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http://www.kamaya.co.jp

Product Line-Up (2021,11)

	Develop				Design				Chi	p Size (I	nch)				
	Produc	ts Cate	gory	Product Type	Page	01005	0201	0402	0603	0805	1206	1210	2010	2512	
	Automotiv	arada		RMC	4		*						*	*	
	Automotive	egrade		NEW RACA	5						NEW				
				RMC	6						•	•			
		Precisio	n	RGC	7										
		High Pre	ecision	RNC	8										
	General	Pb Free		RMPC	9	NEW									
	purpose	High Po	wer	RMCH	10			NEW							
			Wide Terminal	TWMC	11										
		Anti Sulfuration	Barrier / Special electrode	RMGW	12										
		Guilulation	Special electrode type	RMAW	13										
	Trimmable	chip		FCR	14										
	High ohmi	C		RHC	15										
				RVC	16										
	High Voltage	h tage Special High Voltage		RZC	17										
Chip Resistors	Voltago	Anti-Sul	furation	NEW RVAC	18						NEW				
				RPC	20										
	Anti Surgo	High Po	wer	RPCH	21			NEW							
	Anti Surge	Anti-Sul	furation type	RBX	22				NEW	NEW	NEW	NEW			
		High Pov	ver / Anti-Sulfuration	RPGW	23				NEW	NEW	NEW	*			
		Face Do	own type	RCC	25										
		General	purpose type	RLC	26										
				RLP	28										
	sensing	Motal pl	ata tupa	MLP	30					*					
	Contoining		ale lype	NEW MLP63C	32									NEW	
				WLP63	33									NEW	
		Wide Te	rminal General type	TWLC	34						NEW			NEW	
	Fusible Res	sistors		FRC	35										
	Networks			RAC	36										
	NELWOINS	Anti Su	Ifuration	NEW RAAW	37										

Products Category	Product Type	Page	01005	0201	0402	0603	0805	1206	1210	2010	2512	
Linear Positive T-C Chip Thermistors	LTC	38										

	Products Category	Product Type	Page	01005	0201	0402	0603	0805	1206	1210	2010	2512	
	General Purpose	FCC / FHC	40				•	•	•				
	In-rush Withstand / Low ohm Fast Acting	FMC	42			•	•						
Chip Fuse	General Purpose Low ohm	FCCR	44										
	Slow Blow	SBF32	45										
	High Rated Voltage	HFC32	46										

Products Category	Product Type	Page	01005	0201	0402	0603	0805	1206	1210	2010	2512	
Chip Attenuators	RAC101A	48										

Products Category	Product Type	Page	01005	0201	0402	0603	0805	1206	1210	2010	2512	
	SPC	49										
ESD Suppressors	HSPC	49				•						
	SPGA	50		NEW								

Broducto Cotogony	Droduct Type	Dogo	Rated Dissipa	tion at 70°C (W)	
Products Category	Product Type	Faye	0.25W	0.5W	
Lead Resistors Carbon Composition	RC	54			

	Products Category	Page	Chip Type	Lead Type	
Canacitara	Multilayer Ceramic Capacitor	56	01R5 ~ 2225inch		
Capacitors	Film Capacitors	59			

** : Under Development

Information	Page		Information	Page
Application for Automotive	2	:	Packaging for Surface Mount Devices	52
RoHS Directive Compliance & REACH Action	3		Packaging for Leaded Resistors	55
Anti Surge Chip Resistor Selection Guide	19		Inductor/Balun	60
Low Resistance Chip Resistor for Sensing Selection Guide	24			
Chip Fuse Selection Guide	39			
Support of Chip Fuses Selection	47	1		

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	Chi	p Size (In	ch)		Tolerance on Rated	Rated Resistance	Situ	ation for	environ	nent		Demo
0202	0404	0204	0804	2406	Resistance (%)	Range	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					±0.5, ±1, ±2, ±5	$1\Omega \sim 24 M\Omega$	•			•	RMC	4
			NEW		±1, ±5	$1\Omega \sim 1 M \Omega$					NEW RACA	5
					±0.5, ±1, ±2, ±5	$1\Omega \sim 24 M\Omega$				•	RMC	6
					±0.1, ±0.5, ±1	$3.3\Omega \sim 4.7 M\Omega$				•	RGC	7
					±0.1, ±0.25, ±0.5, ±1	$10\Omega \sim 330 k\Omega$				•	RNC	8
					±1, ±5	$1\Omega \sim 10 M\Omega$					RMPC	9
					±0.5, ±1, ±5	$1\Omega \sim 1M\Omega$					RMCH	10
					±1, ±5	$1\Omega \sim 1M\Omega$					TWMC	11
					±0.5, ±1, ±5	$1\Omega \sim 10 M\Omega$					RMGW	12
					±0.5, ±1, ±5	$1\Omega \sim 10 M\Omega$					RMAW	13
					0 -30, ±15	$1\Omega \sim 4.7 M\Omega$					FCR	14
					±5, ±10, ±20, ±30, ±50	$100 M\Omega \sim 150 G\Omega$					RHC	15
					±0.5, ±1, ±2, ±5, ±10	$47\Omega \sim 51 M\Omega$					RVC	16
					±5, ±10, ±20	$1M\Omega \sim 16M\Omega$					RZC	17
					±0.5, ±1, ±5	$47\Omega \sim 51 M\Omega$					NEW RVAC	18
					±5, ±10, ±20	$0.27\Omega \sim 22 M\Omega$					RPC	20
					±0.5, ±1, ±5	$1\Omega \sim 1M\Omega$					RPCH	21
					±0.5, ±1, ±5	$1\Omega \sim 1M\Omega$					RBX	22
					±0.5, ±1, ±5	$1\Omega \sim 1M\Omega$					RPGW	23
					±1, ±5	$10m\Omega \sim 100m\Omega$					RCC	25
					±1, ±2, ±5	$50m\Omega \sim 10\Omega$					RLC	26
					±1, ±5	$1m\Omega \sim 15m\Omega$					RLP	28
					±1, ±5	$0.5m\Omega \sim 10m\Omega$					MLP	30
					±1, ±5	$0.5m\Omega \sim 10m\Omega$					NEW MLP63C	32
					±1, ±2, ±5	$1m\Omega \sim 100m\Omega$					WLP63	33
					±1, ±5	$100m\Omega \sim 910m\Omega$					TWLC	34
					±5	$1\Omega \sim 100\Omega$					FRC	35
					±1, ±5	$1\Omega \sim 1M\Omega$					RAC	36
NEW		NEW			±1, ±5	$10\Omega \sim 1 M \Omega$					NEW RAAW	37

0202	0404	0204	0804	2406	Tolerance on Rated Resistance (%)	Rated Resistance Range	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					±5	$33\Omega \sim 10 k\Omega$					LTC	38

0202	0404	0204	0804	2406	Tolerance on Rated Resistance (%)	Rated Resistance Range	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					±5	$33\Omega \sim 10 k\Omega$					LTC	38
0202	0404	0204	0804	2406	Rated Current	Fusing Characteristics	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					$0.15 A \sim 5.0 A$	Fast-Acting type					FCC / FHC	40
					$0.5 ext{A} \sim 5.0 ext{A}$	Fast-Acting type	•	•	•	•	FMC	42
					$0.15 A \sim 2.5 A$	Fast-Acting type					FCCR	44
					$1.0A \sim 8.0A$	Slow Blow type	•			•	SBF32	45
					$1.0 {\sf A} \sim 12.5 {\sf A}$	Fast-Acting type					HFC32	46
0202	0404	0204	0804	2406	Attenuation Factor	Tolerance on Attenuation Factor	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					$1 \mathrm{dB} \sim 10 \mathrm{dB}$	±0.3dB, ±0.4dB					RAC101A	48

0202	0404	0204	0804	2406	Attenuation Factor	Tolerance on Attenuation Factor	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
					$1 \mathrm{dB} \sim 10 \mathrm{dB}$	±0.3dB, ±0.4dB					RAC101A	48

0202	0404	0204	0904	2406	Ca	pacitar	nce	Test V	oltage	Bolle	Dh fraa	Halogen	Antimony	Product Type	Page
0202	0404	0204	0004	2400	0.1pF	0.2pF	0.5pF	8kV	15kV	КОПЭ	Pullee	free	free	Floudet Type	гауе
								•						SPC	49
													•	HSPC	49
														SPGA	50

	Tolerance on Rated Resistance (%)	Rated Resistance Range	RoHS	Pb free	Halogen free	Antimony free	Product Type	Page
	±10, ±20	$1\Omega \sim 22 M\Omega$					RC	54

Capacitance	Dielectric	Rated Voltage	Products	Product Type	Page
$0.1 m pF \sim 220 \mu F$	NP0, X7R, Y5V, X5R	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 2kV, 3kV, 4kV	Walsin	Conceitere	56
$0.001 \mu F \sim 65 \mu F$			Nitsuko	Capacitors	59

Information Page	Information	Page
Handling Manual	Product Marking	
· SMD Products	Standard Resistance	Values and Symbols 69
· Recommended Land Pattern 64	Kamaya Shipping Lat	pel
· Recommended Soldering Condition	Kamaya Global Networ	k 72



Application for Automotive



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

RoHS Directive Compliance & REACH Action

1. RoHS Directive Compliance

- (1) All Kamaya products are in compliance with RoHS directive^{*1}.
- (2) The following 10 materials are prohibited by RoHS directive.
 - · Lead(Pb)
 - Cadmium(Cd)
 - Mercury(Hg)
 - Bis(2-ethylhexyl) Phthalate(DEHP)
 - Bibutyl Phthalate(DBP)

- Hexavalent Chromium
- Polybrominated Bipheuyl(PBB)
- Polybrominated Diphenyl Ether(PBDE)
- Butylbenzyl Phthalate(BPP)
- Disobutyl Phthalate(DIBP)

(3) PbO is content in glass materials of Kamaya products.

However, this is exception stated by RoHS directive. Directive 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 7(c)-I \Rightarrow Directive(EU)2015/863 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 July 2019 7(c)-I. Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. 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.
- *1 RoHS Directive(The restriction of the certain hazardous substances in electrical and electronic equipment.)

2. Kamaya REACH Action

Kamaya produce and develop our products in compliance with REACH² which is effective since June 2007. Please contact Kamaya sales dept about contained material of SVHC³ in Kamaya product, which need permission in REACH regulation.

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

*3. SVHC (Substances of Very High Concern)

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

ECHA website :

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

3. Reduction of environmentally hazardous substances

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

*1 Pb-free

Products defined as Pb-free satisfy the following requirements.

Pb≦1000 ppm

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

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

*3. Antimony-free

Products defined as antimony free meet the following requirements. Antimony trioxide (Sb₂O₃) content \leq 900 ppm

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

Automotive grade

Chip Resistors

KAMAYA OHM http://www.kamaya.co.jp

Automotive grade RMC

• Features 1. Kamaya automotive grade product is produced in dedicated automotive line by only operaters with Kamaya internal approval and well-trained Product design is same as consumer application grade product.
 Process design has criteria, re-work limitation, 15 year-keep sample of important key process.

Dimensions



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

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

AEC-Q200

Antimony Free

Halogen Free

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

Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	10Ω 1~3.92 4.02~9.76	Rated Resistand 100Ω	ce Range 1MΩ	10ΜΩ	Tolerance on Rated Resistance	Temper of Code	ature Coefficient Resistance 10 ^{-6/°} C +600 ~ -200 +350 ~ -100	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range °C
	(0201)	(1.0A)	1~976	10.4 11	1.1M ~ 10	N		-	±200			-
RMC10	1005 (0402)	0.1 (1.0A)		10~1M	1.02M ~ 3.3M		G,J D,F D,F,G,J	<u> </u>	±200 ±100 +200	50		
	1000	0.1	1~9.76	10~3.3M			F,J F,G,J G,J	-	±200		100	
RMC16	(0603)	(2.0A)				3.6M ~10M 11M ~ 22M	G,J F	к — К	±100 ±200 ±100 +200	75		
RMC20	2012	0.125	1~9.76	10~2.2M			F,G,J G,J D,F	— — К	±200 ±100	150		-55~+155
	(0805)	(2.0A)						-	±200 ±200			
PMC22	3216	0.25	1~9.76	10~1M			F,G,J G,J		±200			
RIVIC32	(1206)	(2.0A)			1.02M ~ 1	0M 11M ~ 24M	F,G,J J		±200		500	
RMC35	3225 (1210)	0.5 (2.0A)	1~9.76	10 ~ 9.1kΩ 10 ~ 9.76kΩ			F,J G,J D.F	— — К	±200 ±100	200		
★RMC50	5025 (2010)	0.75 (2.0A)	1~9.76	$10 \sim 9.1 k\Omega$ $10 \sim 9.76 k\Omega$			F,J G,J F	к — —	±200			
★RMC63	6332 (2512)	1.0 (2.0A)	1~9.76	<u>10~9.1kΩ</u> 10~9.76kΩ			F,J G,J F	— — К	±200 ±100			

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

** : Under Development



Chip Resistors Chip Network

http://www.kamaya.co.jp KAMAYA OHM

NEW **Automotive grade RACA**

Halogen Free **Antimony Free**

AEC-Q200

• Features 1. Kamaya automotive grade product is produced in dedicated automotive line by only operaters with Kamaya internal approval and well-trained Product design is same as consumer application grade product.
 Process design has criteria, re-work limitation, 15 year-keep sample of important key process.

Dimensions



Note. Please contact Kamaya sales dept for the detail of marking on the over coating. Unit :												
Style	Terminal Style	L	W	Н	Q1	*Q2	а	b	*P	*Unit weight/pc.		
RACA104D	С	2.0±0.1	1.0±0.1	0.35 ± 0.10	0.3 ±0.1	0.4 ±0.1	0.2 ± 0.1	0.25±0.15	0.5	2.2mg		
RACA164D	C	3.2±0.15	1.6±0.15	0.5 ± 0.1	0.45 ± 0.15	0.65 ± 0.15	0.3±0.15	0.3 ±0.2	0.8	7mg		

*Values for reference

Ratings

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

Note1. E24 series is available , E96 series is available for tolerance"F"(1%).

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

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

Note5. Jumper : Resistance Value is less than 50m ohm. Note6. Rated Dissipation is the element rated dissipation. Refer to Derating Curve on page 66



Chip Resistors General purpose

KAMAYA OHM http://www.kamaya.co.jp

RMC

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Halogen Free
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Antimony Free

• Features 01005 to 2512 inch size and Jumper chip available. Precise dimension by Laser-scriber method (RMC1/20,RMC1/32).

<

Dimensions



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

тивления в аканалетог та с когланос схертению ило, кине ило а кине изе акине изе куре.											
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.			
RMC1/32	0402	01005	0.4±0.02	0.2 ±0.02	0.13±0.02	0.08 ± 0.03	0.1 ±0.03	0.035mg			
RMC1/20	0603	0201	0.6±0.03	0.3 ± 0.03	0.23 ± 0.03	0.1 ±0.05	0.15 ± 0.05	0.16mg			
RMC1/16S	1005	0402	1.0±0.05	0.5 ± 0.05	0.35 ± 0.05	0.2 ±0.1	$0.25 \ ^{+0.05}_{-0.10}$	0.6mg			
RMC1/16	1608	0603	1.6±0.1	$0.8 \ ^{+0.15}_{-0.05}$	0.45±0.10	0.3 ±0.1	0.3 ±0.1	2mg			
RMC1/10	2012	0805	2.0±0.1	1.25 ±0.10	0.55±0.10	0.4 ±0.2	0.4 ±0.2	5mg			
RMC1/8	3216	1206	3.1±0.1	1.6 ±0.15	0.55 ± 0.10	0.5 ±0.25	0.5 ± 0.25	9mg			
RMC1/4	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.5 ±0.25	0.5 ± 0.25	16mg			
RMC1/2	5025	2010	5.0±0.15	2.5 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	25mg			
RMC1	6332	2512	6.3±0.15	3.2 ±0.15	0.55±0.15	0.6 ±0.2	0.6 ±0.2	40mg			
							*Value	es for reference			

Website for Marking.

Ratings

	0												
Stule	Size	Rated Dissipation		Rated Resist	tance Range			Tolerance	Tempera	ature Coefficient	Limiting Element	Insulation	Category Temperature
Style	(Inch)	W at 70 C	10Ω	100Ω	1MΩ	10N	/Ω	Resistance	Code	10-6/°C	Voltage	Voltage	°C
DMC1/22	0402	0.03	4.7 ~ 9.1					J	-	$+600 \sim -200$	15		55-1125
KIVIC 1/32	(01005)	(0.5A)	10	~ 91	~ 1M			F,J		± 300 + 200	15		-55/0 + 125
	0000	0.05	1~3.92	100				E.I		+ 600 ~- 200		50	
RMC1/20	(0201)	(1 0A)	4.02 ~ 9.76	10~1M				D,F,G,J		+ 350 ~- 100	25		
	(0201)	(1~9.76		1.1N	1~10M		F,J		± 200			-
D 11011100	1005	0.1	1 - 5.70	10~1M				G,J	-	± 200			
RMC1/16S	(0402)	(1.0A)			1.02M ~ 3	.3M		D,F D,F,G,J	<u>к</u>	± 100			
			1 0.70			3.6M ~ 10M		F,J	-	± 200	50	100	
	1000	0.4	1~9.76	10~	3 3M			G,J	_	$\pm 200 \sim -200$	50	100	
RMC1/16	1608	(2 0A)			0.01	3.6M	i	D,F G,J	К	± 100 + 200			
	(0000)	(2.07)				~ 10M	1114-0014	F	К	± 100			
			1~9.76				1111/1~221/1	F,G,J	_	$+500 \sim -200$			1
	2012	0.125		10~2.2N	1 -			G,J D F	— К	± 200 + 100	1.50		
RMC1/10	(0805)	(2.0A)			221	M~3.3M		D,F,G,J	-	± 200	150		
						3.6M~10M	11M~22M	F,G,J J	_	± 200			-55~+155
	2016	0.25	1~9.76	<u> </u>				F, G, J		$+500 \sim -200$ + 200	-		
RMC1/8	(1206)	(2 0A)		10~1M	1.001	4 4014		D,F	К	± 100			
	(1200)	(2.0/1)			1.020		11M~24M	F, G, J J	-	± 200			
	2005	0.5	1~9.76	<u> </u>				F, J G, J		$+500 \sim -200$ + 200		500	
RMC1/4	(1210)	(2 0A)		10~1M	1.020	4 1014		D,F	К	± 100			
	(1210)	(2:0/1)			1.020		11M~22M	F,G,J J	-	± 200	200		
	5025	0.75	1~9.76	10 111				F, J G, J		$\pm 200 \sim -200$			
RIVIC1/2	(2010)	(2.0A)		10~1M		1.1M~22M		F	K	± 100 + 200			
		1	1~9.76	1 1 1		1.1111 22111	;	F. J		$+500 \sim -200$	1		
RMC1	6332	1.0		10~1M				G, J	— —	± 200	1		
	(2512)	(2.0A)	· · · · · · · · · · · · · · · · · · ·	1 1 1		1 1M ~ 22M	:	F	<u> </u>	± 100 + 200			

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

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

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

Note5. Jumper : Resistance value is less than 50m ohm.

Part Number Description

6





General purpose

http://www.kamaya.co.jp KAMAYA OHM

Halogen Free

AEC-Q200

RGC

Antimony Free

≥

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

Dimensions L

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.

473	
C	C

	RGC1/16S,1/20 : only No marking is available.												
	Style	Metric	Inch	L	W	Н	с	d	*Unit weight/pc.				
	RGC1/20	0603	0201	0.6 ± 0.03	0.3 ±0.03	0.23 ± 0.03	0.1 ± 0.05	0.15±0.05	0.16mg				
	RGC1/16S	1005	0402	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.2 ± 0.1	$0.25 \substack{+0.05 \\ -0.10}$	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	10	Rat Ω	ed R 100	esistance Ω 1k i	Range Ω 1	MΩ	Tolerance on Rated Resistance	Tempera of R Code	ture Coefficient esistance 10 ⁻⁶ /°C	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range °C
RGC1/20	0603	0.05			5	51~976			B(±0.1%)	К	±100	25	50	
1100 1/20	(0201)	0.00					$1k \sim 1M$		D(±0.5%)	С	± 50	20	00	
				10~9	97.6				B(+0.1%)	К	±100			
RGC1/16S	1005 (0402)	0.063				100 -	~ 1M		D(±0.5%)	С	± 50			
	(***=)							$1.02M \sim 3.3M$	F(±1%)	К	±100			
			3.3 ~ 9.76						D(±0.5%), F(±1%)	K	+ 100	50		
PCC1/16	1608	0.1		10~9	97.6				B(±0.1%)	ĸ	± 100			-55~+155
RGC 1/10	(0603)	0.1				100 -	~ 1M		D(±0.5%)	С	± 50	1	100	
								1.02M ~ 3.3M	F(±1%)	K	±100			
DCC1/10	2012	0.105	3.3 ~ 9.76						D(±0.5%), F(±1%)	<u> </u>	+ 50	150		
RGC 1/10	(0805)	0.125				10~	3.3M	·	B(±0.1%), D (±0.5%), F (±1%)		<u> </u>	150		
PCC1/9	3216	0.25	3.3 ~ 9.76						F(±1%)	6	+ 50	200		
KGC I/o	(1206)	0.25				10~	4.7M		B(±0.1%), D (±0.5%), F (±1%)		<u> </u>	200		

Note1. E24, E96 are available for "F"(1%), "D"(0.5%) and "B"(0.1%) 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



Chip Resistors General purpose

KAMAYA OHM http://www.kamaya.co.jp

RNC

Halogen Free Antimony Free

Pb Free

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

Dimensions

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



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

*Values for reference

Ratings

Style	Size Rated Dissipation Metric at 70°C Rated Resistance		Tolerance on	Tempera of F	ture Coefficient Resistance	Limiting Element Voltage	Preferred Number Series for	Insulation Voltage	Category Temperature Range	
	(Inch)	W	Range	Rated Resistance	Code	10⁻⁰/°C	V	Resistors	V	°C
			1000~10k0	B(+0.1%)	E	±25				
PNC06	0603	0.05	10022 - 10822	D (<u>+</u> 0.170)	С	±50	15			
TRIVE 00	(0201)	0.03	270~10k0	D (±0.5%)	E	±25	15			
			2732 10832	F (± 1%)	С	±50			50	
RNC10	1005	0.063	100~100k0	B (±0.1%)	E	±25	25			
INCIO	(0402)	0.000	1022 100822	D (±0.5%)	С	±50	20	E96 E24		
PNC16	1608	0.063	100 - 22040	B (±0.1%)	Е	±25	50			$-55 \sim +155$
KINCTO	(0603)	0.003	1012 ~ 330K12	D (±0.5%)	С	±50	50			
	2012		100Ω~130kΩ	B (±0.1%)					100	
RNC20	(0805)	0.1	10Ω~130kΩ	C (±0.25%) D (±0.5%)	E	+25	100		100	
RNC32 3216 (1206) 0.125 100 10			100Ω~180kΩ B (±0.1%)			-25				
		10Ω~180kΩ	C (±0.25%) D (±0.5%)			200				

Note1. Rated Voltage = $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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.



Chip Resistors

http://www.kamaya.co.jp KAMAYA OHM

Antimony Free

RMPC

Halogen Free

Pb Free

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

Dimensions



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

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

Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Resistance Range	d Resistance Range Code 10 ^e /°C		Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range °C
			$1\Omega \sim 9.76\Omega$		$+800 \sim -100$	J (±5%)			
NEW RMPC04	0402 (01005)	0.03 (0.5A)	$10\Omega \sim 97.6\Omega$]	$+600 \sim 0$		15		
	(*****/		$100\Omega \sim 1 M\Omega$]	±200]		50	
			$1\Omega \sim 9.76\Omega$		$+800 \sim -100$			50	
RMPC06	0603 (0201)	0.05 (1.0A)	$10\Omega \sim 97.6\Omega$		$+600 \sim 0$		25		
			$100\Omega \sim 10 M\Omega$		±200				
RMPC10	1005 (0402)	0.063 (1.0A)				= (, , , , ,)	50	100	-55 au± 125
RMPC16	1608 (0603)	0.1 (1.0A)	10 ~ 0.760		$+800 \sim -100$	F (±1%) J (±5%)	50	100	-55**+125
RMPC20	2012 (0805)	0.125 (2.0A)	$\frac{100 \sim 97.6\Omega}{100 \sim 97.6\Omega}$	_	$+500 \sim -200$		150		
RMPC32	3216 (1206)	0.25 (2.0A)	$100\Omega \sim 10 M\Omega$		±200		200	500	
RMPC35	3225 (1210)	0.33 (2.0A)					200		

Note1. E24 series is available , E96 series is available for tolerance"F"(1%),

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

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

Note5. Jumper : Resistance value is less than 50m ohm.



High power

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

RMCH

Halogen Free

AEC-Q200

Antimony Free

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

Dimensions



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

MCH16 : only 3 digits marking is available. Unit												
Style Metric Inch L W H c d *Uni												
NEW RMCH10	1005	0402	1.0±0.05	0.5 ± 0.05	$0.35 {\pm} 0.05$	0.2 ± 0.15	$0.25 \stackrel{+ 0.05}{- 0.10}$	0.6mg				
RMCH16	1608	0603	1.6 0.1	0.8 + 0.15 - 0.05	0.45±0.10	0.3 ± 0.2	0.3 ±0.1	2mg				
RMCH20	2012	0805	2.0±0.1	1.25±0.10	0.55 ± 0.10	0.3 ± 0.2	0.4 ±0.2	5mg				
RMCH32	3216	1206	3.1±0.1	1.6 ±0.15	0.55 ± 0.10	0.3 ± 0.2	0.5 ± 0.25	9mg				
RMCH35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.3 ± 0.2	0.5 ± 0.25	16mg				
*Values for reference												

Ratings

Style	Size Metric	Rated Dissipation at 70°C	Rated Resistance	Temper of	ature Coefficient Resistance	Tolerance on	Limiting Element Voltage	Insulation Voltage	Category Temperature Range	
	(Inch)	W	Range	Code	10 ⁻⁶ /°C	Rated Resistance	V	V	°C	
RMCH10	1005 (0402)	0.125		1	I	1	50	100		
RMCH16	1608 (0603)	0.25	1Ω ~ 9.76Ω		±200	D (±0.5%)	150	150		
DMCUDO	2012	0.4	$10\Omega \sim 1M\Omega$	к	±100	F (± 1%)				
RMCH20	(0805)	0.4	10 ~ 910	_	+200				-55~+155	
DMCU22	3216	0.5			-200	.1 (± 5%)	200	500		
RIVICH32	(1206)	0.5	$10\Omega \sim 1M\Omega$	ĸ	±100	0 (_ 0,0)	200	500		
RMCH35	3225 (1210)	0.75		I						

Note1. E24 series is available <u>, E96 series is available for tolerance</u>"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%). Note2. Rated Voltage=√(Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.



Chip Resistors Anti-Sulfuration & Wide termination

http://www.kamaya.co.jp KAMAYA OHM

Halogen Free

TWMC

Anti-Sulfuration

AEC-Q200

I Init · mm

Antimony Free

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

Dimensions



5		Rated re	sistance	is	marked	with	4-digit	on	the	over	coatin
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	Trated Teololarioe Is	o manea with	- aigit off the	over oouung.					01110 : 111111
	Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
t	TWMC32	1632	0612	1.6±0.2	3.2 ± 0.2	0.55 ± 0.1	0.5 ± 0.25	0.5 ± 0.25	9mg
	TWMC50	2550	1020	2.5±0.15	5.0±0.2	0.55 ± 0.1	0.6±0.2	0.6±0.2	25mg
	TWMC63	3263	1225	3.2±0.2	6.3±0.2	0.55 ± 0.1	0.6±0.2	0.6±0.2	40mg
1								*\/alı	les for reference

Ratings

Size Style Metri		Rated Dissipation at 70°C	Limiting Element Voltage	Rated Resistance	Temper of	ature Coefficient Resistance	Tolerance on	Insulation Voltage	Category Temperature Range
	(Inch)	W	V	Italiye	Code	10⁻⁰/°C		V	C
TWMC32	1632 (0612)	0.75							
TWMC50	2550 (1020)	1.0	200	1Ω~1MΩ	_	±200	F(±1%) J(±5%)	500	-55~+155
TWMC63	3263 (1225)	2.0							

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

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value. Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

Part Number Description

Example Style 1004 TE TWMC 50 .1 Product Type Tolerance on Rated Resistance F $\pm 1\%$ J $\pm 5\%$ Size Metric Code Inch Rated Resistance 1632 0612 32 50 2550 1020 e.g.:1004 = 1MΩ * Packaging & Standard Qty. (Min.) 63 3263 1225 В Bulk (Loose Package) 1,000pcs. All Style Temperature Coefficient of Resistance ±200×10⁻⁶/°C TWMC32 TΡ Paper Tape 5,000pcs. TWMC50 ΤE Embossed Tape 4,000pcs. TWMC63

*Refer to Tape and Packaging information on pages 52 and 53.

Chip Resistors Anti-Sulfuration

KAMAYA OHM http://www.kamaya.co.jp

<u>RMGW</u>

Halogen Free Antimony Free

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Anti-Sulfuration

AEC-Q200

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

≥

Dimensions

T.

Rated resistance value marking is with 3-digit (E24) or 4-digit (E96) on the over coating except RMGW10 & RMGW06.

173	
d	

4-digit marking is available for F tolerance except RMGW16 & RMGW10 & RMGW06. Unit											
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.			
RMGW06	0603	0201	0.6 ± 0.03	0.3 ± 0.03	$0.23\!\pm\!0.03$	0.15 ± 0.1	0.15 ± 0.05	0.16mg			
RMGW10	1005	0402	1.0±0.05	0.5 ± 0.05	$0.35{\pm}0.05$	0.2 ±0.1	0.25 +0.05 -0.10	0.6mg			
RMGW16	1608	0603	1.6±0.1	0.8 +0.15 -0.05	0.45 ± 0.10	0.3 ±0.1	0.3 ±0.1	2mg			
RMGW20	2012	0805	2.0±0.1	1.25±0.10	$0.55 {\pm} 0.10$	0.4 ± 0.2	0.4 ± 0.2	5mg			
RMGW32	3216	1206	3.1±0.1	1.6 ±0.15	0.55 ± 0.10	0.5 ± 0.25	0.5 ± 0.25	9mg			
RMGW35	3225	1210	3.1±0.15	2.5 ± 0.15	0.55 ± 0.15	0.5 ± 0.25	0.5 ± 0.25	16mg			
RMGW50	5025	2010	5.0±0.15	2.5 ±0.15	0.55 ± 0.15	0.6 ±0.2	0.6 ±0.2	25mg			
RMGW63	6332	2512	6.3±0.15	3.2 ±0.15	$0.55 {\pm} 0.15$	0.6 ± 0.2	0.6 ± 0.2	40mg			
							*Value	es for reference			

Ratings

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

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

Note2. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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.





http://www.kamaya.co.jp KAMAYA OHM

Halogen Free

AEC-Q200

RMAW

Anti-Sulfuration

Antimony Free

Special electrode structure, High anti-sulfuration performance, Line up Anti-sulfuration Chip Resistors. Special electrode type High anti-sulfuration performance electrode inside. Qualified for hydrogen sulfide test, H₂S: 3ppm, 40°C, 90%R.H., 1000h. Features

Dimensions



								Unit : mm
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
RMAW06	0603	0201	0.6 ± 0.03	0.3 ± 0.03	0.23 ± 0.03	0.1 ± 0.05	0.15 ± 0.05	0.16mg
							*Value	es for reference

Ratings

Style	Size Metric	Rated Dissipation at 70°C	Rated Resistance Range	Tem	perature Coefficient of Resistance	Tolerance on Rated	Limiting Element Voltage	Insulation Voltage	Category Temperature Range																		
	(Inch)	VV		Code	10-º/ C	Resistance	V	V	C																		
			1Ω~9.76Ω	_	+600~-200	F (± 1%) J (± 5%)																					
DMANA/00	0603	0.05(1.0A)	10Ω~49.9Ω	-	± 200	D(±0.5%)	05	50																			
RMAW06	(0201)		0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	0.05(1.0A)	51Ω~1MΩ	К	± 100	$J(\pm 5\%)$	25	50	-55~+155
			1.02MΩ~10MΩ	-	± 200	F (± 1%) J (± 5%)																					
					•																						

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



Trimmable

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

FCR

• Features Trimmable device and replaceable with various resistors.

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Dimensions



Unit : m									
Style	Metric	Inch	L	W	Н	С	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		Rated Dissipation	Combinations of Rate	ed Resistance Range and efficient of Resistance	Tolerance on	Limiting Element	Preferred Number	Insulation	Category Temperature Range	
otylo	(Inch)	W	Rated Resistance Range	Temperature Coefficient of Resistance 10 ⁻⁶ /°C	Rated Resistance	V	Resistors	V	°C	
FCR1/16	1608 (0603)	0.063	10Ω~4.7MΩ	±200		50		100		
FCR1/10	2012 (0805)	0.1				150				
FCR1/8	3216 (1206)	0.125			L(±15%)		E24		-550.+125	
FCR1/4	3225 (1210)	0.25	1Ω~9.1Ω 10Ω~4.7MΩ	$+500 \sim -200$ ± 200	-(0~-30%)	200	E24	500	-55. 4 125	
FCR1/2	5025 (2010)	0.5		1		200				
FCR1	6332 (2512)	1.0								

Note1. Rated Voltage = $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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.: $\pm 100 \times 10^{6}$ /°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

FCR		1/4			471		L		TE		
Product T	ype				Rated Resistance	Toler	ance on Rated Resistance		* Packaging & Stand	ard Qty. (I	Min.)
					E24 Series	—	+0%	В	Bulk (Loose Package)	1,000pcs.	All Style
			0.0		e.g. : 471=470Ω	L	±15%	TP	Paper Tape	5,000pcs.	FCR1/16 FCR1/10
		Rated Dissipation	& Size		_						FCR1/0
	Code	Rated Dissipation	Metric	Inch				TE	Embossed Tape	4,000pcs.	FCR1/4 FCR1/2
	1/16	0.063W	1608	0603	3				•		FCR1
	1/10	0.1W	2012	0805	5				*Refer to Tape and Packaging	information on	pages 52 and 53
	1/8	0.125W	3216	1206	5						
	1/4	0.25W	3225	1210							
	1/2	0.5W	5025	2010							
	1	1.0W	6332	2512	2						

http://www.kamaya.co.jp KAMAYA OHM

RHC

Halogen Free Antimony Free

• Features Suitable for compact instrumentation, infrared rays, sensors, etc.

Dimensions



								Unit : mm
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
RHC16	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
RHC20	2012	0805	2.0±0.1	1.25±0.10	0.55 ± 0.10	0.4 ± 0.2	0.4 ± 0.2	5mg
							*Valu	les 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	Insulation Voltage V	Category Temperature Range °C	
			100ΜΩ~270ΜΩ	J(± 5%)					
	1608		100MΩ~ 4GΩ	K(±10%)					
RHC16	RHC16 (0603)		100MΩ~150GΩ	M(±20%) N(±30%) H(±50%)	0~-2,000	F12	100	-55~+155	
	15		100MΩ~ 1GΩ	J(± 5%) K(±10%)	+2 000				
RHC20 (0805)			100MΩ~ 10GΩ M(±20%) N(±30%)					-55~+125	
	100	100GΩ~150GΩ	H(±50%)	±4,000					

Part Number Description

Example



High Voltage

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

RVC

Halogen Free

AEC-Q200 **Antimony Free**

• Features Higher Limiting Element Voltage compared with RMC series.

Dimensions



Rated resistance is marked with 3-digit (E24) or 4-digit (E96) on the over coating.

RVC16 : only 3-digit marking is available. Unit : r										
Style	Metric	Inch	L	W	Н	С	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

Size Rated Dissipat Style Metric at 70°C			Limiting Element Voltage	Combinations of Rate	ed Resistance Range and To	Temperature Coefficient		Insulation	Category Temperature Range	
otylo	(Inch)	W	V	D(±0.5%)	F(±1%) , G(±2%)	J(±5%) , K(±10%)	Code	10 ⁻⁶ /°C	Vollage	°C
DVC16	1608	0.1	250		$470\Omega \sim 10 M\Omega$		К	±100	100	
RVCIO	(0603)	0.1	350	$47\Omega \sim 464\Omega$			_	±200	100	
BVC20	2012	0.25	400	1009	$\Omega \sim 10 M \Omega$	$100\Omega\sim51M\Omega$	К	±100		
RVC20	(0805)	0.25	400		$47\Omega \sim 97.6\Omega$		—	±200]	
PV/C32	3216	0.25	800	1009	$\Omega \sim 10 M \Omega$	$100\Omega\sim51M\Omega$	К	±100		
110032	(1206)	0.25	000		$47\Omega \sim 97.6\Omega$		—	±200		-55~+155
PVC50	5025	0.5	2 000	$470\Omega \sim 10 M\Omega$	$470\Omega \sim 20 M\Omega$	$470\Omega \sim 51 M\Omega$	К	±100	500	
RVC30	(2010)	0.5	2,000		$47\Omega \sim 464\Omega$		—	±200		
				$560\Omega \sim 10 \text{M}\Omega \qquad 560\Omega \sim 20 \text{M}\Omega \qquad 560\Omega \sim 51 \text{M}\Omega$		К	±100			
RVC63	(2512)	1.0	3,000	$100\Omega \sim 549\Omega$			—	±200		
	($47\Omega \sim 97.6\Omega$			_	+500 ~ -200		

Note1. E24 series is available, E96 series is available for tolerance "D" (0.5%) and "F" (1%). Note2. Rated Voltage= $\sqrt{(Rated Dissipation)} \times (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)$ 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 Evample

EXa	imple														
		Styl	e ——									_			
	RVC	;	32		К	475				F		TP			
	1	T		-					Toleran	ice on Rate	ed Resistance		* Packaging & Stan	dard Qty. (Min.)
PI	oduct	Туре		Iempe	rature Coefficient of	Resistance			D	±0	.5%	R	Bulk (Loose Package)	1.000pcs	
				-	Standar	ď			F	±	1%	Ľ	Duik (20030 1 ackage)	1,0000003.	All Otyle
				K	±100×10	-6/°C			G	±	2%	-		5 000	RVC16
		Size				Rated F	Resistance	;	J	±	5%	111	Paper Tape	5,000pcs.	RVC20 RVC32
	Code	Metric	Inch			E24 Series			K	± ′	10%				R\/C50
	16 20	1608	0603			e.g. : 475=4.	7ΜΩ	3-Digit				TE	E Embossed Tape	4,000pcs.	RVC63
	32	3216	1206			E06 Sorios						*	Refer to Tape and Packaging info	ormation on page	ges 52 and 53.
	50	5025	2010			e.g. : 7154=7	7.15MΩ	4-Digit							
	63	6332	2512												

Chip **R**esistors Ultra High Voltage

http://www.kamaya.co.jp KAMAYA OHM

Halogen Free

RZC

Antimony Free



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

Dimensions



Rated resistace is marked with 3-digit(E24) on the over coating. Unit : n												
Style Metric Inch L W H c d *Unitw												
RZC50	5025	2010	5.0 ± 0.15	2.5 ± 0.15	0.55±0.15	0.6 ± 0.2	0.6±0.2	25mg				
RZC63 6332 2512 6.3±0.15 3.2±0.15 0.55±0.15 0.6±0.2 0.6±0.2 40mg												
	*\/alues 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	Insulation Voltage V	Category Temperature Range °C
RZC50	5025 (2010)	0.5	1500	2000		J(±5%)	+200	504		55 L 125
RZC63	6332 (2512)	1.0	2000	3000	1.0002~10002	M(±10%)	±200	E24	500	-55~+125

Note1. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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



Chip Resistors Anti-Sulfuration & High Voltage

• Features High voltage chip resistors combined with anti-sulfuration performance.

KAMAYA OHM http://www.kamaya.co.jp

RVAC

Anti-Sulfuration Halogen Free Antimony Free

AEC-Q200

Dimensions



Rated resistance value is marked with 3digits or 4digits on the over coating. Unit : r											
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.			
RVAC32	3216	1206	3.1±0.1	1.6±0.15	0.55±0.10	0.5±0.25	0.5±0.25	9mg			

*Values for reference

Ratings

Style	Size Metric	Rated Dissipation at 70°C	Combination Tolera	s of Rated Resista nce on Rated Res	nce Range of istance	Tempera of F	ature Coefficient Resistance	Limiting Element Voltage	Insulation Voltage	Category Temperature Range	
,	(Inch)	W	D(±0.5%)	F(±1%)	J(±5%)	Code	10 ⁻⁶ /℃	V	v	ິວິ	
DV (4,000	3216	0.25	100Ω ~	$100\Omega \sim 10M\Omega$ $100\Omega \sim 51M\Omega$				500	500	-5501+155	
RVAU32	C32 (1206) 0.25			$47\Omega \sim 97.6\Omega$		-	±200	500	500	-55. * + 155	

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

Note2. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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



*Refer to Tape and Packaging information on pages 52 and 53.

Chip Resistors Selection Guide

http://www.kamaya.co.jp KAMAYA OHM

Anti Surge Chip Resistors Selection Guide

Size Selection Guide

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

Characteristics Selection Guide

	Rated Dissipation	Surge Withstand Capability	Anti-Sulfuration Performance
RMCH	O	0	_
RPC	0	O	_
RPCH	Ø	Ø	_
RBX	0	0	0
RPGW	Ø	O	0

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

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

RPC

Halogen Free

AEC-Q200

Antimony Free

• Features Higher Anti surge performance compared with RMC series.

Dimensions



F	Rated resistance value is marked with 3-digit on the over coating.										
[Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.		
[RPC16	1608	0603	1.6±0.1	0.8 +0.15 -0.05	0.45±0.10	0.3±0.2	0.3±0.1	2mg		
ſ	RPC20	2012	0805	2.0±0.1	1.25±0.10	0.55±0.10	0.3±0.2	0.4±0.2	5mg		
ſ	RPC32	3216	1206	3.1±0.1	1.6 ±0.15	0.55±0.10	0.3±0.2	0.5 ± 0.25	9mg		
[RPC35	3225	1210	3.1±0.15	2.5 ± 0.15	0.55 ± 0.15	0.3±0.2	0.5 ± 0.25	16mg		
	RPC50	5025	2010	5.0±0.15	2.5 ± 0.15	0.55 ± 0.15	0.3±0.15	0.6±0.2	25mg		
Ì	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	Rated Dissipation	Combinations of Rate Temperature Co	ed Resistance Range and efficient of Resistance	Tolerance on	Limiting Element	Preferred Number	Insulation Voltage	Category Temperature
otylo	(Inch)	W	Rated Resistance Range	ce Temperature Coefficient of Resistance 10 ⁻⁶ /°C		V	Resistors	V	°C
PPC16	1608		1Ω~ 9.1Ω	±200	1(+ 5%)			150	
INF CTO	(0603)	0.25	10Ω~ 1MΩ	±100	J (± 576)	150		150	
RPC20	2012 (0805)	0.25				150			
RPC32	3216 (1206)	0.33	0.27Ω~0.91Ω	±200			E24		-55 - + 155
PDC25	3225	0.5	1Ω~ 1MΩ	±100	$J(\pm 5\%)$		E24	500	-55.9 + 155
RFC35	(1210)	0.5	1.1MΩ~22MΩ	±200	M(±20%)	200		500	
RPC50	5025 (2010)	0.75		1		200			
RPC63	6332 (2512)	1.0							

Note1. Rated Voltage= (Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage)

63

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)



*Refer to Tape and Packaging information on pages 52 and 53



http://www.kamaya.co.jp KAMAYA OHM

AEC-Q200

I Init · mn

RPCH

Halogen Free Antimony Free

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

Dimensions



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

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

Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70℃ W	Rated Resistance Range	Tempera of F Code	ature Coefficient Resistance 10 ⁻⁶ /°C	Tolerance on Rated Resistance	Limiting Element Voltage V	Insulation Voltage V	Category Temperature Range °C
RPCH10	1005 (0402)	0.2		L	l	1	50	100	
RPCH16	1608 (0603)	0.33	1Ω~9.76Ω	_	±200	D(±0.5%)	150	150	
RPCH20	2012	0.5	10Ω~1MΩ	к	±100	F (± 1%)			$-55 \sim \pm 155$
	(0805)	0.0	1Ω~9.1Ω	-	±200				00 1100
RPCH32	3216 (1206)	0.66	10Ω~1ΜΩ	К	±100	J (± 5%)	200	500	
RPCH35	3225 (1210)	0.75							

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

Note2. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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



*Refer to Tape and Packaging information on pages 52 and 53.

hip **R**esistors Anti-Sulfuration & Surge

KAMAYA OHM http://www.kamaya.co.jp

NEW RBX

Anti-Sulfuration Halogen Free AEC-Q200

Antimony Free

• Features Anti-surge chip resistor with anti-sulfuration performance.

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

Dimensions



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

RBX16 : only 3digits marking is available.										
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.		
RBX16	1608	0603	1.6±0.1	0.8 +0.15 -0.05	0.45±0.10	0.25±0.10	0.3 ±0.1	2mg		
RBX20	2012	0805	2.0±0.1	1.25 ± 0.10	0.55±0.10	0.3 ±0.2	0.4 ±0.2	5mg		
RBX32	3216	1206	3.1±0.1	1.6 ± 0.15	0.55 ± 0.10	0.4 ±0.25	0.5 ± 0.25	9mg		
RBX35	3225	1210	3.1±0.15	2.5 ±0.15	0.55±0.15	0.4 ±0.25	0.5 ±0.25	16mg		

*Values for reference

I Init : mn

Ratings

Style	Size Metric	Rated Dissipation at 70°C	Rated Resistance Range	Tempo	erature Coefficient of Resistance	Tolerance on Rated	Limiting Element Voltage	Insulation Voltage	Category Temperature Range
	(Inch)	W		Code	10 ⁻ °/℃	Resistance	V	V	C
RBX16	1608 (0603)	0.25					150	150	
DDV00	2012	0.00	1Ω~9.76Ω		±200	D (±0.5%)			
RBX20	(0805)	0.33	10Ω~1ΜΩ	К	±100	F (± 1%)			FF - 1 1 F
DBV32	3216	0.5	1Ω~9.1Ω	_	±200		200	500	-55~+155
INDA32	(1206)	0.5	10Ω~1ΜΩ	К	±100	J (± 5%)	200	500	
RBX35	3225 (1210)	0.75							

Note1. E24 series is available , <u>E96 series is available for tolerance</u>"F"(1%), E96 series is available for tolerance D (±0.5%), F(±1%). Note2. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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.



Chip Resistors Anti-Sulfuration & Surge

http://www.kamaya.co.jp KAMAYA OHM



Anti-Sulfuration **Halogen Free**

AEC-Q200

Antimony Free

3

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

Dimensions



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

PGW16 : only	3 algits markin	ig is available.						Unit : mm
Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
RPGW16	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
RPGW20	2012	0805	2.0±0.1	1.25 ± 0.10	0.55±0.10	0.3 ± 0.2	0.4 ± 0.2	5mg
RPGW32	3216	1206	3.1±0.1	1.6 ± 0.15	0.55±0.10	0.4 ± 0.25	0.5 ± 0.25	9mg
★ RPGW35	3225	1210	3.1±0.15	2.5 ± 0.15	0.55 ± 0.15	0.4 ± 0.25	0.5 ± 0.25	16mg
· Under Developm	rent						*Value	es for reference

Ratings

Style	Size Metric	Rated Dissipation at 70°C	Rated Resistance Range	Tempera of I	ature Coefficient Resistance	Tolerance on Rated	Limiting Element Voltage	Insulation Voltage	Category Temperature Range
	(Incn)	VV		Code	10°/°C	Resistance	V	V	C
RPGW16	1608 (0603)	0.33					150	150	
RPGW20 2012 (0805)		0.5	$1\Omega \sim 9.76\Omega$ – ±200 D (D (±0.5%)				
		0.5	10Ω~1MΩ	к	±100	F (± 1%)			-550.+155
RPGW32	3216	0.66	1Ω~9.1Ω	-	±200		200	500	-55 + 155
111 01102	(1206)	0.00	10Ω~1MΩ	К	±100	J (± 5%)	200	500	
★ RPGW35	3225 (1210)	0.75		,	'	,			

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

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

Note3. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

Note4. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage. ** : Under Development

Part Number Description

Example



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Chip Resistors

Selection Guide

Low Resistance Chip Resistor for Sensing Selection Guide



	Size Metric (Inch)	(1005 0402)		16 (06	08 03)			(2012 (0805)			32 (12	:16 :06)		1632 (0612)	32 (12	225 210)	50 (20	25 10)	2550 (1020)			63 (25	32 12)			3263 (1225)
	Туре	RCC	RLC	RLCL	RCC	RLC	RLCL	RLP	RCC	RLC	RLCL	RLP	MLP	RCC	RLC	RLCL	RLP	TWLC	RLC	RLCL	RLC	RLCL	TWLC	RLC	RLCL	RLP	MLP	WLP	MLP63C	TWLC
St	Metal Plate																													
ructu	Thick Film																													
ILE	Metal Foil																													
	6.0W																													
	3.0W																													
	2.0W																													
	1.5W																													
	1.0W																													
	0.75W																													
	0.66W																													
	0.5W																													
	0.33W																													
	0.25W																													
	0.125W																													
	0.1W																													
	0.063W																													



Precaution for the current sensing chip resistor

- 1. Resistance value changed by the soldering conditions. Please confirm the resistance value change for designing.
- 2. RCC series has resistive element on the bottom side.
- Please be careful for visual inspection, to check missing components and inside out, upper side and bottom side
- 3. It is defined that Rated resistance value of RLP and MLP is resistance value placed on Kamaya recommended land pattern.
- If use very different land pattern from Kamaya, it is possible that rated resistance value and tolerance do not meet the spec.
- 4. For soldering condition, please refer to "SMD Product handling manual" on page 62 and 65.



Sensing

http://www.kamaya.co.jp KAMAYA OHM

RCC

Halogen Free Antimony Free

AEC-Q200 Pb Free

• Features 0201inch & 1206inch Size, Lower than 50mΩ. Suitable for current sensing of small mobile devices.

Dimensions

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



RCC10 is n	RCC10 is no marking. Unit : mm												
Style	Metric	Inch	Rated Resistance	L	W	Н	С	d	*Unit weight/pc.				
RCC10	1005	0402	All Resistance	1.0 ± 0.05	0.5 ± 0.05	$0.35 \substack{+0.05 \\ -0.10}$	$0.25 {}^{+0.05}_{-0.10}$	$0.25^{+0.05}_{-0.10}$	0.6mg				
DCC16	RCC16 1608 0603		20mΩ ≤ R	16-01	0 0 +0.15	0.5 +0.10	02 101	0.3 ±0.1	Jmg				
RCCIO			R < 20mΩ	1.0±0.1	0.0 -0.05	0.5 ± 0.10	0.3 ±0.1	0.55 ± 0.1	Zing				
DCC20			20mΩ ≤ R	20-10-15	1 25 - 0 10	0.6 +0.10	04 0 0	0.4 ± 0.2	Ema				
RCC20	2012	0005	R < 20mΩ	2.0±0.15	1.25±0.10	0.0 ±0.10	0.4 ±0.2	0.6 ± 0.2	Sing				
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

Stulo	Size	Rated Dissipation	Rated Current	Combination of Rated F Temperature Coeffic	Resistance Range and ient of Resistance	Tolerance on	Insulation	Category Temperature
Style	Metric(Inch)	W	A	Rated Resistance Range	Temperature Coefficient of Resistance 10 ^{-6/°} C	Rated Resistance	Voltage	°C
				$20m\Omega\sim~24m\Omega$	0~+800			
RCC10	1005(0402)	0.125	1.11~2.23 $25m\Omega \sim 50m\Omega$ $0\sim +350$		0~+350]		
				$51m\Omega \sim 100m\Omega$	±150]	100	
				$10m\Omega \sim 30m\Omega$	0~+350		100	
RCC16	1608(0603)	0.25	1.58~5.00	$33m\Omega \sim 50m\Omega$	0~+250	E(+1%)		
				$51m\Omega \sim 100m\Omega$	±150			-55~+155
				$10m\Omega\sim~27m\Omega$	0~+250	J(15%)		
RCC20	2012(0805)	0.33	1.81~5.74	$30 \mathrm{m}\Omega \sim 50 \mathrm{m}\Omega$	±150]		
RCC32 3216(1206)	0.00	1.01 0.14	$51m\Omega \sim 100m\Omega$	±100		500		
	0.5 2.22 , 5.00 $20m\Omega \sim 33m\Omega$ $0 \sim +250$							
	0.5	2.23.00	$36m\Omega \sim 100m\Omega$	±100				

Note1. Rated Current= (Rated Dissipation)/(Rated Resistance).

Note2. Rated Voltage= (Rated Dissipation) × (Rated Resistance). (d.c. or a.c. r.m.s Voltage)

Rated Resistance

Resistance	Code	Mark	Resistance	Code	Mark
10mΩ	R010	010	39mΩ	R039	039
15mΩ	R015	015	40mΩ	R040	040
20mΩ	R020	020	43mΩ	R043	043
22mΩ	R022	022	47mΩ	R047	047
24mΩ	R024	024	50mΩ	R050	050
25mΩ	R025	025	51mΩ	R051	051
27mΩ	R027	027	56mΩ	R056	056
30mΩ	R030	030	60mΩ	R060	060
33mΩ	R033	033	62mΩ	R062	062
36mΩ	R036	036	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



*Refer to Tape and Packaging information on pages 52 and 53.

Precaution of use

1. Resistive element is on bottom surface.

Please note for inspection of parts existence & nonexistence, inversion mounting by Inspection machine. 2. Resistance value will be changed by soldering condition.

Please design products in consideration of this change of resistance value.

Sensing

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

RLC

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AEC-Q200
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Halogen Free

Antimony Free

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

Dimensions

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



Please cont	lease contact Kamaya sales dept for marking of RLC16. Unit : mm											
Style	Metric	Inch	TCR Mark	L	W	Н	С	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			
DI C16	1609	0603	– & K	16-01	0.8 +0.15 -0.05	0.45±0.10	02 +01	0.3 ±0.1	Oma			
KLCIO	1000	0003	L	1.0±0.1	0.8 ±0.1	0.45 ± 0.15	0.3 <u>±</u> 0.1	0.3 ± 0.2	Zing			
DI COO	2042	0905	– & K	20-1-01	1 25 - 0 10	0.6 ±0.1	04 0 0	04 0 0	Ema			
RLC20	2012	0005	L	2.0±0.1	1.25±0.10	0.5 ± 0.15	0.4 ±0.2	0.4 ±0.2	Sing			
BI C22	2246	216 1206	– & K	3.1±0.2	1.6 ±0.15	0.6 ± 0.1	0.5 ± 0.25	0.3 +0.2 -0.1	Oma			
RLC32	5210	1200	L	3.1±0.1	1.6 ±0.1	0.6 ± 0.15	0.5 ± 0.2	0.45 ± 0.20	ang			
DI C25	3335	1240	– & K	3.1±0.2	2.5 ±0.15	0.6 ± 0.15	0.5 ± 0.25	0.3 +0.2 -0.1	16mg			
RLC35	5225	1210	L	3.1±0.1	2.6 ± 0.1	$0.55 {\pm} 0.10$	0.5 ± 0.2	0.5 ± 0.2	rong			
DI CEO	5025	2040	– & K	5.0 ± 0.2	2.5 ± 0.15	0.6 ± 0.15	0.6 ± 0.2	0.6 ± 0.2	25mg			
KLC50	5025	2010	L	5.0±0.2	2.5 ± 0.2	$0.55 {\pm} 0.10$	$0.65 {\pm} 0.25$	0.6 ± 0.25	Zong			
DI C63	RLC63 6322	2542	– & K	6.3±0.2	3.2 ±0.15	0.6 ± 0.15	0.6 ± 0.2	0.6 ± 0.2	40mg			
REC03		2012	L	6.4±0.2	3.2 ±0.2	0.6 ±0.1	0.65 ± 0.25	0.9 ± 0.25	4011g			

*Values for reference

Ratings: TCR Mark = — & K

Stulo	Size	Size Rated Dissipation Rated Metric at 70°C Rated (Inch) W	Rated Current	Rated Resistance	Combinations of Coefficient of Resis	Rated Resistance R tance and Tolerance	ange,Temperature on Rated Resistance	Insulation	Category Temperature
Style	(Inch)	W	A	Range	Rated Resistance Range	Tolerance on Rated Resistance	Temperature Coefficient of Resistance 10 ⁻⁶ /°C	Voltage	°C
RLC10	1005 (0402)	0.125	0.11~1.11	100mΩ ~ 10Ω	<u>100mΩ~430mΩ</u> <u>470mΩ~3.3Ω</u> <u>3.6Ω~10Ω</u>	F, J F, G, J F, J	- 0~+300 0~+200 К ±100	100	
RLC16	1608 (0603)	0.25	0.14~1.58	100mΩ ~ 10Ω	100mΩ~180mΩ 200mΩ~430mΩ 470mΩ~3.3Ω 3.6Ω~10Ω	F, G, J F, J	- 0~ +250 0~ +200 К ±100	100	
RLC20	2012 (0805)	0.33	0.15~2.56	50m0 av 100	50mΩ~180mΩ 200mΩ~430mΩ	F, G, J	- <u>0~ +250</u> 0~ +200		-55~+155
RLC32	3216 (1206)	0.5	0.18~3.16	5011122 ** 1022	470mΩ~3.3Ω 3.6Ω~10Ω	F, J	К ±100		
RLC35	3225 (1210)	0.66	0.44~3.63		50-0 100-0	1	0 1050	500	
RLC50	5025 (2010)	0.75	0.47~3.87	$50m\Omega \sim 3.3\Omega$	<u> </u>	F, G, J	$ \begin{array}{c c} - & 0 \sim +250 \\ \hline 0 \sim +200 \\ \hline K & +100 \\ \end{array} $		
RLC63	6332 (2512)	1.0	0.55~4.47]		1	<u> </u>		

Note1. Rated Current = √(Rated Dissipation) / (Rated Resistance). Note2. Rated Voltage = √(Rated Dissipation) × (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 : $7.5\Omega\!<\!R$, RLC32 : $6.2\Omega\!<\!R$ The Rated Current in the above range of the Rated Resistance Value is calculated as below way.

Rated Current=Limiting Element Voltage/Rated Resistance

http://www.kamaya.co.jp KAMAYA OHM

Sensing

Chip Resistors

RLC

• i tatii			-						
Style	Size	Rated Dissipation	Rated Current	Com	binations of Rated Resis Coefficient of	tance Range,Temperature Resistance	Tolerance on	Insulation	Category Temperature
Style	(Inch)	W	A	Mark	Rated Resistance Range	Temperature Coefficient of Resistance 10 ⁻⁶ /°C	Resistance	Voltage	°C
RLC10	1005 (0402)	0.063	0.26~ 1.12		50mΩ~ 91mΩ 100mΩ~500mΩ 510mΩ~910mΩ	±1500 ± 800 ± 300			
RLC16	1608 (0603)	0.1	0.33~ 3.16		50mΩ~ 91mΩ 100mΩ~500mΩ 510mΩ~910mΩ	±1200 ± 800 ± 300	F(±1%)	100	
RLC20	2012 (0805)	0.25	0.52~ 5.0				J(±5%)		-55~+155
RLC32	3216 (1206)	0.5	0.74~ 7.07		<u>50mΩ~ 91mΩ</u> 100mΩ~360mΩ	±1000 ± 600		500	
RLC35	3225 (1210)	0.66	0.85~ 8.12		390mΩ~500mΩ	± 300		500	
RLC50	5025 (2010)	0.75	0.90~ 8.66		510HI22~910HI22	± 200			
RLC63	6332 (2512)	1.0	1.04~10						

Rating : TCR Mark = L

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

Rated Resistance

Resistance	Code		Resistance	Code									
50mΩ	R050	1	120mΩ	R120	1	430mΩ	R430	1	1.0Ω	1R00	1	4.3Ω	4R30
51mΩ	R051		130mΩ	R130	1	470mΩ	R470	1	1.1Ω	1R10		4.7Ω	4R70
56mΩ	R056	1	150mΩ	R150	1	500mΩ	R500		1.2Ω	1R20		5.1Ω	5R10
60mΩ	R060	1	160mΩ	R160]	510mΩ	R510		1.3Ω	1R30		5.6Ω	5R60
62mΩ	R062	1	180mΩ	R180	1	560mΩ	R560	1	1.5Ω	1R50		6.2Ω	6R20
65mΩ	R065	1	200mΩ	R200	1	600mΩ	R600		1.6Ω	1R60	1	6.8Ω	6R80
68mΩ	R068	1	220mΩ	R220	1	620mΩ	R620		1.8Ω	1R80		7.5Ω	7R50
70mΩ	R070	1	240mΩ	R240	1	650mΩ	R650	1	2.0Ω	2R00		8.2Ω	8R20
75mΩ	R075	1	250mΩ	R250	1	680mΩ	R680	1	2.2Ω	2R20	1	9.1Ω	9R10
80mΩ	R080	1	270mΩ	R270	1	700mΩ	R700		2.4Ω	2R40		10Ω	100
82mΩ	R082	1	300mΩ	R300]	750mΩ	R750		2.7Ω	2R70			
90mΩ	R090	1	330mΩ	R330]	800mΩ	R800		3.0Ω	3R00			
91mΩ	R091	1	360mΩ	R360	1	820mΩ	R820		3.3Ω	3R30			
100mΩ	R100		390mΩ	R390		900mΩ	R900		3.6Ω	3R60			
110mΩ	R110		400mΩ	R400		910mΩ	R910		3.9Ω	3R90			

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

Part Number Description

Example



Precaution

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

KAMAYA OHM http://www.kamaya.co.jp

NEW **RLP**

Halogen Free

AEC-Q200

Antimony Free

Pb Free

• Features Suitable for current sensing of battery pack.

Dimensions



Resistanc	istance value of RLP series are marked like below. Unit : mm tyle Metric Inch Rated Resistance L W H c d *Unit weight/pc. Marking												
Style	Metric	Inch	Rated Resistance	L	W	Н	С	d	*Unit weight/pc.	Marking			
PI D16	1608	0603	5mΩ	16+01	08 +01	0.35±0.10	02 +01	0.6 ±0.10	2ma	No Marking			
	1000	0005	10mΩ	1.0±0.1	0.0 ±0.1	0.3 ±0.10	0.2 ±0.1	0.3 ±0.10	Zing	NO Marking			
			★ 2mΩ			0.22±0.10		0.55 ± 0.20		<u>02</u>			
			4mΩ					0.75±0.20		<u>04</u>			
			5mΩ			0.35±0.10		0.6 ± 0.20		<u>05</u>			
RLP20	2012	0805	6mΩ	2.0±0.15	1.25±0.15		0.35 ±0.15	0.47 ± 0.20	3mg	<u>06</u>			
			8mΩ					0.6 ±0.20		<u>08</u>			
			9mΩ			0.22±0.10		0.52 ± 0.20		<u>09</u>			
			10mΩ					0.47 ± 0.20		<u>10</u>			
			1mΩ			0.32+0.15	1.1 ±0.25	1.1 ± 0.25		<u>01</u>			
			2mΩ			0.02_0.10	0.5 ±0.25	0.5 ± 0.25	12mg	<u>02</u>			
			3mΩ				0.7 ± 0.25	1.3 ± 0.25		<u>03</u>			
			4mΩ				1.1 ±0.25	1.1 ±0.25		<u>04</u>			
			5mΩ		1.6 ±0.15	0.35+0.10	1.0 ± 0.25	1.0 ± 0.25		<u>05</u>			
			6mΩ			0.35±0.10	0.85 ± 0.25	0.85 ± 0.25		<u>06</u>			
			7mΩ	2 3.2±0.15 2 2 2			0.7 ±0.25	0.7 ± 0.25		<u>07</u>			
RLP32	3216	1206	8mΩ				0.6 ± 0.25	0.6 ± 0.25		<u>08</u>			
			9mΩ			0.3 ±0.1	0.75 ± 0.25	0.75 ± 0.25	11mg	<u>09</u>			
			10mΩ			0.28+0.10	05 +0 25	25 0.5 ±0.25	inng	<u>10</u>			
			★ 11mΩ			0.28±0.10	0.5 ±0.25	0.0 ±0.20		<u>11</u>			
			12mΩ				0.65+0.25	0.65+0.25	5	<u>12</u>			
			13mΩ			0.22+0.10	0.00±0.20	0.00±0.20		<u>13</u>			
			14mΩ			0.22 0.10	0.55±0.25	0.55 ± 0.25		<u>14</u>			
			15mΩ				0.5 ± 0.25	0.5 ± 0.25		<u>15</u>			
			1mΩ		3.2 ±0.25	0 38+0 15	2.2 ± 0.25	2.2 ± 0.25	47ma	R001			
			2mΩ			0.00 ± 0.10	1.1 ±0.25	1.1 ±0.25		R002			
			3mΩ			0.45±0.15	22 ± 0.25	22 + 0.25		R003			
			4mΩ			0.35±0.15	2.2 -0.20	2.2 -0.20		R004			
			5mΩ			0 34+0 15	1.95±0.25	1.95 ± 0.25		R005			
RI P63	6332	2512	6mΩ	63+025	31 ± 0.25	0.04±0.10	1.75±0.25	1.75±0.25		R006			
	0332	2312	7mΩ	0.0±0.20	0.1 ±0.20		1.4 ±0.25	1.4 ±0.25	43ma	R007			
			8mΩ			0.35±0.15	1.1 ±0.25	1.1 ±0.25		R008			
			9mΩ				0.8 ± 0.25	0.25 0.8 ±0.25 0.25 1.75±0.25	R009				
			10mΩ				1.75±0.25			R010			
			12mΩ			0.23±0.15	1.4 ±0.25	1.4 ±0.25		R012			
			15mO]			0.95 ± 0.25	0.95 ± 0.25]	R015			

** : Under Development

*Values for reference

Ratings

Style Metric	Size	Rated	Rated Current	Combination of Rated Resistance Range a Temperature Coefficient of Resistance	and		Tolerance	Insulation	Category	
Style	Metric (Inch)	at 70°C	Range	Rated Resistance	Temper of	ature Coefficient Resistance	Rated	Voltage	Range	
	(mon)	W		Range	Code	10 ⁻⁶ /°C	Resistance	v	°C	
RI P16	1608	0.33	81 57	5mQ 10mQ	N	±70				
INLF 10	(0603)	0.33	8.1, 3.7	511122, 1011122	K	±100				
	2012	0.5	15.8, 11.1, 10.0, 9.1,	2mΩ, 4mΩ, 5mΩ, 6mΩ,	N	±70				
IXLF 20	(0805)	0.5	7.9, 7.4, 7.0	8mΩ, 9mΩ, 10mΩ	K	±100				
			31.6	1m0	K	±100				
DI D 22	3216	6 6) 1.0	1.0	51.0	221111	-	±150			
INLF 52	(1206)		22.3, 18.2, 15.8, 14.1, 12.9, 11.9,	$2m\Omega$, $3m\Omega$, $4m\Omega$, $5m\Omega$, $6m\Omega$, $7m\Omega$, $8m\Omega$, $9m\Omega$,	N	±70	$F(\pm 1\%)$	100	$-55 \sim +155$	
			11.1, 10.5, 10, 9.5, 9.1, 8.7, 8.4, 8.1	10mΩ, 11mΩ, 12mΩ, 13mΩ, 14mΩ, 15mΩ	K	±100	J(±070)			
					N	±70				
		2.0	44.7	1mΩ	K	±100				
RLP63 63 (25	(2512)				-	±150				
	(2012)	10	22.3, 18.2, 15.8, 14.1, 12.9, 11.9,	11.9, 2mΩ, 3mΩ, 4mΩ, 5mΩ, 6mΩ, 7mΩ, 8mΩ, 9mΩ,	N	±70				
		1.0	22.3, 18.2, 15.8, 14.1, 12.9, 11.9, 11.1, 10.5, 10, 9.1, 8.1	10mΩ, 12mΩ, 15mΩ	K	±100				

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

*★ : Under Development

http://www.kamaya.co.jp KAMAYA OHM

RLP

Recommended Land Pattern



							Unit : mm
Style	Metric	Inch	Rated Resistance	А	В	Х	Y
PI D16	1608	0603	5mΩ	0.6	2.2	0.0	0.8
INLF 10	1000	0003	10mΩ	1.0	2.2	0.9	0.6
			2mΩ	0.8			0.95
			4mΩ				
			5mΩ				
RLP20	2012	0805	6mΩ	0.8	2.7	1.36	0.05
			8mΩ	0.0			0.95
			9mΩ				
			10mΩ				
			1mΩ	1.0		0.95 1.45 0.9 1.55 1.45 1.25 1.7 0.9	
			2mΩ	2.1			
			3mΩ	mΩ 0.8 mΩ 1.0	1.55		
			4mΩ	4mΩ 1.0 5mQ			1.45
			5mΩ	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1 25		
			6mΩ				
			7mΩ				
RLP32	3216	1206	8mΩ		3.9	1.7	1.45 0.9 1.55 1.45 1.25 1.7 0.9
			9mΩ				
			10mΩ				
			11mΩ	2.1			0.9
			11mΩ 2.1 12mΩ				
			13mΩ				
			14mΩ				
			15mΩ				
			1mΩ	1.5	7.5	4.0	3.0
			2mΩ	4.0	_		1.8
			3mΩ	18			29
			4mΩ	1.0	_		2.5
			5mΩ	2.4			2.6
RI P63	6332	2512	6mΩ				
I LEI 00	0002	2012	7mΩ		7.6	3.5	
			8mΩ				
			9mΩ	4.0			1.8
			10mΩ				
			12mΩ				
		1	15mO				

*Values for reference

Part Number Description

Example



*Refer to Tape and Packaging information on pages 52 and 53.

Precaution

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

Resistance value of MLP series are marked like below.

KAMAYA OHM http://www.kamaya.co.jp

NEW **MLP**

Halogen Free Antimony Free AEC-Q200 Pb Free

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

Dimensions



Resistance value of MLP series are marked like below.												
Style	Metric	Inch	Rated Resistance	L	W	H	С	d	*Unit weight/pc.	Marking		
★MLP20	2012	0805	10mΩ	2.0 ± 0.15	1.25 ± 0.15	0.22 ± 0.10	0.33 ± 0.15	0.47 ± 0.20	3mg	<u>10</u>		
			2mΩ			0.58 ± 0.15	2.2 ± 0.25	2.2 ± 0.25		R002		
			3mΩ			0.45 ± 0.15	22 0.25	22 0.25		R003		
			4mΩ]		0.34 ± 0.15	2.2 ±0.25	2.2 ±0.25		R004		
		5mΩ]		0.51±0.15	11 + 0.25	11		R005			
MLP63	6332	2 2512	6mΩ	6.3±0.25	3.1 ±0.25	⁵ 0.5 ±0.15	1.1 ±0.25	1.1 ±0.25	60mg	R006		
			7mΩ				0.6 ± 0.25	0.6 ± 0.25		R007		
			8mΩ				1.1 ±0.25	1.1 ± 0.25		R008		
		-	9mΩ			0.35 ± 0.15	0.8 ±0.25	0.8 ± 0.25		R009		
			10mΩ				0.5 ±0.25	0.5 ±0.25		R010		
+ : Under D	evelopment		10mΩ				0.5 ±0.25	0.5 ±0.25	*\/alue	R0 ²		

Ratings

	Size	Rated Dissipation	Rated Current	Combination of Rated Resis Temperature Coefficient	stance Range of Resistance	and e		Insulation	Category Temperature	
Style Metric (Inch)		at 70°Ċ W	Range	Rated Resistance	Temperature Coefficient of Resistance		Rated Resistance	Voltage V	Range	
	(Range	Code	10 ⁻⁶ /°C			C	
	2012	1.0	10	10	N	±70	F(±1%)			
× IVILP20	(0805)	1.0	10	10002	К	±100	J(±5%)	100		
	6332		31.6, 25.8, 22.3, 20.0, 18.2,	2mQ, 3mQ, 4mQ, 5mQ, 6mQ,	N	±70	F(±1%)	100	-55~+155	
IVILP63	(2512)	2.0	16.9, 15.8, 14.9, 14.1	7mΩ, 8mΩ, 9mΩ, 10mΩ	К	±100] J(±5%)			

Note1. Rated Current= \(<u>Rated Dissipation</u>)/(<u>Rated Resistance</u>) Note2. Rated Voltage= \(<u>Rated Dissipation</u>) × (<u>Rated Resistance</u>). (d.c. or a.c. r.m.s. Voltage) Note3. Please contact Kamaya sales dept. for any other resistance values.

Note4. Resistance value shall be measured by mounting the substrate with the required conditions per Kamaya specification.

** : Under Development

http://www.kamaya.co.jp KAMAYA OHM

MLP

Recommended Land Pattern



							Unit : mm
Style	Metric	Inch	Rated Resistance	А	В	Х	Y
MLP20	2012	0805	10mΩ	0.8	2.7	1.36	0.95
			2mΩ				
			3mΩ	1.8			2.9
			4mΩ				
			5mΩ			3.5	
MLP63	6332	2512	6mΩ		7.6		
			7mΩ	1			1.9
			8mΩ	4			1.0
			9mΩ				
			10mΩ				

*Values for reference

Part Number Description

Example



Precaution

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

KAMAYA OHM http://www.kamaya.co.jp

Chip Resistors

Sensing

NEW MLP63C

Halogen Free Antimony Free

AEC-Q200 **Pb** Free

• Features 2512inch size: 3W.

Dimensions



Style	Metric	Inch	Rated Resistance	L	W	н	С	d	*Unit weight/pc.	Marking
			1mΩ			0.20 - 0.15	2.2 =	±0.25		R001
			1.5mΩ			0.30 ± 0.15	1.5 ±0.25			1L50
			2mΩ			0.58 ± 0.15	2.2 =	±0.25] [R002
			2.5mΩ			0 45 - 0 15	2.4 =	±0.25] [2L50
U D620 6333			3mΩ	6.3±0.25	3.1±0.25	0.45 ± 0.15	22 -	22 ± 0.25		R003
	6222	2542	4mΩ			0.34 ± 0.15	2.2 _	10.25	- 60mg	R004
VILF03C	0332	2512	5mΩ			0.51±0.15	11	L0 25		R005
			6mΩ			0.5 ± 0.15	1.1 ±0.25		[R006
			7mΩ			0.5 ±0.15	0.6 =	±0.25] [R007
			8mΩ				1.1 =	±0.25] [R008
			9mΩ	1		0.35±0.15	0.8 =	±0.25] [R009
			10mΩ	1		Í	0.5 =	±0.25] [R010

Values for reference

Ratings

	Size	Rated Dissipation	Rated Current	Combination of Rated Resis Temperature Coefficient	stance Range of Resistance	and e	T-1	Insulation	Category
Style	Metric (Inch)	at 70°Ċ W	Range A	Rated Resistance	Temperatur of Res	e Coefficient istance	Rated Resistance	Voltage V	Range
				Range	Code	10 ⁻⁶ /°C		, i i i i i i i i i i i i i i i i i i i	Č
	6332	2.0	54.7, 44.7, 38.7, 34.6, 31.6,	1mΩ, 1.5mΩ, 2mΩ, 2.5mΩ,	N	±70	F(±1%)	100	-55
MLF03C	(2512)	3.0	27.3, 24.4, 22.3, 20.7, 19.3, 18.2, 17.3	8mΩ, 9mΩ, 10mΩ	к	±100	J(±5%)	100	-33.9 + 170

Note1. Rated Current= $\sqrt{(Rated Dissipation)/(Rated Resistance)}$

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

Note4. Resistance value shall be measured by mounting the substrate with the required conditions per Kamaya specification.

Recommended Land Pattern



					Unit : mm
Style	Rated Resistance Range	А	В	Х	Y
	1mΩ	1.8	7.5	4.0	3.0
	1.5mΩ	4			1.8
	2mΩ				
	2.5mΩ	10			2.0
	3mΩ	1.0			2.9
MI D62C	4mΩ				
MLP03C	5mΩ		7.6	3.5	
	6mΩ				
	7mΩ	4			10
	8mΩ	4			1.0
-	9mΩ				
	10mΩ				

Part Number Description

Example



Precaution

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



http://www.kamaya.co.jp KAMAYA OHM

Antimony Free

NEW **WLP63**

Halogen Free

AEC-Q200 Pb Free

Features 2512 inch size 3W, $1m\Omega$ to $100m\Omega$ available.

Dimensions





Rated resitance value of WLP series is marking 4-digit on the coating.											
Style	Rated Di at 7	ssipation 0°C W	Metric (Inch)	Rated Resistance Range	L	W	н	с	d	*Unit weight/ pc.	
	3A 1.0 3D 2.0		1mΩ, 2mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25			
	3D	2.0		$3m\Omega \sim 100m\Omega$	6.40±0.20	3.25±0.20	0.75±0.25	1.00±0.25	1.00±0.25	62.5mg	
WLP63	WLP63 3F 3.0		6332 (2512)	1mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25		
		3.0		2mΩ, 3mΩ	6.40±0.20	3.25±0.20	0.75±0.25	2.00±0.25	2.00±0.25		
				4mΩ~100mΩ	6.40±0.20	3.25±0.20	0.75±0.25	1.00±0.25	1.00±0.25		

*Values for reference

Ratings

01.1	Size	Rated Di	d Dissipation Rated Current		Combination of Rated Resistance Range and	Combination of Rated Resistance Range and Temperature Coefficient of Resistance					Category
Style	Metric	at 7	′0°Ċ	Range	Rated Resistance	Temperature Coefficient of Resistance		Products Type	Rated	Voltage	Temperature Range
	(Inch)	Code	W	A	Range	Code	10 ⁻⁶ /°C	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Resistance	V	ື້ວ
		24	1.0	15.8 ~ 31.6	$1m\Omega \sim 4m\Omega$			Low EMF			
		JA	1.0	3.16 ~ 14.1	$5m\Omega\sim 100m\Omega$			Standard			
	6332	20	20	$22.3 \sim 44.7$	$1m\Omega \sim 4m\Omega$		+70	Low EMF	$F(\pm 1\%)$	100	$-55 \sim \pm 170$
VVLF03	WLP63 (2512)		2.0	4.47 ~ 20	$5m\Omega\sim 100m\Omega$		±70	Standard	$J(\pm 5\%)$	100	-55.9 + 170
	35	3.0	$27.3 \sim 54.8$	$1m\Omega \sim 4m\Omega$			Low EMF]			
		51	5.0	$5.48 \sim 24.5$ $5 m\Omega \sim 100 m\Omega$		Standard					

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

Rated Resistance

Resistance	Code/Mark	Resistance	Code/Mark	Resistance	Code/Mark	Resistance	Code/Mark
1mΩ	R001	8mΩ	R008	30mΩ	R030	75mΩ	R075
2mΩ	R002	10mΩ	R010	33mΩ	R033	80mΩ	R080
3mΩ	R003	12mΩ	R012	35mΩ	R035	100mΩ	R100
4mΩ	R004	15mΩ	R015	40mΩ	R040		
5mΩ	R005	20mΩ	R020	50mΩ	R050		
6mΩ	R006	25mΩ	R025	60m0	R060		

Please contact Kamaya sales window for any other resistance values.

Part Number Description



Precaution

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



KAMAYA OHM http://www.kamaya.co.jp

TWLC

Halogen Free

AEC-Q200

Antimony Free

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

Dimensions

W			Rated resistar	Rated resistance value is marking with 4-digit on the over coating.							
			Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
		<u> </u>	TWLC32	1632	0612	1.6±0.2	3.2±0.2	0.55±0.1	0.5 ± 0.25	0.5±0.25	9mg
2500			TWLC50	2550	1020	2.5±0.15	5.0±0.2	0.55±0.1	0.6 ± 0.2	0.6±0.2	26mg
100			TWLC63	3263	1225	3.2±0.2	6.3±0.2	0.60 ± 0.1	0.6 ± 0.2	0.6±0.2	40mg
	ot I	to:								*1	Values for reference

Ratings

Style	Size Metric (Inch)	Rated Dissipation at 70°C W	Rated Current Range A	Rated Resistance Range	Tolerance on Rated Resistance	Temp c Code	erature Coefficient of Resistance 10 ⁻⁶ /°C	Insulation Voltage V	Category Temperature Range ℃
				$100 m \Omega \sim 180 m \Omega$			$0 \sim +350$		
NEW TWLC32	1632 (0612)	1.0		$200 m\Omega \sim 470 m\Omega$			$0 \sim +250$		
			$1.04 \sim 7.07$	$500 m \Omega \sim 910 m \Omega$			$0 \sim +200$		
TW/I C50	2550	1.0		$100 m \Omega \sim 180 m \Omega$	F (± 1%) J (±5%)	-	$0 \sim +350$	500	$-55 \sim +155$
TWECSU	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$200 m\Omega \sim 910 m\Omega$			$0 \sim +200$		
	3263 (1225) 2.0	2.0	1 48 ~ 10 0	$100 m \Omega \sim 180 m \Omega$			$0 \sim +350$		
TWEE005		1.40 ** 10.0	$200 m \Omega \sim 910 m \Omega$			$0 \sim +200$			

Note1. Rated Current = $\sqrt{(Rated Dissipation)/(Rated Resistance)}$

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Note2. Rated Voltage= (Rated Dissipation) × (Rated Resistance) (d.c. or a.c. r.m.s Voltage)

Rated Resistance

Resistance	Code	Resistance	Code	Resistance	Code		Resistance	Code
100mΩ	R100	220mΩ	R220	400mΩ	R400	1	650mΩ	R650
110mΩ	R110	240mΩ	R240	430mΩ	R430		680mΩ	R680
120mΩ	R120	250mΩ	R250	470mΩ	R470		700mΩ	R700
130mΩ	R130	270mΩ	R270	500mΩ	R500		750mΩ	R750
150mΩ	R150	300mΩ	R300	510mΩ	R510		800mΩ	R800
160mΩ	R160	330mΩ	R330	560mΩ	R560		820mΩ	R820
180mΩ	R180	360mΩ	R360	600mΩ	R600		900mΩ	R900
200mΩ	R200	390mΩ	R390	620mΩ	R620		910mΩ	R910

Part Number Description

Example




Circuit Protection

http://www.kamaya.co.jp KAMAYA OHM

FRC

Halogen Free

Antimony Free

• Features Suitable for battery circuit and power supply circuit.

Dimensions



	Rated resistance value is marked with 3-digit on the over coating Unit : mm													
Style Metric Inch L W H c d *Uni														
1608	0603	1.6±0.1	0.8 +0.15 -0.05	$0.45 {\pm} 0.10$	0.3±0.1	0.3±0.1	2.2mg							
2012	0805	2.0±0.1	1.25 ± 0.10	0.6 ±0.1	0.4±0.2	0.4±0.2	6mg							
3216	1206	3.2±0.2	1.6 ± 0.15	0.6 ±0.1	0.5 ± 0.25	0.5±0.25	10mg							
	1608 2012 3216	Internet Internet 1608 0603 2012 0805 3216 1206	Inch L 1608 0603 1.6±0.1 2012 0805 2.0±0.1 3216 1206 3.2±0.2	Iteric Iteric 1.6 ± 0.1 0.8 ± 0.15 1608 0603 1.6 ± 0.1 0.8 ± 0.15 2012 0805 2.0 ± 0.1 1.25 ± 0.10 3216 1206 3.2 ± 0.2 1.6 ± 0.15	Iterit L w n 1608 0603 1.6±0.1 0.8 +0.15 -0.05 0.45±0.10 2012 0805 2.0±0.1 1.25±0.10 0.6 ±0.1 3216 1206 3.2±0.2 1.6 ±0.15 0.6 ±0.1	Iterite <	InchLWHCH16080603 1.6 ± 0.1 $0.8 \pm 0.15 \\ -0.05$ 0.45 ± 0.10 0.3 ± 0.1 0.3 ± 0.1 20120805 2.0 ± 0.1 1.25 ± 0.10 0.6 ± 0.1 0.4 ± 0.2 0.4 ± 0.2 32161206 3.2 ± 0.2 1.6 ± 0.15 0.6 ± 0.1 0.5 ± 0.25 0.5 ± 0.25							

*Values for reference



Ratings

Chulo	Size	Rated	Rated	Tolerance on Temperature Coefficient Pro		Preferred Number	Fusing Ch	aracteristic	Maximum	Category Temperature
Style	(Inch)	W	Range	Resistance	10 ⁻⁶ /°C	Resistors	Applied Power	Fusing Time	Voltage	°C
FRC16	1608 (0603)	0.063	3.9Ω~51Ω		±500		1.89W			
FRC20	2012 (0805)	0.1	1Ω~51Ω	J(±5%)	±1,000	E24	2.0W	30s max.	50V	$-55 \sim +125$
FRC32	3216 (1206)	0.125	1Ω~51Ω 56Ω~100Ω		±500		2.5W			

Note1. Rated Voltage= $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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



Example of Typical Fusing Characteristics



Chip **R**esistors Chip Network

KAMAYA OHM http://www.kamaya.co.jp

Halogen Free

Antimony Free



Dimensions

RAC









Dimensions of Terminal Style : E, please contact us

Circuits \sim R Rn Ra $R_1 = R_2 = \cdots = Rn$ ease contact Kamaya ales dept

,	Note. Please contact Kamaya sales dept for the detail of marking on the over coating.											
	Style	Terminal Style	L	W	H	Q1	*Q2	а	b	*P	*Unit weight/pc.	
	RAC062D E 0.8±0.05 0.6±0.05 0.23±0.10 - 0.2±0.1 0.							0.5	0.38mg			
	RAC102D C 1.0±0.1 1.0±0.1 0.35±0.10 - 0.34±0.05 0.2 ±0.15 0.25±0.17 0											
	RAC104D C		2.0±0.1	1.0±0.1	0.45 ± 0.10	0.3 ± 0.05	0.4 ±0.1	0.2 ± 0.1	0.25 ± 0.10	0.5	2.1mg	
	RAC164D	С	3.2±0.1	1.6±0.1	0.5 ±0.1	0.4±0.1	0.6 ±0.1	0.3 ±0.1	0.3 ± 0.2	0.8	7mg	
	RAC168D C 3.8 ± 0.1 1.6 ± 0.1 0.45 ± 0.1 0.3 ± 0.1 $ 0.3 \pm 0.1$ 0.3 ± 0.1 0.3 ± 0.1									0.5	8.3mg	
	*Values for reference											

Ratings

Style	Rated Dissipation at 70℃		Rated Current of Jumper	Rated Resistance Tolerance on Rated Resistance		Temperature Coefficient of Resistance	Limiting Element Voltage	Preferred Number Series for	Insulation Voltage	Category Temperature Range
	W/Element	W/pc.	A	Range	Raleu Resistance	10 ⁻⁶ /°C	V	Resistors	V	°C
				100Ω~100kΩ	F(±1%)	±200				
RAC062D	0.031	0.063		10Ω~27Ω	1(+5%)	±350	12.5			
				30Ω~1MΩ	J(15%)	±200			50	
		0 125		3Ω~9.1Ω		±400	25			
RACIUZD	0.063	0.125	1.0	10Ω~1MΩ	J(±5%)	±300	25	E24		$-55 \sim \pm 125$
RAC104D		0.25	1.0	10Ω~1MΩ		±200		LZ4		33-1123
				10Ω~1MΩ	F(±1%)	±100	50			
RAC164D	0.1	0.25		1Ω~9.1Ω		+300~+500	50		100	
				10Ω~1MΩ] J(±5%)	±200]	[
RAC168D	0.063	0.25		10Ω~1MΩ		±200	25			

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.

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

Part Number Description

Example



Chip Resistors Anti-Sulfuration & Chip Network

http://www.kamaya.co.jp KAMAYA OHM

NEW RAAW

Anti-Sulfuration Halogen Free



I Init · mm

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

Dimensions



Convex E Type (Low-profile) Р н nt l ĽĴ ≥ Q RAAW064D





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

Circuito											
Circuits	Style	Terminal Style	L	W	Н	Q1	*Q2	а	b	*P	*Unit weight/pc.
	RAAW062D	E G	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
	RAAW064D	E G	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
6 66										*Value	s for reference
R1=R2=···=Rn Please contact Kamaya sales dept for different resistance values.											

Rating

Cin

Style	Rated Di at 7	ssipation ′0°C	Rated Current of Jumper	Rated Resistance	Tolerance on	Temperature Coefficient of Resistance	Limiting Element Voltage	Preferred Number Series for	Insulation Voltage	Category Temperature Range
	W/Element W/pc.		A	Range	Trated Tresistance	10 ⁻⁶ /°C	V	Resistors	V	°C
				100Ω~100kΩ	F(±1%)	±200				
RAAW062D	0.004	0.063	1.0	10Ω~27Ω	J (±5%)	±350	- 12.5	E24	50	55- J 155
				30Ω~1MΩ		±200				
	0.031		1.0	100Ω~100kΩ	F(±1%)	±200		E24		-55~+155
RAAW064D				10Ω~27Ω	1(+5%)	±350]			
				30Ω~1MΩ	J(±5%)	±200				

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

Part Number Description



*Refer to Tape and Packaging information on pages 52 and 53.

Chip**T**hermistors Temperature Compensation

KAMAYA OHM http://www.kamaya.co.jp

LTC

Halogen Free Antimony Free **Pb Free**

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

Dimensions



•		
		8
		<u> </u>
•		

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

Please contact Kamaya sales dept for further information.

									Unit : mm
[Style	Metric	Inch	L	W	Н	с	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	Rated Resis (Rated Dissip	tance Range ation at 70°C)	Tolerance on	Preferred Number	Insulation	Category Temperature Range
10-6/°C	Code	Coefficient Tolerance	LTC1/10 (0.1W)	LTC1/10 LTC1/8 Rated Resistance (0.1W) (0.125W)		Resistors	Voltage	°C
500	05	±100×10-6/°C	100Ω~5.1kΩ	100Ω~10kΩ				
800	08	±150×10-6/°C	100Ω~5.1kΩ	100Ω~10kΩ]			
1,000	10	1 4 5 0/	100Ω~5.1kΩ	100Ω~10kΩ]			
1,500	15	±13%	100Ω~3.3kΩ	100Ω~4.7kΩ]			
2,000	20		100Ω~3.3kΩ	100Ω~4.7kΩ]			
2,400	24] [100Ω~1.6kΩ	100Ω~2.2kΩ]	E24	100	-40~+125
2,800	28		100Ω~3.3kΩ	100Ω~3.6kΩ	J(±5%)			
3,000	30		100Ω~3.3kΩ	100Ω~3.6kΩ				
3,300	33	±10%	100Ω~3.3kΩ	100Ω~3.6kΩ]			
3,600	36		51Ω~910Ω	51Ω~1.2kΩ]			
3,900	39		51Ω~560Ω	51Ω~910Ω]			
4,200	42		33Ω~360Ω	33Ω~470Ω]			
4,500	45		33Ω~200Ω	33Ω~180Ω]			

Note1. Rated Voltage= √(Rated Disspation) × (Rated Resistance). (d.c. or a.c. r.m.s. Voltage) Note2. Listed above will be made by order. Please contact Kamaya sales dept for further information.

Part Number Description

Example Style LTC 1/8 30 102 J TΡ * Packaging & Standard Qty. (Min.) Product Type Rated Resistance Tolerance on Rated Resistance Bulk (Loose Package) J ±5% В 1,000pcs. E24 Series e.g.:102=1kΩ TP Paper Tape 5,000pcs. Rated Dissipation & Size *Refer to Tape and Packaging information on pages 52 and 53. Code Rated Dissipation Metric Inch Temperature Coefficient of Resistance 2012 Refer to Ratings Table on next page e.g.: 30=3,000 × 10⁻⁶/°C 1/10 0.1W 0805 0.125W 1/8 3216 1206

http://www.kamaya.co.jp KAMAYA OHM

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.

Catagony	Series		Tupo	Elec	trical		Size I	ine-up		Easturas
Category	Oenea	5	Туре	Charac	teristics	1005(0402)	1608(0603)	2012(0805)	3216(1206)	i eaures
		AB	Coporal purposo	lr×200%	5s Max.	• 30Vd.c.~24Vd.c.	● 36Vd.c.~32Vd.c.	• 50Vd.c.~32Vd.c.	_	·2 types of the line-up fusing characteristics.
	ree/rne	AD	General-purpose	lr×250%	5s Max.	• 32Vd.c.~24Vd.c.	• 50Vd.c.~24Vd.c.	• 50Vd.c.~24Vd.c.	64Vd.c.~32Vd.c.	·4 size line-up.
	FCCR	AB	Low internal resistance value	lr×200%	5s Max.	e 24Vd.c.	• 50Vd.c.	_	_	 Lower internal resistance value compared to FCC AB series. High interrupting rating 50Vdc / 50A for 0603 Inch size.
Secondary side fuse	FMC	WB AB	Low Ohm Fast Acting	Ir×200%	5s Max.	24Vd.c.		_	_	 Low consumption power by low internal resistance value. Fast acting fusing with anti pulse characteristics
		wн	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	lr×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



Chip Fuses **Circuit Protection**

KAMAYA OHM http://www.kamaya.co.jp

FCC,FHC

Halogen Free

Н

 $0.4 \ \pm 0.05$

 0.45 ± 0.10

 0.6 ± 0.1

0.6 ±0.1

 $0.65\!\pm\!0.10$

1.6 ±0.15

С

 $0.2 {\pm} 0.1$

 0.3 ± 0.15

 0.4 ± 0.2

 0.5 ± 0.25

Antimony Free Pb Free

> C 7 l us

> > Unit : mm

*Unit weight/pc.

0.8mg

2mg

6mg

10mg

• Features Fast-Acting Type. Suitable for over-current protection of the circuit of miniature portable equipment. Please contact Kamaya sales dept, if you need to confirm Inrush current endurance, Anti-pulce performance etc. We can provide Application Guide for FCC, FHC selection. Certified UL, c-UL. File No. : E176847

d

 0.25 ± 0.10

 0.3 ± 0.1

0.4 ±0.2

 0.5 ± 0.25

Dimensions



Current value is marked on the cover coating. Please refer to Ratings table as below.												
_	Ratings/Op	tion Code	e : AD, A	АB								
	Style	Metric	Inch	L	W							
	FCC10	1005	0402	10 ± 0.05	05 +0.05							
_	FHC10	1005	0402	1.0 - 0.00	0.0 _0.00							
	FCC16	1608	0603	16+01	0 8 +0.15							
	FHC16	1000	0005	1.0±0.1	0.0 _0.05							
	FCC20	2012	0805	20 ± 01	1 25+0 10							
	FUODA	2012	0005	Z.U <u>-</u> U.I	1.23 ± 0.10							

1206

3.2±0.2

3216

11mg *Values for reference

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

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FHC20

FCC32

FHC32

Stulo	Size	Rated	Current	Internal Resistance	Mork	Interrupting	Doting	Time/Current Characteristics		Working Temperature Range
Style	(Inch)	Code	A	m ohm max.	IVIAIK	Interrupting	Raung	Option Code	Time/Current Characteris	tics °C
	(mon)	151	0.15	2,700	0	32Vd.c.	35A			
		201	0.2	1,000	Z			1		
		251	0.25	750	С]				
		321	0.315	620	D					
FCC10		401	0.4	340	E					
		501	0.5	290	F	30Vd.c.	35A			
	1005	631	0.63	210	I K	-				
	(0402)	102	1.0	130	K	-				
		132	1.25	90		-				
		162	1.6	55	N			1		
		202	2.0	40	S	1				
FHC10		252	2.5	36	Т	24Vd.c.	35A			
		302	3.0	30	R					
		322	3.15	26	U			-		
		151	0.15	4,000	OD	50Vd.c.	35A	-		
		201	0.2	1,800	<u>ZD</u>	-				
		251	0.25	1,000		-				
		401	0.315	330	ED ED	-				
		501	0.5	280	ED FD	1				
FCC16		631	0.63	200	ID	36Vd.c.	35A			
	1608	801	0.8	130	KD					
	(0603)	102	1.0	110	LD	1				
		132	1.25	85	MD]				
		162	1.6	70	ND					
		202	2.0	55	SD			-		
		252	2.5	45	TD	32Vd.c.	35A	-		
		322	3.15	26	UD	041/4 a	254		Rated Current Opening ti	ne 125
FHCID		352	3.5	22		24V0.C.	35A	AD	×250% 5s Max.	-55~+125
		402	0.4	330	401			-		
		501	0.5	270	501					
		631	0.63	190	631	-				
		801	0.8	130	801					
FCC20		102	1.0	100	102	50Vd.c.	50A			
	2012	132	1.25	80	132					
	(0805)	162	1.6	65	162	_				
		202	2.0	55	202					
		252	2.5	40	252			-		
EHC20		402	3.15	10		32Vd.c.	50A			
111020		502	5.0	15	YD	24Vd c	50A	1		
		201	0.2	1,800	201	2174.0.	00/1	1		
		251	0.25	1,000	251	1				
		321	0.315	750	321	1				
		401	0.4	350	401]				
		501	0.5	295	501					
		631	0.63	200	631					
FCC32	0040	801	0.8	140	801	64Vd.c.	50A			
	3210	102	1.0	110	102	-				
	(1200)	152	1.20	78	152	-				
		162	1.6	75	162	1				
		202	2.0	65	202	1				
		252	2.5	45	252	1				
		322	3.15	26	UD]		1		
FHC32		402	4.0	19	XD	32Vd.c.	50A			
		502	5.0	14	YD					

Circuit Protection

Chip Fuses

http://www.kamaya.co.jp KAMAYA OHM

FCC, FHC

Ratir	ngs/Opti	ion Coc	de : AB	(Fast-Acti	ng Typ	e)			
Chilo	Size	Rated	Current	Internal Resistance	Mork	Interrupting Dating	Time	e/Current Characteristics	Working Temperature Range
Style	(Inch)	Code	A	m ohm max.	Mark	Interrupting Rating	Option Code	Time/Current Characteristics	° °C
	. ,	201	0.2	2,400	Z				
		251	0.25	1,000	С				
		321	0.315	750	D				
		401	0.4	620	E				
		501	0.5	340	F				
ECC10		631	0.63	290	I	20)/d o 25A			
FCCIU	1005	751	0.75	220	A	- 30VU.C. 35A			
	(0402)	801	0.8	210	K				
		102	1.0	150	L				
		132	1.25	120	М				
		152	1.5	100	Н				
		162	1.6	90	N				
		202	2.0	55	S	241/d a 254]		
FICIU		252	2.5	40	Т	24VU.C. 35A			
		201	0.2	3,200	ZB		1		
		251	0.25	1,800	CB				
		321	0.315	1,000	DB				
		401	0.4	750	EB			Rated Current Opening time	-55-1105
		501	0.5	330	FB		AB	×200% 5s Max.	-55~+125
		631	0.63	280	IB			1	
FCC16	1608	751	0.75	210	AB	36Vd.c. 35A			
	(0603)	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]		
		501	0.5	330	FB		1		
		631	0.63	270	IB				
		801	0.8	190	KB				
FCC20	2012	102	1.0	130	LB	50Vd.c. 50A			
	(0805)	132	1.25	100	MB				
	. ,	162	1.6	80	NB				
		202	2.0	65	SB				
FHC20		252	2.5	40	TB	32Vd.c. 50A	1		

Recommended Derating for Rated Current

Nominal Derating

- Option Code AD:Nominal Derating ≤ 80% of Rated Current
- Option Code AB:Nominal Derating ≤ 70% of Rated Current
- Temperature Derating
- Please refer to the following graph regarding the current derating value for ambient temperature.
- e.g.) If FCC16 102AB (Rated Current:1.0A) is used under ambient temperature 70°C, 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



*Refer to Tape and Packaging information on pages 52 and 53.



KAMAYA OHM http://www.kamaya.co.jp

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

Halogen Free **Antimony Free** Pb Free

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

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c 7 Certified UL, c-UL. File No. : E176847

Dimensions



Current	value is	marked	on the	cover	coating.
		Detter and t			

-	Please refer to	Ratings table	e as belov	V.						Unit : mm
	Style	Option Code	Metric	Inch	L	W	Н	С	d	*Unit weight/pc.
	FMC10	WH	1005	0402 1.0+0.0		0.5 + 0.05	$0.35 {\pm} 0.05$	0.2+0.1	0.25 + 0.40	0.0
		AB	1005	0402	1.0±0.05	0.5 ± 0.05	0.38 ± 0.05	-0.2 ± 0.1	0.25 ± 0.10	0.ong
_	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)

Stulo	Size	Rated	Current	Internal Resistance	Mork	Interrupting Poting	E	lectrical Charact	teristics	Working Temperature Range
Style	(Inch)	Code	А	m ohm max.	IVIAIK		Option Code	Electrical C	haracteristics	°C
		501	0.5	260	F					
		751	0.75	140	A					
		102	1.0	110	L			Rated Current	Opening time	
		132	1.25	80	M					
L EMORA	1608	152	1.5	65	Н	2014-254		× 100%	4n Min.	
FINICIO	(0603)	202	2.0	45	S	32VU.C. 35A	VVD	×200%	5s Max.	-55~+125
		252	2.5	32	Т			×300%	0.2s Max	
		302	3.0	26	R					
		402	4.0	18	Х					
		502	5.0	14	Y					

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

Chile	Size	Rated	Current	Internal Resistance	Mark	Interrupting Dating	E	Electrical Charact	teristics	Working Temperature Range
Style	(Inch)	Code	А	m ohm max.	IVIAIK	Interrupting Rating	Option Code	Electrical Cl	haracteristics) °°C
		501	0.5	250	E					
		751	0.75	150	<u>A</u>					
		102	1.0	100	Ŀ					
		132	1.25	70	M					
	1005	152	1.5	60	H					
FMC10	(0402)	202	2.0	40	<u>S</u>	24Vd.c. 35A				
	(0402)	252	2.5	30	Τ					
		302	3.0	25	<u>R</u>					
		322	3.15	24	U					
		402	4.0	18	X			Rated Current	Opening time	
		502	5.0	14	<u>Y</u>			× 100%	4b Min	
		501	0.5	400	OF			× 100%	411 101111.	
		631	0.63	300	01		WH	×200%	5s Max.	-55~+125
		751	0.75	210	A			×300%	0.2s Max.	
		801	0.8	180	ΟK					
		102	1.0	115	OL					
		132	1.25	90	OM					
EMC16	1608	152	1.5	70	ОH	32V/d c 35A				
	(0603)	162	1.6	60	ON	52 VU.C. 55A				
		202	2.0	50	OS					
		252	2.5	37	ОТ					
		302	3.0	28	OR					
		322	3.15	26	OU					
		402	4.0	18	OX					
		502	5.0	14	ΟY					

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Chip Fuses Circuit Protection

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

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

Stulo	le Size Rated Current	Current	Internal Resistance Mark Int		Interrupting Poting	E	Electrical Charact	eristics	Working Temperature Range	
Style	(Inch)	Code	А	m ohm max.	IVIAIK		Option Code	Electrical Cl	naracteristics) °C
		501	0.5	240	F					
		751	0.75	140	A			D / / O /		
		102	1.0	95	L			Rated Current	Opening time	
EMO10	1005	132	1.25	73	М	241/d a 254		×100%	4h Min.	55 - L 105
FINICIU	(0402)	152	1.5	60	Н	24VU.C. 35A	AD	×200%	5s Max.	-55~+125
		202	2.0	41	S			× 300%	0.2s Max	
		252	2.5	32	Т			100070	0.25 Мах.	
		302	3.0	25	R					

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 \leq 3.0A : 75%, Rated Current > 3.0A : 70%

·Temperature Derating

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

e.g.) If FMC16 102WB (Rated Current:1.0A) is used under ambient temperature 70°C, 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



Chip Fuses Circuit Protection

KAMAYA OHM http://www.kamaya.co.jp

FCCR

Halogen Free

Pb Free

Antimony Free

Certified UL, c-UL, File No.



Dimensions



Current value is marked on the cover coating

Please refer to Ra	itings table as	below.						Unit : mm			
Style	Metric	Inch	L	W	Н	с	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)

Stulo	Size	Rated	Current	Internal Resistance	Mork	Interrupting Poting	Tir	me/Current Characteristics	Working Temperature Range
Style	(Inch)	Code	А	m ohm max.	IVICIN		Option Code	Time/Current Characteristics	O,
		151	0.15	1850	\cap				
		201	0.2	1250	Z]			
ECCP10	1005	251	0.25	880	С	241/d c 354			
	(0402)	321	0.315	600	D	24VU.C. 35A			
		401	0.4	400	E]			
		501	0.5	300	F				
		151	0.15	2300	OB				
		201	0.2	1350	ZB				
		251	0.25	1000	CB				
		321	0.315	600	DB			Poted Current X 200%	
		401	0.4	450	EB		AB	Opening time : 5s Max	$-55 \sim +125$
		501	0.5	300	FB]		Opening time : 03 Max.	
	1609	631	0.63	220	IB				
FCCR16	(0603)	751	0.75	190	AB	50Vd.c. 50A			
	(0000)	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 \leq 75% of Rated Current

Temperature Derating

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

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



Part Number Description





http://www.kamaya.co.jp KAMAYA OHM

SBF32 Slow Blow

Halogen Free **Antimony Free** Pb Free

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



Dimensions



Current value is marked on the cover coating.

Please refer to R	lease refer to Ratings table as below. Unit : mm												
Style	Metric	Inch	L	W	Н	С	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					
							*\/alu	es for reference					

Ratings/Option Code : AS (Slow Blow Type)

Chulo	Size	Rated	Current	Internal Resistance	Mark	Interrupting Dating	E	Electrical Chara	acteristics		Working Temperature Range	
Style	(Inch)	Code	A	m ohm max.	IVIAIK		Option Code	Electrica	I Character	istics	°C	
		102	1.0	130	S10							
		132	1.25	94	S13	62V/d o 50A		Data d Ourrant	Openin	g time		
		152	1.5	68	S15	03VU.C. 50A		Rated Current	Min.	Max.		
		202	2.0	40	S20			> 1000/	41-			
	2216	252	2.5	30	S25]	× 100%	4n			
SBF32	(1206)	302	3.0	24	S30		AS	×200%	15	120s	-55~+125	
	(1200)	402	4.0	15	S40							
		502	5.0	12	S50	32Vd.c. 50A		×300%	0.02s	3.0s		
		602	6.0	10	S60				0.0045	0.05		
		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.

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



Example





Chip Fuses

KAMAYA OHM http://www.kamaya.co.jp

HFC32 High Rated Voltage

С

d

Т

Halogen Free

Antimony Free Pb Free

Certified UL, c-UL. File No.



Features

Construction 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.

Dimensions

С

d





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

Stulo	Size	Rated	Current	Internal Resistance	Mork	Interrupting Poting	E	Electrical Characteristics	Working Temperature Range	
Style	(Inch)	Code	A	m ohm max.	IVIAIK		Option Code	Electrical Characteristics	°C	
		102	1.0	180	102					
		132	1.25	140	132					
		162	1.6	100	162					
		202	2.0	60	202					
		252	2.5	38	252				-55-0. + 125	
		302	3.0	32	302					
	3216	322	3.15	30	322	76V/d o 50A		Rated Current × 200%		
	(1206)	402	4.0	20	402	70VU.C. 50A	AG	Opening time : 60s Max.	-55.9 + 125	
		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 \leq 75% of Rated Current

Temperature Derating

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

e.g.) If HFC32 252 AG (Rated Current 2.5A) is used under ambient temperature 70°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



http://www.kamaya.co.jp KAMAYA OHM

Chip Fuses Circuit Protection

Support of Chip Fuse Selection

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

·The item you would like to check.

- •Circuit Voltage:Max voltage value of circuit mounting fuses
- •Steady-State Current:Current value flown fuses on normal condition.

·Ambient Temperature:Temperature around fuses.

·Waveform(In-rush Currnet): It rapidly flows on circuit when power supply is turned on.



We can provide Application Guide for Fuses Selection.

Chip Attenuators High Frequency

KAMAYA OHM http://www.kamaya.co.jp

RAC101A

Halogen Free

Antimony Free



Dimensions



Circuits

Unbalancee	Unit : mm													
Style	Terminal Style	L	W	Н	Q	а	b	Р	*Unit weight/pc.					
RAC101A	С	1.0±0.1	1.0 +0.10	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

Stulo	Characteristic	Attenuatio	on Factor	Tolerance on Attenuation	Voltage Standing	Frequency	Rated Input Power	Category Temperature	
Style	Impedance	symbol	dB	dB	Wave Ratio	Range	mW/package	°C	
		1	1			DC≦f≦3GHz			
		2	2						
	50 ohm	3	3	±0.3					
		4	4				100	-40~+125	
BAC101A		5	5		1.00001				
RACIUIA		6	6		1.211aX.				
		7	7						
		8	8	±0.4					
		9	9						
		А	10						

Note1. The following information is available.

Test methods for Attenuation Factor and VSWR characteristics.

Part Number Description





http://www.kamaya.co.jp KAMAYA OHM

Antimony Free

SPC,HSPC

Halogen Free

AEC-Q200 Pb Free

• Features ESD protection component. SPC Series :Low capacita

Low capacitance 0.1pf Max. Suitable for ESD protection of High Speed data line. Major application : Mobile Phone, Digital Still Camera, PC, LCD TV etc. : High ESD protection performance (15kV) for automotive (Tight ESD spec requirement) HSPC Series

New Line up 0603mm size.

Major application : Car audio, Car Navigation, System etc.

Dimensions



									Unit : mm
	Style	Metric	Inch	L	W	Н	с	d	*Unit weight/pc.
_	SPC10	1005	0402	10+0.05	0.5+0.05	0.25 + 0.05	0.2 +0.1	0.25 +0.10	0.6mg
	HSPC10	1005	0402	1.0±0.05	0.5±0.05	0.35±0.05	0.2 ±0.1	0.25 ±0.10	0.6mg
	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
								*Value	es for reference



Ratings

Size Conscitonee.M					ESD Chara	acteristics		Note.4	Note.5	Note.6
Part Number	Metric (Inch)	pF	Test Voltage V	Peak V Code	oltage ^{Note.2}	Clamp Voltage ^{Note.3} V	ESD pulse withstand Pulses	Rated Voltage V	Leakage current µ A	Category Temperature Range °C
SDC10			9k)/ Contact discharge	501	EOO Mox			30 Max.		
SPCIU	1005	0.1 Max	okv Contact discharge 501		500 Max.			50 Max.		
HSPC10	(0402) 0.1 Ma	0.1 Max.	15k) (Aorial discharge		600 Max.	100 Max.	100 Min.	30 Max.	1 Max.	$-55 \sim +125$
	1608	0.2 Max	ISKV Aerial discharge	701	700 Max			20 Max.		
113-010	(0603)	0.2 Max.			roo wax.			50 Max.		

Note1. Capacitance : Measured at 25°C , 1MHz, 1V rms

Note2. Peak Voltage : Measured at IEC61000-4-2 Test Voltage.

Note3. Clamp Voltage : Measured at IEC61000-4-2 Test Voltage, at 30ns.

Note4. Rated Voltage : The value of voltage that is applicable to each teminal of ESD suppressor without operation of suppressor.

Note5. 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



*Refer to Tape and Packaging information on pages 52 and 53.

KAMAYA OHM http://www.kamaya.co.jp

ESDSuppressors

Circuit Protection

SPGA

Halogen Free

Antimony Free Pb Free

• Features ESD protection component.

Dimensions



Style	Metric	Inch	L	W	Н	С	d	*Unit weight/pc
NEW SPGA06	0603	0201	0.63±0.05	0.3±0.03	0.23 ± 0.05	0.165±0.05	0.165±0.05	0.16mg
							*Value	es for referen
— Circult							*Value	es for referen
— Circult							*Value	es for refere

Ratings

	Size	- Note 1		ESD Characteristics						Note.6
Part Number Metric (Inch)		Capacitance ^{Note.1} pF	Test Voltage V	Peak V Code	oltage ^{Note.2} V	Clamp Voltage ^{Note.3} V	ESD pulse withstand Pulses	Rated Voltage V	Leakage current µ A	Category Temperature Range °C
	0603	0.5 Max.	Ph/ Contact discharge	501	500 Max.	70 Max.	000 Min	5 Max. 1 Max		-40 - 125
SPGA00	(0201)		8kV Contact discharge	701	700 Max.	85 Max.	900 10111.	12 Max.	I Wax.	-40. • + 125

Note1. Capacitance : Measured at 25°C , 1MHz, 1V rms. Note2. Peak Voltage : Measured at IEC61000-4-2 Test Voltage. Note3. Clamp Voltage : Measured at IEC61000-4-2 Test Voltage, at 30ns.

Note4. Rated Voltage : The value of voltage that is applicable to each teminal of ESD suppressor without operation of suppressor.

Note5. 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



Memo

Packaging for SMD

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Packaging for Surface Mount Devices

Reel Dimensions



					1 1				Unit : mm
	Co	de	A	В	С	D	E	G	Н
Plastic Reel	PA,TH,TP,TE	Shoot molding				o +1.0	11.4±1.0	2+05	
	(8 mm width)		$\phi 180 \begin{array}{c} 0 \\ -1.5 \end{array}$	$\phi 60 {}^{+1}_{0}$	φ13±0.2	9 0	13.0±1.0	2±0.5	φ21±0.8
(=# 10 = 1 + 2000)	TE(12 mm width)	vacuum moluling	_			13 ^{+1.0}	17.0±1.0	_	

*Dimension A : Please contact Kamaya sales dept for plastic reels of ϕ 250mm and ϕ 330mm.

• Tape Dimensions (Unit : mm)



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



Metric	Inch	Style	Code	A	В	С	W	E	t1	t2	t
0402	01005	RMC1/32, RMPC04		$0.24 {\pm} 0.03$	0.45 ± 0.03	4.0±0.05			0.31±0.03	0.15 ± 0.02	$0.36 {\pm} 0.03$
0603	0201	RMC06, RMC1/20, RGC1/20, RNC06, RMAW06, RMGW06, RMPC06	PA	0.37±0.05	0.67±0.05	4.0±0.05			0.42±0.03	0.27±0.02	0.45±0.05
		FCC10, FHC10, FCCR10]	0.65 ± 0.10	1.15±0.10]			0.6 ±0.05	0.5 ± 0.05	0.7 max.
1005	0402	RMC10,RMC1/16S, RGC1/16S, RNC10, RLC10, RCC10, FMC10, SPC10, HSPC10, RMGW10, RMPC10, RMCH10, RPCH10	тн	$0.65 {}^{+ 0.05}_{- 0.10}$	1.15 ^{+ 0.05} - 0.10				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	RMC16, RMC1/16, RGC1/16, RNC16, FCR1/16, RVC16, RLC16, RHC16, RCC16, RLP16, FCC16, FHC16, FMC16, FRC16, HSPC16, FCCR16, RBX16, RMPC16, RMCH16, RMGW16, RPCH16, RPGW16, RPC16		1.15±0.15	1.9 ±0.2		8.0±0.2	3.5±0.05	0.6 ±0.1	_	0.8 max.
2012	0805	RMC20, RMC1/10, RGC1/10, FCR1/10, RNC20, RVC20, RPC20, RLC20, RHC20, LTC1/10, FCC20, FHC20, FRC20, RCC20, RMGW20, RBX20, RMPC20, RMCH20, RPCH20, RPGW20	TP	1.65±0.15	2.5 ±0.2				0.8 ±0.1	_	1.0 max.
		RLP20, MLP20]			4 0+0 1			0.6 ±0.1		0.8 max.
3216	1206	RMC32, RMC1/8, RGC1/8, FCR1/8, RNC32, RVC32, RPC32, RLC32, LTC1/8, FCC32, FHC32, SBF32, FRC32, RCC32, HFC32, RMGW32, TWMC32, TWLC32, RBX32, RMPC32, RMCH32, RPCH32, RPGW32, RVAC32		2.0 ±0.15	3.6 ±0.2	4.0 - 0.1			0.8 ±0.1	_	1.0 max.
		RLP32							0.6 ±0.1		0.8 max.
3225	1210	RMC35, RMC1/4, FCR1/4, RPC35, RLC35, RMGW35, RBX35, RMPC35, RMCH35, RPCH35, RPGW35		2.85±0.20	3.5 ±0.2		8.0±0.3	3.5±0.05	_	_	1.0±0.2
5025	2010	RMC50, RMC1/2, FCR1/2, RVC50, RPC50, RZC50, RLC50, TWLC50, RMGW50, TWMC50	TE	3.1 ±0.2	5.5 ±0.2				—	_	1.1±0.15
6332	2512	RMC63, RMC1, FCR1, RVC63, RPC63, RZC63, RLC63, RLP63, MLP63C, MLP63, TWMC63, TWLC63, RMGW63		3.6 ±0.2	6.9 ±0.2		12±0.3	5.5±0.05	_	_	1.1±0.15
		RAC062D, RAAW062D		07 +01	0.9 ±0.1				0 42 + 0 05		0.5-1.0.1
		RAAW064D		0.7 ±0.1	1.5 ±0.1				0.43±0.05	_	0.5±0.1
		RAC101A	TH	1 15 + 0.05	1 15 + 0.05		00+00		0 4 + 0.05		0.55 max.
Chip Net	works	RAC102D]	1.15 - 0.10	1.13 - 0.10	4.0±0.1	0.0±0.2	3.5 ± 0.05	0.4 -0.10	_	0.5 may
		RACA104D, RAC104D		1.2 ±0.1	2.2 ±0.1				0.4 ±0.1	-	0.0 max.
		RACA164D, RAC164D	тр	1.9 ±0.15	3.6 ±0.2				06 +01	_	0.8 may
		RAC168D		1.9 ±0.15	4.1 ±0.15		8.0±0.3		0.0 ±0.1	—	0.0 max.

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

Packaging for SMD

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Packaging for Surface Mount Devices

(lape												
ĺ	Metric	Inch	Style	Code	A	В	С	W	E	t1	t2	t	
ĺ	6332	2512	WLP63	TE	3.5±0.2	6.75±0.20	4.0±0.1	12±0.3	5.5 ± 0.05	_	_	1.2 Max	
1											*Value	es for reference	

Standard Packaging Quantities (Minimum Units)

				Т	ape & Reel			Bulk
Motrio	Inch	Stulo			C	Outer Carton		
Weuto	Inch	Style	Code	M. P. Q. (pcs./reel)	Reel Q'ty (pcs.)	Gross Weight (kg)	Measurement (m ³)	Q'ty (pcs.)
0402	01005	RMC1/32, RMPC04		20,000		8.8		
0603	0201	RMC06, RMC1/20, RGC1/20, RNC06, RMAW06, RMGW06, RMPC06	PA	15,000		7.8		
		FCC10, FHC10, FCCR10						
1005	0402	RMC10, RMC1/16S, RGC1/16S, RNC10, RLC10, RCC10, RLP10, FMC10, SPC10, HSPC10, RMGW10, RMPC10, RMCH10, RPCH10	ТН	10,000		6.0		
		RMC1/16				8.3		1,000
1608	0603	RMC16, RMC1/16, RGC1/16, RNC16, FCR1/16, RVC16, RLC16, RHC16, RCC16, RLP16, FCC16, FHC16, FMC16, FCCR16, FRC16, HSPC16, RBX16, RPC16, RMGW16, RMPC16, RMCH16, RPCH16, RPGW16, RPC16			50	7.2	-	
2012	0805	RMC20, RMC1/10, RGC1/10, FCR1/10, RLP20, RNC20, RVC20, RPC20, RLC20, RHC20, LTC1/10, FCC20, FHC20, FRC20, RCC20,MLP20, RMGW20, RBX20, RMPC20, RMCH20, RPCH20, RPGW20	TP	5,000		8.4		
3216 1632	1206 0612	RMC32, RMC1/8, RGC1/8, FCR1/8, RNC32, RVC32, RPC32, RLC32, LTC1/8, FCC32, FHC32, SBF32, FRC32, RCC32, HFC32, RMGW32, TWMC32, TWLC32, RBX32, RMPC32, RMCH32, RPCH32, RPGW32, RVAC32				8.8	0.027	1,000
		RLP32, FCC32, FHC32, SBF32, HFC32				10.0		
3225	1210	RMC35, RMC1/4, FCR1/4, RPC35, RLC35, RMGW35, RBX35, RMPC35, RMCH35, RPCH35, RPGW35						
5025 2550	2010 1020	RMC50, RMC1/2, FCR1/2, RVC50, RPC50, RZC50, RLC50, TWLC50, TWMC50, RMGW50	TE	4,000		8.0		
6332	2512	RMC63, RMC1, FCR1, RVC63, RPC63, RZC63, RLC63, TWMC63, TWLC63, RMGW63			40	10.4		1 000
5205	1225	RLP63, MLP63C, MLP63, WLP63				12.0		.,
		RAC062D, RAAW062D, RAAW064D				60		
		RAC102D, RAC101A	ТН	10,000		0.0		
Chip Net Chip Atte	works nuators	RACA104D, RAC104D			50	6.3		
		RACA164D, RAC164D	ТР	5 000		7.7		
		RAC168D		0,000		8.6		5,000

Note1. Please contact Kamaya sales dept. for the specification of outer carton for tape and reel code: PA, TH, TP, TE. (8mm width)

Note2. Please contact Kamaya sales dept. for information of bulk packing of RLP, MLP, MLP63C and WLP. Note3. Please contact Kamaya sales dept. for taping and reel packing of WLP and SPGA06.



Leaded Resistors

Pulse & Packing for Leaded Resistors

KAMAYA OHM http://www.kamaya.co.jp

http://www.kamaya.co.jp

RC

• Features Improved pulse endurance characteristics compared to carbon-film devices.

Dimensions



					Unit : mm
Style	L	D	Н	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
				*Valu	es for reference

Ratings

	Rated	Limiting	Rated	Combinations of Rated I	Resistance Range and Ten	nperature Coefficient of Resistance	e Tolerance on Rated	Insulation	Category
Style	Dissipation at 70°C	Voltage Resistance Temperature Coefficient of Resistance %		Rated Resistance	Resistance and Perferred Number Series	Voltage	Range		
	W	v	Range	at −55°C	at +125°C	Range	for Resistors.	V	°Cັ
				+6.5~0	+1~-5	1Ω~ 1kΩ			
RC1/4	0.25	250	1Ω~5.6MΩ	+10~0	0~-6	1.1kΩ~ 10kΩ	_	100	
				+13~0	0~-75	11kΩ~ 91kΩ	K(±10%) : E12series		-55~+125
					07.5	100kΩ	M(±20%): E6series		00 - 1120
RC1/2	0.5	350	350 1Ω~22MΩ	+15~0	0~-10	$120k\Omega \sim 1M\Omega$		500	
				+20~0	0~-15	1.2MΩ~ 22MΩ			

Note1. Rated Voltage = $\sqrt{(Rated Dissipation) \times (Rated Resistance)}$. (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.



*Refer to Tape and Packaging information on pages 55.

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

• Soldering Process Recommented Soldering Process is Flow Solering. Reflow soldering is not preferred.

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Packaging for Leaded Resistors





							Unit : mm
Style	W	L1-L2	Т	t	Р	Z	S
RC1/4 RC1/2	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	а	b	С
RC1/4	TB 52mm	60±5	75 + 5	275±5
RC1/2	Width Tape	65±5	75±5	455±5

● Tape & Reel (Code : TD)



								Unit : mm
Style	Code	А	*A'	В	C ₁	C ₂	d	*Y
RC1/4 RC1/2	TD	260±5	280	75±5	60.4±1	78±1	14.5±0.5	3

*Values for reference

		Tane	& Reel			Ammo Box					Bulk Packaging				
			Outer Carton			7.11	Out	er Carto	on			Outer Carton		on	
Style	Q'ty / Reel (pcs.)	Reel Size (mm)	Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure- ment (m ³)	Width of Taping (mm)	Width of Q'ty / Taping Box (mm) (pcs.)	Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure- ment (m ³)	Q'ty / Plastic Bag (pcs.)	Inner Carton (pcs.)	Q'ty / Carton (pcs.)	Gross Weight (kg)	Measure- ment (m ³)
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

Capacitors

KAMAYA OHM http://www.kamaya.co.jp

Multilayer Ceramic Capacitor

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

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



Characteristic

Series	Dielectric	Size (Inch)	Capacitance	Rated Voltage
	NP0	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	$0.1 pF \sim 0.1 \mu F$	10V, 16V, 25V, 50V, 100V
General Purpose	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	$100 pF \sim 47 \mu F$	6.3V, 10V, 16V, 25V, 50V, 100V
(6.3V ~ 100V)	X5R	0201, 0402, 0603, 0805, 1206, 1210	$100 \mathrm{pF} \sim 220 \mathrm{\mu F}$	4V, 6.3V, 10V, 16V, 25V, 50V
	Y5V	0402, 0603, 0805, 1206, 1210, 1812	$0.01 \mu F \sim 100 \mu F$	6.3V, 10V, 16V, 25V, 50V, 100V
	NP0	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	$0.5 pF \sim 0.1 \mu F$	200V, 250V, 500V, 630V, 1kV, 2kV, 3kV, 4kV
Middle & High Voltage Caps (200~4KV)	X7R	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	$100 pF \sim 2.2 \mu F$	200V, 250V, 500V, 630V, 1kV, 2kV, 3kV, 4kV
· · ·	Y5V	0805, 1206, 1210, 1812	$0.01 \mu F \sim 0.68 \mu F$	200V, 250V
High Q & Low ESR Caps (HH Series)	NP0	0201, 0402, 0603, 0805	$0.3 \mathrm{pF} \sim 3300 \mathrm{pF}$	16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V
Microwave Caps (RF Series)	NP0	01R5, 0201,0402, 0603, 0805, 0505, 1111	0.1pF ~ 1000pF	6.3V, 10V, 25V, 50V, 100V, 500V, 1500V
Soft Termination Caps	NP0	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	$0.1 pF \sim 0.1 \mu F$	10V,16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 3KV
SH = with Ag Polymer	X7R	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	$100 \mathrm{pF} \sim 22 \mathrm{\mu F}$	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 2kV, 3kV
Safety Certificated	NP0	1808, 1812, 2211	$3 \mathrm{pF} \sim 680 \mathrm{pF}$	250Vac
(S2 series)	X7R	1808, 1812, 2220, 2211	100pF ~ 4700pF	250Vac
Safety Certificated	NP0	1808, 1812	$_{ m 3pF}$ \sim 1000pF	250Vac
(S3 series)	X7R	1808, 1812, 2220	$150 \mathrm{pF} \sim 0.022 \mathrm{\mu F}$	250Vac
	NP0	0201, 0402, 0603, 0805, 1206, 1210, 1812	$0.1 pF \sim 0.047 \mu F$	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV
Automotive Caps without AEC-Q200 (MG Series)	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812	$100 \mathrm{pF} \sim 2.2 \mathrm{\mu F}$	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV
, , , , , , , , , , , , , , , , , , ,	X5R	0402, 0603, 0805, 1206, 1210	$0.068 \mu F \sim 10 \mu F$	6.3V, 10V, 16V, 25V
Automotive Caps qualified with	NP0	0201, 0402, 0603, 0805, 1206, 1210	$0.1 \text{pF} \sim 0.047 \mu\text{F}$	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV
AEC-Q200 (MT Series)	X7R	0201, 0402, 0603, 0805, 1206, 1210	$100 pF \sim 2.2 \mu F$	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV
Automotive Hi-Q Caps qualified with AEC-Q200 (RT Series)	NP0	0402	0.1pF ~ 56pF	25V, 50V
3 Terminal Feedthrough Type (FT Series)	X7R	0805	$10 nF \sim 1 \mu F$	16V, 25V, 50V
Automotive AEC-Q200 available Soft Termination (ST Series)	X7R	0603, 0805, 1210	1000pF ~ 0.1µF	10V, 16V, 25V, 50V, 100V
Microwave Capacitance Narrow Deviation (UF Series)	NP0	0402	0.05pF ~ 3pF	25V, 50V

Capacitors

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Dimensions

Single Chip



							Unit : mm
Size Inch (Metric)	L	W	T/Symbol		Soldering Method*	MB	Quantity per Reel (pcs./reel)
01R5 (0402)	0.4 ± 0.02	0.2 ± 0.02	0.2 ± 0.02	V		0.10 ± 0.03	20,000
	0.6±0.03	0.3 ± 0.03	0.3±0.03			0.45 0.05	
0201	0.6±0.05 ^{#2}	0.3±0.05 ^{#2}	0.3±0.05 ^{#2}	L	_	0.15 ± 0.05	15,000
(0003)	0.6±0.09 ^{#3}	0.3±0.09 ^{#3}	0.3±0.09 ^{#3}	1	R	0.15+0.1/-0.05	
0.400	1 00 ± 0 05	0.50±0.05	0.50 ± 0.05	Ν			
(1005)	1.00±0.05	0.50 - 0.05	0.50+0.02/-0.05	Q		0.25+0.05/-0.10	10,000
(1000)	1.00±0.20	0.50 ± 0.20	0.5±0.20	E			
	1.60±0.10	0.80 ± 0.10	0.80 ± 0.07	S			
0603	1 60+0 15/ 0 10	0 80+0 15/ 0 10	0.50 ± 0.10	н		0.40 ± 0.15	4 000
(1608)	1.00+0.13/-0.10	0.00+0.13/-0.10	0.80+0.15/-0.10	x		0.40±0.15	4,000
	1.60±0.20 ^{#1}	$0.80 \pm 0.20^{*1}$	0.8±0.20 ^{#1}		R/W		
			0.50±0.10	н			
	2 00 + 0 15	1 25 + 0 10	0.60±0.10	A			4,000
0805	2.00 ± 0.15	1.20±0.10	0.80±0.10	В		0.50 ± 0.20	
(2012)			1.25±0.10	D	R	0.50 - 0.20	3,000
	2.00 ± 0.20	1 25+0 20	0.85±0.10	Т	R/W		4,000
	2.00 - 0.20	1.20 - 0.20	1.25±0.20	Ι	R		3,000
			0.80±0.10	В	R/W		4,000
	3.20 ± 0.15	1.60 ± 0.15	0.95±0.10	С			
1206		1.00±0.10	1.25±0.10	D	R	0.60 ± 0.20	3 000
(3216)			1.15±0.15	J		(0.5±0.25)***	0,000
()	3.20 ± 0.20	1 60 ± 0 20	1.60±0.20	G			
		1.00_0.20	0.85±0.10	T	R/W		2,000
	3.20+0.30/-0.10	1.60+0.30/-0.10	1.60+0.30/-0.10	Ρ			4,000
			0.95±0.10	С			
	3.20 ± 0.30	2.50 ± 0.20	0.85±0.10	T			3,000
1210			1.25±0.10	D		0.75 ± 0.25	
(3225)			1.60±0.20	G			2,000
	3.20 ± 0.40	2.50 ± 0.30	2.00±0.20	K			1.000
			2.50 ± 0.30	M			,
	4 50 1 0 40		1.25±0.10	D		0.75 0.05	
1808	4.50 ± 0.40 $(4.5+0.5/-0.3)^{**}$	2.03 ± 0.25	1.40±0.15	F		(0.5 ± 0.25)	2,000
(4520)	(,		1.60±0.20	G		(/	
			2.00±0.20	K			1,000
			1.25±0.10	D			4 000
1812	4.50±0.40	3.20 ± 0.30	1.60 ± 0.20	G	R		1,000
(4532)	(4.5+0.5/-0.3)**		2.00 ± 0.20	K			
		3.20 ± 0.40	2.50 ± 0.30	IVI			500
4005			2.80±0.30	U			
(4563)	4.60±0.40	6.30±0.40				0.75±0.35	
2211 (5728)	5.70±0.40	2.80±0.30	1.60±0.20 (G) 2.00±0.20 (K)				
2220 (5750)	5.70±0.40	5.00 ± 0.40	2.50±0.30 (M) 2.80±0.30 (U)			0.85±0.35	****
2225 (5763)	5.70±0.40	6.30±0.40					
0505 (1414)	1.40+0.38/-0.25	1.40±0.38	1.15±0.15	J		0.25+0.25/-0.13	
1111 (2828)	2.79+0.51/-0.25	2.79±0.38	≤ 1.78	G		0.38±0.25	

* R = Reflow soldering process ; W = Wave soldering process.
** For 1808inch_200V ~3kV, 1812inch_200V~3kV and safety certificated products.
*** For 1206inch_1000V ~3kV, 1812inch_200V ~3kV, 1812inch_200V~3kV and safety certificated products.
**** Please contact Kamaya sales dept. for taping and reel packing Quantity of 1825 Size, 2211 Size, 2220 Size, 2255 Size, 0505 Size and 1111 Size.
#1 : For 0603inch/Cap ≥ 10µF or 0603inch(≤6.3V)/Cap ≥ 4.7µFor 0603inch(>10V)/Cap>1µF products.
#2 : For 0201inch/Cap ≥ 0.68µF products. #3 : For 0201inch/Cap ≥ 1µF products.
The table only for General Purpose Series, Soft termination and others please refer to individual sheet for details.

*Values for reference

Capacitors

KAMAYA OHM http://www.kamaya.co.jp

Part Number Description

Example

[General Purpose MLCC / Middle & High Voltage MLCC]



[High Q/Low ESR MLCC / Microwave MLCC / Safety / Certificated MLCC / Automotive MLCC]







http://www.kamaya.co.jp KAMAYA OHM

Film Capacitors

Dipped metallized film capacitors,CR Units

Capacitors for Power Electronics

Film Capacitors Summary

Sum	mary	Style	Series Code	Features	Rated Voltage	Capacitance (µF)	Temp. Range (°C)
		22	FPB	• Small Standard	250VDC 450VDC 630VDC 800VDC 1250VDC	0.47~10 0.22~4.7 0.068~2.2 0.68~2.2 0.001~0.47	-40~+85 (+105)
		ranna.	NEW FPB2	• Small	630VDC	0.47~2.2	-40~+105
	Standard	2222/13	FPT2	 High temperature availability Small 	630VDC	0.068~2.2	-40~+105 (+125)
		12722-021	FPT	 High temperature availability (∼ +125°C) 	450VDC 630VDC	0.22~4.7 0.01 ~ 2.2	-40~+105 (+125)
		2.2%	MDX	• Standard	250VDC 450VDC 630VDC	0.01~10 0.01~4.7 0.015~2.2	-40~+85 (+105)
General use		12.00	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)
		84°0.02	FPS4	Small Low noise Halogen-free product	450VDC	0.47~2.2	-40~+85 (+110)
	PFC circuit in power	2 mag	FPS3	Low Noise Halogen-free product	450VDC	0.47~2.2	-40~+85 (+110)
		gine .	FPA	 Standard Halogen-free product 	450VDC 550VDC	0.47~2.2	-40~+85 (+110)
	Large capacitance	87-359 10/311	MDL	Miniature and Large capacitance For high frequency and high ripple	35VDC 63VDC	4.7~22 10~22	-40~+85 (+105)
	High voltage	2120 M	MDD	• High voltage 500 VAC.	500VAC	0.0022~0.1	-40~+85 (+105)
		212	FPF	Large current	250VDC 450VDC 630VDC	0.01~10 0.01~3.3 0.01~2.2	-40~+105
High frequency	circuit use	*Salite	FPD4	• Standard	250VDC 450VDC 630VDC	0.01~10 0.01~3.3 0.01~2.2	-40~+105
Assess the line		₩ 1 0 un k ko EXENDEN N NOR Autorite Norm	FSX	EMI suppression class X2 Small	310VAC	0.01~10	-40~+110
ACIOSS- IIIe- IIN	e use	groot and a second seco	CFD-N	 For Japan For noise immunity test 	125VAC 250VAC	0.033~4.7 0.01~2.2	-40~+85 (+105)
Surge absorber		1.00 201	CR	• C-R Unit	125VAC 250VAC	0.1μF+120Ω 0.033μF+120Ω	-40~+85
C-R units		dramati	CRKH	C-R Unit UL,VDE Safety Standard	275VAC	0.01~0.1μF +47,100,120Ω	-40~+100

Capacitors for Power Electronics

General Purpose (DC-Link, Smoothing, etc)	arrange arrange bar	FPCL	 Long Life High Voltage High Current 	630VDC 800VDC 1100VDC 1300VDC	5~65 10~20 1~25 1~15	-40~+70 (+85)
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About Nitsuko product, Please contact as follows.

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

Head office

2031-1, Ogawara, Suzaka-shi, Nagano-ken, 382-0071 Yanato office PSA Building, 6-1-6, Chuo, Yamato-shi, Kanagawa, 242-0021 TEL (+81) 46-206-5247 FAX (+81) 46-206-5248

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

KAMAYA OHM http://www.kamaya.co.jp

Inductor/Balun

Please see Catalog of Walsin Technology Corporation Co., Ltd. (Website: http://www.passivecomponent.com) for detal information.

Quick Product Information

Application	Туре	Style	Series	Range		Size(mm)	н	Quantity per
			WLCW1005	1nH~ 120nH	1.19	0.64	0.66	4K
			WLCW1005CH	1.3nH~ 75nH	1	0.6	0.5	10K
			WLCW1608	1.6nH~ 470nH	1.8	1.12	1.02	4K
			WLCW1608HQ	1.8nH~ 390nH	1.7	1.02	0.9	4K
	Wire Wound		WLCW2012	2.2nH~ 4700nH	2.29	1.73	1.52	3K
	Ceramic Chip		WLCW2012HQ	2.5nH~ 51nH	2.4	1.65	1.45	3K
	inductor		WLCW2520	8.2nH~15000nH	2.92	2.79	2.02/2.10	2K
			WLCW2520HQ	3nH~ 100nH	2.92	2.7	2.79	2K
			WOCW1608	1 6nH~ 1200H	1.19	0.04	0.00	4N /K
			WQCW1000	2 2nH~ 1000nH	2.29	1.12	1.02	3K
			WLAC291A	2.5nH~ 18.5nH	3.68	3.05	3.18	0.5K
RF Inductor			WLAC291B	17.5nH~ 43nH	6.86	3.05	3.18	0.5K
	SMD Air		WLAC292A	1.65nH~ 5.4nH	2.21	1.42	1.37	2K
	Wound Coil	-	WLAC292B	5.6nH~ 12.55nH	4.04	1.42	1.37	2K
			WLAC293A	22nH~ 120nH	4.83	3.81	4.2	1K
			WLAC294A	90nH~ 538nH	10.55	6.35	5.9	1K
			WLQC0806	5.5nH~ 19.4nH	2.591	1.829	1.397	2K
			WLQC0807	6.9nH~ 22nH	2.591	1.829	1.524	2K
	SMD Square Air		WLQC0908	8.1nH~ 27.3nH	2.972	2.134	1.829	2K
	Wound Coil	Con the second	WLQC1111	2/11⊟~ 4/11⊟ 47nH~ 92nH	5.84	2.07	2.79	2.5K
			WLQC1313	90nH~ 300nH	11 94	5.30	5.69	0.75K
			WLQC2929	330nH~ 500nH	14	7.49	7.24	0.6K
	Family Objects and		WLFI1608	0.047uH~ 10uH	1.6	0.8	0.8	4K
	Ferrite Chip Inductor		WLFI2012	0.047uH~ 10uH	2	1.25	0.85 / 1.25	4K / 2K
	Wire Weund Ferrite		WLFW1608	0.047uH~ 10uH	1.8	1.1	1.2	4K
Signal and Noise	Chip Inductor		WLFW2012	0.078uH~ 22uH	2.29	1.91	1.6	ЗK
olghar and Noise			WLFW2520	0.047uH~ 22uH	2.72	2.59	1.83	2K
	Common Mode Choke		WTCF2012	67Ω~ 600Ω	2	1.2	1.2	2K
	Delve Trenefermen	MIL	WICF2012FH	6/Ω~ 120Ω	2	1.2	1.2	2K
	Balun Transformer		WIBL2012	1040,757750	2	1.2	1.2	2K 2.5K
			WLPN202012	0.68uH~ 22uH	2 4	2 4	1.2	2.5K
			WL PN242410	0.47uH~ 10uH	2.4	2.4	12	2.5K
	SMD		WLPN303010	1.2uH~ 22uH	3	3	1	2K
			WLPN303015	1uH~ 100uH	3	3	1.5	2K
			WLPN404010	1uH~ 22uH	4	4	1	5K
	Shielded		WLPN404018	1.0uH~ 220uH	4	4	1.8	3.5K
	Wire Wound		WLPN505010	1uH~ 22uH	4.9	4.9	1	1K
	Power Inductor		WLPN505020	1uH~ 22uH	4.9	4.9	2	0.8K
			WLPN505040	1.5uH~ 47uH	4.9	4.9	4.1	1.5K
			WLPN606010	1.5uH~ 22uH	6	6	1	1K
			WLPIN606045	0.90H~ 1000H	6	5.0	2.0	2K 15K
			WLPN808042	0.9uH~ 100uH	8	8	4.3	1.5K
			WLSS214P	1.5uH~ 12uH	3.2	3.2	1.55	1K
			WLSS316P	1.5uH~ 33uH	3.8	3.8	1.8	1K
			WLSS428P	1.2uH~ 180uH	4.7	4.7	3	1.5K
Power Inducto	SMD		WLSS528P	2.5uH~ 100uH	5.7	5.7	3	1.5K
Fower inducto	Assembly Shielded	14	WLSS628P	3uH~ 100uH	6.7	6.7	3	1.5K
	Wire Wound		WLSS124P	3.9uH∼ 330uH	12	12	4.8	0.75K
	Power inductor		WLSS125P	1.3uH~ 1000uH	12	12	6	0.5K
			WLSS127P	1.2uH~ 1000uH	12	12	8	0.5K
			VVLSSA38G	1.50H~ 3300H	10.3	10.4	5 1	1K 0.5K
			WI SN032D	0.00□~ 10000H	10.3	3	0.1 2.1	0.5K
			WL SN043D	1uH~ 330uH	4.3	4	3.2	2 25K
			WLSN054D	1uH~ 270uH	5.8	5.2	4.5	1K
	SMD Unshielded	100	WLSN073D	10uH~ 330uH	7.8	7	3.5	1K
	Wire Wound Power Inductor		WLSN075D	6.8uH~ 4700uH	7.8	7	5	1K
			WLSN084F	1uH~ 1500uH	12.95	9.4	5.21	0.75K
			WLSN104D	10uH~ 1000uH	10	9	4	1.2K
			WLSN105D	10uH~ 820uH	10	89	5.4	0.7K
		-	WLPM706630	0.22uH~ 22uH	7	6.6	2.8	1K
	SMD Molded	A CONTRACT	WLPM545230	0.2uH~ 10uH	5.4	5.2	2.8	2K
	Fower Choke			0.1uH~ 10uH	4.4	4.2	1.8	2K
				0.∠∠u⊓~ 4/uH	10.00/11.15	10	3.0	0.5K

Inductor

Please see Catalog of INPAQ Technology Co., Ltd. (Website: http://www.inpaqgp.com/) for detal information.

Quick Product Information

Application	Turno	Stulo	Sariaa	Banga		Size(mm)		Quantity per
Application	Type	Style	Jerres	Kange	L	w	Н	reel
			MCI0603HQ	0.3nH~100nH	0.6	0.3	0.3	15K
DE Inductor	Multi-Layer	6.2	MCI1005HQ	1nH~270nH	1	0.5	0.5	10K
KF Inductor	Inductor		MCI1608HQ	1nH~270nH	1.6	0.8	0.8	4K
	induotor		MCI0603TG	0.3nH~100nH	0.6	0.3	0.3	15K
			MCB1005S	10Ω~ 220Ω	1	0.5	0.5	10K
			MCB1608S	30Ω~2000Ω	1.6	0.8	0.8	4K
			MCB2012S	11Ω~1000Ω	2	1.2	0.85	4K
	Chip Bead		MCB3216S	26Ω~ 600Ω	3.2	1.6	1.1	3K
			MCB3225S	60Ω~ 90Ω	3.2	2.5	1.3	2K
			MCB4516S	80Ω~ 150Ω	4.5	1.6	1.6	2K
Signal and Noise			MCB4532S	70Ω~ 120Ω	4.5	3.2	1.6	1K
			MHC1005S	10Ω~ 220Ω	1	0.5	0.5	10K
			MHC1608S	30Ω~2000Ω	1.6	0.8	0.8	4K
	Chin Bood		MHC2012S	11Ω~1000Ω	2	1.2	0.85	4K
	High Current Type		MHC3216S	$26\Omega \sim 600\Omega$	3.2	1.6	1.1	3K
	nigh ourient type		MHC3225S	$60\Omega \sim 90\Omega$	3.2	2.5	1.3	2K
			MHC4516S	80Ω~ 150Ω	4.5	1.6	1.6	2K
			MHC4532S	70Ω~ 120Ω	4.5	3.2	1.6	1K
	Multi Lover		MIP1608	0.33uH~ 2.2uH	1.6	0.8	0.95	4K
	Bower Inductor		MIP2012	0.47uH~ 4.7uH	2	1.25	1	3K
Bower Inducto	rower muuctor		MIP2520	0.47uH∼ 4.7uH	2.5	2	1	2K
Fower maacto	CMD Moldod		WIP201610	0.24uH~ 4.7uH	2	1.6	1	3K
	Sivid Wolded	All and	WIP252010	0.22uH~ 4.7uH	2.5	2	1	3K
	Power Choke		WIP252012	0.22uH~ 4.7uH	2.5	2	1.2	3K



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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, Cl₂, H₂S, NH₃, SO₂, NO₂, 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°C 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 64 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 PCB flows direction Easy to become a defective soldering.



- 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 $A \rightarrow B \rightarrow C\&D \rightarrow Proper$



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.

http://www.kamaya.co.jp KAMAYA OHM

SMD PRODUCT HANDLING MANUAL

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.



- 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 65 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, Cl₂, H₂S, NH₃, SO₂, NO₂, etc.)
 - (3) Use in environments with strong electrostatic or magnetic waves exists.
 - (4) Use nearby flammable substances.
 - (5) Use with the resistors coated in resin, etc.
 - (6) Use of water or water solution for flux cleaning after unwashed soldering or soldering.
 - (7) Use under environment of condensation
- 9.5 Ensure that the condition of the mounting is evaluated and verified on circuit boards when subjected to overloads in the form of pulses or surges, etc.
- 9.6 Take cares handling these products as they may be damaged and become defective if subject to impact, such as dropping.
- 9.7 When attaching adhesive materials such as tape to the surface of the component and then pulling and releasing the tape, the electrode terminals and protective coating may peel off, so please take the following points into consideration.(1) Avoid using tape with high adhesive strength.
 - (2) When peeling off the tape, do not peel it off instantaneously and strongly.
 - (3) The adhesive strength of the tape may increase with time after application, so do not leave the tape on for a long time.

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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 nattern	Si	ze		Flow so	oldering		Reflow soldering			
Land pattern	Metric	Inch	A	В	Х	Y	А	В	Х	Y
	0402	01005					0.18	0.58	0.2	0.2
	0603	0201	1	Not a	pplied		0.3	0.9	0.3	0.3
	1005	0402	1				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
1	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
	1632	0612	0.6	2.8	3.2	1.1	0.6	2.4	3.2	0.9
2	2550	1020	1.3	3.8	5	1.25	1.3	3.4	5	1.05
	3263	1225	2.0	4.5	6.3	1.25	2.0	4.1	6.3	1.05

*For RLP and MLP, the recommended land pattern is set by resistance values.

Please look at corresponding page for further information. Please contact Kamaya sales window for the recommended land pattern of WLP.

For RCC16, RCC20 and SPGA06, Please contact Kamaya sales dept.

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

Х



⊿





Land	Land Style Termi		Terminals		Flow soldering					Reflow soldering				
pattern	Style	style	P	A	В	С	Х	Y	А	В	С	Х	Y	
1	RAC062D	D	0.5						0.3	0.9	0.2	0.3	0.3	
1	RAC102D		0.65		,	lat applia	Ч		0.5	12	0.34	0.33	0.4	
	RAC101A		0.05		I	vot applie	u		0.5	1.5	0.34	0.55	0.4	
2	RAC104D, RACA104D	С	0.5						0.5	1.3	0.15	0.35	0.4	
2	RAC164D, RACA164D]	0.8	1.0 2.6 0.35 0.45 0.8					1.0	2.0	0.35	0.45	0.5	
3	RAC168D		0.5		1	Not applie	d		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.

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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







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°C, Duration: 10 s max.
(2) Temperature of soldering iron tip: 350°C, Duration: 3 s max.

Others

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

KAMAYA OHM http://www.kamaya.co.jp

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°C shall be indicated by the derating Curve.

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

Rated Voltage

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

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

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

Critical Resistance Value

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

Limiting Element Voltage

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

Insulation Voltage

The maximum value of the d.c. voltage that can be impressed for 1 minute the one that the electrode (terminal) was lumped together and between the insulation exterior or substrates is indicated.

When the voltage that exceeds the Insulation voltage is impressed for the electrode and the insulation exterior (substrate), the insulation exterior might be destroyed by generation of heat and the direct current electrolysis action by the leakage current.

Voltage Proof

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

Category Temperature Range

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

Derating Curve

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



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

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

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

R :Measured resistance at T°C

- R_0 :Measured resistance at $\mathsf{T}^\circ\!\mathsf{C}$
- T :Measured test temperature (°C)
- To :Measured base temperature (°C)

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.



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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
COIOI	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%)

• Five - color band system



Calar	1st color band	2nd color band	3rd color band	4rd color band	5th color band
COIOI	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 58.



• Example

(Resistance tolerance is $\pm 20\%$)



*For three-color band system the 4th color band is eliminated

Rated resistance symbols

The symbols to indicate rated resistance are depicted in 3 characters (for the E6, E12, and E24 series) or 4 characters (for the E48, E96 and E192 series) as indicated below.

In the case of 3 characters, the first and second character represent the effective numeral, and the third character is the multiplier following the effective numeral. In the case of 4 characters, the first, second and third character represent the effective numeral, and the fourth character is the multiplier following the effective numeral. When a decimal point exists, the decimal point is represented by an R for all effective numerals.

• 3-Digit (example)

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

• 4-Digit (example)

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

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

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

*The letters M and G are used as multipliers for 10⁶ and 10⁹ respectively of the resistance value expressed in ohms.

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Standard Resistance Values and Symbols

•Code Tolerances

Code	Tolerance on rated resistance
Н	±50%
N	±30%
М	±20%
K	±10%
J	±5%
G	±2%
F	±1%
D	±0.5%
С	±0.25%
В	±0.1%
W	±0.05%

Temperature Characteristics Symbol Table

Code	Temperature coefficient of resistance
В	±5×10 ⁻⁶ /°C
Т	±10×10 ⁻⁶ /°C
Р	±15×10 ⁻⁶ /°C
E	±25×10 ⁻⁶ /°C
С	±50×10 ⁻⁶ /°C
K	±100×10 ⁻⁶ /°C
D	±200×10 ⁻⁶ /°C
A	±500×10 ⁻⁶ /°C
М	±1,000×10 ⁻⁶ /°C
N	±70×10 ⁻⁶ /°C

•Significant Figure of Resistance Value

E6	E12	E24	E48	E96	E192]	E6	E12	E24	E48	E96	E192]	E6	E12	E24	E48	E96	E192
10	10	10	100	100	100		22	22	22	215	215	215		17	47	17	464	464	464
				102	102		22	22	~~~		221	221			47	47		475	475
			105	105	105					226	226	226					487	487	487
				107	107						232	232				51		499	499
		11	110	110	110				24	237	237	237 240				01	511	511	511 517
				113	113 114						243	243 246						523	523 530
	12	12	115	115	115 117					249	249	249 252					536	536	536 542
				118	118 120						255	255 258			56	56		549	549 556
			121	121	121 123					261	261	261 264					562	562	562 569
				124	124 126			27	27		267	267 271						576	576 583
			127	127	127					274	274	274 277					590	590	590 597
		13	100	130	130					007	280	280						604	604
			133	133	135					287	287	287				62	619	619	626
			110	137	137				30	204	294	294 298 301					C 40	634	642 649
			140	140	142					301	301	305					649	649	657
			147	143	145					216	309	312		68	68	68	691	601	673 681
15	15	15	147	147	149 150					310	310	320 324					001	608	690 698
15	15	15	154	150	152 154		33	33	33	332	324	328 332					715	715	706
			134	158	156 158					552	340	336 340					/15	732	723 732
		16	162	162	160 162					348	348	344 348				75	750	750	741 750
			102	165	164 165					040	357	352 357				10	100	768	759 768
			169	169	167				36	365	365	361					787	787	777
				174	172						374	370					_	806	806
			178	178	176					383	383	383			82	82	825	825	825
	18	18		182	182			39	39		392	392						845	845
			187	187	187					402	402	402					866	866	866
				191	191						412	412						887	887
			196	196	196				42	422	422	422				01	909	909	909
		20		200	200				43		432	432				91		931	931 942
			205	205	205 208					442	442	442 448					953	953	953 965
				210	210 213						453	453 459						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 ² R	<u>E²</u> R	IR	\sqrt{PR}	<u>Р</u> І	E R	$\sqrt{\frac{P}{R}}$	P E	<u>E</u> I	<u>E²</u> P	$\frac{P}{l^2}$

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Kamaya Shipping Label

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

Example for chip resistors

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



(1)Product type(Style, Temperature coefficient of resistance, Rated resistance, Tolerance, Packaging) (2)Parts number from customer (P/N)

- (3)Quantity
- (4)Shipping Lot Number (L/N)
- (5)Manufacturer

(6)Internal code 1

(7)Internal code 2

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


Memo

Kamaya Global Network

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WALSIN TECHNOLOGY CORPORATION YANG-MEI, TAIWAN

WALSIN ELECTRONICS (S) PTE. LTD. SINGAPORE

KAMAYA ELECTRIC (M) SDN. BHD. (FACTORY & SALES OFFICE) PERAK, MALAYSIA

Application Facilities	Standard	Certification Organization	Certification No.	Rev. certificate Date	Certificate Date
KAMAYA ELECTRIC(M)SDN. BHD.	ISO9001	NQA Grobal Assurance	119040	Nov.20,2019	Nov.20,2019
	IATF16949		0361923	Nov.20,2019	Nov.20,2019
	ISO14001		E3242	Nov.15,2021	Jun.11,2009
	ISO45001		H3023	Sep.16,2020	May.26,2015
NAIE Factory, Hokkaido	ISO9001	Bureau Veritas Japan Co., Ltd	4589648	Feb,26,2021	Mar.22,2012
	IATF16949		362609	Mar.29,2021	Mar.8,2018
	ISO14001		4506826	May.9,2020	May.9,2002
	ISO45001		4280028	Mar.16,2021	Mar.16,2021
DONGGUAN WALSIN TECNOLOGYELECTRONICS CO.,LTD.	ISO9001	UL DQS Inc	20000837QM15	Feb.7,2021	May.21,1996
	IATF16949		0384607	Feb.7,2021	Feb.7,2021
	ISO14001	CTI International Certification	04121E30122R6L	Aug.3,2021	Aug.13,2003
	ISO45001		04120S30090R4L	Aug.13,2020	Aug.14,2008

ISO 45001 was published on March 12, 2018, and OHSAS 18001 will be expired on March 11, 2021.

*Important

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

Naie Factory,Hokkaido Hokkaido Research Center

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