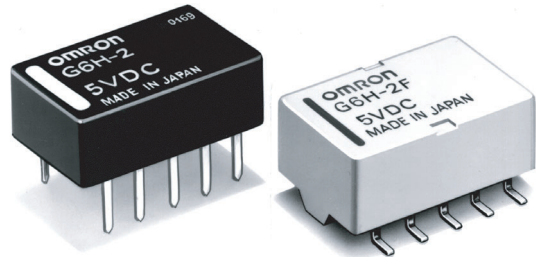


# PCB Relay

# G6H

## Ultra-compact, Ultra-sensitive DPDT Relay

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



RoHS Compliant Refer to pages 16 to 17 for details.



## Ordering Information

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

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

Rated coil voltage

### Model Number Legend

G6H  -   -   VDC  
1 2 3 4 5

#### 1. Relay Function

None: Single-side stable  
U: Single-winding latching  
K: Double-winding latching

#### 2. Contact Form

2: DPDT  
**3. Terminal Shape**  
None: PCB terminal  
F: Surface mount terminal

#### 4. Classification

U: Ultrasonically cleanable

#### 5. Rated Coil Voltage

3, 5, 6, 9, 12, 24 VDC

## Specifications

### Coil Ratings

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

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

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

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

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

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

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

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

## ■ Contact Ratings

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

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

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

## ■ Characteristics

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

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

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

2. Values in parentheses are actual values.

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

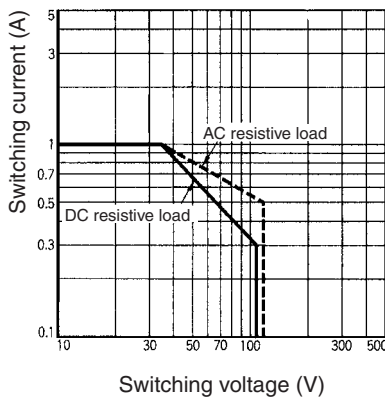
## ■ Approved Standards

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

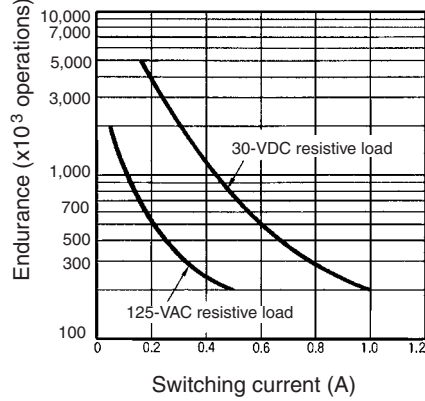
| Model   | Contact form | Coil ratings  | Contact ratings                                 |
|---|--------------|---------------|---|
| G6H-2<br>G6HU-2<br>G6HK-2<br>G6H(U/K)-2-U<br>G6H(U/K)-2-100 | DPDT         | 1.5 to 48 VDC | 2 A, 30 VDC<br>0.3 A, 110 VDC<br>0.5 A, 125 VAC |

# Engineering Data

## Maximum Switching Power

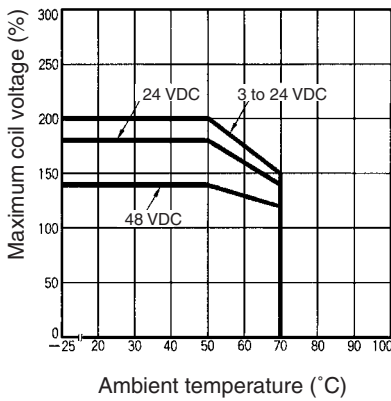


## Endurance

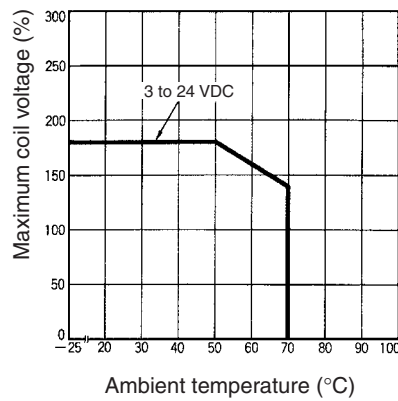


## Ambient Temperature vs. Maximum Coil Voltage

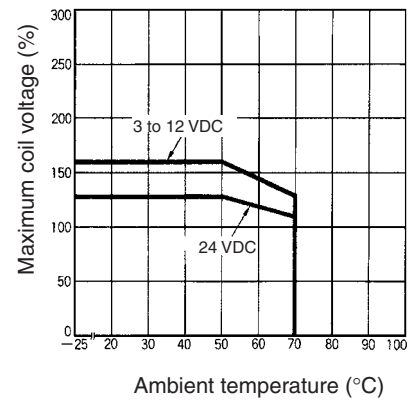
### Single-side Stable (G6H-2)



### Single-winding Latching (G6HU-2)



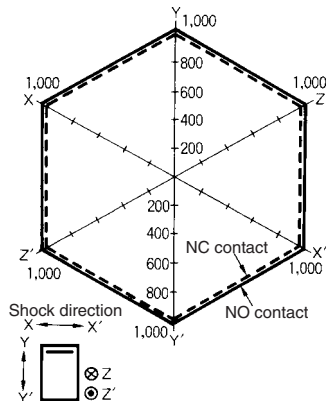
### Double-winding Latching (G6HK-2)



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

## Malfunctioning Shock Resistance (G6H-2)

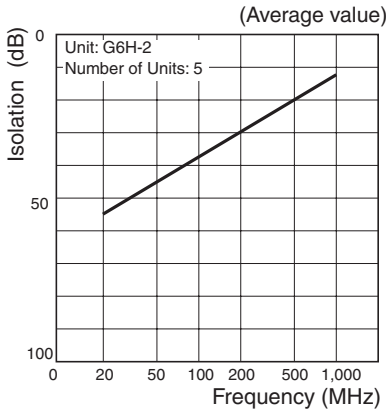
5 VDC  
Number of Units: 10



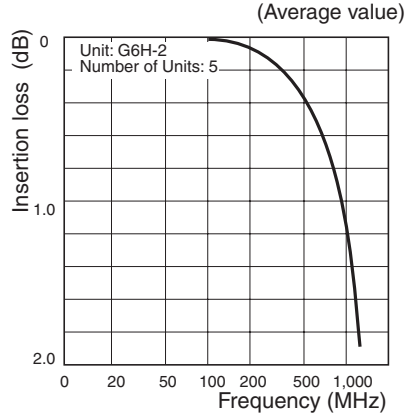
**Condition:** The Units were shocked at the rate of 500 m/s<sup>2</sup> three times each in the ±X, ±Y, and ±Z directions with and without voltage imposed on the Units until the Units malfunctioned.

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

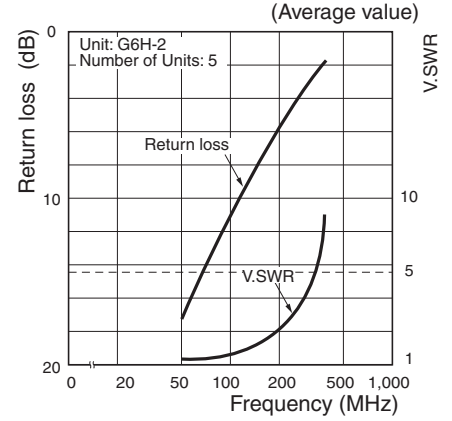
**Frequency vs. Isolation**



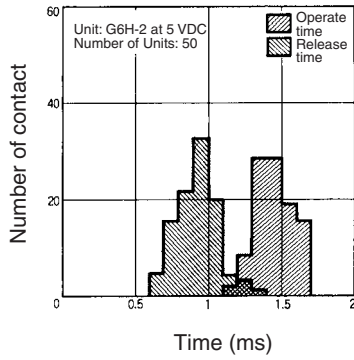
**Frequency vs. Insertion Loss**



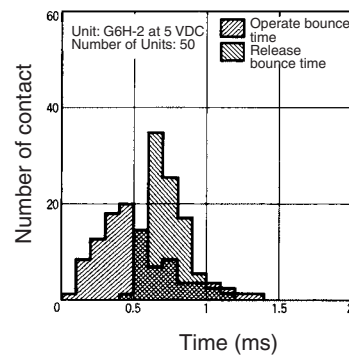
**Frequency vs. Return Loss, V.SWR**



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



**Distribution of Bounce Time (See note 1.)**



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

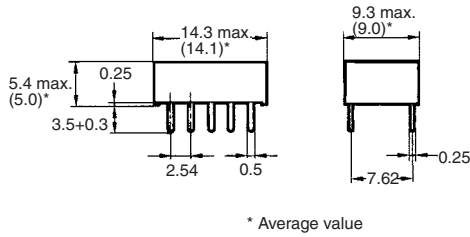
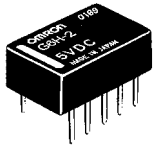
2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

# Dimensions

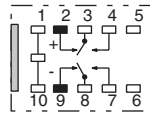
**Note:** 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

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

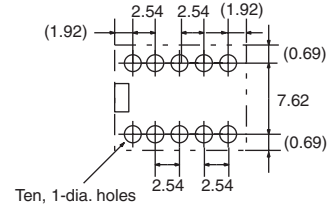


### Terminal Arrangement/ Internal Connections (Bottom View)

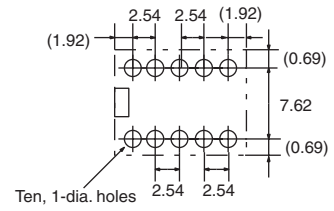
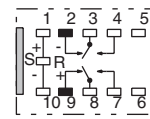
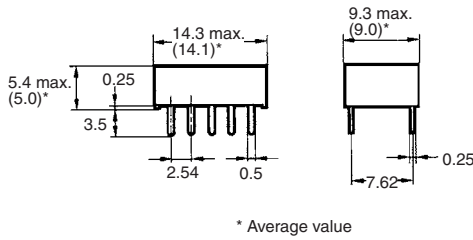
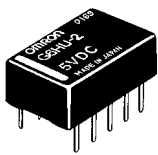


### Mounting Holes (Bottom View)

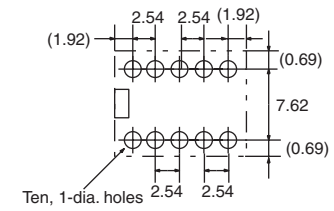
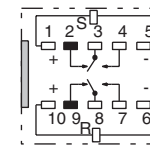
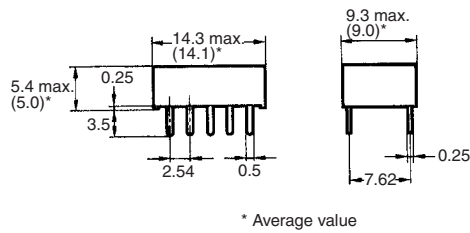
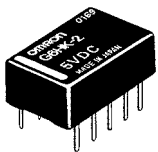
Tolerance:  $\pm 0.1$



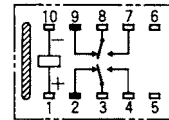
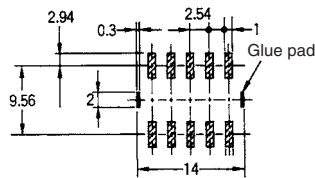
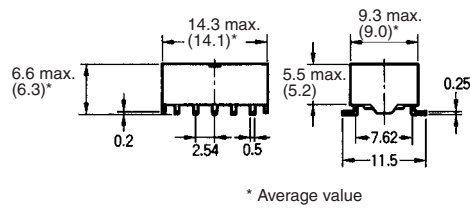
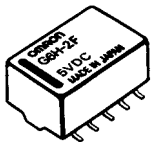
## Single-winding Latching Type G6HU-2(-U)



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

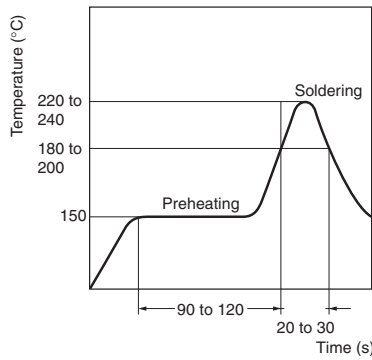


## Single-side Stable Type G6H-2F



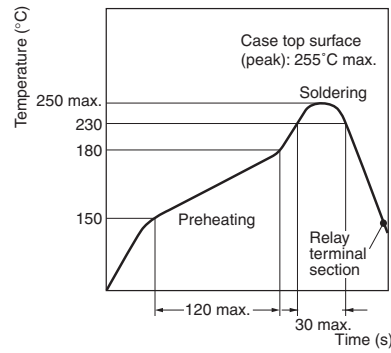
## ■ Example of Recommended Soldering Conditions for the G6H-2F (Surface Mounting Terminal Relays)

### (1) IRS Method (Mounting Solder: Lead)



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

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



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

## ■ Approved Standards

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

### UL114, UL478 (File No. E41515)

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

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

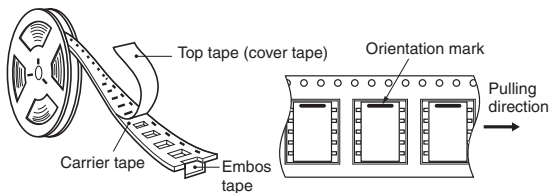
| Model    | No. of poles | Coil rating   | Contact rating | No. of operations |
|----------|--------------|---------------|----------------|-------------------|
| G6H-2(F) | 2            | 1.5 to 48 VDC | 2 A, 30 VDC    | 6,000             |
|          |              |               | 0.3 A, 110 VDC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

## ■ Tape Packing (Surface Mounting Terminal Models)

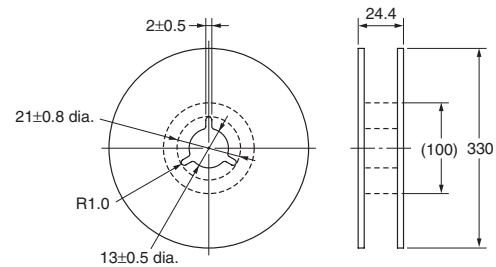
When ordering Relays in tape packing, add the prefix “-TR” to the model number otherwise the Relays in stick packing will be provided.

Relays per Reel: 500

### Direction of Relay Insertion

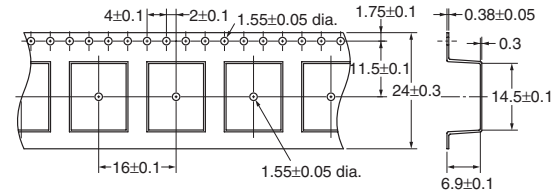


### Reel Dimensions



### Carrier Tape Dimensions

#### G6H-2F



## ■ Precautions

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

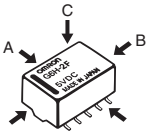
### Precautions for Correct Use

#### Long-term Continuously ON Contacts

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

### Claw Securing Force During Automatic Mounting

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



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

### Relay Handling

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

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

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.