# G3VM-21HR/31HR/41HR/61HR/61HR1

**MOS FET Relays SOP 6-pin, High-current and Low-ON-resistance Type**

## MOS FET Relays in SOP 6-pin packages that achieve the low ON resistance and high switching capacitance of a mechanical relay

- **Load voltage: 20 V, 30 V, 40 V, or 60 V**
- **20-V Relay: Continuous load current of 2.5 A (5 A) max. ✻**
- **30-V Relay: Continuous load current of 4 A (8 A) max. ✻**
- **40-V Relay: Continuous load current of 2.5 A (5 A) max. ✻**
- **60-V Relay: Continuous load current of 3.3 A (6.6 A) max. ✻**

✻ Values in parentheses are for connection C.


**Note:** The actual product is marked differently from the image shown here.

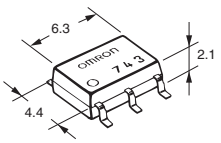
**RoHS Compliant**

## ■Application Examples

- **Semiconductor test equipment**
- **Communication equipment**
- **Test & Measurement equipment**
- **Security equipment**
- **Industrial equipment**
- **Power circuit**
- **Amusement equipment**

## ■Package (Unit : mm, Average)

SOP 6-pin




**Note:** The actual product is marked differently from the image shown here.

## ■Model Number Legend

**G3VM-□□□□□**
**1 2 3 4 5**

**1. Load Voltage**
2 : 20 V
3 : 30 V
4 : 40 V
6 : 60 V

**2. Contact form**
1 : 1a (SPST-NO)

**3. Package**
H : SOP 6-pin

**4. Additional functions**
R: Low ON resistance

**5. Other informations**
When specifications overlap, serial code is added in the recorded order.

## ■Ordering Information

| Package | Contact form | Terminals | Load voltage (peak value) ✻ | Continuous load current (peak value) ✻ | | Stick packaging | | Tape packaging | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Connection A, B | Connection C | Model | Minimum package quantity | Model | Minimum package quantity |
| SOP6 | 1a (SPST-NO) | Surface-mounting Terminals | 20 V | 2.5 A | 5 A | **G3VM-21HR** | 75 | **G3VM-21HR(TR)** | 2,500 |
| | | | 30 V | 4 A | 8 A | **G3VM-31HR** | | **G3VM-31HR(TR05)** | 500 |
| | | | 40 V | 2.5 A | 5 A | **G3VM-41HR** | | **G3VM-41HR(TR)** | 2,500 |
| | | | 60 V | 2.3 A | 4.6 A | **G3VM-61HR** | | **G3VM-61HR(TR)** | 2,500 |
| | | | | 3.3 A | 6.6 A | **G3VM-61HR1** | | **G3VM-61HR1(TR05)** | 500 |

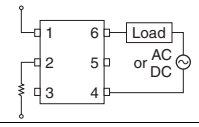
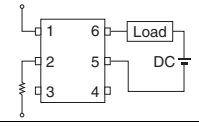
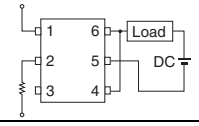
✻ The AC peak and DC value are given for the load voltage and continuous load current.
**Note:** To order tape packaging for Relays with surface-mounting terminals, add "(TR)" to the end of the model number.

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

| Item | | | Symbol | G3VM-21HR | G3VM-31HR | G3VM-41HR | G3VM-61HR | G3VM-61HR1 | Unit | Measurement conditions |
|---|---|---|---|---|---|---|---|---|---|---|
| Input | LED forward current | | $I_F$ | 30 | | | | | mA | |
| | LED forward current reduction rate | | $\Delta I_F$/°C | -0.3 | | | | | mA/°C | Ta ≥ 25°C |
| | LED reverse voltage | | $V_R$ | 5 | | | | | V | |
| | Connection temperature | | $T_J$ | 125 | | | | | °C | |
| Output | Load voltage (AC peak/DC) | | $V_{OFF}$ | 20 | 30 | 40 | 60 | | V | |
| | Continuous load current | Connection A | $I_O$ | 2500 | 4000 | 2500 | 2300 | 3300 | mA | Connection A: AC peak/DC<br>Connection B and C: DC |
| | | Connection B | | | | | | | | |
| | | Connection C | | 5000 | 8000 | 5000 | 4600 | 6600 | | |
| | ON current reduction rate | Connection A | $\Delta I_O$/°C | -33.3 | -40 | -33.3 | -30.7 | -33 | mA/°C | G3VM-31HR/61HR1: Ta ≥ 25°C<br>Others: Ta ≥ 50°C |
| | | Connection B | | | | | | | | |
| | | Connection C | | -66.7 | -80 | -66.7 | -61.3 | -66 | | |
| | Pulse ON current | | $I_{OP}$ | 7.5 | 12 | 7.5 | 7 | 10 | A | t=100 ms, Duty=1/10 |
| | Connection temperature | | $T_J$ | 125 | | | | | °C | |
| Dielectric strength between I/O ✻ | | | $V_{I-O}$ | 1500 | | | | | Vrms | AC for 1 min |
| Ambient operating temperature | | | Ta | -40 to +85 | | | | | °C | With no icing or condensation |
| Ambient storage temperature | | | Tstg | -55 to +125 | | | | | °C | |
| Soldering temperature | | | – | 260 | | | | | °C | 10 s |

✻ The dielectric strength between the input and output was checked by applying voltage between all pins as a group on the LED side and all pins as a group on the light-receiving side.

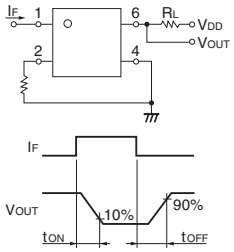
**Connection Diagram**

| | |
|---|---|
| **Connection A** |  |
| **Connection B** |  |
| **Connection C** |  |

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

| Item | | | Symbol | | G3VM-21HR | G3VM-31HR | G3VM-41HR | G3VM-61HR | G3VM-61HR1 | Unit | Measurement conditions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Input | LED forward voltage | | $V_F$ | Minimum | 1.18 | | | | | V | $I_F$=10 mA |
| | | | | Typical | 1.33 | | | | | | |
| | | | | Maximum | 1.48 | | | | | | |
| | Reverse current | | $I_R$ | Maximum | 10 | | | | | μA | $V_R$=5 V |
| | Capacitance between terminals | | $C_T$ | Typical | 70 | | | | | pF | V=0, f=1 MHz |
| | Trigger LED forward current | | $I_{FT}$ | Typical | – | 0.3 | 0.4 | | 0.2 | mA | G3VM-61HR1 : $I_O$=2000 mA<br>Others : $I_O$=100 mA |
| | | | | Maximum | 3 | | | | | | |
| | Release LED forward current | | $I_{FC}$ | Minimum | 0.1 | | | | | mA | $I_{OFF}$=10 μA |
| Output | Maximum resistance with output ON | Connection A | $R_{ON}$ | Typical | 0.02 | 0.02 | 0.03 | 0.04 | 0.03 | Ω | G3VM-31HR:<br>$I_F$=5 mA<br>$I_O$=4 A (Connection A, B)<br>$I_O$=8 A (C connections), t<1s<br>Others:<br>$I_F$=5 mA<br>$I_O$=2 A (Connection A, B)<br>$I_O$=4 A (C connections), t<1s |
| | | Connection B | | | 0.01 | 0.008 | 0.015 | 0.02 | 0.015 | | |
| | | Connection C | | | 0.005 | 0.004 | 0.008 | 0.01 | 0.008 | | |
| | | Connection A | | Maximum | 0.05 | 0.04 | 0.06 | 0.07 | 0.06 | | |
| | | Connection B | | | 0.025 | 0.02 | 0.03 | 0.04 | – | | |
| | | Connection C | | | – | 0.01 | – | | | | |
| | Current leakage when the relay is open | | $I_{LEAK}$ | Typical | – | | | | | nA | $V_{OFF}$= Load voltage ratings |
| | | | | Maximum | 10 | 1000 | 10 | | 20 | | |
| | Capacitance between terminals | | $C_{OFF}$ | Typical | 1000 | 1100 | 1000 | | 700 | pF | V=0, f=1 MHz |
| | | | | Maximum | – | | | | 1500 | | |
| Capacitance between I/O terminals | | | $C_{I-O}$ | Typical | 0.8 | | | | | pF | f=1 MHz, $V_S$=0 V |
| Insulation resistance between I/O terminals | | | $R_{I-O}$ | Minimum | 1000 | | | | | MΩ | $V_{I-O}$=500 VDC, RoH≤60% |
| | | | | Typical | $10^8$ | | | | | | |
| Turn-ON time | | | $t_{ON}$ | Typical | 1.5 | 1.1 | 1.0 | | 0.6 | ms | G3VM-21HR :<br>$I_F$=5 mA, $R_L$=200 Ω,<br>$V_{DD}$=10 V ✻<br>Others :<br>$I_F$=5 mA, $R_L$=200 Ω,<br>$V_{DD}$=20 V ✻ |
| | | | | Maximum | 5 | | | | | | |
| Turn-OFF time | | | $t_{OFF}$ | Typical | 0.1 | 0.1 | 0.15 | | 0.2 | | |
| | | | | Maximum | 1 | | | | | | |

✻ Turn-ON and Turn-OFF Times




## ■Recommended Operating Conditions

For usage with high reliability, Recommended Operation Conditions is a measure that takes into account the derating of Absolute Maximum Ratings and Electrical Characteristics.

Each item on this list is an independent condition, so it is not simultaneously satisfy several conditions.

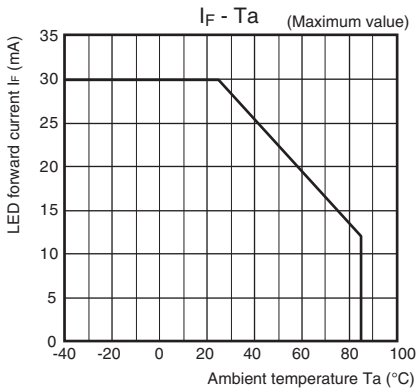
| Item | Symbol | | G3VM-21HR | G3VM-31HR | G3VM-41HR | G3VM-61HR | G3VM-61HR1 | Unit |
|---|---|---|---|---|---|---|---|---|
| Load voltage (AC peak/DC) | $V_{DD}$ | Maximum | 20 | 24 | 40 | 60 | 48 | V |
| Operating LED forward current | $I_F$ | Minimum | 5 | | | | | mA |
| | | Typical | 10 | | 7.5 | | 10 | |
| | | Maximum | 20 | 25 | 20 | | 25 | |
| Continuous load current (AC peak/DC) | $I_O$ | Maximum | 2000 | 4000 | 2000 | 1800 | 3300 | |
| Ambient operating temperature | Ta | Minimum | -20 | | | | | °C |
| | | Maximum | 65 | | | | | |

## ■Spacing and Insulation

| Item | Minimum | Unit |
|---|---|---|
| Creepage distances | 4.0 | mm |
| Clearance distances | 4.0 | |
| Internal isolation thickness | 0.1 | |

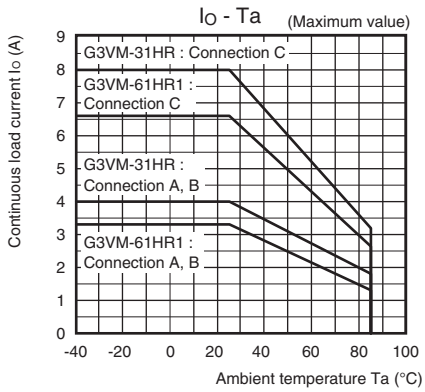
## ■Engineering Data

### ●LED forward current vs. Ambient temperature

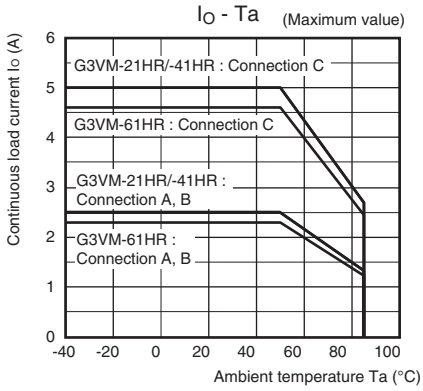



### ●Continuous load current vs. Ambient temperature

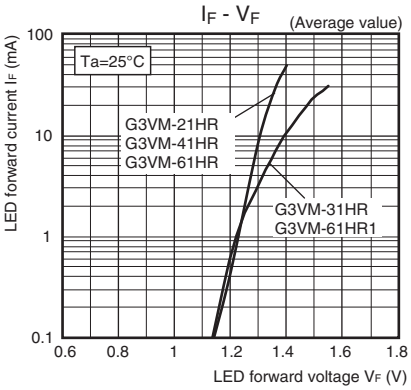
G3VM-31HR/61HR1



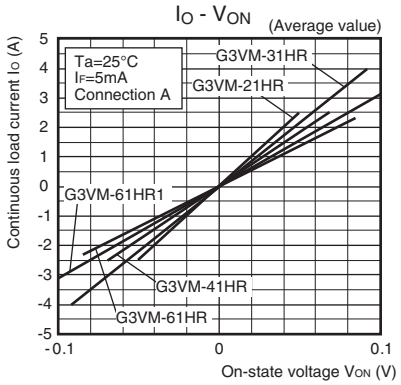

G3VM-21HR/41HR/61HR



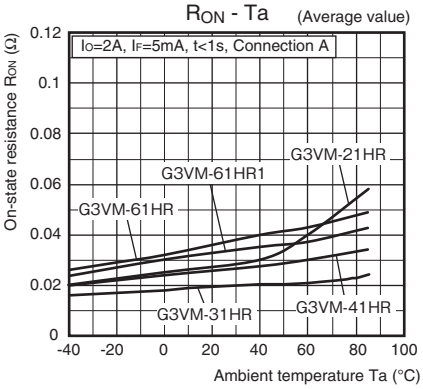

### ●LED forward current vs. LED forward voltage



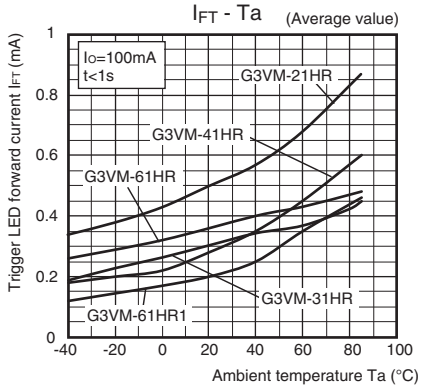

### ●Continuous load current vs. On-state voltage



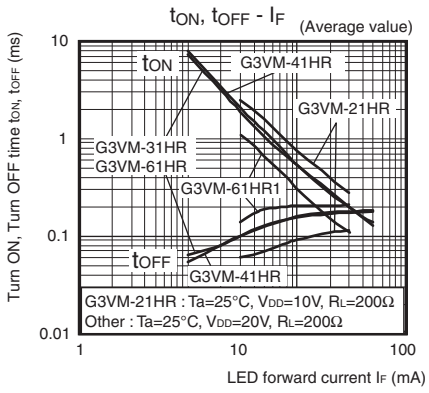

### ●On-state resistance vs. Ambient temperature




### ●Trigger LED forward current vs. Ambient temperature

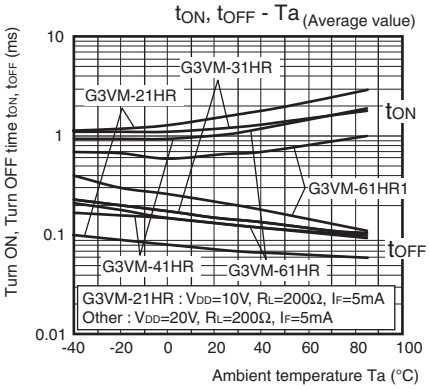



### ●Turn ON, Turn OFF time vs. LED forward current



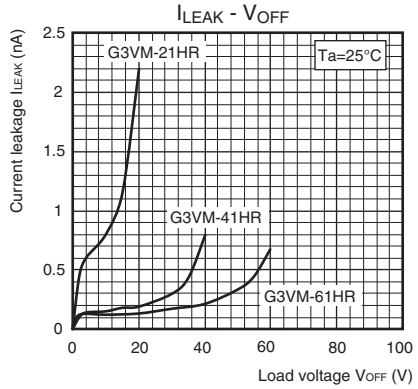
## ■Engineering Data

● **Turn ON, Turn OFF time vs. Ambient temperature**



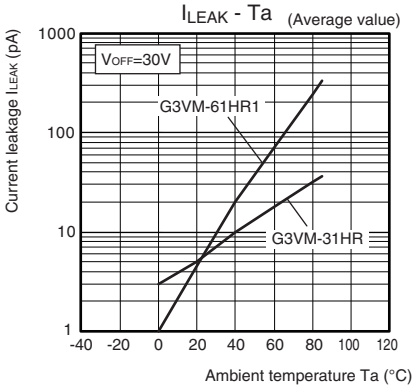

● **Current leakage vs. Load voltage**

G3VM-21HR/41HR/61HR



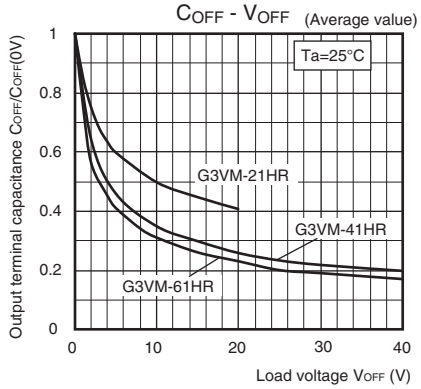

● **Current leakage vs. Ambient temperature**

G3VM-31HR/61HR1




● **Output terminal capacitance vs. Load voltage**

G3VM-21HR/41HR/61HR

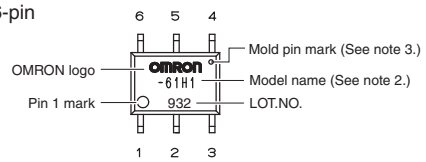


## ■Appearance / Terminal Arrangement / Internal Connections

### ●Appearance

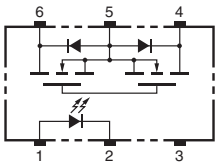
**SOP (Small Outline Package)**

SOP 6-pin

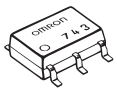



**Note: 1.** The actual product is marked differently from the image shown here.
**Note: 2.** "G3VM" does not appear in the model number on the Relay.
**Note: 3.** The indentation in the corner diagonally opposite from the pin 1 mark is from a pin on the mold.

### ●Terminal Arrangement/Internal Connections (Top View)

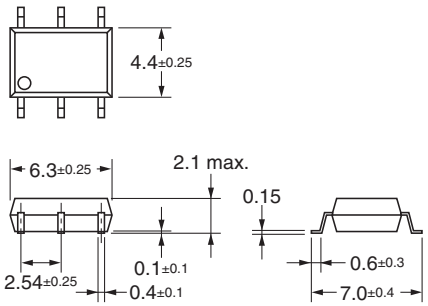



## ■Dimensions (Unit: mm)



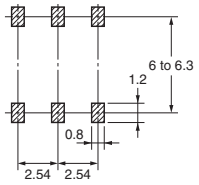
**Surface-mounting Terminals**

**Weight: 0.13 g**




**Actual Mounting Pad Dimensions**

(Recommended Value, Top View)




**Note:** The actual product is marked differently from the image shown here.

## ■Approved Standards

UL recognized

| Approved Standards | Contact form | File No. |
|---|---|---|
| UL (recognized) | 1a (SPST-NO) | E80555 |

## ■Safety Precautions

• Refer to the *Common Precautions for All MOS FET Relays* for precautions that apply to all MOS FET Relays.



**OMRON Corporation**
**Electronic and Mechanical Components Company**

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**Cat. No. K288-E1-04**
0919(0217)(O)

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