

SMD - Resistors

Product:	Thick Film Chip Resistor-SMDC Series
Size:	01005/0201/0402/0603/0805/1206/1210/2010/2512/ 1225/0612



official distributor of



RoHS Compliant

SMD - Resistors

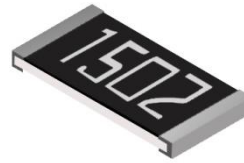
Thick Film Chip Resistor - SMDC Series

► 1. Scope

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

► 2. Features

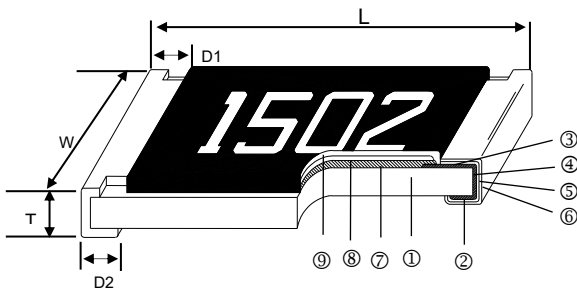
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process



► 3. Applications

- Telecommunication Equipments
- Radio and Tape Recorders, TV Tuners
- Video Cameras, Watches, Pocket Calculators
- Automotive Industry
- Computers, Instruments
- Medical and Military 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)

► 5. Dimensions

Unit: mm

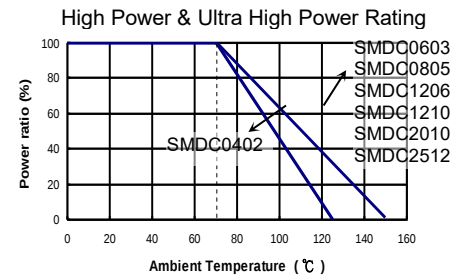
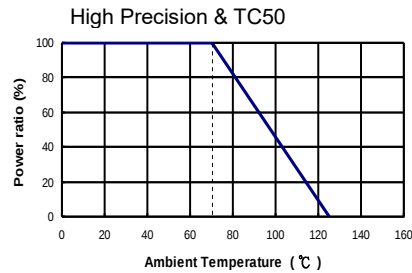
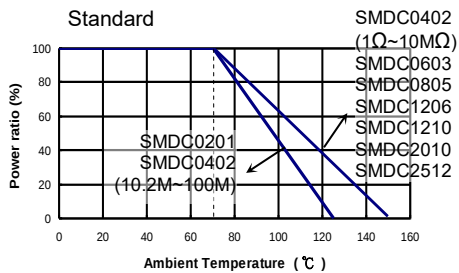
Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
SMDC01005	01005	0.40±0.02	0.20±0.02	0.13±0.02	0.10±0.03	0.10±0.03	0.037
SMDC0201	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05	0.150
SMDC0402	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
SMDC0603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
SMDC0805	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
SMDC1206	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
SMDC1210	1210	3.20±0.20	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
SMDC2010	2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
SMDC2512	2512	6.35±0.20	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

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► 6. Part Numbering

SMDC	0603	F	L	7	---10R
Product Type	Dimensions (L×W)	Resistance Tolerance	Function Code	Packaging Code	Resistance
	01005 0201 0402 0603 0805 1206 1210 2010 2512 1225 0612	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1% J: ±5%	L: Standard & High Precision E: TC50 P: High Power H: Ultra High Power	0: 7" Reel 15Kpcs 2: 7" Reel 2Kpcs 4: 7" Reel 4Kpcs 5: 7" Reel 20Kpcs 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

► 7. Derating Curve



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► 8.1 Standard Electrical Specifications

Item Type	Power Rating at 70°C Jumper Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
SMDC01005	1/32W	-55 ~ +125°C	15V	30V	10Ω - 1MΩ		±300
	Jumper 0.5A		25V	50V	0Ω (<50mΩ)		-
SMDC0201	1/20W	-55 ~ +125°C	25V	50V	1Ω - 10MΩ		±200
	1A				0Ω (<50mΩ)		-
SMDC0402	1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
		-55 ~ +125°C					
	Jumper 1A	-55 ~ +155°C			0Ω (<50mΩ)		-
SMDC0603	1/10W	-55 ~ +155°C	75V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
	Jumper 1A				0Ω (<50mΩ)		-
SMDC0805	1/8W	-55 ~ +155°C	150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
SMDC1206	1/4W		200V	400V	0Ω (<50mΩ)		-
	Jumper 2A						
SMDC1210	1/3W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 39MΩ		±200 ±100 ±200 ±400
	Jumper 2.5A				0Ω (<50mΩ)		-
SMDC2010	3/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
	Jumper 3.5A				0Ω (<50mΩ)		-
SMDC2512	1W	-55 ~ +155°C	250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
	Jumper 4A				0Ω (<50mΩ)		-
SMDC1225	1W	-55 ~ +155°C	250V	500V	10Ω - 20KΩ		±100
	Jumper 10A				0Ω (<20mΩ)		-
SMDC0612	0,75W	-55 ~ +155°C	200V	400V	1Ω - 1MΩ		±100

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8.2 High Precision Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	
SMDC0402	1/16W	-55 ~ +125°C	50V	100V	-		10Ω - 1MΩ	±100
SMDC0603	1/10W		75V	150V	-		1.02M - 10MΩ	±200
SMDC0805	1/8W		150V	300V	-		10Ω - 1MΩ	±100
SMDC1206	1/4W		200V	400V	-		1.02M - 10MΩ	±200
SMDC1210	1/3W		200V	400V	-		10Ω - 1MΩ	±100
SMDC2010	3/4W		200V	400V	-		1.02M - 10MΩ	±200
SMDC2512	1W		250V	500V	-		10Ω - 1MΩ	±100
					-		1.02M - 10MΩ	±200

8.3 TC50 Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	±1%	
SMDC0402	1/16W	-55 ~ +125°C	50V	100V	-		100Ω - 1MΩ		±50
SMDC0603	1/10W		50V	100V					
SMDC0805	1/8W		150V	300V					
SMDC1206	1/4W		200V	400V	10Ω - 1MΩ		10Ω - 10MΩ		
SMDC1210	1/3W		200V	400V					
SMDC2010	3/4W		200V	400V					
SMDC2512	1W		250V	500V					

8.3 High Power & Ultra High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
SMDC0402	1/10W Jumper: 1,5A	-55 ~ +125°C	50V	100V			±200 ±100 ±200
SMDC0603	1/8W Jumper: 2A		75V	150V			
SMDC0805	1/3W Jumper: 2,5A		150V	300V			
SMDC1206	1/3 *1/2W Jumper: 3,5A		200V	400V			
SMDC1210	1/2 *3/4W Jumper: 5A		200V	400V			
SMDC2010	1W Jumper: 6A		200V	400V			
SMDC2512	2W Jumper: 7A		250V	500V			
						1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ	

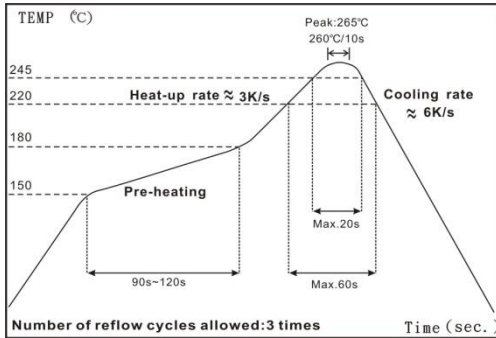
*: Ultra High Power

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

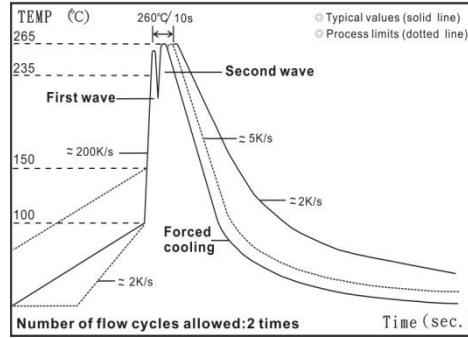
Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

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► 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

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► 10. Environmental Characteristics

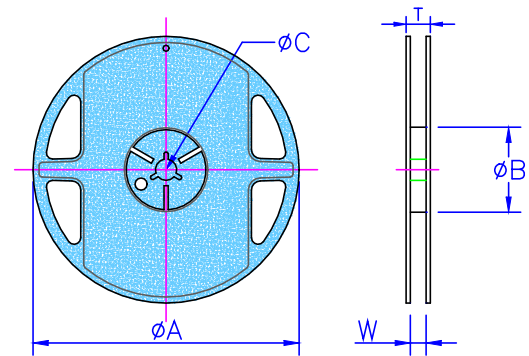
Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~+125/+155°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCWV*2.5 or Max. overload voltage for 5 seconds, 2 seconds for high power series
Insulation Resistance	≥10G			JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. overload voltage for 1 minute
Endurance	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	JIS-C-5201-1 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 hrs "OFF"
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	JIS-C-5201-1 4.24 40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	JIS-C-5201-1 4.23 IEC-60115-1 2.23.2 at +125/+155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage			JIS-C-5201-1 4.17 IEC-60115-1 4.17 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.18 IEC-60115-1 4.18 260±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 ≤5% Total leaching area ≤ 10%			JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	JIS-C-5201-1 4.18 IEC-60115-1 4.18 -55°C to +125/+155°C, 5 cycles

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

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► 11. Packaging

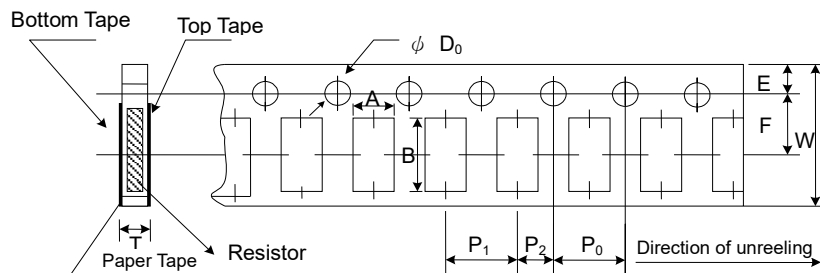
Reel Specifications & Packaging Quantity



Type	Packaging Quantity		Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T
SMDC01005	Paper	10K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
		20K		7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
SMDC0201	Paper	15K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
SMDC0201 SMDC0402	Paper	10K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
		20K							
40K		10 inch		254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5	
5K									
SMDC0603 SMDC0805 SMDC1206 SMDC1210		10K		13 inch	330±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
20K									
SMDC2010 SMDC2512	Embossed	4K	12mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.5	13.0±0.5	15.5±0.5
		8K		10 inch	250±1	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5
SMDC1225	Embossed	2K	12mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	13.0±0.5	15.5±0.5
SMDC0612	Paper	5K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5

Unit: mm

Paper Tape Specifications

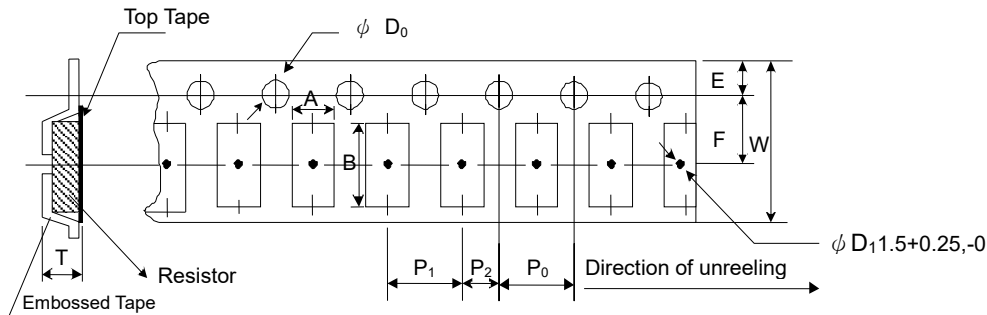


Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
SMDC01005	0.24±0.05	0.45±0.05	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	0.42±0.2
SMDC0201	0.38±0.05	0.68±0.05	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	0.42±0.2
SMDC0402	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
SMDC0603	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
SMDC0805	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
SMDC1206	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
SMDC1210	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
SMDC0612	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

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Embossed Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
SMDC2010	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
SMDC2512	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
SMDC1225	3.38±0.20	6.68±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	1.55+0.1, -0	1.45±0.02

► 12. Marking

No Marking for 01005, 0201 and 0402

Jumper for all: Letter "0"

1% for 0805/1206/1210/2010/2512/1225/0612: 4 digits marking

Example:

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

5% for 0603/0805/1206/1210/2010/2512/1225/0612: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

E24 code	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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1% for 0603: 3 digits marking in E96



3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω

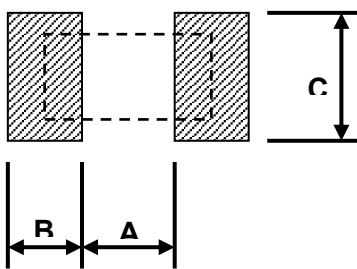
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► 12.1 Marking Table

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

► 13. Recommended Land Pattern

Unit: mm



Type	A	B	C
SMDC01005	0.14	0.18	0.25
SMDC0201	0.30	0.25	0.30
SMDC0402	0.50	0.45	0.60
SMDC0603	0.90	0.60	0.90
SMDC0805	1.20	0.70	1.30
SMDC1206	2.00	0.90	1.60
SMDC1210	2.00	0.90	2.80
SMDC2010	3.80	0.90	2.80
SMDC2512	3.80	1.60	3.50
SMDC1225	1.2	2.00	7.00
SMDC0612	0.70	1.20	3.20