



CR-Series Thick Film Chip Resistor Product Specifications

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■ 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

■ 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 : $\pm 0.1\%$ D : $\pm 0.5\%$ F : $\pm 1\%$ G : $\pm 2\%$ J : $\pm 5\%$	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 ± 100 ppm. R : Metal Paste.



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■ Standard Electrical Specifications

Type	Item	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%)
CR0201		0.05 W	25V	50V	-200/+400	-	-	1Ω ≤ R < 10Ω	
					±200	-	-	10Ω ≤ R ≤ 10MΩ	
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	200V	400V	±400	-	1Ω ≤ R < 10Ω		
					±100	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ		
CR1812		0.75 W	200V	400V	±400	-	1Ω ≤ R < 10Ω		
					±100	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ		
CR2010		0.75 W	200V	400V	±400	-	1Ω ≤ R < 10Ω		
					±100	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ		
CR2512		1 W	200V	400V	±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 TCR: ±100 PPM/℃

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



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● Low Ohm Chip Resistor

■ Standard Electrical Specifications

Item Type	Rated Power at 70°C	Rated Voltage Range	Max Overload Voltage	T.C.R. (PPM/°C)	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	0.09~0.31V	0.775 V	±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°C ~ +155°C.

● Type CR1206/1210/1812/2010/2512 100 mΩ ≤ R < 1000 mΩ optional code 「R」 is Metal Paste.
TCR ±200 PPM/°C (100 mΩ ≤ R ≤ 200 mΩ), TCR ±100 PPM/°C (200 mΩ < R < 1000 mΩ)

● Type CR1206 10 mΩ ≤ R < 100 mΩ optional code 「R」 is Metal Paste.
TCR ±1800 PPM/°C (10 mΩ ≤ R < 20 mΩ), TCR ±1200 PPM/°C (20 mΩ ≤ R < 50 mΩ), TCR ±300 PPM/°C (50 mΩ ≤ R < 100 mΩ)

● Type CR2512 10 mΩ ≤ R < 100 mΩ optional code 「R」 is Metal Paste.
TCR ±1800 PPM/°C (10 mΩ ≤ R < 20 mΩ), TCR ±800 PPM/°C (20 mΩ ≤ R < 50 mΩ), TCR ±200 PPM/°C (50 mΩ ≤ R < 100 mΩ)



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● High Ohm Chip Resistor

■ Standard Electrical Specifications

Type	Item	Rated Power at 70 °C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	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°C ~ +155°C.

■ Type Dimension



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

TYPE	L	W	H	l ₁	l ₂
CR0201	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.05	0.15 ± 0.05	0.15 ± 0.05
CR0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
CR0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
CR0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
CR1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
CR1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
CR1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
CR2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
CR1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
CR2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20



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● 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	3.00	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°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ Voltage Rating or Current Rating

Resistance Range: $\geq 1 \Omega$

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)



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● 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°C and 25°C / +155°C, 25°C 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 , 0402/0603/0805=2.5A 1206/1210/1812/2010/2512=5A	1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(2.0\%+0.10\Omega)$ Jumper : Max 0.05Ω after test.
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	1% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.05\Omega)$
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 5 cycles	1% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.10\Omega)$
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	1% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(0.5\%+0.05\Omega)$ Jumper : Max 0.05Ω after test.
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 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 : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(2.0\%+0.05\Omega)$ Value <1Ω : $\pm(2.0\%+0.05\Omega)$ Jumper : Max 0.1Ω after test.
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .	1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(3.0\%+0.10\Omega)$ Value <1Ω : $\pm(3.0\%+0.10\Omega)$ Jumper : Max 0.1Ω after test.
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	$\geq 10G\Omega$
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、1812=3mm 2010、2512=2mm	1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.05\Omega)$



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■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



■ Solder reflow Temperature condition

■ Rework temperature (hot air equipment) : 350°C, 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.



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■ Appendix For SMD Chip Resistor

● Packaging Information



■ Dimension

Unit:mm

TYPE	SIZE	A	ØB	ØC	ØD	W	ØM
0201/0402	7" 10K/Reel (0201 & 0402) 15K/Reel (0201 only)	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0402	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
2010/2512/1812	7" 4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0



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■ Tapping Specification



■ Dimension

Unit:mm

Packaging	Type	A	B	W	E	F	G	H	T	ϕD	P
Paper Type	0201	0.45±0.1	0.75±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.35±0.1	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		
	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		4.0±0.1



■ Dimension

Unit: mm

Packaging	Type	A	B	W	E	F	G	H	T	ϕD	$\psi D1$	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	



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■ 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: $25 \pm 5^\circ\text{C}$ & humidity: $60 \pm 20\%$ is valid for one year from the date of delivery.

■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-foot 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.

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