

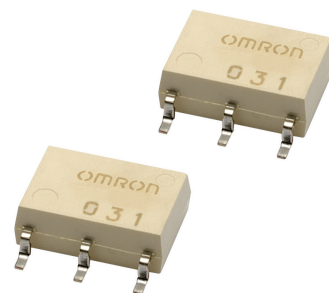
# G3VM-21HR/31HR/31HR1/41HR

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 or 40 V
- 20-V Relay (21HR): Continuous load current of 2.5 A (5 A) max. \*
- 30-V Relay (31HR): Continuous load current of 4 A (8 A) max. \*
- 30-V Relay (31HR1): Continuous load current of 4.5 A (9 A) max. \*
- 40-V Relay (41HR): Continuous load current of 2.5 A (5 A) max. \*

\* Values in parentheses are for connection C.



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

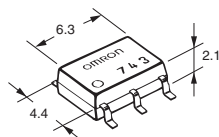
RoHS Compliant

### Application Examples

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

### 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. Contact form         | 3. Package                                                               |
| 2 : 20 V        | 1 : 1a (SPST-NO)        | H : SOP 6-pin                                                            |
| 3 : 30 V        |                         |                                                                          |
| 4 : 40 V        | 4. Additional functions | 5. Other informations                                                    |
|                 | R : Low ON resistance   | 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                      |
|         |              |                            | 30 V                        | 4.5 A                                  | 9 A          | G3VM-31HR1      |                          | G3VM-31HR1(TR05) |                          |
|         |              |                            | 40 V                        | 2.5 A                                  | 5 A          | G3VM-41HR       |                          | G3VM-41HR(TR)    | 2,500                    |

\* The AC peak and DC value are given for the load voltage and continuous load current.

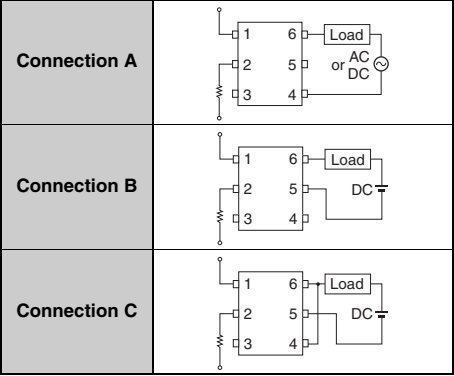
Note: To order tape packaging for Relays with surface-mounting terminals, add "(TR)" or "(TR05)" to the end of the model number.

■Absolute Maximum Ratings (Ta = 25°C)

| Item                              |                                    | Symbol              | G3VM-21HR           | G3VM-31HR | G3VM-31HR1  | G3VM-41HR  | Unit             | Measurement conditions        |                                                    |
|-----------------------------------|------------------------------------|---------------------|---------------------|-----------|-------------|------------|------------------|-------------------------------|----------------------------------------------------|
| Input                             | LED forward current                | I <sub>F</sub>      | 30                  |           |             |            | mA               |                               |                                                    |
|                                   | LED forward current reduction rate | ΔI <sub>F</sub> /°C | -0.3                |           |             |            | mA/°C            | Ta ≥ 25°C                     |                                                    |
|                                   | LED reverse voltage                | V <sub>R</sub>      | 5                   |           | 6           | 5          | V                |                               |                                                    |
|                                   | Connection temperature             | T <sub>J</sub>      | 125                 |           |             |            | °C               |                               |                                                    |
| Output                            | Load voltage (AC peak/DC)          |                     | V <sub>OFF</sub>    | 20        | 30          |            | 40               | V                             |                                                    |
|                                   | Continuous load current            | Connection A        | I <sub>O</sub>      | 2500      | 4000        | 4500       | 2500             | mA                            | Connection A: AC peak/DC<br>Connection B and C: DC |
|                                   |                                    | Connection B        |                     |           |             |            |                  |                               |                                                    |
|                                   |                                    | Connection C        |                     | 5000      | 8000        | 9000       | 5000             |                               |                                                    |
|                                   | ON current reduction rate          | Connection A        | ΔI <sub>O</sub> /°C | -33.3     | -40         | -45        | -33.3            | mA/°C                         | G3VM-31HR/31HR1:<br>Ta ≥ 25°C<br>Others: Ta ≥ 50°C |
|                                   |                                    | Connection B        |                     |           |             |            |                  |                               |                                                    |
|                                   |                                    | Connection C        |                     | -66.7     | -80         | -90        | -66.7            |                               |                                                    |
|                                   | Pulse ON current                   |                     | I <sub>OP</sub>     | 7.5       | 12          | 13.5       | 7.5              | A                             | t=100 ms, Duty=1/10                                |
|                                   | Connection temperature             |                     | T <sub>J</sub>      | 125       |             |            |                  | °C                            |                                                    |
| Dielectric strength between I/O * |                                    | V <sub>I-O</sub>    | 1500                |           |             |            | V <sub>RMS</sub> | AC for 1 min                  |                                                    |
| Ambient operating temperature     |                                    | T <sub>a</sub>      | -40 to +85          |           | -40 to +110 | -40 to +85 | °C               | With no icing or condensation |                                                    |
| Ambient storage temperature       |                                    | T <sub>stg</sub>    | -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.

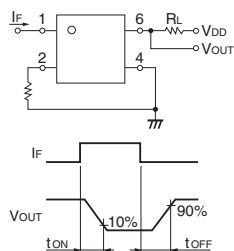
Connection Diagram



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

| Item                                        |                                        |                 | Symbol            |         | G3VM-21HR       | G3VM-31HR | G3VM-31HR1 | G3VM-41HR | Unit                    | Measurement conditions                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------|----------------------------------------|-----------------|-------------------|---------|-----------------|-----------|------------|-----------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input                                       | LED forward voltage                    |                 | V <sub>F</sub>    | Minimum | 1.18            |           | 1.50       | 1.18      | V                       | I <sub>F</sub> =10 mA                                                                                                                                                                                                                                                                                                                                                            |
|                                             |                                        |                 |                   | Typical | 1.33            |           | 1.65       | 1.33      |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        |                 |                   | Maximum | 1.48            |           | 1.80       | 1.48      |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | Reverse current                        |                 | I <sub>R</sub>    | Maximum | 10              |           |            |           | μA                      | V <sub>R</sub> =5 V                                                                                                                                                                                                                                                                                                                                                              |
|                                             | Capacitance between terminals          |                 | C <sub>T</sub>    | Typical | 70              |           |            |           | pF                      | V=0, f=1 MHz                                                                                                                                                                                                                                                                                                                                                                     |
|                                             | Trigger LED forward current            |                 | I <sub>FT</sub>   | Typical | —               | 0.3       |            | 0.4       | mA                      | G3VM-31HR1 : I <sub>o</sub> =1000 mA<br>Others : I <sub>o</sub> =100 mA                                                                                                                                                                                                                                                                                                          |
| Maximum                                     |                                        |                 |                   | 3       |                 |           |            |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
| Release LED forward current                 |                                        | I <sub>FC</sub> | Minimum           | 0.1     |                 |           |            | mA        | I <sub>OFF</sub> =10 μA |                                                                                                                                                                                                                                                                                                                                                                                  |
| Output                                      | Maximum resistance with output ON      | Connection A    | R <sub>ON</sub>   | Typical | 0.02            | 0.02      | 0.022      | 0.03      | Ω                       | G3VM-31HR:<br>I <sub>F</sub> =5 mA<br>I <sub>o</sub> =4 A (Connection A, B)<br>I <sub>o</sub> =8 A (C connections), t<1s<br>G3VM-31HR1:<br>I <sub>F</sub> =5 mA<br>I <sub>o</sub> =4.5 A (Connection A, B)<br>I <sub>o</sub> =9 A (C connections), t<1s<br>Others:<br>I <sub>F</sub> =5 mA<br>I <sub>o</sub> =2 A (Connection A, B)<br>I <sub>o</sub> =4 A (C connections), t<1s |
|                                             |                                        | Connection B    |                   |         | 0.01            | 0.008     | 0.011      | 0.015     |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        | Connection C    |                   |         | 0.005           | 0.004     | 0.006      | 0.008     |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        | Connection A    | Maximum           | 0.05    | 0.04            | 0.03      | 0.06       |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        | Connection B    |                   | 0.025   | 0.02            | 0.015     | 0.03       |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        | Connection C    |                   | —       | 0.01            | 0.008     | —          |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | Current leakage when the relay is open |                 | I <sub>LEAK</sub> | Typical | —               |           |            |           | nA                      | V <sub>OFF</sub> = Load voltage ratings                                                                                                                                                                                                                                                                                                                                          |
|                                             |                                        |                 |                   | Maximum | 10              | 1000      |            | 10        |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | Capacitance between terminals          |                 | C <sub>OFF</sub>  | Typical | 1000            | 1100      | 1200       | 1000      | pF                      | V=0, f=1 MHz                                                                                                                                                                                                                                                                                                                                                                     |
|                                             |                                        |                 |                   | Maximum | —               |           |            |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
| Capacitance between I/O terminals           |                                        |                 | C <sub>I-O</sub>  | Typical | 0.8             |           |            |           | pF                      | f=1 MHz, V <sub>s</sub> =0 V                                                                                                                                                                                                                                                                                                                                                     |
| Insulation resistance between I/O terminals |                                        |                 | R <sub>I-O</sub>  | Minimum | 1000            |           |            |           | MΩ                      | V <sub>I-O</sub> =500 VDC, R <sub>oH</sub> ≤60%                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        |                 |                   | Typical | 10 <sup>8</sup> |           |            |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
| Turn-ON time                                |                                        |                 | t <sub>ON</sub>   | Typical | 1.5             | 1.1       | 0.6        | 1.0       | ms                      | G3VM-21HR :<br>I <sub>F</sub> =5 mA, R <sub>L</sub> =200 Ω,<br>V <sub>DD</sub> =10 V *<br>Others :<br>I <sub>F</sub> =5 mA, R <sub>L</sub> =200 Ω,<br>V <sub>DD</sub> =20 V *                                                                                                                                                                                                    |
|                                             |                                        |                 |                   | Maximum | 5               |           | 2          | 5         |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
| Turn-OFF time                               |                                        |                 | t <sub>OFF</sub>  | Typical | 0.1             |           | 0.15       |           |                         |                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             |                                        |                 |                   | Maximum | 1               |           | 0.5        | 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.

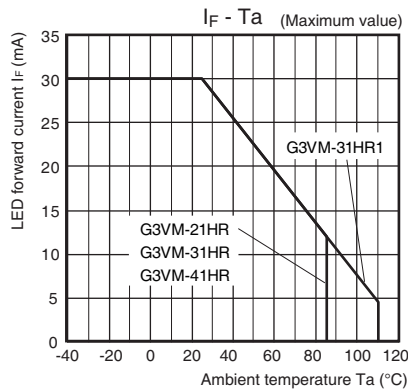
| Item                                 | Symbol          |         | G3VM-21HR | G3VM-31HR | G3VM-31HR1 | G3VM-41HR | Unit |
|--------------------------------------|-----------------|---------|-----------|-----------|------------|-----------|------|
| Load voltage (AC peak/DC)            | V <sub>DD</sub> | Maximum | 20        | 24        |            | 40        | V    |
| Operating LED forward current        | I <sub>F</sub>  | Minimum | 5         |           |            |           | mA   |
|                                      |                 | Typical | 10        |           |            | 7.5       |      |
|                                      |                 | Maximum | 20        | 25        | 20         |           |      |
| Continuous load current (AC peak/DC) | I <sub>O</sub>  | Maximum | 2000      | 4000      | 4500       | 2000      |      |
| Ambient operating temperature        | T <sub>a</sub>  | Minimum | -20       |           |            |           | °C   |
|                                      |                 | Maximum | 65        |           | 85         | 65        |      |

## ■Spacing and Insulation

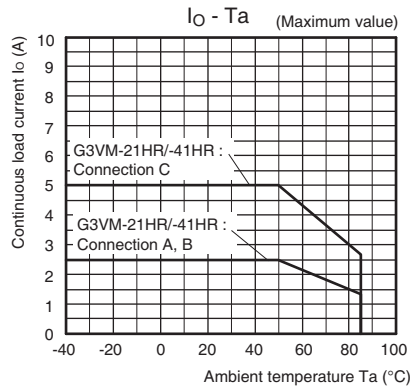
| Item                         | Minimum | Unit |
|------------------------------|---------|------|
| Creepage distances           | 4.0     | mm   |
| Clearance distances          | 4.0     |      |
| Internal isolation thickness | 0.1     |      |

### Engineering Data

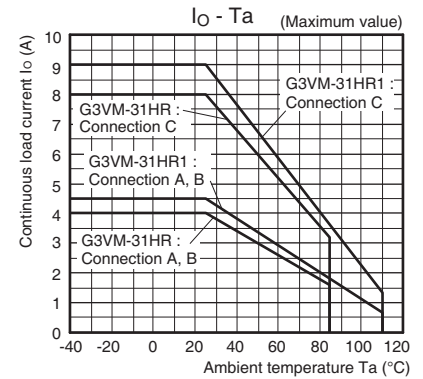
#### LED forward current vs. Ambient temperature



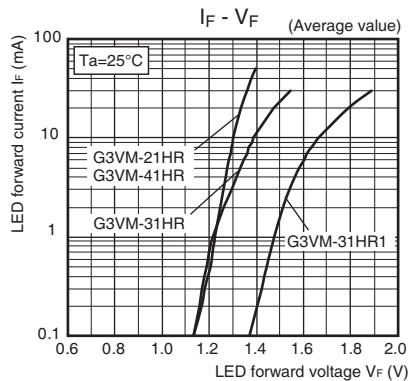
#### Continuous load current vs. Ambient temperature G3VM-21HR/41HR



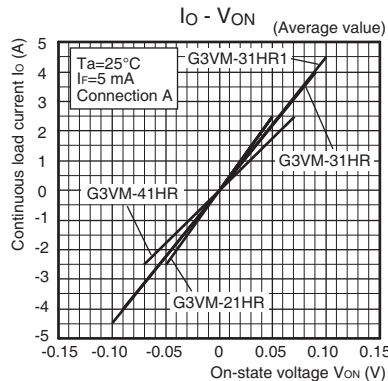
#### G3VM-31HR/31HR1



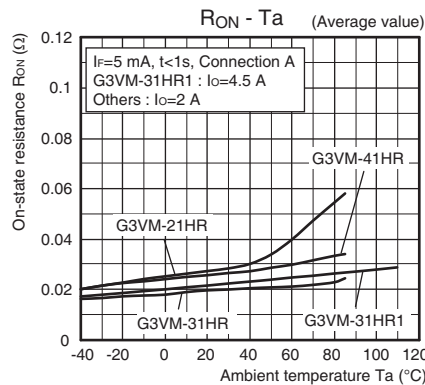
#### LED forward current vs. LED forward voltage



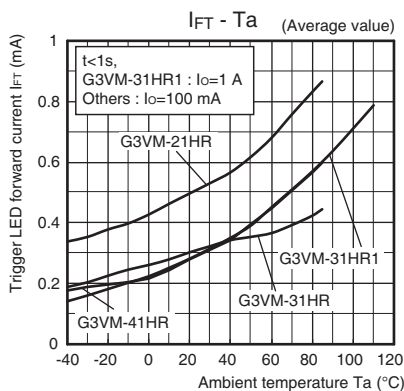
#### Continuous load current vs. On-state voltage



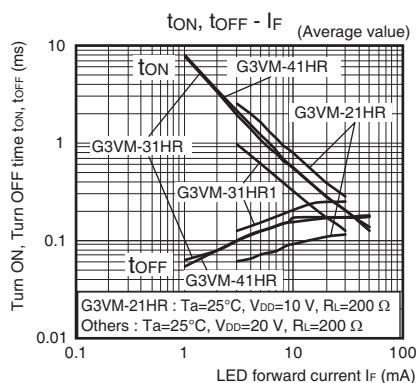
#### On-state resistance vs. Ambient temperature



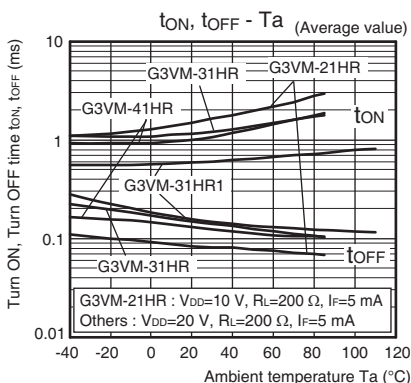
#### Trigger LED forward current vs. Ambient temperature



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

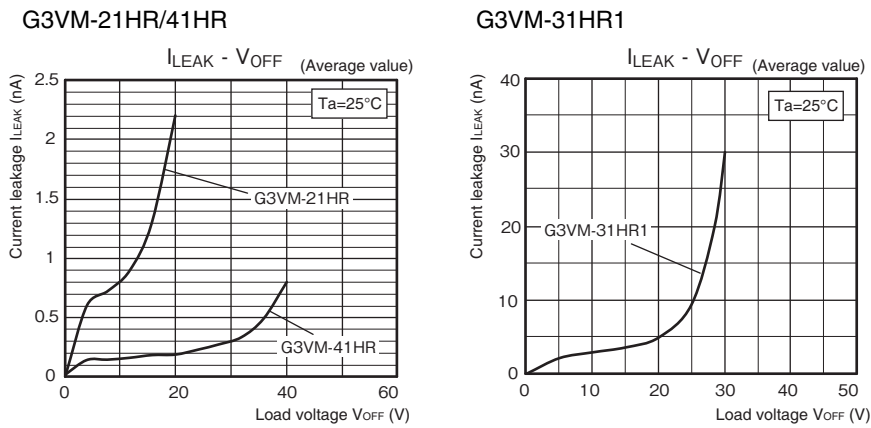


#### Turn ON, Turn OFF time vs. Ambient temperature

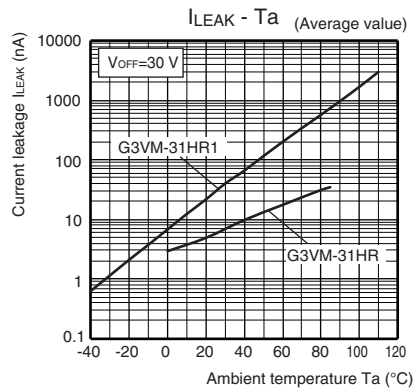


Engineering Data

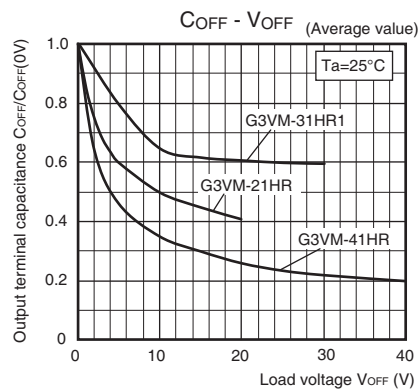
Current leakage vs. Load voltage



Current leakage vs. Ambient temperature  
G3VM-31HR/31HR1



Output terminal capacitance vs. Load voltage  
G3VM-21HR/31HR1/41HR

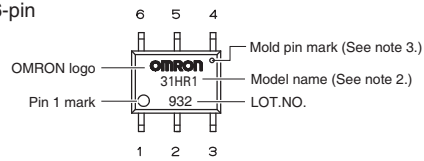


### ■ Appearance / Terminal Arrangement / Internal Connections

#### ● Appearance

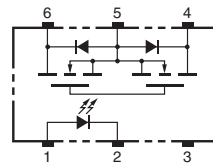
##### SOP (Small Outline Package)

SOP 6-pin

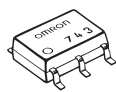


- Note:** 1. The actual product is marked differently from the image shown here.  
**Note:** 2. "G3VM" does not appear in the model number on the Relay.  
**Note:** 3. The indentation in the corner diagonally opposite from the pin 1 mark is from a pin on the mold.

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

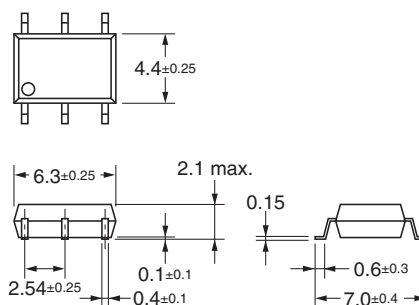


### ■ Dimensions (Unit: mm)



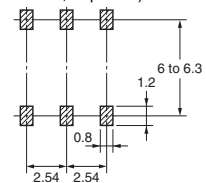
#### Surface-mounting Terminals

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.

SOP

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

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

### OMRON Corporation

Electronic and Mechanical Components Company

#### Regional Contact

##### Americas

<https://www.components.omron.com/>

##### Asia-Pacific

<https://ecb.omron.com.sg/>

##### Korea

<https://www.omron-ecb.co.kr/>

##### Europe

<http://components.omron.eu/>

##### China

<https://www.ecb.omron.com.cn/>

##### Japan

<https://www.omron.co.jp/ecb/>