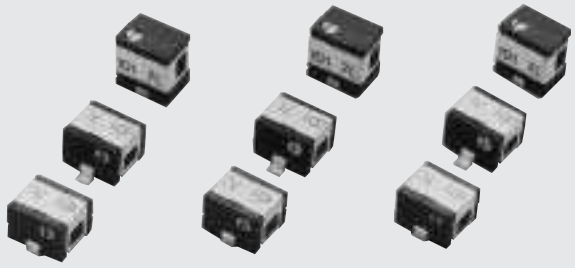
SURFACE MOUNT CERMET TRIMMERS (12 TURNS)

SM-4

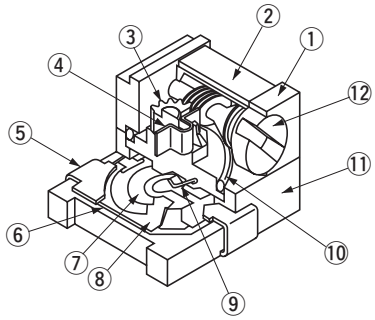
RoHS compliant



■ FEATURES

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

INTERNAL STRUCTURE



Part name		Material	Flammability
①	Housing	Polyphenylenesulphide	UL-94V-0
②	Cover	Stainless steel	—
③	Rotor gear	Polyphenylenesulphide	UL-94V-0
④	Clutch spring	Stainless steel	—
⑤	Terminal pin	Copper alloy, Sn-Cu-plated	
⑥	Base element	Ceramic	
⑦	Resistive element	RuO_2 cermet	
⑧	Electrode	Ag-Pd cermet	
⑨	Wiper	Multi metal alloy	
⑩	"O" ring	Silicone rubber	UL-94HB
⑪	Base	Epoxy	UL-94V-0
⑫	Shaft	Metal	—

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

■ PART NUMBER DESIGNATION

S M - 4 E T A 1 kΩ (1 0 2)

Series name

Terminal pin
E : Sn-Cu (Lead-free)

Form of packaging
T : Taping (Reel)
Blank : Bulk in plastic bag

Product shape (Shape of terminal)
A : J-hook
W : J-hook
B : Gull wing

Resistance value

Resistance code

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

SM-4
SURFACE MOUNT TRIMMERS

■ LIST OF PART NUMBERS

Adjustment position	Shape of terminal	Form of packaging	
		Taping (reel)	Plastic bag
		Sn-Cu (Lead-free)	Sn-Cu (Lead-free)
Top adjustment	W (J-hook)	SM-4ETW	SM-4EW
Side adjustment	A (J-hook)	SM-4ETA	SM-4EA
	B (Gull wing)	SM-4ETB	SM-4EB
Pieces in package		ETW : 250 pcs./reel ETA : 500 pcs./reel ETB : 500 pcs./reel	50 pcs./pack

<Nominal resistance values>

➔ 10 Ω	➔ 20 Ω	50 Ω	100 Ω	200 Ω	500 Ω	1 kΩ	2 kΩ	5 kΩ
10 kΩ	20 kΩ	50 kΩ	100 kΩ	200 kΩ	500 kΩ	1 MΩ	2 MΩ	

Fig. 1

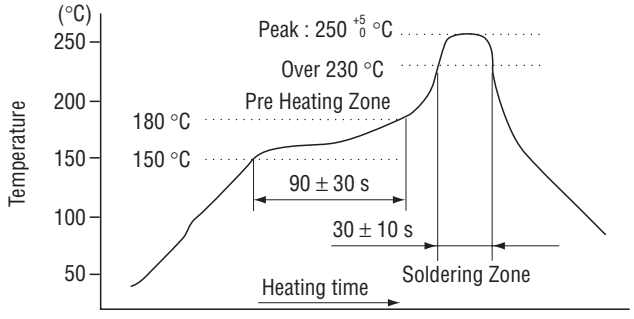
The products indicated by ➔ mark are manufactured upon receipt of order basis.

❊ 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.

■ ELECTRICAL CHARACTERISTICS

Nominal resistance range	10 Ω ~ 2 MΩ
Resistance tolerance	± 10 %
Power ratings	0.25 W (85 °C) 0 W (150 °C)
Resistance law	Linear law
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 Ω, whichever is greater
C.R.V.	1 % or 3 Ω, whichever is greater
Operating temp. range	–65 ~ 150 °C
Temp. coefficient	±100 10^{-6}/°C maximum
Insulation resistance	1000 MΩ minimum (DC500 V)
Dielectric strength	AC600 V, 60 s
Net weight	Approx. 0.2 g

<Reflow profile for soldering heat evaluation>



Reflow : two times maximum

■ MECHANICAL CHARACTERISTICS

Mechanical turn	12 turns
Operating torque	20 mN·m {204 gf·cm} maximum
Mechanical stop	Clutch action
Rotational life	200 cycles [ΔR/R ≦ ± (3 Ω +3 %)]
Thrust to shaft	5 N {0.51 kgf} minimum
Solderability	245 ± 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 ~ 150 °C (0.5 h), 5 cycles	[ΔR/R ≦ 2 %] [S.S. ≦ 1 %]
Humidity	–10 ~ 65 °C (80 ~ 98 %), 10 cycles, 240 h	[ΔR/R ≦ 2 %]
Shock	981 m/s², 6 ms 6 directions for 3 times each	[ΔR/R ≦ 1 %] [S.S. ≦ 1 %]
Vibration	Amplitude 1.52 mm or Acceleration 196 m/s², 10 ~ 2000 Hz, 3 directions, 12 times each	
Load life	85 °C, 0.25 W, 1000 h	[ΔR/R ≦ 2 %] [S.S. ≦ 1 %]
Low temp. operation	–65 °C, 2 h	[ΔR/R ≦ 1 %] [S.S. ≦ 1 %]
High temp. exposure	150 °C, 250 h	[ΔR/R ≦ 2 %] [S.S. ≦ 1 %]
Immersion seal	85 °C, 60 s	No leaks (No continuous bubbles)
Soldering heat	Flow : 260 ± 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	[ΔR/R ≦ 1 %]

ΔR/R : Change in total resistance
S.S. : Setting stability

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

SM-4
SURFACE MOUNT TRIMMERS

■ MAXIMUM INPUT RATINGS

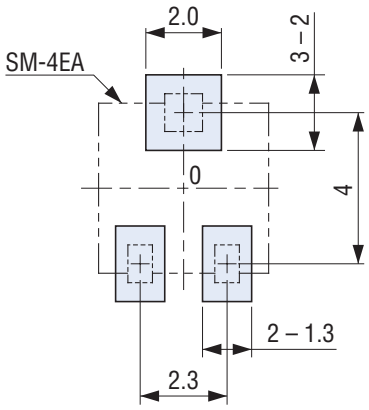
Nominal resistance values (Ω)	Resistance code	Maximum input voltage (V)	Maximum wiper current (mA)
➔ 10	100	1.00	100
➔ 20	200	2.00	100
50	500	3.53	70.7
100	101	5.00	50.0
200	201	7.07	35.4
500	501	11.2	22.4
1 k	102	15.8	15.8
2 k	202	22.4	11.2
5 k	502	35.4	7.07
10 k	103	50.0	5.00
20 k	203	70.7	3.54
50 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.

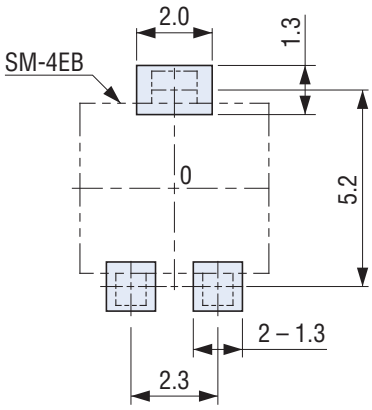
■ RECOMMENDED P.C.B. PAD OUTLINE DIMENSIONS

(Unit: mm)

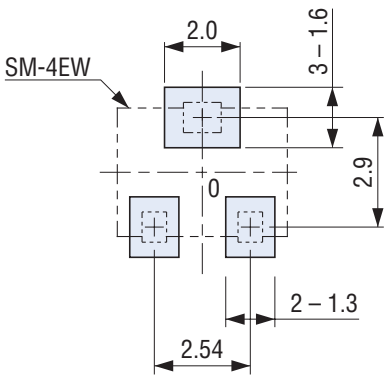
● SM-4EA



● SM-4EB



● SM-4EW



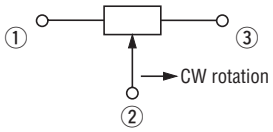
Note) The zero point is the center of mounting.

SM-4
SURFACE MOUNT TRIMMERS

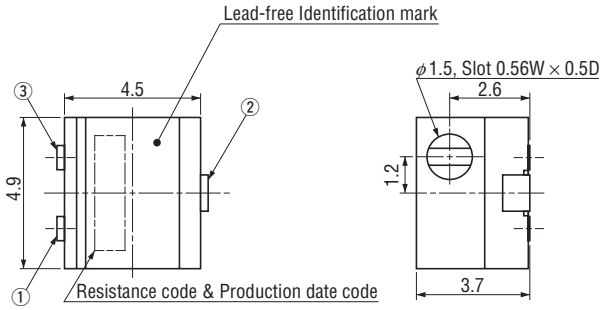
■ OUTLINE DIMENSIONS

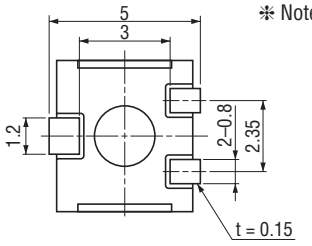
Unless otherwise specified, tolerance : ± 0.3 (Unit : mm)

● SM-4EA
Side adjustment

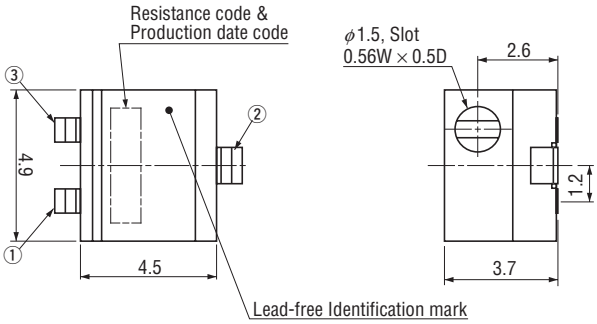


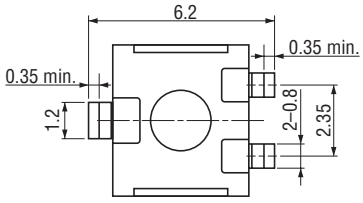
❊ Note the terminal position.



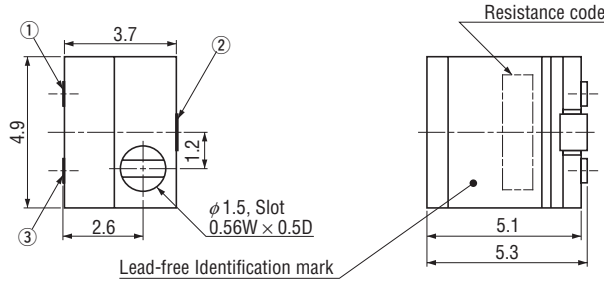


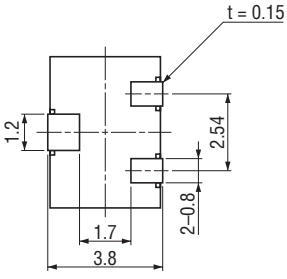
● SM-4EB
Side adjustment





● SM-4EW
Top adjustment





SM-4
SURFACE MOUNT TRIMMERS

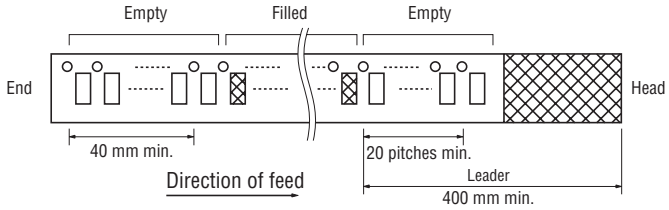
■ PACKAGING SPECIFICATIONS

<Taping packaging specifications>

- Taping version (SM-4ETA, 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-4ETW 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.

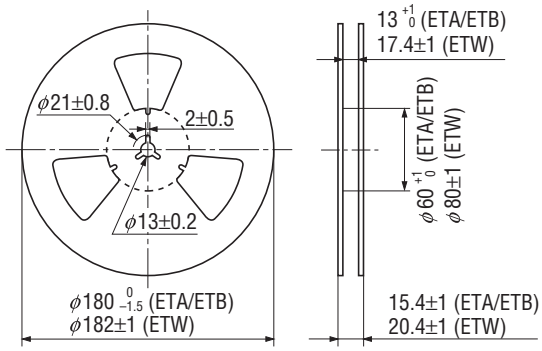
● EMBOSSED TAPE DIMENSIONS



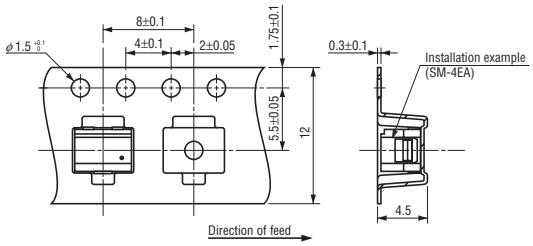
● REEL DIMENSIONS

(Conforms to JIS C 0806-3)
(TA/TB type : In accordance with EIAJ ET-7200A)

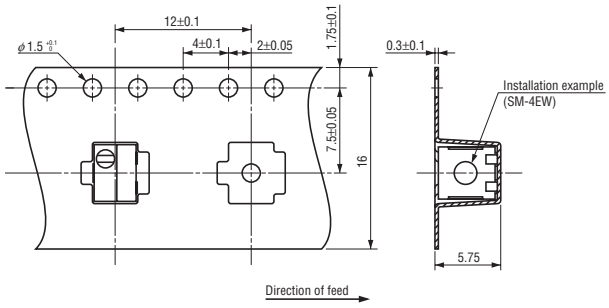
(Unit: mm)



● SM-4ETA/ETB



● SM-4ETW



<Bulk pack packaging specifications>

- Unit of bulk in a plastic bag is 50 pcs. per pack.
- Boxing of bulk in a plastic bag is performed with 200 pcs. per box.