

## MOS FET Relay

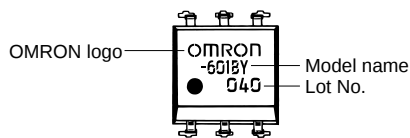
G3VM-601BY/EY

**MOS FET Relay for Switching Analog Signals, with an I/O Dielectric Strength of 5 kVAC Using Optical Isolation**

- Switches minute analog signals.
- Switches AC and DC.
- Load voltage: 600 V.
- I/O dielectric strength: 5 kVAC.
- UL/CSA approval pending.



### ■ Appearance



**Note:** "G3VM" is not printed on the actual product.

## Ordering Information

| Contact form | Terminals                  | Load voltage (peak value) | Model          | Number per stick | Taping quantity |
|--------------|----------------------------|---------------------------|----------------|------------------|-----------------|
| SPST-NO      | PCB terminals              | 600 VAC                   | G3VM-601BY     | 50               | ---             |
|              | Surface-mounting terminals |                           | G3VM-601EY     |                  |                 |
|              |                            |                           | G3VM-601EY(TR) | ---              | 1,500           |

## Application Examples

- Electronic automatic exchange systems
- Measuring systems
- FA
- Security systems

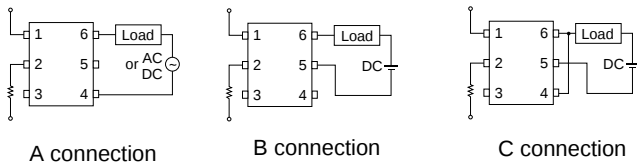
# Specifications

## ■ Absolute Maximum Ratings (Ta = 25°C)

| Item                                                  |                                     |              | Symbol               | Rating                 | Conditions                                               |
|-------------------------------------------------------|-------------------------------------|--------------|----------------------|------------------------|----------------------------------------------------------|
| Input                                                 | LED forward current                 |              | I <sub>F</sub>       | 50 mA                  | ---                                                      |
|                                                       | LED forward current reduction rate  |              | ΔI <sub>F</sub> /°C  | −0.5 mA/°C             | Ta ≥ 25°C                                                |
|                                                       | Repetitive peak LED forward current |              | I <sub>FP</sub>      | 1 A                    | 100-μs pulses, 100 pps                                   |
|                                                       | LED reverse voltage                 |              | V <sub>R</sub>       | 5 V                    | ---                                                      |
|                                                       | Permissible loss                    |              | P <sub>in</sub>      | 50 mW                  | ---                                                      |
|                                                       | Connection temperature              |              | T <sub>J</sub>       | 125°C                  | ---                                                      |
| Output                                                | Output dielectric strength          |              | V <sub>OFF</sub>     | 600 V                  | AC peak value                                            |
|                                                       | Continuous load current             | A connection | I <sub>O</sub>       | 100 mA                 | ---                                                      |
|                                                       |                                     | B connection |                      | 100 mA                 | ---                                                      |
|                                                       |                                     | C connection |                      | 200 mA                 | ---                                                      |
|                                                       | Peak load current                   |              | I <sub>pead</sub>    | 0.3 A                  | ---                                                      |
|                                                       | Output loss                         |              | P <sub>out</sub>     | 454 mW                 | ---                                                      |
|                                                       | ON current reduction rate           | A connection | ΔI <sub>ON</sub> /°C | −1 mA/°C               | Ta ≥ 25°C                                                |
|                                                       |                                     | B connection |                      | −1 mA/°C               |                                                          |
|                                                       |                                     | C connection |                      | −2 mA/°C               |                                                          |
| Total permissible loss                                |                                     |              | P <sub>T</sub>       | 504 mW                 | ---                                                      |
| Dielectric strength between I/O terminals (See note.) |                                     |              | V <sub>I-O</sub>     | 5,000 Vrms             | AC, 1 min                                                |
| Insulation resistance                                 |                                     |              | R <sub>I-O</sub>     | 5 × 10 <sup>10</sup> Ω | V <sub>S</sub> = 500 V, ambient operating humidity ≤ 60% |
| Storage temperature                                   |                                     |              | T <sub>stg</sub>     | −55 to 125°C           | ---                                                      |
| Ambient operating temperature                         |                                     |              | Ta                   | −40 to 85°C            | ---                                                      |

**Note** The dielectric strength between I/O terminals was measured with voltage applied to pins 1, 2, and 3 together, and to pins 4, 5, and 6 together.

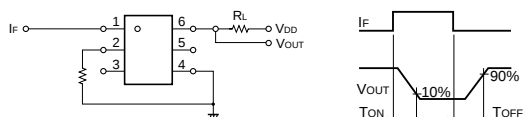
## Connection Circuit Diagram



## ■ Electrical Performance (Ta = 25°C)

| Item                                    |                                          | Symbol       | Minimum | Standard     | Maximum          | Conditions                                                                             |
|-----------------------------------------|------------------------------------------|--------------|---------|--------------|------------------|----------------------------------------------------------------------------------------|
| Input                                   | LED forward current                      | $V_F$        | 1.0 V   | 1.15 V       | 1.3 V            | $I_F = 10 \text{ mA}$                                                                  |
|                                         | Reverse current                          | $I_R$        | ---     | ---          | 10 $\mu\text{A}$ | $V_R = 5 \text{ V}$                                                                    |
|                                         | Capacity between terminals               | $C_T$        | ---     | 30 pF        | ---              | $V = 0$ , $f = 1 \text{ MHz}$                                                          |
| Output                                  | Maximum resistance with output ON        | A connection | ---     | 22 $\Omega$  | 35 $\Omega$      | $I_{ON} = 100 \text{ mA}$ , $I_F = 10 \text{ mA}$                                      |
|                                         |                                          | B connection | ---     | 17 $\Omega$  | 27 $\Omega$      | $I_{ON} = 100 \text{ mA}$ , $I_F = 10 \text{ mA}$                                      |
|                                         |                                          | C connection | ---     | 8.5 $\Omega$ | 13.5 $\Omega$    | $I_{ON} = 200 \text{ mA}$ , $I_F = 10 \text{ mA}$                                      |
|                                         | Current leakage when the relay is closed | $I_{LEAK}$   | ---     | ---          | 10 $\mu\text{A}$ | $V_{OFF} = 600 \text{ V}$                                                              |
| Turn-ON time                            |                                          | $T_{ON}$     | ---     | 0.5 ms       | 1.5 ms           | $R_L = 200 \Omega$<br>(See note.)<br>$V_{DD} = 20 \text{ V}$ ,<br>$I_F = 5 \text{ mA}$ |
| Turn-OFF time                           |                                          | $T_{OFF}$    | ---     | 0.1 ms       | 1.0 ms           |                                                                                        |
| Floating capacity between I/O terminals |                                          | $C_{I-O}$    | ---     | 0.8 pF       | ---              | $V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$                                              |

**Note** The operate and release time were measured in the way shown below.



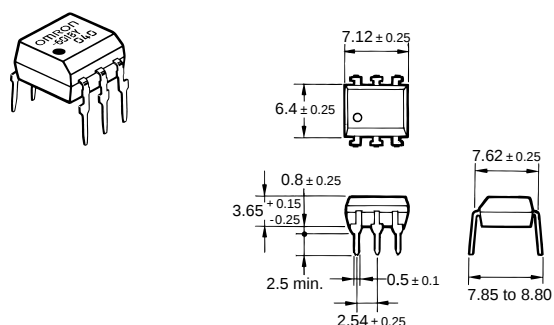
## ■ Recommended Operating Conditions

| Item                    | Symbol   | Minimum | Standard | Maximum |
|-------------------------|----------|---------|----------|---------|
| Operating voltage       | $V_{DD}$ | ---     | ---      | 480 V   |
| Forward current         | $I_F$    | 5 mA    | ---      | 25 mA   |
| Continuous load current | $I_O$    | ---     | ---      | 100 mA  |
| Operating temperature   | $T_a$    | -20°C   | ---      | 65°C    |

## Dimensions

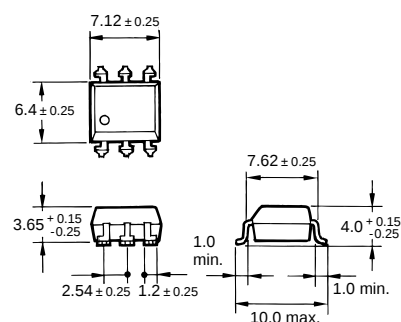
**Note** All units are in millimeters unless otherwise indicated.

### G3VM-601BY



Weight: 0.4 g

### G3VM-601EY

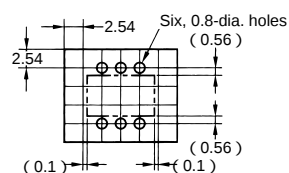


Weight: 0.4 g

**Note:** "G3VM" is not printed on the actual product.

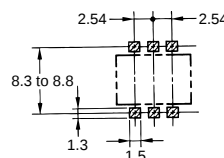
## ■ PCB Dimensions (Bottom View)

### G3VM-601BY



## ■ Actual Mounting Pad Dimensions (Recommended Value, Top View)

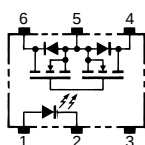
### G3VM-601EY



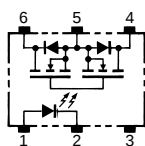
## Installation

## ■ Terminal Arrangement/Internal Connection (Top View)

### G3VM-601BY



### G3VM-601EY



# Precautions

## ! WARNING

Be sure to turn OFF the power when wiring the Relay, otherwise an electric shock may be received.

## ! WARNING

Do not touch the charged terminals of the SSR, otherwise an electric shock may be received.

## ! Caution

Do not apply overvoltage or overcurrent to the I/O circuits of the SSR, otherwise the SSR may malfunction or burn.

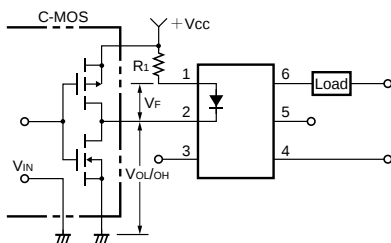
## ! Caution

Be sure to wire and solder the Relay under the proper soldering conditions, otherwise the Relay in operation may generate excessive heat and the Relay may burn.

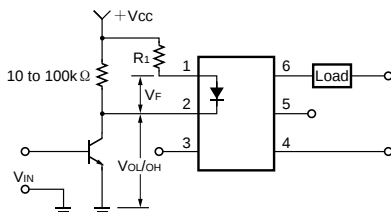
## ■ Correct Use

### Typical Relay Driving Circuit Examples

#### C-MOS



#### Transistor



Use the following formula to obtain the LED current limiting resistance value to assure that the relay operates accurately.

$$R_1 = \frac{V_{CC} - V_{OL} - V_F(ON)}{5 \text{ to } 20 \text{ mA}}$$

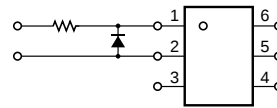
Use the following formula to obtain the LED forward voltage value to assure that the relay releases accurately.

$$V_F(OFF) = V_{CC} - V_{OH} < 0.8 \text{ V}$$

### Protection from Surge Voltage on the Input Terminals

If any reversed surge voltage is imposed on the input terminals, insert a diode in parallel to the input terminals as shown in the following circuit diagram and do not impose a reversed voltage value of 3 V or more.

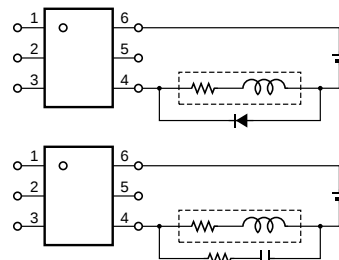
### Surge Voltage Protection Circuit Example



### Protection from Spike Voltage on the Output Terminals

If a spike voltage exceeding the absolute maximum rated value is generated between the output terminals, insert a C-R snubber or clamping diode in parallel to the load as shown in the following circuit diagram to limit the spike voltage.

### Spike Voltage Protection Circuit Example

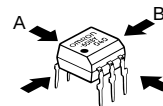


### Unused Terminals (6-pin only)

Terminal 3 is connected to the internal circuit. Do not connect anything to terminal 3 externally.

### Pin Strength for Automatic Mounting

In order to maintain the characteristics of the relay, the force imposed on any pin of the relay for automatic mounting must not exceed the following.

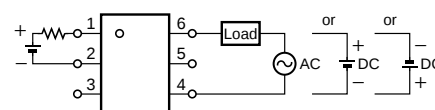


In direction A: 1.96 N max.  
In direction B: 1.96 N max.

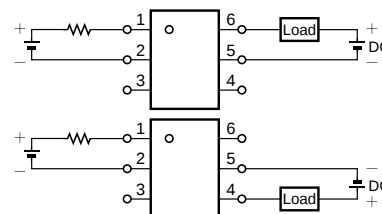
### Load Connection

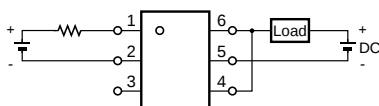
Do not short-circuit the input and output terminals while the relay is operating or the relay may malfunction.

### AC Connection



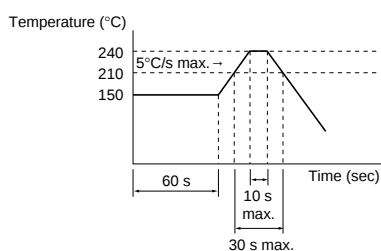
### DC Single Connection



**DC Parallel Connection****Solder Mounting**

Maintain the following conditions during manual or reflow soldering of the relays in order to prevent the temperature of the relays from rising.

1. Pin Soldering  
Solder each pin at a maximum temperature of 260°C within 10 s.
2. Reflow Soldering
  - a. Solder each pin at a maximum temperature of 260°C within 10 s.
  - b. Make sure that the ambient temperature on the surface of the resin casing is 240°C max. for 10 s maximum.
  - c. The following temperature changes are recommendable for 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.

Cat. No. K114-E1-1      **In the interest of product improvement, specifications are subject to change without notice.**

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