0201 Chip Resistors

* 0402 size and above, see Pages C5-C9

Description	Value
Resistance range	10Ω to 1 MΩ; E24 Series
Resistance tolerance	±5%
Temperature coefficient R≤100Ω 100Ω<R≤1MΩ	 ≤250 ±250 x 10^{-6}/K ≤±250 x 10^{-6}/K
Absolute maximum dissipation at T_{amb}=70°C	1/20 W
Maximum permissible voltage	15V (DC or RMS)
Climatic category (IEC 60068)	55/125/56
Basic specification	IEC 601115-8

Features:

- Reduced size of final equipment
- Lower assembly costs
- Higher component and equipment reliability

Applications:

- Camcorders
- Cellular
- Hearing aids
- Advanced pagers
- Palmtop computers

Description:

The resistors are constructed on a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste which is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance, by laser cutting of this resistive layer.

The resistive layer is covered with a protective coating. Finally, external end terminations are added. For ease of soldering the outer layer of these end terminations is a lead-in alloy.

Derating:

The power that the resistor can dissipate depends on the operating temperature. See Fig. 1.

Type	Limiting Voltage(1) (V)	Limiting Power (W)
CR02	15	0.05

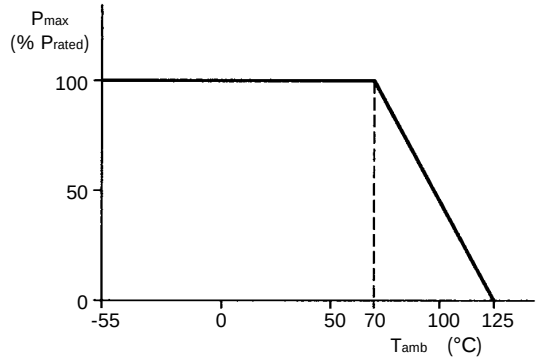


Fig. 1Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient temperature (T_{amb}).

Note:

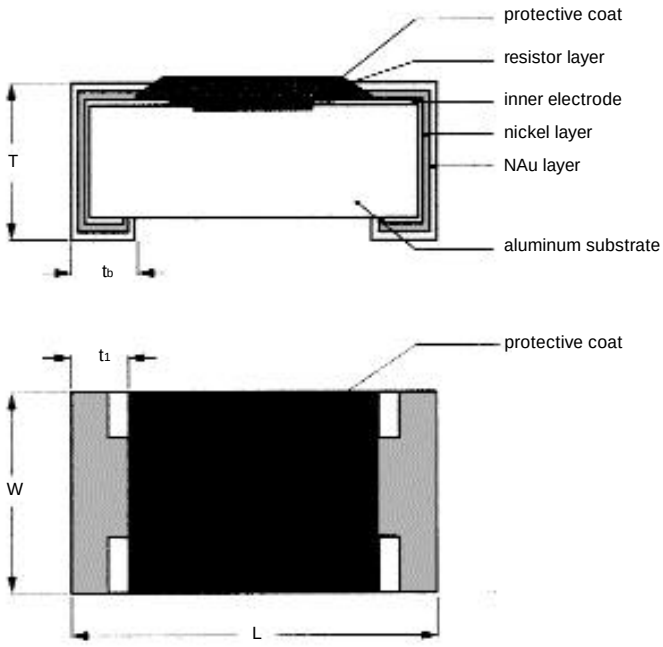
This is the maximum voltage that may be continuously applied to the resistor element.

Thick Film Chip Resistors

1 0201 Size Chip Resistors

2 For E-24 Series (±5%-J, ±2%-G, ±10%-K Tolerances)
3 DIGIT SYSTEM - First two digits are significant and third digit is multiplier, “R” indicates decimal on values under 10 ohms.
Examples: 1R0 = 1 ohms 102 = 1k ohms
470 = 47 ohms 103 = 10k ohms
101 = 100 ohms 104 = 100k ohms
105 = 1 megohms

For E-96 Series (±1% -F Tolerance)
4 DIGIT SYSTEM - First three digits are significant and fourth digit is multiplier, “R” indicates decimal on values under 10 ohms
Examples: 10R0 = 10 ohms 1003 = 100k ohms
1000 = 100 ohms 1004 = 1 megohms
1001 = 1k ohms 1052 = 10.5k ohms
1002 = 10k ohms 2213 = 221k ohms



3 Tolerance
F=1%, J=5%

4 Tape & Reel

There is no marking on 0201 product.

Type	L (mm)	W (mm)	T (mm)	t_t (mm)	t_b (mm)	Mass (g)
CR02	0.6±0.03	0.3±0.03	0.23±0.03	0.13±0.08	0.15±0.08	0.014

Part Numbering System

CR02	B	103	J	T
Type		Nominal Resistance	Tolerance	Packaging
0201	A = Use for 1% B = Use for 5%	Resistors: 3-Digit: E24 Series EX 2.2Ω=2R2 100Ω=101 Resistors: 4-Digit: E96 Series EX 10.2R=10R2 10kΩ=1002 Jumper: 000	F = 1% J = 5%	T = Tape

Thick Film Chip Resistors

Features:

- Small size and light weight
- Suitable for both flow and re-flow soldering
- Reduction of assembly costs and matching with placement machines

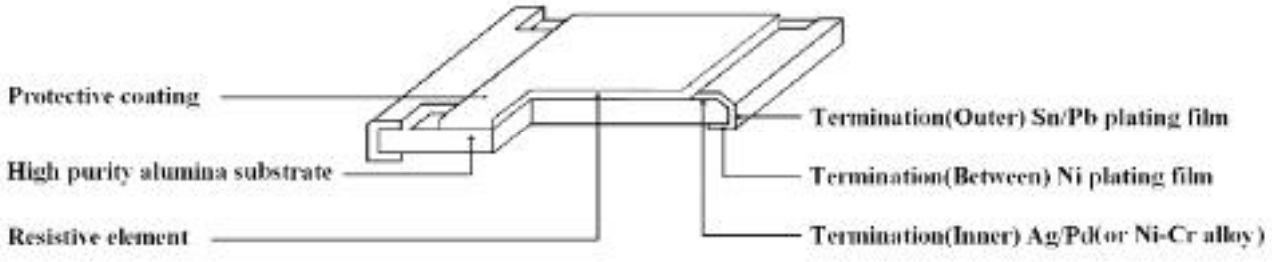
Applications:

- Automotive industry
- Medical and military equipment
- Telecommunication equipment
- Computers
- Pocket calculators
- Radio and tape recorders
- TV tuners and video cameras

Note:

1. Special resistance tolerance requirement available on a case to case basis. Please indicate when ordering.
2. Special T.C.R. requirements can be supplied on a case to case basis. Please indicate when ordering.

Construction



Specialty Chip Resistors:

PCR – Power Chip Resistors
FCR – Fusible Chip Resistors
For detailed specifications, please consult factory.

Part Numbering System

CR16

Type
CR10
CR16
CR21
CR32
CRB32
CR50
CR63

B

A = Use for 1%
B = Use for 5%

103

Nominal Resistance		
Resistors	3-Digit	E24 Series EX 2.2Ω=2R2 100Ω=101
	4-Digit	E96 Series EX 10.2R=10R2 10kΩ=1002
Jumper		000

J

Tolerance
J = 5%
G = 2%
F = 1%
D = .5%

T

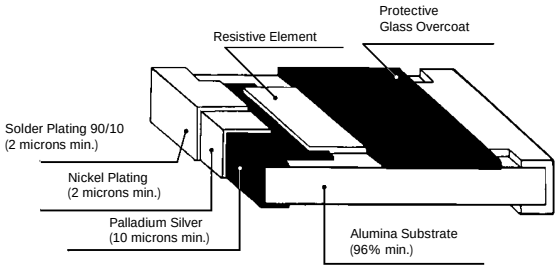
Packaging Code
T = Tape
B = Bulk

IBS ELECTRONICS, INC : 3506D Lake Center Dr, Santa Ana, CA 92704

Tel: 1-800-527-3585 Fax: 1-800-824-7668 Http://www.ibselectronics.com

Thick Film Chip Resistors

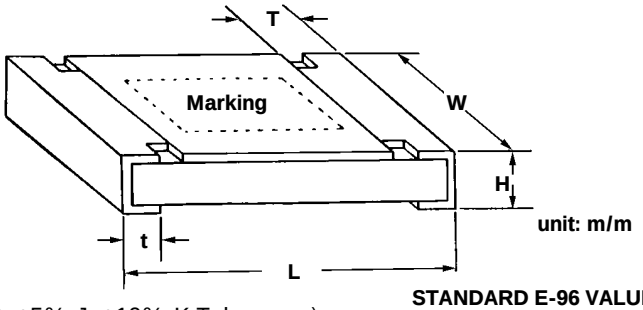
Power Rating and Dimension



Part No.	EIA Size	Power Rating at 70°C	Max. Working Voltage	Max. Overload Voltage	Operating Temp. (°C)	Tolerance %	Resistance Range	Standard Series
CR10	0402	1/16W	25V	50V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ 100Ω-1MΩ 2Ω-3.3MΩ 2Ω-3.3MΩ	 E-96 E-24 E-24
CR16	0603	1/10W 1/16W (Std)	50V	100V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-22MegΩ .01Ω 120MegΩ .01Ω-120MegΩ	 E-96 E-24 E-24
CR21	0805	1/8W 1/10W (Std)	150V	300V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-22MegΩ .01Ω-120MegΩ .01Ω-120MegΩ	 E-96 E-24 E-24
CR32	1206	1/4W 1/8W (Std)	200V	400V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-22MegΩ .01Ω-120MegΩ .01Ω-120MegΩ	 E-96 E-24 E-24
CRB32	1210	1/4W	200V	400V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-10MegΩ .01Ω-10MegΩ .01Ω-10MegΩ	 E-96 E-24 E-24
CR50	2010	1/2W	200V	400V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-10MegΩ .01Ω-10MegΩ .01Ω-10MegΩ	 E-96 E-24 E-24
CR63	2512	1W	200V	400V	-55~+125	Jumper ±1 ±2 ±5	<50mΩ .01Ω-10MegΩ .01Ω-10MegΩ .01Ω-10MegΩ	 E-96 E-24 E-24

Dimensions

Type	Power Rating	EIA Size	L	W	H	T	t
CR10	1/16W	0402	1.0 +0.1 -0.05	0.5 +0.1 -0.05	0.35 ±0.05	0.2 ±0.1	0.25 +0.05 -0.1
CR16	1/16W (Std) 1/10W	0603	1.6 ±0.15	0.8 ±0.15	0.45 ±0.1	0.3 ±0.2	0.2 +0.2 -0.1
CR21	1/10W (Std) 1/8W	0805	2.0 ±0.2	1.25 ±0.1	0.5 ±0.1	0.4 ±0.2	0.2 +0.2 -0.1
CR32	1/8W (Std) 1/4W	1206	3.1 ±0.15	1.55 ±0.15	0.55 ±0.1	0.5 ±0.2	0.5 ±0.25
CRB32	1/4W	1210	3.1 ±0.15	2.65 ±0.15	0.55 ±0.1	0.5 ±0.2	0.5 ±0.25
CR50	1/2W	2010	5.0 ±0.15	2.50 ±0.15	0.55 ±0.1	1.0 ±0.2	0.5 ±0.25
CR63	1W	2512	6.4 ±0.2	3.2 ±0.15	0.55 ±0.1	1.3 ±0.2	0.6 ±0.3



Marking

1. For E-24 Series (±2%-G, ±5%-J, ±10%-K Tolerances) In 0603, 0805, 1206, 1210, 2010 and 2512 sizes.
3 DIGIT SYSTEM - First two digits are significant and third digit is multiplier, "R" indicates decimal on values under 10 ohms.
Examples: 1R0 = 1 ohms; 470 = 47 ohms; 101 = 100 ohms; 102 = 1k ohms; 103 = 10k ohms; 104 = 100k ohms; 105 = 1 megohms

2. For E-96 Series (±1% -F Tolerance) in 0805, 1206, 1210, 2010, and 2512 sizes.
4 DIGIT SYSTEM - First three digits are significant and fourth digit is multiplier, "R" indicates decimal on values under 10 ohms
Examples: 10R0 = 10 ohms; 1000 = 100 ohms; 1001 = 1k ohms; 1002 = 10k ohms; 1003 = 100k ohms; 1004 = 1 megohms; 1052 = 10.5k ohms; 2213 = 221k ohms

3. For E-96 Series (±1% -F Tolerance) in 0603 size
3 DIGIT SYSTEM (Due to space restrictions)

4. No marking for 0402.

STANDARD E-96 VALUES AND 0603 RESISTANCE CODE

E-24	E-96							
Value	Value	Code	Value	Code	Value	Code	Value	Code
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}

CODING FORMULA

XX X
- X: Multiplier Code
- XX: Resistance Code

Example: 10.2 kΩ = $\frac{102}{02} \times \frac{10^2}{C}$ Ω = 02C

33.2 Ω = $\frac{332}{51} \times \frac{10^{-1}}{X}$ = 51X

Marking Examples

10 Ω = 01X
7.5k Ω = 85B
150k Ω = 18D
1 Meg Ω = 01E

Thick Film Chip Resistors

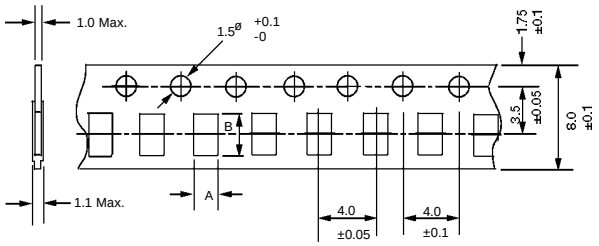
Taping Specifications in Millimeters

(1) Availability

Type	Power Rating	EIA Size	Carrier Tape			Q'ty per Reel (pcs)
			Fig	Material	Width	
CR10	1/16W	0402	A	Paper	8	10,000
CR16	1/16W, 1/10W	0603	A	Paper	8	5,000
CR21	1/10W, 1/8W	0805	A	Paper	8	5,000
CR32	1/8W, 1/4W	1206	A	Paper	8	5,000
CRB32	1/4W	1210	B	Plastic	12	4,000
CR50	1/2W	2010	B	Plastic	12	4,000
CR63	1W	2512	B	Plastic	12	4,000

(2) Paper Tape specifications

FIG. A.

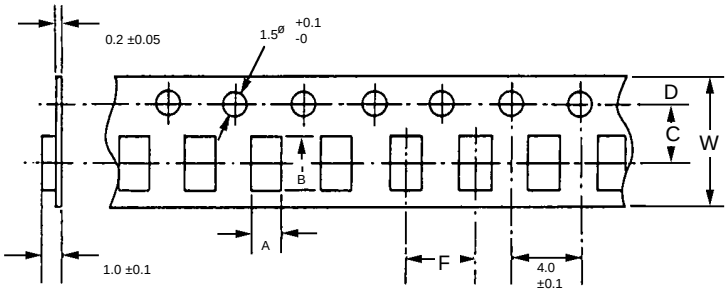


Type	EIA Size	A	B
CR10	0402	0.65 ± 0.1	1.15 ± 0.1
CR16	0603	1.135 ± 0.05	1.95 ± 0.05
CR21	0805	1.65 ± 0.2	± 0.2
CR32	1206	2.0 ± 0.2	3.6 ± 0.2

* Same for Jumper types

(3) Embossed plastic tape specification

FIG. B.

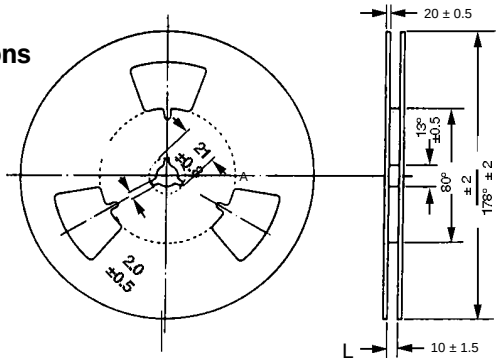


Type	EIA Size	A	B	C	D	F	W
CRB32	1210	2.9 ± 0.1	3.6 ± 0.1	3.5 ± 0.05	1.75 ± 0.1	4.0 ± 0.1	8.0 ± 0.1
CR50	2010	2.9 ± 0.1	5.4 ± 0.1	5.65 ± 0.05	1.50 ± 0.1	4.0 ± 0.1	12.0 ± 0.1
CR63	2512	3.6 ± 0.1	6.9 ± 0.1	5.65 ± 0.05	1.50 ± 0.1	4.0 ± 0.1	12.0 ± 0.1

* Same for Jumper types

(4) Reel Specifications

FIG. C.



Type	EIA Size	L ± 1.5
CR10	0402	10.0
CR16	0603	10.0
CR21	0805	10.0
CR32	1206	10.0
CRB32	1210	10.0
CR50	2010	13.5
CR63	2512	13.5

1. Leader tape: Approximately 250 m/m leader shall be provided at each end of the tape.
2. Accumulative tolerance of feeding hole and chip pocket shall not exceed 0.2mm over 10 pitches.

Performance Specifications

Characteristics	Test Methods	Limits
Temperature coefficient JIS - C - 5202 5.2	Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1 (t_2-t_1)} \times 10^6$ (PPM / °C) R_1 : Resistance value at room temperature (t_1) R_2 : Resistance value at room temp. plus 100 °C (t_2)	±5% 1Ω – 10Ω ≤ ±400PPM/°C 11Ω – 10MΩ ≤ ±200PPM/°C ±1% 10Ω – 100Ω ≤ ±200PPM/°C 101Ω – 1MΩ ≤ ±100PPM/°C
Short - time overload JIS - C - 5202 5.5	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.	± 5% Tolerance ±(2.0%+ 0.1Ω) ± 1% Tolerance ±(1.0%+ 0.1Ω)
Insulation resistance JIS - C- 5202 5.6	Apply 500V DC between protective coating and termination for 1 minute, then measure.	1,000 Mega ohm or more
Dieletric withstanding voltage JIS - C - 5202 6.1.4	Apply 500V AC between protective coating and termination for 1 minute.	No evidence of flashover mechanical damage, arcing or insulation breakdown
Terminal bending JIS - C - 5202 6.1.4	Twist of Test Board: Y/X=5/90mm for 10 seconds.	± (1.0% + 0.05Ω)
Soldering Heat JIS - C - 5202 6.4	Dip the resistor into a solder bath having a temperature of 260°C±5°C and hold it for 10±1 seconds.	Resistance change rate is ± (1.0% + 0.05Ω)
Solderability JIS - C - 5202 6.5	Test temperature of solder 235°C ±5°C. Dipping them in solder: 3±0.5 seconds.	95% coverage Min.
Temperature cycling JIS - C - 5202 7.4	Resistance change after continuous five cycles for duty cycle specified below: Step 1: -55°C ± 3°C, 30 minutes Step 2: Room temp, 10~15 minutes Step 3: + 125°C ± 2°C, 30 minutes Step 4: Room temp, 10~15 minutes	± 5% Tolerance ±(1.0%+ 0.05Ω) ± 1% Tolerance ±(0.5%+ 0.05Ω)
Load life in humidity JIS - C - 5202 7.9	Resistance change after 1,000 hours (1.5 hours “on” 0.5 hour “off”) at RCWV in a humidity chamber controlled at 40°C ± 2°C and 90 to 95% relative humidity.	± 5% Tolerance ±(3.0%+ 0.1Ω) ± 1% Tolerance ±(1.0%+ 0.1Ω)
Load Life JIS - C - 5202 7.10	Permanent resistance change after 1,000 hours operating at RCWV, with duty cycle of 1.5 hours “on”, 0.5 hour “off” at 70°C ± 2°C ambient.	± 5% Tolerance ±(3.0%+ 0.1Ω) ± 1% Tolerance ±(1.0%+ 0.1Ω)

*RCWV = Rated Continuous Working Voltage = $\sqrt{\text{Rated Power x Resistance Value}}$

Derating Curve