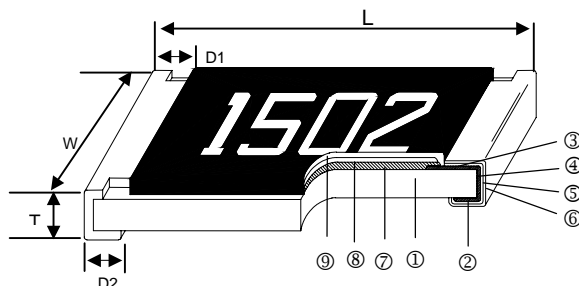


# Thick Film Chip Resistor – CR Series

## Construction



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (RuO <sub>2</sub> /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)

## Features

- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process

## Applications

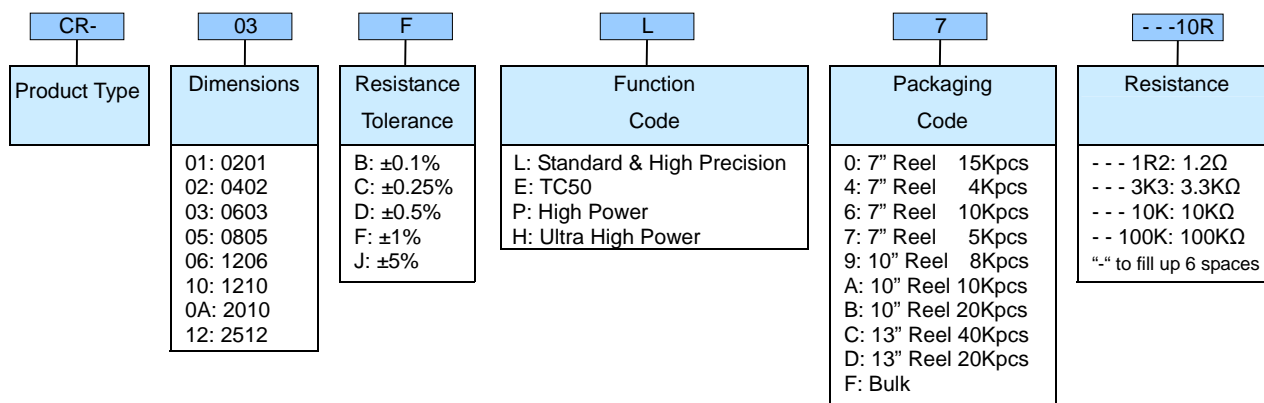
- Telecommunication Equipments
- Radio and Tape Recorders, TV Tuners
- Video Cameras, Watches, Pocket Calculators
- Automotive Industry
- Computers, Instruments
- Medical and Military Equipment

## Dimensions

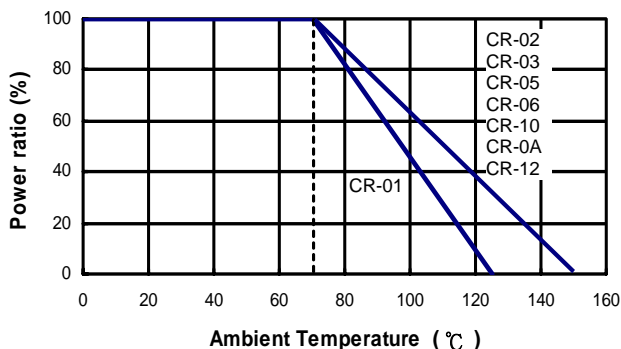
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
CR-01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05	0.150
CR-02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
CR-03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
CR-05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
CR-06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
CR-10	1210	3.20±0.20	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
CR-0A	2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
CR-12	2512	6.35±0.20	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

## Part Numbering



## Derating Curve



## Standard Electrical Specifications

Type \ Item	Power Rating at 70°C Jumper Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
CR-01 (0201)	1/20W	-55 ~ +125°C	25V	50V	1Ω - 10MΩ		±200
Jumper	1A				0Ω (<50mΩ)		-
CR-02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
Jumper	1A				0Ω (<50mΩ)		-
CR-03 (0603)	1/10W	-55 ~ +155°C	75V	150V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
Jumper	1A				0Ω (<50mΩ)		-
CR-05 (0805)	1/8W	-55 ~ +155°C	150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ		±200 ±100
CR-06 (1206)	1/4W		200V	400V	1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±400
Jumper	2A		0Ω (<50mΩ)		-		
CR-10 (1210)	1/3W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 39MΩ		±200 ±100 ±200 ±400
Jumper	2.5A				0Ω (<50mΩ)		-
CR-0A (2010)	3/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
Jumper	3.5A				0Ω (<50mΩ)		-
CR-12 (2512)	1W	-55 ~ +155°C	250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
Jumper	4A				0Ω (<50mΩ)		-

## High Precision Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	
CR-02 (0402)	1/16W	-55 ~ +155°C	50V	100V	-	10Ω - 1MΩ		±100
					-	1.02M - 10MΩ		±200
CR-03 (0603)	1/10W		75V	150V	10Ω - 1MΩ			±100
					-	1.02M - 10MΩ		±200
CR-05 (0805)	1/8W		150V	300V	10Ω - 1MΩ			±100
					-	1.02M - 10MΩ		±200
CR-06 (1206)	1/4W		200V	400V	10Ω - 1MΩ			±100
					-	1.02M - 10MΩ		±200
CR-10 (1210)	1/3W		200V	400V	10Ω - 1MΩ			±100
					-	1.02M - 10MΩ		±200
CR-0A (2010)	3/4W		200V	400V	10Ω - 1MΩ			±100
					-	1.02M - 10MΩ		±200
CR-12 (2512)	1W	250V	500V	10Ω - 1MΩ			±100	
				-	1.02M - 10MΩ		±200	

## TC50 Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	±1%	
CR-02 (0402)	1/16W	-55 ~ +155°C	50V	100V	-		100Ω - 1MΩ		±50
CR-03 (0603)	1/10W		75V	150V					
CR-05 (0805)	1/8W		150V	300V					
CR-06 (1206)	1/4W		200V	400V	10Ω - 1MΩ	10Ω - 10MΩ			
CR-10 (1210)	1/3W		200V	400V					
CR-0A (2010)	3/4W		200V	400V					
CR-12 (2512)	1W		250V	500V					

## High Power & 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%	
CR-02 (0402)	1/10W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
CR-03 (0603)	1/8W		50V	100V			
CR-05 (0805)	1/4W		150V	300V			
CR-06 (1206)	1/3 *1/2W		200V	400V			
CR-10 (1210)	1/2 *3/4W		200V	400V			
CR-0A (2010)	1W		200V	400V			
CR-12 (2512)	2W		250V	500V			

\*: Ultra High Power

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.

## Environmental Characteristics

Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			-55°C~+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	RCWV*2.5 or Max. overload voltage for 5 seconds, 2 seconds for high power series
Insulation Resistance	≥10G			Max. overload voltage for 1 minute
Endurance	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	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	at +125/+155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage			245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover			1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%			260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	-55°C to +125/+155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58; JIS-C 5201-1

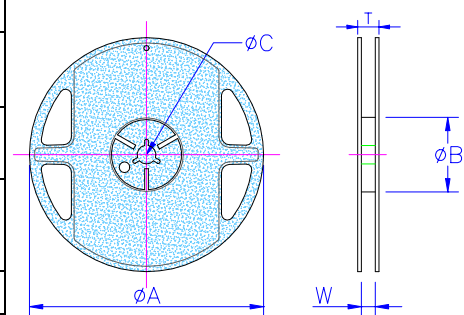
Storage Temperature: 25±3°C; Humidity < 80%RH

## ■ Packaging

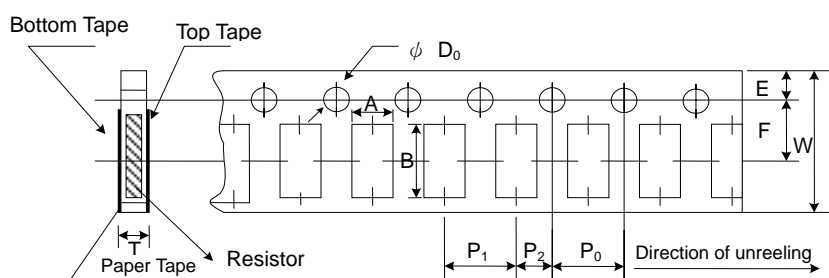
Reel Specifications & Packaging Quantity

Unit: mm

Type	Packaging Quantity	Tape Width	Reel Diameter	ΦA	ΦB	ΦC	W	T	
CR-01	Paper	15K	8mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5
CR-01 CR-02	Paper	10K	8mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5
		20K		10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CR-03 CR-05 CR-06 CR-10	Paper	5K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		10K		13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
	20K	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5	13.5±0.5	
CR-0A CR-12	Embossed	4K	12mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.5	13.0±0.5	15.5±0.5
		8K		10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5



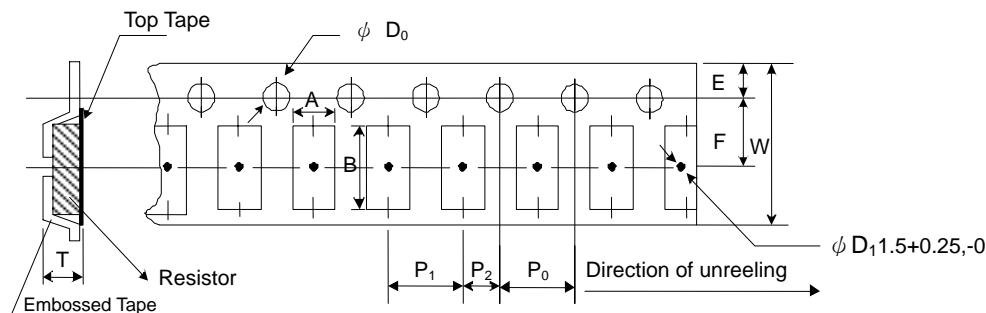
### Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
CR-01	0.38±0.05	0.68±0.05	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	0.42±0.20
CR-02	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
CR-03	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
CR-05	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
CR-06	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
CR-10	2.80±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

### Embossed Plastic Tape Specifications

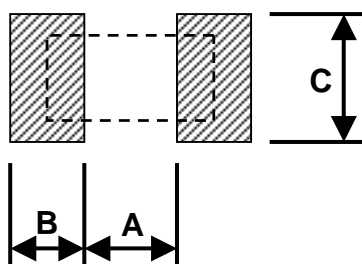


Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
CR-0A	2.8±0.20	5.5±0.20	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 <sup>+0</sup>
CR-12	3.5±0.20	6.7±0.20	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 <sup>+0</sup>

## ■ Recommend Land Pattern

Unit: mm



Type	A	B	C
CR-01	0.30	0.25	0.30
CR-02	0.50	0.45	0.60
CR-03	0.90	0.60	0.90
CR-05	1.20	0.70	1.30
CR-06	2.00	0.90	1.60
CR-10	2.00	0.90	2.80
CR-0A	3.80	0.90	2.80
CR-12	3.80	1.60	3.50