

## SMD - Resistors

Product: Surge Withstanding Chip Resistor - SMDG Series

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



official distributor of



## SMD - Resistors

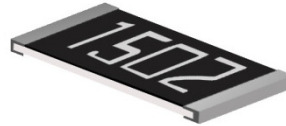
### Surge Withstanding Chip Resistor (SMDG Series)

#### ► 1. Scope

– This specification applies to 0603~2512 sizes of rectangular-type fixed chip Resistor with Ruthenium-base as material.

#### ► 2. Features

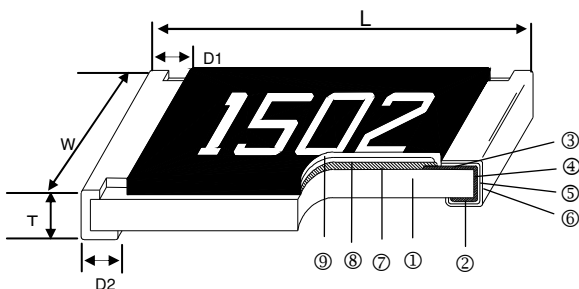
- Tolerance:  $\pm 5\%$ ,  $\pm 10\%$ ,  $\pm 20\%$
- High power rating
- Excellent surge withstanding & pulse withstanding performance
- Improved working voltage ratings
- Standard package sizes of 0603~2512



#### ► 3. Applications

- Metering (Testing/Measurement)
- Medical Devices
- Automotive
- Power supply
- Charger
- Inverter
- LCD Video Monitors

#### ► 4. Construction



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

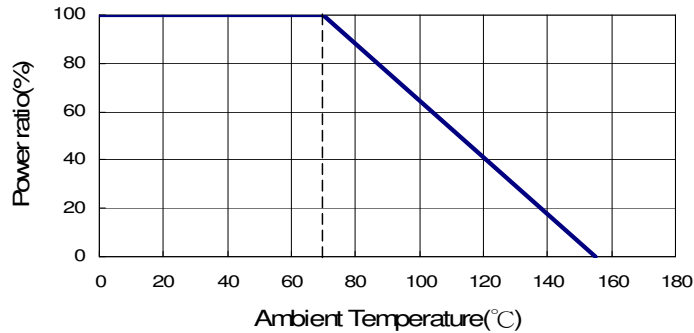
#### ► 5. Dimensions

Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
SMDG0603	0603	1.60 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	2.042
SMDG0805	0805	2.00 $\pm$ 0.10	1.25 $\pm$ 0.10	0.50 $\pm$ 0.10	0.35 $\pm$ 0.20	0.40 $\pm$ 0.20	4.368
SMDG1206	1206	3.10 $\pm$ 0.10	1.55 $\pm$ 0.10	0.55 $\pm$ 0.10	0.50 $\pm$ 0.25	0.50 $\pm$ 0.20	8.947
SMDG1210	1210	3.20 $\pm$ 0.20	2.60 $\pm$ 0.15	0.55 $\pm$ 0.10	0.50 $\pm$ 0.25	0.50 $\pm$ 0.20	15.959
SMDG2010	2010	5.00 $\pm$ 0.20	2.50 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.25	0.50 $\pm$ 0.20	24.241
SMDG2512	2512	6.35 $\pm$ 0.20	3.20 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.25	0.50 $\pm$ 0.20	39.448

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### 6. Derating Curve



### 7. Part Numbering

SMDG	12	J	T	E	A	1001	N
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	0603 0805 1206 1210 2010 2512	J: ±5% K: ±10% M: ±20%	T: Taping Reel B: Bulk	E: ±100 F: ±200	A: 1.5W O: 1/3W Q: 3/4W U: 1/2W V: 1/4W W: 1/8W	1001: 1KΩ 1004: 1MΩ 1005: 10MΩ	: Standard Marking N: No Marking

### 8. Standard Electrical Specifications

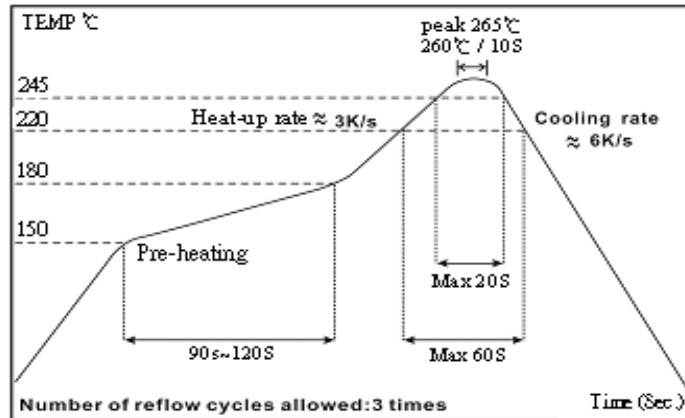
Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Resistance Range			TCR (PPM/°C)
				±5%	±10%	±20%	
SMDG0603	1/8W	-55 ~ +155°C	50V	10Ω - 299Ω			±200
				300Ω - 1MΩ			±100
SMDG0805	1/4W	-55 ~ +155°C	150V	1Ω - 299Ω			±200
				300Ω - 20MΩ			±100
SMDG1206	1/3W	-55 ~ +155°C	200V	1Ω - 299Ω			±200
				300Ω - 20MΩ			±100
SMDG1210	1/2W	-55 ~ +155°C	200V	1Ω - 20Ω			±200
				20.1Ω - 20MΩ			±100
SMDG2010	3/4W	-55 ~ +155°C	400V	1Ω - 20Ω			±200
				20.1Ω - 20MΩ			±100
SMDG2512	1.5W	-55 ~ +155°C	500V	1Ω - 20Ω			±200
				20.1Ω - 20MΩ			±100

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. Reflow



### ► 10. Environmental Characteristics

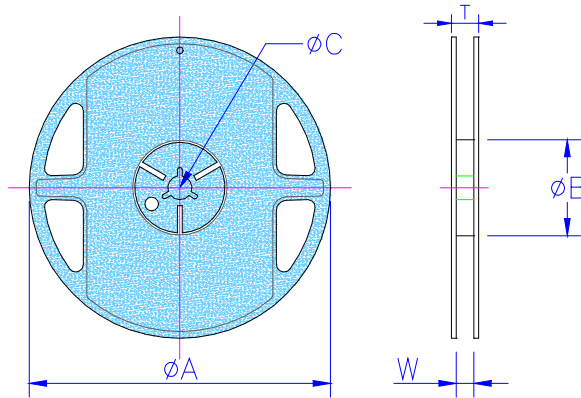
Item	Requirement	Test Method
Temperature Coefficient of Resistance	As Spec.	<b>MIL-STD-202F Method 304</b> +25/-55/+25/+125/+25°C
Short Time Overload	$\pm 1\%$	<b>JIS C 5201-1 4.13</b> 2.5 times RCWV or Max overloading voltage for 5 seconds
Insulation Resistance	>1000M $\Omega$	<b>MIL-STD-202F Method 302</b> Apply 100V <sub>DC</sub> for 1minute
Endurance	$\pm 3\%$	<b>JIS C 5201-1 4.25</b> 70 $\pm 2^\circ\text{C}$ , Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm 3\%$	<b>JIS C 5201-1 4.24</b> 40 $\pm 2^\circ\text{C}$ , 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	$\pm 3\%$	<b>JIS C 5201-1 4.23</b> 1000 hours at +155°C without load
Bending Strength	$\pm 1\%$	<b>JIS C 5201-1 4.33</b> Bending amplitude 3mm for 10 seconds
Solderability	95%min coverage	<b>JIS C 5201-1 4.17</b> 245 $\pm 5^\circ\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\pm 1\%$	<b>JIS C 5201-1 4.18</b> 260 $\pm 5^\circ\text{C}$ for 10 seconds
Thermal Shock	$\pm 1\%$	<b>MIL-STD-202F Method 107G</b> -55°C~150°C, 100 cycles

■ Storage Temperature: 25 $\pm 3^\circ\text{C}$ ; Humidity < 80%RH

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### ► 11. Packaging

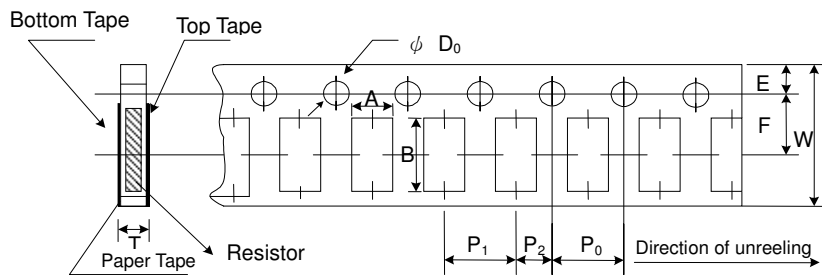
#### Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity	Tape Width	Reel Diameter	ΦA	ΦB	ΦC	W	T	
SMDG0603	Paper	5K	8mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5
SMDG0805		10K		10 inch	254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
SMDG1206		20K		13 inch	330±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
SMDG1210	Embossed	4K	12mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.5	13.0±0.5	15.5±0.5
SMDG2512		8K		10 inch	250±1	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

#### Paper Tape Specifications



Unit: mm

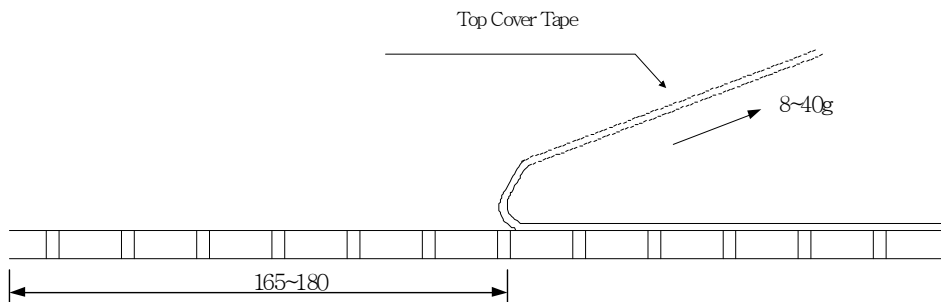
Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
SMDG0603	1.10±0.10	1.90±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
SMDG0805	1.60±0.10	2.40±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
SMDG1206	1.90±0.10	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
SMDG1210	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

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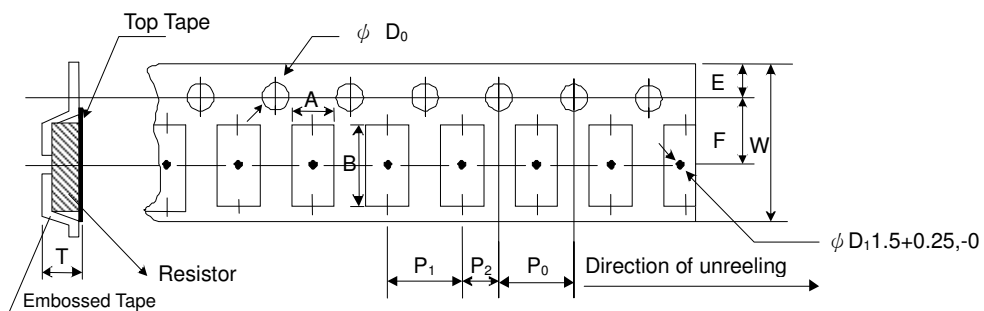
### Peel force of top cover tape

The peel speed shall be about 300mm/min  $\pm 5\%$

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



### Embossed Plastic Tape Specifications



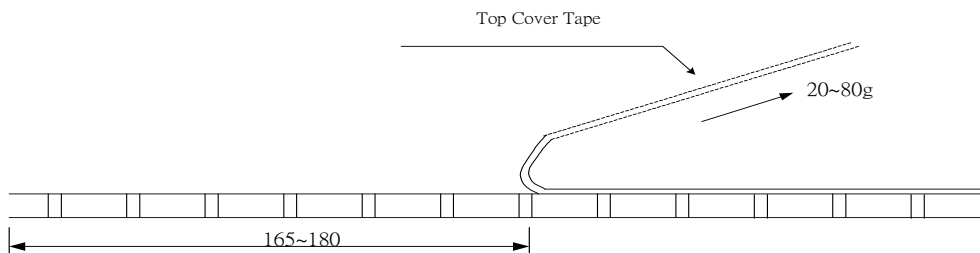
Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
SMDG2010	2.8±0.20	5.5±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>
SMDG2512	3.5±0.20	6.7±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>

Unit: mm

### Peel force of top cover tape

The peel speed shall be about 300mm/min  $\pm 5\%$

The peel force of top cover tape shall be between 20 to 80g



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### ▶ 12. Marking

0805~2512 4 digits marking for Example

Resistance	100Ω	2.2KΩ	10KΩ	100KΩ	1MΩ
marking	1000	2201	1002	1003	1004

0603: 3 digits marking in E24

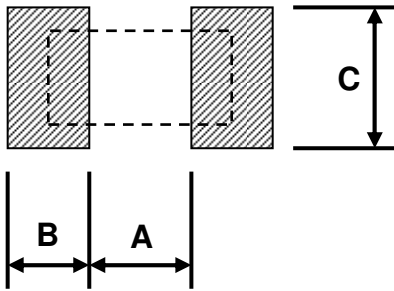
Example: 101=100Ω 102=1KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> code is multiplier)

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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### ► 13. Recommend Land Pattern

Unit: mm



Type	A	B	C
SMDG03	0.90	0.60	0.90
SMDG05	1.20	0.70	1.30
SMDG06	2.00	0.90	1.60
SMDG13	2.00	0.90	2.80
SMDG10	3.80	0.90	2.80
SMDG12	3.80	1.60	3.50

### ► 14. Pulse withstanding capacity

The single impulse graph is the result of 50 impulses of rectangular shape applied at one-minute intervals. The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown.

#### Single Pulse(100 ohm)

