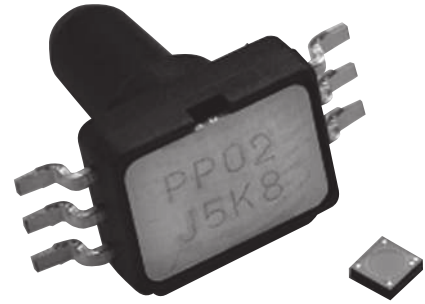


2SMPP-02

MEMS Gauge Pressure Sensor

MEMS Gauge Pressure Sensor Featuring Small Size and Low Power Consumption

- Ultra-miniature 6.1 × 4.7 × 8.2 mm (L × W × H).
- Superior electrical characteristics to capacitive type pressure sensors.
- 0 to 37 kPa pressure range.
 - Offset voltage of -2.5 ± 4 mV
 - Span voltage of 31.0 ± 3.1 mV
- Low Power consumption of 0.2 mW
- Low Temperature Influence
 - Span of $\pm 1.0\%$ FS
 - Offset of $\pm 3.0\%$ FS



RoHS Compliant



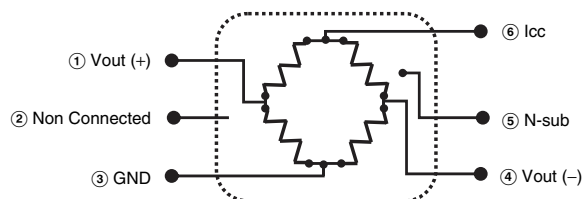
Refer to the *Safety Precautions* on page 6.

Ordering Information

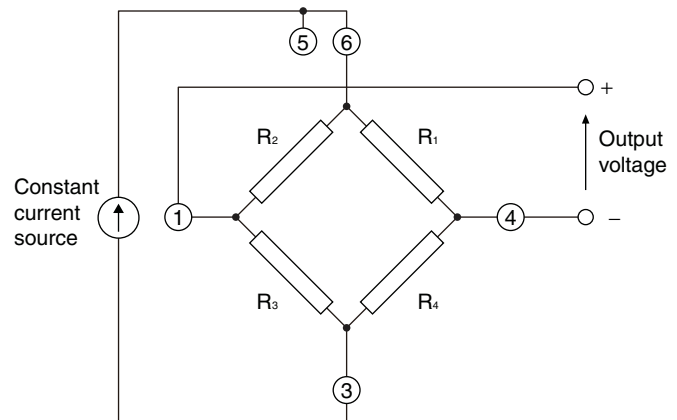
Standard Models with Surface mount package

Model	Classification	Structure	Packaging
2SMPP-02	Bottom Port Type	SOP	Plastic sleeve

Terminal Arrangement



Connection Diagram



Note: If necessary, add a variable resistor below the GND pin (3).
The NC pin (2) must be secured to the circuit board.

Application Examples

- Home appliance
- Air movement control
- Level indicators
- Leak detection
- Pressure controller

Specifications

■ Ratings

Item	2SMPP-02
Type of pressure ^{*1}	Gauge pressure
Sensing method ^{*2}	Piezoresistance
Pressure medium	Air
Driving method	Constant current drive
Drive current	100 μ A DC
Pressure range	0 to 37 kPa
Withstand pressure	53 kPa
Absolute maximum current	130 μ A DC
Ambient operating temperature	0 to 50°C (with no condensation or icing)
Ambient operating humidity	15% to 95% (with no condensation or icing)
Ambient storage temperature	-30 to 85°C (with no condensation or icing)
Ambient storage humidity	10% to 95% (with no condensation or icing)
Weight	0.17 g

Note: The above specifications are the results of measurements taken at an ambient temperature of 23°C.

*1. Do not use the Sensor under negative pressure.

*2. Do not use any corrosive gases. Use only air.

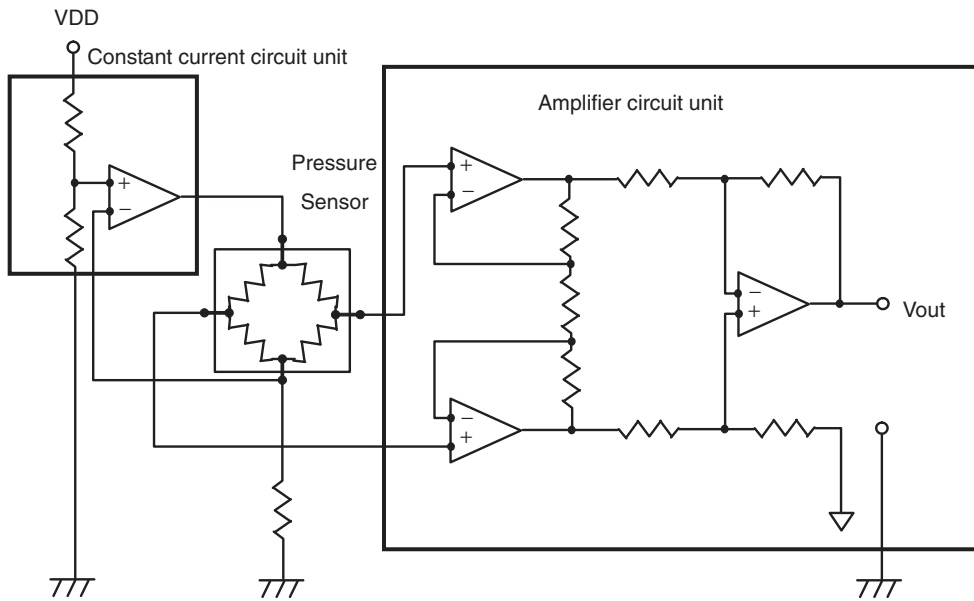
Characteristics

■ Electrical Characteristics

Item	2SMPP-02
Bridge resistance	20 \pm 2 k Ω
Offset voltage	-2.5 \pm 4.0 mV
Span voltage	31.0 \pm 3.1 mV (with an applied pressure of 37 kPa)
Non-linearity	0.8% FS max. (0 to 37 kPa)
Pressure hysteresis	0.5% FS (0 to 37 kPa)
Temperature influence of span voltage	0.5 \pm 1.0% FS (0°C)
	0.3 \pm 1.0% FS (50°C)
Temperature influence of offset voltage	0 \pm 3.0% FS (0 to 25°C)
	0 \pm 3.0% FS (25 to 50°C)

Measurement conditions: Ambient temperature = 23°C, constant current and drive current = 100 μ A

Example of Application Circuit for MEMS Pressure Sensor

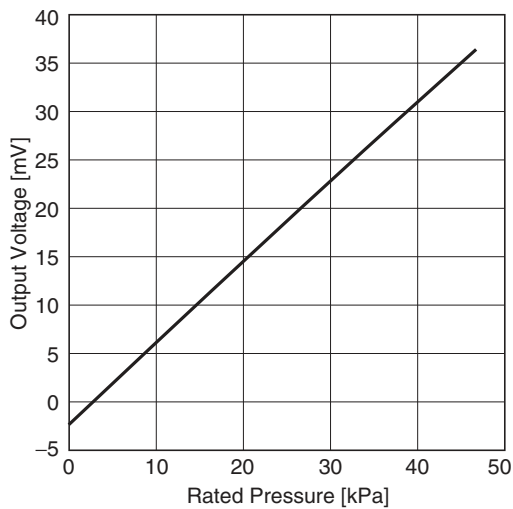


- (1) The pressure sensor is designed to convert a voltage by means of constant current drive.
- (2) Please amplifier the output voltage of the pressure sensor by using the amplifying circuit if necessary.

Engineering Data (for Reference)

■ Output Characteristics

Rated Pressure vs. Output Voltage



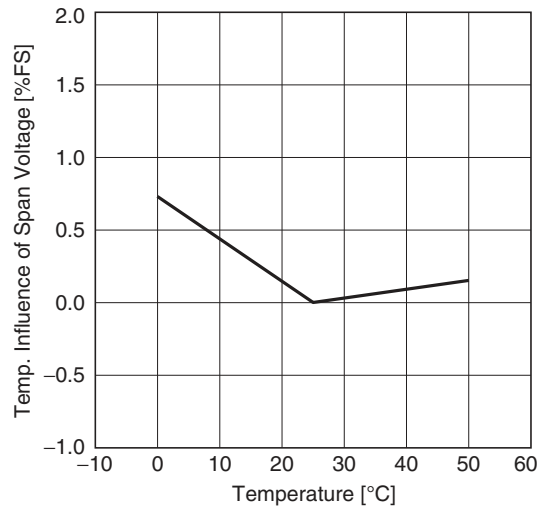
Note: 1. Ambient temperature condition: 25°C

Note: 2. Drive current: 100 μ A

Note: 3. These output voltage characteristics are measured with tester without a mounting board.

Note: 4. The output voltage characteristics may be influenced by the mounting board. Be sure to check operation including durability in actual equipment before use.

Temperature Influence of Span Voltage



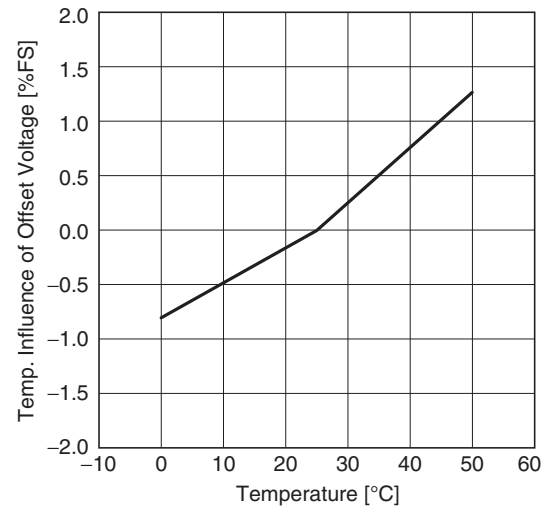
Note: 1. Measured points are 0°C and 25°C, 50°C

Note: 2. Drive current: 100 μ A

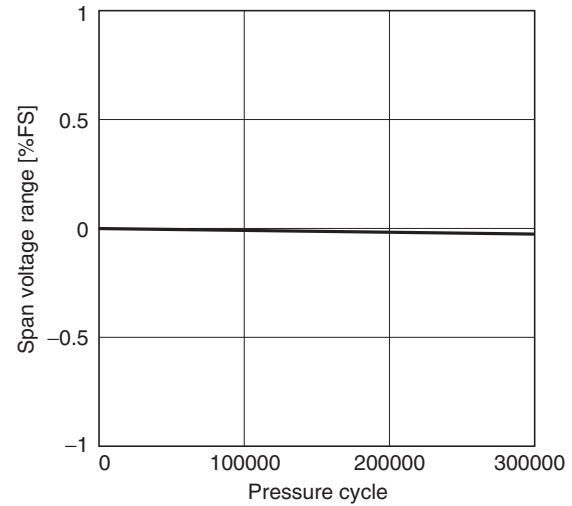
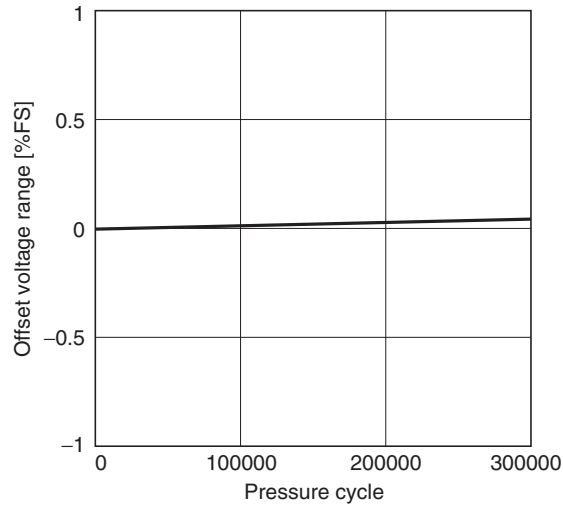
Note: 3. These output voltage characteristics are measured with tester without a mounting board.

Note: 4. The output voltage characteristics may be influenced by the mounting board. Be sure to check operation including durability in actual equipment before use.

Temperature Influence of Offset Voltage



Pressure Cycle Range (0 to 40 kPa)



Note: 1. Tested temperature condition: 25°C

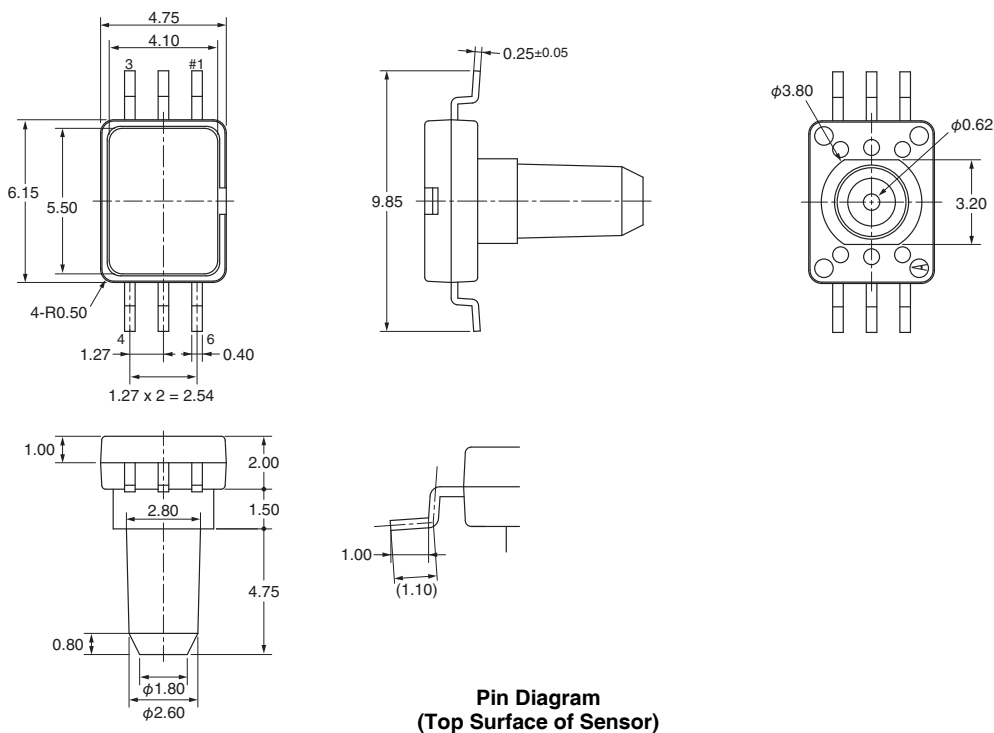
Note: 2. Number of pressure cycle time: 3×10^5

Note: 3. Rated cycle pressure: 0 to 40 kPa

Note: 4. These output voltage characteristics are measured with tester without a mounting board.

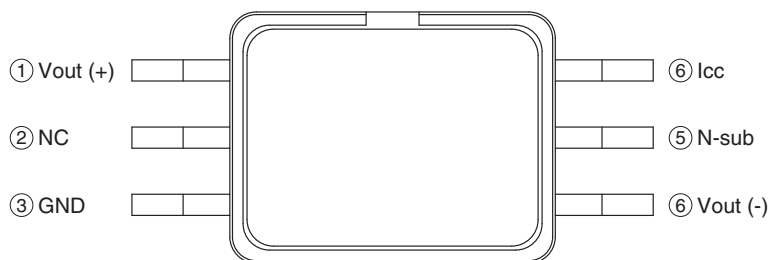
Dimensions

Note: All units are in millimeters unless otherwise indicated.

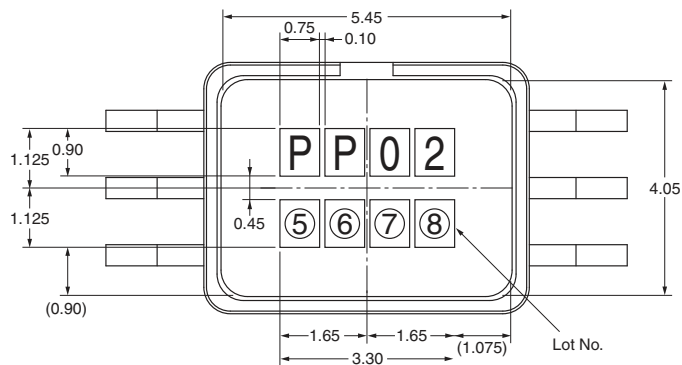


Pin Diagram
(Top Surface of Sensor)

Atmospheric pressure hole



Markings



Note: Unless otherwise specified, the tolerance for all of the above drawings is ±0.3 mm.

Safety Precautions

Precautions for Correct Use

Handling the Sensor

- (1) Air is the only pressure medium that may be used directly with the Sensor. Do not use corrosive gases (organic solvent gases, sulfurous gases, hydrogen sulfide gas, etc.) or pressure mediums containing water particles. These pressure mediums may cause malfunctions.
- (2) The Sensor is not drip-proof. Do not use the Sensor in any environment where it may be subjected to water or other liquids.
- (3) Do not use the Sensor in any environment where condensation may occur. If moisture freezes on the Sensor chip, variations may occur in the Sensor output or the Sensor may malfunction.
- (4) Do not insert wires, pins, or any other foreign objects into the connecting tube. Doing so could destroy the pressure sensor chip inside the Sensor, or the foreign object may become stuck inside the connecting tube and affect the Sensor output.
- (5) Always stay within the rated pressure range. Using a pressure outside of this range may damage the Sensor.
- (6) Do not use the Sensor in any environment subject to vibration from ultrasonic or high-frequency waves.
- (7) The Sensor output may be affected if the pressure sensor chip is exposed to light. Do not expose the Sensor chip to light.
- (8) Static electricity may destroy the Sensor. Any charged materials or surfaces, such as workbenches, floors, or technicians, must be properly grounded to prevent static electricity.
- (9) Applying excessive force to the pins may deform them and damage the soldering. Do not drop the Sensor and always handle it with care. Do not use the Sensor in any environment that is subject to excessive steam or dust.
- (10) Refer to the connection diagrams when connecting the pins on the Sensor.
- (11) Do not connect to the pins on the Sensor in the wrong direction. Doing so may cause variations in Sensor output or malfunctions.
- (12) External noise may effect the Sensor output. Take any necessary measures to eliminate external noise.

Transportation and Storage

- (1) Do not store the Sensor in any environment that contains corrosive gases (organic solvent gases, sulfurous gases, hydrogen sulfide gas, etc.).
- (2) The Sensor is not drip-proof. Do not store the Sensor in any environment where it may be subjected to water or other liquids.
- (3) The cardboard packaging will deteriorate over time depending on the humidity, number of boxes stacked on top, and other factors. Follow the first in, first out rule for storage. Do not drop or throw the Sensor. Handle it with care.
- (4) If the inner packaging is dropped, the stopper may be dislodged from the tube causing the Sensor to fall out and become damaged.
- (5) The surface of the tube containing the Sensor is coated in a film to prevent static electricity. Observe the following items regarding this protective coating:
 1. Avoid exposure to water, which may wash away the protective coating.
 2. The protective anti-static electricity coating may be sticky to the touch in high-temperature, high-humidity environments.
 3. The protective anti-static electricity coating degrades over time. Do not store the Sensor for more than 6 months. Also, do not reuse the packaging.
- (6) Store the Sensor in an environment with suitable temperature and humidity levels.
 - Temperature: 5 to 30°C, Humidity: 40% to 60%
- (7) Leads are silver-plated and may change color over time depending on the storage conditions. Discoloration after the Sensor is delivered is not covered under warranty. Be sure to store the Sensor under the proper conditions.
- (8) Do not store the Sensor in any environment with excessive steam or dust.

Mounting Method

- Mount the Sensor on the land pattern of a printed circuit board.
- Solder pin 2 securely to the printed circuit board in order to maintain the mechanical strength of the mounted Sensor.

Soldering Method

- Due to its small size, the heat capacity of the Sensor is limited. Therefore, measures must be taken to minimize the effects of heating from external sources.
- Solder bath submersion: 260°C max. for 10 seconds max.
- Soldering iron: 260°C max. for 10 seconds max.
- Apply heat to the Sensor pins only, and not to the Sensor package.
- Do not use any flux that may release corrosive gases. Do not allow any flux to enter the inside of the case.

Cleaning

- Do not allow any cleaning liquid to enter the inside of the case.
- Do not use ultrasonic cleaning. Doing so may break connections.
- Do not use any cleaning liquids that contain silicone. Such cleaning liquids may remain on the surface of the Sensor.

Coating

- Do not apply any coating to the Sensor.

Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

- (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
- (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

Limitation on Liability; Etc.

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

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/>