

APPROVAL SHEET

SR20X, SR25X

$\pm 1\%$, $\pm 5\%$

Power chip resistors

Size 2010, 2512

Automotive & Anti-Sulfuration

FEATURE

1. High reliability and stability $\pm 1\%$
2. Sulfuration resistant ASTM B-809-95 compliant
3. Automotive grade AEC Q-200 Compliant
4. Higher component and equipment reliability
5. RoHS compliant Lead free products

APPLICATION

- Power supply
- Industry
- Motor control
- M/B Computer
- Automotives
- Server

DESCRIPTION

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. **The extra protective metal film is added onto top side electrodes to protect termination from sulfuration.** The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy.

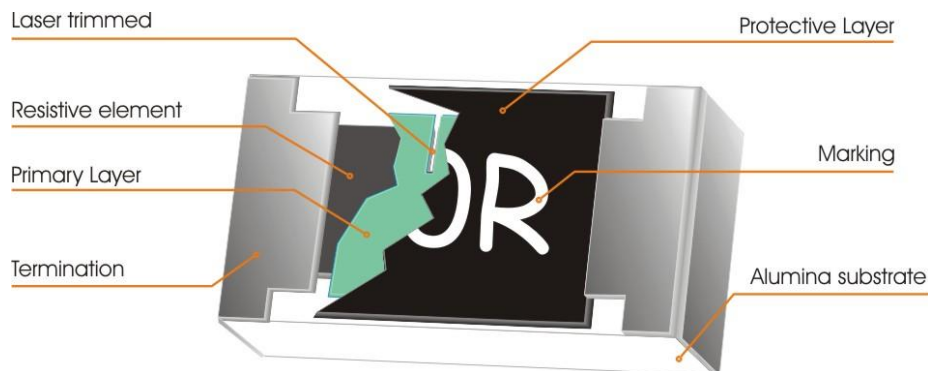


Fig 1. Construction of 2512, 2010 Chip-R

QUICK REFERENCE DATA

Item	General Specification	
Series No.	SR20	SR25
Size code	2010 (5025),	2512(6432)
Resistance Tolerance	$\pm 5\%$ (E24); $\pm 1\%$ (E24+E96)	
Resistance Range	$1\Omega \sim 10M\Omega$, Jumper (0Ω)	
TCR (ppm/°C)	$< 10\Omega$	
	$10\Omega \sim 1M\Omega$	
	$> 1M\Omega$	
	± 200 ppm/°C	
	± 100 ppm/°C	
	± 200 ppm/°C	
Max. dissipation at $T_{amb}=70^\circ\text{C}$	0.75 W	1W
Max. Operation Voltage (DC or RMS)	200V	250V
Max. Overload Voltage (DC or RMS)	400V	500V
Operation temperature	$-55 \sim +155^\circ\text{C}$	

Test conditions for jumper (0 ohm)

Type	SR20X	SR25X
Power Rating At 70C	0.75 W	1 W
Resistance	Max. 50mR	Max. 50mR
Rated Current	3.2 A	4.5 A
Peak Current	8 A	11 A
Operating Temperature	$-55^\circ\text{C} \sim 155^\circ\text{C}$	$-55^\circ\text{C} \sim 155^\circ\text{C}$

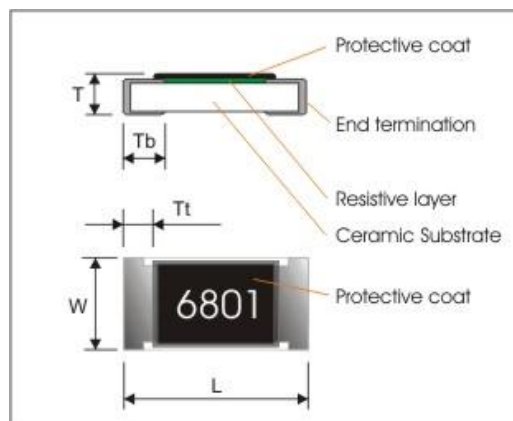
Note :

- This is the maximum voltage that may be continuously supplied to the resistor element, see “IEC publication 60115-8”
- Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

$$\text{RCWV} = \sqrt{\text{Rated Power} \times \text{Resistance Value}} \text{ or Max. RCWV listed above, whichever is lower.}$$

MECHANICAL DATA (unit : mm)

TYPE	SR20	SR25
L	5.00 ± 0.20	6.40 ± 0.20
W	2.50 ± 0.20	3.20 ± 0.20
T	0.55 ± 0.10	0.60 ± 0.10
Tt	0.65 ± 0.25	0.65 ± 0.25
Tb	0.60 ± 0.25	0.90 ± 0.25



MARKING

Each resistor is marked with a four-digit code on the protective coating to designate the nominal resistance value $\pm 5\%$, $\pm 1\%$ tolerance !

Size	$\pm 5\%$	$\pm 1\%$
2512, 2010	4-digits marking	4-digits marking

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E96 & E24 series for resistors with a tolerance of $\pm 5\%$ & $\pm 1\%$. The values of the E24/E96 series are in accordance with "IEC publication 60063".

Derating curve

The power that the resistor can dissipate depends on the operating temperature; see Fig.2

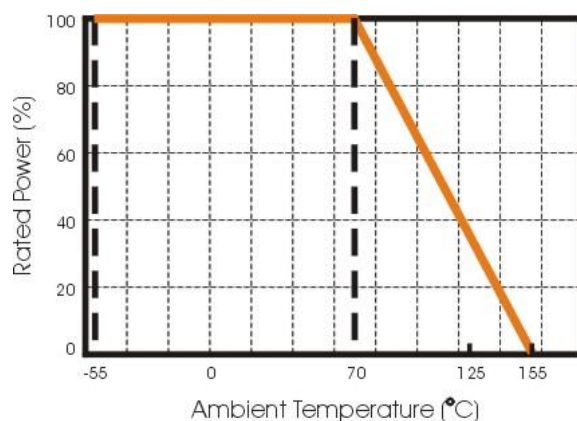


Fig.2 Maximum dissipation in percentage of rated power
As a function of the ambient temperature

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

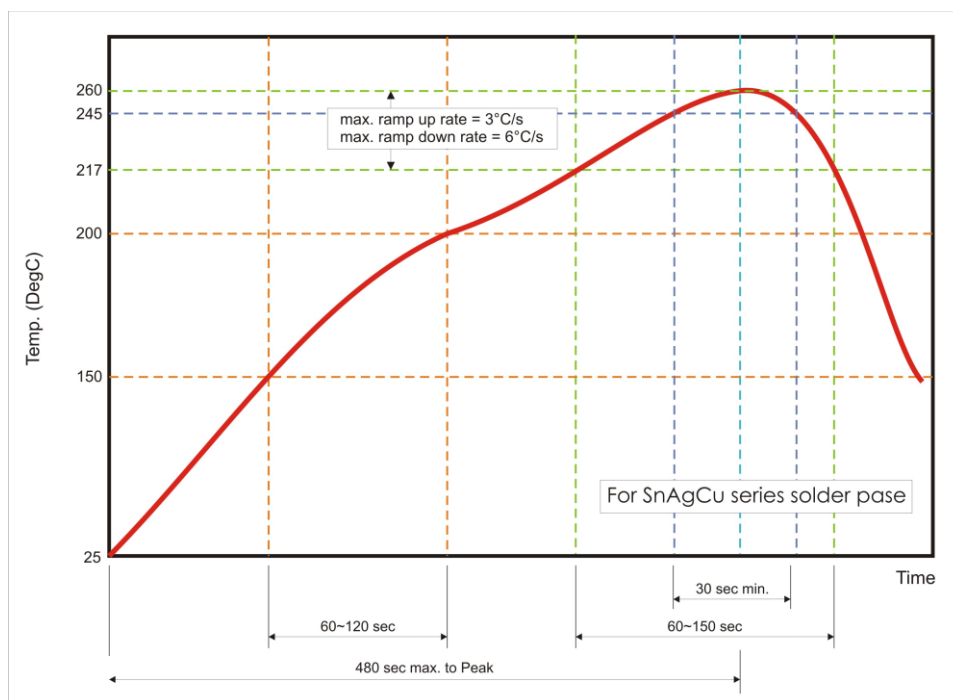


Fig 3. Infrared soldering profile for Chip Resistors

CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

SR25	X	472_	J	T	L
Size code	Type code	Resistance code	Tolerance	Packaging code	Termination code
SR25 : 2512	X :	E24: 2 significant digits followed by no. of zeros	F : $\pm 1\%$	T : 7" Reeled taping	L = Sn base (lead free)
SR20 : 2010	$\pm 5\%$: 1 Ω - 10M Ω	100 Ω = 101_	J : $\pm 5\%$	Q : 10" Reeled taping	
	$\pm 1\%$: 10 Ω - 1M Ω	10K Ω = 103	P : Jumper	G : 13" Reeled taping	
	W :	E96 : 3 significant digits followed by no. of zeros		B : Bulk	
	$\pm 1\%$: <10 Ω ; > 1M Ω	102 Ω = 1020			
		37.4K Ω = 3742			

* Anti-Sulfuration test conditions: ASTM B-809-95 105°C, 750hrs! Acceptance criteria +/-2%!

* 100% CCD visual inspection to guarantee visual quality.

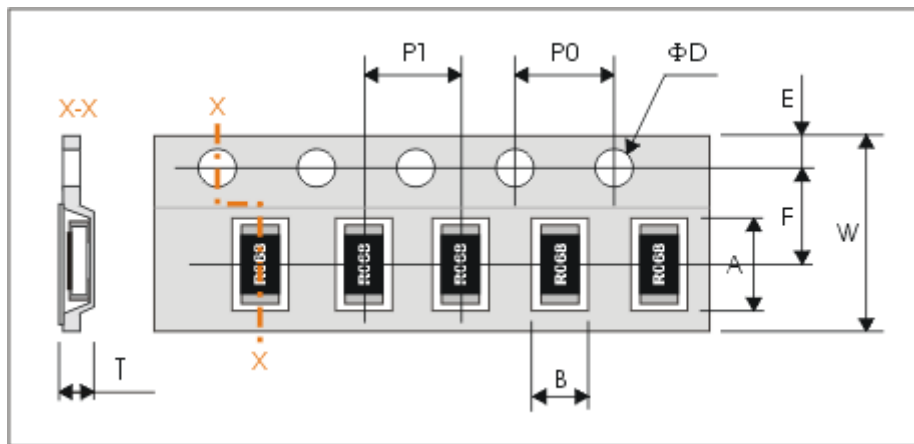
TEST AND REQUIREMENTS (AEC Q-200)

TEST	PROCEDURE / TEST METHOD	REQUIREMENT	
		Resistor	0Ω
Electrical Characteristics JISC5201-1: 1998 Clause 4.8	- DC resistance values measurement - Temperature Coefficient of Resistance (T.C.R) Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ $t_1 : 20^\circ\text{C} + 5^\circ\text{C} - 1^\circ\text{C}$ R_1 : Resistance at reference temperature R_2 : Resistance at test temperature	Within the specified tolerance Refer to "QUICK REFERENCE DATA"	N/A
Resistance to soldering heat(R.S.H) MIL-STD-202 method 210	Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 270°C ±5°C	ΔR/R max. ±(0.5%+0.05Ω) no visible damage	<50mΩ
Solderability J-STD-002	a) Bake the sample for 155°C dwell time 4hrs/ solder dipping 235°C/ 5sec. b) Steam the sample dwell time 8 hour/ solder dipping 215°C/ 5sec. c) Steam the sample dwell time 8 hour/ solder dipping 260°C/ 7sec.	95% coverage min., good tinning and no visible damage	
Temperature cycling JESD22 Method JA-104	1000 cycles, -55°C ~ +155°C, dwell time 30min maximum.	ΔR/R max. ±(0.5%+0.05Ω) no visible damage	<50mΩ
Moisture Resistance MIL-STD-202 method 106	65±2°C, 80~100% RH, 10 cycles, 24 hours/ cycle	ΔR/R max. ±(0.5%+0.05Ω) No visible damage	<50mΩ
Bias Humidity MIL-STD-202 method 103	1000+48/-0 hours; 85°C, 85% RH, 10% of operation power	ΔR/R max. ±(1.0%+0.05Ω) No visible damage	<50mΩ
Operational Life MIL-STD-202 method 108	1000+48/-0 hours; 35% of operation power, 125±2°C	ΔR/R max. ±(1.0%+0.05Ω) No visible damage	<50mΩ
High Temperature Exposure MIL-STD-202 Method 108	1000+48/-0 hours; without load in a temperature chamber controlled 155±3°C	ΔR/R max. ±(1%+0.05Ω) No visible damage	<50mΩ
Board Flex AEC-Q200-005	Resistors mounted on a 90mm glass epoxy resin PCB(FR4),bending once 2mm for 60sec.	ΔR/R max. ±(1.0%+0.05Ω) No visible damage	<50mΩ
Terminal strength AEC-Q200-006	Pressurizing force: 1.8Kg, Test time: 60±1sec.	No remarkable damage or removal of the terminations	
Thermal shock MIL-STD-202 method 107	Test -55 to 155°C/ dwell time 15min/ Max transfer time 20sec 300cycles	ΔR/R max. ±(0.5%+0.05Ω) No visible damage	<50mΩ
ESD AEC-Q200-002	Test contact 3KV.	ΔR/R max. ±(1.0%+0.05Ω) No visible damage	<50mΩ

Mechanical Shock MIL-STD-202 method 213	Test ½ Sine Pulse, Peak value: 100g, normal duration: 6ms, Velocity change:12.3ft/sec. Three shocks in each direction, total 18 shocks.	Within product specification tolerance and no visible damage.	<50mΩ
Vibration MIL-STD-202 method 204	Test 5g's for 20 min., 12 cycles each of 3 orientations.	△R/R max. ±(1%+0.05Ω) and no visible damage.	<50mΩ
Resistance to Solvents : MIL-STD-202 Method 215	Solvent is Isopropyl alcohol, immersion 3mins at 25 °C and brush 10 strokes with a toothbrush with a handle made of a non-reactive material (wet bristle), immersion and brush 3 times and then air blow dry.	No superficial defect on marking, encapsulation, coating, appearance. Electrical characteristics within products specification and tolerance. Inspect at 3X max. for marking, inspect at 10X for part damage.	<50mΩ
External Visual MIL-STD-883 method 2009	Electrical test not required. Inspect device construction, marking and workmanship	No visual damage and refer WTC marking code.	
Physical Dimension JESD22 method JB-100	Verify physical dimensions(L, W, T, Tb, Tt)	Within the specified tolerance for WTC.	

PACKAGING

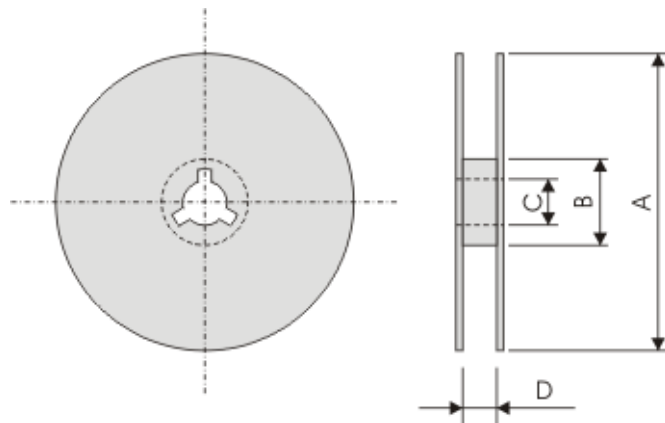
Plastic Tape specifications (unit :mm)



Type	A	B	W	F	E
SR25	6.90±0.20	3.60±0.20	12.00±0.30	5.50±0.10	1.75±0.10
SR20	5.50±0.20	2.80±0.20			

Type	P1	P0	ΦD	T
SR25	4.00±0.10	4.00±0.10	Φ1.50 ^{+0.1} _{-0.0}	MAX1.2
SR20				

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	14.0±0.2

Taping quantity

SR20, SR25 by plastic tape taping 4,000 pcs per reel.