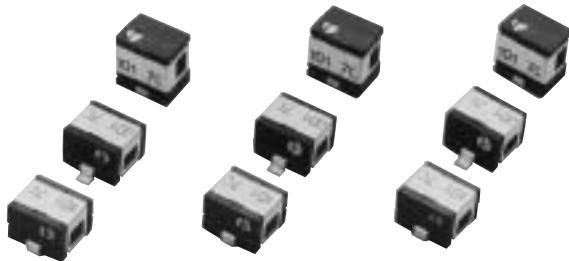


## Surface Mount Cermet Trimmers (12 Turns)

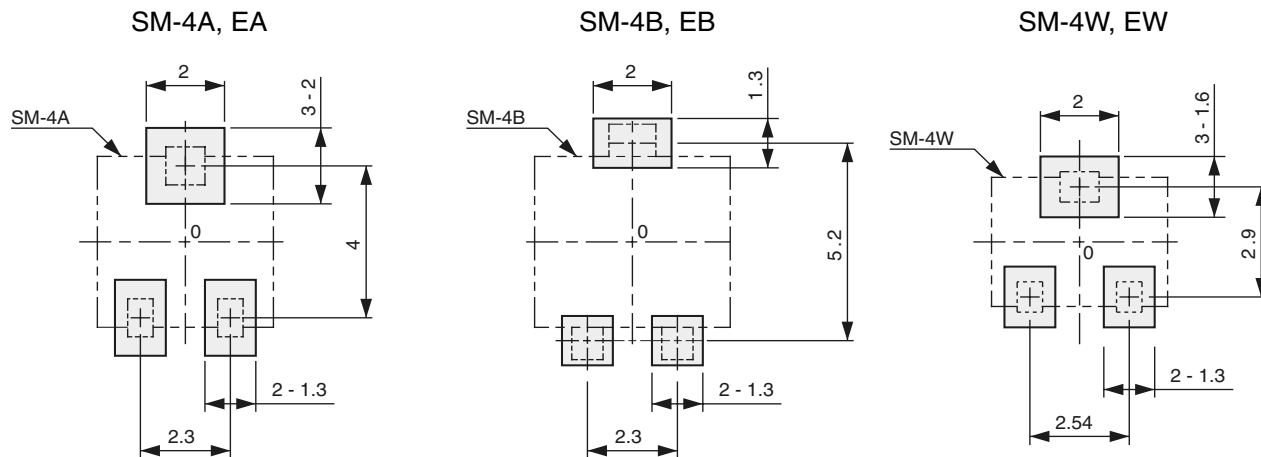


### FEATURES

- Lead (Pb)-free soldering, Cadmium-free
- Fine adjustment is possible
- Automatic mounting is possible (Taping)
- Flow/reflow soldering is possible
- Sealed construction (Washable)
- RoHS compatible

### DIMENSIONS in millimeters

### RECOMMENDED P.C.B. PAD OUTLINE DIMENSIONS



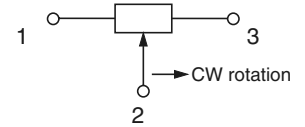
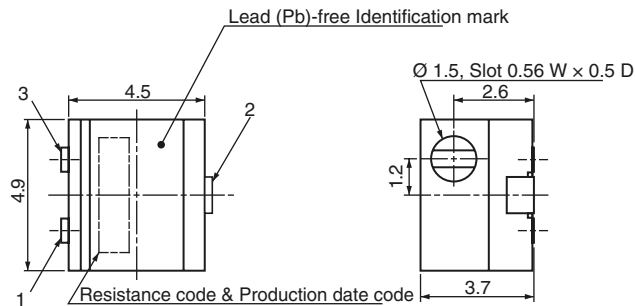
Note) The zero point is the center of mounting.

### OUTLINE DIMENSIONS

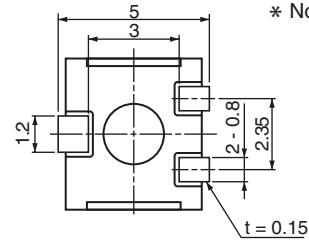
Unless otherwise specified, tolerance:  $\pm 0.3$  (Unit: mm)

#### SM-4A, SM-4EA

Side adjustment

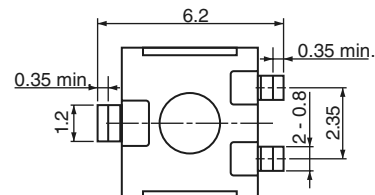
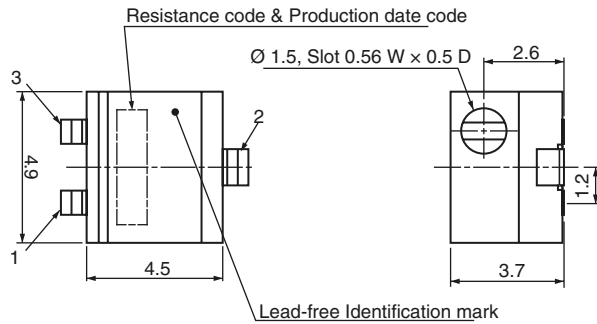


\* Note the terminal position.



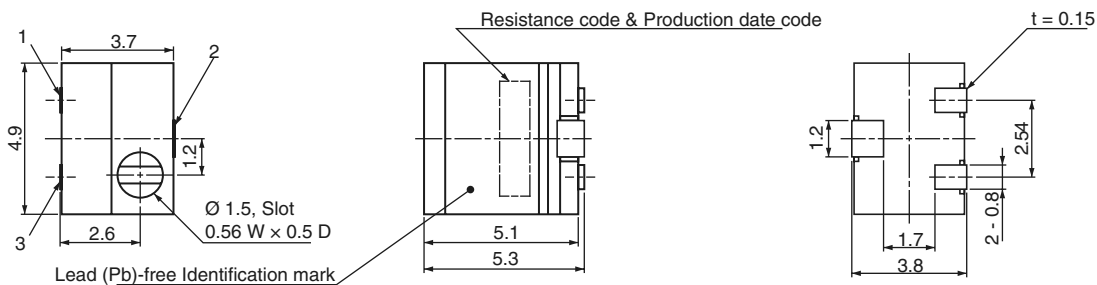
#### SM-4B, SM-4EB

Side adjustment



#### SM-4W, SM-4EW

Top adjustment



## PACKAGING SPECIFICATIONS

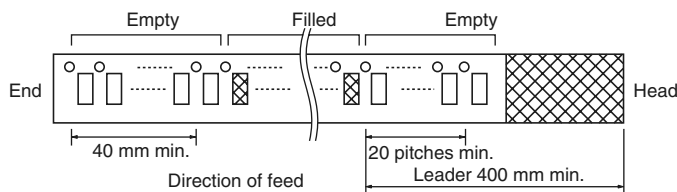
### Taping packaging specifications

- Taping version (SM-4TA, TB, ETA, ETB types) are packaged in 500 pcs. per reel.  
Orders will be accepted for units of 500 pcs., i.e., 500, 1000, 1500 pcs., etc.  
SM-4TW, ETW types are packaged in 250 pcs. per reel.  
Orders will be accepted for units of 250 pcs., i.e., 500, 750 pcs., etc.
- Taping version is boxed with one reel.

Maximum number of consecutive missing pieces = 2

Leader length and reel dimension are shown in the dia-grams below.

### EMBOSSED TAPE DIMENSIONS

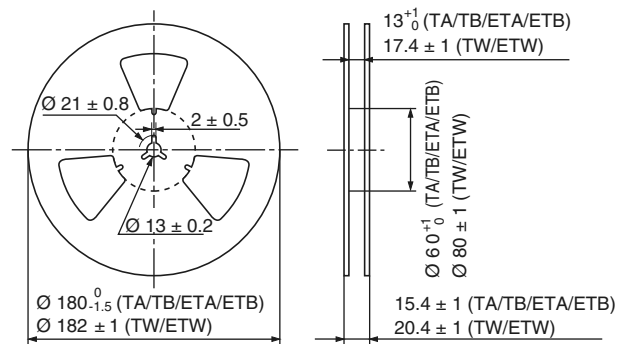


### REEL DIMENSIONS

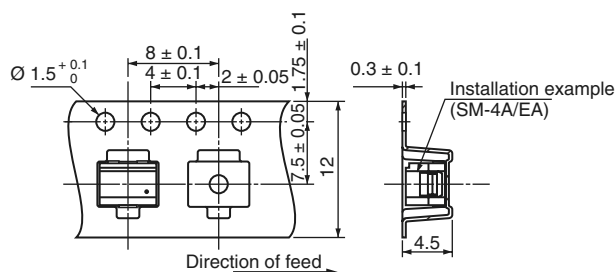
(Conforms to JIS C 0806-3)

(TA/TB type : In accordance with EIAJ ET-7200A)

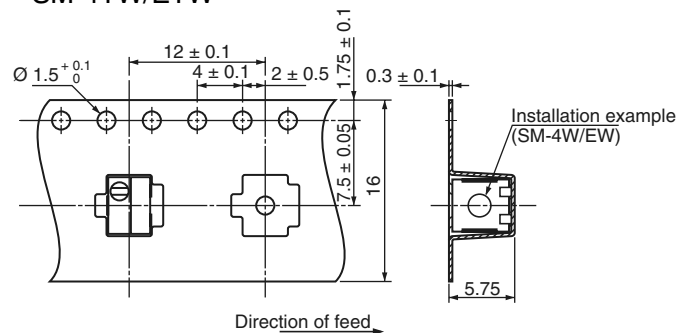
(Unit: mm)



### SM-4TA/TB/ETA/ETB



### SM-4TW/ETW



### Vinyl bag packaging specifications

- Unit of bulk in vinyl bag packaging is 50 pcs. per pack.
- Boxing of bulk in vinyl bags is performed with 200 pcs. per box.

### MECHANICAL SPECIFICATIONS

|                          |                                                                       |
|--------------------------|-----------------------------------------------------------------------|
| <b>Mechanical turn</b>   | 12 turns                                                              |
| <b>Operating torque</b>  | 20 mN m {204 gf cm} maximum                                           |
| <b>Mechanical stop</b>   | Clutch action                                                         |
| <b>Rotational life</b>   | 200 cycles [ $\Delta R/R \leq \pm (3 \Omega + 3 \%)$ ]                |
| <b>Thrust to shaft</b>   | 5 N {0.51 kgf} minimum                                                |
| <b>Solderability</b>     | Sn-Pb: 235 °C, 2 s<br>Sn-Cu (Lead (Pb)-free): 245 $\pm$ 3 °C, 2 ~ 3 s |
| <b>Shear (Adhesion)</b>  | 5 N {0.51 kgf} 10 s                                                   |
| <b>Substrate bending</b> | Width 90 mm, bend 3 mm, 5 s, 1 time                                   |
| <b>Pull-off strength</b> | 5 N {0.51 kgf} 10 s                                                   |

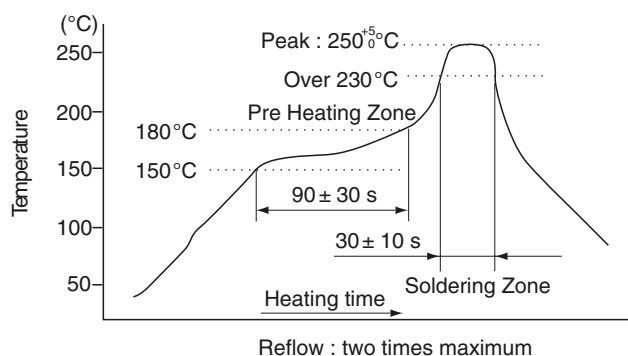
### ELECTRICAL CHARACTERISTICS

|                           |                                                  |
|---------------------------|--------------------------------------------------|
| Nominal resistance range  | 10 $\Omega$ ~ 2 M $\Omega$                       |
| Resistance tolerance      | $\pm 10 \%$                                      |
| Power ratings             | 0.25 W (85 °C) 0 W (150 °C)                      |
| Resistance law            | Linear law (B)                                   |
| Maximum input voltage     | DC300 V or power rating, whichever is smaller    |
| Maximum wiper current     | 100 mA or power rating, whichever is smaller     |
| Effective electrical turn | 10 turns                                         |
| End resistance            | 1 % or 2 $\Omega$ , whichever is greater         |
| C.R.V.                    | 1 % or 3 $\Omega$ , whichever is greater         |
| Operating temp. range     | - 6 ~ 150 °C                                     |
| Temp. coefficient         | $\pm 100 \cdot 10^{-6} / ^\circ\text{C}$ maximum |
| Insulation resistance     | 1000 M $\Omega$ minimum (DC500 V)                |
| Dielectric strength       | AC600 V, 60 s                                    |
| Net weight                | Approx. 0.2 g                                    |

### ENVIRONMENTAL SPECIFICATIONS

| Test item                 | Test conditions                                                                                                                                                                                                                                                                       | Specifications                                    |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Thermal shock             | - 65 ~ 150 °C<br>(0.5 h), 5 cycles                                                                                                                                                                                                                                                    | [ $\Delta R/R \leq 2 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Humidity                  | - 10 ~ 65 °C<br>(Relative humidity 80 ~ 98 %),<br>10 cycles, 240 h                                                                                                                                                                                                                    | [ $\Delta R/R \leq 2 \%$ ]                        |
| Shock                     | 981 m/s <sup>2</sup> , 6 ms<br>6 directions for 3 times each                                                                                                                                                                                                                          | [ $\Delta R/R \leq 1 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Vibration                 | Amplitude 1.52 mm<br>or<br>Acceleration 196 m/s <sup>2</sup> ,<br>10 ~ 2000Hz,<br>3 directions, 12 times each                                                                                                                                                                         |                                                   |
| Load Life                 | 85 °C, 0.25 W, 1000 h                                                                                                                                                                                                                                                                 | [ $\Delta R/R \leq 2 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Low temperature operation | - 65 °C, 2 h                                                                                                                                                                                                                                                                          | [ $\Delta R/R \leq 1 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| High temperature exposure | 150 °C, 250 h                                                                                                                                                                                                                                                                         | [ $\Delta R/R \leq 2 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Immersion seal            | 85 °C, 60 s                                                                                                                                                                                                                                                                           | No leaks (No continuous bubbles)                  |
| Soldering heat            | Sn-Pb<br>260 °C, 10 s or<br>215 °C, 35 s                                                                                                                                                                                                                                              | [ $\Delta R/R \leq 1 \%$ ]                        |
|                           | Sn-Cu<br>Flow: 260 °C $\pm$ 3 °C as the temperature in a pot of molten solder, immersion from head of terminal to backside of board, 5 ~ 6 s, two times maximum<br>Reflow: Peak temperature 255 °C (Please refer to the profile below.)<br>Manual soldering: 350 $\pm$ 10 °C, 3 ~ 4 s |                                                   |

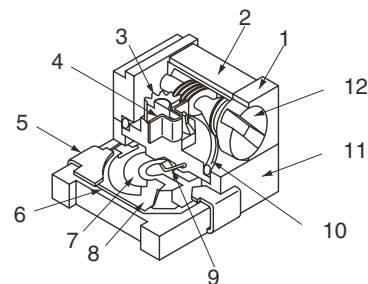
Reflow profile for soldering heat evaluation



**MAXIMUM INPUT RATINGS**

| Nominal resistance values ( $\Omega$ ) | Resistance code | Maximum input voltage (V) | Maximum wiper current (mA) |
|----------------------------------------|-----------------|---------------------------|----------------------------|
| 10*                                    | 100             | 1.00                      | 100                        |
| 20*                                    | 200             | 2.00                      | 100                        |
| 50                                     | 500             | 3.53                      | 70.7                       |
| 100                                    | 101             | 5.00                      | 50.0                       |
| 200                                    | 201             | 7.07                      | 35.4                       |
| 500                                    | 501             | 11.2                      | 22.4                       |
| 1 k                                    | 102             | 15.8                      | 15.8                       |
| 2 k                                    | 202             | 22.4                      | 11.2                       |
| 5 k                                    | 502             | 35.4                      | 7.07                       |
| 10 k                                   | 103             | 50.0                      | 5.00                       |
| 20 k                                   | 203             | 70.7                      | 3.54                       |
| 50 k                                   | 503             | 112                       | 2.24                       |
| 100 k                                  | 104             | 158                       | 1.58                       |
| 200 k                                  | 204             | 223                       | 1.12                       |
| 500 k                                  | 504             | 300                       | 0.60                       |
| 1 M                                    | 105             | 300                       | 0.30                       |
| 2 M                                    | 205             | 300                       | 0.15                       |

\* The products indicated by \* mark are manufactured upon receipt of order basis

**CONSTRUCTION**

|    | Part Name         |           | Material                           | Flammability |
|----|-------------------|-----------|------------------------------------|--------------|
| 1  | Housing           |           | PPS<br>(Polyphenylenesulp<br>hide) | UL-94V-O     |
| 2  | Cover             |           | Stainless steel                    | -            |
| 3  | Rotor gear        |           | PPS<br>(Polyphenylenesulp<br>hide) | UL-94V-O     |
| 4  | Clutch springt    |           | Stainless steel                    | -            |
| 5  | Terminal pin      | Sn-Pb     | Copper alloy,<br>Solder-plated     | -            |
|    |                   | Sn-C<br>u | Copper,<br>Sn-Cu-plated            | -            |
| 6  | Base element      |           | Ceramic                            | -            |
| 7  | Resistive element |           | RuO <sub>2</sub> cermet            | -            |
| 8  | Electrode         |           | Ag-Pd cermet                       | -            |
| 9  | Wiper             |           | Multi metal alloy                  |              |
| 10 | "O" ring          |           | Silicone rubber                    | UL-94HB      |
| 11 | Base              |           | Epoxy                              | UL-94V-O     |
| 12 | Shaft             |           | Metal                              | -            |

CFCs, Halon, Carbon tetrachloride and designated bromic flame retardant PBBs and PBBs are not used in our products.

**LIST OF PART NUMBERS**

| Adjustment position | Shape of terminal | Form of packing                                                            |                        |              |                        |
|---------------------|-------------------|----------------------------------------------------------------------------|------------------------|--------------|------------------------|
|                     |                   | Taping (reel)                                                              |                        | Vinyl bag    |                        |
|                     |                   | Sn-Pb                                                                      | Sn-Pb (Lead (Pb)-free) | Sn-Pb        | Sn-Pb (Lead (Pb)-free) |
| Top adjustment      | W (J-hook)        | SM-4TW                                                                     | SM-4ETW                | SM-4W        | SM-4EW                 |
| Side adjustment     | A (J-hook)        | SM-4TA                                                                     | SM-4ETA                | SM-4A        | SM-4EA                 |
|                     | B (Gull wing)     | SM-4TB                                                                     | SM-4ETB                | SM-4B        | SM-4EB                 |
| Pieces in package   |                   | TW, ETW: 250 pcs./reel<br>TA, ETA: 500 pcs./reel<br>TB, ETB: 500 pcs./reel |                        | 50 pcs./pack |                        |

**FIG. 1: NOMINAL RESISTANCE VALUES**

|               |               |               |                |                |                |              |              |             |
|---------------|---------------|---------------|----------------|----------------|----------------|--------------|--------------|-------------|
| * 10 $\Omega$ | * 20 $\Omega$ | 50 $\Omega$   | 100 $\Omega$   | 200 $\Omega$   | 500 $\Omega$   | 1 k $\Omega$ | 2 k $\Omega$ | 5k $\Omega$ |
| 10 k $\Omega$ | 20 k $\Omega$ | 50 k $\Omega$ | 100 k $\Omega$ | 200 k $\Omega$ | 500 k $\Omega$ | 1 M $\Omega$ | 2 M $\Omega$ | -           |

The products indicated by \* mark are manufactured upon receipt of order basis

\* The above part numbers are all available with the respective combination of <Nominal resistance values>.

\* Verify the above part numbers when placing orders.

\* Taping specification is not sold separately and must be purchased in reel units.

**ORDERING INFO**

| SM-4        |                           | T                         | A                                 | 204             |
|-------------|---------------------------|---------------------------|-----------------------------------|-----------------|
| SERIES NAME | TERMINAL PIN              | FORM OF PACKAGING         | PRODUCT SHAPE (SHAPE OF TERMINAL) | RESISTANCE CODE |
|             | Blank: Sn-Pb              | T: Taping (Reel)          | A: J-hook                         |                 |
|             | E: Sn-Cu (Lead (Pb)-free) | Blank: Bulk in vinyl bags | B: Gull wing                      |                 |
|             |                           |                           | W: J-hook                         |                 |

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