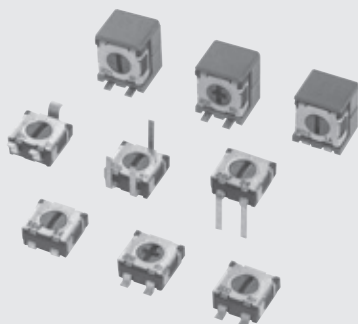


# SURFACE MOUNT CERMET TRIMMERS (SINGLE TURN) **ST-4**

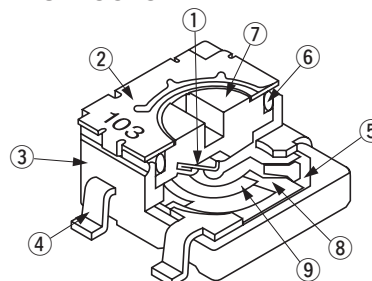
## RoHS compliant



## FEATURES

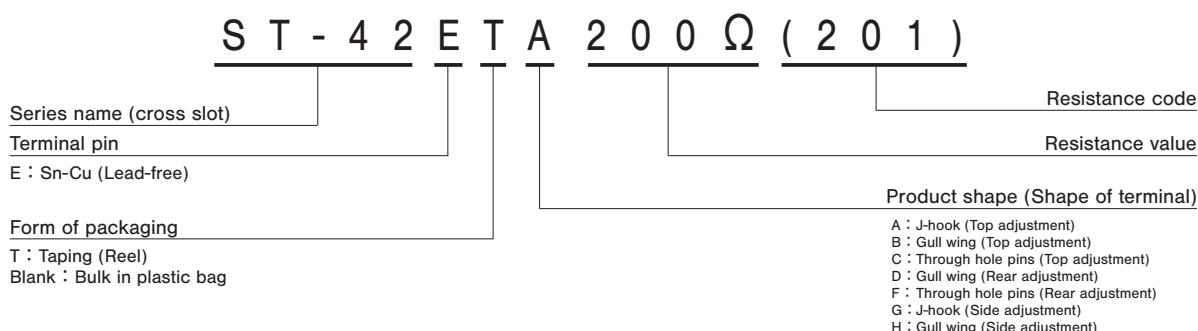
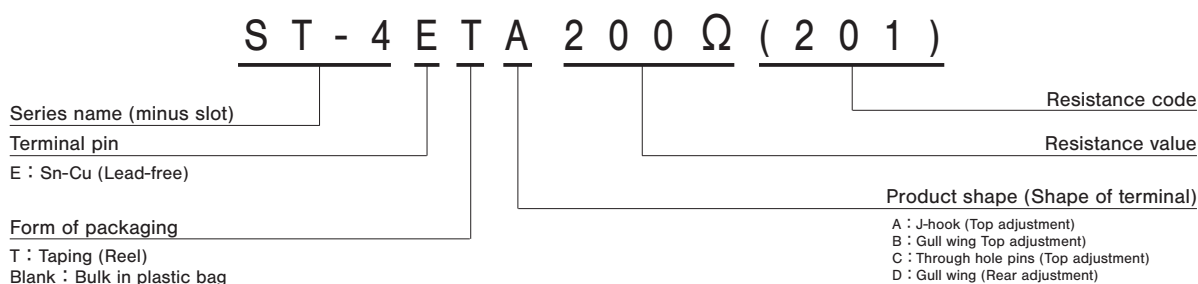
- RoHS compliant
- Wide variety (7 types) to choose from
- Automatic mounting is possible (Taping)
- Flow/reflow soldering is possible
- Sealed construction (Washable: Refer to page 698.)
- Stopper structure prevents terminal pin from being open.
- Cross slot rotor suitable for automatic adjustment
- Resin materials are UL Recognized 94V-0 or 94V-1 equivalent

## INTERNAL STRUCTURE



|   | Part name         | Material                     |
|---|-------------------|------------------------------|
| ① | Wiper             | Multi metal alloy            |
| ② | Cover             | Stainless steel (SUS 304)    |
| ③ | Housing           | Epoxy                        |
| ④ | Terminal pin      | Copper alloy, Sn-Cu-plated   |
| ⑤ | Base element      | Ceramic                      |
| ⑥ | "O" ring          | Silicone rubber              |
| ⑦ | Rotor             | PPS<br>Polyphenylenesulphide |
| ⑧ | Electrode         | Ag-Pd cermet                 |
| ⑨ | Resistive element | RuO <sub>2</sub> cermet      |

## PART NUMBER DESIGNATION



※ Please refer to the LIST OF PART NUMBERS when placing orders.

# ST-4

## SURFACE MOUNT TRIMMERS

### LIST OF PART NUMBERS

| Adjustment position | Shape of terminal       | Form of packaging |               |
|---------------------|-------------------------|-------------------|---------------|
|                     |                         | Taping (reel)     | Plastic bag   |
| Top adjustment      | A ( J-hook )            | ST-4/42ETA        | ST-4/42EA     |
|                     | B ( Gull wing )         | ST-4/42ETB        | ST-4/42EB     |
|                     | C ( Through hole pins ) |                   | ST-4/42EC     |
| Rear adjustment     | D ( Gull wing )         | ST-4/42ETD        | ST-4/42ED     |
|                     | F ( Through hole pins ) |                   | ST-4/42EF     |
| Side adjustment     | G ( J-hook )            | ST-4/42ETG        | ST-4/42EG     |
|                     | H ( Gull wing )         | ST-4/42ETH        | ST-4/42EH     |
| Pieces in package   |                         | 500 pcs./reel     | 100 pcs./pack |

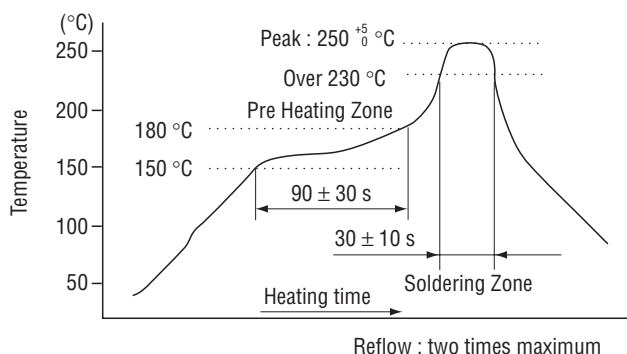
The products indicated by  mark are manufactured upon receipt of order basis.

※  slot : ST-4E  slot : ST-42E 

### ELECTRICAL CHARACTERISTICS

|                            |                                                                                                                                            |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal resistance range   | 10 $\Omega$ ~ 2 M $\Omega$                                                                                                                 |
| Resistance tolerance       | $\pm 20\%$                                                                                                                                 |
| 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 angle | 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 $\Omega$ : $\pm 250$ 10 <sup>-6</sup> /°C maximum<br>100 $\Omega$ ~ 2 M $\Omega$ : $\pm 100$ 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-4EA, EB, EC, ED, EF)<br>Approx. 0.22 g (ST-4EG, EH)                                                                     |

### Reflow profile for soldering heat evaluation



### 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 $\Omega$ |              |

Fig. 1

 : 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.

※ Cross slot available : ST-42E 

### MECHANICAL CHARACTERISTICS

|                   |                                                        |
|-------------------|--------------------------------------------------------|
| Mechanical angle  | 240° (1 turn)                                          |
| Operating torque  | 10 mN·m {102 gf·cm} maximum                            |
| Stop strength     | 30 mN·m {306 gf·cm} minimum                            |
| Rotational life   | 100 cycles [ $\Delta R/R \leq \pm (2 \Omega + 3 \%)$ ] |
| Thrust to rotor   | 5 N {0.51 kgf} minimum                                 |
| Solderability     | 245 $\pm 3$ °C, 2 ~ 3 s                                |
| Shear (Adhesion)  | 5 N {0.51 kgf} 10 s                                    |
| Substrate bending | Width 90 mm, bend 3 mm, 5 s, 1 time                    |
| Pull-off strength | 5 N {0.51 kgf} 10 s                                    |

{ } : Reference only

### ENVIRONMENTAL CHARACTERISTICS

| Test item           | Test conditions                                                                                                                                                                                                                                                              | Specifications                                   |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Thermal shock       | - 65 ~ 125 °C (0.5 h), 5 cycles                                                                                                                                                                                                                                              | [ $\Delta R/R \leq 2\%$ ]<br>[ S.S. $\leq 1\%$ ] |
| Humidity            | - 10 ~ 65 °C (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<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. $\leq 1\%$ ] |
| Low temp. operation | - 55 °C, 2 h                                                                                                                                                                                                                                                                 | [ $\Delta R/R \leq 2\%$ ]<br>[ S.S. $\leq 1\%$ ] |
| High temp. exposure | 125 °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      | Flow : 260 $\pm 3$ °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 | [ $\Delta R/R \leq 1\%$ ]                        |

$\Delta R/R$  : Change in total resistance  
S.S. : Setting stability

# ST-4

## SURFACE MOUNT TRIMMERS

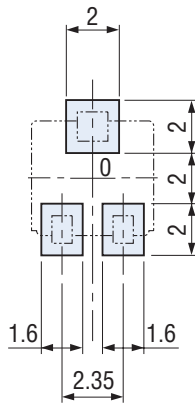
### MAXIMUM INPUT RATINGS

| Nominal resistance values ( $\Omega$ )                          | Resistance code                        | Maximum input voltage (V)                    | Maximum wiper current (mA)                   |
|-----------------------------------------------------------------|----------------------------------------|----------------------------------------------|----------------------------------------------|
| $\rightarrow$ 10<br>$\rightarrow$ 20<br>50<br>100<br>200<br>500 | 100<br>200<br>500<br>101<br>201<br>501 | 1.00<br>2.00<br>3.53<br>5.00<br>7.07<br>11.2 | 100<br>100<br>70.7<br>50.0<br>35.4<br>22.4   |
| 1 k<br>2 k<br>5 k<br>10 k<br>20 k<br>50 k                       | 102<br>202<br>502<br>103<br>203<br>503 | 15.8<br>22.4<br>35.4<br>50.0<br>70.7<br>112  | 15.8<br>11.2<br>7.07<br>5.00<br>3.54<br>2.24 |
| 100 k<br>200 k<br>500 k<br>1 M<br>2 M                           | 104<br>204<br>504<br>105<br>205        | 158<br>200<br>200<br>200<br>200              | 1.58<br>1.00<br>0.40<br>0.20<br>0.10         |

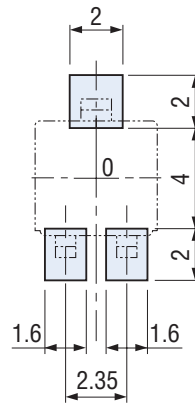
The products indicated by  $\rightarrow$  mark are manufactured upon receipt of order basis.

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

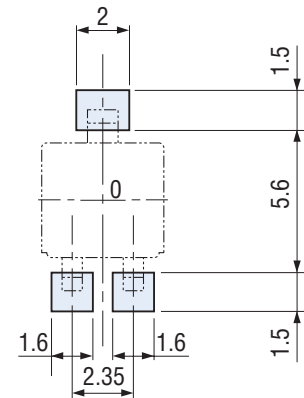
#### ST-4EA



#### ST-4EB

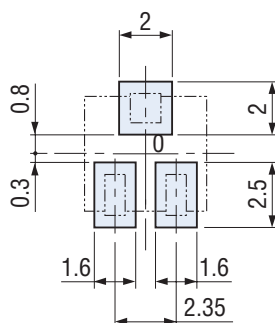


#### ST-4ED

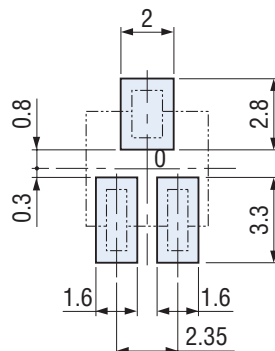


(Unit: mm)

#### ST-4EG



#### ST-4EH



Note) The zero point is the center of mounting.

# ST-4

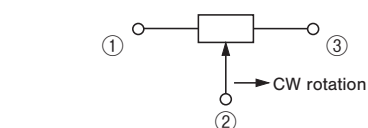
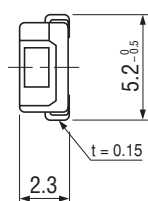
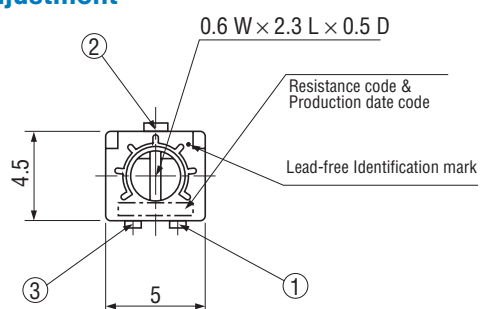
## SURFACE MOUNT TRIMMERS

### OUTLINE DIMENSIONS

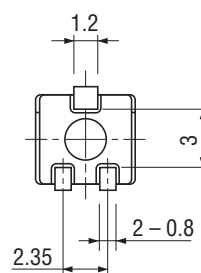
Unless otherwise specified, tolerance :  $\pm 0.3$  (Unit: mm)

#### ST-4EA

##### Top adjustment

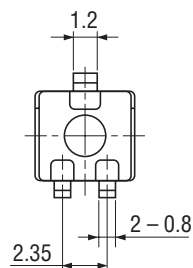
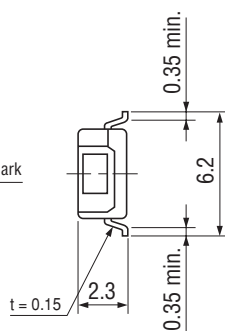
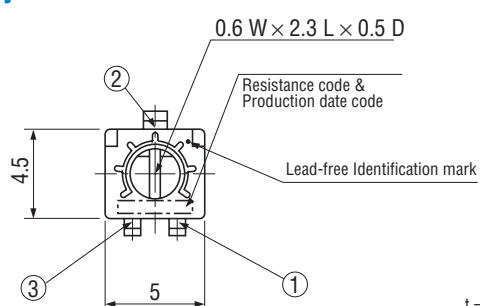


※ Note the terminal position.



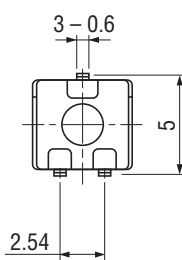
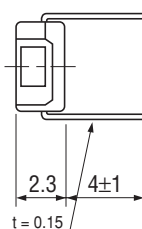
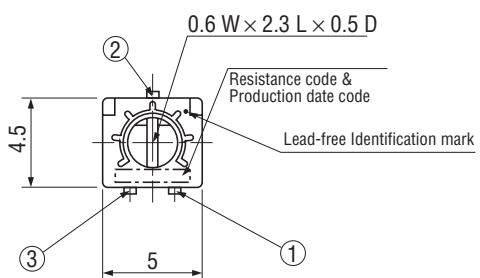
#### ST-4EB

##### Top adjustment



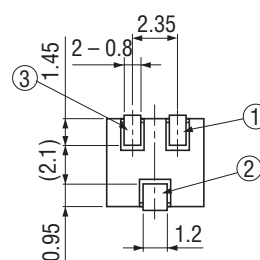
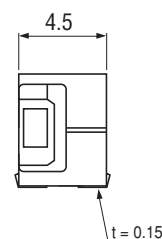
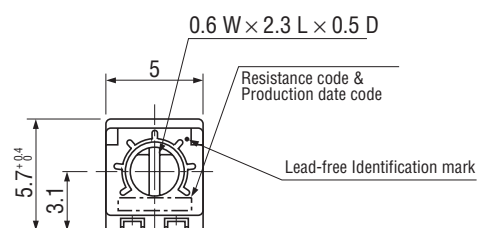
#### ST-4EC

##### Top adjustment



#### ST-4EG

##### Side adjustment



# ST-4

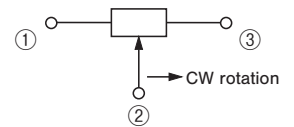
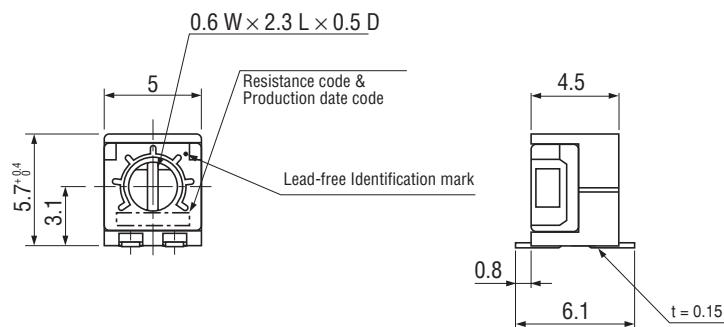
## SURFACE MOUNT TRIMMERS

### OUTLINE DIMENSIONS

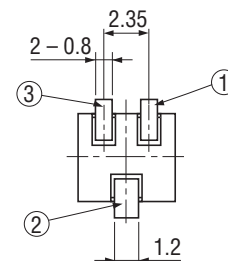
Unless otherwise specified, tolerance :  $\pm 0.3$  (Unit: mm)

#### ST-4EH

##### Side adjustment



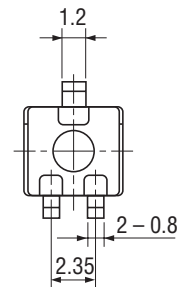
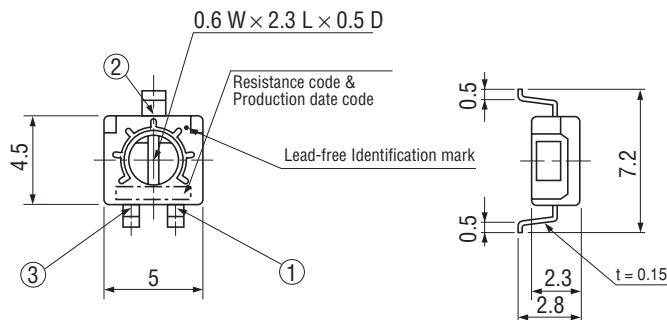
※ Note the terminal position.



#### ST-4ED

##### Rear adjustment

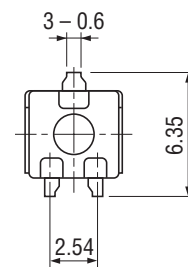
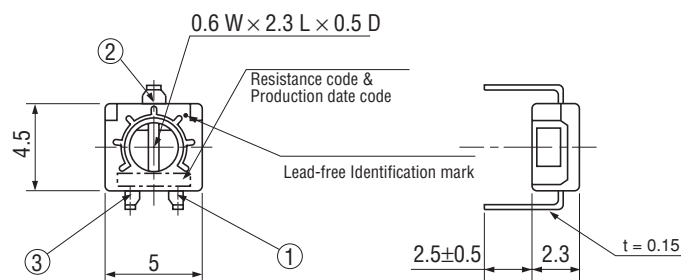
< Semi-standard products >



#### ST-4EF

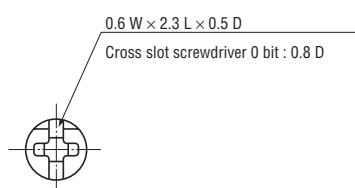
##### Rear adjustment

< Semi-standard products >



#### ST-42E

##### CROSS SLOT DIMENSION



# ST-4

## SURFACE MOUNT TRIMMERS

### PACKAGING SPECIFICATIONS

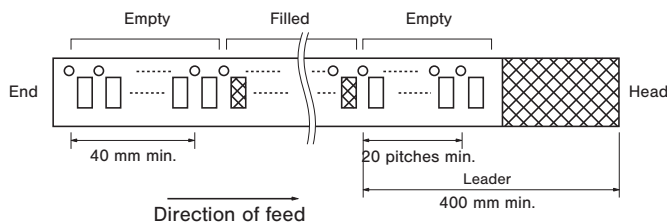
#### <Taping packaging specifications>

- 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-4ETA, ETB and ETD versions are boxed with 4 reels (2000 pcs.).  
ST-4ETG 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

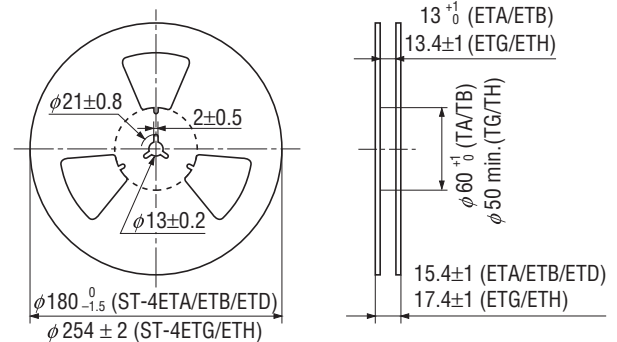


#### REEL DIMENSIONS

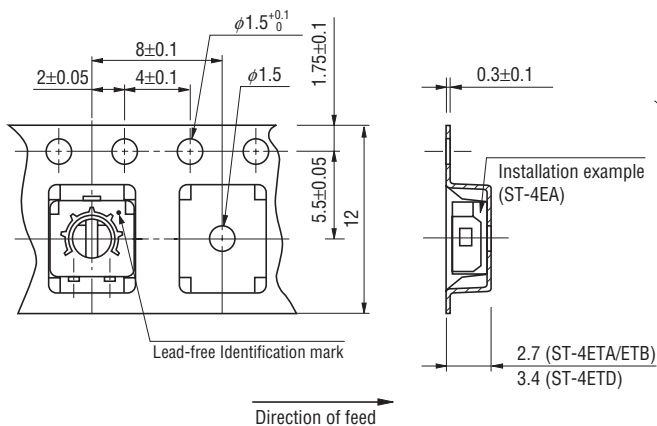
(Conforms to JIS C 0806-3)

(In accordance with EIAJ ET-7200A)

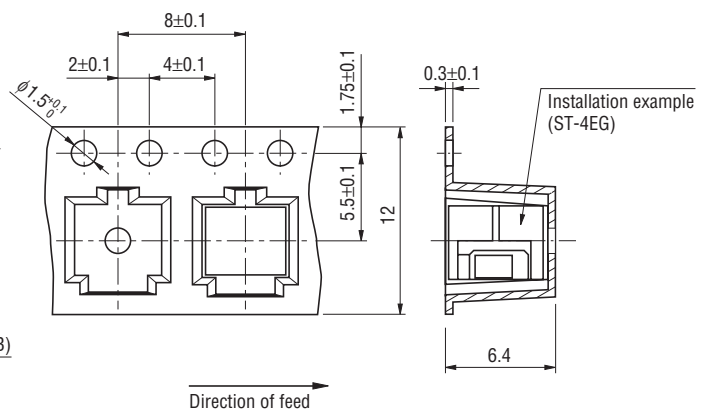
(Unit: mm)



#### ST-4ETA/ETB/ETD



#### ST-4ETG/ETH



#### <Bulk pack specifications>

- Unit of bulk in a plastic bag is 100 pcs. per pack.
- Boxing of bulk in a plastic bag is performed with 500 pcs. per box.