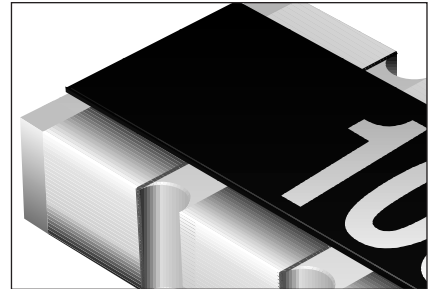


Chip Resistors / Chip Arrays

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I. CR Series Chip Resistors	92
II. CAT/CAY Series Chip Resistor Arrays	96
CAT/CAY 16 Series	96
CAY10 Chip Resistor Array	97
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IV. CAT Thick Film Chip Resistor Arrays	100





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Features

- Very high quality and stability
- Power rating at 70°C: CR0603 - 0.10W, CR0805 - 0.125W, CR1206 - 0.25W
- Three layer contacting process with nickel barrier prevents leaching and provides excellent solderability

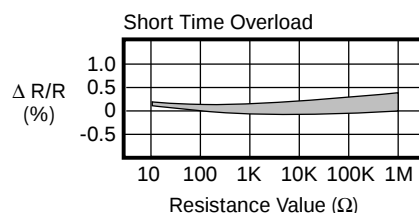
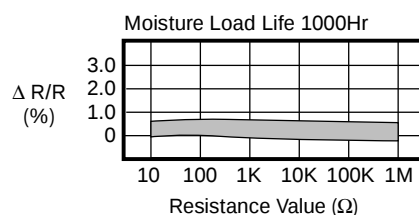
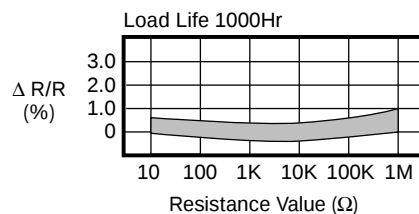
- Tight tolerances of bottom electrode width
- Suitable for all types of soldering processes
- Paper tape on reel for automatic placement

CR0603/CR0805/CR1206 - Chip Resistors

Electrical Characteristics

Characteristic	Model CR0603	Model CR0805	Model CR1206
Power Rating @ 70°C	1/10W	1/8W	1/4W
Operating Temperature Range	-55°C to +125°C		
Derated to 0 Load at	+125°C		
Maximum Working Voltage	50V	100V	200V
Maximum Overload Voltage	100V	200V	400V
Resistance Range: 1%, E-96 + E-24	10Ω-1MΩ		
Resistance Range: 5%, E-24 Zero Ohm Jumper <0.01Ω	1Ω-10MΩ		
Temperature Coefficient	Special value on request 1%: ±100ppm/°C 5%: ±200ppm/°C 1Ω-10Ω: -200ppm/°C to +500ppm/°C		

Characteristic Data

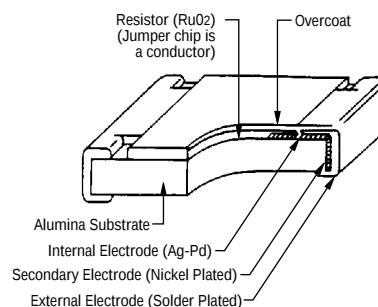
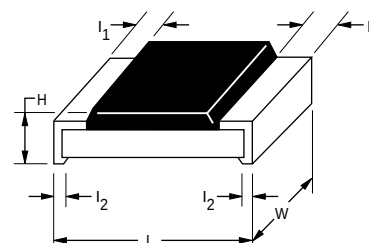


Chip Dimensions

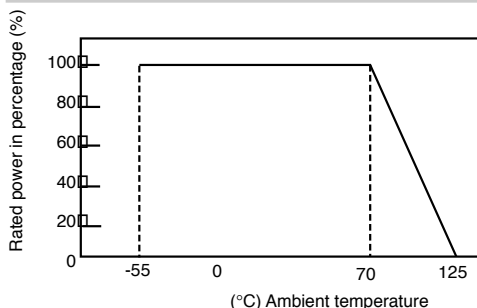
Dimension	Model CR0603	Model CR0805	Model CR1206
L	1.60±0.10 (0.063±0.004)	2.00±0.15 (0.079±0.006)	3.20±0.15 (0.126±0.006)
W	0.80±0.10 (0.031±0.004)	1.25±0.10 (0.049±0.004)	1.60±0.15 (0.063±0.006)
H	0.45±0.10 (0.018±0.004)	0.50±0.10 (0.020±0.004)	0.60±0.10 (0.024±0.004)
l ₁	0.30±0.20 (0.012±0.008)	0.40±0.20 (0.016±0.008)	0.50±0.25 (0.020±0.010)
l ₂	0.30±0.20 (0.012±0.008)	0.40±0.15 (0.016±0.008)	0.50±0.20 (0.020±0.010)

DIMENSIONS ARE: $\frac{\text{METRIC}}{\text{(INCHES)}}$

Dimensional Drawing



Derating Curve



Specifications are subject to change without notice.

CR0603/CR0805/CR1206 - Chip Resistors

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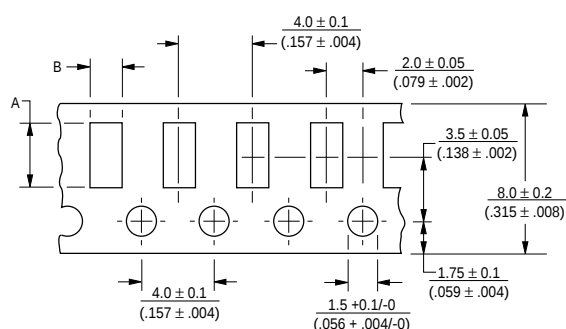
Performance Characteristics (Tests According to MIL-STD-202, MIL-R-55342B, EIA RS-396)

Test	Procedure	Method	Specification	Deviation from Nominal	
				1%	5%
DC Resistance	—	MIL-STD-202 303 EIA RS-396 4.4	MIL-R-55342D 4.7.2	F: $\leq \pm 1\%$	$\leq \pm 5.0\%$
Thermal Shock	-40°C, 60 minutes; +125°C, 60 minutes	MIL-STD-202 107 EIA RS-396 4.5	MIL-R-55342D 4.7.3	$\leq \pm 0.5\% + 0.05\Omega$	$\leq \pm 1\% + 0.05\Omega$
Low Temperature Operation	-55°C, 1 hour off; 45 minutes on	MIL-R-55342D 4.7.4 EIA RS-396 4.6	MIL-R-55342D 4.7.4	$\leq \pm 0.5\% + 0.05\Omega$	$\leq \pm 1.0\% + 0.05\Omega$
Short Time Overload	Rated Voltage x 2.5; 5 seconds CR0603: 100V max. CR0805: 300V max. CR1206: 400V max.	MIL-R-55342D 4.7.5 EIA RS-396 4.7	MIL-R-55342D 4.7.5	$\leq \pm 1\% + 0.05\Omega$	$\leq \pm 2.0\% + 0.05\Omega$
High Temperature Exposure	+125°C; 1000 hours	MIL-R-55342D 4.7.6 EIA RS-396 4.8	MIL-R-55342D 4.7.6	$\leq \pm 1.0\% + 0.05\Omega$	$\leq \pm 2.0\% + 0.1\Omega$
Resistance to Soldering Heat	260°C, 10 seconds	MIL-R-55342D 4.7.7	MIL-R-55342D 4.7.7	$\leq \pm 0.5\% + 0.05\Omega$	$\leq \pm 1.0\% + 0.05\Omega$
Moisture Resistance	90-98%RH; 10 cycles	MIL-STD-202 106D EIA RS-396 4.9	MIL-R-55342D 4.7.8	$\leq \pm 0.5\% + 0.05\Omega$	$\leq \pm 2.0\% + 0.05\Omega$
Load Life 1000 Hours	+70°C; 1.5 hours on, 0.5 hours off; 1000 hours	MIL-STD-202 108 Condition D EIA RS-396 4.12	MIL-R-55342D 4.7.10	$\leq \pm 1.0\% + 0.05\Omega$	$\leq \pm 3.0\% + 0.1\Omega$
Solderability	+235°C; 3 seconds	MIL-STD-202 208 EIA RS-396 4.11	MIL-R-55342D 4.7.11	$\geq 95\%$ of area covered	$\geq 95\%$ of area covered
Terminal Strength	Pull Test	MIL-R-55342D 4.7.12	MIL-R-55342D 4.7.12	$\geq 500\text{g}$	$\geq 500\text{g}$
Current Noise	Quan-Tech Model 315B	MIL-STD-202 308	MIL-R-55342D 6.6	R $\leq 1\text{k}\Omega$; max. 1 $\mu\text{V/V}$ R $\leq 10\text{k}\Omega$; max. 3 $\mu\text{V/V}$ R $\leq 100\text{k}\Omega$; max. 6 $\mu\text{V/V}$ R $\leq 1\text{M}\Omega$; max. 10 $\mu\text{V/V}$	R $\leq 1\text{k}\Omega$; max. 1 $\mu\text{V/V}$ R $\leq 10\text{k}\Omega$; max. 3 $\mu\text{V/V}$ R $\leq 100\text{k}\Omega$; max. 6 $\mu\text{V/V}$ R $\leq 2\text{M}\Omega$; max. 10 $\mu\text{V/V}$
Humidity, Steady State	+40°C; 90-95% RH, 1344 Hours	MIL-STD-202 103B Condition D	—	$\leq \pm 2.5\% + 0.05\Omega$	$\leq \pm 2.5\% + 0.05\Omega$
Salt Spray	96 hours	MIL-STD-202 101D Condition A	—	$\leq \pm 1.0\% + 0.2\Omega$	$\leq \pm 1.0\% + 0.1\Omega$
Vibration	10-2000 Hz, 6 hours	MIL-STD-202 201A	—	$\leq \pm 0.5\% + 0.1\Omega$	$\leq \pm 1.0\% + 0.1\Omega$
Voltage Coefficient	—	MIL-STD-202 309	—	$\leq 100\text{ppm/V}$	$\leq 100\text{ppm/V}$
Insulation Resistance	Test Potential 500V CR0603: 100V	MIL-STD-202 302 Condition B	—	$\geq 10^3\text{M}\Omega$	$\geq 10^3\text{M}\Omega$
Dielectric Withstanding Voltage	—	MIL-STD-202 301	—	$\geq 500\text{V}$ (CR1206, CR0805) $\geq 300\text{V}$ (CR0603)	
Drop Test	1m	MIL-STD-202 203B	—	$\leq \pm 0.5\% + 0.1\Omega$	$\leq \pm 1.0\% + 0.1\Omega$
Bending Test	5mm/90mm; 10 sec.	—	—	$\leq \pm 1\% + 0.05\Omega$	$\leq \pm 1.0\% + 0.05\Omega$

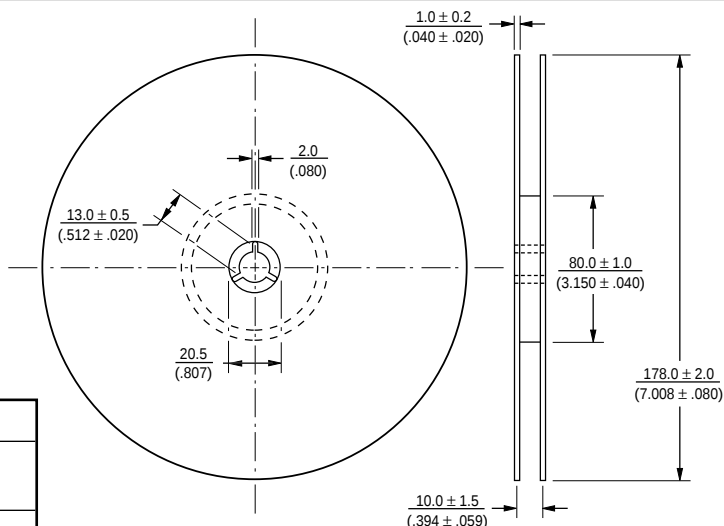
CR0603/CR0805/CR1206 - Chip Resistors

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Packaging Dimensions (Conforms to EIA RS-481A)



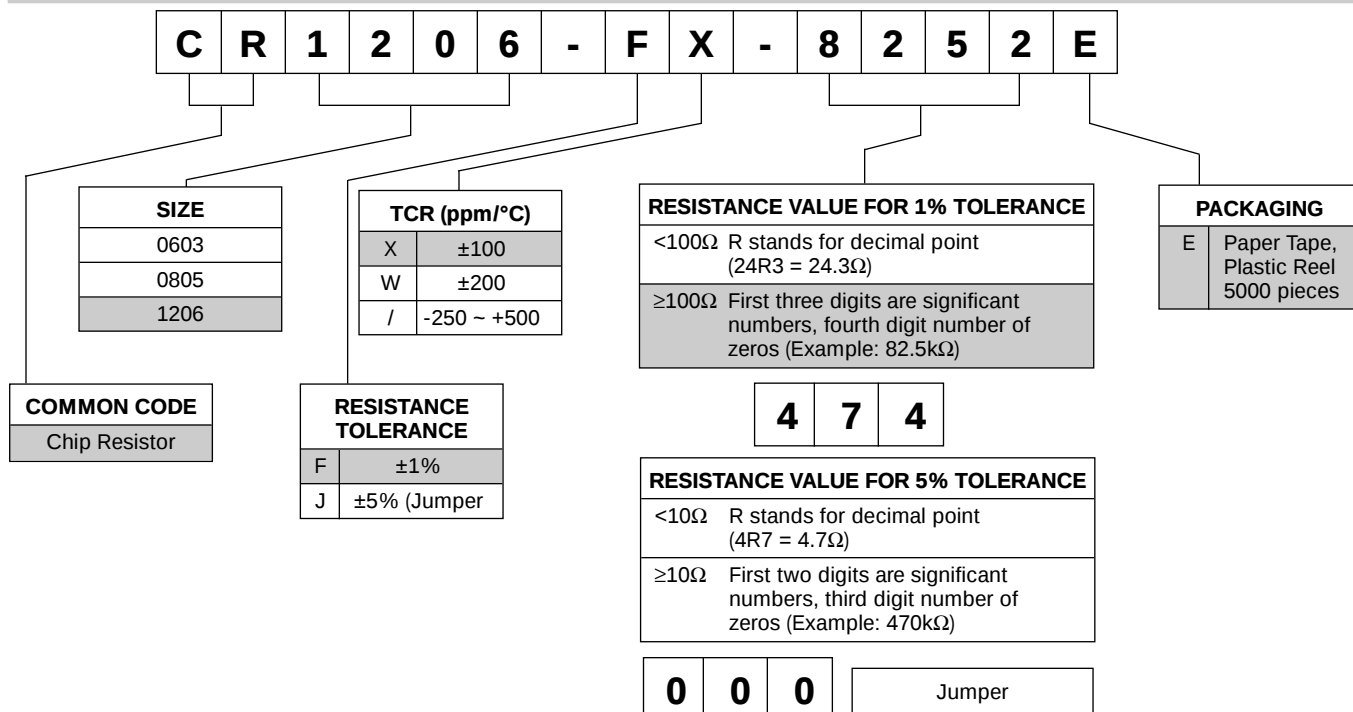
Maximum 1mm (.040) thick
*Cumulative tolerance over 10 holes: ±0.2mm



Series	A	B
CR0603	1.9 ± 0.1 (.075 ± .004)	1.1 ± 0.1 (.043 ± .004)
CR0805	$2.4 \pm 0.2/-0.1$ (.094 ± .008/-0.004)	$1.65 \pm 0.2/-0.1$ (.065 ± .008/-0.004)
CR1206	3.5 ± 0.1 (.138 ± .004)	$1.95 \pm 0.1/-0.05$ (.077 ± .004/-0.002)

Marking on reel: Part number, quantity, resistance value and tolerance, date code.

Part Numbering System and Marking



CR0603/CR0805/CR1206 - Chip Resistors

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Resistor Markings

CR0603
CR0805
CR1206



E-24 marking
Value = 10K Ω

CR0805
CR1206



E-96 marking
Value = 44.2K Ω

CR0603
EIA-96 Marking



1% marking
Value = 12.4K Ω

Marking Explanation

- E-24: 3 digits, first two digits are significant, third digit is number of zeros.
Letter R is decimal point.
 - E-96: 4 digits, first three digits are significant, fourth digit is number of zeros.
Letter R is decimal point.
- 0603 E-96: EIA-96 marking (see table below).

EIA-96 Marking for CR0603, 1%

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

This table shows the first two digits for the three-digit EIA-96 part marking scheme. The third character is a letter multiplier:
S=10⁻² R=10⁻¹ A=10⁰ B=10¹ C=10² D=10³ E=10⁴ F=10⁵

Chip Resistor and Chip Array Lab Kits Available

Part Number	Style	TR tol.	R-range	Values	E-Series
Chip Resistors	Chip Size				
CR1206-JW-LAB1	1206	5%	1 Ω to 10M Ω	146	E 24 10 Ω TO 1M Ω REST E 12
CR0805-JW-LAB2	0805	5%	24 Ω to 1M Ω	121	E 24
CR1206-FX-LAB3	1206	1%	10 Ω to 1M Ω	122	E24
CR1206-FX-LAB4	1206	1%	10 Ω to 1M Ω	242	E 48
CR0805-FX-LAB5	0805	1%	75 Ω to 1M Ω	101	E 24
CR0603-JW-LAB6	0603	5%	3.3 Ω to 1M Ω	128	E 24 10 Ω to 1M Ω Rest E 12
CR0603-FX-LAB7	0603	1%	10 Ω to 1M Ω	122	E 24
Chip Arrays	Resistor Size				
CAT16-J4-LAB1	0603	5%	10 Ω to 1M Ω	62 concave	E 12 4 resistors in a 1206 size
CAY16-J4-LAB2	0603	5%	10 Ω to 1M Ω	62 convex	E 12 4 resistors in a 1206 size

- All Lab Kits have 50 pieces per value
- Jumper is included

Specifications are subject to change without notice.



Features

- Convex and concave terminals
- 4 isolated elements available
- Resistance tolerance 5% and 1%
- E24 series from 10 ohms to 1 megohm

CAT/CAY 16 Series - Chip Resistor Arrays

Specifications

Requirement	Characteristics	Test Method
Short Time Overload	±1%	Rated Voltage X 2.5, 5 seconds
Soldering Heat	±1%	260°C ±5°C, 10 seconds ±1 second
Temperature Cycling (5)	±1%	125°C (30 minutes) - normal (15 minutes) -30°C (30 minutes) - normal (15 minutes)
Moisture Load Life	±2%	1000 hours
Load Life	±2%	1000 hours

Characteristics

Characteristics	CAT16/CAY16
Number of Elements	4
Power Rating	62mW
Resistance Tolerance	5%, 1%
Resistance Range E24	10 ohms - 1 megohm
T.C.R.	±200ppm/°C
Max. Working Voltage	50V
Operating Temp. Range	-55°C - 125°C
Rating Temperature	+70°C

How To Order

Chip Arrays	CA	Y	16	-	103	J	4
Type							
• T = Concave							
• Y = Convex							
Models							
• 16 = 1205 Package Size							
Resistance Code							
• 103 = 10K ohms							
• 1002 = 100K ohms (1% tolerance)							
Resistance Tolerance							
• J = ±5%							
• F = ±1%							
Resistors							
• 4 = 4 pcs.							

Dimensions

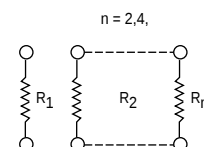
Model	A	A'	B	C	D	E	F
CAT16	0.5±0.15 (.02±.006)	—	3.2±0.2 (.126±.008)	0.8±0.05 (.032±.002)	1.6±0.2 (.063±.008)	0.5±0.1 (.02±.004)	0.3±0.15 (.012±.006)
CAY16	0.5±0.15 (.02±.006)	0.65±0.15 (.026±.006)	3.2±0.2 (.126±.008)	0.8±0.05 (.032±.002)	1.6±0.2 (.063±.008)	0.5±0.1 (.02±.004)	0.3±0.15 (.012±.006)

*5% preferred, 1% available

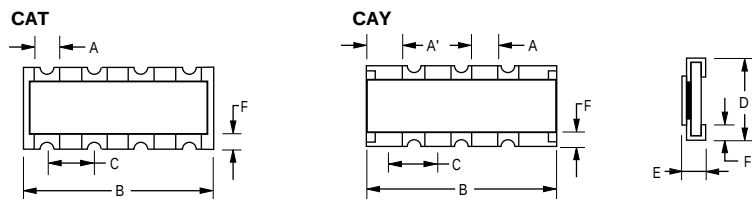
Tape And Reel Packaging

- 5,000 pieces per reel
- 178mm diameter plastic reel
- Paper tape

Schematic



Configuration



DIMENSIONS ARE: $\frac{\text{METRIC}}{\text{(INCHES)}}$



Features

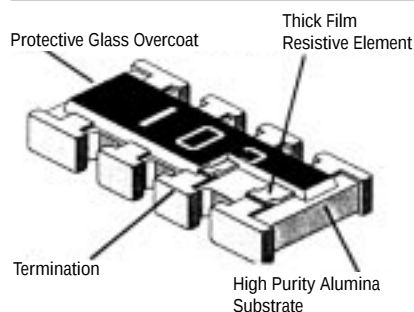
- Improvement of placement efficiency
- 4 insulated resistors in an 0804 size package
- Convex termination style
- E12 series from 10 ohms to 1 megohm
- Resistance tolerance $\pm 5\%$
- Suitable for all types of soldering processes
- Paper tape on plastic reel for automatic placement

Model CAY10 - Chip Resistor Array

Characteristics

Number of Elements4 (insulated)
 Power Rating @ 70°C31 mW
 Operating Temperature Range
-55°C to +125°C
 Derated to 0 Load @+125°C
 Max. Working Voltage25V
 Max. Overload Voltage50V
 Resistance Tolerance $\pm 5\%$
 Resistance Range/E12 Series
10 ohms to 1 megohm
 T.C.R. $\pm 250\text{ppm}/^\circ\text{C}$

Construction

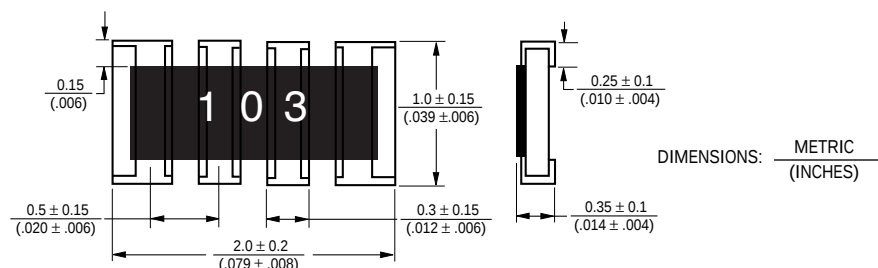


How To Order

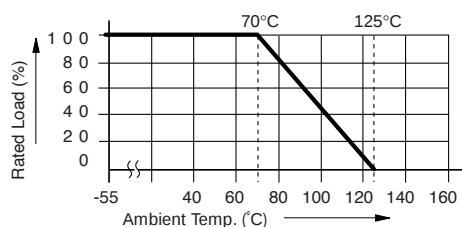
CA Y 10 - 103 J 4

Chip Arrays — CA
 Type — Y
 • Y = Convex
 Model — 10
 • 10 = 0804 Package Size
 Resistance Code — 103
 • 103 = 10K ohms
 Resistance Tolerance — J
 • J = $\pm 5\%$
 Resistors — 4
 • 4 = 4 pcs.

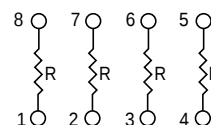
Product Dimensions



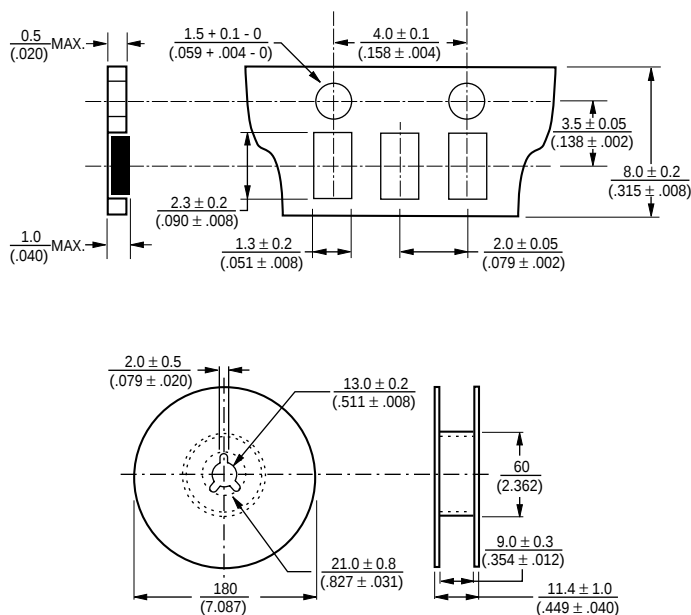
Derating Curve



Isolated Circuit



Packaging Dimensions





Features

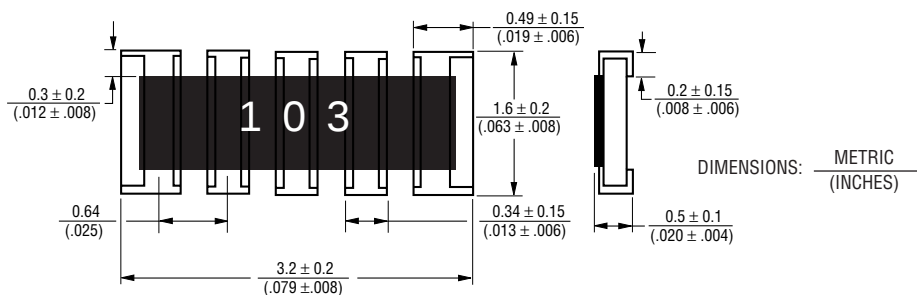
- 10 pin with 8 resistors in bussed type for pull up/down circuit
- 1206 compact size package
- Convex termination style
- Resistance tolerance $\pm 5\%$
- E12 Series from 100 ohms to 100K ohms
- Suitable for all types of soldering processes
- Paper tape on plastic reel for automatic placement

Model CAY17 - Bussed Resistor Array

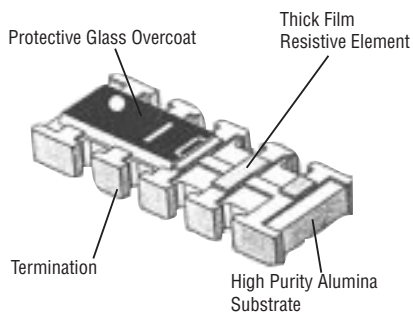
Characteristics

Number of Resistors.....8 (bussed circuit)
 Power Rating @ 70°C31 mW
 Operating Temperature Range
-55°C to +125°C
 Derated to 0 Load @+125°C
 Max. Working Voltage25V
 Max. Overload Voltage.....50V
 Resistance Tolerance $\pm 5\%$
 Resistance Range/E12 Series
100 ohms to 100K ohm
 T.C.R. $\pm 250\text{ppm}/^\circ\text{C}$

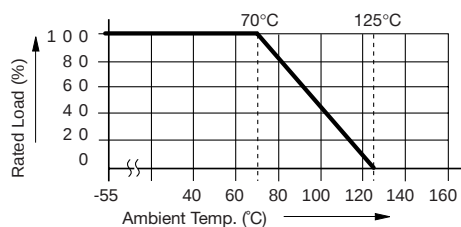
Product Dimensions



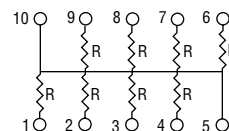
Construction



Derating Curve



Bussed Circuits - Option A

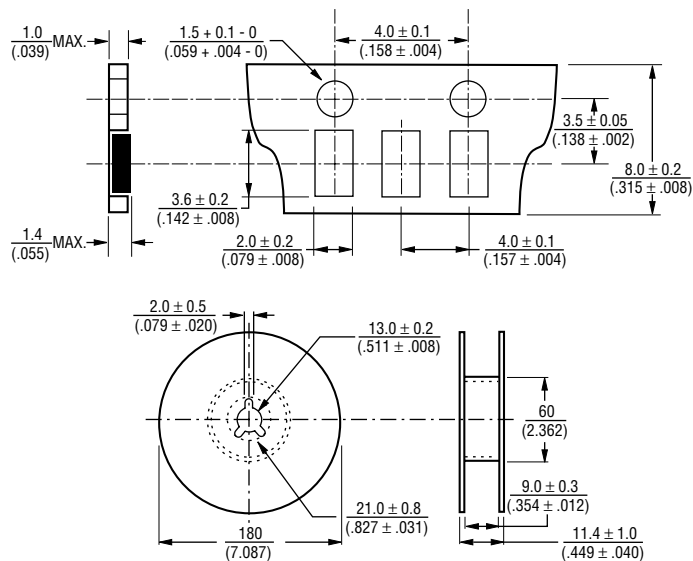


How To Order

CA Y 17 - 103 J A

Chip Arrays _____
 Type _____
 • Y = Convex
 Model _____
 • 17 = 1206 Package Size
 Resistance Code _____
 • 103 = 10K ohms
 Resistance Tolerance _____
 • J = $\pm 5\%$
 Resistors _____
 • A = Common from terminal 5 to 10
 • B = Common from terminal 1 to 6

Packaging Dimensions

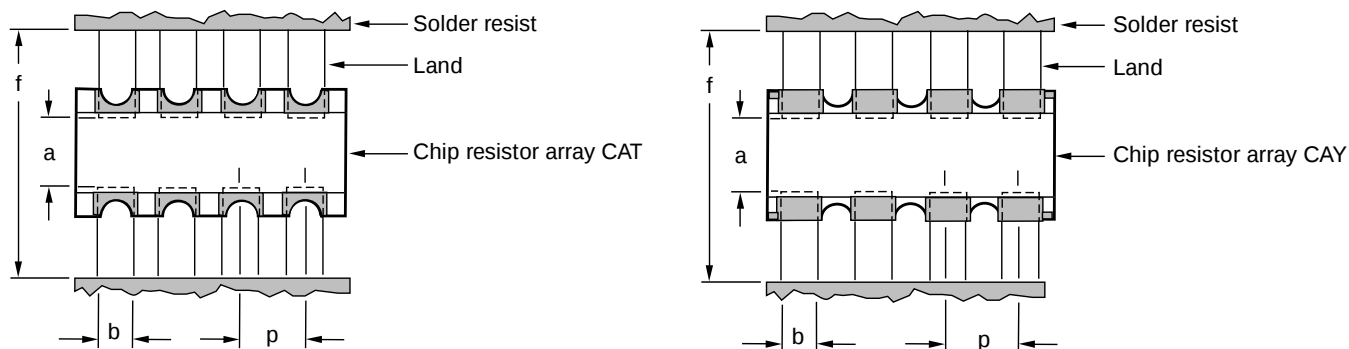


Chip Resistor Arrays - Application Note

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1. Land Pattern Design

Recommended land pattern design for the chip arrays shown in the following illustration.



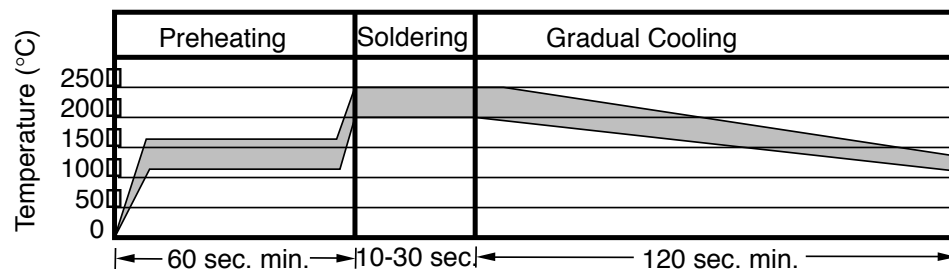
Model	a	b	p	f
CAT16..4	$\frac{0.7 \text{ to } 0.9}{(.028 \text{ to } .035)}$	$\frac{0.4 \text{ to } 0.45}{(.016 \text{ to } .0178)}$	$\frac{0.80}{(.032)}$	$\frac{2.0 \text{ to } 2.2}{(.079 \text{ to } .087)}$
CAY16..4	$\frac{0.7 \text{ to } 0.9}{(.028 \text{ to } .035)}$	$\frac{0.4 \text{ to } 0.45}{(.016 \text{ to } .0178)}$	$\frac{0.80}{(.032)}$	$\frac{2.4 \text{ to } 2.8}{(.094 \text{ to } .11)}$

2. Component Placement

- Reduce the mechanical stress to a minimum during and after placing of the unit in order not to damage the terminals and protective coating.
- Misplacement of components may cause solder bridges.

3. Soldering

- Reflow soldering: Recommendation is shown in the following chart.
- Wave soldering: Recommendation according to IEC standards.
- Hand soldering: Don't touch the protective coating of the part. Solder within 3 seconds when the temperature is over 280°C.

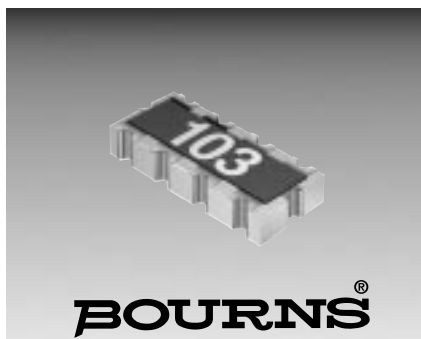


4. Cleaning

A recommended cleaning method is shown in the following table.

Solvents	Cleaning Condition	
	Dipping	Ultrasonic Wave Washing
Isopropyl alcohol	5 minutes maximum	1 minute maximum Power: 20W/L Frequency: 10 to 100kHz

DIMENSIONS ARE: $\frac{\text{METRIC}}{\text{(INCHES)}}$



Features

- Concave terminals
- 8 bit multiple applications
- Smallest bussed chip array
- E 24 Series from 10Ω to 1MΩ

CAT25 - Thick Film Chip Resistor Arrays

Electrical Characteristics

Parameters	CAT25	Test Method
Number of Resistors	8	
Resistance Range E24	10Ω to 1MΩ	
Resistance Tolerance	5%	JIS-C-5202.5.1
Power Rating/Resistor	62.5mW	
Rating Temperature	+70°C.	
T.C.R.	+/-200ppm/°C.	JIS-C-5202.5.2
Maximum Operating Voltage	25V	
Operating Temperature	-55°C to +125°C.	

How To Order

Product **CA T 25 - 103 J A**
 CA=Chip Array
 Pin Style
 T = Concave
 Model
 Resistance Value
 103 = 10KΩ
 Height
 J = 5%
 Electrical Circuit
 A = 8 Resistors, Bussed Type

Environmental Characteristics

Specification	Characteristics	Test Method
Short Time Overload	+/- (3% +0.1Ω)	JIS-C-5202.5.5
Load Life	+/- (5% +0.1Ω)	JIS-C-5202.7.10
Humidity Load Life	+/- (3% +0.1Ω)	JIS-C-5202.7.9
Resistance to Soldering Heat	+/- (1% +0.1Ω)	JIS-C-5202.6.4
Terminal Strength	+/- (1% +0.1Ω)	JIS-C-5202.6.
Temperature Cycle	+/- (2% +0.1Ω)	JIS-C-5202.7.4
Vibration	+/- (1% +0.1Ω)	JIS-C-5202.6.3
Insulation Resistance	1000MΩ minimum	JIS-C-5202.5.6
Dielectric Withstanding Voltage	50VRMS	JIS-C-5202.5.7
Lead Solderability	>95%	JIS-C-5202.6.5

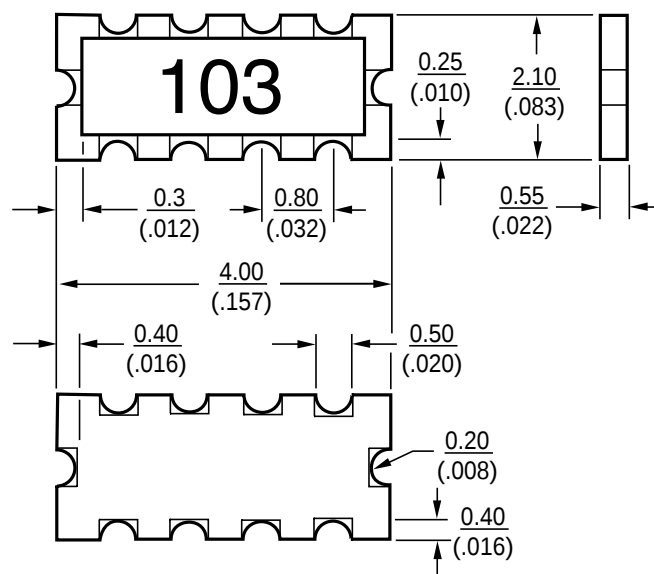
Packaging

12
 (.472) embossed tape
 4,000 pcs per reel

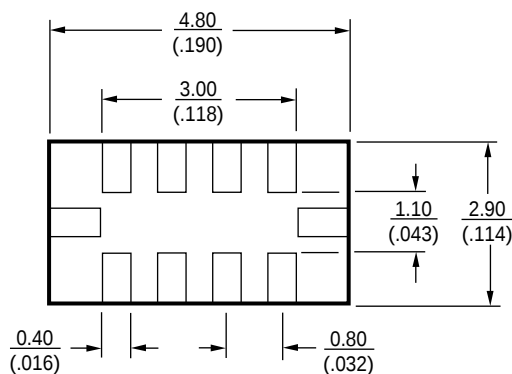
Material

Substrate	Alumina 96
Element	Ruthenium Oxide
Coating	Glass
Terminal	AgPb, Plated Ni+SnPb

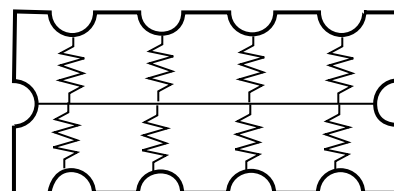
Outline Drawing



Land Pattern



Electrical Circuit



DIMENSIONS ARE: METRIC
 (INCHES)