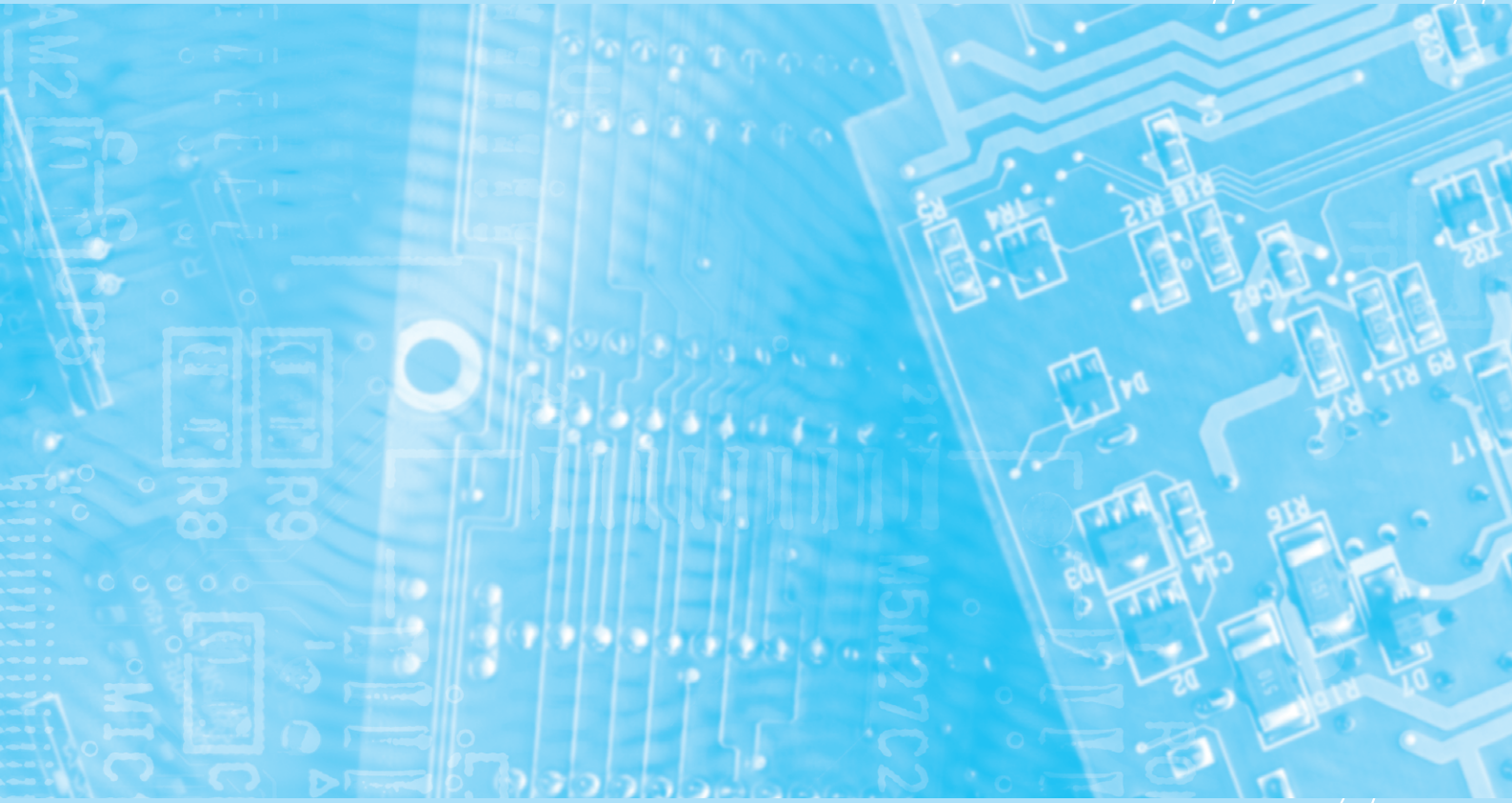
PSA PASSIVE SYSTEM ALLIANCE



KAMAYA
Electronic Components
Catalog 2016

KAMAYA

釜屋電機株式會社
KAMAYA ELECTRIC CO., LTD.
http://www.kamaya.co.jp

Product line up (2015,11)

Products Category				Chip Size									
				01005	0201	0402	0603	0805	1206	1210	2010	2410	2512
Chip Resistors	General purpose		RMC	●	●	●	●	●	●	●	●		●
		Precision	RGC	●	●	●	●	●	●				
		High Precision	RNC		●	●	●	●	●				
		Pb Free	NEW RMPC		NEW ●	NEW ●	NEW ●	NEW ●	NEW ●	NEW ●			
		Wide Terminal	NEW TWMC								NEW ●		
	Anti Sulfuration	Barrier type	RMNW			●	●	●	●	●	●		●
		Special electrode type	RMAW			●	●	●	●				
		Barrier / Special electrode	NEW RMGW			NEW ●	NEW ●	NEW ●	NEW ●	NEW ●			
	Trimmable chip		FCR				●	●	●	●	●		●
	High ohmic		RHC				●	●					
	High Voltage		RVC				●	●	●		●		●
		Special High Voltage type	RZC								●		●
	Anti Surge		RPC				NEW ●	●	●	●	●		●
		High Power type	NEW RBX				NEW ●						
	Current sensing	Face Down type	RCC				●	●	●	●	●		
		General purpose type	RLC			●	●	●	●	●	●		●
		Metal plate type	RLP				●	●	●				●
			MLP					NEW ●					●
			WLP										●
		Wide Terminal General type	NEW TWLC								NEW ●		
		Wide Terminal Metal plate	★ TWP										★
		Metal Foil taype	NEW DLP					NEW ●	NEW ●				
	Networks		RAC						●				
	Linear Positive T-C Chip Thermistors		LTC					●	●				
	Fusible Resistors		FRC				●	●	●				

Products Category		Chip Size									
		01005	0201	0402	0603	0805	1206	1210	2010	2410	2512
Chip Attenuators	RAC101A										

Products Category			Chip Size									
			01005	0201	0402	0603	0805	1206	1210	2010	2410	2512
Chip Fuse	General Purpose	FCC / FHC			●	●	●	●				
	In-rush Withstand / Low ohm Fast Acting	FMC			●	●						
	General Purpose Low ohm	FCCR			●	●						
	Slow Brow	SBF						●				
	High Rated Voltage	HFC						●				
	Ceramics Case (Primary side)	★ PFC									★	

Products Category		Chip Size									
		01005	0201	0402	0603	0805	1206	1210	2010	2410	2512
ESD Suppressors	SPC		★	●							
	HSPC			●	●						

Products Category				Rated Dissipation at 70°C	
				0.25W	0.5W
Lead Resistors	Carbon Composition	UL authorized type	RC1/2U		●
			RC	●	●

Products Category		Size							
		0402	0603	0805	1206	1210	1808	1812	Lead type
Capacitors	Multilayer Ceramic Capacitor	●	●	●	●	●	●	●	
	Film Capacitors								●

*★ : Under Development

4320	0302	0404	0602	0804	1506	Tolerance on Rated Resistance (%)	Rated Resistance Range	RoHS	Pb free*1	Halogen free*2	Antimony free*3	Page
						±0.1, ±0.5, ±1, ±2, ±5	1Ω ～ 24MΩ	●		●	●	2
						±0.1, ±0.5, ±1	3.3Ω ～ 4.7MΩ	●		●	●	3
						±0.05, ±0.1, ±0.25, ±0.5	4.7Ω ～ 680kΩ	●	●	●	●	4
						±1, ±5	1Ω ～ 1MΩ	●	●	●	●	5
						±1, ±5	1Ω ～ 1MΩ	●		●	●	6
						±0.5, ±1, ±5	1Ω ～ 10MΩ	●		●	●	7
							1Ω ～ 10MΩ	●		●	●	7
						±1, ±5	1Ω ～ 12MΩ	●		●	●	8
						0 –30, ±15	1Ω ～ 4.7kΩ	●		●	●	9
						±5, ±10, ±20, ±30, ±50	100MΩ ～ 150GΩ	●		●	●	10
						±0.5, ±1, ±2, ±5, ±10	47Ω ～ 51MΩ	●		●	●	11
						±5, ±10, ±20	1MΩ ～ 16MΩ	●		●	●	12
						±5, ±10, ±20	0.27Ω ～ 27MΩ	●		●	●	13
						±0.5, ±1, ±5	1Ω ～ 1MΩ	●		●	●	14
						±1, ±5	10mΩ ～ 100mΩ	●	●	●	●	15
						±1, ±2, ±5	10mΩ ～ 10Ω	●		●	●	16
						±1, ±5	1mΩ ～ 15mΩ	●	●	●	●	18
							0.5mΩ ～ 10mΩ	●	●	●	●	18
						±1, ±2, ±5	15mΩ, 20mΩ, 25mΩ	●	●	●	●	18
						±1, ±5	100mΩ ～ 910mΩ	●		●	●	20
★						±1, ±5	5mΩ	●	●	●	●	21
						±1	15mΩ ～ 50mΩ	●	●	●	●	22
	●	●	●	●	●	±1, ±5	1Ω ～ 10MΩ	●		●	●	23
						±5	33Ω ～ 10kΩ	●		●	●	24
						±5	1Ω ～ 100Ω	●		●	●	25

4320	0302	0404	0602	0804	1506	Attenuation Factor	Tolerance on Attenuation Factor	RoHS	Pb free*1	Halogen free*2	Antimony free*3	Page
		●				1dB ～ 10dB	±0.3dB, ±0.4dB	●		●	●	26

4320	0302	0404	0602	0804	1506	Rated Current	Fusing Characteristics	RoHS	Pb free*1	Halogen free*2	Antimony free*3	Page
						0.15A ～ 5.0A	Fast-Acting type	●	●	●	●	28
						0.5A ～ 5.0A	Fast-Acting type	●	●	●	●	30
						0.15A ～ 2.5A	Fast-Acting type	●	●	●	●	32
						1.0A ～ 8.0A	Fast-Acting type	●	●	●	●	33
						1.0A ～ 12.5A	Fast-Acting type	●	●	●	●	34
						1.0A ～ 15A	Fast-Acting type	●	●	●	●	35

4320	0302	0404	0602	0804	1506	Capacitance 0.1pF	Capacitance 0.2pF	Test Voltage 8kV	Test Voltage 15kV	RoHS	Pb free*1	Halogen free*2	Antimony free*3	Page
						●		●	●	●	●	●	●	36
							●		●	●	●	●	●	36

	Tolerance on Rated Resistance (%)	Rated Resistance Range	RoHS	Pb free*1	Halogen free*2	Antimony free*3	Page
	±10, ±20	1MΩ ～ 10MΩ					40
	±5, ±10, ±20	1Ω ～ 22MΩ					41

Capacitance	Dielectric	Rated Voltage	Products	Page
0.0005μF ～ 100μF	NP0, X7R, Y5V, X5R	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 1.5V, 2kV, 3kV	Walsin	42
0.001μF ～ 22μF	—	—	Nittuko	43

※1 Pb free : pb ≦ 1000ppm
※2 Halogen free : Cl or Br ≦ 900ppm, Cl+Br ≦ 1500ppm
※3 Antimony free : Sb2O3 ≦ 900ppm

Information **Page**

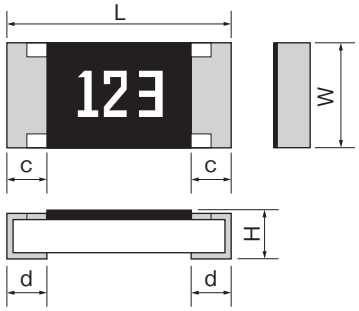
RMC

Halogen Free | Antimony Free

●Features

01005 to 2512 inch size and Jumper chip available.
New line up Tolerance B (±0.1%)
Precise dimension by Laser-scriber method(RMC1/20,RMC1/32).
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
Walsin Technology Corporation OEM products (1206 to 0402 inch) are also available.
AEC-Q200 qualified.

●Dimensions



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

Rated resistance value marking is 3-digit on the over coating except RMC1/16S & RMC1/20 & RMC1/32.
4-digit marking is available for F & G tolerance except RMC1/16, RMC1/16S & RMC1/20 & RMC1/32 type.

Unit : mm

Style	Metric	Inch	Product	L	W	H	c	d	*Unit weight/pc.
RMC1/32	0402	01005	KAMAYA	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	KAMAYA	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	KAMAYA WALSIN	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2 ±0.1	0.25 $^{+0.15}_{-0.05}$	0.6mg
RMC1/16	1608	0603	KAMAYA WALSIN	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	KAMAYA WALSIN	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	KAMAYA WALSIN	3.1±0.15 3.1±0.1	1.6 ±0.15 1.6 ±0.1	0.55±0.10 0.6 ±0.15	0.5 ±0.25 0.5 ±0.2	0.5 ±0.25 0.45 ±0.2	9mg
RMC1/4	3225	1210	KAMAYA	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	KAMAYA	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	25mg
RMC1	6332	2512	KAMAYA	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°C W	Rated Resistance Range (10Ω / 100Ω / 1MΩ / 10MΩ)	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10⁻⁶/°C	Limiting Element Voltage V	Isolation Voltage V	Category Temperature Range °C
RMC1/32	0402 (01005)	0.03 (0.5A)	1 ～ 4.3 4.7 ～ 9.1 10 ～ 91 100 ～ 1M	J F,J	— — — —	＋600 ～−200 ±300 ±200	15	50	−55～＋125
RMC1/20	0603 (0201)	0.05 (1.0A)	1 ～ 3.92 4.02 ～ 9.76 10 ～ 1M 1.1M～10M	F,J B,D,F,G,J F,J	— — —	＋600 ～−200 ＋350 ～−100 ±200	25		
RMC1/16S	1005 (0402)	0.1 (1.0A)	1 ～ 9.76 10 ～ 1M 1.02M ～ 3.3M 3.6M ～ 10M	F,J G,J B,D,F D,F,G,J F,J	— — K — —	＋500 ～−200 ±200 ±100 ±200	50	100	−55～＋155
RMC1/16	1608 (0603)	0.1 (2.0A)	1 ～ 9.76 10 ～ 3.3M 3.6M ～ 10M 11M～22M	F,G,J G,J B,D,F G,J F J	— — K — K —	＋500 ～−200 ±200 ±100 ±200 ±100 ±200			
RMC1/10	2012 (0805)	0.125 (2.0A)	1 ～ 9.76 10 ～ 2.2M 2.21M～3.3M 3.6M～10M 11M～22M	F,G,J G,J B,D,F D,F,G,J F,G,J J	— — K — — —	＋500 ～−200 ±200 ±100 ±200 ±200	150	500	
RMC1/8	3216 (1206)	0.25 (2.0A)	1 ～ 9.76 10 ～ 1M 1.02M ～ 10M 11M～22M	F, G, J G, J B,D,F F, G, J J	— — K — —	＋500 ～−200 ±200 ±100 ±200	200		
RMC1/4	3225 (1210)	0.5 (2.0A)	1 ～ 9.76 10 ～ 1M 1.02M ～ 10M 11M～22M	F, J G, J B,D,F F,G,J J	— — K — —	＋500 ～−200 ±200 ±100 ±200			
RMC1/2	5025 (2010)	0.75 (2.0A)	1 ～ 9.76 10 ～ 1M 1.1M ～ 22M	F, J G, J F J	— — K —	＋500 ～−200 ±200 ±100 ±200			
RMC1	6332 (2512)	1.0 (2.0A)	1 ～ 9.76 10 ～ 1M 1.1M ～ 22M	F, J G, J F J	— — K —	＋500 ～−200 ±200 ±100 ±200			

Note1. E24 series is available , E96 series is available for tolerance"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%). D(±0.5%) is Kamaya products
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

RMC	1/10	K	103	F	TP

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

Temperature Coefficient of Resistance

—	Standard	Resistor
K	±100×10⁻⁶/°C	Resistor
None	——	Jumper

Rated Resistance

E24 Series e.g. : 2R2=2.2 ohm 103=10k ohm	3-Digit	Resistor
E96 Series e.g. : 10R2=10.2 ohm 1002=10k ohm	4-Digit	Resistor
JP		Jumper

Tolerance on Rated Resistance

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

*Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Styles
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 RMC1/16
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 38 and 39.
*Please contact Kamaya sales department for 1mm pitch taping of RMC1/16s, 1/20.

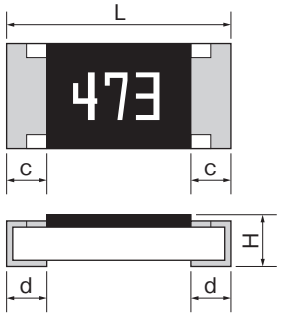
RGC

Halogen Free | Antimony Free

●Features

Suitable for precision applications.
High stabilized characteristics and Performance equivalent to thin film chip resistors.
New line up Tolerance ：0.1%, 0603 mm to 3216 mm.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●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,1/20,1/32 : only No marking is available.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RGC1/32	0402	01005	0.4±0.02	0.2 ±0.02	0.13 ±0.02	0.08 ±0.03	0.1 ±0.03	0.035mg
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°C W	Rated Resistance Range 10Ω 100Ω 1kΩ 1MΩ	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/°C	Limiting Element Voltage V	Isolation Voltage V	Category Temperature Range °C
RGC1/32	0402 (01005)	0.03	100 ～ 100k	D(±0.5%)	C	± 50	15	50	–55～+125
RGC1/20	0603 (0201)	0.05	51 ～ 976	B(±0.1%) D(±0.5%)	K	±100	25		
			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	–55～+155
			100 ～ 1M		C	± 50			
			1.02M ～ 3.3M		K	±100			
RGC1/16	1608 (0603)	0.1 *1(0.063)	3.3 ～ 9.76	F(±1%)	K	±100			–55～+125 *1(–55～+155)
			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 *1(0.1)	3.3 ～ 9.76	F(±1%)	C	± 50	150		
			10 ～ 3.3M	B(±0.1%), D (±0.5%), F (±1%)					
RGC1/8	3216 (1206)	0.25 *1(0.125)	3.3 ～ 9.76	F(±1%)	C	± 50	200		
			10 ～ 4.7M	B(±0.1%), D (±0.5%), F (±1%)					

*1 If Category Temperature Range is "–55~+155", Rated Dissipation is applied to in ( ).
Note1. E24, E96 are available for "F"(1%), "D"(0.5%) and "B"(0.1%)
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
1/32	0.03W	0402	01005
1/20	0.05W	0603	0201
1/16S	0.063W	1005	0402
1/16	0.1W (0.063W)	1608	0603
1/10	0.125W (0.1W)	2012	0805
1/8	0.25W (0.125W)	3216	1206

*If Category Temperature Range is "–55~+155", Rated Dissipation is applied to in ( ).

Temperature Coefficient of Resistance	
C	± 50×10^{-6}/°C
K	±100×10^{-6}/°C

Rated Resistance	
E24 Series e.g. : 473=47k ohm	3-Digit
E96 Series e.g. : 7152=71.5k ohm	4-Digit

Tolerance on Rated Resistance	
B	±0.1%
D	±0.5%
F	±1.0%

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	All Styles
PA	Press-Pocket Paper Tape (2mm pitch)	20,000pcs.	RGC1/32
		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 38 and 39.
*Please contact Kamaya sales department for 1mm pitch taping of RGC1/16s, 1/20.

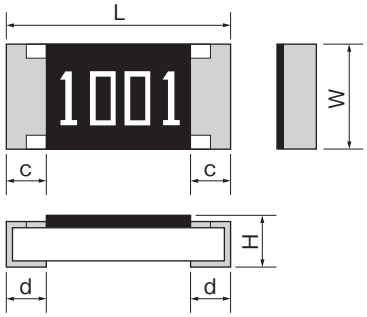
RNC

Halogen Free | Antimony Free | Pb Free

●Features

Suitable for high precision, higher stability and reliability applications.
New lineup; TCR: 5ppm, 10ppm and 15ppm, Tolerance: 0.05% for RNC10, 16
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●Dimensions



Rated resistance value is marked with 3-digit (E24) or 4-digit (E96) on the over coating.
RNC06: only No marking is available.

Unit : mm

Style	Metric	Inch	Product	L	W	H	c	d	*Unit weight/pc.
RNC06	0603	0201	KAMAYA	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	WALSIN	1.0 ±0.05	0.5 ±0.05	0.35 ±0.05	0.2 ±0.1	0.25 ±0.10	0.6mg
RNC16	1608	0603	WALSIN	1.55 ±0.10	0.8 ±0.1	0.45 ±0.15	0.25 ±0.15	0.3 ±0.15	2mg
RNC20	2012	0805	KAMAYA	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	KAMAYA	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°C W	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/°C	Limiting Element Voltage V	Preferred Number Series for Resistors	Isolation Voltage V	Category Temperature Range °C
RNC06	0603 (0201)	0.03	100Ω～10kΩ	B (±0.1%)	E	±25	15	E96 E24	50	−55～+155
		0.05	27Ω～4.99kΩ	D (±0.5%)	E	±25				
			5.1kΩ～10kΩ		C	±50				
RNC10	1005 (0402)	0.063	25Ω～8kΩ	W(±0.05%) B (±0.1%) C (±0.25%)	B	±5	25			
			25Ω～20kΩ		T	±10				
					P	±15				
			10Ω～100kΩ	W(±0.05%) B (±0.1%) C (±0.25%) D (±0.5%)	E	±25				
					C	±50				
RNC16	1608 (0603)	0.063	25Ω～40kΩ	W(±0.05%) B (±0.1%) C (±0.25%)	B	±5	50		100	
			25Ω～100kΩ		T	±10				
					P	±15				
			4.7Ω～680kΩ	W(±0.05%) B (±0.1%) C (±0.25%) D (±0.5%)	E	±25				
					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

NEW B	±5 ×10^{-6}/°C
NEW T	±10×10^{-6}/°C
NEW P	±15×10^{-6}/°C
E	±25×10^{-6}/°C
C	±50×10^{-6}/°C

Rated Resistance

E24 Series e.g. : 103=10k ohm	3-Digit
E96 Series e.g. : 10R2=10.2 ohm 1002=10k ohm	4-Digit

Tolerance on Rated Resistance

NEW W	±0.05%
B	±0.1%
C	±0.25%
D	±0.5%

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	RNC06 RNC20 RNC32
		5,000pcs.	RNC16
		10,000pcs.	RNC10
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 38 and 39.

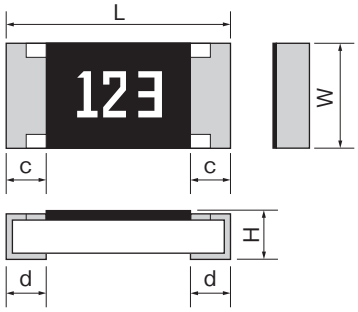
NEW
RMPC

Halogen Free | Antimony Free | Pb Free

●Features

High reliability and stability
Reduced size of final equipment
Lower assembly cost
Higher component and equipment reliability
RoHS compliant and total lead free(Pb<100ppm)

●Dimensions



Unit : mm

Style	Metric	Inch	Product	L	W	H	c	d	*Unit weight/pc.
RMPC06	0603	0201	KAMAYA	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	WALSIN	1.00±0.05	0.5 ±0.05	0.35±0.05	0.2±0.1	0.25±0.1	0.6mg
RMPC16	1608	0603	WALSIN	1.6 ±0.1	0.8 ±0.1	0.45±0.15	0.3±0.1	0.3 ±0.15	2mg
RMPC20	2012	0805	WALSIN	2.0 ±0.1	1.25±0.1	0.5 ±0.15	0.4±0.2	0.4 ±0.2	5mg
RMPC32	3216	1206	WALSIN	3.1 ±0.1	1.6 ±0.1	0.6 ±0.15	0.5±0.2	0.45±0.2	9mg
RMPC35	3225	1210	WALSIN	3.1 ±0.1	2.6 ±0.1	0.55±0.10	0.5±0.2	0.5 ±0.2	16mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/°C	Limiting Element Voltage V	Category Temperature Range °C
RMPC06	0603 (0201)	0.05 (0.5A)	100～1M 10～97.6 1～ 9.76	F(±1%)	—	±200 ±600～0 +800～−100	25	−55～+125
			100～10M 10～91 1～9.1	J(±5%)		±200 ±600～0 +800～−100		
RMPC10	1005 (0402)	0.063 (1.0A)	1Ω～10MΩ	F(±1%) J(±5%)		±200	50	−55～+155
RMPC16	1608 (0603)	0.1 (2.0A)					50	
RMPC20	2012 (0805)	0.125 (2.0A)					150	
RMPC32	3216 (1206)	0.25 (2.0A)					200	
RMPC35	3225 (1210)	0.33 (2.0A)					200	

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.
Note4. Jumper : Resistance value is less than 50m ohm.

●Part Number Description

Example

Style

RMPC	10	—	103	F	TP

Product Type

Temperature Coefficient of Resistance

—	Standard	Resistor
None	—	Jumper

Tolerance on Rated Resistance

F	±1%	Resistor
J	±5%	
None	—	Jumper

Rated Dissipation & Size

Code	Rated Dissipation	Metric	Inch
06	0.05W	0603	0201
10	0.063W	1005	0402
16	0.1W	1608	0603
20	0.125W	2012	0805
32	0.25W	3216	1206
35	0.33W	3225	1210

Rated Resistance

E-24 Series e.g. : 2R2=2.2 ohm 103=10k ohm	3-Digit	Resistor
E-96 Series e.g. : 10R2=10.2 ohm 1002=10k ohm	4-Digit	
JP		Jumper

* Packaging & Standard Qty. (Min.)

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

*Refer to Tape and Packaging information on pages 38 and 39.

NEW

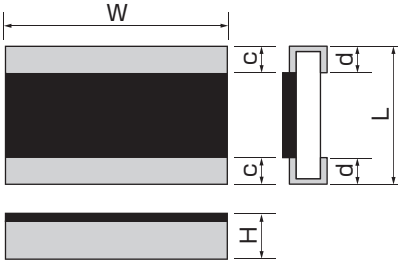
TWMC

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.
AEC-Q200 Qualified.

●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.
TWMC50	2550	1020	2.5±0.15	5.0±0.2	0.55±0.1	0.6±0.2	0.6±0.2	25mg

*Values for reference

●Rating

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Limiting Element Voltage V	Rated Resistance Range	Temperature Coefficient of Resistance		Tolerance on Rated Resistance	Category Temperature Range °C
					Code	10^{-6}/°C		
TWMC50	2550 (1020)	1.0	200	1Ω～1MΩ	—	±200	F (±1%) J (±5%)	−55～+155

Note1. Rated Voltage= $\sqrt{\text{(Rated Dissipantion) × (Rated Resistance)}}$. (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 criticalresistance 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

TWMC	50	—	1002	J	TE

Product Type
TWMC

Size

50	2500

Temperature Coefficient of Resistance

—	±200×10^{-6}/°C

Rated Resistance
e.g.:103 = 1004 = 100kΩ

Tolerance on Rated Resistance

F	±1%
J	±5%

* Packaging & Standard Qty. (Min.)

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

*Refer to Tape and Packaging information on pages 38 and 39.

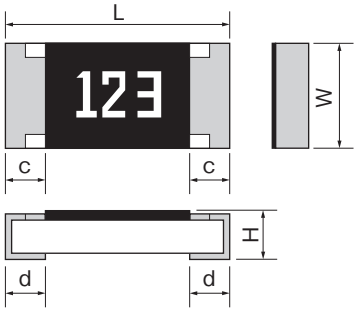
RMNW · RMAW

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Special electrode structure, High anti-sulfuration performance, New Line up of 2 type Anti-sulfuration Chip Resistors.
RMNW/Barrier type Barrier layer inside of electrode to prevent Sulfuration and Disconnection.
RMAW/Special electrode type High anti-sulfuration performance electrode inside
RMNW: qualified for Humid Sulfur Vapor Test ASTM B-809 60°C, 480h
RMAW: qualified for hydrogen sulfide test, H_2S: 3ppm, 40°C, 90%R.H., 1000h
AEC-Q200 qualified.

●Dimensions



Rated resistance value marking is on the over coating except RMNW10 & RMAW10.

Unit : mm

Style	Metric	Inch	Product	L	W	H	c	d	*Unit weight/pc.
RMNW06	0603	0201	KAMAYA	0.6±0.03	0.3±0.03	0.23±0.03	0.1±0.05	0.15±0.05	0.16mg
RMNW10 / RMAW10	1005	0402	WALSIN	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2±0.10	0.25±0.10	0.6mg
RMNW16 / RANW16	1608	0603	WALSIN	1.6±0.10	0.8 ±0.10	0.45±0.15	0.3±0.10	0.3 ±0.15	2mg
RMNW20 / RANW20	2012	0805	WALSIN	2.0±0.10	1.25±0.10	0.50±0.15	0.4±0.20	0.4 ±0.20	5mg
RMNW32 / RMAW32	3216	1206	WALSIN	3.1±0.10	1.6 ±0.10	0.6 ±0.15	0.5±0.20	0.45±0.20	9mg
RMAW35	3225	1210	WALSIN	3.1±0.10	2.6 ±0.10	0.55±0.10	0.5±0.20	0.5 ±0.20	16mg
★ RMNW50	5025	2010	WALSIN	5.0±0.2	2.5 ±0.2	0.55±0.10	0.6±0.25	0.65±0.25	25mg
★ RMNW63	6332	2512	WALSIN	6.4±0.2	3.2 ±0.2	0.6 ±0.10	0.9±0.25	0.65±0.25	40mg

*★ : Under Development

*Values for reference

●Ratings

●RMNW

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Combinations of Rated Resistance Range of Tolerance on Rated Resistance D(±0.5%)	F(±1%)	J(±5%)	Temperature Coefficient of Resistance Code	10^{-6}/°C	Limiting Element Voltage V	Category Temperature Range °C
RMNW10	1005 (0402)	0.1 (1.0A)	—	10.2~1MΩ		K	±100	50	−55~+155
			—	1.02MΩ~10MΩ		—	±200		
			—	1.0Ω~10Ω		—	+400~−200		
RMNW16	1608 (0603)	0.1 (1.0A)	10Ω~1MΩ	10.2~1MΩ		K	±100		
			—	1.02MΩ~10MΩ		—	±200		
			—	1.0Ω~10Ω		—	+400~−200		
RMNW20	2012 (0805)	0.125 (1.5A)						150	
RMNW32	3216 (1206)	0.25 (2.0A)	—	10.2~1MΩ		K	±100	200	
RMNW35	3225 (1210)	0.5 (3.0A)	—	1.02MΩ~10MΩ		—	±200		
★ RMNW50	5025 (2010)	0.5 (2.0A)	—	1.0Ω~10Ω		—	+400~−200		
★ RMNW63	6332 (2512)	1.0 (4.5A)						250	

*★ : Under Development

●RMAW

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Combinations of Rated Resistance Range of Tolerance on Rated Resistance D(±0.5%)	F(±1%)	J(±5%)	Temperature Coefficient of Resistance Code	10^{-6}/°C	Limiting Element Voltage V	Category Temperature Range °C
RMAW06	0603 (0201)	0.05 (1.0A)	—	51Ω ~ 1MΩ		K	±100	25	−55~+155
			—	1.02MΩ ~ 10MΩ		—	±200		
			—	10Ω ~ 49.9Ω					
			—	1.0Ω ~ 9.76Ω		—	+600~−200		
RMAW10	1005 (0402)	0.1 (1.0A)						50	
RMAW16	1608 (0603)	0.1 (1.0A)	—	10.2 ~ 1MΩ		K	±100	75	
RMAW20	2012 (0805)	0.125 (1.5A)	—	1.02MΩ ~ 10MΩ		—	±200	150	
RMAW32	3216 (1206)	0.25 (2.0A)	—	1.0Ω ~ 10Ω		—	+400~−200	200	

Note1. E24 series is available , E96 series is available for tolerance "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					
RMNW	20	K	103	F	TP

Product Type	
RMNW	Barrier Type
RMAW	Special Electrode 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		
—	Standard	Resistor
K	±100×10^{-6}/°C	Resistor
None	—	Jumper

Rated Resistance		
J(±5%): E24 Series e.g. : 2R2=2.2Ω 103=100kΩ	3-Digit	Resistor
F(±1%): E24 Series & E-96 Series e.g. : 10R2=10.2Ω 1002=10kΩ	4-Digit	Resistor
JP		Jumper

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

* Packaging & Standard Qty. (Min.)			
B	Bulk (Loose Package)	1,000pcs.	RMAW06
		10,000pcs.	RMNW10,RMAW10
		5,000pcs.	RMNW16,RMAW16 RMNW20,RMAW20 RMNW32,RMAW32
		4,000pcs.	RMNW35,RMNW50 RMNW63
PA	Press-Pocket Paper Tape(2mm pitch)	15,000pcs.	RMAW06
TH	Paper Tape(2mm pitch)	10,000pcs.	RMNW10,RMAW10
TP	Paper Tape	5,000pcs.	RMNW16,RMAW16 RMNW20,RMAW20 RMNW32,RMAW32 RMAW35
TE	Embossed Tape	4,000pcs.	RMNW50,RMNW63

*Refer to Tape and Packaging information on pages 38 and 39.

NEW

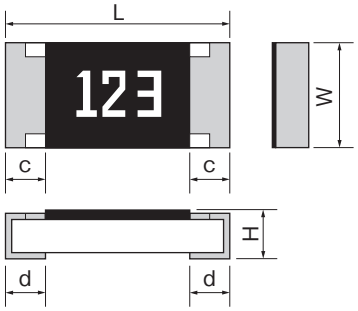
RMGW

Halogen Free | Antimony Free | Anti-Sulfuration

●Features

Special electrode structure, High anti-sulfuration perfomance, New Line up Anti-sulfuration Chip Resistors.
Barrier layer inside of electrode to prevent Sulfuration and Disconnection.
AEC-Q200 qualified

●Dimensions



Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating except RMGW10.
4-digit marking is available for F tolerance except RMGW16 & RMGW10.

Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RMGW10	1005	0402	1.0±0.05	0.5 ±0.05	0.35±0.05	0.2±0.1	0.25 $\pm^{+0.05}_{-0.10}$	0.6mg
RMGW16	1608	0603	1.6±0.1	0.8 $\pm^{+0.15}_{-0.05}$	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 $\pm_{0.15}$	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

*Values for reference

●Rating

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/°C	Tolerance on Rated Resistance	Limiting Element Voltage V	Isolation Voltage V	Category Temperature Range °C
RMGW10	1005 (0402)	0.063 (1.0A)	1Ω～9.76Ω	—	+500～−200	F(±1%) J(±5%)	50	100	−55～+155
			10Ω～ 1MΩ	K	±100				
			1.02MΩ～10MΩ	—	±200				
RMGW16	1608 (0603)	0.1 (1.0A)	1Ω～9.76Ω	—	+500～−200		50		
			10Ω～ 1MΩ	K	±100				
			1.02MΩ～10MΩ	—	±200				
RMGW20	2012 (0805)	0.125 (2.0A)	1Ω～9.76Ω	—	+500～−200		150	500	
			10Ω～ 1MΩ	K	±100				
			1.02MΩ～10MΩ	—	±200				
RMGW32	3216 (1206)	0.25 (2.0A)	1Ω～9.76Ω	—	+500～−200		200		
			10Ω～ 1MΩ	K	±100				
			1.02MΩ～10MΩ	—	±200				
RMGW35	3225 (1210)	0.33 (2.0A)	1Ω～9.76Ω	—	+500～−200		200		
			10Ω～ 1MΩ	K	±100				
			1.02MΩ～10MΩ	—	±200				

Note1. E24, E96 are available for "F"(1%).
Note2. Rated Voltage= $\sqrt{(\text{Rated Dissipantion}) \times (\text{Rated Resistance})}$. (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

RMGW	10	—	103	J	TH

Product Type: RMGW

Size

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

Temperature Coefficient of Resistance

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

Rated Resistance

E24 Series e.g. : 2R2 = 2.2Ω 103 = 10kΩ	3-Digit	Resistor
E96 Series e.g. : 10R2 = 10.2Ω 1002 = 10kΩ	4-Digit	
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 (2mm pitch)	10,000pcs.	RMGW10
TP	Paper Tape	5,000pcs.	RMGW16 RMGW20 RMGW32
TE	Embossed Tape	4,000pcs.	RMGW35

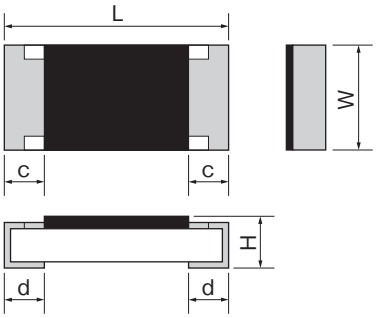
*Refer to Tape and Packaging information on pages 38 and 39.

FCR

●Features

Trimmable device and replaceable with various resistors.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●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°C W	Combinations of Rated Resistance Range and Temperature Coefficient of Resistance		Tolerance on Rated Resistance	Limiting Element Voltage V	Preferred Number Series for Resistors	Isolation Voltage V	Category Temperature Range °C
			Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/°C					
FCR1/16	1608 (0603)	0.063	10Ω～4.7kΩ	±200	L(±15%) −(0～−30%)	50	E24	100	−55～+125
FCR1/10	2012 (0805)	0.1	1Ω～9.1kΩ	+500～−200		150		500	
FCR1/8	3216 (1206)	0.125				200			
FCR1/4	3225 (1210)	0.25	10Ω～4.7kΩ	±200					
FCR1/2	5025 (2010)	0.5							
FCR1	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.
Note4. T.C.R.: ±100×10^{-6}/°C (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

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

Rated Resistance

E24 Series
e.g. : 471=470 ohm

Tolerance on Rated Resistance

—	$^{+0}_{-30}$%
L	±15%

* Packaging & Standard Qty. (Min.)

B	Bulk (Loose Package)	1,000pcs.	All Styles
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 38 and 39.

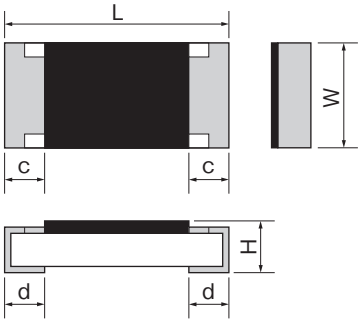
RHC

Halogen Free | Antimony Free

●Features

Suitable for compact instrumentation, infrared rays, sensors, etc.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●Dimensions



Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RHC16	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
RHC20	2012	0805	2.0±0.1	1.25 ±0.10	0.55±0.10	0.4±0.2	0.4±0.2	5mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Voltage V	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/°C	Preferred Number series for resistors	Isolation Voltage V	Category Temperature Range °C
RHC16	1608 (0603)	15	100MΩ～270MΩ	J(± 5%)	0～−2,000	E12	100	−55～+155
			100MΩ～ 4GΩ	K(±10%)				
			100MΩ～150GΩ	M(±20%) N(±30%) H(±50%)				
RHC20	2012 (0805)		100MΩ～ 1GΩ	J(± 5%) K(±10%)	±2,000			−55～+125
			100MΩ～ 10GΩ	M(±20%) N(±30%) H(±50%)				
			100MΩ～150GΩ		±4,000			

●Part Number Description

Example

Style: RHC | 20 | 75G0 | M | TP

Product Type

Size

Code	Metric	Inch
16	1608	0603
20	2012	0805

Rated Resistance

e.g.: 100M=100M ohm
1G00=1G ohm
10G0=10G ohm
100G=100G ohm

Tolerance on Rated Resistance

J	± 5%
K	±10%
M	±20%
N	±30%
H	±50%

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

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

*Refer to Tape and Packaging information on pages 38 and 39.

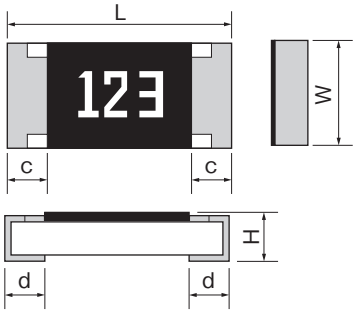
RVC

Halogen Free | Antimony Free

●Features

Higher Limiting Element Voltage compared with RMC series.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●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°C W	Limiting Element Voltage V	Combinations of Rated Resistance Range and Tolerance on Rated Resistance			Temperature Coefficient of Resistance		Isolation Voltage V	Category Temperature Range °C
				D(±0.5%)	F(±1%) , G(±2%)	J(±5%) , K(±10%)	Code	10^{-6}/°C		
RVC16	1608 (0603)	0.1	200	–	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	500	100kΩ～10MΩ	100Ω ～ 10MΩ	100Ω ～ 51MΩ	K	±100		
				–	47Ω ～ 97.6Ω		–	±200		
RVC50	5025 (2010)	0.5		–	470Ω ～ 20MΩ	470Ω ～ 51MΩ	K	±100		
				–	47Ω ～ 464Ω		–	±200		
RVC63	6332 (2512)	1.0	800	–	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 = √(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: 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}/°C

Rated Resistance

E24 Series e.g. : 475=4.7M ohm	3-Digit
E96 Series e.g. : 7154=7.15M ohm	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 Styles
TP	Paper Tape	5,000pcs.	RVC16 RVC20 RVC32
TE	Embossed Tape	4,000pcs.	RVC50 RVC63

*Refer to Tape and Packaging information on pages 38 and 39.

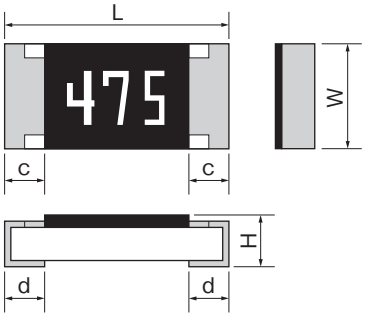
RZC

Halogen Free | Antimony Free

●Features

Suitable for the backlight inverter for large-screen LCD.
Higher Limiting Element Voltage than RVC series.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●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	0.5±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°C W	Limiting Element Voltage V	Anti-Rush Voltage Charactoristics V	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10⁻⁶/°C	Preferred Number Series for Resistors	Isolation Voltage V	Category Temperature Range °C
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

Temperature Coefficient of Resistance

—	Standard

Size

Code	Metric	Inch
50	5025	2010
63	6332	2512

Rated Resistance

e.g.:105=1.0M ohm
475=4.7M ohm
166=16M ohm

Tolerance on Rated Resistance

J	± 5%
K	±10%
M	±20%

* Packaging & Standard Qty. (Min.)

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

*Refer to Tape and Packaging information on pages 38 and 39.

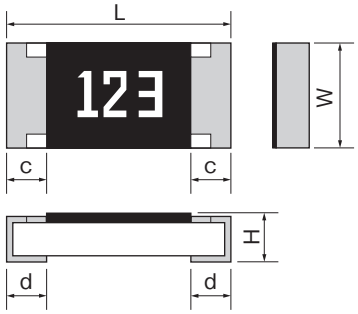
RPC

Halogen Free | Antimony Free

●Features

Higher Anti surge performance compared with RMC series.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●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.
NEW 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±0.15	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

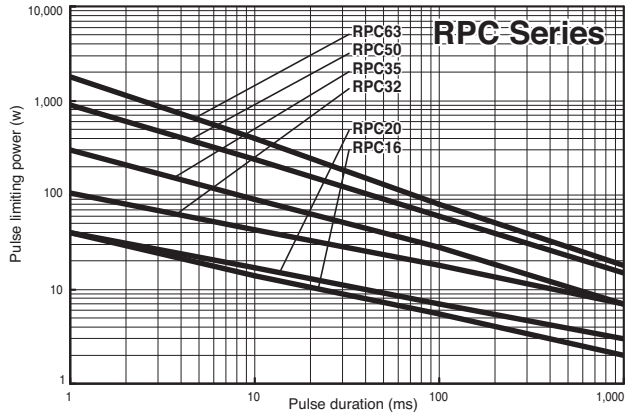
*Values for reference

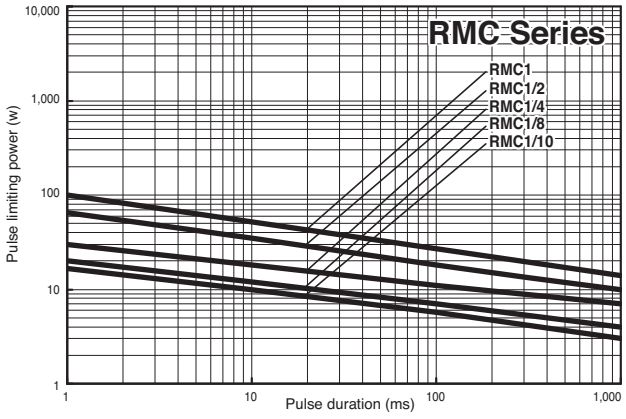
●Ratings

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

Size

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

Rated Resistance

E24 Series e.g. : 2R2=2.2 ohm 103=10k ohm	3-Digit

Tolerance on Rated Resistance

J	± 5%
K	±10%
M	±20%

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

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

*Refer to Tape and Packaging information on pages 38 and 39.

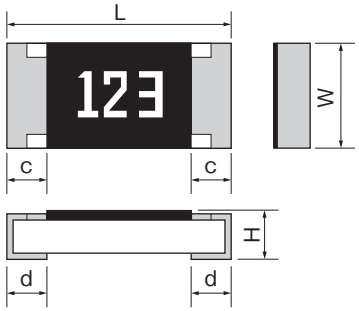
NEW
RBX

Anti-Sulfuration | Halogen Free | Antimony Free

●Features

Anti-Surge Chip resistor with Anti-Sulfuration
New lineup: Tolerance: +/-0.5% for Anti-Surge Chip resistor by Kamaya original laser trimming technology.
High Rated dissipation; RBX16 = 0.25W, 2.5 times higher than general use Chip Resistor; RMC1/16 (0.10W)

●Dimensions



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

Rated resisitance value is marked with 3-digit (E24) on the over coating except 4-digit (E96).

Unit : mm

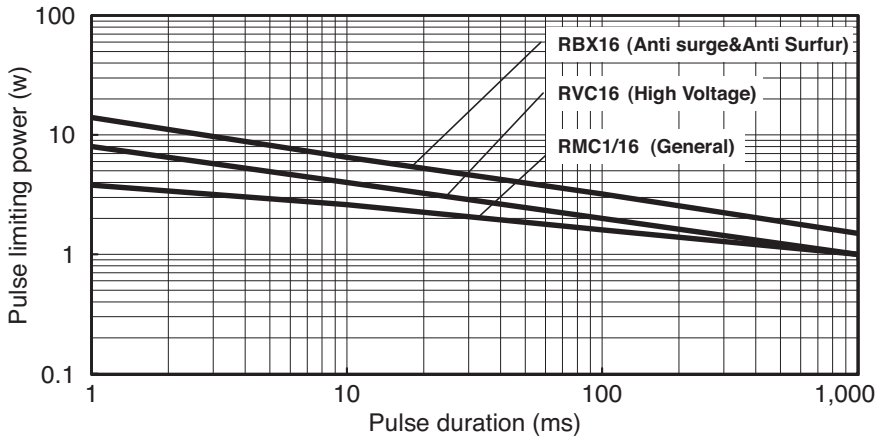
Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
RBX16	1608	0603	1.6±0.1	0.8± $^{+0.15}_{-0.05}$	0.45±0.10	0.3±0.1	0.3±0.1	2mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Limiting Element Voltage V	Rated Resistance Range	Temperature Coefficient of Resistance		Tolerance on Rated Resistance	Category Temperature Range °C
					Code	10^{-6}/°C		
RBX16	1608 (0603)	0.25	150	1Ω～9.76Ω	—	±200	D(±0.5%) F(±1%) J(±5%)	−55～+155
				10Ω～1MΩ	K	±100		

Note1. E24, E96 are available for "F" (1%), "D" (0.5%)
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: RBX | 16 | K | 103 | D | TP

Product type: RBX

Size		
Code	Metric	Inch
16	1608	0603

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

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 38 and 39.

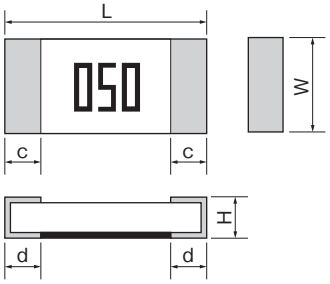
RCC

Halogen Free | Antimony Free | Pb Free

●Features

New lineup, 0201 & 1206 Size, Lower than 50mΩ.
Suitable for current sensing of small mobile devices.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●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 & RCC06 is no marking.

Unit : mm

Style	Metric	Inch	Rated Resistance	L	W	H	c	d	*Unit weight/pc.
RCC06	0603	0201	All Resistance	0.6±0.03	0.3 ±0.03	0.23 $^{+0.03}_{-0.10}$	0.15 $^{+0.05}_{-0.10}$	0.15 ±0.05	0.16mg
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°C W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance		Tolerance on Rated Resistance	Isolation Voltage V	Category Temperature Range °C
				Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/°C			
RCC06	0603(0201)	0.1	1.0 ～2.23	20mΩ ～100mΩ	0～+500	J (±5%)	50	–55～+125
RCC10	1005 (0402)	0.125	1.11～2.23	25mΩ ～ 50mΩ	0～+350	F (±1%) J (±5%)	100	
				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 = $\sqrt{\text{(Rated Dissipation)} \times \text{(Rated Resistance)}}$. (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
06	0603	0201
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 Styles
PA	Press-Pocket Paper Tape (2mm pitch)	15,000pcs.	RCC06
TH	Paper Tape (2mm pitch)	10,000pcs.	RCC10
TP	Paper Tape	5,000pcs.	RCC16 RCC20 RCC32

*Refer to Tape and Packaging information on pages 38 and 39.

●Precautions 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.

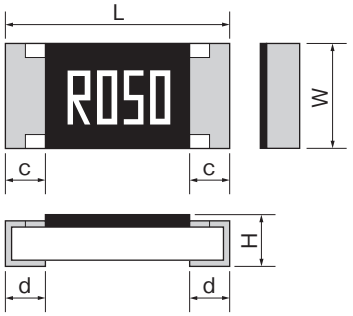
RLC

Halogen Free | Antimony Free

●Features

Most suitable for a detection of current in power source circuits, motor circuits, etc.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●Dimensions



Rated resistance is marked with 4-digit on the over coating. (RLC20~RLC63)
RLC10 : only No marking is available.
Please contact KAMAYA 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		0.5 ±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

●Rating : TCR Mark = — & K

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Current Range A	Rated Resistance Range	Combinations of Rated Resistance Range, Temperature Coefficient of Resistance and Tolerance on Rated Resistance			Isolation Voltage V	Category Temperature Range °C
					Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/°C		
RLC10	1005 (0402)	0.125	0.11～1.11	100mΩ ～ 10Ω	100mΩ～430mΩ	F, J	0～+300	100	−55～+125
					470mΩ～3.3Ω	F, G, J	0～+200		
					3.6Ω～10Ω	F, J	±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		±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		
RLC32	3216 (1206)	0.5	0.18～3.16		470mΩ～3.3Ω		±100		
					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		
RLC63	6332 (2512)	1.0	0.55～4.47		470mΩ～3.3Ω		±100		

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)
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

●Rating : TCR Mark = L NEW

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Current Range A	Combinations of Rated Resistance Range, Temperature Coefficient of Resistance			Tolerance on Rated Resistance	Isolation Voltage V	Category Temperature Range °C
				Mark	Rated Resistance Range	Temperature Coefficient of Resistance 10^{-6}/°C			
RLC10	1005 (0402)	0.063	0.26～ 1.12	L	510mΩ～910mΩ	±300	F(±1%) J(±5%)	100V	−55～+125
					100mΩ～500mΩ	±800			
					50mΩ～91mΩ	±1500			
RLC16	1608 (0603)	0.1	0.33～ 3.16		510mΩ～910mΩ	±300			
					100mΩ～500mΩ	±800			
					39mΩ～91mΩ	±1200			
					10mΩ～36mΩ	±2000			
RLC20	2012 (0805)	0.25	0.52～ 5.0					500V	
RLC32	3216 (1206)	0.5	0.74～ 7.07		510mΩ～910mΩ	±200			
					390mΩ～500mΩ	±300			
					100mΩ～360mΩ	±600			
RLC35	3225 (1210)	0.66	0.85～ 8.12		50mΩ～91mΩ	±1000			
					20mΩ～47mΩ	±1200			
RLC50	5025 (2010)	0.75	0.90～ 8.66		10mΩ～18mΩ	±1500			
RLC63	6332 (2512)	1.0	1.04～10						

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
10mΩ	R010
11mΩ	R011
12mΩ	R012
13mΩ	R013
15mΩ	R015
16mΩ	R016
18mΩ	R018
20mΩ	R020
22mΩ	R022
24mΩ	R024

Resistance	Code
25mΩ	R025
27mΩ	R027
30mΩ	R030
33mΩ	R033
36mΩ	R036
39mΩ	R039
40mΩ	R040
43mΩ	R043
47mΩ	R047
50mΩ	R050

Resistance	Code
51mΩ	R051
56mΩ	R056
60mΩ	R060
62mΩ	R062
65mΩ	R065
68mΩ	R068
70mΩ	R070
75mΩ	R075
80mΩ	R080
82mΩ	R082

Resistance	Code
90mΩ	R090
91mΩ	R091
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
400mΩ	R400
430mΩ	R430

Resistance	Code
470mΩ	R470
500mΩ	R500
510mΩ	R510
560mΩ	R560
600mΩ	R600
620mΩ	R620
650mΩ	R650
680mΩ	R680
700mΩ	R700
750mΩ	R750

Resistance	Code
800mΩ	R800
820mΩ	R820
900mΩ	R900
910mΩ	R910
1.0Ω	1R00
1.1Ω	1R10
1.2Ω	1R20
1.3Ω	1R30
1.5Ω	1R50
1.6Ω	1R60

Resistance	Code
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
4.3Ω	4R30

Resistance	Code
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 for further information.

●Part Number Description

Example

Style: RLC | 32 — Product Type | Size

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

K — Temperature Coefficient of Resistance

K	±100×10^{-6}°C
—	0～+200×10^{-6}°C
	0～+250×10^{-6}°C
	0～+300×10^{-6}°C
L	±200×10^{-6}°C
	±300×10^{-6}°C
	±600×10^{-6}°C
	±800×10^{-6}°C

R470 — Rated Resistance

e.g.: R050=50m ohm
R100=100m ohm
1R00=1 ohm
100=10 ohm

F — Tolerance on Rated Resistance

F	±1%
G	±2%
J	±5%

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

B	Bulk (Loose Package)	1,000pcs.	All Styles
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 38 and 39.

●Precaution

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

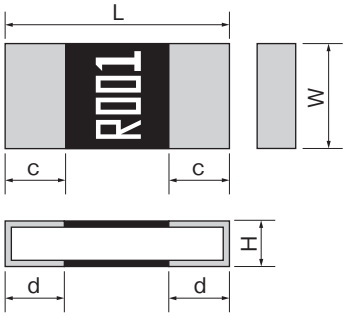
RLP,MLP,WLP

Halogen Free | Antimony Free | Pb Free

●Features

New lineup, 1mΩ to 5mΩ,10mΩ,15mΩ.
Suitable for current sensing of battery pack.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●Dimensions



Resistance value of RLP series are marked like below.
The resistance value of RLP63 & MLP63 are marked with 4 characters on the overcoating.
The resistance value of RLP20 & RLP32 are marked with "2 numbers" & "_" on the overcoating.
Please contact KAMAYA for marking of RLP16.

Unit : mm

Style	Metric	Inch	Product	Rated Resistance	L	W	H	c	d	*Unit weight/pc.
RLP16	1608	0603	KAMAYA	5mΩ	1.6±0.1	0.8±0.1	0.35±0.10	0.2±0.1	0.6 ±0.1	2mg
				10mΩ			0.3 ±0.10		0.3 ±0.1	
RLP20	2012	0805	KAMAYA	NEW 4mΩ	2.0±0.15	1.25±0.15	0.35±0.10	0.3±0.1	0.7 ±0.20	3mg
				5mΩ				0.3±0.10	0.6 ±0.20	
				NEW 6mΩ					0.47±0.20	
				NEW 8mΩ			0.22±0.10		0.6 ±0.20	
				NEW 9mΩ					0.52±0.20	
				10mΩ				0.3±0.1	0.47±0.20	
NEW MLP20				10mΩ						
RLP32	3216	1206	KAMAYA	1mΩ	3.2±0.15	1.6±0.15	0.32±0.15	1.1 ±0.25		12mg
				2mΩ				0.5 ±0.25		11mg
				3mΩ				0.7±0.25	1.3±0.25	11mg
				4mΩ			0.35±0.10	1.1 ±0.25		12mg
				5mΩ				1.0 ±0.25		11mg
				6mΩ				0.85±0.25		11mg
				7mΩ				0.70±0.25		11mg
				8mΩ				0.6 ±0.25		10mg
				9mΩ			0.3 ±0.10	0.75±0.25		9mg
				10mΩ			0.28±0.10	0.5 ±0.25		9mg
				12mΩ			0.22±0.10	0.65±0.25		8mg
				13mΩ						7mg
				15mΩ				0.5 ±0.25		6mg
RLP63	6332	2512	KAMAYA	1mΩ	6.3±0.25	3.2±0.25	0.38±0.15	2.2 ±0.25		50mg
				2mΩ		3.1±0.25		1.1 ±0.25		42mg
				3mΩ			0.45±0.15	2.2 ±0.25		57mg
				4mΩ			0.35±0.15			43mg
				5mΩ			0.34±0.15	1.95±0.25		43mg
				6mΩ				1.75±0.25		41mg
				7mΩ			0.35±0.15	1.4 ±0.25		42mg
				8mΩ				1.1 ±0.25		41mg
				9mΩ				0.8 ±0.25		40mg
				10mΩ			0.23±0.15	1.75±0.25		30mg
				12mΩ				1.4 ±0.25		26mg
				15mΩ				0.95±0.25		26mg
MLP63			KAMAYA	NEW 0.5mΩ			0.58±0.15	2.20±0.25	2.20±0.25	90mg
				NEW 1.5mΩ			0.38±0.15	1.50±0.25	1.50±0.25	47mg
				2mΩ			0.58±0.15	2.2 ±0.25		77mg
				NEW 2.5mΩ			0.45±0.15	2.40±0.25	2.40±0.25	63mg
				3mΩ			0.45±0.15	2.2 ±0.25		63mg
				4mΩ			0.34±0.15	2.2 ±0.25		48mg
				5mΩ			0.51±0.15	1.1 ±0.25		64mg
				6mΩ			0.5 ±0.15	1.1 ±0.25		55mg
				7mΩ				0.6 ±0.25		55mg
				8mΩ			0.35±0.15	1.1 ±0.25		43mg
				9mΩ				0.8 ±0.25		40mg
				10mΩ			0.35±0.15	0.5 ±0.25		41mg
WLP63			WALSIN	★ 15mΩ	6.2±0.2	3.2±0.20	0.6 ±0.2	0.8 ±0.2		62.5mg
				★ 20mΩ						
				NEW 25mΩ						

*★ : Under Development

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Current Range A	Combination of Rated Resistance Range and Temperature Coefficient of Resistance			Tolerance on Rated Resistance	Isolation Voltage V	Category Temperature Range °C
				Rated Resistance Range	Temperature Coefficient of Resistance				
					Code	10^{-6}/°C			
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	11.1, 10.0, 9.13, 7.9, 7.4, 7.0	4mΩ, 5mΩ, 6mΩ, 8mΩ, 9mΩ, 10mΩ	N	±70			
					K	±100			
MLP20		1.0	10.0	10mΩ	N	±70			
					K	±100			
RLP32	3216 (1206)	1	31.6	1mΩ	K	±100			
					—	±150			
			22.3, 18.2, 15.8, 14.1, 12.9, 11.9, 11.1, 10.5, 10, 9.1, 8.7, 8.1	2mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ, 12mΩ, 13mΩ, 15mΩ	N	±70			
					K	±100			
RLP63	6332 (2512)	2	44.7	1mΩ	N	±70			
					—	±150			
		1	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			
MLP63		2	63.2, 36.5, 31.6, 28.2, 25.8, 22.3, 20.0, 18.2, 16.9, 15.8, 14.9 14.1	0.5mΩ	K	±100	J(±5%)		
				1.5mΩ, 2mΩ, 2.5mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ, 10mΩ	N	±70	F(±1%) J(±5%)		
					K	±100			
WLP63			11.54, 10.0, 8.94	15mΩ, 20mΩ, 25mΩ	N	±70	F(±1%) G(±2%) J(±5%)		

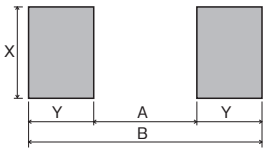
Note1. Rated Current = $\sqrt{\text{(Rated Dissipation)/(Rated Resistance)}}$
Note2. Rated Voltage = $\sqrt{\text{(Rated Dissipation)} \times \text{(Rated Resistance)}}$. (d.c. or a.c. r.m.s. Voltage)
Note3. Please contact Kamaya Sales Dept. for any other resistance values.

RLP, MLP, WLP

●Rated Resistance

Style	Resistance	Marking
RLP16	5m Ω	No Marking
	10m Ω	
RLP20	4m Ω	04
	5m Ω	05
	6m Ω	06
	8m Ω	08
	9m Ω	09
	10m Ω	10
MLP20	10m Ω	10
RLP32	1m Ω	01
	2m Ω	02
	3m Ω	03
	4m Ω	04
	5m Ω	05
	6m Ω	06
	7m Ω	07
	8m Ω	08
	9m Ω	09
	10m Ω	10
	12m Ω	12
	13m Ω	13
	15m Ω	15
RLP63	1m Ω	R001
	2m Ω	R002
	3m Ω	R003
	4m Ω	R004
	5m Ω	R005
	6m Ω	R006
	7m Ω	R007
	8m Ω	R008
	9m Ω	R009
	10m Ω	R010
	12m Ω	R012
	15m Ω	R015
MLP63	0.5m Ω	0L50
	1.5m Ω	1L50
	2m Ω	R002
	2.5m Ω	2L50
	3m Ω	R003
	4m Ω	R004
	5m Ω	R005
	6m Ω	R006
	7m Ω	R007
	8m Ω	R008
	9m Ω	R009
	10m Ω	R010
WLP63	15m Ω	R015
	20m Ω	R020
	25m Ω	R025

●Recommended land Pattern



Unit : mm

Style	Metric	Inch	Rated Resistance	A	B	X	Y
RLP16	1608	0603	5m Ω	0.6	2.2	0.8	0.8
			10m Ω	1.0			0.6
RLP20	2012	0805	4m Ω	0.8	2.7	1.35	0.95
			5m Ω				
			6m Ω				
			8m Ω				
			9m Ω				
			10m Ω				
MLP20			10m Ω				
RLP32	3216	1206	1m Ω	1.0	3.9	1.7	1.45
			2m Ω	2.1			0.9
			3m Ω	0.8			1.55
			4m Ω	1.0			1.45
			5m Ω	1.4			1.25
			6m Ω				
			7m Ω	2.1			0.9
			8m Ω				
			9m Ω				
			10m Ω				
			12m Ω				
			13m Ω				
			15m Ω				
RLP63	6332	2512	1m Ω	2.0	7.6	3.5	2.8
			2m Ω	1.8			2.9
			3m Ω				
			4m Ω				
			5m Ω	2.4			2.6
			6m Ω	4.0			1.8
			7m Ω				
			8m Ω				
			9m Ω				
			10m Ω				
			12m Ω				
			15m Ω				
MLP63			0.5m Ω	1.8			2.9
			1.5m Ω	4.0			1.8
			2m Ω	1.8			2.9
			2.5m Ω				
			3m Ω				
			4m Ω				
			5m Ω	4.0			1.8
			6m Ω				
			7m Ω				
			8m Ω				
			9m Ω				
			10m Ω				
WLP63			15m Ω	4.4	7.6	3.7	1.6
			20m Ω				
			25m Ω				

*Values for reference

●Part Number Description

Example

Style: RLP | 63 | K | R005 | F | TE

Product Type

Product Type
RLP
MLP

Size

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

Temperature Coefficient of Resistance

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

Rated Resistance

e.g. : R001=1mΩ
R010=10mΩ
0L50=0.5mΩ

Tolerance on Rated Resistance

F	±1%
J	±5%

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

TP	Paper Tape	5,000pcs.	RLP16 RLP20 RLP32 MLP20
TE	Embossed Tape	4,000pcs.	RLP63 MLP63

*Refer to Tape and Packaging information on pages 38 and 39.

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

Product Type

Size

Code	Metric	Inch
63	6332	2512

Code | Rated Dissipation

Code	Rated Dissipation
3D	2W

Code | Temperature Coefficient of Resistance

Code	Temperature Coefficient of Resistance
N	±70×10^{-6}/°C

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 38 and 39.

●Precaution

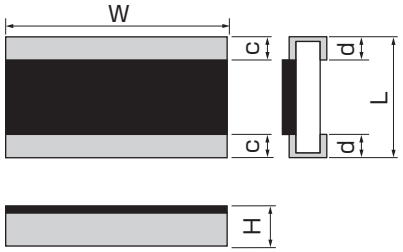
Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.

NEW
TWLC

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.
AEC-Q200 Qualified.

●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.
TWLC50	2550	1020	2.5±0.15	5.0±0.2	0.6±0.1	0.6±0.2	0.6±0.2	26mg

*Values for reference

●Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Current Range A	Rated Resistance Range	Temperature Coefficient of Resistance Code	Temperature Coefficient of Resistance 10^{-6}/°C	Tolerance on Rated Resistance	Category Temperature Range °C
TWLC50	2550 (1020)	1	1.04～3.16	100mΩ～180mΩ	—	±350	F(±1%) J(±5%)	−55～+155
				200mΩ～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
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
50	2550	1020

Temperature Coefficient of Resistance	
—	±200×10^{-6}/°C
	±350×10^{-6}/°C

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.
TE	Embossed Tape	4,000pcs.

*Refer to Tape and Packaging information on pages 38 and 39.

★*Under Development*

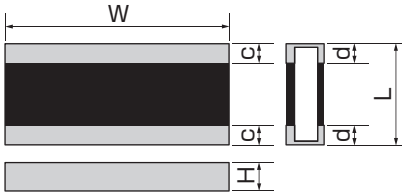
TWP

Halogen Free | Antimony Free

●Features

Wide termination type Metal plate chip resistor.
Higher rated dissipation than standard termination chip resistor.

●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.
TWP63	3263	1225	3.2±0.25	6.3±0.5	0.2±0.15	0.5 ±0.25	0.5 ±0.25	23mg
TWP110	50110	2043	5.0±0.25	11.0±1.0	0.2±0.15	0.55±0.25	0.55±0.25	56mg

*Values for reference

●Rating

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Resistance Range	Temperature Coefficient of Resistance		Tolerance on Rated Resistance	RatedCurrent Range A	Limiting Element Voltage V	Category Temperature Range °C
				Code	10^{-6}/°C				
TWP63	3263 (1225)	3.0	5mΩ	K	±100	F(±1%) J(±5%)	24.4	100	−55～+155
TWP110	50110 (2043)	6.0					34.6		

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)

●Part Number Description

Example

Style

TWP	63	K	R005	F	TE

Product Type
TWP

Temperature Coefficient of Resistance	
K	±100×10^{-6}/°C

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

Size		
Code	Metric	Inch
63	3263	1225
110	50110	2043

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

* Packaging & Standard Qty. (Min.)			
TE	Embossed Tape	4,000pcs.	TWP63

*Please contact sales department for bulk goods and the taping of TWP110.
*Refer to Tape and Packaging information on pages 38 and 39.

NEW

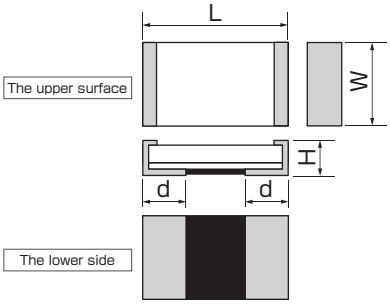
DLP

Halogen Free | Antimony Free | Pb Free

●Features

Metal foil type Low ohm chip resistor.
TCR : ±100×10^{-6}/°C
Rated dissipation 2012mm: 0.5W 3216mm: 1W

●Dimensions



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

Unit : mm

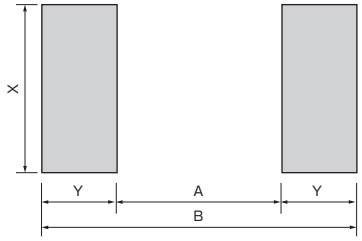
Style	Metric	Inch	L	W	H	d	*Unit weight/pc.
DLP20	2012	0805	2.1±0.2	1.35 ±0.2	0.65±0.20	0.5 ±0.2	23mg
DLP32	3216	1206	3.3±0.2	1.7 ±0.2	0.65±0.20	0.68±0.30	56mg

*Values for reference

●Rating

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Resistance Range	Temperature Coefficient of Resistance		Tolerance on Rated Resistance	Category Temperature Range °C
				Code	10^{-6}/°C		
DLP20	2012 (0805)	0.5	15mΩ～50mΩ	K	±100	F(±1%)	−55～+155
DLP32	3216 (1206)	1.0	15mΩ～40mΩ				

●Recommended land Pattern



Unit : mm

Style	Metric	Inch	A	B	X	Y
DLP20	2012	0805	0.8	3.6	1.44	1.4
DLP32	3216	1206	1.2	4.8	1.84	1.8

●Part Number Description

Example

Style: DLP | 20 | K | R020 | F | TE

Product Type: DLP

Temperature Coefficient of Resistance: K = ±100×10^{-6}/°C

Tolerance on Rated Resistance: F = ±1%

Size:

Code	Metric	Inch
20	2012	0805
32	3216	1206

Rated Resistance: e.g. : R020 = 20mΩ | 4-Digit

* Packaging & Standard Qty. (Min.):

TP	Paper Tape	5,000pcs.	DLP20
TE	Embossed Tape	5,000pcs.	DLP32

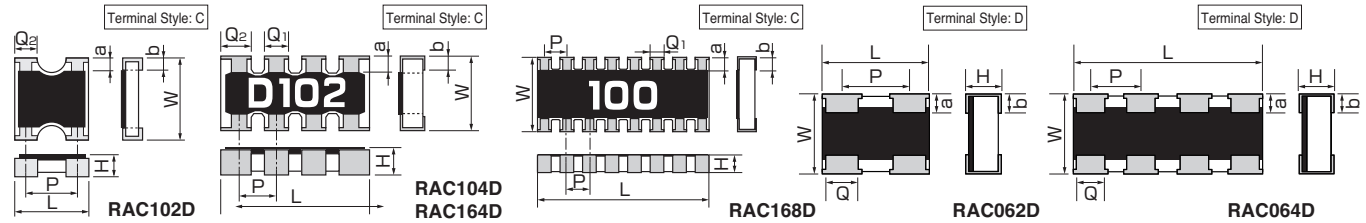
*Refer to Tape and Packaging information on pages 38 and 39.

RAC

Halogen Free | Antimony Free

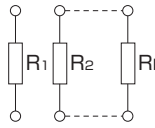
●Features

High-density SMD packaging contributes higher productivity and reduces assembly costs.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
Walsin Technology Corporation OEM products are also available.



Dimensions of Terminal Style : E, please contact us.

Circuits



$R_1=R_2=\cdots=R_n$

• Please contact KAMAYA for different resistance values.

Note. Please contact KAMAYA for the detail of marking on the over coating.

Unit : mm

Style	Terminal Style	Product	L	W	H	Q_1	*Q_2	a	b	*P	*Unit weight/pc.
RAC062D	★ D	KAMAYA	0.8±0.1	0.6±0.1	0.35±0.10	–	0.3 ±0.1	0.15±0.1	0.15±0.1	0.5	0.56mg
	E	KAMAYA	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
RAC064D	★ D	KAMAYA	1.4±0.1	0.6±0.1	0.35±0.10	–	0.25±0.1	0.15±0.1	0.2 ±0.1	0.4	0.98mg
	E	KAMAYA	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
RAC102DC	C	WALSIN	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
RAC104DC	C	WALSIN	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
RAC164DC	C	WALSIN	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
RAC168DC	C	WALSIN	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

*★ : Under Development

*Values for reference

●Ratings

Style	Rated Dissipation at 70°C W/Element	Rated Dissipation at 70°C W/pc.	Rated Current of Jumper A	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10^{-6}/°C	Limiting Element Voltage V	Preferred Number Series for Resistors	Isolation Voltage V	Category Temperature Range °C
RAC062D	0.031	0.063	1.0	100～100kΩ	F(±1%)	±200	12.5	E24	50	−55～+125
				10～27Ω	J (±5%)	±350				
				30～1MΩ		±200				
RAC064D		0.125		100～100kΩ	F(±1%)	±200				
				10～27Ω	J (±5%)	±350				
				30～1MΩ		±200				
RAC102D	0.063	0.125		3～9.1Ω	J(±5%)	±400	25			
				10～1MΩ		±300				
RAC104D		0.25		10～1MΩ		±200	50		100	
RAC164D	0.1	0.25		10～1MΩ	F(±1%)	±100				
				1～9.1Ω	J(±5%)	+300～+500				
				10～1MΩ		±200				
				1.1M～10MΩ		+300～+500				
RAC168D	0.063	0.25		10～1MΩ		±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.

●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
D		Flat Type
E		Flat Type(Low-profile)

Rated Resistance

E24 Series e.g.:103=10k ohm	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 Styles
TH	Paper Tape (2 mm pitch)	10,000pcs.	RAC062D RAC064D RAC102D RAC104D
TP	Paper Tape	5,000pcs.	RAC164D RAC168D

*Refer to Tape and Packaging information on pages 38 and 39.

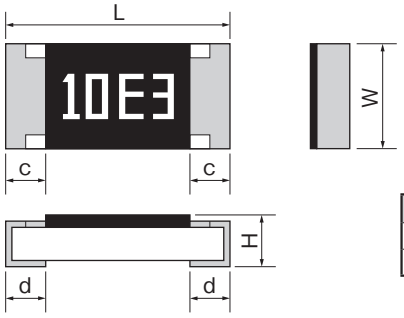
LTC

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.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●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 : 1.5k ohm

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

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

●Part Number Description

Example

Style: LTC | 1/8 — 30 — 102 — J — B

Product Type

Rated Dissipation & Size

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

Temperature Coefficient of Resistance
Refer to Ratings Table on next page
e.g.: 30=3,000×10-6/°C

Rated Resistance
E24 Series
e.g.:102=1k ohm

Tolerance on Rated Resistance

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 38 and 39.

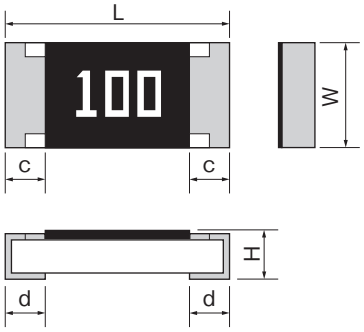
FRC

Halogen Free | Antimony Free

●Features

Suitable for battery circuit and power supply circuit.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●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		Maximum open-circuit voltage	Category Temperature Range ℃
							Applied Power	Fusing Time		
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 — Product Type

C	2A	100	J	TP

Fusing Characteristics: C = standard

Size:

Code	Metric	Inch
16	0608	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

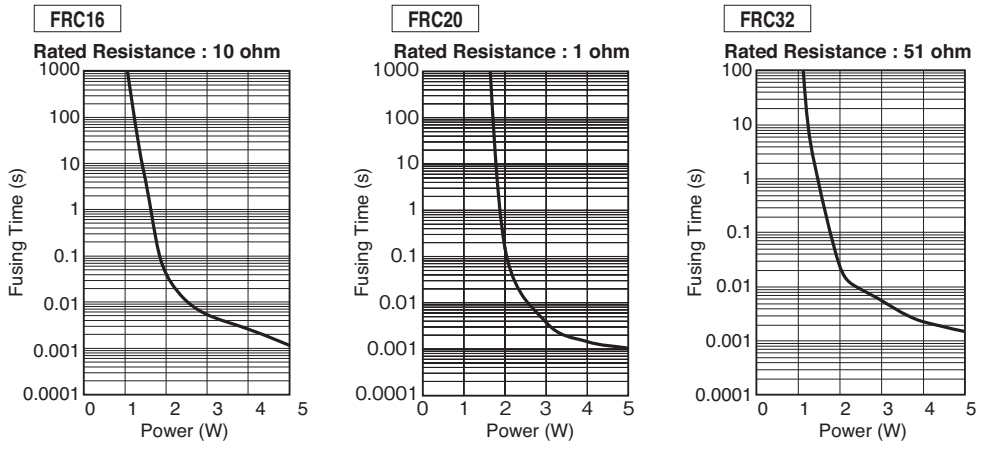
Tolerance on Rated Resistance: J = ±5%

* Packaging & Standard Qty. (Min.)

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

*Refer to Tape and Packaging information on pages 38 and 39.

●Example of Typical Fusing Characteristics



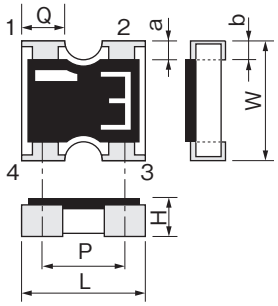
RAC101A

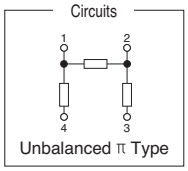
Halogen Free | Antimony Free

●Features

Suitable for use at DC and up to UHF band frequencies.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.
AEC-Q200 qualified.

●Dimensions





Unit : mm

Style	Terminal Style	Product	L	W	H	Q	a	b	P	*Unit weight/pc.
RAC101A	C	WALSIN	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		Tolerance on Attenuation Factor dB	Voltage Standing Wave Ratio	Frequency Range	Rated Input Power mW/package	Category Temperature Range °C
		symbol	dB					
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					

Note. The following information is available.
1. 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 ohm

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)	5,000pcs.

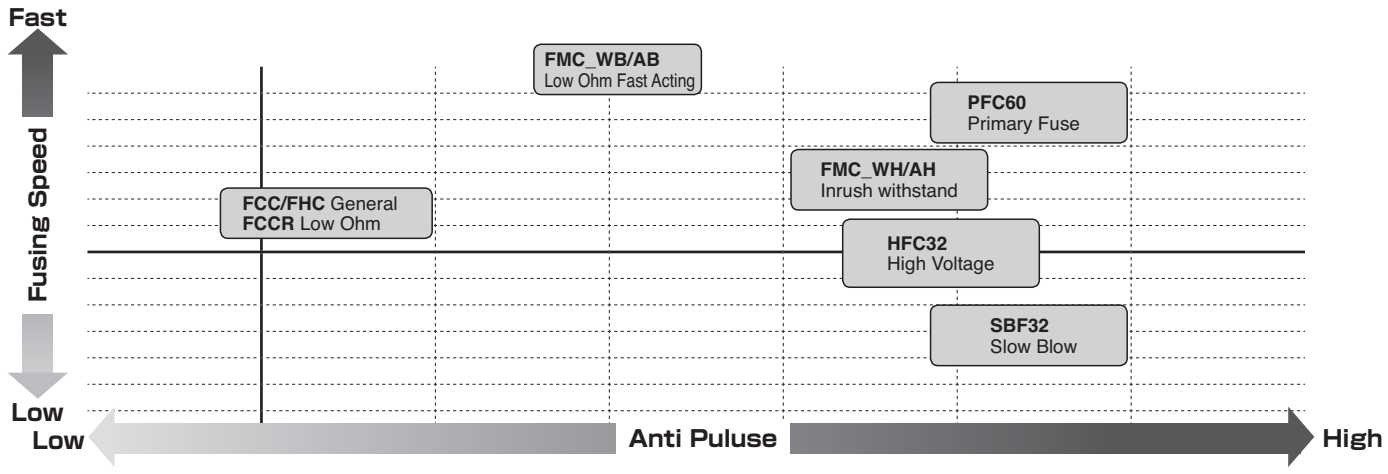
*Refer to Tape and Packaging information on pages 38 and 39.

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.
New Fuse line up available for over 100V for power supply applications.

[Major Application]
・PC related devices (PC, HDD, Printer etc.)
・Small mobile devices (Smartphone, Battery charger etc.)
・Digital camera, Video camera
・Game machine
・LCD display, Module
・Battery pack

Category	Series		Type	Electrical Characteristics		Size Lineup 1005(0402)	1608(0603)	2012(0805)	3216(1206)	6126(2410)	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.	● 30Vd.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 1608mm 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 AH	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
Primary side fuse	PFC	AP	General-purpose	Ir×200%	5s Max.	–	–	–	–	● 125Va.c./d.c. (100Va.c.)	・High Rated voltage 125V a.c. /d.c. available. ・Excellent fusing characteristics by special structure.



Support of Chip Fuse Selection

We would like to support the customer to find the appropriate Kamaya chip fuse it the following conditions of usage are provided.
Please 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.
・Wave form (In-rush Current) : It rapidly flows on circuit when power supply is turned on.
・We can provide Application Guide for Fuse selection.

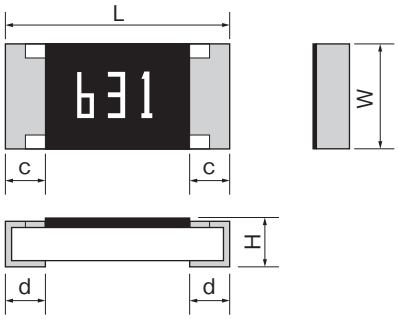
FCC,FHC

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.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail. 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, AA

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

●Ratings/Option Code : LB

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
FCC10	1005	0402	1.0±0.05	0.5±0.05	0.35 Max.	0.2±0.1	0.25±0.10	0.6mg

*Values for reference

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

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Time/Current Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
1005	0402	FCC10	151	0.15	2,700	O	32Vd.c. 35A	Rated Current×250% Opening Time 5s max.	−55～+125
			201	0.2	1,000	Z	30Vd.c. 35A		
			251	0.25	750	C			
			321	0.315	620	D			
			401	0.4	340	E			
			501	0.5	290	F			
			631	0.63	210	I			
			801	0.8	150	K			
			102	1.0	120	L			
			132	1.25	90	M			
		FHC10	162	1.6	55	N	24Vd.c. 35A		
			202	2.0	40	S			
			252	2.5	36	T			
			322	3.15	26	U			
1608	0603	FCC16	151	0.15	4,000	OD	50Vd.c. 35A		
			201	0.2	1,800	ZD	36Vd.c. 35A		
			251	0.25	1,000	CD			
			321	0.315	750	DD			
			401	0.4	330	ED			
			501	0.5	280	FD			
			631	0.63	200	ID			
			801	0.8	130	KD			
			102	1.0	110	LD			
			132	1.25	85	MD			
			162	1.6	70	ND			
			202	2.0	55	SD			
			252	2.5	45	TD	32Vd.c. 35A		
		FHC16	322	3.15	26	UD	24Vd.c. 35A		
			402	4.0	19	XD			
2012	0805	FCC20	401	0.4	330	401	50Vd.c. 50A		
			501	0.5	270	501			
			631	0.63	190	631			
			801	0.8	130	801			
			102	1.0	100	102			
			132	1.25	80	132			
			162	1.6	65	162			
			202	2.0	55	202			
			252	2.5	40	252			
		FHC20	322	3.15	26	UD	32Vd.c. 50A		
			402	4.0	19	XD			
			502	5.0	14	YD	24Vd.c. 50A		
3216	1206	FCC32	201	0.2	1,800	201	64Vd.c. 50A		
			251	0.25	1,000	251			
			321	0.315	750	321			
			401	0.4	350	401			
			501	0.5	295	501			
			631	0.63	200	631			
			801	0.8	140	801			
			102	1.0	110	102			
			132	1.25	85	132			
			152	1.5	78	152			
			162	1.6	75	162			
			202	2.0	65	202			
			252	2.5	45	252			
		FHC32	322	3.15	26	UD	32Vd.c. 50A		
			402	4.0	19	XD			
			502	5.0	14	YD			

FCC, FHC

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

Size		Style	Rated Current		Internal Resistance	Mark	Interrupting Rating	Time/Current Characteristics	Working Temperature Range
Metric	Inch		Code	A	m ohm max.				°C
1005	0402	FCC10	201	0.2	2,400	Z	30Vd.c. 35A	Rated Current×200% Opening Time 5s max.	–55～+125
			251	0.25	1,000	C			
			321	0.315	750	D			
			401	0.4	620	E			
			501	0.5	340	F			
			631	0.63	290	I			
			751	0.75	220	A			
			801	0.8	210	K			
			102	1.0	150	L			
			132	1.25	120	M			
			152	1.5	100	H			
			162	1.6	90	N			
		FHC10	202	2.0	55	S	24Vd.c. 35A		
			252	2.5	40	T			
1608	0603	FCC16	201	0.2	3,200	ZB	36Vd.c. 35A		
			251	0.25	1,800	CB			
			321	0.315	1,000	DB			
			401	0.4	750	EB			
			501	0.5	330	FB			
			631	0.63	280	IB			
			751	0.75	210	AB			
			801	0.8	200	KB			
			102	1.0	130	LB			
			132	1.25	110	MB			
			152	1.5	95	HB			
			162	1.6	85	NB			
			202	2.0	70	SB			
		FHC16	252	2.5	40	TB	32Vd.c. 35A		
2012	0805	FCC20	501	0.5	330	FB	50Vd.c. 50A		
			631	0.63	270	IB			
			801	0.8	190	KB			
			102	1.0	130	LB			
			132	1.25	100	MB			
			162	1.6	80	NB			
			202	2.0	65	SB			
		FHC20	252	2.5	40	TB	32Vd.c. 50A		

●Rating/Option Code : LB (Fast-Acting type)

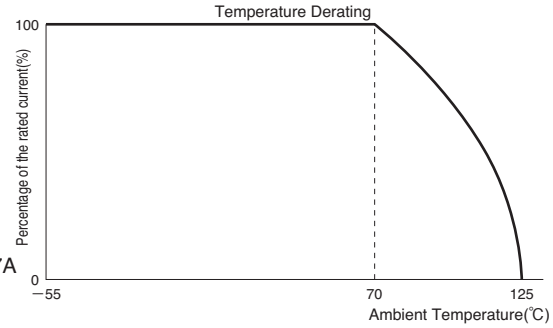
Size		Style	Rated Current		Internal Resistance	Mark	Interrupting Rating	Time/Current Characteristics	Working Temperature Range
Metric	Inch		Code	A	m ohm max.				°C
1005	0402	FCC10	321	0.315	750	3	30Vd.c. 35A	Rated Current×200% Opening Time 5s max.	–55～+125

●Rating/Option Code : AA (Fast-Acting type)

Size		Style	Rated Current		Internal Resistance	Mark	Interrupting Rating	Time/Current Characteristics	Working Temperature Range
Metric	Inch		Code	A	m ohm max.				°C
2012	0805	FCC20	501	0.5	270	501	50Vd.c 50A	Rated Current×200% Opening Time 120s max.	–55～+125
			631	0.63	190	631			
			801	0.8	130	801			
			102	1.0	100	102			
			132	1.25	80	132			
			162	1.6	65	162			
			202	2.0	55	202			
			252	2.5	40	252			

●Recommended Derating for Rated Current

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



Ex.) 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	202	AD	TP

Product Type
FCC
FHC

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

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

Option Code	
Code	Clearing Time
AD	Within 5s under 250% of Rated Current
AB LB	Within 5s under 200% of Rated Current
AA	Within 120s under 200% of Rated Current

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

*Refer to Tape and Packaging information on pages 38 and 39.

FMC

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

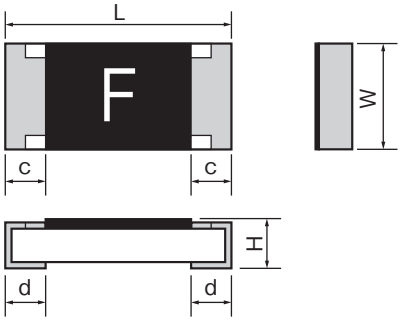
Halogen Free | Antimony Free | Pb Free

●Features

Option code : AB, WB / Low internal resistance compared with FCC/FHC16 AB series for low power consumption and voltage dropping.
Option code : AH, WH / High anti pulse performance.
New line up, 1005mm size, High inrush performance, Option code: WH.
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.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

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	NEW 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)

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

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

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
1005	0402	FMC10	501	0.5	250	F	24Vd.c. 35A	Rated Current / Opening time ×100% / 4h Min. ×200% / 5s Max. ×300% / 0.2s Max.	–55～+125
			751	0.75	150	A			
			102	1.0	100	L			
			132	1.25	70	M			
			152	1.5	60	H			
			202	2.0	40	S			
			252	2.5	30	T			
			302	3.0	25	R			
			NEW 322	3.15	24	U			
			NEW 402	4.0	18	X			
			NEW 502	5.0	14	Y			
1608	0603	FMC16	501	0.5	400	○F	32Vd.c. 35A		
			631	0.63	300	○I			
			751	0.75	210	○A			
			801	0.8	180	○K			
			102	1.0	115	○L			
			132	1.25	90	○M			
			152	1.5	70	○H			
			162	1.6	60	○N			
			202	2.0	50	○S			
			252	2.5	37	○T			
			302	3.0	28	○R			
			322	3.15	26	○U			
			402	4.0	18	○X			
			502	5.0	14	○Y			

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

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

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
1005	0402	FMC10	501	0.5	240	F	24Vd.c. 35A	Rated Current / Opening time ×100% 4h Min. ×200% 5s Max. ×300% 0.2s Max.	–55～+125
			751	0.75	140	A			
			102	1.0	95	L			
			132	1.25	73	M			
			152	1.5	60	H			
			202	2.0	41	S			
			252	2.5	32	T			
			302	3.0	25	R			
1608	0603	FMC16	501	0.5	260	F	32Vd.c. 35A		
			751	0.75	140	A			
			102	1.0	110	L			
			132	1.25	80	M			
			152	1.5	65	H			
			202	2.0	45	S			
			252	2.5	32	T			
			302	3.0	26	R			
			402	4.0	18	X			
			502	5.0	14	Y			

●Ratings/Option Code : AH (Fast-Acting type)

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
1608	0603	FMC16	501	0.5	400	HF	32Vd.c. 35A	Rated Current / Opening time ×100% 4h Min. ×200% 5s Max. ×300% 0.2s Max.	–55～+125
			631	0.63	300	HI			
			751	0.75	210	HA			
			801	0.8	180	HK			
			102	1.0	115	HL			
			132	1.25	90	HM			
			152	1.5	70	HH			
			162	1.6	60	HN			
			202	2.0	50	HS			
			252	2.5	37	HT			
			302	3.0	28	HR			
			322	3.15	26	HU			
			402	4.0	18	HX			
			502	5.0	14	HY			

●Recommended Derating for Rated Current

・Nominal Derating

Nominal Derating ≤ 75% of Rated Current

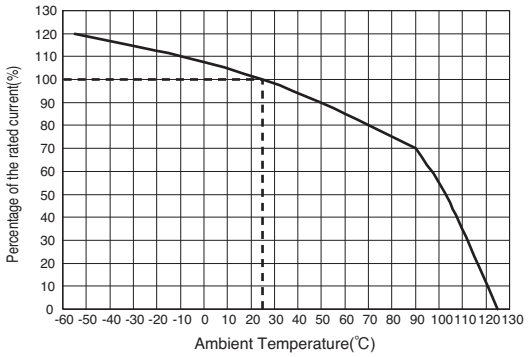
For only FMC10 WH series, please note that the recommendation value is different by Rated current.

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.

Ex.) If FMC16 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 : 75%×Temperature Derating : 80%) = 0.6A



●Part Number Description

Example

Style: FMC | 16 (Product Type)

252 — Rated Current: e.g. :102=1.0A, 132=1.25A, 252=2.5A (3digit)

AB — Option Code

TP — Packaging & Standard Qty. (Min.)

Size		
Code	Metric	Inch
10	1005	0402
16	1608	0603

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

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

*Refer to Tape and Packaging information on pages 38 and 39.

FCCR

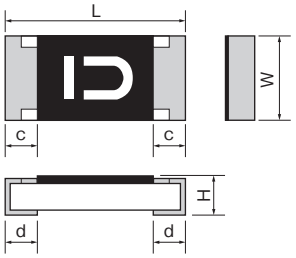
Halogen Free | Antimony Free | Pb Free

●Features

Suitable for over-current protection of the circuit of miniature portable equipment.
Low internal resistance compared with FCC10AB series for low power consumption and voltage dropping.
e.g.) FCCR10 201AB : 1100m Ω Typ
FCC10 201AB(In-line product) : 1850m Ω Typ
FCCR16 401AB : 358m Ω Typ
FCC16 401AB(In-line product) : 590m Ω Typ
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

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)

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Time / Current Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
1005	0402	FCCR10	151	0.15	1850	∩	24Vd.c. 35A	Rated Current × 200% Opening time : 5s Max.	−55～+125
			201	0.2	1250	Z			
			251	0.25	880	C			
			321	0.315	600	D			
			401	0.4	400	E			
			501	0.5	300	F			
1608	0603	FCCR16	NEW 151	0.15	2300	OB	50Vd.c. 50A		
			NEW 201	0.2	1350	ZB			
			NEW 251	0.25	1000	CB			
			NEW 321	0.315	600	DB			
			401	0.4	450	EB			
			501	0.5	300	FB			
			631	0.63	220	IB			
			751	0.75	190	AB			
			801	0.8	165	KB			
			102	1.0	130	LB			
			132	1.25	110	MB			
			152	1.5	90	HB			
			162	1.6	75	NB			
			202	2.0	65	SB			
			252	2.5	40	TB			

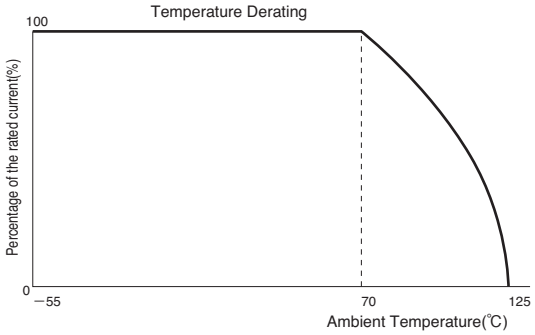
●Recommended Derating for Rated Current

・Nominal Derating

Nominal Derating ≤ 75% of Rated Current

・Temperature Derating

Please refer to the following graph regarding the current derating value for ambient temperature.



Ex.) 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 Styles
PA	Press-Pocket Paper Tape (2mm pitch)	10,000pcs.	FCCR10
TP	Paper Tape	5,000pcs.	FCCR16

*Refer to Tape and Packaging information on pages 38 and 39.

SBF32 Slow Blow

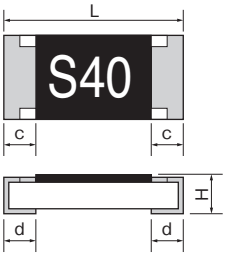
Halogen Free | Antimony Free | Pb Free

●Features

"Slow Blow" ensure 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 SBF32 selection.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

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

●Opton Code:AS(Slow Blow type)

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

●Recommended Derating for Rated Current

・Nominal Derating

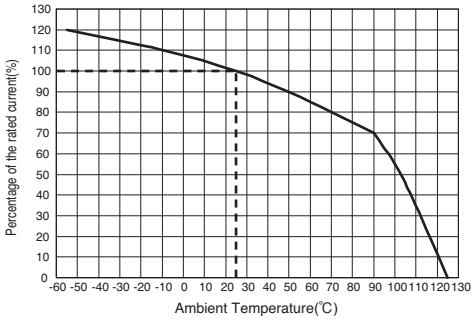
Nominal Derating ≤ 75% of Rated Current

・Temperature Derating

Please refer to the following graph regarding the current derating value for ambient temperature.

Ex.) 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: SBF

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 38 and 39.

NEW
HFC32 High Rated Voltage

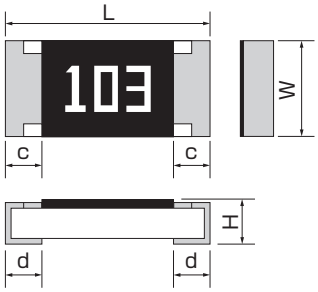
Halogen Free | Antimony Free | Pb Free

●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.
For more details on this product, check the specification on Kamaya website.

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

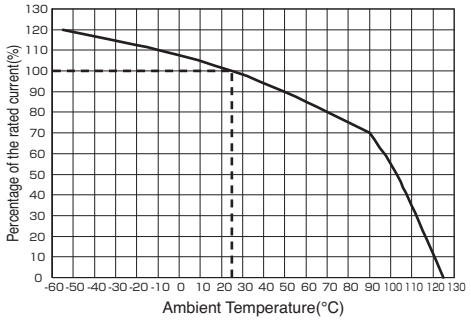
●Rating/Option Code : AG (Fast-Acting type)

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Interrupting Rating	Electrical Characteristics	Working Temperature Range °C
Metric	Inch		Code	A					
3216	1206	HFC32	NEW 102	1.0	180	102	76Vd.c. 50A	Rated Current × 200% Opening time : 60s Max.	−55～+125
			NEW 132	1.25	140	132			
			NEW 162	1.6	100	162			
			NEW 202	2.0	60	202			
			252	2.5	38	252			
			302	3.0	32	302			
			322	3.15	30	322			
			402	4.0	20	402			
			502	5.0	16	502			
			632	6.3	12	632			
			702	7.0	11	702			
			802	8.0	9	802			
			103	10.0	7	103			
			133	12.5	6	133			

●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.

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



●Part Number Description

Example

Style: HFC | 32 — 252 — AG — TP

Product Type: HFC

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 38 and 39.

★*Under Development*

PFC60 Ceramic Case Type

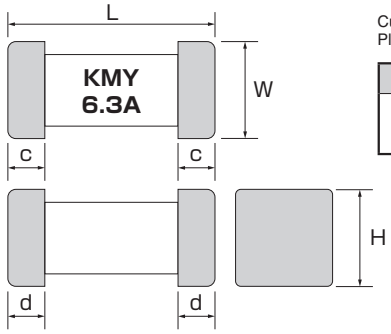
Halogen Free | Antimony Free | Pb Free

●Features

Available until high rated voltage 125Va.c./d.c.
Protect the primary circuit of power supply by excellent interrupting characteristics.
Major application: PC peripherals, Motor circuit, Battery pack, Lighting.
For more details on this product, please contact Kamaya Sales dept.

Safety standards : Electrical Appliance and Material Safety Law PSE class:B
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.
PFC60	6126	2410	6.10±0.2	2.65±0.20	2.65±0.20	1.40±0.2	1.40±0.2	130mg

*Values for reference

●Rating/Option Code : AP (Fast Acting Type)

Size		Style	Rated Current		Internal Resistance m ohm max.	Mark	Safety standard & Electrica Characteristics & Interrupting Rating					Working Temperature Range °C
Metric	Inch		Code	A			Standard	Fusing Characteristics		Interrupting Rating		
6126	2410	PFC60	102	1.0	100	KMY 1A	UL & c-UL	× 100%	4h Min.	125Va.c./dc	50A	−55～+125
			132	1.25	78	KMY 1.25A		× 200%	5s Max.			
			152	1.5	65	KMY 1.5A	PSE	× 130%	4h Min.	100Va.c.	100A	
			162	1.6	60	KMY 1.6A		× 160%	1h Max.			
			202	2.0	48	KMY 2A		× 200%	5s Max.			
			252	2.5	36	KMY 2.5A						
			302	3.0	30	KMY 3A						
			322	3.15	28	KMY 3.15A						
			402	4.0	22	KMY 4A						
			502	5.0	16	KMY 5A						
			632	6.3	13	KMY 6.3A						
			702	7.0	10.6	KMY 7A						
			802	8.0	9.5	KMY 8A						
			103	10	7.5	KMY 10A						
			NEW 123	12	6	KMY 12A	Standard	Fusing Characteristics		Interrupting Rating		
			NEW 153	15	4.5	KMY 15A	UL & c-UL	× 200%	60s Max.	76Va.c./dc	50A	

●Recommended Derating for Rated Current

With regard to the recommended derating conditions of this product, please contact our sales department.

●Part Number Description

Example

Style: PFC | 60

Product Type	Size		
PFC	Code	Metric	Inch
	60	6126	2410

102	AP	TE

Rated Current	
e.g. : 102 =1.0A 322 =3.15A 103 =10.0A	3digit

Option Code	
Code	Clearing Time
AP	Rated Current×200% 5s max.
AG	Rated Current×200% 60s max.

* Packaging & Standard Qty. (Min.)		
B	Bulk (Loose Package)	1,000pcs.
TE	Embossed Tape	

*Refer to Tape and Packaging information on pages 38 and 39.

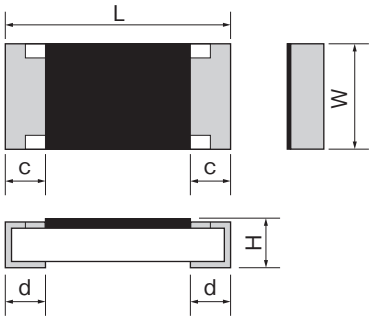
SPC,HSPC

Halogen Free | Antimony Free | Pb Free

●Features

ESD protection component.
SPC Series : Low capacitance 0.1pf Max. Suitable forESD 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 1005mm size.
Major application : Car audio, Car Navigation, System etc.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●Dimensions

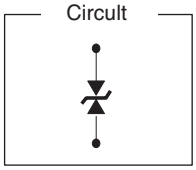


Unit : mm

Style	Metric	Inch	L	W	H	c	d	*Unit weight/pc.
★ SPC06	0603	0201	0.6±0.03	0.3±0.03	0.23±0.03	0.15±0.10	0.15±0.10	0.16mg
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

*★ : Under Development
*Values for reference

Circuit



●Ratings

Part Number	Size Metric (Inch)	Capacitance Note.1 pF	Test Voltage V	ESD Characteristics				Note.4 Rated votage V	Note.5 Leakage current μA	Note.6 Category Temperature Range ℃
				Peak Voltage Note.2		Clamp Voltage Note.3 V	ESD pulse withstand Pulses			
				Code	V					
★SPC06	0603 (0201)	0.1 Max.	8kV Contact discharge	501	500 Max.	100 Max.	20 Min.	30 Max.	1 Max.	−55~+125
SPC10	1005 (0402)						100 Min.	50 Max.		
HSPC10			15kV Aerial discharge	601	600 Max.			30 Max.		
HSPC16	1608 (0603)	0.2 Max.		701	700 Max.			20 Max.		
								50 Max.		

*★ : Under Development

Note1. Capacitance : Measured at 25°C, 1MHz, 1V rms.
Note2. Peak Voltage : Measured at IEC61000-4-2 15kV Air Discharge.
Note3. Clamp Voltage : Measured at IEC61000-4-2 15kV Air Discharge, at 30ns.
Note4. Rated Voltage : The value of voltage that is applicable to each teminal of ESD suppressor without operation of suppressor.
Note5. Lealage 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
06	0603	0201
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 Styles
PA	Press-Pocket Paper Tape (2mm pitch)	15,000pcs.	SPC06
TH	Paper Tape (2mm pitch)	10,000pcs.	SPC10 HSPC10
TP	Paper Tape	5,000pcs.	HSPC16

*Refer to Tape and Packaging information on pages 38 and 39.

AEC-Q200 Rev.D Corresponding situation

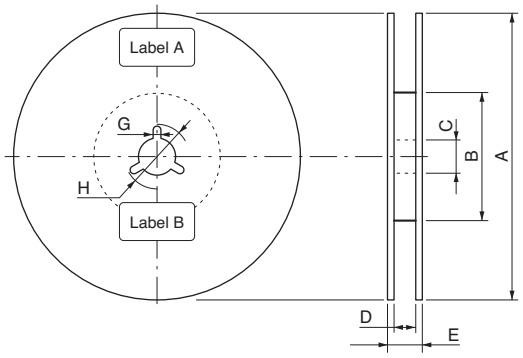
- AEC stands for "Automotive Electronics Council". It is the group consisting of the major automotive makers and major electronic parts maker in the USA.These are devided by the parts categories, and our company is categorized in AEC-Q200.AEC-Qxxx is widely accepted as the electronic parts standards 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	Product Type	Size (Metric)	Corresponding situation
General-purpose	RMC1/32	0402	Non-qualified
	RMC1/20	0603	Test data acquired
	RMC1/16S	1005	
	RMC1/16	1608	
	RMC1/10	2012	Qualified
	RMC1/8	3216	
	RMC1/4	3225	
	RMC1/2	5025	
	RMC1	6332	
	RGC1/32	0402	Non-qualified
	RGC1/20	0603	Test data acquired
	RGC1/16S	1005	
	RGC1/16	1608	
	RGC1/10	2012	Qualified
	RGC1/8	3216	
	RNC06	0603	Non-qualified
	RNC10	1005	
	RNC16	1608	
	RNC20	2012	
	RNC32	3216	
	TWMC50	2550	Test data acquired
Anti-Sulfuration	RMNW10	1005	
	RMNW16	1608	
	RMNW20	2012	Qualified
	RMNW32	3216	
	RMNW35	3225	
	RMNW50	5025	
	RMNW63	6332	
	RMAW06	0603	Test data acquired
	RMAW10	1005	
	RMAW16	1608	
	RMAW20	2012	Qualified
	RMAW32	3216	
	RMGW10	1005	Test data acquired
	RMGW16	1608	
	RMGW20	2012	Qualified
	RMGW32	3216	
	RMGW35	3225	
High-voltage	RVC16	1608	Test data acquired
	RVC20	2012	Qualified
	RVC32	3216	
	RVC50	5025	
	RVC63	6332	
	RZC50	5025	
	RZC63	6332	
Surge	RPC16	1608	Test data acquired
	RPC20	2012	Qualified
	RPC32	3216	
	RPC35	3225	
	RPC50	5025	
	RPC63	6332	
	RBX16	1608	Test data acquired

Category	Product Type	Size (Metric)	Corresponding situation
Sensing	RLC10	0402	Test data acquired
	RLC16	0603	
	RLC20	2012	Qualified
	RLC32	3216	
	RLC35	3225	
	RLC50	5025	
	RLC63	6332	
	RLP16	1608	
	RLP20	2012	
	RLP32	3216	
	RLP63	6332	
	MLP20	2012	
	MLP63	6332	
	RCC06	0603	Test data acquired
	RCC10	1005	
	RCC16	1608	
	RCC20	2012	Qualified
	RCC32	3216	
	TWLC50	2550	
	RHC16	1608	Non-qualified
	RHC20	2012	
Chip Network	RAC062D	0603 2 Elements	Test data acquired
	RAC064D	0603 4 Elements	
	RAC102D	1005 2 Elements	
	RAC104D	1005 4 Elements	
	RAC164D	1608 4 Elements	
	RAC168D	1608 8 Elements	Non-qualified
Circuit Protection	FCC10·FHC10	1005	Test data acquired
	FCC16·FHC16	1608	
	FCC20·FHC20	2012	
	FCC32·FHC32	3216	
	FCCR10	1005	
	FCCR16	1608	
	FMC10	1005	
	FMC16	1608	
	SBF32	3216	
	HFC32	3216	
	PFC60	6126	
	FRC16	1608	
	FRC20	2012	
	FRC32	3216	
ESD Suppressors	SPC06	0603	
	SPC10	1005	
	HSPC10	1005	
	HSPC16	1608	
High Frequency	RAC101A	1005 2 Elements	Non-qualified
Temperature Compensation	LTC1/10	2012	
	LTC1/8	3216	
Trimmable	FCR1/16	1608	
	FCR1/10	2012	
	FCR1/8	3216	
	FCR1/4	3225	
	FCR1/2	5025	
	FCR1	6332	

Packaging for Surface Mount Devices

●Reel Dimensions



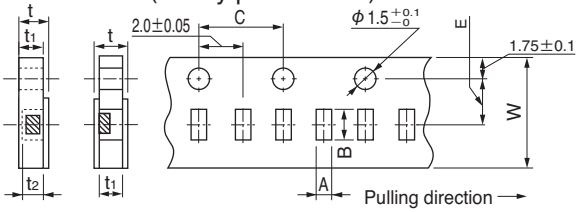
Unit : mm

	Code		A	B	C	D	E	G	H
Plastic Reel (EIAJ ET-7200B)	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	—	

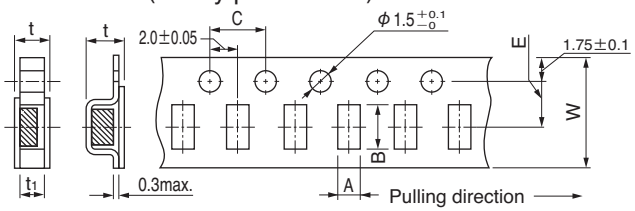
*Dimension A : Please contact KAMAYA for plastic reels of ϕ250mm and ϕ330mm.

●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, RGC1/32	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	RMC1/20, RGC1/20, RCC06, RNC06 RMAW06, RMPC06, SPC06		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.
		RMC1/16S, RGC1/16S, RLC10, RCC10, FCC10(LB), FMC10, SPC10 HSPC10, RMGW10	TH	$0.65^{+0.05}_{-0.10}$	$1.15^{+0.05}_{-0.10}$	4.0±0.1			0.4 ±0.05	—	0.5 max.
		RMC1/16		1.15±0.15	1.9 ±0.2				0.6 ±0.1	—	0.8 max.
1608	0603	RMC1/16, RGC1/16, FCR1/16, RVC16 RLC16, RHC16, RCC16 , RLP16, FCC16 FHC16, FMC16, FRC16, HSPC16, FCCR16 RBX16, RPC16, RMGW16	TP	1.15±0.15	1.9 ±0.2				0.6 ±0.1	—	0.8 max.
2012	0805	RMC1/10, RGC1/10, FCR1/10, RNC20 RVC20, RPC20, RLC20, RHC20, LTC1/10 FCC20, FHC20, FRC20, RCC20, RMGW20		1.65±0.15	2.5 ±0.2				0.8 ±0.1	—	1.0 max.
		RLP20, MLP20							0.6 ±0.1		
		DLP20		1.68±0.15	2.38±0.15				—		0.8±0.2
3216	1206	RMC1/8, RGC1/8, FCR1/8, RNC32 RVC32, RPC32, RLC32, LTC1/8 FCC32, FHC32, SBF32, FRC32, RCC32 HFC32, RMGW32		2.0 ±0.15	3.6 ±0.2				0.8 ±0.1	—	1.0 max.
		RLP32							0.6 ±0.1		
		DLP32		2.05±0.20	3.65±0.20		8.0±0.3	3.5±0.1	—	—	0.9 ±0.2
3225	1210	RMC1/4, FCR1/4, RPC35, RLC35, RMGW35	TE	2.85±0.20	3.5 ±0.2			3.5±0.05	—	—	1.0 ±0.2
5025 2520	2010 1210	RMC1/2, FCR1/2, RVC50, RPC50 RZC50, RLC50, TWLC50, TWMC50		3.1 ±0.2	5.5 ±0.2		12 ±0.3	5.5±0.05	—	—	1.1 ±0.15
6126	2410	PFC60		2.75±0.20	6.45±0.10				—	—	2.8 ±0.1
6332 3263	2512 1225	RMC1, FCR1, RVC63, RPC63, RZC63 RLC63, RLP63, MLP63, TWP63		3.6 ±0.2	6.9 ±0.2				—	—	1.1 ±0.15
Chip Networks Chip Attenuators		RAC062D	PA	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
		RAC064D			1.5 ±0.1						
		RAC101A	TH	$1.15^{+0.05}_{-0.10}$	$1.15^{+0.05}_{-0.10}$				$0.4\ ^{+0.05}_{-0.10}$	—	0.55 max.
		RAC102D									0.5 max.
		RAC104D		1.2 ±0.1	2.2 ±0.1				0.4 ±0.1	—	
		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				

PACKAGING FOR SURFACE MOUNT DEVICES

●Tape Dimensions

Unit : mm

Metric	Inch	Style	Code	A	B	C	W	E	t_1	t_2	t
1005	0402	RMNW10, RMAW10, RNC10, RMPC10	TH	0.7 ±0.1	1.2 ±0.1	4.0±0.1	8.0±0.3	3.5±0.2	—	—	0.4 ±0.05
1608	0603	RMNW16, RMAW16, RNC16, RMPC16	TP	1.1 ±0.2	1.9 ±0.2				—	—	0.65±0.05
2012	0805	RMNW20, RMAW20, RMPC20		1.65±0.20	2.4 ±0.2				—	—	1.0 Max.
3216	1206	RMNW32, RMAW32, RMPC32		2.0 ±0.2	3.6 ±0.2				—	—	1.0 Max.
3225	1210	RMNW35, RMPC35		3.0 ±0.2	3.6 ±0.2				—	—	1.0 Max.
5025	2010	RMNW50	TE	2.8 ±0.2	5.5 ±0.2		12 ±0.3	5.5±0.1	—	—	1.2 Max.
6332	2512	RMNW63		3.6 ±0.2	6.9 ±0.2				—	—	1.2 Max.
		WLP63		3.5 ±0.2	6.75±0.20			5.5±0.05	—	—	1.2 Max.

*Value 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, RGC1/32	PA	20,000	50	8.8	0.027	1,000
0603	0201	RMC1/20, RGC1/20, RCC06, RNC06 RMAW06, SPC06		15,000		7.8		
1005	0402	FCC10, FHC10, FCCR10		10,000		6.0		
		RMC1/16S, RGC1/16S, RLC10, RCC10 FMC10, SPC10, HSPC10, RMGW10	TH					
		RMNW10, RMAW10, RNC10						10,000
1608	0603	RMC1/16				8.3		1,000
		RMC1/16, RGC1/16, FCR16, RVC16, RLC16 RHC16, FCC16, RLP16, FCC16, FHC16 FMC16, FCCR16, FRC16, HSPC16, RBX16, RPC16, RMGW16	TP	5,000		7.2		
		RMNW16, RMAW16, RNC16						5,000
2012	0805	RMC1/10, RGC1/10, FCR1/10, RLP20 RNC20, RVC20, RPC20, RLC20, RHC20 LTC1/10, FCC20, FHC20, FRC20, RCC20 MLP20, RMGW20				8.4		1,000
		RMNW20, RMAW20, RMPC20						5,000
		DLP20				—		—
3216	1206	RMC1/8, RGC1/8, FCR1/8, RNC32, RVC32 RPC32, RLC32, LTC1/8, FRC32, RCC32, RMGW32				8.8		1,000
		RMNW32, RMAW32, RMPC32						5,000
		RLP32, FCC32, FHC32, SBF32, HFC32				10.0		1,000
		DLP32	TE			—		—
3225	1210	RMNW35, RMPC35	TP			7.7		5,000
		RMC1/4, FCR1/4, RPC35, RLC35, RMGW35	TE	4,000				1,000
5025 2550	2010 1020	RMC1/2, FCR1/2, RVC50, RPC50, RZC50 RLC50, TWLC50, TWMC50			40	8.0		
		RMNW50						4,000
6126	2410	PFC60		1,000		9.2		1,000
50110	2043	TWP110	—	—	—	—		Please contact
6332 3263	2512 1225	RMC1, FCR1, RVC63, RPC63, RZC63, RLC63,TWP63	TE	4,000	40	10.4		1,000
		RMNW63						4,000
		RLP63, MLP63, WLP63				12.0		1,000
Chip Networks Chip Attenuators		RAC062D, RAC064D	TH	10,000	50	6.0		
		RAC102D, RAC101A	TH	10,000		6.0		
		RAC104D				6.3		
		RAC164D	TP	5,000		7.7		
		RAC168D				8.6		5,000

*Please contact Kamaya Sales department about bulk package of RLP16, RLP20, RLP32, RLP63, MLP20, MLP63, WLP63.

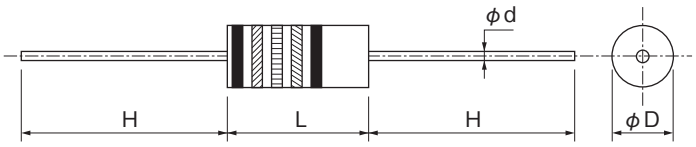
RC1/2U

●Features

UL recognized component(UL1676) (File No.E151897).Reduce UL or CSA approval and maintenance cost.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

UL recognized component (UL1676) (File No.E151897)

●Dimensions



Unit : mm

Style	L	D	H	d	*Unit weight/pc.
RC1/2U	$9.5^{+0.8}_{-0.7}$	3.6±0.2	28±3	$0.7^{+0.07}_{-0.05}$	422mg

*Value for reference

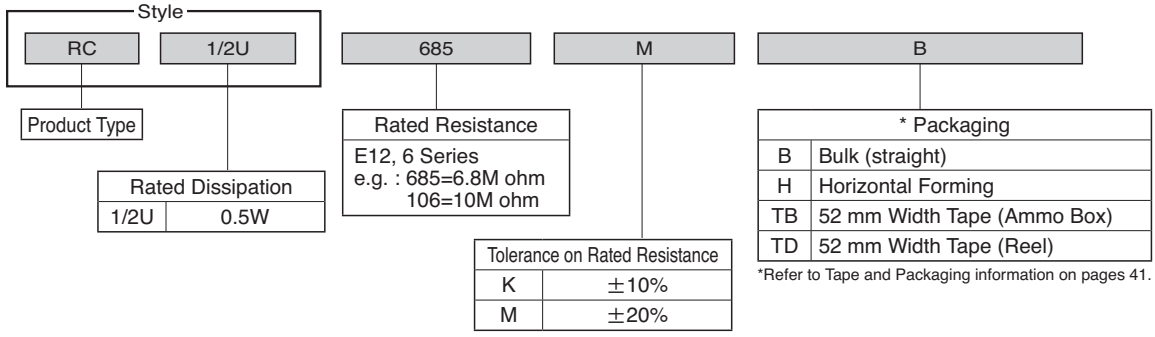
●Ratings

Style	Rated Dissipation at 70°C W	Rated Voltage V	Rated Resistance Range	Tolerance on Rated Resistance and Perferred Number Series for Resistors.	Specified Line Voltage	Isolation Voltage V	Category Temperature Range °C
RC1/2U	0.5	350	1M ohm～10M ohm	K(±10%) E12 M(±20%) E6	250Va.c. max. or 125Va.c. max.	500	–55～+125

Note1. Required characteristic performance is based on JIS C 6406 and UL 1676.
Note2. The name of this, product is granted as Conductive Path, but UL1676 and the requirements as Discharge Path shown in CSA22, 2 No,1-94 are satisfied, but the products performance does not cover all the requirements as Conductive Path.

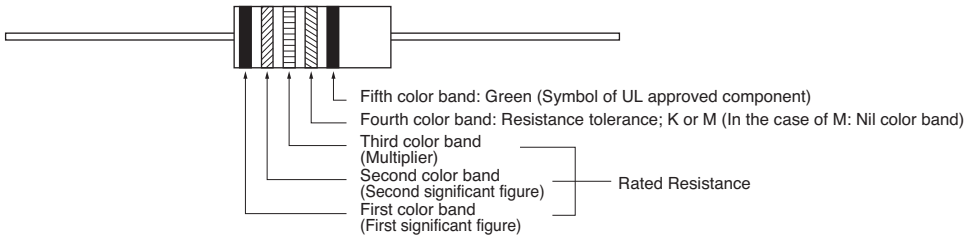
●Part Number Description

Example



*Refer to Tape and Packaging information on pages 41.

●Color Coding

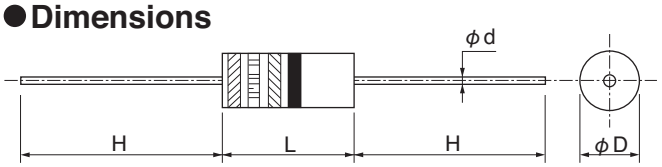


RC

●Features

Improved pulse endurance characteristics compared to carbon-film devices.
Please refer to Specification (Reference) at the Website to confirm the specification for more detail.

●Dimensions



Unit : mm

Style	L	D	H	d	*Unit weight/pc.
RC1/4	6.3±0.7	2.4±0.1	30±3	0.6±0.05	222mg
RC1/2	9.5 $^{+0.8}_{-0.7}$	3.6±0.2	28±3	0.7 $^{+0.07}_{-0.05}$	422mg

*Values for reference

●Ratings

Style	Rated Dissipation at 70℃ W	Limiting Element Voltage V	Rated Resistance Range	Combination of Rated Resistance Range and Temperature Coefficient of Resistance			Tolerance on Rated Resistance and Perferred Number Series for Resistors	Isolation Voltage V	Category Temperature Range ℃
				Temperature Coefficient of Resistance %		Rated Resistance Range			
				at −55°C	at +125°C				
RC1/4	0.25	250	1 ohm~5.6M ohm	+6.5~0	+1~ −5	1 ohm~ 1k ohm	J(± 5%) : E24 K(±10%) : E12 M(±20%) : E6	100	−55~+125
				+10 ~0	0~ −6	1.1kohm~ 10k ohm			
				+13 ~0	0~ −7.5	11 kohm~100k ohm			
RC1/2	0.5	350	1 ohm~22M ohm	+15 ~0	0~−10	110 kohm~ 1M ohm		500	
				+20 ~0	0~−15	1.1Mohm~ 22M ohm			

Note1. Rated Voltage = √(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.

●Part Number Description

Example

Style: RC | 1/4

Product Type

Rated Dissipation	
1/4	0.25W
1/2	0.5W

102

Rated Resistance
E24, 12, 6 Series e.g. : 2R2=2.2 ohm 102=1k ohm

J

Tolerance on Rated Resistance	
J	±5%
K	±10%
M	±20%

B

*Packaging	
B	Bulk (Straight)
H	Horizontal Forming
TB	52 mm Width Tape (Ammo Box)
TD	52 mm Width Tape (Reel)

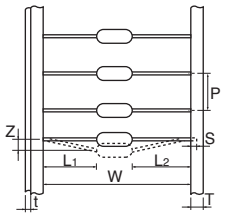
*Refer to Tape and Packaging information on pages 41.

●Storage

Temperature 20±15°C, Humidity 60%R.H. Max, Recommendation Storing Term 6 months after shipped from factory.

Packaging for Leaded Resistors

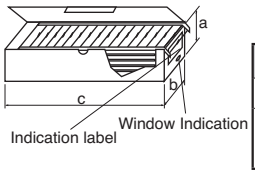
●Tape



Unit : mm

Style	W	L1-L2	T	t	P	Z	S
RC1/4 RC1/2 RC1/2U	52.4 $^{+1.6}_{-1.4}$	1.0max.	6.0±0.5	0.5max.	5.08±0.38	1.0max.	3.2min.

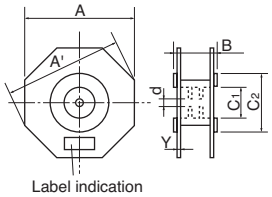
●Ammo Box



Unit : mm

Style	Code	a	b	c
RC1/4	TB 52mm Width Tape	60±5	75±5	275±5
RC1/2 RC1/2U		65±5		455±5

●Tape & Reel (Code : TD)



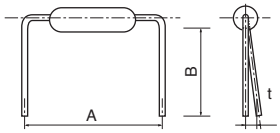
Label indication

Unit : mm

Style	Code	A	*A'	B	C1	C2	d	*Y
RC1/4 RC1/2 RC1/2U	TD	260±5	280	75±5	60.4±1	78±1	14.5±0.5	3

*Value for reference

●Horizontal Forming (Code : H)



Unit : mm

Style	Code	A	B	t
RC1/4	H60	10.0±0.5	5.0±0.5	1.5max.
RC1/4	H62	12.5±0.5		
RC1/2 RC1/2U	H	15.0±0.5		1.8max.

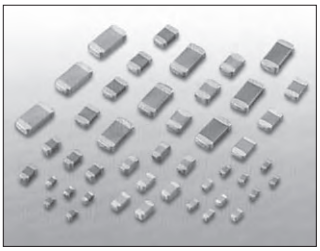
Style	Tape & Reel					Ammo Box					Bulk Packaging				
	Q'ty / Reel (pcs.)	Reel Size (mm)	Outer Carton			Width of Taping (mm)	Q'ty / Box (pcs.)	Outer Carton			M.P.Q. Q'ty / (Plastic Bag) pcs.	Q'ty / Inner Carton (pcs.)	Outer Carton		
			Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure-ment (m^3)			Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure-ment (m^3)			Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure-ment (m^3)
RC1/2U	3,000	260	24,000	13	0.04	52	2,000	30,000	16	0.05	500 (100×5)	5,000	30,000	13	0.04
RC1/2	3,000	260	24,000	13	0.04	52	2,000	30,000	16	0.05	500 (100×5)	5,000	30,000	13	0.04
RC1/4	5,000	260	40,000	12	0.04	52	2,000	30,000	10	0.03	1000 (200×5)	10,000	50,000	13	0.04

Multilayer Ceramic Capacitor

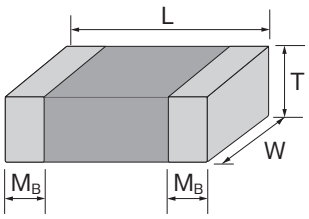
Please see Catalog of Walsin Technology Corporation. (Website: http://www.passivecomponent.com/) for detail information.

●Features

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



●Dimensions



Unit: mm

Metric	Inch	L	W	T/Symbol			M_B	Series
1005	0402	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	N		0.25±0.05/−0.1	General Purpose, High Capacitance, MW, HH
1608	0603	1.6 ±0.1	0.8 ±0.1	0.8 ±0.07	S		0.4 ±0.15	General Purpose, High Capacitance, MW, HH
		1.6 +0.15/−0.1	0.8 +0.15/−0.1	0.8 +0.15/−0.1	X		0.4 ±0.15	General Purpose, High Capacitance
2012	0805	2.0 ±0.15	1.25±0.1	0.6 ±0.1	A		0.5 ±0.2	General Purpose, High Voltage
				0.8 ±0.1	B		0.5 ±0.2	General Purpose, High Capacitance, High Voltage
							0.5 ±0.2	OP
				1.25±0.1	D	#	0.5 ±0.2	General Purpose, High Capacitance, High Voltage
							0.4 ±0.2	OP
			1.25±0.2	0.95max.	T	#	0.5 ±0.2	TT
		2.0 ±0.2		1.25±0.2	I	#	0.5 ±0.2	High Capacitance
1632	0612	3.2 ±0.15	1.6 ±0.15	0.8 ±0.1	B		0.13max.	Low Inductance
3216	1206	3.2 ±0.15	1.6 ±0.15	0.8 ±0.1	B		0.6 ±0.2	General Purpose, High Voltage
							0.5 ±0.2	OP
				0.95max.	T	#	0.6 ±0.2	TT
				0.95±0.1	C		0.6 ±0.2	General Purpose, High Capacitance, High Voltage
							0.5 ±0.2	OP
				1.15±0.15	J	#	0.6 ±0.2	General Purpose
		3.2 ±0.2	1.6 ±0.2				0.6 ±0.2	High Capacitance
				1.25max.			0.6 ±0.2	TT
		3.2 ±0.15	1.6 ±0.15	1.25±0.1	D	#	0.6 ±0.2	General Purpose, High Capacitance, High Voltage
							0.5 ±0.2	OP
			1.6 ±0.2	1.6 ±0.2	G	#	0.6 ±0.2	General Purpose, High Capacitance, High Voltage
							0.5 ±0.2	OP
		3.2+0.3/−0.1	1.6 +0.3/−0.1	1.6 +0.3/−0.1	P	#	0.6 ±0.2	General Purpose, High Capacitance
3225	1210	3.2 ±0.3	2.5 ±0.2	0.95max.	T	#	0.75±0.25	TT
				0.95±0.1	C	#	0.75±0.25	General Purpose, High Voltage
							0.5 ±0.25	OP
				1.25±0.1	D	#	0.75±0.25	General Purpose, High Voltage
							0.5 ±0.25	OP
		3.2 ±0.4	2.5 ±0.3	1.6 ±0.2	G	#	0.75±0.25	General Purpose, High Voltage
							0.5 ±0.25	OP
				2.5 ±0.3	M	#	0.75±0.25	High Voltage
4520	1808	4.5 ±0.4	2.03±0.25	1.25±0.1	D	#	0.5 ±0.25	S2, S3
							0.75±0.25	High Voltage
				2.0 ±0.2	K	#	0.5 ±0.25	S2, S3
							0.75±0.25	High Voltage
4532	1812	4.5 ±0.4	3.2 ±0.3	1.25±0.1	D	#	0.75±0.25	General Purpose, S2, S3
							0.6 ±0.25	OP
				2.0 ±0.2	K	#	0.75±0.25	General Purpose, S2, S3
							0.6 ±0.25	OP

: Reflow soldering process only.

●Characteristic

Application	Series	Dielectric	Size			Rated Voltage	Capacitance
General Purpose	General Purpose	NPO, X7R, Y5V	0402(1005) 0603(1608)	0805(2012) 1206(3216)	1210(3225) 1812(4532)	16V, 25V, 50V, 100V	0.5pF~1uF
	High Capacitance	X7R, X5R, Y5V	0402(1005) 0603(1608)	0805(2012) 1206(3216)	1210(3225) 1812(4532)	6.3V, 10V, 16V, 25V, 50V	1uF~100uF
Safety and Power supply control	Middle & High Voltage	NPO, X7R, Y5V	0805(2012) 1206(3216)	1210(3225) 1812(4532)		200V, 250V, 500V, 630V 1kV, 1.5kV, 2kV, 3kV	0.5pF~0.22uF

●Part Number Description

Example
General purpose
High Capacitance
Ultra-small
Middle & High Voltage
Low Inductance

Style

0805	B	104	K	500	C	T
Size Inch (Metric)	Dielectric	Capacitance	Tolerance	Rated Voltage	Electrode	Package
0201=(0603)	N=NPO	R47=0.47pF	A =±0.05pF	6R3=6.3 Vdc	L =Ag/Ni/Sn	B= Bulk
0402=(1005)	B=X7R	0R5=0.5pF	B =±0.1pF	100=10 Vdc	C =Cu/Ni/Sn	C= Bulk case
0603=(1608)	X=X5R	1R0=1pF	C =±0.25pF	160=16 Vdc		T = 7Inch width Reale
0805=(2012)	F=Y5V	100=10pF	D =±0.5pF	250=25 Vdc		
1206=(3216)		101=100pF	F =±1%	500=50 Vdc		
1210=(3225)		102=1000pF	G =±2%	101=100 Vdc		
1808=(4520)		103=0.01uF	J =±5%	201=200 Vdc		
1812=(4532)		104=0.1uF	K =±10%	251=250 Vdc		
		105=1uF	M =±20%	501=500 Vdc		
		106=10uF	Z =−20to+80%	631=630 Vdc		
		107=100uF		102=1000 Vdc		
				152=1500 Vdc		
				202=2000 Vdc		
				302=3000 Vdc		

Example
Low profile
Open-mode Design
High Q Low ESR
Microwave
Safety certified

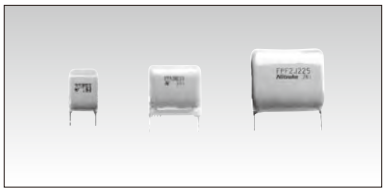
Style

OP	21
Product Type	Size
TT=	15=0402
OP=	18=0603
HH=	21=0805
MW=	31=1206
S2=	32=1210
S3=	42=1808
	43=1812

Film Capacitors

●Dipped metallized film capacitors

● CR Units



Film Capacitors Summary

Summary		Style	Series Code	Features	Rated Voltage	Capacitance (μF)	Temp. Range (°C)
General use	Standard		FPB	・Small	250VDC 450VDC 630VDC 1250VDC	0.47～10 0.22～4.7 0.068～2.2 0.001～0.22	–40 ～ +85 (+105)
			MDX	・Standard	250VDC 450VDC 630VDC	0.01～10 0.01～4.7 0.015～2.2	–40 ～ +85 (+105)
			MDS	・Standard	100VDC 250VDC 400VDC 630VDC	0.56～10 0.18～10 0.039～4.7 0.01～2.2	–40 ～ +85 (+105)
			MDD	・Lead pitch 5mm, 7.5mm	50VDC 63VDC 100VDC 250VDC	0.1～2.2 0.1～1.0 0.047～0.47 0.01～0.15	–40 ～ +85 (+105)
	PFC circuit in power		FPS4 NEW	・Small ・Low noise ・Halogen-free product	450VDC	0.47～2.2	–40 ～ +85 (+110)
			FPS3	・Low Noise ・Halogen-free product	450VDC	0.47～2.2	–40 ～ +85 (+110)
			FPA	・Standard ・Halogen-free product	450VDC 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	・Large current	250VDC 450VDC 630VDC	0.01～10 0.01～3.3 0.01～2.2	–40 ～ +105
			FPD4	・Standard	250VDC 450VDC 630VDC	0.01～10 0.01～3.3 0.01～2.2	–40 ～ +105
			FPD5	・Small	450VDC	0.47～2.2	–40 ～ +105
Across- the- line use			CFD-N	・For Japan ・For noise immunity test	125VAC 250VAC	0.033～4.7 0.01～2.2	–40 ～ +85 (+105)
Surge absorber C-R units			CR	・C-R Unit	125VAC 250VAC	0.1μF ＋120Ω 0.033μF ＋120Ω	–40 ～ +85
			CRKH	・C-R Unit ・UL,VDE Safety Standard	275VAC	0.01～0.1μF 47, 100, 120Ω	–40 ～ +100

● Compliance with RoHS requirement

Our film capacitors (all products in the above list) comply with RoHS requirement.

About Nitsuko product, Please contact as follows.

Nitsuko Electronics Corporation http://www.nitsuko-ele.co.jp/

Development・Sales Department

2031-1, Ogawara, Suzaka-shi, Nagano-ken, Postcode 382-0071

TEL (+81) 26-246-6351 FAX (+81) 26-245-6239 E-Mail: ec@nitsuko-ele.co.jp

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 46 for recommended land pattern of Kamaya product

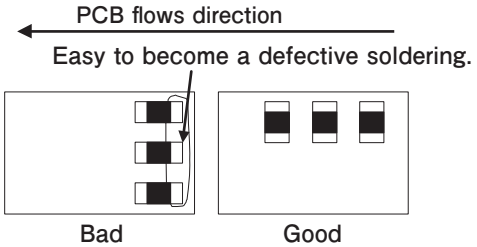
3.1 Strength of parts might decrease under the condition that the width or the shape of land pattern is too large, or the bend of the substrate occurs when gap of soldering position is generated or there are a lot of solder quantities.

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.

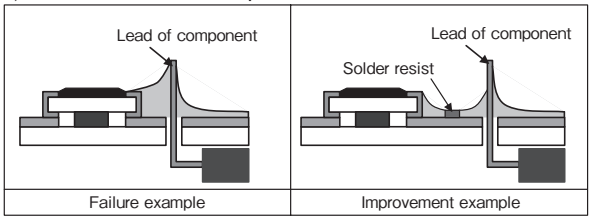
Figure-1



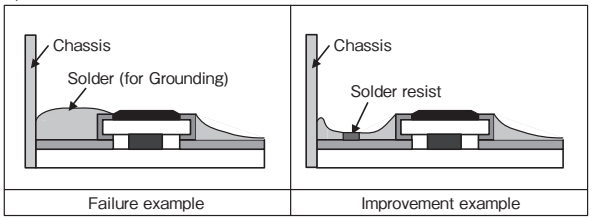
3.5 Examples of division of land pattern (Cross-sectional view)
a. Land share with lead component.
b. Mounted near Chassis.
c. Side by side array.

Figure-2

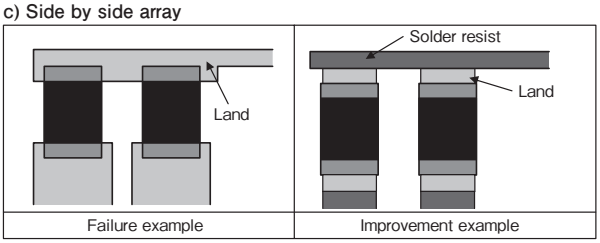
a) Land share with lead component.



b) Mounted near chassis

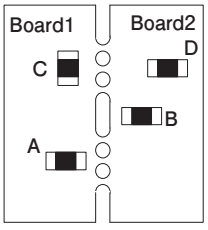


c) Side by side array



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.

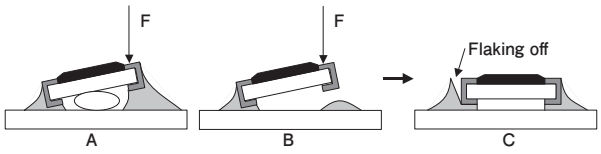
7.2 Select flux without the causticity.

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 47 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.

SMD Product handling manual (RECOMMENDED LAND PATTERN)

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

This is reference information only.

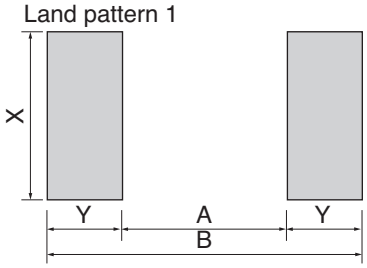
●Application

All KAMAYA Surface Mount Devices

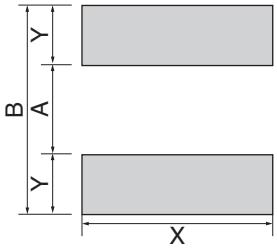
●Recommended land pattern (Reference)

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

Land pattern 1



Land pattern 2



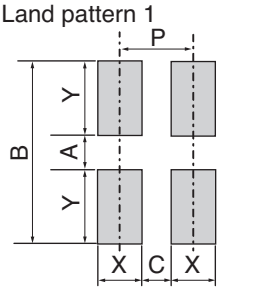
Land pattern	Size		Flow soldering				Reflow soldering			
	Metric	Inch	A	B	X	Y	A	B	X	Y
1	0402	01005	Not applied				0.18	0.58	0.2	0.2
	0603	0201					0.3	0.9	0.3	0.3
	1005	0402					0.5	1.3	0.5	0.4
	1608	0603	1.0	2.6	0.8	0.8	1.0	2.0	0.8	0.5
	2012	0805	1.3	3.1	1.25	0.9	1.3	2.7	1.25	0.7
	3216	1206	2.2	4.3	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	2550	1020	1.3	3.8	5	1.25	1.3	3.4	5	1.05

*For RLP, MLP, WLP and DLP, the recommended land pattern is set by resistance values.
Please look at page#18 and #22 for further information.
TWP is under development, please contact Kamaya contact window for the details.

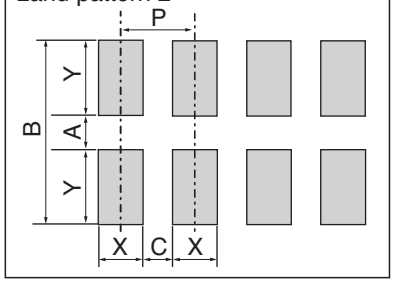
*For RCC16 and RCC20, Please contact Kamaya sales department.

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

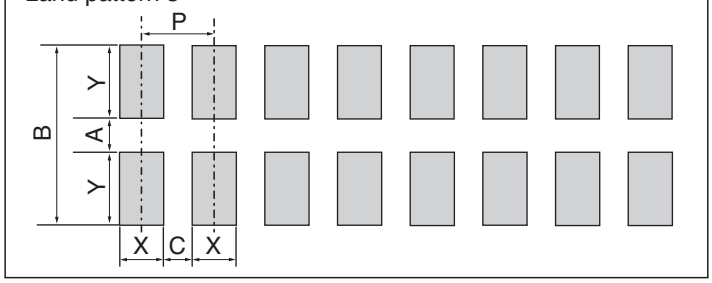
Land pattern 1



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	RAC06 2D	D,E	0.5	Not applied					0.3	0.9	0.2	0.3	0.3
2	RAC06 4D		0.4									0.2	
1	RAC10 2D	C	0.65						0.5	1.3	0.34	0.33	0.4
	RAC10 1A												
2	RAC10 4D		0.5						0.5	1.3	0.15	0.35	0.4
	RAC16 4D		0.8	1.0	2.6	0.35	0.45	0.8	1.0	2.0	0.35	0.45	0.5
3	RAC16 8D		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.

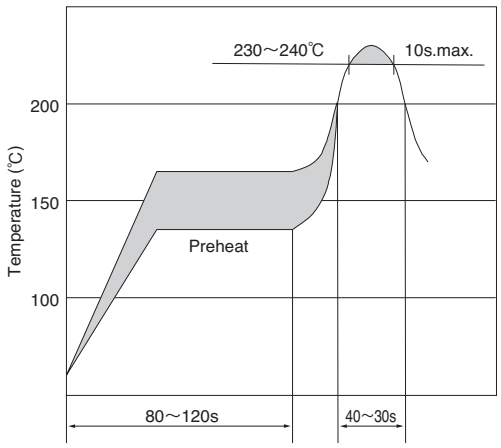
●Application

All KAMAYA Surface Mount Devices

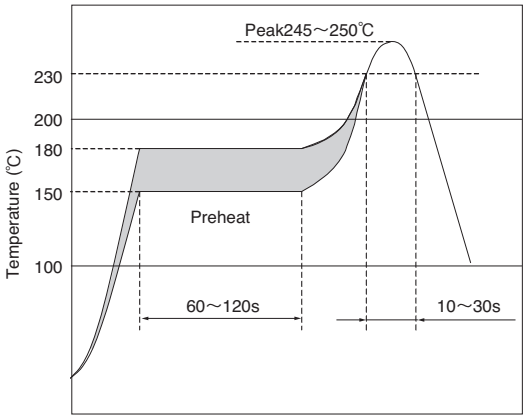
●Recommended soldering condition (Reference)

1. Reflow soldering

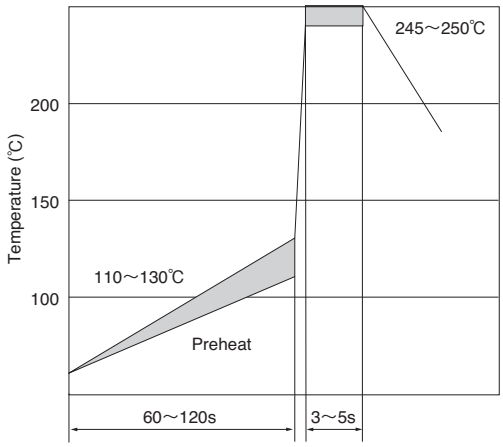
1.1 Recommended condition of Sn-Pb solder.
Reflow times: 2 times



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 contact Kamaya Sales department for further information.
(2) Please carry out an enough mounting evaluation when use this profile.

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 = (Rated Dissipation) (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.

Isolation 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 isolation 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

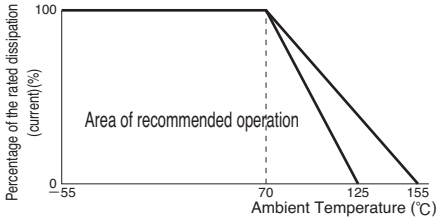
The r.m.s voltage is impressed for 1 minute the one that the electrode (terminal) was lumped together and between the insulation exterior or substrates, and the insulation exterior indicates the maximum value of the voltage that breakdown or flashover.

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.

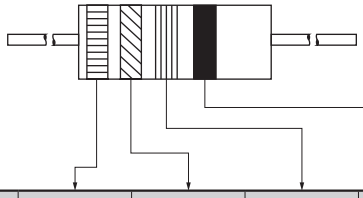
Internal Resistance Value
An internal resistance values shown in this document include values in any materials of fuse,
fuse element, outer terminations etc. Please refer to "section 10" for further information.
Additionally, resistance values are different depending on Temperature and Steady-state Current.

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 Marking

●Color coding

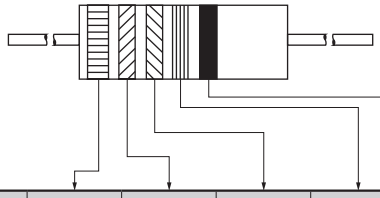
• Three - color band or four - color band system



Color	1st color band	2nd color band	3rd color band	4th color band
	1st figure	2nd figure	Multiplier	Resistance tolerance
Black	0	0	10^0	—
Brown	1	1	10^1	F(±1%)
Red	2	2	10^2	G(±2%)
Orange	3	3	10^3	—
Yellow	4	4	10^4	—
Green	5	5	10^5	—
Blue	6	6	10^6	—
Purple	7	7	10^7	—
Gray	8	8	10^8	—
White	9	9	10^9	—
Gold	—	—	10^{-1}	J(±5%)
Silver	—	—	10^{-2}	K(±10%)
Not colored	—	—	—	M(±20%)

*For three-color band system the 4th color band is eliminated (Resistance tolerance is ±20%).

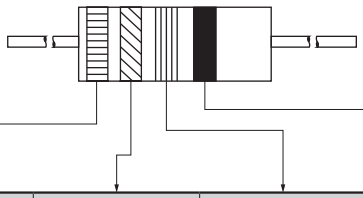
• Five - color band system



Color	1st color band	2nd color band	3rd color band	4rd color band	5th color band
	1st figure	2nd figure	3nd figure	Multiplier	Resistance tolerance
Black	0	0	0	10^0	—
Brown	1	1	1	10^1	F(±1%)
Red	2	2	2	10^2	G(±2%)
Orange	3	3	3	10^3	—
Yellow	4	4	4	10^4	—
Green	5	5	5	10^5	D(±0.5%)
Blue	6	6	6	10^6	C(±0.25%)
Purple	7	7	7	10^7	B(±0.1%)
Gray	8	8	8	10^8	—
White	9	9	9	10^9	—
Gold	—	—	—	10^{-1}	—
Silver	—	—	—	10^{-2}	—

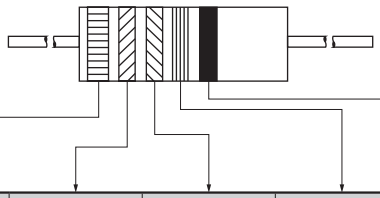
*RC1/2U : Please refer to page 32.

• Example



1st color band	2nd color band	3rd color band	4th color band
Brown	Red	Yellow	Gold
1	2	10^4	±5%
12×10,000 (ohm) ±5%			
120k ohm J			

• Example



1st color band	2nd color band	3rd color band	4th color band	5th color band
Purple	Blue	Gray	Gold	Brown
7	6	8	10^{-1}	±1%
768×0.1 (ohm) ±1%				
76.8 ohm F				

●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	0.15 ohm
1R5	1.5 ohm
150	15 ohm
151	150 ohm
152	1.5k ohm
153	15k ohm
154	150k ohm
155	1.5M ohm
156	15M ohm
157	150M ohm

• 4-Digit (example)

Rated resistance symbols	Resistance value
R154	0.154 ohm
1R54	1.54 ohm
15R4	15.4 ohm
1540	154 ohm
1541	1.54k ohm
1542	15.4k ohm
1543	154k ohm
1544	1.54M ohm
1545	15.4M ohm
1546	154M ohm

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

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

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

Standard Resistance Values and Symbols

●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	$\pm5\times10^{-6}$/°C
T	$\pm10\times10^{-6}$/°C
P	$\pm15\times10^{-6}$/°C
E	$\pm25\times10^{-6}$/°C
C	$\pm50\times10^{-6}$/°C
K	$\pm100\times10^{-6}$/°C
D	$\pm200\times10^{-6}$/°C
A	$\pm500\times10^{-6}$/°C
M	$\pm1{,}000\times10^{-6}$/°C
N	$\pm70\times10^{-6}$/°C

●Significant Figure of Resistance Value

E6	E12	E24	E48	E96	E192
10	10	10	100	100	100
					101
				102	102
					104
			105	105	105
					106
				107	107
					109
		11	110	110	110
					111
				113	113
					114
			115	115	115
	12	12			117
				118	118
					120
			121	121	121
					123
				124	124
					126
			127	127	127
					129
		13		130	130
					132
			133	133	133
					135
				137	137
					138
			140	140	140
					142
				143	143
					145
			147	147	147
					149
15	15	15		150	150
					152
			154	154	154
					156
				158	158
		16			160
			162	162	162
					164
				165	165
					167
			169	169	169
					172
				174	174
					176
			178	178	178
	18	18			180
				182	182
					184
			187	187	187
					189
				191	191
					193
			196	196	196
					198
		20		200	200
					203
			205	205	205
					208
				210	210
					213

E6	E12	E24	E48	E96	E192
22	22	22	215	215	215
					218
				221	221
					223
			226	226	226
					229
				232	232
					234
		24	237	237	237
					240
				243	243
					246
			249	249	249
					252
				255	255
					258
			261	261	261
					264
				267	267
		27			271
			274	274	274
					277
				280	280
					284
			287	287	287
					291
				294	294
		30			298
			301	301	301
					305
				309	309
					312
			316	316	316
					320
				324	324
					328
	33	33	332	332	332
					336
				340	340
					344
			348	348	348
					352
				357	357
		36			361
			365	365	365
					370
				374	374
					379
			383	383	383
		39			388
				392	392
					397
			402	402	402
					407
				412	412
					417
			422	422	422
		43			427
				432	432
					437
			442	442	442
					448
				453	453
					459

E6	E12	E24	E48	E96	E192
47	47	47	464	464	464
					470
				475	475
					481
			487	487	487
					493
				499	499
		51			505
			511	511	511
					517
				523	523
					530
			536	536	536
					542
				549	549
	56	56			556
			562	562	562
					569
				576	576
					583
			590	590	590
					597
				604	604
					612
			619	619	619
		62			626
				634	634
					642
			649	649	649
					657
				665	665
					673
68	68	68	681	681	681
					690
				698	698
					706
			715	715	715
					723
				732	732
					741
		75	750	750	750
					759
				768	768
					777
			787	787	787
					796
				806	806
	82	82			816
			825	825	825
					835
				845	845
					856
			866	866	866
					876
				887	887
					898
			909	909	909
		91			920
				931	931
					942
			953	953	953
					965
				976	976
					988

*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

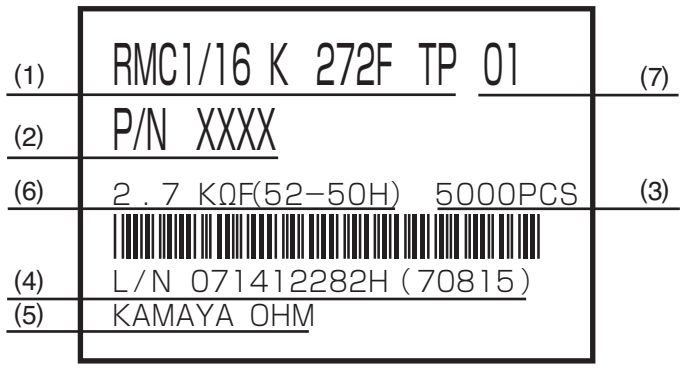
Direct Current	Power(P)			Voltage(E)			Current(I)			Resistance(R)		
Calculating Formula	EI	I^2R	$\frac{E^2}{R}$	IR	$\sqrt{PR}$	$\frac{P}{I}$	$\frac{E}{R}$	$\sqrt{\frac{P}{R}}$	$\frac{P}{E}$	$\frac{E}{I}$	$\frac{E^2}{P}$	$\frac{P}{I^2}$

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 1608size, 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 department, if you need to confirm this label specification.

RoHS Directive Compliance & REACH Action

1. RoHS Directive Compliance

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

(2) The following 6 materials are prohibited by RoHS directive.
-Lead(Pb) -Hexavalent Chromium
-Cadmium(Cd) -Polybrominated Bipheuyl(PBB)
-Mercury(Hg) -Polybrominated Diphenyl Ether(PBDE)

(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
Electrical and electronic components containing lead in a glass or ceramicother than dielectric ceramic in capacitors, e.g. piezoelectronic 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.

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 department about contained material of SVHC*3 in Kamaya product, which need permission in REACH regulation.

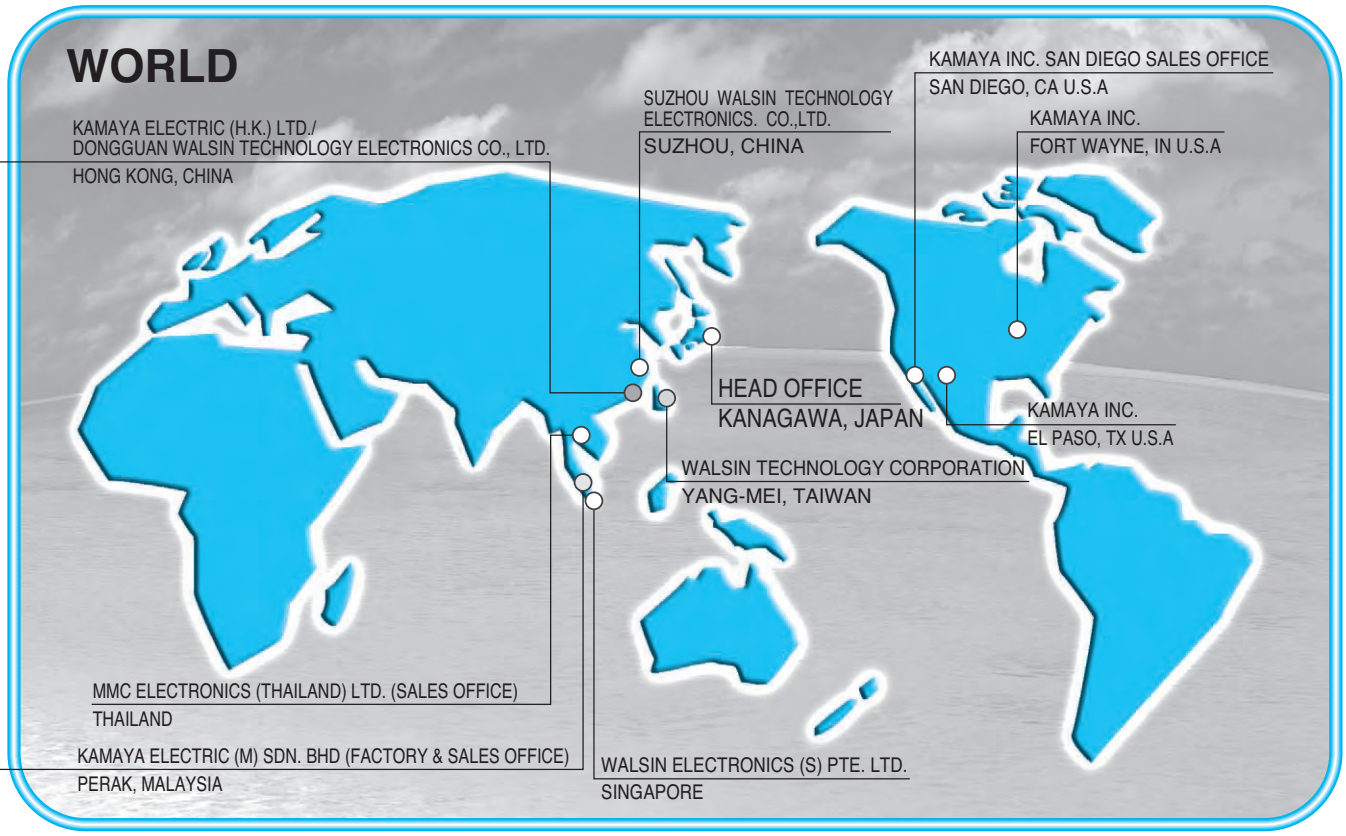
*1 RoHS Directive(The restriction of the certain hazardous substances in electrical and electronic equipment.)

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

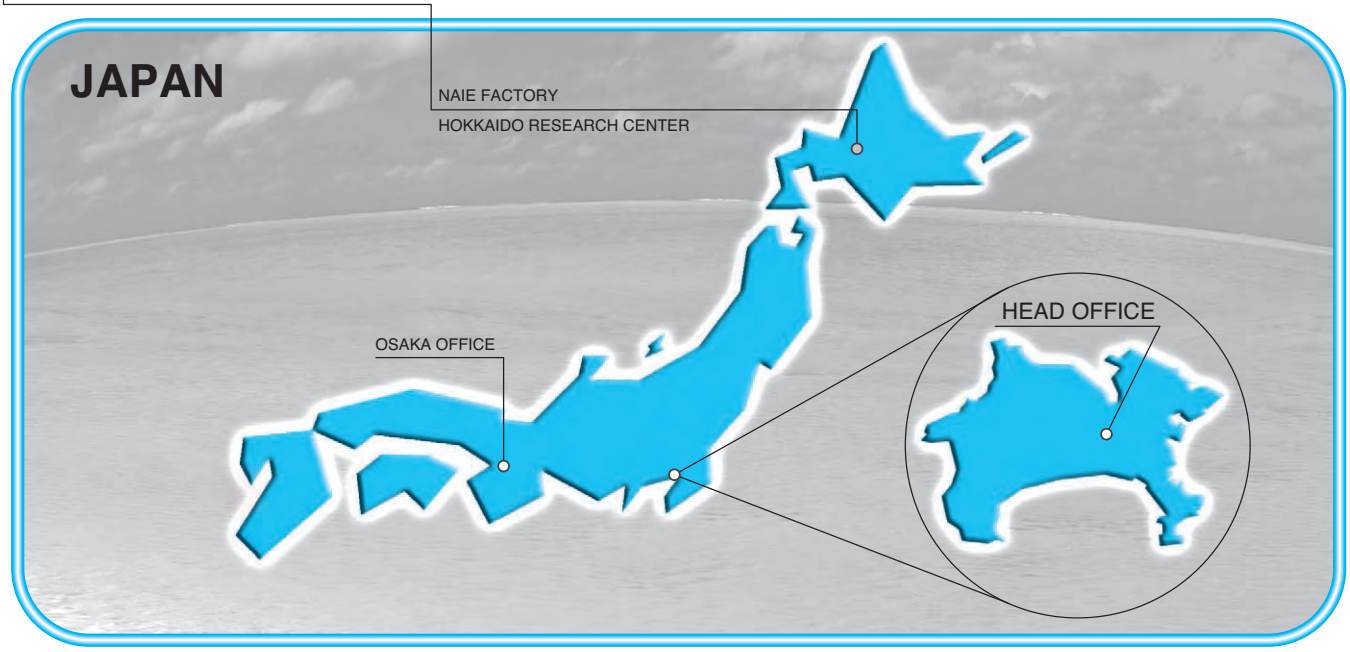
*3. SVHC (Substances of Very High Concern)
Substances in REACH regulation that especially affect the global environment and human body.
Please refer to ECHA (European Chemicals Agency) website for detail about SVHC in REACH regulation.

ECHA website :
(http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp)

•Kamaya Global Network



Application Facilities		Standard	Certification Organization	Certification No.	Certificate Date
JAPAN	NAIE Factory	ISO9001	Bureau Veritas JapanCo.,Ltd	2785613	Jul.28,1995
		ISO/TS16949		IATF 136837	Mar.22,2012
		ISO14001		3187686	May.9,2002
MALAYSIA	KAMAYA ELECTRIC(M)SDN, BHD.	ISO9001	NQA Global Assurance	22815	Aug.10,2007
		ISO/TS16949		IATF 0163981	Jul.26,2007
		ISO14001		E3242	Jul.11,2007
China (WALSIN Product)	DONGGUAN WALSIN TECHNOLOGY ELECTRONICS CO., LTD.	ISO9001	UL DQS Inc	20003508 QM08	May.21,1996
		ISO/TS16949		IATF 0173178	Mar.25,2005
		ISO14001	CTI International Certification	04112E20082R3L	Aug.13,2003
		OHSAS 18001	EICS	04111S18001R1L	Aug.14,2008



釜屋電機株式會社
KAMAYA ELECTRIC CO., LTD.

http://www.kamaya.co.jp

HEAD OFFICE
8-4-17 Fukayanaka, Ayase-shi, Kanagawa, 252-1107 Japan
Tel : (+81) 467-71-0886 / Fax : (+81) 467-71-0910

E-mail : sales@kamaya.co.jp

Osaka Office 6th floor, Sin Nakajima Building, 1-9-20 Nishi Nakajima, Yodogawa-ku, Osaka-shi, Osaka, 532-0011
TEL : (+81) 6-6304-5761 FAX : (+81) 6-6306-0131

Naie Factory, Hokkaido
Hokkaido Research Center 955-1 Naie, Aza, Naie-cho, Sorachi-gun, Hokkaido, 079-0397
TEL : (+81) 125-65-2171 FAX : (+81) 125-65-2177

U.S.A

KAMAYA INC. (SALES OFFICE AND WAREHOUSE)
URL http://www.kamaya.com/
6407 Cross Creek Blvd. Fort Wayne, IN 46818 U.S.A.
Tel : (+1) 260-489-1533 / Fax : (+1) 260-489-2261 / E-mail : sales@kamaya.com

KAMAYA INC. (SAN DIEGO SALES OFFICE)
4163 Cleveland Ave #1 San Diego, CA 92103 U.S.A.
Tel : (+1) 858-775-6050 / Fax : (+1) 619-284-8749

KAMAYA INC. (EL PASO WAREHOUSE)
28-A Concord Street, El Paso, TX 79906 U.S.A.
Tel : (+1) 915-779-7253 / Fax : (+1) 915-779-7180 / E-mail : sales@kamaya.com

TAIWAN

WALSIN TECHNOLOGY CORPORATION
566-1, Kao-shi Road Yang-mei, Taoyuan, 326, Taiwan, R.O.C.
Tel : (+886) 3-4758711 / Fax : (+886) 3-4756747

MALAYSIA

KAMAYA ELECTRIC (M) SDN. BHD. (1ST FACTORY AND SALES OFFICE)
No. 2, Jalan Klebang 1/5 Zone, Perindustrian Bebas, Kinta Jalan Kuala Kangsar,
31200 Chemor, Perak, Malaysia.
Tel : (+60) 5-291-5522 / Fax : (+60) 5-291-2600 / E-mail : generalinfo@kamaya.com.my

KAMAYA ELECTRIC (M) SDN. BND. (2ND FACTORY)
No. 17, Jalan Klebang 1/6 Zone, Perindustrian Bebas, Kinta Jalan Kuala Kangsar,
31200 Chemor, Perak, Malaysia.

HONG KONG

KAMAYA ELECTRIC (H.K.) LTD.
NO.638, Mei Jing West Road (523799) Xiniupo Administrative Zone
Dalang Town, Dong-Guan City, Guang Dong Province, China.
Tel : (+86) 769-8106-9331 / Fax : (+86) 769-8895-3204

CHINA

SUZHOU WALSIN TECHNOLOGY ELECTRONICS. CO.,LTD.
NO.369 Changyang Street, Suzhou Industrial Park, Jiangsu P.R. 215024 China.
Tel : (+86) 512-6283-6888 / Fax : (+86) 512-6283-0886 / E-mail : kamayasales@kamaya.co.jp

SINGAPORE

WALSIN ELECTRONICS (S) PTE. LTD.
8 Ubi View #04-01, Serial System Building,Singapore 408554.
Tel : (+65) 6896-3868 / Fax : (+65) 6861-3381

THAILAND

MMC ELECTRONICS (THAILAND) LTD.
129/2 Moo17 Bangplee Industrial Estate, Bangsaothong,
Bangsaothong Sub-District Samutprakarn 10540 Thailand
Tel : (+66) 2-705-1346 / Fax : (+66) 2-315-1565 / E-mail : mmethsa@mmeth.co.th

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Important

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

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