



Detector

Slide

Push

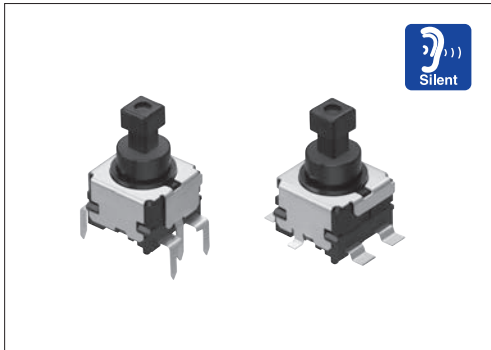
Rotary

Power

Dual-in-line  
Package Type

Horizontal  
Type

Vertical  
Type



**Typical Specifications**

| Items  | Specifications              |
|--|-----------------------------|
| Rating (max.)/(min.)<br>(Resistive load)               | 1A 14.5V DC / 50μA 3V DC    |
| Contact resistance<br>(Initial / After operating life) | 100mΩ max. / 100mΩ max.     |
| Operating force  | 3N, 5N                      |
| Operating life(With load)                              | 30,000 cycles (1A 14.5V DC) |
| Poles-position   | 1-pole, 2-position          |

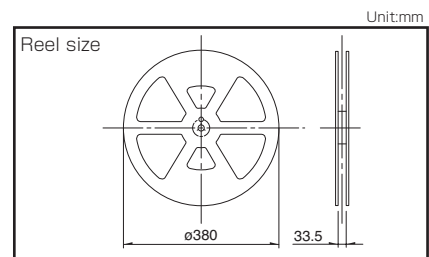
**Product Line**

| Changeover timing | Travel (mm) | Total travel (mm) | Operating force | Mounting method | Operating | Terminal type | Minimum order unit (pcs.) |                   | Product No.       | Drawing No. |
|-------------------|-------------|-------------------|-----------------|-----------------|-----------|---------------|---------------------------|-------------------|-------------------|-------------|
|                   |             |                   |                 |                 |           |               | Japan                     | Export            |                   |             |
| Non shorting      | 1.5         | 2.7               | 3N              | PC board        | Latching  | Reflow        | 660                       | 1,320             | <b>SPEF210101</b> | 1           |
|                   |             |                   |                 |                 |           | Dip           | 1,050                     | 4,200             | <b>SPEF110100</b> | 2           |
|                   |             |                   | Reflow          |                 |           | 660           | 1,320                     | <b>SPEF210200</b> | 1                 |             |
|                   |             |                   | Dip             |                 |           | 1,050         | 4,200                     | <b>SPEF110200</b> | 2                 |             |
|                   | -           |                   | 3N              |                 | Alternate | Reflow        | 660                       | 1,320             | <b>SPEF220100</b> | 1           |
|                   |             |                   |                 |                 |           | Dip           | 1,050                     | 4,200             | <b>SPEF120100</b> | 2           |
|                   |             |                   | 5N              |                 |           | Reflow        | 660                       | 1,320             | <b>SPEF220200</b> | 1           |
|                   |             |                   |                 |                 |           | Dip           | 1,050                     | 4,200             | <b>SPEF120200</b> | 2           |

**Packing Specifications**

Taping

| Product No.  | Number of packages (pcs.) |                |                         | Tape width (mm) | Export package measurements (mm) |
|--|---------------------------|----------------|-------------------------|-----------------|----------------------------------|
|  | 1 reel                    | 1 case / Japan | 1 case / export packing |                 |                                  |
| <b>SPEF210101</b><br><b>SPEF210200</b><br><b>SPEF220100</b><br><b>SPEF220200</b> | 165                       | 660            | 1,320                   | 32              | 403×403×360                      |



Tray

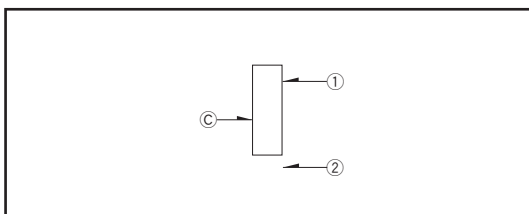
| Product No.  | Number of packages (pcs.) |                         | Export package measurements (mm) |
|--|---------------------------|-------------------------|----------------------------------|
|  | 1 case / Japan            | 1 case / export packing |                                  |
| <b>SPEF110100</b><br><b>SPEF110200</b><br><b>SPEF120100</b><br><b>SPEF120200</b> | 1,050                     | 4,200                   | 540×360×230                      |

Dimensions



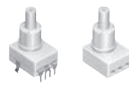








Unit:mm

| No. | Style                               | PC board mounting hole dimensions<br>(Viewed from the direction A) |
|-----|-------------------------------------|--|
| 1   | <p><b>Reflow soldering type</b></p> |  |
| 2   | <p><b>Dip soldering type</b></p>    |  |

Circuit Diagram (Viewed from Direction A)



- Detector
- Slide
- Push
- Rotary
- Power
- Dual-in-line Package Type
- Horizontal Type
- Vertical Type

| Series                         |   | Vertical  |   |   |  |   |   |
|--------------------------------|---|---|---|---|--|---|---|
|                                |   | SPEF  |   | SPED2   | SPED3  | SPED4   | SPED5   |
| Photo                          |   |  |  |  |  |  |  |
| Dimensions (mm)                | W   | 9.4   |   | 14  |  | 13.5  |   |
|                                | D   | 9   |   | 16.8  | 18   |   | 18.2  |
|                                | H   | 6.9   |   | 18.3  | 16.97  | 13.1  | 18  |
| Travel (mm)                    |   | 1.5   |   | —   | —  | —   | —   |
| Total travel (mm)              |   | 2.7   |   | 4.5   | 3.8  |   |   |
| Number of poles                |   | 1   |   | 1<br>2  | 1  |   |   |
| Operating temperature range    |   | -40°C to +85°C  |   |   | -40°C to +95°C   |   |   |
| Automotive use                 |   | ●   | ●   | ●   | ●  | ●   | ●   |
| Life cycle                     |   |  |   |  |  |  |  |
| Rating (max.) (Resistive load) |   | 1A 14.5V DC   |   |   | 2A 14.5V DC  |   |   |
| Rating (min.) (Resistive load) |   | 50µA 3V DC  |   | —   | —  | —   | —   |
| Durability                     | Operating life without load                   | —   | —   | —   | —  | —   | —   |
|                                | Operating life with load (at max. rated load) | 30,000 cycles 100mΩ max.  |   |   |  |   |   |
| Electrical performance         | Initial contact resistance                    | 100mΩ max.  |   |   |  |   |   |
|                                | Insulation resistance                         | 3MΩ min. 100V DC  |   |   | 3MΩ min. 500V DC   |   |   |
|                                | Voltage proof                                 | 100V AC for 1minute   |   |   |  |   |   |
| Mechanical performance         | Terminal strength                             | —   | —   | —   | —  | —   | Wire strength 30N   |
|                                | Actuator strength                             | Operating direction   |   |   | 98N  | 90N   | 98N   |
|                                |   | Pulling direction   |   |   | 30N  | —   | —   |
| Environmental performance      | Cold  | -40°C 96h   |   |   |  |   |   |
|                                | Dry heat                                      | 85°C 96h  |   | 85°C 96h (Connector type)<br>105°C 192h (Dip type)                                | 105°C 192h   |   |   |
|                                | Damp heat                                     | 40°C, 90 to 95%RH 96h   |   |   |  |   |   |
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|                                    |     |
|------------------------------------|-----|
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| Push Switches Cautions             | 141 |

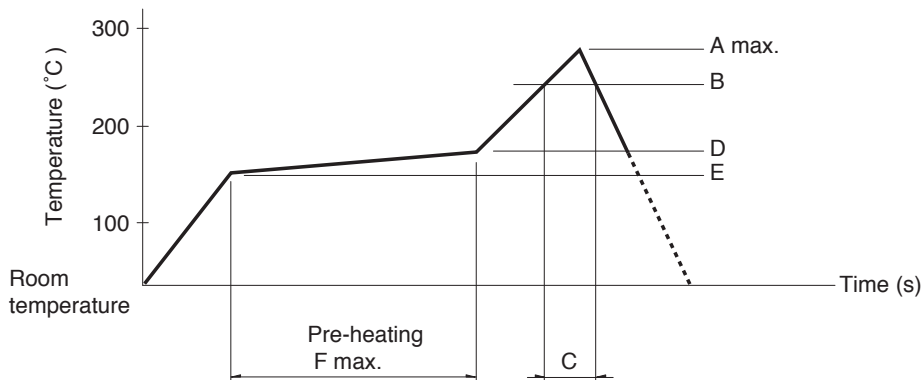
#### Note

● Indicates applicability to all products in the series.

# Push Switches Soldering Conditions

## Example of Reflow Soldering Condition

1. Heating method: Double heating method with infrared heater.
2. Temperature measurement: Thermocouple  $\phi$  0.1 to 0.2 CA (K) or CC (T) at soldering portion (copper foil surface). A heat resisting tape should be used for fixed measurement.
3. Temperature profile



| Series (Reflow type) | A (°C)<br>3s max. | B (°C) | C (s) | D (°C) | E (°C) | F (s) |
|----------------------|-------------------|--------|-------|--------|--------|-------|
| <b>SPEG</b>          | 260               | 230    | 40    | 180    | 150    | 120   |
| <b>SPEJ</b>          |                   |        |       |        |        |       |
| <b>SPEF</b>          |                   |        |       |        |        |       |
| <b>SPEH</b>          |                   |        |       |        |        |       |

### Notes

1. The condition mentioned above is the temperature on the mounting surface of a PC board. There are cases where the PC board's temperature greatly differs from that of the switch, depending on the PC board's material, size, thickness, etc. The above-stated conditions shall also apply to switch surface temperatures.
2. Soldering conditions differ depending on reflow soldering machines. Prior verification of soldering condition is highly recommended.

## Reference for Hand Soldering

| Series                                  | Soldering temperature | Soldering time |
|---|-----------------------|----------------|
| <b>SPPJ3, SPPJ2, SPUN, SPPH4, SPPH1</b> | 350±10°C              | 3+1/0s         |
| <b>SPED2, SPED4</b>                     | 350±10°C              | 3±0.5s         |
| <b>SPEJ</b>                             | 350±10°C              | 4s max.        |
| <b>SPEG, SPEF</b>                       | 350±5°C               | 3s max.        |
| <b>SPEH, SPPH2</b>                      | 350°C max.            | 3s max.        |
| <b>SPUJ</b>                             | 300±10°C              | 3+1/0s         |

## Reference for Dip Soldering

(For PC board terminal types)

| Series                                  | Items                  |                 | Dip soldering         |                       |
|---|------------------------|-----------------|-----------------------|-----------------------|
|   | Preheating temperature | Preheating time | Soldering temperature | Duration of immersion |
| <b>SPPJ3</b>                            | 100°C max.             | 60s max.        | 260±5°C               | 5±1s                  |
| <b>SPUN</b>                             | 100°C max.             | 60s max.        | 260±5°C               | 10±1s                 |
| <b>SPUJ, SPPH2, SPPH4</b>               | —                      | —               | 260±5°C               | 5±1s                  |
| <b>SPPJ2, SPPH1, SPED2, SPED4, SPEF</b> | —                      | —               | 260±5°C               | 10±1s                 |