

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



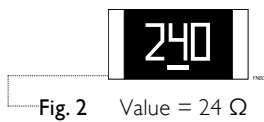
MARKING

SR0402

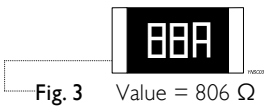


No Marking

SR0603

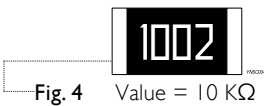


1%, 0.5%, E24 exception values 10/11/13/15/20/75 of E24 series



1%, 0.5%, E96 refer to EIA-96 marking method, including values 10/11/13/15/20/75 of E24 series

SR0805 / SR1206 / SR1210 / SR1218 / SR2010 / SR2512



Both E-24 and E-96 series: 4 digits, ±0.5% & ±1%
First three digits for significant figure and 4th digit for number of zeros

NOTE

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

TAPING REEL & POWER

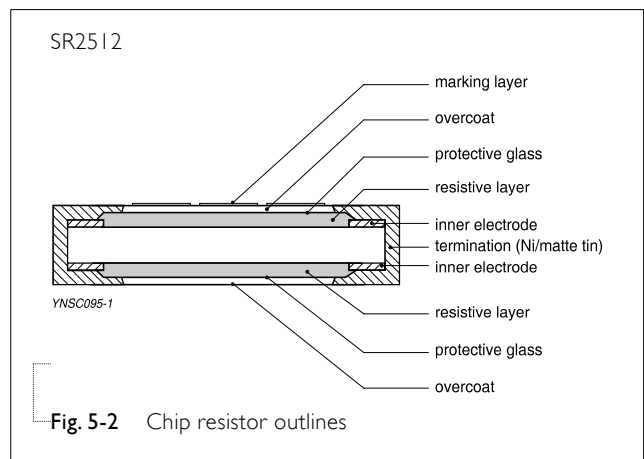
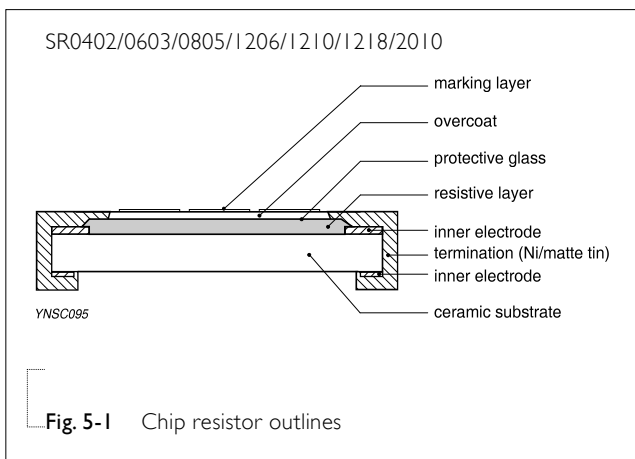
Table I

TYPE	POWER, W (P70)			
	CODING			
	07	7W	7T	47
0402	1/16	1/8	1/5	-
0603	1/10	1/5	1/4	-
0805	1/8	1/4	1/3	1/2
1206	1/4	1/2	3/4	-
1210	1/2	-	-	-
1218	1	-	-	-
2010	3/4	-	-	-
2512	1	2	-	-

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.5.

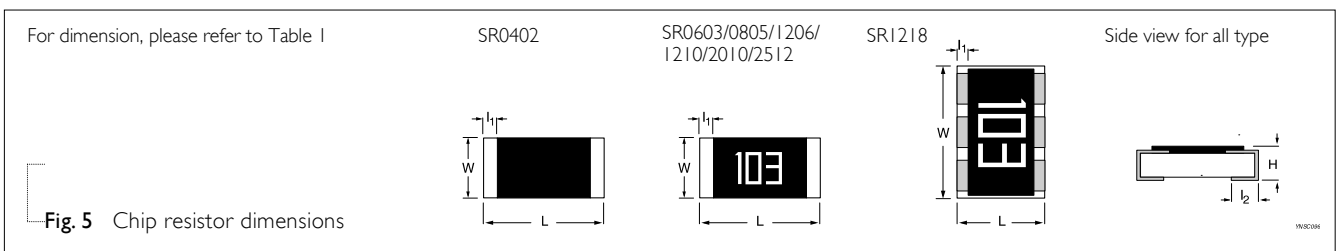
OUTLINES



DIMENSIONS

Table 2

TYPE	L (mm)	W (mm)	H (mm)	l ₁ (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	0.55±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 3

TYPE	POWER	RESISTANCE RANGE	CHARACTERISTICS					
			Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Temperature Coefficient of Resistance	
SR0402	1/16W	E24/E96 0.5%, 1% 1 Ω ≤ R ≤ 1M Ω	-55 °C to +155 °C	50 V	100 V	100 V		
	1/8W							
	1/5W							
SR0603	1/10W			75V	150V	150V		
	1/5W							
	1/4W							
SR0805	1/8 W			150V	300V	300V		10Ω < R ≤ 1MΩ ±100 ppm/°C
	1/4W							
	1/3W							
SR1206	1/2W			200 V	400 V	500 V		1Ω ≤ R ≤ 10Ω ±200 ppm/°C
	1/4 W							
	3/4W							
SR1210	1/2W			200 V	400 V	500 V		
	3/4W							
SR1218	1W			200 V	400 V	500 V		
	1.5W							
SR2010	3/4W	200 V	400 V	500 V				
	1.5W							
SR2512	1 W	200 V	400 V	500 V				
	2W							

FOOTPRINT AND SOLDERING PROFILES

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

PACKING STYLE AND PACKAGING QUANTITY

Table 4 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

I. 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: 1/16W, 1/8W, 1/5W

SR0603: 1/10W, 1/5W, 1/4W

SR0805: 1/8W, 1/4W, 1/3W, 1/2W

SR1206: 1/4W, 1/2W, 3/4W

SR1210: 1/2W, 3/4W

SR1218: 1W, 1.5W

SR2010: 3/4W, 1.5W

SR2512: 1W, 2W

RATED VOLTAGE

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

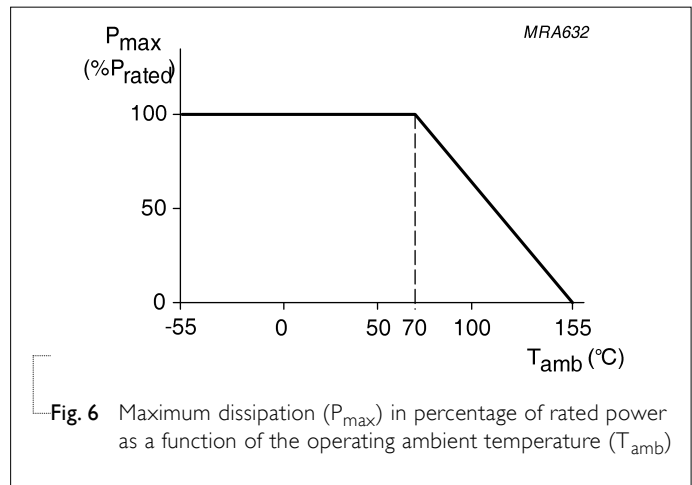
$$V = \sqrt{P \times R}$$

Where

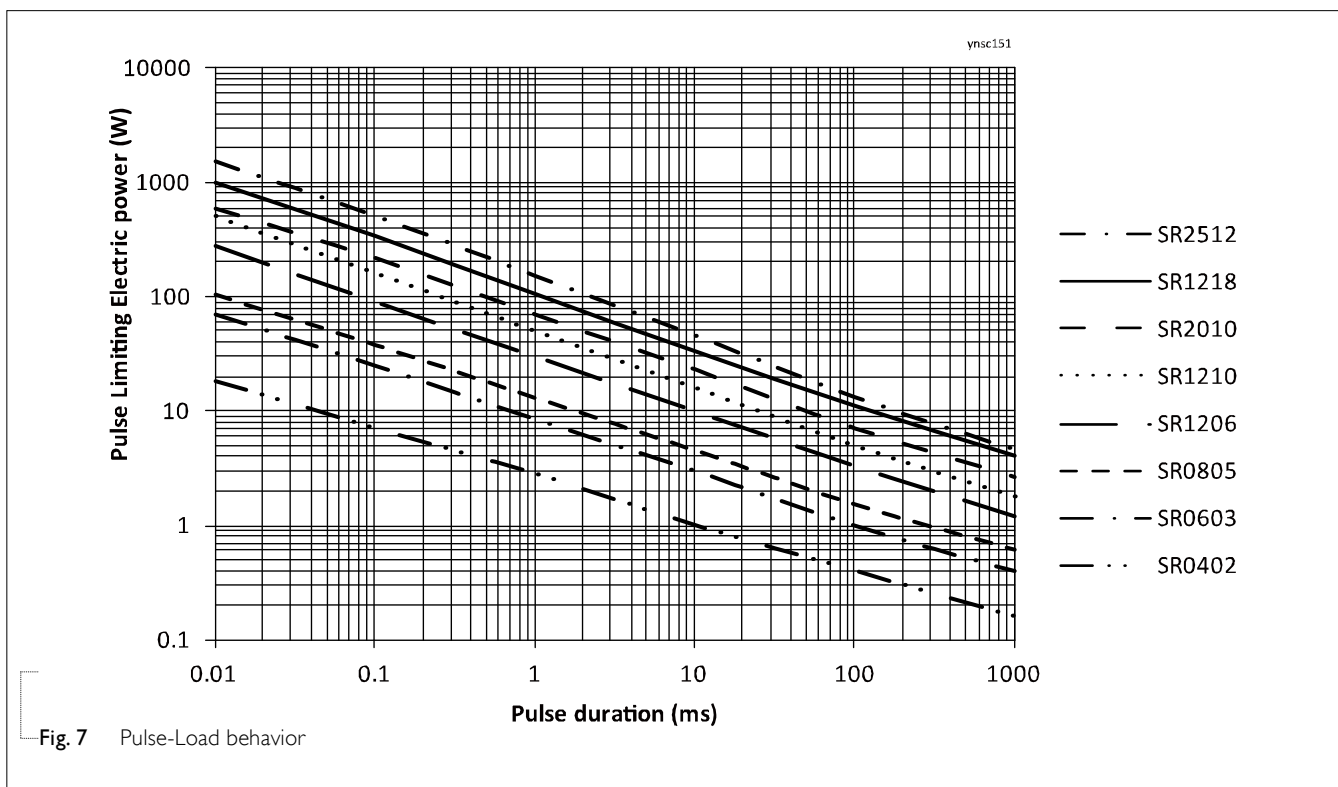
V = Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

R = Resistance value (Ω)



PULSE LOAD BEHAVIOR



TESTS AND REQUIREMENTS
Table 5 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202 Method 304	At +25/-55 °C and +25/+125 °C 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 ₁ = resistance at reference temperature in ohms R ₂ = resistance at test temperature in ohms	Refer to table 2
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. RCWV applied for 1.5 hours on and 0.5 hour off	±(3.0%+0.05 Ω)
Life	IEC 60115-1 4.25.1 MIL-STD-202 Method 108	1,000 hours at 70±2 °C, RCWV applied for 1.5 hours on, 0.5 hour off, still-air required	±(2.0%+0.05 Ω)
Resistance to Soldering Heat	IEC 60115-1 4.18 MIL-STD- 202 Method 210	Condition B, no pre-heat of samples Lead-free solder, 260±5 °C, 10±1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(1.0%+0.05 Ω) No visible damage
Temperature Cycling	JESD22-A104C	-55/+125 °C for 1 cycle per hour, with 1,000 cycles. Devices mounted	±(1.0%+0.05 Ω)

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

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Sep. 27, 2018		- Extend resistance range of 0402 ~ 2512 to 1Mohm - Tighten TCR of all sizes for for $10\Omega < R \leq 1M\Omega$ from ± 200 ppm/ $^{\circ}C$ to ± 100 ppm/ $^{\circ}C$ - Add SR1210, SR1218, SR2010 7W (double power)
Version 2	Oct. 02, 2017	-	- Add SR0402 7T (triple power), SR0805 47 (quadruple power), SR2512 7W (double power)
Version 1	Nov. 11, 2016	-	- Update 7T power for 1206
Version 0	Dec. 01, 2015	-	- New product datasheet

“ 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.”

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