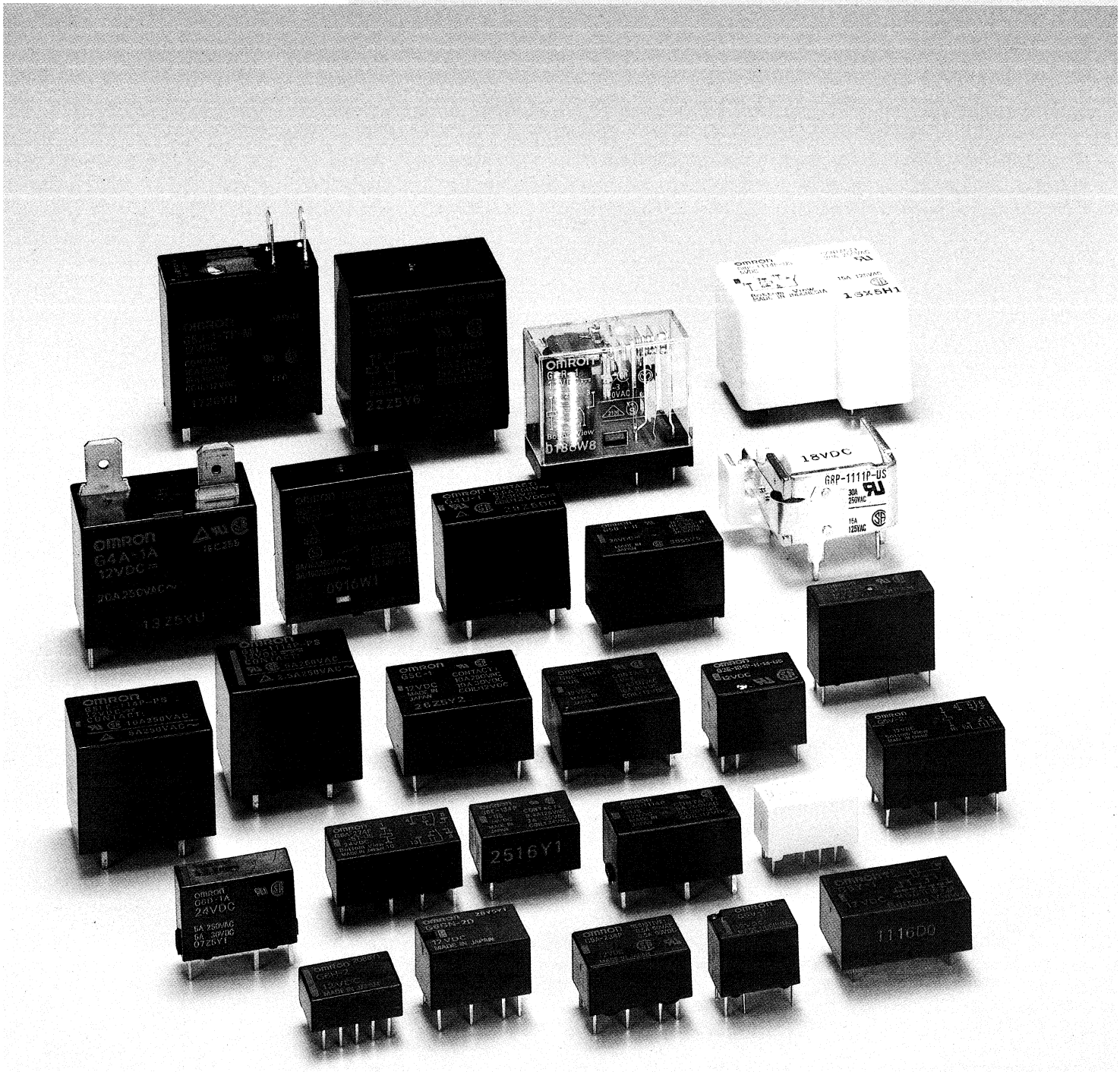
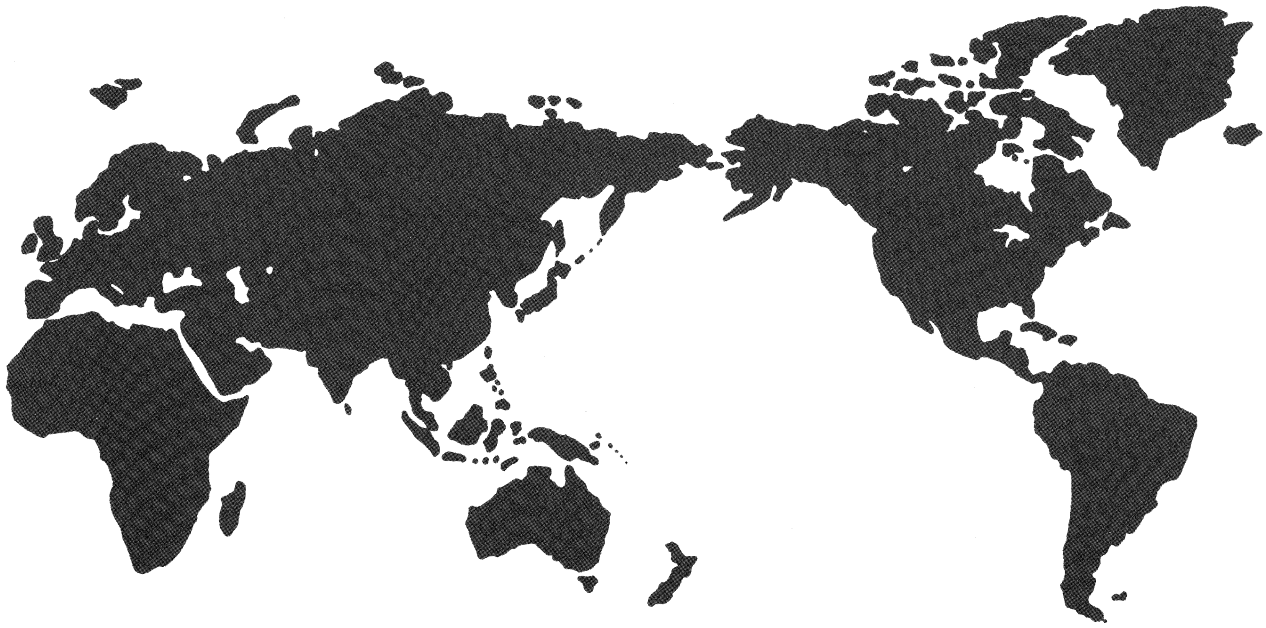
OMRON

PCB Relays





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1. *Each of OMRON Sales offices has its branch offices.*
2. *Some of abovementioned offices do not deal all of OMRON produ*
3. *Information subject to change without notice.*

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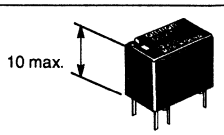
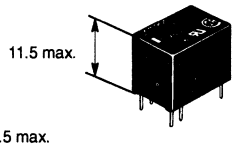
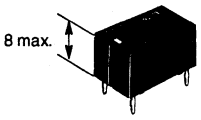
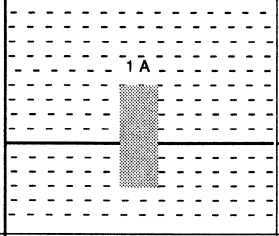
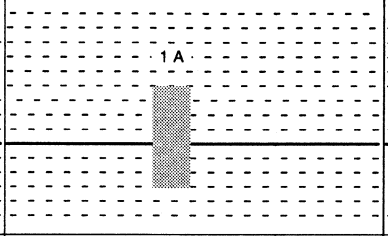
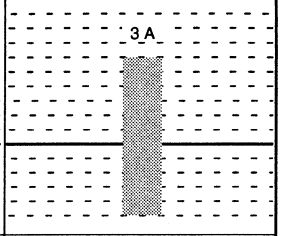
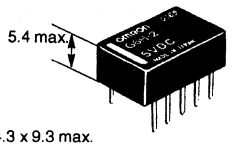
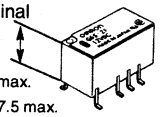
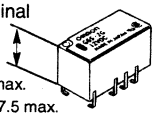
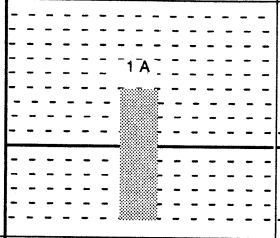
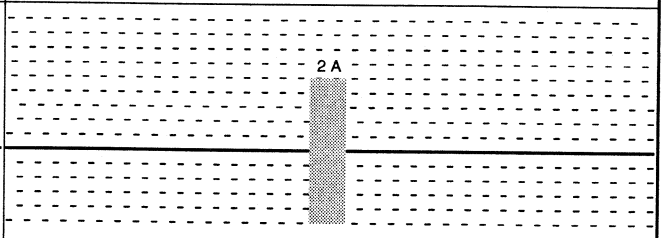
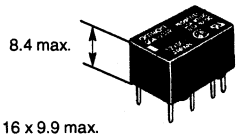
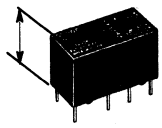
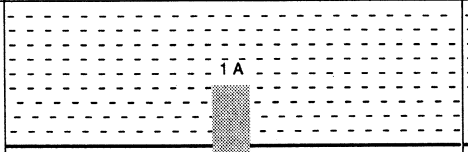
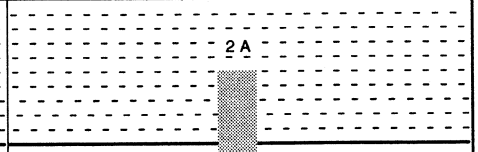
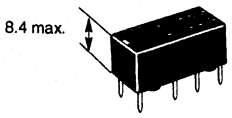
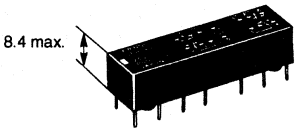
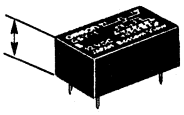
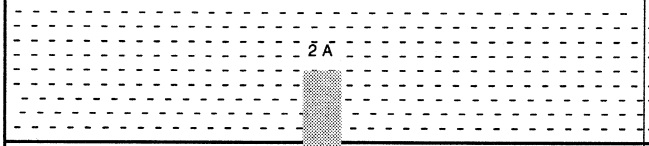
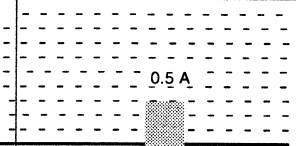
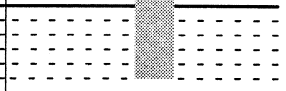
Selection Guide

Classification		Signal control		
Model		G5V-1	G2E	G6E
Features		Ultra-miniature, highly sensitive SPDT relay.	Miniature, low-cost, single-pole PCB relay.	Subminiature, sensitive SPDT relay.
Appearance **Dimensions (L x W)**		 12.5 x 7.5 max.	 15.5 x 10.5 max.	 16 x 10 max.
Contact ratings	**Contact form**	SPDT	SPDT	SPDT
	Contact type	Single crossbar	Single crossbar / Bifurcated crossbar	Bifurcated crossbar
	Contact material	Ag (Au-clad)	AgPd (Au-clad)	Ag (Au-clad)
	Resistive load (cosϕ = 1)	0.5 A at 125 VAC; 1 A at 24 VDC	0.5 A at 110 VAC; 1 A at 24 VDC	0.4 A at 125 VAC; 2 A at 30 VDC
	Max. switching current (A) (under resistive load) **Min. permissible load (mA)**			
Coil ratings	**Rated voltage**	3 to 24 VDC	1.5 to 24 VDC	3 to 48 VDC
	Power consumption	Approx. 150 mW	Approx. 200 to 450 mW	Approx. 200 to 400 mW
Life expectancy	**Electrical (under rated load)**	100,000 operations min.	500,000 operations min. at 1 A, 24 VDC 200,000 operations min. at 0.5 A, 110 VAC	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.	10,000,000 operations min.	100,000,000 operations min.
Dielectric strength	**Between coil and contact**	1,000 VAC	500 VAC	1,500 VAC
	Between contacts of different polarity	---	---	---
	Between contacts of same polarity	400 VAC	500 VAC	1,000 VAC
	Between set and reset coils	---	---	---
Ambient temperature (operating)		–40°C to 70°C	–25°C to 60°C	–40°C to 70°C
Variations		• Plastic-sealed • Bifurcated crossbar	• Plastic-sealed	• Plastic-sealed • Double-winding latching • Single-winding latching • Ultrasonic cleaning
Magazine packaging		25 relays/magazine	---	25 relays/magazine
Approved standards		UL, CSA	UL, CSA	UL, CSA
Weight		Approx. 2 g	Approx. 3.7 g	Approx. 2.7 g

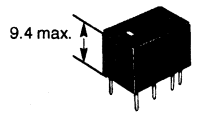
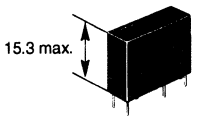
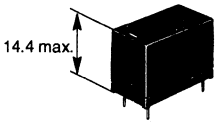
Classification		Signal control		
Model		G6H	G6S	
Features		Ultra-small relay with 5 mm height.	Surface mount DPDT Relay. 2.5 kV surge voltage	
Appearance **Dimensions (L x W)**		 14.3 x 9.3 max.	G6S-F Outside-L surface mount terminal  15 x 7.5 max.	G6S-G Inside-L surface mount terminal  15 x 7.5 max.
Contact ratings	**Contact form**	DPDT	DPDT	
	Contact type	Bifurcated crossbar	Bifurcated crossbar	
	Contact material	Ag (Au-clad)	Ag (Au-clad)	
	Resistive load (cosϕ = 1)	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 **Min. permissible load (mA)** 100 10 1 0.1 0.01			
Coil ratings	**Rated voltage**	3 to 48 VDC	4.5 to 24 VDC	
	Power consumption	140 to 280 mW	Approx. 140 to 200 mW	
Life expectancy	**Electrical (under rated load)**	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 1,800operations/Hr.	
	Mechanical	100,000,000 operations min.	100,000,000 operations min.	
Dielectric strength	**Between coil and contact**	1,000 VAC	2,000 VAC (Impulse withstand voltage: 2,500 V)	
	Between contacts of different polarity	1,000 VAC	1,500 VAC	
	Between contacts of same polarity	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	
Variations		• Plastic-sealed • Double-winding latching • Single-winding latching	• Surface mount • PCB terminal (surface mount terminal) • Double-winding latching • Single-winding latching	
Magazine packaging		25 relays/magazine	25 relays/magazine	
Approved standards		UL, CSA	UL, CSA	
Weight		Approx. 1.5 g	Approx. 2 g	

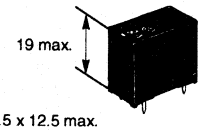
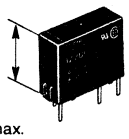
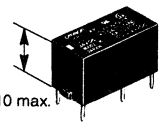
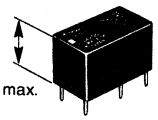
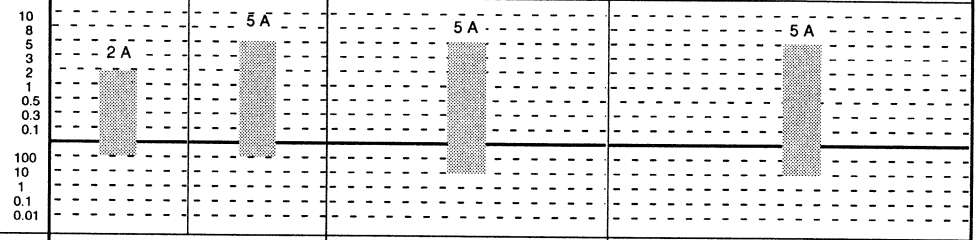
Selection Guide

Classification		Signal control	
Model		G5A	G5V-2
Features		Subminiature relay with DPDT contact.	Miniature DPDT relay for signal circuits.
Appearance **Dimensions (L x W)**		 16 x 9.9 max.	 20.5 x 10.1 max.
Contact ratings	**Contact form**	DPDT	DPDT
	Contact type	Bifurcated crossbar	Bifurcated crossbar
	Contact material	Ag (Au-clad)	Ag (Au-clad)
	Resistive load (cosϕ = 1)	0.5 A at 30 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		
	Min. permissible load (mA) 100 10 1 0.1 0.01		
Coil ratings	**Rated voltage**	3 to 48 VDC	3 to 48 VDC
	Power consumption	Approx. 200 to 280 mW	Approx. 500 to 580 mW
Life expectancy	**Electrical (under rated load)**	100,000 operations min.	100,000 operations min.
	Mechanical	50,000,000 operations min.	15,000,000 operations min.
Dielectric strength	**Between coil and contact**	1,000 VAC	1,000 VAC
	Between contacts of different polarity	1,000 VAC	1,000 VAC
	Between contacts of same polarity	500 VAC	750 VAC
	Between set and reset coils	100 VAC	---
Ambient temperature (operating)		–40°C to 70°C	–25°C to 65°C
Variations		• Double-winding latching • Single-winding latching • High sensitivity (150 mW)	• Plastic-sealed • High sensitivity (150 mW)
Magazine packaging		25 relays/magazine	25 relays/magazine
Approved standards		UL, CSA	UL, CSA
Weight		Approx. 3 g	Approx. 5 g

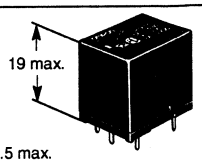
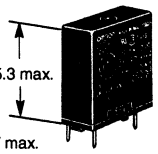
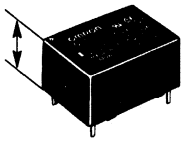
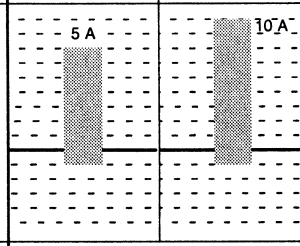
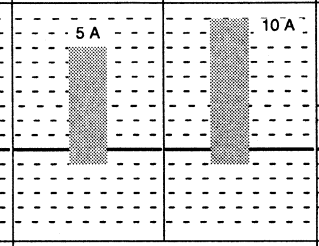
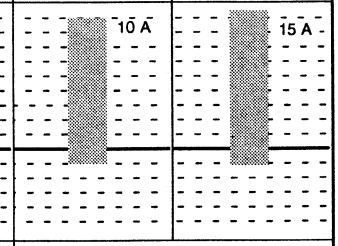
Classification		Signal control				High-frequency signal control
Model		G6A				G5Y-1
Features		Plastic-sealed relay with high surge dielectric for use in telecommunications equipment.				Special SPDT relay for VHF and UHF signal switching and transmission.
Appearance						
Dimensions (L x W)		20.2 x 10.1 max.		35.4 x 10.1 max.		11.5 x 20.5 max.
Contact ratings	**Contact form**	DPDT		4PDT		SPDT
	Contact type	Bifurcated crossbar				Bifurcated
	Contact material	Ag (Au-clad)	AgPd (Au-clad)	Ag (Au-clad)	AgPd (Au-clad)	Au
	Resistive load (cosϕ = 1)	0.5 A at 125 VAC; 2 A at 30 VDC	0.3 A at 125 VAC; 1 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC	0.3 A at 125 VAC; 1 A at 30 VDC	0.01 A at 24 VAC; 0.01 A at 24 VDC
	Max. switching current (A) (under resistive load) 10, 8, 5, 3, 2, 1, 0.5, 0.3, 0.1					
	Min. permissible load (mA) 100, 10, 1, 0.1, 0.01					
Coil ratings	**Rated voltage**	3 to 48 VDC				5 to 24 VDC
	Power consumption	Approx. 200 to 235 mW		Approx. 360 mW		Approx. 200 or 300 mW
Life expectancy	**Electrical (under rated load)**	500,000 operations min.				300,000 operations min.
	Mechanical	100,000,000 operations min.				1,000,000 operations min.
Dielectric strength	**Between coil and contact**	1,000 VAC				1,000 VAC
	Between contacts of different polarity	1,000 VAC				---
	Between contacts of same polarity	1,000 VAC				500 VAC
	Between set and reset coils	250 VAC				---
Ambient temperature (operating)		–40°C to 70°C				–30°C to 70°C
Variations		• Plastic-sealed • Double-winding latching • Single-winding latching				• Plastic-sealed
Magazine packaging		25 relays/magazine		10 relays/magazine		---
Approved standards		UL, CSA				---
Weight		Approx. 3.5 g		Approx. 6 g		Approx. 6 g

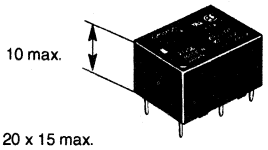
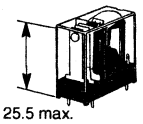
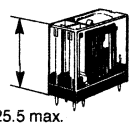
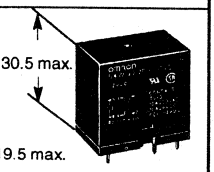
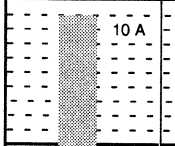
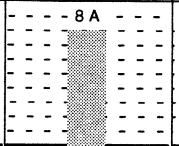
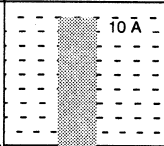
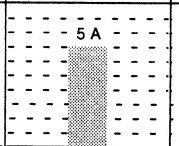
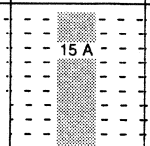
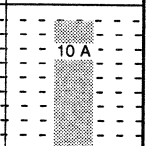
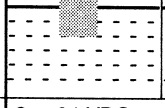
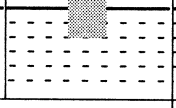
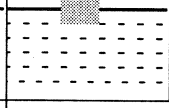
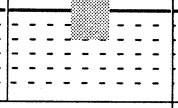
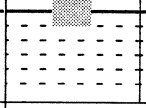
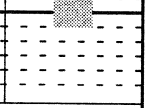
Selection Guide

Classification		Signal control	Power drive	
Model		G6GN	G5N	G5B
Features		Dipole signal relay with a dielectric strength of 2.5 kV ideal for switching telephone lines.	Miniature relays with 1-pole 3-A switching capability and 10-kV impulse withstand voltage.	Single-pole 3-A miniature relay.
Appearance **Dimensions (L x W)**		 16.0 x 10.0 max.	 20.5 x 7.2 max.	 22.4 x 11.9 max.
Contact ratings	**Contact form**	MBB	SPST-NO	SPST-NO
	Contact type	Single	Single	Single
	Contact material	Ag (Au-clad)	Ag	Ag
	Resistive load (cosϕ = 1)	0.5 A at 48 VDC	3 A at 125 VAC; 3 A at 30 VDC	3 A at 125 VAC; 3 A at 30 VDC
	Max. switching current (A) (under resistive load) **Min. permissible load (mA)**	10 8 5 3 2 1 0.5 0.3 0.1 0.5 A 100 10 1 0.1 0.01	3 A	3 A
Coil ratings	**Rated voltage**	5 to 24 VDC	12 to 24 VDC	5 to 24 VDC
	Power consumption	360 mW	Approx. 200 mW	200 mW, 360 mW
Life expectancy	**Electrical (under rated load)**	100,000 operations min.	200,000 operations min.	200,000 operations min.
	Mechanical	1,000,000 operations min.	5,000,000 operations min.	5,000,000 operations min.
Dielectric strength	**Between coil and contact**	2,500 VAC	4,000 VAC (dielectric strength: 1,000 V)	2,000 VAC
	Between contacts of different polarity	1,000 VAC	---	---
	Between contacts of same polarity	500 VAC	750 VAC	750 VAC
	Between set and reset coils	---	---	---
Ambient temperature (operating)		–25°C to 70°C	–40°C to 70°C	–40°C to 70°C
Variations		• Plastic-sealed • PCB terminal	• Flux protection • PCB terminal	• Flux protection
Magazine packaging		25 relays/magazine	50 relays/magazine	Possible
Approved standards		IEC (TÜV)	UL, CSA, IEC (TÜV)	UL, CSA, IEC (TÜV)
Weight		Approx. 3 g	Approx. 4 g	Approx. 7 g

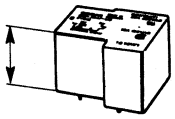
Classification		Power drive				
Model		G4U		G6D	G6B	
Features		Widely employed in air conditioners, fan heaters, and other devices.		Slim, miniature relay, capable of relaying programmable controller and temperature controller outputs.	Subminiature relay that switches up to 5-A.	
Appearance **Dimensions (L x W)**		 22.5 x 12.5 max.		 17.5 x 6.5 max.	 20 x 10 max.	 20 x 11 max.
Contact ratings	**Contact form**	SPDT		SPST-NO	SPST-NO	DPST-NO DPST-NC
	Contact type	Single		Single	Single	
	Contact material	Ag	AgCdO	AgCdO	AgCdO	
	Resistive load (cosϕ = 1)	2 A at 110 VAC; 1 A at 220 VAC; 2 A at 28 VDC	5 A at 110 VAC; 2.5 A at 220 VAC; 5 A at 28 VDC	5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	
	Max. switching current (A) (under resistive load) **Min. permissible load (mA)**					
Coil ratings	**Rated voltage**	5 to 24 VDC		5 to 24 VDC	5 to 24 VDC	
	Power consumption	360 mW		200 mW	200 mW	300 mW
Life expectancy	**Electrical (under rated load)**	100,000 operations min.		100,000 operations min. (5 A load) 300,000 operations min. (2 A 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 contact**	2,000 VAC		3,000 VAC	3,000 VAC	
	Between contacts of different polarity	---		---	---	2,000 VAC
	Between contacts of same polarity	750 VAC		750 VAC	1,000 VAC	
	Between set and reset coils	---		---	250 VAC	---
Ambient temperature (operating)		–25°C to 70°C		–25°C to 70°C	–25°C to 70°C	
Variations		• Flux protection • PCB terminal		• Plastic-sealed	• Double/single-winding latching (SPST-NO) • Plastic-sealed • Plug-in terminal	
Magazine packaging		----		---	20 relays/magazine	
Approved standards		UL, CSA, IEC (TÜV)		UL, CSA, IEC (TÜV)	UL, CSA, SEV, IEC (TÜV)	
Weight		Approx. 8.9 g		Approx. 3 g	Approx. 3.5/4.5 g	

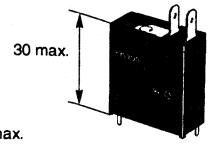
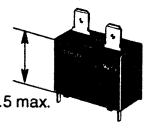
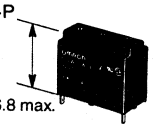
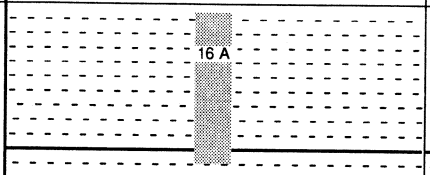
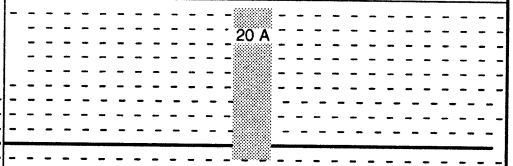
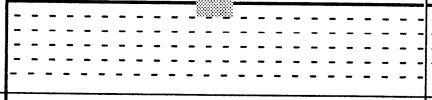
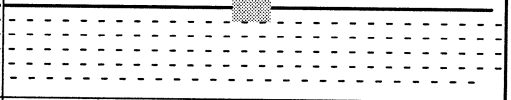
Selection Guide

Classification		Power drive		
Model		G5L(E)	G5P(E)	G5C(E)
Features		Both 5-A and 10-A models available. A cubic, single-pole power relay.	A miniature power relay that withstand up to 5-A at 10-kV.	Flat power relays that switch 10-A or 15-A loads.
Appearance **Dimensions (L x W)**		 22.5 x 16.5 max.	 24.3 x 9.7 max.	 22 x 16 max.
Contact ratings	**Contact form**	SPST-NO, SPDT	SPST-NO	SPST-NO
	Contact type	Single	Single	Single
	Contact material	AgCdO	AgSnIn	AgCdO
	Resistive load (cosϕ = 1)	5 A at 120 VAC; 5 A at 30 VDC / 10 A at 120 VAC; 8 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC / 10 A at 250 VAC; 10 A at 30 VDC	10 A at 250 VAC; 10 A at 30 VDC / 15 A at 110 VAC
	Max. switching current (A) (under resistive load) **Min. permissible load (mA)**			
Coil ratings	**Rated voltage**	3 to 48 VDC	5 to 24 VDC	5 to 24 VDC
	Power consumption	400 mW	530 mW / 800 mW	150/200 mW
Life expectancy	**Electrical (under rated load)**	100,000 operations min.	100,000 operations min.	300,000 operations min. (10 A load) 100,000 operations min. (15 A load, DC load)
	Mechanical	10,000,000 operations min.	2,000,000 operations min.	20,000,000 operations min.
Dielectric strength	**Between coil and contact**	2,000 VAC	4,000 VAC	2,500 VAC
	Between contacts of different polarity	---	---	---
	Between contacts of same polarity	750 VAC	1,000 VAC	1,000 VAC
	Between set and reset coils	---	---	---
Ambient temperature (operating)		–25°C to 70°C (–25°C to 85°C for class-B)	–40°C to 70°C	–25°C to 70°C
Variations		• Flux protection • Plastic-sealed	• Flux protection	• Flux protection • Plastic-sealed • Quick-connect terminal
Magazine packaging		---	Possible	20 relays/magazine
Approved standards		UL, CSA, TÜV	UL, CSA, SEV, SEMKO, IEC (TÜV)	UL, CSA, SEV, SEMKO, IEC (TÜV)
Weight		Approx. 12 g	Approx. 11 g	Approx. 8 g (TP. Approx. 9.6 g)

Classification		Power drive					
Model		G6C		G2R		G4W	
Features		SPST-NO types break 10-A load; SPST-NO/-NC types break 8-A load.		General-purpose power relays (single-pole: 10-A; double-pole: 5-A).		10-kV impulse and 4-kV withstand voltages for power supply switching applications.	
Appearance **Dimensions (L x W)**				 			
Contact ratings	**Contact form**	SPST-NO	SPST-NO/-NC	SPST-NO, SPDT	DPST-NO, DPDT	SPST-NO	DPST-NO
	Contact type	Single		Single		Single	
	Contact material	AgCdO		AgCdO		AgCdO	
	Resistive load (cosϕ = 1)	10 A at 250 VAC; 10 A at 30 VDC	8 A at 250 VAC; 8 A at 30 VDC	10 A at 250 VAC; 10 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	15 A at 250 VAC; 15 A at 24 VDC	10 A at 250 VAC; 10 A at 24 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1						
	Min. permissible load (mA) 100 10 1 0.1 0.01						
Coil ratings	**Rated voltage**	3 to 24 VDC		5 to 100 VDC, 12 to 240 VAC		12 to 100 VDC	
	Power consumption	200 mW		DC: 530 mW; AC: 900 mVA		800 mW	
Life expectancy	**Electrical (under rated load)**	100,000 operations min.		100,000 operations min.		100,000 operations min.	
	Mechanical	50,000,000 operations min.		DC: 20,000,000 operations min. AC: 10,000,000 operations min.		5,000,000 operations min.	
Dielectric strength	**Between coil and contact**	2,000 VAC		5,000 VAC		4,000 VAC	
	Between contacts of different polarity	---	2,000 VAC	---	3,000 VAC	---	2,000 VAC
	Between contacts of same polarity	1,000 VAC		1,000 VAC		1,500 VAC	
	Between set and reset coils	250 VAC		1,000 VAC		---	
Ambient temperature (operating)		–25°C to 70°C		–40°C to 70°C		–25°C to 55°C	
Variations		• Double/single-winding latching • Flux protection • Plastic-sealed		• Flux protection • Plastic-sealed • Plug-in terminal		• Enclosed • Quick-connect terminal (No.187)	
Magazine packaging		Possible		Possible		Not possible	
Approved standards		UL, CSA, VDE, SEV, IEC (TÜV)		UL, CSA, SEV, SEMKO, IEC (TÜV), IEC (VDE)		UL, CSA, VDE (VDE), VDE (TÜV), SEV, SEMKO, DEMKO	
Weight		Approx. 5.6 g		Approx. 17 g		Approx. 29 g	

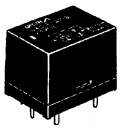
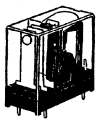
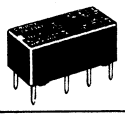
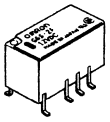
Selection Guide

Classification		Power drive		
Model		G8P		
Features		Small, low-cost 30-A power relay for PCB use.		
Appearance **Dimensions (L x W)**		21.8 max.  33.9 x 28.2 max.		
Contact ratings	**Contact form**	SPST-NO	SPST-NC	SPDT
	Contact type	Single		
	Contact material	AgCdO		
	Resistive load (cosϕ = 1)	30 A at 250 VAC; 20 A at 28 VDC	10 A at 250 VAC; 10 A at 28 VDC	20/10 A at 250 VAC; 20/10 A at 28 VDC
	Max. switching current (A) (under resistive load) 10 8 5 3 2 1 0.5 0.3 0.1	30 A	15 A	10 A
	Min. permissible load (mA) 100 10 1 0.1 0.01	500 mA	500 mA	500 mA
Coil ratings	**Rated voltage**	5 to 48 VDC		
	Power consumption	900 mW		
Life expectancy	**Electrical (under rated load)**	100,000 operations min.		
	Mechanical	10,000,000 operations min.		
Dielectric strength	**Between coil and contact**	1,500 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 70°C (Class B insulation type: –55°C to 85°C) (Class F insulation type: –55°C to 105°C)		
Variations		• Plastic-sealed • Dust cover • Open		
Magazine packaging		---		
Approved standards		UL, CSA		
Weight		Approx. 30 g (sealed), approx. 20 g (open)		

Classification		Power drive	Power drive	
Model		G5J	G4A	
Features		Ideal for microwave oven magnetrons and heater switching.	Miniature, single-pole relay with 80-A surge current and 20-A switching current.	
Appearance **Dimensions (L x W)**		 29 x 13 max.	G4A-1A  30.5 x 16 max.	G4A-1A-P  30.5 x 16 max.
Contact ratings	**Contact form**	SPST-NO	SPST-NO	
	Contact type	Single	Single	
	Contact material	AgCdO	AgCdO	
	Resistive load (cosϕ = 1)	16 A at 250 VAC 16 A at 30 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			
	Min. permissible load (mA) 100 10 1 0.1 0.01			
Coil ratings	**Rated voltage**	5 to 48 VDC	5 to 24 VDC	
	Power consumption	700 mW	900 mW	
Life expectancy	**Electrical (under rated load)**	100,000 operations min.	100,000 operations min.	
	Mechanical	2,000,000 operations min.	1,000,000 operations min.	
Dielectric strength	**Between coil and contact**	4,000 VAC	4,500 VAC	
	Between contacts of different polarity	---	---	
	Between contacts of same polarity	1,000 VAC	1,000 VAC	
	Between set and reset coils	---	---	
Ambient temperature (operating)		–25°C to 70°C	–25°C to 55°C	
Variations		---	• Flux protection	
Magazine packaging		Not possible	Not possible	
Approved standards		UL, CSA, IEC (TÜV)	UL, CSA, IEC (TÜV)	
Weight		Approx. 22.5 g	Approx. 23 g	22 g

Technical Information

■ Relay Classification

Model	Mounting	Enclosure Rating	Features
G4S 	Discrete	Plastic-unsealed	Designed for manual soldering.
G2R 		Flux protection	Designed inhibits flux intrusion into the casing from the terminals during soldering.
G6A 		Plastic-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

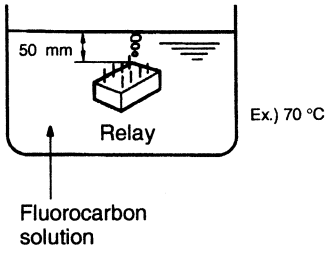
Relays of this type are intended for manual soldering. No measures are taken against penetration of flux and cleaning solvent into the relay. This type of relay cannot be immersion-cleaned.

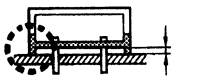
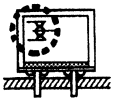
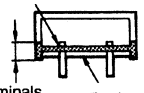
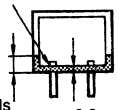
Flux-protection Relays

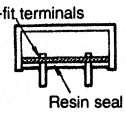
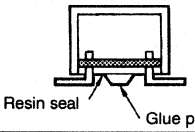
Special design construction prevents flux from penetrating into the relay housing, for example, due to capillary action up the terminals when the relay is soldered onto a PCB. This type of relay also cannot be immersion-cleaned.

Plastic-sealed Relays

Plastic-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	 Terminals separated from PCB	Contacts located at upper part of relay case 	Press-fit terminals  Terminals separated from PCB Resin seal	Inserted terminals  Terminals separated from PCB 0.3 mm min. base thickness
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	

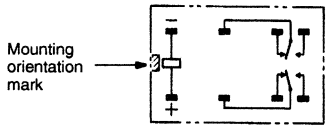
Classification	Plastic-sealed	Surface-mounting
Construction		
Features	Terminals are separated from PCB surface when relay is mounted.	Terminal and base, as well as the base and casing, are sealed with adhesive; the L-shaped terminals and adhesive pads allow temporary fixing to the board.
Automatic flux 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.

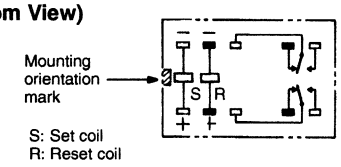
Terminal Arrangement/ Internal Connections (Bottom View)



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.

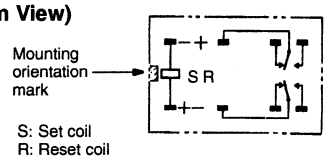
Terminal Arrangement/ Internal Connections (Bottom View)



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

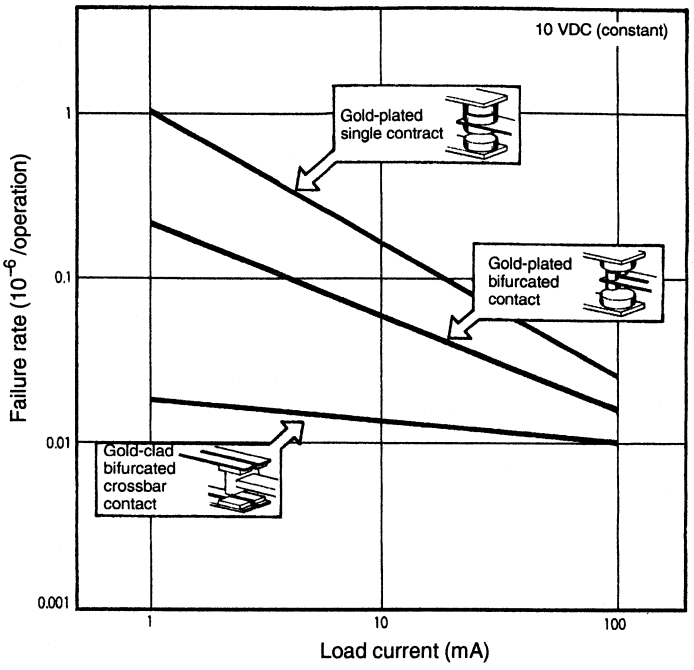
Some relays are provided with a light-emitting diode (LED), wired in parallel with the coil. This permits a fast-check of the relay's operating status.

■ 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



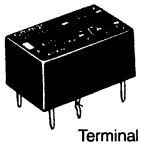
■ Terminals

Straight PCB Terminals

PCB terminals are normally straight.

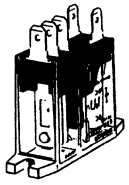
Self-clinching (S-shaped) PCB Terminals

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.

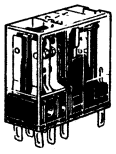


Terminal

Quick-connect Terminals

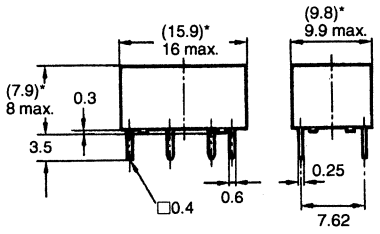


Plug-in Terminals



■ Dimensions

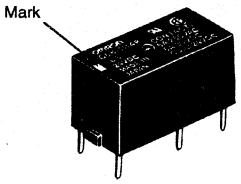
For miniature relays, the maximum dimensions and the average values ( ) marked with an asterisk are provided to aid the customer in designing.



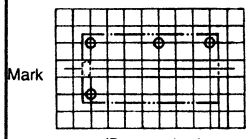
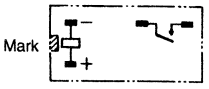
*Average value

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.

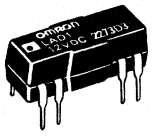


On dimensional drawings in all OMRON literature this mark is left-oriented. Mounting holes, terminal arrangements, and internal connections follow this alignment. The following two symbols are used to represent the orientation mark.

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

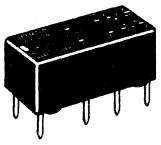
Terminal Arrangement/Internal Connections Top View

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.



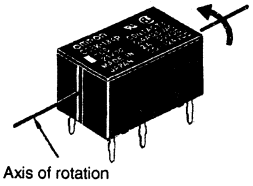
Bottom View

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

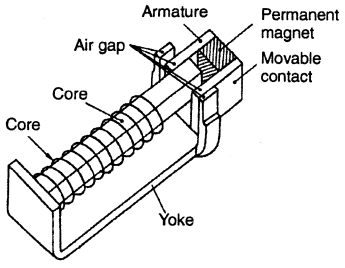
The bottom view shown in the catalog or data sheet is rotated in the direction indicated by the arrow, with the coil always on the left.



■ 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.

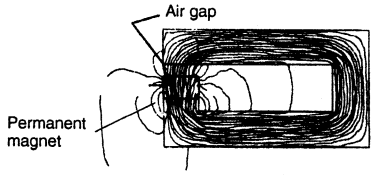
This unique relay construction maximizes electrical and permanent magnet energy. A high-efficiency magnet adds to the magnetic flux of the relay coil, which also allows for tighter packing of relay parts. Relays having such a coil are known as "polarized relays." Details of construction are shown below.



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

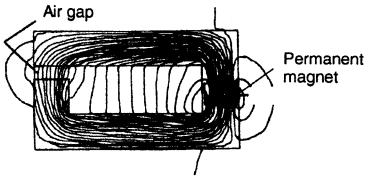
A permanent magnet is placed in the vicinity of the "working gaps." The flux energy of this permanent magnet complements that of the electrical coil. This increased efficiency enables the mechanism holding the contacts closed to ultimately switch larger loads, and at the same time reduces the power consumed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

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



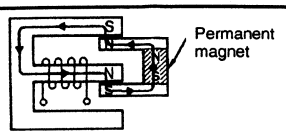
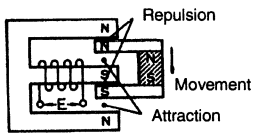
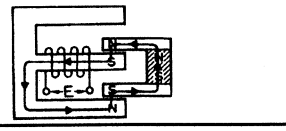
Conventional Relay Coil

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.



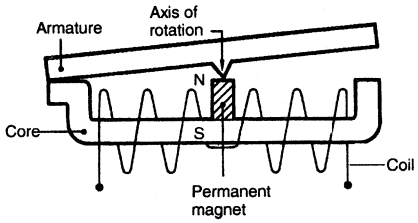
When the operating voltage is removed from the coil, the collapse of the magnetic flux created by the permanent magnet and the electrical coil provides the force to return the relay contacts to the reset position. Note the flux path and magnet polarity in the table below.

Operating Principle

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

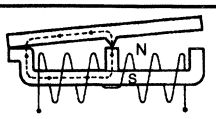
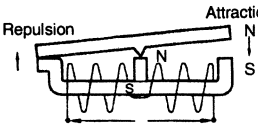
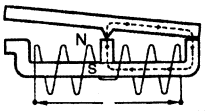
Super Moving Loop System

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 permanent magnet.
Transition from release to operation (operating voltage supplied)		The armature see-saws due to the attraction and repulsion 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

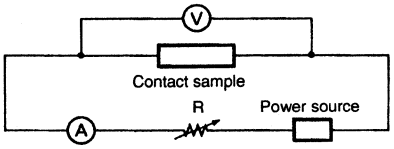
NO	NC	DT (NO/NC)	MBB
			

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. This value is determined by measuring the voltage drop across the contacts by applying test currents as shown in the table below.

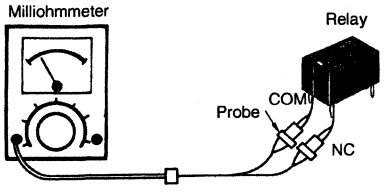


A: Ammeter
V: Voltmeter
R: Variable resistor

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 Capacity

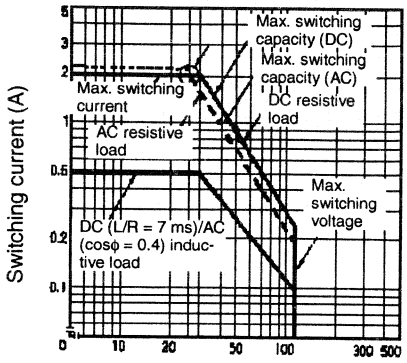
The maximum value of the load capacity which can be switched without problem. When using a relay, do not exceed this value. For example, when maximum switching voltage V_1 is known, maximum switching current I_1 can be obtained at the point of intersection on the characteristic curve "Maximum switching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

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

$$\text{Maximum switching current } (V_1) = \frac{\textit{Max. switching capacity [W(VA)]}}{\textit{Max. switching voltage (V1)}}$$

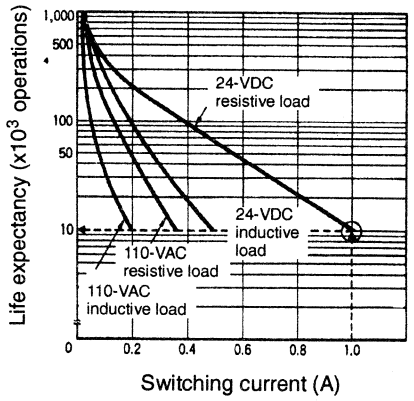
For instance, if the maximum switching voltage = 40 V
Maximum switching current = 2 A (see circled point on graph below.)

Maximum Switching Capacity



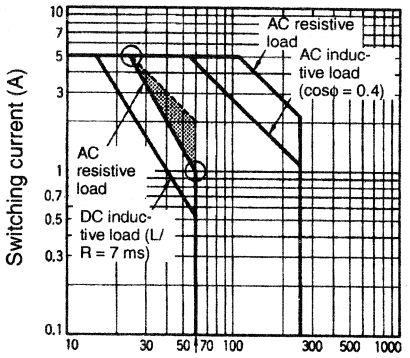
The life expectancy of the relay can be determined from the "Life expectancy" curve shown below, based on the rated switching current (I_1) obtained above. For instance, the electrical life expectancy at the obtained maximum switching current of 2 A is slightly over 300,000 operations (see circled point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

Life Expectancy



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 Capacity



Minimum Permissible Load

The minimum permissible load indicates the lower limit of the switching capability of a relay. 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 minimum permissible load 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

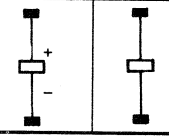
The number of contact circuits. See "*Contact Form*" for reference.

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

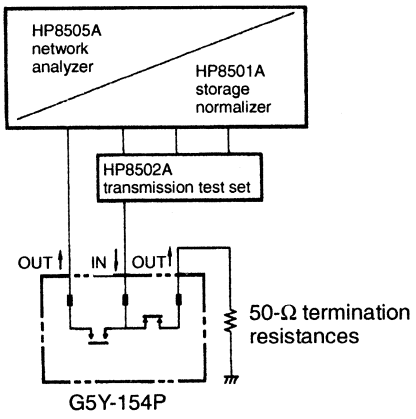
Note that normally a leakage current of 3 mA is detected; however, a leakage current of 1 mA to 10 mA may be detected on occasion.

Life Expectancy

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.



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)

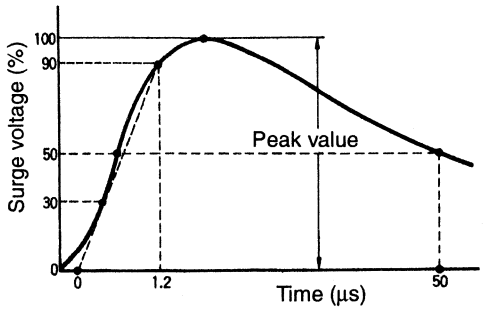
The power of a high-frequency signal that can be switched.

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 life expectancies.

Life Expectancy

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)

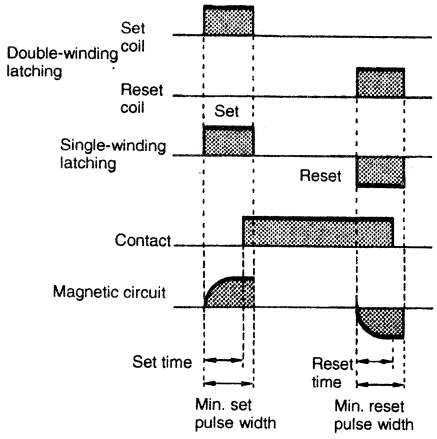
The time that elapses from the moment a relay coil is de-energized until the NC contacts have closed, at an ambient temperature of 23°C. (With a relay having SPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For 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:

Set 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.

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, eddycurrent 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 Operating 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:

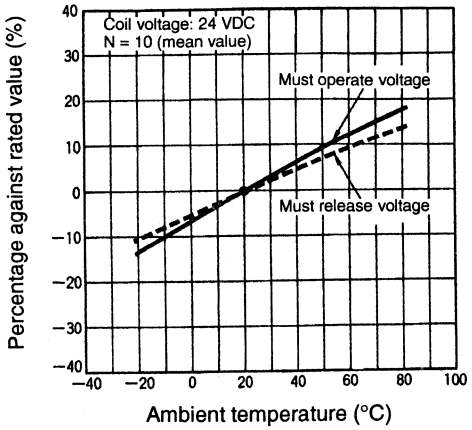
Rated values of Model LZN2 taken from catalog or data sheet
Rated voltage: 12 VDC
Coil resistance: 500 Ω
Must operate voltage: 80% max. of rated voltage at 23°C coil temperature

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 operating 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 energization of 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.

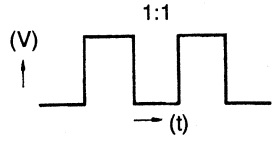
Coil Temperature Rise

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 contact 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 expectancy, 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

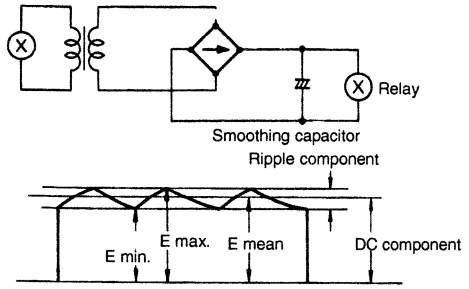
$$t = \frac{R2 - R1}{R1}(234.5 + T1) + T1\ [°C]$$

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.



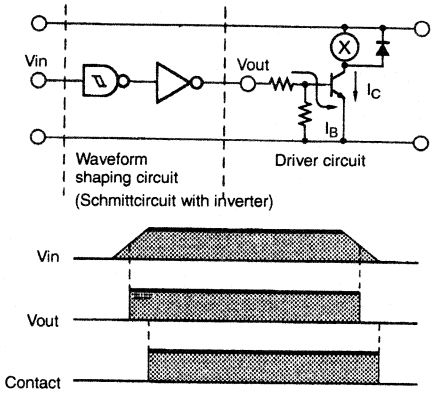
$$Ripplepercentage = \frac{Emax. - Emin.}{Emean} 100$$

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.

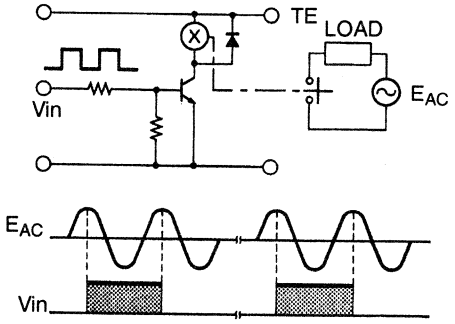
Relay Driving Signal Waveform

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 expectancy 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:



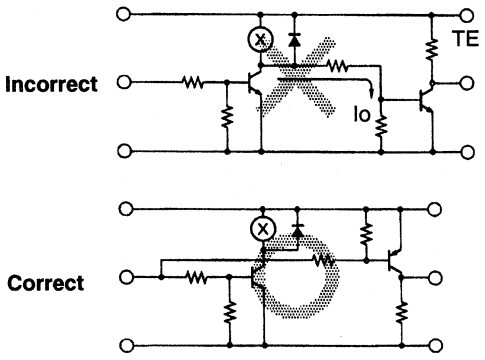
If the Schmitt trigger circuit is configured of transistors, a residual voltage may exist in the output of the circuit. Therefore, confirm that the rated voltage is present across the relay coil, or that the residual voltage drops to zero when the relay releases. When an IC (e.g., TC74HC132P) is used,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

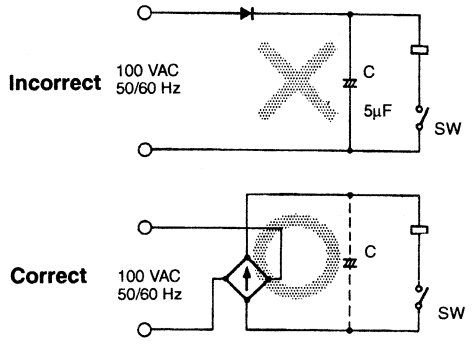
Dark Current in OFF Time



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.

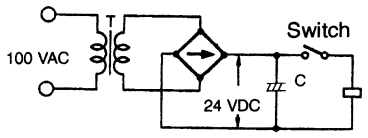


Voltage Considerations for AC Relays

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.

Contact 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 capacity 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.

Contact 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

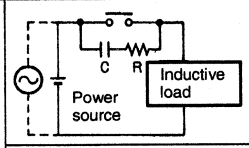
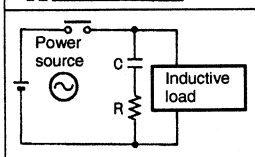
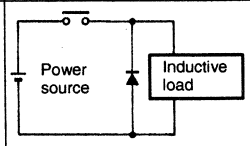
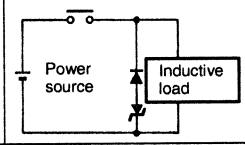
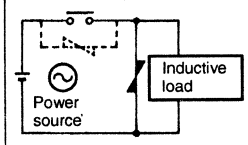
Selection of an appropriate contact material according to the load to be opened or closed is important. Several contact materials and their properties are listed below.

Contact Materials and Features

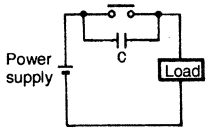
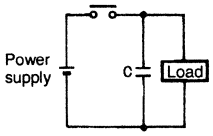
P. G. S. Alloy	This material has excellent corrosion resistance and is suitable for very small current circuits. (Au : Ag : Pt = 69 : 25 : 6)
AgPd	This material exhibits good corrosion and sulfur resistance. In a dry circuit, it attracts organic gas to generate a polymer, therefore it is usually plated 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.
AgCdO	This material exhibits the same high electric conductivity as silver, low contact resistance, and excellent deposition resistance. It easily forms sulfide film in a sulfide gas environment.
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.
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 expectancy 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 AC	Applicability DC	Features and remarks	Element selection
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 contact current R: 0.5 to 1 Ω for 1-V contact 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.

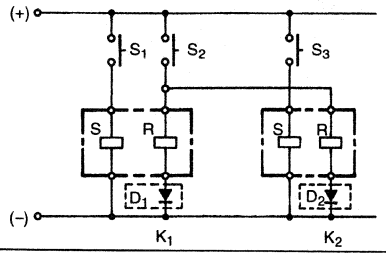
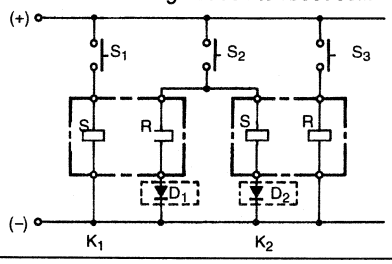
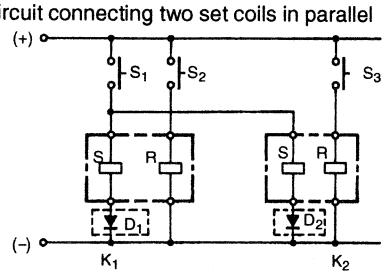
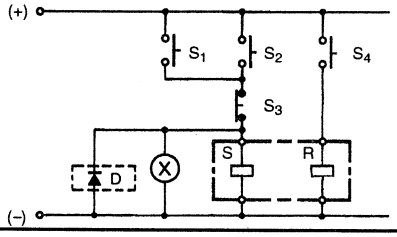
Avoid use under conditions where excessive surge-generating sources exist in the coil power source.

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

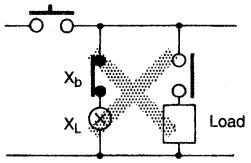
Drive Circuit (Double-winding Relays G5AK, G6AK, G6BK, etc.)

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

<table>
<tr>
<td>Circuit connecting two reset coils in parallel.
 
</td>
<td>Circuit connecting set coil to reset coil.
 
</td>
</tr>
<tr>
<td>Circuit connecting two set coils in parallel
 
</td>
<td>Circuit connecting set coil of latching relay in parallel with another relay coil.
 
</td>
</tr>
</table>

Incorrect Use:



X_L: Latching relay
X_b: NC contact of relay

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:

■ 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 plastic-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.

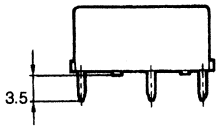
PCB Materials

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

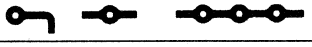
Select the appropriate terminal hole and land diameters from the following table, based on the PCB mounting hole drawing. Land diameters may be reduced to less than those listed below if the through-hole connection process is to be employed.

Terminal Hole and Land Diameters

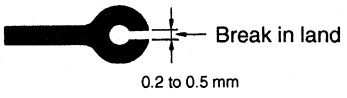
Terminal hole diameter		Minumum land diamter
Normal	Tolerance	
0.6 mm	±0.1 mm	1.5 mm
0.8 mm		1.8 mm
1.0 mm		2.0 mm
1.2 mm		2.5 mm
1.3 mm		2.5 mm
1.5 mm		3.0 mm
1.6 mm		3.0 mm
2.0 mm		3.0 mm

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.

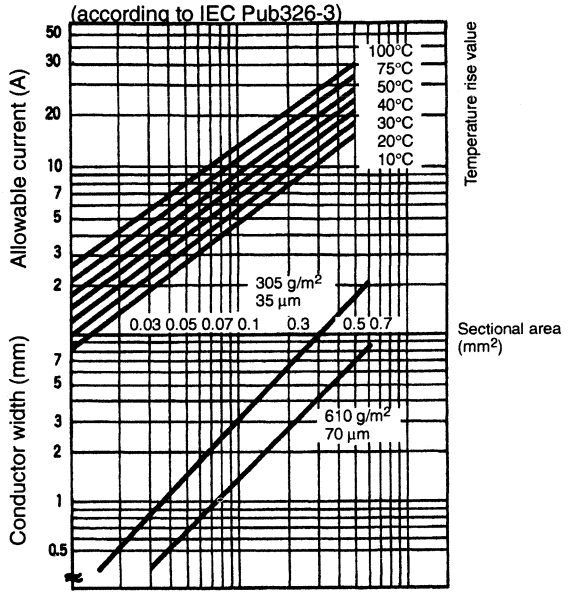


Conductor Width and Thickness

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

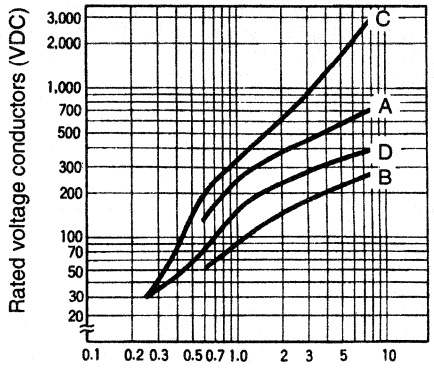
(according to IEC Pub326-3)



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

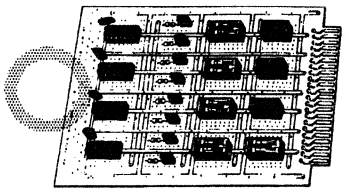
Although the PCB itself is not usually a source of vibration or shock, it may simplify or prolong the vibration by resonate with external vibrations or shocks. Securely fix the PCB, paying attention to the following points.

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.)

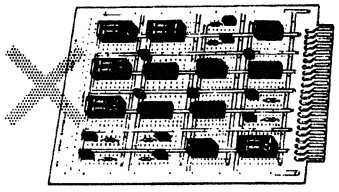
Mounting Position

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.

Correct



Incorrect



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 expectancy, 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 Expectancy

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	Plastic-sealed
Magazine-packaged relay	NO	YES	YES
Self-clinching relays			

Process 2: Flux Application

To apply flux to a flux protection or plastic-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

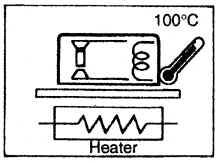
Unsealed	Flux protection	Plastic-sealed
NO	YES	YES

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 100°C maximum within a period of approximately one minute 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	Plastic-sealed
NO	YES	YES

Process 5: Soldering

Flow soldering is recommended to assure a uniform solder joint.

- Solder: JIS Z3282, H60, or H63*
- Solder temperature and soldering time: 250°C, 5 s max.
- Adjust the level of the molten solder so that the PCB is not flooded with solder.

Possibility of Automatic Soldering

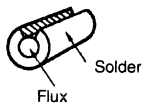
Unsealed	Flux protection	Plastic-sealed
NO	YES	YES

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.

- Solder: JIS Z3282, H60, or H63 (containing resin-type flux)
- 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
Sn	58.8%
Flux content	1.67%
Impurities	JIS Z3282 Class A
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	Plastic-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.

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

Fluxprotection	Plastic-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	Plastic-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. When cleaning the G2R or any other relay, the ambient temperature must be within the permissible ambient operating temperature range of the relay.

List of Cleaning Solvents

Solvent		Plastic-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	Plastic-sealed
Epoxy	YES
Urethane	YES
Silicone	NO
Fluorine	YES

Surface Mounting

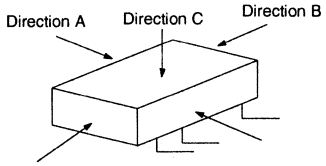
The following tables list the processes required for mounting a relay onto a PCB and the points to be noted in each process.

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.

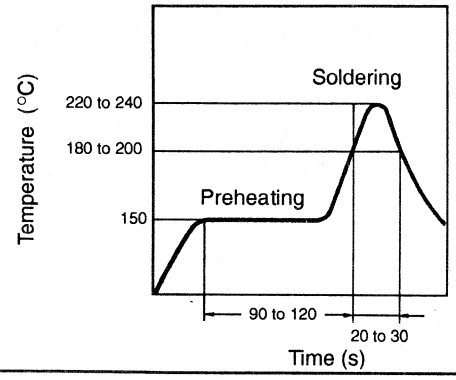
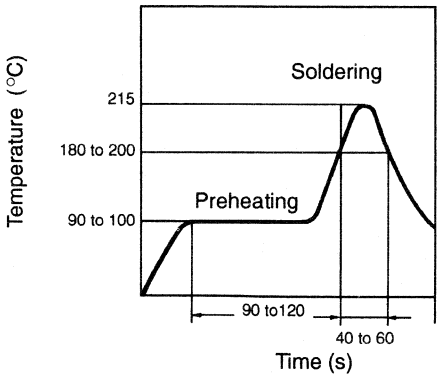
Process 3: Transportation

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 soldering)	VPS (vapor-phase soldering)
The following recommended soldering conditions show the temperature changes of the PCB surface. The conditions vary with the relay model. Do not put the relay in a cold cleaning solvent immediately after soldering or the seal of the relay may be damaged. **Recommended IRS Conditions (G6H-2F)**  	Do not put the relay in a cold cleaning solvent immediately after soldering or the seal of the relay may be damaged. **Recommended VPS Conditions (G6H-2F)** 

Process 5: Cleaning

Boiling cleaning and immersion cleaning are recommended.
Ultrasonic cleaning will have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning.

List of Cleaning Solvent

Solvent		Plastic-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)

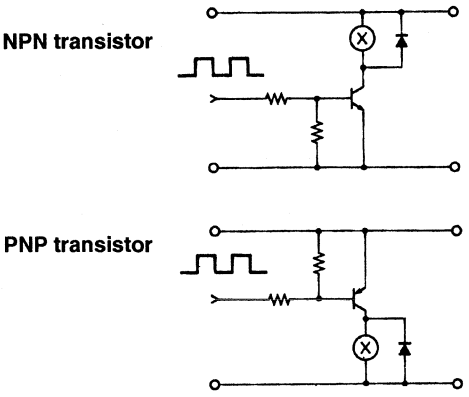
Note:
1. Consult your OMRON representative before using any other cleaning solvent. Do not use Freon-TMC-based, thinner-based, or gasoline-based cleaning solvents.
2. Worldwide efforts are being made at discontinuing the use of CFC-113-based (fluorochlorocarbon-based) and trichloroethylene-based cleaning 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.



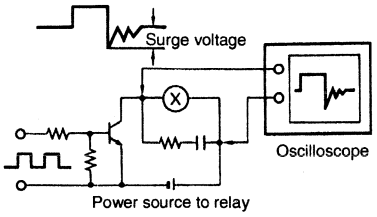
When the transistor is used in a emitter-follower configuration (i.e., the collector is grounded), give adequate consideration to the voltage across the collector and emitter. The required voltage must be applied to the relay.

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.

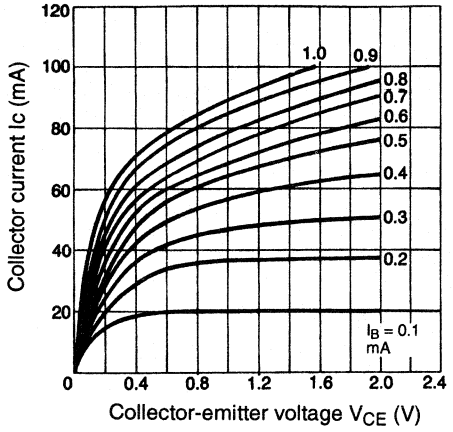
Absolute Maximum Ratings (NPN Transistor Ratings)

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.

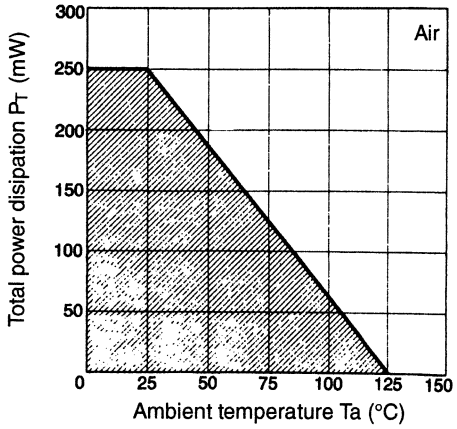
7. Using the following formula, calculate the power dissipated by the transistor to confirm that it is within the range of permissible power dissipation of the transistor.

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.)
$P_B = I_B \times 0.6$ 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.

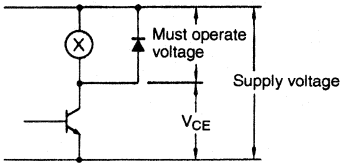
Total Power Dissipation vs. Ambient Temperature



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

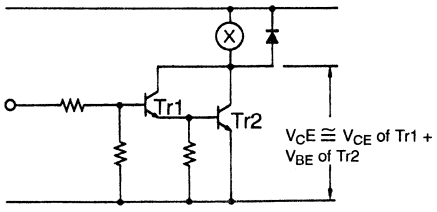
*Inversely proportional to voltage
**Often used V_{CED}: 35 to 60 V

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



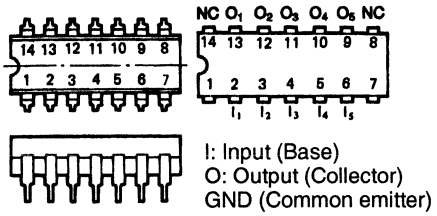
When the Darlington-connected transistors are used, however, the required value of V_{CE} is higher than when using a single transistor.

For this reason, consideration must be given to designing the total power dissipation and supply voltage for the second transistor, Tr2.

Driving by IC

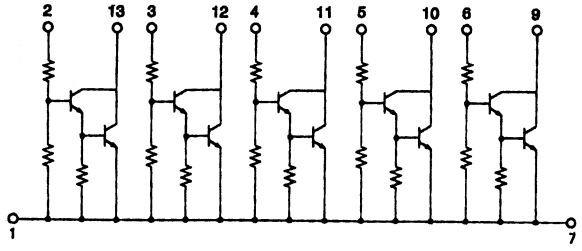
Recently, an IC on which multiple driving transistors are integrated has become available. On some occasions, the designing process of the circuit or PCB to drive multiple relays, a small-size solenoid, or a small-size lamp can be simplified by using such an IC. Consult the manufacturer of the IC to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

Dimensions Connection (Top View)



I: Input (Base)
O: Output (Collector)
GND (Common emitter)

Equivalent Circuit



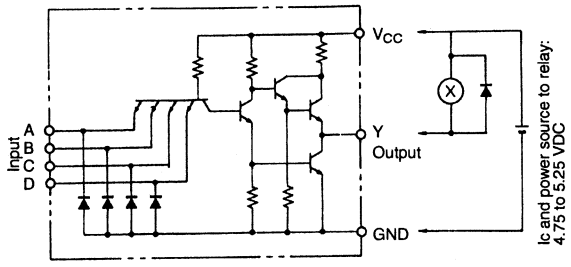
Driving by MOS IC

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

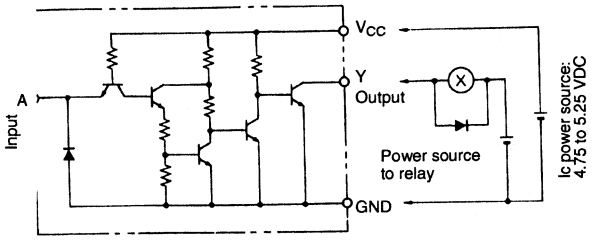
I_{OH} (high-level output current) < Rated current x must operate voltage (%)/200

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

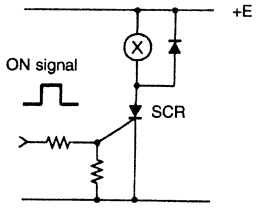
Classification	Texas Instruments	Motorola	Mitsubishi Electric Corporation	Hitachi, Ltd.	Matsushita	Characteristics			
Hex inverter buffer/driver	SN54ALS1004 SN74ALS1004	MC54F04 MC74F04	M74ALS1004P	---	---	5 V_{CC}	5.5 V_{OH}	0.5 V_{OL}	24/ 20 I_{OL} (see note)
	SN54ALS1005 SN74ALS1005 (see note)	---	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}
BCD-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

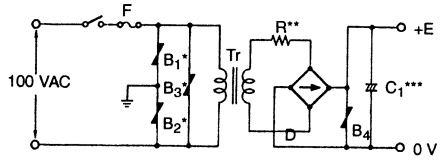
Consult the manufacturer of the switching device intended for use. In this case also, the maximum and minimum values of the must operate voltage can be determined in the same manner as described in Maximum Must Operate Voltage and Minimum Must Operate Voltage.

Example of Driving by SCR



Designing Power Circuits

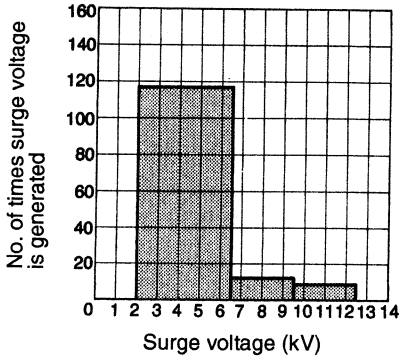
Since many documents and reference books on the power circuit are available, a detailed description is omitted here.



*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.



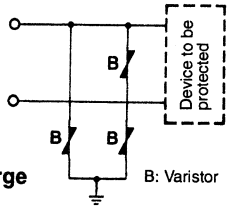
Note: This graph is plotted by measuring the surge voltage in the line of low-tension overhead wiring (cable length: 200 to 500 m).

Connection of Surge Suppressor

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

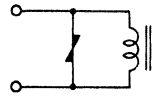
1. Place the surge suppressor near the device to be protected. For example, to protect a device from external surge, set the surge suppressor at the inlet of the device's power cable. To suppress an internal surge, the suppressor must be placed near the surge generating source.

External Surge



Internal Surge

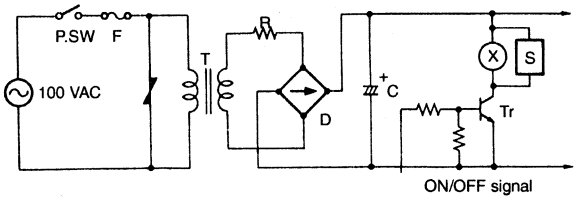
B: Varistor



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 $\sqrt{2}$ + a ≅ varistor voltage 200 V, for cutting the noise from the power cable)

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

C : Smoothing capacitor (Aluminum electrolytic capacitor)

S : Surge suppressor

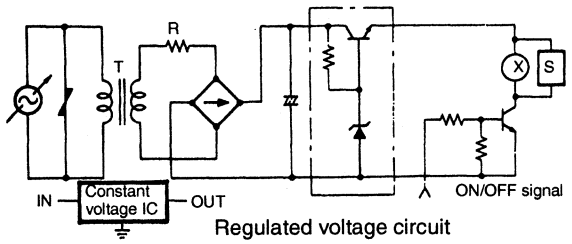
: Transistor for driving relay (Refer to Driving by transistor in "*Correct Use: Relays in Electronic Circuitry.*")

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 Operating Voltage.

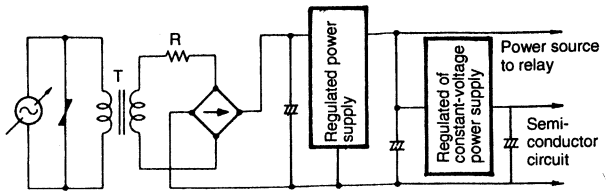
Countermeasures Against Supply Voltage Fluctuation

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

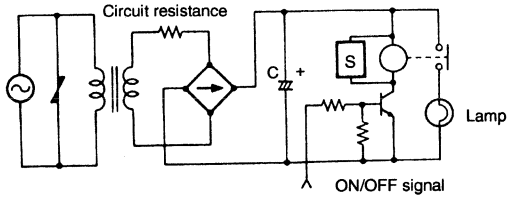


Regulated voltage circuit

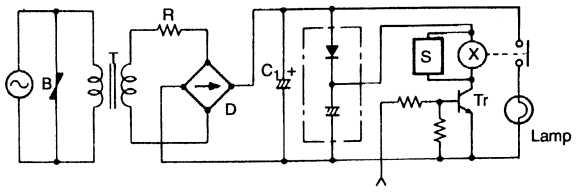
Relays consume more power than semiconductor elements. Therefore, the following circuit configuration is recommended to improve characteristics.



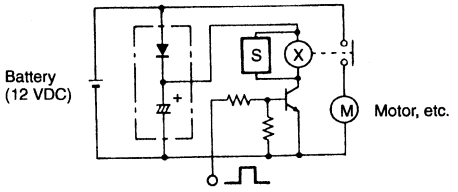
Countermeasures Against Inrush Current



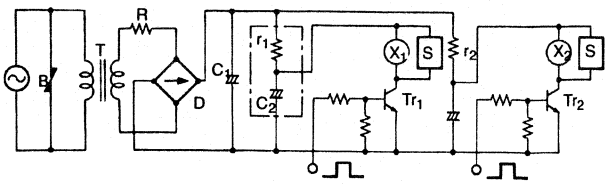
If a load such as a capacitor or lamp through which an inrush current flows is connected to the power source and contact of the relay, the supply voltage may drop when the contact is closed, causing the relay to abnormally release.
Increasing the capacity of the transformer or providing an additional 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.



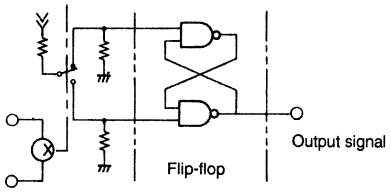
Power Consumption



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 operating 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.

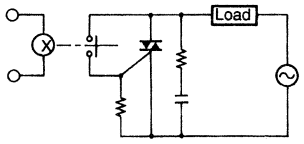
To Use Relay as Interface Input

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

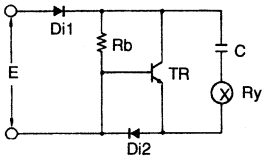
When the relay is used in combination with a thyristor or triac, the switching capacity of the relay can be improved. Moreover, arc and noise are suppressed, prolonging the relay's life.

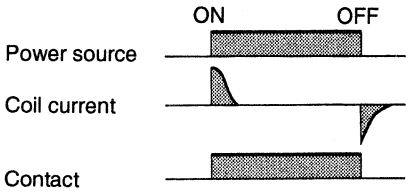


Designing Power-conserving Driver Circuit with Single-winding Latching Relay (PAT. 1239293)

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:

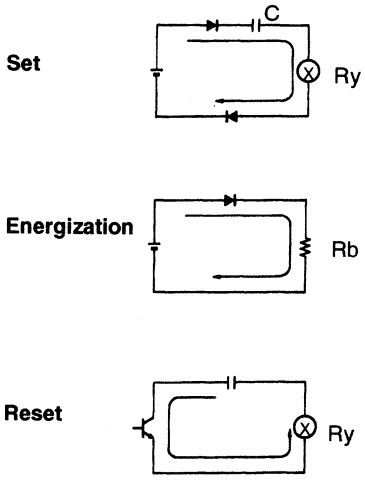
$$P = \frac{(E - VF)^2}{Rb}$$

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.

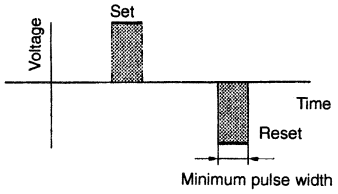
Reset

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

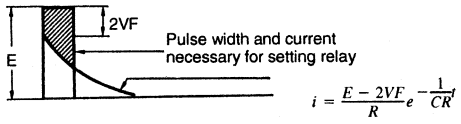
Generally, the latching relay is set and reset when a pulse having a square waveform is applied to it for a short time. The minimum pulse width required to set and reset the relay is predetermined.



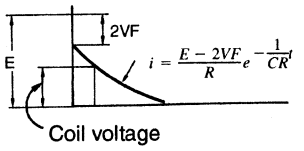
The charging current shown in the above equivalent circuit diagrams, however, has a sawtooth waveform that can be expressed by the following formula, because it is the primary circuit of C and R.

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

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.

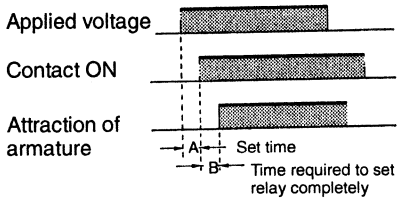


Therefore, the current must be applied to the relay as follows when designing this driver circuit.



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.

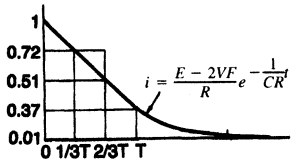


Therefore, it is apparent that time constant T obtained as the product of C and R must be equal to or longer than the sum of A and B. Actually, however, T should not be equal to the sum of A and B but must be longer than that to ensure the stable operation of the circuit. Thus,

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.

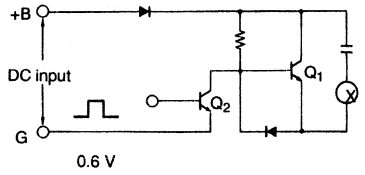
Determining Rb

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.

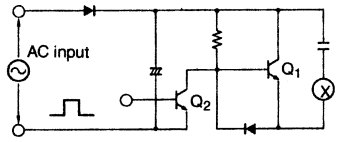
TR must be turned ON even when T equals the time constant.

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.

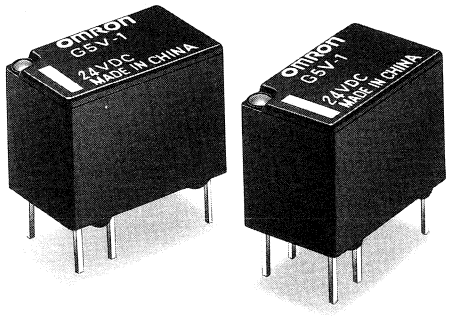
OMRON

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 capacity of 1 mA to 1 A.
- High sensitivity: 150 mW nominal coil power.
- Plastic-sealed construction.
- International 2.54-mm terminal pitch.
- Conforms to FCC Part 68 requirements for coil to contacts.



Ordering Information

Classification				Model
Contact form	Contact type	Contact material	Structure	
SPDT	Single crossbar	Ag + Au-clad	Plastic-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 50°C, 160% at 70°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.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	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, 60 VDC
Max. switching current	1 A
Max. switching capacity	62.5 VA, 30 W
Min. permissible load	1 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	5 ms max. (mean value: approx. 2.5 ms)
Release time	5 ms max. (mean value: approx. 0.9 ms)
Bounce time	Operate: approx. 0.2 ms Release: approx. 5 ms
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	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 Hz, 3.3-mm double amplitude Malfunction: 10 to 55 Hz, 3.3-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	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) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 2 g

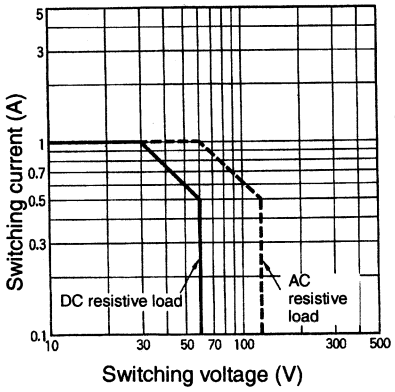
■ Approved Standards

UL478, 1950 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR24825)

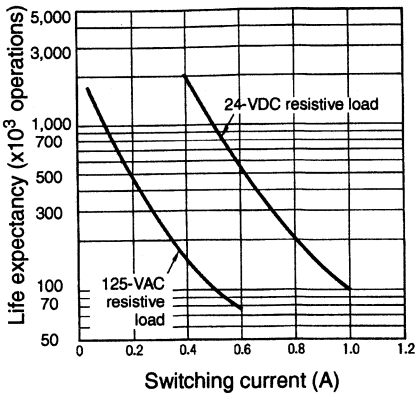
Model	Contact form	Coil ratings	Contact ratings
G5V-1	SPDT	3 to 24 VDC	0.5 A, 125 VAC (general use) 0.3 A, 60 VDC (resistive load) 1 A, 30 VDC (resistive load)

Engineering Data

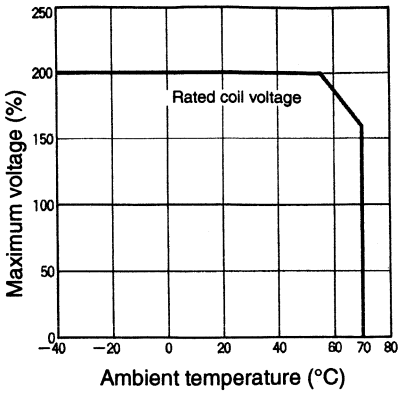
Max. Switching Capacity



Life Expectancy

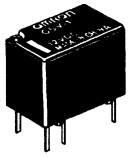


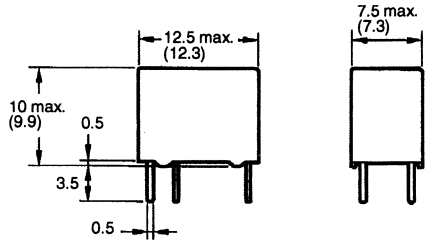
Ambient Temperature vs. Maximum Voltage



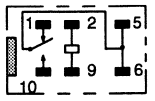
Dimensions

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: ▨ □

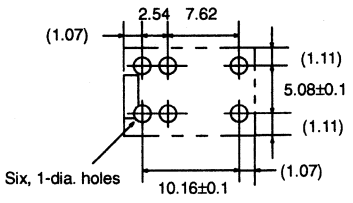




Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)



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

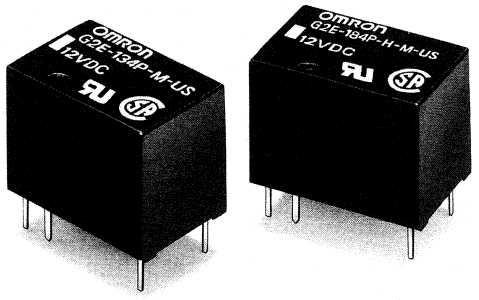
Cat. No. K48-E1-1C

OMRON

PCB Relay | G2E

Miniature, Low-cost, Single-pole PCB Relay

- Miniature: 15.5 x 10.5 x 11.5 mm (L x W x H).
- Low power consumption: 200 mW.
- Bifurcated crossbar contacts.
- Gold-clad contacts.
- Plastic-sealed type available.
- Ideal for telecommunications equipment and security systems.



Ordering Information

Contact		General-purpose	High-sensitivity
		Plastic-sealed	Plastic-sealed
SPDT	Single crossbar	G2E-184P-M-US	G2E-184P-H-M-US
	Bifurcated crossbar	G2E-134P-M-US	G2E-134P-H-M-US

Note: When ordering, add the rated coil voltage to the model number.
Example: G2E-184P-M-US 12 VDC
Rated coil voltage

Model Number Legend:

G2E - □ □ □ □ - □ - □ - □ □ VDC
1 2 3 4 5 6 7 8

1. **Contact Form**
   1: SPDT
2. **Contact Type**
   3: Bifurcated crossbar
   8: Single crossbar
3. **Enclosure Rating**
   4: Plastic-sealed
4. **Terminals**
   P: Straight PCB
5. **Power Consumption**
   None: General-purpose (450 mW)
   H: High-sensitivity (200 mW)
6. **Classification**
   M: General-purpose
7. **Approved Standards**
   US: UL, CSA certified
8. **Rated Coil Voltage**
   1.5, 3, 5, 6, 9, 12, 24 VDC

Specifications

■ Coil Ratings

General-purpose Relays

Rated voltage		1.5 VDC	3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		300 mA	150 mA	89.3 mA	75 mA	50 mA	37.5 mA	18.8 mA
Coil resistance		5 Ω	20 Ω	56 Ω	80 Ω	180 Ω	320 Ω	1,280 Ω
Coil inductance	**Armature OFF**	0.005	0.017	0.044	0.067	0.137	0.229	0.94
(H) (ref. value)	**Armature ON**	0.009	0.034	0.091	0.136	0.297	0.496	2.1
Must operate voltage		70% max. of rated voltage						
Must release voltage		10% min. of rated voltage						
Max. voltage		120% of rated voltage at 23°C, 110% at °60C						
Power consumption		Approx. 450 mW						

High-sensitivity Relays

Rated voltage		1.5 VDC	3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current		125 mA	66.7 mA	41.7 mA	33.3 mA	22.5 mA	17.1 mA	8.6 mA
Coil resistance		12 Ω	45 Ω	120 Ω	180 Ω	400 Ω	700 Ω	2,800 Ω
Coil inductance	**Armature OFF**	0.005	0.022	0.055	0.083	0.165	0.228	1.465
(H) (ref. value)	**Armature ON**	0.009	0.035	0.092	0.129	0.303	0.504	2.287
Must operate voltage		80% max. of rated voltage						
Must release voltage		10% min. of rated voltage						
Max. voltage		140% of rated voltage at 23°C, 130% at 65°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.

■ Contact Ratings

Item	Single crossbar	Bifurcated crossbar
Load	Resistive load (cosϕ = 1)	Resistive load (cosϕ = 1)
Rated load	0.5 A at 110 VAC; 1 A at 24 VDC	0.5 A at 110 VAC; 1 A at 24 VDC
Contact material	AgPd (Au-clad)	
Rated carry current	2 A	
Max. switching voltage	125 VAC, 60 VDC	
Max. switching current	1 A	
Max. switching capacity	120 VA, 30 W	120 VA, 30 W
Min. permissible load	1 mA at 5 VDC	0.1 mA at 0.1 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	General-purpose type: 5 ms max. (mean value: approx. 2.5 ms) High-sensitivity type: 7 ms max. (mean value: approx. 3.5 ms)
Release time	3 ms max. (mean value: approx. 0.8 ms)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric withstand voltage	500 VAC, 50/60 Hz for 1 min between coil and contacts 500 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 Hz, 3.3-mm double amplitude Malfunction: 10 to 55 Hz, 3.3-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: DC: 500,000 operations min. (1 A at 24 VDC resistive load) AC: 200,000 operations min. (0.5 A at 110 VAC resistive load) (at 1,800 operations/hr)
Ambient temperature	Operating: –25°C to 60°C (with no icing) (high-sensitivity type: –25°C to 65°C)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 3.7 g

■ Approved Standards

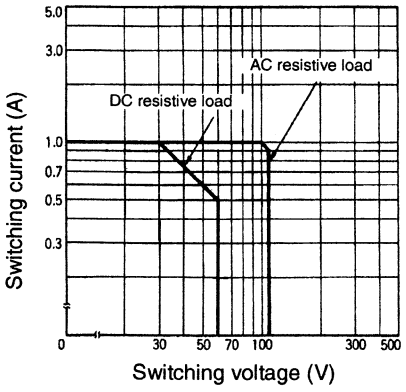
UL114, UL478, UL1950 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR34815-97)

Model	Contact form	Coil ratings	Contact ratings
G2E-184P-M-US G2E-184P-H-M-US G2E-134P-M-US G2E-134P-H-M-US	SPDT	1.5 to 24 VDC	0.5 A, 125 VAC (general use) 1 A, 28 VDC (resistive)

Engineering Data

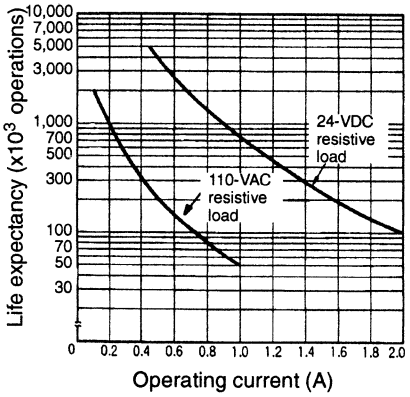
Max. Switching Capacity

G2E-184P-M-US



Life Expectancy

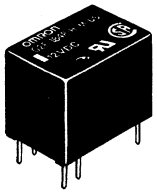
G2E-184P-M-US

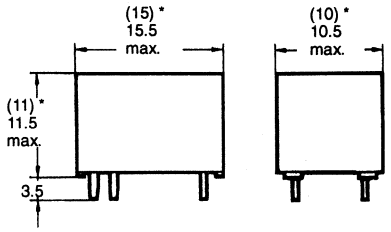


Dimensions

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

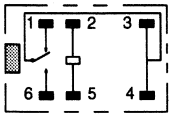
2. Orientation marks are indicated as follows: ▒ □





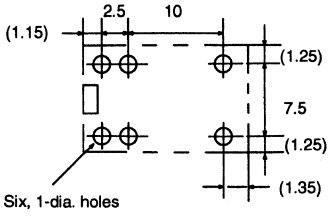
*Average value

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. K06-E1-9C

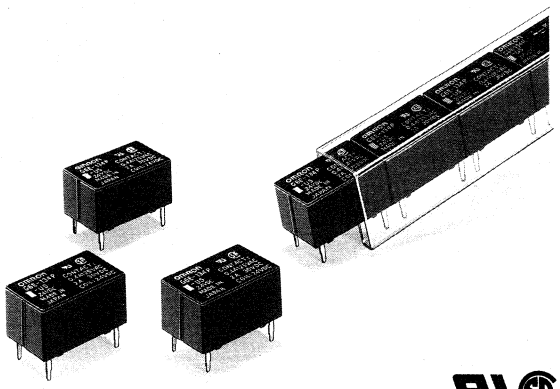
OMRON

PCB Relay

G6E

Subminiature, Sensitive SPDT Signal Switching Relay

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



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

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-clad) contact
   9: Bifurcated crossbar AgNi (Au-clad) contact
4. **Enclosure Rating**
   4: Plastic-sealed
5. **Terminals**
   P: Straight PCB
   C: Curved tail
6. **Approved Standards**
   US: UL, CSA certified
7. **Special Function**
   U: For ultrasonically cleanable
8. **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		155% of rated voltage at 50°C, 130% at °70C						140% of rated voltage at 50°C, 115% at 70°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		130% of rated voltage at 70°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			130% of rated voltage at 70°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.

■ 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-clad)	
Rated carry current	3 A	
Max. switching voltage	250 VAC, 220 VDC	
Max. switching current	3 A	3 A
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 μA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	50 mΩ max.
Operate (set*) time	5 ms max. (mean value: approx. 2.9 ms; 48 VDC type: approx. 2.4 ms)
Release (reset*) time	5 ms max. (mean value: approx. 1.3 ms)
Bounce time	Operate: 3 ms max. (mean value: 0.37 ms) Release: 3 ms max. (mean value: 1.12 ms)
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	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 Hz, 5-mm double amplitude Malfunction: 10 to 55 Hz, 3.3-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 300 m/s^2 (approx. 30G)
Life expectancy	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) Storage: –40°C to 70°C (with no icing)
Ambient humidity	35% to 85%
Weight	Approx. 2.7 g

*Minimum set and reset signals width is 7 ms min.

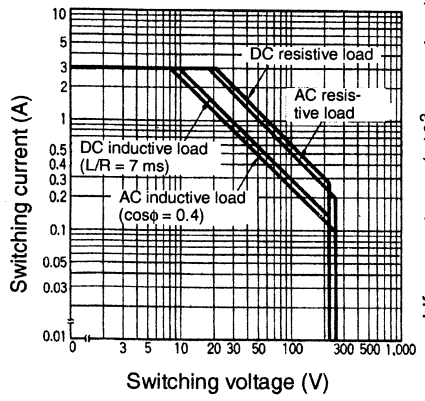
■ Approved Standards

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

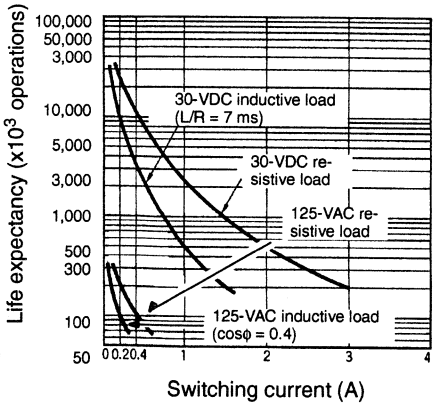
Contact form	Coil ratings	Contact ratings
SPDT	3 to 48 VDC	0.2 A, 250 VAC (general use) 0.6 A, 125 VAC (general use) 2 A, 30 VDC (resistive) 0.6 A, 125 VDC (resistive, Ag contact only)

Engineering Data

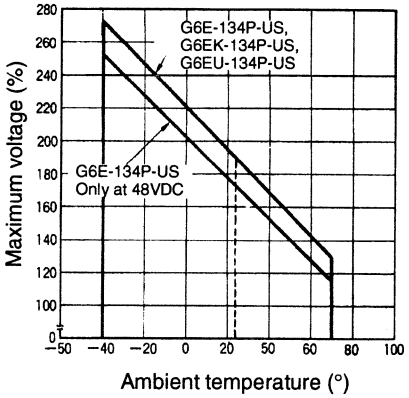
Max. Switching Capacity



Life Expectancy



Ambient Temperature vs. Maximum Voltage

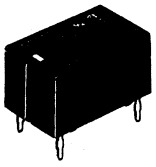


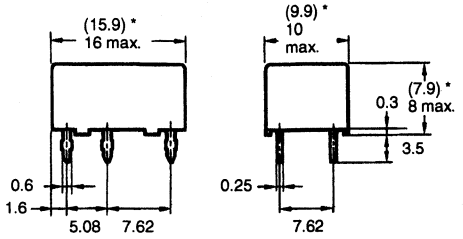
Dimensions

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

2. Orientation marks are indicated as follows:

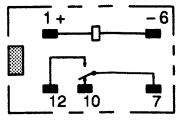
G6E-134P-US, G6E-194P-US



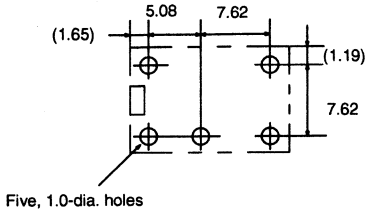


*Average value

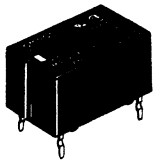
Terminal Arrangement/ Internal Connections (Bottom View)

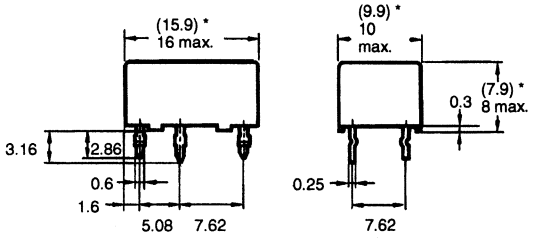


Mounting Holes (Bottom View)
Tolerance: ±0.1



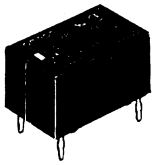
G6E-134C-US, G6E-194C-US

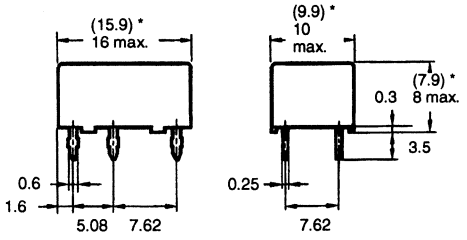




*Average value

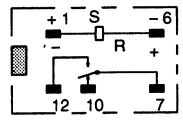
G6EU-134P-US, G6EU-194P-US



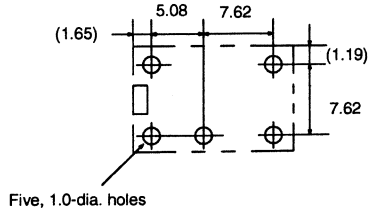


*Average value

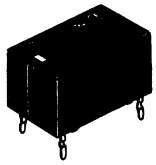
Terminal Arrangement/ Internal Connections (Bottom View)

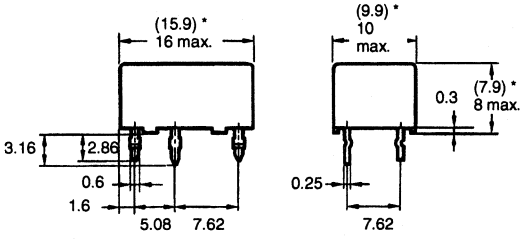


Mounting Holes (Bottom View)
Tolerance: ±0.1



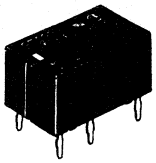
G6EU-134C-US, G6EU-194C-US

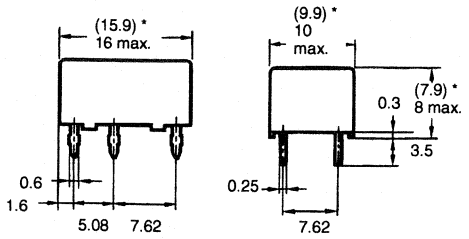




*Average value

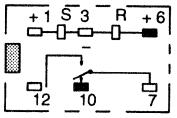
G6EK-134P-US,
G6EK-194P-US



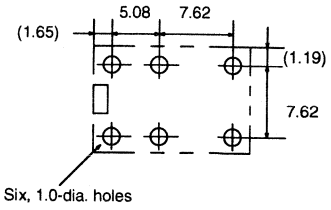


*Average value

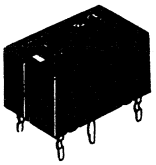
Terminal Arrangement/
Internal Connections
(Bottom View)

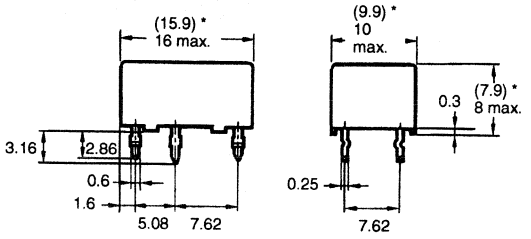


Mounting Holes
(Bottom View)
Tolerance: ±0.1



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





*Average value

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. K24-E1-5A

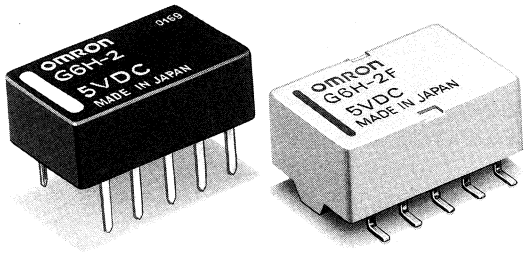
OMRON

PCB Relay

G6H

Ultracompact, Ultrasensitive 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.



Ordering Information

Classification			Single-side stable	Single-winding latching	Double-winding latching
DPDT	Plastic 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
Rated current		46.7 mA	28.1 mA	23.3 mA	15.5 mA	11.7 mA	8.3 mA
Coil resistance		64.3 Ω	178 Ω	257 Ω	579 Ω	1,028 Ω	2,880 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, 150% at 70°C					170% of rated voltage at 23°C, 130% at 70°C
Power consumption		Approx. 140 mW					Approx. 200 mW

Note: 48 VDC (single-side stable) model is also available. Consult OMRON for details.

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	Armature OFF	0.034	0.11	0.14	0.33	0.60	1.6
(H) (ref. value)	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, 140% at 70°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	Armature OFF	0.014	0.042	0.065	0.16	0.3	0.63
(H) (ref. value)	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% at 70°C					130% of rated voltage at 23°C, 110% at 70°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.

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)
Rated load	0.5 A at 125 VAC; 1 A at 30 VDC
Contact material	Ag (Au-clad)
Rated carry current	1 A
Max. switching voltage	125 VAC, 110 VDC
Max. switching current	1 A
Max. switching capacity	62.5 VA, 33 W
Min. permissible load	10 μA at 10 mVDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	50 mΩ max. (G6H-2-U: 100 mΩ max.; G6H-2F: 60 mΩ max.)
Operate (set) time	Single-side stable types: 3 ms max. (mean value: approx. 2 ms) Latching types: 3 ms max. (mean value: approx. 1.5 ms)
Release (reset) time	Single-side stable types: 2 ms max. (mean value: approx. 1 ms) Latching types: 3 ms max. (mean value: approx. 1.5 ms)
Bounce time	Operate: Approx. 0.5 ms Release: Approx. 0.5 ms Set/reset: Approx. 0.5 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	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
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 Hz, 5-mm double amplitude Malfunction: 10 to 55 Hz, 3-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 500 m/s^2 (approx. 50G)
Life expectancy	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) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%
Weight	Approx. 1.5 g

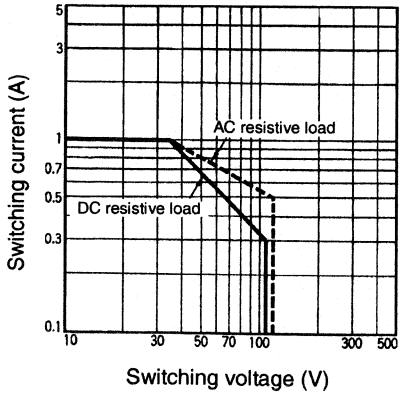
■ Approved Standards

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

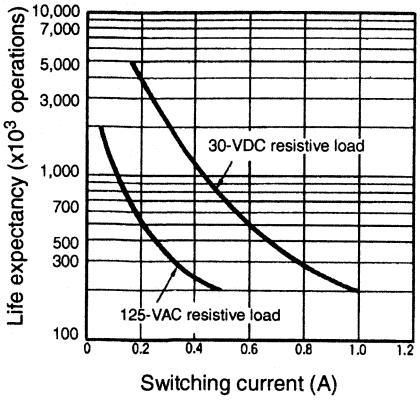
Model	Contact form	Coil ratings	Contact ratings
G6H-2 G6HU-2 G6HK-2 G6H(U/K)-2-U G6H(U/K)-2-100	DPDT	1.5 to 48 VDC	2 A, 30 VDC 0.3 A, 110 VDC 0.5 A, 125 VAC

Engineering Data

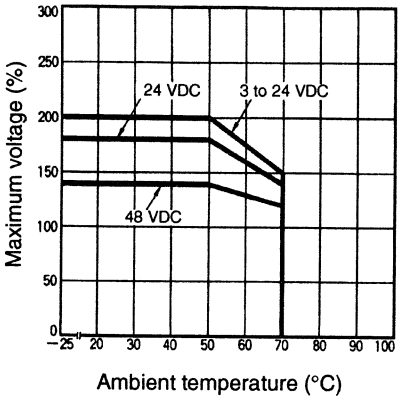
Max. Switching Capacity



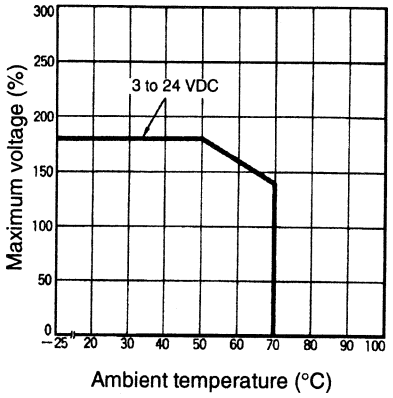
Life Expectancy



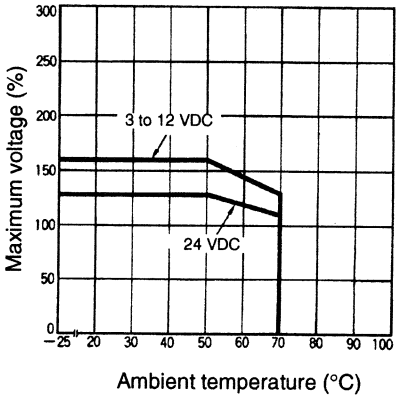
Ambient Temperature vs. Maximum Voltage Single-side Stable (G6H-2)



Single-winding Latching (G6HU-2)

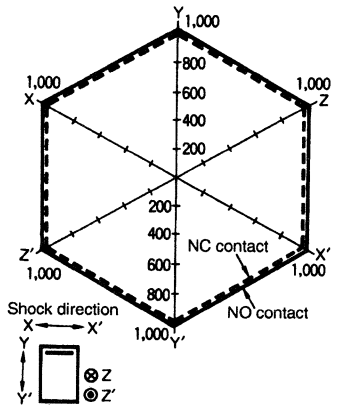


Double-winding Latching (G6HK-2)



Malfunctioning Shock Resistance (G6H-2)

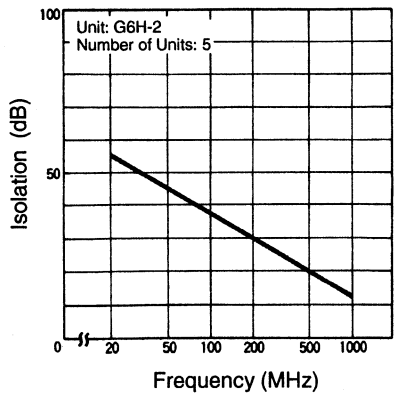
5 VDC
Number of Units: 10



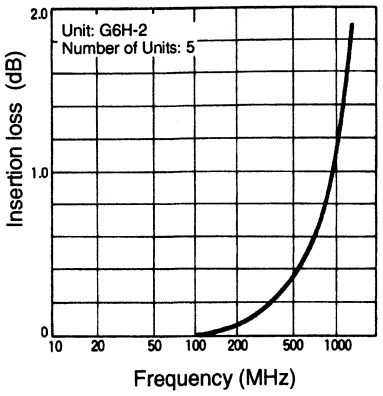
Condition: The Units were shocked at the rate of 500 m/s^2 (approximately 50G) three times each in the ±X, ±Y, and ±Z directions with and without voltage imposed on the Units until the Units malfunctioned.

High-frequency Characteristics

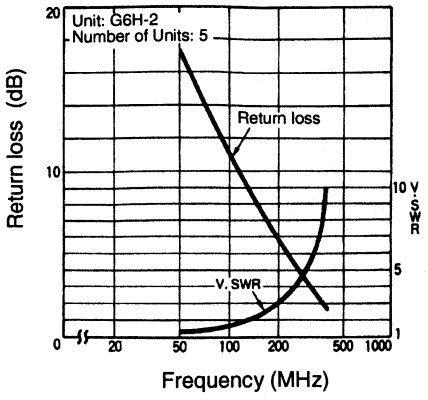
Frequency vs. Isolation



Frequency vs. Insertion Loss

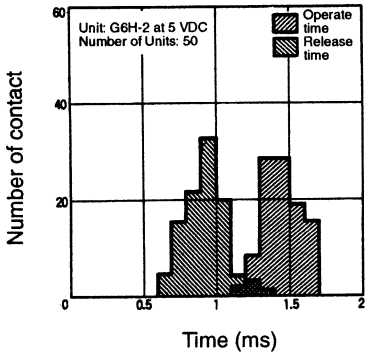


Frequency vs. Return Loss, V.SWR

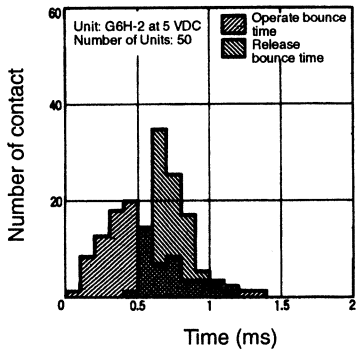


Note: The above characteristics were obtained from the Units inserted into test sockets. The characteristics of G6H-2 Units in actual operation may be different from the above characteristics. Check the characteristics of G6H-2 Units under the actual conditions before use.

Distribution of Operate and Release Time



Distribution of Bounce Time



Dimensions

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

2. Orientation marks are indicated as follows:

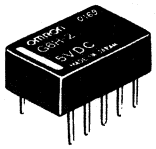
Single-side Stable Type

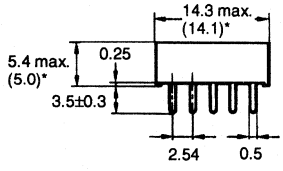
G6H-2(-U)

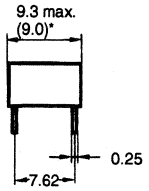
Terminal Arrangement/ Internal Connections (Bottom View)

Mounting Holes (Bottom View)

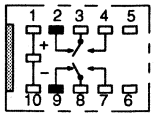
Tolerance: ±0.1

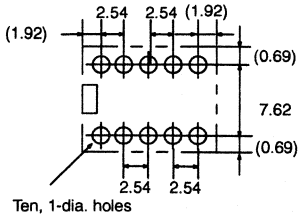






* Average value

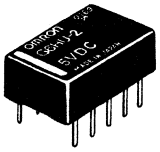


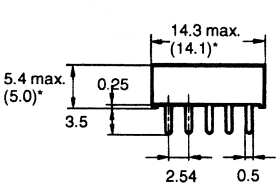


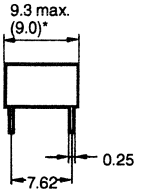
Ten, 1-dia. holes

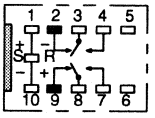
Single-winding Latching Type

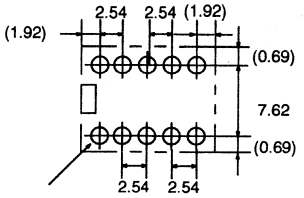
G6HU-2(-U)







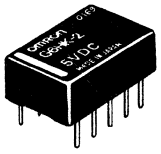


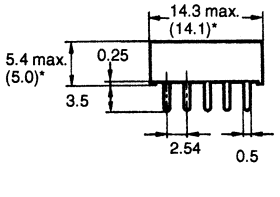


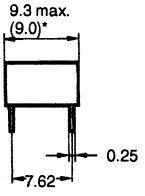
Ten, 1-dia. holes

Double-winding Latching Type

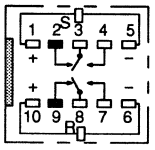
G6HK-2(-U)

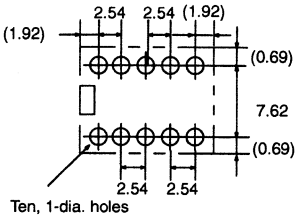






* Average value

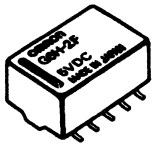


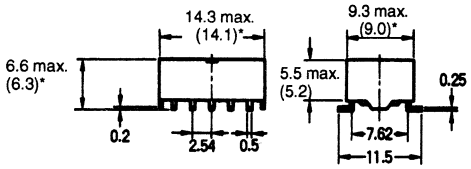


Ten, 1-dia. holes

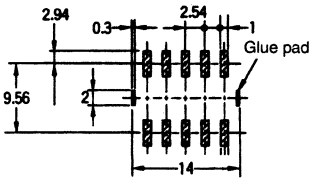
Single-side Stable Type

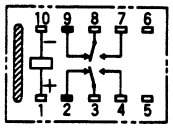
G6H-2F





* Average value





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. K42-E1-5

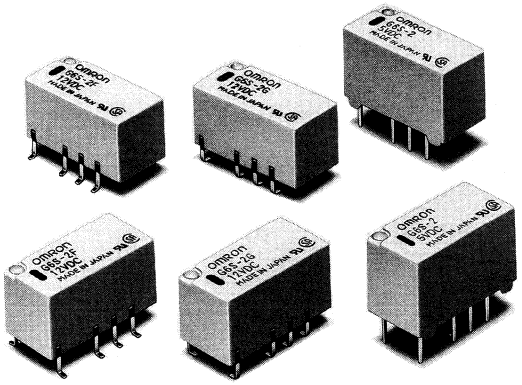
OMRON

PCB Relay

G6S

Surface Mount 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 x 10 μs: Bellcore requirements).
- Low power consumption (140 mW).
- Bifurcated crossbar contact (Au-clad) and plastic sealed construction for high reliability.
- Applicable to IRS.
- High sealability after IRS.
- Ultra-miniature at 15 x 7.5 x 9.4 mm (L x W x H).
- Through-hole terminal is available
- EN60950/EN41003 Supplementary Insulation-certified type is available.



Ordering Information

Classification				Single-side stable	Single-winding latching	Double-winding latching	Single-side stable EN60950/EN41003
DPDT	Plastic sealed	Through-hole terminal		G6S-2	G6SU-2	G6SK-2	G6S-2-Y
		Surface mount terminal	Outside-L	G6S-2G	G6SU-2G	G6SK-2G	G6S-2G-Y
			Inside-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: Through-hole terminal
   F: Outside-L surface mount terminal
   G: Inside-L surface mount terminal
4. **Approved Standards**
   None: UL/CSA
   Y: EN60950/EN41003
5. **Rated Coil Voltage**
   (Refer to "Coil Ratings")

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, 130% at 85°C			170% of rated voltage at 23°C, 130% at 85°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.

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, 140% at 85°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.

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, 130% at 85°C			140% of rated voltage at 23°C, 110% at 70°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.

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, 130% at 85°C		170% of rated voltage at 23°C, 110% at 70°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.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC
Contact material	Ag (Au-clad)
Rated carry current	2 A
Max. switching voltage	250 VAC, 220 VDC
Max. switching current	2 A
Max. switching capacity	62.5 VA, 60 W
Min. permissible load	10 μA at 10 mVDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	75 mΩ max.
Operate (set)time	4 ms max. (mean value: approx. 2.5 ms; latching type: approx. 2 ms)
Release (reset) time	4 ms max. (mean value: 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	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 Hz, 5-mm double amplitude Malfunction: 10 to 55 Hz, 3.3-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 750 m/s^2 (approx. 75G)
Life expectance	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) Storage: –40°C to 85°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 2 g

■ Approved Standards

UL1950 (File No. E41515)/CSA C22.2 No.950 (File No. LR24825)

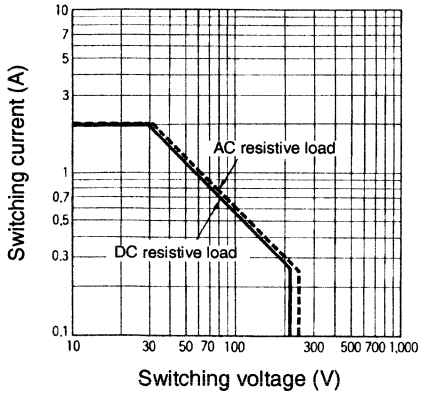
Model	Contact form	Coil ratings	Contact ratings
G6S-2, G6S-2F, G6S-2G	DPDT	1.5 to 48 VDC	2 A, 30 VDC
G6SU-2, G6SK-2, G6SU-2F, G6SU-2G, G6SK-2F, G6SK-2G		1.5 to 24 VDC	0.3 A, 110 VDC 0.5 A, 125 VAC

EN60950/EN41003

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

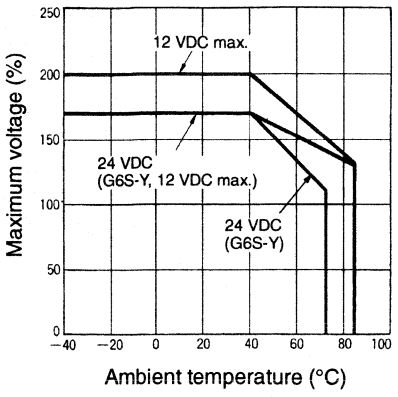
Engineering Data

Max. Switching Capacity

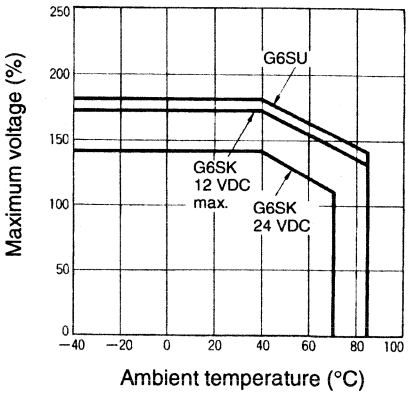


Ambient Temperature vs. Maximum Voltage

Single-side Stable



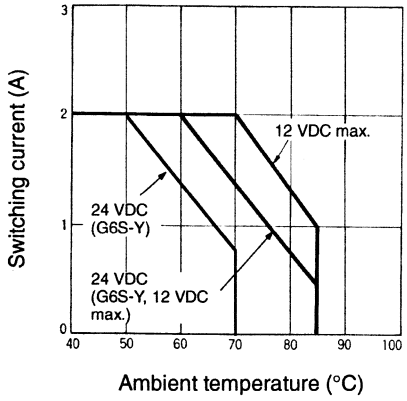
Single-winding Latching Double-winding Latching



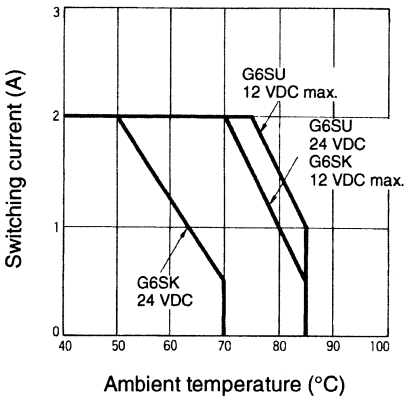
Reference Data

Ambient Temperature vs. Switching Current

Single-side Stable



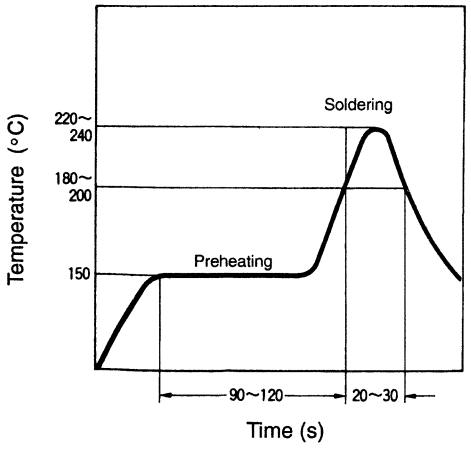
Single-winding Latching Double-winding Latching



Recommended Soldering Time vs. Surface PCB Temperature

(The temperature profile indicates the temperature on the surface of the PCB.)

IRS



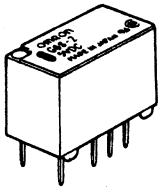
Dimensions

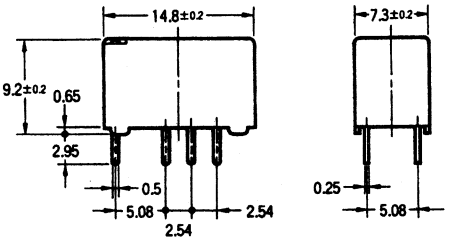
Note: All units are in millimeters unless otherwise indicated.

Single-side Stable

G6S-2, G6S-2-Y

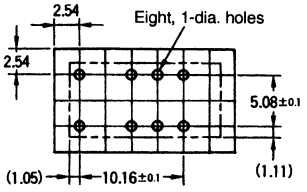
Tolerance: ±0.3



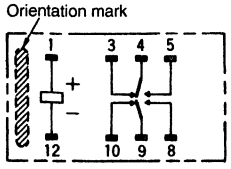


Footprint (Top View)

Tolerance: ±0.1

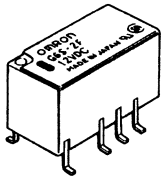


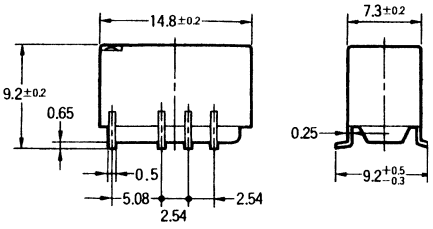
Terminal Arrangement/ Internal Connections (Top View)



G6S-2F, G6S-2F-Y

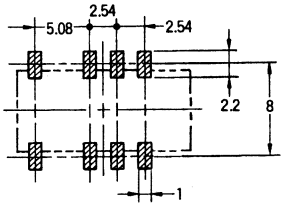
Tolerance: ±0.3



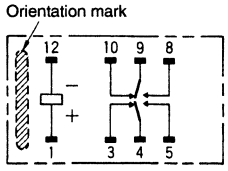


Footprint (Top View)

Tolerance: ±0.1

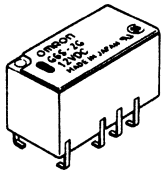


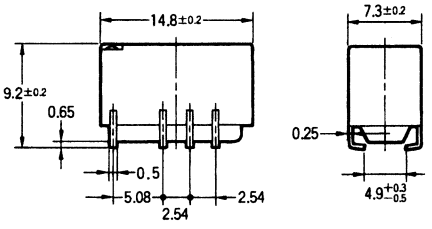
Terminal Arrangement/ Internal Connections (Top View)



G6S-2G, G6S-2G-Y

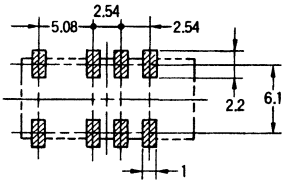
Tolerance: ±0.3



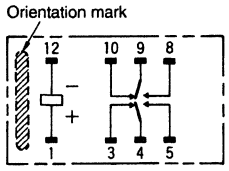


Footprint (Top View)

Tolerance: ±0.1



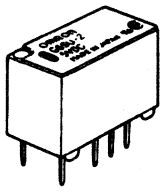
Terminal Arrangement/ Internal Connections (Top View)

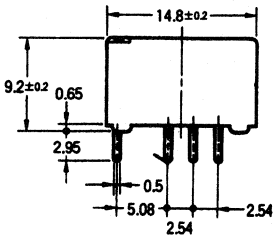


Single-winding Latching

G6SU-2

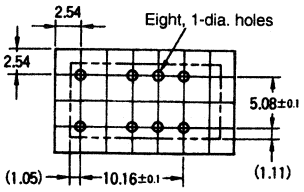
Tolerance: ±0.3



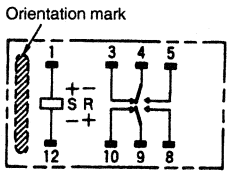


Footprint (Top View)

Tolerance: ±0.1

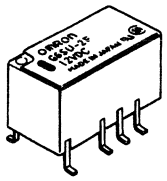


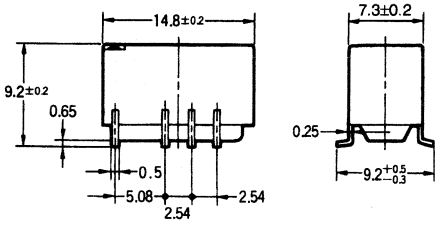
Terminal Arrangement/ Internal Connections (Top View)



G6SU-2F

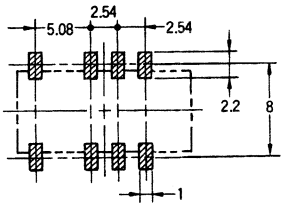
Tolerance: ±0.3



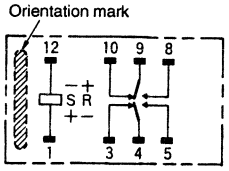


Footprint (Top View)

Tolerance: ±0.1

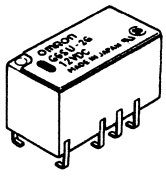


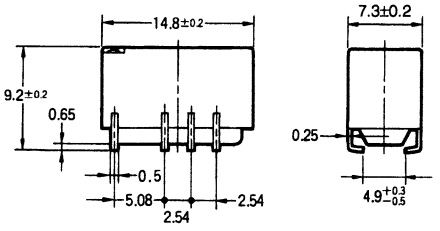
Terminal Arrangement/ Internal Connections (Top View)



G6SU-2G

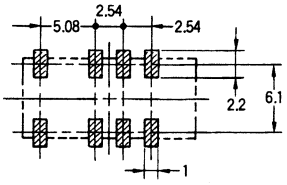
Tolerance: ±0.3



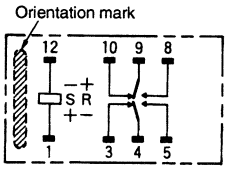


Footprint (Top View)

Tolerance: ±0.1



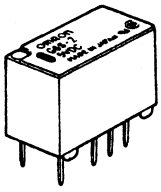
Terminal Arrangement/ Internal Connections (Top View)

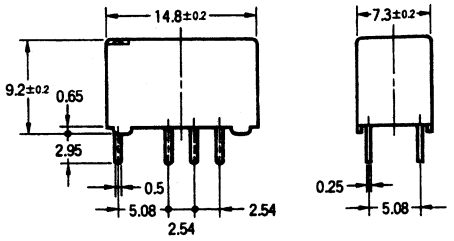


Double-winding Latching

G6S-2

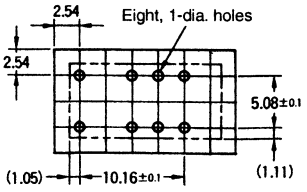
Tolerance: ±0.3



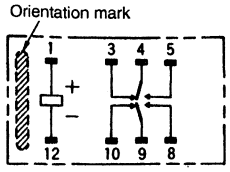


Footprint (Top View)

Tolerance: ±0.1

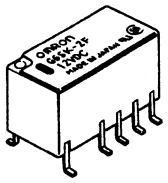


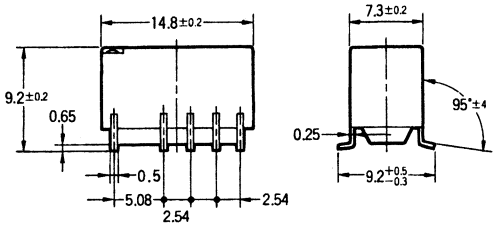
Terminal Arrangement/ Internal Connections (Top View)



G6SK-2F

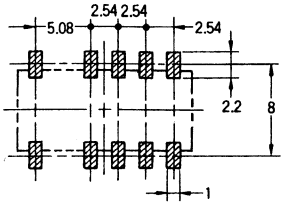
Tolerance: ±0.3



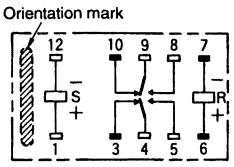


Footprint (Top View)

Tolerance: ±0.1

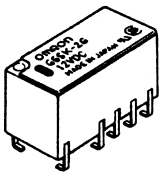


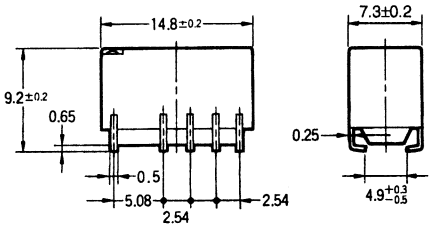
Terminal Arrangement/ Internal Connections (Top View)



G6SK-2G

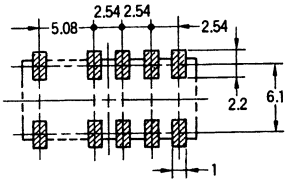
Tolerance: ±0.3



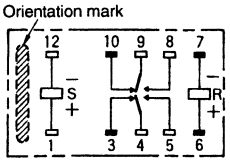


Footprint (Top View)

Tolerance: ±0.1



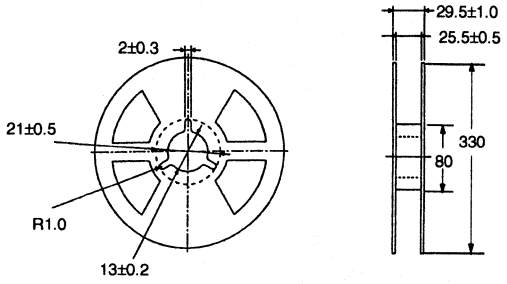
Terminal Arrangement/ Internal Connections (Top View)

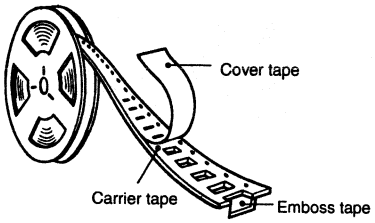


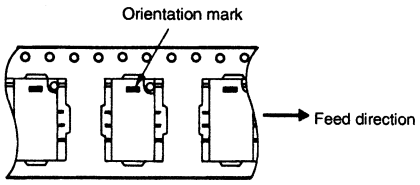
■ Tape Packing

When ordering, add "-TR" before the rated coil voltage for tape packing.

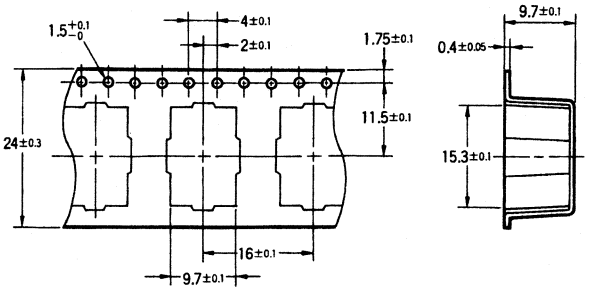
Tape type: TE2416R (Refer to EIAJ)
Reel type: R24E (Refer to EIAJ)
Relays per reel: 400



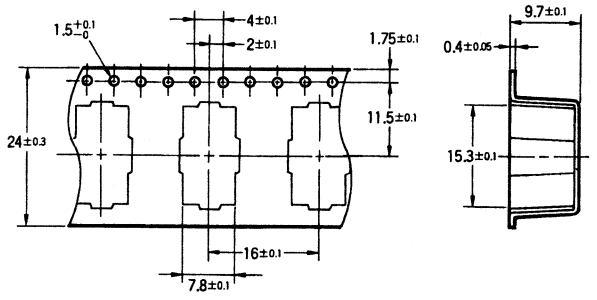




G6S-2F, G6SU-2F, G6SK-2F, G6S-2F-Y



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.

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. K93-E1-2A

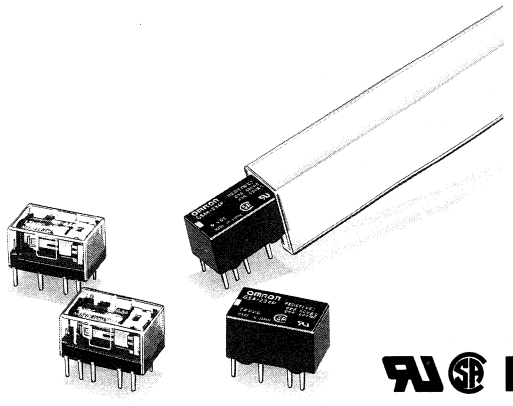
OMRON

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.



FCC

Ordering Information

Classification		Single-side stable	Single-winding latching	Double-winding latching
DPDT	Plastic-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-clad)
4. **Enclosure Rating**
   4: Plastic-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, 140% at 70°C						170% of rated voltage at 23°C, 110% at 70°C
Power consumption		Approx. 200 mW						Approx. 280 mW

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, 140% at 70°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.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 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-clad)	
Rated carry current	1 A	
Max. switching voltage	125 VAC, 125 VDC	
Max. switching current	1 A	0.5 A
Max. switching capacity	37.5 VA, 33 W	12.5 VA, 11 W
Min. permissible load	0.01 mA at 10 mVDC	

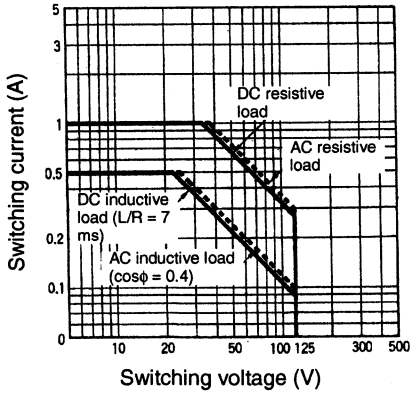
Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

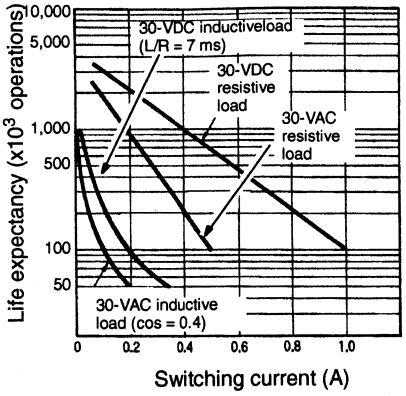
Contact resistance	50 mΩ max.
Operate (set) time	Single-side stable types: 5 ms max. (mean value: approx. 2.4 ms) Latching types: 5 ms max. (mean value: approx. 2 ms)
Release (reset) time	Single-side stable types: 5 ms max. (mean value: approx. 1.1 ms) Latching types: 5 ms max. (mean value: approx. 1.8 ms)
Bounce time	Operate: Approx. 0.5 ms Release: Approx. 0.5 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	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 500 VAC, 50/60 Hz for 1 min between contacts of same polarity 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 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 300 m/s^2 (approx. 30G)
Life expectancy	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) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 3 g

Engineering Data

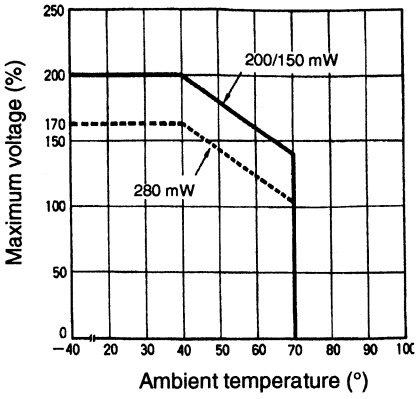
Max. Switching Capacity



Life Expectancy



Ambient Temperature vs. Maximum Voltage



■ Approved Standards

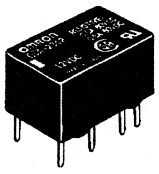
UL114, UL478 (File No.E41515)/CSA C22.2 No.0, No.14 (File No.LR24825)

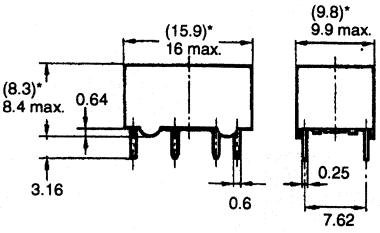
Model	Contact form	Coil ratings	Contact ratings
G5A-234P	DPDT	3 to 48 VDC	0.5 A, 60 VAC 0.5 A, 60 VDC 1 A, 30 VDC
G5AU-234P G5AK-234P		3 to 24 VDC	

Dimensions

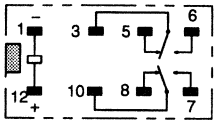
Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows: ▨ □

G5A-234P



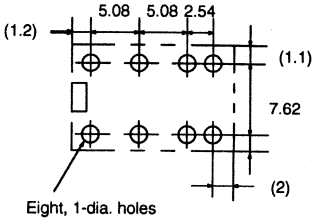


Terminal Arrangement/ Internal Connections (Bottom View)

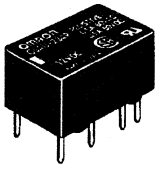


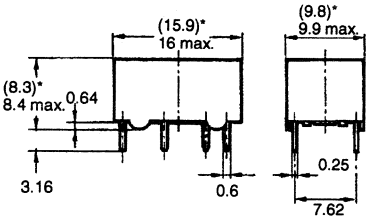
Mounting Holes (Bottom View)

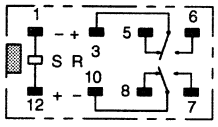
Tolerance: ±0.1

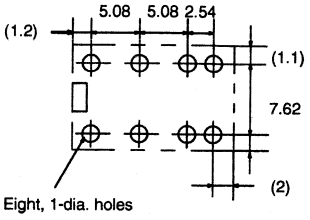


G5AU-234P

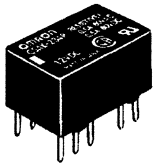


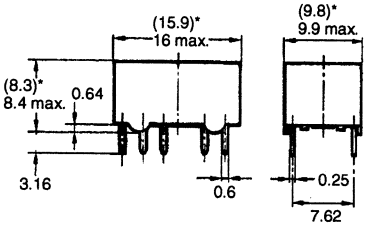


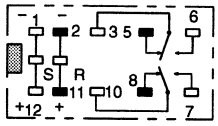




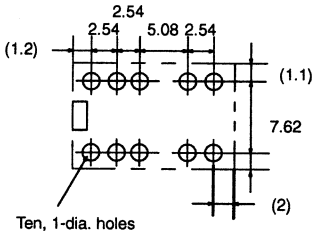
G5AK-234P







S: Set coil
R: Reset coil



*Average value

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. K19-E1-4C

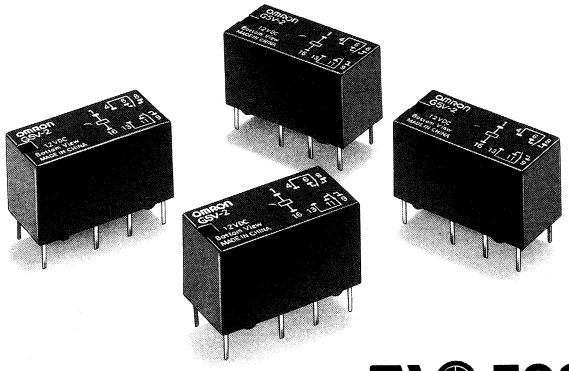
OMRON

PCB Relay

G5V-2

Miniature Relay for Signal Circuits

- Wide switching capacity 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.



FCC

Ordering Information

Classification	Contact form	Contact type	Contact material	Enclosure rating	Model
Standard	DPDT	Bifurcated crossbar	Ag + Au-clad	Plastic-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 65°C, 100% at 70°C						120% of rated voltage at 60°C, 100% at 65°C
Power consumption		Approx. 500 mW						Approx. 580 mW

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% at 70°C						150% of rated voltage at 23°C, 120% at 70°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. A 48-VDC model is available. Consult OMRON for details.

■ Contact Ratings

Item	Standard models	High sensitivity models
Load	Resistive load ($\cos\phi = 1$)	
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 capacity	62.5 VA, 60 W	62.5 VA, 24 W
Min. permissible load	0.01 mA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Item	Standard models	High sensitivity models
Contact resistance	50 mΩ max.	100 mΩ max.
Operate time	7 ms max.	
Release time	3 ms max.	
Bounce time	Operate: approx. 0.3 ms Release: approx. 1.5 ms	
Max. operating frequency	Mechanical: 36,000 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 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 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 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)
Life expectancy	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) Storage: –25°C to 65°C (with no icing)	Operating: –25°C to 70°C (with no icing) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85%	
Weight	Approx. 5 g	

■ Approved Standards

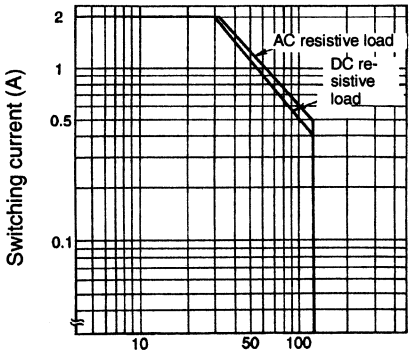
UL478, UL1950, UL508 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR24825)

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)

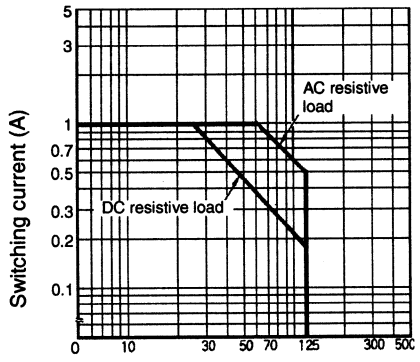
Engineering Data

Max. Switching Capacity

G5V-2

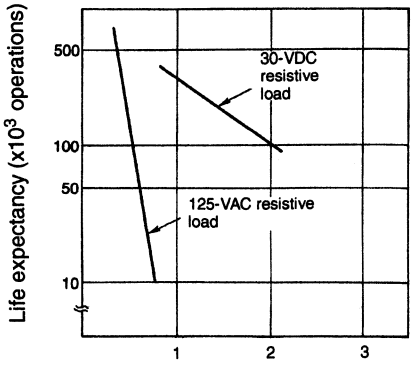


G5V-2-H1

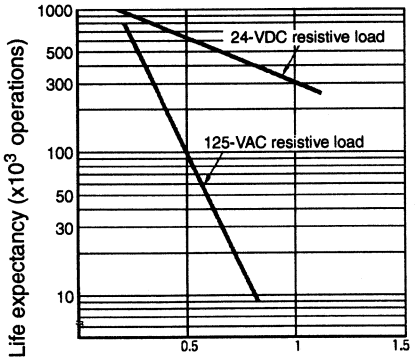


Life Expectancy

G5V-2

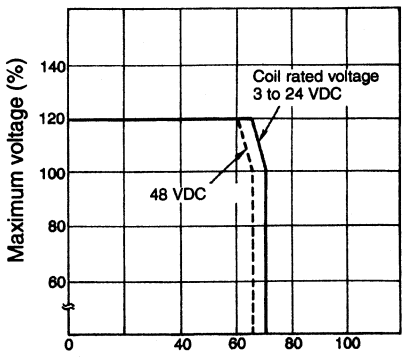


G5V-2-H1

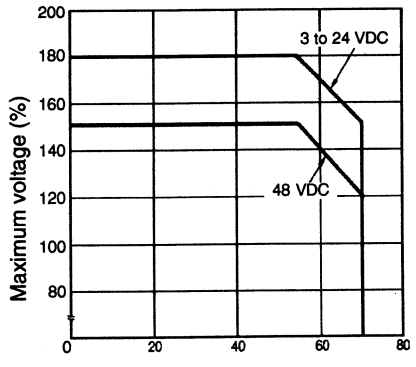


Ambient Temperature vs. Maximum Voltage

G5V-2



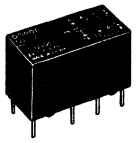
G5V-2-H1

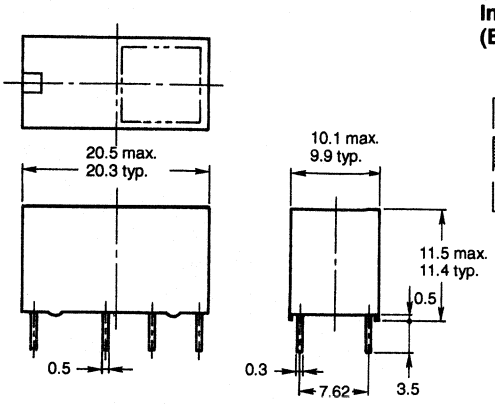


Dimensions

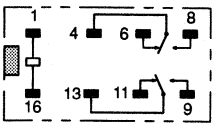
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:



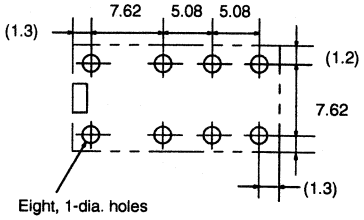


Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



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. K46-E1-2A

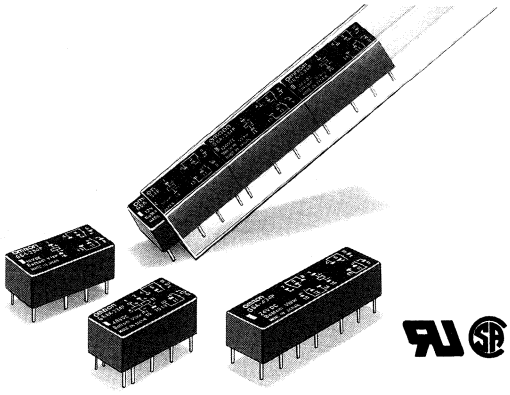
OMRON

PCB Relay

G6A

Plastic-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.



FCC

Ordering Information

Single-side Stable Type

Contact		Ag + Au-clad	AgPd + Au-clad
General purpose	DPDT	G6A-274P-ST-US	G6A-234P-ST-US
	4PDT	G6A-474P-ST-US	G6A-434P-ST-US
Low-sensitivity	DPDT	G6A-274P-ST40-US	G6A-234P-ST40-US
	4PDT	G6A-474P-ST40-US	G6A-434P-ST40-US

Single-winding Latching Type

Contact		Ag + Au-clad	AgPd + Au-clad
General purpose	DPDT	G6AU-274P-ST-US	G6AU-234P-ST-US
	4PDT	G6AU-474P-ST-US	G6AU-434P-ST-US

Double-winding Latching Type

Contact		Ag + Au-clad	AgPd + Au-clad
General purpose	DPDT	G6AK-274P-ST-US	G6AK-234P-ST-US
	4PDT	G6AK-474P-ST-US	G6AK-434P-ST-US
Low-sensitivity	DPDT	G6AK-274P-ST40-US	G6AK-234P-ST40-US
	4PDT	G6AK-474P-ST40-US	G6AK-434P-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-clad) contact
   3: Bifurcated crossbar AgPd (Au-clad) contact
4. **Enclosure Rating**
   4: Plastic-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, 150% at 70°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, 110% at 70°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, 110% at 70°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, 110% at 70°C							
Power consumption		Approx. 400 mW							

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, 150% at 70°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, 110% at 70°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, 150% at 70°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, 110% at 70°C							
Power consumption			Approx. 320 mW							

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, 110% at 70°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, 110% at 70°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.

■ Contact Ratings

Item	G6A-234P-ST(40)-US/434P-ST(40)-US		G6A-274P-ST(40)-US/474P-ST(40)-US	
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	0.3 A at 125 VAC; 1 A at 30 VDC	0.2 A at 125 VAC; 0.5 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC	0.25 A at 125 VAC; 1 A at 30 VDC
Contact material	AgPd (Au-clad)		Ag (Au-clad)	
Rated carry current	3 A			
Max. switching voltage	250 VAC, 220 VDC			
Max. switching current	DC: 2A; AC: 1 A	DC: 1 A; AC: 0.5 A	DC: 2 A; AC: 1 A	DC: 1 A; AC: 0.5 A
Max. switching capacity	125 VA, 60 W	62.5 VA, 30 W	125 VA, 60 W	62.5 VA, 30 W
Min. permissible load	0.01 mA at 10 mVDC			

Item	G6AK-234P-ST(40)-US/G6AK-434P-ST(40)-US G6AU-234P-ST-US/G6AU-434P-ST-US		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)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	0.3 A at 125 VAC; 1 A at 30 VDC	0.2 A at 125 VAC; 0.5 A at 30 VDC	0.5 A at 125 VAC; 2 A at 30 VDC	0.25 A at 125 VAC; 1 A at 30 VDC
Contact material	AgPd (Au-clad)		Ag (Au-clad)	
Rated carry current	3 A		3 A	
Max. switching voltage	250 VAC, 220 VDC		250 VAC, 220 VDC	
Max. switching current	DC: 2 A; AC: 1 A	DC: 1 A; AC: 0.5 A	DC: 2 A; AC: 1 A	DC: 1 A; AC: 0.5 A
Max. switching capacity	125 VA, 60 W	62.5 VA, 30 W	125 VA, 60 W	62.5 VA, 30 W
Min. permissible load	0.01 mA at 10 mVDC		0.01 mA at 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	50 mΩ max.
Operate (set) time	Single-side stable types: DPDT :5 ms max. (mean value: approx. 3 ms) 4PDT :7 ms max. (mean value: approx. 3.8 ms) Latching types: DPDT: 5 ms max. (mean value: approx. 2.5 ms) 4PDT: 7 ms max. (mean value: approx. 3.3 ms)
Release (reset) time	Single-side stable types: DPDT: 3 ms max. (mean value: approx. 1.2 ms) 4PDT: 5 ms max. (mean value: approx. 1.3 ms) Latching types: DPDT: 5 ms max. (mean value: approx. 2.5 ms) 4PDT: 7 ms max. (mean value: approx. 2.7 ms)
Bounce time	Operate: mean value: approx. 0.5 ms Release: mean value: approx. 0.5 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	1,000 MΩ min. (at 500 VDC); except for set-reset
Dielectric strengtn	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 Hz, 5-mm double amplitude Malfunction: 10 to 55 Hz, 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)
Life expectancy	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) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 45% to 85%
Weight	DPDT: Approx. 3.5 g 4PDT: Approx. 6 g

Note: The data shown above are initial values.

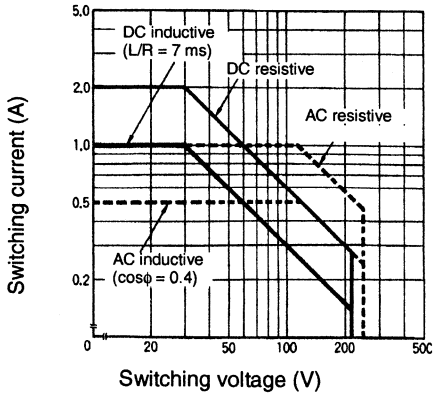
■ Approved Standards

UL114, UL478 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR24825)

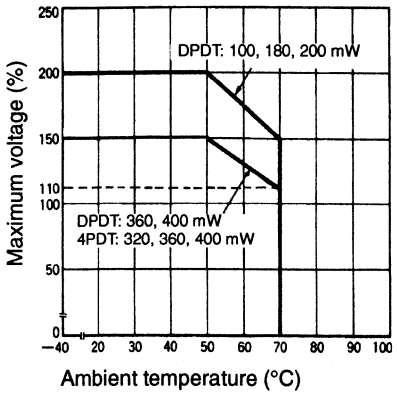
Model	Contact form	Coil ratings	Contact ratings
G6A-234P-ST(40)-US G6AK-234P-ST(40)-US G6AU-234P-ST-US	DPDT	3 to 48 VDC	0.6 A, 125 VAC 1 A, 30 VDC 0.6 A, 110 VDC
G6A-274P-ST(40)-US G6AK-274P-ST(40)-US G6AU-274P-ST-US	DPDT		0.6 A, 125 VAC 2 A, 30 VDC 0.6 A, 110 VDC
G6A-434P-ST(40)-US G6AK-434P-ST(40)-US G6AU-434P-ST-US	4PDT		0.6 A, 125 VAC 1 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

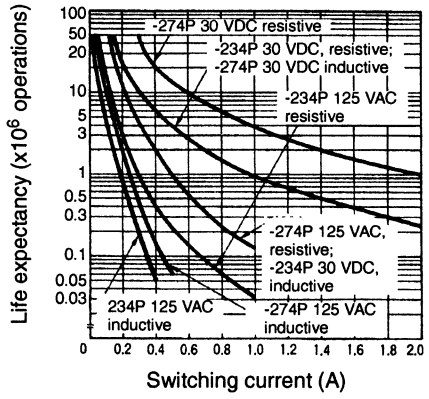
Max. Switching Capacity DPDT, 4PDT



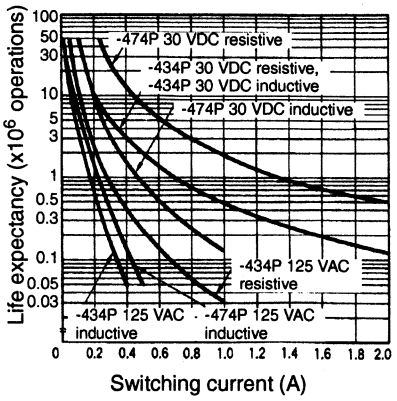
Ambient Temperature vs. Maximum Voltage



Life Expectancy DPDT



4PDT

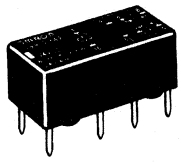


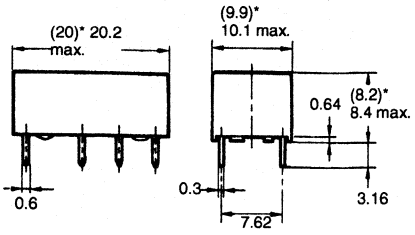
Dimensions

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

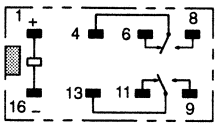
2. Orientation marks are indicated as follows:

G6A-234P-ST(40)-US, G6A-274P-ST(40)-US

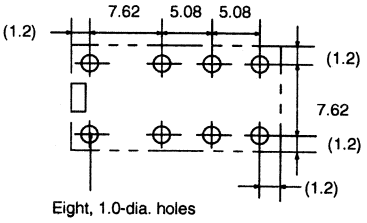




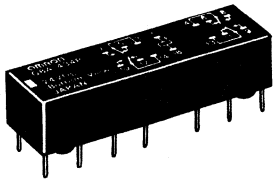
Terminal Arrangement/ Internal Connections (Bottom View)

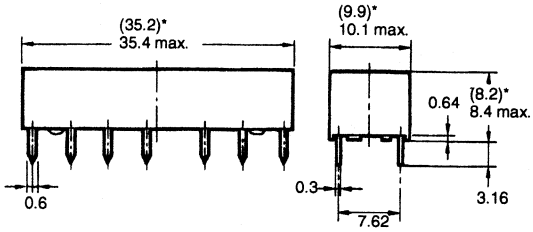


Mounting Holes (Bottom View)
Tolerance: ±0.1

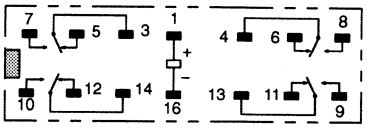


G6A-434P-ST(40)-US, G6A-474P-ST-US

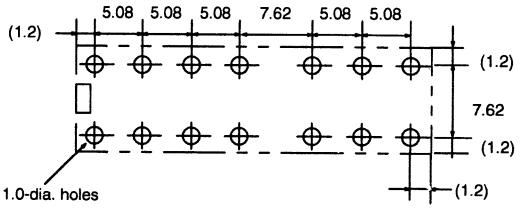




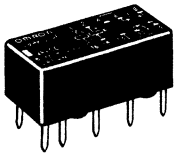
Terminal Arrangement/ Internal Connections (Bottom View)

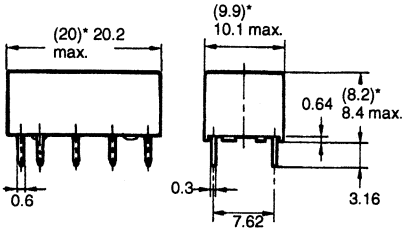


Mounting Holes (Bottom View)
Tolerance: ±0.1

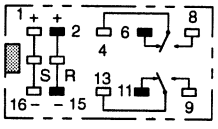


G6AK-234P-ST(40)-US, G6AK-274P-ST(40)-US

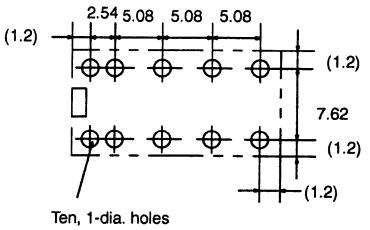




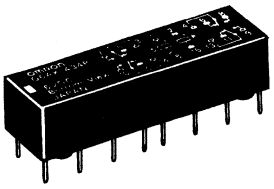
Terminal Arrangement/ Internal Connections (Bottom View)

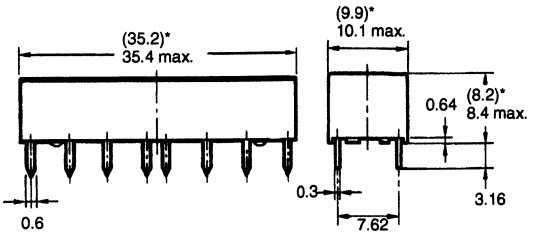


Mounting Holes (Bottom View)
Tolerance: ±0.1

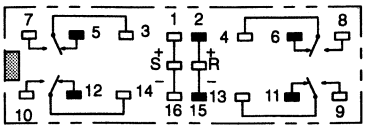


G6AK-434P-ST(40)-US, G6AK-474P-ST(40)-US



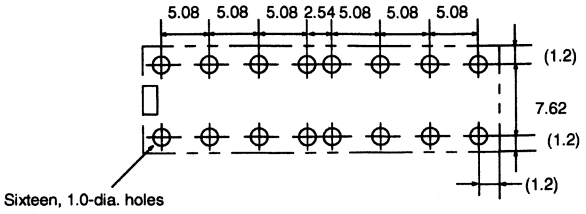


Terminal Arrangement/ Internal Connections (Bottom View)

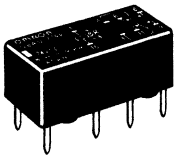


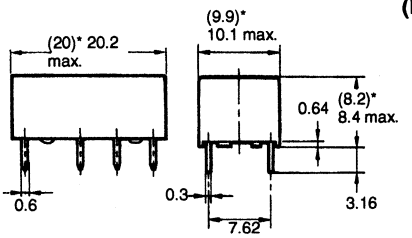
Mounting Holes (Bottom View)

Tolerance: ±0.1

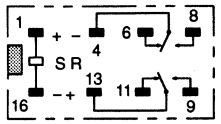


G6AU-234P-ST-US, G6AU-274P-ST-US



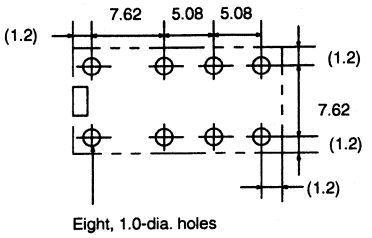


Terminal Arrangement/ Internal Connections (Bottom View)

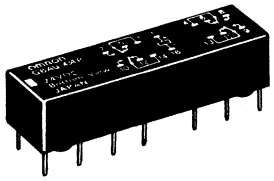


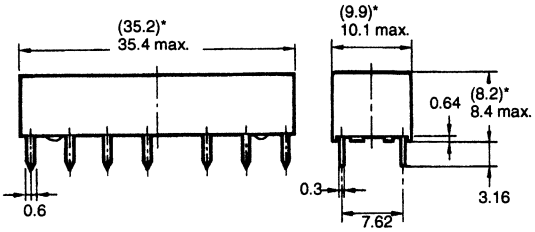
Mounting Holes (Bottom View)

Tolerance: ±0.1

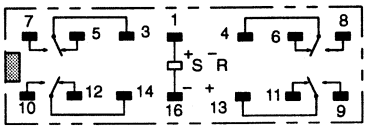


G6AU-434P-US, G6AU-474P-ST-US



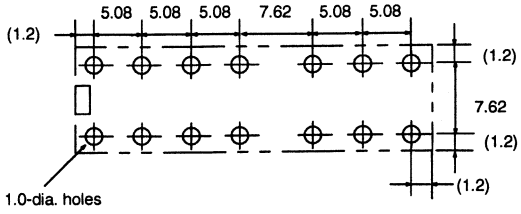


Terminal Arrangement/ Internal Connections (Bottom View)



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.

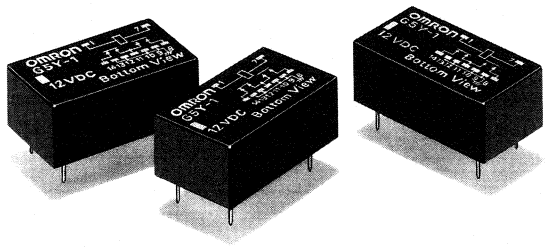
OMRON

PCB Relay

G5Y-1

High-frequency, Single-pole PCB Relay

- Threshold of malfunction by shock: 500 m/s^2 (50G) min. (mean value, 1,000 m/s^2 or greater).
- Max. height is 9 mm.
- High frequency isolation: 60 dB min. at 900 Hz (actual value 68 dB).
- Video applications: CATV, VTRs, TVs, BS tuners, TV games.
- Communications applications: Car telephones, marine mobile telephone systems, emergency traffic for disaster protection, PCM switch transceivers, optical transmission devices.
- Measurement applications: Measuring instrument for above apparatus.



Ordering Information

Classification	Contact form	Enclosure rating	Model
General-purpose	SPDT	Plastic-sealed	G5Y-1
High-sensitivity			G5Y-1-H

Note: When ordering, add the rated coil voltage to the model number.
Example: G5Y-1 12 VDC
Rated coil voltage

Model Number Legend:

G5Y - □ - □ □ VDC
1 2 3

1. **Contact Form**
   1: SPDT
2. **Classification**
   None: General-purpose (300 mW)
   H: High-sensitivity (200 mW)
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Item		General-purpose			High-sensitivity		
Rated voltage		5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current		60.2 mA	25 mA	12.5 mA	40 mA	16.7 mA	8.3 mA
Coil resistance		83 Ω	480 Ω	1,920 Ω	125 Ω	720 Ω	2,880 Ω
Coil inductance	**Armature OFF**	0.27	1.7	6.7	0.42	2.55	10.5
(H) (ref. value)	**Armature ON**	0.32	1.9	7.6	0.50	2.95	12.5
Must operate voltage		75% max. of rated voltage					
Must release voltage		10% min. of rated voltage					
Max. voltage		130% of rated voltage at 70°C					
Power consumption		Approx. 300 mW			Approx. 200 mW		

ote: 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	Resistive load (cosϕ = 1)
Rated load	0.01 A at 24 VAC; 0.01 A at 24 VDC; 900 MHz, 1 W (VSWR: 1.2 max.)
Contact material	Au-plated
Rated carry current	0.5 A
Max. switching voltage	30 VAC, 30 VDC
Max. switching current	0.5 A
Max. switching capacity	10 VA, 10 W
Min. permissible load	0.01 mA at 10 mVDC

High-frequency Characteristics

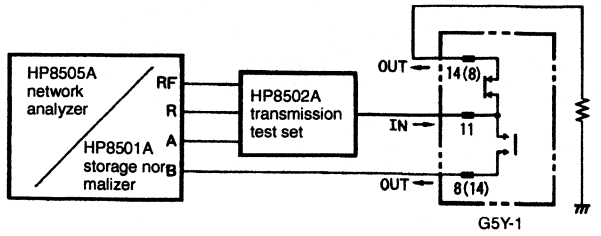
Item	250 MHz	900 MHz
Isolation	80 dB min.	60 dB min.
Insertion loss	0.5 dB max.	0.5 dB max.
VSWR	1.5 max.	1.8 max.
Switching power	10 W	
Carry power	10 W (VSWR ≦ 1.2)	

Note: Line impedance (Zo) of the measuring instrument is 50 Ω.

■ Characteristics

Contact resistance	100 mΩ max. (mean value: approx. 30 mΩ)
Operate time	10 ms max. (mean value: approx. 5 ms)
Release time	5 ms max. (mean value: approx. 1 ms)
Max. operating frequency	Mechanical: 1,800 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
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 contacts, coil, and ground
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 500 m/s^2 (approx. 50G)
Life expectancy	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: –30°C to 70°C (with no icing) Storage: –30°C to 70°C (with no icing)
Ambient humidity	35% to 85%
Weight	Approx. 6 g

Engineering Data



Connecting socket
50 Ω termination

When a signal is applied from the transfer contacts to the NO contacts or from the transfer contacts to the NC contacts of the sample, the following characteristics are measured at contacts unrelated to the measurement terminated at 50 Ω.

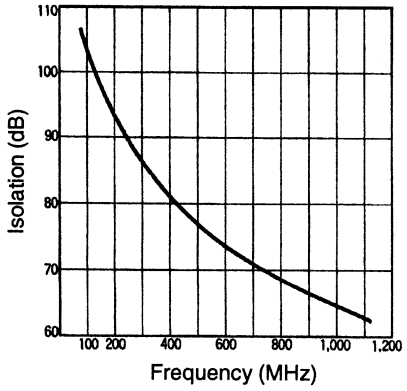
1. Isolation characteristics
2. Insertion loss characteristics
3. Return loss

Note: Conversion formulas between return loss and VSWR. (*x*: return loss)

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

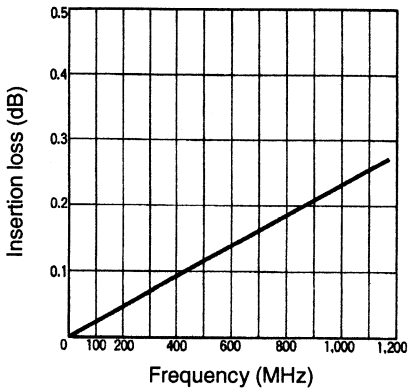
Isolation Characteristics

Frequency vs. Isolation



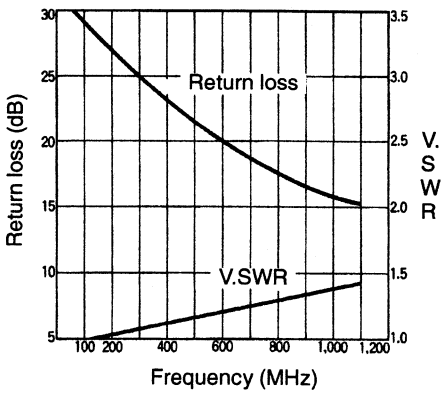
Insertion Loss Characteristics

Frequency vs. Insertion Loss



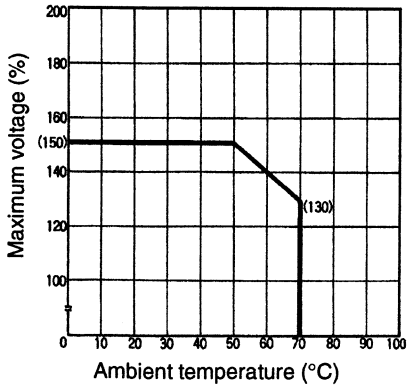
V.SWR Characteristics

Frequency vs. Return Loss and VSWR



Note: VSWR stands for voltage standing wave ratio.

Ambient Temperature vs. Maximum Voltage

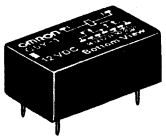


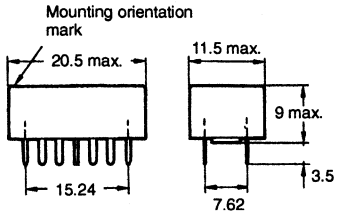
Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

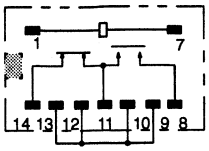
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows: ▨ □

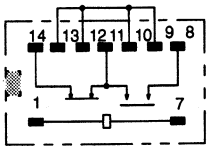




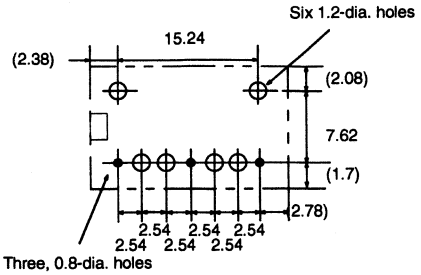
Terminal Arrangement/ Internal Connections (Bottom View)



(Top 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.

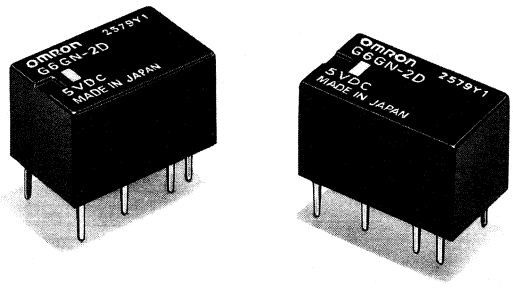
OMRON

PCB Relay

G6GN

Two-pole Signal Relay with a Dielectric Strength of 2.5 kV Ideal for Switching Telephone Lines (MBB Contact)

- Compact (16 x 10 x 9.4 mm (L x W x H)) with a dielectric strength of 2,500 V between coil and contacts.
- Insulation distance of 3 mm minimum between coil and contacts.
- Power consumption of 360 mW.
- Plastic-sealed construction.



Ordering Information

Contact form	Coil rated voltage	Model
		Plastic-sealed
2d (MBB contact)	5 VDC	G6GN-2D
	12 VDC	
	24 VDC	

Note: When ordering, add the rated coil voltage to the model number.
Example: G6GN-2D 12 VDC
Rated coil voltage

Model Number Legend:

G6GN-□□ □ VDC
1 2 3

1. **Number of Poles**
   2: 2 poles
2. **Contact Form**
   D: d contact (MBB contact)
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	72 mA	30 mA	15 mA
Coil resistance	69.4 Ω	400 Ω	1,600 Ω
Must operate voltage	75% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	110% 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. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the upper limit of the permissible voltage range applied to the relay coil.

■ Contact Ratings

Load	Resistive load
Rated load	0.5 A at 48 VDC
Contact material	Au clad + Ag
Rated carry current	0.5 A
Max. switching voltage	100 VDC
Max. switching current	0.5 A
Max. switching capacity	24 W
Min. permissible load	10 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

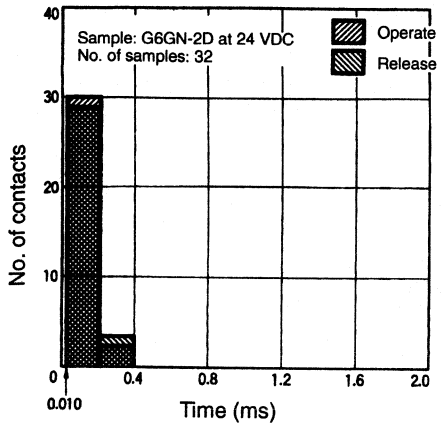
Contact resistance	50 mΩ max.
Operate time	5 ms max.
Release time	5 ms max.
MBB time	0.01 ms min.
Insulation resistance	1,000 MΩ min.
Dielectric strength	2,500 VAC for 1 min between coil and contacts 500 VAC for 1 min between contacts of same polarity 1,000 VAC for 1 min between contacts of different polarity
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G)) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 1,000,000 operations min. (at 36,000 operations/h) Electrical: 100,000 operations min. (at 1,800 operations/h, resistive load)
Ambient temperature	Operating: –25°C to 70°C (with no icing or condensation) Storage: –25°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%
Weight	Approx. 3 g

Note: The data items shown above are initial values.

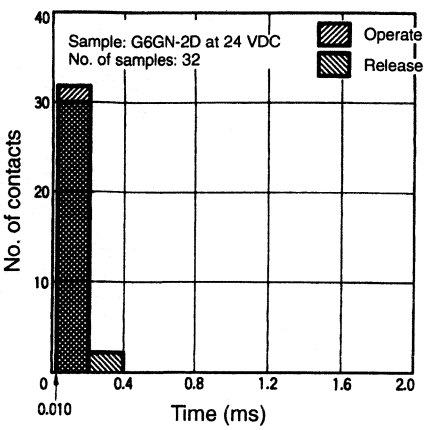
Engineering Data

Overlap Time (MBB Contact)

G6GN-2D (Terminals 3, 5, and 6)

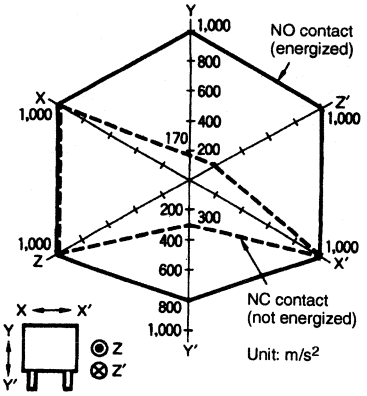


G6GN-2D (Terminals 10, 8, and 7)



Malfunctioning Shock

G6GN-2D

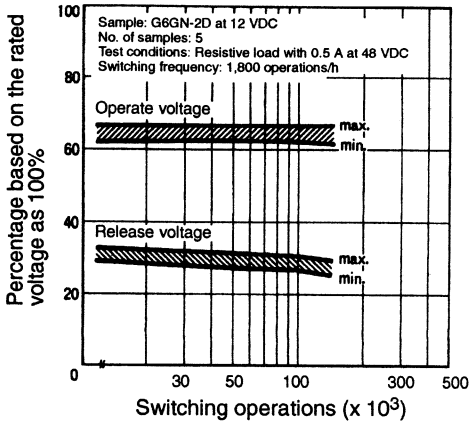


Shock directions (with coil terminals on the front side)

Measurement: The G6GN-2D was shocked with an impact of 100 m/s² (i.e., approximately 10G) in six directions along the X, Y, and Z axes three times without energizing the G6GN-2D and three times by energizing the G6GN-2D. Then, the number of contact malfunctions was checked.

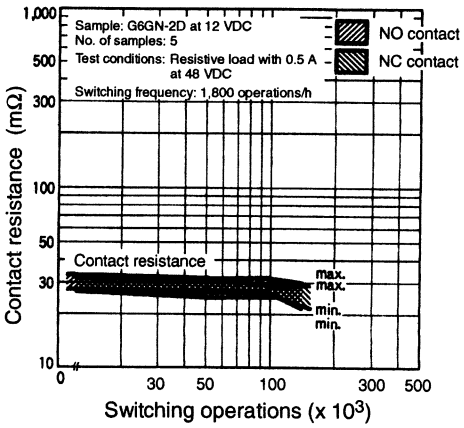
Electrical Life Expectancy (Operate/Release Voltage)

G6GN-2D



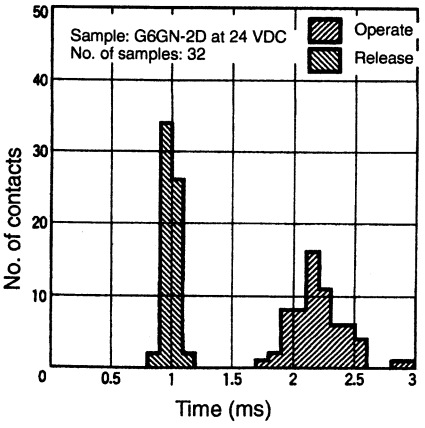
Electrical Life Expectancy (Contact Resistance)

G6GN-2D



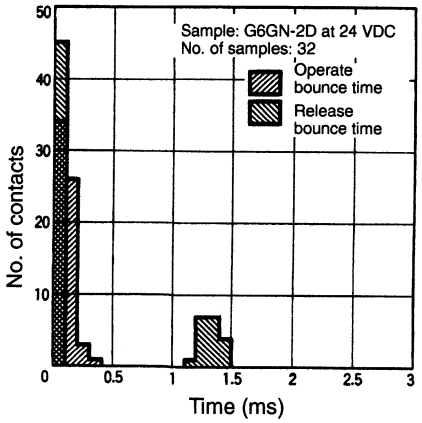
Release Time Distribution

G6GN-2D



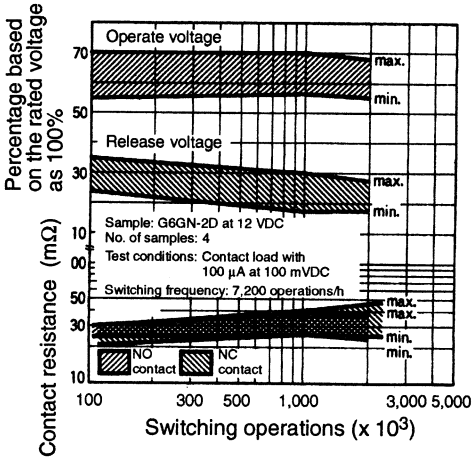
Bounce Time Distribution

G6GN-2D



Contact Reliability Test

G6GN-2D

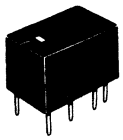


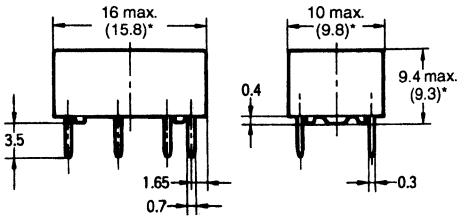
Dimensions

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

2. Orientation marks are indicated as follows:

G6GN-2D

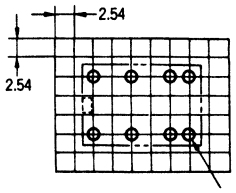




*Average value

PCB Dimensions (Bottom View)

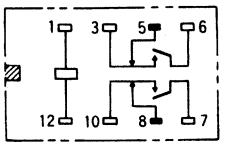
Tolerance: ±0.1 mm



Eight, 1-dia. holes

Terminal Arrangement/ Internal Connections (Bottom View)

(MBB contact)



Precautions

■ Correct In Use

MBB Operation

The contacts of the G6GN may be separated only for a moment after the contacts touch each other due to bouncing of the contacts, which should be taken into consideration when using G6GN.

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

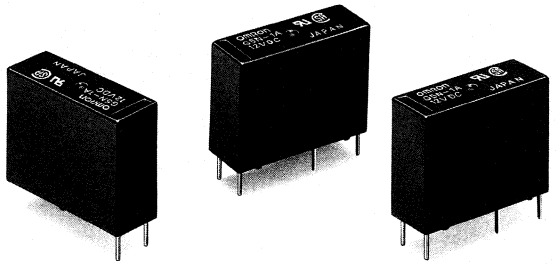
OMRON

PCB Relay

G5N

A Miniature Relays with 1-pole 3-A Switching Capability and 10-kV Impulse Withstand Voltage

- 43% reduced bottom area over previous OMRON product. (G5B)
- Highly efficient magnetic circuit for high sensitivity (200 mW).
- Small, yet provides 10-kV impulse withstand voltage (coil to contact).



Ordering Information

Contact		Enclosure rating	Model
SPST-NO	Single-side stable	Flux protection	G5N-1A

Note: When ordering, add the rated coil voltage to the model number.
Example: G5N-1A 12 VDC
Rated coil voltage

Model Number Legend:

G5N-□□ □ 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	110% of rated voltage			
Power consumption	Approx. 200 mW			

■ Contact Ratings

Load	Resistive load ($\cos\phi = 1$)
Rated load	3 A at 125 VDC, 3 A at 30 VDC
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	3 A
Max. switching capacity	375 VA, 90 W
Min. permissible load	10 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	10 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 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV (1.2 x 50 μs)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 5,000,000 operations min. Electrical: 200,000 operations min.
Ambient temperature	Operating: –40°C to 70°C Storage: –40°C to 70°C
Ambient humidity	Operating: 35% to 85%

Note: The data shown above are initial value.

■ Approved Standards

UL508 (File No. 41515)

Coil ratings	Contact ratings
5 to 24 VDC	3 A, 30 VDC (resistive) 3 A, 125 VAC (resistive) 1.5 A, 220 VAC (resistive) 1 A, 250 VAC (resistive)

CSA C22.2 (No. 0, No. 1, No. 14) (File No. LR31928)

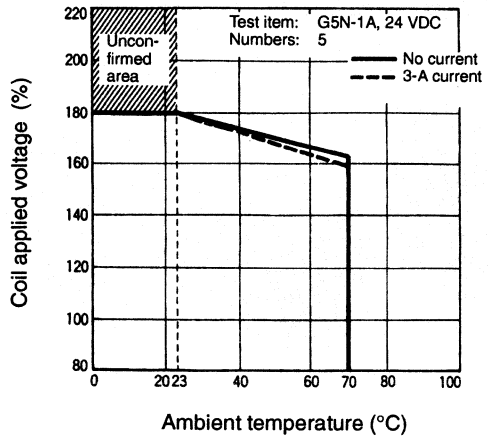
Coil ratings	Contact ratings
5 to 24 VDC	3 A, 30 VDC (resistive) 3 A, 125 VAC (resistive) 1.5 A, 220 VAC (resistive) 1 A, 250 VAC (resistive)

■ Actual Load Life (Reference Values)

1. 100-VAC motor and lamp load (2.5-A surge and 0.5-A normal): 210,000 operations min.(at 23°C)
2. 240-VAC motor and lamp load (0.8-A surge and 0.33-A normal): 210,000 operations min.(at 23°C)

Engineering Data

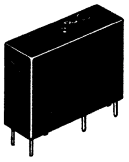
Ambient Temperature vs. Maximum Voltage

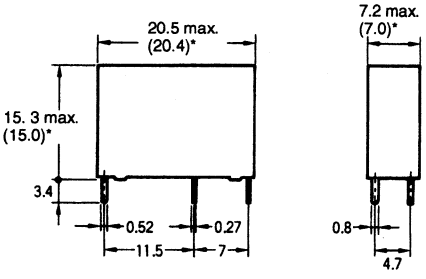


Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

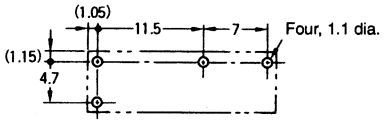




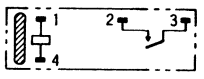
*Average value

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.

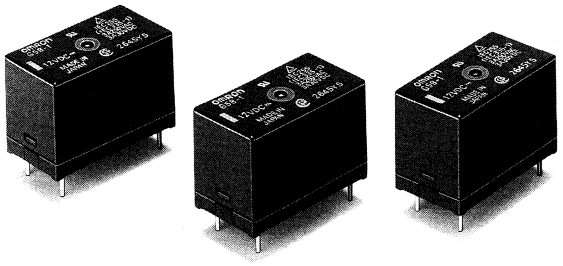
Cat. No. K95-E1-1A

OMRON

PCB Relay | G5B

Single-pole 3-A Miniature Relay

- Impulse withstand voltage of 10 kV (between coil and contact).
- Models available with 200-mW current consumption (High-sensitivity Type).
- High-capacity (8 A) type available.
- UL/CSA/TÜV approved.



Ordering Information

Classification	Contact form	Coil	Model
General purpose	SPST-NO	Single-stable type	G5B-1
High-sensitivity			G5B-1-H
High-capacity			G5B-1-E

Note: 1. 6 VDC can be also produced.

2. When ordering, add the rated coil voltage to the model number.
Example: G5B-1 12 VDC
└── Rated coil voltage

Model Number Legend:

G5B - □ - □ □ VDC
1 2 3

1. **Contact Form**
   1: SPST-NO
2. **Classification**
   H: High-sensitivity
   E: High-capacity
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Item	Standard type, high-capacity type			High-sensitivity type		
Rated voltage	5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current	72.0 mA	30.0 mA	15.0 mA	40.0 mA	16.7 mA	8.3 mA
Coil resistance	69.4 Ω	400 Ω	1,600 Ω	125 Ω	720 Ω	2,880 Ω
Must operate voltage	Standard type: 70% max. of rated voltage High-capacity type: 75% max. of rated voltage			75% max. of rated voltage		
Must release voltage	5% min. of rated voltage					
Max. voltage	140% (at 23°C)/110% (at 70°C) of rated voltage			160% (at 23°C)/130% (at 70°C) of rated voltage		
Power consumption	Approx. 360 mW			Approx. 200 mW		

■ Contact Ratings

Item	Standard type, high-sensitivity type	High-capacity type
Load	Resistive load ($\cos\phi = 1$)	
Rated load	3 A at 125 VAC, 3 A at 30 VDC	8 A at 125 VAC, 8 A at 30 VDC
Contact material	Ag	AgCdO
Rated carry current	3 A	8 A
Max. switching voltage	250 VAC, 30 VDC	
Max. switching current	3 A	8 A
Max. switching capacity	750 VA, 90 W	2,000 VA, 240 W
Min. permissible load	5 VDC, 10 mA	5 VDC, 100 mA

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation (with an operating frequency of 120 operations/min)

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	10 ms max.
Release time	10 ms max.
Insulation resistance	1,000 MΩ max. (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
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx.100G) Malfunction: 100 m/s^2 (approx.10G)
Life expectancy	Mechanical: 5,000,000 operations min. (at 18,000 operations/hr) Electrical: 200,000 operations min. (at 1,800 operations/hr) for standard type, high-sensitivity type 100,000 operations min. (at 1,200 operations/hr) for high-capacity type
Ambient temperature	Operating: –40°C to 70°C (with no icing) Storage: –40°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Sealing	Flux protection
Weight	Approx. 7 g

Note: The data shown above are initial values.

■ Approved Standards

UL508 (File No. E41643)/CSA C22.2 No.0, No.14 (File No. LR31928)

Model	Coil ratings	Contact ratings
G5B-1, G5B-1-H	3 to 24 VDC	3 A, 250 VAC (general use) 3 A, 30 VDC (resistive) 1/8 hp, 125 VAC/1/8 hp, 250 VAC TV-2 125 VAC

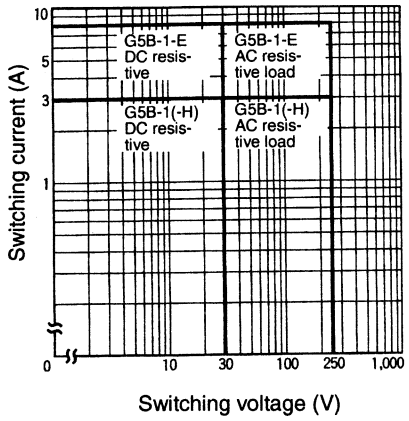
TÜV VDE0435 IEC255 (File No. R9251225)

Model	Coil ratings	Contact ratings	Condition
G5B-1, G5B-1-H	3 to 24 VDC⎓	3 A, 250 VAC∿ (cosϕ = 1) 3 A, 30 VDC⎓ (0 ms)	Duty level: class III Operative range: 2 Pick-up class: class a Pollution degree: 2 Overvoltage category: II Material group: IIIa Ambient temperature: –40°C to 70°C
G5B-1-E		8 A, 125 VAC∿ (cosϕ = 1) 8 A, 30 VDC⎓ (0 ms)	

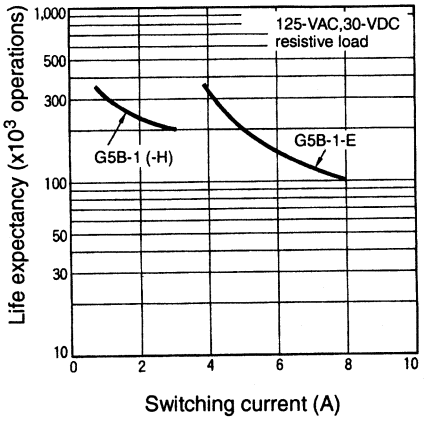
*Reinforced insulation.

Engineering Data

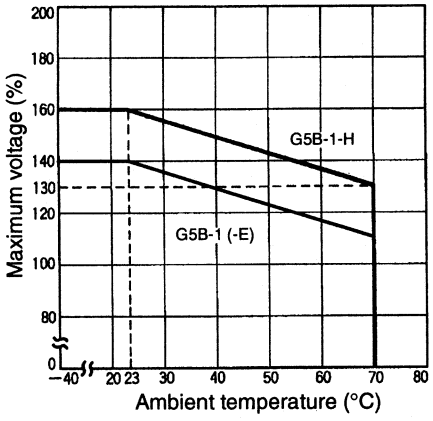
Max. Switching Capacity



Life Expectancy



Ambient Temperature vs. Maximum Voltage

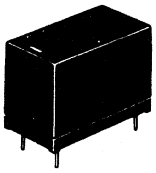


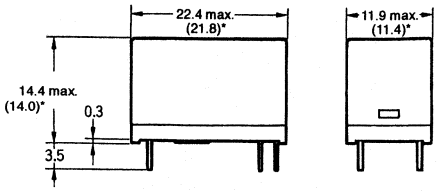
Note: The maximum voltage fefers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

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

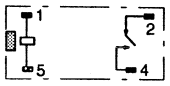
2. Orientation marks are indicated as follows: ▨ □



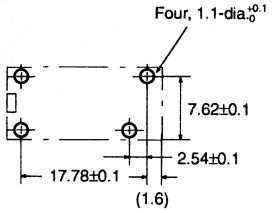


*Average value.

Terminal Arrangement/Internal Connections (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.

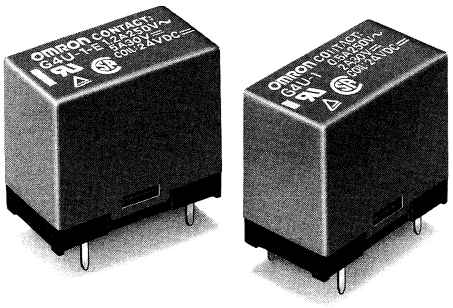
Cat. No. K49-E1-1C

OMRON

Mini Power Relay | G4U

Widely Employed in Air Conditioners, Fan Heaters, and other Devices, Now Appears with a New Product Lineup, Including 5-A Models

- Incorporates relay terminals separated from coil terminals, thus making it possible to design PCB patterns with ease.
- Dielectric strength of 2,000 V between the coil and contacts and an impulse withstand voltage of 5,000 V for greater safety.
- Greater range of applicability with the addition of high-capacity relays (5 A) to standard relays (2 A).
- IEC/VDE/UL/CSA approved.



Ordering Information

Contact form		General-purpose	High-capacity
Single contact	SPDT	G4U-1	G4U-1-E

Note: When ordering, add the rated coil voltage to the model number.
Example: G4U-1 12 VDC
Rated coil voltage

Model Number Legend:

G4U - □ - □ □ VDC
1 2 3

1. **Contact Form**
   1: SPDT
2. **Classification**
   None: General-purpose (2 A)
   E: High-capacity (5 A)
3. **Rated Coil Voltage**
   5, 6, 9, 12, 24 VDC

Classification

Contact type: Single rivet contact
Enclosure ratings: Flux protection
Terminal: PCB terminal

Specifications

■ Coil Ratings

Rated voltage	6 VDC	12 VDC	24 VDC
Rated current	60 mA	30 mA	15 mA
Coil resistance	100 Ω	400 Ω	1,600 Ω
Must operate voltage	70% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	180% of rated voltage at 23°C, 130% at 70°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.

■ Contact Ratings

Item	General-purpose	High-capacity
Load	Resistive load (cosϕ = 1)	Resistive load (cosϕ = 1)
Rated load	2 A at 110 VAC 1 A at 220 VAC 2 A at 28 VDC	5 A at 110 VAC 2.5 A at 220 VAC 5 A at 28 VDC
Rated carry current	2 A	5 A
Max. switching voltage	250 VAC, 60 VDC	250 VAC, 60 VDC
Max. switching current	2 A	5 A
Max. switching capacity	250 VA, 60 W	600 VA, 140 W
Min. permissible load	100 mA at 5 VDC	100 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation (with an operating frequency of 120 operations/min)

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max. (mean value: approx. 4.9 ms)
Release time	5 ms max. (mean value: approx. 1.7 ms)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under 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	5,000 ∇ 1.2 x 50 μs (between coil and contacts)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	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 70°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 8.6 g

■ Approved Standards

UL508/114/478/560/923/1950 (File No.41515)
CSA C22.2 NO.0, 14 (File No. LR34815)

Model	Coil ratings	Contact ratings
G4U-1	3 to 24 VDC	2 A, 120 VAC (general use) 2 A, 30 VDC (resistive) 0.5 A, 250 VAC (general use) 0.8 A, 277 VAC (general use)
G4U-1-E		5 A, 120 VAC (general use) 5 A, 30 VDC (resistive) 1.2 A, 250 VAC (general use) 2 A, 277 VAC (general use)

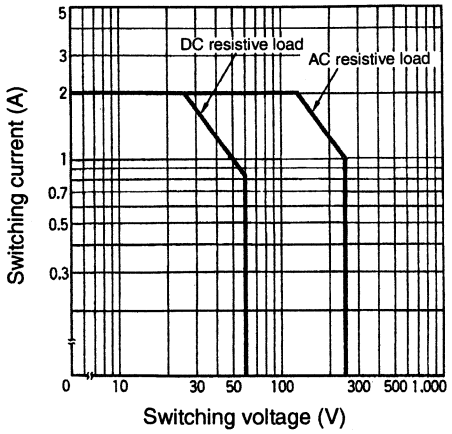
TÜV VDE0435, IEC255, IEC950, EN60950, IEC378, IEC335-1, EN60335-1 (File No. R9151216)

Model	Coil ratings	Contact ratings	Condition
G4U-1	5, 6, 9, 12, 18, 24 VDC	0.5 A, 250 VAC (cosϕ = 0.4) 1 A, 250 VAC (cosϕ = 1) 2 A, 30 VDC (0 ms)	Electrical life: See "*Life expectancy*" Mechanical life: See "*Life expectancy*" Duty level: III Operative range: 1 Pick-up: class a Pollution degree: 3 Overvoltage category: II Material group: IIIa Ambient temperature: –25°C to 70°C
G4U-1-E		1.2 A, 250 VAC (cosϕ = 0.4) 2.5 A, 250 VAC (cosϕ = 1) 5 A, 30 VDC (0 ms)	

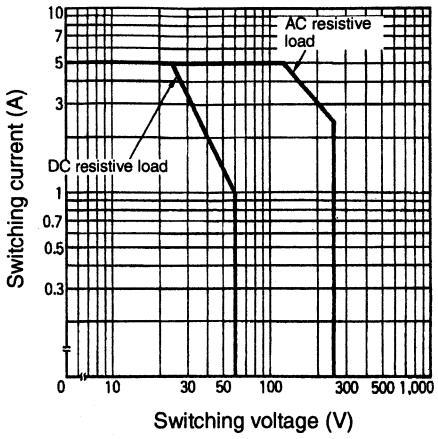
Engineering Data

Max. Switching Capacity

G4U-1

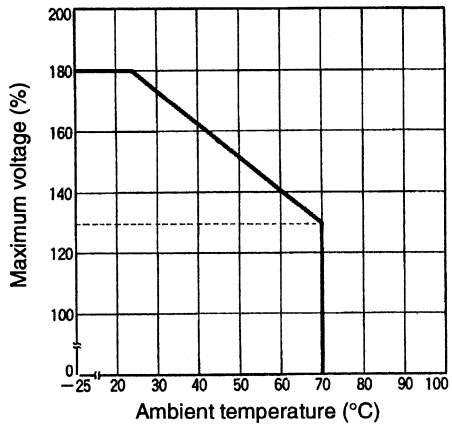


G4U-1-E

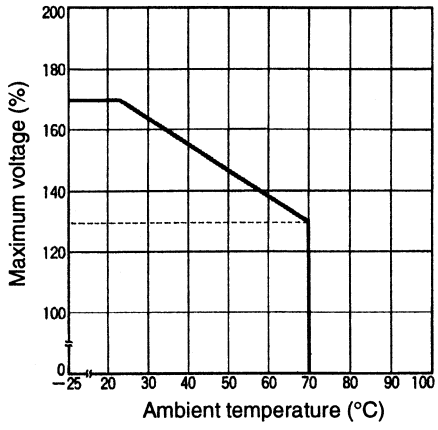


Ambient Temperature vs. Maximum Voltage

G4U-1



G4U-1-E

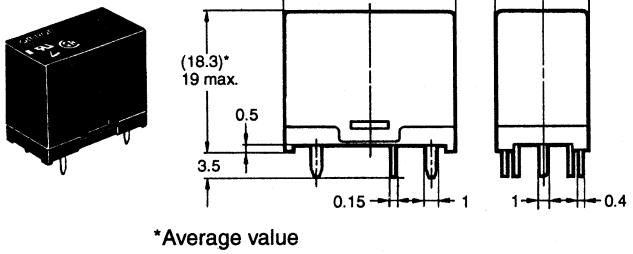


Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

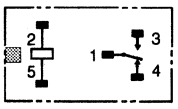
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows: ▒ [ ]

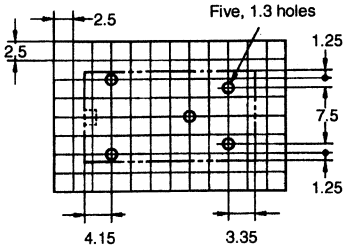


*Average value

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. K50-E1-1C

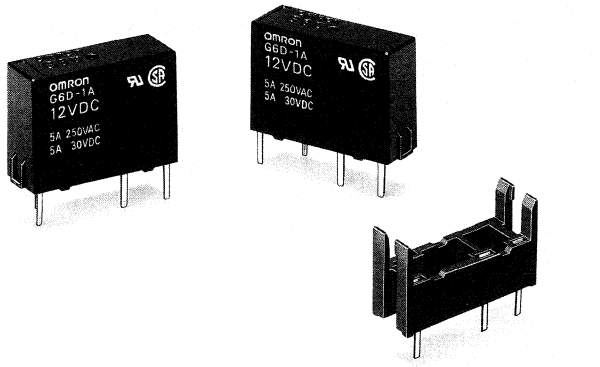
OMRON

PCB Relay

G6D

Slim, Miniature Relay (17.5 x 6.5 x 12.5 (L x W x H)), Capable of Relaying Programmable Controller and Temperature Controller Outputs

- Reduced bottom area (45% smaller than the G6B's bottom area) 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.



Ordering Information

Contact form	Model
SPST-NO	G6D-1A

Note: When ordering, add the rated coil voltage to the model number.
Example: G6D-1A 12 VDC
Rated coil voltage

Classification

Contact form: SPST-NO
Enclosure: Plastic sealed
Terminal: PCB terminal

Model Number Legend:

G6D - □ □ □ 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

■ Accessories (Order Separately)

Connecting Socket	P6D-04P

Specifications

■ 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	130% of rated voltage		
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

Load	Resistive load (cosϕ = 1)
Rated load	5 A at 250 VAC, 5 A at 30 VDC
Rated carry current	5 A
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. switching capacity	1,250 VA, 150 W
Min. permissible load	10 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	100 mΩ max.
Operating 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 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 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) Storage: –25°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%
Weight	Approx. 3 g

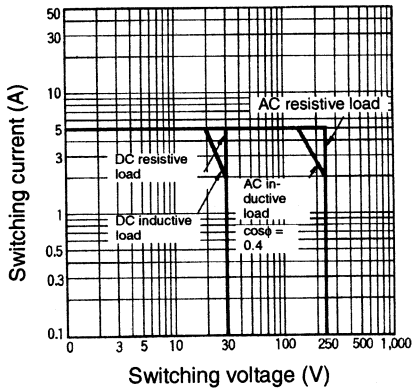
■ Approved Standards

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

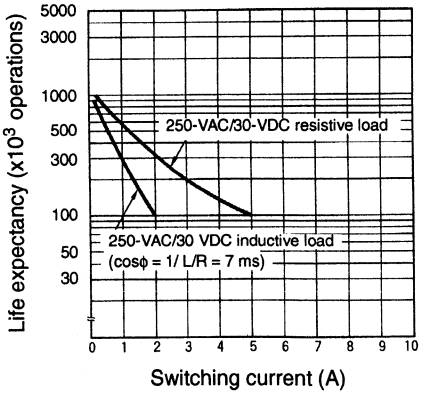
Model	Coil ratings	Contact ratings
G6D-1A	5 to 24 VDC	5 A, 250 VAC 5 A, 30 VDC

Engineering Data

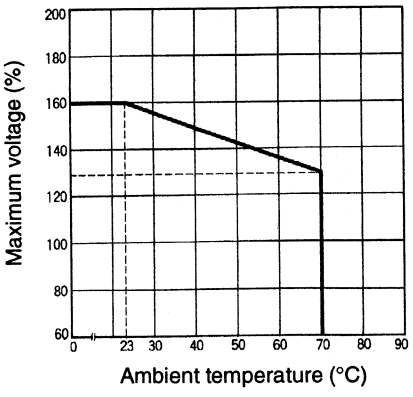
Max. Switching Capacity



Life Expectancy



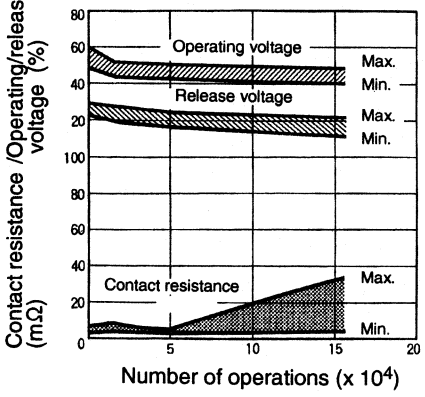
Ambient Temperature vs. Maximum Voltage



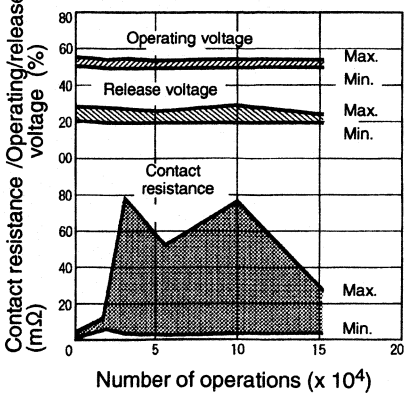
■ Reference Data

Electrical Life Expectancy

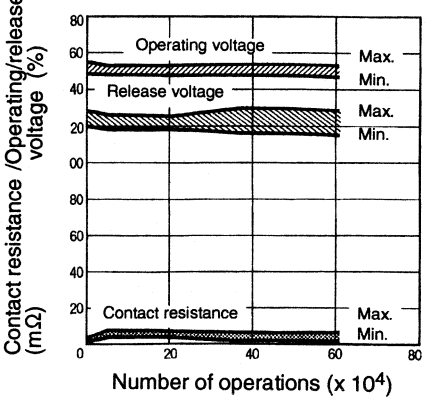
5 A at 250 VAC, cosϕ = 1



5 A at 30 VDC, Resistive Load

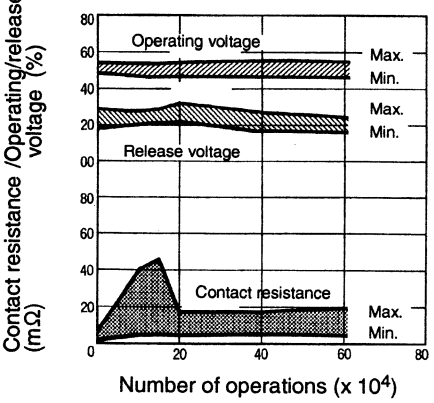


2 A at 30 VDC, Resistive Load



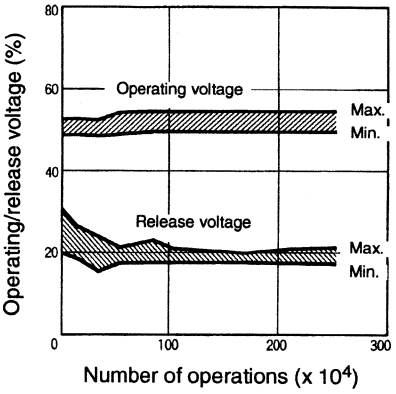
Electrical Life Expectancy

2 A at 250 VAC, cosϕ = 1

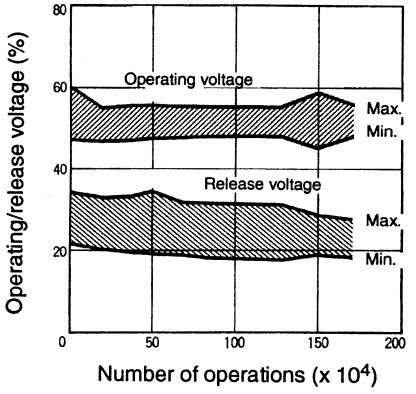


Actual Load Test Data

With OMRON's H3BA Timer (5 mA at 200 VAC)



With OMRON's MA415A Contacter (40 mA at 200 VAC)

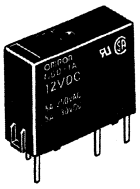


Dimensions

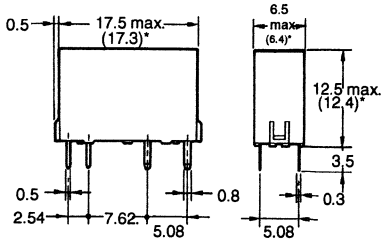
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

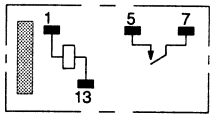
G6D-1A



*Average value

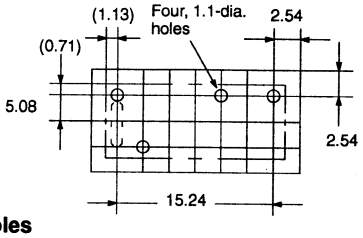


Terminal Arrangement/ Internal Connections (Bottom View)

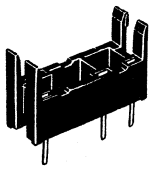


Mounting Holes (Bottom View)

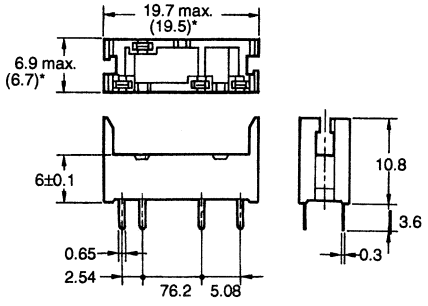
Tolerance: ±0.1



P6D-04P Socket

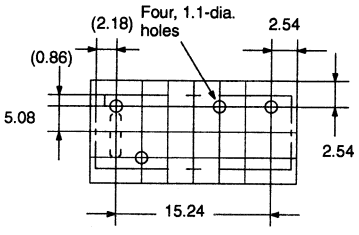


*Average value



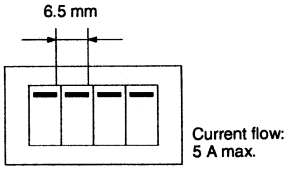
Mounting Holes (Bottom View)

Tolerance: ±0.1

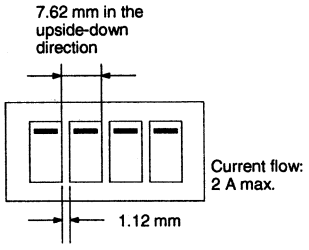


Precautions

More than two relays can be closely mounted right side up as shown in the following illustration.

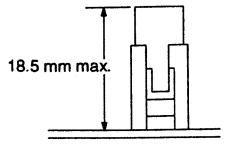


More than two relays can be closely mounted upside down as shown in the following illustration.



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. K84-E1-1B

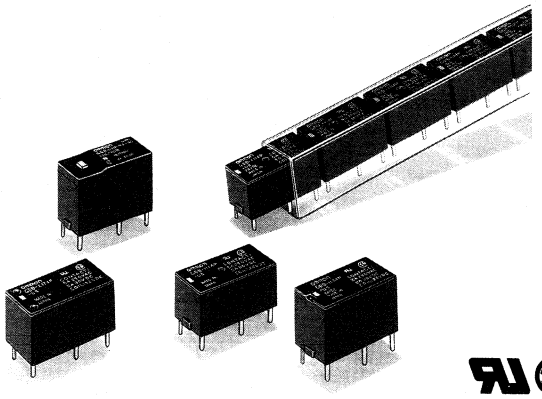
OMRON

PCB Relay

G6B

Subminiature Relay that Switches up to 5 A

- Subminiature: 20 (L) x 10 (W) x 10 (H) mm.
- 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.



Ordering Information

Contact form	Terminal type	Single-side stable	Single winding latching	Double-winding latching
SPST-NO	Straight PCB	G6B-1114P-US	G6BU-1114P-US	G6BK-1114P-US
	Self-clinching PCB	G6B-1114C-US	G6BU-1114C-US	G6BK-1114C-US
SPST-NO + SPST-NC	Straight PCB	G6B-2114P-US	---	
	Self-clinching PCB	G6B-2114C-US	---	
DPST-NO	Straight PCB	G6B-2214P-US	---	
	Self-clinching PCB	G6B-2214C-US	---	
DPST-NC	Straight PCB	G6B-2014P-US	---	
	Self-clinching PCB	G6B-2014C-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

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: Single button
   7: High-capacity
4. **Enclosure Rating**
   4: Plastic-sealed
5. **Terminals**
   P: Straight PCB
   C: Self-clinching PCB
6. **Approved Standards**
   US: UL/CSA certified
7. **Rated Coil Voltage**
   5, 6, 12, 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable relay	Back connecting socket*
G6B(U)-1114P-US	P6B-04P
G6BK-1114P-US	P6B-06P
G6B-2□□4P-US-P6B	P6B-26P
G6B-1174P-US	P6B-04P

*Not applicable to the self-clinching type.

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)		3	5	6	12	24	3	5	6	12	24
Rated current (mA)		67	40	33.3	16.7	8.3	100	60	50	25	12.5
Coil resistance (Ω)		45	125	180	720	2,880	30	83.3	120	480	1,920
Coil inductance	**Armature OFF**	0.20	0.28	0.31	1.2	4.9	---	---	---	---	---
(H) (ref. value)	**Armature ON**	0.18	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		130% of rated voltage					110% of rated voltage				
Power consumption		Approx. 200 mW					Approx. 300 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	**Armature OFF**	0.20	0.28	0.31	1.2	4.9
(H) (ref. value)	**Armature ON**	0.18	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		130% of rated voltage				
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**		93.2 mA	56 mA	46.8 mA	23.3 mA	11.7 mA
	Coil resistance		32.2 Ω	89.2 Ω	128.5 Ω	515 Ω	2,060 Ω
	Coil inductance	**Armature OFF**	0.11	0.15	0.18	0.52	1.2
	(H) (ref. value)	**Armature ON**	0.11	0.15	0.18	0.52	1.2
Reset coil	**Rated current**		93.2 mA	56 mA	46.8 mA	23.3 mA	11.7 mA
	Coil resistance		32.2 Ω	89.2 Ω	128.5 Ω	515 Ω	2,060 Ω
	Coil inductance	**Armature OFF**	0.11	0.15	0.18	0.52	1.2
	(H) (ref. value)	**Armature ON**	0.11	0.15	0.18	0.52	1.2
Must set voltage			70% max. of rated voltage				
Must reset voltage			70% min. of rated voltage				
Maximum voltage			130% of rated voltage				
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 (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; 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	AgCdO			
Rated carry current	5 A			
Max. switching voltage	380 VAC, 125 VDC			
Max. switching current	5 A			
Max. switching capacity	1,250 VA, 150 W	500 VA, 60 W	1,250 VA, 150 W	375 VA, 80 W
Min. permissible load0	10 mA at 5 VDC			

Item	SPST-NO (High-capacity)	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	8 A at 250 VAC; 5A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC
Contact material	AgCdO	
Rated carry current	8 A	
Max. switching voltage	380 VAC, 125 VDC	
Max. switching current	8 A	
Max. switching capacity	2,000 VA, 150 W	
Min. permissible load0	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)
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 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: Single-side stable: 100 m/s^2 (approx. 10G); Latching: 300 m/s^2 (approx. 30G)
Life expectancy	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) Storage: –25°C to 70°C (with no icing)
Ambient humidity	Operating: 45% to 85% Storage: 45% 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 value

■ Approved Standards

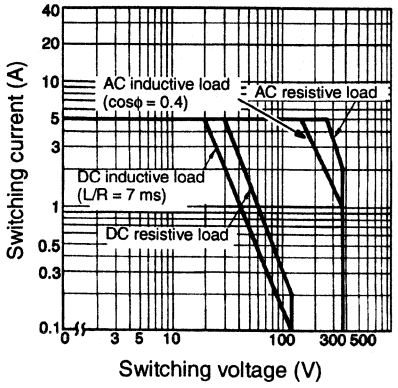
UL508 (File No. E41643)/CSA C22.2 No.14 (File No. LR31928)

Model	Contact form	Coil rating	Contact rating
G6B-1114P-US G6B-1114C-US G6BU-1114P-US G6BU-1114C-US G6BK-1114P-US G6BK-1114C-US G6B-1114P-US G6B-1114C-US G6BU-1114P-US G6BU-1114C-US G6BK-1114P-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)

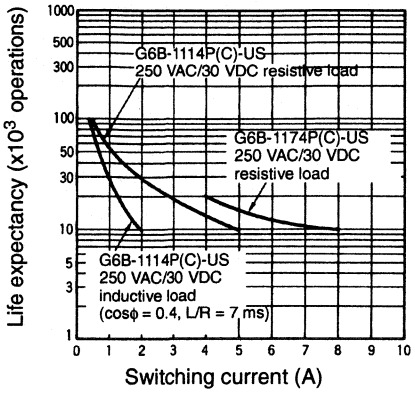
Engineering Data

G6B-1114P-US

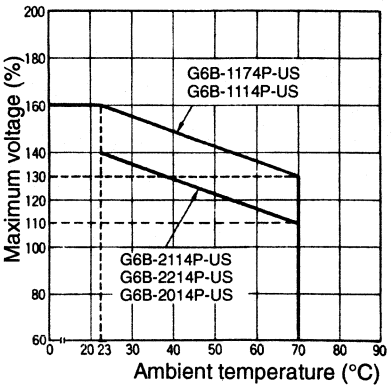
Max. Switching Capacity



Life Expectancy



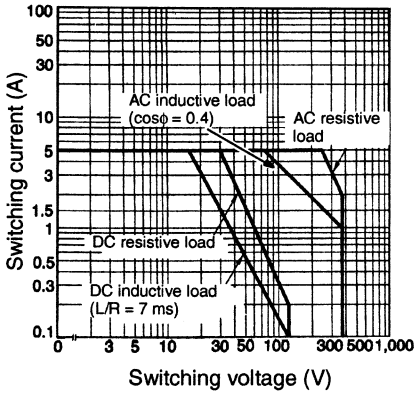
Ambient Temperature vs. Maximum Voltage



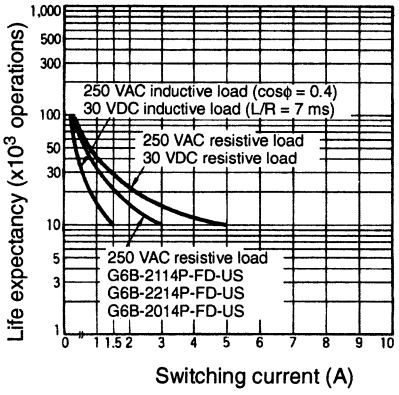
Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

G6B-2114P-US, G6B-2214P-US, G6B-2014P-US

Max. Switching Capacity



Life Expectancy

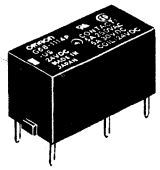


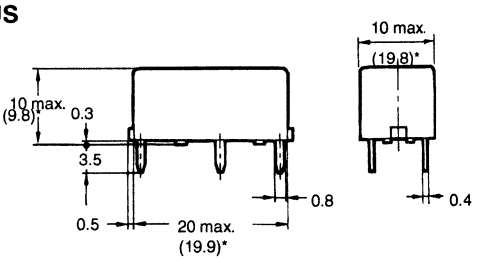
Dimensions

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

2. Orientation marks are indicated as follows: ▩ □

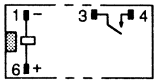
G6B-1114P-US
G6BU-1114P-US



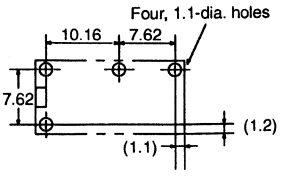


*Average value

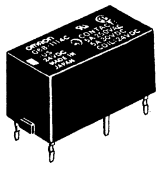
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1114P, -1114C

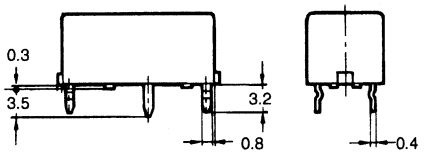


Mounting Holes (Bottom View)
G6B-1114P, -1114C
G6BU-1114P, -1114C

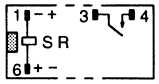


G6B-1114C-US
G6BU-1114C-US

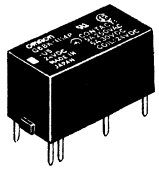


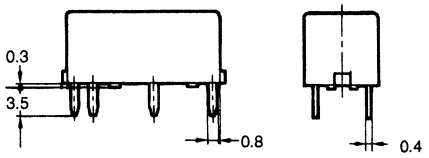


G6BU-1114P, -1114C

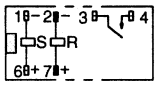


G6BK-1114P-US

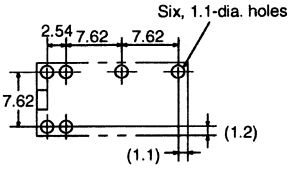




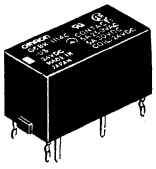
Terminal Arrangement/Internal Connections (Bottom View)
G6BK-1114P, -1114C

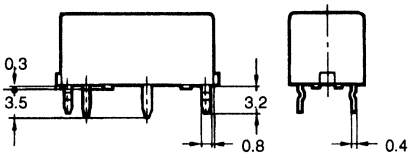


Mounting Holes (Bottom View)
G6BK-1114P, -1114C

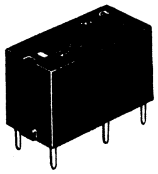


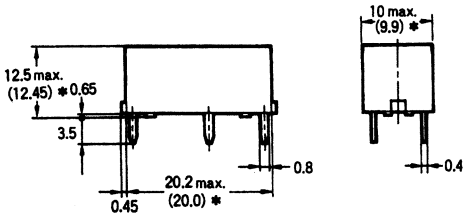
G6BK-1114C-US





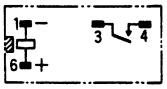
G6B-1174P-US



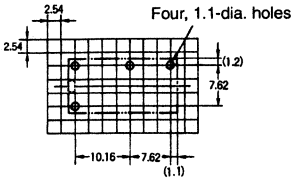


*Average value

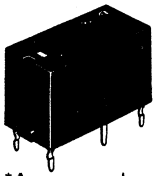
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1174P, -1174C

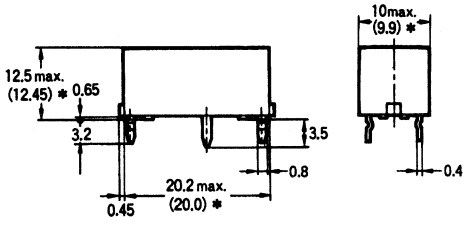


Mounting Holes (Bottom View)



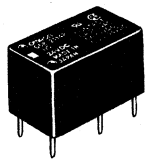
G6B-1174C-US



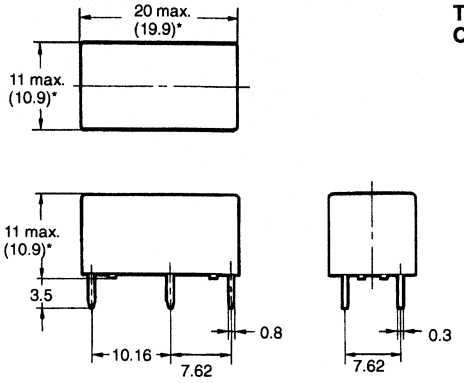


*Average value

G6B-2114P-US
G6B-2214P-US
G6B-2014P-US

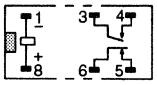


*Average value

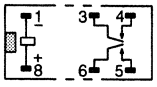


Terminal Arrangement/Internal Connections (Bottom View)

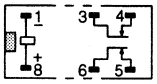
G6B-2114P-US



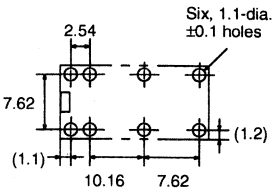
G6B-2214P-US



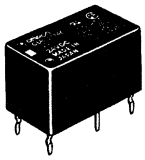
G6B-2014P-US



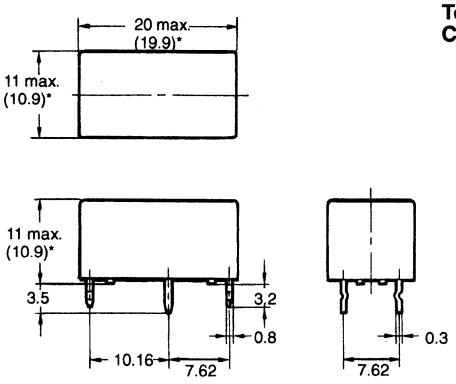
Mounting Holes (Bottom View)
Tolerance: ±0.1



G6B-2114C-US
G6B-2214C-US
G6B-2014C-US

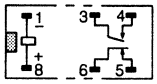


*Average value

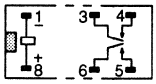


Terminal Arrangement/Internal Connections (Bottom View)

G6B-2114C-US



G6B-2214C-US



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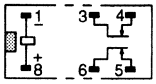
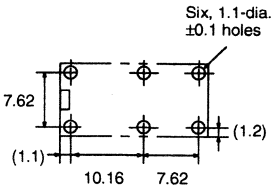
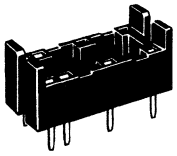
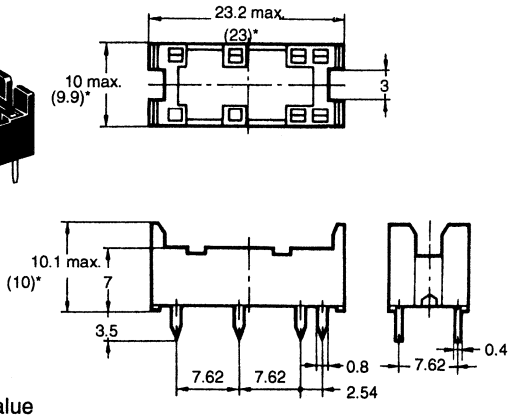


Mounting Holes (Bottom View)
Tolerance: ±0.1



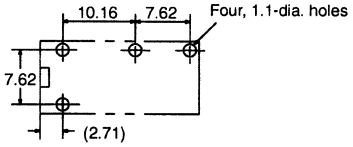
Back Connecting Socket



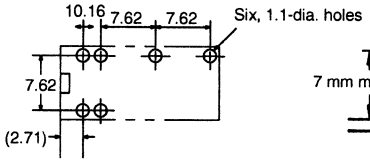


*Average value

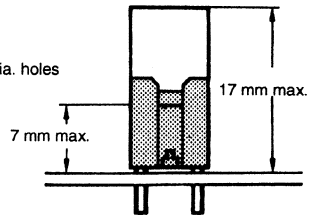
Mounting Holes (Bottom View)
P6B-04P



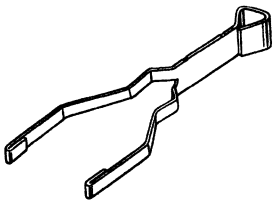
P6B-06P



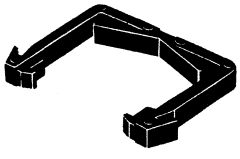
Mounting Height



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. K21-E1-5

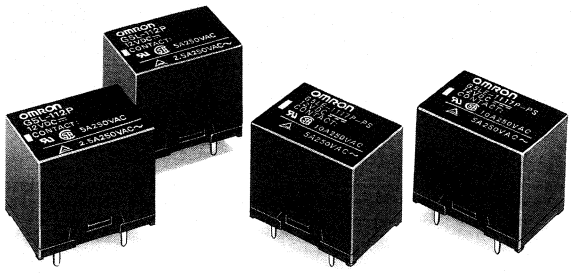
OMRON

PCB Relay

G5L(E)

A Cubic, Single-pole Power Relay Available for 5-A and 10-A Models

- Subminiature "sugar cube" relay.
- Contact ratings of 5 A or 10 A.
- Withstands impulses of up to 4,500 V.
- Three types of seal available: unsealed, flux protection, and plastic-sealed.
- UL class-B insulation type also available.



Ordering Information

Seal	Contact form	Standard	High capacity	UL class-B insulation	
Unsealed	SPDT	G5L-112P	G5LE-112P-PS	G5L-112P-T130	G5LE-112P-T130-PS
	SPST-NO	G5L-1112P	G5LE-1112P-PS	G5L-1112P-T130	G5LE-1112P-T130-PS
Flux protection	SPDT	G5L-117P	G5LE-117P-PS	G5L-117P-T130	G5LE-117P-T130-PS
	SPST-NO	G5L-1117P	G5LE-1117P-PS	G5L-1117P-T130	G5LE-1117P-T130-PS
Plastic-sealed	SPDT	G5L-114P-PS	G5LE-114P-PS	G5L-114P-T130-PS	G5LE-114P-T130-PS
	SPST-NO	G5L-1114P-PS	G5LE-1114P-PS	G5L-1114P-T130-PS	G5LE-1114P-T130-PS

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G5L(E)-112P 12 VDC
Rated coil voltage

2. G5L plastic-sealed relay terminals are pre-soldered in the standard product.

Model Number Legend:

G5L(E) - □ □ □ □ □ □ □ □ □ □ □ VDC
1 2 3 4 5 6 7 8 9 10 11

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   1: SPST-NO
3. **Contact Type**
   1: Single button
4. **Sealing**
   2: Unsealed
   7: Flux-protection
   4: Plastic-sealed
5. **Terminals**
   P: Straight PCB
6. **Configuration**
   None: Standard
   R: Reversed Terminal
7. **Contact Material**
   AP: AU plating (Except TUV)
   ASI: AgSnIn
8. **Insulation**
   None: Standard
   T130: UL Class B (Except TUV)
9. **Terminal Arrangement**
   None: Standard
   PS: Pre-soldered type
10. **Coil Power**
    None: Standard (Coil power = 400 mW)
    55 (43): Coil power 550 mW (without approval)
    36: 360 mW
11. **Rated Coil Voltage**
    5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Rated voltage	3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	133.3 mA	79.4 mA	66.7 mA	45 mA	33.3 mA	16.7 mA	8.33 mA
Coil resistance	22.5 Ω	63 Ω	90 Ω	200 Ω	360 Ω	1,440 Ω	5,760 Ω
Must operate voltage	75% of rated voltage (max.)						
Must release voltage	10% of rated voltage (min.)						
Max. voltage	130% of rated voltage at 70°C, 170% of rated voltage at 23°C						
Power consumption (mW)	Approx. 400						

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

■ Contact Ratings

Item	G5L	G5LE
Load	resistive load (cosϕ = 1)	
Rated load	5 A at 120 VAC; 5 A at 30 VDC	10 A at 120 VAC; 8 A at 30 VDC
Contact material	AgCdO	
Rated carry current	5 A	10 A
Max. switching voltage	250 VAC, 125 VDC (30 VDC when UL/CSA standard is applied)	
Max. switching current	AC or DC: 5 A	AC: 10 A; DC: 8 A
Max. switching capacity	600 VA, 150 W	1,200 VA, 240 W
Min. permissible load	100 mA at 5 VDC	

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Bounce time	Operate: Approx. 0.6 ms Release: Approx. 7.2 ms
Max. switching frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 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
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	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 70°C
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 12 g

■ Approved Standards

UL114, UL478, UL325, UL508, UL1409, UL1950 (File No. E41643)

Model	Coil rating	Contact rating
G5L	3 to 48 VDC	5 A, 250 VAC (general use) 5 A, 30 VDC (resistive load) 125 VA, 120 VAC (P.D 100,000 cycles) 5 A, 125 VAC (G.P), 30K, 70°C NO: 1/8 hp, 120 VAC (50,000 cycles) 4 FLA, 4 LRA, 120 VAC (100,000 cycles) 1/2 s, ON:OFF Ambient temperature: 105°C 5 FLA, 30 LRA, 120 VAC Mechanical life: 100,000 cycles (for G5L-112P) TV-3, 120 VAC NC: 1/10 hp, 120 VAC (50,000 cycles) 2 FLA, 4 LRA, 120 VAC (100,000 cycles) 1/2 s, ON:OFF Ambient temperature: 105°C
G5LE		10 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 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 NC: 1/8 hp, 120 VAC (50,000 cycles)

CSA C22.2 NO. 14 (File No. LR34815)

Model	Coil rating	Contact rating
G5L	3 to 48 VDC	5 A, 250 VAC (general use) 5 A, 30 VDC (resistive load) 125 VA, 120 VAC (P.D 100,000 cycles) 5 A, 125 VAC (G.P), 30K, 70°C NO: 1/8 hp, 120 VAC (50,000 cycles) TV-3 NC: 1/10 hp, 120 VAC (50,000 cycles)
G5LE		10 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 6 A, 277 VAC (general use), 100K NO: 1/6 hp, 120 VAC (50,000 cycles) 1/3 hp, 125 VAC, 70°C 30K NC: 1/10 hp, 120 VAC (50,000 cycles)

Note: Only model numbers with the suffix "AS1" are TV-5 approved.

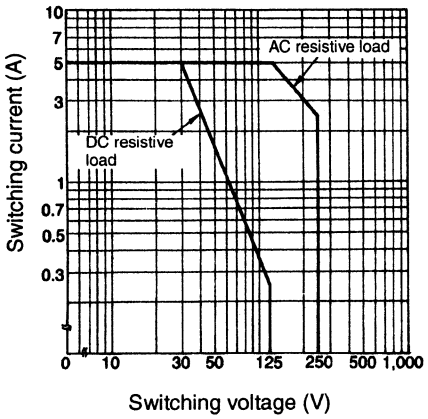
TÜV (VDE File No. R9151267)

Model	Coil rating	Contact rating
G5L	3, 5, 6, 9, 12, 24 VDC	1.2 A, 250 VAC (cosϕ = 0.4) 2.5 A, 250 VAC (resistive load) 5 A, 30 VDC (resistive load)
G5LE		2.5 A, 250 VAC (cosϕ = 0.4) 5 A, 250 VAC (resistive load) 8 A, 30 VDC (resistive load)

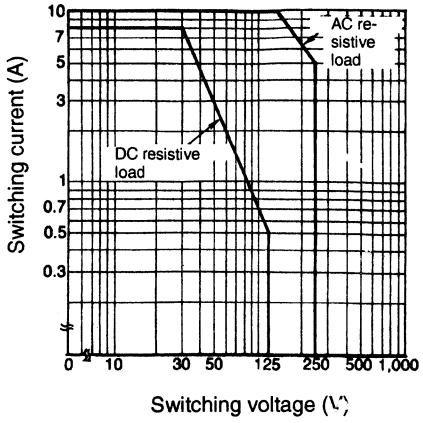
Engineering Data

Max. Switching Capacity

G5L

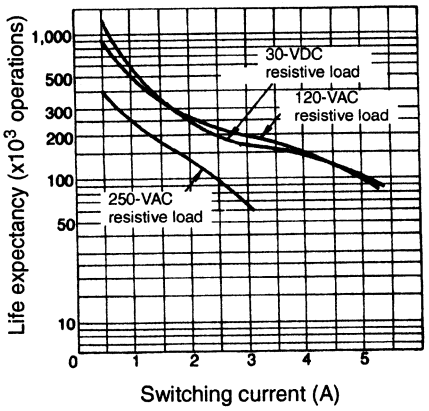


G5LE

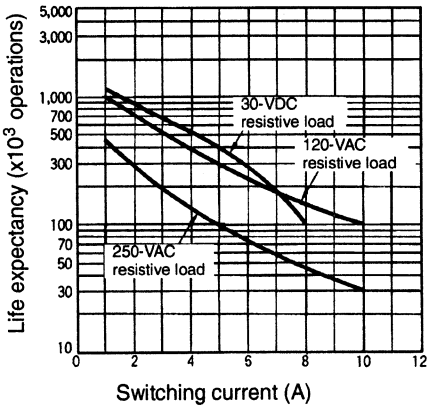


Life Expectancy

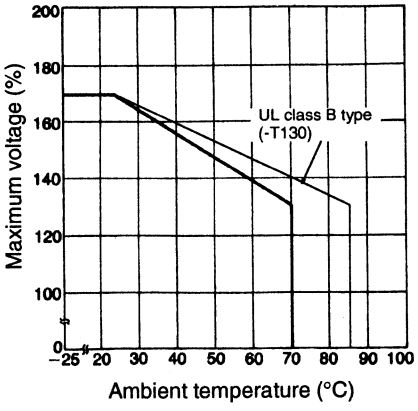
G5L



G5LE



Ambient Temperature vs. Maximum Voltage

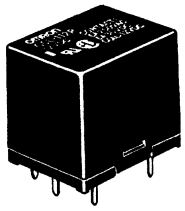


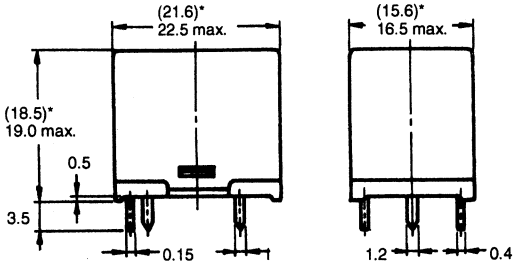
Dimensions

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

2. Orientation marks are indicated as follows:

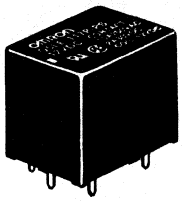
G5L(E)-112P, G5L(E)-117P

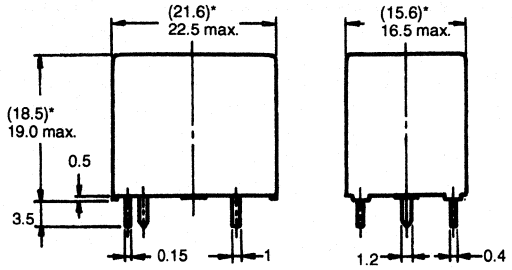




*Average value

G5L(E)-114P, G5L(E)-1114P

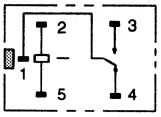




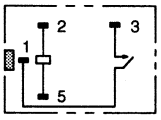
*Average value

Terminal Arrangement/Internal Connections (Bottom View)

SPDT



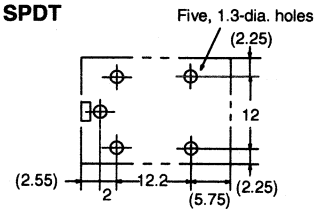
SPST-NO



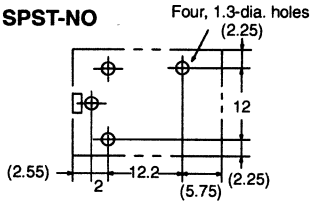
Mounting Holes (Bottom View)

Tolerance: ±0.1 mm

SPDT



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. K28-E1-3E

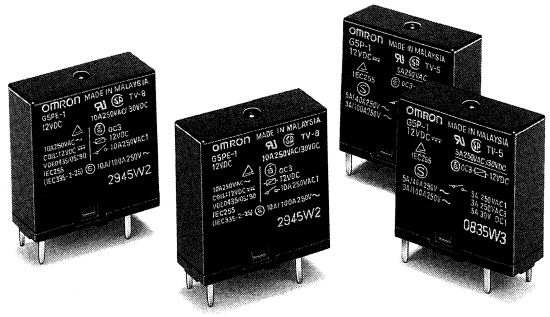
OMRON

PCB Relay

G5P(E)

A Miniature Power Relay that Withstands up to 5 A at 10 kV

- Reduces space requirements by up 30% in high-density mounting (compared to OMRON's G2R).
- Meets UL TV-5 ratings.
- High-capacity models available that meet UL TV-8 ratings.
- IEC/CENELEC/UL/CSA approved.
- Reinforced insulation ideal for use in office machines (IEC950/EN60950).
- Spacings: Clearance of 5.4 mm, creepage of 5.4 mm.



Ordering Information

Type	Contact form	Coil	Model
General purpose	SPDT-NO	Single-stable type	G5P-1
High-capacity			G5PE-1

Note: When ordering, add the rated coil voltage to the model number.
Example: G5P-1 12 VDC
Rated coil voltage

Model Number Legend:

G5P □-□-□ □ **VDC**
1 2 3 4

1. **Type**
   None: Standard
   E: High-capacity
2. **Number of Poles**
   1: 1 pole
3. **Classification**
   H: High-sensitivity
4. **Rated Coil Voltage**
   5, 6, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current	106.4 mA	94.4 mA	59.2 mA	44.2 mA	21.8 mA
Coil resistance	47 Ω	64 Ω	152 Ω	273 Ω	1,100 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	110% of rated voltage				
Power consumption	530 mW				

High-capacity

Rated voltage	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC
Rated current	160 mA	133.3 mA	88.9 mA	66.7 mA	33.3 mA
Coil resistance	31 Ω	45 Ω	101 Ω	180 Ω	721 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Max. voltage	110% of rated voltage				
Power consumption	800 mW				

■ Contact Ratings

Item	Standard	High-capacity
Load	Resistive load ($\cos\phi = 1$)	
Rated load	5 A, 250 VAC; 5 A, 30 VDC	10 A, 250 VAC; 10 A, 30 VDC
Contact material	AgInSn	
Rated carry current	5 A	10 A
Max. switching voltage	250 VAC, 30 VDC	
Max. switching current	5 A	10 A
Max. switching capacity	1,250 VA, 150 W	2,500 VA, 300 W
Min. permissible load	100 mA, 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$operations (with an operating frequency of 120 operations/min)

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	15 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 contact
	1,000 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 contact
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)
Life expectancy	Mechanical: 2,000,000 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: 45% to 85%
Weight	Approx. 11 g

■ Approved Standards

UL508 (File No. E41643)

Model	Coil ratings	Contact ratings
G5P-1	3 to 48 VDC	5 A, 250 VAC 5 A, 30 VDC 1/2 hp, 240 VDC 1/6 hp, 120 VAC TV-5 rating 600 W, 120 VAC (tungsten)
G5PE-1		10 A, 250 VAC 10 A, 30 VDC TV-8 rating 960 W, 120 VAC (tungsten)

CSA C22.2 No.14 (File No. LR31928)

Model	Coil ratings	Contact ratings
G5P-1	3 to 48 VDC	10 A, 250 VAC 10 A, 30 VDC 1/2 hp, 240 VDC TV-5, 5 A (tungsten) 120 VAC 600 W, 120 VAC
G5PE-1	3 to 48 VDC	10 A, 250 VAC TV-8

SEV (File No.88,1 02860,04)

Model	Coil ratings	Contact ratings
G5P-1	3 to 48 VDC	5 A, 250 VAC, 1 3 A, 250 VAC, 3 5 A, 30 VDC, 1
G5PE-1		10 A, 250 VAC, 1

SEMKO (File No. 9010005)

Model	Coil ratings	Contact ratings
G5P-1	3 to 48 VDC	5 A/40 A, 250 VAC 3 A/100 A, 250 VAC
G5PE-1		10 A/100 A, 250 VAC

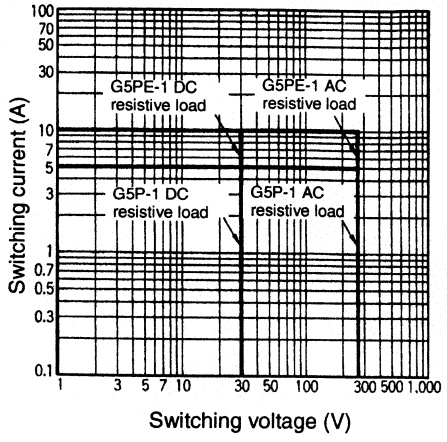
TÜV VDE0435 VDE0860 IEC255, IEC65, IEC950*, IEC335-1, IEC378, EN60335-1, EN60950* (File No. R9251286)

Model	Coil ratings	Contact ratings	Contact ratings
G5P series	3 to 48 VDC⎓	5 A, 250 VAC∿ (cosϕ = 1) 5 A, 30 VDC⎓ (0 ms)	Electrical life: See "*Life expectancy*" on page 137. Mechanical life: See "*Life expectancy*" on page 137. Duty level: class III Operative range: 2 Pick-up class: class a
G5PE series		10 A, 250 VAC∿ (cosϕ = 1)	Pollution degree: 2 Overvoltage category: II Material group: IIIa Ambient temperature: –40°C to 70°C

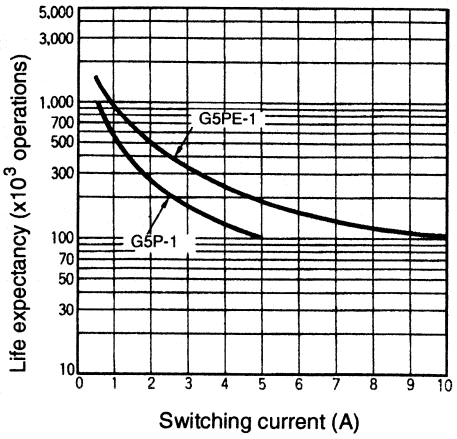
*Reinforced insulation.

Engineering Data

Max. Switching Capacity

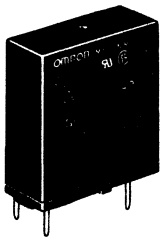


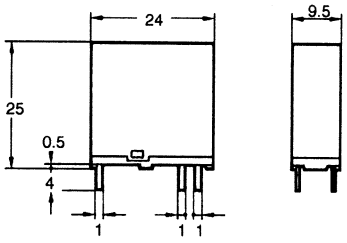
Life Expectancy



Dimensions

Note: All units are in millimeters unless otherwise indicated.

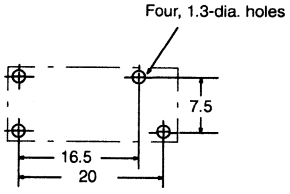




Terminal Arrangement /Internal Connections (Bottom View)

Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



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. K29-E1-2C

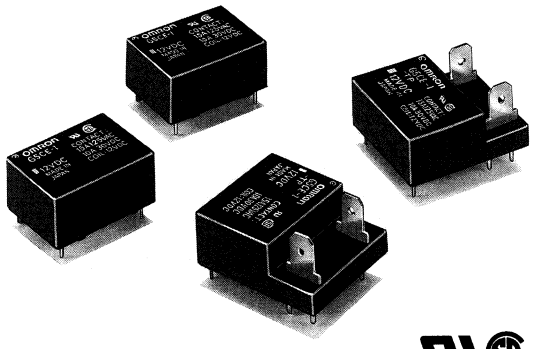
OMRON

PCB Relay

G5C(E)

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: 22 x 16 x 11 mm (L x W x H).
- High-sensitivity models available with low power consumption (150 mW).
- UL and CSA approved.
- Plastic-sealed models and quick-connect terminal models available (#187 load contact terminals).



Ordering Information

Contact form	Enclosure rating	General purpose	High-sensitivity	High-capacity	Quick-connect terminals
SPST-NO	Flux protection	G5C-1	G5C-1-H	G5CE-1	G5CE-1-TP
	Plastic-sealed	G5C-14	G5C-14-H	---	---

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G5C-1 12 VDC
Rated coil voltage

2. High-capacity models with a plastic-sealed structure are not available.
3. Standard or high-sensitivity models with quick-connect terminals are not available.

Model Number Legend:

G5C □-□ □-□ □ **VDC**
1 2 3 4 5

1. **Relay**
None: General-purpose
E: High-capacity

2. **Number of Poles**
1: 1 pole (SPST-NO)

3. **Enclosure Ratings**
None: Flux protection
4: Plastic-sealed

4. **Series**
H: High-sensitivity
TP: Quick-connect terminals (#187)

5. **Rated Coil Voltage**
3, 5, 6, 12, 24, 48 VDC

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	130% (standard)/110% (high-capacity, quick-connect terminals) of rated voltage			130%		
Power consumption	Approx. 200 mW			Approx. 150 mW		

■ Contact Ratings

Item	Standard		High-sensitivity		High-capacity, or quick-connect terminals	
	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	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		250 VAC		250 VAC	
Max. switching current	10 A		10 A		15 A	
Max. switching capacity	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

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	10 ms max. (High-sensitivity type: 15 ms max.)
Release time	10 ms max.
Insulation resistance	1,000 MΩ min.
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between contacts of same polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	4,500 V, 1.2 x 50 μ sec
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)
Life expectancy	Mechanical: 20,000,000 operations min. at 18,000 operations/hr Electrical: 300,000 operations min. (100,000 operations min. for Plastic-sealed Type) at 1,200 operations/hr under rated load of 10 A at 250 VAC; 100,000 operations min. under load of 15 A at 110 VAC for high-capacity models 100,000 operations min. at 1,200 operations/hr under rated load of 10 A at 30 VDC
Ambient temperature	Operating: –25°C to 70°C (with no icing) Storage: –25°C to 70°C
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 8 g (for TP model: Approx. 9.6 g)

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.

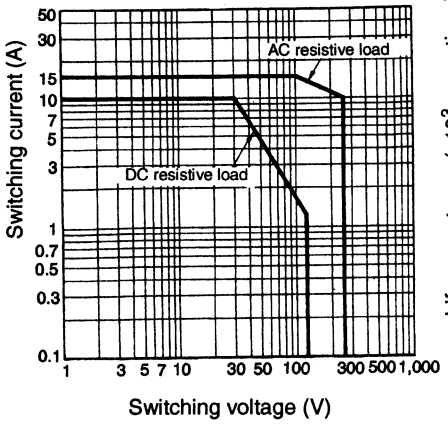
■ Approved Standards

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

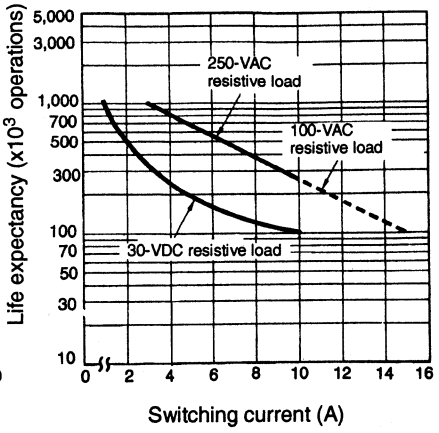
Coil rating	Contact rating
3 to 100 VDC	15 A, 125 VAC 10 A, 250 VAC 10 A, 30 VDC (resistive load only)

Engineering Data

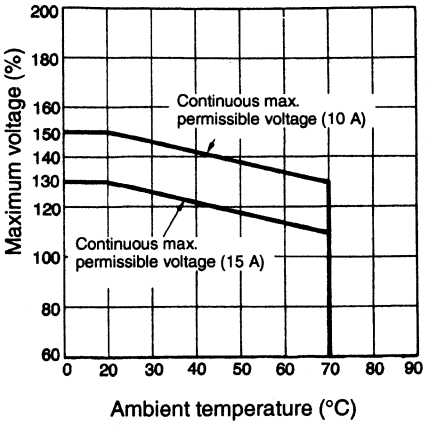
Max. Switching Capacity



Electrical Life Expectancy



Ambient Temperature vs. Maximum Voltage

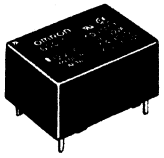


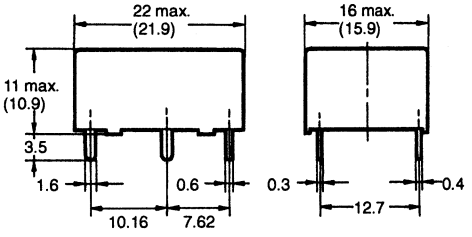
Dimensions

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

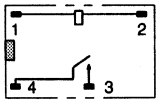
2. Orientation marks are indicated as follows: ▩ □

G5C(E)-1

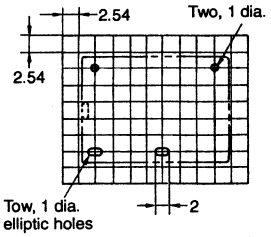




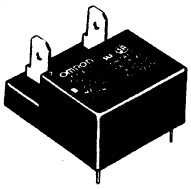
Terminal Arrangement/Internal Connections (Bottom View)

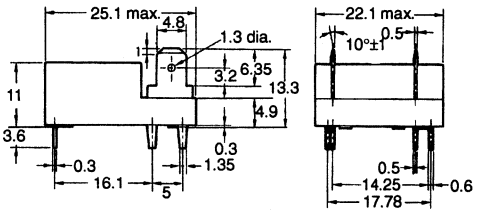


Mounting Holes (PCB)

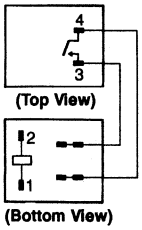


G5CE-1-TP

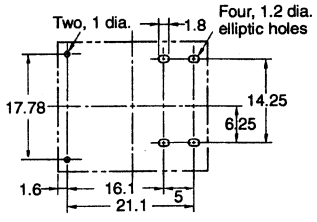




Terminal Arrangement/Internal Connections



Mounting Holes (Bottom View)



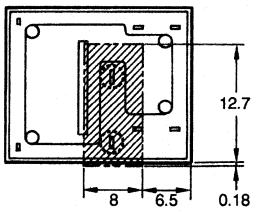
Precautions

Quick-connect Terminals

The quick-connect terminals can be connected to an appropriate load. Consult your OMRON representative, however, when you intend to impose voltage on the quick-connect terminals mounted on a PCB.

The terminals are compatible to the Fasten receptacle #187 positive block connector.

The portion marked with oblique lines includes the charged terminals of the power relay. When you mount the power relay on a PCB, make sure any unnecessary metal patterns on the PCB are kept away from this portion.



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. J85-E1-2

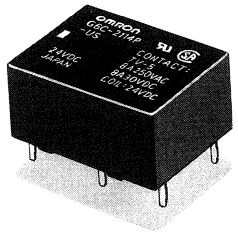
OMRON

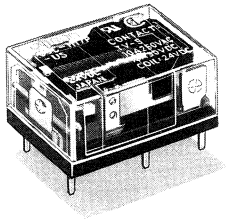
PCB Relay

G6C

SPST-NO Type Breaks 10-A Loads; SPST-NO + SPST-NC Type Breaks 8-A Load

- Compact: 20 x 15 x 10 mm (L x W x H).
- Low power consumption: 200 mW.
- Flux protection or plastic-sealed construction available.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce.
- Single- and double-winding latching types also available





Ordering Information

Classification		Straight PCB		Self-clinching PCB	
		Flux protection	Plastic-sealed	Flux protection	Plastic-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

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: Single button
4. **Enclosure Ratings**
   7: Flux protection
   4: Plastic-sealed
5. **Terminals**
   P: Straight PCB
   C: Self-clinching PCB
6. **Approved Standards**
   US: UL/CSA certified
7. **Rated Coil Voltage**
   3, 5, 6, 12, 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable relay	Back connecting socket*
G6C(U)-1114P-US G6C(U)-1117P-US G6C(U)-2114P-US G6C(U)-2117P-US	P6C-06P
G6CK-1114P-US G6CK-1117P-US G6CK-2114P-US G6CK-2117P-US	P6C-08P

*Not applicable to the self-clinching versions.

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	**Armature OFF**	0.078	0.22	0.36	1.32	4.96
(H) (ref. value)	**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		130% of rated voltage				
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	**Armature OFF**	0.09	0.25	0.36	1.75	5.83
(H) (ref. value)	**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		130% of rated voltage				
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				
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	AgCdO			
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 capacity	2,500 VA, 300 W	1,250 VA, 220 W	2,000 VA, 240 W	875 VA, 170 W
Min. permissible load	10 mA at 5 VDC			

■ 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
Impulse withstand voltage	6.000 V, 1.2 x 50 μs (between coil and contacts) (latching types: 4500 V, 1.2 × 50 μs)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Ambient temperature	Operating: –25°C to 70°C (with no icing) Storage: –25°C to 70°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	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)

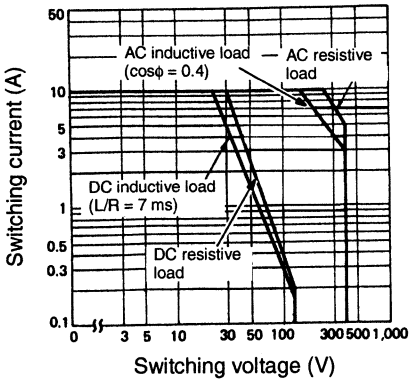
CSA C22.2 No.14 (File No. LR31928)

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)

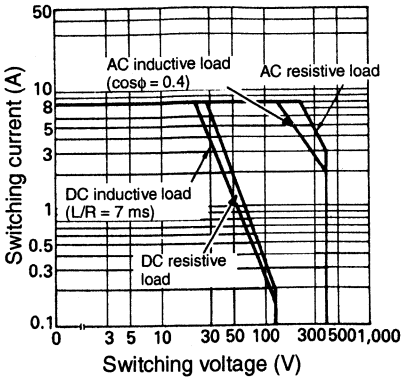
Engineering Data

Max. Switching Capacity

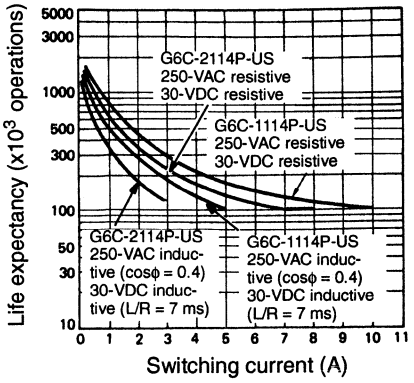
SPST-NO



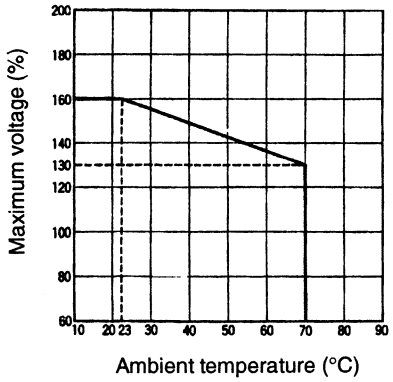
SPST-NO + SPST-NC



Life Expectancy



Ambient Temperature vs. Maximum Voltage

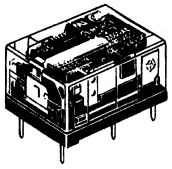


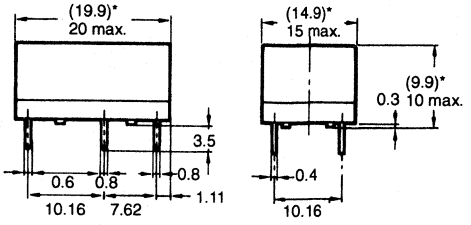
Dimensions

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

2. Orientation mark is indicated as follows: 

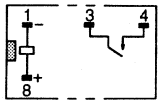
G6C-□117P-US



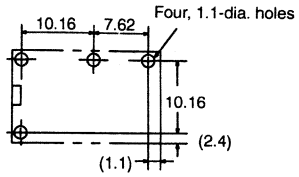


*Average value

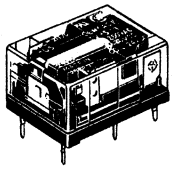
G6C-1117P-US, G6C-1117C-US
G6C-1114P-US, G6C-1114C-US
Terminal Arrangement/Internal Connections (Bottom View)

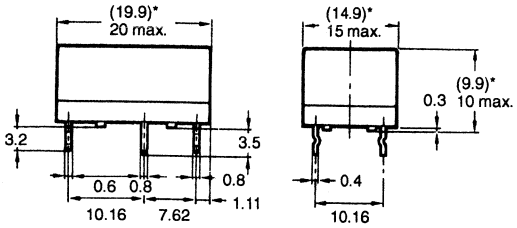


Mounting Holes (Bottom View)
Tolerance: ±0.1



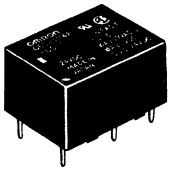
G6C-□117C-US

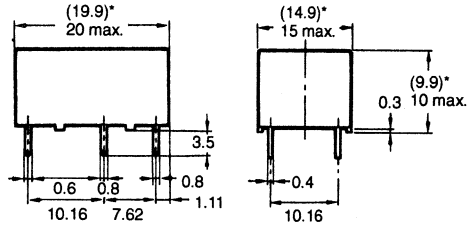




*Average value

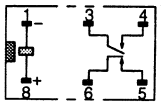
G6C-□114P-US



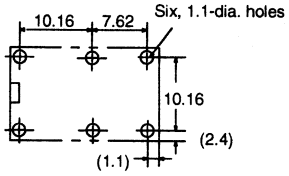


*Average value

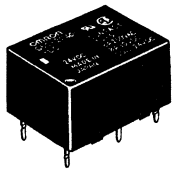
G6C-2117P-US, G6C-2117C-US
G6C-2114P-US, G6C-2114C-US
Terminal Arrangement/Internal Connections (Bottom View)

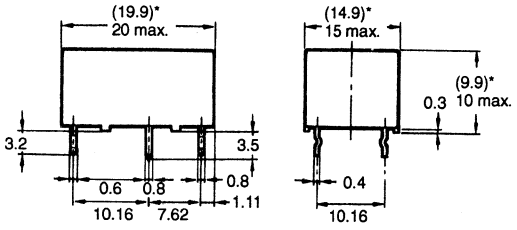


Mounting Holes (Bottom View)
Tolerance: ±0.1



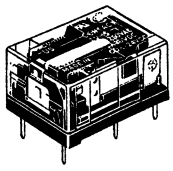
G6C-□114C-US

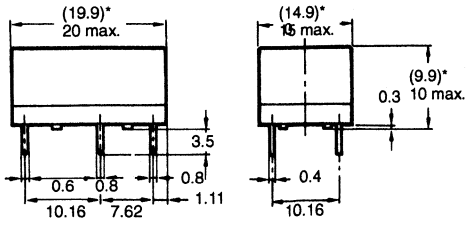




*Average value

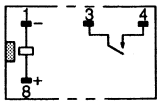
G6CU-□117P-US



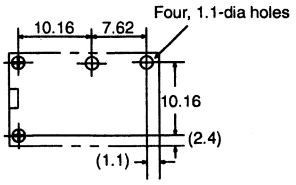


*Average value

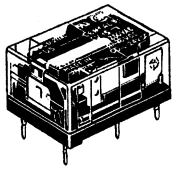
G6CU-1117P-US, G6CU-1117C-US
G6CU-1114P-US, G6CU-1114C-US
Terminal Arrangement/Internal Connections (Bottom View)

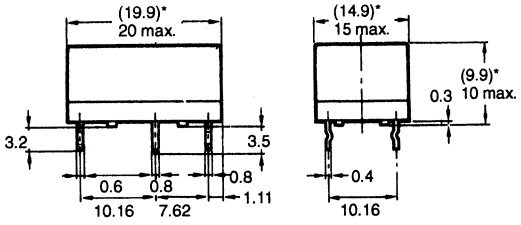


Mounting Holes (Bottom View)



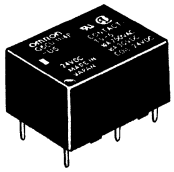
G6CU-□117C-US

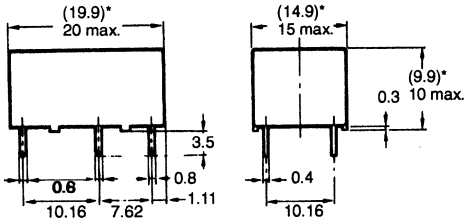




*Average value

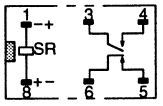
G6CU-□114P-US



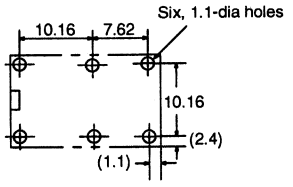


*Average value

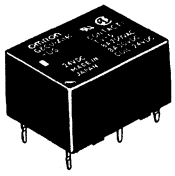
G6CU-2117P-US, G6CU-2117C-US
G6CU-2114P-US, G6CU-2114C-US
Terminal Arrangement/Internal Connections (Bottom View)

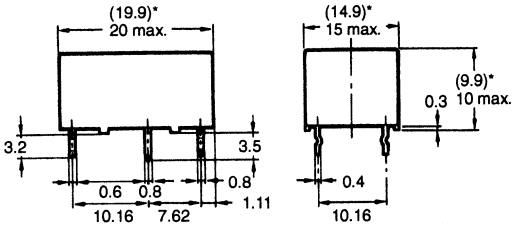


Mounting Holes (Bottom View)



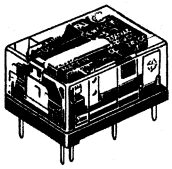
G6CU-□114C-US

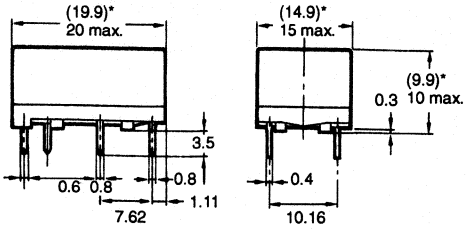




*Average value

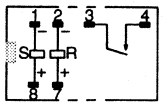
G6CK-□117P-US



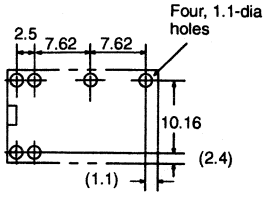


*Average value

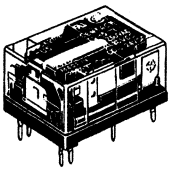
G6CK-1117P-US, G6CK-1117C-US
G6CK-1114P-US, G6CK-1114C-US
Terminal Arrangement/Internal Connections (Bottom View)

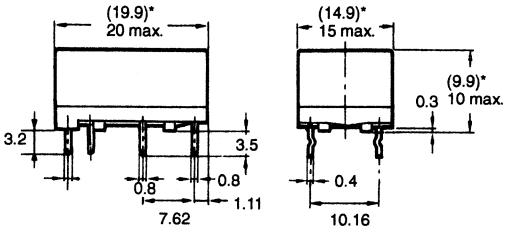


Mounting Holes (Bottom View)



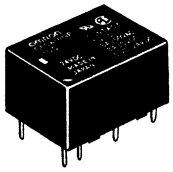
G6CK-□117C-US

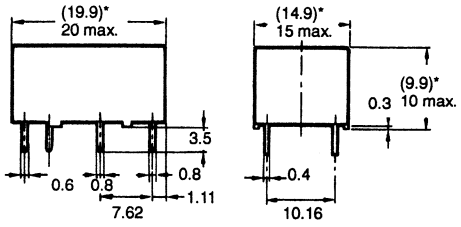




*Average value

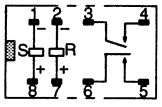
G6CK-□114P-US



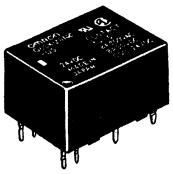


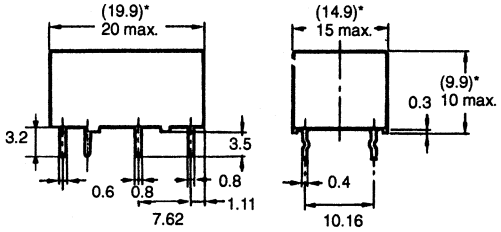
*Average value

G6CK-2117P-US, G6CK-2117C-US
G6CK-2114P-US, G6CK-2114C-US
Terminal Arrangement/Internal Connections (Bottom View)



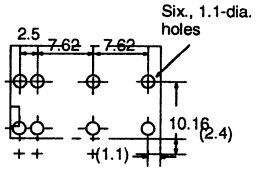
G6CK-□114C-US





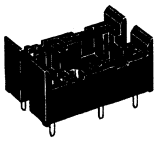
*Average value

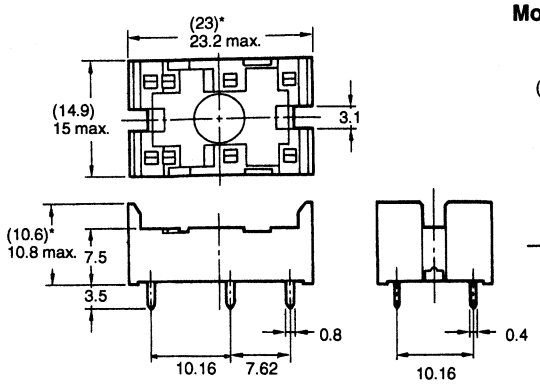
Mounting Holes (Bottom View)



Back Connecting Sockets

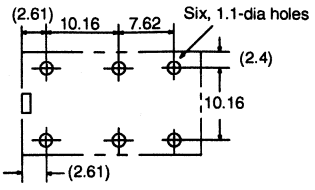
P6C-06P



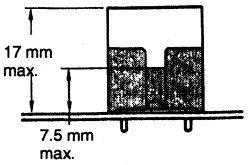


*Average value

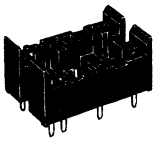
Mounting Holes (Bottom View)

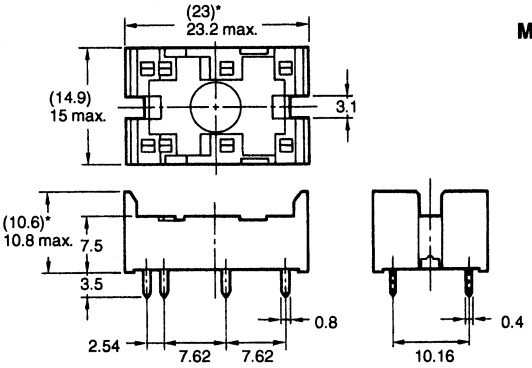


Mounting Height of Relay with Connecting Socket



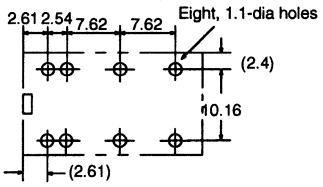
P6C-08P





*Average value

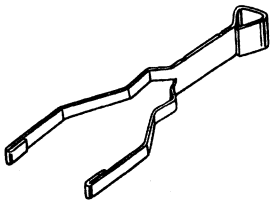
Mounting Holes (Bottom View)



Note: Rated current of socket max. 5 A

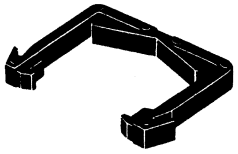
Removal Tool

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.

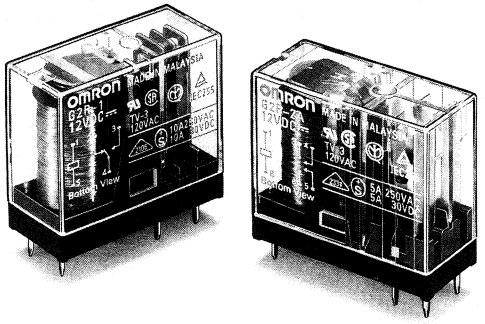
OMRON

PCB Relay

G2R

The Redesigned G2R Power Relay

- Flux protection, pre-tinned terminals now standard.
- High-sensitivity (360 mW) and high-capacity (16 A) types available.
- Double-winding latching type also available.
- Plug-in and quick-connect terminals available.
- Models meeting SEV and SEMKO, or VDE standards available.



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
		Plastic-sealed		G2R-1A4	G2R-14	G2R-2A4	G2R-24
	Twin contact	Flux protection	DC	G2R-1AZ	G2R-1Z	---	---
		Plastic-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
Plug-in terminal	General-purpose	Unsealed	AC/DC	---	G2R-1-S	---	G2R-2-S
	LED indicator			---	G2R-1-SN	---	G2R-2-SN
	Diode		DC	---	G2R-1-SD	---	G2R-2-SD
	LED indicator and diode			---	G2R-1-SND	---	G2R-2-SND
Plug-in terminal (Twin crossbar contact)	General-purpose		AC/DC	G2R-1A3-S	G2R-13-S	---	---
	LED indicator			G2R-1A3-SN	G2R-13-SN	---	---
	LED indicator and diode		DC	G2R-1A3-SND	G2R-13-SND	---	---
Quick-connect terminal	General-purpose		AC/DC	G2R-1A-T	G2R-1-T	---	---

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G2R-1A 12 VDC
Rated coil voltage

2. OMRON has also prepared the above relays with AgSnIn contacts, which are more tolerant of large inrush currents and physical movement compared with relays with standard contacts. When ordering, add "-ASI" to the model number.
Example: G2R-1A-ASI

3. Standard, NO contact type relays are TV-3 class products in accordance with the TV standards of the UL/CSA. Models with AgSnIn contacts are TV-5 class products.
Example: G2R-1A-ASI
When ordering a TV-8 class model, insert "-TV8" into the model number as follows:
Example: G2R-1A-TV8-ASI

Model Number Legend:

G2R □-□ □ □ □ □- □ □- □ □

1 2 3 4 5 6 7 8 9

1. **Relay Function**
   None: General-purpose
   K: Double-winding latching.
2. **Number of Poles**
   1: 1 pole
   2: 2 poles
3. **Contact Form**
   None: SPDT
   A: SPST-NO
4. **Contact Type**
   None: Single
   Z: Bifurcated
   3: Bifurcated crossbar
5. **Enclosure Ratings**
   None: Flux protection
   4: Plastic-sealed
6. **Terminals**
   None: Straight PCB
   S: Plug-in
   T: Quick-connect (upper bracket mounting)
7. **Classification**
   None: General-purpose
   E: High-capacity
   H: High-sensitivity
   N: LED indicator
   D: Diode
   ND: LED indicator and diode
8. **Contact Material**
   None: AgCdO
   ASI: AgSnIn
9. **Rated Coil Voltage**

■ Accessories (Order Separately)

Connecting Sockets

Number of poles	Applicable relay model	Track/surface mounting socket	Back mounting socket	
			Terminals	Model
1 pole	G2R-1-S(N)(D)(ND)	P2RF-05-E	PCB terminals	P2R-05P, P2R-057P
	G2R-13-S (G2R-1A3-S)	P2RF-05	Solder terminals	P2R-05A
2 poles	G2R-2-S(N)(D)(ND)	P2RF-08-E	PCB terminals	P2R-08P, P2R-087P
		P2RF-08	Solder terminals	P2R-08A

Note: See "*Dimensions*" for details on socket size.

Mounting Track

Applicable socket	Description	Model
Track connecting socket	Mounting track	50 cm (ℓ) x 7.3 mm (t): PFP-50N 1 m (ℓ) x 7.3 mm (t): PFP-100N 1 m (ℓ) x 16 mm (t): PFP-100N2
	End plate	PFP-M
	Spacer	PFP-S
Back connecting socket	Mounting plate	P2R-P*

*Used to mount several P2R-05A and P2R-08A connecting sockets side by side.

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 (4.0) mA	5.1 mA	4.7 (3.7) 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 (3.1) mA	3.8 mA
Coil resistance*		65 Ω	260 Ω	4,600 Ω	6,500 Ω	20,200 (25,000) Ω	25,000 Ω	26,850 (30,000) 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% max. of rated voltage							
Max. voltage		110% of rated voltage							
Power consumption		Approx. 0.9 VA at 60 Hz (approx. 0.7 VA at 60 Hz)							

Note: 1. Rated voltage of bifurcated crossbar contact type: 100/(110) VAC, 200/(220) VAC, 230 VAC (Approx. 0.7 VA at 60 Hz)

2. Depending on the type of Relay, Some Relays do not have coil specifications. Contact your OMRON representative for more details.

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	Armature OFF	0.20	0.28	1.15	4.27	13.86	67.2
(H) (ref. value)	Armature ON	0.39	0.55	2.29	8.55	27.71	93.2
Must operate voltage		70% min. of rated voltage					
Must release voltage		15% min. of rated voltage					
Max. voltage		110% of rated voltage					
Power consumption		Approx. 0.53 W					

Note: Rated voltage of bifurcated crossbar contact type: 12 VDC, 24 VDC

High-sensitivity Relays

Rated voltage		5 VDC	6 VDC	12 VDC	24 VDC	48 VDC
Rated current (50/60 Hz)		71.4 mA	60 mA	30 mA	15 mA	7.5 mA
Coil resistance		70 Ω	100 Ω	400 Ω	1,600 Ω	6,400 Ω
Coil inductance	Armature OFF	0.37	0.53	2.14	7.80	31.20
(H) (ref. value)	Armature ON	0.75	1.07	4.27	15.60	62.40
Must operate voltage		70% max. of rated voltage				
Must release voltage		15% max. of rated voltage				
Max. voltage		110% of rated voltage				
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. LEDs are used for the built-in operation indicator. For models equipped with these indications, the VAC rated current must be increased by approximately 1 mA; the VDC rated current, by approximately 4 mA.

3. Operating characteristics are measured at a coil temperature of 23°C.

Double-winding Latching Relays

Rated voltage			5 VDC	6 VDC	12 VDC	24 VDC
Set coil	Rated current*		167 mA	138 mA	70.6 mA	34.6 mA
	Coil resistance*		30 Ω	43.5 Ω	170 Ω	694 Ω
	Coil inductance	Armature OFF	0.073	0.104	0.42	1.74
	(H) (ref. value)	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	Armature OFF	0.003	0.005	0.018	0.079
	(H) (ref. value)	Armature ON	0.006	0.009	0.036	0.148
Must set voltage			70% of rated voltage			
Must reset voltage			70% of rated voltage			
Max. voltage			110% of rated voltage			
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, Plug-in, Quick-connect Terminal Relays

Item	General-purpose, quick-connect terminal, plug-in 1/2/3*		Quick-connect terminal, plug-in 4*		High-capacity	
Number of poles	1 pole		2 pole		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 (1) A at 250 VAC; 10 (1) 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 (1) A		5 A		16 A	
Max. operating voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. operating current	10 (1) A		5 A		16 A	
Max. switching capacity	2,500 (250) VA, 300 (30) 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
Min. permissible load	100 mA at 5 VDC (1 mA at 5 VDC)		10 mA at 5 VDC		100 mA at 5 VDC	

Note: 1. P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

*2. Plug-in type 1: standard; 2: w/operation indicator; 3: w/diode; 4: w/operation indicator and diode

3. ( ): Twin crossbar contact type.

PCB/Flux Protection Relays

Item	Bifurcated contacts		High-sensitivity			
Number of poles	1 pole		1 pole		2 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	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. operating voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. operating 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
Min. permissible load	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/Plastic-sealed Relays

Item	General-purpose (single contact)				Bifurcated contact	
Number of poles	1 pole		2 pole		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. operating voltage	380 VAC, 125 VDC		380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. operating current	8 A		4 A		5 A	
Max. switching capacity	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
Min. permissible load	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 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)
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. operating voltage	380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. operating 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
Min. permissible load	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 pole
Contact resistance	30 mΩ max.	50 mΩ max.
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max. (w/built-in diode: 20 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 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 when energized (approx. 20G); 100m/s^2 when no energized (approx. 10G)	
Life expectancy	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) Storage: –40°C to 70°C (with no icing)	
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%	
Weight	Approx. 17 g (plug-in terminal: approx. 20 g)	

Note: Values in the above table are the initial values.
*2,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A socket is mounted.

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 Hz, 1.5 mm double amplitude Malfunction: 10 to 55 Hz, 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)	
Life expectancy	Mechanical: 10,000,000 operations min (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load)	
Weight	Approx. 17 g	

Note: Values in the above table are the initial values.
*2,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A socket is mounted.

■ Approved Standards

UL 508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings
G2R-1 G2R-14 G2R-1-H G2R-1-S 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-S 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 G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)
G2R-2A G2R-2A4 G2R-2A-H G2R-2A-S	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-S 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-S 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 G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)
G2R-2A G2R-2A4 G2R-2A-H G2R-2A-S	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 poles	3 to 110 VDC	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 240 VAC	5 A, 250 VAC1 2 A, 380 VAC1 5 A, 30 VDC1

SEMKO

Contact form	Coil ratings	Contact ratings
1 poles	3 to 110 VDC	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 (IEC 255)

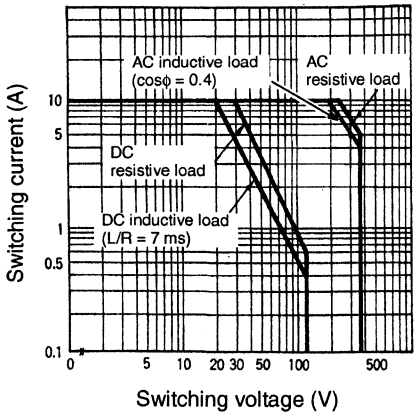
Contact form	Coil ratings	Contact ratings
1 poles	3 to 110 VDC, 6 VAC to 240 VAC (for Standards coil) 3 to 48 VDC (for K, U coil) 3 to 70 VDC (for H coil)	10 A, 250 VAC ($\cos\phi$ = 1.0) 10 A, 30 VDC (0 ms) 16 A, 250 VAC ($\cos\phi$ = 1.0) (AgSnIn contact)
2 poles		8 A, 250 VAC ($\cos\phi$ = 0.4) 5 A, 250 VAC ($\cos\phi$ =1.0) 5 A, 30 VDC (0 ms) 2.5 A, 250 VAC ($\cos\phi$ = 0.4)

Engineering Data

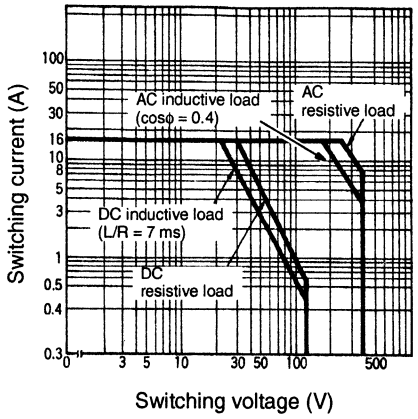
Max. Switching Capacity

Flux Protection/Plug-in Relays

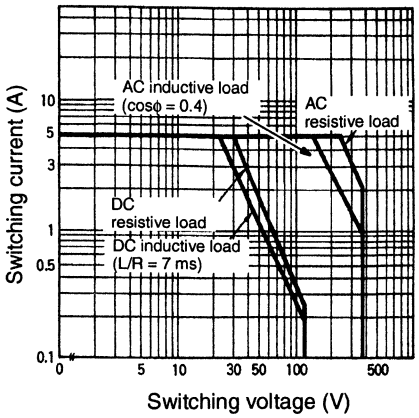
G2R-1, G2R-1A, G2R-1-S, G2R-1-T, G2R-1A-T



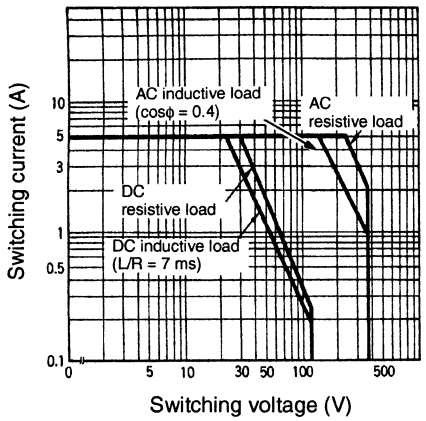
G2R-1-E, G2R-1A-E



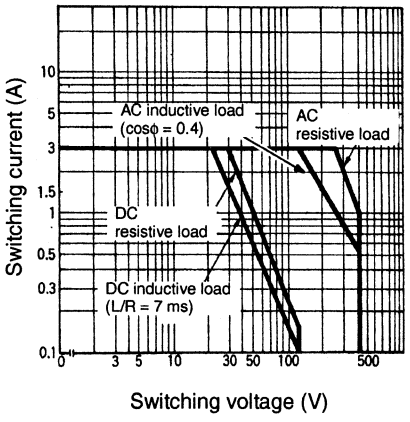
G2R-1Z, G2R-1AZ



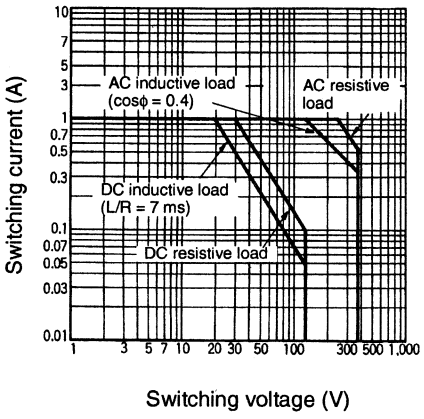
G2R-1-H, G2R-1A-H, G2R-2 G2R-2A, G2R-2-S



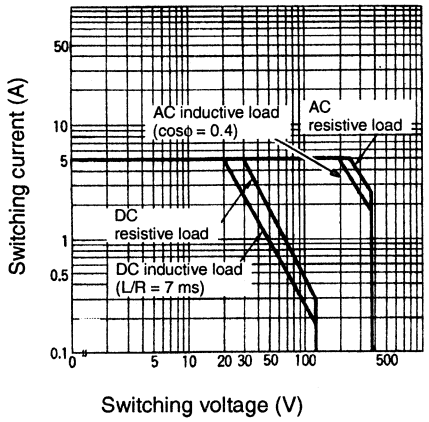
G2R-2-H, G2R-2A-H



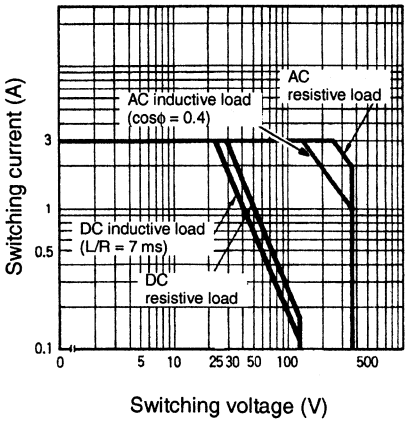
G2R-13-S, G2R-1A3-S



G2RK-1A, G2RK-1

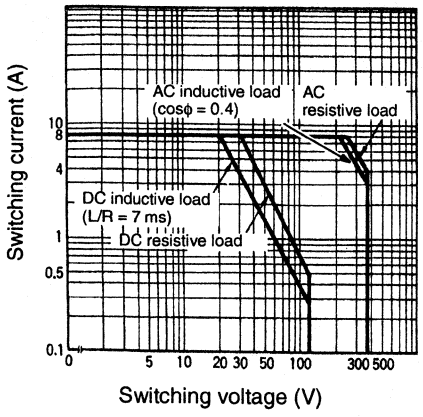


G2RK-2A, G2RK-2

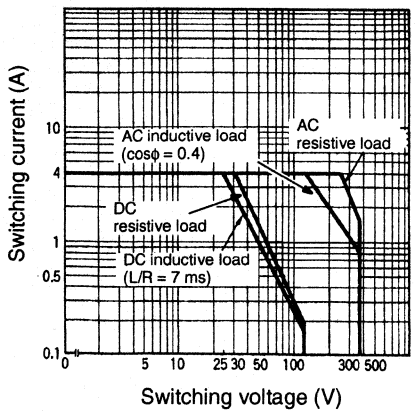


Plastic-sealed Relays

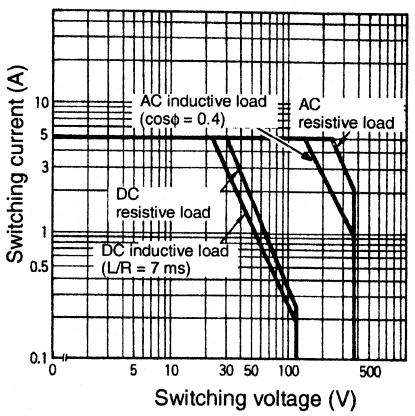
G2R-14, G2R-1A4



G2R-24, G2R-2A4



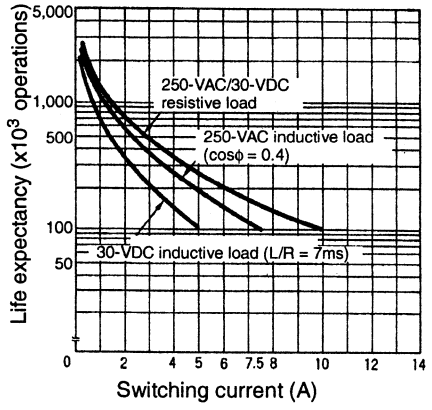
G2R-1Z4, G2R-1AZ4



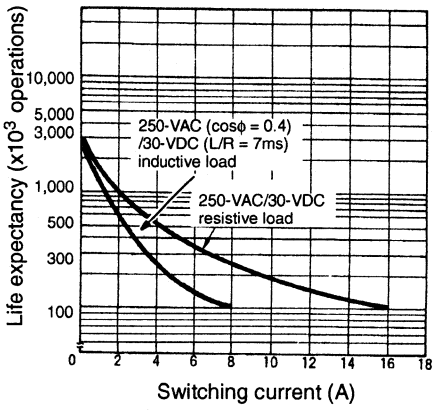
Life Expectancy

Flux Protection/Plug-in Relays

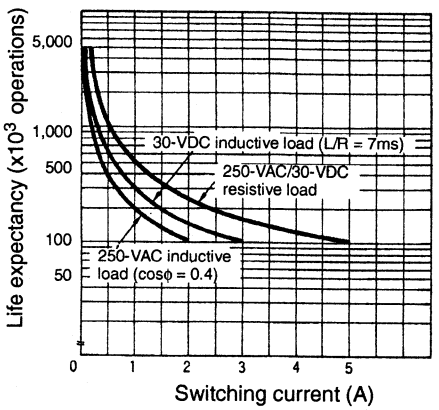
G2R-1, G2R-1A, G2R-1-S, G2R-1-T, G2R-1A-T



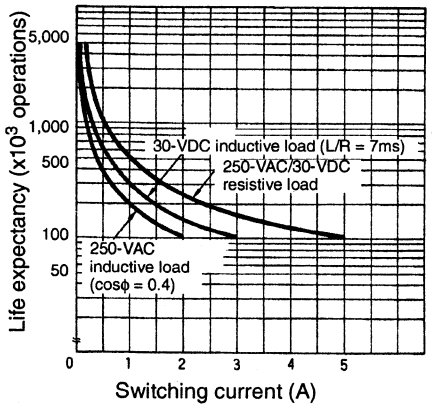
G2R-1-E, G2R-1A-E



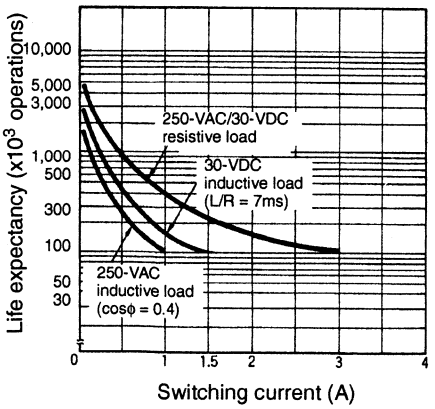
G2R-1Z, G2R-1AZ



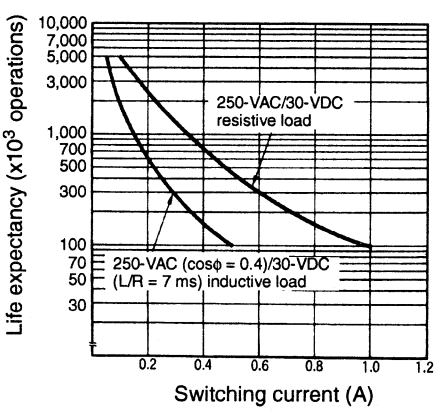
G2R-1-H, G2R-1A-H, G2R-2 G2R-2A, G2R-2-S



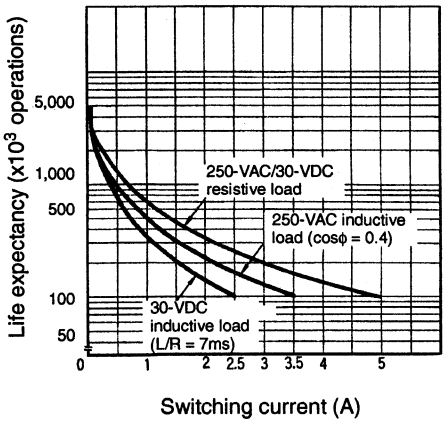
G2R-2-H, G2R-2A-H



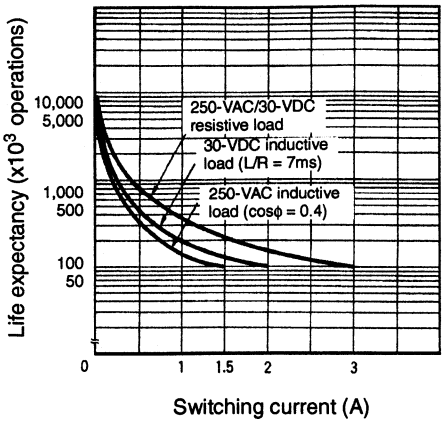
G2R-13-S, G2R-1A3-S



G2RK-1A, G2RK-1

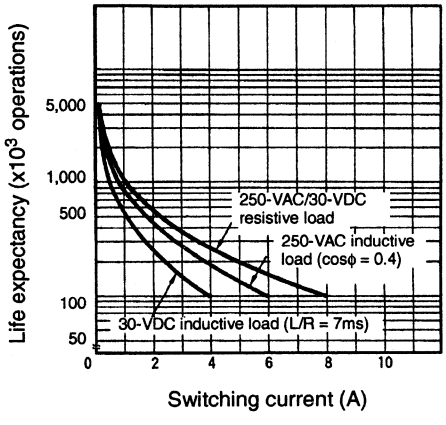


G2RK-2A, G2RK-2

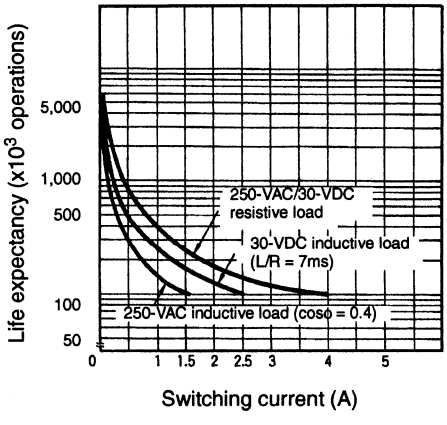


Plastic-sealed Relays

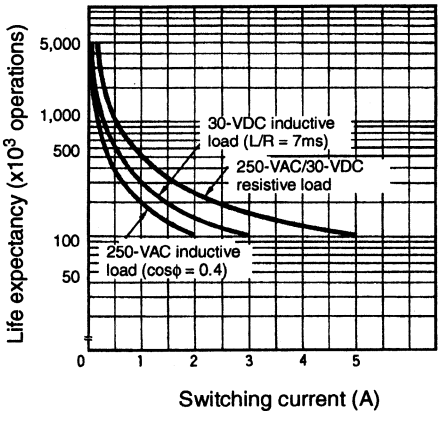
G2R-14, G2R-1A4



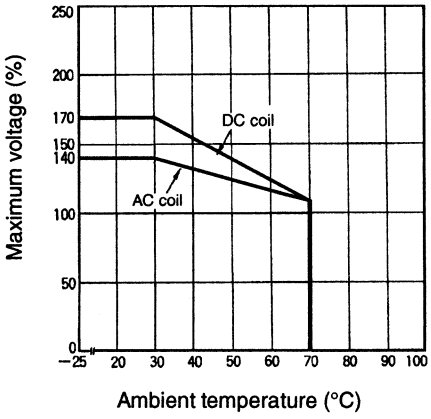
G2R-24, G2R-2A4



G2R-1Z4, G2R-1AZ4



Ambient Temperature vs Maximum Voltage



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

Dimensions

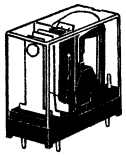
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

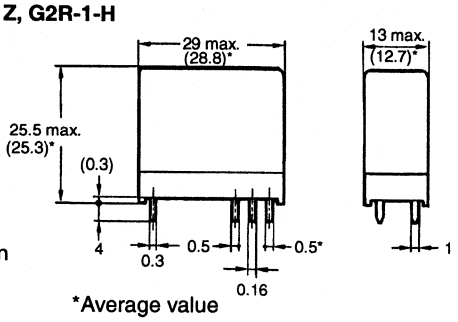
Relays with PCB Terminals

SPDT Relays

G2R-1, G2R-1Z, G2R-1-H

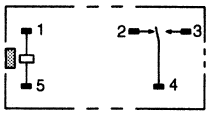


The illustration shows the G2R-1.



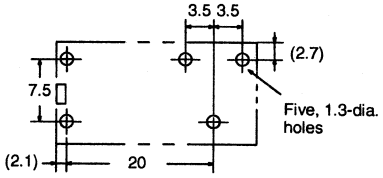
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

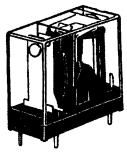
Tolerance: ±0.1



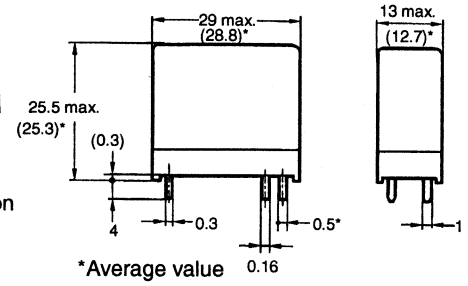
(No coil polarity)

SPST-NO Relays

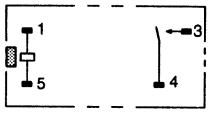
G2R-1A, G2R-1AZ, G2R-1A-H

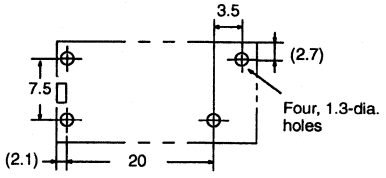


The illustration shows the G2R-1A.



*Average value

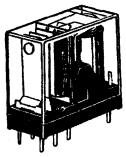


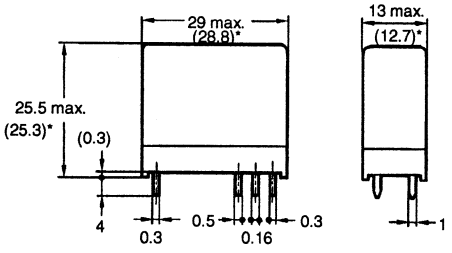


(No coil polarity)

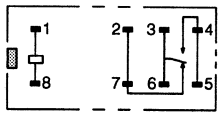
SPDT/High-capacity Relays

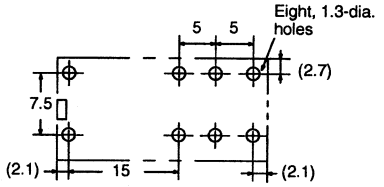
G2R-1-E





*Average value

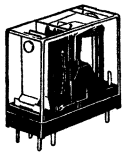


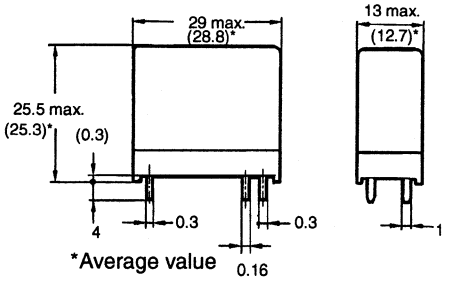


(No coil polarity)

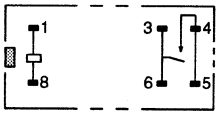
SPST-NO/High-capacity Relays

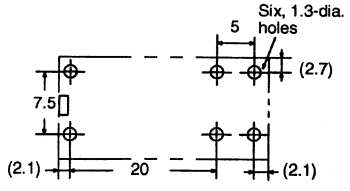
G2R-1A-E





*Average value



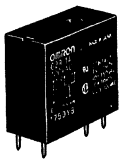


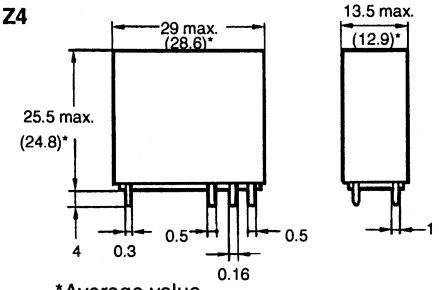
(No coil polarity)

Relays with PCB Terminals

SPDT Relays

G2R-14, G2R-1Z4

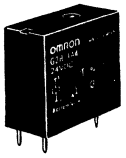


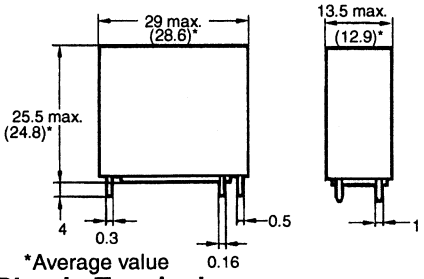


*Average value

SPST-NO Relays

G2R-1A4, G2R-1AZ4

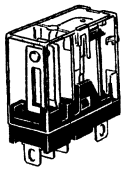


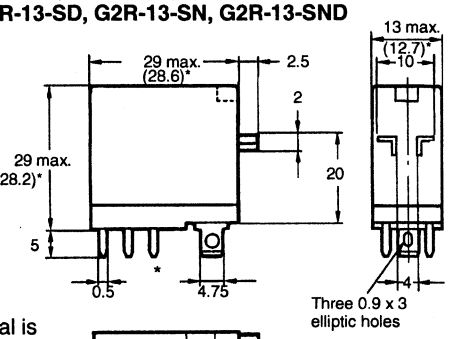


Relays with Plug-in Terminals

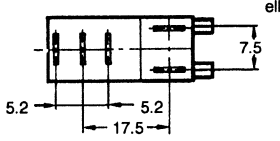
SPDT Relays

G2R-1-S, G2R-1-SD, G2R-1-SN, G2R-1-SND
G2R-13-S, G2R-13-SD, G2R-13-SN, G2R-13-SND





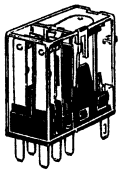
*This terminal is SPDT only.

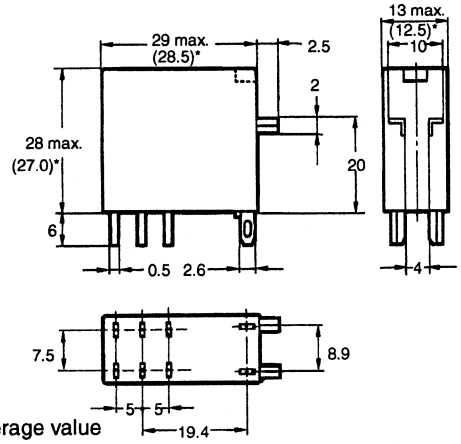


*Average value

SPST-NO Relays

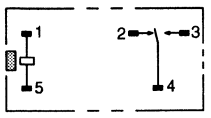
G2R-2-S, G2R-2-SD, G2R-2-SN, G2R-2-SND





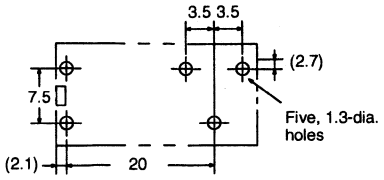
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

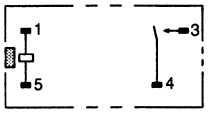


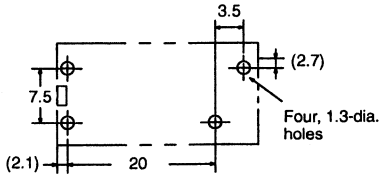
Mounting Holes (Bottom View)

Tolerance: ±0.1



(No coil polarity)

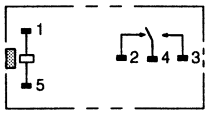




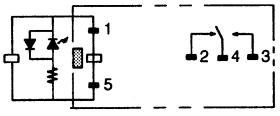
(No coil polarity)

Terminal Arrangement/Internal Connections (Bottom View)

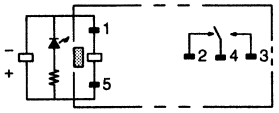
G2R-1-S, G2R-13-S



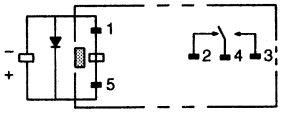
G2R-1-SN, G2R-13-SN (AC)



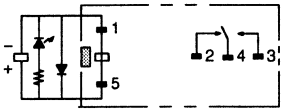
G2R-1-SN, G2R-13-SN (DC)



G2R-1-SD, G2R-13-SD (DC)



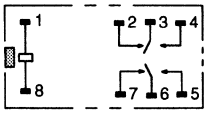
G2R-1-SND, G2R-13-SND (DC)



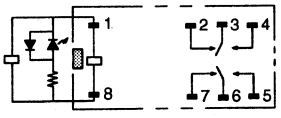
(After confirming coil polarity, wire correctly.) (Except G2R-1-S, G2R-13-S)

Terminal Arrangement/Internal Connections (Bottom View)

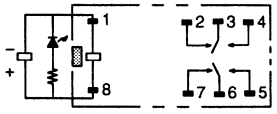
G2R-2-S



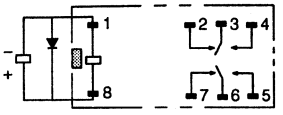
G2R-2-SN (AC)



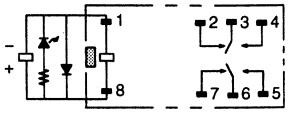
G2R-2-SN (DC)



G2R-2-SD (DC)



G2R-2-SND (DC)

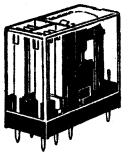


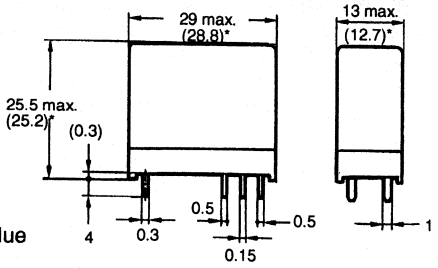
(After confirming coil polarity, wire correctly.)

Relays with PCB Terminals

DPDT Relays

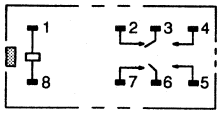
G2R-2, G2R-2-H





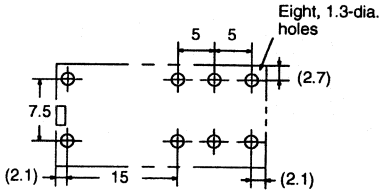
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

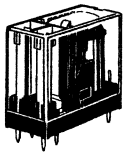
Tolerance: ±0.1

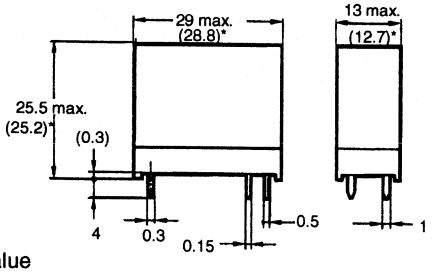


(No coil polarity)

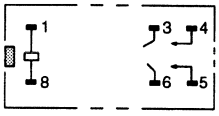
DPST-NO Relays

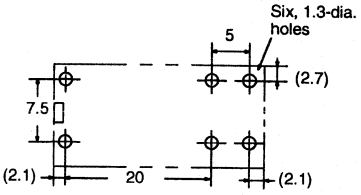
G2R-2A, G2R-2A-H





*Average value

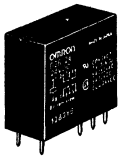


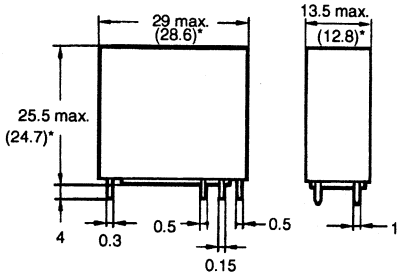


(No coil polarity)

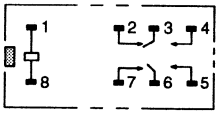
DPDT Relays

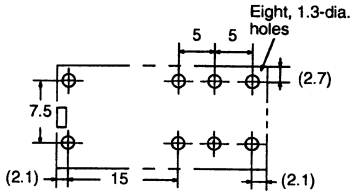
G2R-24





*Average value

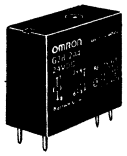


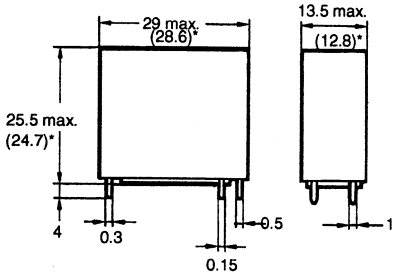


(No coil polarity)

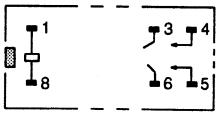
DPST-NO Relays

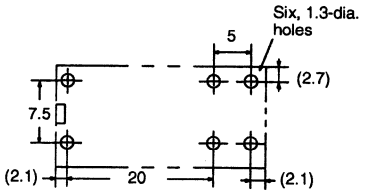
G2R-2A4





*Average value



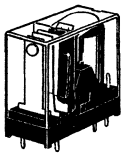


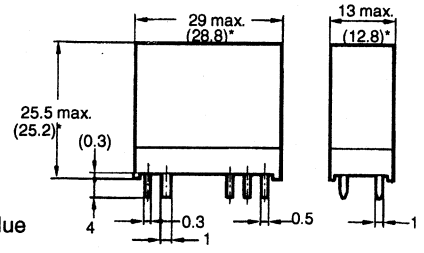
(No coil polarity)

Double-winding Latching Relays with PCB Terminals

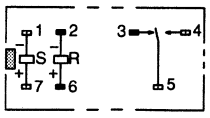
SPDT Relays

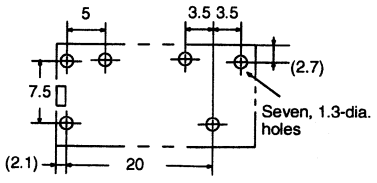
G2RK-1





*Average value



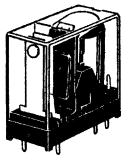


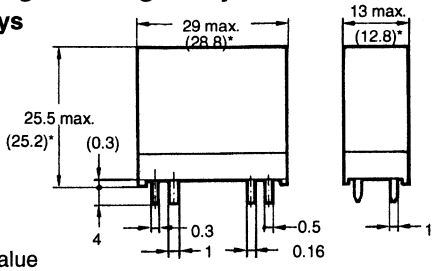
(After confirming coil polarity, wire correctly.)

Double-winding Latching Relays with PCB Terminals

SPST-NO Relays

G2RK-1A

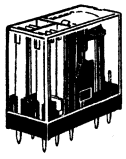


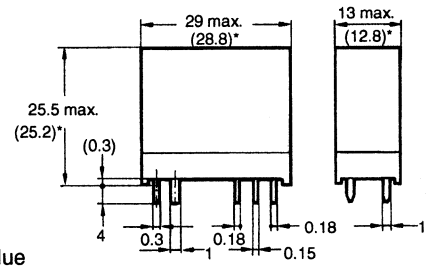


*Average value

DPDT Relays

G2RK-2

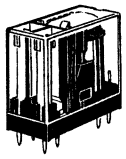


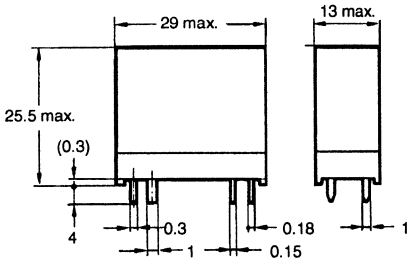


*Average value

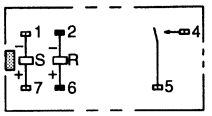
DPST-NO Relays

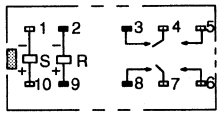
G2RK-2A

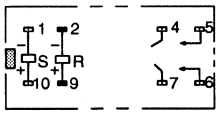




Terminal Arrangement/ Internal Connections (Bottom View)

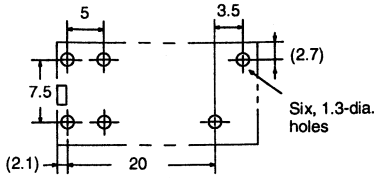




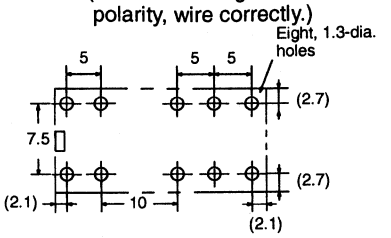


Mounting Holes (Bottom View)

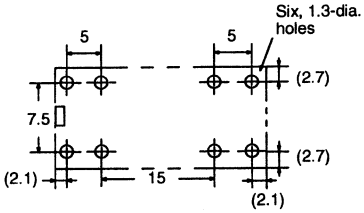
Tolerance: ±0.1



(After confirming coil polarity, wire correctly.)



(After confirming coil polarity, wire correctly.)

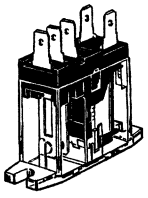


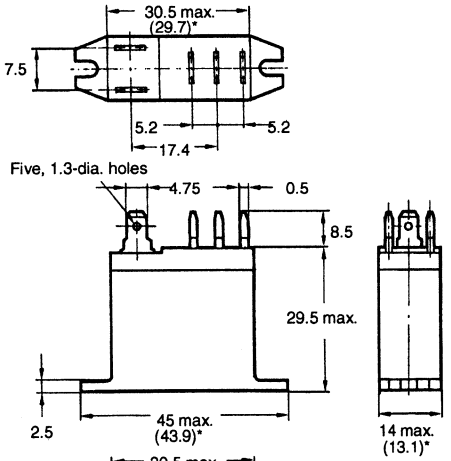
(After confirming coil polarity, wire correctly.)

Relays with Quick-connect terminals

SPDT Relays

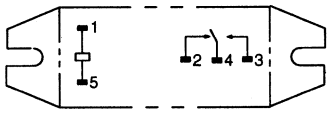
G2R-1-T





*Average value

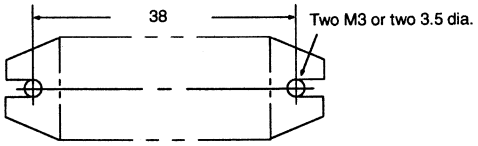
Terminal Arrangement/Internal Connections (Bottom View)



(No coil polarity)

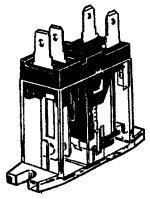
Mounting Holes (Bottom View)

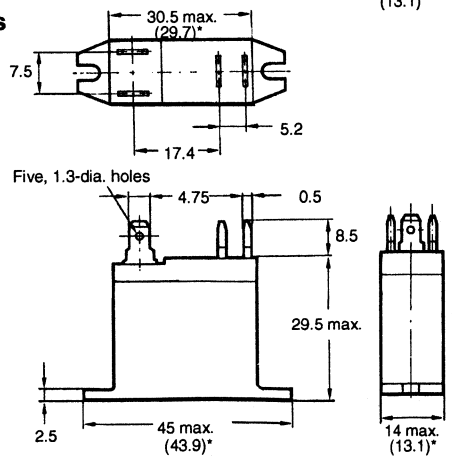
Tolerance: ±0.1



SPST-NO Relays

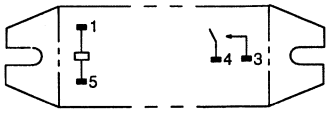
G2R-1A-T





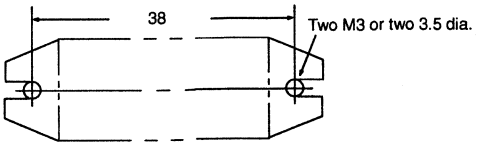
*Average value

Terminal Arrangement/Internal Connections (Bottom View)



(No coil polarity)

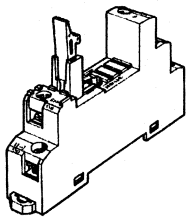
Mounting Holes (Bottom View)

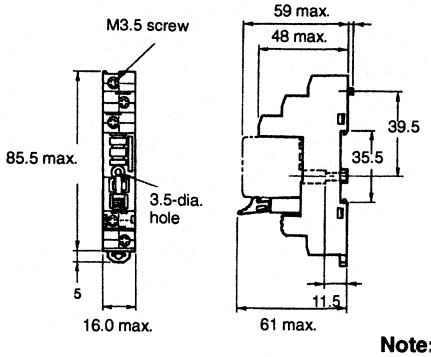


Note: Model number of quick-connect terminal is 187.

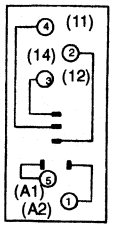
Track/Surface Mounting Sockets

P2RF-05-E

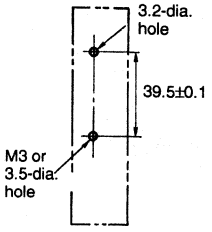




Terminal Arrangement (Top View)

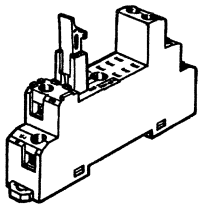


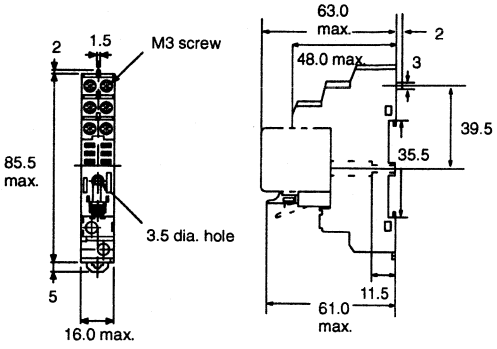
Mounting Holes (for Surface Mounting)



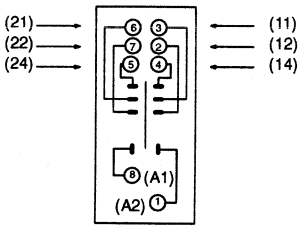
Note: Pin numbers in parentheses apply to DIN standard.

P2RF-08-E

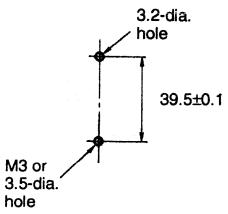




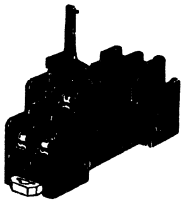
Terminal Arrangement (Top View)

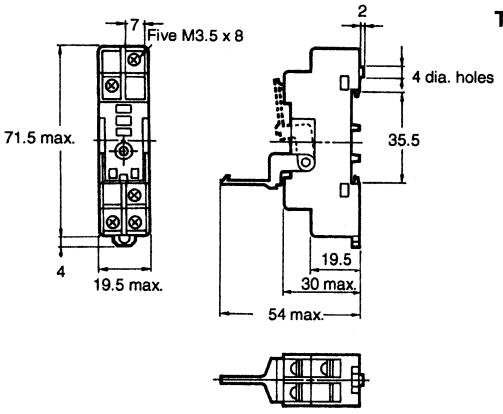


Mounting Holes (for Surface Mounting)

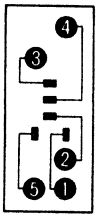


P2RF-05

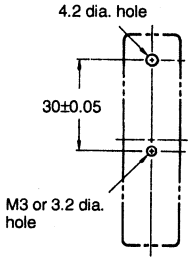




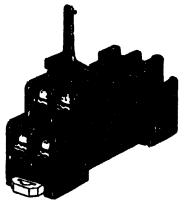
Terminal Arrangement

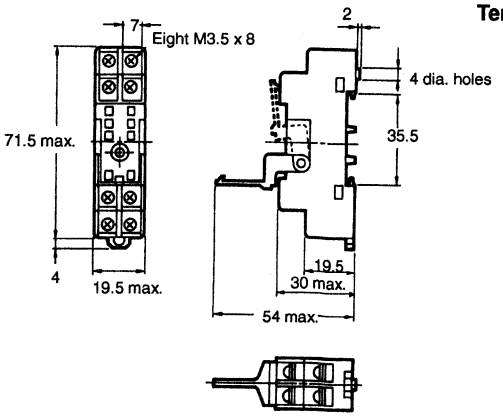


Mounting Holes (for Surface Mounting)

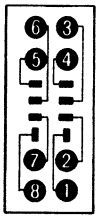


P2RF-08

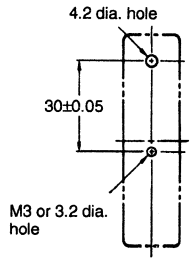




Terminal Arrangement

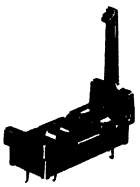


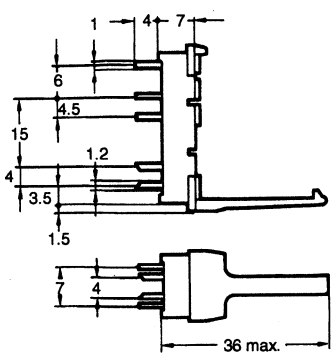
Mounting Holes (for Surface Mounting)



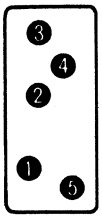
Back Connecting Sockets

P2R-05P (1-pole)



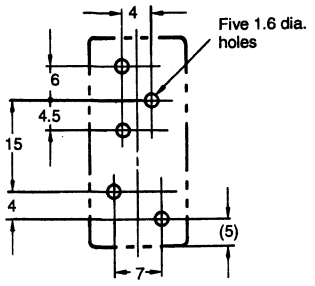


Terminal Arrangement

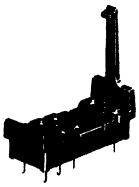


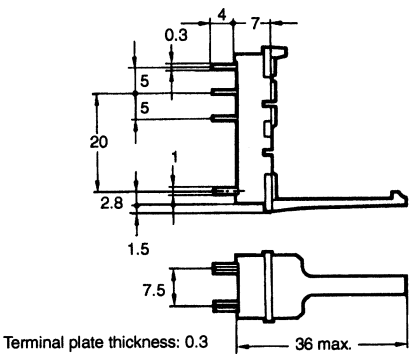
Mounting Holes

Tolerance: ±0.1

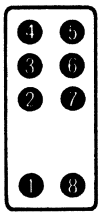


P2R-08P (2-pole)

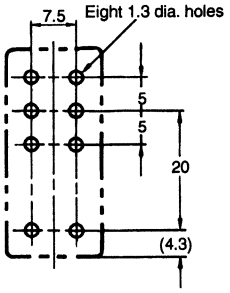




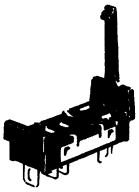
Terminal Arrangement

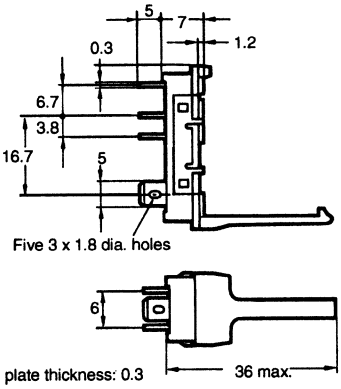


Mounting Holes

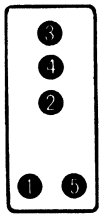


P2R-05A (1-pole)

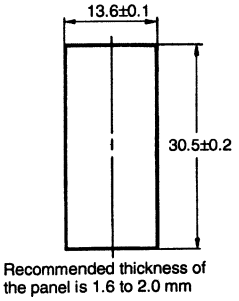




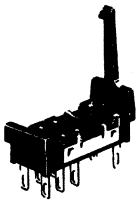
Terminal Arrangement

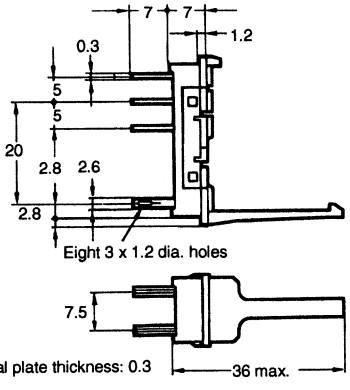


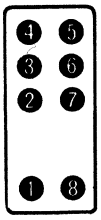
Panel Cutout



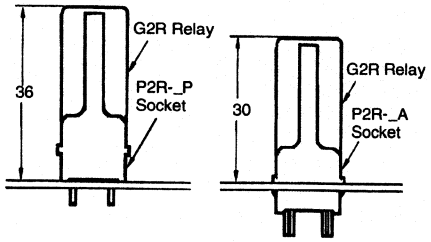
P2R-08A (2-pole)





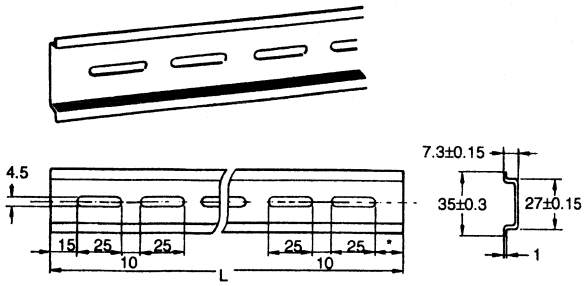


Mounting Height of Relay with Socket

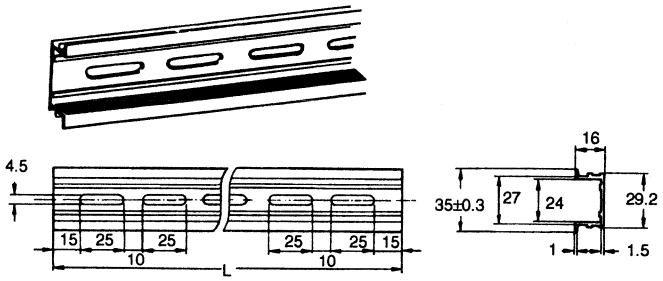


Mounting Track

PFP-100N, PFP-50N



PFP-100N2



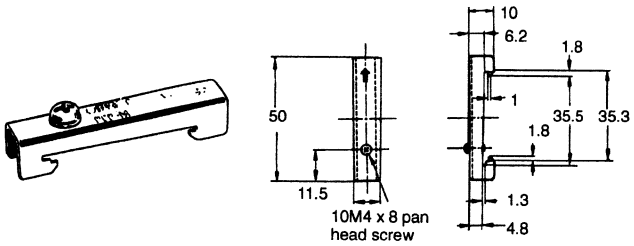
It is recommended to use a panel 1.6 to 2.0 mm thick.

L: Length

1 m	PFP-100N
50 cm	PFP-50N
1 m	PFP-100N2

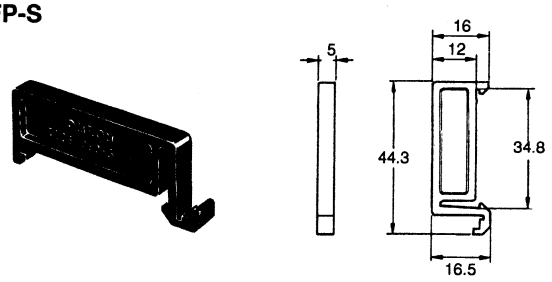
End Plates

PFP-M



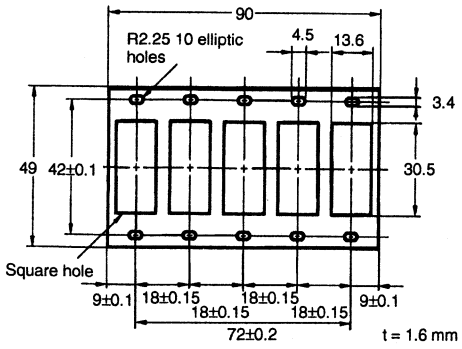
Spacers

PFP-S



Mounting Plates

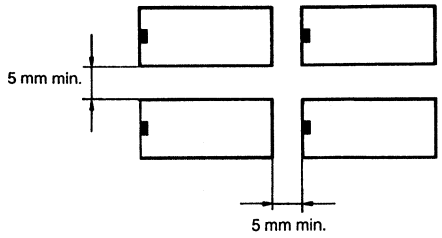
P2R-P



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. K13-E1-11A

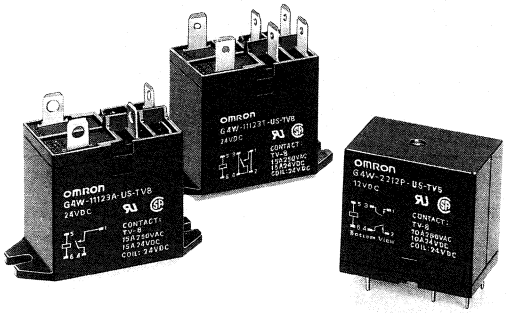
OMRON

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 C/250.
- 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.



Ordering Information

Contacts		SPST-NO	DPST-NO
Mounting style	Terminals		
General purpose	PCB (straight)	G4W-1112P-US-TV8	G4W-2212P-US-TV5
Upper mounting	Solder	G4W-11123A-US-TV8	G4W-22123A-US-TV5
	Quick-connect	G4W-11123T-US-TV8	G4W-22123T-US-TV5

Note: When ordering, add the rated coil voltage to the model number.
Example: G4W-11123A-US-TV8 12 VDC
Rated coil voltage

Model Number Legend:

G4W - □ □ □ □ □ - □ - □ - □ □ VDC
1 2 3 4 5 6 7 8 9

1. **Contact Form**
   11: SPST-NO
   22: DPST-NO
2. **Contact Type**
   1: Single button
3. **Enclosure Rating**
   2: Unsealed
4. **Mounting Style**
   None: Standard
   3: Upper mounting bracket
5. **Terminals**
   P: Straight PCB
   A: Solder
   T: Quick connect
6. **Approved Standards**
   US: UL, CSA certified
7. **TV Ratings**
   TV5: TV-5
   TV8: TV-8
8. **Special Function**
   None: General-purpose
   Z: Full-wave rectifier
9. **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	**Armature OFF**	0.93	3.7	61.8
(H) (ref. value)	**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		110% of rated voltage at 55°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 ±10%.

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

■ Contact Ratings

Item	**SPST-NO**		**DPST-NO**	
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	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	AgCdO			
Rated carry current	15 A		10 A	
Max. switching voltage	250 VAC, 125 VDC			
Max. switching current	15 A		10 A	
Max. switching capacity	3,750 VA, 375 W	2,500 VA, 225 W	2.500 VA, 240 W	1,850 VA, 120 W
Min. permissible load	100 mA at 5 VDC			

■ 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 poles (DPST-NO) 1,500 VAC, 50/60 Hz for 1 min between contacts of same pole
Impulse withstand voltage	10,000 V 1.2 x 50 μs between coil and contacts
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 150 m/s^2 (approx. 15G)
Life expectancy	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) Storage: −25°C to 55°C (with no icing)
Ambient humidity	Operating: 35% 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 G4W-11123A-US-TV8 G4W-11123T-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 G4W-22123A-US-TV5 G4W-22123T-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. 9346122, 9223128)

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

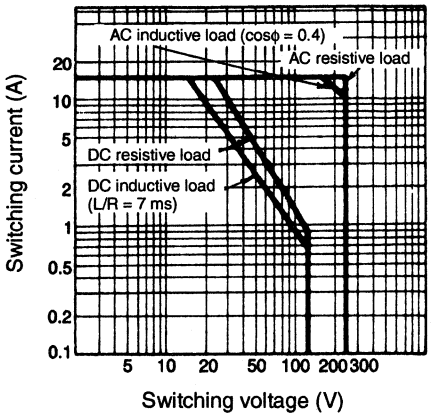
VDE0435 (File No.1906, No.1907)

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)

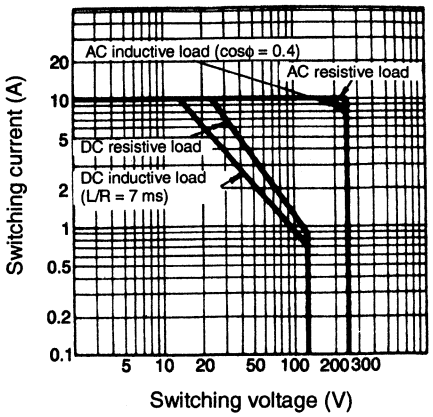
Engineering Data

Max. Switching Capacity

G4W-1112P-US-TV8/-11123A-US-TV8/-11123T-US-TV8

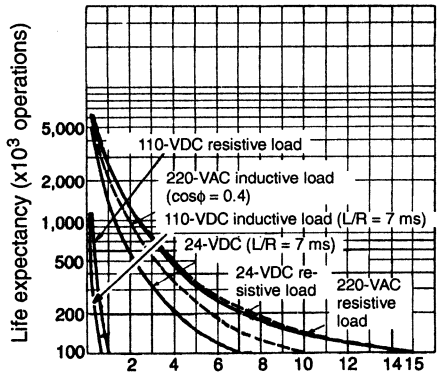


G4W-2212P-US-TV5/-22123A-US-TV5/-22123T-US-TV5

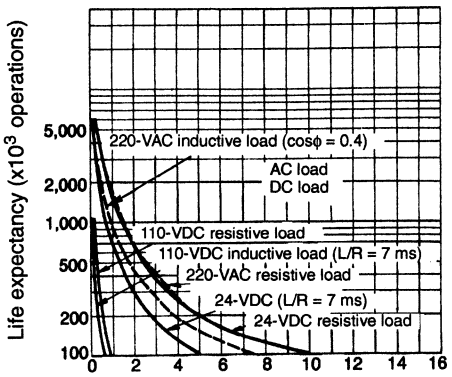


Life Expectancy

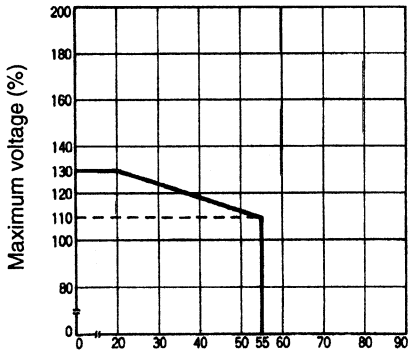
G4W-1112P-US-TV8/-11123A-US-TV8/-1123T-US-TV8



G4W-2212P-US-TV5/-22123A-US-TV5/-22123T-US-TV5



Ambient Temperature vs. Maximum Voltage

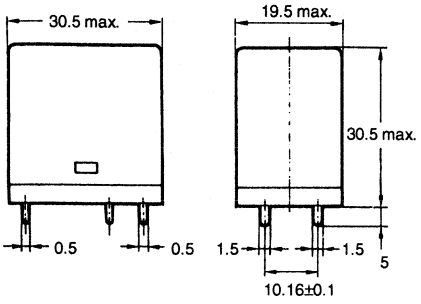


Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

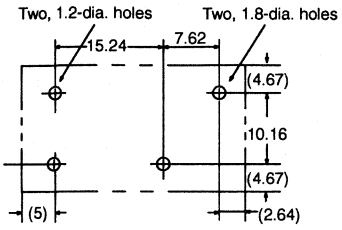
Dimensions

Note: All units are in millimeters unless otherwise indicated.

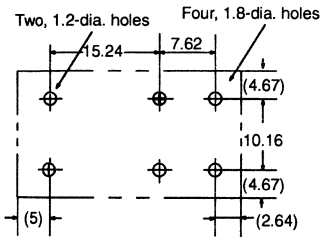
G4W-□12P-US-TV



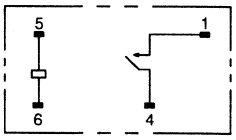
Mounting Holes (Bottom View)
G4W-1112P-US-TV-8

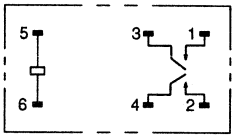


G4W-2212P-US-TV-5

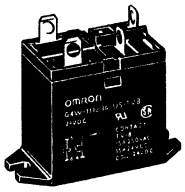


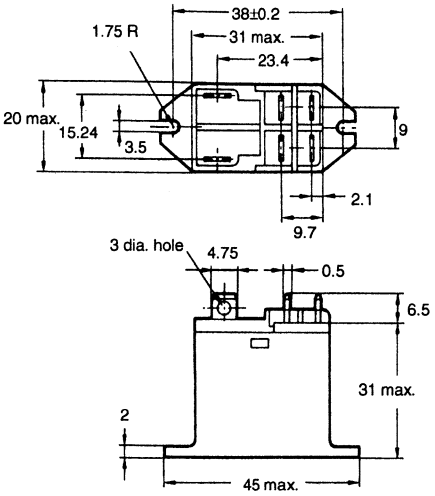
Terminal Arrangement/Internal Connections (Bottom View)



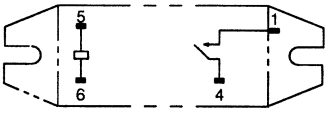


G4W-□123A-US-TV

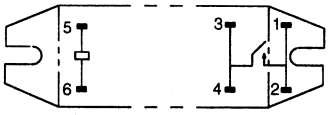




Terminal Arrangement/Internal Connections (Bottom View)
G4W-11123A-US-TV8

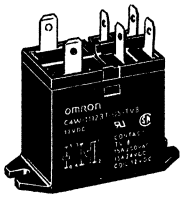


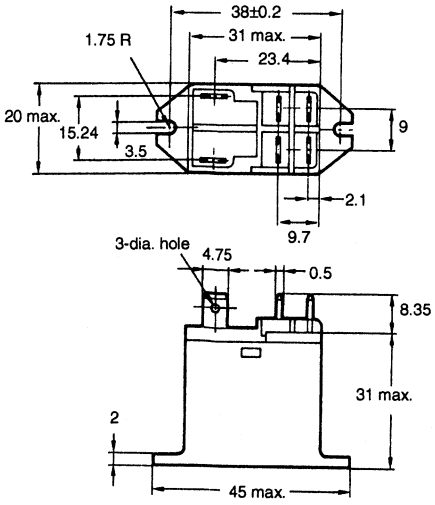
G4W-11123T-US-TV-8



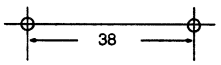
G4W-22123A-US-TV5
G4W-22123T-US-TV5

G4W-□123T-US-TV





Mounting Holes (Bottom View)
Tolerance: ±0.2



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. J39-E1-7C

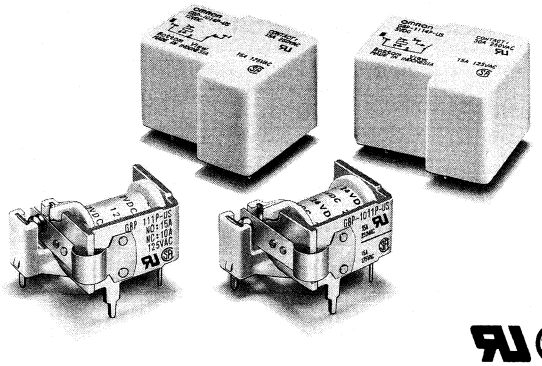
OMRON

PCB Relay

G8P

Small, Low-Cost 30-A Power Relay for PCB Applications

- Small, yet capable of switching up to a 30-A loads.
- Inexpensive.
- Ideal for home and industrial appliances, HVAC (heating, ventilating, and air conditioning), and many other applications.
- A variety of contact forms: SPDT, SPST-NO, and SPST-NC.
- UL Class B and F insulation, open and sealed versions, and dust cover available.
- Solder-plated terminals for better solderability.



Ordering Information

Contact form	Standard		Class B		Class F	
	Open	Plastic-sealed	Open	Plastic-sealed	Open	Plastic-sealed
SPST-NO	G8P-1111P-US	G8P-1114P-US	G8P-1111P-BI-US	G8P-1114P-BI-US	G8P-1111P-CF-US	G8P-1114P-CF-US
SPST-NC	G8P-1011P-US	G8P-1014P-US	G8P-1011P-BI-US	G8P-1014P-BI-US	G8P-1011P-CF-US	G8P-1014P-CF-US
SPDT	G8P-111P-US	G8P-114-US	G8P-111P-BI-US	G8P-114P-BI-US	G8P-111P-CF-US	G8P-114P-CF-US

Note: 1. The contacts described above are AgCdO. Ag- and AgSn-contacts are also available. Consult OMRON for details.

2. When ordering, add the rated coil voltage to the model number.
Example: G8P-111P-US 12 VDC
Rated coil voltage

Model Number Legend:

G8P-□□□□□-□-□□ VDC
1 2 3 4 5 6 7 8

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   1: SPST-NO
   0: SPST-NC
3. **Contact Types**
   1: Single button
4. **Enclosure Ratings**
   1: Open
   4: Plastic-sealed
5. **Terminals**
   P: Straight PCB
6. **UL Insulation Rate**
   None: Standard
   BI: Class B
   CF: Class F
7. **Approved Standards**
   US: UL/CSA certified
8. **Rated Coil Voltage**
   5, 6, 9, 12, 15, 18, 24, 48 VDC

■ Accessories (Order Separately)

Dust cover	G8P-R99-C01

Specifications

■ Coil Ratings

Rated voltage		5 VDC	6 VDC	9 VDC	12 VDC	15 VDC	18 VDC	24 VDC	48 VDC
Rated current		185 mA	150 mA	93 mA	77 mA	59 mA	47 mA	36 mA	19 mA
Coil resistance		27 Ω	40 Ω	97 Ω	155 Ω	256 Ω	380 Ω	660 Ω	2,480 Ω
Coil inductance	Armature OFF	0.12	0.16	0.35	0.58	0.99	1.54	2.43	9.41
(H) (ref. value)	Armature ON	0.18	0.26	0.53	0.92	1.56	2.40	4.14	14.7
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	SPST-NC	SPDT
Load	Resistive load (cosϕ = 1)		
Rated load	30 A at 250 VAC; 20 A at 28 VDC	15 A at 250 VAC; 10 A at 28 VDC	20 A/10 A* at 250 VAC; 20 A/10 A* at 28 VDC
Contact material	AgCdO		
Rated carry current	30 A	15 A	20 A/10 A*
Max. switching voltage	250 VAC, 28 VDC		
Max. switching current	AC: 30 A, DC: 20 A	AC: 15 A, DC: 10 A	AC: 20 A/10 A, DC: 20 A/10 A*
Max. switching capacity	7,500 VA, 560 W	3,750 VA, 280 W	5,000/2,500 VA, 560/280 W*
Min. permissible load	500 mA at 5 VDC		

Note: *NO contact/NC contact

■ Characteristics

Contact resistance	20 mΩ max.
Operate time	15 ms max. (mean value: approx. 8.4 ms)
Release time	10 ms max. (mean value: approx. 1.6 ms)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	10 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min
Vibration resistance	Destruction: 10 to 55 Hz, 1.65-mm double amplitude for 2 hours Malfunction: 10 to 55 Hz, 1.65-mm double amplitude for 5 minutes
Shock resistance	Destruction: 1,000m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operation min. (at 18,000 operations/hr) Electrical: See *Engineering Data*.
Ambient temperature	Standard types: –55°C to 70°C Class B insulation types: –55°C to 85°C Class F insulation types: –55°C to 105°C
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 20 g (G8P-111P), approx. 30 g (G8P-114P)

Note: The data shown above are initial values.

■ Approved Standards

UL (File No. E41643)

Type	Contact form	Coil ratings	Contact ratings	
			UL508-recognized	UL873, UL478, UL1563
G8P-1111P-US	SPST-NO	5 to 48 VDC	15 A, 125 VAC (inductive load) 10 A, 250 VAC (inductive load) 15 A, 28 VDC (resistive load) 1 hp, 125 VAC (motor load) 1 hp, 250 VAC (motor load) 5 A (1,250 W), 250 VAC (tungsten load)	30 A, 250 VAC (inductive load) 1 hp, 125 VAC (motor load) 2 hp, 250 VAC (motor load) 12 A, 277 VAC (inductive load)
G8P-1011P-US	SPST-NC		15 A, 125 VAC (inductive load) 10 A, 250 VAC (inductive load) 10 A, 28 VDC (resistive load) 0.25 hp, 125 VAC (motor load) 0.25 hp, 250 VAC (motor load) 3 A (750 W), 250 VAC (tungsten load)	15 A, 250 VAC (inductive load) 0.25 hp, 125 VAC (motor load) 0.25 hp, 250 VAC (motor load) 6 A, 277 VAC (inductive load)
G8P-111P-US	SPDT		NO/NC 15 A/10 A, 125 VAC (inductive load) 10 A/10 A, 250 VAC (inductive load) 15 A/10 A, 28 VDC (resistive load) 1 hp/0.25 hp, 125 VAC (motor load) 1 hp/0.5 hp, 250 VAC (motor load) 5 A/3 A, 250 VAC (tungsten load)	NO/NC 20 A/10 A, 250 VAC (inductive load) 1 hp/0.25 hp, 125 VAC (motor load) 2 hp/0.5 hp, 250 VAC (motor load) 12 A/6 A, 277 VAC (inductive load)/ UL873

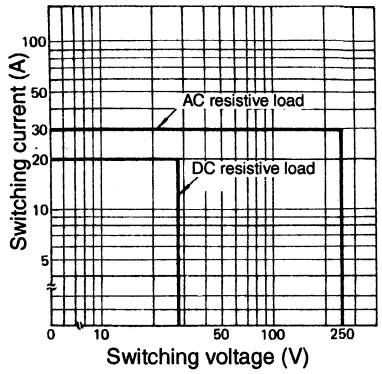
CSA (File No. LR34815-124)

Type	Contact form	Coil ratings	Contact ratings
G8P-1111P-US	SPST-NO	5 to 48 VDC	6 A, 277 VAC (inductive load) 15 A, 125 VAC (inductive load) 10 A, 250 VAC (inductive load) 15 A, 28 VDC (resistive load) 1 hp, 125 VAC (motor load) 1 hp, 250 VAC (motor load) 5 A, 125 VAC (tungsten load) 5 A, 250 VAC, (tungsten load)
G8P-1011P-US	SPST-NC		3 A, 277 VAC (inductive load) 15 A, 125 VAC (inductive load) 10 A, 250 VAC (inductive load) 10 A, 28 VDC (resistive load) 0.25 hp, 125 VAC (motor load) 0.5 hp, 250 VAC (motor load) 3 A, 125 VAC (tungsten load) 3 A, 250 VAC, (tungsten load)
G8P-111P-US	SPDT		NO/NC 6 A/3 A, 277 VAC (inductive load) 15 A/10 A, 125 VAC (inductive load) 10 A/10 A, 250 VAC (inductive load) 15 A/10 A, 28 VDC (resistive load) 0.5 hp/0.25 hp, 125 VAC (motor load) 1 hp/0.5 hp, 250 VAC (motor load) 5 A/3 A, 125 VAC (tungsten load) 5 A/3 A, 250 VAC, (tungsten load)

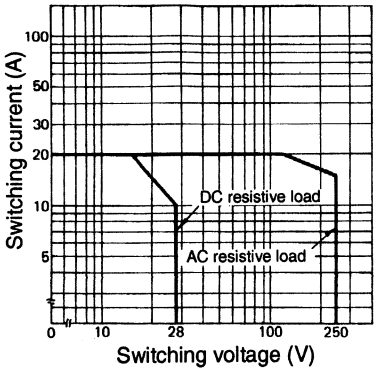
Engineering Data

Max. Switching Capacity

SPST-NO



SPST-NC



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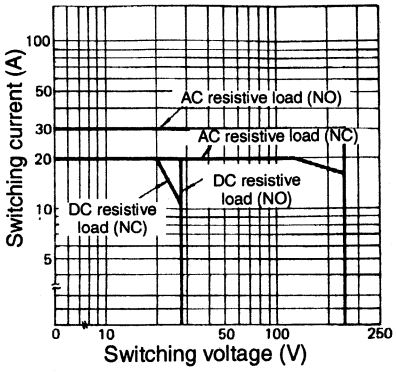
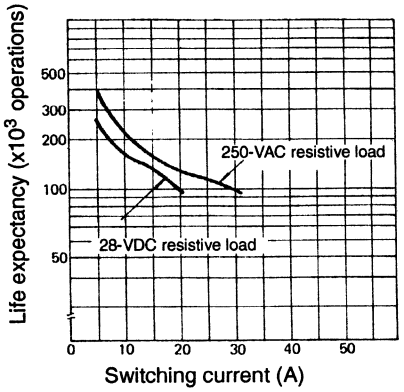
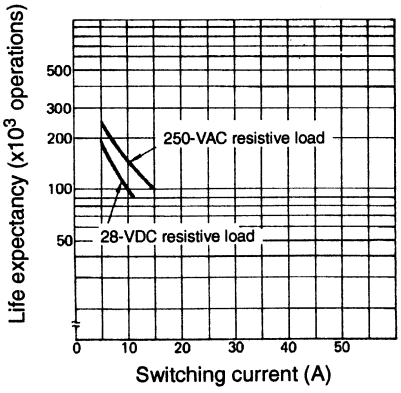


Life Expectancy

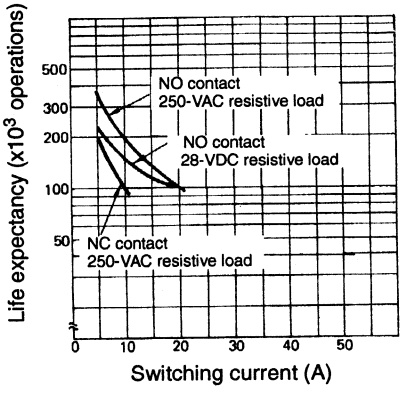
SPST-NO



SPST-NC



SPDT

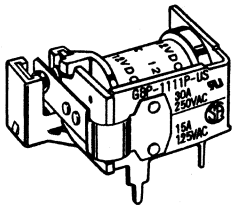


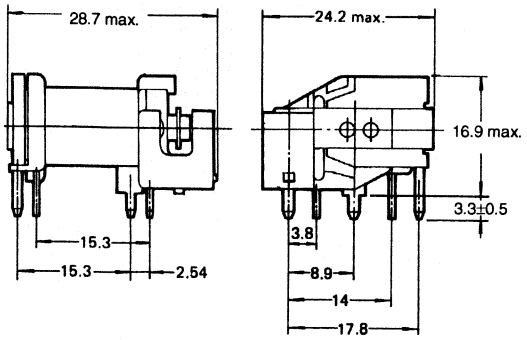
Dimensions

Note: All units are in millimeters unless otherwise indicated.

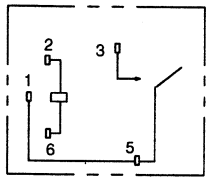
■ Open Types

G8P-1111P-(BI)-US

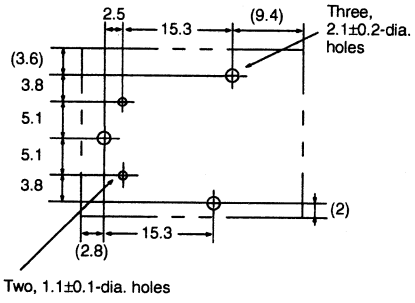




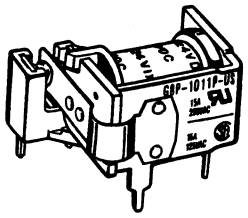
Terminal Arrangement/ Internal Connections (Bottom View)

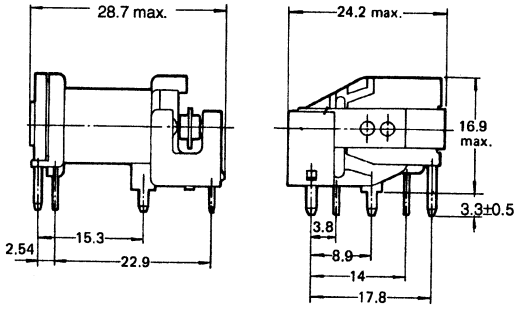


Mounting Holes (Bottom View)

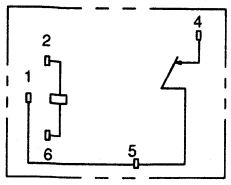


G8P-1011P-(BI)-US

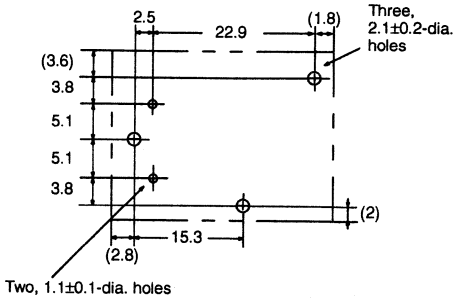




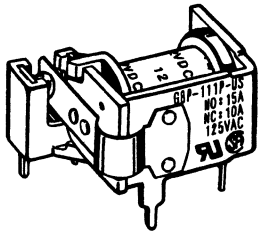
Terminal Arrangement/ Internal Connections (Bottom View)

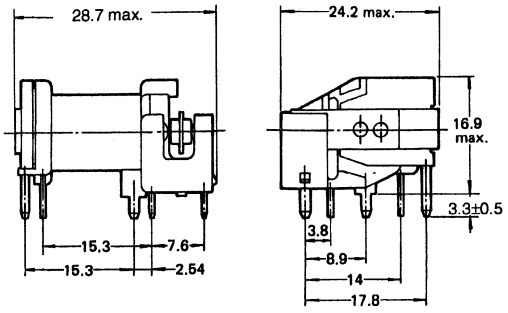


Mounting Holes (Bottom View)

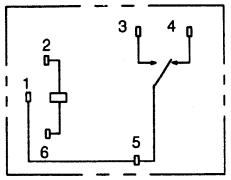


G8P-111P-(BI)-US

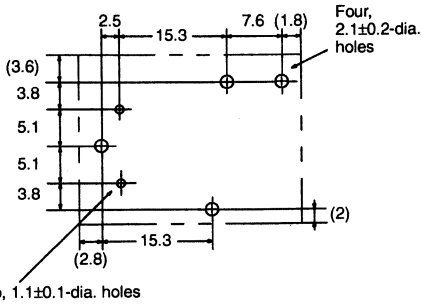




Terminal Arrangement/ Internal Connections (Bottom View)

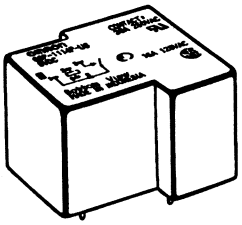


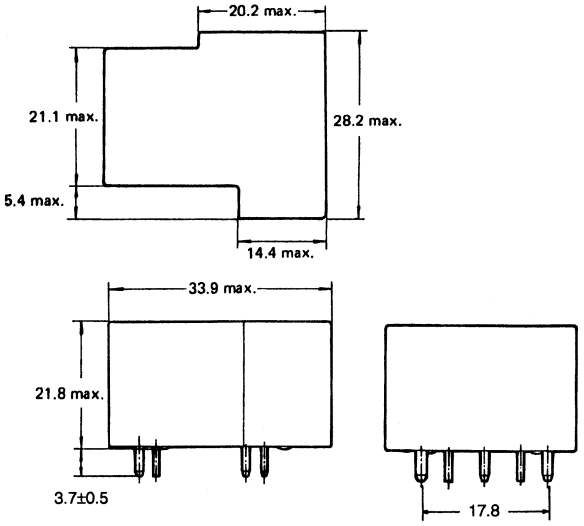
Mounting Holes (Bottom View)



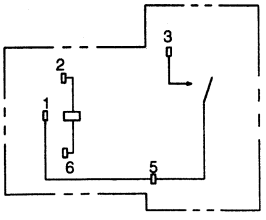
■ Plastic-sealed Types

G8P-1114P-(BI)-US

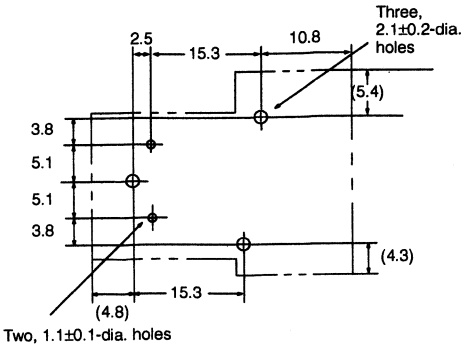




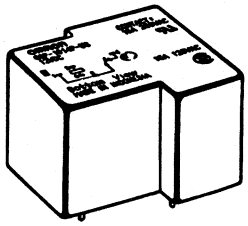
Terminal Arrangement/ Internal Connections (Bottom View)

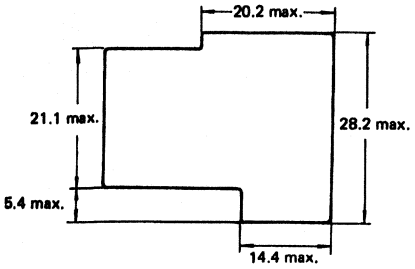


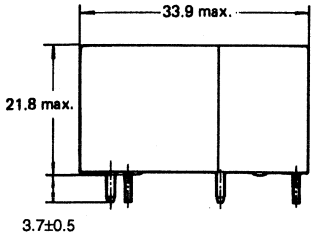
Mounting Holes (Bottom View)



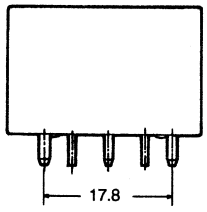
G8P-1014P-(BI)-US



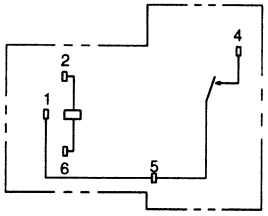


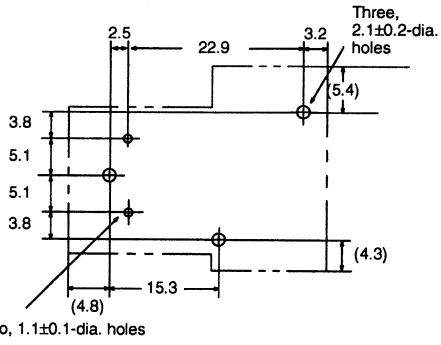


Terminal Arrangement/ Internal Connections (Bottom View)

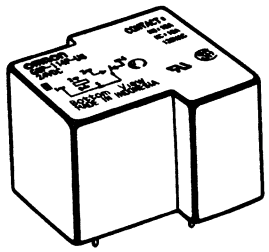


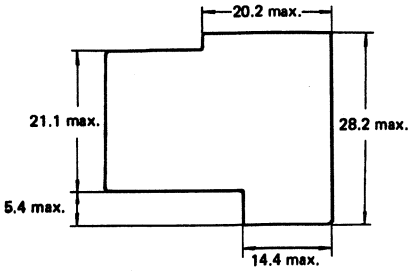
Mounting Holes (Bottom View)

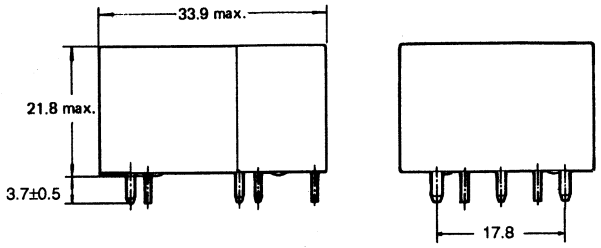




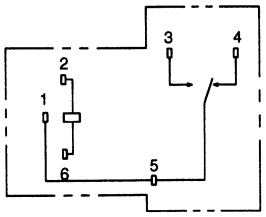
G8P-114P-(BI)-US



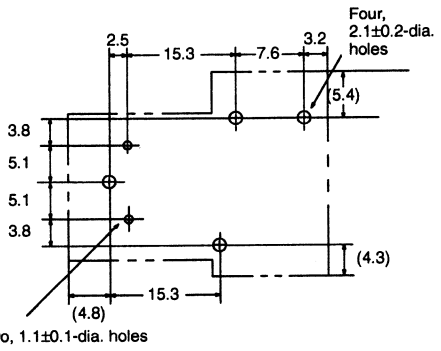




Terminal Arrangement/ Internal Connections (Bottom View)

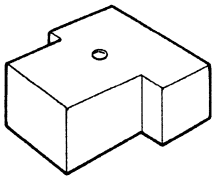


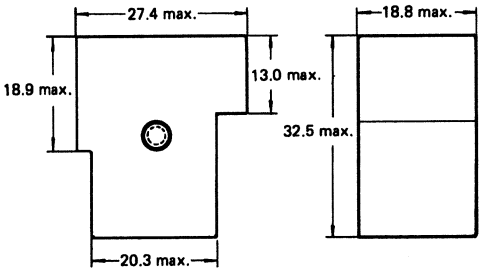
Mounting Holes (Bottom View)



Dust Cover

G8P-R99-C01





Precautions

Sealed Relays

Remove the vent hole tape seal from the cover after all soldering and cleaning have been completed to allow air circulation within sealed G8P 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.

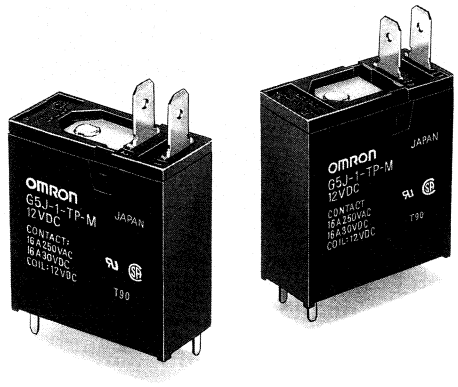
OMRON

PCB Relay

G5J

Ideal for Microwave Oven Magnetrons and Heater Switching

- Dual tab/PCB terminals.
- Small, space-saving bottom surface area..
- High impulse withstand voltage: 10 kV



Ordering Information

Enclosure rating	Contact form	Model
Unsealed	SPST-NO	G5J-1-TP-M

Note: When ordering, add the rated coil voltage to the model number.
Example: G5J-1-TP-M 12 VDC
Rated coil voltage

■ Model Number Legend:

G5J - □ - □ - □ □
1 2 3 4

1. **Number of Poles**
   1: 1 pole (SPST-NO contact)
2. **Terminals**
   TP: Relays with #187, Tab/PCB
3. **Others**
   M: Standard
4. **Rated Coil Voltage**
   12, 18, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	12 VDC	18 VDC	24 VDC
Rated current	58.3 mA	38.9 mA	29.2 mA
Coil resistance	206 Ω	463 Ω	822 Ω
Must operate voltage	70% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Maximum voltage	110% of rated voltage		
Power consumption	Approx. 700 mW		

■ Contact Ratings

Rated load	16 A at 250 VAC/30 VDC ($\cos\phi = 1$)
Rated carry current	16 A
Max. switching voltage	250 VAC; 30 VDC

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. ⎓ indicates DC (IEC 417 publications).

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	20 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC between coil and contacts (1 min.) 1,000 VAC between contacts of same pole (1 min.)
Impulse withstand voltage	10 kV (1.2 x 50μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 150 m/s^2
Life expectancy	Mechanical: 2,000,000 operations min. (18,000 operations/hr) Electrical: 100,000 operations min. (1,800 operations/hr)
Ambient temperature	Operating: –25°C to 70°C (with no icing)
Ambient humidity	45% to 85%
Weight	Approx. 22.5 g

■ Approved by Standards

UL508 (File No. E41643)

Coil ratings	Contact ratings
5 to 48 VDC	16 A 250 VAC 16 A 30 VDC 1/2 HP 125 VAC 1 HP 250 VAC

CSA C22.2 No. 14 (File No. LR31928)

Coil ratings	Contact ratings
5 to 48 VDC	16 A 250 VAC 16 A 30 VDC 1/2 HP 125 VAC 1 HP 250 VAC

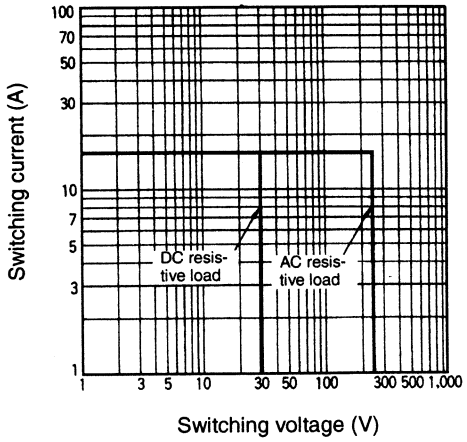
VDE0435, IEC255, (IEC355-1)

Coil ratings	Contact ratings	Approved conditions
5 to 24 V⎓	16 A at 250 V∿ (cosϕ = 1) 16 A at 30 V⎓ (0 ms)	Duty level: class III Operative range: class 2 Pick-up class: class a Pollution degree: 2 Overvoltage category: II Material group: IIIa Ambient temperature: –25°C to 70°C

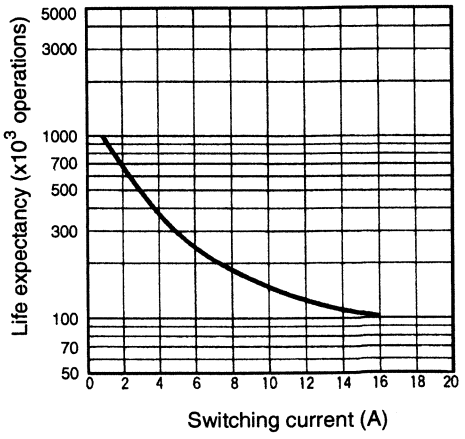
Note: ∿ indicates AC and ⎓ indicates DC (IE417 publications).

Engineering Data

Max. Switching Capacity

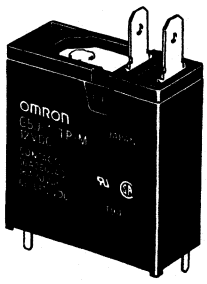


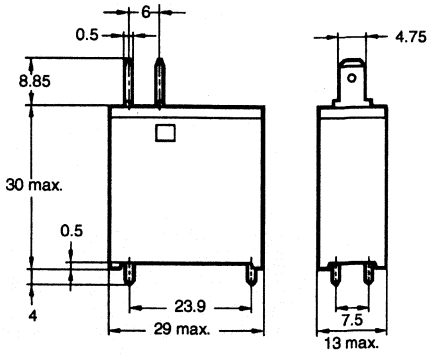
Life Expectancy



Dimensions

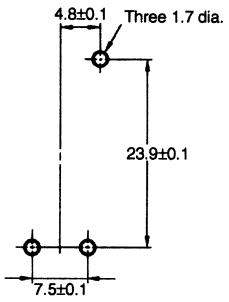
Note: All units are in millimeters unless otherwise indicated.



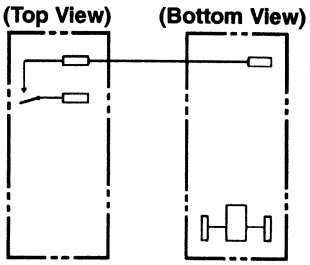


Mounting Holes (Bottom View)

Tolerance: ±0.1



Terminal Arrangement/ Internal Connections



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. J59-E1-1C

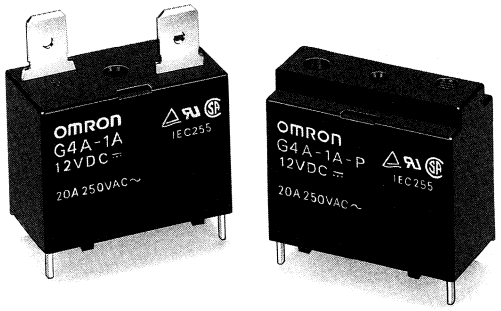
OMRON

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 capacity built-in applications.
- Creepage distance conforms to UL and CSA standards.
- Highly noise-resistive insulation materials employed.
- Standard model available with flux protection construction.



Ordering Information

Contact form	Terminals	Coil terminals	Rated voltage	Model
SPST-NO	#250 tab terminals	PCB terminals	5, 12, 24 VDC	G4A-1A
	PCB terminals			G4A-1A-P

Note: When ordering, add the rated coil voltage to the model number.

Example: G4A-1A 12 VDC
Rated coil voltage

Model Number Legend:

G4A - □ □ - □ □ VDC
1 2 3 4

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Terminals**
   None: Relays with #250 tab/PCB
   P: Straight PCB
4. **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. voltage		110% of rated voltage		
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.

■ 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 capacity	5,000 VA
Min. permissible load	100 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation (with an operating frequency of 120 operations/min)

■ Life Expectancies

With Motor Load

Load conditions	Switching frequency	Electrical life expectancy
250 VAC: Inruch current: 80 A, 0.3 s ($\cos\phi$= 0.7) Break current: 20 A ($\cos\phi$ = 0.9)	ON: 1.5 s OFF: 1.5 s	100,000 operations

With Overload

Load conditions	Switching frequency	Electrical life expectancy
250 VAC: Inruch current: 80 A ($\cos\phi$= 0.7) Break current: 80 A ($\cos\phi$ = 0.7)	ON: 1.5 s OFF: 1.5 s	1,500 operations

With Inverter Load

Load conditions	Switching frequency	Electrical life expectancy
100 VAC; Inrush current: 200 A (0–P) Break current: 20 A	ON: 3 s OFF: 5 s	30,000 operations

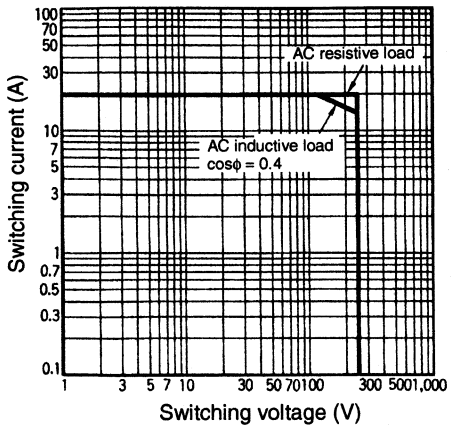
■ Characteristics

Contact resistance	30 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 contact
	1,000 VAC 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)
Life expectancy	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 55°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 23 g

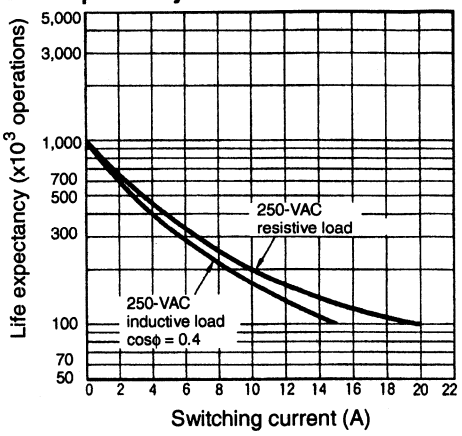
Note: The data shown above are initial values.

Engineering Data

Max. Switching Capacity



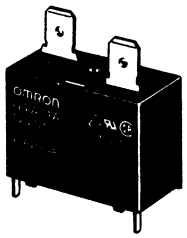
Life Expectancy

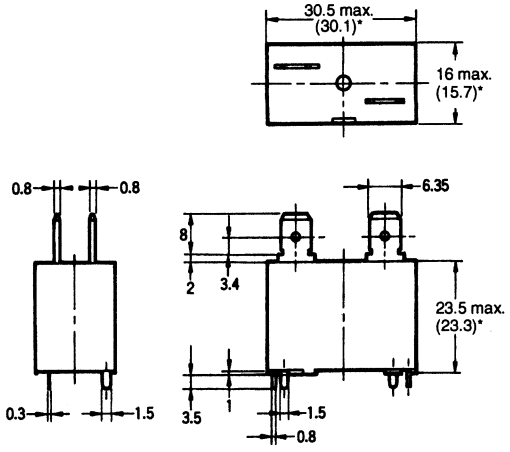


Dimensions

Note: All units are in millimeters unless otherwise indicated; dimensions shown in parentheses are in inches.

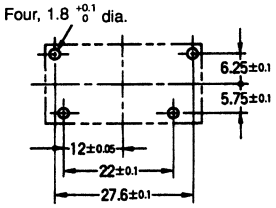
G4A-1A





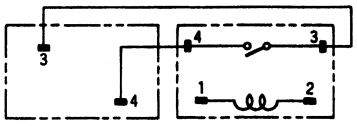
*Average value

Mounting Holes (Bottom View)



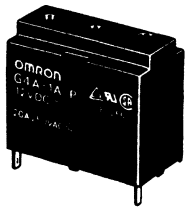
Terminal Arrangement /Internal Connections

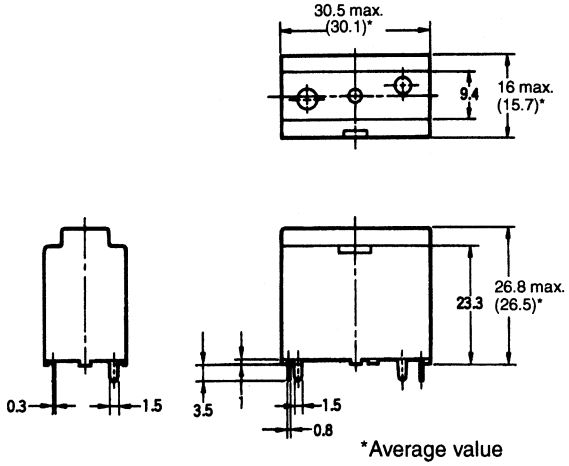
(Top View) (Bottom View)



Tab Terminal PCB Terminal

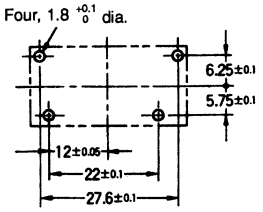
G4A-1A-P



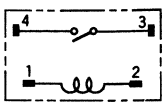


*Average value

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.

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Cat. No. J56-E1-2

Notes:

Notes:

Notes:

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