



Product Family: 2-Terminal Current Sense Resistors

Part Number Series: CSA Series



Construction:

- Metal alloy resistor
- Halogen Free and Beryllium Free
- RoHS complainant and Pb free

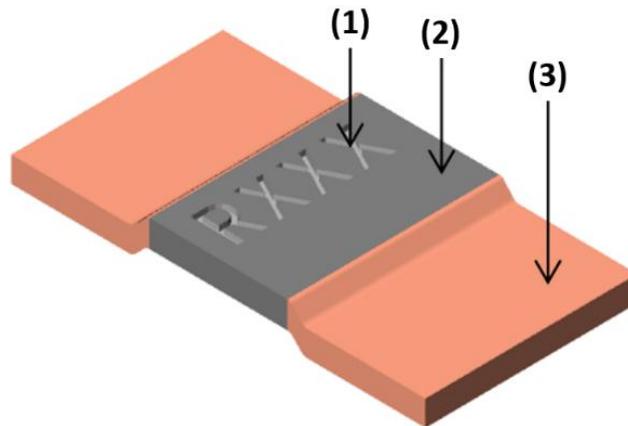
Features:

- Partial TCR down to $\pm 50\text{ppm}/^\circ\text{C}$
- Resistances from $0.2\text{m}\Omega$ ~ $4.0\text{m}\Omega$
- Rated power of 15W

Description:

These two terminals, ultra-low resistance shunt resistors are of superior quality and are best suited for applications including power hybrid applications, frequency converters, power modules, and communication systems.

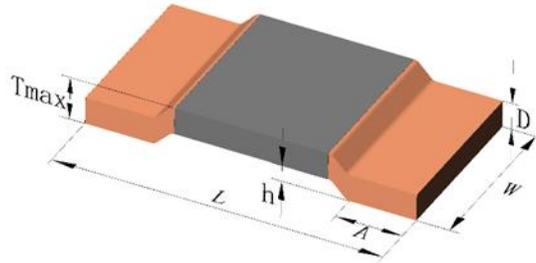
Product Construction



Number	Description
1	Marking: Laser
2	Resistive Element: Cu-alloy, Complex alloy
3	Terminal Electrode: Cu

Part Numbering: Ex: CSA2512M0M25F-T2

Series Name	English Size	Material	Resistance Value	Resistance Tolerance	Packaging
CSA	2512 (6432) 3921 (11050) 5931 (15075)	M F (refer to tables)	0M20 = 0.20mΩ R001 = 1.00mΩ (refer to tables)	F = ±1.0% J = ±5.0%	-T15 = 1,500 -T2 = 2,000 -T3 = 3,000

Product Dimensions

Unit: inches (mm)

Dimension (Metric)	Resistance Range	Material*	L	W	A	h	D	Tmax
CSA2512 (6432)	0.20mΩ	M	0.250±0.008 (6.35±0.20)	0.119±0.010 (3.02±0.25)	0.039±0.012 (1.00±0.30)	0.014±0.002 (0.35±0.05)	0.055±0.012 (1.40±0.30)	0.083 (2.10)
	0.25mΩ						0.043±0.012 (1.10±0.30)	0.071 (1.80)
	0.30mΩ						0.055±0.012 (1.40±0.30)	0.083 (2.10)
	0.50mΩ						0.035±0.008 (0.90±0.20)	0.059 (1.50)
	1.00mΩ						0.016±0.004 (0.40±0.10)	0.043 (1.10)
	2.00mΩ	F					0.028±0.008 (0.70±0.20)	0.051 (1.30)
	3.00mΩ						0.020±0.004 (0.50±0.10)	0.043 (1.10)
	4.00mΩ						0.012±0.004 (0.30±0.10)	0.039 (1.00)
CSA3921 (11050)	0.20mΩ	M	0.394±0.012 (10.0±0.30)	0.205±0.012 (5.20±0.30)	0.079±0.012 (2.00±0.30)	0.020±0.004 (0.50±0.10)	0.055±0.012 (1.40±0.30)	0.087 (2.20)
	0.30mΩ						0.051±0.012 (1.30±0.30)	0.083 (2.10)
	0.50mΩ						0.031±0.008 (0.80±0.20)	0.063 (1.60)
	0.75mΩ						0.024±0.008 (0.60±0.20)	0.055 (1.40)
	1.00mΩ						0.016±0.004 (0.40±0.10)	0.047 (1.20)

Dimension (Metric)	Resistance Range	Material*	L	W	A	h	D	Tmax
CSA3921 (11050)	2.00mΩ	F	0.394±0.012 (10.0±0.30)	0.205±0.012 (5.20±0.30)	0.079±0.012 (2.00±0.30)	0.020±0.004 (0.50±0.10)	0.024±0.008 (0.60±0.20)	0.055 (1.40)
	3.00mΩ						0.016±0.004 (0.40±0.10)	0.047 (1.20)
	4.00mΩ						0.012±0.004 (0.30±0.10)	0.043 (1.10)
CSA5931 (15075)	0.20mΩ	M	0.591±0.012 (15.0±0.30)	0.305±0.012 (7.75±0.30)	0.157±0.012 (4.00±0.30)	0.020±0.004 (0.50±0.10)	0.055±0.012 (1.40±0.30)	0.087 (2.20)
	0.30mΩ						0.043±0.012 (1.10±0.30)	0.079 (2.00)
	0.50mΩ						0.024±0.008 (0.60±0.20)	0.055 (1.40)
	0.70mΩ						0.016±0.004 (0.40±0.10)	0.047 (1.20)
	0.75mΩ	F					0.043±0.012 (1.10±0.30)	0.075 (1.90)
	1.00mΩ						0.020±0.004 (0.50±0.10)	0.051 (1.30)
	2.00mΩ						0.012±0.004 (0.30±0.10)	0.043 (1.10)
	3.00mΩ							

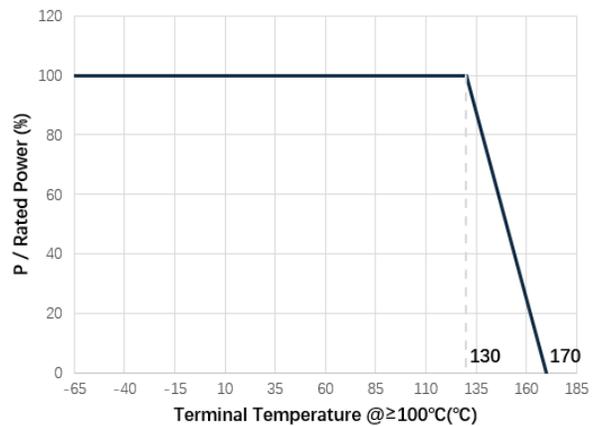
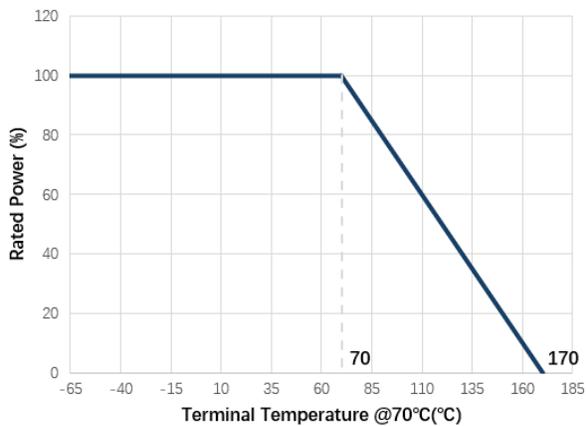
Note: The M material is recommended for use in AC/DC scenarios, while the F material is recommended for use in DC scenarios.

Electrical Specifications								
Type	CSA2512							
Metric Size (mm)	6432							
Material	M				F			
Power Rating@70°C(W)	5		6			4		6
Power Rating@100°C(W)	3	4	4			2	3	4
Resistance Range(mΩ)	0.25	0.30	0.20	0.50	1.00	4.00	3.00	2.00
TCR ppm/°C	±175		±200	±150	±100	±50		
Resistance Tolerance % (code)	±1.0(F), ±5.0(J)							
Operating Temp. Range (°C)	-65~170							

Type	CSA3921							
Metric Size (mm)	11050							
Material	M				F			
Power Rating@70°C(W)	7	8	9	10	5	6		
Power Rating@100°C(W)	4	5			2.5	3	4	
Resistance Range(mΩ)	1.00	0.75	0.20	0.50	0.30	4.00	3.00	2.00
TCR ppm/°C	±50	±70	±150	±70	±150	±50		
Resistance Tolerance % (code)	±1.0(F), ±5.0(J)							
Operating Temp. Range (°C)	-65~170							

Type	CSA5931							
Metric Size (mm)	15075							
Material	M				F			
Power Rating@70°C(W)	7	8	10	15	7	8	10	
Power Rating@100°C(W)	4	6	7	10	4	6	7	
Resistance Range(mΩ)	0.70	0.75	0.50	0.30	0.20	3.00	2.00	1.00
TCR ppm/°C	±100			±125		±50		
Resistance Tolerance % (code)	±1.0(F), ±5.0(J)							
Operating Temp. Range (°C)	-65~170							

Power Derating Curve



Reliability Specifications

Electrical Characteristics

Test Item	Test Method	Specification
Resistance Data IEC60115-1 6.1	Resistance data at 25°C.	Must meet datasheet requirements
TCR Data IEC60115-1 6.2	Tested at 25°C and 125°C, $TCR = (R_b - R_a) / R_a \times 1 / (T_b - T_a) \times 10^6$.	Must meet datasheet requirements
Short Time Overload IEC60115-1 8.1	Applied power: 5X rated power. Test duration: 5 seconds.	$\Delta R \leq \pm 1.0\%$

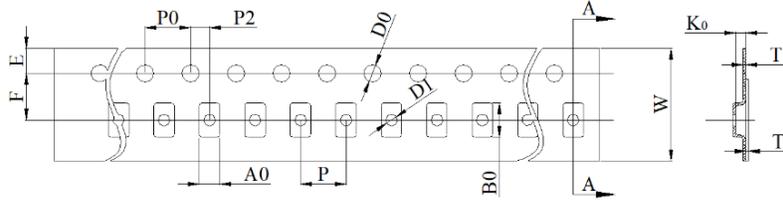
Mechanical Characteristics

Test Item	Test Method	Specification
Substrate Bending IEC60115-1 9.8	90mm span between fulcrums, 2mm bend, Glass-Epoxy test board thickness: 1.6mm.	$\Delta R \leq \pm 1.0\%$
Mechanical Shock IEC60115-1 9.10	Force: 100G Test Duration: 6 ± 1 ms	$\Delta R \leq \pm 1.0\%$

Environmental Characteristics

Test Item	Test Method	Specification
Load Life IEC60115-1 7.1	Test Temperature: 70°C, Applied power: rated power, Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF.	$\Delta R \leq \pm 2.0\%$
Moisture Load Life IEC60115-1 10.4	Test Temperature: 60°C $\pm 2^\circ$ C Humidity: 95% Applied power: 10% rated power Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF	$\Delta R \leq \pm 1.0\%$
Thermal Shock IEC60115-1 10.1	-55°C 30min. \rightarrow R.T. 3min. \rightarrow +155°C 30min. \rightarrow R.T. 3min. Repeat 100 cycles as follows.	$\Delta R \leq \pm 1.0\%$
High Temp. Exposure IEC60115-1 7.3	Test Temperature: +170°C $\pm 2^\circ$ C, Test period: 1,000 hours.	$\Delta R \leq \pm 1.0\%$
Resistance to Solder Heat IEC60115-1 11.2	Parts are subjected to 3 reflow cycles.	$\Delta R \leq \pm 1.0\%$
Solderability IEC60115-1 11.1	Dipped into molten solder for 10 ± 1.0 seconds at $245 \pm 5^\circ$ C.	New solder coverage of 95% minimum

Plastic Tape Dimensions



Unit: mm

Size	Type*	W	P0	P	P2	A0	B0	D0	F	E	T	T1	K0
2512	1	12.00 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	3.40 ±0.20	6.75 ±0.20	1.55 ±0.10	5.50 ±0.10	1.75 ±0.10	0.24 ±0.10	Max 0.1	1.30 ±0.20
	2	12.00 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	3.40 ±0.20	6.75 ±0.20	1.55 ±0.10	5.50 ±0.10	1.75 ±0.10	0.20 ±0.10	Max 0.1	0.98 ±0.20
	M	12.00 ±0.10	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	3.40 ±0.10	6.75 ±0.10	1.55 ±0.05	5.50 ±0.05	1.75 ±0.10	0.20 ±0.05	Max 0.1	1.85 ±0.05
3921	1	24.00 ±0.30	4.00 ±0.10	8.00 ±0.10	2.00 ±0.10	5.70 ±0.20	11.50 ±0.20	1.55 ±0.10	11.50 ±0.10	1.75 ±0.10	0.30 ±0.10	Max 0.1	1.50 ±0.10
	2	24.00 ±0.30	4.00 ±0.10	8.00 ±0.10	2.00 ±0.10	5.70 ±0.20	11.50 ±0.20	1.55 ±0.10	11.50 ±0.10	1.75 ±0.10	0.30 ±0.10	Max 0.1	2.10 ±0.10
5931	1	24.00 ±0.30	4.00 ±0.10	12.00 ±0.10	2.00 ±0.10	8.25 ±0.20	15.50 ±0.20	1.55 ±0.10	11.50 ±0.10	1.75 ±0.10	0.30 ±0.10	Max 0.1	1.50 ±0.10
	2	24.00 ±0.30	4.00 ±0.10	12.00 ±0.10	2.00 ±0.10	8.25 ±0.20	15.50 ±0.20	1.55 ±0.10	11.50 ±0.10	1.75 ±0.10	0.30 ±0.10	Max 0.1	2.10 ±0.10

Note:

Size	2512					3921			5931			
Type	1		2		M	1		2	1		2	
Material	M	F	M	F	M	M	F	M	M	F	M	F
Resistance Range(mΩ)	0.50	2.00	1.00	3.00 4.00	0.20 0.25 0.30	0.50 0.75 1.00	2.00 3.00 4.00	0.20 0.30	0.50 0.70 0.75	2.00 3.00	0.20 0.30	1.00

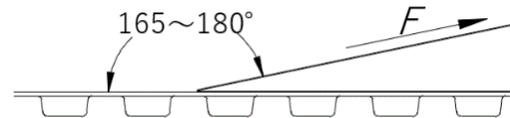
Peeling Strength of Seal Tape

CSA2512 Series:

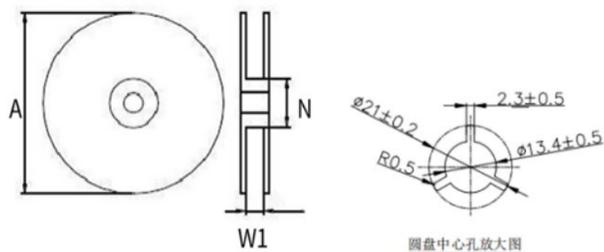
F = Peeling Strength: 0.1 – 1.0N (10 - 100gf)

CSA3921/5931 Series:

F = Peeling Strength: 0.1 – 1.3N (10 - 130gf)



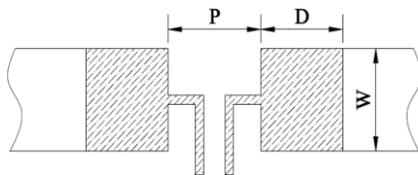
Reel Dimensions



Unit: mm

Size	2512		3921	5931
Resistance Range (mΩ)	0.2~0.3	0.5~4.0	0.2~4.0	0.2~3.0
Quantity	2,000 pcs / reel	3,000 pcs / reel	3,000 pcs / reel	1,500 pcs / reel
A	178.00±5.00		330.00±5.00	
N	60.00±2.00		100.00±2.00	
W1	13.00±1.00		24.50±1.00	

Recommended Land Pattern

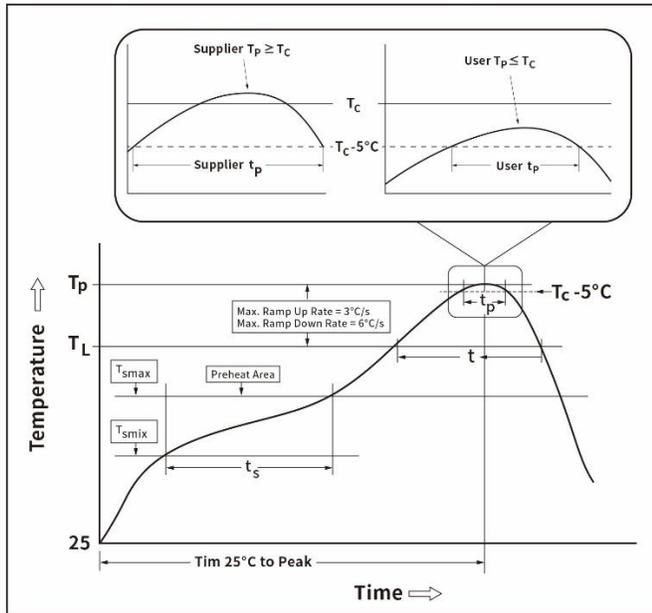


Unit: mm

Size	Resistance Range	P	W	D
2512	0.20~4.00 mΩ	3.60	3.40	1.60
3921	0.20~4.00 mΩ	5.60	6.20	2.70
5931	0.20~3.00 mΩ	5.60	8.75	5.20

Soldering Profile

Soldering Parameters-Reflow Soldering



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T_{Smax} to T_p)	3 °C / second max
Preheat Temperature Minimum (T_{Smin})	150 °C
Temperature Maximum (T_{Smax})	200 °C
Time (T_{Smin} to T_{Smax})	60-120 seconds
Time maintained above Temperature Minimum (T_L) Time (t_l)	217 °C 60-150 seconds
Peak Temperature (T_p)	260 +0 °C
Time within 5 °C of Actual Peak Temperature (t_p)	30 seconds
Ramp-Down Rate	6 °C / second Maximum
Time 25 °C to Peak Temperature	8 minutes Maximum

Rework temperature (hot air equipment) : 350°C, 4~6seconds

Electric soldering iron, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Storage Conditions

Environment Conditions:

Products should be stored under the following environmental conditions.

- Temperature: +5 to +40°C
- Humidity: 10%~75% relative humidity
- Under airtight can store 1 year.

Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting in poor solderability.

- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.