

SMD - Resistors

Product Type:	Precision Chip Resistors	
Part No.:	SMDT Series	(Lead-Free)
Issued Date:	11-Jan-06	



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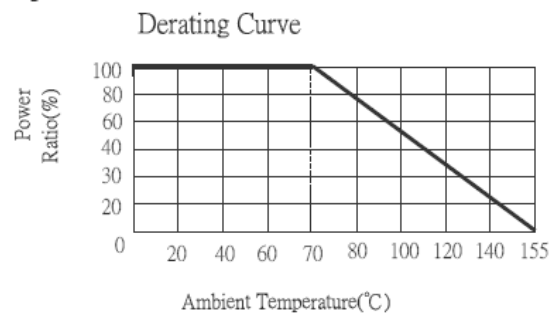
High Precision Chip Resistors (SMDT Series)

► 1. Scope

This specification applies to all sizes of rectangular-type fixed NiCr chip resistors.

► 2. Features

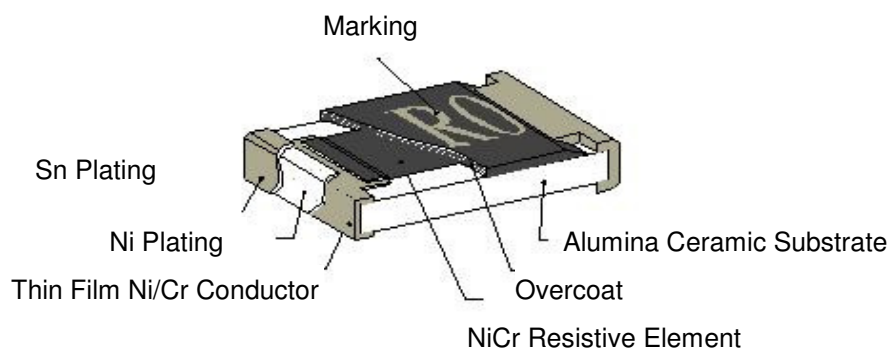
- Tolerance from $\pm 0.01\%$ ~ 1%
- Thin film TaN & Ni/Cr Resistor
- TCR from $\pm 5\text{ppm}$ ~ $\pm 50\text{ppm}$ for thin film chip R



► 3. Applications

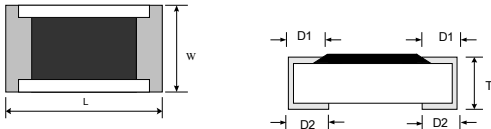
- Medical Equipment
- Measure Instrument
- Communication Device
- Converters
- Printer equipment
- Consumer

► 4. Construction



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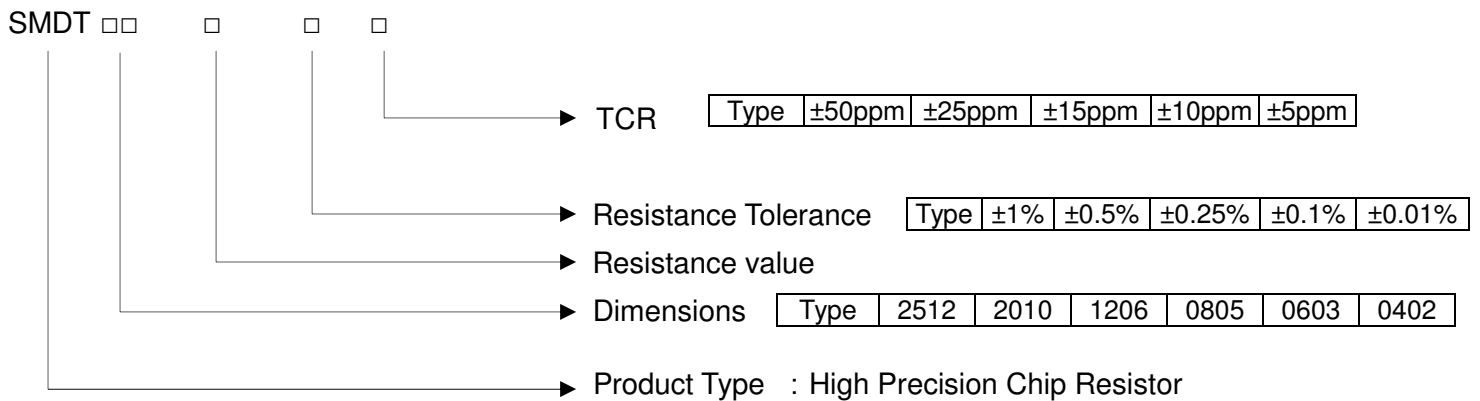
5. Dimensions



SIZE	L	W	T	D1	D2
2512	6.3±0.15	3.1±0.15	0.6±0.10	0.6±0.30	0.5±0.25
2010	4.9±0.15	2.4±0.15	0.6±0.10	0.6±0.30	0.5±0.25
1206	3.0±0.10	1.5±0.10	0.55±0.10	0.45±0.20	0.40±0.20
0805	2.0±0.15	1.25±0.15	0.5±0.10	0.3±0.20	0.3±0.20
0603	1.6±0.10	0.8±0.10	0.45±0.10	0.3±0.20	0.3±0.20
0402	1.0±0.05	0.5±0.05	0.30±0.05	0.20±0.10	0.2±0.10

Unit: mm

6. Product Identification



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7. Electrical Characteristics

7.1 Standard Characteristics

Item Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR (PPM/°C)
SMDT0402	1/16W	-55 ~ +155°C	25V	50V	±0.10% ±0.25% ±0.50%	10Ω~100KΩ	±25 ±50
SMDT0603	1/16W	-55 ~ +155°C	50V	100V	±0.10% ±0.25% ±0.50%	10Ω~332KΩ	±25 ±50
SMDT0805	1/10W	-55 ~ +155°C	100V	200V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25 ±50
SMDT1206	1/8W	-55 ~ +155°C	150V	300V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25 ±50
SMDT2010	1/4W	-55 ~ +155°C	150V	300V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25 ±50
SMDT2512	1/2W	-55 ~ +155°C	150V	300V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25 ±50

7.2 extended Characteristics

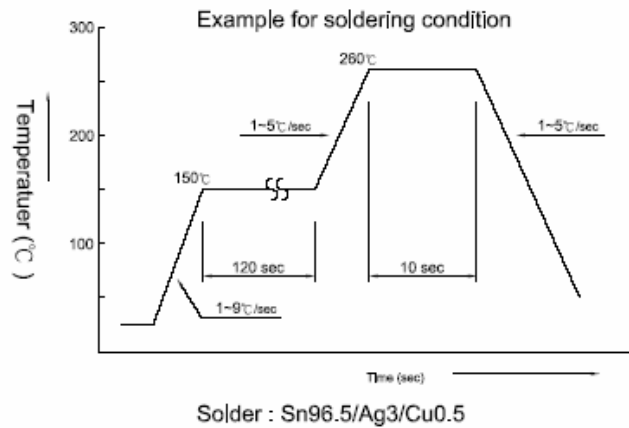
Item Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR (PPM/°C)
SMDT 0402	1/16W	-55 ~ +155°C	25V	50V	±0.01% ±0.05% ±0.10%	50Ω~2KΩ	± 5
						50Ω~12KΩ	±10 ±15
SMDT 0603	1/16W	-55 ~ +155°C	50V	100V	±0.01% ±0.05% ±0.10%	50Ω~4KΩ	± 5
						25Ω~100KΩ	±10 ±15
SMDT 0805	1/10W	-55 ~ +155°C	100V	200V	±0.01% ±0.05% ±0.10%	50Ω~10KΩ	± 5
						25Ω~200KΩ	±10 ±15
SMDT 1206	1/8W	-55 ~ +155°C	150V	300V	±0.01% ±0.05% ±0.10%	50Ω~15KΩ	± 5
						25Ω~400KΩ	±10 ±15
SMDT 2010	1/4W	-55 ~ +155°C	150V	300V	±0.01% ±0.05% ±0.10%	50Ω~25KΩ	± 5
						25Ω~500KΩ	±10 ±15
SMDT 2512	1/2W	-55 ~ +155°C	150V	300V	±0.01% ±0.05% ±0.10%	50Ω~25KΩ	± 5
						25Ω~500KΩ	±10 ±15

Operating Voltage $V=\sqrt{(P \cdot R)}$

Operating Voltage $V=2.5 \cdot \sqrt{(P \cdot R)}$

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8. Reflow



9. Environmental Characteristics

Item	Specification		Test Method
	0.01%	other	
Temperature Coefficient of Resistance	As Spec		MIL-STD-202, Method 304 +25/-55/+25/+125/+25 °C
Short Time Overload	ΔR±0.05%	ΔR±0.5%	JIS-C-5205-5.5 RCWV*2.5 or Max Overloading Voltage , 5 seconds
Dielectric Withstand Voltage	By type		MIL-STD-202F Method 301 Apply Max Overload Voltage for 1 minute
Insulation Resistance	>1000MΩ		MIL-STD-202F Method 302 Apply 100V _{DC} for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.2%	MIL-STD-202F Method 107G -55 °C ~150 °C,100 cycles
Load Life	ΔR±0.05%	ΔR±0.2%	MIL-STD-202F Method 108A RCWV , 70 °C , 1.5 hours ON , 0.5 hours OFF, total 1000~1048 hours
	7kΩ Min ΔR±0.5%		
humidity (Steady State)	ΔR±0.05%	ΔR±0.3%	MIL-STD-202F Method 103B 40 °C , 90~95%RH,RCWV 1.5 hours ON, 0.5 hours OFF, total 1000~1048 hours
Resistance to dry heat	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-7.2 96 hours@+155 °C without load
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-7.1 1 hours,-65 °C,followed by 45minutes of RCWV
Bending Strength	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-6.1.4 Bending Amplitude 3mm for 10 seconds
Solderability	95%min coverage		MIL-STD-202F Method 208H 260 °C ±5 °C, 2±0.5 (sec)
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	MIL-STD-202F Method 210E 260±5 °C, 10±1 second

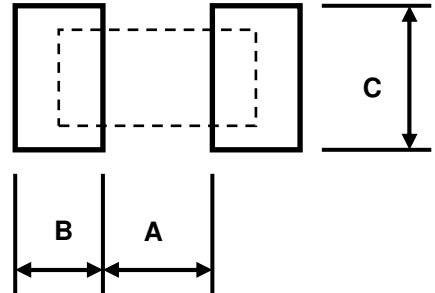
* Storage Temperature :25 ± 3 °C;<80%RH

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► 10. Recommended Land Pattern

SIZE	A	B	C
2512	4.9	1.60	3.00±0.2
2010	3.6	1.40	2.40±0.2
1206	2.0	1.15	1.70±0.2
0805	1.0	1.00	1.35±0.2
0603	0.8	0.70	0.90±0.2
0402	0.5	0.50	0.60±0.2

Unit: mm



► 11. Marking



3digit marking for Example: 14C=13K7 Ω 13C=13K3 Ω
 68B=4K99 Ω 68X=49.9 Ω

1.Remark: 0603 3digit marking

Marking Table

Code	E96		Code	E96		Code	E96		Code	E96	
01	100		25	178		49	316		73	562	
02	102		26	182		50	324		74	576	
03	105		27	187		51	332		75	590	
04	107		28	191		52	340		76	604	
05	110		29	196		53	348		77	619	
06	113		30	200		54	357		78	634	
07	115		31	205		55	365		79	649	
08	118		32	210		56	374		80	665	
09	121		33	215		57	383		81	681	
10	124		34	221		58	392		82	698	
11	127		35	226		59	402		83	715	
12	130		36	232		60	412		84	732	
13	133		37	237		61	422		85	750	
14	137		38	243		62	432		86	768	
15	140		39	249		63	442		87	787	
16	143		40	255		64	453		88	806	
17	147		41	261		65	464		89	825	
18	150		42	267		66	475		90	845	
19	154		43	274		67	487		91	866	
20	158		44	280		68	499		92	887	
21	162		45	287		69	511		93	909	
22	165		46	294		70	523		94	931	
23	169		47	301		71	536		95	953	
24	174		48	309		72	549		96	976	
Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

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11-2 Remark: 0603 3digit marking for E24 Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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11-3 Remark: 0805~2512 4digit marking for Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

► 12. Packaging

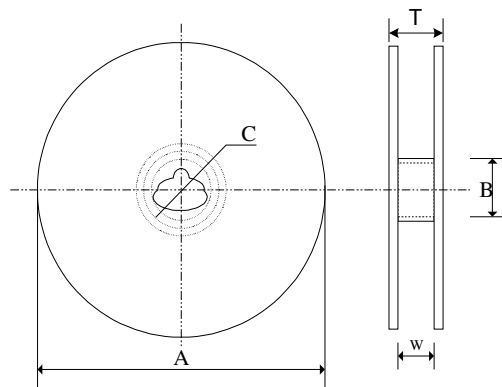
12-1 Package Quantity

Packaging Series	Paper Tape	Emboss Plastic Tape
SMDT0402	10,000	
SMDT0603	5000	
SMDT0805	5000	
SMDT1206	5000	
SMDT2010		4000
SMDT2512		4000

Smaller packaging quantities upon request

Unit: pcs

12-1-1 Reel Specifications

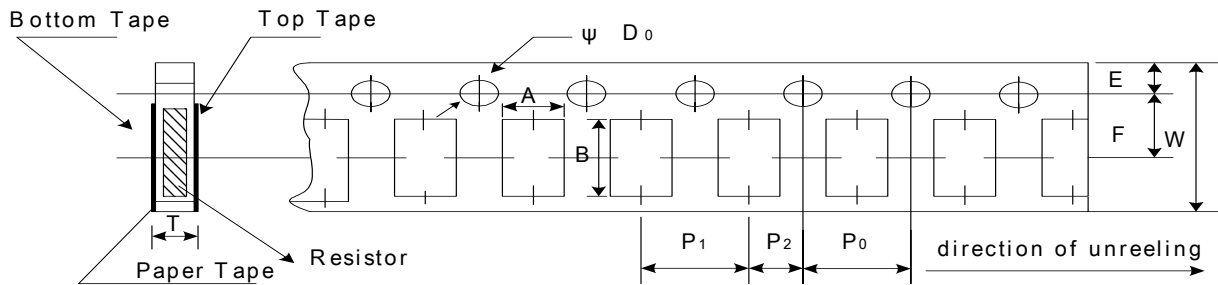


series	ØA	ØB	ØC	W	T
0402 ↓ 1206	178±1	60.0±0.5	13.0±0.20	9.00±0.5	12.0±0.15
2010 ↓ 2512	178±1	60.2±0.5	13.0±0.50	13.2±1.50	16.0±0.20

Unit :mm

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12-1-2 Paper Tape Specifications



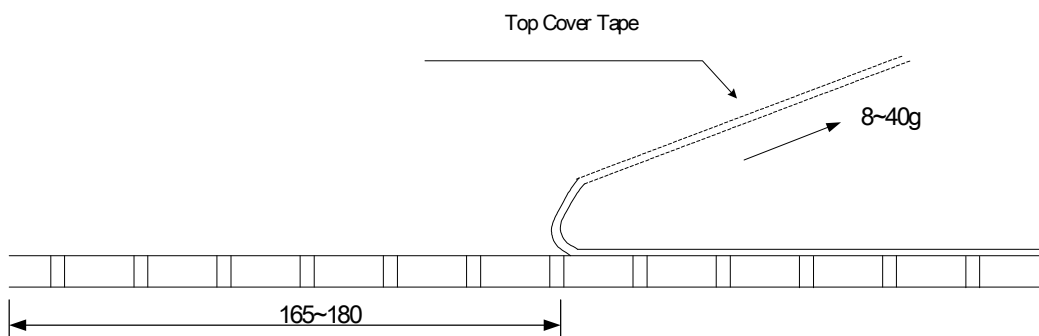
Series	A	B	W	F	E	P ₁	P ₂	P ₀	ψD_0	T
0402	0.67±0.03	1.15±0.03	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.54±0.03	0.40±0.03
0603	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.03	0.60±0.05
0805	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
1206	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

Unit: mm

Peel force of top cover tape

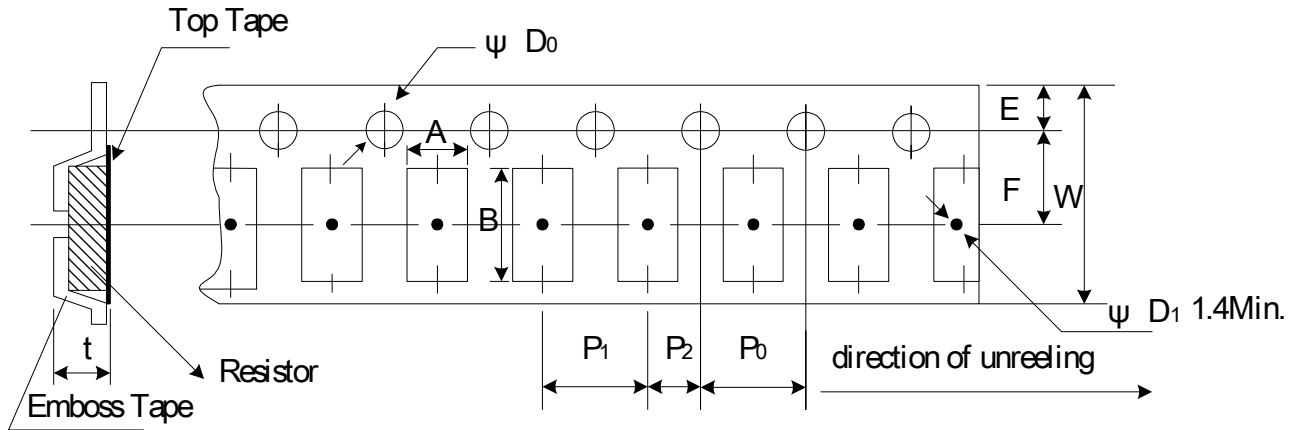
The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8to 40g



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12-1-4 Emboss Plastic Tape Specifications



Series	A	B	W	E	F	P ₁	P ₂	P ₀	ψD ₀	t
2010	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	0.85±0.05
2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	0.80±0.05

Unit: mm

Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 20to80g

