# Type TL-PP702 Flat Proximity Switch

OMRON

■ Features

- Two-wire DC proximity switch with built-in connector.
- 4 mm in thickness.
- Prevention of connector disconnection and improvement of insertion easiness achieved with the use of compatible positive lock connector.

■ Principle of operation

An impedance change in the detection coil of the high-frequency electronic oscillator allows a metallic object to be detected.
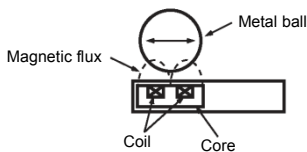

■ Type

TL-PP702: Standard frequency type

■ Specifications

Item	Rating/performance
Detection distance (*1)	5.0 to 6.2 mm
Hysteresis (*2)	0.2 to 2 mm
Distance setting	4.0 mm or less (*3)
Object to be detected	Metal ball (Ø11 ± 0.05 mm)
Power voltage	12 DCV ± 10 %, 15 DCV ± 10 %, 18 DCV ± 10 %, 24 DCV ± 10 %
Leakage current (*4)	0.2 to 1.0 mA
Residual voltage (*5)	Under power voltage 12 DCV: 5.4 to 7.0 V, Under power voltage 15 DCV: 5.4 to 7.0 V Under power voltage 18 DCV: 5.4 to 7.0 V, Under power voltage 24 DCV: 5.4 to 7.0 V
Load resistance	Under power voltage 12 DCV ± 10%: 680 Ω (-5%) to 1.1 kΩ (+5%) Under power voltage 15 DCV ± 10%: 1.1 kΩ (-5%) to 1.6 kΩ (+5%) Under power voltage 18 DCV ± 10%: 1.5 kΩ (-5%) to 2.2 kΩ (+5%) Under power voltage 24 DCV ± 10%: 2.2 kΩ (-5%) to 3.6 kΩ (+5%)
Way of operation	Metal ball present: Output transistor OFF Metal ball absent: Output transistor ON
Response frequency	100 Hz or more
Ambient temperature	When in operation: -10 to 60 deg C (must be free from freezing or condensation) When stored: -20 to 70 deg C (must be free from freezing or condensation)
Ambient humidity	25 to 85% RH
Effect of temperature	Within the temperature range of -10 to 60 deg C, the rate of change in the detection range must be within ±20% relative to the range provided at 23 deg C.
Effect of voltage	Within the ±10% variation in the rated voltage, the rate of change in the detection range must be within ±5%.

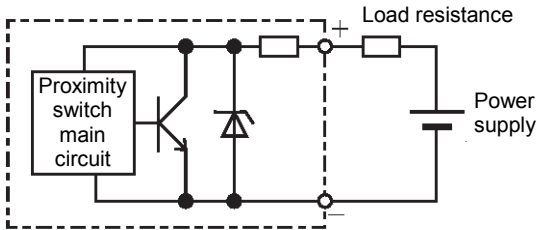*1, 2. The detection distance and hysteresis are as shown below.
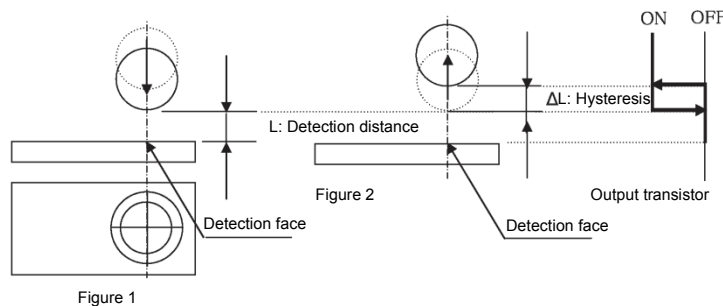
*3. The setting must allow metal balls to pass through the space within 4 mm from the detection face of the proximity switch.
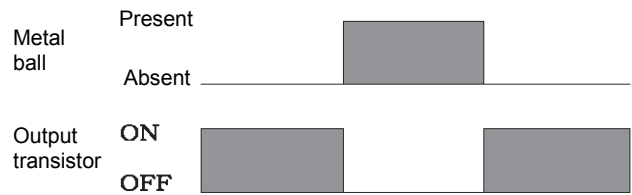*4. Leakage current refers to the current that runs through the proximity switch when the output transistor is off.
*5. Residual Voltage refers to the voltage at both ends of the proximity switch when the output transistor is on.

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■ Output circuit diagram

Load resistance

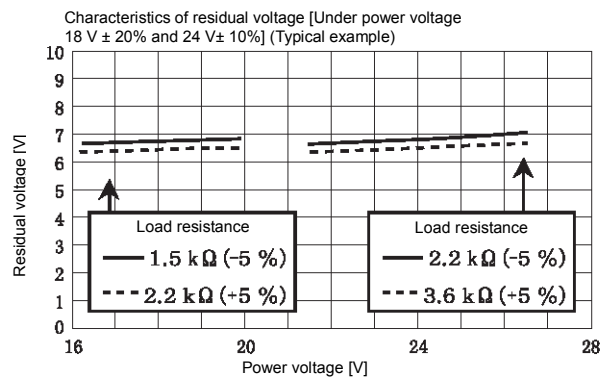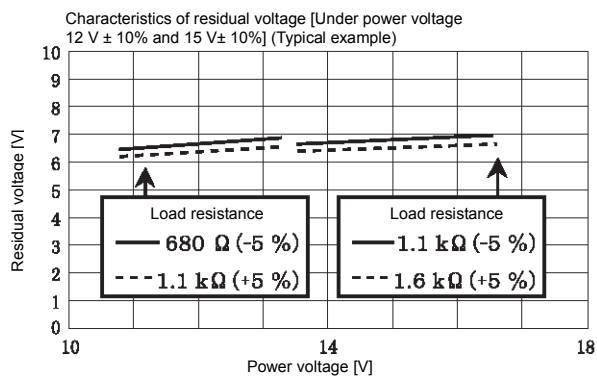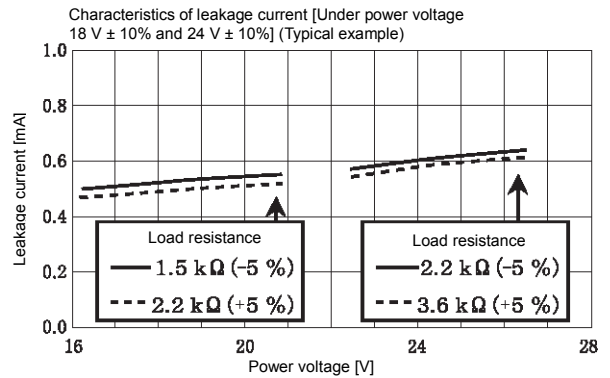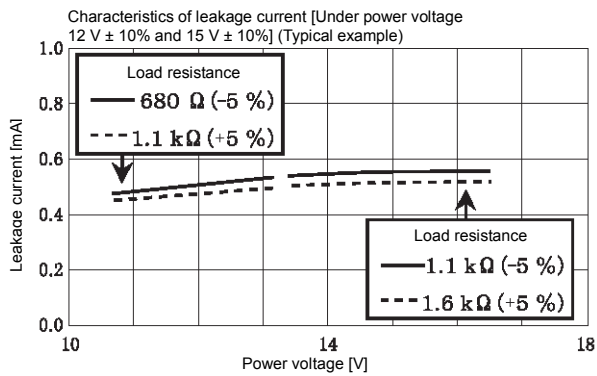Proximity switch main circuit

+

Load resistance

Power supply

–

* Load resistance can be connected to either + or – side.

■ Operation chart

Metal ball — Present / Absent

Output transistor — ON / OFF

■ Data of characteristics

Characteristics of leakage current [Under power voltage 12 V ± 10% and 15 V ± 10%] (Typical example)

Leakage current [mA] vs Power voltage [V]

Load resistance
680 Ω (−5 %)
1.1 kΩ (+5 %)

Load resistance
1.1 kΩ (−5 %)
1.6 kΩ (+5 %)

Characteristics of leakage current [Under power voltage 18 V ± 10% and 24 V ± 10%] (Typical example)

Leakage current [mA] vs Power voltage [V]

Load resistance
1.5 kΩ (−5 %)
2.2 kΩ (+5 %)

Load resistance
2.2 kΩ (−5 %)
3.6 kΩ (+5 %)

Characteristics of residual voltage [Under power voltage 12 V ± 10% and 15 V± 10%] (Typical example)

Residual voltage [V] vs Power voltage [V]

Load resistance
680 Ω (−5 %)
1.1 kΩ (+5 %)

Load resistance
1.1 kΩ (−5 %)
1.6 kΩ (+5 %)

Characteristics of residual voltage [Under power voltage 18 V ± 20% and 24 V± 10%] (Typical example)

Residual voltage [V] vs Power voltage [V]

Load resistance
1.5 kΩ (−5 %)
2.2 kΩ (+5 %)

Load resistance
2.2 kΩ (−5 %)
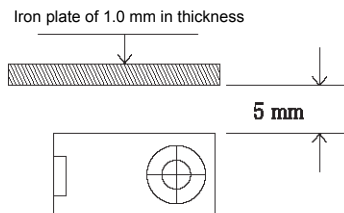3.6 kΩ (+5 %)

* Load resistance refers to the load resistance shown in the above output circuit diagram.

■ Precautions for use

<Effects of metallic objects in the vicinity>
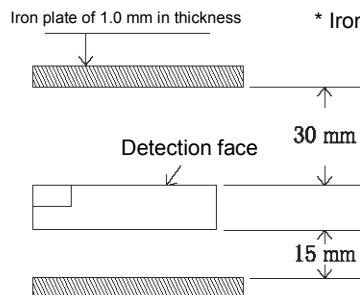When arranging a metallic object near the proximity switch, ensure the distances greater than the ones shown in the following figures.
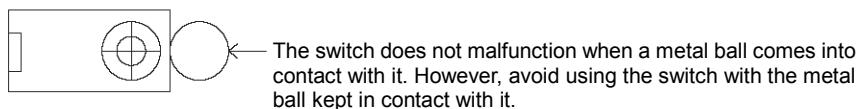
(1) Along the side of case:

Iron plate of 1.0 mm in thickness

5 mm

(2) Over the top or under the bottom of case:

Iron plate of 1.0 mm in thickness

* Iron plate shall be 16 mm x 30 mm.

Detection face

30 mm

15 mm

(3)

The switch does not malfunction when a metal ball comes into contact with it. However, avoid using the switch with the metal ball kept in contact with it.
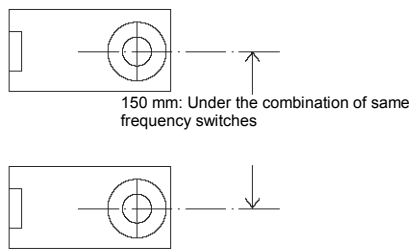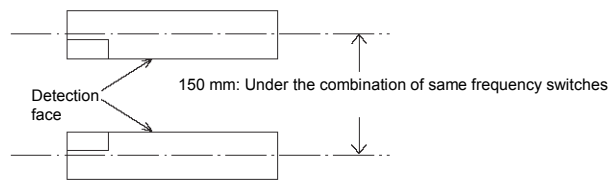
<Mutual interference>
Ensure the distances greater than the ones shown by the values in the figure below to prevent mutual interference.

(1) Parallel arrangement

(2) Faced arrangement

150 mm: Under the combination of same frequency switches

Detection face

150 mm: Under the combination of same frequency switches

<External connection>
In the connection to an external circuit, be careful to prevent reverse connection of power supply and short circuit of a load which cause overcurrent to flow into the proximity switch.
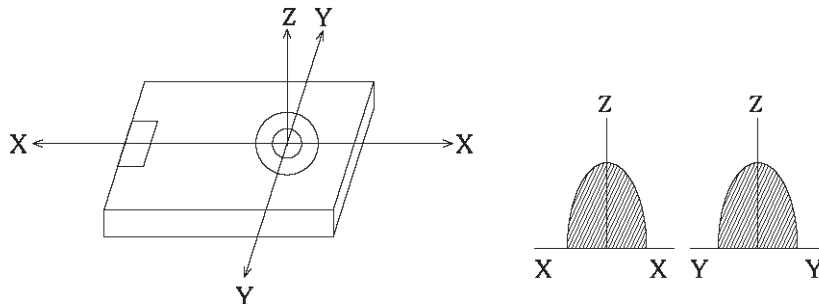
<Others>
(1) Consecutively moving balls cannot be detected.
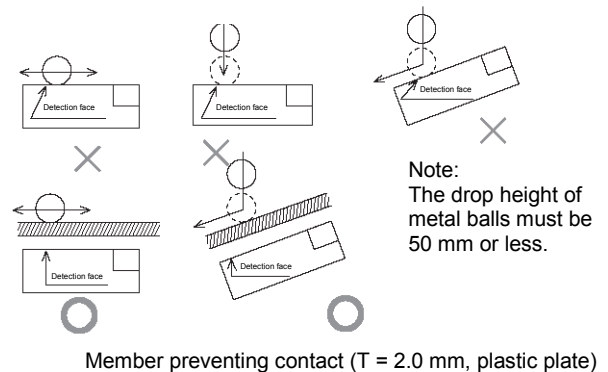To detect each metal ball one by one, make the pitch of metal balls 30 mm or more.
However, the duration of operating time changes according to the location that a metal ball passes and its speed.
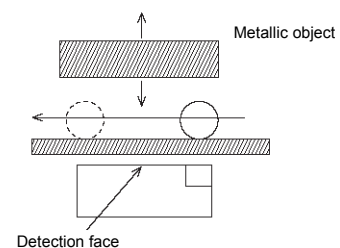The concept of the operation area for metal balls in this switch is as shown in the following figure.

(2) When detecting metal balls, avoid the method of allowing metal balls to directly move on or fall onto the detection face of this switch. Be sure to use a member that prevents them from directly contacting with the detection face.
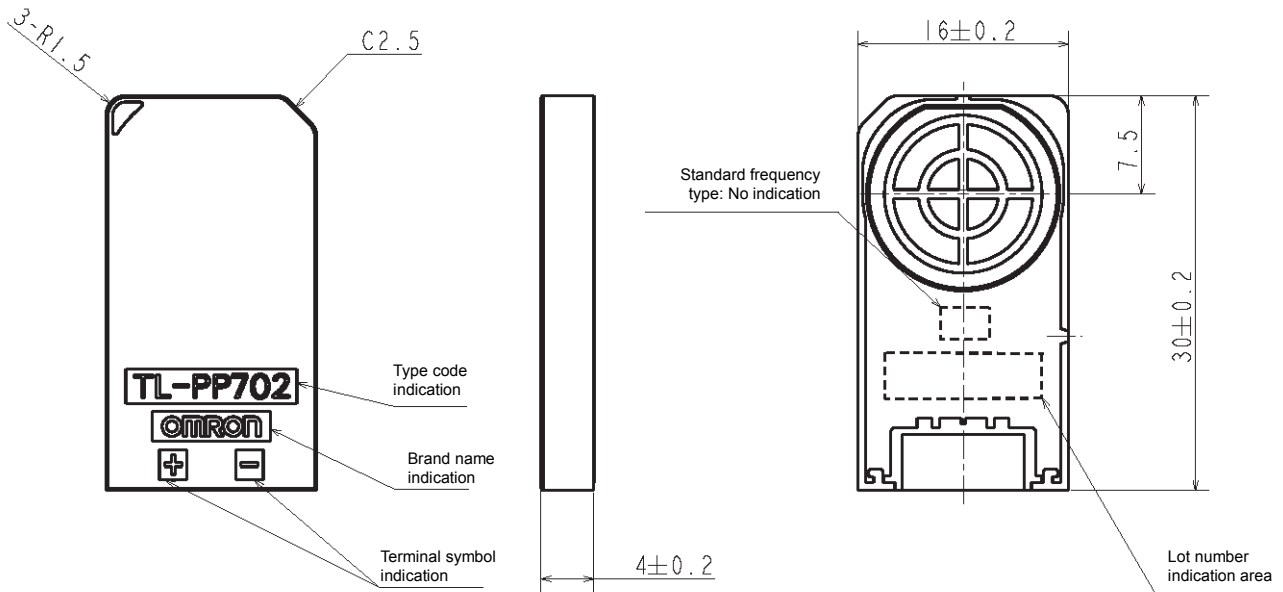Neglecting to do so may break the ferrite core inside the switch due to excessive impact, resulting in characteristic degradation and switch malfunction.

Detection face

Detection face

Detection face

Detection face

Detection face

Note:
The drop height of metal balls must be 50 mm or less.

Member preventing contact (T = 2.0 mm, plastic plate)

(3) If the switch is installed in a way that a metallic object approaches the detection surface, the metallic object itself turns on the switch or detection distance becomes unstable. Be sure to carefully check that these problems do not occur.

Metallic object

Detection face

■ **Exterior dimensions**

3-R1.5 C2.5

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Type code indication
Brand name indication
Terminal symbol indication

4±0.2

16±0.2
7.5
30±0.2

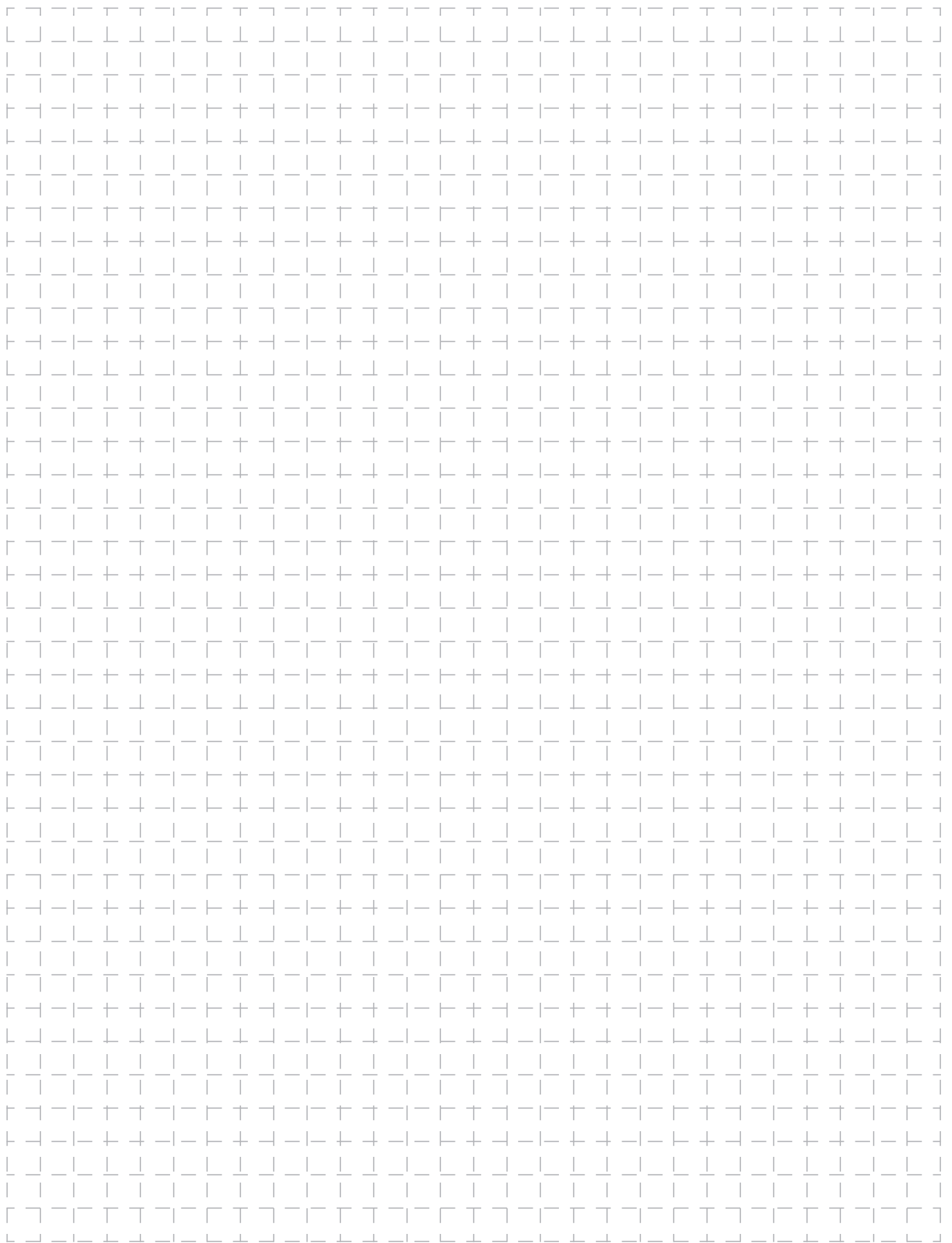Standard frequency type: No indication

Lot number indication area

Note: 1. The following shows the relationship between the connector terminal numbers and terminal symbols.

Connector terminal No.	Terminal symbol
1	-
2	+

2. The housing compatible with the connector shall be Type 502079-020* made by Molex Japan LLC.
3. The exterior dimensions shall not include the gate mark for resin filling. The above gate mark shall be 0.3 at maximum.
4. Lot number shall be displayed in 4 digits at the location specified in the figure.

(PITCH 4.6)
10.4
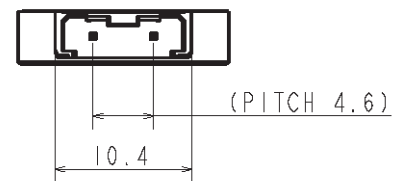
* Unless otherwise specified, the dimensional tolerance shall be IT16. [Unit: mm]

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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