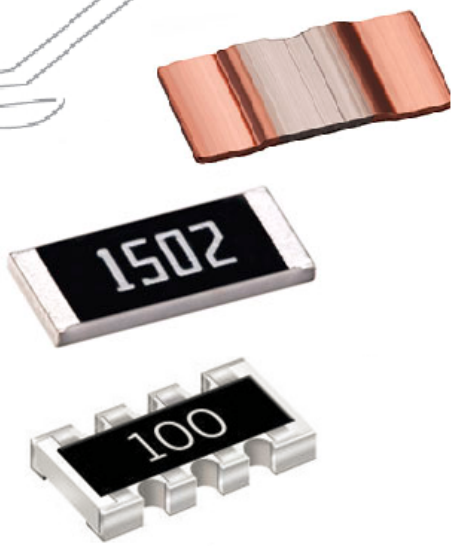
SANNOHM™

SMD Resistor Buyer's Guide



SP international

2023 Edition

S-P International offers a complete line of resistor products to meet all of your requirements, in both SMD and through-hole styles under our Sannohm and Sanyo-Ohm brand names. For over 45 years, Canadian and world-wide manufacturers have come to depend on S-P International's Sannohm and Sanyo-OHM brand resistors. From the basic 5% carbon film to 0.1%, 25ppm metal film; from 1/8W to 500W; SMD sizes 0201 ~ 2512, we have the right resistor for your requirements.

S-P International draws on the expertise of the world's major resistor suppliers to bring you the right products at the right prices. Please note that not all products are carried in stock and some are subject to minimum order quantities. This publication covers the S-P International Sannohm SMD Chip and MELF resistor types. For listings of our through-hole resistors, please consult our "Resistor Buyer's Guide for Through-Hole Resistors." Contact your local S-P International office or distributor with your requirements for complete specifications and pricing.

S-P International - Burnaby
Corporate Head Office and Warehouse

S-P International - Markham
Sales Office - Eastern Region

CELEBRATING 50 Years 1972-2022

RoHS COMPLIANT

REACH COMPLIANT

S-P International's Sannohm and Sanyo-OHM resistors are fully RoHS & REACH compliant as well as meeting all Conflict Minerals Report requirements. Leads are matte tin plated. For further information on S-P International's products, please contact S-P International or your local distributor directly.

Pb

SANNOHM™

SANNOHM is a trademarks of S-P International

NOTICE:
Data given in the publication is subject to product improvement change without prior notification.
Certain products listed in this publication are subject to factory minimum production requirements.

Catalogue created by Arthur Baier and edited by Heidi Wassersleben for S-P International.

Contents

For the following series types not listed in this publication, please contact S-P International for more information.

AS Series	Anti-Sulfurated Thick Film Chip Resistor
LR Series	Ultra Low Ohm (Metal Strip) Chip Resistor
NMP Series	Non-Magnetic Thick Film Chip Resistor
PR Series	Anti-Corrosive Thin Film Precision Chip Resistor
RRT Series	Trimmable Thick Film Chip Resistor
WB Series	Wire Bondable Chip Resistor

SANNOHM

CROSS REFERENCE

SANNOHM	Cyntec	EVER OHMS	IRC	KAMAYA	KOA	Panasonic	RALEC
RT01							
RT02	RR0510(RG1005X)		PCF0402		RN731E	ERA2A	
RT03	RR0816(RG1608X)		PCF0603		RN731J	ERA3A	
RT05	RR1220(RG2012X)		PCF0805		RN732A	ERA6A	
RT06	RG3216X		PCF1206		RN732B	ERA8A	
RT10							
RT20			PCF2010		RN732E		
RT25			PCF2512				
CS01 (0201)							
CS02 (0402)			LVC0402		SR731E	ERJ2GE-0402	RTT02
CS03(0603)	RLT0816-		LVC0603		SR731J	ERJ3GE-0603	RTT03
CS05(0805)	RLT1220-		LVC0805		SR732A	ERJ6GE-0805	RTT05
CS06(1206)	RLT1632-		LVC1206		SR732B	ERJ8GE-1206	RTT06
CS13(1210)			LVC1210				RTT10
CS10(2010)	RLT2550-		LVC2010		SR732E	ERJ12Z-2010	RTT20
CS12(2512)	RLT3264-		LVC2512		SR732H	ERJ1T-2512	RTT25
CS25(1225)			LRF3W		SR733A		
CS37(3720)	RL7520-0830						
CS75(7520)	RL3720-0815						
LR06(1206)	RI1632		ULR1206				
LR10(2010)	RL2550		ULR2010				
LR12(2512)	RL3264		ULR2512			ERJM1W	
RC01	PFR03S	CR0201	WCR0201	RMC 1/20		ERJ1GE	RTT01
RC02	PFR05S	CR0402	WCR0402	RMC 1/16S	RK731E	ERJ2GE	RTT02
RC03		CR0603	WCR0603	RMC 1/16	RK731J	ERJ3GE	RTT03
RC05	PFR12X	CR0805	WCR0805	RMC 1/10	RK732A	ERJ6GE	RTT05
RC06	PFR16X	CR1206	WCR1206	RMC 1/8	RK732B	ERJ8GE	RTT06
RC10		CR1210	WCR1210	RMC 1/4	RK732E	ERJ14	RTT10
RC20		CR2010	WCR2010	RMC 1/2	RK732H	ERJ12Z	RTT20
RC25		CR2512	WCR2512	RMC 1		ERJ1T	RTT25
RS01			LVC0402		SR731H		
RS02		CR0402	LVC0603		SR731E		
RS03	RLT0816-	CR0603	LVC0805		SR731J		
RS05	RLT1220-	CR0805	LVC1206		SR732A		
RS06	RLT1632-	CR1206	LVC1210		SR732B		
RS10		CR1210	LVC2010		SR732E		
RS20	RLT2550-	CR2010	LVC2512		SR73W2H		
RS25	RLT3264-	CR2512			SR73W3A		
HVR02							
HVR03				RVC16	HV731J		
HVR05				RVC20	HV732A		
HVR06				RVC32	HV732B		
HVR20			HVC2010	RVC50/RZC50	HV732H		
HVR25			HVC2512	RVC63/RZC63	HV733A		
PWR03					SG73S(P)1J	ERJP03	
PWR05			PWC0805		SG73S(P)2A	ERJP06	
PWR06			PWC1206		SG73S(P)2B	ERJP08	
PWR10					SG73S(P)2E	ERJP14	
PWR20			PWC2010				
PWR25			PWC2512				
SWR03			PWC0805		SG731J		
SWR05			PWC1206	RPC20	SG732A	ERJT06	
SWR06				RPC32	SG732B	ERJT08	
SWR13			PWC2010	RPC35	SG732E	ERJT14	
SWR10			PWC2512	RPC50	SG73W2H		
SWR12				RPC63	SG73W3A		
HMR05			HR0805	RHC20			
HMR06			HR1206				
CN-21	RS062R				CN1H2N		RTA01-2D
CN-41	RS064R				CN1H4N		
CN-42		CRA024R		RAC104D	CN1E4K		RTA02-4D
CN-43		CRA034R	WCA0804LF	RAC164D	CN1J4K		RTA03-4D
CNA42		CRA024C			CN1E4		RTA02-4C
CNA43			WCC0804LF		CN1J4		RTA02-4C
MM0204					RN412ES		
MM0207					RN412H/RN413AS		

SANNOHM	ROHM	Susumu	Viking	TA-I	Vishay	Walsin	Yageo
RT01		RR0306(0201)	AR01(0201)				RT0201
RT02		RR0510(0402)	AR02(0402)	RB10	P/TNPW0402	WF04T(U)	RT0402
RT03		RR0816(0603)	AR03(0603)	RB16	P/TNPW0603	WF06T(U)	RT0603
RT05		RR1220(0805)	AR05(0805)	RB20	P/TNPW0805	WF08T(U)	RT0805
RT06		RR1632(1206)	AR06(1206)	RB32	P/TNPW1206	WF12T(U)	RT1206
RT10		RR2632(1210)	AR13(1210)		TNPW1210	WF10T(U)	RT1210
RT20			AR10(2010)		TNPW2010	WF20T(U)	RT2010
RT25			AR12(2512)		TNPW2512	WF25T(U)	RT2512
CS01 (0201)			CS01 (0201)				
CS02 (0402)		RL0603-0201	CS02 (0402)	RL04	RCWE0402	WW04X	RL0402
CS03(0603)		RL0510-0402	CS03(0603)	RL06	RCWE0603	WW06X	RL0603
CS05(0805)	MCR10	RL0816-0603	CS05(0805)	RL10	RCWE0805	WW08X	RL0805
CS06(1206)	MCR18	RL1220-0805	CS06(1206)	RL12	RCWE1206	WW12X	RL1206
CS13(1210)			CS13(1210)		RCWE1210	WW10X	RL2010
CS10(2010)	MCR25	RL1632-1206	CS10(2010)	RL20	RCWE2010	WW20X	RL2010
CS12(2512)	MCR50	RL3264-2512	CS12(2512)	RL25	RCWE2512	WW25X	RL2512
CS25(1225)	MCR100 (1225)		CS25(1225)				
CS37(3720)		RL7520-0830	CS37(3720)				
CS75(7520)		RL3720-0815	CS75(7520)				
LR06(1206)		RL1632	LR06(1206)	RLM12	WSL1206	WW12M(N)	
LR10(2010)		RL2550	LR10(2010)	RLM20	WSL2010	WW20M(N)	PR2010
LR12(2512)		RL3264	LR12(2512)	RLM25	WSL2512	WW25M(N)	PR2512
RC01	MCR006	PFR/GFR	CR01(0201)	RM02	D/CR/CRCW	WR02X	RC0201
RC02	MCR01	PFR/GFR	CR02(0402)	RM04	D/CR/CRCW	WR04X	RC0402
RC03	MCR03	PFR/GFR	CR03(0603)	RM06	D/CR/CRCW	WR06X	RC0603
RC05	MCR10	PFR/GFR	CR05(0805)	RM10	D/CR/CRCW	WR08X	RC0805
RC06	MCR18	PFR/GFR	CR06(1206)	RM12	D/CR/CRCW	WR12X	RC1206
RC10	MCR25	PFR/GFR	CR12(1210)	RM13	D/CR/CRCW	WR10X	RC1210
RC20	MCR50		CR10(2010)	RM20	D/CR/CRCW	WR20X	RC2010
RC25	MCR100		CR25(2512)	RM25		WR25X	RC2512
RS01			RS-01				
RS02		RL0603-0201	RS-02		RCWL0402	WW04X	RL0402
RS03		RL0510-0402	RS-03		RCWL0603	WW06X	RL0603
RS05		RL0816-0603	RS-05		RCWL0805	WW08X	RL0805
RS06		RL1220-0805	RS-06		RCWL1206	WW12X	RL1206
RS10			RS-10		RCWL1210	WW10X	RL1210
RS20		RL1632-1206	RS-0A		RCWL2010	WW20X	RL2010
RS25		RL3264-2512	RS-12		RCWL2512	WW25X	RL2512
HVR02			HVR02				
HVR03	KTR03		HVR03				
HVR05	KTR10		HVR05				RV0805
HVR06	KTR18		HVR06	RH12	CRMV1206	WF12V	RV1206
HVR20			HVR0A	RH20	CRMV2010	WF20V	
HVR25			HVR12		CRMV2512	WF25V	RV2512
PWR03	ESR03		PWR03		CRCW0603-HP e3		
PWR05	ESR10		PWR05		CRCW0805-HP e3		
PWR06	ESR18		PWR06		CRCW1206-HP e3		SRC01
PWR10	ESR25		PWR13		CRCW1210-HP e3		
PWR20			PWR10		CRCW2010-HP e3		
PWR25			PWR12		CRCW2512-HP e3		
SWR03			SWR03		D11/CRCW0603-IF		
SWR05			SWR05		D12/CRCW0805-IF		SR0805
SWR06			SWR06		D25/CRCW1206-IF	WF12S	SR1206
SWR13			SWR13				
SWR10			SWR10			WF20S	
SWR12			SWR12			WF25S	SR2512
HMR05			HMR05		RCHR0805		
HMR06			HMR06		RCHR1206		
CN-21			CN-21	CN12			YC102
CN-41			CN-41				
CN-42	MNR04		CN-42	CN24	CRA04S0803	WA04X	YC124
CN-43	MNR14		CN-43	CN34	CRA06S0803	WA06X	YC164
CNA42			CNA42	CNC24		WA04T	TC124
CNA43			CNA43	CNC34	CRA06P0803	WA06T	TC164
MM0204			CSR0204		MMA0204		
MM0207			CSR0207		MMB0207		

SANNOHM

RC Thick Film Chip Resistor

- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- COMPATIBLE WITH ALL SOLDERING PROCESSES
- LEAD FREE , RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/20W ~ 1W (2W - HP Version)

DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	**Type**	**L**	**W**	**H**	**I2**	**I1**
RC01	0201	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.03	0.15 ± 0.08	0.15 ± 0.08
RC02	0402	1.00 ± 0.10	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
RC03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
RC05	0805	2.00 ± 0.15	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.20
RC06	1206	3.05 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RC10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RC20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
RC25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

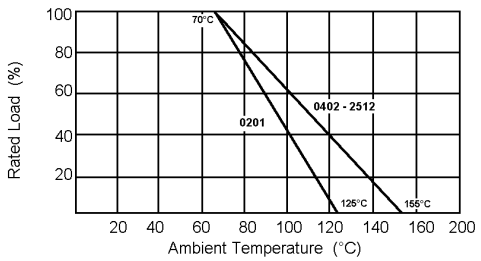
Case sizes 0612 and 1225 available on special order. Contact S-P International for more information.

ELECTRICAL CHARACTERISTICS

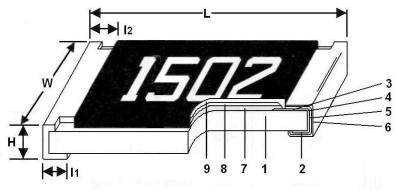
Power Rating at 70°C	**1/20W**	**1/16W**	**1/10W**	**1/8W**	**1/4W**	**1/3W**	**3/4W**	**1W**
High Power Version	**- - -**	**1/8W**	**1/4W**	**1/3W**	**1/3W**	**1/2W**	**1W**	**2W**
Ultra High Power	**- - -**	**- - -**	**- - -**	**- - -**	**1/2W**	**3/4W**	**- - -**	**- - -**
STYLE	**RC01**	**RC02**	**RC03**	**RC05**	**RC06**	**RC10**	**RC20**	**RC25**
Operating Temperature		-55°C ~ +155°C						
Maximum Working Voltage	25V	50V	75V	150V	200V	200V	200V	250V
Maximum Overload Voltage	50V	100V	150V	300V	400V	400V	400V	500V
Temperature Coefficient	1Ω~10MΩ ±200ppm/°C	1% - 10Ω~1MΩ ±100ppm/°C; (<10Ω ±200ppm/°C : >1MΩ ±200ppm/°C) 5% - 10Ω~1MΩ ±100ppm/°C; (<10Ω ±200ppm/°C : >1MΩ ±200ppm/°C) HP Version - 1% : 10Ω~1MΩ ±100ppm/°C; (,10Ω ±200ppm/°C) HP Version - 5% : 10Ω~1MΩ ±100ppm/°C						
Resistance Range: 1%	10Ω~10MΩ*	10Ω~10MΩ*	10Ω~20MΩ*					
Resistance Range: 5% 2%	10Ω~10MΩ	10Ω~10MΩ*	1Ω~20MΩ*					
0Ω Jumper Rated Current	1.0A	1.0A	1.0A	2.0A	2.0A	2.5A	3.5A	4.0A

* Standard Resistance Range - Values above or below this range are available upon request.

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD	SPECIFICATION
Temperature Coefficient	JIS C 5201-1 4.8	As Spec.
Voltage Proof	JIS C 5201-1 4.7	1.42 times maximum operating temperature for 1 minute with no breakdown or flashover
Short Time Overload	JIS C 5201-1 4.13	1% = ± (1% + 0.05Ω), 5% = ± (2% + 0.05Ω) RCWV * 2.5 or maximum overload voltage, whichever is lover for 5 seconds, 2 seconds for HP Series
Endurance	JIS 5201-1 4.25	1% = ± (1.0% + 0.10Ω), 5% = ± (2.0% + 0.10Ω) 70±2°C, 90~95% R.H., RCWV for 1,000 hours ON and 0.5 hours OFF
Insulation Resistance	JIS C 5201-1 4.6	1% & 5% = >10GΩ Maximum overload for 1 minute
Damp Heat with Load	JIS C 5201-1 4.23	1% = ± (1.0% + 0.05Ω), 5% = ± (2.0% + 0.10Ω) At +155°C for 1,000 hours
Dry Heat	JIS C 5201-1 4.23	1% = ± (1.0% + 0.05Ω), 5% = ± (2.0% + 0.10Ω) 40±2°C, 90~95% R.H., RCWV for 1.5 hours ON and 0.5 hours OFF
Solderability	JIS C 5201-1 4.17	95% minimum coverage 245±5°C for 3 seconds
Resistance to Soldering Heat & Solder Method	JIS C 5201-1 4.18	1% = ± (0.5% + 0.05Ω), 5% = ± (1.0% + 0.05Ω) Flow Solder - 260°C for 10 seconds
Leaching	JIS C 5201-1 4.18	260±5°C for 30 seconds Individual leaching are ≤5%, Total leaching area ≤10%
Bending Strength	JIS C 5201-1 4.33	1% & 5% = ± (1.0% + 0.05Ω) Bending once for 60 seconds, all sizes 3mm, 2010 & 2512 sizes 2mm
Rapid Change of Temperature	JIS C 5201-1 4.19	1% = ± (0.5% + 0.05Ω), 5% = ± (1.0% + 0.05Ω) -55°C to +155°C for five cycles

PART NUMBER

RC 06 - 22R6 F R - xx

Series Type	Size	Resistance Value	Tolerance	Package	Option**
RC	01 = 0201 02 = 0402 03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	Example 0R10 100R 10K0 1M00	J = 5% F = 1%	R = T&R	Blank = Standard HP = High Power UP = Ultra HP Contact S-P International for other options

STANDARD PACKAGING

TAPE	0201 ~ 0402	10,000 pieces
	0603 ~ 1210	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7”
Contact S-P International for other reel sizes.

LEAD FREE

RC Series parts are RoHS & REACH Compliant

SANNOHM

RC –AU Automotive Thick Film Chip Resistor

- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- COMPATIBLE WITH ALL SOLDERING PROCESSES
- AUTOMOTIVE AEC-Q200 COMPLIANCE
- LEAD FREE , RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/20W ~ 1W

DIMENSIONS

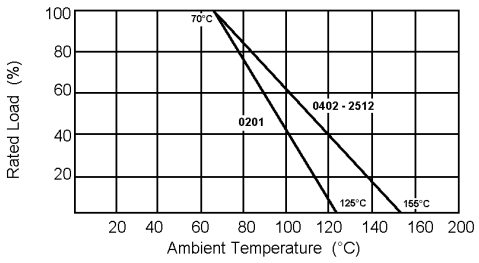
STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I2	I1
RC01	0201	0.60 ± 0.03	0.30 ± 0.03	0.23 ± 0.03	0.15 ± 0.05	0.15 ± 0.05
RC02	0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
RC03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
RC05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.35 ± 0.20
RC06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.05	0.50 ± 0.20	0.50 ± 0.25
RC10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.05	0.50 ± 0.20	0.50 ± 0.25
RC20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.05	0.50 ± 0.20	0.60 ± 0.25
RC25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.05	0.50 ± 0.20	0.60 ± 0.25

ELECTRICAL CHARACTERISTICS

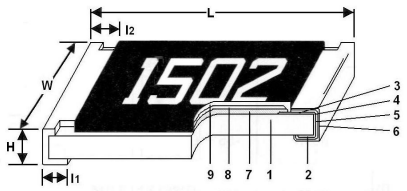
Power Rating at 70°C	1/20W	1/16W	1/10W	1/8W	1/4W	1/2W	3/4W	1W
High Precision (±0.5)	- - -	1/16W	1/10W	1/8W	1/4W	1/3W	3/4W	1W
Ultra High Power	- - -	1/8W	1/4W	1/3W	1/2W	- - -	1W	2W
STYLE	RC01	RC02	RC03	RC05	RC06	RC10	RC20	RC25
Operating Temperature		-55°C ~ +155°C						
Maximum Working Votage	25V	50V	75V	150V	200V	200V	400V	500V
Maximum Overload Voltage	50V	100V	150V	300V	400V	400V	800V	1000V
Temperature Coefficient	±200ppm/°C	1%, 5% : 10Ω~1MΩ ±100ppm/°C; (<10Ω ±200ppm/°C : >1MΩ ±200ppm/°C) HP Version - 1% : 10Ω~1MΩ ±100ppm/°C UHP Version - 1%, 5% : 10Ω~1MΩ ±100ppm/°C; (1Ω~9.76Ω ±200ppm/°C)						
Resistance Range: 1%	1Ω~10MΩ*		1Ω~10MΩ*					
Resistance Range: 5%	1Ω~10MΩ*		1Ω~10MΩ*					
0Ω Jumper Rated Current	1.0A	1.0A	1.0A	2.0A	2.0A	2.5A	3.5A	4.0A

* For manufacturing the optional specification based on customer's requirement, please contact S-P International

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD	SPECIFICATION
Temperature Coefficient	JIS C 5201-1 4.8 IEC-60115-1 4.8	As per specification
High Temperature Exposure	MIL-STD-202 Method 108	1% = ± (1.0% + 0.05Ω) 5% = ± (1.5% + 0.10Ω)
Short Time Overload	JIS C 5201-1 4.13 IEC-60115-1 4.13	1% = ± (1% + 0.05Ω) 5% = ± (2% + 0.05Ω)
Vibration	MIL-STD-202 Method 204 5g's for 20 min, 12 cycles each of 3 orientations, 10 - 2000Hz	1% = ± (0.5% + 0.5Ω) 5% = ± (1.0% + 0.05Ω)
Insulation Resistance	JIS C 5201 4.6 IEC-60115-1 4.6	1% & 5% = ≥10GΩ
Mechanical Shock	MIL-STD-202 Method 213	1% = ± (0.25% + 0.05Ω) 5% = ± (1.0% + 0.05Ω)
Temperature Cycling	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles	1% = ± (0.5% + 0.05Ω) 5% = ± (1.5% + 0.5Ω)
Solderability	IEC 60115-1 4.17 245°C ± 5°C for 3 seconds	95% minimum coverage
Resistance to Soldering Heat	MIL-STD-202 Method 210	1% = ± (0.25% + 0.05Ω) 5% = ± (1.0% + 0.05Ω) Flow Solder - 260°C for 10 seconds
Resistance to Solvent	MIL-STD-202 Method 215	No Visible damage on appearance or marking
Terminal Strength	AEC-Q200-006 Force of 1.8kg for 60 seconds.	No Damage
ESD	IEC61340-3-1 (MIL-STD-883) 3 positive + 3 negative discharges	± (1.0% + 0.05Ω)
Flammability	UL-94 V-0 or V-1 are acceptable, Electrical Test not required	No Ignition of the tissue paper or scorching or the pinewood board

PART NUMBER

RC 06 - 22R6 F R - AU xx

Series Type	Size	Resistance Value	Tolerance	Package	Series Type	Option**
RC	01 = 0201 02 = 0402 03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	Example 0R10 100R 10K0 1M00	E = 0.5% F = 1% J = 5%	R = T&R	AU	UP = Ultra HP Contact S-P International for other options

STANDARD PACKAGING

TAPE	0201 ~ 0402	10,000 pieces
	0603 ~ 1210	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7"
Contact S-P International for other reel sizes.

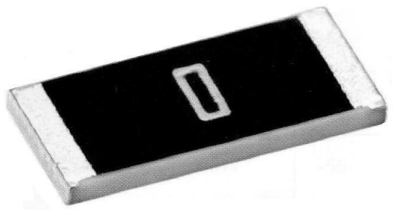
LEAD FREE

RC -AU Series parts are RoHS & REACH Compliant

SANNOHM

RC - 0R Thick Film Chip Resistor

- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- COMPATIBLE WITH ALL SOLDERING PROCESSES
- LEAD FREE, RoHS & REACHCOMPLIANT



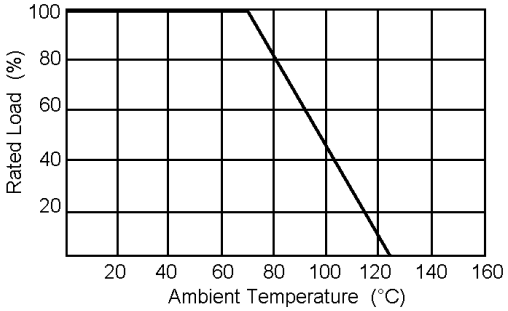
DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
RC02	0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
RC03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
RC05	0805	2.00 ± 0.15	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.35 ± 0.15
RC06	1206	3.05 ± 0.10	1.55 ± 0.15	0.55 ± 0.05	0.45 ± 0.20	0.35 ± 0.15
RC10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.05	0.50 ± 0.25	0.50 ± 0.20
RC20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.05	0.60 ± 0.25	0.50 ± 0.20
RC25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.05	0.60 ± 0.25	0.50 ± 0.20

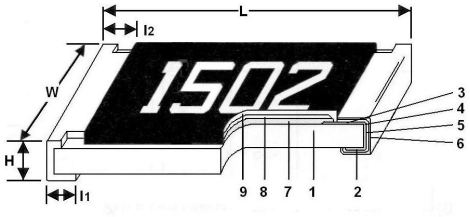
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/16W	1/10W	1/8W	1/4W	1/3W	3/4W	1W
STYLE	RC02	RC03	RC05	RC06	RC10	RC20	RC25
Rated Current	1A	1A	2A	2A	2A	2A	2A
High Power Version*	1.5A	2A	2.5A	3.5A	5A	6A	7A
DC DC Inrush Current	2.5A	2.5A	5A	5A	5A	5A	5A
Resistance Range	50m Ω Max						
Operating Temperature	-55°C ~ +125°C						

DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD	SPECIFICATION
Temperature Coefficient	JIS C 5202 5.2	-55°C to +125°C Refer 5.0
Dielectric Withstanding Voltage	JIS C 5202 5.7 Apply voltage 300V - 0402 & 0603, 500V - all other sizes	No abnormalities such as flashover, burning dielectric breakdown shall appear
Short Time Overload	JIS C 5202 5.5 2.5x rated current for 5 seconds	0Ω : 50mΩ or less
Insulation Resistance	JIS C 5202 5.6 Apply voltage 100V for 1 minute	≥ 1GΩ
Intermittent Overload	JIS C 5202 5.8 2x rated current, 1second on, 254 seconds off, 10,000 cycles	0Ω : 50mΩ or less
Moisture Load Life	JIS C 5202 7.9 1000 hr 90~95% RH, 1.5 hr on, 0.5hr off	0Ω : 100mΩ or less
Load Life	JIS C 5202 7.10	0Ω : 100mΩ or less
Solderability	JIS C 5202 6.11	95% minimum coverage
Resistance to Soldering Heat	JIS C 5202 6.10 270°C ± 5°C, 10 seconds	0Ω : 50mΩ or less
Robustness of Electrode	JIS C 5202 6.1 3mm deflection	0Ω : 50mΩ or less
Rapid Change of Temperature	JIS C 5202 7.4 -55°C 30 min / +155°C 30 min	0Ω : 50mΩ or less

PART NUMBER

RC 06 - 0R00 JR - xx

Series Type	Size	Resistance Value	Package	Options*
RC	02 = 0402 03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	0R00	JR = T&R	Blank = Standard HP = High Power

STANDARD PACKAGING

TAPE	0402	10,000 pieces
	0603 ~ 1210	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7”
Contact S-P International
for other reel sizes.

LEAD FREE

RC Series parts are
RoHS & REACH Compliant

SANNOHM

RT Thin Film Chip Resistor

- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- COMPATIBLE WITH ALL SOLDERING PROCESSES
- LEAD FREE, RoHS & REACH COMPLIANT

POWER RATING

1/16W ~ 3/4W

DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
RT02	0402	1.00 ± 0.10	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
RT03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.25 ± 0.15	0.25 ± 0.15
RT05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.35 ± 0.20
RT06	1206	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.45 ± 0.20	0.40 ± 0.20
RT10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.20	0.50 ± 0.20
RT20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.50 ± 0.20
RT25	2512	6.35 ± 0.10	3.20 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

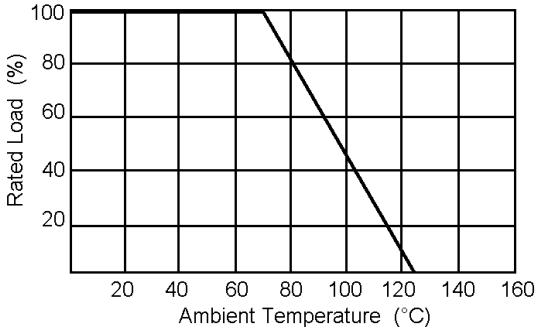
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/16W	1/10W	1/8W	1/8W	1/4W	1/2W	3/4W
STYLE	RT02	RT03	RT05	RT06	RT10	RT20	RT25
Operating Temperature	-55°C ~ +125°C (+155°C on request)						
Maximum Working Voltage	50V	75V	150V	200V	200V	200V	200V
Maximum Overload Voltage	100V	150V	300V	400V	400V	400V	400V
Temperature Coefficient	±50ppm/°C, ±25ppm/°C (±15ppm/°C, ±10ppm/°C, ±5ppm/°C on request)						
Resistance Tolerance	±0.1%, ±0.25%, ±0.5% (±0.01%, ±0.05% on request)						
Resistance Range*	10Ω~121KΩ	10Ω~681KΩ	10Ω~1.5MΩ	10Ω~1.5MΩ	10Ω~1MΩ		

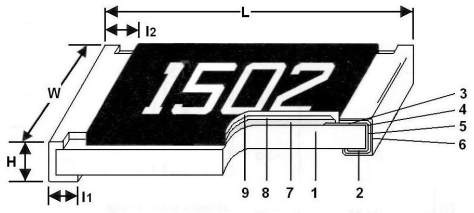
Power Rating at 70°C	1/4W	1/3W	1W
STYLE	RT06-HP	RT10-HP	RT25-HP
Range & TCR - ppm/°C 0.1%, 0.25% and 0.5%	4.7Ω~1MΩ / ±10 ~ ±50	4.7Ω~1MΩ / ±10 ~ ±50	4.7Ω~100Ω / ±25 ~ ±50

*Resistance Range for standard resistance – below or over this resistance on request. Contact S-P International for available values.

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD	SPECIFICATION
Temperature Coefficient	JIS C 5201-1 4.8	-55°C to +125°C Per specification chart
Short Time Overload	Apply 2.5 x rated V but not exceeding the max overload V 1 for 5 seconds Measure ΔR/R(%)	± (0.5% + 0.05Ω)
Insulation Resistance	JIS C 5201-1 4.6	10^9Ω minimum
Dielectric Withstanding Voltage	JIS C5201-1 4.13 Apply rated voltage 2.5 times, 1 seconds on, 25 seconds off, 10K test cycles	No short or burned on the appearance
Loading Life in Moisture	JIS C 5201 4.24 40 ± 2°C, 90~95% RH, 1000 hr at RCWV, 1.5 hr on, 0.5 hr off	± (0.5% + 0.05Ω)
Load Life	JIS C 5202 7.10 70°C, 1000 hrs at RCWV, 1.5 hr on, 0.5 hr off	± (0.5% + 0.05Ω)
Solderability	JIS C 5201-1 4.17	95% minimum coverage
Resistance to Soldering Heat	JIS C5201-1 4.18	± (0.5% + 0.05Ω)
Thermal Shock	-55°C for 2 min and +125°C for 2 min for 5 cycles. Stabilized for 1 hr Measure ΔR/R(%)	± (1% + 0.05Ω)
Bending Strength	JIS C5201-1 4.33	± (0.5% + 0.05Ω)

PART NUMBER

RT 06 - 22R6 B R D - xx

Series Type	Size	Resistance Value	Tolerance	Package	TCR	Option
RT	02 = 0402 03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	Example 0R10 100R 10K0 1M00	F = 1% D = 0.5% C = 0.25% B = 0.1% A = 0.05% T = 0.01%	R = T&R	E = 50ppm D = 25ppm C = 15ppm B = 10ppm S = 5ppm	Blank = Standard HP = High Power

STANDARD PACKAGING

TAPE	0402	10,000 pieces
	0603 ~ 1210	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7”
Contact S-P International for other reel sizes.

LEAD FREE

RT Series parts
RoHS & REACH Compliant

SANNOHM

SWR Surge Withstanding Chip Resistor

- HIGH POWER RATING
- EXCELLENT SURGE & PULSE WITHSTANDING PERFORMANCE
- IMPROVED WORKING VOLTAGE RATINGS
- STANDARD PACKAGE SIZES 0603 ~ 2512
- RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/8W ~ 1.5W

DIMENSIONS

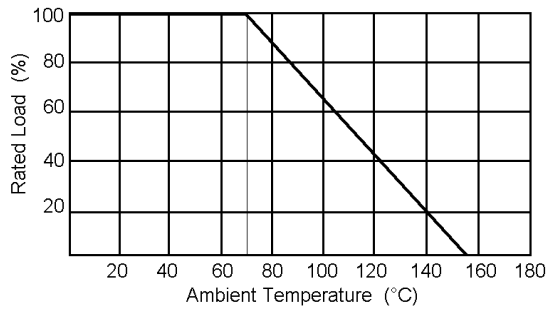
STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
SWR03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
SWR05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.15
SWR06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
SWR10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
SWR20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
SWR25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

ELECTRICAL CHARACTERISTICS

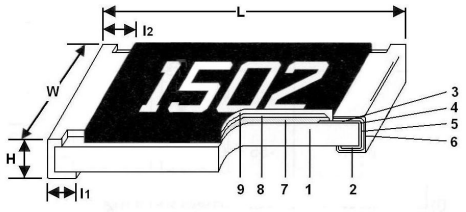
Power Rating at 70°C	1/8W	1/4W	1/3W	1/2W	3/4W	1.5W
High Power	1/4W	2/5W	1/2W	3/4W	1W	
STYLE	SWR03	SWR05	SWR06	SWR10	SWR20	SWR25
Operating Temperature	-55°C ~ +155°C					
Maximum Working V	50V (HP 75V)	150V	200V	200V	400V	500V
Maximum Overload V	100V (HP 150V)	300V	400V	400V	800V	1000V
TCR - ppm/°C	10Ω~270Ω ±200 300Ω~1MΩ ±100	1Ω~270Ω ±200 300Ω~20MΩ ±100	1Ω~20Ω ±200 22Ω~20MΩ ±100	1Ω~20Ω ±200 22Ω~20MΩ ±100	1Ω~20Ω ±200 22Ω~20MΩ ±100	1Ω~20Ω ±200 22Ω~20MΩ ±100
Resistance Range	10Ω~1MΩ *	1Ω~20MΩ * (HP 1Ω~1 MΩ)				

* Standard Resistance Range - Values above or below this range are available upon request.

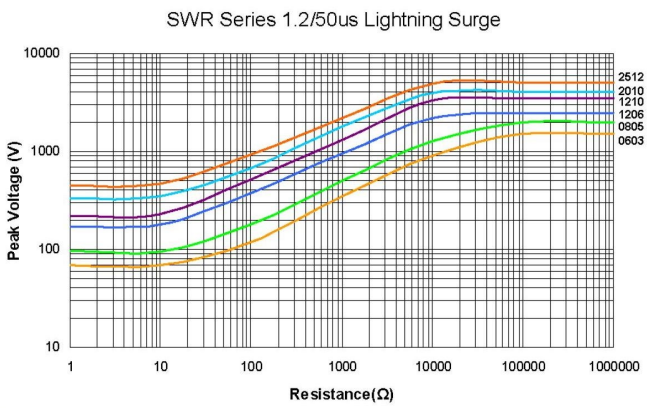
POWER DERATING CURVE

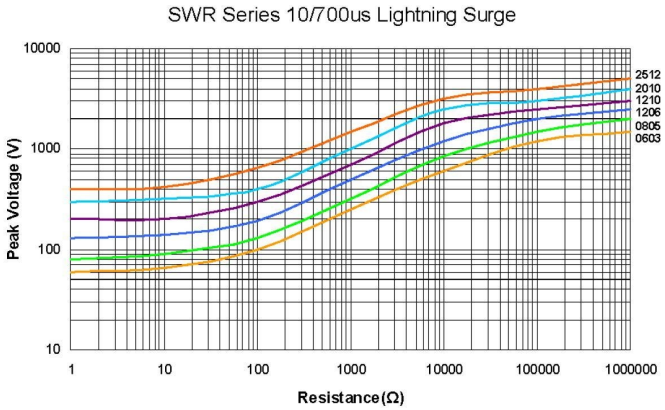


CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)





PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Temperature Coefficient	As per specification	-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	± (1.0% + 0.05Ω)	RCWV*2.5 or Max overload voltage for 5 seconds
Endurance	± (3.0% + 0.05Ω)	70°C ± 2°C, Maximum working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥10GΩ	Maximum overload voltage for 1 minute
Damp Heat with Load	± (3.0% + 0.05Ω)	40°± 2°C, 90~95R.H., Maximum working voltage for 1000 hr with 1.5hr on and 0.5hr off
Dry Heat	± (3.0% + 0.05Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage	+245°C ± 5°C for 3 seconds
Resistance to Soldering Heat	± (1.0% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (1.0% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

PART NUMBER

SWR 10 - 10K0 K R - xx

Series Type	Size	Resistance Value	Tolerance	Package	Option*
SWR	03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	Example 100R 1K00 10K0 10M0	J = 5% K = 10% M = 20%	R = T&R	Blank = Standard HP = High Power Contact S-P International for other options

STANDARD PACKAGING

TAPE	0603 ~ 1210	5,000 pieces	Standard reel is 7” Contact S-P International for other reel sizes.
	2010 ~ 2512	4,000 pieces	

LEAD FREE

SWR Series parts are
RoHS & REACH Compliant

SANNOHM

PWR Pulse Withstanding Chip Resistor

- HIGH POWER RATING
- TOLERANCE FROM ± 0.5% ~ ± 5%
- EXCELLENT PULSE WITHSTANDING PERFORMANCE
- IMPROVED WORKING VOLTAGE RATINGS
- RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/10W ~ 1.5W

DIMENSIONS

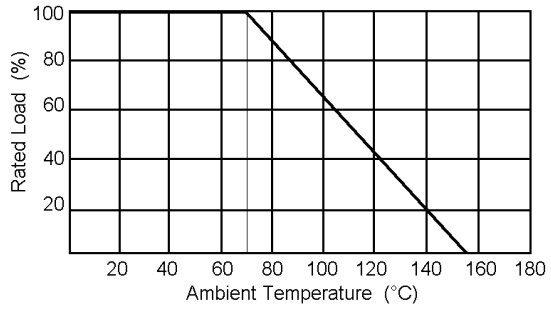
STYLE		DIMENSIONS (mm)				
Series	**Type**	**L**	**W**	**H**	**I1**	**I2**
PWR03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
PWR05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.15
PWR06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
PWR10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
PWR20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
PWR25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

ELECTRICAL CHARACTERISTICS

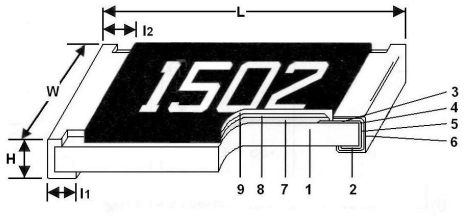
Power Rating at 70°C	**1/10W**	**1/8W**	**1/3W**	**1/2W**	**3/4W**	**1.5W**
STYLE	**PWR03**	**PWR05**	**PWR06**	**PWR10**	**PWR20**	**PWR25**
Operating Temperature	-55°C ~ +155°C					
Maximum Working V	50V	150V	200V	200V	400V	500V
Range & TCR-ppm/°C 1% and 5%	10Ω~294Ω ±200 300R~1M ±100	10Ω~294Ω ±200 300Ω~20MΩ ±100	10Ω~20Ω ±200 20.5Ω~20MΩ ±100	10Ω~20Ω ±200 20.5Ω~20MΩ ±100	10Ω~20Ω ±200 20.5Ω~20MΩ ±100	10Ω~20Ω ±200 20.5Ω~20MΩ ±100
Resistance Range	10Ω~1MΩ *	1Ω~20MΩ *				

Power Rating at 70°C	**1/4W**	**2/5W**	**1/2W**	**3/4W**	**1W**
STYLE	**PWR03-HP**	**PWR05-HP**	**PWR06-HP**	**PWR10-HP**	**PWR20-HP**
Range & TCR-ppm/°C 1% and 5%	1Ω~294Ω ±200 300Ω~1MΩ ±100	1Ω~294Ω ±200 300Ω~1MΩ ±100	1Ω~20Ω ±200 20.5Ω~1MΩ ±100	1Ω~20Ω ±200 20.5Ω~1MΩ ±100	1Ω~20Ω ±200 20.5Ω~1MΩ ±100

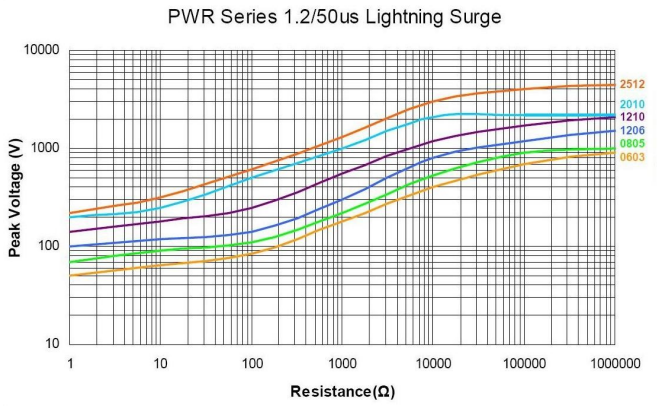
POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)



PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Temperature Coefficient	As per specification	-55°C ~ +125°C (25°C is reference temperature)
Dielectric Withstanding Voltage	JIS C 5202 5.7	1% & 5% = ± (1% + 0.05Ω)
Short Time Overload	± (1.0% + 0.05Ω)	RCWV*2.5 or max overload voltage for 5 seconds
Endurance	± (1.0% + 0.05Ω)	70°C ± 2°C, max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥10GΩ	Max overload voltage for 1 minute
Damp Heat with Load	± (0.5% + 0.05Ω)	40°± 2°C, 90~95R.H., max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (0.5% + 0.05Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage	+245°C ± 5°C for 3 seconds
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

PART NUMBER

PWR 06 - 10K0 F R - xx

Series Type	Size	Resistance Value	Tolerance	Package	Option*
PWR	03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512	Example 100R 1K00 10K0 10M0	D = 0.5% F = 1% J = 5%	R = T&R	Blank = Standard HP = High Power Contact S-P International for other options

STANDARD PACKAGING

TAPE	0603 ~ 1210	5,000 pieces	Standard reel is 7" Contact S-P International for other reel sizes.
	2010 ~ 2512	4,000 pieces	

LEAD FREE

PWR Series parts are RoHS & REACH Compliant

SANNOHM

HVR High Voltage Chip Resistor

- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- HIGHER COMPONENT AND EQUIPMENT RELIABLITY
- EXCELLENT PERFORMANCE AT HIGH VOLTAGE
- STANDARD PACKAGE SIZES 0402 ~ 2512
- GOOD FOR INVERTERS AND CONVERTERS

POWER RATING

1/16W ~ 1W

DIMENSIONS

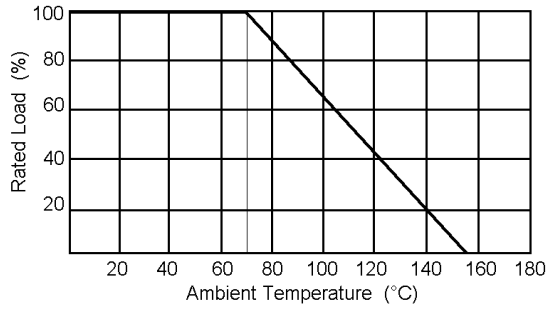
STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
HVR02	0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
HVR03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
HVR05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.20
HVR06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
HVR20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
HVR25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

ELECTRICAL CHARACTERISTICS

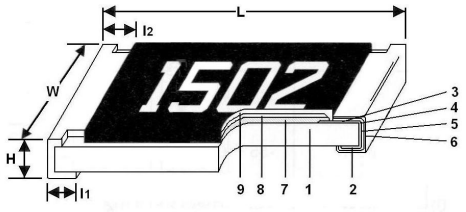
Power Rating at 70°C	1/16W	1/10W	1/8W	1/4W	1/2W	1W
STYLE	HVR02	HVR03	HVR05	HVR06	HVR20	HVR25
Operating Temperature	-55°C ~ +155°C					
Maximum Working V	100V	200V	400V	500V	2000V	3000V
Maximum Overload V	200V	400V	800V	1000V	3000V	4000V
TCR - ppm/°C 5%	10Ω~1MΩ ±100; 1.1MΩ~20MΩ ±200; 22MΩ~100MΩ ±400					
TCR - ppm/°C 1%	10Ω~1MΩ ±100; 1.02MΩ~10MΩ ±200				10Ω~1MΩ ±100; 1.02M~20M ±200	
Resistance Range	10Ω~100MΩ					

Standard resistance range - Values above or below this range may be available upon request.

POWER DERATING CURVE



CONSTRUCTION



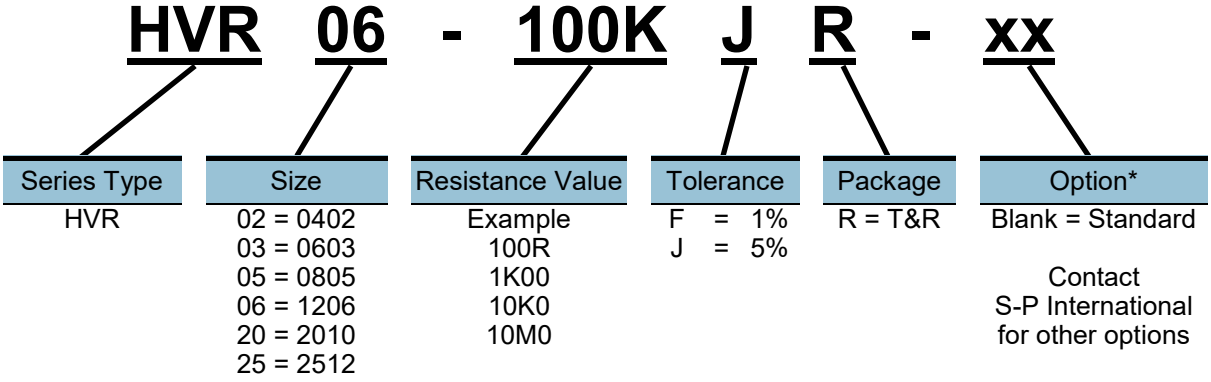
1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT		TEST METHOD
	±1%	±5%	
Temperature Coefficient	As per specification		-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	± (1.0% + 0.05Ω)	± (2.0% + 0.05Ω)	RCWV*2.5 or max overload voltage for 5 seconds
Endurance	± (2.0% + 0.10Ω)	± (3.0% + 0.10Ω)	70°C ± 2°C, max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥ 10GΩ		Max overload voltage for 1 minute
Damp Heat with Load	± (2.0% + 0.10Ω)	± (3.0% + 0.10Ω)	40°± 2°C, 90 ~ 95R.H., Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (1.0% + 0.05Ω)	± (1.5% + 0.10Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage		+245°C ± 5°C for 3 seconds
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Bending Strength	± (1.0% + 0.05Ω)		Bending for 5seconds 0402 ~ 1206 3mm; 2010 ~ 2512 2mm
Voltage Proof	No breakdown or flashover		1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

PART NUMBER



STANDARD PACKAGING

TAPE	0402	10,000 pieces
	0603 ~ 1206	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7”
Contact S-P International
for other reel sizes.

LEAD FREE

HVR Series parts are
RoHS & REACH Compliant

SANNOHM

TCS Current Sensing Thin Film Chip Resistor

- TIGHT TOLERANCE DOWN TO ±0.5%
- EXTREMELY LOW TCR DOWN TO ±50PPM/°C
- STANDARD PACKAGE SIZES 0402 ~ 2512
- RESISTANCE VALUES FROM 50mΩ TO 1Ω
- HIGH PURITY ALUMINA SUBSTRATE FOR HIGH POWER

POWER RATING

1/16W ~ 1W

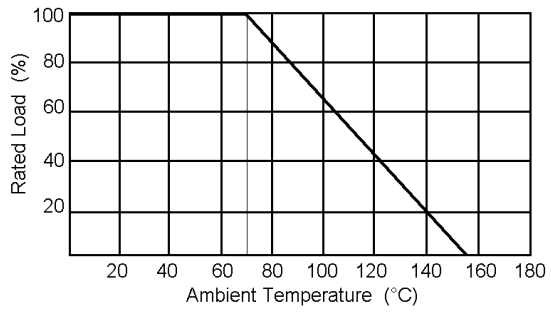
DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
TCS02	0402	1.00 ± 0.05	0.50 ± 0.05	0.32 ± 0.10	0.25 ± 0.10	0.20 ± 0.10
TCS03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
TCS05	0805	2.00 ± 0.10	1.25 ± 0.15	0.55 ± 0.10	0.30 ± 0.20	0.40 ± 0.25
TCS06	1206	3.10 ± 0.10	1.55 ± 0.15	0.55 ± 0.10	0.50 ± 0.30	0.40 ± 0.25
TCS20	2010	5.00 ± 0.10	2.50 ± 0.15	0.60 ± 0.15	0.60 ± 0.30	0.50 ± 0.25
TCS25	2512	6.35 ± 0.10	3.10 ± 0.15	0.60 ± 0.10	0.60 ± 0.30	0.55 ± 0.25

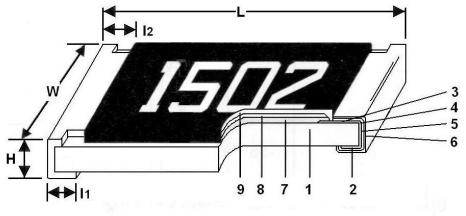
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C		1/16W	1/10W	1/8W	1/4W	1/2W	1W
STYLE		TCS02	TCS03	TCS05	TCS06	TCS20	TCS25
Operating Temperature		-55°C ~ +155°C					
Maximum Working Voltage		100V	200V	400V	500V	2000V	3000V
Maximum Overload Voltage		200V	400V	800V	1000V	3000V	4000V
Temperature Coefficient	0.5%	500mΩ~1Ω ±100 500mΩ~1Ω ±50	200mΩ~300mΩ ±100 301mΩ~1Ω ±50		101mΩ~300mΩ ±100 301mΩ~1Ω ±50	50mΩ~100mΩ ±200 101mΩ~300mΩ ±100 301mΩ~1Ω ±50	
	1%				50mΩ~100mΩ ±200		
Resistance Range		500mΩ~1Ω	200mΩ~1Ω		50mΩ~1Ω	50mΩ~1Ω	

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT		TEST METHOD
	±1%	±5%	
Temperature Coefficient	As per specification		-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	± (1.0% + 0.05Ω)	± (2.0% + 0.05Ω)	RCWV*2.5 or Max overload voltage for 5 seconds
Endurance	± (2.0% + 0.10Ω)	± (3.0% + 0.10Ω)	70°C ± 2°C, Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥10GΩ		Max overload voltage for 1 minute
Damp Heat with Load	± (2.0% + 0.10Ω)	± (3.0% + 0.10Ω)	40°± 2°C, 90~95 R.H., max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (1.0% + 0.05Ω)	± (1.5% + 0.10Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage		+245°C ± 5°C for 3 seconds
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Bending Strength	± (1.0% + 0.05Ω)		Bending for 5 seconds 0402-1206 3mm; 2010-2512 2mm
Voltage Proof	No breakdown or flashover		1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

HIGH POWER CHARACTERISTICS

STYLE	Power 70°C	Operating Temperature	Resistance Range (mΩ) ±1%	TCR (ppm/°C)
TCS12 - HP	3W	-55°C ~ +155°C	100~1000	±100

PART NUMBER

TCS 03 - 0R10 F R E - xx

Series Type	Size	Resistance Value	Tolerance	Package	TCR	Option
TCS	02 = 0402 03 = 0603 05 = 0805 06 = 1206 20 = 2010 25 = 2512	Example R047 0R01 0R10 1R00	D = 0.5% F = 1%	R = T&R	E = 50ppm F = 100ppm G = 200ppm I = 300ppm	Blank = Standard HP = High Power

STANDARD PACKAGING

TAPE	0402	10,000 pieces
	0603 ~ 1206	5,000 pieces
	2010 ~ 2512	4,000 pieces

Standard reel is 7"
Contact S-P International for other reel sizes.

LEAD FREE

TCS Series parts are RoHS & REACH Compliant

SANNOHM

RS Current Sensing Thick Film Chip Resistor

- LOW INDUCTANCE
- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- HIGHER COMPONENT AND EQUIPMENT RELIABILITY
- STANDARD PACKAGE SIZES 0402 ~ 2512
- RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/8W ~ 2W

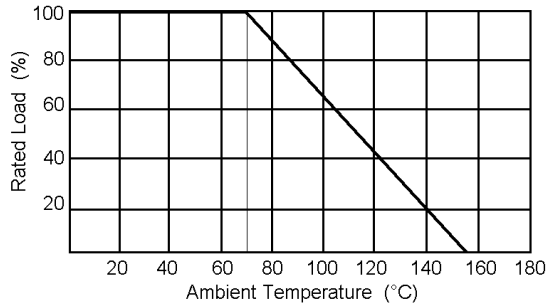
DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
RS02	0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
RS03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
RS05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.15
RS06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RS10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RS20	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.50 ± 0.20
RS25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

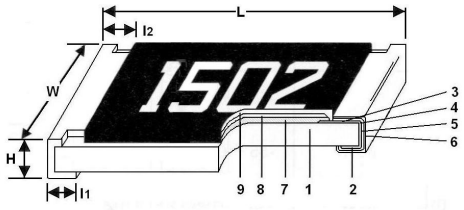
ELECTRICAL CHARACTERISTICS - STANDARD

SERIES TYPE	POWER RATING 70°C	OPERATING TEMPERATURE RANGE	MAXIMUM OPERATING CURRENT	RESISTANCE RANGE		TCR PPM/°C
				±1%	±5%	
RS02	**1/16W**	-55°C to +155°C	1.11A	50mΩ~91mΩ 100mΩ~976mΩ		± 800 ± 500
RS03	**1/10W**		2.23A	20mΩ~47mΩ 50mΩ~91mΩ 100mΩ~976mΩ		± 1200 ± 800 ± 500
RS05	**1/8W**		3.53A	10mΩ~18mΩ 20mΩ~47mΩ 50mΩ~91mΩ 100mΩ~976mΩ		± 1500 ± 1200 ± 800 ± 500
RS06	**1/4W**		5.00A			
RS10	**1/3W**		5.77A	10mΩ~18mΩ 20mΩ~91mΩ 100mΩ~976mΩ		± 1500 ± 800 ± 500
RS20	**3/4W**		8.66A			
RS25	**1W**		10.0A			

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

ELECTRICAL CHARACTERISTICS - HIGH POWER

SERIES TYPE	POWER RATING 70°C	OPERATING TEMPERATURE RANGE	MAXIMUM OPERATING CURRENT	RESISTANCE RANGE		TCR PPM/°C
				±1%	±5%	
RS02	1/10W	-55°C to +155°C	1.40A	50mΩ~91mΩ 100mΩ~976mΩ		± 800 ± 500
RS03	1/8W		2.50A	20mΩ~47mΩ 50mΩ~91mΩ 100mΩ~976mΩ		± 1200 ± 800 ± 500
RS05	1/4W		5.00A	10mΩ~18mΩ 20mΩ~47mΩ 50mΩ~91mΩ 100mΩ~976mΩ		± 1500 ± 1200 ± 800 ± 500
RS06	1/3W		5.77A			
RS10	1/2W		7.07A	10mΩ~18mΩ 20mΩ~91mΩ 100mΩ~976mΩ		± 1500 ± 800 ± 500
RS20	1W		10.0A			
RS25	2W		14.1A			

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT		TEST METHOD
	±1%	±5%	
Temperature Coefficient	As per specification		-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	±(1% + 0.05Ω)	± (2% + 0.05Ω)	RCWV*2.5 or Max Overload Voltage for 5 seconds 2 seconds for high power series
Endurance	± (2% + 0.10Ω)	± (3% + 0.10Ω)	70°C ±2°C, Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥10GΩ		Max overload voltage for 1 minute
Damp Heat with Load	± (2% + 0.10Ω)	± (3% + 0.10Ω)	40°± °C, 90 ~ 95R.H., maximum working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (1% + 0.05Ω)	± (1.5% + 0.10Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage		+245°C ±5°C for 3 seconds
Bending Strength	± (1% + 0.05Ω)		Bending once or 5 seconds 0402~1206: 3mm; 2010~2512: 2mm
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	± (1% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover		1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	± (1% + 0.05Ω)	-55°C to +155°C, 5 cycles

PART NUMBER

RS 03 - R100 J R - xx

Series Type	Size	Resistance Value	Tolerance	Package	Option
RS	02 = 0402 03 = 0603 05 = 0805 06 = 1206 20 = 2010 25 = 2512	Example R050 R100 R976	J = 5% F = 1%	R = T&R	Blank = Standard HP = High Power

STANDARD PACKAGING

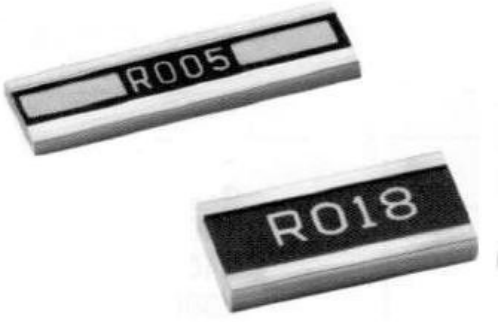
TAPE	0402	10,000 pieces	Standard reel is 7" Contact S-P International for other reel sizes.
	0603 ~ 1206	5,000 pieces	
	2010 ~ 2512	4,000 pieces	

LEAD FREE

RS Series parts are
RoHS & REACH Compliant

CS Current Sensing Chip Resistor

- 3W POWER RATING IN 1W SIZE (1225 PKG)
- LOW TCR OF ±100PPM/°C
- RESISTANCE VALUES FROM 1mΩ TO 8Ω
- HIGH PURITY ALUMINA SUBSTRATE FOR H.P. DISSIPATION
- LONG SIDE TERMINATIONS WITH HIGHER POWER RATING



POWER RATING

1/20W ~ 3W

DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	D1	D2
CS01	0201	0.600 ± 0.03	0.30 ± 0.03	0.23 ± 0.05	0.12 ± 0.05	0.15 ± 0.05
CS02	0402	1.00 ± 0.05	0.50 ± 0.05	0.32 ± 0.10	0.25 ± 0.10	0.20 ± 0.10
CS03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
CS05	0805	2.00 ± 0.10	1.25 ± 0.10	0.55 ± 0.10	0.30 ± 0.20	0.40 ± 0.25
CS06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.30	0.40 ± 0.25
CS10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.30	0.50 ± 0.25
CS20	2010	5.00 ± 0.10	2.50 ± 0.15	0.60 ± 0.15	0.60 ± 0.30	0.50 ± 0.25
CS25	2512	6.35 ± 0.10	3.10 ± 0.15	0.60 ± 0.10	0.60 ± 0.30	0.55 ± 0.25
CS25 (2W)	2512 (10mΩ ~ 99mΩ)	6.35 ± 0.20	3.15 ± 0.15	0.74 ± 0.10	0.60 ± 0.30	0.55 ± 0.25
CS25 (2W)	2512 (100mΩ ~ 1Ω)	6.35 ± 0.20	3.15 ± 0.15	0.74 ± 0.10	0.60 ± 0.30	2.10 ± 0.10
CS12	1225	3.10 ± 0.15	6.30 ± 0.15	0.90 ± 0.15	0.60 ± 0.30	0.80 ± 0.25
CS37	3720	2.00 ± 0.20	3.75 ± 0.20	0.60 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
CS75	7520	2.00 ± 0.20	7.50 ± 0.30	0.60 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
CS62	0612	1.55 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.30 ± 0.15	0.45 ± 0.15

LOW TCR ELECTRICAL SPECIFICATIONS

STYLE	POWER RATING 70°C	OPERATING TEMPERATURE	MAX OPERATING CURRENT	RESISTANCE RANGE ±1% ±2% ±5%	TCR (ppm/°C)
CS05	1/8W	-55°C to +155°C	1.11A	100mΩ~1000mΩ	±100
CS06	1/4W		1.58A		
CS10	1/2W		2.58A	75mΩ~1000mΩ	
CS20	3/4W		3.87A	50mΩ~1000mΩ	
CS25	1W		7.07A	20mΩ~1000mΩ	
CS25	2W*		6.32A	50mΩ~1000mΩ	
CS37	1W		3.16A	100mΩ~500mΩ	
CS75	2W		6.32A	50mΩ~350mΩ	

* Ultra High Power

STANDARD ELECTRICAL SPECIFICATIONS

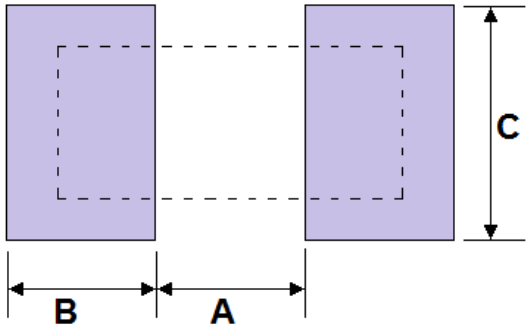
STYLE	POWER RATING 70°C	OPERATING TEMPERATURE	MAX OPERATING CURRENT	RESISTANCE RANGE ±1% ±2% ±5%	TCR (ppm/°C)
CS01	1/20W	-55°C to +155°C	0.70A	100mΩ~147mΩ 150mΩ~500mΩ 510mΩ~1000mΩ	±1000 ±600 ±300
CS02	1/16W		1.11A	50mΩ~100mΩ 102mΩ~500mΩ 510mΩ~1000mΩ	±400 ±300 ±200
CS03	1/10W		2.23A	20mΩ~50mΩ 51mΩ~100mΩ 102mΩ~500mΩ 510mΩ~1000mΩ	±600 ±400 ±300 ±200
CS05	1/8W		2.50A	20mΩ~50mΩ 51mΩ~100mΩ 102mΩ~500mΩ 510mΩ~1000mΩ	±600 ±400 ±300 ±200
CS06	1/4W		5.00A	10mΩ~20mΩ 21mΩ~50mΩ 51mΩ~91mΩ 100mΩ~1000mΩ	±600 ±400 ±300 ±200
CS10	1/2W		7.07A		
CS20	3/4W		8.66A		
CS25	1W		10.0A		
CS12	3W		31.6A	3mΩ~5mΩ 6mΩ~20mΩ 21mΩ~30mΩ 33mΩ~8000mΩ	±300 ±200 ±150 ±100
CS37	1W		10.0A	10mΩ~18mΩ 20mΩ~500mΩ	±300 ±150
CS75	2W		44.7A	- 1mΩ~4mΩ	±300
				5mΩ~10mΩ 11mΩ~350mΩ	±200 ±150
CS62	1W		10.0A	10mΩ~27mΩ 30mΩ~91mΩ 100mΩ~1000mΩ	±600 ±300 ±200

HIGH POWER & ULTRA HIGH POWER ELECTRICAL SPECIFICATIONS

STYLE	POWER RATING 70°C	OPERATING TEMPERATURE	MAX OPERATING CURRENT	RESISTANCE RANGE ±1% ±2% ±5%	TCR (ppm/°C)
CS02	1/8W	-55°C to +155°C	1.11A	51mΩ~100mΩ 102mΩ~500mΩ 510mΩ~1000mΩ	±400 ±300 ±200
CS03	1/8W 1/5W		1.58A		
CS05	1/4W		2.58A		
CS06	1/2W		3.87A	10mΩ~20mΩ 21mΩ~50mΩ 51mΩ~91mΩ 100mΩ~1000mΩ	±600 ±400 ±300 ±200
CS10	3/4W		7.07A		
CS20	1W		6.32A		
CS25	1.5W		3.16A		
CS25	2W*		6.32A		

* Ultra High Power

RECOMENED LAND PATTERN



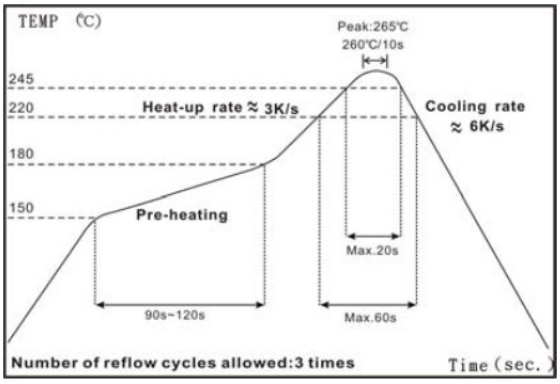
Pad Layout (Except for CS25 High Power Rating Series)

Type	A	B	C
CS01	0.25	0.30	0.40 ± 0.2
CS02	0.50	0.50	0.60 ± 0.2
CS03	0.80	1.00	0.90 ± 0.2
CS05	1.00	1.00	1.35 ± 0.2
CS06	2.00	1.15	1.70 ± 0.2
CS10	2.00	1.15	2.50 ± 0.2
CS20	3.60	1.40	2.50 ± 0.2
CS25	4.90	1.60	3.10 ± 0.2
CS12	2.00	2.00	6.40 ± 0.2
CS37	1.00	1.80	3.90 ± 0.2
CS75	1.00	1.80	7.60 ± 0.2

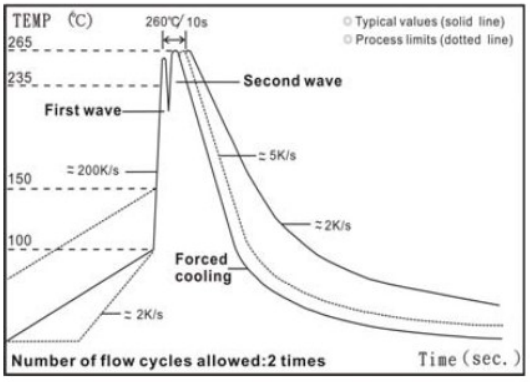
Pads Layout (For CS25 High Power Rating Series)

Type	Resistance Range	A	B	C
CS25	10~99mΩ	0.25	0.30	0.40 ± 0.2
CS25	100~1000mΩ	0.50	0.50	0.60 ± 0.2

SOLDERING CONDITION



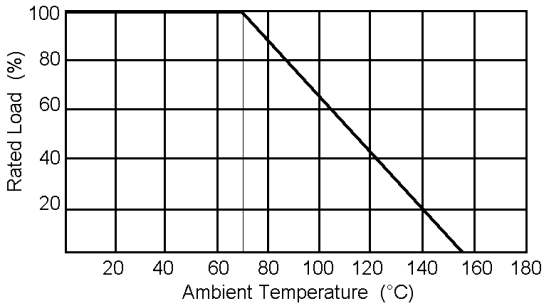
IR Reflow Soldering



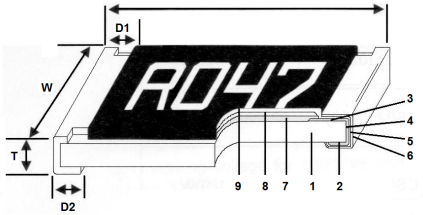
Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260°C : 10 seconds
(2) Time of wave soldering at maximum temperature point 260°C : 10 seconds
(3) Time of soldering iron at maximum temperature point 410°C : 5 seconds

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (Ag/Pd)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Secondary Overcoat (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Temperature Coefficient	As Spec	-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	± (0.5% + 0.05Ω) ± (1.0% + 0.05Ω) for High Power	RCWV*2 or max overload voltage for 5 seconds
Endurance	± (1.0% + 0.05Ω)	70°C ± 2°C, Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥10GΩ	Max overload voltage for 1 minute
Damp Heat with Load	± (0.5% + 0.05Ω)	40°± 2°C, 90~95 R.H., max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (0.5% + 0.05Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage	+245°C ± 5°C for 3 seconds
Bending Strength	As per specification	Bending once for 5 seconds 0603~1206: 3mm; 2010~2512: 2mm
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 min.
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1
Storage Temperature: 25°C ± 3°C; Humidity <80% RH

PART NUMBER

CS 03 - R010 F R x - xx

Series Type	Size	Resistance Value	Tolerance	Package	Power	Options
CS	02 = 0402 03 = 0603 05 = 0805 06 = 1206 10 = 1210 20 = 2010 25 = 2512 12 = 1225 37 = 3720 75 = 7520 62 = 0612	Example R003 R010 R047 0R10 1R00	F = 1% G = 2% J = 5%	R = T&R	_ = Standard W = 1/8W V = 1/4W U = 1/2W Q = 3/4W T = 1W A = 1.5W S = 2W	Blank = Standard HP = High Pwr UP = Ultra HP Low TCR Spec. F = 100ppm

STANDARD PACKAGING

TAPE	0201 ~ 0402	10,000 pieces
	0603 ~ 1206+0612	5,000 pieces
	2010 ~ 2512	4,000 pieces
	1225 ~ 7520	2,000 pieces

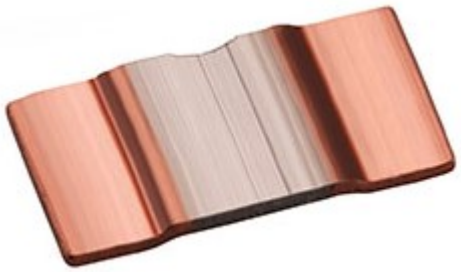
Standard reel is 7”
Contact S-P International for other reel sizes.

LEAD FREE
CS Series parts are RoHS & REACH Compliant

SANNOHM

LRS Chip Shunt Resistor

- LRS1050 3W UP TO 77A AT 0.5m OHM
- LRS1575 5W UP TO 100A AT 0.5m OHM
- EXCELLENT LONG-TERM STABILITY AND LOW INDUCTANCE
- MOUNTING USING REFLOW SOLDERING OR WELDING ON COPPER
- HEAVY COPPER CONNECTORS
- FOR HYBRID POWER SOURCES AND HIGH CURRENT AUTOMOTIVE



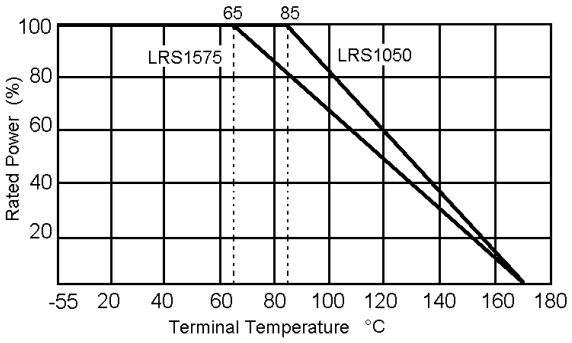
DIMENSIONS

STYLE	SIZE	VALUE	MATERIAL	THICKNESS (t) I1	WEIGHT (g) (1000 PCS)
LRS1050	1050	0.5 mW	Manganin	0.88 ± 0.05	420
LRS1050	1050	1 mW	Manganin	0.43 ± 0.05	220
LRS1050	1050	2 mW	NiCr alloy	0.64 ± 0.05	310
LRS1050	1050	3 mW	NiCr alloy	0.43 ± 0.05	210
LRS1050	1050	4 mW	NiCr alloy	0.32 ± 0.05	160
LRS1575	1575	0.5 mW	Manganin	0.56 ± 0.05	590
LRS1575	1575	1 mW	NiCr alloy	0.90 ± 0.05	940
LRS1575	1575	2 mW	NiCr alloy	0.45 ± 0.05	470
LRS1575	1575	3 mW	NiCr alloy	0.30 ± 0.05	320

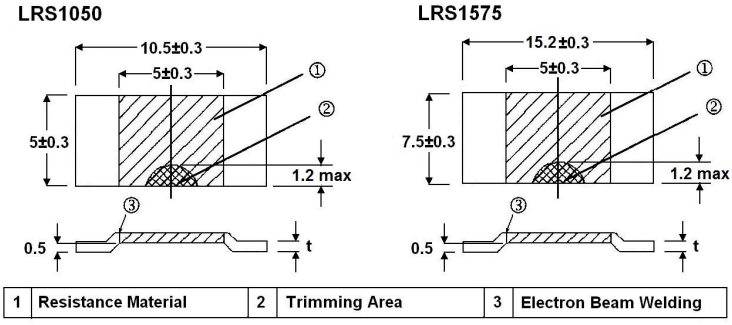
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	5W	4W		3W	2.5W	7W	6W		4W	3.5W
STYLE	LRS1050					LRS1575				
Operating Temperature	-55°C ~ +170°C									
Resistance Tolerance 1%, 2%, 5%	0.5mΩ	1mΩ	2mΩ	3mΩ	4mΩ	0.2mΩ	0.5mΩ	1mΩ	2mΩ	3mΩ
Temperature Coefficient	±75	±60	±100	±100	±100	±50	±100	±120	±120	±120

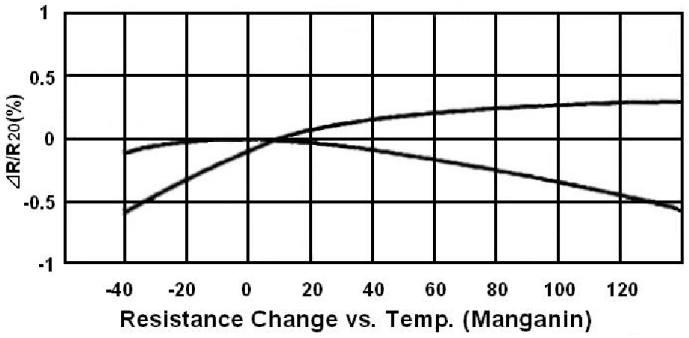
POWER DERATING CURVE



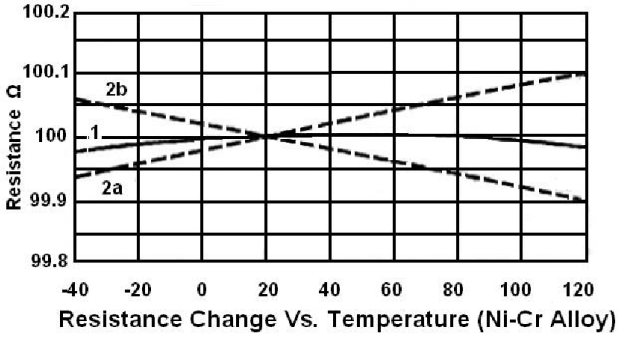
CONSTRUCTION



RESISTANCE CHANGE VS. TEMPERATURE



Resistance Change vs. Temp. (Manganin)



Resistance Change Vs. Temperature (Ni-Cr Alloy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Short Time Overload	±0.2%	Rated power x 5 for 5 seconds
Load Life (Terminal Temp Max 105°C)	±1.0%	Power rating 90 min on, 30 min off for 2000 hrs
Resistance to Soldering Heat	±0.2%	350°C for 30 seconds or 250°C for 10 min.
Moisture Resistance	±0.2%	90 ~ 98 R.H., +25°C, +65°C, -10°C, 10 cycles
Thermal Shock	±0.1%	-65°C, 25°C, 125°C, 25°C, 25 cycles
High Temperature Exposure	±0.2%	+140°C for 250 hrs
Vibration, High Frequency	±0.2%	15g 10 ~ 2000Hz, 36 cycles
Inductance	<3nH	- -
Thermal EMF [μV/°C]	2μV/°C max	0 ~ 100°C
Current Noise	±0.01%	MIL-STD-202 Method 308
Voltage Coefficient	Linearity error less than 120 db	MIL-STD-202 Method 309

Storage Temperature: 25 ± 3°C; Humidity < 80% RH

PART NUMBER

LRS1050 H - 2m00 J R

Series Type	Wattage	Resistance Value	Tolerance	Package
LRS1050	B = 2.5W	Example	F = 1%	B = Bulk
LRS1575	R = 3W	0m50	G = 2%	R = Tape
	C = 3.5W	1m00	J = 5%	
	H = 4W	2m00		
	D = 5W			
	I = 6W			
	E = 7W			

STANDARD PACKAGING

TAPE	LRS1050	3,000 pieces
	LRS1575	2,000 pieces

LEAD FREE

LRS Series parts are RoHS & REACH Compliant

CSM Current Sensing Metal Chip Resistor

- HIGH POWER RATING IN A SMALL SIZE
- LOW RESISTANCE VALUES FOR CURRENT DETECTION
- HIGH RELIABILITY AND PERFORMANCE, LOW AND STABLE TCR
- STANDARD PACKAGE SIZES 0603 ~ 2512
- RoHS & REACH COMPLIANT, MATTE TIN PLATED

POWER RATING

1/8W ~ 1W

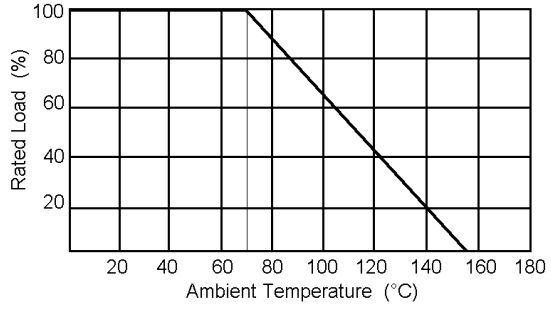
DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	Type	L	W	H	I1	I2
CSM03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
CSM05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.15
CSM06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
CSM10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
CSM25	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20

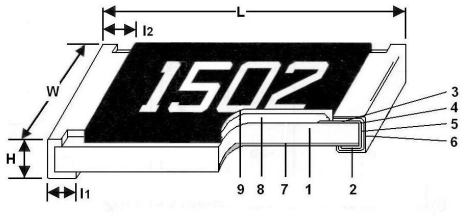
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/8W	1/4W	1/2W	3/4W	1W
STYLE	CSM03	CSM05	CSM06	CSM10	CSM25
Operating Temperature	-55°C ~ +155°C				
Temperature Coefficient	10mΩ~19mΩ ±100 10mΩ~100mΩ ±100 & ±50				
Resistance Range	10mΩ~100mΩ *				

POWER DERATING CURVE



CONSTRUCTION



1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (Alloy)
2	Bottom Electrode (Cu)	5	Barrier Layer (Ni)	8	Primary Overcoat (Epoxy)
3	Top Electrode (NiCr)	6	External Electrode (Sn)	9	Marking (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Temperature Coefficient	As per specification	-55°C ~ +125°C (25°C is reference Temperature)
Short Time Overload	± (0.5% + 0.05Ω)	5 x Rated Power for 5 seconds
Endurance	± (1.0% + 0.05Ω)	70°C ± 2°C, Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥ 10GΩ	Max overload voltage for 1 min
Damp Heat With Load	± (1.0% + 0.05Ω)	40°± 2°C, 90~95R.H., Max working voltage for 1000hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (0.5% + 0.05Ω)	At +155°C for 1000 hrs
Solderability	95% minimum coverage	+245°C ± 5°C for 3 sec
Bending Strength	As per specification	Bending once for 5 seconds 0603 ~ 1206 : 3mm; 2010 ~ 2512 : 2mm
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (0.5% + 0.05Ω)	-55°C to +155°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

PART NUMBER

CSM 05 - 0R47 J R F

Series Type	Size	Resistance Value	Tolerance	Package	TCR
CSM	03 = 0603 05 = 0805 06 = 1206 10 = 1210 25 = 2512	Example R019 0R01 0R10 0R47	F = 1% G = 2% J = 5%	R = T&R	E = 50ppm F = 100ppm

STANDARD PACKAGING

TAPE	0603 ~ 1206	5,000 pieces	Standard reel is 7" Contact S-P International for other reel sizes.
	2010 ~ 2512	4,000 pieces	

LEAD FREE

CSM Series parts are RoHS & REACH Compliant

SANNOHM

HMR High Ohmic Chip Resistor

- EXTENDED RESISTANCE RANGE - 110MΩ ~ 1GΩ
- HIGHLY RELIABLE MULTILAYER ELECTRODE CONSTRUCTION
- STANDARD PACKAGE SIZES 0805 ~ 1206
- RoHS & REACH COMPLIANT, MATTE TIN PLATED
- IDEAL FOR X-RAY EQUIPMENT, HI-Z QUARTZ AMPLIFIERS, VOLTAGE DIVIDERS AND LOW SIGNAL AMPLIFICATION CIRCUITS

POWER RATING

1/8W ~ 1/4W

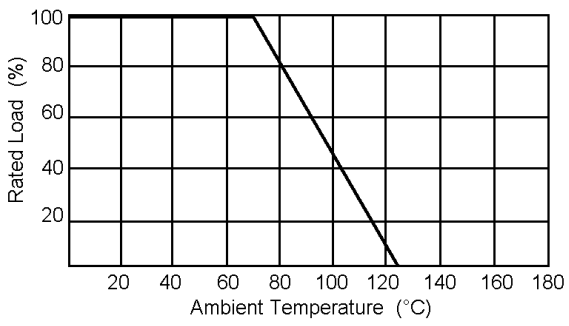
DIMENSIONS

STYLE		DIMENSIONS (mm)				
Series	**Type**	**L**	**W**	**H**	**I1**	**I2**
HRM05	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.20
HRM06	1206	3.10 ± 0.10	1.55 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20

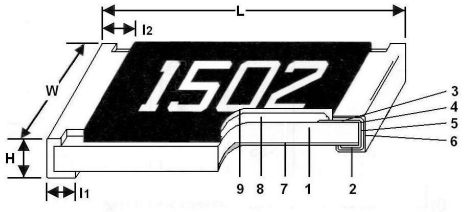
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	**1/8W**	**1/4W**
STYLE	**HMR05**	**HMR06**
Operating Temperature	-55°C ~ +125°C	
Maximum Operating Voltage	150V	200V
Maximum Overload Voltage	300V	400V
Resistance Range & Temperature Coefficient	110MΩ~500MΩ ±500 510MΩ~1GΩ ±1000	

POWER DERATING CURVE



CONSTRUCTION



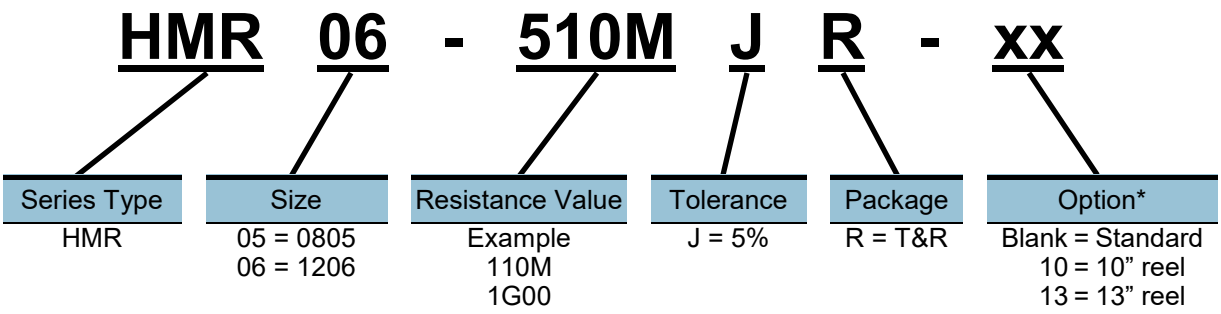
1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (RuO_2/Ag)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Primary Overcoat (Glass)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Marking (Epoxy)

PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Temperature Coefficient	As per specification	-55°C ~ +125°C (25°C is reference temperature)
Short Time Overload	± (2.0% + 0.05Ω)	RCWV x 2.5 or max overload voltage for 5 seconds
Endurance	± (3.0% + 0.10Ω)	70°C ± 2°C, max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Insulation Resistance	≥ 10GΩ	Max overload voltage for 1 minute
Damp Heat With Load	± (3.0% + 0.10Ω)	40° ±2°C, 90 ~ 95 R.H., Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (1.5% + 0.10Ω)	At +125°C for 1000 hrs
Solderability	95% minimum coverage	+245°C ±5°C for 3 seconds
Bending Strength	± (1.0% + 0.05Ω)	Bending once for 5 seconds 0805, 1206 : 3mm
Resistance to Soldering Heat	± (1.0% + 0.05Ω)	+260°C ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	+260°C ± 5°C for 30 seconds
Rapid Change of Temperature	± (1.0% + 0.05Ω)	-55°C to +125°C, 5 cycles

Reference Standards: IEC 60115-1, 60068-2-58, JIS-C 5201-1

PART NUMBER



STANDARD PACKAGING

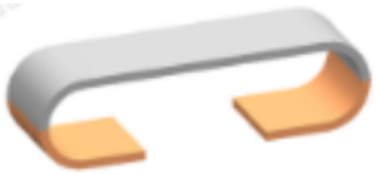
TAPE	0805 ~ 1206	5,000 pieces	7" reel	Standard
		10,000 pieces	10" reel	
		20,000 pieces	13" reel	

LEAD FREE

HMR Series parts are RoHS & REACH Compliant

WPR Weld Precision Resistor

- CURRENT SENSOR FOR POWER HYBRID APPLICATIONS
- FREQUENCY CONVERTERS & POWER MODULES
- STANDARD PACKAGE SIZES 0311
- RoHS & REACH COMPLIANT MATTE TIN PLATED
- IDEAL FOR HIGH CURRENT APPLICATIONS FOR AUTOMOTIVE



POWER RATING

2W

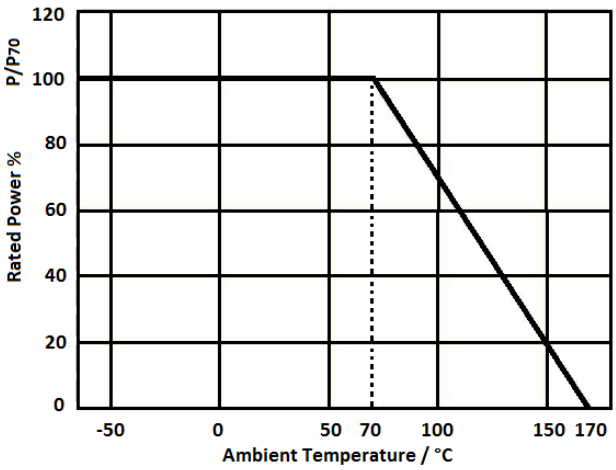
DIMENSIONS

STYLE		DIMENSIONS (mm)					
Series	Type	L	W	H	B	D	T
WPR03	0311	11.18 ± 0.38	3.18 ± 0.38	3.05 ± 0.76	4.83 ± 0.76	0.12 ± 0.10	2.36 ± 0.25

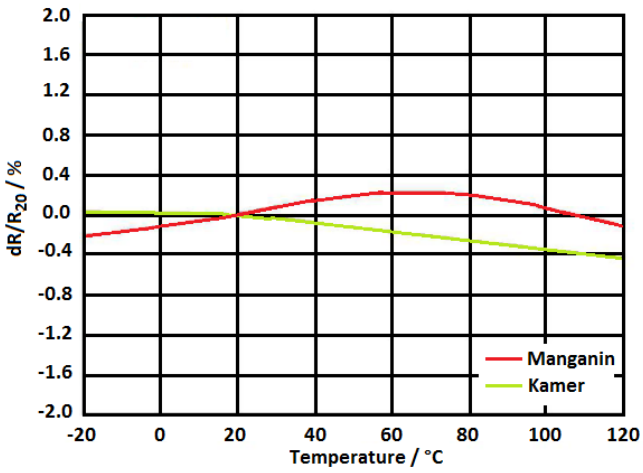
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	2W
STYLE	WPR03
Operating Temperature Range	-65°C ~ +170°C
Wattage in Free Air at 25°C	2.0W
Temperature Coefficient	±40ppm
Resistance Range	2mΩ ~ 50mΩ / 1% & 5%

POWER DERATING CURVE

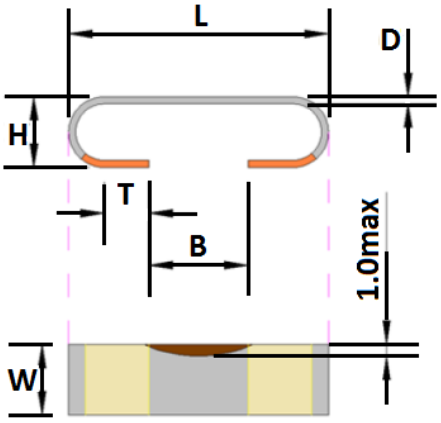


TCR DETATING



PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT	TEST METHOD
Short Time Overload	± (1.0% + 0.0005Ω) Δ R	5 times rated power for 5 seconds
Bias Humidity	± (1.0% + 0.0005Ω) Δ R	100 hrs 85°C,/85% R.H. 10% bias
Mechanical Shock	± (1.0% + 0.0005Ω) Δ R	100g's for 6ms, 5 pulses
Resistance to Soldering Heat	± (1.0% + 0.0005Ω) Δ R	+260°C, 10 seconds to 12 seconds dwell, 25mm/s emergence
Moisture Resistance	± (1.0% + 0.0005Ω) Δ R	MIL-STD-202 Method 106 0% power, 7a and 7b not required
High Temperature Exposure	± (1.0% + 0.0005Ω) Δ R	At + 170°C for 1000 hrs
Low Temperature Storage	± (1.0% + 0.0005Ω) Δ R	-65°C for 4 minutes
Load Life	± (1.0% + 0.0005Ω) Δ R	+70°C for 1000 hrs with 1.5 hr on and 0.5 hr off
Vibration	± (1.0% + 0.0005Ω) Δ R	Frequency varied 10Hz~200Hz in 1 minute, 3 directions, 12hr



PART NUMBER

WPR 03 - 0R04 F R - xx

Series Type	Size	Resistance Value	Tolerance	Package	Option*
WPR	03 = 0311	Example R002 0R04	F = 1% J = 5%	R = T&R	Blank = Standard

STANDARD PACKAGING

TAPE 0311 2,000 pieces - 13" reel Standard

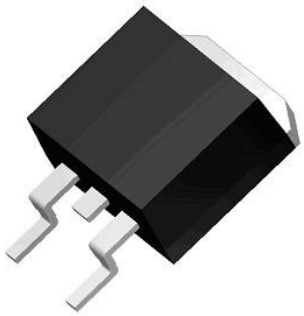
LEAD FREE

WPR Series parts are
RoHS & REACH Compliant

SANNOHM

STR TO-263 Package Power Resistor

- 35 WATT AT 25°C CASE TEMPERATURE
- TO-263 STYLE POWER PACKAGE FOR SMD MOUNTING
- MOLDED CASE FOR PROTECTION
- RESISTOR IS ELECTRICALLY ISOLATED FOR METAL TAB
- IDEAL FOR RF POWER, SWITCH POWER SUPPLY, CONTOLLERS



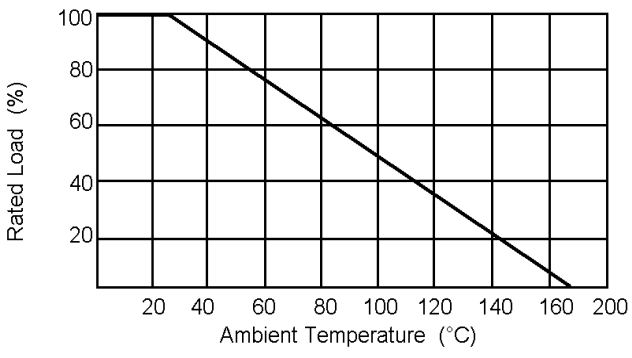
POWER RATING

35W

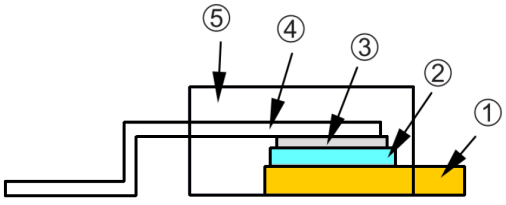
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C		35 W
STYLE		STR35
Operating Temperature Range		-55°C ~ +175°C
Working Voltage		500V
Wattage in Free Air at 25°C		2.5W
Dielectric Strength		2000V
Insulation Resistance		10GΩ min
Resistance Range	Not Specified	0.05Ω~1Ω / 5% ~ 10%
	±300ppm	> 1Ω~3Ω / 1% ~ 10%
	±100ppm ±200ppm	> 3Ω~10Ω / 1% ~ 10%
	±500ppm ±100ppm ±200ppm	> 10Ω~100KΩ / 0.5% ~ 10%

POWER DERATING CURVE



CONSTRUCTION

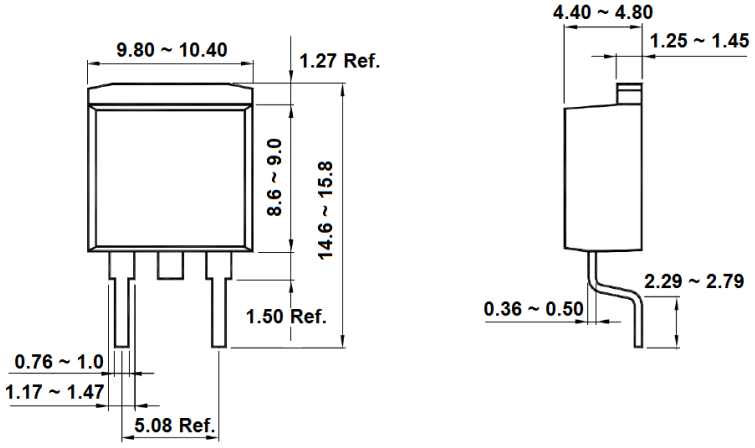


1	Flange	4	Lead
2	Alumina Substrate	5	Molding
3	Resistor Layer		

ENVIRONMENTAL CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD	APPRAISE
Temperature Coefficient	Reference 25°C, ΔR taken at +105°C	As per specification
Short Time Overload	2x rated power with applied voltage not to exceed 1.5 x maximum continuous operating voltage for 5 seconds	ΔR ± 0.3%
Load Life	2,000 hours at rated power	ΔR ± 1.0%
Damp Heat With Load	JIS-C5201 4.24 / IEC 60115-1 4.24 40 ± 2°C, 90 ~ 95% RH at RCWV for 1,000hrs (1.5 hr on, 0.5hr off)	ΔR ± 0.5%
Resistance to Soldering Heat	260 ± 5°C for 10 seconds	ΔR ± 0.5%
Solderability	245 ± 5°C for 3 seconds	90% minimum coverage
Temperature Cycling	-55°C ~ +175°C, 1000 cycles	ΔR ± 0.3%
Terminal Strength	Pull Test, 2.4N	ΔR ± 0.2%
Vibration, High Frequency	5g's for 20 minutes, 12 cycles each of 3 orientations, 10-2000 Hz	ΔR ± 0.2%

DIMENSIONS



PART NUMBER

STR 35 10R0 J R F

Series Type	Wattage	Resistance Value	Tolerance	Package	TCR
STR	35 = 35W	Example 0R10 10R0 1K00 100K	D = 0.5% F = 1% J = 5% K = 10%	R = T&R	Blank = Not Specf. G = 300ppm F = 200ppm E = 100ppm D = 50ppm

STANDARD PACKAGING

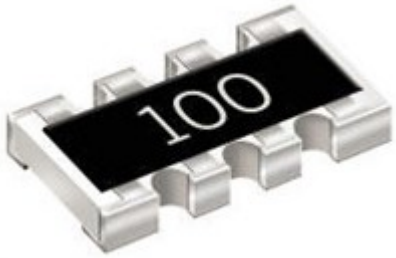
Tape - 500 pcs

LEAD FREE

STR Series parts are RoHS & REACH Compliant

TFAN Thin Film Chip Array Resistor

- ADVANCED THIN FILM TECHNOLOGY
- EXTREAMLY LOW TCR, DOWN TO ±25PPM
- TIGHT TOLERANCE DOWN TO ±0.1%
- RoHS & REACH COMPLIANT, MATTE TIN PLATED



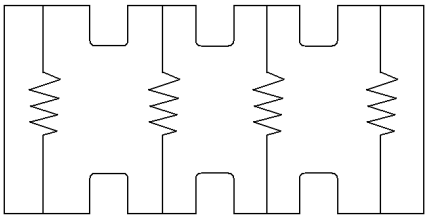
DIMENSIONS

STYLE	NUMBER OF RESISTORS	L	W	H	A	B	C	Y
TFAN	4	3.20 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.15	0.80 ± 0.05	0.30 ± 0.15	0.30 ± 0.15

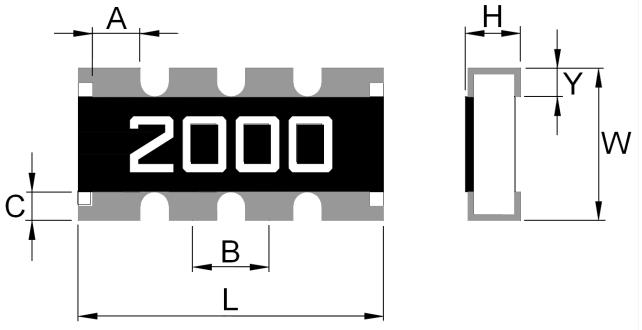
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/16W	1/16W
STYLE	STANDARD SPECIFICATIONS	SPECIAL SPECIFICATIONS
Operating Temperature	-55°C ~ +155°C	
Maximum Operating Voltage	50V	
Maximum Overload Voltage	100V	
Resistance Range	100Ω~20KΩ (0.1%, 0.25%, 0.5%, 1%)	100Ω~2KΩ (0.1%, 0.25%, 0.5%, 1%)
Temperature Coefficient	±25ppm, ±50ppm	±10ppm, ±15ppm

EQUIVALENT CIRCUIT DIAGRAM



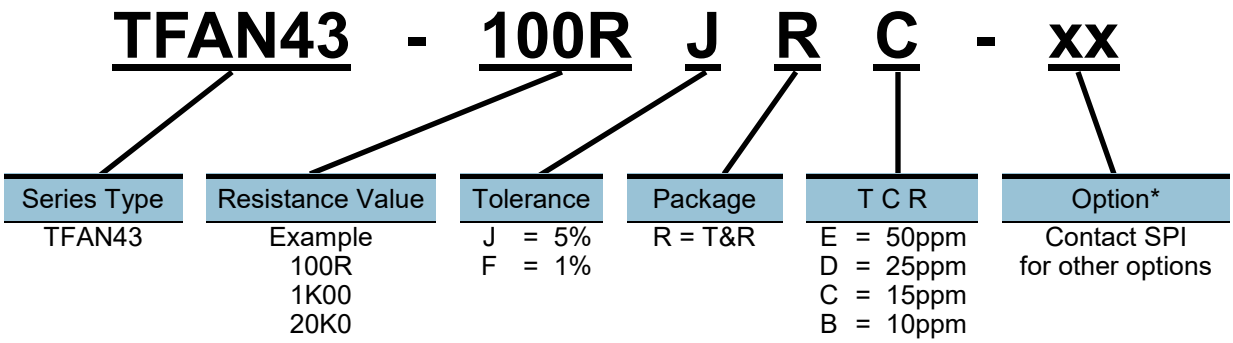
DIMENSION LAYOUT



PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT		TEST METHOD
	Tol ≤ 0.25%	Tol > 0.25%	
Temperature Coefficient	As per specification		MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	ΔR ± 0.25%	ΔR ± 0.5%	JIS-C-5021-1 5.5 RCWV x 2.5 or max overload for 5 seconds
Insulation Resistance	>1000MΩ		MIL-STD-202F Method 302 Apply 1000V DC for 1 minute
Endurance	ΔR ± 0.25%	ΔR ± 0.5%	MIL-STD-202F Method 108A 70 ± 2°C Max working voltage for 1000 hr with 1.5 hr on and 0.5hr off
Damp Heat With Load	ΔR ± 0.25%	ΔR ± 0.5%	MIL-STD-202F Method 103B 40 ± 2°C 90~95 R.H, working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Bending Strength	ΔR ± 0.25%	ΔR ± 0.5%	JIS-C-5201-1 6.1.4 Bending amplitude 3mm for 10 seconds
Solderability	95% Minimum Coverage		MIL-STD-202F Method 208H 245 ± 5°C for 3 seconds
Resistance to Soldering Heat	ΔR ± 0.25%	ΔR ± 0.5%	MIL-STD-202F Method 210E 260 ± 5°C for 10 seconds
Dielectric Withstanding Voltage	100V		MIL-STD-202F Method 301 Maximum overload voltage for 1 minute
Thermal Shock	ΔR ± 0.25%	ΔR ± 0.5%	MIL-STD0292F Method 107G -55°C ~ +150°C for 100 cycles
Low Temperature Operation	ΔR ± 0.25%	ΔR ± 0.5%	JIS-C-5201-1 7.1 1 Hour, -65°C followed by 45 minutes of RCWV

PART NUMBER



STANDARD PACKAGING

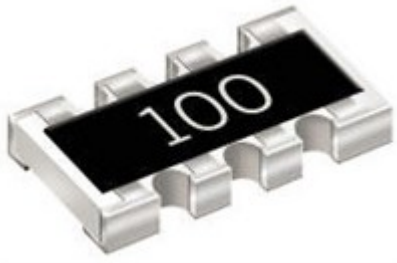
TAPE TFAN42 5,000 pieces

LEAD FREE

TFAN Series parts are
RoHS & REACH Compliant

CN Thick Film Chip Array Resistor

- SMALL SIZE AND LIGHT WEIGHT
- RELIABILITY, HIGH QUALITY
- SUITABLE FOR BOTH IR REFLOW SOLDERING AND WAVE SOLDERING
- RoHS & REACH COMPLIANT, MATTE TIN PLATED



DIMENSIONS

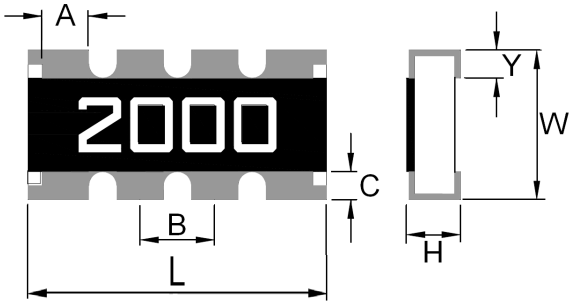
STYLE	NUMBER OF RESISTORS	L	W	H	A	B	C	Y
CN42	4	2.00 ± 0.15	1.00 ± 0.10	0.45 ± 0.10	0.30 ± 0.10	0.50 ± 0.05	0.22 ± 0.15	0.22 ± 0.15
CN43	4	3.20 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.15	0.80 ± 0.05	0.30 ± 0.15	0.30 ± 0.15
CNA42	4	2.00 ± 0.15	1.00 ± 0.10	0.40 ± 0.10	0.30 ± 0.10	0.50 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
CNA43	4	3.20 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.15	0.80 ± 0.05	0.30 ± 0.15	0.40 ± 0.15

ELECTRICAL CHARACTERISTICS

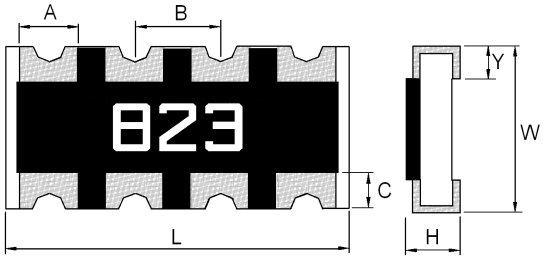
Power Rating at 70°C	1/16W	1/16W	1/16W	1/16W
STYLE	CN42	CN43	CNA42	CNA43
Max Operating Voltage	25V	50V	25V	50V
Max Overload Voltage	50V	100V	50V	100V
Operating Temperature	-55°C ~ +155°C			
Temperature Coefficient	±200 ppm			
Number Of Resistors	4			
Resistance Range 5%	1Ω~1MΩ		10Ω~1MΩ	
Resistance Range 1%	10Ω~1MΩ		10Ω~1MΩ	
0W Jumper	1A (< 50mΩ)			

DIMENSION LAYOUT

CN42 / CN43



CNA42 / CNA43

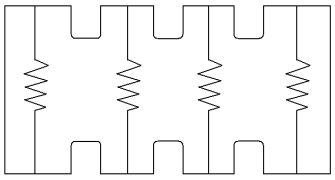


PERFORMANCE CHARACTERISTICS

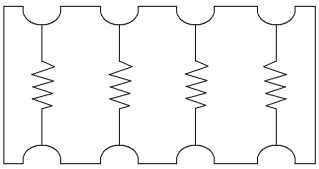
PERFORMANCE TEST	REQUIREMENT			TEST METHOD
	±1%	±5%	Jumper	
Temperature Coefficient	As per specification			-55°C ~ +125°C, 25°C is the reference temperature
Short Time Overload	± (1% + 0.05Ω)	± (2% + 0.05Ω)	< 50mΩ	RCWV x 2.5 or max overload for 5 seconds
Insulation Resistance	≥10GΩ			Max overload voltage for 1 minute
Endurance	± (2% + 0.10Ω)	± (3% + 0.10Ω)	< 50mΩ	70 ± 2°C Max working voltage for 1000 hr with 1.5 hr on and 0.5 hr off
Damp Heat With Load	± (2% + 0.10Ω)	± (3% + 0.10Ω)	< 50mΩ	40 ± 2°C 90~95 R.H, working voltage for 1000hr with 1.5 hr on and 0.5 hr off
Dry Heat	± (1% + 0.05Ω)	± (1.5% + 0.10Ω)	< 50mΩ	at +155°C for 1000 hr
Bending Strength	± (1% + 0.05Ω)	± (1.0% + 0.05Ω)	< 50mΩ	Bending amplitude 3mm for 10 seconds
Solderability	95% minimum coverage			245 ± 5°C for 3 seconds
Resistance to Soldering Heat	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	< 50mΩ	260 ± 5°C for 10 seconds
Voltage Proof	No breakdown or flashover			1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%			260 ± 5°C for 30 seconds
Low Temperature Operation	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	< 50mΩ	JIS-C-5201-1 7.1 1 hour, -65°C followed by 45 min of RCWV

EQUIVALENT CIRCUIT DIAGRAM

CN42 / CN43



CNA42 / CNA43



PART NUMBER

CN 42 - 10K0 J R - xx

Series Type	Dimension	Resistance Value	Tolerance	Package	Option*
CN (Convex) CNA (Concave)	42 = 0402 x4 43 = 0603 x4	Example 100R 1K00 20K0	J = 5% F = 1%	R = T&R	Contact SPI for other options

STANDARD PACKAGING

TAPE	CN42 / CNA42	10,000 pieces
	CN43 / CNA43	5,000 pieces

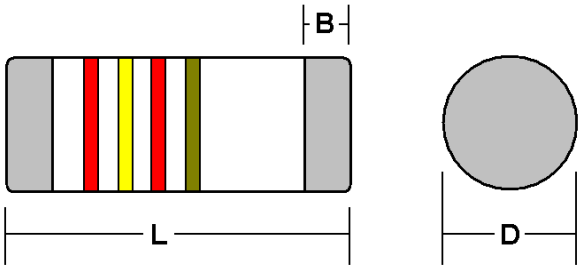
LEAD FREE

CN Series parts are
RoHS & REACH Compliant

SANNOHM

MM Metal Film MELF Resistor

- CONFORMAL MULI LAYER COATING
- EXCELLENT SOLDERABILITY TERMINATION
- AVAILABLE IN 5%, 2% & 1% TOLERANCE
- AEC-Q200 Rev.D AVAILABLE (MM0204 & MM52)
- IEC60115-1 & EN140401-803



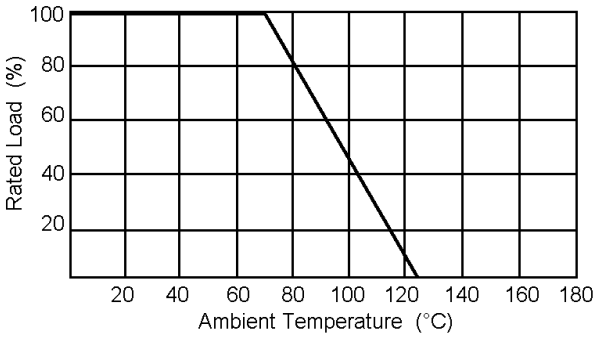
DIMENSIONS

STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
MM16	3.45 ± 0.1	1.35 ± 0.1	0.6 min	17 grams
MM0201	2.10 ± 0.1	1.10 ± 0.1	0.5 min	7 grams
MM0204	3.45 ± 0.1	13.5 ± 0.1	0.6 min	17 grams
MM0207	5.90 ± 0.2	2.2 ± 0.1	1.0 min	66 grams
MM52	5.90 ± 0.2	2.2 ± 0.1	1.0 min	66 grams

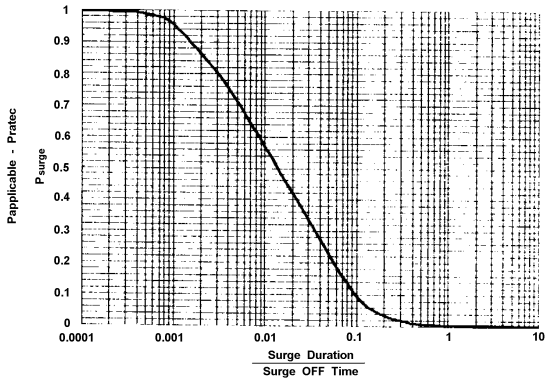
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/6W	1/5W	1/4W	1/3W	1/2W
STYLE	MM16	MM0201	MM0204	MM0207	MM52
Maximum Working Voltage	200V	150V	200V	300V	300V
Maximum Overload Voltage	400V	300V	400V	500V	
Dielectric Withstanding Voltage	200V	150V	200V	500V	
Temperature Coefficient	5% ±100ppm/°C; 1% ±50ppm/°C (25ppm/°C available)				
Rating Ambient Temperature	70°C				
Operating Temperature	-55°C ~ +125°C (+155°C Automotive)				
Resistance Tolerance	1%, 2%, 5%				
Value Range - IEC E24*	0 & 0.1Ω~1MΩ	0 & 0.22Ω~2M2Ω	0 & 0.1Ω~1MΩ	0 & 0.1Ω~10MΩ	

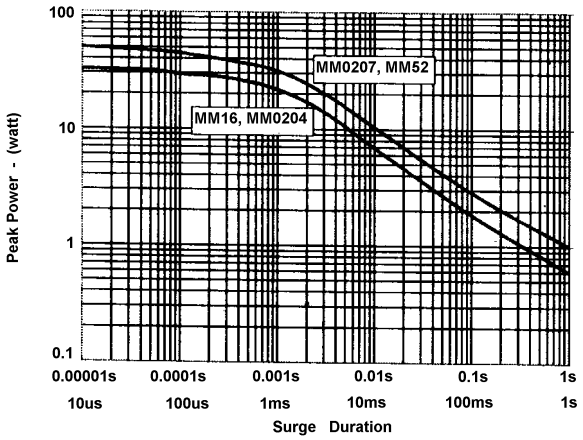
POWER DERATING CURVE



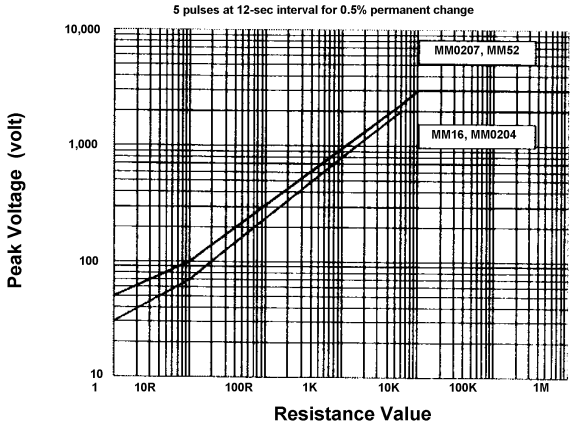
SURGE PWR DERATING CURVE



SINGLE SURGE PERFORMANCE



1.2/50us PEAK PULSE



PERFORMANCE CHARACTERISTICS

DESCRIPTION	TEST METHOD	APPRAISE
Load Life	IEC60115-1 4.25.1 70°C at RCWV for 1000 hrs (1.5 hrs on, 0.5 hrs off)	± (1.5% + 0.05Ω)
Load Life in Humidity	IEC60115-1 4.24 56 days at 40±2°C, 93% RH	± (1.5% + 0.05Ω)
Short Time Overload	IEC60115-1 4.13 2.5 times RCWV for 5 seconds	± (0.5% + 0.05Ω)
Resistance to Soldering Heat	IEC60115-1 4.18 10 seconds at 260°C solder bath temperature	± (0.5% + 0.05Ω)
Vibration	MIL-STD-202 Method 204	± (1% + 0.1Ω)
Solderability	MIL-STD-202 Method 208 230°C solder for 5 ±0.5 seconds	95% minimum coverage
Thermal Endurance	IEC60115-1 4.25.3 1000 hr at 125°C without load	± (0.5% + 0.05Ω)
Thermal Shock	IEC60115-1 4.19 5x -55°C 30 min, +125°C 30 min.	± (0.5% + 0.05Ω)

PART NUMBER

MM 0207 - 47R0 J R

Series Type	Wattage	Resistance Value	Tolerance	Package
MM MMV*	16 = 1/6W 0201 = 1/5W 0204 = 1/4W 0207 = 1/3W 52 = 1/2W	Example 4R7 47R 100R	F = 1% G = 2% J = 5%	R = Tape

*MMV = Automotive AEC-Q200 Rev.D - MM0204 & MM52 only.

LEAD FREE

MM Series parts are
RoHS & REACH Compliant

SANNOHM

CSRV Metal Film MELF Resistor

- AEC-Q200 COMPLIANCE
- EXCELLENT SOLDERABILITY TERMINATION
- TIGHT TOLERANCE DOWN TO ± 0 .1%
- TCR DOWN TO ± 10 PPM/°C
- HIGH POWER UP TO 1 WATT

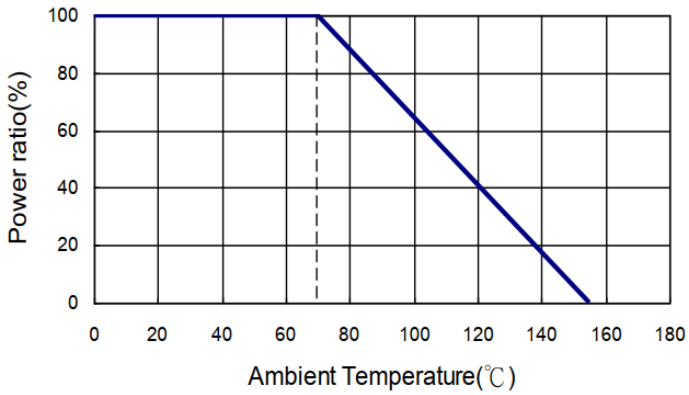
DIMENSIONS

STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
CSRV0102	2.10 ± 0.10	1.10 ± 0.10	0.45 ± 0.05	7.7 grams
CSRV0204	3.50 ± 0.20	14.0 ± 0.15	0.80 ± 0.10	18.7 grams
CSRV0207	5.90 ± 0.20	2.20 ± 0.20	1.30 ± 0.10	80.9 grams

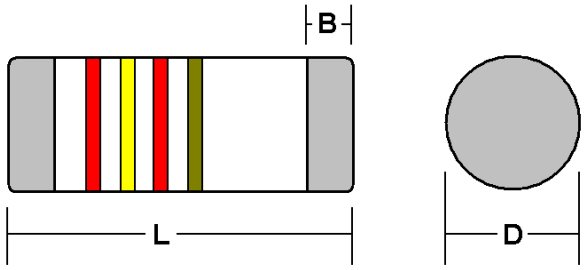
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/8W	1/5W	0.3W	1/4W	2/5W	1/2W	1W
STYLE	CSR0102			CSR0204		CSR0207	
Maximum Working Voltage	150V	200V	200V	200V	200V	300V	350V
Maximum Overload Voltage	400V	300V	400V			500V	
Dielectric Withstanding Voltage	200V	150V	200V			500V	
Temperature Coefficient	±100, ±50, ±25, ±15			±100, ±50, ±25, ±15, ±10			
Rating Ambient Temperature	70°C						
Operating Temperature	-55°C ~ +155°C						
Resistance Tolerance	0.1%, 0.25%, 0.5%, 1%, 5%						
Value Range - IEC E24*	0Ω & 8.2Ω~1MΩ			0Ω & 0.1Ω~3.4MΩ		0Ω & 0.1Ω~3.4MΩ	
Maximum Resistance Change at P70 ΔR/R Maximum, After 1000 Hour	≤0.5%			≤0.5%		≤0.5%	

POWER DERATING CURVE



OUTLINE



STANDARD ELECTRICAL SPECIFICATIONS

SERIES TYPE	POWER RATING 70°C	RESISTANCE RANGE					TCR PPM/°C
		±0.1%	±0.25%	±0.5%	±1%	±5%	
CSVR0102	1/8W	100Ω~56KΩ					± 15
		100Ω~82KΩ		49.9Ω~200KΩ	49.9Ω~390KΩ		± 25
				8.2Ω~1MΩ			± 50
					40Ω~1MΩ		± 100
	0Ω 2A					0Ω	-
CSRV0204	1/4W	49.9Ω~20KΩ					± 10
		10Ω~300KΩ					± 15
		10Ω~1MΩ		10Ω~3.4MΩ	1Ω~3.4MΩ		± 25
		10Ω~1MΩ	1Ω~1MΩ	1Ω~3.4MΩ	0.2Ω~3.4MΩ		± 50
					0.1Ω~1MΩ		± 100
	0Ω 2A					0Ω	-
CSRV0207	1/2W	49.9Ω~20KΩ					± 10
		10Ω~300KΩ					± 15
		10Ω~1MΩ		10Ω~3.4MΩ	1Ω~3.4MΩ		± 25
		10Ω~1MΩ	1Ω~1MΩ	1Ω~3.4MΩ	0.2Ω~3.4MΩ		± 50
					0.1Ω~1MΩ		± 100
	0Ω 2A					0Ω	-

HIGH POWER ELECTRICAL SPECIFICATIONS

SERIES TYPE	POWER RATING 70°C	RESISTANCE RANGE					TCR PPM/°C
		±0.1%	±0.25%	±0.5%	±1%	±5%	
CSVR0102	1/5W	100Ω~56KΩ					± 15
			100Ω~82KΩ	49.9Ω~200KΩ	49.9Ω~390KΩ		± 25
	0.3W			8.2Ω~1MΩ			± 50
					40Ω~1MΩ		± 100
CSRV0204	2/5W	10Ω~300KΩ					± 15
		10Ω~1MΩ		10Ω~3.4MΩ	10Ω~3.4MΩ		± 25
		10Ω~1MΩ	1Ω~1MΩ	1Ω~3.4MΩ	0.2Ω~3.4MΩ		± 50
					0.1Ω~1MΩ		± 100
CSRV0207	1W	10Ω~300KΩ					± 15
		10Ω~1MΩ		10Ω~3.4MΩ	1Ω~3.4MΩ		± 25
		10Ω~1MΩ	1Ω~1MΩ	1Ω~3.4MΩ	0.2Ω~3.4MΩ		± 50
					0.2Ω~3.4MΩ		± 100

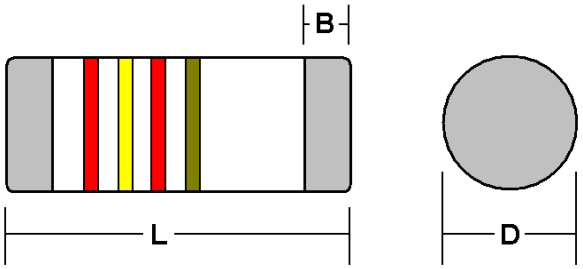
Operating Voltage + √(P*R) or Maximum Operating Voltage listed above, whichever is lower
Overload Voltage =2.5*√(P*R) or Maximum Voltage listed above, whichever is lower.
RCWV (Rated Continuous Working Voltage) =√(P*R) or Maximum Operating Voltage, whichever is lower.
Sannohm is able to supply optional specification based on customer's request.

CM Carbon Film MELF Resistor

- CONFORMAL MULI LAYER COATING
- EXCELLENT SOLDERABILITY TERMINATION
- AVAILABLE IN 5% TOLERANCE
- SPECIFICATIONS PER: MIL-R-226848
  IEC 115-1 115-2
  JIS C 52021

DIMENSIONS

STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
CM16	3.45 ± 0.1	1.35 ± 0.1	0.6 min	17 grams
CM0204	3.45 ± 0.1	1.35 ± 0.1	0.6 min	17 grams
CM0207	5.90 ± 0.2	2.2 ± 0.1	1.0 min	66 grams
CM52	5.90 ± 0.2	2.2 ± 0.1	1.0 min	66 grams

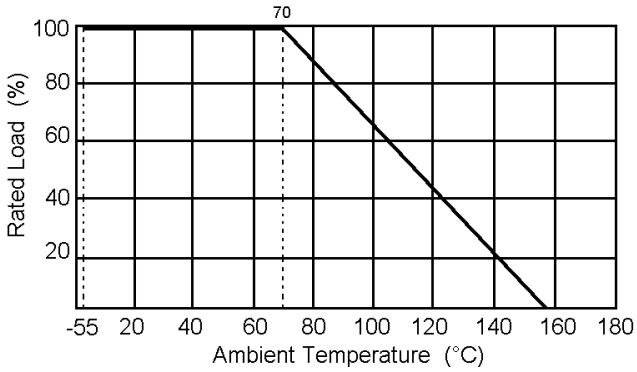


ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/6W	1/4W	1/3W	1/2W
STYLE	CM16	CM0204	CM0207	CM52
Maximum Working Voltage	200V	200V	300V	350V
Maximum Overload Voltage	300V		600V	
Dielectric Withstanding Voltage	200V		500V	
Temperature Coefficient	1Ω~33K ±300; 33K~330K -500; 330K~470K -700; 470K~910K -1000; Over 910K -1500		1Ω~33K ±300; 33K~330K -500; 330K~470K -700; 470K~1M -1000; Over 1M -1500	
Rating Ambient Temperature	70°C			
Operating Temperature	-55°C ~ +155°C			
Resistance Tolerance	5%			
Insulation Resistance, MW	$> 10^4$			
Voltage Coefficient, ppm/V	< 25			
Value Range - IEC E24	0 & 0.1Ω~1MΩ		0 & 0.1Ω~10MΩ	

For zero ohm jumper, resistance value is under 20mΩ . Rated current is 2A for CM16 & CM0204 and 4A for CM0207 & CM52.
Special sizes and values available on special order.

POWER DERATING CURVE



PERFORMANCE CHARACTERISTICS

DESCRIPTION	TEST METHOD	APPRAISE
Load Life	IEC60115-1 4.25.1 70°C at RCWV for 1000 hrs (1.5 hrs on, 0.5 hrs off)	±3%
Load Life in Humidity	IEC60115-1 4.24 56 days at 40 ± 2°C, 93% RH	±5%
Short Time Overload	IEC60115-1 4.13 2.5 times RCWV for 5 seconds	± (1% + 0.05Ω)
Resistance to Soldering Heat	IEC60115-1 4.18 10 seconds at 260°C solder bath temp	± (1% + 0.05Ω)
Vibration	MIL-STD-202 Method 204	± (1% + 0.1Ω)
Solderability	MIL-STD-202 Method 208 230°C solder for 5 ± 0.5 seconds	95% minimum coverage
Thermal Endurance	IEC60115-1 4.25.3 1000 hr at 155°C without load	± (1% + 0.05Ω)
Thermal Shock	IEC60115-1 4.19 5 x -55°C 30 min, +155°C 30 min	± (1% + 0.05Ω)

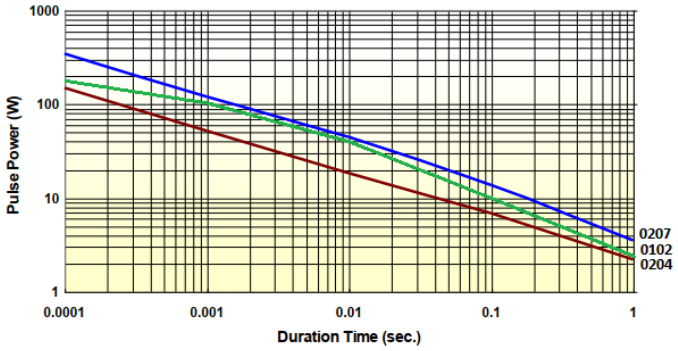
CM 0207 - 47R0 J R

Series Type	Wattage	Resistance Value	Tolerance	Package
CM	16 = 1/6W 0204 = 1/4W 0207 = 1/3W 52 = 1/2W	Example 4R7 47R 100R	J = 5%	R = Tape

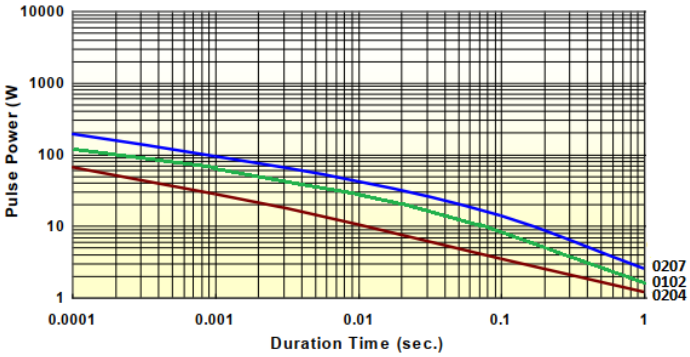
LEAD FREE

CM Series parts are
RoHS& REACH Compliant

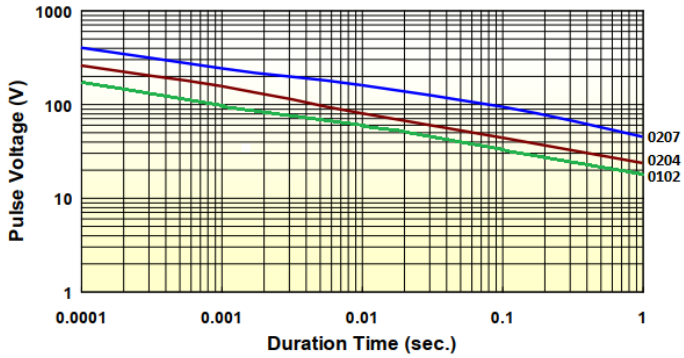
Single Pulse (100 ohm)



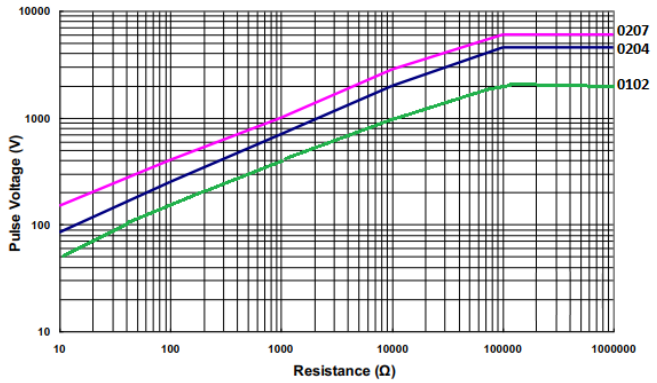
Continuous Pulse (100 ohm)



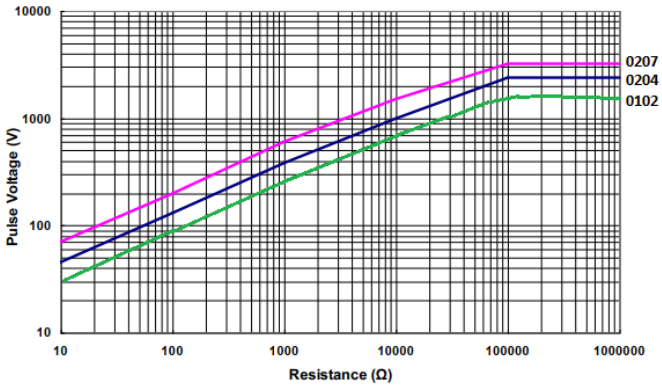
Pulse Voltage (100 ohm)



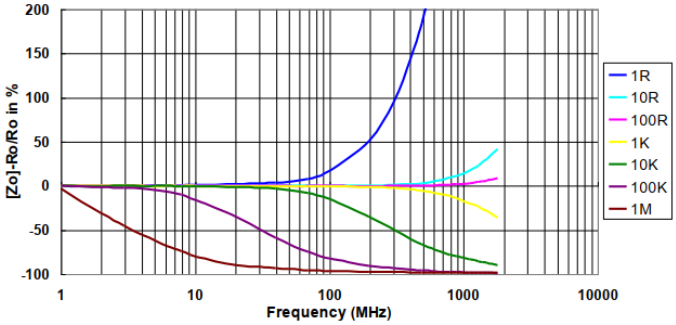
1.2/50µs Lightning Surge



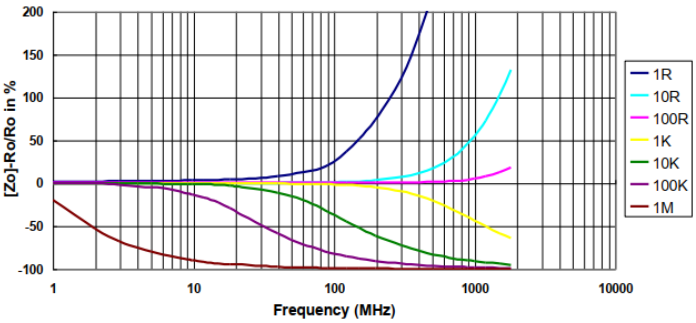
10/700µs Lightning Surge



Frequency vs. Impedance (0204)



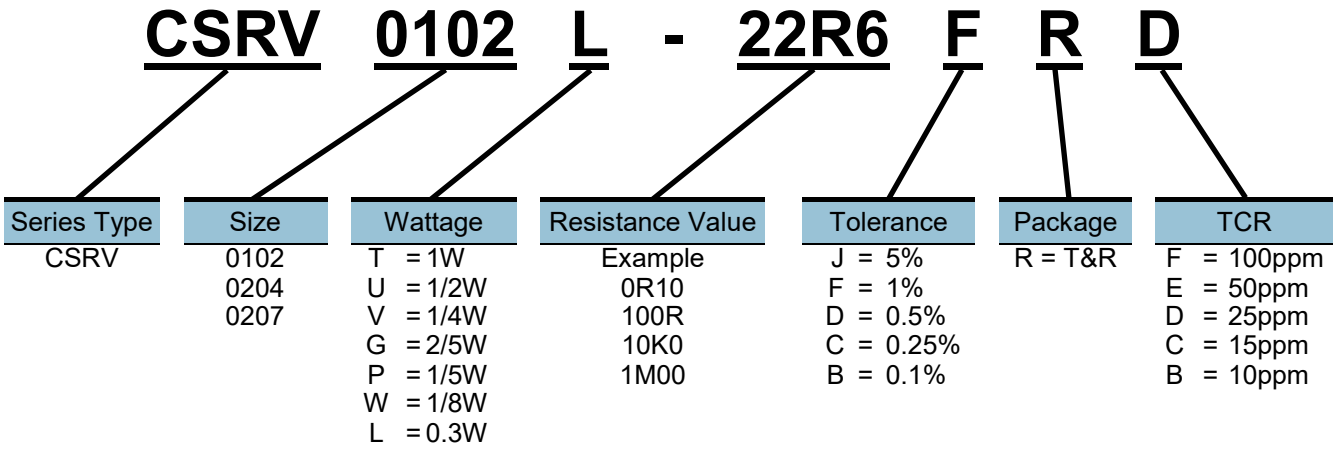
Frequency vs. Impedance (0207)



PERFORMANCE CHARACTERISTICS

PERFORMANCE TEST	REQUIREMENT		TEST METHOD
	±5% and below	Jumper	
Temperature Coefficient	As Per Specification		-55°C ~ +125°C, 25°C is the reference temperature
Short Time Overload	10Ω~270K0Ω ± (0.1% + 0.05Ω) <10Ω & >270KΩ ± (0.15% + 0.05Ω) 0102: ± (0.15% + 0.05Ω)	<15mΩ	RCWVx2.5 or Max Overload for 5 seconds
Insulation Resistance	≥10GΩ		Max Overload Voltage for 1 minute
Board Flex	10Ω~270K0Ω ± (0.1% + 0.05Ω) <10Ω & >270K0Ω ± (0.15% + 0.05Ω) 0102: ± (0.15% + 0.05Ω)	<15mΩ	AEC-Q200-005 Bending once for 60 seconds with 2mm
High Temperature Exposure	10Ω~270K0Ω ± (0.1% + 0.05Ω) <10Ω & >270K0Ω ± (0.15% + 0.05Ω) 0102: ± (0.15% + 0.05Ω)	<15mΩ	MIL-STD-202 Method 108 +155°C for 1000 hours
ESD	± (0.5% + 0.05Ω)	<15mΩ	AEC-Q200-002 Human body, 2KV
Terminal Strength	No broken parts	<15mΩ	AEC-Q200-006 Force of 1.8kg for 60 seconds
Solderability	95% Minimum Coverage		245±5°C for 3 seconds
Resistance to Soldering Heat	10Ω~270K0Ω ± (0.1% + 0.05Ω) <10Ω & >270K0Ω ± (0.15% + 0.05Ω) 0102: ± (0.15% + 0.05Ω)	<15mΩ	260±5°C for 10 seconds
Voltage Proof	No Breakdown or Flashover		1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total Leaching area ≤10%		260±5°C for 30 seconds
Temperature Cycling	10Ω~270K0Ω ± (0.1% + 0.05Ω) <10Ω & >270K0Ω ± (0.15% + 0.05Ω) 0102: ± (0.15% + 0.05Ω)	<15mΩ	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles

PART NUMBER



STANDARD PACKAGING

TAPE	CSRV0102	3,000 pieces -	7" reel
	CSRV0204	3,000 pieces -	7" reel
	CSRV0207	2,000 pieces -	7" reel

LEAD FREE

CSRV Series parts are RoHS& REACH Compliant

SANNOHM

SRS Spark-Noise Suppression SLUG Resistor

- DESIGNED FOR HIGH VOLTAGE SPARK IGNITION SYSTEMS
- PROPRIETARY CONDUCTIVE FILM WITHSTANDS HV SURGE IMPACTS WITH LONG TERM STABILITY

DIMENSIONS

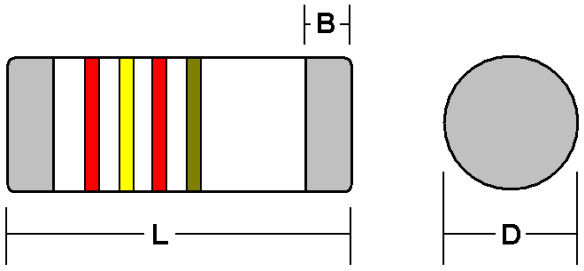
STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
SRS20K	10.5 ± 1.0	3.8 ± 0.5	2.2 ± 0.3	390 grams
SRS35K	16.0 ± 1.0	4.5 ± 0.3	2.2 ± 0.3	700 grams
SRS50K	18.5 ± 1.0	4.5 ± 0.3	2.2 ± 0.3	700 grams
SRS50K1	18.5 ± 1.0	5.5 ± 0.3	2.2 ± 0.3	1200 grams

ELECTRICAL CHARACTERISTICS

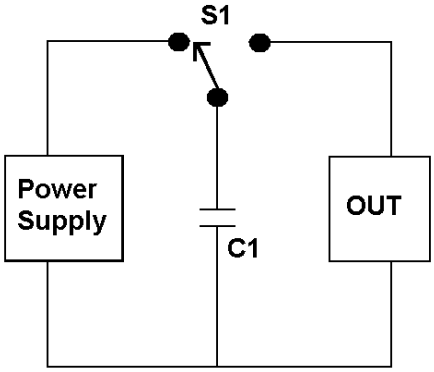
Power Rating at 70°C	1/2W	2W	3W	4W
STYLE	SRS16	SRS35K	SRS50K	SRS50K1
Maximum Surge Load	20KV / 10nS	35KV / 20nS	50KV / 20nS	50KV / 30nS
Minimum Resistance	10Ω	1KΩ		
Maximum Resistance	22KΩ	10KΩ		33KΩ
Resistance Tolerance	±5% ~ ±20%			
Dielectric Withstanding Voltage, VAC or DC	500V			
Operating Temperature	-55°C ~ +155°C			
Temperature Coefficient	±1200			
Insulation Resistance, MΩ	$> 10^4$			

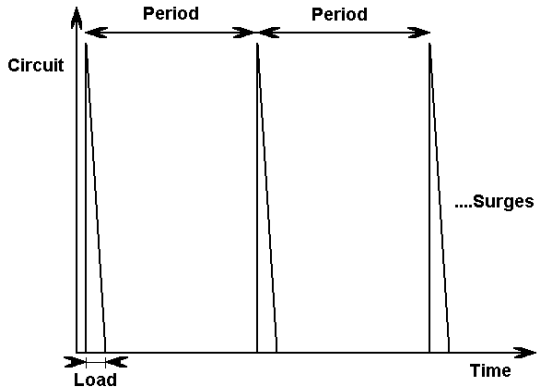
SURGE TEST

STYLE	CIRCUIT	LOAD	PERIOD	SURGES
SRS20K	20KV	20nS	20mS	200,000
SRS35K	35KV	30nS	20mS	200,000
SRS50K	50KV	30nS	20mS	200,000
SRS50K1	50KV	45nS	20mS	200,000



SURGE DIAGRAM





PERFORMANCE CHARACTERISTICS

DESCRIPTION	TEST METHOD	APPRAISE
Load Life	IEC60115-1 4.25.1 70°C at RCWV for 1000 hrs (1.5 hrs on, 0.5 hrs off)	±2%
Load Life in Humidity	IEC60115-1 4.24 56 days at 40 ± 2°C, 93% RH	±3%
Short Time Overload	IEC60115-1 4.13 2.5 times RCWV for 5 seconds	±1%
Vibration	MIL-STD-202 Method 204 Six hours in each parallel & axial direction with a simple harmonic motion having an amplitude of 1.52mm and 10 to 20,000 Hz	±1%
Surge Test	200,000 impacts at a period 20mS (3000rpm/1 hour) according to the surge test chart	-0.5% ~ +0.1%
Thermal Endurance	IEC60115-1 4.25.3 1000 hr at 155°C without load	±1%
Thermal Shock	IEC60115-1 4.19 5 x -55°C 30min, +155°C 30 min.	±1%

PART NUMBER

SRS 20K - 10K0 J B

Series Type	Wattage	Resistance Value	Tolerance	Package
SRS	16 = 1/2W 35K = 2W 50K = 3W 50K1 = 4W	Example 4R7 47R 100R	J = 5%	B = Bulk R = Tape

LEAD FREE

SRS Series parts are RoHS & REACH Compliant

SANNOHM

CSMM Current Sense Metal Film MELF Resistor

- HIGH POWER HANDLING WITH SUPERIOR RELIABILITY AND STABILITY
- CONFORMAL MULTI-LAYER COATING AGAINST HUMIDITY
- SMD ALTERNATIVE TO CARBON COMPOSITION RESISTORS
- HEATSINKER™ TECHNOLOGY FOR BETTER HEAT DISSIPATION
- RESISTANCE VALUES DOWN TO 10mΩ

DIMENSIONS

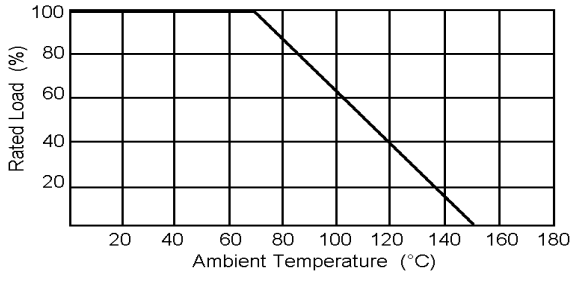
STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
CSMM0204	3.52 ± 0.08	1.35 ± 0.1	0.6 min	17 grams
CSMM52	5.90 ± 0.20	2.20 ± 0.1	1.0 min	66 grams
CSMM0101	5.90 ± 0.20	2.20 ± 0.1	1.0 min	66 grams
CSMM0201	8.50 ± 1.00	3.00 ± 0.2	1.3 min	186 grams
CSMM0301	10.50 ± 1.00	4.00 ± 0.5	1.6 min	446 grams

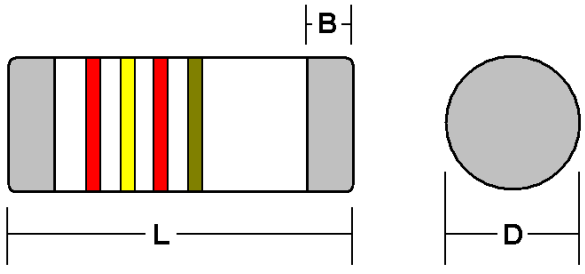
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/4W	1/2W	1W	2W	3W
STYLE	CSMM0204	CSMM52	CSMM0101	CSMM0201	CSMM0301
Maximum Working Voltage	200V	250V	250V	300V	350V
Maximum Overload Voltage	400V	500V	500V	600V	700V
Temperature Coefficient	50, 100, 200, 300, 600 ppm				
Dielectric Withstanding Voltage AC / DC	200V	500V		700V	
Rating Ambient Temperature	70°C				
Operating Temperature	-55°C ~ +150°C				
Resistance Tolerance	1% ~ 5%				
Insulation Resistance, MΩ	$>10^4$				
Minimum Resistance	10m Ω				
Maximum Resistance	510m Ω				

Special sizes, values and specifications not listed, are available on special order.

POWER DERATING CURVE





PERFORMANCE CHARACTERISTICS

DESCRIPTION	TEST METHOD	APPRAISE
Load Life	IEC60115-1 4.25.1 70°C at RCWV for 1000 hrs (1.5 hrs on, 0.5 hrs off)	±3%
Load Life in Humidity	IEC60115-1 4.24 56 days at 40 ± 2°C, 93% RH	±3%
Short Time Overload	IEC60115-1 4.13 2.5 times RCWV for 5 seconds (CSM0204/CSM52) 2.5 times RCWV for 2 seconds (CSM0101, CSM0201, CSM0301)	±1%, 2% - ±0.75% ±5% - ±2%
Periodic Electric Overload	IEC60115-1 4.37 3.9 x rated voltage (not over max) with 0.1s on, 2.5s off for 1,000 cycles	±3%
Resistance to Soldering Heat	IEC60115-1 4.18 10 seconds at 260°C solder bath temp	±1%
Single Pulse HV Overload	IEC60115-1 4.27 Severity No 4 10 pulses of 10/700µ at 10 x rated voltage (not over max) with interval of 60 seconds	±2%
Vibration	MIL-STD-202 Method 204	±(1% + 0.1Ω)
Solderability	MIL-STD-202 Method 208 230°C solder for 5 ±0.5 seconds	95% minimum coverage
Thermal Endurance	IEC60115-1 4.25.3 1000 hr at 125°C without load	±1%
Thermal Shock	IEC60115-1 4.19 5 x -55°C 30 min, +125°C 30 min	±2%
Flammability	IEC60115-1 4.35 Needle Flame Test for 10 seconds	No burning after 30 seconds

PART NUMBER

CSMM 0204 - 0R01 J G R

Series Type	Wattage	Resistance Value	Tolerance	TCR*	Package
CSMM	0204 = 1/4W 52 = 1/2W 0101 = 1W 0201 = 2W 0301 = 3W	Example 0R01 R232 0R51	J = 5% G = 2% F = 1%	Blank = 600ppm M = 300ppm G = 200ppm* F = 100ppm E = 50ppm	R = Tape

STANDARD PACKAGING

TAPE	CSMM0204	3,000 pieces
	CSMM52, CSMM0101	2,000 pieces
	CSMM0201	2,500 pieces
	CSMM0301	2,000 pieces

LEAD FREE

CSMM Series parts are
RoHS & REACH Compliant

SANNOHM

SRM Surge Resistant MELF Resistor

- SRM201 WITHSTANDS 51,840,000 SURGES AT 30KV, IN A DURATION OF 500 HRS
- ABSORBS HARMFUL SURGES WHICH CAN DAMAGE DEVICES OR COMPONENTS
- SMD ALTERNATIVE TO CARBON COMPOSITION RESISTORS
- SPECIAL CONDUCTIVE FILM ENHANCES ANTI-SURGE CAPABILITY
- MINIATURIZED MELF DESIGN HANDLES HIGH POWER

DIMENSIONS

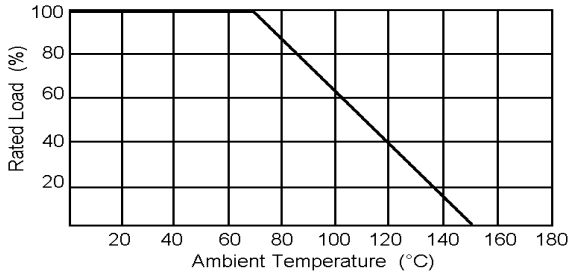
STYLE	DIMENSIONS (mm)			
	L	D	B Solder Spot	Net Weight per 1000 pcs
SRM0204	3.52 ± 0.08	1.35 ± 0.1	0.6 Min	17 grams
SRM0204T	3.52 ± 0.08	1.35 ± 0.1	0.6 Min	17 grams
SRM0207	5.90 ± 0.2	2.2 ± 0.1	1.0 Min	66 grams
SRM101	5.90 ± 0.2	2.2 ± 0.1	1.0 Min	66 grams
SRM201	8.50 ± 1.0	3.0 ± 0.2	1.3 Min	186 grams
SRM301	10.50 ± 1.0	4.0 ± 0.5	1.6 Min	446 grams

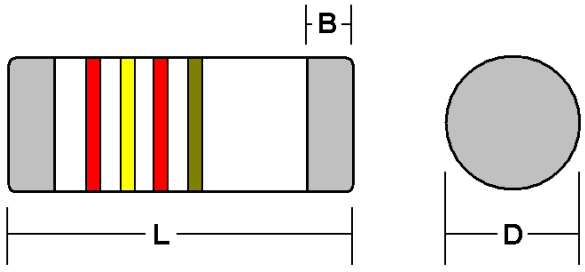
ELECTRICAL CHARACTERISTICS

Power Rating at 70°C	1/4W	1/2W	1/2W	1W	2W	3W
STYLE	SRM0204	SRM0204T	SRM0207	SRM101	SRM201	CSM301
Maximum Working Voltage	200V	250V		300V	350V	400V
Maximum Surge Voltage	2,000V	4,000V	6,000V	8,000V	9,000V	10,000V
Dielectric Withstanding Voltage	350V	300V	350V		500V	800V
Temperature Coefficient	100, 200, 300 ppm					
Rating Ambient Temperature	70°C					
Operating Temperature	-55°C ~ +150°C					
Resistance Tolerance	1%, 2%, 5%					
Insulation Resistance, MΩ	$>10^4$					
Minimum Resistance	1.0Ω			0.1Ω		
Maximum Resistance	1 MΩ	10 KΩ	1 MΩ	100 KΩ	120 KΩ	150 KΩ

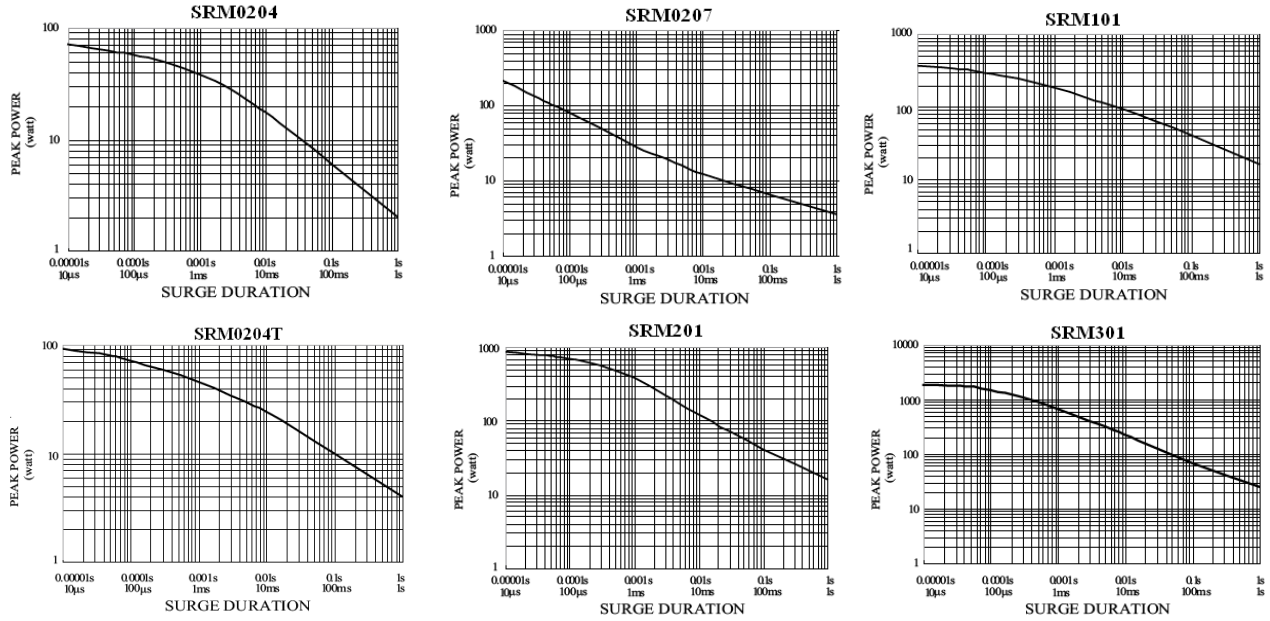
Special sizes, values and specifications not listed, are available on special order.

POWER DERATING CURVE





SURGE PERFORMANCE



PERFORMANCE CHARACTERISTICS

DESCRIPTION	TEST METHOD	LIMITS
Single Pulse HV Overload	IEC60115-1 4.27 Severity #4 10 pulses of 10/700µs at 10 x rated voltage (not over max overload voltage) with interval of 60 seconds	±0.5%
Surge Test	Surge Voltage = √(6000 x P x R) DC P=Pwr, R=Resistance Value Surge Power is no more than listed at right Surge spec = 1.2/10µs, period of 1 second, 50 surges	SRM0204 - 2KV SRM0204T - 4KV SRM0207 - 6KV SRM101 - 8KV SRM201 - 9KV SRM301 - 10KV 5%
Short Time Overload	IEC60115-1 4.13 2.5 times rated voltage for 2 seconds	±2%
Resistance to Soldering Heat	IEC60115-1 4.18 10 sec at 260°C solder bath temperature	±1%
Thermal Endurance	IEC60115-1 4.25.3 1000 hr at 150°C without load	±1%

PART NUMBER

SRM 0207 - 10R0 J G R

Series Type	Wattage	Resistance Value	Tolerance	TCR*	Package
SRM	0204 = 1/4W 0204T = 1/2W 0207 = 1/2W 101 = 1W 201 = 2W 301 = 3W	Example 0R10 10K0 150K	J = 5% G = 2% F = 1%	Blank = 400ppm* G = 200ppm F = 100ppm	R = Tape

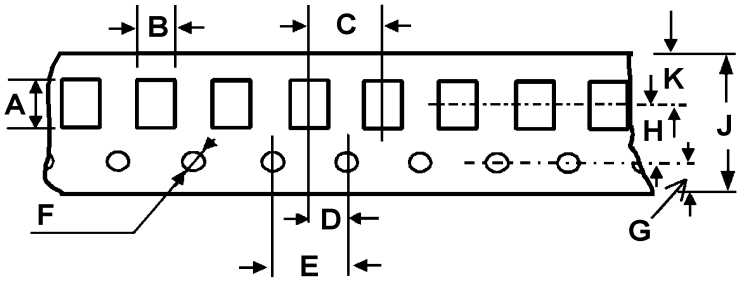
LEAD FREE

SRM Series parts are RoHS & REACH Compliant

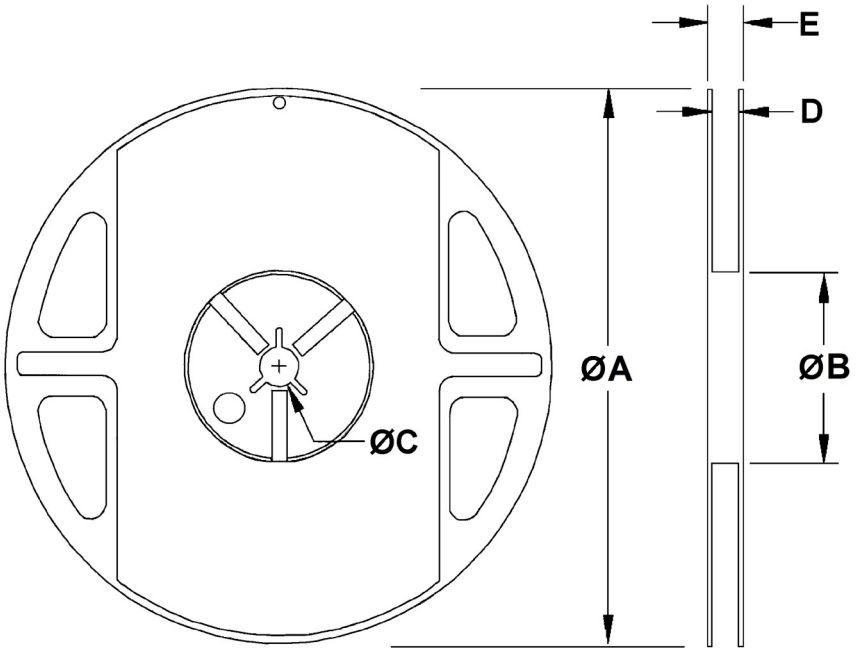
PACKAGING

RC SERIES TAPING SPECIFICATIONS

Contact S-P International for specifications for other series types.



Type	A	B	C	D	E	F	G	H	J	K
0402	1.20 ±0.1	0.65 ±0.1	2.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.5+0. 1-0	1.75 ±0.1	3.5 ±0.05	8.0 ±0.2	2.75
0603	1.90 ±0.1	1.10 ±0.1	4.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5+0 .1-0	1.75 ±0.1	3.5 ±0.05	8.0 ±0.2	2.75
0805	2.40 ±0.2	1.60 ±0.1	4.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5+ 0.1-0	1.75 ±0.1	3.5 ±0.05	8.0 ±0.2	2.75
1206	3.50 ±0.2	1.90 +0.1	4.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5 +0.1-0	1.75 ±0.1	3.5 ±0.05	8.0 ±0.2	2.75
1210	3.50 ±0.2	2.90 +0.1	4.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5 +0.1-0	1.75 ±0.1	3.5 ±0.05	8.0 ±0.2	2.75
2010	5.40 ±0.2	2.80 +0.1	4.0 ±0.10	2.0 ±0.05	4.0 ±0.1	1.5 +0.1-0	1.75 ±0.1	5.5 ±0.05	12 ±0.3	4.75
2512	6.70 ±0.1	3.50 +0.1	4.0 ±0.10	2.0 ±0.05	4.0 ±0.1	1.5 +0.1-0	1.75 ±0.1	5.5 ±0.05	12 ±0.3	4.75

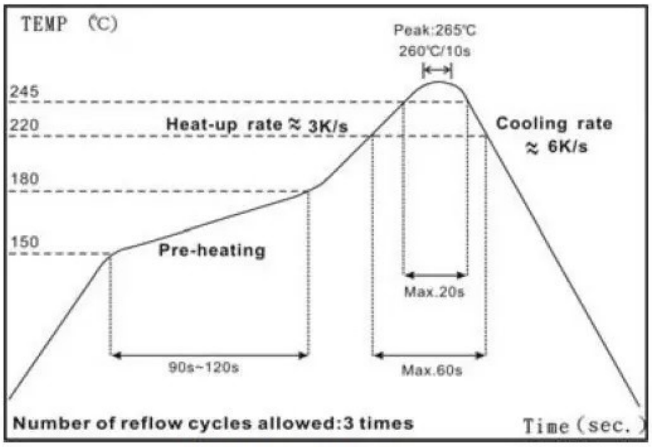


Package Type	Type	A	B	C	D	E
Paper	0201 ~ 1210	178.5 ±1.5 (7”)	60.0 +1-0	13.0 ±0.2	9.0 ±0.5	12.5 ±0.5
Embossed	2010	178.5 ±1.5 (7”)	60.0 +1-0	13.0 ±0.5	13.0 ±0.5	15.5 ±0.5
Embossed	2512	250 ±1.0 (10”)	62 ±0.5	13.0 ±0.5	12.5 ±0.5	16.5 ±0.5

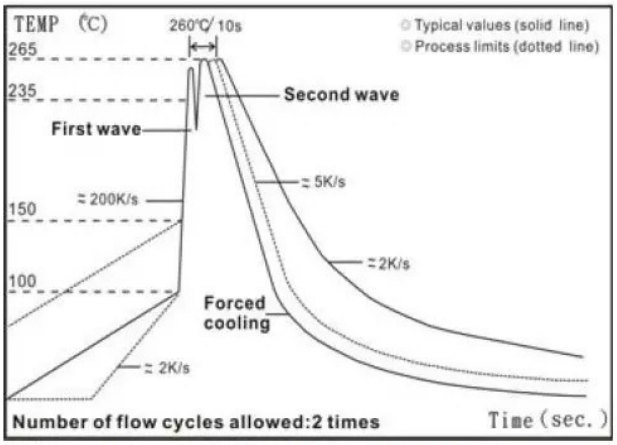
STANDARD RESISTANCE VALUES per TOLERANCE

0.1% .25% 0.5%	1%	2% 5% 10%	0.1% .25% 0.5%	1%	2% 5% 10%	0.1% .25% 0.5%	1%	2% 5% 10%	0.1% .25% 0.5%	1%	2% 5% 10%	0.1% .25% 0.5%	1%	2% 5% 10%	0.1% .25% 0.5%	1%	2% 5% 10%
10.0	10.0	10	14.7	14.7	-	21.5	215.	-	31.6	31.6	-	46.4	46.4	-	68.1	68.1	68
10.1	-	-	14.9	-	-	21.8	-	-	32.0	-	-	47.0	-	47	69.0	-	-
10.2	10.2	-	15.0	15.0	15	22.1	22.1	22	32.4	32.4	-	47.5	47.5	-	69.8	69.8	-
10.4	-	-	15.2	-	-	22.3	-	-	32.8	-	-	48.1	-	-	70.6	-	-
10.5	10.5	-	15.4	15.4	-	22.6	22.6	-	33.2	33.2	33	48.7	48.7	-	71.5	71.5	-
10.6	-	-	15.6	-	-	22.9	-	-	33.6	-	-	49.3	-	-	72.3	-	-
10.7	10.7	-	15.8	15.8	-	23.2	23.2	-	34.0	34.0	-	49.9	49.9	-	73.2	73.2	-
10.9	-	-	16.0	-	16	23.4	-	-	34.4	-	-	50.5	-	-	74.1	-	-
11.0	11.0	11	16.2	16.2	-	23.7	23.7	-	34.8	34.8	-	51.1	51.1	51	75.0	75.0	75
11.1	-	-	16.4	-	-	24.0	-	24	35.2	-	-	51.7	-	-	75.9	-	-
11.3	11.3	-	16.5	16.5	-	24.3	24.3	-	35.7	35.7	-	52.3	52.3	-	76.8	76.8	-
11.4	-	-	16.7	-	-	24.6	-	-	36.1	-	36	53.0	-	-	77.7	-	-
11.5	11.5	-	16.9	16.9	-	24.9	24.9	-	36.5	36.5	-	53.6	53.6	-	78.7	78.7	-
11.7	-	-	17.2	-	-	25.2	-	-	37.0	-	-	54.2	-	-	79.6	-	-
11.8	11.8	-	17.4	17.4	-	25.5	25.5	-	37.4	37.4	-	54.9	54.9	-	80.6	80.6	-
12.0	-	12	17.6	-	-	25.8	-	-	37.9	-	-	55.6	-	-	81.6	-	-
12.1	12.1	-	17.8	17.8	-	26.1	26.1	-	38.3	38.3	-	56.2	56.2	56	82.5	82.5	82
12.3	-	-	18.0	-	18	26.4	-	-	38.8	-	-	56.9	-	-	83.5	-	-
12.4	12.4	-	18.2	18.2	-	26.7	26.7	-	39.2	39.2	39	57.6	57.6	-	84.5	84.5	-
12.6	-	-	18.4	-	-	27.1	-	27	39.7	-	-	58.3	-	-	85.6	-	-
12.7	12.7	-	18.7	18.7	-	27.4	27.4	-	40.2	40.2	-	59.0	59.0	-	86.6	86.6	-
12.9	-	-	18.9	-	-	27.7	-	-	40.7	-	-	59.7	-	-	87.6	-	-
13.0	13.0	13	19.1	19.1	-	28.0	28.0	-	41.2	41.2	-	60.4	60.4	-	88.7	88.7	-
13.2	-	-	19.3	-	-	28.4	-	-	41.7	-	-	61.2	-	-	89.8	-	-
13.3	13.3	-	19.6	19.6	-	28.7	28.7	-	42.2	42.2	-	61.9	61.9	62	90.9	90.9	91
13.5	-	-	19.8	-	-	29.1	-	-	42.7	-	-	62.6	-	-	92.0	-	-
13.7	13.7	-	20.0	20.0	20	29.4	29.4	-	43.2	43.2	43	63.4	63.4	-	93.1	93.1	-
13.8	-	-	20.3	-	-	29.8	-	-	43.7	-	-	64.2	-	-	94.2	-	-
14.0	14.0	-	20.5	20.5	-	30.1	30.1	30	44.2	44.2	-	64.9	64.9	-	95.3	95.3	-
14.2	-	-	20.8	-	-	30.5	-	-	44.8	-	-	65.7	-	-	96.5	-	-
14.3	14.3	-	21.0	21.0	-	30.9	30.9	-	45.3	45.3	-	66.5	66.5	-	97.6	97.6	-
14.5	-	-	21.3	-	-	31.2	-	-	45.9	-	-	67.3	-	-	98.8	-	-

RECOMMENDED IR REFLOW and WAVE SOLDER PROFILE



IR Reflow Soldering



Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260°C：10s

(2) Time of wave soldering at maximum temperature point 260°C：10s

(3) Time of soldering iron at maximum temperature point 410°C：5s

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