

DATA SHEET

SURGE CHIP RESISTORS

AUTOMOTIVE GRADE SR series

1%, 0.5% sizes 0402/0603/0805/1206/1210/1218/2010/2512 RoHS compliant & Halogen free



YAGEO Phi(comp



SCOPE

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.

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

 $D = \pm 0.5\%$

 $F = \pm 1\%$

(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	$7W = 7$ inch dia. Reel & $2 \times$ standard power
13 = 13 inch dia. Reel	$7T = 7$ inch dia. Reel & $3 \times$ standard power

(6) RESISTANCE VALUE

 $I \Omega \le R \le I00 K\Omega$

There are 2~4 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. I K2, not I K20.

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 Resistance coding Example rule $IR = I \Omega$ XRXX $IR5 = 1.5 \Omega$ (1 to 9.76 Ω) $9R76 = 9.76 \Omega$ $IOR = IO \Omega$ **XXRX** (10 to 97.6 Ω) $97R6 = 97.6 \Omega$ **XXXR** $100R = 100 \Omega$ (100 to 976 Ω) $IK = 1,000 \Omega$ XKXX(I to 9.76 K Ω) $9K76 = 9760 \Omega$ $10K = 10,000 \Omega$ XXKX (10 to 97.6 K Ω) $97K6 = 976,000 \Omega$ XXXK $100K = 100,000 \Omega$ $(100 \text{ K}\Omega)$

ORDERING EXAMPLE

The ordering code for an SR0805 chip resistor, value $10~\text{K}\Omega$ with $\pm 5\%$ tolerance, supplied in 7-inch tape reel is: SR0805JR-0710KL.



SR SERIES

Chip Resistor Surface Mount

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SR0402



No Marking

Fig. I

SR1218



E-24 series: 3 digits

First two digits for significant figure and 3rd digit for number of zeros

Fig. 2 Value=10 KΩ

SR0603 / SR0805 / SR1206 / SR1210 / SR2010 / SR2512



E-24 series: 3 digits

First two digits for significant figure and 3rd digit for number of zeros

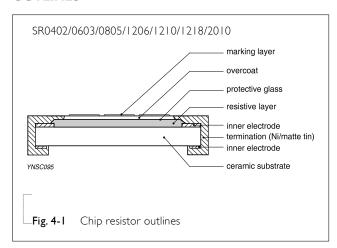
NOTE

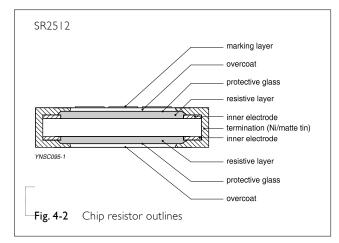
For further marking information, please refer to data sheet "Chip resistors marking".

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					
TYPE	L (mm)	W (mm)	H (mm)	I _I (mm)	I 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

ELECTRICAL CHARACTERISTICS

Table 2

			CHARACTERISTICS				
TYPE	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	
3110 102	1/8W			30 V	100 V	100 V	
	1/10W						
SR0603	1/5W			75V	150V	150V	
	1/4W						
	1/8 W		_				
SR0805	1/4W			150V	300V	300V	
	1/3W	E24/E96 0.5%, 1% I $\Omega \le R \le 100 \text{ K}\Omega$	-55 °C to +155 °C				±200 ppm/°C
	1/4 W	1 22 2 1/ 2 100 1/22	_				
SR1206	1/2W			200 V	400 V	500 V	
	3/4W						
SR1210	1/2W		-	200 V	400 V	500 V	
SR1218	IW		- -	200 V	400 V	500 V	
SR2010	3/4 W			200 V	400 V	500 V	
SR2512	ΙW		-	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

NOTE

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



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 = IW

SR2010: 07 = 3/4W

SR2512: 07 = IW

RATED VOLTAGE

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

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

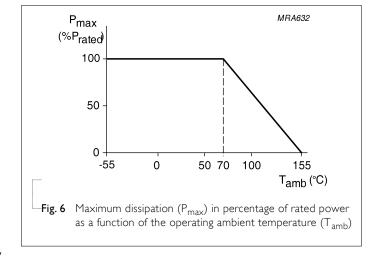
Where

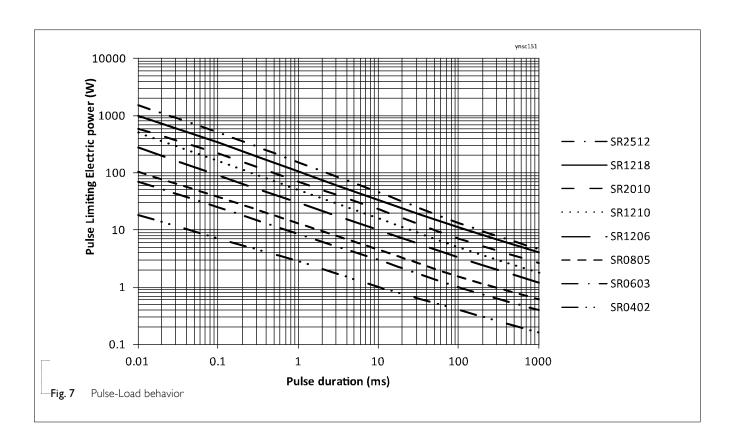
V = Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

 $R = Resistance value (\Omega)$

PULSE LOAD BEHAVIOR





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	IEC60115-1 4.13	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 T_A = 155 °C ±5 °C, unpowered	±(2.0%+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	±(2.0%+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)



TEST

Solderability - Wetting

Product specification

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Chip Resistor Surface Mount

TEST METHOD

J-STD-002

SR SERIES

PROCEDURE

SMD conditions:

245±3°C for 2±0.5 seconds.

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

REQUIREMENTS	
Well tinned (≥95% covered) No visible damage	

Board Flex IFC 6

IEC 60115-1 4.33 Chips mounted on a 90mm glass epoxy resin

unted on a 90mm glass epoxy resin $\pm (1.0\% + 0.05 \Omega)$

PCB (FR4)

Bending for 0402: 5mm 0603 & 0805: 3mm 1206 and above: 2mm

Electrical Test not required Magnification 50X

Immerse the specimen into the solder pot at

Holding time: minimum 60 seconds

Chip Resistor Surface Mount

SERIES

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

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version I	Nov. 11 2016	-	- Update 7T power for 1206
Version 0	Dec. 01 2015	-	- New product datasheet

[&]quot;The reimbursement is limited to the value of the products."



[&]quot;Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products are unchanged. Any product change will be announced by PCN."