




**Thin Film Technology Corp.**

**Product Family:** 2-Terminal, Metal Type Current Shunt Resistor

**Part Number Series:** D1CSA Series

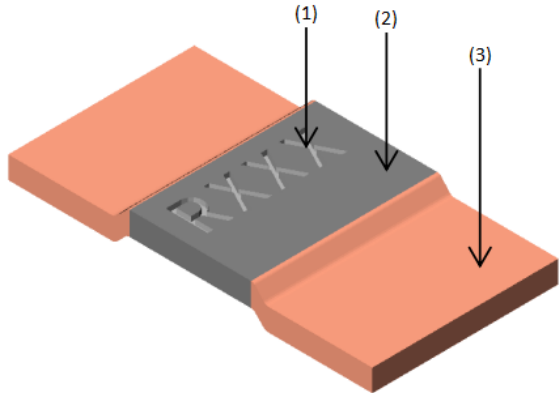


	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• Cu alloy resistive element</li> <li>• Welded construction</li> <li>• Halogen free</li> <li>• RoHS compliant and Pb free</li> <li>• Inherently Anti-Sulfur</li> </ul>	<p><b>Features:</b></p> <ul style="list-style-type: none"> <li>• 2512, 3921, and 5931 English case sizes</li> <li>• Power up to 15W</li> <li>• Resistance from 0.2mΩ~4mΩ</li> <li>• TCR down to ±50ppm/°C</li> <li>• Tolerance down to ±1.0%</li> <li>• Moisture Sensitivity Level (MSL) = 1</li> </ul>
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**Description:**

These two terminal, 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.

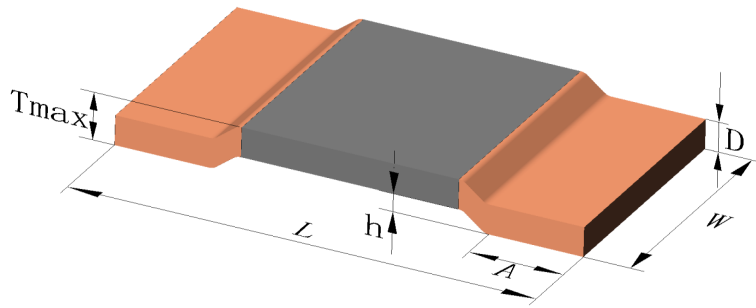
**Product Construction:**

	<p><b>Number</b></p>	<p><b>Description</b></p>
	1	Marking (Laser)
	2	Resistor element (Cu-alloy)
	3	Terminal electrode (Cu)

**Part Numbering:** Ex: D1CSA2512FR002F-T3

Series Name	English Size (metric size)	Material	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
D1CSA	2512 (6432) 3921 (10052) 5931 (1577)	M = MnCu F = Cu (refer to tables)	For all sizes, use 4 digit code for all values. "R" denotes decimal position as necessary Ex. <b>0M30</b> = 0.30mΩ <b>R001</b> = 1mΩ	F = ±1.0% J = ±5.0% (refer to tables)	-T15 = 1,500 pcs/reel -T2 = 2,000 pcs/reel -T3 = 3,000 pcs/reel -T4 = 4,000 pcs/reel (refer to tables)

## Product Dimensions:



All dimensions shown in inches, mm in parenthesis.

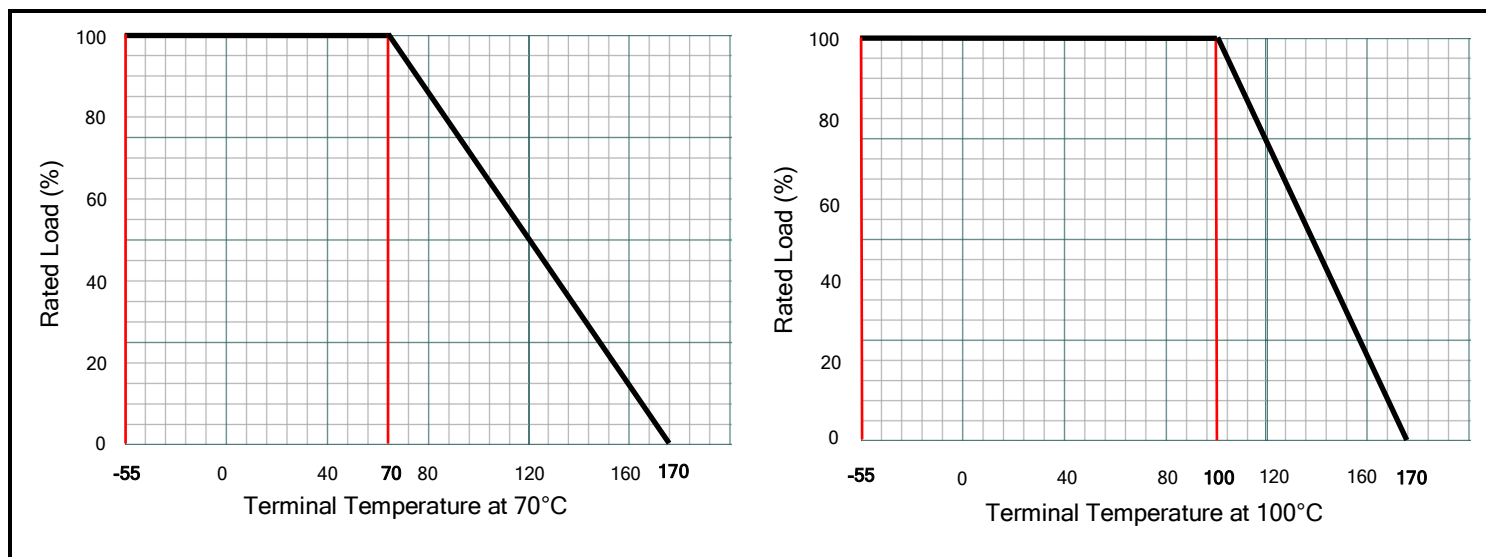
Dimensions (Metric)	Resistance Value	Material	W	L	H	A	D Typical	Tmax
D1CSA2512 (6432)	0.2mΩ	M	0.119 ±0.010 (3.02 ±0.25)	0.250 ±0.008 (6.35 ±0.20)	0.014 ±0.002 (0.35 ±0.05)	0.039 ±0.012 (1.00 ±0.30)	0.055 ±0.012 (1.40 ±0.30)	0.083 (2.10)
	0.25mΩ						0.043 ±0.012 (1.10 ±0.30)	0.071 (1.80)
	0.3mΩ						0.055 ±0.012 (1.40 ±0.30)	0.083 (2.10)
	0.5mΩ						0.035 ±0.008 (0.90 ±0.20)	0.060 (1.50)
	1mΩ	F					0.016 ±0.004 (0.40 ±0.10)	0.043 (1.10)
	2mΩ						0.028 ±0.008 (0.70 ±0.20)	0.051 (1.30)
	3mΩ						0.020 ±0.004 (0.50 ±0.10)	0.043 (1.10)
	4mΩ						0.012 ±0.004 (0.30 ±0.10)	0.040 (1.00)
D1CSA3921 (10052)	0.2mΩ	M	0.205 ±0.012 (5.20 ±0.30)	0.394 ±0.012 (10.0 ±0.30)	0.020 ±0.004 (0.50 ±0.10)	0.079 ±0.012 (2.00 ±0.30)	0.055 ±0.012 (1.40 ±0.30)	0.087 (2.20)
	0.3mΩ						0.051 ±0.012 (1.30 ±0.30)	0.083 (2.10)
	0.5mΩ						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)
	1mΩ	F					0.016 ±0.004 (0.40 ±0.10)	0.047 (1.20)
	2mΩ						0.024 ±0.008 (0.60 ±0.20)	0.055 (1.40)
	3mΩ						0.016 ±0.004 (0.40 ±0.10)	0.047 (1.20)
	4mΩ						0.012 ±0.004 (0.30 ±0.10)	0.043 (1.10)
D1CSA5931 (1577)	0.2mΩ	M	0.305 ±0.012 (7.75 ±0.30)	0.591 ±0.012 (15.0 ±0.30)	0.020 ±0.004 (0.50 ±0.10)	0.157 ±0.012 (4.00 ±0.30)	0.055 ±0.012 (1.40 ±0.30)	0.087 (2.20)
	0.3mΩ						0.043 ±0.012 (1.10 ±0.30)	0.079 (2.00)
	0.5mΩ						0.024 ±0.008 (0.60 ±0.20)	0.055 (1.40)
	0.7mΩ						0.016 ±0.004 (0.40 ±0.10)	0.047 (1.20)
	0.75mΩ	F					0.016 ±0.004 (0.40 ±0.10)	0.047 (1.20)
	1mΩ						0.043 ±0.012 (1.10 ±0.30)	0.075 (1.90)
	2mΩ						0.020 ±0.004 (0.50 ±0.10)	0.051 (1.30)
	3mΩ						0.012 ±0.004 (0.30 ±0.10)	0.043 (1.10)

**Electrical Specifications:**

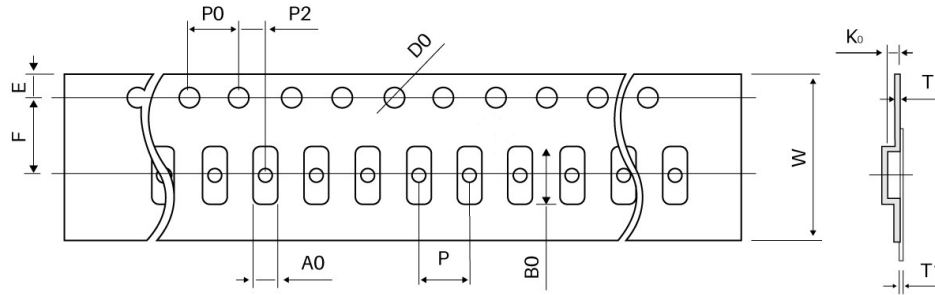
Type	D1CSA2512							
Metric Size	6432							
Power Rating (70°C)	6.0W	5.0W	5.0W	6.0W	6.0W	6.0W	4.0W	4.0W
Power Rating (100°C)	4.0W	3.0W	4.0W	4.0W	4.0W	4.0W	3.0W	2.0W
Resistance Range	0.20mΩ	0.25mΩ	0.30mΩ	0.50mΩ	1mΩ	2mΩ	3mΩ	4mΩ
Resistance Tolerance % (code)	±1.0(F), ±5.0(J)							
TCR ppm/°C	±200	±175	±175	±150	±100	±50	±50	±50
Rated Voltage	$\sqrt{(\text{Power} \times \text{Resistance})}$							
Operating Temp. Range	-55°C~+155°C							
Packaging (code)	2,000pcs/reel (-T2)				3,000pcs/reel (-T3)			

Type	D2CSA3921							
Metric Size	10052							
Power Rating (70°C)	9.0W	10W	9.0W	8.0W	7.0W	6.0W	6.0W	5.0W
Power Rating (100°C)	5.0W	5.0W	5.0W	5.0W	4.0W	4.0W	3.0W	2.5W
Resistance Range	0.20mΩ	0.30mΩ	0.50mΩ	0.75mΩ	1mΩ	2mΩ	3mΩ	4mΩ
Resistance Tolerance % (code)	±1.0(F), ±5.0(J)							
TCR ppm/°C	±150	±150	±70	±70	±50	±50	±50	±50
Rated Voltage	$\sqrt{(\text{Power} \times \text{Resistance})}$							
Operating Temp. Range	-55°C~+155°C							
Packaging (code)	3,000pcs/reel (-T3)							

Type	D1CSA5931							
Metric Size	1577							
Power Rating (70°C)	15W	10W	8.0W	7.0W	7.0W	10W	8.0W	7.0W
Power Rating (100°C)	10W	7.0W	6.0W	4.0W	4.0W	7.0W	6.0W	4.0W
Resistance Range	0.20mΩ	0.30mΩ	0.50mΩ	0.70mΩ	0.75mΩ	1mΩ	2mΩ	3mΩ
Resistance Tolerance %(code)	±1.0(F), ±5.0(J)							
TCR ppm/°C	±125	±100	±100	±100	±100	±50	±50	±50
Rated Voltage	$\sqrt{(\text{Power} \times \text{Resistance})}$							
Operating Temp. Range	-55°C~+155°C							
Packaging (code)	1,500pcs/reel (-T15)							

**Power Derating Curve:****Reliability Specifications:**

Test	Test Method	Specification
Resistance Data	Resistance data at 25°C	Must meet datasheet requirements.
TCR Data	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.
Dimensional Data	Measure all dimensions specified in datasheet	Must meet datasheet requirements.
Short Time Overload IEC60115-1 4.13	Rated Power = 5x Temperature = 25±2°C Time = 5 seconds	±2.0%
Operational Life	Time: 1,000 hours Terminal Temperature: max at rated power	±2.0%, Terminal Temperature ≤130°C
Biased Humidity IEC60115-1 4.25	85°C/85% RH Operating Power: 10% Time: 1,000 hours	±1.0%
Temperature Cycle (Thermal Shock) IEC60115-1 4.19	-55°C (30 min.) / +155°C (30 min.) Transition time of 3 minute maximum Test Period: 100 cycles	±1.0%
High Temperature Exposure IEC60115-1 4.25	Temperature = +170±2°C Time = 1,000 hours	±2.0%
Low Temperature Exposure IEC60115-1 4.25	Temperature = +55±2°C Time = 1,000 hours	±1.0%
Mechanical Shock IEC60115-1, 4.21	Force: 100G Time: 6ms	±1.0%
Solderability IEC60115-1 Clause 4.17	Non-activated flux dip: 5-10 seconds SAC solder dip: 5 seconds at 245°C	New solder coverage of 95% minimum.

**Plastic Tape Dimensions:**

All dimensions are in mm.

Type	Resistance ( $\Omega$ )	W	P0	P	P2	A0	B0	D0	F	E	T	T1	K0
2512	0.2m $\Omega$ ~0.3m $\Omega$	12.00 $\pm 0.10$	4.00 $\pm 0.10$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	3.40 $\pm 0.10$	6.75 $\pm 0.10$	1.55 $\pm 0.05$	5.50 $\pm 0.05$	1.75 $\pm 0.10$	0.20 $\pm 0.05$	Max 0.10	1.85 $\pm 0.05$
	0.5m $\Omega$ , 2m $\Omega$	12.00 $\pm 0.30$	4.00 $\pm 0.10$	4.00 $\pm 0.10$	2.00 $\pm 0.10$	3.40 $\pm 0.20$	6.75 $\pm 0.20$	1.55 $\pm 0.10$	5.50 $\pm 0.10$	1.75 $\pm 0.10$	0.24 $\pm 0.10$	Max 0.10	1.30 $\pm 0.20$
	1m $\Omega$ , 3m $\Omega$ , 4m $\Omega$	12.00 $\pm 0.30$	4.00 $\pm 0.10$	4.00 $\pm 0.10$	2.00 $\pm 0.10$	3.40 $\pm 0.20$	6.75 $\pm 0.20$	1.55 $\pm 0.10$	5.50 $\pm 0.10$	1.75 $\pm 0.10$	0.20 $\pm 0.10$	Max 0.10	0.98 $\pm 0.20$
3921	0.2m $\Omega$ ~0.3m $\Omega$	24.00 $\pm 0.30$	4.00 $\pm 0.10$	8.00 $\pm 0.10$	2.00 $\pm 0.10$	5.70 $\pm 0.20$	11.50 $\pm 0.20$	1.55 $\pm 0.10$	11.50 $\pm 0.10$	1.75 $\pm 0.10$	0.30 $\pm 0.10$	Max 0.10	2.10 $\pm 0.10$
	0.5m $\Omega$ ~4m $\Omega$	24.00 $\pm 0.30$	4.00 $\pm 0.10$	8.00 $\pm 0.10$	2.00 $\pm 0.10$	5.70 $\pm 0.20$	11.50 $\pm 0.20$	1.55 $\pm 0.10$	11.50 $\pm 0.10$	1.75 $\pm 0.10$	0.30 $\pm 0.10$	Max 0.10	1.50 $\pm 0.10$
5931	0.2m $\Omega$ ~0.3m $\Omega$ , 1m $\Omega$	24.00 $\pm 0.30$	4.00 $\pm 0.10$	12.00 $\pm 0.10$	2.00 $\pm 0.10$	8.25 $\pm 0.20$	15.50 $\pm 0.20$	1.55 $\pm 0.10$	11.50 $\pm 0.10$	1.75 $\pm 0.10$	0.30 $\pm 0.10$	Max 0.10	2.10 $\pm 0.10$
	0.5m $\Omega$ ~0.75m $\Omega$ , 2m $\Omega$ ~3m $\Omega$	24.00 $\pm 0.30$	4.00 $\pm 0.10$	12.00 $\pm 0.10$	2.00 $\pm 0.10$	8.25 $\pm 0.20$	15.50 $\pm 0.20$	1.55 $\pm 0.10$	11.50 $\pm 0.10$	1.75 $\pm 0.10$	0.30 $\pm 0.10$	Max 0.10	1.50 $\pm 0.10$

**Reel Dimensions:**

Type	Resistance Range	A	N	W1
2512	0.2m $\Omega$ ~4m $\Omega$	178 $\pm 5.00$	60.0 $\pm 2.00$	13.0 $\pm 1.00$
3921	0.2m $\Omega$ ~4m $\Omega$	330 $\pm 5.00$	100 $\pm 2.00$	24.5 $\pm 1.00$
5931	0.2m $\Omega$ ~3m $\Omega$	330 $\pm 5.00$	100 $\pm 2.00$	24.5 $\pm 1.00$

All dimensions in mm.

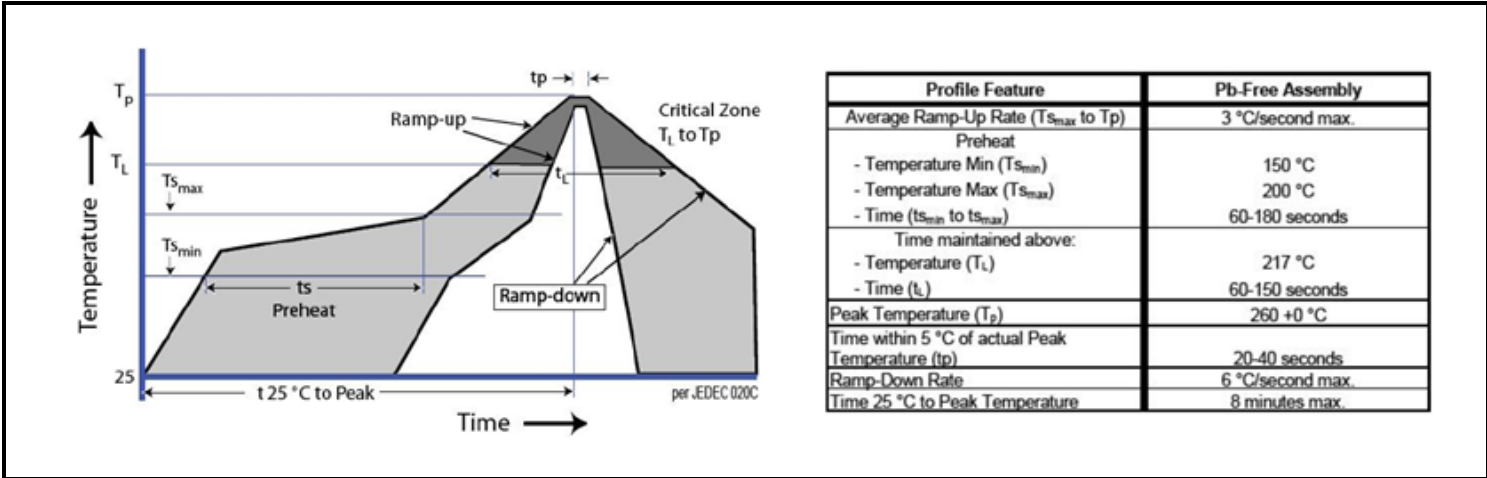
**Recommended Land Pattern\*:**

Type	Resistance Range	P	D	W
2512	0.2m $\Omega$ ~4m $\Omega$	3.60	3.40	1.60
3921	0.2m $\Omega$ ~4m $\Omega$	5.60	6.20	2.70
5931	0.2m $\Omega$ ~3m $\Omega$	5.60	8.75	5.20

All dimensions in mm.

\*Provisions must be made to insure that the part does not exceed the maximum operating temperature in the customers application.

**Soldering Profile:**



**Marking Information:**



Examples of 4 Digit Resistance Codes				
R-Value	0.3mΩ	0.5mΩ	1mΩ	2mΩ
Code	0M30	0M50	R001	R002

**Storage Conditions:**

**Environmental Conditions:**

Products should be stored under the following environmental conditions:

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- 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.