

### Miniature Relay for Signal Circuits

- Wide switching power of 10  $\mu$ A 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.

RoHS Compliant Refer to pages 16 to 17 for details.



### Ordering Information

| Classification   | Contact form | Contact type        | Contact material | Enclosure ratings | Model    |
|------------------|--------------|---------------------|------------------|-------------------|----------|
| Standard         | DPDT         | Bifurcated crossbar | Ag + Au-Alloy    | Fully 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 $\Omega$                   | 50 $\Omega$ | 72 $\Omega$ | 162 $\Omega$ | 288 $\Omega$ | 1,152 $\Omega$ | 4,000 $\Omega$ |
| Coil inductance (H) (ref. value) | Armature OFF                  | 0.04        | 0.09        | 0.16         | 0.31         | 0.47           | 1.98           |
|                                  | Armature ON                   | 0.05        | 0.11        | 0.19         | 0.49         | 0.74           | 2.63           |
| Must operate voltage             | 75% max. of rated voltage     |             |             |              |              |                |                |
| Must release voltage             | 5% min. of rated voltage      |             |             |              |              |                |                |
| Max. voltage                     | 120% of rated voltage at 23°C |             |             |              |              |                |                |
| Power consumption                | Approx. 500 mW                |             |             |              |              |                | Approx. 580 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. 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.

## 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<br>(H) (ref. value) | Armature ON                   | 0.18    | 0.46  | 0.70    | 1.67    | 2.90           | 6.72                          |
|                                     | Armature OFF                  | 0.57    | 0.71  | 0.97    | 2.33    | 3.99           | 9.27                          |
| 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% of rated voltage at 23°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. The maximum voltage is the highest voltage that can be imposed on the relay coil.

## ■ 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 power                          | 62.5 VA, 60 W                     | 62.5 VA, 24 W                   |
| Failure rate (reference value)<br>(See note.) | 0.01 mA 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 switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

## ■ Characteristics

| Item                                | Standard models  | High sensitivity models  |
|-------------------------------------|--|--|
| Contact resistance (See note 1.)    | 50 mΩ max.   | 100 mΩ max.  |
| Operate time                        | 7 ms max.  |  |
| Release time                        | 3 ms max.  |  |
| Max. operating frequency            | Mechanical: 36,000 operations/hr<br>Electrical: 1,800 operations/hr (under rated load)   |  |
| Insulation resistance (See note 2.) | 1,000 MΩ min. (at 500 VDC)   |  |
| Dielectric strength                 | 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 | 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>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 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)<br>Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)                         |  |
| Shock resistance                    | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 200 m/s <sup>2</sup> (approx. 20G)  | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 100 m/s <sup>2</sup> (approx. 10G)  |
| Endurance                           | Mechanical: 15,000,000 operations min. (at 36,000 operations/hr)<br>Electrical: 100,000 operations min. (at 1,800 operations/hr)   |  |
| Ambient temperature                 | Operating: -25°C to 65°C (with no icing)   | Operating: -25°C to 70°C (with no icing)   |
| Ambient humidity                    | Operating: 5% to 85%   |  |
| Weight                              | Approx. 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. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

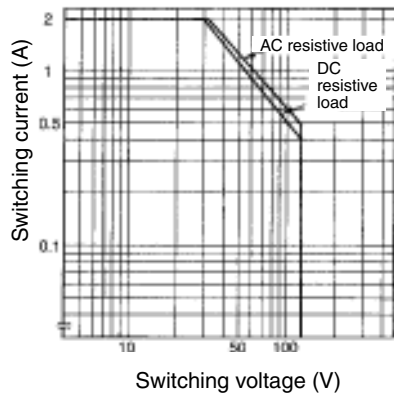
■ Approved Standards

UL478, UL1950, UL508 (File No. E41515)/CSA C22.2 No.0, No.14 (File No. LR31928)

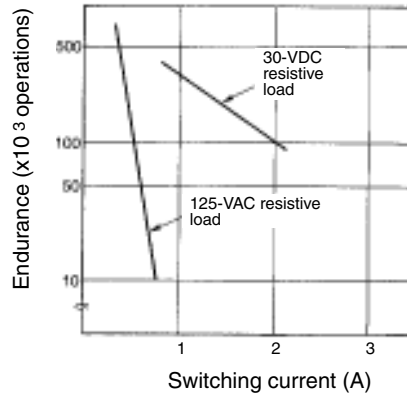
| Contact form | Coil ratings | Contact ratings   |   |
|--------------|--------------|---|---|
|              |              | G5V-2   | G5V-2-H1  |
| DPDT         | 3 to 48 VDC  | 0.6 A, 125 VAC (general use)<br>0.6 A, 110 VDC (resistive load)<br>2 A, 30 VDC (resistive load) | 0.5 A, 125 VAC (general use)<br>0.2 A, 110 VDC (resistive load)<br>1 A, 24 VDC (resistive load) |

Engineering Data

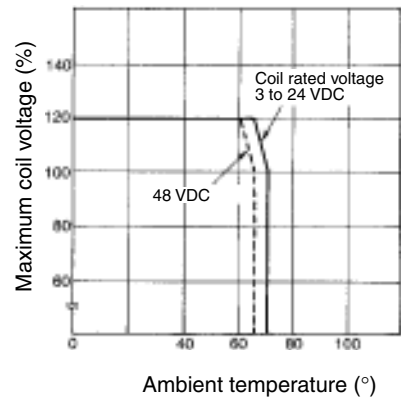
Maximum Switching Power  
G5V-2



Endurance  
G5V-2

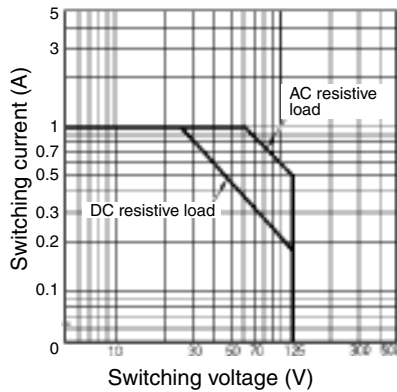


Ambient Temperature vs. Maximum Coil Voltage  
G5V-2

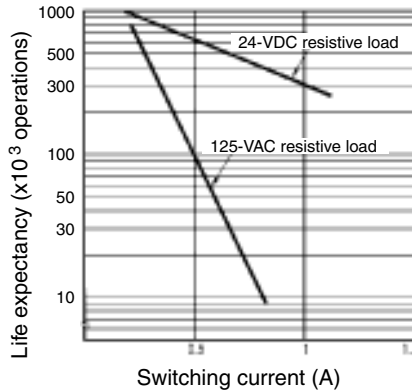


**Note:** The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

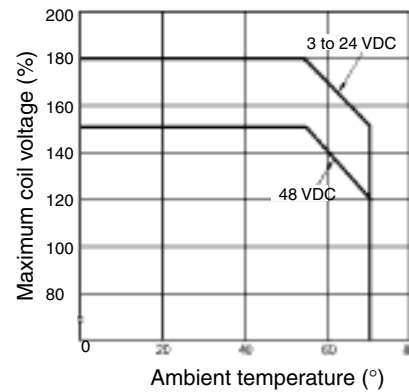
G5V-2-H1



G5V-2-H1



G5V-2-H1

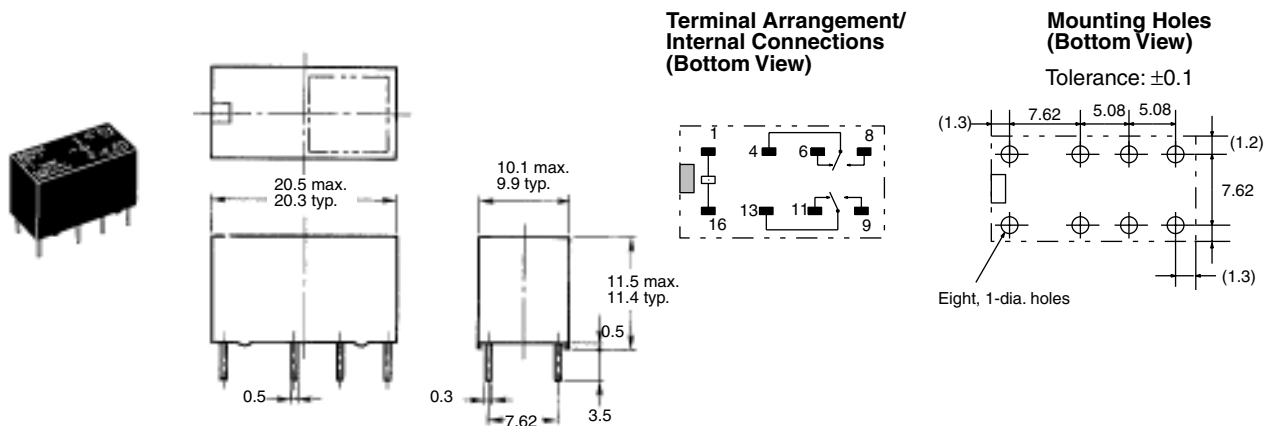


**Note:** The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

## Dimensions

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

2. Orientation marks are indicated as follows:  



## Precautions

### 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. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

### Relay Handling

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.