



# DATA SHEET

SURGE CHIP RESISTORS AUTOMOTIVE GRADE SR series 20%, 10%, 5% sizes 0402/0603/0805/1206/1210/1218/2010/2512 RoHS compliant & Halogen free



# YAGEO Phícomp

# YAGEO Phicomp

Chip Resistor Surface Mount SR SERIES

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

#### <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.

# **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

 $J = \pm 5\%$ 

 $K = \pm 10\%$ 

 $M = \pm 20\%$ 

#### (3) PACKAGING TYPE

R = Paper taping reel

K = Embossed taping reel

#### (4) TEMPERATURE COEFFICIENT OF RESISTANCE

– = Based on spec.

#### (5) TAPING REEL & POWER

07 = 7 inch dia. Reel	7W = 7 inch dia. Reel & 2 x standard power

- 13 = 13 inch dia. Reel 7T = 7 inch dia. Reel & 3 x standard power
- 47 = 7 inch dia. Reel & 4xstandard power

# (6) RESISTANCE VALUE

#### $\mid \Omega \leq R \leq \mid M \Omega$

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. <sup>(Note)</sup>

Resistance rule number Resistance coding rule	of global part Example
XRXX (Ι to 9.76 Ω)	R =   Ω  R5 =  .5 Ω 9R76 = 9.76 Ω
XXRX (10 to 97.6 Ω)	וסת = וס Ω 97R6 = 97.6 Ω
XXXR (100 to 976 <b>Ω)</b>	100R = 100 Ω
XKXX (1 to 9.76 K <b>Ω)</b>	ικ = 1,000 Ω 9κ76 = 9760 Ω
XXKX (10 to 97.6 K <b>Ω)</b>	ו0K = 10,000 ג 97K6= 976,000 ג
×××κ (100 κ <b>Ω)</b>	100K = 100,000 C

#### **ORDERING EXAMPLE**

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



	Phícomp Chin Resistor	Surface Mount	SR	SERIES	Product specification 3 0402/0603/0805/1206/1210/1218/2010/2512
I					
<u>1ARKING</u>					
SR0402					
Fig. I	pant	No Marking			
SR1218					

# SR0603 / SR0805 / SR1206 / SR1210 / SR2010 / SR2512

**Γig. 3** Value=10 KΩ

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".

#### TAPING REEL & POWER

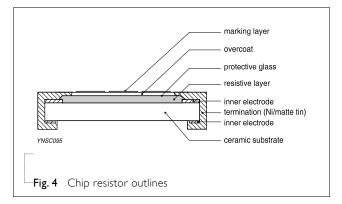
#### Table I

		F	POWER, W (P70)		
TYPE			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	I	-	-	-	
2010	3/4	-	-	-	
2512	l	2	-	-	

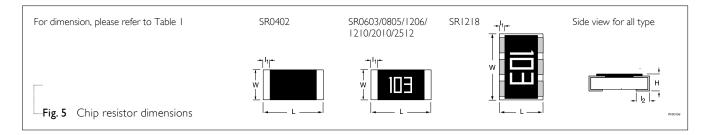
#### **CONSTRUCTION**

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.4.

#### OUTLINES



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	<b>Chip Resistor Surface Mount</b>	SR	SERIES	0402/0603/0805/1	206/1210/1218/2010/251	2 8
<u>DIMENSIO</u>	NS					
Table 2						
TYPE	L (mm)	W (mm	)	H (mm)	l⊤ (mm)	l <sub>2</sub> (mm)
SR0402	1.00±0.05	0.50±0.0	5	0.35±0.05	0.20±0.10	0.25±0.10
SR0603	1.60±0.10	0.80±0.10	C	0.45±0.10	0.25±0.15	0.25±0.15
SR0805	2.00±0.10	1.25±0.10	C	0.50±0.10	0.35±0.20	0.35±0.20
SR1206	3.10±0.10	1.60±0.10	C	0.55±0.10	0.45±0.20	0.40±0.20
SR1210	3.10±0.10	2.60±0.1	5	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±0.1	5	0.55±0.10	0.55±0.15	0.50±0.20
SR2512	6.35±0.10	3.10±0.1	5	0.55±0.10	0.60±0.20	0.50±0.20



# ELECTRICAL CHARACTERISTICS

Table 3							
				CHAI	RACTERISTIC	CS	
TYPE	POWER	RESISTANCE RANGE	Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Temperature Coefficient of Resistance
	1/16W						
SR0402	1/8W			50 V	100 V	100 V	
	1/5W						
SR0603	1/10W			75V	150V	150V	
310003	1/5W						
	1/8 W		-		2001/	2001/	
CDOOOF	1/4W						
SR0805	1/3W	150V	300V	300V			
	1/2W	524 504 1004 2004					10Ω < R ≤ 1MΩ ±100 ppm/°C
65 I 66 /	1/4 W	E24 5%, 10%, 20% 1 Ω ≤ R ≤ 1M Ω	–55 ℃ to +155 ℃				±100 ppm/ C
SR1206	1/2W			200 V	400 V	500 V	$ \Omega \le R \le  0\Omega $
	3/4W						±200 ppm/°C
SR1210	1/2W 3/4W			200 V	400 V	500 V	
	IW						
SR1218	1.5W			200 V	400 V	500 V	
<u></u>	3/4W			200.14	400.54	500.14	
SR2010	1.5W			200 V	400 V	500 V	
SR2512	I W			200 V	400 V	500 V	
	2W						

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Chip Resistor Surface Mount SR SERIES

#### 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

#### **R**ATED VOLTAGE

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

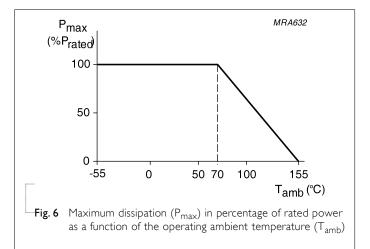
$$V = \sqrt{(P \times R)}$$

Where

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

P = Rated power (W)

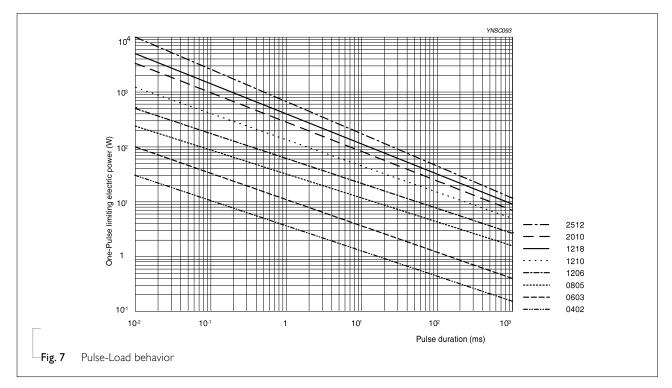
 $R = Resistance value (\Omega)$ 





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# PULSE LOAD BEHAVIOR



#### TESTS AND REQUIREMENTS

Table 5 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 <sub>1</sub> =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 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	



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TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
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 60115-14.18	Condition B, no pre-heat of samples	±(1.0%+0.05 Ω)
Soldering Heat	MIL-STD- 202 Method 210	Lead-free solder, 260±5 °C, 10±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 I cycle per hour, with 1,000 cycles. Devices mounted	±(1.0%+0.05 Ω)
Solderability - Wetting	J-STD-002	Electrical Test not required Magnification 50X	Well tinned (≥95% covered)
		SMD conditions: Immerse the specimen into the solder pot at 245±3°C for 2±0.5 seconds.	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	±(1.0%+0.05 Ω)
		Holding time: minimum 60 seconds	



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REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
			- Extend resistance range of 0402 ~ 2512 to 1Mohm,
Version 7	Sep. 27, 2018	-	- Tighten TCR of all sizes for 10 $\Omega$ $<$ R $\leq$ 1M $\Omega$ from $\pm$ 200 ppm/°C to $\pm$ 100 ppm/°C
			- Add SR1210, SR1218, SR2010 7W (double power)
Version 6	Oct. 02, 2017	-	- Add SR0402 7T (triple power), SR0805 47 (quadruple power), SR2512 7W (double power)
Version 5	Nov.11, 2016	-	- Update 7T power for 1206
		- Update SR0603 Dielectric Withstanding Voltage to 150V	
Version 4	Sep. 01, 2015	-	- Update 7T power for 0603/0805 & 7W for 1210
Version 3	Jul. 31, 2015	-	- Comply with AEC-Q200 standard
			- Add SR0402/0603/1210
Version 2	n 2 Jan. 06, 2014 -	-	- 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	-	-

DEVICIÓN LICTÓDY

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

