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RoHS compliant

### FEATURES

- 1. Small size, Low height**  
L: 31 mm × W: 16 mm × H: 9 mm L: 1.220 inch × W: .630 inch × H: .354 inch
- 2. Low Insertion Loss**  
Achieved 1dB max. insertion loss (Typ. 0.5dB)
- 3. Non-latching and latching types available.**
- 4. Conforms to Telcordia GR-1221-core**  
Everything is produced under one roof from internal mechanical relays to optical

products. We ensure high reliability by harnessing our powerful production technology that has been cultivated over many years.

### APPLICATIONS

- Optical ADM equipment
- Protection switching (WDM, CATV, FTTH)
- Optical measuring instrument

### ORDERING INFORMATION

| AWAP   |            |         |         |              |  |  |
|--|------------|---------|---------|--------------|--|--|
| WA Optical Switch  |            |         |         |              |  |  |
| Switch type  |            |         |         |              |  |  |
| 0: 1 × 2   |            |         |         |              |  |  |
| 1: 2 × 2   |            |         |         |              |  |  |
| Fiber type and wavelength                                      |            |         |         |              |  |  |
|  | Wavelength | 1310 nm | 1550 nm | 1310/1550 nm |  |  |
| Fiber type   |            |         |         |              |  |  |
| Single mode (9/125/900)  |            | 0       | 1       | 2            |  |  |
|  | Wavelength | 850 nm  | 1310 nm | 850/1310 nm  |  |  |
| Fiber type   |            |         |         |              |  |  |
| Multi mode (50/125/900)  |            | 3       | 4       | 5            |  |  |
| Multi mode (62.5/125/900)                                      |            | 6       | 7       | 8            |  |  |
| Operation type   |            |         |         |              |  |  |
| 0: Non-latching type   |            |         |         |              |  |  |
| 1: 1-coil latching type  |            |         |         |              |  |  |
| 2: 2-coil latching type  |            |         |         |              |  |  |
| Connector type (For other connector types, please contact us.) |            |         |         |              |  |  |
| Connector type   | SC/AdPC    | MU/AdPC |         |              |  |  |
|  | 2          | 3       |         |              |  |  |
| Nominal operating voltage                                      |            |         |         |              |  |  |
| 1: 3 VDC   |            |         |         |              |  |  |
| 6: 4.5 VDC   |            |         |         |              |  |  |
| 9: 5 VDC   |            |         |         |              |  |  |

### TYPES

#### 1. 1 × 2 type (single mode)

| Wavelength  | Nominal operating voltage | Non-latching type |                   | 1-coil latching type |                   | 2-coil latching type |                   |
|-------------|---------------------------|-------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
|             |                           | SC/AdPC connector | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector |
| 1310±20nm   | 3V                        | AWAP00021         | AWAP00031         | AWAP00121            | AWAP00131         | AWAP00221            | AWAP00231         |
|             | 4.5V                      | AWAP00026         | AWAP00036         | AWAP00126            | AWAP00136         | AWAP00226            | AWAP00236         |
|             | 5V                        | AWAP00029         | AWAP00039         | AWAP00129            | AWAP00139         | AWAP00229            | AWAP00239         |
| 1550±20nm   | 3V                        | AWAP01021         | AWAP01031         | AWAP01121            | AWAP01131         | AWAP01221            | AWAP01231         |
|             | 4.5V                      | AWAP01026         | AWAP01036         | AWAP01126            | AWAP01136         | AWAP01226            | AWAP01236         |
|             | 5V                        | AWAP01029         | AWAP01039         | AWAP01129            | AWAP01139         | AWAP01229            | AWAP01239         |
| 1310/1550nm | 3V                        | AWAP02021         | AWAP02031         | AWAP02121            | AWAP02131         | AWAP02221            | AWAP02231         |
|             | 4.5V                      | AWAP02026         | AWAP02036         | AWAP02126            | AWAP02136         | AWAP02226            | AWAP02236         |
|             | 5V                        | AWAP02029         | AWAP02039         | AWAP02129            | AWAP02139         | AWAP02229            | AWAP02239         |

Standard packing; Inner carton: 1 pcs., Outer case: 1 pcs.

# WA (AWAP)

## 2. 1 × 2 type (multi mode)

| Fiber type                | Wavelength | Nominal operating voltage | Non-latching type |                   | 1-coil latching type |                   | 2-coil latching type |                   |
|---------------------------|------------|---------------------------|-------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
|                           |            |                           | SC/AdPC connector | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector |
| Multi mode (50/125/900)   | 850±20nm   | 3V                        | AWAP03021         | AWAP03031         | AWAP03121            | AWAP03131         | AWAP03221            | AWAP03231         |
|                           |            | 4.5V                      | AWAP03026         | AWAP03036         | AWAP03126            | AWAP03136         | AWAP03226            | AWAP03236         |
|                           |            | 5V                        | AWAP03029         | AWAP03039         | AWAP03129            | AWAP03139         | AWAP03229            | AWAP03239         |
|                           | 1310±20nm  | 3V                        | AWAP04021         | AWAP04031         | AWAP04121            | AWAP04131         | AWAP04221            | AWAP04231         |
|                           |            | 4.5V                      | AWAP04026         | AWAP04036         | AWAP04126            | AWAP04136         | AWAP04226            | AWAP04236         |
|                           |            | 5V                        | AWAP04029         | AWAP04039         | AWAP04129            | AWAP04139         | AWAP04229            | AWAP04239         |
|                           | 850/1310nm | 3V                        | AWAP05021         | AWAP05031         | AWAP05121            | AWAP05131         | AWAP05221            | AWAP05231         |
|                           |            | 4.5V                      | AWAP05026         | AWAP05036         | AWAP05126            | AWAP05136         | AWAP05226            | AWAP05236         |
|                           |            | 5V                        | AWAP05029         | AWAP05039         | AWAP05129            | AWAP05139         | AWAP05229            | AWAP05239         |
| Multi mode (62.5/125/900) | 850±20nm   | 3V                        | AWAP06021         | AWAP06031         | AWAP06121            | AWAP06131         | AWAP06221            | AWAP06231         |
|                           |            | 4.5V                      | AWAP06026         | AWAP06036         | AWAP06126            | AWAP06136         | AWAP06226            | AWAP06236         |
|                           |            | 5V                        | AWAP06029         | AWAP06039         | AWAP06129            | AWAP06139         | AWAP06229            | AWAP06239         |
|                           | 1310±20nm  | 3V                        | AWAP07021         | AWAP07031         | AWAP07121            | AWAP07131         | AWAP07221            | AWAP07231         |
|                           |            | 4.5V                      | AWAP07026         | AWAP07036         | AWAP07126            | AWAP07136         | AWAP07226            | AWAP07236         |
|                           |            | 5V                        | AWAP07029         | AWAP07039         | AWAP07129            | AWAP07139         | AWAP07229            | AWAP07239         |
|                           | 850/1310nm | 3V                        | AWAP08021         | AWAP08031         | AWAP08121            | AWAP08131         | AWAP08221            | AWAP08231         |
|                           |            | 4.5V                      | AWAP08026         | AWAP08036         | AWAP08126            | AWAP08136         | AWAP08226            | AWAP08236         |
|                           |            | 5V                        | AWAP08029         | AWAP08039         | AWAP08129            | AWAP08139         | AWAP08229            | AWAP08239         |

Standard packing; Inner carton: 1 pcs., Outer case: 1 pcs.

## 3. 2 × 2 type (single mode)

| Wavelength  | Nominal operating voltage | Non-latching type |                   | 1-coil latching type |                   | 2-coil latching type |                   |
|-------------|---------------------------|-------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
|             |                           | SC/AdPC connector | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector |
| 1310±20nm   | 3V                        | AWAP10021         | AWAP10031         | AWAP10121            | AWAP10131         | AWAP10221            | AWAP10231         |
|             | 4.5V                      | AWAP10026         | AWAP10036         | AWAP10126            | AWAP10136         | AWAP10226            | AWAP10236         |
|             | 5V                        | AWAP10029         | AWAP10039         | AWAP10129            | AWAP10139         | AWAP10229            | AWAP10239         |
| 1550±20nm   | 3V                        | AWAP11021         | AWAP11031         | AWAP11121            | AWAP11131         | AWAP11221            | AWAP11231         |
|             | 4.5V                      | AWAP11026         | AWAP11036         | AWAP11126            | AWAP11136         | AWAP11226            | AWAP11236         |
|             | 5V                        | AWAP11029         | AWAP11039         | AWAP11129            | AWAP11139         | AWAP11229            | AWAP11239         |
| 1310/1550nm | 3V                        | AWAP12021         | AWAP12031         | AWAP12121            | AWAP12131         | AWAP12221            | AWAP12231         |
|             | 4.5V                      | AWAP12026         | AWAP12036         | AWAP12126            | AWAP12136         | AWAP12226            | AWAP12236         |
|             | 5V                        | AWAP12029         | AWAP12039         | AWAP12129            | AWAP12139         | AWAP12229            | AWAP12239         |

Standard packing; Inner carton: 1 pcs., Outer case: 1 pcs.

## 4. 2 × 2 type (multi mode)

| Fiber type                | Wavelength | Nominal operating voltage | Non-latching type |                   | 1-coil latching type |                   | 2-coil latching type |                   |
|---------------------------|------------|---------------------------|-------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
|                           |            |                           | SC/AdPC connector | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector | SC/AdPC connector    | MU/AdPC connector |
| Multi mode (50/125/900)   | 850±20nm   | 3V                        | AWAP13021         | AWAP13031         | AWAP13121            | AWAP13131         | AWAP13221            | AWAP13231         |
|                           |            | 4.5V                      | AWAP13026         | AWAP13036         | AWAP13126            | AWAP13136         | AWAP13226            | AWAP13236         |
|                           |            | 5V                        | AWAP13029         | AWAP13039         | AWAP13129            | AWAP13139         | AWAP13229            | AWAP13239         |
|                           | 1310±20nm  | 3V                        | AWAP14021         | AWAP14031         | AWAP14121            | AWAP14131         | AWAP14221            | AWAP14231         |
|                           |            | 4.5V                      | AWAP14026         | AWAP14036         | AWAP14126            | AWAP14136         | AWAP14226            | AWAP14236         |
|                           |            | 5V                        | AWAP14029         | AWAP14039         | AWAP14129            | AWAP14139         | AWAP14229            | AWAP14239         |
|                           | 850/1310nm | 3V                        | AWAP15021         | AWAP15031         | AWAP15121            | AWAP15131         | AWAP15221            | AWAP15231         |
|                           |            | 4.5V                      | AWAP15026         | AWAP15036         | AWAP15126            | AWAP15136         | AWAP15226            | AWAP15236         |
|                           |            | 5V                        | AWAP15029         | AWAP15039         | AWAP15129            | AWAP15139         | AWAP15229            | AWAP15239         |
| Multi mode (62.5/125/900) | 850±20nm   | 3V                        | AWAP16021         | AWAP16031         | AWAP16121            | AWAP16131         | AWAP16221            | AWAP16231         |
|                           |            | 4.5V                      | AWAP16026         | AWAP16036         | AWAP16126            | AWAP16136         | AWAP16226            | AWAP16236         |
|                           |            | 5V                        | AWAP16029         | AWAP16039         | AWAP16129            | AWAP16139         | AWAP16229            | AWAP16239         |
|                           | 1310±20nm  | 3V                        | AWAP17021         | AWAP17031         | AWAP17121            | AWAP17131         | AWAP17221            | AWAP17231         |
|                           |            | 4.5V                      | AWAP17026         | AWAP17036         | AWAP17126            | AWAP17136         | AWAP17226            | AWAP17236         |
|                           |            | 5V                        | AWAP17029         | AWAP17039         | AWAP17129            | AWAP17139         | AWAP17229            | AWAP17239         |
|                           | 850/1310nm | 3V                        | AWAP18021         | AWAP18031         | AWAP18121            | AWAP18131         | AWAP18221            | AWAP18231         |
|                           |            | 4.5V                      | AWAP18026         | AWAP18036         | AWAP18126            | AWAP18136         | AWAP18226            | AWAP18236         |
|                           |            | 5V                        | AWAP18029         | AWAP18039         | AWAP18129            | AWAP18139         | AWAP18229            | AWAP18239         |

Standard packing; Inner carton: 1 pcs., Outer case: 1 pcs.

Note: For other connector types, please contact us.

## RATING

### 1. Coil data (at 20°C 68°F)

| Drive type           | Nominal operating voltage | Nominal operating current (±10%) | Coil resistance (±10%) | Nominal operating power | Max. applied voltage                       |
|----------------------|---------------------------|----------------------------------|------------------------|-------------------------|--|
| Non-latching type    | 3 V DC                    | 83.3 mA                          | 36Ω                    | 250 mW                  | 130% V DC of the nominal operating voltage |
|                      | 4.5 V DC                  | 55.5 mA                          | 81Ω                    |                         |  |
|                      | 5 V DC                    | 50.0 mA                          | 100Ω                   |                         |  |
| 1-coil latching type | 3 V DC                    | 50.0 mA                          | 60Ω                    | 150 mW                  |  |
|                      | 4.5 V DC                  | 33.3 mA                          | 135Ω                   |                         |  |
|                      | 5 V DC                    | 30.0 mA                          | 166.7Ω                 |                         |  |
| 2-coil latching type | 3 V DC                    | 66.7 mA                          | 45Ω                    | 200 mW                  |  |
|                      | 4.5 V DC                  | 44.4 mA                          | 101.3Ω                 |                         |  |
|                      | 5 V DC                    | 40.0 mA                          | 125Ω                   |                         |  |

### 2. Specifications

| Item                            |  | Specifications   |  |
|---------------------------------|--|--|--|
|                                 |  | Single mode  | Multi mode   |
| Optical characteristics         | Insertion loss*1                                       | Max. 1.0 dB  | Max. 1.0 dB  |
|                                 | Isolation  | Min. 60 dB   | Min. 50 dB   |
|                                 | Return loss*1  | Min. 50 dB   | Min. 20 dB   |
|                                 | P.D.L.*1   | Max. 0.1 dB  | —  |
|                                 | Optical input power                                    | Max. 100 mW (20 dBm)   | Max. 100 mW (20 dBm)   |
| Expected life                   | Mechanical life  | Min. 10 <sup>7</sup> (at 20°C 68°F, at 180 cpm)  |  |
| Mechanical characteristics      | Vibration resistance                                   | Functional   | 10 to 55 Hz at double amplitude of 0.75 mm (Optical power fluctuation: Max. 1 dB)  |
|                                 |  | Destructive  | 10 to 55 Hz at double amplitude of 1.52 mm   |
|                                 | Shock resistance (Half-wave pulse of sine wave: 11 ms) | Functional   | Non-latching type: Min. 100 m/s <sup>2</sup> (Optical power fluctuation: 1 dB or less)<br>Latching type: Min. 200 m/s <sup>2</sup> (Optical power fluctuation: 1 dB or less) |
|                                 |  | Destructive  | Min. 500 m/s <sup>2</sup>  |
| Electrical characteristics      | Switching time (at 20°C 68°F)*2                        | Non-latching type: Max. 15 ms (Nominal applied operating voltage)<br>Latching type: Max. 10 ms (Nominal applied operating voltage) |  |
| Fiber tensile strength          |  | 450 g, Tension rate: 0.4 mm/sec, 1 min.  |  |
| Fiber flexural tensile strength |  | 230 g, 5 sec., Tension direction 90° (perpendicular with fiber)  |  |
| Conditions                      | Conditions for operation, transport and storage        | Ambient temperature -40 to +70°C -40 to +158°F,<br>Humidity 5 to 85% R.H. (Not freezing and condensing at low temperature)         |  |
| Unit weight                     |  | Approx. 11 g .388 oz (Not including connector)   |  |

Notes: 1. Without connectors' loss. Insertion loss is approx. 0.2 dB per connector. Return loss at connector parts is approx. 50 dB.  
2. Oscilloscope waveform of switching characteristic.



# WA (AWAP)

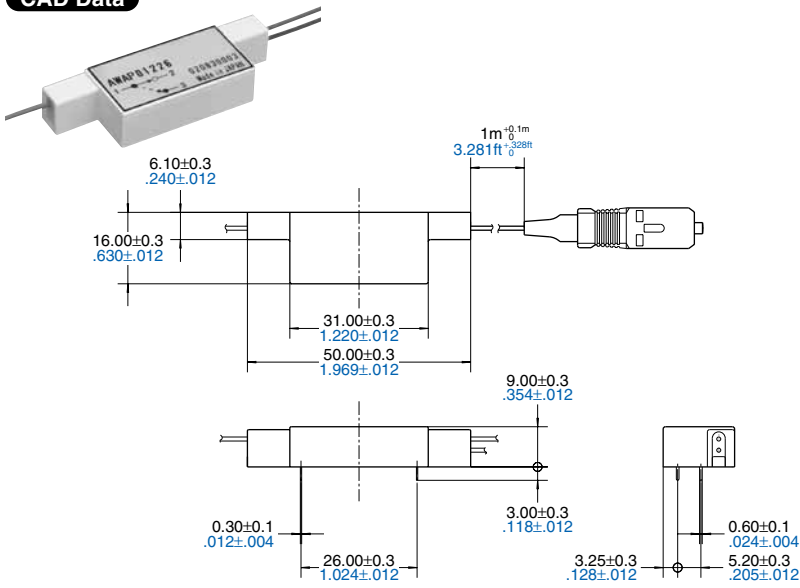
## DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://panasonic-electric-works.net/ac>

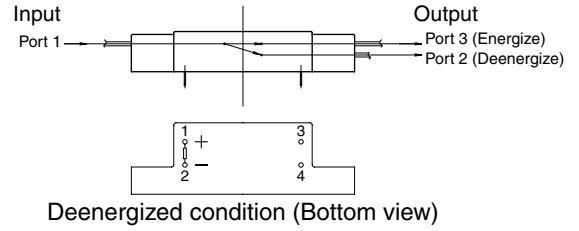
### 1. 1 × 2 type

**CAD Data**

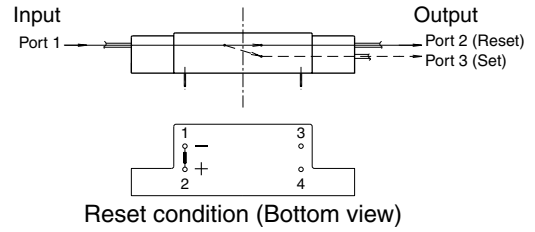
#### External dimensions



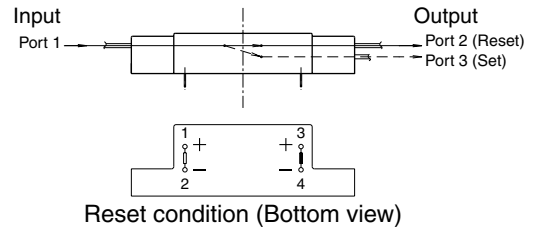
#### Optical signal I/O and coil impress direction indication diagram 1 × 2, Non-latching type



#### 1 × 2, 1-coil latching type



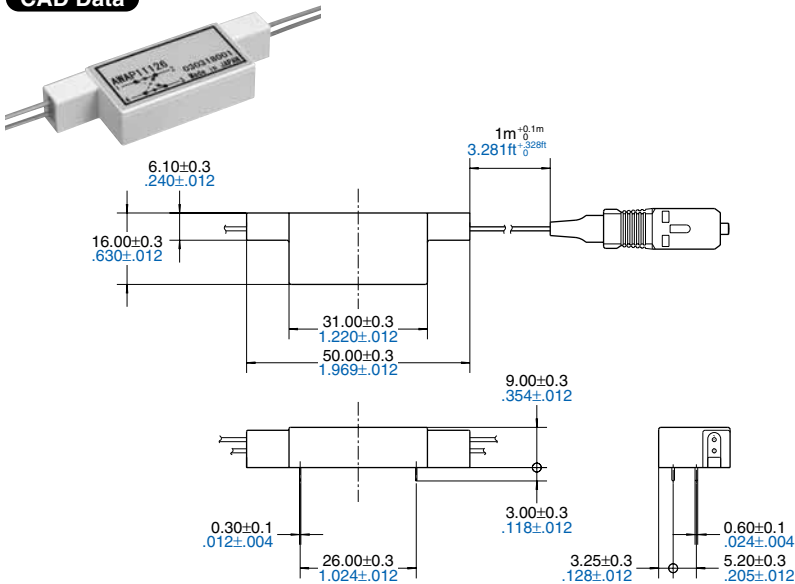
#### 1 × 2, 2-coil latching type



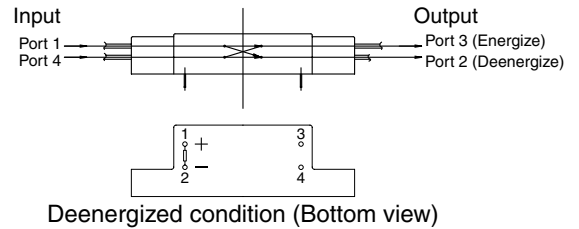
### 2. 2 × 2 type

**CAD Data**

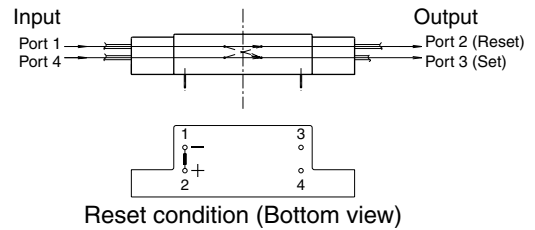
#### External dimensions



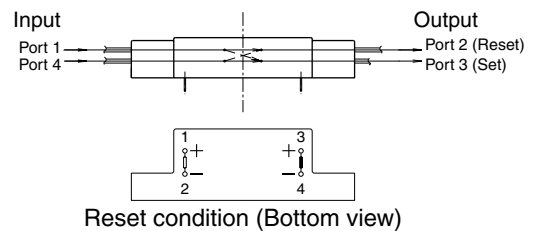
#### Optical signal I/O and coil impress direction indication diagram 2 × 2, Non-latching type



#### 2 × 2, 1-coil latching type



#### 2 × 2, 2-coil latching type



|                    |                                    |
|--------------------|------------------------------------|
| Reset (Deenergize) | Port 1 → Port 2<br>Port 4 → Port 3 |
| Set (Energize)     | Port 1 → Port 3<br>Port 4 → Port 2 |

PC board pattern

(Tolerance:  $\pm 0.1 \pm .004$ )



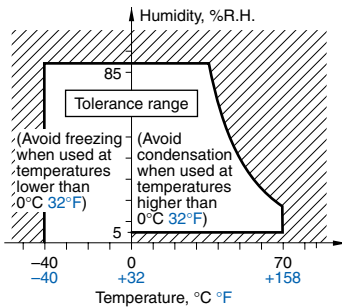
Nominal operating voltage applied method

|                  | Terminal No. | Non-latching type | 1- coil latching type | 2- coil latching type |
|------------------|--------------|-------------------|-----------------------|-----------------------|
| Set Energize     | 1            | +V                | +V                    | +V                    |
|                  | 2            | GND               | GND                   | GND                   |
|                  | 3            | -                 | -                     | -                     |
|                  | 4            | -                 | -                     | -                     |
| Reset Deenergize | 1            | -                 | GND                   | -                     |
|                  | 2            | -                 | +V                    | -                     |
|                  | 3            | -                 | -                     | +V                    |
|                  | 4            | -                 | -                     | GND                   |

NOTES

1. Operation, transport and storage conditions

- 1) Temperature:  $-40$  to  $+70^{\circ}\text{C}$   $-40$  to  $+158^{\circ}\text{F}$
- 2) Humidity: 5 to 85% RH (Avoid freezing and condensation.) The humidity range varies with the temperature. Use within the range indicated in the graph below.
- 3) Atmospheric pressure: 86 to 106 kPa  
Temperature and humidity range for usage, transport, and storage



2. Solder and cleaning conditions

- 1) Adhere to the conditions below when soldering this switch.  
Solder iron tip temperature:  $400^{\circ}\text{C}$   $752^{\circ}\text{F}$  min.  
Soldering iron: 60 to 100 W  
Soldering time: within 5 seconds  
The effect on the switch will differ depending on the type of PC board used. For this reason, please verify using the actual PC board to be worked on.
- 2) This switch cannot be washed.

3. Precautions for use

- 1) Since this switch is polarized, reversing the coil + and - terminals will cause reverse operation. Be sure to connect following the attached product specification diagram.
- 2) Keep the ripple rate of the nominal coil voltage below 5%.
- 3) Avoid exceeding the specification ranges such as those for coil nominal voltage, contact rating and optical input power. Exceeding specifications can cause abnormal heating or deterioration of performance.

- 4) For fiber, avoid bending to a radius smaller than 30 mm 1.181 inch as doing so can cause breakage.
- 5) If a switch has been subjected to a strong shock such as dropping, do not use it.
- 6) (Only latching type) Considering the possible change in ambient temperature and other conditions, it is recommended that the coil impress set and reset pulse width be at the nominal operation voltage and at least 20 ms to make certain of operation.
- 7) (Only latching type) This switch is shipped from the factory in the reset state. A shock to the switch during shipping or installation may cause it to change to the set state. Therefore, it is recommended that the switch be used in a circuit which initializes it to the required state (set or reset) whenever the power is turned on.

For Cautions for Use, see Relay Technical Information.