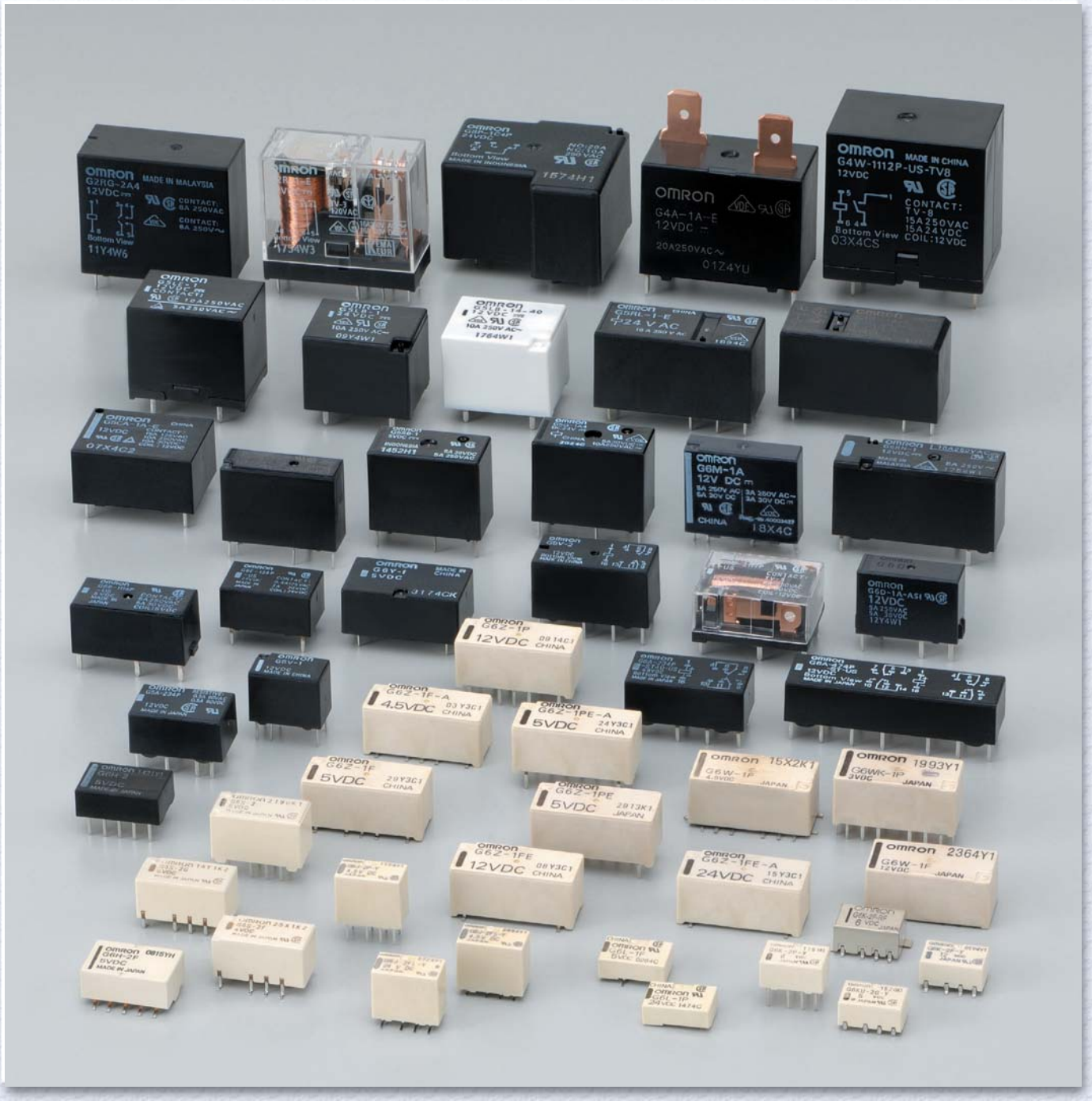
OMRON

PCB Relays

Cat. No. X033-E1-14A



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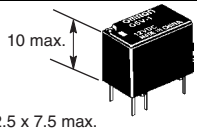
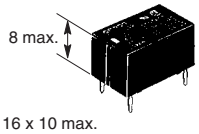
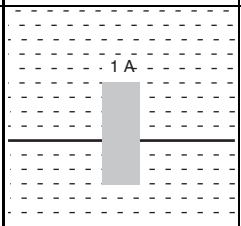
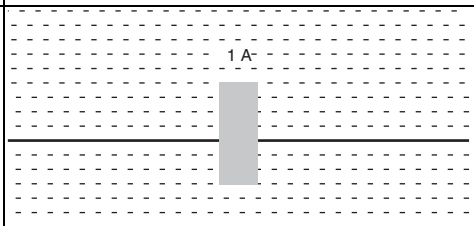
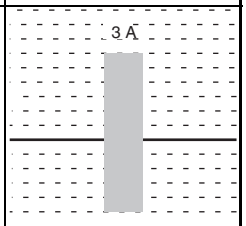
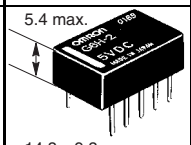
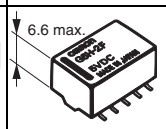
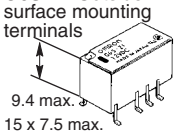
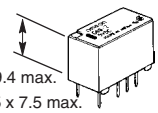
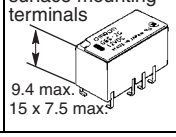
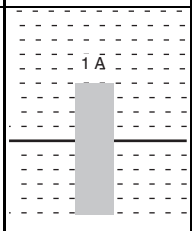
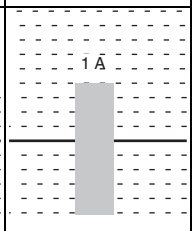
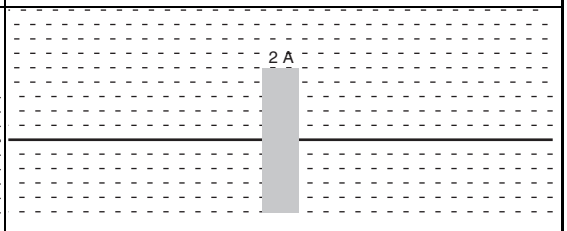
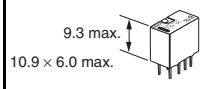
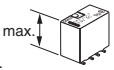
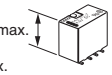
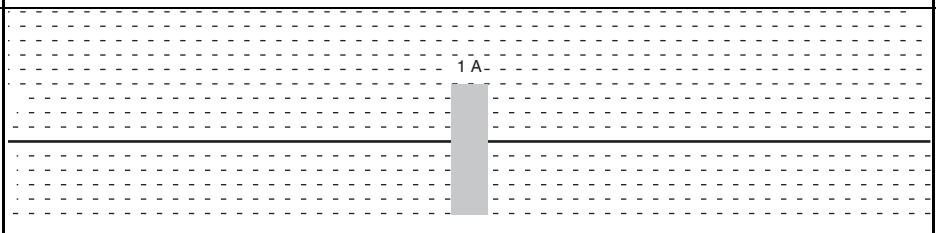
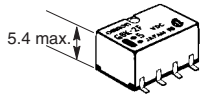
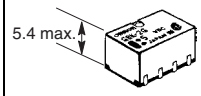
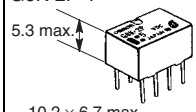
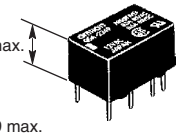
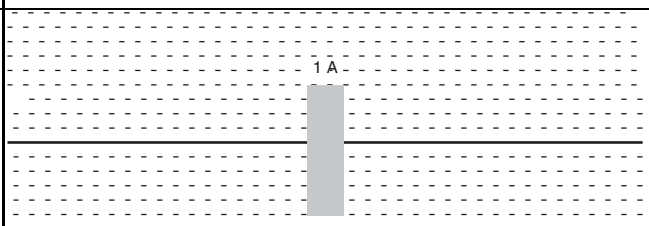
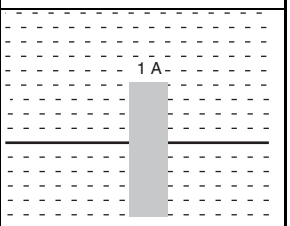
Classification		Signal control		
Model		G5V-1	G6L	G6E
Features		Ultra-miniature, highly sensitive SPDT relay.	Ultra-slim (lowest height class in the world) single-pole flat relay.	Subminiature, sensitive SPDT relay.
Appearance **Dimensions (L x W)**		 12.5 x 7.5 max.	G6L-1P Through-hole terminals  10.8 × 7.2 max. G6L-1F Surface mounting terminals  10.8 × 7.2 max.	 16 x 10 max.
Contact ratings	**Contact form**	SPDT	SPST	SPDT
	Contact type	Single crossbar	Single crossbar	Bifurcated crossbar
	Contact material	Ag (Au-Alloy)	Ag (Au-Alloy)	Ag (Au-Alloy)
	Resistive load (cosϕ = 1)	0.5 A at 125 VAC; 1 A at 24 VDC	0.3 A at 125 VAC; 1 A at 24 VDC	0.4 A at 125 VAC; 2 A at 30 VDC
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**	10 8 5 3 2 1 0.5 0.3 0.1 100 10 1 0.1 0.01 		
Coil ratings	**Rated voltage**	3 to 24 VDC	3 to 24 VDC	3 to 48 VDC
	Power consumption	Approx. 150 mW	Approx. 180 mW (but, Approx. 230 mW at 24 VDC)	Approx. 200 to 400 mW
Endurance	**Electrical (under rated load)**	100,000 operations min.	100,000 operations min.	500,000 operations min. at 2 A, 30 VDC 100,000 operations min. at 0.4 A, 125 VAC
	Mechanical	5,000,000 operations min.	5,000,000 operations min.	100,000,000 operations min.
Dielectric strength	**Between coil and contacts**	1,000 VAC (Impulse withstand voltage: 1,500 V)	1,000 VAC (Impulse withstand voltage: 1,500 V)	1,500 VAC (Impulse withstand voltage: 2,500 V)
	Between contacts of different polarity	---	---	---
	Between contacts of same polarity	400 VAC	750 VAC	1,000 VAC
	Between set and reset coils	---	---	---
Ambient temperature (operating)		–40°C to 70°C	–40°C to 70°C	–40°C to 70°C
Variations		• Fully sealed • Bifurcated crossbar	• Surface-mounting terminals • PCB terminals	• Fully sealed • Double-winding latching • Single-winding latching • Ultrasonic cleaning
Magazine packaging		25 relays/magazine	50 relays/magazine	25 relays/magazine
Approved standards		UL, CSA	UL, CSA	UL, CSA
Weight		Approx. 2 g	Approx. 0.6 g	Approx. 2.7 g

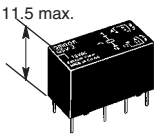
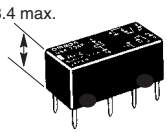
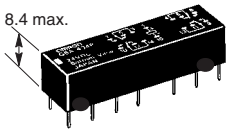
Classification		Signal control		
Model		G6H	G6H-2F	G6S
Features		Ultra-small relay with 5 mm height.	Compact, highly sensitive, surface-mounting DPDT relay.	Surface-mounting DPDT relay. 2.5 kV surge voltage
Appearance **Dimensions (L x W)**		 14.3 x 9.3 max.	 14.3 × 9.3 max.	G6S-2F Outside-L surface mounting terminals  15 x 7.5 max. G6S-2 Through-hole terminals  15 x 7.5 max. G6S-2G Inside-L surface mounting terminals  15 x 7.5 max.
Contact ratings	**Contact form**	DPDT	DPDT	DPDT
	Contact type	Bifurcated crossbar	Bifurcated crossbar	Bifurcated crossbar
	Contact material	Ag (Au-Alloy)	Ag (Au-Alloy)	Ag (Au-Alloy)
	Resistive load (cosϕ = 1)	0.5 A at 125 VAC; 1 A at 30 VDC	0.5 A at 125 VAC; 1 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1 **Failure rate (mA) (reference value)** 100 10 1 0.1 0.01			
Coil ratings	**Rated voltage**	3 to 48 VDC	3 to 24 VDC	3 to 24 VDC
	Power consumption	140 to 280 mW	140 to 200 mW	Approx. 140 to 200 mW
Endurance	**Electrical (under rated load)**	200,000 operations min.	200,000 operations min.	100,000 operations min. at 2 A, 30 VDC at 1,200 operations/hr. 100,000 operations min. at 0.5 A, 125 VAC at 1,800 operations/hr.
	Mechanical	100,000,000 operations min.	50,000,000 operations min.	100,000,000 operations min.
Dielectric strength	**Between coil and contacts**	1,000 VAC (Impulse withstand voltage: 1,500 V)	1,000 VAC (Impulse withstand voltage: 1,500 V)	2,000 VAC (Impulse withstand voltage: 2,500 V)
	Between contacts of different polarity	1,000 VAC	1,000 VAC	1,500 VAC
	Between contacts of same polarity	750 VAC	750 VAC	1,000 VAC (Impulse withstand voltage: 1,500 V)
	Between set and reset coils	125 VAC	---	500 VAC
Ambient temperature (operating)		–40°C to 70°C	–40°C to 85°C	–40°C to 85°C
Variations		• Fully sealed • Double-winding latching • Single-winding latching	• Fully sealed	• Surface-mounting terminals • PCB terminals • Double-winding latching • Single-winding latching
Magazine packaging		25 relays/magazine	50 relays/magazine	25 relays/magazine
Approved standards		UL, CSA	UL, CSA	UL, CSA
Weight		Approx. 1.5 g	Approx. 1.5 g	Approx. 2 g

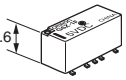
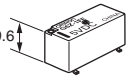
Selection Guide

Classification		Signal control		
Model		G6J-Y		
Features		Subminiature, surface-mounting DPDT relay		
Appearance **Dimensions (L x W)**		G6J-2P-Y Through-hole terminal  NEW	G6J-2FS-Y Surface mounting terminal (short)  NEW	G6J-2FL-Y Surface mounting terminal (long)  NEW
Contact ratings	**Contact form**	DPDT		
	Contact type	Bifurcated crossbar		
	Contact material	Ag (Au-alloy)		
	Resistive load (cosϕ = 1)	0.3 A at 125 VAC; 1 A at 30 VDC		
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**	 		
Coil ratings	**Rated voltage**	3 to 24 VDC		
	Power consumption	Approx. 140 to 230 mW		
Endurance	**Electrical (under rated load)**	100,000 operations min.		
	Mechanical	50,000,000 operations min.		
Dielectric strength	**Between coil and contacts**	1,500 VAC (Impulse withstand voltage: 2,500 V)		
	Between contacts of different polarity	1,000 VAC		
	Between contacts of same polarity	750 VAC		
	Between set and reset coils	---		
Ambient temperature (operating)		–40°C to 85°C		
Variations		• Surface-mounting terminals • PCB terminals • Single-winding latching		
Magazine packaging		50 relays/magazine		
Approved standards		UL, CSA		
Weight		Approx. 1 g		

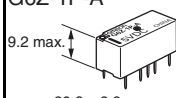
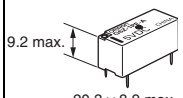
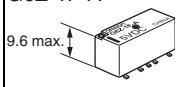
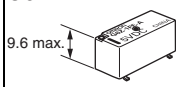
Classification		Signal control		
Model		G6K		G5A
Features		Subminiature surface-mounting relay with DPDT contact.		Subminiature relay with DPDT contact.
Appearance **Dimensions (L x W)**		G6K-2F-Y  5.4 max. 10.2 × 6.7 max.	G6K-2G-Y  5.4 max. 10.2 × 6.7 max.	G6K-2P-Y  5.3 max. 10.2 × 6.7 max.	 8.4 max. 16 x 9.9 max.
Contact ratings	**Contact form**	DPDT		DPDT
	Contact type	Bifurcated crossbar		Bifurcated crossbar
	Contact material	Ag (Au-Alloy)		Ag (Au-Alloy)
	Resistive load (cosϕ = 1)	0.3 A at 125 VAC; 1 A at 30 VDC		0.5 A at 30 VAC; 1 A at 30 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1 **Failure rate (mA) (reference value)** 100 10 1 0.1 0.01	 		
Coil ratings	**Rated voltage**	3 to 24 VDC		3 to 48 VDC
	Power consumption	Approx. 100 mW		Approx. 200 to 280 mW
Endurance	**Electrical (under rated load)**	100,000 operations min. (with a rated load at 1,800 operations/hr.)		100,000 operations min.
	Mechanical	50,000,000 operations min. (at 36,000 operations/hr.)		50,000,000 operations min.
Dielectric strength	**Between coil and contacts**	1,500 VAC, 50/60 Hz for 1 min (Impulse withstand voltage: 2,500 V)		1,000 VAC (Impulse withstand voltage: 1,500 V)
	Between contacts of different polarity	1,000 VAC, 50/60 Hz for 1 min		1,000 VAC
	Between contacts of same polarity	750 VAC, 50/60 Hz for 1 min		500 VAC
	Between set and reset coils	---		100 VAC
Ambient temperature (operating)		–40°C to 70°C		–40°C to 70°C
Variations		• Fully sealed • PCB terminals • Surface-mounting terminals • Single-winding latching		• Double-winding latching • Single-winding latching • High sensitivity (150 mW)
Magazine packaging		50 relays/magazine		25 relays/magazine
Approved standards		UL, CSA		UL, CSA
Weight		Approx. 0.7 g		Approx. 3 g

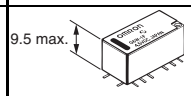
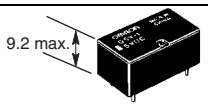
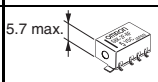
Selection Guide

Classification		Signal control		
Model		G5V-2	G6A	
Features		Miniature DPDT relay for signal circuits.	Fully sealed relay with high surge dielectric for use in telecommunications equipment.	
Appearance **Dimensions (L x W)**		 20.5 x 10.1 max.	 20.2 x 10.1 max.	 35.4 x 10.1 max.
Contact ratings	**Contact form**	DPDT	DPDT	4PDT
	Contact type	Bifurcated cross-bar	Bifurcated crossbar	
	Contact material	Ag (Au-Alloy)	Ag (Au-Alloy)	Ag (Au-Alloy)
	Resistive load (cosϕ = 1)	0.5 A at 125 VAC; 2 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**	10 8 5 3 2 1 0.5 0.3 0.1 2 A 100 10 1 0.1 0.01	2 A	
Coil ratings	**Rated voltage**	3 to 48 VDC	3 to 48 VDC	
	Power consumption	Approx. 500 to 580 mW	Approx. 200 to 235 mW	Approx. 360 mW
Endurance	**Electrical (under rated load)**	100,000 operations min.	500,000 operations min.	
	Mechanical	15,000,000 operations min.	100,000,000 operations min.	
Dielectric strength	**Between coil and contacts**	1,000 VAC (Impulse withstand voltage: 1,500 V)	1,000 VAC (Impulse withstand voltage: 1,500 V)	
	Between contacts of different polarity	1,000 VAC	1,000 VAC	
	Between contacts of same polarity	750 VAC	1,000 VAC	
	Between set and reset coils	---	250 VAC	
Ambient temperature (operating)		–25°C to 65°C	–40°C to 70°C	
Variations		• Fully sealed • High sensitivity (150 mW)	• Fully sealed • Double-winding latching • Single-winding latching	
Magazine packaging		25 relays/ magazine	25 relays/magazine	10 relays/magazine
Approved standards		UL, CSA	UL, CSA	
Weight		Approx. 5 g	Approx. 3.5 g	Approx. 6 g

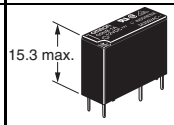
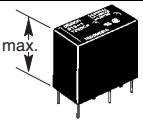
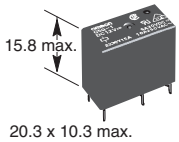
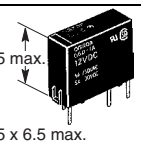
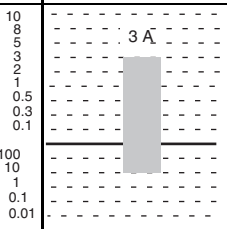
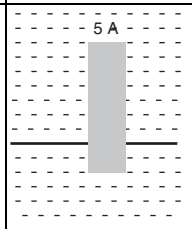
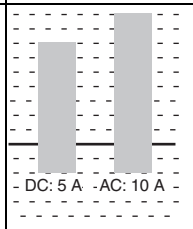
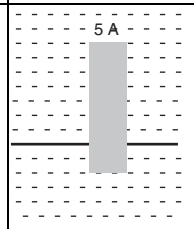
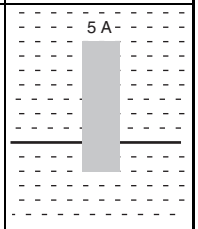
Classification		High-frequency control			
Model		G6Z			
Features		2.6 -GHz band, compact, single-pole, high-frequency relay with Y-shape terminal construction	2.6 -GHz band, compact, single-pole, high-frequency relay with E-shape terminal construction	2.6 -GHz band, compact, single-pole, surface-mounting, high-frequency relay with Y-shape terminal construction	2.6 -GHz band, compact, single-pole, surface-mounting, high-frequency relay with E-shape terminal construction
Appearance **Dimensions (L x W)**		G6Z-1P  20.3 × 8.9 max.	G6Z-1PE  20.3 × 8.9 max.	G6Z-1F  20.3 × 8.9 max.	G6Z-1FE  20.3 × 8.9 max.
Characteristic impedance		75 Ω			
High-frequency characteristics	**Isolation (between contacts of same polarity)**	45 dB min. at 2.6 GHz	35 dB min. at 2.6 GHz	40 dB min. at 2.6 GHz	30 dB min. at 2.6 GHz
	Isolation (between contacts of different polarity)	---			
	Insertion loss	0.5 dB max.			
	Return loss	14.0 dB min.			
	V.SWR	1.5 max.			
Contact ratings	**Contact form**	SPDT			
	Contact type	Double brake single			
	Contact material	Au-Alloy			
	Resistive load (cosϕ = 1)	0.01 A at 30 VAC; 0.01 A at 30 VDC			
	Max. switching current	0.5 A			
Coil ratings	**Rated voltage**	3 to 24 VDC			
	Power consumption	Approx. 200 to 360 mW			
Endurance	**Electrical (under rated load)**	300,000 operations min.			
	Mechanical	1,000,000 operations min.			
Dielectric strength	**Between coil and contacts**	1,000 VAC			
	Between contacts of different polarity	---			
	Between contacts of same polarity	500 VAC			
	Between coil and ground and between contacts and ground	500 VAC			
Ambient temperature (operating)		−40°C to 70°C			
Variations		• Surface-mounting terminals • PCB terminals • Double-winding latching • Single-winding latching			
Magazine packaging		25 relays/magazine			
Approved standards		---			
Weight		Approx. 2.8 g			

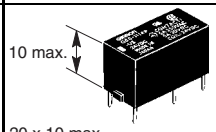
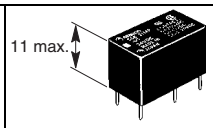
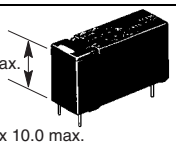
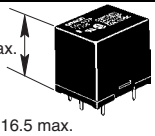
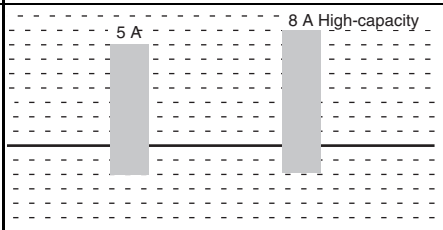
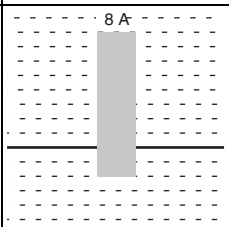
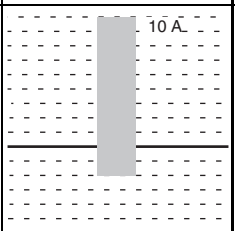
Selection Guide

Classification		High-frequency control			
Model		G6Z			
Features		2.6 -GHz band, compact, single-pole, high-frequency relay with Y-shape terminal construction	2.6 -GHz band, compact, single-pole, high-frequency relay with E-shape terminal construction	2.6 -GHz band, compact, single-pole, surface-mounting, high-frequency relay with Y-shape terminal construction	2.6 -GHz band, compact, single-pole, surface-mounting, high-frequency relay with E-shape terminal construction
Appearance **Dimensions (L x W)**		G6Z-1P-A  20.3 × 8.9 max.	G6Z-1PE-A  20.3 × 8.9 max.	G6Z-1F-A  20.3 × 8.9 max.	G6Z-1FE-A  20.3 × 8.9 max.
Characteristic impedance		50 Ω			
High-frequency characteristics	**Isolation (between contacts of same polarity)**	45 dB min. at 2.6 GHz	35 dB min. at 2.6 GHz	40 dB min. at 2.6 GHz	30 dB min. at 2.6 GHz
	Isolation (between contacts of different polarity)	---			
	Insertion loss	0.3 dB max.			
	Return loss	17.7 dB max.			
	V.SWR	1.3 max.			
Contact ratings	**Contact form**	SPDT			
	Contact type	Double brake single			
	Contact material	Au-Alloy			
	Resistive load (cosϕ = 1)	0.01 A at 30 VAC; 0.01 A at 30 VDC			
	Max. switching current	0.5 A			
Coil ratings	**Rated voltage**	3 to 24 VDC			
	Power consumption	Approx. 200 to 360 mW			
Endurance	**Electrical (under rated load)**	300,000 operations min.			
	Mechanical	1,000,000 operations min.			
Dielectric strength	**Between coil and contacts**	1,000 VAC			
	Between contacts of different polarity	---			
	Between contacts of same polarity	500 VAC			
	Between coil and ground and between contacts and ground	500 VAC			
Ambient temperature (operating)		−40°C to 70°C			
Variations		• Surface-mounting terminals • PCB terminals • Double-winding latching • Single-winding latching			
Magazine packaging		25 relays/magazine			
Approved standards		---			
Weight		Approx. 2.8 g			

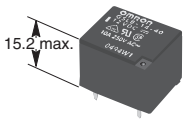
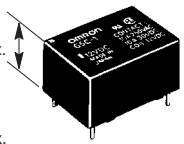
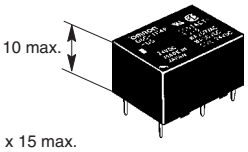
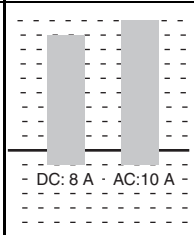
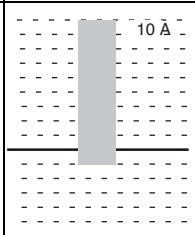
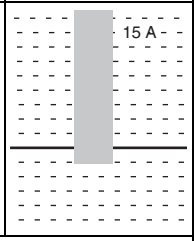
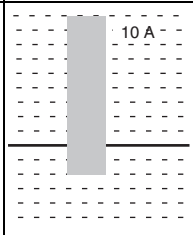
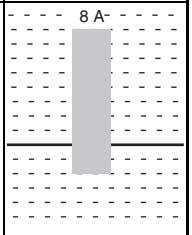
Classification		High-frequency control		
Model		G6W	G6Y	G6K(U)-2F-RF
Features		2.5 -GHz band, compact, single-pole, high-frequency relay	1-GHz band, high-frequency relay	1-GHz band, subminiature, double-pole, surface-mounting, high-frequency relay
Appearance **Dimensions (L x W)**		 9.5 max. 20.3 × 9.7 max.	 9.2 max. 20.7 x 11.7 max.	 5.7 max. 10.6 × 7.2 max.
Characteristic impedance		50 Ω	50 Ω	50 Ω
High-frequency characteristics	**Isolation (between contacts of same polarity)**	60 dB min. at 2.5 GHz	65 dB min. at 900 MHz	20 dB min. at 1 GHz
	Isolation (between contacts of different polarity)	---	---	30 dB min. at 1 GHz
	Insertion loss	0.2 dB max.	0.5 dB max.	0.2 dB max.
	Return loss	20.8 dB min.	14.0 dB min.	20.8 dB min.
	V.SWR	1.2 max.	1.5 max.	1.2 max.
Contact ratings	**Contact form**	SPDT	SPDT	DPDT
	Contact type	Double brake single	Double brake twin	Bifurcated crossbar
	Contact material	Au-Alloy	Au-Alloy	Au-Alloy
	Resistive load (cosϕ = 1)	0.01 A at 30 VAC; 0.01 A at 30 VDC	0.01 A at 30 VAC; 0.01 A at 30 VDC	0.3 A at 125 VAC; 1 A at 30 VDC
	Max. switching current	0.5 A	0.5 A	1 A
Coil ratings	**Rated voltage**	3 to 24 VDC	4.5 to 24 VDC	3 to 24 VDC
	Power consumption	Approx. 200 to 360 mW	Approx. 200 mW	Approx. 100 mW
Endurance	**Electrical (under rated load)**	300,000 operations min.	300,000 operations min.	100,000 operations min.
	Mechanical	1,000,000 operations min.	1,000,000 operations min.	50,000,000 operations min.
Dielectric strength	**Between coil and contacts**	1,000 VAC	1,000 VAC	750 VAC
	Between contacts of different polarity	---	---	750 VAC
	Between contacts of same polarity	500 VAC	500 VAC	750 VAC
	Between coil and ground and between contacts and ground	500 VAC	500 VAC	500 VAC
Ambient temperature (operating)		–40°C to 70°C	–40°C to 70°C	–40°C to 70°C
Variations		• Surface-mounting terminals • PCB terminals • Double-winding latching • Single-winding latching	• Fully sealed	• Surface-mounting terminals • Single-winding latching
Magazine packaging		---	---	---
Approved standards		---	---	---
Weight		Approx. 3 g	Approx. 5 g	Approx. 0.95 g

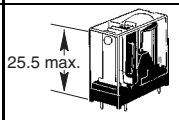
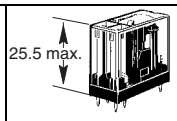
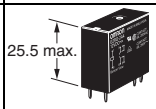
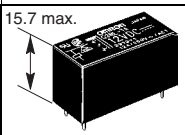
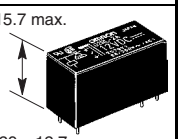
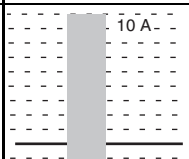
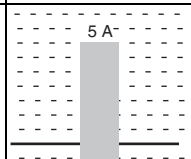
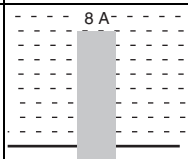
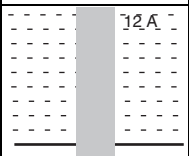
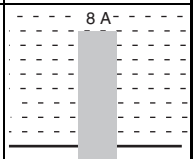
Selection Guide

Classification		Power drive				
Model		G5NB	G5SB	G5Q	G6M	G6D
Features		Miniature relays with 1-pole 3-A switching capability and 10-kV impulse withstand voltage.	Compact single pole relay that withstands up to 5 A at 8 kV.	Compact, high insulation relay	Slim power relay for equipment interface.	Slim, miniature relay, capable of relaying programmable controller and temperature controller outputs.
Appearance **Dimensions (L x W)**		 20.5 × 7.2 max.	 20.3 x 10.3 max.	 20.3 x 10.3 max.	 20.3 × 5.08 max.	 17.5 x 6.5 max.
Contact ratings	**Contact form**	SPST-NO	SPDT	SPST-NO, SPDT	SPST-NO	SPST-NO
	Contact type	Single	Single	Single	Single	Single
	Contact material	Ag Alloy (Cd free)	Ag Alloy (Cd free)	Ag Alloy (Cd free)	Ag Alloy (Cd free)	Ag Alloy (Cd free)
	Resistive load (cosϕ = 1)	3 A at 125 VAC; 3 A at 30 VDC	3 A (NO)/3 A (NC) at 125 VAC 5 A (NO)/3 A (NC) at 125 VAC 5 A(NO) at 250 VAC 3 A (NC) at 250 VAC 5 A (NO)/3 A (NC) at 30 VDC	10 A (NO)/3 A (NC) at 125 VAC 3 A at 250 VAC 3 A (NO)/3 A (NC) at 30 VDC 10 A at 125 VAC 3 A at 250 VAC 5 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**					
Coil ratings	**Rated voltage**	5 to 24 VDC	5 to 48 VDC	5 to 24 VDC	5 to 24 VDC	5 to 24 VDC
	Power consumption	Approx. 200 mW	400 mW	200 mW (SPST-NO) 400 mW (SPDT)	120 mW	200 mW
Endurance	**Electrical (under rated load)**	200,000 operations min.	50,000 to 200,000 operations min. (AC load) 100,000 operations (DC load)	200,000 operations (3 A load) 100,000 operations (5 A load) 50,000 operations (10 A load)	100,000 operations min.	70,000 operations min. (5 A load) 300,000 operations min. (2 A load)
	Mechanical	5,000,000 operations min.	5,000,000 operations min.	10,000,000 operations min.	20,000,000 operations min.	20,000,000 operations min.
Dielectric strength	**Between coil and contacts**	4,000 VAC	4,000 VAC	4,000 VAC	3,000 VAC	3,000 VAC
	Between contacts of different polarity	---	---	---	---	---
	Between contacts of same polarity	750 VAC	1,000 VAC	1,000 VAC	750 VAC	750 VAC
	Between set and reset coils	---	---	---	---	---
Ambient temperature (operating)		–40°C to 70°C	–40°C to 70°C	–40°C to 105°C	–40°C to 85°C	–25°C to 70°C
Variations		• Flux protection • PCB terminals	• Fully sealed	• Fully sealed	• Fully sealed	• Fully sealed
Magazine packaging		50 relays/magazine	---		25 relays/magazine	---
Approved standards		UL, CSA, EN (VDE)	UL, CSA, EN (VDE)	UL, CSA, EN (VDE)	UL, CSA, EN (VDE)	UL, CSA, EN (TÜV)
Weight		Approx. 4 g	Approx. 6.5 g	Approx. 6.5 g	Approx. 4 g	Approx. 3 g

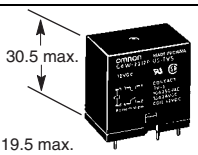
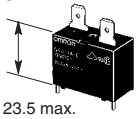
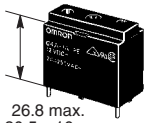
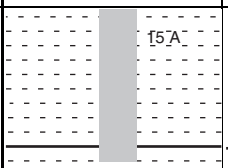
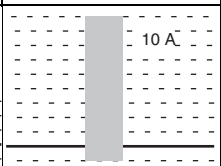
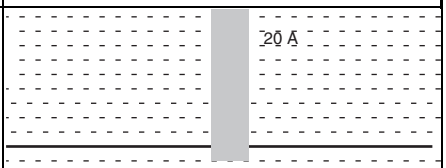
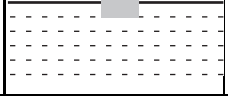
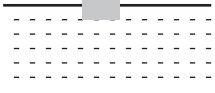
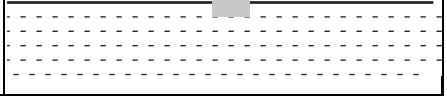
Classification		Power drive			
Model		G6B		G6RN	G5LE
Features		Subminiature relay that switches up to 5 A (8 A).		Slim, low profile 8-A power switching relay.	Subminiature “sugar cube” relay with 10-A switching.
Appearance **Dimensions (L x W)**		 20 x 10 max.	 20 x 11 max.	 28.5 x 10.0 max.	 22.5 x 16.5 max.
Contact ratings	**Contact form**	SPST-NO	SPST-NO + SPST-NC DPST-NO DPST-NC	SPST-NO, SPDT	SPST-NO, SPDT
	Contact type	Single		Single	Single
	Contact material	Ag Alloy (Cd free)		Ag Alloy (Cd free) (Au Clad)	$AgSnO_2$ AgSnIn
	Resistive load (cosϕ = 1)	5 A at 250 VAC; 5 A at 30 VDC (High-capacity 8 A at 250 VAC; 8 A at 30 VDC)		8 A at 250 VAC; 5 A at 30 VDC	10 A at 120 VAC 8 A at 30 VDC
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**	10 8 5 3 2 1 0.5 0.3 0.1 100 10 1 0.1 0.01			
Coil ratings	**Rated voltage**	5 to 24 VDC		5 to 48 VDC	5 to 48 VDC
	Power consumption	200 mW	300 mW	220 mW, 250 mW (48 VDC)	400 mW
Endurance	**Electrical (under rated load)**	100,000 operations min.		50,000 operations min.	100,000 operations min.
	Mechanical	50,000,000 operations min.		10,000,000 operations min.	10,000,000 operations min.
Dielectric strength	**Between coil and contacts**	3,000 VAC		4,000 VAC	2,000 VAC
	Between contacts of different polarity	---	2,000 VAC	---	---
	Between contacts of same polarity	1,000 VAC		1,000 VAC	750 VAC
	Between set and reset coils	250 VAC	---	---	---
Ambient temperature (operating)		–25°C to 70°C		–40°C to 85°C	–25°C to 85°C
Variations		• Double/single-winding latching (SPST-NO) • Fully sealed • Plug-in terminals		• Fully sealed	• Flux protection • Fully sealed
Magazine packaging		20 relays/magazine		Possible	Possible
Approved standards		UL, CSA, SEV, EN (TÜV)		UL, CSA, EN (VDE)	UL, CSA, EN (TÜV), EN (VDE)
Weight		Approx. 3.5/4.5 g		Approx. 9 g	Approx. 12 g

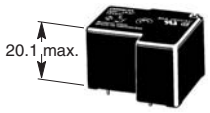
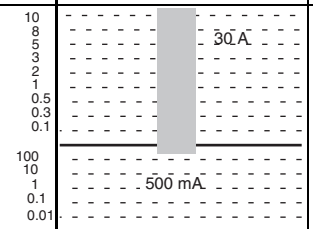
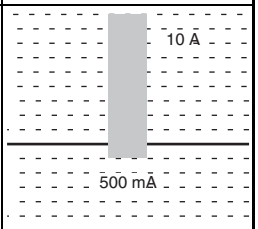
Selection Guide

Classification		Power drive				
Model		G5LB	G5CA	G5CA-E	G6C	
Features		A cubic, single-pole 10-A power relay	Flat power relays that switch 10-A or 15-A loads.		SPST-NO types break 10-A load; SPST-NO/-NC types break 8-A load.	
Appearance **Dimensions (L x W)**		 19.6 x 15.6 max.	 22 x 16 max.		 20 x 15 max.	
Contact ratings	**Contact form**	SPST-NO, SPDT	SPST-NO		SPST-NO	SPST-NO/-NC
	Contact type	Single	Single		Single	
	Contact material	Ag Alloy (Cd free)	Ag Alloy (Cd free)		Ag Alloy (Cd free)	
	Resistive load (cosϕ = 1)	10 A at 120 VAC 8 A at 30 VDC 10 A at 250 VAC	10 A at 250 VAC; 10 A at 30 VDC	15 A at 110 VAC 10 A at 30 VDC	10 A at 250 VAC; 10 A at 30 VDC	8 A at 250 VAC; 8 A at 30 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1 **Failure rate (mA) (reference value)** 100 10 1 0.1 0.01					
Coil ratings	**Rated voltage**	3 to 48 VDC	5 to 24 VDC		3 to 24 VDC	
	Power consumption	360/400/600 mW	150/200 mW		200 mW	
Endurance	**Electrical (under rated load)**	100,000 operations min.	300,000 operations min. (10 A load) 100,000 operations min. (15 A load, DC load)		100,000 operations min.	
	Mechanical	10,000,000 operations min.	20,000,000 operations min.		50,000,000 operations min.	
Dielectric strength	**Between coil and contacts**	2,000 VAC	2,500 VAC		2,000 VAC	
	Between contacts of different polarity	---	---		---	2,000 VAC
	Between contacts of same polarity	750 VAC	1,000 VAC		1,000 VAC	
	Between set and reset coils	---	---		250 VAC	
Ambient temperature (operating)		–40°C to 85°C	–25°C to 70°C		–25°C to 70°C	
Variations		• Fully sealed • Unsealed	• Flux protection • Fully sealed	• Flux protection • Quick-connect terminals	• Double/single-winding latching • Flux protection • Fully sealed	
Magazine packaging		Possible	20 relays/magazine		Possible	
Approved standards		UL, CSA, EN (VDE)	UL, CSA, EN (TÜV)		UL, CSA, EN (VDE), SEV, EN (TÜV)	
Weight		Approx. 10 g	Approx. 8 g (TP. Approx. 9.6 g)		Approx. 5.6 g	

Classification		Power drive				
Model		G2R		G2RG	G2RL	
Features		General-purpose power relays (single-pole: 10 A; double-pole: 5 A).		Compact power relay with 3-mm contact gap (1.5-mm SPST-NO contacts, 2 poles arranged in parallel)	Low profile: 15.7-mm height. Tracking resistance: CTI>250. UL 1446 Class F Coil Insulation system available.	
Appearance						
Dimensions (L x W)		29 x 13 max.	29 x 13 max.	29 × 13.5 max.	29 x 12.7 max.	29 x 12.7 max.
Contact ratings	**Contact form**	SPST-NO, SPDT	DPST-NO, DPDT	DPST	SPST-NO, SPDT	DPST-NO, DPDT
	Contact type	Single		Single	Single	
	Contact material	Ag Alloy (Cd free)		Ag Alloy (Cd free)	Ag Alloy (Cd free)	Ag Alloy (Cd free)
	Resistive load (cosϕ = 1)	10 A at 250 VAC; 10 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	8 A at 250 VAC	12 A at 250 VAC; 12 A at 24 VDC	8 A at 250 VAC; 8 A at 30 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1					
	Failure rate (mA) (reference value) 100 10 1 0.1 0.01					
Coil ratings	**Rated voltage**	5 to 100 VDC, 12 to 240 VAC		5 VDC, 10 mA	5 to 48 VDC	
	Power consumption	DC: 530 mW; AC: 900 mVA		Approx. 800 mW	5 to 24 VDC; 400 mW, 48 VDC; 430 mW	
Endurance	**Electrical (under rated load)**	100,000 operations min.		10,000 operations min.	---	
	Mechanical	DC: 20,000,000 operations min. AC: 10,000,000 operations min.		1,000,000 operations min.	20,000,000 operations min.	
Dielectric strength	**Between coil and contacts**	5,000 VAC		5,000 VAC (Impulse withstand voltage: 10 kV)	5,000 VAC	
	Between contacts of different polarity	---	3,000 VAC	3,000 VAC	---	2,500 VAC
	Between contacts of same polarity	1,000 VAC		1,000 VAC	1,000 VAC	
	Between set and reset coils	1,000 VAC		---	1,000 VAC	
Ambient temperature (operating)		–40°C to 70°C		–40°C to 70°C	–40°C to 85°C	
Variations		• Flux protection • Fully sealed • Quick-connect (upper bracket mounting) • High-capacity (1 pole 16 A) • High-sensitivity (coil 360 mW)		• Fully sealed	• Flux protection • Fully sealed • High capacity (1 pole 16 A)	
Magazine packaging		Possible		Not possible	20 relays/magazine	
Approved standards		UL, CSA, SEV, SEMKO, IEC (TÜV), IEC (VDE)		UL, CSA EN (VDE)	UL, CSA, VDE	
Weight		Approx. 17 g		Approx. 17.2 g	Approx. 12 g	

Selection Guide

Classification		Power drive			
Model		G4W		G4A	
Features		10-kV impulse and 4-kV withstand voltages for power supply switching applications.		Miniature, single-pole relay with 80-A surge current and 20-A operating current.	
Appearance **Dimensions (L x W)**				G4A-1A-E 	G4A-1A-PE 
Contact ratings	**Contact form**	SPST-NO	DPST-NO	SPST-NO	
	Contact type	Single		Single	
	Contact material	Ag Alloy (Cd free)		Ag Alloy (Cd free)	
	Resistive load (cosϕ = 1)	15 A at 250 VAC; 15 A at 24 VDC	10 A at 250 VAC; 10 A at 24 VDC	20 A at 250 VAC	
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1				
	Failure rate (mA) (reference value) 100 10 1 0.1 0.01				
Coil ratings	**Rated voltage**	12 to 100 VDC		5 to 24 VDC	
	Power consumption	800 mW		900 mW	
Endurance	**Electrical (under rated load)**	100,000 operations min.		100,000 operations min.	
	Mechanical	5,000,000 operations min.		2,000,000 operations min.	
Dielectric strength	**Between coil and contacts**	4,000 VAC		4,500 VAC	
	Between contacts of different polarity	---	2,000 VAC	---	
	Between contacts of same polarity	1,500 VAC		1,000 VAC	
	Between set and reset coils	---		---	
Ambient temperature (operating)		–25°C to 55°C		–20°C to 60°C	
Variations		• Unsealed		• Flux protection	
Magazine packaging		Not possible		Not possible	
Approved standards		UL, CSA, EN (VDE), EN (TÜV), SEV, SEMKO, DEMKO		UL, CSA, EN (VDE)	
Weight		Approx. 29 g		Approx. 25 g	

Classification		Power drive	
Model		G8P	
Features		Small, low-cost 30-A power relay for PCB use.	
Appearance **Dimensions (L x W)**		 32.1 x 28.2 max.	
Contact ratings	**Contact form**	SPST-NO	SPDT
	Contact type	Single	
	Contact material	Ag Alloy (Cd free)	
	Resistive load (cosϕ = 1)	30 A at 250 VAC; 20 A at 28 VDC	20/10 A at 250 VAC; 20/10 A at 28 VDC
	Max. switching current (A) (under resistive load) **Failure rate (mA) (reference value)**		
Coil ratings	**Rated voltage**	5 to 110 VDC	
	Power consumption	900 mW	
Endurance	**Electrical (under rated load)**	100,000 operations min.	
	Mechanical	10,000,000 operations min.	
Dielectric strength	**Between coil and contacts**	2,500 VAC	
	Between contacts of different polarity	---	
	Between contacts of same polarity	1,500 VAC	
	Between set and reset coils	---	
Ambient temperature (operating)		–55°C to 105°C	
Variations		• Fully sealed • Un-sealed • Open	
Magazine packaging		---	
Approved standards		UL, CSA	
Weight		Approx. 30 g (sealed), approx. 20 g (open)	

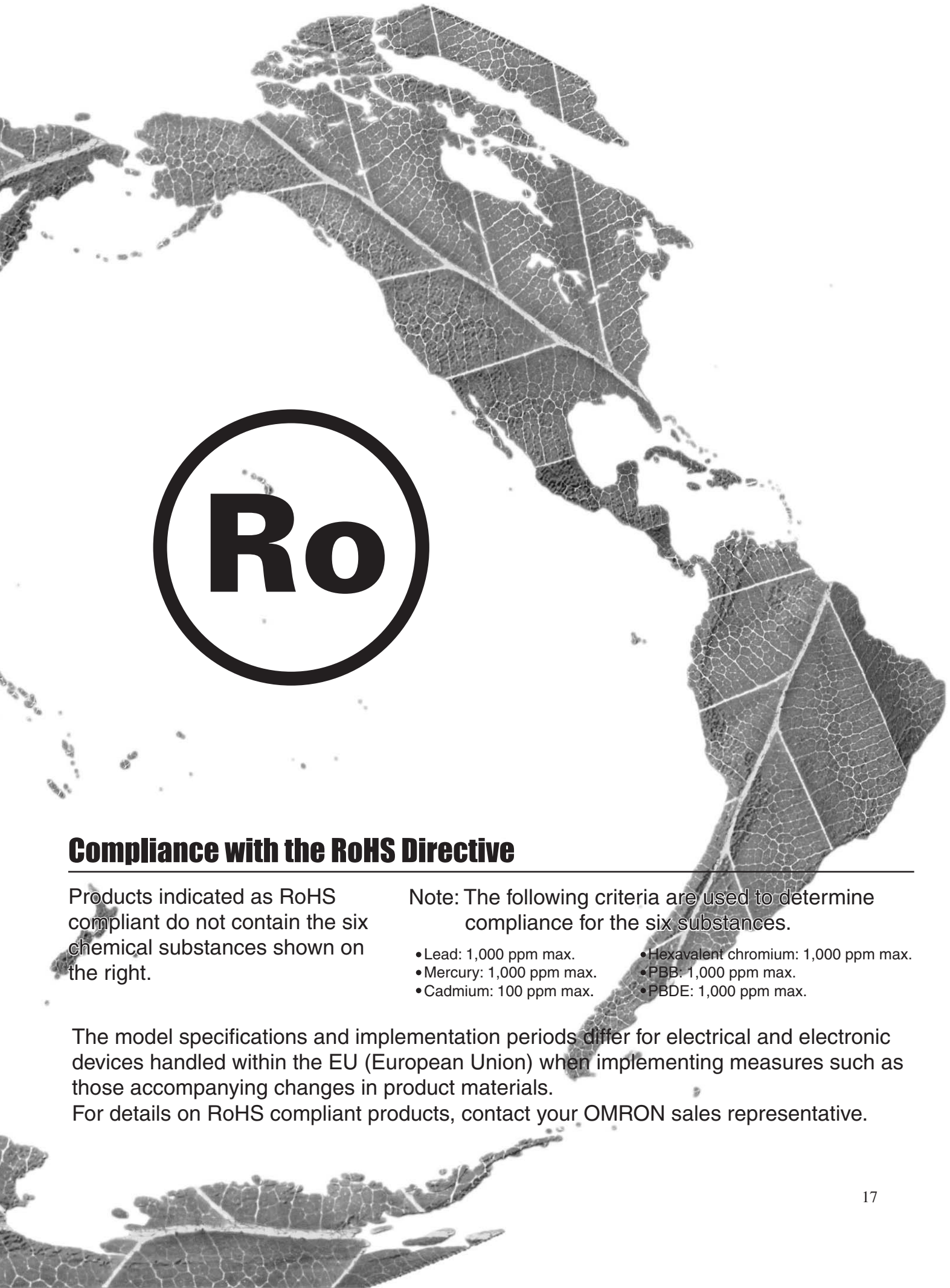
Striving to Create Clean, Eco-friendly Products

Total Abolishment of the Six Chemical Substances Targeted by RoHS

Toward providing products that can be used safely throughout the world, OMRON is implementing a global-scale reduction of restricted chemical substances that burden the environment. In response to the RoHS Directive (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), which is to become effective on July 2006, OMRON is working toward total abolishment of the restricted chemical substances (six chemical substances), which include the "certain hazardous substances" specified in the RoHS Directive, by the end of March 2006.

*The six chemical substances are lead, mercury, cadmium, hexavalent chromium, and certain brominated flame retardants (PBB (polybrominated biphenyl) and PBDE (polybrominated diphenyl ether)).

*RoHS Directive: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment



Compliance with the RoHS Directive

Products indicated as RoHS compliant do not contain the six chemical substances shown on the right.

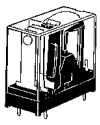
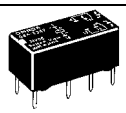
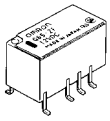
Note: The following criteria are used to determine compliance for the six substances.

- Lead: 1,000 ppm max.
- Mercury: 1,000 ppm max.
- Cadmium: 100 ppm max.
- Hexavalent chromium: 1,000 ppm max.
- PBB: 1,000 ppm max.
- PBDE: 1,000 ppm max.

The model specifications and implementation periods differ for electrical and electronic devices handled within the EU (European Union) when implementing measures such as those accompanying changes in product materials.
For details on RoHS compliant products, contact your OMRON sales representative.

Technical Information

■ Relay Classification

Model	Mounting	Enclosure Ratings	Features
G4W 	Discrete	Unsealed	Designed for manual soldering.
G2R 		Flux protection	Designed inhibits flux intrusion into the casing from the terminals during soldering.
G6A 		Fully sealed	Sealed resin casings and covers, limiting damage from corrosive atmospheres.
G6S 	Surface mounting		Surface mounting relays permit automatic reflow soldering.

■ Construction

Sealing

Unsealed Relays

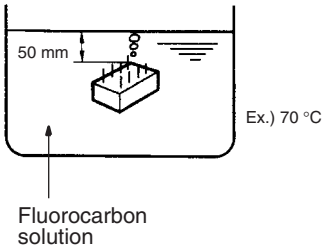
Relays of this type are intended for manual soldering. No measures are taken against penetration of flux and cleaning solvent into the relay. This type of relay cannot be immersion-cleaned.

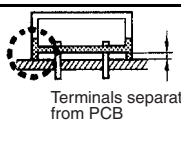
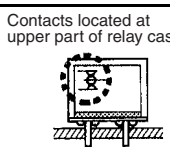
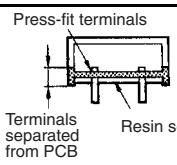
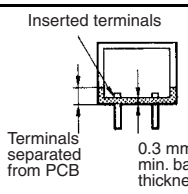
Flux-protection Relays

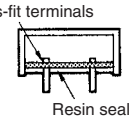
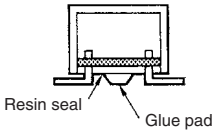
Special design construction prevents flux from penetrating into the relay housing, for example, due to capillary action up the terminals when the relay is soldered onto a PCB. This type of relay also cannot be immersion-cleaned.

Fully Sealed Relays

Fully sealing prevents not only flux, but also cleaning solvent from penetrating into the relay housing. Therefore, this type of relay can be immersion-cleaned. Relays are each tested before being shipped. The relay is immersed in fluorocarbon solution for 1 minute, at a temperature of 70°C $^{+5°C}_{-0°C}$, to see if gases escape from the relay. The following figure illustrates the test conditions.



Classification	Unsealed		Flux protection	
Construction				
Features	Terminals are separated from PCB surface when relay is mounted.	Contacts are positioned away from base.	Terminals are pressed into base.	Terminals are inserted into base 0.3 mm min. thick.
Automatic flux application	Poor	Poor	Good	Good
Automatic soldering	Poor	Poor	Good	Good
Automatic cleaning	Poor	Poor	Poor	Poor
Manual soldering	Good	Good	Good	Good
Penetration of dust	Fair		Fair	
Penetration of corrosive gas	Poor		Poor	

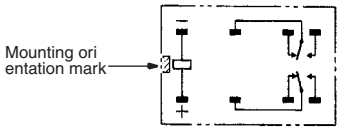
Classification	Fully sealed	Surface mounting
Construction		
Features	Terminals are separated from PCB surface when relay is mounted.	Terminal and base, as well as the base and casing, are sealed with adhesive; the L-shape terminals and adhesive pads allow temporary fixing to the board.
Automatic flux application	Good	Good
Automatic soldering	Good	Good
Automatic cleaning	Good	Good
Manual soldering	Good	Good
Penetration of dust	Good	Good
Penetration of corrosive gas	Good	Good

■ Operation

Single-side Stable Relays (Standard)

The contacts of this simple type of relay momentarily turn ON and OFF, depending on the excitement state of the coil.

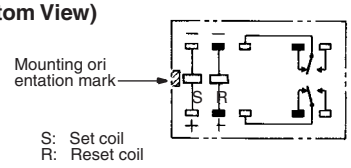
Terminal Arrangement/ Internal Connections (Bottom View)



Double-winding, Latching Relays

This latching relay has two coils: set and reset. It can retain the ON or OFF states even when a pulsating voltage is supplied, or when the voltage is removed.

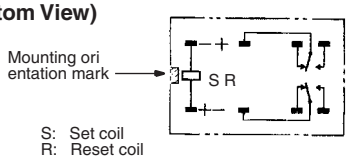
Terminal Arrangement/ Internal Connections (Bottom View)



Single-winding, Latching Relays

Unlike the double-winding latching relay, the single-winding latching relay has only one coil. This coil, however, serves as both the set and reset coils, depending on the polarity (direction) of current flow. When current flows through the coil in the forward direction, it functions as a set coil; when current flows through the coil in the reverse direction, it functions as a reset coil.

Terminal Arrangement/ Internal Connections (Bottom View)



Built-in Diode

A diode is built into some relays, wired in parallel with the coil to absorb the counterelectromotive force (counter emf) generated by the coil.

Built-in Operation Indicator

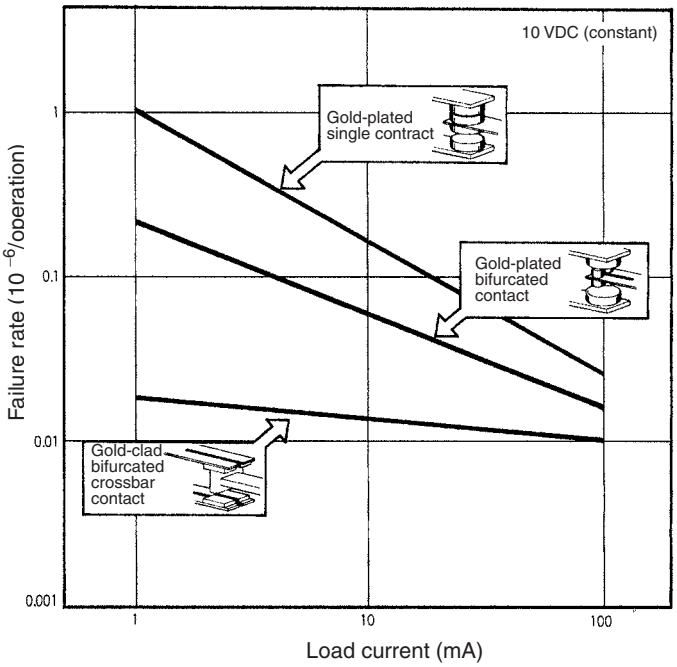
Some relays are provided with a light-emitting diode (LED), wired in parallel with the coil. This permits a fast–check of the relay's operating status.

■ Contacts

Contact ratings are generally indicated according to resistive loads and inductive loads (cosϕ = 0.4 or L/R = 7 ms). Contact shape and material are also shown to guide the customer in selection of a model suitable for the intended load and required service life.

When used at extremely low loads, the failure rate differs according to the contact material and contact method, as shown in the figure. For example, in comparing a single contact point with a bifurcated contact point, the bifurcated contact model has higher parallel redundancy and will therefore exhibit a lower failure rate.

Failure Rate vs. Load Current



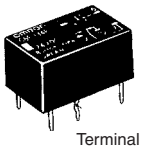
■ Terminals

Straight PCB Terminals

PCB terminals are normally straight.

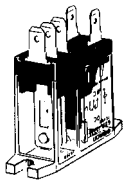
Self-clinching (S-shape) PCB Terminals

Some relays have terminals that are bent into an “S” shape. This secures the PCB relay to the PCB prior to soldering, helping the terminals stay in their holes and keeping the relay level.



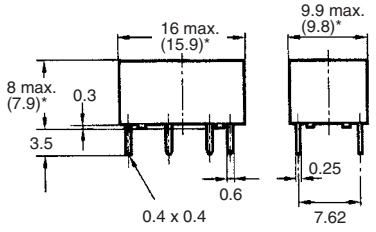
Terminal

Quick-connect Terminals



■ Dimensions

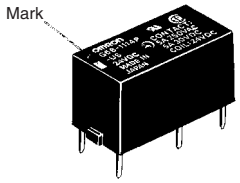
For miniature relays, the maximum dimensions and the average values ( ) marked with an asterisk are provided to aid the customer in designing.



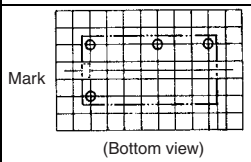
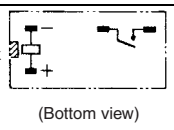
*Average value

Mounting Orientation Mark

On the top of all OMRON relays is a mark indicating where the relay coil is located. Knowing the coil location aids in designing PCBs when spacing components. Also, pin orientation is easy to discern when automatic or hand-mounting relays.



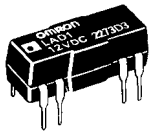
On dimensional drawings in all OMRON literature this mark is left-oriented. Mounting holes, terminal arrangements, and internal connections follow this alignment. The following two symbols are used to represent the orientation mark.

Drawing view	Bottom	Top
Detail	Mounting holes	Terminal arrangement/ internal connections
Symbol		
Example	 (Bottom view)	 (Bottom view)

Terminal Arrangement/Internal Connections

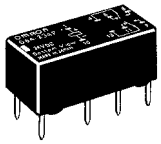
Top View

If the terminal arrangement of a relay can be seen from above the PCB, the top view of the relay is provided in the *Dimensions* section of the catalog or data sheet.



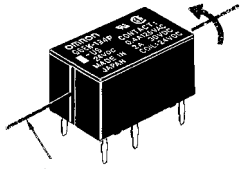
Bottom View

If the relay's terminals cannot be seen from above the PC board, as in this example, a bottom view is shown.



Rotation Direction to Bottom View

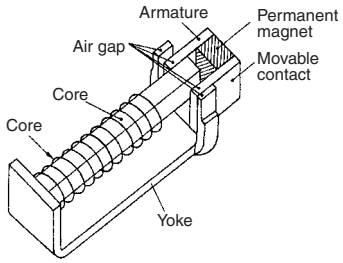
The bottom view shown in the catalog or data sheet is rotated in the direction indicated by the arrow, with the coil always on the left.



■ Moving Loop System

In U.S.A., the National Association of Relay Manufactures (NARM) in April 1984, awarded OMRON for monumental advances in relay technology, as embodied in the Moving Loop System.

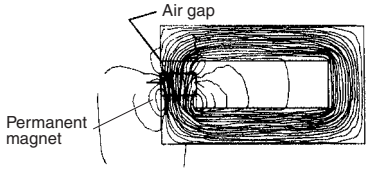
This unique relay construction maximizes electrical and permanent magnet energy. A high-efficiency magnet adds to the magnetic flux of the relay coil, which also allows for tighter packing of relay parts. Relays having such a coil are known as "polarized relays." Details of construction are shown below.



The moving loop design has similarities with polarized relays; however, the following two features make for a large performance distinction.

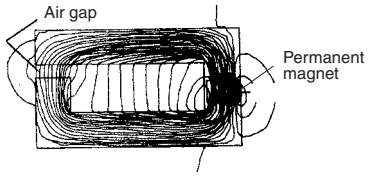
A permanent magnet is placed in the vicinity of the "working gaps." The flux energy of this permanent magnet complements that of the electrical coil. This increased efficiency enables the mechanism holding the contacts closed to ultimately switch larger loads, and at the same time reduces the power consumed by the coil.

The following diagram shows concentric lines of magnetic flux when the permanent magnet is placed near the working gap.



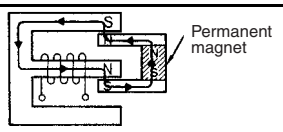
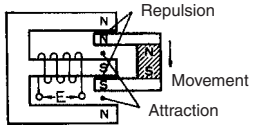
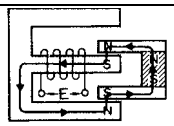
Conventional Relay Coil

The following diagram shows the lines of magnetic flux when the permanent magnet is placed away from the working gap. These lines of flux detract from the total strength of the coil.



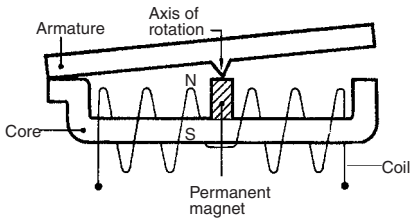
When the switching voltage is removed from the coil, the collapse of the magnetic flux created by the permanent magnet and the electrical coil provides the force to return the relay contacts to the reset position. Note the flux path and magnet polarity in the table below.

Operating Principle

Release	
Transition from release to operation (operating voltage supplied)	
Operation	

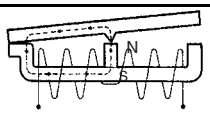
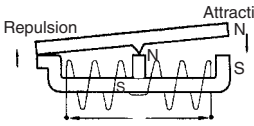
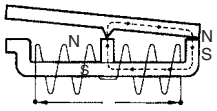
Super Moving Loop System

A very small high-sensitivity magnetic circuit is incorporated to further minimize the conventional moving loop system.



This magnetic circuit has the following features:

1. High-efficiency polarized magnetic circuit utilizes power of both attraction and repulsion.
2. Balanced armature system improves resistance to both vibration and impacts.
3. Ideal mechanism for a low-profile relay.

Release	 Released status is maintained by per manent magnet.
Transition from release to operation (operating voltage supplied)	 The armature see saws due to the at traction and repul sion torque exerted on the armature by the coil voltage and the permanent magnet.
Operation	 Energized status is maintained by the coil voltage and permanent magnet.

Note: The above applies to a latching relay.

■ Glossary

Terms Related to Contacts

Carry Current

The value of the current which can be continuously applied to the relay contacts without opening or closing them, and which allows the relay to stay within the permissible temperature rise.

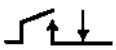
Maximum Switching Current

A current which serves as a reference in determining the performance of the relay contacts. This value will never exceed the current flow. When using a relay, do not exceed this value.

Contact Form

OMRON uses the following relay terminology for the various polarity and switch configurations.
SPST-NO (Single-pole, single-throw, normally open)
SPST-NC (Single-pole, single-throw, normally close)
SPDT (or changeover contact) (single-pole, double-throw)
DPDT (Double-pole, double–throw)

Contact Symbols

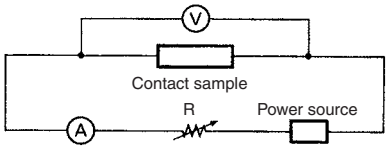
NO	NC	DT (NO/NC)	MBB
			

Make-before-break (MBB) Contact

A contact arrangement in which part of the switching section is shared between both an NO and NC contact. When the relay operates or releases, the contact that closes the circuit operates before the contact that opens the circuit releases. Thus both contacts are closed momentarily at the same time.

Contact Resistance

The total resistance of the conductor, as well as specific resistivities such as of the armature and terminal, and the resistance of the contacts. Contact resistance values given in this catalog are initial values. These values are not intended to indicate suitability or unsuitability in actual use. The contact resistance values given are measurement values for a stable contact circuit at a stable contact resistance.This value is determined by measuring the voltage drop across the contacts by applying test currents as shown in the table below.

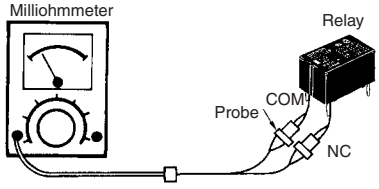


A: Ammeter
V: Voltmeter
R: Variable resistor

Test Current

Rated current or switching current	Test current (mA)
Less than 0.01	1
0.01 or higher but less than 0.1	10
0.1 or higher but less than 1	100
1 or higher	1,000

To measure the contact resistance, a milliohmmeter can be also used, although the accuracy drops slightly.



Maximum Switching Power

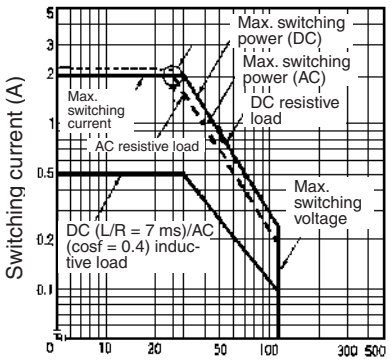
The maximum value of the load capacity which can be switched without problem. When using a relay, do not exceed this value. For example, when maximum switching voltage V_1 is known, maximum switching current I_1 can be obtained at the point of intersection on the characteristic curve "Maximum Switching Power" shown below. Conversely, maximum switching voltage V_1 can be obtained if I_1 is known.

$$\text{Maximum switching current } (I_1) = \frac{\text{Max. switching power [W(VA)]}}{\text{Max. switching voltage (V1)}}$$

$$\text{Maximum switching voltage } (V_1) = \frac{\text{Max. switching power [W(VA)]}}{\text{Max. switching current (I1)}}$$

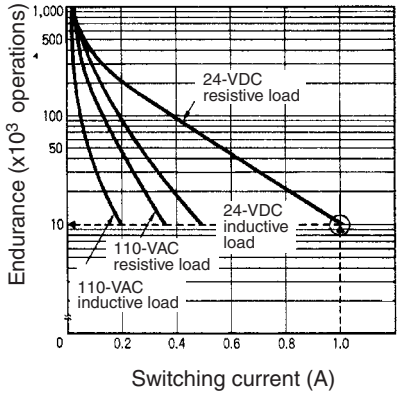
For instance, if the maximum switching voltage = 40 V
Maximum switching current = 2 A (see circled point on graph below.)

Maximum Switching Power



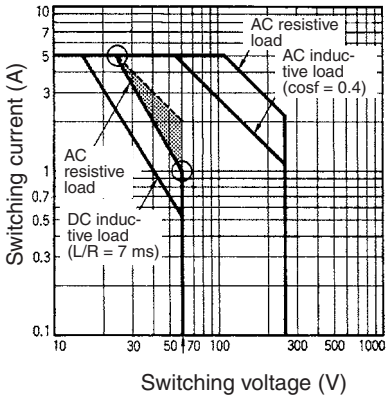
The life expectancy of the relay can be determined from the "Endurance" curve shown below, based on the rated switching current (I_1) obtained above. For instance, the electrical endurance at the obtained maximum switching current of 2 A is slightly over 300,000 operations (see circled point on graph below).

Endurance



However, with a DC load, it may become difficult to break the circuit of 48 V or more due to arcing. Determine the suitability of the relay in actual usage testing.
The correlation between the contact ratings is shown in the following figure:

Maximum Switching Power



Failure Rate

The failure rate indicates the lower limit of switching capability of a relay as the reference value. Such minute load levels are found in microelectronic circuits. This value may vary, depending on operating frequency, operating conditions, expected reliability level of the relay, etc. It is always recommended to double-check relay suitability under actual load conditions.
In this catalog, the failure rate of each relay is indicated as a reference value. It indicates failure level at a reliability level of 60% (λ_{60}). $\lambda_{60} = 0.1 \times 10^{-6}$/operation means that one failure is presumed to occur per 10,000,000 (ten million) operations at a reliability level of 60%.

Number of Poles

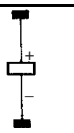
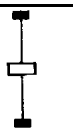
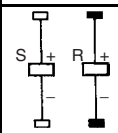
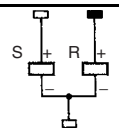
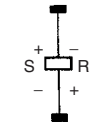
The number of contact circuits. See *Contact Form* for reference.

Terms Related to Coils

Rated Coil Voltage

A reference voltage applied to the coil when the relay is used under normal operating conditions.

Coil Symbols

Single-side stable		Double-winding latching		Single-winding latching
Polarized	Non-polarized	w/4 terminals	w/3 terminals	
				

Coil Resistance (Applicable to DC-switching Relays only)

The resistance of the coil is measured at a temperature of 23°C with a tolerance of ±10% unless otherwise specified. (The coil resistance of an AC-switching type relay may be given for reference when the coil inductance is specified.)

Hot Start

The ratings set forth in the catalog or data sheet are measured at a coil temperature of 23°C.

Maximum Voltage

The maximum value of the pulsating voltage fluctuations in the operating power supply to the relay coil.

Minimum Pulse Width

The minimum value of the pulsating voltage required to set and reset a latching relay at a temperature of 23°C.

Must Operate (Must Set) Voltage

The threshold value of a voltage at which a relay operates when the input voltage applied to the relay coil in the reset state is increased gradually.

Must Release (Must Reset) Voltage

The threshold value of a voltage at which a relay releases when the rated input voltage applied to the relay coil in the operating state is decreased gradually.

Power Consumption

The power (= rated voltage x rated current) consumed by the coil when the rated voltage is applied to it. A frequency of 60 Hz is assumed if the relay is intended for AC operation. The current flows through the coil when the rated voltage is applied the coil at a temperature of 23°C. The tolerance is $^{+15\%}/_{-20\%}$ unless otherwise specified.

Terms Related to Electrical Characteristics

Dielectric Strength

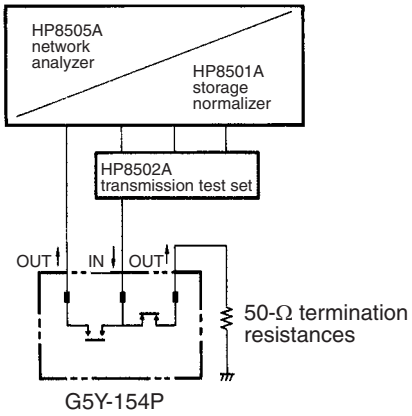
The critical value which a dielectric can withstand without rupturing when a high-tension voltage is applied for 1 minute between the following points:
Between coil and contact
Between contacts of different polarity
Between contacts of same polarity
Between set coil and reset coil
Between current-carrying metal parts and ground terminal
Note that normally a leakage current of 3 mA is detected; however, a leakage current of 1 mA to 10 mA may be detected on occasion.

Electrical Endurance

The life of a relay when it is switched at the rated operating frequency with the rated load applied to its contacts.

High-frequency Isolation (Applicable to High-frequency Relay only)

The degree of isolation of a high-frequency signal, which is equivalent to the insulation resistance of ordinary relays.



G5Y-154P

The following characteristics are measured with contacts unrelated to the measurement terminated at 50 Ω, when a signal is applied from input terminal 11 to output terminal 8 or from input terminal 11 to output terminal 14 of the sample.

1. Isolation characteristics
2. Insertion loss characteristics
3. Return loss

The following conversion formula converts from return loss to VSWR.

$$VSWR = \frac{1 + 10^{-\frac{x}{20}}}{1 - 10^{-\frac{x}{20}}}$$

where,
x = return loss

High-frequency Switching Power (Applicable to High-frequency Relays Only)

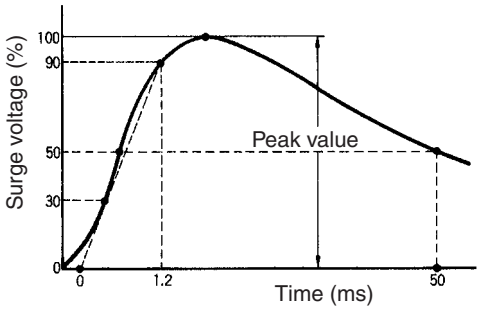
The power of a high-frequency signal that can be switched.

High–frequency Transmitted Power (Applicable to High-frequency Relays Only)

The transmission capacity of a high-frequency signal.

Impulse Withstand Voltage

The critical value which the relay can withstand when the voltage surges momentarily due to lightning, switching an inductive load, etc. The surge waveform which has a pulse width of ±1.2 x 50 μs is shown below:



Insertion Loss (Applicable to High-frequency Relays Only)

The attenuation of a high-frequency signal in a transmission line and is equivalent to the contact resistance of ordinary relays.

Insulation Resistance

The resistance between an electric circuit such as the contacts and coil, and grounded, non-conductive metal parts such as the core, or the resistance between the contacts. The measured values are as follows:

Rated insulation voltage	Measured value
60 V max.	250 V
61 V min.	500 V

Maximum Operating Frequency

The frequency or intervals at which the relay continuously operates and releases, satisfying the rated mechanical and electrical endurance.

Mechanical Endurance

The life of a relay when it is switched at the rated operating frequency without the rated load.

Operate Bounce Time

The bounce time of the normally open (NO) contact of a relay when the rated coil voltage is applied to the relay coil at an ambient temperature of 23°C.

Operate Time

The time that elapses after power is applied to a relay coil until the NO contacts have closed, at an ambient temperature of 23°C. Bounce time is not included. For the relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Operate time	5 ms max. (mean value: approx. 2.3 ms)

Release Bounce Time

The bounce time of the normally closed (NC) contact of a relay when the coil is de-energized at an ambient temperature of 23°C.

Release Time

The time that elapses between the moment a relay coil is de-energized until the NC contacts have closed, at an ambient temperature of 23°C. (With a relay having SPST-NO or DPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For the relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Release time	5 ms max. (mean value: approx. 2.3 ms)

Reset Time (Applicable to Latching Relays Only)

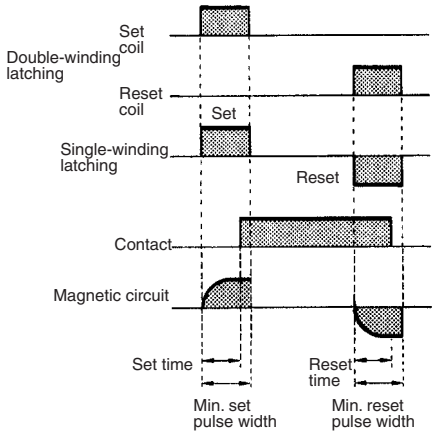
The time that elapses from the moment a relay coil is de-energized until the NC contacts have closed, at an ambient temperature of 23°C. (With a relay having SPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For the relays having a reset time of less than 10 ms, the mean (reference) value of its reset time is specified as follows:

Reset time	5 ms max. (mean value: approx. 2.3 ms)

Set Time

The time that elapses after power is applied to a relay coil until the NO contacts have closed, at an ambient temperature of 23°C. Bounce time is not included. For the relays having a set time of less than 10 ms, the mean (reference) value of its set time is specified as follows:

Reset time	5 ms max. (mean value: approx. 2.3 ms)



Shock Resistance

The shock resistance of a relay is divided into two categories: "Destruction" which quantifies the characteristic change of, or damage to, the relay due to considerably large shocks which may develop during the transportation or mounting of the relay, and "Malfunction" which quantifies the malfunction of the relay while it is in operation.

Stray Capacitance

The capacitance measured between terminals at an ambient temperature of 23°C and a frequency of 1 kHz.

VSWR (Applicable to High-frequency Relays Only)

Stands for voltage standing-wave ratio. The degree of reflected wave that is generated in the transmission line.

Vibration Resistance

The vibration resistance of a relay is divided into two categories: "Destruction" which quantifies the characteristic changes of, or damage to, the relay due to considerably large vibrations which may develop during the transportation or mounting of the relay, and "Malfunction" which quantifies the malfunction of the relay due to vibrations while it is in operation.

$a = 0.002f^2A$

where,

a: Acceleration of vibration

f: Frequency

A: Double amplitude

Precautions

■ Basic Information

Before actually committing any component to a mass-production situation, OMRON strongly recommends situational testing, in as close to actual production situations as possible. One reason is to confirm that the product will still perform as expected after surviving the many handling and mounting processes in involved in mass production. Also, even though OMRON relays are individually tested a number of times, and each meets strict requirements, a certain testing tolerance is permissible. When a high-precision product uses many components, each depends upon the rated performance thresholds of the other components. Thus, the overall performance tolerance may accumulate into undesirable levels. To avoid problems, always conduct tests under the actual application conditions.

General

To maintain the initial characteristics of a relay, exercise care that it is not dropped or mishandled. For the same reason, do not remove the case of the relay; otherwise, the characteristics may degrade. Avoid using the relay in an atmosphere containing sulfuric acid (SO_2), hydrogen sulfide (H_2S), or other corrosive gases.

Do not continuously apply a voltage higher than the rated maximum voltage to the relay. Never try to operate the relay at a voltage and a current other than those rated.

If the relay is intended for DC operation, the coil has polarity. Connect the power source to the coil in the correct direction. Do not use the relay at temperatures higher than that specified in the catalog or data sheet.

The storage for the relay should be in room temperature and humidity.

Coil

1) AC-switching Relays

Generally, the coil temperature of the AC-switching relay rises higher than that of the DC-switching relay. This is because of resistance losses in the shading coil, eddy current losses in the magnetic circuit, and hysteresis losses. Moreover, a phenomenon known as "beat" may take place when the AC-switching relay operates on a voltage lower than that rated. For example, beat may occur if the relay's supply voltage drops. This often happens when a motor (which is to be controlled by the relay) is activated. This results in damage to the relay contacts by burning, contact weld, or disconnection of the self–holding circuit. Therefore, countermeasures must be taken to prevent fluctuation in the supply voltage.

One other point that requires attention is the "inrush current." When the relay operates, and the armature of the relay is released from the magnet, the impedance drops. As a result, a current much higher than that rated flows through the coil. This current is known as the inrush current. (When the armature is attracted to the magnet, however, the impedance rises, decreasing the inrush current to the rated level.) Adequate consideration must be given to the inrush current, along with the power consumption, especially when connecting several relays in parallel.

2) DC-switching Relays

This type of relay is often used as a so-called "marginal" relay that turns ON or OFF when the voltage or current reaches a critical value, as a substitute for a meter. However, if the relay is used in this way, its control output may fail to satisfy the ratings because the current applied to the coil gradually increases or decreases, slowing down the speed at which the contacts move. The coil resistance of the DC-switching relay changes by about 0.4% per degree C change in the ambient temperature. It also changes when the relay generates heat. This means that the must operate and must release voltages may increase as the temperature rises.

Coil switching voltage Source

If the supply voltage fluctuates, the relay will be caused to malfunction regardless of whether the fluctuation lasts for a long time or only for a moment.

For example, assume that a large-capacity solenoid, relay, motor, or heater is connected to the same power source as the relay, or that many relays are used at the same time. If the capacity of the power source is insufficient to operate these devices at the same time, the relay may not operate, because the supply voltage has dropped. Conversely, if a high voltage is applied to the relay (even after taking voltage drop into account), chances are that the full voltage will be applied. As a consequence, the relay's coil will generate heat. Therefore, be sure 1) to use a power source with sufficient capacity and 2) that the supply voltage to the relay is within the rated must operate voltage range of the relay.

Minimum Must Operate Voltage

When the relay is used at a high temperatures, or when the relay coil is continuously energized, the coil temperature rises and coil resistance increases. Consequently, the must operate voltage increases. This increase in the must operate voltage requires attention when determining the minimum must operate voltage are given below for reference when designing a power source appropriate for the relay.

Assuming a coil temperature rise of 10°C, the coil resistance will increase about 4%. The must operate voltage increases as follows:

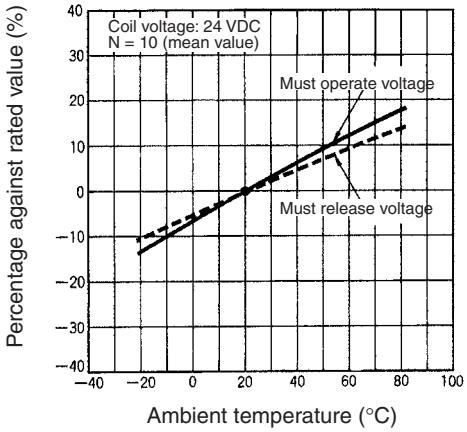
Rated values of Model LZN2 taken from catalog or data sheet
Rated voltage: 12 VDC
Coil resistance: 500 Ω
Must operate voltage: 80% max. of rated voltage at 23°C coil temperature

The rated current that flows through this relay can be obtained by diving the rated voltage by the coil resistance. Hence,

12 VDC ÷ 500 Ω = 24 mA

However, the relay operates at 80% maximum of this rated current, i.e., 19.2 mA (= 24 mA x 0.8). Assuming that the coil temperature rises by 10°C, the coil resistance increases 4% to 520 Ω (= 500 Ω x 1.04). The voltage that must be applied to the relay to flow an switching current of 19.2 mA x 520 Ω = 9.98 V. This voltage, which is at a coil temperature of 33°C (= 23°C + 10°C), is 83.2% of the rated voltage (= 9.98 V ÷ 12 V). As is evident from this, the must operate voltage increases when the coil temperature rises, in this example, 10°C from 23°C.

Coil Temperature vs.
Must Operate/release Voltage (LZN)



The minimum must operate voltage can be determined by this expression.

$$E_T > E \times \frac{Epv + 5}{100} \times \left(\frac{T - Ta}{234.5 + Ta} + 1 \right) [V]$$

where,
E (V): Rated coil voltage
Epv (%): Must operate voltage
Ta: Coil temperature for determining Epv (20°C, unless otherwise specified)
T (°C): Ambient operating temperature
E_T (V): Minimum must operate voltage

Note: In the above expression, T is taken to be the result of energizing the coil, when the coil temperature is the same as the ambient temperature.

■ Coil Input

To guarantee accurate and stable relay operation, the first and foremost condition to be satisfied is the application of the rated voltage to the relay. Additionally, the rated voltage in light of the type of the power source, voltage fluctuation, and changes in coil resistance due to temperature rise. If a voltage higher than the rated maximum voltage is applied to the coil for a long time, layer short-circuiting and damage to the coil by burning may take place.

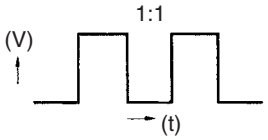
Coil Temperature Rise

When a current flows through the coil, the coil's temperature rises to a measurable level, because of copper loss. If an alternating current flows, the temperature rises even more, due not only to the copper loss, but additionally to the iron loss of the magnetic materials, such as the core. Moreover, when a current is applied to the contact, heat is generated on the contacts, raising the coil temperature even higher (however, with relays whose switching current is rated at 2 A or lower, this rise is insignificant).

Temperature Rise by Pulsating Voltage

When a pulsating voltage having an ON time of less than 2 minutes is applied to the relay, the coil temperature rise varies, and is independent of the duration of the ON time, depending only on the ratio of the ON time to the OFF time. The coil temperature in this case does not rise as high as when a voltage is continuously applied to the relay.

Energization time	Release temperature rise
Continuous energization	100%
ON:OFF = 3:1 approx.	80%
ON:OFF = 1:1 approx.	50%
ON:OFF = 1:3 approx.	35%



Changes in Must Operate Voltage by Coil Temperature Rise

The coil resistance of a DC-switching relay increases (as the coil temperature rises) when the coil has been continuously energized, de-energized once, and then immediately energized again. This increase in the coil resistance raises the voltage value at which the relay operates. Additionally, the coil resistance rises when the relay is used at a high ambient temperature.

Maximum Must Operate Voltage

The maximum voltage applicable to a relay is determined in accordance with the coil temperature rise and the coil insulation materials' heat resistivity, electrical as well as mechanical life, general characteristics, and other factors.

If a voltage exceeding the maximum voltage is applied to the relay, it may cause the insulation materials to degrade, the coil to be burnt, and the relay to not operate at normal levels. Actually, however, there are occasions when the maximum voltage is exceeded to compensate for fluctuation in the supply voltage. In this event, pay attention to the following points.

The coil temperature must not exceed the temperature that the spool and wound wire constituting the coil can withstand. The following table shows the wires often used for a coil. In this table, the coil temperature is measured through calculation of the coil resistance.

Wire material	Maximum coil temperature
Polyurethane (UEW)	120°C
Polyester (PEW)	130°C

How to Calculate Coil Temperature

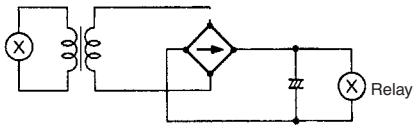
$$t = \frac{R2 - R1}{R1} (234.5+T1) + T1\ [°C]$$

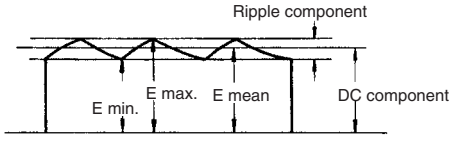
where,
R1 (Ω): coil resistance before energization
R2 (Ω): coil resistance after energization
T1 (°C): coil temperature (ambient) before energization
t (°C): coil temperature after energization

Before using the relay confirm that there are no problems.

DC Input Power Source

Pay attention to the coil polarity of the DC-switching relay. Power sources for DC-operated relays are usually a battery or a DC power supply, either with a maximum ripple of 5%. If power is supplied to the relay via a rectifier, the must operate and must release voltages vary with the ripple percentage. Therefore, check the voltages before actually using the relay. If the ripple component is extremely large, beat may occur. If this happens, it is recommended that a smoothing capacitor be inserted as shown in the following diagram.





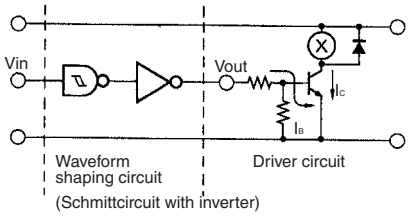
$$Ripple\ percentage = \frac{Emax. - Emin.}{Emean} 100$$

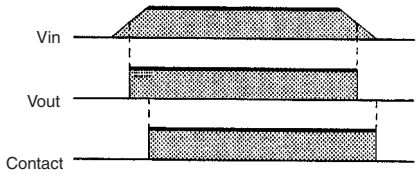
where,
E max.: maximum value of ripple component
E min.: minimum value of ripple component
E mean: mean value of DC component

If the voltage applied to the DC-operated coil increases or decreases slowly, each contact of a multi-pole contact relay may not operate at the same time. It is also possible for this situation to result in the must operate voltage varying each time the relay operates. Either way, circuit sequencing will not be correct. In critical applications, the use of a Schmitt circuit is recommended, reshape the DC waveform to trigger all contacts of the relay at the same time.

Relay Driving Signal Waveform

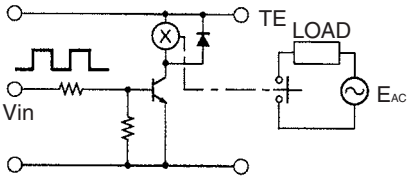
A long rise time and/or fall time of the signal driving the relay may prolong the operate time and/or release time of the relay. This situation may shorten the life of the contacts. If this situation cannot be avoided, providing a Schmitt trigger circuit at the circuit stage preceding the relay circuit will shape a waveform with sharp transitions, as shown in the following diagram:

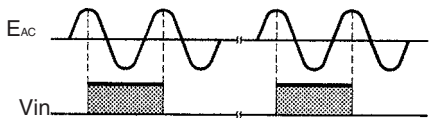




If the Schmitt trigger circuit is configured of transistors, a residual voltage may exist in the output of the circuit. Therefore, confirm that the rated voltage is present across the relay coil, or that the residual voltage drops to zero when the relay releases. When an IC (e.g., TC74HC132P) is used, this value is close to zero.

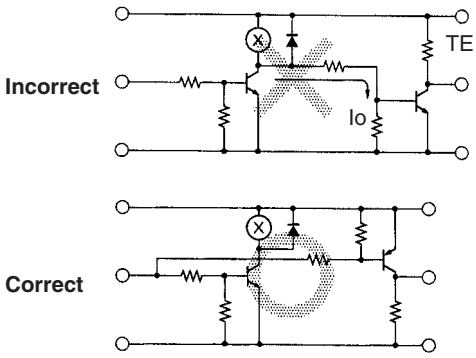
Cyclic Switching of AC Load





If the relay operates in synchronization with the supply voltage, the life of the relay may be shortened. When designing the control system in which the relay is used, estimate the life of the relay and thus the reliability of the overall system under actual operating conditions. Moreover, construct the circuit so that the relay operates in a random phase or in the vicinity of the zero point.

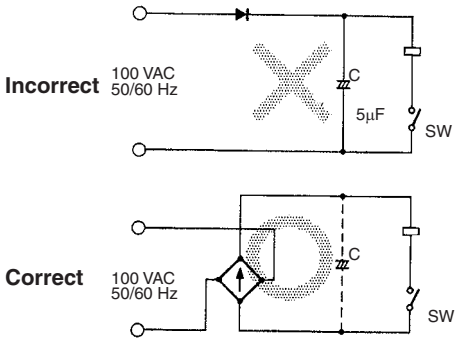
Dark Current in OFF Time



A circuit that produces a control output as soon as the relay operates must be carefully designed. In the example on the left, electrode dark current flows as shown when the relay operates. When dark current flows into the relay coil, the relay's resistivity to shock and vibration may degrade.

Overcoming Beat in DC Relays

When using AC power to generate power for operating a DC relay, the use of half-wave rectification causes the formation of a pulsating current. Therefore, when the capacitance of the smoothing capacitor C is low, the relay generates a beat. However, when a bridge rectification circuit is used, the frequency of the pulsating current doubles, generating no beat even when a smoothing capacitor C is not provided. The bridge rectification circuit can provide a higher rectification efficiency to increase the contact attraction, which is desirable in terms of prolonging the service life of the contact.

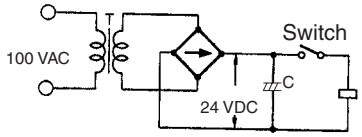


Voltage Considerations for AC Relays

For stable relay operation, a voltage +10% to −20% of the rated voltage should be applied to the relay. The voltage applied to the relay must be a sine wave. When a commercial power source is used, there should be no problem. However, if an AC stabilized power source is used, either beat or abnormal heating may occur, depending on the wave distortion of the power source. A shading coil is used to suppress beat in an AC current coil, but wave distortion defeats this function.

When a motor, solenoid, transformer, or other device is connected to the same power line source as the relay controller, and any of these devices causes a drop in the line voltage, the relay may vibrate, damaging the contact. This commonly occurs when a small transformer is added to the line, when the transformer is too small, when long wiring is used, or when thin wiring is used in the customer's premises. Be aware of this phenomenon, as well as normal voltage fluctuations. Should this problem occur, check the change in voltage with a synchroscope or the like, and take appropriate countermeasures. Effective countermeasures include replacing the relay with a special relay suited to the circumstances, or use of a DC circuit and inclusion of a capacitor to compensate for the voltage change, as shown in the following circuit diagram.

Voltage change compensation circuit incorporating a capacitor



■ Contacts

The contacts are the most important constituent of a relay. Their characteristics are significantly affected by factors such as the material of the contacts, voltage and current values applied to them (especially, the voltage and current waveforms when energizing and de-energizing the contacts), the type of load, operating frequency, atmosphere, contact arrangement, and bounce. If any of these factors fail to satisfy predetermined values, problems such as metal deposition between contacts, contact welding, wear, or rapid increase in the contact resistance may occur.

Switching voltage (AC, DC)

When a relay breaks an inductive load, a fairly high counterelectromotive force (counter emf) is generated in the relay's contact circuit. The higher the counter emf, the greater the damage to the contacts. This may result in a significant decrease in the switching power of DC-switching relays. This is because, unlike the AC-switching relay, the DC-switching relay does not have a zero-cross point. Once arc has been generated, it does not easily diminish, prolonging the arc time. Moreover, the unidirectional flow of the current in a DC circuit may cause metal deposition to occur between contacts and the contacts to wear rapidly (this is discussed later).

Despite the information a catalog or data sheet sets forth as the approximate switching power of the relay, always confirm the actual switching power by performing a test with the actual load.

Switching Current

The quantity of electrical current which flows through the contact directly influences the contact' characteristics. For example, when the relay is used to control an inductive load such as a motor or a lamp, the contacts will wear more quickly, and metal deposition between the mating contacts will occur more often as the inrush current to the contacts increases. Consequently, at some point the contacts may not be able to open.

Contact Materials

Selection of an appropriate contact material according to the load to be opened or closed is important. Several contact materials and their properties are listed below.

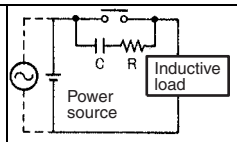
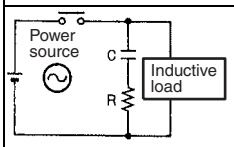
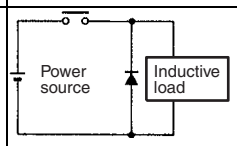
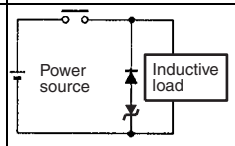
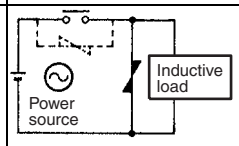
Contact Materials and Features

P. G. S. Alloy	This material has excellent corrosion resistance and is suitable for very small current circuits. (Au : Ag : Pt = 69 : 25 : 6)
AgPd	This material exhibits good corrosion and sulfur resistance. In a dry circuit, it attracts organic gas to generate a polymer, therefore it is usually plated with gold or other material.
Ag	This material has the highest electric and heat conductivities among all metals. It exhibits low contact resistance, but easily forms sulfide film in a sulfide gas environment. This may result in defective contact performance at a low-voltage small-current operation.
AgNi	This material exhibits the same high electric conductivity as silver and excellent arc resistance.
AgSnIn	This material exhibits excellent deposition resistance and exhaustion resistance.
$AgSnO_2$	This material exhibits excellent deposition resistance. It easily forms sulfide film in a sulfide gas environment same as Ag contact material.
AgW	This material exhibits a high hardness and melting point. It also exhibits excellent arc resistance and superior resistance to deposition and transfer. However, it shows high contact resistance and inferior environmental resistance.

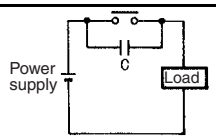
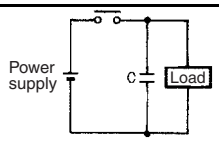
Contact Protection Circuit

A contact protection circuit, designed to prolong the life of the relay, is recommended. This protection will have the additional advantages of suppressing noise, as well as preventing the generation of carbide and nitric acid, which otherwise would be generated at the contact surface when the relay contact is opened. However, unless designed correctly, the protection circuit may produce adverse effects, such as prolonging the release time of the relay.

The following table lists examples of contact protection circuits.

Circuit example		Applicability		Features and remarks	Element selection
		AC	DC		
CR		Fair	Good	Load impedance must be much smaller than the RC circuit when the relay operates on an AC voltage.	Optimum C and R values are: C: 1 to 0.5 μF for 1–A switching current R: 0.5 to 1 Ω for 1–V switching voltage
		Good	Good	The release time of the contacts will be delayed when a relay solenoid is used as a load. This circuit is effective if connected across the load when the supply voltage is 24 to 48 V. When the supply voltage is 100 to 240 V, connect the circuit across the contacts.	These values do not always agree with the optimum values due to the nature of the load and the dispersion in the relay characteristics. Confirm optimum values experimentally. Capacitor C suppresses discharge when the contacts are opened, while resistor R limits the current applied when the contacts are closed the next time. Generally, employ a capacitor C whose dielectric strength is 200 to 300 V. If the circuit is powered by an AC power source, employ an AC capacitor (non–polarized).
Diode		Poor	Good	The energy stored in a coil (inductive load) reaches the coil as current via the diode connected in parallel with the coil, and is dissipated as Joule (measurable) heat by the resistance of the inductive load. This type of circuit delays the release time more than the RC type.	Employ a diode having a reverse breakdown voltage of more than 10 times the circuit voltage and a forward current rating greater than the load current. A diode having a reverse breakdown voltage two to three times that of the supply voltage can be used in an electronic circuit where the circuit voltage is not particularly high.
Diode + Zener diode		Poor	Good	This circuit effectively shortens release time in applications where the release time of a diode protection circuit proves to be too slow.	The zener diode breakdown voltage should be about the same as the supply voltage.
Varistor		Good	Good	By utilizing the constant–voltage characteristic of a varistor, this circuit prevents high voltages from being applied across the contacts. This circuit also somewhat delays the release time. This circuit, if connected across the load, is effective when the supply voltage is 24 to 48 V. If the supply voltage is 100 to 240 V, connect the circuit across the contacts.	---

Avoid use of a surge suppressor in the manner shown below.

	
This circuit arrangement is very effective for diminishing sparking (arcing) at the contacts, when breaking the circuit. However, since electrical energy is stored in C (capacitor) when the contacts are open, the current from C flows into the contacts when they close. Therefore, metal deposition is likely to occur between mating contacts.	This circuit arrangement is very useful for diminishing sparking (arcing) at the contacts when breaking the circuit. However, since the charging current to C flows into the contacts when they are closed, metal deposition is likely to occur between the mating contacts.

Although it is considered that switching a DC inductive load is more difficult than a resistive load, an appropriate contact protection circuit can achieve almost the same characteristics.

■ Latching Relays

Avoid use in locations subject to excessive magnetic particles or dust.

Avoid use in magnetic fields (over 8,000 A.m).

Take measures to preventing problems caused by vibration or shock. Problems may originate from other relay(s) operating or releasing on the same panel.

Avoid simultaneous energization of the set and reset coils, even though both coils can be continuously energized.

Avoid use under conditions where excessive surge-generating sources exist in the coil power source.

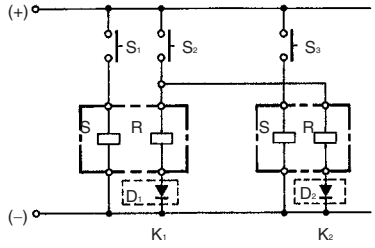
When planning to mount multiple relays together, observe the minimum mounting interval of each type of relay.

Drive Circuit (Double-winding Relays G5AK, G6AK, G6BK, etc.)

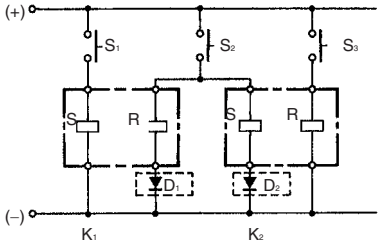
When a DC-switching latching relay is used in one of the circuits shown in the following diagram, the relay contacts may be released from the locked state unless a diode (enclosed in the dotted box in the circuit diagram) is connected to the circuit.

Circuits

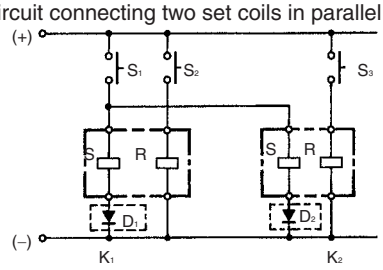
Circuit connecting two reset coils in parallel.



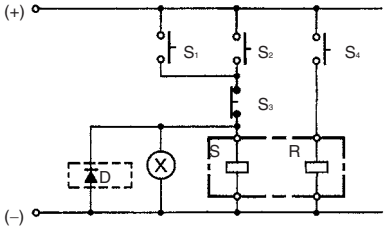
Circuit connecting set coil to reset coil.



Circuit connecting two set coils in parallel



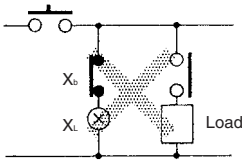
Circuit connecting set coil of latching relay in parallel with another relay coil.



When connecting a diode to the relay circuit, be sure to use a diode with a repetitive peak–inverse voltage, and a DC reverse voltage sufficient to withstand external noise or surge. Also be sure that the diode has an average rectified current greater than the coil current.

If the contact of the relay is used to de-energize the relay, the relay may not operate normally. Avoid using the relay in a circuit like the one shown below:

Incorrect Use:



X_L: Latching relay
X_b: NC contact of relay

■ PCB Design

Soldering

As demands for more compact electronic devices have grown, so have demands declined for the plug-in relays that requires a bulky socket for connection. This trend has lead to the development of relays that can be soldered directly onto the PCB. Smaller relays have made possible great density increases on the PCB, which in turn reduces the size of the product or device. However, unless the relay is fully sealed, when soldered onto a PCB, flux may penetrate into the housing, adversely affecting the internal circuitry. The following points will help when designing a product which uses relays. This section points out details to be noted when soldering a relay to a PCB.

PCB Selection

In general, relays are directly mounted and soldered onto a PCB. Although seemingly an uninvolved process, soldering and its related processes of flux application, relay mounting, heat application, and washing can be detrimental to a relay's performance. For example, if the PCB were to warp, the internal mechanism of the relay could become distorted, degrading the performance characteristics. Thus it could be said that the relay's characteristics are also affected by the size, thickness, and material of the PCB. Therefore, carefully select a PCB that will not jeopardize the performance of the relay.

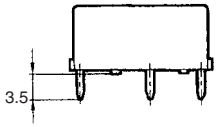
PCB Materials

Generally, the substrate of a PCB is made of glass epoxy (GE), paper epoxy (PE), or paper phenol (PP). Of these, the glass-epoxy or paper-epoxy PCB is recommended for mounting relays. See the following table

Item	Epoxy-based		Phenol-based
	Glass epoxy (GE)	Paper epoxy (PE)	Paper phenol (PP)
Electrical characteristics	High insulation resistance. Insulation resistance hardly affected by humidity.	Fair	Insulation resistance degraded by humidity.
Mechanical characteristics	Little expansions/shrinkage caused by change in temperature or humidity. Suitable for through-hole PCBs and multi-layered PCBs.	Fair	Much expansion/shrinkage caused by changes in temperature or humidity. Not suitable for through-hole PCB.
Cost effectiveness	Expensive	Fair	Inexpensive

PCB Thickness

PCBs having a thickness of 0.8, 1.2, 1.6, or 2.0 mm are generally used. A PCB that is 1.6 mm thick is best for mounting a PCB relay, considering the weight of the relay and the length of the terminals. (The terminal length of OMRON relays is 3, 3.5, or 4.0 to 5.0 mm.)



Terminal Hole Diameter and Land Diameter

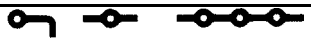
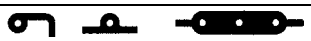
Select the appropriate terminal hole and land diameters from the following table, based on the PCB mounting hole drawing. Land diameters may be reduced to less than those listed below if the through-hole connection process is to be employed.

Terminal Hole and Land Diameters

Terminal hole diameter		Minumum land diamter
Normal	Tolerance	
0.6 mm	±0.1 mm	1.5 mm
0.8 mm		1.8 mm
1.0 mm		2.0 mm
1.2 mm		2.5 mm
1.3 mm		2.5 mm
1.5 mm		3.0 mm
1.6 mm		3.0 mm
2.0 mm		3.0 mm

Shape of Lands

The land section should be on the center line of the copper-foil pattern, so that the soldered fillets become uniform.

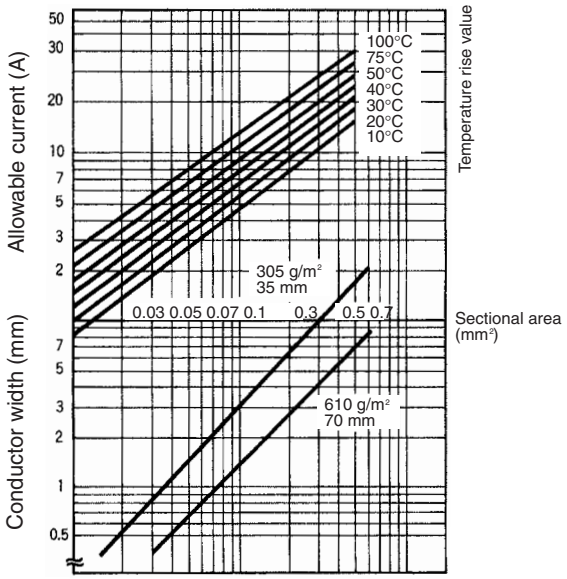
Correct	
Incorrect	

A break in the circular land area will prevent molten solder from filling holes reserved for components which must be soldered manually after the automatic soldering of the PCB is complete.

Conductor Width and Thickness

The following thickness of copper foil are standard: 35 μm and 70 μm. The conductor width is determined by the current flow and allowable temperature rise. Refer to the chart below.

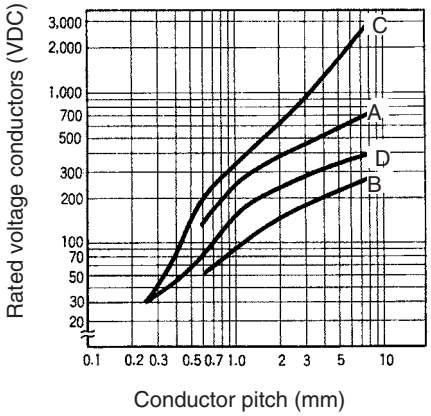
Conductor Width and Carry Current
(according to IEC Pub326-3)



Conductor Pitch

The conductor pitch on a PCB is determined according to the insulation resistance between conductors and the environmental conditions under which the PCB is to be placed. The following graph shows the general relationship between the voltage between conductors and the conductor pitch on a PCB. However, if the PCB must conform to safety organization standards (such as UL, CSA, VDE, etc.), priority must be given to fulfilling their requirements.

Voltage between Conductors vs. Conductor Pitch



A = w/o coating at altitude of 3,000 m max.
B = w/o coating at altitude of 3,000 m or higher but lower than 15,000 m
C = w/coating at altitude of 3,000 m max.
D = w/coating at altitude of 3,000 m or higher

Temperature and Humidity

PCBs expand or contract with changes in temperature. Should expansion occur with a relay mounted on the PCB, the internal components of the relay may be shifted out of operational tolerance. As a result, the relay may not be able to operate with its normal characteristics.
PCB materials have "directionality," which means that a PCB generally has expansion and contraction coefficients 1/10 to 1/2 higher in the vertical direction than in the horizontal direction. Conversely, its warp in the vertical direction is 1/10 to 1/2 less than in the horizontal direction. Therefore, take adequate countermeasures against humidity by coating the PCB. Should heat or humidity be entirely too high, the relay's physical characteristics will likewise be affected. For example, as the heat rises the PCB's insulation resistance degrades. Mechanically, PCB parts will continue to expand as heat is applied, eventually passing the elastic limit, which will permanently warp components.
Moreover, if the relay is used in an extremely humid environment, silver migration may take place.

Gas

Exposure to gases containing substances such as sulfuric acid, nitric acid, or ammonia can cause malfunctions such as faulty contacting in relays. They can also cause the copper film of a PCB to corrode, or prevent positive contacts between the PCB's connectors. Of the gases mentioned, nitric acid is particularly damaging as it tends to accelerate the silver migration. As a countermeasures against gas exposure damage, the following processes on the relay and PCB have proved useful.

Item	Process
Outer casing, housing	Sealed construction by using packing, etc.
Relay	Use of simplified hermetically sealed type relay, DIP relay, reed relay
PCB, copper firm	Coating
Connector	Gold-plating, rhodium-plating process

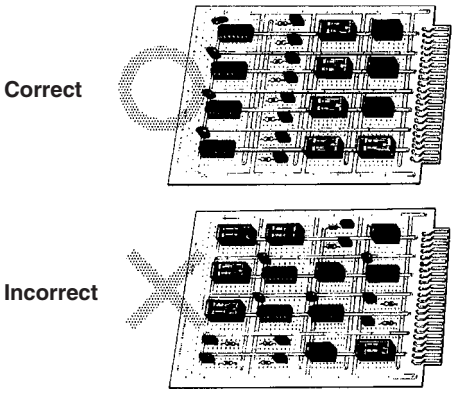
Vibration and Shock

Although the PCB itself is not usually a source of vibration or shock, it may simplify or prolong the vibration by resonate with external vibrations or shocks. Securely fix the PCB, paying attention to the following points.

Mounting method	Process
Rack mounting	No gap between rack's guide and PCB
Screw mounting	Securely tighten screw. Place heavy components such as relays on part of PCB near where screws are to be used. Attach rubber washers to screws when mounting components that are affected by shock (such as audio devices.)

Mounting Position

Depending on where the relay is mounted, the function of the relay (and the performance of the circuit which includes the relay) may be adversely affected.
The relay may malfunction if it is mounted near a transformer or other device that generates a large magnetic field, or much heat. Provide an adequate distance between the relay and such devices.
Also, keep the relay away from semiconductor devices, if they are to be mounted on the same PCB.



Mounting Direction

To allow a relay to operate to its full capability, adequate consideration must be given to the mounting direction of the relay. Relay characteristics that are considerably influenced by mounting direction are shock resistance, life, and contact reliability.

Shock Resistance

Ideally, the relay must be mounted so that any shock or vibration is applied to the relay at right angles to the operating direction of the armature of the relay. Especially when a relay's coil is not energized, the shock resistance and noise immunity are significantly affected by the mounting direction of the relay.

Life

When switching a heavy load that generates arc (generally, having a greater impedance than that of the relay coil), substances spattered from the contact may accumulate in the vicinity, resulting in degradation of the insulation resistance of the circuit. Mounting the relay in the correct direction is also important in preventing this kind of degradation of the insulation resistance.

Contact Reliability

Switching both a heavy and a minute load with a single relay contact is not recommended. The reason for this is that the substances scattered from the contact when the heavy load is switched degrade the contact when switching the minute load. For example, when using a multi-pole contact relay, avoid the mounting direction or terminal connections in which the minute load switching contact is located below the heavy load switching contact.

Mounting Interval

When mounting multiple relays side by side on a PCB, pay attention to the following points:

When many relays are mounted together, they may generate an abnormally high heat due to the thermal interference between the relays. Therefore, provide an adequate distance between the relays to dissipate the heat. When using a relay, be sure to check the minimum mounting interval.

Also, if multiple PCBs with relays are mounted to a rack, the temperature may rise. In this case, preventive measures must be taken so that the ambient temperature falls within the rated value.

Pattern Layout

Countermeasures Against Noise

The relay can be a noise source when viewed from a semiconductor circuit. This must be taken into consideration when designing the layout positioning of the relay and other semiconductor components on the PCB.

Keep the relay away from semiconductor components as far away as possible.

Locate the surge suppressor for the relay coil as close to the relay as possible.

Do not route wiring for signals such as audio signals that are likely to be affected by noise below the relay.

Design the shortest possible pattern.

One method for separating the power source and relay from other electronic components is to use shielded patterns.

Coating

As is also the case in humid environments, coating the PCB is recommended to prevent the insulation of its pattern form being degraded by gases containing harmful substances. When coating the PCB, however, care must be exercised not to allow the coating agent to penetrate into the relays mounted on the PCB; otherwise, faulty contact of the relay may occur due to sticking or coating. Moreover, some coating agents may degrade or adversely affect the relay. Select the coating agent carefully.

Type of Coating

Item	Applicability to PCB with relays mounted	Feature
Epoxy	Good	Good insulation. Performing this coating is a little difficult, but has no effect on relay contact.
Urethane	Good	Good insulation and easy to coat. Be careful not to allow the coating on the relay itself, as thinner-based solvents are often used with this coating.
Silicon	Poor	Good insulation and easy to coat. However, silicon gas may cause faulty contact of relay.

■ Automatic Mounting of Relay on PCB

Though-hole Mounting

The following tables list the processes required for mounting a relay onto a PCB and the points to be noted in each process.

Process 1: Placement

Do not bend any terminal of the relay to use it as a self–clinching relay or the relay may malfunction.
It is recommended to use magazine-packaged self–clinching relays for placement onto the PCB.

Possibility of Automatic Placement

Construction	Unsealed	Flux protection	Fully sealed
Magazine-packaged relay	NO	YES	YES
Self-clinching relays			

Process 2: Flux Application

To apply flux to a flux protection or fully sealed relay, a sponge soaked with flux can be used. Place the relay in the holes drilled in the PCB and press the PCB (with the relay still mounted) firmly against the sponge. The flux will be pushed up the relay's contact legs, and through the PCB holes. This method must never be applied with an unsealed relay because the flux will penetrate into the relay.
The flux used with the sponge must be a non-corrosive resin-type flux.
For the flux solvent, use an alcohol–based solvent, which tends to be less chemically reactive.
Apply the flux sparingly and evenly to prevent penetration into the relay. When dipping the relay terminals into liquid flux, be sure to adjust the flux level, so that the upper surface of the PCB is not flooded with flux.

Possibility of Dipping Method

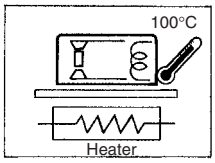
Unsealed	Flux protection	Fully sealed
NO	YES	YES

Process 3: Transportation

When the PCB is transported, the relay mounted on the PCB may be lifted from the board surface due to vibration. This can be prevented if the relay mounted on the PCB has self-clinching terminals.

Process 4: Preheating

Preheat the PCB at a temperature of 110°C maximum within a period of approximately 40 s for smooth soldering. The characteristics of the relay may change if it is heated at a high temperature for a long time.



Possibility of Preheating

Unsealed	Flux protection	Fully sealed
NO	YES	YES

Process 5: Soldering

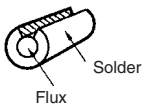
Flow soldering is recommended to assure a uniform solder joint.
- Solder temperature and soldering time: 260°C, 5 s max.
- Adjust the level of the molten solder so that the PCB is not flooded with solder.

Possibility of Automatic Soldering

Unsealed	Flux protection	Fully sealed
NO	YES	YES

Manual Soldering

Complete the soldering operation quickly. Use the correct wattage of soldering iron. Do not overheat while smoothing the applied solder with the tip of the iron.
- Soldering iron: rated at 30 to 60 W
- Tip temperature: 280°C to 300°C
- Soldering time: 3 s max.
- The following table contains recommended solders:



Type	Sparkle solder
Applicable solder diameter	0.8 to 1.6 mm
Spread rate	90%
Storage	3 months max.

The solder in the illustration shown above is provided with a cut section to prevent the flux from splattering.

Possibility of Manual Soldering

Unsealed	Flux protection	Fully sealed
YES	YES	YES

Process 6: Cooling

Upon completion of automatic soldering, use a fan or other device to forcibly cool the PCB. This helps prevent the relay and other components from deteriorating from the residual heat of soldering.

Fully sealed relays are washable. Do not, however, put fully sealed relays in a cold cleaning solvent immediately after soldering or the seals may be damaged.

Fluxprotection	Fully sealed
Necessary	Necessary

Process 7: Cleaning

Avoid cleaning the soldered terminals whenever possible. When a resin-type flux is used, no cleaning is necessary. If cleaning cannot be avoided, exercise care in selecting an appropriate cleaning solvent.

Cleaning Method

Unsealed	Fluxprotection	Fully sealed
Boiling cleaning and immersion cleaning are not possible. Clean only the back of the PCB with a brush.		Boiling cleaning and immersion cleaning are possible. Ultrasonic cleaning will have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. The washing temperature is 40°C max..

List of Cleaning Solvents

Solvent		Fully sealed
Chlorine-based	• Perochlene • Chlorosolder • Trichloroethylene	YES
Water-based	• Indusco • Holys	YES
Alcohol-based	• IPA • Ethanol	YES
Others	• Thinner • Gasoline	NO
Cleaning method		Automatic cleaning Ultrasonic cleaning (See note 4.)

Note: **1.** Consult your OMRON representative before using any other cleaning solvent. Do not use Freon-TMC-based, thinner-based, or gasoline-based cleaning solvents.
2. Worldwide efforts are being made at discontinuing the use of CFC-113-based (fluorochlorocarbon-based) and trichloroethylene-based cleaning solvents. The user is requested to refrain from using these cleaning solvents
3. It may be difficult to clean the space between the relay and PCB using hydrogen-based or alcohol-based cleaning solvent. It is recommended the stand-off-type be used G6A-□-ST when using hydrogen-based or alcohol-based cleaning solvents.
4. Ultrasonic cleaning may have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. Please refer to the model number to determine if your relay is intended to be cleaned ultrasonically.

Process 8: Coating

Do not apply a coating agent to any flux-resistant relay or relay with a case because the coating agent will penetrate into the relay and the contacts may be damaged.
Some coating agents may damage the case of the relay. Be sure to use a proper coating agent.

Do not fix the position of relay with resin or the characteristics of the relay will change.

Resin	Fully sealed
Epoxy	YES
Urethane	YES
Silicone	NO
Fluorine	YES

Surface Mounting

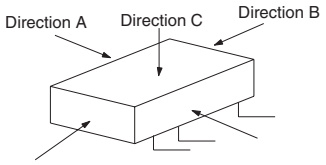
The following tables list the processes required for mounting a relay onto a PCB and the points to be noted in each process.

Process 1: Cream Solder Printing

Do not use a cream solder that contains a flux with a large amount of chlorine or the terminals of the relay may be corroded.

Process 2: Relay Mounting

The holding force of the relay holder must be the same as or more than the minimum holding force value required by the relay.



Direction	G6H	G6S
A	200 g max.	200 g max.
B	500 g max.	500 g max.
C	200 g max.	200 g max.

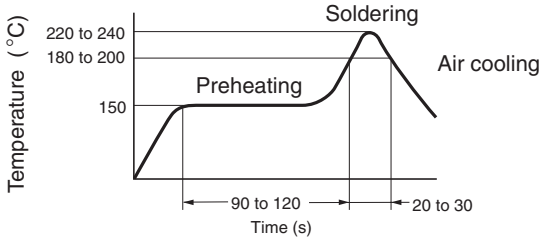
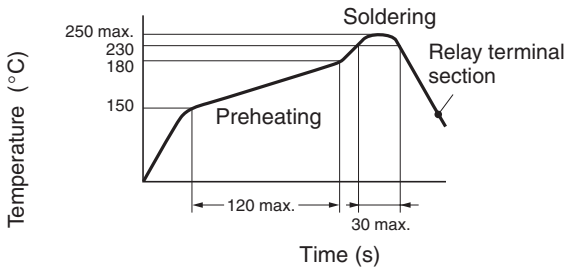
Process 3: Transportation

The relay may be dismounted by vibration during transportation. To prevent this, it is recommended an adhesive agent be applied to the relay's gluing part (protruding part) to tack the relay.

Adhesive Agent Application Methods

Dispenser method	Screen-printing method
YES	YES

Process 4: Soldering Reflow

IRS (infrared reflow soldering)	
Mounting with lead solder	**Mounting with lead-free solder**
The recommended soldering conditions show the temperature changes of the PCB surface. The conditions, however, vary with the relay model. Check the relay specifications before soldering. (For details refer to the precautions for each model.) Do not put the relay in a cleaning solvent or other cold liquid immediately after soldering or the seal of the relay may be damaged.  **Recommended IRS Conditions (G6H-2F)**	The recommended soldering conditions show the temperature changes of the relay terminal section. The conditions, however, vary with the relay model. Check the relay specifications before soldering. (For details refer to the precautions for each model.) Do not put the relay in a cleaning solvent or other cold liquid immediately after soldering or the seal of the relay may be damaged. Top surface of case (peak): 255˚C max.  **Recommended IRS Conditions (G6H-2F)**

Note: Do not submerse the relay in a solder bath. Doing so will deform the resin, causing faulty operation.

Process 5: Cleaning

Boiling cleaning and immersion cleaning are recommended. When washing the product after soldering the Relay to a PCB, use a wafer-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C.
Ultrasonic cleaning will have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning.

List of Cleaning Solvent

Solvent		Fully sealed
Chlorine-based	• Perochlene • Chlorosolder • Trichloroethylene	YES
Water-based	• Indusco • Holys	YES
Alcohol-based	• IPA • Ethanol	YES
Others	• Thinner • Gasoline	NO
Cleaning method		Automatic cleaning Ultrasonic cleaning (See note 4.)

Note: **1.** Consult your OMRON representative before using any other cleaning solvent. Do not use Freon-TMC-based, thinner-based, or gasoline-based cleaning solvents.

2. Worldwide efforts are being made at discontinuing the use of CFC-113-based (fluorochlorocarbon-based) and trichloroethylene-based cleaning solvents. The user is requested to refrain from using these cleaning solvents

3. It may be difficult to clean the space between the relay and PCB using hydrogen-based or alcohol–based cleaning solvent. It is recommended the stand-off-type be used G6A-□-ST when using hydrogen-based or alcohol-based cleaning solvents.

4. Ultrasonic cleaning may have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. Please refer to the model number to determine if your relay is intended to be cleaned ultrasonically.

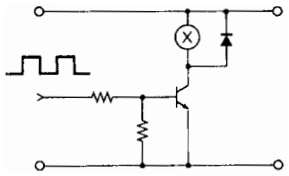
■ Correct Use

Relays in Electronic Circuitry

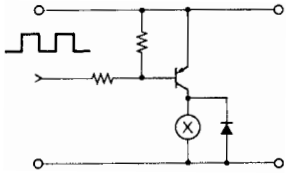
Driving by Transistor

When a transistor is used to drive the relay, be sure to ground the emitter of the transistor.

NPN transistor



PNP transistor



When the transistor is used in a emitter-follower configuration (i.e., the collector is grounded), give adequate consideration to the voltage across the collector and emitter. The required voltage must be applied to the relay.

Selecting a Transistor for Driving the Relay

After determining which relay to use, and after becoming familiar with its ratings, select a transistor to drive the relay.

1. From the relay's catalog or data sheet, ascertain the following characteristics:
   Rated voltage:_ VDC
   Rated current:_ mA
   coil resistance:_ Ω
2. Determine the minimum and maximum values of the must operate voltage form the rated voltage.
   Minimum must operate voltage: _ V
   Maximum must operate voltage: _ V
   (If ripple is contained in the rated voltage, obtain the maximum value including the ripple.)
3. By determining the component for suppressing surge, obtain the dielectric strength of the transistor for driving the relay.

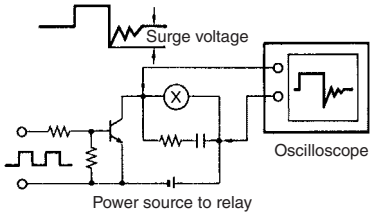
< In the case of diode>
(Maximum of must operate voltage + 0.6) x 2* ≅ V_CEO ≅ V_CBO = __V

< In the case of diode and zener diode>
(Maximum of must operate voltage + 0.6 + breakdown voltage**) x 2* ≅ VCEO ≅ V_CBO = __V

< In the case of varistor>
(Maximum of must operate voltage + varistor voltage***) x 2* ≅ V_CEO ≅ V_CBO = __V

< In the case of RC>
(Maximum of must operate voltage + surge voltage****) x 2* ≅ V_CEO ≅ V_CBO = __V

* This safety factor must be determined by the user.
** The breakdown voltage differs, depending upon the component. Therefore, if multiple zener diodes are to be used, use their maximum breakdown voltage.
*** The varistor voltage differs depending upon the component. In addition, the varistor voltage of a single varistor may vary depending upon the current. Consult the manufacturer of the varistor to be used to determine the varistor voltage.
**** The surge voltage differs depending upon the type and rating of the relay, and the constants of C and R of the circuit in which the relay is used. Positively determine the surge voltage by experiment.



where,
R ≅ Coil resistance of relay
(measured changing the value of C)
C = 0.01 to 0.2 μF

4. Determine collector current I_C.
   I_C = Maximum must operate voltage/coil resistance x 2*

   *This safety factor must be determined by the user.
5. Select the transistor that satisfies the conditions determined in steps 3 and 4 above.

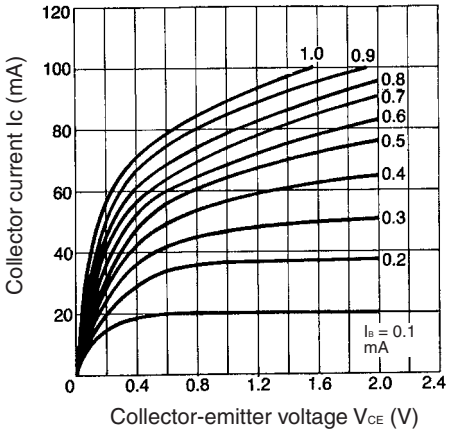
Absolute Maximum Ratings (NPN Transistor Ratings)

Item	Symbol	Rating
Collector–base voltage	V_{CBO}	60 V
Collector–emitter voltage	V_{CEO}	50 V
Emitter–base voltage	V_{CBO}	5.0 V
Collector current (DC)	I_C (DC)	100 mA
Collector current (pulse)	I_C (pulse)*	200 mA
Base current (DC)	I_B (DC)	20 mA
Base current (pulse)	I_B (pulse)*	40 mA
Total power dissipation	P_T	250 mW
Junction temperature	T_J	125°C
Storage temperature	Tstg	–55°C to 125°C

Note: PW ≤ 10 ms, duty cycle ≤ 50%

6. After selecting the transistor, examine the I_C vs. V_{CE} characteristics of the transistor indicated in its ratings.

I_C vs. V_{CE} Characteristics



This characteristic curve illustrates the relation between collector current I_C and collector-emitter voltage V_{CE} at base current I_B.

From this graph, obtain collector-emitter voltage V_{CE} where,

I_C = (Maximum value of must operate voltage)

coil resistance

I_B = Base current of the switching transistor which is determined by the driver stage

Thus,

Collector-emitter voltage V_{CE} = _ V

Use the transistor in its switching (saturation) area. Therefore, an adequate base current is required.

7. Using the following formula, calculate the power dissipated by the transistor to confirm that it is within the range of permissible power dissipation of the transistor.

Total power dissipation P_T = Collector dissipation P_C + Base dissipation P_B where,

P_C = (Maximum value of must operate voltage) ÷

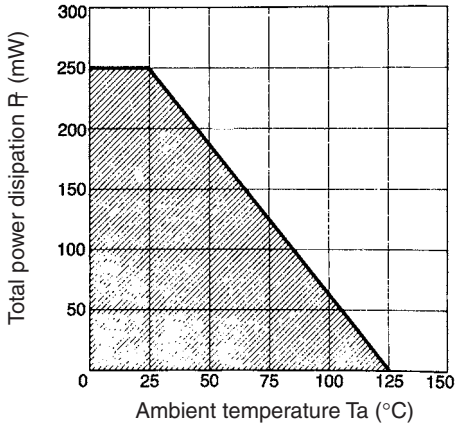
coil resistance x V_{CE} (V_{CE} is determined in step 6.)

P_B = I_B x 0.6 to 1

(For details on I_B, refer to step 6.)

Confirm that P_T obtained by the above formula is within the curve representing the total power dissipation vs. ambient temperature characteristics.

Total Power Dissipation vs. Ambient Temperature

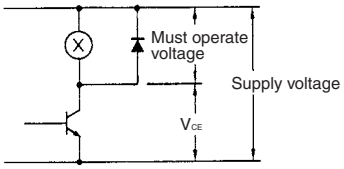


In case the total dissipation exceeds the permissible power dissipation, either attach a radiator plate to the transistor, or replace the transistor.

8. Determine the supply voltage to the relay.
The maximum and minimum values of the supply voltage to the relay are determined by the following expressions using the maximum and minimum values of the must operate voltage V_{CE} obtained in step 6.

Maximum supply voltage ≤ Maximum must operate voltage + V_{CE}

Minimum supply voltage ≥ Minimum must operate voltage + V_{CE}



9. Refer to the table indicating the absolute maximum ratings of the transistor again to check whether these conditions are satisfied.

V_{CEO} > (Maximum supply voltage + surge voltage) x safety factor*

V_{CBO} > (Maximum supply voltage + surge voltage) x safety factor*

*Determine the safety factor giving consideration to external surge (such as lightning and surge from other devises.)

10. Check the following items during actual use of the relay.

- Is the maximum value of the must operate voltage equal to or less than the rated value when the maximum supply voltage is applied?
- Is the minimum value of the must operate voltage equal to or more than the rated value when the minimum supply voltage is applied?
- Are the above conditions satisfied within the operating temperature range?
- Is there any abnormality found in test run?
In addition to the above checking items, take into consideration the items listed in this table.

Rated voltage of relay	Low	High
Coil current*	High	Low
I_C of switching transistor	High	Low
V_{ECO}, V_{CEO} of switching transistor**	High	Low
Driving current of transistor	High	Low
Voltage drop V_{CE} in transistor	High	Low
Voltage drop V_{BE} in transistor	High	Low
Total power dissipation P_T of transistor	High	Low

*Inversely proportional to voltage

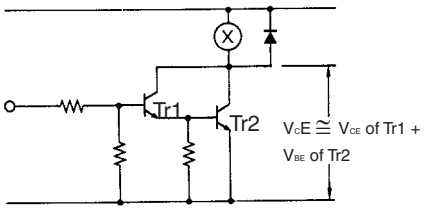
**Often used V_{CED}: 35 to 60 V

From the above discussion, the best relay coil should be rated at 12 VDC or 24 VDC when the relay is driven by a transistor.

Driving by Darlington-connected Transistor

To reduce the current of the transistor to drive the relay (i.e., base current of the transistor), two transistors may be used, via Darlington connection. Darlington-connected transistors are available enclosed in a single package.

NPN-NPN Darlington Connection

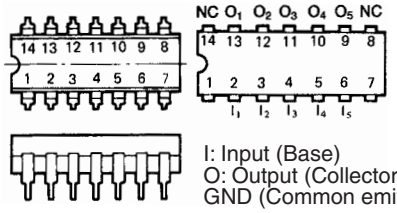


When the Darlington-connected transistors are used, however, the required value of V_{CE} is higher than when using a single transistor. For this reason, consideration must be given to designing the total power dissipation and supply voltage for the second transistor, Tr2.

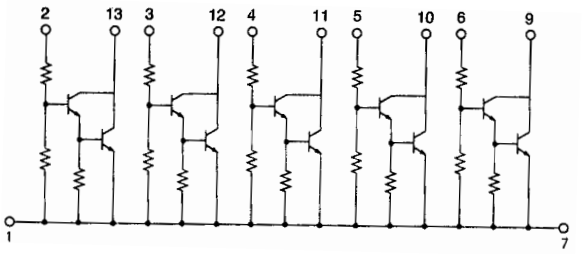
Driving by IC

Recently, an IC on which multiple driving transistors are integrated has become available. On some occasions, the designing process of the circuit or PCB to drive multiple relays, a small-size solenoid, or a small-size lamp can be simplified by using such an IC. Consult the manufacturer of the IC to be used for details. For V_{CE}, refer to the description to the rated voltage and surge suppressor.

Dimensions Connection (Top View)



Equivalent Circuit



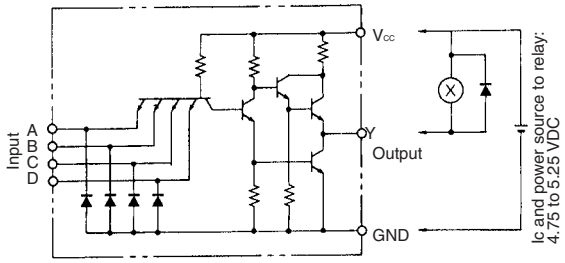
Driving by MOS IC

At present, no C MOS, N MOS, or P MOS that can directly drive relays is available. Use a transistor or IC to drive relay.

Driving by TTL

TTLs can be divided into two types by classification of the output: totem-pole and open-collector outputs. Connection of each type of TTL is described next.

Totem-pole Output



1. To drive a relay by the totem-pole output of a TTL, these conditions must be satisfied.

I_{OL} (low-level output current) > Maximum supply voltage/coil resistance

I_{OH} (high-level output current) < Rated current x must operate voltage (%)/200

Minimum supply voltage (4.75 V) – Maximum V_{OL} (low-level output voltage) > minimum value of must operate voltage (Refer to driving by transistor in *Hints on Correct Use: Relays in Electronic Circuitry.*)

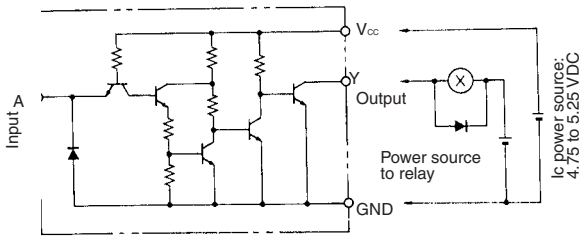
Use a diode as surge suppressor.

In the specifications of some ICs, such a phrase as “fan-out. 10” may be used in place of the legend I_{OL}. This denotes that 10 standard TTLs can be connected in parallel. In terms of current, a fan-out of 1 equals 1.6 mA.

Hence,

Fan-out n = 1.6 x n (mA)

Open-collector Output



2. To drive a relay with open-collector output type TTL, a degree of freedom is allowed in the ratings of the relay coil. However, these conditions must be satisfied:

I_{OL} > Maximum supply voltage to the relay coil/Coil resistance

I_{OH} < Rated current x must operate voltage (%)/200

V_O = Dielectric strength of the output transistor (Refer to Driving by transistor in *Correct Use: Relays in Electronic Circuitry.*)

V_{OL} = Collector-emitter voltage VCE of the output transistor (Refer to Driving by transistor in *Correct Use: Relays in Electronic Circuitry.*)

The above description of the standard TTL is applicable when using S, H, and LS type TTLs. The following table shows the TTLs of various marks.

Examples of Various TTLs

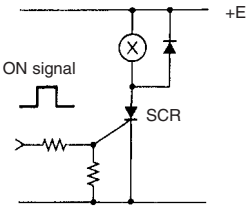
Classification	Texas Instruments	Motorola	Mitsubishi Electric Corporation	Hitachi, Ltd.	Matsushita	Characteristics			
Hex inverter buffer/driver	SN54ALS1004 SN74ALS1004	MC54F04 MC74F04	M74ALS1004P	---	---	5 V_{CC}	5.5 V_{OH}	0.5 V_{OL}	24/ 20 I_{OL} (See note.)
	SN54ALS1005 SN74ALS1005 (See note.)	---	M74ALS1005P (See note.)	---	---	5 V_{CC}	5.5 V_{OH}	0.5 V_{OL}	24 I_{OL}
Positive NAND buffer	SN74LS37 SN74LS37A	MC74LS37	M74LS37P M74ALS37AP	HD74LS37	DN74LS37	5 V_{CC}	---	0.5 V_{OL}	24 I_{OL}
	SN74LS38 SN74LS38A (See note.)	MC74LS38 (See note.)	M74LS38P M74ALS38AP (See note.)	HD74LS38	DN74LS38 (See note.)	5 V_{CC}	---	0.5 V_{OL}	24 I_{OL}
BC-to-decimal decoder/driver	SN74LS145 (See note.)	MC74LS145 (See note.)	M74LS145P (See note.)	HD74LS145 (See note.)	---	5 V_{CC}	---	0.5 V_{OL}	24 I_{OL}

Note: Asterisk-marked models are open-collector models.
A value of 20 mA is for Motorola's MC54F04 and MC74F04.

Driving by Other Switching Device

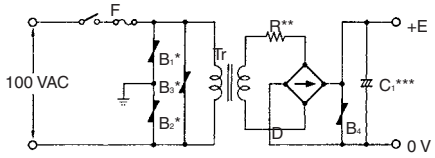
Consult the manufacturer of the switching device intended for use. In this case also, the maximum and minimum values of the must operate voltage can be determined in the same manner as described in Maximum Must Operate Voltage and Minimum Must Operate Voltage.

Example of Driving by SCR



Designing Power Circuits

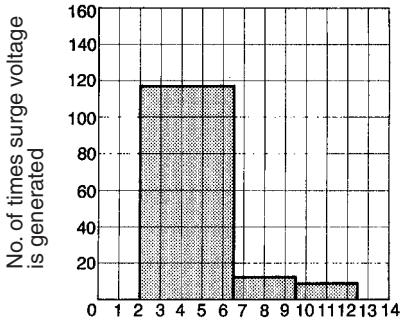
Since many documents and reference books on the power circuit are available, a detailed description is omitted here.



*In the above circuit, varistors B_1 to B_4 are used to protect the power circuit elements, as well as elements related to the power circuit, in case the voltage on the power line experiences surges (due to lightning or the surge voltage generation in other devices connected to the power circuit). Connect an appropriate surge suppressor across the output terminals of the power circuit to prevent a surge voltage from being generated and to prevent the surge voltage, if generated, from exceeding the breakdown voltage of each element in the power circuit.

**Resistor R protects diode bridge D from the inrush current that flows through the power circuit upon power application. Although the resistance of R is determined according to the resistance of the load coil and the rating of the diodes, the use of a resistor having a resistance of 0.1 to 100 Ω is recommended.

***C_1 is a smoothing capacitor. Its capacitance must be as large as possible to reduce the ripple percentage.



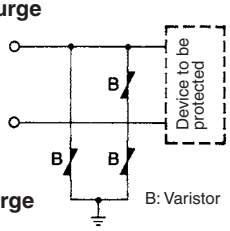
Note: This graph is plotted by measuring the surge voltage in the line of low-tension overhead wiring (cable length: 200 to 500 m).

Connection of Surge Suppressor

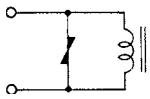
When connecting a surge suppressor, pay attention to the following points:

1. Place the surge suppressor near the device to be protected. For example, to protect a device from external surge, set the surge suppressor at the inlet of the device's power cable. To suppress an internal surge, the suppressor must be placed near the surge generating source.

External Surge



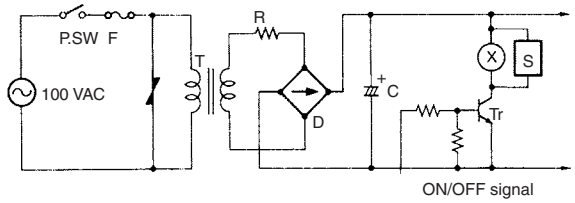
Internal Surge



L: Inductive load (relay, solenoid, etc.)

2. The cable for connecting the surge suppressor must be as short as possible in length, and thick enough in diameter, so that it can sufficiently withstand the surge current. The short length and thick diameter are important to reduce the inductance and generated voltage, and to protect the device from heat damage.
3. When using a surge suppressor between cable and ground, the lower the ground resistance of the surge suppressor, the better the protective effect of the surge suppressor. Ground at a resistance of 10 Ω or less.

Coil Power Circuit with Small Transformer



B : Varistor (supply voltage 100 VAC x /2 + a @ varis tor voltage 200 V, for cutting the noise from the pow er cable)

R : 0.1 to 100 W (for protection of rectification diode from surge current)

C : Smoothing capacitor (Aluminum electrolytic capacitor)

S : Surge suppressor

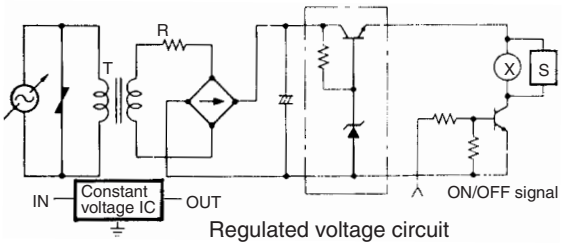
: Transistor for driving relay (Refer to Driving by transistor in Correct Use: Relays in Electronic Cir cuitry.)

X : Relay coil

Note: **1.** As much as possible, use a smoothing capacitor with a large capacitance to improve the ripple percentage.
2. Also, use a power transformer with sufficient capacity, lessen voltage fluctuation.
3. The voltage applied across the relay when Tr is ON must satisfy the conditions described in Coil switching voltage.

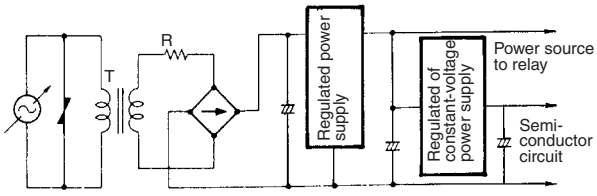
Countermeasures Against Supply Voltage Fluctuation

In case the supply voltage fluctuates heavily, insert a regulated voltage circuit or constant–voltage circuit in the application circuit as shown below.

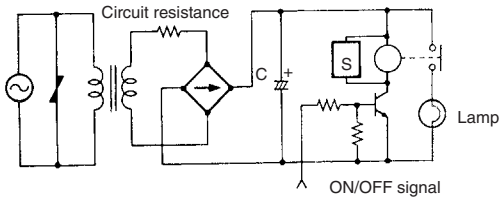


Regulated voltage circuit

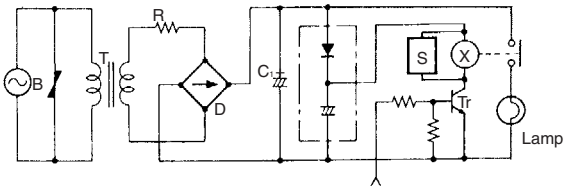
Relays consume more power than semiconductor elements. Therefore, the following circuit configuration is recommended to improve characteristics.



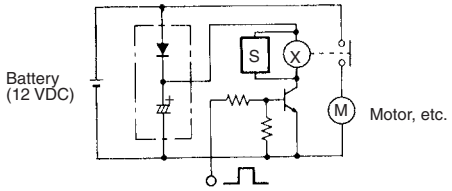
Countermeasures Against Inrush Current



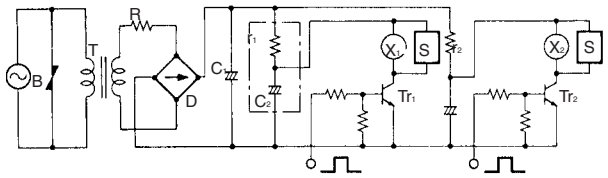
If a load such as a capacitor or lamp through which an inrush current flows is connected to the power source and contact of the relay, the supply voltage may drop when the contact is closed, causing the relay to abnormally release.
Increasing the capacity of the transformer or providing an additional smoothing circuit can be used as a preventive measure against this drop in the supply voltage. On some occasions, employment of the following circuit may also prevent voltage drop.



This same circuit also applies when the relay is driven by a battery.



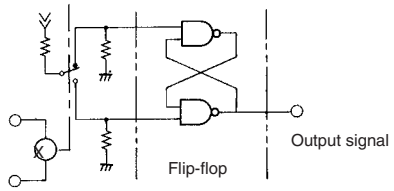
Power Consumption



This circuit is useful in reducing the power consumption at the transformer or saving overall power consumption. The resistances of r_1 and r_2 must be determined through experiment. When transistor Tr_1 turns OFF, capacitor C_2 is charged via r_1 to the supply voltage. When Tr_1 turns ON, the sum of the current discharged by C_1 and the current from the power supply via r_1 flows through relay coil X_1. When this current flows through the relay coil, exceeding the switching current of the relay for a specific period of time, the relay operates. Therefore, the power consumption of the relay can be reduced by selecting appropriate values for r1 and C_2. However, the relay cannot operate while C_2 is being charged after Tr_1 has once turned OFF.

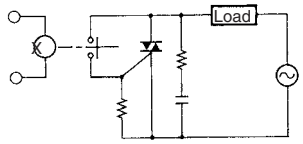
To Use Relay as Interface Input

To use a relay at the input stage of an interface, configure the following circuit to prevent the relay contacts from chattering and bouncing.



In Combination with Thyristor or Triac

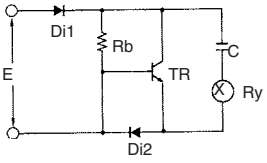
When the relay is used in combination with a thyristor or triac, the switching power of the relay can be improved. Moreover, arc and noise are suppressed, prolonging the relay's life.

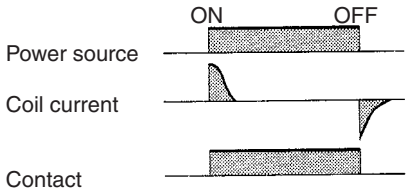


Designing Power-conserving Driver Circuit with Single-winding Latching Relay (PAT. 1239293)

This section introduces a patented drive circuit for the single-winding latching relay that can be driven on several milliwatts. This drive circuit not only allows the relay to be used in the same manner as semiconductor devices but also offers a wide range of applications.

Operating Principle





Set

When a specified voltage is applied across E, the current flows through the circuit in the sequence of diode Di1, capacitor C, relay Ry, and diode Di2. C is then changed, setting the relay.

Energization

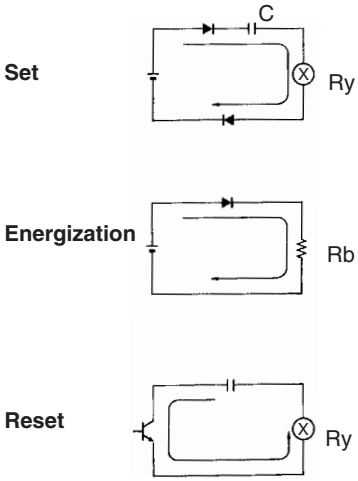
When C has been fully charged, the relay is biased by the current flow from Di1 to Rb. C does not discharge. The power consumption at this time is very small, several milliwatts at best, and its value can be calculated as follows:

$$P = \frac{(E - VF)2}{Rb}$$

where,
P:power consumption
VF:voltage drop across diode Di1
The current that is to flow through Rb at this time is dependent on the transfer ratio of transistor TR which is required for TR to turn ON.

Reset

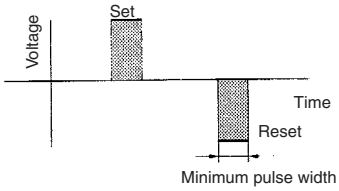
When the voltage placed across E is removed, the electrical charge in C is discharged, causing the current to flow through the circuit in the sequence of Rb, the base, and the emitter of TR. In this way, the relay is reset by the current flow in the direction opposite to that when the relay is set.
The following equivalent circuits illustrate the current flows when the relay is set, energized, and reset.



Circuit Design

Fundamental

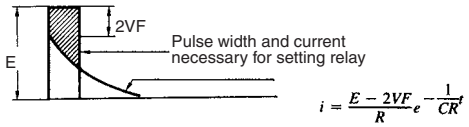
Generally, the latching relay is set and reset when a pulse having a square waveform is applied to it for a short time. The minimum pulse width required to set and reset the relay is predetermined.



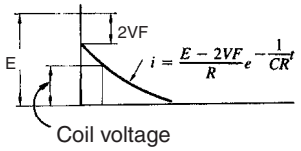
The charging current shown in the above equivalent circuit diagrams, however, has a sawtooth waveform that can be expressed by the following formula, because it is the primary circuit of C and R.

$$i = \frac{E - 2VF}{R} e^{-\frac{1}{CR}t}$$

If applied voltage E and the rated coil voltage of the relay are the same, the current to the relay falls short by the quantity indicated by the shaded portion in the following figure.

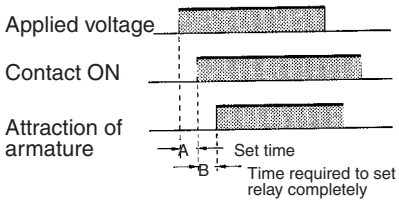


Therefore, the current must be applied to the relay as follows when designing this driver circuit.



Time Constant

When the rated voltage is applied to the relay, time A in the following timing chart is required to turn ON the contacts. After this time has elapsed, time B is required until the armature has completely been attracted to the magnet.

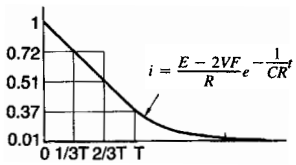


Therefore, it is apparent that time constant T obtained as the product of C and R must be equal to or longer than the sum of A and B. Actually, however, T should not be equal to the sum of A and B but must be longer than that to ensure the stable operation of the circuit. Thus,

T = A + B + X

where X is a time margin.

The set time A of OMRON's moving-loop relays (with a pickup power of 200 mV) is rated at about 3 milliseconds. Time constant T for them should be about three times that of A. The following graph illustrates this. This graph indicates that, if C is completely charged (I peak), it takes 4.6T to discharge to 1%. Note that time constant T is broken down into three segments. The first 1/3T is the time margin expressed as X in the above equation. As is evident from this, T is three times A.



Voltage drop E1 across the total resistance of the capacitance C's resistance and relay coil's internal resistance is the difference between the supply voltage E and voltage drops across two diodes: Di1 and Di2. Hence,

E1 = E - 2VF

Assuming the supply voltage to be 5 V and VF to be 0.6 V,

E1 = 5 - 2 x -0.6 = 3.8 V

From E1 and the above graph, the required coil voltage of a relay can be obtained. Again assuming the E, i.e., the supply voltage of a single-winding latching relay is 5 V, the coil voltage is as follows:

3.8 x 7.2 = 2.7 V

At this time, the capacitance of C is 246.9 μF, according to the equation shown in the graph.

Coil Ratings and Capacitance of C

In the above example, the coil voltage obtained by calculation is 2.7 V, which is 0.3 V less than the value at which the coil voltage of commercially available standard latching relay is rated. The standard coil voltage of relays at a supply voltage of 6, 9. 12, and 24 V can be calculated in the same way. The following table compares the results of the calculation and the coil voltages of standard relays.

Supply voltage	Coil voltage (calculated)	Standard voltage	Coil resistance
5 V	2.7 V	3 V	45 Ω
6 V	3.5 V	3 V	45 Ω
9 V	5.6 V	5 V	125 Ω
12 V	7.8 V	9 V	405 Ω
24 V	16.4 V	12 V	720 Ω

As is evident, the calculate coil voltages significantly deviates from the standard values. It is therefore necessary to determine the time constant of the relay by adjusting the capacitance of C when the relay coil is to operate at the standard voltage.

As an example, calculate the capacitance of C and time constant T of a relay with a rated supply voltage of 5 V. The coil voltage E, has been already calculated above (3.8 V). But to determine how much current I flows through the coil at 3.8 V from the above table, note that the coil resistance is 45 Ω. So,

I = 3.8/45 = 84.4 mA

Therefore, the peak current of capacitor C to be used must be 84.4 mA.

Remember that time A of OMRON relays is 3 ms. Capacitance C must be a value that allows 66.6 mA to flow through 3 ms after 5 V is applied to the relay. Thus,

$$66.6 = 84.4e^{-\frac{3\times10^{-3}}{c\times45}}$$

From this,

C = 280 μF

At this time, time constant T is:

280 x 10^{-6} x 45 = 12.6 ms

By calculating the C of each of the relays listed in the above table, the following values are obtained.

Supply voltage	Coil voltage (calculated)	Coil resistance	Standard voltage
5 V	2.7 V	45 Ω	280 μF
6 V	3.5 V	45 Ω	142 μF
9 V	5.6 V	125 Ω	54 μF
12 V	7.8 V	405 Ω	40 μF
24 V	16.4 V	720 Ω	6.5 μF

Again, these calculated capacitance deviate from the commercially available standard capacitors. There is no problem in using standard capacitors but, if the cost and circuit space permit, it is recommended to use two or more capacitors so that a capacitance as close to the calculated value as possible is obtained. At this time, pay attention to the following point:

Confirm that the relay operates normally even when the supply voltage is brought to 80% to 120% of the rated value.

Even if a voltage of two or three times the rated voltage is applied to this driver circuit, the coil wire will not sever. That is why, for example, when the driver circuit is mounted in an automobile where a supply voltage of 12 VDC is available from the battery, it is recommended to use a relay whose coil voltage is rate at 6 VDC, taking a voltage fluctuation of 8 to 16 VDC into consideration.

Determining Rb

The current flows into Rb should be enough to turn ON TR when the relay is reset. When determining value of Rb, the following points must be noted.

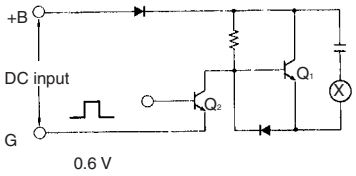
TR must be turned ON even when T equals the time constant.

Given as it its, the driver circuit introduced here can efficiently control the relay and consumes only a tiny amount power.

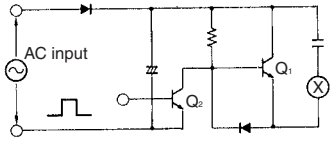
An experiment reveals that the relay sufficiently operates with a capacitance of 100 μF + 47 μF where the relay is rated at a supply voltage of 5 VDC and a coil voltage of 3 VDC. It can therefore be

said that the capacitance can be lower than the calculated value. This is because the time constant is determined with a relatively wide margin. So it is recommended to perform experiments to determine the time constant.

Application Circuit Examples



The TTL output of a solid-state switch can be used as Q_2.



Half-wave rectified AC power is applied to the circuit. Q_1 is the output of a TTL, and drives the relay.

OMRON

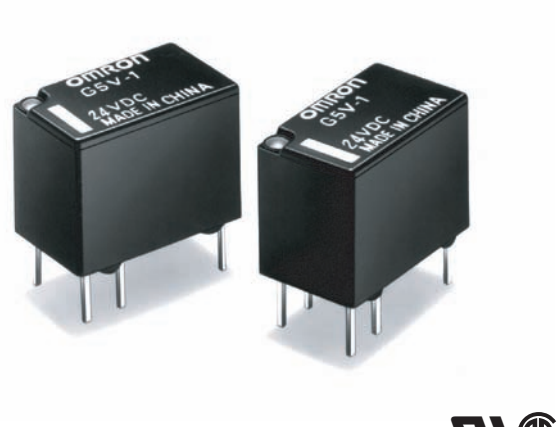
PCB Relay

G5V-1

Ultra-miniature, Highly Sensitive SPDT Relay for Signal Circuits

- Ultra-miniature at 12.5 x 7.5 x 10 mm (L x W x H).
- Wide switching power of 1 mA to 1 A.
- High sensitivity: 150-mW nominal coil power.
- Fully sealed construction.
- International 2.54-mm terminal pitch.
- Conforms to FCC Part 68 requirements for coil to contacts.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification				Model
Contact form	Contact type	Contact material	Structure	
SPDT	Single crossbar	Ag + Au-Alloy	Fully sealed	G5V-1

Note: When ordering, add the rated coil voltage to the model number.
Example: G5V-1 12 VDC
Rated coil voltage

Model Number Legend

G5V - □ □ VDC
1 2

1. **Contact Form**
   1: SPDT
2. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		50 mA	30 mA	25 mA	16.7 mA	12.5 mA	6.25 mA
Coil resistance		60 Ω	167 Ω	240 Ω	540 Ω	960 Ω	3,840 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.05	0.15	0.20	0.45	0.85	3.48
	Armature ON	0.11	0.29	0.41	0.93	1.63	6.61
Must operate voltage		80% max. of rated voltage					
Must release voltage		10% min. of rated voltage					
Max. voltage		200% of rated voltage at 23°C					
Power consumption		Approx. 150 mW					

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	0.5 A at 125 VAC; 1 A at 24 VDC
Contact material	Ag + Au-Alloy
Rated carry current	2 A
Max. switching voltage	125 VAC, 60 VDC
Max. switching current	1 A
Max. switching power	62.5 VA, 30 W
Failure rate (reference value) (See note.)	1 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 100 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Contact resistance (See note 1.)	100 mΩ max.
Operate time (See note 2.)	5 ms max. (approx. 2.5 ms)
Release time (See note 2.)	5 ms max. (approx. 0.9 ms)
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 2.)	1,000 MΩ min. (at 500 VDC between coil and contacts, at 250 VDC between contacts of same polarity.)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 400 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	1,500 V (10 x 160 μs) between coil and contacts (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 5,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (under rated load, at 1,800 operations/hr)
Ambient temperature	Operating: −40°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 2 g

Note: The values here are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.
2. Values in parantheses are actual values.
3. The insulation resistance was measured with a 500-VDC megohmmeter between coil and contacts and a 250-VDC megohmmeter between contacts with the same polarity applied to the same parts as those used for checking the dielectric strength.

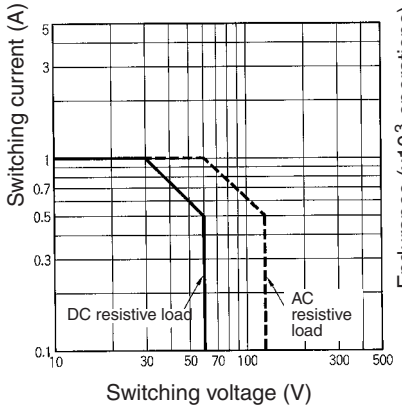
■ Approved Standards

UL1950 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR31928)

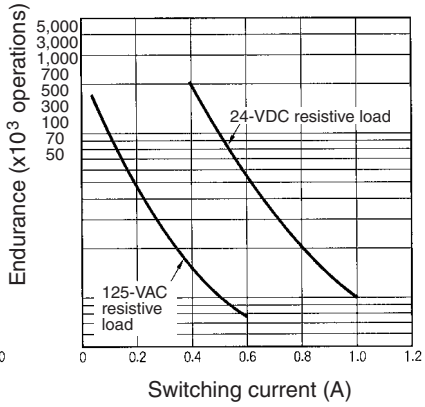
Model	Contact form	Coil ratings	Contact ratings
G5V-1	SPDT	3 to 24 VDC	0.5 A, 125 VAC (general use) 0.3 A, 110 VDC (resistive load) 1 A, 30 VDC (resistive load)

Engineering Data

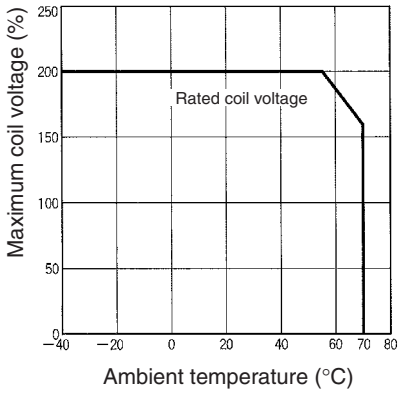
Maximum Switching Power



Endurance



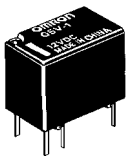
Ambient Temperature vs. Maximum Coil Voltage

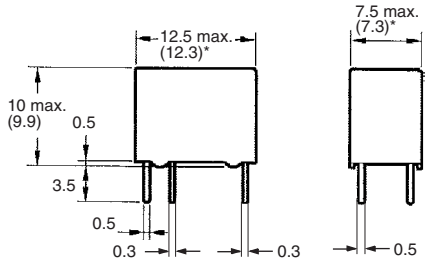


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

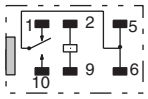
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.
2. Numbers in parentheses are reference values.
3. Tolerance: ±0.1
4. Orientation marks are indicated as follows:

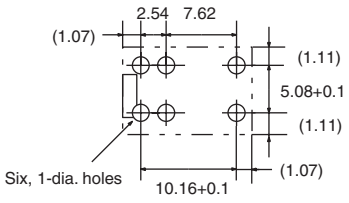




Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)



Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts, because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K048-E1-02

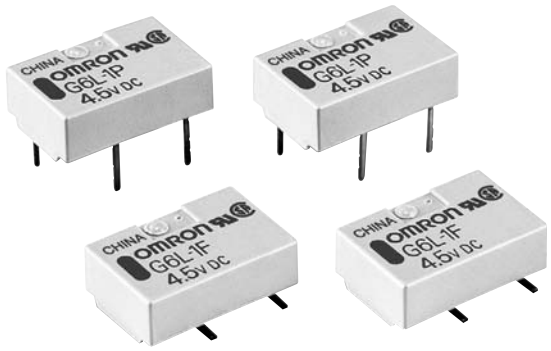
OMRON

Surface-mounting Relay | G6L

Extremely Thin SPST-NO Flat Relay, One of the Thinnest Relays in the World

- Dimensions of 7.0 (W) × 10.6 (L) × 4.5 mm (H) (SMD) or 4.1 mm (H) (TH) represent a reduction of approximately 20% in mounting area and approximately 64% in volume compared with the OMRON G5V-1, for higher-density mounting.
- Ensures a dielectric strength between coil and contacts (1,000 VAC), and conforms to FCC Part 68 (i.e., withstanding an impulse withstand voltage of 1.5 kV for 10 × 160 μs).
  High dielectric strength between contacts of same polarity (750 VAC).
- Surface-mounting relays are also available.
- Conforms to UL60950 (File No. E41515) / CSA C22.2 No. 60950 (File No. LR31928).
- Use of lead completely eliminated.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification			Single-side stable
SPST-NO	Fully sealed	PCB terminal	G6L-1P
		Surface-mounting terminal	G6L-1F

Note: **1.** When ordering, add the rated coil voltage to the model number.
Example: G6L-1P 12 VDC
└ Rated coil voltage

2. When ordering tape packing, add "-TR" to the model number.
Example: G6L-1F-TR 12 VDC
└ Tape packing
Be sure since "-TR" is not part of the relay model number, it is not marked on the relay case.

Model Number Legend:

G6L□-1□-□
1 2 3 4

1. **Relay function**
   None: Single-side stable relay
2. **Number of contact poles/ Contact form**
   1: SPST-NO
3. **Terminal shape**
   P: PCB terminals
   F: Surface-mounting terminals
4. **Packing state**
   None: Stick packing
   TR: Tape packing

Application Examples

Peripherals of MODEM/PC, telephones, office automation machines, audio-visual products, communications equipment, measurement devices, amusement equipment, or security equipment.

Specifications

■ Contact Ratings

Item / Load	Resistive load
Contact mechanism	Single crossbar
Rated load	0.3 A at 125 VAC, 1 A at 24 VDC
Rated carry current	1 A
Max. switching voltage	125 VAC, 60 VDC
Max. switching current	1 A

■ Coil Ratings

Single-side Stable Relays (G6L-1P, G6L-1F)

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	60.0 mA	40.0 mA	36.0 mA	15.0 mA	9.6 mA
Coil resistance	50.0 Ω	112.5 Ω	139.0 Ω	800.0 Ω	2,504.0 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Maximum voltage	150% of rated voltage				130% of rated voltage
Power consumption	Approx. 180 mW				Approx. 230 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

4. The voltage measurements for operate/release are the values obtained for instantaneous changes in the voltage (rectangular wave).

■ Characteristics

Classification / Item / Model		Single-side Stable Relays G6L-1P, G6L-1F
Contact resistance (See note 1.)		100 mΩ max.
Operating time (See note 2.)		5 ms max. (approx. 1.1 ms)
Release time (See note 2.)		5 ms max. (approx. 0.4 ms)
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)
Dielectric strength	**Coil and contacts**	1,000 VAC, 50/60 Hz for 1 min
	Contacts of same polarity	750 VAC, 50/60 Hz for 1 min
Impulse withstand voltage	**Coil and contacts**	1,500 VAC, 10 × 160 μs
Vibration resistance	**Destruction**	10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
	Malfunction	10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock resistance	**Destruction**	1,000 m/s^2
	Malfunction	100 m/s^2
Endurance	**Mechanical**	5,000,000 operations min. (at 36,000 operations/hour)
	Electrical	100,000 operations min. (with a rated load at 1,800 operations/hour)
Failure rate (P level) (See note 4.)		1 mA at 5 VDC
Ambient temperature		Operating: -40°C to 70°C (with no icing or condensation)
Ambient humidity		Operating: 5% to 85%
Weight		Approx. 0.6 g

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

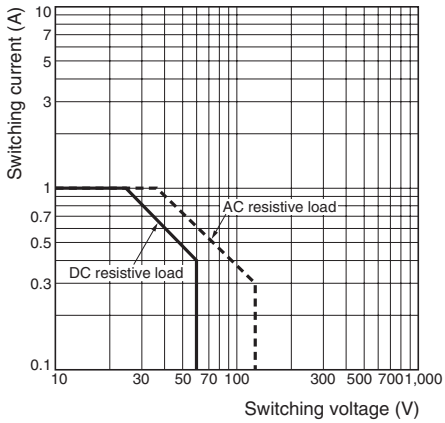
2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC Megger Tester applied to the same parts as those used for checking the dielectric strength.

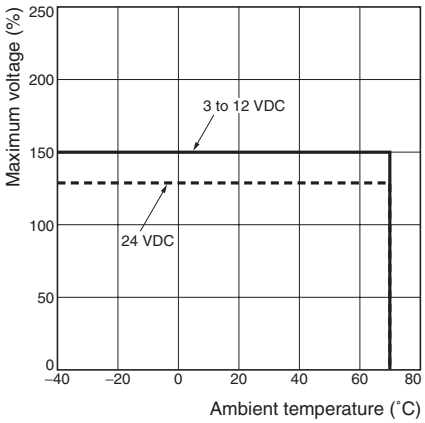
4. This value was measured at a switching frequency of 120 operations/min. This value may vary, depending on switching frequency, operating conditions, expected reliability level of the relay, etc. It is always recommended to double-check relay suitability under actual load conditions.

Engineering Data

Maximum Switching Capacity

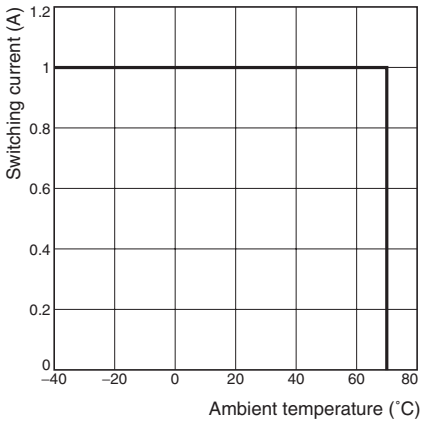


Ambient Temperature vs. Maximum Voltage

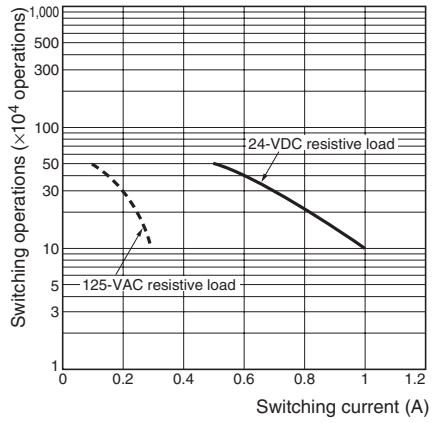


Note: "Maximum voltage" is the maximum voltage that can be applied to the Relay coil.

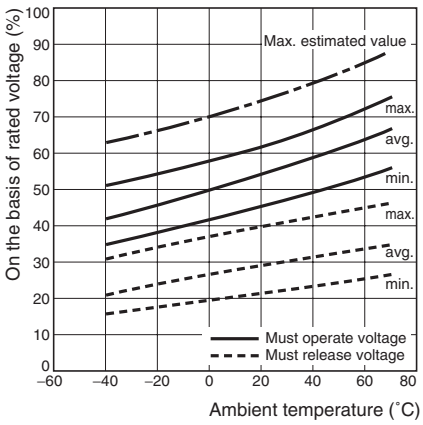
Ambient Temperature vs. Switching Current



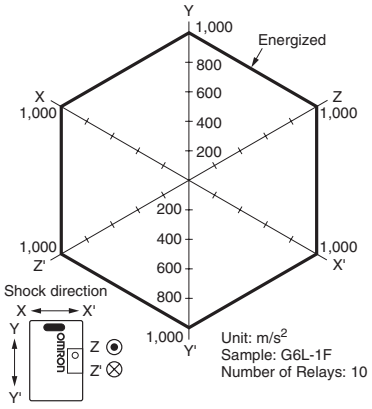
Endurance



Ambient Temperature vs. Must Operate or Must Release Voltage

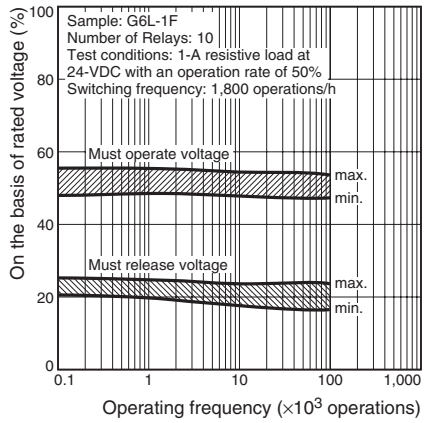


Shock Malfunction

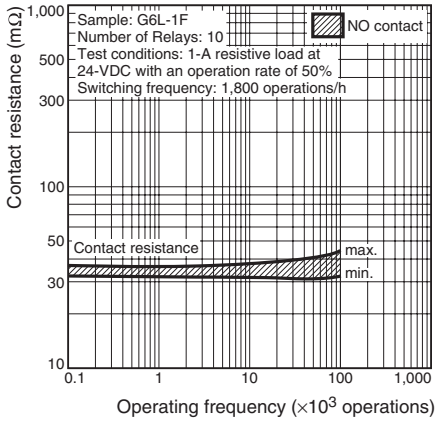


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

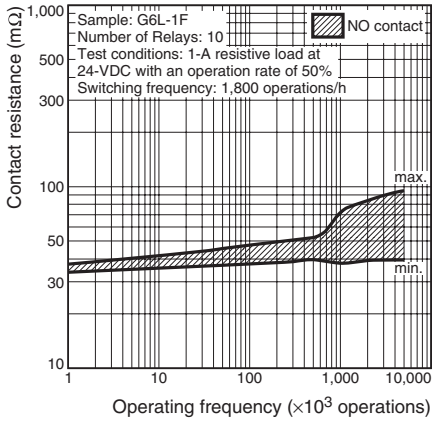
Electrical Endurance (with Must Operate and Must Release Voltage) (See note 1.)



Electrical Endurance (Contact Resistance) (See note 1.)



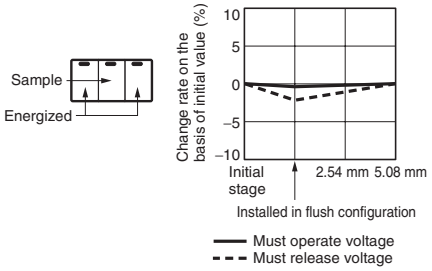
Contact Reliability Test (Contact Resistance) (See notes 1 and 2.)



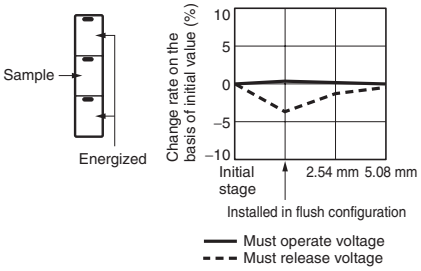
Note: **1.** The tests were conducted at an ambient temperature of 23ºC.

2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

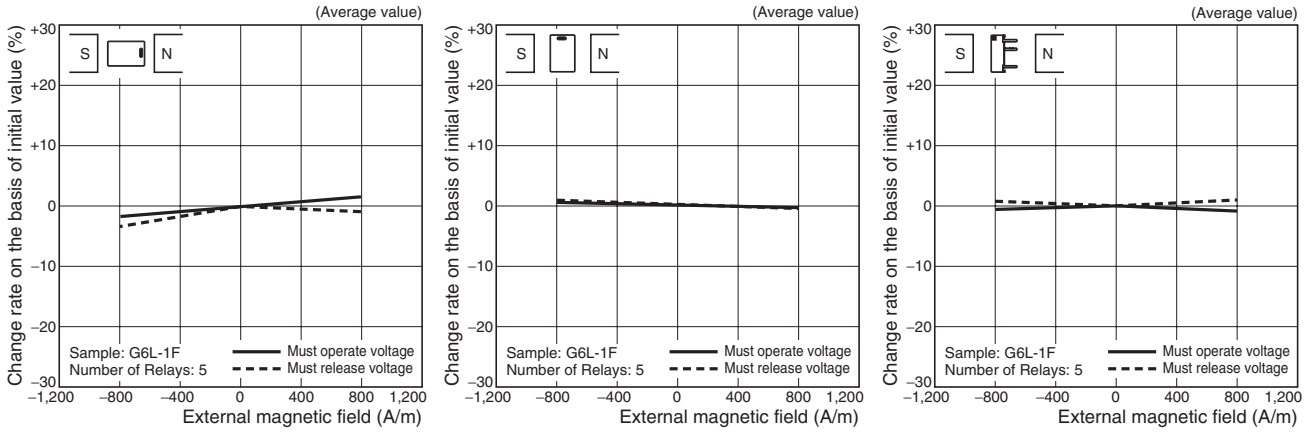
Mutual Magnetic Interference



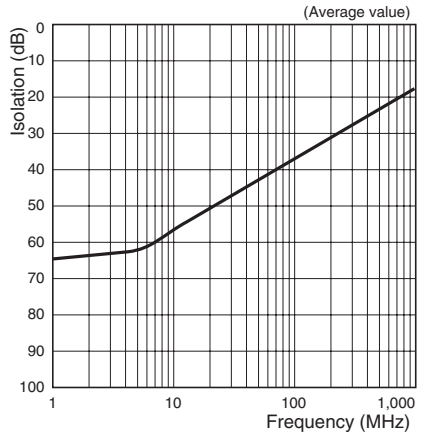
Mutual Magnetic Interference



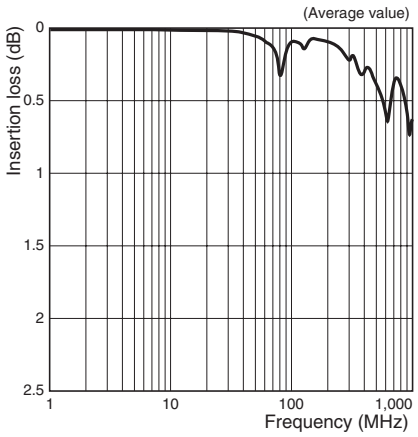
External Magnetic Interference



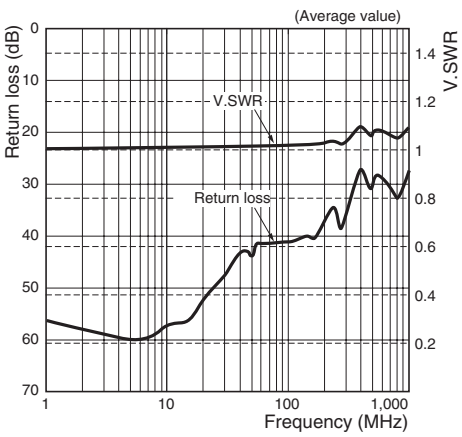
High-frequency Characteristics (Isolation) (See note.)



High-frequency Characteristics (Insertion Loss) (See note.)

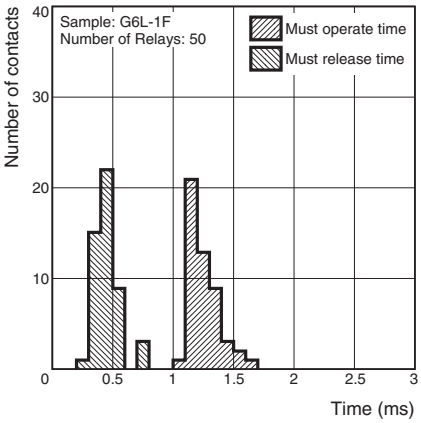


High-frequency Characteristics (Return Loss, V.SWR) (See note.)

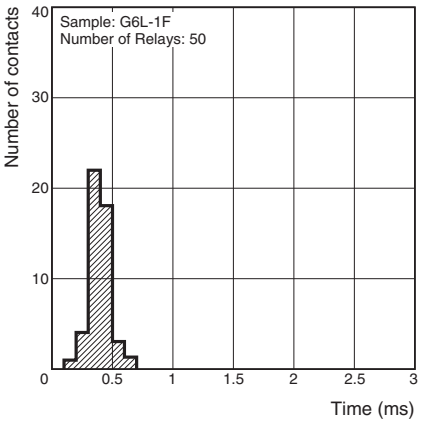


Note: High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

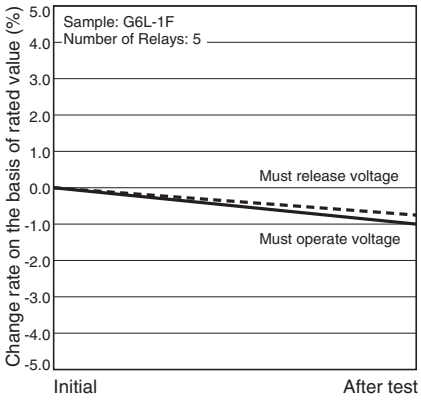
Must Operate and Must Release Time Distribution (See note.)



Distribution of Bounce Time (See note.)



Vibration Resistance

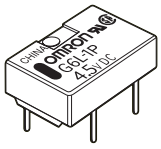


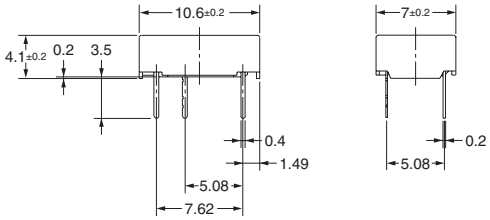
Note: The tests were conducted at an ambient temperature of 23ºC.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

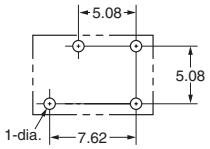
G6L-1P



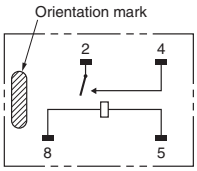


PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm

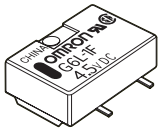


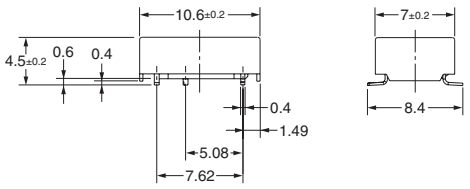
Terminal Arrangement/ Internal Connections (Bottom View)



Note: Each value has a tolerance of ±0.3 mm.

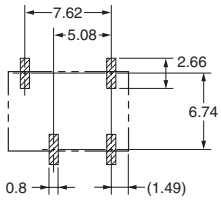
G6L-1F



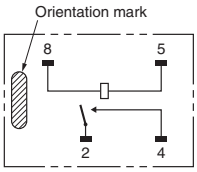


PCB Mounting Holes (Top View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Top View)



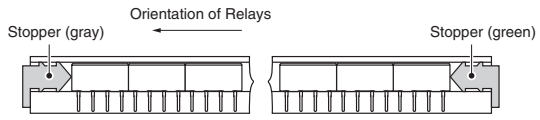
Note: Each value has a tolerance of ±0.3 mm.

Stick Packing and Tape Packing

1. Stick Packing

Relays in stick packing are arranged so that the orientation mark of each Relay is on the left side.

Always confirm that the Relays are in the correct orientation when mounting the Relays to the PCBs.



Stick length: 552 mm (stopper not included)

No. of Relays per stick: 50

2. Tape Packing (Surface-mounting Terminal Relays)

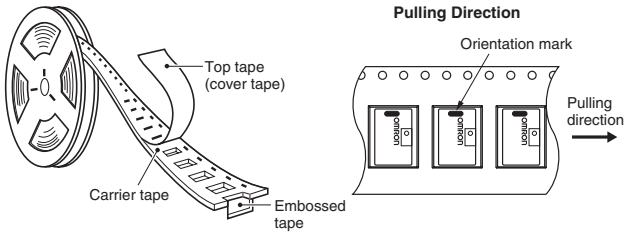
When ordering Relays in tape packing, add the suffix "-TR" to the model number, otherwise the Relays in stick packing will be provided.

Tape type: TB2412R (Refer to EIAJ (Electronic Industries Association of Japan))

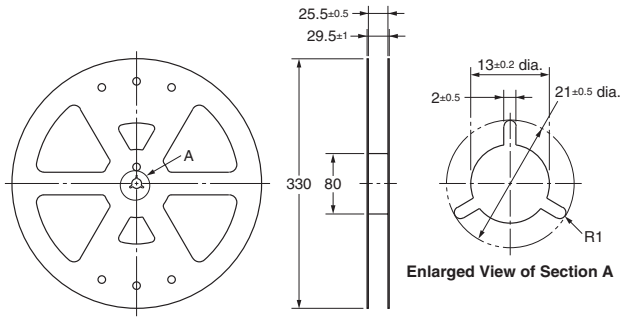
Reel type: R24D (Refer to EIAJ (Electronic Industries Association of Japan))

Relays per reel: 1,000

Direction of Relay Insertion

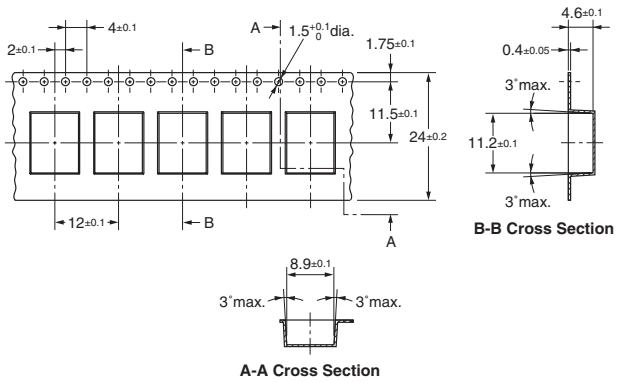


Reel Dimensions



Carrier Tape Dimensions

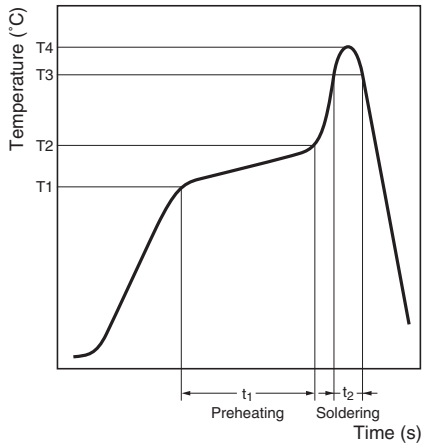
G6L-1F



Recommended Soldering Method

Temperature Profile According to IRS

- When performing reflow-soldering, check the profile on an actual device after setting the temperature condition so that the temperatures at the relay terminals and the upper surface of the case do not exceed the limits specified in the following table.



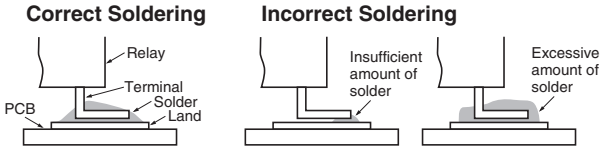
Mounting Solder: Lead

Item / Measuring position	Preheating (T1 to T2, t_1)	Soldering (T3, t_2)	Peak value (T4)
Terminal	150°C to 180°C, 120 s max.	180°C to 200°C, 20 to 30 s	245°C max.
Upper surface of case	---	---	250°C max.

Mounting Solder: Lead-free

Item / Measuring position	Preheating (T1 to T2, t_1)	Soldering (T3, t_2)	Peak value (T4)
Terminal	150°C to 180°C, 120 s max.	230°C min., 30 s max.	250°C max.
Upper surface of case	---	---	255°C max.

- The thickness of cream solder to be applied should be within a range between 150 and 200 μm on OMRON's recommended PCB pattern.



Visually check that the Relay is properly soldered.

■ Approved Standards

UL approval: UL60950 (File No. E41515)

CSA approval: C22.2 No.60950 (File No. LR31928)

Contact form	Coil rating	Contact rating	Number of test operations
SPST-NO	G6L-1P and G6L-1F: 3 to 24 VDC	1A at 30 VDC 0.5A at 60 VDC 0.3A at 125 VAC	6,000

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

Correct Use

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40ºC. Do not put the Relay in a cold cleaning bath immediately after soldering.

Soldering

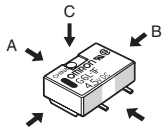
Soldering temperature: Approx. 250ºC (At 260ºC if the DWS method is used.)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Insertion

During automatic insertion of Relays, make sure to set the securing force of the claws to the following values so that the Relay characteristics will be maintained.



Direction A: 5.0 N max.
Direction B: 5.0 N max.
Direction C: 5.0 N max.

Secure the claws to the area indicated by shading.
Do not attach them to the center area or to only part of the Relay.

Environmental Conditions During Operation, Storage, and Transportation

Protect the Relays from direct sunlight and keep the Relays under normal temperature, humidity, and pressure.

Maximum Voltage

The maximum voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting.) The maximum voltage also involves important restrictions which include the following:

- Must not cause thermal changes in or deterioration of the insulating material.
- Must not cause damage to other control devices.
- Must not cause any harmful effect on people.
- Must not cause fire.

Therefore, be sure not to exceed the maximum voltage specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than the maximum voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase thus affecting characteristics such as electrical life and resulting in the deterioration of coil insulation.

Coating

Relays mounted on PCBs may be coated or washed. Do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relays.

Coil Power Supply Waveform

If the voltage applied to the coil is increased or decreased gradually, operating characteristics may be unstable, contact endurance may decline, or the Relay may not function at its full performance level. Therefore, always use an instantaneous ON and instantaneous OFF when applying the voltage. Be sure that the rated voltage or zero voltage is reached within 1 ms.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K119-E1-02

OMRON

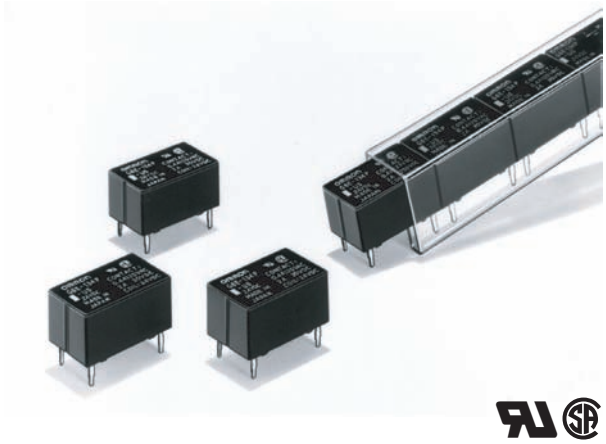
PCB Relay

G6E

Subminiature, Sensitive SPDT Signal Switching Relay

- High sensitivity: 98-mW pickup coil power.
- Impulse withstand voltage meets FCC Part 68 requirements.
- Fully sealed construction.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce time.
- Single- and double-winding latching types also available.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Contact form		Terminal	Single-side stable	Single-winding latching	Double-winding latching
SPDT	Bifurcated crossbar	Straight terminal	G6E-134P-US	G6EU-134P-US	G6EK-134P-US
		Self-clinching terminal	G6E-134C-US	G6EU-134C-US	G6EK-134C-US

Note: When ordering, add the rated coil voltage to the model number.
Example: G6E-134P-US 12 VDC
Rated coil voltage

Model Number Legend

G6E □ - □ □ □ □ □ - □ - □ □ **VDC**
1 2 3 4 5 6 7 8 9

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   1: SPDT
3. **Contact Type**
   3: Bifurcated crossbar Ag (Au-Alloy) contact
   9: Bifurcated crossbar AgNi (Au-Alloy) contact
4. **Enclosure Ratings**
   4: Fully sealed
5. **Terminals**
   P: Straight PCB
   C: Curved tail
6. **Special Function**
   L: Low sensitivity coil (400 mW)
7. **Approved Standards**
   US: UL, CSA certified
8. **Special Function**
   U: For ultrasonically cleanable
9. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Single-side Stable, Bifurcated Crossbar Contact Type

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA	8.3 mA
Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω	5,760 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.08	0.18	0.31	0.62	1.20	4.70	5.35
	Armature ON	0.06	0.17	0.24	0.50	0.99	3.90	5.12
Must operate voltage		70% max. of rated voltage						
Must release voltage		10% min. of rated voltage						
Max. voltage		190% of rated voltage at 23°C						170% of rated voltage at 23°C
Power consumption		Approx. 200 mW						Approx. 400 mW

Single-winding Latching, Bifurcated Crossbar Contact Type

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA
Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.05	0.13	0.19	0.45	0.84	3.56
	Armature ON	0.04	0.12	0.17	0.40	0.79	3.10
Must set voltage		70% max. of rated voltage					
Must reset voltage		70% max. of rated voltage					
Max. voltage		190% of rated voltage at 23°C					
Power consumption		Approx. 200 mW					

Double-winding Latching, Bifurcated Crossbar Contact Type

Rated voltage			3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Set coil	**Rated current**		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA
	Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω
	Coil inductance (H) (ref. value)	**Armature OFF**	0.03	0.09	0.12	0.25	0.44	1.66
		Armature ON	0.03	0.08	0.11	0.22	0.41	1.62
Reset coil	**Rated current**		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA
	Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω
	Coil inductance (H) (ref. value)	**Armature OFF**	0.03	0.09	0.12	0.25	0.44	1.66
		Armature ON	0.03	0.08	0.11	0.22	0.41	1.62
Must set voltage			70% max. of rated voltage					
Must reset voltage			70% max. of rated voltage					
Max. voltage			190% of rated voltage at 23°C					
Power consumption			Set coil: Approx. 200 mW Reset coil: Approx. 200 mW					

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	0.4 A at 125 VAC; 2 A at 30 VDC	0.2 A at 125 VAC; 1 A at 30 VDC
Contact material	Ag (Au-Alloy)	
Rated carry current	3 A	
Max. switching voltage	250 VAC, 220 VDC	
Max. switching current	3 A	3 A
Max. switching power	50 VA, 60 W	25 VA, 30 W
Failure rate (reference value) (See note.)	10 μA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Contact resistance (See note 1.)	50 mΩ max.
Operate (set) time (See note 2.)	5 ms max. (approx. 2.9 ms; 48 VDC type: approx. 2.4 ms)
Release (reset) time (See note 2.)	5 ms max. (approx. 1.3 ms)
Min. set/reset signal width	Latching type: 15 ms min. (at 23°C)
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3.)	1,000 MΩ min. (at 500 VDC)
Dielectric withstand voltage	1,500 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	1,500 V (10 x 160 μs) (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 2.5-mm single amplitude (5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 300 m/s^2
Endurance	Mechanical: 100,000,000 operations min. (at 36,000 operations/hr) Electrical: 100,000 operations min. (0.4 A at 125 VAC resistive load; 0.2 A at 125 VAC inductive load) 500,000 operations min. (2 A at 30 VDC resistive load; 1 A at 30 VDC inductive load) 200,000 operations min. (3 A at 30 VDC resistive load)
Ambient temperature	Operating: −40°C to 70°C (with no icing)
Ambient humidity	5% to 85%
Weight	Approx. 2.7 g

Note: The values here are initial values.

Note: **1.** The contact resistance was measured with 1 A at 5 VDC using a voltage-drop method.

2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

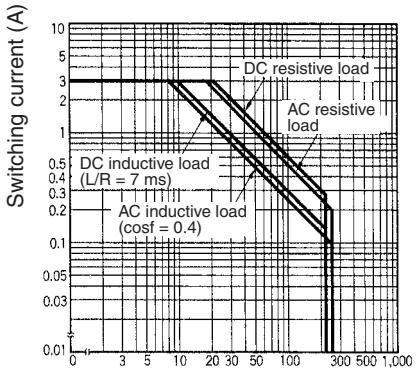
■ Approved Standards

UL508 (File No. E41515)/CSA C22.2, No.14 (File No. LR31928)

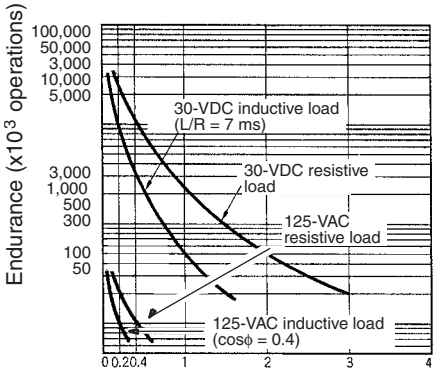
Contact form	Coil ratings	Contact ratings
SPDT	3 to 48 VDC	0.2 A, 250 VAC (general use) 0.6 A, 125 VAC (general use) 2 A, 30 VDC (resistive) 0.6 A, 125 VDC (resistive, Ag contact only)

Engineering Data

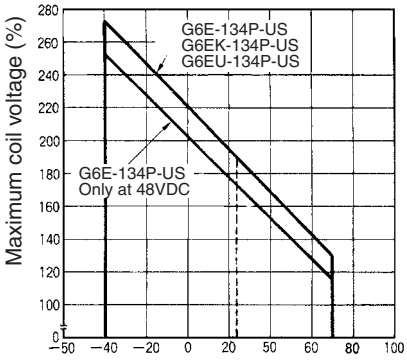
Maximum Switching Power



Endurance



Ambient Temperature vs. Maximum Coil Voltage



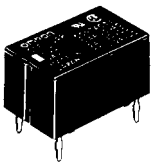
Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

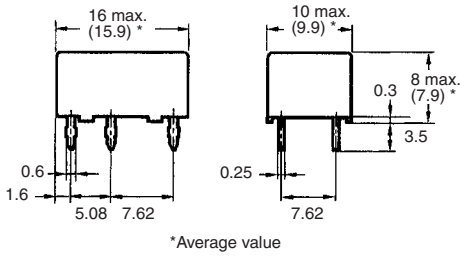
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

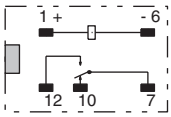
G6E-134P-US
G6E-194P-US





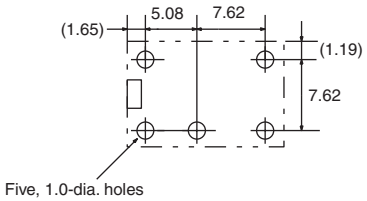
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

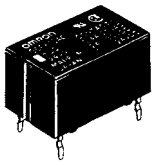


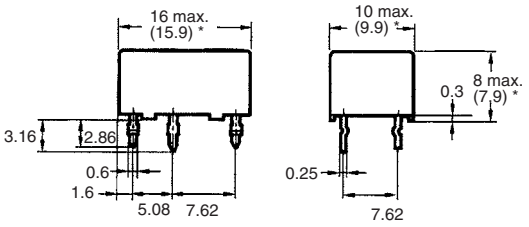
Mounting Holes (Bottom View)

Tolerance: ±0.1



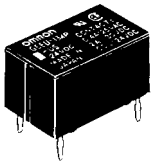
G6E-134C-US
G6E-194C-US

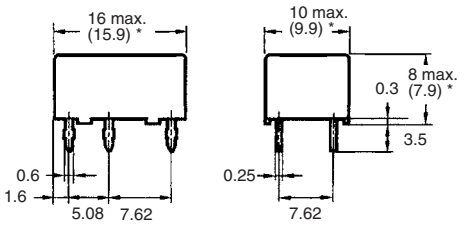




*Average value

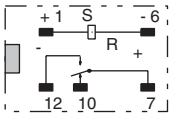
G6EU-134P-US
G6EU-194P-US





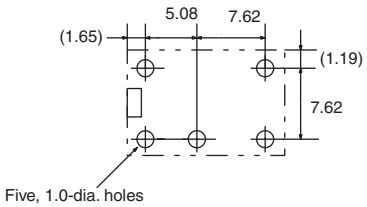
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

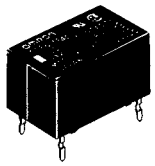


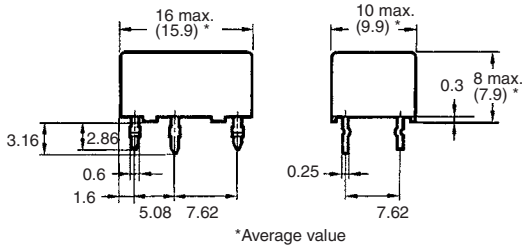
Mounting Holes (Bottom View)

Tolerance: ±0.1



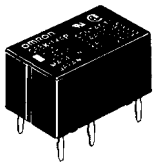
G6EU-134C-US
G6EU-194C-US

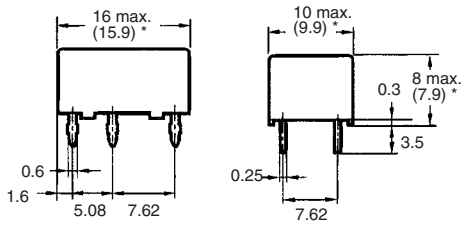




*Average value

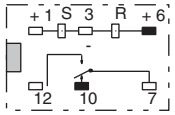
G6EK-134P-US
G6EK-194P-US





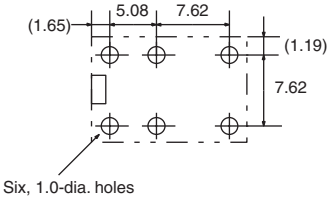
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

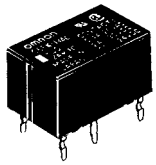


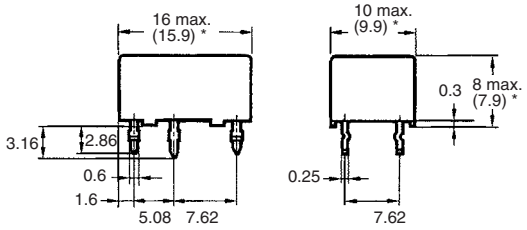
Mounting Holes (Bottom View)

Tolerance: ±0.1



G6EK-134C-US
G6EK-194C-US





*Average value

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

■ Precautions for Correct Use

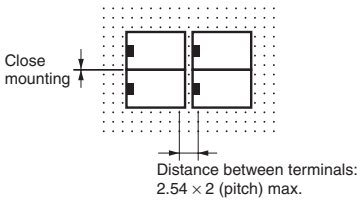
Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Installation

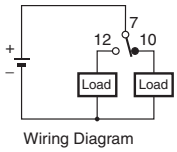
Do not reverse the polarity of the coil (+, -).

Provide sufficient space between Relays when mounting two or more on the same PCB, as shown in the following diagram.



Wiring

Refer to the following diagram when wiring to switch a DC load. The difference in polarity applied to the contacts will affect the endurance of the Relay due to the amount of contact movement. To extend the endurance characteristics beyond the performance ratings, wire the common (pin 7) terminal to the positive (+) side.



Wiring Diagram

Ultrasonic Cleaning

Do not use ultrasonic cleaning on standard relay models. Doing so may result in resonance, coil burnout, and contact adhesion within the Relay. Use a model designed for ultrasonic cleaning if ultrasonic cleaning is required.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K024-E1-06

OMRON

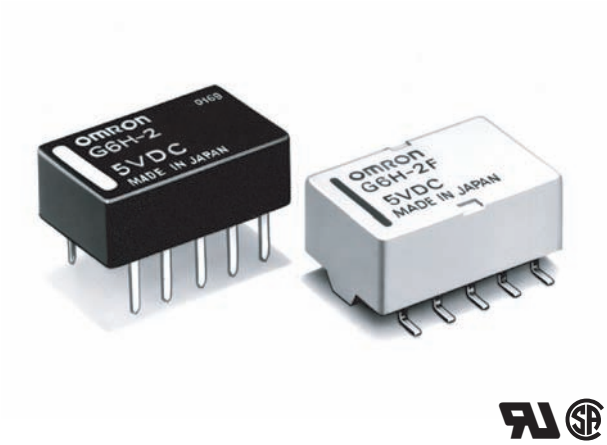
PCB Relay

G6H

Ultra-compact, Ultra-sensitive DPDT Relay

- Compact size and low 5-mm profile.
- Low power consumption (140 mW for single-side stable, 100 to 300 mW for latching type) and high sensitivity.
- Low thermoelectromotive force.
- Low magnetic interference enables high-density mounting.
- Single- and double-winding latching types also available.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification			Single-side stable	Single-winding latching	Double-winding latching
DPDT	Fully sealed	PCB terminal	G6H-2	G6HU-2	G6HK-2
		Surface mount terminal	G6H-2F	---	---

Note: When ordering, add the rated coil voltage to the model number.
Example: G6HK-2 12 VDC
Rated coil voltage

Model Number Legend

G6H □ - □ □ - □ □ VDC
1 2 3 4 5

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   2: DPDT
3. **Terminal Shape**
   None: PCB terminal
   F: Surface mount terminal
4. **Classification**
   U: Ultrasonically cleanable
5. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24 VDC

Specifications

■ Coil Ratings

Single-side Stable Type (G6H-2, G6H-2F)

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		46.7 mA	28.1 mA	23.3 mA	15.5 mA	11.7 mA	8.3 mA	5.8 mA
Coil resistance		64.3 Ω	178 Ω	257 Ω	579 Ω	1,028 Ω	2,880 Ω	8,228 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.025	0.065	0.11	0.24	0.43	1.2	---
	Armature ON	0.022	0.058	0.09	0.20	0.37	1.0	---
Must operate voltage		75% max. of rated voltage						
Must release voltage		10% min. of rated voltage						
Max. voltage		200% of rated voltage at 23°C					170% of rated voltage at 23°C	140% of rated voltage at 23°C
Power consumption		Approx. 140 mW					Approx. 200 mW	Approx. 280 mW

Note:
1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C with a tolerance of ±10%.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.
4. The maximum voltage that can be be applied when using the G6H-2F (at 85°C) is 115% (3 to 12 V) or 105% (24 V) of the rated voltage.

Single-winding Latching Type (G6HU-2)

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		33.3 mA	20 mA	16.7 mA	11.1 mA	8.3 mA	6.25 mA
Coil resistance		90 Ω	250 Ω	360 Ω	810 Ω	1,440 Ω	3,840 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.034	0.11	0.14	0.33	0.60	1.6
	Armature ON	0.029	0.09	0.12	0.28	0.50	1.3
Must operate voltage		75% max. of rated voltage					
Must release voltage		75% min. of rated voltage					
Max. voltage		180% of rated voltage at 23°C					
Power consumption		Approx. 100 mW					Approx. 150 mW

Double-winding Latching Type (G6HK-2)

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	12.5 mA
Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	1,920 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.014	0.042	0.065	0.16	0.3	0.63
	Armature ON	0.0075	0.023	0.035	0.086	0.16	0.33
Must operate voltage		75% max. of rated voltage					
Must release voltage		75% min. of rated voltage					
Max. voltage		160% of rated voltage at 23°C					130% of rated voltage at 23°C
Power consumption		Approx. 200 mW					Approx. 300 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	0.5 A at 125 VAC; 1 A at 30 VDC
Contact material	Ag (Au-Alloy)
Rated carry current	1 A
Max. switching voltage	125 VAC, 110 VDC
Max. switching current	1 A
Max. switching power	62.5 VA, 33 W
Failure rate (reference value) (See note.)	10 μA at 10 mVDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Contact resistance (See note 1.)	50 mΩ max. (G6H-2-U: 100 mΩ max.; G6H-2F: 60 mΩ max.)
Operate (set) time (See note 2.)	Single-side stable types: 3 ms max. (approx. 2 ms) Latching types: 3 ms max. (approx. 1.5 ms)
Release (reset) time (See note 2.)	Single-side stable types: 2 ms max. (approx. 1 ms) Latching types: 3 ms max. (approx. 1.5 ms)
Min. set/reset signal width	Latching type: 5 ms min. (at 23°C)
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3.)	1,000 MΩ min. (at 500 VDC)
Dielectric withstand voltage	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 750 VAC, 50/60 Hz for 1 min between contacts of same polarity 125 VAC, 50/60 Hz for 1 min between set and reset coil (only G6HK-2)
Impulse withstand voltage	1,500 V (10 x 160 μs) between contacts of same polarity (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 2.5-mm single amplitude (5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 500 m/s^2
Endurance	Mechanical: 100,000,000 operations min. (at 36,000 operations/hr) Electrical: 200,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: −40°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 1.5 g

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.

2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength. (The insulation resistance between the set and reset coil (G6HK-2 only), however, is 100 MΩ min. when measured with a 125-VDC megohmmeter.)

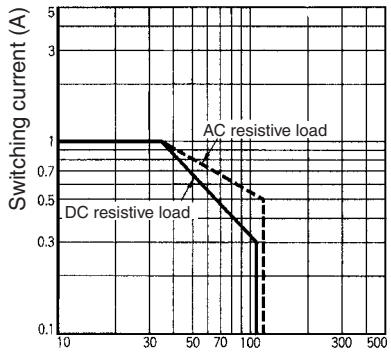
■ Approved Standards

UL114, UL478 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR31928)

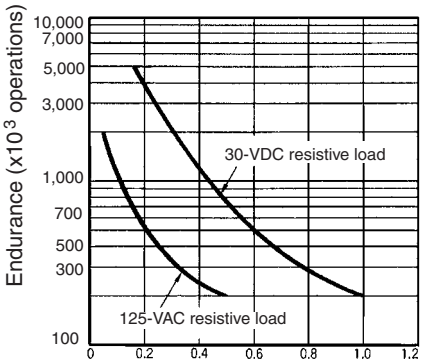
Model	Contact form	Coil ratings	Contact ratings
G6H-2 G6HU-2 G6HK-2 G6H(U/K)-2-U G6H(U/K)-2-100	DPDT	1.5 to 48 VDC	2 A, 30 VDC 0.3 A, 110 VDC 0.5 A, 125 VAC

Engineering Data

Maximum Switching Power

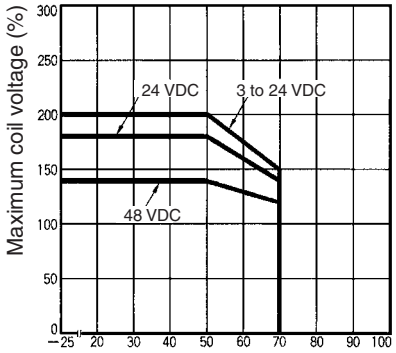


Endurance

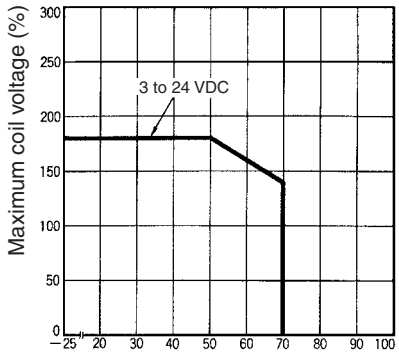


Ambient Temperature vs. Maximum Coil Voltage

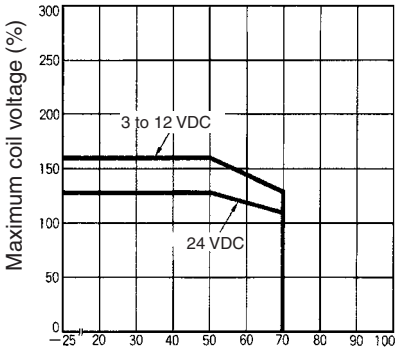
Single-side Stable (G6H-2)



Single-winding Latching (G6HU-2)



Double-winding Latching (G6HK-2)

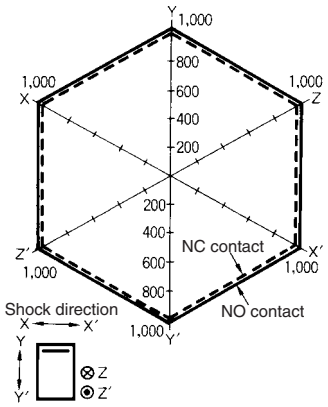


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Malfunctioning Shock Resistance (G6H-2)

5 VDC

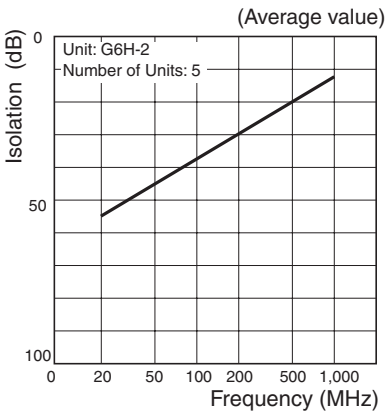
Number of Units: 10



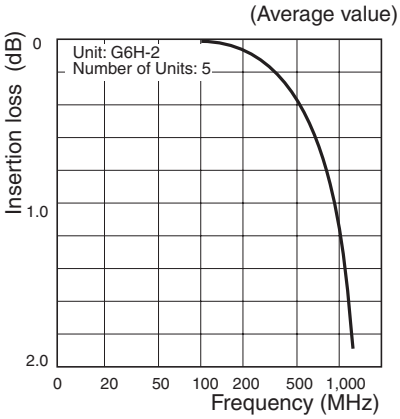
Condition: The Units were shocked at the rate of 500 m/s^2 three times each in the ±X, ±Y, and ±Z directions with and without voltage imposed on the Units until the Units malfunctioned.

High-frequency Characteristics (See notes 1 and 2.)

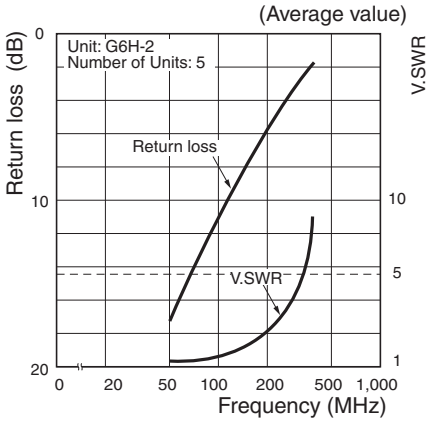
Frequency vs. Isolation



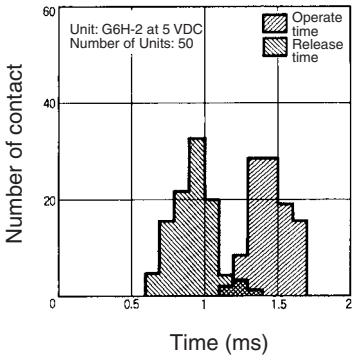
Frequency vs. Insertion Loss



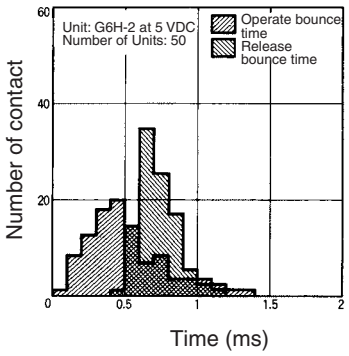
Frequency vs. Return Loss, V.SWR



Distribution of Operate and Release Time (See note 1.)



Distribution of Bounce Time (See note 1.)



Note: **1.** The ambient temperature is 23°C.

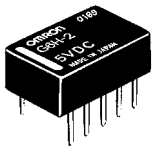
2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

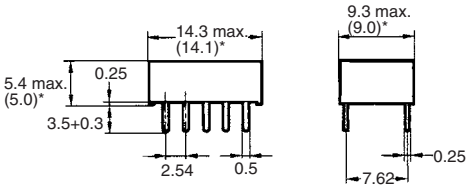
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

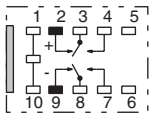
Single-side Stable Type
G6H-2(-U)





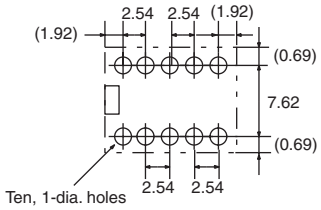
* Average value

Terminal Arrangement/ Internal Connections (Bottom View)

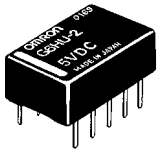


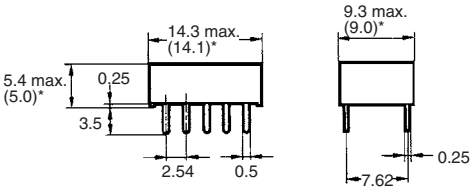
Mounting Holes (Bottom View)

Tolerance: ±0.1

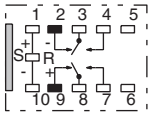


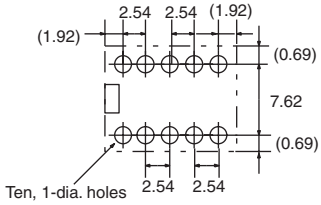
Single-winding Latching Type
G6HU-2(-U)



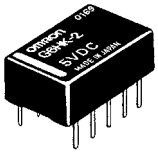


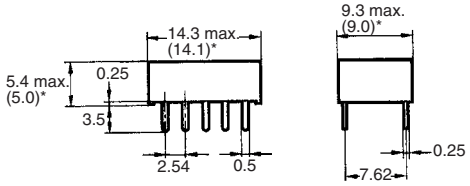
* Average value



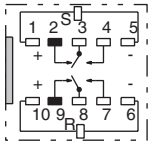


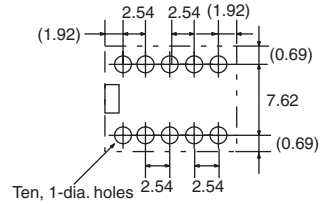
Double-winding Latching Type
G6HK-2(-U)



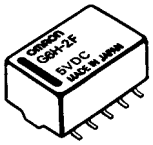


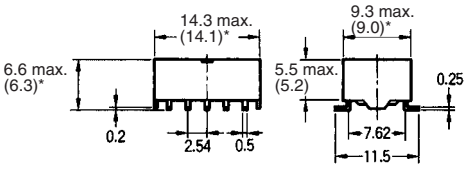
* Average value





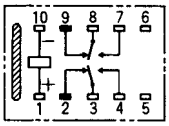
Single-side Stable Type
G6H-2F





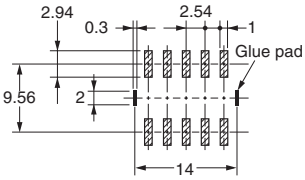
* Average value

Terminal Arrangement/ Internal Connections (Top View)



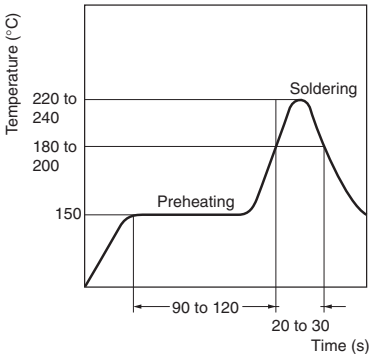
Mounting Holes (Top View)

Tolerance: ±0.1



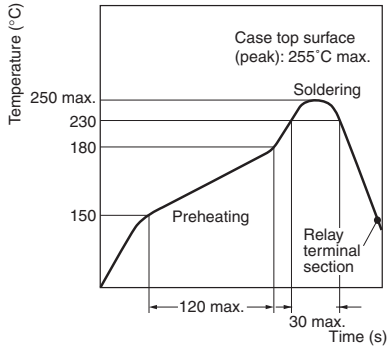
■ Example of Recommended Soldering Conditions for the G6H-2F (Surface Mounting Terminal Relays)

(1) IRS Method (Mounting Solder: Lead)



Note: The temperature profile indicates the temperature on the PCB.

(2) IRS Method (Mounting Solder: Lead-free)



Note: The temperature profile indicates the temperature on the relay terminal.

■ Approved Standards

The approved rated values for international standards differ from the performance characteristics of the individual models. Be sure to confirm that required standards are satisfied before actual use.

UL114, UL478 (File No. E41515)

Model	No. of poles	Coil rating	Contact rating	No. of operations
G6H-2(F)	2	1.5 to 48 VDC	2 A, 30 VDC	6,000
			0.3 A, 110 VDC	
			0.5 A, 125 VAC	

CSA Standard C22.2, No.0, No. 14 (File NO. LR31928)

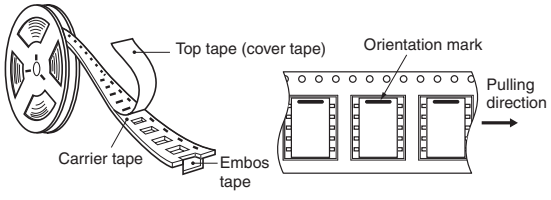
Model	No. of poles	Coil rating	Contact rating	No. of operations
G6H-2(F)	2	1.5 to 48 VDC	2 A, 30 VDC	6,000
			0.3 A, 110 VDC	
			0.5 A, 125 VAC	

■ Tape Packing (Surface Mounting Terminal Models)

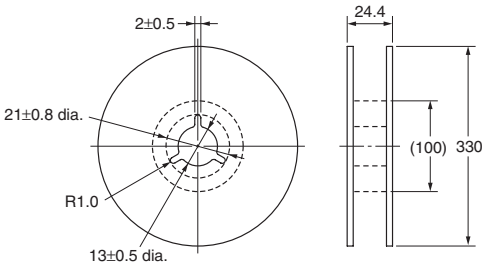
When ordering Relays in tape packing, add the prefix "-TR" to the model number otherwise the Relays in stick packing will be provided.

Relays per Reel: 500

Direction of Relay Insertion

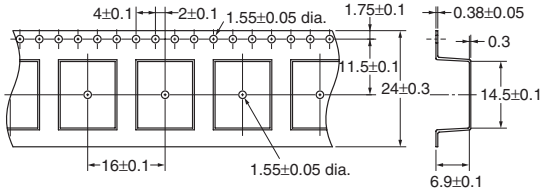


Reel Dimensions



Carrier Tape Dimensions

G6H-2F



■ Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

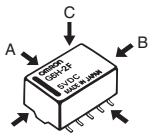
Precautions for Correct Use

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



Direction A: 1.96 N max.
Direction B: 4.90 N max.
Direction C: 1.96 N max.

Relay Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may deteriorate and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and seal the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

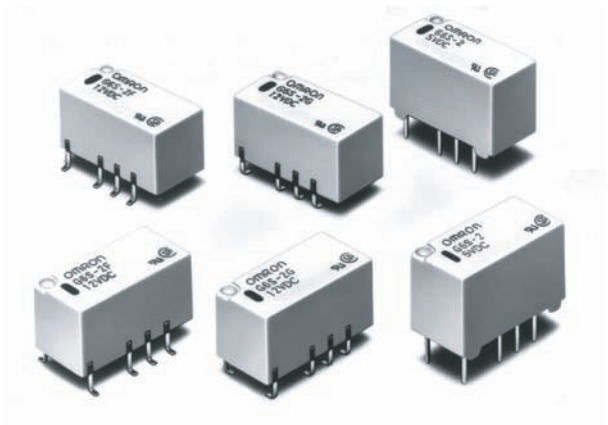
Cat. No. K042-E1-06A

OMRON

PCB Relay

G6S

Surface Mounting DPDT Relay



- Long terminals for ideal for soldering and mounting reliability.
- Space-saving inside-L terminal.
- High dielectric strength between coil and contacts (2,000 VAC), and between contacts of different polarity (1,500 VAC).
- High impulse withstand voltages between coil and contacts, and between contacts of different polarity (2,500 V, 2 × 10 μs: Bellcore requirements).
- Low power consumption (140 mW).
- Bifurcated crossbar contact (Au-clad) and Fully sealed construction for high reliability.
- Applicable to IRS.
- High sealability after IRS.
- Ultra-miniature at 15 × 7.5 × 9.4 mm (L × W × H).
- Through-hole terminal is available
- EN60950/EN41003 Supplementary Insulation-certified type is available.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification				Single-side stable	Single-winding latching	Double-winding latching	Single-side stable EN60950/EN41003
DPDT	Fully sealed	PCB terminal		G6S-2	G6SU-2	G6SK-2	G6S-2-Y
		Surface mounting terminal	Inside-L	G6S-2G	G6SU-2G	G6SK-2G	G6S-2G-Y
			Outside-L	G6S-2F	G6SU-2F	G6SK-2F	G6S-2F-Y

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G6S-2F 12 VDC
Rated coil voltage

2. When ordering tape packing, add -TR" to the model number.
Example: G6S-2F-TR 12 VDC
Tape packing
Be sure since -TR" is not part of the relay model number, it is not marked on the relay case.

Model Number Legend

G6S□-□□-□ □ VDC
1 2 3 4 5

1. Relay Function
None: Single-side stable
U: Single-winding latching
K: Double-winding latching

2. Contact Form
2: DPDT

3. Terminal Shape
None: PCB terminal
G: Inside-L surface mounting terminal
F: Outside-L surface mounting terminal

4. Approved Standards
None: UL/CSA
Y: EN60950/EN41003

5. Rated Coil Voltage
4.5, 5, 12, 24 VDC

Specifications

■ Coil Ratings

Single-side Stable Type (G6S-2, G6S-2F, G6S-2G)

Rated voltage		4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current		31.0 mA	28.1 mA	11.7 mA	8.3 mA
Coil resistance		145 Ω	178 Ω	1,028 Ω	2,880 Ω
Must operate voltage		75% max. of rated voltage			
Must release voltage		10% min. of rated voltage			
Max. voltage		200% of rated voltage at 23°C			170% of rated voltage at 23°C
Power consumption		Approx. 140 mW			Approx. 200 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Single-winding Latching Type (G6SU-2, G6SU-2F, G6SU-2G)

Rated voltage		4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current		22.2 mA	20 mA	8.3 mA	6.3 mA
Coil resistance		203 Ω	250 Ω	1,440 Ω	3,840 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.27	0.36	2.12	5.80
	Armature ON	0.14	0.18	1.14	3.79
Must set voltage		75% max. of rated voltage			
Must reset voltage		75% max. of rated voltage			
Max. voltage		180% of rated voltage at 23°C			
Power consumption		Approx. 100 mW			Approx. 150 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Double-winding Latching Type (G6SK-2, G6SK-2F, G6SK-2G)

Rated voltage			4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current			44.4 mA	40 mA	16.7 mA	12.5 mA
Coil resistance			101 Ω	125 Ω	720 Ω	1,920 Ω
Coil inductance (H) (ref. value)	**Set**	**Armature OFF**	0.12	0.14	0.60	1.98
		Armature ON	0.074	0.088	0.41	1.23
	Reset	**Armature OFF**	0.082	0.098	0.46	1.34
		Armature ON	0.14	0.16	0.54	2.23
Must set voltage			75% max. of rated voltage			
Must reset voltage			75% max. of rated voltage			
Max. voltage			170% of rated voltage at 23°C			140% of rated voltage at 23°C
Power consumption			Approx. 200 mW			Approx. 300 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Single-side Stable EN60950/EN41003 Approved Type (G6S-2-Y, G6S-2F-Y, G6S-2G-Y)

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	40 mA	16.7 mA	9.6 mA
Coil resistance	125 Ω	720 Ω	2,504 Ω
Must operate voltage	75% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	170% of rated voltage at 23°C		170% of rated voltage at 23°C
Power consumption	Approx. 200 mW		Approx. 230 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC
Contact material	Ag (Au-Alloy)
Rated carry current	2 A
Max. switching voltage	250 VAC, 220 VDC
Max. switching current	2 A
Max. switching power	62.5 VA, 60 W
Failure rate (reference value) (See note.)	10 μA at 10 mVDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Contact resistance (See note 1.)	75 mΩ max.
Operate (set) time (See note 2.)	4 ms max. (approx. 2.5 ms; latching type: approx. 2 ms)
Release (reset) time (See note 2.)	4 ms max. (approx. 1.5 ms; latching type: approx. 2 ms)
Bounce time	Operate: Approx. 0.5 ms Release: Approx. 0.5 ms Set/Reset: Approx. 0.5 ms
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3.)	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between coil and contacts (double-winding latching) 1,500 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 500 VAC, 50/60 Hz for 1 min between set and reset coil (double-winding latching)
Impulse withstand voltage	2,500 V (2 x 10 μs) between coil and contacts 1,500 V (10 x 160 μs) between coil and contacts (double-winding latching) 2,500 V (2 x 10 μs) between contacts of different polarity 1,500 V (10 x 160 μs) between contacts of same polarity (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 2.5-mm single amplitude (5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 750 m/s^2 (approx. 75G)
Endurance	Mechanical: 100,000,000 operations min. (at 36,000 operations/hr) Electrical: 100,000 operations min. (2 A at 30 VDC, resistive load: 1,200 operations/hr) 100,000 operations min. (0.5 A at 125 VAC, resistive load)
Ambient temperature	Operating: –40°C to 85°C (with no icing), –40°C to 70°C (double-winding latching, 24 VDC)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 2 g

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.
2. Values in parentheses are actual values.
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength (except between the set and reset coil).

■ Approved Standards

UL1950 (File No. E41515)/CSA C22.2 No.950 (File No. LR31928)

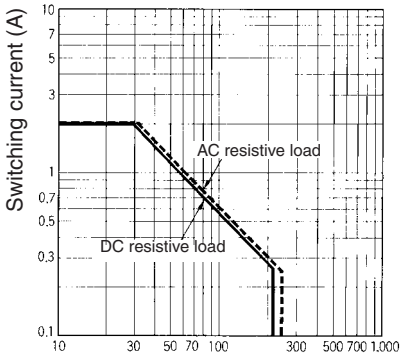
Model	Contact form	Coil ratings	Contact ratings
G6S-2, G6S-2F, G6S-2G	DPDT	1.5 to 48 VDC	2 A, 30 VDC 0.3 A, 110 VDC 0.5 A, 125 VAC
G6SU2, G6SK-2, G6SU-2F, G6SU2G, G6SK-2F, G6SK-2G		1.5 to 24 VDC	

EN60950/EN41003

Model	Contact form	Isolation category	Voltage
G6S-2-Y, G6S-2G-Y, G6S-2F-Y	DPDT	Supplementary Isolation	250 VAC

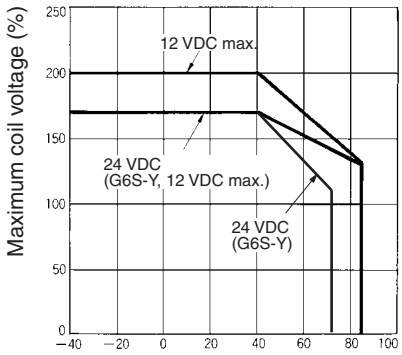
Engineering Data

Maximum Switching Power

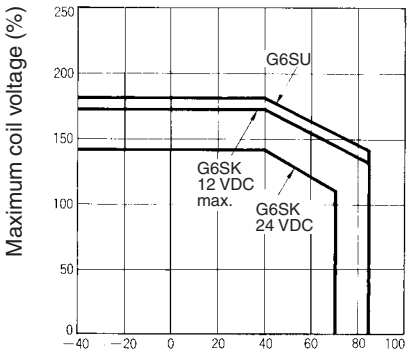


Ambient Temperature vs. Maximum Coil Voltage

Single-side Stable



Single-winding Latching
Double-winding Latching

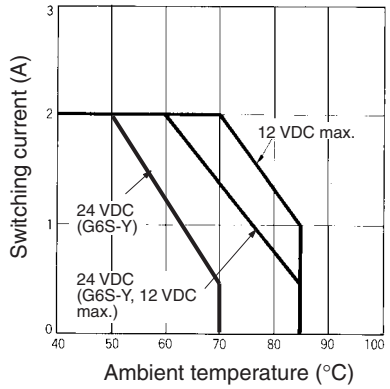


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

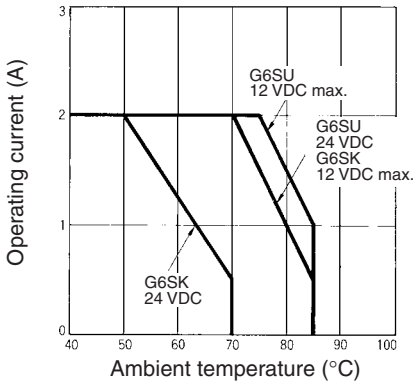
Reference Data

Ambient Temperature vs. Switching Current

Single-side Stable

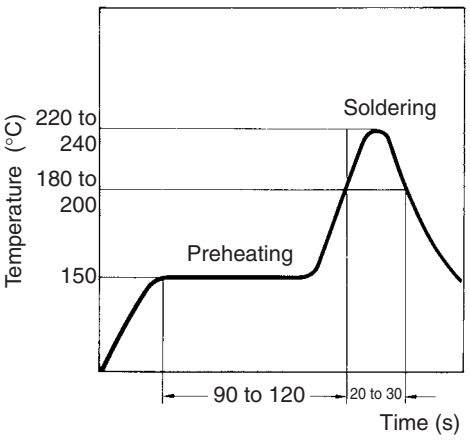


Single-winding Latching
Double-winding Latching

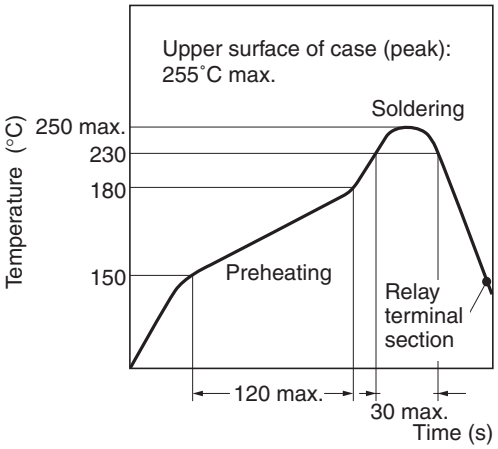


Recommended Soldering Time vs. Surface PCB Temperature

(1) IRS Method (Mounting Solder: Lead)



(2) IRS Method (Mounting Solder: Lead-free)



Note: The temperature profile indicates the temperature of the relay terminal section.

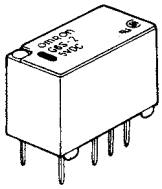
Dimensions

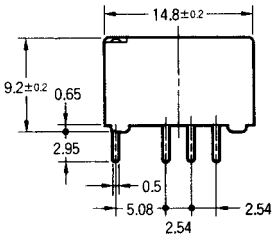
Note: All units are in millimeters unless otherwise indicated.

Single-side Stable

G6S-2, G6S-2-Y

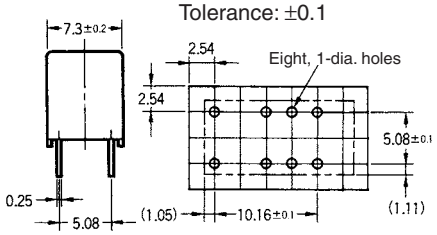
Tolerance: ±0.3



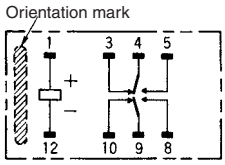


Footprint (Bottom View)

Tolerance: ±0.1

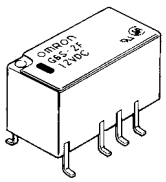


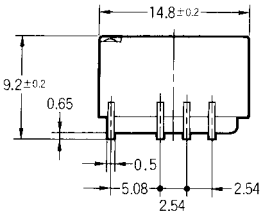
Terminal Arrangement/ Internal Connections (Bottom View)



G6S-2F, G6S-2F-Y

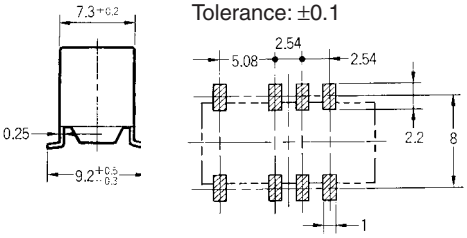
Tolerance: ±0.3



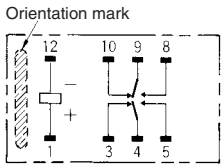


Footprint (Top View)

Tolerance: ±0.1

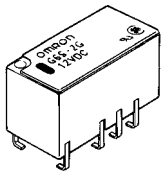


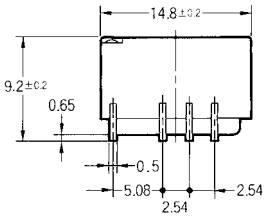
Terminal Arrangement/ Internal Connections (Top View)



G6S-2G, G6S-2G-Y

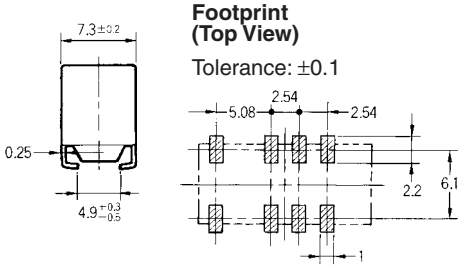
Tolerance: ±0.3



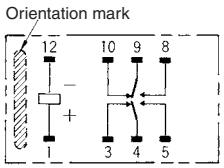


Footprint (Top View)

Tolerance: ±0.1



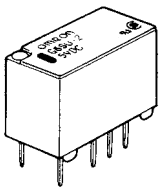
Terminal Arrangement/ Internal Connections (Top View)

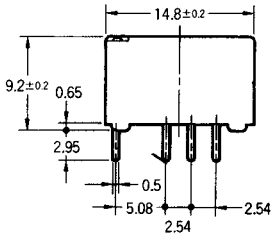


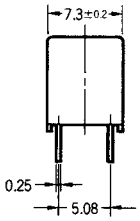
Single-winding Latching

G6SU-2

Tolerance: ±0.3

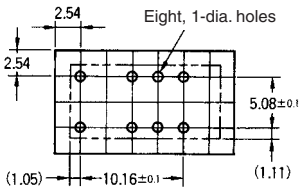




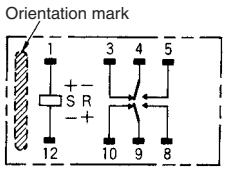


Footprint (Bottom View)

Tolerance: ±0.1

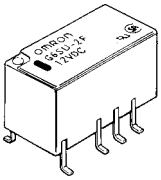


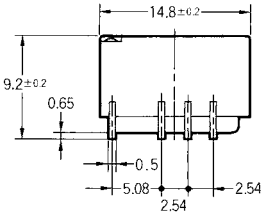
Terminal Arrangement/ Internal Connections (Bottom View)

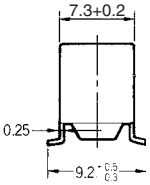


G6SU-2F

Tolerance: ±0.3

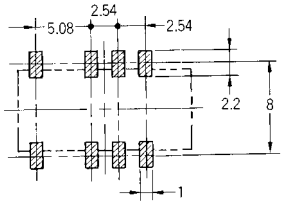




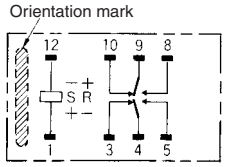


Footprint (Top View)

Tolerance: ±0.1

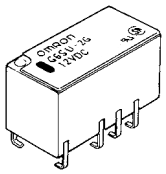


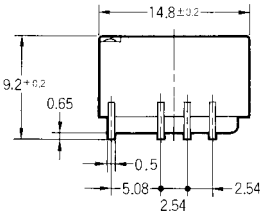
Terminal Arrangement/ Internal Connections (Top View)

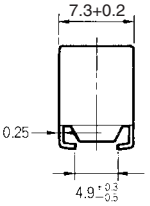


G6SU-2G

Tolerance: ±0.3

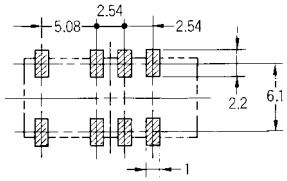




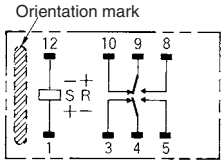


Footprint (Top View)

Tolerance: ±0.1



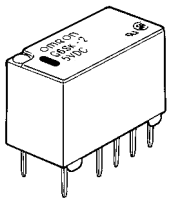
Terminal Arrangement/ Internal Connections (Top View)

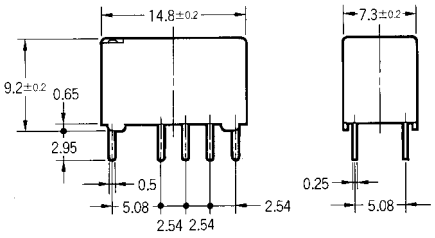


Double-winding Latching

G6SK-2

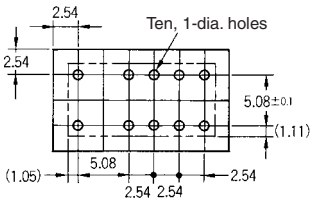
Tolerance: ±0.3



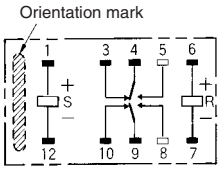


Footprint (Bottom View)

Tolerance: ±0.1

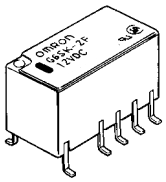


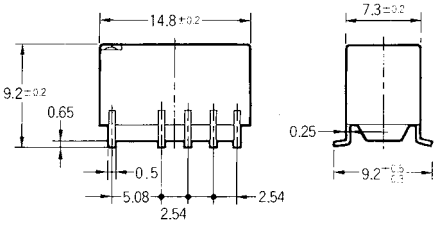
Terminal Arrangement/ Internal Connections (Bottom View)



G6SK-2F

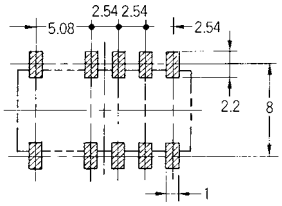
Tolerance: ±0.3



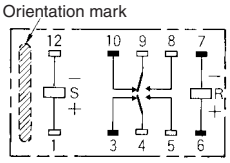


Footprint (Top View)

Tolerance: ±0.1

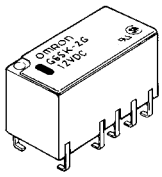


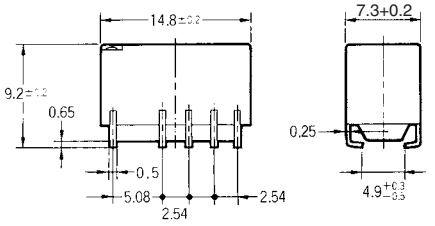
Terminal Arrangement/ Internal Connections (Top View)



G6SK-2G

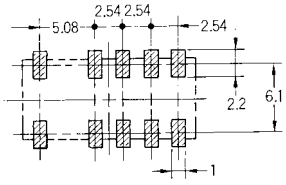
Tolerance: ±0.3



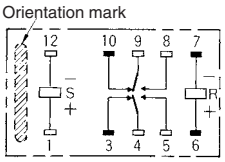


Footprint (Top View)

Tolerance: ±0.1

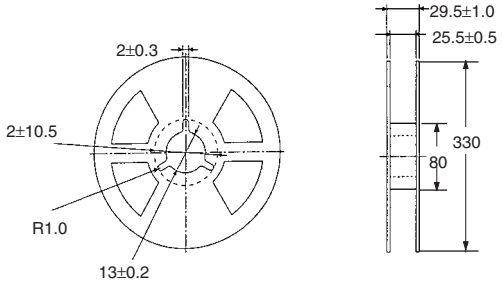


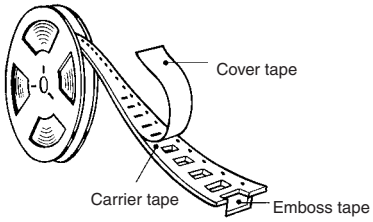
Terminal Arrangement/ Internal Connections (Top View)

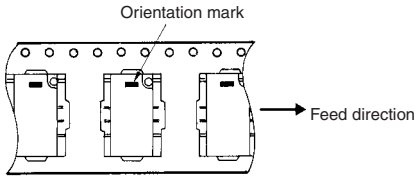


■ Tape Packing

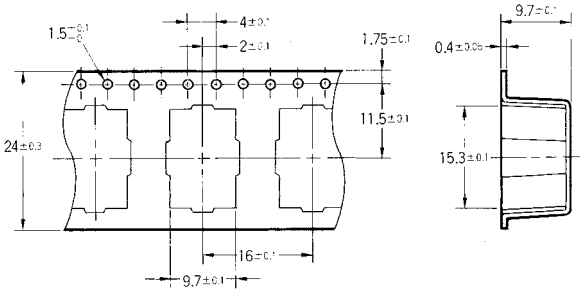
When ordering, add "-TR" before the rated coil voltage for tape packing.
Tape type: TE2416R (Refer to EIAJ)
Reel type: R24E (Refer to EIAJ)
Relays per reel: 400



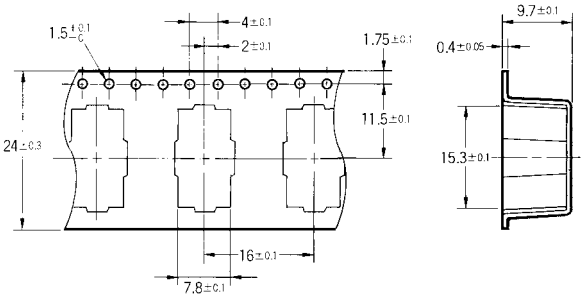




G6S-2F, G6SU-2F, G6SK-2F, G6S-2F-Y



G6S-2G, G6SU-2G, G6SK-2G, G6S-2G-Y



Precautions

Use a DC power supply with 5% or less ripple factor to operate the coil.

Do not use the G6S where subject to strong external magnetic fields.

Do not use the G6S where subject to magnetic particles or excessive amounts of dust.

Do not reverse the polarity of the coil (+, –).

Latching types are delivered in the reset position. We recommend that a reset voltage be applied in advance to start operation.

Do not drop the G6S or otherwise subject it to excessive shock.

Remove the relay from the packing immediately prior to usage.

■ Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

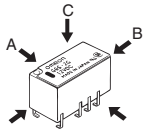
When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

G6S (K) (-U) -2 Soldering

- Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)
- Soldering time: Approx. 5 s max. (Approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)
- Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



Dimension A: 1.96 N max.
Dimension B: 4.90 N max.
Dimension C: 1.96 N max.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

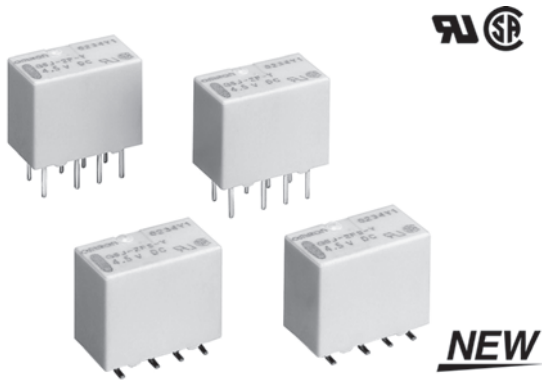
Cat. No. K093-E1-03

OMRON

Surface-mounting Relay | G6J-Y

Ultra-compact and Slim DPDT Relay

- Dimensions of 5.7 × 10.6 × 9 mm (W × L × H) represent a reduction of approximately 56% in mounting area compared with the OMRON G6S, for higher-density mounting.
- Dielectric strength of 1,500 VAC and an impulse withstand voltage of 2,500 V for 2 × 10 μs (conforms to North American Telcordia specifications (formerly Bellcore)).
- Conforms to FCC Part 68 (i.e., impulse withstand voltage of 1,500 V for 10 × 160 μs between coil and contacts and between contacts of the same polarity).
- Single-winding latching models to save energy.
- Conforms to UL60950 (File No. E41515)/CSA C22.2 No. 60950 (File No. LR31928).



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification				Single-side stable	Single-winding latching
DPDT	Plastic sealed	PCB terminal		G6J-2P-Y	G6JU-2P-Y
		Surface mount terminal	Short	G6J-2FS-Y	G6JU-2FS-Y
			Long	G6J-2FL-Y	G6JU-2FL-Y

Note: **1.** When ordering, add the rated coil voltage to the model number.
Example: G6J-2P-Y 12 VDC
Rated coil voltage

2. When ordering tape packing, add "-TR" to the model number.
Example: G6J-2P-Y-TR 12 VDC
Tape packing
Be sure since "-TR" is not part of the relay model number, it is not marked on the relay case.

Model Number Legend:

G6J□-□□-□
1 2 3 4

1. Relay function
None: Single-side stable relay
U: Single-winding latching relay

2. Contact form
2: DPDT

3. Terminal shape
P: PCB terminals
FS: Surface-mounting terminals, short
FL: Surface-mounting terminals, long

4. Special function
Y: Improved product for soldering heat resistance

Application Examples

Telephones, communications equipment, measurement devices, office automation machines, and audio-visual products.

Specifications

■ Standard Specifications

Contact mechanism: Crossbar twin Ag (Au-alloy contact)

Enclosure rating: Plastic-sealed

■ Coil Ratings

Single-side Stable Relays (G6J-2P-Y, G6J-2FS-Y, G6J-2FL-Y)

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	48.0 mA	32.6 mA	28.9 mA	12.3 mA	9.2 mA
Coil resistance	62.5 Ω	137.9 Ω	173.1 Ω	976.8 Ω	2,600.5 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	150% of rated voltage				
Power consumption	Approx. 140 mW				Approx. 230 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

Single-winding Latching Relays (G6JU-2P-Y, G6JU-2FS-Y, G6JU-2FL-Y)

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC
Rated current	33.7 mA	22.0 mA	20.4 mA	9.0 mA
Coil resistance	89.0 Ω	204.3 Ω	245.5 Ω	1,329.2 Ω
Must set voltage	75% max. of rated voltage			
Must reset voltage	75% max. of rated voltage			
Max. voltage	150% of rated voltage			
Power consumption	Approx. 100 mW			

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

■ Contact Ratings

Load	Resistive load
Rated load	0.3 A at 125 VAC, 1 A at 30 VDC
Rated carry current	1 A
Max. switching voltage	125 VAC, 110 VDC
Max. switching current	1 A

■ Characteristics

Item		Single-side Stable Relays	Single-winding Latching Relays
		G6J-2P-Y, G6J-2FS-Y, G6J-2FL-Y	G6JU-2P-Y, G6JU-2FS-Y, G6JU-2FL-Y
Contact resistance (See note 1.)		100 mΩ max.	
Operating (set) time (See note 2.)		3 ms max. (approx. 1.6 ms)	
Release (reset) time (See note 2.)		3 ms max. (approx. 1.0 ms)	3 ms max. (approx. 0.9 ms)
Minimum set/reset signal width		---	10 ms
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)	
Dielectric strength	Coil and contacts	1,500 VAC, 50/60 Hz for 1 min	
	Contacts of different polarity	1,000 VAC, 50/60 Hz for 1 min	
	Contacts of same polarity	750 VAC, 50/60 Hz for 1 min	
Impulse withstand voltage	Coil and contacts	2,500 VAC, 2 x 10 μs	
	Contacts of different polarity	1,500 VAC, 10 x 160 μs	
	Contacts of same polarity		
Vibration resistance		Destruction: 10-55-10 Hz 2.5-mm single amplitude (5-mm double amplitude) Malfunction: 10-55-10 Hz 1.65-mm single amplitude (3.3-mm double amplitude)	
Shock resistance		Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 750 m/s^2 (approx. 75G)	
Life expectancy		Mechanical: 50,000,000 operations min. (at 36,000 operations/hour) Electrical: 100,000 operations min. (with a rated load at 1,800 operations/hour)	
Failure rate (P level) (See note 4.)		10 μA at 10 mVDC	
Ambient temperature		–40 to 85°C (with no icing or condensation)	
Ambient humidity		5% to 85%	
Weight		Approx. 1.0 g	

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

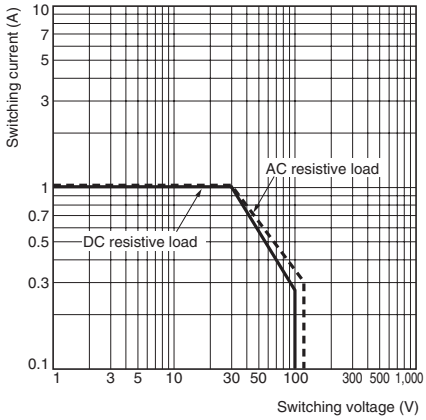
2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC Megger Tester applied to the same parts as those for checking the dielectric strength.

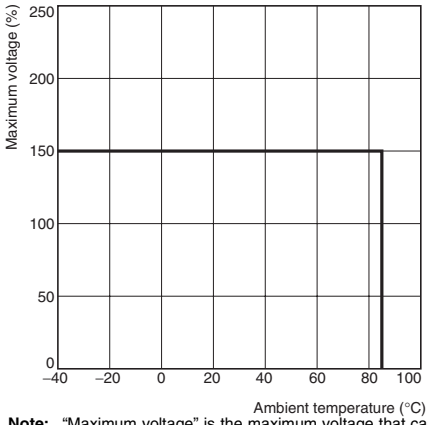
4. This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating frequency, operating conditions, expected reliability level of the relay, etc. Always double-check relay suitability under actual load conditions.

Engineering Data

Maximum Switching Capacity

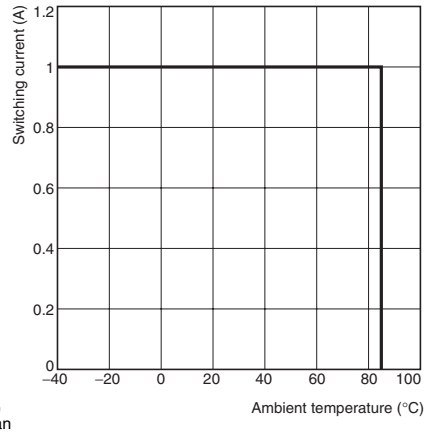


Ambient Temperature vs. Maximum Voltage

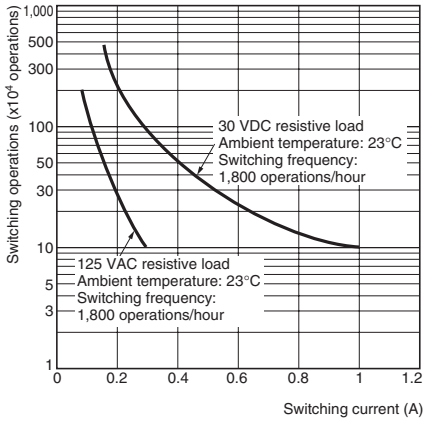


Note: "Maximum voltage" is the maximum voltage that can be applied to the Relay coil.

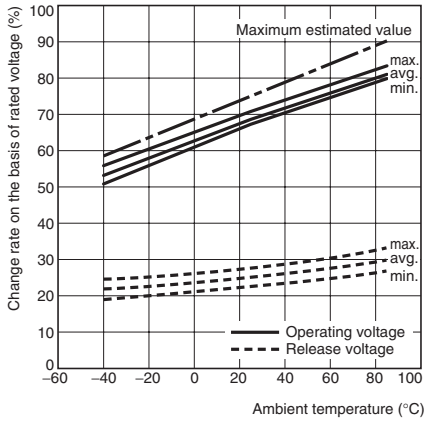
Ambient Temperature vs. Switching Current



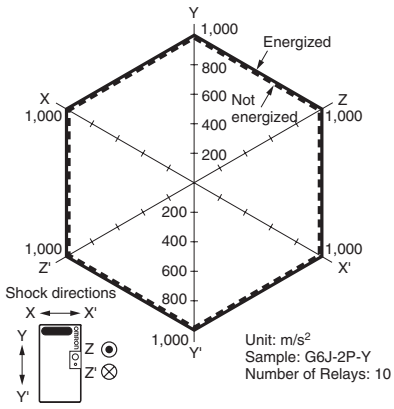
Electrical Endurance



Ambient Temperature vs. Must Operate or Must Release Voltage

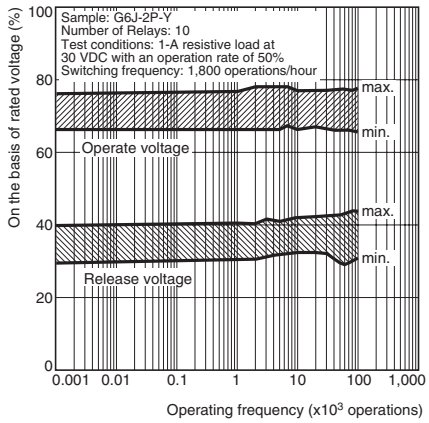


Shock Malfunction

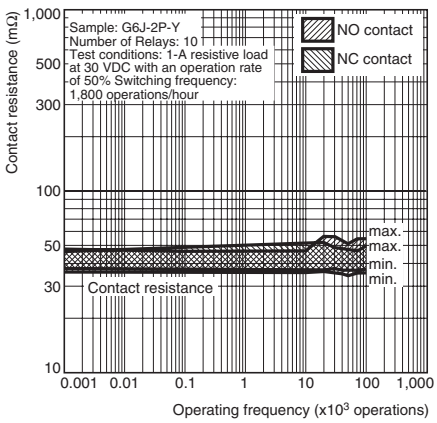


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

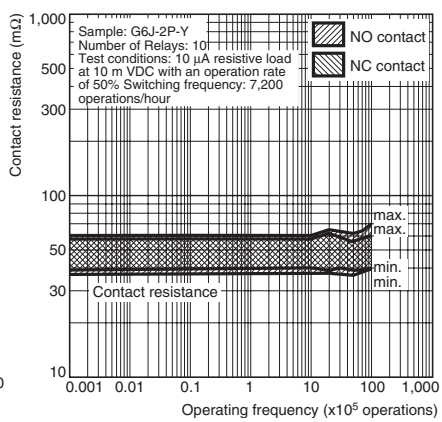
Electrical Endurance (with Operate and Release Voltage) (See note 1.)



Electrical Endurance (Contact resistance) (See note 1.)



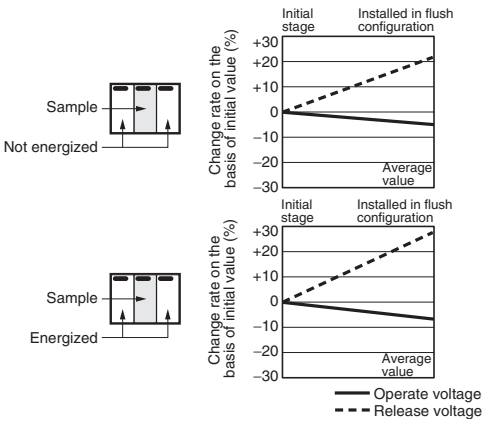
Contact Reliability Test (See notes 1 and 2.)



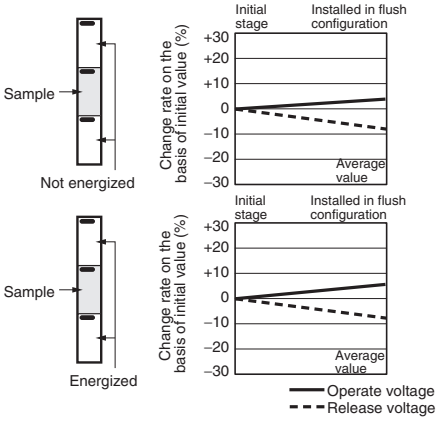
Note: 1. The tests were conducted at an ambient temperature of 23°C.

2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

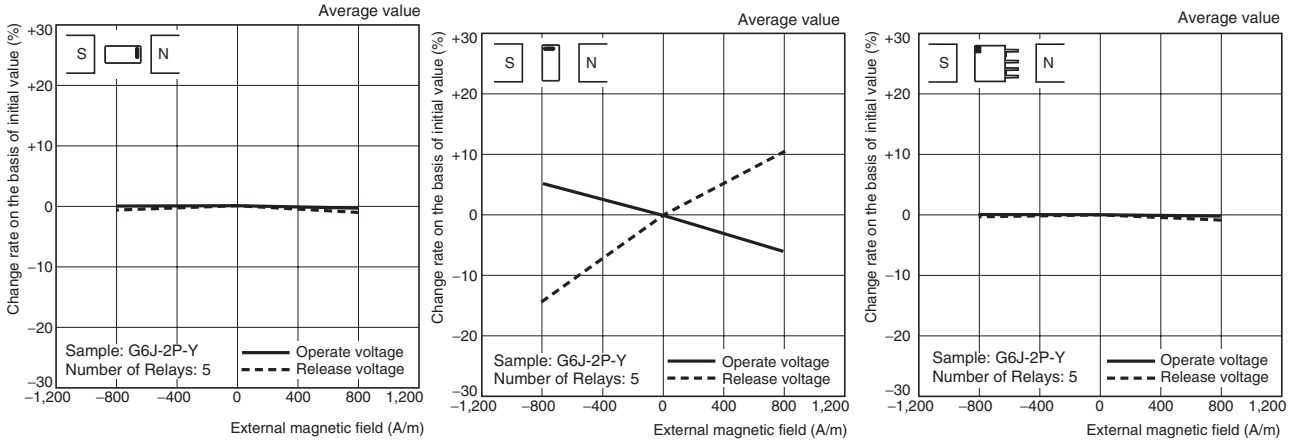
Mutual Magnetic Interference



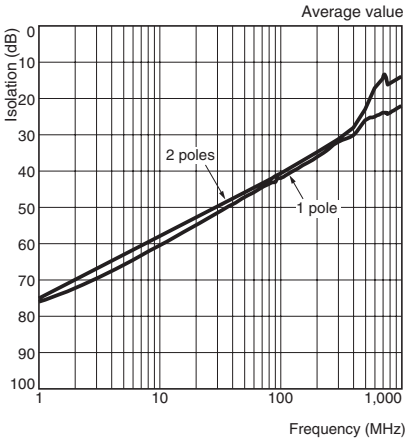
Mutual Magnetic Interference



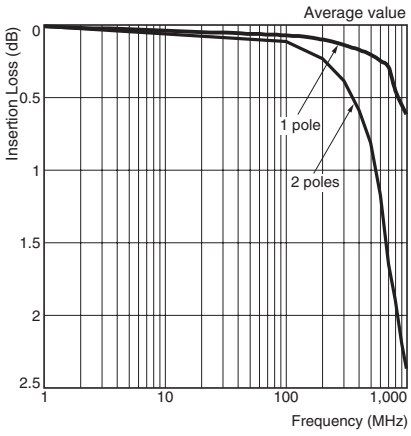
External Magnetic Interference



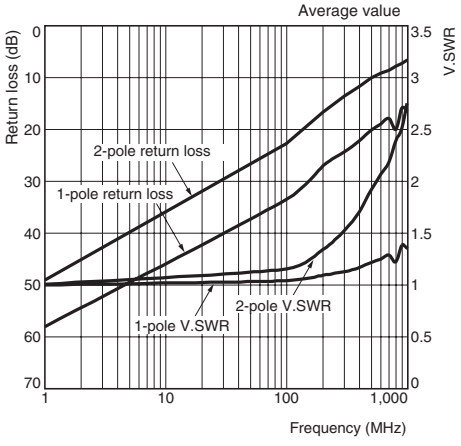
High-frequency Characteristics (Isolation) (See notes 1 and 2.)



High-frequency Characteristics (Insertion Loss) (See notes 1 and 2.)



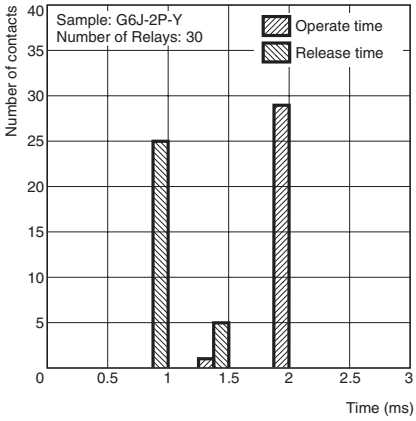
High-frequency Characteristics (Return Loss, V.SWR) (See notes 1 and 2.)



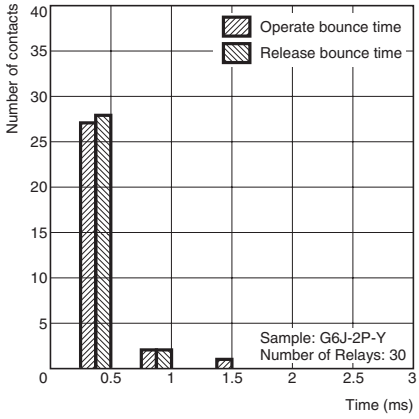
Note: **1.** The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

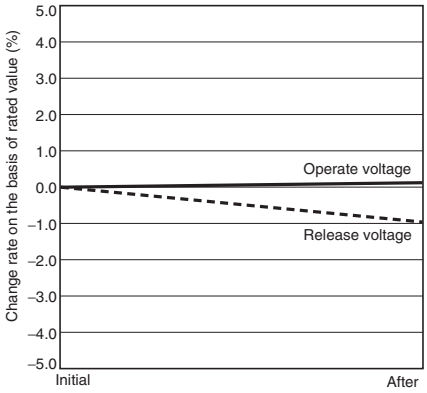
Operate and Release Time Distribution (See note.)



Operate and Release Bounce Time Distribution (See note.)



Vibration Resistance

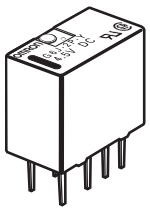


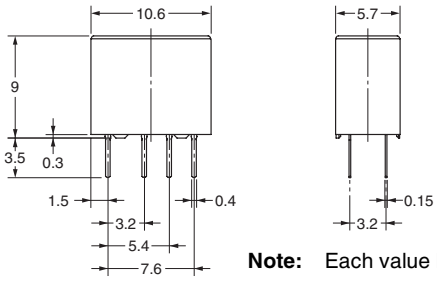
Note: The tests were conducted at an ambient temperature of 23°C.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

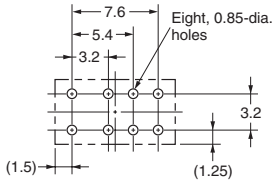
G6J-2P-Y
G6JU-2P-Y





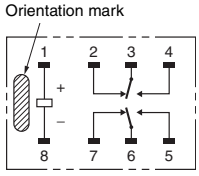
Mounting Dimensions (Bottom View)

Tolerance ±0.1 mm

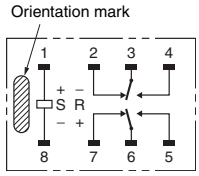


Terminal Arrangement/ Internal Connections (Bottom View)

G6J-2P-Y

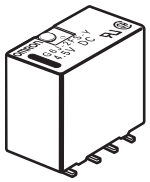


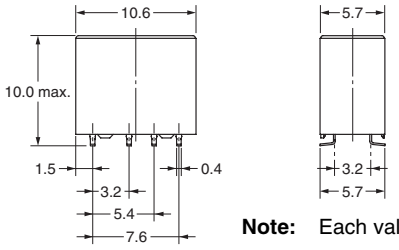
G6JU-2P-Y



Note: Each value has a tolerance of ±0.3 mm.

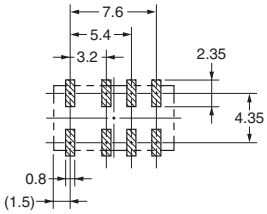
G6J-2FS-Y
G6JU-2FS-Y





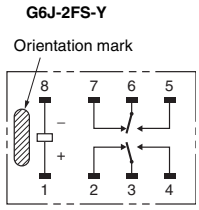
Mounting Dimensions (Top View)

Tolerance ±0.1 mm

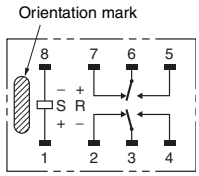


Terminal Arrangement/ Internal Connections (Top View)

G6J-2FS-Y

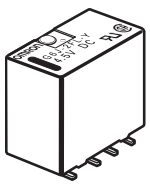


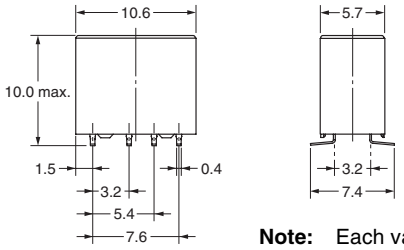
G6JU-2FS-Y



Note: Each value has a tolerance of ±0.3 mm.

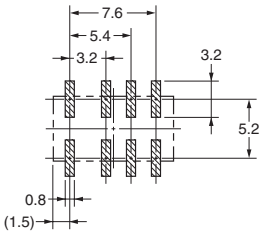
G6J-2FL-Y
G6JU-2FL-Y





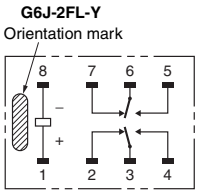
Mounting Dimensions (Top View)

Tolerance ±0.1 mm

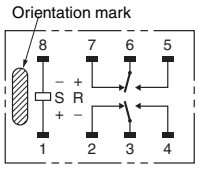


Terminal Arrangement/ Internal Connections (Top View)

G6J-2FL-Y



G6JU-2FL-Y



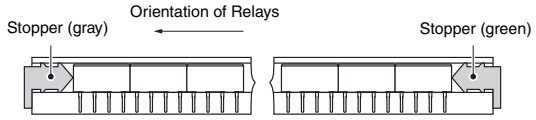
Note: Each value has a tolerance of ±0.3 mm.

Stick Packing and Tape Packing

1. Stick Packing

Relays in stick packing are arranged so that the orientation mark of each Relay is on the left side.

Always confirm that the Relays are in the correct orientation when mounting the Relays to the PCBs.



Stick length: 555 mm (stopper not included)

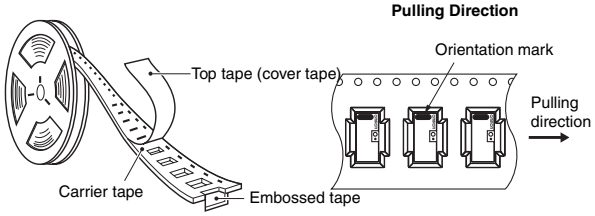
No. of Relays per stick: 50

2. Tape Packing (Surface-mounting Terminal Relays)

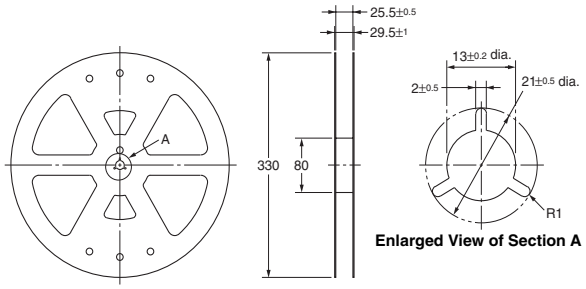
When ordering Relays in tape packing, add the prefix "-TR" to the model number, otherwise the Relays in stick packing will be provided.

Tape type: TB2412R (EIAJ (Electronic Industrial Association of Japan))
Reel type: R24D (EIAJ (Electronic Industrial Association of Japan))
Relays per reel: 400

Direction of Relay Insertion

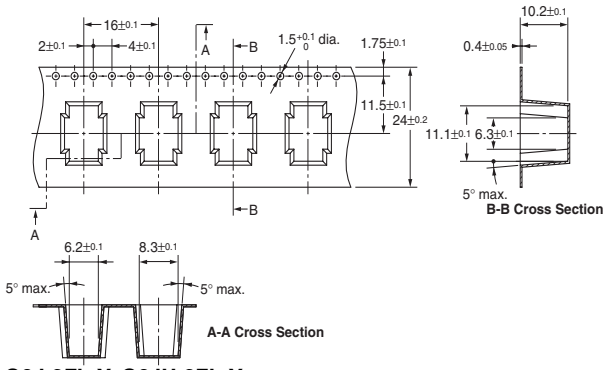


Reel Dimensions

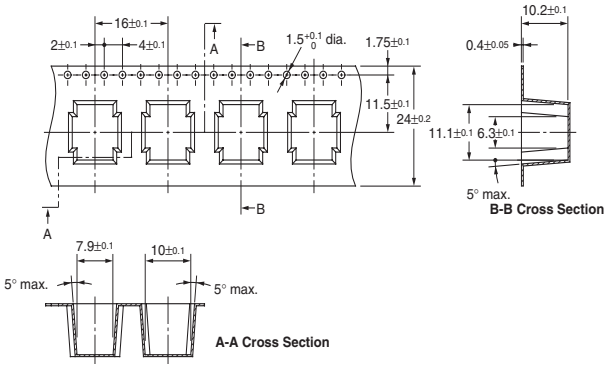


Carrier Tape Dimensions

G6J-2FS-Y, G6JU-2FS-Y

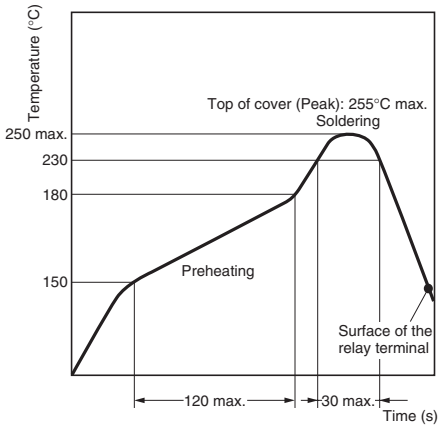


G6J-2FL-Y, G6JU-2FL-Y



Recommended Soldering Method

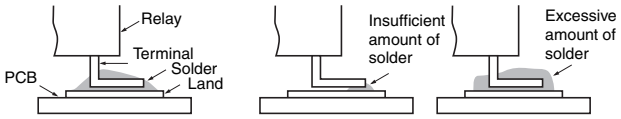
IRS Method (for Surface-mounting Terminal Relays)



Note: Temperatures are given for the surface of the terminal.

- The thickness of cream solder to be applied should be between 150 and 200 μm on OMRON's recommended PCB pattern.
- In order to perform correct soldering, it is recommended that the correct soldering conditions be maintained as shown below on the left-hand side.

Correct Soldering **Incorrect Soldering**



Visually check that the Relay is properly soldered.

■ Approved Standards

UL approval: UL60950 (File No. E41515)
CSA approval: C22.2 No. 60950 (File No. LR31928)

Contact form	Coil rating	Contact rating	Number of test operations
DPDT	G6J-2P-Y, 2FS-Y, 2FL-Y: 3 to 24 VDC	1 A at 30 VDC	6,000
	G6JU-2P-Y, 2FS-Y, 2FL-Y: 3 to 24 VDC	0.5 A at 60 VDC	
		0.3 A at 125 VAC	

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

Correct Use

- Long Term Current Carrying
  Under a long-term current carrying without switching, the insulation resistance of the coil goes down gradually due to the heat generated by the coil itself. Furthermore, the contact resistance of the Relay will gradually become unstable due to the generation of film on the contact surfaces. A Latching Relay can be used to prevent these problems. When using a single-side stable relay, the design of the fail-safe circuit provides protection against contact failure and open coils.

Handling of Surface-mounting Relays

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the relay in a cold cleaning bath immediately after soldering.

Soldering

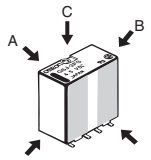
Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)

Soldering time: Approx. 5 s max. (Approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Insertion

During automatic insertion of Relays, make sure to set the securing force of the claws to the following values so that the Relay characteristics will be maintained.



Direction A: 4.90 N max.
Direction B: 9.80 N max.
Direction C: 9.80 N max.

Secure the claws to the area indicated by shading.
Do not attach them to the center area or to only part of the Relay.

Environmental Conditions During Operation, Storage, and Transportation

Protect the Relays from direct sunlight and keep the Relays under normal temperature, humidity, and pressure.

Mounting Latching Relays

Make sure that the vibration or shock that is generated from other devices, such as Relays in operation, on the same panel and imposed on the Latching Relays does not exceed the rated value, otherwise the Latching Relays that have been set may be reset or vice versa. The Latching Relays are reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relays may be set accidentally. Be sure to apply a reset signal before use.

Maximum Voltage

The maximum voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting.) The maximum voltage also involves important restrictions which include the following:

- Must not cause thermal changes or deterioration of the insulating material.
- Must not cause damage to other control devices.
- Must not cause any harmful effect on people.
- Must not cause fire.

Therefore, be sure not to exceed the maximum voltage specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than the maximum voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase thus affecting characteristics such as electrical life and resulting in the deterioration of coil insulation.

Coating

Relays mounted on PCBs may be coated or washed. Do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relays.

Other Handling

Please don't use the relay if it suffered the dropping shock. Because there is a possibility of something damage for initial performance.

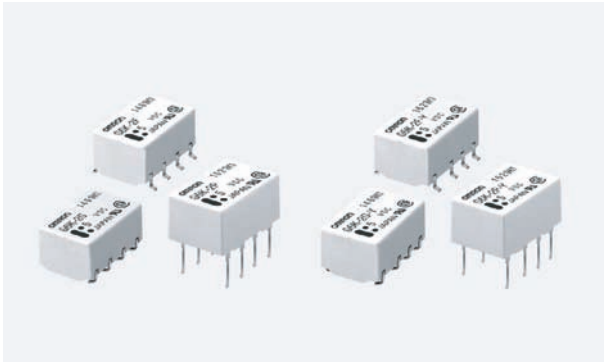
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K125-E1-02

OMRON

Surface Mounting Relay | G6K

Surface Mounting Relay with the World's Smallest Mounting Area and a Height of Only 5.2 mm



- Subminiature model as small as 5.2 (H) x 6.5 (W) x 10 (L) mm is ideal for high-density mounting.
- Low profile of 5.2 mm and weight of only 0.7 g combine to improve mounting efficiency.
- Models with inside-L surface mounting terminals are available.
- Consumes approximately 70% the power of a conventional OMRON model and operates at a current that is as low as 100 mW.
- Surface mounting terminal models incorporate a unique terminal structure with high infrared irradiation efficiency which allows the terminal temperature to rise easily when mounting the IRS, thus ensuring excellent soldering.
- Ensures a dielectric strength of 1,500 VAC and conforms to FCC Part 68 (i.e., withstanding an impulse withstand voltage of 1,500 V for 10 x 160 μs).
- New-Y models offer an impulse withstand voltage of 2,500 V for 2 x 10 μs (conforms to Telcordia specifications) by optimizing the distance between coil and contacts.
- Conforms to UL1950 (File No. E41515)/CSA C22.2 No. 950 (File No. LR24825)

The above specifications are ensured as of August 1999.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification				Single-side stable	Single-winding latching	Single-side stable Bellcore: 2, 500 V for 2x10 μs
DPDT	Fully sealed	PCB terminal		G6K-2P	G6KU-2P-Y	G6K-2P-Y
		Surface mounting terminal	Inside-L	G6K-2G	G6KU-2G-Y	G6K-2G-Y
			Outside-L	G6K-2F	G6KU-2F-Y	G6K-2F-Y

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G6K-2F 12 VDC
Rated coil voltage

2. When ordering tape packing, add -TR" to the model number.
Example: G6K-2F-TR 12 VDC
Tape packing

Be sure since -TR" is not part of the relay model number, it is not marked on the relay case.

Model Number Legend

G6K□-□□-□ □ VDC
1 2 3 4 5

1. **Relay function**
   None: Single-side stable model
   U: Single-winding latching model
2. **Contact form**
   2: DPDT
3. **Terminal shape**
   F: Outside-L surface mounting terminal
   G: Inside-L surface mounting terminal
   P: PCB terminal
4. **Approved standards**
   None: UL, CSA
   Does not conform to Telcordia specifications
   Y: UL, CSA
   Conforms to Telcordia specifications: 2,500 V for 2 x 10 μs
5. **Rated Coil Voltage**
   3, 4.5, 5, 12, 24 VDC

Application Examples

Telephones, communications equipment, measurement devices, office automation machines, and audio–visual products.

Specifications

Contact mechanism:Bifurcated crossbar Ag (Au-alloy contact)
Enclosure ratings:Fully sealed

■ Coil Ratings

Single-side Stable Models

G6K-2F, G6K-2G, G6K-2P

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC
Rated current	33.0 mA	23.2 mA	21.1 mA	9.1 mA
Coil resistance	91 Ω	194 Ω	237 Ω	1,315 Ω
Must operate voltage	80% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	150% of rated voltage at 23°C to 70°C			
Power consumption	Approx. 100 mW			

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil instantaneously.

Single-side Stable Models (Bellcore Version)

G6K-2F-Y, G6K-2G-Y, G6K-2P-Y

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	33.0 mA	23.2 mA	21.1 mA	9.1 mA	4.6 mA
Coil resistance	91 Ω	194 Ω	237 Ω	1,315 Ω	5,220 Ω
Must operate voltage	80% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	150% of rated voltage at 23°C to 70°C				
Power consumption	Approx. 100 mW				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil instantaneously.

Single-winding Latching Models (Bellcore Version)

G6KU-2F-Y, G6KU-2G-Y, G6KU-2P-Y

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	33.0 mA	23.2 mA	21.1 mA	9.1 mA	4.6 mA
Coil resistance	91 Ω	194 Ω	237 Ω	1,315 Ω	5,220 Ω
Must set voltage	75% max. of rated voltage				
Must reset voltage	75% max. of rated voltage				
Max. voltage	150% of rated voltage at 23°C to 70°C				
Power consumption	Approx. 100 mW				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil instantaneously.

■ Contact Ratings

Load	Resistive load
Rated load	0.3 A at 125 VAC; 1 A at 30 VDC
Rated carry current	1 A
Max. switching voltage	125 VAC, 60 VDC
Max. switching current	1 A

■ Characteristics

Item		**Single-side stable models (double-pole)**		**Single-winding latching model**
		G6K-2F, G6K-2G, G6K-2P	**G6K-2F-Y, G6K-2G-Y, G6K-2P-Y**	**G6KU-2F-Y, G6KU-2G-Y, G6KU-2P-Y**
Contact resistance (See note 1.)		100 mΩ max.		
Operating (set) time (See note 2.)		3 ms max. (approx. 1.4 ms)		3 ms max. (approx. 1.2 ms)
Release (reset) time (See note 2.)		3 ms max. (approx. 1.3 ms)		3 ms max. (approx. 1.2 ms)
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)		
Dielectric strength	**Coil and contacts**	1,500 VAC, 50/60 Hz for 1 min		
	Contacts of different polarity	1,000 VAC, 50/60 Hz for 1 min		
	Contacts of same polarity	750 VAC, 50/60 Hz for 1 min		
Impulse withstand voltage	**Coil and contacts**	1,500 V (10 x 160 μs)	2,500 V (2 x 10 μs), 1,500 V (10 x 160 μs)	
	Contacts of different polarity	1,500 V (10 x 160 μs)		
	Contacts of same polarity			
Vibration resistance		Destruction: 10 to 55 Hz, 2.5-mm single amplitude (5-mm double amplitude) and 55 to 500 Hz, 300 m/s^2 (approx. 30G) Malfunction: 10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude) and 55 to 500 Hz, 200 m/s^2 (approx. 20G)		
Shock resistance		Destruction: 1,000 ms^2 (approx. 100G) Malfunction: 750 ms^2 (approx. 75G)		
Endurance		Mechanical: 50,000,000 operations min. (at 36,000 operations/hour) Electrical: 100,000 operations min. (with a rated load at 1,800 operations/hour)		
Failure rate (P level) (See note 4.)		10 μA at 10 mVDC		
Ambient temperature		Operating: –40°C to 70°C (with no icing or condensation)		
Ambient humidity		Operating: 5% to 85%		
Weight		Approx. 0.7 g		

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage-drop method.

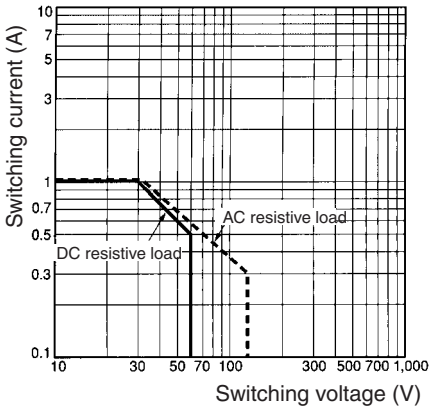
2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

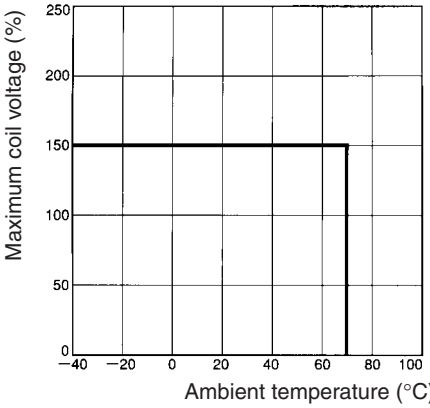
4. This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

Engineering Data

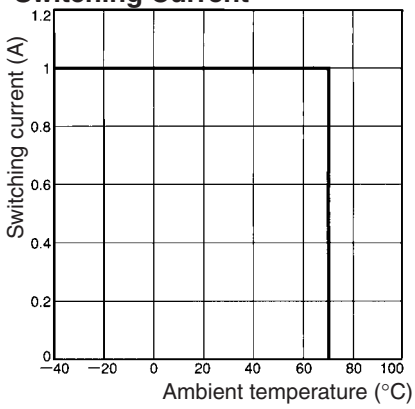
Maximum Switching Power



Ambient Temperature vs. Maximum Coil Voltage

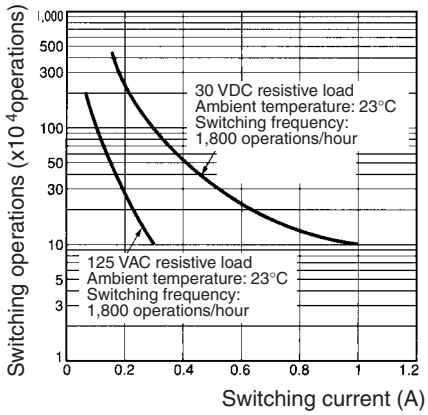


Ambient Temperature vs. Switching Current

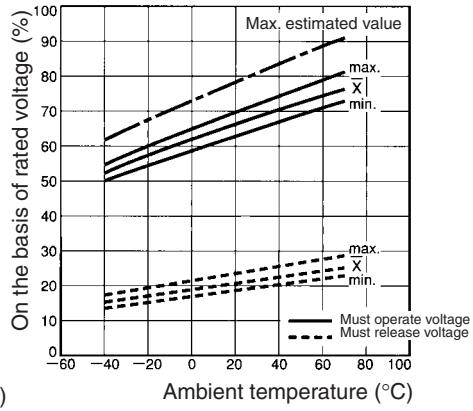


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

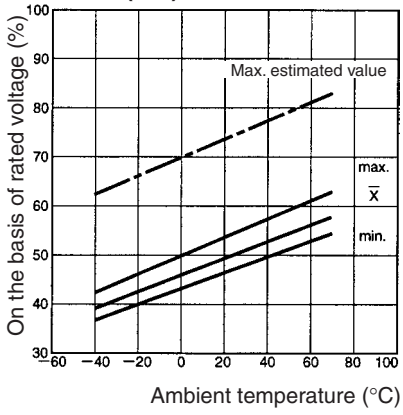
Endurance



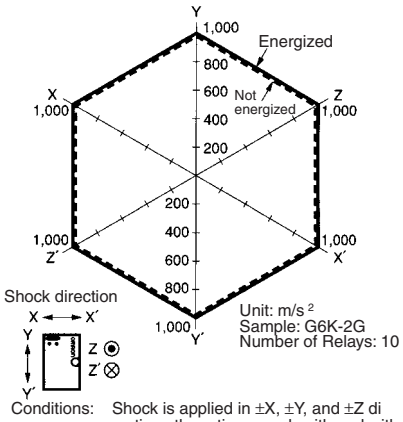
Ambient Temperature vs. Must Operate or Must Release Voltage
G6K-2G (F/P), G6K-2G (F/P)-Y



Ambient Temperature vs. Must Set or Must Reset Voltage
G6KU-2G (F/P)-Y

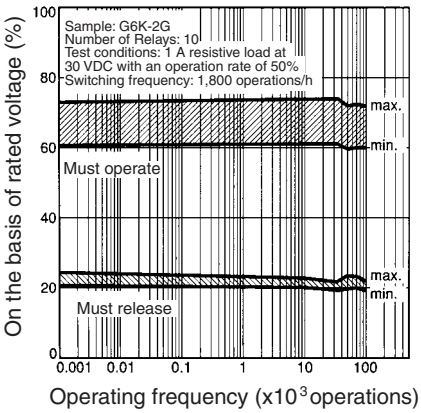


Shock Malfunction



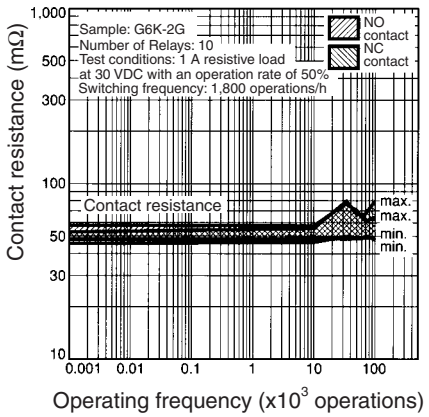
Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

Electrical Endurance (with Must Operate and Must Release Voltage) (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



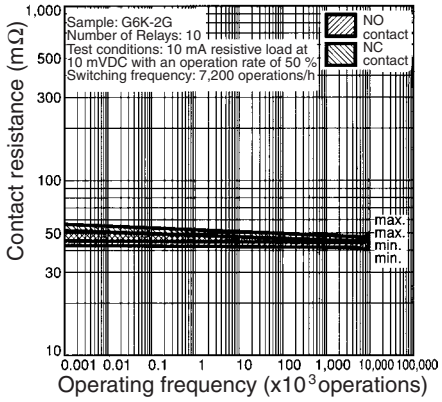
Note: The tests were conducted at an ambient temperature of 23˚C.

Electrical Endurance (Contact Resistance) (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y

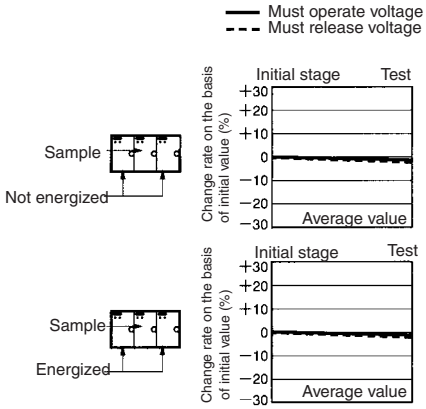


Note: The tests were conducted at an ambient temperature of 23˚C.

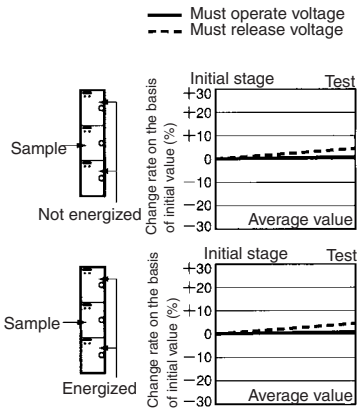
Contact Reliability Test (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



Mutual Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



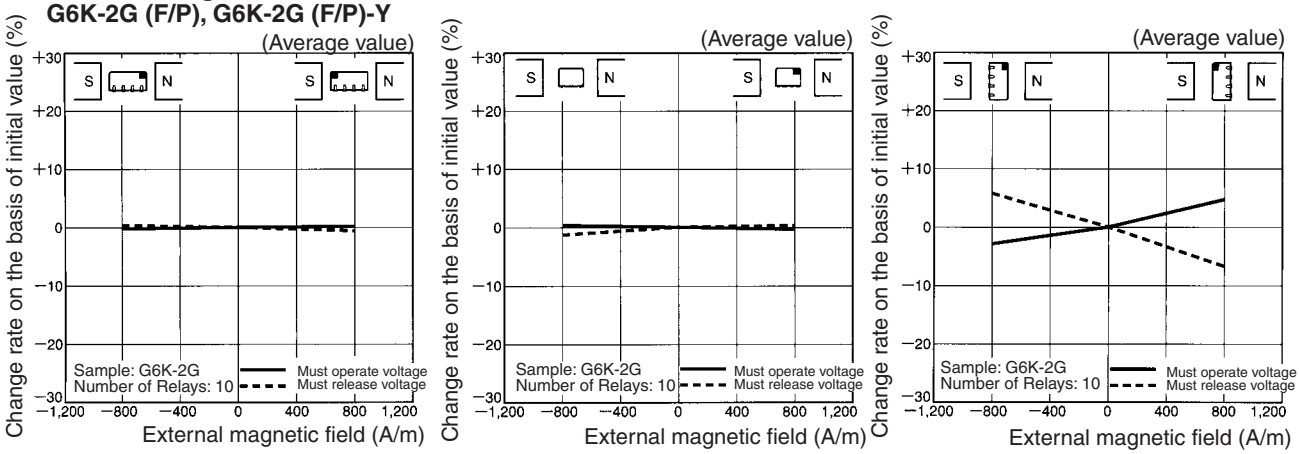
Mutual Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



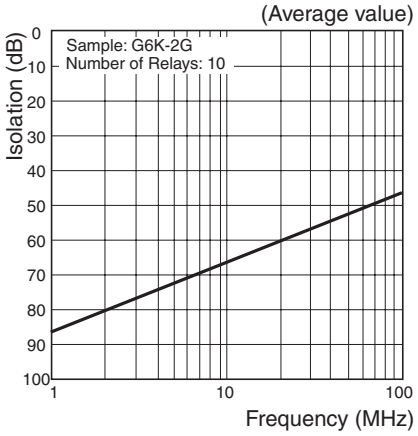
Note 1: The test was conducted at an ambient temperature of 23°C.

2: The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

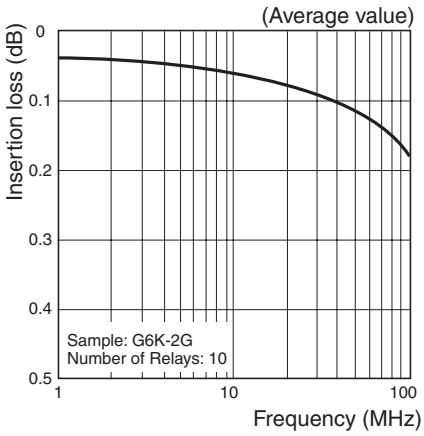
External Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



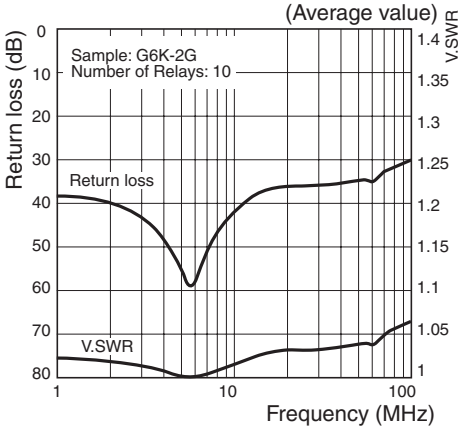
High-frequency Characteristics (Isolation)
G6K-2G (F/P), G6K-2G (F/P)-Y



High-frequency Characteristics (Insertion Loss)
G6K-2G (F/P), G6K-2G (F/P)-Y



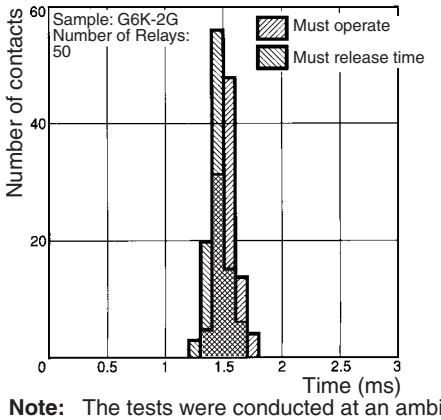
High-frequency Characteristics (Return Loss)
G6K-2G (F/P),G6K-2G (F/P)-Y



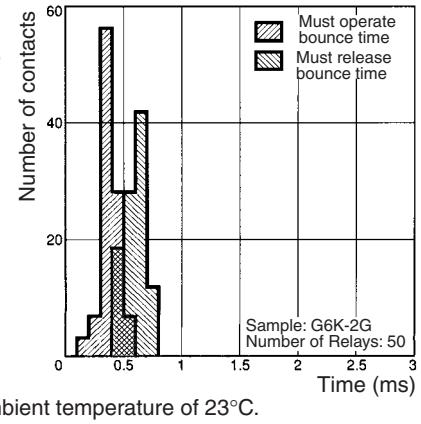
Note: 1. The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics including endurance in the actual machine before use.

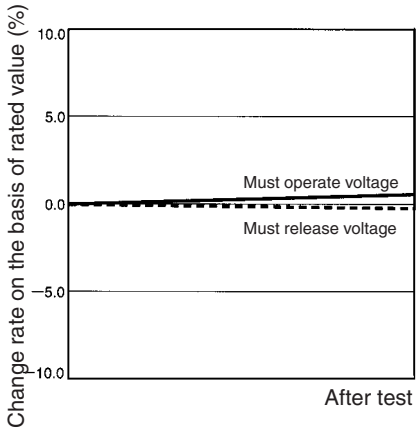
Must Operate and Must Release Time Distribution (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



Must Operate and Must Release Bounce Time Distribution (See note.)
G6K-2G (F/P) , G6K-2G (F/P)-Y



Vibration Resistance
G6K-2G (F/P), G6K-2G (F/P)-Y



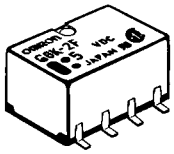
Note: The tests were conducted at an ambient temperature of 23°C.

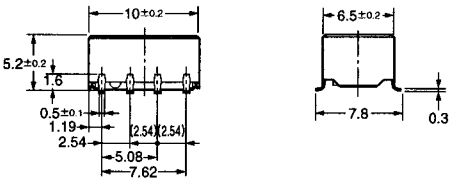
Dimensions

Note: All units are in millimeters unless otherwise indicated.

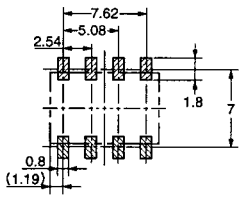
■ DPDT

G6K-2F

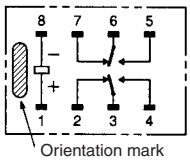




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

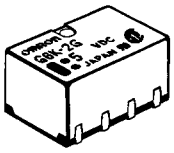


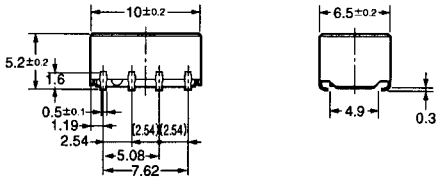
Terminal Arrangement/ Internal Connections (Top View)



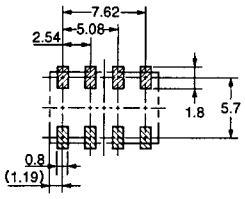
Note: Each value has a tolerance of ±0.3 mm.

G6K-2G

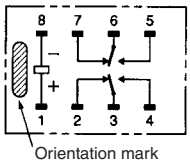




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

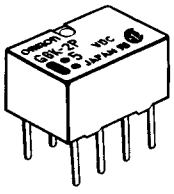


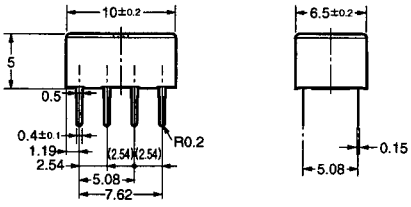
Terminal Arrangement/ Internal Connections (Top View)



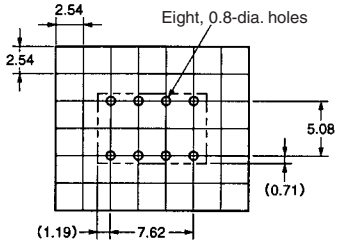
Note: Each value has a tolerance of ±0.3 mm.

G6K-2P

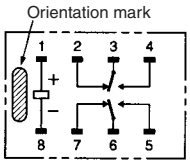




Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

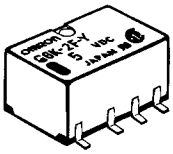


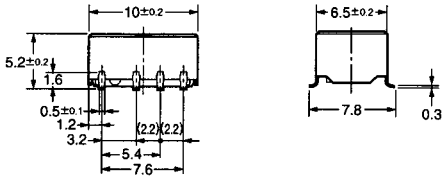
Terminal Arrangement/ Internal Connections (Bottom View)



Note: Each value has a tolerance of ±0.3 mm.

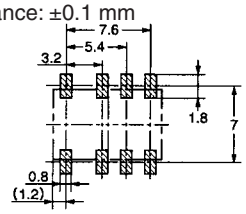
G6K-2F-Y



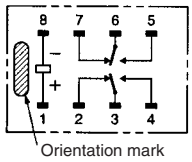


Note: Each value has a tolerance of ±0.3 mm.

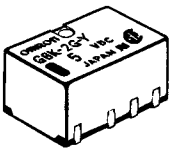
Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

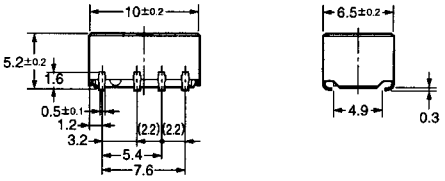


Terminal Arrangement/ Internal Connections (Top View)



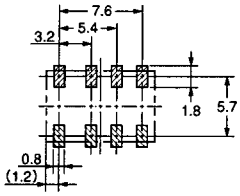
G6K-2G-Y



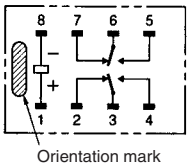


Note: Each value has a tolerance of ±0.3 mm.

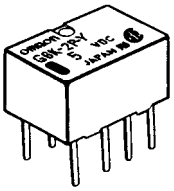
Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

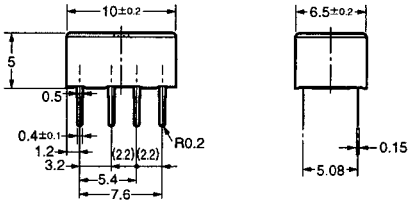


Terminal Arrangement/ Internal Connections (Top View)



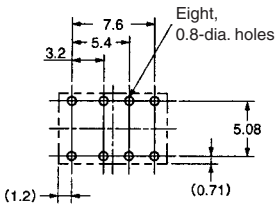
G6K-2P-Y



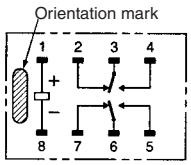


Note: Each value has a tolerance of ±0.3 mm.

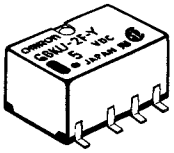
Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

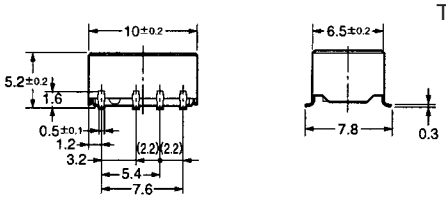


Terminal Arrangement/ Internal Connections (Bottom View)



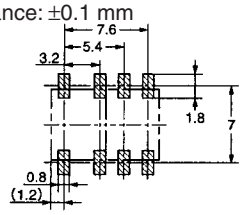
G6KU-2F-Y



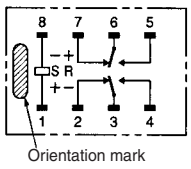


Note: Each value has a tolerance of ±0.3 mm.

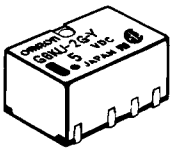
Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

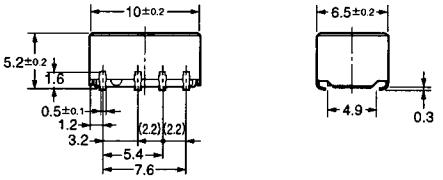


Terminal Arrangement/ Internal Connections (Top View)



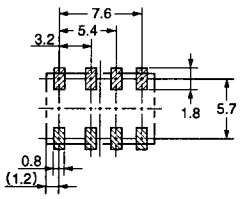
G6KU-2G-Y



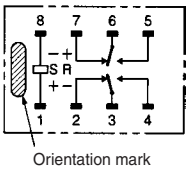


Note: Each value has a tolerance of ±0.3 mm.

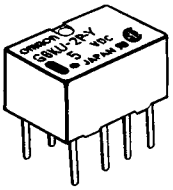
Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

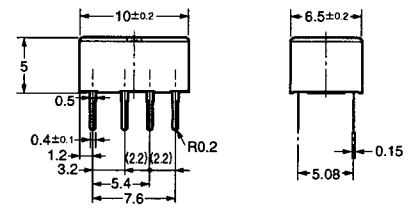


Terminal Arrangement/ Internal Connections (Top View)



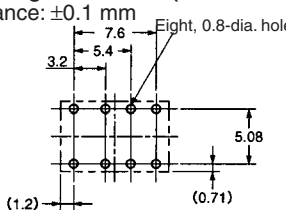
G6KU-2P-Y



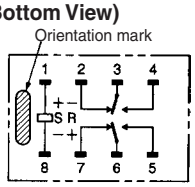


Note: Each value has a tolerance of ±0.3 mm.

Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)

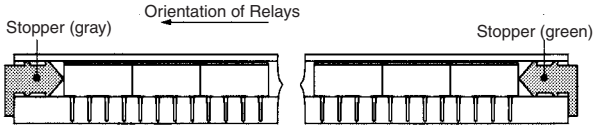


Stick Packing and Tape Packing

Stick Packing

Relays in stick packing are arranged so that the orientation mark of each Relay in on the left side. Fifty Relays are packed on one stick.

Be sure not to make mistakes in Relay orientation when mounting the Relay to the PCB.



Stick length: 520 mm (stopper not included)
No. of Relays per stick: 50

Tape Packing (Surface Mounting Terminal Models)

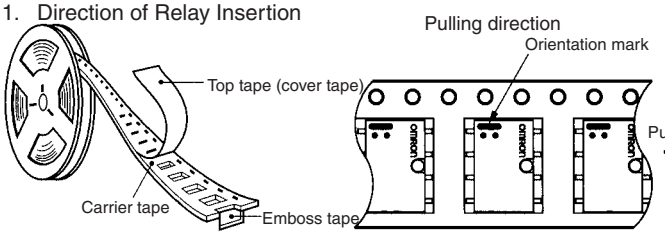
When ordering Relays in tape packing, add the prefix “-TR” to the model number, otherwise the Relays in stick packing will be provided.

Tape Type:ETX7200
(EIAJ (Electronic Industrial Association of Japan))

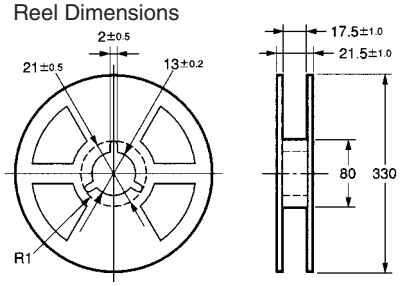
Reel type:RPM-16D (EIAJ)

Relays per Reel: 900

1. Direction of Relay Insertion

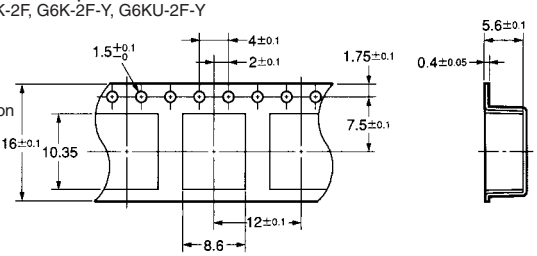


2. Reel Dimensions

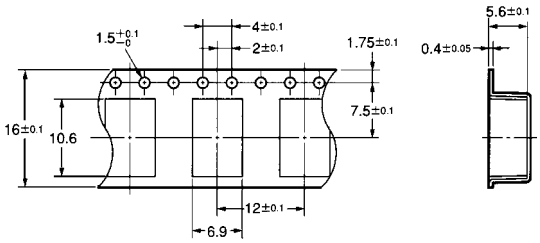


3. Carrier Tape Dimensions

G6K-2F, G6K-2F-Y, G6KU-2F-Y



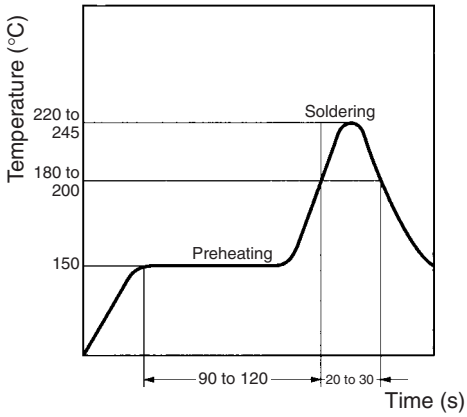
G6K-2G, G6K-2G-Y, G6KU-2G-Y



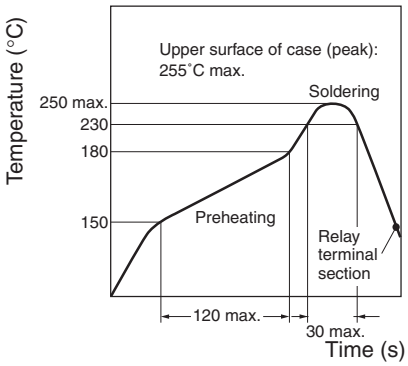
Recommended Soldering Method

Temperature indicate the surface temperature of the PCBs.
IRS Method (for surface mounting terminal models)

(1) IRS Method (Mounting Solder: Lead)



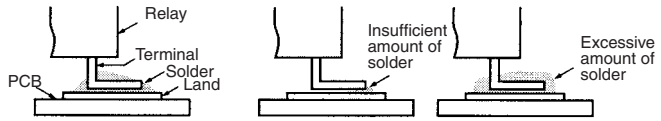
(2) IRS Method (Mounting Solder: Lead-free)



Note: The temperature profile indicates the temperature of the relay terminal section.

- The thickness of cream solder to be applied should be within a range between 150 and 200 μm on OMRON's recommended PCB pattern.
- In order to perform correct soldering, it is recommended that the correct soldering conditions be maintained as shown below on the left side.

Correct Soldering **Incorrect Soldering**



Visually check that the Relay is properly soldered.

■ Approved Standards

UL approval:UL1950 (File No. E41515)

CSA approval:C22.2 No. 950 (File No. LR31928)

Contact form	Coil rating	Contact rating	Number of test operations
DPDT	G6K-2G(F/P): 3 to 12 VDC G6K(U)-2G(F/P)-Y: 3 to 24 VDC	1 A at 30 VDC 0.5 A at 60 VDC 0.3 A at 125 VAC	6,000

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

Correct Use

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Soldering

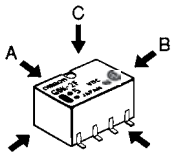
Soldering temperature: Approx. 250°C (260°C if the DWS method is used)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, make sure to set the securing force of each claw to the following so that the Relays characteristics will be maintained.



Direction A: 1.96 N
Direction B: 4.90 N
Direction C: 1.96 N

Environmental Conditions During Operation, Storage, and Transportation

Protect the Relay from direct sunlight and keep the Relay under normal temperature, humidity, and pressure.

If the Relay is stored for a long time in an adverse environment with high temperature, high humidity, organic gases, or sulfide gases, sulfide or oxide films will form on the contact surfaces. These films may result in unstable contact, contact problems, or functional problems. Therefore, operate, store, or transport the product under specified environmental conditions.

Latching Relay Mounting

Make sure that the vibration or shock that is generated from other devices, such as relays in operation, on the same panel and imposed on the Latching Relay does not exceed the rated value, otherwise the Latching Relay that has been set may be reset or vice versa. The Latching Relay is reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relay may be set accidentally. Be sure to apply a reset signal before use.

Maximum Allowable Voltage

The maximum allowable voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting.) The maximum allowable voltage also involves important restrictions which include the following:

- Must not cause thermal changes in or deterioration of the insulating material.
- Must not cause damage to other control devices.
- Must not cause any harmful effect on people.
- Must not cause fire.

Therefore, be sure to use the maximum allowable voltage beyond the value specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than the maximum allowable voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase thus affecting characteristics such as electrical life and resulting in the deterioration of coil insulation.

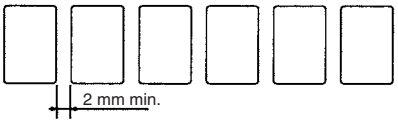
Coating

The Relay mounted on the PCB may be coated or washed but do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relay.

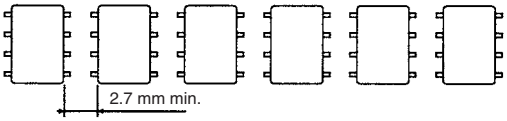
PCB Mounting

If two or more Relays are closely mounted with the long sides of the Relays facing each other and soldering is performed with infrared radiation, the solder may not be properly exposed to the infrared rays. Be sure to keep the proper distance between adjacent Relays as shown below.

G6K-2G



G6K-2F



Two or more Relays may be closely mounted with the short sides of the Relays facing each other.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K106-E1-04

OMRON

PCB Relay | G5A

Subminiature Relay (16 x 9.9 x 8.4 mm (L x W x H)) with DPDT Contact

- Unique moving-loop armature reduces relay size, magnetic interference and contact bounce time.
- Miniature permissible load: 0.01 mA 10 mVDC.
- Bifurcated gold-clad crossbar contact.
- International 2.54-mm terminal pitch.
- Special models available for FCC Part 68 compliance.

RoHS Compliant Refer to pages 16 to 17 for details.

FCC

Ordering Information

Classification		Single-side stable	Single-winding latching	Double-winding latching
DPDT	Fully sealed	G5A-234P	G5AU-234P	G5AK-234P

Note: When ordering, add the rated coil voltage to the model number.
Example: G5A-234P 12 VDC
Rated coil voltage

Model Number Legend

G5A □ - □ □ □ □ - □ □ VDC
1 2 3 4 5 6 7

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   2: DPDT
3. **Contact Type**
   3: Bifurcated crossbar Ag (Au-Alloy)
4. **Enclosure Ratings**
   4: Fully sealed
5. **Terminals**
   P: Straight PCB
   C: Self-clinching PCB
6. **Special Function**
   None: General-purpose
   FC: FCC part 68 compliance
   U: For ultrasonically cleanable
7. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Single–side Stable Types

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA	5.8 mA
Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω	8,230 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.048	0.13	0.17	0.43	0.71	2.76	7.44
	Armature ON	0.043	0.12	0.16	0.4	0.68	2.70	7.25
Must operate voltage		70% max. of rated voltage						
Must release voltage		10% min. of rated voltage						
Max. voltage		200% of rated voltage at 23°C						170% of rated voltage at 23°C
Power consumption		Approx. 200 mW						Approx. 280 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Single/Double–winding Latching Types

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		66.7 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA
Coil resistance		45 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.02	0.06	0.08	0.17	0.29	1.1
	Armature ON	0.02	0.05	0.07	0.14	0.24	0.85
Must operate voltage		80% max. of rated voltage					
Must release voltage		80% min. of rated voltage					
Max. voltage		200% of rated voltage at 23°C					
Power consumption		Approx. 200 mW					

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$) (L/R = 7 ms)
Rated load	0.5 A at 30 VAC; 1 A at 30 VDC	0.1 A at 30 VAC; 0.2 A at 30 VDC
Contact material	Ag (Au-Alloy)	
Rated carry current	1 A	
Max. switching voltage	125 VAC, 125 VDC	
Max. switching current	1 A	0.5 A
Max. switching power	37.5 VA, 33 W	12.5 VA, 11 W
Failure rate (reference value) (See note.)	0.01 mA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 100 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

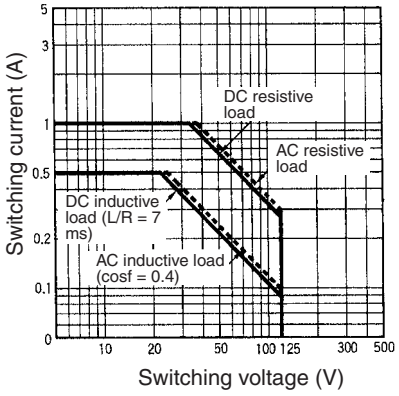
Contact resistance (See note 1.)	50 mΩ max.
Operate (set) time (See note 2.)	Single-side stable types: 5 ms max. (approx. 2.4 ms) Latching types: 5 ms max. (approx. 2 ms)
Release (reset) time (See note 2.)	Single-side stable types: 5 ms max. (approx. 1.1 ms) Latching types: 5 ms max. (approx. 1.8 ms)
Min. set/reset signal width	Latching type: 7 ms
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3.)	1,000 MΩ min. (at 250 VDC)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts (See note 4.) 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity (See note 4.) 500 VAC, 50/60 Hz for 1 min between contacts of same polarity (See note 5.) 100 VAC, 50/60 Hz for 1 min between set and reset coils (double-winding type only)
Impulse withstand voltage	1,500 V (10 x 160 μs) between contacts of same polarity (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 300 m/s^2 (approx. 30G)
Endurance	Mechanical: 50,000,000 operations min. (at 36,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: −40°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 3 g

Note: The above values are initial values.

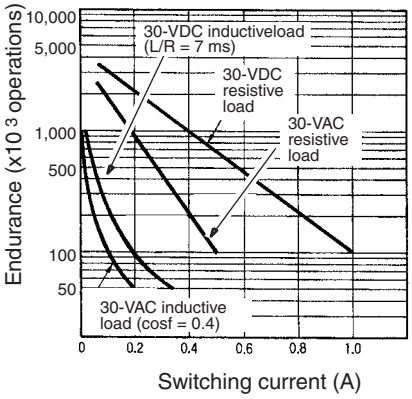
Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.
2. Values in parentheses are actual values.
3. The insulation resistance was measured with a 250-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength (except between the set and reset coil).
4. Models with FC suffix: 1,200 VAC, 50/60 Hz for 1 min, impulse withstand voltage of 1,500 V (10 x 160 μs).
5. Models with FC suffix: 750 VAC, 50/60 Hz for 1 min, impulse withstand voltage of 1,500 V (10 x 160 μs).

Engineering Data

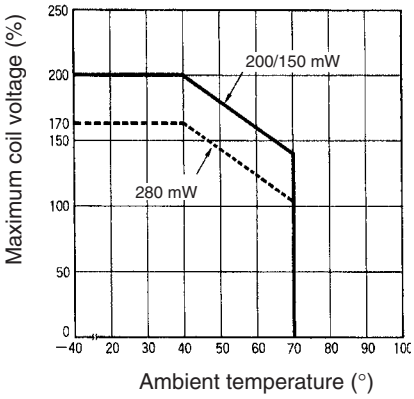
Maximum Switching Power



Endurance



Ambient Temperature vs. Maximum Coil Voltage



Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

■ Approved Standards

UL114, UL478 (File No.E41515)/CSA C22.2 No.0, No.14 (File No.LR31928)

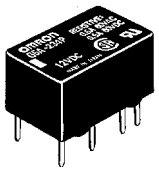
Model	Contact form	Coil ratings	Contact ratings
G5A-234P	DPDT	3 to 48 VDC	0.5 A, 60 VAC 0.5 A, 60 VDC 1 A, 30 VDC
G5AU-234P G5AK-234P		3 to 24 VDC	

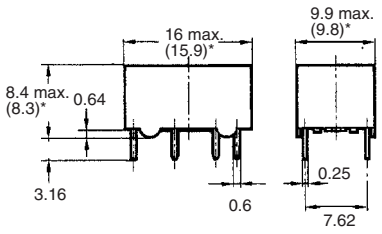
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

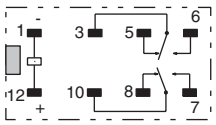
G5A-234P





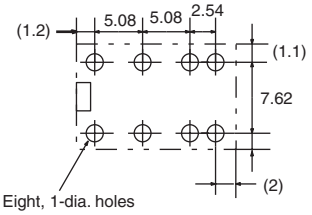
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

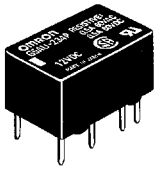


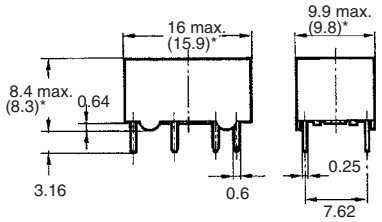
Mounting Holes (Bottom View)

Tolerance: ±0.1

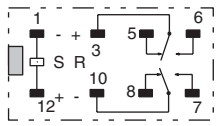


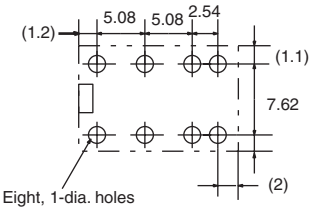
G5AU-234P



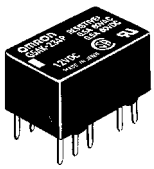


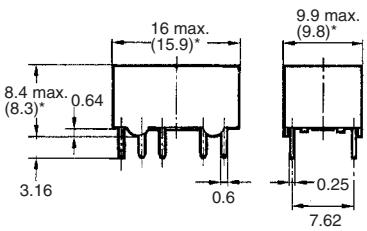
*Average value



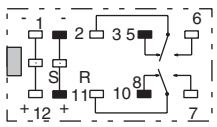


G5AK-234P

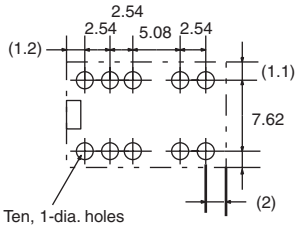




*Average value



S: Set coil
R: Reset coil



Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K019-E1-05

OMRON

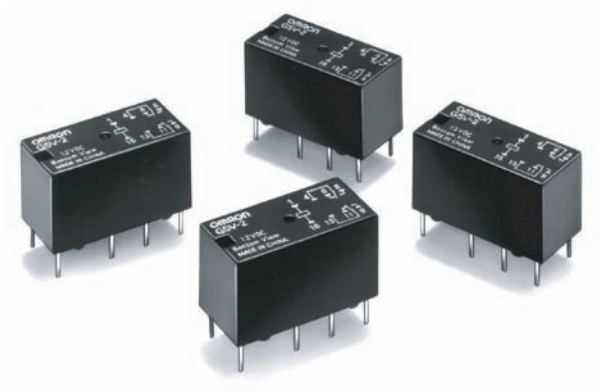
PCB Relay

G5V-2

Miniature Relay for Signal Circuits

- Wide switching power of 10 μA to 2 A.
- High dielectric strength coil-contacts:1,000 VAC; open contacts: 750 VAC.
- Conforms to FCC Part 68 requirements.
- Ag + Au clad bifurcated crossbar contacts and fully sealed for high contact reliability.
- New 150-mW relays with high-sensitivity.

RoHS Compliant Refer to pages 16 to 17 for details.



FCC

Ordering Information

Classification	Contact form	Contact type	Contact material	Enclosure ratings	Model
Standard	DPDT	Bifurcated crossbar	Ag + Au-Alloy	Fully sealed	G5V-2
High-sensitivity					G5V-2-H1

Note: When ordering, add the rated coil voltage to the model number.
Example: G5V-2 12 VDC
Rated coil voltage

Model Number Legend

G5V - □ - □ □ VDC
1 2 3

1. **Contact Form**
   2: DPDT
2. **Classification**
   H1: High-sensitivity
3. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Standard Models

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		166.7 mA	100 mA	83.3 mA	55.6 mA	41.7 mA	20.8 mA	12 mA
Coil resistance		18 Ω	50 Ω	72 Ω	162 Ω	288 Ω	1,152 Ω	4,000 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.04	0.09	0.16	0.31	0.47	1.98	7.23
	Armature ON	0.05	0.11	0.19	0.49	0.74	2.63	10.00
Must operate voltage		75% max. of rated voltage						
Must release voltage		5% min. of rated voltage						
Max. voltage		120% of rated voltage at 23°C						
Power consumption		Approx. 500 mW						Approx. 580 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

High Sensitivity Models

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		50 mA	30 mA	25 mA	16.7 mA	12.5 mA	8.33 mA	6.25 mA
Coil resistance		60 Ω	166.7 Ω	240 Ω	540 Ω	960 Ω	2,880 Ω	7,680 Ω
Coil inductance (H) (ref. value)	Armature ON	0.18	0.46	0.70	1.67	2.90	6.72	20.1
	Armature OFF	0.57	0.71	0.97	2.33	3.99	9.27	26.7
Must operate voltage		75% max. of rated voltage						
Must release voltage		5% min. of rated voltage						
Max. voltage		180% of rated voltage at 23°C						150% of rated voltage at 23°C
Power consumption		Approx. 150 mW					Approx. 200 mW	Approx. 300 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Item	Standard models	High sensitivity models
Load	Resistive load (cosϕ = 1)	
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC	0.5 A at 125 VAC; 1 A at 24 VDC
Contact material	Ag + Au-clad	
Rated carry current	2 A	
Max. switching voltage	125 VAC, 125 VDC	
Max. switching current	2 A	1 A
Max. switching power	62.5 VA, 60 W	62.5 VA, 24 W
Failure rate (reference value) (See note.)	0.01 mA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Item	Standard models	High sensitivity models
Contact resistance (See note 1.)	50 mΩ max.	100 mΩ max.
Operate time	7 ms max.	
Release time	3 ms max.	
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance (See note 2.)	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 750 VAC, 50/60 Hz for 1 min between contacts of same polarity	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 500 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	1,500 V (10 x 160 μs) between coil and contacts (conforms to FCC Part 68)	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Endurance	Mechanical: 15,000,000 operations min. (at 36,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)	
Ambient temperature	Operating: −25°C to 65°C (with no icing)	Operating: −25°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 5 g	

Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.
2. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

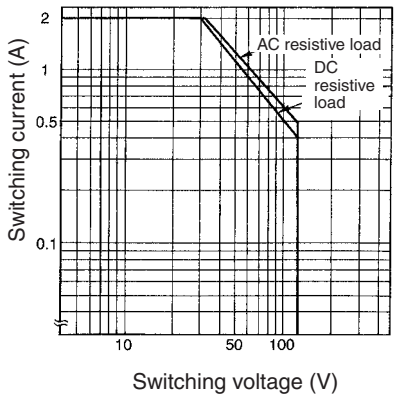
■ Approved Standards

UL478, UL1950, UL508 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR31928)

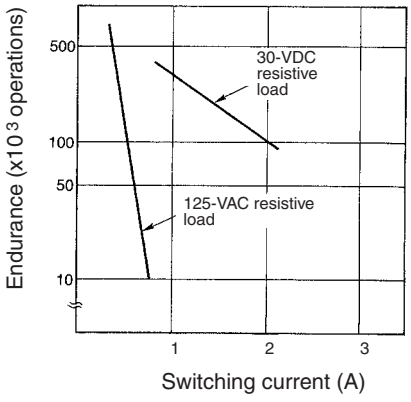
Contact form	Coil ratings	Contact ratings	
		G5V-2	G5V-2-H1
DPDT	3 to 48 VDC	0.6 A, 125 VAC (general use) 0.6 A, 110 VDC (resistive load) 2 A, 30 VDC (resistive load)	0.5 A, 125 VAC (general use) 0.2 A, 110 VDC (resistive load) 1 A, 24 VDC (resistive load)

Engineering Data

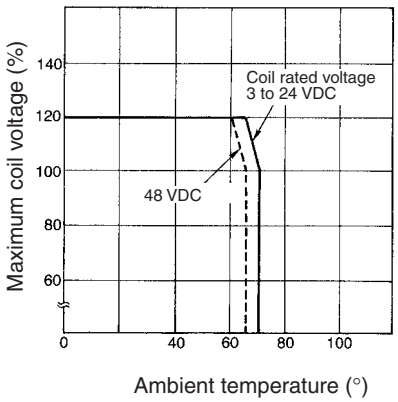
Maximum Switching Power
G5V-2



Endurance
G5V-2

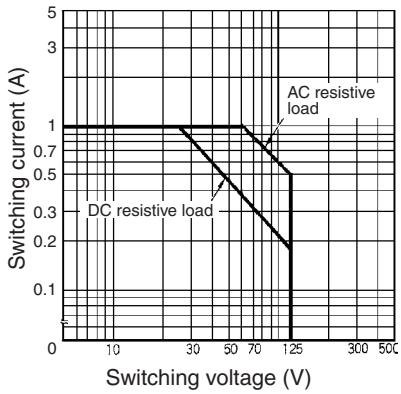


Ambient Temperature vs. Maximum Coil Voltage
G5V-2

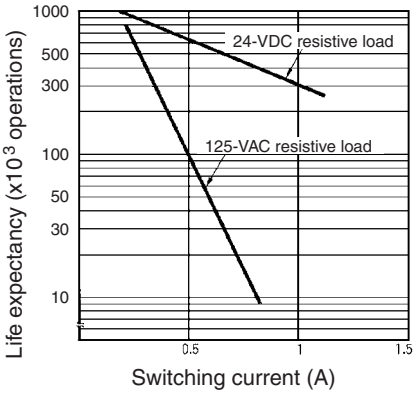


Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

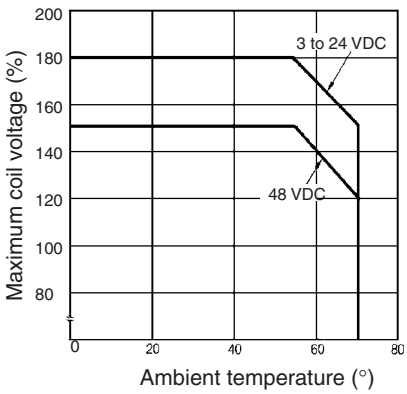
G5V-2-H1



G5V-2-H1



G5V-2-H1

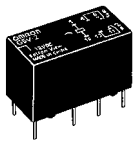


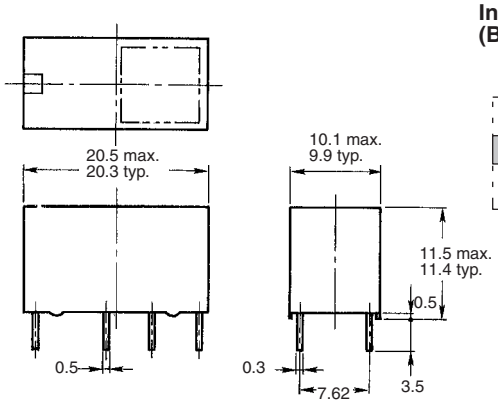
Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

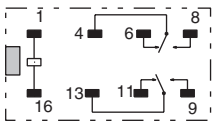
Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:



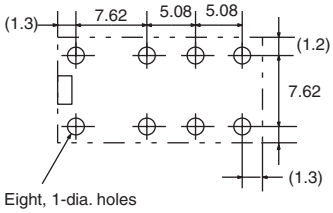


Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K046-E1-03

OMRON

PCB Relay

G6A

Fully Sealed Relay with High Impulse Dielectric for Use in Telecommunications Equipment

- High sensitivity can be driven by digital circuits.
- Horizontal design allows use in 1/2-inch PCB racks.
- Impulse withstand voltage meets FCC Part 68 requirements.
- Relays can be mounted side-by-side due to low magnetic leakage.
- Single- and double-winding latching relays also available.
- Special models available for low thermoelectromotive force.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Single-side Stable Type

Contact		Ag + Au-Alloy
General purpose	DPDT	G6A-274P-ST-US
	4PDT	G6A-474P-ST-US
Low-sensitivity	DPDT	G6A-274P-ST40-US
	4PDT	G6A-474P-ST40-US

Single-winding Latching Type

Contact		Ag + Au-Alloy
General purpose	DPDT	G6AU-274P-ST-US
	4PDT	G6AU-474P-ST-US

Double-winding Latching Type

Contact		Ag + Au-Alloy
General purpose	DPDT	G6AK-274P-ST-US
	4PDT	G6AK-474P-ST-US
Low-sensitivity	DPDT	G6AK-274P-ST40-US
	4PDT	G6AK-474P-ST40-US

Note: When ordering, add the rated coil voltage to the model number.
Example: G6A-274P-ST-US 12 VDC
Rated coil voltage

Model Number Legend

G6A □ - □ □ □ □ - □ □ - □ □ VDC
1 2 3 4 5 6 7 8 9

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   2: DPDT
   4: 4PDT
3. **Contact Type**
   7: Bifurcated crossbar Ag (Au-Alloy) contact
4. **Enclosure Ratings**
   4: Fully sealed
5. **Terminals**
   P: Straight PCB
6. **Stand-off**
   ST: Stand-off 0.64 mm
7. **Special Function**
   40: Low-sensitivity (400 mW)
   LT: Low thermoelectromotive force
8. **Approved Standards**
   US: UL, CSA certified
9. **Rated Coil Voltage**
   3, 4.5, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

General-purpose, DPDT Relays

Rated voltage		3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		66.7 mA	44.6 mA	40 mA	33.3 mA	22.2 mA	16.7 mA	8.3 mA	4.9 mA
Coil resistance		45 Ω	101 Ω	125 Ω	180 Ω	405 Ω	720 Ω	2,880 Ω	9,750 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.07	0.16	0.2	0.29	0.63	1.1	4.5	13.7
	Armature ON	0.065	0.14	0.18	0.26	0.57	1.06	4.1	12.5
Must operate voltage		70% max. of rated voltage							
Must release voltage		10% min. of rated voltage							
Max. voltage		200% of rated voltage at 23°C							
Power consumption		Approx. 200 mW							Approx. 235 mW

General-purpose, 4PDT Relays

Rated voltage		3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		120 mA	79.9 mA	72.5 mA	60 mA	40 mA	30 mA	15 mA	7.5 mA
Coil resistance		25 Ω	56.3 Ω	69 Ω	100 Ω	225 Ω	400 Ω	1,600 Ω	6,400 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.05	0.11	0.14	0.2	0.45	0.8	3.2	12.8
	Armature ON	0.045	0.095	0.12	0.17	0.38	0.68	2.7	10.9
Must operate voltage		70% max. of rated voltage							
Must release voltage		10% min. of rated voltage							
Max. voltage		150% of rated voltage at 23°C							
Power consumption		Approx. 360 mW							

Low-sensitivity DPDT Relays

Rated voltage		3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		133.3 mA	88.9 mA	80 mA	66.7 mA	44.3 mA	33.3 mA	16.7 mA	8.3 mA
Coil resistance		22.5 Ω	50.6 Ω	62.5 Ω	90 Ω	203 Ω	360 Ω	1,440 Ω	5,760 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.03	0.065	0.08	0.11	0.27	0.52	2.1	7.5
	Armature ON	0.02	0.06	0.07	0.1	0.23	0.43	1.8	6.4
Must operate voltage		70% max. of rated voltage							
Must release voltage		10% min. of rated voltage							
Max. voltage		150% of rated voltage at 23°C							
Power consumption		Approx. 400 mW							

Low-sensitivity 4PDT Relays

Rated voltage		3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		133.3 mA	88.9 mA	80 mA	66.7 mA	44.3 mA	33.3 mA	16.7 mA	8.3 mA
Coil resistance		22.5 Ω	50.6 Ω	62.5 Ω	90 Ω	203 Ω	360 Ω	1,440 Ω	5,760 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.035	0.1	0.12	0.17	0.42	0.7	2.8	10.2
	Armature ON	0.02	0.07	0.09	0.13	0.3	0.52	2.2	8.6
Must operate voltage		70% max. of rated voltage							
Must release voltage		10% min. of rated voltage							
Max. voltage		150% of rated voltage at 23°C							
Power consumption		Approx. 400 mW							

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Single-winding Latching, DPDT Relays

Rated voltage		3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		33.7 mA	22.2 mA	20 mA	16.7 mA	11.1 mA	8.3 mA	4.2 mA	2.5 mA
Coil resistance		89 Ω	202 Ω	250 Ω	360 Ω	810 Ω	1,440 Ω	5,760 Ω	19,000 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.15	0.34	0.44	0.64	1.38	2.5	9.2	28.5
	Armature ON	0.11	0.25	0.35	0.48	1.07	2	7.2	22
Must operate voltage		70% max. of rated voltage							
Must release voltage		70% max. of rated voltage							
Max. voltage		200% of rated voltage at 23°C							
Power consumption		Approx. 100 mW							Approx. 120 mW

Single-winding Latching, 4PDT Relays

Rated voltage	3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	106.8 mA	71.2 mA	64 mA	53.3 mA	35.6 mA	26.7 mA	13.3 mA	6.7 mA
Coil resistance	28.1 Ω	63.2 Ω	78.1 Ω	112.5 Ω	253 Ω	450 Ω	1,800 Ω	7,200 Ω
Coil inductance (H) (ref. value) **Armature OFF**	0.03	0.06	0.08	0.11	0.25	0.45	1.8	7
Armature ON	0.02	0.04	0.06	0.08	0.18	0.32	1.3	5.2
Must operate voltage	70% max. of rated voltage							
Must release voltage	70% max. of rated voltage							
Max. voltage	150% of rated voltage at 23°C							
Power consumption	Approx. 320 mW							

Double-winding Latching, DPDT Relays

Rated voltage			3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current			66.7 mA	40.2 mA	36 mA	30 mA	20 mA	15 mA	7.5 mA	4.2 mA
Coil resistance			45 Ω	112 Ω	139 Ω	200 Ω	450 Ω	800 Ω	3,200 Ω	11,520 Ω
Coil inductance (H) (ref. value)	**Set**	**Armature OFF**	0.037	0.09	0.11	0.16	0.38	0.6	2.1	8.5
		Armature ON	0.027	0.065	0.08	0.12	0.28	0.45	1.5	6.3
	Reset	**Armature OFF**	0.027	0.065	0.08	0.12	0.28	0.45	1.5	6.3
		Armature ON	0.037	0.09	0.11	0.16	0.38	0.6	2.1	8.5
Must operate voltage			70% max. of rated voltage							
Must release voltage			70% max. of rated voltage							
Max. voltage			200% of rated voltage at 23°C							
Power consumption			Approx. 200 mW	Approx. 180 mW						Approx. 200 mW

Double-winding Latching, 4PDT Relays

Rated voltage			3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current			106.8 mA	71.2 mA	64 mA	53.3 mA	35.6 mA	26.7 mA	13.3 mA	6.7 mA
Coil resistance			28.1 Ω	63.2 Ω	78.1 Ω	112.5 Ω	253 Ω	450 Ω	1,800 Ω	7,200 Ω
Coil inductance (H) (ref. value)	**Set**	**Armature OFF**	0.03	0.06	0.08	0.11	0.25	0.45	1.8	7
		Armature ON	0.02	0.04	0.06	0.08	0.18	0.32	1.3	5.2
	Reset	**Armature OFF**	0.02	0.04	0.06	0.08	0.18	0.32	1.3	5.2
		Armature ON	0.03	0.06	0.08	0.11	0.25	0.45	1.8	7
Must operate voltage			70% max. of rated voltage							
Must release voltage			70% max. of rated voltage							
Max. voltage			150% of rated voltage at 23°C							
Power consumption			Approx. 320 mW							

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Double-winding Latching, Low-sensitivity DPDT Relays

Rated voltage			3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current			120 mA	79.9 mA	72.5 mA	60 mA	40 mA	30 mA	15 mA	7.5 mA
Coil resistance			25 Ω	56.3 Ω	69 Ω	100 Ω	225 Ω	400 Ω	1,600 Ω	6,400 Ω
Coil inductance (H) (ref. value)	Set	Armature OFF	0.015	0.04	0.05	0.07	0.16	0.28	1.1	4
		Armature ON	0.01	0.025	0.035	0.05	0.12	0.2	0.75	2.9
	Reset	Armature OFF	0.01	0.025	0.035	0.05	0.12	0.2	0.75	2.9
		Armature ON	0.015	0.04	0.05	0.07	0.16	0.28	1.1	4
Must operate voltage			70% max. of rated voltage							
Must release voltage			70% max. of rated voltage							
Max. voltage			150% of rated voltage at 23°C							
Power consumption			Approx. 360 mW							

Double-winding Latching, Low-sensitivity 4PDT Relays

Rated voltage			3 VDC	4.5 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current			120 mA	79.9 mA	72.5 mA	60 mA	40 mA	30 mA	15 mA	7.5 mA
Coil resistance			25 Ω	56.3 Ω	69 Ω	100 Ω	225 Ω	400 Ω	1,600 Ω	6,400 Ω
Coil inductance (H) (ref. value)	Set	Armature OFF	0.02	0.045	0.065	0.09	0.18	0.3	1.2	4.4
		Armature ON	0.015	0.035	0.05	0.075	0.14	0.23	0.82	3.2
	Reset	Armature OFF	0.015	0.035	0.05	0.075	0.14	0.23	0.82	3.2
		Armature ON	0.02	0.045	0.065	0.09	0.18	0.3	1.2	4.4
Must operate voltage			70% max. of rated voltage							
Must release voltage			70% max. of rated voltage							
Max. voltage			150% of rated voltage at 23°C							
Power consumption			Approx. 360 mW							

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Contact Ratings

Item	G6A-274P-ST(40)-US/474P-ST(40)-US	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC	0.3 A at 125 VAC; 1 A at 30 VDC
Contact material	Ag (Au-Alloy)	
Rated carry current	3 A	
Max. switching voltage	250 VAC, 220 VDC	
Max. switching current	2 A	1 A
Max. switching power	125 VA, 60 W	62.5 VA, 30 W
Failure rate (reference value)	0.01 mA at 10 mVDC	

Item	G6AK-274P-ST(40)-US/G6AK-474P-ST(40)-US G6AU-274P-ST-US/G6AU-474P-ST-US	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC	0.25 A at 125 VAC; 1 A at 30 VDC
Contact material	Ag (Au-Alloy)	
Rated carry current	3 A	
Max. switching voltage	250 VAC, 220 VDC	
Max. switching current	2 A	1 A
Max. switching power	125 VA, 60 W	62.5 VA, 30 W
Failure rate (reference value) (See note.)	0.01 mA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 60 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Characteristics

Contact resistance (See note 1.)	50 mΩ max.
Operate (set) time (See note 2.)	Single-side stable types: DPDT: 5 ms max. (approx. 3 ms) 4PDT: 7 ms max. (approx. 3.8 ms) Latching types: DPDT: 5 ms max. (approx. 2.5 ms) 4PDT: 7 ms max. (approx.approx. 3.3 ms)
Release (reset) time (See note 2.)	Single-side stable types: DPDT: 3 ms max. (approx. 1.2 ms) 4PDT: 5 ms max. (approx. 1.3 ms) Latching types: DPDT: 5 ms max. (approx. 2.5 ms) 4PDT: 7 ms max. (approx. 2.7 ms)
Min. set/reset signal width	DPDT: 7 ms min. 4PDT: 15 ms min.
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3.)	1,000 MΩ min. (at 500 VDC); except for set-reset
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between set and reset coils
Impulse withstand voltage	1,500 V (10 x 160 μs) (conforms to FCC Part 68)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 2.5-mm single amplitude (5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: DPDT: 500 m/s^2 (approx. 50G) 4PDT, Latching type: 300 m/s^2 (approx. 30G)
Endurance	Mechanical: 100,000,000 operations min. (at 36,000 operations/hr) Electrical: 500,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	DPDT: Approx. 3.5 g 4PDT: Approx. 6 g

Note: The data shown above are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.

2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength (except between the set and reset coil).

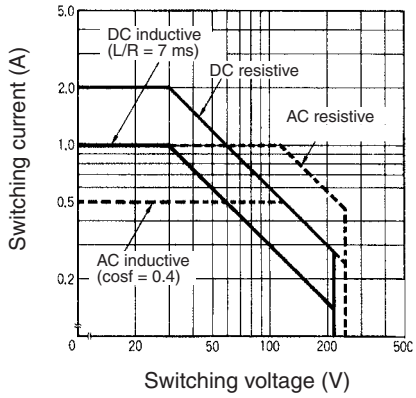
■ Approved Standards

UL114, UL478 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR31928)

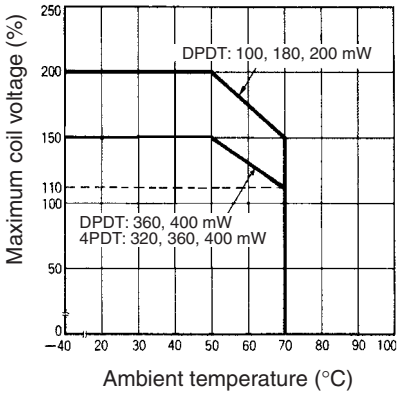
Model	Contact form	Coil ratings	Contact ratings
G6A-274P-ST(40)-US **G6AK-274P-ST(40)-US** **G6AU-274P-ST-US**	DPDT	3 to 48 VDC	0.6 A, 125 VAC 2 A, 30 VDC 0.6 A, 110 VDC
G6A-474P-ST(40)-US **G6AK-474P-ST(40)-US** **G6AU-474P-ST-US**	4PDT		0.6 A, 125 VAC 2 A, 30 VDC 0.6 A, 110 VDC

Engineering Data

Maximum Switching Power
DPDT, 4PDT

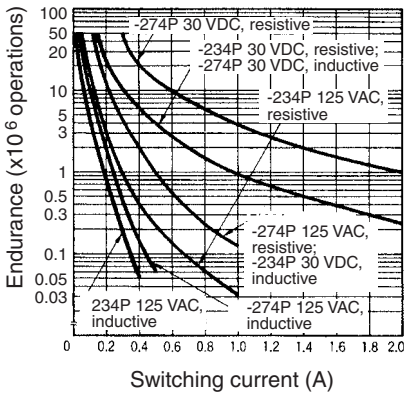


Ambient Temperature vs.
Maximum Coil Voltage

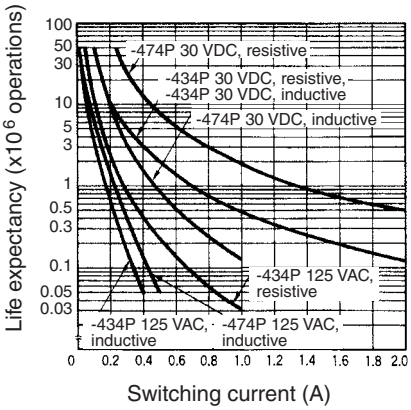


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Endurance
DPDT



4PDT

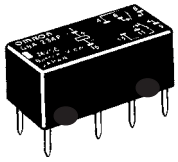


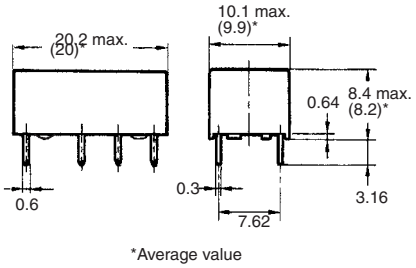
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

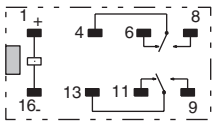
G6A-274P-ST(40)-US





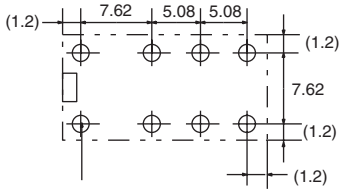
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



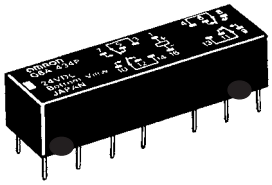
Mounting Holes (Bottom View)

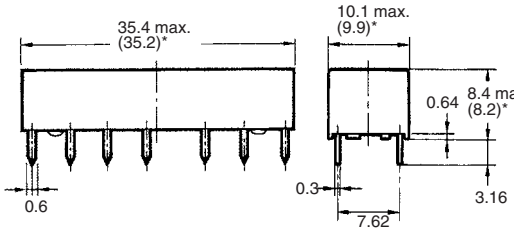
Tolerance: ±0.1



Eight, 1.0-dia. holes

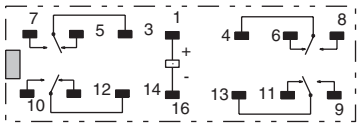
G6A-474P-ST-US





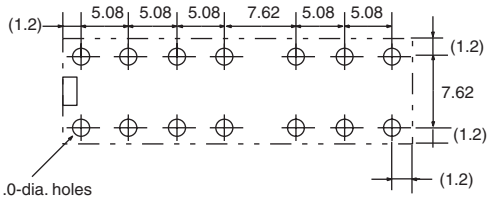
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



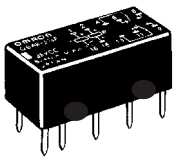
Mounting Holes (Bottom View)

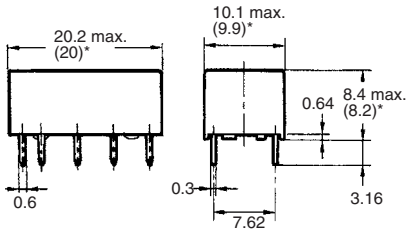
Tolerance: ±0.1



Fourteen, 1.0-dia. holes

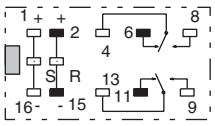
G6AK-274P-ST(40)-US





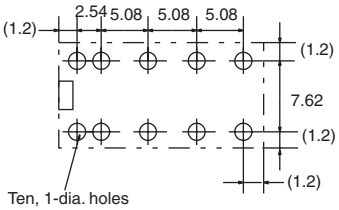
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



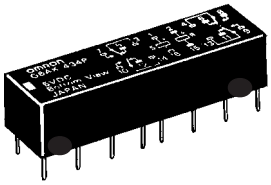
Mounting Holes (Bottom View)

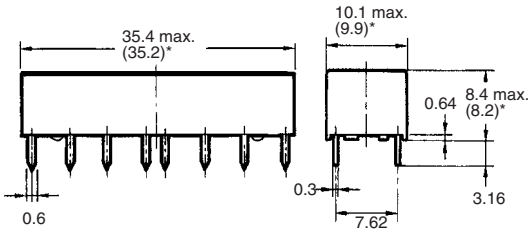
Tolerance: ±0.1



Ten, 1-dia. holes

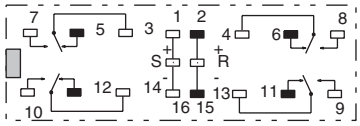
G6AK-474P-ST(40)-US





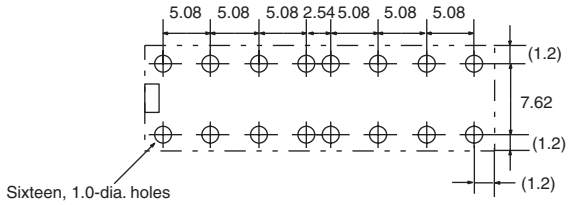
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

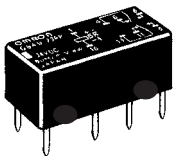


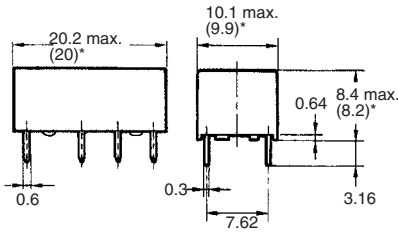
Mounting Holes (Bottom View)

Tolerance: ±0.1



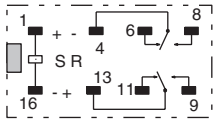
G6AU-274P-ST-US





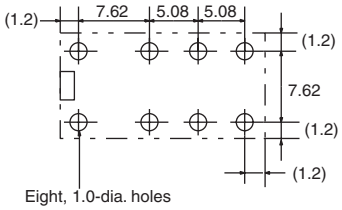
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

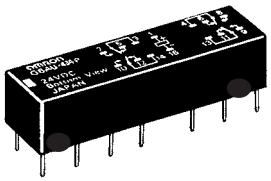


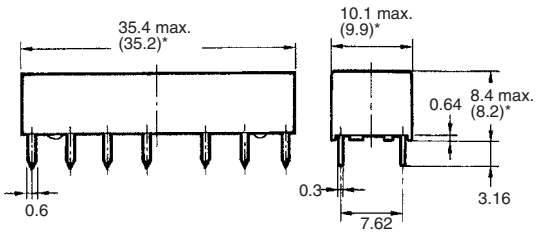
Mounting Holes (Bottom View)

Tolerance: ±0.1



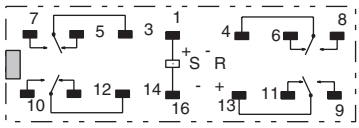
G6AU-474P-ST-US





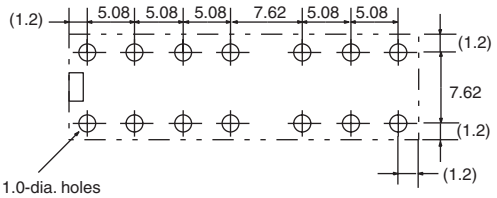
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

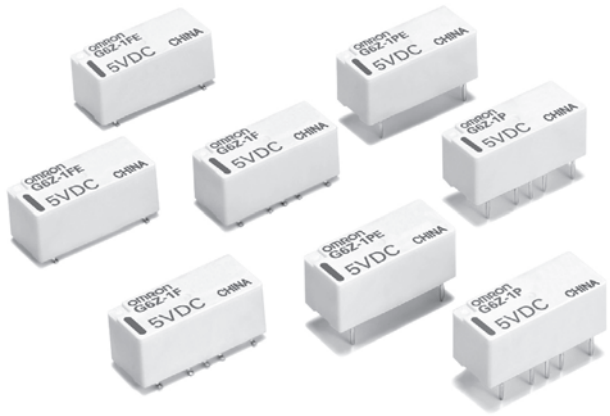
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K020-E1-08

OMRON

Surface-mounting High-frequency Relay | G6Z

Surface-mounting, 2.6-GHz-Band, Miniature, SPDT, High-frequency Relay



- Superior high-frequency characteristics, such as an isolation of 30 dB min., insertion loss of 0.5 dB max., and V.SWR of 1.5 max. at 2.6 GHz.
- Surface-mounting terminals and superior high frequency characteristics combined using semi triplate strip transmission lines.
- Miniature dimensions of 20 × 8.6 × 8.9 mm (L × W × H).
- Choose from a lineup that includes single-winding latching models (200 mW), double-winding latching models (360 mW), and models with a reverse contact arrangement.
- Series includes models with an E-shape terminal structure (same as existing models), and models with a Y-shape terminal structure, allowing greater freedom with PCB design.
- Models with 75-Ω impedance and models with 50-Ω impedance are available.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

■ Model Number Legend:

G6Z-□-□□□-□□

1 2 3 4 5 6

1. **Relay Function**
   - None: Single-side stable
   - U: Single-winding latching
   - K: Double-winding latching
2. **Contact Form**
   - 1: SPDT
3. **Terminal Shape**
   - F: Surface-mounting terminals
   - P: PCB terminals
4. **Terminal Structure**
   - None: Y-shape terminal structure
   - E: E-shape terminal structure
5. **Characteristic Impedance**
   - None: 75 Ω
   - A: 50 Ω
6. **Contact Arrangement**
   - None: Standard contact arrangement
   - R: Reverse contact arrangement

■ List of Models

Standard Models with PCB Terminals

Classification	Structure	Contact form	Terminal arrangement	Characteristic impedance	Rated coil voltage	Model
Single-side stable	Plastic sealed	SPDT	E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1PE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1PE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1P
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1P-A
Single-winding latching			E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1PE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1PE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1P
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1P-A
Double-winding latching			E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1PE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1PE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1P
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1P-A

Standard Models with Surface-mounting Terminals

Classification	Structure	Contact form	Terminal arrangement	Characteristic impedance	Rated coil voltage	Model
Single-side stable	Plastic sealed	SPDT	E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1FE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1FE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1F
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6Z-1F-A
Single-winding latching			E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1FE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1FE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1F
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZU-1F-A
Double-winding latching			E-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1FE
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1FE-A
			Y-shape	75 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1F
				50 Ω	3, 4.5, 5, 9, 12, and 24 VDC	G6ZK-1F-A

Note: When ordering tape packing (surface-mounting models), add "-TR" to the model number. "-TR" does not appear on the Relay itself.

Application Examples

These Relays can be used for switching signals in media equipment.

- **Wire communications:**
  Cable TV (STB and broadcasting infrastructure), cable modems, and VRS (video response systems)
- **Wireless communications:**
  Transceivers, ham radios, car telephones, ETC, ITS, high-level TV, satellite broadcasting, text multiplex broadcasting, pay TV, mobile phone stations, TV broadcasting facilities, and community antenna systems
- **Public equipment:**
  TVs, TV games, satellite radio units, car navigation systems
- **Industrial equipment:**
  Measuring equipment, test equipment, and multiplex transmission devices

Specifications

■ Contact Ratings

Load	Resistive load
Rated load	10 mA at 30 VAC; 10 mA at 30 VDC; 10 W at 900 MHz (See note.)
Rated carry current	0.5 A
Max. switching voltage	30 VAC, 30 VDC
Max. switching current	0.5 A

Note: This value is for an impedance of 50 Ω or 75 Ω with a V.SWR of 1.2 max.

■ High-frequency Characteristics

Item	Frequency	900 MHz				2.6 GHz			
		TH		SMD		TH		SMD	
		E-shape	Y-shape	E-shape	Y-shape	E-shape	Y-shape	E-shape	Y-shape
Isolation	75 Ω	65 dB min.		60 dB min.		35 dB min.	45 dB min.	30 dB min.	40 dB min.
	50 Ω	60 dB min.							
Insertion loss (not including substrate loss)	75 Ω	0.2 dB max.				0.5 dB max.			
	50 Ω	0.1 dB max.				0.3 dB max.			
V.SWR	75 Ω	1.2 max.				1.5 max.			
	50 Ω	1.1 max.				1.3 max.			
Return loss	75 Ω	20.8 dB min.				14.0 dB min.			
	50 Ω	26.4 dB min.				17.7 dB min.			
Maximum carry power		10 W (See note 2.)							
Maximum switching power		10 W (See note 2.)							

Note: **1.** The above values are initial values.

2. These values are for an impedance of 50 Ω or 75 Ω with a V.SWR of 1.2 max.

■ Coil Ratings

Single-side Stable Models

G6Z-1P(E), G6Z-1F(E)

Raged voltage	3 VDC	4.5 VDC	5 VDC	9 VDC	12 VDC	24 VDC
Rated current	66.7 mA	44.4 mA	40.0 mA	22.2 mA	16.7 mA	8.3 mA
Coil resistance	45 Ω	101 Ω	125 Ω	405 Ω	720 Ω	2,880 Ω
Must operate voltage	75% max. of rated voltage					
Must release voltage	10% min. of rated voltage					
Maximum voltage	150% of rated voltage					
Power consumption	Approx. 200 mW					

Single-winding Latching Models

G6ZU-1P(E), G6ZU-1F(E)

Raged voltage	3 VDC	4.5 VDC	5 VDC	9 VDC	12 VDC	24 VDC
Rated current	66.7 mA	44.4 mA	40.0 mA	22.2 mA	16.7 mA	8.3 mA
Coil resistance	45 Ω	101 Ω	125 Ω	405 Ω	720 Ω	2,880 Ω
Must operate voltage	75% max. of rated voltage					
Must release voltage	75% max. of rated voltage					
Maximum voltage	150% of rated voltage					
Power consumption	Approx. 200 mW					

Double-winding Latching Models

G6ZK-1P(E), G6ZK-1F(E)

Raged voltage	3 VDC	4.5 VDC	5 VDC	9 VDC	12 VDC	24 VDC
Rated current	120 mA	80 mA	72 mA	40 mA	30 mA	15 mA
Coil resistance	25 Ω	56 Ω	69 Ω	225 Ω	400 Ω	1,600 Ω
Must operate voltage	75% max. of rated voltage					
Must release voltage	75% max. of rated voltage					
Maximum voltage	150% of rated voltage					
Power consumption	Approx. 360 mW					

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

4. The voltage measurements for operate/release and set/reset are the values obtained for instantaneous changes in the voltage (rectangular wave).

■ Characteristics

Item		Single-side stable models	Single-winding latching models	Double-winding latching models
		G6Z-1P(E), G6Z-1F(E)	G6ZU-1P(E), G6ZU-1F(E)	G6ZK-1P(E), G6ZK-1F(E)
Contact resistance (See note 1.)		100 mΩ max.		
Operating (set) time (See note 2.)		10 ms max. (approx. 3.5 ms)	10 ms max. (approx. 2.5 ms)	
Release (reset) time (See note 2.)		10 ms max. (approx. 2.5 ms)		
Minimum set/reset pulse time		---	12 ms	
Insulation resistance (See note 3.)		100 MΩ min. (at 500 VDC)		
Dielectric strength	Coil and contacts	1,000 VAC, 50/60 Hz for 1 min		
	Coil and ground, contacts and ground	500 VAC, 50/60 Hz for 1 min		
	Contacts of same polarity	500 VAC, 50/60 Hz for 1 min		
Vibration resistance		Destruction:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)		
Shock resistance		Destruction:1,000 m/s^2 Malfunction:500 m/s^2		
Endurance		Mechanical:1,000,000 operations min. (at 36,000 operations/hour) Electrical: 300,000 operations min. (30 VAC, 10 mA/30 VDC, 10 mA), 100,000 operations min. (900 MHz, 10 W) at a switching frequency of 1,800 operations/hour		
Ambient temperature		Operating: –40°C to 70°C (with no icing or condensation)		
Ambient humidity		Operating: 5% to 85%		
Weight		Approx. 2.8 g		

Note: The above values are initial values.

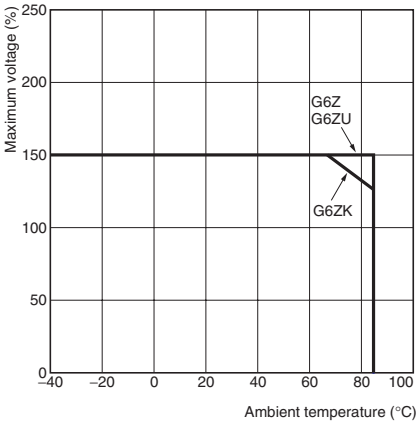
Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.

2. Values in parentheses are actual values.

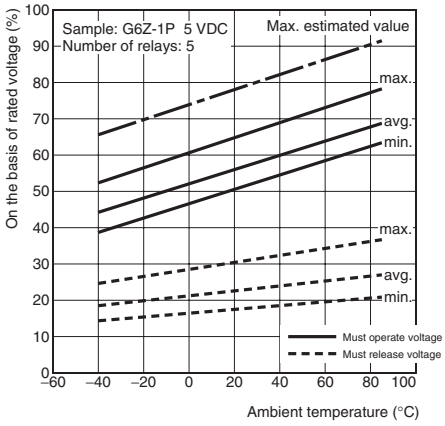
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

Engineering Data

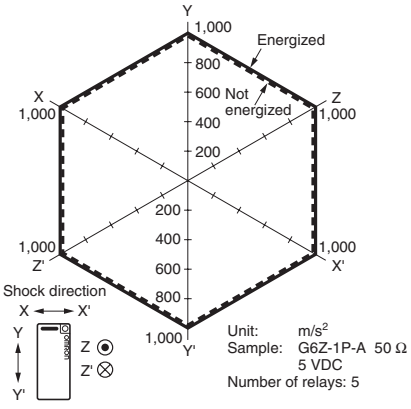
Ambient Temperature vs. Maximum Voltage



Ambient Temperature vs. Must Operate or Must Release Voltage

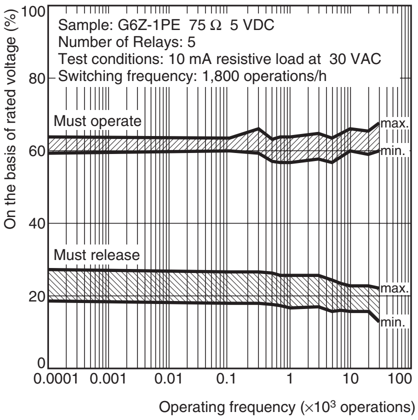


Shock Malfunction

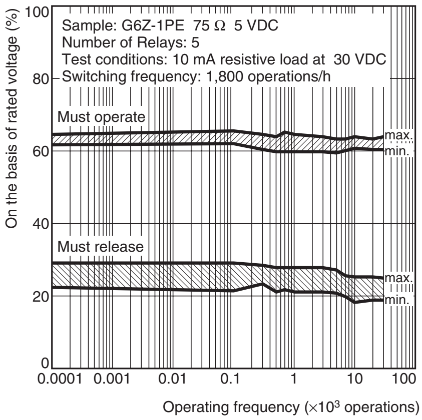


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check for contact malfunctions.

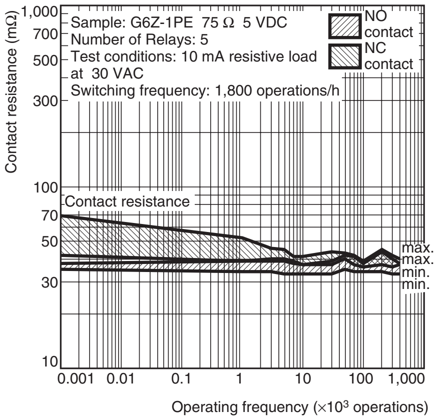
Electrical Endurance (with Must Operate and Must Release Voltage)



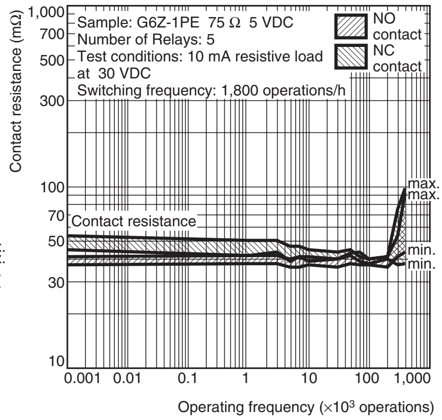
Electrical Endurance (with Must Operate and Must Release Voltage)



Electrical Endurance (Contact Resistance)



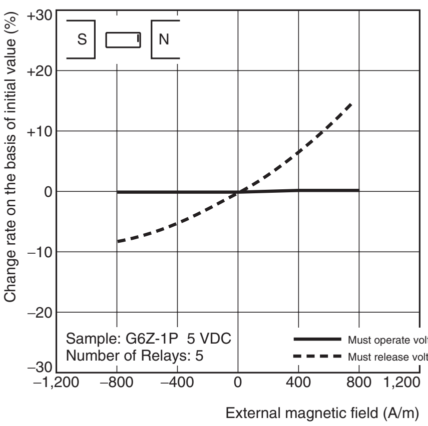
Electrical Endurance (Contact Resistance)



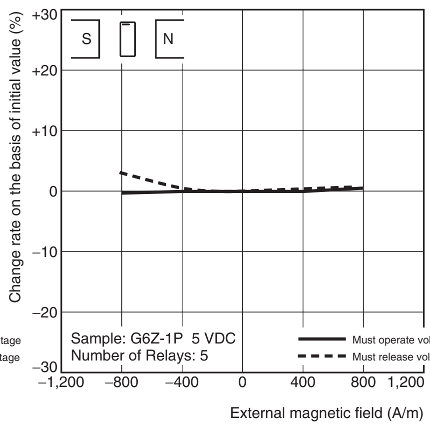
Note:
1. The tests were conducted at an ambient temperature of 23°C.
2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

External Magnetic Interference

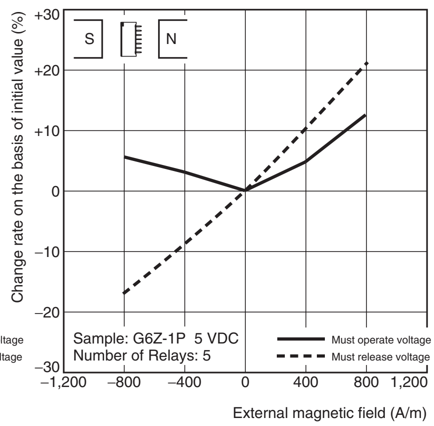
(Average value)



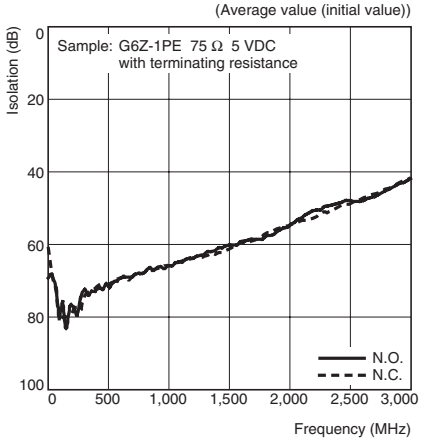
(Average value)



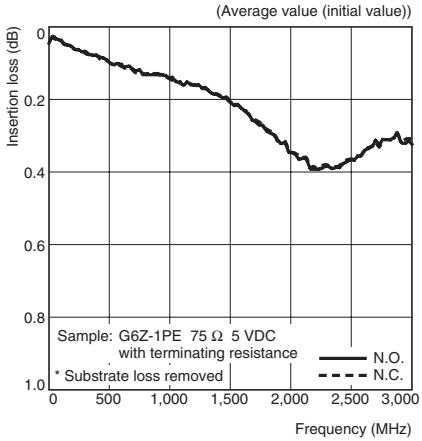
(Average value)



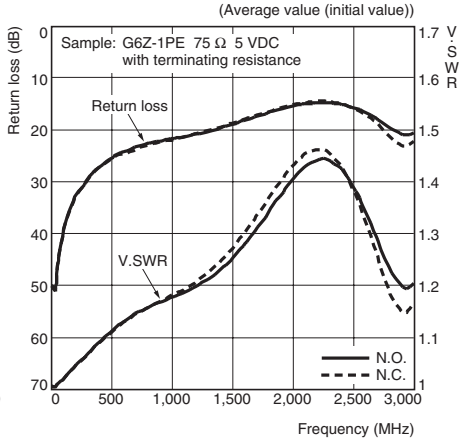
High-frequency Characteristics at 75 Ω (Isolation) (See notes 1 and 2.)



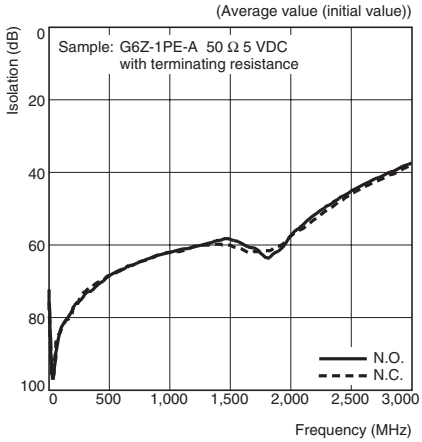
High-frequency Characteristics at 75 Ω (Insertion Loss) (See notes 1 and 2.)



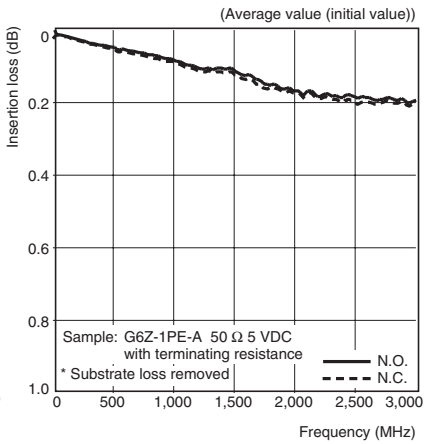
High-frequency Characteristics at 75 Ω (Return Loss, V.SWR) (See notes 1 and 2.)



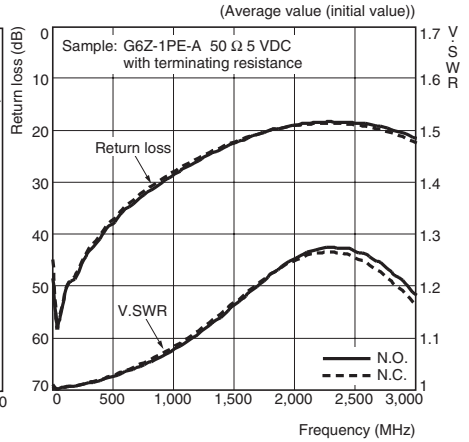
High-frequency Characteristics at 50 Ω (Isolation) (See notes 1 and 2.)



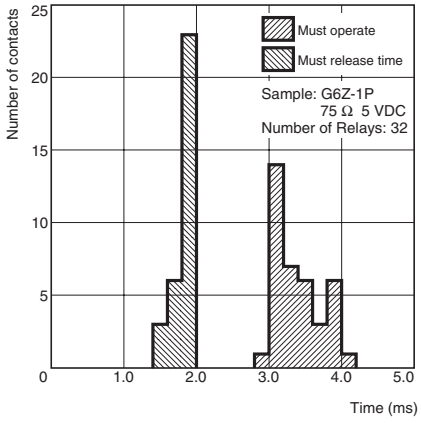
High-frequency Characteristics at 50 Ω (Insertion Loss) (See notes 1 and 2.)



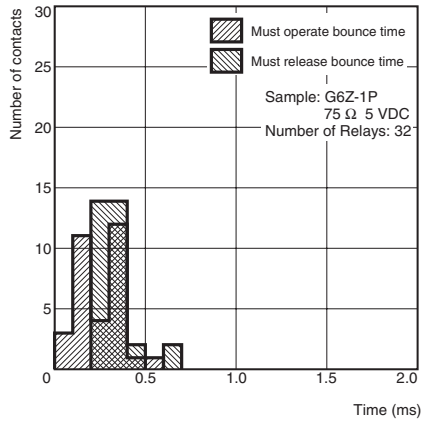
High-frequency Characteristics at 50 Ω (Return Loss, V.SWR) (See notes 1 and 2.)



Must Operate and Must Release Time Distribution (See note 1.)



Must Operate and Must Release Bounce Time Distribution (See note 1.)



Note: **1.** The tests were conducted at an ambient temperature of 23°C.

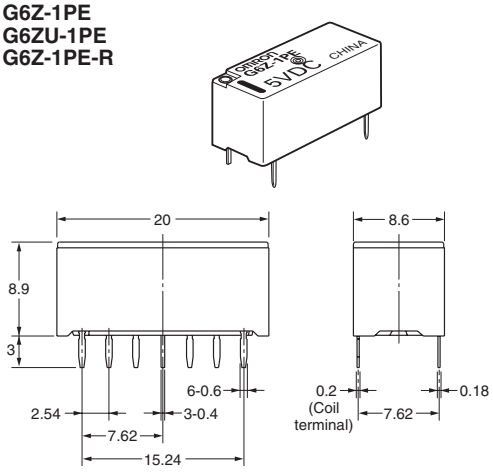
2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

Dimensions

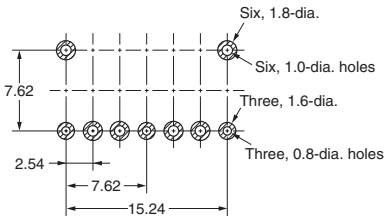
Note: All units are in millimeters unless otherwise indicated.

■ Models with PCB Terminals

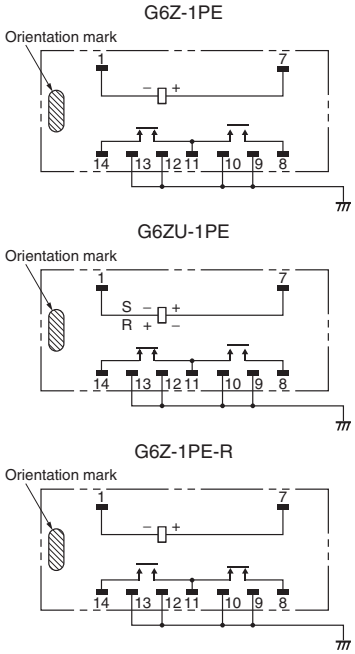
G6Z-1PE
G6ZU-1PE
G6Z-1PE-R



Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

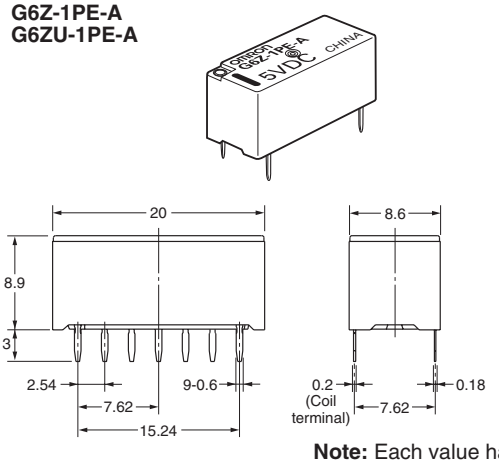


Terminal Arrangement/Internal Connections (Bottom View)

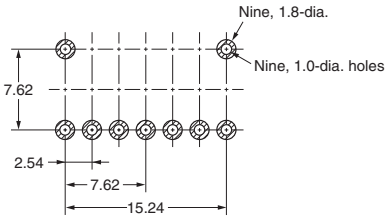


Note: Each value has a tolerance of ±0.3 mm.

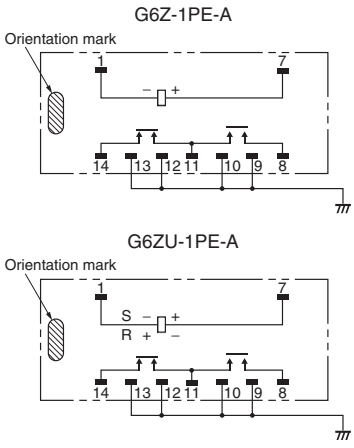
G6Z-1PE-A
G6ZU-1PE-A



Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

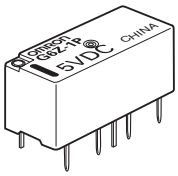


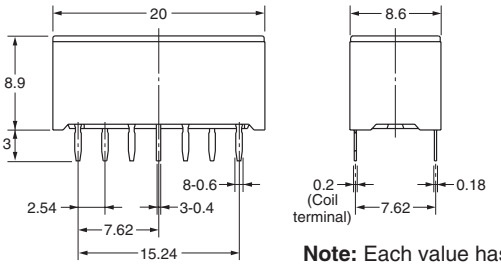
Terminal Arrangement/Internal Connections (Bottom View)



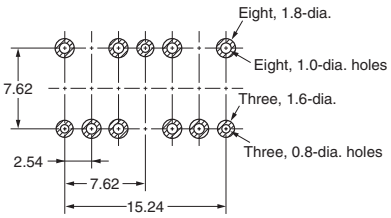
Note: Each value has a tolerance of ±0.3 mm.

G6Z-1P
G6ZU-1P



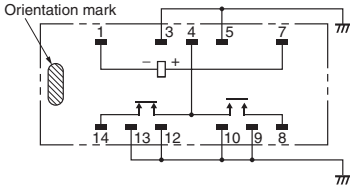


Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

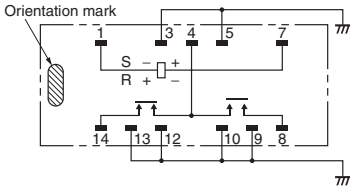


Terminal Arrangement/Internal Connections (Bottom View)

G6Z-1P

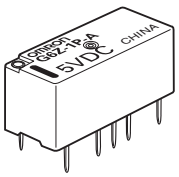


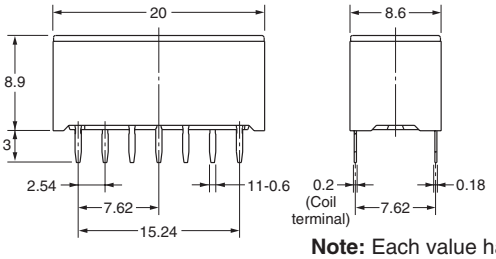
G6ZU-1P



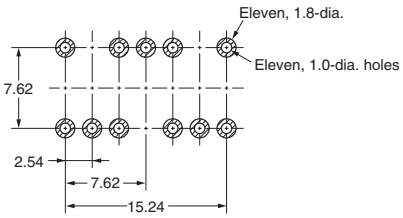
Note: Each value has a tolerance of ±0.3 mm.

G6Z-1P-A
G6ZU-1P-A



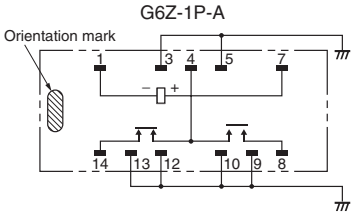


Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

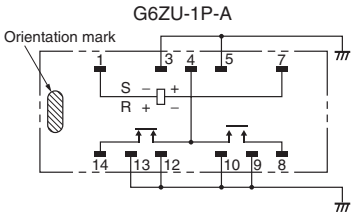


Terminal Arrangement/Internal Connections (Bottom View)

G6Z-1P-A

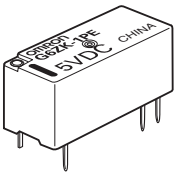


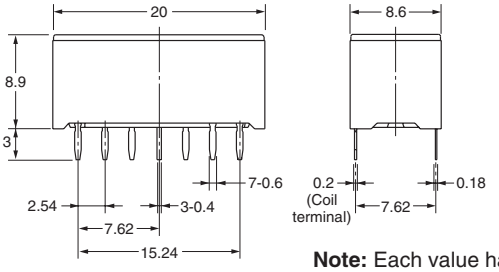
G6ZU-1P-A



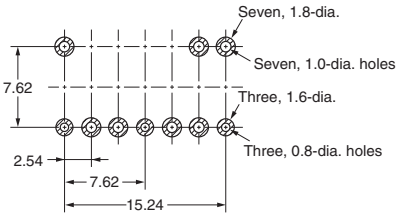
Note: Each value has a tolerance of ±0.3 mm.

G6ZK-1PE

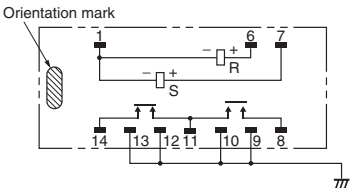




Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

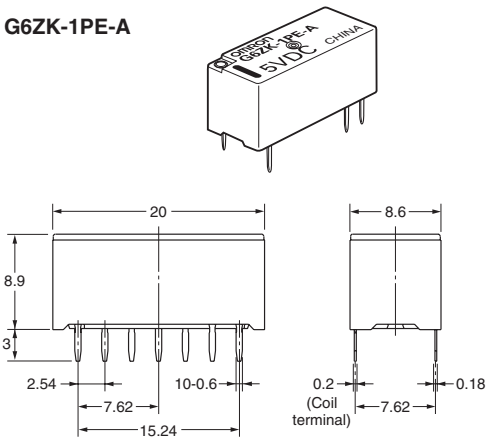


Terminal Arrangement/Internal Connections (Bottom View)

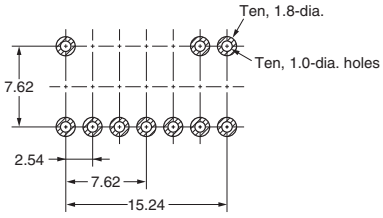


Note: Each value has a tolerance of ±0.3 mm.

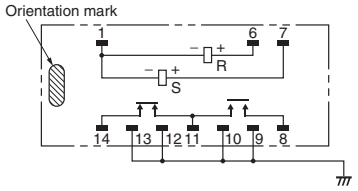
G6ZK-1PE-A



Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

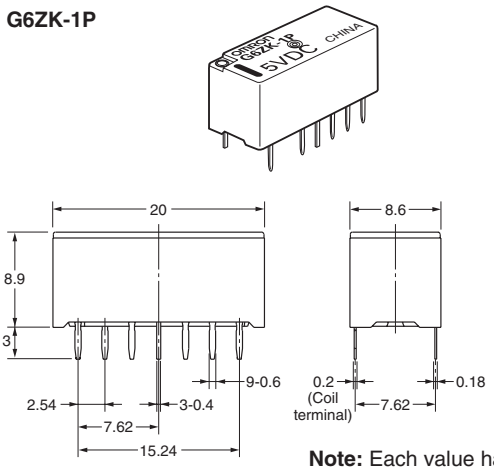


Terminal Arrangement/Internal Connections (Bottom View)

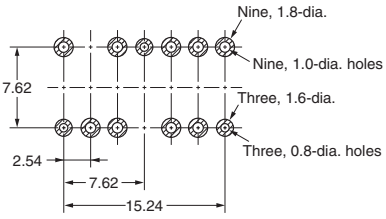


Note: Each value has a tolerance of ±0.3 mm.

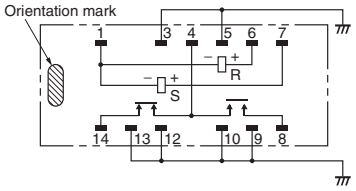
G6ZK-1P



Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

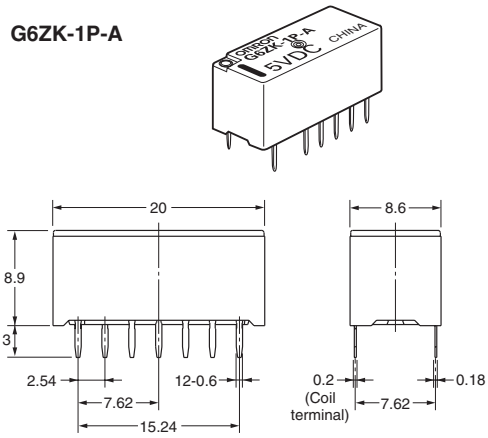


Terminal Arrangement/Internal Connections (Bottom View)

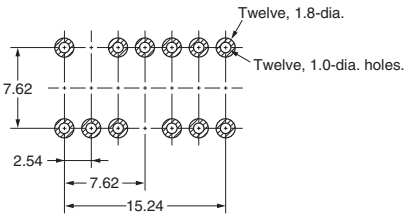


Note: Each value has a tolerance of ±0.3 mm.

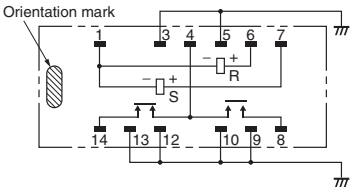
G6ZK-1P-A



Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm



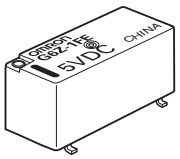
Terminal Arrangement/Internal Connections (Bottom View)



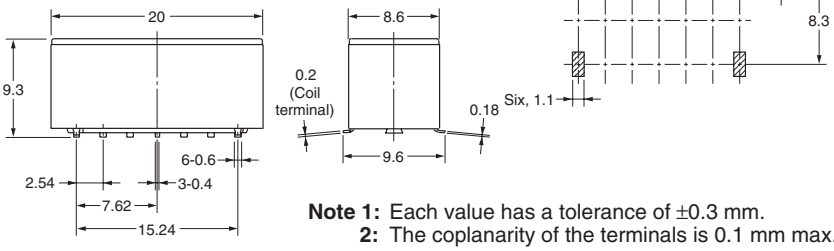
Note: Each value has a tolerance of ±0.3 mm.

■ Models with Surface-mounting Terminals

G6Z-1FE
G6ZU-1FE

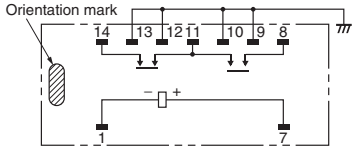


Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

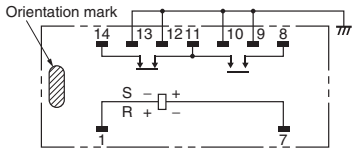


Terminal Arrangement/Internal Connections (Top View)

G6Z-1FE

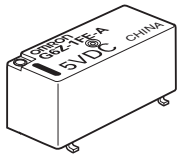


G6ZU-1FE

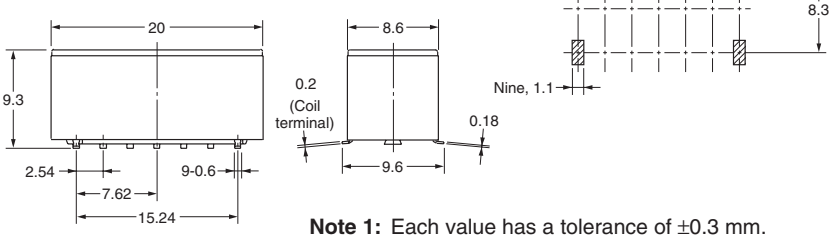


Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

G6Z-1FE-A
G6ZU-1FE-A

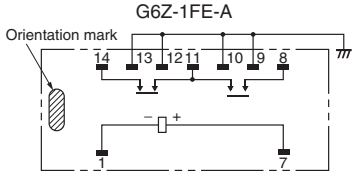


Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

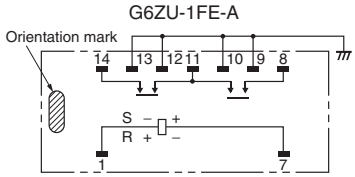


Terminal Arrangement/Internal Connections (Top View)

G6Z-1FE-A

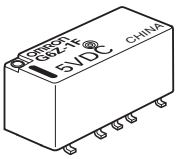


G6ZU-1FE-A

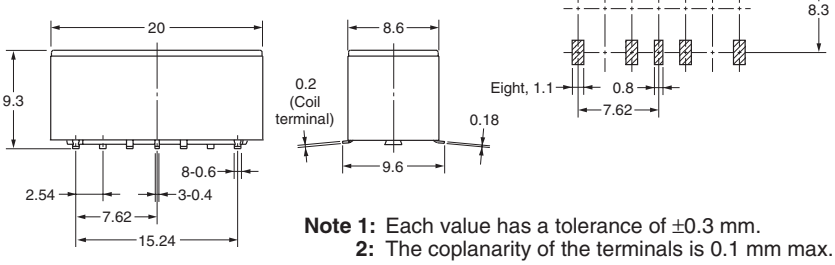


Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

G6Z-1F
G6ZU-1F

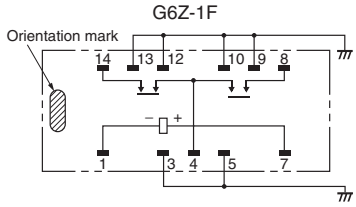


Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

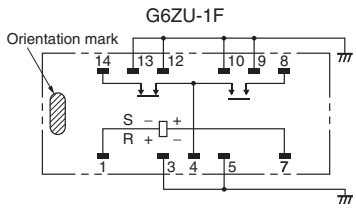


Terminal Arrangement/Internal Connections (Top View)

G6Z-1F

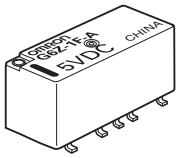


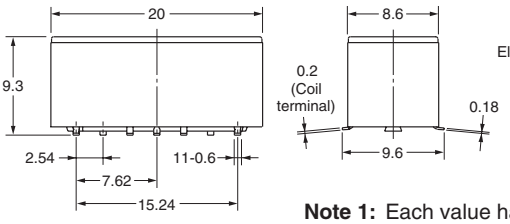
G6ZU-1F



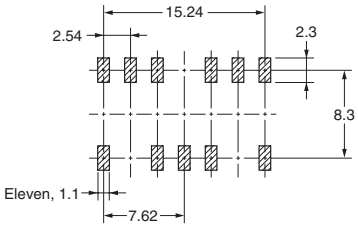
Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

G6Z-1F-A
G6ZU-1F-A



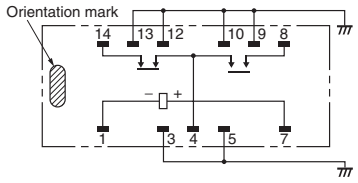


Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

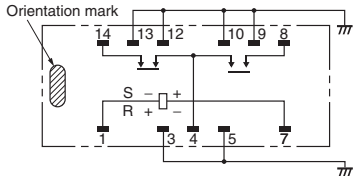


Terminal Arrangement/Internal Connections (Top View)

G6Z-1F-A

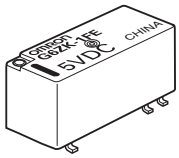


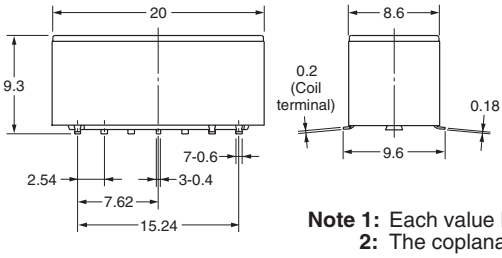
G6ZU-1F-A



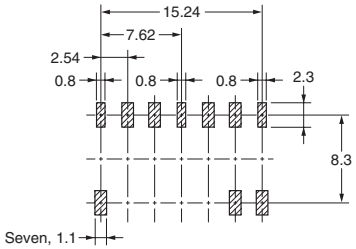
Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

G6ZK-1FE

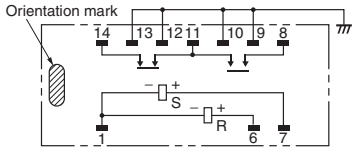




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

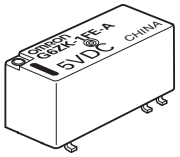


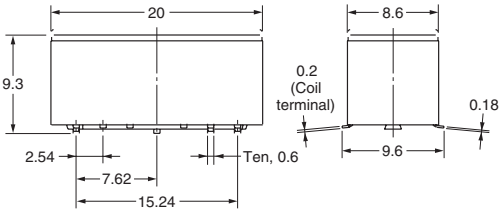
Terminal Arrangement/Internal Connections (Top View)



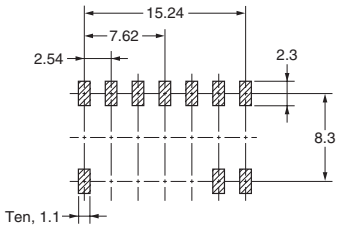
Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

G6ZK-1FE-A

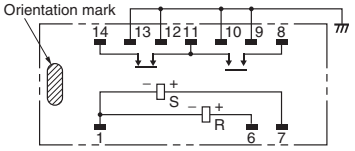




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

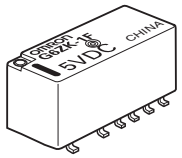


Terminal Arrangement/Internal Connections (Top View)

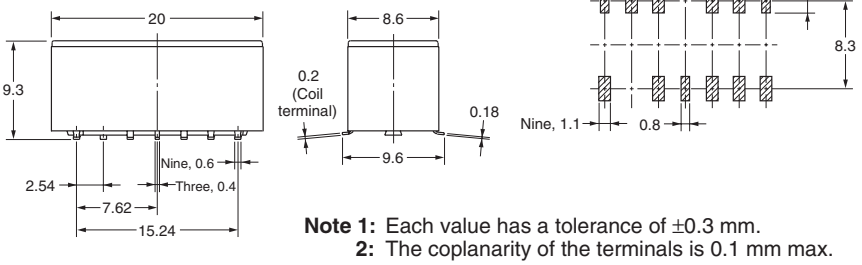


Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

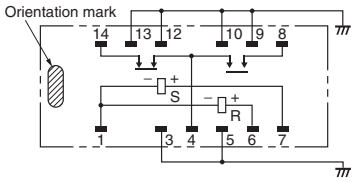
G6ZK-1F



Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

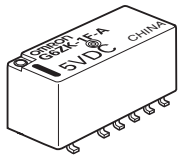


Terminal Arrangement/Internal Connections (Top View)

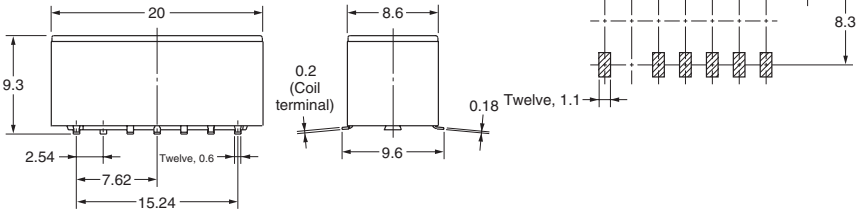


Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

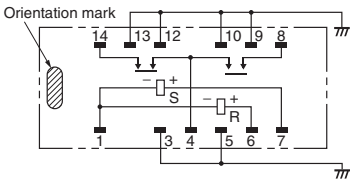
G6ZK-1F-A



Mounting Dimensions (Top View)
Tolerance: ±0.1 mm



Terminal Arrangement/Internal Connections (Top View)



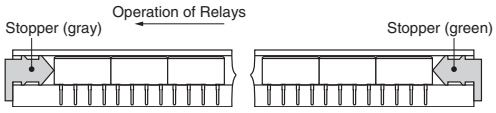
Note 1: Each value has a tolerance of ±0.3 mm.
2: The coplanarity of the terminals is 0.1 mm max.

Stick Packing and Tape Packing

Stick Packing

Relays in stick packing are arranged so that the orientation mark of each Relay in on the left side.

Be sure not to make mistakes in Relay orientation when mounting the Relay to the PCB.



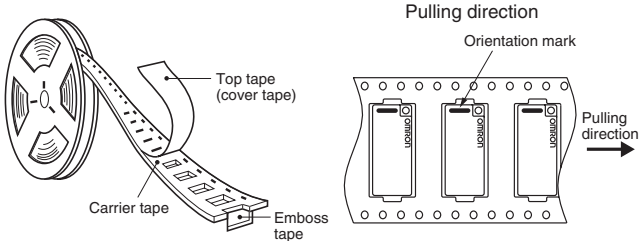
Stick length: 530 mm (stopper not included)
No. of Relays per stick: 25

Tape Packing (Surface-mounting Terminal Models)

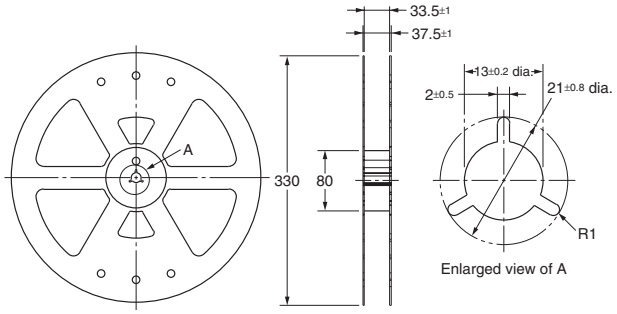
When ordering Relays in tape packing, add the prefix "-TR" to the model number, otherwise the Relays in stick packing will be provided.

Relays per Reel: 300

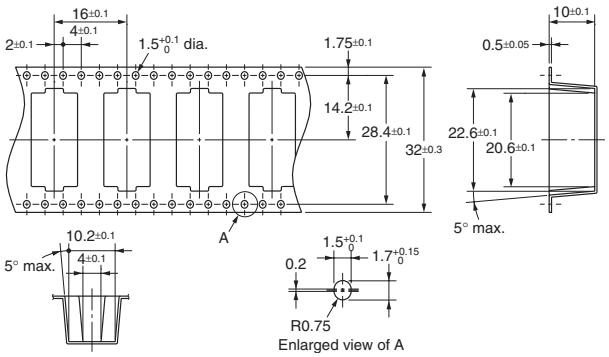
Direction of Relay Insertion



Reel Dimensions



Carrier Tape Dimensions

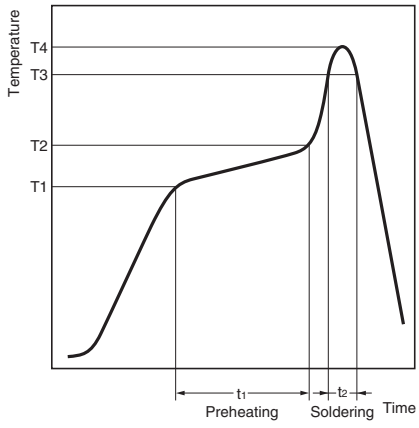


Note: The radius of the unmarked corner is 0.3 mm.

Recommended Soldering Method

Temperature Conditions for IRS Method

When using reflow soldering, ensure that the Relay terminals and the top of the case stay below the following curve. Check that these conditions are actually satisfied before soldering the terminals.

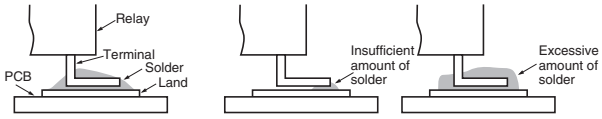


Measured part	Preheating (T1 → T2, t1)	Soldering (T3, t2)	Maximum peak (T4)
Terminals	150 → 180°C, 120 s max.	230°C min, 30 s max.	250°C max.
Top of case	---	---	255°C max.

Do not quench the terminals after mounting. Clean the Relay using alcohol or water no hotter than 40°C max.

The thickness of cream solder to be applied should be between 150 and 200 μm on OMRON's recommended PCB pattern.

Correct Soldering **Incorrect Soldering**



Check the soldering in the actual mounting conditions before use.

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

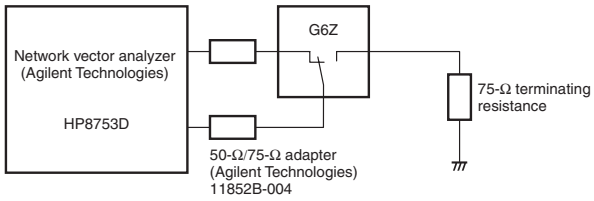
■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

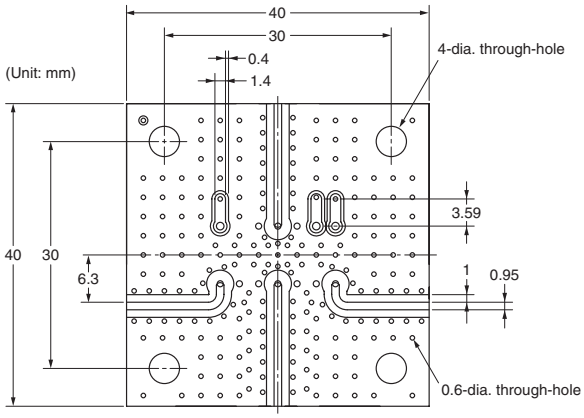
High-frequency Characteristics Measurement Method and Measurement Substrate

High-frequency characteristics for the G6Z are measured in the way shown below. Consult your OMRON representative for details on 50-Ω models.

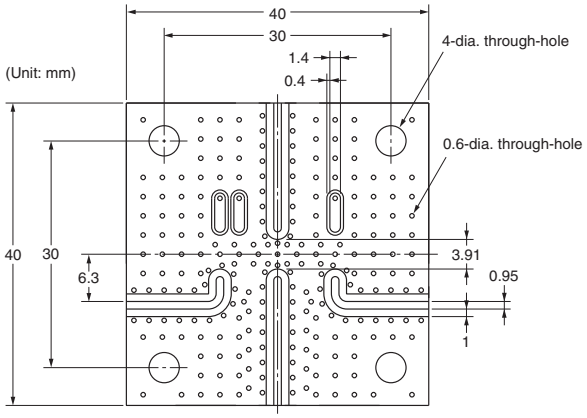
Measurement Method for 75-Ω Models



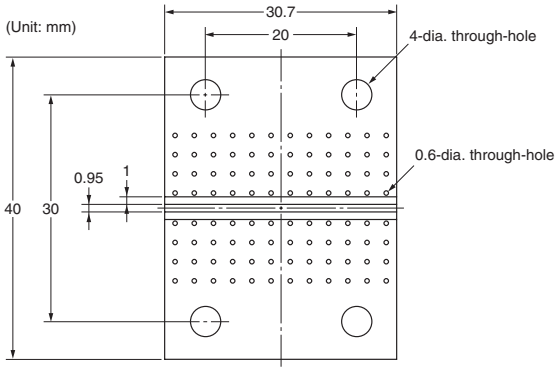
Through-hole Substrate (75-Ω Models, E-shape or Y-shape)



SMD-type Substrate (75-Ω Models, E-shape or Y-shape)



Substrate for High-frequency Characteristic Compensation (75-ΩModels, E-shape or Y-shape)



Substrate Types

Material: FR-4 glass epoxy (glass cloth impregnated with epoxy resin and copper laminated to its outer surface)

Thickness: 1.6 mm

Thickness of copper plating:18 μm

Note:

1. The compensation substrate is used when measuring the Relay's insertion loss. The insertion loss is obtained by subtracting the measured value for the compensation substrate from the measured value with the Relay mounted to the high-frequency measurement substrate.
2. For convenience, the diagrams of the high-frequency measurement substrates given here apply both to models with an E-shape terminal structure and to models with a Y-shape terminal structure.
3. Be sure to mount a standoff tightly to the through-hole substrate.
4. Use measuring devices, connectors, and substrates that are appropriate for 50 Ω and 75 Ω respectively.
5. Ensure that there is no pattern under the Relay. Otherwise, the impedance may be adversely affected and the Relay may not be able to attain its full characteristics.

Handling

Do not use the Relay if it has been dropped. Dropping the Relay may adversely affect its functionality.

Protect the Relay from direct sunlight and keep the Relay under normal temperature, humidity, and pressure.

Flow Soldering

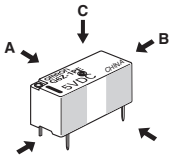
Soldering temperature: Approx. 250°C (260°C if the DWS method is used)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



Direction A: 4.90 N max.
Direction B: 4.90 N max.
Direction C: 4.90 N max.

Secure the claws to the shaded area.
Do not attach them to the center area or to only part of the Relay.

Latching Relay Mounting

Make sure that the vibration or shock that is generated from other devices, such as Relays, on the same panel or substrate and imposed on the Latching Relay does not exceed the rated value, otherwise the set/reset status of the Latching Relay may be changed. The Latching Relay is reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relay may be set accidentally. Be sure to apply a reset signal before use.

Coating

Do not use silicone coating to coat the Relay when it is mounted to the PCB. Do not wash the PCB after the Relay is mounted using detergent containing silicone. Otherwise, the detergent may remain on the surface of the Relay.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

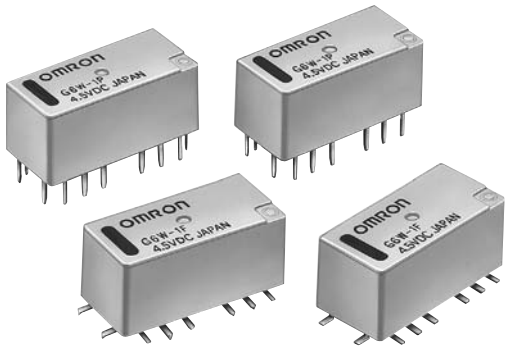
Cat. No. K124-E1-02

OMRON

High-frequency Relay | G6W

Surface-mountable 2.5 GHz Band Miniature SPDT High-frequency Relay

- Superior high-frequency characteristics, such as an isolation of 60 dB min., insertion loss of 0.2 dB max., and V.S.W.R. of 1.2 max. at 2.5 GHz (50 Ω).
- Surface-mounting terminals and superior high-frequency characteristics combined through adoption of tri-plate micro strip type transmission lines.
- Ultra-miniature at 20 × 9.4 × 8.9 mm (L × W × H).
- Serialized relay lineup consisting of single-winding latching type (200 mW), double-winding latching type (360 mW), and reverse-arrangement contact type.
- Y-shape terminal arrangement that simplifies wiring to PCBs.



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification				Single-side stable	Single-winding latching	Double-winding latching
SPDT	Fully sealed	PCB terminal	Y-shape terminal	G6W-1P	G6WU-1P	G6WK-1P
		Surface-mounting terminal	Y-shape terminal	G6W-1F	G6WU-1F	G6WK-1F

Note: When ordering, add the rated coil voltage to the model number.
Example: G6W-1P 12 VDC
Rated coil voltage

Model Number:

G6W□-□□□-□
1 2 3 4 5

1. **Relay function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact form**
   1: SPDT
3. **Terminal shape**
   F: Surface-mounting terminals
   P: PCB terminals
4. **Terminal Arrangement**
   None: Y-shape terminal arrangement (standard)
5. **Classification**
   None: Standard contact arrangement
   R: Reverse contact arrangement

Application Examples

Mobile phone base station (W-Cdma, UMTS, Cdma-2000, PCS), wireless LAN, and measurement devices.

Specifications

■ Contact Ratings

Item / Load	Resistive load
Rated load	10 mA at 30 VAC 10 mA at 30 VDC 2.5 GHz, 50 Ω, 10 W (See note 2.)
Rated carry current	0.5 A
Max. switching voltage	30 VDC, 30 VAC
Max. switching current	0.5 A

■ High-frequency Characteristics

Item / Frequency	2.0 GHz	2.5 GHz
Isolation	65 dB min.	60 dB min.
Insertion loss	0.2 dB max.	
V.SWR	1.2 max.	
Max. carry power	20 W (See note 2.)	
Max. switching power	10 W (See note 2.)	

Note: **1.** The above values are initial values.

2. This values is for a load with V.SWR ≤ 1.2 at the impedance of 50 Ω.

■ Coil Ratings

Single-side Stable Relays (G6W-1F, G6W-1P)

Rated voltage	3 VDC	4.5 VDC	9 VDC	12 VDC	24 VDC
Rated current	66.7 mA	44.4 mA	22.2 mA	16.7 mA	8.3 mA
Coil resistance	45 Ω	101 Ω	405 Ω	720 Ω	2,880 Ω
Must operate voltage	80% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Maximum voltage	150% of rated voltage				
Power consumption	Approx. 200 mW				

Single-winding Latching Relays (G6WU-1F, G6WU-1P)

Rated voltage	9 VDC	12 VDC
Rated current	22.2 mA	16.7 mA
Coil resistance	405 Ω	720 Ω
Must set voltage	80% max. of rated voltage	
Must reset voltage	80% max. of rated voltage	
Maximum voltage	150% of rated voltage	
Power consumption	Approx. 200 mW	

Double-winding Latching Relays (G6WK-1F, G6WK-1P)

Rated voltage	3 VDC	4.5 VDC	9 VDC	12 VDC	24 VDC
Rated current	120 mA	80 mA	40 mA	30 mA	15 mA
Coil resistance	25 Ω	56 Ω	225 Ω	400 Ω	1,600 Ω
Must set voltage	80% max. of rated voltage				
Must reset voltage	80% max. of rated voltage				
Maximum voltage	150% of rated voltage				
Power consumption	Approx. 360 mW				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil.

4. The voltage measurements for operate/release and set/reset are the values obtained for instantaneous changes in the voltage (rectangular wave).

■ Characteristics

Item \ Classification		Single-side Stable	Single-winding Latching	Double-winding Latching
Item \ Model		G6W-1F, G6W-1P	G6WU-1F, G6WU-1P	G6WK-1F, G6WK-1P
Contact resistance (See note 1.)		100 mΩ max.		
Operate (set) time (See note 2.)		10 ms max. (Approx. 3.5 ms)	10 ms max. (Approx. 2.5 ms)	
Release (reset) time (See note 2.)		10 ms max. (Approx. 2.5 ms)		
Minimum set/reset signal width		——	12 ms	
Insulation resistance (See note 3.)		100 MΩ min. (at 500 VDC)		
Dielectric strength	Coil and contacts	1,000 VAC, 50/60 Hz for 1 min		
	Coil and ground, contacts and ground	500 VAC, 50/60 Hz for 1 min		
	Contacts of same polarity	500 VAC, 50/60 Hz for 1 min		
Vibration resistance	Destruction	10 to 55 Hz, 2-mm double amplitude		
	Malfunction	10 to 55 Hz, 1.5-mm double amplitude		
Shock resistance	Destruction	1,000 m/s^2		
	Malfunction	500 m/s^2		
Endurance	Mechanical	1,000,000 operations min. (at 36,000 operations/hour)		
	Electrical	300,000 operations min. (30 VAC 10 mA/ 30 VDC 10 mA), 100,000 operations min. (2.5 GHz, 50 Ω, 10 W)		
Ambient temperature		Operating: −40°C to 70°C (with no icing or condensation)		
Ambient humidity		Operating: 5% to 85%		
Weight		Approx. 3 g		

Note: The above values are initial values.

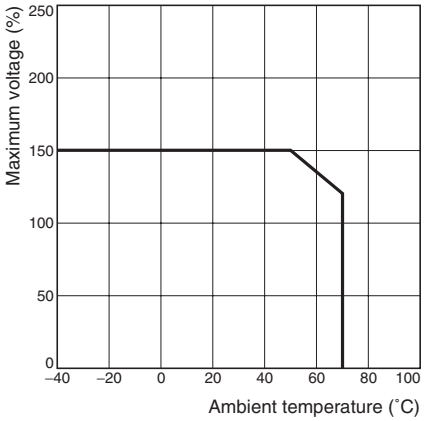
Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC Megger Tester applied to the same parts as those used for checking the dielectric strength.

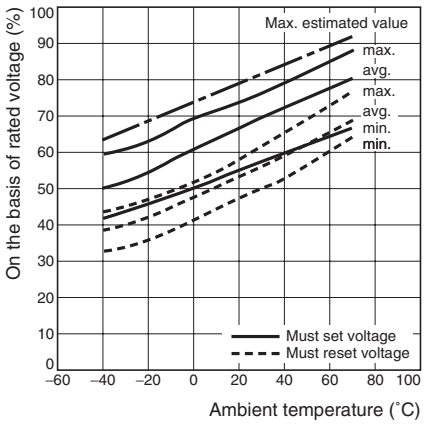
Engineering Data

Ambient Temperature vs. Maximum Voltage

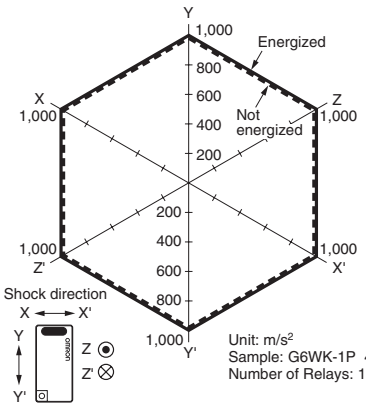


Note: "Maximum voltage" is the maximum voltage that can be applied to the Relay coil.

Ambient Temperature vs. Must Set or Must Reset Voltage

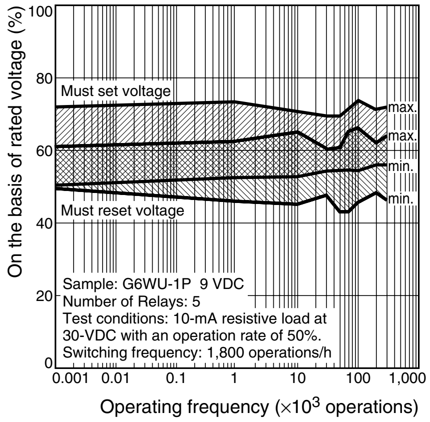


Shock Malfunction

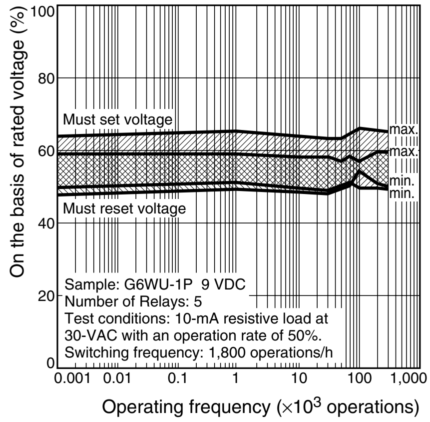


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

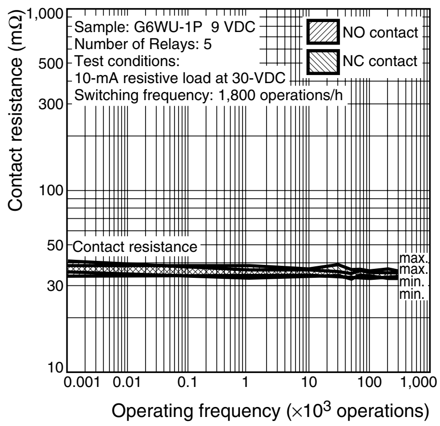
Electrical Endurance (With Must Set and Must Reset Voltage)



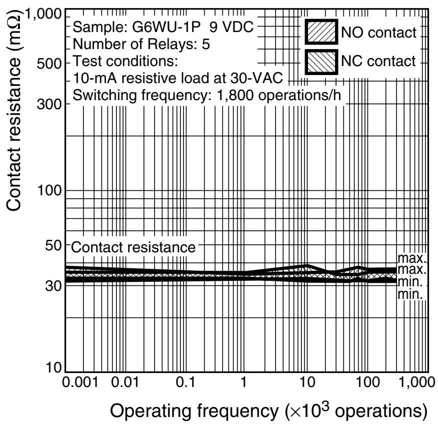
Electrical Endurance (With Must Set and Must Reset Voltage)



Electrical Endurance (Contact Resistance)



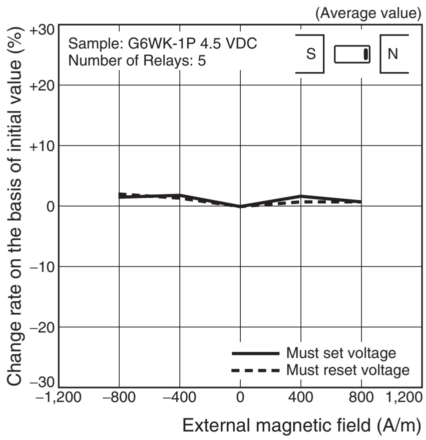
Electrical Endurance (Contact Resistance)

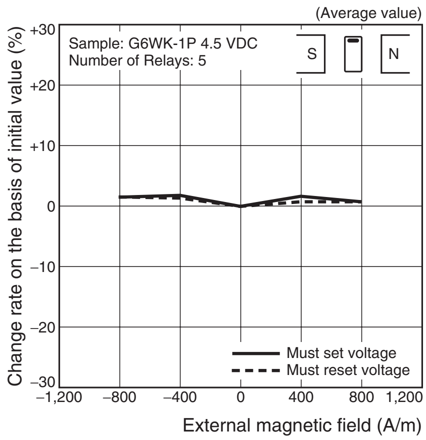


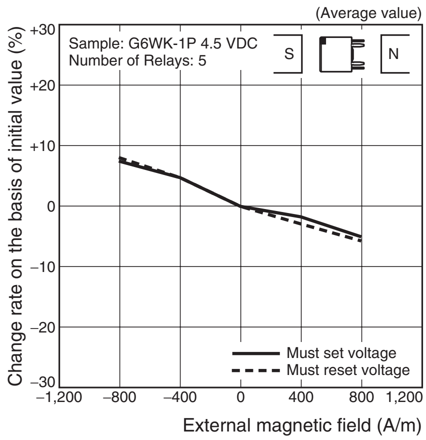
Note:

1. The tests were conducted at an ambient temperature of 23°C.
2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

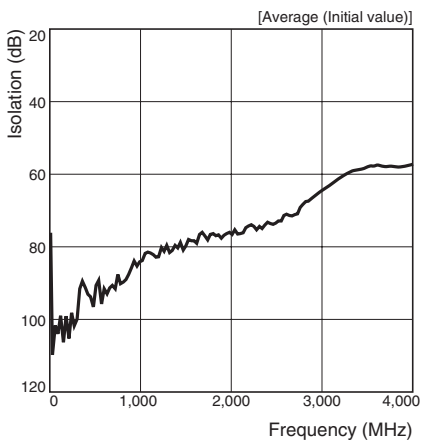
External Magnetic Interference



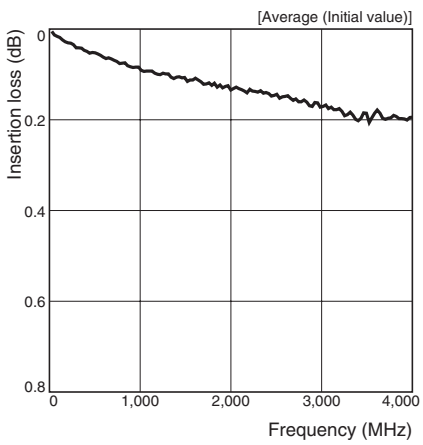




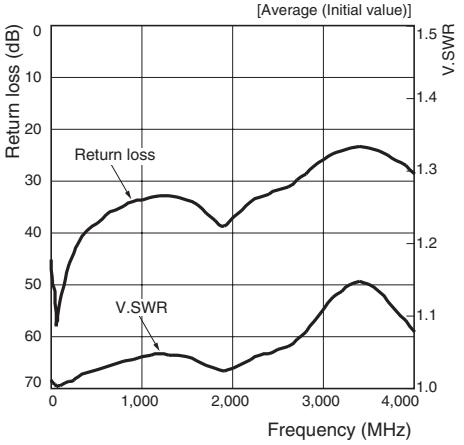
High-frequency Characteristics (Isolation) (See notes 1 and 2.)



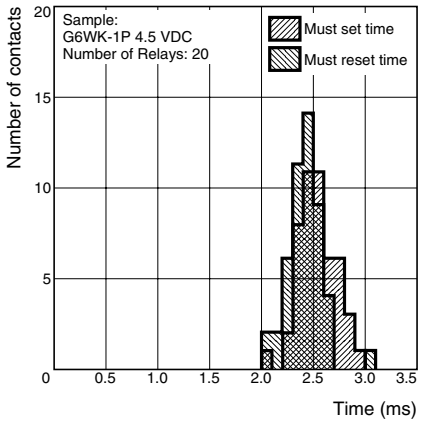
High-frequency Characteristics (Insertion Loss) (See notes 1 and 2.)



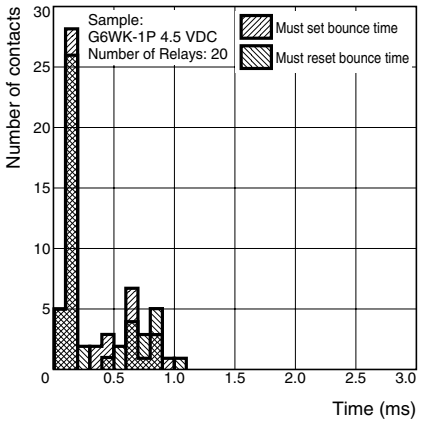
High-frequency Characteristics (Return Loss) (See notes 1 and 2.)



Must Set and Must Reset Time Distribution (See note 1.)



Must Set and Must Reset Bounce Time Distribution (See note 1.)

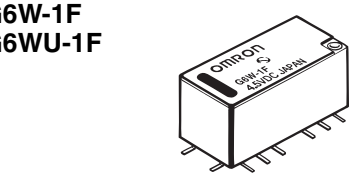


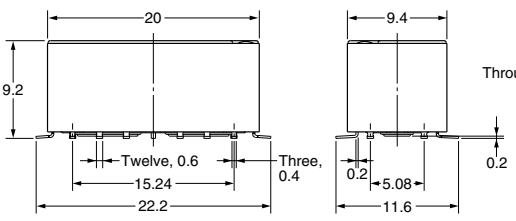
Note:
1. The tests were conducted at an ambient temperature of 23°C.
2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

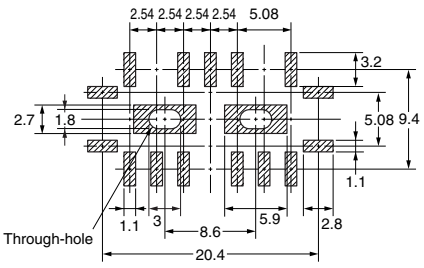
G6W-1F
G6WU-1F



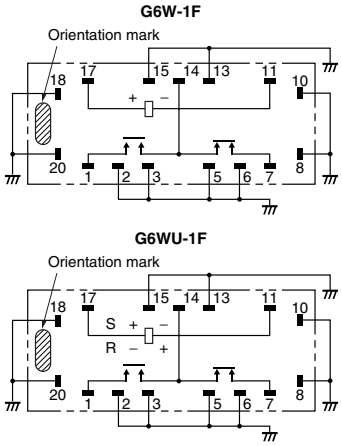


PCB Mounting Holes (Top View)

Tolerance: ±0.1 mm

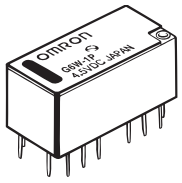


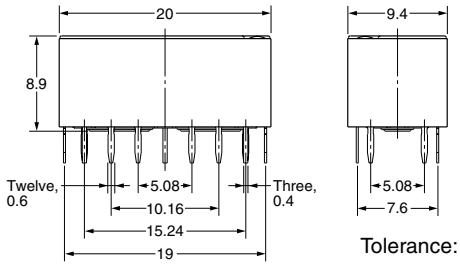
Terminal Arrangement/ Internal Connections (Top View)



Note: Each value has a tolerance of ±0.3 mm.

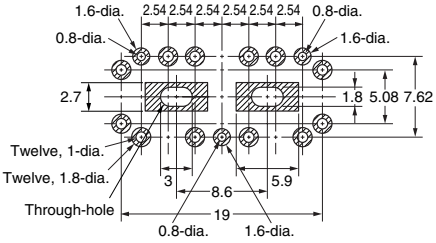
G6W-1P
G6WU-1P



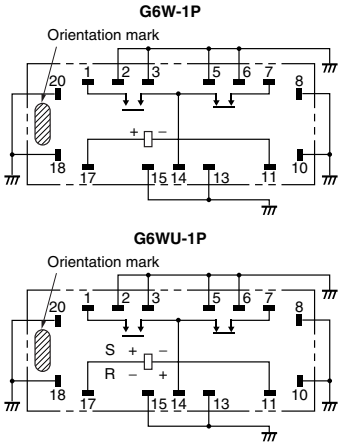


PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm

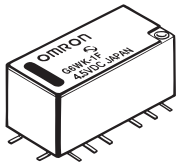


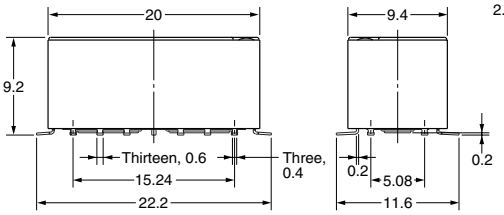
Terminal Arrangement/ Internal Connections (Bottom View)



Tolerance: ±0.3 mm unless specified.

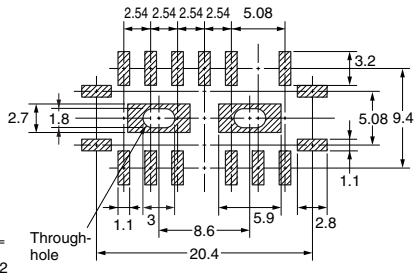
G6WK-1F



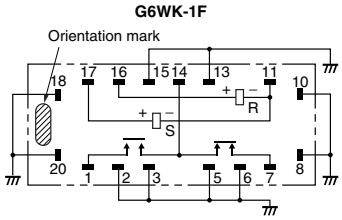


PCB Mounting Holes (Top View)

Tolerance: ±0.1 mm

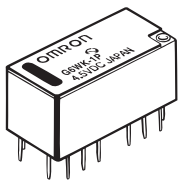


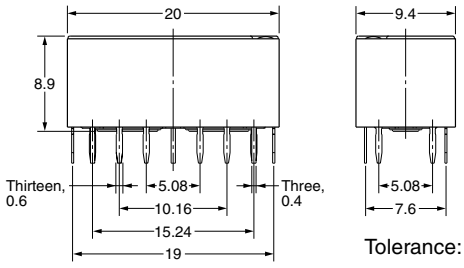
Terminal Arrangement/ Internal Connections (Top View)



Tolerance: ±0.3 mm unless specified.

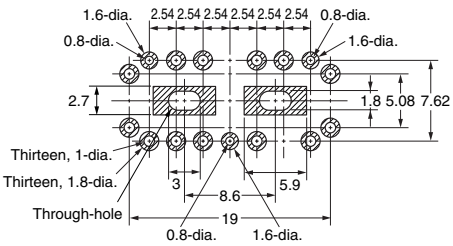
G6WK-1P



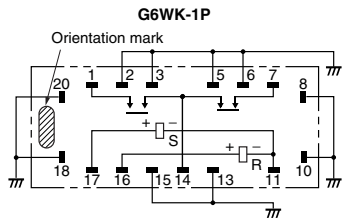


PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)

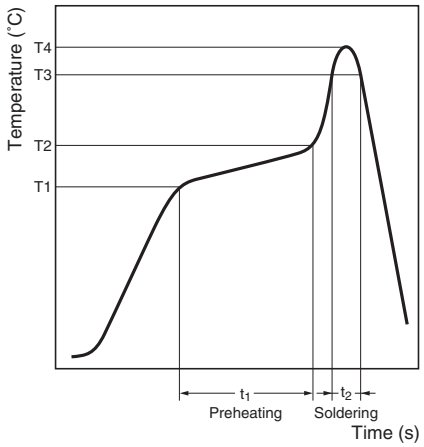


Tolerance: ±0.3 mm unless specified.

Recommended Soldering Method

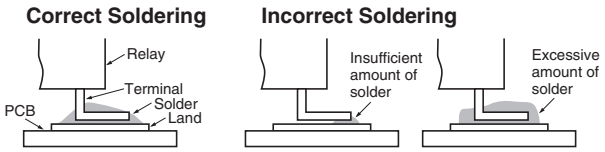
Temperature Profile According to IRS Method

- When performing reflow-soldering, check the profile on an actual device after setting the temperature condition so that the temperatures at the relay terminals and the upper surface of the case do not exceed the limits specified in the following table.



Item / Measuring position	Preheating (T1 to T2, t_1)	Soldering (T3, t_2)	Peak value (T4)
Terminal	150°C to 180°C, 120 s max.	230°C min., 30 s max.	250°C max.
Upper surface of case	——	——	255°C max.

- The thickness of cream solder to be applied should be within a range between 150 and 200 μm on OMRON's recommended PCB pattern.



Visually check that the Relay is properly soldered.

Bottom Ground Soldering Conditions

To solder the bottom ground, manually solder separately from the terminals according to the following conditions.

- Soldering iron: 50 W
- Iron temperature: 380°C to 400°C
- Soldering time: 10 s max.

Note: The above conditions are for a PCB with OMRON's recommended patterns and hole perforations. The conditions will depend on the PCB being used. Therefore, it is recommended to double-check the suitability under actual PCB conditions.

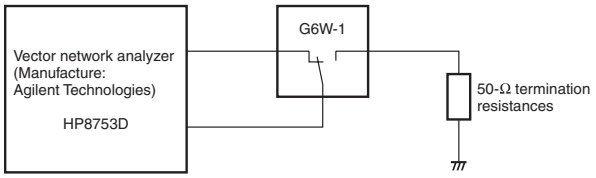
Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

Correct Use

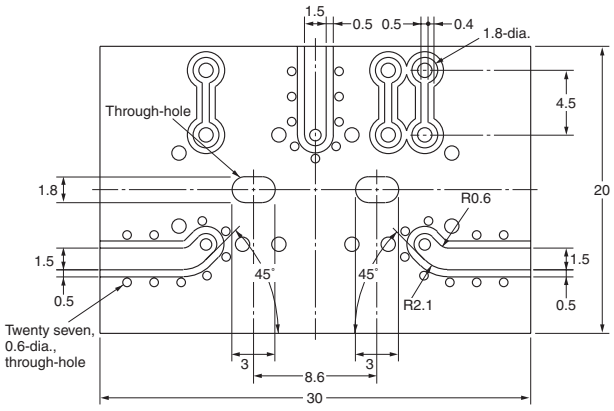
High-frequency Characteristics Measurement Method and Substrate to be Measured

High-frequency Characteristics for G6W are measured as shown below.

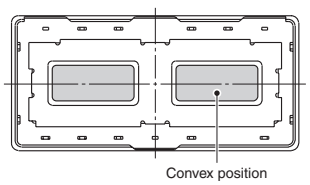


Through-hole substrate

Substrate: t-0.8 BT resin (Dielectric constant at 2 GHz: 3.37)

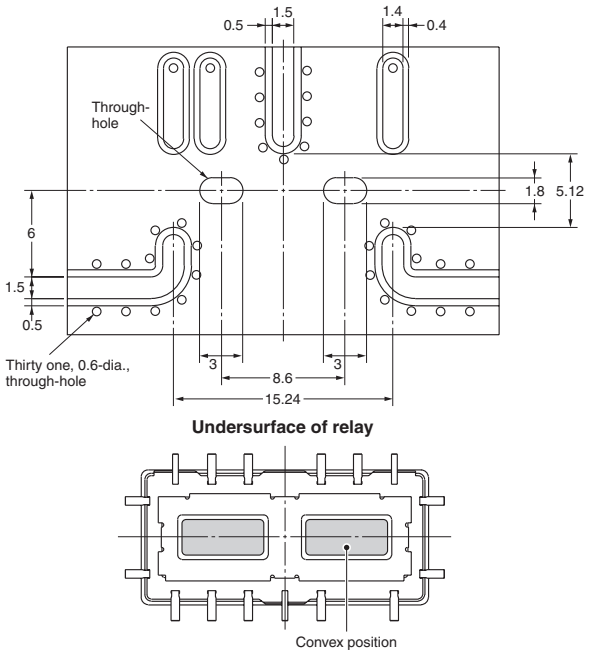


Undersurface of relay



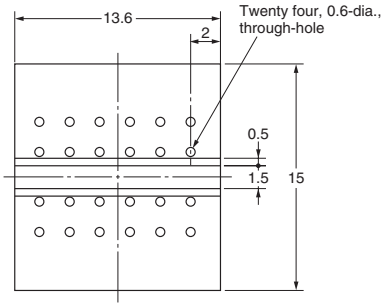
SMD-type substrate

Substrate: t-0.8 BT resin (Dielectric constant at 2 GHz: 3.37)



Note: To obtain high-frequency characteristics close to the charts shown on page 135, solder the convex point on the undersurface of the relay to the ground pattern of the substrate.

Base plate for high-frequency characteristic compensation



Note: The above compensation plate is used to measure the loss by the relay.
The relay loss is determined by subtracting the data measured for a compensation base plate from those for a high-frequency characteristics measuring substrate mounted with a relay.

Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Dropping the Relay may cause damage to its functional capability. Never use the Relay if it is dropped.

Protect the Relays from direct sunlight during operation, storage, and transportation and keep the relays under normal temperature, humidity, and pressure.

Soldering

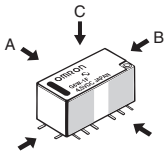
Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Insertion

During automatic insertion of Relays, make sure to set the securing force of the claws to the following values so that the Relay characteristics will be maintained.



Direction A: 4.90 N max.
Direction B: 9.80 N max.
Direction C: 9.80 N max.

Secure the claws to the area indicated by shading.
Do not attach them to the center area or to only part of the Relay.

Latching Relay Mounting

Make sure that the vibration or shock that is generated from other devices, such as relays in operation, on the same panel and imposed on the Latching Relay does not exceed the rated value, otherwise the Latching Relay that has been set may be reset or vice versa. The Latching Relay is reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relay may be set accidentally. Be sure to apply a reset signal before use.

Coating

Relays mounted on PCBs may be coated or washed. Do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relays.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K120-E1-02

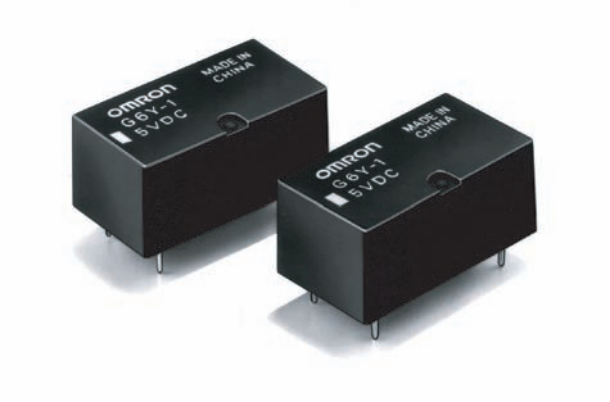
OMRON

High-frequency Relay

G6Y

Switching Structure Based on the Micro Strip Line is Used to Combine High Performance and Cost-effectiveness

- Isolation characteristics of 65 dB or better at 900 MHz
- Effective insertion loss characteristics of 0.2 dB or better at 900 MHz (half the loss of earlier models)
- Fully sealed construction provides excellent environmental resistance.
- Improved shock-resistance (double the resistance of earlier models)



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Class	Sealing	Fully sealed	
	Contact configuration	Rated coil voltage	Model
Basic type	SPDT	4.5 VDC	G6Y-1
		5 VDC	
		9 VDC	
		12 VDC	
		24 VDC	

■ Model Number Legend

G6Y-□□ VDC

1 2

1. Number of contact poles

1: Single pole (SPDT contact)

2. Rated Coil Voltage

4.5, 5, 9, 12, 24 VDC

■ Basic Specifications

- Contact Mechanism: Double-braking bifurcated contact
- Contact Material: Gold alloy
- Sealing: Fully sealed
- Terminal Configuration: Printed circuit board terminal configuration

Application Examples

Signal Switching in Various Communications Equipment

- Wired Communications: Cable TV, captain systems, and video response systems (VRS)
- Wireless Communications: Transceivers, ham radio, car telephones, high-level TV, fax machines, satellite broadcasting, text multiplex broadcasting, and pay TV
- Public Equipment: VCRs, TVs, video disk players, and TV games
- Industrial Equipment: Measuring equipment, test equipment, and multiplex transmission devices

Specifications

■ Ratings

Operational Coil

Class	Item Rated voltage (V)		Rated current (mA)	Coil resistance (Ω)	Operating voltage (V)	Release voltage (V)	Max. allowed voltage (V)	Power consumption (mW)
Basic type	DC	4.5	44.4	101	75% max.	10% min.	150% of rated voltage at 23°C	Approx. 200
		5	40.0	125				
		9	22.2	405				
		12	16.7	720				
		24	8.3	2,880				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
The operating characteristics are measured at a coil temperature of 23°C.
The "Max. allowed voltage" is the maximum voltage that can be applied to the relay coil. It is not the maximum voltage that can be applied continuously.

Contact Ratings

Load	Resistive load
Rated load	0.01 A at 30 VAC 0.01 A at 30 VDC 900 MHz, 1 W (See note.)
Rated carry current	0.5 A
Max. switching voltage	30 VAC 30 VDC
Max. switching current	0.5 A
Max. switching power (reference value)	AC10VA DC10W

Note: This value is for a load with V.SWR x 1.2.

High-frequency Characteristics

Item	250 MHz	900 MHz	2.5 GHz
Isolation	80 db min.	65 dB min.	30 dB min.
Insertion loss	0.5 dB max.	0.5 dB max.	---
V.SWR	1.5 max.	1.5 max.	---
Max. carry power	10 W		---
Max. switching power	10 W (See note 3.)		---

Note: **1.** The impedance of the measuring system is 50 Ω.
2. The table above shows preliminary values.
3. This value is for a load with V.SWR x 1.2.

■ Characteristics

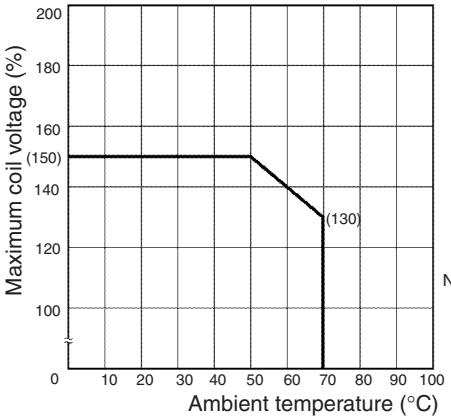
Contact resistance (See note 1.)	100 mΩ max.
Operating time	10 ms max. (approx. 5 ms)
Release time	5 ms max. (approx. 1 ms)
Insulation resistance (See note 2.)	100 MΩ min.
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts
	500 VAC, 50/60 Hz for 1 min between contacts of same polarity
	500 VAC, 50/60 Hz for 1 min between coil and ground and between contacts and ground
Vibration resistance	Destruction: 10 Hz to 55 to 10 Hz, 0.75-mm single amplitude (1.5 mm double amplitude) Malfunction: 10 Hz to 55 to 10 Hz, 0.75-mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 500 m/s^2
Endurance	Mechanical: 1,000,000 operations min. (at 1,800 operations/hr) Electrical: 300,000 operations min. (under rated load at 1,800 operations/hr)
Ambient temperature	Operating: −40°C to 70°C (with no icing)
Ambient humidity	Operating: 5 to 85%
Weight	Approx. 5 g

Note: The table above shows preliminary values.

Note: **1.** Measurement Conditions: 5 VDC, 100 mA, voltage drop method
2. Measurement Conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

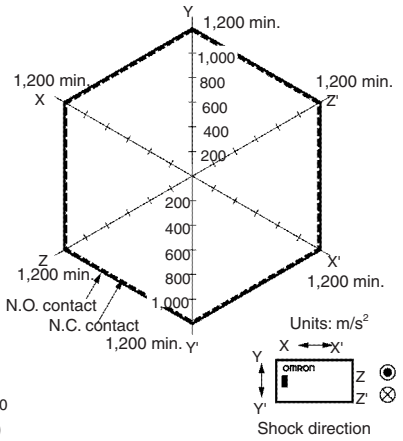
Engineering Data

Ambient Temperature vs. Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

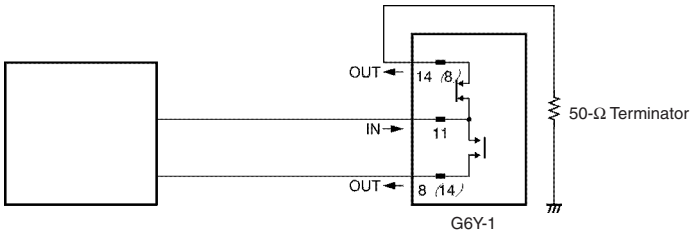
Malfunctioning Shock



Quantity Tested: 10 Units
Test Method: Shock was applied 3 times in each direction with and with out excitation and the level at which the shock caused mal function was measured.
Rating: 500 m/s^2

High-frequency Characteristics

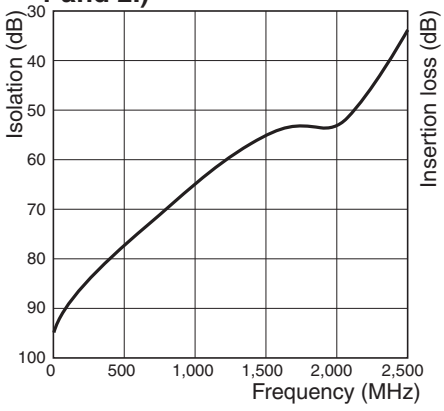
Measurement Conditions



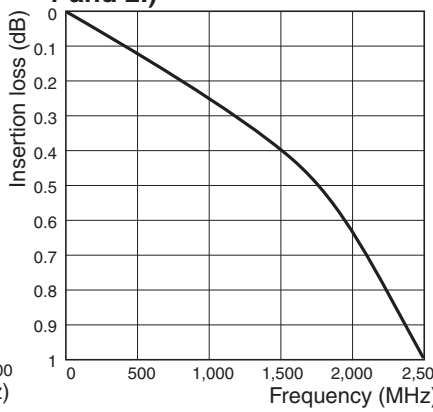
Terminals which were not being measured were terminated with 50 Ω.

Note: The high-frequency characteristics data were measured using a dedicated circuit board and actual values will vary depending on the usage conditions. Check the characteristics of the actual equipment being used.

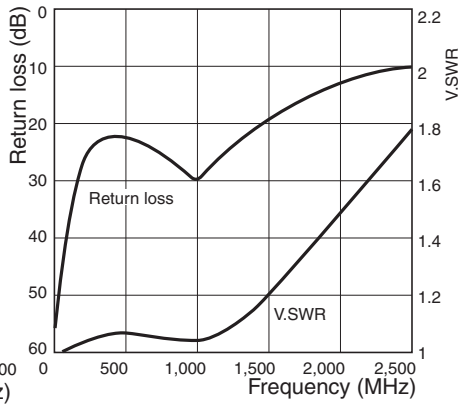
Isolation Characteristics (Average Values) (See notes 1 and 2.)



Insertion Loss Characteristics (Average Values) (See notes 1 and 2.)



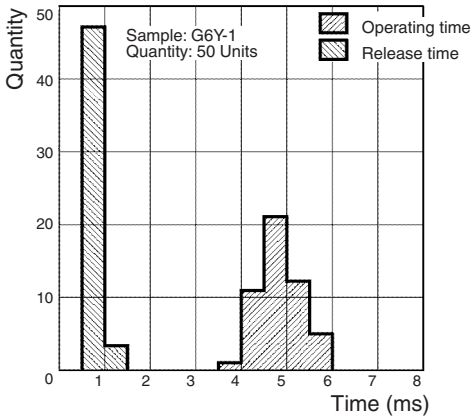
V.SWR, Return Loss Characteristics (Average Values) (See notes 1 and 2.)



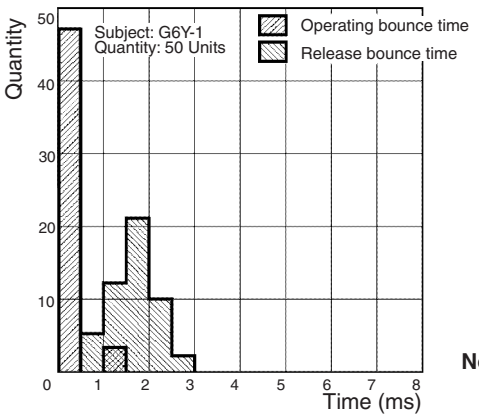
Note: **1.** The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

Operating/Release Time Distribution (See note.)



Bounce Time Distribution (See note.)

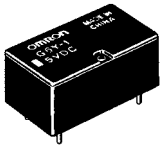


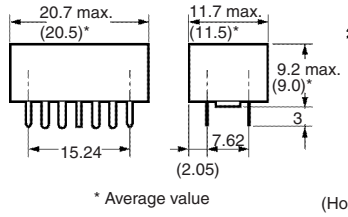
Note: Ambient temperature: 23°C

Dimensions

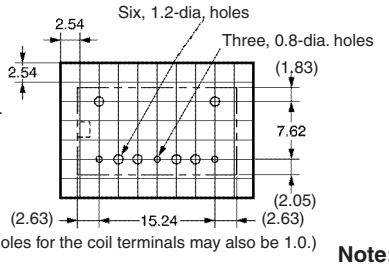
Note: All units are in millimeters unless otherwise indicated.

G6Y-1

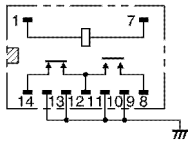




PCB Dimensions (Bottom View)
Tolerances: ±0.1 mm.



Terminal Arrangement/ Internal Connections (Bottom View)



(There is no polarity to the coil.)

Note: The shaded and unshaded parts indicate the product's directional marks.

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the G6Y Relay.

■ Correct Use

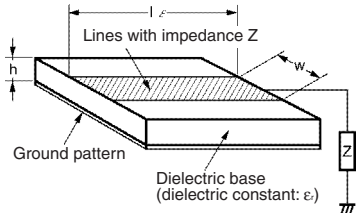
Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Airtightness when cleaning will last 1 minute at 70°C. Complete cleaning within these conditions.

Micro Strip Line Design

- It is advantageous to use the Micro Strip Line in high–frequency transmission circuits because a low-loss transmission can be constructed with this method. By etching the dielectric base which has copper foil attached to both sides, the Micro Strip Line will have a concentrated electric field between the lines and ground as shown in the following diagram.



- The characteristic impedance of the lines Z_O is determined by the kind of base (dielectric constant), the base's thickness, and the width of the lines, as expressed in the following equation.

$$Z_O = \frac{377}{\sqrt{\varepsilon_r}\ \frac{W}{H}\left\{1+\frac{2H}{\pi W}\left[1+\ln\frac{\pi W}{H}\right]\right\}}$$

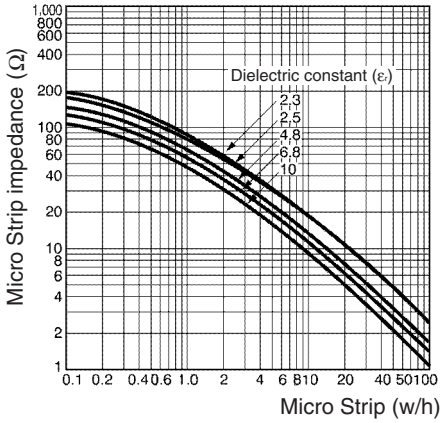
W: Line width

ε_r: Effective dielectric constant

H: Dielectric base thickness

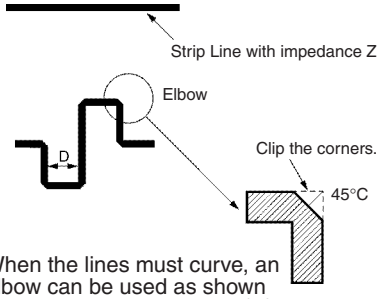
The copper foil thickness must be less than H.

- The following graph shows this relationship.



- For example, when creating 50-Ω lines using a glass epoxy base with a thickness of 1.6 mm, the above graph will yield a w/h ratio of 1.7 for a dielectric constant of 4.8. Since the base thickness is 1.6 mm, the width will be h × 1.7 ≈ 2.7 mm.
  The thickness of the copper foil "t" is ignored in this design method, but it must be considered because large errors will occur in extreme cases such as a foil thickness of t ≈ w.
  Furthermore, with the Micro Strip Line design, the lines are too short for the G6Y's intended frequency bandwidths, so we can ignore conductive losses and the line's attenuation constant.
- The spacing of the Strip Lines and ground pattern should be comparable to the width of the Strip Lines.
- Design the pattern with the shortest possible distances. Excessive distances will adversely effect the high-frequency characteristics.
- Spread the ground patterns as widely as possible so that potential differences are unlikely to develop between the ground patterns.
- To avoid potential short-circuits, do not place the pattern's leads near the point where the bottom of the Relay attaches to the board.

Bending the Micro Strip Line



When the lines must curve, an elbow can be used as shown in the diagram. A distance (D) between the lines of approximately twice the line width is sufficient.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Examples of Mounting Designs

Since this example emphasizes reducing mounting costs, expensive mounting methods such as through-hole boards are not shown. If such methods are to be used, the characteristics must be studied carefully using the actual board configuration.

Using a Double-sided Paper Epoxy Board

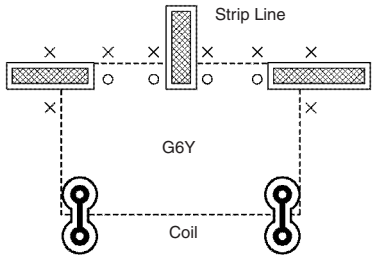
When double-sided paper epoxy boards are used, the dielectric constant will be approximately the same as that of glass epoxy boards (ε_r=4.8).

The width of the Strip Lines for a board with t=1.6 mm is 2.7 mm for 50 Ω and 1.3 mm for 75 Ω. For a board with t=1.0 mm the width is 1.7 mm for 50 Ω and 0.8 mm for 75 Ω.

The following diagram shows an example pattern and the Micro Strip Lines connected to the contact terminals are formed with pattern widths derived from the description above. The width between the Micro Strip Lines and ground patterns are comparable to the Micro Strip Line width.

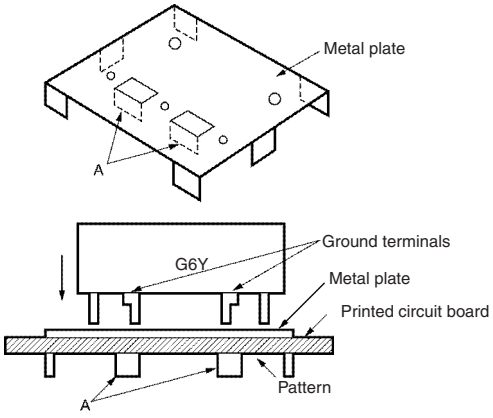
There are jumpers between the upper and lower patterns at the points marked with Xs in the diagram. Improved characteristics can be obtained with more jumper locations. This method yields isolation characteristics of 65 dB to 75 dB at 500 MHz and 50 dB at 900 MHz.

At this point in the diagram the component side is the entire ground pattern side, but set aside approximately 2.0 mm × 2.0 mm of the pattern for the contact terminals and coil terminals.



Using a Single-sided Board

When a single-sided board is used, isolation characteristics of only 60 dB to 70 dB at 200 MHz can be obtained. When high frequency bands are to be used with a single-sided board, a metal plate can be placed between the base and Relay and connected to the ground pattern.



With this method a metal plate is placed between the Relay and base and connected to the pattern, as shown in the above diagram. The important point here is that 3 locations (the G6Y's ground terminal, the metal plate's bent tabs (A), and the ground pattern) are soldered together at the same time. This method combines an inexpensive single-sided board and inexpensive metal plate to yield the same characteristics as a double-sided board and good characteristics are obtained by grounding the G6Y's ground terminal and metal plate in the same place.

The metal plate must be attached to the base as described here. From this point, the methods used for Strip Line design are the same as for the double-sided board.

Mounting Precautions

Be sure to securely attach the Relay's base surface to the board during installation. The isolation characteristics will be affected if the Relay lifts off the board.

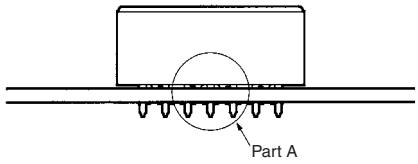
As shown in the enlarged illustration of the cross-section of part A, the G6Y is designed to ensure better high-frequency characteristics if the stand-off part of the G6Y is in contact with the ground pattern of the PCB. Therefore, the ground terminal and stand-off part are electrically connected internally.

Should the through hole electrically connected to the contact terminal come in contact with the stand-off part, the contact will be short-circuited with the ground, which may cause in an accident.

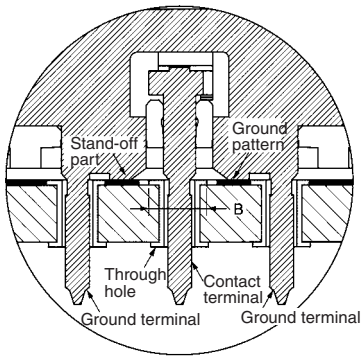
As a preventive measure, keep at least a distance of 0.3 mm between the stand-off part and the through hole or land.

For example, if the terminal hole on the PCB is 1 mm in diameter and the length B shown in the illustration is 1.4 mm, a distance of 0.3 mm or more will be provided between the through hole and stand-off part.

PCB Mounting



Cross-section of Part A



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K104-E1-02

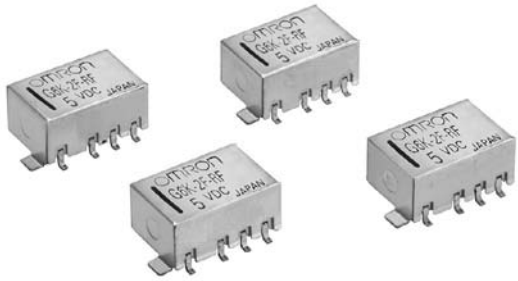
OMRON

Surface-mounting High-frequency Relay

G6K(U)-2F-RF

Surface-mounting, 1-GHz-Band, Miniature, DPDT, High-frequency Relay

- Superior high-frequency characteristics (at 1 GHz), such as an isolation of 20 dB min. between contacts of the same polarity or 30 dB min. between contacts of different polarity with an insertion loss of 0.2 dB max.
- Miniaturized to 10.3 × 6.9 × 5.4 mm (L × W × H).
- Rated power consumption of 100 mW with high sensitivity.
- Single-side stable and single-winding latching models available.



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

■ Model Number Legend:

G6K□-□□-□
1 2 3 4

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
2. **Contact Form**
   2: DPDT
3. **Terminal Shape**
   F: Surface-mounting terminals
4. **Special Function**
   RF: High-frequency compatible

■ List of Models

Standard Models with Surface-mounting Terminals

Classification	Structure	Contact form	Rated coil voltage	Model
Single-side stable	Plastic sealed	DPDT	3, 4.5, 5, 12, and 24 VDC	G6K-2F-RF
Single-winding latching			3, 4.5, 5, 12, and 24 VDC	G6KU-2F-RF

Application Examples

- Measurement devices
- Communications devices
- Broadcasting and audio-visual devices

Specifications

■ Contact Ratings

Load	Resistive load
Rated load	125 VAC, 0.3 A 30 VDC, 1 A 1 GHz, 1 W (See note.)
Rated carry current	1 A
Max. switching voltage	125 VAC or 60 VDC
Max. switching current	1 A

Note: This value is for a V.SWR of 1.2 max. at the load.

■ High-frequency Characteristics

Item	Frequency	1 GHz
Isolation	**Between contacts of the same polarity**	20 dB min.
	Between contacts of different polarity	30 dB min.
Insertion loss		0.2 dB max.
V.SWR		1.2 max.
Maximum carry power		3 W (See note 3.)
Maximum switching power		1 W (See note 3.)

Note: **1.** The impedance of the measurement system is 50 Ω.

2. The above values are initial values.

3. These values are for a V.SWR of 1.2 max. at the load.

■ Coil Ratings

Single-side Stable Models

G6K-2F-RF

Rated voltage (VDC)	3	4.5	5	12	24
Rated current (mA)	33.0	23.2	21.1	9.1	4.6
Coil resistance (Ω)	91	194	237	1,315	5,220
Must operate voltage (V)	80% max. of rated voltage				
Must release voltage (V)	10% min. of rated voltage				
Maximum voltage (V)	150% of rated voltage				
Power consumption (mW)	Approx. 100 mW				

Single-winding Latching Models

G6KU-2F-RF

Rated voltage (VDC)	3	4.5	5	12	24
Rated current (mA)	33.0	23.2	21.1	9.1	4.6
Coil resistance (Ω)	91	194	237	1,315	5,220
Must operate voltage (V)	75% max. of rated voltage				
Must release voltage (V)	75% max. of rated voltage				
Maximum voltage (V)	150% of rated voltage				
Power consumption (mW)	Approx. 100 mW				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

■ Characteristics

Item		Single-side stable models	Single-winding latching models
		G3K-2F-RF	G6KU-2F-RF
Contact resistance (See note 1.)		100 mΩ max.	
Operating (set) time (See note 2.)		3 ms max. (approx. 1.4 ms)	3 ms max. (approx. 1.2 ms)
Release (reset) time (See note 2.)		3 ms max. (approx. 1.3 ms)	3 ms max. (approx. 1.2 ms)
Minimum set/reset pulse time		---	10 ms
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)	
Dielectric strength	**Between coil and contacts**	750 VAC, 50/60 Hz for 1 min	
	Between contacts of different polarity	750 VAC, 50/60 Hz for 1 min	
	Between contacts of the same polarity	750 VAC, 50/60 Hz for 1 min	
	Between ground and coil/contacts	500 VAC, 50/60 Hz for 1 min	
Vibration resistance		Destruction: 10 to 55 to 10 Hz, 2.5-mm single amplitude (5-mm double amplitude) and 55 to 500 to 55 Hz, 300 m/s^2 Malfunction: 10 to 55 to 10 Hz, 1.65-mm single amplitude (3.3-mm double amplitude) and 55 to 500 to 55 Hz, 200 m/s^2	
Shock resistance		Destruction: 1,000 m/s^2 Malfunction: 750 m/s^2	
Endurance		Mechanical: 50,000,000 operations min. (at a switching frequency of 36,000 operations/hour) Electrical: 100,000 operations min. (at a switching frequency of 1,800 operations/hour)	
Ambient temperature		Operating: −40°C to 70°C (with no icing or condensation)	
Ambient humidity		Operating: 5% to 85%	
Weight		Approx. 0.95 g	

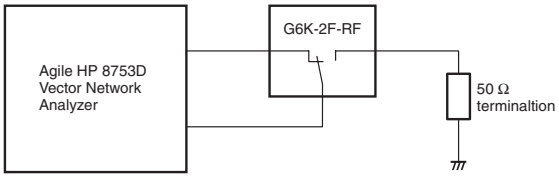
Note: The above values are initial values.

Note: **1.** The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.

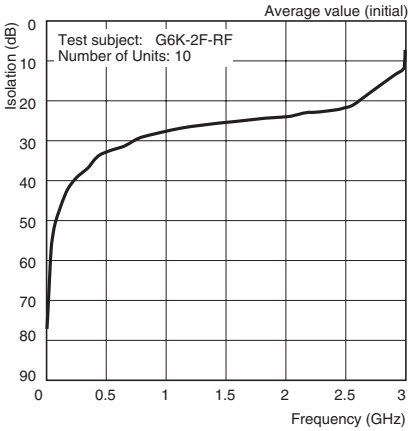
2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

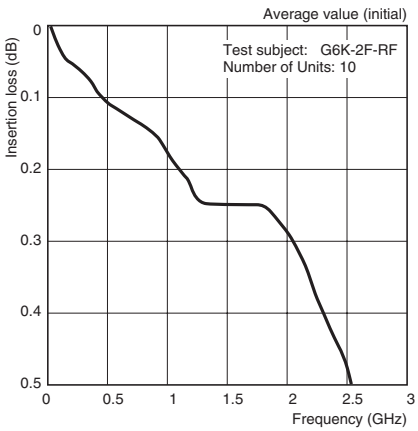
Engineering Data



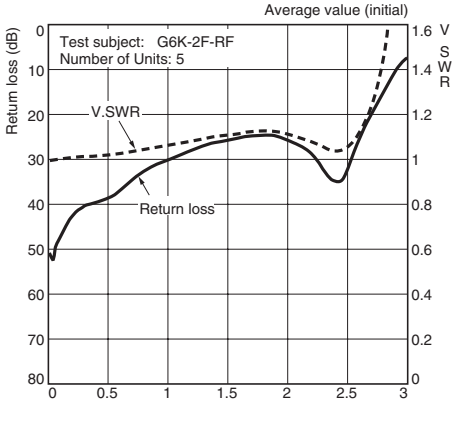
High-frequency Characteristics (Isolation) (See notes 1 and 2.)



High-frequency Characteristics (Insertion Loss) (See notes 1 and 2.)



High-frequency Characteristics (Return Loss, V.SWR) (See notes 1 and 2.)



Note: Refer to the G6K specifications for basic specifications not shown above.

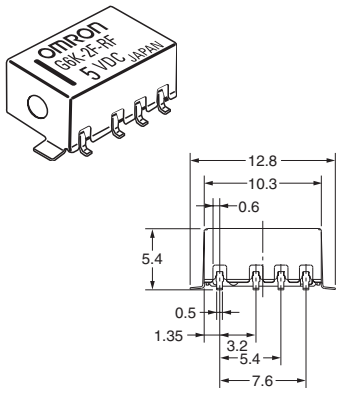
Note: **1.** The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

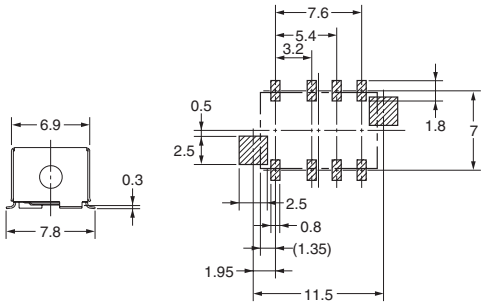
Dimensions

Note: All units are in millimeters unless otherwise indicated.

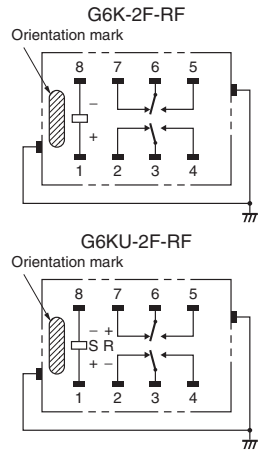
G6K-2F-RF
G6KU-2F-RF



Mounting Dimensions (Top View)
Tolerance: ±0.1 mm



Terminal Arrangement/Internal Connections (Top View)



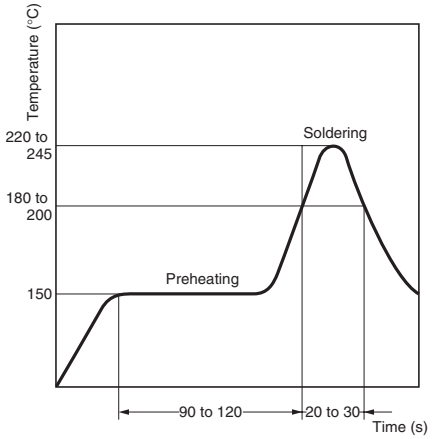
Note: **1.** Each value has a tolerance of ±0.3 mm.

2. The coplanarity of the terminals is 0.15 mm max.

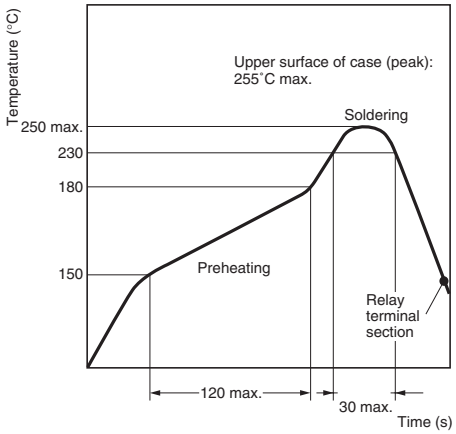
Recommended Soldering Method

Recommended Conditions for IRS Method (Surface-mounting Terminals)

(1) IRS Method (Mounting Solder: Lead)



(2) IRS Method (Mounting Solder: Lead-free)

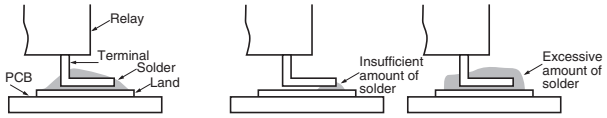


Note: The temperature profile indicates the temperature on the circuit board surface.

The thickness of cream solder to be applied should be between 200 and 250 μm and the land pattern should be based on OMRON's recommended PCB pattern.

To maintain the correct soldering joint shown in the following diagram, we recommend applying solder with the soldering conditions shown on the left.

Correct Soldering **Incorrect Soldering**



Check the soldering in the actual mounting conditions before use.

Precautions

Refer to page 25 for information on general precautions. Be sure to read these precautions before using the Relay.

■ Precautions for Correct Use

Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Environmental Conditions for Usage, Storage, and Transport

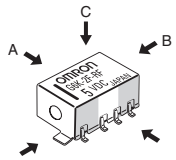
Avoid direct sunlight when using, storing, or transporting the Relay and maintain normal temperature, humidity, and pressure conditions.

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (rather than switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation and can cause a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend adding fail-safe circuits in case the contact fails or the coil burns out.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



Direction A: 1.96 N max.
Direction B: 4.90 N max.
Direction C: 1.96 N max.

Secure the claws to the shaded area.
Do not attach them to the center of the Relay or just one part of the Relay.

Coating

Do not use silicone coating to coat the Relay when it is mounted to the PCB. Do not wash the PCB after the Relay is mounted using detergent containing silicone. Otherwise, the detergent may remain on the surface of the Relay.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K908-E1-02

OMRON

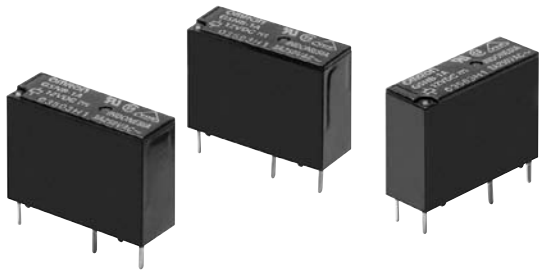
PCB Relay

G5NB

A Miniature Relay with 1-pole 3-A Switching Capability and 10-kV Impulse Withstand Voltage

- Highly efficient magnetic circuit for high sensitivity (200 mW).
- Small, yet provides 10-kV impulse withstand voltage (between coil and contacts).
- Standard model conforms to UL and CSA and VDE standards.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Flux protection	G5NB-1A

Note: When ordering, add the rated coil voltage to the model number.
Example: G5NB-1A 12 VDC
Rated coil voltage

Model Number Legend

G5NB-□□ □VDC
1 2 3

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Rated Coil Voltage**
   5, 12, 18, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	18 VDC	24 VDC
Rated current	40.0 mA	16.7 mA	11.1 mA	8.3 mA
Coil resistance	125 Ω	720 Ω	1,620 Ω	2,880 Ω
Must operate voltage	75% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	180% of rated voltage (at 23°C)			
Power consumption	Approx. 200 mW			

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. The "Max. voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)
Rated load	3 A at 125 VAC, 3 A at 30 VDC
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	3 A
Max. switching power	375 VA, 90 W
Failure rate (reference value)	10 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$operations

■ Characteristics

Contact resistance (See note 2.)	100 mΩ max.
Operate time	10 ms max.
Release time	10 ms max.
Insulation resistance (See note 3.)	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10,000 V (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 5,000,000 operations min. Electrical: 200,000 operations min.
Ambient temperature	Operating: −40°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 4 g

Note: **1.** The data shown above are initial value.
2. Measurement conditions: 5 VDC, 1 A, voltage drop method
3. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

■ Approved Standards

UL508 (File No. 41515), CSA C22.2 (No. 0, No. 1, No. 14) (File No. LR31928)

Coil ratings	Contact ratings	Number of test operations
5 to 24 VDC	3 A, 30 VDC (resistive)	6,000
	3 A, 250 VAC (general use) 1 A, 277 VAC (resistive)	30,000

EN/VDE Approval (Registration No. 137575/EN61810-1)

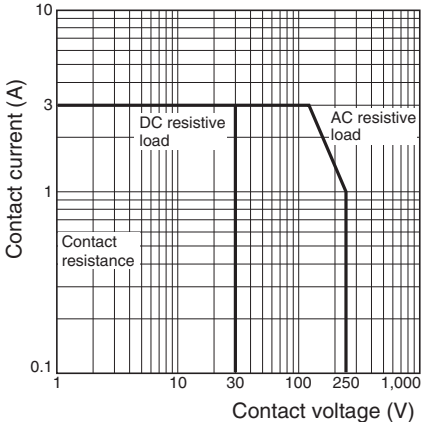
Coil ratings	Contact ratings	Number of test operations
5, 12, 18, 24 VDC	3 A, 250 VAC (resistive) 3 A, 30 VDC (resistive)	100,000

■ Actual Load Life (Reference Values)

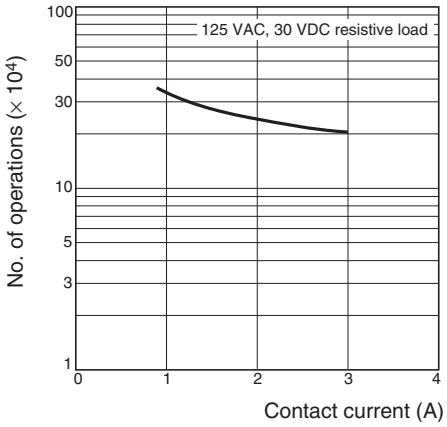
1. 120-VAC motor and lamp load (2.5-A surge and 0.5-A normal): 250,000 operations min. (at 23°C)
2. 160-VDC valve load (with varistor) (0.24-A): 250,000 operations min. (at 23°C)

Engineering Data

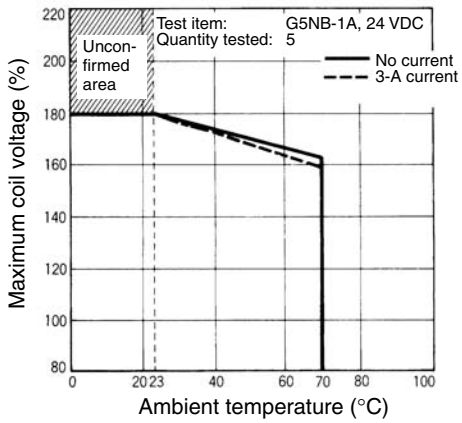
Maximum Switching Capacity



Endurance

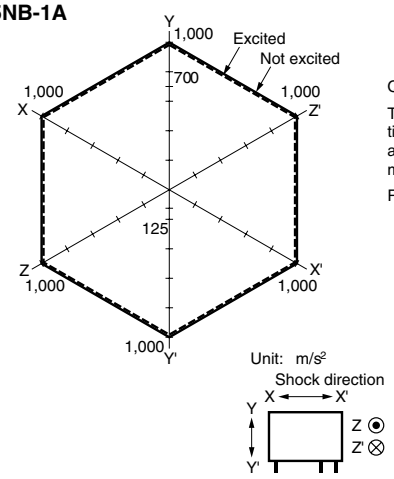


Ambient Temperature vs. Maximum Coil Voltage



Malfunctioning Shock

G5NB-1A



Quantity Tested: 5 units

Test Method: Shock was applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction was measured.

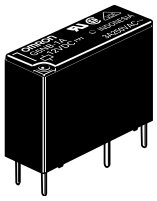
Rating: 100 m/s²

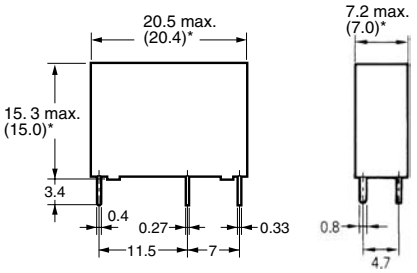
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G5NB-1A

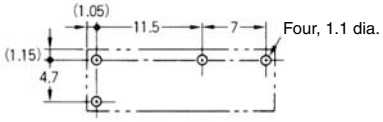




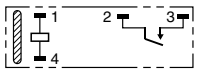
*Average value

PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)



(No coil polarity)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

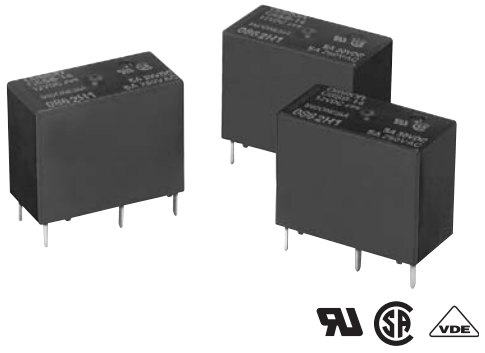
Cat. No. J143-E1-02

OMRON

PCB Relay

G5SB

Compact Single-pole Relay for Switching 5 A (Normally Open Contact), Fan Control of Air Conditioners, and Heating Control of Small Appliances.



- Compact SPDT Relay with high insulation.
- Incorporates a normally open contact that switches 5 A max.
- Ensures a withstand impulse voltage of 8,000 V between the coil and contacts.
- Conforms to UL and CSA.
  - UL508
  - CSA C22.2 (No.14)
  - VDE (EN61810-1)

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification	Contact form	Protective structure	Model
Standard	SPDT	Fully sealed	G5SB-14

Note: When ordering, add the rated coil voltage to the model number.

Example: G5SB-14 12 VDC
Rated coil voltage

Model Number Legend:

G5SB-□□□ VDC
1 2 3

1. **Number of Poles**
   1: SPDT
2. **Protective Structure**
   4: Fully sealed
3. **Rated Coil Voltage**
   5, 9, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC
Rated current	80 mA	44.4 mA	33.3 mA	16.7 mA
Coil resistance	63 Ω	202 Ω	360 Ω	1,440 Ω
Must operate voltage	75% max. of rated voltage			
Must release voltage	5% min. of rated voltage			
Max. voltage	150% of rated voltage (at 23°C)			
Power consumption	Approx. 400 mW			

■ Contact Ratings

Load	Resistive load
Rated load	3 A (NO)/3 A (NC) at 125 VAC 5 A (NO)/3 A (NC) at 125 VAC 5 A (NO) at 250 VAC 3 A (NC) at 250 VAC 5 A (NO)/3 A (NC) at 30 VDC
Contact material	Ag alloy (Cd free)
Rated carry current	5 A (NO)/3 A (NC)
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A (NO)/3 A (NC)
Max. switching capacity	1,250 VA, 150 W (NO) 750 VA, 30 W (NC)
Failure rate (reference value)	10 mA at 5 VDC

Note: P level: $\lambda 60=0.1 \times 10^{-6}$ operation

■ Characteristics

Contact resistance (See note 2.)	100 mΩ max.
Operate time (See note 3.)	10 ms max.
Release time (See note 3.)	5 ms max.
Insulation resistance (See note 4.)	1,000 MΩ min.
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	8 kV (1.2×50 μs)
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: Energized: 100 m/s^2 (approximately 10G) Non-energized: 100 m/s^2 (approximately 10G)
Endurance (See note 5.)	Mechanical: 5,000,000 operations (18,000 operations per hour) Electrical: 200,000 operations: 3 A (NO)/3 A (NC) at 125 VAC resistive load 50,000 operations: 5 A (NO)/3 A (NC) at 125 VAC resistive load 50,000 operations: 5 A (NO) at 250 VAC resistive load 100,000 operations: 3 A (NC) at 250 VAC resistive load 100,000 operations: 5 A (NO)/3 A (NC) at 30 VDC resistive load Switching frequency: 1,800 operations per hour
Ambient temperature	Operating: –40°C to 70°C with no icing or condensation
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 6.5 g

Note: **1.** The data shown above are initial values.

2. The contact resistance is possible with 1 A applied at 5 VDC using a fall-of-potential method.

3. The operating time is possible with the operating voltage imposed with no contact bounce at an ambient temperature of 23°C.

4. The insulation resistance is possible between coil and contacts and between contacts of the same polarity at 500 VDC.

5. The electrical endurance data items shown are possible at 23°C.

■ Approved Standards

UL508 (File No. E41515)
CSA C22.2 (No. 14) (File No. LR31928)

Model	Coil ratings	Contact ratings	Number of test operations
G5SB	5 to 24 VDC	3 A, 125 VAC (resistive) NC only 2 A, 125 VAC (resistive) NC only 5 A, 250 VAC (resistive) NO only 3 A, 250 VAC (resistive) NO only 5 A, 30 VDC (resistive) NO only	6,000

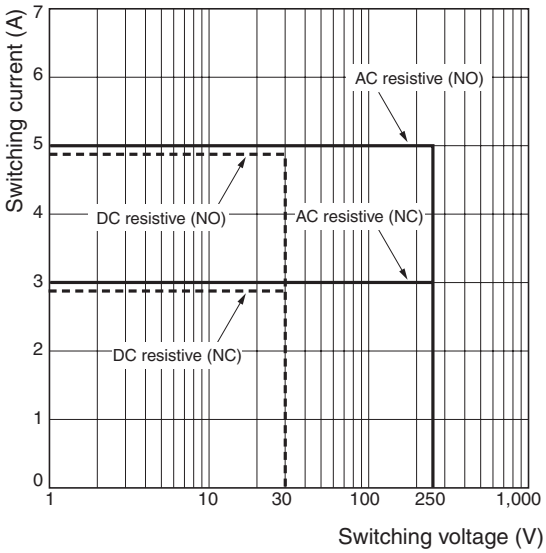
Electrical endurance tests are performed at 70°C.

VDE (EN61810-1) (Approval No. 40003957)

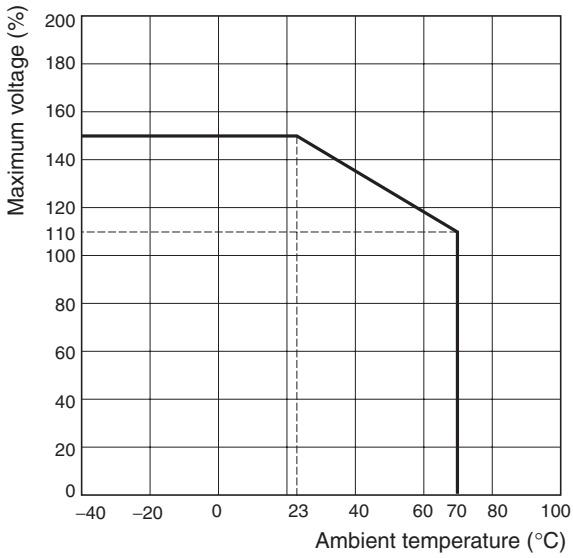
Model	Coil ratings	Contact ratings	Number of test operations
G5SB	5, 12, 24 VDC	5 A (NO)/3 A (NC), 250 VAC	10,000

Engineering Data

Max. Switching Capacity

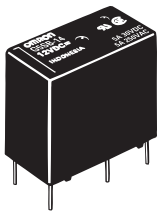


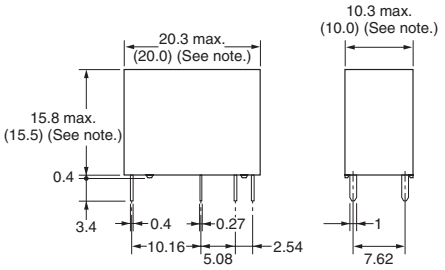
Ambient Temperature vs. Maximum Voltage



Dimensions

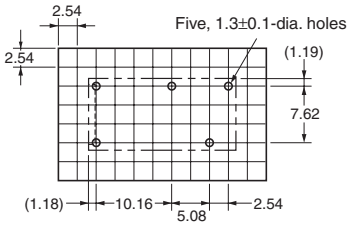
Note: All units are in millimeters unless otherwise indicated.



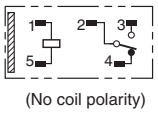


PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)



(No coil polarity)

Note: Values in parentheses are average values.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K122-E1-02

OMRON

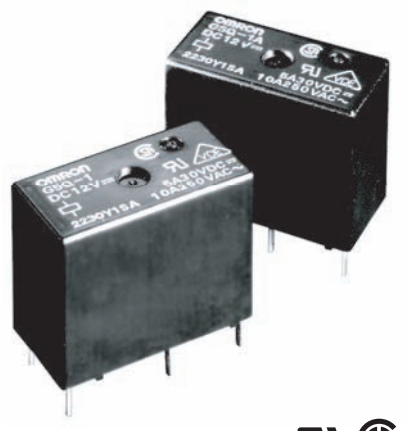
PCB Relay

G5Q

Compact, High Isolation Relay

- Compact single pole relay with high isolation between coil and contacts.
- Up to 10 A switching on the NO contacts.
- Ensures a withstand impulse voltage of 8,000 V between the coil and contacts.
- Low coil power consumption.
- UL class F coil insulation.
- UL, CSA, and VDE approvals.
- Ideal for appliance and HVAC controls.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification	Contact form	Enclosure ratings	Model
Single contact, class F coil insulation	SPST-NO	Vented	G5Q-1A
		Sealed	G5Q-1A4
	SPDT	Vented	G5Q-1
		Sealed	G5Q-14

Note: When ordering, add the rated coil voltage to the model number.

Example: G5Q-1A 12 VDC
Rated coil voltage

Model Number Legend:

G5Q-□□ □ VDC
1 2 3

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   A: SPST-NO
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Item	SPST-NO			SPDT		
Rated voltage	5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current	40 mA	16.7 mA	8.3 mA	80 mA	33.3 mA	16.7 mA
Coil resistance	125 Ω	720 Ω	2,880 Ω	63 Ω	360 Ω	1,440 Ω
Must-operate voltage	75% max. of rated voltage					
Must-release voltage	5% min. of rated voltage					
Max. voltage	130% of rated voltage					
Power consumption	Approx. 200 mW			Approx. 400 mW		

■ Contact Ratings

Load	SPST-NO	SPDT
Rated load (resistive)	10 A at 125 VAC 3 A at 250 VAC 5 A at 30 VDC	10 A at 125 VAC (NO) 3 A at 250 VAC (NO) 5 A at 30 VDC (NO) 3 A at 125 VAC (NC) 3 A at 30 VDC (NC)
Contact material	Ag Alloy (Cd free)	
Rated carry current	10 A (NO)/3 A (NC)	
Max. switching voltage	277 VAC, 30 VDC	
Max. switching current	AC: 10 A (NO)/3 A (NC)	
	DC: 5 A (NC)/3 A (NC)	
Max. switching power	1250 VA, 150 W (NO)	
	375 VA, 90 W (NC)	
Failure rate (reference value)	10 mA at 5 VDC	

■ Characteristics

Contact resistance (See Note 2.)	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 1000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	8 kV (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approximately 10G)
Endurance	Mechanical: 10,000,000 operations (18,000 operations per hour) Electrical: 200,000 operations: 3 A (NO)/3 A (NC) at 125-VAC resistive load 100,000 operations: 3 A (NO)/3 A (NC) at 250 VAC 5 A (NO)/3 A (NC) at 30-VDC resistive load 50,000 operations: 10 A (NO) at 125-VAC (900 operations per hour)
Ambient temperature	Operating: –40°C to 105°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 6.5 g

Note: **1.** The data shown above are initial values.

2. The contact resistance is possible with 1 A applied at 5 VDC using a fall-of-potential method.

■ Approved Standars

UL508 (File No. E41515)
CSA C22.2 No. 14 (File No. LR31928)

Model	Coil ratings	Contact ratings (See Note)	
		NO contacts	NC contacts
G5Q	5-48 VDC	10 A, 250 VAC resistive 10 A, 30 VDC resistive 4 A, 120 VAC resistive, 100,000 ops. 4 FLA, 4 LRA 120 VAC, definite purpose, 100,000 ops. 400W, 120 VAC, Tungsten, 25°C 5 LRA, 4 FLA, 120 VAC, definite purpose, 30,000 ops., 25°C	3 A, 250 VAC resistive 3 A, 30 VDC resistive 4 LRA, 2 FLA, 120 VAC definite purpose, 100,000 ops. 400W, 120 VAC, Tungsten, 25°C 5 LRA, 4 FLA, 120 VAC, definite purpose, 30,000 ops., 25°C

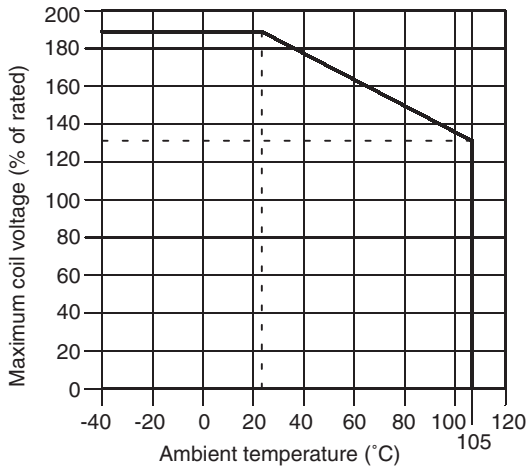
Note: Ratings for both NO contacts and NC contacts are given at 105°C (221°F), unless specified.

VDE (Reg. No. 125314)

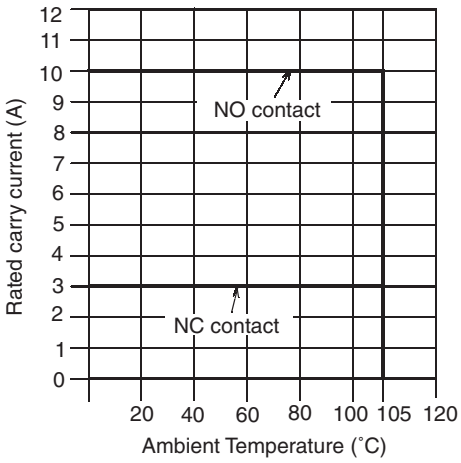
Model	Coil ratings	Contact ratings
G5Q	5, 12, 24 VDC	10 A, 250 VAC cosϕ=1 (NO) 5 A, 30 VDC L/R=0 ms (NO) 3 A, 30 VDC L/R=0 ms (NC)

Engineering Data

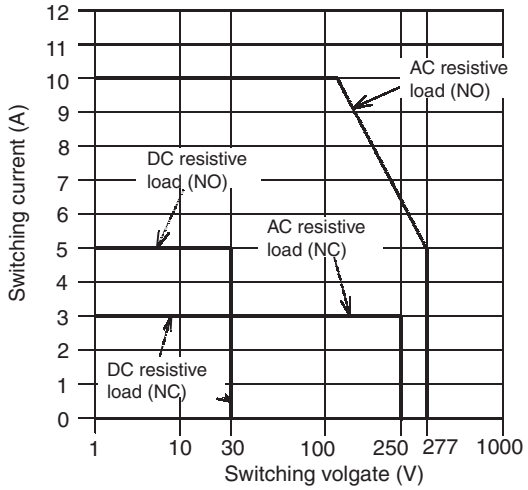
■ Ambient Temperature VS. Maximum Voltage



■ Ambient Temperature VS. Rated Carry Current



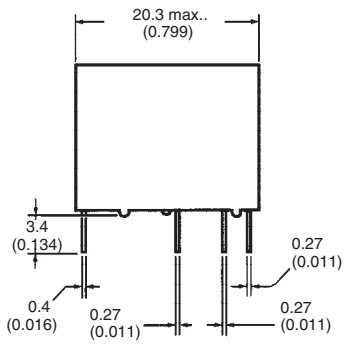
■ Max. Switching Capacity

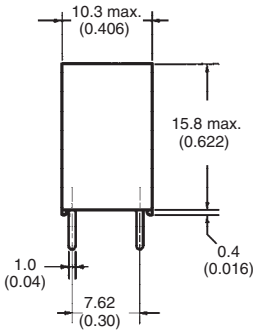


Dimensions

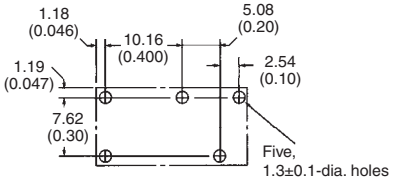
Unit: mm (inch)

■ G5Q SPDT

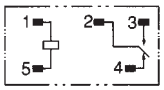




PCB Mounting Holes
(Bottom View)
Tolerance: ±0.1 mm

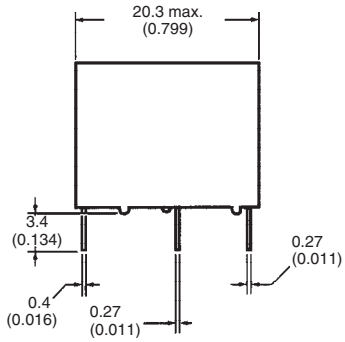


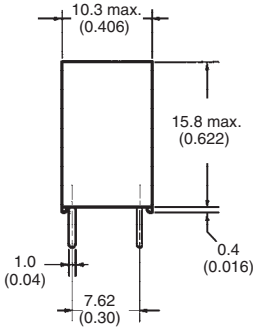
Terminal Arrangement/
Internal Connections
(Bottom View)



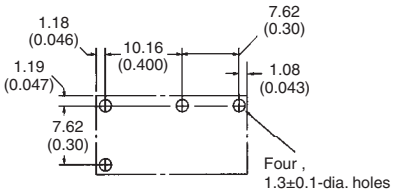
(No coil polarity)

■ SPST-NO

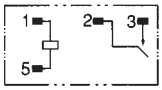




PCB Mounting Holes
(Bottom View)
Tolerance: ±0.1 mm



Terminal Arrangement/
Internal Connections
(Bottom View)



(No coil polarity)

Precautions

For general precautions on PCB Relays, refer to the precautions provided in the Relay Catalog *Reference Information Section*. Document available on line.

⚠ Caution

Do not touch the terminals of the Relay or the charted part of the socket when power is supplied to the Relay. Otherwise, an electric shock may occur.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J155-E1-01

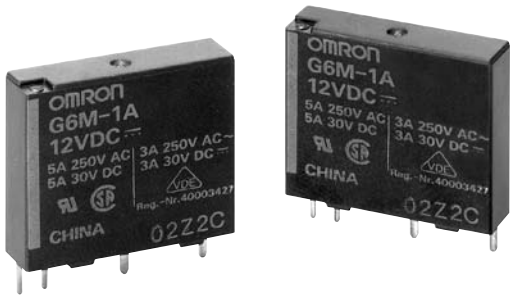
OMRON

PCB Relay | G6M

Slim, Miniature Relay, Capable of Relaying Programmable Controller and Temperature Controller Outputs

- Slim 5-mm width, and miniature size.
- Reduced board area ideal for high-density mounting.
- Highly efficient magnetic circuit for high sensitivity (40% higher than the G6D, with power consumption of 120 mW).
- Satisfies EN61131-2 and EN61010 requirements.
- SIL (single-in-line) terminal pitch.
- UL, CSA, and VDE approved.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Fully sealed	G6M-1A

Note: When ordering, add the rated coil voltage to the model number.

Example: G6M-1A 12 VDC
Rated coil voltage

Model Number Legend

G6M -□ □ □ VDC
1 2 3

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	24 mA	10 mA	5 mA
Coil resistance	208 Ω	1,200 Ω	4,800 Ω
Must operate voltage	70% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	160% of rated voltage (at 23°C)		
Power consumption	Approx. 120 mW		

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. The "Max. voltage" is the maximum voltage that can be applied to the relay coil. It is not the maximum voltage that can be applied continuously.

4. The must operate voltage is 72% or less of the rated voltage if the relay is mounted vertically and the terminals are pointing downwards.

■ Contact Ratings

Rated load	3 A at 250 VAC, 3 A at 30 VDC
Rated carry current	5 A
Max. switching voltage	270 VAC, 125 VDC
Max. switching current	5 A
Max. switching power	750 VA, 90 W
Failure rate (reference value)	10 mA at 5 VDC (at 120 operations/min)

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	3,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	5,080 V (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 Hz, 2.5-mm single amplitude (5.0-mm double amplitude) Malfunction: 10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (3 A at 250 VAC/30 VDC, resistive load at 1,800 operations/hr.)
Ambient temperature	Operating: –40°C to 85°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 4 g

■ Approved Standards

UL508 (File No. E41515)/CSA C22.2 No.14 (File No. LR31928)

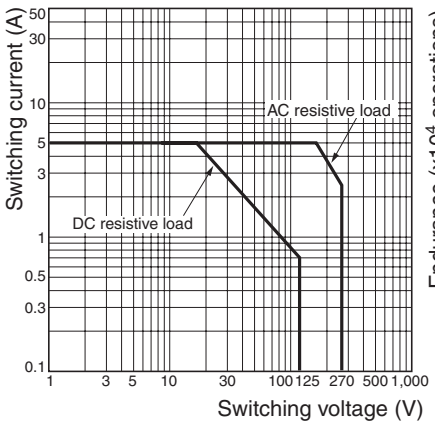
Model	Coil ratings	Contact ratings
G6M-1A	4.5 to 24 VDC	5 A, 250 VAC (resistive load, 6,000 operations) 5 A, 30 VDC (resistive load, 6,000 operations) 3 A, 250 VAC (general use, 10,000 operations) 3 A, 30 VDC (general use, 10,000 operations)

VDE (Reg. No. 40003427) EN61810-1

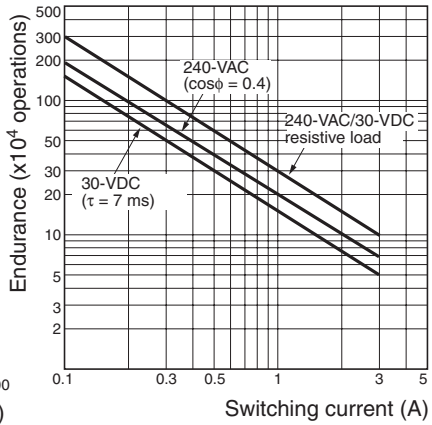
Model	Coil ratings	Contact ratings
G6M-1A	4.5, 5, 12, 24 VDC	3 A, 250 VAC (cosϕ 1, 50,000) 3 A, 30 VDC (0 ms, 50,000)

Engineering Data

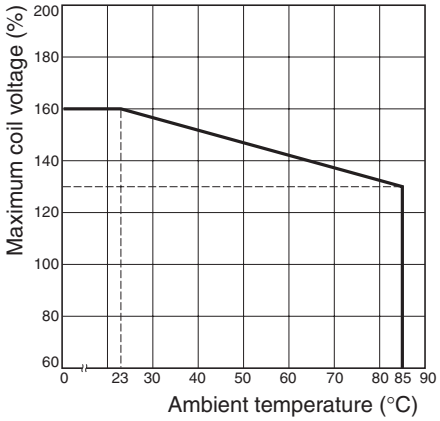
Maximum Switching Power



Endurance



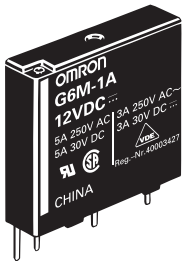
Ambient Temperature vs. Maximum Coil Voltage

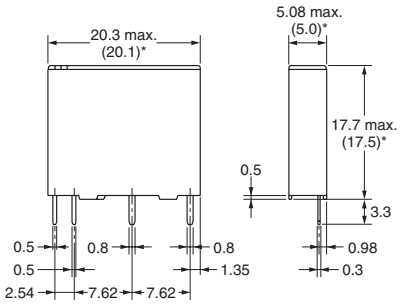


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

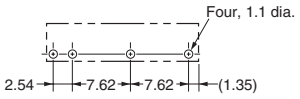
G6M-1A





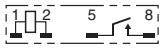
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K121-E1-03

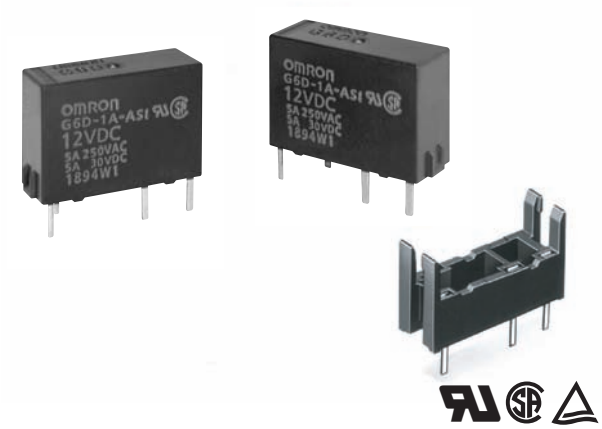
OMRON

PCB Relay

G6D

Slim, Miniature Relay, Capable of Relaying Programmable Controller and Temperature Controller Outputs

- Slim and miniature: 17.5 × 6.5 × 12.5 mm (L × W × H).
- Ideal for high-density mounting.
- Switches 5 A at 250 VAC/30 VDC.
- Allows 300,000 operations with a 2-A load at 250 VAC or 30 VDC.
- Actual load switching capability equals the G6B's capability.
- Washable construction.



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Fully sealed	G6D-1A-ASI

Note: When ordering, add the rated coil voltage to the model number.
Example: G6D-1A-ASI 12 VDC
Rated coil voltage

Model Number Legend

G6D - □ □ - □ □ VDC
1 2 3 4

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Contact Material**
   ASI: Silver alloy (cadmium-free)
4. **Rated Coil Voltage**
   5, 12, 24 VDC

■ Accessories (Order Separately)

Connecting Socket	P6D-04P

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	40 mA	16.7 mA	8.3 mA
Coil resistance	125 Ω	720 Ω	2,880 Ω
Must operate voltage	70% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	160% of rated voltage (at 23°C)		
Power consumption	Approx. 200 mW		

Note: The must operate voltage is 75% or less of the rated voltage if the relay is mounted upside down.

■ Contact Ratings

Rated load	5 A at 250 VAC, 5 A at 30 VDC, resistive load
Rated carry current	5 A
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. switching power	1,250 VA, 150 W
Failure rate (reference value)	10 mA at 5 VDC

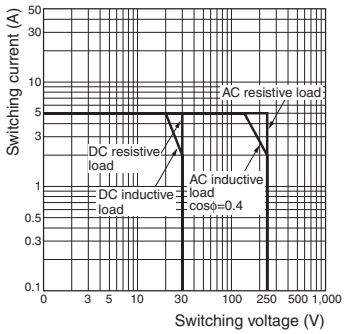
Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

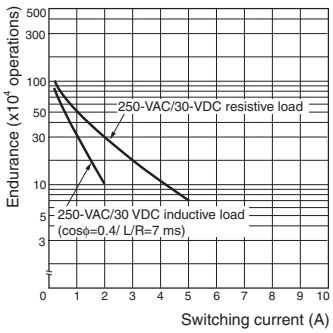
Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	3,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	6,000 V (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 70,000 operations min. (5 A at 250 VAC/30 VDC, resistive load) 300,000 operations min. (2 A at 250 VAC/30 VDC, resistive load)
Ambient temperature	Operating: –25°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 3 g

Engineering Data

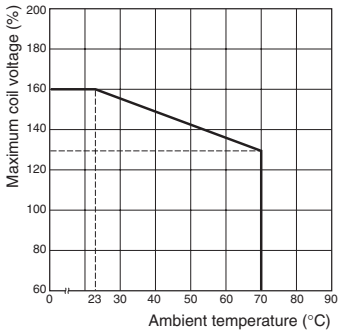
Maximum Switching Power



Endurance

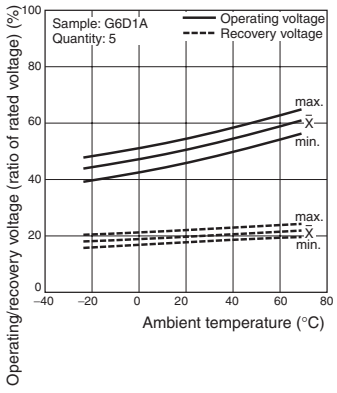


Ambient Temperature vs. Maximum Coil Voltage

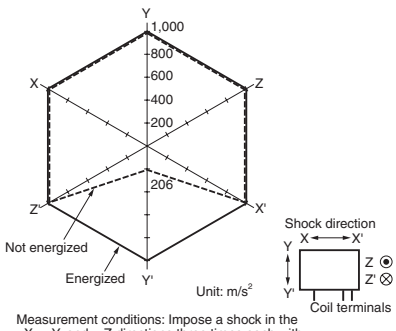


Note: The maximum coil voltage is the maximum voltage that can be applied to the relay coil.

Ambient Temperature vs. Operating/Recovery Voltage G6D-1A-ASI



Malfunctioning Shock G6D-1A-ASI



Measurement conditions: Impose a shock in the ±X, ±Y, and ±Z directions three times each with the Relay energized to check the shock values that cause the Relay to malfunction.

■ Approved Standards

• The rated values approved by each of the safety standards may be different from the performance characteristics individually defined in this catalog.

UL Approval (File No. E41515) UL508

Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5 to 24 VDC	5 A, 250 VAC (General Use)	6,000
			5 A, 30 VDC	

CSA Approval (File No. LR31928) C22.2 No. 14

Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5 to 24 VDC	5 A, 250 VAC (General Use)	6,000
			5 A, 30 VDC (Resistive)	

EN/TÜV Approval (Registration No. R50029064/EN61810-1)

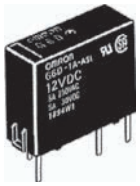
Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5, 12, 24 VDC	5 A, 250 VAC (cosϕ=1.0)	70,000
			5 A, 30 VDC (0 ms)	

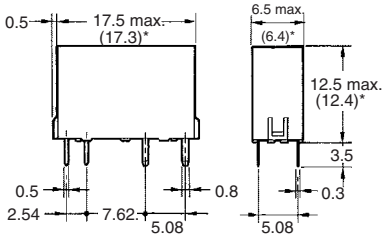
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

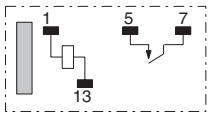
G6D-1A-ASI





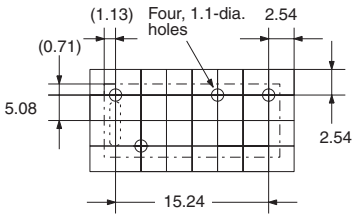
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

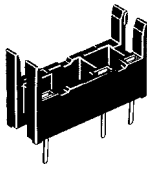


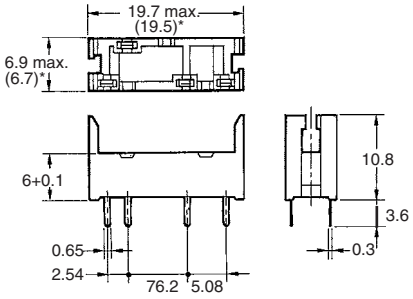
Mounting Holes (Bottom View)

Tolerance: ±0.1



P6D-04P Socket

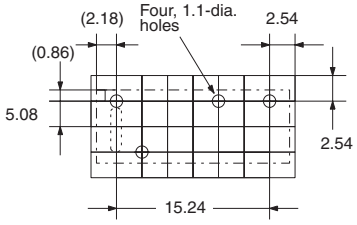




*Average value

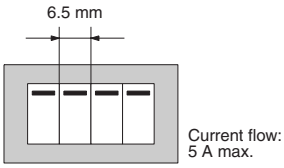
Mounting Holes (Bottom View)

Tolerance: ±0.1

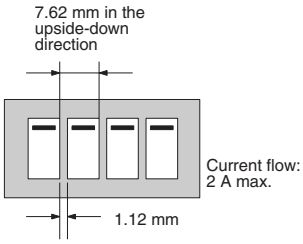


Precautions

More than two relays can be closely mounted right side up as shown in the following illustration.

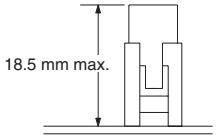


More than two relays can be closely mounted upside down as shown in the following illustration.



Note: The space between each relay required for heat radiation may vary with operating conditions. Contact your OMRON representative for details.

Socket Mounting Height



When mounting the relay, insert it into the socket as vertically as possible so that the relay terminals contact securely with the contact pins on the socket.

The P6D is flux-resistive. Do not wash the P6D with water.

Dismount the relay from the socket before soldering the socket to a PCB.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K127-E1-02

OMRON

PCB Relay

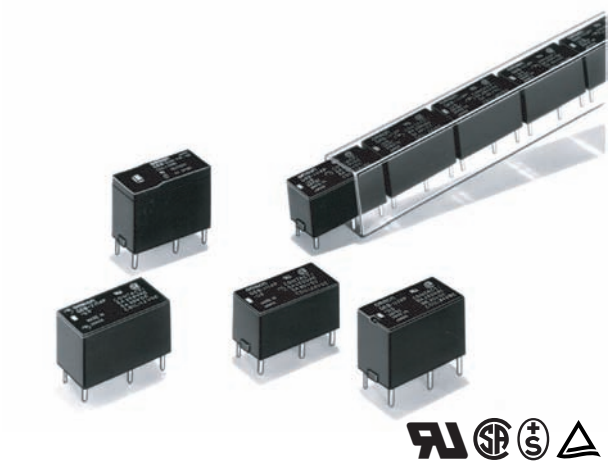
G6B

Subminiature Relay that Switches up to 5 A

- Subminiature: 20 ×10 ×10 mm (L × W × H).
- Low power consumption: 200 mW.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce time.
- Single- and double-winding latching types also available.

RoHS Compliant

Note: The information in this datasheet applies to PCB Relays manufactured after January 2007.



Ordering Information

Classification	Contact form	Straight PCB	Self-clinching PCB
Single-side stable	SPST-NO	G6B-1114P-US	G6B-1114C-US
	SPST-NO+SPST-NC	G6B-2114P-US	G6B-2114C-US
	DPST-NO	G6B-2214P-US	G6B-2214C-US
	DPST-NC	G6B-2014P-US	G6B-2014C-US
Single-winding latching	SPST-NO	G6BU-1114P-US	G6BU-1114C-US
Double-winding latching	SPST-NO	G6BK-1114P-US	G6BK-1114C-US
High-capacity single-side stable	SPST-NO	G6B-1174P-US	G6B-1174C-US

Note: When ordering, add the rated coil voltage to the model number.
Example: G6B-1114P-US 12 VDC
Rated coil voltage

Model Number Legend

G6B □-□ □ □ □ □- □ - □ □ VDC
1 2 3 4 5 6 7 8

1. Relay Function
None: Single-side stable
U: Single-winding latching
K: Double-winding latching

2. Contact Form
21: SPST-NO + SPST-NC
22: DPST-NO
20: DPST-NC
11: SPST-NO

3. Contact Type
1: Standard
7: High-capacity

4. Enclosure Ratings
4: Fully sealed

5. Terminals
P: Straight PCB
C: Self-clinching PCB

6. Approved Standards
US: UL/CSA certified

7. Mounting
None: Mounted directly to PCB
P6B: Mounted to Socket

8. Rated Coil Voltage
5, 6, 12, or 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable Relay	Back Connecting Socket (See note 1.)
G6B(U)-1114P-US-P6B	P6B-04P
G6BK-1114P-US-P6B	P6B-06P
G6B-2□□4P-US-P6B	P6B-26P
G6B-1174P-US-P6B	P6B-04P

Note: **1.** Not applicable to the self-clinching type.
2. Use the G6B-□□□□P-US P6B to mount to a P6B Socket.

Removal Tool	P6B-Y1
Hold-down Clips	P6B-C2

Specifications

■ Coil Ratings

Single-side Stable Type

Item		SPST-NO				SPST-NO + SPST-NC, DPST-NO, DPST-NC			
Rated voltage (VDC)		5	6	12	24	5	6	12	24
Rated current (mA)		40	33.3	16.7	8.3	60	50	25	12.5
Coil resistance (Ω)		125	180	720	2,880	83.3	120	480	1,920
Coil inductance (H) (ref. value)	**Armature OFF**	0.28	0.31	1.2	4.9	---	---	---	---
	Armature ON	0.26	0.28	1.1	4.1	---	---	---	---
Must operate voltage		70% max. of rated voltage				80% max. of rated voltage			
Must release voltage		10% min. of rated voltage							
Max. voltage		160% of rated voltage (at 23°C)				140% of rated voltage (at 23°C)			
Power consumption		Approx. 200 mW				Approx. 300 mW			

Single-winding Latching Type

Rated voltage		5 VDC	6 VDC	12 VDC	24 VDC
Rated current		40 mA	33.3 mA	16.7 mA	8.3 mA
Coil resistance		125 Ω	180 Ω	720 Ω	2,880 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.28	0.31	1.2	4.9
	Armature ON	0.26	0.28	1.1	4.1
Must operate voltage		70% max. of rated voltage			
Must release voltage		70% min. of rated voltage			
Max. voltage		160% of rated voltage (at 23°C)			
Power consumption		Approx. 200 mW			

Double-winding Latching Type

Rated voltage			5 VDC	6 VDC	12 VDC	24 VDC
Set coil	**Rated current**		56 mA	46.8 mA	23.3 mA	11.7 mA
	Coil resistance		89.2 Ω	128.5 Ω	515 Ω	2,060 Ω
	Coil inductance (H) (ref. value)	**Armature OFF**	0.15	0.18	0.52	1.2
		Armature ON	0.15	0.18	0.52	1.2
Reset coil	**Rated current**		56 mA	46.8 mA	23.3 mA	11.7 mA
	Coil resistance		89.2 Ω	128.5 Ω	515 Ω	2,060 Ω
	Coil inductance (H) (ref. value)	**Armature OFF**	0.15	0.18	0.52	1.2
		Armature ON	0.15	0.18	0.52	1.2
Must set voltage			70% max. of rated voltage			
Must reset voltage			70% min. of rated voltage			
Max. voltage			130% of rated voltage (at 23°C)			
Power consumption			Set coil: Approx. 280 mW Reset coil: Approx. 280 mW			

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Contact Ratings

Item	SPST-NO		SPST-NO + SPST-NC, DPST-NO, DPST-NC	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)
Rated load	5 A at 250 VAC; 5A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC	5 A at 250 VAC; 5A at 30 VDC	1.5 A at 250 VAC; 1.5 A at 30 VDC
Contact material	Ag Alloy (Cd free)			
Rated carry current	5 A			
Max. switching voltage	380 VAC, 125 VDC			
Max. switching current	5 A			
Max. switching power	1,250 VA, 150 W	500 VA, 60 W	1,250 VA, 150 W	375 VA, 80 W
Failure rate (reference value)	10 mA at 5 VDC			

Item	SPST-NO (High-capacity)	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)
Rated load	8 A at 250 VAC; 8 A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC
Contact material	Ag Alloy (Cd free)	
Rated carry current	8 A	
Max. switching voltage	380 VAC, 125 VDC	
Max. switching current	8 A	
Max. switching power	2,000 VA, 150 W	
Failure rate (reference value)	10 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	30 mΩ max.
Operate (set) time	10 ms max. (mean value: 1-pole approx. 3 ms, 2-pole approx. 4 ms)
Release (reset) time	Single-side stable types: 10 ms max. (mean value: 1-pole approx. 1 ms, 2-pole approx. 2 ms) Latching types: 10 ms max. (mean value: approx. 3 ms)
Min. set/reset signal width	Latching type: 15 ms min. (at 23°C)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC, at 250 VDC between set coil and reset coil)
Dielectric strength	3,000 VAC (Latching types: 2,000 VAC), 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between set and reset coils 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: Single-side stable: 100 m/s^2; Latching: 300 m/s^2
Endurance	Mechanical: 50,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operation min. (at 1,800 operations/hr)
Ambient temperature	Operating: –25°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Double-winding latching: Approx. 3.7 g High-capacity: Approx. 4.6 g Double pole: Approx. 4.5 g Other: Approx. 3.5 g

Note: The data shown above are initial values.

■ Approved Standards

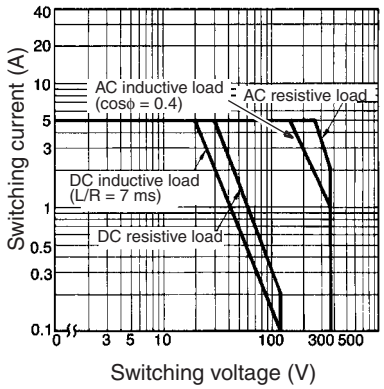
UL508 (File No. E41643)/CSA C22.2 No.14 (File No. LR31928)

Model	Contact form	Coil rating	Contact rating
G6B-1114P-US G6B-1114C-US G6BU-1114P-US G6BU-1114C-US G6BK-1114C-US G6BK-1114C-US	SPST-NO	3 to 24 VDC	5 A, 250 VAC (general use) 5 A, 30 VDC (resistive load)
G6B-1174P-US G6B-1174C-US			8 A, 250 VAC (general use) 8 A, 30 VDC (resistive load)
G6B-2114P-US G6B-2114C-US G6B-2214P-US G6B-2214C-US G6B-2014P-US G6B-2014C-US	SPST-NO + SPST-NC DPST-NO DPST-NC		5 A, 250 VAC (general use) 5 A, 30 VDC (resistive load)

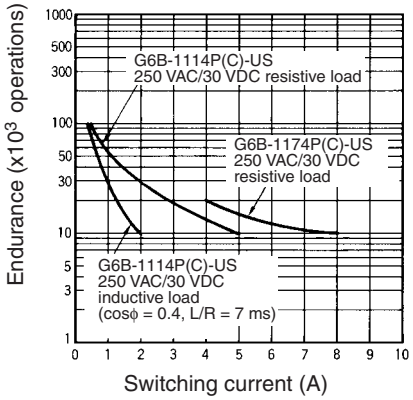
Engineering Data

G6B-1114P-US

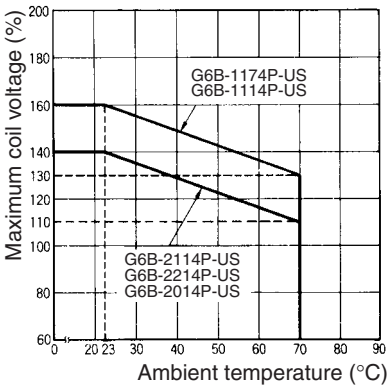
Maximum Switching Power



Endurance

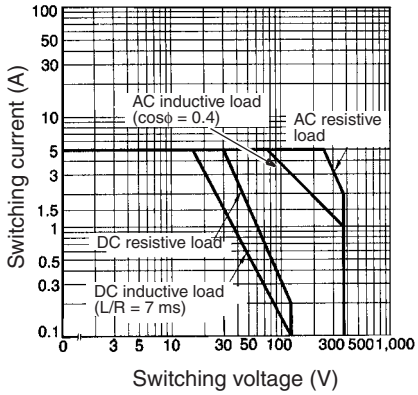


Ambient Temperature vs. Maximum Coil Voltage

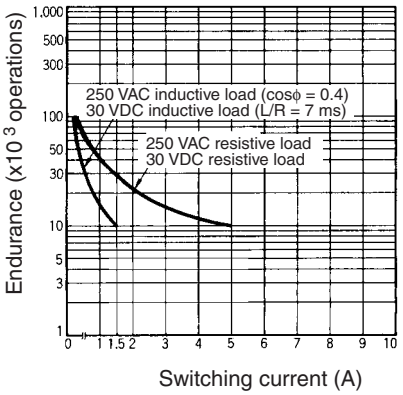


Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

G6B-2114P-US, G6B-2214P-US
G6B-2014P-US
Maximum Switching Power



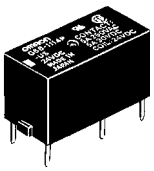
Endurance

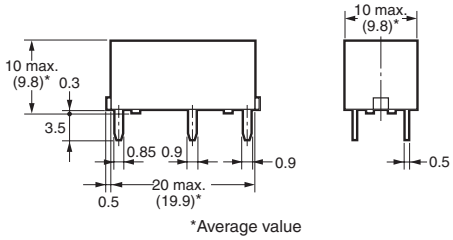


Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

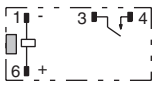
G6B-1114P-US
G6BU-1114P-US



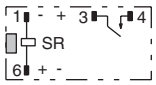


*Average value

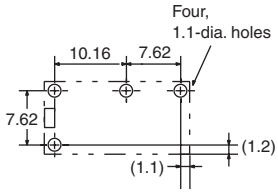
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1114P, -1114C



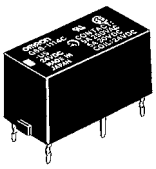
G6BU-1114P, -1114C

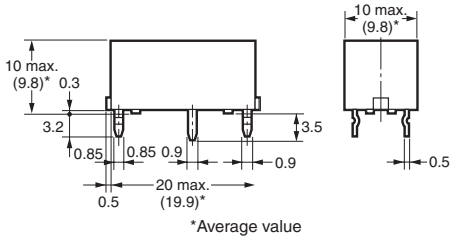


Mounting Holes (Bottom View)
G6B-1114P, -1114C
G6BU-1114P, -1114C



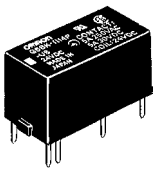
G6B-1114C-US
G6BU-1114C-US

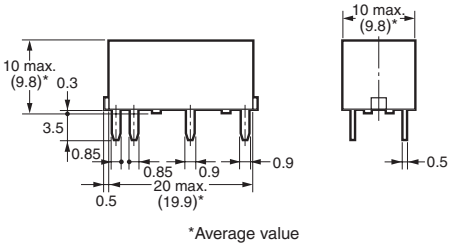




*Average value

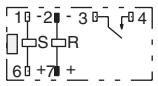
G6BK-1114P-US



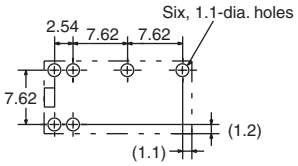


*Average value

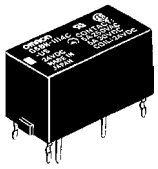
Terminal Arrangement/Internal Connections (Bottom View)
G6BK-1114P, -1114C

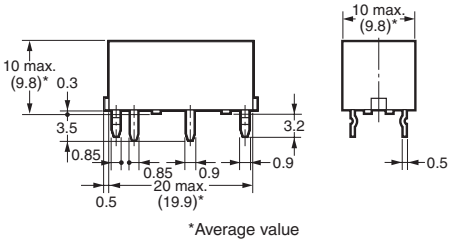


Mounting Holes (Bottom View)
G6BK-1114P, -1114C



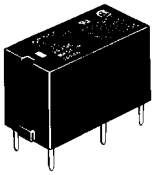
G6BK-1114C-US

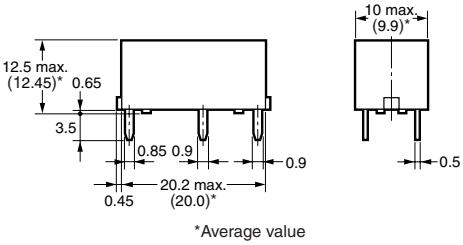




*Average value

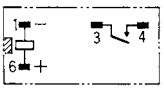
G6B-1174P-US



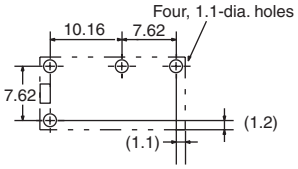


*Average value

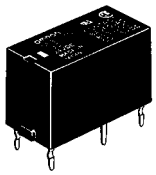
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1174P, -1174C

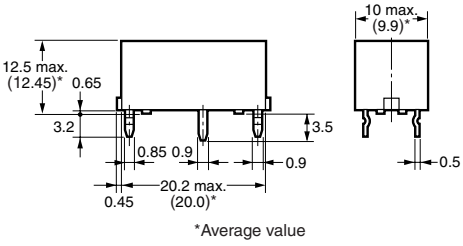


Mounting Holes (Bottom View)



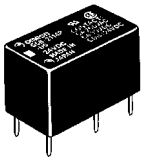
G6B-1174C-US

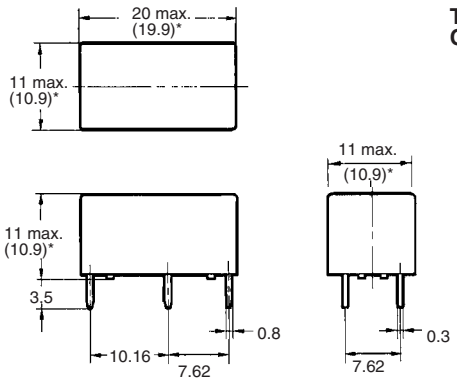




*Average value

G6B-2114P-US
G6B-2214P-US
G6B-2014P-US

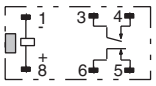




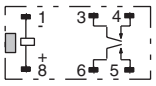
*Average value

Terminal Arrangement/Internal Connections (Bottom View)

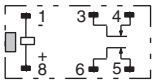
G6B-2114P-US



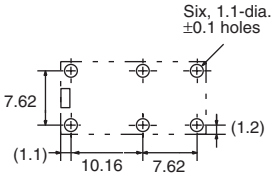
G6B-2214P-US



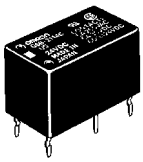
G6B-2014P-US

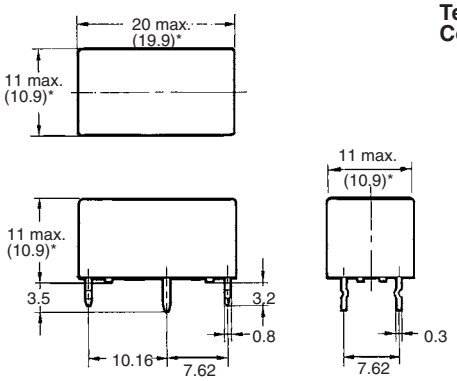


Mounting Holes (Bottom View)
Tolerance: ±0.1



G6B-2114C-US
G6B-2214C-US
G6B-2014C-US

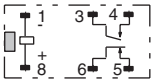




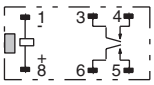
*Average value

Terminal Arrangement/Internal Connections (Bottom View)

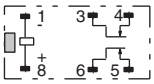
G6B-2114C-US



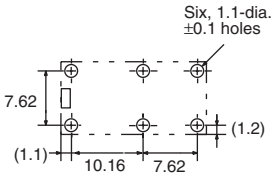
G6B-2214C-US



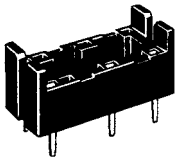
G6B-2014C-US

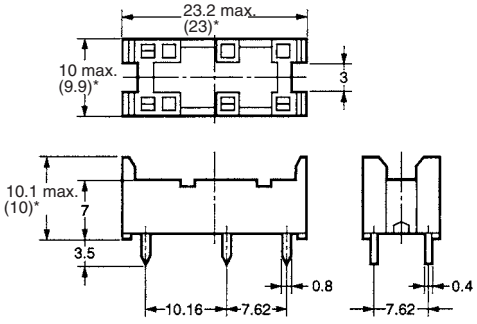


Mounting Holes (Bottom View)
Tolerance: ±0.1



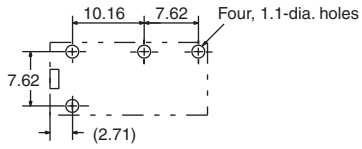
Back Connecting Socket
P6B-04P



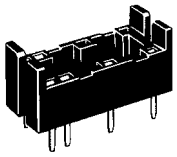


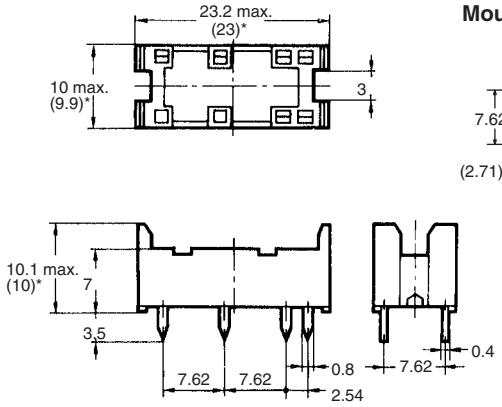
*Average value

Mounting Holes (Bottom View)

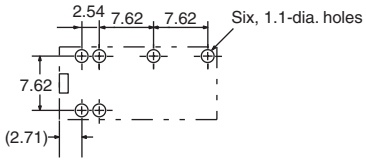


P6B-06P



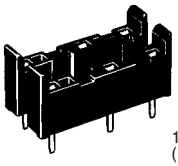


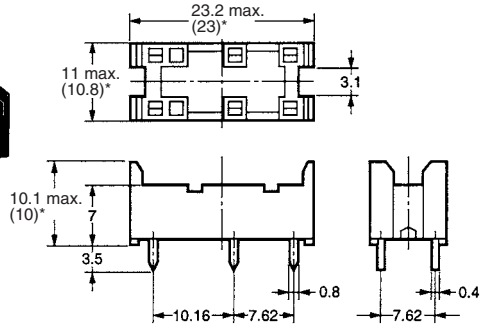
Mounting Holes (Bottom View)



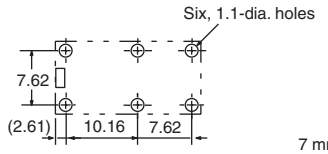
*Average value

P6B-26P



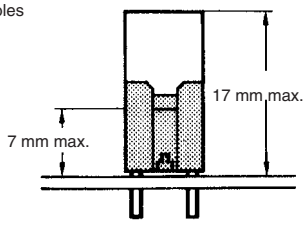


Mounting Holes (Bottom View)



Note: Rated current of socket is 5 A max.

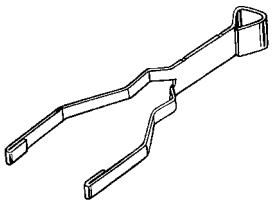
Mounting Height of Relay with Connecting Socket



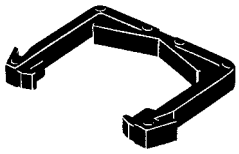
Note: Height of G6B-1174P-US is 19.5 mm max.

*Average value

Removal Tool
P6B-Y1



Hold-down Clips
P6B-C2



Note: P6B-C2 Hold-down Clips cannot be used for G6B-1174P-US.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K021-E1-07

OMRON

PCB Relay

G6RN

Heavy-duty Miniature Relay

- Variety of contact forms: SPDT or SPST-NO (continuous current rating: 8 A)
- Mechanical and electrical characteristics comply with EN61810-1.
- Satisfies EN60335-1 requirements with a dielectric strength of 4 kV at a distance of 8 mm.
- Tracking resistance: CTI>250

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification	Enclosure ratings	Contact material	Contact form	
			SPST-NO	SPDT
Standard	Fully sealed	Ag Alloy + gold plating (0.35 μ)	G6RN-1A	G6RN-1
		Ag Alloy	G6RN-1A-ANI	G6RN-1-ANI
		Ag Alloy + gold plating (4 μ)	G6RN-1A-AP4	G6RN-1-AP4

Note: When ordering, add the rated coil voltage to the model number.

Example: G6RN-1A 24 VDC
Rated coil voltage

Model Number Legend

G6RN-□□-□ □ VDC
1 2 3 4

1. Number of Poles
1: 1 pole

2. Contact Form
None: SPDT
A: SPST-NO

3. Contact Material
None: Ag Alloy + gold plating (0.35 μ)
ANI: Ag Alloy
AP4: Ag Alloy + gold plating (4 μ)

4. Rated Coil Voltage
5, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	43.9 mA	18.3 mA	9.2 mA	5.2 mA
Coil resistance	114 Ω	655 Ω	2,620 Ω	9,210 Ω
Must operate voltage	70% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	150% of rated voltage (at 23°C)			
Power consumption	Approx. 220 mW			Approx. 250 mW

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Contact Ratings

Load	Resistance load (cos ϕ = 1)
Rated load	8 A at 250 VAC: 5 A at 30 VDC
Rated carry current	8 A
Max. switching voltage	250 VAC; 30 VDC, (400 VAC) (See note.)
Max. switching current	AC 8 A; DC 5 A
Max. switching power	2,000 VA; 150 W
Failure rate (reference value)	5 VDC 10 mA (for gold plating 0.35 μ min.)

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Characteristics

Operate time	Max. 15 ms (Typ. 6 ms)
Release time	Max. 5 ms (Typ. 3 ms)
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 360 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC between coil and contacts 1,000 VAC between contacts
Creepage/clearance	8 mm min. between coil and contacts
Vibration resistance	Malfunction: NO: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) NC: 10 to 55 to 10 Hz, 0.4-mm single amplitude (0.8-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: NO: 100 m/s^2 NC: 50 m/s^2
Endurance	Mechanical: 10,000,000 operations min. Electrical: 50,000 operations (Typ. 100,000 operations)
Ambient temperature	Operating: –40°C to 85°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 9 g
Protection class	II according to VDE0106 Part 1
Insulation class	C/250, B/380 according to VDE0110

■ Approved Standards

VDE (EN61810-1)

Contact form	Coil ratings	Contact ratings
SPDT SPST-NO	5, 6, 12, 18, 24, 36, 48 VDC	8 A at 250 VAC (cosϕ = 1)

UL508 (File No. E41515)

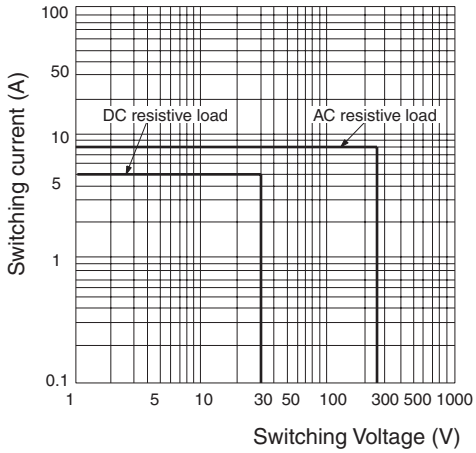
Coil rating	Contact rating
5 to 48 VDC	10 A at 250 VAC (resistive) 5 A at 30 VDC (resistive) 8 A at 250 VAC (resistive) (ambient temperature: 85°C)

CSA C22.2 (File No. LR31928-543)

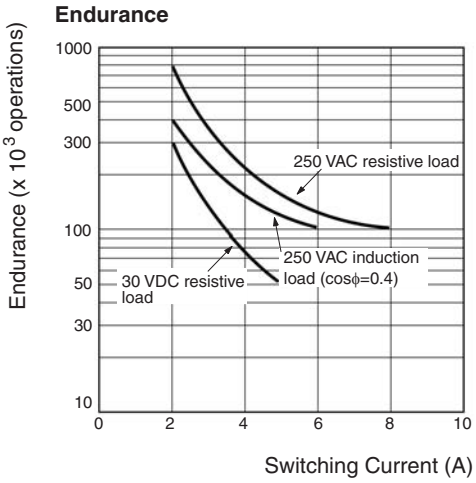
Coil rating	Contact rating
5 to 48 VDC	10 A at 250 VAC (resistive) 5 A at 30 VDC (resistive) 8 A at 250 VAC (resistive) (ambient temperature: 85°C)

Engineering Data

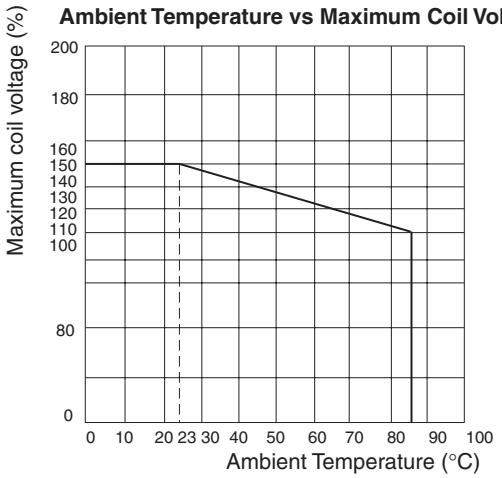
Maximum Switching Power



Endurance



Ambient Temperature vs Maximum Coil Voltage

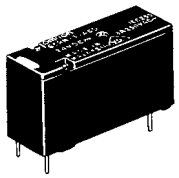


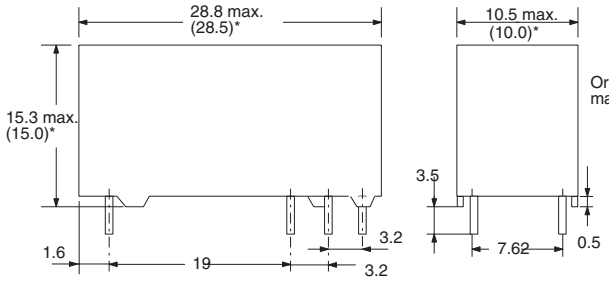
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

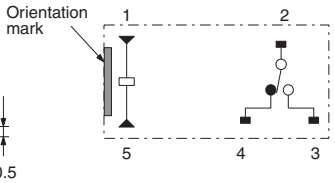
SPDT Type





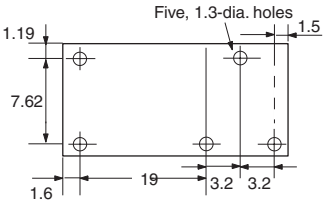
*Average value.

Terminal Arrangement/ Internal Connections (Bottom View)

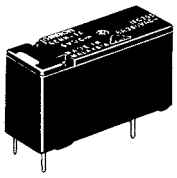


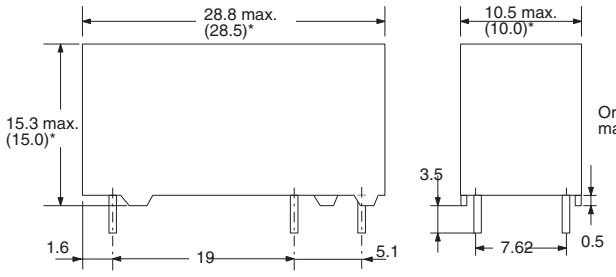
Mounting Holes (Bottom View)

Tolerance: ±0.1



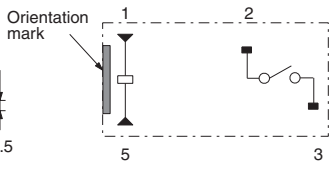
SPST-NO Type





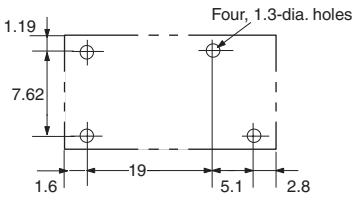
*Average value.

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K096-E1-03

OMRON

PCB Relay

G5LE

A Cubic, Single-pole 10-A Power Relay

- Subminiature “sugar cube” relay with universal terminal footprint.
- Conforms to VDE0435 (VDE approval: B250 Insulation grade), UL508, CSA22.2.
- Tracking resistance: CTI>250 (-VD type).
- UL class-F coil insulation model available (UL class-B coil insulation for standard model).
- High switching power: 10 A.
- Two types of seal available; flux protection and fully sealed.
- Withstands impulse of up to 4,500 V.
- 400-mW and 360-mW coil power consumption types available.
- Pre-soldered terminals.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Enclosure ratings	Contact form	Contact material	
		$AgSnO_2$	AgSnIn
Flux protection	SPDT	G5LE-1 G5LE-1-VD G5LE-1-CF	G5LE-1-ASI G5LE-1-ASI-VD G5LE-1-ASI-CF
	SPST-NO	G5LE-1A G5LE-1A-VD G5LE-1A-CF	G5LE-1A-ASI G5LE-1A-ASI-VD G5LE-1A-ASI-CF
Fully sealed	SPDT	G5LE-14 G5LE-14-VD G5LE-14-CF	G5LE-14-ASI G5LE-14-ASI-VD G5LE-14-ASI-CF
	SPST-NO	G5LE-1A4 G5LE-1A4-VD G5LE-1A4-CF	G5LE-1A4-ASI G5LE-1A4-ASI-VD G5LE-1A4-ASI-CF

Note: When ordering, add the rated coil voltage to the model number.
Example: G5LE-1 12 VDC
Rated coil voltage

Model Number Legend

G5LE - □ □ □ - □ - □ - □ - □ □ VDC
1 2 3 4 5 6 7 8

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   A: SPST-NO
3. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
4. **Contact Material**
   None: $AgSnO_2$
   ASI: AgSnIn
5. **Insulation System**
   None: Class B
   CF: Class F (UL and CSA only)
6. **Coil Power Consumption/Coil Characteristic**
   None: Approx. 400 mW
   36: Approx. 360 mW
7. **Approved Standards**
   None: UL, CSA, TÜV
   VD: UL, CSA, TÜV and VDE
   (Not applicable with “-CF.”)
8. **Rated Coil Voltage**
   5, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

400-mW Type

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	79.4 mA	45 mA	33.3 mA	16.7 mA	8.33 mA
Coil resistance	63 Ω	200 Ω	360 Ω	1,440 Ω	5,760 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	170% of rated voltage at 23°C				
Power consumption	Approx. 400 mW				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

360-mW Type

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	72 mA	40 mA	30 mA	15 mA	7.5 mA
Coil resistance	70 Ω	225 Ω	400 Ω	1,600 Ω	6,400 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	170% of rated voltage (at 23°C)				
Power consumption	Approx. 360 mW				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)
Rated load	10 A at 120 VAC; 8 A at 30 VDC
Rated carry current	10 A
Max. switching voltage	250 VAC, 125 VDC (30 VDC when UL/CSA standard is applied)
Max. switching current	AC: 10 A; DC: 8 A
Max. switching power	1,200 VA, 240 W
Failure rate (reference value)	100 mA at 5 VDC

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Max. switching frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr at rated load
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	4,500 V (1.2 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: –25°C to 85°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 12 g

■ Approved Standards

UL508, UL114, UL478, UL325, UL873, UL1409, UL1950 (File No. E41643)/CSA C22.2 No. 14, No. 1 (File No. LR34815)

Model	Coil rating	Contact rating
G5LE	3 to 48 VDC	12 A, 120 VAC (resistive load 30,000 cycles) 10 A, 250 VAC (general use) 10 A, 125 VAC (general use 100,000 cycles) 8 A, 30 VDC (resistive load) 6 A, 277 VAC (general use) NO: 1/6 hp, 120 VAC (50,000 cycles) 1/3 hp, 125 VAC, 70°C 30K with Class 130B system 65°C 30K with Class 105 Coil insulation system TV-3, 120 VAC TV-5, 120 VAC (For ASI only) NC: 1/8 hp, 120 VAC (50,000 cycles) 1/10 hp, 120 VAC (50,000 cycles)

TÜV DIN EN61810-1 (File No. J50030324)

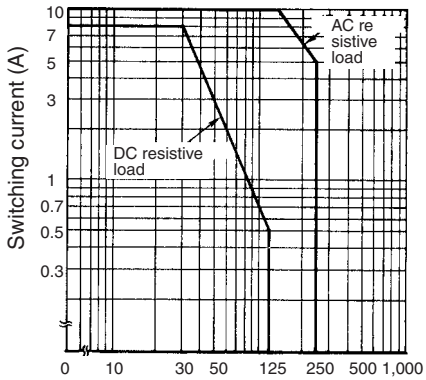
Model	Coil rating	Contact rating
G5LE	Approx. 400 mW 3, 5, 6, 9, 12, 24 VDC Approx. 360 mW 5, 6, 9, 12, 24 VDC	2.5 A, 250 VAC (cosϕ = 0.4) 5 A, 250 VAC (resistive load) 8 A, 30 VDC (resistive load)

VDE DIN EN61810-1, DIN EN60255 (File No. 6850ÜG)

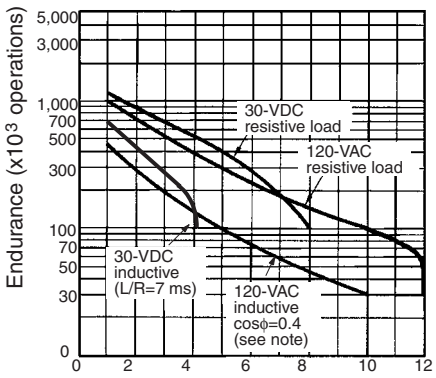
Model	Coil rating	Contact rating
G5LE	Approx. 400 mW 3, 5, 6, 9, 12, 24, 48 VDC Approx. 360 mW 5, 6, 12, 24, 48 VDC	5 A, 250 VAC (resistive load, 50,000 cycles) at 85°C.

Engineering Data

Maximum Switching Power
G5LE

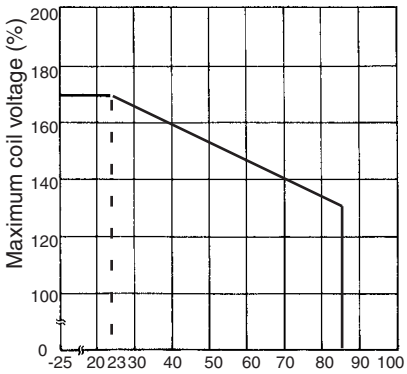


Endurance
G5LE



Note: Same curve as for 250-VAC resistive load

Ambient Temperature vs. Maximum Coil Voltage



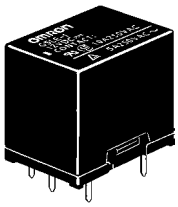
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continu-ous voltage.

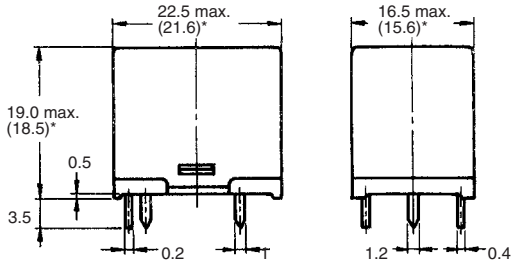
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

G5LE-1
G5LE-1A

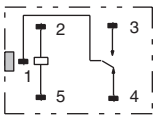




*Average value

Terminal Arrangement/Internal Connections (Bottom View)

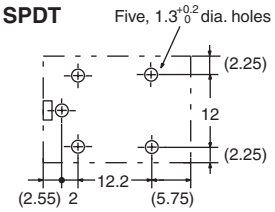
SPDT



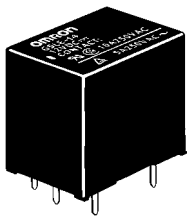
Mounting Holes (Bottom View)

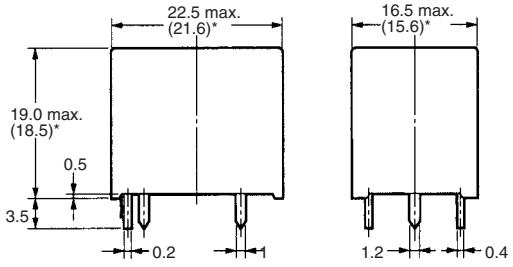
Tolerance: ±0.1 mm unless specified

SPDT



G5LE-14
G5LE-1A4

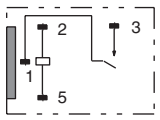




*Average value

Terminal Arrangement/Internal Connections (Bottom View)

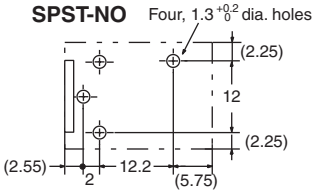
SPST-NO



Mounting Holes (Bottom View)

Tolerance: ±0.1 mm unless specified

SPST-NO



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K100-E1-03

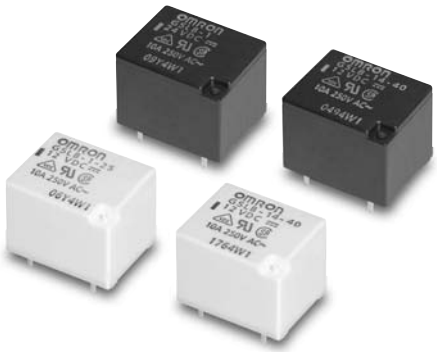
OMRON

PCB Relay | G5LB

A Cubic, Single-pole 10-A Power Relay

- 19.6 × 15.6 × 15.2 mm (L × W × H) Subminiature “Sugar Cube” relay.
- Low coil power consumption (360 mW).
- UL class B and class F insulation available.
- Models with CTI >175 and CTI > 250 available.
- Withstands impulse of up to 4,500 V.

RoHS Compliant Refer to pages 16 to 17 for details.



EN61810 Edition 2

Ordering Information

Seal	Contact form	Contact material
		$AgSnO_2$
No sealed (vent hole)	SPDT	G5LB-1
	SPST-NO	G5LB-1A
Plastic-sealed	SPDT	G5LB-14
	SPST-NO	G5LB-1A4

Note: When ordering, add the rated coil voltage to the model number.

Example: G5LB-1 12 VDC
└ Rated coil voltage

■ Model Number Legend:

G5LB □□□-□-□-□-□-□-□ VDC
1 2 3 4 5 6 7 8

1. **Number of Poles**
   1: 1 pole
2. **Contact Form/Contact Construction**
   None: SPDT
   A: SPST-NO
3. **Sealing/Protective Construction**
   None: No sealed (vent hole)
   4: Sealed
4. **Contact Type**
   None: Standard (Silver Tin Oxide)
5. **Coil Power Consumption**
   None: 360 mW
   40: 400 mW
   60: 600 mW (UL and CSA only)
6. **Tracking Index, and Coil Insulation**
   None: At least PTI 175 (CTI Index 3), and Class B
   25: At least PTI 250 (CTI Index 2), and Class F
7. **Optional Suffix(es)**
   None: May include additional numbers and/or letters for sales purposes.
8. **Rated Coil Voltage**

Specifications

■ Coil Ratings

360-mW Models

Rated voltage	3 VDC	5 VDC	6 VDC	9 VDC	12VDC	24 VDC	36 VDC	48 VDC
Rated current	123.3 mA	72.0mA	60.8 mA	40.8 mA	30.7 mA	15.2 mA	10.2 mA	7.6 mA
Coil resistance	24.3 Ω	69.4 Ω	98.7 Ω	220.4 Ω	390.6 Ω	1575.4 Ω	3533.7 Ω	6287.4 Ω
Must operate voltage	75% of rated voltage (max.)							
Must release voltage	10% of rated voltage (min.)							
Max. voltage	170% of rated voltage at 23°C							
Power consumption	Approx. 360 mW							

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

400-mW Models

Rated voltage	3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	36 VDC	48 VDC
Rated current	136.4 mA	80.0 mA	67.8 mA	45.7 mA	32.8 mA	17.0 mA	11.3 mA	8.5 mA
Coil resistance	22.0 Ω	62.5 Ω	88.5 Ω	196.9 Ω	366.0 Ω	1,407.7 Ω	3,196.8 Ω	5,638.0 Ω
Must operate voltage	75% of rated voltage (max.)							
Must release voltage	10% of rated voltage (min.)							
Max. voltage	130% of rated voltage at 85°C, 170% of rated voltage at 23°C							
Power consumption	Approx. 400 mW							

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

600-mW Models

Rated voltage	3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	36 VDC	48 VDC
Rated current	200.2 mA	120.0 mA	100.7 mA	66.8 mA	50.4mA	25.3 mA	16.6 mA	12.6 mA
Coil resistance	15.0 Ω	41.7 Ω	59.6 Ω	134.8 Ω	237.9 Ω	947.6 Ω	2,164.8 Ω	3,800.0 Ω
Must operate voltage	75% of rated voltage (max.)							
Must release voltage	10% of rated voltage (min.)							
Max. voltage	130% of rated voltage at 85°C, 170% of rated voltage at 23°C							
Power consumption	Approx. 600 mW							

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Contact Ratings

Load	Resistive load (cos ϕ=1)
Rated load	10 A at 120 VAC, 8 A at 30 VDC, 10 A at 250 VAC
Rated carry current	10 A
Max. switching voltage	250 VAC, 125 VDC (30 VDC when UL/CSA standard is applied)
Max. switching current	AC: 10 A, DC: 8 A
Max. switching power	1,200 VA, 240 W, 2,500 VA
Failure rate (reference value)	100 mA at 5 VDC

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Approved Standards

UL325, UL873 (File No. E41643 Vol. 11 Sec. 6) and CSA C22.2 No. 14 (File No. LR31928)

Model	Coil rating	Contact rating
G5LB	3 to 48 VDC	10 A, 250 VAC (general use, 100,000 cycles) 10 A, 30 VDC (resistive load, 100,000 cycles)

EN61810-1 (2nd Ed) and EN60255-25 (VDE Reg. No. A662)

Model	Coil rating	Contact rating
G5LB	3, 5, 6, 9, 12, 24, 36, and 48 VDC	10 A 30 VDC (resistive load, 50,000 cycles) NO and Sealed: 10 A 250 VAC (general use, 25,000 cycles at 85°C) NO and Vent Hole: 10 A 250 VAC (general use, 50,000 cycles at 85°C) NC and Vent Hole: 10 A 250 VAC (general use, 25,000 cycles at 85°C)

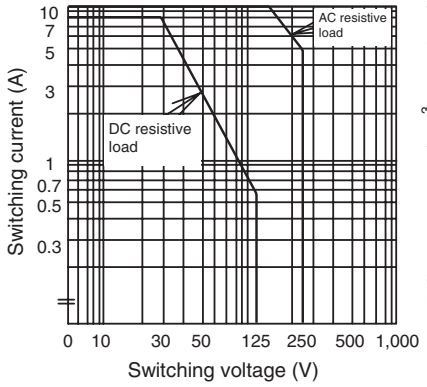
■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Max. switching frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	750 VAC, 50/60 Hz for 1 min. between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min. between coil and contacts
Impulse withstand voltage	4,500 V between coil and contacts, 1.2 × 50 μs
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 to 10 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100 G) Malfunction: 100 m/s^2 (approx. 10 G)
Endurance	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: ∗100,000 operations min. (at 1,800 operations/hr, 10 A, 120 VAC)
Ambient temperature	Operating: −40°C to 85°C
Ambient humidity	Operating: 35% to 85%
Weight	Approx.: 10 g

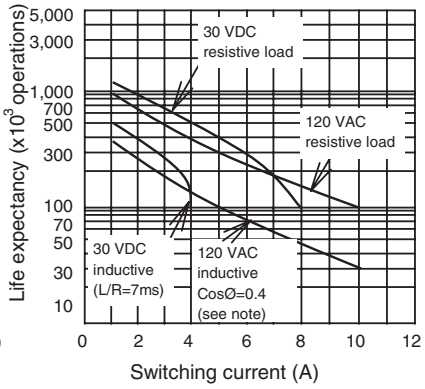
∗ G5LB-1

Engineering Data

Max. Switching Power, G5LB-1

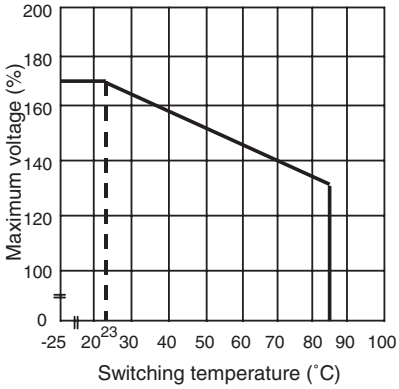


Endurance, G5LB-1



Note: Curve for 120 VAC, inductive load Cosϕ=0.4 is the same for 250 VAC, resistive load.

Ambient Temp. Vs Max. Voltage



Note: The maximum coil voltage is the maximum value in a varying range of operating power voltages not a continuous voltage.

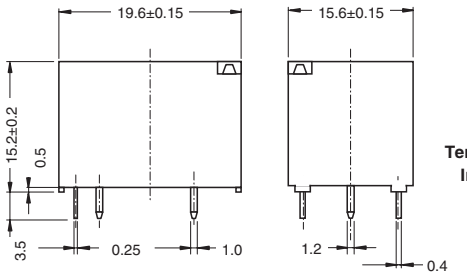
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

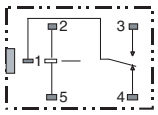
2. Orientation marks are indicated as follows:

■ SPDT Models

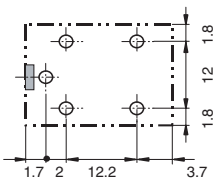
G5LB-1



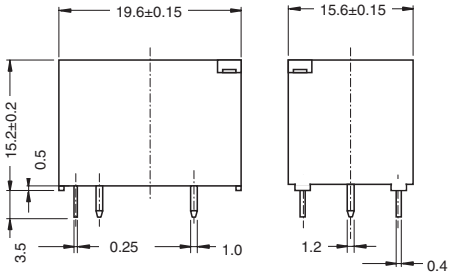
Terminal Arrangemment/ Internal Connections (Bottom View)



Mounting Holes (Bottom View) Tolerance: ±0.1mm

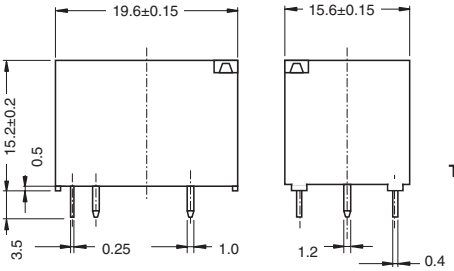


G5LB-14

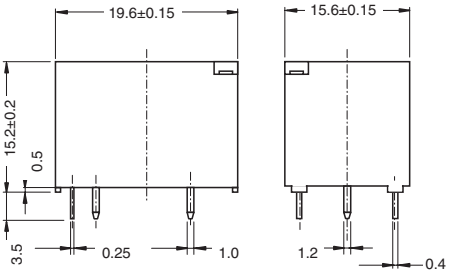


■ SPST Models

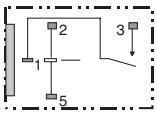
G5LB-1A



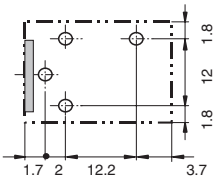
G5LB-1A4



Terminal Arrangemment/ Internal Connections (Bottom View)



Mounting Holes (Bottom View) Tolerance: ±0.1mm



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. k128-E1-02

OMRON

PCB Relay

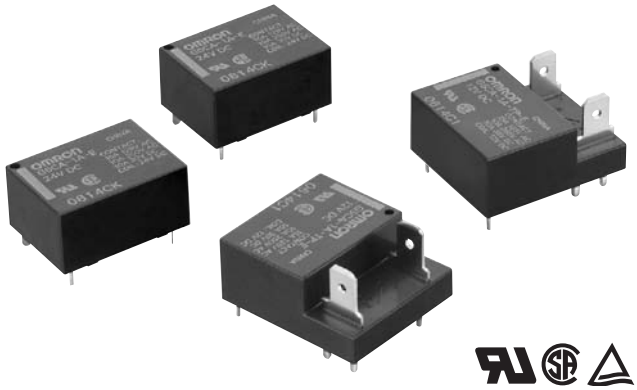
G5CA

Flat Relays that Switch 10-A/15-A Loads with New Quick-connect Terminals

- Ideal for switching power in household appliances or for outputs from industrial devices.
- Subminiature dimensions: 16 × 22 × 11 mm (L × W × H).
- High-sensitivity models available with low power consumption (150 mW).
- UL and CSA approved.
- Fully sealed models and quick-connect terminal models available (#187 load contact terminals).

RoHS Compliant

Refer to pages 16 to 17 for details.



Ordering Information

Model Number Legend

G5CA-1A □-□-□-□
1 2 3 4 5

1. **Number of Poles**
   1A: 1 pole (SPST-NO)
2. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
3. **Terminal form**
   None: PCB terminal
   TP: Quick-connect terminal (#187)
4. **Special functions**
   None: Standard
   E: High-capacity
5. **Coil consumption**
   None: Standard
   H: High-sensitivity

Standard Specifications

Contact Configuration: SPST-NO
Enclosure Ratings: Flux protection
Terminal form: PCB terminal

List of Models

Item		Standard		High-sensitivity		High-capacity		Quick-connect terminals (#187)	
Enclosure Ratings	Contact configuration	Rated coil voltage	Model	Rated coil voltage	Model	Rated coil voltage	Model	Rated coil voltage	Model
Flux protection	SPST-NO	5 VDC	G5CA-1A	5 VDC	G5CA-1A-H	5 VDC	G5CA-1A-E	5 VDC	G5CA-1A-TP-E
		12 VDC		12 VDC		12 VDC		12 VDC	
		24 VDC		24 VDC		24 VDC		24 VDC	
Fully sealed		5 VDC	G5CA-1A4	5 VDC	G5CA-1A4-H				
		12 VDC		12 VDC					
		24 VDC		24 VDC					

Note: 1. Contact your OMRON representative for details on other coil voltage specifications.
2. High-capacity models with a fully sealed structure are not available.
3. Standard or high-sensitivity models with quick-connect terminals are not available.

Specifications

■ Coil Ratings

Item	Standard, high-capacity, or quick-connect terminals			High-sensitivity		
	5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current	40 mA	16.7 mA	8.3 mA	30 mA	12.5 mA	6.25 mA
Coil resistance	125 Ω	720 Ω	2,880 Ω	167 Ω	960 Ω	3,840 Ω
Must-operate voltage	75% max. of rated voltage			80% max. of rated voltage		
Must-release voltage	10% min. of rated voltage					
Max. voltage	150% (standard)/130% (high-capacity, quick-connect terminals) of rated voltage (at 23°C)			150% (at 23°C)		
Power consumption	Approx. 200 mW			Approx. 150 mW		

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. The "maximum voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Item	Standard		High-sensitivity		High-capacity, or quick-connect terminals	
	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Contact form	Single					
Contact material	Silver alloy (cadmium-free)					
Rated load	10 A at 250 VAC; 10 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	10 A at 250 VAC; 10 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	15 A at 110 VAC; 10 A at 30 VDC	5 A at 110 VAC; 3 A at 30 VDC
Rated carry current	10 A		10 A		15 A	
Max. switching voltage	250 VAC, 125 VDC					
Max. switching current	10 A		10 A		15 A	
Max. switching power	2,500 VA, 300 W	750 VA, 90 W	2,500 VA, 300 W	750 VA, 90 W	2,500 VA, 300 W	750 VA, 90 W
Failure rate (Reference value)	5 VDC, 100 mA					

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance (See note 2.)	30 mΩ max. (Quick-connect terminals type: 100 mΩ max.)
Operate time (See note 3.)	10 ms max. (15 ms max.)
Release time	10 ms max.
Insulation resistance (See note 4.)	1,000 MΩ min.
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	4,500 V (1.2 x 50 μs)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	Mechanical: 20,000,000 operations min. at 18,000 operations/hr Electrical: 300,000 operations min. (100,000 operations min. for Fully sealed Type) at 1,200 operations/hr under resistive load of 10 A at 250 VAC; 100,000 operations min. under resistive load of 15 A at 110 VAC for high-capacity models 100,000 operations min. at 1,200 operations/hr under resistive load of 10 A at 30 VDC
Ambient temperature	Operating: −25°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 8 g (for TP model: Approx. 9.6 g)

Note: **1.** The data shown above are initial values.
2. Measurement conditions: 5 VDC, 1 A, voltage drop method.
3. Measurement conditions: The value in parentheses indicates the operate time for high-sensitivity types.
4. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

■ Approved Standards

• The following UL-, CSA-, and EN/TÜV-certifying ratings differ from the performance characteristics of the individual models.

UL Standard: UL508 (File No. E41515)

Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	3 to 100 VDC	15 A, 125 VAC (General purpose) 10 A, 250 VAC (General purpose) 15 A, 250 VAC (Resistive) 10 A, 30 VDC (Resistive)	100,000

CSA Standard: CSA C22.2 No.14 (File No. LR31928)

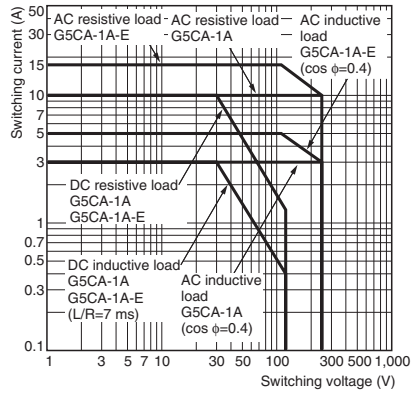
Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	3 to 100 VDC	15 A, 125 VAC (General purpose) 10 A, 250 VAC (General purpose) 15 A, 250 VAC (Resistive) 10 A, 30 VDC (Resistive)	100,000

EN Standard/TÜV Certificated: EN61810-1 (Certification No. R50030053)

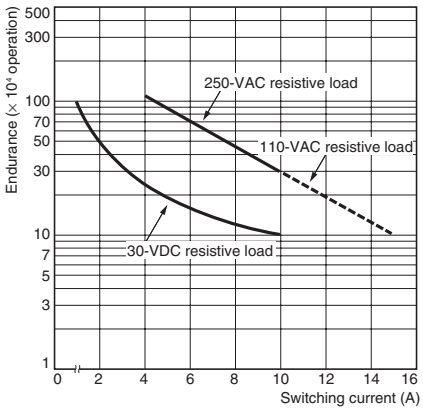
Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	3, 5, 6, 12, 24, 48 VDC	15 A, 125 VAC (cosϕ = 1.0)	100,000
			10 A, 250 VAC (cosϕ = 1.0)	
			10 A, 30 VDC (0 ms)	

Engineering Data

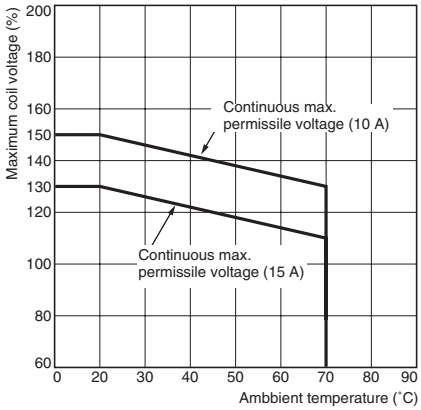
Maximum Switching Power



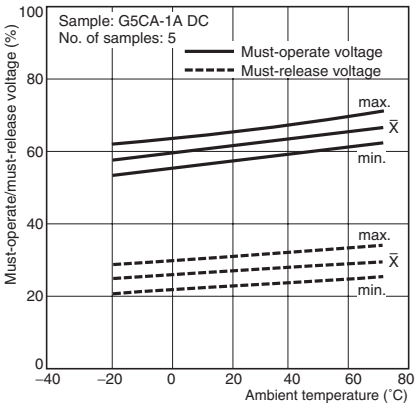
Endurance



Ambient Temperature vs. Maximum Coil Voltage

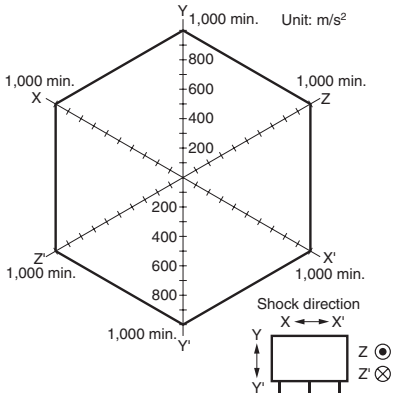


Operating Temperature vs. Must-operate/Must-release Voltage



Note: The "maximum voltage" is the maximum voltage that can be applied to the relay coil.

Malfunction Shock

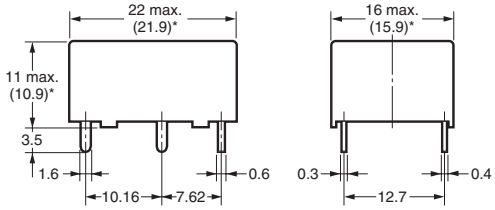


No. of samples: 10
Measured value: The value at which malfunction occurs in the contact when the contact is subjected to shock three times each in six directions for three axes.
Standard: 200 m/s²

Dimensions

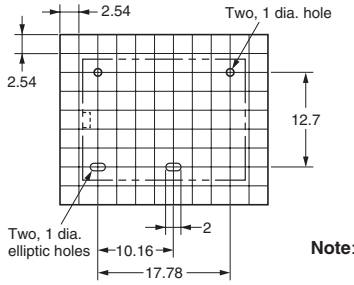
Note: All units are in millimeters unless otherwise indicated.

G5CA-1A(-E)
G5CA-1A4(-H)

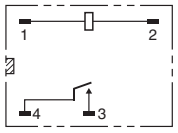


* Average value

Mounting Holes (PCB)
(BOTTOM VIEW)
Tolerance: ±0.1 mm



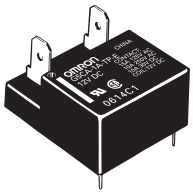
Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)

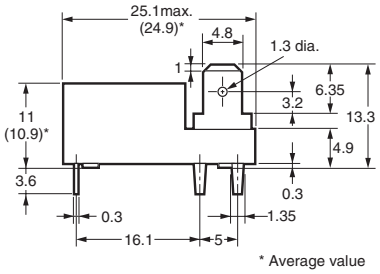


(No coil polarity)

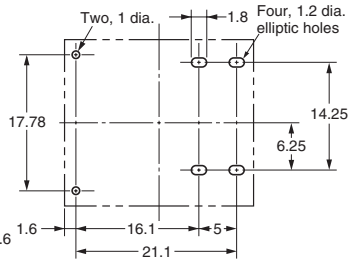
Note: Orientation marks are indicated as follows:

G5CA-1A-TP-E

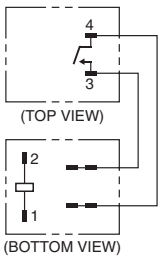




Mounting Holes
(BOTTOM VIEW)
Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)



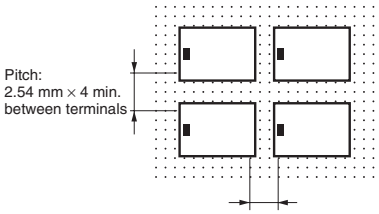
(No coil polarity)

Precautions

■ Precautions for Correct Use

Installation

Make sure that sufficient space is provided between relays when installing two or more relays side by side to facilitate heat dissipation. Insufficient heat dissipation may result in the relay malfunctioning.



Pitch: 2.54 mm × 3 min. between terminals

Quick-connect Terminal Connections

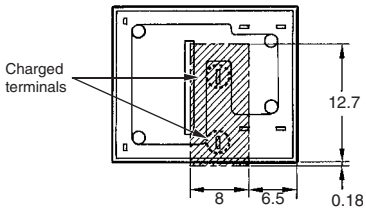
- Do not pass current through the PCB of the load contact terminals (quick-connect terminals).
- The terminals are compatible with Faston receptacle #187 and are suitable for positive-lock mounting.
  Use only Faston terminals with the specified numbers. Select leads for connecting Faston receptacles with wire diameters that are within the allowable range for the load current. Do not apply excessive force to the terminals when mounting or dismounting the Faston receptacle.
  Insert and remove terminals carefully one at a time. Do not insert terminals on an angle, or insert/remove multiple terminals at the same time.
  The following positive-lock connectors made by AMP are recommended. Contact the manufacturer directly for details on connectors including availability.

Type	Receptacle terminals (See note.)	Positive housing
#187 terminals (width: 4.75 mm)	AMP 170330-1 (170324-1) AMP 170331-1 (170325-1) AMP 170332-1 (170326-1)	AMP 172074-1 (natural color) AMP 172074-4 (yellow) AMP 172074-5 (green) AMP 172074-6 (blue)

Note: The numbers shown in parentheses are for air-feeding.

Charged Terminals

The section marked with dotted circles (indicated by arrows) in the following diagram includes the charged terminals of the relay. When the relay is mounted on a PCB, make sure that there are no metal patterns on the section of the PCB facing the portion of the relay shaded in the following diagram.



Other Precautions

- The G5CA is a power relay designed for applications switching power loads such as heaters in electric household appliances. Do not use the G5CA to switch micro loads less than 100 mA, such as in signal applications.
- Use fully sealed models if the relays will require washing. Flux-protection models may malfunction or the relay's performance may be otherwise adversely affected if cleaning fluid enters the relay.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J151-E1-02

OMRON

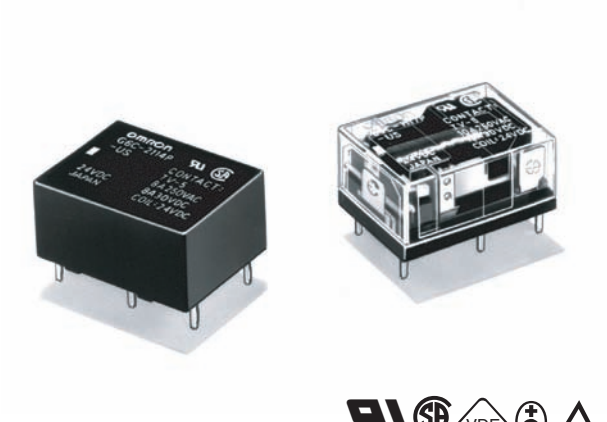
PCB Relay

G6C

SPST-NO Type Breaks 10-A Loads;
SPST-NO + SPST-NC Type
Breaks 8-A Load

- Compact: 20 × 15 × 10 mm (L × W × H).
- Low power consumption: 200 mW.
- Flux protection or fully sealed construction available.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce.
- Single- and double-winding latching types also available

RoHS Compliant



Ordering Information

Classification	Contact form	Straight PCB		Self-clinching PCB	
		Flux protection	Fully sealed	Flux protection	Fully sealed
Single-side stable	SPST-NO	G6C-1117P-US	G6C-1114P-US	G6C-1117C-US	G6C-1114C-US
	SPST-NO + SPST-NC	G6C-2117P-US	G6C-2114P-US	G6C-2117C-US	G6C-2114C-US
Single-winding latching	SPST-NO	G6CU-1117P-US	G6CU-1114P-US	G6CU-1117C-US	G6CU-1114C-US
	SPST-NO + SPST-NC	G6CU-2117P-US	G6CU-2114P-US	G6CU-2117C-US	G6CU-2114C-US
Double-winding latching	SPST-NO	G6CK-1117P-US	G6CK-1114P-US	G6CK-1117C-US	G6CK-1114C-US
	SPST-NO + SPST-NC	G6CK-2117P-US	G6CK-2114P-US	G6CK-2117C-US	G6CK-2114C-US

Note: When ordering, add the rated coil voltage to the model number.
Example: G6C-1117P-US 12 VDC
Rated coil voltage

Model Number Legend

G6C □ - □ □ □ □ - □ - □ □ VDC
1 2 3 4 5 6 7 8

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   11: SPST-NO
   21: SPST-NO + SPST-NC
3. **Contact Type**
   1: Standard
4. **Enclosure Ratings**
   4: Fully sealed
   7: Flux protection
5. **Terminals**
   P: Straight PCB
   C: Self-clinching PCB
6. **Approved Standards**
   US: UL/CSA certified
7. **Mounting**
   None: Mounted directly to PCB
   P6C: Mounted to Socket
8. **Rated Coil Voltage**
   3, 5, 6, 12, or 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable Relay	Back Connecting Socket (See note 1.)
G6C(U)-1114P-US-P6C G6C(U)-1117P-US-P6C G6C(U)-2114P-US-P6C G6C(U)-2117P-US-P6C	P6C-06P
G6CK-1114P-US-P6C G6CK-1117P-US-P6C G6CK-2114P-US-P6C G6CK-2117P-US-P6C	P6C-08P

Note: **1.** Not applicable to the self-clinching versions.
The operating current for the socket is 5 A max.
2. Use the G6C-□□□□P-US-P6C to mount to a P6C Socket.

Removal Tool	P6B-Y1
Hold-down Clips	P6B-C2

Specifications

■ Coil Ratings

Single-side Stable Type

Rated voltage		3 VDC	5 VDC	6 VDC	12 VDC	24 VDC
Rated current		67 mA	40 mA	33.3 mA	16.7 mA	8.3 mA
Coil resistance		45 Ω	125 Ω	180 Ω	720 Ω	2,880 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.078	0.22	0.36	1.32	4.96
	Armature ON	0.067	0.18	0.29	1.13	4.19
Must operate voltage		70% max. of rated voltage				
Must release voltage		10% min. of rated voltage				
Max. voltage		160% of rated voltage (at 23°C)				
Power consumption		Approx. 200 mW				

Single-winding Latching Type

Rated voltage		3 VDC	5 VDC	6 VDC	12 VDC	24 VDC
Rated current		67 mA	40 mA	33.3 mA	16.7 mA	8.3 mA
Coil resistance		45 Ω	125 Ω	180 Ω	720 Ω	2,880 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.09	0.25	0.36	1.75	5.83
	Armature ON	0.06	0.20	0.24	1.17	3.84
Must operate voltage		70% max. of rated voltage				
Must release voltage		70% min. of rated voltage				
Max. voltage		160% of rated voltage (at 23°C)				
Power consumption		Approx. 200 mW				

Double-winding Latching Type

Rated voltage			3 VDC	5 VDC	6 VDC	12 VDC	24 VDC
Set coil	Rated current		93.5 mA	56.0 mA	46.7 mA	23.3 mA	11.7 mA
	Coil resistance		32.1 Ω	89.3 Ω	129 Ω	514 Ω	2,056 Ω
	Coil inductance (H) (ref. value)	Armature OFF	0.03	0.07	0.10	0.37	1.56
		Armature ON	0.02	0.06	0.08	0.32	1.18
Reset coil	Rated current		93.5 mA	56.0 mA	46.7 mA	23.3 mA	11.7 mA
	Coil resistance		32.1 Ω	89.3 Ω	129 Ω	514 Ω	2,056 Ω
	Coil inductance (H) (ref. value)	Armature OFF	0.03	0.08	0.12	0.47	1.46
		Armature ON	0.02	0.07	0.10	0.38	1.13
Must set voltage			70% max. of rated voltage				
Must reset voltage			70% min. of rated voltage				
Max. voltage			130% of rated voltage (at 23°C)				
Power consumption			Set coil: Approx. 280 mW Reset coil: Approx. 280 mW				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The minimum pulse width of the set and reset voltage is 20 ms.

■ Contact Ratings

Item	SPST-NO		SPST-NO+SPST-NC	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	8 A at 250 VAC; 8A at 30 VDC	3.5 A at 250 VAC; 3.5 A at 30 VDC
Contact material	Ag Alloy (Cd free)			
Rated carry current	10 A		8 A	
Max. switching voltage	380 VAC, 125 VDC (the case of latching 250 VAC, 125 VDC)			
Max. switching current	10 A		8 A	
Max. switching power	2,500 VA, 300 W	1,250 VA, 220 W	2,000 VA, 240 W	875 VA, 170 W
Failure rate (reference value)	10 mA at 5 VDC			

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance	30 mΩ max.
Operate (set) time	10 ms max. (mean value: approx. 5 ms)
Release (reset) time	10 ms max. (mean value: approx. 2 ms; latching types: mean value: approx. 5 ms)
Bounce time	Operate: 5 ms max. Release: 5 ms max.
Min. set/reset signal width	Latching type: 20 ms (at 23°C)
Max. switching frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC, at 250 VDC between set coil and reset coil)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contacts 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between set and reset coils (double winding latching type)
Impulse withstand voltage	6.000 V (1.2 x 50 μs) between coil and contacts (latching types: 4,500 V, 1.2 50 μs)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Ambient temperature	Operating: −25°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Endurance	Mechanical: 50,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)
Weight	Approx. 5.6 g

■ Approved Standards

UL508 (File No. E41643)

Model	Contact form	Coil rating	Contact rating
G6C-1114P-US **G6C-1114C-US** **G6C-1117P-US** **G6C-1117C-US**	SPST-NO	3 to 60 VDC	10 A, 250 VAC (general use) 10 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC 1/3 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten) 530 VA, 20 to 265 VAC, 2 A max. (pilot duty) 43.2 VA, 30 VDC (pilot duty) 12LRA, 2.2FLA, 30 VDC (30,000 cycle)
G6C-2114P-US **G6C-2114C–US** **G6C-2117P-US** **G6C-2117C-US**	SPST-NO + SPST-NC		8 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten) 530 VA, 20 to 265 VAC, 2 A max. (pilot duty) 43.2 VA, 30 VDC (pilot duty) 12LRA, 2.2FLA, 30 VDC (30,000 cycle)

CSA C22.2 No.14 (File No. LR31928)

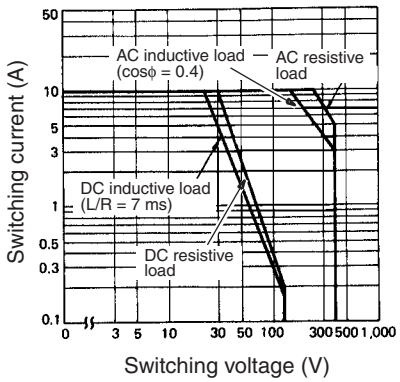
Model	Contact form	Coil rating	Contact rating
G6C-1114P-US **G6C-1114C-US** **G6C-1117P-US** **G6C-1117C-US**	SPST-NO	3 to 60 VDC	10 A, 250 VAC (general use) 10 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC 1/3 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten)
G6C-2114P-US **G6C-2114C-US** **G6C-2117P-US** **G6C-2117C-US**	SPST-NO + SPST-NC	3 to 60 VDC	8 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten)

VDE (Approval No. 2413) EN61810-1

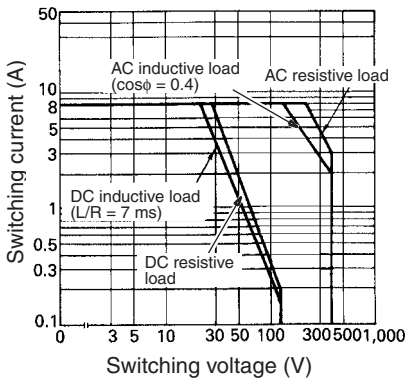
Model	Contact form	Coil rating	Contact rating	Number of test operations
G6C-1114P-US **G6C-1114C-US** **G6C-1117P-US** **G6C-1117C-US**	SPST-NO	3, 12, 24 VDC	10 A, 250 VAC ($\cos\phi$ = 1) 5 A, 250 VAC ($\cos\phi$ = 0.4)	100,000 operations
G6C-2114P-US **G6C-2114C-US** **G6C-2117P-US** **G6C-2117C-US**	SPST-NO + SPST-NC	Single-stable: 3, 5, 12, 24 VDC Latching: 5 VDC G6CU-2117P-VD: 3 VDC	7 A, 250 VAC ($\cos\phi$ = 1) 3.5 A, 250 VAC ($\cos\phi$ = 0.4)	100,000 operations

Engineering Data

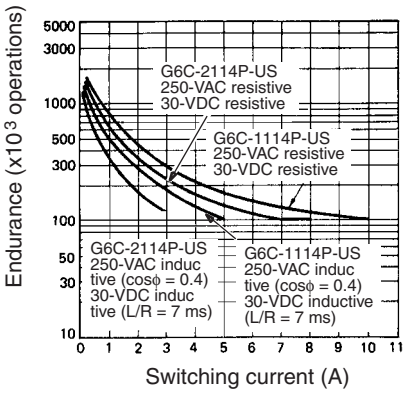
Maximum Switching Power
SPST-NO



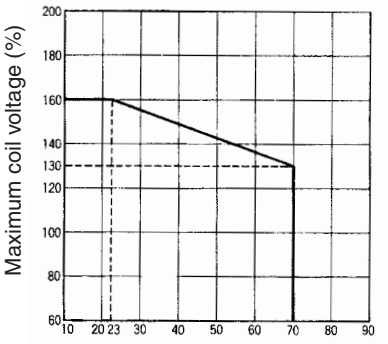
SPST-NO + SPST-NC



Endurance



Ambient Temperature vs. Maximum Coil Voltage



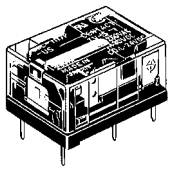
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

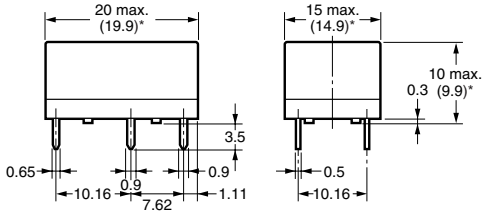
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

2. Orientation mark is indicated as follows: □

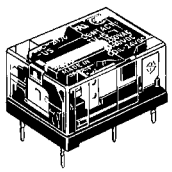
G6C-□117P-US

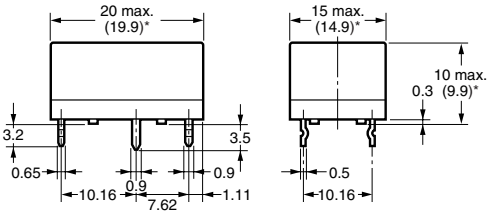




*Average value

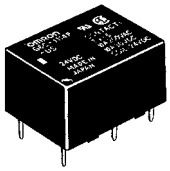
G6C-□117C-US

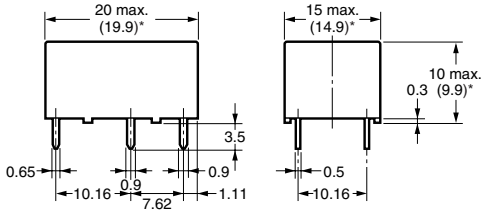




*Average value

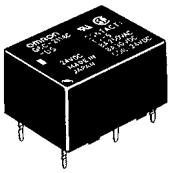
G6C-□114P-US

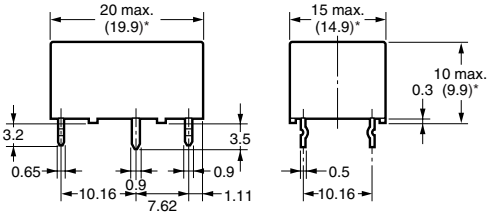




*Average value

G6C-□114C-US

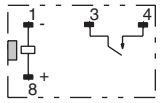




*Average value

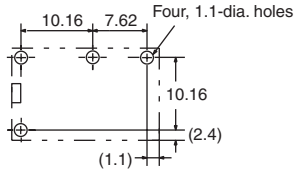
G6C-1117P-US, G6C-1117C-US
G6C-1114P-US, G6C-1114C-US

Terminal Arrangement/Internal Connections (Bottom View)



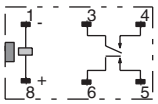
Mounting Holes (Bottom View)

Tolerance: ±0.1



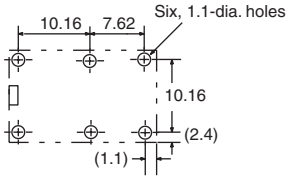
G6C-2117P-US, G6C-2117C-US
G6C-2114P-US, G6C-2114C-US

Terminal Arrangement/Internal Connections (Bottom View)

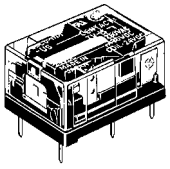


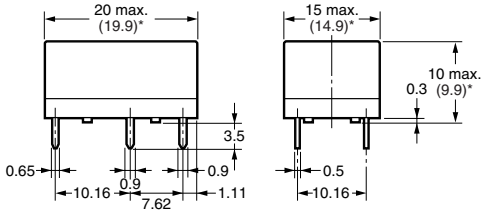
Mounting Holes (Bottom View)

Tolerance: ±0.1



G6CU-□117P-US

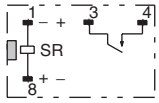




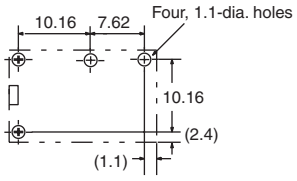
*Average value

G6CU-1117P-US, G6CU-1117C-US
G6CU-1114P-US, G6CU-1114C-US

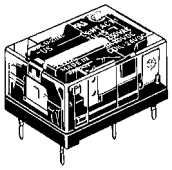
Terminal Arrangement/Internal Connections (Bottom View)

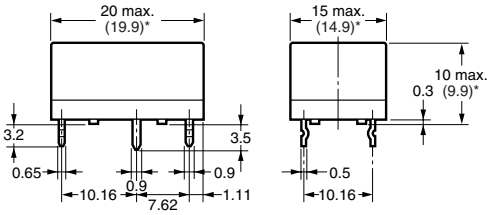


Mounting Holes (Bottom View)



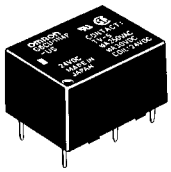
G6CU-□117C-US

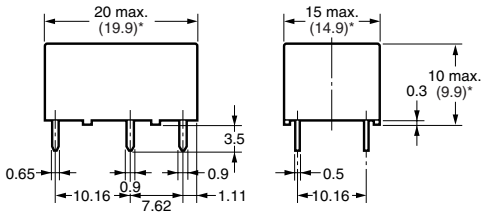




*Average value

G6CU-□114P-US

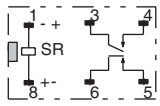




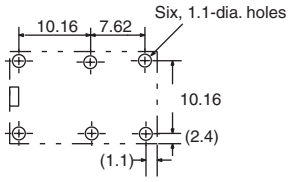
*Average value

G6CU-2117P-US, G6CU-2117C-US
G6CU-2114P-US, G6CU-2114C-US

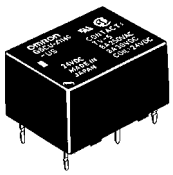
Terminal Arrangement/Internal Connections (Bottom View)

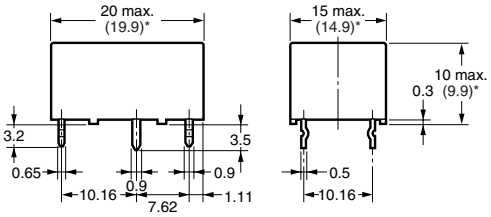


Mounting Holes (Bottom View)



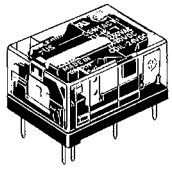
G6CU-□114C-US

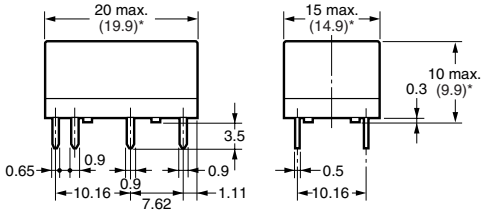




*Average value

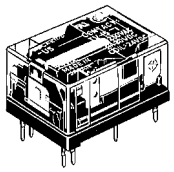
G6CK-□117P-US

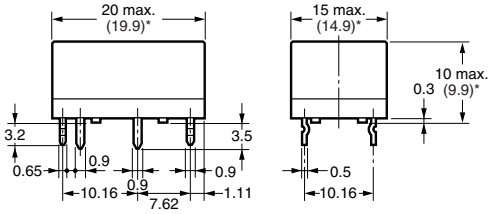




*Average value

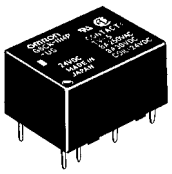
G6CK-□117C-US

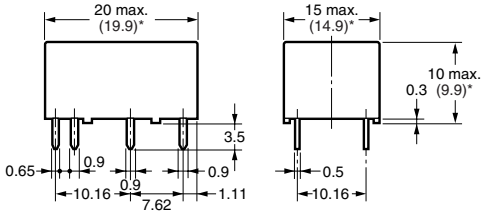




*Average value

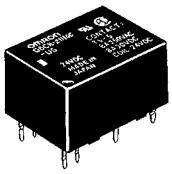
G6CK-□114P-US

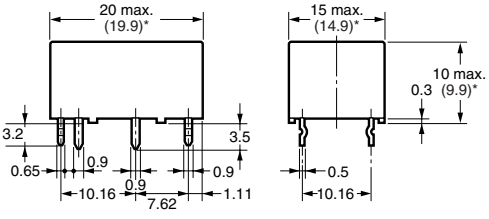




*Average value

G6CK-□114C-US

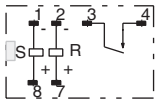




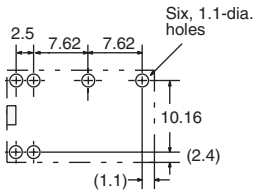
*Average value

G6CK-1117P-US, G6CK-1117C-US
G6CK-1114P-US, G6CK-1114C-US

Terminal Arrangement/Internal Connections (Bottom View)

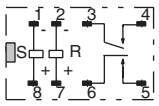


Mounting Holes (Bottom View)

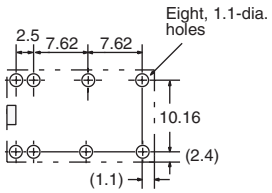


G6CK-2117P-US, G6CK-2117C-US
G6CK-2114P-US, G6CK-2114C-US

Terminal Arrangement/Internal Connections (Bottom View)

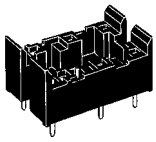


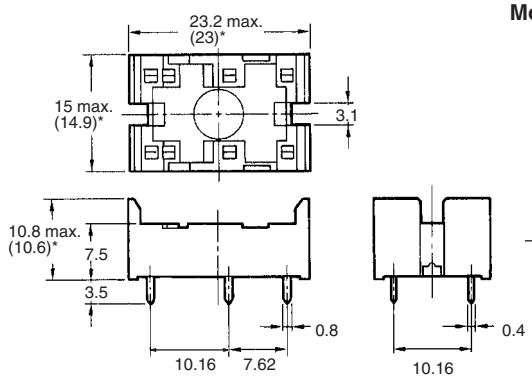
Mounting Holes (Bottom View)



Back Connecting Sockets

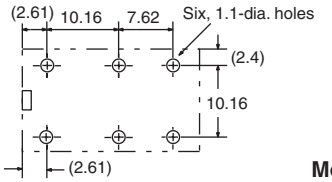
P6C-06P



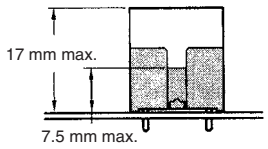


*Average value

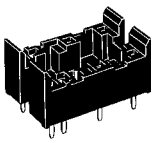
Mounting Holes (Bottom View)

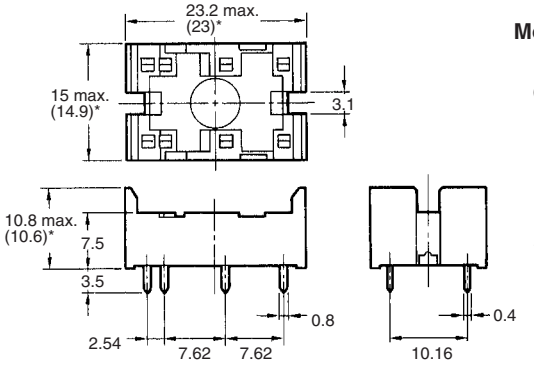


Mounting Height of Relay with Connecting Socket



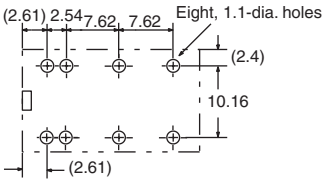
P6C-08P





*Average value

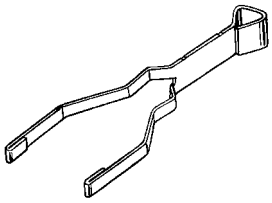
Mounting Holes (Bottom View)



Note: Rated current of socket max. 5 A

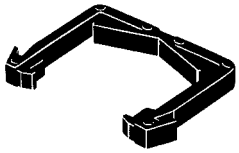
Removal Tool

P6B-Y1



Hold-down Clips

P6B-C2



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K018-E1-06

OMRON

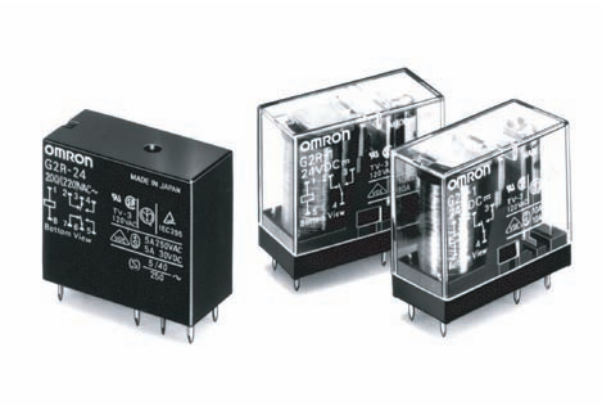
PCB Relay

G2R

A Power Relay for a Variety of Purposes with Various Models

- Conforms to VDE (EN61810-1), UL508, CSA22.2.
- Meets EN60335-1 requirements for household products.
- Clearance and creepage distance: 8 mm/8 m.
- Models with CTI250 material available.
- High-sensitivity (360 mW) and high-capacity (16 A) types available.
- Double-winding latching type available.

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification		Enclosure ratings	Coil ratings	Contact form			
				SPST-NO	SPDT	DPST-NO	DPDT
PCB terminal	General-purpose	Flux protection	AC/DC	G2R-1A	G2R-1	G2R-2A	G2R-2
		Fully sealed		G2R-1A4	G2R-14	G2R-2A4	G2R-24
	Bifurcated contact	Flux protection	DC	G2R-1AZ	G2R-1Z	---	---
		Fully sealed		G2R-1AZ4	G2R-1Z4	---	---
	High-capacity	Flux protection	AC/DC	G2R-1A-E	G2R-1-E	---	---
	High-sensitivity	Flux protection	DC	G2R-1A-H	G2R-1-H	G2R-2A-H	G2R-2-H
	Double-winding latching	Flux protection		G2RK-1A	G2RK-1	G2RK-2A	G2RK-2
Quick-connect (upper bracket mounting)	General-purpose	Unsealed	AC	G2R-1A-T	G2R-1-T	---	---
			DC				

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G2R-1A 12 VDC
Rated coil voltage

2. Models with CTI250 material are also available.
Contact your OMRON representative for more details.

Model Number Legend

G2R □-□ □ □ □ □- □ □-□ □ VDC (VAC)

1 2 3 4 5 6 7 8 9

1. Relay Function

None: Single-side stable
K: Double-winding latching.

2. Number of Poles

1: 1 pole
2: 2 poles

3. Contact Form

None: □PDT
A: □PST-NO

4. Contact Type

None: Single
Z: Bifurcated

5. Enclosure Ratings

None: Flux protection
4: Fully sealed

6. Terminals

None: Straight PCB
T: Quick-connect (upper bracket mounting)

7. Classification

None: General-purpose
E: High-capacity
H: High-sensitivity

8. Safety standards

None: UL/CSA/VDE/SEV/TÜV
SKVD: UL/CSA/VDE/SEV/TÜV/SEMKO

9. Rated Coil Voltage

Refer to *Coil Ratings*.

Specifications

■ Coil Ratings

Rated voltage		12 VAC	24 VAC	100/ (110) VAC	120 VAC	200/ (220) VAC	220 VAC	230 VAC	240 VAC
Rated current	**50 Hz**	93 mA	46.5 mA	11 mA	9.3 mA	5.5 mA	5.1 mA	4.7 mA	4.7 mA
	60 Hz	75 mA	37.5 mA	9/ (10.6) mA	7.5 mA	4.5 (5.3) mA	4.1 mA	3.8 mA	3.8 mA
Coil resistance		65 Ω	260 Ω	4,600 Ω	6,500 Ω	20,200 Ω	25,000 Ω	26,850 Ω	30,000 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.19	0.81	13.34	21	51.3	57.5	62	65.5
	Armature ON	0.39	1.55	26.84	42	102	117	124	131
Must operate voltage		80% max. of rated voltage							
Must release voltage		30% min. of rated voltage							
Max. voltage		140% of rated voltage (at 23°C)							
Power consumption		Approx. 0.9 VA at 60 Hz (approx. 0.7 VA at 60 Hz)							

Rated voltage		5 VDC	6 VDC	12 VDC	24 VDC	48 VDC	100 VDC
Rated current (50/60 Hz)		106 mA	88.2 mA	43.6 mA	21.8 mA	11.5 mA	5.3 mA
Coil resistance		47 Ω	68 Ω	275 Ω	1,100 Ω	4,170 Ω	18,860 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.20	0.28	1.15	4.27	13.86	67.2
	Armature ON	0.39	0.55	2.29	8.55	27.71	93.2
Must operate voltage		70% max. of rated voltage					
Must release voltage		15% min. of rated voltage					
Max. voltage		170% of rated voltage (at 23°C)					
Power consumption		Approx. 0.53 W					

High-sensitivity Relays

Rated voltage		5 VDC	6 VDC	12 VDC	24 VDC	48 VDC
Rated current (50/60 Hz) (See note 1.)		71.4 mA	60 mA	30 mA	15 mA	7.5 mA
Coil resistance (See note 1.)		70 Ω	100 Ω	400 Ω	1,600 Ω	6,400 Ω
Coil inductance (H) (ref. value)	Armature OFF	0.37	0.53	2.14	7.80	31.20
	Armature ON	0.75	1.07	4.27	15.60	62.40
Must operate voltage		70% max. of rated voltage				
Must release voltage		15% min. of rated voltage				
Max. voltage		170% of rated voltage (at 23°C)				
Power consumption		Approx. 0.36 W				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of $^{+15\%}/_{-20\%}$ (AC rated current) or ±10% (DC coil resistance).
2. Operating characteristics are measured at a coil temperature of 23°C.
3. Depending on the type of Relay, some Relays do not have coil specifications. Contact your OMRON representative for more details.

Double-winding Latching Relays

Rated voltage			5 VDC	6 VDC	12 VDC	24 VDC
Set coil	Rated current (See note 1.)		167 mA	138 mA	70.6 mA	34.6 mA
	Coil resistance (See note 1.)		30 Ω	43.5 Ω	170 Ω	694 Ω
	Coil inductance (H) (ref. value)	Armature OFF	0.073	0.104	0.42	1.74
		Armature ON	0.146	0.208	0.83	3.43
Reset coil	Rated current		119 mA	100 mA	50 mA	25 mA
	Coil resistance		42 Ω	60 Ω	240 Ω	960 Ω
	Coil inductance (H) (ref. value)	Armature OFF	0.003	0.005	0.018	0.079
		Armature ON	0.006	0.009	0.036	0.148
Must set voltage			70% max. of rated voltage			
Must reset voltage			70% max. of rated voltage			
Max. voltage			140% of rated voltage (at 23°C)			
Power consumption			Set coil: Approx. 850 mW; Reset coil: Approx. 600 mW			

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Contact Ratings

PCB/Flux Protection, Quick-connect Terminal Relays

Item	General-purpose, quick-connect terminal				High-capacity	
Number of poles	1 pole		2 poles		1 pole	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10 A at 30 VDC	7.5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC	16 A at 250 VAC; 16 A at 30 VDC	8 A at 250 VAC; 8 A at 30 VDC
Rated carry current	10 A		5 A		16 A	
Max. switching voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	10 A		5 A		16 A	
Max. switching power	2,500 VA, 300 W	1,875 VA, 150 W	1,250 VA, 150 W	500 VA, 90 W	4,000 VA, 480 W	2,000 VA, 240 W
Failure rate (reference value)	100 mA at 5 VDC		10 mA at 5 VDC		100 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

PCB/Flux Protection Relays

Item	Bifurcated contacts		High-sensitivity			
Number of poles	1 pole		1 pole		2 poles	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	1 A at 250 VAC; 1.5 A at 30 VDC
Rated carry current	5 A		5 A		3 A	
Max. switching voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	5 A		5 A		3 A	
Max. switching power	1,250 VA, 150 W	500 VA, 90 W	1,250 VA, 150 W	500 VA, 90 W	750 VA, 90 W	250 VA, 45 W
Failure rate (reference value)	1 mA at 5 VDC		100 mA at 5 VDC		10 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

PCB/Fully sealed Relays

Item	General-purpose (single contact)				Bifurcated contact	
Number of poles	1 pole		2 poles		1 pole	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	8 A at 250 VAC; 8 A at 30 VDC	6 A at 250 VAC; 4 A at 30 VDC	4 A at 250 VAC; 4 A at 30 VDC	1.5 A at 250 VAC; 2.5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC
Rated carry current	8 A		4 A		5 A	
Max. switching voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	8 A		4 A		5 A	
Max. switching power	2,000 VA, 240 W	1,500 VA, 120 W	1,000 VA, 120 W	375 VA, 75 W	1,250 VA, 150 W	500 VA, 90 W
Failure rate (reference value)	100 mA at 5 VDC		10 mA at 5 VDC		1 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

Latching Relays

Number of poles	1 pole		2 poles	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	5 A at 250 VAC; 5 A at 30 VDC	3.5 A at 250 VAC; 2.5 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	1.5 A at 250 VAC; 2 A at 30 VDC
Rated carry current	5 A		3 A	
Max. switching voltage	380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	5 A		3 A	
Max. switching power	1,250 VA, 150 W	875 VA, 75 W	750 VA, 90 W	375 VA, 60 W
Failure rate (reference value)	100 mA at 5 VDC		10 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Standard Relays

Item	1 pole	2 poles
Contact resistance	30 mΩ max. (high-capacity type: 100 mΩ max.)	50 mΩ max.
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max.	
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	5,000 VAC, 50/60 Hz for 1 min between coil and contacts 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2 when energized; 100m/s^2 when no energized	
Endurance	Mechanical: AC coil: 10,000,000 operations min.; DC coil: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load)	
Ambient temperature	Operating: –40°C to 70°C (with no icing)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 17 g	

Note: Values in the above table are the initial values.

Double-winding Latching Relays

Item	1 pole	2 poles
Contact resistance	30 mΩ max.	50 mΩ max.
Set time	20 ms max.	
Reset time	20 ms max.	
Min. set/reset signal width	30 ms max.	
Max. operating frequency	Mechanical:18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same pole; 1,000 VAC, 50/60 Hz for 1 min between set and reset coil	5,000 VAC, 50/60 Hz for 1 min between coil and contacts 3,000 VAC, 50/60 Hz for 1 min between contacts of different poles 1,000 VAC, 50/60 Hz for 1 min between contacts of same pole 1,000 VAC, 50/60 Hz for 1 min between set and reset coil
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: Set: 500 m/s^2 (approx. 50G); 200m/s^2 (approx. 20G) Reset: 100 m/s^2 (approx. 10G)	
Endurance	Mechanical:10,000,000 operations min (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load)	
Ambient temperature	Operating: –40°C to 70°C (with no icing)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 17 g (Quick-connect type: approx. 20 g)	

Note: Values in the above table are the initial values.

■ Approved Standards

UL 508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings
G2R-1 G2R-14 G2R-1-H G2R-1-T	SPDT	3 to 110 VDC 3 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)
G2R-1A G2R-1A4 G2R-1A-H G2R-1A-T	SPST-NO		
G2R-1-E	SPDT		16 A, 30 VDC (resistive, NO contact only) 16 A, 250 VAC (general use, NO contact only) TV-3 (NO contact only); 1/3 hp, 120 VAC
G2R-1A-E	SPST-NO		
G2R-2 G2R-24 G2R-2-H	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)
G2R-2A G2R-2A4 G2R-2A-H	DPST-NO		
G2R-1A-ASI	SPST-NO		10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-5/TV-8 (NO contact only)

CSA 22.2 No.0, No.14 (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings
G2R-1 G2R-14 G2R-1-H G2R-1-T	SPDT	3 to 110 VDC 3 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) T-3 (NO contact only)
G2R-1A G2R-1A4 G2R-1A-H G2R-1A-T	SPST-NO		
G2R-1-E	SPDT		16 A, 30 VDC (resistive, N.O only) 16 A, 250 VAC (general use, NO contact only) TV-3 (NO contact only)
G2R-1A-E	SPST-NO		
G2R-2 G2R-24 G2R-2-H	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)
G2R-2A G2R-2A4 G2R-2A-H	DPST-NO		
G2R-1A-ASI	SPST-NO		10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-8 (NO contact only); 1/4 hp, 125 VAC

SEV

Contact form	Coil ratings	Contact ratings
1 pole	3 to 110 VDC 3 to 240 VAC	16 A, 250 VAC1 (AgSnIn contact) 16 A, 30 VDC1 (AgSnIn contact) 10 A, 250 VAC1 5 A, 250 VAC3 10 A, 30 VDC1
2 poles	3 to 110 VDC 3 to 240 VAC	5 A, 250 VAC1 2 A, 380 VAC1 5 A, 30 VDC1

SEMKO

Contact form	Coil ratings	Contact ratings
1 pole	3 to 110 VDC 6 to 240 VAC	10/80 A, 250 VAC 3/100 A, 250 VAC 16/128 A, 250 VAC (AgSnIn contact)
2 poles		5/40 A, 250 VAC

TÜV (EN61810-1)

Contact form	Coil ratings	Contact ratings
1 pole	3 to 110 VDC, 6 VAC to 240 VAC (for Standard coil) 3 to 48 VDC (for K, U coil) 3 to 70 VDC (for H coil)	10 A, 250 VAC (cosϕ = 1.0) 10 A, 30 VDC (0 ms) 16 A, 250 VAC (cosϕ = 1.0) (AgSnIn contact)
2 poles		8 A, 250 VAC (cosϕ = 0.4) 5 A, 250 VAC (cosϕ =1.0) 5 A, 30 VDC (0 ms) 2.5 A, 250 VAC (cosϕ = 0.4)

VDE (EN61810-1), IMQ

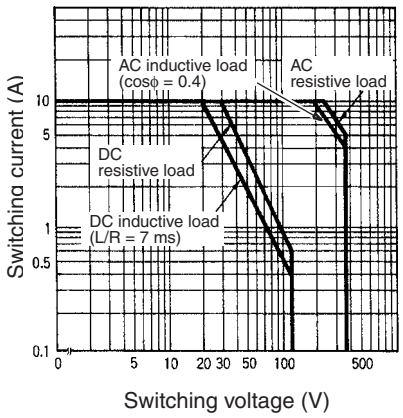
Contact form	Coil ratings	Contact ratings
1 pole	5, 6, 9, 12, 18, 24, 48, 60, 100, 110 VDC 12, 18, 24, 48, 50, 100/(110), 110, 120, 200/(220), 220, 230, 240 VAC	10 A, 250 VAC (cosϕ = 1.0) 10 A, 30 VDC (0 ms) 16 A, 250 VAC (cosϕ = 1.0)
2 poles	5, 6, 9, 12, 18, 24, 48, 60, 100, 110 VDC 12, 18, 24, 48, 50, 100/(110), 110, 120, 200/(220), 220, 230, 240 VAC	5 A, 250 VAC (cosϕ =1.0) 5 A, 30 VDC (0 ms)

Engineering Data

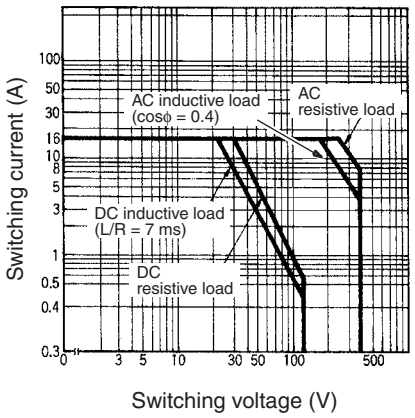
Maximum Switching Power

Flux Protection/Plug-in Relays

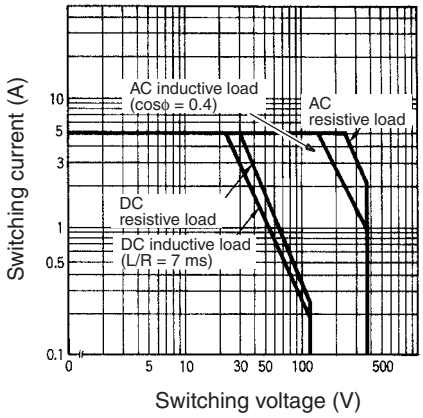
G2R-1, G2R-1A, G2R-1-T, G2R-1A-T



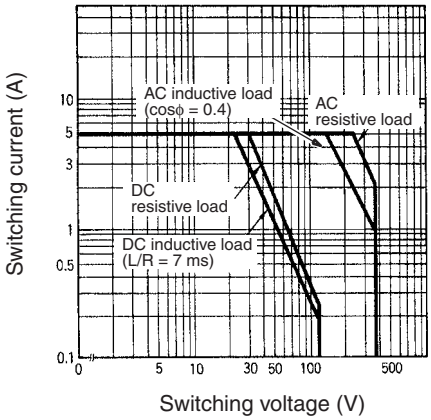
G2R-1-E, G2R-1A-E



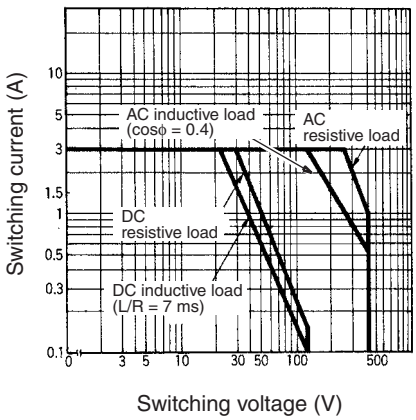
G2R-1Z, G2R-1AZ



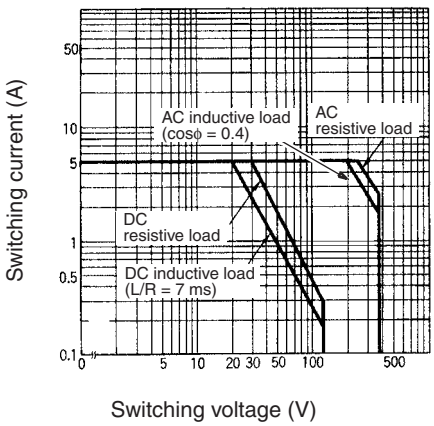
G2R-1-H, G2R-1A-H, G2R-2
G2R-2A



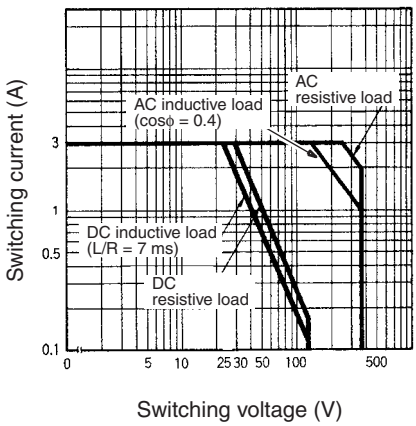
G2R-2-H, G2R-2A-H



G2RK-1A, G2RK-1

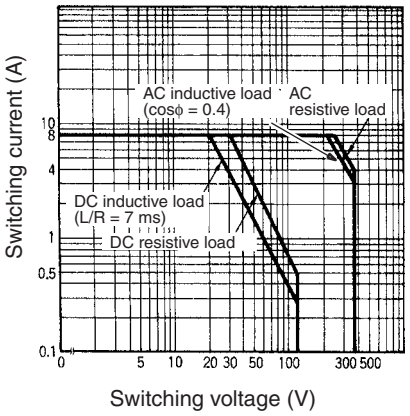


G2RK-2A, G2RK-2

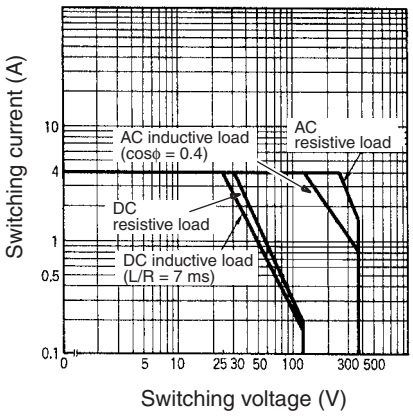


Fully Sealed Relays

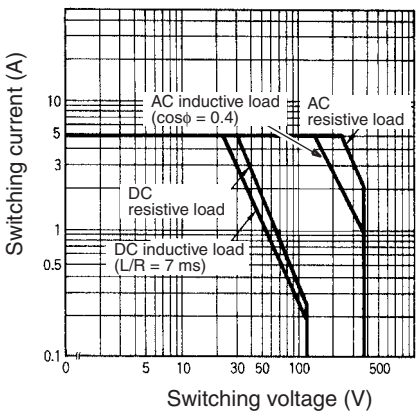
G2R-14, G2R-1A4



G2R-24, G2R-2A4



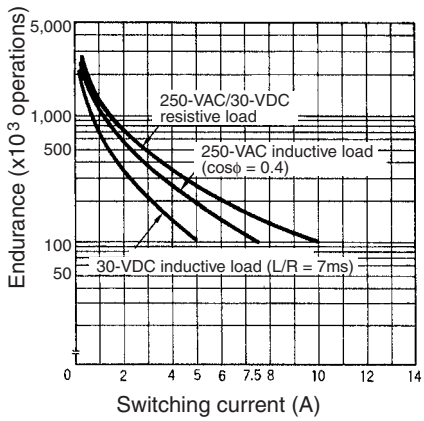
G2R-1Z4, G2R-1AZ4



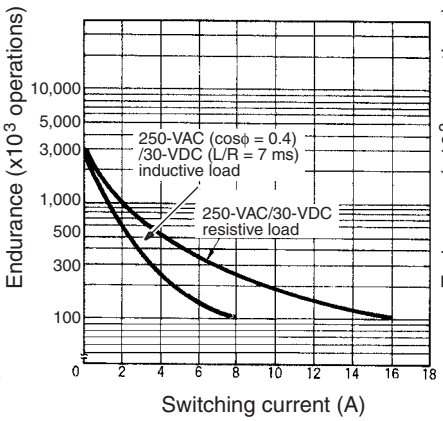
Endurance

Flux Protection/Plug-in Relays

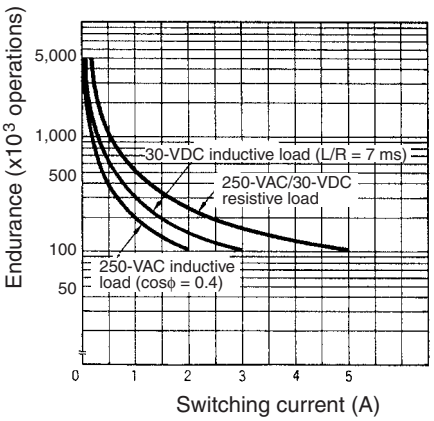
G2R-1, G2R-1A, G2R-1-T, G2R-1A-T



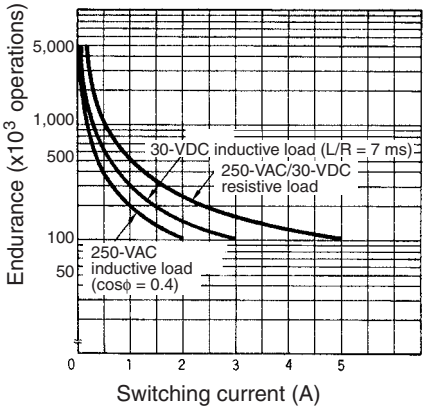
G2R-1-E, G2R-1A-E



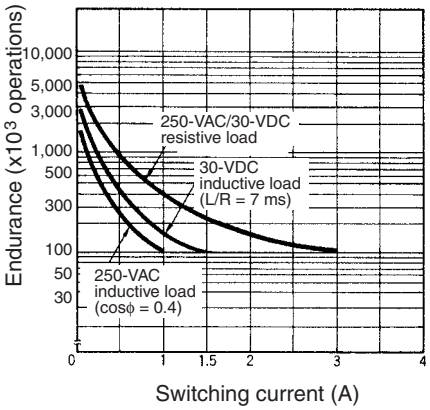
G2R-1Z, G2R-1AZ



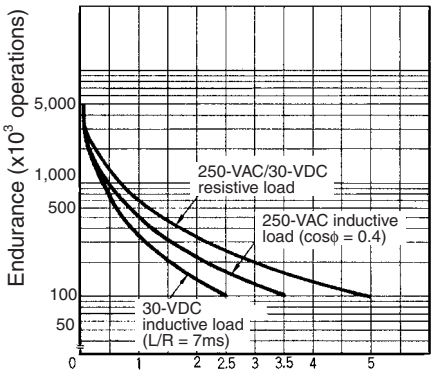
G2R-1-H, G2R-1A-H, G2R-2 G2R-2A



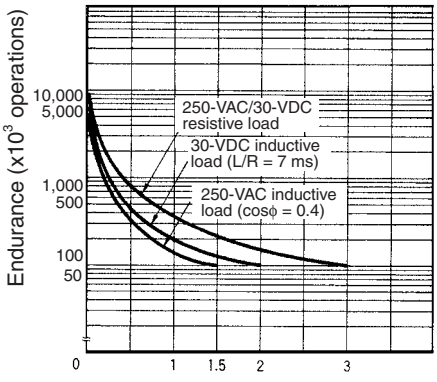
G2R-2-H, G2R-2A-H



G2RK-1A, G2RK-1

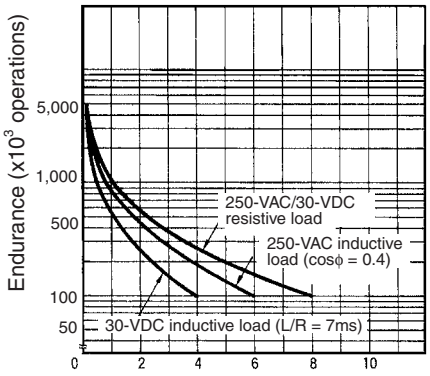


G2RK-2A, G2RK-2

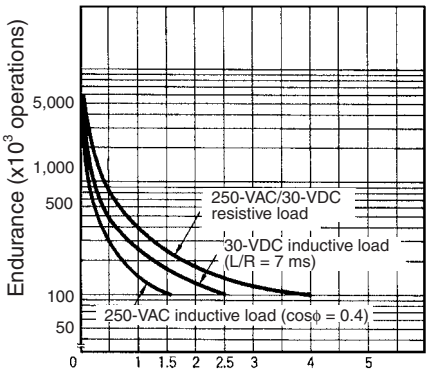


Fully sealed Relays

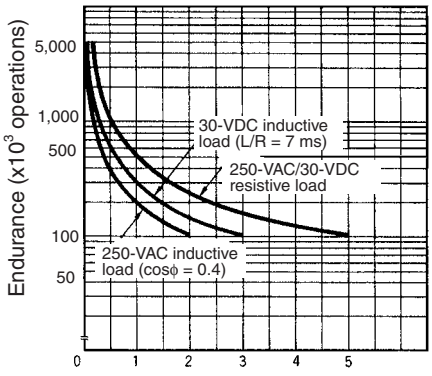
G2R-14, G2R-1A4



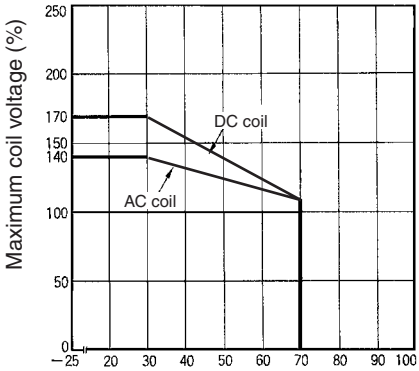
G2R-24, G2R-2A4



G2R-1Z4, G2R-1AZ4



Ambient Temperature vs Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

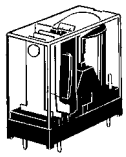
Dimensions

Note: **1.** All units are in millimeters unless otherwise indicated.

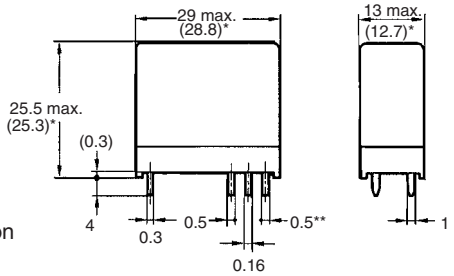
2. Orientation marks are indicated as follows:

Relays with PCB Terminals

SPDT Relays
G2R-1, G2R-1Z, G2R-1-H

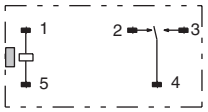


The illustration shows the G2R-1.



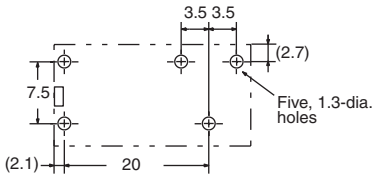
*Average value
**0.3 (-H Type)

Terminal Arrangement/ Internal Connections (Bottom View)



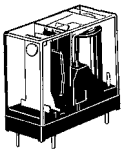
Mounting Holes (Bottom View)

Tolerance: ±0.1

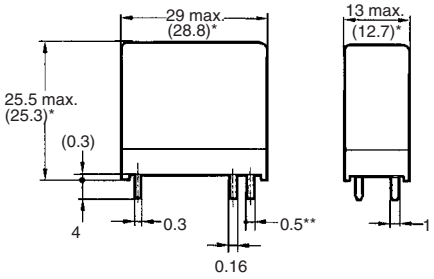


(No coil polarity)

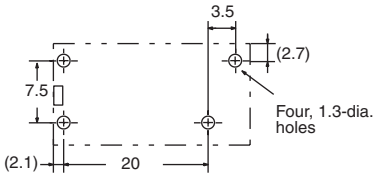
SPST-NO Relays
G2R-1A, G2R-1AZ, G2R-1A-H



The illustration shows the G2R-1A.

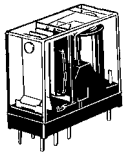


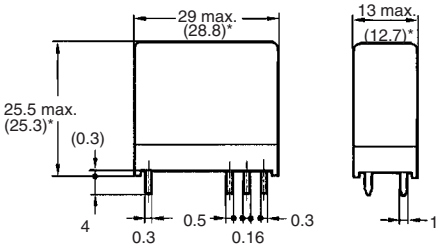
*Average value
**0.3 (-H Type)



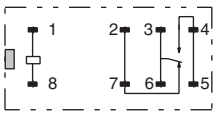
(No coil polarity)

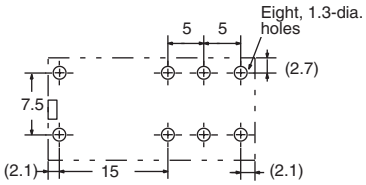
SPDT/High-capacity Relays
G2R-1-E





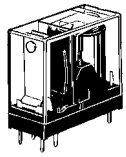
*Average value

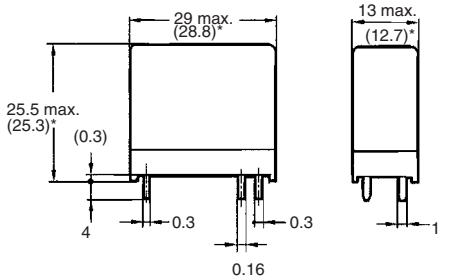




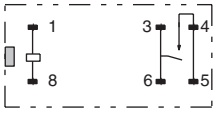
(No coil polarity)

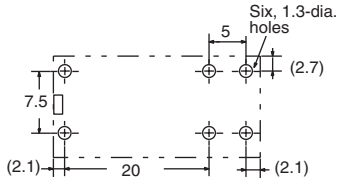
SPST-NO/High-capacity Relays
G2R-1A-E





*Average value

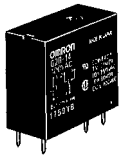


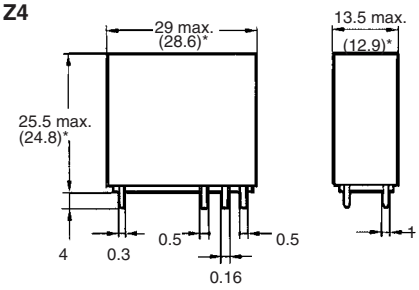


(No coil polarity)

Relays with PCB Terminals

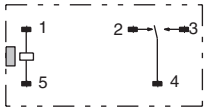
SPDT Relays
G2R-14, G2R-1Z4





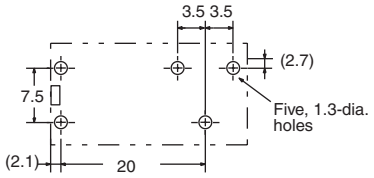
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



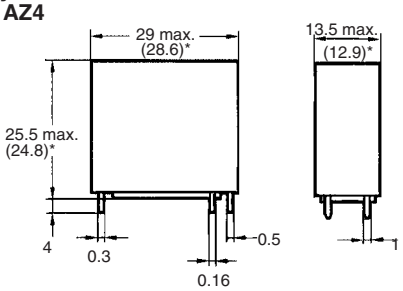
Mounting Holes (Bottom View)

Tolerance: ±0.1

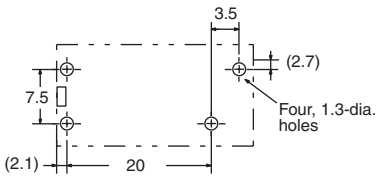


(No coil polarity)

SPST-NO Relays
G2R-1A4, G2R-1AZ4



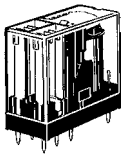
*Average value

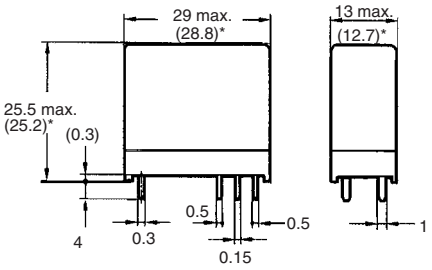


(No coil polarity)

Relays with PCB Terminals

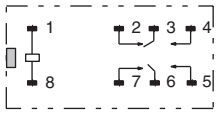
DPDT Relays
G2R-2, G2R-2-H





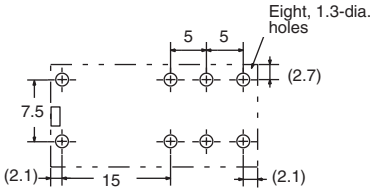
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



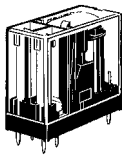
Mounting Holes (Bottom View)

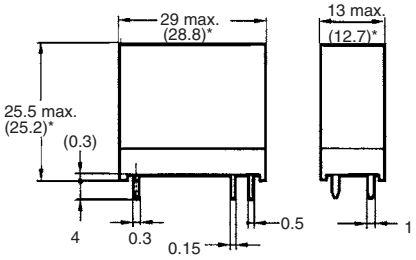
Tolerance: ±0.1



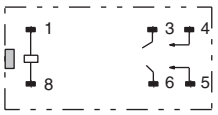
(No coil polarity)

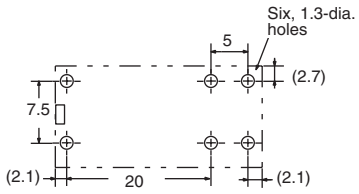
DPST-NO Relays
G2R-2A, G2R-2A-H





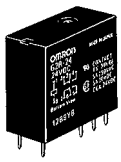
*Average value

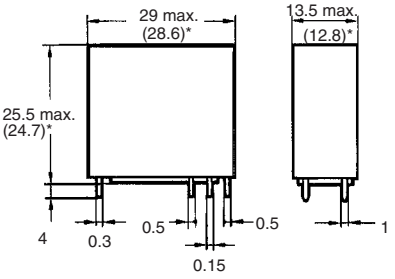




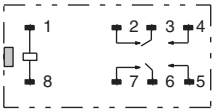
(No coil polarity)

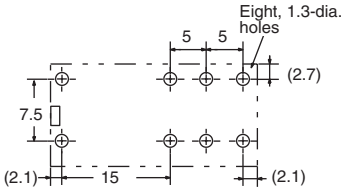
DPDT Relays
G2R-24





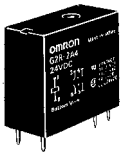
*Average value

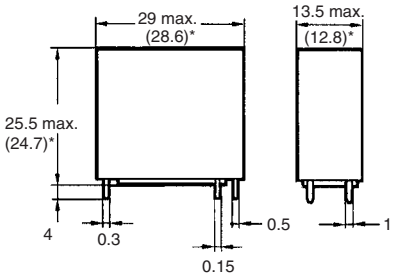




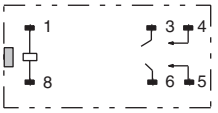
(No coil polarity)

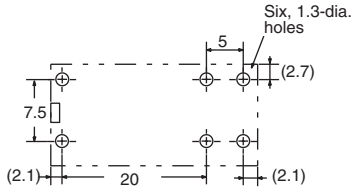
DPST-NO Relays
G2R-2A4





*Average value

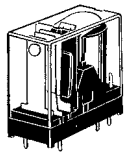


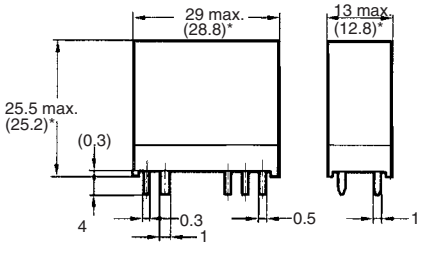


(No coil polarity)

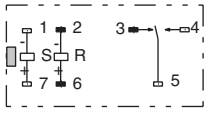
Double-winding Latching Relays with PCB Terminals

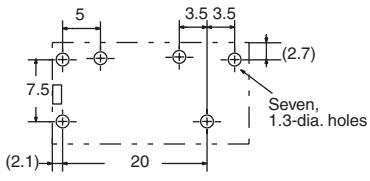
SPDT Relays
G2RK-1





*Average value

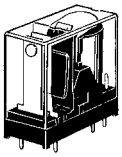


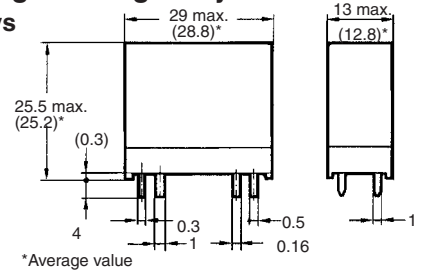


(After confirming coil polarity, wire correctly.)

Double-winding Latching Relays with PCB Terminals

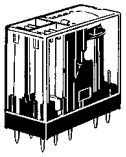
SPST-NO Relays
G2RK-1A

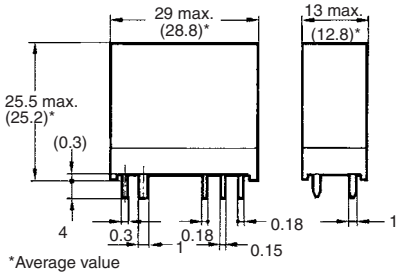




*Average value

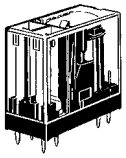
DPDT Relays
G2RK-2

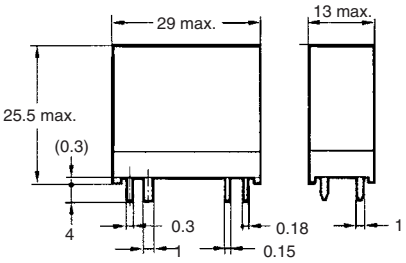




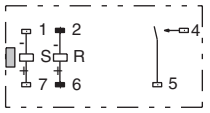
*Average value

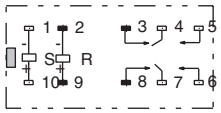
DPST-NO Relays
G2RK-2A

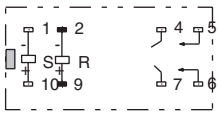




Terminal Arrangement/ Internal Connections (Bottom View)

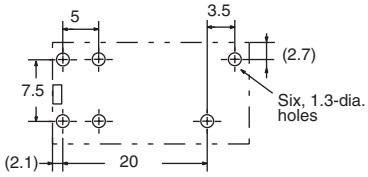




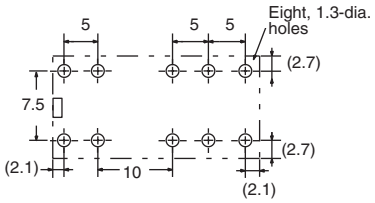


Mounting Holes (Bottom View)

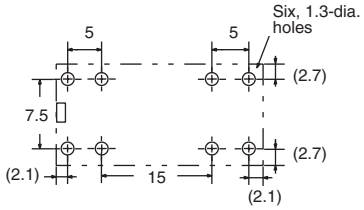
Tolerance: ±0.1



(After confirming coil polarity, wire correctly.)



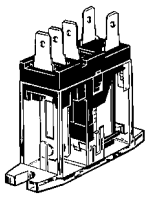
(After confirming coil polarity, wire correctly.)

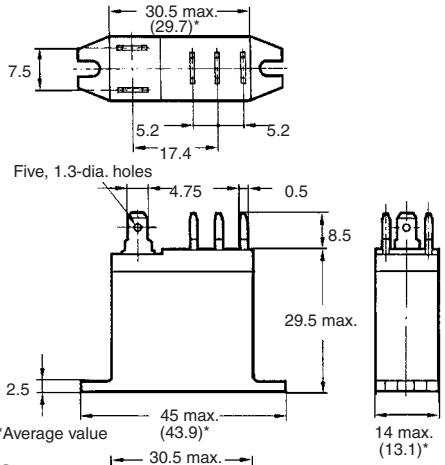


(After confirming coil polarity, wire correctly.)

Relays with Quick-connect Terminals

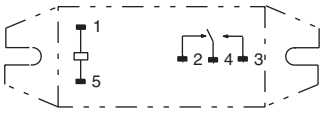
SPDT Relays
G2R-1-T





*Average value

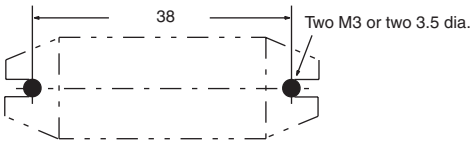
Terminal Arrangement/Internal Connections (Bottom View)



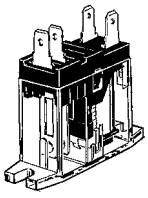
(No coil polarity)

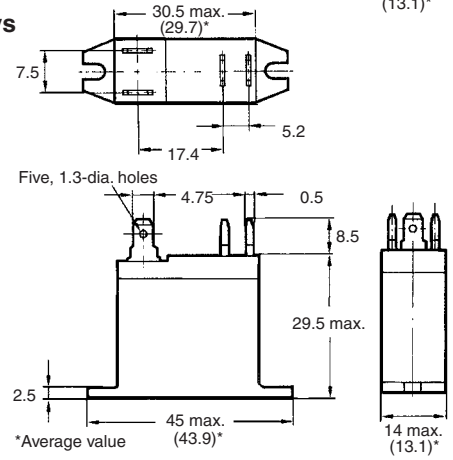
Mounting Holes (Bottom View)

Tolerance: ±0.1



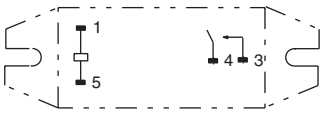
SPST-NO Relays
G2R-1A-T





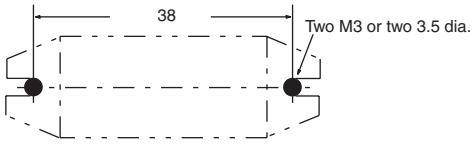
*Average value

Terminal Arrangement/Internal Connections (Bottom View)



(No coil polarity)

Mounting Holes (Bottom View)

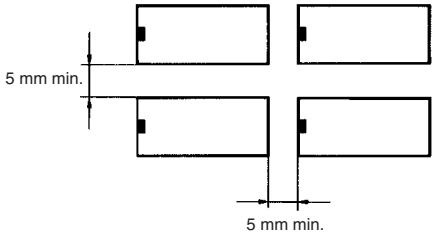


Note: Model number of quick-connect terminal is 187.

Precautions

■ Mounting

When mounting a number of relays on a PCB, be sure to provide a minimum mounting space of 5 mm between the two juxtaposed relays as shown below.



The above minimum mounting space is necessary due to mutual thermal interference generated by the relays. This restriction may be ignored, however, depending on the operating conditions of the relays. Consult OMRON for details.

There is no restriction on the mounting direction of each relay on the PCB.

When using this circuit, confirm the set and reset states and then take into account the circuit constant.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K013-E1-12

OMRON

PCB Relay

G2RG

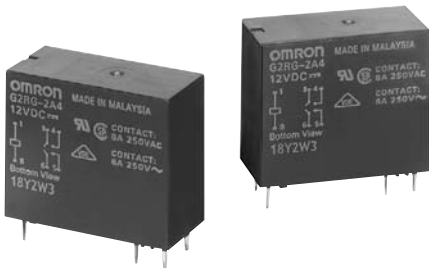
Power Relay with 1.5-mm Contact Gap

- Clearance between contact terminals of the same polarity: 1.5 mm min.
- Meets the requirements of European UPS standards.

Note: UPS: Uninterruptible power systems.

- Conforms to EN61810-1, UL508, CSA22.2.
- Tracking resistance: CTI > 250 V.

RoHS Compliant Refer to pages 16 to 17 for details.



Model Number Structure

■ Model Number Legend

G2RG-□□□
1 2 3

1. **Number of Poles**
   2: 2 poles
2. **Contact Form**
   A: N.O. contact
3. **Protective Structure**
   4: Plastic sealing

Ordering Information

Contact form	Rated coil voltage	Model number
DPST-NO	12 VDC 24 VDC	G2RG-2A4

Specifications

■ Coil Ratings

Rated voltage	Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Maximum allowable voltage	Power consumption
12 VDC	66.6 mA	180 Ω	80% max.	10% min.	140% (at 23°C)	Approx. 800 mW
24 VDC	33.3 mA	720 Ω				

Note 1. The rated current and coil resistance are for a coil temperature of 23°C and have a tolerance of ±10%.
2. The operating characteristics given in the above table are for a coil temperature of 23°C.
3. The maximum allowable voltage is the maximum possible value of the voltage that can be applied to the relay coil.

■ Contact Ratings

Load	Resistive load
Contact material	Ag alloy (Cd free)
Rated load	250 VAC, 8 A
Rated carry current	8 A
Maximum switching voltage	380 VAC, 125 VDC
Maximum switching current	8 A
Failure rate (reference value)	5 VDC, 10 mA

Note: P level: $\lambda 60 = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance (See note 1.)		100 mΩ max.
Operate time		15 ms max.
Release time		5 ms max.
Max. switching frequency	**Mechanical**	18,000 operations/hr
	Electrical	1,800 operations/hr (under rated load)
Insulation resistance (See note 2.)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		5,000 VAC, 50/60 Hz for 1 min between coil and contacts 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of the same polarity
Impulse withstand voltage		10 kV (1.2 × 50 μs)
Vibration resistance	**Destruction**	10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
	Malfunction	10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	**Destruction**	1,000 m/s^2
	Malfunction	200 m/s^2 when energized
Endurance	**Mechanical**	1,000,000 operations min. (at 18,000 operations/hr)
	Electrical	10,000 operations min. (at 1,800 operations/hr under rated load)
Ambient operating temperature		−40 to 70 °C (with no icing or condensation)
Ambient operating humidity		5% to 85%
Weight		Approx. 17.2 g

Note 1. The above values are initial values (at an ambient temperature of 23°C.)

2. Measurement conditions: 5 VDC, 1 A, voltage-drop method.

3. Measurement conditions: Measured with a 500-VDC megohmmeter at the same places as the dielectric strength.

■ Approved Standards

The approved rated values for international standards are different to the individually specified characteristic values. Be sure to confirm that required standards are satisfied before actual use.

UL508 (File No. E41643)

Model	Contact form	Coil rating	Contact rating
G2RG-2A4	DPST-NO	12 to 24 VDC	8 A, 250 VAC (general use)

CSA C22.2 No. 14 (File No. LR31928)

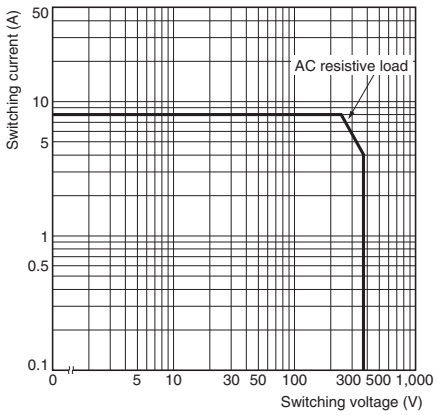
Model	Contact form	Coil rating	Contact rating
G2RG-2A4	DPST-NO	12 to 24 VDC	8 A, 250 VAC (general use)

VDE (EN61810-1)

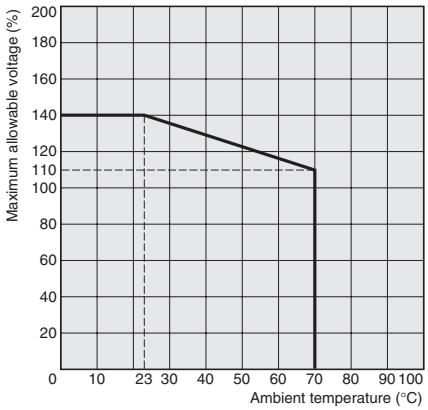
Model	Contact form	Coil rating	Contact rating
G2RG-2A4	DPST-NO	12, 24 VDC	8 A, 250 VAC ($\cos\phi = 1$)

Engineering Data

Maximum Switching Capacity



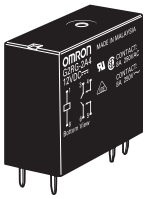
Ambient Temperature vs Maximum Allowable Voltage

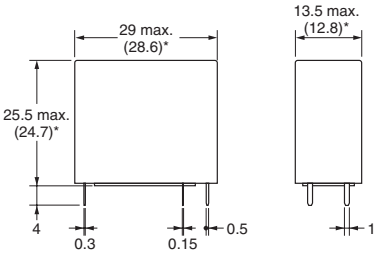


Note: The maximum allowable voltage is the maximum possible value of the voltage that can be applied to the relay coil.

Dimensions

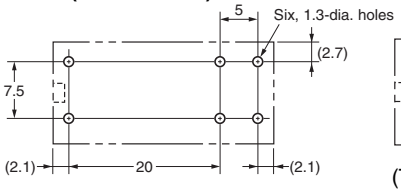
G2RG-2A4



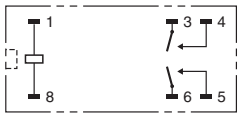


*Figures in parentheses indicate average values.

PCB Mounting Holes (Bottom View)



Terminal Arrangement/ Internal Connections (Bottom View)



(The coil has no polarity.)

Precautions

■ Correct Use

Differences with the G2R

The G2RG-2A4 has the same terminal arrangement as the G2R-2A4 but the switching capacity and electrical endurance are different. Confirm that correct operation is possible in the actual operating conditions before using in applications.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J142-E1-02

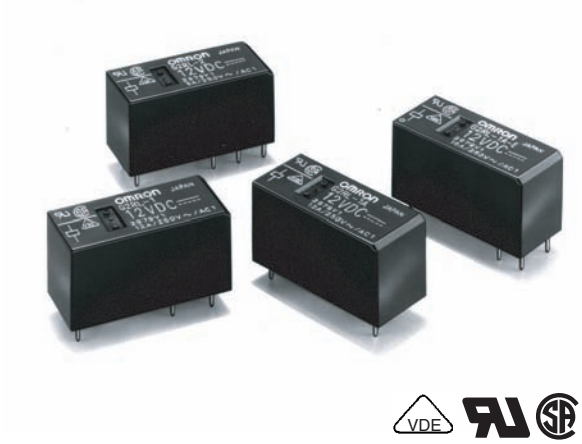
OMRON

PCB Relay

G2RL

Next-generation PCB Relay Available in 24 Models

- Low profile: 15.7 mm max. in height
- Conforms to VDE (EN61810-1), UL508 and CSA22.2.
- Meets EN60335-1 requirements for household products.
- Clearance and creepage distance: 10 mm/10 mm.
- Tracking resistance: CTI>250
  (Both standard and class F type)
- Coil Insulation system: Class F (UL1446)
- High sensitivity: 400 mW



RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification		Enclosure ratings	Contact form			
			SPST-NO	SPDT	DPST-NO	DPDT
Standard	General-purpose	Flux protection	G2RL-1A	G2RL-1	G2RL-2A	G2RL-2
		Fully sealed	G2RL-1A4	G2RL-14	G2RL-2A4	G2RL-24
	High-capacity	Flux protection	G2RL-1A-E	G2RL-1-E	---	---
		Fully sealed	G2RL-1A4-E	G2RL-14-E	---	---

Note: When ordering, add the rated coil voltage to the model number.
Example: G2RL-1A 12 VDC
Rated coil voltage

Model Number Legend

G2RL-□□□-□-□
1 2 3 4 5

1. **Number of Poles**
   1: 1 pole
   2: 2 poles
2. **Contact Form**
   None: □PDT
   A: □PST-NO
3. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
4. **Classification**
   None: General purpose
   E: High capacity (1 pole)
5. **Approved Standards**
   None: UL, CSA, VDE, UL Class B Insulation

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	80.0 mA	33.3 mA	16.7 mA	8.96 mA
Coil resistance	62.5 Ω	360 Ω	1,440 Ω	5,358 Ω
Must operate voltage	70% max. of the rated voltage			
Must release voltage	10% min. of the rated voltage			
Max. voltage	180% of rated voltage (at 23°C)			
Power consumption	Approx. 400 mW			Approx. 430 mW

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Contact Ratings

Number of poles	1 pole	2 poles
Contact material	$AgSnO_2$	AgNi
Load	Resistive load (cosϕ=1)	Resistive load (cosϕ=1)
Rated load	12 A (16 A) at 250 VAC 12 A (16 A) at 24 VDC (See note 2.)	8 A at 250 VAC 8 A at 30 VDC (See note 2.)
Rated carry current	12 A (16 A) (See note 2.)	8 A (70°C)/5 A (85°C) (See note 2.)
Max. switching voltage	440 VAC, 300 VDC	
Max. switching current	12 A (16 A)	8 A
Max. switching power	3,000 VA (4,000 VA)	2,000 VA

Note: 1. Values in parentheses are those for the high-capacity model.

2. Contact your OMRON representative for the ratings on fully sealed models.

■ Characteristics

Item	1 pole	2 poles
Contact resistance	100 mΩ max.	
Operate (set) time	15 ms max. (Approx. 7 ms typical)	
Release (reset) time	5 ms max. (Approx. 2 ms typical)	
Max. operating frequency	Mechanical:18,000 operation/hr Electrical:1,800 operation/hr at rated load	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of same polarity	5,000 VAC, 1 min between coil and contacts 2,500 VAC, 1 min between contacts of different polarity 1,000 VAC, 1 min between contacts of same polarity
Impulse withstand voltage	10 kV (1.2×50 μs) between coil and contact	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: Energized: 100 m/s^2 Not energized: 100 m/s^2	
Endurance (Mechanical)	20,000,000 operations (at 18,000 operations/hr)	
Ambient temperature	Operating: –40°C to 85°C (with no icing) Storage: –40°C to 85°C (with no icing)	
Ambient humidity	5% to 85%	
Weight	Approx. 12 g	

Note: Values in the above table are the initial values.

■ Approved Standards

UL508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings
G2RL-1A	SPST-NO	3 to 48 VDC	12 A at 250 VAC (General use) 12 A at 24 VDC (Resistive)
G2RL-1	SPDT		
G2RL-1A-E	SPST-NO (High capacity)		16 A at 250 VAC (General use) 16 A at 24 VDC (Resistive)
G2RL-1-E	SPDT (High capacity)		
G2RL-2A	DPST-NO		8 A at 277 VAC (General use) 8 A at 30 VDC (Resistive)
G2RL-2	DPDT		

CSA C22.2 (No. 14) (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings
G2RL-1A	SPST-NO	3 to 48 VDC	12 A at 250 VAC (General use) 12 A at 24 VDC (Resistive)
G2RL-1	SPDT		
G2RL-1A-E	SPST-NO (High capacity)		16 A at 250 VAC (General use) 16 A at 24 VDC (Resistive)
G2RL-1-E	SPDT (High capacity)		
G2RL-2A	DPST-NO		8 A at 277 VAC (General use) 8 A at 30 VDC (Resistive)
G2RL-2	DPDT		

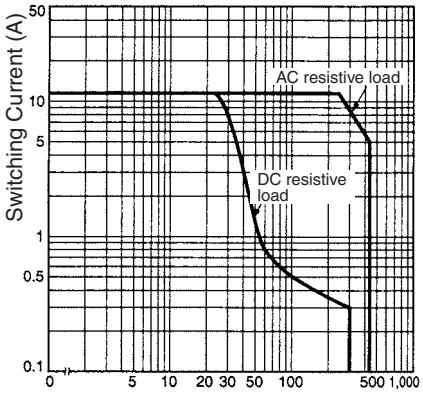
VDE (EN61810-1) (Licence No. 119650)

Model	Contact form	Coil ratings	Contact ratings
G2RL	1 pole	5, 12, 18, 22, 24, 48 VDC	12 A at 250 VAC (cosϕ=1) 12 A at 24 VDC (L/R=0 ms) AC15:3 A at 240 VAC DC13: 2.5 A at 24 VDC, 50 ms
	1 pole (High capacity)		16 A at 250 VAC (cosϕ=1) 16 A at 24 VDC (L/R=0 ms) AC15:3 A at 240 VAC (NO) 1.5 A at 240 VAC (NC) DC13: 2.5 A at 24 VDC (NO), 50 ms
	2 poles		8 A at 250 VAC (cosϕ=1) 8 A at 24 VDC (L/R=0 ms) AC15:1.5 A at 240 VAC DC13: 2 A at 30 VDC, 50 ms

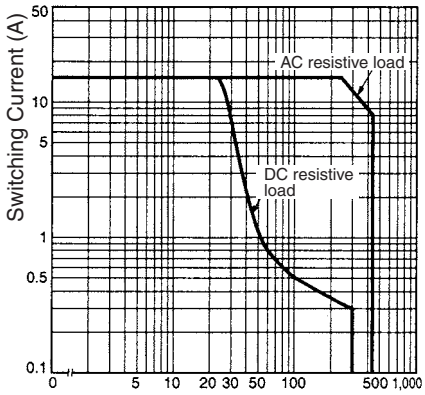
Engineering Data

Maximum Switching Capacity

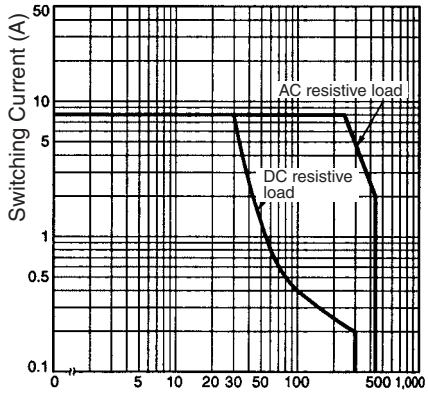
G2RL-1A, G2RL-1



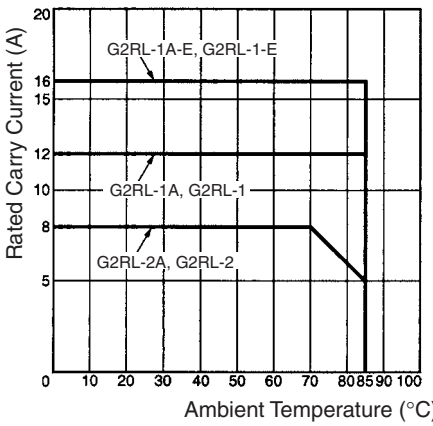
G2RL-1A-E, G2RL-1-E



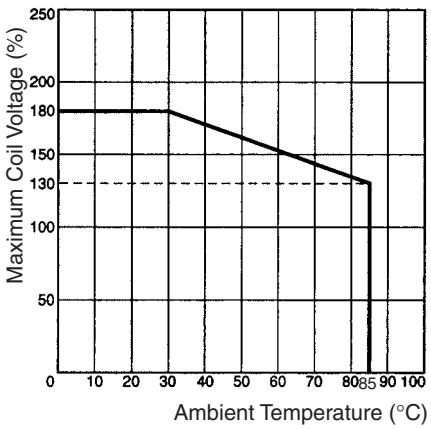
G2RL-2A, G2RL-2



Ambient Temperature vs Rated Carry Current



Ambient Temperature vs Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Note: Contact your OMRON representative for the data on fully sealed models.

Electrical Endurance Data

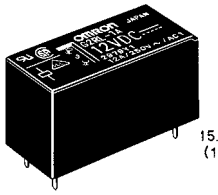
G2RL-1-E	16 A at 250 VAC (cosϕ=1) 16 A at 24 VDC 8 A at 250 VAC (cosϕ=0.4) 8 A at 30 VDC (L/R=7 ms)	30,000 operations min. 30,000 operations min. 200,000 operation min. (Normally open side operation) 10,000 operation min. (Normally open side operation)
G2RL-1	12 A at 250 VAC (cosϕ=1) 12 A at 24 VDC 5 A at 250 VAC (cosϕ=0.4) 5 A at 30 VDC (L/R=7 ms)	50,000 operations min. 30,000 operations min. 150,000 operation min. (Normally open side operation) 20,000 operation min. (Normally open side operation)
G2RL-2	8 A at 250 VAC (cosϕ=1) 8 A at 30 VDC	30,000 operations min. 30,000 operations min.
G2RL-1A-E	Pilot duty (A300), 250 VAC Pilot duty (A300), 125 VAC	250,000 operations min. 150,000 operations min.

Note: The results shown reflect values measured using very severe test conditions i.e., Duty: 1 s ON/1 s OFF.
Electrical endurance will vary depending on the test conditions. Contact your OMRON representative if you require more detailed information for the electrical endurance under your test conditions.

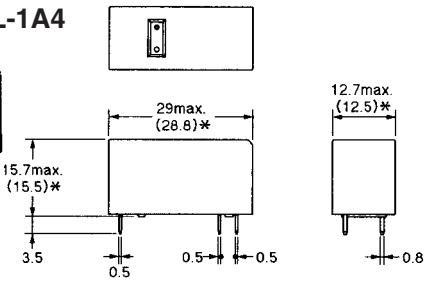
Dimensions

Note: All units are in millimeters unless otherwise indicated.

G2RL-1A, G2RL-1A4

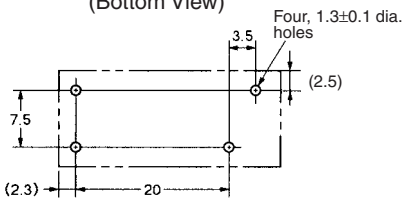


* Indicates average dimensions.

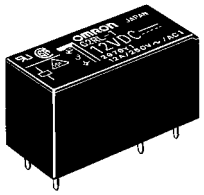


Terminal Arrangement/
Internal Connection
(Bottom View)

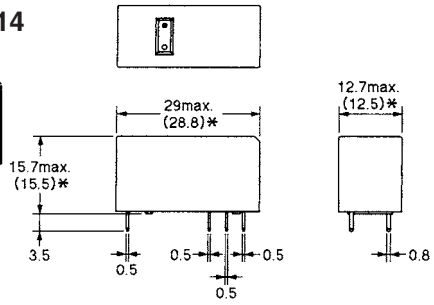
Mounting Holes
(Bottom View)



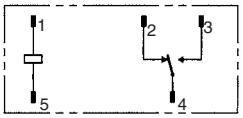
G2RL-1, G2RL-14



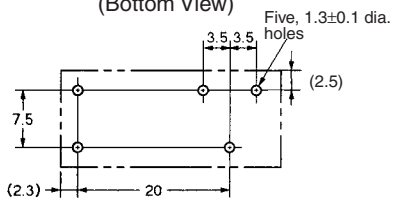
* Indicates average dimensions.



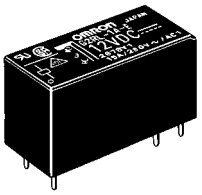
Terminal Arrangement/
Internal Connection
(Bottom View)



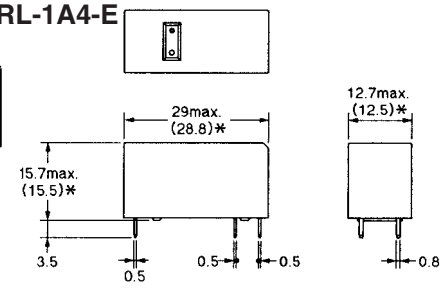
Mounting Holes
(Bottom View)



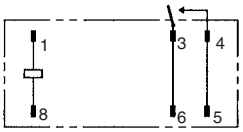
G2RL-1A-E, G2RL-1A4-E



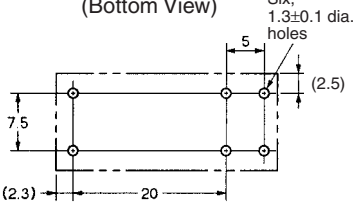
* Indicates average dimensions.



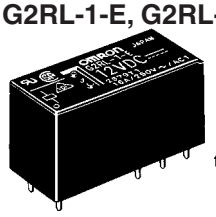
Terminal Arrangement/
Internal Connection
(Bottom View)

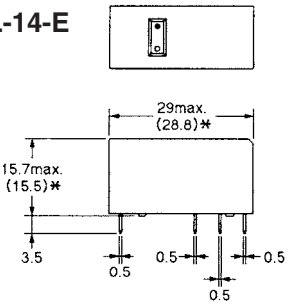


Mounting Holes
(Bottom View)



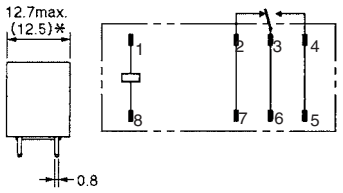
G2RL-1-E, G2RL-14-E



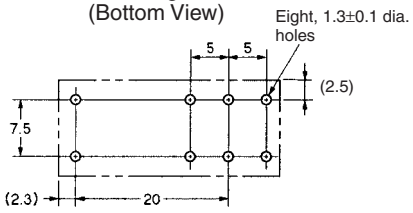


* Indicates average dimensions.

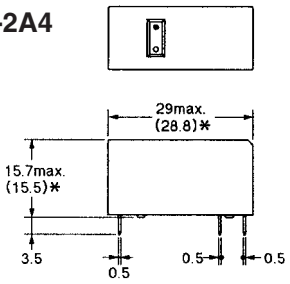
Terminal Arrangement/
Internal Connection
(Bottom View)



Mounting Holes
(Bottom View)

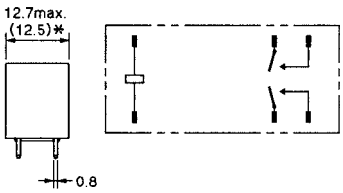


G2RL-2A, G2RL-2A4

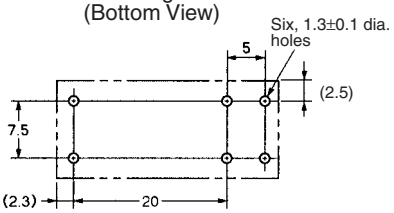


* Indicates average dimensions.

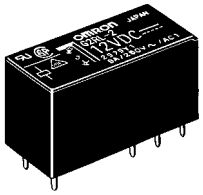
Terminal Arrangement/
Internal Connection
(Bottom View)

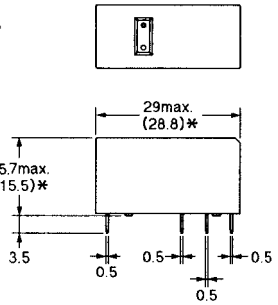


Mounting Holes
(Bottom View)



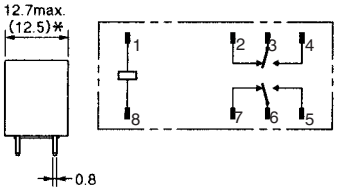
G2RL-2, G2RL-24



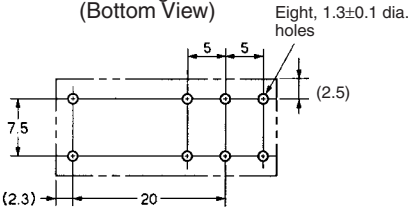


* Indicates average dimensions.

Terminal Arrangement/
Internal Connection
(Bottom View)



Mounting Holes
(Bottom View)



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J117-E1-03

OMRON

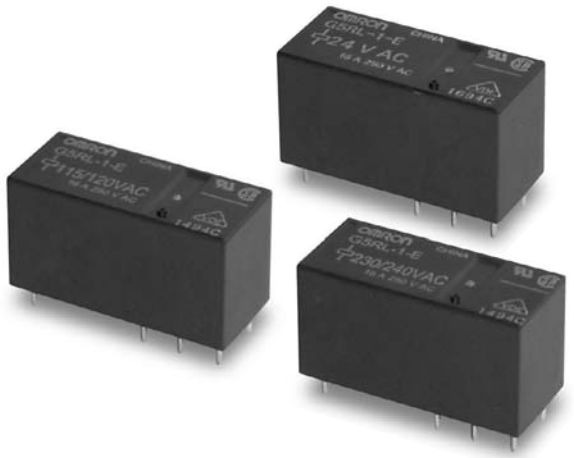
PCB Relay

G5RL(AC)

A Single-pole, 16-A Power Relay with AC Coil

- 29.0 × 12.7 × 15.7 mm (L × W × H)
  Low profile: 15.7 mm in height
- Clearance and creepage distance
  Between coil and contacts: 8 mm/8 mm
  Between contacts of the same polarity:
  3 mm/4 mm

RoHS Compliant Refer to pages 16 to 17 for details.



Ordering Information

Classification		Enclosure ratings	Contact form	
			SPST-NO	SPDT
Class F	High capacity	Flux protection	---	G5RL-1-E

Note: When ordering, add the rated coil voltage to the model number.

Examples: G5RL-1-E 100 VAC
└ Rated coil voltage

■ Model Number Legend:

G5RL-□□□-□ □VAC
1 2 3 4 5

1. **Number of Poles**
   1: 1 pole
2. **Contact Form/Contact Construction**
   None: SPDT
3. **Enclosure Rating**
   None: Flux protection
4. **Classification**
   E: High-capacity
5. **Rated Coil Voltage**
   24, 100, 115/120, 200, 230/240 VAC

Specifications

■ Coil Ratings

Rated voltage	24 VAC	100 VAC	115 VAC/120 VAC		200 VAC	230 VAC/240 VAC	
Rated current at 50 Hz (mA)	31.30	7.50	5.85	6.25	3.75	3.00	3.13
Rated current at 60 Hz (mA)	28.30	6.88	5.35	5.70	3.45	2.76	2.88
Coil resistance (Ω)	443	8,220	11,600		33,000	47,600	
Must operate voltage	75% of rated voltage (max.)						
Must release voltage	15% of rated voltage (min.)						
Max. voltage	90% to 110% of rated voltage						
Power consumption	Approx. 0.75 VA						

Note: **1.** The above items are measured at a coil temperature of 23°C.

2. The tolerance of the rated current is +15%/–20%.

3. Power consumption drop was measured at 50 Hz.

4. Coil resistances are provided as reference values.

■ Contact Ratings

Contact material	Ag alloy (Cd free)
Load	Resistive load (cos ϕ=1)
Rated load	16 A at 250 VAC (NO), 16 A at 24 VDC (NO), 5 A at 250 VAC (NC), 5 A at 24 VDC (NC)
Rated carry current	16 A (NO), 5 A (NC)
Max. switching voltage	250 VAC, 24 VDC
Max. switching current	16 A (NO), 5 A (NC)
Max. switching power	4,000 VA AC (NO), 1,250 VA AC (NC) 384 W DC (NO), 120 W DC (NC)
Failure rate (reference value)	40 mA at 24 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Max. switching frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min. between contacts of same polarity 6,000 VAC, 50/60 Hz for 1 min. between coil and contacts
Impulse withstand voltage	10,000 V between coil and contacts, 1.2 × 50 μs
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 to 10 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100 G) Malfunction: 100 m/s^2 (approx. 10 G)
Endurance	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 50,000 operations min. (Resistive load, 16 A, 250 VAC, NO contact, at 1 sec. ON/4 sec. OFF) (Resistive load,16 A, 24 VDC, NO contact, at 1 sec. ON/4 sec. OFF) (Resistive load, 5 A, 250 VAC, NC contact, at 1 sec. ON/4 sec. OFF) (Resistive load, 5 A, 24 VDC, NC contact, at 1 sec. ON/4 sec. OFF) 100,000 operations min. (Resistive load, 12 A, 24 VDC, NO contact, at 1 sec. ON/4 sec. OFF)
Ambient temperature	Operating: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx.: 10 g

■ Approved Standards

UL 508 (File No. E41643 Vol. 4 Sec.38) and CSA C22.2 No. 1, C22.2 No. 14 (Certificate No.: 1419093)

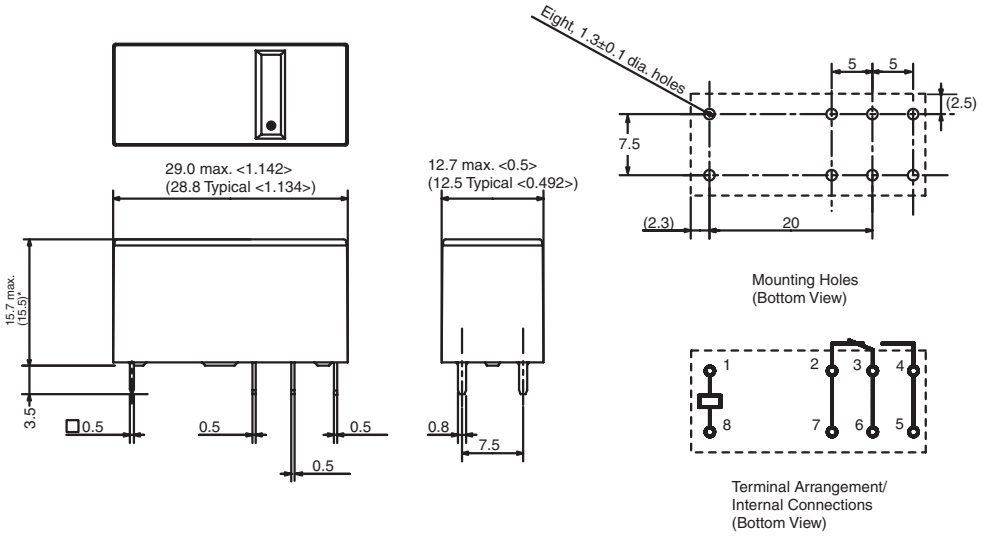
Model	Coil Rating	Contact rating
G5RL-1-E	24 to 240 VAC	16 A, 277 VAC General, 50,000 c - NO 16 A, 250 VAC General, 50,000 c - NO TV-5, 25,000 c - NO A 300 Pilot Duty, 720 VA, 240 VAC, 30,000 c- NO 1/2 Hp, 120 VAC, 6,000 c - NO 60 LRA/10 FLA, 250 VAC, 6,000 c - NO 5 A, 250 VAC General, 50,000 c - NC 5 A, 24 VDC Resistive, 50,000 c - NC

VDE DIN EN 61810-1 Edition 2 and EN60255-25 (Reg. No. A662)

Model	Coil Rating	Contact rating
G5RL-1-E	24, 100, 115/120, 200, 230/240 VAC (50 Hz)	16 A, 250 VAC 15,000 c

Dimensions

Note: All units are in millimeters unless otherwise indicated.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K129-E1-02

OMRON

PCB Relay

G4W

Impulse Withstand Voltage as High as 10 kV with 4-kV Dielectric Strength: Ideal for Power Supply Switching

- Creepage distance of 8 mm min. meets VDE C250.
- Dielectric strength of 4,000 VAC min.
- SPST-NO types conform to TV-8 rating.
- DPST-NO types conform to TV-5 rating.
- International 2.54-mm terminal pitch.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Contacts		SPST-NO	DPST-NO
Mounting style	Terminals		
General purpose	PCB (straight)	G4W-1112P-US-TV8	G4W-2212P-US-TV5

Note: When ordering, add the rated coil voltage to the model number.
Example: G4W-1112P-US-TV8 12 VDC
Rated coil voltage

Model Number Legend

G4W - □ □ □ □ - □ - □ - □ □ **VDC**
1 2 3 4 5 6 7 8

1. **Contact Form**
   11: SPST-NO
   22: DPST-NO
2. **Contact Type**
   1: Single button
3. **Enclosure Ratings**
   2: Unsealed
4. **Terminals**
   P: Straight PCB
5. **Approved Standards**
   US: UL, CSA certified
6. **TV Ratings**
   TV5: TV-5
   TV8: TV-8
7. **Special Function**
   None: General-purpose
   Z: Full-wave rectifier
8. **Rated Coil Voltage**
   12, 24, 100 VDC

Specifications

■ Coil Ratings

Single-side Stable Type

Rated voltage		12 VDC	24 VDC	100 VDC
Rated current		66.7 mA	33.3 mA	8 mA
Coil resistance		180 Ω	720 Ω	12,500 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.93	3.7	61.8
	Armature ON	1.65	6.4	106
Must operate voltage		80% max. of rated voltage		
Must release voltage		10% min. of rated voltage		
Max. voltage		130% of rated voltage (at 23°C)		
Power consumption		Approx. 800 mW		

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±15%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Contact Ratings

Item	SPST-NO		DPST-NO	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	15 A at 250 VAC; 15 A at 24 VDC	10 A at 250 VAC; 7.5 A at 24 VDC	10 A at 250 VAC; 10 A at 24 VDC	7.5 A at 250 VAC; 5 A at 24 VDC
Contact material	Ag Alloy			
Rated carry current	15 A		10 A	
Max. switching voltage	250 VAC, 125 VDC			
Max. switching current	15 A		10 A	
Max. switching power	3,750 VA, 375 W	2,500 VA, 255 W	2.500 VA, 240 W	1,850 VA, 120 W
Failure rate (reference value)	100 mA at 5 VDC			

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	20 ms max. (mean value: approx. 13 ms)
Release time	5 ms max. (mean value: approx. 2.5 ms)
Bounce time	Operate: approx. 3 ms
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ max. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarities (DPST-NO) 1,500 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10,000 V (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 150 m/s^2
Endurance	Mechanical: 5,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: –25°C to 55°C (with no icing)
Ambient humidity	Operating: 5% to 85% RH
Weight	Approx. 29 g

■ Approved Standards

UL508 (File No. E41643)/CSA C22.2 No.14 (File No.LR31928)

Model	Contact form	Coil ratings	Contact ratings
G4W-1112P-US-TV8	SPST-NO	6 to 120 VDC	15 A, 250 VAC (general use) 15 A, 24 VDC TV-8 1/2 hp, 125 VAC 1 hp, 250 VAC 3/4 hp, 240 VAC
G4W-2212P-US-TV5	DPST-NO		15 A, 250 VAC (general use) 10 A, 250 VAC (general use) 15 A, 24 VDC TV-5 1/2 hp, 250 VAC 1/3 hp, 125/250 VAC

SEMKO (File No. 204772)

Contact form	Coil ratings	Contact ratings
SPST-NO	6-100 VDC	15/120 A, 250 VAC
DPST	6-120 VDC	10/80 A, 250 VAC

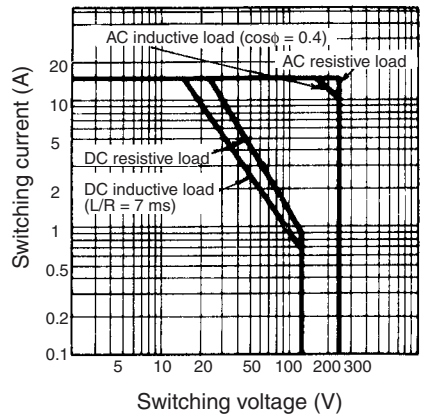
VDE0435 (File No.1907)

Contact form	Coil ratings	Contact ratings
SPST-NO	6, 12, 24, 48, 100 VDC	15 A, 250 VAC ($\cos\phi$ = 1.0) 10 A, 250 VAC ($\cos\phi$ = 0.4) 15 A, 24 VDC (0 ms) 7.5 A, 24 VDC (40 ms)
DPST-NO		10 A, 250 VAC ($\cos\phi$ = 1.0) 7.5 A, 250 VAC ($\cos\phi$ = 0.4) 10 A, 24 VDC (0 ms) 5 A, 24 VDC (40 ms)

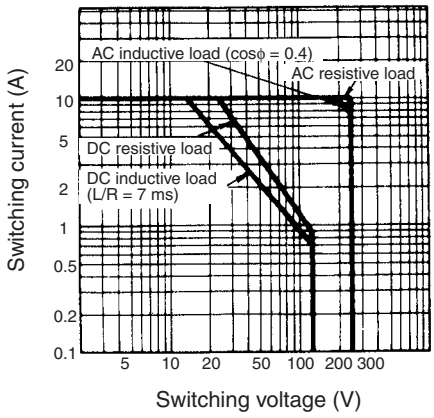
Engineering Data

Maximum Switching Power

G4W-1112P-US-TV8

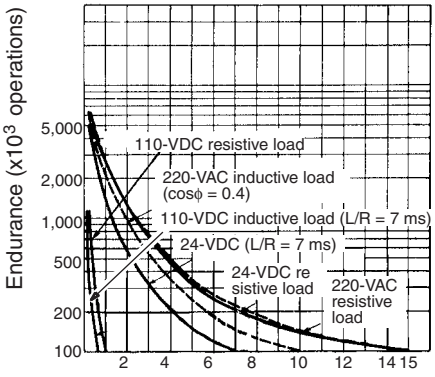


G4W-2212P-US-TV5

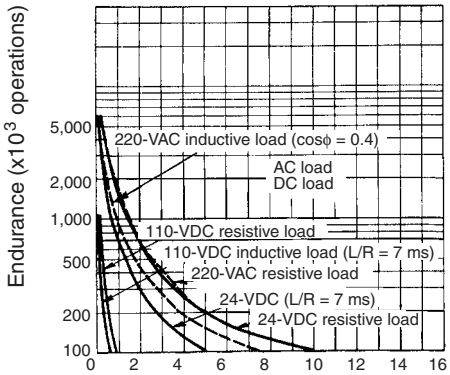


Endurance

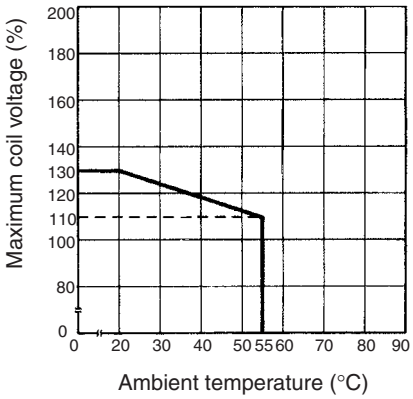
G4W-1112P-US-TV8



G4W-2212P-US-TV5



Ambient Temperature vs. Maximum Coil Voltage

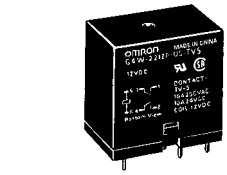


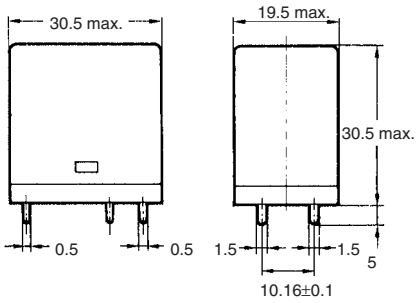
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

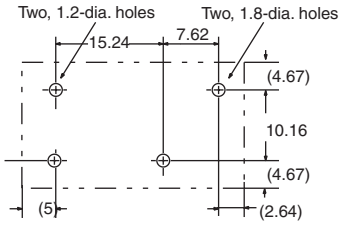
Note: All units are in millimeters unless otherwise indicated.

G4W-□12P-US-TV

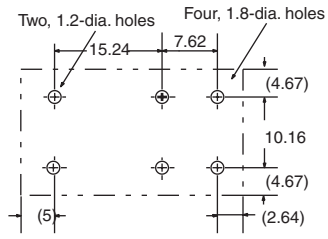




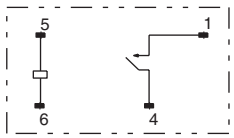
Mounting Holes (Bottom View)
G4W-1112P-US-TV-8

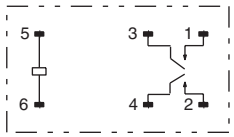


G4W-2212P-US-TV-5



Terminal Arrangement/Internal Connections (Bottom View)





ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J039-E1-09

OMRON

Special-purpose PCB Relay | G4A

Miniature Single-pole Relay with 80-A Surge Current and 20-A Switching Current

- Ideal for motor switching.
- Miniature, relay with high switching power and long endurance.
- Creepage distance conforms to UL and CSA standards.
- Highly noise-resistive insulation materials employed.
- Standard model available with flux protection construction.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification	Contact form	Model
#250 tab terminals/PCB coil terminals	SPST-NO	G4A-1A-E
PCB terminals/PCB coil terminals		G4A-1A-PE

Note: When ordering, add the rated coil voltage to the model number.
Example: G4A-1A-E 12 VDC
Rated coil voltage

Model Number Legend

G4A-□□-□□ □ VDC
1 2 3 4 5

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Terminals**
   None: #250 tab/PCB coil terminals
   P: Straight PCB/PCB coil terminals
4. **Special Function**
   E: For long endurance
5. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage		5 VDC	12 VDC	24 VDC
Rated current		180 mA	75 mA	37.5 mA
Coil resistance		27.8 Ω	160 Ω	640 Ω
Coil inductance (ref. value)	**Armature OFF**	---	0.8 H	3.5 H
	Armature ON	---	1.1 H	4.8 H
Must operate voltage		70% of rated voltage max.		
Must release voltage		10% of rated voltage min.		
Max. permissible voltage		160% of rated voltage at (23°C)		
Power consumption		Approx. 0.9 W		

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. Max. permissible voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

■ Contact Ratings

Rated load	20 A at 250 VAC
Rated carry current	20 A
Max. switching voltage	250 VAC
Max. switching current	20 A
Max. switching power	5,000 VA
Failure rate (reference value)	100 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Endurance

With Motor Load

Load conditions	Switching frequency	Electrical endurance
250 VAC: Inrush current: 80 A, 0.3 s (cosϕ= 0.7) Break current: 20 A (cosϕ = 0.9)	ON: 1.5 s OFF: 1.5 s	200,000 operations

With Overload

Load conditions	Switching frequency	Electrical endurance
250 VAC: Inrush current: 80 A (cosϕ= 0.7) Break current: 80 A (cosϕ = 0.7)	ON: 1.5 s OFF: 99 s	1,500 operations

With Inverter Load

Load conditions	Switching frequency	Electrical endurance
100 VAC; Inrush current: 200 A (0–P) Break current: 20 A	ON: 3 s OFF: 5 s	30,000 operations

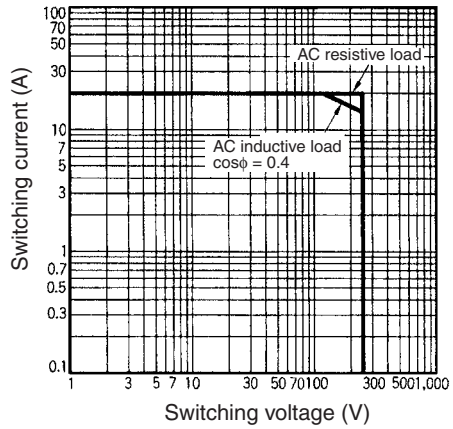
■ Characteristics

Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	10 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,500 VAC 50/60 Hz for 1 min between coil and contacts 1,000 VAC 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	Mechanical: 2,000,000 operations min. (at 18,000 operations/hr) Motor load: 100,000 operations min. (ON/OFF: 1.5 s) Inverter load: 30,000 operations min. (ON: 3 s, OFF: 5 s)
Ambient temperature	Operating: –20°C to 60°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 23 g

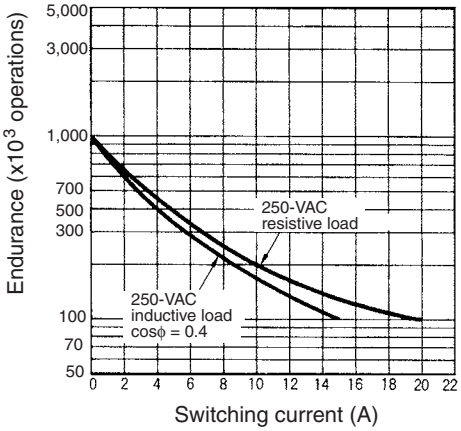
Note: The data shown above are initial values.

Engineering Data

Maximum Switching Power



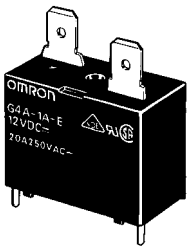
Endurance

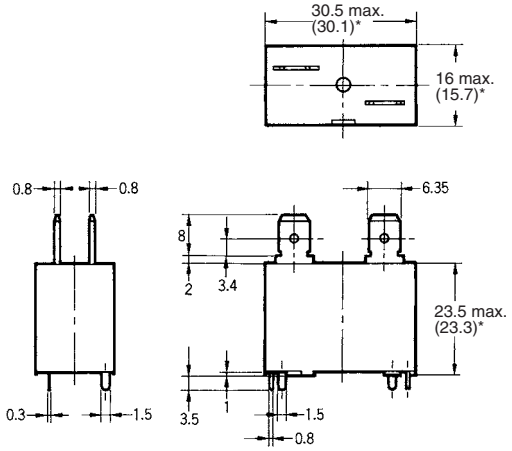


Dimensions

Note: All units are in millimeters unless otherwise indicated; dimensions shown in parentheses are in inches.

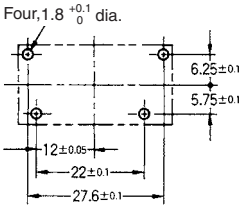
G4A-1A-E



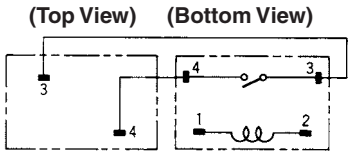


*Average value

Mounting Holes (Bottom View)

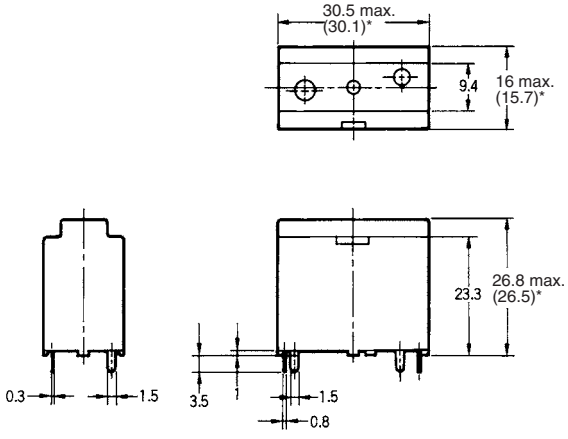


Terminal Arrangement /Internal Connections



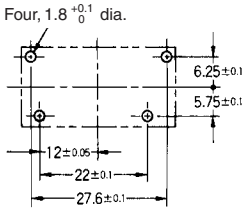
Tab Terminal **PCB Terminal**

G4A-1A-PE

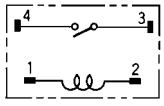


*Average value

Mounting Holes (Bottom View)



Terminal Arrangement /Internal Connections (Bottom View)



Precautions

Mounting

When mounting two or more relays side by side, provide a minimum space of 3 mm between relays.

Terminal Connection

The terminals fit FASTON receptacle 250 and are suitable for positive-lock mounting.
Do not apply excessive force on the terminals when mounting or dismounting the relay.

The following positive-lock connectors made by AMP are recommended.

Type	Receptacle terminals	Positive housing
#250 terminals (width: 6.35 mm)	AMP 170333-1 (170327-1) AMP 170334-1 (170328-1) AMP 170335-1 (170329-1)	AMP 172076-1 natural color AMP 172076-4 yellow AMP 172076-5 green AMP 172076-6 blue

Note: The numbers shown in parentheses are for air-feeding.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J056-E1-03

OMRON

PCB Relay

G8P

Compact, Low-cost 30-A Power Relay for PC Board or Panel-mounted Applications

- Compact, yet capable of switching up to 30-A loads.
- Complies with UL873 and UL508 column A spacings (1/8" through air, 1/4" over surface).
- UL Class F insulation standard.
- Withstands of up to 6,000 V under 1.2 × 50 μs impulse wave or ring wave.
- A selection of contact forms: SPDT and SPST-NO.
- Quick-connect terminals versions ideal for PC board and panel mounting.
- Flanged mounting available.
- Ideal for home and industrial appliances, HVAC (heating, ventilating, and air conditioning), and many other applications.

RoHS Compliant Refer to pages 16 to 17 for details.

Ordering Information

Classification		Contact form	Enclosure ratings		
Mounting style	Terminals		Open	Unsealed	Fully sealed
PCB mounting	PCB	SPST-NO	G8P-1AP	G8P-1A2P	G8P-1A4P
		SPDT	G8P-1CP	G8P-1C2P	G8P-1C4P
	Quick-connect and PCB	SPST-NO	G8P-1ATP	G8P-1A2TP	G8P-1A4TP
		SPDT	G8P-1CTP	G8P-1C2TP	G8P-1C4TP
Flanged mounting	Quick-connect	SPST-NO	---	G8P-1A2T-F	---
		SPDT	---	G8P-1C2T-F	---

Note: When ordering, add the rated coil voltage to the model number
Example: G8P-1AP 12 VDC
Rated coil voltage

Model Number Legend

G8P -□ □ □ □ -□ □ VDC
1 2 3 4 5 6

1. Number of Poles
1: 1 pole

2. Contact Form
A: SPST-NO
C: SPDT

3. Enclosure Ratings
None: Open
2: Unsealed
4: Fully-Sealed

4. Terminals
P: Straight PCB for contacts and coil
T: Quick-connect (#250 terminals for contacts and #187 terminals for coil)
TP: Quick-connect (#250 terminals) and straight PCB for contacts, and straight PCB for coil

5. Mounting
None: PCB mounting
F: Flanged mounting

6. Rated Coil Voltage
5, 9, 12, 24, 48, 110
Other rated coil voltages available.

Specifications

■ Coil Ratings

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC	110 VDC
Rated current	185 mA	93 mA	77 mA	36 mA	19 mA	9 mA
Coil resistance	27 Ω	97 Ω	155 Ω	660 Ω	2,480 Ω	12,400 Ω
Must operate voltage	75% max. of rated voltage					
Must release voltage	10% min. of rated voltage					
Max. voltage	120% of rated voltage					
Power consumption	Approx. 900 mW					

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±10%.

■ Contact Ratings

Item	SPST-NO	SPDT
Load	Resistive load (cosϕ = 1)	
Rated load	30 A at 250 VAC; 20 A at 28 VDC	20 A/10 A (See note.) at 250 VAC; 20 A/10 A (See note.) at 28 VDC
Contact material	Ag Alloy (Cd free)	
Rated carry current	30 A	20 A/10 A (See note.)
Max. switching voltage	250 VAC, 28 VDC	
Max. switching current	AC: 30 A, DC: 20 A	AC: 20 A/10 A, DC: 20 A/10 A (See note.)
Max. switching capacity	7,500 VA, 560 W	5,000/2,500 VA, 560/280 W (See note.)

Note: NO contact/NC contact

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	15 ms max.
Release time	10 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 360 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts 1,500 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	6,000 V (1.2/50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.825-mm single amplitude (1.65-mm double amplitude) for 2 hours Malfunction: 10 to 55 to 10 Hz, 0.825-mm single amplitude (1.65-mm double amplitude) for 5 minutes
Shock resistance	Destruction: 1,000m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Endurance	Mechanical: 10,000,000 operation min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at rated load)
Ambient temperature	Operating: −55°C to 105°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	G8P-1CP: Approx. 21 g, G8P-1CTP: Approx. 24 g G8P-1C4P: Approx. 28 g, G8P-1C4TP: Approx. 31 g

Note: The data shown above are initial values.

■ Approved Standards

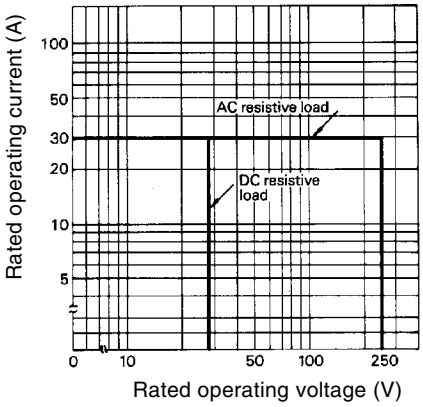
UL (File No. E41643)/CSA (File No. LR34815-101)

Type	Contact form	Coil ratings	Contact ratings
G8P-1A	SPST-NO	5 to 110 VDC	30 A, 277 VAC (G.P./Res.) 30 A, 250 VAC, 100 k ops. (Res.) 20 A, 120-240 VAC, 70°C, 100 k ops. (G.P./Res.) 20 A, 28 VDC (Res.) 20 A, 240 VAC, 105°C, 100 k ops. (Res.) 1 hp, 125-250 VAC 2 hp, 250 VAC A300 Pilot Duty 12FLA/72LRA, 250 VAC, 100 k ops. 20 FLA/96 LRA, 125 VAC, 100 k ops. 5 A, 250 VAC (Tungsten) 20 A, 120-277 VAC (Ballast)
G8P-1C	SPDT	5 to 110 VDC	30 A/30 A, 250 VAC (Res.) 30 A/30 A, 277 VAC, 40°C, 100 k opns (NO) and 50 k opns (NC) 20 A/15 A, 120-240 VAC, 105°C, 100 k ops. (Res.) 20 A/10 A, 120-240 VAC, 70°C, 100 k ops. (G.P./Res.) 20 A/10 A, 28 VDC (Res.) 1/2 hp/ 1/2 hp, 125 VAC, 100 k ops. 2 hp/ 1/2 hp, 250 VAC 1 hp/ 1/4 hp, 125 VAC B150 Pilot Duty 5 A/3 A, 250 VAC (Tungsten) 6 A/3 A, 277 VAC (Ballast)

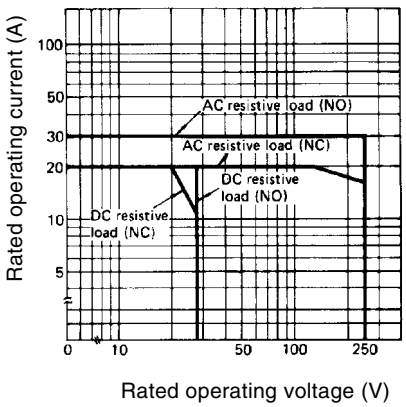
Engineering Data

Maximum Switching capacity

SPST-NO

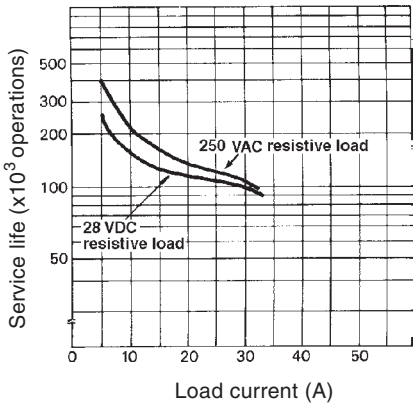


SPDT

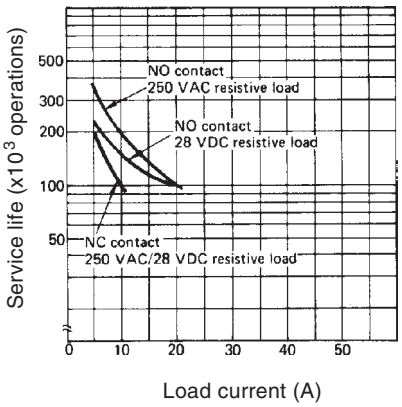


Endurance

SPST-NO



SPDT

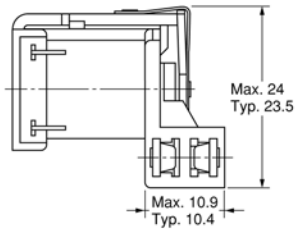


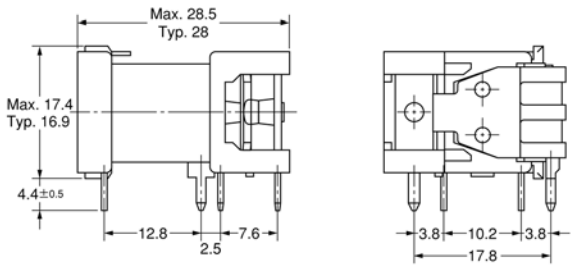
Dimensions

Note: All units are in millimeters unless otherwise indicated.

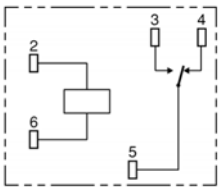
■ Open Types

G8P-1CP/1AP

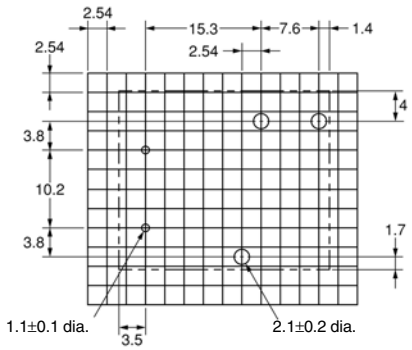




Terminal Arrangement/ Internal Connections (Bottom View)

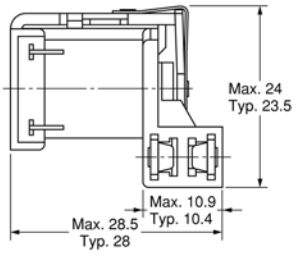


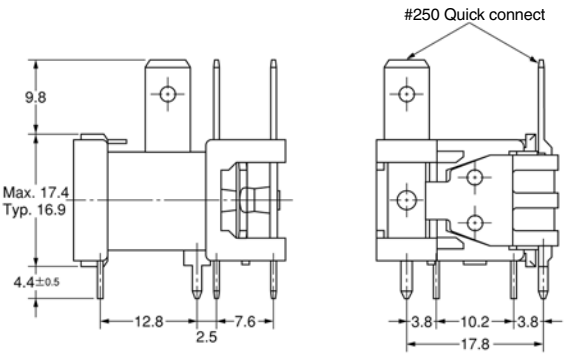
Mounting Holes (Bottom View)



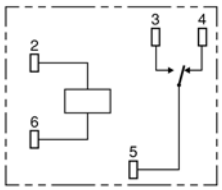
Note: Pin #4 is omitted on G8P-1AP

G8P-1CTP/1ATP

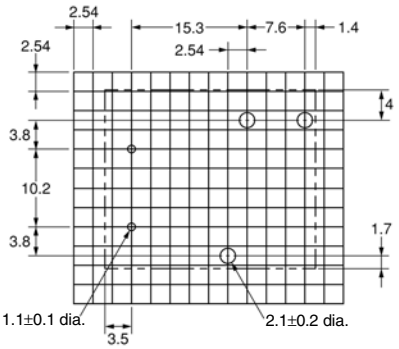




Terminal Arrangement/ Internal Connections (Bottom View)



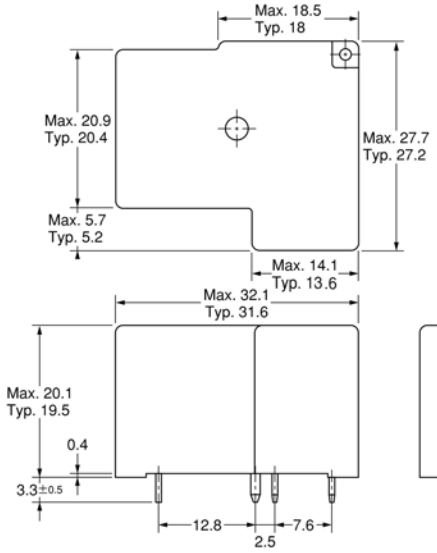
Mounting Holes (Bottom View)



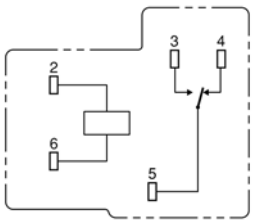
Note: Pin #4 is omitted on G8P-1ATP

■ Fully-Sealed Types/Unsealed Types

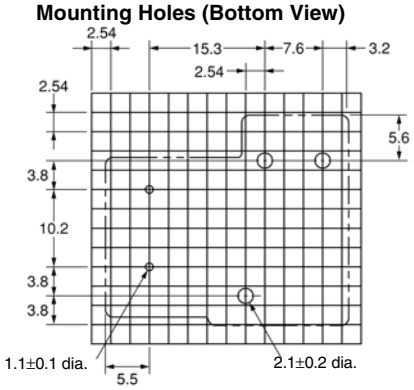
G8P-1C4P/1A4P/1C2P/1A2P



Terminal Arrangement/ Internal Connections (Bottom View)

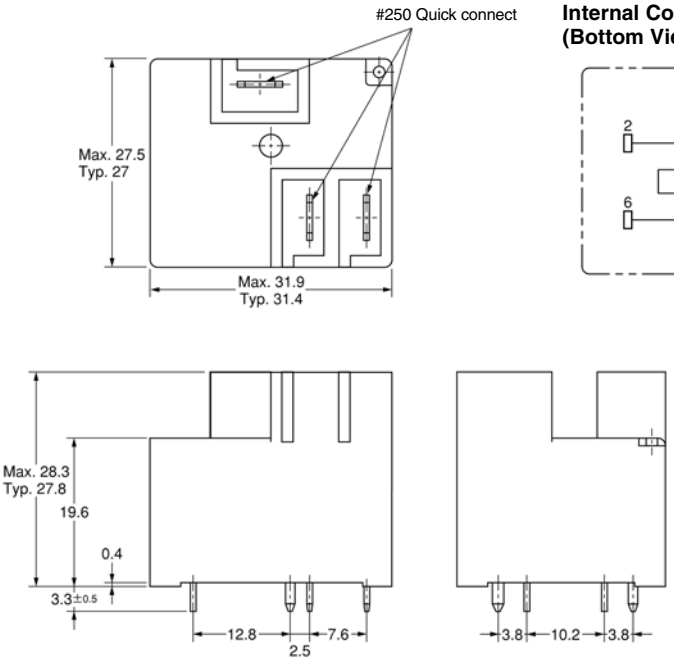


Mounting Holes (Bottom View)

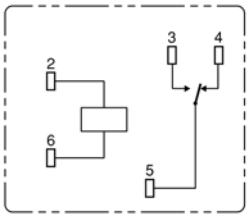


Note: Pin #4 is omitted on G8P-1A4P/1A2P

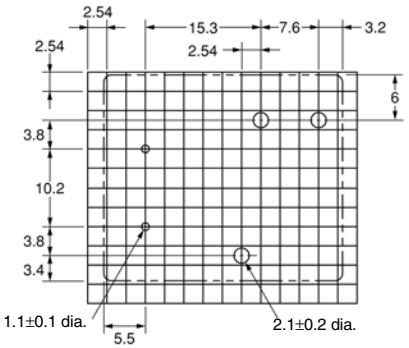
G8P-1C4TP/1A4TP/1C2TP/1A2TP



Terminal Arrangement/ Internal Connections (Bottom View)



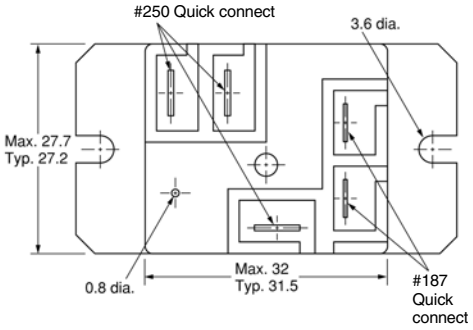
Mounting Holes (Bottom View)



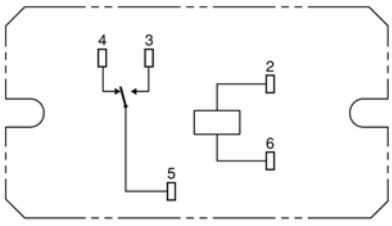
Note: Pin #4 is omitted on G8P-1A4TP/1A2TP

■ Flange Mounting Types

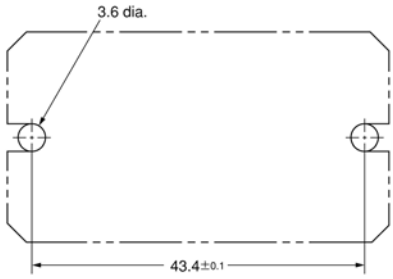
G8P-1C2T-F/1A2T-F



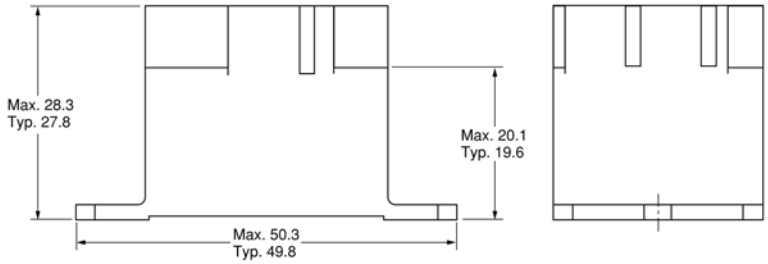
Terminal Arrangement/Internal Connections (Bottom View)



Mounting Holes (Bottom View)



Note: Pin #4 is omitted on G8P-1A2T-F



Note: Allow air circulation within the sealed type G8P by removing the knock off nib from the cover after soldering and cleaning is complete.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K108-E1-03

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