

Table of Contents

Chip resistor

■ Thick Film Chip Resistor — CR Series	3
● Low Ohm Chip Resistor	6
● High Ohm Chip Resistor	8
● Trimmable Chip Resistor – TCR series	9
■ Thick Film Array Chip Resistor — CRA Series	11
■ AEC-Q200 Chip Resistor — QR Series	14
● AEC-Q200 Low Ohm Chip Resistor	17
● AEC-Q200 High Ohm Chip Resistor	19
■ AEC-Q200 Array Chip Resistor — QRA Series	20
■ Anti-Sulfur SMD Chip Resistor — ST Series	23
■ Anti-Sulfur SMD Array Chip Resistor — STA Series	27
■ Thin Film Chip Resistor — TR Series	30
● Low Ohm Thin Film Chip Resistor	33
■ Fusible Chip Resistor — FCR Series	36
■ Appendix For SMD Chip Resistor	39
● Packaging Information	39
● Reliability Test and Requirement	42
● General Information	45
■ Metal Alloy Low-Resistance Resistor	
● LR Series	49
● LH Series	56

Melf resistor

■ Melf Carbon Film Resistor — MMC Series	60
■ Melf Metal Film Resistor — MMF Series	62
■ Melf Metal Oxide Resistor — MMO Series	64
● Packaging Information.....	66

DIP resistor

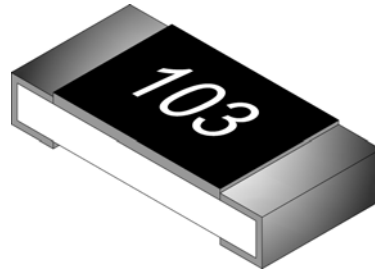
■ Carbon Film Fixed Resistor — CB Series	67
■ Metal Film Resistor — MF Series	70
■ Metal Oxide Flame-Proof Resistor — MO Series	73
■ Wirewound Resistors Flame -Proof Coating Type — KNP Series.....	76
■ Cement Type Resistor	79
● SPS Series	79
● SQM Series	80
● SQT Series	81
● SQP Series.....	82
● SQZ Series	83
● SQH / SQHG Series	84
● Technical Data	85

Multilayer Ceramic Chip Capacitor

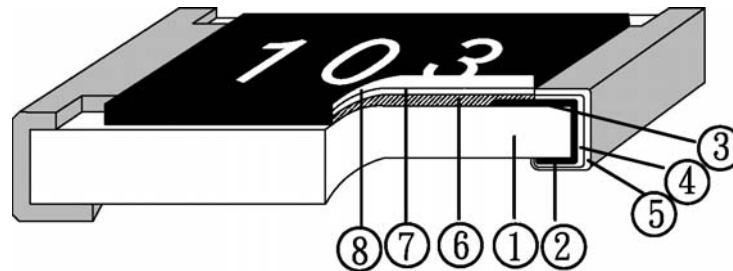
■ Multilayer Ceramic Chip Capacitor (MLCC).....	85
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● All specifications are subject to change without notice.

Thick Film Chip Resistor — CR Series



Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO ₂)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

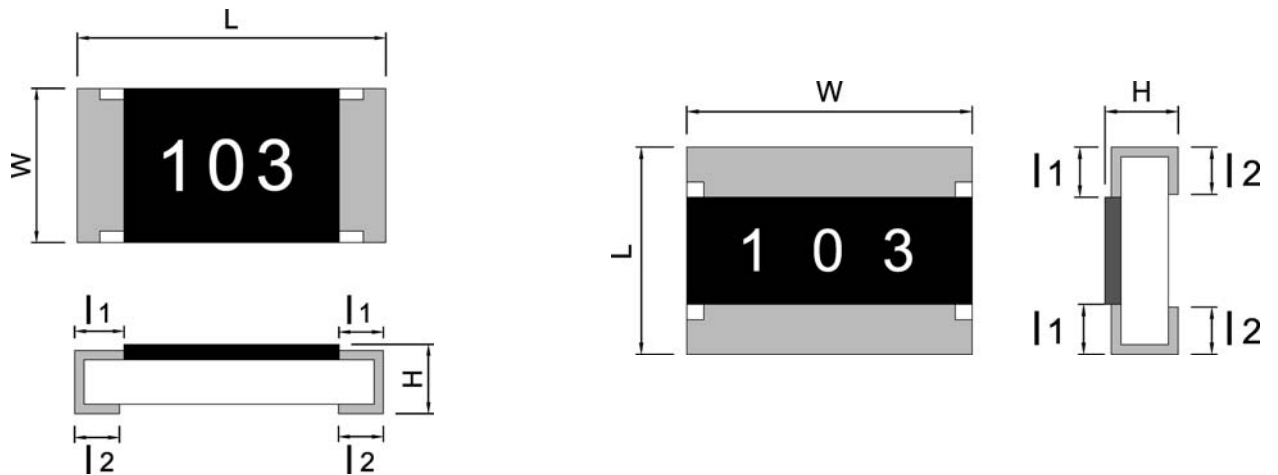
Application

- Entertainment: Stereo, TV tuners, Tape recorder
- Appliance: Air conditioner, Refrigerator
- Computer & relative products: Main board, PDA
- Communication equipment: Cell phone, Fax machine
- Power equipment: Power supply, Illumination equipment
- Measuring instrument: Electric meter, Navigation equipment

Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery

■ Type Dimension



CR0201 / CR0402 / CR 0603 / CR0805
 CR1206 / CR1210 / CR1812 / CR2010
 CR2512

CR1218 / CR2030

■ Dimension

Unit: mm

TYPE	L	W	H	l ₁	l ₂
CR0201	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.05	0.15 ± 0.05	0.15 ± 0.05
CR0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
CR0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
CR0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
CR1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
CR1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
CR1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
CR2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
CR1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
CR2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
CR2030	5.10 ± 0.10	7.60 ± 0.10	1.20 ± 0.10	0.80 ± 0.20	0.80 ± 0.20

■ Standard & High Power Electrical Specifications

Type	Item	Rated Power at 70°C		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range		
		Standard	High				B(±0.1%) D(±0.5%)	F(±1%) G(±2%)	J(±5%) K(±10%)
CR0201		0.05 W	-	25V	50V	±200	-	10Ω~1MΩ	10Ω~1MΩ
CR0402		0.063 W	-	50V	100V	0~+400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±300	-	10Ω~990Ω	10Ω~990Ω
						±200	10Ω~1MΩ	1KΩ~10MΩ	1KΩ~10MΩ
CR0603		0.1 W	0.125 W	50V	100V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR0805		0.125 W	0.25 W	150V	300V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR1206		0.25 W	0.5 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR1210		0.33 W	0.66 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR1812		0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR2010		0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR1218		1 W	-	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR2512		1 W	2 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
						±200	-	-	10Ω~10MΩ
						±100	10Ω~1MΩ	10Ω~10MΩ	-
CR2030		2 W	5 W	200V	400V	±100	-	1Ω~1KΩ	1Ω~1KΩ

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

Type	0201	0402	0603	0805	1206	1210	1812	2010	1218	2512	2030
Jumper Resistance Value	50mΩ Max										
Jumper Rated Current	0.5A		1A			2A					

● Low Ohm Chip Resistor

■ Standard Electrical Specifications

Type	Item	Rated Power at 70°C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)
							F(±1%) J±(5%)
CR0402		0.063 W	0.17~0.25V	0.25 V	0.624 V	±800	470~990
CR0603		0.1 W	0.1~0.31V	0.31 V	0.775 V	±800	100~330
						±600	331~510
						±400	511~990
CR0805		0.125 W	0.04~0.35V	0.35 V	0.875 V	±1000	10~50
						±800	51~100
						±600	101~330
						±400	331~990
CR1206		0.25 W	0.05~0.5V	0.5 V	1.25 V	±800	10~50
						±600	51~100
						±500	101~330
						±400	331~990
CR1210		0.33 W	0.06~0.57V	0.57 V	1.425 V	±800	10~50
						±600	51~100
						±500	101~330
						±400	331~990
CR1812		0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50
						±600	51~100
						±500	101~330
						±400	331~990
CR2010		0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50
						±800	51~100
						±600	101~330
						±400	331~990
CR1218		1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50
						±400	51~990
CR2512		1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50
						±700	51~100
						±500	101~330
						±400	331~990

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.

■ High Power Electrical Specifications

Item Type	Rated Power at 70°C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)	
						F(±1%)	J±(5%)
CR0603	0.125 W	0.11~0.35V	0.352 V	0.879 V	±800	100~330	
					±600	331~510	
					±400	511~990	
CR0805	0.25 W	0.05~0.5V	0.497 V	1.244 V	±1000	10~50	
					±800	51~100	
					±600	101~330	
CR1206	0.5 W	0.07~0.7V	0.704 V	1.759 V	±800	10~50	
					±600	51~100	
					±500	101~330	
CR1210	0.66 W	0.08~0.81V	0.808 V	2.021 V	±800	10~50	
					±600	51~100	
					±500	101~330	
CR1812	1 W	0.1~0.99V	0.995 V	2.487 V	±800	10~50	
					±600	51~100	
					±500	101~330	
CR2010	1 W	0.1~0.99V	0.995 V	2.487 V	±800	10~50	
					±800	51~100	
					±600	101~330	
CR2512	2 W	0.14~1.41V	1.407 V	3.518 V	±800	10~50	
					±700	51~100	
					±500	101~330	
					±400	331~990	

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.

■ Rated Resistance

Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code
10mΩ	R010	010	65mΩ	R065	065	0.12Ω	R120	R12	0.27Ω	R270	R27	0.56Ω	R560	R56
15mΩ	R015	015	68mΩ	R068	068	0.13Ω	R130	R13	0.30Ω	R300	R30	0.60Ω	R600	R60
20mΩ	R020	020	70mΩ	R070	070	0.15Ω	R150	R15	0.33Ω	R330	R33	0.65Ω	R650	R65
30mΩ	R030	030	75mΩ	R075	075	0.16Ω	R160	R16	0.36Ω	R360	R36	0.68Ω	R680	R68
40mΩ	R040	040	80mΩ	R080	080	0.18Ω	R180	R18	0.40Ω	R400	R40	0.70Ω	R700	R70
50mΩ	R050	050	90mΩ	R090	090	0.20Ω	R200	R20	0.43Ω	R430	R43	0.75Ω	R750	R75
56mΩ	R056	056	0.10Ω	R100	R10	0.22Ω	R220	R22	0.47Ω	R470	R47	0.80Ω	R800	R80
60mΩ	R060	060	0.11Ω	R110	R11	0.25Ω	R250	R25	0.50Ω	R500	R50	0.90Ω	R900	R90

● High Ohm Chip Resistor

■ Standard & High Power Electrical Specifications

Type	Item	Rated Power at 70°C		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
		Standard	High Power				F(±1%)	J(±5%)
CR0402		0.063 W	-	50V	100V	±200	10.1 MΩ ~ 54 MΩ	10.1 MΩ ~ 100 MΩ
CR0603		0.1 W	0.125 W	50V	100V			
CR0805		0.125 W	0.25 W	150V	300V			
CR1206		0.25 W	0.5 W	200V	400V			
CR1210		0.33 W	0.66 W	200V	400V			
CR2010		0.5 W	1 W	200V	400V			
CR1218		1 W	-	200V	400V			
CR2512		1 W	2 W	200V	400V			

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

● Trimmable Chip Resistor – TCR series

■ Standard Electrical Specifications

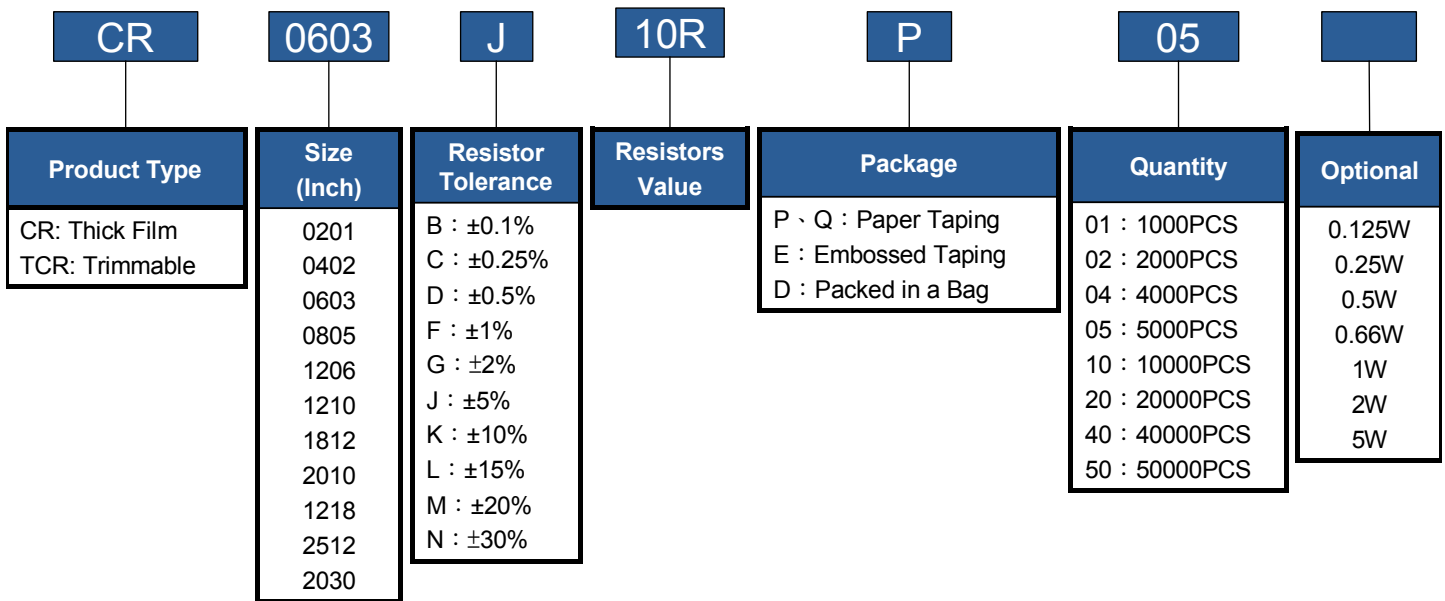
Type \ Item	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Tolerance	Resistance Range
TCR0402	0.063 W	50V	100V	±200	±15% ±20% ±30%	10Ω~1MΩ
TCR0603	0.1 W	50V	100V			
TCR0805	0.125 W	150V	300V			
TCR1206	0.25 W	200V	400V			
TCR1210	0.33 W	200V	400V			
TCR1812	0.5 W	200V	400V			
TCR2010	0.5 W	200V	400V			
TCR1218	1 W	200V	400V			
TCR2512	1 W	200V	400V			

● For non-standard parts, please contact our sales dept.

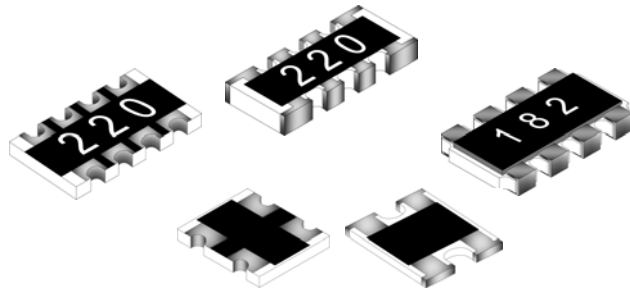
● Operating Temperature Range : -55°C ~ +155°C.

■ Parts Number Explanation

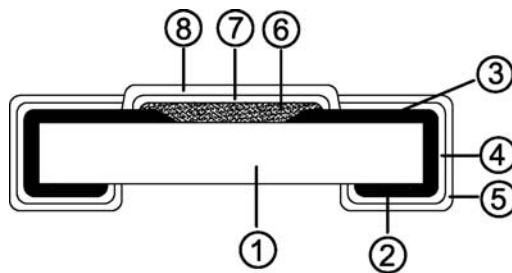
■ Example:



Thick Film Array Chip Resistor — CRA Series



Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO ₂)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

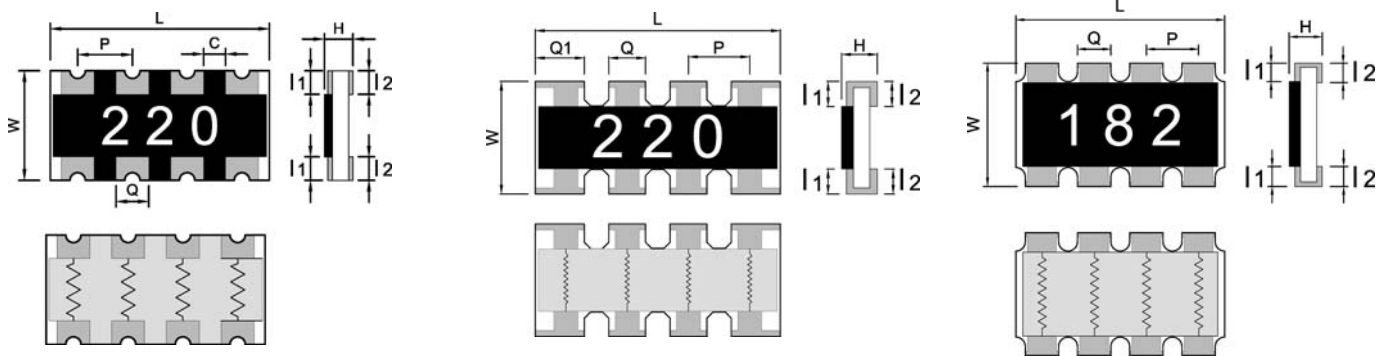
Application

- Computer & relative products: Main board, PDA
- Communication equipment: Cell phone, Fax machine
- Power equipment: Power supply, Illumination equipment
- Terminal for SDRAM and DDRAM
- DIMM

Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery

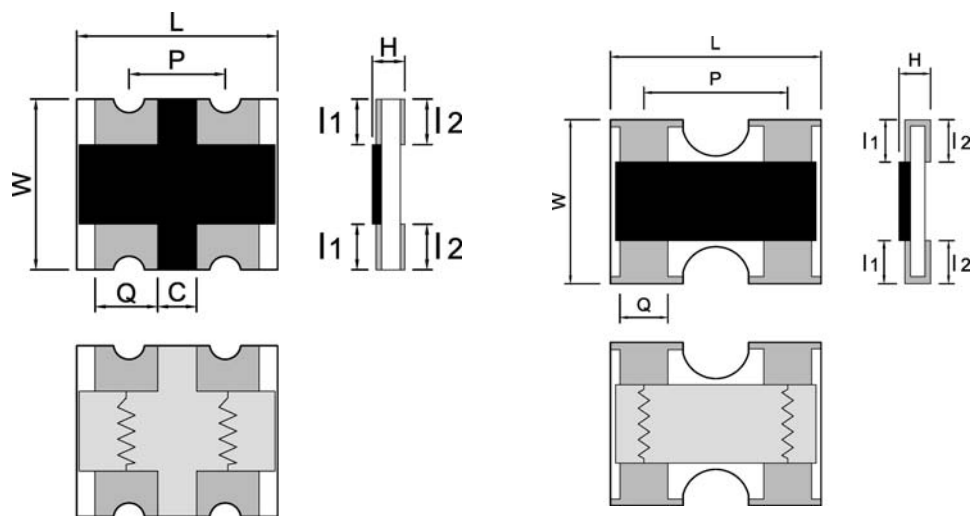
■ Type Dimension



CRA024C

CRA024R/CRA034R

CRA064R



CRA022C

CRA022R

■ Dimension

Unit: mm

TYPE	L	W	H	I ₁	I ₂	P	Q	Q1	C
CRA022R	1.00±0.10	1.00±0.10	0.33±0.05	0.15±0.10	0.25±0.10	0.67±0.10	0.34±0.10	---	---
CRA024R	2.00±0.10	1.00±0.10	0.40±0.10	0.20±0.10	0.20±0.10	0.50±0.10	0.30±0.10	0.43±0.10	---
CRA034R	3.20±0.20	1.60±0.15	0.50±0.10	0.30±0.20	0.30±0.20	0.80±0.20	0.50±0.15	0.61±0.10	---
CRA064R	5.10±0.20	3.10±0.20	0.55±0.15	0.55±0.15	0.55±0.15	1.30±0.20	0.90±0.10	---	---
CRA022C	1.00±0.10	1.00±0.10	0.30±0.10	0.25±0.15	0.25±0.15	0.50±0.10	0.35±0.10	---	0.15±0.10
CRA024C	2.00±0.10	1.00±0.10	0.40±0.10	0.15±0.10	0.20±0.10	0.50±0.10	0.35±0.10	---	0.15±0.10

Standard Electrical Specifications

Type	Item	Rating Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range
						F(±1%) J(±5%)
CRA022R		0.063 W	25V	50V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ
CRA024R		0.063 W	25V	50V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ
CRA034R		0.1 W	50V	100V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ
CRA022C		0.063 W	25V	50V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ
CRA024C		0.063 W	25V	50V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ
CRA064R		0.25 W	200V	400V	0~+400	1Ω~9.9Ω
					±200	10Ω~1MΩ

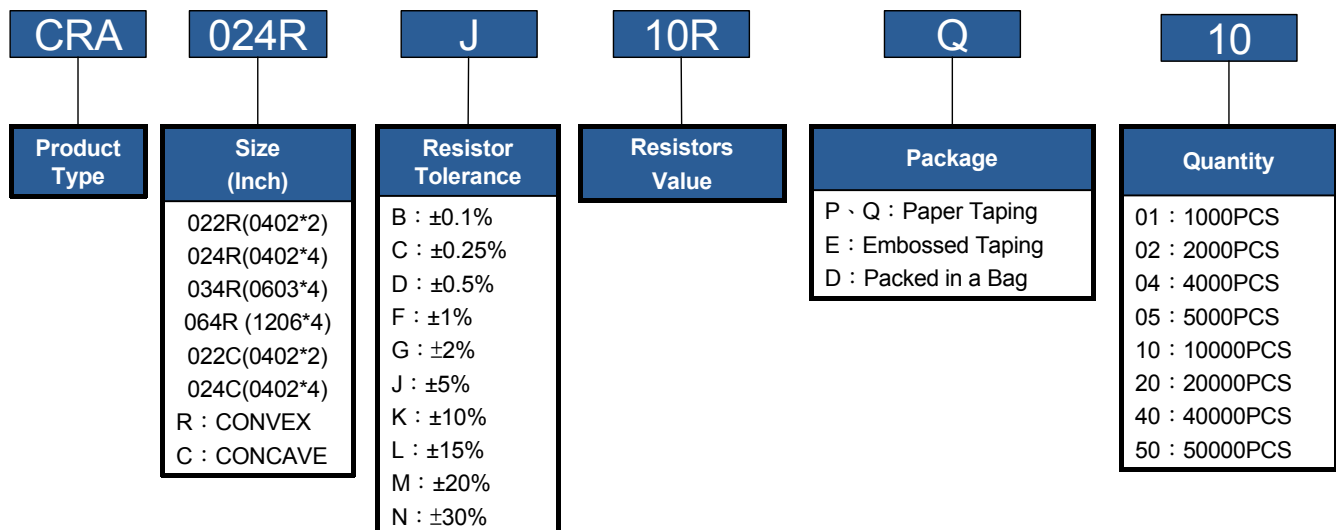
● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.

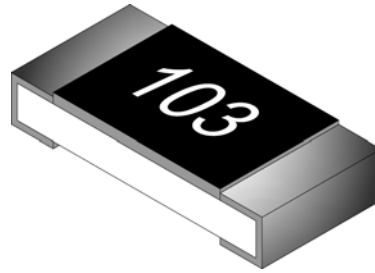
Type	022R	024R	034R	022C	024C	064R
Jumper Resistance Value	50mΩ Max					
Jumper Rated Current	1A					2A

Parts Number Explanation

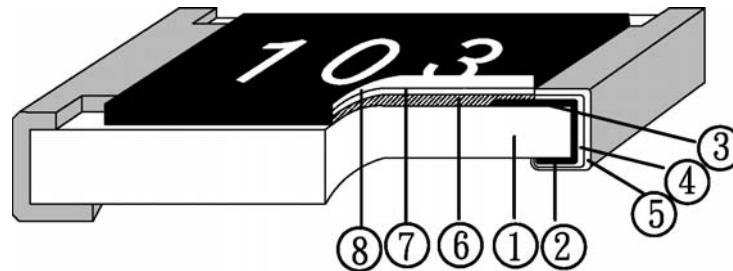
Example:



■ AEC-Q200 Chip Resistor — QR Series



■ Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO ₂)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

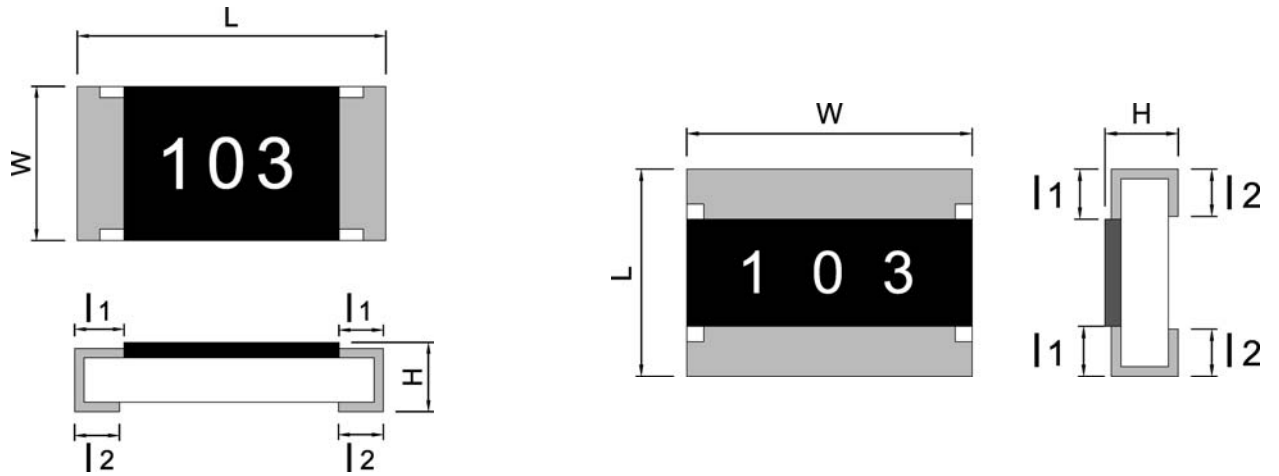
■ Application

- Automotive electronics
- Navigation equipment
- Heating, Ventilating and Air conditioning system
- Indoor lighting, Central door locking, Wiper module

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery
- AEC-Q200 rev.D compliant

■ Type Dimension



QR0402 / QR0603 / QR0805 / QR1206 /
QR1210 / QR1812 / QR2010 / QR2512

QR1218

■ Dimension

Unit: mm

TYPE	L	W	H	l ₁	l ₂
QR0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
QR0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.20 ± 0.10	0.30 ± 0.10
QR0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
QR1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
QR1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
QR1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
QR2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
QR1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
QR2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

Standard & High Power Electrical Specifications

Type	Item	Rated Power at 70°C		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range		
		Standard	High				B(±0.1%) D(±0.5%)	F(±1%) G(±2%)	J(±5%) K(±10%)
QR0402	0.063 W	-	50V	100V	0~+400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±300	-	10Ω~990Ω	10Ω~990Ω	
					±200	10Ω~1MΩ	1KΩ~10MΩ	1KΩ~10MΩ	
QR0603	0.1 W	0.125 W	50V	100V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR0805	0.125 W	0.25 W	150V	300V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR1206	0.25 W	0.5 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR1210	0.33 W	0.66 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR1812	0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR2010	0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR1218	1 W	-	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
QR2512	1 W	2 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

Type	0402	0603	0805	1206	1210	1812	2010	1218	2512
Jumper Resistance Value	50mΩ Max								
Jumper Rated Current	1A				2A				

● AEC-Q200 Low Ohm Chip Resistor

■ Standard Electrical Specifications

Type	Item	Rated Power at 70 °C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)	
							F(±1%)	J(±5%)
QR0402		0.063 W	0.17~0.25V	0.25 V	0.624 V	±800	470~990	
QR0603		0.1 W	0.1~0.31V	0.31 V	0.775 V	±800	100~330	
						±600	331~510	
						±400	511~990	
QR0805		0.125 W	0.04~0.35V	0.35 V	0.875 V	±1000	10~50	
						±800	51~100	
						±600	101~330	
						±400	331~990	
QR1206		0.25 W	0.05~0.5V	0.5 V	1.25 V	±800	10~50	
						±600	51~100	
						±500	101~330	
						±400	331~990	
QR1210		0.33 W	0.06~0.57V	0.57 V	1.425 V	±800	10~50	
						±600	51~100	
						±500	101~330	
						±400	331~990	
QR1812		0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50	
						±600	51~100	
						±500	101~330	
						±400	331~990	
QR2010		0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50	
						±800	51~100	
						±600	101~330	
						±400	331~990	
QR1218		1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50	
						±400	51~990	
QR2512		1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50	
						±700	51~100	
						±500	101~330	
						±400	331~990	

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.

High Power Electrical Specifications

Type	Item	Rated Power at 70°C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)
							F(±1%) J±(5%)
QR0603	0.125 W	0.11~0.35V	0.352 V	0.879 V	±800	100~330	
						±600	331~510
						±400	511~990
QR0805	0.25 W	0.05~0.5V	0.497 V	1.244 V	±1000	10~50	
						±800	51~100
						±600	101~330
QR1206	0.5 W	0.07~0.7V	0.704 V	1.759 V	±400	331~990	
						±800	10~50
						±600	51~100
QR1210	0.66 W	0.08~0.81V	0.808 V	2.021 V	±500	101~330	
						±800	10~50
						±600	51~100
QR1812	1 W	0.1~0.99V	0.995 V	2.487 V	±400	331~990	
						±800	10~50
						±600	51~100
QR2010	1 W	0.1~0.99V	0.995 V	2.487 V	±500	101~330	
						±800	10~50
						±600	51~100
QR2512	2 W	0.14~1.41V	1.407 V	3.518 V	±400	331~990	
						±800	10~50
						±700	51~100
						±500	101~330
						±400	331~990

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

Rated Resistance

Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code	Resistance	Code	0603 Code
10mΩ	R010	010	65mΩ	R065	065	0.12Ω	R120	R12	0.27Ω	R270	R27	0.56Ω	R560	R56
15mΩ	R015	015	68mΩ	R068	068	0.13Ω	R130	R13	0.30Ω	R300	R30	0.60Ω	R600	R60
20mΩ	R020	020	70mΩ	R070	070	0.15Ω	R150	R15	0.33Ω	R330	R33	0.65Ω	R650	R65
30mΩ	R030	030	75mΩ	R075	075	0.16Ω	R160	R16	0.36Ω	R360	R36	0.68Ω	R680	R68
40mΩ	R040	040	80mΩ	R080	080	0.18Ω	R180	R18	0.40Ω	R400	R40	0.70Ω	R700	R70
50mΩ	R050	050	90mΩ	R090	090	0.20Ω	R200	R20	0.43Ω	R430	R43	0.75Ω	R750	R75
56mΩ	R056	056	0.10Ω	R100	R10	0.22Ω	R220	R22	0.47Ω	R470	R47	0.80Ω	R800	R80
60mΩ	R060	060	0.11Ω	R110	R11	0.25Ω	R250	R25	0.50Ω	R500	R50	0.90Ω	R900	R90

● AEC-Q200 High Ohm Chip Resistor

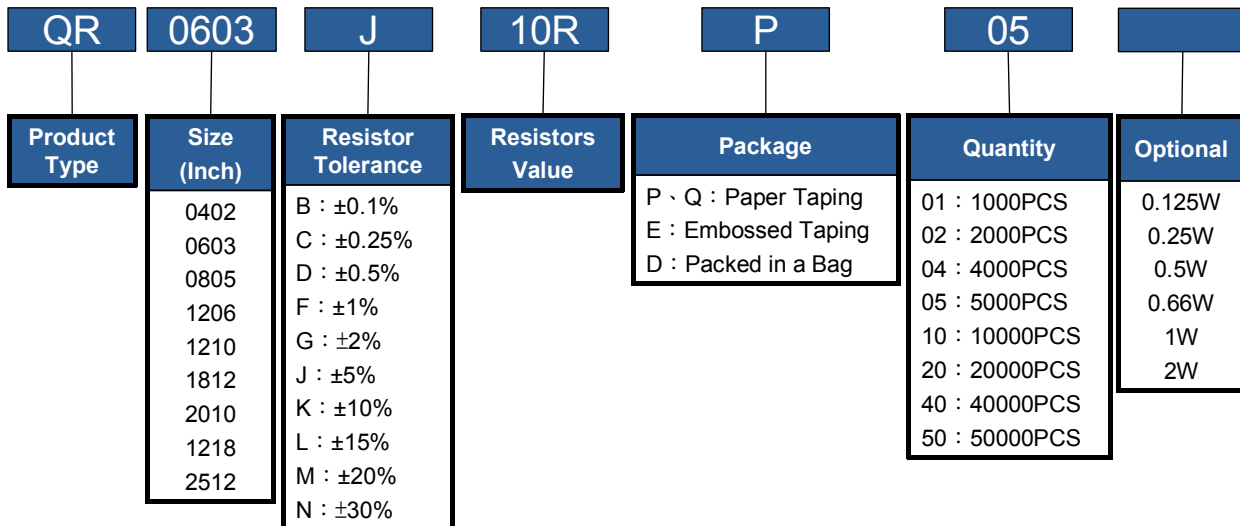
■ Standard & High Power Electrical Specifications

Type	Item	Rated Power at 70°C		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
		Standard	High Power				F(±1%)	J(±5%)
QR0402		0.063 W	-	50V	100V	±200	10.1 MΩ ~ 54 MΩ	10.1 MΩ ~ 100 MΩ
QR0603		0.1 W	0.125 W	50V	100V			
QR0805		0.125 W	0.25 W	150V	300V			
QR1206		0.25 W	0.5 W	200V	400V			
QR1210		0.33 W	0.66 W	200V	400V			
QR1812		0.5 W	1 W	200V	400V			
QR2010		0.5 W	1 W	200V	400V			
QR1218		1 W	-	200V	400V			
QR2512		1 W	2 W	200V	400V			

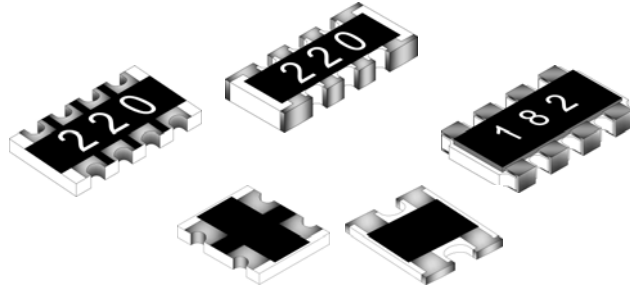
- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

■ Parts Number Explanation

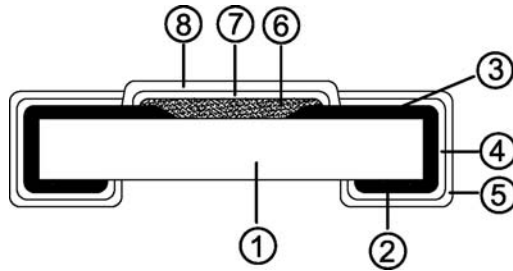
■ Example:



■ AEC-Q200 Array Chip Resistor — QRA Series



■ Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO_2)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

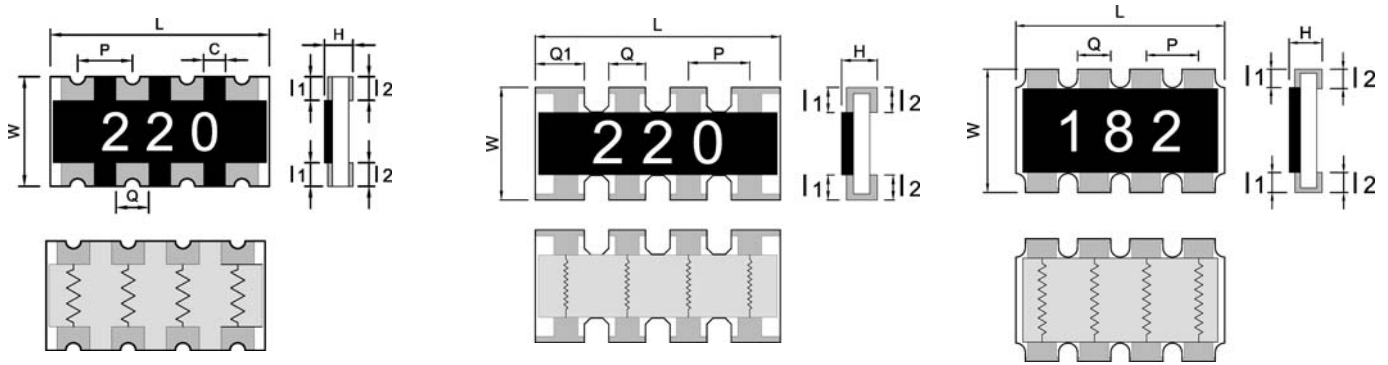
■ Application

- Terminal for SDRAM and DDRAM
- Automotive electronics
- Navigation equipment
- Heating, Ventilating and Air conditioning system
- Indoor lighting, Central door locking, Wiper module

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery
- AEC-Q200 rev.D compliant

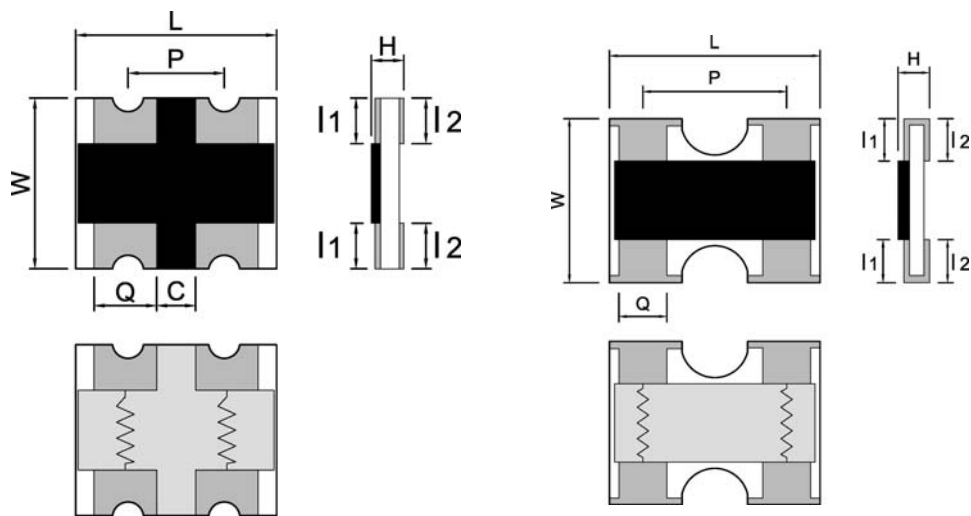
■ Type Dimension



QRA024C

QRA024R/QRA034R

QRA064R



QRA022C

QRA022R

■ Dimension

Unit: mm

TYPE	L	W	H	I ₁	I ₂	P	Q	Q1	C
QRA022R	1.00±0.10	1.00±0.10	0.33±0.05	0.15±0.10	0.25±0.10	0.67±0.10	0.34±0.10	---	---
QRA024R	2.00±0.10	1.00±0.10	0.40±0.10	0.20±0.10	0.20±0.10	0.50±0.10	0.30±0.10	0.43±0.10	---
QRA034R	3.20±0.20	1.60±0.15	0.50±0.10	0.30±0.20	0.30±0.20	0.80±0.20	0.50±0.15	0.61±0.10	---
QRA064R	5.10±0.20	3.10±0.20	0.55±0.15	0.55±0.15	0.55±0.15	1.30±0.20	0.90±0.10	---	---
QRA022C	1.00±0.10	1.00±0.10	0.30±0.10	0.25±0.15	0.25±0.15	0.50±0.10	0.35±0.10	---	0.15±0.10
QRA024C	2.00±0.10	1.00±0.10	0.40±0.10	0.15±0.10	0.20±0.10	0.50±0.10	0.35±0.10	---	0.15±0.10

■ Standard Electrical Specifications

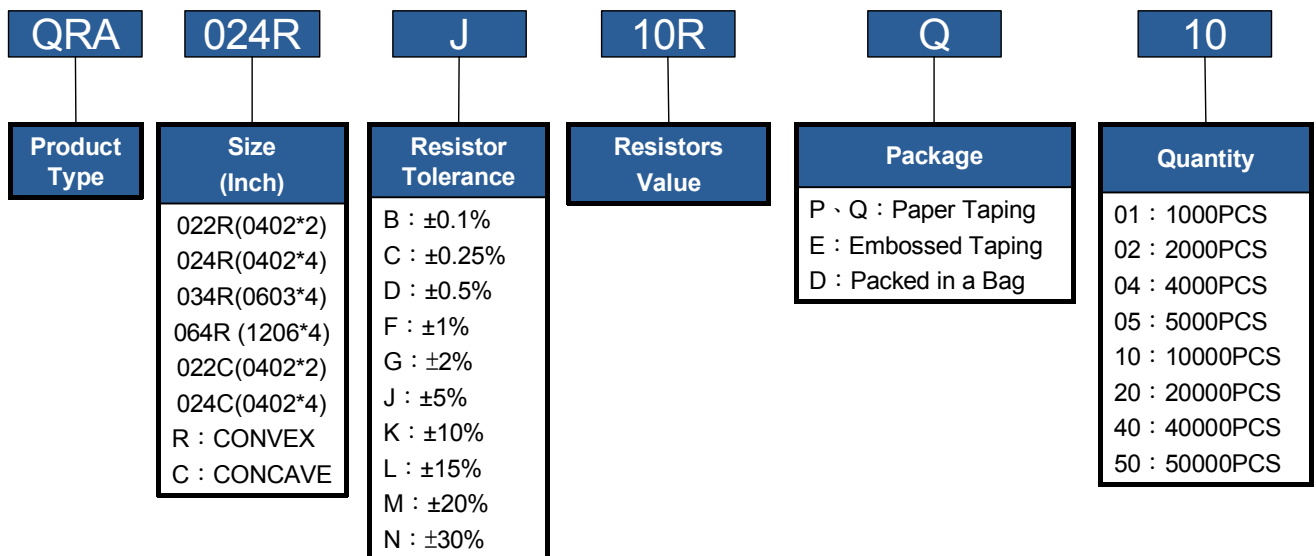
Item Type	Rating Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
					F(±1%)	J±(5%)
QRA022R	0.063 W	25V	50V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	
QRA024R	0.063 W	25V	50V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	
QRA034R	0.1 W	50V	100V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	
QRA022C	0.063 W	25V	50V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	
QRA024C	0.063 W	25V	50V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	
QRA064R	0.25 W	200V	400V	0~+400	1Ω~9.9Ω	
				±200	10Ω~1MΩ	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

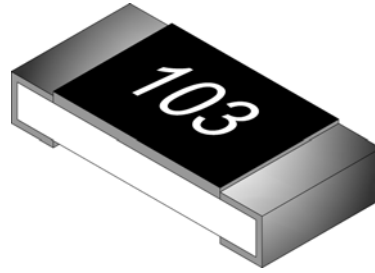
Type	QRA 022R	QRA 024R	QRA 034R	QRA 022C	QRA 024C	QRA 064R
Jumper Resistance Value	50mΩ Max					
Jumper Rated Current	1A					2A

■ Parts Number Explanation

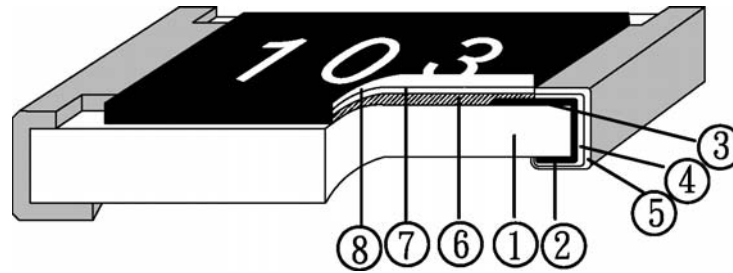
■ Example:



■ Anti-Sulfur SMD Chip Resistor — ST Series



■ Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO ₂)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

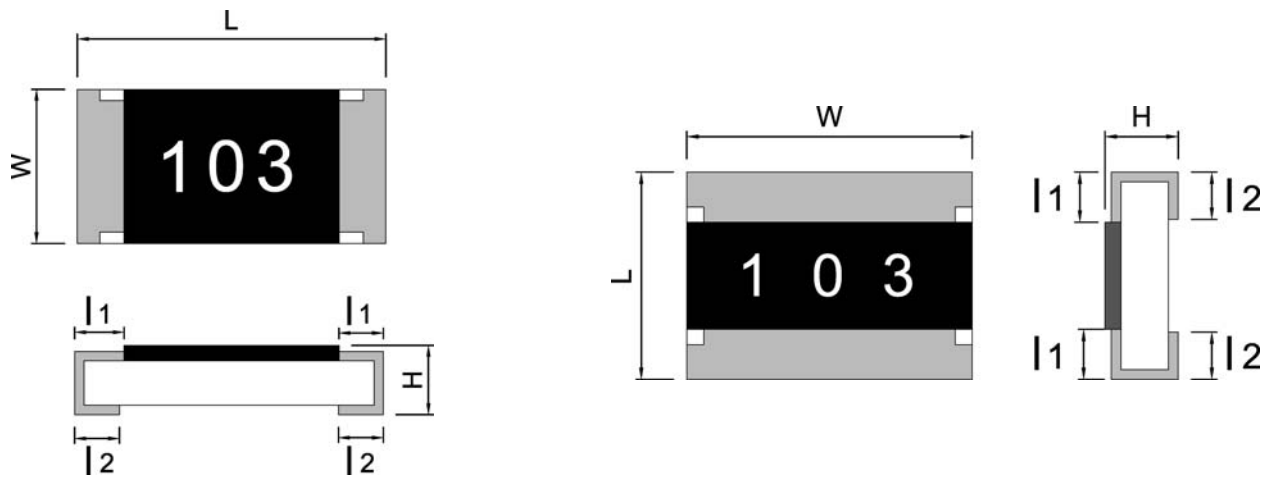
■ Application

- Industrial control system, Sensor
- Navigation equipment
- Measuring equipment
- Automotive electronics
- Telecommunication equipment

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery
- AEC-Q200 rev.D compliant

■ Type Dimension



ST0402 / ST0603 / ST0805 / ST1206
ST1210 / ST1812 / ST2010 / ST2512

ST1218

■ Dimension

Unit: mm

TYPE	L	W	H	l ₁	l ₂
ST0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
ST0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.20 ± 0.10	0.30 ± 0.10
ST0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
ST1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
ST1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
ST1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
ST2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
ST1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
ST2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

■ Standard & High Power Electrical Specifications

Type	Item		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range		
	Rated Power at 70°C					B(±0.1%) D(±0.5%)	F(±1%) G±(2%)	J(±5%) K(±10%)
	Standard	High						
ST0402	0.063 W	-	50V	100V	0~+400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±300	-	10Ω~990Ω	10Ω~990Ω
					±200	10Ω~1MΩ	1KΩ~10MΩ	1KΩ~10MΩ
ST0603	0.1 W	0.125 W	50V	100V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST0805	0.125 W	0.25 W	150V	300V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST1206	0.25 W	0.5 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST1210	0.33 W	0.66 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST1812	0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST2010	0.5 W	1 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST1218	1 W	-	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-
ST2512	1 W	2 W	200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω
					±200	-	-	10Ω~10MΩ
					±100	10Ω~1MΩ	10Ω~10MΩ	-

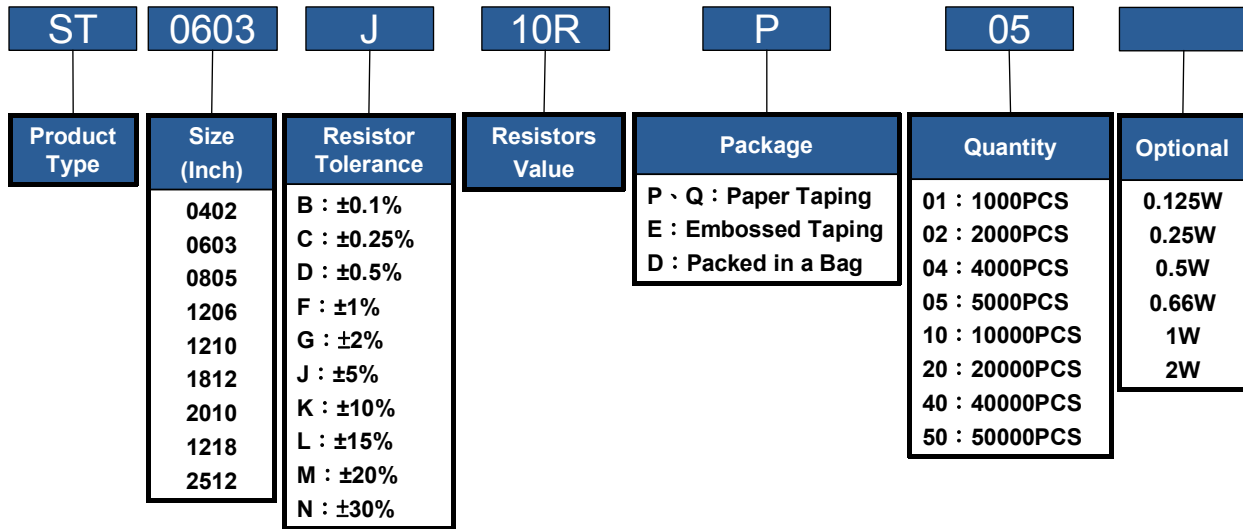
● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.

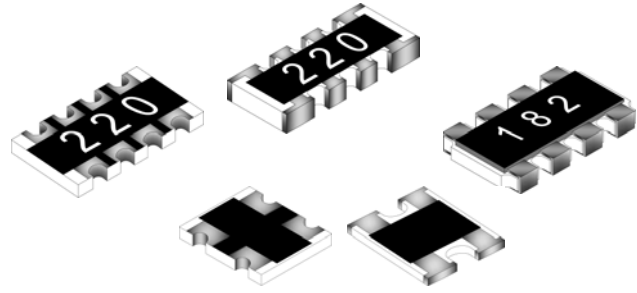
Type	0402	0603	0805	1206	1210	1812	2010	1218	2512
Jumper Resistance Value	50mΩ Max								
Jumper Rated Current	1A				2A				

■ Parts Number Explanation

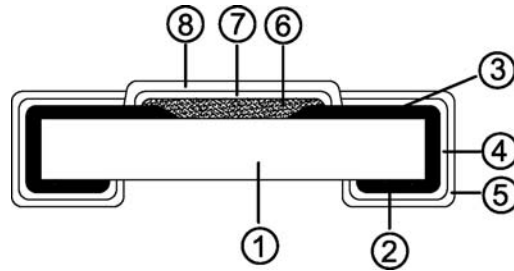
■ Example:



■ Anti-Sulfur SMD Array Chip Resistor — STA Series



■ Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO ₂)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

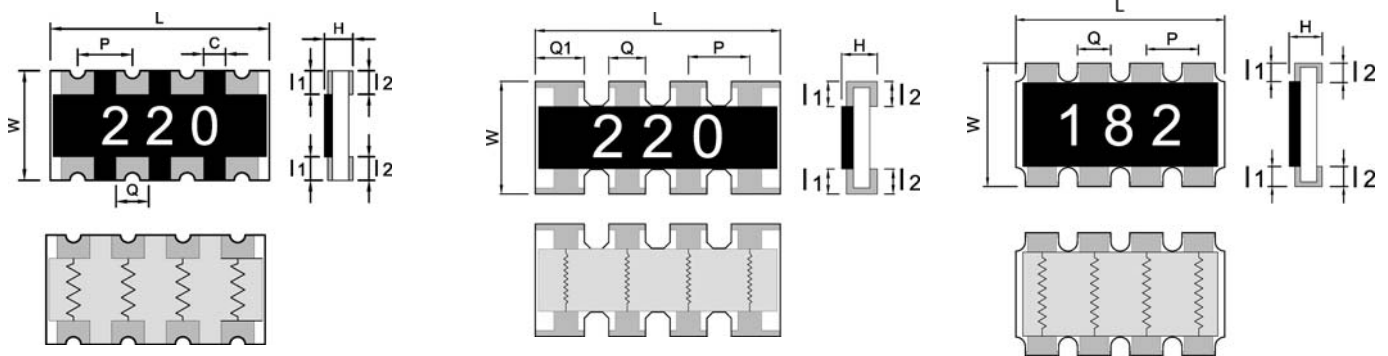
■ Application

- Terminal for SDRAM and DDRAM
- Industrial control system, Sensor
- Automotive electronics
- Telecommunication equipment

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery
- AEC-Q200 rev.D compliant

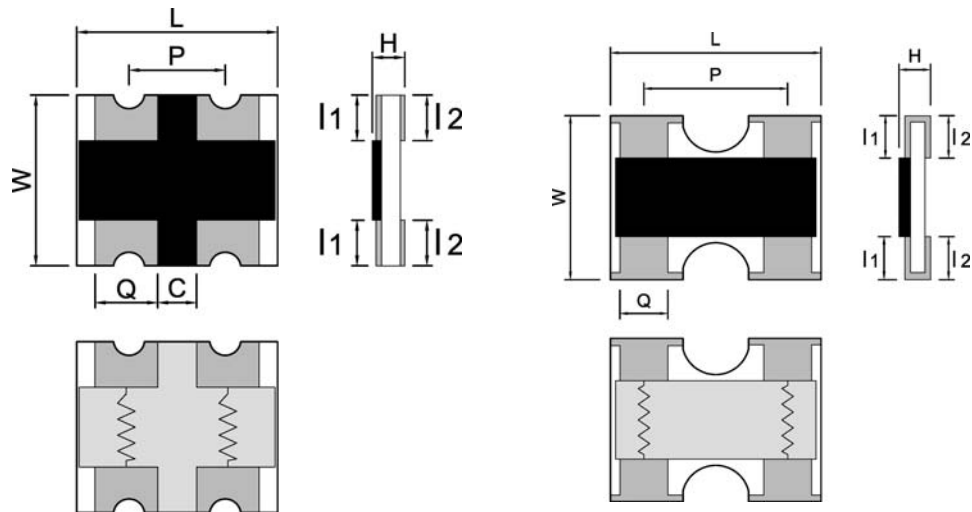
■ Type Dimension



STA024C

STA024R/STA034R

STA064R



STA022C

STA022R

■ Dimension

Unit: mm

TYPE	L	W	H	I ₁	I ₂	P	Q	Q1	C
STA022R	1.00±0.10	1.00±0.10	0.33±0.05	0.15±0.10	0.25±0.10	0.67±0.10	0.34±0.10	---	---
STA024R	2.00±0.10	1.00±0.10	0.40±0.10	0.20±0.10	0.20±0.10	0.50±0.10	0.30±0.10	0.43±0.10	---
STA034R	3.20±0.20	1.60±0.15	0.50±0.10	0.30±0.20	0.30±0.20	0.80±0.20	0.50±0.15	0.61±0.10	---
STA064R	5.10±0.20	3.10±0.20	0.55±0.15	0.55±0.15	0.55±0.15	1.30±0.20	0.90±0.10	---	---
STA022C	1.00±0.10	1.00±0.10	0.30±0.10	0.25±0.15	0.25±0.15	0.50±0.10	0.35±0.10	---	0.15±0.10
STA024C	2.00±0.10	1.00±0.10	0.40±0.10	0.15±0.10	0.20±0.10	0.50±0.10	0.35±0.10	---	0.15±0.10

Standard Electrical Specifications

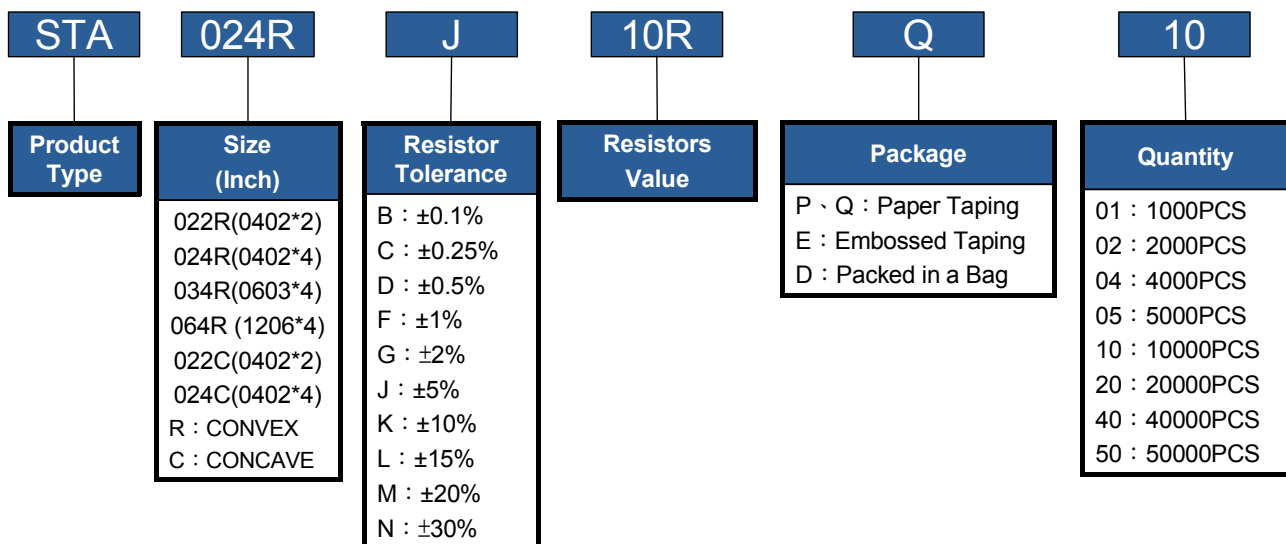
Item Type	Rating Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range
					F(±1%) J(±5%)
STA022R	0.063 W	25V	50V	0~+400	1Ω~9.9Ω
				±300	10Ω~1MΩ
STA024R	0.063 W	25V	50V	0~+400	1Ω~9.9Ω
				±300	10Ω~1MΩ
STA034R	0.1 W	50V	100V	0~+400	1Ω~9.9Ω
				±200	10Ω~1MΩ
STA022C	0.063 W	25V	50V	0~+400	1Ω~9.9Ω
				±200	10Ω~1MΩ
STA024C	0.063 W	25V	50V	0~+400	1Ω~9.9Ω
				±200	10Ω~1MΩ
STA064R	0.25 W	200V	400V	0~+400	1Ω~9.9Ω
				±200	10Ω~1MΩ

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

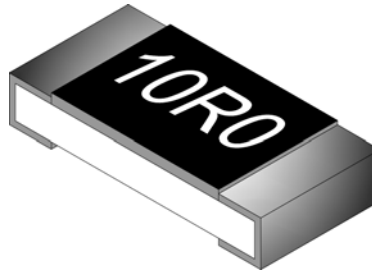
Type	022R	024R	034R	022C	024C	064R
Jumper Resistance Value	50mΩ Max					
Jumper Rated Current	1A					2A

Parts Number Explanation

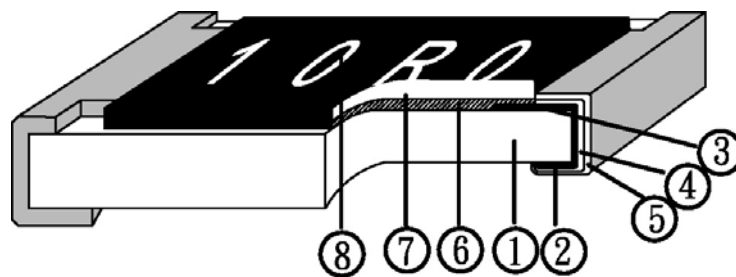
Example:



■ Thin Film Chip Resistor — TR Series



■ Construction



1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (NiCr)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Epoxy)
4	Barrier Layer (Ni)	8	Marking

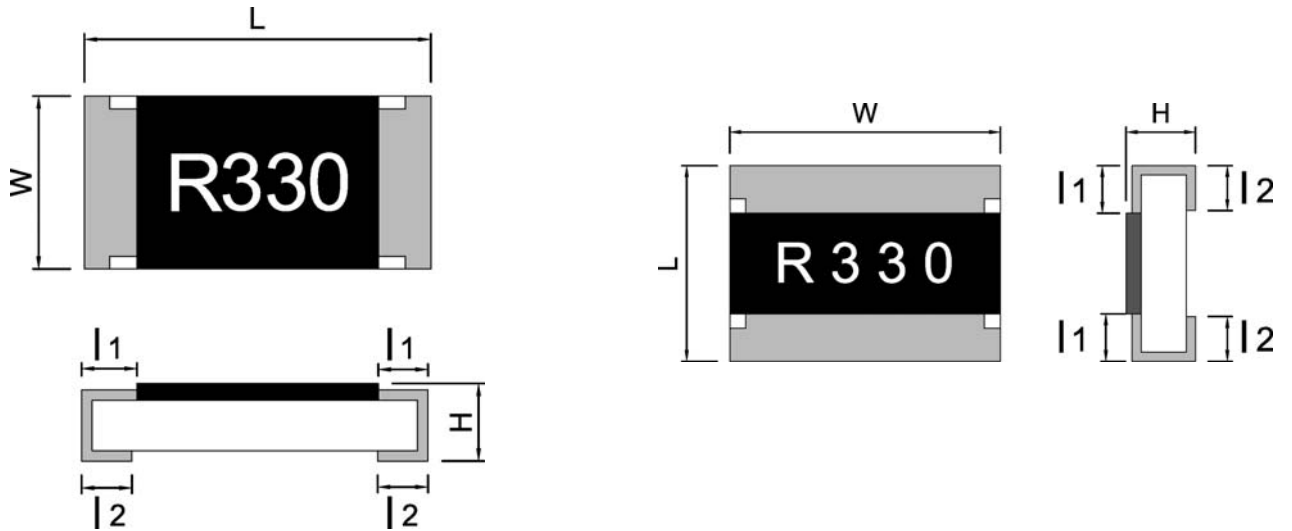
■ Application

- Medical equipments, Military equipments
- Converters
- Consumer products
- Communication devices
- Measurement instruments
- Printers

■ Features

- Tight tolerance from $\pm 0.01\%$, $\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$, $\pm 1\%$
- Thin film Ni / Cr / Si Resistor
- Low T.C.R. $\pm 10\text{ppm}$, $\pm 25\text{ppm}$, $\pm 50\text{ppm}$

■ Type Dimension



TR0805 / TR1206 / TR1210 /
TR1812 / TR2010 / TR2512

TR1218

■ Dimension

Unit: mm

TYPE	L	W	H	l ₁	l ₂
TR0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
TR0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.15
TR0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.35 ± 0.15	0.35 ± 0.15
TR1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.45 ± 0.20	0.45 ± 0.20
TR1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
TR1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.10	0.80 ± 0.10
TR2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
TR1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.45 ± 0.10	0.40 ± 0.10
TR2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

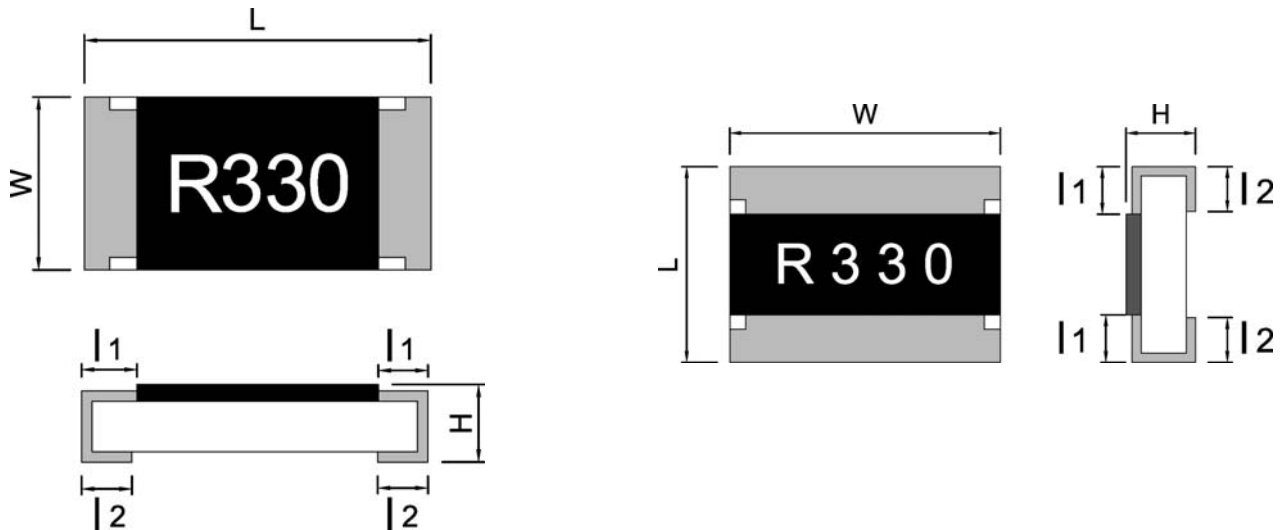
Standard Electrical Specifications

TYPE	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range			
					T(±0.01%) W(±0.05%)	B(±0.1%)	C(±0.25%) D(±0.5%)	F(±1%)
TR0402	0.031W	25V	50V	±10	—	40.2Ω~42K2Ω	40.2Ω~42K2Ω	40.2Ω~42K2Ω
				±25		10Ω~100KΩ	10Ω~100KΩ	10Ω~100KΩ
				±50		10Ω~1MΩ	10Ω~1MΩ	10Ω~1MΩ
TR0603	0.063W	50V	100V	±10	24.9Ω~100KΩ	4.7Ω~100KΩ	4.7Ω~100KΩ	4.7Ω~100KΩ
				±25		1Ω~332KΩ	1Ω~332KΩ	1Ω~332KΩ
				±50		1Ω~4M7Ω	1Ω~4M7Ω	1Ω~4M7Ω
TR0805	0.1W	100V	200V	±10	24.9Ω~100KΩ	10Ω~220KΩ	10Ω~220KΩ	10Ω~220KΩ
				±25		1Ω~3M32Ω	1Ω~3M32Ω	1Ω~3M32Ω
				±50		1Ω~3M32Ω	1Ω~3M32Ω	1Ω~3M32Ω
TR1206	0.125W	150V	300V	±10	24.9Ω~100KΩ	10Ω~1M11Ω	10Ω~1M11Ω	10Ω~1M11Ω
				±25		1Ω~2M74Ω	1Ω~2M74Ω	1Ω~2M74Ω
				±50		1Ω~2M74Ω	1Ω~2M74Ω	1Ω~2M74Ω
TR1210	0.165W	150V	300V	±10	24.9Ω~100KΩ	10Ω~499KΩ	10Ω~499KΩ	10Ω~499KΩ
				±25		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
				±50		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
TR1812	0.25W	150V	300V	±25	—	30Ω~22KΩ		
				±50				
TR2010	0.25W	150V	300V	±10	24.9Ω~100KΩ	10Ω~499KΩ	10Ω~499KΩ	10Ω~499KΩ
				±25		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
				±50		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
TR1218	0.5W	150V	300V	±10	24.9Ω~100KΩ	10Ω~499KΩ	10Ω~499KΩ	10Ω~499KΩ
				±25		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
				±50		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
TR2512	0.5W	150V	300V	±10	24.9Ω~100KΩ	10Ω~499KΩ	10Ω~499KΩ	10Ω~499KΩ
				±25		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
				±50		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

● Low Ohm Thin Film Chip Resistor

■ Type Dimension



TR0805 / TR1206 / TR1210 /
TR1812 / TR2010 / TR2512

TR1218

■ Dimension

Unit: mm

TYPE	L	W	H	l ₁	l ₂
TR0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
TR1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
TR1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
TR1812	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
TR2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
TR1218	3.10 ± 0.10	4.60 ± 0.10	0.55 ± 0.05	0.40 ± 0.20	0.50 ± 0.20
TR2512	6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

■ Application

- Medical equipment, Military equipment
- Power management
- DC-DC converter, Battery pack, Charger
- Voltage regulation module

■ Features

- Tight tolerance from ±1%, ±5%
- Thin film Ni / Cr / Si Resistor
- Low T.C.R. ±100ppm, ±150ppm, ±250ppm

Standard Electrical Specifications

Type	Item	Rated Power at 70 °C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)
							F(±1%) J±(5%)
TR0805		0.125 W	0.04~0.35V	0.35 V	0.875 V	±100	330~990
TR1206		0.25 W	0.05~0.5V	0.5 V	1.25 V	±250	100~330
						±100	331~990
TR1210		0.33 W	0.06~0.57V	0.57 V	1.425 V	±250	100~330
						±100	331~990
TR1812		0.5 W	0.07~0.7V	0.7 V	1.75 V	±250	100~330
						±100	331~990
TR2010		0.5 W	0.07~0.7V	0.7 V	1.75 V	±250	100~330
						±100	331~990
TR1218		1 W	0.1~0.99V	0.99 V	2.475V	±250	100~330
						±100	331~990
TR2512		1 W	0.1~0.99V	0.99 V	2.475V	±150	100~330
						±100	331~990

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

High Power Electrical Specifications

Type	Item	Rated Power at 70 °C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)
							F(±1%) J±(5%)
TR0805		0.25 W	0.05~0.5 V	0.497 V	1.244 V	±100	330~990
TR1206		0.5 W	0.07~0.7 V	0.704 V	1.759 V	±250	100~330
						±100	331~990
TR1210		0.66 W	0.08~0.81 V	0.808 V	2.021 V	±250	100~330
						±100	331~990
TR1812		1 W	0.1~0.99 V	0.995 V	2.487 V	±250	100~330
						±100	331~990
TR2010		1 W	0.1~0.99 V	0.995 V	2.487 V	±250	100~330
						±100	331~990
TR2512		2 W	0.14~1.41 V	1.407 V	3.518 V	±150	100~330
						±100	331~990

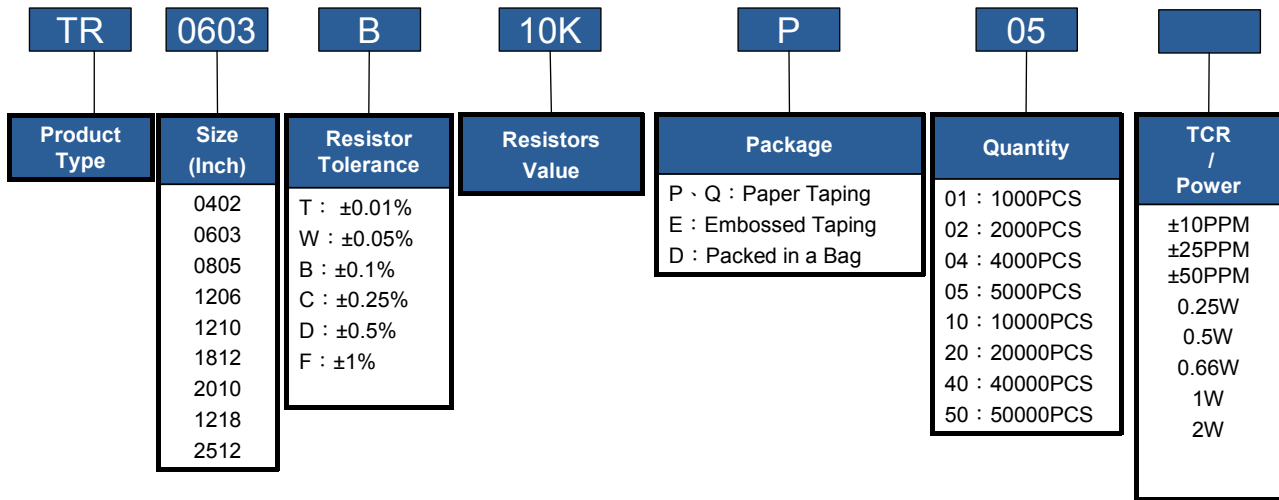
- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

Rated Resistance

Resistance	Code	Resistance	Code	Resistance	Code	Resistance	Code
0.10 Ω	R100	0.22 Ω	R220	0.47 Ω	R470	0.80 Ω	R800
0.11 Ω	R110	0.25 Ω	R250	0.50 Ω	R500	0.90 Ω	R900
0.12 Ω	R120	0.27 Ω	R270	0.56 Ω	R560		
0.13 Ω	R130	0.30 Ω	R300	0.60 Ω	R600		
0.15 Ω	R150	0.33 Ω	R330	0.65 Ω	R650		
0.16 Ω	R160	0.36 Ω	R360	0.68 Ω	R680		
0.18 Ω	R180	0.40 Ω	R400	0.70 Ω	R700		
0.20 Ω	R200	0.43 Ω	R430	0.75 Ω	R750		

■ Parts Number Explanation

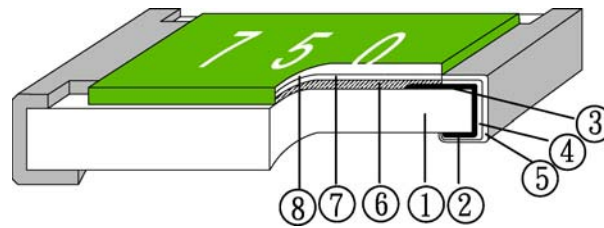
■ Example:



■ Fusible Chip Resistor — FCR Series



■ Construction

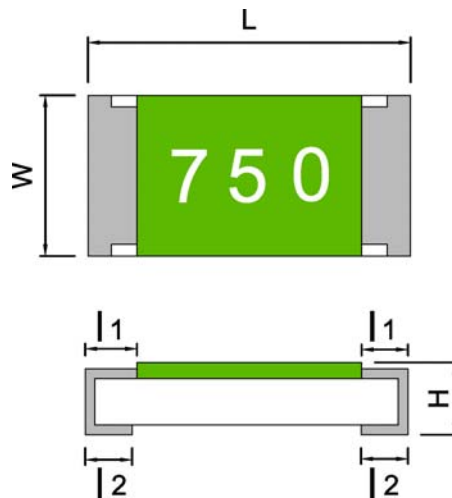


1	Alumina Substrate	5	External Electrode (Sn)
2	Bottom Electrode (Ag)	6	Resistor Layer (RuO_2)
3	Top Electrode (Ag/Pd)	7	Primary Overcoat (Glass)
4	Barrier Layer (Ni)	8	Secondary Overcoat (Epoxy)

■ Features

- The accurate fusibility is applicable to safety circuits in the wide range of electronic sets.
- Small in size, light in weight.
- Low temperature coefficient.(under ± 400 PPM/ $^{\circ}\text{C}$)
- Noncombustible insulated coat.
- May treat as the general resistance use.

■ Type Dimension



■ Dimension

Unit : mm

TYPE	L	W	H	l ₁	l ₂
FCR0402	1.00±0.10	0.50±0.05	0.30±0.05	0.15 ± 0.10	0.15 ± 0.10
FCR0603	1.60±0.20	0.80±0.15	0.40±0.10	0.20 ± 0.10	0.20 ± 0.10
FCR0805	2.00±0.20	1.25±0.15	0.50±0.15	0.30 ± 0.15	0.40 ± 0.15
FCR1206	3.05±0.10	1.60±0.20	0.55±0.15	0.40 ± 0.20	0.50 ± 0.20
FCR1210	3.05±0.10	2.50±0.20	0.55±0.15	0.50 ± 0.20	0.50 ± 0.20
FCR2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60 ± 0.20	0.60 ± 0.20
FCR2512	6.30±0.20	3.20±0.20	0.55±0.10	0.60 ± 0.20	0.60 ± 0.20

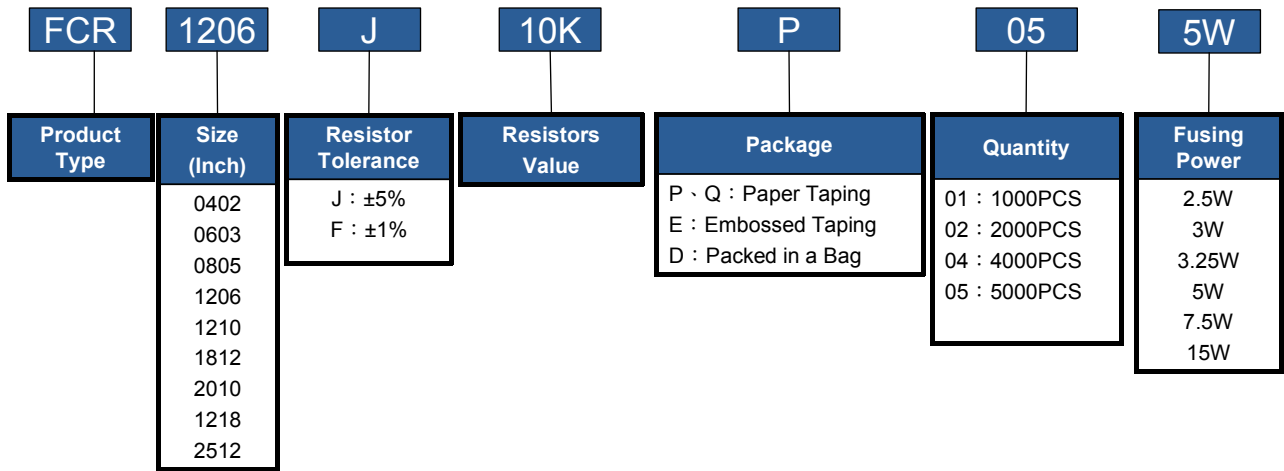
■ Power Characteristic

Item Type	Rated Power at 70°C	Max Hold-Off Voltage	Fusing Time & Min. Fusing Power	Resistance Range	T.C.R. (PPM/°C)	Standard Tolerance (%)
FCR0402	0.1W	50V	< 30 sec at 2.5W	1Ω~1KΩ	1Ω~47Ω (±600PPM) 48Ω~470Ω (±400PPM) 471Ω~1KΩ (±200PPM)	±5%,10% (1%,2% available)
FCR0603	0.125W	100V	< 30 sec at 3W			
FCR0805	0.15W	150V	< 30 sec at 3.25W			
FCR1206	0.25W	200V	< 30 sec at 5W			
FCR1210	0.5W	250V	< 30 sec at 7.5W			
FCR2010	0.75W	300V	< 30 sec at 11.25W			
FCR2512	1W	400V	< 30 sec at 15W			

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

■ Parts Number Explanation

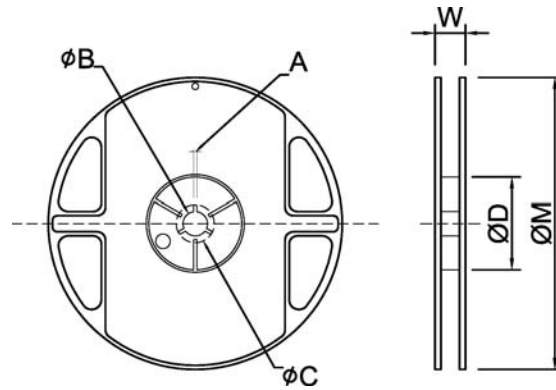
■ Example:



Appendix For SMD Chip Resistor

● Packaging Information

◆ For All Series

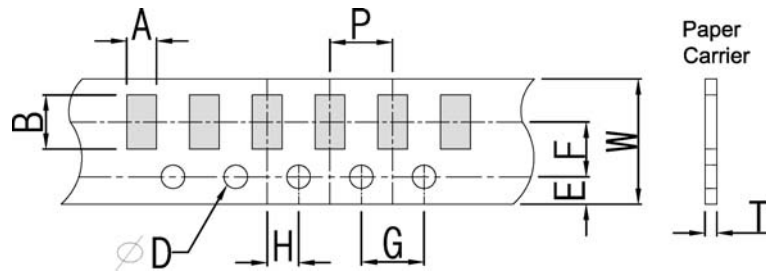


■ Dimension

Unit: mm

TYPE	SIZE		A	φB	φC	φD	W	φM
0201 022R 024R 022C 024C	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
	13"	40K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
	13"	50K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
0603 0805 1206	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
	10"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	254±2.0
	13"	20K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
1210 034R	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
2010 2512 1812 1218	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0
2030	7"	1K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	19.0±2.0	178±2.0
064R	11"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	278±2.0

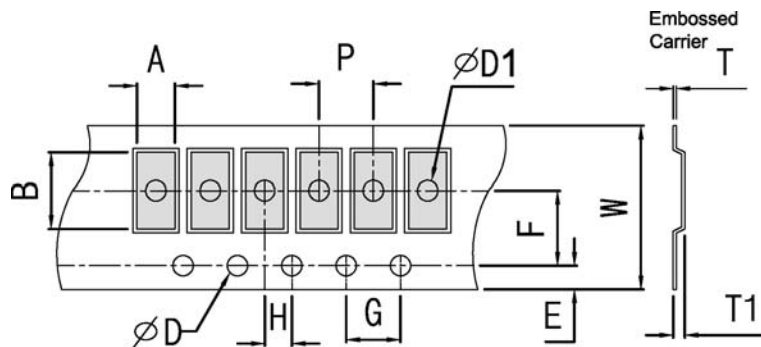
■ Tapping Specification



■ Dimension

Unit: mm

Packaging	Type	A	B	W	E	F	G	H	T	ϕD	P
Paper Type	0201	0.45±0.10	0.75±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.35±0.10	1.50 +0.10 -0	2.0±0.1
	0402	0.70±0.10	1.20±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.45±0.10		
	022R	1.25±0.10	1.25±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.45±0.10		
	024R	1.20±0.10	2.20±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.60±0.10		
	022C	1.25±0.10	1.25±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.45±0.10		
	024C	1.20±0.10	2.20±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.60±0.10	4.0±0.1	
	0603	1.05±0.20	1.80±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.60±0.10		
	0805	1.55±0.20	2.30±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10		
	1206 034R	1.90±0.20	3.50±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10		
	1210	2.85±0.20	3.50±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10		



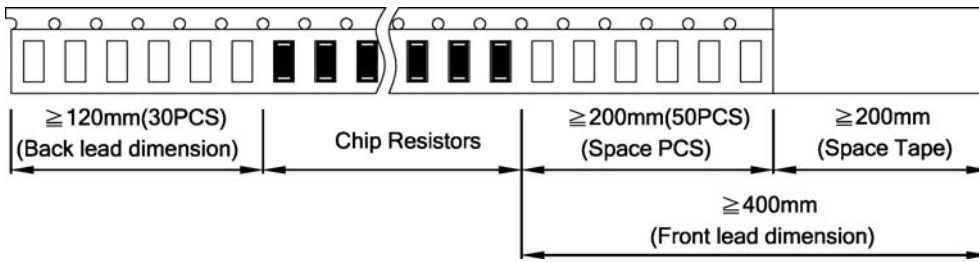
■ Dimension

Unit: mm

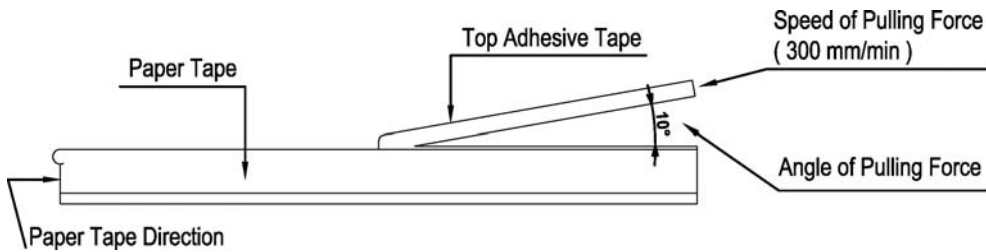
Packaging	Type	A	B	W	E	F	G	H	T	ϕD	$\psi D1$	T1	P
Embossed Type	2010	2.80±0.20	5.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10	1.50 +0.10 -0	1.50±0.10	0.85±0.15	4.0±0.1
	2512	3.40±0.20	6.70±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	
	1812	3.30±0.20	4.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	
	1218	3.30±0.20	4.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.85±0.15	
	2030	5.50±0.20	7.90±0.20	16±0.10	1.75±0.10	7.5±0.05	4.0±0.10	2.0±0.05	0.25±0.10		1.50±0.10	1.30±0.10	
	064R	3.55±0.20	5.55±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.25±0.10	1.50±0.10	0.85±0.15		

■ Packing Material Data / Storage Data

■ Front & Back Lead Dimension

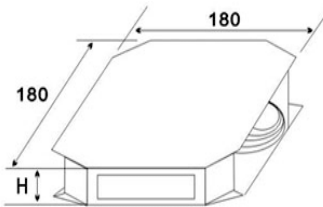


■ Top Adhesive Peel Off Strength : 10~70g

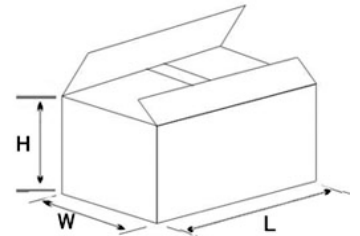


■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200

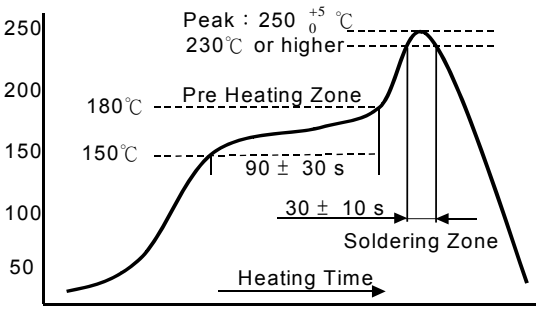


■ Storage Data :

Storage time at the environment temp: 25±5°C & humidity: 50±20% is valid for one year from the date of delivery.

● Reliability Test and Requirement

◆ For CR/CRA/TR low ohm/QR/QRA/ST/STA/FCR Series

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	-55°C ~ +155°C, 25°C is the reference temperature	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	General : 2.5 times RCWV or Max. Overload voltage for 5 seconds. High Power : 5 × Rated power for 5 seconds	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
IR Reflow	Sony SS-00254	 <p>The graph shows a temperature profile for IR reflow. The y-axis is temperature in °C (50 to 250) and the x-axis is time. Key points include: Peak at 250 ± 5 °C (230°C or higher), Pre-Heating Zone at 180°C, and Soldering Zone at 150°C. Heating time is 90 ± 30 s, and the soldering zone duration is 30 ± 10 s.</p>	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Leaching	Sony SS-00254-9	260±5°C for 30 seconds.	>95% Coverage
Soldering Heat	JIS C 5201-1 clause 4.18	260±5°C for 10 seconds.	±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +155°C, 5 cycles	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(1.0%+0.10Ω)
Electric Iron	Sony SS-00254-5	Preheating temperature : 350±10°C Electric iron preheating time : 3+1/-0 sec	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Resistance to Solvent	JIS C 5201-1 clause 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±1 : ±(0.5%+0.05Ω) ±5 : ±(0.5%+0.05Ω)
Load Life in Humidity	JIS C 5201-1 clause 4.24	40±2°C, 90~95% R.H. or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(2.0%+0.05Ω)
Load Life (Endurance)	JIS C 5201-1 clause 4.25	70±2°C, or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	0.1%、0.5%、1% : ±(1.0%+0.05Ω) 2%、5% : ±(3.0%+0.10Ω)
Insulation Resistance	JIS C 5201-1 clause 4.6	Max. Overload voltage for 1 minute.	≥ 10GΩ

◆ For CR/TR low ohm/QR/ST/FCR Series

Test Item	Test Method	Procedure	Requirements
Terminal Bending Strength	JIS C 5201-1 clause 4.33	Bending once for 5 seconds D : 0402、0603、0805=5mm 1206、1210、1812=3mm 1218、2010、2512、2030=2mm	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)

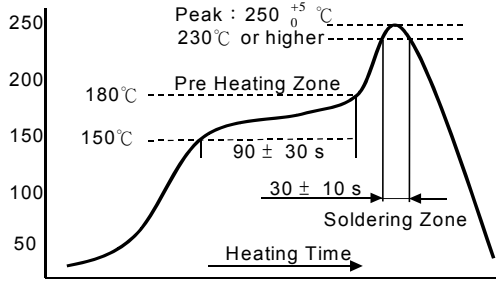
◆ For ST/STA Series

Test Item	Test Method	Procedure	Requirements
Sulfur Test	ASTM-B-809-95	60±2°C, no power rating for 1000 hrs	△R : ±(1.0%+0.05 Ω)

◆ For QR/QRA/ST/STA Series

AEC-Q200 test			
Test Item	Test Method	Procedure	Requirements
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24± 4 hours after test conclusion.	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(1.0%+0.10Ω)
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical-OKEM clean or equivalent.	±1 : ±(0.5%+0.05Ω) ±5 : ±(0.5%+0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85°C/85%RH.	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(2.0%+0.05Ω)
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 hrs. @ T=125°C.	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(2.0%+0.05Ω)
Operation Life	MIL-STD-202 Method 108	125°C, or Max.working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5hr "OFF"	0.1%、0.5%、1% : ±(1.0%+0.05Ω) 2%、5% : ±(3.0%+0.10Ω)
External Visual	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	—
Mechanical Shock	MIL-STD-202 Method 213	Impact acceleration : 1500g Pulse duration : 0.5ms Number of shocks : 30 shocks(5 shocks for each face)	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
Vibration	MIL-STD-202 Method 204	5 g's for 20min., 12 cycles each of 3 orientations.	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
ESD	ACE-Q200- 002 or ISO/DIS 10605	2kV	For the product %
Solderability	J-STD-002	(1) 4 hrs 155°C dry heat (2) 260±5°C 10 sec.	±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Board Flex	AEC Q200-005	Beading once for 60 seconds	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)

◆ For TR Series

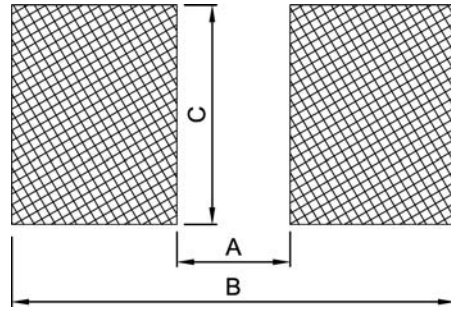
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	TCR +155 °C , 25°C is the reference temperature	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	General : 2.5 times RCWV or Max. Overload voltage for 5 seconds. High Power : 2.5 times RCWV or Max. Overload voltage for 2 seconds.	±(0.5%+0.05Ω)
IR Reflow	Sony SS-00254	 <p>The graph shows a temperature profile for IR reflow. The y-axis represents temperature in °C (50 to 250), and the x-axis represents heating time. Key points include: a peak temperature of 250⁺⁵₀ °C (230°C or higher), a pre-heating zone at 180°C, and a soldering zone at 150°C. Time intervals are marked as 90 ± 30 s for the pre-heating zone and 30 ± 10 s for the soldering zone.</p>	±(0.5%+0.05Ω)
Leaching	Sony SS-00254-9	260±5°C for 30 seconds.	>95% Coverage
Soldering Heat	JIS C 5201-1 clause 4.18	260±5°C for 10 seconds.	±(0.5%+0.05Ω)
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +155°C, 5 cycles	±(0.5%+0.05Ω)
Electric Iron	Sony SS-00254-5	Preheating temperature : 350±10°C Electric iron preheating time : 3+1/-0 sec	±(0.5%+0.05Ω)
Resistance to Solvent	JIS C 5201-1 clause 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(0.5%+0.05Ω)
Load Life in Humidity	JIS C 5201-1 clause 4.24	40±2°C, 90~95% R.H. or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	±(0.5%+0.05Ω)
Load Life (Endurance)	JIS C 5201-1 clause 4.25	70±2°C, or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	±(0.5%+0.05Ω)
Terminal Bending Strength	JIS C 5201-1 clause 4.33	Bending once for 5 seconds D : TR Series 0402、0603、0805=5mm TR Series 1206、1210、=3mm TR Series 2010、2512、1218、1812=2mm	±(0.5%+0.05Ω)
Insulation Resistance	JIS C 5201-1 clause 4.6	Max. Overload voltage for 1 minute.	≥ 10GΩ

● Temperature Coefficient of Resistance test to - 55 °C is available on request

● General Information

■ Recommend Land Pattern Design (For Reflow Soldering)

◆ For CR/TR/QR/ST/FCR Series

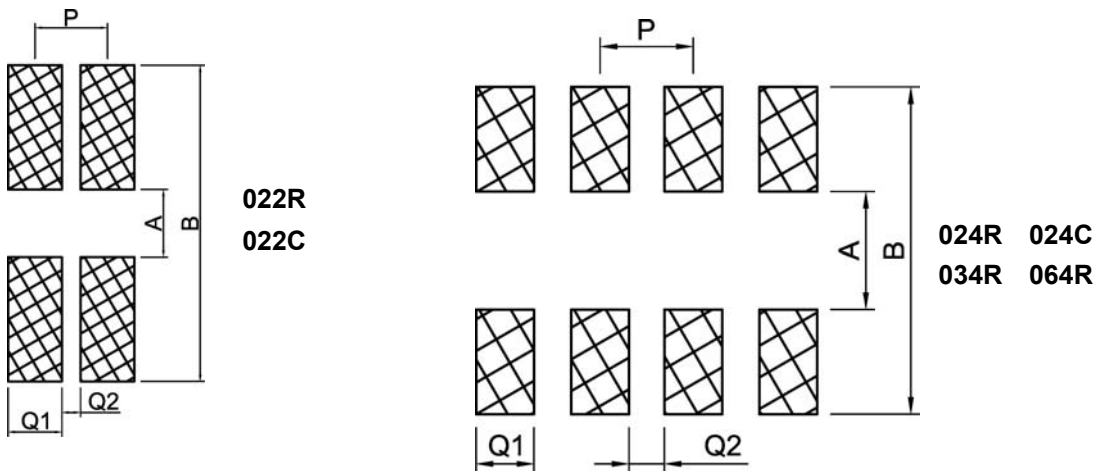


■ Dimension

Unit: mm

Type Item	0201	0402	0603	0805	1206	1210	1812	2010	1218	2512	2030
A	0.25	0.60	0.80	1.30	2.20	2.00	3.11	3.80	2.04	4.90	3.50
B	1.10	1.60	2.40	2.90	4.20	4.40	5.91	6.60	4.24	8.10	7.50
C	0.32	0.70	1.00	1.45	1.80	2.70	3.30	2.70	4.80	3.40	7.80

◆ For CRA/QRA/STA Series



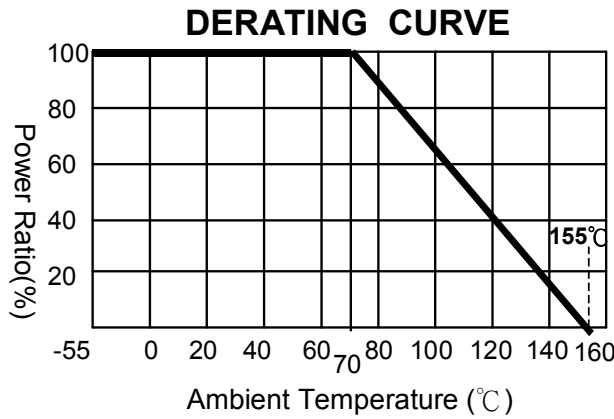
■ Dimension

Unit: mm

Type Item	022R	024R 024C	034R	022C	064R
A	0.50	0.50	1.00	0.50	2.00
B	2.00	2.00	2.60	2.00	4.75
P	0.67	0.50	0.80	0.50	1.30
Q1	0.33	0.28	0.40	0.33	0.90
Q2	0.34	0.22	0.40	0.17	0.375

■ Performance Characteristics

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ Voltage Rating or Current Rating

Resistance Range: $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

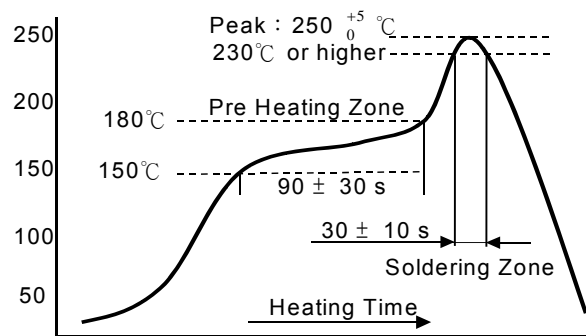
$$E = \sqrt{P \times R}$$

E=Rated voltage(V)
 P=Power rating(W)
 R=Nominal resistance(Ω)

■ Operation and Storage Temperature

	MIN	MAX
Operation temperature	-55°C	70°C
Storage temperature	20°C	30°C
Storage humidity	30%	70%

■ Soldering Profile



Equipments Applicable:

Our company's products are produced under low temperature processing applicable to IR reflow surface mounting devices. It is comparatively not applicable to wave soldering which will possibly cause the risk ablating the element protection layer and the front conductor and cause the drift of the resistance value and ablation of the markings.

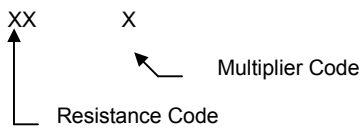
Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-feet probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.

0603 E-96 Multiplier Code

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

CODING FORMULA



Example: 10.2KΩ = 102 x 10²Ω = 02C

02 C

33.2Ω = 332 x 10⁻¹Ω = 51X

51 X

0603 Standard E-96 Values and 0603 Resistance Codes

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

■ Standard Resistance Values in a Decade

Marking code:

1%: marking code, please refer to E96 and E24 data form as below

Ex: 120K, The marking code is 1203 in E24

121K, The marking code is 1213 in E96

5%: marking code, please refer to E24 data form as below

Ex: 120K, The marking code is 124 in E24

Note: 0201 / 0402 / 022C / 022R series resistor has no marking code.

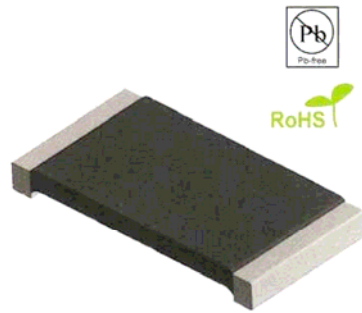
Type: 0603 1% marking code, please refer to E-96 multiplier code.

E192	E96	E48	E192	E96	E48	E192	E96	E48	E192	E96	E48	E192	E96	E48	
100	100	100	169	169	169	287	287	287	487	487	487	825	825	825	
101			172			291			493			835			
102	102		174	174		294	294		499	499		845	845		
104			176			298			505			856			
105	105	105	178	178	178	301	301	301	511	511	511	866	866	866	
106			180			305			517			876			
107	107		182	182		309	309		523	523		887	887		
109			184			312			530			898			
110	110	110	187	187	187	316	316	316	536	536	536	909	909	909	
111			189			320			542			920			
113	113		191	191		324	324		549	549		931	931		
114			193			328			556			942			
115	115	115	196	196	196	332	332	332	562	562	562	953	953	953	
117			198			336			569			965			
118	118		200	200		340	340		576	576		976	976		
120			203			344			583			988			
121	121	121	205	205	205	348	348	348	590	590	590				
123			208			352			597						
124	124		210	210		357	357		604	604		E24	E12	E6	E3
126			213			361			612			10	10	10	10
127	127	127	215	215	215	365	365	365	619	619	619	11			
129			218			370			626			12	12		
130	130		221	221		374	374		634	634		13			
132			223			379			642			15	15	15	
133	133	133	226	226	226	383	383	383	649	649	649	16			
135			229			388			657			18	18		
137	137		232	232		392	392		665	665		20			
138			234			397			673			22	22	22	22
140	140	140	237	237	237	402	402	402	681	681	681	24			
142			240			407			690			27	27		
143	143		243	243		412	412		698	698		30			
145			246			417			706			33	33	33	
147	147	147	249	249	249	422	422	422	715	715	715	36			
149			252			427			723			39	39		
150	150		255	255		432	432		732	732		43			
152			258			437			741			47	47	47	47
154	154	154	261	261	261	442	442	442	750	750	750	51			
156			264			448			759			56	56		
158	158		267	267		453	453		768	768		62			
160			271			459			777			68	68	68	
162	162	162	274	274	274	464	464	464	787	787	787	75			
164			277			470			796			82	82		
165	165		280	280		475	475		806	806		91			
167			284			481			816						

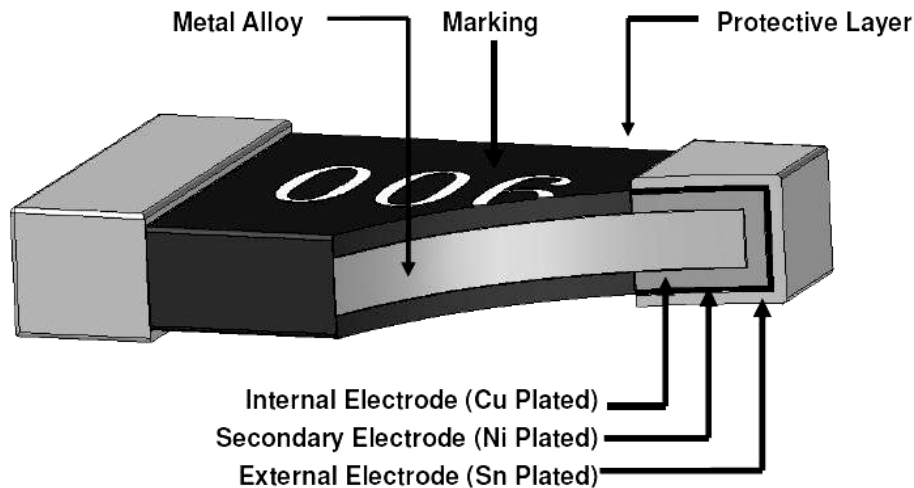
According to IEC publication 63

■ Metal Alloy Low-Resistance Resistor

● LR Series



■ Construction



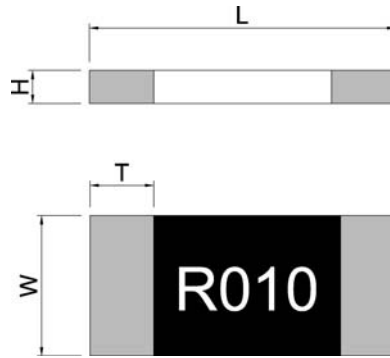
■ Application

- Power supply
- Battery pack
- DIY tools
- Inverter/Converter (AC/DC, DC/DC, DC/AC)
- Measurable instrument
- Consumer electronics
- Note book
- PC power pack
- LED driver
- Others (Auto tronics... etc.)

■ Features

- Ideal for all types of current sensing, voltage division and pulse applications including switching and linear power supplies, instruments, power amplifiers.
- Very low inductance 0.5nH to 5nH.
- Stable high frequency characteristic with reduced lead inductance and excellent frequency response.
- Low thermal EMF ($<1\mu\text{V}/^\circ\text{C}$).
- Pure tin plating provides compatibility with lead (Pb) free and lead containing soldering processes.
- Excellent stability ($|\Delta R/R| \leq \pm 0.5\%$ for 1000h at 100°C different environmental conditions).

■ Type Dimension



■ Dimension

Unit: mm

TYPE	Resistance Range mΩ	L	W	H	T
LR1206 1W	1~50	3.15±0.254	1.60±0.254	0.750±0.254	0.50±0.254
LR2010 1W	0.5~3	5.10±0.254	2.54±0.254	0.8±0.254	1.295±0.254
	4~100				0.8±0.254
LR2512 1W, 1.5W, 2W	0.5~4	6.25±0.254	3.30±0.254	0.8±0.254	1.88±0.254
LR2512 1W, 1.5W	4.1~100				1.13±0.254
LR2512 2W	4.1~75				1.13±0.254
LR2512 3W	0.5				1.88±0.254
	0.6~2.9 & 4.1~10				1.13±0.254
	3~4				1.68±0.254
LR2725 4W	0.25, 0.5	6.8±0.254	6.007±0.254	1.0±0.254	2.15±0.254
	1			1.1±0.254	2.15±0.254
	1.5			1.0±0.254	2.15±0.254
	2			0.9±0.254	1.8±0.254
	2.5				1.65±0.254
	3				1.3±0.254
LR2728 3W, 3.5W, 4W	4~100	6.7±0.254	7.2±0.254	1.0±0.254	1.15±0.254
LR4527 3W, 5W	0.5~5	11.43± 0.254	6.85± 0.254	1.50± 0.254	3.215±0.254
	5.1~120				1.815±0.254

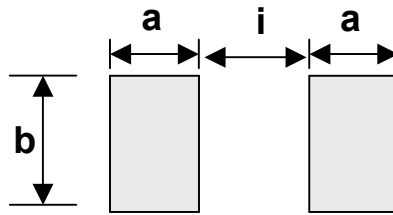
● For non-standard parts, please contact our sales dept.

Remark: 1.0 Watts with total solder pad trace size of 100mm²
 1.5 Watts with total solder pad trace size of 200mm²
 2.0 Watts with total solder pad trace size of 300mm²
 3.0 Watts with total solder pad trace size of 300mm²
 3.5 Watts with total solder pad trace size of 300mm²
 4.0 Watts with total solder pad trace size of 300mm²
 5.0 Watts with total solder pad trace size of 625mm²

Standard Electrical Specifications

Type	Power Rating at 100°C	T.C.R. (ppm/°C)	Max. Rating Current	Max. Overload Current	Resistance Range mΩ			Operating Temperature Range (°C)
					0.5% (D)	1.0% (F)	5.0% (J)	
LR1206	1W	±50	31.62A	63.25A	7~50mΩ	1~50mΩ		- 55 ~ + 170
LR2010	1W	±50	44.72A	89.44A	7~100mΩ	0.5~100mΩ		
LR2512	1 W	±50	44.72A	100.00A	7~100mΩ	0.5~100mΩ		
	1.5 W	±50	54.77A	122.48A	7~100mΩ	0.5~100mΩ		
	2 W	±50	63.25A	126.49A	7~75mΩ	0.5~75mΩ		
	3 W	±50	77.46A	134.16A	7~10mΩ	0.5~10mΩ		
LR2725	4 W	±50	126.49A	252.95A	---	0.25~3mΩ		
LR2728	3 W	±50	27.39A	47.43A	4~100mΩ			
	3.5 W	±50	29.58A	51.23A	4~100mΩ			
	4 W	±50	31.62A	63.25A	4~50mΩ			
LR4527	3W	±50	77.5A	134A	7~120mΩ	0.5~120mΩ		
	5W	±50	100A	200A	7~120mΩ	0.5~120mΩ		

■ Recommend Land Pattern Design (For Reflow Soldering)

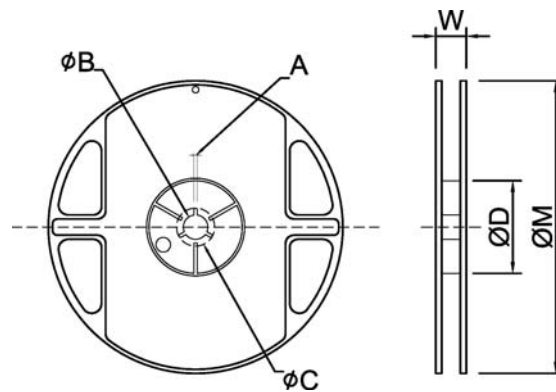


■ Dimension

Unit: mm

Type	Resistance Range mΩ	a	b	i
LR1206 - 1W	1~50	1.60	2.18	0.66
LR2010 - 1W	0.5~3	1.80	2.92	1.22
	4~100	2.29	2.92	2.41
LR2512 - 1W, 1.5W, 2W	0.5~4	3.05	3.68	1.27
LR2512 - 1W, 1.5W, 2W	4.1~100	2.11	3.68	3.18
LR2512 - 3W	0.5	3.05	3.68	1.27
	0.6~10	2.11	3.68	3.18
LR2725 - 4W	0.25 ~3	3.18	6.86	1.32
LR2728 - 3W, 3.5W, 4W	4~100	2.75	7.82	3.51
LR4527 - 3W, 5W	0.5~3.0	4.80	8.74	5.51
	3.1~120	3.40	8.74	8.31

● Packaging Information

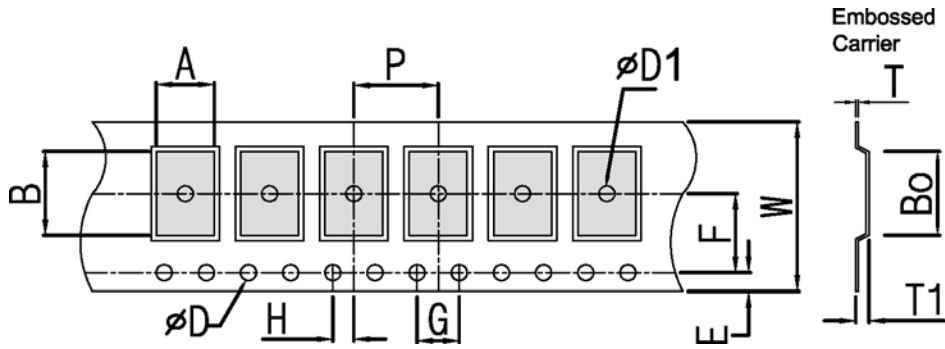


■ Dimension

Unit: mm

Reel Type / Tape	A	φB	φC	φD	W	φM
7" reel for 12 mm embossed	2.5 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	16.2 ± 0.5	178 ± 1.0
7" reel for 8 mm embossed (for LR1206 only)	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	12.00 ± 0.5	178 ± 1.0
7" reel for 24 mm embossed	2.0 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	24.4 +2.0	178 ± 1.0

■ Embossed Dimension



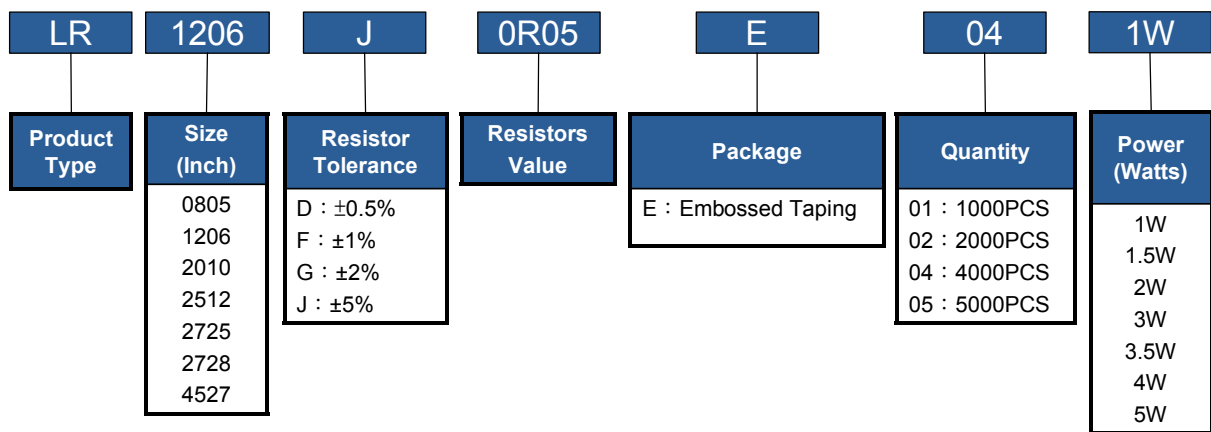
■ Dimension

Unit: mm

Item	W	P	E	F	φD	φD1	G	H	A	Bo	T1	T
LR1206	8.00	4.00	1.75	3.50	1.55	1.00	4.00	2.00	1.83	3.50	0.90	0.20
LR2010	12.00	4.00	1.75	5.50	1.50	1.50	4.00	2.00	2.90	5.45	1.10	0.23
LR2512	12.00	8.00	1.75	5.50	1.55	1.50	4.00	2.00	3.90	6.74	1.08	0.24
LR2725	12.00	8.00	1.75	5.50	1.50	1.50	4.00	2.00	6.75	7.15	1.70	0.25
LR2728	12.00	12.00	1.75	5.50	1.55	1.55	4.00	2.00	7.70	7.15	1.20	0.25
LR4527	24.00	12.00	1.75	11.50	1.55	1.50	4.00	2.00	7.12	11.70	1.55	0.30

■ Parts Number Explanation

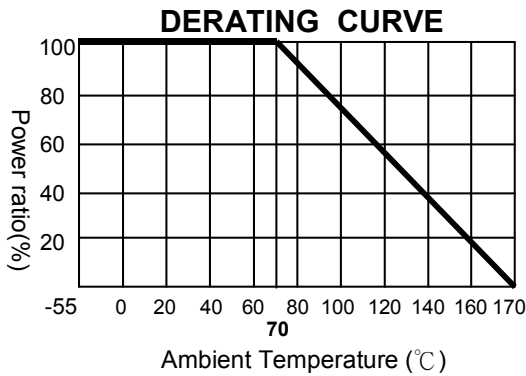
■ Example:



Test Procedures and Requirements

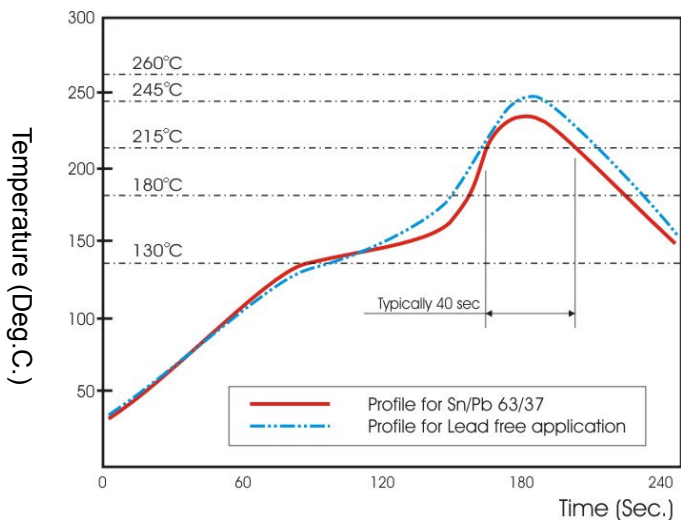
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (TCR)	JIS C 5201 clause 4.8	$\text{TCR (ppm/}^{\circ}\text{C)} = \frac{\text{R2-R1}}{\text{R1 (T2-T1)}} \times 10^6$ R1 : resistance of room temperature (T1) R2 : resistance of 150 °C (T2)	Refer to Ratings
Short Time Overload	JIS C 5201 clause 4.13	3 times rated power for LR2512-3W, LR2728-3W, LR2728-3.5W 4 times rated power for LR1206-1W, LR2010-1W, LR2512-2W, LR2725-4W, LR2728-4W, LR4527-3W/5W 5 times rated power for LR2512-1W, LR2512-1.5W Rating power duration: 5secs	$\pm(0.5\%+0.0005\Omega)\Delta R$
Insulation Resistance	JIS C 5201 clause 4.6	100±15V _{DC} for 1 minute	$\geq 10^9\Omega$
Dielectric Withstanding Voltage	JIS C 5201 clause 4.7	Applied 500V _{AC} for 1 minute, and Limit surge current 50 mA (max.)	Without break down
Resistance to Solder Heat	JIS C 5201 clause 4.18	Solder temp./immersion time: 260±5°C, 10±1secs and 350±10°C, 3.5±0.5secs	$\pm(0.5\%+0.0005\Omega)\Delta R$
Solderability Test	JIS C 5201 clause 4.17	Specimen prep.: 4 hours ± 15 min. Steam Aging : Solder Bath/Dip and Look Test, 245±5°C, 3±1 secs	95% coverage
Vibration	JIS C 5201 clause 4.22	Frequency varied 55Hz in one minute, 3 orientations @ Total duration 12 hours	$\pm(0.5\%+0.0005\Omega)\Delta R$
Resistance to Solvent	JIS C 5201 clause 4.29, 4.30	Immersion time: 60±5 secs @ 20°C~25°C	$\pm(0.5\%+0.0005\Omega)\Delta R$
Mechanical Shock	JIS C 5201 clause 4.21	100 grams for 6 milliseconds, 5 pulses	$\pm(0.5\%+0.0005\Omega)\Delta R$
Low Temperature Exposure (Storage)	JIS C 5201 clause 4.23.4	1,000 hours @ -55°C	$\pm(0.5\%+0.0005\Omega)\Delta R$
High Temperature Exposure (Storage)	JIS C 5201 clause 4.23.2	1,000 hours @ + 155°C	$\pm(1.0\%+0.0005\Omega)\Delta R$
Temperature Cycling (Rapid Temperature Change)	JIS C 5201 clause 4.19	Air to air, - 55°C to + 150°C, 1,000 cycles, 15 minutes at each extreme, transition time 2 to 3 minutes	$\pm(0.5\%+0.0005\Omega)\Delta R$
Moisture Resistance (Climatic Sequence)	JIS C 5201 clause 4.23	Mil-STD-202, Method 106, 0% power, 7a and 7b not required, t = 24 h/cycle, 10 cycles, Unpowered,	$\pm(0.5\%+0.0005\Omega)\Delta R$
Bias Humidity	JIS C 5201 clause 4.24	+ 85 °C, 85% RH, 10% Bias, Extended Life Test: 1,000 hours, 1.5 hours On, 0.5 hours Off	$\pm(0.5\%+0.0005\Omega)\Delta R$
Load Life	JIS C 5201 clause 4.25.1	Test temperature 100 °C Rated continuous working voltage, Extended Life Test: 1,000 hours, 1.5 hours On · 0.5 hours Off	$\pm(1.0\%+0.0005\Omega)\Delta R$

■ Power Derating Curve

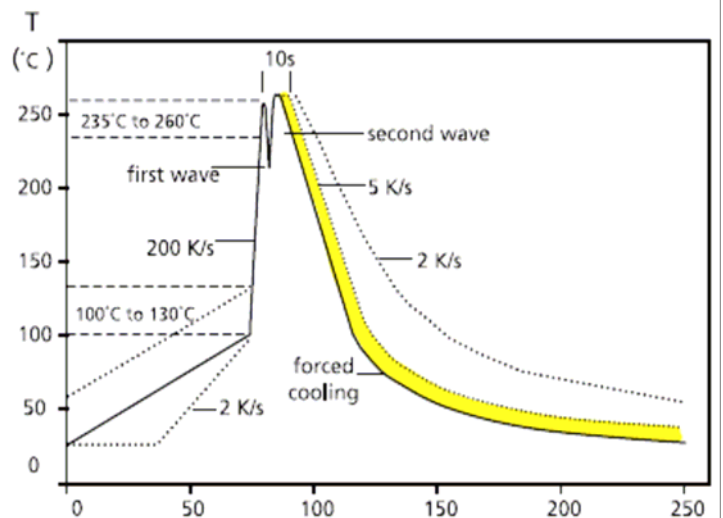


■ Recommend Soldering Conditions:

Surface-mount components are tested for solderability at a temperature of 245 °C for 3 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in below:



Recommended IR Reflow Soldering Profile



Recommended double-wave Soldering Profile

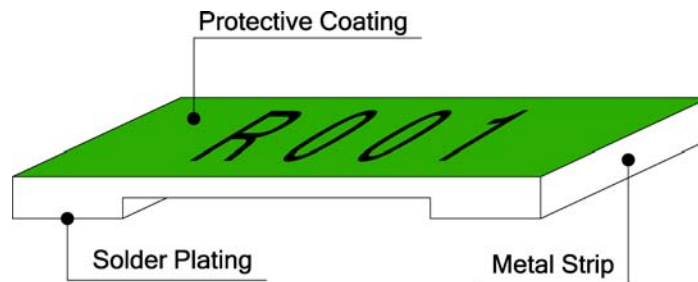
Typical values (solid line)

Process limits (dotted line)

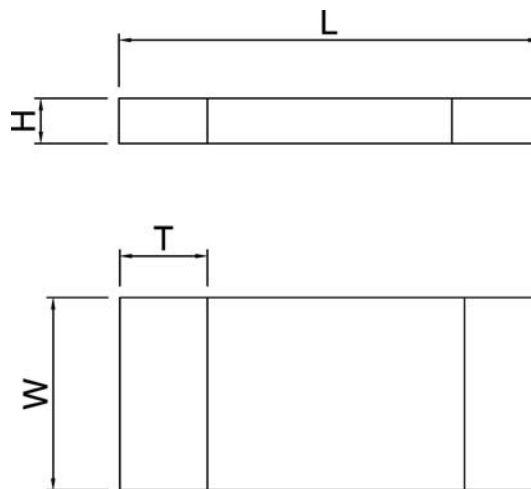
● LH Series



■ Construction



■ Type Dimension



■ Dimension

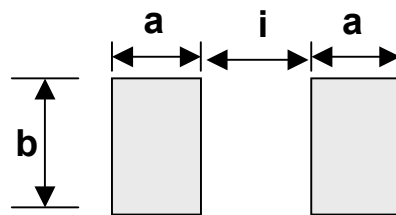
Unit: mm

TYPE	L	W	H	T
LH1206	3.20±0.254	1.60±0.09	0.6±0.2	0.975±0.375
LH2010	5.08±0.254	2.54±0.15	0.6±0.2	1.665±0.625
LH2512	6.35±0.254	3.18±0.35	0.6±0.2 (1.0±0.2 for 0.5 mΩ, 0.75 mΩ)	1.925±0.75

■ Standard Electrical Specifications

Type	Power Rating at 100°C	T.C.R. (ppm/°C)	Resistance Range mΩ			Operating Temperature Range (°C)
			1.0% (F)	3.0% (H)	5.0% (J)	
LH1206	1W	±50	1 mΩ~10 mΩ			- 55 ~ + 170
LH2010	1.5W	±50	1 mΩ~10 mΩ			
LH2512	1W	±50	11 mΩ~15mΩ			
	2W	±50	7 mΩ~10mΩ			
	2.5W	±50	4 mΩ~6 mΩ			
	3W	±75	1 mΩ~3 mΩ			
	3W	±100	0.5 mΩ~0.75 mΩ			

■ Recommend Land Pattern Design (For Reflow Soldering)

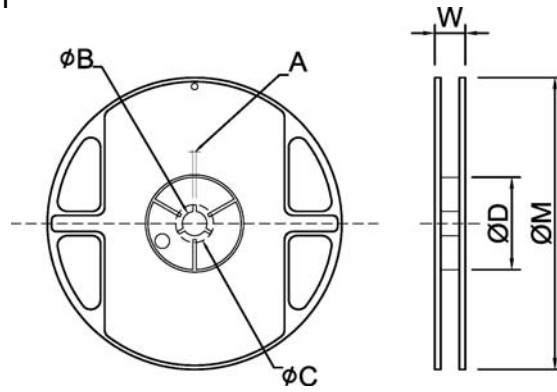


■ Dimension

Unit: mm

Type	a	b	i
LH1206	1.28	2.29	1.25
LH2010	1.97	3.14	1.75
LH2512	1.8	3.6	4.75

● Packaging Information

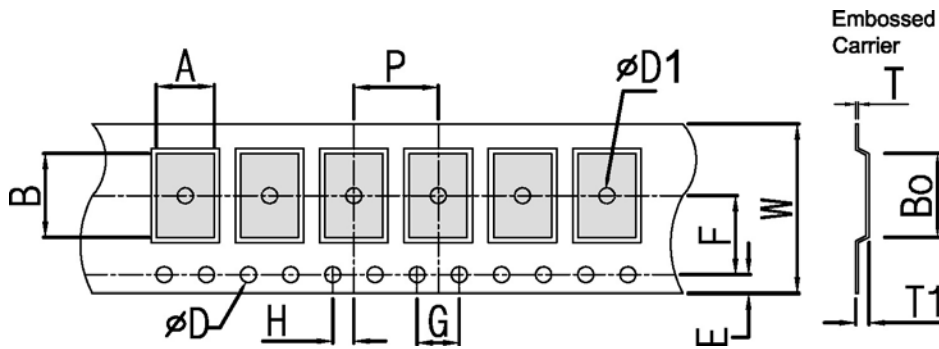


■ Dimension

Unit: mm

Type	A	B	C	ϕD	W
LH1206	2 ± 0.5	13.5 ± 0.5	21 ± 0.5	60 ± 0.2	11 ± 1
LH2010 LH2512	2 ± 0.5	13.5 ± 0.5	21 ± 0.5	60 ± 0.2	15 ± 1

■ Embossed Dimension



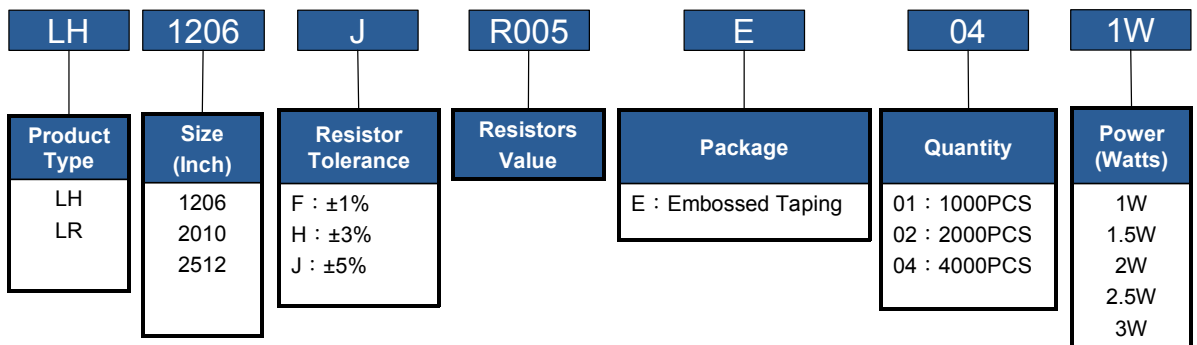
■ Dimension

Unit: mm

Type	W	P	E	F	ϕD	$\phi D1$	G	H	A	Bo	T1	T
LH1206	8.00±0.2	4.00±0.1	1.75±0.1	3.50±0.05	1.55±0.05	1.10±0.1	4.00±0.1	2.00±0.05	1.90±0.1	3.60±0.1	0.87±0.1	0.20±0.05
LH2010	12.00±0.2	4.00±0.1	1.75±0.1	5.50±0.05	1.55±0.05	1.50(min)	4.00±0.1	2.00±0.05	2.85±0.1	5.55±0.1	0.85±0.1	0.25±0.05
LH2512	12.00±0.3	4.00±0.1	1.75±0.1	5.50±0.05	1.55±0.05	1.50(min)	4.00±0.1	2.00±0.05	3.40±0.1	6.75±0.1	0.8±0.1	0.25±0.1

■ Parts Number Explanation

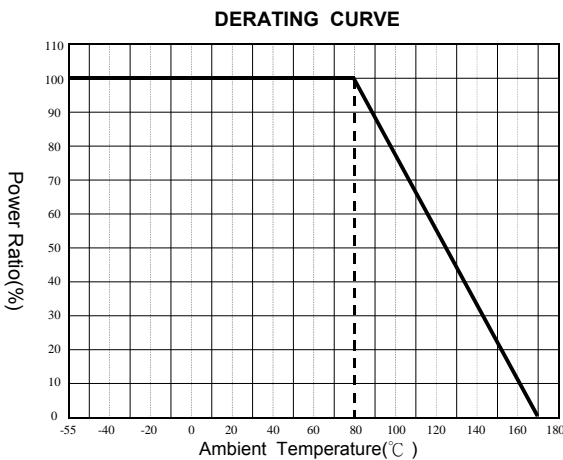
■ Example:



■ Test Procedures and Requirements

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (TCR)	JIS C 5201 clause 4.8	$TCR (ppm/^{\circ}C) = \frac{R2-R1}{R1 (T2-T1)} \times 10^6$ R1 : resistance of room temperature (T1) R2 : resistance at -55°C or +125 °C (T2)	Refer to Ratings
Short Time Overload	JIS C 5201 clause 4.13	5 times the rated power is applied to the resistor for 5 seconds and the change in resistance is measured after 30mins.	$\Delta R < \pm 1\%$
Resistance to Solder Heat	JIS C 5201 clause 4.18	The resistor is immersed in solder bath at 260±5°C for 10±1secs and the resistance is measured 1hr after the test.	$\Delta R < \pm 1\%$
Solderability Test	JIS C 5201 clause 4.17	The resistor is immersed in solder bath at 260±5°C for 2±0.5secs.	95% coverage
Thermal Shock	JIS C 5201 clause 4.21	The resistor is kept at a temperature of -55°C for 15mins and the temperature is then raised to 150°C and the resistor is held in this state for another 15mins. This is repeated for 1000 cycles. The change in resistance is then measured 2hrs after the completion of 1000 cycles.	$\Delta R < \pm(0.5\%+0.5m\Omega)$
Thermal Shock	JIS C 5201 clause 4.21	The resistor is kept at a temperature of -55°C for 5mins and the temperature is then raised to 125°C and the resistor is held in this state for another 5mins. The time taken for switching between temperatures does not exceed 10secs and this is repeated for 5 cycles. The change in resistance is measured 2hrs after the completion of 5 cycles.	$\Delta R < \pm 1\%$
Low Temperature Exposure (Storage)	JIS C 5201 clause 4.23.4	The resistor is placed in a chamber at -65±2°C and the rated voltage is applied to the resistor for 24hrs. The change in resistance is measured 60mins after removal from test chamber.	$\Delta R < \pm 1\%$
High Temperature Exposure (Storage)	JIS C 5201 clause 4.23.2	The resistor is placed in a constant temperature-humidity chamber at 170±2°C for 1000hrs and the resistance is measured 60mins after the end of the cycle.	$\Delta R < \pm 1\%$
Moisture Resistance (Climatic Sequence)	JIS C 5201 clause 4.23	The resistor is placed in a chamber at 80~100% RH and the temperature is raised from 25°C to 65°C in 2.5hrs where it is kept for 3hrs after which the temperature is brought down to 25°C in 2.5hrs. This 24hr loop is repeated again and at the end of the second loop the resistor is held at 25°C for the remaining 8hrs. The change in resistance is then measured 2hrs after the completion of 10 cycles	$\Delta R < \pm 1\%$
Load Life	JIS C 5201 clause 4.25.1	The resistor is placed in a chamber for 1000hrs at 70±2°C. The rated voltage is applied to the resistor (duty cycle: 90mins ON, 30mins OFF). The change in resistance is measured 60mins after removal from test chamber.	$\Delta R < \pm 1\%$

■ Power Derating Curve



■ Marking

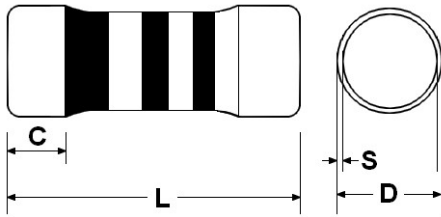
■ Example: M50=0.5mΩ / M75=0.75mΩ / R001=1mΩ

LH1206、LH2010、LH2512



Melf Resistor

Melf Carbon Film Resistor — MMC Series



Coating color: Beige

Features

- Tolerance up to $\pm 2\%$.
- Wide resistance range: $1\ \Omega$ to $10\text{M}\ \Omega$.

Type Dimension

Dimension

Unit: mm

TYPE	L	D	C	S
0102	2.00 ± 0.10	1.30 ± 0.10	0.55 ± 0.10	0.10 ± 0.05
0204	3.50 ± 0.20	1.45 ± 0.10	0.70 ± 0.10	0.15 ± 0.10
0207	5.70 ± 0.20	2.20 ± 0.10	0.80 ± 0.20	0.20 ± 0.10
0309	8.50 ± 0.30	3.00 ± 0.30	1.70 ± 0.20	0.30 ± 0.10
0411	10.50 ± 0.30	4.00 ± 0.30	2.30 ± 0.20	0.30 ± 0.10
0515	14.50 ± 0.30	4.50 ± 0.30	2.30 ± 0.20	0.30 ± 0.10

Electrical Specifications

Size	Power Rating	Max. Working Voltage	Max. Overload Voltage	T.C.R.	Resistance Range	Operating Temperature Range
					G (2%) ; J (5%)	
0204	1/8W	200V	400V	+350~-450	$1\ \Omega$ ~47K	-55°C ~ +155°C
				0~-700	51K~220K	
				0~-1000	240K~470K	
				0~-1300	510K~1M	
	1/4Ws	250V	500V	+350~-450	$1\ \Omega$ ~47K	
				0~-700	51K~220K	
				0~-1000	240K~470K	
				0~-1300	510K~1M	
0207	1/4W	250V	500V	+350~-450	$1\ \Omega$ ~100K	
	1/2Ws	300V	600V	0~-700	110K~330K	
	1Ws	400V	600V	0~-1000	360K~1M	
0309	1Ws	500V	1000V	0~-1300	1M1~2M2	
0411	2Ws			+350~-450	$1\ \Omega$ ~100K	
0515	3Ws			0~-700	110K~330K	
				0~-1000	360K~1M	
				0~-1300	1M1~2M2	

• For non-standard parts, please contact our sales dept.

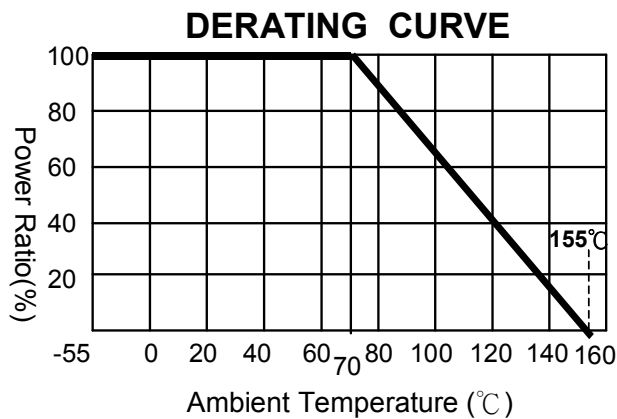
Rated Voltage = $\sqrt{P(W) \times R(\ \Omega)}$ or Max.working voltage, whichever lower.

Parts Number Explanation

Example:

MMC	0204	1/4Ws	F	174R	P03
Product Type	Size	Power	Resistor Tolerance	Resistors Value	Packing Quantity
MELF Carbom film	0204 0207 0309 0411 0515		G: $\pm 2\%$ J: $\pm 5\%$		W05: 500 pcs W15: 1500 pcs P01: 1000 pcs P02: 2000 pcs P03: 3000 pcs

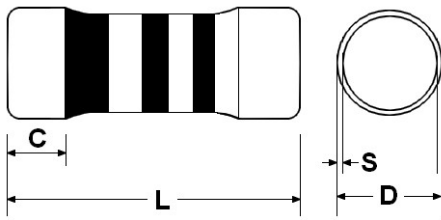
Power Derating Curve



Test Procedures and Requirements

Test Item	Test Method	Requirements
Temperature Coefficient of Resistance	JIS-C-5202; 5.2	
Short Time Overload	Rating voltage x 2.5 or Max. overload voltage for 5 sec. whichever less	$\pm 1\%$
Pulse Overload	Rating voltage x 4 or Max. pulse overload voltage whichever less for 10,000 cycles (1 sec. "ON" 25 sec. "OFF") Whichever less	$\pm 2\%$
Temperature Cycling	-55°C (30 min.)/+85°C (30 min.) for 5 cycles	$\pm 1\%$
Load Life in Humidity	40°C $\pm 2^\circ\text{C}$, 90%~95% RH, 1000h, 1.5h "ON"/0.5h "OFF" cycle	$\pm 5\%$
Load Life	70°C $\pm 2^\circ\text{C}$, 1000h, 1.5h "ON"/0.5h "OFF" cycle	$\pm 5\%$
Resistance to Soldering Heat	260°C $\pm 5^\circ\text{C}$, 5 sec ± 1 sec	$\pm 2\%$
Solderability	235°C $\pm 5^\circ\text{C}$, 2 sec ± 0.5 sec	$\geq 90\%$ coverage/Min
Bending Test	Holding point width 90mm, Bending 5mm, 1 time	$\pm 1\%$
High Temp. exposure	155°C $\pm 5^\circ\text{C}$, 2hours	$\pm 2\%$
Non-Combustibility	The resistor shall withstand Overload test in accordance with Article UL-94, V-0 without producing a fire hazard.	

■ Melf Metal Film Resistor — MMF Series



Coating color: Blue

■ Features

- Low TCR $\pm 15\text{ppm}/^\circ\text{C}$.
- Tolerance up to $\pm 0.1\%$.
- Wide resistance range: 0.1Ω to $5\text{M}\Omega$.

■ Type Dimension

■ Dimension

Unit: mm

TYPE	L	D	C	S
0102	2.00±0.10	1.30±0.10	0.55±0.10	0.10±0.05
0204	3.50±0.20	1.45±0.10	0.70±0.10	0.15±0.10
0207	5.70±0.20	2.20±0.10	0.80±0.20	0.20±0.10
0309	8.50±0.30	3.00±0.30	1.70±0.20	0.30±0.10
0411	10.50±0.30	4.00±0.30	2.30±0.20	0.30±0.10
0515	14.50±0.30	4.50±0.30	2.30±0.20	0.30±0.10

■ Electrical Specifications

Size	Power Rating	Max. Working Voltage	Max. Overload Voltage	T.C.R.	Resistance Range				Operating Temperature Range	
					B (0.1%) C (0.25%)	D (0.5%)	F (1%)	J (5%)		
0102	1/8Ws	150V	300V	±15ppm	50Ω-56K	50Ω-100K	1Ω-1M	0Ω 22-2M	-55°C ~ +155°C	
0204	1/8W	150V	300V		50Ω-56K	100Ω-100K	1Ω-1M	0Ω 22-2M		
	1/4Ws	200V	400V	±25ppm	50Ω-56K	100Ω-100K	1Ω-1M	0Ω 5-2M		
0207	1/4W	200V	400V	±50ppm	50Ω-56K	10Ω-560K	1Ω-5M	0Ω 22-5M		
	1/2Ws	300V	600V	±100ppm	50Ω-56K	10Ω-560K	1Ω-5M	0Ω 22-5M		
	1Wss	400V	700V		50Ω-56K	10Ω-560K	1Ω-5M	0Ω 5-5M		
0309	1Ws	500V	1000V	±50ppm		10Ω-100K	1Ω-1M	0Ω 1-1M		
0411	2Ws					10Ω-100K	1Ω-1M	0Ω 1-1M		
0515	3Ws							10Ω-100K	1Ω-1M	0Ω 1-1M
								10Ω-100K	1Ω-1M	0Ω 1-1M

● For non-standard parts, please contact our sales dept.

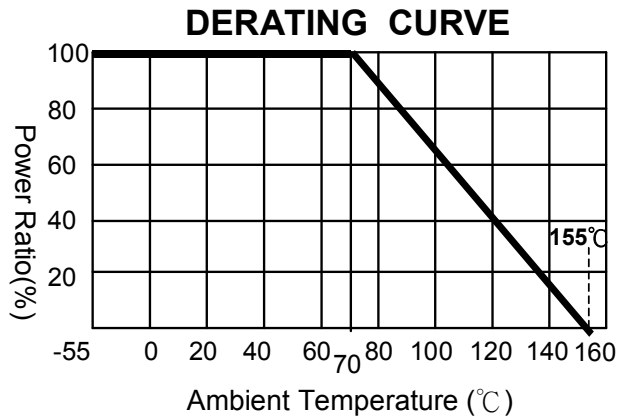
Rated Voltage = $\sqrt{P(W) \times R(\Omega)}$ or Max.working voltage, whichever lower.

Parts Number Explanation

Example:

MMF	0204	1/4Ws	F	174R	P03	optional
Product Type	Size	Power	Resistor Tolerance	Resistors Value	Packing Quantity	TCR
MELF Metal film	0102 0204 0207 0309 0411 0515		B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$ J: $\pm 5\%$		W05: 500 pcs W15: 1500 pcs P01: 1000 pcs P02: 2000 pcs P03: 3000 pcs	15: 15ppm 25: 25ppm 50: 50ppm 100: 100ppm

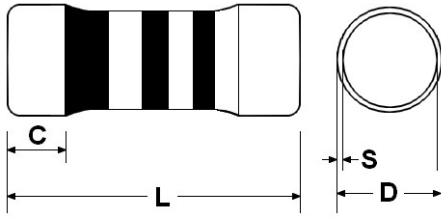
Power Derating Curve



Test Procedures and Requirements

Test Item	Test Method	Requirements
Temperature Coefficient of Resistance	JIS-C-5202; 5.2	$\pm 100\text{ppm}/^\circ\text{C}$; $\pm 50\text{ppm}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$; $\pm 15\text{ppm}/^\circ\text{C}$
Short Time Overload	Rating voltage x 2.5 or Max. overload voltage for 5 sec. whichever less	$\pm(0.5\%+0.05\Omega)$
Pulse Overload	Rating voltage x 3 or Max. pulse overload voltage whichever less for 10,000 cycles (1 sec. "ON" 25 sec. "OFF")	$\pm(0.5\%+0.05\Omega)$
Temperature Cycling	-55°C (30 min.)/ $+85^\circ\text{C}$ (30 min.) for 5 cycles	$\pm(0.5\%+0.05\Omega)$
Load Life in Humidity	$40^\circ\text{C} \pm 2^\circ\text{C}$, 90%~95% RH, 1000h, 1.5h "ON"/0.5h "OFF" cycle	$\pm(1\%+0.05\Omega)$
Load Life	$70^\circ\text{C} \pm 2^\circ\text{C}$, 1000h, 1.5h "ON"/0.5h "OFF" cycle	$\pm(1\%+0.05\Omega)$
Resistance to Soldering Heat	$260^\circ\text{C} \pm 5^\circ\text{C}$, 5 sec \pm 1 sec	$\pm(0.5\%+0.05\Omega)$
Solderability	$235^\circ\text{C} \pm 5^\circ\text{C}$, 5 sec \pm 0.5 sec	$\geq 90\%$ coverage
Bending Test	Holding point width 90mm, Bending 5mm, 1 time	$\pm(0.5\%+0.05\Omega)$
Non-Combustibility	The resistor shall withstand Overload test in accordance with Article UL-94, V-0 without producing a fire hazard.	

■ Melf Metal Oxide Resistor — MMO Series



Coating color: Grey

■ Features

- Tolerance up to $\pm 2\%$.
- Wide resistance range: 0.5Ω to $120K\Omega$.

■ Type Dimension

■ Dimension

Unit: mm

TYPE	L	D	C	S
0207	5.70 ± 0.20	2.20 ± 0.10	0.80 ± 0.20	0.20 ± 0.10
0309	8.50 ± 0.30	3.00 ± 0.30	1.70 ± 0.20	0.30 ± 0.10
0411	10.50 ± 0.30	4.00 ± 0.30	2.30 ± 0.20	0.30 ± 0.10
0515	14.50 ± 0.30	4.50 ± 0.30	2.30 ± 0.20	0.30 ± 0.10

■ Electrical Specifications

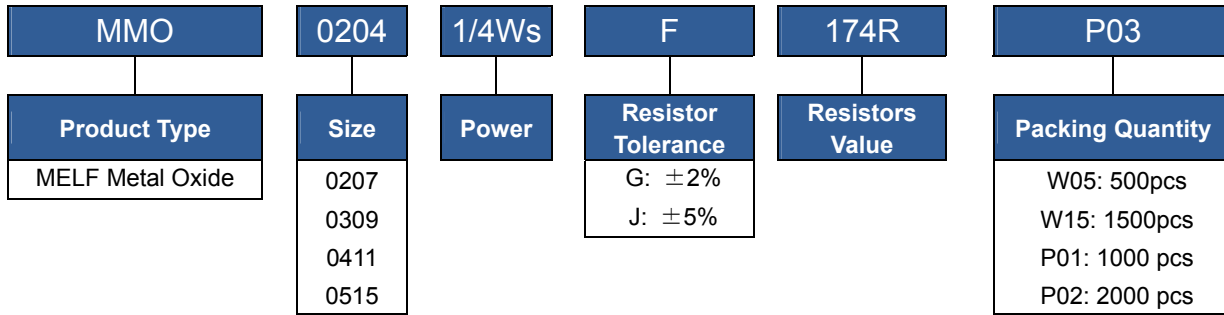
Size	Power Rating	Max. Working Voltage	Max. Overload Voltage	T.C.R.	Resistance Range		Operating Temperature Range
					G (2%)	J (5%)	
0207	1/4W	250V	500V	$\pm 350\text{ppm}$	0Ω 5-56K	0Ω 5-56K	-55°C ~ +155°C
	1/2Ws	300V	500V				
0309	1/2W	350V	600V		0Ω 5-82K	0Ω 5-82K	
	1Ws	350V	600V				
0411	1W	400V	700V		0Ω 5-100K	0Ω 5-100K	
	2Ws	400V	700V				
0515	3Ws	500V	800V	0Ω 5-120K	0Ω 5-120K		

- For non-standard parts, please contact our sales dept.

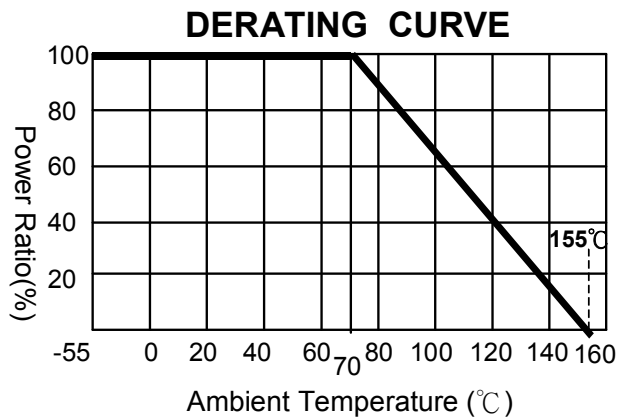
Rated Voltage = $\sqrt{P(W) \times R(\Omega)}$ or Max.working voltage, whichever lower.

■ Parts Number Explanation

■ Example:



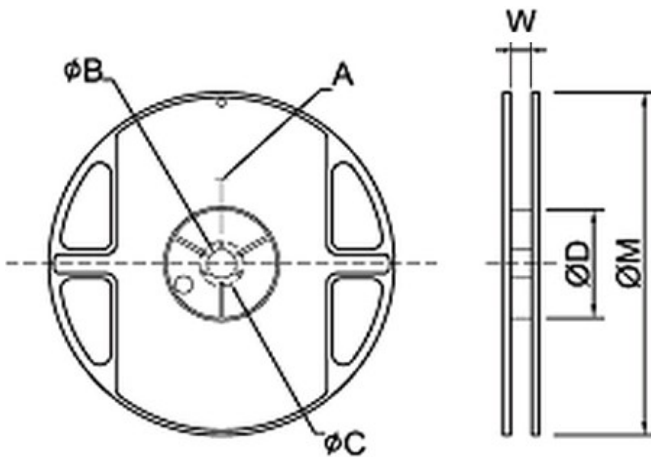
■ Power Derating Curve



■ Test Procedures and Requirements

Test Item	Test Method	Requirements
Temperature Coefficient of Resistance	JIS-C-5202; 5.2	±350ppm/°C
Short Time Overload	Rating voltage x 2.5 or Max. overload voltage for 5 sec.	±1%
Pulse Overload	Rating voltage x 4 or Max. pulse overload voltage for 10,000 cycles (1 sec. "ON" 25 sec. "OFF")	±2%
Temperature Cycling	-55°C (30 min.)/+85°C (30 min.) for 5 cycles	±1%
Load Life in Humidity	40°C ± 2°C, 90%~95% RH, 1000h, 1.5h "ON"/0.5h "OFF" cycle	±5%
Load Life	70°C ± 2°C, 1000h, 1.5h "ON"/0.5h "OFF" cycle	±5%
Resistance to Soldering Heat	260°C ± 5°C, 5 sec ± 1 sec	±2%
Solderability	235°C ± 5°C, 5 sec ± 0.5 sec	≥ 90% coverage/Min
Bending Test	Holding point width 90mm, Bending 5mm, 1 time	±1%
Non-Combustibility	The resistor shall withstand Overload test in accordance with Article UL-94, V-0 without producing a fire hazard.	

● Packaging Information

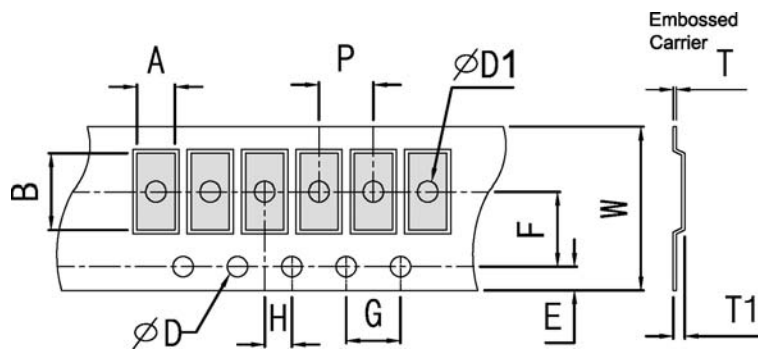


■ Dimension

Unit: mm

TYPE	Q'ty/reel	A	φB	φC	φD	W	φM
0102	3000 pcs	2.0±0.5	13.0±0.5	20.5±0.5	60.0±1.0	8.0±0.5	178.0±2.0
0204	3000 pcs	2.0±0.5	13.0±0.5	20.5±0.5	60.0±1.0	8.0±0.5	178.0±2.0
0207	2000 pcs	2.0±0.5	13.0±0.5	20.5±0.5	60.0±1.0	12.0±0.5	178.0±2.0
0309	2000 pcs		R10.5	13.5±0.5		16.0±0.5	330.0±2.0
0411	1500 pcs		R10.5	13.5±0.5		24.0±0.5	330.0±2.0

■ Tapping Specification



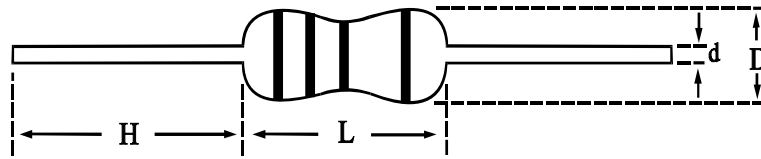
■ Dimension

Unit: mm

Size	A	B	W	E	F	G	H	T	φD	φD1	T1	P
0102	1.50±0.10	2.20±0.10	8.00±0.10	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	0.22±0.05	1.50±0.10	1.50±0.10	1.50±0.10	4.00±0.10
0204	1.60±0.10	3.70±0.10	8.00±0.10	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	0.22±0.05	1.50±0.10	1.50±0.10	1.65±0.10	4.00±0.10
0207	2.40±0.10	6.05±0.10	12.00±0.10	1.75±0.10	5.50±0.05	4.00±0.10	2.00±0.05	0.30±0.05	1.50±0.10	1.50±0.10	2.50±0.10	4.00±0.10
0309	3.30±0.10	8.15±0.10	16.00±0.30	1.75±0.10	7.50±0.10	4.00±0.10	2.00±0.10	0.35±0.05	1.50±0.10	1.50±0.10	3.35±0.10	8.00±0.10
0411	4.20±0.10	10.00±0.10	24.00±0.30	1.75±0.10	11.50±0.10	4.00±0.10	2.00±0.10	0.35±0.05	1.50±0.10	1.50±0.10	4.20±0.10	8.00±0.10

DIP Resistor

Carbon Film Fixed Resistor — CB Series



Features

- Lowest cost, prompt delivery
- Excellent long term stability
- Wide resistance range $0\ \Omega$ 22~100M Ω
- Power ratings

Dimension

Unit: mm

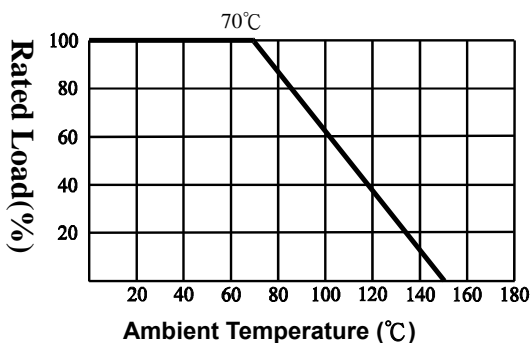
TYPE / Rated Power at 70°C		L	D	H	d	Comment
Standard	Miniature					
1/8W	1/4WS	3.3±0.4 0.2 0.2	1.8±0.3	26±2.0	0.43±0.05	★ Standard Series: Light Brown (khaki) Color Epoxy Coating
1/4W	1/2WS	6.3±0.5	2.3±0.3	26±2.0	0.5±0.03	
1/3W	1/2WSS	8.5±0.5	2.7±0.5	26±2.0	0.52±0.03	★ Miniature Series: Pink Color Epoxy Coating
1/2W	1WS	9.0±0.5	3.2±0.5	26±2.0	0.65±0.03	
1W	2WS	11.5±1.0	4.5±0.5	30±2.0	0.76±0.03	
2W	3WS	15.5±1.0	5.0±0.5	32±2.0	0.76±0.03	

Electrical Characteristics

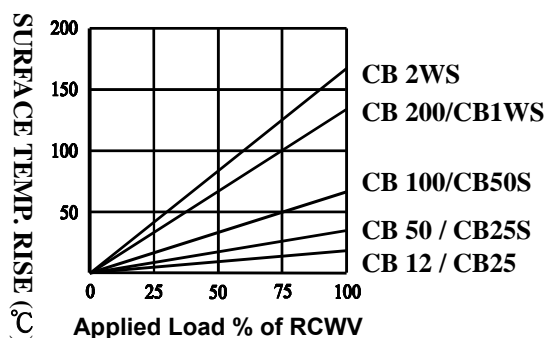
Power rating at 70°C	1/8W	1/4WS	1/4W	1/2WS	1/3W	1/2WSS	1/2W	1WS	1W	2WS	2W	3WS
Operating Temp. Range	-55°C to +155°C											
Max. Working Voltage	150V	200V	250V	300V	280V	320V	350V	400V	450V	500V	500V	500V
Max. Overload Voltage	300V	400V	500V	500V	500V	600V	700V	800V	1000V	1000V	1000V	1000V
Dielectric Withstanding Voltage	300V	400V	500V	500V	500V	600V	700V	800V	1000V	1000V	1000V	1000V
Resistance Range (±5%)	1 Ω ~10M Ω , E24 series											

● For non-standard parts, please contact our sales dept.

Power Graph (°C)



Hot-Spot Temperature (%)



Temperature Coefficient (T.C.R.)

TYPE	Max. Value of Temp. Coefficient ppm/°C		
	under 100KΩ	100KΩ to 1MΩ	1MΩ to 4M7Ω
1W, 2W, 2WS, 3WS	±350 ppm	-0ppm -500ppm	-0ppm -1000ppm
1/6W, 1/4W, 1/4WS, 1/2W, 1/2WS, 1WS	+350ppm- 500ppm	-0ppm-700ppm	-0ppm-1500ppm

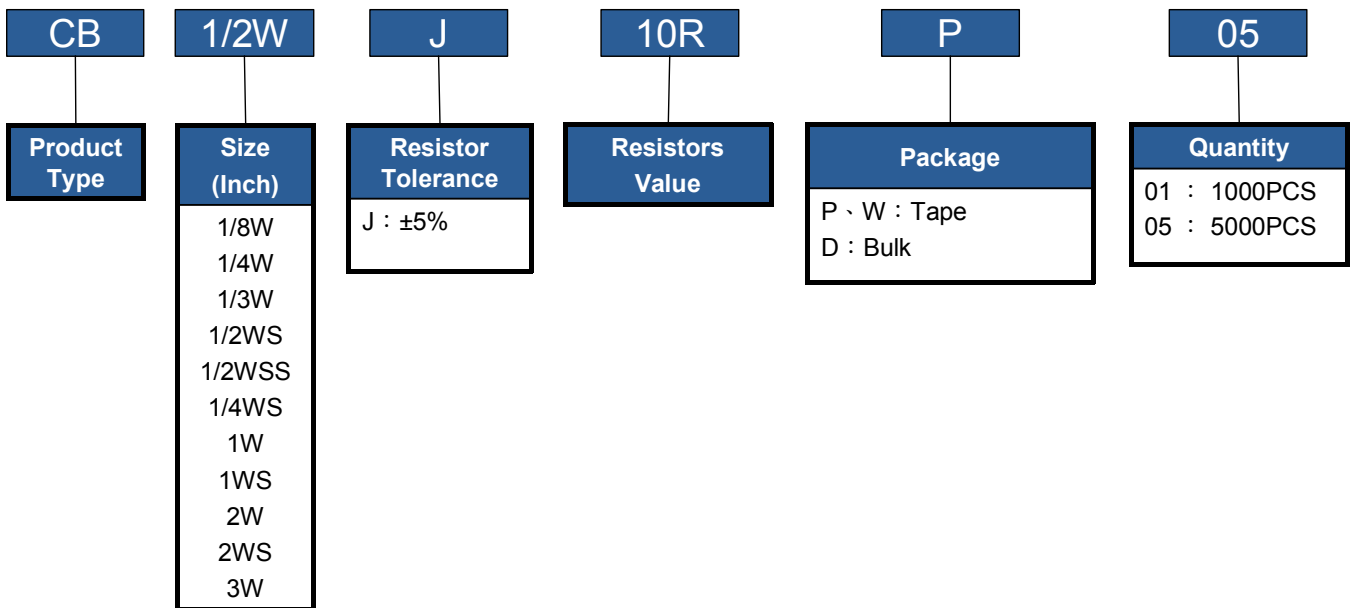
Environmental Characteristics

Performance Test	Test Method	Requirements
Short Time Overload	JIS-C-5202 5.5 2.5 times RCWV for 5 seconds	±(0.75%+0.05Ω)
Temperature Coefficient Resistance (T.C.R.)	Resistance value at room Temperature and room Temperature+100°C	page
Dielectric Withstanding Votage	JIS-C5202 5.7 In V-Block for 60 seconds	By Type
Pulse Overload	JIS-C5202 5.8 4 times RCWV for 10000cycles(1sec.on · 25secs.off)	±(1%+0.05Ω)
Insulation Resistance	JIS-C5202 5.6 In V-Block	> 10000MΩ
Load Life	JIS-C5202 7.10 70°C at RCWV for 1000hrs.(1.5hrs. on · 0.5hrs.off)	±(3%+0.05Ω)
Load Life in Humidity	JIS-C5202 7.9 40±2°C 90~95%RH at RCWV for 1000hrs. (1.5hrs. on · 0.5hrs.off)	Less than 100KΩ±3% 100KΩ or more±5%
Solder Ability	JIS-C5202 6.5 235±5°C for 2±0.5 seconds	95% min. coverage
Resistance to Solvent	JIS-C5202 6.9 Trichroethane for 1 min. with ultrasonic	No deterioration of coatings and markings
Terminal Strength	Direct load for 10 sec. In the direction off the terminal leads.	Tensile: ≥2.5kg

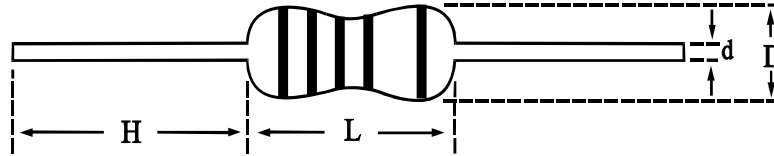
★ Rated continuous Working Voltage (RCWV) = $\sqrt{\text{POWER.RATING.} * \text{RESISTANCE.VALUE}}$

■ Parts Number Explanation

■ Example:



■ Metal Film Resistor — MF Series



■ Features

- Low noise
- Low t.c.r. 100ppm, 50ppm, 25ppm, 10ppm, 5ppm.
- High precision 1%, 0.5%, 0.25%, 0.1%

■ Dimension

Unit: mm

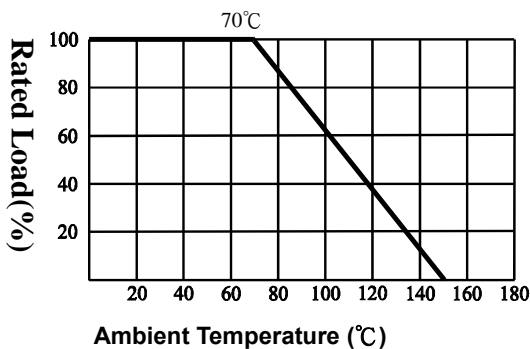
TYPE / Rated Power at 70°C		L	D	H	d	Comment
Standard	Miniature					
1/8W	1/4WS	3.3±0.4 0.2	1.8±0.3	29±2.0	0.43±0.05	★ Standard Series: Blue Color Epoxy Coating ★ Miniature Series: Blue Color Epoxy Coating
1/4W	1/2WS	6.3±0.5	2.3±0.3	28±2.0	0.5±0.03	
1/2W	1WS	9.0±0.5	3.2±0.5	26±2.0	0.6±0.03	
1W	2WS	11.5±1.0	4.5±0.5	35±2.0	0.76±0.03	
2W	3WS	15.5±1.0	5.0±0.5	32±2.0	0.76±0.03	

■ Electrical Characteristics

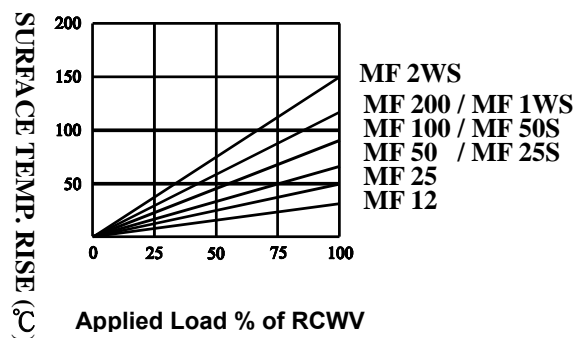
Power rating at 70°C	1/8W	1/4WS	1/4W	1/2WS	1/2W	1WS	1W	2WS	2W	3WS
Operating Temp. Range	-55°C to +155°C									
Max. Working Voltage	200V	200V	250V	300V	350V	400V	450V	500V	500V	500V
Max. Overload Voltage	400V	400V	500V	600V	700V	800V	1000V	1000V	1000V	1000V
Dielectric Withstanding Voltage	300V	400V	500V	500V	500V	700V	1000V	1000V	1000V	1000V
Resistance Range (±1%.±0.5%)	10Ω~1MΩ, E96series									
Resistance Range (±0.25%.±0.1%)	100Ω~100KΩ, E192series									

● For non-standard parts, please contact our sales dept.

■ Power Graph (°C)



■ Hot-Spot Temperature (%)



■ Temperature Coefficient (T.C.R.)

TYPE	Max. Value of Temp. Coefficient ppm/°C
1/8W, 1/4W, 1/4WS, 1/2W, 1/2WS, 1W, 1WS, 2W, 2WS, 3WS	±15ppm/°C, ±25ppm/°C, ±50ppm/°C, ±100ppm/°C

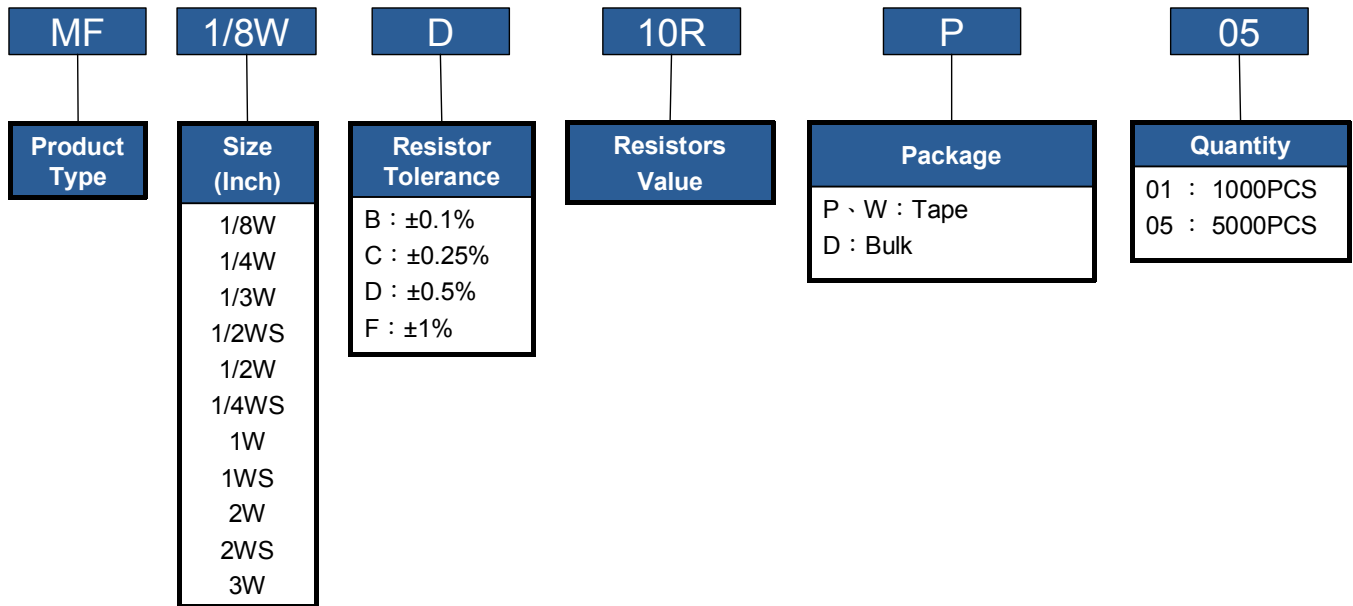
■ Environmental Characteristics

Performance Test	Test Method	Requirements
Short Time Overload	JIS-C-5202 5.5 2.5 times RCWV for 5 seconds	±(0.25%+0.05Ω)
Temperature Coefficient Resistance (T.C.R.)	Resistance value at room Temperature and room Temperature+100°C	By Type
Dielectric Withstanding Votage	JIS-C5202 5.7 In V-Block for 60 seconds	By Type
Pulse Overload	JIS-C5202 5.8 4 times RCWV for 10000 cycles(1sec.on · 25secs.off)	±(0.75%+0.05Ω)
Insulation Resistance	JIS-C5202 5.6 In V-Block	> 10000MΩ
Load Life	JIS-C5202 7.10 70°C at RCWV for 1000hrs.(1.5hrs. on · 0.5hrs.off)	±(1.5%+0.05Ω)
Load Life in Humidity	JIS-C5202 7.9 40±2°C 90~95%RH at RCWV for 1000hrs. (1.5hrs. on · 0.5hrs.off)	±(1.5%+0.05Ω)
Solder Ability	JIS-C5202 6.5 260±5°C for 2±0.5 seconds	95% min. coverage
Resistance to Solvent	JIS-C5202 6.9 Trichroethane for 1 min. with ultrasonic	No deterioration of coatings and markings
Terminal Strength	Direct load for 10 sec. In the direction off the terminal leads.	Tensile: ≥ 2.5kg

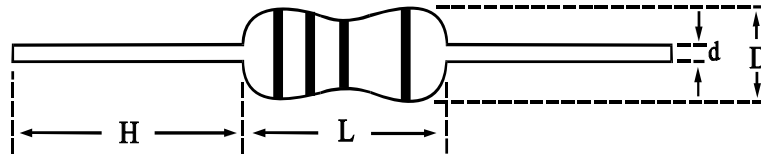
★ Rated continuous Working Voltage (RCWV) = $\sqrt{\text{POWER.RATING} \cdot \text{RESISTANCE.VALUE}}$

■ Parts Number Explanation

■ Example:



■ Metal Oxide Flame-Proof Resistor — MO Series



■ Features

- Low cost, prompt delivery
- High power-to-size ratio for significant space savings
- Excellent long-time stability
- Complete flameproof construction UL-1412
- High surge/overload capability
- Wide resistance range: 0.1Ω~1mΩ
- Controlled temperature coefficient
- Resistance standard tolerance : ±5% (consult factory for ±2% ±1%)
- Coating and marking resist trichorethelyne, freon, and other cleaning agents
- Non-inductive design, resistance range: 0.1Ω~100Ω

■ Dimension

Unit: mm

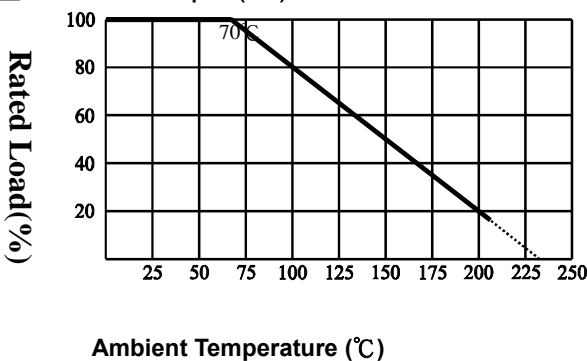
TYPE / Rated Power at 70°C		L	D	H	d	Comment
Standard	Miniature					
1/4W	1/2WS	6.3±0.5	2.3±0.3	28±2.0	0.55±0.03	★ Standard Series: Flameproof Coating , Grey color
1/2W	1WS	9.0±0.5	3.2±0.5	26±2.0	0.65±0.03	
1W	2WS	11.5±1.0	4.5±0.5	35±2.0	0.76±0.03	★ Miniature Series: Flameproof Coating , Pink color
2W	3WS	15.5±1.0	5.0±0.5	32±2.0	0.76±0.03	
3W	5WS	17.5±1.0	6.5±0.5	35±2.0	0.78±0.03	
5W	7WS	24.5±1.0	8.5±0.5	35±2.0	0.78±0.03	

■ Electrical Characteristics

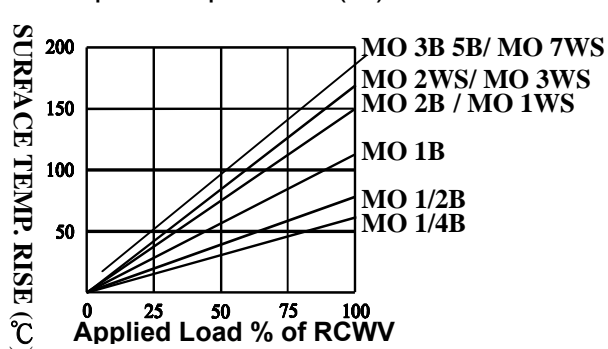
Power rating at 70°C	1/4W	1/2WS	1/2W	1WS	1W	2WS	2W	3WS	3W	5WS	5W	7WS
Operating Temp. Range	-55°C to +155°C											
Max. Working Voltage	200V	250V	250V	300V	350V	350V	350V	400V	400V	750V	750V	750V
Max. Overload Voltage	350V	400V	400V	500V	600V	600V	600V	700V	700V	1000V	1000V	1000V
Dielectric Withstanding Voltage	350V	350V	350V	400V	500V	500V	500V	600V	600V	1000V	1000V	1000V
Resistance Range (±1%.±2%.±5%)	1Ω~510KΩ, E24 series											

● For non-standard parts, please contact our sales dept.

■ Power Graph (°C)



■ Hot-Spot Temperature (%)



■ Temperature Coefficient (T.C.R.)

TYPE	Max. Value of Temp. Coefficient ppm/°C
1/4W, 1/2WS, 1/2W, 1WS 1W, 2WS, 2W, 3WS, 3W, 5W, 5WS, 7WS	±300 ppm

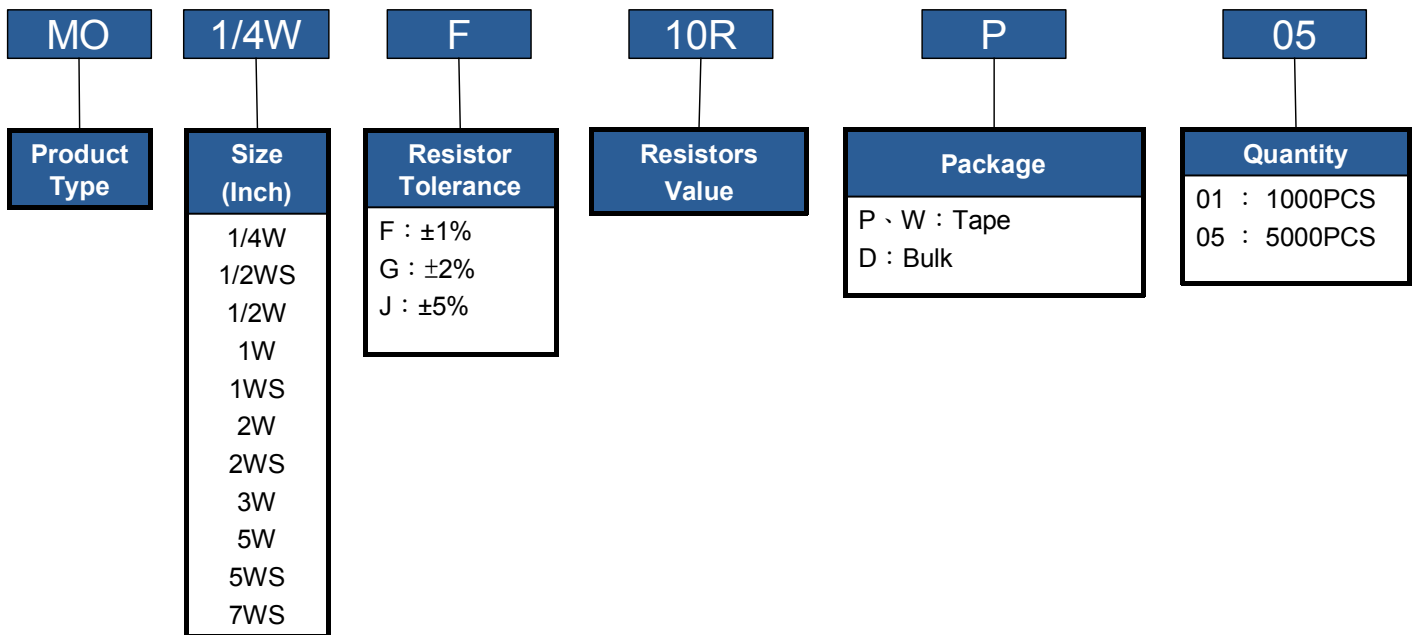
■ Environmental Characteristics

Performance test	Test Method	Requirements
Short time Overload	JIS-C-5202 5.5 2.5 times RCWV for 5 seconds	±(0.25%+0.05Ω)
Temperature Coefficient Resistance (T.C.R.)	Resistance value at room Temperature and room Temperature+100°C	By Type
Dielectric Withstanding Voltage	JIS-C5202 5.7 In V-Block for 60 seconds	By Type
Pulse Overload	JIS-C5202 5.8 4 times RCWV for 10000cycles(1sec.on · 25secs.off)	±(1%+0.05Ω)
Insulation Resistance	JIS-C5202 5.6 In V-Block	> 10000MΩ
Load Life	JIS-C5202 7.10 70°C at RCWV for 1000hrs.(1.5hrs. on · 0.5hrs.off)	±(1.5%+0.05Ω)
Load Life in Humidity	JIS-C5202 7.9 40±2°C 90~95%RH at RCWV for 1000hrs. (1.5hrs. on · 0.5hrs.off)	±(1.5%+0.05Ω)
Solder Ability	JIS-C5202 6.5 260±5°C for 2±0.5 seconds	95% min. coverage
Resistance to Solvent	JIS-C5202 6.9 Trichroethane for 1 min. with ultrasonic	No deterioration of coatings and markings
Terminal Strength	Direct load for 10 sec. In the direction off the terminal leads.	Tensile: ≥2.5kg

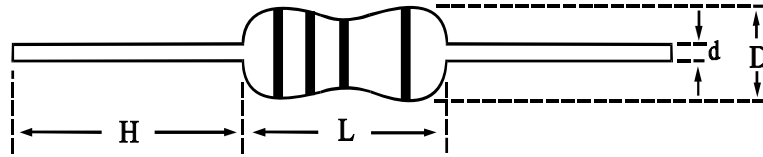
★ Rated continuous Working Voltage (RCWV) = $\sqrt{\text{POWER.RATING.} * \text{RESISTANCE.VALUE}}$

■ Parts Number Explanation

■ Example:



■ Wirewound Resistors Flame -Proof Coating Type — KNP Series



■ Features

- Super heat dissipation ; small linear temperature coefficient
- Instant overload capability ; low noise figure and without annual shift on resistance value
- Complete flameproof construction UL-1412
- Identify NKNP by fifth color band with green color.
- Value range 、 $\pm 5\%$ 、 $\pm 2\%$ 、 $\pm 1\%$

■ Dimension

Unit: mm

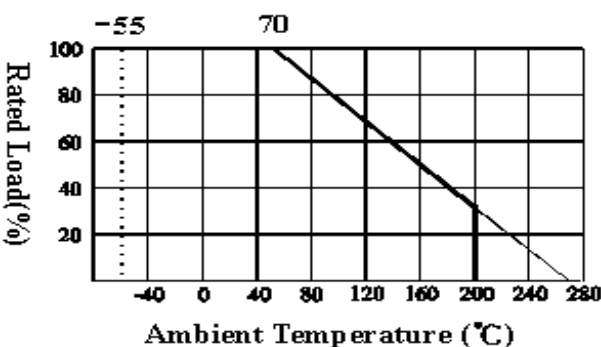
TYPE / Rated Power at 70°C		L	D	H	d	Comment
Standard	Miniature					
1/2W	1WS	9.0±0.5	3.2±0.5	26±2.0	0.65±0.03	★Standard Series:Grey Color Epoxy Coating
1W	2WS	11.5±1.0	4.5±0.5	35±2.0	0.78±0.03	
2W	3WS	15.5±1.0	5.0±0.5	32±2.0	0.78±0.03	★Miniature Series: Pink Color Epoxy Coating
3W	5WS	17.5±1.0	6.0±0.5	32±2.0	0.78±0.03	
5W	7WS	24.5±1.0	8.0±0.5	38±2.0	0.78±0.03	

■ Electrical Characteristics

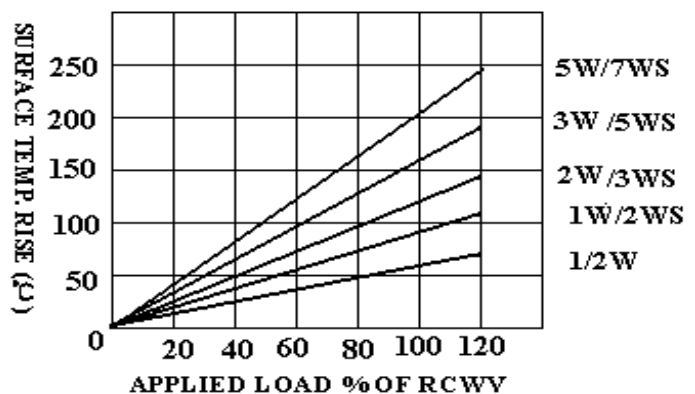
Power rating at 70°C	1/2W	1WS	1W	2WS	2W	3WS	3W	5WS	5W	7WS
Operating Temp. Range	-55°C to +155°C									
Dielectric Withstanding volt	300V			400V						
Resistance Range ($\pm 1\%$, $\pm 2\%$, $\pm 5\%$)	0.01Ω~50Ω		0.01Ω~100Ω		0.01Ω~330Ω		0.01Ω~330Ω		0.01Ω~560Ω	

● For non-standard parts, please contact our sales dept.

■ Power Graph (°C)



■ Hot-Spot Temperature (%)



■ Temperature Coefficient (T.C.R.)

TYPE	Max. Value of Temp. Coefficient ppm/°C
1/2W, 1WS, 1W, 2W, 2WS, 3W, 3WS, 5W, 5WS, 7WS	±400 ppm

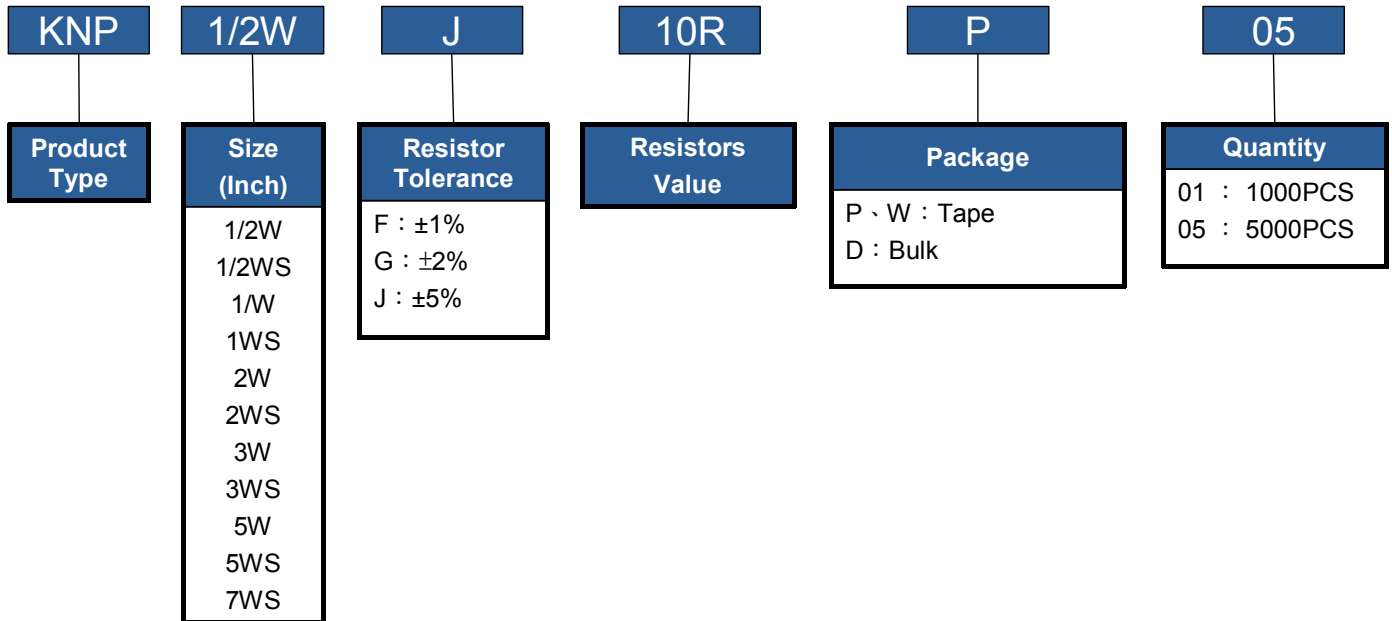
■ Environmental Characteristics

Performance test	Test Method	Requirements
Short time Overload	JIS-C-5202 5.5 2.5 times RCWV for 5 seconds	±(2%+0.05Ω)
Temperature Coefficient Resistance (T.C.R.)	Resistance value at room Temperature and room Temperature+100°C	By Type
Dielectric Withstanding Voltage	JIS-C5202 5.7 In V-Block for 60 seconds	By Type
Insulation Resistance	JIS-C5202 5.6 In V-Block	> 100MΩ
Load Life	JIS-C5202 7.10 70°C at RCWV for1000hrs.(1.5hrs. on · 0.5hrs.off)	±(5%+0.05Ω)
Load Life in Humidity	JIS-C5202 7.9 40±2°C 90~95%RH at RCWV for1000hrs. (1.5hrs. on · 0.5hrs.off)	±(5%+0.05Ω)
Solder Ability	JIS-C5202 6.5 260±5°C for 2±0.5 seconds	95% min. coverage
Terminal Strength	Direct load for 10 sec. In the direction off the terminal leads.	Tensile: ≥ 2.5kg

★ Rated continuous Working Voltage (RCWV) = $\sqrt{\text{POWER.RATING} \cdot \text{RESISTANCE.VALUE}}$

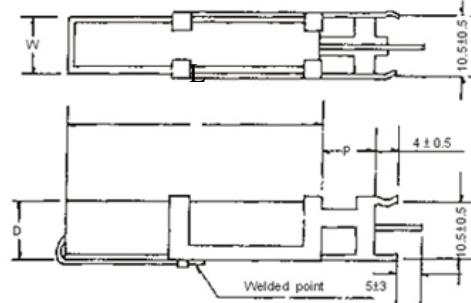
■ Parts Number Explanation

■ Example:



■ Cement Type Resistor

● SPS Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

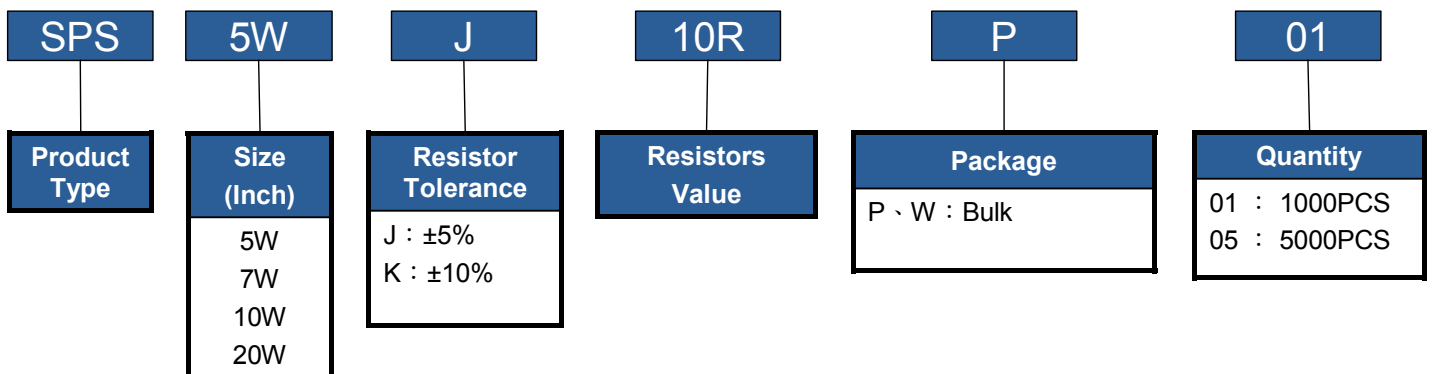
■ Dimension

Unit: mm

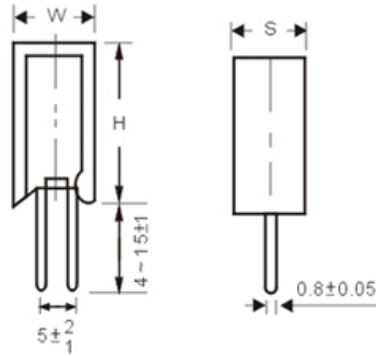
TYPE	L	W	D	P	RESISTANCE RANGE Ω	
					Wirewound	RS
5W	10	9	22	5	0.1 Ω ~ 200 Ω	200 Ω ~ 50K Ω
7W	10	9	35	10	0.1 Ω ~ 300 Ω	300 Ω ~ 50K Ω
10W	10	9	48	10	0.1 Ω ~ 500 Ω	500 Ω ~ 50K Ω
20W	60	14	13	10	0.1 Ω ~ 500 Ω	500 Ω ~ 50K Ω

■ Parts Number Explanation

■ Example:



● SQM Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

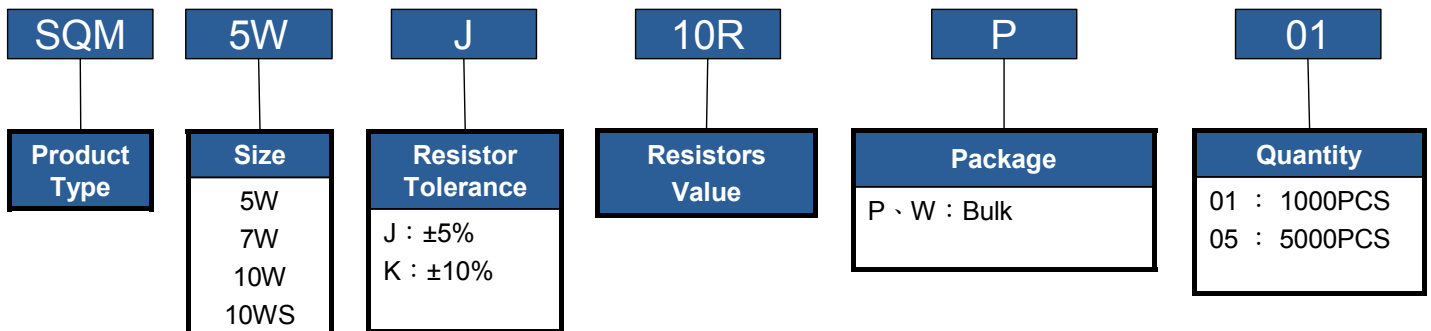
■ Dimension

Unit: mm

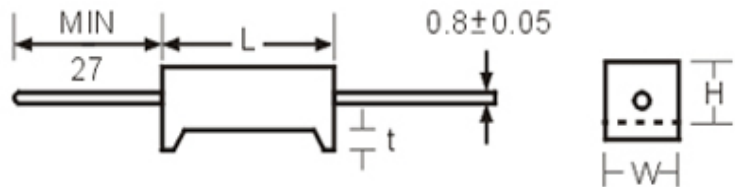
TYPE	H ± 1.5	W ± 1	S ± 1	RESISTANCE RANGE Ω	
				Wirewound	Metal oxide
5W	25	13	9	0.1 Ω ~ 50 Ω	50 ~ 50K Ω
7W	39	13	9	0.1 Ω ~ 500 Ω	500 ~ 47K Ω
10W	51	13	9	0.1 Ω ~ 500 Ω	500 ~ 47K Ω
10WS	35	16	12	0.1 Ω ~ 500 Ω	500 ~ 47K Ω

■ Parts Number Explanation

■ Example:



● SQT Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

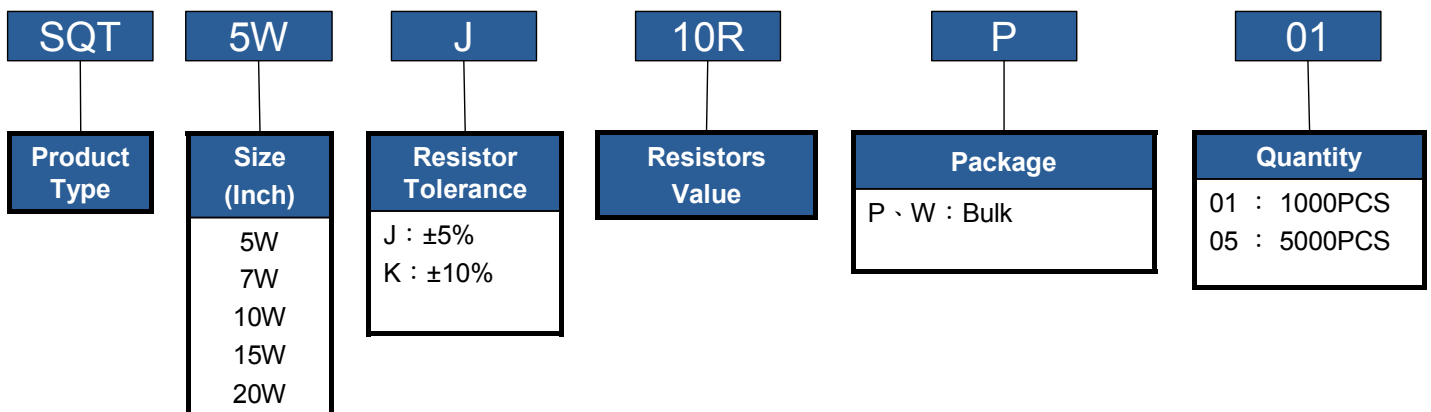
■ Dimension

Unit: mm

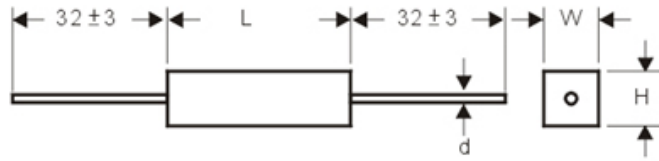
TYPE	W ± 1	H ± 1	L ± 1	t ± 0.5	RESISTANCE RANGE Ω	
					Wire wound	Metal oxide
5W	10	9	22	1.5	0.1 Ω ~ 50 Ω	50 ~ 50K Ω
7W	10	9	35	3.0	0.1 Ω ~ 500 Ω	500 ~ 47K Ω
10W	10	9	48	3.0	0.1 Ω ~ 500 Ω	500 ~ 47K Ω
15W	12.5	12.5	48	3.0	0.1 Ω ~ 500 Ω	500 ~ 47K Ω
20W	13	14	60	5.0	0.1 Ω ~ 500 Ω	500 ~ 47K Ω

■ Parts Number Explanation

■ Example:



● SQP Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

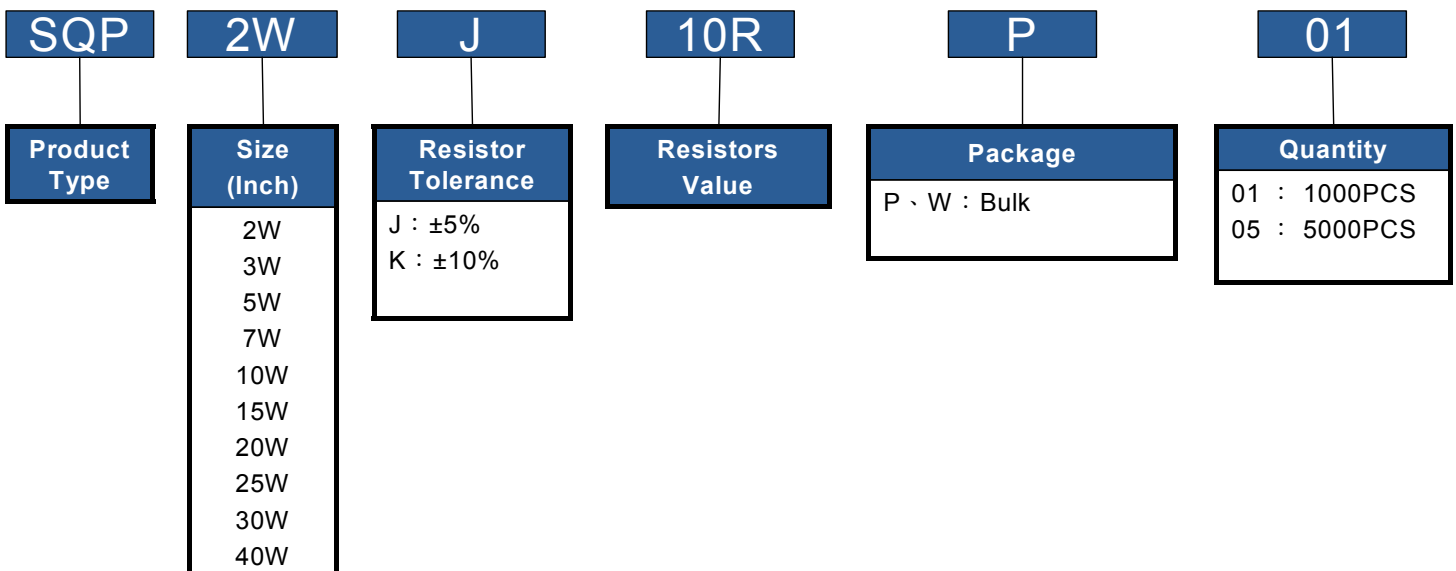
■ Dimension

Unit: mm

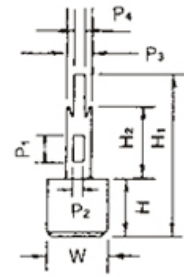
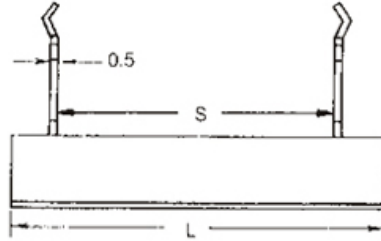
TYPE	L ± 0.5	W ± 0.5	H ± 0.5	d ± 0.03	RESISTANCE RANGE Ω	
					Wire wound	Metal oxide
2W	18.0	7.0	7.0	0.65	0.1 Ω ~ 50 Ω	50 Ω ~ 200K Ω
3W	22.0	8.0	8.0	0.8	0.1 Ω ~ 50 Ω	50 Ω ~ 330K Ω
5W	22.0	9.5	9.0	0.8	0.1 Ω ~ 50 Ω	50 Ω ~ 500K Ω
7W	35.0	9.5	9.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 500K Ω
10W	48.0	9.5	9.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 500K Ω
15W	48.0	12.5	12.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 150K Ω
20W	60.0	14.0	13.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 150K Ω
25W	60.0	14.0	13.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 150K Ω
30W	77.0	18.0	17.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 150K Ω
40W	90.0	19.0	18.0	0.8	0.1 Ω ~ 500 Ω	500 Ω ~ 150K Ω

■ Parts Number Explanation

■ Example:



● SQZ Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

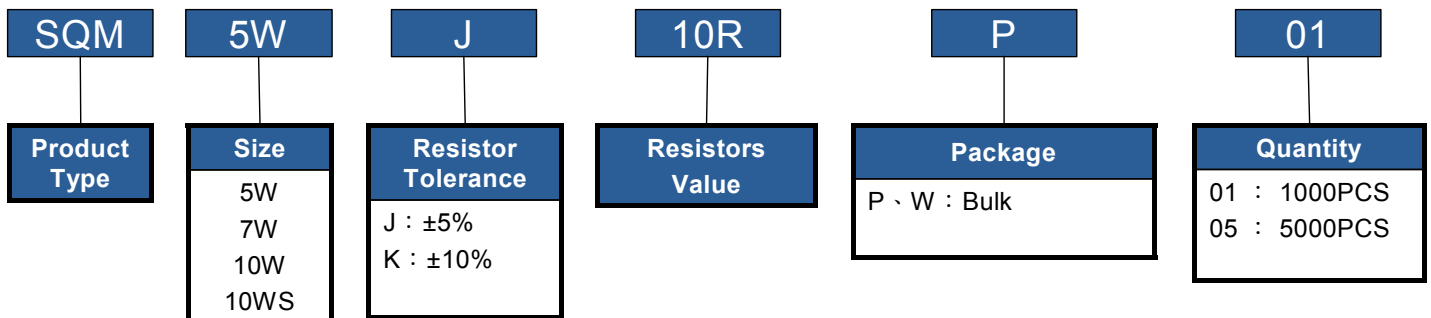
■ Dimension

Unit: mm

TYPE	L	H	W	S	H1	H2	P1	P2	P3	P4	RESISTANCE RANGE Ω	
											Wire wound	Metal oxide
5W	27.0	9.5	9.5	15.0	24.0	9.5	4.0	2.0	5.0	1.4	0.1 ~ 100 Ω	100 Ω ~ 50K Ω
7W	35.0	9.5	9.5	22.5	24.0	9.5	4.0	2.0	5.0	1.4	0.1 ~ 500 Ω	500 Ω ~ 50K Ω
10W	48.0	9.5	9.5	32.5	24.0	9.5	4.0	2.0	5.0	1.4	0.2 ~ 500 Ω	500 Ω ~ 50K Ω
15W	48.0	12.5	12.5	32.5	34.5	15	7.0	6.0	10.0	2.7	0.5 ~ 500 Ω	500 Ω ~ 150K Ω
20W	63.5	12.5	12.5	42.5	34.5	15	7.0	6.0	10.0	2.7	1 ~ 50 Ω	500 Ω ~ 150K Ω
3WS	22.0	8.0	8.0	10.0	23.0	12	4.0	2.0	5.0	1.4	0.1 ~ 50 Ω	50 Ω ~ 33K Ω
5WS	22.0	9.5	9.5	10.0	24.0	12	4.0	2.0	5.0	1.4	0.1 ~ 50 Ω	50 Ω ~ 50K Ω

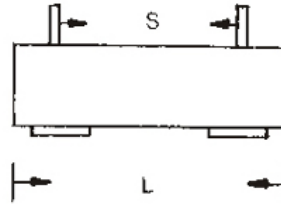
■ Parts Number Explanation

■ Example:

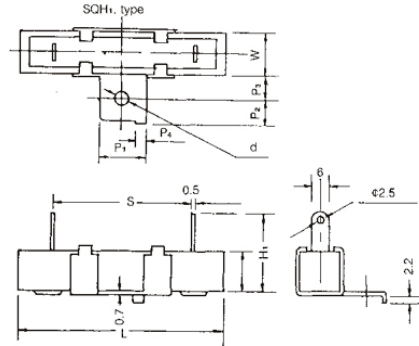


● SQH / SQHG Series

SQH Series



SQHG Series



■ Features

- Heat and flame resistant
- Completely insulated character suitable for printed circuit board.
- For high resistance value, the winding core will be replaced by metal oxide film cutting core (RS type).
- Non-inductive type is available on request.
- Tolerance : $\pm 5\%$ $\pm 10\%$.

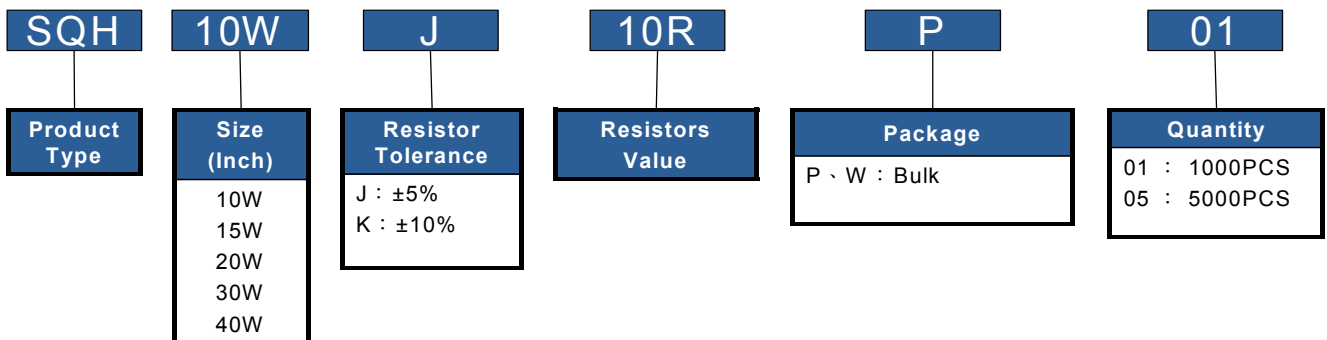
■ Dimension

Unit: mm

TYPE	RESISTANCE RANGE Ω		L ± 2	H ± 1	W ± 1	S ± 1	H ± 1	P1 ± 1	P2 ± 1	P3 ± 1	P4 ± 1	d
	Wire wound	Metal oxide										
10W	0.5 Ω ~ 100 Ω	500 Ω ~ 50K Ω	48.0	10.0	10.0	33	21	12	6	8.0	3.0	4
15W	1 Ω ~ 500 Ω	500 Ω ~ 150K Ω	48.0	12.0	12.0	33	21	12	6	8.0	3.0	4
20W	1 Ω ~ 500 Ω	500 Ω ~ 150K Ω	63.7	12.0	12.0	42	24	12	6	8.0	3.0	4
30W	1 Ω ~ 500 Ω		75.0	19.0	18.0	56	30	17	8	10.0	3.0	4
40W	1 Ω ~ 500 Ω		90.0	19.0	18.0	68	30	17	8	10.0	3.0	4

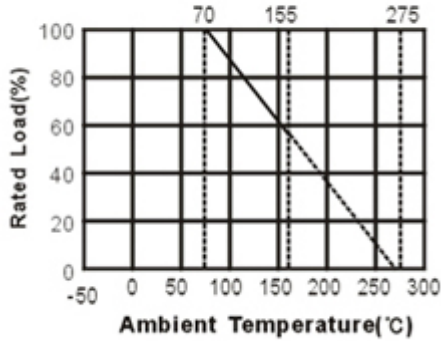
■ Parts Number Explanation

■ Example:

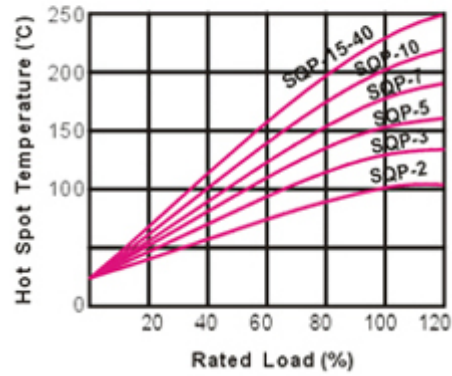


● Technical Data

DERATING CURVE



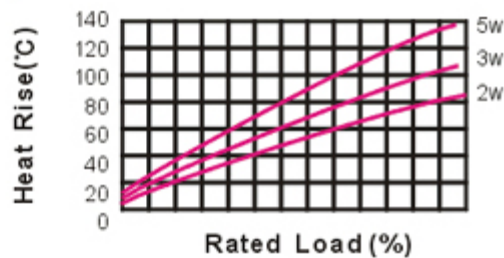
TEMPERATURE RISE



CHARACTERISTICS

REQUIREMENTS	CHARACTERISTICS
Temperature Coefficient	$\pm 300\text{PPM}/^{\circ}\text{C}$ $<20\ \Omega$ $\pm 400\text{PPM}/^{\circ}\text{C}$
Insulation Resistance	$> 100\text{M}\ \Omega$
Load Life (1,000 hours)	$\pm (2\% + 0.05\ \Omega)$
Short-time Overload	$\pm (2\% + 0.05\ \Omega)$
Dielectric Withstanding Voltage	$\pm (1\% + 0.05\ \Omega)$
Moisture Resistance	$\pm (3\% + 0.05\ \Omega)$
Shock and Vibration	$\pm (1\% + 0.05\ \Omega)$
Soldering Heat	$\pm (1\% + 0.05\ \Omega)$
Incombustibility	EX16 TimeS V., 5 min

HEAT RISE CHART



■ **Multilayer Ceramic Chip Capacitor (MLCC)**

(We also provide MLCC. Please contact our sales for more details.)