**MOS FET Relays** SOP 4-pin, General-purpose Type

# **General-purpose MOS FET Relays** in SOP 4-pin packages for a wide range of applications

- Contact form: 1a (SPST-NO) or 1b (SPST-NC)
- Load voltage: 350 V or 400 V



- Semiconductor test equipment
- Test & Measurement equipment
- Communication equipment
- Various battery-driven devices Security equipment

VM-35\_G\_/351VY/401G\_/401

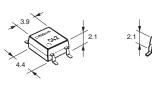
- Power circuit
  - Amusement equipment

Package

# (Unit:mm, Average)

### SOP 4-pin

### Special SOP 4-pin



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

## Model Number Legend

### 1 2 3 4 5

| 1. Load Voltage | 2. Contact form  |
|-----------------|------------------|
| 35 : 350 V      | 1 : 1a (SPST-NO) |
| 40 : 400 V      | 3 : 1b (SPST-NC) |

# ST-NO) ST-NC)

### 4. Additional functions

None: Dielectric strength between I/O 1500 V Y: Dielectric strength between I/O 3750 V

### 3. Package

- G : SOP 4-pin
- V : Special SOP 4-pin

### 5. Other informations

When specifications overlap, serial code is added in the recorded order.

# Ordering Information

|                      |                 |                      | Load voltage   | Continuous                            | Stick p    | backaging                   | Tape pacl        | kaging                      |          |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
|----------------------|-----------------|----------------------|----------------|---------------------------------------|------------|-----------------------------|------------------|-----------------------------|----------|---------------|---|---|---|---|---|---|---|---|--|--------|------------|----------|----------------|------------|
| Package              | Contact form    | Terminals            | (peak value) * | load current<br>(peak value) <b>*</b> | Model      | Minimum package<br>quantity | Model            | Minimum package<br>quantity |          |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
| SOP4                 | 4.5             |                      |                | 100 mA                                | G3VM-351G1 | 100 pcs.                    | G3VM-351G1(TR)   | 2,500 pcs.                  |          |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
| Special SOP          | 1a<br>(SPST-NO) |                      |                | 350 V                                 | 110 mA     | G3VM-351VY                  | 125 pcs.         | G3VM-351VY(TR05)            | 500 pcs. |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
| 4-PIN                |                 | 0                    | 350 V          | 350 V 110 MA G3VM-351VY               | 125 pcs.   | G3VM-351VY(TR)              | 3,000 pcs.       |                             |          |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
|                      | 1b (SPST-NC)    | Surface-<br>mounting |                | 120 mA                                | G3VM-353G  |                             | G3VM-353G(TR)    |                             |          |               |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
| SOP4                 |                 | 0                    | U U            | 0                                     | Terminals  | 0                           | 0                | 0                           | 0        | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 100 mA | G3VM-401G1 | 100 pcs. | G3VM-401G1(TR) | 2,500 pcs. |
|                      | 1a              | 1a                   | 1a             | 1a                                    |            | 400 V                       | 120 mA           | G3VM-401G                   | -        | G3VM-401G(TR) |   |   |   |   |   |   |   |   |  |        |            |          |                |            |
| Special SOP<br>4-PIN | (SPST-NO)       |                      | 400 V          | 110mA                                 | G3VM-401VY | 125 pcs.                    | G3VM-401VY(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)", "(TR05)" to the end of the model number.

SO

- - Industrial equipment



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

# G3VM-35\_G\_/351VY/401G\_/401VY

# **MOS FET Relays**

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

|        | Item                                    | Symbol | G3VM-351G1 | G3VM-351VY                                    | G3VM-353G | G3VM-401G1 | G3VM-401G | G3VM-401VY | Unit             | Measurement<br>conditions |
|--------|---|--------|------------|---|-----------|------------|-----------|------------|------------------|---------------------------|
|        | LED forward current                     | IF     | 50         | 30  | 50        | 30         | 50        | 30         | mA               |                           |
| Input  | LED forward current reduction rate      | ∆IF/°C | -0.5       | -0.3  | -0.5      | -0.3       | -0.5      | -0.3       | mA/°C            | Ta≥25°C                   |
| lnp    | LED reverse voltage                     | VR     | 5          | 6   |           | 5          |           | 6          | V                |                           |
|        | Connection temperature                  | TJ     |            |   | 1/        | 25         |           | ·          | °C               |                           |
|        | Load voltage (AC peak/DC)               | VOFF   |            | 350   |           |            | 400       |            | V                |                           |
| Ŧ      | Continuous load current<br>(AC peak/DC) | lo     | 100        | 110   | 120       | 100        | 120       | 110        | mA               |                           |
| Output | ON current reduction rate               | ∆lo/°C | -1.0       | -1.1  | -1.2      | -1.0       | -1.2      | -1.1       | mA/°C            | Ta≥25°C                   |
| ō      | Pulse ON current                        | Іор    | 300        | 330   | 360       | 300        | 360       | 330        | mA               | t=100 ms,<br>Duty=1/10    |
|        | Connection temperature                  | TJ     |            | 125   |           |            |           |            | °C               |                           |
| Die    | electric strength between I/O *         | VI-0   | 1500       | 3750  |           | 1500       |           | 3750       | Vrms             | AC for 1 min              |
| Am     | nbient operating temperature            | Та     | -40 to +85 | -40 to +85 -40 to +110 -40 to +85 -40 to +110 |           |            |           | °C         | With no icing or |                           |
| Am     | nbient storage temperature              | Tstg   |            |   | -55 tc    | o +125     |           |            | °C               | condensation              |
| So     | oldering temperature                    | -      |            |   | 26        | 60         |           |            | °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.

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

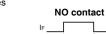
|        | Item                                 | Symbol             |         | G3VM-<br>351G1 | G3VM-<br>351VY | G3VM-<br>353G   | G3VM-<br>401G1 | G3VM-<br>401G | G3VM-<br>401VY   | Unit  | Measurement conditions  |
|--------|--------------------------------------|--------------------|---------|----------------|----------------|-----------------|----------------|---------------|--|---|---|
|        |                                      |                    | Minimum | 1.0            | 1.1            | 1.0             | 1.1            | 1.0           | 1.1  |   |   |
|        | LED forward voltage                  | VF                 | Typical | 1.15           | 1.27           | 1.15            | 1.27           | 1.15          | 1.27   | V   | IF=10 mA  |
|        |                                      |                    | Maximum | 1.3            | 1.4            | 1.3             | 1.4            | 1.3           | 1.4  |   |   |
|        | Reverse current                      | IR                 | Maximum |                |                | 1               | 0              |               |  | μA  | Vr=5 V  |
| ŧ      | Capacitance<br>between terminals     | Ст                 | Typical | 30             |                |                 |                |               | pF   | V=0, f=1 MHz  |   |
| Input  | Trigger LED forward                  | IFT<br>(IFC)       | Typical | 0.4            | 0.8            | 1               | -              | 1             | 0.8  | mA  | G3VM-351G1/401G1 : lo=100 mA<br>G3VM-351VY/401VY : lo=110 mA                              |
|        | current                              | (IFC)<br><b>*2</b> | Maximum | 1              | ;              | 3               | 0.2            | ;             | 3  | IIIA  | G3VM-353G : loff=10 μA<br>G3VM-401G : lo=120 mA   |
|        | Release LED                          | IFC<br>(IFT)       | Minimum |                | 0.1            | 1               | -              | 0             | .1   | mA  | G3VM-351G1/351VY/401G1/401G/<br>401VY : IoFF=100 μA                                       |
|        | forward current                      | *2                 | Typical | -              | 0.4            | -               | 0.001          | -             | 0.5  |   | G3VM-353G : lo=120 mA   |
|        | Maximum resistance<br>with output ON | Typical            | 35 (25) | 35 (22)        | 15             | 18              | 17             | 40 (30)       |  | G3VM-351G1 : IF=2 mA, Io=100 mA<br>Values in parentheses are for t < 1 s.<br>G3VM-351VY/401VY: IF=5 mA, Io=110 mA |   |
| Output |                                      | Maximum            | 50      | (35)           | 25             | 35 65 (45)      |                | Ω             | Values in parentheses are for t < 1 s. G3VM-353G : lo=120 mA G3VM-401G1 : l=0.5 mA, lo=100 mA, t < 1 s G3VM-401G : l=5 mA, lo=120 mA |   |   |
| OUI    | Current leakage when the relay is    | ILEAK              | Typical | 1              | 1              | -               | 1              | -             | 1  | nA  | G3VM-351G1/351VY : VoFF=350 V<br>G3VM-353G: VoFF=350 V, IF=5 mA                           |
|        | open                                 | ILEAK              | Maximum |                |                | 1,(             | 000            |               |  |   | G3VM-401G1/401G/401VY : VoFF=400 V  |
|        | Capacitance<br>between terminals     | COFF               | Typical | 35             | 30             | 65              | 7              | 70            | 30   | pF  | G3VM-351G1/351VY/401G1/401G/<br>401VY : V=0, f=1 MHz<br>G3VM-353G : V=0, f=1 MHz, IF=5 mA |
|        | apacitance between I/<br>terminals   |                    |         |                | pF             | f=1 MHz, Vs=0 V |                |               |  |   |   |
| Ins    | sulation resistance                  | Ri-o               | Minimum |                |                | 10              | 00             |               |  | MΩ  | V⊦o=500 VDC, RoH≤60%  |
| be     | tween I/O terminals                  |                    | Typical |                |                | 1               | 0 <sup>8</sup> |               |  | 10122   | vi-0=300 vDC, n0⊓≥00%   |
| Tu     | rn-ON time                           | ton                | Typical | 1              | 0.5            | -               | 2              | 0.3           | 0.5  |   | G3VM-351G1 :  |
|        |                                      |                    | Maximum | 5              |                | 1               | 10             |               | 1  | ms  | I⊧=2 mA, R∟=200 Ω, Vɒɒ=20 V<br>G3VM-401G1 :   |
| Tu     | rn-OFF time                          | toff               | Typical | 1              | 0.1            | -               | 1              | 0             | .1   | 1113  | IF=0.5 mA, RL=200 Ω, VDD=20 V   |
| Tu     |                                      | IUFF               | Maximum | 3              | 0.5            | 3               | 5              | 1             | 0.5  |   | Others : IF=5 mA, RL=200 $\Omega$ , VDD=20 V <b>*1</b>                                    |

\*1. Turn-ON and Turn-OFF Times

 $\frac{1}{m}$ 

2

0



ton

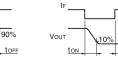
109

Vout

NC contact

90%

toff



\*2. These values are for Relays with NC contacts

R∟ ₩VDD

Vout

## ■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-351G1 | G3VM-351VY | G3VM-353G | G3VM-401G1 | G3VM-401G | G3VM-401VY | Unit |
|---|--------|---------|------------|------------|-----------|------------|-----------|------------|------|
| Load voltage (AC peak/DC)               | Vdd    | Maximum |            | 280        |           | 320        |           |            | V    |
|   |        | Minimum | -          | 5          | 5         | -          |           | 5          |      |
| Operating LED forward current           | IF     | Typical | 2          | 7.5        | -         | 0.5        | 7         | .5         | 1    |
|   |        | Maximum | n 25       |            |           |            |           | mA         |      |
| Continuous load current<br>(AC peak/DC) | lo     | Maximum | 80         | 110        | 120       | 80         | 120       | 110        |      |
| Ambient operating temperature           | Та     | Minimum | n -20      |            |           |            |           |            | °C   |
| Ambient operating temperature           | 1a     | Maximum | 65         | 100        |           | 65         |           | 100        | Ŭ    |

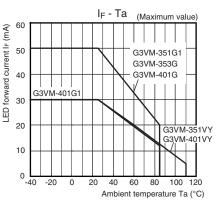
## Spacing and Insulation

| Itom                         | Item G3VM-35□G□/401G□ G3VM-351VY/401VY |      |    |  |  |  |
|------------------------------|--|------|----|--|--|--|
| item                         | Minii                                  | Unit |    |  |  |  |
| Creepage distances           | 4.0                                    | 5.0  |    |  |  |  |
| Clearance distances          | 4.0                                    | 5.0  | mm |  |  |  |
| Internal isolation thickness | 0.1                                    | 0.2  |    |  |  |  |

# G3VM-35\_G\_/351VY/401G\_/401VY

## Engineering Data

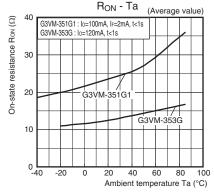
#### LED forward current vs. Ambient temperature



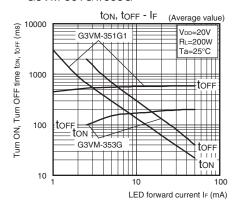
 Continuous load current vs. On-state voltage G3VM-351G1/353G

Io - Von (Average value) 150 Continuous load current lo (mA) G3VM-351G1 : Ta=25°C, IF=2mA G3VM-351G1 G3VM-353G : Ta=25°C 100 50 0 -50 -100 G3VM-353G -150 2 -3 -2 -1 0 1 3 On-state voltage Von (V)

#### On-state resistance vs. Ambient temperature G3VM-351G1/353G



#### Turn ON, Turn OFF time vs. LED forward current G3VM-351G1/353G



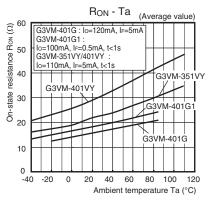
 Continuous load current vs. Ambient temperature

#### I<sub>O</sub> - Ta (Maximum value) 1 current lo (mA) 100 G3VM-353G G3VM-401G Continuous load G3VM-351G1 G3VM-401G1 G3VM-351VY 50 G3VM-401VY 0 -20 40 60 80 100 0 20 120 -40 Ambient temperature Ta (°C)

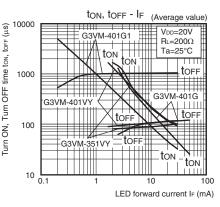
### G3VM-351VY/401G/401G1/401VY

#### IO - VON (Average value) 150 (mA) G3VM-351VY G3VM-401G 0 100 G3VM-401G1 Continuous load current 50 G3VM-401VY 0 G3VM-401G/351VY : Ta=25°C, IF=5mA G3VM-401G1 : Ta=25°C, IF=1mA, t<1s G3VM-401VY : Ta=25°C, IF=5mA, t<1s -50 -100 -150 -3.5 -3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3 3.5 On-state voltage Von (V)

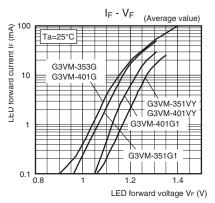
### G3VM-351VY/401G/401G1/401VY

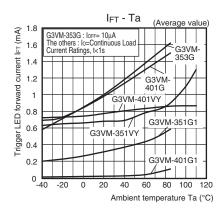


### G3VM-351VY/401G/401G1/401VY



### LED forward current vs. LED forward voltage





Trigger LED forward current vs. Ambient temperature

### **MOS FET Relays**

## ■Engineering Data

#### • Turn ON, Turn OFF time vs. Ambient temperature G3VM-351G1/353G G3VM-351VY/401G/401G1/401VY ton, toff - Ta (Average value) t<sub>ON</sub>, t<sub>OFF</sub> - Ta (Average value) Turn ON, Turn OFF time ton, torr ( $\mu s)$ 2000 5000 G3VM-351G1 : Vod=20V, RL=200Ω, IF=2mA ↓ ton Turn ON, Turn OFF time ton, toFF (µs) ton -G3VM-353G : VDD=20V, RL=200Ω, IF=5mA - toff G3VM-401G1 G3VM-351G1 1000 1000 ton 01VY ton ‡ton GSVM 401G tore torr G3VM-353G 100 ±torr TOFF E G3VM-351VY toff ton G3VM-351VY/401G/401VY : VDD=20V, RL=200Ω, IF=5mA 10 G3VM-401G1 : VbD=20V, RL=200Ω, IF=0.5mA <sup>100</sup> -40 -20 0 20 40 60 80 100 -40 -20 0 20 40 60 80 100 120 Ambient temperature Ta (°C) Ambient temperature Ta (°C) • Current leakage vs. • Current leakage vs. SOP Ambient temperature Load voltage G3VM-351G1/353G/351VY/401G/ G3VM-401VY 401G1 I<sub>LEAK</sub> - Ta I<sub>LEAK</sub> - Ta (Average value) (Average value) 100 2 Current leakage ILEAK (nA) ILEAK (nA) G3VM-353G VOFF=400V 10 Current leakage I<sub>L</sub> 5.1 5 G3VM-401G G3VM-351VY G3VM-G3VM-351G1 0.1 401G1 0.5 0.01 0.1

0.01

-40 -20 0 20 40 60 80

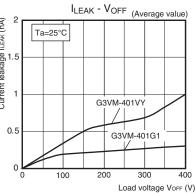
G3VM-353G : VOFF=350V, IF=5mA The others : VOFF=Load voltage ratings

60

80 100

Ambient temperature Ta (°C)

120



100 120

Ambient temperature Ta (°C)

G3VM-35□G□/351VY/401G□/401VY

0.001

-40

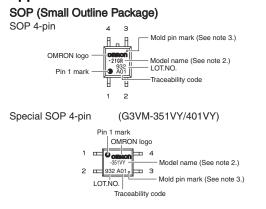
-20 0

20 40

# G3VM-35\_G\_/351VY/401G\_/401VY

# Appearance / Terminal Arrangement / Internal Connections

### Appearance

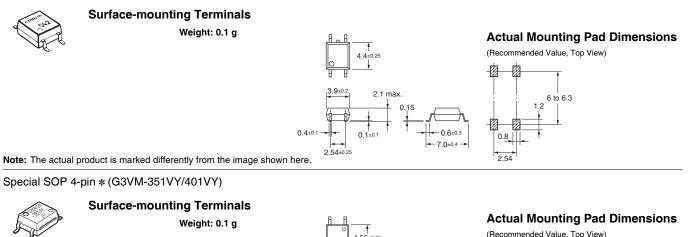


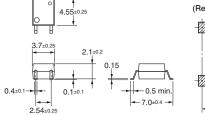
Note: 1. The actual product is marked differently from the image shown here. Note: 2. "G3VM" does not appear in the model number on the Relay.

- Note: 3. The indentation in the corner diagonally opposite from the pin 1
  - mark is from a pin on the mold.

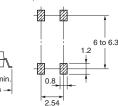
### ■Dimensions (Unit: mm)

SOP (Small Outline Package) SOP 4-pin





(Recommended Value, Top View)



\* The external dimensions are different from those of the standard SOP 4-pin, but the mounting pad dimensions are the same. Note: The actual product is marked differently from the image shown here.

# Approved Standards

| UL recognized                                       | <i>91</i>          |              |          |
|---|--------------------|--------------|----------|
| Model   | Approved Standards | Contact form | File No. |
| G3VM-351G1<br>G3VM-401G<br>G3VM-351VY<br>G3VM-401VY | UL (recognized)    | 1a (SPST-NO) | E80555   |
| G3VM-353G   |                    | 1b (SPST-NC) |          |

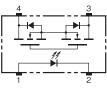
### Models Certified by SEMKO for EN/IEC Standards

| Model     | Approved Standards             | Contact form | File No.     |
|-----------|--------------------------------|--------------|--------------|
| G3VM-401G | EN62368-1<br>(SEMKO certified) | 1a (SPST-NO) | SE-S-2001018 |

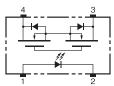
# Terminal Arrangement/Internal Connections

(Top View)

G3VM-351G1/VY G3VM-401G1/G/VY







SOP

### ■Safety Precautions

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

Please check each region's Terms & Conditions by region website.

### OMRON Corporation Device & Module Solutions Company

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In the interest of product improvement, specifications are subject to change without notice.