

SMD - Resistors

Product: Trimmable Thick Film Chip Resistor-SMDE Series

Size: 0402/0603/0805/1206/1210/2010/2512



official distributor of



SMD - Resistors

Trimmable Thick Film Chip Resistor – SMDE Series

▶ 1. Scope

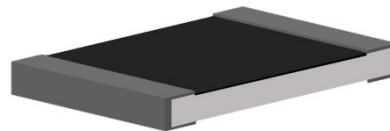
– This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

▶ 2. Features

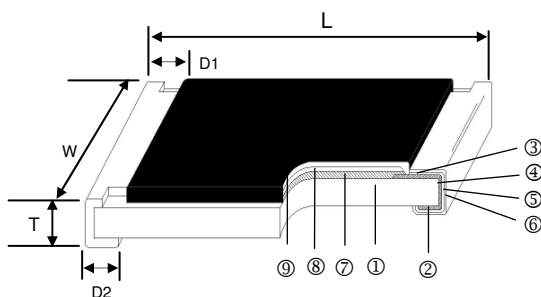
- Suitable for laser fine tune
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process

▶ 3. Applications

- Tuner
- Mobile Phone
- Camcorder
- Portable Audio
- Photo Sensor
- Portable Measuring Equipment



▶ 4. Construction



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (RuO ₂ /Ag)
② Bottom Electrode (Ag-Pd)	⑤ Barrier Layer (Ni)	⑧ Primary Overcoat (Glass)
③ Top Electrode (Ag)	⑥ External Electrode (Sn)	⑨ Secondary Overcoat (Epoxy)

SMD - Resistors

5. Dimensions

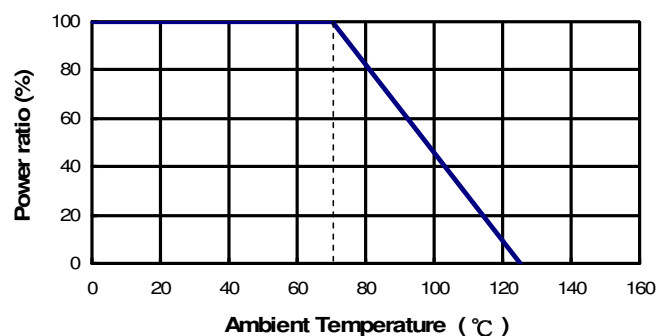
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
SMDE0402	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
SMDE0603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
SMDE0805	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
SMDE1206	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
SMDE1210	1210	3.20±0.20	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
SMDE2010	2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
SMDE2512	2512	6.35±0.20	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

6. Part Numbering

SMDE	0603	N	L	7	---1R2	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Function Code	Packaging Code	Resistance	Marking Code
	0402 0603 0805 1206 1210 2010 2512	N: 0~-10% P: 0~-20% Q: 0~-30%	T: Taping Reel B: Bulk	4: 7" Reel 4Kpcs 6: 7" Reel 10Kpcs 7: 7" Reel 5Kpcs 9: 10" Reel 8Kpcs A: 10" Reel 10Kpcs B: 10" Reel 20Kpcs C: 13" Reel 40Kpcs D: 13" Reel 20Kpcs F: Bulk	--- 1R2: 1.2Ω --- 3K3: 3.3KΩ --- 10K: 10KΩ -- 100K: 100KΩ "-" to fill up 6 spaces	: Standard Marking for E96 / E24 N: No Marking

7. Derating Curve



SMD - Resistors

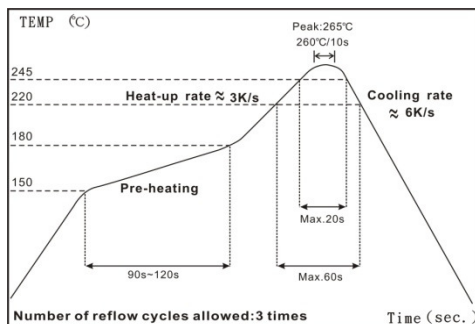
8. Standard Electrical Specifications

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

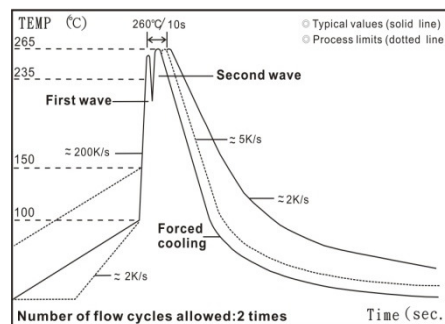
Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

9. Soldering condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

SMD - Resistors

► 10. Environmental Characteristics

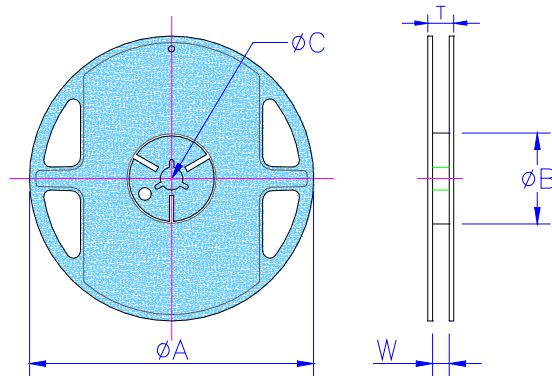
Item	Requirement	Test Method
	1% and Below	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	JIS C 5201-1 4.8 IEC 60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\pm(1.0\%+0.05\Omega)$	JIS C 5201-1 4.13 IEC 60115-1 4.13 2.5 times RCWV or Max. overload voltage for 5 seconds
Insulation Resistance	$\geq 10G$	JIS C 5201-1 4.6 IEC 60115-1 4.6 Max. overload voltage for 1 minute
Endurance	$\pm(2.0\%+0.10\Omega)$	JIS C 5201-1 4.25 IEC 60115-1 4.25.1 70 \pm 2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(2.0\%+0.10\Omega)$	JIS C 5201-1 4.24 40 \pm 2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	$\pm(1.0\%+0.05\Omega)$	JIS C 5201-1 4.23.2 IEC 60115-1 2.23.2 at +125°C for 1000 hrs
Bending Strength	$\pm(1.0\%+0.05\Omega)$	JIS C 5201-1 4.33 IEC 60115-1 4.33 Bending once for 5 seconds with 3mm 2010, 2512 sizes: 2 mm
Solderability	>95% coverage	JIS C 5201-1 4.17 IEC 60115-1 4.17 245 \pm 5°C for 3 seconds
Resistance to Soldering Heat	$\pm(0.5\%+0.05\Omega)$	JIS C 5201-1 4.18 IEC 60115-1 4.18 260 \pm 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	JIS C 5201-1 4.7 IEC 60115-1 4.7 1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$	JIS C 5201-1 4.18 IEC 60068-2-58 8.2.1 260 \pm 5°C for 30 seconds
Rapid Change of Temperature	$\pm(0.5\%+0.05\Omega)$	JIS C 5201-1 4.19 IEC 60115-1 4.19 -55°C to +125°C, 5 cycles

■ Storage Temperature: 25 \pm 3°C; Humidity < 80%RH

SMD - Resistors

► 11. Packaging

Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity	Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T
SMDE0402	Paper	10K	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
		20K						
		40K						
SMDE0603	Paper	5K	10 inch	254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
SMDE0805		10K						
SMDE1206		20K						
SMDE1210	Embossed	4K	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.5	13.0±0.5	15.5±0.5
SMDE2512		8K						

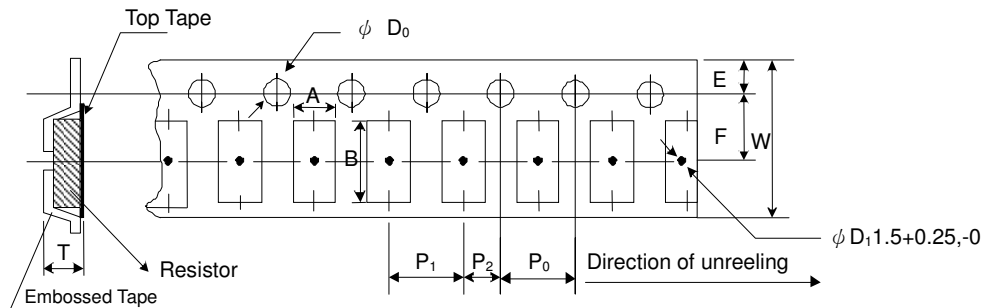
Paper Tape Specifications

Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD_0	T
SMDE0402	0.65±0.10	1.15±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.1
SMDE0603	1.10±0.10	1.90±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
SMDE0805	1.60±0.10	2.40±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
SMDE1206	1.90±0.10	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
SMDE1210	2.80±0.10	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1

SMD - Resistors

Embossed Plastic Tape Specifications

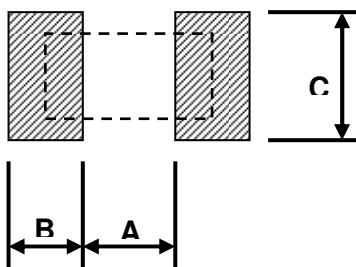


Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
SMDE2010	2.8±0.20	5.5±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰
SMDE2512	3.5±0.20	6.7±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰

▶ 12. Recommended Land Pattern

Unit: mm



Type	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