

High Power Chip Resistor



CRH Series

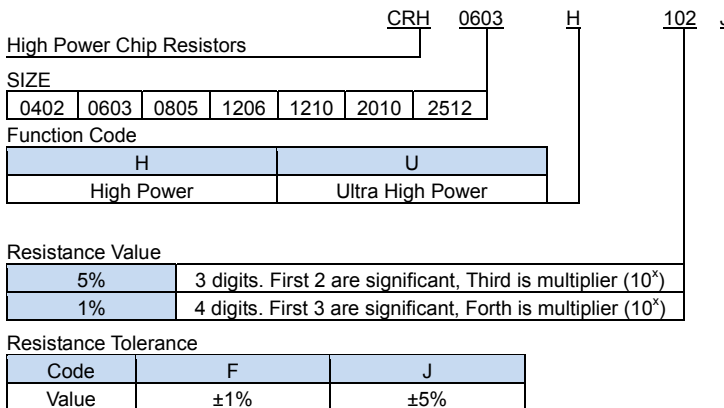
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Feature and Applications

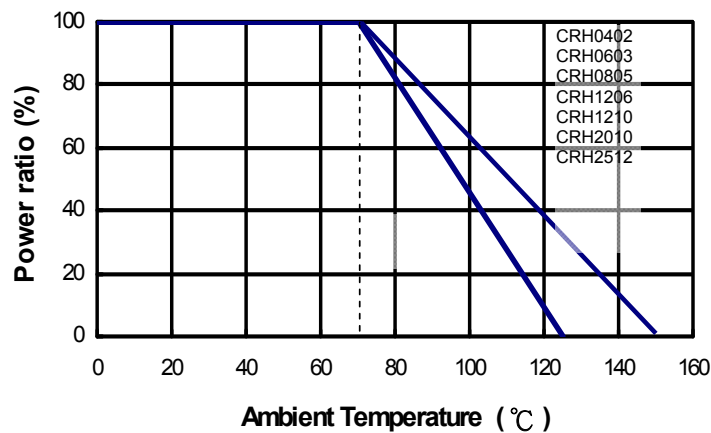
- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process
- Telecommunication Equipment
- Radio and Tape Recorders, TV Tuners
- Digital Cameras, Watches, Pocket Calculators
- Automotive Industry
- Computers, Instruments
- Medical and Military Equipment



PART NUMBERING SYSTEM



Derating Curve



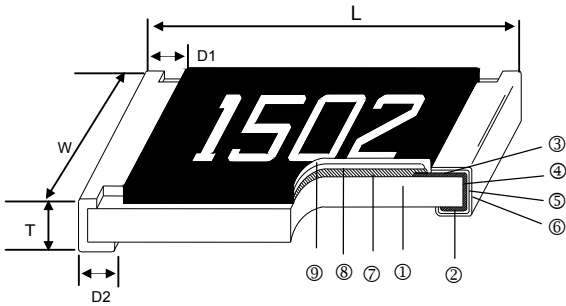
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Construction

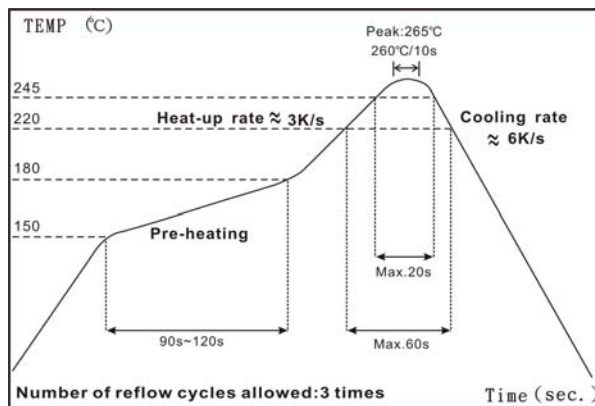


① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (RuO ₂ /Ag)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Primary Overcoat (Glass)
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Secondary Overcoat (Epoxy)

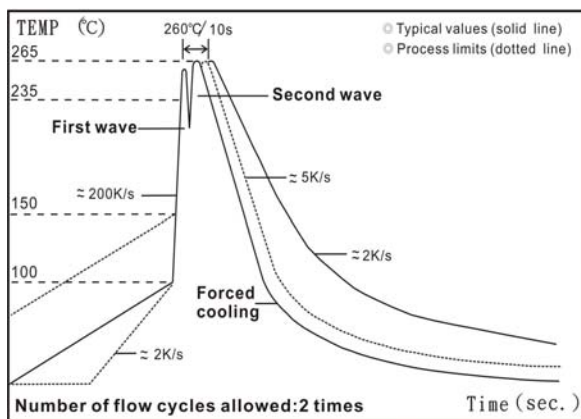
Unit: mm

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
CRH0402	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
CRH0603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
CRH0805	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
CRH1206	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
CRH1210	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
CRH2010	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
CRH2512	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

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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Resistance Range: >1Ω

High Power Rating Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
CRH0402	1/8W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ		±200 ±100
CRH0603	1/4W		75V	100V			
CRH0805	1/3W		150V	300V			
CRH1206	1/3W		200V	400V			
CRH1210	1/2W		200V	400V			
CRH2010	1W		200V	400V			
CRH2512	2W		250V	500V			

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.

Ultra High Power Rating Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
CRH0402	1/8W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ		±200 ±100
CRH0603	1/4W		75V	100V			
CRH0805	1/3W		150V	300V			
CRH1206	1/2W		200V	400V			
CRH1210	3/4W		200V	400V			
CRH2010	1W		200V	400V			
CRH2512	2W		250V	500V			

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.

Resistance Range: <1Ω

High Power Rating Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)		TCR (PPM/°C)
			±1%	±5%	
CRH0402	1/16W	-55 ~ +155°C	50 - 91 100 - 976		±800 ±500
CRH0603	1/10W	-55 ~ +155°C	20 - 47 50 - 91 100 - 976		±1200 ±800 ±500
CRH0805	1/8W	-55 ~ +155°C	10 - 18 20 - 47		±1500 ±1200
CRH1206	1/4W	-55 ~ +155°C	50 - 91 100 - 976		±800 ±500
CRH1210	1/3W	-55 ~ +155°C	10 - 18		±1500
CRH2010	3/4W	-55 ~ +155°C	20 - 91		±800
CRH2512	1W	-55 ~ +155°C	100 - 976		±500

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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°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	±(1.0%+0.10Ω)	±(2.0%+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	±(1.0%+0.10Ω)	±(2.0%+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

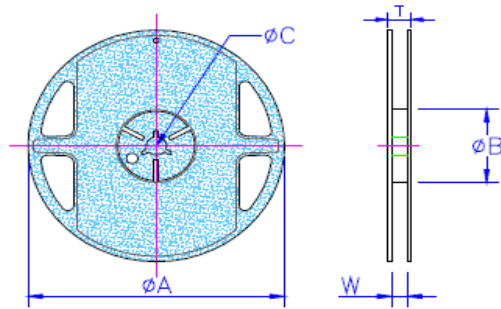
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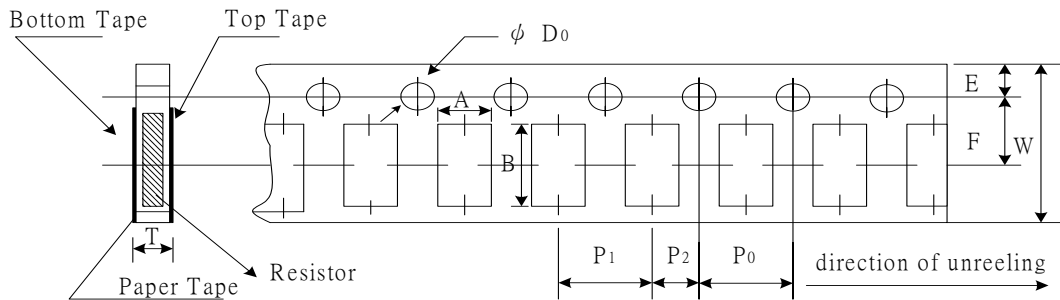
Packaging



Packaging Quantity & Reel Specifications

Type	Packaging Quantity	Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
CRH0402	Paper	10K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	12.5±0.5
		20K		10 inch	254±1.0	100±0.5	13.0±0.2	13.5±0.5
		40K		13 inch	330±1.0	100±0.5	13.0±0.2	13.5±0.5
CRH0603 CRH0805 CRH1206 CRH1210	Paper	5K	8mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	12.5±0.5
		10K		10 inch	254±1.0	100±0.5	13.0±0.2	13.5±0.5
		20K		13 inch	330±1.0	100±0.5	13.0±0.2	13.5±0.5
CRH2010 CRH2512	Embossed	4K	12mm	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.5	15.5±0.5
		8K		10 inch	250±1.0	62±0.5	13.0±0.5	16.5±0.5

Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD ₀ (mm)	T (mm)
CRH0402	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
CRH0603	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
CRH0805	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CRH1206	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CRH1210	2.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

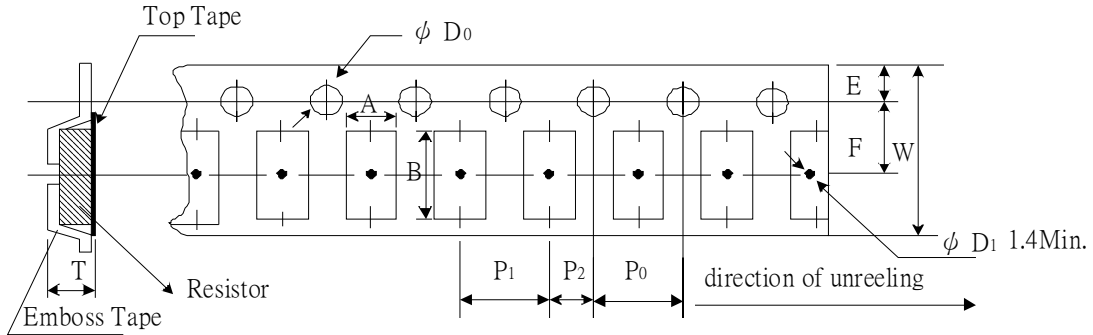
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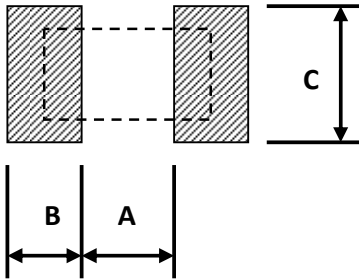
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Emboss Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD_0 (mm)	T (mm)
CRH2010	2.8±0.10	5.5±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰
CRH2512	3.5±0.10	6.7±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 ⁺⁰

Recommend Land Pattern



Type	A (mm)	B (mm)	C (mm)
CRH0402	0.50	0.45	0.60
CRH0603	0.90	0.60	0.90
CRH0805	1.20	0.70	1.30
CRH1206	2.00	0.90	1.60
CRH1210	2.00	0.90	2.80
CRH2010	3.80	0.90	2.80
CRH2512	3.80	1.60	3.50