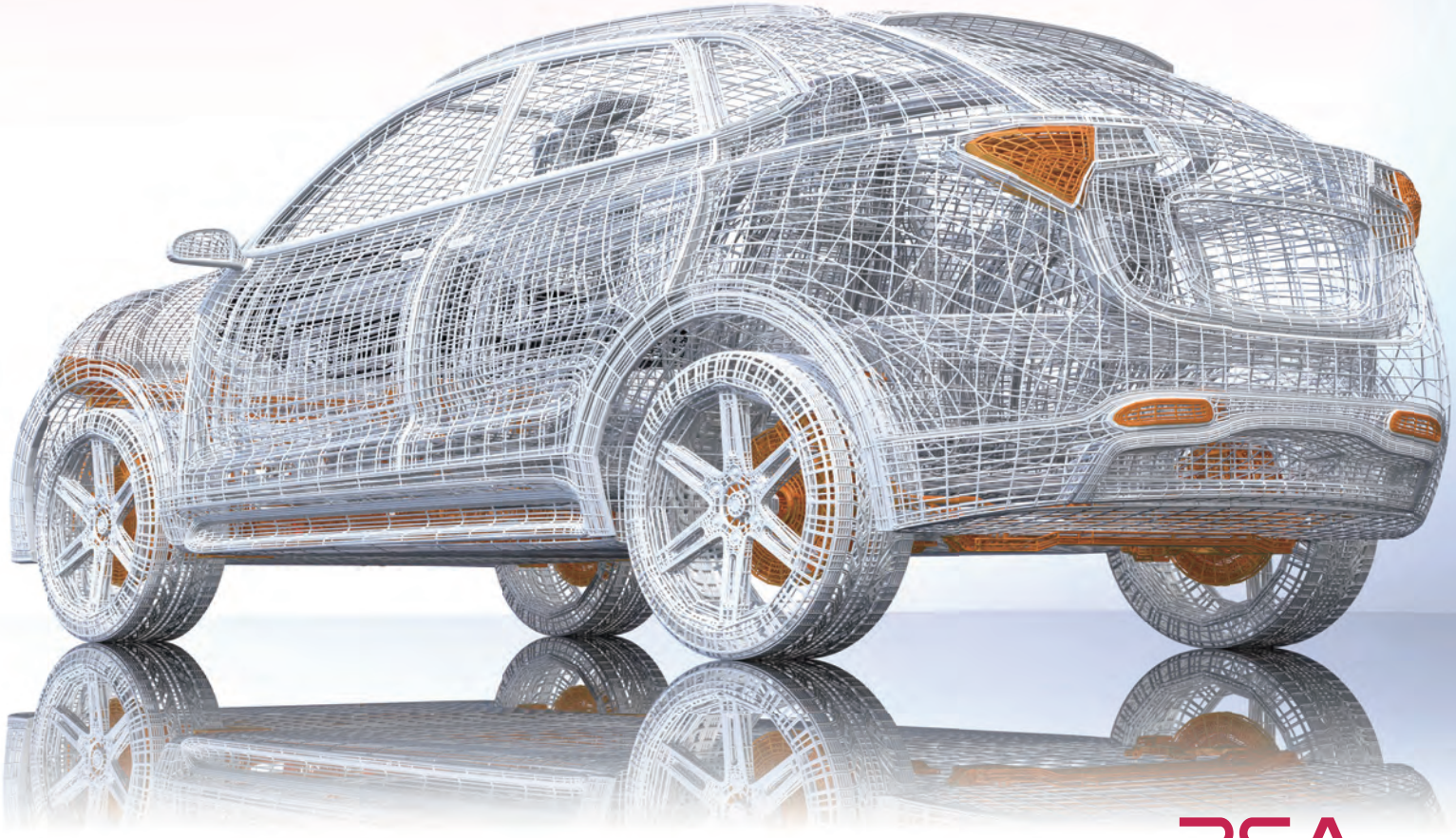
KAMAYA

ELECTRONIC COMPONENTS CATALOG



PSA
PASSIVE SYSTEM ALLIANCE

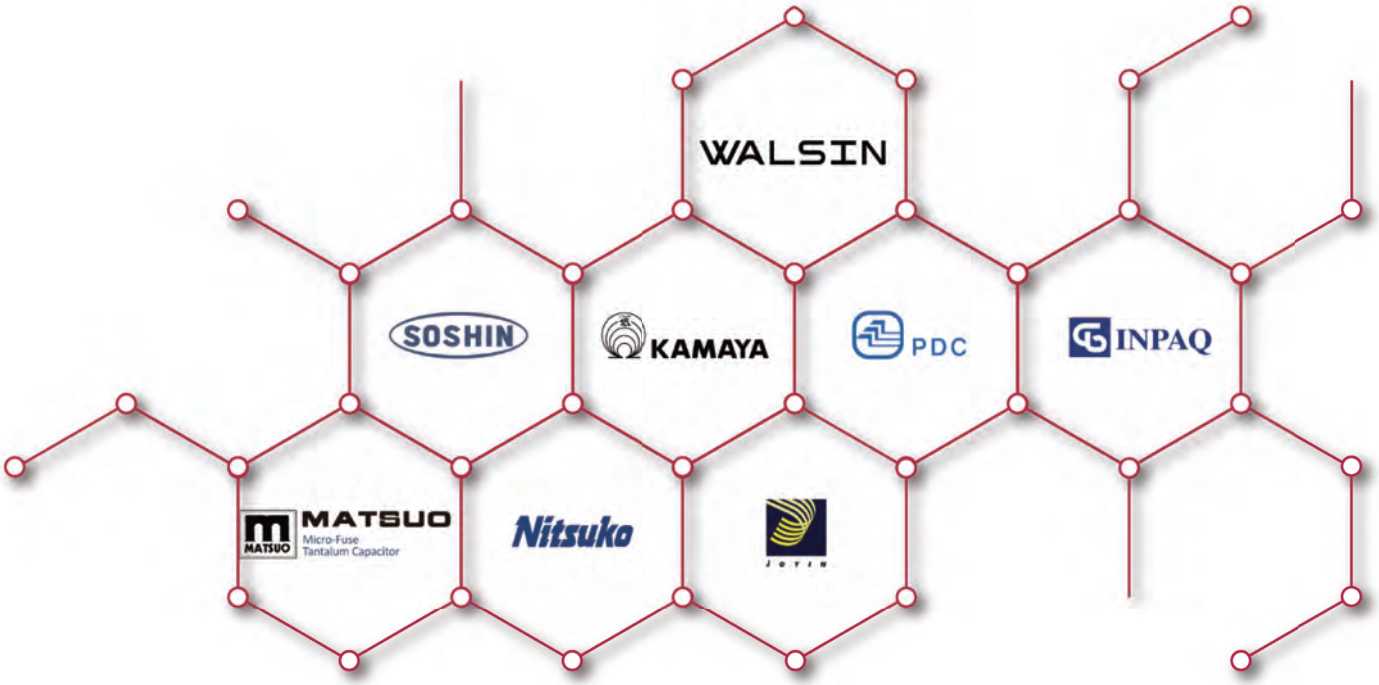
About PSA Group

Passive System Alliance

Walsin – the Platform where Industry Leading Brands Synergized

each with their unique expertise and industry leading position,
ally for a shared value –

long term win-win partnership



PASSIVE SYSTEM ALLIANCE

Product Line-Up (2023,11)

Products Category				Product Type	Situation for environment				Page
					RoHS	Pb free	Halogen free	Antimony free	
Chip Resistors	Automotive grade			RMC	●		●	●	6
				RACA	●		●	●	7
	General purpose	General purpose		RMC	●		●	●	8
		Precision		RGC	●		●	●	9
		High Precision		RNC	●	●	●	●	10
		Pb Free		RMPC	●	●	●	●	11
		High Power		RMCH	●		●	●	12
		Anti Sulfuration	Wide Terminal	TWMC	●		●	●	13
			Barrier / Special electrode	RMGW	●		●	●	14
			Special electrode type	RMAW	●		●	●	15
	Trimmable chip			FCR	●		●	●	16
	High Voltage			RVC	●		●	●	17
		Special High Voltage type		RZC	●		●	●	18
		Anti-Sulfuration		RVAC	●		●	●	19
	Anti Surge			RPC	●		●	●	21
		High Power		RPCH	●		●	●	22
		Anti-Sulfuration type		RBX	●		●	●	23
		High Power / Anti-Sulfuration		RPGW	●		●	●	24
	Current sensing	Face Down type		RCC	●	●	●	●	27
		General purpose type		RLC	●		●	●	28
		Metal plate type		RLP	●	●	●	●	30
				MLP	●	●	●	●	32
				MLP63C	●	●	●	●	34
				WLP63	●	●	●	●	35
		Wide Terminal General type		TWLC	●		●	●	36
	Fusible Resistors			FRC	●		●	●	37
	Array type	General purpose type		RAC	●		●	●	38
		Anti- Sulfuration type		RAAW	●		●	●	39

Products Category	Product Type	RoHS	Pb free	Halogen free	Antimony free	Page
Linear Positive T-C Chip Thermistors	LTC	●	●	●	●	40

Products Category		Product Type	RoHS	Pb free	Halogen free	Antimony free	Page
Chip Fuse	General Purpose	FCC / FHC	●	●	●	●	42
	In-rush Withstand / Low ohm Fast Acting	FMC	●	●	●	●	44
	General Purpose Low ohm	FCCR	●	●	●	●	46
	Slow Blow	SBF32	●	●	●	●	47
	High Rated Voltage	HFC32	●	●	●	●	48

Products Category	Product Type	RoHS	Pb free	Halogen free	Antimony free	Page
Chip Attenuators	RAC101A	●		●	●	50

Products Category	Product Type	RoHS	Pb free	Halogen free	Antimony free	Page
ESD Suppressors	SPC	●	●	●	●	51
	HSPC	●	●	●	●	51
	SPGA	●	●	●	●	52

Products Category	Manufacturer	Page
Thin-film type chip resistors	WALSIN	56

Products Category		Manufacturer	Page
Capacitor	Chip Multilayer Ceramic Capacitors	WALSIN	60
	Safety Standard Ceramic Capacitor	WALSIN	63
	Ceramic Disc Capacitor	WALSIN	65
	Radial Leaded Multilayer Ceramic Capacitor	WALSIN	67
	SMD Type Safety Standard ramic Capacitor	WALSIN	68
	Film Capacitors	Nitsuko	69

Products Category	Manufacturer	Page
Inductor	WALSIN	70

Products Category		Manufacturer	Page
Antenna	Antenna	WALSIN	72
	Chip type Antenna	WALSIN	74

Products Category		Manufacturer	Page
Thermistor	NTC POWER Thermistor	JOYIN	75
	SMD NTC Thermistor	JOYIN	78

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Application for Automotive

Powertrain

- Ignition coil
- HV/EV Inverter
- Electric motor

Anti sulfuration

Low Ohm

High Voltage

High Power

Wide Terminal

Chassis Control

- Electric Power Steering (EPS)
- Electric Parking Brake (EPB)

Anti sulfuration

Low Ohm

High Voltage

High Power

Wide Terminal

Body Control

- Smart Key/Immobilizer
- Retractable Power Door Mirror
- HID & LED Head Light
- Power Window
- Meter
- Power seat
- Air conditioner

Anti sulfuration

Low Ohm

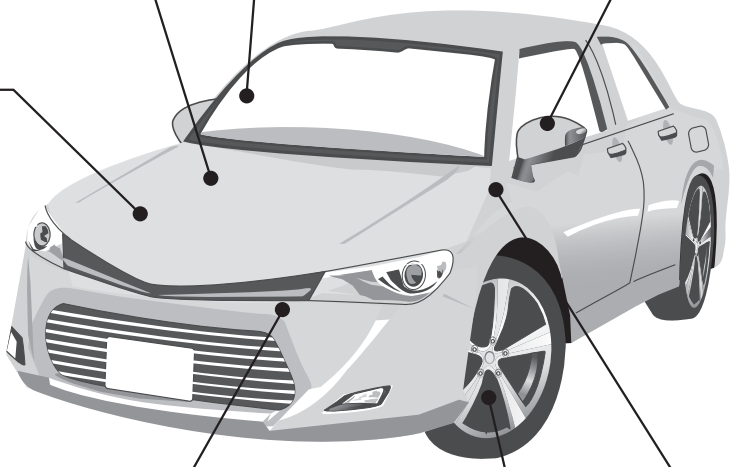
Chip Fuse

High Voltage

High Power

ESD Suppressor

Wide Terminal



Battery Management

- Battery Charger
- Charging stations
- Battery management system

Anti sulfuration

Low Ohm

Chip Fuse

Wide Terminal

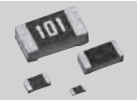
High Voltage

High Power

ADAS

- Millimeter Wave Rader/Infrared Lidar
- Ultrasonic sensor/Motion sensor
- Camera/Night vision device
- Adaptive Cruise Control(ACC)

Miniature size



Anti sulfuration

Low Ohm

High Power

Wide Terminal

Safety

- Airbags
- Electronic Stability Control (ESC)
- Anti-lock Brake System(ABS)
- Tire Pressure Monitoring System (TPMS)

Anti sulfuration

Low Ohm

High Voltage

High Power

Wide Terminal

Infotainment

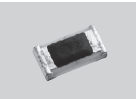
- Car navigation system
- Rear View Camera Monitor
- Electronic Toll Collection System

Low Ohm

High Power

Chip Fuse

ESD Suppressor



Wide Terminal

RoHS Directive Compliance & REACH Action

Please download the environmental information from the KAMAYA homepage.http://www.kamaya.co.jp/about-doc.php

1. RoHS Directive Compliance

(1) All Kamaya products are in compliance with RoHS directive[*1].

(2) The following 10 materials are prohibited by RoHS directive.

- Lead(Pb)
- Cadmium(Cd)
- Mercury(Hg)
- Bis(2-ethylhexyl) Phthalate(DEHP)
- Bibutyl Phthalate(DBP)
- Hexavalent Chromium
- Polybrominated Bipheuyl(PBB)
- Polybrominated Diphenyl Ether(PBDE)
- Butylbenzyl Phthalate(BPP)
- Disobutyl Phthalate(DIBP)

(3) PbO is content in glass materials of Kamaya products.
However, this is exception stated by RoHS directive.
Directive 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 7(c)-I
⇒ Directive(EU)2015/863 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 July 2019 7(c)-I.
Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices,or in a glass or ceramic matrix compound.

(4) About shipment product after January,2004 of our product(Kamaya brand product),we ship it with an article (an electrode plating no lead article) for environment.

*1 RoHS Directive(The restriction of the certain hazardous substances in electrical and electronic equipment.)

2. Kamaya REACH Action

Kamaya produce and develop our products in compliance with REACH[*2] which is effective since June 2007.
Please contact Kamaya sales dept about contained material of SVHC[*3] in Kamaya product, which need permission in REACH regulation.

*2. REACH (The Regulation for Registration, Evaluation, Authorization, and Restriction of Chemicals)

*3. SVHC (Substances of Very High Concern)
Substances in REACH regulation that especially affect the global environment and human body.
Please refer to ECHA (European Chemicals Agency) website for detail about SVHC in REACH regulation.

ECHA website :
(https://www.echa.europa.eu/candidate-list-table)

3. Reduction of environmentally hazardous substances

Kamaya is reducing environmentally hazardous substances such as Pb Free, halogen-free and antimony-free for all chip products.

*1 Pb-free
Products defined as Pb-free satisfy the following requirements.

Pb≦1000 ppm

*2. Halogen-free
Products defined as halogen-free satisfy the following requirements.

Bromine (Br) content ≤ 900 ppm
Chlorine (Cl) content ≤ 900 ppm
Total halogen content ≤ 1500 ppm

*3. Antimony-free
Products defined as antimony free meet the following requirements.
Antimony trioxide (Sb_2O_3) content ≤ 900 ppm

The threshold in Pb free, Halogen free and Antimony free products shows the content in a homogeneous material.

AEC-Q200 Rev.D Qualification

- AEC stands for "Automotive Electronics Council". It is the group consisting of the major automotive makers and major electronic parts maker in the USA.These are divided by the parts categories, and our company is categorized in AEC-Q200.
  AEC-Qxxx is widely accepted as the electronic parts standards for the automotive products and this is the actual industry standard in the market.
- The following indicates the parts evaluated by AEC-Q200 testing. They are AEC-Q200 qualified.
- For more details, specification, evaluation test result etc, please contact Kamaya sales dept.

Category	Seires	Products	Size (Metric)	Size (Inch)	Status	Remakrs
Automotive Garade	RMC	RMC06	0603	0201	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
		RMC10	1005	0402	Qualified	
		RMC16	1608	0603	Qualified	
		RMC20	2012	0805	Qualified	
		RMC32	3216	1206	Qualified	
		RMC35	3225	1210	Qualified	
		RMC50	5025	2010	Qualified	
		RMC63	6332	2512	Qualified	
	RACA	RACA104D	1005 4-Elements	0402 4-Elements	Qualified	
		RACA164D	1608 4-Elements	0603 4-Elements	Qualified	
Precision	RGC	RGC1/20	0603	0201	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
		RGC1/16S	1005	0402	Qualified	
		RGC1/16	1608	0603	Qualified	
		RGC1/10	2012	0805	Qualified	
		RGC1/8	3216	1206	Qualified	
High Power	RMCH	RMCH06	0603	0201	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
		RMCH10	1005	0402	Qualified	
		RMCH16	1608	0603	Qualified	
		RMCH20	2012	0805	Qualified	
		RMCH32	3216	1206	Qualified	
		RMCH35	3225	1210	Qualified	
Wide Terminal	TWMC	TWMC32	1632	0612	Qualified	
		TWMC50	2550	1020	Qualified	
		TWMC63	3263	1225	Qualified	
Anti Sulfuration	RMGW	RMGW06	0603	0201	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
		RMGW10	1005	0402	Qualified	
		RMGW16	1608	0603	Qualified	
		RMGW20	2012	0805	Qualified	
		RMGW32	3216	1206	Qualified	
		RMGW35	3225	1210	Qualified	
		RMGW50	5025	2010	Qualified	
		RMGW63	6332	2512	Qualified	
Anti Sulfuration	RMAW	RMAW06	0603	0201	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
High Voltage	RVC	RVC16	1608	0603	Qualified	
		RVC20	2012	0805	Qualified	R≤10MΩ is available.
		RVC32	3216	1206	Qualified	R≤10MΩ is available.
		RVC50	5025	2010	Qualified	R≤10MΩ is available.
		RVC63	6332	2512	Qualified	R≤10MΩ is available.
High Voltage/Anti Sulfur	RVAC	RVAC32	3216	1206	Qualified	R≤10MΩ is available.
Anti Surge	RPC	RPC16	1608	0603	Qualified	
		RPC20	2012	0805	Qualified	
		RPC32	3216	1206	Qualified	
		RPC35	3225	1210	Qualified	
		RPC50	5025	2010	Qualified	
		RPC63	6332	2512	Qualified	
Anti Surge High Power	RPCH	RPCH10	1005	0402	Qualified	
		RPCH16	1608	0603	Qualified	
		RPCH20	2012	0805	Qualified	
		RPCH32	3216	1206	Qualified	
		RPCH35	3225	1210	Qualified	
Anti Surge Anti-Sulfuration	RBX	RBX16	1608	0603	Qualified	
		RBX20	2012	0805	Qualified	
		RBX32	3216	1206	Qualified	
		RBX35	3225	1210	Qualified	
Anti Surge High Power Anti-Sulfuration	RPGW	RPGW16	1608	0603	Qualified	
		RPGW20	2012	0805	Qualified	
		RPGW32	3216	1206	Qualified	
		RPGW35	3225	1210	Qualified	
Low Ohm	RLC	RLC10	1005	0402	Qualified	TCR:-&K products are available.
		RLC16	1608	0603	Qualified	TCR:-&K products are available.
		RLC20	2012	0805	Qualified	TCR:-&K products are available.
		RLC32	3216	1206	Qualified	TCR:-&K products are available.
		RLC35	3225	1210	Qualified	TCR:-&K products are available.
		RLC50	5025	2010	Qualified	TCR:-&K products are available.
		RLC63	6332	2512	Qualified	TCR:-&K products are available.
Low Ohm Metal Plate	RLP	RLP16	1608	0603	Qualified	
		RLP20	2012	0805	Qualified	
		RLP32	3216	1206	Qualified	
		RLP63	6332	2512	Qualified	
Low Ohm Metal Plate	MLP	MLP20	2012	0805	Qualified	
		MLP32	3216	1206	Qualified	
		MLP63	6332	2512	Qualified	
Low Ohm Metal Plate	MLP63C	MLP63C	6332	2512	Qualified	
Low Ohm Wide Terminal	TWLC	TWLC32	1632	0612	Qualified	
		TWLC50	2550	1020	Qualified	
		TWLC63	3263	1225	Qualified	
ESD Suppressors	HSPC	HSPC10	1005	0402	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use
		HSPC16	1608	0603	Qualified※	※ Based on the evaluation test result of Kamaya, please consider to use

AEC-Q200

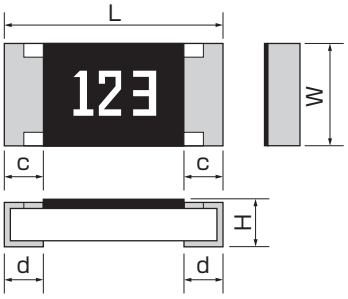
Automotive grade RMC

Halogen Free | Antimony Free

●Features

1. Kamaya automotive grade product is produced in dedicated automotive line by only operaters with Kamaya internal approval and well-trained based on automotive application criteria. Kamaya set up the production condition for automotive grade products.
2. Product design is same as consumer application grade product.
   Process design has criteria, re-work limitation, 15 year-keep sample of important key process.

●Dimensions



Please refer to Specification (Reference) at the Website for Marking.

Rated resistance value is marked with 3-digit or 4-digit on the over coating.
RMC16 4-digits and RMC06, RMC10 : only no marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
NEW RMC06	0603	0201	0.6±0.03	0.3±0.03	0.23±0.03	0.1 ±0.05	0.15±0.05	0.16mg
RMC10	1005	0402	1.0±0.05	0.5±0.05	0.35±0.05	0.2 ±0.1	0.25 $^{+0.05}_{-0.10}$	0.6mg
RMC16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg
RMC20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.4 ±0.2	0.4 ±0.2	5mg
RMC32	3216	1206	3.1±0.1	1.6±0.15	0.55±0.10	0.5 ±0.25	0.5 ±0.25	9mg
RMC35	3225	1210	3.1±0.15	2.5±0.15	0.55±0.15	0.5 ±0.25	0.5 ±0.25	16mg
★RMC50	5025	2010	5.0±0.15	2.5±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	25mg
★RMC63	6332	2512	6.3±0.15	3.2±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	40mg

★ : Under Development

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range (10Ω 100Ω 510kΩ 1MΩ 10MΩ)	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
NEW RMC06	0603 (0201)	0.05 (1.0A)	1～3.92	F,J	—	+600～−200	25	50	−55～+155
			4.02～9.76		—	+350～−100			
			10～97.6	D,F,G,J	—	±200			
			100～510k	B,D,F,G,J	—				
			511k～1M	D,F,G,J	—				
			1.02M～10M	F,J	—				
RMC10	1005 (0402)	0.1 (1.0A)	1～9.76	F,J	—	±200	50	100	
			10～97.6	G,J	—				
				D,F	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～1M	G,J	—	±200			
				D,F,	K	±100			
			1.02M～3.3M	D,F,G,J	—	±200			
			3.32M～10M	F,J	—				
RMC16	1608 (0603)	0.1 (0.125*) (2.0A)	1～9.76	F,G,J	—	±200	75		
			10～97.6	G,J	—				
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～3.3M	G,J	—	±200			
				D,F,	K	±100			
			3.32M～10M	G,J	—	±200			
				F	K	±100			
			11M～22M	J	—	±200			
RMC20	2012 (0805)	0.125 (0.25*) (2.0A)	1～9.76	F,G,J	—	±200	150	500	
			10～97.6	G,J	—				
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～2.2M	G,J	—	±200			
				D,F,	K	±100			
			2.21M～3.3M	D,F,G,J	—	±200			
			3.32M～10M	F,G,J	—				
			11M～22M	J	—				
RMC32	3216 (1206)	0.25 (2.0A)	1～9.76	F,G,J	—	±200	200		
			10～97.6	G,J	—				
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～1M	G,J	—	±200			
				D,F,	K	±100			
			1.02M～10M	F,G,J	—	±200			
			11M～24M	J					
RMC35	3225 (1210)	0.5 (2.0A)	1～9.76	F,J	—	±200			
			10～97.6	G,J	—				
				D,F	K	±100			
			100～9.76k	B,D,F					
				G,J	—	±200			
★RMC50	5025 (2010)	0.75 (2.0A)	1～9.76	F,J	—	±200			
			10～9.76k	G,J	—				
				F	K	±100			
★RMC63	6332 (2512)	1.0 (2.0A)	1～9.76	F,J	—	±200			
			10～9.76k	G,J	—				
				F	K	±100			

Note1. E24 series is available , E96 series is available for tolerance "B" (0.1%), "D" (0.5%) and "F" (1%) .
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper: Resistance Value is less than 50m ohm
*RMC16 R≦1kΩ and RMC20 are under developmet with Rated Dissipation at 70℃ indicated. Please contact Kamaya sales dept. for the detail.
★ : Under Development Please contact Kamaya sales dept. for the detail.

●Part Number Description

Example

Style: RMC | 10 — Product Type

Rated Dissipation & Size			
Code	Rated Dissipation	Metric	Inch
06	0.05W	0603	0201
10	0.1W	1005	0402
16		1608	0603
20	0.125W	2012	0805
32	0.25W	3216	1206
35	0.5W	3225	1210
50	0.75W	5025	2010
63	1.0W	6332	2512

K — Temperature Coefficient of Resistance

—	Standard	Resistor
K	±100×10^{-6}/℃	Resistor
None	————	Jumper

103 — Rated Resistance

E24 Series e.g. : 2R2=2.2Ω 103=10kΩ	3-Digit	Resistor
E96 Series e.g. : 10R2=10.2Ω 1242=12.4kΩ	4-Digit	Resistor
JP		Jumper

F — Tolerance on Rated Resistance

B	±0.1%	Resistor
D	±0.5%	Resistor
F	±1%	Resistor
G	±2%	Resistor
J	±5%	Resistor
None	—	Jumper

TH — *Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2 mm pitch)	15,000pcs.	RMC06
TH	Paper Tape (2 mm pitch)	10,000pcs.	RMC10
TP	Paper Tape	5,000pcs.	RMC16 RMC20 RMC32
TE	Embossed Tape	4,000pcs.	RMC35 RMC50 RMC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.Please contact our Sales Department.

NEW

Automotive grade RACA

AEC-Q200

Halogen Free Antimony Free

●Features

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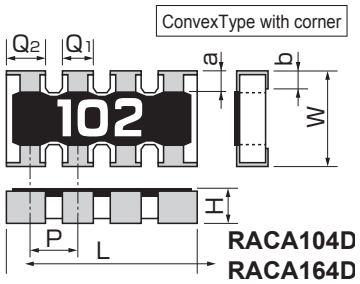
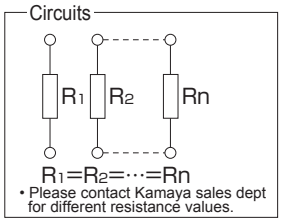
   Process design has criteria, re-work limitation, 15 year-keep sample of important key process.

●Dimensions





Note. Please contact Kamaya sales dept for the detail of marking on the over coating.

Unit : mm

Style	Terminal Style	L	W	H	Q_1	*Q_2	a	b	*P	*Unit weight/pc.
RACA104D	C	2.0±0.1	1.0±0.1	0.35±0.10	0.3 ±0.1	0.4 ±0.1	0.2±0.1	0.25±0.15	0.5	2.2mg
RACA164D	C	3.2±0.15	1.6±0.15	0.5 ±0.1	0.45±0.15	0.65±0.15	0.3±0.15	0.3 ±0.2	0.8	7mg

*Values for reference

●Ratings

Style	Rated Dissipation at 70℃ W/Element	Rated Current of Jumper A	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RACA104D	0.063	1.0	1Ω～1MΩ	F(±1%) J(±5%)	±200	50	100	−55～+155
RACA164D	0.1		1Ω～1MΩ					

Note1. E24 series is available , E96 series is available for tolerance"F"(1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper : Resistance Value is less than 50m ohm.
Note6. Rated Dissipation is the element rated dissipation. Refer to Derating Curve on page 83.

●Part Number Description

Example

Style

RACA	10	4	D	103	J	C	TH

Product Type	Size		No. of Elements		Circuits	
	10	W:1.0mm	4	4-Elements	D	Isolation
	16	W:1.6mm				

Rated Resistance		
E24 Series e.g.:2R2=2.2Ω 103=10kΩ	3-Digit	Resistor
E96 Series e.g.:10R2=10.2Ω 1242=12.4kΩ	4-Digit	Resistor
JP		Jumper

Tolerance on Rated Resistance		
F	±1%	Resistor
J	±5%	Resistor
None	———	Jumper

Terminal Style		
C	ConvexType	With corner

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2 mm pitch)	10,000pcs.	RACA104D
TP	Paper Tape	5,000pcs.	RACA164D

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

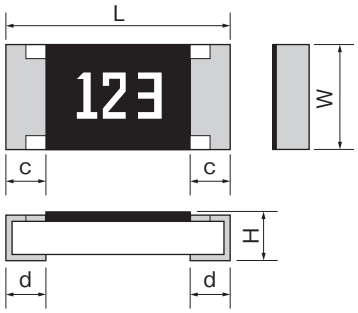
RMC

Halogen Free | Antimony Free

●Features

01005 to 2512 inch size and Jumper chip available.
Metal-glaze thick-film general-purpose chip resistors.

●Dimensions



Please refer to Specification (Reference) at the Website for Marking.

Rated resistance value is marked with 3-digit or 4-digit on the over coating.
RMC1/16 4-digits and RMC1/32,RMC1/20, RMC1/16S : only no marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RMC1/32	0402	01005	0.4±0.02	0.2 ±0.02	0.13±0.02	0.08 ±0.03	0.1 ±0.03	0.035mg
RMC1/20	0603	0201	0.6±0.03	0.3 ±0.03	0.23±0.03	0.1 ±0.05	0.15±0.05	0.16mg
RMC1/16S	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	$0.25^{+0.05}_{-0.10}$	0.6mg
RMC1/16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg
RMC1/10	2012	0805	2.0±0.1	1.25 ±0.10	0.55±0.10	0.4 ±0.2	0.4 ±0.2	5mg
RMC1/8	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.5 ±0.25	0.5 ±0.25	9mg
RMC1/4	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.5 ±0.25	0.5 ±0.25	16mg
RMC1/2	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	25mg
RMC1	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RMC1/32	0402 (01005)	0.03 (0.50A)	1～4.3	J	—	+600～-200	15	50	−55～+125
			4.7～9.1	F,J	—	±300			
			10～91		—	±200			
			100～1M						
RMC1/20	0603 (0201)	0.05 (1.0A)	1～3.92	F,J	—	+600～-200	25		
			4.02～9.76		—	+350～-100			
			10～97.6	D,F,G,J	—	±200			
			100～510k	B,D,F,G,J	—				
			511k～1M	D,F,G,J	—				
			1.02M～10M	F,J	—				
RMC1/16S	1005 (0402)	0.1 (1.0A)	1～9.76	F,J	—	+500～-200	50	100	
			10～97.6	G,J	—	±200			
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～1M	G,J	—	±200			
				D,F,	K	±100			
			1.02M～3.3M	D,F,G,J	—	±200			
			3.32M～10M	F,J	—				
RMC1/16	1608 (0603)	0.1 (2.0A)	1～9.76	F,G,J	—	+500～-200	75		
			10～97.6	G,J	—	±200			
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～3.3M	G,J	—	±200			
				D,F,	K	±100			
			3.32M～10M	G,J	—	±200			
				F	K	±100			
			11M～22M	J	—	±200			
RMC1/10	2012 (0805)	0.125 (2.0A)	1～9.76	F,G,J	—	+500～-200	150	500	−55～+155
			10～97.6	G,J	—	±200			
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～2.2M	G,J	—	±200			
				D,F,	K	±100			
			2.21M～3.3M	D,F,G,J	—	±200			
			3.32M～10M	F,G,J	—				
			11M～22M	J	—				
RMC1/8	3216 (1206)	0.25 (2.0A)	1～9.76	F,G,J	—	+500～-200	200		
			10～97.6	G,J	—	±200			
				D,F,	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～1M	G,J	—	±200			
				D,F,	K	±100			
			1.02M～10M	F,G,J	—	±200			
			11M～24M	J					
RMC1/4	3225 (1201)	0.5 (2.0A)	1～9.76	F,J	—	+500～-200			
			10～97.6	G,J	—	±200			
				D,F	K	±100			
			100～510k	G,J	—	±200			
				B,D,F	K	±100			
			511k～1M	G,J	—	±200			
				D,F	K	±100			
			1.02M～10M	F,G,J	—	±200			
			11M～22M	J					
RMC1/2	5025 (2010)	0.75 (2.0A)	1～9.76	F,J	—	+500～-200			
			10～1M	G,J	—	±200			
				F	K	±100			
			1.1M～22M	J	—	±200			
RMC1	6332 (2512)	1.0 (2.0A)	1～9.76	F,J	—	+500～-200			
			10～1M	G,J	—	±200			
				F	K	±100			
			1.1M～22M	J	—	±200			

Note1. E24 series is available, E96 series is available for tolerance "B" (0.1%), "D" (0.5%) and "F" (1%) .
Note2. Rated Voltage = √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper : Resistance value is less than 50m ohm.

●Part Number Description

Example

Style: RMC | 1/10 — Product Type

Rated Dissipation & Size			
Code	Rated Dissipation	Metric	Inch
1/32	0.03W	0402	01005
1/20	0.05W	0603	0201
1/16S	0.1W	1005	0402
1/16		1608	0603
1/10	0.125W	2012	0805
1/8	0.25W	3216	1206
1/4	0.5W	3225	1210
1/2	0.75W	5025	2010
1	1.0W	6332	2512

K

Temperature Coefficient of Resistance		
—	Standard	Resistor
K	±100×10^{-6}/℃	
None	————	Jumper

103

Rated Resistance		
E24 Series e.g. : 2R2=2.2Ω 103=10kΩ	3-Digit	Resistor
E96 Series e.g. : 10R2=10.2Ω 1242=12.4kΩ	4-Digit	
JP		Jumper

F

Tolerance on Rated Resistance		
B	±0.1%	Resistor
D	±0.5%	
F	±1%	
G	±2%	
J	±5%	
None	—	Jumper

TP

*Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2 mm pitch)	20,000pcs.	RMC1/32
		15,000pcs.	RMC1/20
TH	Paper Tape (2 mm pitch)	10,000pcs.	RMC1/16S
TP	Paper Tape	5,000pcs.	RMC1/16 RMC1/10 RMC1/8
TE	Embossed Tape	4,000pcs.	RMC1/4 RMC1/2 RMC1

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

AEC-Q200

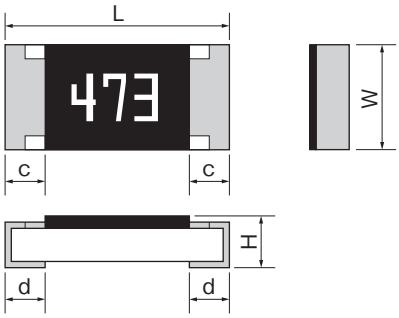
RGC

Halogen Free Antimony Free

●Features

Suitable for precision applications.
High stabilized characteristics and performance equivalent to thin film chip resistors.

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating.
RGC1/16 : only 3-digit marking is available.
RGC1/16S,1/20 : only No marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RGC1/20	0603	0201	0.6±0.03	0.3 ±0.03	0.23±0.03	0.1 ±0.05	0.15±0.05	0.16mg
RGC1/16S	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	$0.25^{+0.05}_{-0.10}$	0.6mg
RGC1/16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.25±0.10	0.3 ±0.1	2mg
RGC1/10	2012	0805	2.0±0.1	1.25±0.10	0.6 ±0.1	0.4 ±0.2	0.4 ±0.2	5mg
RGC1/8	3216	1206	3.1±0.1	1.6 ±0.15	0.6 ±0.1	0.5 ±0.25	0.5 ±0.25	9mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range (10Ω, 100Ω, 1kΩ, 1MΩ)	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RGC1/20	0603 (0201)	0.05	51 ~ 976	B(±0.1%) D(±0.5%)	K	±100	25	50	−55～＋155
			1k ~ 1M		C	± 50			
RGC1/16S	1005 (0402)	0.063	10 ~ 97.6	B(±0.1%) D(±0.5%) F(±1%)	K	±100	50	100	
			100 ~ 1M		C	± 50			
			1.02M ~ 3.3M		K	±100			
RGC1/16	1608 (0603)	0.1	3.3 ~ 9.76	D(±0.5%), F(±1%)	K	±100			
			10 ~ 97.6	B(±0.1%) D(±0.5%) F(±1%)					
			100 ~ 1M		C	± 50			
			1.02M ~ 3.3M		K	±100			
RGC1/10	2012 (0805)	0.125	3.3 ~ 9.76	D(±0.5%), F(±1%)	C	± 50	150	500	
			10 ~ 3.3M	B(±0.1%), D (±0.5%), F (±1%)					
RGC1/8	3216 (1206)	0.25	3.3 ~ 9.76	F(±1%)	C	± 50	200		
			10 ~ 4.7M	B(±0.1%), D (±0.5%), F (±1%)					

Note1. E24 series is available, E96 series is available for tolerance "B" (0.1%), "D" (0.5%) and "F" (1%) .
Note2. Rated Voltage = $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RGC | 1/16 — C — 473 — D — TP

Product Type

Rated Dissipation & Size

Code	Rated Dissipation	Metric	Inch
1/20	0.05W	0603	0201
1/16S	0.063W	1005	0402
1/16	0.1W	1608	0603
1/10	0.125W	2012	0805
1/8	0.25W	3216	1206

Temperature Coefficient of Resistance

C	± 50×10^{-6}/℃
K	±100×10^{-6}/℃

Rated Resistance

E24 Series e.g. : 473=47kΩ	3-Digit
E96 Series e.g. : 7152=71.5kΩ	4-Digit

Tolerance on Rated Resistance

B	±0.1%
D	±0.5%
F	±1.0%

*2 Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2mm pitch)	15,000pcs.	RGC1/20
TH	Paper Tape (2mm pitch)	10,000pcs.	RGC1/16S
TP	Paper Tape	5,000pcs.	RGC1/16 RGC1/10 RGC1/8

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

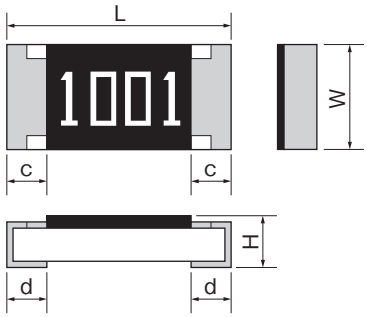
RNC

Halogen Free | Antimony Free | Pb Free

●Features

Suitable for high precision, higher stability and reliability applications.
RoHS compliant and total lead free (Pb<100ppm).

●Dimensions



RNC20, RNC32 : Rated resistance value is marked with 3digits or 4digits on the over coating.
Please contact Kamaya sales dept. for detail information.
RNC16 4digits and RNC06, 10 : Only no marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RNC06	0603	0201	0.6 ±0.03	0.3 ±0.03	0.23 ±0.03	0.1 ±0.05	0.15±0.05	0.16mg
RNC10	1005	0402	1.0 ±0.05	0.5 ±0.05	0.35 ±0.05	0.2 ±0.10	0.25±0.10	0.6mg
RNC16	1608	0603	1.55±0.10	0.8 ±0.1	0.45 ±0.15	0.25±0.15	0.3 ±0.15	2mg
RNC20	2012	0805	2.0 ±0.15	$1.25^{+0.10}_{-0.05}$	0.6 ±0.1	0.4 ±0.2	$0.3^{+0.2}_{-0.1}$	5mg
RNC32	3216	1206	3.1 ±0.1	$1.55^{+0.10}_{-0.05}$	0.6 ±0.1	0.45±0.20	$0.3^{+0.2}_{-0.1}$	9mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
RNC06	0603 (0201)	0.05	100Ω～10kΩ	B (±0.1%)	E	±25	15	E96 E24	50	−55～+155
					C	±50				
			27Ω～10kΩ	D (±0.5%) F (± 1%)	E	±25				
					C	±50				
RNC10	1005 (0402)	0.063	10Ω ～100kΩ	B (±0.1%) C (±0.25%) D (±0.5%)	E	±25	50			
					C	±50				
RNC16	1608 (0603)	0.063	10Ω ～330kΩ	B (±0.1%) C (±0.25%) D (±0.5%)	E	±25	50		100	
					C	±50				
RNC20	2012 (0805)	0.1	100Ω～130kΩ	B (±0.1%)	E	±25	100			
			10Ω～130kΩ	C (±0.25%) D (±0.5%)						
RNC32	3216 (1206)	0.125	100Ω～180kΩ	B (±0.1%)			200			
			10Ω～180kΩ	C (±0.25%) D (±0.5%)						

Note1. Rated Voltage = $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RNC 32 | E | 1002 | B | TP

Product Type

Size

Code	Metric	Inch
06	0603	0201
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206

Temperature Coefficient of Resistance

E	±25×10^{-6}/℃
C	±50×10^{-6}/℃

Rated Resistance

E24 Series e.g. : 103=10kΩ	3-Digit
E96 Series e.g. : 10R2=10.2Ω 1242=12.4kΩ	4-Digit

Tolerance on Rated Resistance

B	±0.1%
C	±0.25%
D	±0.5%
F	±1%

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2mm pitch)	15,000pcs.	RNC06
TH	Paper Tape (2mm pitch)	10,000pcs.	RNC10
TP	Paper Tape	5,000pcs.	RNC16 RNC20 RNC32

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

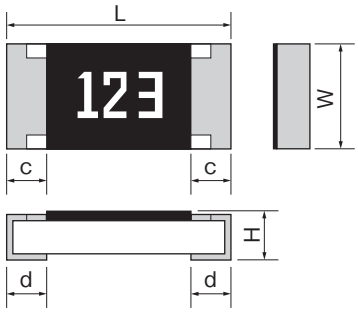
RMPC

Halogen Free | Antimony Free | Pb Free

●Features

RoHS compliant and total lead free(Pb<100ppm)

●Dimensions



Rated resistance value is marked with 3digits or 4digits on the over coating.
RMPC16 : only 3 digits marking is available.
RMPC10, RMPC06, RMPC04 : only No marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RMPC04	0402	01005	0.4 ±0.02	0.2 ±0.02	0.13±0.02	0.08±0.03	0.1 ±0.03	0.035mg
RMPC06	0603	0201	0.6 ±0.03	0.3 ±0.03	0.23±0.03	0.1 ±0.05	0.15±0.05	0.16mg
RMPC10	1005	0402	1.0 ±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	$0.25^{+0.05}_{-0.10}$	0.6mg
RMPC16	1608	0603	1.6 ±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg
RMPC20	2012	0805	2.0 ±0.1	1.25±0.10	0.55±0.10	0.4 ±0.2	0.4 ±0.2	5mg
RMPC32	3216	1206	3.1 ±0.1	1.6 ±0.15	0.55±0.10	0.5 ±0.25	0.5 ±0.25	9mg
RMPC35	3225	1210	3.1 ±0.15	2.5 ±0.15	0.55±0.15	0.5 ±0.25	0.5 ±0.25	16mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RMPC04	0402 (01005)	0.03 (0.5A)	1Ω ～ 9.76Ω	—	+800 ～ −100	J (±5%)	15	50	−55 ～+125
			10Ω ～ 97.6Ω		+600 ～ 0	F (±1%) J (±5%)			
			100Ω ～ 1MΩ		±200				
RMPC06	0603 (0201)	0.05 (1.0A)	1Ω ～ 9.76Ω		+800 ～ −100		25		
			10Ω ～ 97.6Ω		+600 ～ 0				
			100Ω ～ 10MΩ		±200				
RMPC10	1005 (0402)	0.063 (1.0A)	1Ω ～ 9.76Ω	—	+800 ～ −100		50	100	
RMPC16	1608 (0603)	0.1 (1.0A)							
RMPC20	2012 (0805)	0.125 (2.0A)	10Ω ～ 97.6Ω		+500 ～ −200		150	500	
RMPC32	3216 (1206)	0.25 (2.0A)	100Ω ～ 10MΩ		±200		200		
RMPC35	3225 (1210)	0.33 (2.0A)							

Note1. E24 series is available , E96 series is available for tolerance"F"(1%),
Note2. Rated Voltage =$\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper : Resistance value is less than 50m ohm.

●Part Number Description

Example

Style: RMPC | 10 | — | 103 | F | TH

Product Type

Temperature Coefficient of Resistance

—	Standard	Resistor
None	—	Jumper

Tolerance on Rated Resistance

F	±1%	Resistor
J	±5%	
None	—	Jumper

Size

Code	Metric	Inch
04	0402	01005
06	0603	0201
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210

Rated Resistance

E-24 Series e.g. : 2R2=2.2Ω 103=10kΩ	3-Digit	Resistor
E-96 Series e.g. : 10R2=10.2Ω 1242=12.4kΩ	4-Digit	
JP		Jumper

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2mm pitch)	20,000pcs.	RMPC04
		15,000pcs.	RMPC06
TH	Paper Tape (2mm pitch)	10,000pcs.	RMPC10
TP	Paper Tape	5,000pcs.	RMPC16 RMPC20 RMPC32
TE	Embossed Tape	4,000pcs.	RMPC35

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

AEC-Q200

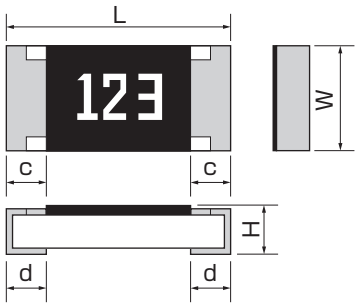
RMCH

Halogen Free Antimony Free

●Features

Implemented high rated voltage RMCH16=0.25W RMC1/16(0603 Inch general purpose)=0.1W 2.5 times as much as RMC1/16.

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating except RMCH06 and RMCH10.
RMCH16 : only 3 digits marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
NEW RMCH06	0603	0201	0.6±0.03	0.3 ±0.03	0.23±0.03	0.1±0.05	0.15±0.05	0.16mg
RMCH10	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2±0.15	$0.25^{+0.05}_{-0.10}$	0.6mg
RMCH16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.2	0.3 ±0.1	2mg
RMCH20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3±0.2	0.4 ±0.2	5mg
RMCH32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.3±0.2	0.5 ±0.25	9mg
RMCH35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.3±0.2	0.5 ±0.25	16mg
★RMCH63	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6±0.2	0.6 ±0.2	40mg

★ : Under Development

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
NEW RMCH06	0603 (0201)	0.063	1Ω ～ 9.76Ω	—	+350 ～−100	D (±0.5%) F (± 1%)	25	50	−55～+155
			10Ω ～ 1MΩ	—	±200				
			1Ω ～ 9.1Ω	—	+350 ～−100	J (± 5%)			
			10Ω ～ 1MΩ	—	±200				
RMCH10	1005 (0402)	0.125	1Ω ～ 9.76Ω	—	±200	D (±0.5%) F (± 1%)	50	100	
RMCH16	1608 (0603)	0.25					150	150	
RMCH20	2012 (0805)	0.4	10Ω ～ 1MΩ	K	±100		200	500	
RMCH32	3216 (1206)	0.5	1Ω ～ 9.1Ω	—	±200	J (± 5%)			
RMCH35	3225 (1210)	0.75	10Ω ～ 1MΩ	K	±100				
★RMCH63	6332 (2512)	2.0							

Note1. E24 series is available , E96 series is available for tolerance"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage=$\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
★ : Under Development Please contact Kamaya sales dept. for the detail.

●Part Number Description

Example

Style: RMCH 16 | K | 103 | D | TP

Product Type

Size		
Code	Metric	Inch
06	0603	0201
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210
63	6332	2512

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	±200×10^{-6}/℃
—	+350～+−100

Rated Resistance	
E24 Series e.g. : 103 = 10kΩ	3-Digit
E96 Series e.g. : 1242=12.4kΩ	4-Digit

Tolerance on Rated Resistance	
D	±0.5%
F	± 1%
J	± 5%

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape(2mm pitch)	15,000pcs.	RMCH06
TH	Paper Tape (2mm Pitch)	10,000pcs.	RMCH10
TP	Paper Tape	5,000pcs.	RMCH16 RMCH20 RMCH32
TE	Embossed Tape	4,000pcs.	RMCH35 RMCH63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order. Please contact our Sales Department.

AEC-Q200

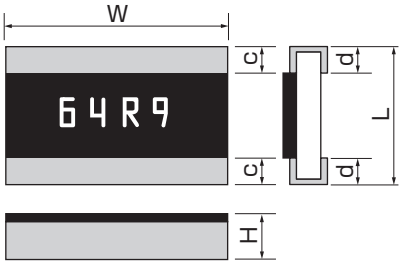
TWMC

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Downsizing and High rated dissipation by wide termination structure
Downsizing and space reduction
High solderability strength and reliability by wide termination structure.

●Dimensions



Rated resistance is marked with 4-digit on the over coating.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
★TWMC20	1220	0508	1.25±0.15	2.0±0.15	0.55±0.1	0.3±0.2	0.35±0.25	5mg
TWMC32	1632	0612	1.6 ±0.2	3.2±0.2	0.55±0.1	$0.35^{+0.15}_{-0.10}$	0.5 ±0.25	9mg
TWMC50	2550	1020	2.5 ±0.15	5.0±0.2	0.55±0.1	0.6±0.2	0.6 ±0.2	25mg
TWMC63	3263	1225	3.2 ±0.2	6.3±0.2	0.55±0.1	0.6±0.2	0.6 ±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Limiting Element Voltage V	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
★TWMC20	1220 (0508)	0.75	200	1Ω～1MΩ	—	±200	F(±1%) J(±5%)	400	−55～+155
TWMC32	1632 (0612)	0.75						500	
TWMC50	2550 (1020)	1.0							
TWMC63	3263 (1225)	2.0							

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s Voltage)
Note2. Rated Current= $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$.
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
★ : Under Development Please contact Kamaya sales dept. for the detail.

●Part Number Description

Example

Style: TWMC 50 — Product Type

Size		
Code	Metric	Inch
20	1220	0508
32	1632	0612
50	2550	1020
63	3263	1225

Temperature Coefficient of Resistance	
—	±200×10^{-6}/℃

Rated Resistance
e.g.:1004 = 1MΩ

Tolerance on Rated Resistance	
F	±1%
J	±5%

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	TWMC20 TWMC32
TE	Embossed Tape	4,000pcs.	TWMC50 TWMC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

AEC-Q200

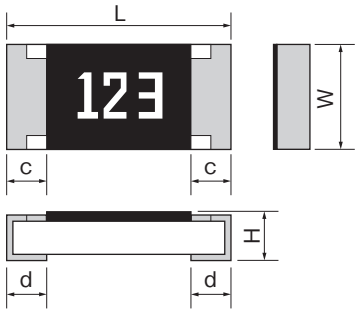
RMGW

Halogen Free | Antimony Free | Anti-Sulfuration

●Features

Barrier layer inside of electrode to prevent Sulfuration and Disconnection.
Humid Sulfur Vapor Test ASTM B-809 60℃ 1000Hr.

●Dimensions



Rated resistance value is marked with 3-digit or 4-digit on the over coating.
RMGW16 4-digits and RMGW06, RMGW10: only no marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RMGW06	0603	0201	0.6±0.03	0.3 ±0.03	0.23±0.03	0.15±0.1	0.15±0.05	0.16mg
RMGW10	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	$0.25^{+0.05}_{-0.10}$	0.6mg
RMGW16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg
RMGW20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.4 ±0.2	0.4 ±0.2	5mg
RMGW32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.5 ±0.25	0.5 ±0.25	9mg
RMGW35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.5 ±0.25	0.5 ±0.25	16mg
RMGW50	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	25mg
RMGW63	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RMGW06	0603 (0201)	0.05 (1.0A)	1Ω～3.92Ω	—	+600～−200	F (± 1%) J (± 5%)	25	50	−55～+155
			4.02Ω～9.76Ω		± 350～−100				
			10Ω～1MΩ		± 200				
RMGW10	1005 (0402)	0.1 (1.0A)	1Ω～9.76Ω	—	±200	F (± 1%) J (± 5%)	50	100	
RMGW16	1608 (0603)	0.1 (1.0A)							
RMGW20	2012 (0805)	0.125 (2.0A)					150	500	
RMGW32	3216 (1206)	0.25 (2.0A)					200		
RMGW35	3225 (1210)	0.5 (2.0A)	10Ω～1MΩ	K	± 100	D (±0.5%) F (± 1%) J (± 5%)			
			1.02MΩ～10MΩ	—	± 200				
RMGW50	5025 (2010)	0.75 (2.0A)							
RMGW63	6332 (2512)	1.0 (2.0A)							

Note1. E24 series is available, E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper: Resistance Value is less than 50m ohm.

●Part Number Description

Example

Style: RMGW | 16 | K | 103 | D | TP

Product Type

Size		
Code	Metric	Inch
06	0603	0201
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210
50	5025	2010
63	6332	2512

Temperature Coefficient of Resistance		
K	±100×10^{-6}/℃	Resistor
—	Standard	
None	—	Jumper

Rated Resistance	
E24 Series e.g. : 103 = 10kΩ	3-Digit
E96 Series e.g. : 1242=12.4kΩ	4-Digit
JP	Jumper

Tolerance on Rated Resistance		
D	±0.5%	
F	± 1%	
J	± 5%	
None	—	Jumper

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape(2mm pitch)	15,000pcs.	RMGW06
TH	Paper Tape (2mm pitch)	10,000pcs.	RMGW10
TP	Paper Tape	5,000pcs.	RMGW16 RMGW20 RMGW32
TE	Embossed Tape	4,000pcs.	RMGW35 RMGW50 RMGW63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

AEC-Q200

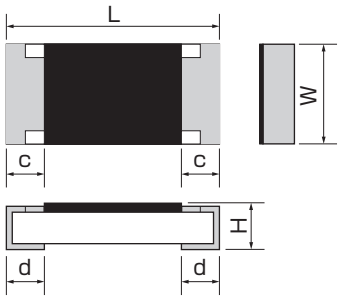
RMAW

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Special electrode structure, High anti-sulfuration performance, Line up Anti-sulfuration Chip Resistors.
Special electrode type High anti-sulfuration performance electrode inside.
Qualified for hydrogen sulfide test, H_2S: 3ppm, 40℃ , 90%R.H., 1000h.

●Dimensions



Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RMAW06	0603	0201	0.6±0.03	0.3 ±0.03	0.23±0.03	0.1±0.05	0.15±0.05	0.16mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RMAW06	0603 (0201)	0.05(1.0A)	1Ω～9.76Ω	–	+600 ～ −200	F (± 1%) J (± 5%)	25	50	−55 ～+155
			10Ω～49.9Ω	–	± 200	D(±0.5%) F (± 1%) J (± 5%)			
			51Ω～510kΩ	K	± 100	B(±0.5%) D(±0.5%) F (± 1%) J (± 5%)			
			511kΩ～1MΩ	K	± 100	D(±0.5%) F (± 1%) J (± 5%)			
			1.02MΩ～10MΩ	–	± 200	F (± 1%) J (± 5%)			

Note1. E24 series is available , E96 series is available for tolerance "B" (0.1%), "D" (0.5%) and "F" (1%) .
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note5. Jumper: Resistance Value is less than 50m ohm

●Part Number Description

Example

Style: RMAW | 20 | K | 103 | F | TP

Product Type

Size		
Code	Metric	Inch
06	0603	0201

Temperature Coefficient of Resistance		
—	±200×10^{-6}/℃	Resistor
	+600 ～ −200×10^{-6}/℃	
K	±100×10^{-6}/℃	
None	—	Jumper

Rated Resistance		
J(±5%): E24 Series e.g. : 2R2=2.2Ω 103=100kΩ	3-Digit	Resistor
F(±1%): E-96 Series e.g. : 10R2=10.2Ω	4-Digit	
JP		Jumper

Tolerance on Rated Resistance		
B	±0.1%	Resistor
D	±0.5%	
F	± 1%	
J	± 5%	
None	—	Jumper

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
PA	Press-Pocket Paper Tape(2mm pitch)	15,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

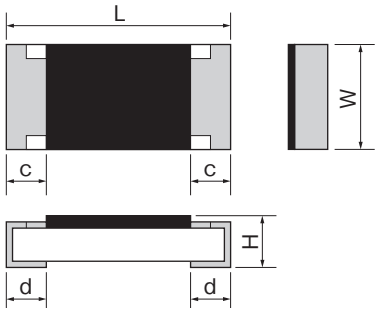
FCR

Halogen Free | Antimony Free

●Features

Trimmable device and replaceable with various resistors.

●Dimensions



Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FCR1/16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.10}$	0.45±0.10	0.3±0.1	0.3±0.1	2mg
FCR1/10	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.4±0.2	0.4±0.2	5mg
FCR1/8	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.5±0.25	0.5±0.25	9mg
FCR1/4	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.5±0.25	0.5±0.25	16mg
FCR1/2	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6±0.2	0.6±0.2	25mg
FCR1	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6±0.2	0.6±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Combinations of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
FCR1/16	1608 (0603)	0.063	10Ω～4.7MΩ	±200	L(±15%) −(0～−30%)	50	E24	100	−55～+125
FCR1/10	2012 (0805)	0.1	1Ω～9.1Ω	+500～−200		150		500	
FCR1/8	3216 (1206)	0.125	10Ω～4.7MΩ	±200		200			
FCR1/4	3225 (1210)	0.25							
FCR1/2	5025 (2010)	0.5							
FCR1	6332 (2512)	1.0							

Note1. Rated Voltage = $\sqrt{\text{(Rated Dissipation) × (Rated Resistance)}}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note4. T.C.R.: ±100×10^{-6}/℃ (10 ohm ～ 1M ohm) is available on your request.
Note5. The indicated values of Ratings are in the case without trimming.

●Part Number Description

Example

Style: FCR | 1/4 — 471 — L — TE

Product Type: FCR

Rated Resistance: E24 Series e.g. : 471=470Ω

Tolerance on Rated Resistance

—	$^{+0}_{-30}$%
L	±15%

Rated Dissipation & Size

Code	Rated Dissipation	Metric	Inch
1/16	0.063W	1608	0603
1/10	0.1W	2012	0805
1/8	0.125W	3216	1206
1/4	0.25W	3225	1210
1/2	0.5W	5025	2010
1	1.0W	6332	2512

*** Packaging & Standard Qty. (Min.)**

B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	FCR1/16 FCR1/10 FCR1/8
TE	Embossed Tape	4,000pcs.	FCR1/4 FCR1/2 FCR1

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

AEC-Q200

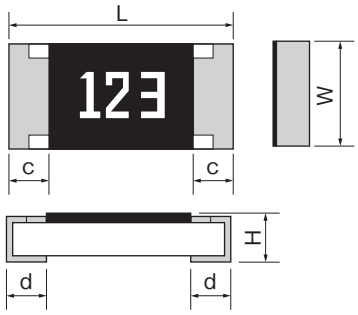
RVC

Halogen Free Antimony Free

●Features

Higher Limiting Element Voltage compared with RMC series.

●Dimensions



Rated resistance is marked with 3-digit (E24) or 4-digit (E96) on the over coating.
RVC16 : only 3-digit marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RVC16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.1	0.3±0.1	2mg
RVC20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.4±0.2	0.4±0.2	5mg
RVC32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.5±0.25	0.5±0.25	9mg
RVC50	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6±0.2	0.6±0.2	25mg
RVC63	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6±0.2	0.6±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Limiting Element Voltage V	Combinations of Rated Resistance Range and Tolerance on Rated Resistance			Temperature Coefficient of Resistance		Insulation Voltage V	Category Temperature Range ℃
				D(±0.5%)	F(±1%) , G(±2%)	J(±5%) , K(±10%)	Code	10^{-6}/℃		
RVC16	1608 (0603)	0.1	350	470Ω ～ 10MΩ			K	±100	100	−55～+155
				47Ω ～ 464Ω			—	±200		
RVC20	2012 (0805)	0.25	400	100Ω ～ 10MΩ		100Ω ～ 51MΩ	K	±100	500	
				47Ω ～ 97.6Ω			—	±200		
RVC32	3216 (1206)	0.25	800	100Ω ～ 10MΩ		100Ω ～ 51MΩ	K	±100		
				47Ω ～ 97.6Ω			—	±200		
RVC50	5025 (2010)	0.5	2,000	470Ω ～ 10MΩ	470Ω ～ 20MΩ	470Ω ～ 51MΩ	K	±100		
				47Ω ～ 464Ω			—	±200		
RVC63	6332 (2512)	1.0	3,000	560Ω ～ 10MΩ	560Ω ～ 20MΩ	560Ω ～ 51MΩ	K	±100		
				100Ω ～ 549Ω			—	±200		
				47Ω ～ 97.6Ω			—	+500 ～ −200		

Note1. E24 series is available , E96 series is available for tolerance "D" (0.5%) and "F" (1%) .
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style

RVC	32	K	475	F	TP

Product Type

Size

Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206
50	5025	2010
63	6332	2512

Temperature Coefficient of Resistance

—	Standard
K	±100×10^{-6}/℃

Rated Resistance

E24 Series e.g. : 475=4.7MΩ	3-Digit
E96 Series e.g. : 1005=10MΩ	4-Digit

Tolerance on Rated Resistance

D	±0.5%
F	± 1%
G	± 2%
J	± 5%
K	± 10%

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	RVC16 RVC20 RVC32
TE	Embossed Tape	4,000pcs.	RVC50 RVC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

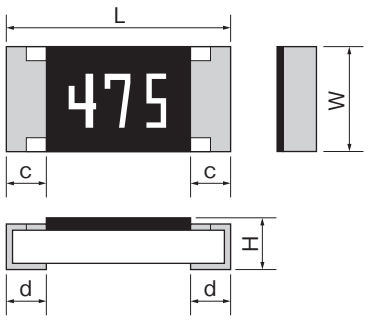
RZC

Halogen Free | Antimony Free

●Features

Suitable for the backlight inverter for large-screen LCD.
Higher Limiting Element Voltage than RVC series.

●Dimensions



Rated resistace is marked with 3-digit(E24) on the over coating.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RZC50	5025	2010	5.0±0.15	2.5 ± 0.15	0.55±0.15	0.6±0.2	0.6±0.2	25mg
RZC63	6332	2512	6.3±0.15	3.2 ± 0.15	0.55±0.15	0.6±0.2	0.6±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Limiting Element Voltage V	Anti-Rush Voltage Charactoristics V	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/℃	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
RZC50	5025 (2010)	0.5	1500	3000	1.0MΩ～16MΩ	J(±5%) K(±10%) M(±20%)	±200	E24	500	−55～+125
RZC63	6332 (2512)	1.0	2000							

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors, when the resistance values is equal to or higher than the critical resistance value.
Note3. Anti-Rush Voltage Characteristics : 3,000V, 1sec "On", 9sec"off" ,100,000 times, Room temperature.

●Part Number Description

Example

Style: RZC | 50 — 475 — J — TE

Product Type: RZC

Size

Code	Metric	Inch
50	5025	2010
63	6332	2512

Temperature Coefficient of Resistance

—	±200×10^{-6}/℃

Rated Resistance

e.g.:105=1.0MΩ
475=4.7MΩ
166=16MΩ

Tolerance on Rated Resistance

J	± 5%
K	±10%
M	±20%

*** Packaging & Standard Qty. (Min.)**

B	Bulk (Loose Package)	1,000pcs.	All Style
TE	Paper Tape	4,000pcs.	All Style

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

AEC-Q200

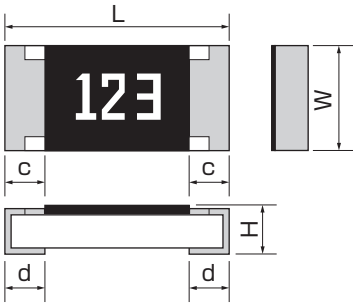
RVAC

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

High voltage chip resistors combined with anti-sulfuration performance.

●Dimensions



Rated resistance value is marked with 3digits or 4digits on the over coating.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RVAC32	3216	1206	3.1±0.1	1.6±0.15	0.55±0.10	0.5±0.25	0.5±0.25	9mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Combinations of Rated Resistance Range of Tolerance on Rated Resistance			Temperature Coefficient of Resistance		Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
			D(±0.5%)	F(±1%)	J(±5%)	Code	10^{-6}/℃			
RVAC32	3216 (1206)	0.25	100Ω ～ 10MΩ		100Ω ～ 51MΩ	K	±100	500	500	−55～+155
			47Ω ～ 97.6Ω			—	±200			

Note1. E24 series is available, E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RVAC | 32 | K | 103 | D | TP

Product Type

Size		
Code	Metric	Inch
32	3216	1206

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	±200×10^{-6}/℃

Rated Resistance	
E24 Series e.g. : 103 = 10kΩ	3-Digit
E96 Series e.g. : 1002=10kΩ	4-Digit

Tolerance on Rated Resistance	
D	±0.5%
F	± 1%
J	± 5%

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TP	Paper Tape	5,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

NEW

Anti Surge Chip Resistors Selection Guide

■ Size Selection Guide

Unit : mm

	RMC Series	Automotive Grade RMC Series	RMCH Series	RPC Series	RPCH Series	RBX Series	RPGW Series
0.1W	1005 1608	1005 1608					
0.125W	2012	2012	1005				
0.2W					1005		
0.25W	3216	3216	1608	1608 2012		1608	
0.33W				3216	1608	2012	1608
0.4W			2012				
0.5W	3225	3225	3216	3225	2012	3216	2012
0.66W					3216		3216
0.75W	5025	5025	3225	5025	3225	3225	3225
1W	6332	6332		6332			

■ Characteristics Selection Guide

	RMCH Series	RPC Series	RPCH Series	RBX Series	RPGW Series
Rated Dissipation	◎	○	◎	○	◎
Surge Withstand Capability*1	○	◎	◎	○	◎
Anti-Sulfuration Performance	—	—	—	◎	◎

*1 It shows durability for Instantaneous abnormal voltage when inductive load switching like lightning.
Surge waveform is shown by the pulse waveform of JIS C 5201-1 4.27 1.2 x 50us.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

AEC-Q200

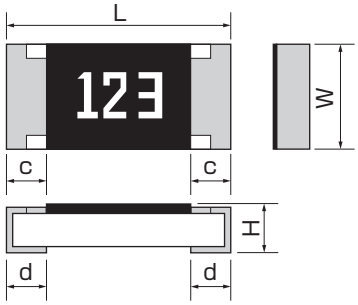
RPC

Halogen Free Antimony Free

●Features

Higher Anti surge performance compared with RMC series.

●Dimensions



Rated resistance value is marked with 3-digit on the over coating.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RPC16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.2	0.3±0.1	2mg
RPC20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3±0.2	0.4±0.2	5mg
RPC32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.3±0.2	0.5±0.25	9mg
RPC35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.3±0.2	0.5±0.25	16mg
RPC50	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.3±0.15	0.6±0.2	25mg
RPC63	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.3±0.15	0.6±0.2	40mg

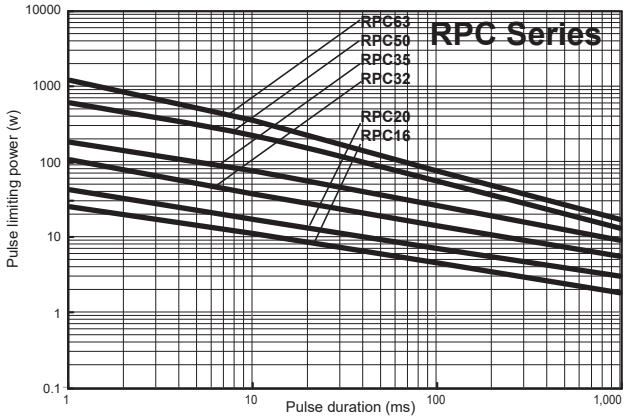
*Values for reference

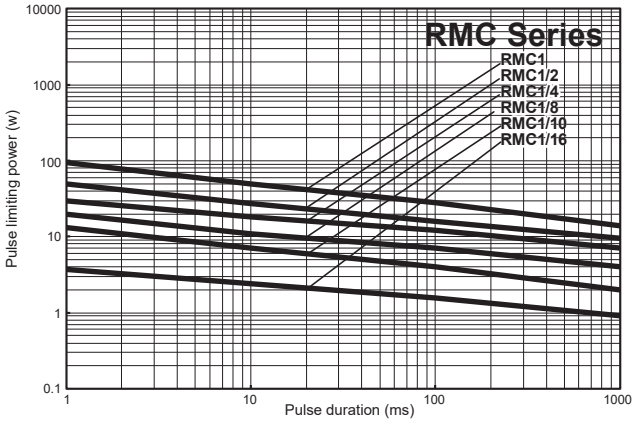
●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Combinations of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
RPC16	1608 (0603)	0.25	1Ω～ 9.1Ω	±200	J (± 5%)	150	E24	150	−55～+155
			10Ω～ 1MΩ	±100					
RPC20	2012 (0805)				J (± 5%) K(±10%) M(±20%)			500	
RPC32	3216 (1206)	0.33	0.27Ω～0.91Ω	±200		200			
RPC35	3225 (1210)	0.5	1Ω～ 1MΩ	±100					
RPC50	5025 (2010)	0.75	1.1MΩ～22MΩ	±200					
RPC63	6332 (2512)	1.0							

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors, when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●1Pulse Limiting Power Curve Comparison (e.g 100Ω value for reference)





* pulse limiting power curve is different from resistance value.
* Please contact Kamaya sales department for the details.

●Part Number Description

Example

Style: RPC | 50 | 103 | J | TE

Product Type: RPC

Size

Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210
50	5025	2010
63	6332	2512

Rated Resistance

E24 Series e.g. : 2R2=2.2Ω 103=10kΩ	3-Digit

Tolerance on Rated Resistance

J	± 5%
K	±10%
M	±20%

*** Packaging & Standard Qty. (Min.)**

B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	RPC16 RPC20 RPC32
TE	Embossed Tape	4,000pcs.	RPC35 RPC50 RPC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order. Please contact our Sales Department.

AEC-Q200

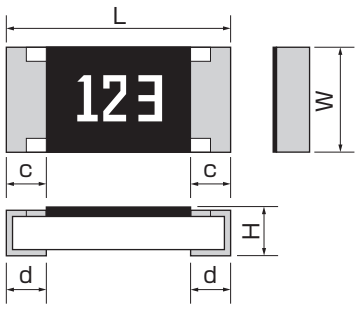
RPCH

Halogen Free Antimony Free

●Features

Implemented high rated voltage RPCH16=0.33W, RMC1/16(0603 inch general purpose)=0.1W, 3.3 times as much as RMC1/16.
Anti-surge chip resistor with tolerance D (±0.5%) lined-up.

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating except RPCH10.
RPCH16: only 3digits marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RPCH10	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2±0.15	$0.25^{+0.05}_{-0.10}$	0.6mg
RPCH16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.2	0.3±0.1	2mg
RPCH20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3±0.2	0.4±0.2	5mg
RPCH32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.3±0.2	0.5±0.25	9mg
RPCH35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.3±0.2	0.5±0.25	16mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RPCH10	1005 (0402)	0.2					50	100	−55～+155
RPCH16	1608 (0603)	0.33	1Ω～9.76Ω	−	±200	D (±0.5%) F (± 1%)	150	150	
RPCH20	2012 (0805)	0.5	10Ω～1MΩ	K	±100		200	500	
RPCH32	3216 (1206)	0.66	1Ω～9.1Ω	−	±200	J (± 5%)			
RPCH35	3225 (1210)	0.75	10Ω～1MΩ	K	±100				

Note1. E24 series is available, E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RPCH | 16 | K | 103 | D | TP

Product Type

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	±200×10^{-6}/℃

Rated Resistance	
E24 Series e.g. : 103 = 10kΩ	3-Digit
E96 Series e.g. : 1002=10kΩ	4-Digit

Tolerance on Rated Resistance	
D	±0.5%
F	± 1%
J	± 5%

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2mm Pitch)	10,000pcs.	RPCH10
TP	Paper Tape	5,000pcs.	RPCH16 RPCH20 RPCH32
TE	Embossed Tape	4,000pcs.	RPCH35

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

AEC-Q200

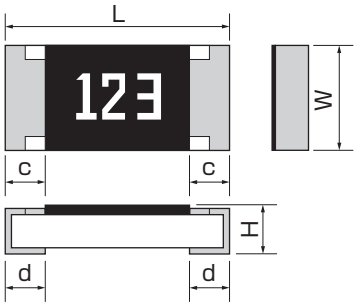
RBX

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Anti-surge chip resistor with anti-sulfuration performance.
Anti-surge chip resistor with tolerance D (±0.5%) lined-up.
Implemented high rated voltage RBX16=0.25W, RMC1/16(0603inch general purpose)=0.1W, 2.5 times as much as RMC1/16.

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating.
RBX16 : only 3digits marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RBX16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.25±0.10	0.3 ±0.1	2mg
RBX20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3 ±0.2	0.4 ±0.2	5mg
RBX32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.4 ±0.25	0.5 ±0.25	9mg
RBX35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.4 ±0.25	0.5 ±0.25	16mg
★RBX63	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RBX16	1608 (0603)	0.25					150	150	−55～+155
RBX20	2012 (0805)	0.33	1Ω～9.76Ω	—	±200	D (±0.5%) F (± 1%)	200	500	
RBX32	3216 (1206)	0.5	10Ω～1MΩ	K	±100				
RBX35	3225 (1210)	0.75	1Ω～9.1Ω	—	±200	J (± 5%)			
			10Ω～1MΩ	K	±100				
★RBX63	6332 (2512)	2.0							

Note1. E24 series is available , E96 series is available for tolerance"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
★ : Under Development Please contact Kamaya sales dept. for the detail.

●Part Number Description

Example

Style: RBX | 16 | K | 103 | D | TP

Product Type

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	±200×10^{-6}/℃

Tolerance on Rated Resistance	
D	±0.5%
F	± 1%
J	± 5%

Size		
Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210
63	6332	2512

Rated Resistance	
E24 Series e.g. : 103=10kΩ	3-Digit
E96 Series e.g. : 1002=10kΩ	4-Digit

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	RBX16 RBX20 RBX32
TE	Embossed Tape	4,000pcs.	RBX35 RBX63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

AEC-Q200

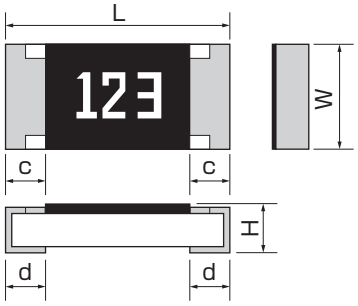
RPGW

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Anti-surge chip resistor combined with anti-sulfuration performance.
Implemented high rated voltage RPGW16=0.33W, RMC1/16(0603inch general purpose)=0.1W, 3.3 times as much as RMC1/16.
Anti-surge chip resistor with tolerance D (±0.5%) line-up.

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating.
RPGW16 : only 3digits marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RPGW16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.25±0.10	0.3 ±0.1	2mg
RPGW20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3±0.2	0.4 ±0.2	5mg
RPGW32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.4±0.25	0.5 ±0.25	9mg
NEW RPGW35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.4±0.25	0.5 ±0.25	16mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range ℃
RPGW16	1608 (0603)	0.33					150	150	−55～+155
RPGW20	2012 (0805)	0.5	1Ω～9.76Ω	−	±200	D (±0.5%) F (± 1%)	200	500	
			10Ω～1MΩ	K	±100				
RPGW32	3216 (1206)	0.66	1Ω～9.1Ω	−	±200	J (± 5%)			
			10Ω～1MΩ	K	±100				
NEW RPGW35	3225 (1210)	0.75							

Note1. E24 series is available , E96 series is available for tolerance"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%).
Note2. Rated Voltage= √(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RPGW | 16 | K | 103 | D | TP

Product Type

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	±200×10^{-6}/℃

Tolerance on Rated Resistance	
D	±0.5%
F	± 1%
J	± 5%

Size		
Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210

Rated Resistance	
E24 Series e.g. : 103=10kΩ	3-Digit
E96 Series e.g. : 1002=10kΩ	4-Digit

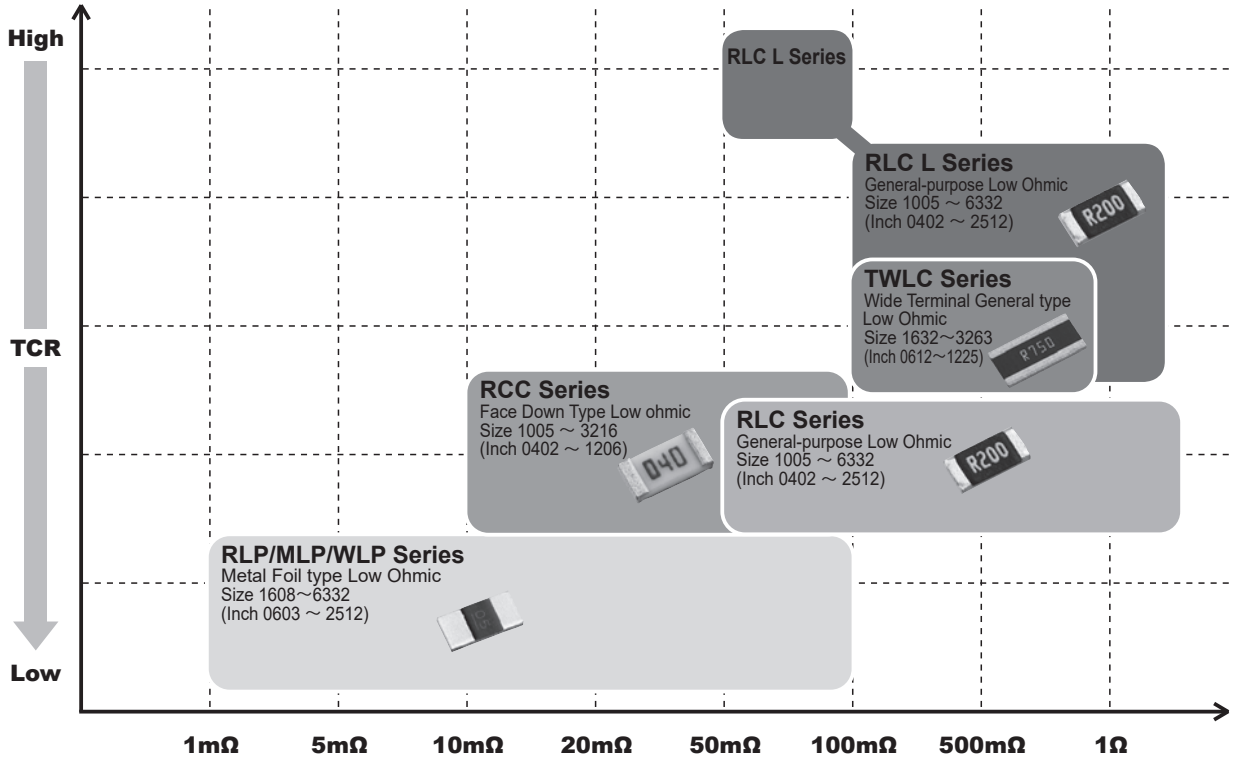
* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	RPGW16 RPGW20 RPGW32
TE	Embossed Tape	4,000pcs.	RPGW35

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

MEMO

Low Resistance Chip Resistor for Sensing Selection Guide



Size Metric (Inch)		1005 (0402)			1608 (0603)				2012 (0805)					3216 (1206)				1632 (0612)	3225 (1210)		5025 (2010)		2550 (1020)	6332 (2512)						3263 (1225)
Type		RCC	RLC	RLCL	RCC	RLC	RLCL	RLP	RCC	RLC	RLCL	RLP	MLP	RCC	RLC	RLCL	RLP	TWLC	RLC	RLCL	RLC	RLCL	TWLC	RLC	RLCL	RLP	MLP	WLP	MLP63C	TWLC
Structure	Metal Plate							●				●	●				●									●	●	●	●	
	Thick Film	●	●	●	●	●	●		●	●	●			●	●	●		●	●	●	●	●	●	●	●					●
	Metal Foil																													
3.0W																												▒	▒	
2.0W																										▒	▒	▒		▒
1.5W																														
1.0W													▒				▒	▒					▒	▒	▒	▒		▒		
0.75W																					▒	▒								
0.66W																			▒	▒										
0.5W												▒		▒	▒	▒														
0.33W							▒	▒	▒																					
0.25W				▒	▒						▒																			
0.125W	▒	▒																												
0.1W						▒																								
0.063W			▒																											

[Note] For the details of low-ohm chip resistor, please refer to page 27 to 36.

●Precaution for the current sensing chip resistor

1. Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.
2. RCC series has resistive element on the bottom side.
   Please be careful for visual inspection, to check missing components and inside out, upper side and bottom side
3. It is defined that Rated resistance value of RLP and MLP is resistance value placed on Kamaya recommended land pattern.
   If use very different land pattern from Kamaya, it is possible that rated resistance value and tolerance do not meet the spec.
4. For soldering condition, please refer to "SMD Product handling manual" on page 79 and 82.

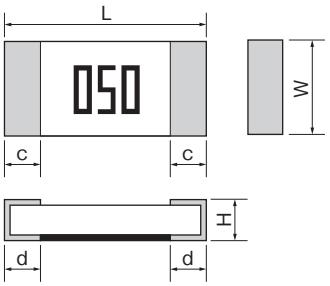
RCC

Halogen Free | Antimony Free | Pb Free

●Features

0402inch & 1206inch Size, Lower than 50mΩ.
Suitable for current sensing of small mobile devices.

●Dimensions



Resistance value is marking on surface.
Please refer to Specification (Reference) on Kamaya website.
Please contact Kamaya sales dept. for marking of RCC16.
RCC10 is no marking.

Unit : mm

Style	Metric	Inch	Rated Resistance	L	W	H	c	d	*Unit weight/pc.
RCC10	1005	0402	All Resistance	1.0±0.05	0.5 ±0.05	0.35 $^{+0.05}_{-0.10}$	0.25 $^{+0.05}_{-0.10}$	0.25 $^{+0.05}_{-0.10}$	0.6mg
RCC16	1608	0603	20mΩ ≤ R	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.5 ±0.10	0.3 ±0.1	0.3 ±0.1	2mg
			R < 20mΩ					0.55 ±0.1	
RCC20	2012	0805	20mΩ ≤ R	2.0±0.15	1.25±0.10	0.6 ±0.10	0.4 ±0.2	0.4 ±0.2	5mg
			R < 20mΩ					0.6 ±0.2	
RCC32	3216	1206	All Resistance	3.1±0.2	1.6 ±0.15	0.6 ±0.10	0.5 ±0.25	0.5 ±0.25	9mg

*Values for reference

●Ratings

Style	Size Metric(Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/℃	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
RCC10	1005(0402)	0.125	1.11～2.5	20mΩ ～ 24mΩ	0～+800	F (±1%) J (±5%)	100	−55～+155
				25mΩ ～ 50mΩ	0～+350			
				51mΩ ～100mΩ	±150			
RCC16	1608(0603)	0.25	1.58～5.00	10mΩ ～ 30mΩ	0～+350			
				33mΩ ～ 50mΩ	0～+250			
				51mΩ ～100mΩ	±150			
RCC20	2012(0805)	0.33	1.81～5.74	10mΩ ～ 27mΩ	0～+250		500	
				30mΩ ～ 50mΩ	±150			
				51mΩ ～100mΩ	±100			
RCC32	3216(1206)	0.5	2.23～5.00	20mΩ ～ 33mΩ	0～+250			
				36mΩ ～100mΩ	±100			

Note1. Rated Current= $\sqrt{\text{(Rated Dissipation)/(Rated Resistance)}}$.
Note2. Rated Voltage= $\sqrt{\text{(Rated Dissipation) × (Rated Resistance)}}$. (d.c. or a.c. r.m.s Voltage)

●Rated Resistance

Resistance	Code	Mark
10mΩ	R010	010
15mΩ	R015	015
20mΩ	R020	020
22mΩ	R022	022
24mΩ	R024	024
25mΩ	R025	025
27mΩ	R027	027
30mΩ	R030	030
33mΩ	R033	033
36mΩ	R036	036

Resistance	Code	Mark
39mΩ	R039	039
40mΩ	R040	040
43mΩ	R043	043
47mΩ	R047	047
50mΩ	R050	050
51mΩ	R051	051
56mΩ	R056	056
60mΩ	R060	060
62mΩ	R062	062
65mΩ	R065	065

Resistance	Code	Mark
68mΩ	R068	068
70mΩ	R070	070
75mΩ	R075	075
80mΩ	R080	080
82mΩ	R082	082
90mΩ	R090	■90
91mΩ	R091	091
100mΩ	R100	R10

Please contact Kamaya sales dept. for any other resistance values.

●Part Number Description

Example

Style: RCC | 20 — Product Type

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206

R050 — Rated Resistance
e.g.: R050=50mΩ
R100=100mΩ

F — Tolerance on Rated Resistance

F	±1%
J	±5%

TP — * Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2mm pitch)	10,000pcs.	RCC10
TP	Paper Tape	5,000pcs.	RCC16 RCC20 RCC32

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution of use

1. Resistive element is on bottom surface.
   Please note for inspection of parts existence & nonexistence, inversion mounting by Inspection machine.
2. Resistance value will be changed by soldering condition.
   Please design products in consideration of this change of resistance value.

AEC-Q200

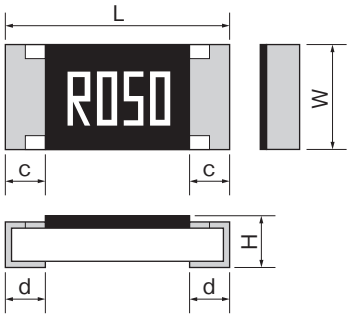
RLC

Halogen Free Antimony Free

●Features

Most suitable for a detection of current in power source circuits, motor circuits, etc.

●Dimensions



Rated resistance is marked with 4-digit on the over coating. (RLC20~RLC63)
RLC10 : only No marking is available.
Please contact Kamaya sales dept for marking of RLC16.

Unit : mm

Style	Metric	Inch	TCR Mark	L	W	H	c	d	*Unit weight/pc.
RLC10	1005	0402	All	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	0.25 $^{+0.05}_{-0.10}$	0.6mg
RLC16	1608	0603	– & K	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg
			L		0.8 ±0.1	0.45±0.15		0.3 ±0.2	
RLC20	2012	0805	– & K	2.0±0.1	1.25±0.10	0.6 ±0.1	0.4 ±0.2	0.4 ±0.2	5mg
			L			0.5 ±0.15			
RLC32	3216	1206	– & K	3.1±0.2	1.6 ±0.15	0.6 ±0.1	0.5 ±0.25	0.3 $^{+0.2}_{-0.1}$	9mg
			L	3.1±0.1	1.6 ±0.1	0.6 ±0.15	0.5 ±0.2	0.45±0.20	
RLC35	3225	1210	– & K	3.1±0.2	2.5 ±0.15	0.6 ±0.15	0.5 ±0.25	0.3 $^{+0.2}_{-0.1}$	16mg
			L	3.1±0.1	2.6 ±0.1	0.55±0.10	0.5 ±0.2	0.5 ±0.2	
RLC50	5025	2010	– & K	5.0±0.2	2.5 ±0.15	0.6 ±0.15	0.6 ±0.2	0.6 ±0.2	25mg
			L	5.0±0.2	2.5 ±0.2	0.55±0.10	0.65±0.25	0.6 ±0.25	
RLC63	6322	2512	– & K	6.3±0.2	3.2 ±0.15	0.6 ±0.15	0.6 ±0.2	0.6 ±0.2	40mg
			L	6.4±0.2	3.2 ±0.2	0.6 ±0.1	0.65±0.25	0.9 ±0.25	

*Values for reference

●Ratings : TCR Mark = — & K

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Rated Resistance Range	Combinations of Rated Resistance Range, Temperature Coefficient of Resistance and Tolerance on Rated Resistance: Rated Resistance Range	Tolerance on Rated Resistance		Temperature Coefficient of Resistance 10^{-6}/℃	Insulation Voltage V	Category Temperature Range ℃
RLC10	1005 (0402)	0.125	0.11～1.11	100mΩ ～ 10Ω	100mΩ~430mΩ	F, J	–	0~ +300	100	−55～＋155
					470mΩ~3.3Ω	F, G, J		0~ +200		
					3.6Ω~10Ω	F, J	K	±100		
RLC16	1608 (0603)	0.25	0.14～1.58	100mΩ ～ 10Ω	100mΩ~180mΩ	F, G, J	–	0~ +250		
					200mΩ~430mΩ			0~ +200		
					470mΩ~3.3Ω		K	±100		
					3.6Ω~10Ω	F, J				
RLC20	2012 (0805)	0.33	0.15～2.56	50mΩ ～ 10Ω	50mΩ~180mΩ	F, G, J	–	0~ +250	500	
					200mΩ~430mΩ			0~ +200		
					470mΩ~3.3Ω		K	±100		
RLC32	3216 (1206)	0.5	0.18～3.16		3.6Ω~10Ω	F, J				
RLC35	3225 (1210)	0.66	0.44～3.63	50mΩ ～ 3.3Ω	50mΩ~180mΩ	F, G, J	–	0~ +250		
RLC50	5025 (2010)	0.75	0.47～3.87		200mΩ~430mΩ			0~ +200		
					470mΩ~3.3Ω		K	±100		
RLC63	6332 (2512)	1.0	0.55～4.47							

Note1. Rated Current = $\sqrt{(\text{Rated Dissipation}) / (\text{Rated Resistance})}$.
Note2. Rated Voltage = $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Limiting Element Voltage*1 is set up on RLC16, 20, 32, and rated current is not applied in the range of following rated of Resistance*2.
*1 RLC16=1.41V, RLC20=1.58V, RLC32=1.81V *2 RLC16 and RLC20 : 7.5Ω＜R , RLC32 : 6.2Ω＜R
The Rated Current in the above range of the Rated Resistance Value is calculated as below way.
Rated Current=Limiting Element Voltage/Rated Resistance

RLC

●Rating : TCR Mark = L

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Combinations of Rated Resistance Range,Temperature Coefficient of Resistance			Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
				Mark	Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/℃			
RLC10	1005 (0402)	0.063	0.26～ 1.12	L	50mΩ～ 91mΩ	±1500	F(±1%) J(±5%)	100	−55～+155
					100mΩ～500mΩ	± 800			
					510mΩ～910mΩ	± 300			
RLC16	1608 (0603)	0.1	0.33～ 3.16		50mΩ～ 91mΩ	±1200			
					100mΩ～500mΩ	± 800			
					510mΩ～910mΩ	± 300			
RLC20	2012 (0805)	0.25	0.52～ 5.0					500	
RLC32	3216 (1206)	0.5	0.74～ 7.07		50mΩ～ 91mΩ	±1000			
RLC35	3225 (1210)	0.66	0.85～ 8.12		100mΩ～360mΩ	± 600			
RLC50	5025 (2010)	0.75	0.90～ 8.66		390mΩ～500mΩ	± 300			
RLC63	6332 (2512)	1.0	1.04～10		510mΩ～910mΩ	± 200			

Note1. Rated Current =$\sqrt{\text{(Rated Dissipation)/(Rated Resistance)}}$
Note2. Rated Voltage= $\sqrt{\text{(Rated Dissipation)} \times \text{(Rated Resistance)}}$ (d.c. or a.c. r.m.s Voltage)

●Rated Resistance

Resistance	Code
50mΩ	R050
51mΩ	R051
56mΩ	R056
60mΩ	R060
62mΩ	R062
65mΩ	R065
68mΩ	R068
70mΩ	R070
75mΩ	R075
80mΩ	R080
82mΩ	R082
90mΩ	R090
91mΩ	R091
100mΩ	R100
110mΩ	R110

Resistance	Code
120mΩ	R120
130mΩ	R130
150mΩ	R150
160mΩ	R160
180mΩ	R180
200mΩ	R200
220mΩ	R220
240mΩ	R240
250mΩ	R250
270mΩ	R270
300mΩ	R300
330mΩ	R330
360mΩ	R360
390mΩ	R390
400mΩ	R400

Resistance	Code
430mΩ	R430
470mΩ	R470
500mΩ	R500
510mΩ	R510
560mΩ	R560
600mΩ	R600
620mΩ	R620
650mΩ	R650
680mΩ	R680
700mΩ	R700
750mΩ	R750
800mΩ	R800
820mΩ	R820
900mΩ	R900
910mΩ	R910

Resistance	Code
1.0Ω	1R00
1.1Ω	1R10
1.2Ω	1R20
1.3Ω	1R30
1.5Ω	1R50
1.6Ω	1R60
1.8Ω	1R80
2.0Ω	2R00
2.2Ω	2R20
2.4Ω	2R40
2.7Ω	2R70
3.0Ω	3R00
3.3Ω	3R30
3.6Ω	3R60
3.9Ω	3R90

Resistance	Code
4.3Ω	4R30
4.7Ω	4R70
5.1Ω	5R10
5.6Ω	5R60
6.2Ω	6R20
6.8Ω	6R80
7.5Ω	7R50
8.2Ω	8R20
9.1Ω	9R10
10Ω	100

Note3. Other nominal resistances values are also available, please contact Kamaya sales dept for further information.

●Part Number Description

Example

Style: RLC 32 — R050 J TP

Product Type: RLC

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206
35	3225	1210
50	5025	2010
63	6332	2512

Rated Resistance
e.g.: R050=50mΩ
R100=100mΩ
1R00=1Ω
100=10Ω

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
—	0～+200×10^{-6}/℃
	0～+250×10^{-6}/℃
	0～+300×10^{-6}/℃
L	±200×10^{-6}/℃
	±300×10^{-6}/℃
	±600×10^{-6}/℃
	±800×10^{-6}/℃
	±1,000×10^{-6}/℃
	±1,200×10^{-6}/℃
	±1,500×10^{-6}/℃

Tolerance on Rated Resistance	
F	±1%
G	±2%
J	±5%

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape(2mm pitch)	10,000pcs.	RLC10
TP	Paper Tape	5,000pcs.	RLC16 RLC20 RLC32
TE	Embossed Tape	4,000pcs.	RLC35 RLC50 RLC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution

Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.

NEW

RLP

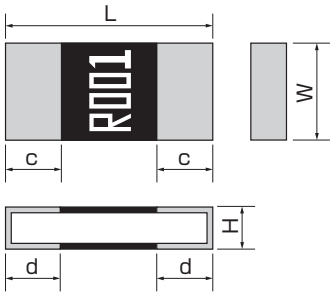
AEC-Q200

Halogen Free | Antimony Free | Pb Free

●Features

Suitable for current sensing of battery pack.

●Dimensions



Resistance value of RLP series are marked like below.

Unit : mm

Style	Metric	Inch	Rated Resistance	L	W	H	c	d	*Unit weight/pc.	Marking
RLP16	1608	0603	5mΩ	1.6±0.1	0.8 ±0.1	0.35±0.10	0.2 ±0.1	0.6 ±0.10	2mg	No Marking
			10mΩ			0.3 ±0.10		0.3 ±0.10		
RLP20	2012	0805	NEW 2mΩ	2.0±0.15	1.25±0.15	0.26±0.10	0.35 ±0.15	0.42±0.20	3mg	02
			4mΩ			0.35±0.10		0.75±0.20		04
			5mΩ					0.6 ±0.20		05
			6mΩ					0.47±0.20		06
			8mΩ			0.22±0.10		0.6 ±0.20		08
			9mΩ					0.52±0.20		09
			10mΩ					0.47±0.20		10
RLP32	3216	1206	1mΩ	3.2±0.15	1.6 ±0.15	0.32±0.15	1.1 ±0.25	1.1 ±0.25	12mg	01
			2mΩ				0.5 ±0.25	0.5 ±0.25		02
			3mΩ			0.35±0.10	0.7 ±0.25	1.3 ±0.25		03
			4mΩ				1.1 ±0.25	1.1 ±0.25	11mg	04
			5mΩ				1.0 ±0.25	1.0 ±0.25		05
			6mΩ				0.85±0.25	0.85±0.25		06
			7mΩ				0.7 ±0.25	0.7 ±0.25		07
			8mΩ				0.6 ±0.25	0.6 ±0.25		08
			9mΩ			0.3 ±0.1	0.75±0.25	0.75±0.25		09
			10mΩ			0.28±0.10	0.5 ±0.25	0.5 ±0.25		10
			11mΩ							11
			12mΩ			0.22±0.10	0.65±0.25	0.65±0.25		12
			13mΩ							13
			14mΩ				0.55±0.25	0.55±0.25		14
			15mΩ				0.5 ±0.25	0.5 ±0.25		15
RLP63	6332	2512	1mΩ	6.3±0.25	3.2 ±0.25	0.38±0.15	2.2 ±0.25	2.2 ±0.25	47mg	R001
			2mΩ		3.1 ±0.25		1.1 ±0.25	1.1 ±0.25		R002
			3mΩ			0.45±0.15	2.2 ±0.25	2.2 ±0.25	43mg	R003
			4mΩ			0.35±0.15				R004
			5mΩ			0.34±0.15	1.95±0.25	1.95±0.25		R005
			6mΩ				1.75±0.25	1.75±0.25		R006
			7mΩ			0.35±0.15	1.4 ±0.25	1.4 ±0.25		R007
			8mΩ				1.1 ±0.25	1.1 ±0.25		R008
			9mΩ				0.8 ±0.25	0.8 ±0.25		R009
			10mΩ			0.23±0.15	1.75±0.25	1.75±0.25		R010
			12mΩ				1.4 ±0.25	1.4 ±0.25		R012
			15mΩ				0.95±0.25	0.95±0.25		R015

*Values for reference

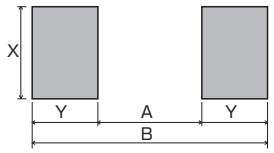
●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance: Code	Temperature Coefficient of Resistance: 10^{-6}/℃	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
RLP16	1608 (0603)	0.33	8.1, 5.7	5mΩ, 10mΩ	N	±70	F(±1%) J(±5%)	100	−55～+155
					K	±100			
RLP20	2012 (0805)	0.5	15.8, 11.1, 10.0, 9.1, 7.9, 7.4, 7.0	2mΩ, 4mΩ, 5mΩ, 6mΩ, 8mΩ, 9mΩ, 10mΩ	N	±70			
					K	±100			
RLP32	3216 (1206)	1.0	31.6	1mΩ	K	±100			
					—	±150			
			22.3, 18.2, 15.8, 14.1, 12.9, 11.9, 11.1, 10.5, 10, 9.5, 9.1, 8.7, 8.4, 8.1	2mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ, 11mΩ, 12mΩ, 13mΩ, 14mΩ, 15mΩ	N	±70			
					K	±100			
RLP63	6332 (2512)	2.0	44.7	1mΩ	N	±70			
					K	±100			
					—	±150			
		1.0	22.3, 18.2, 15.8, 14.1, 12.9, 11.9, 11.1, 10.5, 10, 9.1, 8.1	2mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ, 12mΩ, 15mΩ	N	±70			
					K	±100			

Note1. Rated Current= $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Please contact Kamaya sales dept. for any other resistance values.
Note4. Resistance value shall be measured by mounting the substrate with the required conditions per Kamaya specification.
★ : Under Development

RLP

●Recommended Land Pattern



Unit : mm

Style	Metric	Inch	Rated Resistance	A	B	X	Y
RLP16	1608	0603	5mΩ	0.6	2.2	0.9	0.8
			10mΩ	1.0			0.6
RLP20	2012	0805	2mΩ	0.8	2.7	1.36	0.95
			4mΩ	0.8			0.95
			5mΩ				
			6mΩ				
			8mΩ				
			9mΩ				
			10mΩ				
RLP32	3216	1206	1mΩ	1.0	3.9	1.7	1.45
			2mΩ	2.1			0.9
			3mΩ	0.8			1.55
			4mΩ	1.0			1.45
			5mΩ	1.4			1.25
			6mΩ				
			7mΩ	2.1			0.9
			8mΩ				
			9mΩ				
			10mΩ				
			11mΩ				
			12mΩ				
			13mΩ				
			14mΩ				
			15mΩ				
RLP63	6332	2512	1mΩ	1.5	7.5	4.0	3.0
			2mΩ	4.0	7.6	3.5	1.8
			3mΩ	1.8			2.9
			4mΩ				
			5mΩ	2.4			2.6
			6mΩ	4.0			1.8
			7mΩ				
			8mΩ				
			9mΩ				
			10mΩ				
			12mΩ				
			15mΩ				

*Values for reference

●Part Number Description

Example

Style: RLP 63 — Product Type

Size		
Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206
63	6332	2512

K — Temperature Coefficient of Resistance

—	±150×10^{-6}/℃
K	±100×10^{-6}/℃
N	±70 ×10^{-6}/℃

R005 — Rated Resistance

e.g. : R001=1mΩ
R010=10mΩ

F — Tolerance on Rated Resistance

F	±1%
J	±5%

TE — * Packaging & Standard Qty. (Min.)

TP	Paper Tape	5,000pcs.	RLP16 RLP20 RLP32
TE	Embossed Tape	4,000pcs.	RLP63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution

Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.

NEW

MLP

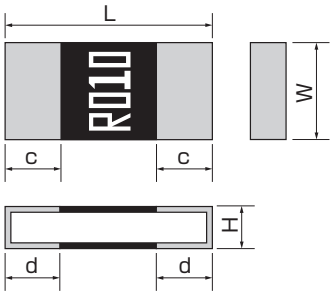
AEC-Q200

Halogen Free | Antimony Free | Pb Free

●Features

0805inch size : 1W 2512inch size: 2W.

●Dimensions



Resistance value of MLP series are marked like below.

Unit : mm

Style	Metric	Inch	Rated Resistance	L	W	H	c	d	*Unit weight/pc.	Marking
NEW MLP20	2012	0805	10mΩ	2.0±0.15	1.25±0.15	0.22±0.10	0.33±0.15	0.47±0.20	3mg	10
MLP63	6332	2512	2mΩ	6.3±0.25	3.1 ±0.25	0.58±0.15	2.2 ±0.25	2.2 ±0.25	60mg	R002
			3mΩ			0.45±0.15	2.2 ±0.25	2.2 ±0.25		R003
			4mΩ			0.34±0.15				R004
			5mΩ			0.51±0.15	1.1 ±0.25	1.1 ±0.25		R005
			6mΩ			0.5 ±0.15				R006
			7mΩ				0.6 ±0.25	0.6 ±0.25		R007
			8mΩ			0.35±0.15	1.1 ±0.25	1.1 ±0.25		R008
			9mΩ				0.8 ±0.25	0.8 ±0.25		R009
			10mΩ				0.5 ±0.25	0.5 ±0.25		R010

*Values for reference

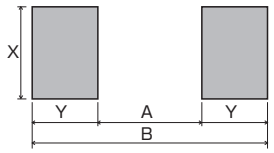
●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance: Code	Temperature Coefficient of Resistance: 10^{-6}/℃	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
NEW MLP20	2012 (0805)	1.0	10	10mΩ	N	±70	F(±1%) J(±5%)	100	−55～+170
					K	±100			
MLP63	6332 (2512)	2.0	31.6, 25.8, 22.3, 20.0, 18.2, 16.9, 15.8, 14.9, 14.1	2mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ	N	±70	F(±1%) J(±5%)		
					K	±100			

Note1. Rated Current= $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Please contact Kamaya sales dept. for any other resistance values.
Note4. Resistance value shall be measured by mounting the substrate with the required conditions per Kamaya specification.

MLP

●Recommended Land Pattern



Unit : mm

Style	Metric	Inch	Rated Resistance	A	B	X	Y
MLP20	**2012**	**0805**	10mΩ	0.8	2.7	1.36	0.95
MLP63	**6332**	**2512**	2mΩ	1.8	7.6	3.5	2.9
			3mΩ				
			4mΩ				
			5mΩ	4			1.8
			6mΩ				
			7mΩ				
			8mΩ				
			9mΩ				
			10mΩ				

*Values for reference

●Part Number Description

Example

Style: MLP 63 — Product Type

Size		
Code	Metric	Inch
20	2012	0805
63	6332	2512

K — Temperature Coefficient of Resistance

K	±100×10^{-6}/℃
N	±70 ×10^{-6}/℃

R005 — Rated Resistance

e.g. : R005=5mΩ
R010=10mΩ

F — Tolerance on Rated Resistance

F	±1%
J	±5%

TE — * Packaging & Standard Qty. (Min.)

TP	Paper Tape	5,000pcs.	MLP20
TE	Embossed Tape	4,000pcs.	MLP63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution

Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.

NEW

MLP63C

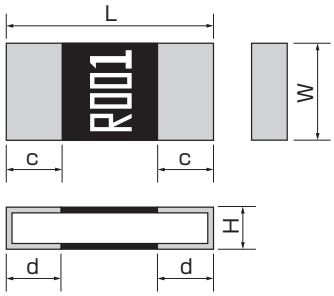
AEC-Q200

Halogen Free | Antimony Free | Pb Free

●Features

2512inch size: 3W.

●Dimensions



Resistance value of MLP series are marked like below.

Unit : mm

Style	Metric	Inch	Rated Resistance	L	W	H	c	d	*Unit weight/pc.	Marking
MLP63C	6332	2512	1mΩ	6.3±0.25	3.1±0.25	0.38±0.15	2.2 ±0.25		60mg	R001
			1.5mΩ				1.5 ±0.25			1L50
			2mΩ			0.58±0.15	2.2 ±0.25			R002
			2.5mΩ			0.45±0.15	2.4 ±0.25			2L50
			3mΩ				2.2 ±0.25			R003
			4mΩ			0.34±0.15				R004
			5mΩ			0.51±0.15	1.1 ±0.25			R005
			6mΩ			0.5 ±0.15				R006
			7mΩ				0.6 ±0.25			R007
			8mΩ			0.35±0.15	1.1 ±0.25			R008
			9mΩ				0.8 ±0.25			R009
			10mΩ				0.5 ±0.25			R010

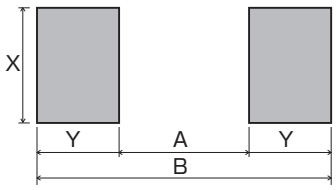
*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance: Code	Temperature Coefficient of Resistance: 10^{-6}/℃	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
MLP63C	6332 (2512)	3.0	54.7, 44.7, 38.7, 34.6, 31.6, 27.3, 24.4, 22.3, 20.7, 19.3, 18.2, 17.3	1mΩ, 1.5mΩ, 2mΩ, 2.5mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ	N	±70	F(±1%) J(±5%)	100	−55～+170
					K	±100			

Note1. Rated Current= $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Please contact Kamaya sales dept. for any other resistance values.
Note4. Resistance value shall be measured by mounting the substrate with the required conditions per Kamaya specification.

●Recommended Land Pattern



Unit : mm

Style	Rated Resistance Range	A	B	X	Y
MLP63C	1mΩ	1.8	7.5	4.0	3.0
	1.5mΩ	4	7.6	3.5	1.8
	2mΩ	1.8			2.9
	2.5mΩ				
	3mΩ				
	4mΩ				
	5mΩ	4			1.8
	6mΩ				
	7mΩ				
	8mΩ				
	9mΩ				
	10mΩ				

●Part Number Description

Example

Style: MLP 63C | K | R005 | F | TE

Product Type

Temperature Coefficient of Resistance	
K	±100×10^{-6}/℃
N	±70×10^{-6}/℃

Tolerance on Rated Resistance	
F	±1%
J	±5%

Size		
Code	Metric	Inch
63C	6332-3W	2512-3W

Rated Resistance	
e.g. : R005=5mΩ R010=10mΩ	4-Digit

* Packaging & Standard Qty. (Min.)		
TE	Embossed Tape	4,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution

Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.

NEW

WLP63

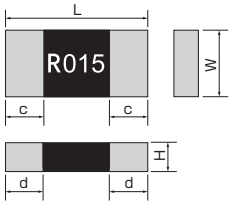
Halogen Free | Antimony Free | Pb Free

●Features

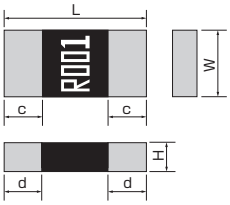
2512 inch size 3W, 1mΩ to 100mΩ available.

●Dimensions

WLP63 3A/3D : 3mΩ~100mΩ
WLP63 3F : 4mΩ~100mΩ



WLP63 3A/3D : 1mΩ, 2mΩ
WLP63 3F : 1mΩ~3mΩ



Rated resitance value of WLP series is marking 4-digit on the coating.

Unit : mm

Style	Rated Dissipation at 70℃ Code	Rated Dissipation at 70℃ W	Metric (Inch)	Rated Resistance Range	L	W	H	c	d	*Unit weight/pc.
WLP63	3A 3D	1.0 2.0	6332 (2512)	1mΩ, 2mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25	62.5mg
				3mΩ ～100mΩ	6.40±0.20	3.25±0.20	0.75±0.25	1.00±0.25	1.00±0.25	
	3F	3.0		1mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25	
				2mΩ, 3mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25	
				4mΩ～100mΩ	6.40±0.20	3.25±0.20	0.75±0.25	1.00±0.25	1.00±0.25	

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ Code	Rated Dissipation at 70℃ W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Products Type	Tolerance on Rated Resistance	Insulation Voltage V	Category Temperature Range ℃
WLP63	6332 (2512)	3A	1.0	15.8 ～ 31.6	1mΩ ～4mΩ	N	±70	Low EMF	F(±1%) G(±2%) J(±5%)	100	−55～+170
				3.16 ～ 14.1	5mΩ ～100mΩ			Standard			
		3D	2.0	22.3 ～ 44.7	1mΩ ～4mΩ			Low EMF			
				4.47 ～ 20	5mΩ ～100mΩ			Standard			
		3F	3.0	27.3 ～ 54.8	1mΩ ～4mΩ			Low EMF			
				5.48 ～ 24.5	5mΩ ～100mΩ			Standard			

Note1. Rated Current= $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation})} \times (\text{Rated Resistance})$. (d.c. or a.c. r.m.s. Voltage)
Note3. Please contact Kamaya sales dept. for any other resistance values.

●Rated Resistance

Resistance	Code/Mark
1mΩ	R001
2mΩ	R002
3mΩ	R003
4mΩ	R004
5mΩ	R005
6mΩ	R006

Resistance	Code/Mark
8mΩ	R008
10mΩ	R010
12mΩ	R012
15mΩ	R015
20mΩ	R020
25mΩ	R025

Resistance	Code/Mark
30mΩ	R030
33mΩ	R033
35mΩ	R035
40mΩ	R040
50mΩ	R050
60mΩ	R060

Resistance	Code/Mark
75mΩ	R075
80mΩ	R080
100mΩ	R100

Please contact Kamaya sales window for any other resistance values.

●Part Number Description

Example

Style: WLP 63 | 3D | N | R025 | F | TE

Product Type

Rated Dissipation	
3A	1W
3D	2W
3F	3W

Temperature Coefficient of Resistance	
N	±70×10^{-6}/℃

Size		
Code	Metric	Inch
63	6332	2512

Rated Resistance
e.g. : R025=25mΩ

Tolerance on Rated Resistance	
F	±1%
G	±2%
J	±5%

* Packaging & Standard Qty. (Min.)		
TE	Embossed Tape	4,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Precaution

Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.
Please contact Kamaya sales window for the recommended land pattern of this resistor.

AEC-Q200

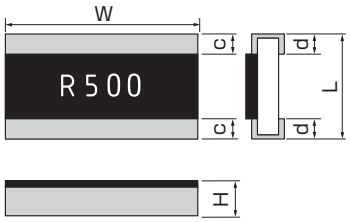
TWLC

Halogen Free Antimony Free

●Features

Downsizing and High rated dissipation by wide termination structure.
High solderability strength and reliability by wide termination structure.

●Dimensions



Rated resistance value is marking with 4-digit on the over coating.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
TWLC32	1632	0612	1.6±0.2	3.2±0.2	0.55±0.1	$0.35^{+0.15}_{-0.10}$	0.5±0.25	9mg
TWLC50	2550	1020	2.5±0.15	5.0±0.2	0.55±0.1	0.6±0.2	0.6±0.2	26mg
TWLC63	3263	1225	3.2±0.2	6.3±0.2	0.60±0.1	0.6±0.2	0.6±0.2	40mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Current Range A	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/℃	Insulation Voltage V	Category Temperature Range ℃
TWLC32	1632 (0612)	1.0	1.04 ～ 3.16	100mΩ ～ 180mΩ	F (± 1%) J (±5%)	—	0 ～ +350	500	−55～+155
				200mΩ ～ 470mΩ			0 ～ +250		
				500mΩ ～ 910mΩ			0 ～ +200		
TWLC50	2550 (1020)	1.0		100mΩ ～ 180mΩ			0 ～ +350		
				200mΩ ～ 910mΩ			0 ～ +200		
TWLC63	3263 (1225)	2.0	1.48 ～ 4.47	100mΩ ～ 180mΩ			0 ～ +350		
				200mΩ ～ 910mΩ			0 ～ +200		

Note1. Rated Current = $\sqrt{(\text{Rated Dissipation})/(\text{Rated Resistance})}$
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$ (d.c. or a.c. r.m.s Voltage)

●Rated Resistance

Resistance	Code
100mΩ	R100
110mΩ	R110
120mΩ	R120
130mΩ	R130
150mΩ	R150
160mΩ	R160
180mΩ	R180
200mΩ	R200

Resistance	Code
220mΩ	R220
240mΩ	R240
250mΩ	R250
270mΩ	R270
300mΩ	R300
330mΩ	R330
360mΩ	R360
390mΩ	R390

Resistance	Code
400mΩ	R400
430mΩ	R430
470mΩ	R470
500mΩ	R500
510mΩ	R510
560mΩ	R560
600mΩ	R600
620mΩ	R620

Resistance	Code
650mΩ	R650
680mΩ	R680
700mΩ	R700
750mΩ	R750
800mΩ	R800
820mΩ	R820
900mΩ	R900
910mΩ	R910

●Part Number Description

Example

Style: TWLC | 50 | — | R470 | F | TE

Product Type: TWLC

Size:

Code	Metric	Inch
32	1632	0612
50	2550	1020
63	3263	1225

Temperature Coefficient of Resistance:

—	0～+200×10^{-6}/℃
	0～+250×10^{-6}/℃
	0～+350×10^{-6}/℃

Rated Resistance: e.g. : R470 = 470mΩ, R100 = 100mΩ

Tolerance on Rated Resistance:

F	±1%
J	±5%

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
TP	Paper Tape	5,000pcs.	TWLC32
TE	Embossed Tape	4,000pcs.	TWLC50 TWLC63

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

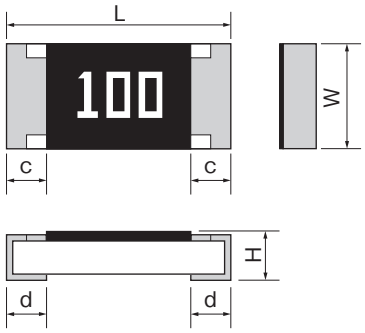
FRC

Halogen Free | Antimony Free

●Features

Suitable for battery circuit and power supply circuit.

●Dimensions



Rated resistance value is marked with 3-digit on the over coating

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FRC16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.1	0.3±0.1	2.2mg
FRC20	2012	0805	2.0±0.1	1.25±0.10	0.6 ±0.1	0.4±0.2	0.4±0.2	6mg
FRC32	3216	1206	3.2±0.2	1.6 ±0.15	0.6 ±0.1	0.5±0.25	0.5±0.25	10mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation W	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/℃	Preferred Number Series for Resistors	Fusing Characteristic Applied Power	Fusing Characteristic Fusing Time	Maximum Open Circuit Voltage	Category Temperature Range ℃
FRC16	1608 (0603)	0.063	3.9Ω～51Ω	J(±5%)	±500	E24	1.89W	30s max.	50V	−55～+125
FRC20	2012 (0805)	0.1	1Ω～51Ω		±1,000		2.0W			
FRC32	3216 (1206)	0.125	1Ω～51Ω				2.5W			
			56Ω～100Ω		±500					

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Contact us for further information on other style, resistance and pre-arcing time-current characteristic than those mentioned above.
Note3. Contact us for information when inrush and surge voltage are supposed to be applied.
Note4. Maximum open circuit voltage is the value of voltage applicable to both ends of resistors,when a resister is open condition in a circuit.
This voltage shall be corresponding to 1,000 times the rated dissipation or maximum open circuit which is the less severe.

●Part Number Description

Example

Style: FRC 20 | C | 2A | 100 | J | TP

Product Type

Fusing Characteristics	
C	standard

Tolerance on Rated Resistance	
J	±5%

Size		
Code	Metric	Inch
16	1608	0603
20	2012	0805
32	3216	1206

Size	Rated Dissipation	
16	1J	0.063W
20	2A	0.1W
32	2B	0.125W

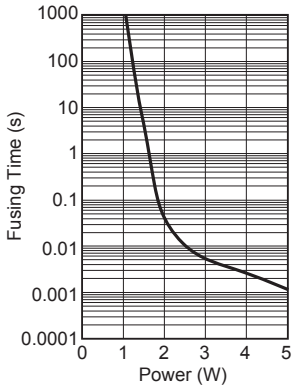
Rated Resistance
E24series
ex.:100=10Ω

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TP	Paper Tape	5,000pcs.

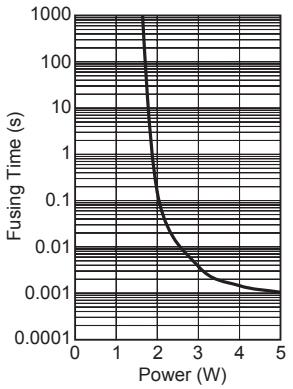
*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

●Example of Typical Fusing Characteristics

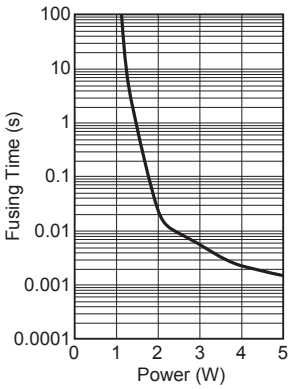
FRC16
Rated Resistance Value : 10 ohm



FRC20
Rated Resistance Value : 1 ohm



FRC32
Rated Resistance Value : 51 ohm



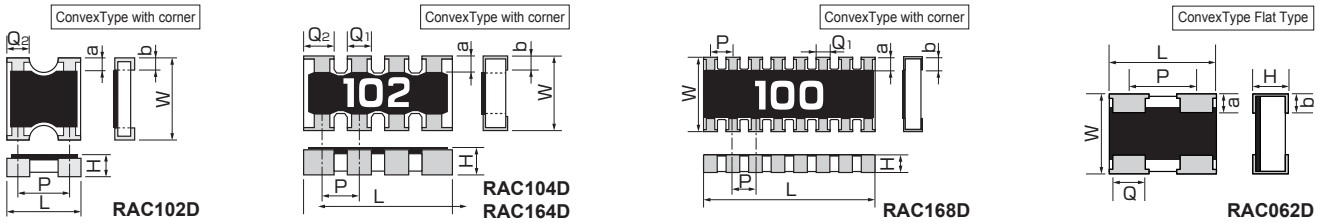
RAC

Halogen Free | Antimony Free

●Features

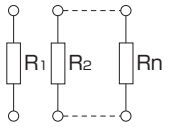
High-density SMD packaging contributes higher productivity and reduces assembly costs.

●Dimensions



Dimensions of Terminal Style : E, please contact us.

Circuits



$R_1=R_2=\cdots=R_n$

• Please contact Kamaya sales dept for different resistance values.

Note. Please contact Kamaya sales dept for the detail of marking on the over coating.

Unit : mm

Style	Terminal Style	L	W	H	Q_1	*Q_2	a	b	*P	*Unit weight/pc.
RAC062D	E	0.8±0.05	0.6±0.05	0.23±0.10	—	0.2 ±0.1	0.2 ±0.1	0.2 ±0.1	0.5	0.38mg
RAC102D	C	1.0±0.1	1.0±0.1	0.35±0.10	—	0.34±0.05	0.2 ±0.15	0.25±0.17	0.65	1.1mg
RAC104D	C	2.0±0.1	1.0±0.1	0.45±0.10	0.3±0.05	0.4 ±0.1	0.2 ±0.1	0.25±0.10	0.5	2.1mg
RAC164D	C	3.2±0.1	1.6±0.1	0.5 ±0.1	0.4±0.1	0.6 ±0.1	0.3 ±0.1	0.3 ±0.2	0.8	7mg
RAC168D	C	3.8±0.1	1.6±0.1	0.45±0.1	0.3±0.1	—	0.3 ±0.1	0.3 ±0.1	0.5	8.3mg

*Values for reference

●Ratings

Style	Rated Dissipation at 70℃ W/Element	Rated Dissipation at 70℃ W/pc.	Rated Current of Jumper A	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
RAC062D	0.031	0.063	1.0	100Ω～100kΩ	F(±1%)	±200	12.5	E24	50	−55～+125
				10Ω～27Ω	J (±5%)	±350				
				30Ω～1MΩ		±200				
RAC102D	0.063	0.125		3Ω～9.1Ω	J(±5%)	±400	25			
				10Ω～1MΩ		±300				
RAC104D		0.25		10Ω～1MΩ		±200	50			
RAC164D	0.1	0.25		10Ω～1MΩ	F(±1%)	±100			100	
				1Ω～9.1Ω	J(±5%)	+300～+500				
				10Ω～1MΩ		±200				
RAC168D	0.063	0.25		10Ω～1MΩ		±200	25			

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Note4. Jumper : Resistance value is less than 50m ohm.

●Part Number Description

Example

Style: RAC | 10 | 2 | D

103 | J | C | B

Product Type

Size

06	W:0.6mm
10	W:1.0mm
16	W:1.6mm

No. of Elements

2	2-Elements
4	4-Elements
8	8-Elements

Circuits

D	Isolation

Terminal Style

C	Convex Type	With corner
E		Flat Type(Low-profile)

Rated Resistance

E24 Series e.g.:103=10kΩ	Resistor
JP	Jumper

Tolerance on Rated Resistance

F	±1%	Resistor
J	±5%	
None	———	Jumper

*** Packaging & Standard Qty. (Min.)**

B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2 mm pitch)	10,000pcs.	RAC062D RAC102D RAC104D
TP	Paper Tape	5,000pcs.	RAC164D RAC168D

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

NEW

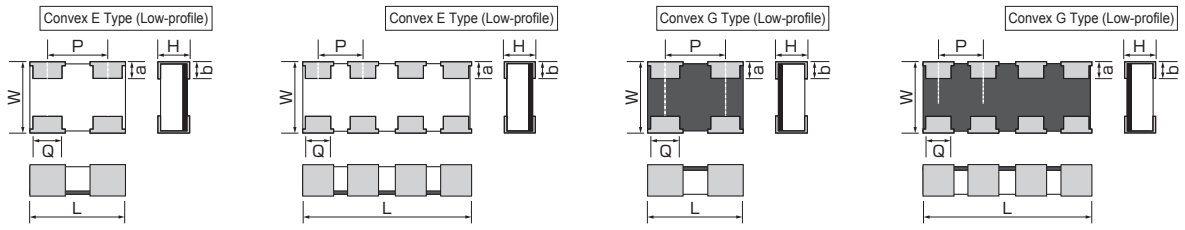
RAAW

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

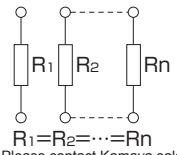
Chip resistor network combined with anti-sulfuration performance.
High-density SMD packaging contributes higher productivity and reduces assembly costs.

●Dimensions



RAAW062D RAAW064D RAAW062D RAAW064D

Circuits



$R_1=R_2=\cdots=R_n$

• Please contact Kamaya sales dept for different resistance values.

Note. Please contact Kamaya sales dept for the detail of marking on the over coating.

Unit : mm

Style	Terminal Style	L	W	H	Q_1	*Q_2	a	b	*P	*Unit weight/pc.
RAAW062D	E	0.8±0.05	0.6±0.05	0.23±0.10	—	0.2 ±0.1	0.2±0.1	0.2 ±0.1	0.5	0.38mg
	G									
RAAW064D	E	1.4±0.05	0.6±0.05	0.23±0.10	—	0.2 ±0.1	0.2±0.1	0.2 ±0.1	0.4	0.65mg
	G									

*Values for reference

●Rating

Style	Rated Dissipation at 70℃ W/Element	Rated Dissipation at 70℃ W/pc.	Rated Current of Jumper A	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/℃	Limiting Element Voltage V	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
RAAW062D	0.031	0.063	1.0	100Ω～100kΩ	F(±1%)	±200	12.5	E24	50	−55～+155
				10Ω～27Ω	J (±5%)	±350				
				30Ω～1MΩ		±200				
RAAW064D		0.125		100Ω～100kΩ	F(±1%)	±200				
				10Ω～27Ω	J (±5%)	±350				
				30Ω～1MΩ		±200				

Note1. Rated Voltage= $\sqrt{(\text{Rated Dissipation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

●Part Number Description

Example

Style: RAAW | 06 | 4 | D

Product Type	Size		No. of Elements		Circuits	
	06	W:0.6mm	2	2-Elements	D	Isolation
			4	4-Elements		

103 — Rated Resistance

E24 Series e.g. : 103=10kΩ	3-Digit

F — Tolerance on Rated Resistance

F	±1%
J	±5%

G — Terminal Style

E	Convex Type	Flat Type(Low-profile) (Face down)
G		Flat Type(Low-profile) (Face up)

TH — * Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2 mm pitch)	10,000pcs.	RAAW062D RAAW064D

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

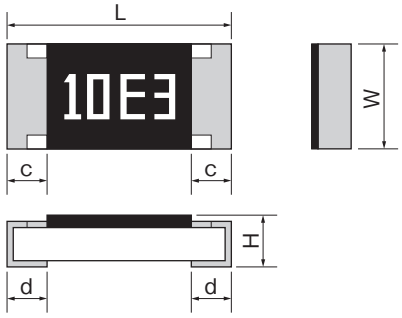
LTC

Halogen Free | Antimony Free | Pb Free

●Features

Linearity of resistance change in wide temperature range.
Suitable for temperature compensation, temperature sensing and controlling, and circuit protection applications.

●Dimensions



Rated resistance and T.C.R. value are marked with 4-digit on the over coating.
e.g. 10E3··· 10 : 1,000×10^{-6}/℃
E3 : 1.5kΩ

Please contact Kamaya sales dept for further information.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
LTC1/10	2012	0805	2.0±0.15	$1.25^{+0.10}_{-0.05}$	0.6±0.1	0.4 ±0.2	$0.3^{+0.2}_{-0.1}$	5mg
LTC1/8	3216	1206	3.1±0.1	1.55±0.10	0.6±0.1	0.45±0.20	$0.3^{+0.2}_{-0.1}$	9mg

*Values for reference

●Ratings

Temperature Coefficient of Resistance		Resistance Temperature Coefficient Tolerance	Rated Resistance Range (Rated Dissipation at 70℃)		Tolerance on Rated Resistance	Preferred Number Series for Resistors	Insulation Voltage V	Category Temperature Range ℃
10^{-6}/℃	Code		LTC1/10 (0.1W)	LTC1/8 (0.125W)				
500	05	±100×10^{-6}/℃	100Ω～5.1kΩ	100Ω～10kΩ	J(±5%)	E24	100	−40～+125
800	08	±150×10^{-6}/℃	100Ω～5.1kΩ	100Ω～10kΩ				
1,000	10	±15%	100Ω～5.1kΩ	100Ω～10kΩ				
1,500	15		100Ω～3.3kΩ	100Ω～4.7kΩ				
2,000	20	±10%	100Ω～3.3kΩ	100Ω～4.7kΩ				
2,400	24		100Ω～1.6kΩ	100Ω～2.2kΩ				
2,800	28		100Ω～3.3kΩ	100Ω～3.6kΩ				
3,000	30		100Ω～3.3kΩ	100Ω～3.6kΩ				
3,300	33		100Ω～3.3kΩ	100Ω～3.6kΩ				
3,600	36		51Ω～910Ω	51Ω～1.2kΩ				
3,900	39		51Ω～560Ω	51Ω～910Ω				
4,200	42		33Ω～360Ω	33Ω～470Ω				
4,500	45		33Ω～200Ω	33Ω～180Ω				

Note1. Rated Voltage= $\sqrt{(\text{Rated Disspation}) \times (\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Listed above will be made by order. Please contact Kamaya sales dept for further information.

●Part Number Description

Example

Style: LTC | 1/8 — Product Type

Rated Dissipation & Size			
Code	Rated Dissipation	Metric	Inch
1/10	0.1W	2012	0805
1/8	0.125W	3216	1206

30 — Temperature Coefficient of Resistance
Refer to Ratings Table on next page
e.g.: 30=3,000×10^{-6}/℃

102 — Rated Resistance
E24 Series
e.g.:102=1kΩ

J — Tolerance on Rated Resistance

J	±5%

TP — * Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.
TP	Paper Tape	5,000pcs.

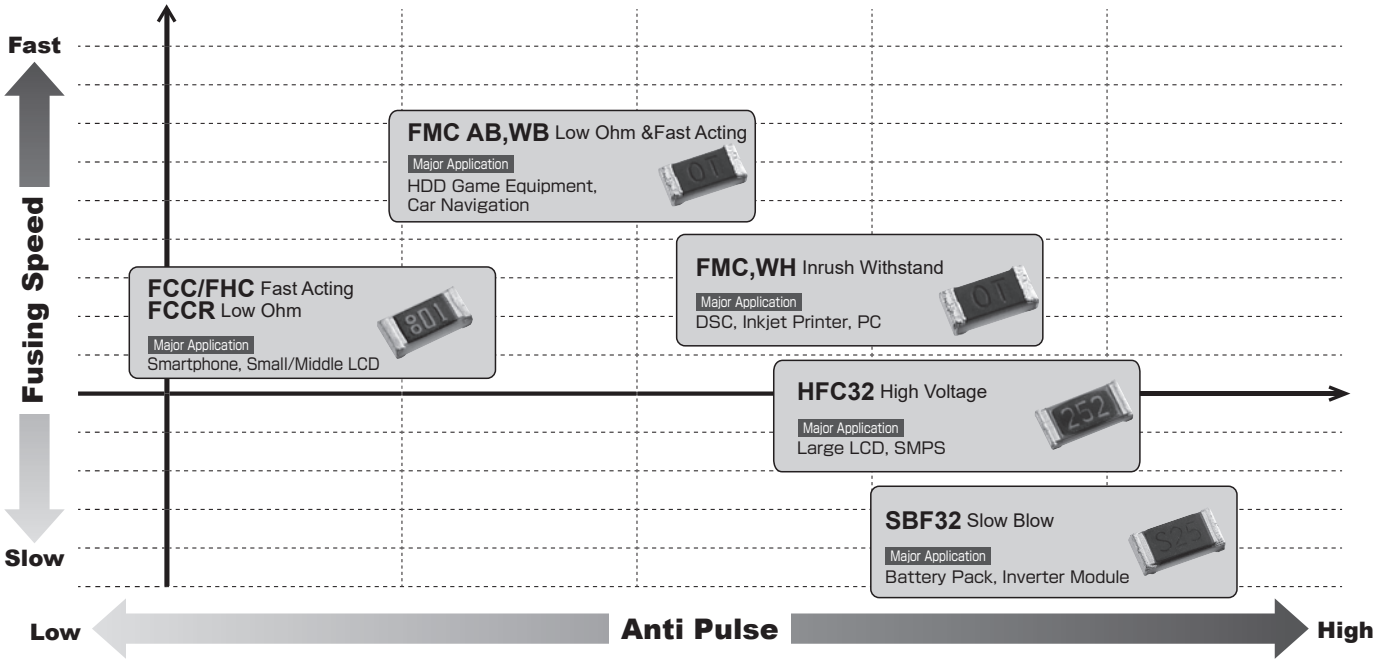
*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

Chip Fuse Selection Guide

Various type Chip Fuse line-up, High Inrush performance, Fast acting with low internal resistance value and High rated voltage etc.

Category	Series		Type	Electrical Characteristics		Size line-up 1005(0402)	1608(0603)	2012(0805)	3216(1206)	Features
Secondary side fuse	FCC/FHC	AB	General-purpose	Ir×200%	5s Max.	● 30Vd.c.～24Vd.c.	● 36Vd.c.～32Vd.c.	● 50Vd.c.～32Vd.c.	—	·2 types of the line-up fusing characteristics. ·4 size line-up.
		AD		Ir×250%	5s Max.	● 32Vd.c.～24Vd.c.	● 50Vd.c.～24Vd.c.	● 50Vd.c.～24Vd.c.	● 64Vd.c.～32Vd.c.	
	FCCR	AB	Low internal resistance value	Ir×200%	5s Max.	● 24Vd.c.	● 50Vd.c.	—	—	·Lower internal resistance value compared to FCC AB series. ·High interrupting rating 50Vdc / 50A for 0603 Inch size.
	FMC	WB AB	Low Ohm Fast Acting	Ir×200%	5s Max.	● 24Vd.c.	● 32Vd.c.	—	—	·Low consumption power by low internal resistance value. ·Fast acting fusing with anti pulse characteristics
		WH	In-rush Withstand	Ir×200%	5s Max.	● 24Vd.c.	● 32Vd.c.	—	—	·Small size with anti pulse characteristics. ·New Line up 1005mm size.
	SBF	AS	Slow Blow	Ir×200%	120s Max.	—	—	—	● 63Vd.c.～32Vd.c.	·High anti pulse characteristics by slow blow fusing.
	HFC	AG	High rated voltage	Ir×200%	60s Max.	—	—	—	● 76Vd.c.	·High rated voltage 76Vdc with low profile structure. ·Line up of Rated current, Max. 12.5A



FCC,FHC

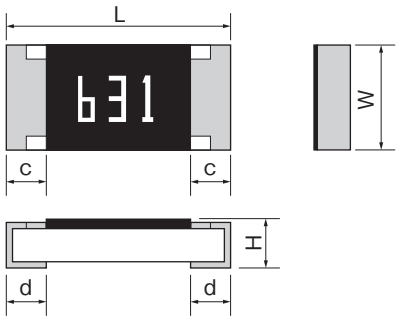
Halogen Free | Antimony Free | Pb Free

●Features

Fast-Acting Type. Suitable for over-current protection of the circuit of miniature portable equipment.Please contact Kamaya sales dept, if you need to confirm Inrush current endurance, Anti-pulce performance etc.We can provide Application Guide for FCC,FHC selection.

Certified UL, c-UL. File No. : E176847

●Dimensions



Current value is marked on the cover coating.
Please refer to Ratings table as below.

●Ratings/Option Code : AD, AB

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FCC10	1005	0402	1.0±0.05	0.5 ±0.05	0.4 ±0.05	0.2±0.1	0.25±0.10	0.8mg
FHC10								
FCC16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.15	0.3 ±0.1	2mg
FHC16								
FCC20	2012	0805	2.0±0.1	1.25±0.10	0.6 ±0.1	0.4±0.2	0.4 ±0.2	6mg
FHC20								
FCC32	3216	1206	3.2±0.2	1.6 ±0.15	0.6 ±0.1	0.5±0.25	0.5 ±0.25	10mg
FHC32					0.65±0.10			11mg

*Values for reference

●Ratings/Option Code : AD (Fast-Acting Type)

Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Time/Current Characteristics Option Code	Time/Current Characteristics	Working Temperature Range ℃
FCC10	1005 (0402)	FCC10151AD*	151	0.15	2,700	O	32Vd.c. 35A	AD	Rated Current ×250% / Opening time 5s Max.	−55～＋125
		FCC10201AD*	201	0.2	1,000	Z	30Vd.c. 35A			
		FCC10251AD*	251	0.25	750	C				
		FCC10321AD*	321	0.315	620	D				
		FCC10401AD*	401	0.4	340	E				
		FCC10501AD*	501	0.5	290	F				
		FCC10631AD*	631	0.63	210	I				
		FCC10801AD*	801	0.8	150	K				
		FCC10102AD*	102	1.0	120	L				
		FCC10132AD*	132	1.25	90	M				
FHC10		FHC10162AD*	162	1.6	55	N	24Vd.c. 35A			
		FHC10202AD*	202	2.0	40	S				
		FHC10252AD*	252	2.5	36	T				
		FHC10302AD*	302	3.0	30	R				
		FHC10322AD*	322	3.15	26	U				
FCC16	1608 (0603)	FCC16151AD*	151	0.15	4,000	OD	50Vd.c. 35A			
		FCC16201AD*	201	0.2	1,800	ZD	36Vd.c. 35A			
		FCC16251AD*	251	0.25	1,000	CD				
		FCC16321AD*	321	0.315	750	DD				
		FCC16401AD*	401	0.4	330	ED				
		FCC16501AD*	501	0.5	280	FD				
		FCC16631AD*	631	0.63	200	ID				
		FCC16801AD*	801	0.8	130	KD				
		FCC16102AD*	102	1.0	110	LD				
		FCC16132AD*	132	1.25	85	MD				
		FCC16162AD*	162	1.6	70	ND				
		FCC16202AD*	202	2.0	55	SD				
		FCC16252AD*	252	2.5	45	TD	32Vd.c. 35A			
FHC16		FHC16322AD*	322	3.15	26	UD	24Vd.c. 35A			
		FHC16352AD*	352	3.5	22	VD				
		FHC16402AD*	402	4.0	19	XD				
FCC20	2012 (0805)	FCC20401AD*	401	0.4	330	401	50Vd.c. 50A			
		FCC20501AD*	501	0.5	270	501				
		FCC20631AD*	631	0.63	190	631				
		FCC20801AD*	801	0.8	130	801				
		FCC20102AD*	102	1.0	100	102				
		FCC20132AD*	132	1.25	80	132				
		FCC20162AD*	162	1.6	65	162				
		FCC20202AD*	202	2.0	55	202				
		FCC20252AD*	252	2.5	40	252				
FHC20		FHC20322AD*	322	3.15	26	UD	32Vd.c. 50A			
		FHC20402AD*	402	4.0	19	XD				
		FHC20502AD*	502	5.0	14	YD	24Vd.c. 50A			
FCC32	3216 (1206)	FCC32201AD*	201	0.2	1,800	201	64Vd.c. 50A			
		FCC32251AD*	251	0.25	1,000	251				
		FCC32321AD*	321	0.315	750	321				
		FCC32401AD*	401	0.4	350	401				
		FCC32501AD*	501	0.5	295	501				
		FCC32631AD*	631	0.63	200	631				
		FCC32801AD*	801	0.8	140	801				
		FCC32102AD*	102	1.0	110	102				
		FCC32132AD*	132	1.25	85	132				
		FCC32152AD*	152	1.5	78	152				
		FCC32162AD*	162	1.6	75	162				
		FCC32202AD*	202	2.0	65	202				
		FCC32252AD*	252	2.5	45	252				
FHC32		FHC32322AD*	322	3.15	26	UD	32Vd.c. 50A			
		FHC32402AD*	402	4.0	19	XD				
		FHC32502AD*	502	5.0	14	YD				

"*" is packaging specification. Refer to Part Number Description for the detail.

FCC, FHC

●Ratings/Option Code : AB (Fast-Acting Type)

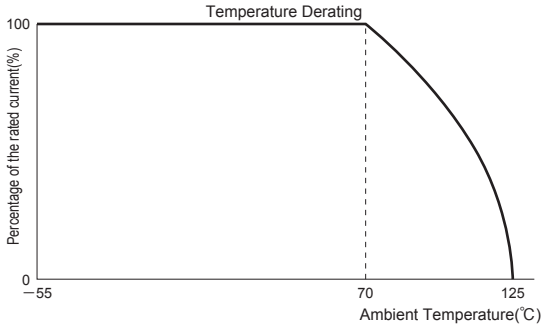
Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Time/Current Characteristics Option Code	Time/Current Characteristics Time/Current Characteristics	Working Temperature Range ℃
FCC10	1005 (0402)	FCC10201AB*	201	0.2	2,400	Z	30Vd.c. 35A	AB	Rated Current ×200% / Opening time 5s Max.	−55～＋125
		FCC10251AB*	251	0.25	1,000	C				
		FCC10321AB*	321	0.315	750	D				
		FCC10401AB*	401	0.4	620	E				
		FCC10501AB*	501	0.5	340	F				
		FCC10631AB*	631	0.63	290	I				
		FCC10751AB*	751	0.75	220	A				
		FCC10801AB*	801	0.8	210	K				
		FCC10102AB*	102	1.0	150	L				
		FCC10132AB*	132	1.25	120	M				
		FCC10152AB*	152	1.5	100	H				
		FCC10162AB*	162	1.6	90	N				
FHC10		FHC10202AB*	202	2.0	55	S	24Vd.c. 35A			
		FHC10252AB*	252	2.5	40	T				
FCC16	1608 (0603)	FCC16201AB*	201	0.2	3,200	ZB	36Vd.c. 35A			
		FCC16251AB*	251	0.25	1,800	CB				
		FCC16321AB*	321	0.315	1,000	DB				
		FCC16401AB*	401	0.4	750	EB				
		FCC16501AB*	501	0.5	330	FB				
		FCC16631AB*	631	0.63	280	IB				
		FCC16751AB*	751	0.75	210	AB				
		FCC16801AB*	801	0.8	200	KB				
		FCC16102AB*	102	1.0	130	LB				
		FCC16132AB*	132	1.25	110	MB				
		FCC16152AB*	152	1.5	95	HB				
		FCC16162AB*	162	1.6	85	NB				
		FCC16202AB*	202	2.0	70	SB				
FHC16		FHC16252AB*	252	2.5	40	TB	32Vd.c. 35A			
FCC20	2012 (0805)	FCC20501AB*	501	0.5	330	FB	50Vd.c. 50A			
		FCC20631AB*	631	0.63	270	IB				
		FCC20801AB*	801	0.8	190	KB				
		FCC20102AB*	102	1.0	130	LB				
		FCC20132AB*	132	1.25	100	MB				
		FCC20162AB*	162	1.6	80	NB				
		FCC20202AB*	202	2.0	65	SB				
FHC20		FHC20252AB*	252	2.5	40	TB	32Vd.c. 50A			

"*" is packaging specification. Refer to Part Number Description for the detail.

●Recommended Derating for Rated Current

・Nominal Derating
Option Code AD:Nominal Derating ≤ 80% of Rated Current
Option Code AB:Nominal Derating ≤ 70% of Rated Current
・Temperature Derating
Please refer to the following graph regarding the current derating value for ambient temperature.

e.g.) If FCC16 102AB (Rated Current:1.0A) is used under ambient temperature 70℃,
Kamaya recommends, less than the current value derated as below,
Rated Current：1.0A×(Nominal Derating：70% ×Temperature Derating：100%) =0.7A



●Part Number Description

Example

Style: FCC 20

Product Type
FCC
FHC

Size Code	Metric	Inch
10	1005	0402
16	1608	0603
20	2012	0805
32	3216	1206

202

Rated Current	
e.g. : 501=0.5A 132=1.25A 202=2.0A	3-Digit

AD

Option Code Code	Clearing Time
AD	Within 5s under 250% of Rated Current
AB	Within 5s under 200% of Rated Current

TP

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2mm pitch)	10,000pcs.	FCC10 FHC10
TP	Paper Tape	5,000pcs.	FCC16 FHC16 FCC20 FHC20 FCC32 FHC32

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

FMC

Option Code : WB, AB / Low Ohm & Fast Acting
Option Code : WH / In-rush Withstand

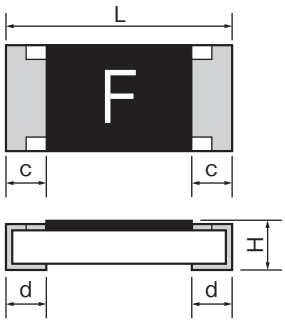
Halogen Free | Antimony Free | Pb Free

●Features

Option code : AB, WB / Low internal resistance compared with FCC/FHC16 AB series for low power consumption and voltage dropping.
Option code : WH / High anti pulse performance.
Please contact Kamaya sales dept, if you need to confirm Inrush current endurance, Anti-pulse performance etc.
We can provide Application Guide for FMC16 selection.

Certified UL, c-UL. File No. : E176847

●Dimensions



Current value is marked on the cover coating.
Please refer to Ratings table as below.

Unit : mm

Style	Option Code	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FMC10	WH	1005	0402	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	0.25±0.10	0.6mg
	AB					0.38±0.05			
FMC16	All	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.15	0.3 ±0.1	2mg

*Values for reference

●Ratings/Option Code : WB (Fast-Acting Type)

Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics Option Code	Electrical Characteristics	Working Temperature Range °C
FMC16	1608 (0603)	FMC16501WB*	501	0.5	260	F	32Vd.c. 35A	WB	Rated Current / Opening time ×100% / 4h Min. ×200% / 5s Max. ×300% / 0.2s Max.	−55～＋125
		FMC16751WB*	751	0.75	140	A				
		FMC16102WB*	102	1.0	110	L				
		FMC16132WB*	132	1.25	80	M				
		FMC16152WB*	152	1.5	65	H				
		FMC16202WB*	202	2.0	45	S				
		FMC16252WB*	252	2.5	32	T				
		FMC16302WB*	302	3.0	26	R				
		FMC16402WB*	402	4.0	18	X				
		FMC16502WB*	502	5.0	14	Y				

"*" is packaging specification. Refer to Part Number Description for the detail.

●Ratings/Option Code : WH (Fast-Acting Type)

Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics Option Code	Electrical Characteristics	Working Temperature Range °C
FMC10	1005 (0402)	FMC10501WH*	501	0.5	250	F	24Vd.c. 35A	WH	Rated Current / Opening time ×100% / 4h Min. ×200% / 5s Max. ×300% / 0.2s Max.	−55～＋125
		FMC10751WH*	751	0.75	150	A				
		FMC10102WH*	102	1.0	100	L				
		FMC10132WH*	132	1.25	70	M				
		FMC10152WH*	152	1.5	60	H				
		FMC10202WH*	202	2.0	40	S				
		FMC10252WH*	252	2.5	30	T				
		FMC10302WH*	302	3.0	25	R				
		FMC10322WH*	322	3.15	24	U				
		FMC10402WH*	402	4.0	18	X				
		FMC10502WH*	502	5.0	14	Y				
FMC16	1608 (0603)	FMC16501WH*	501	0.5	400	○F	32Vd.c. 35A			
		FMC16631WH*	631	0.63	300	○I				
		FMC16751WH*	751	0.75	210	○A				
		FMC16801WH*	801	0.8	180	○K				
		FMC16102WH*	102	1.0	115	○L				
		FMC16132WH*	132	1.25	90	○M				
		FMC16152WH*	152	1.5	70	○H				
		FMC16162WH*	162	1.6	60	○N				
		FMC16202WH*	202	2.0	50	○S				
		FMC16252WH*	252	2.5	37	○T				
		FMC16302WH*	302	3.0	28	○R				
		FMC16322WH*	322	3.15	26	○U				
		FMC16402WH*	402	4.0	18	○X				
		FMC16502WH*	502	5.0	14	○Y				

"*" is packaging specification. Refer to Part Number Description for the detail.

FMC Option Code : WB, AB / Low Ohm & Fast Acting
Option Code : WH / In-rush Withstand

●Ratings/Option Code : AB (Fast-Acting Type)

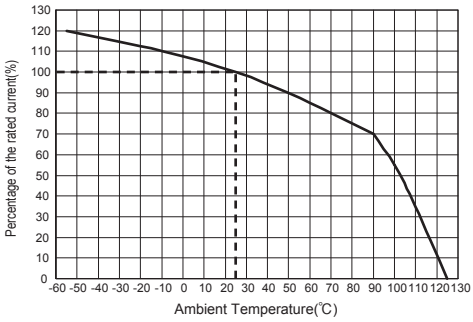
Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics Option Code	Electrical Characteristics	Working Temperature Range ℃
FMC10	1005 (0402)	FMC10501AB*	501	0.5	240	F	24Vd.c. 35A	AB	Rated Current / Opening time ×100% / 4h Min. ×200% / 5s Max. ×300% / 0.2s Max.	−55～＋125
		FMC10751AB*	751	0.75	140	A				
		FMC10102AB*	102	1.0	95	L				
		FMC10132AB*	132	1.25	73	M				
		FMC10152AB*	152	1.5	60	H				
		FMC10202AB*	202	2.0	41	S				
		FMC10252AB*	252	2.5	32	T				
		FMC10302AB*	302	3.0	25	R				

"*" is packaging specification. Refer to Part Number Description for the detail.

●Recommended Derating for Rated Current

・Nominal Derating
Nominal Derating ≤ 75% of Rated Current
For only FMC10 WH series, please note that the recommendation value is different by Rated current.
Rated Current ≦ 3.0A : 75%, Rated Current ＞ 3.0A : 70%
・Temperature Derating
Please refer to the following graph regarding the current derating value for ambient temperature.

e.g.) If FMC16 102WB (Rated Current:1.0A) is used under ambient temperature 70℃,
Kamaya recommends, less than the current value derated as below,
Rated Current : 1.0A× (Nominal Derating : 75% × Temperature Derating : 80%) =0.6A



●Part Number Description

Example

Style: FMC | 16 | 501 | WB | TP

Product Type

Rated Current	
e.g. :501=0.5A 132=1.25A 252=2.5A	3digit

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603

Option Code	
Code	Clearing Time
WB	Rated Current×200% 5s max.
AB	
WH	

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Press-Pocket Paper Tape (2mm pitch)	10,000pcs.	FMC10
TP	Paper Tape	5,000pcs.	FMC16

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

FCCR

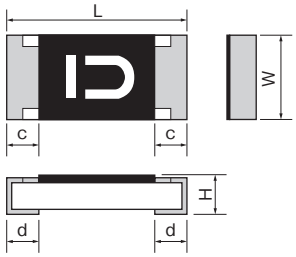
Halogen Free | Antimony Free | Pb Free

●Features

Suitable for over-current protection of the circuit of miniature portable equipment.

Certified UL, c-UL. File No. : E176847

●Dimensions



Current value is marked on the cover coating.
Please refer to Ratings table as below.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FCCR10	1005	0402	1.0±0.05	0.5±0.05	0.4 ±0.05	0.2±0.1	0.25±0.10	0.8mg
FCCR16	1608	0603	1.6±0.1	0.8 $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.15	0.3 ±0.1	2mg

*Values for reference

●Ratings/Option Code : AB (Fast-Acting Type)

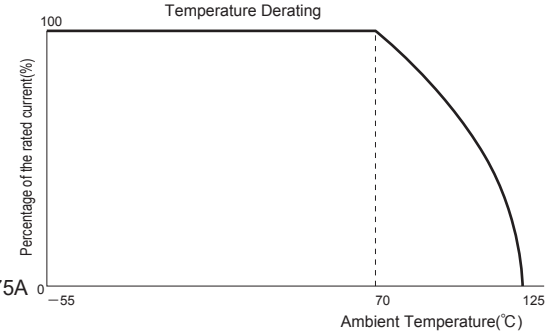
Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Time/Current Characteristics Option Code	Time/Current Characteristics Time/Current Characteristics	Working Temperature Range ℃
FCCR10	1005 (0402)	FCCR10151AB*	151	0.15	1850	∩	24Vd.c. 35A	AB	Rated Current × 200% Opening time : 5s Max.	−55～+125
		FCCR10201AB*	201	0.2	1250	Z				
		FCCR10251AB*	251	0.25	880	C				
		FCCR10321AB*	321	0.315	600	D				
		FCCR10401AB*	401	0.4	400	E				
		FCCR10501AB*	501	0.5	300	F				
FCCR16	1608 (0603)	FCCR16151AB*	151	0.15	2300	OB	50Vd.c. 50A			
		FCCR16201AB*	201	0.2	1350	ZB				
		FCCR16251AB*	251	0.25	1000	CB				
		FCCR16321AB*	321	0.315	600	DB				
		FCCR16401AB*	401	0.4	450	EB				
		FCCR16501AB*	501	0.5	300	FB				
		FCCR16631AB*	631	0.63	220	IB				
		FCCR16751AB*	751	0.75	190	AB				
		FCCR16801AB*	801	0.8	165	KB				
		FCCR16102AB*	102	1.0	130	LB				
		FCCR16132AB*	132	1.25	110	MB				
		FCCR16152AB*	152	1.5	90	HB				
		FCCR16162AB*	162	1.6	75	NB				
		FCCR16202AB*	202	2.0	65	SB				
		FCCR16252AB*	252	2.5	40	TB				

"*" is packaging specification. Refer to Part Number Description for the detail.

●Recommended Derating for Rated Current

・Nominal Derating
Nominal Derating ≤ 75% of Rated Current
・Temperature Derating
Please refer to the following graph regarding the current derating value for ambient temperature.

e.g.) If FCCR10 501AB (Rated Current:0.5A) is used under ambient temperature 70℃,
Kamaya recommends, less than the current value derated as below,
Rated Current : 0.5A × (Nominal Derating : 75% × Temperature Derating : 100%) =0.375A



●Part Number Description

Example

Style: FCCR | 10 | 151 | AB | PA

Product Type

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603

Rated Current	
e.g. :151=0.15A 321=0.315A 132=1.25A	3digit

Option Code	
Code	Clearing Time
AB	Within 5s under 200% of Rated Current

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
PA	Press-Pocket Paper Tape (2mm pitch)	10,000pcs.	FCCR10
TP	Paper Tape	5,000pcs.	FCCR16

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

SBF32 Slow Blow

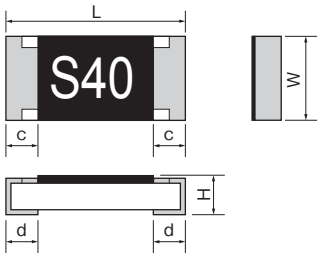
Halogen Free | Antimony Free | Pb Free

●Features

"Slow Blow "ensure high anti pulse performance. Line up of 8A.
Please contact Kamaya sales dept, if you need to confirm Inrush current endurance, Anti-pulse performance etc.
We can provide Application Guide for SBF32 selection.

Certified UL, c-UL. File No. : E176847

●Dimensions



Current value is marked on the cover coating.
Please refer to Ratings table as below.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
SBF32	3216	1206	3.2±0.2	1.6±0.15	0.65±0.10	0.5±0.25	0.5±0.25	10mg

*Values for reference

●Ratings/Option Code : AS (Slow Blow Type)

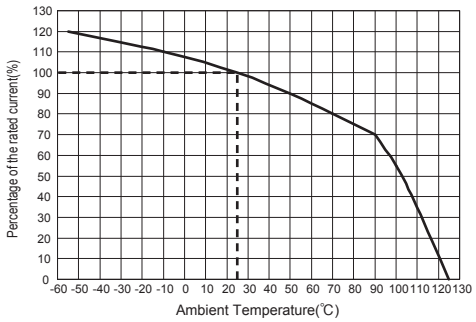
Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics Option Code	Electrical Characteristics: Rated Current	Opening time Min.	Opening time Max.	Working Temperature Range ℃
SBF32	3216 (1206)	SBF32102AS*	102	1.0	130	S10	63Vd.c. 50A	AS	×100%	4h	—	−55～+125
		SBF32132AS*	132	1.25	94	S13			×200%	1s	120s	
		SBF32152AS*	152	1.5	68	S15			×300%	0.02s	3.0s	
		SBF32202AS*	202	2.0	40	S20			×800%	0.0015s	0.05s	
		SBF32252AS*	252	2.5	30	S25	32Vd.c. 50A					
		SBF32302AS*	302	3.0	24	S30						
		SBF32402AS*	402	4.0	15	S40						
		SBF32502AS*	502	5.0	12	S50						
		SBF32602AS*	602	6.0	10	S60						
		SBF32702AS*	702	7.0	7	S70						
		SBF32802AS*	802	8.0	6	S80						

"*" is packaging specification. Refer to Part Number Description for the detail.

●Recommended Derating for Rated Current

・Nominal Derating
Nominal Derating ≤ 75% of Rated Current
・Temperature Derating
Please refer to the following graph regarding the current derating value for ambient temperature.

e.g.) If SBF32 102AS (Rated Current 1.0A) is used under ambient temperature 70℃,
Kamaya recommends, less than the current value derated as below,
Rated Current : 1.0A × (Nominal Derating : 75% × Temperature Derating : 80%) = 0.6A



●Part Number Description

Example

Style: SBF | 32 | 402 | AS | TP

Product Type

Size		
Code	Metric	Inch
32	3216	1206

Rated Current	
e.g. : 252=2.5A 402=4.0A 802=8.0A	3digit

Option Code	
Code	Clearing Time
AS	Rated Current×200% : 1s min～120s. max.

Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TP	Paper Tape	5,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

HFC32 High Rated Voltage

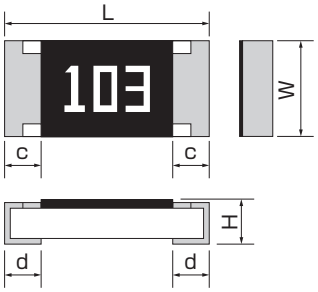
Halogen Free | Antimony Free | Pb Free

●Features

Line-up of Low-profile Chip Fuse with high rated voltage 76Vd.c.
Withstanding for rated current until Max. 12.5A
For Chip Fuse selection, application guide is available. Please contact Kamaya sales dept. if it is required.

Certified UL, c-UL. File No. : E176847

●Dimensions



Current value is marked on the cover coating.
Please refer to Ratings table as below.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
HFC32	3216	1206	3.2±0.2	1.6±0.15	0.60±0.1	0.5±0.25	0.5±0.25	9mg

*Values for reference

●Ratings/Option Code : AG (Fast-Acting Type)

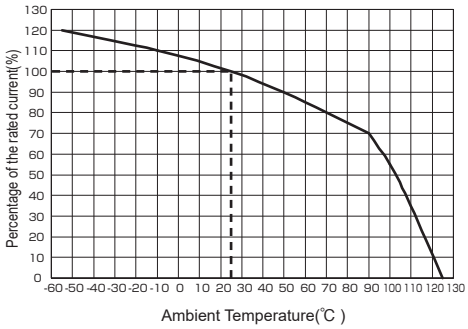
Style	Size Metric (Inch)	Part Number	Rated Current Code	Rated Current A	Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics Option Code	Electrical Characteristics Electrical Characteristics	Working Temperature Range ℃
HFC32	3216 (1206)	HFC32102AG*	102	1.0	180	102	76Vd.c. 50A	AG	Rated Current × 200% Opening time : 60s Max.	−55～+125
		HFC32132AG*	132	1.25	140	132				
		HFC32162AG*	162	1.6	100	162				
		HFC32202AG*	202	2.0	60	202				
		HFC32252AG*	252	2.5	38	252				
		HFC32302AG*	302	3.0	32	302				
		HFC32322AG*	322	3.15	30	322				
		HFC32402AG*	402	4.0	20	402				
		HFC32502AG*	502	5.0	16	502				
		HFC32632AG*	632	6.3	12	632				
		HFC32702AG*	702	7.0	11	702				
		HFC32802AG*	802	8.0	9	802				
		HFC32103AG*	103	10.0	7	103				
		HFC32133AG*	133	12.5	6	133				

"*" is packaging specification. Refer to Part Number Description for the detail.

●Recommended Derating for Rated Current

・Nominal Derating
Nominal Derating ≤ 75% of Rated Current
・Temperature Derating
Please refer to the following graph regarding the current derating value for ambient temperature.

e.g.) If HFC32 252 AG (Rated Current 2.5A) is used under ambient temperature 70℃,
Kamaya recommends, less than the current value derated as below,
Rated Current : 2.5A x (Nominal Derating : 75% × Temperature Derating : 80%) = 1.5A



●Part Number Description

Example

Style: HFC | 32 | 252 | AG | TP

Product Type

Size		
Code	Metric	Inch
32	3216	1206

Rated Current	
e.g. : 252 =2.5A 103 =10.0A 133 =12.5A	3digit

Option Code	
Code	Clearing Time
AG	Rated Current×200% 60s max.

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TP	Paper Tape	5,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

Support of Chip Fuse Selection

In order to select the appropriate Kamaya chip fuse, please provide the following information and contact Kamaya sales dept for details.

・The item you would like to check.
・Circuit Voltage:Max voltage value of circuit mounting fuses
・Steady-State Current:Current value flown fuses on normal condition.
・Ambient Temperature:Temperature around fuses.
・Waveform(In-rush Currnet):It rapidly flows on circuit when power supply is turned on.

Messrs***

****/**/**
Kamaya Electric Co., Ltd.
Hokkaido Research Center

Verification of Chip Fuse Application

■Item for examination

Series	FCCR
Size	1005 (mm)
OP Code	AB

■Operating condition

Application	15	V d.c.
	20	A
Nominal	0.2	A max.
Ambient	70	deg.C Max
Abnormal	1	A

■Item for recommend

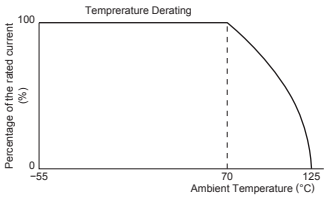
P/N	Size	Amp.	Fusing	Interrupting	Note.
FCCR10501AB	1005	0.5 A	200%, 5s	24Vd.c. 35A	OK: 100k times pulse withstand.

■Confirmation for Interrupting

	Condition	Spec	Judgment
Voltage	15Vd.c.	24Vd.c.	OK
Current	20A	35A	OK

■Confirmation for Derating

Nominal Derating	75%
Temperature Derating	100%



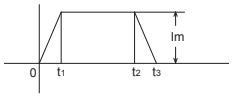
■Basis of selection

#1	0.2666667 A Min.
#2	0.5 A Max.

Rated Current ≧ Nominal Current / (Nominal Derating × Temperature Derating)
Rated Current ≦ Abnormal Current / Fusing Characteristics

■Confirmations for Rush

#1	Trapezoidal waveform	0-0.00003 s	
		Im	2 A
		t1	5 us
		t2	10 us
		t3	30 us
		→ Joule Integra	53.333 A^2 * us
		Interval	00
Amount		Joule Integra	

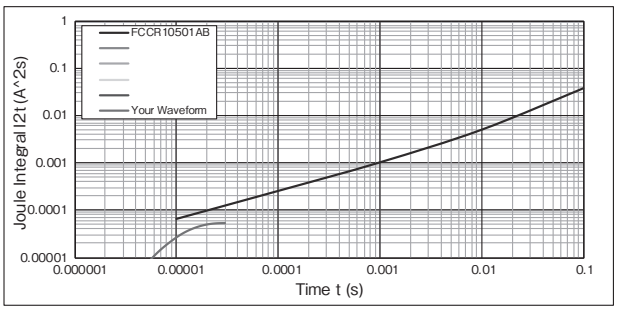


Num of wave	1

■Confirmation of Rush

	Items				Size	Current	Fusing	Note
#1	FCCR	10	501	AB	1005	0.5 A	200%,5s	OK: 100k times pulse withstand.
#2								
#3								
#4								
#5								

Recommended Item→	①FCCR10501AB



We can provide Application Guide for Fuses Selection.

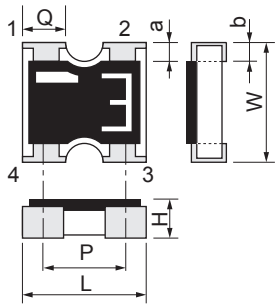
RAC101A

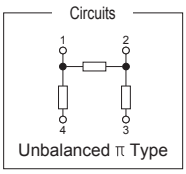
Halogen Free | Antimony Free

●Features

Suitable for use at DC and up to UHF band frequencies.

●Dimensions





Unit : mm

Style	Terminal Style	L	W	H	Q	a	b	P	*Unit weight/pc.
RAC101A	C	1.0±0.1	$1.0^{+0.10}_{0}$	0.35±0.1	0.33±0.10	0.15±0.10	0.25±0.10	0.65±0.10	1.1mg

*Values for reference

Dot mark on Termination 1
Attenuation factor on Termination 2 to 3

●Ratings

Style	Characteristic Impedance	Attenuation Factor symbol	Attenuation Factor dB	Tolerance on Attenuation Factor dB	Voltage Standing Wave Ratio	Frequency Range	Rated Input Power mW/package	Category Temperature Range ℃
RAC101A	50 ohm	1	1	±0.3	1.2max.	DC≦f≦3GHz	100	−40～+125
		2	2					
		3	3					
		4	4					
		5	5					
		6	6	±0.4				
		7	7					
		8	8					
		9	9					
		A	10					

Note1. The following information is available.
Test methods for Attenuation Factor and VSWR characteristics.

●Part Number Description

Example

Style: RAC | 10 | 1 | A

- Product Type: RAC
- Size: 10 — W:1.0mm
- Characteristic Impedance: 1 — 50 Ω
- Circuits: A — Unbalanced π Type

1

Attenuation Factor	
1	1dB
2	2dB
3	3dB
4	4dB
5	5dB
6	6dB
7	7dB
8	8dB
9	9dB
A	10dB

C

Terminal Style		
C	Convex Type	With corner

TH

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TH	Paper Tape (2 mm pitch)	10,000pcs.

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

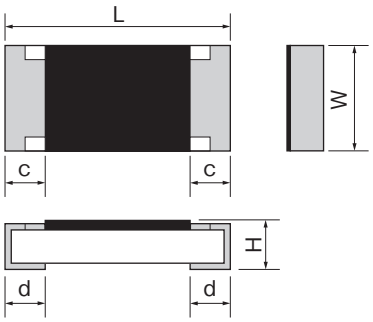
SPC,HSPC

AEC-Q200 | Halogen Free | Antimony Free | Pb Free

●Features

ESD protection component.
SPC Series : Low capacitance 0.1pf Max. Suitable for ESD protection of High Speed data line.
Major application : Mobile Phone, Digital Still Camera, PC, LCD TV etc.
HSPC Series : High ESD protection performance (15kV) for automotive (Tight ESD spec requirement)
New Line up 0603mm size.
Major application : Car audio, Car Navigation, System etc.
AEC-Q200 qualified (SPC Series is not supported.)

●Dimensions



Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
SPC10	1005	0402	1.0±0.05	0.5±0.05	0.35±0.05	0.2 ±0.1	0.25 ±0.10	0.6mg
HSPC10								
HSPC16	1608	0603	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.5±0.10	0.3 ±0.1	0.3 ±0.1	2mg

*Values for reference

Circult

●Ratings

Part Number	Size Metric (Inch)	Part Number	Capacitance Note.1 pF	ESD Characteristics: Test Voltage V	Peak Voltage Note.2 Code	Peak Voltage Note.2 V	Clamp Voltage Note.3 V	ESD pulse withstand Pulses	Note.4 Rated Voltage V	Note.5 Leakage current μA	Note.6 Category Temperature Range ℃
SPC10	1005 (0402)	SPC10501A01*	0.1 Max.	8kV Contact discharge	501	500 Max.	100 Max.	100 Min.	30 Max.	1 Max.	−55～+125
		SPC10501C01*							50 Max.		
HSPC10		HSPC10601A01*		15kV Aerial discharge	601	600 Max.			30 Max.		
HSPC16	1608 (0603)	HSPC16701B02*	0.2 Max.		701	700 Max.			20 Max.		
		HSPC16701C02*							50 Max.		

"*" is packaging specification. Refer to Part Number Description for the detail.

Note1. Capacitance : Measured at 25℃ , 1MHz, 1V rms.
Note2. Peak Voltage : Measured at IEC61000-4-2 Test Voltage.
Note3. Clamp Voltage : Measured at IEC61000-4-2 Test Voltage, at 30ns.
Note4. Rated Voltage : The value of voltage that is applicable to each teminal of ESD suppressor without operation of suppressor.
Note5. Leakage Current : The value of current that ESD suppressor is impressed at rated voltage.
Note6. Category Temperature Range : Working Temperature Range of ESD suppressor.

●Part Number Description

Example

Style: SPC | 10 | 501 | A | 01 | TH

Product Type
SPC
HSPC

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603

Peak Voltage	
Code	Peak Voltage
501	500V
601	600V
701	700V

Rated Voltage	
Code	Rated Voltage
A	30V max.
B	20V max.
C	50V max.

Option Code	
Code	Option Code
01	Capacitance 0.1pF max.
02	Capacitance 0.2pF max.

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Style
TH	Paper Tape (2mm pitch)	10,000pcs.	SPC10 HSPC10
TP	Paper Tape	5,000pcs.	HSPC16

*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

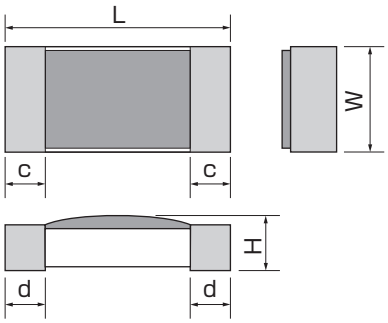
SPGA

Halogen Free | Antimony Free | Pb Free

●Features

ESD protection component.

●Dimensions

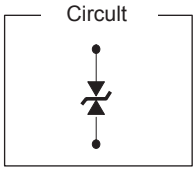


Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
NEW SPGA06	0603	0201	0.63±0.05	0.3±0.03	0.23±0.05	0.165±0.05	0.165±0.05	0.16mg

*Values for reference

Circuit



●Ratings

Part Number	Size Metric (Inch)	Capacitance Note.1 pF	ESD Characteristics					Note.4 Rated Voltage V	Note.5 Leakage current μA	Note.6 Category Temperature Range ℃
			Test Voltage V	Peak Voltage Note.2 Code	Peak Voltage Note.2 V	Clamp Voltage Note.3 V	ESD pulse withstand Pulses			
NEW SPGA06	0603 (0201)	0.5 Max.	8kV Contact discharge	501	500 Max.	70 Max.	900 Min.	5 Max.	1 Max.	−40～+125
				701	700 Max.	85 Max.		12 Max.		

Note1. Capacitance : Measured at 25℃ , 1MHz, 1V rms.
Note2. Peak Voltage : Measured at IEC61000-4-2 Test Voltage.
Note3. Clamp Voltage : Measured at IEC61000-4-2 Test Voltage, at 30ns.
Note4. Rated Voltage : The value of voltage that is applicable to each teminal of ESD suppressor without operation of suppressor.
Note5. Leakage Current : The value of current that ESD suppressor is impressed at rated voltage.
Note6. Category Temperature Range : Working Temperature Range of ESD suppressor.

●Part Number Description

Example

Style: SPGA | 06 | 501 | D | 05 | PA

Product Type

Product Type
SPGA

Size

Code	Metric	Inch
06	0603	0201

Peak Voltage

Code	Peak Voltage
501	500V
701	700V

Rated Voltage

Code	Rated Voltage
D	5V max.
E	12V max.

Option Code

Code	Option Code
05	Capacitance 0.5pF max.

* Packaging & Standard Qty. (Min.)

PA	Press-Pocket Paper Tape (2mm pitch)	15,000pcs.	SPGA06

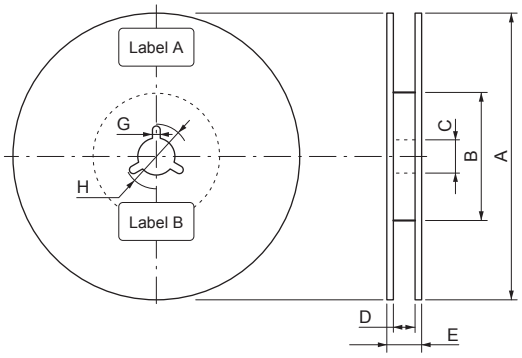
*Refer to Tape and Packaging information on pages 54 and 55.
*Bulk (bulk, bagged) is made to order.
Please contact our Sales Department.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.【RoHS】

Memo

Packaging for Surface Mount Devices

●Reel Dimensions



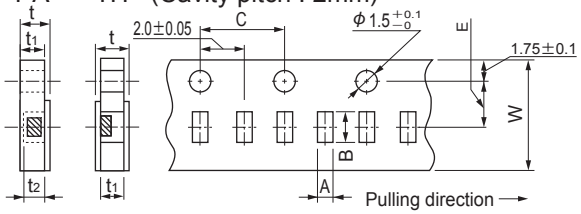
Unit : mm

	Code		A	B	C	D	E	G	H
Plastic Reel (EIAJ ET-7200C)	PA,TH,TP,TE (8 mm width)	Shoot molding	$\phi 180^{0}_{-1.5}$	$\phi 60^{+1}_{0}$	$\phi 13\pm0.2$	$9^{+1.0}_{0}$	11.4±1.0	2±0.5	$\phi 21\pm0.8$
		Vacuum molding					13.0±1.0		
	TE(12 mm width)					$13^{+1.0}_{0}$	17.0±1.0	—	

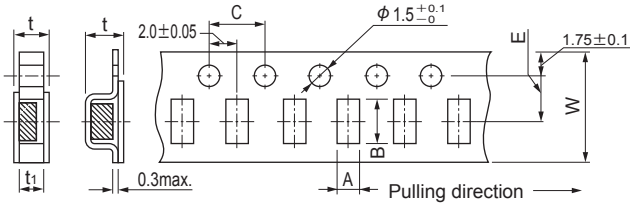
*Dimension A : Please contact Kamaya sales dept for plastic reels of ϕ250mm and ϕ330mm.

●Tape Dimensions (Unit : mm)

PA TH (Cavity pitch : 2mm)



TP TE (Cavity pitch : 4mm)



*Please contact Kamaya sales department for 1mm pitch cavity taping.

Metric	Inch	Style	Code	A	B	C	W	E	t_1	t_2	t
0402	01005	RMC1/32, RMPC04	PA	0.24±0.03	0.45±0.03	4.0±0.05	8.0±0.2	3.5±0.05	0.31±0.03	0.15±0.02	0.36±0.03
0603	0201	RMC06, RMC1/20, RGC1/20, RNC06, RMAW06, RMGW06, RMPC06, RMCH06		0.37±0.05	0.67±0.05	4.0±0.05			0.42±0.03	0.27±0.02	0.45±0.05
1005	0402	FCC10, FHC10, FCCR10		0.65±0.10	1.15±0.10				0.6 ±0.05	0.5 ±0.05	0.7 max.
		RMC10,RMC1/16S, RGC1/16S, RNC10, RLC10, RCC10, FMC10, SPC10, HSPC10, RMGW10, RMPC10, RMCH10, RPCH10	TH	$0.65^{+0.05}_{-0.10}$	$1.15^{+0.05}_{-0.10}$	4.0±0.1			0.4 ±0.05	—	0.5 max.
1608	0603	RMC16, RMC1/16, RGC1/16, RNC16, FCR1/16, RVC16, RLC16, RHC16, RCC16, RLP16, FCC16, FHC16, FMC16, FRC16, HSPC16, FCCR16, RBX16, RMPC16, RMCH16, RMGW16, RPCH16, RPGW16, RPC16	TP	1.15±0.15	1.9 ±0.2				0.6 ±0.1	—	0.8 max.
2012 1220	0805 0508	RMC20, RMC1/10, RGC1/10, FCR1/10, RNC20, RVC20, RPC20, RLC20, RHC20, LTC1/10, FCC20, FHC20, FRC20, RCC20, RMGW20, RBX20, RMPC20, RMCH20, RPCH20, RPGW20, TWMC20		1.65±0.15	2.5 ±0.2				0.8 ±0.1	—	1.0 max.
		RLP20, MLP20							0.6 ±0.1		0.8 max.
3216 1632	1206 0612	RMC32, RMC1/8, RGC1/8, FCR1/8, RNC32, RVC32, RPC32, RLC32, LTC1/8, FCC32, FHC32, SBF32, FRC32, RCC32, HFC32, RMGW32, TWMC32, TWLC32, RBX32, RMPC32, RMCH32, RPCH32, RPGW32, RVAC32		2.0 ±0.15	3.6 ±0.2				0.8 ±0.1	—	1.0 max.
		RLP32							0.6 ±0.1		0.8 max.
3225	1210	RMC35, RMC1/4, FCR1/4, RPC35, RLC35, RMGW35, RBX35, RMPC35, RMCH35, RPCH35, RPGW35	TE	2.85±0.20	3.5 ±0.2		8.0±0.3	3.5±0.05	—	—	1.0±0.2
5025 2550	2010 1020	RMC50, RMC1/2, FCR1/2, RVC50, RPC50, RZC50, RLC50, TWLC50, RMGW50, TWMC50		3.1 ±0.2	5.5 ±0.2		12±0.3	5.5±0.05	—	—	1.1±0.15
6332 3263	2512 1225	RMC63, RMC1, FCR1, RMCH63, RVC63, RPC63, RZC63, RBX63, RLC63, RLP63, MLP63C, MLP63, TWMC63, TWLC63, RMGW63		3.6 ±0.2	6.9 ±0.2				—	—	1.1±0.15
Chip Networks Chip Attenuators		RAC062D, RAAW062D	TH	0.7 ±0.1	0.9 ±0.1	4.0±0.1	8.0±0.2	3.5±0.05	0.43±0.05	—	0.5±0.1
		RAAW064D			1.5 ±0.1						
		RAC101A		1.15	1.15				$0.4^{+0.05}_{-0.10}$	—	0.55 max.
		RAC102D		$^{+0.05}_{-0.10}$	$^{+0.05}_{-0.10}$						0.5 max.
		RACA104D, RAC104D		1.2 ±0.1	2.2 ±0.1				0.4 ±0.1	—	
		RACA164D, RAC164D	TP	1.9 ±0.15	3.6 ±0.2				0.6 ±0.1	—	0.8 max.
		RAC168D		1.9 ±0.15	4.1 ±0.15		8.0±0.3			—	

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Packaging for Surface Mount Devices

●Tape Dimensions

Unit : mm

Metric	Inch	Style	Code	A	B	C	W	E	t_1	t_2	t
6332	2512	WLP63	TE	3.5±0.2	6.75±0.20	4.0±0.1	12±0.3	5.5±0.05	—	—	1.2 Max

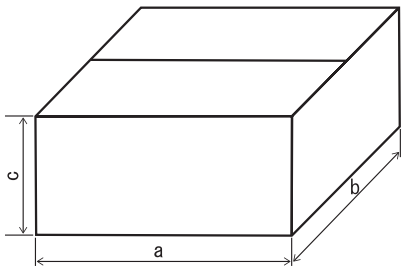
*Values for reference

●Standard Packaging Quantities (Minimum Units)

Metric	Inch	Style	Tape & Reel					Bulk
			Code	M. P. Q. (pcs./reel)	Outer Carton			Q'ty (pcs.)
					Reel Q'ty (pcs.)	Gross Weight (kg)	Measurement (m^3)	
0402	01005	RMC1/32, RMPC04	PA	20,000	50	8.8	0.027	1,000
0603	0201	RMC06, RMC1/20, RGC1/20, RNC06, RMAW06, RMGW06, RMPC06, RMCH06		15,000		7.8		
1005	0402	FCC10, FHC10, FCCR10		10,000		6.0		
		RMC10, RMC1/16S, RGC1/16S, RNC10, RLC10, RCC10, FMC10, SPC10, HSPC10, RMGW10, RMPC10, RMCH10, RPCH10	TH					
1608	0603	RMC16, RMC1/16, RGC1/16, RNC16, FCR1/16, RVC16, RLC16, RHC16, RCC16, RLP16, FCC16, FHC16, FMC16, FCCR16, FRC16, HSPC16, RBX16, RPC16, RMGW16, RMPC16, RMCH16, RPCH16, RPGW16	TP	5,000		7.2		
2012 1220	0805 0508	RMC20, RMC1/10, RGC1/10, FCR1/10, RLP20, RNC20, RVC20, RPC20, RLC20, RHC20, LTC1/10, FCC20, FHC20, FRC20, RCC20,MLP20, RMGW20, RBX20, RMPC20, RMCH20, RPCH20, RPGW20, TWMC20				8.4		
3216 1632	1206 0612	RMC32, RMC1/8, RGC1/8, FCR1/8, RNC32, RVC32, RPC32, RLC32, LTC1/8, FCC32, FHC32, SBF32, FRC32, RCC32, HFC32, RMGW32, TWMC32, TWLC32, RBX32, RMPC32, RMCH32, RPCH32, RPGW32, RVAC32				8.8		1,000
		RLP32, FCC32, FHC32, SBF32, HFC32				10.0		
3225	1210	RMC35, RMC1/4, FCR1/4, RPC35, RLC35, RMGW35, RBX35, RMPC35, RMCH35, RPCH35, RPGW35	TE	4,000				1,000
5025 2550	2010 1020	RMC50, RMC1/2, FCR1/2, RVC50, RPC50, RZC50, RLC50, TWLC50, TWMC50, RMGW50			40	8.0		
6332 3263	2512 1225	RMC63, RMC1, FCR1, RMCH63, RVC63, RPC63, RZC63, RBX63, RLC63, TWMC63, TWLC63, RMGW63				10.4		
		RLP63, MLP63C, MLP63, WLP63				12.0		
Chip Networks Chip Attenuators		RAC062D, RAAW062D, RAAW064D	TH	10,000	50	6.0		
		RAC102D, RAC101A						
		RACA104D, RAC104D				6.3		
		RACA164D, RAC164D	TP	5,000		7.7		
		RAC168D				8.6		5,000

Note1. When ordering taping packaging, please use an integral multiple of the taping quantity.
Note2. Please contact Kamaya sales dept. for the specification of outer carton for tape and reel code: PA, TH, TP, TE. (8mm width)
Note3. Please contact Kamaya sales dept. for information of bulk packing of RLP, MLP, MLP63C and WLP.
Note4. Please contact Kamaya sales dept. for taping and reel packing of WLP and SPGA06.

* Reference Outer box dimensions



	a	b	c
Big	400	355	205
Middle	355	205	195
Small	205	105	195

Unit : mm

Thin Film Resistor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

Thin Film Series: Precision; High Precision; Auto Grade; Current Sensing Resistor

Type code	Size code	Functional code	Resistance	Tolerance	Packaging code	Termination code	Special code
WF/SF/MF	12	T	1001	B	T	L	Q
WF_Q: High Precision Thin Film AEC-Q200 Compliant SF_Q: Thin Film Anti-Sulfuration/ AEC-Q200 Compliant ASTM B809 SF_A: High Precision Thin Film Anti-Sulfuration ASTM B809 +Under Oil 105℃+3.5% Sulfur power 500hrs MF: Precision Thin Film Auto Grade AEC-Q200 Qualified ASTM-B809	25 : 2512 (6432) 20 : 2010 (5025) 12 : 1206 (3216) 10 : 1210 (3225) 08 : 0805 (2012) 06 : 0603 (1608) 04 : 0402 (1005) 02 : 0201 (0603)	T : TCR 50 ppm U : TCR 25 ppm Q : TCR 50 ppm, Power R : TCR 25 ppm, Power F : Low TCR 15 ppm W : Low TCR 10 ppm Z : Ultra Low TCR 5 ppm	E24+E192 **Please see remark for detail explanation	A : ± 0.05% B : ± 0.1% C : ± 0.25% D : ± 0.5% F : ± 1%	T : 7" Reel &Taped Q : 10" Reel &Taped G : 13" Reel &Taped V : 7" Reel &Taped 1Kpcs B : Bulk M : 7" Reel 5K/RL 0402	L= Sn base (Lead free)	Q= AEC-Q200 Compliant A= Under Oil 105℃+3.5% Sulfur power 500 hurs S= Low Resistance Pulse withstanding

●High Precision Thin Film Chip Resistor (AEC-Q200 Compliant): WF_Q Series

●Feature

1. NiCr Thin Film Resistor.
2. AEC-Q200 compliant.
3. High reliability and stability of 0.3%
4. TCR down to 5ppm/°C and below per Customer Request.
5. Tight Tolerance : 0.01%
6. Low current noise
7. RoHS compliant and lead free.

●Application

1. Medical equipment
2. Measuring instrument
3. Communication device
4. Electronic Energy Meter
5. Audio System.

●High Precision Thin Film (AEC-Q200 Compliant) WFxxT & U_Q Series — TC50 / 25 (E192+E24 series)

Series No.	WF25T&U_Q	WF20T&U_Q	WF10T&U_Q	WF12T&U_Q	WF08T&U_Q	WF06T&U_Q	WF04T&U_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	±1%, ±0.5%, ±0.25% , ±0.1%, ±0.05%						
Resistance Range	10～ 1.5MΩ	10～ 1.5MΩ	10～ 1MΩ	4.7～ 1MΩ	4.7～ 1MΩ	4.7～ 330KΩ	10～ 100KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	3/4W	1/2W	1/4W	1/8W	1/10W	1/16W	1/16W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	100V	50V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 /AEC-Q200						

●High Precision Thin Film (AEC-Q200 Compliant) WFxxQ & R_Q (Power) Series — TC50 / 25 (E192+E24 series)

Series No.	WF25Q&R_Q	WF20Q&R_Q	WF10Q&R_Q	WF12Q&R_Q	WF08Q&R_Q	WF06Q&R_Q	WF04Q&R_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	±1%, ±0.5% ,±0.25% , ±0.1%, ±0.05%						
Resistance Range	10～ 1.5MΩ	10～ 1.5MΩ	10～ 1MΩ	4.7～ 1MΩ	4.7～ 1MΩ	4.7～ 330KΩ	10～ 100KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 /AEC-Q200						

●High Precision Thin Film (AEC-Q200 Compliant) WFxxF& W_Q Series — TC15 / 10 (E192+E24 series)

Series No.	WF25F&W_Q	WF20F&W_Q	WF10F&W_Q	WF12F&W_Q	WF08F&W_Q	WF06F&W_Q	WF04F&W_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	±1%, ±0.5%, ±0.25% , ±0.1%, ±0.05%				±1%, ±0.5%, ±0.25%, ±0.1%, ±0.05%		
Resistance Range	10～ 1.5MΩ	10～ 1MΩ	10～ 600KΩ	4.7～ 500KΩ	4.7～ 400KΩ	4.7～ 150KΩ	10～ 60KΩ
TCR (ppm/℃)	±15 /10 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1/AEC-Q200						

●High Precison Thin Film (AEC-Q200 Compliant) WFxxZ_Q Series — TC5 (E192+E24 series)

Series No.	WF25Z_Q	WF20Z_Q	WF10Z_Q	WF12Z_Q	WF08Z_Q	WF06Z_Q	WF04Z_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	±1%, ±0.5% , ±0.25% , ±0.1%, ±0.05%						
Resistance Range	10～ 600KΩ	10～ 360KΩ	10～ 150KΩ	4.7～ 150KΩ	4.7～ 100KΩ	4.7～ 50KΩ	10～ 10KΩ
TCR (ppm/℃)	±5 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 /AEC-Q200						

Detail specification please refer to specific data sheets

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

●Thin Film Anti-Sulfuration (ASTM B-809 & Under Oil 105℃+3.5% Sulfur power 500 hours): SF_A Series

●Feature

1. SMD metal film resistor
2. High reliability and stability of 0.5% and below per customer request
3. High performance of TCR: 15 ppm/℃ and below per customer request
4. Low current noise
5. RoHS compliant and lead free
6. Sulfuration resistant Oil 105℃+3.5% Sulfur powder x 500hrs

●Application

1. Automotive
2. Medical equipment
3. Measuring instrument
4. Communication device
5. Computer
6. Printer

●Thin Film Anti-Sulfuration SFxxT & U_A Series — TC50 / 25 (E192+E24 series)

Series No.	SF25T&U_A	SF20T&U_A	SF10T&U_A	SF12T&U_A	SF08T&U_A	SF06T&U_A	SF04T&U_A
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1.0%, ±0.5%, ±0.25%, ±0.1%, ±0.05%*						
Resistance Range	1Ω ～ 3MΩ	4.7Ω ～ 3MΩ	4.7Ω ～ 2.5MΩ	1 ～ 2.5MΩ	4.7～ 2MΩ	4.7～ 1MΩ	10～ 255KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	3/4W	1/2W	1/4W	1/8W	1/10W	1/16W	1/16W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	100V	50V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809						

●Thin Film Anti-Sulfuration SFxxQ & R_A (Power) Series — TC50 / 25 (E192+E24 series)

Series No.	SF25Q&R_A	SF20Q&R_A	SF10Q&R_A	SF12Q&R_A	SF08Q&R_A	SF06Q&R_A	SF04Q&R_A
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1.0%, ±0.5%, ±0.25%, ±0.1%, ±0.05%*						
Resistance Range	1Ω ～ 3MΩ	4.7Ω ～ 3MΩ	4.7Ω ～ 2.5MΩ	1 ～ 2.5MΩ	4.7～ 2MΩ	4.7～ 1MΩ	10～ 255KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809						

●Thin Film Anti-Sulfuration SFxxF& W_A (Power) Series — TC15 / 10 (E192+E24 series)

Series No.	SF25F&W_A	SF20F&W_A	SF10F&W_A	SF12F&W_A	SF08F&W_A	SF06F&W_A	SF04F&W_A
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1.0%, ±0.5%, ±0.25%, ±0.1%, ±0.05%,						
Resistance Range	10Ω ～ 1.5MΩ	10Ω ～ 1MΩ	10Ω ～ 600KΩ	4.7Ω～ 500KΩ	4.7Ω～ 400KΩ	4.7Ω～ 200KΩ	10Ω～ 100KΩ
TCR (ppm/℃)	±15 / 10 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809						

●Thin Film Anti-Sulfuration SFxxZ_A (Power) Series — TC 5 (E192+E24 series)

Series No.	SF25Z_A	SF20Z_A	SF10Z_A	SF12Z_A	SF08Z_A	SF06Z_A	SF04FZ_A
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1.0%, ±0.5%, ±0.25%, ±0.1%, ±0.05%						
Resistance Range	4.7Ω～600KΩ	4.7Ω～360KΩ	4.7Ω～150KΩ	4.7Ω～ 150KΩ	4.7Ω～ 100KΩ	4.7Ω～ 50KΩ	10Ω～ 10KΩ
TCR (ppm/℃)	±5 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	−55 ～ +155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809						

Detail specification please refer to specific data sheets

Thin Film Resistor

●Thin Film Anti-Sulfuration Chip Resistor (AEC-Q200/ASTM-B809-95*): SF_Q Series

●Feature

1. SMD metal film resistor
2. High reliability and stability of 0.5% and below per customer request
3. High performance of TCR: 15 ppm/℃ and below per customer request
4. Low current noise
5. RoHS compliant and lead free
6. AEC-Q200 compliant.
7. Sulfuration resistant against ASTM B-809-95*.

●Application

1. Automotive
2. Medical equipment
3. Measuring instrument
4. Communication device
5. Computer
6. Printer

●Thin Film Anti-Sulfuration (AEC-Q200 Compliant & ASTM B-809) SFxxT & U_Q Series — TC50 / 25 (E192+E24 series)

Series No.	SF25T&U_Q	SF20T&U_Q	SF10T&U_Q	SF12T&U_Q	SF08T&U_Q	SF06T&U_Q	SF04T&U_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05%*						
Resistance Range	10～1.5MΩ	10 ～1.5MΩ	10～1MΩ	10 ～ 1MΩ	10～ 1MΩ	4.7～ 330KΩ	10～ 100KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	3/4W	1/2W	1/4W	1/8W	1/10W	1/16W	1/16W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	100V	50V	50V
Operating Temperature	－55 ～ ＋155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809 / AEC-Q200						

●Thin Film Anti-Sulfuration (AEC-Q200 Compliant & ASTM B-809) SFxxQ & R_Q (Power) Series — TC50 / 25 (E192+E24 series)

Series No.	SF25Q&R_Q	SF20Q&R_Q	SF10Q&R_Q	SF12Q&R_Q	SF08Q&R_Q	SF06Q&R_Q	SF04Q&R_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05%*						
Resistance Range	10～1.5MΩ	10 ～1.5MΩ	10～1MΩ	10 ～ 1MΩ	10～ 1MΩ	4.7～ 330KΩ	10～ 100KΩ
TCR (ppm/℃)	±50 / 25 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	－55 ～ ＋155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809 / AEC-Q200						

●Thin Film Anti-Sulfuration (AEC-Q200 Compliant & ASTM B-809) SFxxF & W_Q Series — TC15 / 10 (E192+E24 series)

Series No.	SF25F&W_Q	SF20F&W_Q	SF10F&W_Q	SF12F&W_Q	SF08F&W_Q	SF06F&W_Q	SF04F&W_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05%*						
Resistance Range	10 ～1.5MΩ	10 ～900KΩ	10～400KΩ	10～300KΩ	10～200KΩ	10～ 100KΩ	10～ 20KΩ
TCR (ppm/℃)	±15 /10 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	200V	150V	75V	50V
Operating Temperature	－55 ～ ＋155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809 / AEC-Q200						

●Thin Film Anti-Sulfuration (AEC-Q200 Compliant & ASTM B-809) SFxxZ_Q Series — TC5 (E192+E24 series)

Series No.	SF25Z_Q	SF20Z_Q	SF10Z_Q	SF12Z_Q	SF08Z_Q	SF06Z_Q	SF04Z_Q
Size	2512(6432)	2010(5025)	1210(3225)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05%*						
Resistance Range	10～600KΩ	10～360KΩ	10～150KΩ	10～150KΩ	10～100KΩ	10～ 50KΩ	10～ 10KΩ
TCR (ppm/℃)	±5 ppm/℃						
Max. dissipation @ Tamb=70℃	1W	3/4W	2/5W	1/4W	1/8W	1/10W	1/10W
Max. Operating Voltage (DC or RMS)	200V	200V	200V	250V	150V	75V	50V
Operating Temperature	－55 ～ ＋155℃						
Basic Specification	JIS C5201-1 / IEC 60115-1 / ASTM B-809 / AEC-Q200						

Detail specification please refer to specific data sheets

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

●TaN Thin Film Chip Resistor (Auto Grade/AEC-Q200/ASTM B-809): MF Series

●Feature

1. SMD TaN thin film resistor
2. Special passivation layer on resistive file
3.AEC-Q200qualified
4. Products with lead free terminations meet RoHS requirements
5. Sulfur resistant (per ASTM B809-95 humid vapor test)
6. Laser trimmed to any value.

●Application

1. Professional Industrial equipment
2. Automotive
3. Medical equipment
4. Measuring instrument
5. Industrial Equipment.

●TaN Thin Film (Auto Grade/AEC-Q200 & ASTM B-809) MFxxQ & R Series

TC25 / 50 (E192+E24 series)

Series No.	MF12Q&R	MF08Q&R	MF06Q&R	MF04Q&R
Size	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05% ,			
Resistance Range	10Ω ～ 1MΩ	10Ω ～ 350KΩ	40Ω ～ 130KΩ	40Ω ～ 35KΩ
TCR (ppm/℃)	±50 /25 ppm/℃			
Max. dissipation at Tamb=85°C	0.4W	0.2W	0.15W	0.063W
Max. Operating Voltage (DC or RMS)	200V	100V	75V	50V
Operating Temperature	−55 ～ +175℃			
Basic Specification	JIS C5201-1 / IEC 60115-1 / AEC Q200 /ASTM B-809			

●TaN Thin Film (Auto Grade/AEC-Q200 & ASTM B-809) MFxxF & W Series

TC15 / 10 (E192+E24 series)

Series No.	MF12F&W	MF08F&W	MF06F&W	MF04F&W
Size	1206(3216)	0805(2012)	0603(1608)	0402(1005)
Resistance Tolerance	±1% , ±0.5% , ±0.25% , ±0.1%, ±0.05% ,			
Resistance Range	10Ω ～ 1MΩ	10Ω ～ 350KΩ	40Ω ～ 130KΩ	40Ω ～ 35KΩ
TCR (ppm/℃)	±15 /10 ppm/℃			
Max. dissipation at Tamb=85°C	0.4W	0.2W	0.15W	0.063W
Max. Operating Voltage (DC or RMS)	200V	100V	75V	50V
Operating Temperature	−55 ～ +175℃			
Basic Specification	JIS C5201-1 / IEC 60115-1 / AEC Q200 /ASTM B-809			

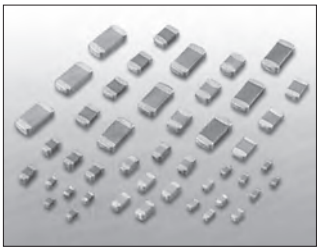
Detail specification please refer to specific data sheets

Multilayer Ceramic Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

●Features

General purpose, Board of PC etc.
Full support by Japanese Quality Assurance team.



Series	Dielectric	Size	Capacitance	Rated voltage
General Purpose Caps (4V~100V)	NPO	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	0.1pF ～ 0.1μF	10V, 16V, 25V, 50V, 100V
	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	100pF ～ 47μF	6.3V, 10V, 16V, 25V, 50V, 100V
	X6S	0201, 0402, 0603, 0805, 1206,1210	0.1μF ～ 100μF	6.3V, 10V, 16V, 25V, 50V, 100V
	X7S	0201, 0402, 0603, 0805, 1206,1210	0.1μF ～ 100μF	6.3V, 10V, 16V, 25V, 50V, 100V
	X5R	0201, 0402, 0603, 0805, 1206,1210	100pF ～ 220μF	4V, 6.3V, 10V, 16V, 25V, 50V
Ultra-small Caps (01R5 series)	NPO	01005	0.2pF ～ 220pF	16V, 25V, 50V
	X7R	01005	100pF ～ 1000pF	10V
	X5R	01005	100pF ～ 0.1μF	4V, 6.3V,10V
Middle & High Voltage Caps (200V~4kV)	NPO	0402, 0603, 0805, 1206, 1210,1808, 1812, 1825, 2220, 2225	0.5pF ～ 0.1μF	200V, 250V, 500V, 630V,1kV, 2kV, 3kV, 4kV
	X7R	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	100pF ～ 2.2μF	200V, 250V, 400V, 450V, 500V, 630V, 1kV, 2kV, 3kV, 4kV
Microwave Caps (RF series)	NPO	01005, 0201, 0402, 0603, 0805, 0505, 1111	0.1pF ～ 1000pF	6.3V, 10V, 25V, 50V, 100V,250V, 500V, 1500V
	X8G	0402, 0603, 0805	0.1pF ～ 82pF	200V, 250V, 500V
Microwave Caps Narrow Tolerance (UF series)	NPO	0201, 0402	0.05pF ～ 10pF	25V, 50V, 100V
Automotive Hi-Q Caps Qualified to AEC-Q200 (RT series)	NPO	0402	0.1pF ～ 56pF	25V, 50V
High Q & Low ESR Caps (HH series)	NPO	0201, 0402, 0603, 0805	0.1pF to 3300pF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V
Automotive Capacitor Qualified to AEC-Q200 (MT series)	X8G	0402, 0603, 0805, 1206, 1210	0.1pF ～ 0.015μF	10V, 16V, 25V, 50V, 100V
	NPO	0201, 0402, 0603, 0805, 1206, 1210	0.1pF ～ 0.047μF	10V, 16V, 25V, 50V, 100V,250V, 500V, 630V, 1kV
	X7R	0201, 0402, 0603, 0805, 1206, 1210	100pF ～ 2.2μF	10V, 16V, 25V, 50V, 100V,250V, 500V, 630V, 1kV
Automotive Soft Termination Caps Qualified to AEC-Q200 (ST series)	X7R	0402, 0603, 0805, 1210, 1812	270pF ～ 10μF	10V, 16V, 25V, 50V, 100V, 3kV
Automotive Caps Without AEC-Q200 Certification (MG series)	NPO	0201, 0402, 0603, 0805, 1206, 1210, 1812	0.1pF ～ 0.047μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV
	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812	100pF ～ 2.2μF	10V, 16V, 25V, 50V, 100V,250V, 500V, 630V, 1kV
	X5R	0402, 0603, 0805, 1206, 1210	0.068μF ～ 6.8μF	6.3V,10V,16V,25V
Safety Certificated Caps X1/Y2 (S2 series)	NPO	1808, 1812, 2211	3pF ～ 680pF	250Vac
	X7R	1808, 1812, 2220, 2211	100pF ～ 4700pF	250Vac
Safety Certificated Caps X2 (S3 series)	NPO	1808, 1812	3pF ～ 1000pF	250Vac
	X7R	1808, 1812, 2220	150pF ～ 0.056μF	250Vac
Soft Termination Capacitors (SH series, Ag-poly)	NPO	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0.1pF ～ 0.1μF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 3kV
	X7R	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	100pF ～ 47μF	10V, 16V, 25V, 50V, 100V,200V, 250V, 500V, 630V, 1kV, 2kV, 3kV
Feed Through (3-terminal) Caps (FT series)	X7R	0805	10nF ～ 1μF	10V, 16V, 25V, 50V
	X5R	0402	4.3μF	4V

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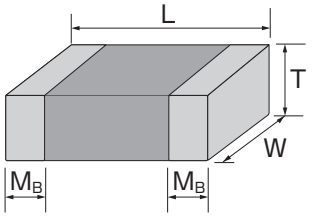
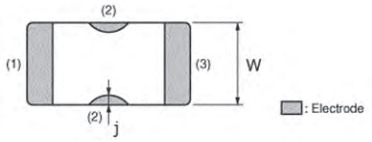
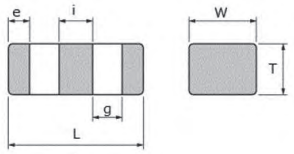
SINGLE CHIP CAPACITORS



Outline	Size Inch (mm)	L(mm)	W(mm)	T (mm)/Symbol		Soldering Method *	MB (mm)
	01R5 (0402)	0.4±0.02	0.2±0.02	0.2±0.02	V	R	0.10±0.03
	0201 (0603)	0.6±0.03	0.3±0.03	0.3±0.03	L	R	0.15±0.05
		0.6±0.05#2	0.3±0.05#2	0.3±0.05#2			
		0.6±0.09#3	0.3±0.09#3	0.3±0.09#3			0.15+0.1/-0.05
	0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N	R	0.25 +0.05/-0.10
				0.50+0.02/-0.05	Q	R	
		1.00±0.20	0.50±0.20	0.5±0.20	E	R	
	0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	S	R / W	0.40±0.15
		1.60+0.15/-0.10	0.80+0.15/-0.10	0.50±0.10	H	R / W	
				0.80+0.15/-0.10	X	R / W	
		1.60±0.20#1	0.80±0.20#1	0.8±0.20#1			
	0805 (2012)	2.00±0.15	1.25±0.10	0.50±0.10	H	R / W	0.50±0.20
				0.60±0.10	A	R / W	
				0.80±0.10	B	R / W	
				1.25±0.10	D	R	
		2.00±0.20	1.25±0.20	0.85±0.10	T	R / W	
				1.25±0.20	I	R	
	1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10	B	R / W	0.60±0.20 (0.5±0.25)***
				0.95±0.10	C	R	
				1.25±0.10	D	R	
		3.20±0.20		1.15±0.15	J	R	
			1.60±0.20	1.60±0.20	G	R	
				0.85±0.10	T	R / W	
		3.20+0.30/-0.1 3.30+0.30/-0.1#5	1.60 +0.30/-0.10	1.60+0.30/-0.10	P	R	
	1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C	R	0.75±0.25
				0.85±0.10	T	R	
				1.25±0.10	D	R	
		3.20±0.40	2.50±0.30	1.60±0.20	G	R	
				2.00±0.20	K	R	
				2.50±0.30	M	R	
		3.20±0.60#4	2.50±0.50#4	2.50±0.50#4			
	1808 (4520)	4.50±0.40 (4.5+0.5/-0.3)**	2.03±0.25	1.25±0.10	D	R	0.75±0.25 (0.5±0.25)***
				1.40±0.15	F	R	
				1.60±0.20	G	R	
				2.00±0.20	K	R	
	1812 (4532)	4.50±0.40 (4.5+0.5/-0.3)**	3.20±0.30	1.25±0.10	D	R	0.75±0.25 (0.5±0.25)***
				1.60±0.20	G	R	
				2.00±0.20	K	R	
			3.20±0.40	2.50±0.30	M	R	
				2.80±0.30	U	R	
	1825 (4563)	4.50±0.40	6.30±0.40	1.60±0.20 (G) 2.00±0.20 (K) 2.50±0.30 (M) 2.80±0.30 (U) 3.10±0.30 (R)		R	0.75±0.35
	2211 (5728)	5.70±0.40	2.80±0.30			R	0.85±0.35
	2220 (5750)	5.70±0.40	5.00±0.40			R	0.85±0.35
	2225 (5763)	5.70±0.40	6.30±0.40			R	0.85±0.35

* Recommended soldering method : R = Reflow soldering process; W = Wave soldering process.
** For 1808/1812/1825_200V~4000V and safety certificated products.
*** For 1206_≧1000V, 1808/1812_200V~4000V and safety certificated products.
#1: For 0603/Cap≧10μF or 0603(≦6.3V)/Cap≧4.7μF or 0603(>10V)/Cap>1μF products.
Excluding 0603X225(16V&25V),0603S225(6.3V&16V),0603X475(6.3V&16V),0603S475(4V&6.3V).
#2: For 0201/ 0.1uF < Cap < 0.68uF products, Excluding 0201X334~474(≦6.3V) & 0201X224(≦10V)
#3: For 0201/Cap≧0.68μF products, Excluding 0201X105*6R3=>(L:0.6±0.05,W:0.3±0.05,T:0.3±0.05).
#4: For 1210(200V & 250V)/Cap>0.47μF products.
#5: For 1206(100V)/Cap≧1.2μF products.
The table only for General Purpose Series, Soft termination and others please refer to individual sheet for details.

■ Feed Through Type Capacitor

Outline	Size Inch (mm)	L(mm)	W(mm)	T (mm)/Symbol		e (mm)	g (mm)	i (mm)	J (mm)
	0402 (1005)	1.00±0.10	0.50±0.20	0.40±0.10	W	0.17±0.10	0.10 min	0.35±0.10	0.15±0.10
	0805 (2012)	2.00±0.20	1.25±0.10	0.85±0.10	T	0.30±0.20	0.40±0.20	0.60±0.20	0.25±0.20

Reflow soldering process only.

■ HOW TO ORDER

Type of MLCC	0805		B	104	K	500	C	T
General Purpose MLCC Ultra-small MLCC Middle & High Voltage MLCC	**Size** Inch (mm) : 01R5(0402), 0201(0603), 0402(1005), 0603(1608), 0805(2012), 1206(3216), 1210(3225), 1808(4520), 1812(4532), 1825(4563), 2220(5750), 2225(5763)		**Dielectric** N=NP0 G=X8G R=X8R B=X7R A=X7S S=X6S X=X5R	**Capacitance** Two significant digits followed by no. of zeros. And R is in place of decimal point. R47=0.47pF 0R5=0.5pF 1R0=1pF 100=10pF 101=100pF 102=1000pF 103=0.01uF 104=0.1uF 105=1uF 106=10uF 107=100uF	**Tolerance** A= ±0.05pF B= ±0.1pF C= ±0.25pF D= ±0.5pF F= ±1% G= ±2% J= ±5% K= ±10% M= ±20% Z=-20/+80% P=±0.02pF** Q=±0.03pF**	**Rated voltage** Two significant digits followed by no. of zeros. And R is in place of decimal point. 4R0=4 Vdc 6R3=6.3 Vdc 100=10 Vdc 160=16 Vdc 250=25 Vdc 350=35 Vdc 500=50 Vdc 101=100 Vdc 201=200 Vdc 251=250 Vdc 401=400 Vdc 451=450 Vdc 501=500 Vdc 631=630 Vdc 102=1000 Vdc 152=1500 Vdc 202=2000 Vdc 252=2500 Vdc 302=3000 Vdc 352=3500 Vdc 402=4000 Vdc 502=5000 Vdc 602=6000 Vdc`	**Termination** C=Cu/Ni/Sn	**Packaging** T=7” reeled Q=10” reeled G=13” reeled
High Vol. Cap. with Surface Coating							M= Cu/Ni/Sn Surface coating	
Microwave MLCC Microwave-Narrow Tolerance Microwave-High reliability Automotive High-Q MLCC High Q / Low ESR MLCC Automotive MLCC High Temperature MLCC. Safety Certificated MLCC Feed Through MLCC	RF **Series** RF=Microwave UF=Microwave-Narrow Tolerance RT=Automotive High Q Caps Qualified to AEC-Q200 HH=High Q/ Low ESR MT=Automotive Cap. Qualified to AEC-Q200 MG=Automotive Cap. without AEC-Q200 Cap. FT=Feed Through(3-terminal)	03 **Size** Inch : 02=01005 03=0201 15=0402 11=0505 18=0603 21=0805 22=1111 31=1206 32=1210 42=1808 43=1812 52=2211 55=2220 56=2225					C=Cu/Ni/Sn	
Soft Termination MLCC	ST=Qualified to AEC-Q200 SH=With Ag polymer						C=Cu +Conductive resin /Ni /Sn M=Surface coating	
Safety Certificated MLCC	S2=X1/Y2 Safety Class (Qualified to AEC-Q200)						H=Auto_AECQ200 Y=Auto_AECQ200 + Soft termination X=Auto_AECQ200 + Soft termination + Surface Coating U=Auto_AECQ200 + Surface Coating	

* The packaging code per each size of reel, please refer to following table "packaging style and quantity".
** Tolerance “P” & “Q” only for UF series items.

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Safety Standard Ceramic Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information).

Part Number Explanation

YV	0AC	472	M	10	0	L	20	C	7	H
1	2	3	4	5	6	7	8	9	10	11

1. Temperature characteristic (identified code):

CODE	SL	YP (Y5P)	YU (Y5U)	YV (Y5V)
Cap. Change (%)	−1000～+350ppm/°C(+20°C～+85°C)	±10%	+20%to −55%	+30%to −80%

2. TYPE, Capacitor class and Rated voltage (identified by 3-figure code):

0AC=AC(X1-400V~/Y2-250V~); 1AC=AC(X1-440V~/Y2-300V~); 5AC = AC(X1:500V~/Y2:500V~/1500VDC)
7AC(for Automotive)= AC(X1:440V~/Y2:300V~/1500VDC)
0AH=AH(X1-400V~/Y1-250V~); 1AH=AH(X1-400V~/Y1-400V~); 5AH = AC(X1:500V~/Y1:500V~/1500VDC)
0AS=AS(X1-760V~/Y1-500V~) (Only approval for VDE//ENEC/UL/CUL/CQC)

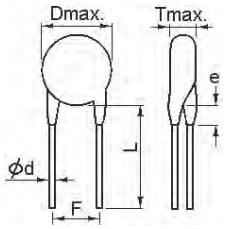
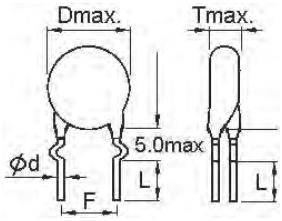
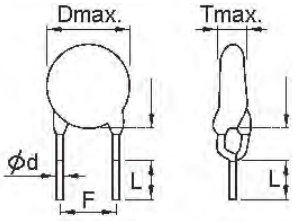
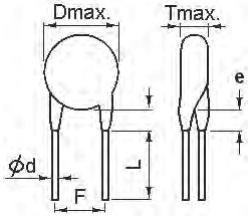
3. Capacitance (identified by 3-figure code)

4. Capacitance tolerance (identified by code)

5. Nominal body diameter dimension (identified by 2-figure code)

6. Internal control code:0—Normal, other code—Special control

7. Lead Style:

Lead type & Code	Lead Configuration	Lead type & Code	Lead Configuration
Type B Straight lead for taping	Lead style: B 	Type X Outside kink lead	Lead style: X 
Type D Vertical kink short lead	Lead style: D 	Type L Straight lead for bulk	Lead style: L 

8. Packing mode and lead length (identified by 2-figure code)

Bulk Code	Description
3E	lead length L : 3.5mm
04	lead length L : 4.0mm
4E	lead length L : 4.5mm
20	lead length L : 20mm

Taping Code	Description
AM	Box and Pitch : 25.4 mm (10.0mm)
AF	Box and Pitch : 15.0 mm (Pitch=7.5mm)
AS	Box and Pitch : 15.0 mm (Pitch=10mm)

9. Length tolerance

Code	Description
A	±0.5 mm (only for kink lead type)
B	±1.0 mm
C	MIN.
D	Taping special purpose

10. Pitch

Code	Description
7	7.5±1.0 mm
M	7.5±0.5 mm
0	10±1.0 mm
A	10±0.5 mm

11. Epoxy Resin Code

Code	Description
H	Halogen and Pb free, epoxy resin (Ag electrode)
W	Ag electrode products / Halogen and Pb free, epoxy resin. (for 85C/85% 1000HR).

Code	Description
T	Halogen and Pb free, epoxy resin (Cu electrode)

Safety Standard Ceramic Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information).

AH and AS Type-Class X1/Y1; AC Type-Class X1/Y2

Introduction

Ideal for use as X/Y capacitors for AC line filters and primary-secondary coupling on switching power Supplies and AC adapters applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment.
They are also an ideal solution in situations where there is a need to suppress line disturbances at the power.

Features

- ■Compact size
- ■Cost effective products
- ■Ideal for across the line applications
- ■Safety Standard Recognized for AC applications
- ■Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standards)
- ■RoHS Compliance
- ■Halogen free products are available

Approval standards

Agencies	Approval Mark	Capacitor class & Rated Voltage	Type, Capacitor class and Rated voltage Code
UL		X1: 400Vac /440Vac /500Vac/ 760Vac /1500Vdc Y1: 250Vac /400Vac /500Vac/ 1500 Vdc Y2: 250Vac /300Vac /500Vac/ 1500 Vdc	0AH/1AH/5AH/0AS 0AC/1AC/5AC 7AC(for Automotive)
cUL			
ENEC			
CQC			
DEMKO		X1: 400Vac /440Vac /500Vac/ 1500Vdc Y1: 250Vac /400Vac /500Vac/ 1500 Vdc Y2: 250Vac /300Vac /500Vac/ 1500 Vdc	0AH/1AH/5AH 0AC/1AC/5AC 7AC(for Automotive)
SEMKO			
NEMKO			
FIMKO			
SEV			
VDE	or	X1: 400Vac /440Vac / 760Vac Y1: 250Vac /400Vac /500Vac Y2: 250Vac /300Vac	0AH/1AH/0AS 0AC/1AC
CSA		X1: 400Vac /440Vac Y1: 250Vac /400Vac Y2: 250Vac /300Vac	0AH/1AH 0AC/1AC
KTL			

General specification

Capacitance Range	AH:10pF to 4700pF; AC:10pF to 10000pF; AS: 100pF to 4700pF
Capacitance Tolerance	±5%, ±10%, ±20%
Operating Temperature Range	−40℃～ +125℃
Temperature Coefficient (△C Max)	SL:−1000～+350ppm/℃,Y5P: ±10% , Y5U:+20～55% , Y5V:+30～80%
Rated Voltage	AH Type: X1: 400Vac /500Vac/ 1500Vdc / Y1: 250Vac /400Vac /500Vac/ 1500 Vdc ; AC Type: X1: 400Vac /440Vac /500Vac/ 1500Vdc / Y2: 250Vac /300Vac /500Vac/ 1500 Vdc ; AS Type: X1:760Vac / Y1:500Vac
Dissipation Factor(tanδ) or Q	SL: 30pF&above:Q≧1000 Below 30pF:Q≧400+20×C @20℃, 1MHz, 1±0.2Vrms Y5P: tanδ=2.5% Max. , Y5U: tanδ=2.5% Max. , Y5V: tanδ=5.0% Max. @20℃, 1KHz, 1±0.2Vrms
Insulation Resistance	10000MΩ at 500VDC for 60 Seconds
Dielectric Strength	2600VAC for 60 Seconds (AC TYPE) (For Lead Pitch=7.5 & 10 mm)
	4000VAC for 60 Seconds (AH,AS TYPE) (For Lead Pitch=10.0mm)

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Ceramic Disc Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information).

Part Number Explanation

YP	102	102	K	060	B	20	C	5	H
Dielectric Code	Voltage Code	Capacitance Code	Tolerance Code	Diameter Code	Lead Style	Length or Packing	Length Tolerance	Pitch	Coating
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶ Dielectric Code

CLASS I:		CLASS II:	
CODE	T.C. (ppm/°C)	CODE	T.C. (△C%)
SL	SL (−1000 ～ +350) (+20°C to +85°C)	YP	Y5P (±10%)
		ZU	Z5U (+22 ～ −56%)
		ZV	Z5V (+22 ～ −82%)
		YU	Y5U (+22 ～ −56%)
		YV	Y5V (+22 ～ −82%)
		LN	Y5R (±15%)

❷ Voltage Code

CODE	WV
500	50 VDC
501	500 VDC
102	1KVDC
202	2KVDC
302	3KVDC
602	6KVDC

❸ Capacitance Code

CODE	Capacitance
100	10 pF
101	100 pF
102	1000 pF
472	4700 pF
103	0.01uF

❹ Tolerance Code

CODE	Tolerance
J	± 5%
K	± 10%
M	± 20%
Z	−20 ～ +80 %

❺ Diameter Code

CODE	Diameter max
040	4.0mm
050	5.0mm
060	6.0mm
070	7.0mm
080	8.0mm
090	9.0mm
100	10.0mm
110	11.0mm
120	12.0mm
130	13.0mm
140	14.0mm

❻ Lead Style-Reference Lead Style
❼ Packing / Pitch / Lead Length

Taping(ex)	
CODE	Packing & Pitch
AF	Ammo Box & Pitch 15.0 mm
AN	Ammo Box & Pitch 12.7 mm
AM	Ammo Box & Pitch 25.4 mm
Bulk (ex)	
CODE	Length
3E	3.5mm
04	4.0mm
4E	4.5mm
05	5.0mm
20	20.0mm

❽ Length Tolerance

CODE	Length Tolerance
A	± 0.5 mm (Only for short kink lead type)
B	± 1.0 mm
C	Min.(Only for long lead)
D	Tapping & Special Purpose

❾ Pitch

CODE	Length Pitch
2	2.5±0.8mm (For straight lead)
5	5.0±0.8mm (for Bulk)
	5.0+0.8-0.2mm (for Taping)
7	7.5 ± 1mm
0	10.0 ± 1mm

❿ Coating Type

CODE	Coating
A	Phenolic resin Halogen free and Pb free, voltage<1KV
H	Epoxy resin Halogen free and Pb free, voltage≧1KV

Ceramic Disc Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.)

CLASS I 50V, 100V, 500V, 1KV, 2KV, 3KV, 6KV TEMPERATURE COMPENSATION TYPE

Features

- Capacitance has linear temperature coefficient
- Capacitance high stability
- Epoxy Coating for 1KV, 2KV, 3KV, 6KV parts (equivalent to UL94V-0 standards)
- RoHS Compliance
- Halogen free products are available
- Low lost at wide range of frequency

Capacitance Range	15～820 pF
Capacitance Tolerance	±5%
Operating Temperature Range	20°C ～ +85°C.
Rated Voltage	50,100, 500, 1000, 2000, 3000 ,6000 VDC
Q Factor @ 1MHz, 1±0.2 Vrms, 25°C	C≧30 pF.....Q≧1,000, C＜30 pF.....Q≧400+20*C
Insulation Resistance (IR) @ 25°C	10,000 MΩ Minimum
Dielectric Strength	50～500VDC:3 times the rated WVDC ; 1K, 2K, 3KVDC:2 times the rated WVDC; 6KVDC:1.5 times the rated WVDC.
Testing Parameters	1MHz ±20%, 1.0Vrms±0.2Vrms

CLASS II 50V, 100V, 500V, 1KV, 2KV, 3KV Hi-K TYPE

Features

- Capacitance has non-linear temperature coefficient.
- Large capacitance in small size.
- Epoxy Coating for 1KV, 2KV and 3KV parts (equivalent to UL94V-0 standards).
- RoHS Compliance.
- Halogen free products are available.
- Wide range of general purposes applications.

Capacitance Range	100pF to 22000pF
Capacitance Tolerance	±10%(for Y5P), ±20%(for Z5U), +80% −20%(for Z5U&Z5V&Y5V)
Operating Temperature Range	−25°C～ +85°C(Y5P,Y5V) ; 10°C～ +85°C(Z5U, Z5V)
Rated Voltage	50,100, 500,1000, 2000, 3000VDC
Dissipation Factor (tan δ)	Y5P, Z5U, Y5U : tanδ≤2.5%, Z5V, Y5V : tanδ≤5.0%
Insulation Resistance (IR) @ 25°C	10,000 MΩMinimum or 200 MΩμF whichever is smaller
Dielectric Strength	50～500VDC: 2.5 times the rated WVDC; 1K, 2K, 3KVDC: 2 times the rated WVDC
Testing Parameters	1KHz ±20%, 1.0Vrms±0.2Vrms

1KV, 2KV LOW DISSIPATION LN TYPE

Features

- Reduced heat dissipation permitted due to small dielectric loss of the ceramic material.
- Operating temperature range is guaranteed up to 125 degree C.
- Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standards).
- RoHS Compliance.
- Halogen free products are available.
- Ideal for use on high frequency pulse circuits such as a horizontal resonance circuit for CTV and snubber circuits for switching power supplies.

Capacitance Tolerance	±10%,
Operating Temperature Range	−25℃～ +125℃
Rated Voltage	1K, 2K VDC
Dissipation Factor (tan δ)	0.2% Max
Cap. Change:	±15%(−25℃～+85℃)
Insulation Resistance (IR) @ 25℃	10000MΩ Minimum or 200MΩμF whichever is smaller (500VDC, 60sec)
Dielectric Strength	2 times the rated WVDC
Testing Parameters	1KHz ±20%, 1.0Vrms±0.2Vrms

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

Radial Leaded Multilayer Ceramic Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information).

Features

- MLC Radial Lead Capacitor (RD) has wide application in computer, data processing, telecommunication, industrial control and instrumentation equipment.
- The radial lead MLC is built with superior moisture, and shock resistant epoxy coating material, can be supplied in both, bulk or taping form for automatic insertion.
- RoHS compliance.
- Halogen free products are available.

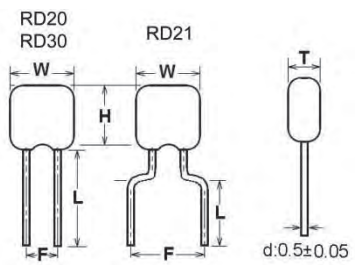
SAP Part Number Explanation

RD21	B		102	K	500	B	5	H	07	B
Product Type	Dielectric Code		Capacitance Code	Tolerance Code	Rated Voltage	Packaging Code	Chip Size	Termination	Lead length	Length Tolerance
RD21 RD20 RD30	Code	T.C	1R0=1pF 1R5=1.5pF 100=10pF 101=100pF 102=1000pF 472=4700pF 103=10000pF 104=100000pF	D=±0.5pF J=±5% K=±10% M=±20% Z=+80%/-20%	100=10V 160=16V 250=25V 500=50V 101=100V 201=200V 251=250V 501=500V 631=630V 102=1000V 202=2000V	A=Ammo B=Bulk	5=0805 6=1206 0=1210 2=1812 8=1808	H= Cu/Ni/Sn Halogen free	Tapping: AN=Ammo Bulk 07=7.0 mm 3E=3.5 mm 05=5.0 mm	D= Taping A=±0.5mm B=±1mm
	N	NP0								
	B	X7R								

Lead Configuration And Dimension

(Unit: mm)

Size		Width (W) Max.	Height (H)Max.	Height (H1)Max	Length (L)	Lead spacing for Taping (F)	Lead spacing for Bulk (F)	Lead Diameter (d)
RD20	0805	5.0	4.5	6.0	Refer to the item SAP Part Number	2.5±1.0	2.54±1.0	0.5±0.05
RD21	0805	5.0	4.5	6.5		5.0±1.0	5.08±1.0	
	1206	6.5	5.0	7.0				
	1210	6.5	5.5	7.5				
RD30	1808	8.0	6.0	7.5		5.0±1.0	5.08±1.0	
	1812	8.0	6.5	8.0				



General Electrical Data

Dielectric	NP0	X7R
Size	RD20: 0805 RD21: 0805, 1206, 1210 RD30: 1808 and 1812	
Capacitance range	1.0pF to 0.1uF	100pF to 4.7uF
Capacitance Tolerance	J: ± 5%, K: ± 10%, M: ± 20%,	
Rated Voltage (WVDC)	50V, 100V, 200V, 250V, 500V, 630V, 1000V, 2000V	50V, 100V, 200V, 250V, 500V, 630V, 1000V, 2000V, 3000V
Operating Temperature	−55～+125℃	−55～+125℃
Capacitance characteristic	0 ± 30 (ppm/℃)	± 15%
Termination	H=Cu/Ni/Sn Halogen free	

SMD Type Safety Standard Ceramic Capacitor

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information).

Part Number Explanation

YV	SYW	102	M	P	00
1	2	3	4	5	6

1. Temperature characteristic (identified code):

CODE	SL	YP (Y5P)	YU (Y5U)	YV (Y5V)
Cap. Change (%)	−1000～+350ppm/°C(+20°C～+85°C)	±10%	+20%to −55%	+30%to −80%

2. TYPE (identified by 3-figure code):

SYW= Y1:250V～/400V～
SYL= X1:440V～/Y2:300V～

3. Capacitance (identified by 3-figure code)

4. Capacitance tolerance (identified by code)

5. Special Specification Code (identified by 2-figure code)

Code	Description
P	Pb Solder Product

6. Internal control code:0—Normal, other code—Special control

Safety Standards Approval

Safety Standard	Standard No.	Safety Standard	Standard No.
UL / CUL	ANSI/UL 60384-14	CQC	GB/T6346.14
ENEC	EN 60384-14:2013/A1:2016	KC	K60384-14

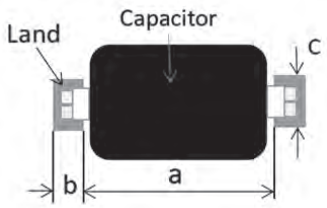
SYW Type-Class X1/Y1

SAP P/N	T.C.	Capacitance	Tolerance
SLSYW100JP00	SL	10 pF	±5%
SLSYW220JP00		22 pF	
SLSYW470JP00		47 pF	
SLSYW680JP00		68 pF	
YPSYW101KP00	Y5P	100 pF	±10%
YPSYW221KP00		220 pF	
YPSYW331KP00		330 pF	
YUSYW471MP00	Y5U	470 pF	±20%
YUSYW681MP00		680 pF	
YUSYW102MP00		1000 pF	
YUSYW152MP00		1500 pF	±20%
YVSYW222MP00	Y5V	2200 pF	

SYL Type-Class X1/Y2

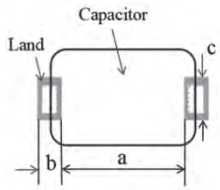
SAP P/N	T.C.	Capacitance	Tolerance
SLSYL220KP00	SL	22 pF	±10%
SLSYL470KP00		47 pF	
YPSYL680KP00	Y5P	68 pF	±10%
YPSYL101KP00		100 pF	
YPSYL221KP00		220 pF	
YPSYL331KP00		330 pF	
YUSYL471MP00	Y5U	470 pF	±20%
YUSYL681MP00		680 pF	
YUSYL102MP00		1000 pF	
YVSYL152MP00	Y5V	1500 pF	±20%
YVSYL222MP00		2200 pF	

Solder Pad dimension



SYW

Dimension	a(mm)	b(mm)	c(mm)
7.8x5.4	8.0min	2.2±0.1	3.6±0.1



Gener

SYL

Dimension	a(mm)	b(mm)	c(mm)
4.3x3.5	4.0 min.	2.2±0.1	3.2±0.1

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Film Capacitors

●Metallized film capacitors
●Capacitors for Power Electronics

Film Capacitors Summary

Summary		Style	Series Code	Features	Rated Voltage	Capacitance (μF)	Temp. Range (°C)
General use	Standard		FPB	・Small Standard	250VDC 450VDC 630VDC 800VDC 1250VDC	0.47~10 0.22~4.7 0.068~2.2 0.68~2.2 0.001~0.47	−40~+85 (+105)
			NEW FPB2	・Small	630VDC	0.47~2.2	−40 ~+105
			FPT2	・High temperature（~ +125℃） ・Small	630VDC	0.068~2.2	−40 ~+105 (+125)
			FPT	・High temperature（~ +125℃）	630VDC	0.01~0.047	−40 ~+105 (+125)
			MDX	・Standard	250VDC 450VDC 630VDC	0.01~0.33 0.01~0.15 0.015~0.047	−40~+85 (+105)
			MDD	・Lead pitch 5mm, 7.5mm	50VDC 250VDC	0.1~2.2 0.01~0.15	−40~+85 (+105)
	PFC circuit in power		NEW FPCS	・Boxed small ・Low noise ・Halogen-free product	450VDC	0.47~2.2	−40~+85 (+110)
			NEW FPS5	・Small ・Low noise ・Halogen-free product	450VDC	0.47~2.2	−40~+85 (+110)
			FPS4	・Small standard ・Low noise ・Halogen-free product	450VDC	0.47~4.7	−40~+85 (+110)
			FPS3	・Low Noise ・Halogen-free product	450VDC	0.47~2.2	−40~+85 (+110)
			FPA	・550V ・Halogen-free product	550VDC	0.47~2.2	−40~+85 (+110)
	Large capacitance		MDL	・Miniature and Large capacitance ・For high frequency and high ripple	35VDC 63VDC	4.7~22 10~22	−40~+85 (+105)
	High voltage		MDD	・High voltage 500 VAC.	500VAC	0.0022~0.1	−40~+85 (+105)
High frequency circuit use			FPF	・High current	250VDC 450VDC 630VDC	0.01~10 0.01~3.3 0.01~2.2	−40~+105
Across- the- line use			FSX	・EMI suppression class X2 ・Small	310VAC	0.01~10	−40~+110
			CFD-N	・For Japan ・For noise immunity test	125VAC 250VAC	0.033~4.7 0.01~2.2	−40~+85 (+105)

Capacitors for Power Electronics

General (DC-Link, Smoothing, etc)		FPCL	・Long Life ・High Voltage ・High Current	630VDC 800VDC 1100VDC 1300VDC	5~65 10~20 1~25 1~15	−40~+70 (+85)

About Nitsuko product, Please contact as follows.

Nitsuko Nitsuko Electronics Corporation
http://www.nitsuko-ele.co.jp/
E-Mail: support@nitsuko-ele.co.jp
Sales Department : 2031-1, Ogawara, Suzaka-shi, Nagano-ken, Postcode 382-0071
TEL (+81) 26-246-6351 FAX (+81) 26-245-6239

INDUCTOR

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

Quick Product Information

Application	Type	Style	Series	Range	Size (mm)			Quantity per reel
					L	W	H	
RF Inductor	Wire Wound Ceramic Chip Inductor		WCI1005CP	1.0nH～ 120nH	1.19	0.64	0.66	4K
			WCI1608CP	1.6nH～ 470nH	1.8	1.12	1.02	4K
			0603HQ-XXXX-LRH	1.8nH～ 390nH	1.7	1.02	0.9	4K
			WCI2012CP	2.2nH～ 1000nH	2.29	1.73	1.52	3K
			0805HQ-XXXX-LRH	2.5nH～ 51nH	2.4	1.65	1.45	3K
			WCI2520CP	10nH～ 15000nH	2.92	2.79	2.02 / 2.10	2K
			WCI3225CG	4.7nH～ 3300nH	3.42	2.8	2.3	1.5K
			WCI4532CP	82nH～ 4700nH	4.95	3.81	3.43	0.6K
	Multi-Layer High Frequency		MCI0603TG	0.3nH～ 39nH	0.6	0.3	0.3	15K
			MCI1005HQ	0.3nH～ 150nH	1.0	0.5	0.5	10K
			MCI1608HQ	1.0nH～ 470nH	1.6	0.8	0.8	4K
	SMD Air Wound Coil		LSI291AB	2.5nH～ 18.5nH	3.68	3.05	3.18	0.5K
			LSI291AB	17.5nH～ 43nH	6.86	3.05	3.18	0.5K
			LSI292AR	1.65nH～ 5.4nH	2.21	1.42	1.37	2K
			LSI292BR	5.6nH～ 12.55nH	4.04	1.42	1.37	2K
			LSI293AB	22nH～ 120nH	4.83	3.81	4.2	1K
			LSI294AB	90nH～ 538nH	10.55	6.35	5.9	1K

Application	Type	Style	Series	Range	Size (mm)			Quantity per reel
					L	W	H	
Signal and Noise	Ferrite Chip Inductor		WLFI1608	0.047uH～ 10uH	1.6	0.8	0.8	4K
			WLFI2012	0.047uH～ 10uH	2.0	1.25	0.85 / 1.25	4K / 2K
	Chip Bead		MCB1005-S	10Ω～ 1000Ω	1.0	0.5	0.5	10K
			MCB1608-S	10Ω～ 2500Ω	1.6	0.8	0.8	4K
			MCB2012-S	30Ω～ 2000Ω	2.0	1.2	0.9	4K
			MCB3216-S	31Ω～ 2000Ω	3.2	1.6	1.1	3K
			MCB3225-S	60Ω～ 90Ω	3.2	2.5	1.3	2K
			MCB4516-S	80Ω～ 150Ω	4.5	1.6	1.6	2K
			MCB4532-S	70Ω～ 120Ω	4.5	3.2	1.5	1K
			MHC1005-S	10Ω～ 120Ω	1.0	0.5	0.5	10K
			MHC1608-S	19Ω～ 1000Ω	1.6	0.8	0.8	4K
			MHC2012-S	30Ω～ 1500Ω	2.0	1.25	0.9 / 1.25	3K /4K
			MHC3216-S	19Ω～ 1200Ω	3.2	1.6	1.1	3K
			MHC3225-S	60Ω～ 1000Ω	3.2	2.5	1.3	2K
			MHC4516-S	60Ω～ 850Ω	4.5	1.6	1.6	2K
			MHC4532-S	120Ω～ 1300Ω	4.5	3.2	1.5	1K
			WFI2012FS	0.078uH ～ 27uH	2.29	1.91	1.6	3K
			WFI2520FS	0.047uH～ 22uH	2.72	2.59	1.83	2K
	Common Mode Choke		SCM2012FS	67Ω～ 750Ω	2.0	1.2	1.2	2K
			SCM2012FH	67Ω～ 120Ω	2.0	1.2	1.2	2K
	Balun Transformer		BIH2012OB	50 / 50Ω;75 / 75Ω	2.0	1.2	1.2	2K

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INDUCTOR

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Quick Product Information

Application	Type	Style	Series	Range	Size (mm)			Quantity per reel
					L	W	H	
Power Inductor	Multi-Layer Power Inductor		MIP160808-P	0.24uH～ 2.2uH	1.6	0.80	0.80	4K
			MIP201205-P	0.47uH～ 2.2uH	2.0	1.25	0.50	4K
			MIP2520	0.47uH～ 4.7uH	2.5	2.0	1.0	3K
			CSME0418D	1.0uH～220uH	4.0	4.0	1.85	3K
			CSMM0420D	0.24uH～ 47uH	4.0	4.0	1.8	1K
			CSME0540D	1.0uH～100uH	5.0	5.0	4.0	1.5K
			CSME0645D	1.0uH～150uH	6.0	5.9	4.5	1.5K
			WIP201208Y	0.47uH	2.0	1.2	0.8	3K
			WIP201210Y	1.0uH	2.0	1.2	1.0	3K
			WIP201610P	0.24uH～ 2.2uH	2.0	1.6	1.0	3K
			WIP201610S	0.47uH～ 2.2uH				
			WIP201610Y	0.47uH～ 1.0uH				
			WIP252010P	0.22uH～ 4.7uH	2.5	2.0	1.0	3K
			WIP252010S	0.33uH～ 4.7uH				
			WIP252010A	0.47uH～ 1.0uH	2.5	2.0	1.8	3K
			WIP252012P	0.47uH～ 4.7uH	2.5	2.0	1.2	3K
			WIP252012S	0.47uH～ 4.7uH				
			WIP322512A	0.47uH～ 6.8uH	3.2	2.5	2.3	3K

Antenna

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

Dipole Antenna (N/SMA and Cable)

TYPE	Series	Size(mm)		Working Frequency Range	Gain	VSWR	Return Loss
		L	Ø				
Dipole Antenna (N/SMA)	8709	87	9.95	2.4～2.5 GHz	2dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:2dBi 5.15～5.85 GHz:3dBi	<2	<-10dB
	1713	172.5	13	2.4～2.5 GHz	3dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:4dBi 5.15～5.85 GHz:5dBi	<2	<-10dB
				5150～7125 MHz	5150～5850 GHz:3.5dBi 5950～7125 GHz:3.5dBi	<2	<-10dB
	1310	135.7	10	2.4～2.5 GHz	5dBi	<2	<-10dB
				5.x GHz	5dBi	<2	<-10dB
				2.4～2.5/5.x GHz	3dBi～4dBi	<2	<-10dB
				Lora	3dBi	<2.5	<-7dB
				LTE	3dBi	<3	<-6dB
	1913	196.6	13	2.4～2.5 GHz	5dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:4dBi 5.15～5.85 GHz:5dBi	<2	<-10dB
				5150～7125 MHz	5150～5850 GHz:3.0dBi 950～7125 GHz:3.5dBi	<2	<-10dB
	2520	25	20	2.4 GHz	5～7dBi	<2	<-10dB
				5.x GHz	7dBi	<2	<-10dB
				2.4～2.5 GHz (High Gain)	7dBi	<2	<-10dB
Dipole Antenna (Cable)	8709	87	9.35	2.4～2.5 GHz	2dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:2dBi 5.15～5.85 GHz:3dBi	<2	<-10dB
	1713	172	9.35	2.4～2.5 GHz	3dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:4dBi 5.15～5.85 GHz:5dBi	<2	<-10dB
				5150～7125 MHz	5150～5850 GHz:3.0dBi 5950～7125 GHz:3.5dBi	<2	<-10dB
	1310	135.7	10	2.4～2.5 GHz	5dBi	<2	<-10dB
				5.x GHz	5dBi	<2	<-10dB
				2.4～2.5/5.x GHz	3dBi～4dBi	<2	<-10dB
				LTE	3dBi	<3	<-6dB
	1913	192	9.35	2.4～2.5 GHz	5dBi	<2	<-10dB
				2.4～2.5/5.x GHz	2.4～2.5 GHz:4dBi 5.15～5.85 GHz:5dBi	<2	<-10dB
				5150～7125 MHz	5150～5850 GHz:3.0dBi 5950～7125 GHz:3.5dBi	<2	<-10dB

Connector

Series	Size(mm)		Working Frequency Range	VSWR
	L	W		
1612	16.8	12.3	DC ～ 6 GHz	2.0
0703	7.5	3.3	DC ～ 6 GHz	2.0
1308	13.3	8	DC ～ 6 GHz	2.0
1609	16.5	9	DC ～ 6 GHz	2.0

Cable Assembly

Series	Connector 1	Connector 2	Wire Diameter	Color	L	Working Frequency Range	VSWR
1006	Straight Reverse SMA Jack	IPEX(or Strip & Tin)	Ø1.13/Ø1.37/ RG178	Option	Option	DC ～ 6 GHz	2
1106	Straight Reverse SMA Jack	IPEX(or Strip & Tin)	Ø1.13/Ø1.37/ RG178	Option	Option	DC ～ 6 GHz	2
1613	R/A Reverse SMA Jack	IPEX(or Strip & Tin)	Ø1.13/Ø1.37/ RG178	Option	Option	DC ～ 6 GHz	2
403	IPEX	IPEX(or Strip & Tin)	Ø0.81/Ø1.13/ Ø1.37/RG178	Option	Option	DC ～ 6 GHz	2
202	IPEX III	IPEX(or Strip & Tin)	Ø0.81	Option	Option	DC ～ 6 GHz	2
xxxx	Strip & Tin	Strip & Tin	Ø0.81/Ø1.13/ Ø1.37/RG178	Option	Option	DC ～ 6 GHz	2
1015	N Jack	MMCX(or Strip & Tin)	RG316	Option	Option	DC ～ 6 GHz	2
1008	Straight Reverse SMA Plug	IPEX(or Strip & Tin)	RG405	Option	Option	DC ～ 6 GHz	2

PCB Antenna, FPA Antenna and Metal Antenna

TYPE	Series	PCB Size (mm)		Cable Length (mm)	Working Frequency Range	Gain	VSWR	Return Loss
		L	w	L				
PCB Antenna	1118	118	18	Option	LTE+Sub-6G+5G	3.32 dBi(@ 698～960 MHz) 6.04 dBi(@1710～2690 MHz) 5.36 dBi(@ 3300～3800 MHz) 4.39 dBi(@5150～5850 MHz)	<2.0(@ 698～960 MHz) < 3.0(@1710～2690 / 3300～3800 / 5150～5850 MHz)	<-10.0 dB (@698～960 / 1710～2690 MHz) <-6.0 dB (@3300～3800 / 5150～5850 MHz)
	2022	20	22	Option	LTE+Sub-6G+5G	5.54 dBi	<2	<-10dB
	2010	20.1	10	Option	5 GHz	3dBi	<2	<-10dB
	4606	46.5	6	Option	2.4～2.5 GHz	2dBi	<2	<-10dB
	3513	35	13	Option	2.4～2.5 GHz	4dBi	<2	<-10dB
	3515	35	15	Option	2.4～2.5/5.x GHz	2.4～2.5 GHz : 2dBi 5.x GHz : 3dBi	<2	<-10dB
	2022	20	22.75	Option	5150～7125 MHz	3.5dBi	<2	<-10dB
FPA Antenna	3025	30.3	25.3	Option	2.4～2.5 GHz	3dBi	<2	<-10dB
	3225	25	32.6	Option	2.4～2.5 GHz	2dBi	<2	<-10dB
	3226	32.35	26	Option	2.4～2.5 / 5.x GHz	3dBi	<2	<-10dB
	2006	20	6	Option	5.x GHz	2dBi	<2	<-10dB
	2022	20	22.75	Option	5150～7125 MHz	3.5dBi	<2	<-10dB
Metal Antenna	3109	31	9	Option	2.4～2.5/5.x GHz	2.4～2.5 GHz : 2 dBi 5.x GHz : 2 dBi	<2	<-10dB
	2107	21.5	7.1	None	2.4～2.5 GHz	3 dBi	<2	<-10dB
	2807	28.6	7.9	Option	2.4～2.5 GHz	3 dBi	<2	<-10dB
	3706	37.4	6.5	Option	2.4～2.5/5.x GHz	2.4～2.5 GHz : 5 dBi 5.x GHz : 5 dBi	<2	<-10dB
	2712	27.75	12.8	None	2.4～2.5 GHz	3.38 dBi	<2	<-10dB
	2811	27.05	11.3	None	2.4～2.5/5.x GHz	2.4～2.5 GHz : 2.66dBi 5.x GHz : 3.68dBi	<2	<-10dB
	2007	20.9	7.8	Option	5150～7125 MHz	5 dBi	<2	<-10dB

NFC Antenna (NFC/WPC/WNC)

TYPE	Series	Size (mm)		Ls		Rs		Q	
		L	w						
NFC	5030	50	30	1.62±0.1μH		0.66±0.15Ω		15.42±2.5(1MHz)	
	5040	50	40	1.89±0.1μH		0.76±0.15Ω		15.62±2.5(1MHz)	
	6040	60	40	2.37±0.1μH		0.85±0.15Ω		17.5±2.5(1MHz)	
WPC	4832	48	32	1.35±0.1μH		0.3±0.15Ω		28.3±2.5(1MHz)	
WNC	6060	60	60	NFC	2.11±0.1μH	NFC	0.572±0.15Ω	NFC	37.2±2.5(1MHz)
				WPC	18.69±0.1μH	WPC	0.837±0.15Ω	WPC	14.03±2.5(1MHz)

Chip Antenna

Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

ECA Series	FRA Series	ANT Series

■ELECTRICAL SPECIFICATION

Application	Part Number	Frequency Range (GHz)	Azimuth Beamwidth (MHz)	Gain (dBi)	VSWR (max.)	Impedance (Ω)	Polarization	Size (mm)
1.575GHz WORKING FREQUENCY	RFANT3216110E0T	1.575	Omni-directional	1.7	3.0	50	Linear	3.20x1.60x0.60
Bluetooth/WiFi/Wifi 6E WORKING FREQUENCY	RFECA3216060L1T	2.4～2.5 5.25～5.85	Omni-directional	0.6/2	2.1	50	Linear	3.20x1.60x0.60
	RFANT6050110L0T	2.4～2.5 4.9～5.9	Omni-directional	4	2.0	50	Linear	5.90x5.10x1.10
	RFANT6050110L1T	2.4～2.5 4.9～5.9	Omni-directional	4	2.0	50	Linear	5.90x5.10x1.10
	RFANT2012090A0T	2.4～2.5	Omni-directional	1.72	2.0	50	Linear	2.00x1.25x0.90
	RFANT3216120A1T	2.4～2.5	Omni-directional	2	2.0	50	Linear	3.20x1.60x1.20
	RFANT3216120A3T	2.4～2.5	Omni-directional	2	2.0	50	Linear	3.20x1.60x1.20
	RFANT3216120A5T	2.4～2.5	Omni-directional	2	2.0	50	Linear	3.20x1.60x1.20
	RFANT5220110A0T	2.4～2.5	Omni-directional	2	2.0	50	Linear	5.20x2.00x1.10
	RFANT5220110A2T	2.4～2.5	Omni-directional	2	2.0	50	Linear	5.20x2.00x1.10
	RGFRA8010110A2T	2.4～2.5	Omni-directional	3.61	2.0	50	Linear	8.00x1.00x1.10
	RFANT9520120A0T	2.4～2.5	Omni-directional	2	2.0	50	Linear	9.50x2.00x1.20
	RFECA3216060A1T	2.4～2.5	Omni-directional	2	2.1	50	Linear	3.20x1.60x0.60
	RFECA3216060K1T	4.9～5.85	Omni-directional	2.8	2.0	50	Linear	3.20x1.60x0.60
	RFANT9030200A1T	2.4～2.4835	Omni-directional	2	2.1	50	Linear	9.00x 3.00x2.00
	RGFRA1903041A1T	2.4～2.5	Omni-directional	2	2.0	50	Linear	19.0x3.00x3.80
	RGFRA9937380A3T	2.4～2.55	Omni-directional	2	2.0	50	Linear	9.90x3.70x3.80
	RGFRA1204021A1T	2.4～2.5	Omni-directional	2	2.0	50	Linear	12.0x4.00x2.00
	RFANT2012090A0T	2.4～2.5	Omni-directional	2	2.0	50	Linear	2.00x1.25x0.90
	RFECA2012050A3T	2.4～2.5	Omni-directional	0.29	2.6	50	Linear	2.00x1.20x0.50
	RFANT2012060L4T	2.4～2.5 5.15～7.125	Omni-directional	1.5 / 4.5	3.0	50	Linear	2.00x1.20x0.60
UHF WORKING FREQUENCY	RGFRA1204011DCT	900～930	Omni-directional	1	2.0	50	Linear	12.00x4.00x1.60
	RGFRA1204011DET	855～885	Omni-directional	1	2.0	50	Linear	12.00x4.00x1.60
Ultra WideBand WORKING FREQUENCY	RFANT3216110Y1T	6.24～8.5	Omni-directional	3～4.5	2.0	50	Linear	3.20x1.60x1.10
	RFANT8060101YAT	3.0～10	Omni-directional	1.5～4.5	2.0	50	Linear	8.00x6.00x1.00
Automotive Series	AMANT3216110E0T	1.575	Omni-directional	1.7	3.0	50	Linear	3.20x1.60x0.60
	AMANT3216120A5T	2.4～2.5	Omni-directional	2	2.0	50	Linear	3.20x1.60x1.20
	AMANT2012060L4T	2.4～2.5 5.15～7.125	Omni-directional	1.5 / 4.5	3.0	50	Linear	2.00x1.20x0.60
	AMANT5220110A0T	2.4～2.5	Omni-directional	2	2.0	50	Linear	5.20x2.00x1.10
	AMANT3216110Y1T	6.24～8.5	Omni-directional	3～4.5	2.0	50	Linear	3.20x1.60x1.10
	AMANT9030200A1T	2.4～2.4835	Omni-directional	2	2.1	50	Linear	9.00x 3.00x2.00
	AMANT2012090A0T	2.4～2.5	Omni-directional	2	2.0	50	Linear	2.00x1.25x0.90

■For more information, please contact with local sales representative

■All specifications are subject to change without notice

NTC POWER Thermistor JNR series

Halogen Free | RoHS COMPLIANCE ITEM

Please see Catalog of JOYIN CO.,LTD. (Website: http://www.joyin.com.tw) for detail information.

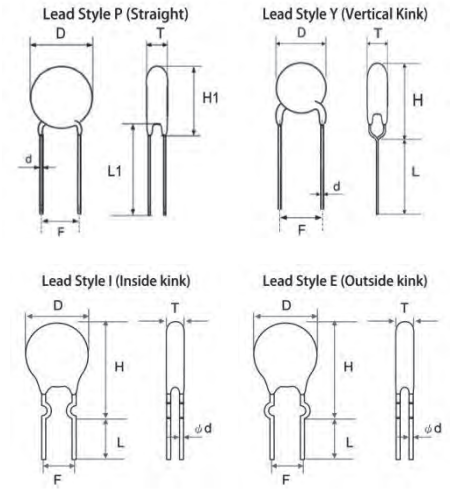
Features

1. RoHS / Halogen-Free (HF) compliant
2. Body size: Ø5mm ～ Ø25mm
3. Highly stable electrical characteristics
4. Coating material flame retardant to UL94V-0
5. Wide resistance range
6. Agency recognition: UL / TUV / CQC

Safety Certification

Standard NO	UL / CUL	TUV	CQC
	UL1434	EN 60539-1:2016	GB/T6663.1-2007
File NO	E171531	R 50236285	CQC10001050816

Structure and Dimension



Unit in mm

Diameter	Ø 5mm	Ø 8mm	Ø 10mm	Ø 13mm	Ø 15mm	Ø 20mm	Ø 25mm
D max.	7.5	10.5	12.5	15.5	17.5	23.5	29.0
d ± 0.05	0.6/0.8	0.6/0.8	0.6/0.8	0.8/1.0	0.8/1.0	1.0	1.0
F ± 1.0	5.0	5.0	5.0/7.5	7.5	7.5/10	7.5/10	7.5/10
H max.	11.0	14.5	18.5	21.0	23.0	28.0	36.0
H1 max.	10.0	13.5	17.5	19.0	22.0	27.0	35.0
L min.	24.0	24.0	24.0	24.0	24.0	24.0	20.0
L1 min.	25.0	25.0	25.0	25.0	25.0	25.0	20.0
T max.	6.0	6.0	7.5	8.0	8.0	8.0	8.0

Electrical Characteristics

Style	Resistance at 25℃ (Ohms)	Imax (Amps)	RImax (Ω)	Maximum Load Cap. AC240V (μF)	Pmax typical (W)	Dissipation factor typical δ(mW/℃)	Thermal time constant typical (sec.)	Rated temperature T_L～T_U℃
JNR05S	3.0～20	0.3～3.0	0.200～5.600	68～100	1.6	Approx.13	Approx.25	−40～+150
JNR08S	2.5～30	0.5～4.0	0.103～4.087	100	2.0	Approx.14	Approx.33	−40～+170
JNR10S	1.0～120	1.0～5.0	0.081～2.693	150～390	2.3	Approx.16	Approx.40	−40～+170
JNR13S	1.0～50	2.0～7.0	0.042～0.763	330～560	3.2	Approx.18	Approx.60	−40～+200
JNR15S	0.7～220	1.0～8.0	0.027～3.455	470～1500	3.7	Approx.21	Approx.80	−40～+200
JNR20S	0.7～120	2.0～13.0	0.029～1.075	1000～1500	4.9	Approx.28	Approx.110	−40～+200
JNR25S	1.0～20	5.0～15.0	0.034～0.245	1200	7.0	Approx.30	Approx.130	−40～+200

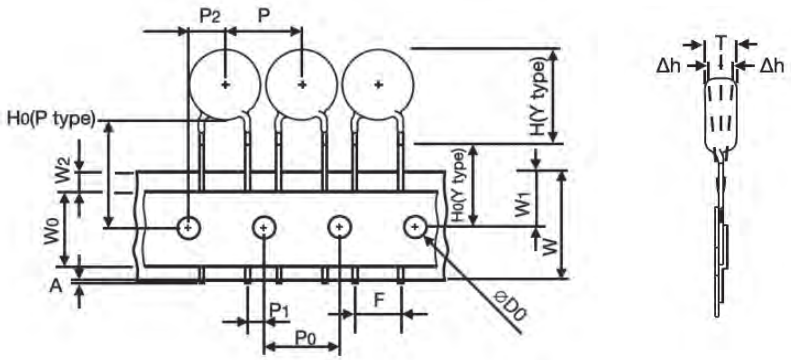
Part Number Description

Part Number Code														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
J	N	R	1	0	S	1	0	0	L	8	5	P	U	5
①			②		③	④			⑤	⑥	⑦	⑧	⑨	

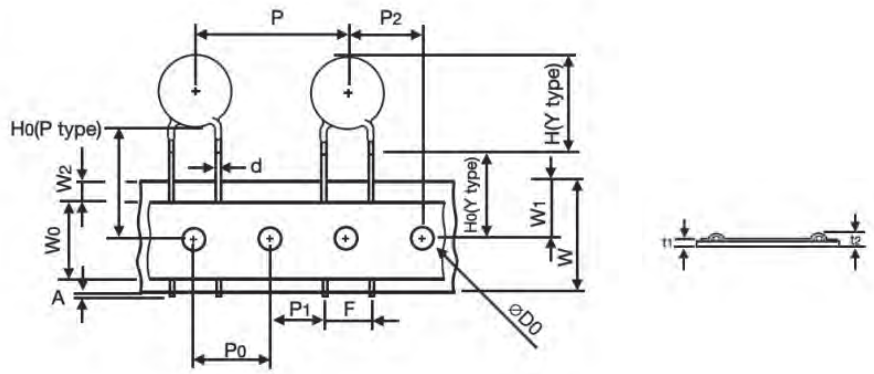
①	Product Type	JNR series	④	Resistance @25℃(R25)	2R5 = 2.5Ω 050 = 5Ω 100 = 10Ω 101= 100Ω	⑦	Lead Spacing	5 = 5mm 7 = 7.5mm 1 = 10mm
②	Body Size	05 = 5mm 08 = 8mm 10 = 10mm 15 = 15mm 20 = 20mm 25 = 25mm	⑤	Tolerance o f R25	L = ±15% M = ±20%	⑧	Lead Style	P = Straight Lead Y = Vertical Kink Lead I = Inside Kink Lead E = Outside Kink Lead
③	Series	S = Power NTC thermistor for Inrush Current Limiting (ICL)	⑥	Lead Diameter	6 = 0.6mm 8 = 0.8mm 1 = 1.0mm	⑨	Packaging	50 = L:5.0±1mm for Straight Lead or L1:5.0±0.5mm for Kink Lead U4 = L1:24mm for Bulk & Kink Lead U5 = L:25mm for Bulk & Straight Lead AW = H0:16mm for Ammo RY = H0:20mm for Tape/Reel

Packaging
Tape and Reel Dimension

1/2" pitch

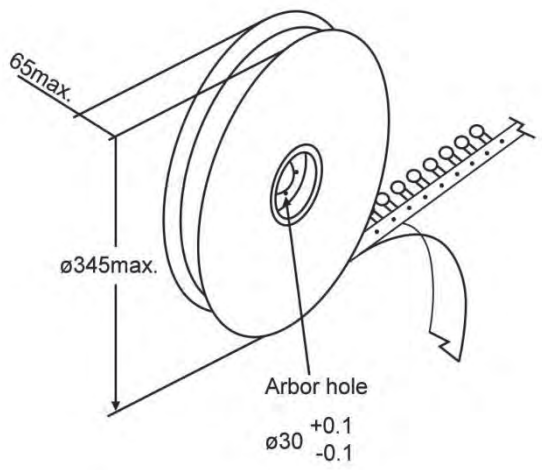


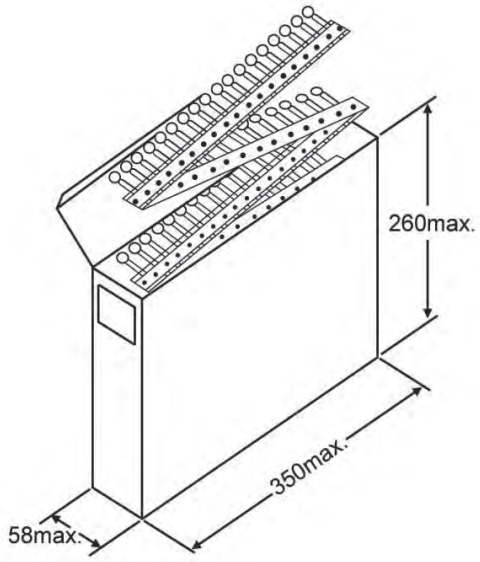
1.0" pitch



Symbols	Item	Body size 5/8/10 mm	Body size 8/10/13/15/20 mm	Body size 20/25 mm
A	Cut out length	1.1 mm max.	1.1 mm max.	
H (Y type)	Height of Top	See H max. table		
H_0(Y type)	Height to seating plane	16.0 ± 0.5 mm	16.0 ± 0.5 mm	
H_0(P type)	Height of component from hole center	16.0 ～ 21.0 mm	16.0 ～ 21.0 mm	
△h	Front to back deviation	0 ± 2.0 mm	0 ± 2.0 mm	
W	Carrier tape width	$18^{+1}_{-0.5}$ mm	$18^{+1}_{-0.5}$ mm	
W_0	Hold down tape width	10.0 mm	12.0 mm	
W_1	Sprocket hole position	$9^{+0.75}_{-0.5}$ mm	$9^{+0.75}_{-0.5}$ mm	
W_2	Adhesive tape position	3.0 mm max.	3.0 mm max.	
F	Component lead spacing	5.0 ± 1.0 mm	7.5 ± 1.0 mm	10.0 ± 1.0 mm
P	Pitch of component	12.7 ± 1. 0 mm	25.4 ± 1.0 mm	
P_0	Sprocket hole pitch	12.7 ± 0.3 mm	12.7 ± 0.3 mm	
P_1	Lead length from hole center to lead	3.85 ± 0.7 mm	8.95 ± 0.7 mm	7.7 ± 0.7 mm
P_2	Length from hole center to disk center	6.35 ± 1.3 mm	12.7 ± 1.3 mm	
D_0	Sprocket hole diameter	4.0 ± 0.2 mm	4.0 ± 0.2 mm	
d	Lead wire diameter	0.6 ± 0.05 mm	0.8 ± 0.05 mm	1.0 ± 0.05 mm
T	Disk thickness	See T max. table	See T max. table	
t_1	Total thickness tape	0.7 ± 0.05 mm	0.7 ± 0.05 mm	
t_2	Total thickness	1.6 mm max.	1.8 mm max.	

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.





Quantity per Packing Unit

Packaging \ Diameter	Ø 5mm	Ø 8mm	Ø 10mm	Ø 13mm	Ø 15mm	Ø 20mm	Ø 25mm
Bulk (box)	5000	4000	1500-2500	1000-2000	750-1500	750-1000	450-750
Reel	1500	1500	750-1000	500-1000	500-750	500-750	-
Ammo	1500	1000	750-1000	500-1000	500-750	-	-

Packaging	Bulk (box)	Reel (5mm～10mm)	Reel (13mm～20mm)	Ammo (5mm,8mm)	Ammo (10mm～15mm)	Ammo (10mm～16mm)	Ammo (20mm)
Box size (mm)	290X155X110	350X350X108	350X350X74	330X240X46	343X210X52	343X260X52	343X220X58
Carton size (mm)	310X328X250	371X371X590	370X370X468	350X500X270	363X440X250	363X540X250	363X460X250
One carton with	4 Boxes	5 Boxes (10 reels)	6 Boxes (6 reels)	10 Boxes	8 Boxes	8 Boxes	8 Boxes

SMD NTC Thermistor JSN series

Halogen Free | RoHS COMPLIANCE ITEM

Please see Catalog of JOYIN CO.,LTD. (Website: http://www.joyin.com.tw) for detail information.

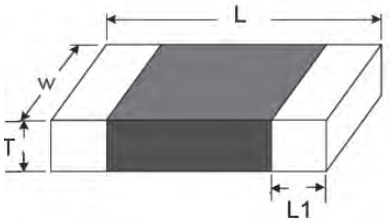
Features

1. RoHS / Halogen-Free (HF) compliant
2. Highly reliable structure
3. Operating temperature range: −40℃～+ 125℃
4. Agency recognition: UL / TUV

Safety Certification

Standard NO	UL / CUL	TUV
	UL1434	EN 60539-1:2016 EN 60539-2:2004 +A1
File NO	E171531	R 50267437

Dimension



Unit in mm

Size	L	W	T	L1	Quantity / Reel(Pcs)
JSNZ(0201)	0.60±0.05	0.30±0.05	0.30±0.05	0.15±0.05	15,000
JSNA(0402)	1.00±0.15	0.50±0.15	0.50±0.15	0.25±0.10	10,000
JSNB(0603)	1.60±0.15	0.80±0.15	0.80±0.15	0.30±0.20	4,000
JSNC(0805)	2.00±0.20	1.25±0.20	0.85±0.20	0.50±0.30	4,000

Electrical Characteristics

Style	Zero Power Resistance at 25℃ R 25 (Ω)	Tolerance of R25 (± %)	B 25/50 Value (K)	Tolerance of B Value (± %)	Dissipation Factor δ(mW/℃)	Thermal Time Constant τ(sec.)	Max. Power Rating at 25℃ (mW)
JSNZ	10K～470K	10,5,3,2,1	3380～4250	5,3,2,1	Approx.1.0	Approx.3.0	100
JSNA	10K～100K	10,5,3,2,1	3380～4250	5,3,2,1	Approx.1.7	Approx.3.0	170
JSNB	10K～100K	10,5,3,2,1	3380～4250	5,3,2,1	Approx.2.1	Approx.3.1	210
JSNC	10K～100K	10,5,3,2,1	3380～4250	5,3,2,1	Approx.2.4	Approx.7.5	240
Style	Zero Power Resistance at 25℃ R 25 (Ω)	Tolerance of R25 (± %)	B 25/85 Value (K)	Tolerance of B Value (± %)	Dissipation Factor δ(mW/℃)	Thermal Time Constant τ(sec.)	Max. Power Rating at 25℃ (mW)
JSNZ	10K～470K	10,5,3,2,1	3435～4050	5,3,2,1	Approx.1.0	Approx.3.0	100
JSNA	47K～100K	10,5,3,2,1	3435～4310	5,3,2,1	Approx.1.7	Approx.3.0	170
JSNB	6.8K～200K	10,5,3,2,1	3435～4400	5,3,2,1	Approx.2.1	Approx.3.1	210
JSNC	5K～200K	10,5,3,2,1	3435～4050	5,3,2,1	Approx.2.4	Approx.7.5	240

Part Number Description

Part Number Code															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
J	S	N	A	1	0	3	F	3	4	4	F	B	B	X	G
①			②	③			④	⑤			⑥	⑦	⑧		

①	Product Type	JSN series	⑤	B Value	344 = 3435 K 405 = 4050 K
②	Size	Z = 0201 (0603) A = 0402 (1005) B = 0603 (1608) C = 0805 (2012)	⑥	Tolerance of B Value	F = ±1% G = ±2% H = ±3% J = ±5%
③	Zero Power Resistance @25℃(R25)	502 = 5KΩ 103 = 10KΩ 104 = 100KΩ	⑦	Definition of B Value	A = 25/50 B = 25/85 C = 25/100
④	Tolerance of R25	F = ±1% G = ±2% H = ±3% J = ±5% K = ±10%	⑧	Optional Suffix	Internal Control Code

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

SMD Product handling manual

1. Scope

This product handling manual is applied to parts for the surface mounting that KAMAYA ELECTRIC CO., LTD. produce.

2. Storage

Consider the following four points for keeping the environment, the storage method, and the storage period to maintain the qualities of parts below.

2.1 Avoid storing in locations where corrosive gas is present (Sea breezes, Cl_2, H_2S, NH_3, SO_2, NO_2, etc.) or in dusty and moist circumstances. Otherwise, it may result in deterioration of performance and adversely affect the soldering.

2.2 Avoid keeping goods in high temperature and direct sunlight. Otherwise, it may cause deformation of packing materials, and adherence of parts on packing materials.

2.3 Please enforce First-In & First-Out for the use of parts in consideration of the change in the environmental condition.

2.4 Store these products in the following environment.
Temperature: 5 to 35℃
Humidity : 25 to 75%
Terms of guarantee: 2 years

3. Pattern Design

To solder parts on the printed circuit board properly, it is necessary to take a careful attention in design stage.
It is necessary to consider the land pattern position by mounting equipment, method of soldering (flow or reflow), and material of print circuit board. Moreover, it is necessary to consider the position of adhesive and the array of parts at the flow soldering. Refer to Page 81 for recommended land pattern of Kamaya product

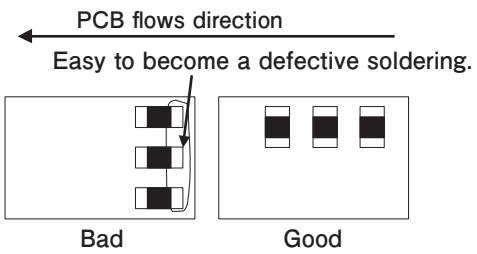
3.1 Strength of parts might decrease under the condition that the width or the shape of land pattern is too large, or the bend of the substrate occurs when gap of soldering position is generated or there are a lot of solder quantities.

3.2 Interval of parts should not narrow too much for the short-circuit prevention.
In general, it is safer to open more than 0.5mm from the positioning accuracy of mounting.

3.3 The resistor is a generation of heat source.
The pattern design that opens enough distance is necessary from other generation of heat parts.
Especially, please do enough derating of the rated dissipation for a high voltage circuit after considering the temperature rises of the adjoining generation of heat parts.

3.4 When the flow soldering is executed, soldering differs depending on the direction where the printed circuit board is thrown.

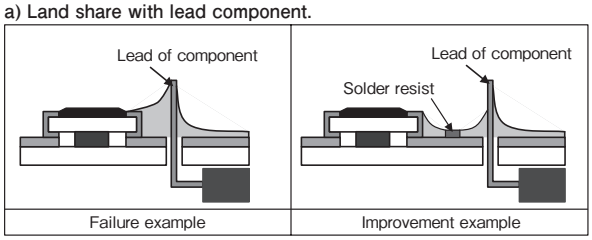
Figure-1



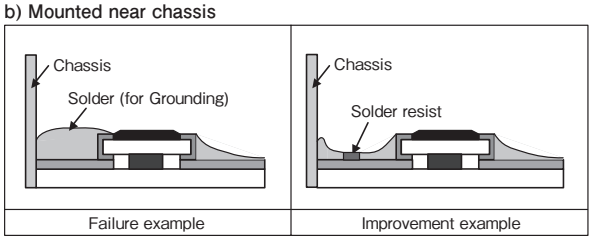
3.5 Examples of division of land pattern (Cross-sectional view)
a. Land share with lead component.
b. Mounted near Chassis.
c. Side by side array.

Figure-2

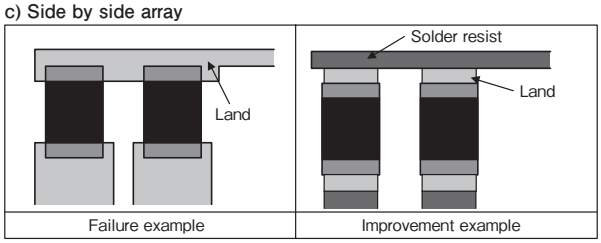
a) Land share with lead component.



b) Mounted near chassis

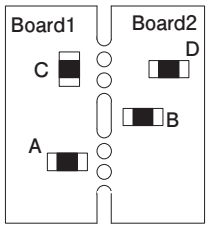


c) Side by side array



3.6 Avoid the component placement to the following places.
1) Near cutting line of print circuit board.
2) Place where print circuit board is distorted and mechanical stress is received easily.

Figure-3
Layout of resistors near the cutting line of print circuit board.
Improper A → B → C&D → Proper



4. Print Circuit Board

Please consider following respects.

4.1 Thermal diffusivity (thermal conductivity)
Thermal diffusivity through the print circuit board is necessary for generation of heat from parts.
Especially, use the print circuit board with high thermal conductivity when the calorific value is large.

4.2 Resistance to soldering heat
Select a heatproof, good substrate to soldering parts.
Because it often solders two or more times.

4.3 Pull peel strength of land pattern
Consider that the print circuit board corresponding to the land pattern size and sticking strength with the copper foil.

4.4 Bend strength
The stress in the electrodes and parts body, when the PCB bends by weight and external stress of parts, causes the joining electrode flaking off and the crack. Consider the bend ability of print circuit board.

5. Adhesive

When an adhesive is applied, the spread should be set corresponding to each part so that there are no overflow into the land or no dropout of the parts.

5.1 Strength of adhesive must be strong not to fall and move parts in the mounting process.

5.2 Stiffen at the low temperature as much as possible. Do not heat parts as the cure temperature.

5.3 Keep without stringy, slumping adhesion, and dewetting that solder can not adhere to parts.

5.4 After soldering, there must be no causticity.

6. Mounting

Please consider following to install parts in the printed circuit board.
1) Gap of installing position
2) Product floating from land pattern
3) Mechanical stress to overcoat of parts.

6.1 Do not touch with bare-handed in the electrode and wash it well with an organic solvent when the foreign body such as oils and fats adheres.

6.2 Mounting trouble of static electricity may occur when you touch or rub the part, packaging materials and the cover tape of the taping especially. When you deal with parts on the worktable, please execute the static electricity prevention measures (like the electrification prevention mat).

7. Soldering

7.1 The lead free is recommended in the solder paste.
Select appropriate solder paste after executing the evaluations of soldering and strength of bond, etc.

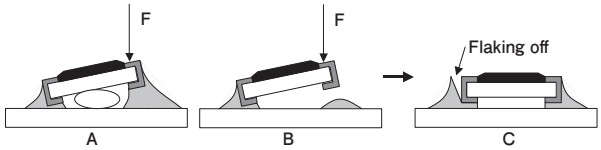
7.2 Select flux without the causticity.

7.3 The conditions of temperature and time should be well considered in the soldering process so that any warp or twist in the printed circuit board may not grow.Moreover, the electrode might flake off when the substrate is bent after it solders or the high impact is given parts or around it.

7.4 In VPS Reflow, preheat well so that the difference of temperature may not big too much between parts and inside of furnace. A big difference of temperature cause drop out of parts.

7.5 Do not rub the electrodes of resistor with soldering iron. The electrode may flake off when the iron is pressed on the electrode. Do not raise the temperature of the soldering iron more than necessary when the side electrode of parts is formed with the Ag resin.

Figure-4



7.6 The overcoat and the main body may be chipped off when you hold the parts strongly with tweezers.
Do not use parts detached from the print circuit board once again.

7.7 Please refer to page 82 for our recommended soldering conditions.

8. Cleaning

The remaining of the flux on print circuit board with part mounted may cause a bad effect on humidity resistance and corrosion resistance. Please use a rosin flux with low chlorine-containing, or alcoholic and hydrocarbon solvent.

9. Other Notes

9.1 The use of the products mentioned in this catalog refers to consumer applications that are available on the open market.

9.2 There are cases which high levels of reliability distinctive from consumer applications sold on the open market are necessary for electrical components which are used in equipment that could effect human life or create huge social loss owing to defect in medical equipment, space equipment, nuclear power-related equipment, vehicle mounted equipment, aircraft and other equipment. When you examine the use in the above-mentioned equipment or for uses not mentioned within this catalog, ensure that you consult with our sales department prior to deployment.

9.3 As the use of resistors and surface-mounted parts used in all electrical components, especially resistors used in high-voltage circuits and in circuits prescribed for safely regulations, will be greatly affected by the circuit used, the method of mounting, the material, and environmental conditions, ensure that you consult with our sales department prior to deployment when examining the viability of use in characteristic circuits, mounting methods, material and under characteristic environmental conditions,

9.4 Thoroughly verify performance and reliability when using under the following characteristic environmental conditions :
(1) Use within a liquid environment (Water, oil, liquid chemical, organic solution, etc.)
(2) Use in direct sunshine. Outdoors in heavy dew, in dusty environments, or where corrosive gas is present (Sea breezes, Cl_2, H_2S, NH_3, SO_2, NO_2, etc.)
(3) Use in environments with strong electrostatic or magnetic waves exists.
(4) Use nearby flammable substances.
(5) Use with the resistors coated in resin, etc.
(6) Use of water or water solution for flux cleaning after unwashed soldering or soldering.
(7) Use under environment of condensation

9.5 Ensure that the condition of the mounting is evaluated and verified on circuit boards when subjected to overloads in the form of pulses or surges, etc.

9.6 Take cares handling these products as they may be damaged and become defective if subject to impact, such as dropping.

9.7 When attaching adhesive materials such as tape to the surface of the component and then pulling and releasing the tape, the electrode terminals and protective coating may peel off, so please take the following points into consideration.
(1) Avoid using tape with high adhesive strength.
(2) When peeling off the tape, do not peel it off instantaneously and strongly.
(3) The adhesive strength of the tape may increase with time after application, so do not leave the tape on for a long time.

Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

SMD Product handling manual (RECOMMENDED LAND PATTERN)

Note: This land pattern is not supported by the mounting evaluation.

This is reference information only.

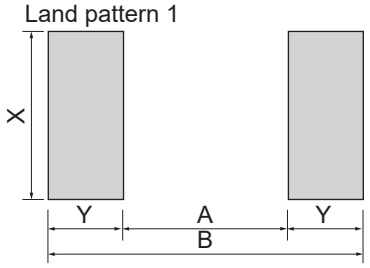
●Application

All KAMAYA Surface Mount Devices

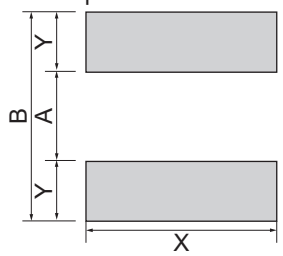
●Recommended Land Pattern (Reference)

1.Square chip type (No. of terminals: 2)

Land pattern 1



Land pattern 2

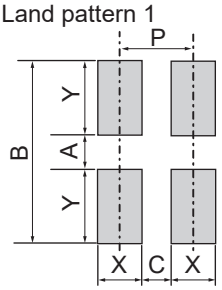


Land pattern	Size		Flow soldering				Reflow soldering			
	Metric	Inch	A	B	X	Y	A	B	X	Y
1	0402	01005	Not applied				0.18	0.58	0.2	0.2
	0603	0201					0.3	0.9	0.3	0.3
	1005	0402					0.5	1.3	0.5	0.4
	1608	0603	1.0	2.6	0.8	0.8	1.0	2.0	0.8	0.5
	2012	0805	1.3	3.1	1.25	0.9	1.3	2.7	1.25	0.7
	3216	1206	2.2	4.3	1.6	1.05	2.2	3.9	1.6	0.85
	3225	1210	2.2	4.3	2.5	1.05	2.2	3.9	2.5	0.85
	5025	2010	3.9	6.3	2.5	1.2	3.9	5.9	2.5	1.0
	6332	2512	5.2	7.6	3.2	1.2	5.2	7.2	3.2	1.0
2	1632	0612	0.6	2.8	3.2	1.1	0.6	2.4	3.2	0.9
	2550	1020	1.3	3.8	5	1.25	1.3	3.4	5	1.05
	3263	1225	2.0	4.5	6.3	1.25	2.0	4.1	6.3	1.05

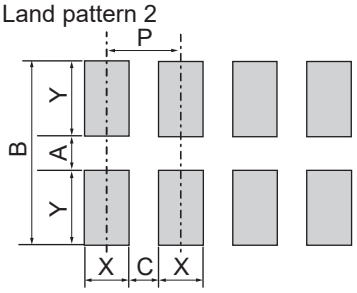
*For RLP and MLP, the recommended land pattern is set by resistance values.
Please look at corresponding page for further information.
Please contact Kamaya sales window for the recommended land pattern of WLP.
For RCC16, RCC20 and SPGA06, Please contact Kamaya sales dept.

2.Chip network type (No. of terminal: Multiple)

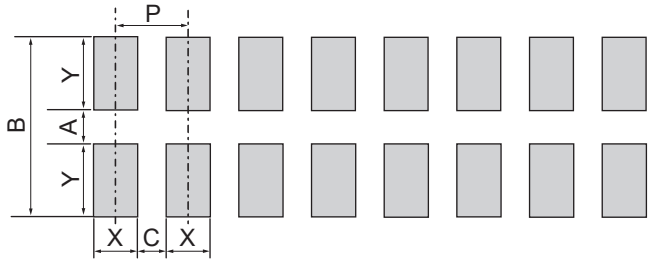
Land pattern 1



Land pattern 2



Land pattern 3



Land pattern	Style	Terminals style	P	Flow soldering					Reflow soldering				
				A	B	C	X	Y	A	B	C	X	Y
1	RAC062D, RAAW062D	E, G	0.5	Not applied					0.2	0.8	0.3	0.3	0.3
2	RAAW064D								0.3	0.9	0.2	0.3	0.3
1	RAC102D	C	0.65						0.5	1.3	0.34	0.33	0.4
	RAC101A												
2	RAC104D, RACA104D		0.5						0.5	1.3	0.15	0.35	0.4
	RAC164D, RACA164D		0.8	1.0	2.6	0.35	0.45	0.8	1.0	2.0	0.35	0.45	0.5
3	RAC168D		0.5	Not applied					1.0	2.0	0.2	0.3	0.5

●Others

(1) Please contact Kamaya sales dept for other products and further details.

(2) Please carry out an enough mounting evaluation when use these patterns.

SMD Product handling manual (Recommended Soldering Condition)

Note: This soldering condition is not supported by the mounting evaluation.
This is reference information only.

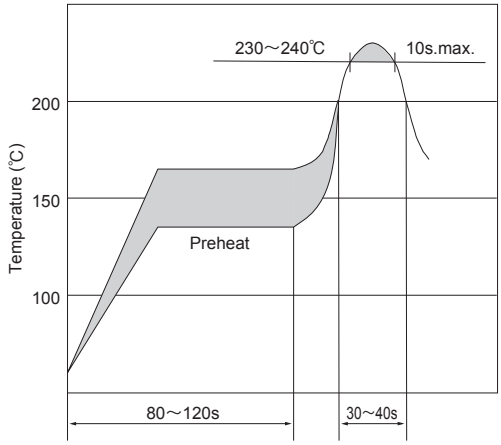
●Application

All Kamaya Surface Mount Devices

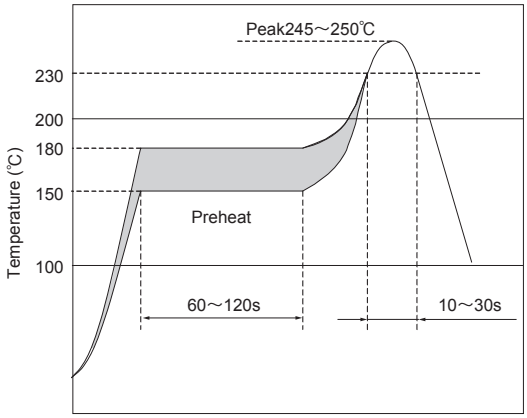
●Recommended Soldering Condition (Reference)

1. Reflow soldering

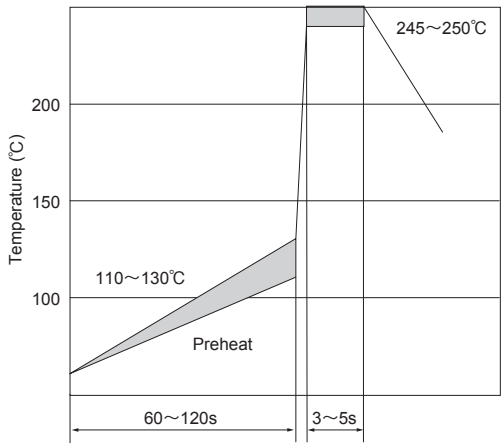
1.1 Recommended condition of Sn-Pb solder.
Reflow times: 2 times



1.2 Recommended condition of Sn solder
Reflow times: 2 times



2. Flow soldering (Recommended condition of Sn solder and Sn-Pb solder)



3. Soldering Iron (Recommended condition of Sn solder and Sn-Pb solder)
(1) Temperature of soldering iron tip: 300℃, Duration: 10 s max.
(2) Temperature of soldering iron tip: 350℃, Duration: 3 s max.

●Others

(1) Please carry out enough mounting evaluation when use the profile except those above.
(2) Please contact Kamaya sales dept. for further information.

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

Term Explanation

●Resistors

Rated Dissipation

The maximum value of the electric power that can continuously be impressed to the resistor at the ambient temperature provided for within the category temperature range is indicated.
The derated values of dissipation for temperatures in excess of 70℃ shall be indicated by the derating Curve.

Please note that the chip resistor networks provide for the rated dissipation of each element and each package when you use it.

Rated Voltage

The maximum value of the D.C or r.m.s. voltage that can continuously be impressed to the resistor at the ambient temperature provided for within the range of the category temperature range is indicated.

Rated Voltage $=\sqrt{(\text{Rated Dissipation})\times(\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)

However, Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Critical Resistance Value

Critical resistance value is the resistance value at which the rated voltage is equal to the limiting element voltage.
Below critical resistance value, please use the rated voltage as the limiting element voltage.

Limiting Element Voltage

The maximum value of the d.c. or r.m.s. voltage that can continuously be impressed to the resistor and the resistive element is indicated.
Limiting Element Voltage that provides for the kind and each shape is different.

Insulation Voltage

The maximum value of the d.c. voltage that can be impressed for 1 minute the one that the electrode (terminal) was lumped together and between the insulation exterior or substrates is indicated.
When the voltage that exceeds the Insulation voltage is impressed for the electrode and the insulation exterior (substrate), the insulation exterior might be destroyed by generation of heat and the direct current electrolysis action by the leakage current.

Voltage Proof

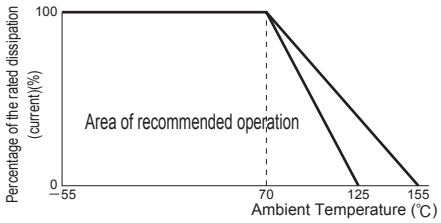
The r.m.s voltage is impressed for 1 minute the one that the electrode (terminal) was lumped together and between the insulation exterior or substrates, and the insulation exterior indicates the maximum value of the voltage that breakdown or flashover.

Category Temperature Range

The ambient temperature of the resistor that can continuously be used adding a regulated rated load (electric power) is shown.
It is not a temperature of air outside of an electronic equipment, and it is necessary to compare it with the ambient temperature in the electronic equipment in which the resistor is built in.

Derating Curve

The derated values of dissipation for temperatures in excess of 70℃ shall be indicated by the following Curve.



Variation of Resistance with Temperature (Temperature Coefficient of Resistance: TCR)

The change of resistance 1℃ rate of the resistor within the range of the category temperature (category temperature range) is shown.

$$\text{Temperature Coefficient of Resistance: TCR } (\times 10^{-6}/℃) = \frac{R-R_0}{R_0} \times \frac{1}{T-T_0} \times 10^6$$

R :Measured resistance at T℃
R_0 :Measured resistance at T℃
T :Measured test temperature (℃)
T_0 :Measured base temperature (℃)

Especially, because the resistance temperature coefficient tends the large dependence of the measurement resistance on the measuring method, RLC/RCC/RLP&MLP&WLP/TWLC needs noting.

Term Explanation

●Chip Fuses & Fusible Resistors

Joule Heat
It is the heat generated by the current.
The fuse melts inside by joule heat, and interrupts the current.

Fusible Characteristics
Relation between current (I) and fusion time (t) that flows to fuse.
It shows for the fusible Resistors by the relation between an impressed electric power (W) and the fusion time (W-t characteristic).

Rated Voltage
It shows maximum voltage value fuse can work properly.
It is the maximum voltage value in which the circuit can be safely interrupted after the fuse workings.
On selecting a fuse, it is necessary to confirm that the maximum rated voltage is less than rated voltage.

Interrupting Rating
It shows Maximum voltage(Rated voltage) and Maximum current for an interrupting circuit safely.
Maximum voltage and Maximum current should be applied below interrupting rating.

Working Temperature Range
It is temperature range fuse can works with specified condition,
Ambient temperature is to be within category temperature range.

Rated Current
A value of current which the fuse can be complied with, according to the test conditions.
It is different from the maximum current that applied to fuses, considering a long life span, the deratings are required.

Steady - State Current
It is current value at time that regularly flows to circuit regularly.

Deratings
1）Nominal Derating
It is derating value for rated current.
The reduction rate is depended on the type of fuse.

2）Temperature Derating
It is ambient temperature derating value for rated current.
The reduction rate is depended on the types of fuse and ambient temperature.

In-rush Current(Rush Current)
Current that rapidly flows on circuit when power supply is turned on.
In many cases In-rush Current is bigger than Steady-state Current.
Chip fuses are confirmed to withstand In-rush Current.

Internal Resistance Value
An internal resistance values shown in this document include values in any materials of fuse, fuse element, outer terminations etc. Please refer to "section 10" for further information.
Additionally, resistance values are different depending on Temperature and Steady-state Current.

Maximum Open Circuit Voltage
Maximum open circuit voltage is the value of voltage applicable to both ends of resistors, when a resister is open condition in a circuit.
This voltage shall be corresponding to 1,000 times the rated dissipation or maximum open circuit which is the less severe.

 Product specifications contained in this catalogue are subject to change at any time without notice. Please confirm specifications with your order.

Product Marking and Symbols

●Rated resistance symbols

The symbols to indicate rated resistance are depicted in 3 characters (for the E6, E12, and E24 series) or 4 characters (for the E48, E96 and E192 series) as indicated below.
In the case of 3 characters, the first and second character represent the effective numeral, and the third character is the multiplier following the effective numeral.
In the case of 4 characters, the first, second and third character represent the effective numeral, and the fourth character is the multiplier following the effective numeral.
When a decimal point exists, the decimal point is represented by an R for all effective numerals.

• 3-Digit (example)

Rated resistance symbols	Resistance value
R15	0.15Ω
1R5	1.5Ω
150	15Ω
151	150Ω
152	1.5kΩ
153	15kΩ
154	150kΩ
155	1.5MΩ
156	15MΩ
157	150MΩ

• 4-Digit (example)

Rated resistance symbols	Resistance value
0L50	0.0005Ω
R005	0.005Ω
R050	0.05Ω
R154	0.154Ω
1R54	1.54Ω
15R4	15.4Ω
1540	154Ω
1541	1.54kΩ
1542	15.4kΩ
1543	154kΩ
1544	1.54MΩ
1545	15.4MΩ
1546	154MΩ

• Resistance values of 100M ohm and greater(example)

Rated resistance symbols	Resistance value
100M	100MΩ
1G00	1GΩ
10G0	10GΩ
100G	100GΩ

*The letters M and G are used as multipliers for 10^6 and 10^9 respectively of the resistance value expressed in ohms.

●Code Tolerances

Code	Tolerance on rated resistance
H	±50%
N	±30%
M	±20%
K	±10%
J	±5%
G	±2%
F	±1%
D	±0.5%
C	±0.25%
B	±0.1%
W	±0.05%

●Temperature Characteristics Symbol Table

Code	Temperature coefficient of resistance
B	$\pm 5\times 10^{-6}$/℃
T	$\pm 10\times 10^{-6}$/℃
P	$\pm 15\times 10^{-6}$/℃
E	$\pm 25\times 10^{-6}$/℃
C	$\pm 50\times 10^{-6}$/℃
K	$\pm 100\times 10^{-6}$/℃
D	$\pm 200\times 10^{-6}$/℃
A	$\pm 500\times 10^{-6}$/℃
M	$\pm 1{,}000\times 10^{-6}$/℃
N	$\pm 70\times 10^{-6}$/℃

Standard Resistance Values and Symbols

●Significant Figure of Resistance Value

E6	E12	E24	E48	E96
10	10	10	100	100
				102
			105	105
				107
		11	110	110
				113
	12	12	115	115
				118
			121	121
				124
			127	127
		13		130
			133	133
				137
			140	140
				143
			147	147
15	15	15		150
			154	154
				158
		16	162	162
				165
			169	169
				174
			178	178
	18	18		182
			187	187
				191
			196	196
		20		200
			205	205
				210

E6	E12	E24	E48	E96
22	22	22	215	215
				221
			226	226
				232
		24	237	237
				243
			249	249
				255
			261	261
				267
	27	27	274	274
				280
			287	287
				294
		30	301	301
				309
			316	316
				324
33	33	33	332	332
				340
			348	348
				357
		36	365	365
				374
			383	383
	39	39		392
			402	402
				412
			422	422
		43		432
			442	442
				453

E6	E12	E24	E48	E96
47	47	47	464	464
				475
			487	487
				499
		51	511	511
				523
			536	536
				549
	56	56	562	562
				576
			590	590
				604
			619	619
		62		634
			649	649
				665
68	68	68	681	681
				698
			715	715
				732
		75	750	750
				768
			787	787
				806
	82	82	825	825
				845
			866	866
				887
			909	909
		91		931
			953	953
				976

*Please refer to each page for standard values of each parts.

Numerical Symbols and Multipliers

Code	T(tera)	G(giga)	M(mega)	k(kilo)	m(milli)	μ(micron)	n(nano)	p(pico)
Multiplier	10^{12}	10^{9}	10^{6}	10^{3}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

Formula of Ohm's Law

Direct Current	Power(P)			Voltage(E)			Current(I)			Resistance(R)		
Calculating Formula	EI	I^2R	$\frac{E^2}{R}$	IR	$\sqrt{PR}$	$\frac{P}{I}$	$\frac{E}{R}$	$\sqrt{\frac{P}{R}}$	$\frac{P}{E}$	$\frac{E}{I}$	$\frac{E^2}{P}$	$\frac{P}{I^2}$

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Kamaya Shipping Label

Kamaya products are put a shipping label on reel or other packaging.
Refer to the sample of the shipping label as follows.

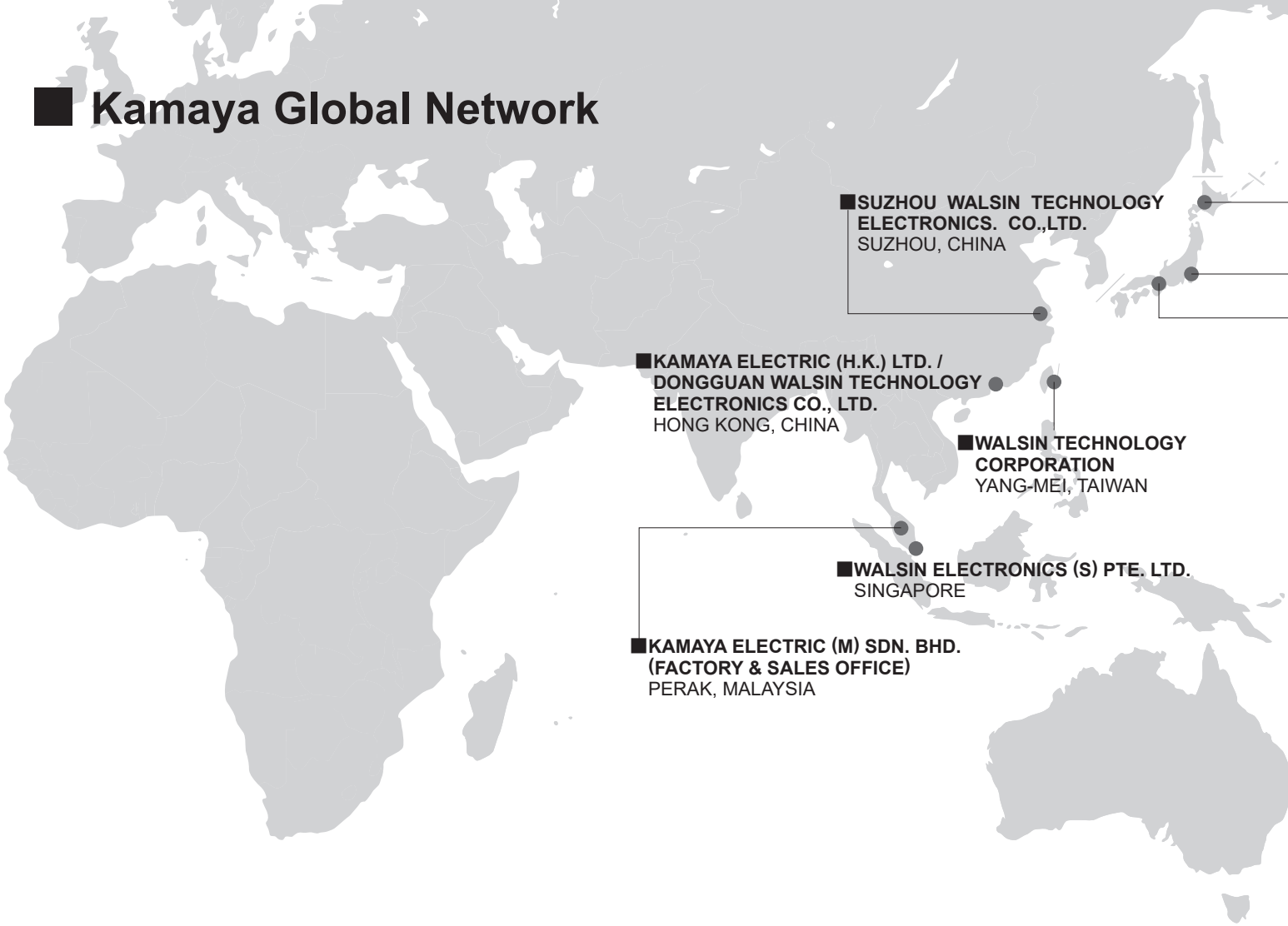
●Example for chip resistors

RMC1/16K 272F TP 0603 inch size, Fixed Thick Film Chip Resistor, 2.7k ohm F(±1%)

(1)Product type(Style, Temperature coefficient of resistance, Rated resistance, Tolerance, Packaging)
(2)Parts number from customer (P/N)
(3)Quantity
(4)Shipping Lot Number (L/N)
(5)Manufacturer
(6)Internal code 1
(7)Internal code 2

*There are cases in which (2) and (7) are not shown on Kamaya shipping label.
*Please contact Kamaya sales dept, if you need to confirm this label specification.

■ Kamaya Global Network



Application Facilities	Standard	Certification Organization	Certification No.	Rev. certificate Date	Certificate Date
KAMAYA ELECTRIC(M)SDN. BHD.	ISO9001	NQA Grobal Assurance	119040	Nov.18,2022	Nov.20,2019
	IATF16949		0461997	Nov.11,2022	Nov.20,2019
	ISO14001		E3242	May.29,2024	Jun.11,2009
	ISO45001		H3023	Nov.22,2021	May.26,2015
NAIE Factory, Hokkaido	ISO9001	Bureau Veritas Japan Co., Ltd	JP024546	Mar.1,2024	Mar.22,2012
	IATF16949		0505361	Mar.11,2024	Mar.11,2024
	ISO14001		JP023529	Apr.13,2023	May.9,2002
	ISO45001		JP022625	Jun.23,2022	Mar.16,2021
DONGGUAN WALSIN TECNOLOGYELECTRONICS CO.,LTD.	ISO9001	UL DQS Inc	20000837QM15	Oct.12,2023	May.21,1996
	IATF16949		0485215	Oct.12,2023	Feb.7,2021
	ISO14001	CTI International Certification	04124E30147R7L	Aug.3,2024	Aug.13,2003
	ISO45001		04123S30120R5L	Aug.13,2023	Aug.14,2008

***Important**
Product specifications c ontained in this catalogue are subje ct to c hange at any time without notice. Please c onfirm specifications with your order.

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Issued Dec. 2024