1 Part Numbering System

EVM	3ES	X50	B13
A	B	C	D

A:Product Code
B:Type and Construction
C:Packaging Spec.
D:Taper and Resistance

2 Appearance and Shape

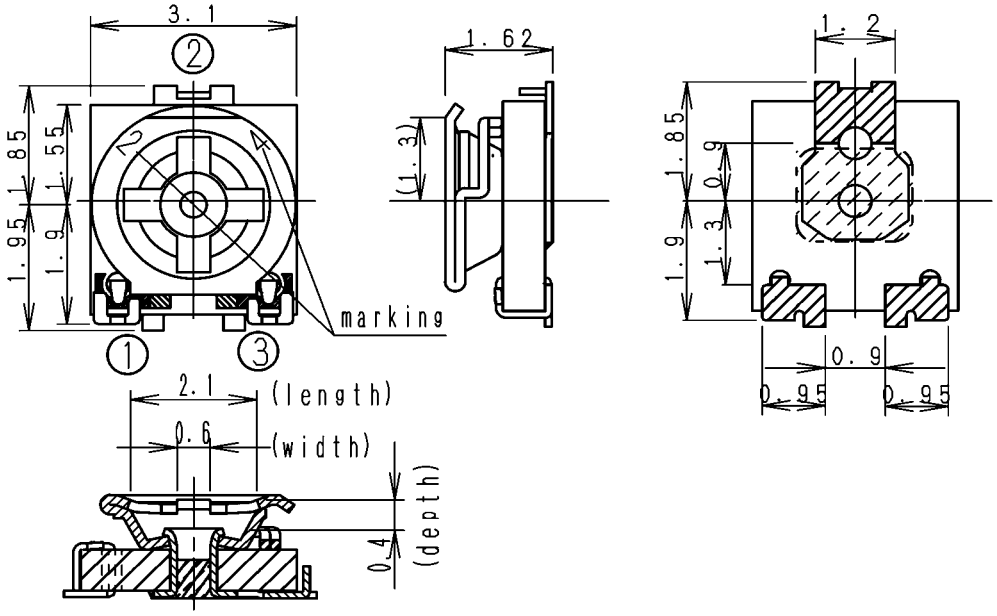
2.1 Marking

Nominal Total Resistance shall be marked by 2 digits.
Please refer to table noted right side.

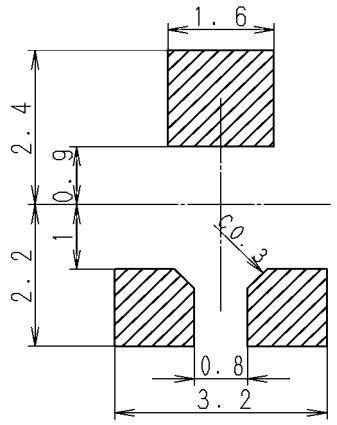
Nominal Total Resistance	Marking
100 ohm	12
1 k ohm	13
10 k ohm	14
1 M ohm	16

2.2 Dimensions in mm(not to scale)

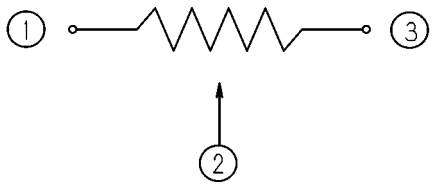
General Tolerance ±0.3



Recommended Land Pattern

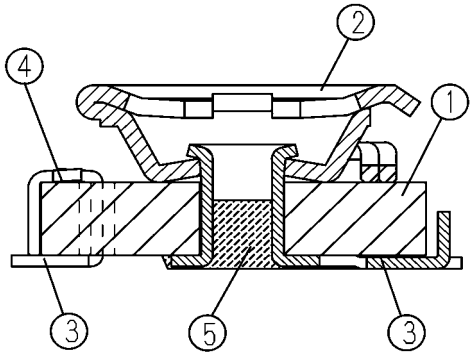


Circuit Diagram



Part Name 3mm Square Trimmer Potentiometers		
	Issue	Revisions
Part No. EVM3ESX50B**	Drawing No. EVM3ESE00 4	1/10

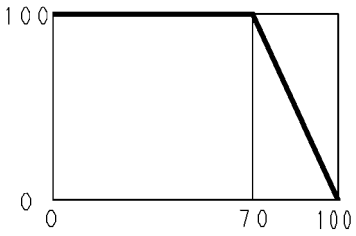
2.3 Constructions and Part List



NO	Parts	Materials	Notes
1	Resistor Base	Base Alumina Resist. Metalgraze	
2	Brush	Stainless Steel	
3	Terminal	Stainless Steel	Tin Plating
4		Solder	Tin,Silver, Copper Alloy Solder
5	Coating	UV Resin	

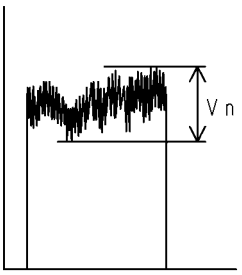
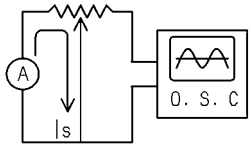
3 Performance

3.1 Rating

Item	Performance	Remarks
Power Rating	0.15 W For potentiometers operated in ambient temperature above 70 deg.C , Power Rating shall be derated in accordance with the figure at right.	Power Derating Curve  Ambient temperatur (deg.C)
Maximum Operating Voltage	50 V [DC]	
Voltage Rating	Voltage Rating should be Maximum Operating Voltage when E shall exceed Maximum Operating Voltage.	Voltage Rating $E = \sqrt{P \times R}$ E:Voltage Rating(V) P:Power Rating(W) R:Nominal Total Resistance (ohm)
Operating Temperature Range	-40 deg.C to 100 deg.C	
Nominal Total Resistance	100 ohm to 1 M ohm	
Tolerancce of Total Resistance	± 25 %	

3.2 Characteristics

3.2.1 Electrical Characteristics

Item	Performance	Test Methods
Resistance Law	0B (Linear)	Conforming to JIS C 5260-1 4.9
Minimum Resistance	Shall be below 2 % of Nominal Total Resistance.	Conforming to JIS C 5260-1 4.7
Temperature Coefficients of Resistance	Shall be within $\pm 250 \times 10^{-6}$ /deg.C	Conforming to JIS C 5260-1 2.2.19
Sliding Noise	Shall be below 5 % of Nominal Total Resistance. $\frac{Vn / Is}{R} \times 100 \leqq 5\ \%$ Vn :Noise voltage Is : Test current R :Nominal Total Resistance  Noise voltage	Conforming to JIS C 5260-1 4.15 method B.  Except both terminations. Operating rate of actuator at meansurement 5 s/cycle to 15 s/cycle Test currrent Is＝100×a / R(mA) R: Nominal Total Resistance / a less than 10 k ohm / 10 more than 10 k ohm and less than 1 M ohm / 100 more than 1 M ohm / 1000

3.2.2 Mechanical Characteristics

Item	Performance	Test Methods
Angle of Rotation	Electrically Effective Range 260 ° ±20 °	Conforming to JIS C 5260-1 4.4.6
Rotation Torque	2 mN・m to 20 mN・m	Conforming to JIS C 5260-1 4.18
Adhesion	No damage on appearance, mechanical and electrical performance.	・After mounting SMD at recommended land pattern on the test printed wiring board. □ ← horizontal direction 10 N ↑ vertical direction 5 N Apply the pressure in two direction for each time 10 s as illustrated above.
Resistance to Vibration	ΔV_{12} / V_{13} × 100 ≦ ± 2 V_{13} :Input voltage (terminal 1-3) V_{12} :Output voltage (terminal 1-2) ΔV_{12} : change of V_{12}	・Frequency range : 10 Hz to 55 Hz ・Peak to peak amplitud : 1.5 mm ・Sweeping : 5 min/cycle ・Test duration : 2 h in each directions(X,Y,Z) (6 h in total) ・Brush setting point : middle point
Shock	ΔV_{12} / V_{13} × 100 ≦ ± 2 V_{13} :Input voltage (terminal 1-3) V_{12} :Output voltage (terminal 1-2) ΔV_{12} : change of V_{12}	・Wave form : Half-sine pulse ・Peak acceleration : 981 m/s² ・Duration of pulse : 6 ms ・Number of times : 3 times in each directions(X,Y,Z) (18 times in total) ・Brush setting point : middle point
Resistance to Soldering Heat	Total resistance change shall be within ± 2 % of initial value and no damage on apperance.	Conforming to 4.1 Mounting Notes,Soldering Method(1). ・Number of times : 1 time
Solderability	New solder should be wet on the electrode and be raised, and wet angle of the solder should be less than 90degree.	Reflow soldering should be done on the print board for the test by the recommended land pattern. ・Solder paste :Sn-3.0Ag-0.5Cu(RMAtype) ・Paste thickness :150 μm ・Reflow conditions :Peak-temp. 250 deg.C maximum 230 deg.C or more time 30 s to 40 s

3.2.3 Environmental Characteristics

Item	Performance	Test Methods
Resistance to Cold	Total resistance change shall be within ± 5 % of initial value.	Test temperature : -40 deg.C ± 3 deg.C Test duration : 96 h ± 4 h Brush setting point : middle point
Resistance to Heat	Total resistance change shall be within ± 5 % of initial value.	Test temperature : 70 deg.C ± 2 deg.C Test duration : 500 h ±12 h Brush setting point : middle point
Change of Temperature	Total resistance change shall be within ± 5 % of initial value.	Low temperature : -40 deg.C ± 3 deg.C, 30 min High temperature : 85 deg.C ± 2 deg.C, 30 min Room temperature : 5 min Number of temperature change cycle : 50 cycle Brush setting point : middle point
Resistance to Damp,Heat	Total resistance change shall be within ± 5 % of initial value.	Test temperature : 60 deg.C ± 2 deg.C Relative humidity : 90 %RH to 95 %RH Test duration : 500 h ± 12 h Brush setting point : middle point
Endurance (Under Damp Load)	Total resistance change shall be within ± 5 % of initial value.	Test temperature : 60 deg.C ± 2 deg.C Relative humidity : 90 %RH to 95 %RH Test duration : 500 h ± 12 h Load : Votage Rating Loading method : 1.5 h on and 0.5 h off (across terminations 1 and 3) Brush setting point : middle point
Endurance (Under Rated Load)	Total resistance change shall be within ± 5 % of initial value.	Test temperature : 70 deg.C ± 2 deg.C Test duration : 500 h ± 12 h Load : Votage Rating Loading method : 1.5 h on and 0.5 h off (across terminations 1 and 3) Brush setting point : middle point
Endurance (To Sliding)	Total resistance change shall be within ± 15 % of initial value.	Number of test revolution : 20 revolution (without electrical load) Revolutional speed : 5 /min to 10 /min One revolution means more than 90 % of the total electrical range.

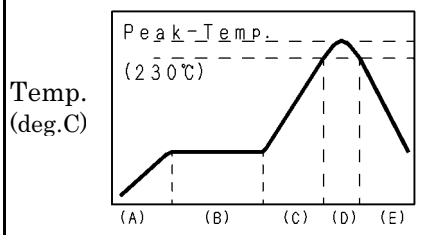
4 Application Notes

4.1 Mounting Notes

Reflow Soldering

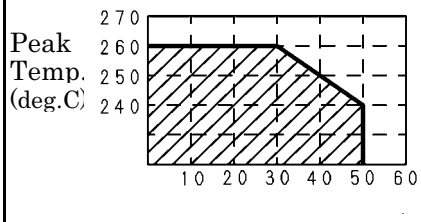
When reflow soldering, please observe below conditions.

〔Reflow Soldering Profile〕



(A)Heat-up zone 1
Room-temp. to preheat zone: 30 s to 60 s
(B)Preheat zone
140 deg.C to 180 deg.C : 60 s to 120 s
(C)Heat-up zone 2
Preheat zone to 230 deg.C : 20 s to 40 s
(D)Melting-heat zone
Peak-temp. : 5 s max
Refer to the following (230 deg.C or more) graph.
(E)Cooling zone
200 deg.C to 100 deg.C 1 deg.C/s to 4 deg.C/s

〔Recommended condition〕



(1)In case of reflow soldering,please measure actual temp. on the product surface and observe recommended condition described left.
(2)In case of exceeding recommended condition, please consult with us before use.
(3)The temp. strongly depends on measuring method of profile, please note how to do it.
(4)In case that temp.changes by PWB size, mounting density and so on, please check them by each PWB.

Manual Soldering

When manual soldering, please observe below condition.

- Soldering iron : 20 W maximum
- Soldering iron tip temperature : 280 deg.C maximum
- Soldering time : 3 s maximum

Soldering Notes (1)

This trimmer potentiometer is available for reflow soldering and manual soldering only.

Soldering Notes (2)

Solder and flux dissipated on the surface of element and contactor cause fatal damage, therefore in case of making wash and rinse, please consult before use.

(2)Design PCB
When designing land pattern, please design it,in accordance with recommended land layout deseribed in this production specifications for information.

(3)Mounting Notes
Mounting top side pressure loaded on the trimmer potentiometer shall be 4.9 N maximum.
Overload is afraid to cause fatal damage as transform or breakdown.
After soldering ,solder ball or solder scrap may cause short between the land pattern,so please make enough insulation there.

(4)Adjustment Notes
Adjusting top side pressure loaded on the contactor shall be 4.9 N maximum.
Overload is afraid to cause fatal damage as transform or breakdown of adjustment knob.
In case that the moving contact is set near the border portion between electrically effective and non-effective range ,electrically non-effective and open range, be afraid to be deviation of setting value. So avoid the setting like this.

(5)Lock paint
Avoid applying any lockpaint otherwise intrusion or dissipation of the paint may cause contact dectect. In case of being subjected to apply it,please avoid using adhesives that may generate corrosive gas.

4.2 Circuit Diagram Notes

(1)Power Rating
The Maximum value of electric power which can continuously dissipated from all area of a resistive element at the rated ambient temperature.
In general, rated power shall be registrated in accordance with size & kind of them.
Please observe to use below rated power.Continuously dissipation is afraid to cause fatal damege, for example,deviation,firing,smoking.

(2)Influence of ambient temperature
Influence of ambient temperature can not be neglected for operating trim-pot in general case.
Please comply with power derated curve,in case of using it under the condition of exceeding specified power rating.

4.3 Mounting Notes

This trimmer potentiometer is not available for sealed type, so this is afraid to be influented fatally under the following conditions.
(1)Corrosive gas atomosphere of Cl, H_2S,NH_3,$N0_X$,$S0_2$ and so on.
(2)Moisture atomosphere of waterdrop, dewdrop and so on.
(3)Water,Salt,oil,chemicals,solvents and so on.
(4)Atmosphere of direct solar radiation.

4.4 Storage Notes

Storage under the following condition should be avoided.
Be afraid to degrade some performances and soldering wettability.
(1)Temperature:less than -10 deg.C and more than 40 deg.C,
Relative humidity:more than 85 %.
(2)Atmosphere of corrosive gas.
(3)Long term storage of over 6 months after delivery.
(4)Atmosphere of direct solar radiation.
Please store the package without unsuitable load and stress.
While remaining some product after opening the package, any countermeaure of shutting moisture gas and so on,should be done.

4.5 Application Notes for electric equipments and instruments

Although enough care is taken to ensure trimmer potentiometer quality.
As life-end breakage mode,some fatal trouble might generate,such as spec-out resistance change, short or open circuits, abnomally generated heat.
So please review the affect of any single fault of a potentiometer in advance.
(1)The product specification for information ensures the quality of pre-set potentiometers. For applying ,please should evaluate this product under the condition built in the appliances.
(2)The troubles caused by applying this product under out-specification should not be warranbted.
(3)When applying for high-excellent liabilty and security appliances,for example,traffic transportation equipments(train,auto vehicles,traffic-signal equipments),medical apparatus, aircraft, spacecraft,heating,firing,gas,rotating equipment,security equipment, atomic-power equipment, machine-tool,and so on.
Please make enough considerations to design fail-safe circuit system for safety as followings.
*To make a safety system by a protective circuit or a protective device.
*To make a safety system by the redundant circuit so that the single fault of a trimmer potentiometer does not cause a dangerous situation.
(4)In case of arising some questions on the safety of this product,please don't hesitate to contact with our company and further technical evaluation should be done.

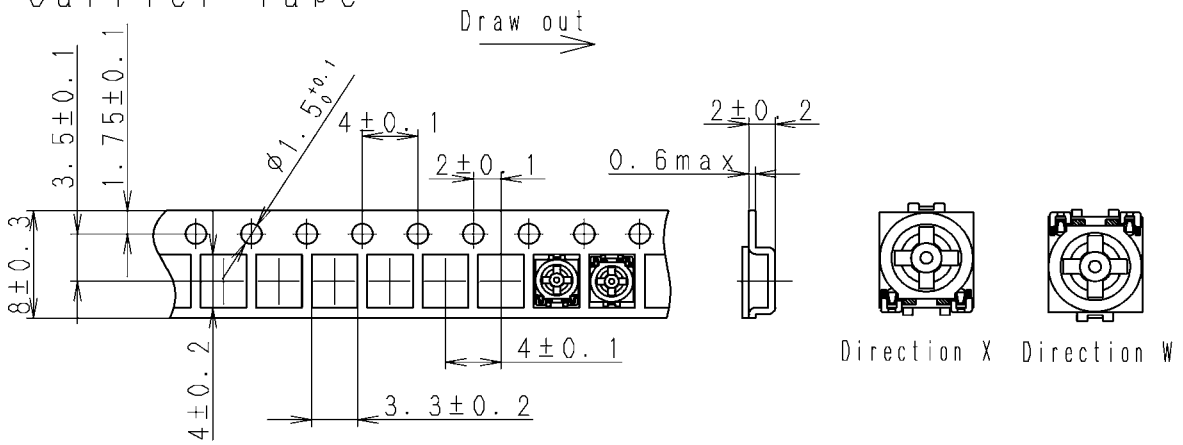
5 Operation of product specification for information

(1)Please return one set specification as approval one with accepted stamp or sign,after confirming and checking it .
In case that it will not be returned,in spite of taking three months or more from issue date noted on the cover page of this specification.
We could estimate that it has been already accepted, so please consider to operate it.

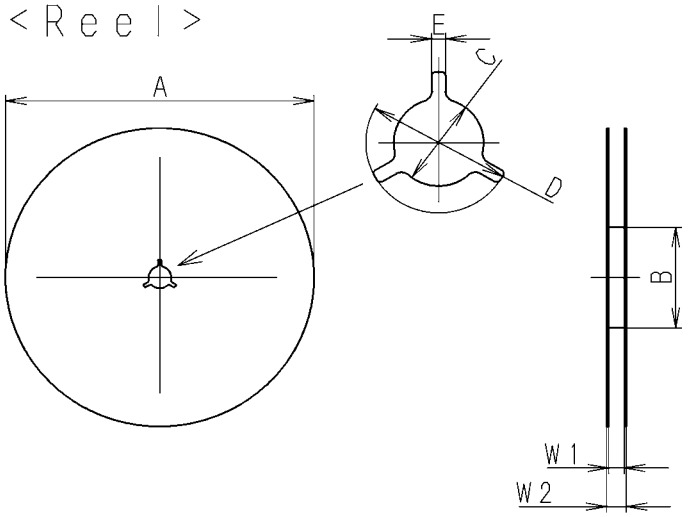
(2)Changing the content of product of specification for information is to be performed after pre-coordination with customer.
When you confirm revision of this specification, the previous version shall lose its validity.

6 Packaging Methods

<Carrier Tape>



<Reel>

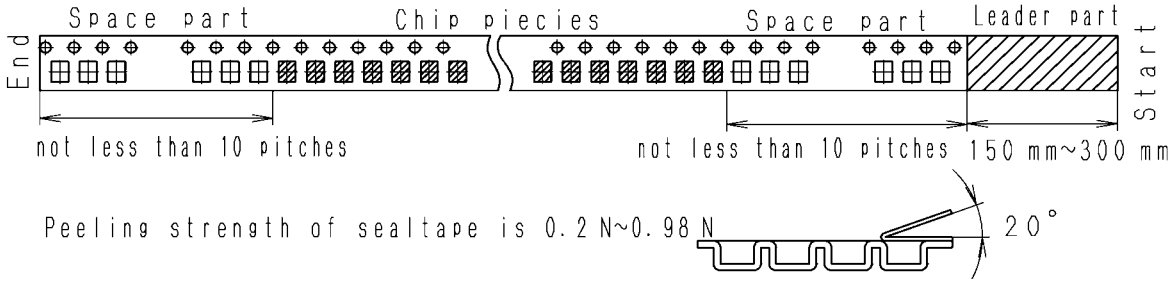


<Quantity>

NO	Part Number	Quantity/Reel
1	EVM3ESX50B** (W)	2000

NO	A	B	C	D	E	W1	W2
1	178	60	13	21	2	8.4	14.4
Tolerance	±2	min.	±0.2	±0.8	±0.5	+2 −0	max.

<Taping Methods>



Part Name 3mm Square Trimmer Potentiometers		Issue	Revisions
Part No. EVM3ESX50B**	Drawing No. EVM3ESE00 4		9/10

THE PART NUMBER CHART

NO	Customer PartNo.	ResistMAT	SUSHITAPartNo.	Marking	
1			１００ ΩE	VM3ESX5 0B1212	
2			１５０ ΩE	VM3ESX5 0BC2C2	
3			２００ ΩE	VM3ESX5 0B2222	
4			２２０ ΩE	VM3ESX5 0BE2E2	
5			３００ ΩE	VM3ESX5 0B3232	
6			３３０ ΩE	VM3ESX5 0BY2Y2	
7			４７０ ΩE	VM3ESX5 0BQ2Q2	
8			５００ ΩE	VM3ESX5 0B5252	
9			６８０ ΩE	VM3ESX5 0BS2S2	
10			１ kΩE	VM3ESX5 0B1313	
11			１．５ kΩE	VM3ESX5 0BC3C3	
12			２ kΩE	VM3ESX5 0B2323	
13			２．２ kΩE	VM3ESX5 0BE3E3	
14			３ kΩE	VM3ESX5 0B3333	
15			３．３ kΩE	VM3ESX5 0BY3Y3	
16			４．７ kΩE	VM3ESX5 0BQ3Q3	
17			５ kΩE	VM3ESX5 0B5353	
18			６．８ kΩE	VM3ESX5 0BS3S3	
19			１０ kΩE	VM3ESX5 0B1414	
20			１５ kΩE	VM3ESX5 0BC4C4	
21			２０ kΩE	VM3ESX5 0B2424	
22			２２ kΩE	VM3ESX5 0BE4E4	
23			３０ kΩE	VM3ESX5 0B3434	

THEPARTNUMBERCHART

NO	Customer PartNo.	ResistMAT	SUSHITAPartNo.	Marking	
24			３３ kΩE	VM3ESX5 0BY4Y4	
25			４７ kΩE	VM3ESX5 0BQ4Q4	
26			５０ kΩE	VM3ESX5 0B5454	
27			６８ kΩE	VM3ESX5 0BS4S4	
28			１００ kΩE	VM3ESX5 0B1515	
29			１５０ kΩE	VM3ESX5 0BC5C5	
30			２００ kΩE	VM3ESX5 0B2525	
31			２２０ kΩE	VM3ESX5 0BE5E5	
32			３００ kΩE	VM3ESX5 0B3535	
33			３３０ kΩE	VM3ESX5 0BY5Y5	
34			４７０ kΩE	VM3ESX5 0BQ5Q5	
35			５００ kΩE	VM3ESX5 0B5555	
36			６８０ kΩE	VM3ESX5 0BS5S5	
37			１ MΩE	VM3ESX5 0B1616	
38					
39					
40					
41					
42					
43					
44					
45					
46					

			Drawing No	EVM3ESE004	10/10
Issue	Revisions				