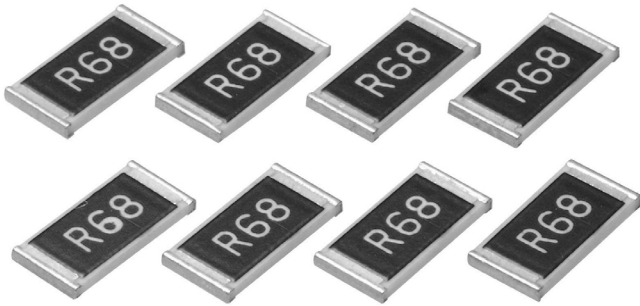




ELECTRO-MECHANICS

Thick Film Chip Resistors.

Rectangular type – Low ohms



FEATURES

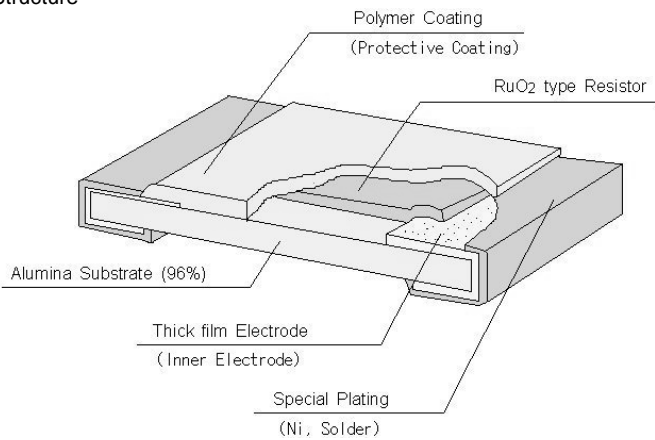
- Under 1 ohms, precision resistance.
- Both flow and reflow soldering are applicable.
- Owing to the reduced lead inductance, the high frequency characteristic is excellent.

APPLICATION

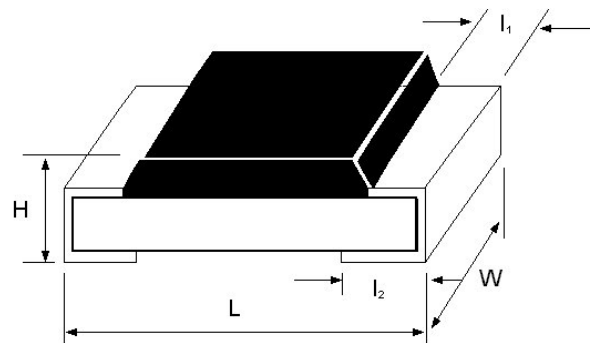
- Current detect
- Safe circuit through protecting over-current flow.
- Power supplying part.
- Motor controlling, DC power charger, etc.

STRUCTURE AND DIMENSIONS

Structure



Dimensions



(UNIT : mm)

TYPE	inch	Power (W)	L	W	H	l ₁	l ₂	Unit Weight
RC1608	0603	1/10	1.60±0.10	0.80±0.15	0.45±0.10	0.30±0.20	0.35±0.20	2.1mg
RC2012	0805	1/8	2.00±0.20	1.25±0.15	0.50±0.10	0.40±0.20	0.35±0.20	4.9mg
RC3216	1206	1/4	3.20±0.20	1.60±0.15	0.55±0.10	0.45±0.20	0.40±0.20	9.5mg
RC3225	1210	1/4	3.20±0.20	2.55±0.20	0.55±0.10	0.45±0.20	0.40±0.20	16mg
RC5025	2010	1/2	5.00±0.15	2.50±0.15	0.55±0.15	0.60±0.20	0.60±0.20	26mg
RC6432	2512	1	6.30±0.15	3.20±0.15	0.55±0.15	0.60±0.20	0.60±0.20	41mg

The new product will be available on the market from the fourth quarter of year 2001.

PARTS NUMBERING SYSTEM

- The part number system shall be in the following format

RC	2012	J	R68	CS
Code Designation	Dimension & Size Code	Tolerance	Resistance Value	Packaging Code
RC : Chip Resistor	1608 : 1.6×0.8(mm)——0603(inch) 2012 : 2.0×1.2(mm)——0805(inch) 3216 : 3.2×1.6(mm)——1206(inch) 3225 : 3.2×2.5(mm)——1210(inch) 5025 : 5.0×2.5(mm)——2010(inch) 6432 : 6.4×3.2(mm)——2512(inch)	F : ± 1% G : ± 2% J : ± 5% K : ± 10%	3 or 4 digits coding system (IEC coding system) 3digits (E-24 series) 4digits (E-96, E-48 series)	GS: Bulk Packaging CS: Tape Packaging 7" ES: Tape Packaging 10" FS: Tape Packaging 13" AS: Tape Packaging 13"

Thick Film Chip Resistors.

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■ SPECIFICATION

TYPE	Power Rating(W)	Working Voltage(MAX)	Overload Voltage(MAX)	TCR (ppm/°C)	Resistance Range (Ω)				Rated Ambient Temperature	Rated Working Temperature
					F(±1%) E-24, E-96	G(±2%) E-24, E-48	J(±5%) E-24	K(±10%) E-12		
RC1608	1/10	0.32(V)	0.79(V)	F,G tolerance ±200ppm	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω	70°C	-55°C ~ +125°C
RC2012	1/8	0.35(V)	0.88(V)		0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω		
RC3216	1/4	0.50(V)	1.25(V)		0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω		
RC3225	1/4	0.50(V)	1.25(V)	J,K tolerance +600ppm -300ppm	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω	0.1Ω-1Ω		
RC5025	1/2	0.71(V)	1.77(V)		0.098Ω-1Ω	0.098Ω-1Ω	0.098Ω-1Ω	0.098Ω-1Ω		
RC6432	1	1.00(V)	2.50(V)		0.098Ω-1Ω	0.098Ω-1Ω	0.098Ω-1Ω	0.098Ω-1Ω		

The new product will be available on the market from the fourth quarter of year 2001.

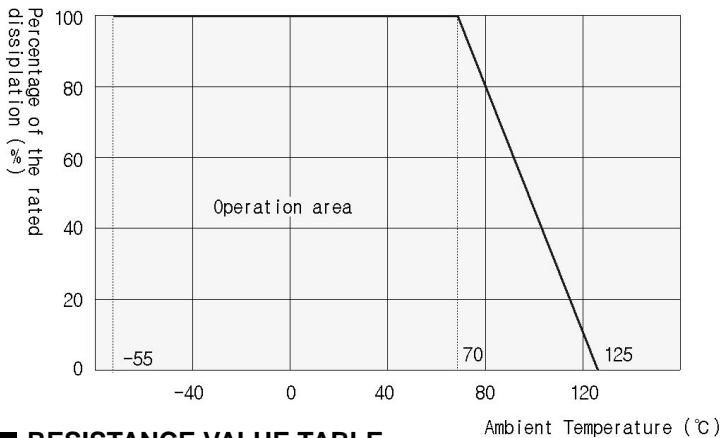
• Rated voltage (V) = $\sqrt{\text{Rated power (W)} \times \text{Normal resistance value (R)}}$

Rated voltage should be lower than (MAX) working voltage.

■ POWER DERATING CURVE

The rated power is the maximum continuous loading power at 70°C ambient temperature.

For ambient temperature above 70°C, the loading power follows the below power derating curve.



■ MARKING

• 3 digits indication (E-24, E-12 series)	• 4 digits indication (E-96, E-48 series)
<ul style="list-style-type: none"> - R means decimal point. - Other digits represent significant value. - Example : R22 Left 1 digit : R Last 2 digits : 22 R22 = 0.22Ω 	<ul style="list-style-type: none"> - R means decimal point. - Other digits represent significant value. - Example : R098 Left 1 digit : R Last 1 digits : 098 R098 = 0.098Ω
<ul style="list-style-type: none"> • 1608 type : No marking. (F,G tolerance) 	

■ RESISTANCE VALUE TABLE

• E-96 series

Code	Ω value	Code	Ω value	Code	Ω value	Code	Ω value
R100	0.100Ω	R147	0.147Ω	R215	0.215Ω	R316	0.316Ω
R102	0.102Ω	R150	0.150Ω	R221	0.221Ω	R324	0.324Ω
R105	0.105Ω	R154	0.154Ω	R226	0.226Ω	R332	0.332Ω
R107	0.107Ω	R158	0.158Ω	R232	0.232Ω	R340	0.340Ω
R110	0.110Ω	R162	0.162Ω	R237	0.237Ω	R348	0.348Ω
R113	0.113Ω	R165	0.165Ω	R243	0.243Ω	R357	0.357Ω
R115	0.115Ω	R169	0.169Ω	R249	0.249Ω	R365	0.365Ω
R118	0.118Ω	R174	0.174Ω	R255	0.255Ω	R374	0.374Ω
R121	0.121Ω	R178	0.178Ω	R261	0.261Ω	R383	0.383Ω
R124	0.124Ω	R182	0.182Ω	R267	0.267Ω	R392	0.392Ω
R127	0.127Ω	R187	0.187Ω	R274	0.274Ω	R402	0.402Ω
R130	0.130Ω	R191	0.191Ω	R280	0.280Ω	R412	0.412Ω
R133	0.133Ω	R196	0.196Ω	R287	0.287Ω	R422	0.422Ω
R137	0.137Ω	R200	0.200Ω	R294	0.294Ω	R432	0.432Ω
R140	0.140Ω	R205	0.205Ω	R301	0.301Ω	R442	0.442Ω
R143	0.143Ω	R210	0.210Ω	R309	0.309Ω	R453	0.453Ω

• E-24 series

Code	Ω value	Code	Ω value	Code	Ω value	Code	Ω value
R464	0.464Ω	R665	0.665Ω	R10	0.10Ω	R33	0.33Ω
R475	0.475Ω	R681	0.681Ω	R11	0.11Ω	R36	0.36Ω
R487	0.487Ω	R698	0.698Ω	R12	0.12Ω	R39	0.39Ω
R499	0.499Ω	R715	0.715Ω	R13	0.13Ω	R43	0.43Ω
R511	0.511Ω	R750	0.750Ω	R15	0.15Ω	R47	0.47Ω
R523	0.523Ω	R768	0.768Ω	R16	0.16Ω	R51	0.51Ω
R532	0.532Ω	R787	0.787Ω	R18	0.18Ω	R56	0.56Ω
R536	0.536Ω	R806	0.806Ω	R20	0.20Ω	R62	0.62Ω
R549	0.549Ω	R825	0.825Ω	R22	0.22Ω	R68	0.68Ω
R562	0.562Ω	R845	0.845Ω	R24	0.24Ω	R75	0.75Ω
R576	0.576Ω	R866	0.866Ω	R27	0.27Ω	R82	0.82Ω
R590	0.590Ω	R887	0.887Ω	R30	0.30Ω	R91	0.91Ω
R604	0.604Ω	R909	0.909Ω				
R619	0.619Ω	R931	0.931Ω				
R634	0.634Ω	R953	0.953Ω				
R649	0.649Ω	R976	0.976Ω				

× Colored region code is same as E-24 series.



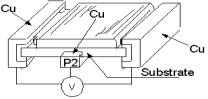
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Thick Film Chip Resistors.

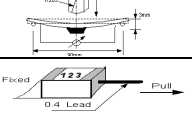
Rectangular type – Low ohms

■ CHARACTERISTICS PERFORMANCE

• Electrical Characteristic

Item		Requirements Specification	Test Methods
Direct Current Resistance		Within the regulated resistance tolerance.	JIS C 5202 (5.1) Voltage apply within 5 sec.
Temperature Characteristic		F,G tolerance ±200ppm J,K tolerance +600ppm -300ppm	Test Temperature(°C) 20 → -55 → 20 → 125 → 20 T.C.R(ppm/°C)=(R-R ₂₀ /R ₂₀ × 1/(T/T ₂₀) × 10 ⁶ × T=Test Temperature, T ₂₀ =20°C R=Resistance at T, R ₂₀ =Resistance at T ₂₀
Short-time Overload	ΔR	Less than ±1% of the initial value.	Apply 2.5 times rated voltage for 5 sec. Wait 30 minutes at room temperature. Measure the resistance value.
	Visual	No evidence of mechanical damage.	
Intermittent Overload	ΔR	Less than ±3% of the initial value.	2.5 times of rated voltage. 1 second ON, 25 second OFF. 10,000cycles.
	Visual	No evidence of mechanical damage.	
Dielectric Withstanding Voltage		No evidence of mechanical damage.	Apply voltage for 1 minute. Voltage = rated voltage × 2.5
Insulation Resistance		Over 1,000MΩ	

• Mechanical Characteristic

Item		Requirements Specification	Test Methods
Solderability		Coverage : ≥95% each termination.	Rosin Flux : Rosin 25%, Methanol 75% Solder Temp. : 235± 5°C Dipping time : 2± 0.5sec.
Bending Test	ΔR	Less than ±0.5% of the initial value.	After soldering resistor on the PCB, 3mm of bending shall be applied for 10 sec.
	Visual	No evidence of mechanical damage.	
Terminal Strength		1608 : Over 0.3kg Others : Over 0.5kg	Pull direction fixed 0.4 lead. 
Resis. to Soldering H.	ΔR	Less than ±1% of the initial value.	Immerse in molten solder at 260°C for 10±1sec. Preheat and soldering Procedure.
	Visual	No evidence of mechanical damage.	
Anti-Vibration Test	ΔR	Less than ±1% of the initial value.	2 hours each in X,Y, and Z axis(total 6 hours) 10 to 55 Hz sweep in 1 minute at 1.5mm amplitude.
	Visual	No evidence of mechanical damage.	

• Environmental Characteristic

Item		Requirements Specification	Test Methods
Temperature Cycle	ΔR	Less than ±1% of the initial value.	Test Temperature(°C) : -55 → 20 → 125 → 20 Test Time (minute) : 30 → 15 → 30 → 15
	Visual	No evidence of mechanical damage.	
Load Life	ΔR	Less than ±3% of the initial value.	Test Voltage : rated voltage Temp : 70 ± 3°C Time : 1,000 ⁺⁴⁸ hours (90min ; ON, 30min ; OFF)
	Visual	No evidence of mechanical damage.	
Low Temp. Exposure	ΔR	Less than ±3% of the initial value.	Dwell in -55°C chamber without loading for 1,000 ⁺⁴⁸ hours. Stabilize for 60 minute at room temperature. Measure value.
	Visual	No evidence of mechanical damage.	
High Temp. Exposure	ΔR	Less than ±3% of the initial value.	Dwell in 125°C chamber without loading for 1,000 ⁺⁴⁸ hours. Stabilize for 60 minute at room temperature. Measure value.
	Visual	No evidence of mechanical damage.	
Moisture Resistance	ΔR	Less than ±3% of the initial value.	Test voltage : rated voltage Test Temp. : 40±2°C Time : 1,000 ⁺⁴⁸ hours (90min:ON,30min:OFF) Humidity : 90~95% RH Stabilize for 1hrs & Measure.
	Visual	No evidence of mechanical damage.	