G7L-X

PCB Power Relays

Compact Power Relay Capable of Switching 1,000 VDC Loads



- DC high capacity switching for both normal and reverse polarity is available with the addition of the reverse polarity specification.
- Two poles wired in series to break or switch 600 to 1,000 VDC.
- Contributes to a lower power consumption. (low power consumption of approx. 600 mW at 50% reduced coil voltage).
- UL and EN conformed.
- Designed for safety with 6.0-mm contact gap (two-pole series wiring).
- A series of low contact resistance power relays with an initial contact resistance of 10 mΩ max. (with conditions of 5 VDC, 1 A).

⚠ **Refer to the *Precautions* on page 5.**

Model Number Legend

G7L-2A□-X-□

1 2 3 4

1. Number of poles
   2: 2-poles
2. Contact Form
   A: DPST-NO (2a)
3. Enclosure rating
   Blank: Flux protection
4. Additional Models
   None: Standard model
   L: General purpose model
   SI: Low contact resistance model

Application Examples

- Photovoltaic Power Systems
- Energy Storage System
- Inverter
- UPS
- FA DC link

Ordering Information

Classification	Contact Form	Enclosure rating	Terminal Shape	Model	Rated coil voltage	Minimum packing unit
Standard model	DPST-NO*1	Flux protection	PCB terminals	G7L-2A-X	12 VDC, 24 VDC	20 pcs/tray
General purpose model				G7L-2A-X-L		
Low contact resistance model*2				G7L-2A-X-SI		

Note. When ordering, add the rated coil voltage to the model number.
Example: G7L-2A-X DC24
Rated coil voltage
However, the notation of the coil voltage on the product case as well as on the packing will be marked as[][] VDC.

*1. It is assumed that the Relay will be used with 2-pole series wiring.

*2. The values given are initial values. Measurement conditions: 5 VDC, 1 A, voltage drop method.

Ratings

● Coil

Rated Voltage	Item (V)	Rated current (mA)	Coil resistance (Ω)	Must operate voltage	Must release voltage	Max. voltage	Power consumption (W)
				% of rated voltage			
DC	12	190	63	75% max.	10% min.	110%	Approx. 2.3
	24	96	250				Approx. 0.6 *

Note 1. The rated current and coil resistance were measured at a coil temperature of 23°C with tolerances of ± 15%.
Note 2. The operating characteristics are measured at a coil temperature of 23°C.
Note 3. The maximum permissible voltage is the maximum value of the fluctuation range for the Relay coil operating power supply and was measured at an ambient temperature of 23°C.
Note 4. For currents exceeding 30 A, use a Holding Voltage of 50 to 60%.
* Power consumption with Holding Voltage is 0.6 W. Please confirm the detail in page 5 Coil Voltage Reduction (Holding Voltage) during and after Relay Operation.

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● Contacts (Two-pole Series Wiring)

Item / Classification	Standard model/Low contact resistance model	General purpose model
Contact type	Double break	
Contact material	Ag alloy	
Rated load (resistive load)	600 VDC, 30 A / 1,000 VDC, 25 A / 500 VDC, 40 A / 1,000 VDC, make 1 A, carry 35 A, break 1A / 800 VDC, make 0.5 A, carry 35 A, break 0.5 A / 700 VDC, make 1 A, carry 35 A, break 1 A / 600 VDC, make 0.5 A, carry 35 A, break 0.5 A	600 VDC, 20 A / 1,000 VDC, 20 A
Rated carry current	40A *	20 A
Max. switching voltage	1,000 VDC	
Max. switching current	40A *	20 A

* For currents exceeding 30 A, use a Holding Voltage of 50 to 60%. Please confirm the detail in page 5 Safety Precautions.

Characteristics

Item / Classification		Standard model	Low contact resistance model	General purpose model
Contact resistance *1		100 mΩ max	10 mΩ max.	100 mΩ max.
Operate time *2		30 ms max.		
Release time *2 *5		30 ms max.		
Insulation resistance *3		1,000 MΩ min.		
Dielectric strength	Between coil and contacts	4,000 VAC, 50/60 Hz for 1 min		
	Between contacts of the same polarity	2,000 VAC, 50/60 Hz for 1 min		
	Between contacts of different polarity	2,000 VAC, 50/60 Hz for 1 min		
Impulse withstand voltage *4	Between coil and contacts	10 kV		
Vibration resistance	Destruction	10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)		
	Malfunction	10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)		
Shock resistance	Destruction	1,000 m/s²		
	Malfunction	100 m/s²		
Mechanical durability *5		1,000,000 operations min. (at 1,800 operations/h)		
Electrical durability *5 *6 (Resistive load, for two-pole series wiring.) (ON for 1 s and OFF for 9 s, at 85°C)	Normal polarity	1,000 VDC, 25 A, 100 operations 600 VDC, 30 A, 6,000 operations 500 VDC, 40 A, 3,000 operations		1,000 VDC, 20 A, 100 operations 600 VDC, 20 A, 6,000 operations
	Reverse polarity	600 VDC, -30 A, 5,000 operations 500 VDC, -40 A, 3,000 operations		400 VDC, -20 A, 5,000 operations
	Normal polarity / Reverse polarity *7	1,000 VDC, make 1 A, carry 35 A, break 1 A, 20,000 operations 800 VDC, make 0.5 A, carry 35 A, break 0.5 A, 20,000 operations 700 VDC, make 1 A, carry 35 A, break 1 A, 50,000 operations 600 VDC, make 0.5 A, carry 35 A, break 0.5 A, 30,000 operations		---
Ambient operating temperature		–40° to 85°C (with no icing or condensation)		
Ambient operating humidity		5% to 85%		
Weight		Approx. 100 g		

Note. The values given above are initial values.
*1. Measurement conditions: 5 VDC, 1 A, voltage drop method.
*2. Measurement conditions: Rated operating voltage applied, not including contact bounce.
Ambient temperature: 23°C
*3. Measurement conditions: The insulation resistance was measured with a 1,000-VDC megohmmeter at the same locations as the dielectric strength was measured.
*4. JEC-212 (1981) Standard Impulse Wave Type (1.2×50μs).
*5. A diode and zener diode are connected to the relay coil.
*6. The polarity can not be changed every switching. Refer to *Polarity change when switching* on the page 5.
*7. Only Connected in series can be used. (Check circuit diagrams Picture 1. and Picture 2.)

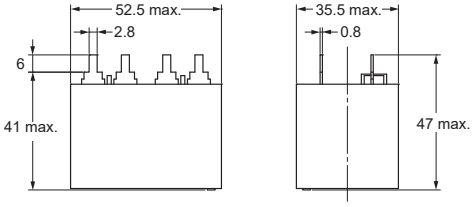
Dimensions

CAD Data marked products, 2D drawings and 3D CAD models are available.
For CAD information, please visit our website, which is noted on the last page.

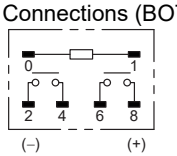
(Unit: mm)

G7L-2A-X
G7L-2A-X-SI
G7L-2A-X-L



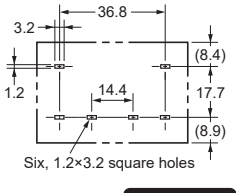


Terminal Arrangement/Internal Connections (BOTTOM VIEW)



The coil has no polarity.

PCB Mounting Holes (BOTTOM VIEW)
Tolerance: ±0.1 mm



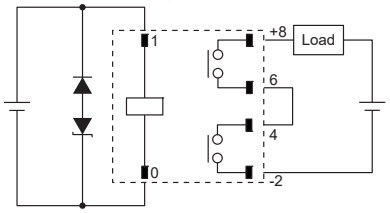
CAD Data

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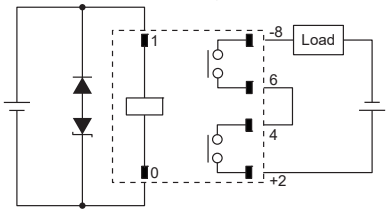
Circuit Diagrams

Connected in series

Picture 1. Normal polarity

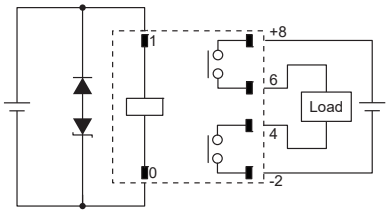


Picture 2. Reverse polarity

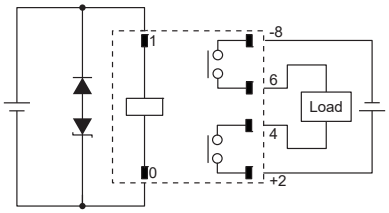


Break all lines

Picture 3. Normal polarity



Picture 4. Reverse polarity



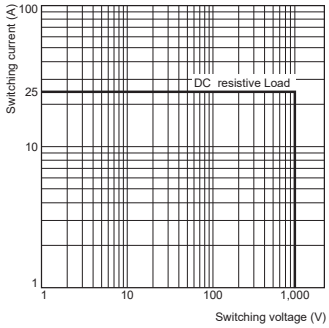
Note. The switching part has polarity. Exercise caution.
The diode and zener diode absorb coil surge. (The coil has no polarity.)

Engineering Data (Two-pole Series Wiring)

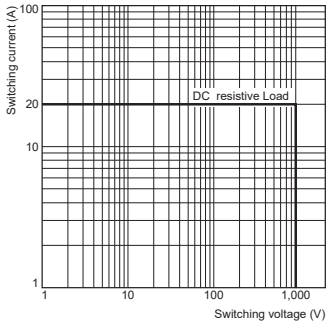
■ Normal polarity

●Maximum Switching Capacity

G7L-2A-X
G7L-2A-X-SI



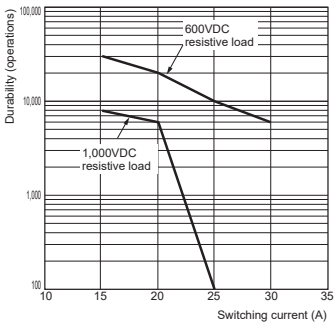
G7L-2A-X-L



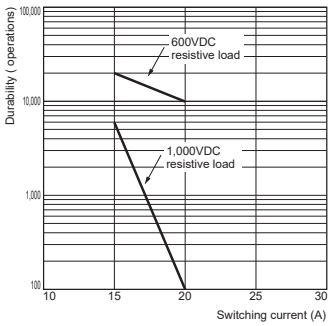
●Durability

Note: Ambient temperature: 85°C

G7L-2A-X
G7L-2A-X-SI



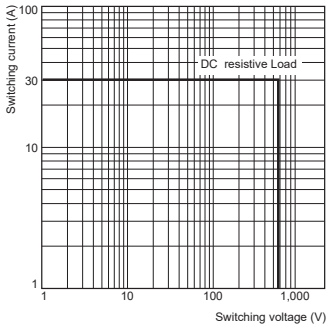
G7L-2A-X-L



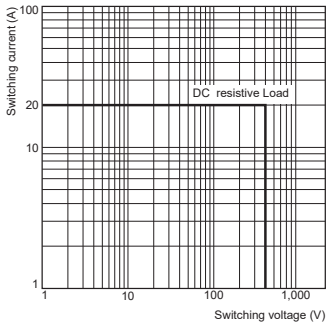
■Reverse polarity

●Maximum Switching Capacity

G7L-2A-X
G7L-2A-X-SI



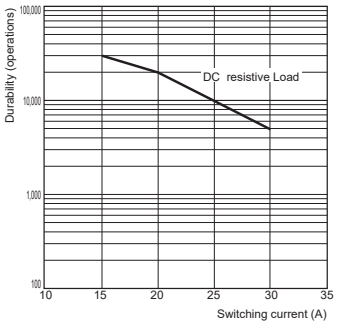
G7L-2A-X-L



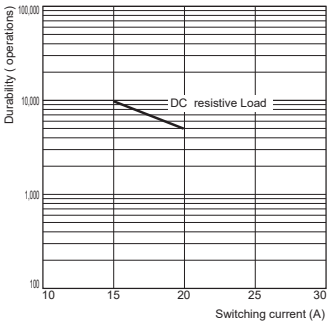
●Durability

Note: Ambient temperature: 85°C

G7L-2A-X
G7L-2A-X-SI



G7L-2A-X-L



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Approved Standards

• The approval rating values for overseas standards are different from the performance values determined individually confirm the values before use.

UL Recognized (File No. E41515)

Model	Coil ratings	Contact ratings	Number of test operations
G7L-2A-X G7L-2A-X-SI	12 VDC, 24 VDC	15 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	6,000
		20 A at 1,000 VDC (Resistive) 85°C, Connected in series	
		25 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	
		30 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	
		Make 1 A, carry 35 A, break 1 A, 1,000 VDC, 85°C, Connected in series	20,000
		Make 0.5 A, carry 35 A, break 0.5 A, 800 VDC, 85°C, Connected in series	20,000
		Make 1 A, carry 35 A, break 1 A, 700 VDC, 85°C, Connected in series	50,000
		Make 0.5 A, carry 35 A, break 0.5 A, 600 VDC, 85°C, Connected in series	30,000
G7L-2A-X-L	12 VDC, 24 VDC	15 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	6,000
		20 A at 1,000 VDC (Resistive) 85°C, Connected in series	
		20 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	

● **EN/IEC and VDE Approval** (Approval No.40045061)

Model	Coil ratings	Contact ratings	Number of test operations
G7L-2A-X G7L-2A-X-SI	12 VDC, 24 VDC	25 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	50
		15 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	8,000
		25 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	10,000
		32 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	3,000
G7L-2A-X-L	12 VDC, 24 VDC	20 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	50
		15 A at 1,000 VDC (Resistive) 85°C, Connected in series or Break all lines	6,000
		20 A at 600 VDC (Resistive) 85°C, Connected in series or Break all lines	10,000

Creepage distance (required value)		16 mm min. (IEC/UL)
Clearance (required value)		8 mm min. (IEC/UL)
Insulation material group		III
Type of insulation	coil-contact circuit	Basic (1,000 V, OV-cat III, up to 2,000 m above sea level)
	open contact circuit	Micro disconnection
Rated insulation voltage		1,000
Pollution degree		2
Rated voltage system		1,000
Category of protection (IEC61810-1)		RT II
Flammability class (UL94)		V-0
Coil insulation system (UL)		Class F

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Safety Precautions

• Please refer to "PCB Relays Common Precautions" for correct use.

Correct Use

●Installation

- Contacts are polarized, and durability is the different by polarity. Failure to observe correct DC load connection will result in reduced durability and may risk failure in application.
- The Relay is designed and manufactured under the assumption that it will be used with 2-pole series wiring. Do not use just one pole only.
- Install the Relays in locations that are as dry as possible and have as little dust, dirt, and harmful gas.
- Using the Relay under high temperature, high humidity, or harmful gas may deteriorate its performance characteristics due to condensation or corrosive materials, resulting in failure or burn damage to the Relay.
- The Relay weighs approx. 100 g. Be sure that the PCB is strong enough to support it.
  We recommend dual-side through-hole PCBs to reduce solder cracking from heat stress.

●Micro Loads

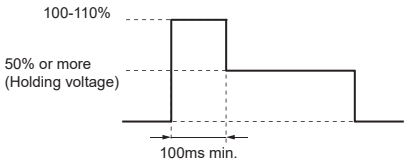
- These Power Relays are suitable for switching and breaking high-capacity DC. For switching applications of less than 1 A, switching characteristics may become unstable depending on voltage, etc. Please consult us or check using the actual machine in advance.

●Soldering PCB Terminals

- Do not perform automatic soldering. Always solder the terminals manually. When performing automatic soldering, please consult us separately.
- Solder with the following conditions: Soldering iron temperature (max.) 380°C, Soldering time within 10 seconds.
- The G7L-X is not sealed. Do not wash the G7L-X with water or detergent.

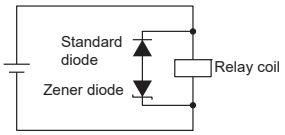
●Coil Voltage Reduction (Holding Voltage) during and after Relay Operation

- Use in the applied voltage and time ranges indicated in the figure below. Do not exceed this range due to coil voltage change and so on.
- A voltage of at least 50% of the rated voltage is required for the coil holding voltage. However, for currents exceeding 30 A, use a Holding Voltage of 50 to 60%. Do not allow voltage fluctuations to cause the coil holding voltage to fall below this level.



●Connection of Diodes to the Operation Coil

- Connect the standard diode and zener diode (or varistors) to the relay coil. (Refer to the following figure.)
  The diode absorbs coil surge. Switching performance may be affected if only a diode is used, so use in combination with a zener diode.
- The coil has no polarity. Connect the diodes in the reverse polarity of the voltage applied to the coil.
- The recommended zener voltage of the zener diode is one to two times the rated coil voltage.
- Use a diode with a reverse breakdown voltage at least 10 times the rated voltage of the coil, and a forward current equal to or greater than the rated current of the coil.



●PCB Mounting Interval (When Using Multiple Items)

- Use a mounting interval of 10 mm or more.

●Relay Service Life

- These Relays must be used for high DC voltages. The final failure mode is failure to break the circuit. In a worst-case scenario, burning may extend to surrounding components. Do not use these Relays outside of the specified ratings and service life, or for any application other than high DC voltages. Implement safety circuits and other safety measures to minimize the risk in case of the unlikely event of a failure.
- The electrical durability of these Relays is specified as the number of load switching operations under a resistive load and OMRON-specified standard testing conditions.
  The coil drive circuit, ambient environment, switching frequency, or load conditions (e.g., inductive load or capacitor load) may reduce the service life and possibly lead to failure to break. Always confirm the service life in the actual equipment.
- The service life may change due to high-voltage and high-current switching in low-humidity or low (minus)-temperature atmospheres. Always confirm the service life in the actual equipment.
- The service life may change due to high-voltage and high-current switching in low-humidity or low (minus)-temperature atmospheres. Always confirm the service life in the actual equipment.

●Polarity change when switching

- During switching operation in application should the polarity change it will reduce switching lifetime performance. Please contact Omron for further information.

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