

## Surface Mount Cermet Trimmers (14 turns)



### FEATURES

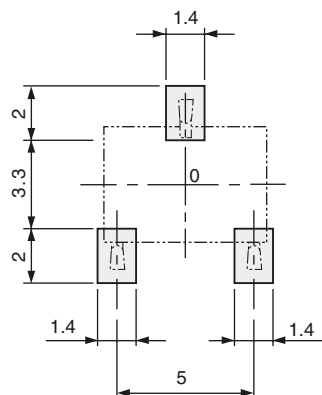
- Lead (Pb)-free soldering, Cadmium-free
- Precise adjustment is possible
- Automatic mounting is possible (Taping)
- Flow/reflow soldering is possible
- Sealed construction (Washable)
- RoHS compliant



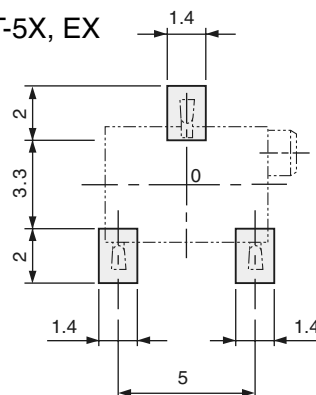
### DIMENSIONS in millimeters

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

ST-5W, EW

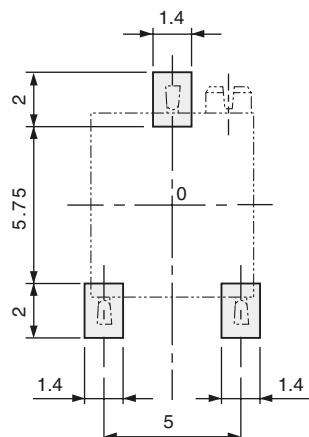


ST-5X, EX

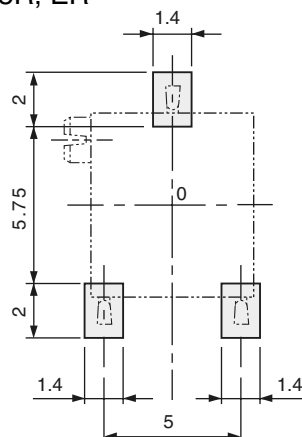


(Unit: mm)

ST-5P, EP



ST-5R, ER



Note) The zero point is the center of mounting.

Specifications are subject to change without notice. Specifications in this catalog are for reference. The formal specification sheets will be submitted upon request.

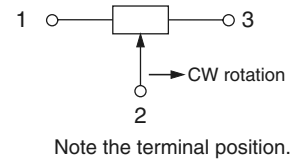
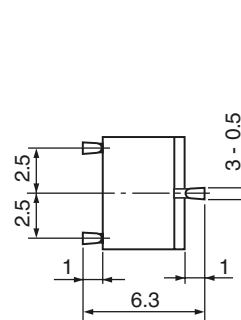
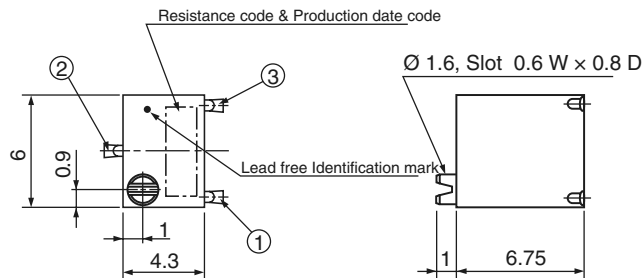
### DIMENSIONS in millimeters

#### OUTLINE DIMENSIONS

ST-5W, ST-5EW

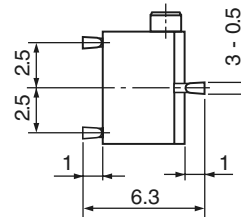
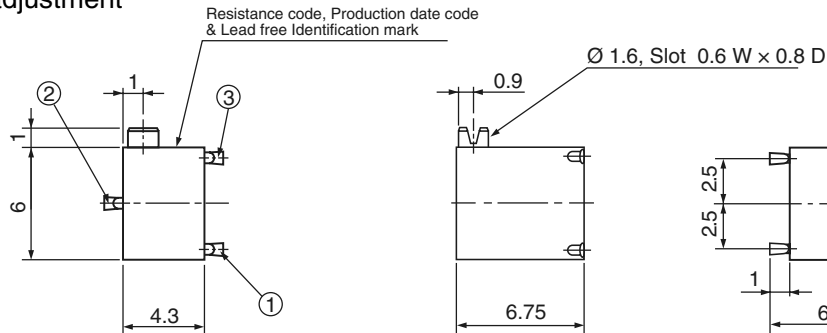
Top adjustment

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



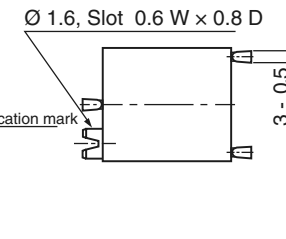
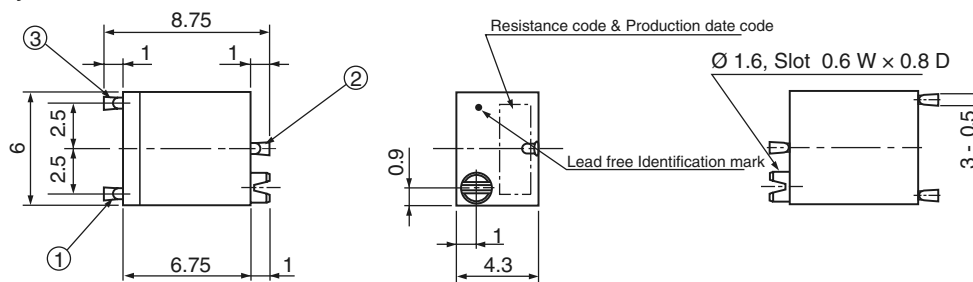
ST-5X, ST-5EX

Side adjustment



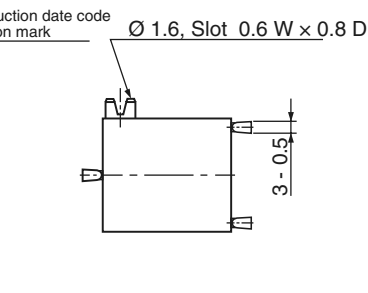
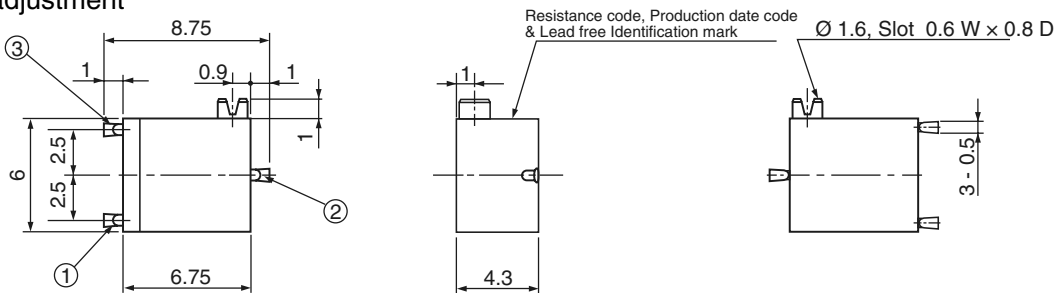
ST-5P, ST-5EP

Side adjustment



ST-5R, ST-5ER

Side adjustment



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**DIMENSIONS** in millimeters**PACKAGING SPECIFICATIONS**

Taping packaging specifications

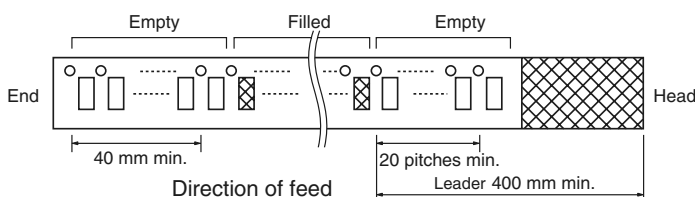
Taping version is packaged in 500 pcs. per reel.

Orders will be accepted for units of 500 pcs., i.e., 500, 1000, 1500 pcs., etc.

Taping version is boxed with one reel (500 pcs.).

Maximum number of consecutive missing pieces = 2

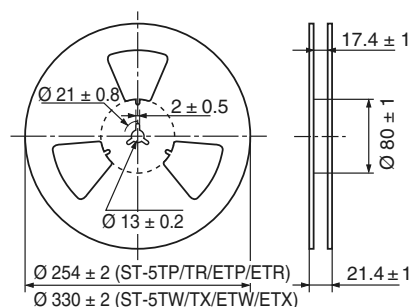
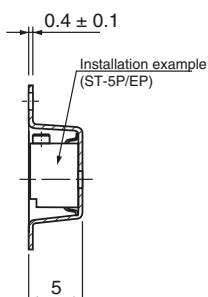
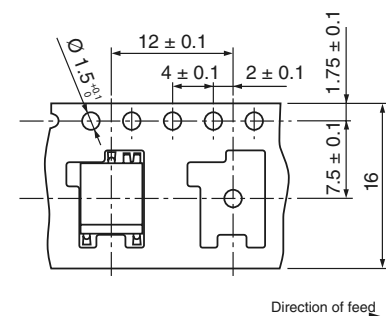
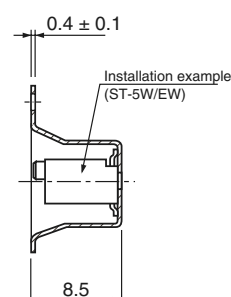
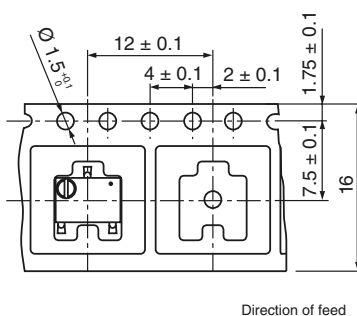
Leader length and reel dimension are shown in the dia-grams below.

**EMBOSED TAPE DIMENSIONS****REEL DIMENSIONS**

(Conforms to JIS C 0806-3)

(In accordance with EIAJ ET-7200A)

(Unit: mm)

**ST-5TP/TR/ETP/ETR****ST-5TW/TX/ETW/ETX**

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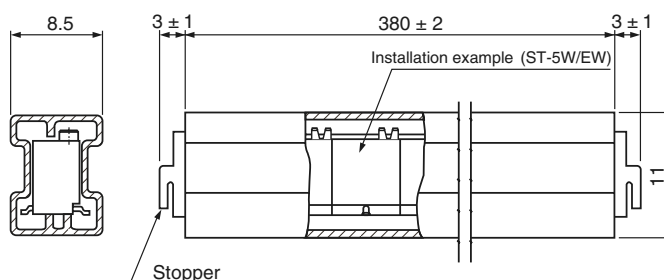
**Magazine packaging specifications**

Magazine is packed 50 pcs. per stick.

Orders will be accepted for units of 50 pcs., i.e., 50, 100, 150 pcs., etc.

Magazines are packed 2000 pcs. per box.

(Unit: mm)

**Magazine dimensions****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.

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### MECHANICAL SPECIFICATIONS

|                          |                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mechanical turn</b>   | 14 turns                                                                                                                                              |
| <b>Operating torque</b>  | 20 mN m {204 gf cm} maximum                                                                                                                           |
| <b>Mechanical stop</b>   | Clutch action                                                                                                                                         |
|                          | 200 cycles                                                                                                                                            |
| <b>Rotational life</b>   | 10 $\Omega$ ~ 200 $\Omega$ [ $\Delta R/R \leq \pm (0.5 \Omega + 3 \%)$ ]<br>500 $\Omega$ ~ 2 M $\Omega$ [ $\Delta R/R \leq \pm (0.5 \Omega + 2 \%)$ ] |
| <b>Thrust to shaft</b>   | 5 N {0.51 kgf} minimum                                                                                                                                |
| <b>Solderability</b>     | Sn-Pb: 235 °C, 2 s<br>Sn (Lead-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                                                                                                                                   |

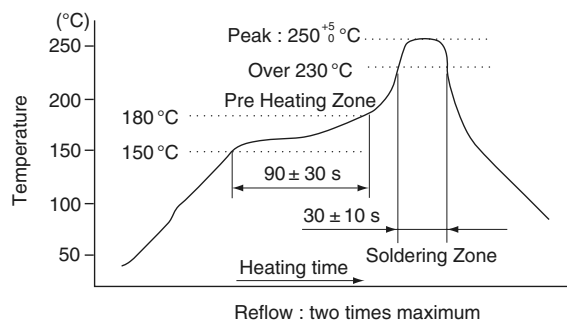
### ELECTRICAL CHARACTERISTICS

|                           |                                                                                                                                                                |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal resistance range  | 10 $\Omega$ ~ 2 M $\Omega$                                                                                                                                     |
| Resistance tolerance      | $\pm 10 \%$                                                                                                                                                    |
| Power ratings             | 0.25 W (85 °C) 0 W (120 °C)                                                                                                                                    |
| Resistance law            | Linear law (B)                                                                                                                                                 |
| Maximum input voltage     | DC200 V or power rating, whichever is smaller                                                                                                                  |
| Maximum wiper current     | 100 mA or power rating, whichever is smaller                                                                                                                   |
| Effective electrical turn | 11 turns                                                                                                                                                       |
| End resistance            | 1 % or 2 $\Omega$ , whichever is greater                                                                                                                       |
| C.R.V.                    | 1 % or 3 $\Omega$ , whichever is greater                                                                                                                       |
| Operating temp. range     | - 55 ~ 120°C                                                                                                                                                   |
| Temp. coefficient         | 10 $\Omega$ ~ 50 $\Omega$ : $\pm 250 \cdot 10^{-6} / ^\circ\text{C}$ maximum<br>100 $\Omega$ ~ 2 M $\Omega$ : $\pm 100 \cdot 10^{-6} / ^\circ\text{C}$ maximum |
| Insulation resistance     | 1000 M $\Omega$ minimum (DC500 V)                                                                                                                              |
| Dielectric strength       | AC600 V, 60 s                                                                                                                                                  |
| Net weight                | Approx. 0.35 g                                                                                                                                                 |

### ENVIRONMENTAL SPECIFICATIONS

| Test item                 | Test conditions                                                                                                                                                                                                                                                                    | Specifications                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Thermal shock             | - 65 ~ 125 °C (0.5 h),<br>5 cycles                                                                                                                                                                                                                                                 | [ $\Delta R/R \leq 2 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Humidity                  | - 10 ~ 65 °C (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 or Acceleration 196 m/s <sup>2</sup> ,<br>10 ~ 2000 Hz,<br>3 directions, 12 times each                                                                                                                                                                           |                                                   |
| Load Life                 | 85 °C, 0.25 W, 1000 h                                                                                                                                                                                                                                                              | [ $\Delta R/R \leq 3 \%$ ]<br>[S.S. $\leq 1 \%$ ] |
| Low temperature operation | - 55 °C, 2 h                                                                                                                                                                                                                                                                       | [ $\Delta R/R \leq 2 \%$ ]<br>[S.S. $\leq 2 \%$ ] |
| High temperature exposure | 120 °C, 250 h                                                                                                                                                                                                                                                                      | [ $\Delta R/R \leq 3 \%$ ]<br>[S.S. $\leq 2 \%$ ] |
| Immersion seal            | 85 °C, 60 s                                                                                                                                                                                                                                                                        | No leaks (No continuous bubbles)                  |
| Soldering heat            | Sn-Pb<br>260 °C, 10 s or 215 °C, 35 s                                                                                                                                                                                                                                              | [ $\Delta R/R \leq 1 \%$ ]                        |
|                           | Sn<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**

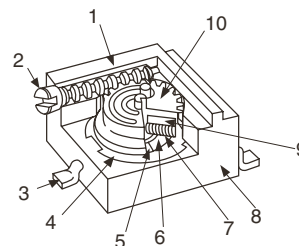
| Nominal resistance values ( $\Omega$ ) | Resistance code | Maximum input voltage (V) | Maximum wiper current (mA) |
|----------------------------------------|-----------------|---------------------------|----------------------------|
| 10*                                    | 100             | 1.00                      | 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             | 200                       | 1.00                       |
| 500 k                                  | 504             | 200                       | 0.40                       |
| 1 M                                    | 105             | 200                       | 0.20                       |
| 2 M                                    | 205             | 200                       | 0.10                       |

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

**CONSTRUCTION**

| Part Name |                   | Material                | Flammability |
|-----------|-------------------|-------------------------|--------------|
| 1         | Housing           | Polyphenylenesulphide   | UL-94V-O     |
| 2         | Shaft             | Brass, Nickel-plated    | -            |
| 3         | Terminal pin      | Sn-Pb                   |              |
|           |                   | Copper, Solder-plated   |              |
|           |                   | Sn                      |              |
|           |                   | Copper, Tin-plated      | -            |
| 4         | Base element      | Ceramic                 | -            |
| 5         | Electrode         | Ag-Pd cermet            | -            |
| 6         | Resistive element | RuO <sub>2</sub> cermet | -            |
| 7         | Wiper             | Multi metal alloy       | -            |
| 8         | Adhesive          | Epoxy                   | -            |
| 9         | Rubber cushion    | Silicone rubber         | -            |
| 10        | Rotor gear        | PA (Polyamide)          | UL-94HB      |

CFC's, 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)   |                     | Magazine (stick) |                     | Vinyl bag    |                     |
|                     |                   | Sn-Pb           | Sn (Lead (Pb)-free) | Sn-Pb            | Sn (Lead (Pb)-free) | Sn-Pb        | Sn (Lead (Pb)-free) |
| Top adjustment      | W (Gull-wing)     | ST-5TW          | ST-5ETW             | ST-5MW           | ST-5EMW             | ST-5W        | ST-5EW              |
| Side adjustment     | X (Gull-wing)     | ST-5TX          | ST-5ETX             | ST-5MX           | ST-5EMX             | ST-5X        | ST-5EX              |
|                     | P (Gull-wing)     | ST-5TP          | ST-5ETP             | ST-5MP           | ST-5EMP             | ST-5P        | ST-5EP              |
|                     | R (Gull-wing)     | ST-5TR          | ST-5ETR             | ST-5MR           | ST-5EMR             | ST-5R        | ST-5ER              |
| Pieces in package   |                   | 500 pcs./reel   |                     | 50 pcs./reel     |                     | 50 pcs./reel |                     |

**FIG. 1: NOMINAL RESISTANCE VALUES**

|               |               |               |                |                |                |              |              |              |
|---------------|---------------|---------------|----------------|----------------|----------------|--------------|--------------|--------------|
| 10 $\Omega$ * | 20 $\Omega$ * | 50 $\Omega$   | 100 $\Omega$   | 200 $\Omega$   | 500 $\Omega$   | 1 k $\Omega$ | 2 k $\Omega$ | 5 k $\Omega$ |
| 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> (Fig.1)

\* Verify the above part numbers when placing orders.

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

**ORDERING INFORMATION**

| ST-5        |                          | T                         | W                                 | 204             |
|-------------|--------------------------|---------------------------|-----------------------------------|-----------------|
| SERIES NAME | TERMINAL PIN             | FORM OF PACKAGING         | PRODUCT SHAPE (SHAPE OF TERMINAL) | RESISTANCE CODE |
|             | Blank: Sn-Pb             | T: Taping (Reel)          | W: Gull wing (Top adjustment)     |                 |
|             | E: Sn<br>(Lead(Pb)-free) | M: Magazine (Stick)       | X: Gull wing (Side adjustment)    |                 |
|             |                          | Blank: Bulk in vinyl bags | P: Gull wing (Side adjustment)    |                 |
|             |                          |                           | R: Gull wing (Side adjustment)    |                 |

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