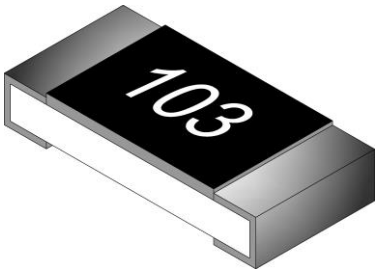
■ High Voltage Chip Resistor — HR Series (Thick Film)



■ Application

- Power supply, Industrial control system
- Measurement instrument
- Back light inverter
- Medical, Precision equipment's

■ Features

- Special material and design for high working voltage require
- Meet IEC62368 standard (0805 100K~27M , 1206 75K~27M , 2512 75K27M).

■ Parts Number Explanation

Example:

HR	2010	F	1M00	E	04	Z
Product Type	Size (Inch)	Resistor Tolerance	Resistor Value	Package	Quantity	Optional
HR	0402 0603 0805 1206 1210 2010 2512	D：±0.5% F：±1% J：±5%	100R=100R 1K=1K00 1M=1M00	P：Paper Taping (0603~1210) Q：Paper Taping (0402) E：Embossed Taping	04：4000PCS 05：5000PCS 10：10000PCS 40：40000PCS 50：50000PCS	Z：TYPE-1 NORMAL TYPE U：TYPE-2 SUPER TYPE

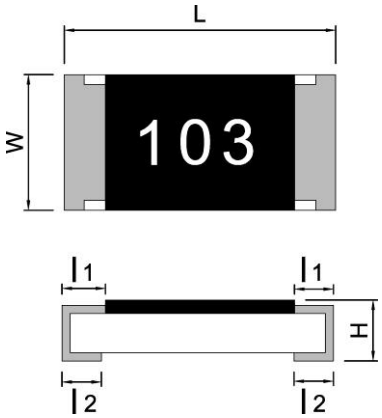
■ Standard Electrical Specifications

Type-1	Rated Power At 70℃	Max. Working Voltage	Max. Over Load Voltage	T.C.R (ppm/℃)	Resistance Range		
					D: ±0.5%	J : ±5%	F : ±1%
HR0402	0.063W	100V	200V	±100	-	100Ω≦R≦10MΩ	
HR0603	0.1W	350 V	500 V	±100	-	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	
HR0805	0.125 W	400 V	800 V	±100	100KΩ≦R≦1MΩ	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	
HR1206	0.25 W	500 V	1000 V	±100	100KΩ≦R≦2MΩ	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	
HR1210	0.33 W			±100	100KΩ≦R≦1MΩ	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	
HR2010	0.5 W			±100	100KΩ≦R≦1MΩ	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	
HR2512	1.0 W			±100	43KΩ≦R≦1MΩ	47Ω≦R≦10MΩ	
				±200	-	10MΩ<R≦30MΩ	

Type-2	Rated Power At 70℃	Max. Working Voltage (DC)	Max. Over Load Voltage (DC)	T.C.R (ppm/℃)	Resistance Range		
					D: ±0.5%	J : ±5%	F : ±1%
HR1206	0.25	800 V	1000 V	±100	100KΩ≦R≦2MΩ	100KΩ≦R≦10MΩ	
HR1210	0.33	800 V	1000 V	±100	100KΩ≦R≦2MΩ		
HR2010	0.5 W	2000 V	3000 V	±100	100KΩ≦R≦1MΩ		
HR2512	1.0 W	3000 V	4000 V	±100	43KΩ≦R≦1MΩ		

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

■ Type Dimension



HR0402 / HR0603 / HR0805 / HR1206 /
HR1210 / HR2010 / HR2512

■ Dimension

Unit: mm

Type-1	L	W	H	l_1	l_2
HR0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
HR0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
HR0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
HR1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
HR1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
HR2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
HR2512	6.30 ± 0.20	3.20 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

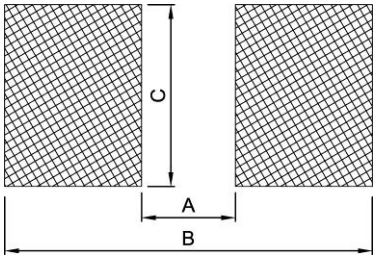
■ Dimension

Unit: mm

Type-2	L	W	H	l_1	l_2
HR1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.30 ± 0.20	0.60 ± 0.20
HR1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.30 ± 0.20	0.60 ± 0.20
HR2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.40 ± 0.20	0.60 ± 0.20
HR2512	6.30 ± 0.20	3.20 ± 0.15	0.55 ± 0.10	0.40 ± 0.20	0.60 ± 0.20

● General Information

■ Recommend Land Pattern Design



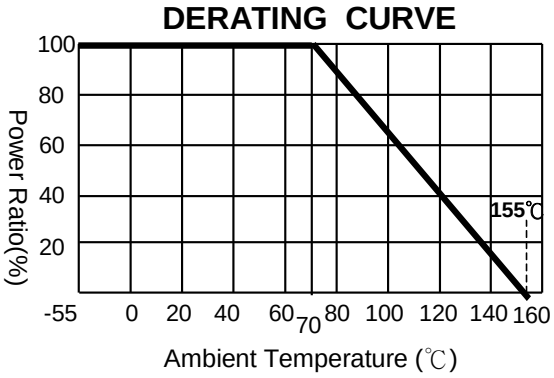
■ Dimension

Unit: mm

Type / Item	0402	0603	0805	1206	1210	2010	2512
A	0.60	1.00	1.20	2.20	2.20	3.80	4.80
B	1.90	3.05	4.10	5.10	5.10	6.90	8.20
C	0.70	1.20	1.70	2.00	2.90	2.90	3.65

■ 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:

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

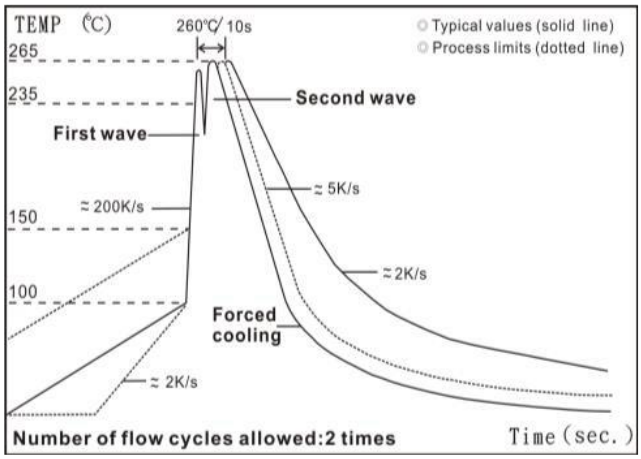
E=Rated voltage(V)
P=Power rating(W)
R=Nominal resistance(Ω)

● Reliability Test and Requirement

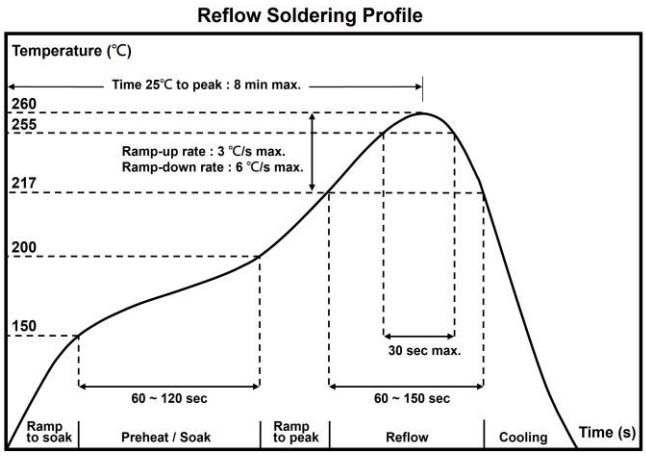
Test Item	Test Method	Procedure	Requirements	
			Type-1	Type-2
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25℃ / -55℃ and 25℃ /+155℃, 25℃ is the reference temperature	As Spec	
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	1% and below： ±(1.0%+0.05Ω) 5%：±(2.0%+0.1Ω)	±2.0%
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) 5%：±(1.0%+0.05Ω)	±1.0%
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) 5%： ±(1.0%+0.10Ω)	±1.0%
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) 5%：±(0.5%+0.05Ω)	±1.0%
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) 5%：±(2.0%+0.05Ω)	±3.0%
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 hr〝OFF〞.	1% and below： ±(1.0%+0.05Ω) 5%：±(3.0%+0.10Ω)	±3.0%
Insulation Resistance	JJIS-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： 0402、0603、0805=5mm 1206、1210=3mm 2010、2512=2mm	1% and below： ±(1.0%+0.05Ω) 5%：±(1.0%+0.05Ω)	±1.0%

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



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

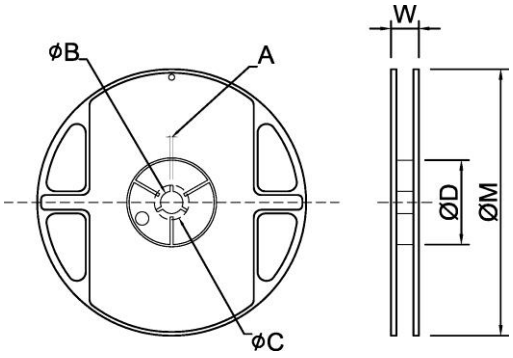
■ Recommended reflow methods

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

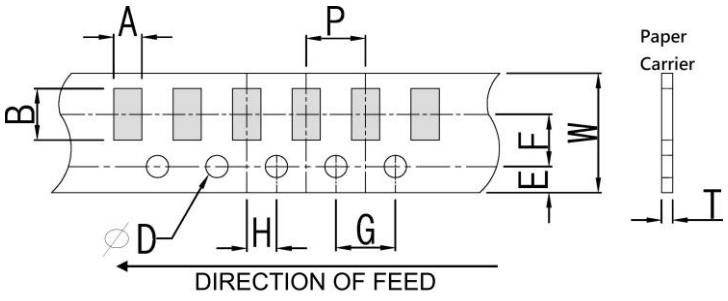
● Packaging Information



■ Dimension **Unit: mm**

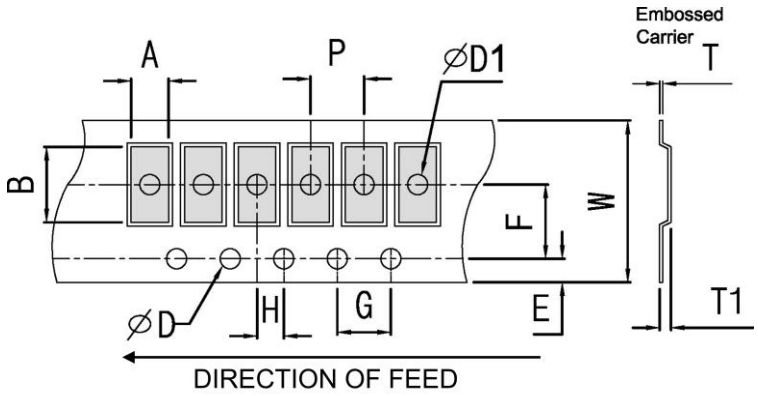
Type	Size		A	ΦB	ΦC	ΦD	W	ΦM
0402	7”	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
	13”	40K/50K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
0603/0805/1206/ 1210	7”	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0603/0805 /1206	10”	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	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	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	⌀D	P
Paper Type	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	$1.50^{+0.10}_{-0}$	2.0±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		

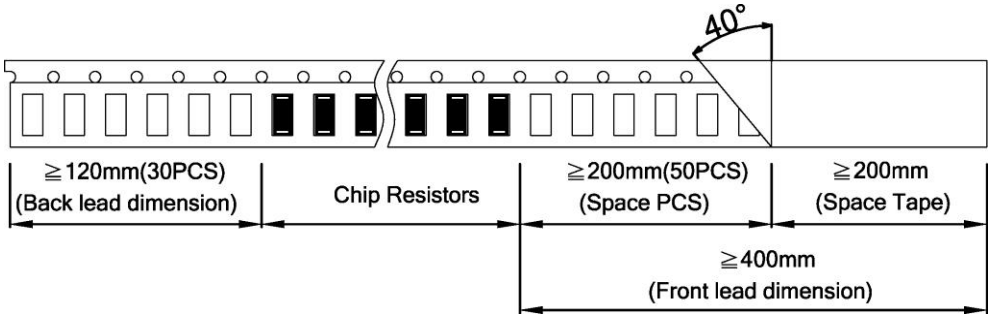


■ **Dimension** **Unit: mm**

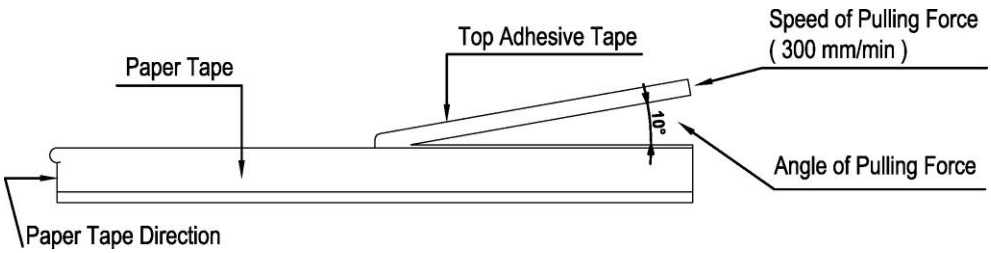
Packaging	Type	A	B	W	E	F	G	H	T	ØD	ΨD1	T1	P
Embossed Type	2010	2.80±0.20	5.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10	$1.50^{+0.10}_{-0}$	1.50±0.10	0.85±0.15	4.0±0.1
	2512	3.40±0.20	6.70±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	

■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension

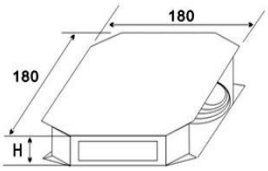


■ Top Adhesive Peel Off Strength：10~70g

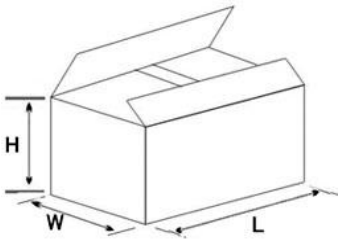


■ Package

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.