

# OMRON



A wide range of contact forms and functions  
Over 250 different models available

# G3VM MOSFET RELAY

## *Selection Guide*

Ultra small outline package "USOP series" expansion  
DIP high-capacity & Low ON resistance series expansion  
New DIP small series with High Dielectric Strength available



MOS FET Relays  
**G3VM Series**

## About MOS FET relays

Omron's Mos Fet Relays lead the industry in Solid State Relay technology, utilizing a LED, PDA and Mos Fet in the load switching current. Our G3VM series of relays offer many benefits including low maintenance costs, small footprint and high-speed switching. As a suitable replacement for a mechanical relay, Mos Fet relays are displacing reed relays as well as relays containing mercury. OMRON has expanded the product lineup by introducing their smallest relay\* to date, the new ultra small outline package(USOP) and SSOP which lead the industry in size and performance, with high switching capacity and high sensitivity series available.

\*As of September, 2012.

## Advantages of MOS FET relays

### Ultra small and Weight

Leading the market with substantial space saving offered in our SSOP and new USOP package size

### Low driving current

Standard driving current is 2-15mA.  
Ultrasensitive type with driving current 1mA(max.) available.

### Long operating life

Realize the structure without contacts by sending light signal. Avoid the reduction of life caused by wear of contacts, and realize extended operational life.

### Small leakage current

Can withstand external surge current, and not add the snubber circuit. Under normal condition, it is 1 nanometer A or below (GR, LR type), and the leakage current is very small when close.

### Excellent shock resistance

All the internal parts use the casting method, and there is not movable part in it, so it has excellent shock resistance and vibration resistance.

### High insulation

It turns the voltage into the light, and transfers by the light signal, so it is electrical insulation. It not only can ensure that the Dielectric strength between input and output under normal condition is AC 2500V, but also realizes the serialization of upper 5000V product at the same time, and realize the high insulation.

### Silent operation

Avoid the switching voice caused by metal contacts of mechanical relay. Realize the function of silence.

### High-speed switching

Comparing with the switching time of 3 ~ 5ms of mechanical relay, its switching time is shortened to 1ms. Realize the quick response performance.

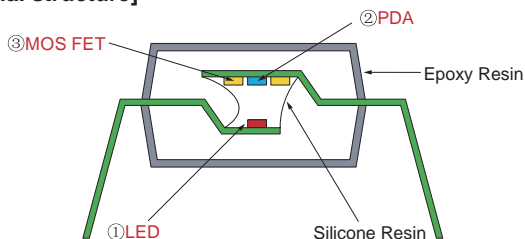
### Control the micro analog signal correctly

Comparing with the triac, it reduces the dead zone greatly. The input waveform of micro analog signal dose not distort basically and is converted into output waveform without distortion.



## Structure and operational principle of MOS FET relays

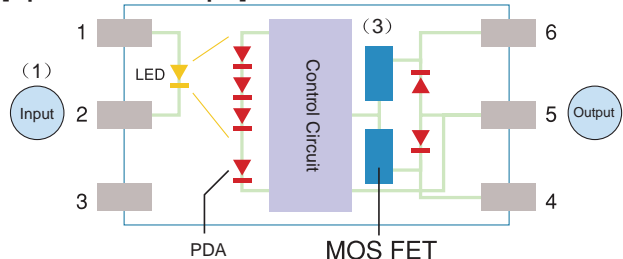
### [Internal structure]



MOS FET relay consists of the following three components:

- ① LED (light emitting diode)
- ② Photodiode dome array (PDA)
- ③ MOS FET

### [Operational Principle] (2)

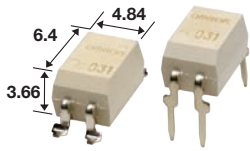


- (1) The LED lights when the current is connected at the input side.
- (2) The light sent by the LED will be converted into voltage again when it is received by the photodiode.
- (3) This voltage will be a gate voltage to drive MOS FET via control circuit.

# Package of MOS FET Relays

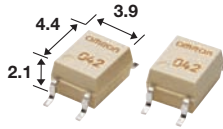
## DIP

■ Bottom surface  
100%



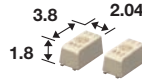
## SOP

■ Bottom surface  
59%



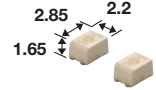
## SSOP

■ Bottom surface  
19%



## USOP

■ Bottom surface  
16%



**Competitor's SSOP Package**

**OMRON SSOP**   **OMRON USOP**

**New package USOP**   **SSOP**

6pitch

5pitch

4pitch

3pitch

2pitch

2pitch

4pitch

1pitch=1.27mm

**Omron's SSOP leads the industry in size\* and performance. New ultra small outline package USOP available !**

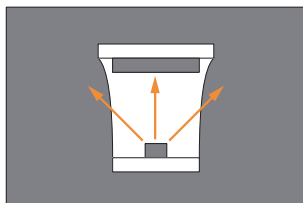
\*As of September, 2012.

# Features of Omron's technology

## 1. White Mold

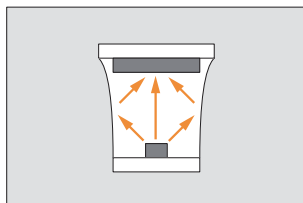
### High efficient light conductivity

Black mold resin



Other manufacturers

White mold resin



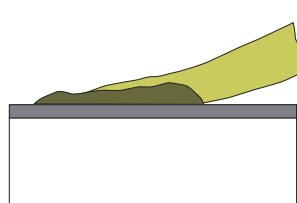
OMRON

Black mold: only can receive the direct light from LED  
White mold: can receive the indirect reflecting light from both LED and resin

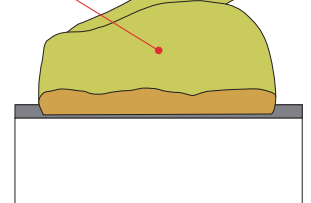
## 2. BWB Bonding

### High contact reliability

Bonding material



Other manufacturers



OMRON

OMRON uses more bonding material than that used by other manufacturers; in an effort to improve the contact reliability.

# MOS FET Relay Lineup

## High Current & Low On-resistance Type

Ideal for power circuit with high current and low on-resistance



Package	Model	Load Voltage(V) Max.	Continuous load current (mA) Max.	Typical ON resistance(Ω)
DIP	G3VM-21AR/DR <b>NEW</b>	20	3	0.04
	G3VM-21BR/ER <b>NEW</b>	20	4(8)*	0.02(0.005)*
	G3VM-41AR/DR <b>NEW</b>	40	2.5	0.05
	G3VM-41BR/ER <b>NEW</b>	40	3.5(7)*	0.03(0.008)*
	G3VM-61AR/DR <b>NEW</b>	60	2	0.08
	G3VM-61BR/ER	60	2.5	0.065
	G3VM-61BR1/ER1 <b>NEW</b>	60	3(6)*	0.04(0.01)*
	G3VM-101AR/DR <b>NEW</b>	100	1	0.25
	G3VM-101BR/ER <b>NEW</b>	100	2(4)*	0.1(0.025)*
SOP	G3VM-21HR	20	2.5(5)*	0.02(0.005)*
	G3VM-41GR8	40	1	0.1
	G3VM-41HR <b>NEW</b>	40	2.5(5)*	0.03(0.008)*
	G3VM-61GR1	60	1	0.25
	G3VM-61HR <b>NEW</b>	60	2.3(4.6)*	0.04(0.01)*
	G3VM-81HR	80	1.25(2.5)*	0.11(0.03)*
G3VM-101HR <b>NEW</b>	100	1.4(2.8)*	0.1(0.025)*	

\*( )=C-connection

## New Ultra Small Outline Package USOP Type

USOP with low C (capacity between terminals) × R (output on-resistance)



Model	Load Voltage(V) Max.	Continuous load current(mA) Max.	Typical ON resistance(Ω)	Capacity between terminals (pF) Typ.
G3VM-21PR10 <b>NEW</b>	20	200	3	0.8
G3VM-21PR11 <b>NEW</b>	20	900	0.18	40
G3VM-41PR12 <b>NEW</b>	40	100	15	0.3
G3VM-41PR10 <b>NEW</b>	40	120	12	0.45
G3VM-41PR11 <b>NEW</b>	40	140	7	0.7
G3VM-51PR <b>NEW</b>	50	300	1	12
G3VM-61PR1 <b>NEW</b>	60	120	10	0.7
G3VM-61PR <b>NEW</b>	60	400	1	20

## Small & High Dielectric Strength Type

Dielectric Strength between I/O 5,000Vrms with small DIP4.

Low Power Consumption at 2mA (maximum) driving current\*.

\*Driving current=Trigger LED forward current



Model	Load Voltage(V) Max.	Continuous load current (mA) Max.	Maximum Trigger LED forward current (mA)	Dielectric strength between input and output (Vrms) Max.
G3VM-41AY/DY <b>NEW</b>	40	2000	2	5000
G3VM-61AY/DY <b>NEW</b>	60	500	2	5000
G3VM-201AY/DY <b>NEW</b>	200	250	2	5000
G3VM-351AY/DY <b>NEW</b>	350	100	2	5000
G3VM-401AY/DY <b>NEW</b>	400	120	2	5000
G3VM-601AY/DY <b>NEW</b>	600	90	2	5000

## Ultrasensitive Type

Ideal for power saving with a driving current\* 1mA(maximum)

\*Driving current=Trigger LED forward current



Model	Load Voltage(V) Max.	Continuous load current (mA) Max.	Maximum Trigger LED forward current (mA)	Operating LED forward current (mA)
G3VM-61G2	60	400	1	2
G3VM-201G1	200	200	1	2
G3VM-351G1	350	100	1	2
G3VM-601G	600	90	1	2

## Low Capacity between terminals & Low On-resistance Type (Low C × R)

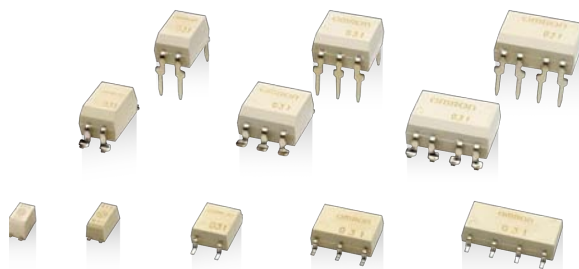
Ideal for semi-conductor test equipment. low C(capacity between terminals) × R(output on-resistance) type

### ■ SOP package

Model	Load Voltage(V) Max.	Continuous load current(mA) Max.	Typical ON resistance(Ω)	Capacity between terminals (pF) Typ.
G3VM-21GR	20	160	5	1
G3VM-21GR1	20	300	1	5
G3VM-41GR4	40	250	2	5
G3VM-41GR5	40	300	1	10
G3VM-41GR6	40	120	10	1
G3VM-81GR	80	40	16	2.5
G3VM-81GR1	80	200	5	6.5

### ■ SSOP package

Model	Load Voltage(V) Max.	Continuous load current(mA) Max.	Typical ON resistance(Ω)	Capacity between terminals (pF) Typ.
G3VM-21LR	20	160	5	1
G3VM-21LR1	20	450	0.8	5
G3VM-21LR10	20	200	3	0.8
G3VM-41LR4	40	250	2	5
G3VM-41LR5	40	300	1	10
G3VM-41LR6	40	120	10	1
G3VM-41LR10	40	120	12	0.45
G3VM-41LR11	40	140	7	0.7



# Product lineup of MOS FET Relays

## DIP(Dual Inline Package)

Load Voltage(V) Max.	Model	Number of terminals	Contact form	Continuous load current (mA) Max.	Typical ON resistance( $\Omega$ )	Maximum turn-ON time (ms)	Maximum turn-OFF time (ms)	Dielectric strength between input and output (Vrms) Max.
20	G3VM-21AR/DR <i>NEW</i>	4	1a	3000	0.04	5.0	1.0	2500
20	G3VM-21BR/ER <i>NEW</i>	6	1a	4000	0.02	5.0	1.0	2500
40	G3VM-41AY/DY <i>NEW</i>	4	1a	2000	0.09*	5.0	1.0	5000
40	G3VM-41AR/DR <i>NEW</i>	4	1a	2500	0.05	5.0	1.0	2500
40	G3VM-41BR/ER <i>NEW</i>	6	1a	3500	0.03	5.0	1.0	2500
60	G3VM-61A1/D1	4	1a	500	1	2.0	0.5	2500
60	G3VM-61AY/DY <i>NEW</i>	4	1a	500	0.6	1.0	1.0	5000
60	G3VM-61AR/DR <i>NEW</i>	4	1a	2000	0.08	5.0	1.0	2500
60	G3VM-61B1/E1	6	1a	500	1	2.0	0.5	2500
60	G3VM-61BR/ER	6	1a	2500	0.065	1.5	0.4	2500
60	G3VM-61BR1/ER1 <i>NEW</i>	6	1a	3000	0.04	5.0	1.0	2500
60	G3VM-62C1/F1	8	2a	500	1	2.0	0.5	2500
100	G3VM-101AR/DR <i>NEW</i>	4	1a	1000	0.25	5.0	1.0	2500
100	G3VM-101BR/ER <i>NEW</i>	6	1a	2000	0.1	5.0	1.0	2500
200	G3VM-201AY/DY <i>NEW</i>	4	1a	250	5	1.0	1.0	5000
350	G3VM-351AY/DY <i>NEW</i>	4	1a	100	35*	1.0	1.0	5000
350	G3VM-2L/2FL	4	1a	120	22	1.0	1.0	2500
350	G3VM-351A/D	4	1a	120	35*	1.0	1.0	2500
350	G3VM-351B/E	6	1a	120	35	1.0	1.0	2500
350	G3VM-352C/F	8	2a	120	35*	1.0	1.0	2500
350	G3VM-WL/WFL	8	2a	120	22	1.0	1.0	2500
350	G3VM-353A/D	4	1b	150	15	1.0	3.0	2500
350	G3VM-353B/E	6	1b	150	15	1.0	3.0	2500
350	G3VM-354C/F	8	2b	150	15	1.0	1.0	2500
350	G3VM-355CR/FR	8	1a1b	120	15	1.0	3.0	2500
400	G3VM-401A/D	4	1a	120	18	1.0	1.0	2500
400	G3VM-401AY/DY <i>NEW</i>	4	1a	120	22*	1.0	1.0	5000
400	G3VM-401B/E	6	1a	120	17	1.0	1.0	2500
400	G3VM-401BY/EY	6	1a	120	17	1.0	1.0	5000
400	G3VM-402C/F	8	2a	120	18	1.0	1.0	2500
600	G3VM-601AY/DY <i>NEW</i>	4	1a	90	45*	1.0	1.0	5000
600	G3VM-601BY/EY	6	1a	100	30	1.5	1.0	5000

On-resistance when saturated

## SOP(Small Outline Package)

Load Voltage(V) Max.	Model	Number of terminals	Contact form	Continuous load current (mA) Max.	Typical ON resistance( $\Omega$ )	Maximum turn-ON time (ms)	Maximum turn-OFF time (ms)	Dielectric strength between input and output (Vrms) Max.
20	G3VM-21GR	4	1a	160	5	0.5	0.5	1500
20	G3VM-21GR1	4	1a	300	1	0.5	0.5	1500
20	G3VM-21HR	6	1a	2500	0.02	5.0	1.0	1500
40	G3VM-41GR4	4	1a	250	2	0.5	0.5	1500
40	G3VM-41GR5	4	1a	300	1	0.5	0.5	1500
40	G3VM-41GR6	4	1a	120	10	0.5	0.5	1500
40	G3VM-41GR8	4	1a	1000	0.1	3.0	0.5	1500
40	G3VM-41HR <i>NEW</i>	6	1a	2500	0.03	5.0	1.0	1500
60	G3VM-61VY <i>NEW</i>	4	1a	70	25	5.0	5.0	3750
60	G3VM-61G1	4	1a	400	1	2.0	0.5	1500
60	G3VM-61G2	4	1a	400	1	8.0	3.0	1500
60	G3VM-61GR1	4	1a	1000	0.25	3.0	1.0	1500
60	G3VM-61H1	6	1a	400	1	2.0	0.5	1500
60	G3VM-61HR <i>NEW</i>	6	1a	2300	0.04	5.0	1.0	1500
60	G3VM-62J1	8	2a	400	1	2.0	0.5	1500
80	G3VM-81G1	4	1a	350	1	0.5	0.5	1500
80	G3VM-81GR	4	1a	40	16	0.5	0.5	1500
80	G3VM-81GR1	4	1a	200	5	0.5	0.5	1500
80	G3VM-81HR	6	1a	1250	0.11	3.0	1.0	1500
100	G3VM-101HR <i>NEW</i>	6	1a	1400	0.1	5.0	1.0	1500
200	G3VM-201G	4	1a	50	40	0.5	0.2	1500
200	G3VM-201G1	4	1a	200	5	8.0	3.0	1500
200	G3VM-S5	4	1a	200	5	1.5	1.0	1500
200	G3VM-201H1	6	1a	200	5	1.5	1.0	1500

On-resistance when saturated

# Product lineup of MOS FET Relays

## SOP (Small Outline Package)

Load Voltage(V) Max.	Model	Number of terminals	Contact form	Continuous load current (mA) Max.	Typical ON resistance( $\Omega$ )	Maximum turn-ON time (ms)	Maximum turn-OFF time (ms)	Dielectric strength between input and output (Vrms) Max.
200	G3VM-202J1	8	2a	200	5	1.5	1.0	1500
350	G3VM-351G	4	1a	110	35*	1.0	1.0	1500
350	G3VM-351G1	4	1a	100	35	5.0	3.0	1500
350	G3VM-351GL	4	1a	120	15	1.0	1.0	1500
350	G3VM-351H	6	1a	110	35*	1.0	1.0	1500
350	G3VM-352J	8	2a	110	35*	1.0	1.0	1500
350	G3VM-353G	4	1b	120	15	1.0	3.0	1500
350	G3VM-353H	6	1b	120	15	1.0	3.0	1500
350	G3VM-354J	8	2b	120	15	1.0	3.0	1500
350	G3VM-355JR	8	1a1b	120	15	1.0	3.0	1500
400	G3VM-401G	4	1a	120	17	1.0	1.0	1500
400	G3VM-401H	6	1a	120	17	1.0	1.0	1500
400	G3VM-402J	8	2a	120	17	1.0	1.0	1500
600	G3VM-601G	4	1a	90	45	8.0	3.0	1500

ON resistance when it is saturation

## SSOP (Shrink Small Outline Package)

Load Voltage(V) Max.	Model	Number of terminals	Contact form	Continuous load current (mA) Max.	Typical ON resistance( $\Omega$ )	Maximum turn-ON time (ms)	Maximum turn-OFF time (ms)	Dielectric strength between input and output (Vrms) Max.
20	G3VM-21LR	4	1a	160	5	0.5	0.5	1500
20	G3VM-21LR1	4	1a	450	0.8	0.5	0.5	1500
20	G3VM-21LR10	4	1a	200	3	0.2	0.2	1500
20	G3VM-21LR11	4	1a	900	0.18	2.0	1.0	1500
40	G3VM-41LR4	4	1a	250	2	0.5	0.5	1500
40	G3VM-41LR5	4	1a	300	1	0.5	0.5	1500
40	G3VM-41LR6	4	1a	120	10	0.5	0.5	1500
40	G3VM-41LR10	4	1a	120	12	0.2	0.3	1500
40	G3VM-41LR11	4	1a	140	7	0.2	0.2	1500
60	G3VM-61LR	4	1a	400	1	1.0	1.0	1500
80	G3VM-81LR	4	1a	120	7.5	0.25	0.2	1500
100	G3VM-101LR	4	1a	80	8	0.3	0.3	1500

## USOP (Ultra Small Outline Package)

Load Voltage(V) Max.	Model	Number of terminals	Contact form	Continuous load current (mA) Max.	Typical ON resistance( $\Omega$ )	Maximum turn-ON time (ms)	Maximum turn-OFF time (ms)	Dielectric strength between input and output (Vrms) Max.
20	G3VM-21PR10 <b>NEW</b>	4	1a	200	3	0.2	0.2	500
20	G3VM-21PR11 <b>NEW</b>	4	1a	900	0.18	2.0	1.0	500
40	G3VM-41PR12 <b>NEW</b>	4	1a	100	15	0.2	0.2	500
40	G3VM-41PR10 <b>NEW</b>	4	1a	120	12	0.2	0.3	500
40	G3VM-41PR11 <b>NEW</b>	4	1a	140	7	0.2	0.2	500
50	G3VM-51PR <b>NEW</b>	4	1a	300	1	0.5	0.4	500
60	G3VM-61PR1 <b>NEW</b>	4	1a	120	10	0.2	0.2	500
60	G3VM-61PR <b>NEW</b>	4	1a	400	1	0.5	0.5	500

## G3VM Model Number Legend

G3VM-                  

①    ②    ③    ④    ⑤

① Load voltage	② Contact form	③ Package type	④ Additional functions	⑤ Other information
2: 20V 4: 40V 6: 60V 8: 80V 10: 100V 20: 200V 25: 250V 35: 350V 40: 400V 60: 600V	1: 1a(SPST-NO) 2: 2a(DPST-NO) 3: 1b(SPST-NC) 4: 2b(DPST-NC) 5: 1a1b(SPST-NO/SPST-NC) 6: Other form	A: DIP 4pin B: DIP 6pin C: DIP 8pin D: SMD 4pin E: SMD 6pin F: SMD 8pin G: SOP 4pin H: SOP 6pin J: SOP 8pin K: SOP 18pin L: SSOP 4pin M: SSOP 6pin N: SSOP 8pin P: USOP 4pin Q: USOP 6pin R: USOP 8pin S: SON 4pin T: SON 6pin U: SON 8pin V: SOP 4pin (special)	L: Current limit M: Multi-functional and basic type N: Multi-function without diode O: Single input LED type P: Special pin arrangement Q: Multifunction with current limiter type R: Low ON-resistance type S: Slow input/slow output T: Multifunction with current limiter and without diode type Y: Dielectric strength between I/O above 2.5 kV type F: High switching speed type	When specifications overlap, serial code is added in the recorded order.

Note 1: Some products may have a different model number structure.

Note 2: In order to avoid the confusion of I (English letter) and 1 (number), I (English letter) are not used here.

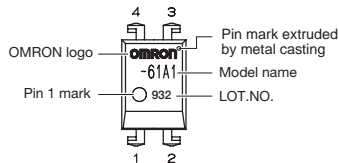
Note 3: For 4-pin SOP models, where the available marking space is insufficient to clearly differentiate model numbers with 6 or more suffix digits, the package type code ③ is omitted.

# Product lineup of MOS FET Relays

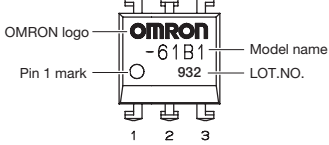
## Package

### DIP(Dual Inline Package)

DIP4pin

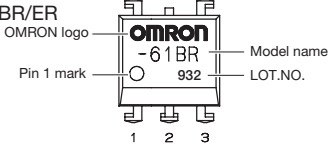


DIP6pin

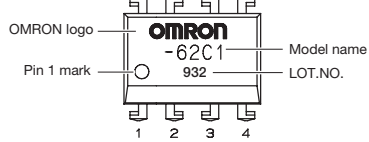


DIP6pin(special)

G3VM-61BR/ER

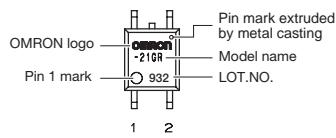


DIP8pin



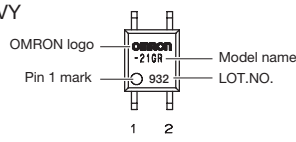
### SOP(Small Outline Package)

SOP4pin

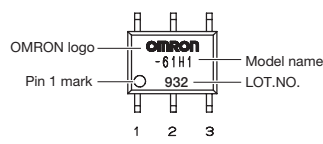


SOP4pin(special)

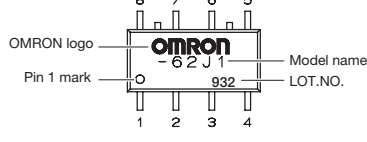
G3VM-61VY



SOP6pin

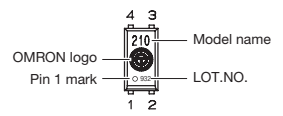


SOP8pin



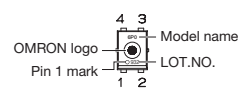
### SSOP(Shrink Small Outline Package)

SSOP4pin



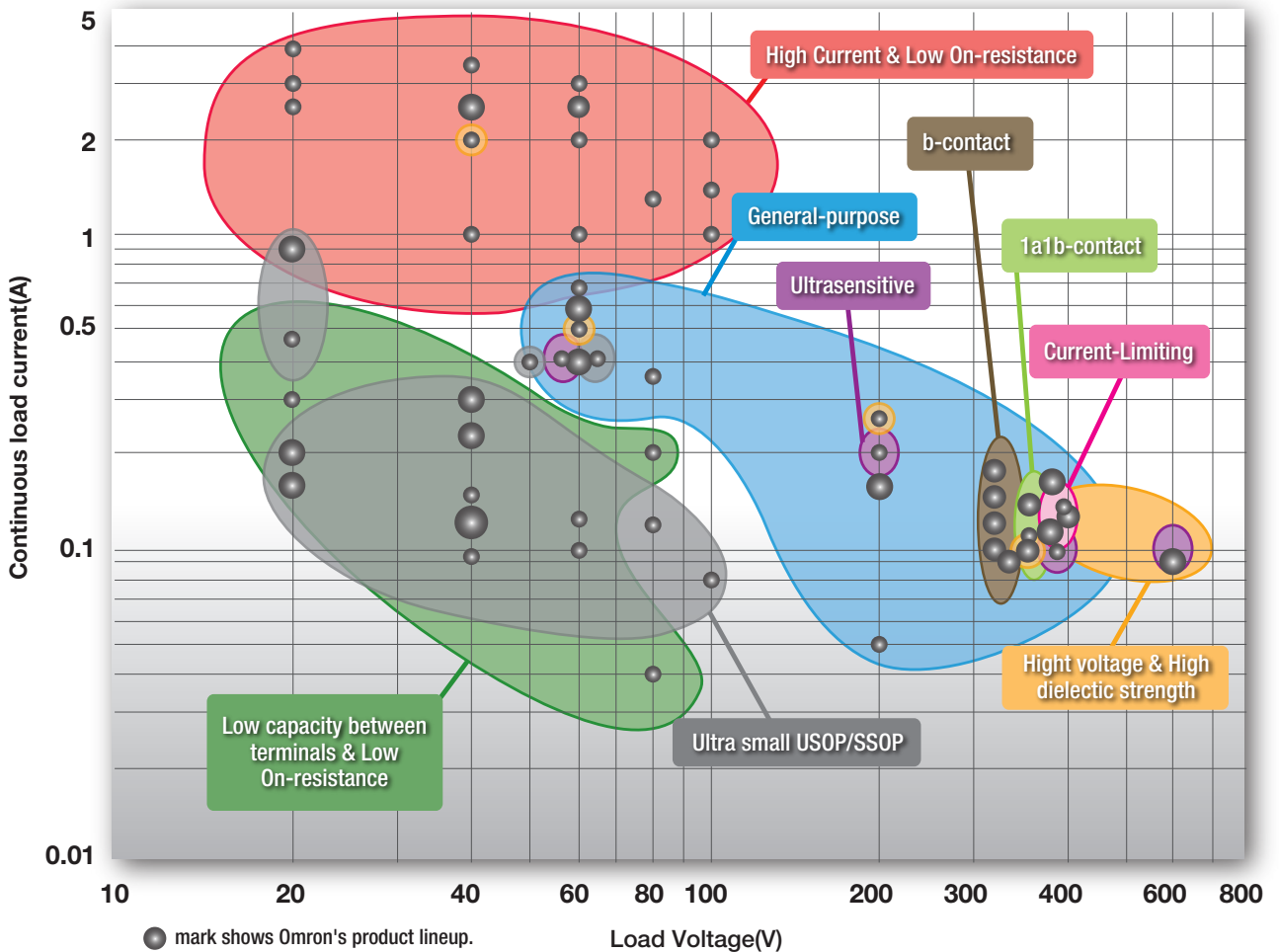
### USOP(Ultra Small Outline Package)

USOP4pin



Note: Model symbol of product does not include "G3VM".  
 ※ 1PIN mark and the dent at the side opposite to the angle are marks extruded by metal casting.

## Product Map by features



# Target Applications

## Communication Equipment

- Modem
- FAX
- Network equipment
- PBX • Transmission equipment

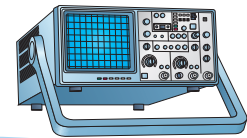


Recommended products

**General -purpose/  
b-contact type**  
G3VM-61A1/D1  
G3VM-351A/D  
G3VM-353A/D

## Test and Measurement Equipment

- ATE(Automated test equipment)
- Oscilloscope
- Probe/Load card
- IC tester



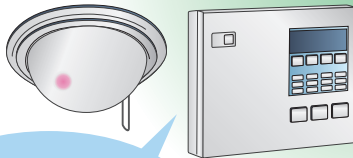
Recommended products

**Ultra-small/Low C×R type**  
G3VM-21GRxx/41GRxx/81GRXX  
G3VM-21LRxx/41LRxx/  
61LR/81LR/101LR  
G3VM-21PRxx/41PRxx/61PRxx



## Security Equipment

- Smoke and gas detection equipment
- Household safety panel
- Human detection sensor
- Video intercom

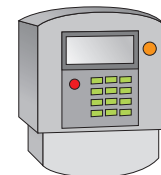


Recommended products

**Silent/Ultrasonic type**  
G3VM-61G1/G2/VY  
G3VM-351G/351G1

## Electric Meter

- Electric Meter
- Smart Meter
- Gas Meter



Recommended products

**High Dielectric Strength type**  
G3VM-351AY/DY  
G3VM-401AY/DY  
G3VM-401BY/EY  
G3VM-601AY/DY  
G3VM-601BY/DY

There are many other usages beyond the above applications.

Medical Equipment

Broadcasting Equipment

Factory Automation Equipment

FA/Amusement Equipment

For more detailed information, please contact your local Omron Representative.

Note: Do not use this document to operate the Unit.

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