

Following are a list of the resistor tolerances, manufacturers, weblinks and part series that this datasheet supports. This datasheet does not cover low value current sense resistors.

Standard Precision Resistor Matrix Datasheet

Tolerance	Manufacturer Website	Part Series (Old Series)
0.1% and 0.5%	Panasonic	ERA
0.1% and 0.5%	Susumu Group	RR & RN
0.1% to 1%	Vishay	TNPW
0.5% and 1%	Susumu Group	RR
0.5% and 1% tolerance	KOA Speer	RK73H
0.5% or 1% tolerance	KOA Speer	RK73G (RK73C)
0.5% or 1% tolerance	Panasonic	ERJ
0.5% to 0.1%	CAL Chip (must register)	RN
0.5% to 5%	ROHM	MCR
0.5% to 5%	AAC (TAD)	CR/CJ
1% and 5%	CAL Chip	RM
1% and 5%	Vishay	CRCW
1% and 5%	SEI	RMC
1% to 20%	Vishay	CR
2% and 5%	KOA Speer	RK73B (RM73B)

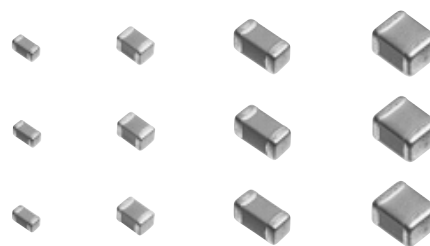
Additional Manufacturer Websites:

NIC Components	Precision Resistive Products
Riedon	Yageo

Please report any broken links to the library team

Multilayer Ceramic Capacitors (High Capacitance)

Series: **ECJ**



■ Features

- Small size and high capacitance
- Low ESR/ESL and excellent high-frequency characteristics
- Ideal alternative to TANTALUM CHIP CAPACITORS and ALUMINUM ELECTROLYTIC CAPACITORS
- RoHS compliant

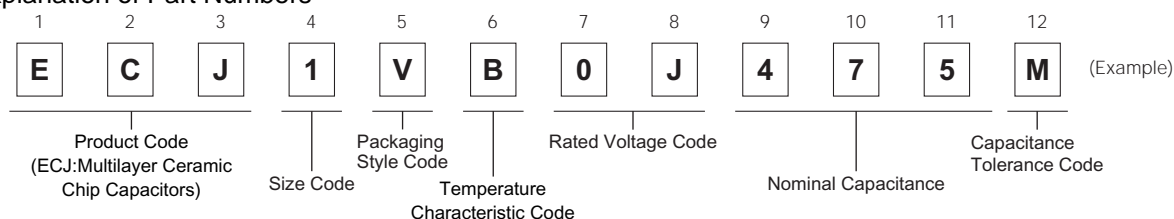
■ Handling Precautions

See Page 49 to 54

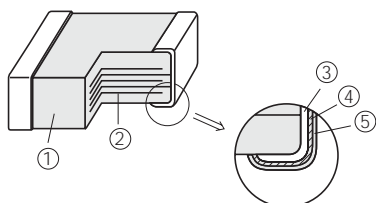
■ Discontinued / Revised Part Numbers, Alternative Part Numbers

See Page 56, 57

■ Explanation of Part Numbers

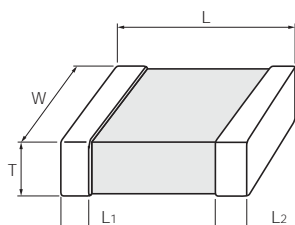


■ Construction



No	Name	
1	Ceramic dielectric	
2	Internal electrode	
3	Terminal electrode	Substrate electrode
4		Intermediate electrode
5		External electrode

■ Dimensions in mm (not to scale)



Size Code	Size (EIA)	L	W	T	L ₁ , L ₂
0	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.2±0.1
1	0603	1.6±0.1	0.8±0.1	0.8±0.1	0.3±0.2
		1.60±0.15	0.80±0.15	0.80±0.15	
2	0805	2.0±0.1	1.25±0.10	0.85±0.10	0.50±0.25
				1.25±0.10	
		2.00±0.15	1.25±0.15	1.25±0.15	
		2.0±0.2	1.25±0.20	1.25±0.20	
G		2.00±0.15	1.25±0.15	0.85±0.10	
3	1206	3.20±0.15	1.60±0.15	0.85±0.10	0.6±0.3
				1.15±0.10	
				1.6±0.2	
		3.2±0.2	1.6±0.2	0.85±0.10	
D				1.15±0.10	
M					
4	1210	3.2±0.3	2.5±0.2	2.0±0.2	0.6±0.3
			2.5±0.3	2.5±0.3	
			2.5±0.2	0.85±0.10	
9					

■ Packaging Styles and Standard Packaging Quantity

Quantity : pcs./reel

Packaging Style Code	Packaging Styles	Size Thickness	0402	0603	0805		1206			1210		
			T=0.5	T=0.8	T=0.85	T=1.25	T=0.85	T=1.15	T=1.6	T=0.85	T=2.0	T=2.5
E	ø180 reel	Paper taping (Pitch : 2 mm)	10,000	—	—	—	—	—	—	—	—	—
V		Paper taping (Pitch : 4 mm)	—	4,000	4,000	—	4,000	—	—	—	—	—
F		Embossed taping (Pitch : 4 mm)	—	—	—	3,000	—	3,000	—	3,000	—	—
Y			—	—	—	—	—	—	2,000	—	2,000	1,000

■ Temperature Characteristics

● Class 2

Temperature Characteristic Code	Temperature Characteristics	Capacitance Change	Measurement Temperature Range	Reference Temperature
B	B	±10 %	−25 to 85 °C	20 °C
	X7R	±15 %	−55 to 125 °C	25 °C
	X5R	±15 %	−55 to 85 °C	25 °C
F	F	+30, −80 %	−25 to 85 °C	20 °C
	Y5V	+22, −82 %	−30 to 85 °C	25 °C

For applicable "Temperature Characteristics", see the lists of standard products on page 6 to 7.

■ Rated Voltage

Code	1H	1E	1C	1A	0J
Rated Voltage	DC 50 V	DC 25 V	DC 16 V	DC 10 V	DC 6.3 V

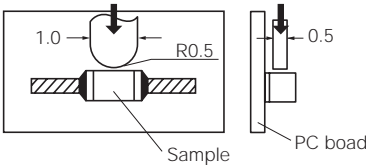
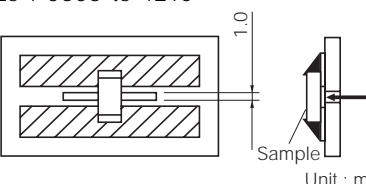
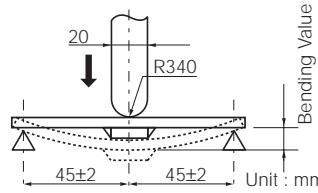
■ Nominal Capacitance

Ex.	105	225	106	226
Nominal Capacitance	1,000,000 pF (1 µF)	2,200,000 pF (2.2 µF)	10,000,000 pF (10 µF)	22,000,000 pF (22 µF)

■ Capacitance Tolerance

Class	Temperature Characteristics	Capacitance Tolerance Code	Capacitance Tolerance
2	B, X7R, X5R	K	±10 %
		M	±20 %
	F, Y5V	Z	+80, −20 %

■ Specification and Test Method

Item	Specification	Test Method																														
Operating Temperature Range	Temp. Char. B, X7R : -55 to 125 °C Temp. Char. B, X5R : -55 to 85 °C Temp. Char. F, Y5V : -30 to 85 °C	_____																														
Dielectric Withstanding Voltage	No dielectric breakdown and/or damage	Test voltage : Rated voltage ×250 % Duration:1 to 5 s. Charge / Discharge current: 50 mA max.																														
Insulation Resistance (I.R.)	500/C (MΩ) min. Note : 100/C(MΩ)min. for DC 10 V max. C : Nominal Cap. in μF	Measuring voltage : Rated voltage Duration : 60±5 s Charge / Discharge current: 50 mA max.																														
Capacitance	within the specified tolerance	Measuring temperature: 20±2 °C																														
Dissipation Factor (tan δ)	0.2 max. Please see the technical specifications for details.	Preconditioning: The capacitors shall be kept in temperature of 150 +0/-10 °C for 1 hour and subject to standard condition* 48±4 hours before initial measurement. <table><tr><td>Nominal capacitance</td><td>C<10 μF</td><td>C>10 μF</td></tr><tr><td>Measuring frequency</td><td>1 kHz±10 %</td><td>120 Hz±20 %</td></tr><tr><td>Measuring voltage</td><td>1.0±0.2 Vrms</td><td>0.5±0.2 Vrms</td></tr></table>	Nominal capacitance	C<10 μF	C>10 μF	Measuring frequency	1 kHz±10 %	120 Hz±20 %	Measuring voltage	1.0±0.2 Vrms	0.5±0.2 Vrms																					
Nominal capacitance	C<10 μF	C>10 μF																														
Measuring frequency	1 kHz±10 %	120 Hz±20 %																														
Measuring voltage	1.0±0.2 Vrms	0.5±0.2 Vrms																														
Temperature Characteristics	Temperature Characteristics B : ±10 % X7R : ±15 % X5R : ±15 % F : +30, -80 % Y5V : +22, -82 %	Maximum capacitance change at stages 1 to 5 <table><tr><td>Temp. Char.</td><td>B, F</td><td>X7R</td><td>X5R</td><td>Y5V</td></tr><tr><td>Stage 1</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr><tr><td>Stage 2</td><td>-25 °C</td><td>-55 °C</td><td>-55 °C</td><td>-30 °C</td></tr><tr><td>Stage 3 (Ref. Temp.)</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr><tr><td>Stage 4</td><td>85 °C</td><td>125 °C</td><td>85 °C</td><td>85 °C</td></tr><tr><td>Stage 5</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr></table> See the technical specifications for details such as measuring voltage.	Temp. Char.	B, F	X7R	X5R	Y5V	Stage 1	20 °C	25 °C	25 °C	25 °C	Stage 2	-25 °C	-55 °C	-55 °C	-30 °C	Stage 3 (Ref. Temp.)	20 °C	25 °C	25 °C	25 °C	Stage 4	85 °C	125 °C	85 °C	85 °C	Stage 5	20 °C	25 °C	25 °C	25 °C
Temp. Char.	B, F	X7R	X5R	Y5V																												
Stage 1	20 °C	25 °C	25 °C	25 °C																												
Stage 2	-25 °C	-55 °C	-55 °C	-30 °C																												
Stage 3 (Ref. Temp.)	20 °C	25 °C	25 °C	25 °C																												
Stage 4	85 °C	125 °C	85 °C	85 °C																												
Stage 5	20 °C	25 °C	25 °C	25 °C																												
Adhesion	Terminal electrodes shall be free from peeling or signs of peeling.	Applied force : 5 N Duration : 10 s Size : 0402  Size : 0603 to 1210  Unit : mm																														
Bending Strength	Appearance: No mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ±12.5 % F, Y5V: within ±30 %	Bending value :1 mm Bending speed : 1 mm/s  Unit : mm																														
Vibration Proof	Appearance : No mechanical damage. Capacitance : Within the specified tolerance tanδ : Initial standard value	Total amplitude : 1.5 mm Vibration frequency : 10 to 55 to 10 Hz for 1 min 3 perpendicular directions for 2 hours each, a total of 6 hours																														

*Standard condition : Temperature 15 to 35 °C, Relative humidity 45 to 75 %

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

Item	Specification	Test Method												
Resistance to Soldering Heat	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±7.5 % F, Y5V : within ±20 % tanδ : Initial standard value IR : Initial standard value Withstand voltage : No dielectric breakdown or damage	Soldering bath method Preconditioning : Heat treatment ^(※1) Solder temperature : 270±5 °C Dipping period : 3.0±0.5 s Preheat condition : <table><tr><td>Order</td><td>Temp. (°C)</td><td>Size 0805 max.</td><td>Size 1206 min.</td></tr><tr><td>1</td><td>80 to 100</td><td>120 to 180s</td><td>300 to 360s</td></tr><tr><td>2</td><td>150 to 200</td><td>120 to 180s</td><td>300 to 360s</td></tr></table> Recovery (Standard condition) : 48±4 h	Order	Temp. (°C)	Size 0805 max.	Size 1206 min.	1	80 to 100	120 to 180s	300 to 360s	2	150 to 200	120 to 180s	300 to 360s
Order	Temp. (°C)	Size 0805 max.	Size 1206 min.											
1	80 to 100	120 to 180s	300 to 360s											
2	150 to 200	120 to 180s	300 to 360s											
Solderability	More than 95 % of the soldered area of both terminal electrodes shall be covered with fresh solder.	Soldering bath method Solder temperature : 230±5 °C Dipping period : 4±1 s Solder : H63A (JIS-Z-3282)												
Temperature Cycle	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±7.5 % F, Y5V : within ±20 % tanδ : Initial standard value IR : Initial standard value Withstand voltage : No dielectric breakdown and/or damage	Preconditioning : Heat treatment ^(※1) Step 1: Minimum operating temp. 30±3 min Step 2: Room temp. 3 min max. Step 3: Maximum operating temp. 30±3 min Step 4: Room temp. 3 min max. Number of cycles : 5 cycles Recovery(Standard condition) : 48±4 h												
Damp Heat (steady state)	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 50/C (MΩ) min. Note : 10/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in μF Please see the technical specifications for details.	Preconditioning : Heat treatment ^(※1) Temperature : 40±2 °C Relative humidity : 90 to 95 % Test period : 500+24/0 h Recovery(Standard condition) : 48±4 h												
Damp Heat Load	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 25/C (MΩ) min. Note : 5/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in μF Please see the technical specifications for details.	Preconditioning : Voltage treatment ^(※2) Temperature : 40±2 °C Relative humidity : 90 to 95 % Applied voltage : Rated voltage Charge/discharge current : 50 mA max. Test period : 500+24/0 h Recovery(Standard condition) : 48±4 h												
High Temperature Load	Appearance : no mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 50/C (MΩ) min. Note : 10/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in μF Please see the technical specifications for details.	Preconditioning : Voltage treatment ^(※2) Temperature : Maximum operation temp. ±3 °C Applied voltage : (1)Rated voltage×200 % (2)Rated voltage×150 % (3)Rated voltage×100 % Please see the technical specifications for details. Charge/discharge current : 50 mA max. Test period : 1000+48/0 h Recovery (Standard condition) : 48±4 h												

(※1) Heat treatment : 1 h of heat treatment at $150 \pm 0/-10$ °C followed by 48 ± 4 h recovery under the standard condition.

(※2) Voltage treatment : 1 h of voltage treatment under the specified temperature and voltage for testing followed by 48 ± 4 h of recovery under the standard condition.

■ Standard Products for EIA Size "0402", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : X5R)

Rated Voltage		DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 % (K)	ECJ0EB1A105M	0.5	○	ECJ0EB0J105□	0.5	○
2.2	or ±20 % (M)				ECJ0EB0J225M	0.5	○

□ : Capacitance tolerance code.

Standard packaging quantity of Packaging Style Code "E" (T = 0.5 mm) : 10,000 pcs./reel.

Recommend soldering method : Reflow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F Y5V
1	+80, -20 % (Z)	ECJ0EF0J105Z	0.5	○ ○

Standard packaging quantity of Packaging Style Code "E" (T = 0.5 mm) : 10,000 pcs./reel.

Recommend soldering method : Reflow soldering.

■ Standard Products for EIA Size "0603", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : X5R)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 % (K)	ECJ1VB1E105□	0.8	○	ECJ1VB1C105□	0.8	○	ECJ1VB1A105□	0.8	○	ECJ1VB0J105□	0.8	○
2.2	or							ECJ1VB1A225□	0.8	○	ECJ1VB0J225□	0.8	○
4.7	±20 % (M)										ECJ1VB0J475□	0.8	○
10											ECJ1VB0J106M	0.8*	○

□ : Capacitance tolerance code.

Dimensional tolerance of L, W, T : ±0.1 mm for no mark, ±0.15 mm for "*" mark.

Standard packaging quantity of Packaging Style Code "V" (T = 0.8 mm) : 4,000 pcs./reel.

Recommend soldering method : Reflow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F Y5V	Part No.	Dim. T (mm)	Temp. Char. F Y5V
1	+80,	ECJ1VF1E105Z	0.8	○	ECJ1VF1C105Z	0.8	○	ECJ1VF1A105Z	0.8	○ ○			
2.2	-20 % (Z)							ECJ1VF1A225Z	0.8	○ ○	ECJ1VF0J225Z	0.8	○ ○

Standard packaging quantity of Packaging Style Code "V" (T = 0.8 mm) : 4,000 pcs./reel.

Recommend soldering method : Reflow soldering.

■ Standard Products for EIA Size "0805", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : B, X5R)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. B X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 % (K)	ECJ2FB1E105□	1.25*	○	ECJ2FB1C105□	1.25*	○	ECJ2FB1A105□	1.25	○ ○			
2.2	or	ECJ2FB1E225□	1.25*	○	ECJ2FB1C225□	1.25*	○	ECJ2FB1A225□	1.25*	— ○	ECJ2FB0J225□	1.25	○
4.7	±20 % (M)	ECJ2FB1E475□	1.25*	○	ECJ2FB1C475□	1.25*	○	ECJ2FB1A475□	1.25*	— ○	ECJ2FB0J475□	1.25*	○
10								ECJ2FB1A106□	1.25**	— ○	ECJ2FB0J106□	1.25**	○
22											ECJ2FB0J226M	1.25**	○

□ : Capacitance tolerance code.

Dimensional tolerance of L, W, T : L, W : ±0.1 mm / T : ±0.1 mm for no mark, ±0.15 mm for "*" mark, ±0.2 mm for "**" mark.

Standard packaging quantity of Packaging Style Code "F" (T = 1.25 mm) : 3,000 pcs./reel.

Avoid flow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 50 V			DC 25 V			DC 16 V			DC 10 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F Y5V	Part No.	Dim. T (mm)	Temp. Char. F Y5V
1	+80,	ECJ2FF1H105Z	1.25*	○	ECJ2FF1E105Z	1.25*	○	ECJ2VF1C105Z	0.85	○ ○			
2.2	or				ECJ2FF1E225Z	1.25*	○	ECJGVF1C225Z	0.85	○ ○			
4.7	±20 % (Z)							ECJGVF1C475Z	0.85	○ ○	ECJGVF1A475Z	0.85	○ ○
10											ECJ2FF1A106Z	1.25*	○ ○

Dimensional tolerance of L, W, T : L, W : ±0.15 mm / T : ±0.1 mm for no mark, ±0.15 mm for "*" mark.

Standard packaging quantity of Packaging Style Code "V" (T = 0.85 mm) : 4,000 pcs./reel, "F" (T = 1.25 mm) : 3,000 pcs./reel.

Soldering method of dimension T > 1 mm : Avoid flow soldering.

■ Standard Products for EIA Size “1206”, Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : B, X7R, X5R)

Rated Voltage		DC 25 V				DC 16 V				DC 10 V				DC 6.3 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.	
				B	X7R/X5R			B	X7R/X5R			B	X5R			X5R	
1	±10 % (K) or ±20 % (M)	ECJ3YB1E105□	1.6	○	○	ECJ3FB1C105□	1.15*	○	○								
2.2		ECJ3YB1E225□	1.6	—	—	ECJ3YB1C225□	1.6	○	○	ECJ3YB1A225□	1.6	○	○				
4.7		ECJ3YB1E475□	1.6	—	—	ECJ3YB1C475□	1.6	—	—	ECJ3YB1A475□	1.6	—	○	ECJ3YB0J475□	1.6	○	
10		ECJ3YB1E106□	1.6	—	—	ECJ3YB1C106□	1.6	—	—	ECJ3YB1A106□	1.6	—	○	ECJDV50J106M	0.85**	○	
22														ECJDV50J226M	0.85**	○	

□ : Capacitance tolerance code.

Dimensional tolerance of L, W, T: ±0.2 mm for no mark, L, W: ±0.15 mm / T: ±0.1 mm for “*” mark, L, W: ±0.2 mm / T: ±0.1 mm for “**” mark.

Standard packaging quantity of Packaging Style Code “V” (T = 0.85 mm) : 4,000 pcs./reel, “F” (T = 1.15 mm) : 3,000 pcs./reel, “Y” (T = 1.6 mm) :

2,000 pcs./reel

Avoid flow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 50 V				DC 25 V				DC 16 V				DC 10 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.	
				F				F	Y5V			F	Y5V			F	Y5V
1	+80, -20 % (Z)	ECJ3FF1H105Z	1.15*	○		ECJ3FF1E105Z	1.15*	○	○	ECJ3VF1C105Z	0.85*	○	○				
2.2						ECJ3FF1E225Z	1.15*	○	○	ECJ3VF1C225Z	0.85*	○	○				
4.7						ECJ3FF1E475Z	1.15*	○	—	ECJ3FF1C475Z	1.15*	○	○				
10						ECJ3YF1E106Z	1.60	○	—	ECJMFF1C106Z	1.15**	○	○	ECJMFF1A106Z	1.15**	○	○
22														ECJMFF1A226Z	1.15**	○	○

Dimensional tolerance of L, W, T: ±0.2 mm for no mark, L, W: ±0.15 mm / T: ±0.1 mm for “*” mark, L, W: ±0.2 mm / T: ±0.1 mm for “**”.

Standard packaging quantity of Packaging Style Code “V” (T = 0.85 mm) : 4,000 pcs./reel, “F” (T = 1.15 mm) : 3,000 pcs./reel, “Y” (T = 1.6 mm) :

2,000 pcs./reel

Soldering method of dimension T > 1 mm: Avoid flow soldering.

■ Standard Products for EIA Size “1210”, Taped Version

● Class 2 Capacitors

◆ Temperature Characteristic Code : B (Temperature Characteristics : X5R)

Rated Voltage		DC 50 V				DC 25 V				DC 16 V				DC 10 V				DC 6.3 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.	
				X5R				X5R				X5R				X5R				X5R	
1	±10 % (K) or ±20 % (M)	ECJ4YB1H105□	2.0	○																	
2.2						ECJ4YB1E225□	2.0*	○													
4.7						ECJ4YB1E475□	2.0*	○		ECJ4YB1C475□	2.0*	○									
10						ECJ4YB1E106M	2.5	○		ECJ4YB1C106M	2.0*	○		ECJ4YB1A106□	2.0*	○					
22						ECJ4YB1E226M	2.5	○		ECJ4YB1C226M	2.5	○		ECJ4YB1A226M	2.5	○		ECJ4YB0J226M	2.5	○	

□ : Capacitance tolerance code.

Dimensional tolerance of L, W, T: ±0.3 mm for no mark, L: ±0.3 mm / W, T: ±0.2 mm for “*” mark.

Standard packaging quantity of Packaging Style Code “V” (T = 2.0 mm) : 2,000 pcs./reel, “Y” (T = 2.5 mm) : 1,000 pcs./reel

Avoid flow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 50 V				DC 25 V				DC 16 V				DC 10 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.	
				F				F	Y5V			F				F	Y5V
4.7	+80, -20 % (Z)	ECJ4YF1H475Z	2.0*	○		ECJ4YF1E475Z	2.0*	○	○								
10		ECJ4YF1H106Z	2.0*	○		ECJ4YF1E106Z	2.0*	○	○	ECJ4YF1C106Z	2.0*	○					
22						ECJ4YF1E226Z	2.0*	○	○	ECJ4YF1C226Z	2.0*	○		ECJ9FF1A226Z	0.85**	○	○

Dimensional tolerance of L, W, T: L: ±0.3 mm / W, T: ±0.2 mm for no mark, L, W: ±0.3 mm / T: ±0.1 mm for “**” mark.

Standard packaging quantity of Packaging Style Code “F” (T = 0.85 mm) : 3,000 pcs./reel, “Y” (T = 2.0 mm) : 2,000 pcs./reel.

Avoid flow soldering.

Metal Film Chip Resistors, Rectangular Type 0603, 0805, (1206, 1210, 2512)

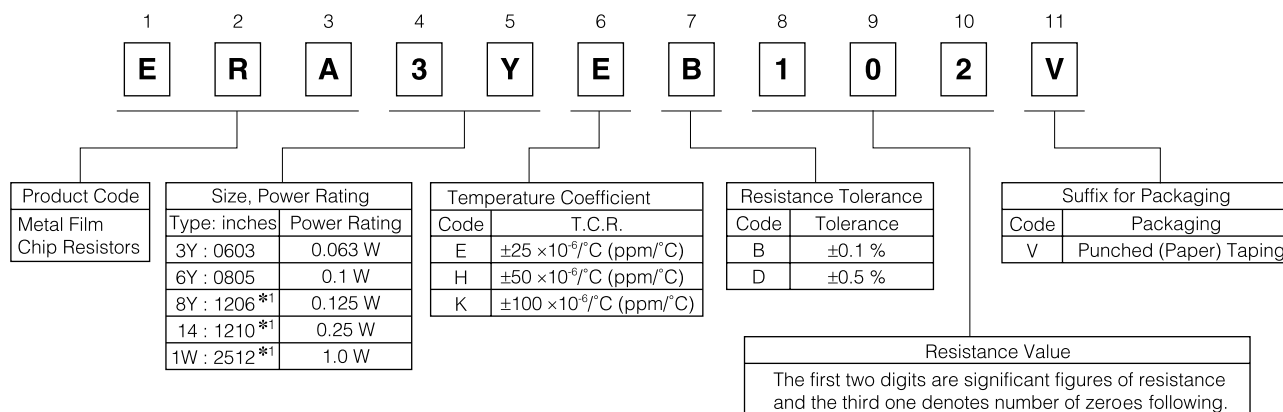
Type: **ERA 3Y, 6Y (8Y, 14, 1W)**



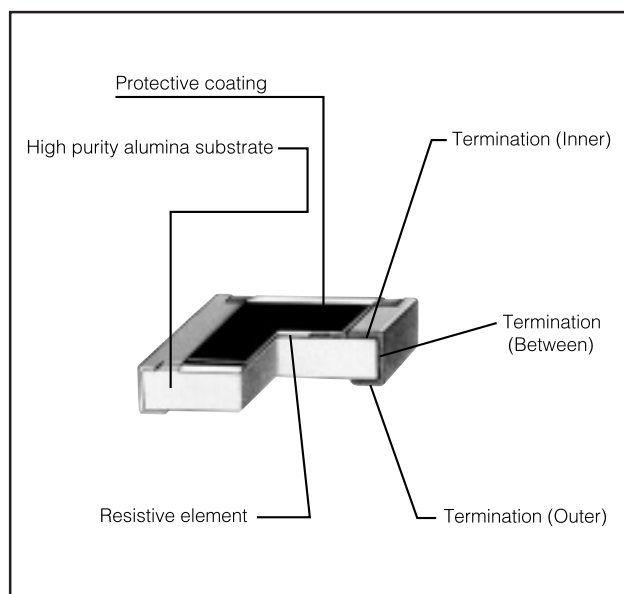
■ Features

- Small size and lightweight
PWB size reduction and lightweight products
- High reliability
Low T.C.R. & current noise, excellent non-linearity.
- Suitable for both reflow soldering and flow soldering
- Approved under the ISO 9001 system
- Reference Standards
IEC 60115-8, JIS C 5201-8, EIAJ RC-2133A

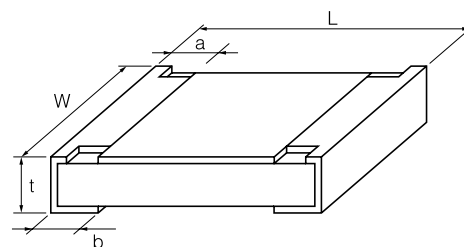
■ Explanation of Part Numbers



■ Construction



■ Dimensions in mm (not to scale)



Type (inches)	Dimensions (mm)					Net Weight (1000 pcs.)
	L	W	a	b	t	
ERA3Y (0603)	1.60 \pm 0.20	0.80 \pm 0.20	0.30 \pm 0.20	0.30 \pm 0.20	0.45 \pm 0.10	2 g
ERA6Y (0805)	2.00 \pm 0.20	1.25 \pm 0.10	0.40 \pm 0.25	0.40 \pm 0.25	0.50 \pm 0.10	4 g
ERA8Y *1 (1206)	3.20 \pm 0.20	1.60 \pm 0.20	0.50 \pm 0.20	0.50 \pm 0.20	0.60 \pm 0.10	10 g
ERA14 *1 (1210)	3.20 \pm 0.20	2.50 \pm 0.20	0.50 \pm 0.20	0.50 \pm 0.20	0.60 \pm 0.10	16 g
ERA1W *1 (2512)	6.40 \pm 0.20	3.20 \pm 0.20	0.65 \pm 0.20	1.30 \pm 0.20	0.60 \pm 0.10	45 g

*1 : 8Y, 14, 1W Type are custom product. Please ask us to confirm your requirements.

Rev.02/04

■ Ratings

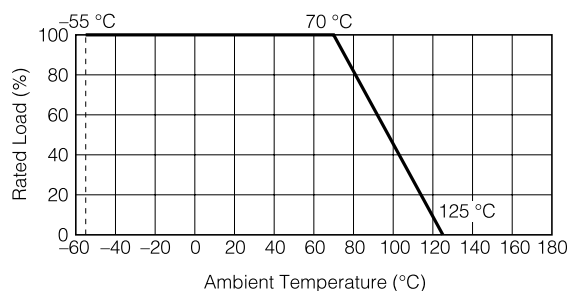
Type (inches)	Power Rating at 70 °C (W)	Limiting Element Voltage (Maximum RCWV) ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Resistance Tolerance (%)	Resistance Range (Ω)		T.C.R. ×10 ⁻⁶ /°C (ppm/°C)	Standard Resistance Values
					min.	max.		
ERA3Y (0603)	0.063	75	150	±0.5	10	91	±50	E24
					100	33 K	±25	
					36 K	330 K	±100	
				±0.1	100	33 K	±25	
ERA6Y (0805)	0.1	100	200	±0.5	10	91	±50	E24
					100	100 K	±25	
					110 K	1 M	±100	
				±0.1	100	100 K	±25	

(1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$, or Limiting Element Voltage (max. RCWV) listed above, whichever is less.

(2) Overload (Short-time Overload) Test Voltage (SOTV) shall be determined from $SOTV = 2.5 \times \text{Power Rating}$ or max. Overload Voltage listed above whichever is less.

Power Derating Curve

For resistors operating in ambient temperature above 70 °C, power rating must be derated in accordance with the curve right.

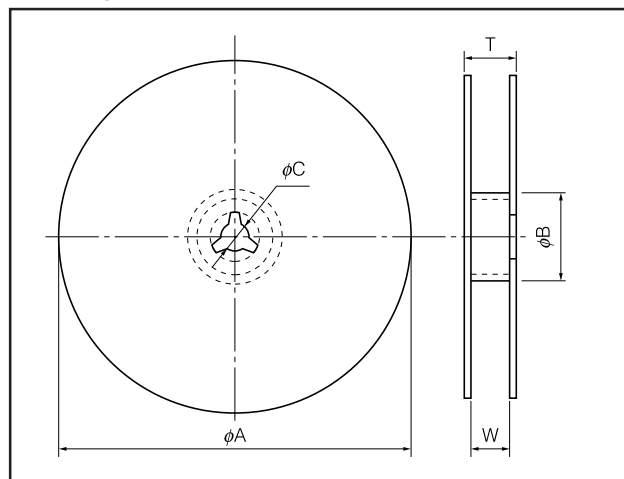


■ Packaging Specifications

● Standard Quantity

Type (inches)	Thickness (mm)	Punched (Paper) Taping
ERA3Y (0603)	0.45	5000 pcs./reel
ERA6Y (0805)	0.5	5000 pcs./reel

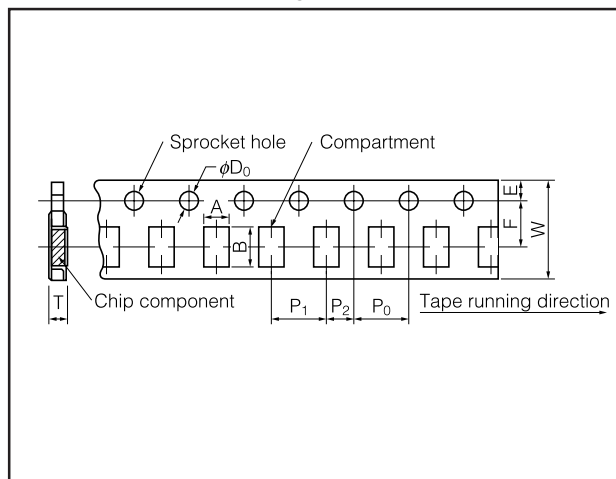
● Taping Reel



Dimensions (mm)	Type	φA	φB	φC
	3Y	180.0 ^{+0.0} _{-3.0}	60 min.	13.0±1.0
	6Y			

Dimensions (mm)	Type	W	T
	3Y	9.0±1.0	11.4±2.0
	6Y		

● Punched (Paper) Taping



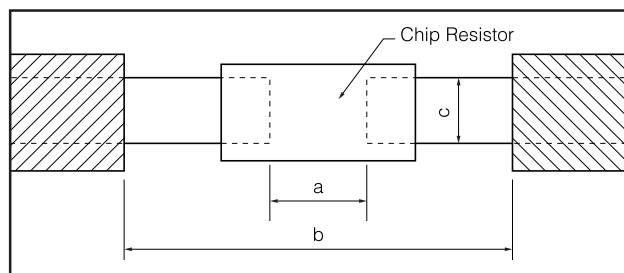
Dimensions (mm)	Type	A	B	W	F	E
	3Y	1.10±0.10	1.90±0.10	8.00±0.20	3.50±0.05	1.75±0.10
	6Y	1.65±0.15	2.50±0.20			

Dimensions (mm)	Type	P1	P2	P0	φD0	T
	3Y	4.00±0.10	2.00±0.05	4.00±0.10	1.50 ^{+0.10} ₀	0.70±0.05
	6Y					0.84±0.05

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use. Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

■ Recommended Land Pattern

In case of flow soldering, the land width must be smaller than the Chip Resistor width to properly control the solder amount. Generally, the land width should be 0.7 to 0.8 times (W) of the width of chip resistor. In case of reflow soldering, solder amount can be adjusted, therefore the land width should be set to 1.0 to 1.3 times chip resistor width (W).



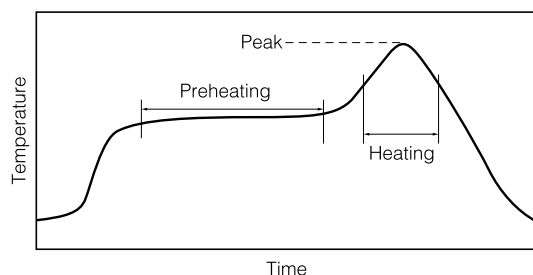
Type (inches)	Dimensions (mm)		
	a	b	c
ERA3Y (0603)	0.7 to 0.9	2 to 2.2	0.8 to 1
ERA6Y (0805)	1 to 1.4	3.2 to 3.8	0.9 to 1.4

■ Recommended Soldering Conditions

Recommendations and precautions are described below.

● Recommended soldering conditions for reflow

- Reflow soldering should be a maximum of two times
- Please contact us for additional information when used in conditions other than those specified.
- Please measure the temperature of the terminations and study every kind of printed circuit board for solderability, before actual use.



For soldering (Example: Sn/Pb)

	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s
Main heating	Above 200 °C	30 s to 40 s
Peak	235 ± 5 °C	max. 10 s

For lead-free soldering (Example: Sn/Ag/Cu)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 230 °C	30 s to 40 s
Peak	max. 260 °C	max. 10 s

● Recommended soldering conditions for flow

	For soldering		For lead-free soldering	
	Temperature	Time	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s	150 °C to 180 °C	60 s to 120 s
Soldering	245±5 °C	20 s to 30 s	max. 260 °C	max. 10 s

⚠ Safety Precautions

1. Rated Power and Ambient Temperature

Keep the rated power and ambient temperature within the specified derating curve.

- * Mount resistors and other heating components on board, taking the cumulative temperature rise of all components into consideration.

2. External Shock

Mechanical shock during automatic mounting or handling of board after chip being mounted may result in breakage, or separation of protective coating of resistors that may impair initial characteristics.

Avoid nipping of resistor with hard tool (pliers or tweezers) as it may damage protective coating or electrode of resistor and may affect resistor's performance.

3. Application of Pulse

When pulse is applied to a resistor, the peak value of the pulse should be within rated value.

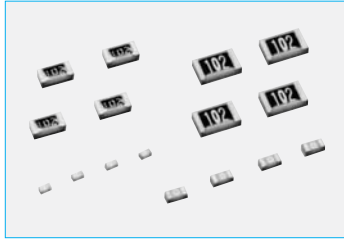
4. The resistor is non-combustible nor flame-retardant.

5. When using soldering iron, never let the tip of the soldering iron touch the body of the chip resistor.

When using a soldering iron with a tip at high temperature, solder for as short a time as possible (no more three seconds and up to 350°C).

6. Avoid immersion of chip resistor in solvent for a long time. Verify that the solvent will not deteriorate the product and/or impair its performance.

7. Keep the product away from moisture and condensation.



RR series, high-precision metal film chip resistors



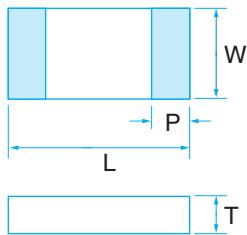
Thin Film Technology has achieved high performance chip resistors with low price and reliable supply. The parts offer excellent performance and tolerance in TCR, current noise, linearity, for high frequency circuit applications. Precise dimensions minimize errors during mounting. Tight tolerance allow for cost saving due to circuit simplification and elimination of trim pots for adjustment.

RoHS compliant

Completely lead free

SPECIFICATIONS

Mechanical



Dimension (Inch Size)	RR0306 (0201)	RR0510 (0402)	RR0816 (0603)	RR1220 RN73 (0805)	RR1632 (1206)	RR2632 (1210)
L	0.60±0.05	1.00±0.05	1.60±0.20	2.00±0.20	3.20±0.20	3.20±0.20
W	0.30±0.05	0.50±0.05	0.80±0.20	1.25±0.20	1.60±0.20	2.60±0.20
P	0.12±0.05	0.20±0.10	0.30±0.20	0.40±0.20	0.50±0.20	0.50±0.20
T	0.23±0.03	0.35±0.05	0.40±0.10	0.40±0.10	0.40±0.10	0.40±0.10

(unit : mm)

Electrical

Type	RR0306		RR0510		RR0816		RR1220		RN73		RR1632					RR2632				
Power	1/20W		1/16W		1/16W		1/10W		1/10W		1/8W					1/4W				
Tolerance %(code)	±1.0% (F)	±0.5% (D)	±0.5% (D)		±0.5% (D)		±0.5% (D)		±0.1% (B)		±0.5% (D)		±0.1% (B)			±0.5% (D)		±0.1% (B)		
Resistance Range (Ω)	10~30	33~22k	10~97.6	100~100k	10~97.6	100~360k	10~97.6	100~1M	511~100k	100~100k	10~49.9	51~1M	100~200k	100~200k	51~1M	10~49.9	51~2M	100~330k	100~330k	51~2M
TCR ppm /°C(code)	±100 (R)	±25 (P)	±100 (R)	±25 (P)	±50 (Q)	±25 (P)	±50 (Q)	±25 (P)	±5 (V)	±10 (N)	±50 (Q)	±25 (P)	±5 (V)	±10 (N)	±25 (P)	±50 (Q)	±25 (P)	±5 (V)	±10 (N)	±25 (P)
Resistance Value	E-24		E-24/E-96		E-24/E-96		E-24/E-96		E-24/E-96		E-24/E-96		E-24/E-96			E-24/E-96		E-24/E-96		
Max Operating Voltage	15V		25V		75V		100V		100V		150V		150V			200V		200V		
Package	5,000 pcs/reel		10,000 pcs/reel		5,000 pcs/reel		5,000 pcs/reel		1,000(T1)· 5,000(T5)pcs/reel		1,000(T1)· 5,000(T5)/reel		1,000(T1)· 5,000(T5)pcs/reel			1,000(T1)· 5,000(T5)/reel		1,000(T1)· 5,000(T5)pcs/reel		

· Contact us also for RL0816-JMP jumper resistor whose dimensions are the same as those of RR0816.

PART NUMBER

RR 0816 P - 102 - D - (M) - (T5) - (*)**

— To be added as for E-96 series value of RR0816 as 3 letters code

Taping quantity unit

RR1632,RR2632:"T1" to be added for 1000pcs/reel

"T5" to be added for 5000pcs/reel

RR0306,RR0510,RR0816,RR1220: No marking

"M" to be added as for E-96 series value of RR1220

Resistance Tolerance

Resistance value

RR0306,RR0510,RR0816,RR1220:3 digits for E-24 series

RR0306,RR0510,RR0816,RR1220:4 digits for E-96 series

RR1632,RR2632:4 digits for all values

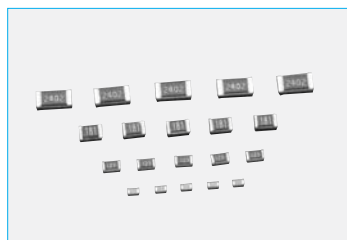
Power Rating

Temperature Coefficient of Resistance

Dimensions

Part Code

RN73 N 2X 1001 B (-T1)



RG series, ultra-precision & ultra-reliability metal film chip resistors



Tight resistance tolerance of $\pm 0.02\%$ and temperature coefficient of resistance of $\pm 5\text{ppm}/^\circ\text{C}$ are achieved. Under high temperature and humid condition of 85°C and $85\%\text{RH}$, and at 155°C (duration:10000 hours for both tests), superior reliability of only less than $\pm 0.1\%$ of change in resistance value is realized.

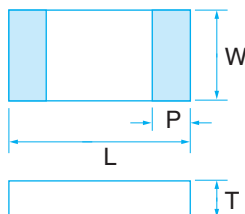
RoHS compliant

Completely lead free



SPECIFICATIONS

Mechanical



Dimension (Inch Size)	RG1005 (0402)	RG1608 (0603)	RG2012 (0805)	RG3216 (1206)
L	1.0 ± 0.05	1.6 ± 0.2	2.0 ± 0.2	3.2 ± 0.2
W	0.5 ± 0.05	0.8 ± 0.2	1.25 ± 0.2	1.6 ± 0.2
P	0.2 ± 0.10	0.3 ± 0.2	0.4 ± 0.2	0.5 ± 0.25
T	0.35 ± 0.05	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1

(unit : mm)

Electrical

Type		RG1005				RG1608					
Power	general	1/16W				1/10W					
	Ultra-reliability	1/32W				1/16W					
Tolerance %(code)		±0.5(D)	±0.05(W),±0.1(B) ±0.25(C),±0.5(D)	±0.02(P),±0.05(W), ±0.1(B), ±0.25(C),±0.5(D)	±0.05(W),±0.1(B), ±0.25(C),±0.5(D)	±0.5(D)	±0.05(W),±0.1(B) ±0.25(C),±0.5(D)	±0.02(P),±0.05(W), ±0.1(B), ±0.25(C),±0.5(D)	±0.05(W),±0.1(B), ±0.25(C),±0.5(D)	±0.1(B) ±0.5(D)	±0.5(D)
Resistance Range(Ω)		10~46.4	47~97.6	100~2.94k	3k~100k	10~46.4	47~97.6	100~4.99k	5.1k~270k	274~332k	340~360k
TCR ppm /°C(code)		±100 (R)	±10 (N) ±25 (P)	±5 (V) ±10 (N) ±25 (P)	±10 (N) ±25 (P)	±50 (Q)	±10 (N) ±25 (P)	±5 (V) ±10 (N) ±25 (P)	±10 (N) ±25 (P)	±25 (P)	±25 (P)
Max Operating Voltage		25V				75V					
Resistance Value		E-24, E-96									
Operating Temp. Range		-55°C~155°C									
Package		1,000pcs/reel (T1:P,W,B), 5,000pcs/reel (T5:B), 10,000pcs/reel (T10:C,D)				1,000pcs/reel (T1:P,W,B), 5,000pcs/reel(T5:W,B,C,D)					

Type		RG2012					RG3216		
Power	general	1/8W					1/4W		
	Ultra-reliability	1/10W					1/8W		
Tolerance %(code)		±0.5(D)	±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)	±0.02(P), ±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)	±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)	±0.1(B) ±0.5(D)	±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)	±0.02(P), ±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)	±0.05(W), ±0.1(B), ±0.25(C), ±0.5(D)
Resistance Range(Ω)		10~46.4	47~97.6	100~10k	10.2k~475k	487k~1M	47~97.6	100~33.2k	34k~1M
TCR ppm /°C(code)		±50 (Q)	±10 (N) ±25 (P)	±5 (V) ±10 (N) ±25 (P)	±10 (N) ±25 (P)	±25 (P)	±10 (N) ±25 (P)	±5 (V) ±10 (N) ±25 (P)	±10 (N) ±25 (P)
Max Operating Voltage		100V					150V		
Resistance Value		E-24, E-96							
Operating Temp. Range		-55°C~155°C							
Package		1,000pcs/reel (T1:P,W,B), 5,000pcs/reel(T5:W,B,C,D)					1,000pcs/reel (T1:P,W,B), 5,000pcs/reel(T5:B,C,D)		

· Please contact us for Resistance tolerance $\pm 0.01\%$. · Please contact us for RG3225 series with power of 1/2W

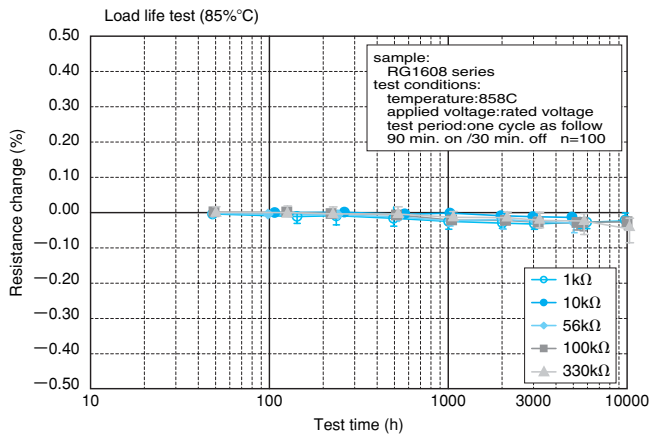
Reliability

Item	Test Method	Specification		Typical
		Ultra-reliability	general	Ultra-reliability
Short time overload	Applied voltage: $2.5 \times$ rated voltage or $2 \times$ maximum operating voltage which ever is less test duration: 5 seconds	$\pm (0.05\% + 0.01\Omega)$	$\pm (0.05\% + 0.01\Omega)$	$\pm (0.01\% + 0.01\Omega)$
Load Life	Test Temperature: 85°C Applied voltage: rated voltage Test period: repeat 1000 cycle as follow: 90 min. on/30 min. off cycled	$\pm (0.1\% + 0.01\Omega)$	$\pm (0.25\% + 0.05\Omega)$	$\pm (0.01\% + 0.01\Omega)$
Moisture load life	Test condition: $85^\circ\text{C}85\%\text{RH}$ Applied power: 1/10 rated Power Test period: repeat 1000 cycle as follow: 90 min. on/30 min. off cycled	$\pm (0.1\% + 0.01\Omega)$	$\pm (0.25\% + 0.05\Omega)$	$\pm (0.05\% + 0.01\Omega)$
Temperature cycle	Repeat 1000 cycle as follow: -55°C (30 min.)/Room Tem.(2 min.)/ $+125^\circ\text{C}$ (30 min.)/Room Tem.(2 min.)	$\pm (0.1\% + 0.01\Omega)$		$\pm (0.01\% + 0.01\Omega)$
High temperature exposure	$+155^\circ\text{C}$ for 1000 hours with no load	$\pm (0.1\% + 0.01\Omega)$		$\pm (0.01\% + 0.01\Omega)$

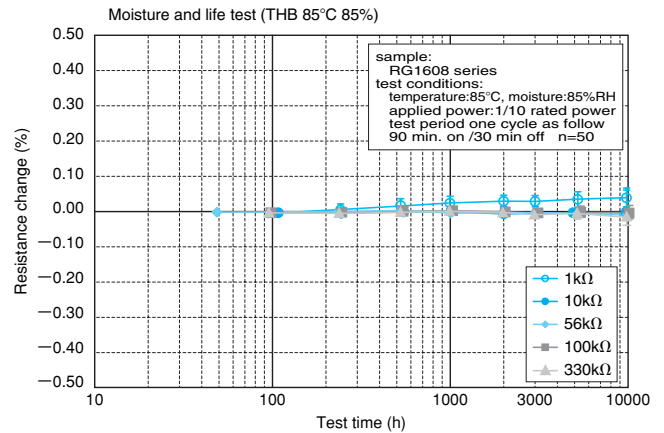


The result of each reliability test for 10000 hours

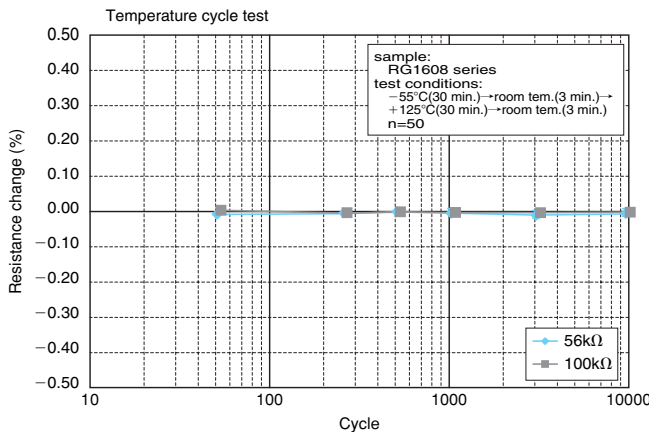
Load life test



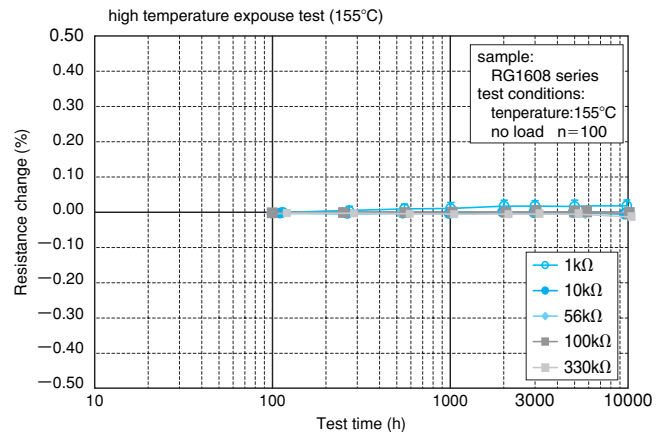
Moisture and life test



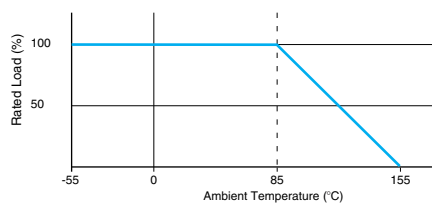
Temperature cycle test



High temperature exposure test



CHARACTERISTIC of Power Temperature Derating Curve



PART NUMBER

RG 1608 N - 102 - B - T5

Package (T1,T5,T10)

Resistance Tolerance

Resistance

(E-24: in a 3 digit number,
E-96: in a 4 digit number 4 digits for all RG3216)

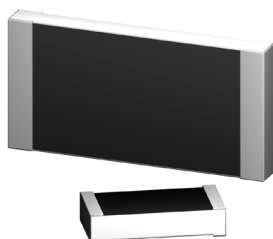
Temperature Coefficient of Resistance

Dimensions

Part Code

CMF Series

Precision Chip Resistors



- Resistances from 5.1Ohm to 10MOhms
- Power Rating 0.065 to 0.75 Watts
- Resistance Tolerances to $\pm 0.05\%$
- TCR's to ± 5 ppm/K
- Extreme Low Noise
- Precision / Thin Film Resistance Element
- Sizes: 0603 / 0805 / 1206



SPECIFICATIONS

Type	0603	0805	1206
Power Rating (W) ¹	0.065	0.125	0.25
Working Voltage (VAC)	75	100	200
Resistance Range (Ω)	Tolerances Available (%) Temperature Coefficients Available (\pm ppm/K) ²		
5.1 Ω - <10 Ω	-	-	1% 50
10 Ω - <47 Ω	0.1% to 1% 25 / 50	0.1% to 1% 25 / 50	0.1% to 1% 25 / 50
47 Ω - <100 Ω	0.1% to 1% 10 / 15 / 25 / 50	0.1% to 1% 10 / 15 / 25 / 50	0.1% to 1% 10 / 15 / 25 / 50
100 Ω - 332k	0.1% to 1% 5 / 10 / 15 / 25 / 50	0.05% to 1% 5 / 10 / 15 / 25 / 50	0.05% to 1% 5 / 10 / 15 / 25 / 50
>332k - 1M	-	0.1% to 1% 10 / 15 / 25 / 50	0.05% to 1% 10 / 15 / 25 / 50
>1M - 2M	-	-	0.25% to 1% 50
>2M - 10M	-	-	-

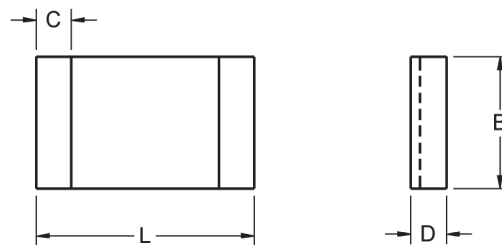
¹W @ 70 °C / 0W @ 125 °C

²5 / 10 / 15 PPM : +25 °C to +85 °C

³ 1000V Available / contact factory

SPECIFICATIONS (continued)

Specification	Value	
Temperature Range	-55°C to +125°C	
Climactic Category	55 / 125 / 56	
Solderability	250°C / 3s	
Max. Soldering Temperature	260°C / 10s	
Long Term Stability	Max ΔR	
	< 47 Ω	47 Ω - 10 M Ω
Storage 125°C / 1000h	$\pm 0.25\%$	$\pm 0.15\%$
Load Life / P=70% / 70°C / 1000h	$\pm 0.25\%$	$\pm 0.1\%$
Humidity / 96%RH / 40°C / 56 days	$\pm 0.5\%$	$\pm 0.15\%$



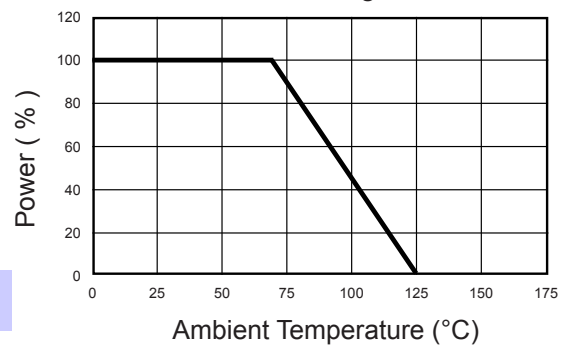
Type	Dimensions			
	L	B	D	C
CMF 0603	0.063 ± 0.004 [1.6 ± 0.1]	0.030 ± 0.004 [0.8 ± 0.1]	0.018 ± 0.004 [0.45 ± 0.1]	0.012 ± 0.008 [0.3 ± 0.2]
CMF 0805	0.080 ± 0.004 [2.0 ± 0.1]	0.050 ± 0.004 [1.25 ± 0.1]	0.022 ± 0.004 [0.55 ± 0.1]	0.016 ± 0.008 [0.4 ± 0.2]
CMF 1206	0.126 ± 0.008 [3.2 ± 0.2]	0.063 ± 0.006 [1.6 ± 0.15]	0.022 ± 0.004 [0.55 ± 0.1]	0.020 ± 0.008 [0.5 ± 0.2]

Packaging:

Bulk or Blister tape to IEC 60286-3

Tape width 8mm / Reel Diameter 180 or 330mm
 Minimum quantity Bulk / 100 pieces per value
 Minimum quantity Tape & Reel / 1000 pieces per value

Power Derating Curve



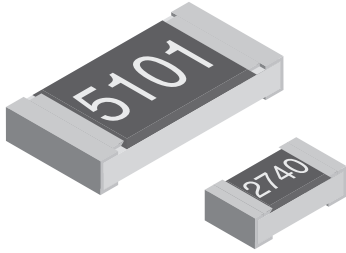
Ordering Information

Part Number - Resistance - Tolerance - TCR - Packaging

Example: CMF 0603 10 kOhms 0.1% 10ppm Tape

(Note: if no TCR is Specified / The highest value will be supplied)

Thin Film, Rectangular, Resistor Chips



TNPW Precision Thin Film Flat Chip Resistors are the perfect choice for most fields of modern electronics where reliability and stability is of major concern. Typical applications include telecommunication, industrial, medical equipment, high-end computer and audio/video electronics.

FEATURES

- Metal film layer on high quality ceramic
- Protective top coat
- Available with tin lead or lead (Pb)-free solder contacts
- Excellent stability at different environmental conditions
- Low temperature coefficient and tight tolerances

APPLICATIONS

- Automotive
- Telecommunication
- Medical Equipment
- Industrial Equipment

STANDARD ELECTRICAL SPECIFICATIONS

TYPE	POWER RATING P _{70°C} (W)		RESISTANCE RANGE (Ω)	TEMPERATURE COEFFICIENT (ppm/K)	TOLERANCE	E-SERIES
	EN 140401-801	EIA 575				
TNPW0402	0.063	0.063	10R - 100K	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 100K	± 10, ± 15, ± 25, ± 50	± 0.1%	
TNPW0603	0.100	0.063	10R - 332K	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% ¹⁾	24-192
			47R - 332K	± 10, ± 15	± 0.1%	
TNPW0805	0.125	0.100	10R - 1M0	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% ¹⁾	24-192
			47R - 1M0	± 10, ± 15	± 0.1%	
TNPW1206	0.250	0.125	10R - 2M0	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% ¹⁾	24-192
			47R - 2M0	± 10, ± 15	± 0.1%	
TNPW1210	0.33 ²⁾	0.250	10R - 3M01	± 25, ± 50	± 0.5%, ± 1% ¹⁾	24-192
			47R - 2M13	± 10, ± 15, ± 25, ± 50	± 0.1%	
TNPW2010	0.40 ²⁾	0.400	10R - 4M99	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 1M0	± 25, ± 50	± 0.1%	
TNPW2512	0.50 ²⁾	0.500	10R - 8M87	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 1M0	± 25, ± 50	± 0.1%	

¹⁾ ±1% resistors are only available in E24/E96

²⁾ Size not specified in EN-140401-801

• Extended values available on request

• Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

• TNPW 0402 without marking

TECHNICAL SPECIFICATIONS

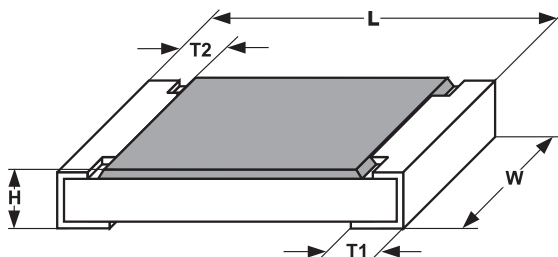
PARAMETER	UNIT	TNPW0402		TNPW0603		TNPW0805		TNPW1206		TNPW1210		TNPW2010		TNPW2512	
Rated Dissipation at 70°C (EN-140401-801 EIA 575)	W	0.063	0.063	0.1	0.063	0.125	0.1	0.25	0.125	0.33	0.25		0.4		0.5
Limiting Element Voltage ⁴⁾	V _≡	25		75		100		100		100		150		200	
Thermal Resistance ³⁾	K/W	≤ 870		≤ 550		≤ 440		≤ 220		≤ 140		≤ 90		≤ 70	
Insulation Resistance	Ω	> 10 ⁹													
Category Temperature Range	°C	- 55 / + 125 (+ 155)													
Failure Rate	h ⁻¹	0.3 • 10 ⁻⁹													
Weight / 1000pcs	g	0.65		2		5.5		10		16		28		39	

³⁾ Measuring conditions in acc. with EN 140401-801

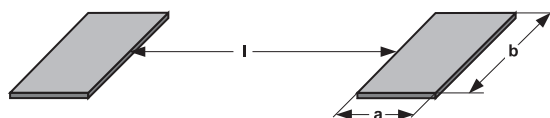
⁴⁾ Rated voltage: $\sqrt{P \times R}$



DIMENSIONS



SIZE		DIMENSIONS millimeters				
INCH	METRIC	L	W	H	T1	T2
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.2 ± 0.1	
0603	1608	1.6 ± 0.2	0.81 ± 0.2	0.4 ± 0.1	0.3 ± 0.2	
0805	2012	2.0 ± 0.2	1.24 ± 0.2	0.4 ± 0.1	0.4 ± 0.25	
1206	3216	3.2 ± 0.15	1.6 ± 0.15	0.61 ± 0.15	0.5 ± 0.25	
1210	3225	3.2 ± 0.15	2.49 ± 0.15	0.61 ± 0.15	0.46 ± 0.2	
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.61 ± 0.15	0.6 ± 0.25	
2512	6332	6.3 ± 0.2	3.1 ± 0.15	0.61 ± 0.15	0.6 ± 0.25	



SOLDER PAD DIMENSIONS millimeters							
SIZE		REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0402	1005	0.4	0.6	0.5	-	-	-
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	0.9	2.5	2.0	1.1	2.5	2.3
2010	5025	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	1.0	3.2	5.2	1.2	3.2	5.2

PART NUMBER AND PRODUCT DESCRIPTION

PART NUMBER: (TIN LEAD) TNPW12061K32DETA

PART NUMBER: (LEAD (Pb)-FREE) TNPW12061K32DEEA

Please note that products can be ordered with or without Lead (Pb)-free termination

T N P W 1 2 0 6 1 K 3 2 D E T A

MODEL
TNPW 0402
TNPW 0603
TNPW 0805
TNPW 1206
TNPW 1210
TNPW 2010
TNPW 2512

VALUE
R = Decimal
K = Thousand
M = Million
(4 digits)

TOLERANCE
B = $\pm 0.1\%$
D = $\pm 0.5\%$
F = $\pm 1.0\%$

T.C.
H = ± 50 ppm/K
E = ± 25 ppm/K
X = ± 15 ppm/K
Y = ± 10 ppm/K

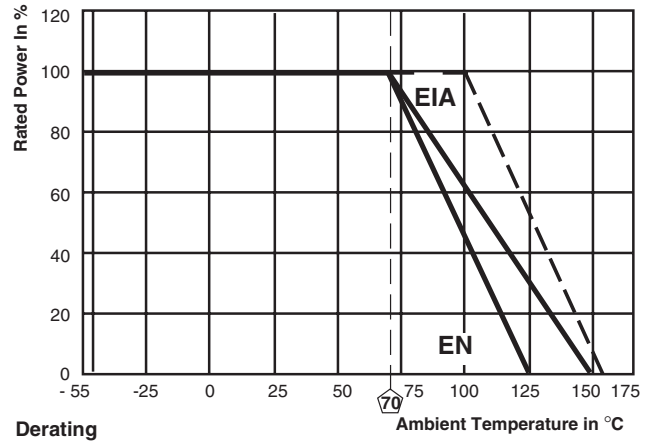
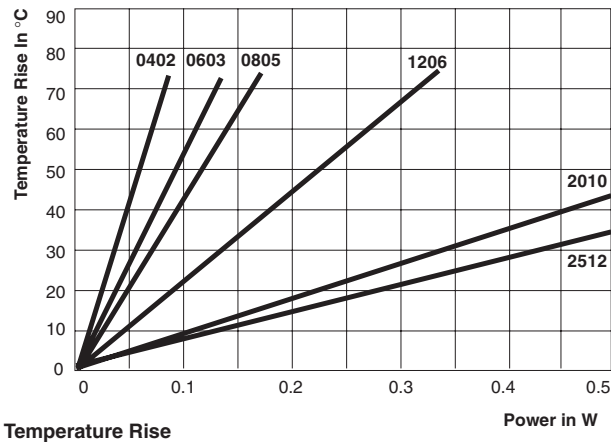
PACKAGING TIN LEAD		
TA = RT1	5000	paper tape
TC = RT6	20000	paper tape
TD = RT7	10000	paper tape
TF = R02	4000	blister tape
TG = R67	2000	blister tape
CN = R52	1000	paper tape
TY = R75	1000	blister tape

PACKAGING LEAD FREE		
EA = ET1	5000	paper tape
EC = ET6	20000	paper tape
ED = ET7	10000	paper tape
EF = E02	4000	blister tape
EG = E67	2000	blister tape
EN = E52	1000	paper tape
EY = E75	1000	blister tape

SPECIAL
up to 2 digits
Blank = standard

Historical Part Number only valid for TNPW with tin lead termination. Example: TNPW0805 1002 B T9 RT1 (will continue to be accepted)

TNPW0805	1002	B	T9	RT1
MODEL	RESISTANCE VALUE Ω	TOLERANCE	T.C.	PACKAGING
TNPW0805	EX: 1501 = 1.5K 10R0 = 10 Ω 3303 = 330K	B = $\pm 0.1\%$ D = $\pm 0.5\%$ F = $\pm 1.0\%$	T2 = ± 50 ppm/K T9 = ± 25 ppm/K T10 = ± 15 ppm/K T13 = ± 10 ppm/K	RT1 Paper tape 5000 pcs



PACKAGING							
MODEL	TAPE WIDTH [mm]	PITCH [mm]	REEL DIAMETER [mm/inch]	PIECES PER REEL	TIN LEAD PACKAGING CODE	LEAD FREE (e3) PACKAGING CODE	TYPE OF CARRIER TAPE
TNPW 0402	8	2	180 / 7	10,000	RT7	ET7	Paper
TNPW 0603	8	4	180 / 7	1,000	R52 ¹	E52 ¹	Paper
TNPW 0805							
TNPW 1206							
TNPW 1210							
TNPW 0603	8	4	180 /	5,000	RT1	ET1	Paper
TNPW 0805							
TNPW 1206							
TNPW 1210							
TNPW 0603	8	4	330 / 13	20,000	RT6	ET6	Paper
TNPW 0805							
TNPW 1206							
TNPW 1210							
TNPW 2010	12	4	180 / 7	1,000	R75	E75	Blister
				4,000	R02	E02	Blister
TNPW 2512	12	4	180 / 7	1,000	R75	E75	Blister
				2,000	R67	E67	Blister

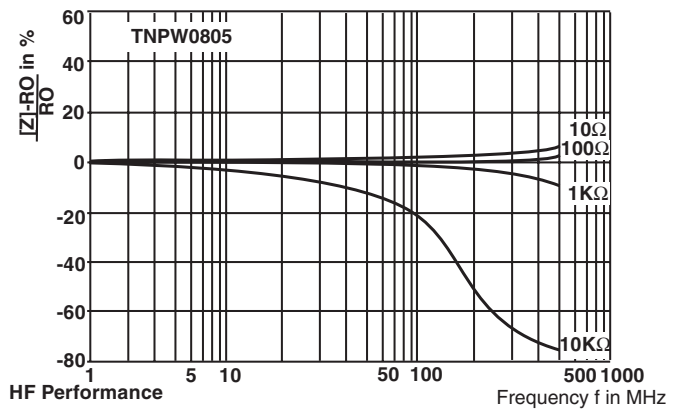
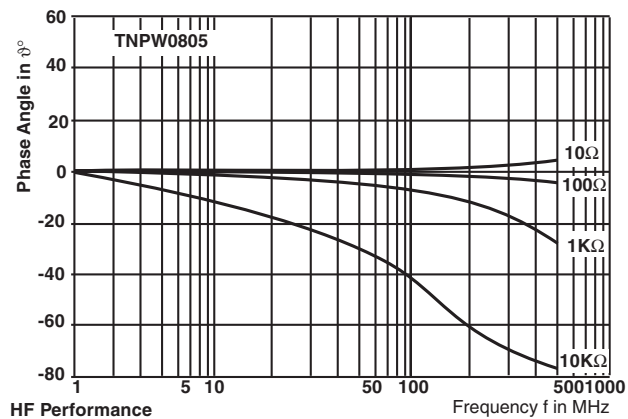
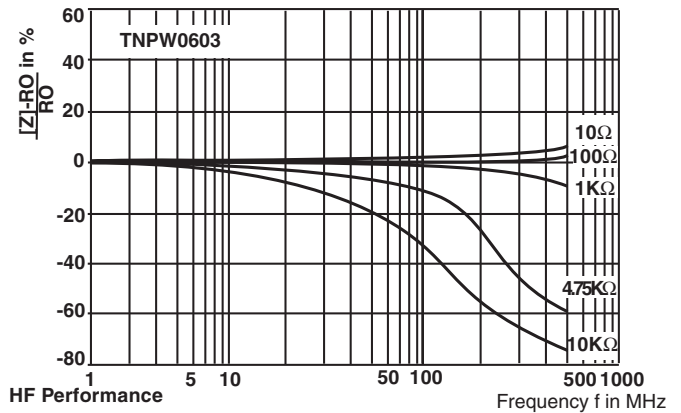
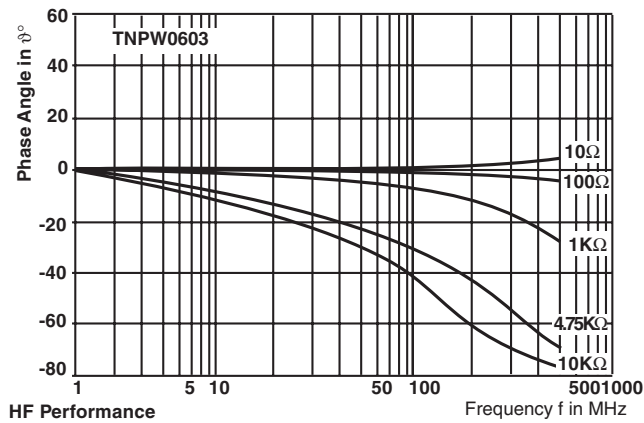
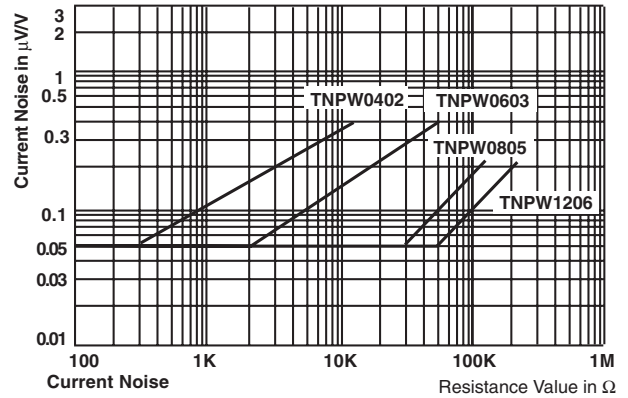
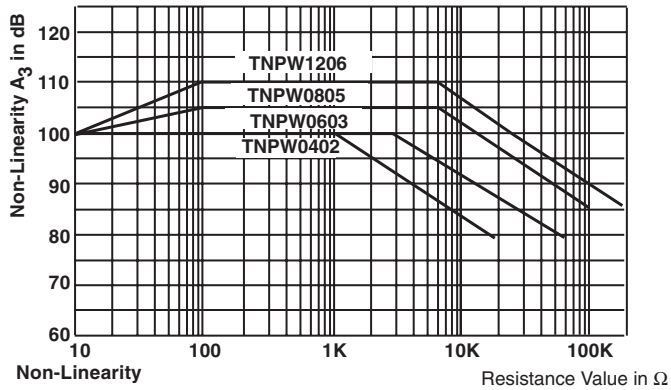
¹⁾ R52 and E52 only for precision resistors with tolerance $\pm 0.1\%$ and temperature coefficient $\leq \pm 25$ ppm/k

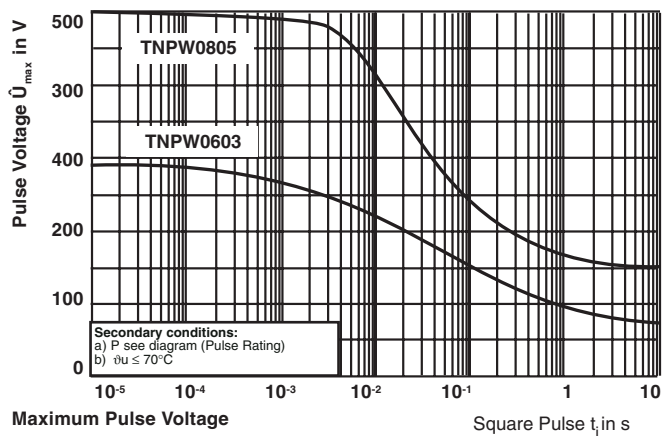
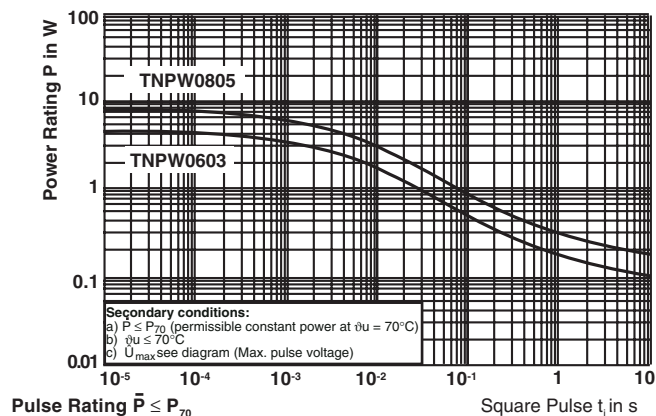
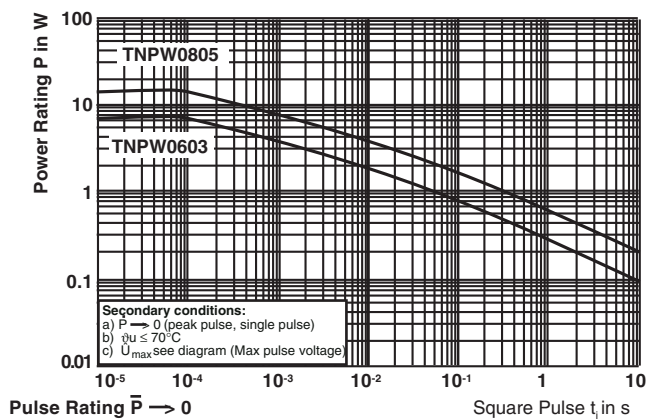
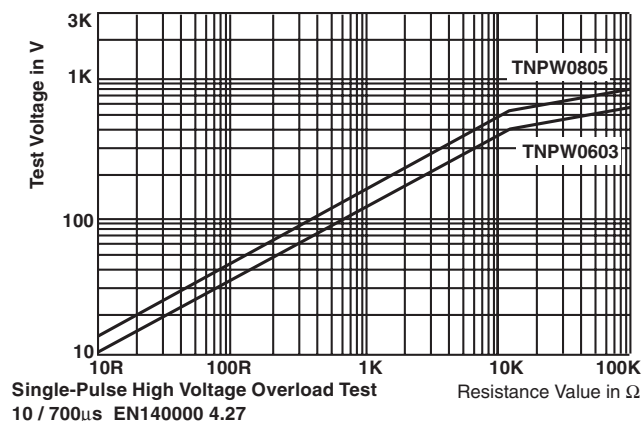
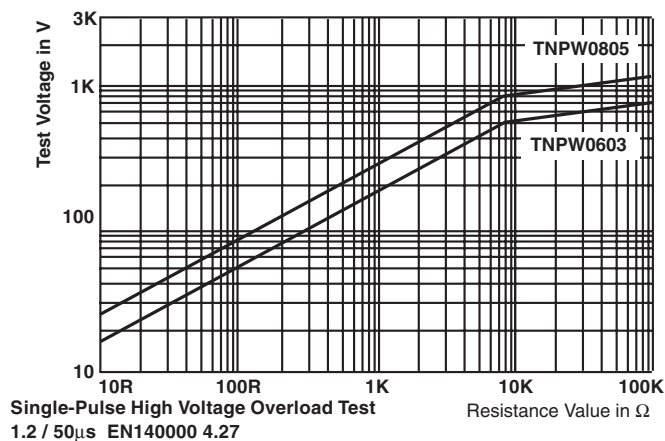
DESCRIPTION

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a super high grade ceramic substrate and conditioned to achieve the desired temperature coefficient. A special laser is used to achieve the target value by smoothly cutting a meander groove in the resistive layer without damaging the ceramics.

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. Beside tin lead termination TNPW is also available with Lead (Pb)-free pure tin termination. The pure tin plating of the Lead (Pb)-free resistors type, provides compatibility with Lead (Pb)-free and lead-containing soldering processes. The immunity of the plating against tin whisker growth has been proven under extensive testing.



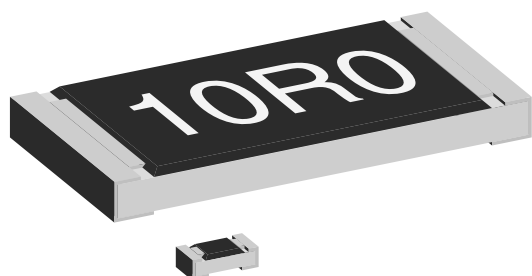




PERFORMANCE				
TEST	CONDITIONS OF TEST	TEST RESULTS		
		TNPW0402 TO TNPW2512		
		TOLERANCES		
		± 0.1 % ; ± 0.25 %		± 0.5 % ; ± 1.0%
		< 100R	≥ 100R	
Endurance Test at 70°C IEC 60115-1 4.25.1	1000 hours at 70°C, 1.5 hours “ON”, 0.5 hours “OFF”	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.25%
Endurance at UCT IEC 60115-1 4.25.3	1000 hours at 125 °C without load	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.5%
Overload Test IEC 60115-1 4.13	Short time overload for 2 seconds 2.5 x rated voltage or ≤ 2 x limiting element voltage	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%
Thermal Shock IEC 60115-1 4.19, IEC 60068-2-14	Rapid change between upper and lower category temperature	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%
Damp Heat Steady State IEC 60115-1 4.24, IEC 60068-2-3	56 days at 40°C and 93% relative humidity	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.5%
Resistance to Soldering Heat IEC 60115-1 4.18, IEC 60068-2-20	10 seconds at 260°C solder bath temperature	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%

APPLICABLE SPECIFICATIONS
<ul style="list-style-type: none">• CECC40000 / 40400• EN140400• EIA 575• EN 140401-801• EN 60115-1• IEC 60286-3

Lead (Pb)-free Thick Film, Rectangular Chip Resistors



FEATURES

- Metal glaze on high quality ceramic
- Protective overglaze
- Lead (Pb)-free solder contacts on Ni barrier layer
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)
- Excellent stability ($|\Delta R/R| \leq \pm 0.5\%$ for 1000 h at 70 °C) different environmental conditions
- High volume product suitable for commercial and special applications



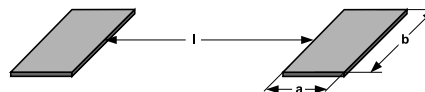
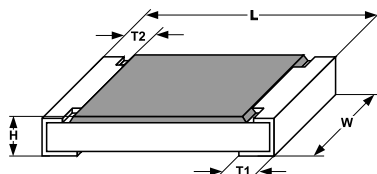
STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING $P_{70\text{ °C}}$ W	LIMITING ELEMENT VOLTAGE MAX V \leq	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC	CECC 40401-802/EIA-575					
CRCW0201	0201	0525	0.05 0.05	30 30	± 200 ± 200	± 1 ± 5	10R - 1M 10R - 1M0	24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 50\text{ m}\Omega$, $I_{\max} = 1\text{ A}$					
D10/CRCW0402	0402	1005	0.063	50	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 1\text{ A}$					
D11/CRCW0603	0603	1608	0.10	75	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 1.5\text{ A}$					
D12/CRCW0805	0805	2012	0.125	150	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 2\text{ A}$					
D25/CRCW1206	1206	3216	0.25	200	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 2.5\text{ A}$					
CRCW1210	1210	3225	0.33	200	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 1M0 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 2.5\text{ A}$					
CRCW1218	1218	3246	1.0	200	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 2M2 1R0 - 2M2	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 4\text{ A}$					
CRCW2010	2010	5025	0.5	400	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 3\text{ A}$					
CRCW2512	2512	6332	1.0	500	$\pm 200^{1)}$ ± 100 ± 200	± 1 ± 1 ± 5	1R0 - 9R76 10R - 10M 1R0 - 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: $R_{\max} = 20\text{ m}\Omega$, $I_{\max} = 4\text{ A}$					

¹⁾ 100 ppm/K on request

- Ask about further value ranges
- For low values see Thick Film rectangular low value resistors
- For high values see Thick Film rectangular high values
- For precision Thick Film CRCW see Thick Film rectangular Precision Resistors
- Marking and packing: see appropriate catalog or web pages
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material
- AgPd or Pd terminations for conductive adhesive attachment on request

DIMENSIONS



SIZE		DIMENSIONS [in millimeters]				
INCH	METRIC	L	W	H	T1	T2
0201	0525	0.6 ±	0.3 ± 0.05	0.23 ± 0.05	0.15 ± 0.05	0.6 ± 0.05
0402	1005	1.0 ±	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1
0603	1608	1.55 +0.10 -0.05	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2
0805	2012	2.0 +0.20 -0.10	1.25 ± 0.15	0.45 ± 0.05	0.3 +0.20 -0.10	0.3 ± 0.2
1206	3216	3.2 +0.10 -0.20	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1218	3246	3.2 +0.10 -0.20	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
2010	5025	5.0 ±	2.5 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2
2512	6332	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2

SIZE		SOLDER PAD DIMENSIONS [in millimeters]					
		REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0201	0525	0.28	0.43	0.23			
0402	1005	0.4	0.6	0.5			
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	0.9	2.5	2.0	1.1	2.5	2.2
1218	3246	1.05	4.9	1.9	1.25	4.8	1.9
2010	5025	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	1.0	3.2	5.2	1.2	3.2	5.2

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	CRCW0201	D10/ CRCW0402	D11/ CRCW0603	D12/ CRCW0805	D25/ CRCW1206	CRCW1210	CRCW1218	CRCW2010	CRCW2512
Rated Dissipation at 70 °C (CECC 40401 EIA 575)	W	0.05	0.063	0.10	0.125	0.25	0.33	1.0	0.5	1.0
Limiting Element Voltage ²⁾	V _≡	30	50	75	150	200	200	200	400	500
Insulation Voltage (1 min)	V _{peak}	50	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Thermal Resistance	K/W		≤ 870 ¹⁾	≤ 550 ¹⁾	≤ 440 ¹⁾	≤ 220 ¹⁾	≤ 140 ³⁾	≤ 65 ³⁾	≤ 88 ³⁾	≤ 65 ³⁾
Insulation Resistance	Ω		> 10 ⁹							
Category Temperature Range	°C		- 55 / + 125 (+ 155)							
Failure Rate	h ⁻¹	1.10 ⁻⁹	0.3 • 10 ⁻⁹							
Weight/1000 pcs	g	0.17	0.65	2	5.5	10	16	29.5	25.5	40.5

¹⁾ Measuring conditions in acc. to CECC 4040

²⁾ Rated voltage: $\sqrt{P \times R}$

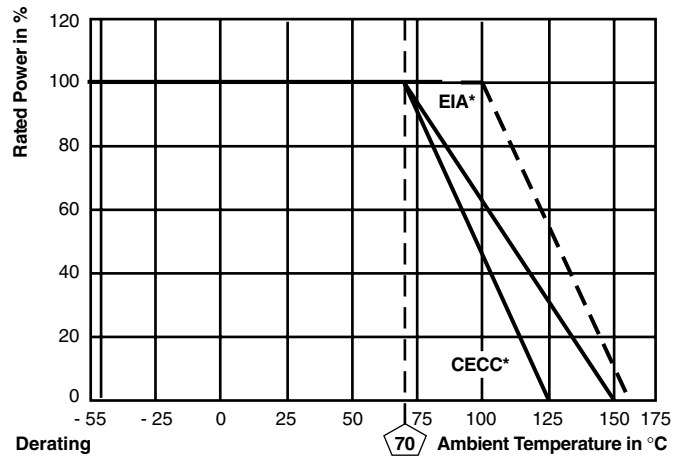
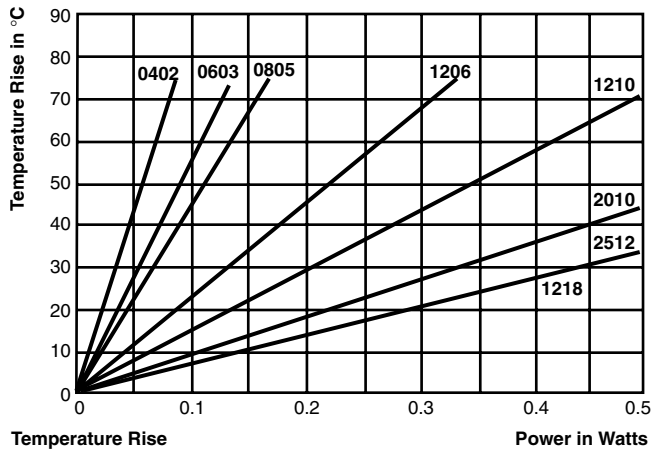
³⁾ Depending on solder pad dimensions

PART NUMBER AND PRODUCT DESCRIPTION

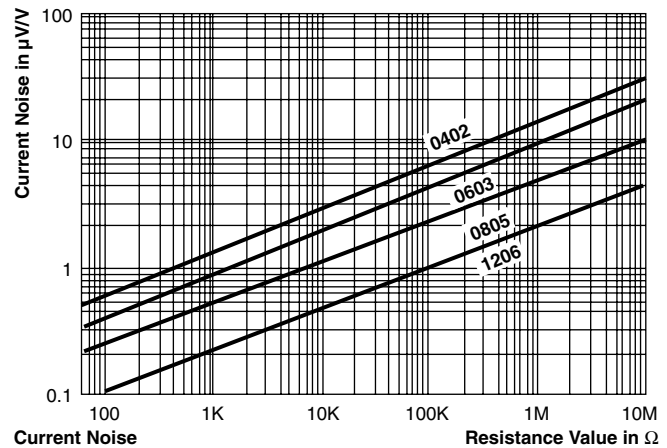
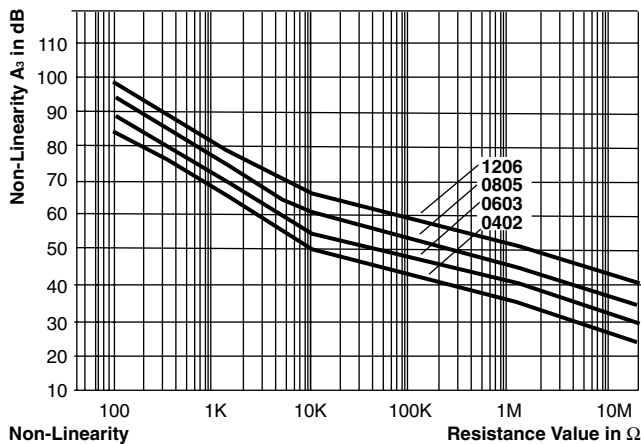
PART NUMBER: CRCW0603562RFKEC

MODEL	VALUE	TOLERANCE	T.C.	PACKING	SPECIAL
CRCW0201 CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW1218 CRCW2010 CRCW2512	R = Decimal K = Thousand M = Million 0000 = Jumper	F = ± 1.0 % J = ± 5.0 % Z = Zero Ohm Jumper	K = ± 100 ppm/K N = ± 200 ppm/K 0 = Jumper S = Special	EA = ET1 5000 paper tape EB = ET5 10000 paper tape EC = ET6 20000 paper tape ED = ET7 10000 paper tape EE = EF4 50000 paper tape EF = E02 4000 blister tape EG = E67 2000 blister tape EH = E82 4000 blister tape EI = EG1 5000 blister tape EK = ET9 4000 blister tape EL = E20 20000 blister tape EY = E27 bulk	up to 2 digits
PRODUCT DESCRIPTION: D11/CRCW0603 100 562R 1 % ET6 E3					
D11/CRCW0603	100	562R	1 %	ET6	e3
MODEL CRCW0201 D10/CRCW0402 D11/CRCW0603 D12/CRCW0805 D25/CRCW1206 CRCW1210 CRCW1218 CRCW2010 CRCW2512	TC ± 200 ppm/K ± 100 ppm/K	RESISTANCE VALUE 10R = 10 Ω 562R = 562 Ω 10K = 10.0 kΩ 1M = 1 MΩ 0R0 = JUMPER	TOLERANCE ± 5 % ± 1 %	PACKING ET1, ET5 ET6, ET7 EF4, E02 E67, E82 EG1, ET9 E20, E27	LEAD (Pb)-FREE e3 = Pure Tin Termination Finish

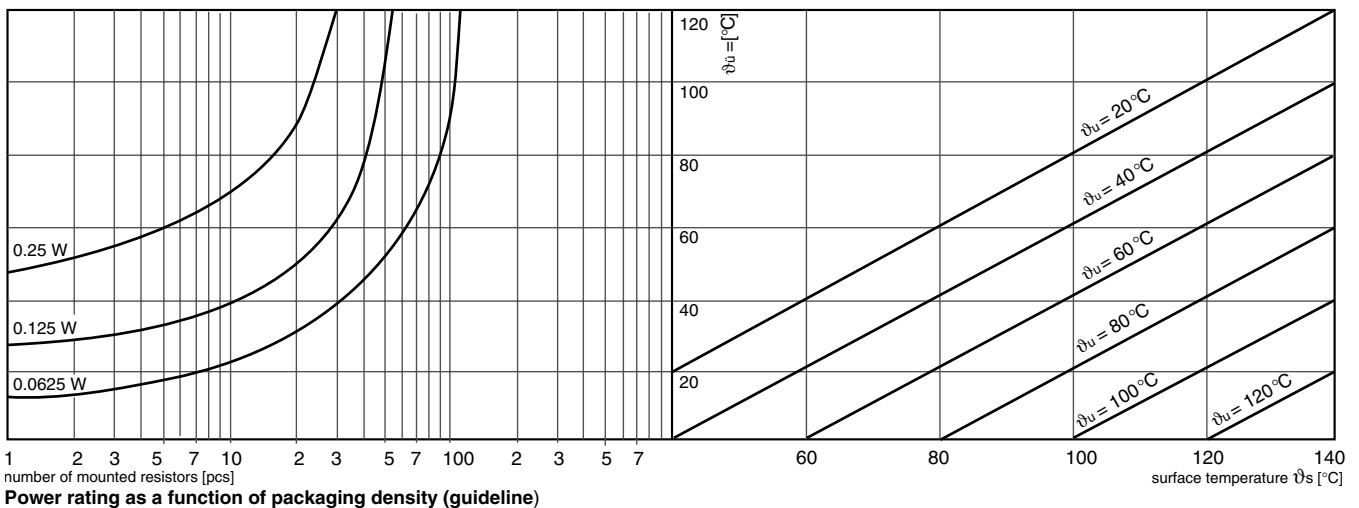
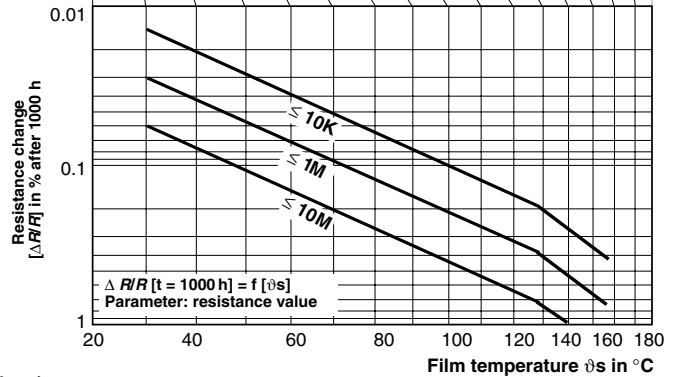
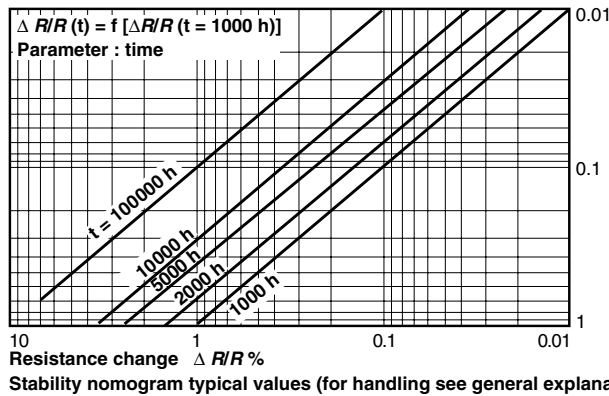
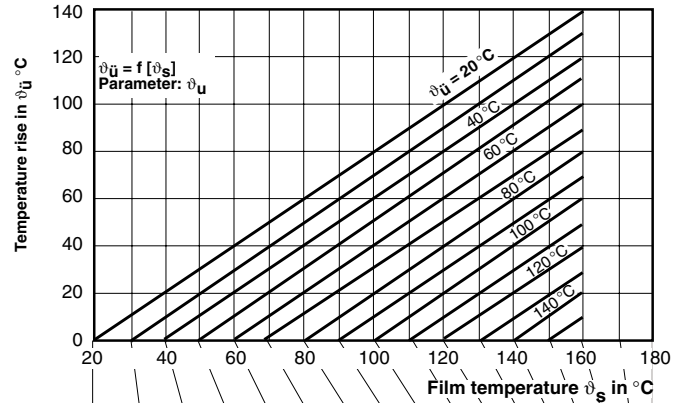
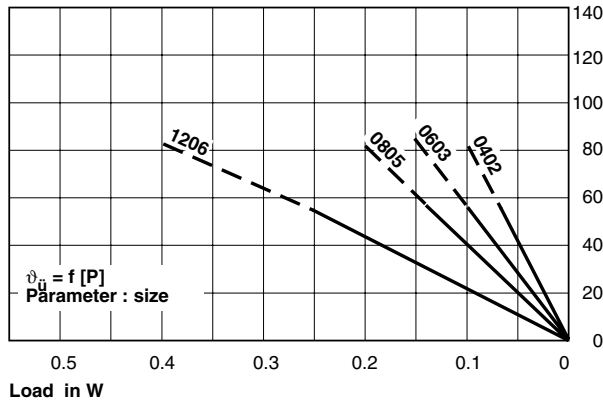
NOTE: Products can be ordered using either the Product Description or the Part Number.

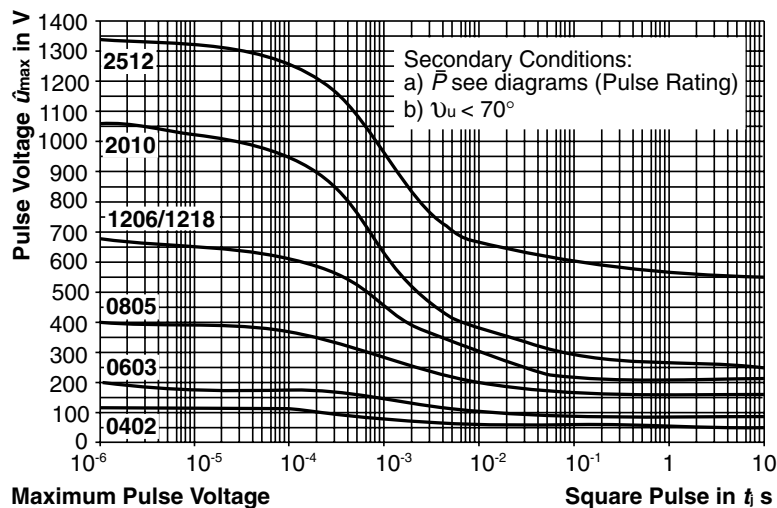
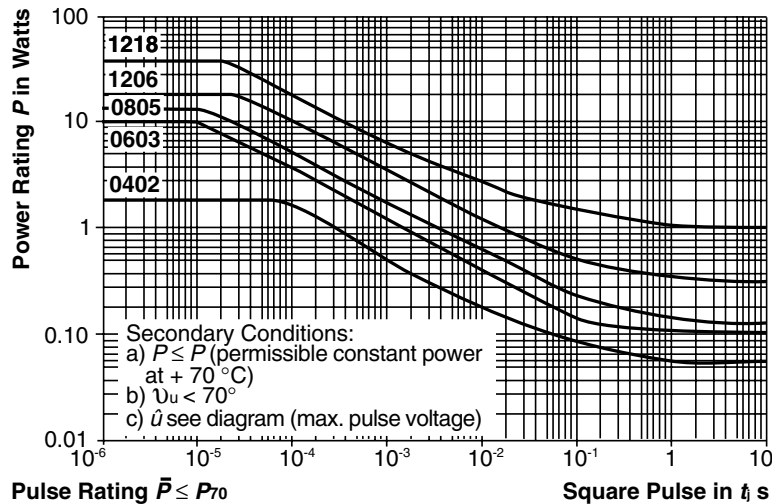
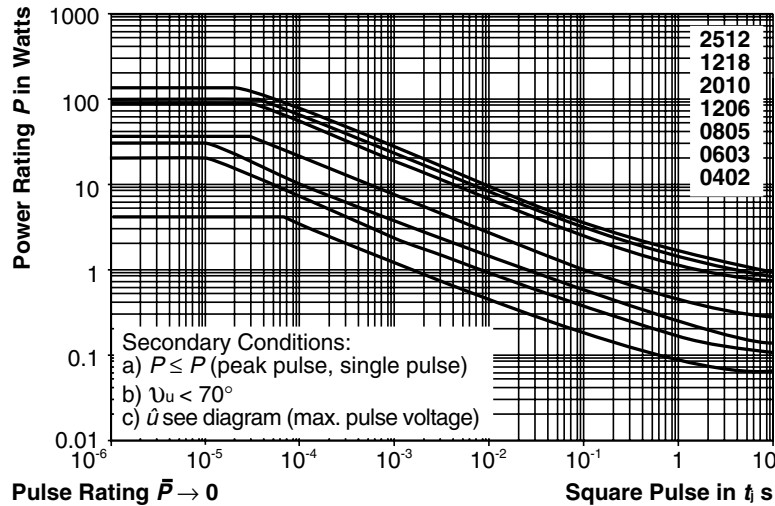


* There are differences in board layout and measurements between CECC and EIA.



PACKING								
MODEL	REEL					BULK		
	TAPE WIDTH	DIAMETER	PIECES/REEL	PITCH	PACKING CODE		BULK FEEDING MAGAZINE PIECES/MAGAZINE	
					PAPER	BLISTER	PIECES	CODE
CRCW0201	8 mm Papertape	180 mm/7" 330 mm/13"	10000 50000	2 mm 2 mm	ET7 EF4			
D10/CRCW0402	8 mm Papertape	180 mm/7" 330 mm/13"	10000 50000	2 mm 2 mm	ET7 EF4		50000	E27
D11/CRCW0603	8 mm Paper-/ Blisertape	180 mm/7" 255 mm/10" 330 mm/13"	5000 10000 20000	4 mm 4 mm 4 mm	ET1 ET5 ET6	EG1 E20	25000	E27
D12/CRCW0805	8 mm Paper-/ Blisertape	180 mm/7" 255 mm/10" 330 mm/13"	5000 10000 20000	4 mm 4 mm 4 mm	ET1 ET5 ET6	EG1 E20	10000	E27
D25/CRCW1206	8 mm Paper-/ Blisertape	180 mm/7" 255 mm/10" 330 mm/13"	5000 10000 20000	4 mm 4 mm 4 mm	ET1 ET5 ET6	EG1 E20		
CRCW1210	8 mm Paper-/Blisertap	180 mm/7" 330 mm/13"	5000 20000	4 mm 4 mm	ET1 ET6	EG1 E20		
CRCW1218	12 mm Blisertape	180 mm/7"	4000	4 mm		ET9		
CRCW2010	12 mm Blisertape	180 mm/7"	4000	4 mm		E02		
CRCW2512	12 mm Blisertape	180 mm/7"	2000 4000	8 mm 4 mm		E67 E82		







PERFORMANCE					
TEST	CONDITIONS OF TEST	REQUIREMENTS IN % ¹⁾			
		0402 0603	0805 1206 1210	1218 2010 2512	0201
Endurance Test at 70 °C IEC 60115-1 4.25.1; EIA-575	1000 hours at 70 °C, 1.5 hours "ON", 0.5 hours "OFF"	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 3.0
Endurance at UCT IEC 60115-1 4.25.3	1000 hours at 125 °C without load	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 2.0
Overload Test IEC 60115-1 4.13; EIA-575	Short time overload, 2.5 x rated voltage or 2 x limiting element voltage.	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 1.0
Thermal Shock IEC 60115-1 4.19; IEC 60068-2-14; EIA-575	Rapid change between upper and lower category temperature	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 0.5
Damp Heat Steady State IEC 60115-1 4.24; IEC 60068-2-3	56 days at 40 °C and 93 % relative humidity	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 2.0
Resistance to Soldering Heat IEC 60115-1 4.18; IEC 60068-2-20; EIA-575	10 seconds at 260 °C solder bath temperature	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 1.0

¹⁾ Limits for change of resistance at test acc. to CECC

APPLICABLE SPECIFICATIONS
<ul style="list-style-type: none">• CECC40000/40400/40401-004,-006,-007,-802• EN140400/IEC 60115 - 1• EIA-575

Thick Film Chip Resistors



FEATURES

- Flow solderable.
- Custom sizes available.
- Burn-in data available.
- Automatic placement capability.
- Top and wraparound terminations.
- Tape and reel packaging available.
- Internationally standardized sizes.

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	RESISTANCE RANGE (Ohms)	POWER RATING* (mW)
CR1	100 - 500K	100
CR5050	100 - 500K	100
CR2	100 - 1M	200
CR3	100 - 1M	250
CR1010	100 - 1M	450
CR1206	100 - 1M	300
CR4	100 - 1M	325
CR5	100 - 1M	525
CR2010	100 - 1M	575

*Higher values available. Please consult our application engineer at +1-909-923-3313.

ELECTRICAL SPECIFICATIONS

Resistance Range: 100 ohms to 1 Megohm (Higher values available).

Resistance Tolerance: $\pm 1\%$, $\pm 2\%$, $\pm 5\%$, $\pm 10\%$, $\pm 20\%$.

Temperature Coefficient: (- 55 °C to + 150 °C)

± 100 PPM/°C: Standard thru 1 Megohm.

± 200 PPM/°C: 1.1 Megohms thru 10 Megohms.

Power Rating: 100 mW thru 575 mW.

Short Time Overload: Less than 0.5 % ΔR .

MECHANICAL SPECIFICATIONS

Construction: 96 % alumina substrate with proprietary cermet resistance element and specified termination material.

ENVIRONMENTAL SPECIFICATIONS

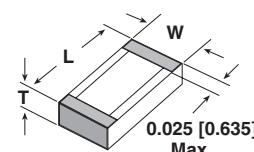
Operating Temperature: - 55 °C to + 150 °C.

Moisture Resistance: Less than 0.5 % change when tested per Method 106 of MIL-STD-202.

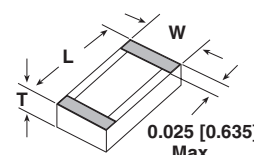
Life: Less than 1 % change when tested per Method 108D (+ 85 °C) of MIL-STD-202.

DIMENSIONS in inches [millimeters]

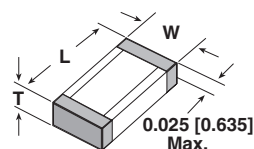
Termination Style A (3-sided wraparound)



Termination Style B (Top conductor only)



Termination Style C (5-sided wraparound)



MODEL	LENGTH (L)* ± 0.006 [0.152]	WIDTH (W)* ± 0.006 [0.152]	THICKNESS (T)* ± 0.002 [0.051]
CR1	0.050 [1.27]	0.040 [1.02]	0.012 [0.305]
CR5050	0.050 [1.27]	0.050 [1.27]	0.010 [0.254]
CR2	0.075 [1.90]	0.050 [1.27]	0.015 [0.381]
CR3	0.100 [2.54]	0.050 [1.27]	0.015 [0.381]
CR1010	0.100 [2.54]	0.100 [2.54]	0.020 [0.508]
CR1206	0.125 [3.18]	0.062 [1.57]	0.025 [0.635]
CR4	0.150 [3.81]	0.050 [1.27]	0.015 [0.381]
CR5	0.225 [5.72]	0.075 [1.90]	0.015 [0.381]
CR2010	0.200 [5.08]	0.100 [2.54]	0.020 [0.508]

*All dimensions are before solder coating.

ORDERING INFORMATION

CR	5050	A	A	1001	F	100	e1
MODEL	SIZE	TERMINATION STYLE	TERMINATION MATERIAL	VALUE	TOLERANCE	TCR	SOLDER TERMINATION
CR =		A = 3 sided	A = Palladium Silver	The first 3 digits are	F = $\pm 1\%$	100 = ± 100 PPM/°C	S2 = Sn62
Standard		B = Top only	B = Platinum Gold	significant figures. Last digit	G = $\pm 2\%$	150 = ± 150 PPM/°C	e1 = Sn/Ag/Cu
		C = 5 sided	C = Gold	specifies the number of	J = $\pm 5\%$	200 = ± 200 PPM/°C	96.5/3.0/0.5
			D = Platinum Silver	zeros to follow. Example:	K = $\pm 10\%$	350 = ± 350 PPM/°C	
			E = Palladium Gold	1001 = 1 kilohm.	M = $\pm 20\%$		



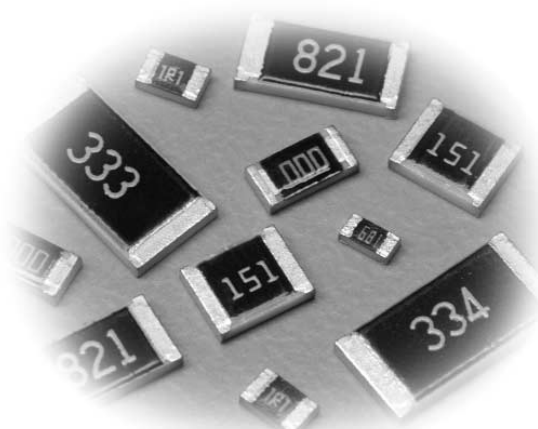
Notice

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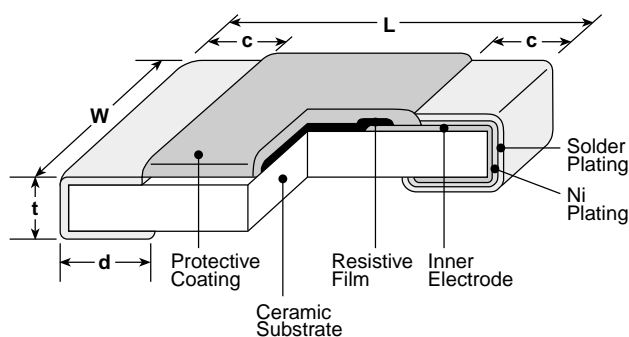
general purpose 2%, 5% tolerance thick film chip resistor



features

- RuO₂ thick film resistor element
- Anti-leaching nickel barrier terminations
- Also available with epoxy bondable palladium silver terminations in 1J, 2A and 2B sizes.
- Meets or exceeds EIA 575, EIAJ RC 2690A, EIA PDP-100, MIL-R-55342F
- Marking: White three-digit on black protective coat
No marking on 1F, 1H and 1E sizes

dimensions and construction



Type (Inch Size Code)	Dimensions inches (mm)				
	L	W	c	d	t
NEW 1F (01005)	.015±.001 (0.4±0.02)	.007±.001 (0.2±0.02)	.004±.001 (0.1±0.03)	.004±.001 (0.1±0.03)	.005±.001 (0.12±0.02)
1H (0201)	.024±.001 (0.6±0.03)	.012±.001 (0.3±0.03)	.004±.002 (0.1±0.05)	.006±.002 (0.15±0.05)	.009±.001 (0.23±0.03)
1E (0402)	.039 ^{+.004} _{-.002} (1.0 ^{+.01} _{-.005})	.02±.002 (0.5±0.05)	.008±.004 (0.2±0.1)	.01 ^{+.002} _{-.004} (0.25 ^{+.02} _{-.01})	.014±.002 (0.35±0.05)
1J (0603)	.063±.008 (1.6±0.2)	.031±.004 (0.8±0.1)	.012±.004 (0.3±0.1)	.012±.004 (0.3±0.1)	.018±.004 (0.45±0.1)
2A (0805)	.079±.008 (2.0±0.2)	.049±.004 (1.25±0.1)	.016±.008 (0.4±0.2)	.012 ^{+.008} _{-.004} (0.3 ^{+.02} _{-.01})	.02±.004 (0.5±0.1)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.02±.012 (0.5±0.3)	.016 ^{+.008} _{-.004} (0.4 ^{+.02} _{-.01})	.024±.004 (0.6±0.1)
2E (1210)		.102±.008 (2.6±0.2)			
2H (2010)	.197±.008 (5.0±0.2)	.098±.008 (2.5±0.2)		.025±.005 (0.65±0.15)	
3A (2512)	.248±.008 (6.3±0.2)	.122±.008 (3.1±0.2)			

ordering information

New Part #	RK73B	2B	T	TD	102	J
Type		Size	Termination Material	Packaging	Nominal Resistance	Tolerance
		1F 1H 1E 1J 2A 2B 2E 2H 3A	T: Sn* X: AgPd*** G: Au** L: SnPb	TC: 2mm pitch punched pressed paper (01005 & 0201 only) TB: 2mm pitch pressed paper (0201 only) TP: 2mm pitch punched paper (0402 & 0603) TD: 7" paper tape (0603, 0805, 1206 & 1210) TDD: 10" paper tape (0603, 0805, 1206 & 1210) TE: 7" punched plastic (0805, 1206, 1210, 2010 & 2512) TED: 10" punched plastic (0805, 1206, 1210, 2010 & 2512)	2 significant figures + 1 multiplier "R" indicates decimal on value <10Ω	G: ±2% J: ±5%

* 1F available in Sn only

** Available ONLY in 1E, 1J and 2A (10Ω - 1MΩ) chip sizes

*** Available ONLY in 1J, 2A and 2B (10Ω ~ 22MΩ) chip sizes

For further information on packaging, please refer to Appendix A.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

9/01/05

applications and ratings

	Part Designation*	Power Rating @ 70°C	T.C.R. (ppm/°C) Max.	Resistance Range E-24** (G±2%)	Resistance Range E-24** (J±5%)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range***
UNDER DEVELOPMENT	RK73B1F (01005)	1/32W (.03W)	±250	10Ω - 1MΩ	10Ω - 1MΩ	15V	30V	-55°C to +125°C
	RK73B1H (0201)	1/20W (.05W)	±200 ±400	10Ω - 10MΩ —	10Ω - 10MΩ 1Ω - 9.1Ω	25V	50V	
	RK73B1E (0402)	1/16W (.063W)	±200 ±400	10Ω - 1MΩ —	10Ω - 10MΩ 1.0Ω - 9.1Ω	50V	100V	-55°C to +155°C
	RK73B1J (0603)	1/10W (.10W)	±200 ±400	10Ω - 10MΩ 1Ω - 9.1Ω	10Ω - 10MΩ 1Ω - 9.1Ω 11MΩ - 22MΩ			
	RK73B2A (0805)	1/8W (.125W)	±200 ±400	10Ω - 1MΩ 1Ω - 9.1Ω 1.1MΩ - 10MΩ	10Ω - 1MΩ 1Ω - 9.1Ω 1.1MΩ - 22MΩ	150V	300V	
	RK73B2B (1206)	1/4W (.25W)	±200 ±400	10Ω - 5.6MΩ 1Ω - 9.1Ω 6.2MΩ - 10MΩ	10Ω - 5.6MΩ 1Ω - 9.1Ω 6.2MΩ - 22MΩ	200V	400V	
	RK73B2E (1210)	1/2W (.50W)	±200	10Ω - 1KΩ	10Ω - 1KΩ			
		1/3W (.33W)		1.1KΩ - 5.6MΩ	1.1KΩ - 5.6MΩ			
		1/2W (.50W)	±400	—	1Ω - 9.1Ω			
	1/3W (.33W)	6.2MΩ - 10MΩ						
	RK73B2H (2010)	3/4W (.75W)	±200 ±400	10Ω - 5.6MΩ —	10Ω - 5.6MΩ 1Ω - 9.1Ω 6.2MΩ - 22MΩ		500V	
	RK73B3A (2512)	1W	±200 ±400	10Ω - 5.6MΩ —	10Ω - 5.6MΩ 1Ω - 9.1Ω 6.2MΩ - 22MΩ			

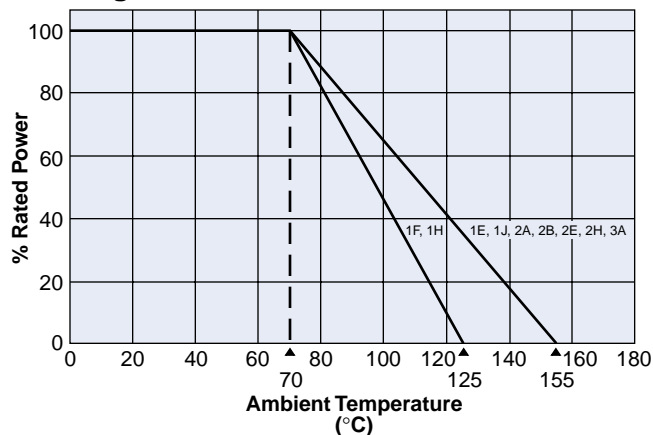
* Parenthesis indicate EIA package size codes.

** See Appendix D for available decade values.

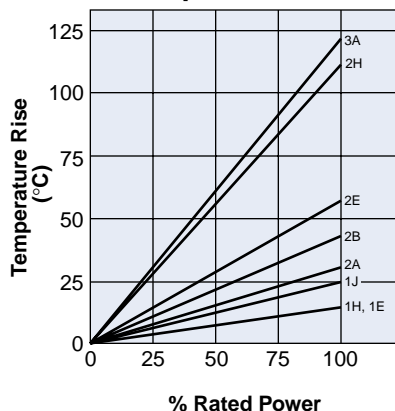
*** 1J, 2A, 2B sizes available -55°C to +175°C (contact factory).

environmental applications

Derating Curve



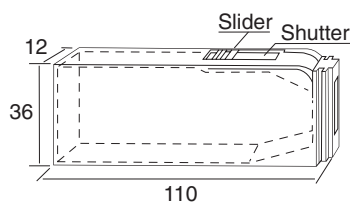
Surface Temperature Rise



For complete environmental specifications,
please refer to pages 24-25.

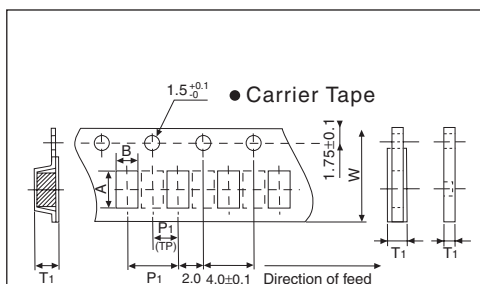
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
RK73B RK73H RK73G RK73A RK73Z SG73 RK73N SR73 RF73 UR73 RN73 LT73	1F	0.4	0.2	0.12	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.31±0.2/-0	178
	1H	0.6	0.3	0.23	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.42±0.2/-0	178
	1E	1	0.5	0.35	TB	10000	0.67±0.05	0.37±0.05	8.0±0.2	2±0.05	0.37±0.2/-0	178
					TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2±0.05	0.45±0.2/-0	178
	1J	1.6	0.8	0.45	TP	10000	1.9±0.1	1.1±0.1	8.0±0.2	2±0.05	0.6±0.2/-0	178
					TD	5000	1.9±0.1	1.1±0.08	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
					TP	10000	2.4±0.2	1.65±0.2	8.0±0.2	2±0.05	0.75±0.2/-0	178
					TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	0.9±0.1	178
					TDD	10000	2.4±0.1	1.65±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	2.4±0.2	1.45±0.15	8.0±0.2	4.0±0.1	0.65±0.1	255
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	178
					TDD	10000	3.5±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.5±0.1	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	255
					TD	5000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1.0±0.15	178
	2E	3.2	2.6	0.6	TDD	10000	3.5±0.1	2.8±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.6±0.15	2.9±0.15	8.0±0.2	4.0±0.1	1.0±0.1	255
					TE	4000	5.35±0.2	2.9±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
	2H	5	2.5	0.6	TED	10000	5.4±0.2	2.9±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
	3A	6.3	3.1	0.6	TE	4000	6.65±0.2	3.44±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
					TED	10000	6.9±0.2	3.6±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
CND	2B10	6.40	3.1	0.6	TE	4000	6.6±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
	1J10	3.20	1.6	0.55	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2A10	4.00	2.1	0.6	TE	4000	4.45±0.2	2.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
CNB	2B5Z	3.2	2.5	0.6	TE	4000	3.5±0.2	3.0±0.2	8.0±0.2	4.0±0.1	1±0.15	178
	2E9Z	6.40	3.2		TE	4000	6.7±0.2	3.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
TMC	P	2.0	1.025	1.2	TE	3000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	1.6 MAX	178
	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	178
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.3 MAX	178
TMR	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMH	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.7±0.1	8±0.3	4±0.1	2.5 MAX	180
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMU	UA	3.2	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8±0.3	4±0.1	7.0 MAX	180
	UC	6.0	3.2	1.5	TE	1000	6.3±0.1	3.7±0.1	12±0.3	8±0.1	7.0 MAX	180
TMX	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
	F	7.3	5.8	3.5	TE	500	7.5±0.1	6.3±0.1	12±0.3	8±0.1	4.1 MAX	180

Bulk Case (RK73 1E, 1J, 2A, 2B) Packaging Designation: BK

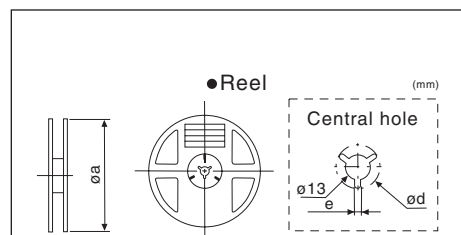


Style	Packaging Quantity
1E	50,000 pieces/case
1J	25,000 pieces/case
2A	10,000 pieces/case
2B	5,000 pieces/case

Packaging specifications



(Notes) Dotted lines are applicable to only "TP" and "TB."



(Notes) Reel holes, shapes and design are examples

Type	ød (mm)	e (mm)
All	21	2
RCU, RCT, RCS, RCW	27	3

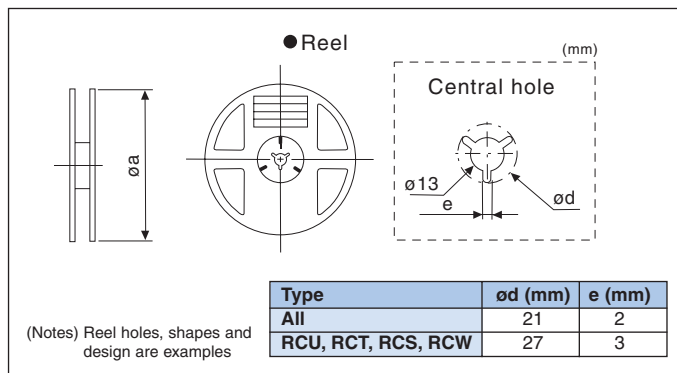
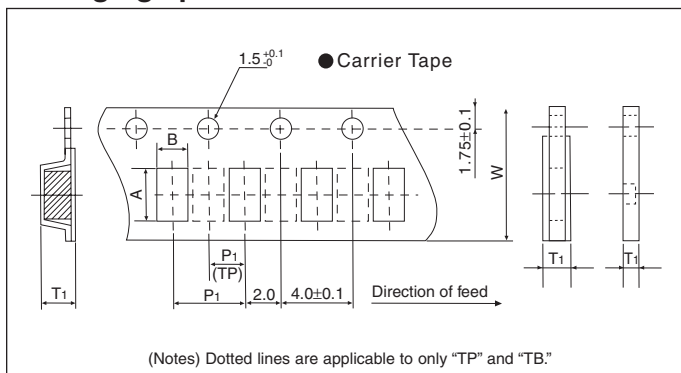
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
CN CN_A CN_K CN_Z	1F8	3.8±0.1	1.6±0.2	0.44±0.1	TP	5000	4.0±0.1	1.8±0.1	8.0±0.2	2.0±0.05	0.55±0.1	178
	1E2K	1.00	1	0.35	TP	10000	1.2±0.1	1.2±0.1	8.0±0.2	2.0±0.05	0.45±0.1	178
	1E4/1E4K				TP	10000	2.2±0.1	1.2±0.1	8.0±0.2	2.0±0.5	0.45±0.1	178
	1J2/1J2K	1.60	1.6	0.6/0.5	TD	5000	1.9±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	255
	1J4/1J4KA	3.20	1.6	0.6/0.5	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0 0.6±0.2/-0	255
	1J8	6.40	2	0.6	TE	4000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	178
					TED	10000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	255
	2A2	2.54	2	0.6	TE	4000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2A4	5.08	2	0.6	TE	4000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	255
	2A8	10.16	2	0.6	TE	4000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	178
					TED	10000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	255
	2B2	2.54	3.2	0.6	TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2B4	5.08	3.2	0.6	TE	4000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	255
RD41B RN41 RM41 MLT CC	2A	2	1.25	-	TE	3000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	178
					TED	10000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	255
	2B	3.5	1.45	-	TE	3000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
					TED	10000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	255
	2D	3.2	1.55	-	TE	2000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
	2E, 2H, 3AS	5.9	2.2	-	TE	1500	6.2±0.2	2.4±0.2	12.0±0.1	4.0±0.1	2.6±0.2	178
NT73 LA73 LT73	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.1/-0	178
	1J	1.6	0.8	0.45	TD	5000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
PT72	2A	2	1.25	1	TE	3000	2.25±0.1	1.45±0.1	8.0±0.2	4.0±0.1	1.5±0.15	178
	2B	3.2	1.6	1	TE	3000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.5±0.15	178
RCU		1.60	0.8	1.15	TE	2000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	178
					TED	5000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	255
RCT		2.00	1.25	1.45	TE	2000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	178
					TED	5000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	255
RCS		3.20	1.6	1.25	TE	2000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	178
					TED	5000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	255
RCW		3.2	1.6	2	TE	2000	3.4±0.1/ -0.05	1.95±0.1/ -0.05	8.0±0.2	4.0±0.1	2.2±.01	178
C4000	C4L_I12	4.50	3.8	2.25	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4L_I14			2.3	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4315			2.4	TE	500	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	3.0±0.2	178
KL32		3.2	2.5	2.2	TE	2000	3.55±0.1	2.70±0.1	8.0±0.1	4.00±0.1	2.7±0.5	178
KL73	1H	0.6	0.3	0.23	TB	10000	0.67±0.05	0.37±0.05	8.0	2.0	0.42±0.2/-0	178
	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.2	180
	1J	1.6	0.8	0.5	TE	4000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.9±0.15	180
	2A	2	1.25	0.5	TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
KQ KQC KQT	2B	3.2	1.6	10.6	TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
	0402	1.10	0.5	0.5	TD	2000	1.22±0.05	0.73±0.05	8.0±0.2	4.0±0.1	0.65±0.1	180
	0603	1.60	1	0.9	TE	2000	1.72±0.05	1.07±0.05	8.0±0.2	4.0±0.1	1.2±0.1	180
	0805	2.00	1.5	1.3	TE	2000	2.22±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.65±0.1	180
LPC	1008	2.50	2.2	1.8	TE	2000	2.7±0.1	2.35±0.1	8.0±0.2	4.0±0.1	2.2±0.1	180
	4045	4.50	4	4.5	TED	1000	4.158±0.2	4.75±0.2	12.0±0.1	8.0±0.2	5±0.2	380
	9040N	9.00	10.2	4.9	TED	500	Ø9.4±0.2		16±.01	12±.01	7±0.2	380
	12065	12.40	12	7.5	TED	300	12.5±0.2	13±0.2	24±.01	16±.02	8.2±0.2	380
SDR	10065	10.40	10	7.5	TED	300	11±0.2	111.5±0.2	24±.01	16±.02	8.2±0.2	380
	0604	5.6	—	4.5	TE	1500	—	—	12	4.0±0.1	5.0	330
	0805	7.8	—	5.3	TE	1000	—	—	—	12.0	6.2	380
SL	1006	9.8	—	5.8	TE	1000	—	—	—	12.0	6.7	380
	1	6.3	3.1	1.9	TE	1000	6.8±0.1	3.6±0.1	12.0±0.1	8.2±0.2	2.35±0.1	180
LPS	2/3	11.5	7	2.5	TED	1000	12.2±0.1	7.7±0.1	24	12.0±0.1	3.1±0.1	255
	5018	5.4	5.0	1.8	TE	1000	5.6±0.1	6.3±0.1	16±0.1	12±0.1	2.1±0.1	255
	5728	6.1	5.7	2.8	TE	1000	6.3±0.1	6.0±0.1	16±0.1	12±0.1	3.2±0.1	255
	6926	7.3	6.9	2.6	TE	1000	7.5±0.1	7.2±0.1	16±0.1	12±0.1	3.0±0.1	255

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
TLR	3A, 3AW	6.4	3.2	0.6	TE	2000	6.75±0.2	3.55±0.1	12.0±0.1	8.0±0.2	1.0±0.1	180
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2.0±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	180
	2H	5.0	2.5	0.6	TE	4000	5.35±0.2	2.9±0.1	12.0±0.1	4.0±0.1	1.0±0.15	180
TSL	1	6.3	3.1	1	TE	3000	6.6±0.1	3.4±0.1	12.0±0.1	4.0±0.1	1.3±0.1	180
NPR	1	7.5	4.5	2	TE	1000	7.9±0.1	4.8±0.1	16	8.2±0.2	2.45±0.1	178
	2	12	8	4	TE	1000	13±0.1	9±0.1	24	102	4.35±0.1	330
CSR	1	10.8	6.2	2.1	TE	1000	11.1±0.14	6.7±0.1	24	12.0±0.1	2.6±0.1	255
	2	12.8±0.5	8.2±0.3	3.1±0.2	TE	1000	13.0±0.1	9.0±0.15	24	12.0±0.1	4.35±0.1	330
CZB CZP MCL	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.65±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	4000	1.8±0.1	1.1±0.1	8.1±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MHL	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.67±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TD	4000	1.85±0.1	1.15±0.1	8.0±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.0±0.1	4.0±0.1	1.2±0.1	178
	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MCA	1E4	2.0±0.15	1.25±0.15	0.6±0.1	TE	4000	2.2±0.1	1.45±0.1	8.0±0.2	4.0±0.1	2.0±0.1	180
	1J4	3.2±0.15	1.6±0.15	0.8±0.1	TD	4000	3.5±0.15	1.9±0.15	8.0±0.2	4.0±0.1	2.5±0.1	180
KGM	0603	1.6±0.2	0.8±0.2	0.6±0.2	TE	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	2.5 max.	178
	0805	2.0±0.2	1.25±0.2	0.8±0.2	TE	4000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1812	4.5±0.3	3.2±0.3	1.0±0.2	TE	1000	4.9±0.1	3.5±0.2	12.0±0.3	4.0±0.1	2.5 max.	178
FBA	1J	3.2±0.2	1.6±0.2	0.8±0.2	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
NV73	1E	1.0±0.1	0.5±0.1	0.25±0.15	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	4.0±0.1	0.6±0.2	180
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	2500	1.9±0.1	1.2±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2A	2.0±0.2	1.25±0.2	1.3 max.	TE	2500	2.4±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2B	3.2±0.2	1.6±0.2	1.65 max.	TE	2500	3.6±0.1	2.0±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
LR72	A	10±0.2	5.2	2	TED	2000	1.45±0.2	5.7±0.2	2.0±0.05	8.0±0.10	2.3±0.2	255
	B	10±0.2	3	2	TED	2000	1.45±0.2	3.4±0.2	2.0±0.05	8.0±0.10	2.5±0.2	255
	C	11.2±0.4	3.2±0.4	3.5±0.4	TEB	1500	1.17±0.1	4.3±0.1	24±0.2	8.0±0.1	4.4±0.15	330
HFC	1005	1.0±0.15	0.5±0.1	0.5±0.1	T	10000	1.15±0.03	0.65±0.03	8.0±0.10	2.0±0.05	0.60±0.05	178
	1410	1.4±0.15	1.0±0.1	1.0±0.1	TE	3000	1.60±0.05	1.20±0.05	8.0±0.20	4.0±0.10	1.20±0.10	178
	1608	1.6±0.15	0.8±0.1	0.7±0.2	TE	4000	1.80±0.05	1.00±0.05	8.0±0.20	4.0±0.10	0.75 or 0.95±0.10	178
	1610	1.6±0.15	1.0±0.1	0.85±0.25	TE	3000	1.80±0.05	1.20±0.05	8.0±0.20	4.0±0.10	0.80 or 1.00 or 1.20±0.10	178
KC	1612	1.6±0.15	1.2±0.1	1.1±0.2	TE	3000	1.80±0.05	1.40±0.05	8.0±0.20	4.0±0.10	1.40±0.10	178
	1J	1.6±0.2	0.8±0.2	0.6±0.2	TD	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	0.75±0.04	178
	2AF	2.0±0.2	1.25±0.2	0.8±0.2	TD	4000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	N/A	178
KCR	2A	2.0±0.2	1.25±0.2	1.6±0.2	TE	2000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	1.9±0.1	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
TF	10A	1.00	0.5	0.45	TB	10000	1.15±0.05	0.65±0.05	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	16S	1.60	0.8	0.6	TD	5000	1.9±0.1	1.1±0.1	8.0±0.3	4.0±0.1	0.9±0.1	180
CCP	2B	3.20	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	1.5±0.1	178
	2E	3.20	2.5	2.2	TE	2000	3.5±0.1	2.8±0.1	8.0±0.3	4.0±0.1	2.4±0.1	178
CCF	1	6.00	2.5	2.5	TE	1000	6.4±0.2	2.7±0.2	12.0±0.3	4.0±0.1	2.9±0.2	178
CR	1J10	3.2±0.1	1.6±0.1	0.65±0.1	TE	4000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0.1	178
	2A10	4.0±0.2	2.1±0.2	0.7±0.1			4.4±0.2	2.5±0.2	12.0±0.2	4.0±0.1	1.15±0.2	178
MRGF16	—	11	7.7	2.2	TEB	2000	11.7±0.2	8.2±0.2	24	12	2.4±0.1	330
PGD	1E	1.1	0.75	0.75	TE	5000	3.5±0.10	1.2±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180
	1J	1.6	0.8	0.75	TE	4000	3.5±0.1	1.0±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180

*MHL0805: 1.5nH ~ 39nH = 4,000 pieces, 47nH ~ R68 = 3,000 pieces

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
AA(X)	T16	5.0	6.4	1.0	TE	2500	5.4±0.1	6.8±0.1	16	8	0.3±0.05	330
	T20	6.5	6.4	1.0	TE	2500	7.1±0.1	6.95±0.1	16	8	0.3±0.05	330
AC(X)	T24	7.8	6.4	1.0	TE	2500	8.3±0.1	6.95±0.1	16	8	0.3±0.05	330
AP(X)	Q16	4.9	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
CR(X)	Q20	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
CTX	Q24	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
DNA	Q28	10.0	5.99	1.6	TE	2500	3.5±0.1	6.5±0.1	16	8	0.3±0.05	330
DN(X)	N08	4.83	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
EA(X)	N14	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
ED(X)	N16	9.91	5.99	1.6	TE	2500	10.3±0.1	6.5±0.1	16	8	0.3±0.05	330
RD(X)	W16	10.44	10.36	2.4	TE	1000	10.7±0.1	10.9±0.1	16	12	0.3±0.05	330
R(X)A	W20	12.7	10.36	2.4	TE	1000	13.3±0.1	10.9±0.1	24	12	0.3±0.05	330
RT(X)	S03	2.92	2.30	0.95	TE	3000	2.77±0.1	3.15±0.1	8	4	0.23±0.05	180
TF(X)	S14	2.92	2.30	0.95	TE	3000	3.5±0.1	3.15±0.1	8	4	0.23±0.05	180
US(X)	S05	2.90	2.80	1.0	TE	3000	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180
	S06	2.90	2.80	1.0	TE	2500	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180

Packaging specifications

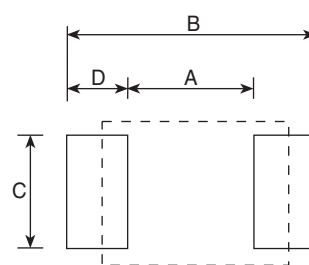


standard soldering pad dimensions

The optimum soldering pad dimensions may differ depending on soldering conditions, however, the following land dimensions are generally recommended.

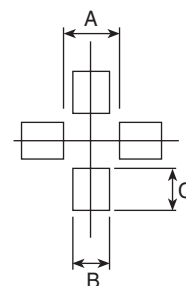
Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
RK73	1H	0.6 X 0.3	0.25	0.7	0.3	0.225
SG73	1E	1.0 X 0.5	0.5	1.3	0.3	0.4
RN73	1J	1.6 X 0.8	1.0	2.0	0.6	0.5
SR73	2A	2.0 X 1.25	1.3	2.5	1.05	0.6
RK73N	2B	3.2 X 1.6	2.2	4.0	1.4	0.9
LT73	2E	3.2 X 2.5	2.2	4.0	2.3	0.9
NT73	2H	5.0 X 2.5	3.3	6.1	2.3	1.4
PT72	3A	6.4 X 3.2	4.6	8.0	3.0	1.7
LA73	1	6.3 X 3.1	3.4	8.0	3.0	2.3
RF73	2-3	11.5 X 7.0	5.4	15.0	4.0	4.8
KL73	1	7.5 X 4.5	4.0	10.0	3.0	3.0
SL/TSL	2	12.0 X 8.0	8.0	15.0	4.0	3.5
NPR	2E	3.2 X 2.5	2.2	5.0	2.0	1.4
CCP	2B	3.2 X 1.6	2.2	5.0	1.4	1.4
CCF	1	6.0 X 2.5	3.0	7.2	2.8	2.1
LPC	4045	4.5 X 4.0	1.5	5.1	3.5	1.8
	9040	9.0 X 4.8	4.0	2.6	3.0	—
	10065	10.0 X 10.4	5.0	13.0	6.0	4.0
	12065	12 X 12.4	5.0	15.0	7.5	5.0
KL	32	3.2 X 2.5	2.2	5.0	2.0	1.4
KQT	0402	1.0 X 0.5	0.46	1.18	0.66	0.36
KQ	0603	1.6 X 1.0	0.64	1.92	1.02	0.64
	0805	2.0 X 1.5	0.76	2.8	1.78	1.02
	1008	2.5 X 2.2	1.27	3.31	2.54	1.02
CZB	1E	0.50 X 0.10	0.4	1.3	0.5	—
	1J	0.80 X 1.6	0.55	2.6	0.94	—
	2A	1.25 X 2.0	0.66	3.0	1.45	—
	2B	1.6 X 3.2	1.5	4.4	1.8	—
SDR	0604	5.6 X 4.5	1.7	6.0	5.8	—
	0805	7.5 X 7.5	2.4	7.8	8.0	2.7
	1006	9.5 X 9.5	2.8	10.0	10.0	3.6
TF	10	1.0 X 0.5	0.5	1.3	0.3	0.4
	16	1.6 X 0.8	1.0	2.0	0.6	0.5
TMC	P	2.0 X 1.25	1.2	1.1	0.8	—
	A	3.2 X 1.6	1.6	1.2	1.2	—
	B	3.5 X 2.8	1.6	2.2	1.4	—
	C	5.8 X 3.2	2.3	2.4	2.4	—
	E	7.3 X 4.3	2.3	2.6	3.8	—
	J	1.6 X 0.8	0.9	1.0	0.7	—

Flat Type Components

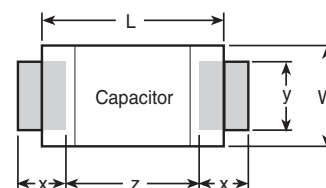


 Soldering Pad
 Chip Component

LPC 9040



TMC



Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
TLR	3A (1mΩ)	6.35 X 3.18	1.45	7.55	3.83	3.05
	3A (2mΩ)		3.45	7.55	3.83	2.05
	3A (3mΩ)		2.15	7.55	3.83	2.70
	3A (4mΩ)		3.45	7.55	3.83	2.05
	2B	3.2 X 1.6	1.4	4.0	1.8	1.3
	2H (2mW~6mW)	5.0 X 2.5	1.3	6.1	3.0	2.4
	2H (7mW~10mW)	5.0 X 2.5	3.3	6.1	3.0	1.4
	3AW (2mW~4mW)	6.35 X 3.18	1.45	7.55	3.83	3.05
	3AW (5mW~8mW)	6.35 X 3.18	3.45	7.55	3.83	2.05
	3AW (10mΩ)	6.35 X 3.18	4.40	7.55	3.83	1.575
UR73	2A	2.0 X 1.25	1.3	3.1	1.25	0.9
	2B	3.2 X 1.6	2.2	4.4	1.6	1.1
UR73D	1J	1.6 X 0.8	0.5	2.5	0.9	1.0
	2A	2.0 X 1.25	0.8	3.4	1.3	1.3
	2B	3.2 X 1.6	1.2	4.6	1.8	1.7
	3A (10m~30mΩ)	6.4 X 3.2	2.3	8.0	3.3	1.7
	3A (33m~100mΩ)	6.4 X 3.2	4.6	8.0	3.0	1.7
NV73	1E	1.0 X 0.5	0.51	1.73	0.51	0.61
	1J	1.6 X 0.8	1.0	3.0	1.2	1.0
	2A	2.0 X 1.25	1.2	4.0	1.0	1.4
	2B	3.2 X 1.6	2.2	5.0	1.3	1.4

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

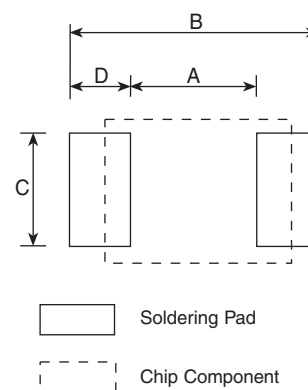
6/20/05

standard soldering pad dimensions (continued)

The optimum soldering pad dimensions may differ depending on soldering conditions, however, the following land dimensions are generally recommended.

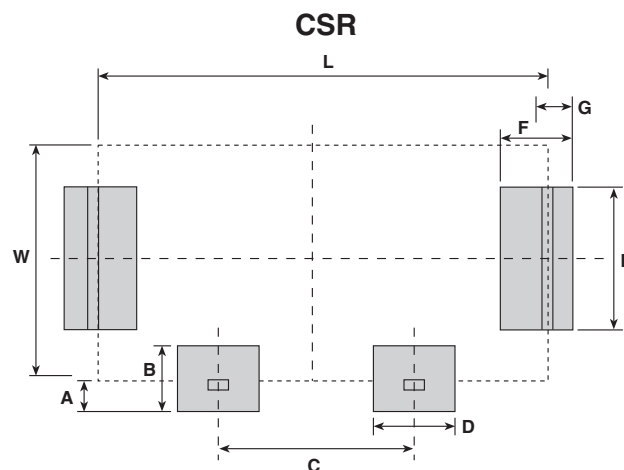
Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
LPS	5018	5.0 X 5.4	4.0	6.0	2.0	1.0
	5728	5.7 X 6.1	4.7	6.7	2.5	1.0
	6926	6.9 X 7.3	5.9	7.9	2.7	1.0

Flat Type Components



current sense resistor—CSR

Dimensions inches (mm)									
Type	L	W	A	B	C	D	E	F	G
CSR1	.393 (10.0)	.236 (6.0)	.039 (1.0)	.078 (2.0)	.196 (5.0)	.062 (1.6)	.118 (3.0)	.078 (2.0)	.039 (1.0)
CSR2	.472 (12.0)	.314 (8.0)	.062 (1.6)	.125 (3.2)	.236 (6.0)	.086 (2.2)	.208 (5.3)	.090 (2.3)	.045 (1.15)

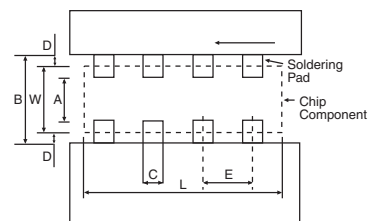


resistor arrays—CN

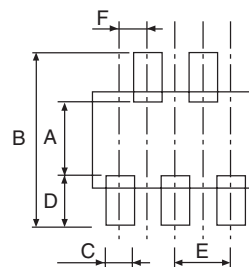
Type	Style	Dimensions						
		Component Size		A	B	C	D	E
		L	W					
CN	1E2K 1E4K	0.5 X n	1.0	0.5	1.5	0.4 0.3	0.25	0.67 0.5
	1F8K	3.8	1.6	1.0	2.6	0.3	0.5	0.5
	1JA/K	0.8 X n	1.6	1.0	2.6	0.6	0.5	0.8
	2B4A	5.1	3.1	2.1	4.1	0.9	0.5	1.27
	1J	0.8 X n	1.6	0.8	2.6	0.4	0.5	0.8
	2A	1.27 X n	2.0	1.0	3.0	0.65	0.5	1.27
	2B		3.2	2.2	4.2	0.65	0.5	1.27
CND	1J10K	3.2	1.6	0.9	2.6	0.4	0.5	0.64
	2B10	6.4	3.1	2.1	4.1	0.6	0.5	1.27
CNN	2A	2.54	2.0	1.2	2.8	0.6	0.4	1.27

Type	Style	Dimensions							
		Component Size	A	B	C	D	E	F	G
CND	1J10Y	3.2 X 1.6	0.9	2.3	0.3	0.7	0.635	2.45	0.4
CND	2A10Y	4.0 X 2.1	1.0	3.0	0.4	1.0	0.8	3.4	0.4
CNB	2E5Z	3.2 X 2.5	1.7	3.9	0.5	1.1	1.0	0.5	—
CNB	2B9Z	6.4 X 3.2	2.4	4.6	0.5	1.1	1.3	0.65	—

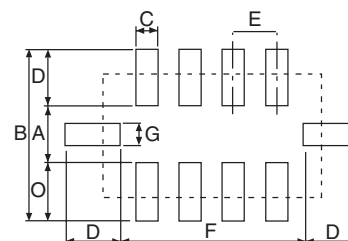
Chip Networks



CNB2E5Z, CNB2B9Z

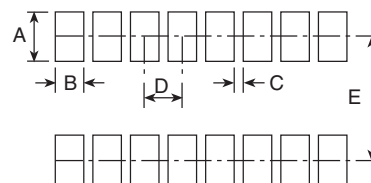


CND1J10Y, CND2A10Y



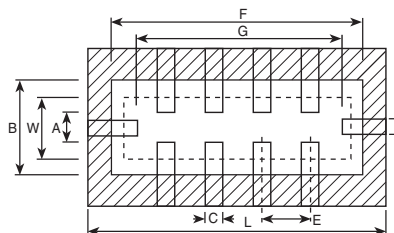
thick film resistor—MRGF

Type	Dimensions					
	Component Size	A	B	C	D	E
MRGF16	11.0 X 7.7	1.27	0.76	0.51	1.27	7.62



chip resistor array—CR

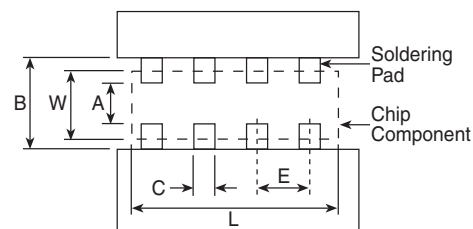
Dimensions inches (mm)								
L	W	A	B	C	D	E	F	G
1.6	.08	.07	.12	.02	.02	.03	.2	.14
4.0	2.1	1.7	3.1	0.4	0.4	0.8	5.1	3.5



(unit: mm)

ferrite bead array—FBA

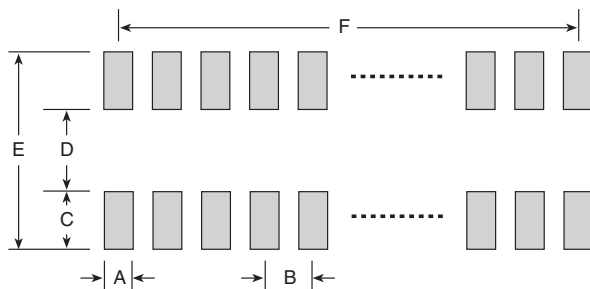
Chip Size	Dimensions inches (mm)					
	Component Size		A	B	C	E
	L	W				
1206 (3216)	.126 (3.2)	.063 (1.6)	.030 (0.762)	.120 (3.048)	.016 (0.406)	.031 (0.787)



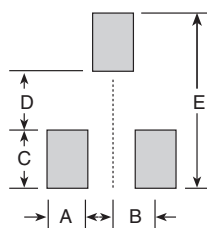
integrated passive devices—SOIC, TSSOP, QSOP & SOT23

Chip Size	Dimensions inches (mm)					
	A	B	C	D	E	F
N08	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.150 (3.81)
N14	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.300 (7.62)
N16	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.350 (8.89)
W16	.028 (0.7)	.050 (1.27)	.094 (2.4)	.272 (6.9)	.461 (11.7)	.350 (8.89)
W20	.028 (0.7)	.050 (1.27)	.094 (2.4)	.272 (6.9)	.461 (11.7)	.450 (11.43)
Q16	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.175 (4.45)
Q20	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.225 (5.72)
Q24	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.275 (6.99)
Q28	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.325 (8.26)
SOT23	.035 (0.9)	.037 (0.95)	.055 (1.4)	.035 (0.9)	.138 (3.5)	—

SOIC, TSSOP, QSOP

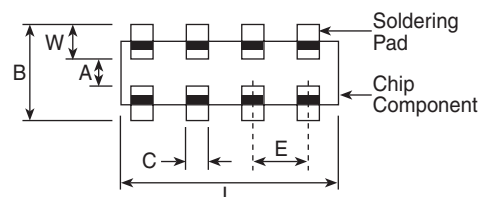


SOT23



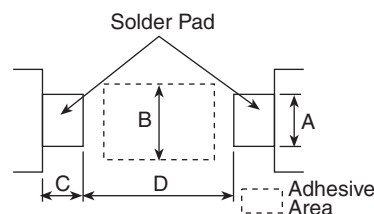
capacitor arrays—MCA

Chip Size	Dimensions inches (mm)				
	Size W	A	B	C	E
0402	.012 (0.31 ± 0.10)	—	.062 (1.59 ± 0.15)	.011 (0.28 ± 0.10)	.019 (0.50 ± 0.10)
0603	.035 (0.89 ± 0.10)	.030 (0.76 ± 0.10)	.099 (2.54 ± 0.15)	.020 (0.45 ± 0.10)	.031 (0.80 ± 0.10)

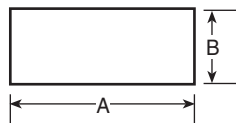


melf type components—MCR, RD41, RN41, RM41, MLT, CC

Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
MCR	1J	1.6 X 1.0	1.0	1.0	1.6	1.0
RD41	2A 10	2.0 X 1.25	1.3	1.3	2.0	1.3
RN41	2B,2E 12	3.5 X 1.45	1.5	2.2	1.5	2.0
RM41	2D 20	3.2 X 1.55	1.5	2.2	1.5	2.0
MLT	2E,2H 25	5.9 X 2.2	2.0	3.0	3.0	4.0
CC						



other chips—RCS, RCT, RCU, RCW

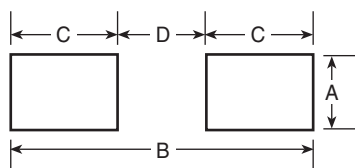


Type	Dimensions millimeters	
	A	B
RCS	4.1-4.3	1.4-1.6
RCT	2.9-3.1	1.05-1.25
RCU	2.5-2.7	0.6-0.8
RCW	4.1-4.3	1.4-1.6

ceramic chip capacitors

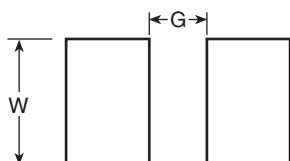
Component pads should be designed to achieve good solder fillets and minimize component movement during reflow soldering. Pad dimensions are given below for multilayer ceramic capacitors for both reflow and wave soldering. The basis for these designs is:

- Pad width equal to component width. It is permissible to decrease this to as low as 85% of component width but it is not advisable to go below this.
- Pad overlap 0.5mm beneath component
- Pad extension 0.5mm beyond components for reflow and 1.0mm for wave soldering



Case Size	Dimensions inches (mm)			
	A	B	C	D
0402	0.02 (0.50)	0.07 (1.70)	0.02 (0.60)	0.02 (0.50)
0603	0.03 (0.75)	0.09 (2.30)	0.03 (0.80)	0.03 (0.70)
0805	0.05 (1.25)	0.12 (3.00)	0.04 (1.00)	0.04 (1.00)
1206	0.06 (1.60)	0.16 (4.00)	0.04 (1.00)	0.09 (2.00)
1210	0.10 (2.50)	0.16 (4.00)	0.04 (1.00)	0.09 (2.00)
1812	0.12 (3.00)	0.22 (5.60)	0.04 (1.00)	0.14 (3.60)

ceramic chip capacitors—HFC

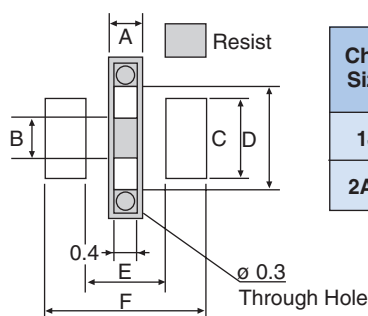


Type	Part	Dimensions inches (mm)	
		L	W
HFC	1005	0.015 (0.40)	0.020 (0.50)
	1410	0.031 (0.80)	0.039 (1.00)
	1608	0.039 (1.00)	0.031 (0.80)
	1610	0.039 (1.00)	0.039 (1.00)
	1612	0.039 (1.00)	0.047 (1.20)

three-terminal inductor/capacitor—KC

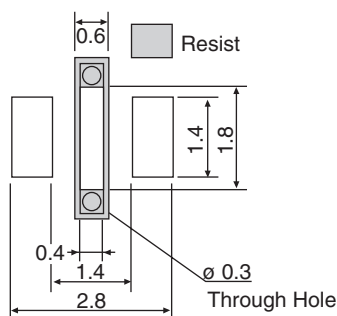
Chip Mounting Side

1J, 2AF



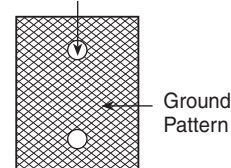
Chip Size	Dimensions inches (mm)					
	A	B	C	D	E	F
1J	.024 (0.6)	.020 (0.5)	.039 (1.0)	.055 (1.4)	.047 (1.2)	.094 (2.4)
2AF	.024 (0.6)	.028 (0.7)	.055 (1.4)	.071 (1.8)	.055 (1.4)	.110 (2.8)

2A



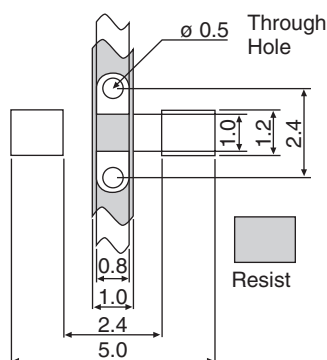
Back Side

Connect to ground pattern of mounting side



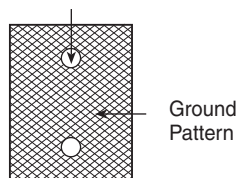
three-terminal capacitor/resistor—KCR

Chip Mounting Side



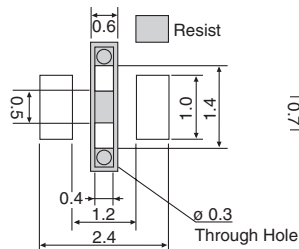
Back Side

Connect to ground pattern of mounting side

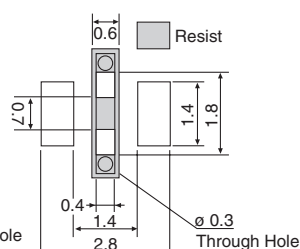


three-terminal capacitor—KGM

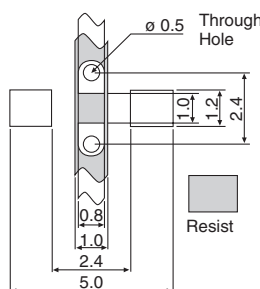
0603 Chip Mounting Side



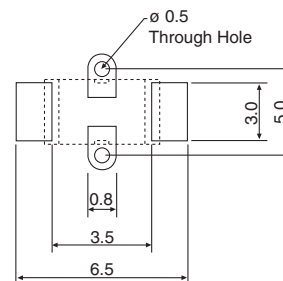
0805 Chip Mounting Side



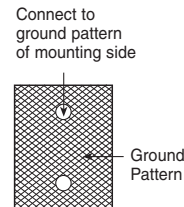
1206 Chip Mounting Side



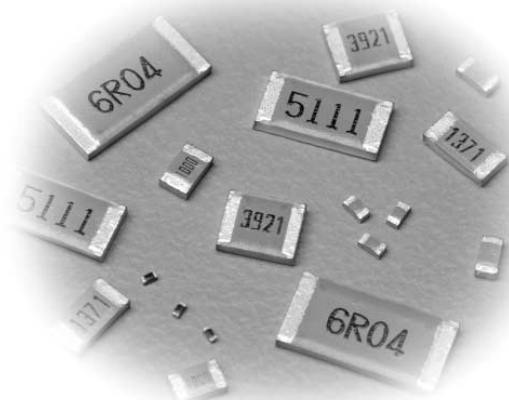
1812 Chip Mounting Side



0603, 0805, 1206, 1812 Back Side



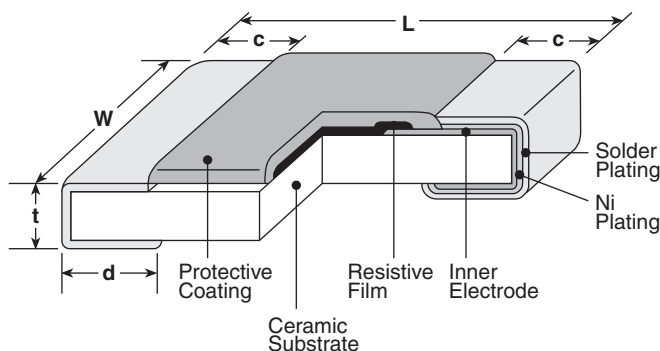
(unit: mm)



features

- RuO₂ thick film resistor element
- Anti-leaching nickel barrier terminations
- Also available with epoxy bondable palladium silver terminations in 1J, 2A and 2B sizes.
- Meets or exceeds EIA 575, EIAJ RC 2690A, EIA PDP-100, MIL-R-55342F
- Marking: Four-digit black on blue protective coat
No marking on 1H or 1E sizes
Three-digit on 1J size, E-24 values only

dimensions and construction



Type (Inch Size Code)	Dimensions inches (mm)				
	L	W	c	d	t
1H (0201)	.024±.001 (0.6±0.03)	.012±.001 (0.3±0.03)	.004±.002 (0.1±0.05)	.006±.002 (0.15±0.05)	.009±.001 (0.23±0.03)
1E (0402)	.039 ^{+.004} _{-.002} (1.0 ^{+.01} _{-.05})	.02±.002 (0.5±0.05)	.008±.004 (0.2±0.1)	.01 ^{+.002} _{-.004} (0.25 ^{+.05} _{-.1})	.014±.002 (0.35±0.05)
1J (0603)	.063±.008 (1.6±0.2)	.031±.004 (0.8±0.1)	.012±.004 (0.3±0.1)	.012±.004 (0.3±0.1)	.018±.004 (0.45±0.1)
2A (0805)	.079±.008 (2.0±0.2)	.049±.004 (1.25±0.1)	.016±.008 (0.4±0.2)	.012 ^{+.008} _{-.004} (0.3 ^{+.2} _{-.1})	.02±.004 (0.5±0.1)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.02±.012 (0.5±0.3)	.016 ^{+.008} _{-.004} (0.4 ^{+.2} _{-.1})	.024±.004 (0.6±0.1)
2E (1210)		.102±.008 (2.6±0.2)			
2H (2010)	.197±.008 (5.0±0.2)	.098±.008 (2.5±0.2)		.025±.005 (0.65±0.15)	
3A (2512)	.248±.008 (6.3±0.2)	.122±.008 (3.1±0.2)			

ordering information

New Part #	RK73H	2B	T	TD	1003	F
Type		Size	Termination Material	Packaging	Nominal Resistance	Tolerance
		1H 1E 1J 2A 2B 2E 2H 3A	T: Sn X: AgPd** G: Au* L: SnPb	TC: 2mm pitch pressed paper (0201 only) TB: 2mm pitch pressed paper (0201 only) TP: 2mm pitch punched paper (0402 & 0603) TD: 7" paper tape (0603, 0805, 1206 & 1210) TDD: 10" paper tape (0603, 0805, 1206 & 1210) TE: 7" punched plastic (0805, 1206, 1210, 2010 & 2512) TED: 10" punched plastic (0805, 1206, 1210, 2010 & 2512)	3 significant figures + 1 multiplier "R" indicates decimal on value <100Ω	D: ±0.5% F: ±1%

* Available ONLY in 1E, 1J and 2A
(10Ω ~ 1MΩ) chip sizes

** Available ONLY in 1J, 2A and 2B (10Ω ~ 10MΩ) chip sizes

For further information on packaging, please refer to Appendix A.

applications and ratings

Part Designation*	Power Rating @ 70°C	T.C.R. (ppm/°C) Max.	Resistance Range E-24, E-96 (D±0.5%)	Resistance Range E-24, E-96 (F±1%)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range**
RK73H1H (0201)	1/20W (.05W)	±200	10Ω - 1MΩ	10Ω - 1MΩ ¹	25V	50V	-55°C to +125°C
RK73H1E (0402)	1/16W (.063W)	±100	10Ω - 976k	10Ω - 1MΩ	50V	100V	-55°C to +155°C
		±200	—	1.02MΩ - 10MΩ			
		±400	—	1.0Ω - 9.76Ω			
RK73H1J (0603)	1/10W (.10W)	±100	10Ω - 1MΩ	10Ω - 1MΩ			
		±400	—	1.0Ω - 9.76Ω			
		±200	—	1.02MΩ - 10MΩ			
RK73H2A (0805)	1/8W (.125W)	±100	10Ω - 1MΩ	10Ω - 1MΩ	150V	300V	
		±400	—	1.0Ω - 9.76Ω 1.02MΩ - 10MΩ			
RK73H2B (1206)	1/4W (.25W)	±100	10Ω - 1MΩ	10Ω - 1MΩ	200V	400V	
		±200	—	1.02MΩ - 5.6MΩ			
		±400	—	1.0Ω - 9.76Ω 5.62MΩ - 10MΩ			
RK73H2E (1210)	1/2W (.50W)	±100	10Ω - 1KΩ	10Ω - 1KΩ			
	1/3W (.33W)		1.02KΩ - 1MΩ	1.02KΩ - 1MΩ			
	1/3W (.33W)	±200	—	1.02MΩ - 5.6MΩ			
	1/2W (.50W)	±400	—	1.0Ω - 9.76Ω			
	1/3W (.33W)		—	5.62MΩ - 10MΩ			
RK73H2H (2010)	3/4W (.75W)	±100	10Ω - 1MΩ	10Ω - 1MΩ			
		±200	—	1.02MΩ - 5.6MΩ			
		±400	—	1.0Ω - 9.76Ω 5.62MΩ - 10MΩ			
RK73H3A (2512)	1W	±100	10Ω - 1MΩ	10Ω - 1MΩ			
		±200	—	1.02MΩ - 5.6MΩ			
		±400	—	1.0Ω - 9.76Ω 5.62MΩ - 10MΩ			

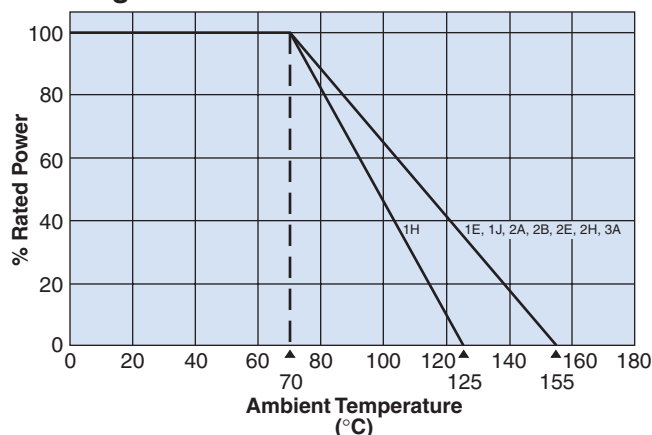
* Parenthesis indicate EIA package size codes.

¹ E-24 values only.

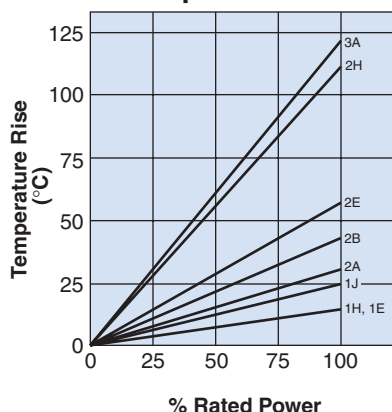
** 1J, 2A, 2B sizes available -55°C to +175°C (contact factory).

environmental applications

Derating Curve



Surface Temperature Rise



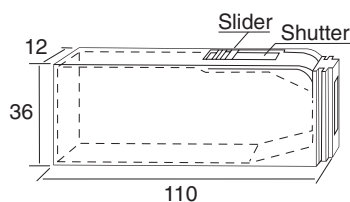
For complete environmental specifications, please refer to pages 24-25.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

3/22/05

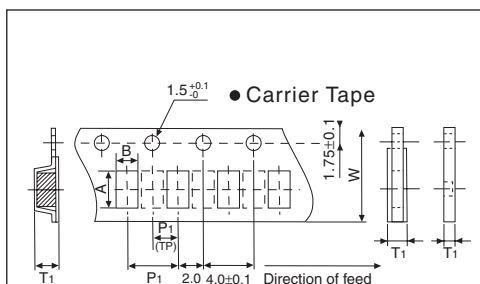
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
RK73B RK73H RK73G RK73A RK73Z SG73 RK73N SR73 RF73 UR73 RN73 LT73	1F	0.4	0.2	0.12	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.31±0.2/-0	178
	1H	0.6	0.3	0.23	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.42±0.2/-0	178
	1E	1	0.5	0.35	TB	10000	0.67±0.05	0.37±0.05	8.0±0.2	2±0.05	0.37±0.2/-0	178
					TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2±0.05	0.45±0.2/-0	178
	1J	1.6	0.8	0.45	TP	10000	1.9±0.1	1.1±0.1	8.0±0.2	2±0.05	0.6±0.2/-0	178
					TD	5000	1.9±0.1	1.1±0.08	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
					TP	10000	2.4±0.2	1.65±0.2	8.0±0.2	2±0.05	0.75±0.2/-0	178
					TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	0.9±0.1	178
					TDD	10000	2.4±0.1	1.65±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	2.4±0.2	1.45±0.15	8.0±0.2	4.0±0.1	0.65±0.1	255
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	178
					TDD	10000	3.5±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.5±0.1	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	255
					TD	5000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1.0±0.15	178
	2E	3.2	2.6	0.6	TDD	10000	3.5±0.1	2.8±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.6±0.15	2.9±0.15	8.0±0.2	4.0±0.1	1.0±0.1	255
					TE	4000	5.35±0.2	2.9±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
	2H	5	2.5	0.6	TED	10000	5.4±0.2	2.9±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
	3A	6.3	3.1	0.6	TE	4000	6.65±0.2	3.44±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
					TED	10000	6.9±0.2	3.6±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
CND	2B10	6.40	3.1	0.6	TE	4000	6.6±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
	1J10	3.20	1.6	0.55	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2A10	4.00	2.1	0.6	TE	4000	4.45±0.2	2.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
CNB	2B5Z	3.2	2.5	0.6	TE	4000	3.5±0.2	3.0±0.2	8.0±0.2	4.0±0.1	1±0.15	178
	2E9Z	6.40	3.2		TE	4000	6.7±0.2	3.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
TMC	P	2.0	1.025	1.2	TE	3000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	1.6 MAX	178
	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	178
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.3 MAX	178
TMR	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMH	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.7±0.1	8±0.3	4±0.1	2.5 MAX	180
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMU	UA	3.2	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8±0.3	4±0.1	7.0 MAX	180
	UC	6.0	3.2	1.5	TE	1000	6.3±0.1	3.7±0.1	12±0.3	8±0.1	7.0 MAX	180
TMX	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
	F	7.3	5.8	3.5	TE	500	7.5±0.1	6.3±0.1	12±0.3	8±0.1	4.1 MAX	180

Bulk Case (RK73 1E, 1J, 2A, 2B) Packaging Designation: BK

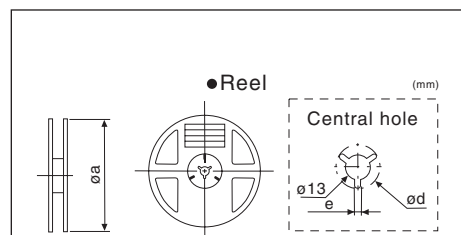


Style	Packaging Quantity
1E	50,000 pieces/case
1J	25,000 pieces/case
2A	10,000 pieces/case
2B	5,000 pieces/case

Packaging specifications



(Notes) Dotted lines are applicable to only "TP" and "TB."



(Notes) Reel holes, shapes and design are examples

Type	ød (mm)	e (mm)
All	21	2
RCU, RCT, RCS, RCW	27	3

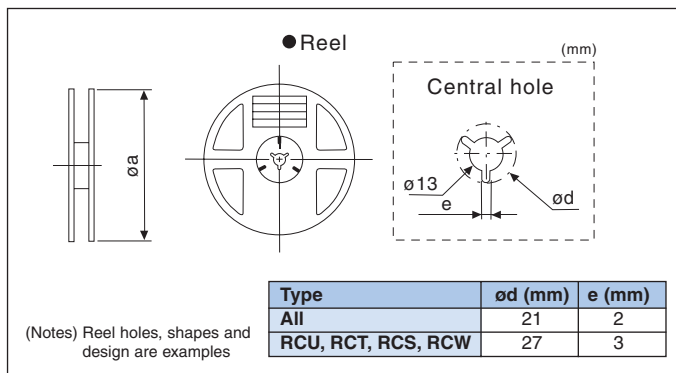
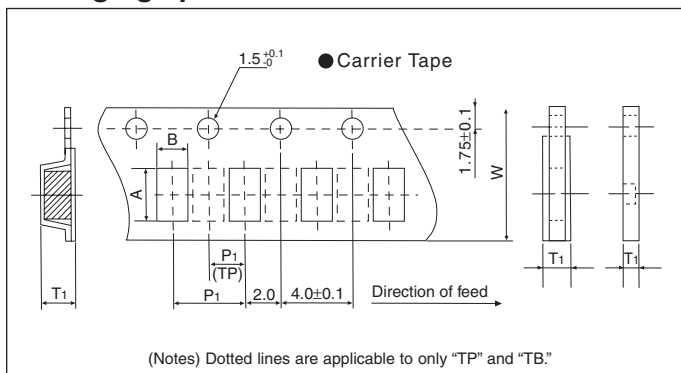
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
CN CN_A CN_K CN_Z	1F8	3.8±0.1	1.6±0.2	0.44±0.1	TP	5000	4.0±0.1	1.8±0.1	8.0±0.2	2.0±0.05	0.55±0.1	178
	1E2K	1.00	1	0.35	TP	10000	1.2±0.1	1.2±0.1	8.0±0.2	2.0±0.05	0.45±0.1	178
	1E4/1E4K				TP	10000	2.2±0.1	1.2±0.1	8.0±0.2	2.0±0.5	0.45±0.1	178
	1J2/1J2K	1.60	1.6	0.6/0.5	TD	5000	1.9±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	255
	1J4/1J4KA	3.20	1.6	0.6/0.5	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0 0.6±0.2/-0	255
	1J8	6.40	2	0.6	TE	4000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	178
					TED	10000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	255
	2A2	2.54	2	0.6	TE	4000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2A4	5.08	2	0.6	TE	4000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	255
	2A8	10.16	2	0.6	TE	4000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	178
					TED	10000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	255
	2B2	2.54	3.2	0.6	TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2B4	5.08	3.2	0.6	TE	4000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	255
RD41B RN41 RM41 MLT CC	2B8	10.16	3.2	0.6	TE	2000	10.55±0.2	3.6±0.2	16	4.0±0.1	1±0.15	178
					TED	5000	10.55±0.2	3.6±0.2	16	4.0±0.1	1±0.15	255
	2A	2	1.25	-	TE	3000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	178
					TED	10000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	255
	2B	3.5	1.45	-	TE	3000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
					TED	10000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	255
NT73 LA73 LT73	2D	3.2	1.55	-	TE	2000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
					TED	10000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	255
	2E, 2H, 3AS	5.9	2.2	-	TE	1500	6.2±0.2	2.4±0.2	12.0±0.1	4.0±0.1	2.6±0.2	178
					TED	10000	6.2±0.2	2.4±0.2	12.0±0.1	4.0±0.1	2.6±0.2	255
PT72	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.1/-0	178
	1J	1.6	0.8	0.45	TD	5000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
RCU	2A	2	1.25	1	TE	3000	2.25±0.1	1.45±0.1	8.0±0.2	4.0±0.1	1.5±0.15	178
	2B	3.2	1.6	1	TE	3000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.5±0.15	178
RCT		1.60	0.8	1.15	TE	2000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	178
					TED	5000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	255
RCS		2.00	1.25	1.45	TE	2000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	178
					TED	5000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	255
RCW		3.20	1.6	1.25	TE	2000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	178
					TED	5000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	255
C4000		3.2	1.6	2	TE	2000	3.4±0.1/ -0.05	1.95±0.1/ -0.05	8.0±0.2	4.0±0.1	2.2±0.1	178
KL32	C4L_I12	4.50	3.8	2.25	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4L_I14			2.3	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4315			2.4	TE	500	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	3.0±0.2	178
KL73	1H	0.6	0.3	0.23	TP	10000	0.67±0.05	0.37±0.05	8.0	2.0	0.42±0.2/-0	178
	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.1	180
	1J	1.6	0.8	0.5	TE	4000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.9±0.15	180
	2A	2	1.25	0.5	TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
	2B	3.2	1.6	10.6	TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
KQ KQC KQT	0402	1.10	0.5	0.5	TD	2000	1.22±0.05	0.73±0.05	8.0±0.2	4.0±0.1	0.65±0.1	180
	0603	1.60	1	0.9	TE	2000	1.72±0.05	1.07±0.05	8.0±0.2	4.0±0.1	1.2±0.1	180
	0805	2.00	1.5	1.3	TE	2000	2.22±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.65±0.1	180
	1008	2.50	2.2	1.8	TE	2000	2.7±0.1	2.35±0.1	8.0±0.2	4.0±0.1	2.2±0.1	180
LPC	4045	4.50	4	4.5	TED	1000	4.158±0.2	4.75±0.2	12.0±0.1	8.0±0.2	5±0.2	380
	9040N	9.00	10.2	4.9	TED	500	Ø9.4±0.2		16±0.1	12±0.1	7±0.2	380
	12065	12.40	12	7.5	TED	300	12.5±0.2	13±0.2	24±0.1	16±0.2	8.2±0.2	380
	10065	10.40	10	7.5	TED	300	11±0.2	111.5±0.2	24±0.1	16±0.2	8.2±0.2	380
SDR	0604	5.6	—	4.5	TE	1500	—	—	12	4.0±0.1	5.0	330
	0805	7.8	—	5.3	TE	1000	—	—	—	12.0	6.2	380
	1006	9.8	—	5.8	TE	1000	—	—	—	12.0	6.7	380
SL	1	6.3	3.1	1.9	TE	1000	6.8±0.1	3.6±0.1	12.0±0.1	8.2±0.2	2.35±0.1	180
	2/3	11.5	7	2.5	TED	1000	12.2±0.1	7.7±0.1	24	12.0±0.1	3.1±0.1	255
LPS	5018	5.4	5.0	1.8	TE	1000	5.6±0.1	6.3±0.1	16±0.1	12±0.1	2.1±0.1	255
	5728	6.1	5.7	2.8	TE	1000	6.3±0.1	6.0±0.1	16±0.1	12±0.1	3.2±0.1	255
	6926	7.3	6.9	2.6	TE	1000	7.5±0.1	7.2±0.1	16±0.1	12±0.1	3.0±0.1	255

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
TLR	3A, 3AW	6.4	3.2	0.6	TE	2000	6.75±0.2	3.55±0.1	12.0±0.1	8.0±0.2	1.0±0.1	180
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2.0±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	180
	2H	5.0	2.5	0.6	TE	4000	5.35±0.2	2.9±0.1	12.0±0.1	4.0±0.1	1.0±0.15	180
TSL	1	6.3	3.1	1	TE	3000	6.6±0.1	3.4±0.1	12.0±0.1	4.0±0.1	1.3±0.1	180
NPR	1	7.5	4.5	2	TE	1000	7.9±0.1	4.8±0.1	16	8.2±0.2	2.45±0.1	178
	2	12	8	4	TE	1000	13±0.1	9±0.1	24	102	4.35±0.1	330
CSR	1	10.8	6.2	2.1	TE	1000	11.1±0.14	6.7±0.1	24	12.0±0.1	2.6±0.1	255
	2	12.8±0.5	8.2±0.3	3.1±0.2	TE	1000	13.0±0.1	9.0±0.15	24	12.0±0.1	4.35±0.1	330
CZB CZP MCL	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.65±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	4000	1.8±0.1	1.1±0.1	8.1±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MHL	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.67±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TD	4000	1.85±0.1	1.15±0.1	8.0±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.0±0.1	4.0±0.1	1.2±0.1	178
	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MCA	1E4	2.0±0.15	1.25±0.15	0.6±0.1	TE	4000	2.2±0.1	1.45±0.1	8.0±0.2	4.0±0.1	2.0±0.1	180
	1J4	3.2±0.15	1.6±0.15	0.8±0.1	TD	4000	3.5±0.15	1.9±0.15	8.0±0.2	4.0±0.1	2.5±0.1	180
KGM	0603	1.6±0.2	0.8±0.2	0.6±0.2	TE	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	2.5 max.	178
	0805	2.0±0.2	1.25±0.2	0.8±0.2	TE	4000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1812	4.5±0.3	3.2±0.3	1.0±0.2	TE	1000	4.9±0.1	3.5±0.2	12.0±0.3	4.0±0.1	2.5 max.	178
FBA	1J	3.2±0.2	1.6±0.2	0.8±0.2	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
NV73	1E	1.0±0.1	0.5±0.1	0.25±0.15	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	4.0±0.1	0.6±0.2	180
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	2500	1.9±0.1	1.2±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2A	2.0±0.2	1.25±0.2	1.3 max.	TE	2500	2.4±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2B	3.2±0.2	1.6±0.2	1.65 max.	TE	2500	3.6±0.1	2.0±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
LR72	A	10±0.2	5.2	2	TED	2000	1.45±0.2	5.7±0.2	2.0±0.05	8.0±0.10	2.3±0.2	255
	B	10±0.2	3	2	TED	2000	1.45±0.2	3.4±0.2	2.0±0.05	8.0±0.10	2.5±0.2	255
	C	11.2±0.4	3.2±0.4	3.5±0.4	TEB	1500	1.17±0.1	4.3±0.1	24±0.2	8.0±0.1	4.4±0.15	330
HFC	1005	1.0±0.15	0.5±0.1	0.5±0.1	T	10000	1.15±0.03	0.65±0.03	8.0±0.10	2.0±0.05	0.60±0.05	178
	1410	1.4±0.15	1.0±0.1	1.0±0.1	TE	3000	1.60±0.05	1.20±0.05	8.0±0.20	4.0±0.10	1.20±0.10	178
	1608	1.6±0.15	0.8±0.1	0.7±0.2	TE	4000	1.80±0.05	1.00±0.05	8.0±0.20	4.0±0.10	0.75 or 0.95±0.10	178
	1610	1.6±0.15	1.0±0.1	0.85±0.25	TE	3000	1.80±0.05	1.20±0.05	8.0±0.20	4.0±0.10	0.80 or 1.00 or 1.20±0.10	178
KC	1612	1.6±0.15	1.2±0.1	1.1±0.2	TE	3000	1.80±0.05	1.40±0.05	8.0±0.20	4.0±0.10	1.40±0.10	178
	1J	1.6±0.2	0.8±0.2	0.6±0.2	TD	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	0.75±0.04	178
	2AF	2.0±0.2	1.25±0.2	0.8±0.2	TD	4000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	N/A	178
KCR	2A	2.0±0.2	1.25±0.2	1.6±0.2	TE	2000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	1.9±0.1	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
TF	10A	1.00	0.5	0.45	TB	10000	1.15±0.05	0.65±0.05	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	16S	1.60	0.8	0.6	TD	5000	1.9±0.1	1.1±0.1	8.0±0.3	4.0±0.1	0.9±0.1	180
CCP	2B	3.20	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	1.5±0.1	178
	2E	3.20	2.5	2.2	TE	2000	3.5±0.1	2.8±0.1	8.0±0.3	4.0±0.1	2.4±0.1	178
CCF	1	6.00	2.5	2.5	TE	1000	6.4±0.2	2.7±0.2	12.0±0.3	4.0±0.1	2.9±0.2	178
CR	1J10	3.2±0.1	1.6±0.1	0.65±0.1	TE	4000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0.1	178
	2A10	4.0±0.2	2.1±0.2	0.7±0.1			4.4±0.2	2.5±0.2	12.0±0.2	4.0±0.1	1.15±0.2	178
MRGF16	—	11	7.7	2.2	TEB	2000	11.7±0.2	8.2±0.2	24	12	2.4±0.1	330
PGD	1E	1.1	0.75	0.75	TE	5000	3.5±0.10	1.2±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180
	1J	1.6	0.8	0.75	TE	4000	3.5±0.1	1.0±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180

*MHL0805: 1.5nH ~ 39nH = 4,000 pieces, 47nH ~ R68 = 3,000 pieces

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
AA(X)	T16	5.0	6.4	1.0	TE	2500	5.4±0.1	6.8±0.1	16	8	0.3±0.05	330
	T20	6.5	6.4	1.0	TE	2500	7.1±0.1	6.95±0.1	16	8	0.3±0.05	330
AC(X)	T24	7.8	6.4	1.0	TE	2500	8.3±0.1	6.95±0.1	16	8	0.3±0.05	330
AP(X)	Q16	4.9	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
CR(X)	Q20	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
CTX	Q24	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
DNA	Q28	10.0	5.99	1.6	TE	2500	3.5±0.1	6.5±0.1	16	8	0.3±0.05	330
DN(X)	N08	4.83	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
EA(X)	N14	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
ED(X)	N16	9.91	5.99	1.6	TE	2500	10.3±0.1	6.5±0.1	16	8	0.3±0.05	330
RD(X)	W16	10.44	10.36	2.4	TE	1000	10.7±0.1	10.9±0.1	16	12	0.3±0.05	330
R(X)A	W20	12.7	10.36	2.4	TE	1000	13.3±0.1	10.9±0.1	24	12	0.3±0.05	330
RT(X)	S03	2.92	2.30	0.95	TE	3000	2.77±0.1	3.15±0.1	8	4	0.23±0.05	180
TF(X)	S14	2.92	2.30	0.95	TE	3000	3.5±0.1	3.15±0.1	8	4	0.23±0.05	180
US(X)	S05	2.90	2.80	1.0	TE	3000	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180
	S06	2.90	2.80	1.0	TE	2500	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180

Packaging specifications

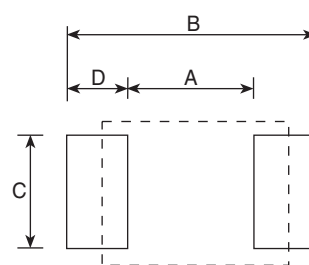



standard soldering pad dimensions

The optimum soldering pad dimensions may differ depending on soldering conditions, however, the following land dimensions are generally recommended.

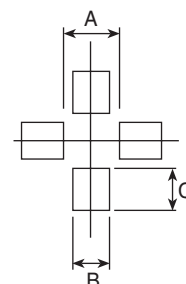
Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
RK73	1H	0.6 X 0.3	0.25	0.7	0.3	0.225
SG73	1E	1.0 X 0.5	0.5	1.3	0.3	0.4
RN73	1J	1.6 X 0.8	1.0	2.0	0.6	0.5
SR73	2A	2.0 X 1.25	1.3	2.5	1.05	0.6
RK73N	2B	3.2 X 1.6	2.2	4.0	1.4	0.9
LT73	2E	3.2 X 2.5	2.2	4.0	2.3	0.9
NT73	2H	5.0 X 2.5	3.3	6.1	2.3	1.4
PT72	3A	6.4 X 3.2	4.6	8.0	3.0	1.7
LA73	1	6.3 X 3.1	3.4	8.0	3.0	2.3
RF73	2-3	11.5 X 7.0	5.4	15.0	4.0	4.8
KL73	1	7.5 X 4.5	4.0	10.0	3.0	3.0
SL/TSL	2	12.0 X 8.0	8.0	15.0	4.0	3.5
NPR	2E	3.2 X 2.5	2.2	5.0	2.0	1.4
CCP	2B	3.2 X 1.6	2.2	5.0	1.4	1.4
CCF	1	6.0 X 2.5	3.0	7.2	2.8	2.1
LPC	4045	4.5 X 4.0	1.5	5.1	3.5	1.8
	9040	9.0 X 4.8	4.0	2.6	3.0	—
	10065	10.0 X 10.4	5.0	13.0	6.0	4.0
	12065	12 X 12.4	5.0	15.0	7.5	5.0
KL	32	3.2 X 2.5	2.2	5.0	2.0	1.4
KQT	0402	1.0 X 0.5	0.46	1.18	0.66	0.36
KQ	0603	1.6 X 1.0	0.64	1.92	1.02	0.64
	0805	2.0 X 1.5	0.76	2.8	1.78	1.02
	1008	2.5 X 2.2	1.27	3.31	2.54	1.02
KQC	1E	0.50 X 0.10	0.4	1.3	0.5	—
	1J	0.80 X 1.6	0.55	2.6	0.94	—
	2A	1.25 X 2.0	0.66	3.0	1.45	—
	2B	1.6 X 3.2	1.5	4.4	1.8	—
SDR	0604	5.6 X 4.5	1.7	6.0	5.8	—
	0805	7.5 X 7.5	2.4	7.8	8.0	2.7
	1006	9.5 X 9.5	2.8	10.0	10.0	3.6
TF	10	1.0 X 0.5	0.5	1.3	0.3	0.4
	16	1.6 X 0.8	1.0	2.0	0.6	0.5
TMC	P	2.0 X 1.25	1.2	1.1	0.8	—
	A	3.2 X 1.6	1.6	1.2	1.2	—
	B	3.5 X 2.8	1.6	2.2	1.4	—
	C	5.8 X 3.2	2.3	2.4	2.4	—
	E	7.3 X 4.3	2.3	2.6	3.8	—
	J	1.6 X 0.8	0.9	1.0	0.7	—

Flat Type Components

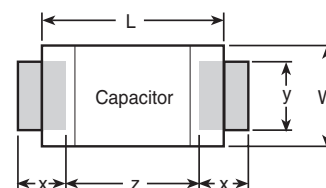


 Soldering Pad
 Chip Component

LPC 9040



TMC



Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
TLR	3A (1mΩ)	6.35 X 3.18	1.45	7.55	3.83	3.05
	3A (2mΩ)		3.45	7.55	3.83	2.05
	3A (3mΩ)		2.15	7.55	3.83	2.70
	3A (4mΩ)		3.45	7.55	3.83	2.05
	2B	3.2 X 1.6	1.4	4.0	1.8	1.3
	2H (2mW~6mW)	5.0 X 2.5	1.3	6.1	3.0	2.4
	2H (7mW~10mW)	5.0 X 2.5	3.3	6.1	3.0	1.4
	3AW (2mW~4mW)	6.35 X 3.18	1.45	7.55	3.83	3.05
	3AW (5mW~8mW)	6.35 X 3.18	3.45	7.55	3.83	2.05
	3AW (10mΩ)	6.35 X 3.18	4.40	7.55	3.83	1.575
UR73	2A	2.0 X 1.25	1.3	3.1	1.25	0.9
	2B	3.2 X 1.6	2.2	4.4	1.6	1.1
UR73D	1J	1.6 X 0.8	0.5	2.5	0.9	1.0
	2A	2.0 X 1.25	0.8	3.4	1.3	1.3
	2B	3.2 X 1.6	1.2	4.6	1.8	1.7
	3A (10m~30mΩ)	6.4 X 3.2	2.3	8.0	3.3	1.7
	3A (33m~100mΩ)	6.4 X 3.2	4.6	8.0	3.0	1.7
NV73	1E	1.0 X 0.5	0.51	1.73	0.51	0.61
	1J	1.6 X 0.8	1.0	3.0	1.2	1.0
	2A	2.0 X 1.25	1.2	4.0	1.0	1.4
	2B	3.2 X 1.6	2.2	5.0	1.3	1.4

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

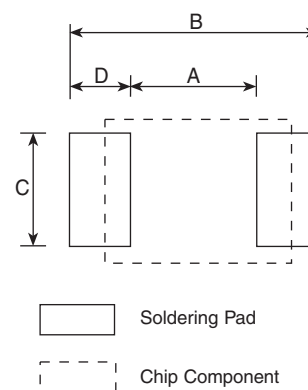
6/20/05

standard soldering pad dimensions (continued)

The optimum soldering pad dimensions may differ depending on soldering conditions, however, the following land dimensions are generally recommended.

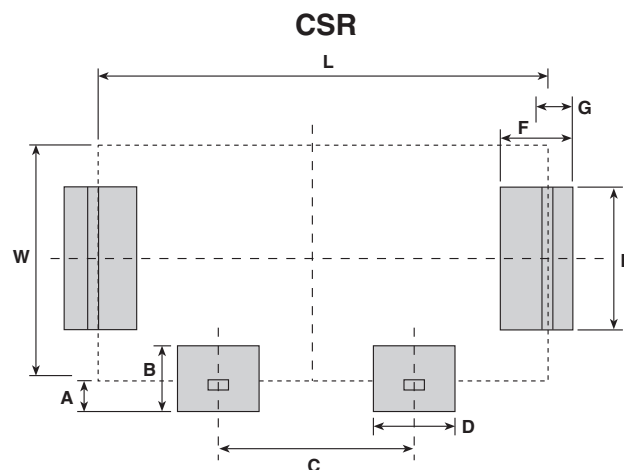
Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
LPS	5018	5.0 X 5.4	4.0	6.0	2.0	1.0
	5728	5.7 X 6.1	4.7	6.7	2.5	1.0
	6926	6.9 X 7.3	5.9	7.9	2.7	1.0

Flat Type Components



current sense resistor—CSR

Dimensions inches (mm)									
Type	L	W	A	B	C	D	E	F	G
CSR1	.393 (10.0)	.236 (6.0)	.039 (1.0)	.078 (2.0)	.196 (5.0)	.062 (1.6)	.118 (3.0)	.078 (2.0)	.039 (1.0)
CSR2	.472 (12.0)	.314 (8.0)	.062 (1.6)	.125 (3.2)	.236 (6.0)	.086 (2.2)	.208 (5.3)	.090 (2.3)	.045 (1.15)

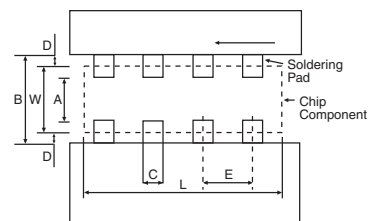


resistor arrays—CN

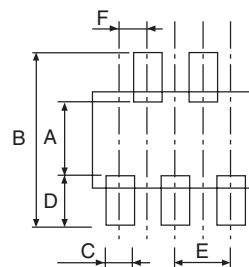
Type	Style	Dimensions						
		Component Size		A	B	C	D	E
		L	W					
CN	1E2K 1E4K	0.5 X n	1.0	0.5	1.5	0.4 0.3	0.25	0.67 0.5
	1F8K	3.8	1.6	1.0	2.6	0.3	0.5	0.5
	1JA/K	0.8 X n	1.6	1.0	2.6	0.6	0.5	0.8
	2B4A	5.1	3.1	2.1	4.1	0.9	0.5	1.27
	1J	0.8 X n	1.6	0.8	2.6	0.4	0.5	0.8
	2A	1.27 X n	2.0	1.0	3.0	0.65	0.5	1.27
	2B		3.2	2.2	4.2	0.65	0.5	1.27
CND	1J10K	3.2	1.6	0.9	2.6	0.4	0.5	0.64
	2B10	6.4	3.1	2.1	4.1	0.6	0.5	1.27
CNN	2A	2.54	2.0	1.2	2.8	0.6	0.4	1.27

Type	Style	Dimensions							
		Component Size	A	B	C	D	E	F	G
CND	1J10Y	3.2 X 1.6	0.9	2.3	0.3	0.7	0.635	2.45	0.4
CND	2A10Y	4.0 X 2.1	1.0	3.0	0.4	1.0	0.8	3.4	0.4
CNB	2E5Z	3.2 X 2.5	1.7	3.9	0.5	1.1	1.0	0.5	—
CNB	2B9Z	6.4 X 3.2	2.4	4.6	0.5	1.1	1.3	0.65	—

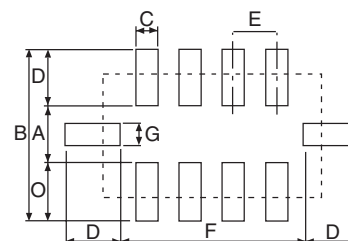
Chip Networks



CNB2E5Z, CNB2B9Z

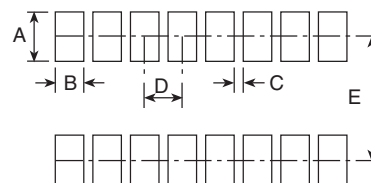


CND1J10Y, CND2A10Y



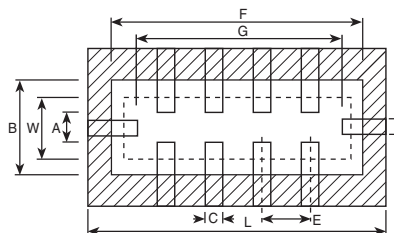
thick film resistor—MRGF

Type	Dimensions					
	Component Size	A	B	C	D	E
MRGF16	11.0 X 7.7	1.27	0.76	0.51	1.27	7.62



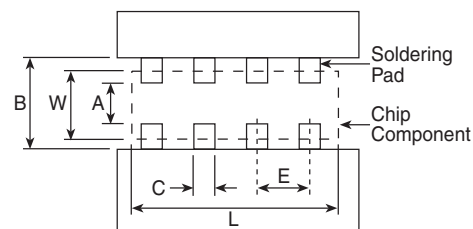
chip resistor array—CR

Dimensions inches (mm)								
L	W	A	B	C	D	E	F	G
1.6	.08	.07	.12	.02	.02	.03	.2	.14
4.0	2.1	1.7	3.1	0.4	0.4	0.8	5.1	3.5



ferrite bead array—FBA

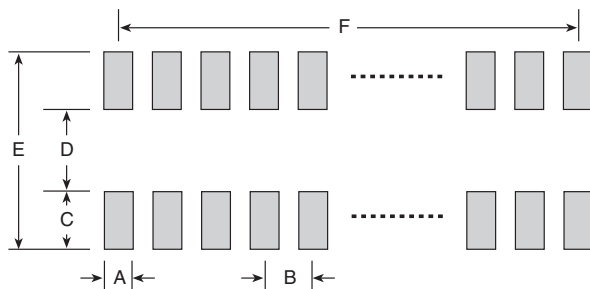
Chip Size	Dimensions inches (mm)					
	Component Size		A	B	C	E
	L	W				
1206 (3216)	.126 (3.2)	.063 (1.6)	.030 (0.762)	.120 (3.048)	.016 (0.406)	.031 (0.787)



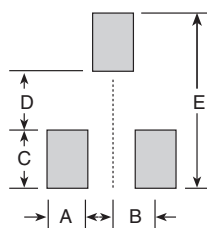
integrated passive devices—SOIC, TSSOP, QSOP & SOT23

Chip Size	Dimensions inches (mm)					
	A	B	C	D	E	F
N08	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.150 (3.81)
N14	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.300 (7.62)
N16	.028 (0.7)	.050 (1.27)	.094 (2.4)	.098 (2.5)	.287 (7.3)	.350 (8.89)
W16	.028 (0.7)	.050 (1.27)	.094 (2.4)	.272 (6.9)	.461 (11.7)	.350 (8.89)
W20	.028 (0.7)	.050 (1.27)	.094 (2.4)	.272 (6.9)	.461 (11.7)	.450 (11.43)
Q16	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.175 (4.45)
Q20	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.225 (5.72)
Q24	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.275 (6.99)
Q28	.012 (0.3)	.025 (0.63)	.050 (1.27)	.180 (4.56)	.280 (7.1)	.325 (8.26)
SOT23	.035 (0.9)	.037 (0.95)	.055 (1.4)	.035 (0.9)	.138 (3.5)	—

SOIC, TSSOP, QSOP

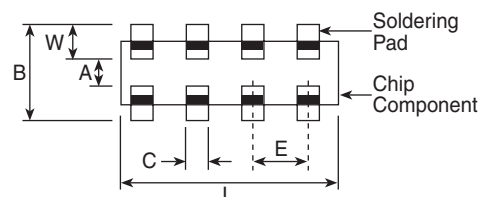


SOT23



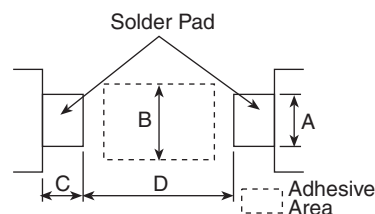
capacitor arrays—MCA

Chip Size	Dimensions inches (mm)				
	Size W	A	B	C	E
0402	.012 (0.31 ± 0.10)	—	.062 (1.59 ± 0.15)	.011 (0.28 ± 0.10)	.019 (0.50 ± 0.10)
0603	.035 (0.89 ± 0.10)	.030 (0.76 ± 0.10)	.099 (2.54 ± 0.15)	.020 (0.45 ± 0.10)	.031 (0.80 ± 0.10)

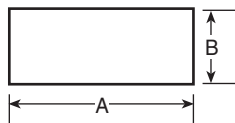


melf type components—MCR, RD41, RN41, RM41, MLT, CC

Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
MCR	1J	1.6 X 1.0	1.0	1.0	1.6	1.0
RD41	2A 10	2.0 X 1.25	1.3	1.3	2.0	1.3
RN41	2B,2E 12	3.5 X 1.45	1.5	2.2	1.5	2.0
RM41	2D 20	3.2 X 1.55	1.5	2.2	1.5	2.0
MLT	2E,2H 25	5.9 X 2.2	2.0	3.0	3.0	4.0
CC						



other chips—RCS, RCT, RCU, RCW

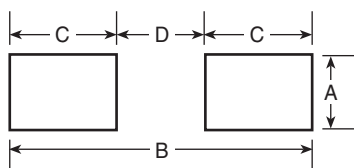


Type	Dimensions millimeters	
	A	B
RCS	4.1-4.3	1.4-1.6
RCT	2.9-3.1	1.05-1.25
RCU	2.5-2.7	0.6-0.8
RCW	4.1-4.3	1.4-1.6

ceramic chip capacitors

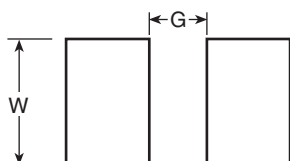
Component pads should be designed to achieve good solder fillets and minimize component movement during reflow soldering. Pad dimensions are given below for multilayer ceramic capacitors for both reflow and wave soldering. The basis for these designs is:

- Pad width equal to component width. It is permissible to decrease this to as low as 85% of component width but it is not advisable to go below this.
- Pad overlap 0.5mm beneath component
- Pad extension 0.5mm beyond components for reflow and 1.0mm for wave soldering



Case Size	Dimensions inches (mm)			
	A	B	C	D
0402	0.02 (0.50)	0.07 (1.70)	0.02 (0.60)	0.02 (0.50)
0603	0.03 (0.75)	0.09 (2.30)	0.03 (0.80)	0.03 (0.70)
0805	0.05 (1.25)	0.12 (3.00)	0.04 (1.00)	0.04 (1.00)
1206	0.06 (1.60)	0.16 (4.00)	0.04 (1.00)	0.09 (2.00)
1210	0.10 (2.50)	0.16 (4.00)	0.04 (1.00)	0.09 (2.00)
1812	0.12 (3.00)	0.22 (5.60)	0.04 (1.00)	0.14 (3.60)

ceramic chip capacitors—HFC

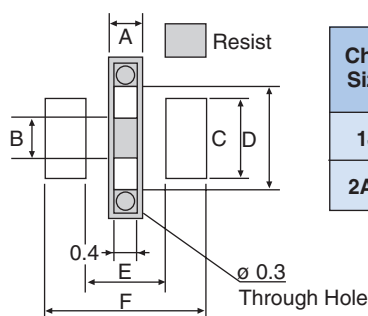


Type	Part	Dimensions inches (mm)	
		L	W
HFC	1005	0.015 (0.40)	0.020 (0.50)
	1410	0.031 (0.80)	0.039 (1.00)
	1608	0.039 (1.00)	0.031 (0.80)
	1610	0.039 (1.00)	0.039 (1.00)
	1612	0.039 (1.00)	0.047 (1.20)

three-terminal inductor/capacitor—KC

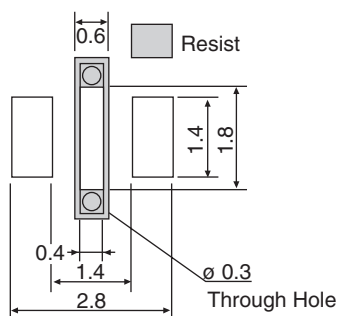
Chip Mounting Side

1J, 2AF



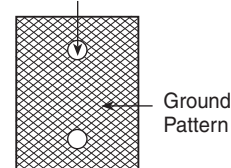
Chip Size	Dimensions inches (mm)					
	A	B	C	D	E	F
1J	.024 (0.6)	.020 (0.5)	.039 (1.0)	.055 (1.4)	.047 (1.2)	.094 (2.4)
2AF	.024 (0.6)	.028 (0.7)	.055 (1.4)	.071 (1.8)	.055 (1.4)	.110 (2.8)

2A



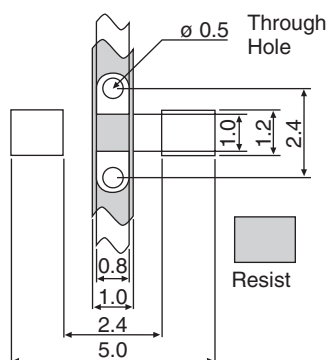
Back Side

Connect to ground pattern of mounting side



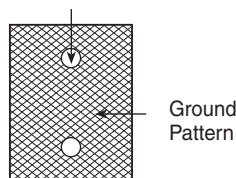
three-terminal capacitor/resistor—KCR

Chip Mounting Side



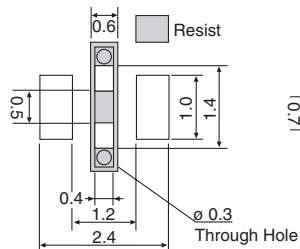
Back Side

Connect to ground pattern of mounting side

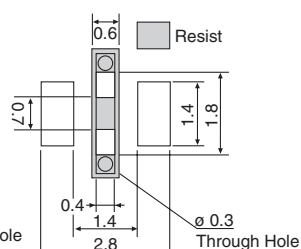


three-terminal capacitor—KGM

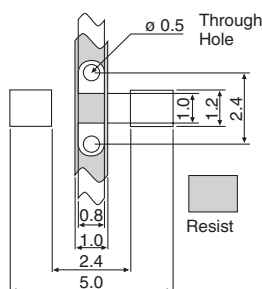
0603 Chip Mounting Side



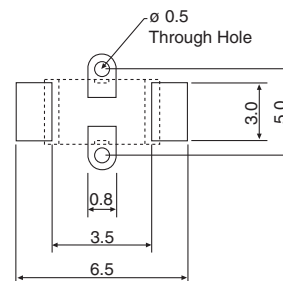
0805 Chip Mounting Side



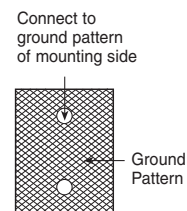
1206 Chip Mounting Side



1812 Chip Mounting Side



0603, 0805, 1206, 1812 Back Side



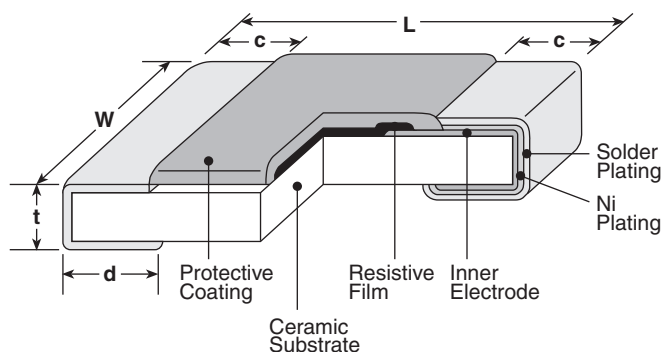
(unit: mm)

thick film 0.5%, 1% tolerance, 50ppm/°C chip resistor

features

- High precision resistor with T.C.R. of ± 50 ppm/°C and tolerance of $\pm 0.5\%$ or 1%
- RuO₂ thick film resistor element
- Also available with epoxy bondable palladium silver terminations in 2A and 2B sizes
- Marking: Four-digit, black on dark blue protective coat (1J, 2A, 2B)
1J-3 marking for E-24
No marking for E-96
Black protective coat on 1E with no marking

dimensions and construction



Type (Inch Size Code)	Dimensions inches (mm)				
	L	W	c	d	t
1E (0402)	.039 $\begin{smallmatrix} +.004 \\ -.002 \end{smallmatrix}$ (1.0 $\begin{smallmatrix} +0.1 \\ -0.05 \end{smallmatrix}$)	.02 \pm .002 (0.5 \pm 0.05)	.008 \pm .004 (0.2 \pm 0.1)	.01 $\begin{smallmatrix} +.002 \\ -.004 \end{smallmatrix}$ (0.25 $\begin{smallmatrix} +0.05 \\ -0.1 \end{smallmatrix}$)	.014 \pm .002 (0.35 \pm 0.05)
1J (0603)	.063 \pm .008 (1.6 \pm 0.2)	.031 \pm .004 (0.8 \pm 0.1)	.012 \pm .004 (0.3 \pm 0.1)	.012 \pm .004 (0.3 \pm 0.1)	.018 \pm .004 (0.45 \pm 0.1)
2A (0805)	.079 \pm .008 (2.0 \pm 0.2)	.049 \pm .004 (1.25 \pm 0.1)	.016 \pm .008 (0.4 \pm 0.2)	.012 $\begin{smallmatrix} +.008 \\ -.004 \end{smallmatrix}$ (0.3 $\begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$)	.02 \pm .004 (0.5 \pm 0.1)
2B (1206)	.126 \pm .008 (3.2 \pm 0.2)	.063 \pm .008 (1.6 \pm 0.2)	.02 \pm .012 (0.5 \pm 0.3)	.016 $\begin{smallmatrix} +.008 \\ -.004 \end{smallmatrix}$ (0.4 $\begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$)	.024 \pm .004 (0.6 \pm 0.1)

ordering information

New Part #	RK73G	1J	T	TD	1003	F
Type		Size	Termination Material	Packaging	Nominal Resistance	Tolerance
		1E 1J 2A 2B	T: Sn L: SnPb	TP: 2mm pitch punched paper (0402, 0603 & 0805) TD: 7" paper tape (0603, 0805, 1206 & 1210) TDD: 10" paper tape (0603, 0805, 1206 & 1210) TE: 7" punched plastic (0805, 1206, 1210, 2010 & 2512) TED: 10" punched plastic (0805, 1206, 1210, 2010 & 2512)	3 significant figures + 1 multiplier "R" indicates decimal on value <100 Ω	D: $\pm 0.5\%$ F: $\pm 1\%$

For further information on packaging, please refer to Appendix A.

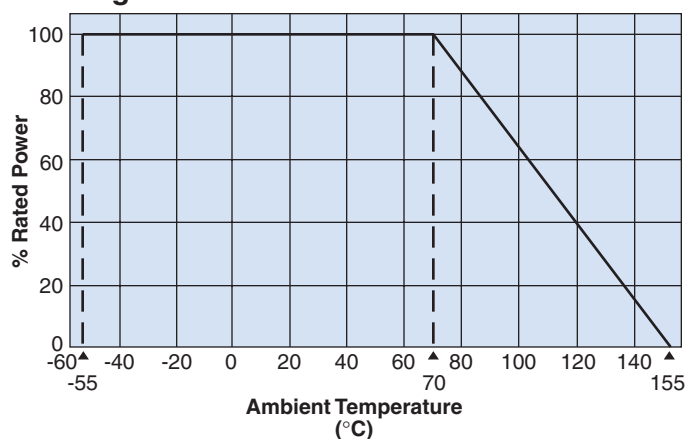
applications and ratings

Part Designation*	Power Rating @ 70°C	T.C.R. (ppm/°C) Max.	Resistance Range E-24, E-96 (D±0.5%)	Resistance Range E-24, E-96 (F±1%)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
RK73G1E (0402)	1/16W (.063W)	±50	10Ω - 976kΩ	10Ω - 1MΩ	50V	100V	-55°C to +155°C
RK73G1J (0603)	1/10W (.10W)		10Ω - 1MΩ				
RK73G2A (0805)	1/8W (.125W)				150V	200V	
RK73G2B (1206)	1/4W (.25W)				200V	400V	

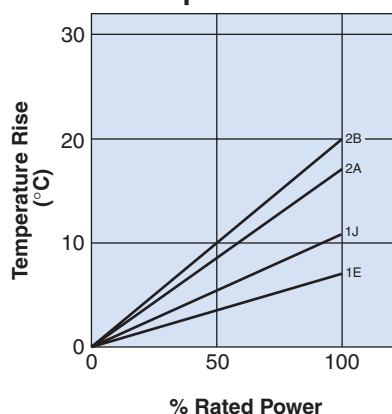
* Parenthesis indicate EIA package size codes.

environmental applications

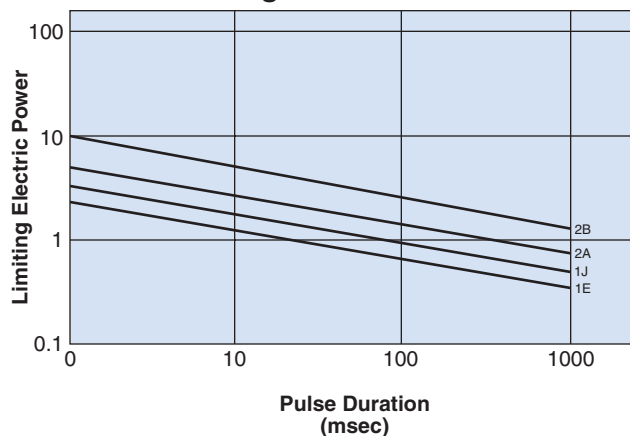
Derating Curve



Surface Temperature Rise

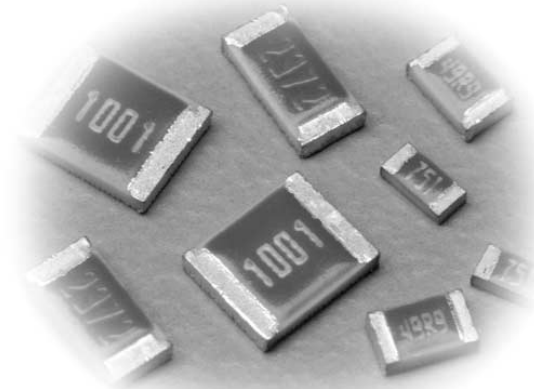


One-Pulse Limiting Electric Power



For complete environmental specifications, please refer to pages 24-25.

ultra precision 0.05%, 0.1%, 1% tolerance thin film chip resistor

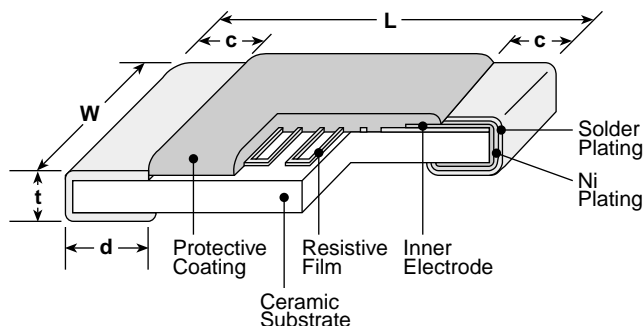


features

- Nickel chromium thin film resistor element
- Anti-leaching nickel barrier terminations
- Meets or exceeds EIA 576, MIL-R-55342F
- Marking: Four-digit, distinctive color identifiers
(Only E-24 values are marked on 1J)
- Products with lead-free terminations meet RoHS requirements



dimensions and construction



Type (Inch Size Code)	Dimensions inches (mm)				
	L	W	c	d	t
1E (0402)	.039 ^{+0.004} / _{-.002} (1.0 ^{+0.1} / _{-0.05})	.02±.002 (0.5±0.05)	.008±.004 (0.2±0.1)	.01 ^{+0.002} / _{-.004} (0.25 ^{+0.05} / _{-0.1})	.014±.002 (0.35±0.05)
1J (0603)	.063±.008 (1.6±0.2)	.031±.004 (0.8±0.1)	.012±.004 (0.3±0.1)	.012±.004 (0.3±0.1)	.018±.004 (0.45±0.1)
2A (0805)	.079±.008 (2.0±0.2)	.049±.004 (1.25±0.1)	.016±.008 (0.4±0.2)	.012 ^{+0.008} / _{-.004} (0.3 ^{+0.2} / _{-0.1})	.02±.004 (0.5±0.1)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.02±.012 (0.5±0.3)	.016 ^{+0.008} / _{-.004} (0.4 ^{+0.2} / _{-0.1})	.024±.004 (0.6±0.1)
2E (1210)		.098±.008 (2.5±0.2)			

ordering information

New Part #	RN73	2B	T	TE	1002	B	25
Type		Size	Termination Material	Packaging	Nominal Resistance	Tolerance	T.C.R. (ppm/°C)
		1E 1J 2A 2B 2E	T: Sn L: SnPb (Other termination styles available, contact factory for options)	TP: 2mm pitch punched paper (0402 only) TD: 7" paper tape (0603, 0805, 1206 & 1210) TDD: 10" paper tape (0603, 0805, 1206 & 1210) TE: 7" punched plastic (0805, 1206 & 1210) TED: 10" punched plastic (0805, 1206 & 1210)	3 significant figures + 1 multiplier "R" indicates decimal on value <100Ω	A: ±0.05% B: ±0.1% C: ±0.25% D: ±0.5% F: ±1.0%	05 10 25 50 100

For further information on packaging, please refer to Appendix A.

applications and ratings

Part Designation	Power Rating @ 70°C	T.C.R. (ppm/°C) Max.	Resistance Range E-24*, E-96					Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temp. Range**
			(A±0.05%)	(B±0.1%)	(C±0.25%)	(D±0.5%)	(F±1.0%)			
RN731E*	1/16W	±25	—	100Ω - 10KΩ	100Ω - 10KΩ	10Ω - 10KΩ		25V	50V	-55°C to +125°C
RN731E*	(.063W)	±50		10Ω - 100KΩ						
RN731J	1/16W (.063W)	±5	100Ω - 47kΩ	—			50V	100V		
RN731J		±10	100Ω - 47KΩ							
RN731J		±25	15Ω - 150kΩ		10Ω - 150kΩ					
RN731J		±50	15Ω - 330KΩ		10Ω - 330KΩ					
RN731J		±100	—	—	—	10Ω - 330kΩ				
RN732A		±5	100Ω - 100KΩ	100Ω - 100kΩ	—				100V	
RN732A	±10	100Ω - 100KΩ								
RN732A	±25	51Ω - 100kΩ	15Ω - 1MΩ		10Ω - 1MΩ					
RN732A	±50	—								
RN732A	±100	—	—	—						
RN732B	1/8W (.125W)	±5	100Ω - 330kΩ	100Ω - 300kΩ	—			150V	300V	
RN732B		±10	100Ω - 300KΩ							
RN732B		±25	51Ω - 300kΩ	15Ω - 1MΩ		10Ω - 1MΩ				
RN732B		±50	—							
RN732B		±100	—	—	—					
RN732E	1/4W (.25W)	±10	100Ω - 510KΩ	100Ω - 510KΩ				200V	400V	
RN732E		±25	51Ω - 510kΩ	15Ω - 1MΩ		10Ω - 1MΩ				
RN732E		±50	—							
RN732E		±100	—	—	—					

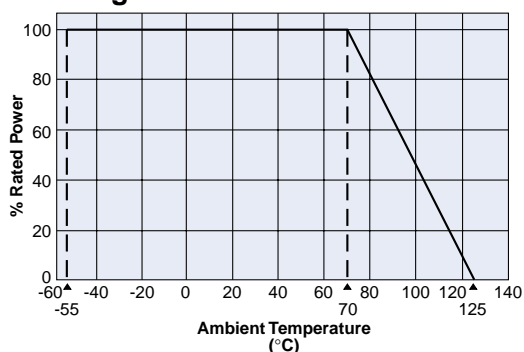
* 1E sizes available in E-24 values only.

** +150°C operating temperature is available by special request.

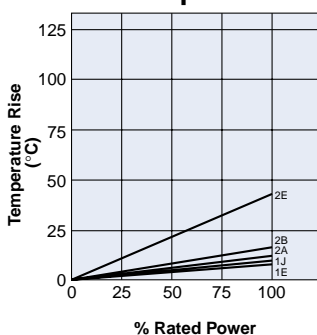
E-192 Resistance Range available, contact factory for details

environmental applications

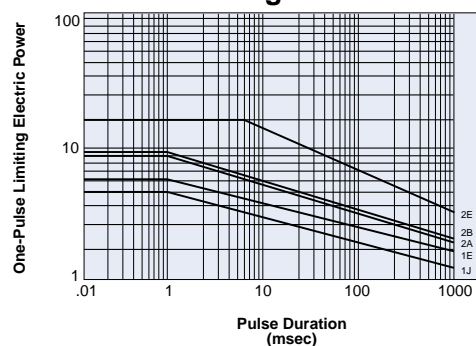
Derating Curve



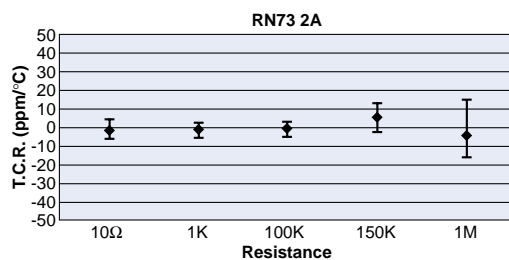
Surface Temperature Rise



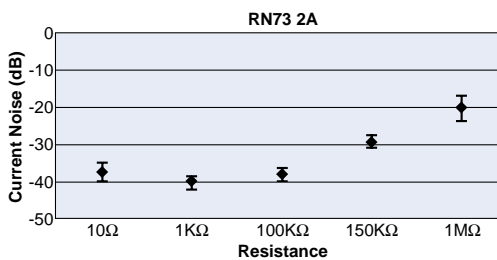
One-Pulse Limiting Electric Power



T.C.R. Characteristics



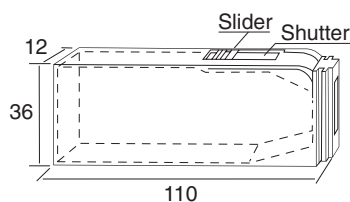
Noise Characteristics



For complete environmental specifications, please refer to pages 28-29.

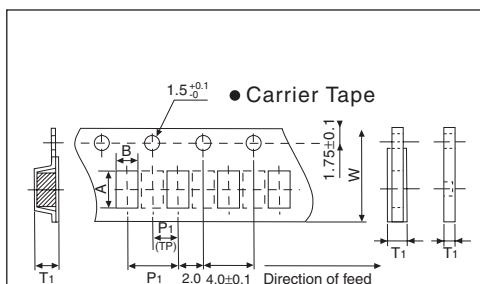
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
RK73B RK73H RK73G RK73A RK73Z SG73 RK73N SR73 RF73 UR73 RN73 LT73	1F	0.4	0.2	0.12	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.31±0.2/-0	178
	1H	0.6	0.3	0.23	TC	10000	0.45±0.03	0.25±0.03	8.0±0.2	2±0.05	0.42±0.2/-0	178
	1E	1	0.5	0.35	TB	10000	0.67±0.05	0.37±0.05	8.0±0.2	2±0.05	0.37±0.2/-0	178
					TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2±0.05	0.45±0.2/-0	178
	1J	1.6	0.8	0.45	TP	10000	1.9±0.1	1.1±0.1	8.0±0.2	2±0.05	0.6±0.2/-0	178
					TD	5000	1.9±0.1	1.1±0.08	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
					TP	10000	2.4±0.2	1.65±0.2	8.0±0.2	2±0.05	0.75±0.2/-0	178
					TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	0.9±0.1	178
					TDD	10000	2.4±0.1	1.65±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	2.4±0.2	1.45±0.15	8.0±0.2	4.0±0.1	0.65±0.1	255
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	178
					TDD	10000	3.5±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.5±0.1	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	255
					TD	5000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1.0±0.15	178
	2E	3.2	2.6	0.6	TDD	10000	3.5±0.1	2.8±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	255
					TED	10000	3.6±0.15	2.9±0.15	8.0±0.2	4.0±0.1	1.0±0.1	255
					TE	4000	5.35±0.2	2.9±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
	2H	5	2.5	0.6	TED	10000	5.4±0.2	2.9±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
	3A	6.3	3.1	0.6	TE	4000	6.65±0.2	3.44±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
					TED	10000	6.9±0.2	3.6±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
CND	2B10	6.40	3.1	0.6	TE	4000	6.6±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
	1J10	3.20	1.6	0.55	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2A10	4.00	2.1	0.6	TE	4000	4.45±0.2	2.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
CNB	2B5Z	3.2	2.5	0.6	TE	4000	3.5±0.2	3.0±0.2	8.0±0.2	4.0±0.1	1±0.15	178
	2E9Z	6.40	3.2		TE	4000	6.7±0.2	3.5±0.2	12.0±0.1	4.0±0.1	1±0.15	178
TMC	P	2.0	1.025	1.2	TE	3000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	1.6 MAX	178
	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8.0±0.3	4.0±0.1	2.5 MAX	178
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	178
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.3 MAX	178
TMR	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMH	A	3.2	1.6	1.6	TE	2000	3.5±0.1	1.7±0.1	8±0.3	4±0.1	2.5 MAX	180
	B	3.5	2.8	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	6.0	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
TMU	UA	3.2	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8±0.3	4±0.1	7.0 MAX	180
	UC	6.0	3.2	1.5	TE	1000	6.3±0.1	3.7±0.1	12±0.3	8±0.1	7.0 MAX	180
TMX	B	3.4	2.6	1.9	TE	2000	3.9±0.1	3.1±0.1	8±0.3	4±0.1	2.5 MAX	180
	C	5.8	3.2	2.5	TE	500	6.3±0.1	3.7±0.1	12±0.3	8±0.1	3.0 MAX	180
	E	7.3	4.3	2.8	TE	500	7.7±0.1	4.8±0.1	12±0.3	8±0.1	3.4 MAX	180
	F	7.3	5.8	3.5	TE	500	7.5±0.1	6.3±0.1	12±0.3	8±0.1	4.1 MAX	180

Bulk Case (RK73 1E, 1J, 2A, 2B) Packaging Designation: BK

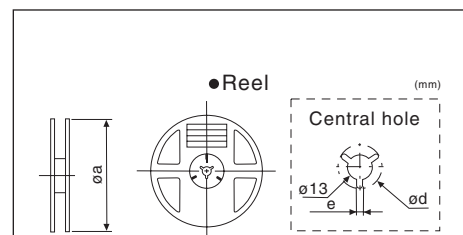


Style	Packaging Quantity
1E	50,000 pieces/case
1J	25,000 pieces/case
2A	10,000 pieces/case
2B	5,000 pieces/case

Packaging specifications



(Notes) Dotted lines are applicable to only "TP" and "TB."



(Notes) Reel holes, shapes and design are examples

Type	ød (mm)	e (mm)
All	21	2
RCU, RCT, RCS, RCW	27	3

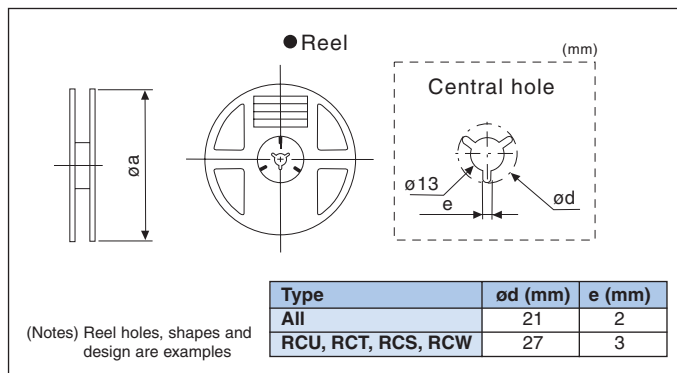
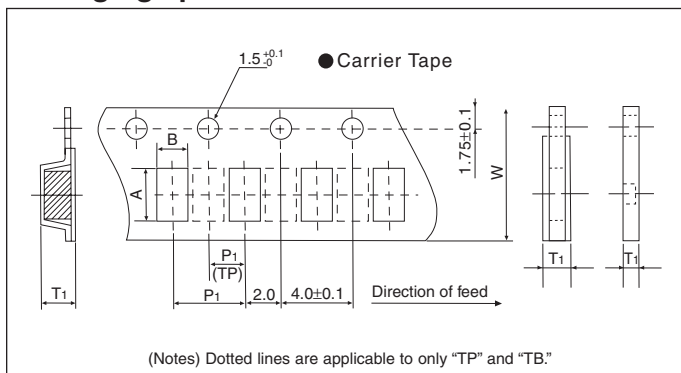
Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
CN CN_A CN_K CNZ	1F8	3.8±0.1	1.6±0.2	0.44±0.1	TP	5000	4.0±0.1	1.8±0.1	8.0±0.2	2.0±0.05	0.55±0.1	178
	1E2K	1.00	1	0.35	TP	10000	1.2±0.1	1.2±0.1	8.0±0.2	2.0±0.05	0.45±0.1	178
	1E4/1E4K				TP	10000	2.2±0.1	1.2±0.1	8.0±0.2	2.0±0.5	0.45±0.1	178
	1J2/1J2K	1.60	1.6	0.6/0.5	TD	5000	1.9±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0 0.75±0.2/-0	255
	1J4/1J4KA	3.20	1.6	0.6/0.5	TD	5000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0 0.6±0.2/-0	255
	1J8	6.40	2	0.6	TE	4000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	178
					TED	10000	6.9±0.2	2.0±0.2	12.0±0.1	4.0±0.1	0.9±0.1	255
	2A2	2.54	2	0.6	TE	4000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	2.9±0.2	2.4±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2A4	5.08	2	0.6	TE	4000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	2.3±0.2	12.0±0.1	4.0±0.1	1±0.15	255
	2A8	10.16	2	0.6	TE	4000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	178
					TED	10000	10.6±0.2	2.45±0.2	16	4.0±0.1	1±0.15	255
	2B2	2.54	3.2	0.6	TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	178
					TED	10000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1±0.15	255
	2B4	5.08	3.2	0.6	TE	4000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	178
					TED	10000	5.4±0.2	3.4±0.2	12.0±0.1	4.0±0.1	1±0.15	255
RD41B RN41 RM41 MLT CC	2B8	10.16	3.2	0.6	TE	2000	10.55±0.2	3.6±0.2	16	4.0±0.1	1±0.15	178
					TED	5000	10.55±0.2	3.6±0.2	16	4.0±0.1	1±0.15	255
	2A	2	1.25	-	TE	3000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	178
					TED	10000	2.4±0.2	1.5±0.2	8.0±0.2	4.0±0.1	1.45±0.2	255
	2B	3.5	1.45	-	TE	3000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
					TED	10000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	255
NT73 LA73 LT73	2D	3.2	1.55	-	TE	2000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	178
					TED	10000	3.7±0.2	1.7±0.2	8.0±0.2	4.0±0.1	1.7±0.2	255
	2E, 2H, 3AS	5.9	2.2	-	TE	1500	6.2±0.2	2.4±0.2	12.0±0.1	4.0±0.1	2.6±0.2	178
					TED	10000	6.2±0.2	2.4±0.2	12.0±0.1	4.0±0.1	2.6±0.2	255
PT72	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.1/-0	178
	1J	1.6	0.8	0.45	TD	5000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	2A	2	1.25	0.5	TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	178
RCU	2A	2	1.25	1	TE	3000	2.25±0.1	1.45±0.1	8.0±0.2	4.0±0.1	1.5±0.15	178
	2B	3.2	1.6	1	TE	3000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.5±0.15	178
RCT		1.60	0.8	1.15	TE	2000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	178
					TED	5000	1.85±0.16	1.05±0.15	8.0±0.2	4.0±0.1	1.25±0.1	255
RCS		2.00	1.25	1.45	TE	2000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	178
					TED	5000	2.45±0.15	1.65±0.1	8.0±0.2	4.0±0.1 -0.2	1.70±0.1	255
RCW		3.20	1.6	1.25	TE	2000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	178
					TED	5000	3.6±0.2	2.0±0.2	8.0±0.2	4.0±0.1	1.45±0.15	255
C4000		3.2	1.6	2	TE	2000	3.4±0.1/ -0.05	1.95±0.1/ -0.05	8.0±0.2	4.0±0.1	2.2±.01	178
KL32	C4L_I12	4.50	3.8	2.25	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4L_I14			2.3	TE	750	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	2.7±0.2	178
	C4315			2.4	TE	500	5.0±0.2	4.3±0.2	12.0±0.1	8.0±0.2	3.0±0.2	178
KL73	1H	0.6	0.3	0.23	TP	10000	0.67±0.05	0.37±0.05	8.0	2.0	0.42±0.2/-0	178
	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2.0±0.05	0.45±0.1	180
	1J	1.6	0.8	0.5	TE	4000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.9±0.15	180
	2A	2	1.25	0.5	TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
	2B	3.2	1.6	10.6	TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.15	180
KQ KQC KQT	0402	1.10	0.5	0.5	TD	2000	1.22±0.05	0.73±0.05	8.0±0.2	4.0±0.1	0.65±0.1	180
	0603	1.60	1	0.9	TE	2000	1.72±0.05	1.07±0.05	8.0±0.2	4.0±0.1	1.2±0.1	180
	0805	2.00	1.5	1.3	TE	2000	2.22±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.65±0.1	180
	1008	2.50	2.2	1.8	TE	2000	2.7±0.1	2.35±0.1	8.0±0.2	4.0±0.1	2.2±0.1	180
LPC	4045	4.50	4	4.5	TED	1000	4.158±0.2	4.75±0.2	12.0±0.1	8.0±0.2	5±0.2	380
	9040N	9.00	10.2	4.9	TED	500	Ø9.4±0.2		16±.01	12±.01	7±0.2	380
	12065	12.40	12	7.5	TED	300	12.5±0.2	13±0.2	24±.01	16±.02	8.2±0.2	380
	10065	10.40	10	7.5	TED	300	11±0.2	111.5±0.2	24±.01	16±.02	8.2±0.2	380
SDR	0604	5.6	—	4.5	TE	1500	—	—	12	4.0±0.1	5.0	330
	0805	7.8	—	5.3	TE	1000	—	—	—	12.0	6.2	380
	1006	9.8	—	5.8	TE	1000	—	—	—	12.0	6.7	380
SL	1	6.3	3.1	1.9	TE	1000	6.8±0.1	3.6±0.1	12.0±0.1	8.2±0.2	2.35±0.1	180
	2/3	11.5	7	2.5	TED	1000	12.2±0.1	7.7±0.1	24	12.0±0.1	3.1±0.1	255
LPS	5018	5.4	5.0	1.8	TE	1000	5.6±0.1	6.3±0.1	16±0.1	12±0.1	2.1±0.1	255
	5728	6.1	5.7	2.8	TE	1000	6.3±0.1	6.0±0.1	16±0.1	12±0.1	3.2±0.1	255
	6926	7.3	6.9	2.6	TE	1000	7.5±0.1	7.2±0.1	16±0.1	12±0.1	3.0±0.1	255

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
TLR	3A, 3AW	6.4	3.2	0.6	TE	2000	6.75±0.2	3.55±0.1	12.0±0.1	8.0±0.2	1.0±0.1	180
	2B	3.2	1.6	0.6	TD	5000	3.5±0.2	2.0±0.2	8.0±0.2	4.0±0.1	0.75±0.2/-0	180
	2H	5.0	2.5	0.6	TE	4000	5.35±0.2	2.9±0.1	12.0±0.1	4.0±0.1	1.0±0.15	180
TSL	1	6.3	3.1	1	TE	3000	6.6±0.1	3.4±0.1	12.0±0.1	4.0±0.1	1.3±0.1	180
NPR	1	7.5	4.5	2	TE	1000	7.9±0.1	4.8±0.1	16	8.2±0.2	2.45±0.1	178
	2	12	8	4	TE	1000	13±0.1	9±0.1	24	102	4.35±0.1	330
CSR	1	10.8	6.2	2.1	TE	1000	11.1±0.14	6.7±0.1	24	12.0±0.1	2.6±0.1	255
	2	12.8±0.5	8.2±0.3	3.1±0.2	TE	1000	13.0±0.1	9.0±0.15	24	12.0±0.1	4.35±0.1	330
CZB	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.65±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
CZP	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	4000	1.8±0.1	1.1±0.1	8.1±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
MCL	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MHL	1E	1.0±0.1	0.5±0.1	0.5±0.1	TP	10000	1.17±0.1	0.67±0.1	8.0±0.22	2.0±0.23	0.63±0.1	178
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TD	4000	1.85±0.1	1.15±0.1	8.0±0.1	4.0±0.1	1.1±0.1	178
	2A	2.0±0.2	1.25±0.2	0.9±0.2	TE	3000/4000*	2.4±0.1	1.6±0.1	8.0±0.1	4.0±0.1	1.2±0.1	178
	2B	3.2±0.2	1.6±0.2	0.51±0.25	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.8±0.1	178
MCA	1E4	2.0±0.15	1.25±0.15	0.6±0.1	TE	4000	2.2±0.1	1.45±0.1	8.0±0.2	4.0±0.1	2.0±0.1	180
	1J4	3.2±0.15	1.6±0.15	0.8±0.1	TD	4000	3.5±0.15	1.9±0.15	8.0±0.2	4.0±0.1	2.5±0.1	180
KGM	0603	1.6±0.2	0.8±0.2	0.6±0.2	TE	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	2.5 max.	178
	0805	2.0±0.2	1.25±0.2	0.8±0.2	TE	4000	2.2±0.1	1.5±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
	1812	4.5±0.3	3.2±0.3	1.0±0.2	TE	1000	4.9±0.1	3.5±0.2	12.0±0.3	4.0±0.1	2.5 max.	178
FBA	1J	3.2±0.2	1.6±0.2	0.8±0.2	TE	3000	3.5±0.1	1.8±0.1	8.1±0.1	4.0±0.1	1.2±0.1	178
NV73	1E	1.0±0.1	0.5±0.1	0.25±0.15	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	4.0±0.1	0.6±0.2	180
	1J	1.6±0.15	0.8±0.15	0.8±0.15	TE	2500	1.9±0.1	1.2±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2A	2.0±0.2	1.25±0.2	1.3 max.	TE	2500	2.4±0.1	1.6±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
	2B	3.2±0.2	1.6±0.2	1.65 max.	TE	2500	3.6±0.1	2.0±0.1	8.0±0.2	4.0±0.1	1.75 max.	180
LR72	A	10±0.2	5.2	2	TED	2000	1.45±0.2	5.7±0.2	2.0±0.05	8.0±0.10	2.3±0.2	255
	B	10±0.2	3	2	TED	2000	1.45±0.2	3.4±0.2	2.0±0.05	8.0±0.10	2.5±0.2	255
	C	11.2±0.4	3.2±0.4	3.5±0.4	TEB	1500	1.17±0.1	4.3±0.1	24±0.2	8.0±0.1	4.4±0.15	330
HFC	1005	1.0±0.15	0.5±0.1	0.5±0.1	T	10000	1.15±0.03	0.65±0.03	8.0±0.10	2.0±0.05	0.60±0.05	178
	1410	1.4±0.15	1.0±0.1	1.0±0.1	TE	3000	1.60±0.05	1.20±0.05	8.0±0.20	4.0±0.10	1.20±0.10	178
	1608	1.6±0.15	0.8±0.1	0.7±0.2	TE	4000	1.80±0.05	1.00±0.05	8.0±0.20	4.0±0.10	0.75 or 0.95±0.10	178
	1610	1.6±0.15	1.0±0.1	0.85±0.25	TE	3000	1.80±0.05	1.20±0.05	8.0±0.20	4.0±0.10	0.80 or 1.00 or 1.20±0.10	178
KC	1612	1.6±0.15	1.2±0.1	1.1±0.2	TE	3000	1.80±0.05	1.40±0.05	8.0±0.20	4.0±0.10	1.40±0.10	178
	1J	1.6±0.2	0.8±0.2	0.6±0.2	TD	4000	1.9±0.05	1.1±0.05	8.0±0.1	4.0±0.1	0.75±0.04	178
	2AF	2.0±0.2	1.25±0.2	0.8±0.2	TD	4000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	N/A	178
KCR	2A	2.0±0.2	1.25±0.2	1.6±0.2	TE	2000	2.3±0.1	1.55±0.1	8.0±0.2	4.0±0.1	1.9±0.1	178
	1206	3.2±0.2	1.6±0.2	0.8±0.2	TE	2000	3.5±0.1	2.0±0.1	8.0±0.3	4.0±0.1	2.5 max.	178
TF	10A	1.00	0.5	0.45	TB	10000	1.15±0.05	0.65±0.05	8.0±0.2	4.0±0.1	0.6±0.2/-0	178
	16S	1.60	0.8	0.6	TD	5000	1.9±0.1	1.1±0.1	8.0±0.3	4.0±0.1	0.9±0.1	180
CCP	2B	3.20	1.6	1.2	TE	3000	3.5±0.1	1.9±0.1	8.0±0.3	4.0±0.1	1.5±0.1	178
	2E	3.20	2.5	2.2	TE	2000	3.5±0.1	2.8±0.1	8.0±0.3	4.0±0.1	2.4±0.1	178
CCF	1	6.00	2.5	2.5	TE	1000	6.4±0.2	2.7±0.2	12.0±0.3	4.0±0.1	2.9±0.2	178
CR	1J10	3.2±0.1	1.6±0.1	0.65±0.1	TE	4000	3.5±0.1	2.0±0.1	8.0±0.2	4.0±0.1	0.75±0.2/-0.1	178
	2A10	4.0±0.2	2.1±0.2	0.7±0.1			4.4±0.2	2.5±0.2	12.0±0.2	4.0±0.1	1.15±0.2	178
MRGF16	—	11	7.7	2.2	TEB	2000	11.7±0.2	8.2±0.2	24	12	2.4±0.1	330
PGD	1E	1.1	0.75	0.75	TE	5000	3.5±0.10	1.2±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180
	1J	1.6	0.8	0.75	TE	4000	3.5±0.1	1.0±0.1	8.0±0.3	4.0±0.1	0.9±0.05	180

*MHL0805: 1.5nH ~ 39nH = 4,000 pieces, 47nH ~ R68 = 3,000 pieces

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
AA(X)	T16	5.0	6.4	1.0	TE	2500	5.4±0.1	6.8±0.1	16	8	0.3±0.05	330
	T20	6.5	6.4	1.0	TE	2500	7.1±0.1	6.95±0.1	16	8	0.3±0.05	330
AC(X)	T24	7.8	6.4	1.0	TE	2500	8.3±0.1	6.95±0.1	16	8	0.3±0.05	330
AP(X)	Q16	4.9	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
CR(X)	Q20	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
CTX	Q24	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
DNA	Q28	10.0	5.99	1.6	TE	2500	3.5±0.1	6.5±0.1	16	8	0.3±0.05	330
DN(X)	N08	4.83	5.99	1.6	TE	2500	5.3±0.1	6.5±0.1	12	8	0.3±0.05	330
EA(X)	N14	8.66	5.99	1.6	TE	2500	9.0±0.1	6.5±0.1	16	8	0.3±0.05	330
ED(X)	N16	9.91	5.99	1.6	TE	2500	10.3±0.1	6.5±0.1	16	8	0.3±0.05	330
RD(X)	W16	10.44	10.36	2.4	TE	1000	10.7±0.1	10.9±0.1	16	12	0.3±0.05	330
R(X)A	W20	12.7	10.36	2.4	TE	1000	13.3±0.1	10.9±0.1	24	12	0.3±0.05	330
RT(X)	S03	2.92	2.30	0.95	TE	3000	2.77±0.1	3.15±0.1	8	4	0.23±0.05	180
TF(X)	S14	2.92	2.30	0.95	TE	3000	3.5±0.1	3.15±0.1	8	4	0.23±0.05	180
US(X)	S05	2.90	2.80	1.0	TE	3000	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180
	S06	2.90	2.80	1.0	TE	2500	3.5±0.1	3.4±0.1	8	4	0.23±0.05	180

Packaging specifications



Low Resistance Flat Chip Resistors

Type SR73

ISO 9000:2000
TS-16949

1. Scope

This specification applies to chip resistors (SR73) produced by KOA Corporation.

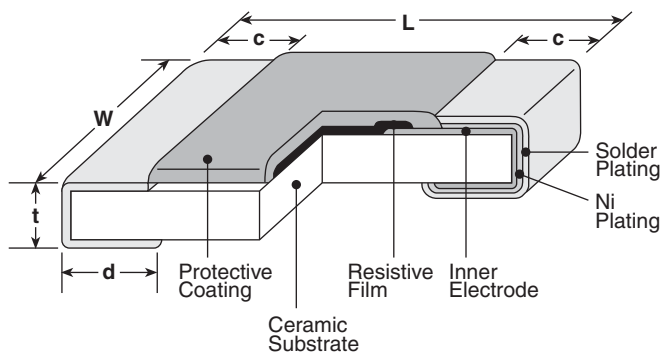
2. Type Designation

The type designation shall be in the following form:

SR73	2B	T	TD	1R00	F
Size	Size	Termination Material	Packaging	Nominal Resistance	Tolerance
1E 1J 2A 2B 2E 2H 3A	1E 1J 2A 2B 2E 2H 3A	T: Sn (Other termination styles may be available, please contact factory for options)	TP: 2mm Pitch Punched Paper Tape (0402, 0603 & 0805) TD: 7" Paper Tape (0603, 0805, 1206 & 1210) TDD: 10" Paper Tape (0603, 0805, 1206 & 1210) TE: 7" Punched Plastic (0805, 1206, 1210, 2010 & 2512) TED: 10" Punched Plastic (0805, 1206, 1210, 2010 & 2512)	±2%, ±5%: 2 significant figures + 1 multiplier "R" indicates decimal on value <10Ω ±1%: 3 significant figures + 1 multiplier "R" indicates decimal on value <100Ω All values less than 0.1Ω (100mΩ) are expressed in mΩ with "L" as decimal Example: 20mΩ = 20L0	D: ±0.5% F: ±1% G: ±2% J: ±5%

3. Dimensions and Structure

3-1 Dimensions



Type (Inch Size Code)	Dimensions inches (mm)				
	L	W	c	d	t
1E (0402)	.039 ^{+0.004} / _{-.002} (1.0 ^{+0.1} / _{-0.05})	.02 ^{+0.004} / _{-.002} (0.5 ^{+0.1} / _{-0.05})	.01±.004 (0.25±0.1)	.01±.004 (0.25±0.1)	.014±.002 (0.35±0.05)
1J (0603)	.063±.008 (1.6±0.2)	.031 ^{+0.006} / _{-.004} (0.8 ^{+0.15} / _{-0.1})	.014±.004 (0.35±0.1)	.014±.004 (0.35±0.1)	.018±.004 (0.45±0.1)
2A (0805)	.079±.008 (2.0±0.2)	.049±.004 (1.25±0.1)	.016±.008 (0.4±0.2)	.012 ^{+0.008} / _{-.004} (0.3 ^{+0.2} / _{-0.1})	.02±.004 (0.5±0.1)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.02±.012 (0.5±0.3)	.016 ^{+0.008} / _{-.004} (0.4 ^{+0.2} / _{-0.1})	.024±.004 (0.6±0.1)
2E (1210)		.102±.008 (2.6±0.2)			
2H (2010)	.197±.008 (5.0±0.2)	.098±.008 (2.5±0.2)		.025±.005 (0.65±0.15)	
3A (2512)	.248±.008 (6.3±0.2)	.122±.008 (3.1±0.2)			

4. Standard Applications

Part Designation*	Power Rating @ 70°C	T.C.R. (ppm/°C) Max.	Resistance Range**				Absolute Maximum Working Voltage	Maximum Overload Voltage (5 Secs. Max.)	Operating Temperature Range
			E-24, E-96 (D±0.5%)	E-24, E-96 (F±1%)	E-24 (G±2%)	E-24 (J±5%)			
SR731E (0402)	1/8W (.125W) 1/6W (.166W ²)	±200	—	0.51Ω - 10Ω***	0.51Ω - 10Ω	0.51Ω - 10Ω	1.11V	2.79V	-55°C to +150°C
		±300	—	0.2Ω - 0.47Ω***	0.2Ω - 0.47Ω	0.2Ω - 0.47Ω			
		±500	—	0.1Ω - 0.18Ω***	0.1Ω - 0.18Ω	0.1Ω - 0.18Ω			
SR731J (0603)	1/5W (.2W)	±200	—	0.1Ω - 10Ω	0.1Ω - 10Ω	0.1Ω - 10Ω	1.41V	3.53V	
SR732A (0805)	1/4W (.25W) 1/3W (.33W ²)	±100	0.15Ω - 10Ω	0.1Ω - 10Ω	—	—	1.58V	3.95V	
		±200	—	—	0.1Ω - 10Ω	0.1Ω - 10Ω			
		±500	—	—	—	0.051Ω - 0.091Ω			
		±800	—	—	—	0.030Ω - 0.047Ω			
SR732B (1206)	1/3W (.33W) 1/2W (.5W ²)	±100	0.15Ω - 10Ω	0.1Ω - 10Ω	—	—	1.81V	4.54V	
		±200	—	—	0.1Ω - 10Ω	0.1Ω - 10Ω			
		±500	—	—	—	0.056Ω - 0.091Ω			
		±800	—	—	—	0.030Ω - 0.051Ω			
SR732E (1210)	1/2W (.5W) 2/3W (.66W ²)	±100	—	0.1Ω - 10Ω	—	—	2.23V	5.59V	
		±200	—	—	0.1Ω - 10Ω	0.047Ω - 10Ω			
		±500	—	—	—	0.036Ω - 0.043Ω			
		±1000	—	—	—	0.024Ω - 0.033Ω			
SR732H (2010)	3/4W (.75W)	±100	—	0.1Ω - 10Ω	—	—	2.73V	6.84V	
		±200	—	—	0.1Ω - 10Ω	0.1Ω - 10Ω			
		±500	—	—	—	0.056Ω - 0.091Ω			
		±800	—	—	—	0.033Ω - 0.051Ω			
SR733A (2512)	1W	±100	—	0.1Ω - 10Ω	—	—	3.16V	7.90V	
		±200	—	—	0.1Ω - 10Ω	0.1Ω - 10Ω			
		±500	—	—	—	0.056Ω - 0.091Ω			
		±900	—	—	—	0.039Ω - 0.051Ω			

* Parenthesis indicate EIA package size codes.

** See Appendix D for available decade values.

*** 1E (F: ±1%) E-24 values only.

¹ Power Rating for SR731E 0.91Ω - 10Ω = 1/10 (0.1W)

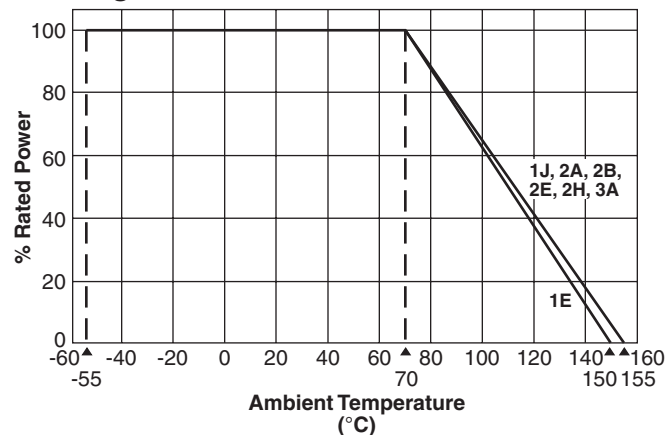
² Please contact factory for limitation of Surface Mount Temp. Rise

5. Rating

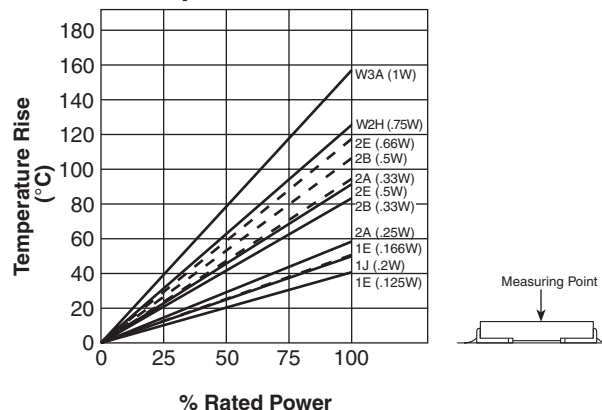
5-1 Rating

For temperature in excess of 70°C, the load shall be derated in accordance with the following figure.

Derating Curve



Surface Temperature Rise



5-2 Voltage Rating

Resistors shall have a rated direct-current (DC) continuous working voltage or approximate sine-wave root-mean-square (RMS) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$E = \sqrt{P \times R}$$

Where:
E = Rated voltage (V)
P = Rated power (W)
R = Nominal resistance (Ω)

In no case shall be rated DC or R.M.S. continuous working voltage be greater than the applicable maximum value.

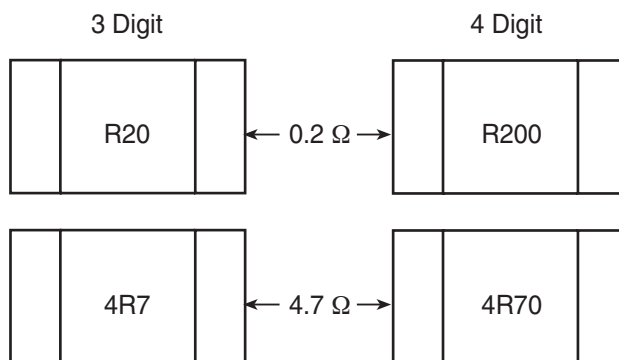
6. Body and Marking

Type	Tolerance	Coating Color	Marking Color
SR73	D ($\pm 0.5\%$) F ($\pm 1\%$)	Indigo	White/ 4 digit
SR73	G ($\pm 2\%$) J ($\pm 5\%$)	Indigo	White/ 3 digit

Marking: a effective number and a multiplier. R means a decimal point.

7. Marking Method

D, F	4 digit	This character indicate Ω unit and express 4 effective numbers. R means a decimal point.
G, J	3 digit	This character indicate Ω unit and express 3 effective numbers. R means a decimal point.

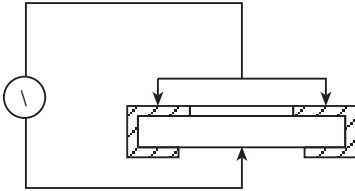


8. Characteristics

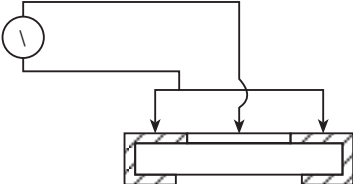
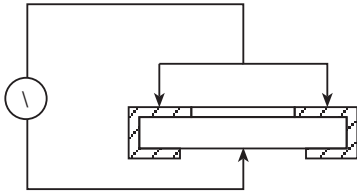
8-1 Mechanical Characteristics

Item	Requirement	Test Methods (JIS C 5202)
Withstanding Soldering Heat	No visual damage $\pm 1.0\%$	6.10 $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 10 ± 1 sec.
Solderability	More than 95% of the surface of the termination must be covered new solder	6.11 $230^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 3 ± 0.5 sec.
Termination Strength	$\pm 1.0\%$	6.1.4 1) Bending 2A, 2B Circuit board bending 5mm Circuit board bending 2mm 2) Shear 3) Pull-off strength
Vibration	$\pm 0.5\%$	6.3 Condition A Each direction / 2hrs
Withstanding Solvent	No visual & mechanical damage	1) 4.2 and 4.9 2) MIL-STD-202F Test method 215

8-2 Electrical Characteristics

Item	Requirement	Test Methods (JIS C 5202)
Resistance	Within tolerance	5.1 Measuring Voltage A, 25°C
Resistance of Temperature Coefficient	Within specified R.T.C $-55^{\circ}\text{C}/125^{\circ}\text{C}$	5.2 Condition B
Short Time Overload	$\pm 2.0\%$	5.5 Condition A
Intermittent Overload	$\pm 5.0\%$	5.8 Applied Voltage: $\text{RV} \times 2.5$
Insulation	Above $10^4 \text{ M}\Omega$	5.5 500V DC The following sketch: 

8-2 Electrical Characteristics (Continued)

Item	Requirement	Test Methods (JIS C 5202)
Insulation	Above $10^3 M\Omega$	5.6 500V DC The following sketch: 
Withstanding Voltage	$\pm 0.5\%$	5.7 500V DC $60 \pm 10/0$ sec. The following sketch: 
Temperature Rise (Rated Load)	1) Surface temp. rise: $100^\circ C \geq$ 2) $\Delta R \pm 0.5\%$	5.4 1) Test board 90mm x 10mm x 1.6mm 2) Recommended land dimensions

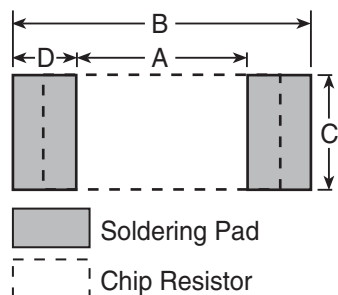
8-3 Environmental Characteristics

Item	Requirement	Test Methods (JIS C 5202)
Thermal Shock (Air to Air)	$\pm 1.0\%$	-40°C 30 minutes 125°C 30 minutes 100 cycles
High Temperature Exposure	$\pm 1.0\%$	7.2 $125 \pm 3^\circ C$ 1000 hrs.
Load Life in Humidity	$\pm 2.0\%$	7.9 $40 \pm 2^\circ C$ 90 ~ 95% RH 1000 hrs.
Load Life	$\pm 2.0\%$	7.10 $70 \pm 3^\circ C$ 1000 hrs.

9. Recommended Land Dimensions

9-1 Flow Soldering

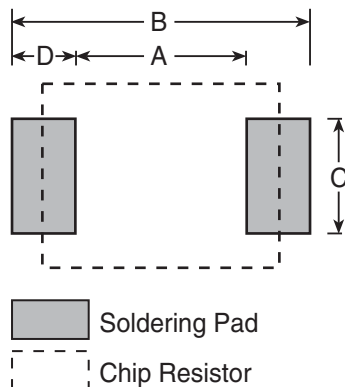
Dimensions in inches (mm)



Type	Style	Resistor Size	A	B	C	D
SR73	1 E	0.039 x 0.020 (1.0 x 0.5)	0.020 (0.5)	0.059 (1.5)	0.020 (0.5)	0.020 (0.5)
	1 J	0.063 x 0.031 (1.6 x 0.8)	0.039 (1.0)	0.094 (2.4)	0.031 (0.8)	0.028 (0.7)
	2 A	0.079 x 0.049 (2.0 x 1.25)	0.051 (1.3)	0.122 (3.1)	0.049 (1.25)	0.035 (0.9)
	2 B	0.126 x 0.063 (3.2 x 1.6)	0.087 (2.2)	0.173 (4.4)	0.063 (1.6)	0.043 (1.1)
	2 E	0.126 x 0.098 (3.2 x 2.5)	0.087 (2.2)	0.173 (4.4)	0.098 (2.5)	0.043 (1.1)
	2 H	0.197 x 0.098 (5.0 x 2.5)	0.138 (3.5)	0.248 (6.3)	0.098 (2.5)	0.055 (1.4)
	3 A	0.252 x 0.126 (6.4 x 3.2)	0.181 (4.6)	0.315 (8.0)	0.126 (3.2)	0.067 (1.7)

9-2 Reflow Soldering

Dimensions in inches (mm)

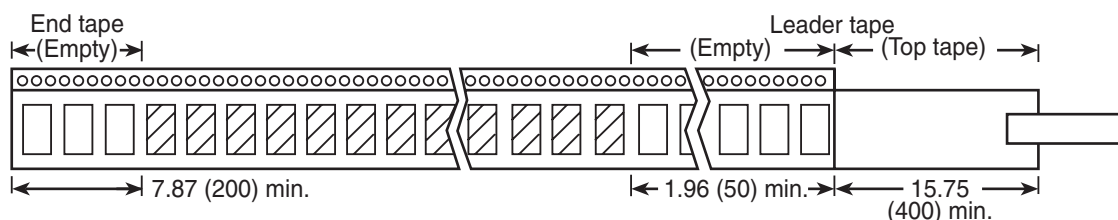


Type	Style	Resistor Size	A	B	C	D
SR73	1 E	0.039 x 0.020 (1.0 x 0.5)	0.020 (0.5)	0.051 (1.3)	0.012 (0.3)	0.016 (0.4)
	1 J	0.063 x 0.031 (1.6 x 0.8)	0.039 (1.0)	0.079 (2.0)	0.024 (0.6)	0.020 (0.5)
	2 A	0.079 x 0.049 (2.0 x 1.25)	0.051 (1.3)	0.098 (2.5)	0.041 (1.05)	0.024 (0.6)
	2 B	0.126 x 0.063 (3.2 x 1.6)	0.087 (2.2)	0.157 (4.0)	0.055 (1.4)	0.035 (0.9)
	2 E	0.126 x 0.098 (3.2 x 2.5)	0.087 (2.2)	0.157 (4.0)	0.091 (2.3)	0.035 (0.9)
	2 H	0.197 x 0.098 (5.0 x 2.5)	0.138 (3.5)	0.248 (6.3)	0.091 (2.3)	0.055 (1.4)
	3 A	0.252 x 0.126 (6.4 x 3.2)	0.181 (4.6)	0.315 (8.0)	0.118 (3.0)	0.067 (1.7)

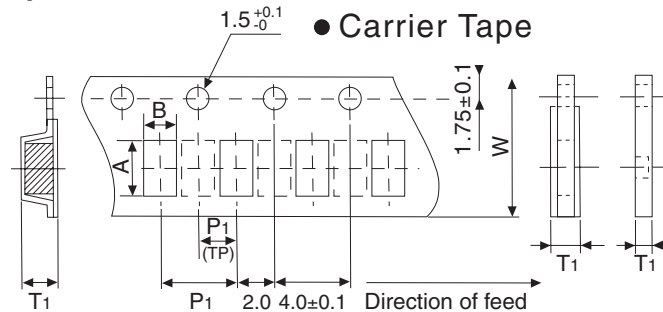
10. Taping

10-1 Taped Configuration

Dimensions in inches (mm)



10-2 Dimensions of Punched Paper Tape



(Notes) Dotted lines are applicable to only "TP" and "TB."

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
SR73	1E	1	0.5	0.35	TP	10000	1.15±0.1	0.65±0.1	8.0±0.2	2±0.05	0.45+0.2/-0	178
	1J	1.6	0.8	0.45	TP	10000	1.9±0.1	1.1±0.1	8.0±0.2	2±0.05	0.6+0.2/-0	178
					TD	5000	1.9±0.1	1.1±0.08	8.0±0.2	4.0±0.1	0.6+0.2/-0	178
					TDD	10000	1.9±0.1	1.1±0.1	8.0±0.2	4.0±0.1	0.6+0.2/-0	255
					TP	10000	2.4±0.2	1.65±0.2	8.0±0.2	2±0.05	0.75+0.2/-0	178
	2A	2	1.25	0.5	TD	5000	2.4±0.2	1.65±0.2	8.0±0.2	4.0±0.1	0.75+0.2/-0	178
					TE	4000	2.4±0.2	1.6±0.2	8.0±0.2	4.0±0.1	0.9±0.1	178
					TDD	10000	2.4±0.1	1.65±0.1	8.0±0.2	4.0±0.1	0.75+0.2/-0	255
					TED	10000	2.4±0.2	1.45±0.15	8.0±0.2	4.0±0.1	0.65±0.1	255
					TD	5000	3.5±0.2	2±0.2	8.0±0.2	4.0±0.1	0.75+0.2/-0	178
	2B	3.2	1.6	0.6	TE	4000	3.5±0.2	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	178
					TDD	10000	3.5±0.1	1.9±0.1	8.0±0.2	4.0±0.1	0.75+0.2/-0	255
					TED	10000	3.5±0.1	1.9±0.2	8.0±0.2	4.0±0.1	1.0±0.1	255
					TD	5000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	0.75+0.2/-0	178
	2E	3.2	2.6	0.6	TE	4000	3.5±0.2	2.85±0.2	8.0±0.2	4.0±0.1	1.0±0.15	178
					TDD	10000	3.5±0.1	2.8±0.1	8.0±0.2	4.0±0.1	0.75+0.2/-0	255
					TED	10000	3.6±0.15	2.9±0.15	8.0±0.2	4.0±0.1	1.0±0.1	255
					TE	4000	5.35±0.2	2.9±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
	2H	5	2.5	0.6	TED	10000	5.4±0.2	2.9±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255
					TE	4000	6.65±0.2	3.44±0.2	12.0±0.1	4.0±0.1	1.0±0.15	178
	3A	6.3	3.1	0.6	TED	10000	6.9±0.2	3.6±0.2	12.0±0.1	4.0±0.1	0.85±0.1	255

11-5 Dimensions of Reel

Dimensions in inches (mm)

Technical drawing of a reel showing side and top views with dimensions:

- t**: Thickness of the reel.
- w**: Width of the reel.
- øa**: Outer diameter of the reel.
- øb**: Inner diameter of the reel.
- øc**: Diameter of the mounting hole.
- ød**: Diameter of the mounting hole.
- e**: Pitch of the mounting holes.

Size Code	øa max.	øb	w	t	øc	ød	e			
	7"	10"								
1 H (0201)	7.008 (178)	10.039 (255)	3.150 (80 ± 2.0)	0.394 (10 ± 1.0)	.059 (1.5 ± 0.05)	0.512 (13 ± 0.5)	1.063 (27 ± 2.0)	.118 (3.0 ± 0.5)		
1 E (0402)										
1 J (0603)										
2 A (0805)			2.362 (60 ± 2.0)	0.551 (14 ± 1.0)			.827 (21 ± 2.0)	.079 (2.0 ± 0.5)		
2 B (1206)										
2 E (1210)										
2 H (2010)										
3 A (2512)										

Quantity per reel or reel size are requested to designate at the time of ordering.

Contents on label:

- | | |
|---|--|
| (1) Article number (SR73K2ATD J) | (4) Customer's code number (subject to change) |
| (2) Quantity | (5) Production lot number |
| (3) Nominal Resistance and the chip marking [Ex: 0.2 Ω (R20)] | (6) Manufacturer's name |

10. Packing

Lot number (8 digits)

<u>89</u>	<u>12</u>	<u>3001</u>
Production	Date	Additional
year, month		day number

41~52	January 2006 ~ December 2006
53~64	January 2007 ~ December 2007

11. Packaging Method

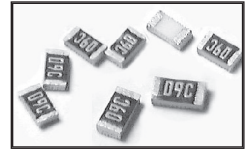
Size Code	TE 7" Embossed Plastic	TP 7" Punched Paper	TD Punched Paper	TED 10" Embossed Plastic	TDD 10" Punched Paper
1 E (0402)	—	10,000	—	—	—
1 J (0603)	—	10,000	5,000	—	10,000
2 A (0805)	4,000	10,000	5,000	10,000	10,000
2 B (1206)	4,000	—	5,000	10,000	10,000
2 E (1210)	4,000	—	5,000	10,000	10,000
2 H (2010)	4,000	—	—	10,000	—
3 A (2512)	4,000	—	—	10,000	—

FEATURES

- PRECISE TOLERANCE AND TEMPERATURE COEFFICIENT
- EIA STANDARD CASE SIZES (0402 ~ 2512)
- LOW NOISE, THIN FILM (NiCr) CONSTRUCTION
- REFLOW SOLDERABLE (Pb FREE TERMINATION FINISH)

RoHS
Compliant

*See Part Number System for Details



Type	EIA Size	Power Rating at 70°C	Max.*1 Working Voltage	Max.*2 Overload Voltage	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)	Resistance Values
NTR04	0402	1/16 (0.063)W	25V	50V	±0.01% (T)	±5	50 ~ 2KΩ	E-24 & E-96
					±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D)	±10, ±15	50 ~ 12KΩ	
					±0.01% (T), ±0.05% (A),	±25, ±50	50 ~ 12KΩ	
					±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	10 ~ 100KΩ	
NTR06	0603	1/16 (0.063)W	50V	100V	±0.01% (T)	±5	50 ~ 8KΩ	
					±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D)	±10, ±15	25 ~ 100KΩ	
					±0.01% (T)	±25, ±50	25 ~ 100KΩ	
					±0.05% (A)	±25, ±50	4.7 ~ 150KΩ	
					±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	4.7 ~ 402KΩ	
NTR10	0805	1/10 (0.10) W	100V	200V	±0.25 (C), ±0.5 (D), ±1% (F)	±25, ±50	2.0 ~ 4.6Ω	
					±0.01% (T)	±5	50 ~ 16KΩ	
					±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D)	±10, ±15	25 ~ 200KΩ	
					±0.01% (T)	±25, ±50	25 ~ 200KΩ	
					±0.05 (A)	±25, ±50	4.7 ~ 500KΩ	
NTR12	1206	1/8 (0.125) W	150V	300V	±0.1% (B), ±0.25 (C), ±0.5 (D), ±1% (F)	±25, ±50	4.7 ~ 1MΩ	
					±0.25 (C), ±0.5 (D), ±1% (F)	±25, ±50	1 ~ 4.6Ω	
					±0.01% (T)	±5	50 ~ 30KΩ	
					±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D)	±10, ±15	25 ~ 500KΩ	
					±0.01% (T)	±25, ±50	25 ~ 500KΩ	
NTR25	2010	1/4 (0.25) W	150V	300V	±0.05% (A)	±25, ±50	4.7 ~ 1MΩ	
					±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	4.7 ~ 1MΩ	
					±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	1.0 ~ 4.6Ω 1MΩ ~ 2MΩ	
					±0.01% (T)	±5	50 ~ 30KΩ	
					±0.01% (T), ±0.05% (A), ±0.1% (B), ±0.25% (C), ±0.5% (D)	±10, ±15	250 ~ 500KΩ	
NTR50	2512	1/2 (0.50) W	150V	300V	±0.01% (T)	±25, ±50	250 ~ 500KΩ	
					±0.05% (A)	±25, ±50	4.7 ~ 1MΩ	
					±0.1% (B), ±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	4.7 ~ 1MΩ	
					±0.25% (C), ±0.5% (D), ±1% (F)	±25, ±50	1.0 ~ 4.6Ω 1MΩ ~ 2MΩ	
					±0.01% (T)	±5	50 ~ 50KΩ	

Note *1 - Maximum allowable continuous Working Voltage for all resistors is the lower of the two values:

"Maximum Working Voltage" as specified above
or

$$\sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

Note *2 - Maximum Overload Voltage for all resistors is the lower of the two values:

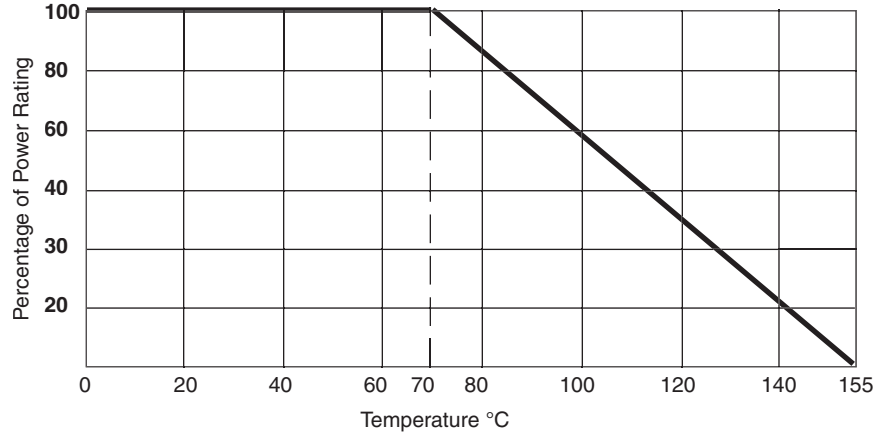
"Maximum Overload Voltage" as specified above
or

$$2 \times \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

TYPICAL NOISE CHARACTERISTICS

Resistance Value (Ω)	Case Size		
	0603	0805	1206
1 ~ 9	-95dB	-95dB	-95dB
10 ~ 49	-85dB	-85dB	-85dB
50 ~ 99	-85dB	-85dB	-85dB
100 ~ 4.99K	-100dB	-100dB	-105dB
5K ~ 19.9K	-100dB	-100dB	-100dB
20K ~ 1M	-90dB	-100dB	-100dB

Power Derating Curve: For operation above 70°C, power rating must be derated according to the following chart:



ENVIRONMENTAL CHARACTERISTICS

Item	Specification	Test Method
Temperature Coefficient of Resistance	As specified	MIL-STD-202, Method 304 +25/-55/+25/+155/+25°C
Short Time Overload	± (0.5% + 0.05Ω)	JIS-C-5205-5.5 RCWV*2.5 or Max. Overloading Voltage for 5 seconds
Dielectric Withstanding Voltage	by Type	MIL-STD-202F, Method 301 Apply Max Overlad Voltage for 1 minute
Insulation Resistance	>1000MW	MIL-STD-202F, Method 302 Apply 100VDC for 1 minute
Thermal Shock	± (0.5% + 0.05Ω)	MIL-STD-202F, Method 107G -55°C ~ +155°C, 100 cycles
Load Life	± (0.5% + 0.05Ω)	MIL-STD-202F, Method 108A RCWV +70°C, 1.5 hours ON, 0.5 hours OFF Total 1000 ~ 1048 hours
Humidity (Steady State)	± (0.5% + 0.05Ω)	MIL-STD-202F, Method 103B +40°C, 90 ~ 95% RH, RCWV 1.5 hours ON, 0.5 hours OFF, Total 1000 ~ 1048 hours
Resistance to Dry Heat	± (0.5% + 0.05Ω)	JIS-C-5205-7.2 96 hours @ +155°C without load
Low Temperature Operation	± (0.5% + 0.05Ω)	JIS-C-5205-7.1 1 hour, -65°C followed by 45 minutes of RCWV
Bending Strength	± (0.5% + 0.05Ω)	JIS-C-5205-6.1.4 Bending Amplitude 3mm for 10 seconds
Solderability	90% min. coverage	MIL-STD-202F, Method 208H 235°C ± 5°C, 2.0 ± 0.5 sec.
Resistance to Solder Heat	± (0.5% + 0.05Ω)	MIL-STD-202F, Method 208H 260°C ± 5°C, 10 ± 1 sec.

STANDARD E-24, E-96 VALUES AND 0603 RESISTANCE CODES

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	88
820	825	89	845	90	866	91	887	92
910	909	93	931	94	953	95	976	96

MULTIPLIER CODE

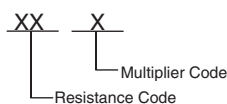
Code	A	B,b	C	D,d	E	F	G	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

1. No marking on 0402 case size.

2. Marking for 0603 case size:

E-24 values and E-96 Series - ± 1% (F), ± 0.5% (D), ± 0.25% (C), ± 0.1% (B) tolerances

CODING FORMULA

Example: $10.2\text{k}\Omega = \frac{102}{02} \times 10^2 \Omega = 02C$ $33.2 \Omega = \frac{332}{51} \times 10^{-1} = 51X$

MARKING EXAMPLES

$10\Omega = 01X$
 $7.5\text{k}\Omega = 85B$
 $150\text{k}\Omega = 18D$
 $1 \text{ Meg}\Omega = 01E$

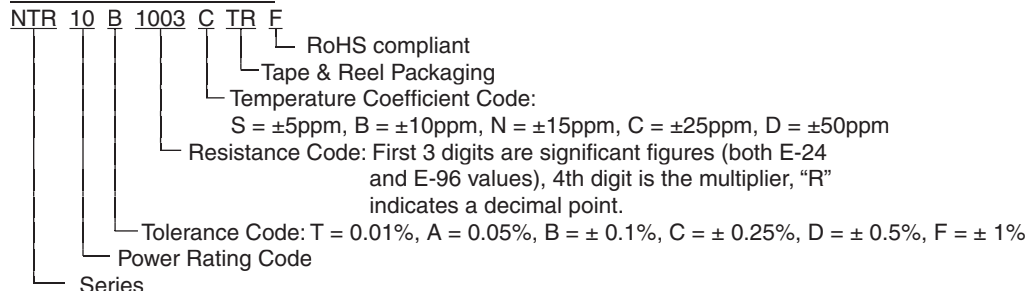
3. Marking for 0805, 1206, 2010 and 2512 case sizes:

E-24 and E-96 series - ±1%(F), ±0.5% (D), ±0.25%(C), ±0.1% (B) tolerances

4 DIGIT MARKING SYSTEM - First 3 digits are the significant figures, the 4th digit is the multiplier. "R"= decimal point.

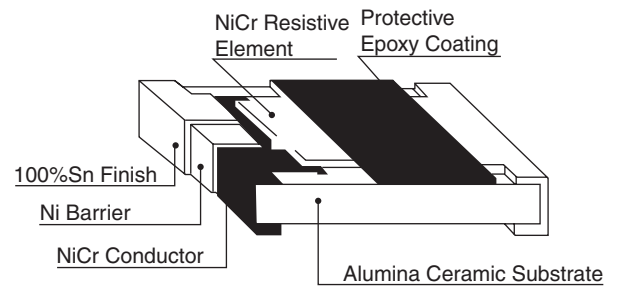
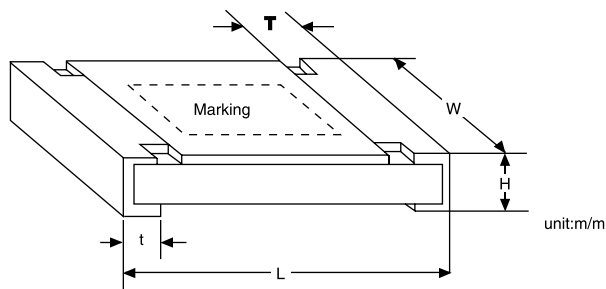
Examples: 0R10 = 0.10 ohms, 1R00 = 1.0 ohms, 22R1=22.1 ohms, 3320= 332 ohms, 4751=4.75K ohms,
 1132=11.3K ohms, 6493=649K ohms

PART NUMBER SYSTEM



DIMENSIONS (mm)

Type	Power Rating	EIA Size	L	W	H	T	t
NTR04	1/16W	0402	1.0 ± 0.05	0.5 ± 0.05	0.30 ± 0.05	0.2 ± 0.10	0.20 ± 0.10
NTR06	1/16W	0603	1.55 ± 0.10	0.8 ± 0.10	0.45 ± 0.10	0.3 ± 0.20	0.30 ± 0.20
NTR10	1/10W	0805	2.0 ± 0.15	1.25 ± 0.15	0.55 ± 0.10	0.3 ± 0.20	0.40 ± 0.25
NTR12	1/8W	1206	3.05 ± 0.10	1.5 ± 0.10	0.55 ± 0.10	0.42 ± 0.20	0.35 ± 0.25
NTR25	1/4W	2010	4.9 ± 0.15	2.4 ± 0.15	0.55 ± 0.10	0.6 ± 0.30	0.50 ± 0.25
NTR50	1/2W	2512	6.3 ± 0.15	3.1 ± 0.15	0.55 ± 0.10	0.6 ± 0.30	0.50 ± 0.25



TAPING SPECIFICATIONS

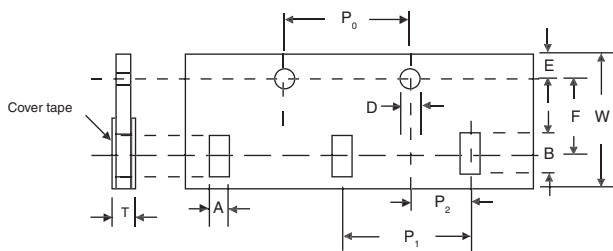
(1) Availability

Type	Power Rating	EIA Size	Carrier Tape			Q'ty per Reel (pcs)
			Fig	Material	Width(mm)	
NTR04	1/16W	0402	A	Paper	8	10,000
NTR06	1/16W	0603	A	Paper	8	5,000
NTR10	1/10W	0805	A	Paper	8	5,000
NTR12	1/8W	1206	A	Paper	8	5,000
NTR25	1/4W	2010	B	Plastic	12	4,000
NTR50	1/2W	2512	B	Plastic	12	4,000

(2) PAPER TAPE DIMENSIONS (mm)

Type	EIA Size	A	B	D	E	F	P ₀	P ₁	P ₂	W	T
NTR04	0402	0.67 ±0.03	1.15 ±0.03	1.55 ±0.03	1.75 ± 0.05	3.50 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	2.0±0.05	8.0 ± 0.1	0.40 ± 0.03
NTR06	0603	1.10 ±0.05	1.90 ±0.05					0.60 ± 0.03			
NTR10	0805	1.60 ±0.05	2.37 ±0.05					0.75 ± 0.05			
NTR12	1206	2.00 ±0.05	3.55 ±0.05								

FIG. A

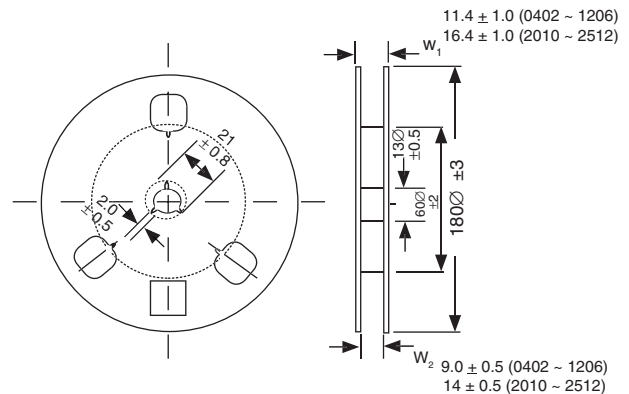
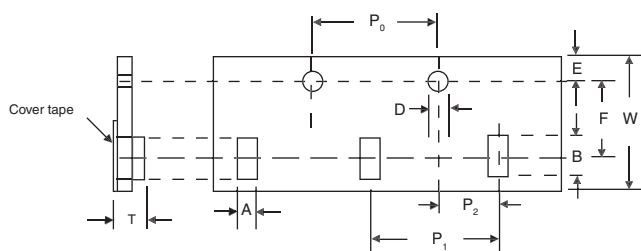


(2) PLASTIC EMBOSSED TAPE DIMENSIONS (mm)

FIG. B

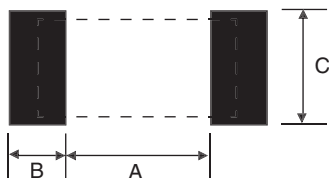
Type	EIA Size	A	B	D	E	F	P ₀	P ₁	P ₂	W	T
NTR25	2010	2.85 ± 0.10	5.45 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.05	4.0 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	12.0 ± 0.1	0.85 ± 0.10
NTR50	2512	3.40 ± 0.10	6.65 ± 0.10								

FIG. B

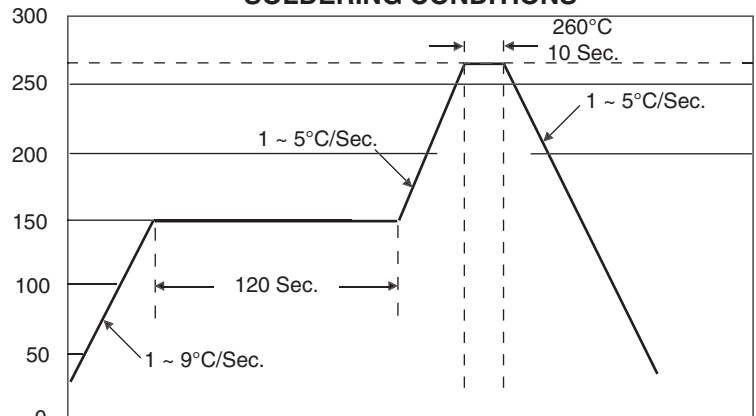


LAND PATTERN DIMENSIONS (mm)

Type	EIA Size	A	B	C
NTR04	0402	0.5	0.50	0.60 ± 0.2
NTR06	0603	0.8	0.70	0.90 ± 0.2
NTR10	0805	1.0	1.00	1.35 ± 0.2
NTR12	1206	2.0	1.15	1.70 ± 0.2
NTR25	2010	3.6	1.40	2.40 ± 0.2
NTR50	2512	4.9	1.60	3.00 ± 0.2



PEAK REFLOW SOLDERING CONDITIONS



Precision Thick Film Chip Resistors

ERJ G: 0201

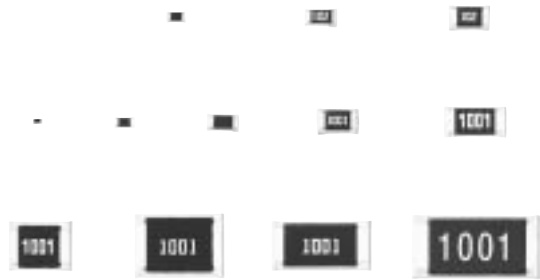
ERJ R: 0402, 0603, 0805

**ERJ E: 0603, 0805, 1206,
1210, 1812, 2010, 2512**

Type: **ERJ 1G**

ERJ 2R, 3R, 6R

ERJ 3E, 6E, 8E, 14, 12, 1T

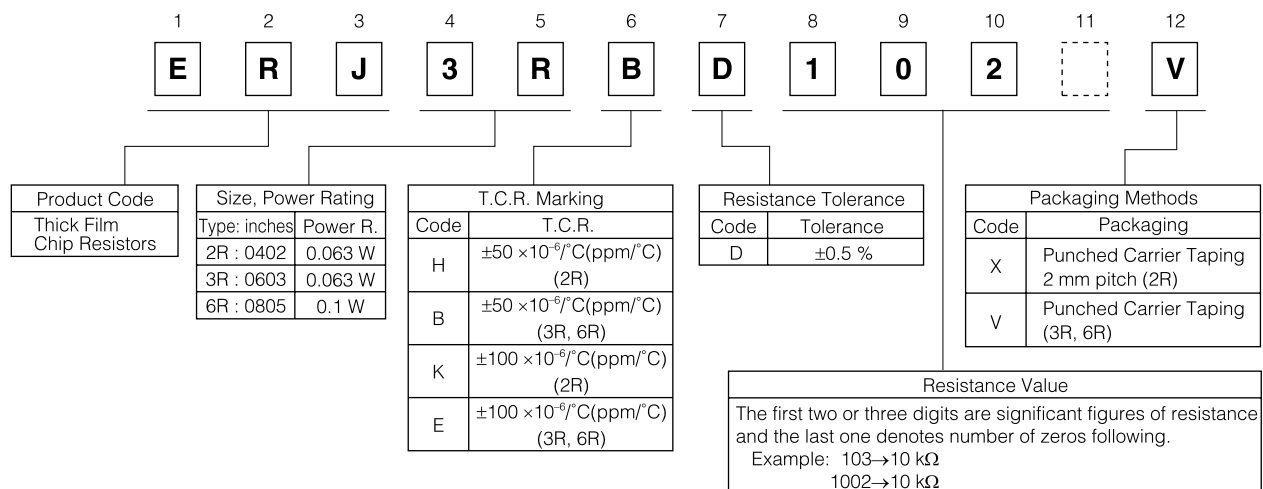


■ Features

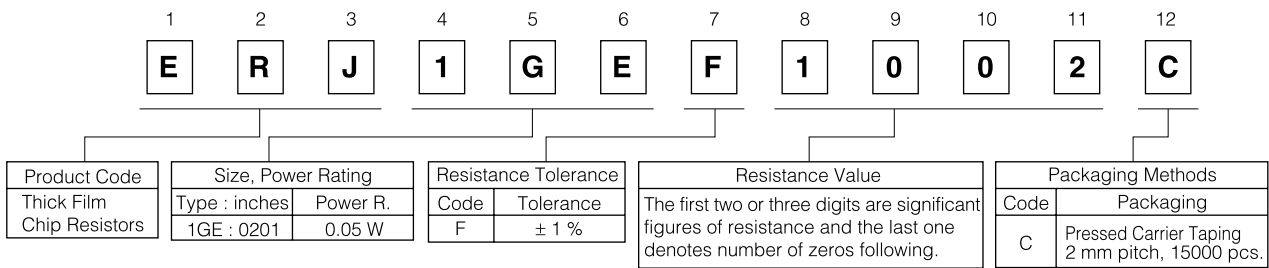
- Small size and lightweight
For PCB size reduction and lightweight products
- High reliability
Metal glaze thick film resistive element and three layered electrode results in high reliability.
- Matching with placement machines
Bulk, Taping and magazine packagings for automatic placement machines
- Solderability
Suitable for both reflow soldering and flow soldering
- Low Resistance Tolerance
ERJ1G, 2R, 3E, 6E, 8E, 14, 12, 1T Series ... $\pm 1\%$
ERJ2R, 3R, 6R Series $\pm 0.5\%$
- Reference Standards
IEC 60115-8, JIS C 5201-8

■ Explanation of Part Numbers

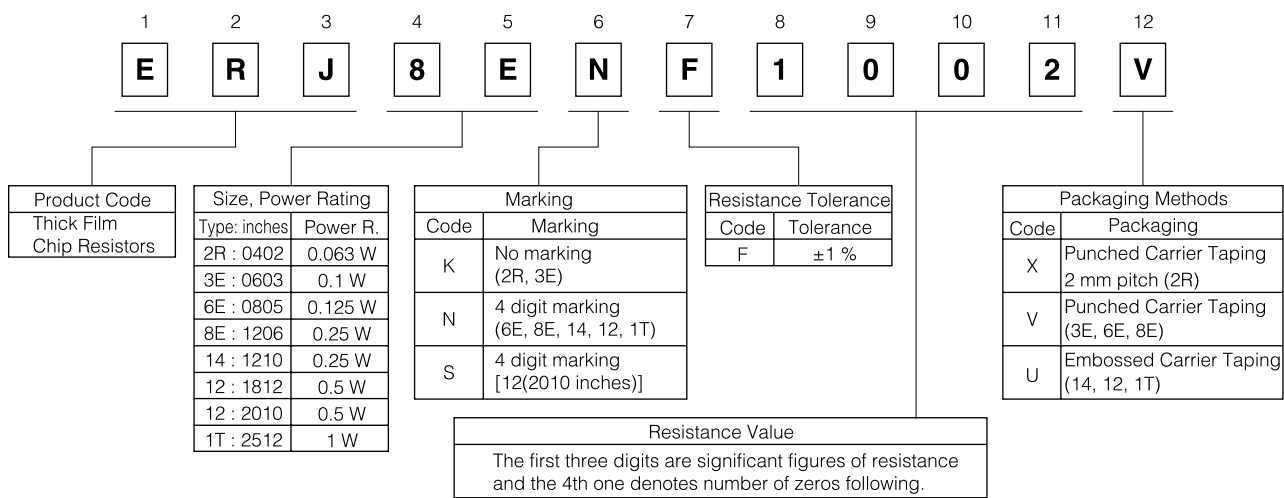
- ERJ2R, 3R, 6R Series, $\pm 0.5\%$ type



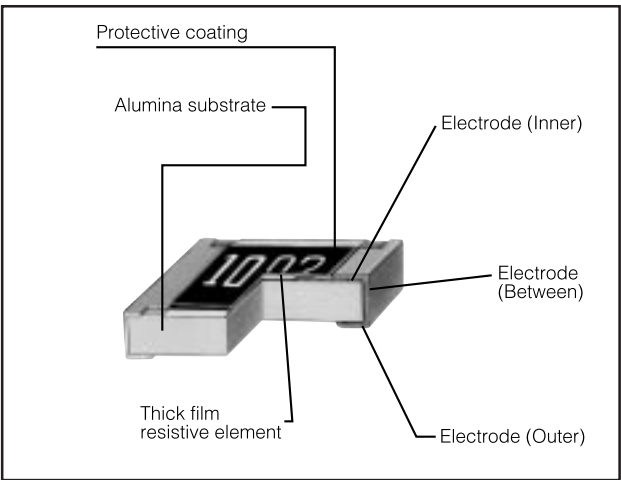
● ERJ1G Series, ±1 % type



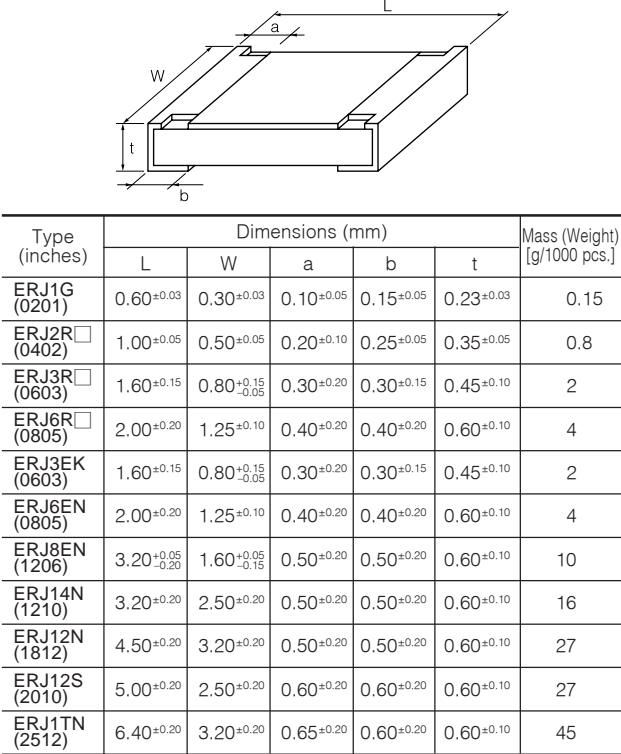
● ERJ2R, 3E, 6E, 8E, 14, 12, 1T Series, ±1 % type



■ Construction



■ Dimensions in mm (not to scale)



■ Ratings

<±0.5 %>

Type (inches)	Power Rating at 70 °C (W)	Limiting Element Voltage (Maximum RCWV) ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Resistance Tolerance (%)	Resistance Ranges (Ω)	T.C.R. [×10 ⁻⁶ /°C (ppm/°C)]	Category Temperature Range (Operating Temperature Range) (°C)
ERJ2RH (0402)	0.063	50	100	±0.5	100 to 100 K (E24, E96)	±50	-55 to +125
ERJ2RK (0402)	0.063	50	100	±0.5	10 to 97.6 102 k to 1 M (E24, E96)	±100	-55 to +125
ERJ3RB (0603)	0.063	50	100	±0.5	100 to 100 K (E24, E96)	±50	-55 to +125
ERJ3RE (0603)	0.063	50	100	±0.5	10 to 97.6 102 k to 1 M (E24, E96)	±100	-55 to +125
ERJ6RB (0805)	0.1	150	200	±0.5	100 to 100 K (E24, E96)	±50	-55 to +125
ERJ6RE (0805)	0.1	150	200	±0.5	10 to 97.6 102 k to 1 M (E24, E96)	±100	-55 to +125

<±1 %>

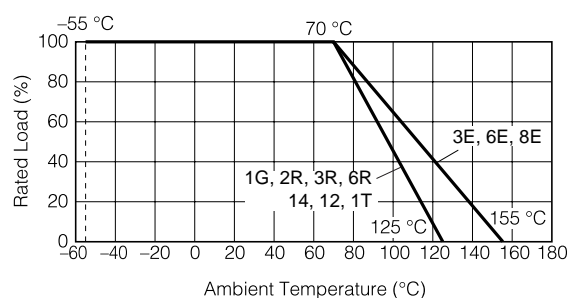
Type (inches)	Power Rating at 70 °C (W)	Limiting Element Voltage (Maximum RCWV) ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Resistance Tolerance (%)	Resistance Ranges (Ω)	T.C.R. [×10 ⁻⁶ /°C (ppm/°C)]	Category Temperature Range (Operating Temperature Range) (°C)
ERJ1G (0201)	0.05	15	30	±1	10 to 1 M (E24, E96)	±200	-55 to +125
ERJ2RK (0402)	0.063	50	100	±1	10 to 1 M (E24, E96)	±100	-55 to +125
ERJ3EK (0603)	0.1	50	100	±1	10 to 1 M (E24, E96)	±100	-55 to +155
ERJ6EN (0805)	0.125	150	200	±1	10 to 2.2 M (E24, E96)	±100	-55 to +155
ERJ8EN (1206)	0.25	200	400	±1	10 to 2.2 M (E24, E96)	±100	-55 to +155
ERJ14N (1210)	0.25	200	400	±1	10 to 1 M (E24, E96)	±100	-55 to +125
ERJ12N (1812)	0.5	200	400	±1	10 to 1 M (E24, E96)	±100	-55 to +125
ERJ12S (2010)	0.5	200	400	±1	10 to 1 M (E24, E96)	±100	-55 to +125
ERJ1TN (2512)	1	200	400	±1	10 to 1 M (E24, E96)	±100	-55 to +125

(1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Values}}$, or Limiting Element Voltage (max. RCWV) listed above, whichever less.

(2) Overload (Short-time Overload) Test Voltage (SOTV) shall be determined from $SOTV = 2.5 \times \text{Power Rating}$ or max. Overload Voltage listed above whichever less.

Power Derating Curve

For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the right figure.



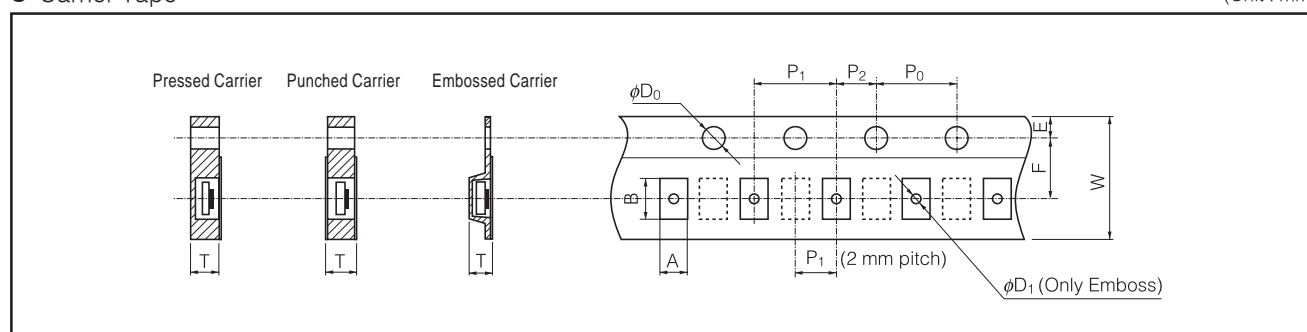
■ Packaging Methods (Taping)

● Standard Quantity

Type	Kind of Taping	Pitch (P ₁)	Quantity
ERJ1G	Pressed Carrier Taping	2 mm	15000 pcs./reel
ERJ2RH, ERJ2RK	Punched Carrier Taping		10000 pcs./reel
ERJ3R□, ERJ3EK		4 mm	5000 pcs./reel
ERJ6R□, ERJ6EN			
ERJ8EN			
ERJ14N	Embossed Carrier Taping		
ERJ12N			
ERJ12S			
ERJ1TN		4000 pcs./reel	

● Carrier Tape

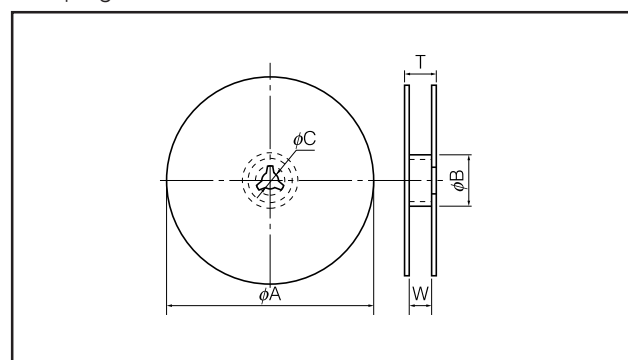
(Unit : mm)



Type	A	B	W	F	E	P ₁	P ₂	P ₀	φD ₀	T	φD ₁
ERJ1G	0.38±0.05	0.68±0.05	8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.10	2.00±0.05	4.00±0.10	1.50 ^{+0.10} ₀	0.42±0.05	—
ERJ2RH, ERJ2RK	0.70±0.05	1.20±0.05				4.00±0.10				0.52±0.05	—
ERJ3R□, ERJ3EK	1.10±0.10	1.90±0.10								0.70±0.05	—
ERJ6R□, ERJ6EN	1.65±0.15	2.50±0.20								0.84±0.05	—
ERJ8EN	2.00±0.15	3.60±0.20	8.00±0.30	5.50±0.20	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50 ^{+0.10} ₀	0.84±0.05	—
ERJ14N	2.80±0.20	3.50±0.20								1.00±0.10	1.0 ^{+0.10} ₀
ERJ12N	3.50±0.20	4.80±0.20									1.5 min.
ERJ12S	2.80±0.20	5.30±0.20									
ERJ1TN	3.60±0.20	6.90±0.20									

● Taping Reel

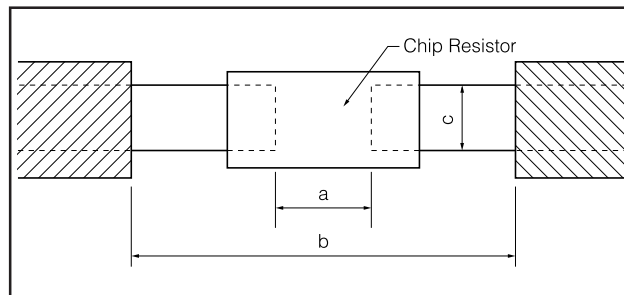
(Unit : mm)



Type	φA	φB	φC	W	T
ERJ1G	180.0 ⁺⁰ _{-3.0}	60 min.	13.0±1.0	9.0±1.0	11.4±1.0
ERJ2RH, ERJ2RK					
ERJ3R□, ERJ3EK					
ERJ6R□, ERJ6EN					
ERJ8EN	180.0 ⁺⁰ _{-3.0}	60 min.	13.0±1.0	9.0±1.0	11.4±1.0
ERJ14N					
ERJ12N					
ERJ12S					
ERJ1TN				13.0±1.0	15.4±2.0

■ Recommended Land Pattern

In the case of flow soldering, the land width must be smaller than the Chip Resistor width to control the solder amount properly. Generally, the land width should be 0.7 to 0.8 times (W) of the width of chip resistor. In the case of reflow soldering, solder amount can be adjusted, therefore the land width should be set to 1.0 to 1.3 times chip resistor width (W).



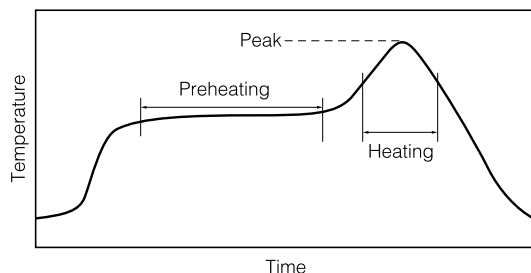
Type (inches)	Dimensions (mm)		
	a	b	c
ERJ1G (0201)	0.3 to 0.4	0.8 to 0.9	0.25 to 0.35
ERJ2R (0402)	0.5 to 0.6	1.4 to 1.6	0.4 to 0.6
ERJ3R, 3EK (0603)	0.7 to 0.9	2 to 2.2	0.8 to 1
ERJ6R, 6EN (0805)	1 to 1.4	3.2 to 3.8	0.9 to 1.4
ERJ8EN (1206)	2 to 2.4	4.4 to 5	1.2 to 1.8
ERJ14N (1210)	2 to 2.4	4.4 to 5	1.8 to 2.8
ERJ12N (1812)	3.3 to 3.7	5.7 to 6.5	2.3 to 3.5
ERJ12S (2010)	3.6 to 4	6.2 to 7	1.8 to 2.8
ERJ1TN (2512)	5 to 5.4	7.6 to 8.6	2.3 to 3.5

■ Recommended Soldering Conditions

Recommendations and precautions are described below.

● Recommended soldering conditions for reflow

- Reflow soldering shall be two times maximum.
- Please contact us for additional information when you use in conditions other than those specified.
- Please measure temperature of terminations and study solderability every kind of solder and board, before actual use.



For solder (Example : Sn/Pb)

	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s
Main heating	Above 200 °C	30 s to 40 s
Peak	235 ± 5 °C	max. 10 s

For lead-free solder (Example : Sn/Ag/Cu)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 230 °C	30 s to 40 s
Peak	max. 260 °C	max. 10 s

● Recommended soldering conditions for flow

	For solder		For lead-free solder	
	Temperature	Time	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s	150 °C to 180 °C	60 s to 120 s
Soldering	245±5 °C	20 s to 30 s	max. 260 °C	max. 10 s

⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the precautions common to Fixed Resistors shown on page ER3 of this catalog.

1. Take measures against mechanical stress during and after mounting of Precision Thick Film Chip Resistors (hereafter called the Resistors) so as not to damage their electrodes and protective coatings.
2. If a transient load (heavy load in a short time) like a pulse is expected to be applied, check and evaluate the performance of the Resistors when installed in your products before use.
Never exceed the rated power. Otherwise, the performance and/or reliability of the Resistors may be impaired.
3. Do not use halogen-based or other high-activity flux. Otherwise, the residue may impair the Resistors' performance and/or reliability.
4. When soldering with a soldering iron, never touch the Resistors' bodies with the tip of the soldering iron. When using a soldering iron with a high temperature tip, finish the soldering as quickly as possible (within three seconds at 350 °C max.).
5. As the amount of applied solder becomes larger, the mechanical stress applied to the Resistors increases, causing problems such as cracks and faulty characteristics. Avoid applying an excessive amount of solder.
6. Do not apply a shock to the Resistors or pinch them with a hard tool (e.g. pliers and tweezers). Otherwise, the Resistors' protective coatings and bodies may be chipped, affecting their performance.
7. Avoid excessive bending of printed circuit boards in order to protect the Resistors from abnormal stress.

Safety Precautions (Common precautions for Fixed Resistors)

- When using our products, no matter what sort of equipment they might be used in, be sure **confirm** agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate their operations when installed in your products.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other significant damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.
 - * Systems equipped with a protection circuit and a protection device
 - * Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault

(1) Precautions for use

- These products are designed and manufactured for general purpose and standard use in general electronic equipment (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment)
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
 1. In liquid, such as water, oil, chemicals, or organic solvent
 2. In direct sunlight, outdoors, or in dust
 3. In salty air or air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
 4. In an environment where strong static electricity or electromagnetic waves exist
 5. In an environment where these products cause dew condensation
 6. Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin or other materials
- These products generate Joule heat when energized. Carefully position these products so that their heat will not affect the other components.
- Carefully position these products so that their temperatures will not exceed the category temperature range due to the effects of neighboring heat-generating components. Do not mount or place heat-generating components or inflammables, such as vinyl-coated wires, near these products .
- Note that non-cleaning solder, halogen-based highly active flux, or water-soluble flux may deteriorate the performance or reliability of the products.
- Carefully select a flux cleaning agent for use after soldering. An unsuitable agent may deteriorate the performance or reliability. In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues. Otherwise, the insulation performance may be deteriorated.

(2) Precautions for storage

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 5 °C to 35 °C and a relative humidity of 45 % to 85 %.

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
2. In direct sunlight

<Package markings>

Package markings include the product number, quantity, and country of origin.
In principle, the country of origin should be indicated in English.

Fixed Metal (Oxide) Film Resistors, Surface Mount Type

Type: **ERG(X)1H (1 W)**

ERG(X)2H (2 W)



■ Features

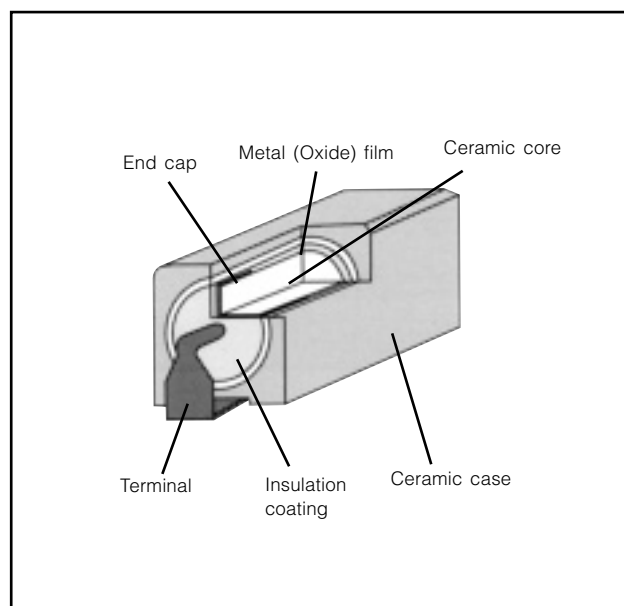
- Non-flammable
- High Reliability

■ Explanation of Part Numbers

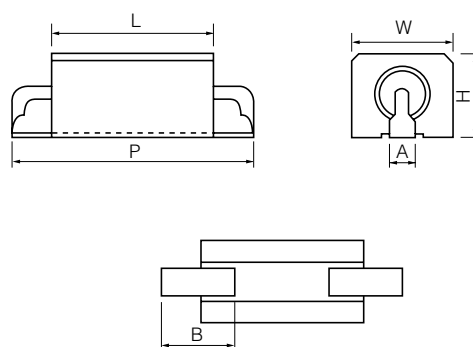
1		2		3		4		5		6		7		8		9		10		11		
E		R		X		1		H				J		1		R		0		H		
Product Code		Power Rating				Special Feature				Resistance Tolerance				Resistance Value				Packaging Methods				
ERG	Metal Oxide Film Resistors	1	1 W			H	Surface Mount Type			G	±2 %			The first two digits are significant figures of resistance and the third one denotes number of zeros following. Decimal point is expressed by R as 2.7 = 2R7.				H	Embossed Carrier Taping			
ERX	Metal Film Resistors	2	2 W							J	±5 %											
Code	Type	Res. Tol.	Res. Value Range																			
Q	1H	± 5 %	22 mΩ to 82 mΩ																			
	2H	± 5 %	22 mΩ to 82 mΩ																			
Z	1H	± 2 %	0.1 Ω to 0.82 Ω																			
		± 5 %	0.1 Ω to 0.18 Ω																			
	2H	± 2 %	0.1 Ω to 0.82 Ω																			
		± 5 %	0.1 Ω to 0.18 Ω																			
Nil	Over than above list																					

The above example shows a surface mount type metal film resistor, 1 W power rating, resistance value of 1.0 ohms, tolerance ±5 %, and embossed taping.

■ Construction



■ Dimensions in mm (not to scale)



Type	Dimensions (mm)					
	P	L	W	H	A	B
ERG(X)1H	12.5 ^{+1.0} _{-0.5}	9.0±0.5	5.6±0.3	5.0±0.2	1.5±0.3	3.0±1.0
ERG(X)2H	15.0 ^{+1.0} _{-0.5}	12.0±0.5	6.4±0.3	5.8±0.2	1.5±0.3	4.0±1.0

■ Ratings

Type	Power Rating at 70 °C (W) ⁽¹⁾	Dielectric Withstanding Voltage (VAC)	Res. Tol. (%) ⁽²⁾	Resistance Range (Ω) ⁽²⁾		T.C.R. [×10 ⁻⁶ /°C (ppm/°C)]	Standard Resistance Value
				min. ⁽³⁾	max.		
ERG(X)1H	1	1000	J (±5)	22 m	39 m	±1000	E12
				47 m	82 m	±500	
			G (±2) J (±5)	0.1	10 k	±350	
ERG(X)2H	2	1000	J (±5)	22 m	39 m	±1000	E12
				47 m	82 m	±500	
			G (±2) J (±5)	0.1	10 k	±350	

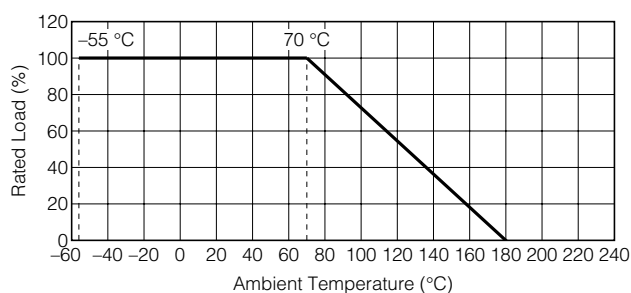
(1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$.

(2) Resistance tolerance and resistance range is of use besides range listed, please inquire.

(3) As for the low resistance value range, "Q" or "Z" is given to the part number.(Refer to the explanation of part numbers.)

Power Derating Curve

For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.

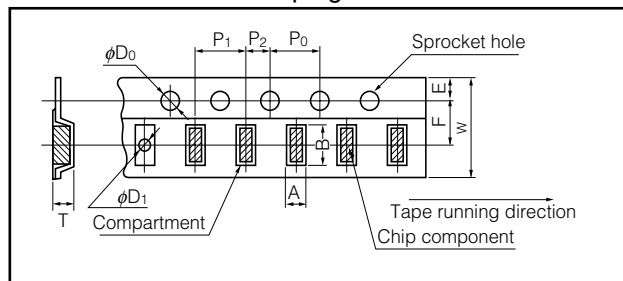


■ Packaging Methods

● Standard Quantity

Type	Embossed Carrier Taping
ERG(X)1H	2000 pcs./reel
ERG(X)2H	1000 pcs./reel

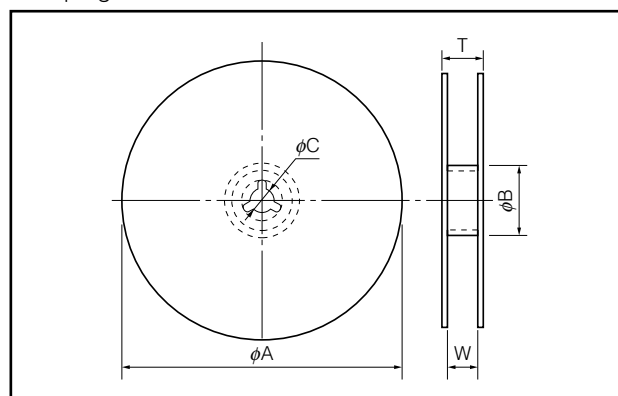
● Embossed Carrier Taping



Dimensions (mm)	Type	W	F	E	A	B	P ₁
1H	1H	24.0 ^{+0.30}	11.5 ^{+0.10}	1.75 ^{+0.10}	6.2 ^{+0.20}	13.7 ^{+0.20}	8.0 ^{+0.10}
	2H				7.0 ^{+0.20}	16.2 ^{+0.20}	12.0 ^{+0.10}

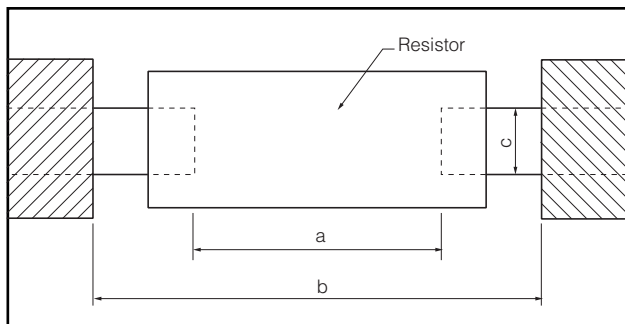
Dimensions (mm)	Type	P ₂	P ₀	φD ₀	φD ₁	T
1H	1H	2.00 ^{+0.10}	4.00 ^{+0.10}	1.50 ^{+0.10}	1.5 min.	5.7 ^{+0.10}
	2H					6.4 ^{+0.10}

● Taping Reel



Dimensions (mm)	Type	φA	φB	φC	W	T
1H, 2H	1H, 2H	380 ^{±3}	80 ^{±2}	13.0 ^{±1.0}	25.5 ^{±1.0}	29.5 ^{±1.0}

■ Recommended Land Pattern

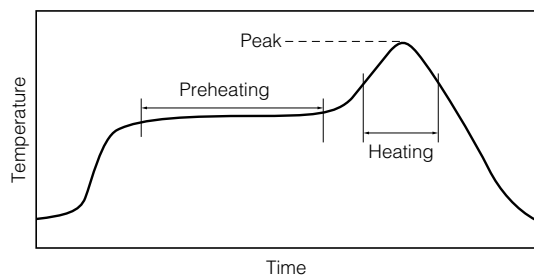


Type	Dimensions (mm)		
	a	b	c
ERG(X)1H	3.5 to 4.0	14.5 to 15.0	2.8 to 3.3
ERG(X)2H	4.0 to 4.5	17.0 to 17.5	3.1 to 3.6

■ Recommended Soldering Conditions

Recommendations and precautions are described below.

- Recommended soldering conditions for reflow
 - Reflow soldering shall be performed a maximum of two times.
 - Please contact us for additional information when used in conditions other than those specified.
 - Please measure the temperature of the terminals and study every kind of solder and printed circuit board for solderability before actual use.



For soldering (Example : Sn/Pb)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 200 °C	30 s to 40 s
Peak	235 °C	max. 10 s

For lead-free soldering (Example : Sn/Ag/Cu)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 230 °C	30 s to 40 s
Peak	255 °C	max. 5 s

⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the precautions common to Fixed Resistors shown on page ER3 of this catalog.

1. Transient voltage

If there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a high voltage pulse may be applied, make sure to evaluate and check the characteristics of Fixed Metal (Oxide) Film Resistors mounted on your product rather than only depending on the calculated power limit or steady-state conditions to complete the design or decide to use the resistors.

2. Do not apply excessive tension to the terminals.

Safety Precautions (Common precautions for Fixed Resistors)

- When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate their operations when installed in your products.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other significant damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.
- * Systems equipped with a protection circuit and a protection device
- * Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general electronic equipment (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment)
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
 1. In liquid, such as water, oil, chemicals, or organic solvent
 2. In direct sunlight, outdoors, or in dust
 3. In salty air or air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
 4. Electric Static Discharge (ESD) Environment
 - These components are sensitive to static electricity and can be damaged under static shock (ESD).
 - Please take measures to avoid any of these environments.
 - Smaller components are more sensitive to ESD environment.
 5. Electromagnetic Environment
 - Avoid any environment where strong electromagnetic waves exist.
 6. In an environment where these products cause dew condensation
 7. Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin or other materials
- These products generate Joule heat when energized. Carefully position these products so that their heat will not affect the other components.
- Carefully position these products so that their temperatures will not exceed the category temperature range due to the effects of neighboring heat-generating components. Do not mount or place heat-generating components or inflammables, such as vinyl-coated wires, near these products.
- Note that non-cleaning solder, halogen-based highly active flux, or water-soluble flux may deteriorate the performance or reliability of the products.
- Carefully select a flux cleaning agent for use after soldering. An unsuitable agent may deteriorate the performance or reliability. In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues. Otherwise, the insulation performance may be deteriorated.

(2) Precautions for storage

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 5 °C to 35 °C and a relative humidity of 45 % to 85 %.

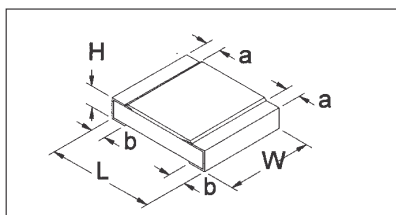
Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
2. In direct sunlight

<Package markings>

Package markings include the product number, quantity, and country of origin. In principle, the country of origin should be indicated in English.

Thin Film Chip Resistors



FEATURES

- Surface Mount Devices (SMD)
- Precision Tolerances of $\pm 0.5\%$ to $\pm 0.1\%$
- Temperature Coefficients of $\pm 50\text{ppm}/^\circ\text{C}$ and $\pm 25\text{ppm}/^\circ\text{C}$
- Precision Performance
- Space Saving Construction

PERFORMANCE CHARACTERISTICS (Tested per Mil-STD-202)

Dimensions in mm

Electrical (Operating Temperature Range -55°C to $+155^\circ\text{C}$)

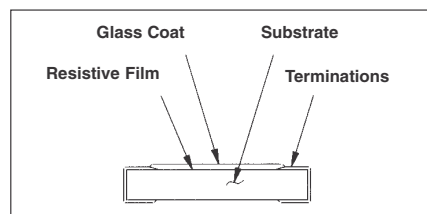
TYPE	Packaging Size	Power Rating (Watts)	Max. Working Voltage	Max. Overload Voltage	Resistance Temp. Coefficient	Resistance Range	Tolerance ₁
RN10	0805	1/10 @ 70°C	50V	100V	$\pm 50\text{ppm}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$	100Ohm - 1M 1000Ohm - 100K	D = $\pm 0.5\%$ C = $\pm 0.25\%$, B = $\pm 0.1\%$
RN12	1206	1/8 @ 70°C	100V	200V	$\pm 50\text{ppm}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$	100Ohm - 1M 49.9Ohm - 1M	D = $\pm 0.5\%$ C = $\pm 0.25\%$, B = $\pm 0.1\%$

ENVIRONMENTAL

	Specification	Typical	Test Method
Moisture Resistance, Thermal Shock	$\pm(0.25\%+0.05\Omega)$	$\leq 0.1\%$	JIS C 5202 7.4
Load Life	$\pm(0.5\%+0.05\Omega)$	$\leq 0.2\%$	JIS C 5202 7.10
Load Life in Moisture	$\pm(0.5\%+0.05\Omega)$	$\leq 0.25\%$	JIS C 5202 7.9
Resistance to Soldering Heat	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	JIS C 5202 6.4, $260\pm 5^\circ\text{C}$, 10 sec.
Solderability	min. 95% coverage	$\geq 95\%$	JIS C 5202 6.5
Terminal Strength	$\pm(0.2\%+0.05\Omega)$	$\leq 0.05\%$	EIAJ RC-2609A 6.6
Dielectric Withstanding Voltage	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	EIAJ RC-2609A 6.5 Test Voltage: 10@ 150VAC, RN12 @ 300VAC
Short Time Overload	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	JIS C 5202 7.4
Insulation Resistance	1,000 meg minimum	$\geq 1,000$ meg	EIAJ RC-2609A 6.36

MATERIALS

Feature	Material	Remarks (Reference Only)
Substrate	Alumina Porcelain	Purity 96% min.
Resistive Film	Nickel-Chromium Film	20 Microns Thick
Coating	Boro-Silicated Acid Lead Glass	20 Microns Thick
Terminations	90/10 Tin-Lead (Electrical Plated) over Nickel (Electrical Plated) over AG-PD (Silver-Palladium [Glaze Printed])	3 Microns Thick 3 Microns Thick 8 Microns Thick



Dimensions in mm

Feature	RN10	RN12
L - Body Length	.078 \pm .008 (2.00 \pm 0.20)	.122 \pm .004 (3.10 \pm 0.10)
W - Body Width	.049 \pm .008 (1.25 \pm 0.20)	.061 \pm .004 (1.55 \pm 0.10)
H - Body Height	.018 \pm .004 (0.45 \pm 0.10)	.021 \pm .004/- .002 (0.55 \pm 0.10/-0.05)
a - Top Termination	.016 \pm .008 (0.40 \pm 0.20)	.018 \pm .008 (0.45 \pm 0.20)
b - Bottom Termination	.012 \pm .008/- .004 (0.30 \pm 0.20/-0.10)	.012 \pm .008/- .004 (0.30 \pm 0.20/-0.10)

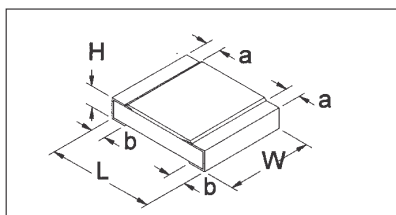
Notes: 1. Embossed taping available on RN12 only.

Ordering Information

Example: 0805 1/10 watt .1% 1k

RN	10	B	1001	CT
Thin Film	Wattage	Resistance	Packaging (Tape & Reel)	
Tolerance *Note				
B = .1%				
C = .25%				
D = .50%				

Thin Film Chip Resistors



FEATURES

- Surface Mount Devices (SMD)
- Precision Tolerances of $\pm 0.5\%$ to $\pm 0.1\%$
- Temperature Coefficients of $\pm 50\text{ppm}/^\circ\text{C}$ and $\pm 25\text{ppm}/^\circ\text{C}$
- Precision Performance
- Space Saving Construction

PERFORMANCE CHARACTERISTICS (Tested per Mil-STD-202)

Electrical (Operating Temperature Range -55°C to $+155^\circ\text{C}$)

Dimensions in mm

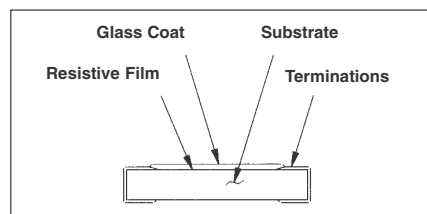
TYPE	Packaging Size	Power Rating (Watts)	Max. Working Voltage	Max. Overload Voltage	Resistance Temp. Coefficient	Resistance Range	Tolerance ¹
RN04	0402	1/16 @ 70°C	25V	50V	$\pm 50\text{ppm}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$	10 Ω - 97.6K 100 Ω - 100K	D = $\pm 0.5\%$ C = $\pm 0.25\%$, B = $\pm 0.1\%$
RN06	0603	1/16 @ 70°C	50V	100V	$\pm 50\text{ppm}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$	10 Ω - 97.6K 49.9 Ω - 360K	D = $\pm 0.5\%$ C = $\pm 0.25\%$, B = $\pm 0.1\%$

ENVIRONMENTAL

	Specification	Typical	Test Method
Moisture Resistance, Thermal Shock	$\pm(0.25\%+0.05\Omega)$	$\leq 0.1\%$	JIS C 5202 7.4
Load Life	$\pm(0.5\%+0.05\Omega)$	$\leq 0.2\%$	JIS C 5202 7.10
Load Life in Moisture	$\pm(0.5\%+0.05\Omega)$	$\leq 0.25\%$	JIS C 5202 7.9
Resistance to Soldering Heat	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	JIS C 5202 6.4, $260\pm 5^\circ\text{C}$, 10 sec.
Solderability	min. 95% coverage	$\geq 95\%$	JIS C 5202 6.5
Terminal Strength	$\pm(0.2\%+0.05\Omega)$	$\leq 0.05\%$	EIAJ RC-2609A 6.6
Dielectric Withstanding Voltage	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	EIAJ RC-2609A 6.5 Test Voltage: 10@ 150VAC, RN12 @ 300VAC
Short Time Overload	$\pm(0.25\%+0.05\Omega)$	$\leq 0.05\%$	JIS C 5202 7.4
Insulation Resistance	1,000 meg minimum	$\geq 1,000$ meg	EIAJ RC-2609A 6.36

MATERIALS

Feature	Material	Remarks (Reference Only)
Substrate	Alumina Porcelain	Purity 96% min.
Resistive Film	Nickel-Chromium Film	20 Microns Thick
Coating	Boro-Silicated Acid Lead Glass	20 Microns Thick
Terminations	90/10 Tin-Lead (Electrical Plated) over Nickel (Electrical Plated) over AG-PD (Silver-Palladium [Glaze Printed])	3 Microns Thick 3 Microns Thick 8 Microns Thick



Dimensions in mm

Feature	RN04	RN06
L - Body Length	1.00 ± 0.05	1.60 ± 0.20
W - Body Width	0.50 ± 0.05	0.80 ± 0.20
H - Body Height	0.35 ± 0.05	0.40 ± 0.10
a - Top Termination	0.20 ± 0.10	0.30 ± 0.20
b - Bottom Termination	0.20 ± 0.10	0.30 ± 0.20

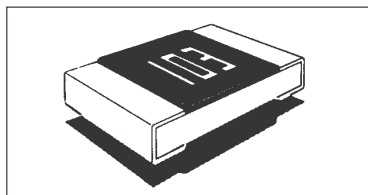
Notes: 1. Embossed taping available on RN12 only.

Ordering Information

Example: 0805 1/10 watt .1% 1k

RN	10	B	1001	CT
Thin Film	Wattage	Resistance		Packaging (Tape & Reel)
Tolerance *Note				
B = .1%				
C = .25%				
D = .50%				

Thick Film Chip Resistors - RM Series



“Fixed Chip Resistors” manufactured for more compact electronic components and automatic mounting system.

These Chip Resistors have electrical stability and mechanical stress due to used reliable metal glazed paste printed on Alumina substrate. Resistors will reduce your cost and save developmental time.

FEATURES

1. Very small, thin and light weight.
2. Both flow soldering and reflow soldering are applicable.
3. Owing to the reduced lead inductance, the high frequency characteristic is excellent.
4. Suitable size and packaging for surface mount assembly.

PART NUMBERING

(EX) 0805 1/10 watt 5% 10ohm

RM	10	J	100	CT
1	2	3	4	5

1. Code Designation: Thick Film Chip Resistors

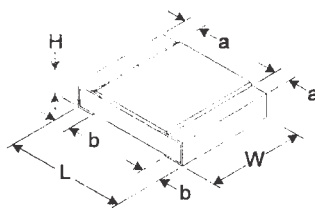
2. Dimensions: RM04 1.0x.5mm; RM06 1.6x.8mm;
RM10 2.0x1.25mm; RM12 3.2x1.6mm
RM14 3.2x2.65mm; RM20 5.0x2.5mm;
RM25 6.3x3.1mm

3. Resistance Tolerance: F: $\pm 1\%$; J: $\pm 5\%$

4. Nominal Resistance: 5% - 3 Digit
1st 2 significant 3rd
is multiplier (10x)
000 = jumper “0” ohm
1% - 4 digit
1st 3 significant
4th multiplier (10x)

5. Packaging: Tape packaging; CT

Thick Film Chip Resistors



PERFORMANCE CHARACTERISTICS (Tested per MIL-STD-202)

Type	Package Size	Power Rating (Watts)	Maximum Working Voltage	Maximum Overload Voltage	Resistance Temperature Coefficient	Resistance Range	Tolerance	Current Rating of Jumper ³
RM04	0402	1/16 @ 70°C	50V	100V	±250ppm/°C ±200ppm/°C ±200ppm/°C	2.2Ω - 9.1Ω 10Ω - 10M 10Ω - 3.3M	±5% ±5% ±1%	1A max.
RM06	0603	1/10 @ 70°C	50V	100V	±500ppm/°C ±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 9.1Ω 1.1M - 5.6M 10Ω - 10M 10Ω - 3.74M	±5% ±5% ±5% ±1%	1A max.
RM10	0805	1/8 @ 70°C	150V	300V	±500ppm/°C ±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 9.1Ω 1.1M - 10M 10Ω - 20M 10Ω - 2.43M	±5% ±5% ±5% ±1%	2A max.
RM12	1206	1/4 @ 70°C	200V	400V	±500ppm/°C ±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 9.1Ω 1.1M - 10M 10Ω - 20M 10Ω - 10M	±5% ±5% ±5% ±1%	2A max.
RM14	1210	1/4 @ 70°C	200V	400V	±500ppm/°C ±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 1.8Ω 2.2Ω - 9.1Ω 10Ω - 10M 10Ω - 1M	±5% ±5% ±5% ±1%	3A max.
RM20	2010	1/2 @ 70°C	200V	400V	±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 8.2Ω 10Ω - 1M 10Ω - 1M	±5% ±5% ±1%	3A max.
RM25	2512	1 @ 70°C	200V	400V	±500ppm/°C ±200ppm/°C ±100ppm/°C	1.0Ω - 8.2Ω 5.6Ω - 1M 47.5Ω - 1M	±5% ±5% ±1%	3A max.

DIMENSIONS

Inches (mm)

Type	Body Length (L)	Body Width (W)	Body Height (H)	Top Terminator (a)	Bottom Terminator (b)
RM04	0.39±.004/-0.002 (1.0±0.10/-0.05)	.020±.004/-0.002 (0.50±.10/-0.05)	.014±.002 (0.35±0.05)	.008±.004 (0.20±0.10)	.010±.008/-0.004 (0.25±0.20/-0.10)
RM06	.063±.004 (1.60±0.10)	.031±.006/-0.002 (0.80±0.15/-0.05)	.018±.004 (0.45±0.10)	.010±.004 (0.25±0.10)	.012±.008/-0.004 (0.30±0.20/-0.10)
RM10	.078±.008 (2.00±0.20)	.049±.008 (1.25±0.20)	.018±.004 (0.45±0.15)	.016±.008 (0.40±0.20)	.012±.008/-0.004 (0.30±0.20/-0.10)
RM12	.122±.004 (3.10±0.10)	.061±.004 (1.55±0.10)	.021±.004/-0.002 (0.55±0.10/-0.05)	.018±.008 (0.45±0.20)	.012±.008/-0.004 (0.30±0.20/-0.10)
RM14	.122±.004 (3.10±0.10)	.100±.004 (2.55±0.10)	.021±.004/-0.002 (0.55±0.10/-0.05)	.018±.008 (0.45±0.20)	.012±.008/-0.004 (0.30±0.20/-0.10)
RM20	.197±.008 (5.00±0.20)	.098±.008 (2.50±0.20)	.021±.004 (0.55±0.10)	.020±.008 (0.50±0.20)	.020±.008 (0.50±0.20)
RM25	.248±.008 (6.30±0.20)	.124±.008 (3.15±0.20)	.021±.004 (0.55±0.10)	.020±.008 (0.50±0.20)	.020±.008 (0.50±0.20)

NOTES

1. RM04 J & F are not marked
2. Zero Ohm (0.05 max.) jumper available in all sizes
3. EIA, E24 and E96 resistance ranges apply
4. Higher and lower values available. Consult Factory.

Thick Film Chip Resistors

MARKING



Resistance value in three digit designation system is marked on the glasscoat. Illustrated is a resistor of 15K Ω . Four digit resistance designation system is applied to RM12 and E-96 Series. For example, 1502 designated 15K Ω . (The last digit specifies the number of zeros.)

- For E-24 Series ($\pm 5\%$ -J and $\pm 10\%$ -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: 10R = 10 ohms 102 = 1k ohms
470 = 47 ohm 103 = 10k ohms
101 = 100 ohms 104 = 100k ohms
105 = 1 megohms

- For E-96 Series ($\pm 1\%$ -F Tolerance)

In 0805, 1206, and 1210 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 1003 = 100k ohms
1000 = 100 ohms 1004 = 1 megohms
1001 = 1k ohms 1052 = 10.5k ohms
1002 = 10k ohms 2213 = 221k ohms

- For E-96 Series ($\pm 1\%$ -F Tolerance) in 0603 size

3 DIGIT SYSTEM (Due to space restrictions)

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	88
820	825	89	845	90	866	91	887	92
910	909	93	931	94	953	95	976	96

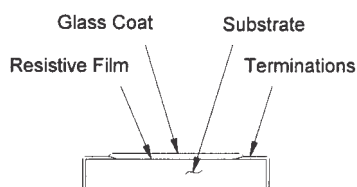
*For 1%, a 3-digit alpha-numeric marking system is used as follows.

A	B	C	D	E	F	X
10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁻¹

PERFORMANCE CHARACTERISTICS

ITEMS		SPECIFICATIONS, REQUIREMENT	TESTED PER EIA J-RC-2690A	TYPICAL
Moisture Resistance, Thermal Shock		±(1%+0.05Ω), No Mechanical Damage	-55°C to +125°C, 5 cycles	Within ±0.2%
Low Temperature Exposure		±(3%+0.1Ω), No Mechanical Damage	-55°C, 1,000 Hours	Within ±0.5%
Load Life		<1 meg ±(3%+0.1Ω), ≥1 meg ±5%	70°C, rated voltage, 1.5hr on/0.5hr off, 1,000 hrs	See Graph
Load Life in Moisture		<1 meg ±(3%+0.1Ω), ≥1 meg ±5%	40°C, 95% R.H., 1.5hr on/0.5hr off, 1,000 hrs	See Graph
Vibration		±(1%+0.05Ω), No Mechanical Damage	10-55 Hz, 3 direction, each 2 hours	Within ±0.1%
Resistance to Soldering Heat		±(1%+0.05Ω), No Mechanical Damage	270°C, 10 seconds	See Graph
Solderability		min. 95% coverage	230°C, 3 seconds, flux applied ¹	More than 97%
Heat Resistance	Adhesion Curing	±(1%+0.05Ω)	+150°C, 10 minutes	Within ±0.3%
	Dry Heat	±(3%+0.1Ω), No Mechanical Damage	-125°C, 1,000 hours	Within ±0.5%
Terminal Strength	Pull	±(1%+0.05Ω), No Mechanical Damage	500G load, 30 seconds	Within ±0.2%
	Board Bending	±(1%+0.05Ω), No Mechanical Damage	1/45mm bend, 10 seconds	Within ±0.2%
Dielectric Withstanding Voltage		No Insulation Breakdown	500V, 1 minute	Above 900V
Short Time Overload		±(1%+0.05Ω), No Evidence of Arc	2 1/2 times rated voltage, 5 seconds	Within ±0.4%
Insulation Resistance		1,000 meg minimum	500V, 1 minute	Above 10 ⁶ meg
Voltage Coefficient		+0/-100ppm/V (above 1K±)	Rated Voltage & 1/10 times rated voltage	Within -90ppm/V

MATERIALS

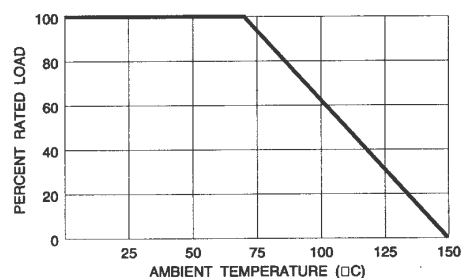


Feature	Material	Remarks (Reference Only)
Substrate	Alumina Porcelain	Purity 90% min.
Resistive Film	Ruthenium-Oxide Film	20 Microns Thick
Coating	Boro-Silicated Acid Lead Glass	20 Microns Thick
Terminations	90/10 Tin-Lead (Electrical Plated) over Nickel (Electrical Plated) over AG-PD (Silver Palladium[Glaze Printed])	3 Microns Thick 3 Microns Thick 8 Microns Thick

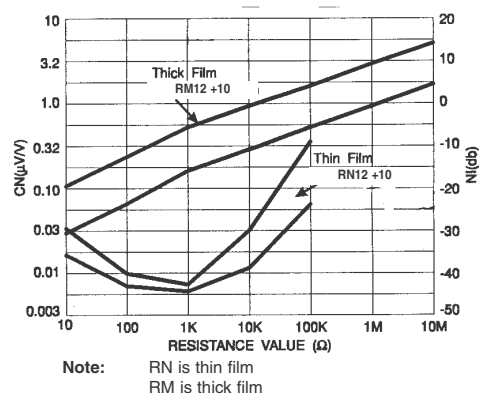
Thick Film Chip Resistors

PERFORMANCE CURVES

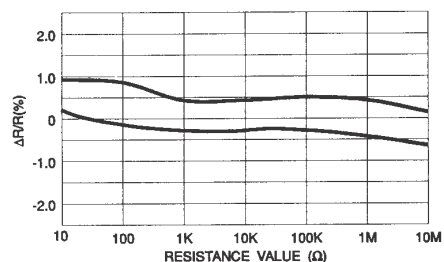
Power - Temperature Derating



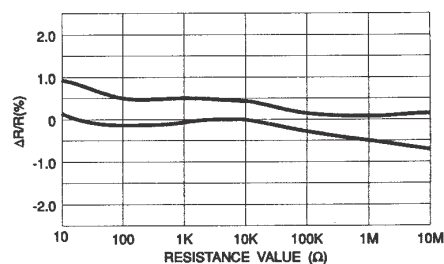
Current Noise



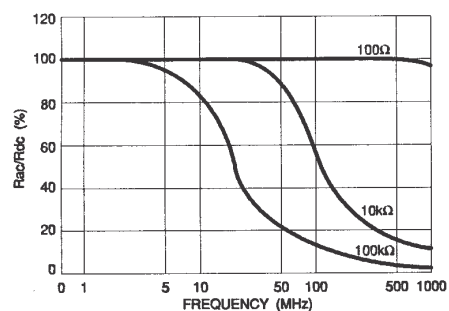
Load Life in Moisture (1,000 hours)



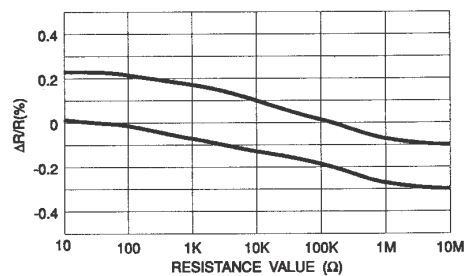
Load Life (1,000 hours)



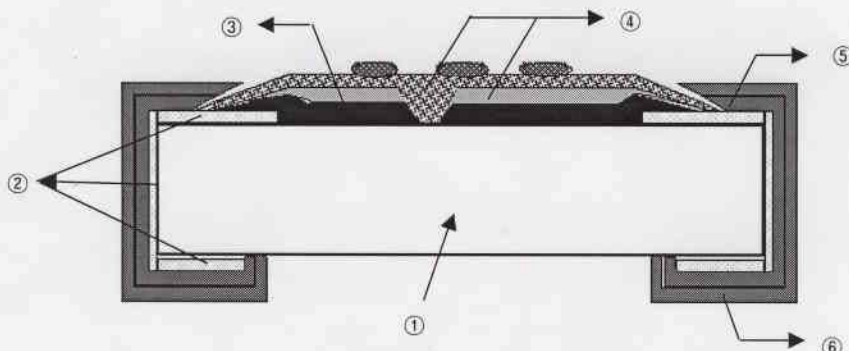
High Frequency Characteristics



Resistance to Soldering Heat



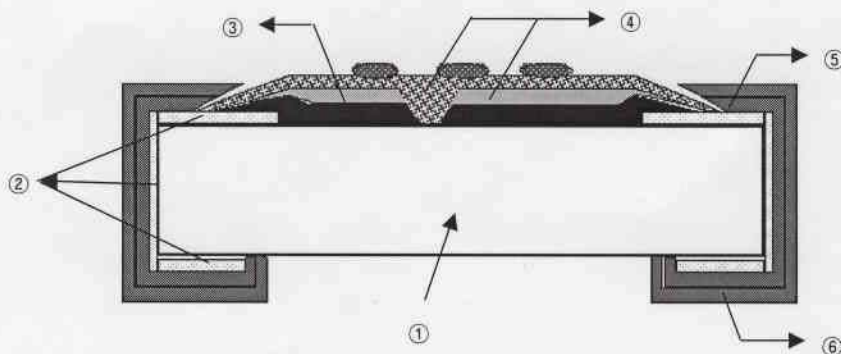
RM04 SERIES



※ The color of the resistor shown is different from actual product.

[illegible]

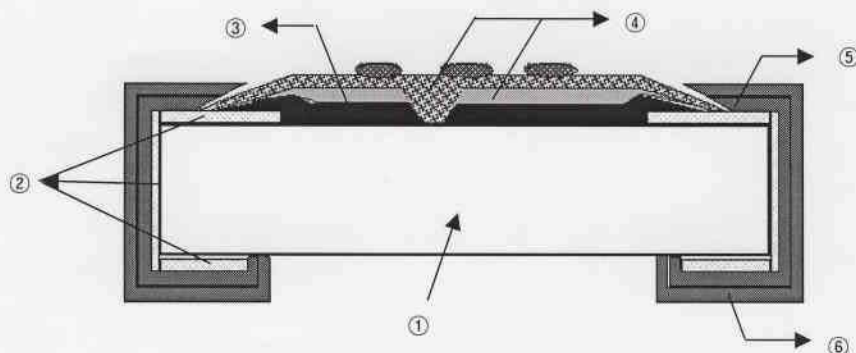
RM06 SERIES



※ The color of the resistor shown is different from actual product.

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RM10 SERIES

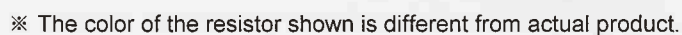


※ The color of the resistor shown is different from actual product.

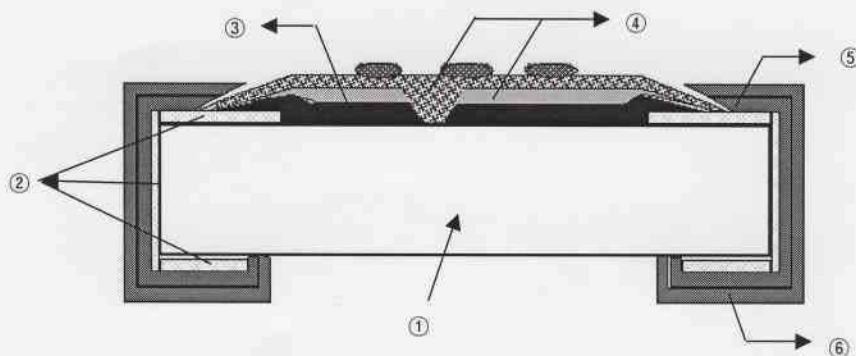
[illegible]

※ All the above is based on the component parts of the material for your information.

RM12 SERIES

[illegible]

RM14 SERIES



※ The color of the resistor shown is different from actual product.









Part Name	Material	% of total Wt.	Substance Name	% of total Wt.	CAS No.	wt%	Mass mg
RM14	① Substrate	88.6	Aluminium oxide	96.79	1344-28-1	85.734	13.438
			Sillicon dioxide	3.21	7631-86-9	2.842	0.445
	② Conductor layer	5.6	Silver	61.14	7440-22-4	3.445	0.540
			Palldium	3.30	7440-05-3	0.186	0.029
			Lead oxide	27.36	1317-36-8	1.542	0.242
			Silicon dioxide	4.49	7631-86-9	0.253	0.040
			Boron trioxide	3.71	1303-86-2	0.209	0.033
	③ Resistive layer	0.6	Ruthenium oxide	38.33	12036-10-1	0.248	0.039
			Lead oxide	42.04	1317-36-8	0.272	0.043
			Silicon dioxide	13.45	7631-86-9	0.087	0.014
			Boron trioxide	2.78	1303-86-2	0.018	0.003
			Aluminium oxide	3.40	1344-28-1	0.022	0.003
	④ Coating layer	1.9	Lead oxide	44.62	1317-36-8	0.846	0.133
			Silicon dioxide	39.19	7631-86-9	0.743	0.116
			Boron trioxide	7.81	1303-86-2	0.148	0.023
			Aluminium oxide	8.39	1344-28-1	0.159	0.025
⑤ Plating Ni	1.6	Nickel	100.00	7440-02-0	1.560	0.245	
⑥ Plating Sn	1.7	Tin	100.00	7440-31-5	1.686	0.264	

※ All the above is based on the component parts of the material for your informaiton.

100.00015.674



●Thick Film Resistors : General

Part No.	Size (Inch)	Package	Circuit	Rated power (70°C)	Limiting element voltage	Resistance tolerance	Resistance range (Ω)	Operating temperature range(°C)
MCR006	0603 (0201)			1/20W (0.05W)	25V	J(±5%)	1.0 to 10M	-55 to +125
						F(±1%)	1.0 to 10M	
MCR01	1005 (0402)			1/16W (0.063W)	50V	J(±5%)	1.0 to 10M	-55 to +155
						F(±1%)	10 to 2.2M	
MCR03	1608 (0603)			1/10W (0.10W)		J(±5%)	1.0 to 10M	
						F(±1%)	10 to 10M	
MCR10	2012 (0805)			1/8W (0.125W)	150V	J(±5%)	1.0 to 10M	
					F(±1%)	10 to 2.2M		
MCR18	3216 (1206)			1/4W (0.25W)	200V	J(±5%)	1.0 to 10M	
						F(±1%)	10 to 2.2M	
MCR25	3225 (1210)					J(±5%)	1.0 to 3.3M	
						F(±1%)	10 to 1.0M	
MCR50	5025 (2010)			1/2W (0.50W)		J(±5%)	1.0 to 560k	-55 to +125
						F(±1%)	10 to 180k	

MCR100	6432 (2512)			1W		J(±5%)	1.0 to 100k	
						F(±1%)	10 to 82k	

Soldering condition for Resistors

Lead free paste

(Sn-3Ag-0.5Cu) version

CONTENTS

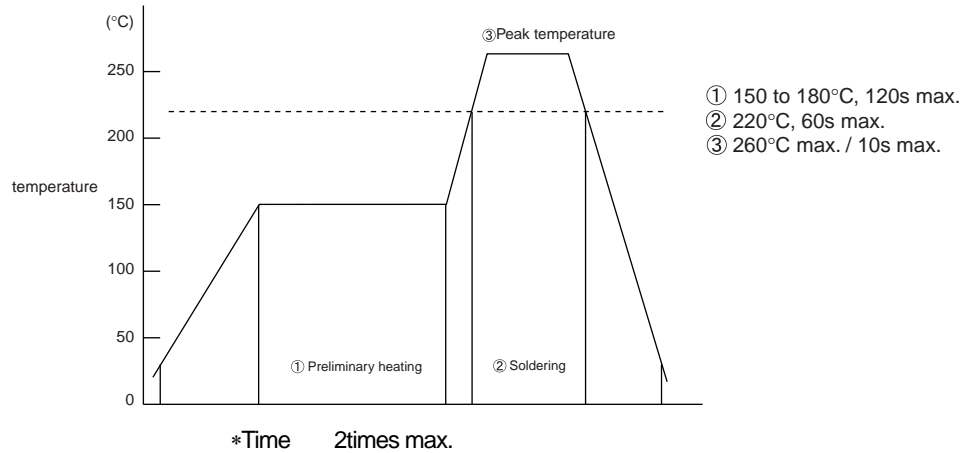
Recommended condition of reflow soldering	2/4
Recommended condition of flow soldering	2/4
Recommended condition of hand soldering	2/4
Recommended condition of washing	3/4
Sample of land pattern	4/4

Resistors

● Recommended reflow soldering condition

Corresponded products

MCR series / MNR series / PMR series / ESR series / KTR series / MHR series / RCN series



● Recommended flow soldering condition

Corresponded products

MCR series (except for MCR006 series) / MNR series (except for MNR02 / 04 / 12 / 14 / 15 / 18 series) /

PMR series / ESR series / KTR series / MHR series

Peak temperature 265°C, 10s max.

● Recommended hand soldering condition

Corresponded products

MCR series (except for MCR006 series) / MNR series (except for MNR15 / 18 series) /

PMR series / ESR series / KTR series / MHR series / RCN series

Temperature less than 350°C

Time less than 3s

Times one time

Watt less than 20W

Resistors

● Recommended washing condition

Corresponded products

MCR series / MNR series / PMR series / ESR series / KTR series / MHR series / RCN series

1. Washing liquid

washing liquid	manufacturers
water	—
ethanol	—
methanol	—
pine alpha ST-100S	ARAKAWA CHEMICAL
clean through 750H	KAO
technocare FRW-1	TOSHIBA TECHNOCARE

2. Condition of washing

washing bath		time	temperature	remarks
first bath	ultrasonic bath	less than 2min	less than 60°C	25 to 28kHz, 15W / L
second bath	immersion bath	less than 2min	less than 40°C	
third bath	immersion bath	less than 2min	room temperature	

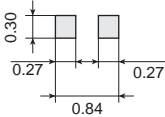
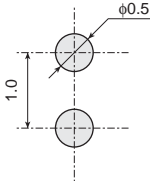
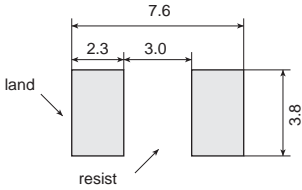
3. Condition of drying

	time	temperature	remarks
Drying machine	less than 5min	less than 100°C	

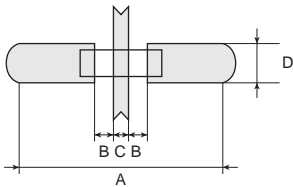
Resistors

●Sample of land pattern

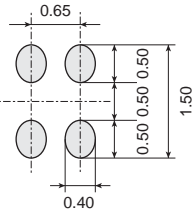
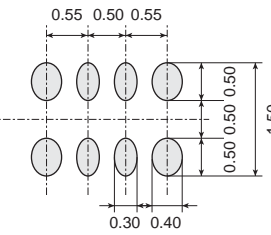
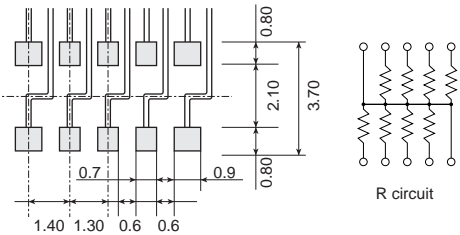
(Unit : mm)

MCR006	MCR01 / MHR01	PMR100
		

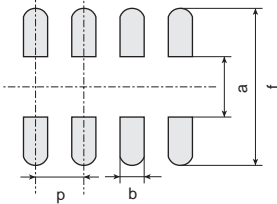
MCR / MHR / ESR / KTR



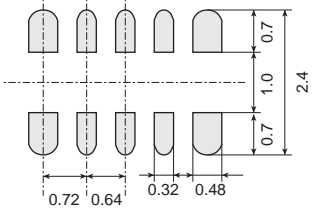
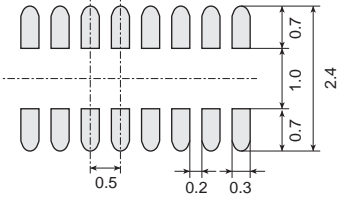
Type	Dimension			
	A	B	C	D reference
MCR03 , MHR03	2.7	0.3	0.2	0.52 to 0.92
MCR10 , ESR10 , KTR10	3.5	0.3 to 0.4	0.3	1.1 to 1.3
MCR18 , ESR18 , KTR18	5.0	0.8	0.6	1.4 to 1.8
MCR25	5.0	0.8	0.6	2.1 to 3.0
MCR50	8.4	1.6	0.6	2.1 to 3.0
MCR100	10.5	1.6	0.6	2.56 to 4.8

MNR02 / RCN02	MNR04	MNR35
		

MNR12 / MNR14 / MNR32 / MNR34



Division	a	b	p	f
MNR12 / 14	1.0	0.4	0.8	2.6
MNR32 / 34	2.1	0.8	1.27	4.1

MNR15	MNR18
	

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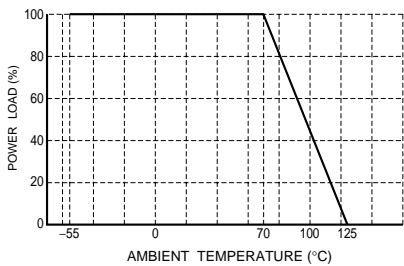
Thick film rectangular

MCR006 (0201 size : 1 / 20W)

●Features

- 1) Extremely small light
Area ratio is 60% smaller than that of chip 1005, while weight ratio has been cut 80%.
- 2) Highly reliable chip resistor
Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Thick film makes the electrodes very strong.
- 4) Flat surface further facilitates mounting
- 5) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet supplied with the product before using or ordering it.

●Ratings

Item	Conditions	Specifications	
Rated power	Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C.  Fig.1	0.05W (1 / 20W) at 70°C	
Rated voltage	The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage. $E = \sqrt{P \times R}$ E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)	Limiting element voltage	25V
Nominal resistance	See Table 1.		
Operating temperature		-55°C to +125°C	

Resistors

Jumper type

Resistance	Max. 100mΩ
Rated current	0.5A
Operating temperature	-55°C to +125°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm / °C)
J (±5%)	1≤R≤10M (E24)	±250
F (±1%)	1≤R≤10M (E24)	±250

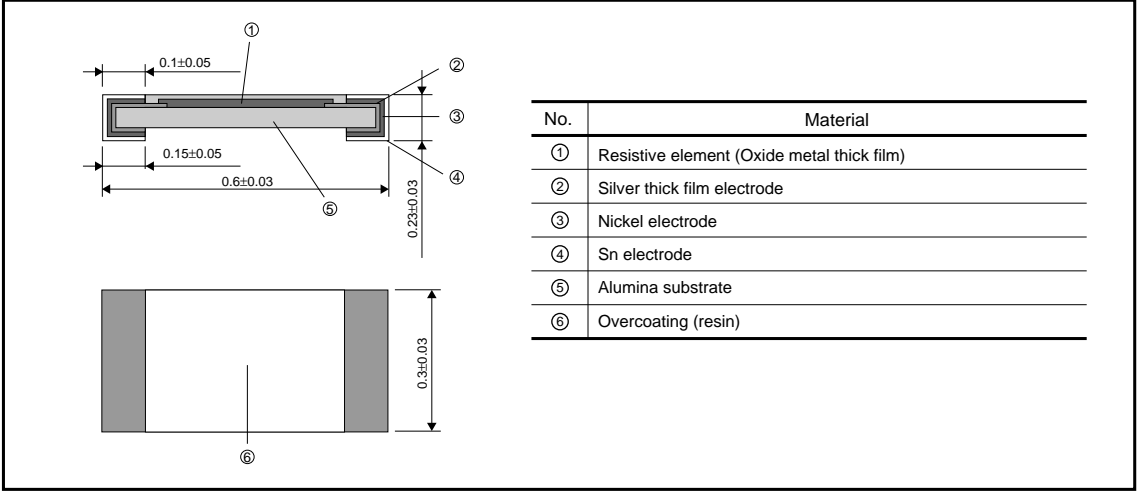
- Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

●Characteristics

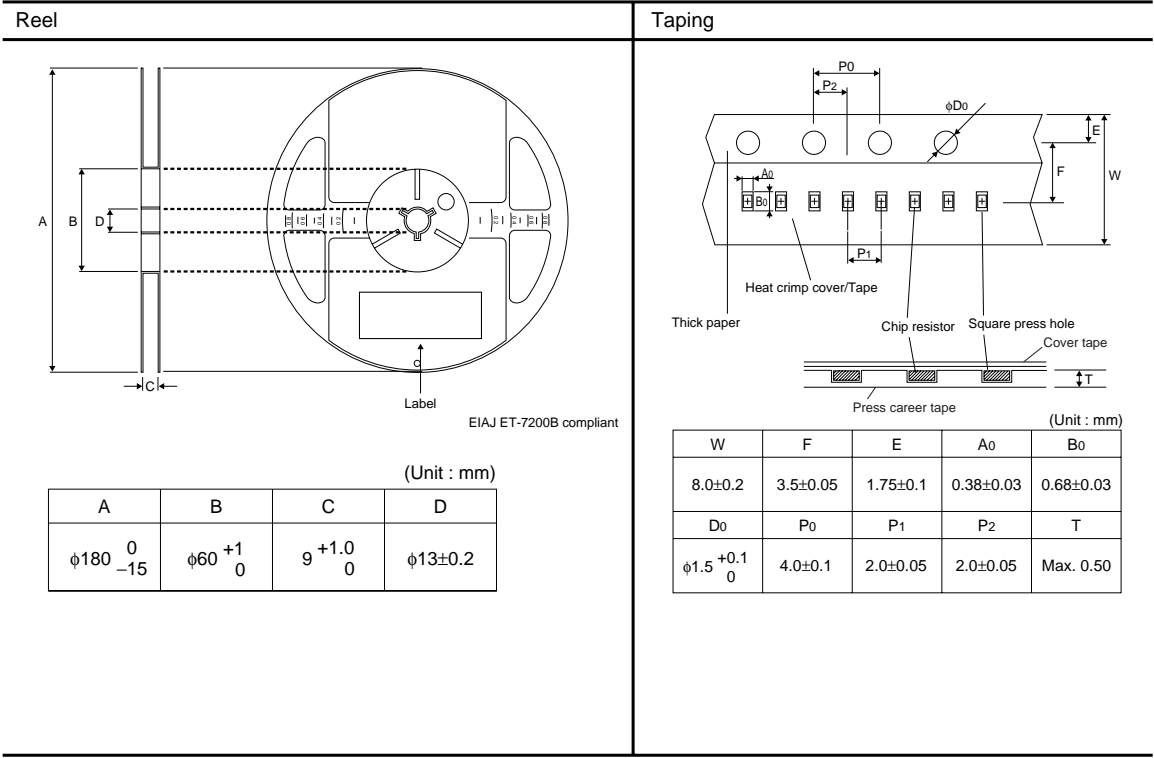
Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : ±5% F : ±1%	Max. 100mΩ	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1	Max. 100mΩ	JIS C 5201-1 4.8 Measurement : +20 / -55 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.13 Rated voltage (current) ×2.5, 2s. Maximum overload voltage : 50V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s.
Resistance to soldering heat	± (1.0%+0.05Ω) No remarkable abnormality on the appearance.	Max. 100mΩ	JIS C 5201-1 4.18 Soldering condition : 260±5°C Duration of immersion : 10±1s.
Rapid change of temperature	± (1.0%+0.05Ω)	Max. 100mΩ	JIS C 5201-1 4.19 Test temp. : -55°C to +125°C 100cyc
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.24 40°C, 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C±3°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.3 125°C Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω)	Max. 100mΩ	JIS C 5201-1 4.29 23±5°C, Immersion cleaning, 5±0.5min. Solvent : 2-propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 100mΩ	JIS C 5201-1 4.33

Resistors

●External dimensions (Unit : mm)

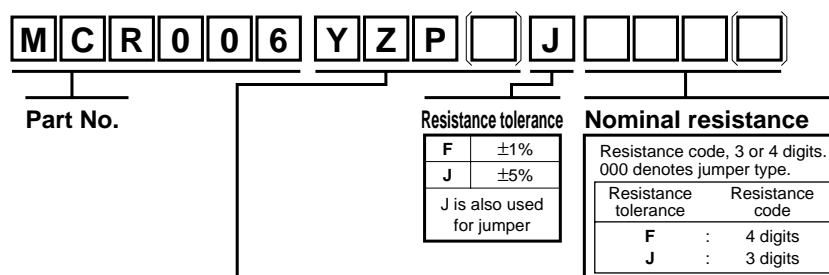


●Packaging



Resistors

●Part designation



Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)			
MCR006	YZP	◎	◎	Paper tape (2mm Pitch)	φ180mm (7in.)	15,000

Reel (φ180) : JEITA ET-7200B

◎ : Standard product

●Dimensions

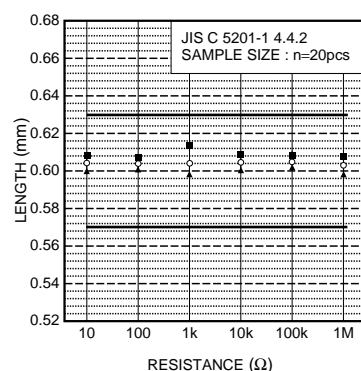


Fig.2 Dimensions (length)

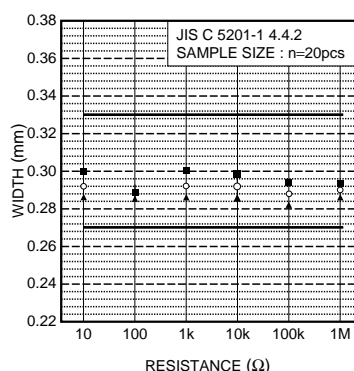


Fig.3 Dimensions (width)

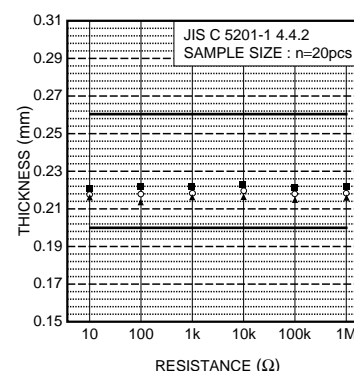


Fig.4 Dimensions (thickness)

●Electrical characteristics

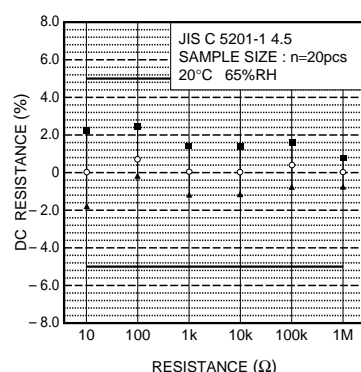


Fig.5 Resistance

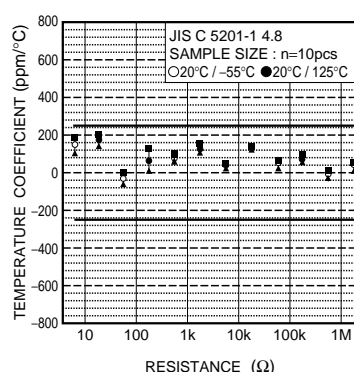


Fig.6 Variation of resistance with temperature

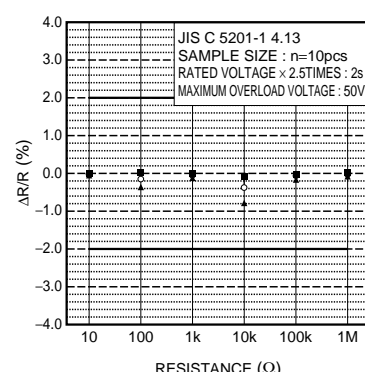


Fig.7 Overload

Resistors

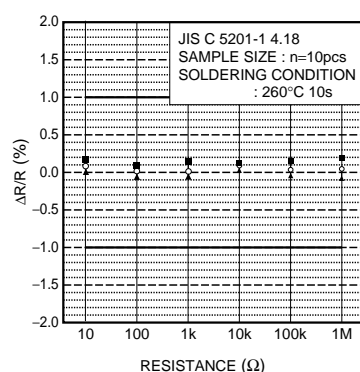


Fig.8 Resistance to soldering heat

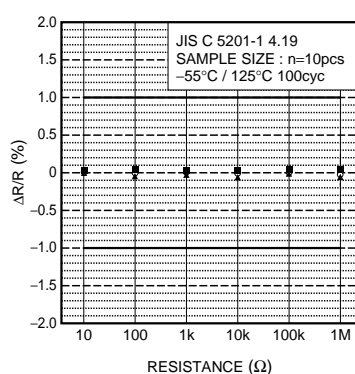


Fig.9 Rapid change of temperature

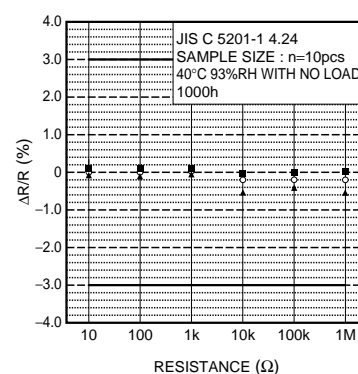


Fig.10 Damp heat, steady state

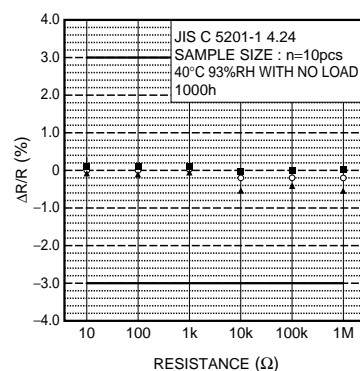
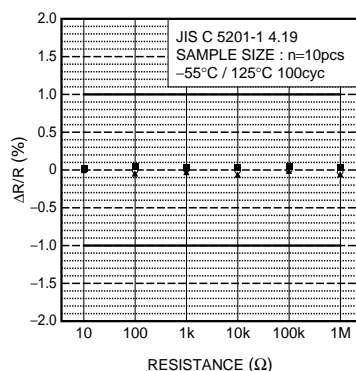
Fig.11 Endurance at 70°C 

Fig.12 Endurance

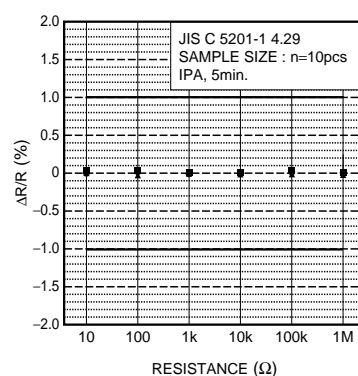


Fig.13 Resistance to solvents

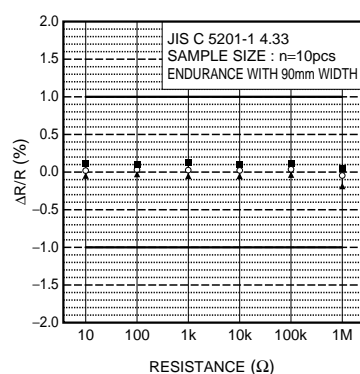


Fig.14 Bend strength of the end face plating

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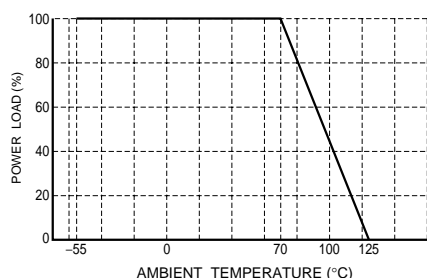
Thick film rectangular

MCR01 (0402 size : 1 / 16W)

●Features

- 1) Extremely small light
Area ratio is 60% smaller than that of chip 1608, while weight ratio has been cut 75%.
- 2) Highly reliable chip resistor
Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Thick film makes the electrodes very strong.
- 4) Flat surface further facilitates mounting
Mounting can also be automated.
- 5) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet supplied with the product before using or ordering it.

●Ratings

Item	Conditions	Specifications	
Rated power	<p>Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C.</p> <div></div> <p style="text-align: center;">Fig.1</p>	0.063W (1 / 16W) at 70°C	
Rated voltage	<p>The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage.</p> <div>$E=\sqrt{P\times R}$<p>E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)</p></div>	Limiting element voltage	50V
Nominal resistance	See Table 1.		
Operating temperature		-55°C to +155°C	

Resistors

Jumper type

Resistance	Max. 50mΩ
Rated current	1A
Operating temperature	-55°C to +125°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm / °C)
J (±5%)	1.0≤R<10 (E24)	+500 / -250
	10≤R≤10M (E24)	±250
F (±1%)	100≤R≤2.2M (E24)	±250
D (±0.5%)	10≤R≤91 (E24)	±100
	100≤R≤1M (E24)	±50

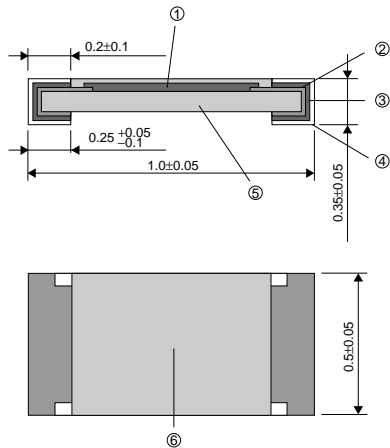
●Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

●Characteristics

Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : ±5% F : ±1% D : ±0.5%	Max. 50mΩ	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : -55 / +25 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 50mΩ	JIS C 5201-1 4.13 Rated voltage (current) ×2.5, 2s. Maximum Overload Voltage : 100V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s.
Resistance to soldering heat	± (1.0%+0.05Ω) No remarkable abnormality on the appearance.	Max. 50mΩ	JIS C 5201-1 4.18 Soldering condition : 260±5°C Duration of immersion : 10±1s.
Rapid change of temperature	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.19 Test temp. : -55°C to +125°C 5cyc
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.24 40°C, 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON - 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.3 125°C Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.29 23±5°C, Immersion cleaning, 5±0.5min. Solvent : 2-propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 50mΩ	JIS C 5201-1 4.33

Resistors

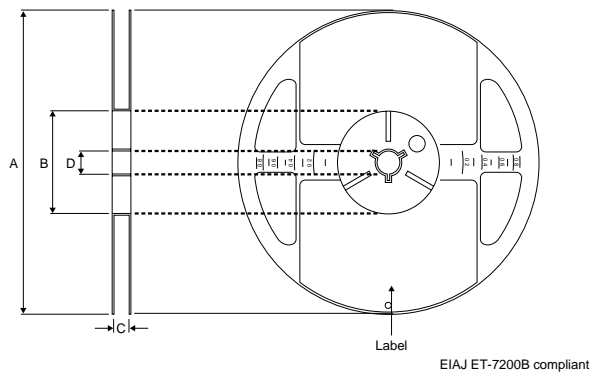
●External dimensions (Unit : mm)



No.	Material
①	Resistive element (Oxide metal thick film)
②	Silver thick film electrode
③	Nickel electrode
④	Sn electrode
⑤	Alumina substrate
⑥	Overcoating (J, F : glass)

- **Packaging**

Reel

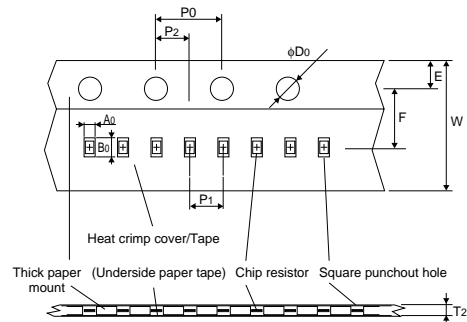


EIAJ ET-7200B compliant

(Unit : mm)

A	B	C	D
$\phi 180 \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$	$\phi 60 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	$9 \begin{smallmatrix} +1.0 \\ 0 \end{smallmatrix}$	$\phi 13 \pm 0.2$

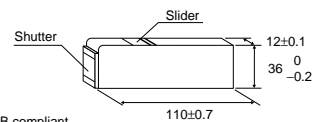
Taping



(Unit : mm)

W	F	E	A0	B0
8.0±0.3	3.5±0.05	1.75±0.1	0.7±0.1	1.2±0.1
D0	P0	P1	P2	T2
$\phi_{1.5}^{+0.1}_0$	4.0±0.1	2.0±0.05	2.0±0.05	Max. 1.1

Bulk case

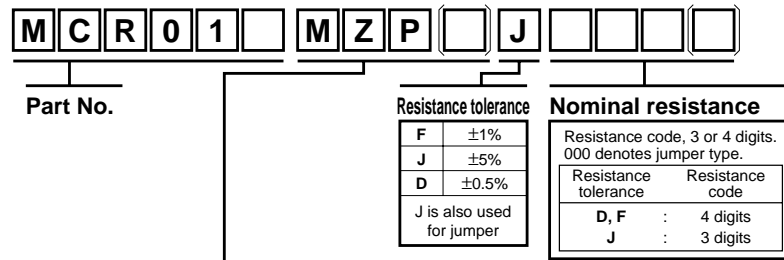


EIAJ ET-7200B compliant

(Unit : mm)

Resistors

●Part designation



Packaging Specifications Code

Part No.	Code	Resistance tolerance			Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)	D(±0.5%)			
MCR01	MZP	⊙	⊙	⊙	Paper tape (2mm Pitch)	φ180mm (7in.)	10,000

Reel (φ180) : JEITA ET-7200B

⊙ : Standard product

●Dimensions

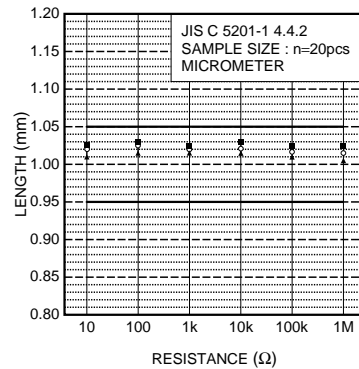


Fig.2 Dimensions (length)

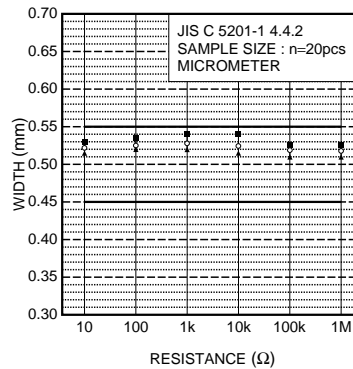


Fig.3 Dimensions (width)

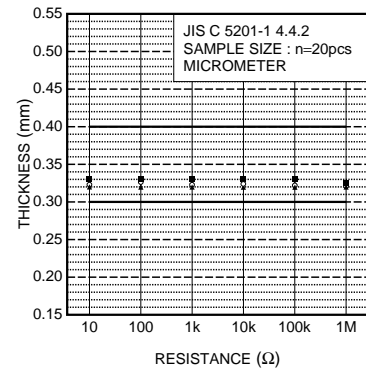


Fig.4 Dimensions (thickness)

●Electrical characteristics

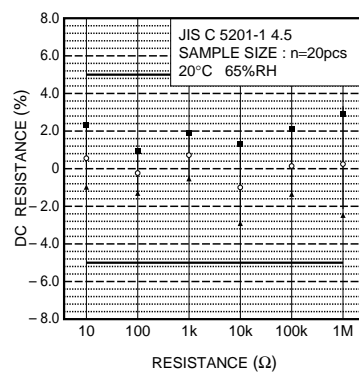


Fig.5 Resistance

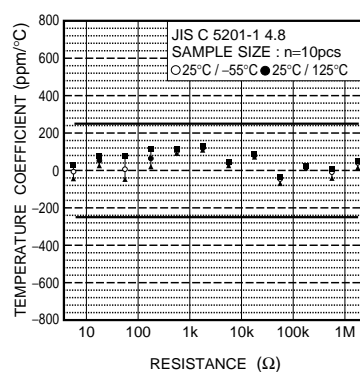


Fig.6 Variation of resistance with temperature

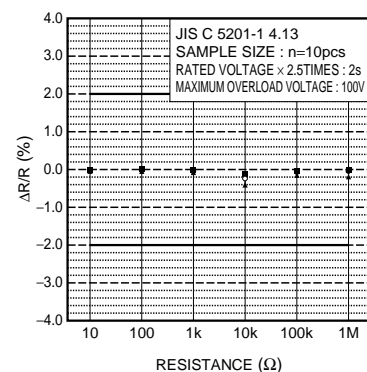


Fig.7 Overload

Resistors

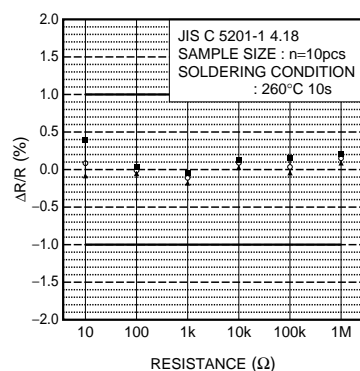


Fig.8 Resistance to soldering heat

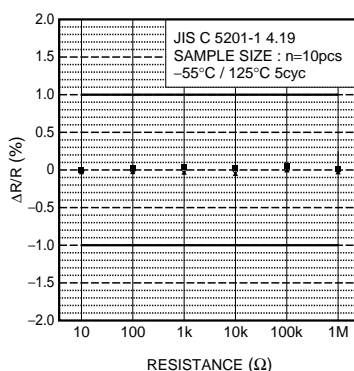


Fig.9 Rapid change of temperature

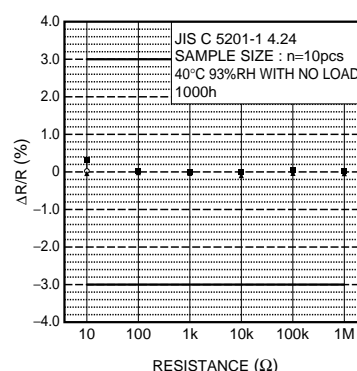


Fig.10 Damp heat, steady state

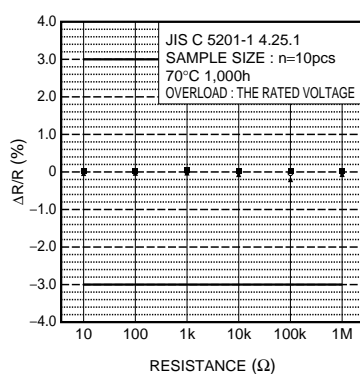


Fig.11 Endurance at 70°C

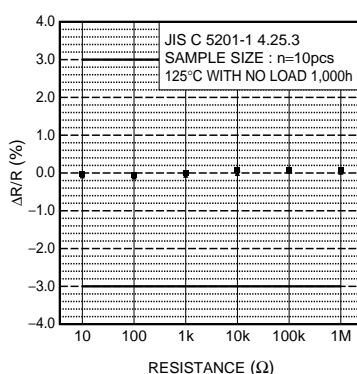


Fig.12 Endurance

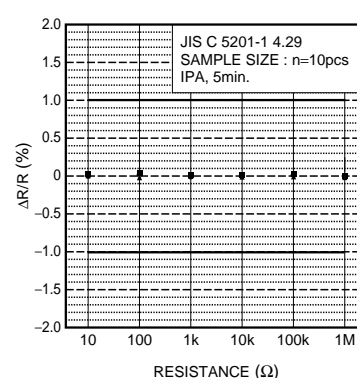


Fig.13 Resistance to solvents

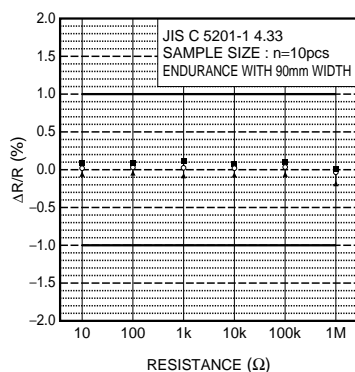


Fig.14 Bend strength of the end face plating

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MCR03 (0603 size)

1) Power rating of 1 / 10W

- 2) Highly reliable chip resistor

- 2) Highly reliable chip resistor

Ruthenium oxide dielectric offers superior resistance to the elements.

- 3) Electrodes not corroded by soldering

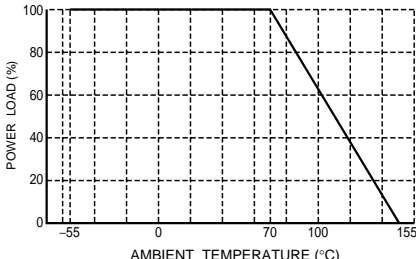
Thick film makes the electrodes very strong.

- 4) Resin protective coating for FX, D resistors

Absorbs impact, facilitates mounting.

- 5) ROHM resistors have approved ISO-9001 certification.

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Item	Conditions	Specifications	
Rated power	Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C. <div></div> <p>Fig.1</p>	0.10W (1 / 10W) at 70°C	
Rated voltage	The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage. $E = \sqrt{P \times R}$ E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)	Limiting element voltage	
		50V	
Nominal resistance	See Table 1.		
Operating temperature		-55°C to +155°C	

Resistors

Jumper type

Resistance	Max. 50mΩ
Rated current	1A
Operating temperature	-55°C to +155°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm/°C)
J (±5%)	1.0 ≤ R < 10 (E24)	±400
	10 ≤ R ≤ 10M (E24)	±200
FX (±1%)	10 ≤ R ≤ 10M (E24,96)	±100
D (±0.5%)	10 ≤ R < 100 (E24)	±400
	100 ≤ R ≤ 1M (E24)	±200

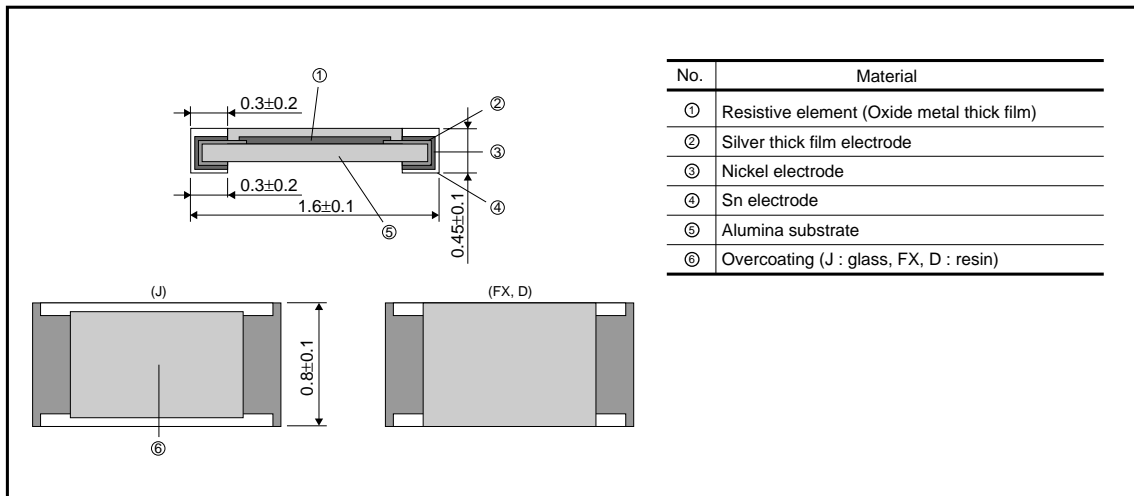
- Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

● Characteristics

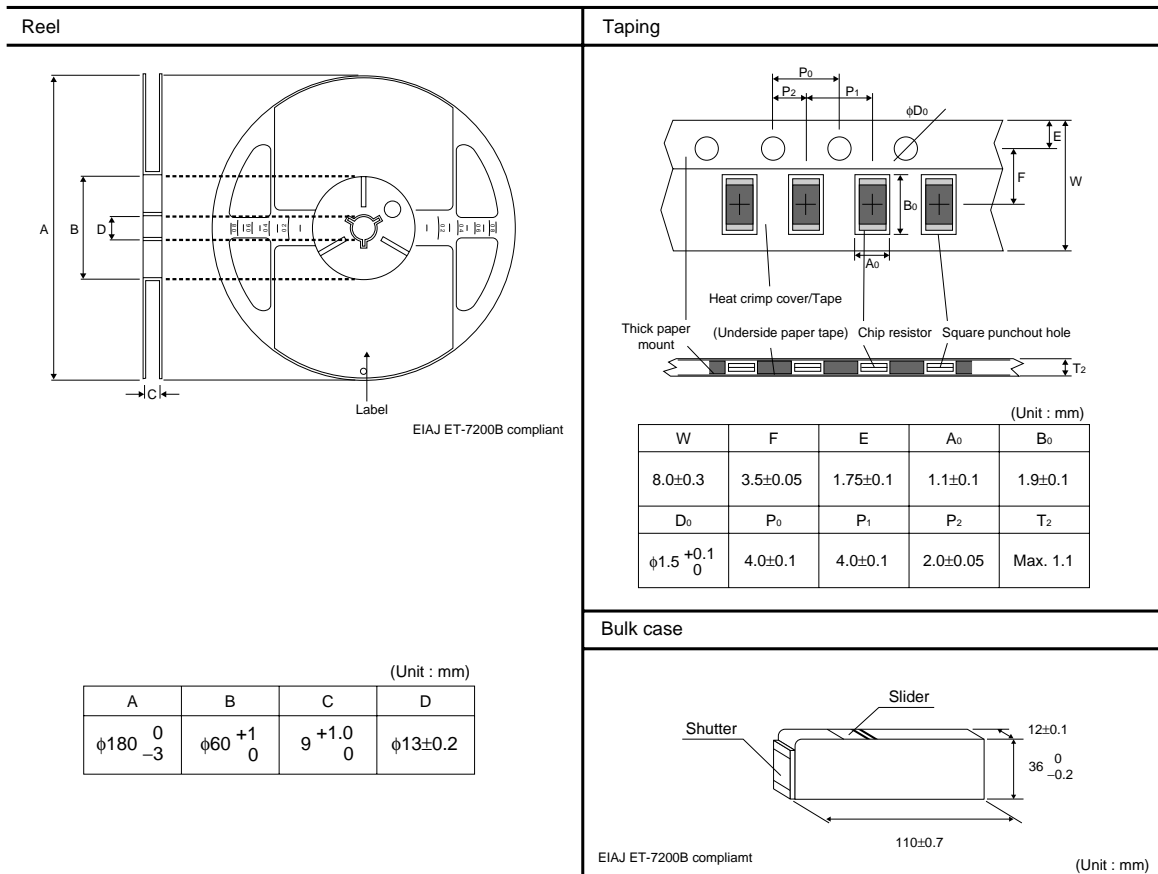
Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : ±5% FX : ±1% D : ±0.5%	Max. 50mΩ	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : -55 / +25 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 50mΩ	JIS C 5201-1 4.13 Rated voltage (current) ×2.5, 2s. Maximum overload voltage : 100V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s.
Resistance to soldering heat	± (1.0%+0.05Ω) No remarkable abnormality on the appearance.	Max. 50mΩ	JIS C 5201-1 4.18 Soldering condition : 260±5°C Duration of immersion : 10±1s.
Rapid change of temperature	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.19 Test temp. : -55°C to +125°C 5cyc
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.24 40°C, 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.3 155°C Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.29 23±5°C, Immersion cleaning, 5±0.5min. Solvent : 2-propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 50mΩ	JIS C 5201-1 4.33

Resistors

●External dimensions (Unit : mm)

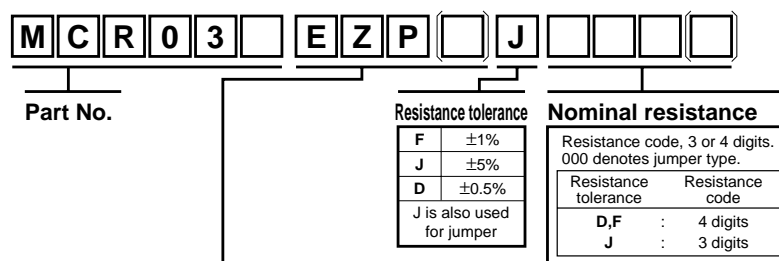


●Packaging



Resistors

●Part designation



Packaging Specifications Code

Part No.	Code	Resistance tolerance			Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)	D(±0.5%)			
MCR03	EZP	◎	◎	◎	Paper tape (4mm Pitch)	φ180mm (7in.)	5,000

Reel (φ180) : JEITA ET-7200B
 ◎ : Standard product

●Dimensions

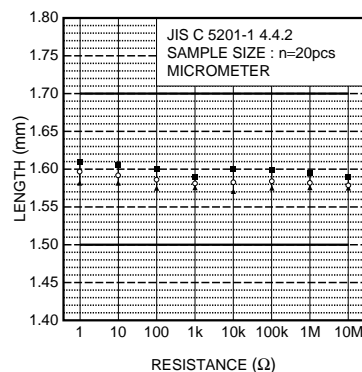


Fig.2 Dimensions (length)

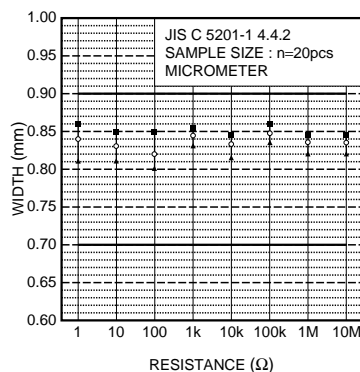


Fig.3 Dimensions (width)

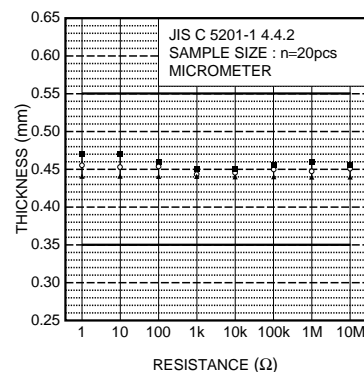


Fig.4 Dimensions (thickness)

●Electrical characteristics

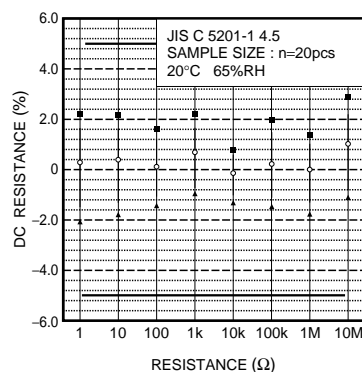


Fig.5 Resistance

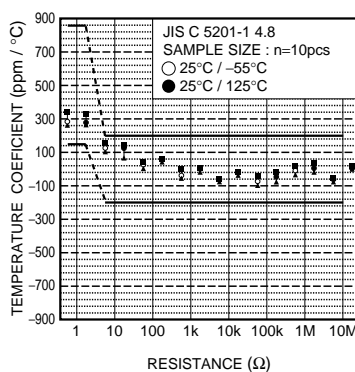


Fig.6 Variation of resistance with temperature

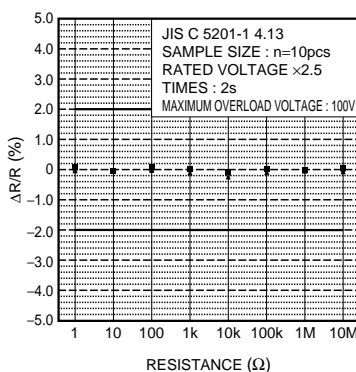


Fig.7 Overload

Resistors

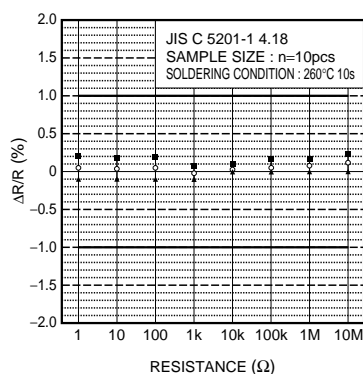


Fig.8 Resistance to soldering heat

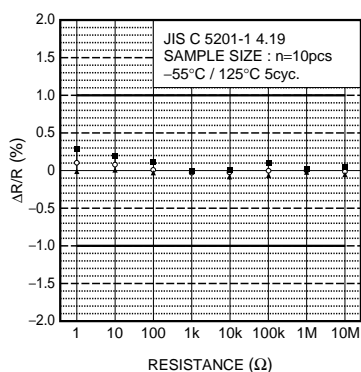


Fig.9 Rapid change of temperature

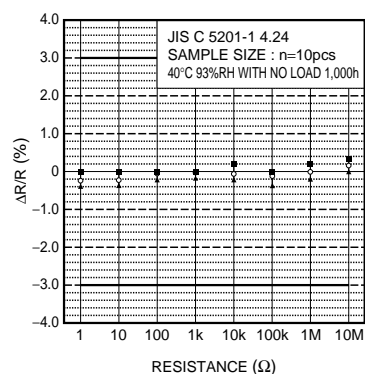


Fig.10 Damp heat, steady state

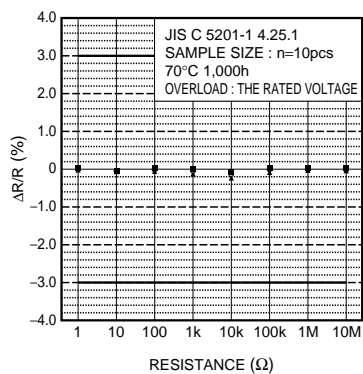


Fig.11 Endurance at 70°C

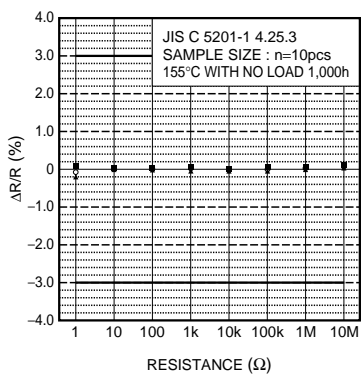


Fig.12 Endurance

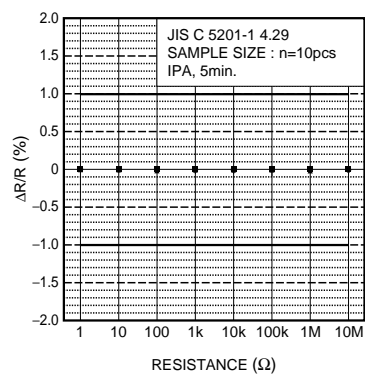


Fig.13 Resistance to solvents

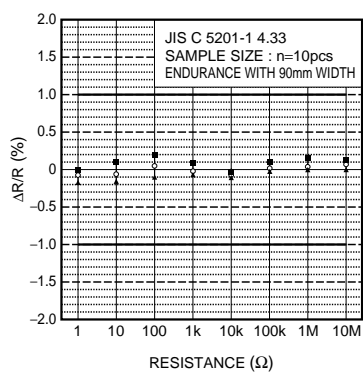


Fig.14 Bend strength of the end face plating

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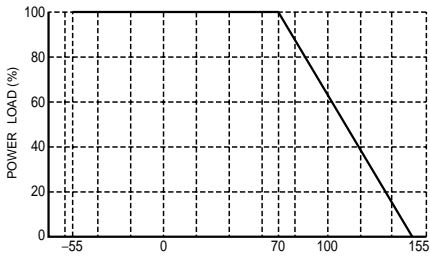
Thick film rectangular

MCR10 (2012 size : 1 / 8W)

●Features

- 1) Power rating of 1 / 8W
- 2) Highly reliable chip resistor
Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Thick film makes the electrodes very strong.
- 4) Leading the world in development and mass production.
Since start of production in 1982 (first in the world), this component has established a solid reputation as a general-purpose chip resistor.
- 5) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet before using or ordering it.

●Ratings

Item	Conditions	Specifications	
Rated power	<p>Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C.</p>  <p style="text-align: center;">Fig.1</p>	0.125W (1 / 8W) at 70°C	
Rated voltage	<p>The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage.</p> $E = \sqrt{P \times R}$ <p style="margin-left: 150px;">E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)</p>	Limiting element voltage	150V
Nominal resistance	See Table 1.		
Operating temperature		-55°C to + 55°C	

Resistors

Jumper type

Resistance	Max. 50mΩ
Rated current	2A
Operating temperature	-55°C to +155°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm/°C)
F (±1%)	0.1 ≤ R < 0.15 (E24)	400±200
	0.15 ≤ R < 10 (E24)	±250
	10 ≤ R ≤ 2.2M (E24,96)	±100
J (±5%)	0.1 ≤ R < 0.15 (E24)	400±200
	0.15 ≤ R < 1 (E24)	±250
	1.0 ≤ R < 2.2 (E24)	500±350
	2.2 ≤ R < 10 (E24)	±500
	10 ≤ R ≤ 10M (E24)	±200

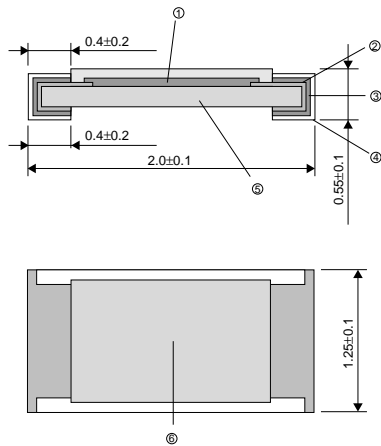
●Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

●Characteristics

Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : ±5% F : ±1%	Max. 50mΩ	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : -55 / +25 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 50mΩ	JIS C 5201-1 4.13 Rated voltage (current) ×2.5, 2s. Maximum overload voltage : 200V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s.
Resistance to soldering heat	± (1.0%+0.05Ω) No remarkable abnormality on the appearance.	Max. 50mΩ	JIS C 5201-1 4.18 Soldering condition : 260±5°C Duration of immersion : 10±1s.
Rapid change of temperature	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.19 Test temp. : -55°C to +125°C 5cyc
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.24 40°C, 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.3 155°C Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.29 23±5°C, Immersion cleaning, 5±0.5min. Solvent : 2-propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 50mΩ	JIS C 5201-1 4.33

Resistors

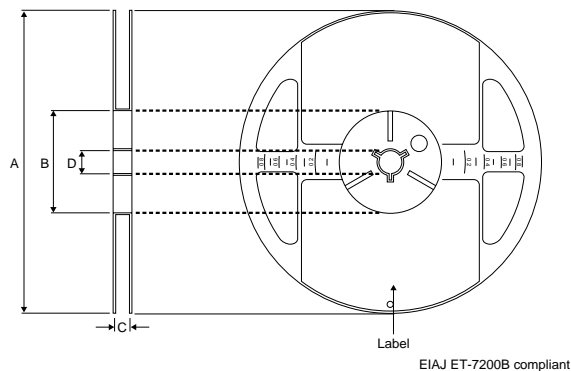
●External dimensions (Unit : mm)



No.	Material
①	Resistive element (Oxide metal thick film)
②	Silver thick film electrode
③	Nickel electrode
④	Sn electrode
⑤	Alumina substrate
⑥	Overcoating

●Packaging

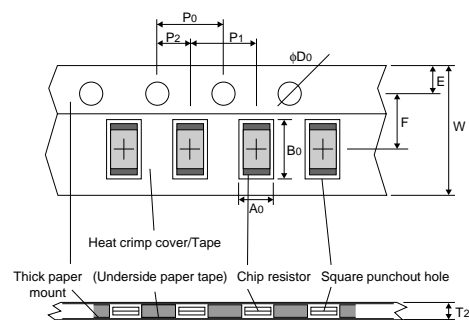
Reel



(Unit: mm)

A	B	C	D
$\phi 180 \begin{smallmatrix} 0 \\ -1.5 \end{smallmatrix}$	$\phi 60 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	$9 \begin{smallmatrix} +1.0 \\ 0 \end{smallmatrix}$	$\phi 13 \pm 0.2$

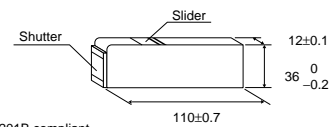
Taping



(Unit: mm)

W	F	E	A ₀	B ₀
8.0±0.3	3.5±0.05	1.75±0.1	1.65 $\begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$	2.4 $\begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$
D ₀	P ₀	P ₁	P ₂	T ₂
$\phi 1.5 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$	4.0±0.1	4.0±0.1	2.0±0.05	Max. 1.1

Bulk case

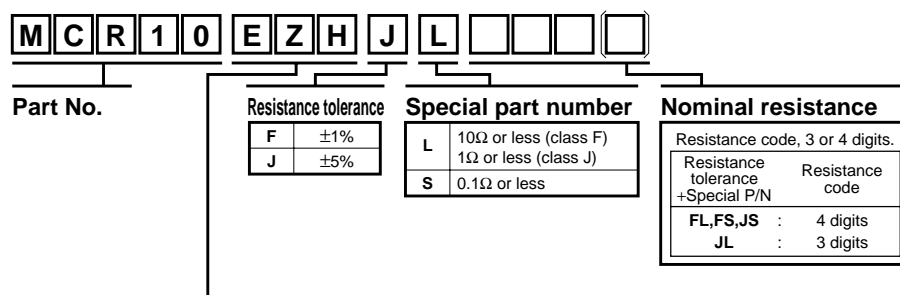


EIAJ ET-7201B compliant

(Unit : mm)

Resistors

●Part designation



Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit(pcs)
		J(±5%)	F(±1%)			
MCR10	EZH	◎	◎	Paper tape (4mm Pitch)	φ180mm (7in.)	5,000

Reel (φ180mm) : Compatible with JEITA standard "EIAJ ET-7200B"

◎ : Standard product

●Dimensions

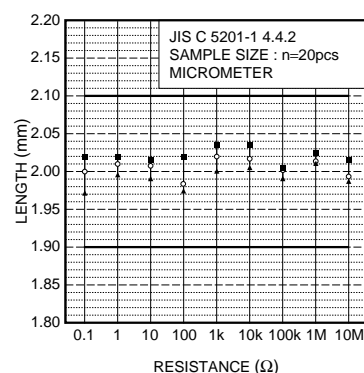


Fig.2 Dimensions (length)

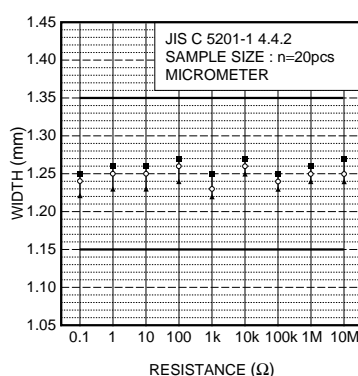


Fig.3 Dimensions (width)

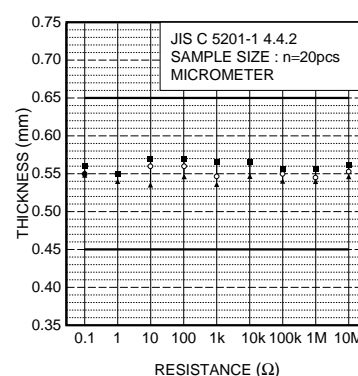


Fig.4 Dimensions (thickness)

●Electrical characteristics

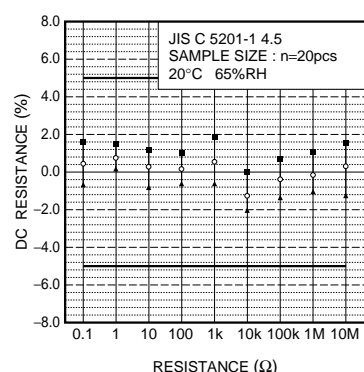


Fig.5 Resistance

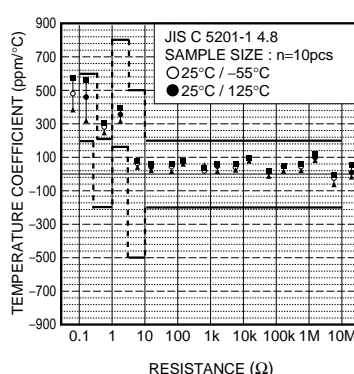


Fig.6 Variation resistance with temperature

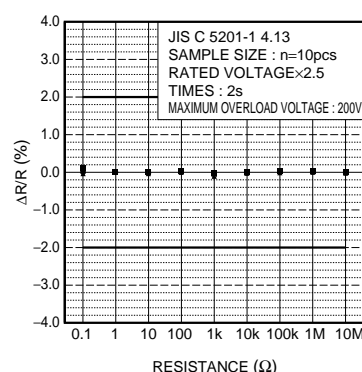


Fig.7 Overload

Resistors

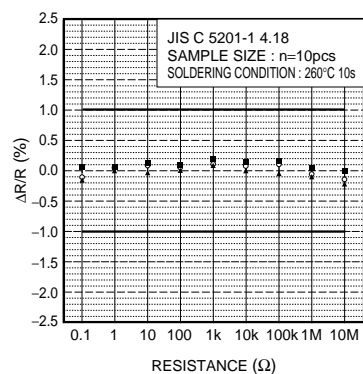


Fig.8 Resistance to soldering heat

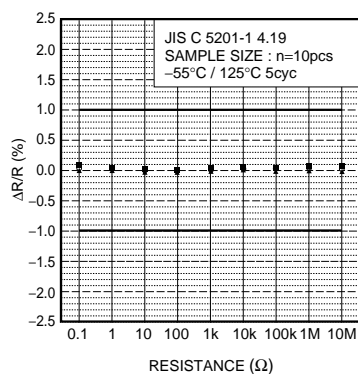


Fig.9 Rapid change of temperature

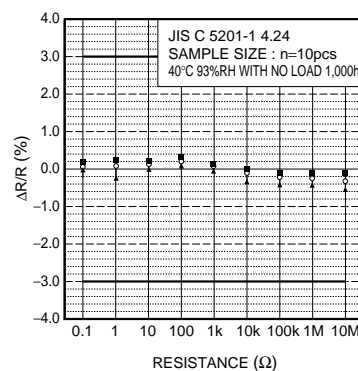


Fig.10 Damp heat, steady state

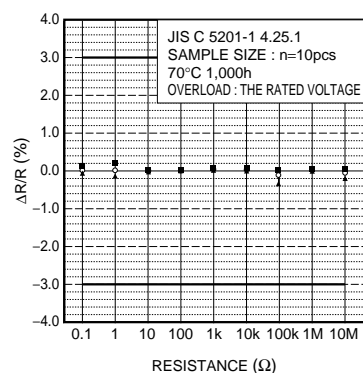


Fig.11 Endurance at 70°C

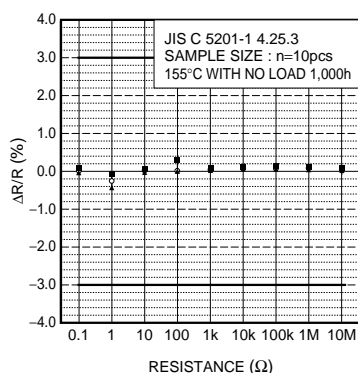


Fig.12 Endurance

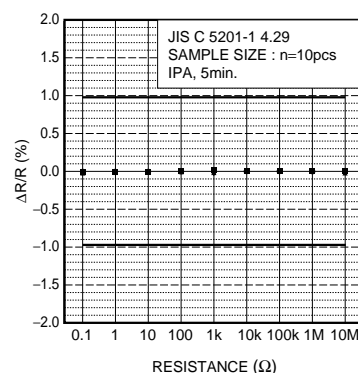


Fig.13 Resistance to solvents

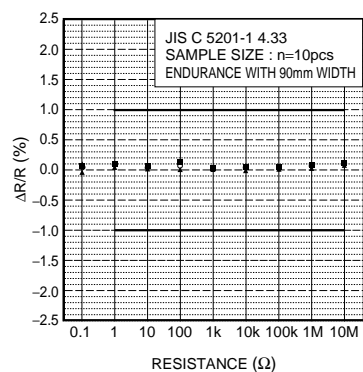


Fig.14 Bend strength of the end face plating

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About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

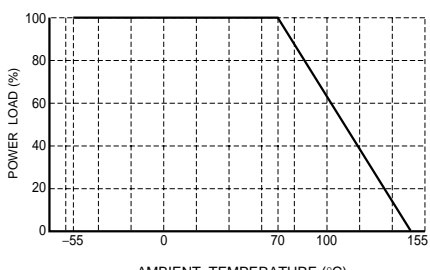
Thick film rectangular

MCR18 (1206 size: 1 / 4W)

●Features

- 1) Power rating of 1 / 4W
- 2) Highly reliable chip resistor Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Thick film makes the electrodes very strong.
- 4) Leading the world in development and mass production.
Since start of production in 1976 (first in the world), this component has established a solid reputation as a general-purpose chip resistor.
- 5) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet before using or ordering it.

●Ratings

Item	Conditions	Specifications	
Rated power	Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C. <div style="text-align: center;">  <p>Fig.1</p> </div>	0.25W (1 / 4W) at 70°C	
Rated voltage	The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage. <div style="margin-top: 10px;"> $E = \sqrt{P \times R}$ <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>E: Rated voltage (V)</div> <div>P: Rated power (W)</div> <div>R: Nominal resistance (Ω)</div> </div> </div>	Limiting element voltage	200V
Nominal resistance	See Table 1.		
Operating temperature		-55°C to +155°C	

Resistors

Jumper type

Resistance	Max. 50mΩ
Rated current	2A
Operating temperature	-55°C to +155°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm / °C)
F (±1%)	10 ≤ R ≤ 2.2M (E24,96)	±100
J (±5%)	1.0 ≤ R < 2.2 (E24)	500±350
	2.2 ≤ R < 10 (E24)	±500
	10 ≤ R ≤ 10M (E24)	±200

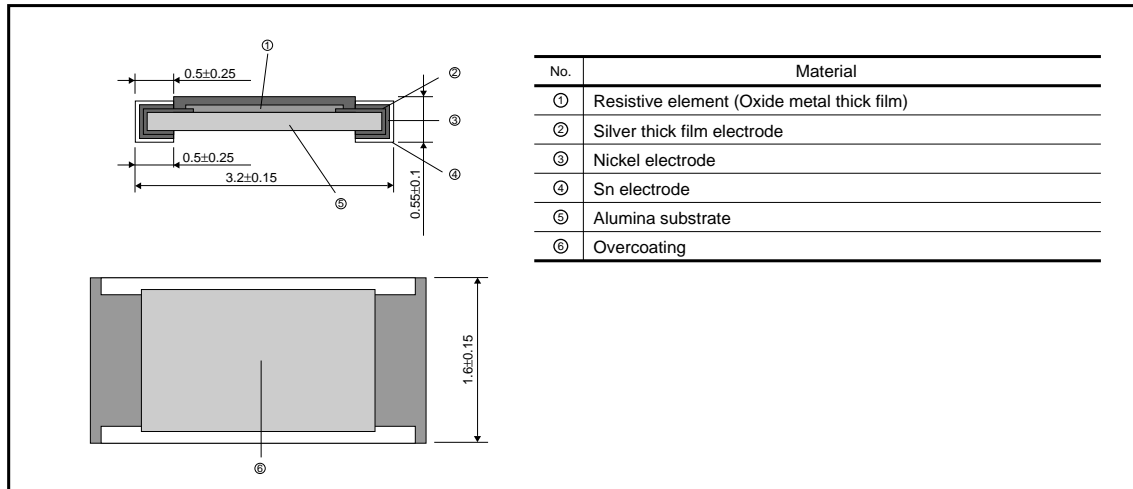
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● Characteristics

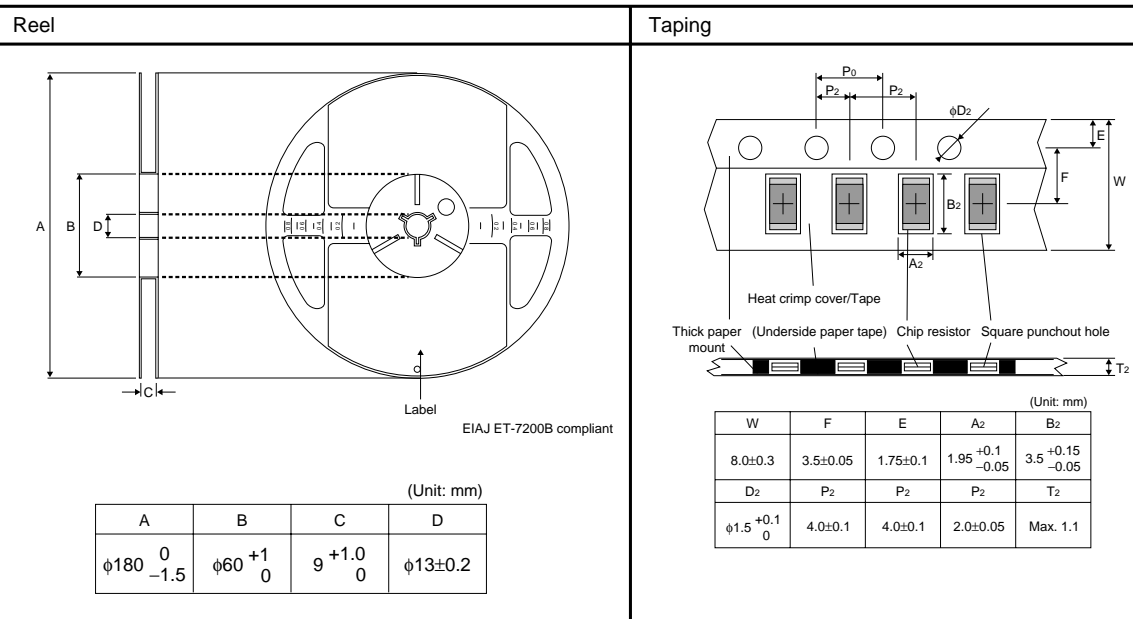
Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : ±5% F : ±1%	Max. 50mΩ	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : -55 / +25 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 50mΩ	JIS C 5201-1 4.13 Rated voltage (current) ×2.5, 2s. Maximum overload voltage : 400V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s.
Resistance to soldering heat	± (1.0%+0.05Ω) No remarkable abnormality on the appearance.	Max. 50mΩ	JIS C 5201-1 4.18 Soldering condition : 260±5°C Duration of immersion : 10±1s.
Rapid change of temperature	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.19 Test temp. : -55°C to +125°C 5cyc
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.24 40°C, 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	JIS C 5201-1 4.25.3 155°C Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω)	Max. 50mΩ	JIS C 5201-1 4.29 23±5°C, Immersion cleaning, 5±0.5min. Solvent : 2-propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 50mΩ	JIS C 5201-1 4.33

Resistors

●External dimensions (Unit : mm)

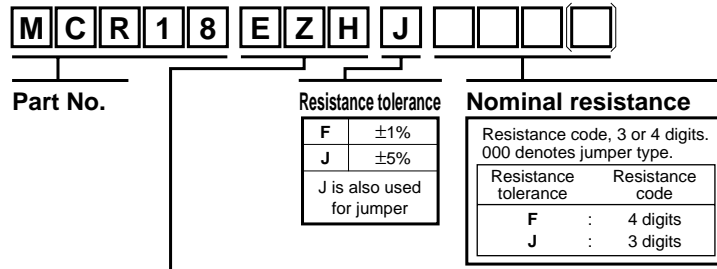


●Packaging



Resistors

●Makeup of the part number



Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)			
MCR18	EZH	◎	◎	Paper tape (4mm Pitch)	φ180mm (7in.)	5,000

Reel (φ180) : JEITA ET-7200B
◎ : Standard product

●Dimensions

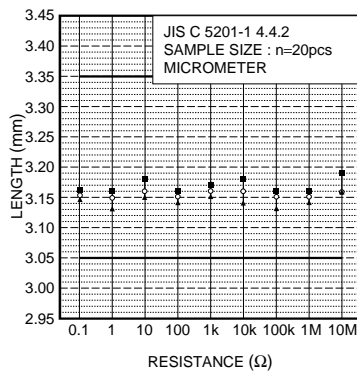


Fig.2 Dimensions (length)

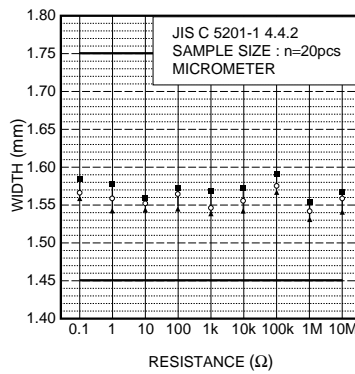


Fig.3 Dimensions (width)

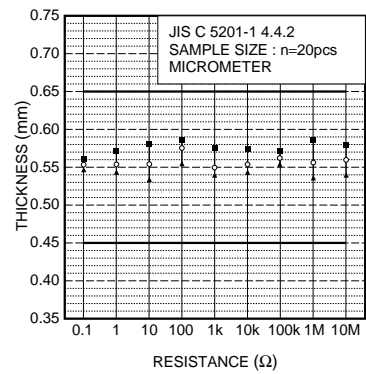


Fig.4 Dimensions (thickness)

●Electrical characteristics

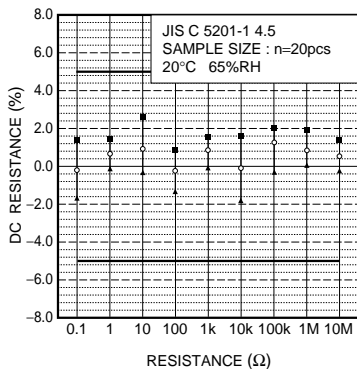


Fig.5 Resistance

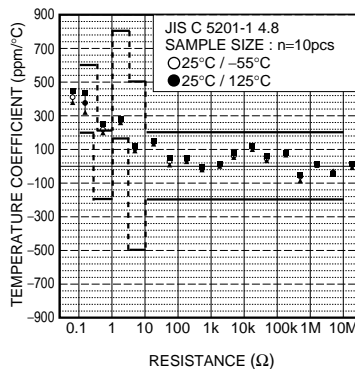


Fig.6 Variation resistance with temperature

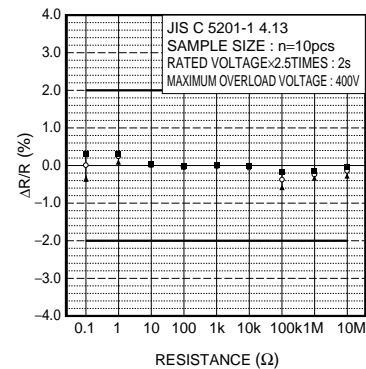


Fig.7 Overload

Resistors

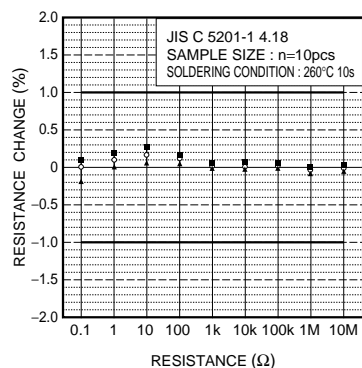


Fig.8 Resistance to soldering heat

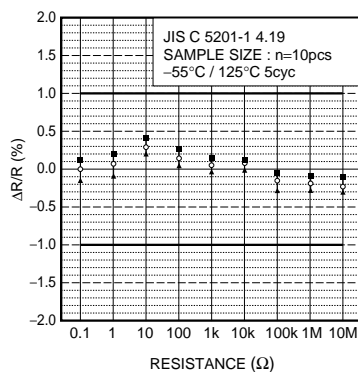


Fig.9 Rapid change of temperature

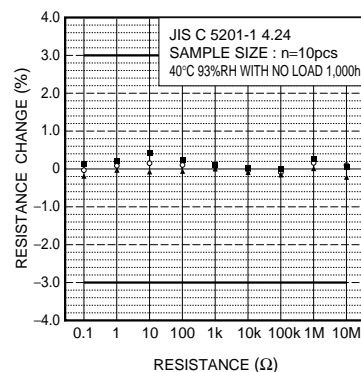


Fig.10 Damp heat, steady state

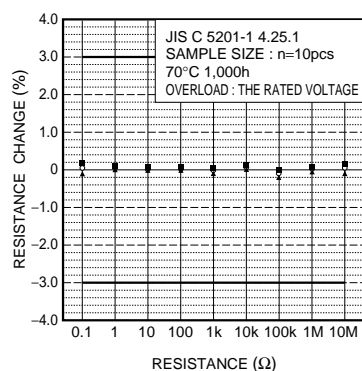


Fig.11 Endurance (at 70°C)

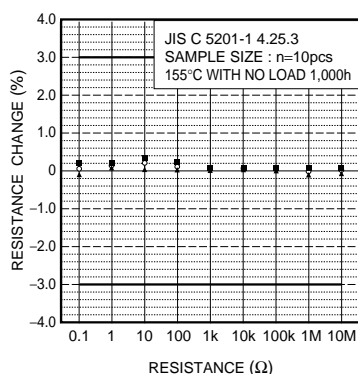


Fig.12 Endurance

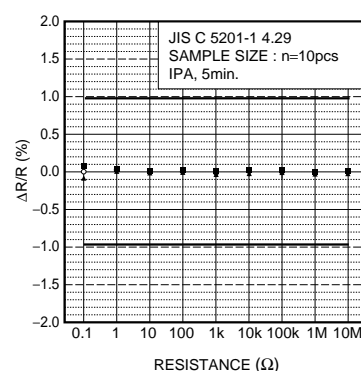


Fig.13 Resistance to solvents

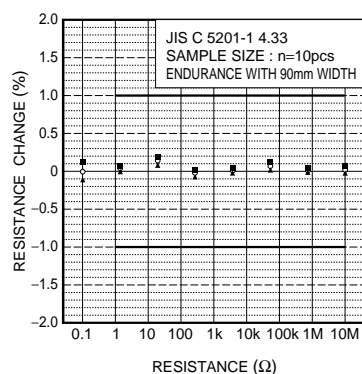


Fig.14 Bend strength of the end face plating

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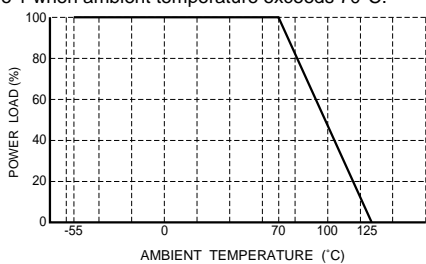
Thick film rectangular

MCR25 (1210 size: 1 / 4W)

●Features

- 1) Made of same material as the general purpose chip resistors (MCR10 / 18).
- 2) Highly reliable chip resistor
Ruthenium oxide resistive material offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Suitable for re-flow soldering.
- 4) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet before using or ordering it.

●Ratings

Item	Conditions	Specifications	
Rated power	Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C. <div><p style="text-align: center;">Fig.1</p></div>	0.25W (1 / 4W) at 70°C	
Rated voltage	The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage. $E = \sqrt{P \times R}$ <div>E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)</div>	Limiting element voltage	
		200V	
Nominal resistance	See <u>Table 1</u> .		
Operating temperature		-55°C to +125°C	

Jumper type

Resistance	Max. 50mΩ
Rated current	2A
Operating temperature	-55°C to +125°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm/°C)
F (±1%)	0.1 ≤ R < 10 (E24)	±250
	10 ≤ R ≤ 1M (E24,96)	±200
J (±5%)	0.1 ≤ R < 1 (E24)	±250
	1.0 ≤ R < 2.2 (E24)	500±350
	2.2 ≤ R < 5.6 (E24)	±500
	5.6 ≤ R ≤ 3.3M (E24)	±200

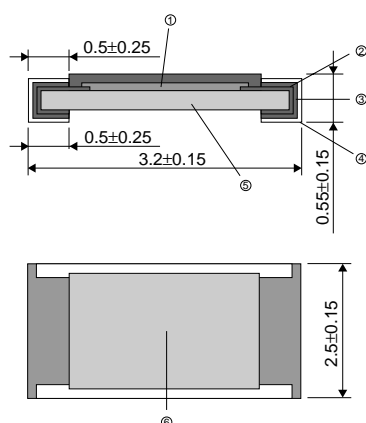
●Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

Resistors

●Characteristics

Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : $\pm 5\%$ F : $\pm 1\%$	Max. 50m Ω	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : $-55 / +25 / +125^{\circ}\text{C}$
Overload	$\pm (2.0\%+0.1\Omega)$	Max. 50m Ω	JIS C 5201-1 4.13 Rated voltage (current) $\times 2.5$, 2s. Maximum overload voltage : 400V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : $235\pm 5^{\circ}\text{C}$ Duration of immersion : $2.0\pm 0.5\text{s}$.
Resistance to soldering heat	$\pm (1.0\%+0.05\Omega)$ No remarkable abnormality on the appearance.	Max. 50m Ω	JIS C 5201-1 4.18 Soldering condition : $260\pm 5^{\circ}\text{C}$ Duration of immersion : $10\pm 1\text{s}$.
Rapid change of temperature	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.19 Test temp. : -55°C to $+125^{\circ}\text{C}$ 5cyc
Damp heat, steady state	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.24 40°C , 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.3 125°C Test time : 1,000h to 1,048h
Resistance to solvent	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.29 $23\pm 5^{\circ}\text{C}$, Immersion cleaning, $5\pm 0.5\text{min}$. Solvent : 2-propanol
Bend strength of the end face plating	$\pm (1.0\%+0.05\Omega)$ Without mechanical damage such as breaks.	Max. 50m Ω	JIS C 5201-1 4.33

●External dimensions (Unit : mm)



No.	Material
①	Resistive element (Oxide metal thick film)
②	Silver thick film electrode
③	Nickel electrode
④	Sn electrode
⑤	Alumina substrate
⑥	Overcoating (glass)

Resistors

●Packaging

Reel

Diagram of a reel showing dimensions A, B, C, D, and a label. The label is EIAJ ET-7200B compliant.

Label
EIAJ ET-7200B compliant

(Unit : mm)

A	B	C	D
$\phi 180 \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$	$\phi 60 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	13 ± 0.3	$\phi 13 \pm 0.2$

Taping

Diagram of a resistor tape showing dimensions W, F, E, A0, B0, P0, P1, P2, D0, K, and a label.

(Unit : mm)

W	F	E	A ₀	B ₀
8.0 ± 0.3	3.5 ± 0.05	1.75 ± 0.1	3.0 ± 0.1	3.5 ± 0.1
D ₀	P ₀	P ₁	P ₂	K
$\phi 1.5 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	Max. 1.1

●Makeup of the part number

M	C	R	2	5	J	Z	H	J																
Part No.					Resistance tolerance				Nominal resistance															
					<table><tr><td>F</td><td>±1%</td></tr><tr><td>J</td><td>±5%</td></tr><tr><td colspan="2">J is also used for jumper</td></tr></table>				F	±1%	J	±5%	J is also used for jumper		<p>Resistance code, 3 or 4 digits. 000 denotes jumper type.</p> <table><tr><td>Resistance tolerance</td><td>Resistance code</td></tr><tr><td>F</td><td>: 4 digits</td></tr><tr><td>J</td><td>: 3 digits</td></tr></table>				Resistance tolerance	Resistance code	F	: 4 digits	J	: 3 digits
F	±1%																							
J	±5%																							
J is also used for jumper																								
Resistance tolerance	Resistance code																							
F	: 4 digits																							
J	: 3 digits																							

Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)			
MCR25	JZH	○	○	Embossed tape (4mm Pitch)	φ180mm (7in.)	4,000

Reel ($\phi 180$) : JEITA ET-7200B
 ○ : Standard product

●Dimensions

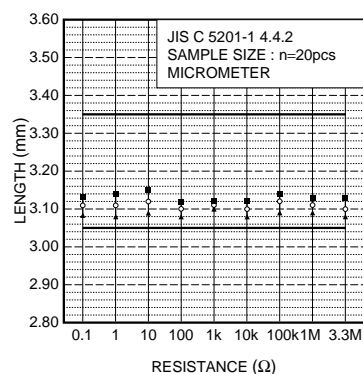


Fig.2 Dimensions (length)

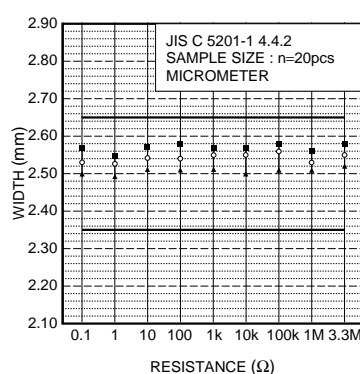


Fig.3 Dimensions (width)

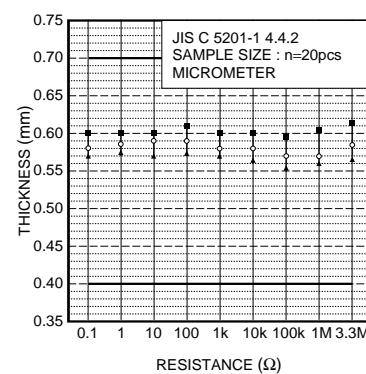


Fig.4 Dimensions (thickness)

Resistors

●Electrical characteristics

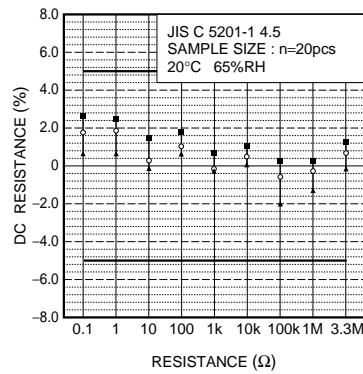


Fig.5 Resistance

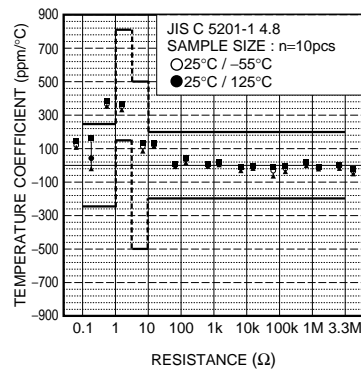


Fig.6 Variation resistance with temperature

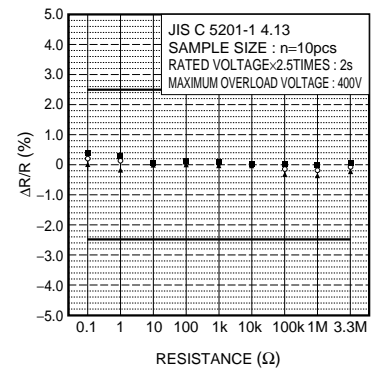


Fig.7 Overload

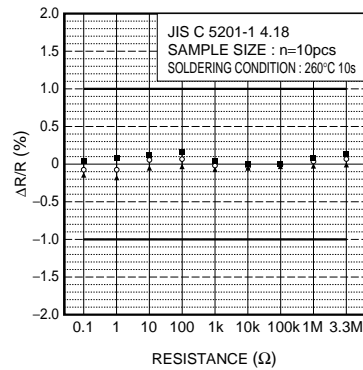


Fig.8 Resistance to soldering heat

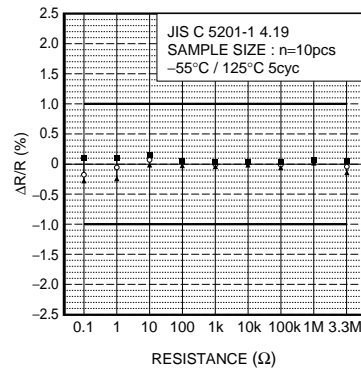


Fig.9 Rapid change of temperature

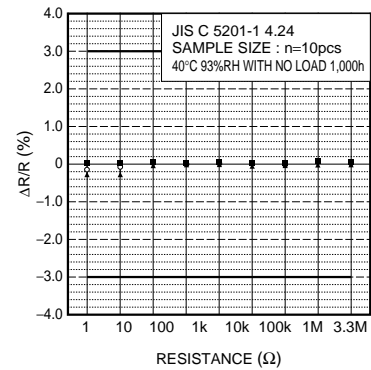


Fig.10 Damp heat, steady state

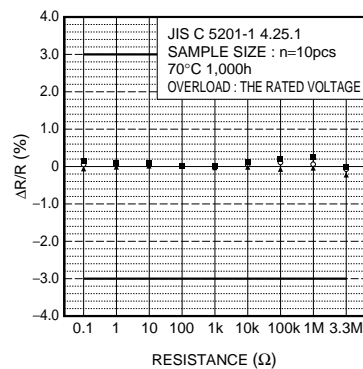


Fig.11 Endurance at 70°C

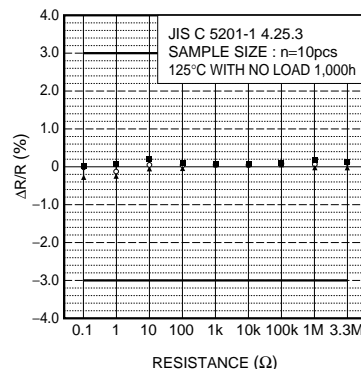


Fig.12 Endurance

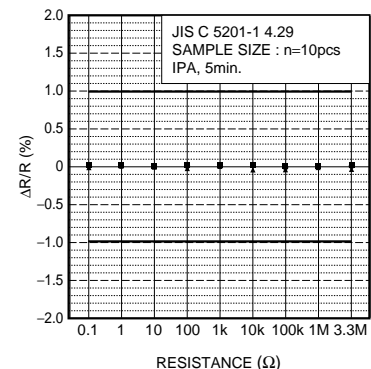


Fig.13 Resistance to solvents

Resistors

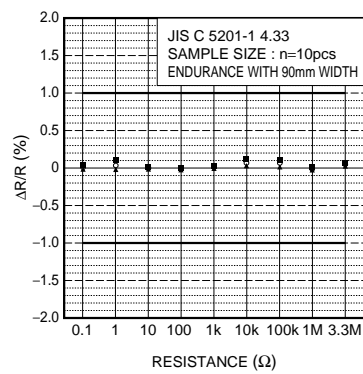


Fig.14 Bend strength of
the end face plating

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Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

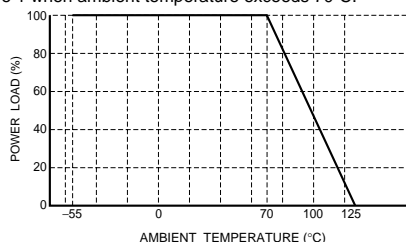
Thick film rectangular

MCR50 (2010 size : 1 / 2W)

●Features

- 1) Made of same material as the general purpose chip resistors (MCR10 / 18).
- 2) Highly reliable chip resistor
Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Suitable for re-flow soldering.
- 4) ROHM resistors have approved ISO-9001 certification. Design and specifications are subject to change without notice.
Carefully check the specification sheet supplied with the product before using or ordering it.

●Ratings

Item	Conditions	Specifications			
Rated power	<p>Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C.</p> <div><p style="text-align: center;">Fig.1</p></div>	0.5W (1 / 2W) at 70°C			
Rated voltage	<p>The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage.</p> <div>$E = \sqrt{P \times R}$<p>E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)</p></div>	<table><tr><td>Limiting element voltage</td><td>200V</td></tr></table>		Limiting element voltage	200V
Limiting element voltage	200V				
Nominal resistance	See Table 1.				
Operating temperature		-55°C to +125°C			

Jumper type

Resistance	Max. 50mΩ
Rated current	3A
Operating temperature	-55°C to +125°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm / °C)
F (±1%)	10≤R≤180k (E24,96)	±100
J (±5%)	1.0≤R<2.0 (E24)	500±350
	2.2≤R<9.1 (E24)	±500
	10≤R≤330k (E24)	±200
	360k<R≤560k (E24)	±350

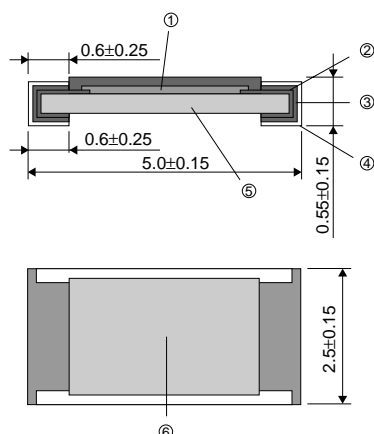
●Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

Resistors

●Characteristics

Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : $\pm 5\%$ F : $\pm 1\%$	Max. 50m Ω	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : $-55 / +25 / +125^{\circ}\text{C}$
Overload	$\pm (2.0\%+0.1\Omega)$	Max. 50m Ω	JIS C 5201-1 4.13 Rated voltage (current) $\times 2.5$, 2s. Maximum Overload Voltage : 400V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : $235\pm 5^{\circ}\text{C}$ Duration of immersion : $2.0\pm 0.5\text{s}$.
Resistance to soldering heat	$\pm (1.0\%+0.05\Omega)$ No remarkable abnormality on the appearance.	Max. 50m Ω	JIS C 5201-1 4.18 Soldering condition : $260\pm 5^{\circ}\text{C}$ Duration of immersion : $10\pm 1\text{s}$.
Rapid change of temperature	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.19 Test temp. : -55°C to $+125^{\circ}\text{C}$ 5cyc
Damp heat, steady state	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.24 40°C , 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.3 125°C Test time : 1,000h to 1,048h
Resistance to solvent	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.29 $23\pm 5^{\circ}\text{C}$, Immersion cleaning, $5\pm 0.5\text{min}$. Solvent : 2-propanol
Bend strength of the end face plating	$\pm (1.0\%+0.05\Omega)$ Without mechanical damage such as breaks.	Max. 50m Ω	JIS C 5201-1 4.33

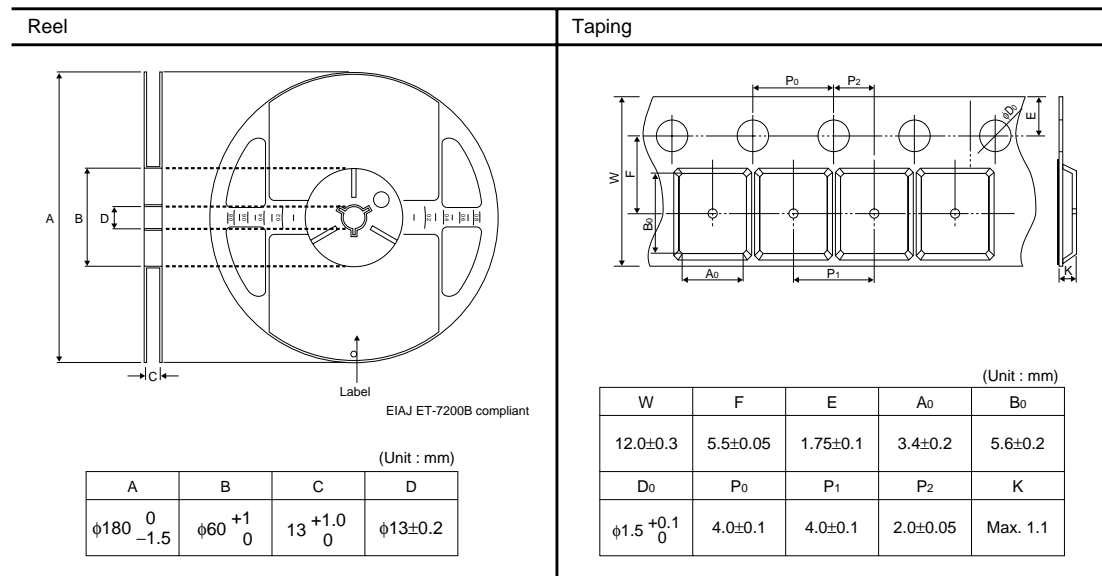
●External dimensions (Unit : mm)



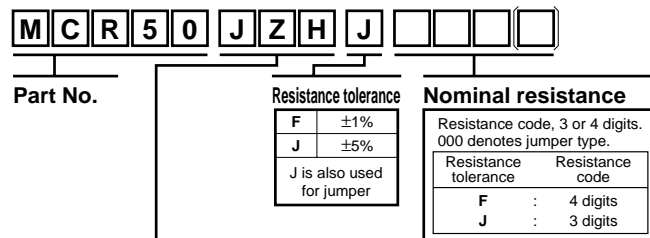
No.	Material
①	Resistive element (Oxide metal thick film)
②	Silver thick film electrode
③	Nickel electrode
④	Sn electrode
⑤	Alumina substrate
⑥	Overcoating (glass)

Resistors

●Packaging



●Makeup of the part number



Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit (pcs)
		J($\pm 5\%$)	F($\pm 1\%$)			
MCR50	JZH	○	○	Embossed tape (4mm Pitch)	$\phi 180\text{mm}$ (7in.)	4,000

Reel ($\phi 180$) : JEITA ET-7200B
 ○ : Standard product

●Dimensions

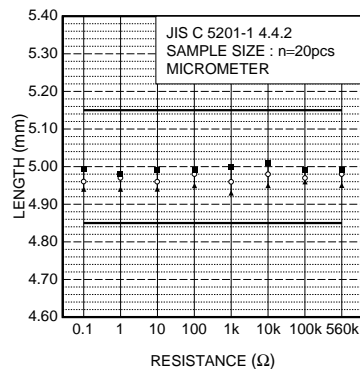


Fig.2 Dimensions (length)

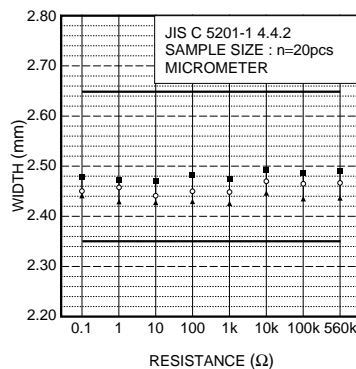


Fig.3 Dimensions (width)

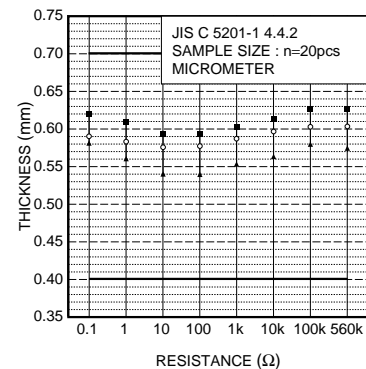


Fig.4 Dimensions (thickness)

Resistors

●Electrical characteristics

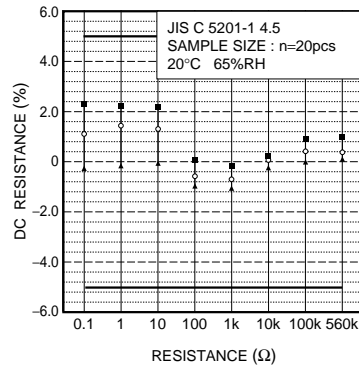


Fig.5 Resistance

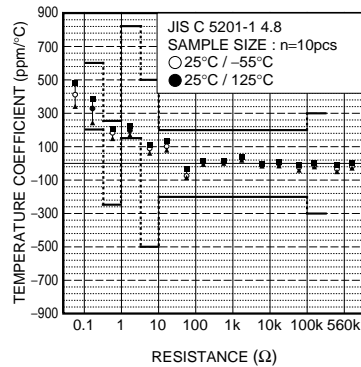


Fig.6 Variation resistance with temperature

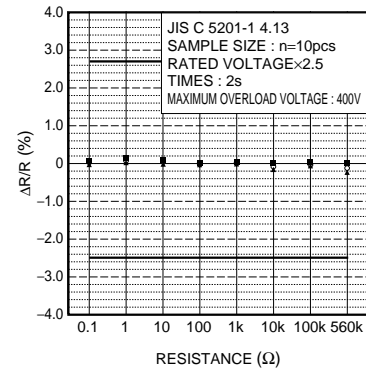


Fig.7 Overload

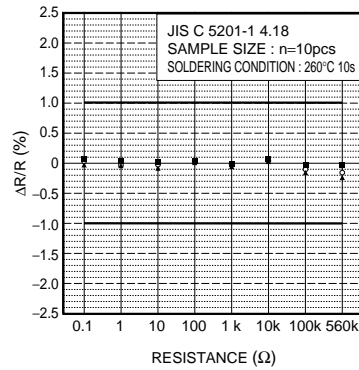


Fig.8 Resistance to soldering heat

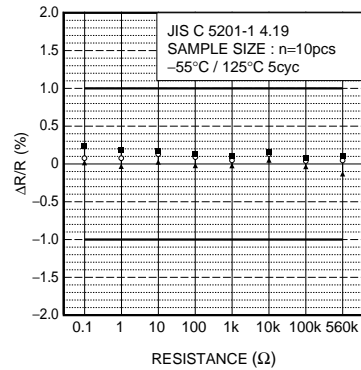


Fig.9 Rapid change of temperature

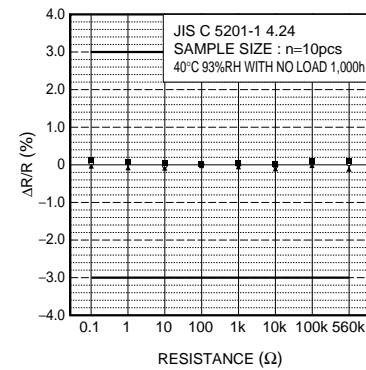


Fig.10 Damp heat, steady state

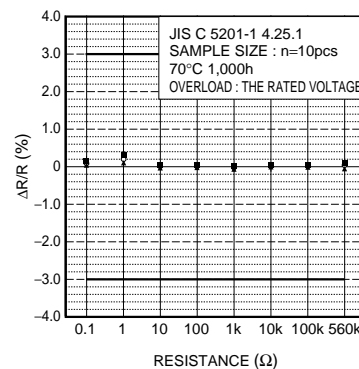


Fig.11 Endurance at 70°C

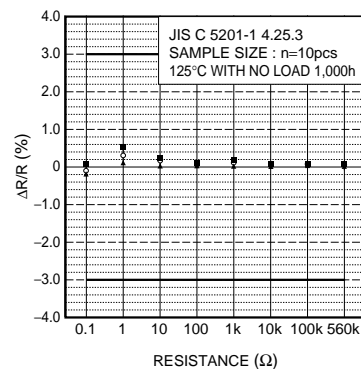


Fig.12 Endurance

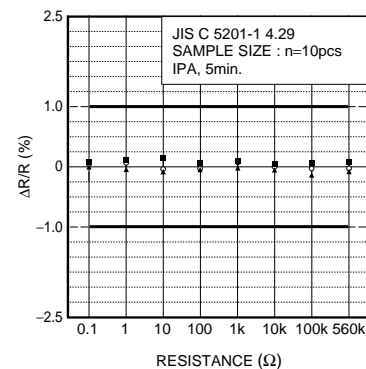


Fig.13 Resistance to solvents

Resistors

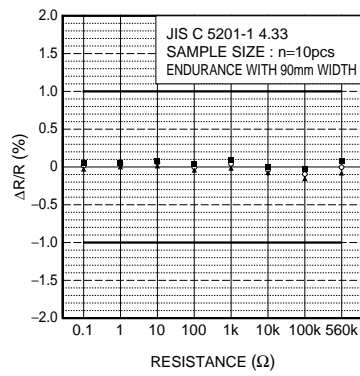


Fig.14 Bend strength of
the end face plating

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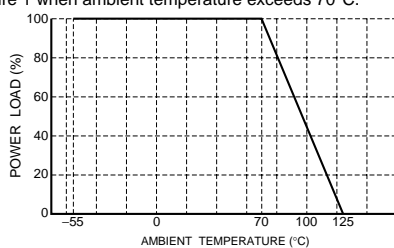
Thick film rectangular

MCR100 (2512 size : 1W)

●Features

- 1) Made of same material as the general purpose chip resistors (MCR10 / 18).
- 2) Highly reliable chip resistor
Ruthenium oxide dielectric offers superior resistance to the elements.
- 3) Electrodes not corroded by soldering
Suitable for re-flow soldering.
- 4) ROHM resistors have approved ISO-9001 certification.
Design and specifications are subject to change without notice. Carefully check the specification sheet supplied with the product before using or ordering it.

●Ratings

Item	Conditions	Specifications		
Rated power	<p>Power must be derated according to the power derating curve in Figure 1 when ambient temperature exceeds 70°C.</p>  <p>Fig.1</p>	1W at 70°C		
Rated voltage	<p>The voltage rating is calculated by the following equation. If the value obtained exceeds the limiting element voltage, the voltage rating is equal to the maximum operating voltage.</p> <p>$E = \sqrt{P \times R}$</p> <p>E: Rated voltage (V) P: Rated power (W) R: Nominal resistance (Ω)</p>	<table><tr><td>Limiting element voltage</td><td>200V</td></tr></table>	Limiting element voltage	200V
Limiting element voltage	200V			
Nominal resistance	See <u>Table 1</u> .			
Operating temperature		-55°C to +125°C		

Jumper type

Resistance	Max. 50mΩ
Rated current	4A
Operating temperature	-55°C to +125°C

Table 1

Resistance tolerance	Resistance range (Ω)	Resistance temperature coefficient (ppm / °C)
F (±1%)	10≤R≤82k (E24,96)	±100
J (±5%)	1.0≤R<2.0 (E24)	500±350
	2.2≤R<9.1 (E24)	±500
	10≤R<22 (E24)	±350
	24≤R≤100k (E24)	±200

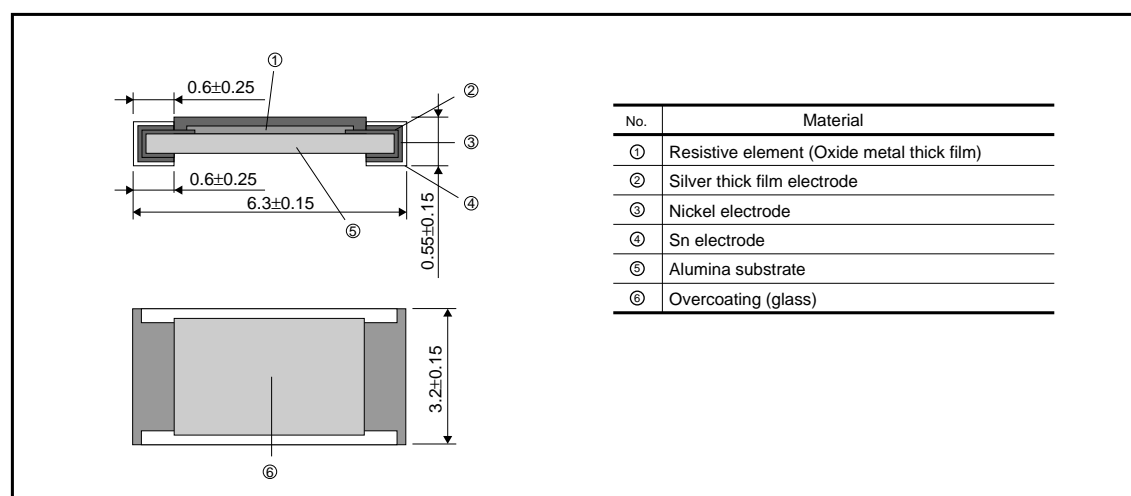
●Before using components in circuits where they will be exposed to transients such as pulse loads (short-duration, high-level loads), be certain to evaluate the component in the mounted state. In addition, the reliability and performance of this component cannot be guaranteed if it is used with a steady state voltage that is greater than its rated voltage.

Resistors

●Characteristics

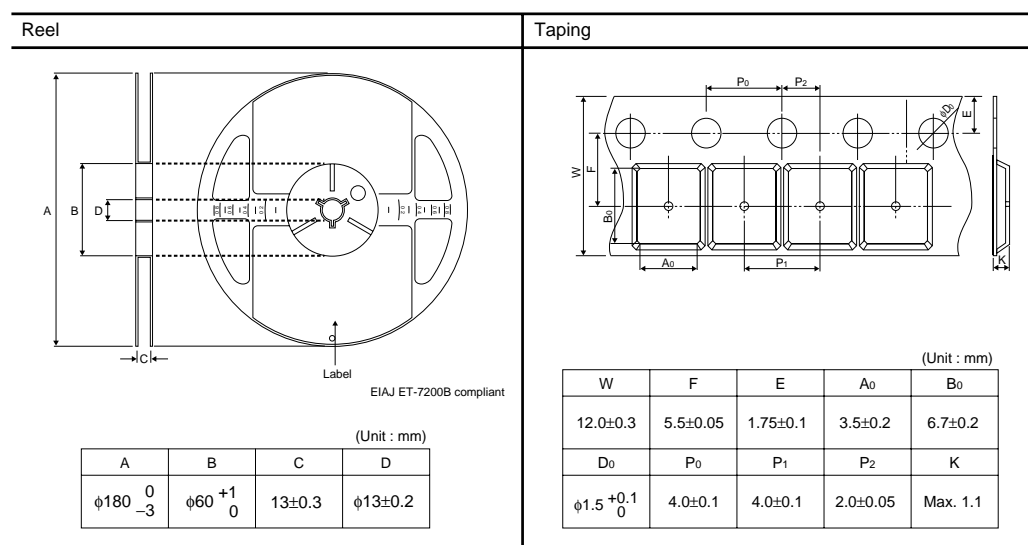
Item	Guaranteed value		Test conditions (JIS C 5201-1)
	Resistor type	Jumper type	
Resistance	J : $\pm 5\%$ F : $\pm 1\%$	Max. 50m Ω	JIS C 5201-1 4.5
Variation of resistance with temperature	See Table.1		JIS C 5201-1 4.8 Measurement : $-55 / +25 / +125^{\circ}\text{C}$
Overload	$\pm (2.0\%+0.1\Omega)$	Max. 50m Ω	JIS C 5201-1 4.13 Rated voltage (current) $\times 2.5$, 2s. Maximum Overload Voltage : 400V
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		JIS C 5201-1 4.17 Rosin-Ethanol (25%WT) Soldering condition : $235\pm 5^{\circ}\text{C}$ Duration of immersion : $2.0\pm 0.5\text{s}$.
Resistance to soldering heat	$\pm (1.0\%+0.05\Omega)$ No remarkable abnormality on the appearance.	Max. 50m Ω	JIS C 5201-1 4.18 Soldering condition : $260\pm 5^{\circ}\text{C}$ Duration of immersion : $10\pm 1\text{s}$.
Rapid change of temperature	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.19 Test temp. : -55°C to $+125^{\circ}\text{C}$ 5cyc
Damp heat, steady state	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.24 40°C , 93%RH Test time : 1,000h to 1,048h
Endurance at 70°C	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.1 Rated voltage (current), 70°C 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	$\pm (3.0\%+0.1\Omega)$	Max. 100m Ω	JIS C 5201-1 4.25.3 125°C Test time : 1,000h to 1,048h
Resistance to solvent	$\pm (1.0\%+0.05\Omega)$	Max. 50m Ω	JIS C 5201-1 4.29 $23\pm 5^{\circ}\text{C}$, Immersion cleaning, $5\pm 0.5\text{min}$. Solvent : 2-propanol
Bend strength of the end face plating	$\pm (1.0\%+0.05\Omega)$ Without mechanical damage such as breaks.	Max. 50m Ω	JIS C 5201-1 4.33

●External dimensions (Unit : mm)

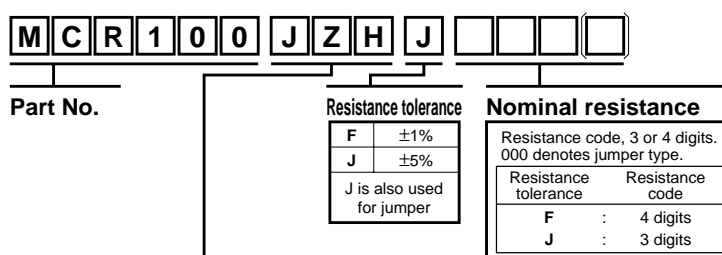


Resistors

●Packaging



●Makeup of the part number



Packaging Specifications Code

Part No.	Code	Resistance tolerance		Packaging specifications	Reel	Basic ordering unit (pcs)
		J(±5%)	F(±1%)			
MCR100	JZH	◎	◎	Embossed tape (4mm Pitch)	φ180mm (7in.)	4,000

Reel (φ180) : JEITA ET-7200B
 ◎ : Standard product

●Dimensions

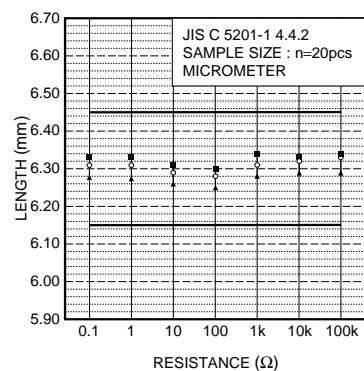


Fig.2 Dimensions (length)

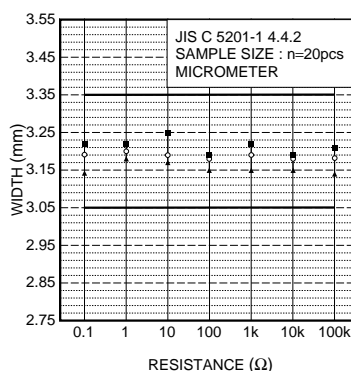


Fig.3 Dimensions (width)

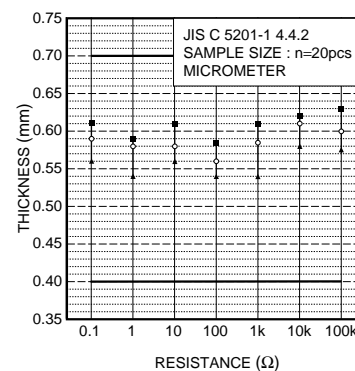


Fig.4 Dimensions (thickness)

Resistors

●Electrical characteristics

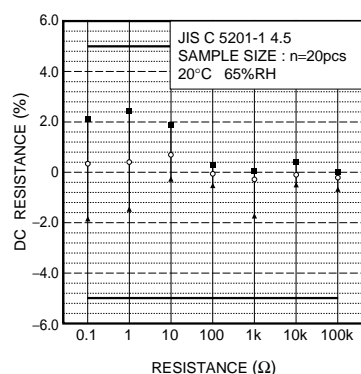


Fig.5 Resistance

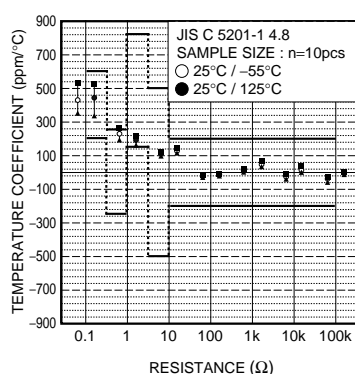


Fig.6 Variation resistance with temperature

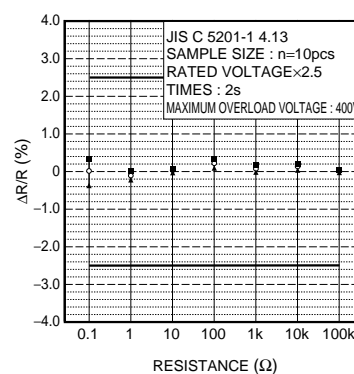


Fig.7 Overload

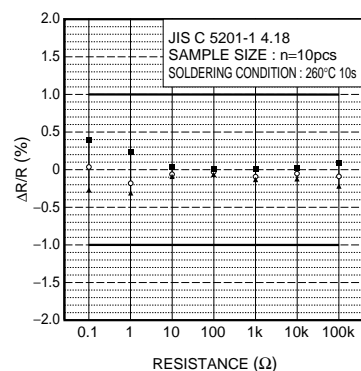


Fig.8 Resistance to soldering heat

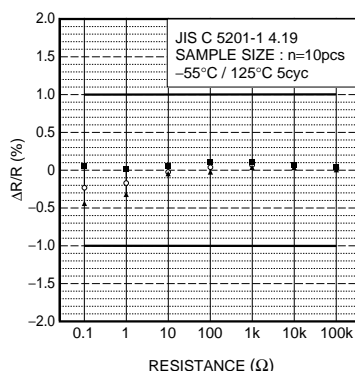


Fig.9 Rapid change of temperature

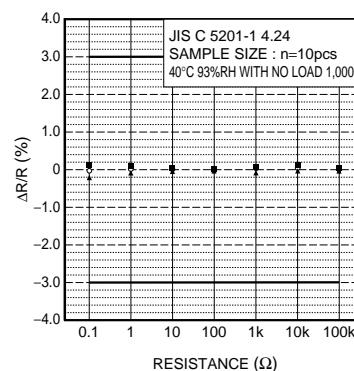


Fig.10 Damp heat, steady state

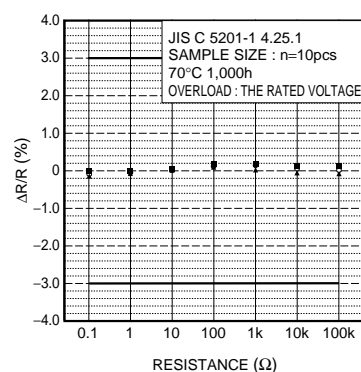


Fig.11 Endurance at 70°C

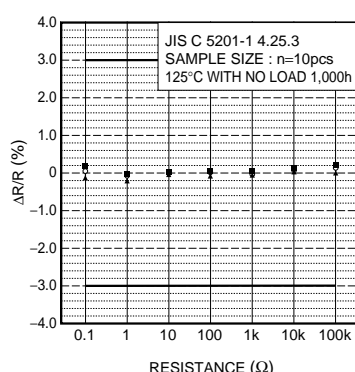


Fig.12 Endurance

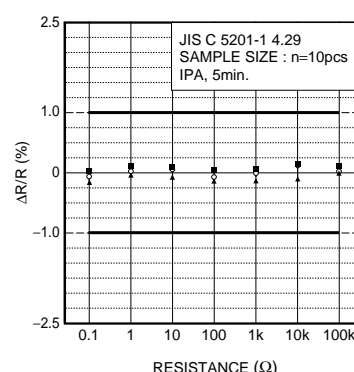


Fig.13 Resistance to solvents

Resistors

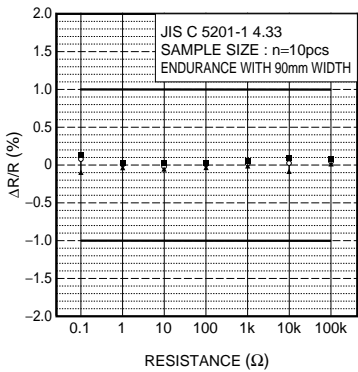


Fig.14 Bend strength of the end face plating

Notes

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The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

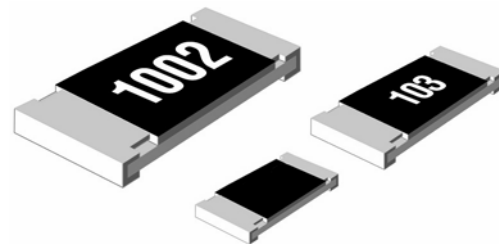
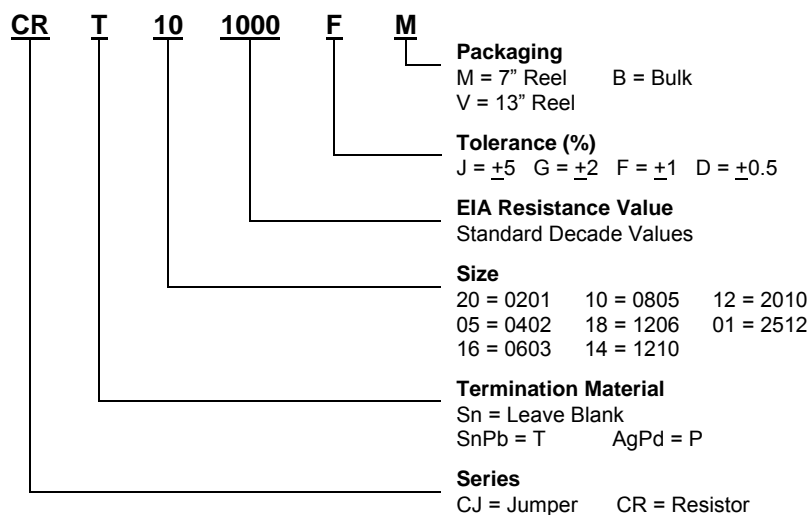
About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

CR/CJ, CRP/CJP, and CRT/CJT Series Chip Resistors

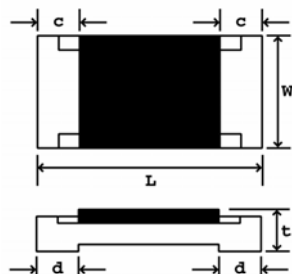
HOW TO ORDER



FEATURES

- ISO 9002 Quality Certified
- Excellent stability over a wide range of environmental conditions
- CR and CJ types in compliance with RoHs
- CRP and CJP types constructed with AgPd Terminals, Epoxy Bondable
- Operating temperature -55°C ~ +125°C
- Applicable Specifications: EIA 575, IEC 60115-1, JIS 5201-1, and MIL-R-55342G

SCHEMATIC



DIMENSIONS (mm)

Size	L	W	c	d	t
0201	0.60 ± 0.05	0.30 ± 0.05	0.13 ± 0.05	0.25 ± 0.05	0.25 ± 0.05
0402	1.00 ± 0.05	0.5 ± 0.1-0.05	0.20 ± 0.10	0.25 ± 0.05-0.10	0.35 ± 0.05
0603	1.60 ± 0.10	0.80 ± 0.10	0.20 ± 0.10	0.30 ± 0.20-0.10	0.50 ± 0.10
0805	2.00 ± 0.15	1.25 ± 0.15	0.40 ± 0.25	0.30 ± 0.20-0.10	0.50 ± 0.15
1206	3.20 ± 0.15	1.60 ± 0.15	0.45 ± 0.25	0.40 ± 0.20-0.10	0.60 ± 0.15
1210	3.20 ± 0.15	2.60 ± 0.15	0.50 ± 0.30	0.40 ± 0.20-0.10	0.60 ± 0.10
2010	5.00 ± 0.20	2.50 ± 0.20	0.50 ± 0.30	0.40 ± 0.20-0.10	0.60 ± 0.10
2512	6.30 ± 0.20	3.10 ± 0.20	0.50 ± 0.30	0.40 ± 0.20-0.10	0.60 ± 0.15

ELECTRICAL SPECIFICATIONS for CHIP RESISTORS

Size	0201	0402	0603	0805
Power Rating (EIA 575)	0.050 (1/20) W	0.063 (1/16) W	0.100 (1/10) W	0.125 (1/8) W
Working Voltage*	25V	50V	50V	100V
Overload Voltage	50V	100V	100V	200V
Tolerance (%)	±5	±1 ±5 ±0.5	±1 ±2 ±5	±0.5 ±1 ±2 ±5
EIA Values	E-24	E-96 E-24	E-96 E-24	E-96 E-24
Resistance	10 ~ 1 M	10 ~ 1 M 10 ~ 3.3 M	10 ~ 1 M 1.0-9.1, 10-10M	10 ~ 1 M 1.0-9.1, 10-10M
TCR (ppm/°C)	±250	±250 ±250	±100 ±400, ±200	±100 ±400, ±200
Operating Temp.	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C

Size	1206	1210	2010	2512
Power Rating (EIA 575)	0.250 (1/4) W	0.33 (1/3) W	0.500 (1/2) W	1.000 (1) W
Working Voltage*	200V	200V	200V	200V
Overload Voltage	400V	400V	400V	400V
Tolerance (%)	±0.5 ±1 ±2 ±5	±0.5 ±1 ±2 ±5	±0.5 ±1 ±2 ±5	±0.5 ±1 ±2 ±5
EIA Values	E-96 E-24	E-96 E-24	E-96 E-24	E-96 E-24
Resistance	10 ~ 1 M 1.0-9.1, 10-10M	10 ~ 1 M 1.0-9.1, 10-10M	10 ~ 1 M 1.0-9.1, 10-10M	10 ~ 1 M 1.0-9.1, 10-10M
TCR (ppm/°C)	±100 ±400, ±200	±100 ±400, ±200	±100 ±400, ±200	±100 ±400, ±200
Operating Temp.	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C

* Rated Voltage: $\sqrt{P \times R}$

ELECTRICAL SPECIFICATIONS for ZERO OHM JUMPERS

Series	CJ20 (0201)	CJ05 (0402)	CJ06 (0603)	CJ10 (0805)	CJ18 (1206)	CJ14 (1210)	CJ12 (2010)	CJ01 (2512)
Rated Current	0.5A (70°C)	1A (70°C)	1A (70°C)	1A (70°C)	2A (70°C)	2A (70°C)	2A (70°C)	2A (70°C)
Resistance (Max)	50 m Ω	50 m Ω	50 m Ω	50 m Ω	50 m Ω	50 m Ω	50 m Ω	50 m Ω
Max. Overload Current	1A	1A	1A	2A	2A	2A	2A	2A
Working Temp.	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C	-55°C ~ +125°C

* Rated Voltage: $\sqrt{P \times R}$

DERATING CURVE

For resistors operated at ambient temperature over 70°C , power rating shall be derated in accordance with figure 1.

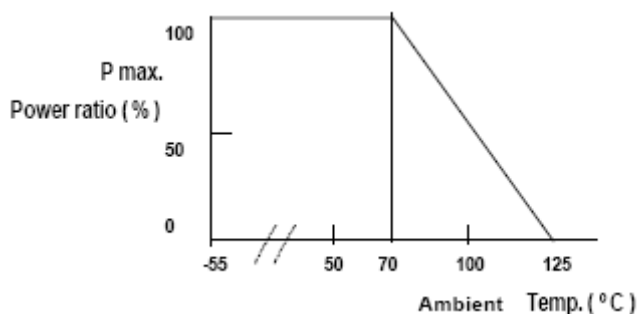


Figure 1

The rated voltage is calculated by the following formula:

$$E = \sqrt{P \times R}$$

E=Rated Voltage(V)

P=Rated Power(W)

R=Resistance Value(Ω)

CHARACTERISTICS

Test Item	Maximum $\Delta \Omega \pm 0.05\Omega$		Test Conditions
	$\pm 2\% \text{ \& } \pm 5\% \text{ Tolerance}$	$\pm 1\% \text{ \& } \pm 0.5\% \text{ Tolerance}$	
Short Time Overload	$\pm 0.75\%$	$\pm 0.50\%$	EIA Standard 575, π 3.6 2.5 x rated voltage for 5 seconds
Load Life	$\pm 1.50\%$	$\pm 1.00\%$	EIA Standard 575, π 3.14 90 minutes on; 30 minutes off for 1000 hours
Thermal Shock	$\pm 0.25\%$	$\pm 0.50\%$	EIA Standard 575, π 3.5 -55°C ~ +150°C for 5 cycles
High Temperature Exposure	$\pm 0.50\%$	$\pm 1.25\%$	EIA Standard 575, π 3.7 125°C \pm 5°C continuous for 100 hours
Terminal Strength	$\pm 0.50\%$	$\pm 0.50\%$	EIA Standard 575, π 3.9 20gms @ 90° angle for 30 seconds
Moisture Resistance	$\pm 1.00\%$	$\pm 0.50\%$	EIA Standard 575, π 3.10
Solderability	95% minimum coverage	95% minimum coverage	EIA Standard 575, π 3.12 3 seconds of immersion @ +215°C

EIA Standard Values

Decade Values in the EIA Standard E-24 Series:

1.0	1.1	1.2	1.3	1.5	1.6
1.8	2.0	2.2	2.4	2.7	3.0
3.3	3.6	3.9	4.3	4.7	5.1
5.6	6.2	6.8	7.5	8.2	9.1

Decade Values in the EIA Standard E-96 Series:

1.00	1.02	1.05	1.07	1.10	1.13
1.15	1.18	1.21	1.24	1.27	1.30
1.33	1.37	1.40	1.43	1.47	1.50
1.54	1.58	1.62	1.65	1.69	1.74
1.78	1.82	1.87	1.91	1.96	2.00
2.05	2.10	2.15	2.21	2.26	2.32
2.37	2.43	2.49	2.55	2.61	2.67
2.74	2.80	2.87	2.94	3.01	3.09
3.16	3.24	3.32	3.40	3.48	3.57
3.65	3.74	3.83	3.92	4.02	4.12
4.22	4.32	4.42	4.53	4.64	4.75
4.87	4.99	5.11	5.23	5.36	5.49
5.62	5.76	5.90	6.04	6.19	6.34
6.49	6.65	6.81	6.98	7.15	7.32
7.50	7.68	7.87	8.06	8.25	8.45
8.66	8.87	9.09	9.31	9.53	9.76

Those items in a shaded box are also E-24 values and will be marked with the EIA 3 Digit Code.

VALUE MARKING

For those parts ordered with an E-24 value, the product will be marked with a 3 digit code. For those products ordered with an E-96 value, the product will be marked with a 4 digit code. For those parts which fall under E-96 and E-24 values (e.g. 1K ohm is both an E-96 and E-24 value), the part will be marked with a 3 digit code; 4 digit markings for this type is available upon special request.



0201 and 0402 Size
No marking
E-24 & E-96 Values



0603 Size
EIA 96 Digit Code of 3.32K ohm
E-96 Values



0603, 0805, 1206, 1210, 2010, 2512 Sizes
EIA 3 Digit Code of 10K ohm resistor
E-24 Values, E-96 Values



0805, 1206, 1210, 2010, 2512 Sizes
EIA 4 Digit Code of 121K ohm resistor
E-96 Values

0603 MARKING CODE for E96 VALUES

By combining a specific two digit number and a letter code, you have a series of numeric/alpha digits that give you the complete (E96) resistance value codes for 0603 size part marking.

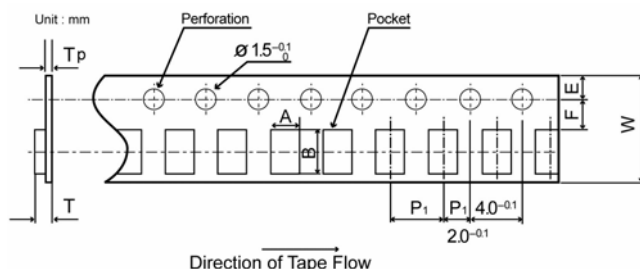
Value	Code	Value	Code	Value	Code	Value	Code
10.0	01	17.8	25	31.6	49	56.2	73
10.2	02	18.2	26	32.4	50	57.6	74
10.5	03	18.7	27	33.2	51	59.0	75
10.7	04	19.1	28	34.0	52	60.4	76
11.0	05	19.6	29	34.8	53	61.9	77
11.3	06	20.0	30	35.7	54	63.4	78
11.5	07	20.5	31	36.5	55	64.9	79
11.8	08	21.0	32	37.4	56	66.5	80
12.1	09	21.5	33	38.3	57	68.1	81
12.4	10	22.1	34	39.2	58	69.8	82
12.7	11	22.6	35	40.2	59	71.5	83
13.0	12	23.3	36	41.2	60	73.2	84
13.3	13	23.7	37	42.2	61	75.0	85
13.7	14	24.3	38	43.2	62	76.8	86
14.0	15	24.9	39	44.2	63	78.7	87
14.3	16	25.5	40	45.3	64	80.6	88
14.7	17	26.1	41	46.4	65	82.5	89
15.0	18	26.7	42	47.5	66	84.5	90
15.4	19	27.4	43	48.7	67	86.6	91
15.8	20	28.0	44	49.9	68	88.7	92
16.2	21	28.7	45	51.1	69	90.9	93
16.5	22	29.4	46	52.3	70	93.1	94
16.9	23	30.1	47	53.6	71	95.3	95
17.4	24	30.9	48	54.9	72	97.6	96

Letter Multiplier Cross Reference

A = 10 C = 1,000 E = 100,000 X = 1
B = 100 D = 10,000 F = 1,000,000 Y = 0.1

0603 Code	Explanation	Value
01B	01 = 10.0 & B = 100	10.0x100 = 1K Ω
25C	25 = 17.8 & C = 1,000	17.8x1,000 = 17.8K Ω
93D	93 = 90.9 & D = 10,000	90.9 x 10,000 = 909K Ω

TAPE SCHEMATIC



TAPE DIMENSIONS (mm)

	0201	0402	0603	0805
A	0.41±0.1	0.65±0.1	1.1±0.2	1.65±0.2
B	0.71±0.1	1.15±0.1	1.9±0.2	2.4±0.2
W	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2
E	1.75±0.10	1.75±0.10	1.75±0.1	1.75±0.1
F	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
P ₁	2.0±0.05	2.0±0.05	4.0±0.1	4.0±0.1
T	0.5 _{max}	0.55±0.1	0.70±0.1	0.90±0.1
T _p	0.4±0.05	0.40±0.05	0.60±0.1	0.75±0.1

	1206	1210	2010	2512
A	2.0±0.15	2.9±0.1	2.9±0.1	3.4±0.1
B	3.6±0.15	3.5±0.1	5.3±0.1	6.6±0.1
W	8.0±0.2	8.0±0.2	12.0±0.2	12.0±0.2
E	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F	3.5±0.05	3.5±0.05	5.5±0.05	5.5±0.05
P ₁	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
T	0.90±0.1	0.90±0.1	1.0±0.1	1.0±0.1
T _p	0.75±0.1	0.75±0.1	0.25±0.1	0.25±0.1

TAPE TYPE

0201	0402	0603	0805	1206	1210	2010	2512
Paper Tape						Plastic Tape	

TAPE MATERIALS

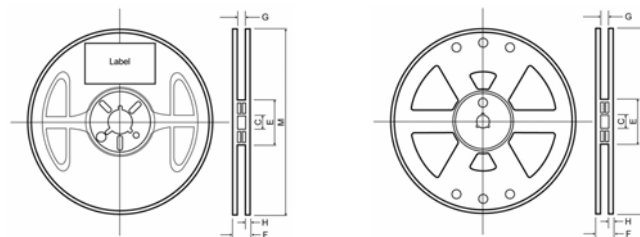
A heat press sticks the transparent or half-transparent plastic covered tape.

PACKAGE QUANTITY

Type	0201	0402	0603	0805
B			25,000	10,000
M	10,000	10,000	5,000	5,000
V	40,000	40,000	20,000	20,000

Type	1206	1210	2010	2512
B	5,000			
M	5,000	4,000	4,000	4,000
V	20,000	20,000	20,000	20,000

REEL DRAWINGS



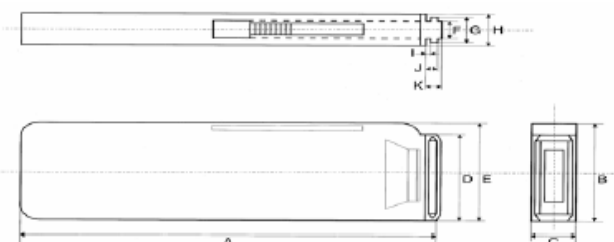
7" Reel (M)

13" Reel (V)

PACKAGE DIMENSIONS (mm)

	7" Reel (M)	13" Reel (V)
M	180 ± 3.0	330±2.5
H	1.20	2.3± 0.5
C	13.0 ± 0.2	13.0 ± 0.2
G	9.0 ± 0.3	9.5 ± 0.5
E	60 ± 1.0	80.0 ± 1.0
F	11.4 ± 1.0	14.4

BULK CASE SCHEMATIC



BULK CASE DIMENSIONS (mm)

A	B	C	D	E
110.0 ± 0.7	36.0 ± 0.2	12.0 ± 0.1	31.5 ± 0.2	36.0 ± 0.2

F	G	H	I	J	K
6.8 ± 0.1	8.8 ± 0.1	12.0 ± 0.1	1.5 ± 0.1	2.0 ± 0.1	4.7 ± 0.1

LABEL DESCRIPTION

One side surface of a reel is marked with a label with the following items of information.

1. Chip Resistor
2. Part Number
3. Tolerance
4. Quantity
5. Lot number for production month/year/suffix L*
6. Manufacturer's name or symbol

* The suffix "L" indicates that this item is lead free. As of September 2004, all new production items of the series CR and CJ are no longer containing tin/lead (SnPb) terminals; they are lead free and in compliance with Lead Free/RoHS.

The content of this specification may change without notification

CR-KITS Series, Thick Film Chip Resistor Engineering Kits

This engineering and design kit is a great sales tool, allowing for application testing before ordering minimum quantities. AAC offers a wide assortment of popular chip resistors sizes and tolerances, in addition to a large quantity of each value. The kits are convenient with easy-to-use packaging.

PACKAGE CONSTRUCTION

- 3 Ring Binder Case Holder
- Plastic pages with slip holders for each value
- Each value is individually identified in a slip holder
- Resistors are packaged on paper tape strips

E-24 KIT VALUES

2.2	10	47	180	560	1.8K	5.6K	18K	56K	270K
2.7	18	68	220	680	2.2K	6.8K	22K	82K	390K
3.9	22	75	270	850	2.7K	8.2K	27K	100K	470K
4.7	27	100	330	1.0K	3.3K	10K	33K	120K	560K
6.8	33	120	390	1.2K	3.9K	12K	39K	150K	1.0M
8.2	39	150	470	1.5K	4.7K	15K	47K	220K	2.2M

E-96 KIT VALUES

10.0	24.3	56.2	133	301	681	1.62K	4.22K	10.0K	23.7K	60.4K	150K	332K	649K
11.3	26.1	61.9	150	332	750	1.82K	4.75K	11.0K	27.4K	68.1K	162K	365K	681K
12.1	28.7	68.1	162	348	825	2.00K	5.11K	12.1K	30.1K	75.0K	178K	392K	732K
13.3	33.2	75.0	174	383	909	2.21K	5.62K	13.0K	33.2K	82.5K	200K	422K	750K
15.0	35.7	82.5	200	422	1.00K	2.37K	6.19K	15.0K	39.2K	90.9K	221K	464K	825K
16.5	39.2	90.9	215	475	1.10K	2.67K	6.81K	16.2K	41.2K	100K	237K	511K	866K
18.2	42.2	100	237	511	1.21K	3.01K	7.50K	18.2K	47.5K	110K	255K	536K	909K
20.0	46.4	107	261	549	1.33K	3.32K	8.25K	20.0K	49.9K	121K	274K	562K	953K
22.1	51.1	118	287	604	1.50K	3.92K	9.09K	22.1K	56.2K	130K	301K	619K	1.0M

Engineering Kits J Type

FEATURES

- EIA Standard E-24 Values
- Full range from 1 Ω ~ 1M Ω
- Resistance Tolerance of $\pm 5\%$
- 3,000 Pieces: 50 pieces of 60 different values
- ISO 9002 Quality Certified products

Part Number for $\pm 5\%$ Sample Kit

Part Number	Description
CR05-J-KITS	0402, 1/16w, 5%, E-24 values (1 Ω through 2.2M Ω)
CR16-J-KITS	0603, 1/16w, 5%, E-24 values (1 Ω through 2.2M Ω)
CR10-J-KITS	0805, 1/10w, 5%, E-24 values (1 Ω through 2.2M Ω)
CR18-J-KITS	1206, 1/8w, 5%, E-24 values (1 Ω through 2.2M Ω)

Engineering Kits F Type

FEATURES

- EIA Standard E-24 Values
- Full range from 10 Ω ~ 1M Ω
- Resistance Tolerance of $\pm 1\%$
- 3,150 Pieces: 25 pieces of 126 different values
- ISO 9002 Quality Certified products

Part Number for $\pm 1\%$ Sample Kit

Part Number	Description
CR05-F-KITS	0402, 1/16w, 1%, E-96 values (10 Ω through 1M Ω)
CR16-F-KITS	0603, 1/16w, 1%, E-96 values (10 Ω through 1M Ω)
CR10-F-KITS	0805, 1/10w, 1%, E-96 values (10 Ω through 1M Ω)
CR18-F-KITS	1206, 1/8w, 1%, E-96 values (10 Ω through 1M Ω)



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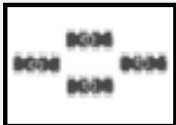
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Surface Mount Resistors

Quick View	Series	Product Description	Product Information	Data Sheets
	<u>RMC</u>	General Purpose Thick Film Chip Resistor	Available in 0201 thru 2512 at 1% and 5% Tolerances From .1 Ω - 24M	
	<u>HMC</u>	General Purpose High Value Chip Resistor	Sizes from 0603 thru 1206, Tolerances 10% & 20%, TCs 500 & 1500ppm, values 47M to 4.7G.	
	<u>FCR</u>	Thick Film Trimmable Chip Resistor	Sizes from 0603 thru 2010, Tolerances 5%, 10%, 15%, 0/-20%, 0/-30%, values 10 Ω to 1M.	
	<u>RPC</u>	Anti-Surge Chip Resistor	Available in sizes from 0805 through 2512 with tolerances down to 5%, values from 0.27 Ω to 22M with excellent pulse handling capabilities.	
	<u>HVC</u>	High Voltage Chip Resistor	Sizes from 0402 to 3512, tolerances down to 0.1% and TCR's to 25ppm. Values up to 1T Ω with extended voltage handling to 2500 volts.	
	<u>RVC</u>	Medium Voltage Chip Resistor	Available in sizes from 0603 through 2512 with tolerances down to 1%. Values from 47 Ω to 51M with extended voltage handling to 800V.	
	<u>CSR</u>	Current Sensing Chip Resistors	Sizes from 0402 thru 2512, tolerances 1% & 5%, values 0.005 Ω to 1 Ω , narrow terminations available in sizes 2010 and 2512.	

	<u>CSRL</u>	Metal Strip Current Sensing Chip Resistors	2512 size; 2W power, low inductance, available in 1% and 5% and value ranges of 0.001 Ω and 0.002 Ω .	 
	<u>CSRF</u>	Foil on Ceramic Current Sensing Chip Resistors	Available in 1206, 2010, 2512 sizes, low inductance, 1% and 5% tolerances, value ranges from 0.005 Ω to 0.15 Ω .	 
	<u>CSNL</u>	Metal Strip Current Sensing Resistor	2512 size; 2W power, low inductance, available in 1% and 5% and value ranges from 0.005 Ω to 0.02 Ω .	 
	<u>RGC</u>	Semi Precision Thick Film Surface Mount	Sizes from 0402 thru 1206, Tolerances .5% & 1%, TCs 50 to 100ppm, values 10 Ω to 4.64M.	 
	<u>RNC</u>	Precision Thin Film Chip Resistor	Sizes from 0201 thru 2512, Tolerances .01% to 1%, TCs 5 to 100ppm/ $^{\circ}$ C, values 4.7 Ω to 1M.	 
	<u>RNCS</u>	Anti-Corrosive Precision Thin Film Chip Resistor	Sizes 0402 through 2512, TCR's to 25ppm/ $^{\circ}$ C, tolerances to 0.1%, values 25 Ω to 600K Ω . Special passivation for moisture sensitive applications.	 
	<u>SMX</u>	Surface Mount Power Metal Oxide	Available in 2W & 3W, Tolerances 1% to 5%, values 2K to 470K.	 
	<u>HPC</u>	High Power Surface Mount Resistor	Surface mount power resistor rated from 5-12 watts at 40 $^{\circ}$ C. Tolerances from 5%, ohmic values from 0.025 to 250 K Ω .	 
	<u>SM</u>	Surface Mount - General Purpose/Precision Wirewound	Available in 1W - 3W, Tolerances .1% to 5%, values .005 Ω to 3.01K.	 
	<u>RAC</u>	Chip Resistor Array Concave Terminations	Sizes from 0603x4, 0805x8, 1206x4,8, Tolerances 1% & 5%, values 10 Ω to 1M.	 
	<u>RAV</u>	Chip Resistor Array Convex Terminations	Sizes from 0402x2,4 0603x2,4,8, 1206x4,8 , Tolerances 1% & 5%, values 10 Ω to 1M.	 










RAF

Chip Resistor Array Flat Terminations

Sizes from 0402x2,4 0603x2,4, 1206x4, Tolerances 1% & 5%, values 10 Ω to 1M.



Additional Documents

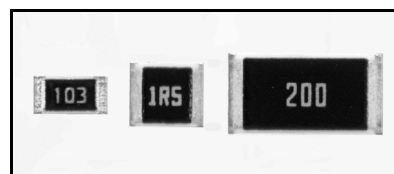
Document Description	Options	Document Description	Options
Entire Resistor Catalog	 	Resistor Packaging Specifications	 
General Resistor Information	 	Lead Free/RoHS Status	 

[Return to Top](#)

RMC Series — General Purpose Thick Film Chip Resistors

Features

- Nickel barrier terminations standard
- Operating temp range from -65°C to +150°C
- Power derating from 100% at 70°C to zero at +150°C
- Zero ohm available (max resistance 0.05Ω)
- RoHS compliant / lead-free available (RMCF)



Electrical Specifications

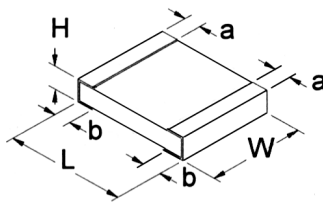
Type / Code	Package Size	Power Rating (Watts) @ 70°C	Maximum Working Voltage*	Maximum Overload Voltage	Max. Current	Resistance Temperature Coefficient	Ohmic Range and Tolerance	
							1%	5%
RMC 1/20	0201	0.05W	25	50	1 Amp	±300 ppm/°C ±200 ppm/°C	10Ω – 97.6Ω 100Ω – 1M	10Ω – 91Ω 100Ω – 10M
RMC 1/16S	0402	0.063W	50	100	1 Amp	±200 ppm/°C	1Ω – 10M	1Ω – 10M
RMC 1/16	0603	0.1W	50	100	1 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	– 1Ω – 9.76Ω 10Ω – 1M 1.02M – 10M	1Ω – 9.1Ω 10Ω – 1M – 1.1M – 22M
RMC 1/10	0805	0.125W	150	300	2 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	– 0.1Ω – 0.976Ω 1.0Ω – 10M –	0.1Ω – 9.1Ω 10Ω – 1M – 1.1M – 22M
RMC 1/8	1206	0.25W	200	400	2 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	– 0.1Ω – 0.976Ω 1.0Ω – 10M –	0.1Ω – 9.1Ω 10Ω – 1M – 1.1M – 24M
RMC 1/4	1210	0.33W	200	400	3 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	– 0.1Ω – 0.97Ω 1.0Ω – 10M –	0.15Ω – 9.1Ω 10Ω – 1M – 1.1M – 22M
RMC 1/2	2010	0.75W	200	400	3 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	0.1Ω – 3.6Ω 3.9Ω – 9.76Ω 10Ω – 10M –	0.1Ω – 9.1Ω 10Ω – 1M – 1.1M – 22M
RMC 1	2512	1W	200	400	3 Amp	±350 ppm/°C ±200 ppm/°C ±100 ppm/°C ±350 ppm/°C	– 0.1Ω – 9.76Ω 10Ω – 1M –	0.1Ω – 9.1Ω 10Ω – 1M – 1.1M – 22M

* Lesser of \sqrt{PR} or maximum working voltage.

How to Order

RMC		1/16			4.7K		5%		R		
SEI Type		Code			Nominal Resistance		Tolerance		Packaging		
SEI Type	Description	Code	Wattage	Size	Tolerance	Values	1/16, 1/10, 1/8	Styles	Pkg Qty	Description	Code
RMC	Standard	1/20	0.05W	0201	1%	E96,E24		1,000	Bulk	A	
RMCF	RoHS	1/16S	0.063W	0402	5%	E24		10,000	10" reel - Paper	G	
		1/16	0.1W	0603				5,000	7" reel - Paper	R	
		1/10	0.125W	0805				4,000	7" - Embossed		
		1/8	0.25W	1206			10,000	10" reel - Paper			
		1/4	0.33W	1210							
		1/2	0.75W	2010							
		1	1W	2512							

RMC Series — General Purpose Thick Film Chip Resistors



Mechanical Specifications

Type / Code	L Body Length	W Body Width	H Body Height	a Top Termination	b Bottom Termination	Units
RMC 1/20	0.024 ± 0.001 0.60 ± 0.03	0.011 ± 0.001 0.30 ± 0.03	0.009 ± 0.001 0.23 ± 0.03	0.004 ± 0.002 0.10 ± 0.05	0.006 ± 0.002 0.15 ± 0.05	inches mm
RMC 1/16S	0.039 ± 0.002 1.00 ± 0.05	0.020 ± 0.002 0.50 ± 0.05	0.014 ± 0.002 0.35 ± 0.05	0.008 ± 0.004 0.20 ± 0.10	0.010 +0.002, -0.004 0.25 +0.05, -0.10	inches mm
RMC 1/16	0.063 ± 0.004 1.60 ± 0.10	0.031 ± 0.004 0.80 ± 0.10	0.018 ± 0.004 0.45 ± 0.10	0.012 ± 0.008 0.30 ± 0.20	0.012 ± 0.008 0.30 ± 0.20	inches mm
RMC 1/10	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.004 1.25 ± 0.10	0.020 ± 0.006 0.50 ± 0.15	0.016 ± 0.008 0.40 ± 0.20	0.016 ± 0.008 0.40 ± 0.20	inches mm
RMC 1/8	0.126 ± 0.008 3.20 ± 0.20	0.063 ± 0.006 1.60 ± 0.15	0.021 ± 0.006 0.55 ± 0.15	0.020 ± 0.010 0.50 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	inches mm
RMC 1/4	0.126 ± 0.008 3.20 ± 0.20	0.098 ± 0.008 2.50 ± 0.20	0.021 ± 0.006 0.55 ± 0.15	0.020 ± 0.010 0.50 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	inches mm
RMC 1/2	0.197 ± 0.008 5.00 ± 0.20	0.098 ± 0.008 2.50 ± 0.20	0.021 ± 0.006 0.55 ± 0.15	0.024 ± 0.010 0.60 ± 0.25	0.024 ± 0.010 0.60 ± 0.25	inches mm
RMC 1	0.248 ± 0.008 6.30 ± 0.20	0.126 ± 0.008 3.20 ± 0.20	0.021 ± 0.006 0.55 ± 0.15	0.024 ± 0.010 0.70 ± 0.25	0.024 ± 0.010 0.70 ± 0.25	inches mm

*Lead free (RMCF) dimensions same as standard parts

Performance Characteristics

Test	Test Conditions (JIS C 5202)	Test Results
Short Time Overload	2.5x rated voltage for 5 seconds	±(2% +0.1Ω)
Dielectric Withstanding Voltage	100VAC, 1 minute	±(1% +0.05Ω)
Resistance to Soldering Heat	260°C ±5°C, for 10 sec. ±0.5 sec. (Solder Bath)	±(1% +0.05Ω)
Solderability	235°C ±5°C, for 2 sec. ±0.5 sec. (Colophonium flux)	95% coverage, minimum
Temperature Cycle	-65°C: 30 min. 25°C: 2 to 3 min. 150°C: 30 min. 25°C: 2 to 3 min. (5 Cycles)	±(1% +0.05Ω) Jumper (<0.05Ω)
Endurance (Damp load)	40°C ± 2°C, 90% RH, Rated Load 90 min. On, 30 min. Off, (1,000 hrs. - 0 hrs. + 48 hrs.)	±(3% +0.1Ω) Jumper (<0.05Ω)
Endurance (Rated load)	70°C ± 2°C, Rated Load 90 min. On, 30 min. Off, (1,000 hrs. - 0 hrs. + 48 hrs.)	±(3% +0.1Ω) Jumper (<0.05Ω)
Voltage Coefficient	1/10 rated voltage for 3 sec. max, then rated voltage for 3 sec. max.	±100 (ppm/V)
Robustness of Termination	Bend of 3mm for 5 ± 1 sec.	±(1.0% + 0.05 Ohm)

ROHS INFORMATION



CAL-CHIP

Electronics, Inc. 12/13/05

Att: To all our valued Customers

Re: Lead free vs. Non-lead free

To Whom It May Concern;

Cal-Chip Electronics Inc. would like to take this opportunity to clarify our roadmap goals for the next few years as they pertain to lead free non-lead free production.

Our factory locations have all switched completely over to lead free production of many of our most popular products. Series included are GMC, CHV, CHQ and TC capacitors, RM, RN, CN series resistors, and FB, GHF, GLF and WB series beads and inductors. Also, CV, CV2, CV3, CVB, CVS and CVZ are fully compliant as well.

These products have been engineered for both forward and backward compatibility in regards to most SMT manufacturing printing and placement operations along with most solder paste in use in our industry today.

Although soldering temperatures are generally higher for lead free vs. non-lead free soldering, most newer reflow ovens and other solder processing equipment are capable of making the adjustments.

Cal-Chip stock of non-lead free components may reach the exhaustion point by the end of 2008. For those customers who have experienced problems with lead free soldering and are planning to continue to order non-lead free product we ask that you please make your sales associate or broker aware of this so we can accommodate your request and quote stock from our existing non-lead free warehouse stock. This is to guarantee correct order processing and reduce costly returns due to soldering problems.

As stock runs the course orders will be filled with lead free counterparts to satisfy the orders if we are not aware of a special need for all non-lead free product.

Until further notice when ordering lead free parts please specify by placing "-LF" as a suffix to the existing Cal-Chip part

number. In this case parts will be pulled from a designated lead free and ROHS compliant warehouse. Labels on all Cal-Chip products are furnished with a lot code at bottom left corner, which will be followed as well by "LF" indicating ROHS and lead free compliance. As a reminder component manufacturing is projected to be virtually ROHS compliant by January of 2006.

Please contact a sales associate or Cal-Chip distributor if you have any questions. In addition our website <http://www.calchip.com> will contain all information required for ROHS compliance surveys. Date of availability January 2005.

- [ROHS MAT DEC \(SIGNED\)](#)

Cal-Chip Management

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Contact us at quotes@calchipelectronics.com, 215-942-8900
We look forward to working with you.

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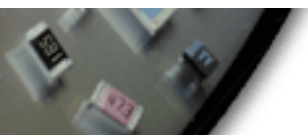
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KOA Speer Electronics

Bolivar Drive • P.O. Box 547 • Bradford, PA 16701

Phone: 814.362.5536 • Fax: 814.362.8883

NEW Global Part Numbers



Features

- Lead free version available (see How to Order "Termination" options)
- RoHS compliant*
- Power rating at 70 °C: CR0603 - 0.10 W, CR0805 - 0.125 W, CR1206 - 0.25 W
- Tight tolerances of bottom electrode width
- Three layer contacting process with nickel barrier prevents leaching and provides excellent solderability
- Suitable for all types of soldering processes
- Paper tape on reel for automatic placement

CR0603/CR0805/CR1206 - Chip Resistors

Electrical Characteristics

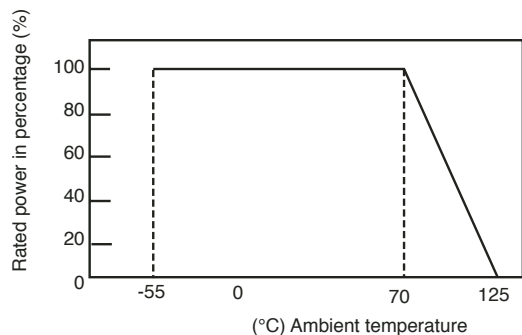
Characteristic	Model CR0603	Model CR0805	Model CR1206
Power Rating @ 70 °C	1/10 W	1/8 W	1/4 W
Operating Temperature Range	-55 °C to +125 °C		
Derated to 0 Load at	+125 °C		
Maximum Working Voltage	50 V	100 V	200 V
Maximum Overload Voltage	100 V	200 V	400 V
Resistance Range: 1 %, E-96 + E-24	10 ohms -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

For Standard Values Used in Capacitors, Inductors, and Resistors, [click here](#).

Chip Dimensions

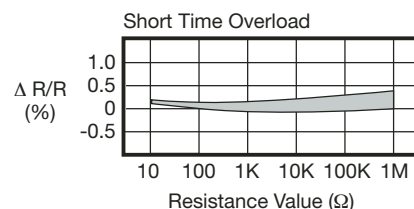
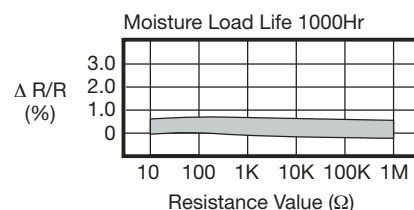
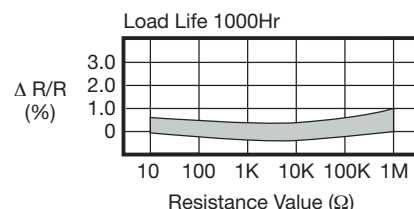
Dimension	Model CR0603	Model CR0805	Model CR1206
L	$\frac{1.60 \pm 0.10}{(0.063 \pm 0.004)}$	$\frac{2.00 \pm 0.15}{(0.079 \pm 0.006)}$	$\frac{3.20 \pm 0.25}{(0.126 \pm 0.010)}$
W	$\frac{0.80 \pm 0.10}{(0.031 \pm 0.004)}$	$\frac{1.25 \pm 0.15}{(0.049 \pm 0.006)}$	$\frac{1.60 \pm 0.15}{(0.063 \pm 0.006)}$
H	$\frac{0.45 \pm 0.10}{(0.018 \pm 0.004)}$	$\frac{0.50 \pm 0.10}{(0.020 \pm 0.004)}$	$\frac{0.60 \pm 0.15}{(0.024 \pm 0.006)}$
l_1	$\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$	$\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$	$\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$
l_2	$\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$	$\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$	$\frac{0.50 \pm 0.20}{(0.020 \pm 0.010)}$

Derating Curve

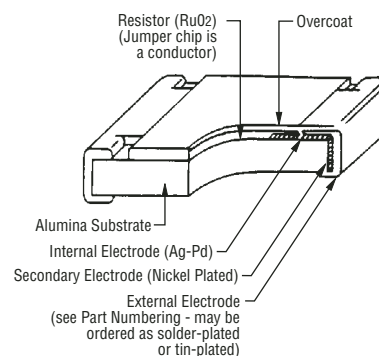
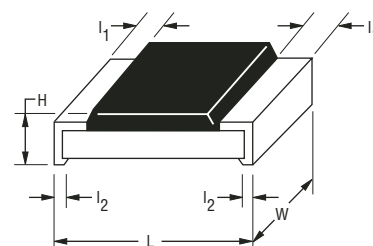


DIMENSIONS ARE: $\frac{\text{MM}}{(\text{INCHES})}$

Characteristic Data



Dimensional Drawing



*RoHS Directive 2002/95/EC Jan 27 2003 including Annex
Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

CR0603/CR0805/CR1206 - Chip Resistors

BOURNS®

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

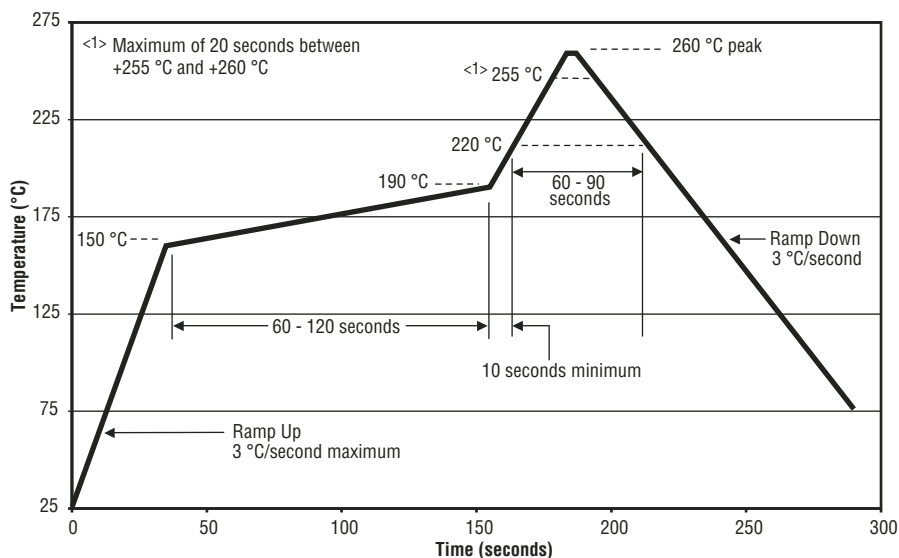
Test	Procedure	Method	Specification	Deviation from Nominal	
				1 %	5 %
DC Resistance	—	MIL-STD-202 303 EIA RS-396 4.4	MIL-R-55342D 4.7.2	F: $\leq \pm 1 \%$	$\leq \pm 5.0 \%$
Thermal Shock	-40 °C, 60 minutes; +125 °C, 60 minutes	MIL-STD-202 107 EIA RS-396 4.5	MIL-R-55342D 4.7.3	$\leq \pm 0.5 \%$ +0.05 Ω	$\leq \pm 1 \%$ +0.05 Ω
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 Ω	$\leq \pm 1.0 \%$ +0.05 Ω
Short Time Overload	Rated Voltage x 2.5; 5 seconds CR0603: 100 V max. CR0805: 300 V max. CR1206: 400 V max.	MIL-R-55342D 4.7.5 EIA RS-396 4.7	MIL-R-55342D 4.7.5	$\leq \pm 1 \%$ +0.05 Ω	$\leq \pm 2.0 \%$ +0.05 Ω
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 Ω	$\leq \pm 2.0 \%$ +0.1 Ω
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 Ω	$\leq \pm 1.0 \%$ +0.05 Ω
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 Ω	$\leq \pm 2.0 \%$ +0.05 Ω
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 Ω	$\leq \pm 3.0 \%$ +0.1 Ω
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	≥ 500 g	≥ 500 g
Current Noise	Quan-Tech Model 315B	MIL-STD-202 308	MIL-R-55342D 6.6	$R \leq 1k \Omega$; max. 1 μ V/V $R \leq 10k \Omega$; max. 3 μ V/V $R \leq 100k \Omega$; max. 6 μ V/V $R \leq 1M \Omega$; max. 10 μ V/V	$R \leq 1k \Omega$; max. 1 μ V/V $R \leq 10k \Omega$; max. 3 μ V/V $R \leq 100k \Omega$; max. 6 μ V/V $R \leq 2M \Omega$; max. 10 μ V/V
Humidity, Steady State	+40 °C; 90-95 % RH, 1344 Hours	MIL-STD-202 103B Condition D	—	$\leq \pm 2.5 \%$ +0.05 Ω	$\leq \pm 2.5 \%$ +0.05 Ω
Salt Spray	96 hours	MIL-STD-202 101D Condition A	—	$\leq \pm 1.0 \%$ +0.2 Ω	$\leq \pm 1.0 \%$ +0.1 Ω
Vibration	10-2000 Hz, 6 hours	MIL-STD-202 201A	—	$\leq \pm 0.5 \%$ +0.1 Ω	$\leq \pm 1.0 \%$ +0.1 Ω
Voltage Coefficient	—	MIL-STD-202 309	—	≤ 100 ppm/V	≤ 100 ppm/V
Insulation Resistance	Test Potential 500V CR0603: 100V	MIL-STD-202 302 Condition B	—	$\geq 10^9 M \Omega$	$\geq 10^9 M \Omega$
Dielectric Withstanding Voltage	—	MIL-STD-202 301	—	≥ 500 V (CR1206, CR0805) ≥ 300 V (CR0603)	
Drop Test	1 m	MIL-STD-202 203B	—	$\leq \pm 0.5 \%$ +0.1 Ω	$\leq \pm 1.0 \%$ +0.1 Ω
Bending Test	5 mm/90 mm; 10 sec.	—	—	$\leq \pm 1 \%$ +0.05 Ω	$\leq \pm 1.0 \%$ +0.05 Ω

Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

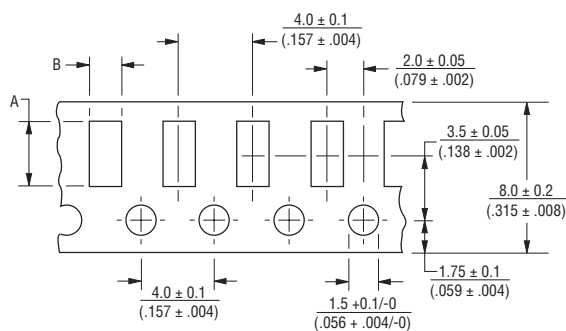
CR0603/CR0805/CR1206 - Chip Resistors

BOURNS®

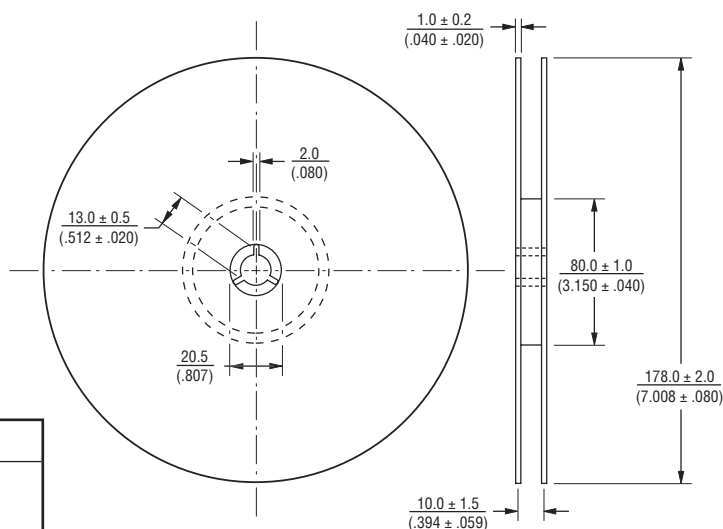
Soldering Profile for Lead Free Chip Resistors and Arrays



Packaging Dimensions (Conforms to EIA RS-481A)



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



Series	A	B
CR0603	$\frac{1.9 \pm 0.2}{(.075 \pm .008)}$	$\frac{1.1 \pm 0.2}{(.043 \pm .008)}$
CR0805	$\frac{2.4 \pm 0.2}{(.094 \pm .008)}$	$\frac{1.65 \pm 0.2}{(.065 \pm .008)}$
CR1206	$\frac{3.57 \pm 0.2}{(.161 \pm .008)}$	$\frac{2.00 \pm 0.2}{(.079 \pm .008)}$

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

CR0603/CR0805/CR1206 - Chip Resistors

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Resistor Markings

CR0603
CR0805
CR1206



E-24 marking
Value = 10K ohms

CR0805
CR1206



E-96 marking
Value = 44.2K ohms

CR0603
EIA-96 Marking



1 % marking
Value = 12.4K ohms

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:
Y=10⁻² X=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 ohm to 10 megohms	146	E-24 10 ohms to 1 megohm, Rest E-12
CR0805-JW-LAB2	0805	5 %	24 ohms to 1 megohm	121	E-24
CR1206-FX-LAB3	1206	1 %	10 ohms to 1 megohm	122	E-24
CR1206-FX-LAB4	1206	1 %	10 ohms to 1 megohm	242	E-48
CR0805-FX-LAB5	0805	1 %	75 ohms to 1 megohm	101	E-24
CR0603-JW-LAB6	0603	5 %	3.3 ohms to 1 megohm	128	E-24 10 ohms to 1 megohm, Rest E-12
CR0603-FX-LAB7	0603	1 %	10 ohms to 1 megohm	122	E-24
Chip Arrays	Resistor Size				
CAT16-J4-LAB1	0603	5 %	10 ohms to 1 megohm	62 concave	E-12 4 resistors in a 1206 size
CAY16-J4-LAB2	0603	5 %	10 ohms to 1 megohm	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.
Customers should verify actual device performance in their specific applications.

CR0603/CR0805/CR1206 - Chip Resistors

BOURNS®

How To Order

	CR	1206	-	F	X	-	8252	E	
Model _____ (CR = Chip Resistor)									
Size _____ <ul style="list-style-type: none">• 0603• 0805• 1206									
Resistance Tolerance _____ F = $\pm 1\%$Used with "X" TCR code only for values from 10 ohms through 1 megohm. J = $\pm 5\%$Used with "W" TCR code for values from 10 ohms through 10 megohms. Used with "/" TCR code for zero ohm (jumper) and for values from 1 ohm through 9.1 ohms.									
TCR (ppm/°C) _____ X = ± 100Used with "F" Resistance Tolerance code only for values from 10 ohms through 1 megohm. W = ± 200Used with "J" Resistance Tolerance code for values from 10 ohms through 10 megohms. / = -250 to +500 ..Used with "J" Resistance Tolerance code only for zero ohm (jumper), and for values from 1 ohm through 9.1 ohms.									
Resistance Value _____ For 1 % Tolerance: <100 ohms....."R" represents decimal point (example: 24R3 = 24.3 ohms) ≥ 100 ohms.....First three digits are significant, fourth digit represents number of zeros to follow (example: 8252 = 82.5k ohms). For 5 % Tolerance: <10 ohms....."R" represents decimal point (example: 4R7 = 4.7 ohms) ≥ 10 ohms.....First two digits are significant, third digit represents number of zeros to follow (example: 474 = 470k ohms; 000 = Jumper).									
Packaging _____ E = Paper Tape (5,000 pcs.) on 7 " Plastic Reel									
Termination _____ LF = Tin-plated (lead free) ___ = Solder-plated									

Sitemap



Yageo October sales hit record NT\$ 1.901 billion sequentially

Yageo Corporation announced today its worldwide net sales, driven by strong end market demands, rose sequentially from previous month and 12% y-o-y to NT\$1.901 billion in October marking new yearly and five-year highs. Accumulated sales from January to October increased by 25% y-o-y to NT\$ 16.953 billion. - Nov 8, 2006

[Read more...](#)

Yageo releases miniature multilayer chip varistors in penetrating protective device market

Yageo Cooperation today announced the launch of a comprehensive series of multilayer varistors (MLV), in packages ranging from 0201 to 0805, designed for the protection of electronic equipments from surge and electrostatic-discharge (ESD). Having been certified by major mobile phone makers, Yageo expects to ramp up MLV monthly capacity to 100 millions pieces by 2007 thereby making Yageo the largest supplier of multilayer varistors in Taiwan. - Oct 31, 2006

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Phycomp  **FERROXCUBE** **VITROHM**

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[EMI PC Beads](#)

[Multilayer Capacitor Chips and Arrays](#)

[Surface Mount Ceramic Multilayer Capacitors](#)

[Multilayer Capacitor Networks](#)

[Ceramic Multilayer Capacitor Network \(SMD\)](#)

Multilayer Chip Varistors

Multilayer Chip Varistors

Resistor Arrays and Networks

This product group combines the Convex and Concave Array Networks.

Resistor Chips

This product group consists of the main surface mount single resistor chips series such as Thick and Thin Film Chip Resistors, Low Ohmic and Power Resistors and many other series.

SMD Chip Inductor

SMD Chip Inductor CL, NL en NLC series

SMD High Frequency Chip Inductor

SMD High Frequency Chip Inductors CLH en LCN series

SMD Multilayer Ferrite Chip Beads

SMD Multilayer Ferrite Chip Beads SB, PB, NB, GB and FB series

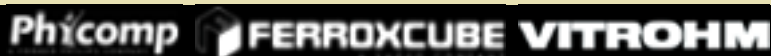
SMD Power Inductors

SMD Power Inductors

Vitrohm leaded power resistors

Vitrohm's leaded power resistors and current sensors

Parametric search is optimised for Internet Explorer and the latest versions of Netscape/Mozilla.



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Springsite Technology

APPROVAL SHEET

WR12X / WR08X / WR06X

$\pm 1\%$, $\pm 5\%$

General purpose chip resistors

Size 1206 / 0805 / 0603

Customer : _____
Approval No : _____
Issue Date : _____

Customer Approval :

FEATURE

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly costs
4. Higher component and equipment reliability
5. Lead free products upon customer requested

APPLICATION

- Consumer electrical equipment
- Automotive application
- EDP, Computer application
- Telecom application

DESCRIPTION

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that 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 coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin or Tin (lead free) alloy.

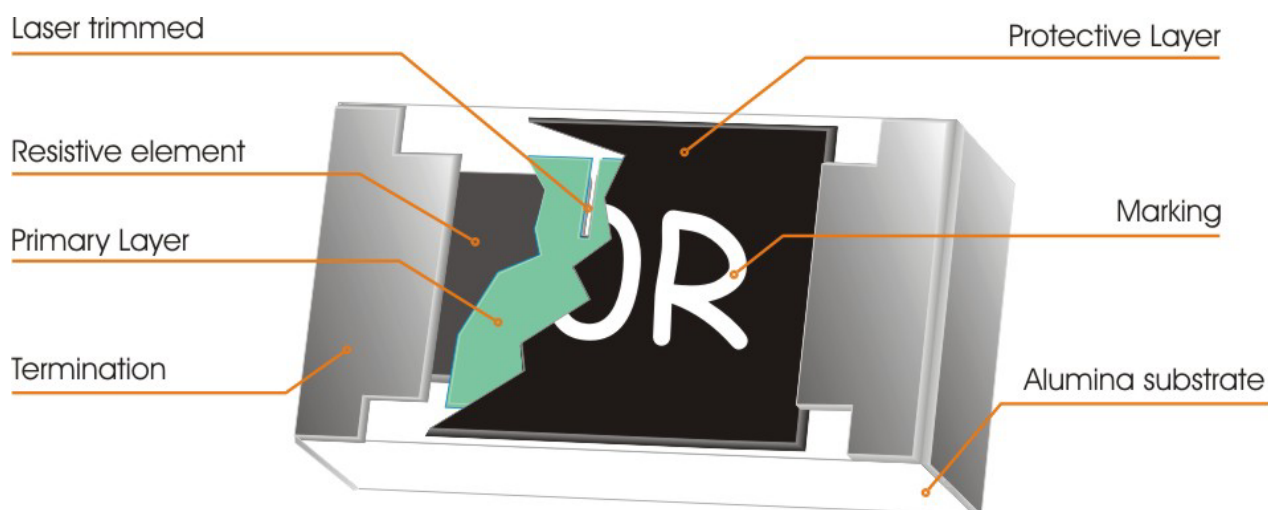


Fig 1. Construction of a Chip-R

QUICK REFERENCE DATA

Item	General Specification					
Series No.	WR12		WR08		WR06	
Size code	1206(3216)		0805(2012)		0603(1608)	
Resistance Range	1Ω~10MΩ(±5% tolerance),10Ω~1MΩ(±1% tolerance), Jumper					
Resistance Tolerance	±1% E96/E24	±5% E24	±1% E96/E24	±5% E24	±1% E96/E24	±5% E24
TCR (ppm/°C)						
R≥1MΩ		≤ ± 200		≤ ± 200		≤ ± 200
1MΩ > R > 10Ω	≤ ± 100	≤ ± 200	≤ ± 100	≤ ± 200	≤ ± 100	≤ ± 200
R≤10Ω	-300~+500	-300~+500	-300~+500	-300~+500	-300~+500	-300~+500
Max. dissipation @ T _{amb} =70°C	1/4 W		1/8 W		1/10 W	
Max. Operation Voltage (DC or RMS)	200V		150V		50V	
Max. Overload Voltage (DC or RMS)	400V		300V		100V	
Climatic category (IEC 60068)	55/155/56					

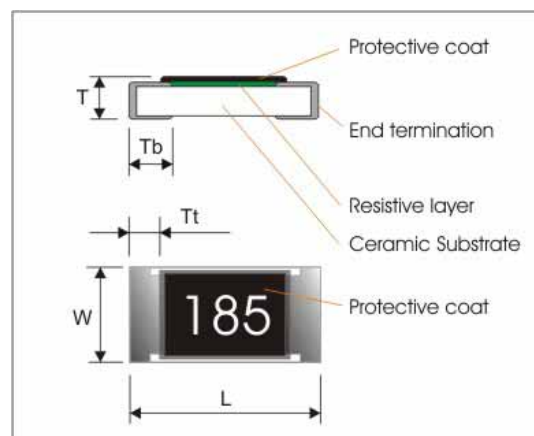
Note :

- This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
- Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$$
or Max. RCWV listed above, whichever is lower.
- The resistance range 1~10Ω and 1M ~10MΩ with 1% tolerance please refer to WR12W / WR08W / WR06W series.
- The resistance of Jumper is defined <0.05Ω.

DIMENSIONS

	WR12X	WR08X	WR06X
L	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10
W	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10
T	0.60 ± 0.15	0.50 ± 0.15	0.45 ± 0.15
Tb	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.15
Tt	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10



MARKING

Size \ Nr. Of digit of code\tolerance	$\pm 5\%$	$\pm 1\%$
1206 (3216)	3-digits marking	4-digits marking
0805 (2012)	3-digits marking	4-digits marking
0603 (1608)	3-digits marking	3-digits marking

3-digits marking ($\pm 5\%$: 1206 & 0805 & 0603)

Each resistor is marked with a three digits code on the protective coating to designate the nominal resistance value. For values up to 91Ω the R is used as a decimal point. For values of 100Ω or greater the first 3 digits apply to the resistance value and fourth indicate the number of zeros to follow. (EX. Jumper(0Ω) can be 0 or 000)

3-digits marking ($\pm 1\%$: 0603)

Nominal resistance				Description											
1.E-24 series				As 0603 WR06X ±5%.											
2.E-96 series				The 1st two digit codes are referring to the CODE on the table, the 3rd code is the index of resistance value :											
				Y=10 ⁻² , X=10 ⁻¹ , A=10 ⁰ , B=10 ¹ , C=10 ² , D=10 ³ , E=10 ⁴ , F=10 ⁵											
				EX : 17.8 =25X , 178 =25A , 1K78 =25B 17K8=25C , 178K=25D , 1M78=25E											
3. Remark				There is no marking for the items are not under E-24 and E-96 series											
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

4-digits marking ($\pm 1\%$: 1206/0805)

Each resistor is marked with a four digits code on the protective coating to designate the nominal resistance value. For values of $<97.6\Omega$ the R is used as a decimal point. For values of 100Ω or greater the first 3 digits are significant, the fourth indicates the number of zeros to follow.

Example

RESISTANCE	10 Ω	12 Ω	100 Ω	6800 Ω	0 Ω
3-digits marking (1206 & 0805 & 0603 $\pm 5\%$)	100	120	101	682	0 or 000
4-digits marking	10R0	12R0	1000	6801	----

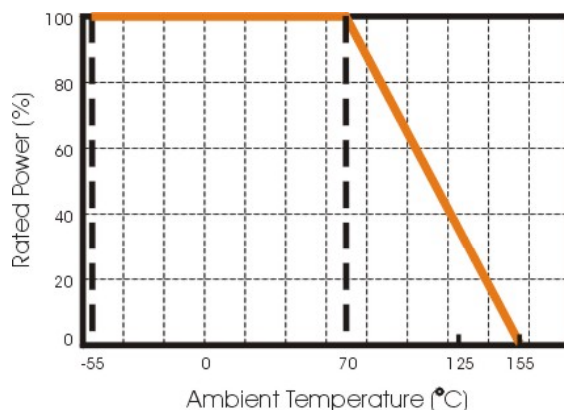
FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of $\pm 5\%$, and E96 series for resistors with a tolerance of $\pm 1\%$. The values of the E24/E96 series are in accordance with "IEC publication 60063"

Derating

The power that the resistor can dissipate depends on the operating temperature; see Fig.2



**Figure 2. Maximum dissipation in percentage of rated power
As a function of the ambient temperature**

MOUNTING

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems.

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for one minute. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 60 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

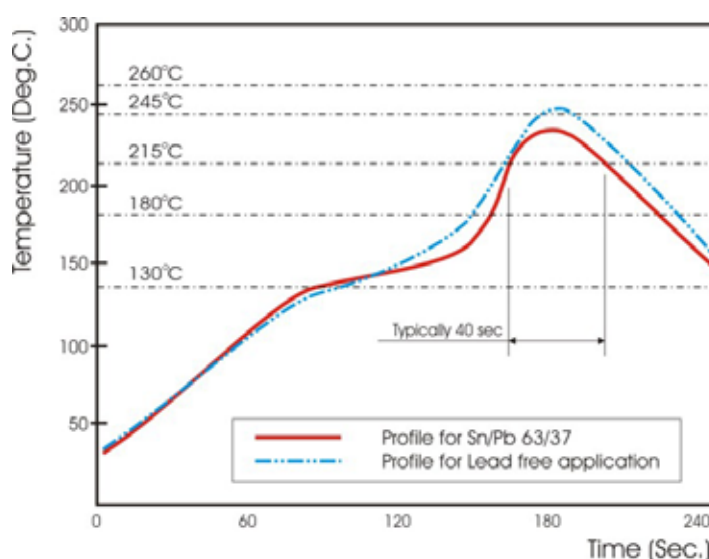


Fig 3. Infrared soldering profile for Chip Resistors



CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WR12	X	472_	J	T	—
Size code	Type code	Resistance code	Tolerance	Packaging code	Termination code
WR12 : 1206 WR08 : 0805 WR06 : 0603	X : Normal	E24 : 2 significant digits followed by no. of zeros and a blank 4.7Ω =4R7_ 10Ω =100_ 220Ω =221_ Jumper =000_ ("_" means a blank) E96 : 3 significant digits followed by no. of zeros 102Ω =1020 37.4KΩ =3742	F : ±1% J : ±5% P : Jumper	T : 7" Reeled taping Q : 10" Reeled taping G : 13" Reeled taping B : Bulk	_ = SnPb base ("_" means a blank) L = Sn base (lead free)

1. Reeled tape packaging : 8mm width paper taping 5000pcs per 7" reel, 10kpcs per 10" reel, 20kpcs per 13" reel.
2. Bulk packaging : 5000pcs per polybag

TEST AND REQUIREMENTS(JIS C 5201-1 : 1998)

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category **LCT/UCT/56**(rated temperature range : **Lower Category Temperature**, **Upper Category Temperature**; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS.

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied :

Temperature: 15°C to 35°C.

Relative humidity: 45% to 75%.

Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

All soldering tests are performed with mildly activated flux.

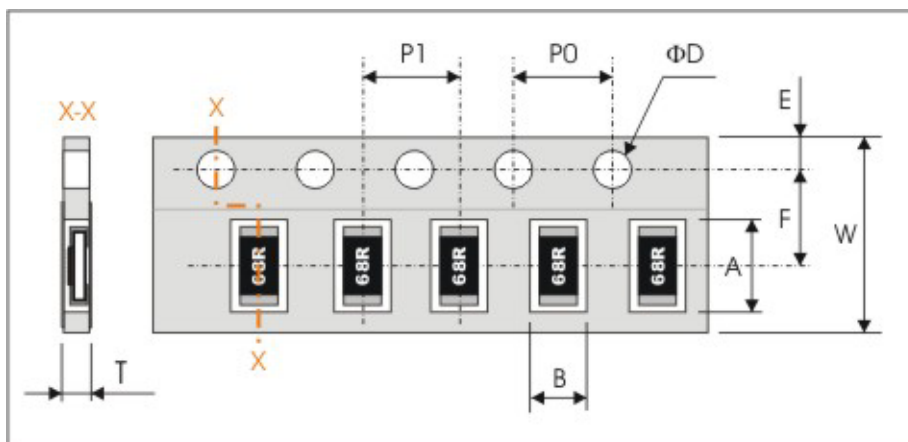
TEST CONDITION FOR JUMPER (0 Ω)

Item	WR12X	WR08X	WR06X
Power Rating At 70°C	1/4W	1/8W	1/10W
Resistance	MAX.50mΩ		
Rated Current	2A	1.5A	1A
Peak Current	5A	3.5A	3A
Operating Temperature	-55~155°C		

TEST	PROCEDURE / TEST METHOD	REQUIREMENT	
		Resistor	0Ω
DC resistance Clause 4.5	DC resistance values measured at the test voltages specified below : <10Ω@0.1V, <100Ω@0.3V, <1KΩ@1.0V, <10KΩ@3V, <100KΩ@10V, <1MΩ@25V, <10MΩ@30V	Within the specified tolerance	<50mΩ
Temperature Coefficient of Resistance(T.C.R) Clause 4.8	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ $t_1 : 20^\circ\text{C}+5^\circ\text{C}-1^\circ\text{C}$ R_1 : Resistance at reference temperature R_2 : Resistance at test temperature	Refer to "QUICK REFERENCE DATA"	N/a
Short time overload (S.T.O.L) Clause 4.13	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	$\Delta R/R \text{ max. } \pm(2\%+0.10\Omega)$	<50mΩ
Resistance to soldering heat(R.S.H) Clause 4.18	Un-mounted chips completely immersed for 10±1second in a solder bath at 270 ±5°C	R/R max. $\pm(1\%+0.05)$ no visible damage	<50mΩ
Solderability Clause 4.17	Un-mounted chips completely immersed for 2±0.5second in a solder bath at 235 ±5	95% coverage min., good tinning and no visible damage	
Leach Test Clause 4.18	Un-mounted chips completely immersed for 60±1second in a solder bath at 260 ±5	Ditto	
Temperature cycling Clause 4.19	30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +155°C±3°C, 2~3 minutes at 20°C+5°C-1°C, total 5 continuous cycles	$\Delta R/R \text{ max. } \pm(1\%+0.05\Omega)$	< 50mΩ
Damp Heat (Load life in humidity) Clause 4.24	1000+48/-0 hours; 1.5hours ON, 0.5hours OFF at RCWV in a humidity chamber controlled 40±2°C, 90~95% RH	10Ω≤R<1MΩ : $\Delta R/R \text{ max. } \pm(3\%+0.10\Omega)$ R<10Ω, R≥1MΩ : $\Delta R/R \text{ max. } \pm(5\%+0.10\Omega)$	< 50mΩ
Load Life (Endurance) Clause 4.25	1000+48/-0 hours; loaded with P_n or V_{max} ; 1.5 hours ON, 0.5 hours OFF	Ditto.	
Bending strength Clause 4.33	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once 3mm for 10sec.	No visual damaged, $\Delta R/R \text{ max. } \pm(1\%+0.05\Omega)$	< 50mΩ
Adhesion Clause 4.32	Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or removal of the terminations	

PACKAGING

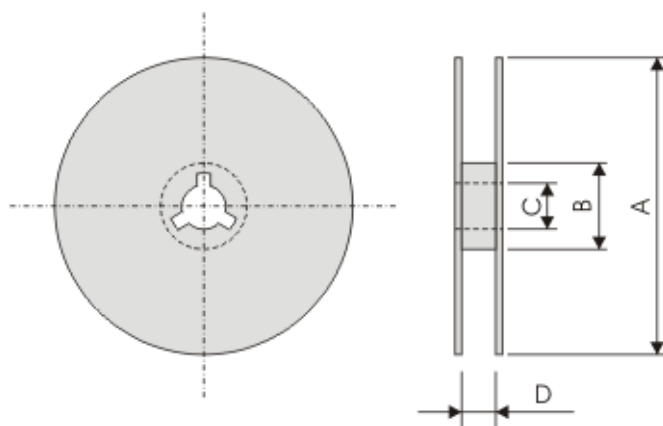
Paper Tape specifications (unit :mm)



Series No.	A	B	W	F	E
WR12X	3.60±0.20	2.00±0.20	8.00±0.30	3.50±0.20	1.75±0.10
WR08X	2.40±0.20	1.65±0.20	8.00±0.30	3.50±0.20	1.75±0.10
WR06X	1.90±0.20	1.10±0.20	8.00±0.30	3.50±0.20	1.75±0.10

Series No.	P1	P0	ΦD	T
WR12X / WR08X	4.00±0.10	4.00±0.10	Φ1.50 ^{+0.1} _{-0.0}	Max. 1.0
WR06X	4.00±0.10	4.00±0.10	Φ1.50 ^{+0.1} _{-0.0}	0.65±0.05

7" Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5