OMRON

MOSFET Relays

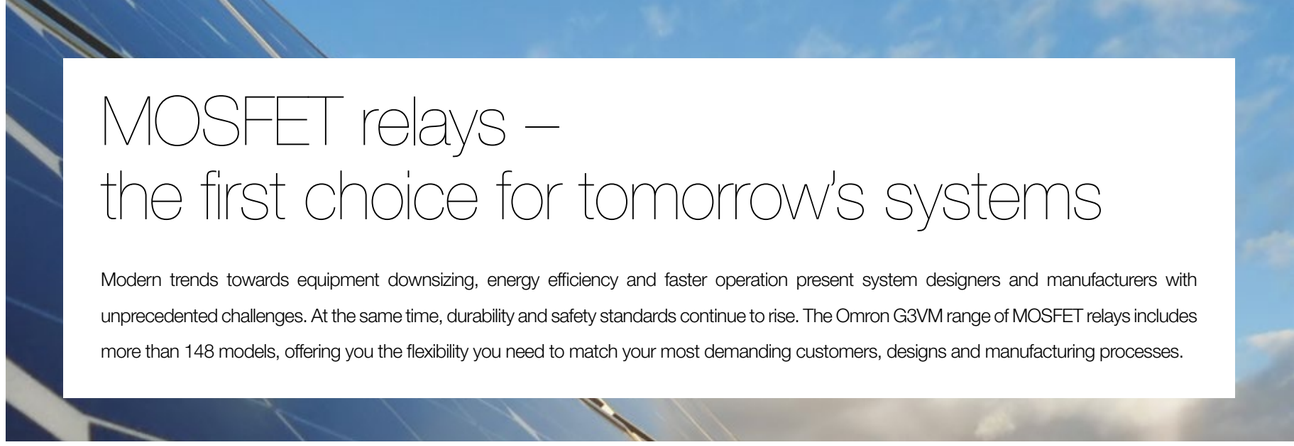
Your partner in solid state innovation

MOSFET relays are modern electronic components used in all kinds of equipment, spanning test and measurement, the energy industry, factory automation, residential and commercial buildings, healthcare and communication. They are essential to the performance of broadcasting equipment, audio/video devices and office systems, while today's most advanced digital technologies depend on them for advanced performance and reliability.

Omron's G3VM MOSFET relays are a world-leading benchmark in the solid state relay (SSR) market. Manufactured using the latest advances in automated production, they include a variety of improved construction technologies within the areas of the input LED, PDA and MOSFET chips used in the load switching circuit. These innovations have helped us to achieve further reductions in package sizes and power requirements and provide components with best-in-class specifications.

The G3VM range combines the advantages of mechanical and solid state technology, giving you unprecedented design capability. Each model features a double MOSFET load circuit, making it possible to connect an AC or DC load in either direction. The range is also expanding to enable higher current switching and the possibility of being driven directly from a logic circuit. These features mean that the MOSFET relay offers a fully functional alternative to an electromechanical relay with minimal additional drive circuitry.

Our products always meet the highest quality requirements and are accompanied by reliable customer care and technical support. Working hand-in-hand with designers, we combine the latest technologies with innovative designs that open up new possibilities every day.



MOSFET relays – the first choice for tomorrow's systems

Modern trends towards equipment downsizing, energy efficiency and faster operation present system designers and manufacturers with unprecedented challenges. At the same time, durability and safety standards continue to rise. The Omron G3VM range of MOSFET relays includes more than 148 models, offering you the flexibility you need to match your most demanding customers, designs and manufacturing processes.

1. Smallest size and lowest power requirements in the industry

Our SSOP, USOP and new VSON packages are more than 60% smaller than standard electromechanical or reed relays. This makes them ideal for small-profile applications or those where bottom surface space is limited. Our SSOP package is only 2 mm wide, 4.2 mm long and 1.8 mm high, allowing designers to reduce overall equipment and instrumentation size. That gives them the freedom to pack more features and components into the same amount of space.

MOSFET relays also require less power. Low driving current enables significant energy savings. Standard driving current in circuits with MOSFET relays is 3mA. Omron's ultrasensitive models feature driving current specifications down to 0.2mA resp. 1mA (max. value for Trigger LED forward current).

2. Long operating life

MOSFET relays use light signal instead of moveable contacts, avoiding contact wear and extending their operating life. Casting is used for all internal parts, giving excellent shock and vibration resistance.

Independent tests on the G3VM LED chip – the only component that could possibly vary in performance – simulated successful operation for a total of 100,000 hours. Bearing in mind that circuit boards need to be replaced if just one reed relay fails, using Omron MOSFET relays instead is an excellent way to save time and reduce waste.

3. Solid State performance and accuracy

Various features contribute to the advanced performance of MOSFET relays. They can often withstand external surge current without an additional snubber circuit. Under normal conditions the minimum leakage current is less than 1nA.

Excellent input/output isolation is accomplished by models with a high dielectric strength of 5.000 Vrms. Unlike triacs, MOSFET relays ensure correct control of the micro analogue signal. Input waveform distortion is eliminated by a considerably reduced dead zone, and this leads to correct output signal. Providing linear contact resistance over the whole lifetime and the ability to withstand shock and vibration, G3VM relays offer new parameters to be considered at the design stage.

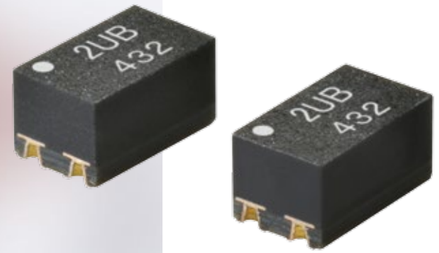
As there are no mechanical contacts, switching noise is fully eliminated. The operational speed of MOSFET relays gives excellent characteristics at 0.2ms (for SSOP, USOP, VSON types), enabling your systems to achieve fast-response performance.

Test and measurement equipment – compact and convenient

Increasingly sophisticated testing and measuring devices are in demand for the electronics, medical, healthcare and automotive sectors, among others. These complex applications require high relay density in tiny spaces to guarantee the utmost accuracy and reliability.

Omron provides a range of purpose-built MOSFET relays for the Test and Measurement industry, suitable for applications like Automated Test Equipment (ATE), semiconductor test boards, oscilloscopes, data loggers and other measurement instruments. For example, they can be used for LSI functional test in performance boards, or they can switch measurement line in display test equipment. They can also be found in spectrum analysers or various recorders.

Low output capacitance and on-resistance types are available in a range of SSOP, USOP and VSON packages. Remarkable small capacitance between terminals and output on-resistance enables clear signal transfer at high frequencies. Easily visible solder joints make installation quick and convenient, despite their minute package sizes.



G3VM-21UR10
The new G3VM-21UR10, part of our industry-leading VSON series. Its tiny VSON package helps designers to pack more performance and accuracy into small measurement devices.

G3VM-61PR1
Low CxR MOSFET relays like the new G3VM-61PR1 ensure clear signal transfer at high frequencies, making them ideal for testing devices such as oscilloscopes.

Tiny sizes for high density mounting

Testing and measurement devices benefit from much smaller dimensions going down to 2.45 x 1.45x 1.3 mm comparing to other components switching signals, as for example reed relays. This makes high density mounting possible and gives designers greater flexibility.

Designed for high frequencies

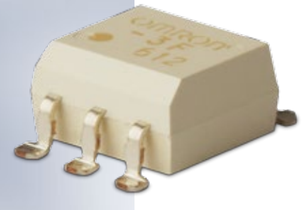
Companies developing test and measurement equipment require relays with low C x R specifications to reduce signal distortion at high frequencies. Omron meets the needs of the sector's R&D specialists with MOSFET relays delivering 2.4 pFxΩ to enable clear signal transfer.

Industrial equipment – resilient and reliable

Reliable on-off signal switching is a vital requirement for power management in many industrial applications. Our general purpose MOSFET relays combine reliable high-speed switching with low consumption and small size. They are ideal for Programmable logic controllers (PLC), small solenoid-controlled valves, motors and lamps used in robotic and other manufacturing equipment. They are also used extensively in control terminals and power supplies for factory automation.

The energy industry is evolving fast, and so are the needs of its generation, monitoring and storage systems. Relays with high dielectric strength are needed to enable switching of high voltages in small spaces. Energy management is also changing, as smart meters enable more control over energy consumption and costs. To optimise the benefits, system components need to meet the highest standards of accuracy, safety and reliability.

Omron supplies purpose-built MOSFET relays that allow system designers and manufacturers to stay ahead of these demands. They include a wide array of DIP, SOP, SSOP and USOP relays in a variety of designs to fit several applications. Their reliability makes them perfect for battery charge monitoring, while cost-effective production contributes to savings in electricity metering systems.



G3VM-21ER/BR
G3VM-21ER / G3VM-21BR Product series offers remarkable High Current & Low On-resistance at the same level as the mechanical relay. Relay enables switching continuous load up to 8A (in connection C as specified in datasheet) and is also suitable for power supply circuit.

G3VM-401DY
High dielectric strength type relays like the G3VM-401DY are essential components for the energy industry.

Current Limit Function

A built-in Current Limit Function (CLF) is incorporated in some models for protection against surge. Traditionally used to clamp excessive overcurrent fault conditions in sensitive equipment, this feature can also be used to good effect to resist transient and short circuit conditions.

Enhanced productivity

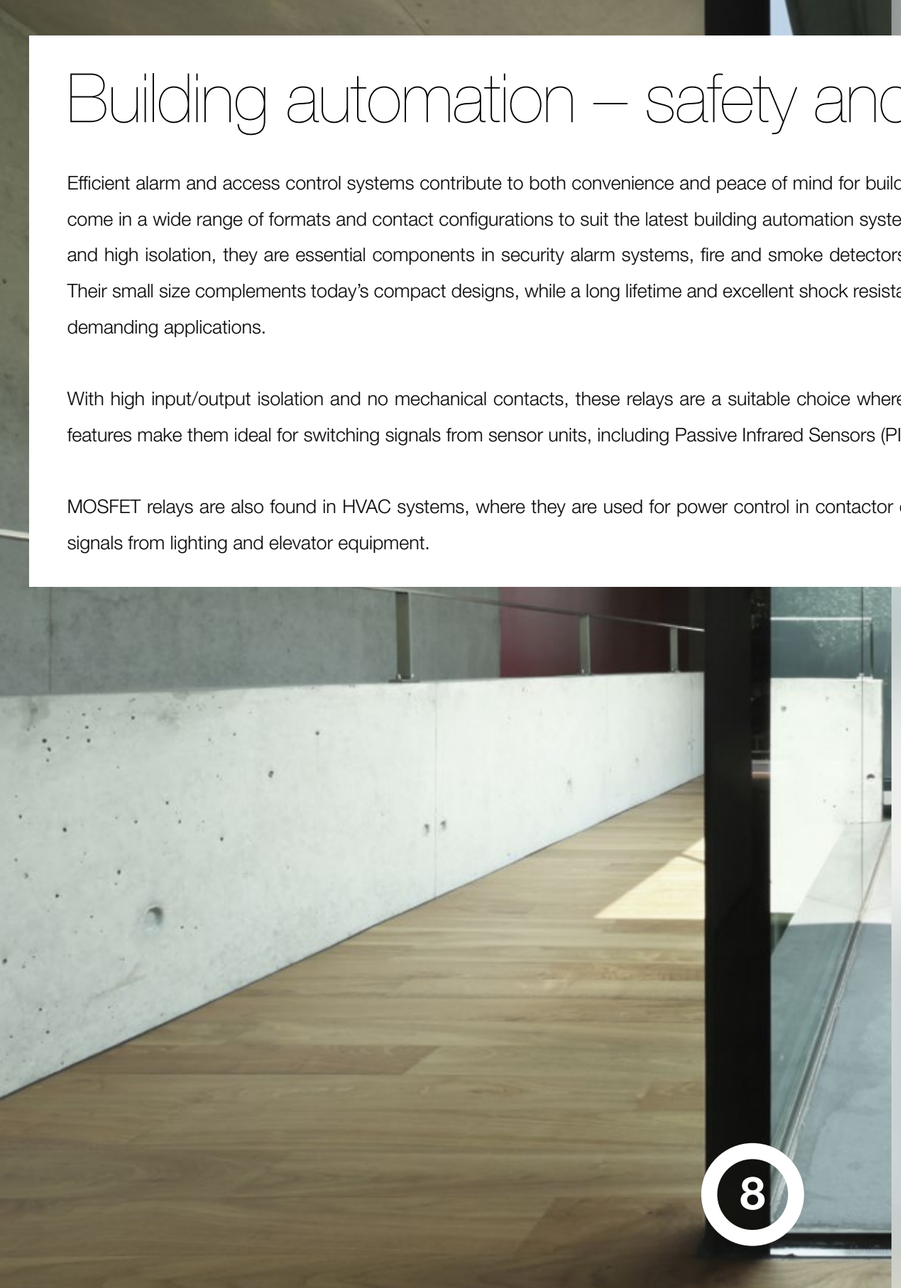
Smaller size no longer means reduced visibility or difficult solder mounting and PCB inspection! Despite their tiny packages, the Omron USOP and SSOP series have highly visible lead terminals to make solder mounting easier. VSON types with side solder joints achieve high visibility as well, while solder strength is greatly enhanced by large solder joints on the bottom of the relay. Many small details also improve manufacturing productivity.

Building automation – safety and security

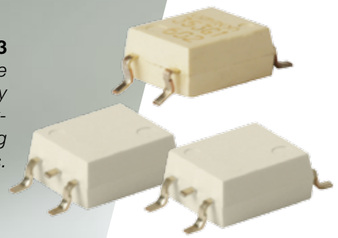
Efficient alarm and access control systems contribute to both convenience and peace of mind for building occupants. Omron MOSFET relays come in a wide range of formats and contact configurations to suit the latest building automation systems. Offering reliability, energy efficiency and high isolation, they are essential components in security alarm systems, fire and smoke detectors and building access control systems. Their small size complements today's compact designs, while a long lifetime and excellent shock resistance ensure long-term reliability, even in demanding applications.

With high input/output isolation and no mechanical contacts, these relays are a suitable choice where silent operation is preferred. All these features make them ideal for switching signals from sensor units, including Passive Infrared Sensors (PIR).

MOSFET relays are also found in HVAC systems, where they are used for power control in contactor coils. Additional uses include switching signals from lighting and elevator equipment.



G3VM 61G2/G3
Omron ultrasensitive type relays are suitable for many energy-saving and battery-driven devices used in building automation systems.



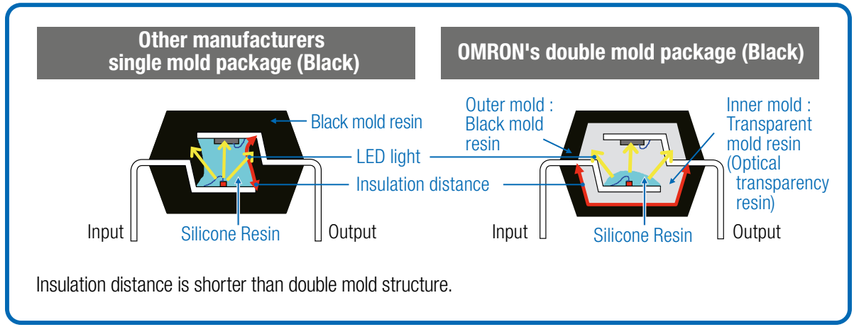
G3VM-61G1/G3VM-351G/ G3VM-61VY1
General purpose MOSFET relays like G3VM 61G1, 61VY1 or 351G1 are used for switching AC/DC load, ON/OFF control or micro analog signal operation in industrial equipment or building automation.

High dielectric strength and sensitivity

The double moulded structure used for our high dielectric type MOSFET relays (DIP4) improves insulation by lengthening the insulation distance. By using high-luminance LED, we achieve high dielectric strength and heightened sensitivity.

Low driving current (white mould package)

Many of our MOSFET relays are made with white instead of black mould resin. The white mould package can receive light both directly from the LED and indirectly through reflection from the resin. This results in a remarkably low driving current and high sensitivity.



Insulation distance is shorter than double mold structure.

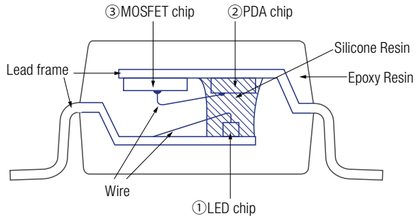
Medical equipment – fast and flexible

Relays are used extensively in the medical industry for laboratory and diagnostic equipment as well as home healthcare devices. Omron MOSFET relays are used in electric therapy equipment and ultrasonic diagnostic devices, for instance. Their reliability and high-speed switching performance ensure quick response and accuracy. Offering the advantages of a small, thin profile and versatile mounting options, they give manufacturers the flexibility necessary for many market-leading devices in laboratory, hospital and home care environments.

Design flexibility

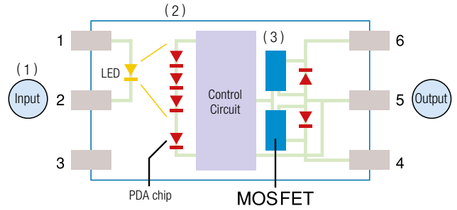
The internal optocoupling structure of every Omron MOSFET relay is designed for the utmost versatility in terms of mounting possibilities. This gives device designers the flexibility they need for advanced innovation. With just four basic elements (2 MOSFET chips, LED and PDA) and a simple operating principle, the design delivers high performance, utilising all the advantages of MOSFET technology for reliable signal switching or power source control.

Internal structure



MOSFET relay consists of the following three components:
①LED (light emitting diode)
②Photodiode dome array (PDA)
③MOSFET

Operating principle



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

G3VM-21LR1
The G3VM-21LR1 can achieve the response required for high-speed signal switching in medical applications. Space-saving requirements are met by a 4 pin Small Shrink Outline Package (SSOP) with dimensions of only 1.7 x 4.2 x 1.8 mm.

Omron MOSFET relay type overview

The Omron MOSFET relay product range includes more than 148 different models with various contact forms, packages and additional functions.

General-purpose type

- Best-sellers
- Ideal for AC/DC load
- Micro analogue signal

Package	Model	Contact form	Load voltage (V) Max.	Continuous load current (mA) Max.	Dielectric strength between I/O (Vrms)
DIP	G3VM-61A1/D1	1a	60	500	2500
	G3VM-61B1/E1	1a	60	500 (1000)	2500
	G3VM-62C1/F1	2a	60	500	2500
	G3VM-351A/D	1a	350	120	2500
	G3VM-351B/E	1a	350	120 (240)	2500
	G3VM-352C/F *NEW*	2a	350	120	2500
SOP	G3VM-61G1	1a	60	400	1500
	G3VM-61VY1	1a	60	100	3750
	G3VM-61H1	1a	60	400 (800)	1500
	G3VM-62J1	2a	60	400	1500
	G3VM-81G1	1a	80	350	1500
	G3VM-351G	1a	350	110	1500
	G3VM-351H	1a	350	110 (220)	1500
	G3VM-352J	2a	350	110	1500

High current & low on-resistance type

- Same high-current and low on-resistance level as a mechanical relay
- Ideal for power circuits (the G3VM-21BR/ER can switch up to 8A in C connection)

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

* Load current in case of connection C is shown in parentheses

Small & high dielectric strength type

- Dielectric strength between I/O 5,000Vrms with small DIP4 package
- High continuous load current at 2A for G3VM-41AY1/DY1

Package	Model	Load voltage (V) Max.	Continuous load current (mA) Max.	Recommended Trigger LED forward current (mA) Typ.	Dielectric strength between I/O (Vrms)
DIP4	G3VM-41AY1/DY1	40	2000	7.5	5000
	G3VM-61AY1/DY1	60	500	7.5	5000
	G3VM-201AY1/DY1	200	250	7.5	5000
	G3VM-351AY1/DY1	350	100	7.5	5000
	G3VM-401AY1/DY1	400	120	7.5	5000
	G3VM-601AY1/DY1	600	90	7.5	5000

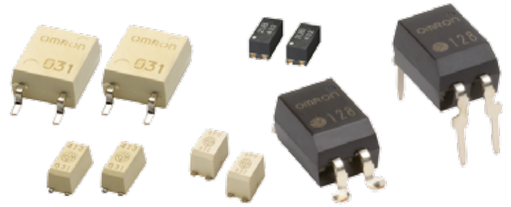
Ultrasensitive type

- Ideal for energy-saving & battery-driven devices
- Ultrasensitive driving current (LED forward current) 0.2 mA (max.)
- SOP4 available

Model	Load voltage (V) Max.	Continuous load current (mA) Max.	Trigger LED forward current (mA) Max.	Recommended Trigger LED forward current (mA) Max.
G3VM-61G2	60	400	1	2
G3VM-61G3 *NEW*	60	400	0.2	0.5
G3VM-201G1	200	200	1	2
G3VM-201G2 *NEW*	200	200	0.2	0.5
G3VM-351G1	350	100	1	2
G3VM-401G1 *NEW*	400	100	0.2	0.5
G3VM-601G1 *NEW*	600	70	0.2	0.5
G3VM-601G	600	90	1	2

Low output capacitance and on-resistance type (low CxR)

- Ideal for semiconductor test equipment
- Low C (capacitance between terminals) x R (output on-resistance type)
- Enables clear signal transfer at high frequency characteristics



SSOP package

Model	Load voltage (V) Max.	Continuous load current (mA) Max.	Maximum resistance with output ON(Ω) Typ.	Capacitance 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

USOP package

Model		Load voltage (V) Max.	Continuous load current (mA) Max.	Maximum resistance with output ON(Ω) Typ.	Capacitance between terminals (pF) Typ.
G3VM-21PR1	***NEW***	20	450	0.6	5
G3VM-21PR10	***NEW***	20	200	3	0.8
G3VM-21PR11	***NEW***	20	900	0.18	40
G3VM-41PR12	***NEW***	40	100	15	0.3
G3VM-41PR6	***NEW***	40	120	10	1
G3VM-41PR10	***NEW***	40	120	12	0.45
G3VM-41PR11	***NEW***	40	140	7	0.7
G3VM-61PR1	***NEW***	60	120	10	0.7

USOP package

Model		Load voltage (V) Max.	Continuous load current (mA) Max.	Maximum resistance with output ON(Ω) Typ.	Capacitance between terminals (pF) Typ.
G3VM-21UR10	***NEW***	20	200	3	0.8
G3VM-21UR1	***NEW***	20	450	0.8	5
G3VM-21UR11	***NEW***	20	1000	0.18	40
G3VM-41UR12	***NEW***	40	100	15	0.3
G3VM-41UR10	***NEW***	40	120	12	0.45
G3VM-41UR11	***NEW***	40	140	7	0.7
G3VM-61UR1	***NEW***	60	120	10	0.7

G3VM model number legend

G3VM-□□ □ □ □ □ □
(① ② ③ ④ ⑤)

① Load voltage

2:20V 10:100V
4:40V 20:200V
5:50V 35:350V
6:60V 40:400V
7:75V 60:600V
8:80V

② Contact form

1: 1a(SPST-NO)
2: 2a(DPST-NO)
3: 1b(SPST-NC)
4: 2b(DPST-NC)
5: 1a1b
(SPST-NO/SPST-NC)

③ Package type

A: DIP 4pin PCB Terminals
B: DIP 6pin PCB Terminals
C: DIP 8pin PCB Terminals
D: DIP 4pin Surface-mounting Terminals
E: DIP 6pin Surface-mounting Terminals
F: DIP 8pin Surface-mounting Terminals
G: SOP 4pin
H: SOP 6pin
J: SOP 8pin
L: SSOP 4pin
P: USOP 4pin
U: VSON 4pin
V: SOP 4pin (Special)

④ Additional functions

L: Current limit
R: Low ON-resistance type
Y: Dielectric strength between I/O above 2.5 kV type

⑤ Other information

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), l (English letter) is 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.

See more relays at **www.components.omron.eu**

About Omron

Omron Corporation is a global leader in the field of automation. It provides a variety of products and services in the fields of industrial automation, electronic component industries and healthcare.

Based in Kyoto, Japan, Omron has head offices in Kyoto, Singapore, Hong Kong, Amsterdam and Chicago. It employs more than 37,000 people in 36 countries. The European division has its own development and manufacturing facilities. Local customer support is provided in all European countries.

Omron seeks to anticipate the needs of future generations. This is the inspiration for all our products and services. We engage with customers to advance not just products, but also the way they are created and used. From the birth of an idea to the production line and right through R&D, shipping and aftersales, we are continually exploring new possibilities. Our aim is to create maximum value for you.

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