

Thick Film Chip Resistors

1. Scope

This specification prescribes thick film chip resistors for use in electronics system

2. Designation

2.1 Designation is made in accordance with the following system

3. Rating

3.1 Rated Power (%)

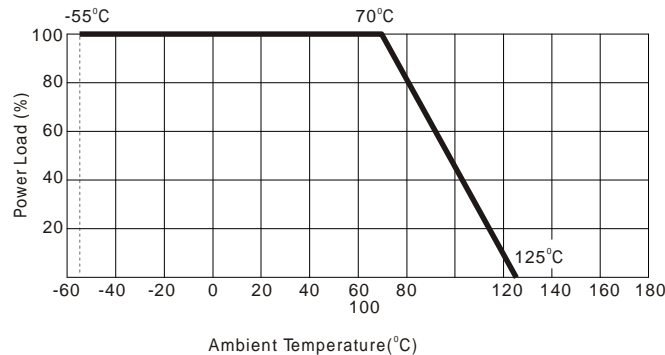
Rated power shall be load power corresponding to normal wattage suitable for continuous use at 70°C ambient temperature. In case the ambient temperature exceeds 70°C reduce the load power in accordance with derating curve shown as graph 4.2.

Type	Power Rating At 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Resistance Range		Standard Resistance Values	Temperature Coefficient (TCR; ppm / °C)
					Min.	Max.		
CR01	1/20W	50V	100V	+1% (F)	100Ω	100KΩ	E-96	+50, +100
				+5% (J)	10Ω	1MΩ	E-24	+200
CR02	1/16W	50V	100V	+1% (F)	100Ω	100KΩ	E-96	+50, +100
				+5% (J)	10Ω	1MΩ	E-24	+200
CR03	1/10W	50V	100V	+1% (F)	10Ω	1MΩ	E-96	+50, +100
				+2% (G)	1Ω	10MΩ	E-24	+200
				+5% (J)	1Ω	10MΩ	E-24	+200
CR05	1/8W	150V	300V	+1% (F)	10Ω	1MΩ	E-96	+50, +100
				+2% (G)	1Ω	10MΩ	E-24	+200
				+5% (J)	1Ω	10MΩ	E-24	+200
CR06	1/4W	200V	400V	+1% (F)	10Ω	1MΩ	E-96	+50, +100
				+2% (G)	1Ω	10MΩ	E-24	+200
				+5% (J)	1Ω	10MΩ	E-24	+200
CR10	1/4W	200V	400V	+1% (F)	10Ω	1MΩ	E-96	+50, +100
				+2% (G)	1Ω	10MΩ	E-24	+200
				+5% (J)	1Ω	10MΩ	E-24	+200
CR20	1/2W	200V	400V	+5% (J)	1Ω	10MΩ	E-24	+200
CR12	1W	200V	400V	+5% (J)	1Ω	10MΩ	E-24	+200

* Lesser of √PR or max.

P.S. Broader ohmage range, tighter tolerance and low TCR are also available too upon special request. Please consult factory for availability.

3.2 Derating Curve



3.3 Operating and Storage Temperature Range -55°C~+125°C

3.4 Rated Voltage

The rated voltage is calculated from the rated power and normal resistance by the following formula :

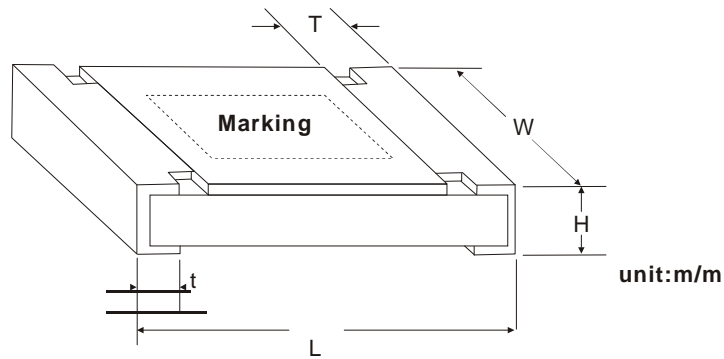
$$E = \sqrt{PR}$$

Where E : Rated Voltage (V)
P : Rated Power (W)
R : Normal Resistance (ohm)

In case the value calculated by the formula exceed the maximum working voltage as 4.1, the maximum working voltage shall be regarded as rated.

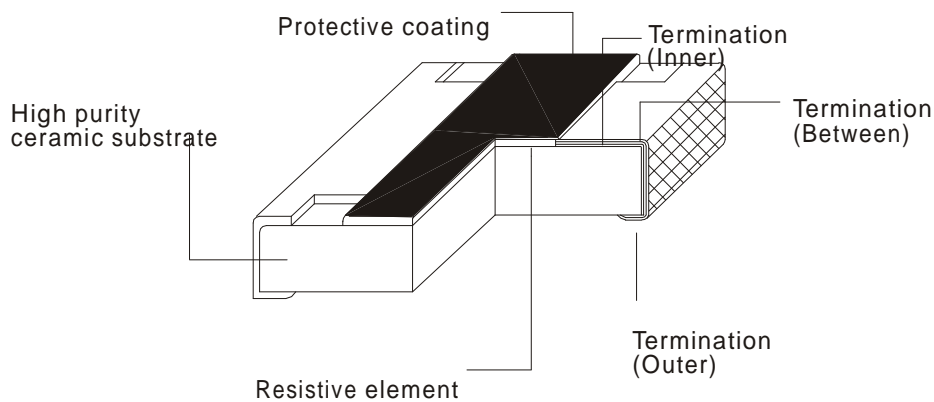
Specifications given herein may be changed at any time without prior notice.

4. Dimensions



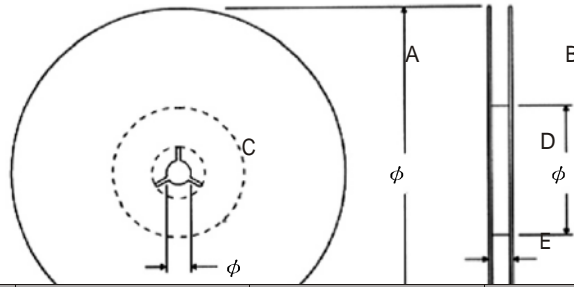
Type	Power Rating	EIA Size	Units	L	W	H	T	t
CR01	1/20W	0201	mm	0.6 ⁺ _{-0.03}	0.3 ⁺ _{-0.03}	0.23 ⁺ _{-0.03}	0.1 ⁺ _{-0.05}	0.15 ⁺ _{-0.05}
			Inch	0.024 ⁺ _{-0.001}	0.011 ⁺ _{-0.001}	0.009 ⁺ _{-0.001}	0.004 ⁺ _{-0.002}	0.006 ⁺ _{-0.002}
CR02	1/16W	0402	mm	1.0 ⁺ _{-0.05}	0.5 ⁺ _{-0.05}	0.35 ⁺ _{-0.05}	0.2 ⁺ _{-0.1}	0.25 ⁺ _{-0.1}
			Inch	0.039 ⁺ _{-0.002}	0.020 ⁺ _{-0.002}	0.014 ⁺ _{-0.002}	0.08 ⁺ _{-0.004}	0.010 ⁺ _{-0.004}
CR03	1/10W	0603	mm	1.6 ⁺ _{-0.15}	0.8 ⁺ _{-0.15}	0.45 ⁺ _{-0.1}	0.3 ⁺ _{-0.2}	0.2 ⁺ _{-0.1}
			Inch	0.063 ⁺ _{-0.006}	0.031 ⁺ _{-0.006}	0.018 ⁺ _{-0.004}	0.012 ⁺ _{-0.008}	0.008 ⁺ _{-0.004}
CR05	1/8W	0805	mm	2.0 ⁺ _{-0.2}	1.25 ⁺ _{-0.1}	0.5 ⁺ _{-0.1}	0.4 ⁺ _{-0.2}	0.4 ⁺ _{-0.2}
			Inch	0.079 ⁺ _{-0.008}	0.049 ⁺ _{-0.010}	0.020 ⁺ _{-0.004}	0.016 ⁺ _{-0.008}	0.016 ⁺ _{-0.008}
CR06	1/4W	1206	mm	3.1 ⁺ _{-0.15}	1.55 ⁺ _{-0.15}	0.55 ⁺ _{-0.1}	0.5 ⁺ _{-0.2}	0.5 ⁺ _{-0.25}
			Inch	0.122 ⁺ _{-0.006}	0.061 ⁺ _{-0.006}	0.021 ⁺ _{-0.004}	0.020 ⁺ _{-0.008}	0.020 ⁺ _{-0.010}
CR20	1/2W	2010	mm	5.0 ⁺ _{-0.15}	2.5 ⁺ _{-0.15}	0.55 ⁺ _{-0.1}	0.6 ⁺ _{-0.2}	0.5 ⁺ _{-0.25}
			Inch	0.197 ⁺ _{-0.006}	0.098 ⁺ _{-0.006}	0.021 ⁺ _{-0.004}	0.024 ⁺ _{-0.008}	0.020 ⁺ _{-0.010}
CR12	1W	2512	mm	6.4 ⁺ _{-0.2}	3.2 ⁺ _{-0.15}	0.55 ⁺ _{-0.1}	0.6 ⁺ _{-0.2}	0.6 ⁺ _{-0.3}
			Inch	0.252 ⁺ _{-0.008}	0.126 ⁺ _{-0.006}	0.021 ⁺ _{-0.004}	0.024 ⁺ _{-0.008}	0.024 ⁺ _{-0.012}

5. Construction and materials



6. Package

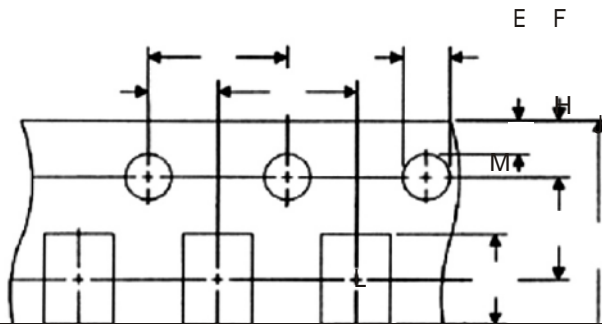
6.1 Taping Specification



Dimensions

Type	Units	A	B	C	D	E
CR01 CR02	mm	178 2	60 2	13.5 0.5	12.5 1.5	9.8 1.5
CR03 CR05 CR06	Inch	7.008 0.080	2.362 0.080	0.512 0.020	0.492 0.060	0.386 0.060
CR20 CR12	mm	178	60	13.5 ± 0.5	15.4	13
	Inch	7.008 ± 0.08	2.362 ± 0.080	0.512 ± 0.020	0.606 ± 0.040	0.511 ± 0.011

±	±	±	±	±
±	±	±	±	±
±	±	±	±	±



Dimensions

Type	Units	A	B	C	D	E	F	H	J	L	M
CR02	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	3.5	8 0.2	0.65	1.15
	Inch	0.157 0.004	0.079 0.002	0.157 0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.138 0.002	0.315 0.008	0.026 0.004	0.045 0.004
CR03	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	3.5	8 0.2	1.1 0.1	1.9 0.1
	Inch	0.157 0.004	0.079 0.002	0.157 0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.138 0.002	0.315 0.008	0.043 0.004	0.079 0.004
CR05	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	3.5	8 0.2	1.65	2.4 0.2
	Inch	0.157 0.004	0.079 0.002	0.157 0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.138 0.002	0.315 0.008	0.065 0.008	0.094 0.008
CR06	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	3.5	8 0.2	2 0.2	3.6 0.2
	Inch	0.157 0.004	0.079 0.002	0.157 ±0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.138 0.002	0.315 0.008	0.079 0.008	0.142 0.008
CR20	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	5.5	12.5	2.9 0.1	5.3 0.1
	Inch	0.157 0.004	0.079 0.002	0.157 0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.216 0.002	0.492 0.008	0.114 0.004	0.208 0.004
CR12	mm	4 0.1	2 0.05	4 0.1	1.5 +0.1 -0	1 0.1	1.75	5.5	12.5	3.4 0.1	6.6 0.1
	Inch	0.157 0.004	0.079 0.002	0.157 0.04	0.059+0.004 -0	0.039 0.004	0.069 0.004	0.216 0.002	0.492 0.008	0.133 0.004	0.26 0.004

±	±	±	±	±	±	±	±	±	±	±
±	±	±	±	±	±	±	±	±	±	±

7.Explanation Of Body Marking System For 0603, 1% EIA-96 Marking

Standard E-96 Values And 0603 Resistance Code

E24 Value	E96 Value	Code	E96 Value	Code	E96 Value	Code	E96 Value	E96 Value
100	100	01	102	02	105	03	107	04
110	110	05	113	06	115	07	118	08
120	121	09	124	10	127	11	130	12
130	133	13	137	14	140	15	143	16
150	147	17	150	18	154	19	158	20
160	162	21	165	22	169	23	174	24
180	178	25	182	26	187	27	191	28
200	196	29	200	30	205	31	210	32
220	215	33	221	34	226	35	232	36
240	237	37	243	38	249	39	255	40
270	261	41	267	42	274	43	280	44
300	287	45	294	46	301	47	309	48
330	316	49	324	50	332	51	340	52
360	348	53	357	54	365	55	374	56
390	383	57	392	58	402	59	412	60
430	422	61	432	62	442	63	453	64
470	464	65	475	66	487	67	499	68
510	511	69	523	70	536	71	549	72
560	562	73	576	74	590	75	604	76
620	619	77	634	78	649	79	665	80
680	681	81	698	82	715	83	732	84
750	750	85	768	86	787	87	806	86
820	825	89	845	90	866	91	887	92
910	909	93	931		953	95	976	

Multiplier Code

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

This table shows the first two digits for the three-digit EIA-96 part-marking scheme

The third character is a letter multiplier:

8.Part Number

CR 03 T05 N J 100R
 Type Size Packing Ref. Code Tolerance Ohmage
 (1) (2) (3) (4) (5) (6)

Type		Size		Packing		Ref. Code		Tolerance		Ohmage	
(1)		(2)		(3)		(4)		(5)		(6)	
Code	Type	Code	Type	Code	Type	Code	Type	Code	%	Code	Value
CR	Chip Resistor	01	0201	B00	Bulk	N	Normal	F	1%	100R	100 ohm
		02	0402	T05	5K/Reel	1	100 ppm	G	2%	1K	1K ohm
		03	0603	T10	10K/Reel	2	50 ppm	J	5%	10K5	10.5K ohm
		05	0805	T20	20K/Reel	S	1206:1/2W	N	0%	100K	100K ohm
		06	1206			F	Lead Free			1M	1M ohm
		10	1210								
		20	2010								
		12	2512								

Classification given herein may be changed at any time without notice