

## FEATURE

- Tiny and light with thick film technology.
- High reliability.
- Superior anti-sulfur performance.
- RoHS and Halogen-free compliance
- Compatible with reflow and wave soldering type.
- MSL class: MSL 1
- Applications:
  - Home appliances
  - Telecommunications
  - Smart wears
  - Computer, notebook, workstation, tablet, and peripherals
  - Instruments and meters
  - etc.

## MANUFACTURER PART NO.

For example: GF1206J100KT5G00-GF1206  $\pm 5\%$  100K $\Omega$  T/R-5000

Series	Size	Tol.	Nominal Resistance Value	PKG	SPQ	Feature	TCR
2 codes	4 codes	1 code	2~5 codes	1 code	1 code	1 code	2 codes
<b>GF</b>	<b>1206</b>	<b>J</b>	<b>100K</b>	<b>T</b>	<b>5</b>	<b>G</b>	<b>00</b>
General Purpose Anti-Sulfur Thick Film Chip Resistors	0201 0402 0603 0805 1206 1210 1812 2010 2512	D= $\pm 0.5\%$ F= $\pm 1\%$ J= $\pm 5\%$	0R=Jumper(< 50m $\Omega$ ) 1R <sup>①</sup> =1 $\Omega$ 4R7 <sup>②</sup> =4.7 $\Omega$ 4K7 <sup>③</sup> =4.7K $\Omega$ 100K=100K $\Omega$ 4M7 <sup>④</sup> =4.7M $\Omega$	T=T/R <sup>⑤</sup>	4=4K 5=5K A=10K B=15K C=20K D=50K E=60K	G=Std. S=P.C. <sup>⑤</sup>	00=Refer to item RELIABILITY.

Note: ① R=Radix, 10<sup>0</sup>,  $\Omega$

② K=Kilo, 10<sup>3</sup>, K $\Omega$

③ M=Mega, 10<sup>6</sup>, M $\Omega$

④ T/R=Taping in Reel Package.

⑤ P.C.=Personal and Customized.

## CHARACTERISTICS

Series	Rated Power	MWV <sup>①</sup>	MOV <sup>②</sup>	DWV <sup>③</sup>	Tolerance	Res. Value	Jumper		
							MRC <sup>④</sup>	MOC <sup>⑤</sup>	Res. Value
GF0201	1/20W	25V	50V	-	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	0.5A	1A	< 50m $\Omega$
GF0402	1/16W	50V	100V	100V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	1A	2A	< 50m $\Omega$
GF0603	1/10W	75V	150V	300V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	1A	2A	< 50m $\Omega$
GF0805	1/8W	150V	300V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	5A	< 50m $\Omega$
GF1206	1/4W	200V	400V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	10A	< 50m $\Omega$
GF1210	1/2W	200V	500V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	10A	< 50m $\Omega$
GF1812	3/4W	200V	500V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	10A	< 50m $\Omega$
GF2010	3/4W	200V	500V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	10A	< 50m $\Omega$
GF2512	1W	200V	500V	500V	$\pm 1\%$ , $\pm 5\%$	1 $\Omega$ -10M $\Omega$	2A	10A	< 50m $\Omega$

Note: ① MWV=Max. Working Voltage.

② MOV=Max. Overload Voltage.

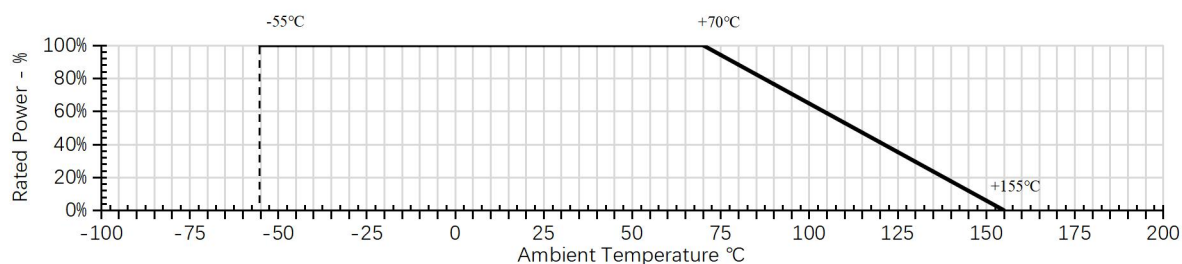
③ DWV=Dielectric Withstanding Voltage

④ MRC=Max. Rated Current

⑤ MOC=Max. Overload Current

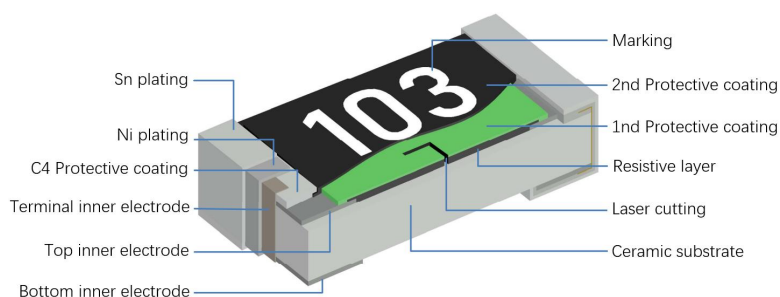
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## POWER DERATING CURVE



Note: Operating temperature range: from -55°C to +155°C.

## STRUCTURE GRAPH



## RATED VOLTAGE

Resistors should have a Rated Voltage DC or AC corresponding to Rated Power which can be calculated by formula as below.

The Rated Voltage of certain resistance value should be the calculated result or Max. Working Voltage of product series whichever less.

Formula:

$$E = \sqrt{P \times R}$$

E=Rated voltage(V)

P=Rated power(W)

R=Nominal resistance(Ω)

## DIMENSIONS

Unit: mm

Figure	Type	L	W	H	A	B
	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05
	0402	1.00±0.10	0.50±0.05	0.35±0.05	0.25±0.15	0.25±0.10
	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.40±0.20	0.40±0.20
	1206	3.10±0.15	1.55±0.15	0.55±0.10	0.45±0.20	0.45±0.20
	1210	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
	1812	4.50±0.20	3.20±0.20	0.55±0.20	0.50±0.20	0.50±0.20
	2010	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
	2512	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

## RELIABILITY

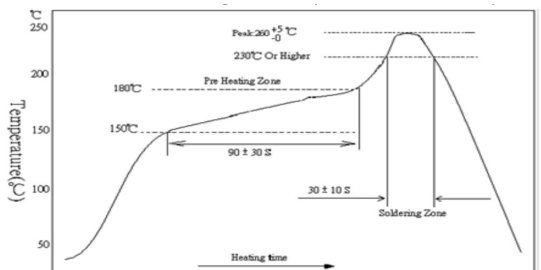
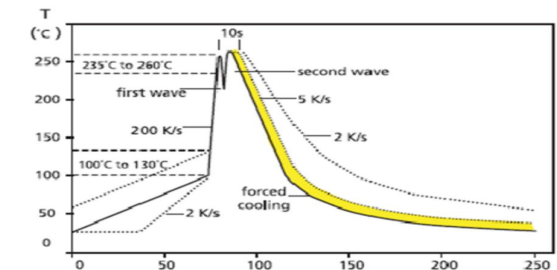
Item	Test Method	Acceptable criterion
Temperature Coefficient of Resistance (T.C.R.)	$TCR(PPM/^{\circ}C)=\frac{(R_2-R_1)}{R_1\times(T_2-T_1)}\times10^6$ $R_1$ =Value in room temperature $R_2$ =Value in test temperature -55℃ or +125℃ $T_1$ =Room temperature $T_2$ =Test temperature -55℃ or +125℃ Reference: IEC 60115-1 6.2	0201: 1Ω≤R≤10Ω: -100~+350PPM/℃ 

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Item	Test Method	Acceptable criterion								
Load Life	Put in an oven at 70±2℃, apply rated voltage, 90 min ON, 30 min OFF, 1000 hrs., take out and stand for more than 60 min, then measure the resistance change rate. Reference: IEC 60115-1 7.1	1% series: ΔR/R=±(1.0%+0.05Ω) 5% series: ΔR/R=±(3.0%+0.05Ω) Jumper: < 100mΩ								
Low temperature load test	-55℃, unpowered, 1 hr.: Rated voltage/current for 45 minutes, then unpowered within 15 minutes, return to room temperature, take out and stand for 24 hours, then measure the change rate of resistance value. Reference: IEC 60115-1 10.2.4	1% series: ΔR/R=±(1.0%+0.05Ω) 5% series: ΔR/R=±(2.0%+0.05Ω) Jumper: < 50mΩ								
Shear force test	Weld the part to the PCB. Apply the corresponding test stress from the side of the part with the test terminal for 10s. Check the appearance of the welded end of the part under the stress condition <table><tr><td>Size</td><td>0201</td><td>0402</td><td>0603, 0805, 1206, 1210, 1812, 2010, 2512</td></tr><tr><td>Test force</td><td>2N</td><td>10N</td><td>18N</td></tr></table> Reference: IEC 60115-1 9.7	Size	0201	0402	0603, 0805, 1206, 1210, 1812, 2010, 2512	Test force	2N	10N	18N	Without visible damage.
Size	0201	0402	0603, 0805, 1206, 1210, 1812, 2010, 2512							
Test force	2N	10N	18N							
Sulfide test	Method 1: Sulfur vapor test, dry sulfur powder, 105℃±3℃, unpowered, 750 hrs. Reference: ASTM-809-95, EIA-977 Method 2: Soaked in industrial oil with sulfur substance 3.5% contained, unpowered, 105℃ ±3℃, 500H.	ΔR/R=±(4%+0.05Ω) Jumper: < 100mΩ								

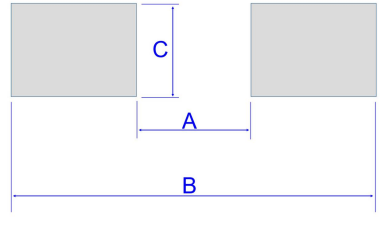
## SOLDERING TEMPERATURE

- Recommendation only. Please adjust it according to the actual application

Lead-free IR Reflow Soldering Profile	Lead-free Double-Wave Soldering Profile
	
Note: <ul style="list-style-type: none"> <li>The Max. Temp. is 260<sup>+5</sup><sub>-0</sub>°C within 10 sec</li> <li>Reference: J-STD-020D</li> </ul>	Note: <ul style="list-style-type: none"> <li>Suit for ≥ 0603 size</li> <li>Manual soldering in 350±10°C within 3 sec.</li> </ul>

## SOLDERING PAD

Resistance value would be lower than nominal value because of joint with soldering material, so designing circuit should adjust the pad size

		Unit: mm		
Figure	Type	A	B	C
	0201	0.3	1.0	0.4
	0402	0.5	1.5	0.6
	0603	0.8	2.1	0.9
	0805	1.2	3.0	1.3
	1206	2.2	4.2	1.6
	1210	2.2	4.2	2.8
	1812	3.1	5.9	3.0
	2010	3.5	6.1	2.8
	2512	3.8	8.0	3.5

## WORKING ENVIRONMENT

If user intends to use products in special environments or states (including but not limited to the following), it is necessary to approve special characteristics and reliability for the following or other application environments.

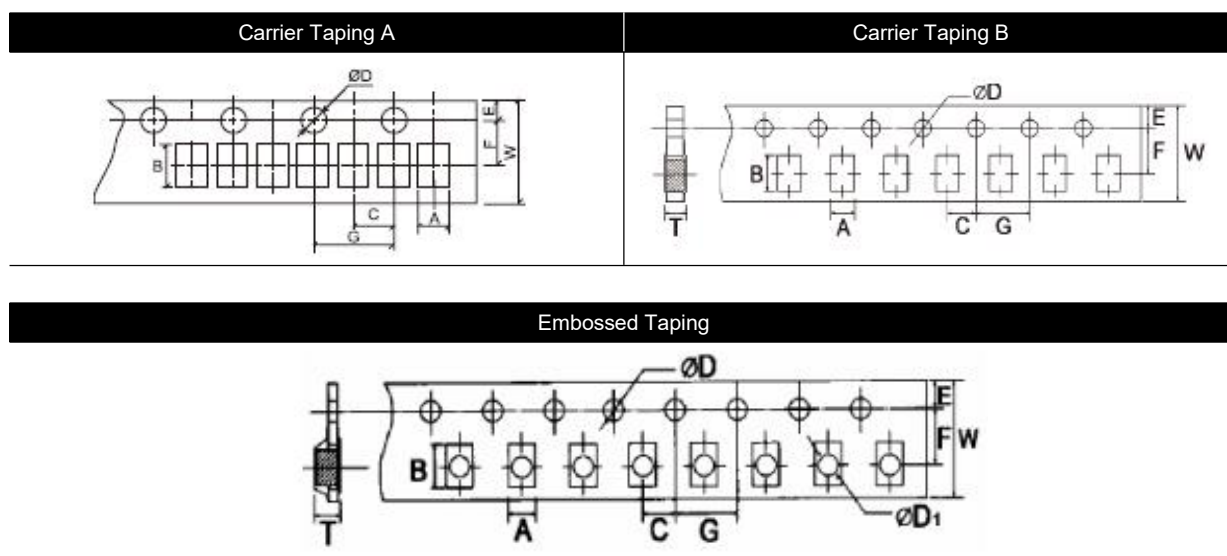
- High temperature, high moisture.
- Near the sea, or corrosive gas, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$  and  $\text{NO}_2$ , etc.
- Unverified liquids, such as water, oil, chemical or organic solvent.
- Unverified resin or paint to cover products.
- Products should be washed with water soluble cleaner even if non cleaning flux.

## STORAGE / CARRY CONDITIONS

- Temperature:  $25 \pm 5^\circ\text{C}$
- Humidity:  $60 \pm 15\% \text{RH}$
- Storage life: 0201 size: 1 year;  $\geq 0402$  size: 2 years. FIFO.
- Please hold box correct orientation when storing and carrying. It is strictly prohibited to fall or squeeze the box, otherwise the product electrode or body may be damaged.

## TAPING SPECIFICATIONS

- Taping drawing



- Taping Dimensions

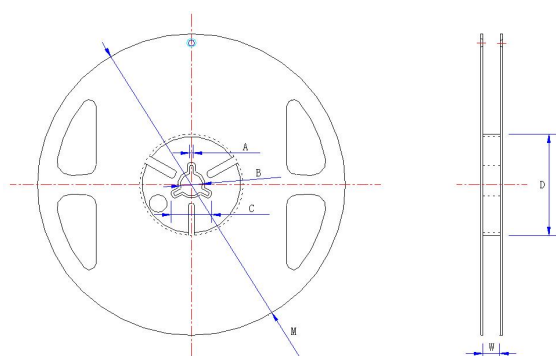
Unit: mm

Type or Size		A±0.2	B±0.2	C±0.05	∅D <sup>+0.1</sup> <sub>-0</sub>	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
Carrier Taping A	0201	0.40±0.05	0.70±0.05	2.0	1.5	1.75	3.5	4.0	8.0	0.47
	0402	0.67±0.1	1.17±0.1	2.0	1.5	1.75	3.5	4.0	8.0	0.47
	0603	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
Carrier Taping B	0603	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
	0805	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
	1206	1.90	3.45	2.0	1.5	1.75	3.5	4.0	8.0	0.81
	1210	2.85	3.50	2.0	1.5	1.75	3.5	4.0	8.0	0.81

Type or Size		A±0.2	B±0.2	C±0.05	$\varnothing D_{-0}^{+0.1}$	$\varnothing D_{-0}^{+0.25}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
Embossed Taping	2010	2.90	5.60	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00
	1812	3.50	4.80	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00
	2512	3.50	6.70	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00

## REEL SPECIFICATION

### A. Reel drawing



### B. Reel dimension

Unit: mm

Type	SPQ PCS/RI.	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
0201	15,000	2.0	13.0	21.0	60.0	178.0	10.0
0402	10,000	2.0	13.0	21.0	60.0	178.0	10.0
0603	5,000	2.0	13.0	21.0	60.0	178.0	10.0
0805	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1206	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1210	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1812	4,000	2.0	13.0	21.0	60.0	178.0	13.8
2010	4,000	2.0	13.0	21.0	60.0	178.0	13.8
2512	4,000	2.0	13.0	21.0	60.0	178.0	13.8

## LABEL SPECIFICATION

### A. Produce Label (Ref.)



### B. Customer Label (Ref.)



## PACKING BOX

A. Packing Type

Taping in reel / Bulk in plastic bag.

B. Inner box

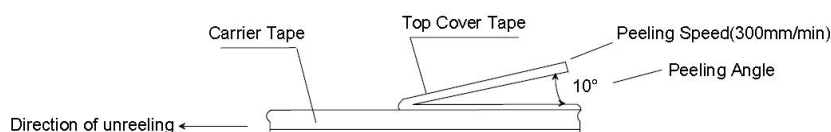
The inner box has several capacities hold 1 reel, 2 reels, 3 reels, 4 reels, 5 reels and 10 reels.

C. Out box

The out box has two capacities hold 6- or 8-pieces inner box.

## NOTE OF COVER TAPE PEEL OFF

A. Figure of cover tape peel off.



B. Please keep peeling speed under 300mm per minute.

C. Please keep the angle between cover tape and direction of unreeling narrower than 10 degrees.

D. There is limit of adhesive force between cover tape and carrier tape or embossed tape shown as following table.

Size of chip resistors	0201	0402	0603 and above
Adhesive force limit	6~30gf	10~40gf	10~70gf

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