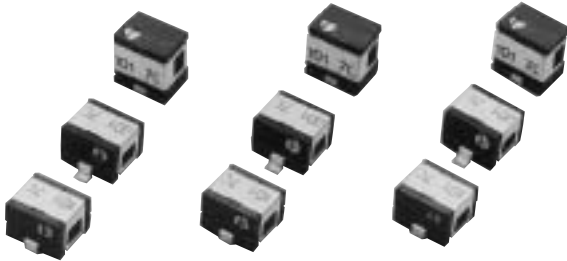




**THE DATASHEET OF  
SM-4TW202**



## Surface Mount Cermet Trimmers (12 Turns)

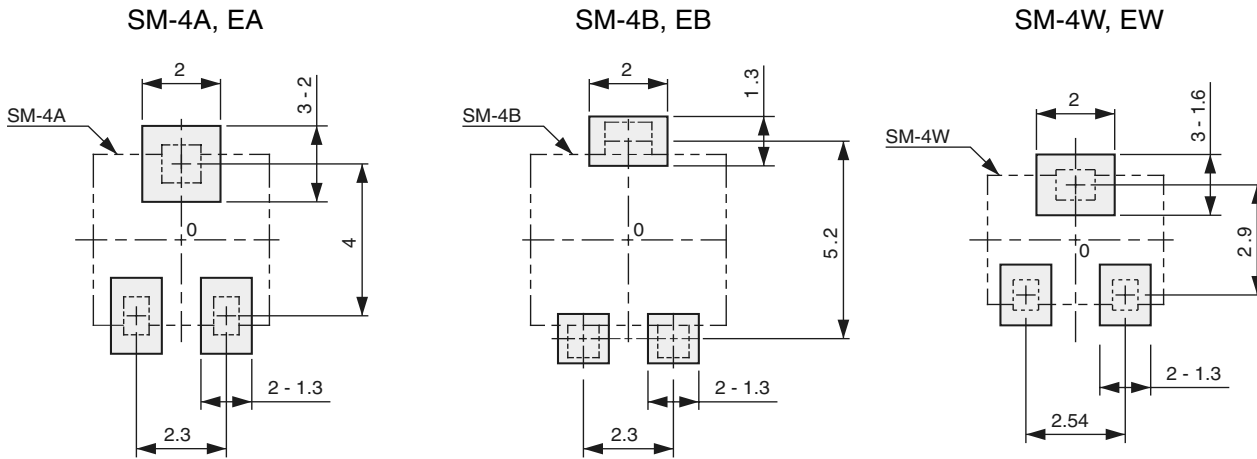


### FEATURES

- 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

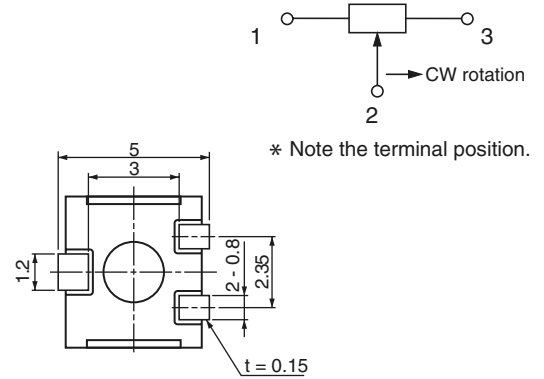
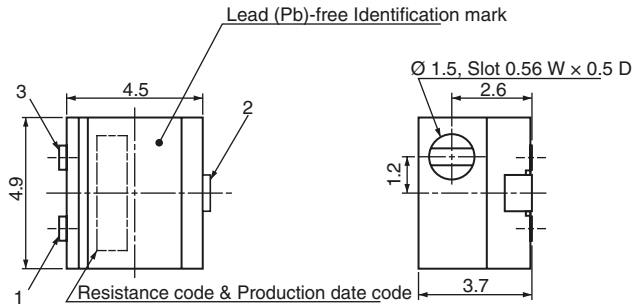


Note) The zero point is the center of mounting.

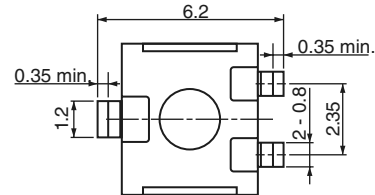
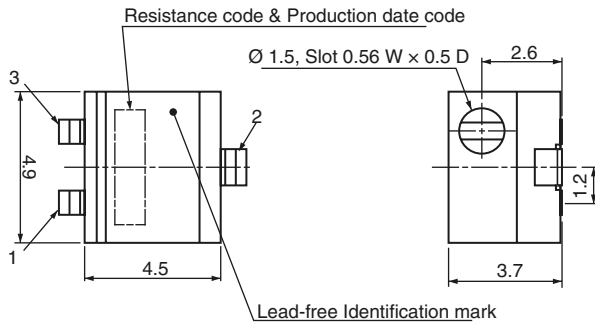
**OUTLINE DIMENSIONS**

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

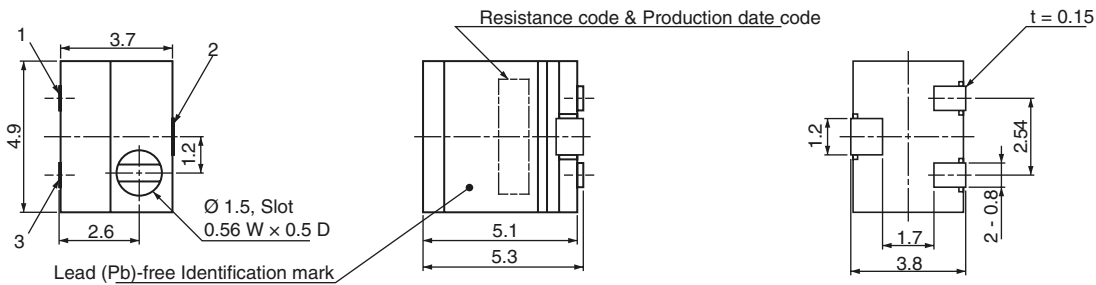
**SM-4A, SM-4EA**  
Side adjustment



**SM-4B, SM-4EB**  
Side adjustment



**SM-4W, SM-4EW**  
Top adjustment



## PACKAGING SPECIFICATIONS

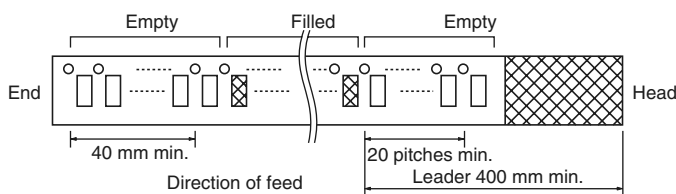
### Taping packaging specifications

- 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

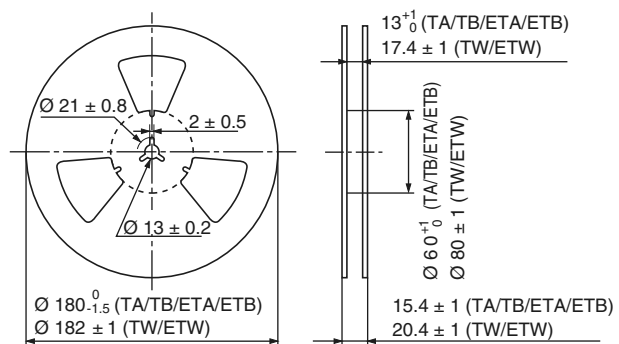


### REEL DIMENSIONS

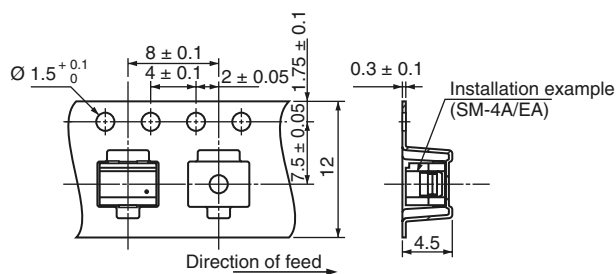
(Conforms to JIS C 0806-3)

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

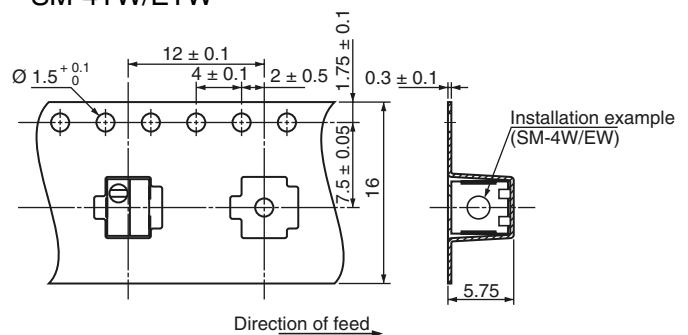
(Unit: mm)



### 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 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

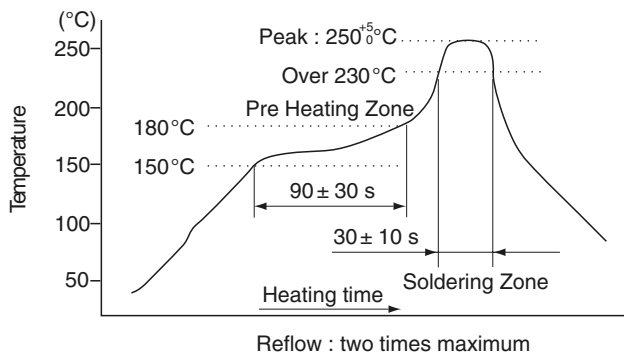
**ELECTRICAL CHARACTERISTICS**

Nominal resistance range	10 $\Omega$ ~ 2 M $\Omega$
Resistance tolerance	± 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	± 100 10 <sup>-6</sup> /°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 (0.5 h), 5 cycles	[ $\Delta R/R \leq 2 \%$ ] [S.S. ≤ 1 %]
Humidity	- 10 ~ 65 °C (Relative humidity 80 ~ 98 %), 10 cycles, 240 h	[ $\Delta R/R \leq 2 \%$ ]
Shock	981 m/s <sup>2</sup> , 6 ms 6 directions for 3 times each	[ $\Delta R/R \leq 1 \%$ ] [S.S. ≤ 1 %]
Vibration	Amplitude 1.52 mm or Acceleration 196 m/s <sup>2</sup> , 10 ~ 2000Hz, 3 directions, 12 times each	
Load Life	85 °C, 0.25 W, 1000 h	[ $\Delta R/R \leq 2 \%$ ] [S.S. ≤ 1 %]
Low temperature operation	- 65 °C, 2 h	[ $\Delta R/R \leq 1 \%$ ] [S.S. ≤ 1 %]
High temperature exposure	150 °C, 250 h	[ $\Delta R/R \leq 2 \%$ ] [S.S. ≤ 1 %]
Immersion seal	85 °C, 60 s	No leaks (No continuous bubbles)
Soldering heat	Sn-Pb 260 °C, 10 s or 215 °C, 35 s	[ $\Delta R/R \leq 1 \%$ ]
	Sn-Cu 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 Reflow: Peak temperature 255 °C (Please refer to the profile below.) Manual soldering: 350 ± 10 °C, 3 ~ 4 s	

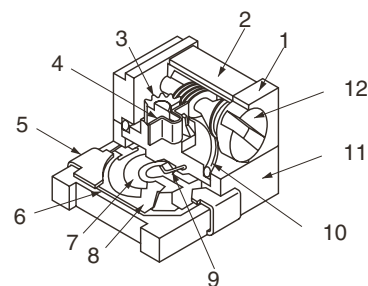
Reflow profile for soldering heat evaluation



**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 (Polyphenylenesulp hide)	UL-94V-O
2	Cover	Stainless steel	-
3	Rotor gear	PPS (Polyphenylenesulp hide)	UL-94V-O
4	Clutch spring	Stainless steel	-
5	Terminal pin	Sn-Pb	Copper alloy, Solder-plated
		Sn-Cu	Copper, 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 TA, ETA: 500 pcs./reel TB, ETB: 500 pcs./reel		50 pcs./pack	



<b>FIG. 1: NOMINAL RESISTANCE VALUES</b>								
* 10 Ω	* 20 Ω	50 Ω	100 Ω	200 Ω	500 Ω	1 kΩ	2 kΩ	5kΩ
10 kΩ	20 kΩ	50 kΩ	100 kΩ	200 kΩ	500 kΩ	1 MΩ	2 MΩ	-

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.

<b>ORDERING INFO</b>				
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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