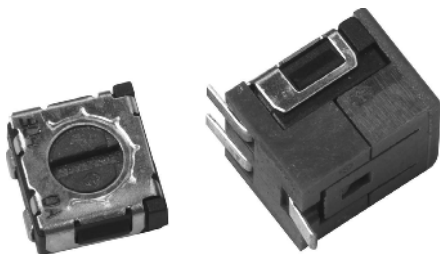


## Surface Mount Cermet Trimmers (single turn)



### FEATURES

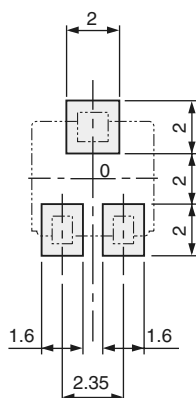
- Lead (Pb)-free soldering, Cadmium-free
- Wide variety (7 types) to choose from
- Automatic mounting is possible (Taping)
- Flow/reflow soldering is possible
- Sealed construction (Washable)
- Stopper structure prevents terminal pin from being open
- Cross slot totor suitable for automatic adjustment
- RoHS compliant



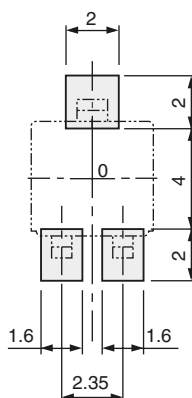
### DIMENSIONS in millimeters

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

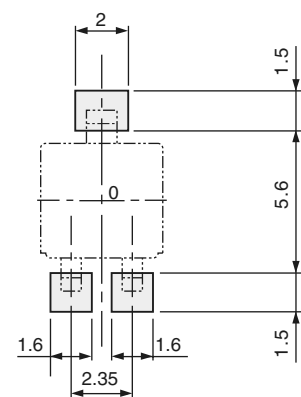
ST-4A, 4EA



ST-4B, 4EB

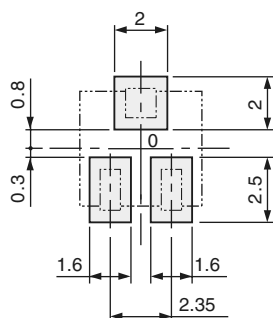


ST-4D, 4ED

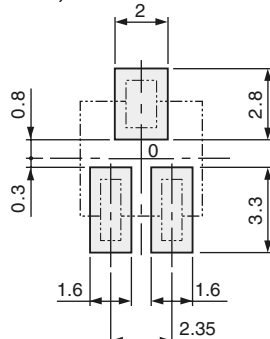


(Unit: mm)

ST-4G, 4EG



ST-4H, 4EH



Note) The zero point is the center of mounting.

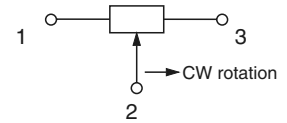
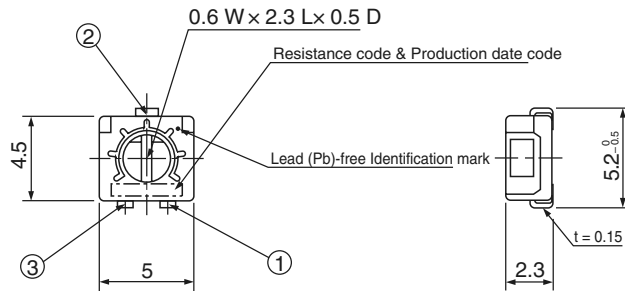
Specifications are subject to change without notice. Specifications in this catalog are for reference. The formal specification sheets will be submitted upon request.

## DIMENSIONS in millimeters

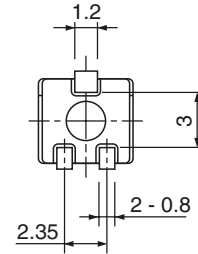
Unless otherwise specified, tolerance:  $\pm 0.3$  (Unit: mm)

## OUTLINE DIMENSIONS

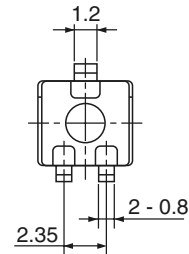
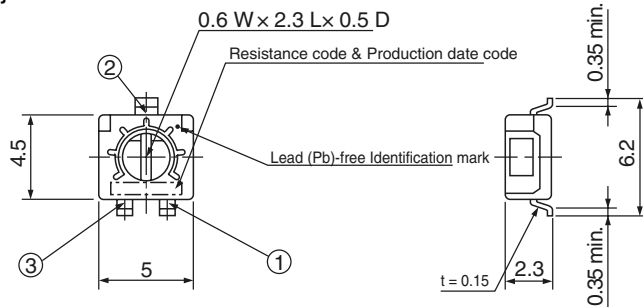
ST-4A, 4EA  
Top adjustment



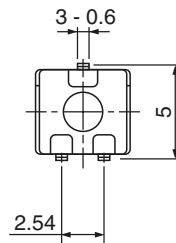
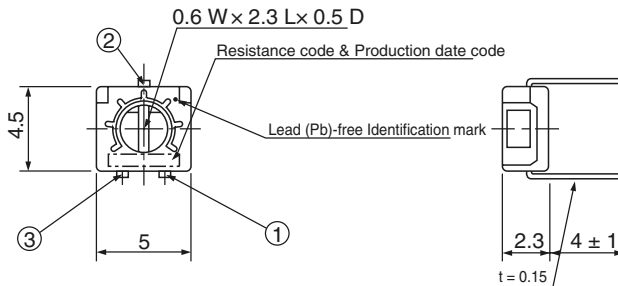
\*: Note the terminal position.



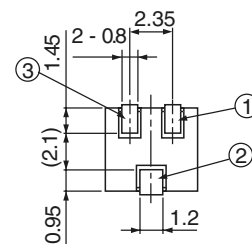
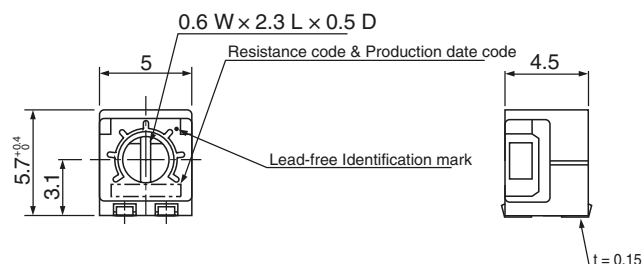
ST-4B, 4EB  
Top adjustment



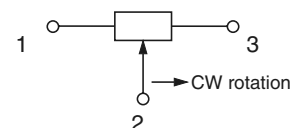
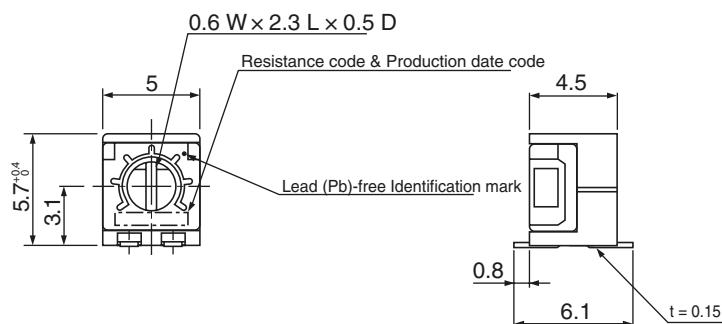
ST-4C, 4EC  
Top adjustment



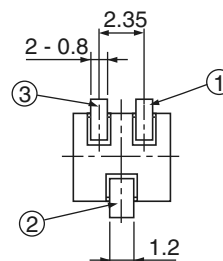
ST-4G, 4EG  
Side adjustment



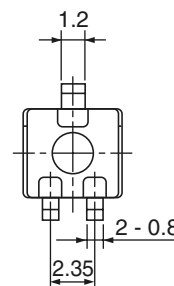
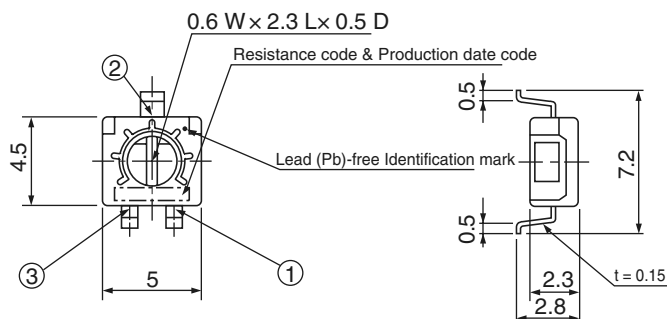
Specifications are subject to change without notice. Specifications in this catalog are for reference. The formal specification sheets will be submitted upon request.

**DIMENSIONS** in millimeters**OUTLINE DIMENSIONS**Unless otherwise specified, tolerance:  $\pm 0.3$  (Unit: mm)ST-4H, 4EH  
Side adjustment

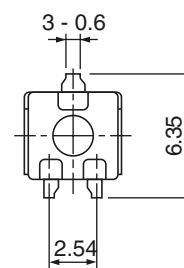
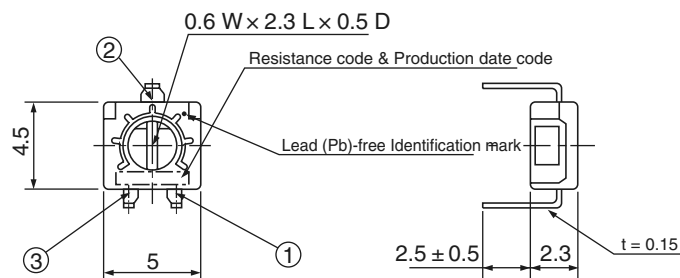
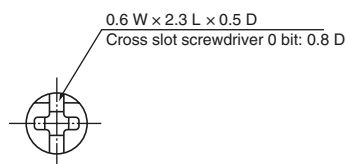
\*: Note the terminal position.

ST-4D, 4ED  
Rear adjustment

&lt;Semi-standard products&gt;

ST-4F, 4EF  
Rear adjustment

&lt;Semi-standard products&gt;

ST-42, 42E  
CROSS SLOT DIMENSION

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

## PACKAGING SPECIFICATIONS

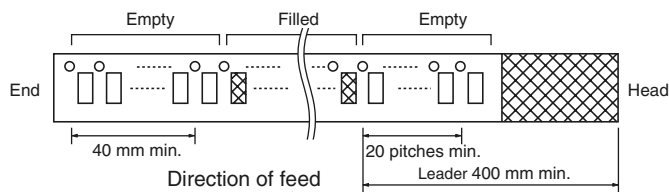
### Taping packaging specifications

- 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.
- ST-4TA, TB, TD, ETA, ETB and ETD versions are boxed with 4 reels (2000 pcs.).
- ST-4TG, TH, ETG and ETH versions are 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.

### EMBOSSED TAPE DIMENSIONS

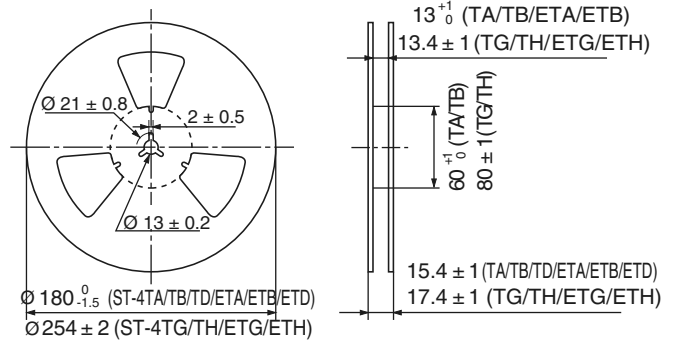


### REEL DIMENSIONS

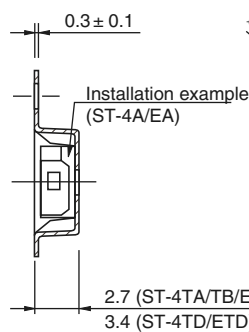
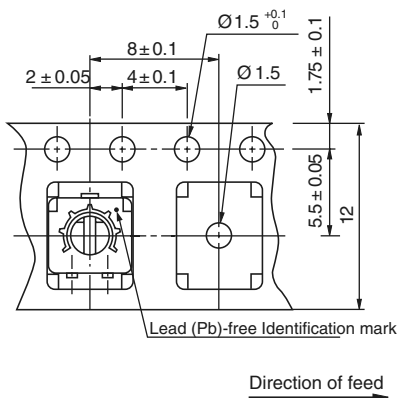
(Conforms to JIS C 0806-3)

(In accordance with EIAJ ET-7200A)

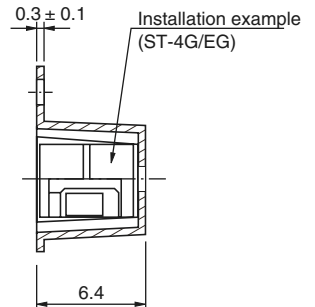
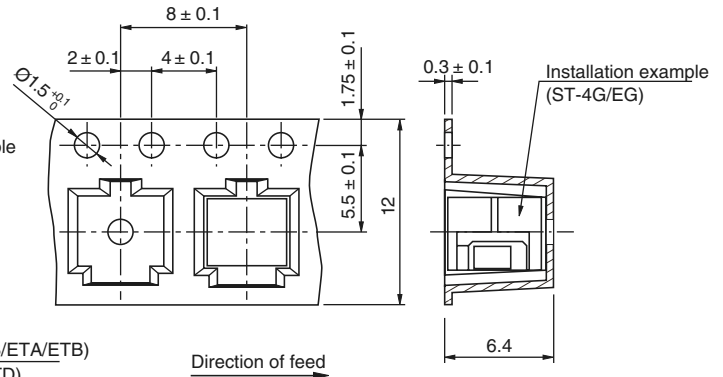
(Unit: mm)



### ST-4TA/TB/TD/ETA/ETB/ETD



### ST-4TG/TH/ETG/ETH



### Vinyl bag packaging specifications

- Unit of bulk in vinyl bag packaging is 100 pcs. per pack.
- Boxing of bulk in vinyl bags is performed with 500 pcs. per box.

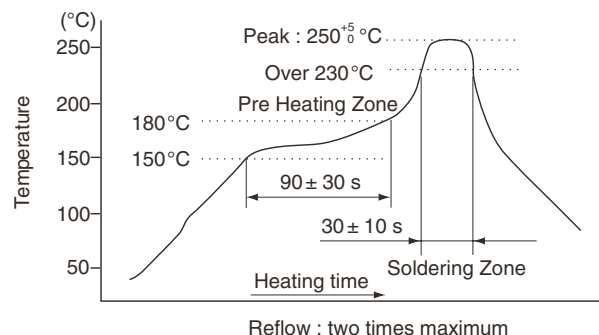
**MECHANICAL SPECIFICATIONS**

|                          |                                                                   |
|--------------------------|-------------------------------------------------------------------|
| <b>Mechanical angle</b>  | 240° (1 turn)                                                     |
| <b>Operating torque</b>  | 10 mN m {102 gf cm} maximum                                       |
| <b>Stop strength</b>     | 30 mN m {306 gf cm} minimum                                       |
| <b>Rotational life</b>   | 100 cycles [ $\Delta R/R \leq \pm (2\% + 3\%)$ ]                  |
| <b>Thrust to rotor</b>   | 5 N {0.51 kgf} minimum                                            |
| <b>Solderability</b>     | Sn-Pb: 235 °C, 2 s<br>Sn-Cu (Lead (Pb)-free): 245 ± 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 SPECIFICATIONS**

|                           |                                                                                                                                   |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Nominal resistance range  | 10 $\Omega$ ~ 2 M $\Omega$                                                                                                        |
| Resistance tolerance      | ± 20 %                                                                                                                            |
| Power ratings             | 0.25 W (70 °C) 0 W (125 °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 | 210° (1 turn)                                                                                                                     |
| End resistance            | 1 % or 2 $\Omega$ , whichever is greater                                                                                          |
| C.R.V.                    | 1 % or 3 $\Omega$ , whichever is greater                                                                                          |
| Operating temp. range     | - 55 ~ 125 °C                                                                                                                     |
| Temp. coefficient         | 10 $\Omega$ ~ 50 $\Omega$ : ± 250 10 <sup>-6</sup> /°C maximum<br>100 $\Omega$ ~ 2M $\Omega$ : ± 100 10 <sup>-6</sup> /°C maximum |
| Insulation resistance     | 1000 M $\Omega$ minimum (DC500 V)                                                                                                 |
| Dielectric strength       | AC500 V, 60 s                                                                                                                     |
| Net weight                | Approx. 0.12 g (ST-4A, B, C, D, F, EA, EB, EC, ED, EF)<br>Approx. 0.22 g (ST-4G, H, EG, EH)                                       |

Reflow profile for soldering heat evolution

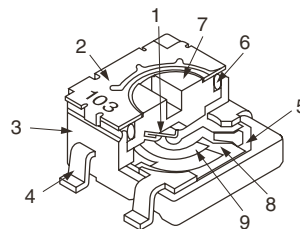
**ENVIRONMENTAL SPECIFICATIONS**

| Test item                 | Test conditions                                                                                                                                                                                                                                                               | Specifications                            |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Thermal shock             | - 65 ~ 125 °C (0.5 h),<br>5 cycles                                                                                                                                                                                                                                            | [ $\Delta R/R \leq 2\%$ ]<br>[S.S. ≤ 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. ≤ 1 %] |
| Vibration                 | Amplitude 1.52 mm or<br>Acceleration 196 m/s <sup>2</sup> ,<br>10 ~ 2000 Hz, 3 directions, 12 times each                                                                                                                                                                      |                                           |
| Load Life                 | 70 °C, 0.25 W, 1000 h                                                                                                                                                                                                                                                         | [ $\Delta R/R \leq 3\%$ ]<br>[S.S. ≤ 1 %] |
| Low temperature operation | - 55 °C, 2 h                                                                                                                                                                                                                                                                  | [ $\Delta R/R \leq 2\%$ ]<br>[S.S. ≤ 2 %] |
| High temperature exposure | 125 °C, 250 h                                                                                                                                                                                                                                                                 | [ $\Delta R/R \leq 3\%$ ]<br>[S.S. ≤ 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-Cu<br>Flow: 260 °C ± 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 ± 10 °C, 3 ~ 4 s |                                           |

## 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         | Wiper             | Multi metal alloy                    | -            |
| 2         | Cover             | Stainless steel (SUS 304)            |              |
| 3         | Housing           | Epoxy                                | UL-94V-O     |
| 4         | Terminal pin      | Sn-Pb<br>Copper alloy, Solder-plated | -            |
|           |                   | Sn-Cu<br>Copper alloy, Sn-Cu-plated  |              |
| 5         | Base element      | Ceramic                              |              |
| 6         | "O" ring          | Silicone rubber                      | UL-94HB      |
| 7         | Rotor             | Polyphenylenesulphide                | UL-94V-O     |
| 8         | Electrode         | Ag-Pd cermet                         | -            |
| 9         | Resistive element | RuO2 cermet                          |              |

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) |                     |
|                     |                       | Sn-Pb           | Sn (Lead (Pb)-free) | Sn-Pb            | Sn (Lead (Pb)-free) |
| Top adjustment      | A (J-hook)            | ST-4/42TA       | ST-4/42ETA          | ST-4/42A         | ST-4/42EA           |
|                     | B (Gull wing)         | ST-4/42TB       | ST-4/42ETB          | ST-4/42B         | ST-4/42EB           |
|                     | C (Through hole pins) | -               | -                   | ST-4/42C         | ST-4/42EC           |
| Rear adjustment     | D (Gull-wing)         | ST-4/42TD*      | ST-4/42ETD*         | ST-4/42D*        | ST-4/42ED*          |
|                     | F (Through hole pins) | -               | -                   | ST-4/42F*        | ST-4/42EF*          |
| Side adjustment     | G (J-hook)            | ST-54/42TG      | ST-4/42ETG          | ST-4/42G         | ST-4/42EG           |
|                     | H (Gull-wing)         | ST-4/42TH       | ST-4/42ETH          | ST-4/42H         | ST-4/42EH           |
| Pieces in package   |                       | 500 pcs./reel   |                     | 100 pcs./reel    |                     |

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

\* Slot: ST-4□□ Slot:-42□□

**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 $\Omega$ | -            |

Not manufactured

\* 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**

| ORDERING INFORMATION     |                 |                           |                                   |                 |
|--------------------------|-----------------|---------------------------|-----------------------------------|-----------------|
| ST-4                     |                 | T                         | A                                 | 204             |
| SERIES NAME (MINUS SLOT) | TERMINAL PIN    | FORM OF PACKAGING         | PRODUCT SHAPE (SHAPE OF TERMINAL) | RESISTANCE CODE |
|                          | Blank: Sn-Pb    | T: Taping (Reel)          | A, G: J-hook                      |                 |
|                          | E: Sn           | Blank: Bulk in vinyl bags | B, D, H: Gull wing                |                 |
|                          | (Lead(Pb)-free) |                           | C; F: Through hole pins           |                 |

**ORDERING INFORMATION**

| ST-4 2                      |                      | T                            | A                                    | 204             |
|-----------------------------|----------------------|------------------------------|--------------------------------------|-----------------|
| SERIES NAME<br>(CROSS SLOT) | TERMINAL<br>PIN      | FORM OF<br>PACKAGING         | PRODUCT SHAPE (SHAPE<br>OF TERMINAL) | RESISTANCE CODE |
|                             | Blank: Sn-Pb         | T: Taping (Reel)             | A, G: J-hook                         |                 |
|                             | E: Sn<br>(Lead-free) | Blank: Bulk in vinyl<br>bags | B, D, H: Gull wing                   |                 |
|                             |                      |                              | C; F: Through hole pins              |                 |

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