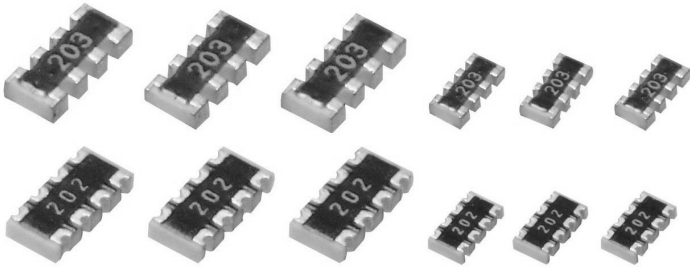




ELECTRO-MECHANICS

Thick Film Chip Resistors.

Rectangular type – Array



FEATURES

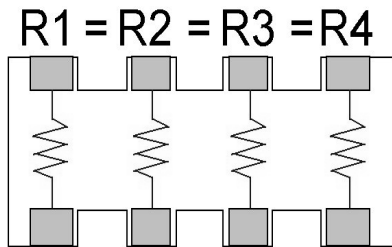
- Reducing SMD surface area (40% reduced).
- Reducing SMD costs (75% reduced).
- Both flow and reflow soldering are applicable.
- Convex & concave type.

APPLICATION

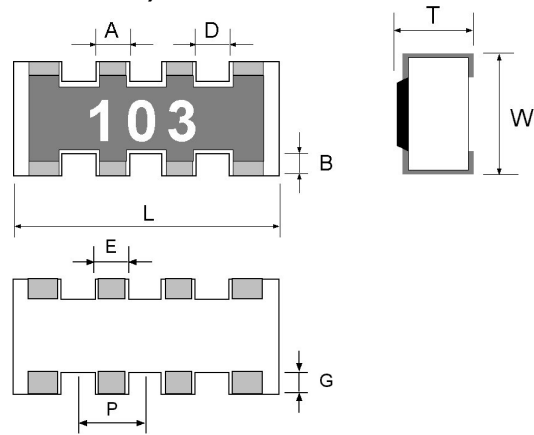
- For semiconductor devices.
- For computers, digital circuits.

STRUCTURE AND DIMENSIONS (CONVEX TYPE ; R/P DIPPING TYPE)

• Structure



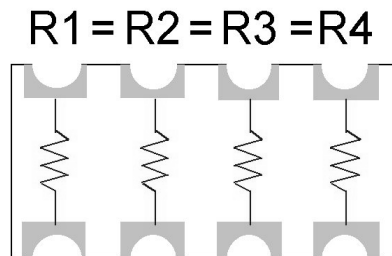
• Dimensions



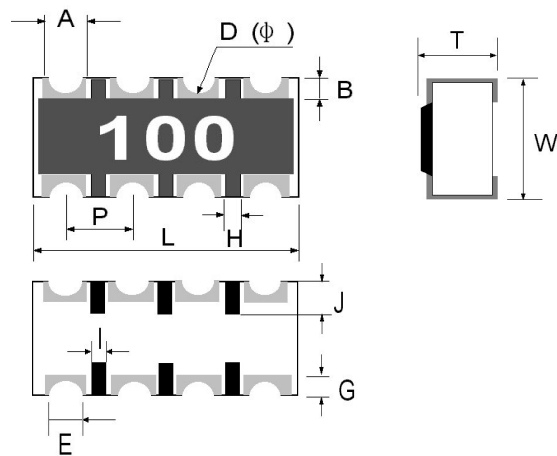
TYPE	L	W	T	A	D	B	P	E	G	Unit Weight
104P	2.00±0.20	1.00±0.20	0.35±0.10	0.30±0.15	0.15 Max.	0.15±0.10	0.50±0.15	0.25±0.15	0.25±0.15	2.6 mg
164P	3.20±0.20	1.50±0.20	0.60±0.20	0.40±0.20	0.35 Max.	0.30±0.20	0.80±0.15	0.40±0.20	0.30±0.20	8.5 mg

STRUCTURE AND DIMENSIONS (CONCAVE TYPE ; R/N THROUGH HOLE TYPE)

• Structure



• Dimensions



(UNIT : mm)

TYPE	L	W	T	A	B	D(Φ)	E	G	H	I	J	P	Unit Weight
104P	2.00±0.10	1.00±0.15	0.40±0.10	0.30±0.10	0.20±0.10	0.14±0.10	0.30±0.10	0.25±0.15	0.20±0.10	0.10±0.10	-	0.50±0.10	2.9 mg
164P	3.20±0.20	1.60±0.20	0.60±0.10	0.45±0.10	0.30±0.20	0.30±0.10	0.45±0.10	0.40±0.15	0.20±0.10	0.20±0.10	0.60±0.20	0.80±0.10	9.9 mg

Thick Film Chip Resistors.

Rectangular type – Array

■ PARTS NUMBERING SYSTEM

- The part number system shall be in the following format

R N	1 6	4 P	J	1 0 0	F S
Code Designation	Dimension	Resistors	Tolerance	Resistance Value	Packaging Code
RN : Concave type array RP : Convex type array	10 : 1005 16 : 1608	4P : 4 Resistors	J : ± 5% × Jumper : 'J'	3 digit coding system (IEC coding system) E-24 series	CS: Tape Packaging 7" FS: Tape Packaging 13" AS: Tape Packaging 13"

■ SPECIFICATION

TYPE	Power Rating(W)	Working Voltage(MAX)	Overload Voltage(MAX)	TCR (ppm/°C)	Resistance Range (Ω)	Rated Ambient Temperature	Rated Working Temperature
104P	1/16	50(V)	100(V)	±200ppm	10Ω~1MΩ	70°C	-55°C ~ +125°C
164P	1/10						

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

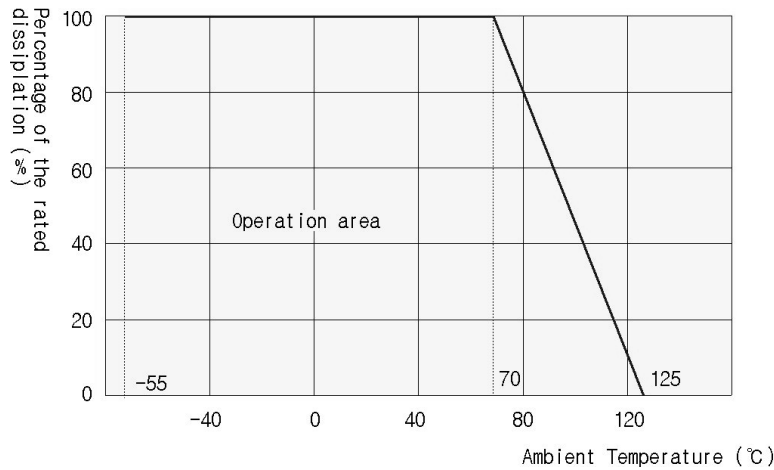
Rated voltage should be lower than (MAX) working voltage.

■ 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.

(The load current shall be derated according to Derating curve in case of the 'Jumper')



■ JUMPER RESISTORS

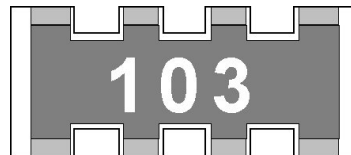
TYPE	Resistance	Current Rating	Rated Ambient Temperature	Rated Working Temperature
104P	50mΩ .MAX	1.0(A)	70°C	-55°C ~ +125°C
164P				

■ MARKING

- 3 digits indication (E-24 series)

- Left 2 digits represent significant figures.
- Last 1 digit represents exponential number of 10.
- Example : 103

Left 2 digits : 10
Last 1 digit : 3
 $103 = 10 \times 10^3 \Omega = 10000 \Omega = 10k\Omega$



× Jumper chip is printed as "000".

Thick Film Chip Resistors.

Rectangular type – Array

■ CHARACTERISTICS PERFORMANCE

• Electrical Characteristic

Item	Requirements Specification		Test Methods	
	Resistor	Jumper	Resistor	Jumper
Direct Current Resistance	Within the regulated resistance tolerance.		JIS C 5202 (5.1) Voltage apply within 5 sec.	
Temperature Characteristic	$1\Omega \leq R < 10\Omega$: +300 ppm/°C -200 ppm/°C $10\Omega \leq R < 1M\Omega$: ±200 ppm/°C $1M\Omega \leq R < 10M\Omega$: ±300 ppm/°C	50mΩ max.	Test Temperature(°C) 20 → -55 → 20 → 125 → 20 $T.C.R(ppm/°C) = (R - R_{20}) / R_{20} \times 1 / (T - T_{20}) \times 10^6$ * T=Test Temperature, T ₂₀ =20°C R=Resistance at T, R ₂₀ =Resistance at T ₂₀	
Short-time Overload	ΔR	Less than ±(1%+0.1Ω)of the initial value.	50mΩ max.	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%+0.1Ω)of the initial value.	50mΩ max.	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 : 100V	
Insulation Resistance	Over 1,000MΩ			

• Mechanical Characteristic

Item	Requirements Specification		Test Methods	
	Resistor	Jumper	Resistor	Jumper
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%+0.05Ω)of initial value.	50mΩ max.	After soldering resistor on the PCB, 3mm of bending shall be applied for 10 sec.
	Visual	No evidence of mechanical damage.		
Terminal Strength	Voltage : Over 0.3kg		Pull direction fixed 0.4 lead.	
Resis. to Soldering H.	ΔR	Less than ±(1%+0.05Ω)of initial value.	50mΩ max.	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%+0.1Ω)of initial value.	50mΩ max.	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	
	Resistor	Jumper	Resistor	Jumper
Temperature Cycle	ΔR	Less than ±(1%+0.1Ω)of initial value.	50mΩ max.	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%+0.1Ω)of initial value.	50mΩ max.	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%+0.1Ω)of initial value.	50mΩ max.	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%+0.1Ω)of initial value.	50mΩ max.	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%+0.1Ω)of initial value.	50mΩ max.	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.		