

## Data Sheet

Customer:

Product: Thick Film Chip Resistor – CR..AC Series

Size: 0201/0402/0603/0805/1206/1210/2010/2512

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Thick Film Chip Resistor  
Thick Film Chip Resistor



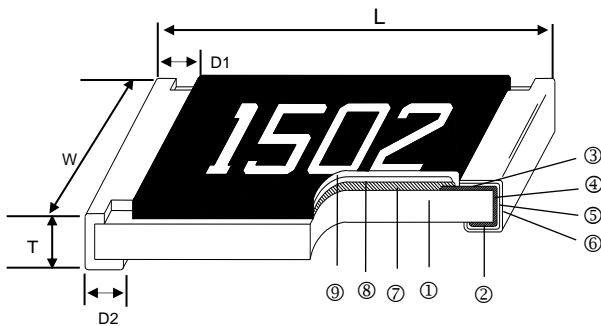
■ Scope

– This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

■ Features

- AEC-Q200 Compliance
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process
- 100% CCD inspection

■ Construction



■ Applications

- Telecommunication Equipment
- Car Media
- Digital Cameras, Watches, Pocket Calculators
- Computers, Instruments
- Medical Equipment

① Alumina Substrate	④ Edge Electrode	⑦ Resistor Layer
② Bottom Electrode	⑤ Barrier Layer	⑧ Primary Overcoat
③ Top Electrode	⑥ External Electrode	⑨ Secondary Overcoat

■ Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	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	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
CR-0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
CR-12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

**Thick Film Chip Resistor**

**Part Numbering**

Part Number : CR-03FL7---10RAC

Part Number : CR-03JL7----0RAC



Product Type	Dimensions	Resistance Tolerance	Function Code	Packaging Code	Resistance	Special Code
CR-	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1% J: ±5%	L: Standard & High Precision E: TC50 P: High Power H: Ultra High Power M: High Power 1	0: 7" Reel 15Kpcs 2: 7" Reel 2Kpcs 4: 7" Reel 4Kpcs 5: 7" Reel 20Kpcs 6: 7" Reel 10Kpcs 7: 7" Reel 5Kpcs 9: 10" Reel 8Kpcs A: 10" Reel 10Kpcs B: 10" Reel 20Kpcs C: 13" Reel 40Kpcs D: 13" Reel 20Kpcs	--- 1R2: 1.2Ω --- 3K3: 3.3KΩ --- 10K: 10KΩ -- 100K: 100KΩ “-“ to fill up 6 spaces	AC:100% CCD inspection

**Standard Electrical Specifications**

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%(E24、E96)	±5%(E24)	
CR-01 (0201)	1/20W	-55 ~ +155°C	25V	50V	1Ω - 10MΩ		±200
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
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
CR-05 (0805)	1/8W	-55 ~ +155°C	150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
CR-06 (1206)	1/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400
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
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
CR-12 (2512)	1W	-55 ~ +155°C	250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 20MΩ 20.5MΩ - 100MΩ		±200 ±100 ±200 ±400

**High Precision Electrical Specifications**

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range (E24 · E96)			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**

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range (E24 · E96)				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	10Ω - 1MΩ	10Ω - 10MΩ			
CR-05 (0805)	1/8W		150V	300V					
CR-06 (1206)	1/4W		200V	400V					
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**

Item Type	Power Rating at 70°C	Function Code	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
						±0.5% (E24 · E96)	±1% (E24 · E96)	±5% (E24)	
CR-02 (0402)	1/10W	M	-55 ~ +155°C	50V	100V	10Ω - 1MΩ	1Ω - 9.76Ω	1Ω - 9.76Ω	±200 ±100
	1/8W	P							
CR-03 (0603)	1/4W	P		75V	150V				
CR-05 (0805)	1/3W	P		150V	300V				
CR-06 (1206)	1/3	P		200V	400V				
	*1/2W	H							
CR-10 (1210)	1/2	P		200V	400V				
	*3/4W	H							
CR-0A (2010)	1W	P	200V	400V					
CR-12 (2512)	2W	P	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.

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

**Thick Film Chip Resistor**

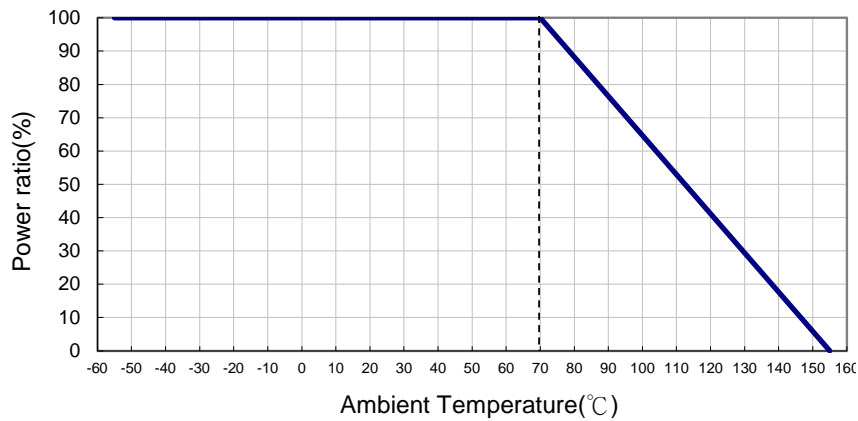
**■ Jumper(0Ω)**

Type \ Item	Rated Current	Function Code	Resistance	Operating Temp. Range
			5%	
CR-01 (0201)	1A	L	<50mΩ	-55 ~ +155°C
CR-02 (0402)	1A			
CR-03 (0603)	1A			
CR-05 (0805)	2A			
CR-06 (1206)	2A			
CR-10 (1210)	2.5A			
CR-0A (2010)	3.5A			
CR-12 (2512)	4A			

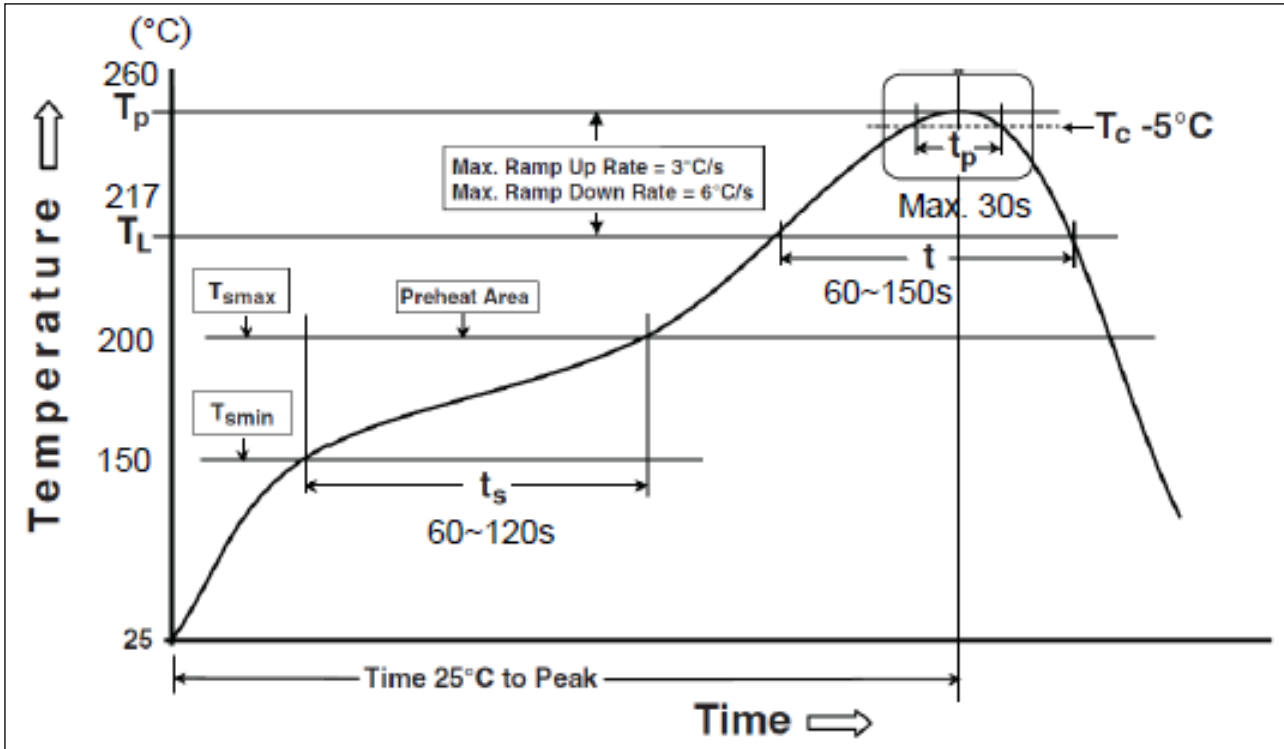
**■ High Current Jumper(0Ω)**

Type \ Item	Rated Current	Function Code	Resistance	Operating Temp. Range
			5%	
CR-02 (0402)	1.5A	P	<20mΩ	-55 ~ +155°C
CR-03 (0603)	2A			
CR-05 (0805)	2.5A			
CR-06 (1206)	3.5A			
CR-10 (1210)	5A			
CR-0A (2010)	6A			
CR-12 (2512)	7A			

**■ Derating Curve**



**■ Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)**



Reflow Profiles	
Profile Feature	Pb-Free Assembly
<b>Preheat</b> Min. Temperature (T <sub>smin</sub> ) Max Temperature (T <sub>smax</sub> ) Preheating time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	150 °C 200 °C 60-120 seconds
Ramp-up rate (T <sub>L</sub> to T <sub>p</sub> )	3 °C/second max.
Liquidous temperature (T <sub>L</sub> ) Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	217 °C 60-150 seconds
Min. Peak temperature (T <sub>p</sub> min)	235°C
Max. Peak temperature (T <sub>p</sub> max)	260°C
Time (t <sub>p</sub> ) within 5 °C of the specified classification temperature (T <sub>c</sub> )	30 seconds max.
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

**■ Environmental Characteristics**

Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			<b>JIS-C-5201-1 4.8</b> <b>IEC-60115-1 4.8</b> At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	<b>JIS-C-5201-1 4.13</b> <b>IEC-60115-1 4.13</b> RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds, 2 seconds for high power series
Insulation Resistance	≥10G			<b>JIS-C-5201-1 4.6</b> <b>IEC-60115-1 4.6</b> Max. Overload Voltage for 1 minute
Endurance	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	<100mΩ	<b>JIS-C-5201-1 4.25</b> <b>IEC-60115-1 4.25.1</b> 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Damp Heat with Load	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	<100mΩ	<b>JIS-C-5201-1 4.24</b> <b>IEC-60115-1 4.24</b> 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Dry Heat	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	<b>JIS-C-5201-1 4.23</b> <b>IEC-60115-1 4.23.2</b> At +155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	<b>JIS-C-5201-1 4.33</b> <b>IEC-60115-1 4.33</b> Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage			<b>JIS-C-5201-1 4.17</b> <b>IEC-60115-1 4.17</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	<b>JIS-C-5201-1 4.18</b> <b>IEC-60115-1 4.18</b> 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover			<b>JIS-C-5201-1 4.7</b> <b>IEC-60115-1 4.7</b> 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤ 10%			<b>JIS-C-5201-1 4.18</b> <b>IEC-60068-2-58 8.2.1</b> 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	<b>JIS-C-5201-1 4.19</b> <b>IEC-60115-1 4.19</b> -55°C to +155°C, 5 cycles

RCWV(Rated Continuous Working Voltage)=√(P\*R) or Max. Operating Voltage whichever is lower.

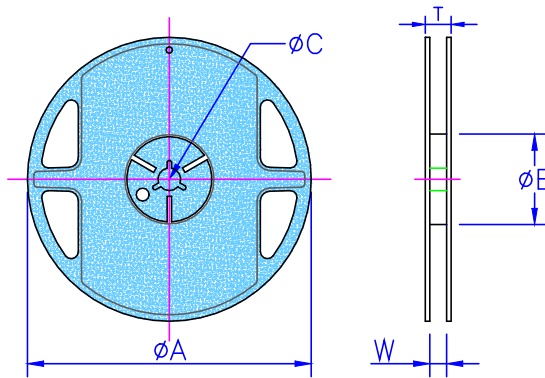
**■ Storage Temperature: 15~28°C; Humidity < 80%RH**

**■ Shelf Life: 2 years from production date.**

Thick Film Chip Resistor

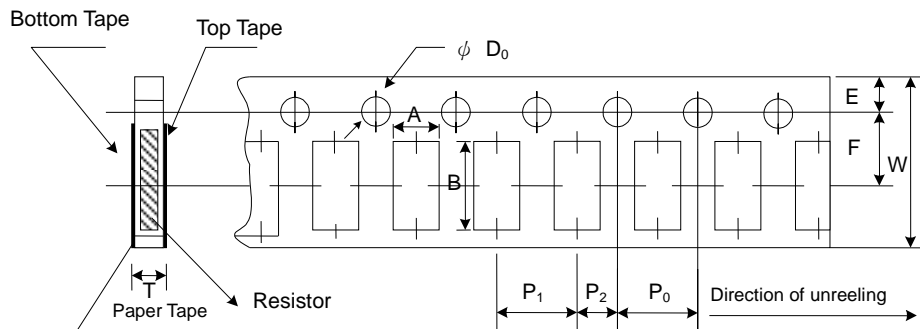
■ Packaging

Reel Specifications & Packaging Quantity



Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
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	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±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	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5
		10K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		20K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±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	12mm	10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

Paper Tape Specifications

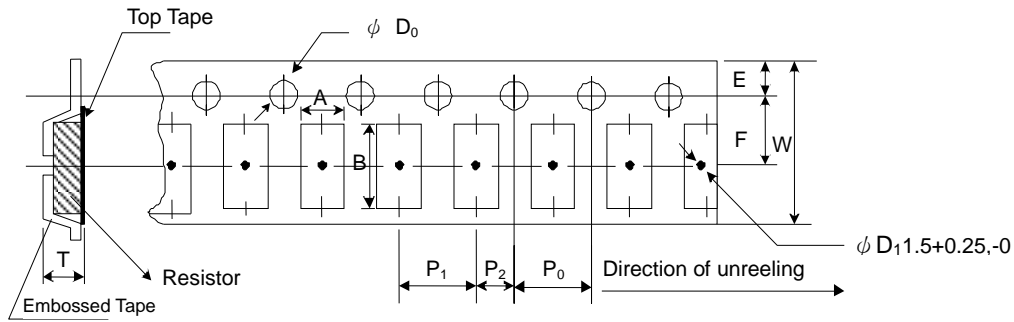


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P <sub>0</sub> (mm)	P <sub>1</sub> (mm)	P <sub>2</sub> (mm)	ΦD <sub>0</sub> (mm)	T (mm)
CR-01	0.38±0.05	0.68±0.05	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.42±0.20
CR-02	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	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	2.90±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



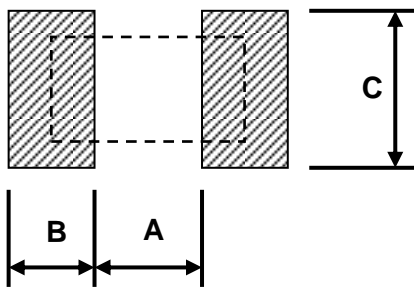
**Thick Film Chip Resistor**

Embossed Plastic Tape Specifications



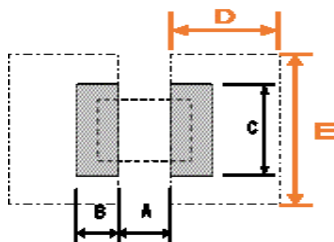
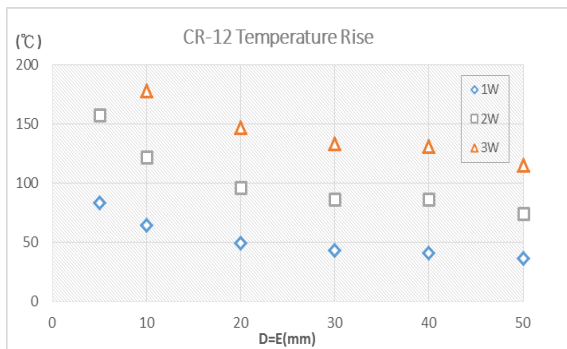
Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P <sub>0</sub> (mm)	P <sub>1</sub> (mm)	P <sub>2</sub> (mm)	ΦD <sub>0</sub> (mm)	T (mm)
CR-0A	2.8±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>
CR-12	3.5±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>

**Recommend Land Pattern**



Type	A (mm)	B (mm)	C (mm)
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	4.90	1.60	3.50

**Temperature Rise**



\*FR4 copper board, 35μm of copper pad thickness

**■ Marking**

No Marking for 0201 and 0402

Jumper for all: Letter "0"

1% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	5R60	97R6	1000	2201	1002	4992	1003

5% for 0603/0805/1206/1210/2010/2512: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> code is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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1% for 0603(E24): 3 digits marking in E24, When the E24 and E96 are the same resistance, this marking in E96

Example: 01A= 100Ω 05C=11KΩ 123=12KΩ 273=27KΩ

1% for 0603: 3 digits marking in E96



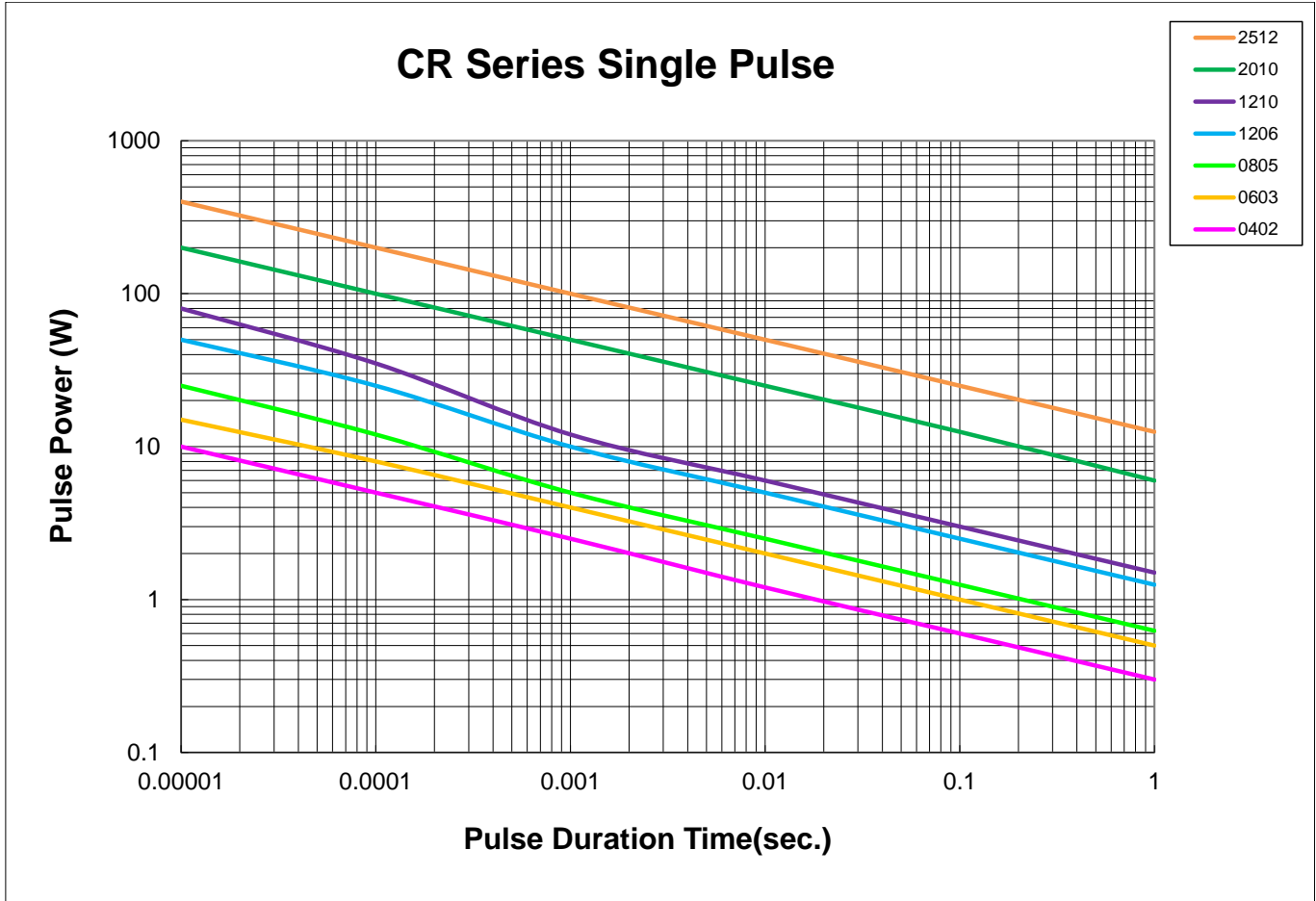
3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω  
68B=4K99Ω 68X=49.9Ω

**Marking Table**

Code	E96	Code	E96	Code	E96	Code	E96				
01	100	25	178	49	316	73	562				
02	102	26	182	50	324	74	576				
03	105	27	187	51	332	75	590				
04	107	28	191	52	340	76	604				
05	110	29	196	53	348	77	619				
06	113	30	200	54	357	78	634				
07	115	31	205	55	365	79	649				
08	118	32	210	56	374	80	665				
09	121	33	215	57	383	81	681				
10	124	34	221	58	392	82	698				
11	127	35	226	59	402	83	715				
12	130	36	232	60	412	84	732				
13	133	37	237	61	422	85	750				
14	137	38	243	62	432	86	768				
15	140	39	249	63	442	87	787				
16	143	40	255	64	453	88	806				
17	147	41	261	65	464	89	825				
18	150	42	267	66	475	90	845				
19	154	43	274	67	487	91	866				
20	158	44	280	68	499	92	887				
21	162	45	287	69	511	93	909				
22	165	46	294	70	523	94	931				
23	169	47	301	71	536	95	953				
24	174	48	309	72	549	96	976				
Code	A	B	C	D	E	F	G	X	Y		
Multiplier	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>		

**Pulse withstanding capacity**

The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage.



**Note:** The limit of the applicable voltage is the max. overload voltage. Please consult us about the resistance characteristic when pulse is applied continuously. This data is a reference value, please be sure to test the products on the actual circuit before you use them.

**REVISION HISTORY**

<b>REVISION</b>	<b>DATE</b>	<b>CHANGE NOTIFICATION</b>	<b>DESCRIPTION</b>
Version A	Apr 23, 2021	-	- New product release
Version A1	Nov 15, 2021	-	- Increase the shelf life description
Version A2	Jan 26, 2022	-	- 0201 Operating temperature rises to 155°C
Version A3	Feb 15, 2022	-	- Derating Curve changes the temperature range
Version A4	Jun 15, 2022	-	- Modify Soldering Condition
Version A5	Jul 13, 2023	-	- Increase 0402 0.1W

单击下面可查看定价，库存，交付和生命周期等信息

[>>VIKING\(光颧\)](#)