

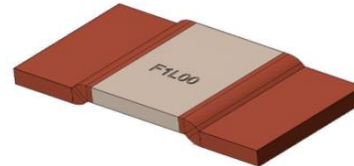
High-Precision Low-TCR Current Sense Resistor Surface Mount Metal Strip Power Resistors



RoHS*
COMPLIANT

FEATURES

- Temperature coefficient of resistance to ± 25 ppm/ $^{\circ}\text{C}$ max. (-55 $^{\circ}\text{C}$ to +170 $^{\circ}\text{C}$, 20 $^{\circ}\text{C}$ Ref.)
- Power rating: to 8 W
- Resistance tolerance: to $\pm 0.5\%$
- Resistance range: 1 m Ω to 5 m Ω
- Short time overload: $\pm 0.5\%$ Max.
- Maximum current: up to 89 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
- Testing & Measurement Equipment
- Medical and automatic test equipment
- DC low frequency sampling circuits
- Communication systems
- High current applications for the automotive market

Figure 1 – Power Derating Curve

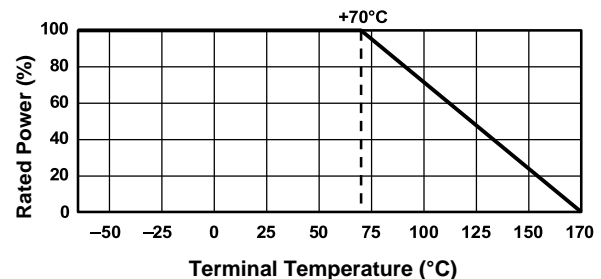


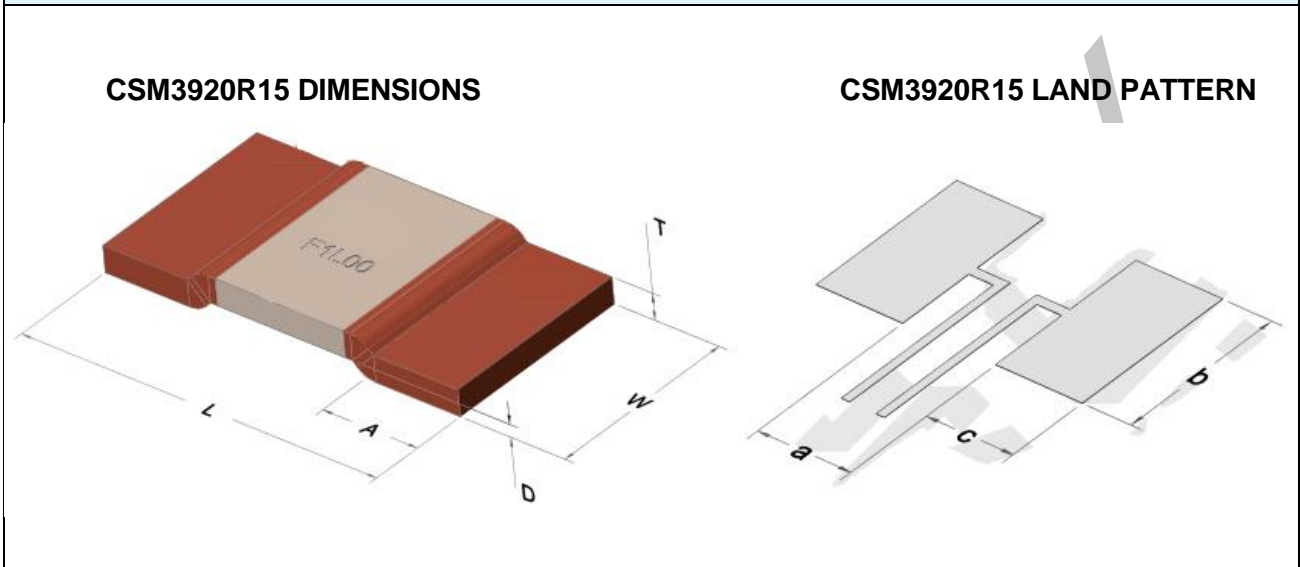
Table 1 – Specifications

PARAMETER	CSM3920R15
Resistance Range	1 m Ω to 5 m Ω
Power Rating at 70 $^{\circ}\text{C}$	8 W (1 m Ω) 6 W (2 m Ω) 5 W (3 m Ω) 4 W (4 m Ω) 3 W (5 m Ω)
Maximum Current ⁽¹⁾	89 A
Tolerance	$\pm 0.5\%$, $\pm 1\%$, $\pm 5\%$
Temperature Coefficient Max. (-55 $^{\circ}\text{C}$ to +170 $^{\circ}\text{C}$, 20 $^{\circ}\text{C}$ Ref.)	± 25 ppm/ $^{\circ}\text{C}$
Operating Temperature Range	-55 $^{\circ}\text{C}$ to +170 $^{\circ}\text{C}$.
Maximum Working Voltage	$(P \times R)^{1/2}$

Notes

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

Figure 2 – Mechanical Dimensions in millimeters



Dimensions in millimeters

MODEL	RESISTANCE RANGE (mΩ)	L	A	W	D	T
CSM3920R15	1	10 ± 0.3	2.0 ± 0.3	5.2 ± 0.3	0.5 ± 0.2	1.3 ± 0.2
	2	10 ± 0.3	2.0 ± 0.3	5.2 ± 0.3	0.5 ± 0.2	0.65 ± 0.2
	3	10 ± 0.3	2.0 ± 0.3	5.2 ± 0.3	0.5 ± 0.2	0.45 ± 0.2
	4	10 ± 0.3	2.0 ± 0.3	5.2 ± 0.3	0.5 ± 0.2	0.33 ± 0.15
	5	10 ± 0.3	2.0 ± 0.3	5.2 ± 0.3	0.5 ± 0.2	0.27 ± 0.15

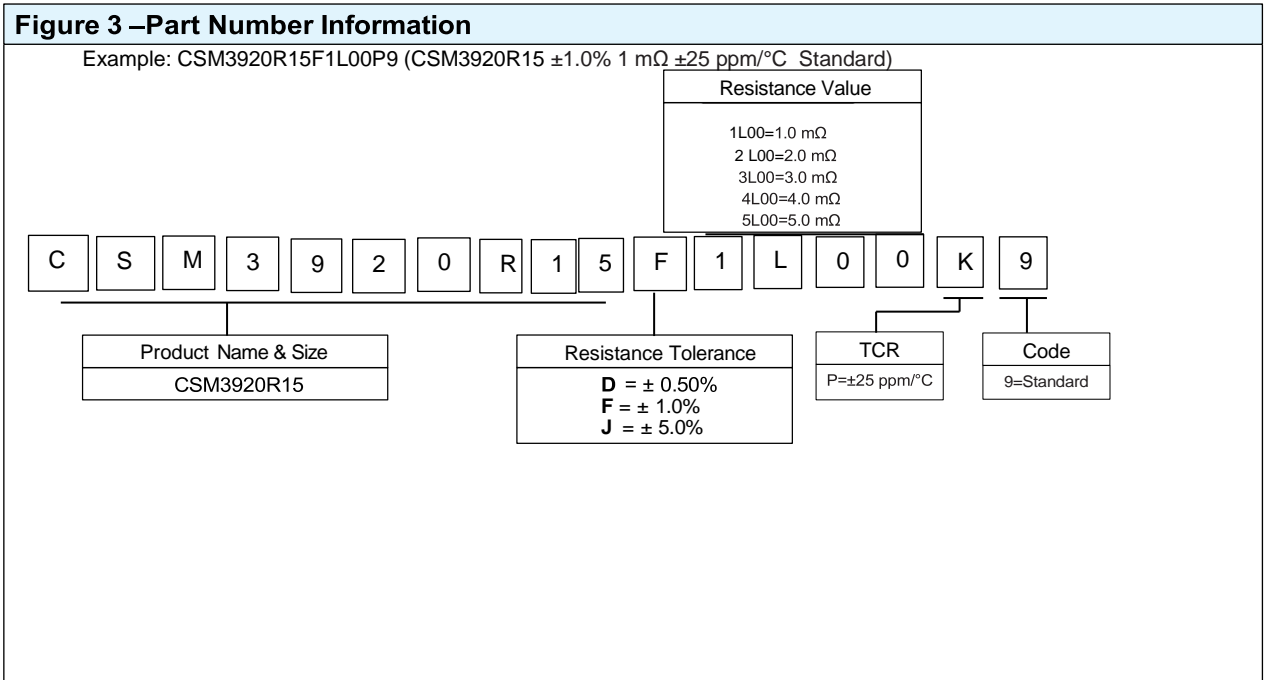
Land Pattern Dimensions in millimeters

MODEL	RESISTANCE RANGE (mΩ)	a	c	b
CSM3920R15	1 to 5	5.6 ± 0.1	2.7 ± 0.2	6.2 ± 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 $\pm 25\text{ppm}/^\circ\text{C}$	
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 Operation	-55°C, unpowered for 1h, load rated power for 45min, unpowered for 15min	IEC 60068-2-1 4.36	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$

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