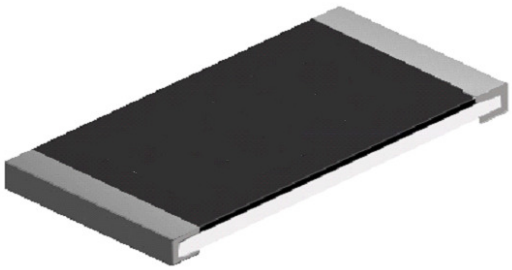
SMD - Resistors

Product Type:	Trimmable Thick Film Chip Resistors
Part No.:	SMDE Series
Issued Date:	13-Feb-09



RoHS Compliant

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Trimmable Chip Resistors

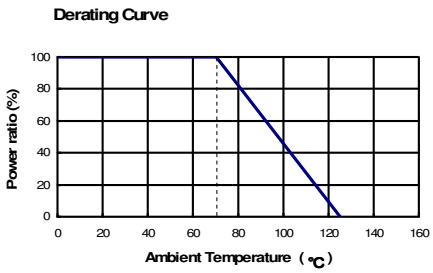
(SMDE Series)

▶ 1. Scope

This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

▶ 2. Features

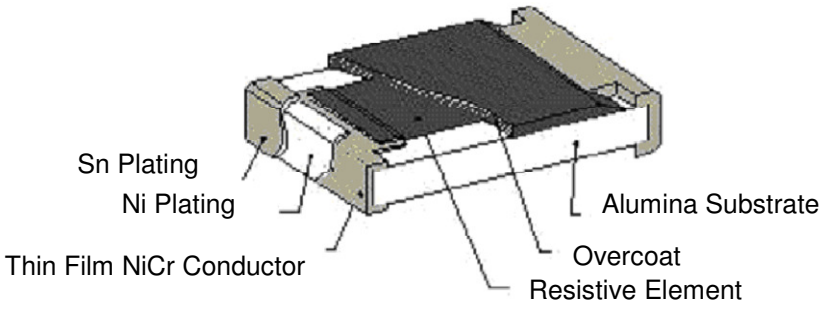
- Suitable for laser fine tune
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process



▶ 3. Applications

- Tuner
- Mobile phone
- Camcorder
- Portable audio
- Photo sensor
- Portable measuring equipment

▶ 4. Construction



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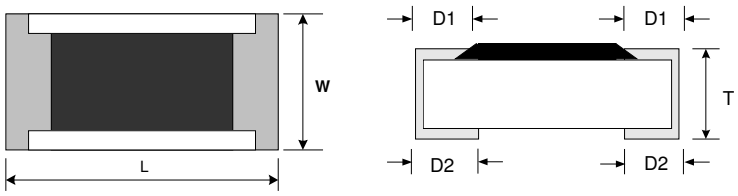
▶ 5. Dimensions



Unit: mm

Size	Codes	L	W	T	D1	D2
0402	SMDE0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10
0603	SMDE0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
0805	SMDE0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20
1206	SMDE1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20
1210	SMDE1210	3.20±0.20	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20
2010	SMDE2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20
2512	SMDE2512	6.35±0.20	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20

▶ 6. Product Identification

SMDE	0603	N	L	7	---10K
(1)	(2)	(3)	(4)	(5)	(6)

(1) Product Type: SMDE = Trimmable Chip Resistors

(2) Dimensions: 02=0402, 03=0603, 05=0805, 06=1206, 10=1210, 0A=2010, 12=2512

(3) Tolerance: N=0~-10%, P=0~-20%, Q=0~-30%

(4) Function: L=Standard

(5) Packaging: 6=7” Reel 10K, B=10” Reel 20K, C=13” Reel 40K (0402)

7=7” Reel 5K, A=10” Reel 10K, D=13” Reel 20K (0603, 0805,1206, 1210)

4=7” Reel 4K, 9=10” Reel 8K (2010, 2512)

(6) Resistance: ---1R2=1.2Ω, ---3K3=3.3KΩ, ---10K=10KΩ, --100K=100KΩ, --33K2=33.2KΩ, ---1M2=1.2MΩ

“-“ to fill up 6 spaces

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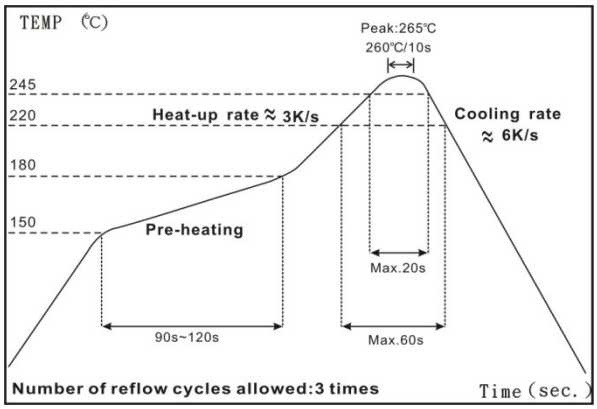
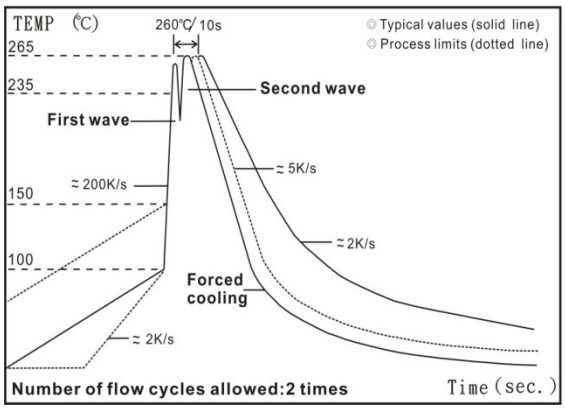
▶ 7. Electrical Characteristics

Item / Type	Power Rating at 70℃	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR (±PPM/℃)
SMDE0402	1/16W	-55 ~ +125℃	50V	100V	0~ -10% 0~ -20% 0~ -30%	1Ω~9.76Ω 10Ω~1MΩ 1.02MΩ~10MΩ	200 200 200
SMDE0603	1/10W	-55 ~ +125℃	50V	100V			
SMDE0805	1/8W	-55 ~ +125℃	150V	300V			
SMDE1206	1/4W	-55 ~ +125℃	200V	400V		1Ω~9.76Ω 10Ω~1MΩ 1.02MΩ~10MΩ	200 100 200
SMDE1210	1/3W	-55 ~ +125℃	200V	400V			
SMDE2010	3/4W	-55 ~ +125℃	200V	400V			
SMDE2512	1W	-55 ~ +125℃	250V	500V			

● Soldering condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260℃ : 10s

(2) Time of wave soldering at maximum temperature point 260℃ : 10s

(3) Time of soldering iron at maximum temperature point 410℃ : 5s

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▶ 8. Environmental Characteristics

Item	Specification		Test Method
	1%	5%	
Temperature Coefficient of Resistance (T.C.R.)	Within the specification		**JIS C 5201 4.8** **IEC 60115-1 4.8** -55°C~+125°C, 20°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	**JIS C 5201 4.13** **IEC 60115-1 4.13** 2.5 times RCWV / Max. overload voltage for 5 seconds
Insulation Resistance	≥10G		**JIS C 5201 4.6** **IEC 60115-1 4.6** Max. overload voltage for 1 minute
Voltage Proof	No breakdown or flashover		**JIS C 5201 4.7** **IEC 60115-1 4.7** 1.42 times RCWV (RMS) for 1 minute
Substrate Bending Test	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	**JIS C 5201 4.33** **IEC 60115-1 4.33** Bending once for 5 seconds with 3mm 2010, 2512 size: 2 mm
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	**JIS C 5201 4.18** **IEC 60115-1 4.18** 260±5°C for 10 seconds
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		**JIS C 5201 4.18** **IEC 60068-2-58 8.2.1** 260±5°C for 30 seconds
Solderability	>95% coverage		**JIS C 5201 4.17** **IEC 60115-1 4.17** 245±5°C for 3 seconds
Endurance at Upper Category Temperature	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	**JIS C 5201 4.23** **IEC 60115-1 2.23.2** at +125°C for 1000 hrs
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	**JIS C 5201 4.19** **IEC 60115-1 4.19** -55°C to +125°C, 5 cycles
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	**JIS 5201 4.24** 40±2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Endurance	±(2.0+0.10Ω)	±(3.0+0.10Ω)	**JIS C 5201 4.25** **IEC 60115-1 4.25.1** 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”

* **Storage Temperature: 5~40℃; Humidity 40%~80%RH**

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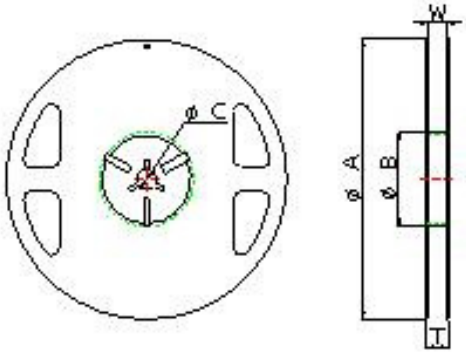
▶ 9. Packaging

9-1 Reel Specifications & Packaging Quantity



Unit: mm

Series	Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T	Packaging Method	Packaging	
									Series	Quality
SMDE0402 SMDE0603 SMDE0805 SMDE1206 SMDE1210	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5	Paper	SMDE0402	10K
									SMDE0603/05/06/10	5K
		10 inch	254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5		SMDE0402	20K
									SMDE0603/05/06/10	10K
		13 inch	330±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5		SMDE0402	40K
									SMDE0603/05/06/10	20K
SMDE2010 SMDE2512	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5	Embossed	SMDE2010/2512	4K
		10 inch	250±1	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5		SMDE2010/2512	8K

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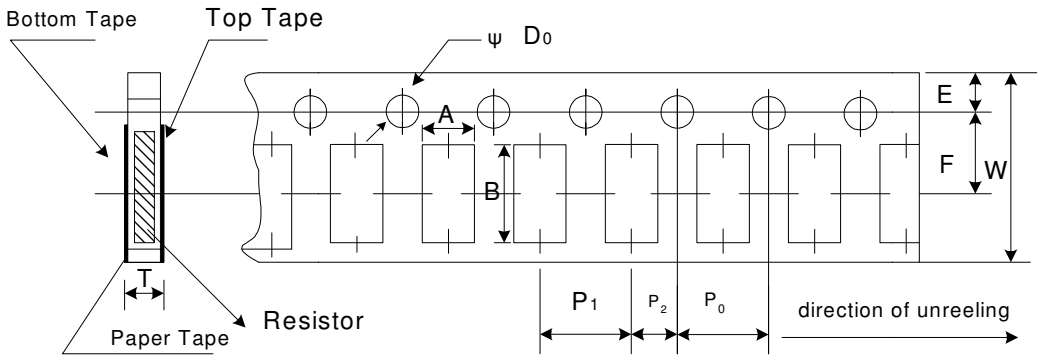
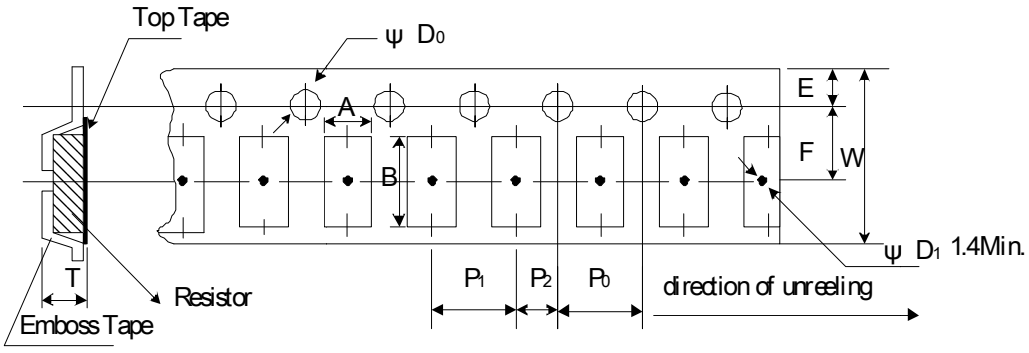
9-1-2 Paper Tape Specifications



Unit: mm

Series	A	B	W	F	E	P1	P2	P0	ψD0	T
SMDE0402	0.65±0.15	1.15±0.2	8.0±0.2	3.50±0.05	1.75±0.01	2.00±0.01	2.00±0.05	4.00±0.10	1.50+0.1,-0	0.45±0.1
SMDE0603	1.10±0.10	1.90±0.1	8.0±0.2	3.50±0.05	1.75±0.01	4.00±0.01	2.00±0.05	4.00±0.10	1.50+0.1,-0	0.85±0.1
SMDE0805	1.60±0.15	2.40±0.2	8.0±0.2	3.50±0.05	1.75±0.01	4.00±0.01	2.00±0.05	4.00±0.10	1.50+0.1,-0	0.85±0.1
SMDE1206	2.00±0.15	3.60±0.2	8.0±0.2	3.50±0.05	1.75±0.01	4.00±0.01	2.00±0.05	4.00±0.10	1.50+0.1,-0	0.85±0.1
SMDE1210	2.80±0.10	3.50±0.2	8.0±0.2	3.50±0.05	1.75±0.01	4.00±0.01	2.00±0.05	4.00±0.10	1.50+0.1,-0	0.85±0.1

9-1-3 Emboss Plastic Tape Specifications



Unit: mm

Series	A	B	W	F	E	P_1	P_2	P_0	ψD_0	T
SMDE2010	2.8±0.20	5.5±0.20	12.0±0.3	5.5±0.05	1.75±0.1	4.00±0.1	2.00±0.05	4.00±0.10	1.50+0.25, -0	1.2^{+0}
SMDE2512	3.6±0.20	6.9±0.20	12.0±0.3	5.5±0.05	1.75±0.1	4.00±0.1	2.00±0.05	4.00±0.10	1.50+0.25, -0	1.2^{+0}

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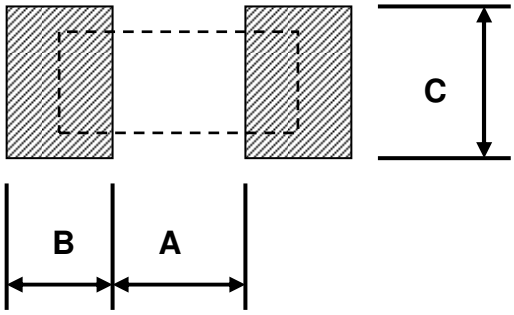
▶ 11. Recommended Land Pattern

Unit: mm



Codes	A	B	C
SMDE0402	0.50	0.45	0.60
SMDE0603	0.90	0.60	0.90
SMDE0805	1.20	0.70	1.30
SMDE1206	2.00	0.90	1.60
SMDE1210	2.00	0.90	2.80
SMDE2010	3.80	0.90	2.80
SMDE2512	3.80	1.60	3.50

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