



SURGE CHIP RESISTORS AUTOMOTIVE GRADE SR series

20%, 10%, 5% sizes 0402/0603/0805/1206/1210/1218/2010/2512 RoHS compliant & Halogen free

Product specification – November 11, 2016 V.5







<u>SCOPE</u>

This specification describes SR0402 to SR2512 chip resistors with lead-free terminations made by thick film process.

APPLICATIONS

- Telecommunications
- Power supplies
- Car electronics

FEATURES

- AEC-Q200 qualified
- Superior to SR series in pulse withstanding voltage and surge withstanding voltage.
- MSL class: MSL I
- Halogen free epoxy
- RoHS compliant
 - Products with lead-free terminations meet RoHS requirements
 - Pb-glass contained in electrodes, resistor element and glass are exempted by RoHS
- Reduce environmentally hazardous waste
- High component and equipment reliability

ORDERING INFORMATION - GLOBAL PART NUMBER

Part number is identified by the series name, size, tolerance, packaging type, temperature coefficient, taping reel and resistance value.

0402/0603/0805/1206/1210/1218/2010/2512

GLOBAL PART NUMBER

SR XXXX X X X XX XXXX L

(1) (2) (3) (4) (5) (6) (7)

(I) SIZE

0402 / 0603 / 0805 / 1206 / 1210 / 1218 / 2010 / 2512

(2) TOLERANCE

 $J = \pm 5\%$ K = ±10%

 $M = \pm 20\%$

(3) PACKAGING TYPE

R = Paper taping reel

K = Embossed taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(5) TAPING REEL

07 = 7 inch dia. Reel
13 = 13 inch dia. Reel

7W	' =	7	inch	dia.	Reel	&	2	×	standard	power
7T	=	7	inch	dia.	Reel	&	3	х	standard	power

(6) RESISTANCE VALUE

$| \Omega \leq R \leq | 00 \text{ K}\Omega$

There are $2\sim4$ digits indicated the resistance value. Letter R/K/M is decimal point, no need to mention the last zero after R/K/M, e.g. IK2, not IK20.

Detailed coding rules of resistance are shown in the table of "Resistance rule of global part number".

(7) DEFAULT CODE

Letter L is the system default code for ordering only. ^(Note)

Resistance rule of global part number

number Resistance coding rule	Example
XRXX (Ι to 9.76 Ω)	R = Ω R5 = .5 Ω 9R76 = 9.76 Ω
XXRX (10 to 97.6 Ω)	IOR = IO Ω 97R6 = 97.6 Ω
XXXR (100 to 976 Ω)	$100R = 100 \Omega$
XKXX (Ι to 9.76 K Ω)	IK = 1,000 Ω 9K76 = 9760 Ω
XXKX (10 to 97.6 K Ω)	10K = 10,000 Ω 97K6= 976,000 Ω
XXXK (100 KΩ)	100Κ = 100,000 Ω

ORDERING EXAMPLE

The ordering code for an SR0805 chip resistor, value 10 K Ω with ±5% tolerance, supplied in 7-inch tape reel is: SR0805JR-0710KL.

MARKING SR0402 Fig. 1 SR1218 Fig. 2 Value=10 KΩ E-24 series: 3 digits First two digits for significant figure and 3rd digit for number of zeros SR0603 / SR0805 / SR1206 / SR1210 / SR2010 / SR2512 E-24 series: 3 digits First two digits for significant figure and 3rd digit for number of zeros

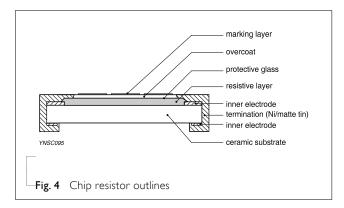
ΝΟΤΕ

For further marking information, please refer to data sheet "Chip resistors marking".

CONSTRUCTION

The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added at each end and connected by a resistive glaze. The resistive glaze is covered by a lead-free glass. The composition of the glaze is adjusted to give the approximately required resistance value. The whole element is covered by a protective overcoat. The top of overcoat is marked with the resistance value. Finally, the two external terminations (Ni/matte tin) are added, as shown in Fig.4.

OUTLINES



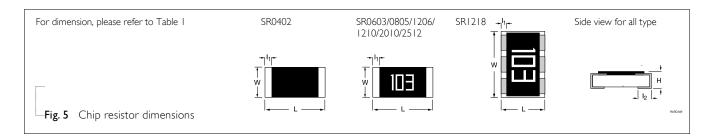
DIMENSIONS

Table I

Table I					
ТҮРЕ	L (mm)	W (mm)	H (mm)	I⊨ (mm)	l ₂ (mm)
SR0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
SR0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15
SR0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.35 ±0.20
SR1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20
SR1210	3.10±0.10	2.60±0.15	0.50±0.10	0.45±0.15	0.50±0.20
SR1218	3.10 ±0.10	4.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20
SR2010	5.00 ±0.10	2.50 ±0.15	0.55 ±0.10	0.55 ±0.15	0.50 ±0.20
SR2512	6.35 ±0.10	3.10 ±0.15	0.55 ±0.10	0.60 ±0.20	0.50 ±0.20

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Chip Resistor Surface Mount SR SR



ELECTRICAL CHARACTERISTICS

			CHARACTERISTICS				
ТҮРЕ	POWER	RESISTANCE RANGE	Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Temperature Coefficient of Resistance
SR0402	1/16W			50 V	100 V	100 V	
	1/8		_	50 V	100 1	100 1	
	1/10W				150V		
SR0603	1/5W			75V		150V	
	1/4W						
	1/8 W						
SR0805	1/4W			150V	V006 V0	300V	
	1/3W	E24 5%, 10%, 20% $ \Omega \leq R \leq 100 \text{ K}\Omega$	–55 ℃ to +155 ℃				±200 ppm/°C
	1/4 W						
SR I 206	1/2W			200 V	400 V	500 V	
	3/4W						
SR1210	1/2W		-	200 V	400 V	500 V	
SR1218	I W		-	200 V	400 V	500 V	
SR2010	3/4 W		-	200 V	400 V	500 V	
SR2512	IW		=	200 V	400 V	500 V	

FOOTPRINT AND SOLDERING PROFILES

Recommended footprint and soldering profiles, please refer to data sheet "Chip resistors mounting".

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity							
PACKING STYLE	REEL DIMENSION	SR0402	SR0603/0805/1206	SR1210	SR1218/2010/2512		
Paper taping reel (R)	7" (178 mm)	10,000	5,000	5,000			
	13" (330 mm)	50,000	20,000	20,000			
Embossed taping reel (K)	7" (178 mm)				4,000		

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I. For paper/embossed tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".



8

Chip Resistor Surface Mount SR SERIES

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

Range: -55 °C to +155 °C

POWER RATING

Each type rated power at 70 °C: SR0402: 07 = 1/16W; 7W = 1/8W SR0603: 07 = 1/10W; 7W = 1/5W; 7T=1/4W SR0805: 07 = 1/8W; 7W = 1/4W; 7T=1/3W SR1206: 07 = 1/4W; 7W = 1/2W; 7T=3/4W SR1210: 07 = 1/2W SR1218: 07 = 1W SR2010: 07 = 3/4W SR2512: 07 = 1W

RATED VOLTAGE

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

V = $\sqrt{(P \times R)}$

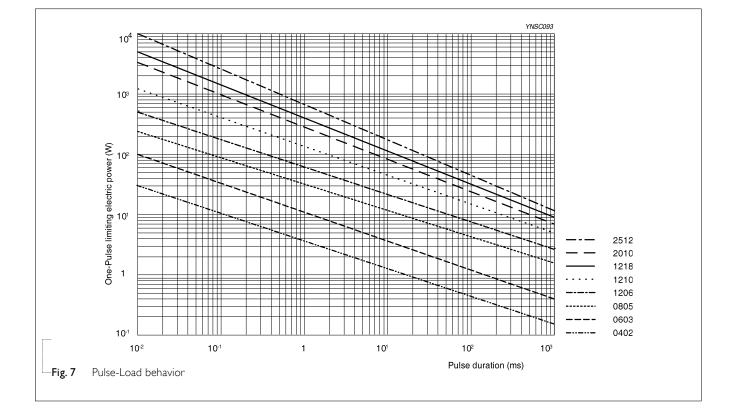
Where

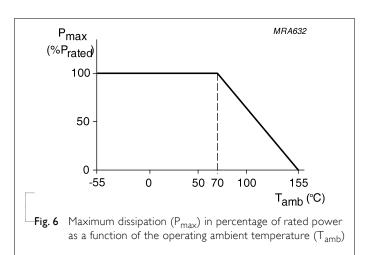
V = Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

 $R = Resistance value (\Omega)$

PULSE LOAD BEHAVIOR





Product specification

Nov. 11, 2016 V.5

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6 8

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of	MIL-STD-202 Method 304	At +25/–55 °C and +25/+125 °C	Refer to table 2
Resistance (T.C.R.)		Formula:	
		T.C.R= $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$	
		Where t_1 = +25 °C or specified room temperature	
		t_2 = –55 °C or +125 °C test temperature	
		R_I =resistance at reference temperature in ohms	
		R_2 =resistance at test temperature in ohms	
Short Time Overload	IEC60115-14.13	2.5 times of rated voltage or maximum overload voltage whichever is less for 5 sec at room temperature	±(2.0%+0.05 Ω)
High Temperature Exposure	IEC 60068-2-2	1,000 hours at TA = 155 °C \pm 5 °C, unpowered	±(3.0%+0.05 Ω)
Humidity	IEC 60115-1 4.24.2	Steady state for 1,000 hours at 40 °C / 95% R.H.	±(3.0%+0.05 Ω)
		RCWV applied for 1.5 hours on and 0.5 hour off	
Life	IEC 60115-1 4.25.1	1,000 hours at 70±2 °C, RCWV applied for 1.5	±(3.0%+0.05 Ω)
	MIL-STD-202 Method 108	hours on, 0.5 hour off, still-air required	、 , , ,
Resistance to	IEC 60115-1 4.18	Condition B, no pre-heat of samples	±(1.0%+0.05 Ω)
Soldering Heat	MIL-STD- 202 Method 210	Lead-free solder, 260 \pm 5 °C, 10 \pm 1 seconds immersion time	No visible damage
		Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	
Temperature Cycling	JESD22-A104C	-55/+125 °C for 1 cycle per hour, with 1,000 cycles. Devices mounted	±(1.0%+0.05 Ω)

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 Chip Resistor Surface Mount
 SR
 SERIES
 0402/0603/0805/1206/1210/1218/2010/2512

Product specification	7

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	8

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability			
- Wetting	J-STD-002	Electrical Test not required Magnification 50X	Well tinned (≥95% covered)
		SMD conditions:	No visible damage
		Immerse the specimen into the solder pot at 245±3°C for 2±0.5 seconds.	
Board Flex	IEC 60115-1 4.33	Chips mounted on a 90mm glass epoxy resin PCB (FR4)	±(1.0%+0.05 Ω)
		Bending for 0402: 5mm 0603 & 0805: 3mm 1206 and above: 2mm	
		Holding time: minimum 60 seconds	

Chip Resistor Surface Mount SR

<u>REVISION HISTORY</u>

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REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 5	Nov.11, 2016	-	- Update 7T power for 1206
Version 4	Sep. 01, 2015	-	- Update SR0603 Dielectric Withstanding Voltage to 150V
			- Update 7T power for 0603/0805 & 7W for 1210
Version 3	Jul. 31, 2015	-	- Comply with AEC-Q200 standard
Version 2	Jan. 06, 2014	_	- Add SR0402/0603/1210
	,, <u>_</u>		- Update electrical characteristic
Version I	Mar 18, 2011	_	- Change to dual brand datasheet that describes SR0805 to SR2512 with
			RoHS compliant
			- Define global part number
Version 0	Oct 19, 2004	-	-

SERIES

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"The reimbursement is limited to the value of the products."



8