

DATA SHEET

SURGE CHIP RESISTORS

AUTOMOTIVE GRADE

SR series

1%, 0.5%

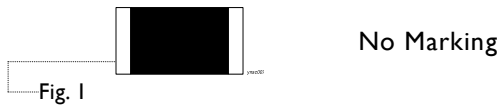
sizes 0402/0603/0805/1206/1210/1218/2010/2512

RoHS compliant & Halogen free

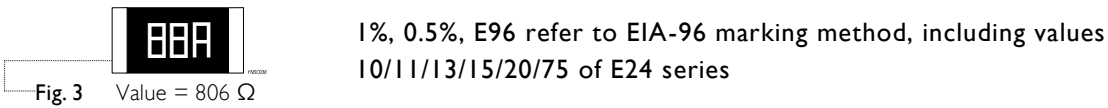
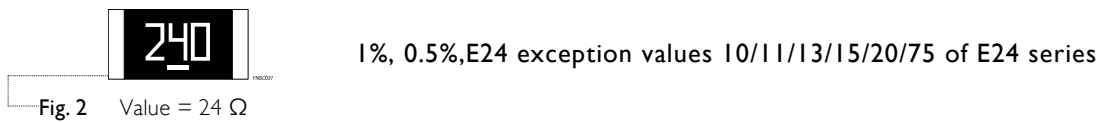


MARKING

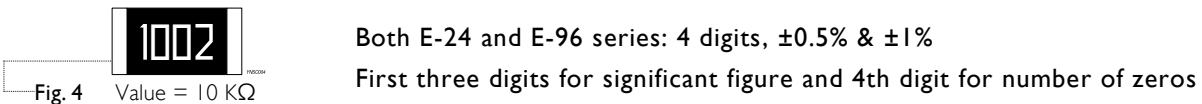
SR0402



SR0603



SR0805 / SR1206 / SR1210 / SR1218 / SR2010 / SR2512



NOTE

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

TAPING REEL & POWER

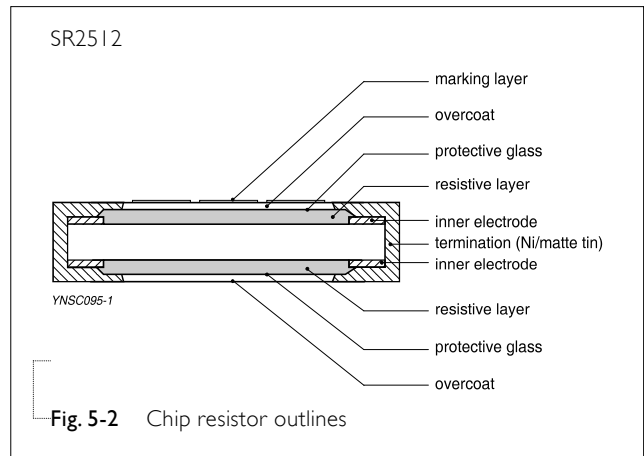
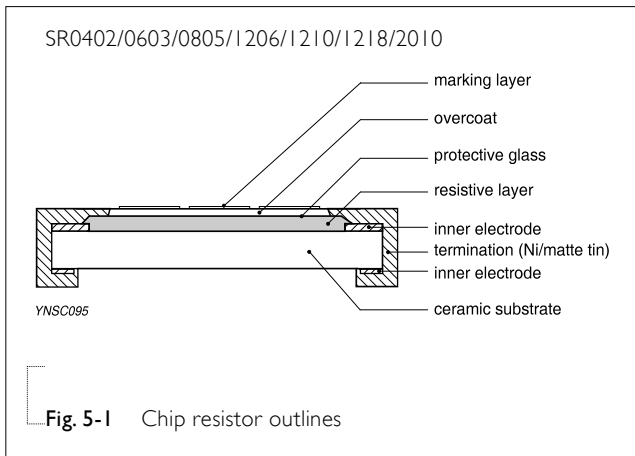
Table I

| 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.

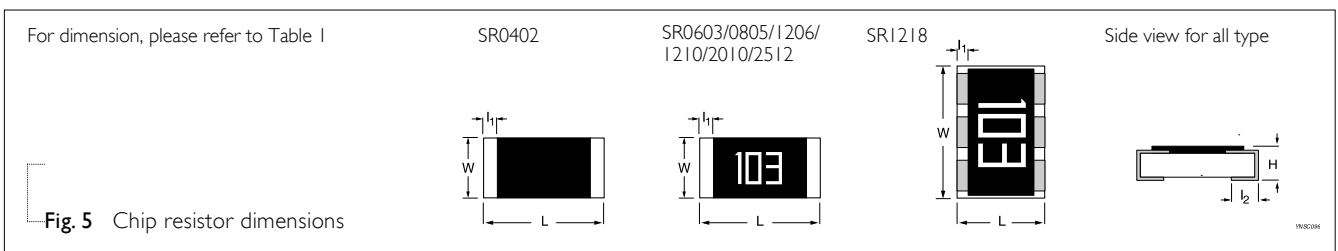
OUTLINES



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 | 10 Ω < R ≤ 1M Ω ±100 ppm/°C | | |
| | 1/8W | | | | | | | | |
| | 1/5W | | | | | | | | |
| SR0603 | 1/10W | | | 75V | 150V | 150V | | | |
| | 1/5W | | | | | | | | |
| | 1/4W | | | | | | | | |
| SR0805 | 1/8 W | | | 150V | 300V | 300V | | | |
| | 1/4W | | | | | | | | |
| | 1/3W | | | | | | | | |
| SR1206 | 1/2W | | | -55 °C to +155 °C | 200 V | 400 V | | 500 V | 1 Ω ≤ R ≤ 10 Ω ±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:

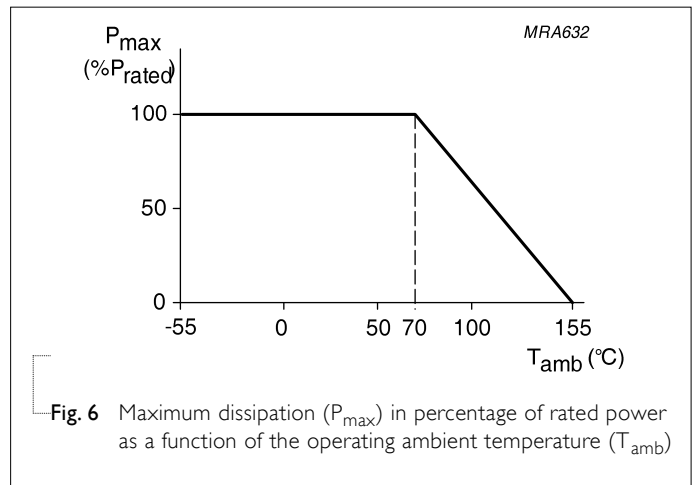
$$V = \sqrt{P \times R}$$

Where

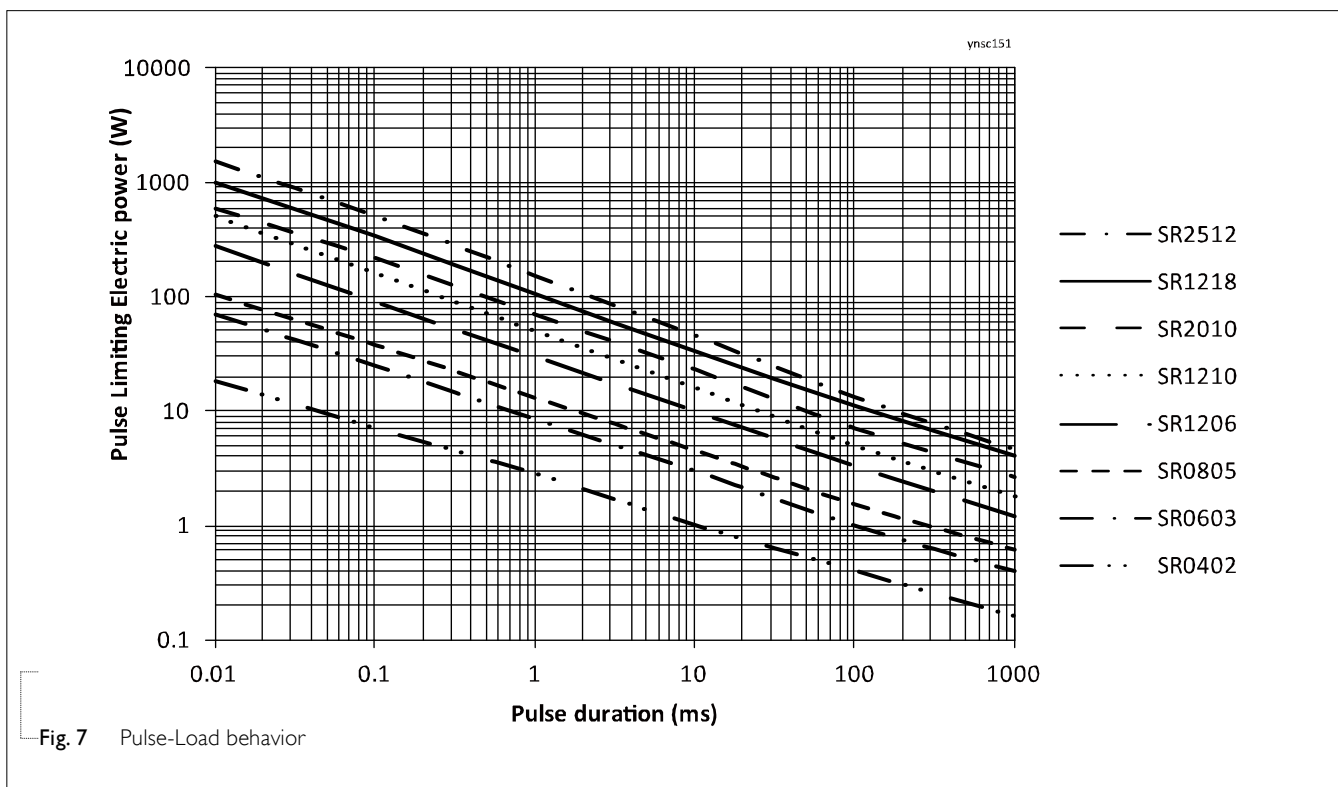
V = Continuous rated DC or AC (rms) working voltage (V)

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 | | <ul style="list-style-type: none"> - 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 |

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