



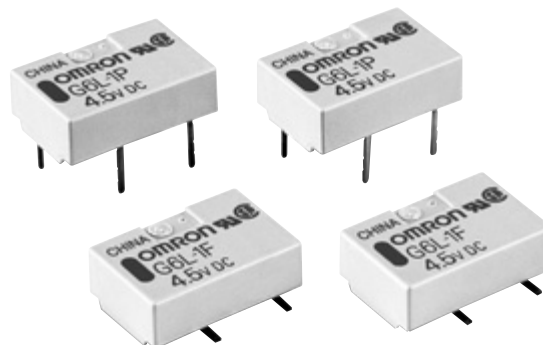
# THE DATASHEET OF G6L-1P-DC24

# Ultra-thin Low Signal Relay

## G6L

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

- For high-density mounting and slim finished packaging, G6L uses 20% less mounting area and 67% less volume in comparison with the G5V-1 relay.
- Measures just 7.0 (W) x 10.6 (L) x 4.2 (H) mm for surface-mount or 3.8 (H) for through-hole.
- High dielectric strength: 1,000 VAC between coil and contacts and 750 VAC between contacts of the same polarity.
- Conforms to FCC Part 68 impulse withstand voltage rating of 1.5kV for 10 x 160  $\mu$ s.
- Conforms to UL60950 (File No. E41515) / CSA C22.2 No. 60950 (File No. LR31928).
- Use of lead completely eliminated.



## Ordering Information

| Contact form | Construction | Mounting type          | Model  |
|--------------|--------------|------------------------|--------|
| SPST-NO      | Fully sealed | Through-hole terminal  | G6L-1P |
|              |              | Surface-mount terminal | G6L-1F |

**Note:** 1. When ordering, add the rated coil voltage to the model number.

Example: G6L-1P 12 VDC

└── Rated coil voltage

2. When ordering tape packing, add "-TR" to the model number.

Example: G6L-1F-TR 12 VDC

└── Tape packing

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

### Model Number Legend:

**G6L**  $\square$  - 1  $\square$  -  $\square$

1    2 3    4

#### 1. Relay function

None: Non-latching

#### 2. Contact form

1: SPST-NO

#### 3. Terminal shape

P: PCB terminals

F: Surface-mount terminals

#### 4. Packaging

None: Tube packaging

TR: Tape and reel packaging

## Application Examples

- Peripherals of MODEM/PC
- Telephones
- Office automation machines
- Audio-visual products
- Communications equipment
- Measurement devices
- Amusement equipment
- Security equipment

# Specifications

## ■ Contact Ratings

| Item                   | Resistive load                  |
|------------------------|---------------------------------|
| Contact mechanism      | Single crossbar                 |
| Rated load             | 0.3 A at 125 VAC, 1 A at 24 VDC |
| Carry current          | 1 A                             |
| Max. operating voltage | 125 VAC, 60 VDC                 |
| Max. operating current | 1 A                             |

## ■ Coil Ratings

| Item              | Voltage Rating            |                |                |                |                       |
|-------------------|---------------------------|----------------|----------------|----------------|-----------------------|
| Rated voltage     | 3 VDC                     | 4.5 VDC        | 5 VDC          | 12 VDC         | 24 VDC                |
| Rated current     | 60.0 mA                   | 40.0 mA        | 36.0 mA        | 15.0 mA        | 9.6 mA                |
| Coil resistance   | 50.0 $\Omega$             | 112.5 $\Omega$ | 139.0 $\Omega$ | 800.0 $\Omega$ | 2,504.0 $\Omega$      |
| Pick-up voltage   | 75% max. of rated voltage |                |                |                |                       |
| Dropout voltage   | 10% min. of rated voltage |                |                |                |                       |
| Maximum voltage   | 150% of rated voltage     |                |                |                | 130% of rated voltage |
| Power consumption | Approx. 180 mW            |                |                |                | Approx. 230 mW        |

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

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

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

## ■ Characteristics

| Item                                |                        | Non-latching Relays<br>G6L-1P, G6L-1F                                |
|-------------------------------------|------------------------|----------------------------------------------------------------------|
| Contact resistance (See Note 1)     |                        | 100 m $\Omega$ max.                                                  |
| Operate time (See Note 2)           |                        | 5 ms max. (approx. 1.1 ms)                                           |
| Release time (See Note 2)           |                        | 5 ms max. (approx. 0.4 ms)                                           |
| Insulation resistance (See Note 3)  |                        | 1,000 M $\Omega$ min. (at 500 VDC)                                   |
| Dielectric strength                 | Coil and contacts      | 1,000 VAC, 50/60 Hz for 1 min                                        |
|                                     | Contacts of same poles | 750 VAC, 50/60 Hz for 1 min                                          |
| Surge withstand voltage             | Coil and contacts      | 1,500 VAC, 10 $\times$ 160 $\mu$ s                                   |
| Vibration                           | Mechanical durability  | 10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)      |
|                                     | Malfunction durability | 10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)      |
| Shock                               | Mechanical durability  | 1,000 m/s <sup>2</sup>                                               |
|                                     | Malfunction durability | 100 m/s <sup>2</sup>                                                 |
| Service life                        | Mechanical             | 5,000,000 operations min. (at 36,000 operations/hour)                |
|                                     | Electrical             | 100,000 operations min. (with a rated load at 1,800 operations/hour) |
| Failure rate (P level) (See Note 4) |                        | 1 mA at 5 VDC                                                        |
| Ambient temperature                 |                        | Operating: -40°C to 70°C (with no icing or condensation)             |
| Humidity                            |                        | Operating: 5% to 85% RH                                              |
| Weight                              |                        | Approx. 0.6 g                                                        |

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

2. Values in parentheses are actual values.

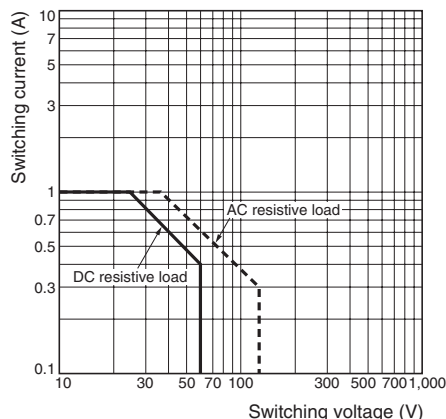
3. The insulation resistance was measured with a 500-VDC Megger Tester applied to the same parts as those used for checking the dielectric strength.

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

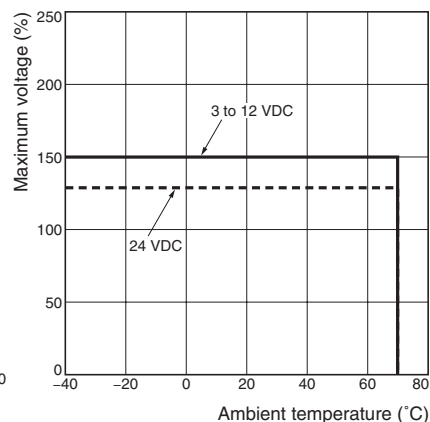
5. The above values are initial values.

# Engineering Data

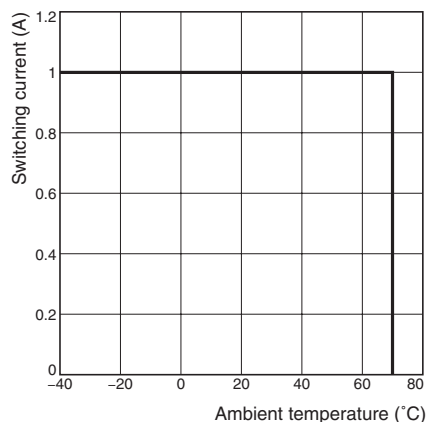
## Maximum Switching Capacity



## Ambient Temperature vs. Maximum Voltage

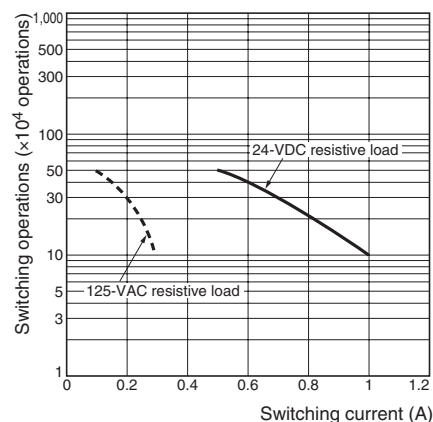


## Ambient Temperature vs. Switching Current

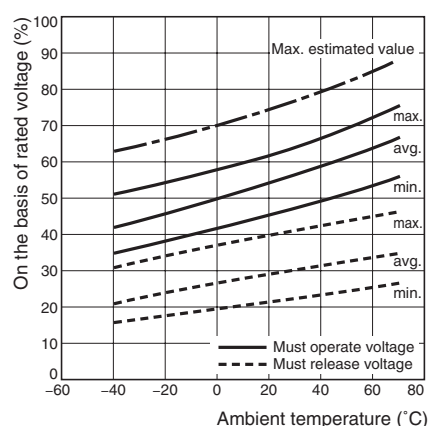


**Note:** "Maximum Voltage" is the maximum voltage that can be applied to the relay coil.

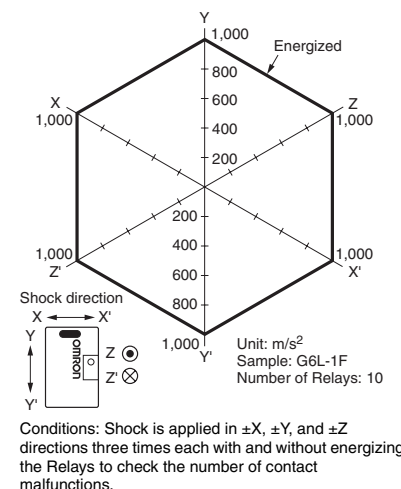
## Endurance



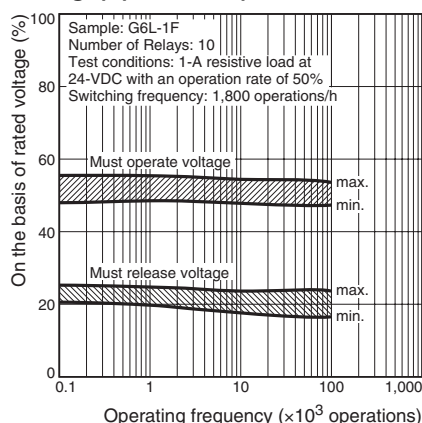
## Ambient Temperature vs. Must Operate or Must Release Voltage



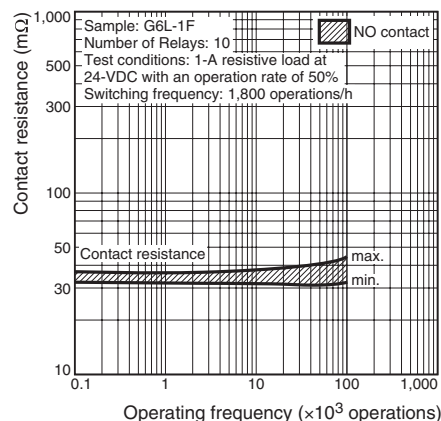
## Shock Malfunction



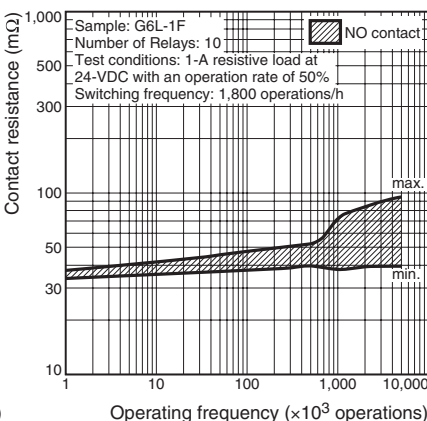
## Electrical Endurance (with Must Operate and Must Release Voltage) (See Note)



## Electrical Endurance (Contact Resistance) (See Note)

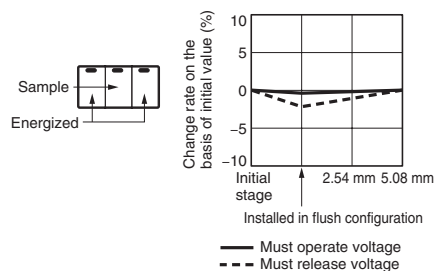


## Contact Reliability Test (Contact Resistance) (See Note)

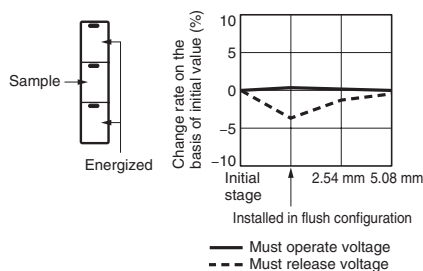


**Note:** The tests were conducted at an ambient temperature of 23°C.

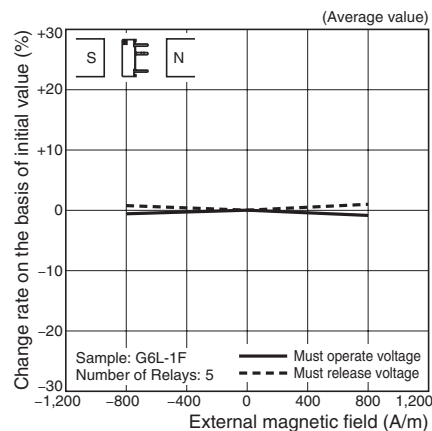
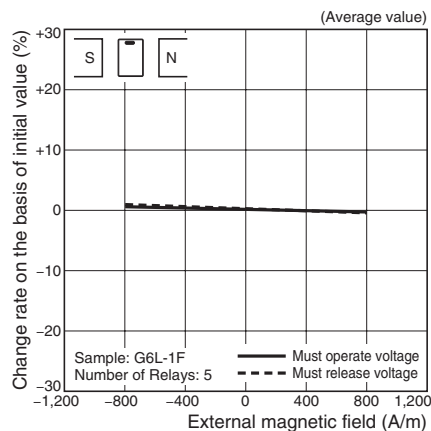
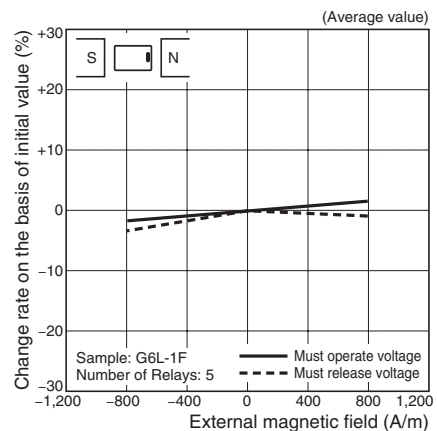
## Mutual Magnetic Interference



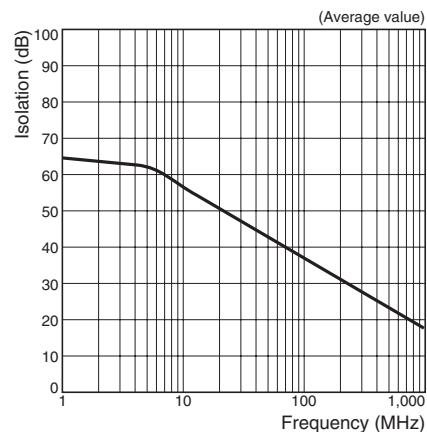
## Mutual Magnetic Interference



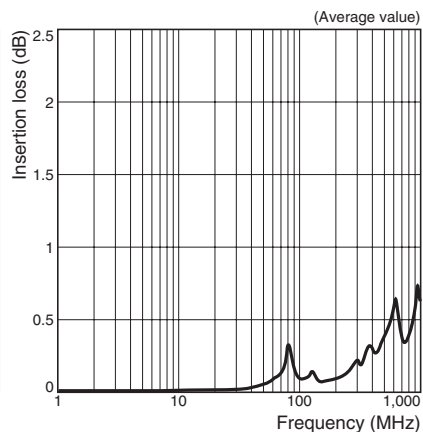
## External Magnetic Interference



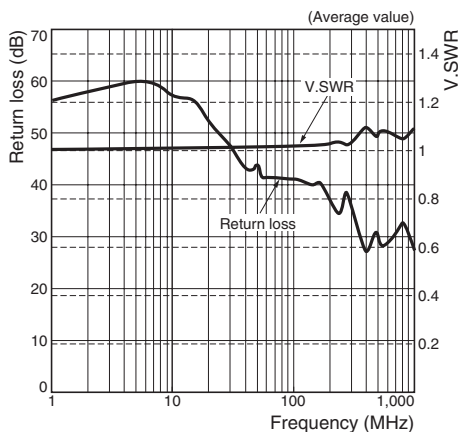
## High-frequency Characteristics (Isolation)



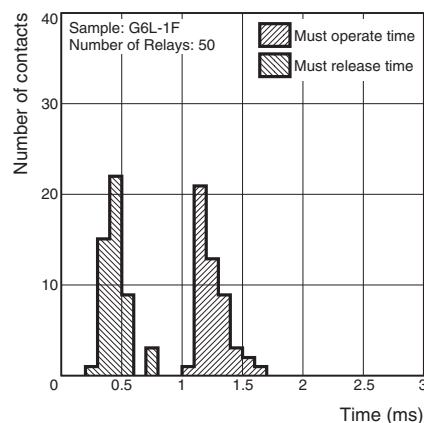
## High-frequency Characteristics (Insertion Loss)



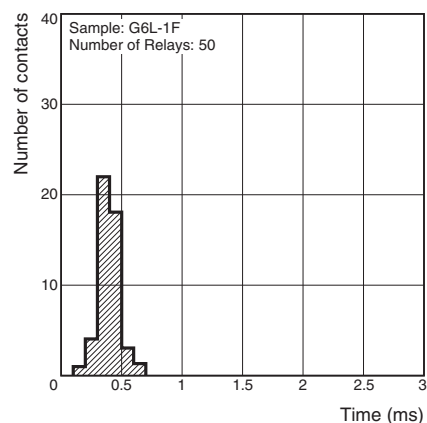
## High-frequency Characteristics (Return Loss, V.SWR)



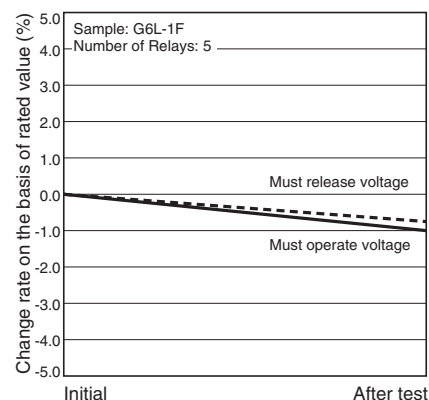
## Must Operate and Must Release Time Distribution (See Note)



## Distribution of Bounce Time (See Note)



## Vibration Resistance

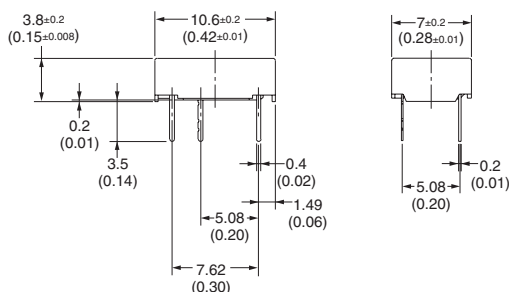
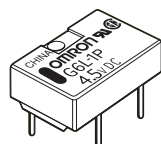


**Note:** The tests were conducted at an ambient temperature of 23°C.

# Dimensions

Unit: mm (inch)

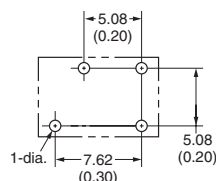
## G6L-1P



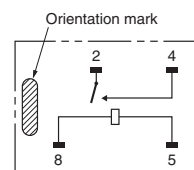
**Note:** Each value has a tolerance of ±0.3 mm.

## PCB Mounting Holes (Bottom View)

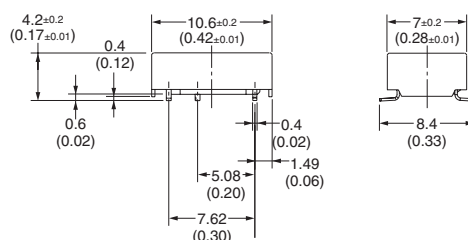
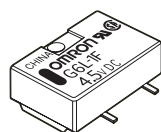
Tolerance: ±0.1 mm



## Terminal Arrangement/ Internal Connections (Bottom View)



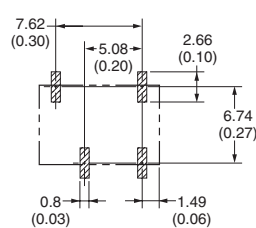
## G6L-1F



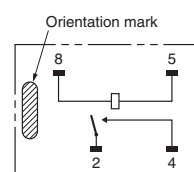
**Note:** Each value has a tolerance of ±0.3 mm.

## PCB Mounting Holes (Top View)

Tolerance: ±0.1 mm



## Terminal Arrangement/ Internal Connections (Top View)

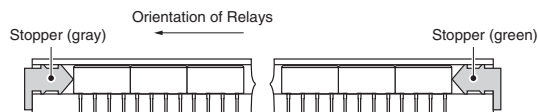


# Packaging

## ■ Tube Packaging

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

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



Tube length: 552 mm (stopper not included)

No. of Relays per tube: 50

## ■ Tape and Reel Packaging (Surface-mount Terminal Relays)

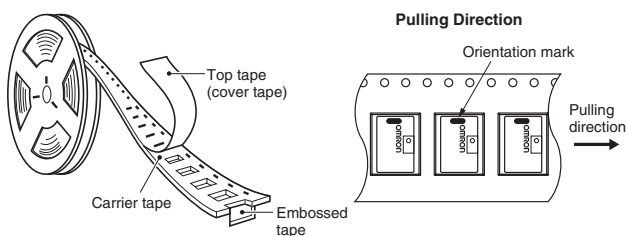
When ordering Relays in tape and reel packaging, add the suffix "-TR" to the model number, otherwise the Relays in tube packing will be provided.

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

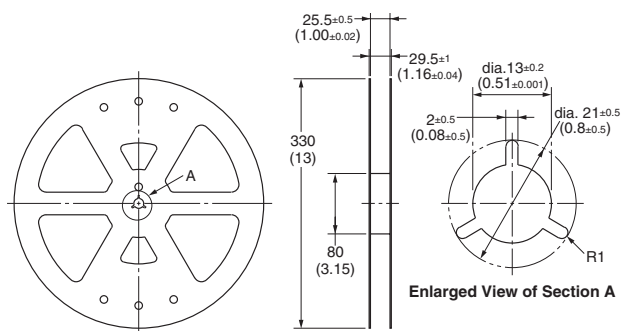
Reel type: R24D (Refer to EIAJ (Electronic Industries Association of Japan))

Relays per reel: 1,000

## Direction of Relay Insertion

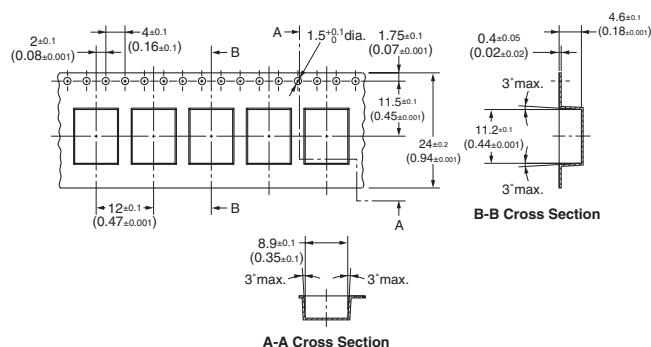


## Reel Dimensions



## Carrier Tape Dimensions

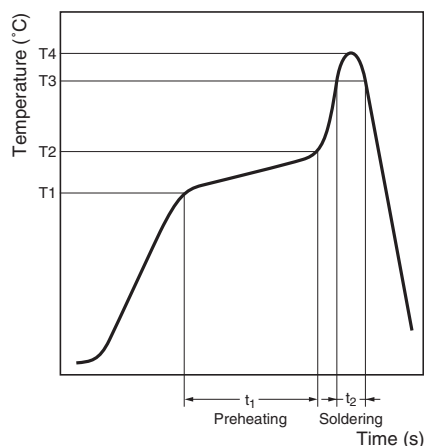
### G6L-1F



# Recommended Soldering Method

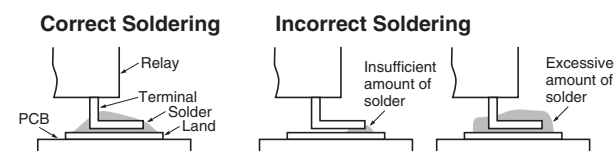
## Temperature Profile According to IRS

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



| Item<br>Measuring<br>position | Preheating<br>(T1 to T2, t <sub>1</sub> ) | Soldering<br>(T3, t <sub>2</sub> ) | Peak value<br>(T4) |
|-------------------------------|-------------------------------------------|------------------------------------|--------------------|
| Terminal                      | 150°C to 180°C,<br>120 s max.             | 180°C to 200°C,<br>20 to 30 s      | 245°C max.         |
| Upper surface<br>of case      | —                                         | —                                  | 250°C max.         |

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



Visually check that the Relay is properly soldered.

## Approved Standards

UL approval: UL60950 (File No. E41515)

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

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

# Precautions

## ■ Correct Use

### Handling

Leave the Relays packed until just prior to mounting them.

### Soldering

Solder: JIS Z3282, H63A

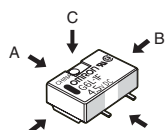
Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)

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

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

### Claw Securing Force During Automatic Insertion

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



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

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

### Environmental Conditions During Operation, Storage, and Transportation

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

### Maximum Voltage

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

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

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

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

### Coating

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, divide by 25.4

# OMRON

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