

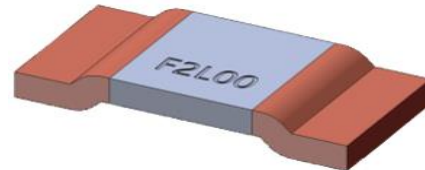
## Low TCR High-Precision Current Sense Resistor Surface Mount Metal Strip Power Resistors



**RoHS\***  
COMPLIANT

### FEATURES

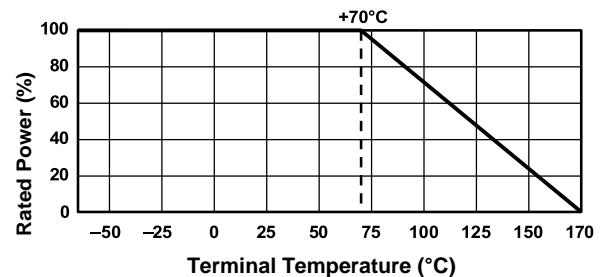
- Temperature coefficient of resistance to  $\pm 50$  ppm/ $^{\circ}\text{C}$  max. (-55 $^{\circ}\text{C}$  to +170 $^{\circ}\text{C}$ , +20 $^{\circ}\text{C}$  Ref.)
- Power rating: to 5 W
- Resistance tolerance: to  $\pm 0.5\%$
- Resistance range: 2 m $\Omega$  to 5 m $\Omega$
- Short time overload:  $\pm 0.5\%$  Max.
- Maximum current: up to 50 A
- AEC-Q200 qualified
- Proprietary processing techniques produce low resistance values and improved TCR
- Working Temperature -55 $^{\circ}\text{C}$  to +170 $^{\circ}\text{C}$
- Solderable terminations



### KEY APPLICATIONS

- Switching and linear power supplies
- Precision current-sensing
- Power management systems
- Automotive
- Power amplifiers
- Measurement instrumentation
- Precision instrumentation amplifiers
- Medical and automatic test equipment
- AC, DC low and high frequency sampling circuits
- Communication systems
- High current applications for the automotive market

**Figure 1 – Power Derating Curve**



**Table 1 – Specifications**

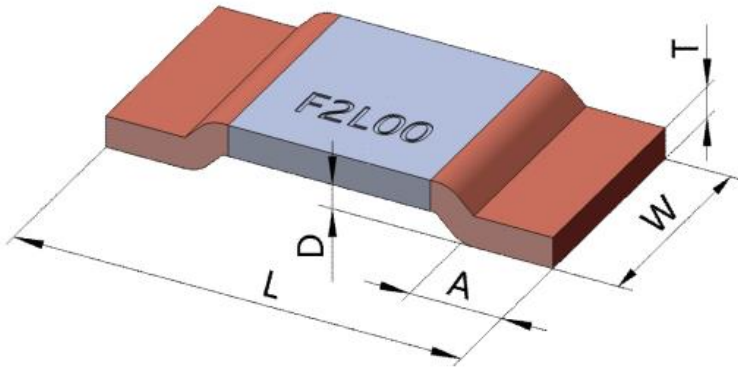
PARAMETER	CSM2512R5L
<b>Resistance Range</b>	2 m $\Omega$ to 5 m $\Omega$
<b>Power Rating at 70<math>^{\circ}\text{C}</math></b>	5 W (2m $\Omega$ ) 4 W (3 m $\Omega$ ) 3 W (4 m $\Omega$ ) 2.5 W (5 m $\Omega$ )
<b>Maximum Current<sup>(1)</sup></b>	50 A
<b>Tolerance</b>	$\pm 0.5\%$ , $\pm 1\%$ , $\pm 5\%$
<b>Temperature Coefficient Max. (-55<math>^{\circ}\text{C}</math> to +170<math>^{\circ}\text{C}</math>, +20<math>^{\circ}\text{C}</math> Ref.)</b>	$\pm 50$ ppm/ $^{\circ}\text{C}$
<b>Operating Temperature Range</b>	-55 $^{\circ}\text{C}$ to +170 $^{\circ}\text{C}$
<b>Maximum Working Voltage</b>	$(P \times R)^{1/2}$

**Notes**

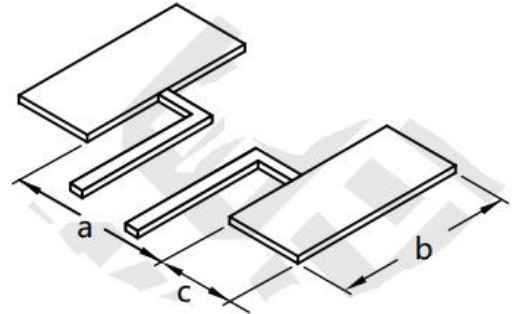
<sup>(1)</sup> Maximum current for a given resistance value is calculated using  $I = \sqrt{P/R}$

Figure 2 – Mechanical Dimensions in millimeters

CSM2512R5L DIMENSIONS



CSM2512R5L LAND PATTERN



Dimensions in millimeters

MODEL	RESISTANCE RANGE (mΩ)	L	A	W	D	T
CSM2512R5L	2	6.3 ± 0.3	1.3 ± 0.3	3.0 ± 0.3	0.35 ± 0.2	0.65 ± 0.2
	3	6.3 ± 0.3	1.3 ± 0.3	3.0 ± 0.3	0.35 ± 0.2	0.45 ± 0.2
	4	6.3 ± 0.3	1.3 ± 0.3	3.0 ± 0.3	0.35 ± 0.2	0.33 ± 0.15
	5	6.3 ± 0.3	1.3 ± 0.3	3.0 ± 0.3	0.35 ± 0.2	0.27 ± 0.15

Land Pattern Dimensions in millimeters

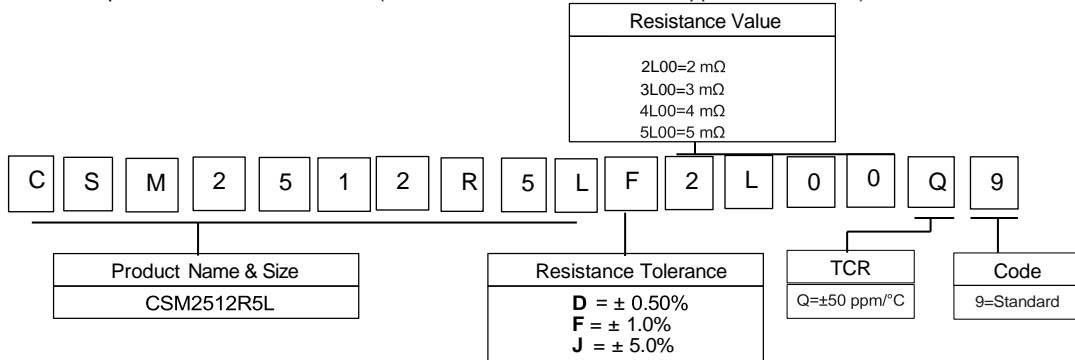
MODEL	RESISTANCE RANGE (mΩ)	a	c	b
CSM2512R5L	2 to 5	3.9 ± 0.1	1.8 ± 0.2	3.4 ± 0.2

**Table 2 - PERFORMANCE SPECIFICATIONS**

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h @ +170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Load Life	2000h @ +70°C, rated power, 90min on, 30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	$\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	$\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage 95% minimum coverage	
TCR	-55°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Max. value $\pm 50\text{ppm}/^\circ\text{C}$	
Substrate Bending	2mm. Duration: 60s	AEC-Q200 TEST 21 AEC-Q200-005	$\Delta R \leq \pm 0.01\%$	$\Delta R \leq \pm 0.1\%$
Short time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$

**Figure 3 –Part Number Information**

Example: CSM2512R5LF2L00Q9 (CSM2512R5L  $\pm 1.0\%$  2 m $\Omega$   $\pm 50$  ppm/ $^{\circ}$ C Standard)





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