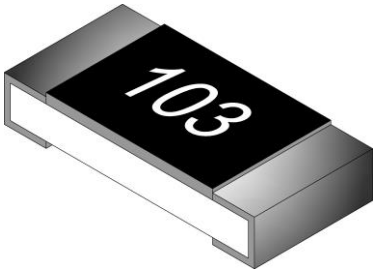
■ Thick Film Chip Resistor — CR Series



■ Application

- Entertainment: Stereo, TV tuners, Tape recorder
- Appliance: Air conditioner, Refrigerator
- Computer & relative products: Main board, PDA
- Communication equipment: Cell phone, Fax machine
- Power equipment: Power supply, Illumination equipment
- Measuring instrument: Electric meter, Navigation equipment

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery
- RoHS 2 compliant with exemption 7(c)-V and Halogen free products

■ Parts Number Explanation

Example:

CR	0603	J	10R0	P	05	Z
Product Type	**Size (Inch)**	**Resistor Tolerance**	**Resistor Value**	**Package**	**Quantity**	**Optional**
CR: Thick Film	0201 0402 0603 0805 1206 1210 1812 2010 2512	B：±0.1% D：±0.5% F：±1% G：±2% J：±5%	10mR=R010 100mR=R100 1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00	P：Paper Taping (0603~1210) Q：Paper Taping (0201、0402) E：Embossed Taping	01：1000PCS 02：2000PCS 04：4000PCS 05：5000PCS 10：10000PCS 20：20000PCS 40：40000PCS 50：50000PCS	Z：Default code (Resistor Paste). S：TCR ±100ppm.

■ Standard Electrical Specifications

Item / Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range		
					D(±0.5%)	F(±1%)	G(±2%) J(±5%)
CR0201	0.05 W	25V	50V	-200/+400	-	1Ω≦R<10Ω	
				±200	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	

Item / Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range		
					B(±0.1%)	D(±0.5%) F(±1%)	G(±2%) J(±5%)
CR0402	0.063 W	50V	100V	±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR0603	0.1 W	75V	150V	±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR0805	0.125 W	150V	300V	±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR1206	0.25 W	200V	400V	±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR1210	0.5 W			±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR1812	0.75 W			±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR2010	0.75 W			±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	
CR2512	1 W			±400	-	1Ω≦R<10Ω	
				±100	10Ω≦R≦1MΩ	10Ω≦R≦10MΩ	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range ：−55℃～＋155℃
- Type CR0603/0805/1206/1210/1812/2010/2512 1Ω≦R≦10Ω optional code 「S」is Low TCR Alloy Film: ±100 PPM/℃

Type	0201	0402	0603	0805	1206	1210	1812	2010	2512
Jumper Resistance Value	50mΩMax								
Jumper Rated Current	0.5A	1A		2A					
Max. Over Load Current <1 second and 1 times	1A	3A		10A					

● Low Ohm Chip Resistor

■ Standard Electrical Specifications

Item / Type	Rated Power at 70℃	Rated Voltage Range	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range (mΩ) F(±1%)、J(±5%)
CR0402	0.063 W	0.12~0.25V	0.624 V	±1000	220≦R≦450
				±800	450<R<1000
CR0603	0.1 W	0.03~0.31V	0.775 V	±2600	10≦R<20 (only for J)
				±2000	20≦R<36 (only for J)
				±1500	36≦R<50 (only for J)
				±1200	50≦R<75 (only for J)
				±1000	75≦R<100
				±800	100≦R≦330
				±600	330<R<1000
CR0805	0.125 W	0.04~0.35V	0.875 V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000
CR1206	0.25 W	0.05~0.5V	1.25 V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000
CR1210	0.5 W	0.07~0.7V	1.75 V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000
CR1812	0.75 W	0.08~0.8V	2.15 V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000
CR2010	0.75 W	0.08~0.8V	2.15 V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000
CR2512	1 W	0.1~0.99V	2.475V	±1800	10≦R<50
				±800	50≦R<100
				±600	100≦R<1000

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range ：−55℃～＋155℃.

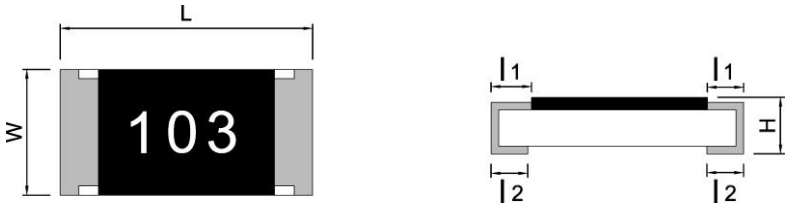
● High Ohm Chip Resistor

■ Standard Electrical Specifications

Item / Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F(±1%)	J(±5%)
CR0402	0.063 W	50V	100V	±200	10.1 MΩ ~ 30 MΩ	10.1 MΩ ~ 30 MΩ
CR0603	0.1 W	75V	150V			
CR0805	0.125 W	150V	300V			
CR1206	0.25 W	200V	400V			
CR1210	0.5 W					
CR2010	0.75 W					
CR2512	1 W					

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range ：−55℃～＋155℃.

■ Type Dimension

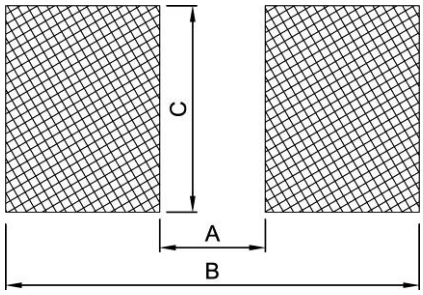


CR0201 / CR0402 / CR0603 / CR0805 / CR1206
CR1210 / CR1812 / CR2010 / CR2512

Type	L	W	H	I_1	I_2
CR0201	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.03	0.15 ± 0.05	0.15 ± 0.05
CR0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
CR0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
CR0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.30 ± 0.15	0.40 ± 0.15
CR1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.40 ± 0.20	0.50 ± 0.20
CR1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
CR1812	4.50 ± 0.10	3.10 ± 0.15	0.55 ± 0.15	0.55 ± 0.20	0.70 ± 0.20
CR2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.15	0.60 ± 0.20	0.60 ± 0.20
CR2512	6.30 ± 0.20	3.20 ± 0.15	0.55 ± 0.15	0.60 ± 0.20	0.60 ± 0.20

● General Information

■ Recommend Land Pattern Design



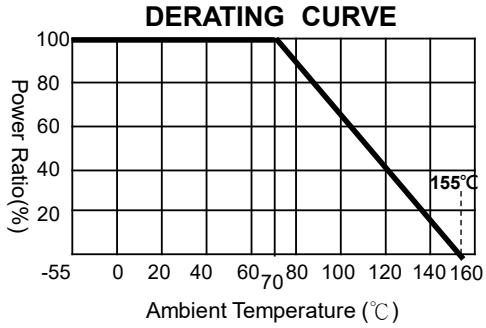
■ Dimension

Unit: mm

Item \ Type	0201	0402	0603	0805	1206	1210	1812	2010	2512
A	0.25	0.60	0.80	1.30	2.20	2.00	3.11	3.80	4.90
B	1.10	1.60	2.40	2.90	4.20	4.40	5.91	6.60	8.10
C	0.32	0.70	1.00	1.40	1.70	2.70	3.30	2.70	3.40

■ Performance Characteristics

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70℃.
For operation at ambient temperature in excess of 70℃, the load should be derated in accordance with figure of derating Curve.

■ Voltage Rating or Current Rating

Resistance Range: ≧1Ω

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV)=\sqrt{P \times R}$$

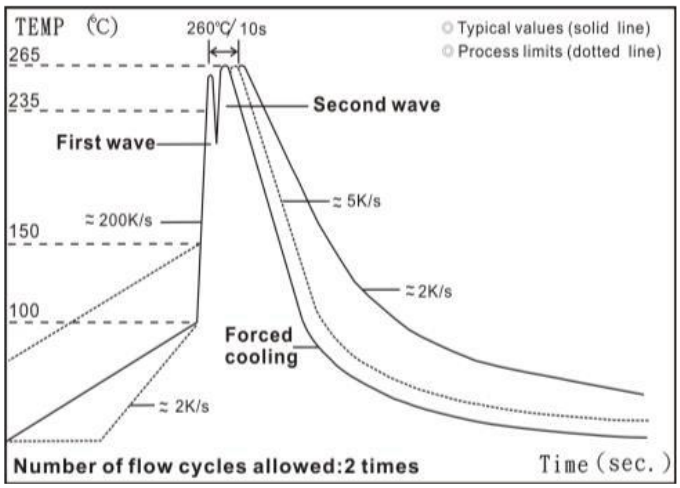
E=Rated voltage(V)
P=Power rating(W)
R=Nominal resistance(Ω)

■ Reliability Test and Requirement

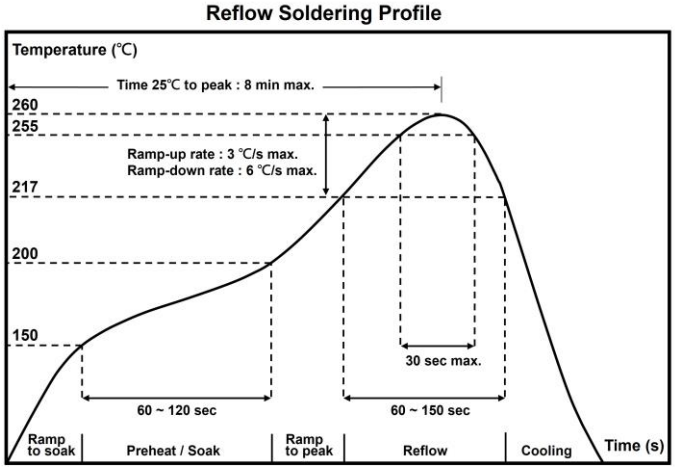
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25℃ / -55℃ and 25℃ /+155℃, 25℃ is the reference temperature	As Spec
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds. Jumper : Over Load Current for 5 seconds 0201=1A , 0402/0603=2.5A 0805/1206/1210/1812/2010/2512=5A	1% and below：±(1.0%+0.05Ω) 2%、5%：±(2.0%+0.10Ω) Jumper : Max 0.05Ω after test.
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5℃ for 30 seconds.	Individual leaching area ≦5% Total leaching area ≦ 10%
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5℃ for 10 seconds.	1% and below：±(0.5%+0.05Ω) 2%、5%：±(1.0%+0.05Ω)
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55℃ to +155℃,5 cycles	1% and below： ±(0.5%+0.05Ω) 2%、5%：±(1.0%+0.10Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 60 secs. Then the resistor is left in the room for 48 hrs.	1% and below：±(0.5%+0.05Ω) 2%、5%：±(0.5%+0.05Ω) Jumper : Max 0.05Ω after test.
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2℃, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs〝ON〞and 0.5 hrs〝OFF〞.	1% and below：±(1.0%+0.05Ω) 2%、5%：±(2.0%+0.05Ω) Value <1Ω：±(2.0%+0.05Ω) Jumper : Max 0.1Ω after test.
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2℃, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs〝ON〞and 0.5 hrs〝OFF〞.	1% and below： ±(1.0%+0.05Ω) 2%、5% ：±(3.0%+0.10Ω) Value <1Ω：±(3.0%+0.10Ω) Jumper : Max 0.1Ω after test.
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≧10GΩ
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D： 0201、0402、0603、0805=5mm 1206、1210、1812=3mm 2010、2512=2mm	1% and below：±(1.0%+0.05Ω) 2%、5%：±(1.0%+0.05Ω)

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



■ Solder reflow Temperature condition

■ Rework temperature（hot air equipment）: 350℃, 3~5seconds

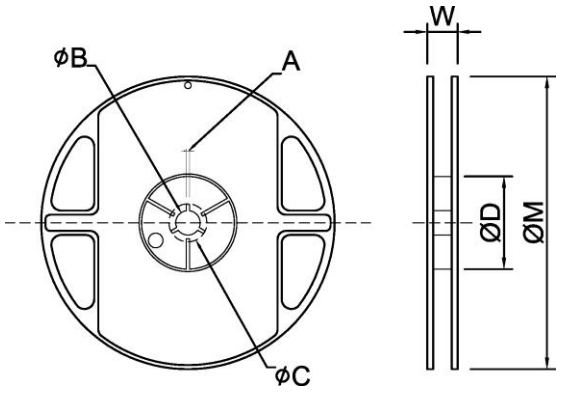
■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

■ Appendix For SMD Chip Resistor

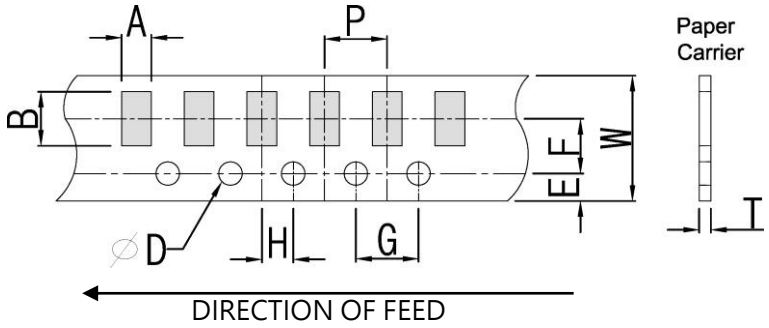
● Packaging Information



■ **Dimension** **Unit: mm**

Type	Size		A	ΦB	ΦC	ΦD	W	ΦM
0201	7”	10K/Reel 15K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0402		10K/Reel						
0201	13”	50K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
0402		40K/Reel 50K/Reel						
0603/0805 /1206/1210	7”	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0603/0805 /1206	10”	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	254±2.0
	13”	20K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
2010/2512 /1812	7”	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0

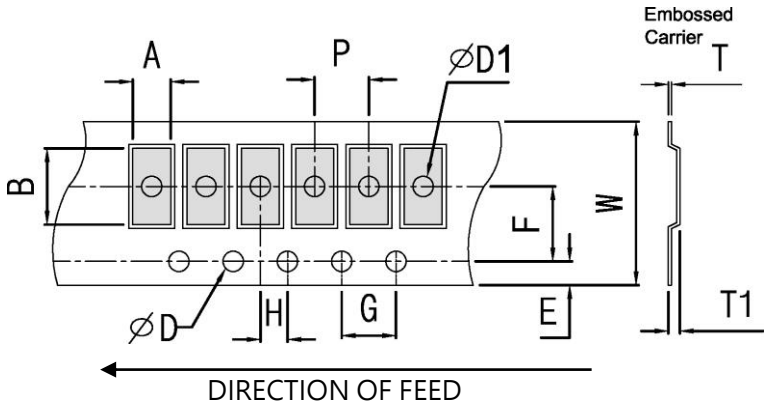
■ Tapping Specification



■ Dimension

Unit: mm

Packaging	Type	A	B	W	E	F	G	H	T	ΦD	P
Paper Type	0201	0.38±0.02	0.68±0.02	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.42±0.02	1.50 +0.10 -0	2.0±0.1
	0402	0.70±0.1	1.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.45±0.1		
	0603	1.05±0.2	1.80±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.60±0.1		4.0±0.1
	0805	1.55±0.2	2.30±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		
	1206	1.90±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		
	1210	2.85±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		



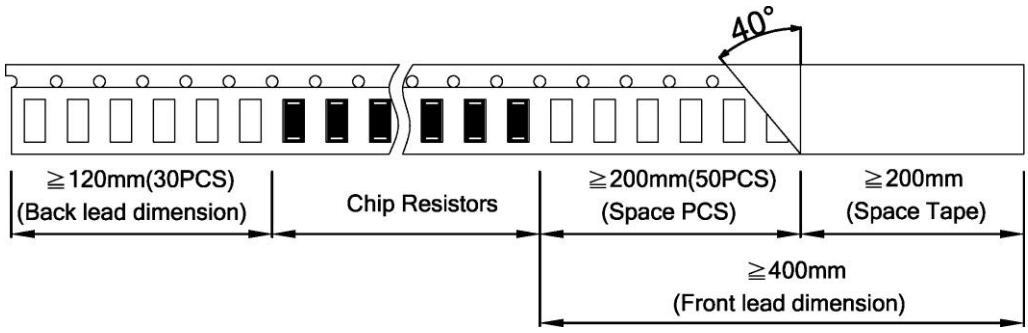
■ Dimension

Unit: mm

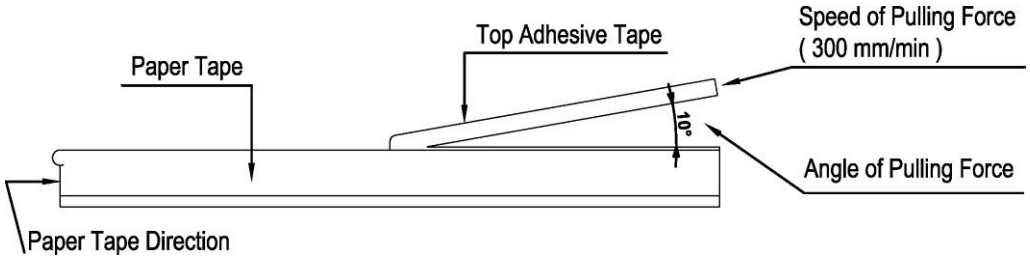
Packaging	Type	A	B	W	E	F	G	H	T	ΦD	ΦD1	T1	P
Embossed Type	2010	2.80±0.20	5.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10	1.50 +0.10 -0	1.50±0.10	0.85±0.15	4.0±0.1
	2512	3.40±0.20	6.70±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	
	1812	3.30±0.20	4.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	

■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension

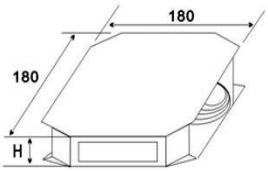


■ Top Adhesive Peel Off Strength：10~70g

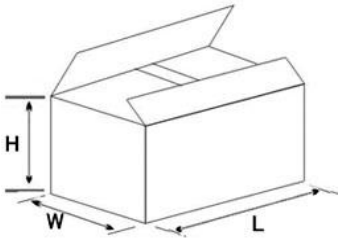


■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



■ Storage Data：

Storage time at the environment temp: 25±5℃& humidity: 60±20% is valid for two years.

■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-feet probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.