OMRON

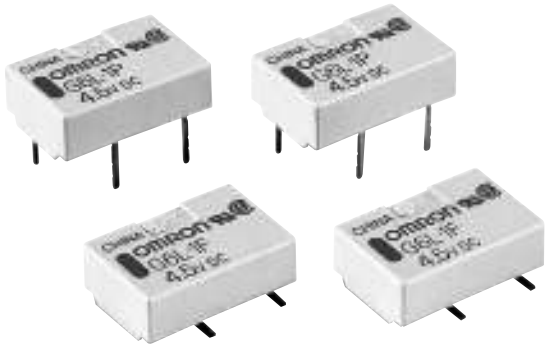
# Surface-mounting Relay

# G6L

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

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

RoHS Compliant Refer to pages 16 to 17 for details.



# Ordering Information

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

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

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

### Model Number Legend:

**G6L□-1□-□**
1 2 3 4

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

# Application Examples

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

# Specifications

## ■ Contact Ratings

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

## ■ Coil Ratings

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

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

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

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

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

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

## ■ Characteristics

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

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

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

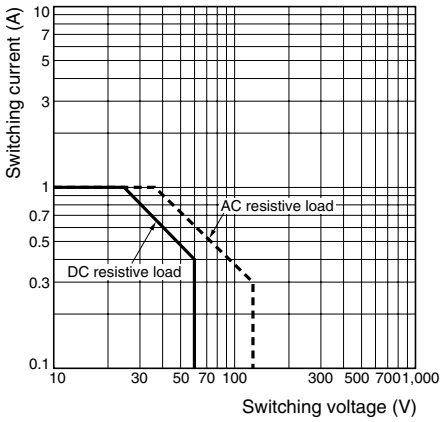
**2.** Values in parentheses are actual values.

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

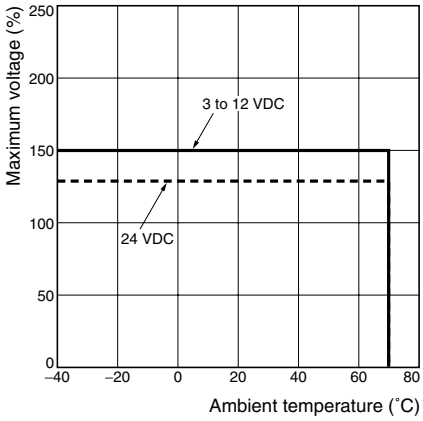
**4.** This value was measured at a switching frequency of 120 operations/min. This value may vary, depending on switching frequency, operating conditions, expected reliability level of the relay, etc. It is always recommended to double-check relay suitability under actual load conditions.

# Engineering Data

## Maximum Switching Capacity

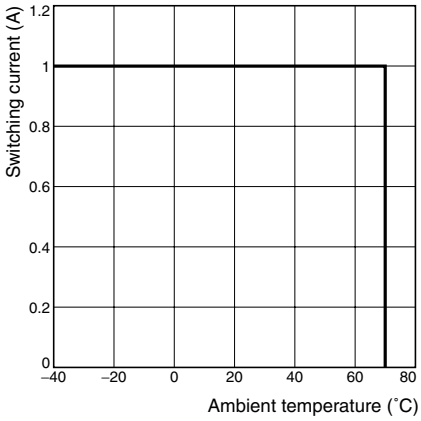



## Ambient Temperature vs. Maximum Voltage

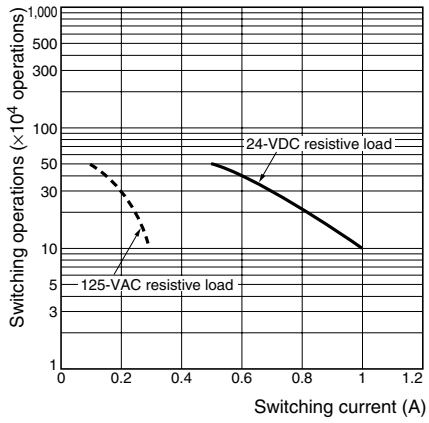



**Note:** "Maximum voltage" is the maximum voltage that can be applied to the Relay coil.

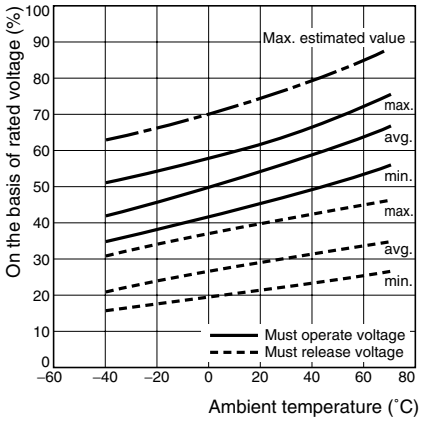
## Ambient Temperature vs. Switching Current



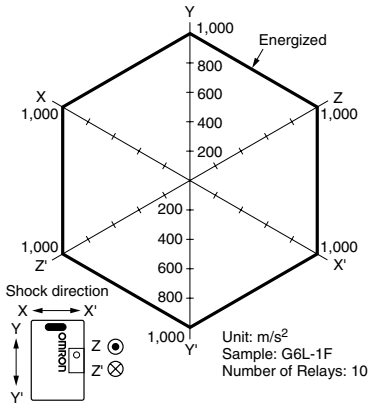

## Endurance




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

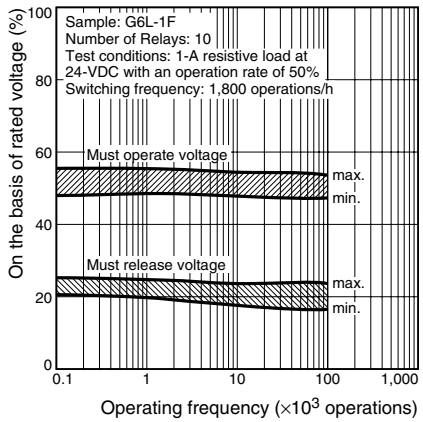



## Shock Malfunction

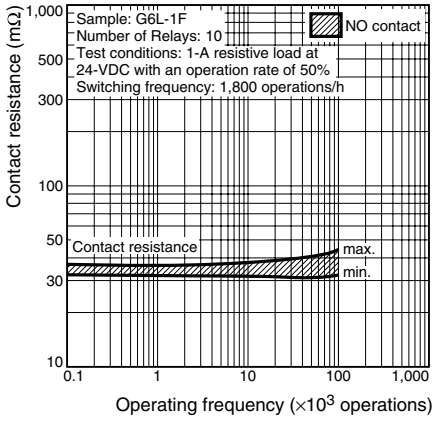



Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

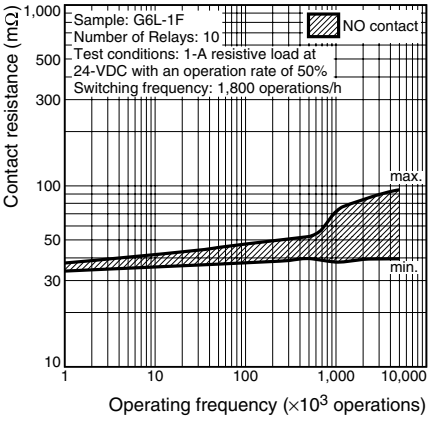
## Electrical Endurance (with Must Operate and Must Release Voltage) (See note 1.)




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



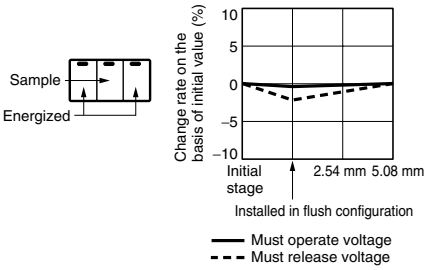

## Contact Reliability Test (Contact Resistance) (See notes 1 and 2.)



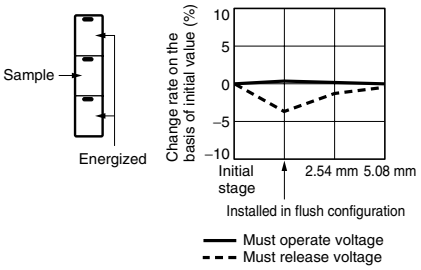

**Note:** **1.** The tests were conducted at an ambient temperature of 23ºC.

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

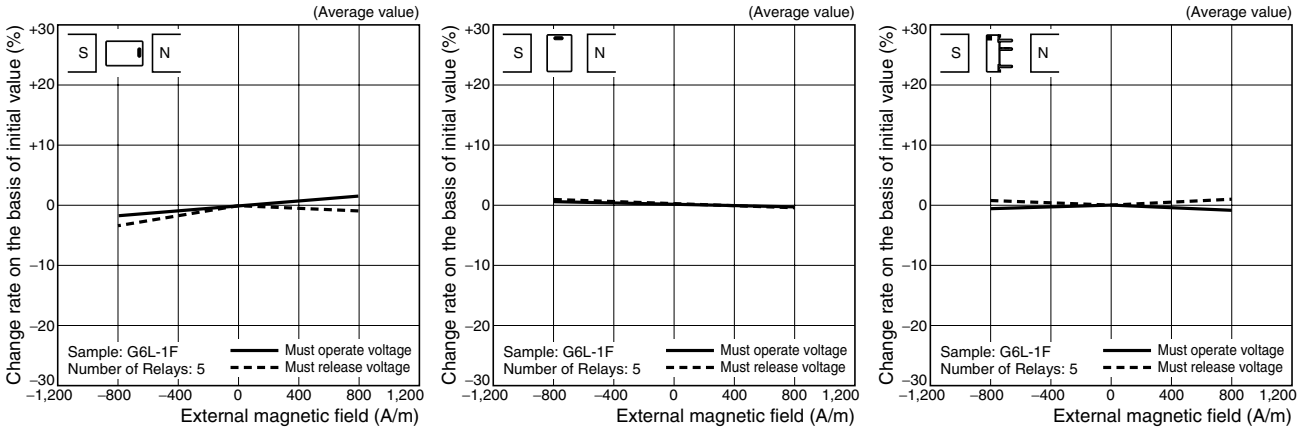
### Mutual Magnetic Interference



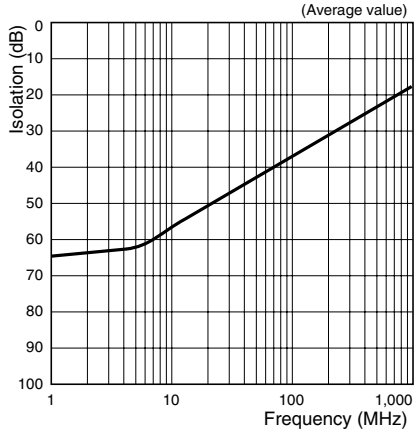

### Mutual Magnetic Interference



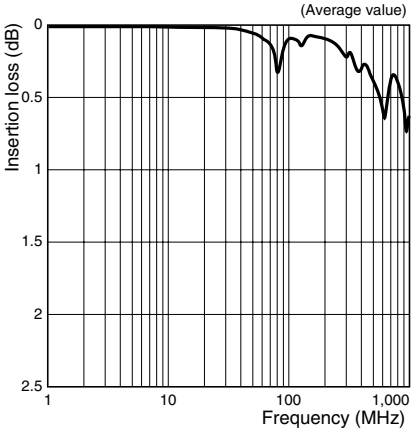

### External Magnetic Interference



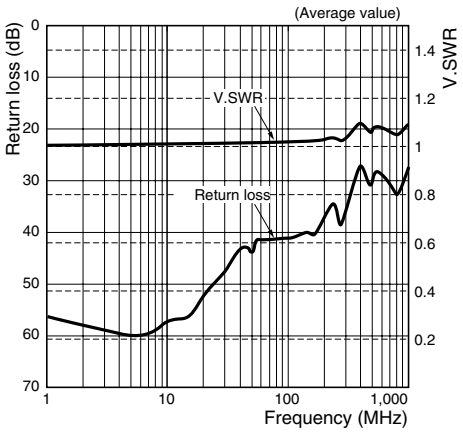

### High-frequency Characteristics (Isolation) (See note.)




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

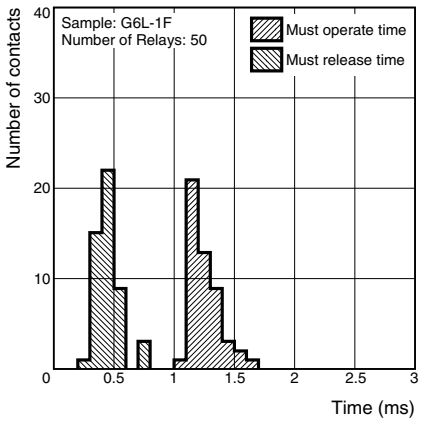



### High-frequency Characteristics (Return Loss, V.SWR) (See note.)

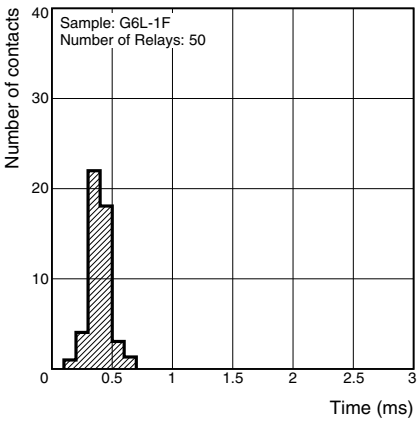



**Note:** High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

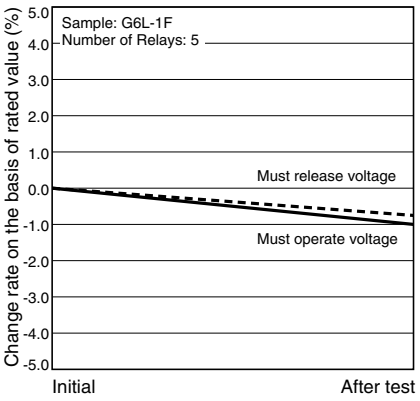
### Must Operate and Must Release Time Distribution (See note.)




### Distribution of Bounce Time (See note.)




### Vibration Resistance

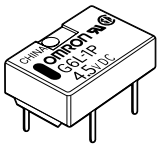


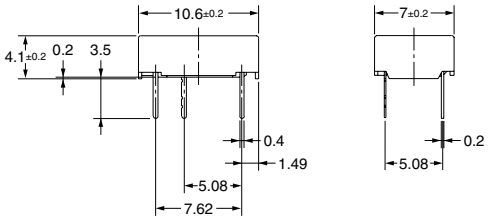

**Note:** The tests were conducted at an ambient temperature of 23°C.

# Dimensions

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

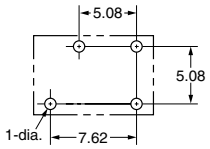
### G6L-1P



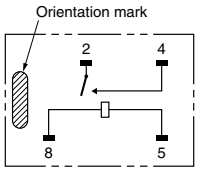



**PCB Mounting Holes (Bottom View)**

Tolerance: ±0.1 mm

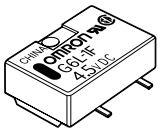


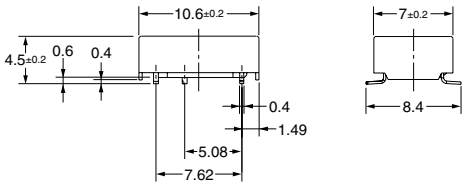

**Terminal Arrangement/ Internal Connections (Bottom View)**




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

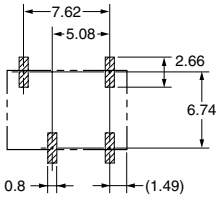
### G6L-1F



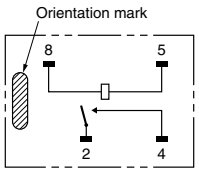



**PCB Mounting Holes (Top View)**

Tolerance: ±0.1 mm




**Terminal Arrangement/ Internal Connections (Top View)**



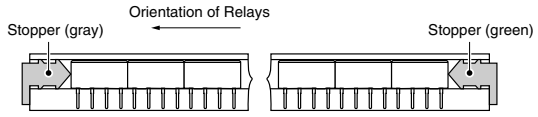

**Note:** Each value has a tolerance of ±0.3 mm.

# Stick Packing and Tape Packing

## 1. Stick Packing

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

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




Stick length: 552 mm (stopper not included)

No. of Relays per stick: 50

## 2. Tape Packing (Surface-mounting Terminal Relays)

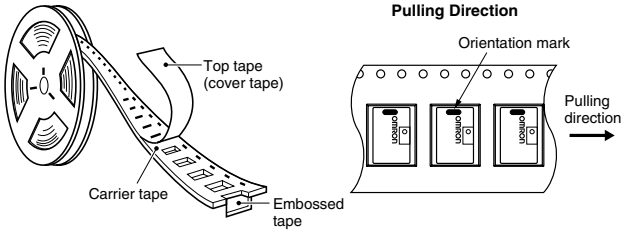
When ordering Relays in tape packing, add the suffix "-TR" to the model number, otherwise the Relays in stick packing will be provided.

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

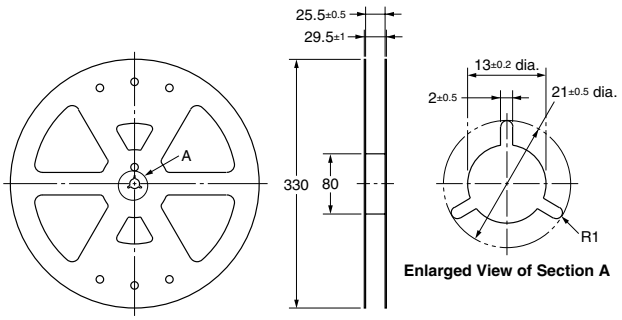
Reel type: R24D (Refer to EIAJ (Electronic Industries Association of Japan))

Relays per reel: 1,000

### Direction of Relay Insertion

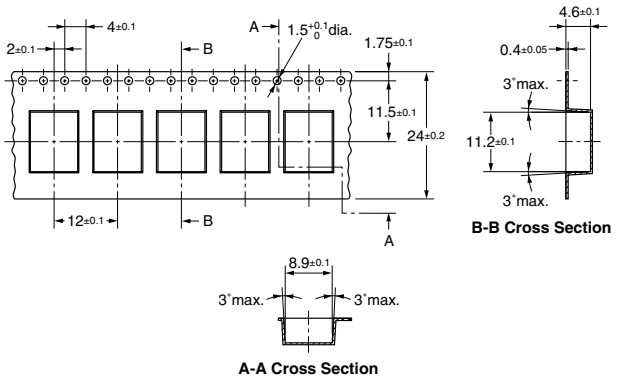



### Reel Dimensions




### Carrier Tape Dimensions

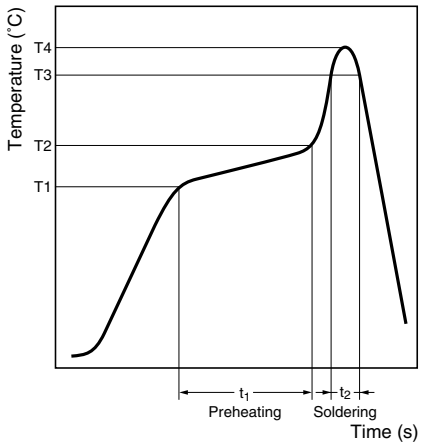
**G6L-1F**



# Recommended Soldering Method

## Temperature Profile According to IRS

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




**Mounting Solder: Lead**

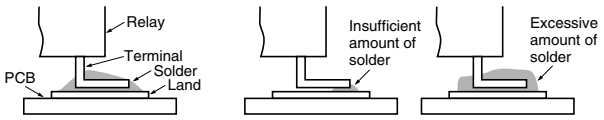
| Item / Measuring position | Preheating (T1 to T2, $t_1$) | Soldering (T3, $t_2$) | Peak value (T4) |
|---|---|---|---|
| **Terminal** | 150°C to 180°C, 120 s max. | 180°C to 200°C, 20 to 30 s | 245°C max. |
| **Upper surface of case** | --- | --- | 250°C max. |

**Mounting Solder: Lead-free**

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

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

**Correct Soldering** **Incorrect Soldering**




Visually check that the Relay is properly soldered.



## ■ Approved Standards

UL approval: UL60950 (File No. E41515)

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

| Contact form | Coil rating | Contact rating | Number of test operations |
|---|---|---|---|
| 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 |