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# G3VM-□AR□/□DR□

**MOS FET Relays DIP 4-pin, High-current and Low-ON-resistance Type**



## MOS FET Relays in DIP 4-pin packages that achieve the low ON resistance and high switching capacity of a mechanical relay

- **Load voltage: 20 V, 30V, 40 V, 60 V, 100 V, or 200 V**
- **20-V Relay: Continuous load current of 3 A max.**
- **30-V Relay: Continuous load current of 4 A max.**
- **40-V Relay: Continuous load current of 2.5 A max.**
- **60-V Relay: Continuous load current of 3 A max.**
- **100-V Relay: Continuous load current of 2 A max.**
- **200-V Relay: Continuous load current of 0.7 A max.**



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

**RoHS Compliant**

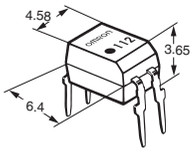
## ■Application Examples

- **Communication equipment**
- **Security equipment**
- **Power circuit**
- **Test & Measurement equipment**
- **Industrial equipment**

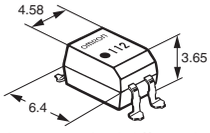
## ■Package (Unit : mm, Average)

DIP 4-pin

PCB Terminals




Surface-mounting Terminals




**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
10 : 100 V
20 : 200 V

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

**3. Package**
A : DIP 4-pin with PCB terminals
D : DIP 4-pin with surface-mounting terminals

**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 | Load voltage (peak value) ✻ | Continuous load current (peak value) ✻ | Stick packaging | | | Tape packaging | |
|---|---|---|---|---|---|---|---|---|
| | | | | Model | | Minimum package quantity | Model | Minimum package quantity |
| | | | | PCB Terminals | Surface-mounting Terminals | | Surface-mounting Terminals | |
| DIP4 | 1a (SPST-NO) | 20 V | 3 A | G3VM-21AR | G3VM-21DR | 100 pcs. | G3VM-21DR(TR) | 1,500 pcs. |
| | | 30 V | 4 A | G3VM-31AR | G3VM-31DR | | G3VM-31DR(TR05) | 500 pcs. |
| | | 40 V | 2.5 A | G3VM-41AR | G3VM-41DR | | G3VM-41DR(TR) | 1,500 pcs. |
| | | 60 V | 2 A | G3VM-61AR | G3VM-61DR | | G3VM-61DR(TR) | 1,500 pcs. |
| | | | 3 A | G3VM-61AR1 | G3VM-61DR1 | | G3VM-61DR1(TR05) | 500 pcs. |
| | | 100 V | 1 A | G3VM-101AR | G3VM-101DR | | G3VM-101DR(TR) | 1,500 pcs. |
| | | | 2 A | G3VM-101AR1 | G3VM-101DR1 | | G3VM-101DR1(TR05) | 500 pcs. |
| | | 200 V | 0.7 A | G3VM-201AR | G3VM-201DR | | G3VM-201DR(TR05) | 500 pcs. |

✻ 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)" or "(TR05)" to the end of the model number.

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

| Item | | Symbol | G3VM-21AR G3VM-21DR | G3VM-31AR G3VM-31DR | G3VM-41AR G3VM-41DR | G3VM-61AR G3VM-61DR | G3VM-61AR1 G3VM-61DR1 | G3VM-101AR G3VM-101DR | G3VM-101AR1 G3VM-101DR1 | G3VM-201AR G3VM-201DR | Unit | Measurement conditions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input | LED forward current | $I_F$ | 30 | | | | | | | | mA | |
| | Repetitive peak LED forward current | $I_{FP}$ | 1 | | | | | | | | A | 100 μs pulses, 100 pps |
| | LED forward current reduction rate | $\Delta I_F$/°C | -0.3 | | | | | | | | mA/°C | Ta ≥ 25°C |
| | LED reverse voltage | $V_R$ | 5 | 6 | 5 | | 6 | 5 | 6 | | V | |
| | Connection temperature | $T_J$ | 125 | | | | | | | | °C | |
| Output | Load voltage (AC peak/DC) | $V_{OFF}$ | 20 | 30 | 40 | 60 | 60 | 100 | | 200 | V | |
| | Continuous load current (AC peak/DC) | $I_O$ | 3 | 4 | 2.5 | 2 | 3 | 1 | 2 | 0.7 | A | |
| | ON current reduction rate | $\Delta I_O$/°C | -30 | -40 | -25 | -20 | -30 | -10 | -20 | -7 | mA/°C | Ta ≥ 25°C |
| | Pulse ON current | $I_{OP}$ | 9 | 9 | 7.5 | 6 | 9 | 3 | 6 | 2.1 | A | t=100 ms, Duty=1/10 |
| | Connection temperature | $T_J$ | 125 | | | | | | | | °C | |
| Dielectric strength between I/O ✻ | | $V_{I-O}$ | 2,500 | | | | | | | | Vrms | AC for 1 min |
| Ambient operating temperature | | Ta | -40 to +85 | -40 to +110 | -40 to +85 | | -40 to +110 | -40 to +85 | -40 to +110 | | °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.

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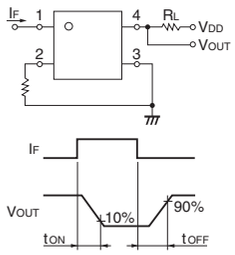




## ■Electrical Characteristics (Ta = 25°C)

| Item | | Symbol | | G3VM-21AR G3VM-21DR | G3VM-31AR G3VM-31DR | G3VM-41AR G3VM-41DR | G3VM-61AR G3VM-61DR | G3VM-61AR1 G3VM-61DR1 | G3VM-101AR G3VM-101DR | G3VM-101AR1 G3VM-101DR1 | G3VM-201AR G3VM-201DR | Unit | Measurement conditions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input | LED forward voltage | $V_F$ | Minimum | 1.18 | 1.5 | 1.18 | | 1.5 | 1.18 | 1.5 | | V | $I_F$=10 mA |
| | | | Typical | 1.33 | 1.64 | 1.33 | | 1.64 | 1.33 | 1.64 | | | |
| | | | Maximum | 1.48 | 1.8 | 1.48 | | 1.8 | 1.48 | 1.8 | | | |
| | 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 | $I_{FT}$ ($I_{FC}$) | Typical | 0.7 | 0.3 | 0.5 | | 0.3 | 0.5 | 0.4 | 0.3 | mA | G3VM-201AR/201DR: $I_O$=0.7A<br>Others: $I_O$=1A |
| | | | Maximum | 3 | | | | | | | | | |
| | Release LED forward current | $I_{FC}$ ($I_{FT}$) | Minimum | 0.1 | | | | | | | | mA | $I_{OFF}$=10 μA |
| | | | Typical | 0.1 | 0.2 | 0.1 | | 0.2 | 0.1 | 0.2 | | | |
| Output | Maximum resistance with output ON | $R_{ON}$ | Typical | 40 | 25 | 50 | 80 | 45 | 250 | 110 | 900 | mΩ | G3VM-31AR/31DR<br>$I_F$=5mA, t<1s, $I_O$=4A<br>G3VM-61AR1/61DR1<br>$I_F$=5mA, t<1s, $I_O$=3A<br>G3VM-21AR/21DR/ 41AR/41DR/61AR/ 61DR/101AR1/101DR1:<br>$I_F$=5mA, t<1s, $I_O$=2A<br>G3VM-101AR/101DR:<br>$I_F$=5mA, t<1s, $I_O$=1A<br>G3VM-201AR/201DR:<br>$I_F$=5mA, t<1s, $I_O$=0.7A |
| | | | Maximum | 80 | 50 | 150 | 200 | 100 | 700 | 200 | 2000 | | |
| | Current leakage when the relay is open | $I_{LEAK}$ | Typical | – | 0.01 | – | | 0.005 | – | 0.01 | 0.04 | μA | $V_{OFF}$=Load voltage ratings |
| | | | Maximum | 1 | | | | | | | | | |
| | Capacitance between terminals | $C_{OFF}$ | Typical | 300 | 450 | 300 | 250 | | 200 | 110 | | pF | V=0, f=1 MHz |
| 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 | 0.6 | 0.8 | | 0.45 | 0.8 | 0.4 | 0.13 | ms | $I_F$=5 mA, $R_L$=200 Ω, $V_{DD}$=20 V ✻ |
| | | | Maximum | 5 | 3 | 5 | | 2 | 5 | 2 | 1 | | |
| Turn-OFF time | | $t_{OFF}$ | Typical | 0.3 | | | | 0.2 | 0.3 | 0.2 | 0.14 | | |
| | | | Maximum | 1 | | | | | | 0.5 | | | |

✻ Turn-ON and Turn-OFF Times



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## ■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-21AR G3VM-21DR | G3VM-31AR G3VM-31DR | G3VM-41AR G3VM-41DR | G3VM-61AR G3VM-61DR | G3VM-61AR1 G3VM-61DR1 | G3VM-101AR G3VM-101DR | G3VM-101AR1 G3VM-101DR1 | G3VM-201AR G3VM-201DR | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Load voltage (AC peak/DC) | $V_{DD}$ | Maximum | 16 | 24 | 32 | 48 | | 80 | | 160 | V |
| Operating LED forward current | $I_F$ | Minimum | 5 | | | | | | | | mA |
| | | Typical | 10 | | | | | | | | |
| | | Maximum | 25 | | | | | | | | |
| Continuous load current (AC peak/DC) | $I_O$ | Maximum | 3 | 4 | 2.5 | 2 | 3 | 1 | 2 | 0.7 | A |
| Ambient operating temperature | Ta | Minimum | -20 | | | | | | | | °C |
| | | Maximum | 65 | 85 | 65 | | 85 | 65 | 85 | | |

## ■Spacing and Insulation

| Item | Minimum | Unit |
|---|---|---|
| Creepage distances | 7.0 | mm |
| Clearance distances | 7.0 | |
| Internal isolation thickness | 0.4 | |

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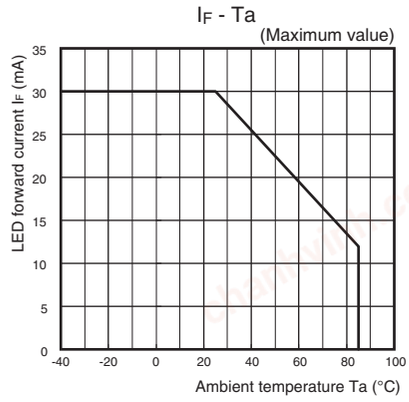




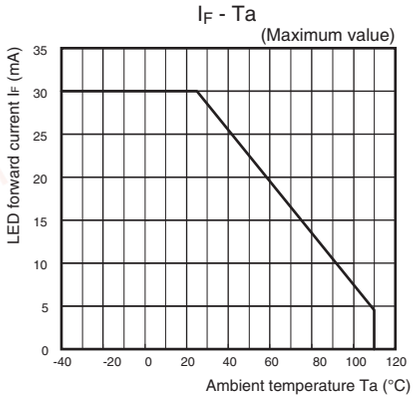
## ■Engineering Data

### ●LED forward current vs. Ambient temperature

G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR

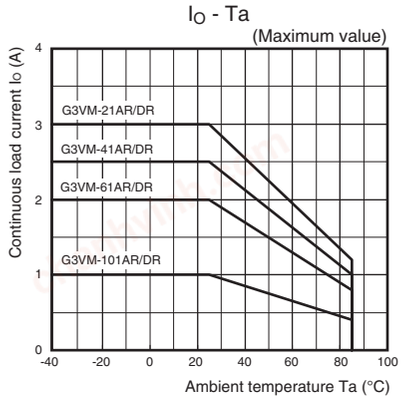



G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR

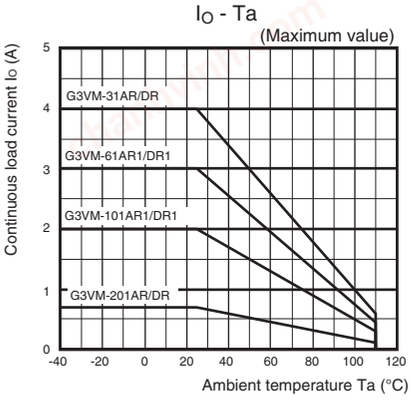



### ●Continuous load current vs. Ambient temperature

G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR

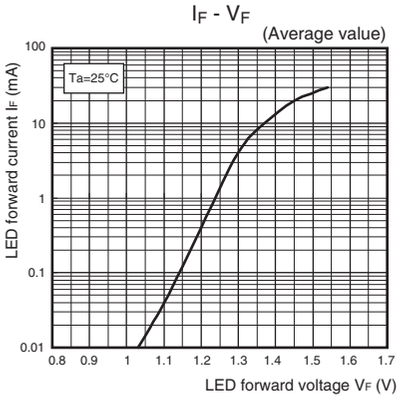



G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR

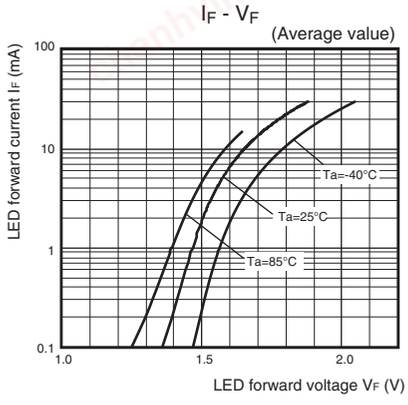



### ●LED forward current vs. LED forward voltage

G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR

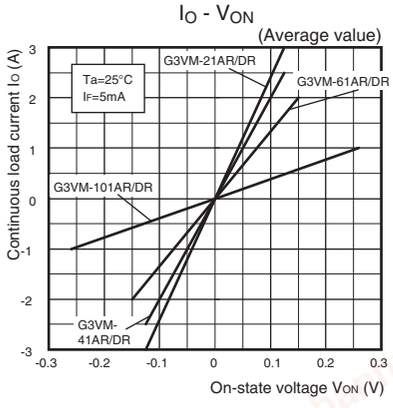



G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR

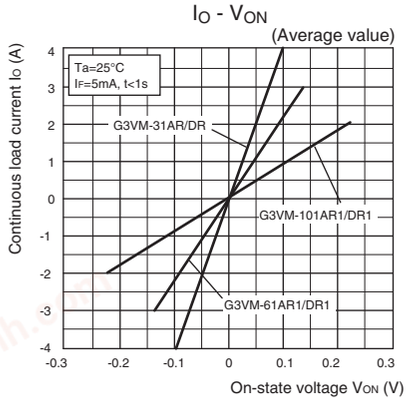



### ●Continuous load current vs. On-state voltage

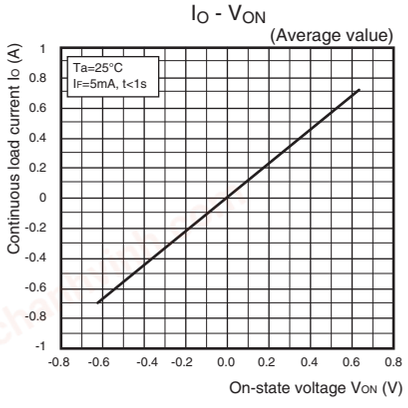
G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR




G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1




G3VM-201AR/201DR



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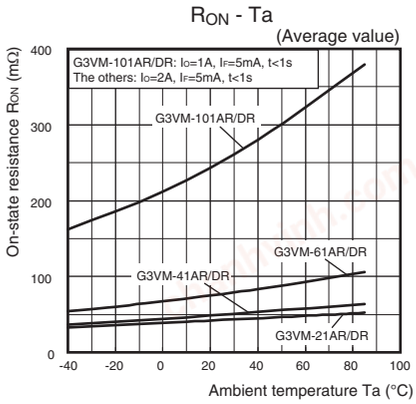




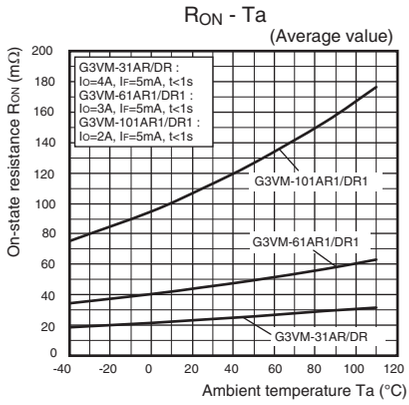
## ■Engineering Data

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

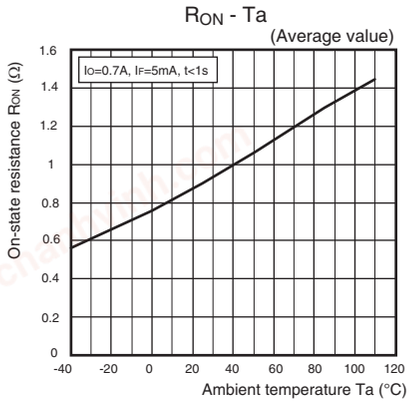
G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR




G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR

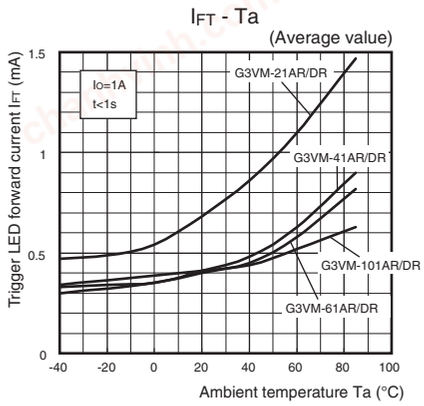



G3VM-201AR/201DR

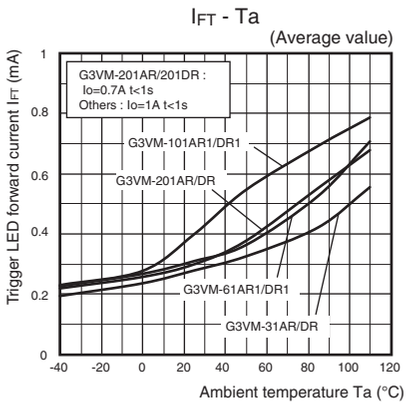



### ●Trigger LED forward current vs. Ambient temperature

G3VM-21AR/21DR/41AR/41DR/61AR/61DR/101AR/101DR

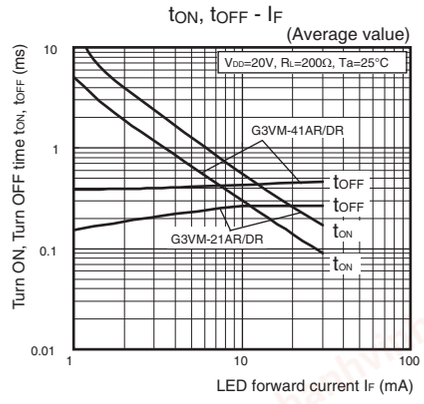



G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR

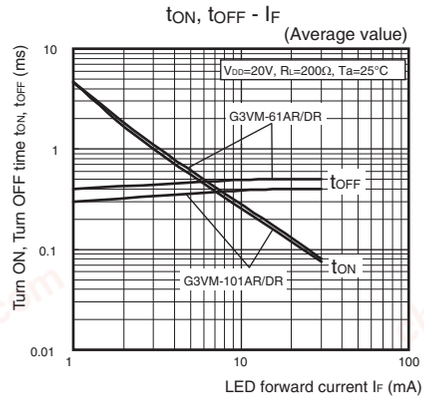



### ●Turn ON, Turn OFF time vs. LED forward current

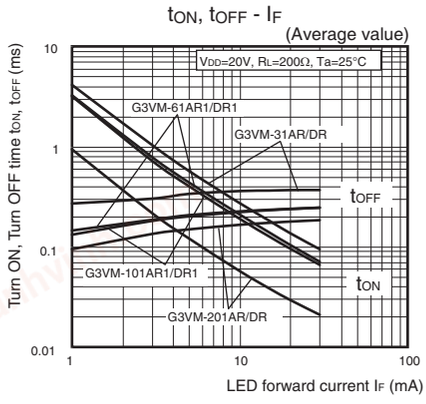
G3VM-21AR/21DR/41AR/41DR




G3VM-61AR/61DR/101AR/101DR




G3VM-31AR/31DR/61AR1/61DR1/101AR1/101DR1/201AR/201DR



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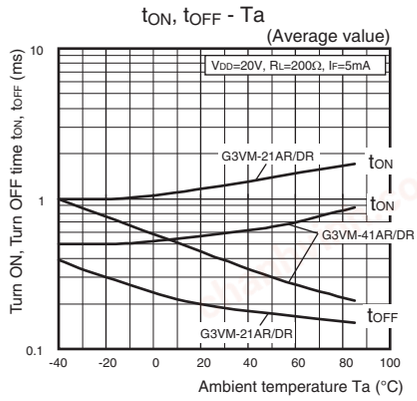




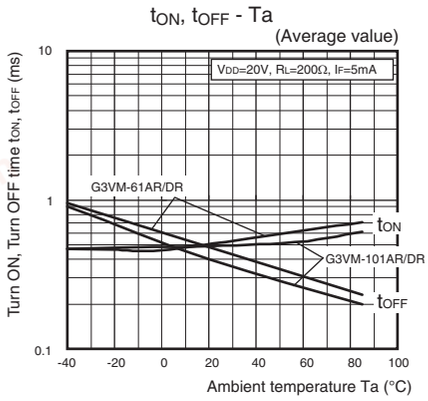
## ■Engineering Data

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

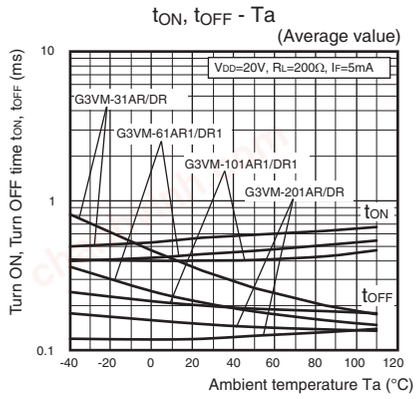
G3VM-21AR/21DR/41AR/41DR




G3VM-61AR/61DR/101AR/101DR

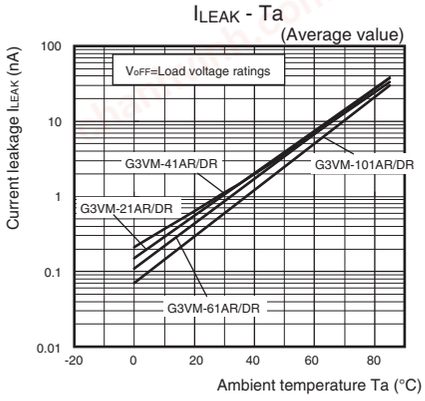



G3VM-31AR/31DR/61AR1/61DR1/ 101AR1/101DR1/201AR/201DR

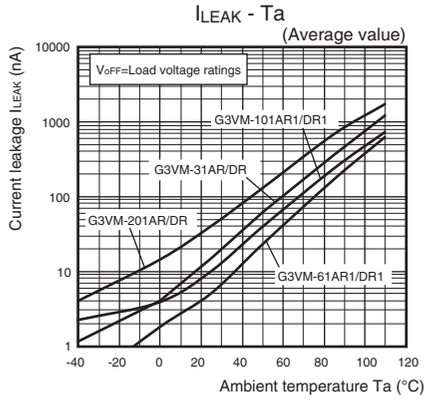



● **Current leakage vs. Ambient temperature**

G3VM-21AR/21DR/41AR/41DR/61AR/ 61DR/101AR/101DR




G3VM-31AR/31DR/61AR1/61DR1/ 101AR1/101DR1/201AR/201DR



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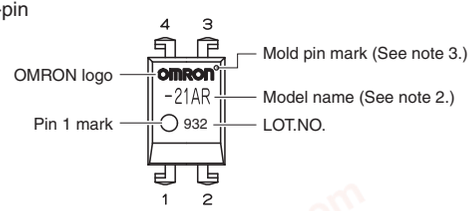


# ■Appearance / Terminal Arrangement / Internal Connections

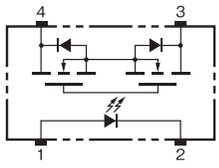
## ●Appearance

### DIP (Dual Inline Package)

DIP 4-pin




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



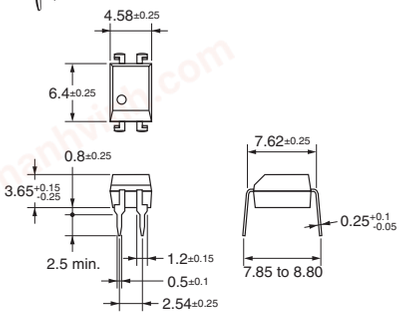

**Note: 1.** The actual product is marked differently from the image shown here.
**Note: 2.** "G3VM" does not appear in the model number on the Relay.
**Note: 3.** The indentation in the corner diagonally opposite from the pin 1 mark is from a pin on the mold.

# ■Dimensions (Unit: mm)



### PCB Terminals

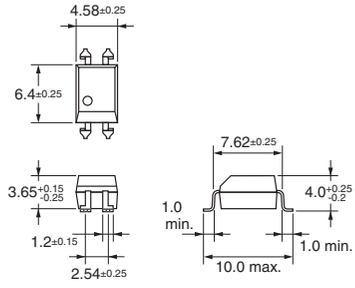
**Weight: 0.25 g**



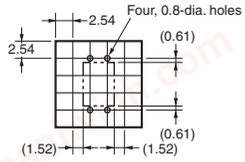



### Surface-mounting Terminals

**Weight: 0.25 g**

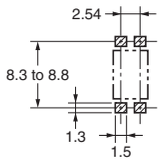



### PCB Dimensions (BOTTOM VIEW)




### 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.

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