FCSL Series

Metal Foil Current Sense



Ohmite continues to add to its complement of Current Sense offerings with the FCSL Series. FCSL incorporates proven metal foil technology to produce the ultimate in a current sense resistor. FCSL features the effective combination of very low and stable TCRs (Temperature Coefficient of Resistance) available in a wide selection of very low ohmic values. Power ratings up to 10 Watts makes FCSL the ideal choice for your current sensing applications.

FEATURES

- Foil Construction ensures a very stable TCR (Temperature Coefficient of Resistance)
- Designed for automatic insertion
- Industry standard sizes
- High heat resistant use
- Low heat electromotive use
- Color: white (top) and green (bottom)

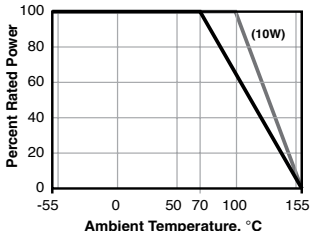
SERIES SPECIFICATIONS

Series	Power Rating	Resistance Range (mΩ)	Tol.	TCR (ppm/°C)	Weight (g)
FCSL64	2.0W	1m	±5%	±150	0.036
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	
FCSL76	3.0W	1m	±5%	±150	0.050
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
FCSL90	4.0W	1m	±5%	±150	0.071
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
FCSL110	5.0W	1m	±5%	±150	0.096
		2m	±2%	±100	
		3m ~ 100m	±1%	±50	
		10m ~ 50mΩ	±0.5%	±50	
FCSL150	10.0W	1m	±5%	±100	0.316
		2m	±2%	±100	
		3m ~ 100m	±1%	±100 (>9m:±50)	

CHARACTERISTICS

Test	Condition	Maximum ΔR
Overload	(10W) Rated power x1.5, 5s	±(1.0%+0.0005Ω)
Max. temperature for rated power	70°C (10W: 100°C)	
Operating temp. range	-55°C ~ +155°C	
Rated voltage	√(Rated power x Resistance value) V	
In-rush current*	Rated current 10 msec ON, 60 sec OFF, 10 cycles* (see table below)	±(1.0% +0.0005Ω)
Rapid change of temperature	-55°C (30min.)/+155°C (30min.), 100 cy.	±(1.0% +0.0005Ω)
	-40°C (30min), Room temp (3min), +125°C (30min), Room temp (3min), 1000 cy., **FCSL150 only**	±0.6%
Solderability	245°C ±5°C for 3 ±0.5 sec.	Min. 90% coverage
Endurance at 70°C	70°C ±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(1.0% +0.0005Ω)
Resistance to soldering heat	260°C ±5°C for 10 ±1 sec.	±(0.5% +0.0005Ω)
Moisture resistance	60°C ±2°C, 90~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1000h	±(2.0% +0.0005Ω)
Terminal strength	**10W:** Bending width: 2mm for 10s±1s, Glass epoxy substrate 1.6mm thick	±(1.0%+0.0005Ω)

Derating

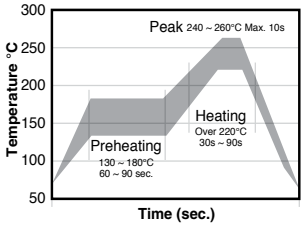


Recommended Reflow Temperature Profile

For lead free soldering (Sn-Ag-Cu solder)

Preheating:	130° ~ 180°	60s ~ 90s
Heating:	Over 220°	30s ~ 90s
Peak:	240° ~ 260°	Max. 10s

Max. number of reflow: 2



*In-rush Current

Series	Rated Wattage	1mΩ~10mΩ In-rush Power	1mΩ~10mΩ Max. Current	12mΩ~100mΩ In-rush Power	12mΩ~100mΩ Max. Current
FCSL64	2W	225W	125A	150W	70A
FCSL76	3W	325W	150A	210W	80A
FCSL90	4W	440W	180A	300W	100A
FCSL110	5W	600W	240A	440W	120A
FCSL150	10W	700W	270A	470W	140A

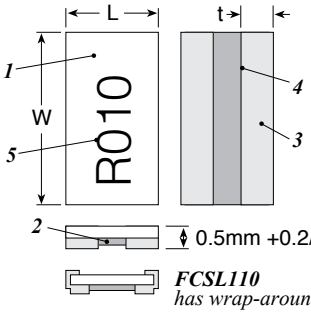
In-rush current = √(in-rush power/resistance value), or max. current, whichever is smaller

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DIMENSIONS

(in.±.008/mm ±0.20)

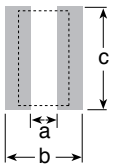


1. *Alumina substrate*
2. *Resistive element (Ni-Cu-Mn alloy)*
3. *Electrode (Ni, Sn)*
4. *Protective coating (Epoxy resin)*
5. *Marking (Epoxy resin)*

FCSL110
has wrap-around terminals

Series	Power Rating	L	W	t
FCSL64	2.0W	0.122/3.1	0.248/6.3	0.047/1.2 0.020/0.5 0.020/0.5
FCSL76	3.0W	0.15/3.8	0.3/7.6	0.053/1.35 0.024/0.6 0.024/0.6
FCSL90	4.0W	0.177/4.5	0.35/8.9	0.063/1.6 0.028/0.7 0.028/0.7
FCSL110	5.0W	0.197/5.0	0.43/11.0	0.071/1.8 0.031/0.8 0.031/0.8
FCSL150	10W	0.295/7.5	0.591/15.0	0.043/1.1

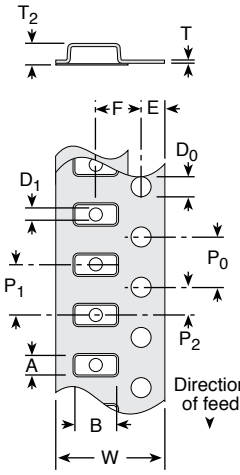
Land Pattern



(mm)	Value range	a	b	c
FCSL64	1mΩ	0.9	4.2	6.6
	2mΩ~100mΩ	2.2	4.2	6.6
FCSL76	1mΩ	1.1	4.6	7.8
	2mΩ~100mΩ	2.6	4.6	7.8
FCSL90	1mΩ	1.3	5.1	9.2
	2mΩ~100mΩ	3.1	5.1	9.2
FCSL110	1mΩ	1.5	5.6	11.2
	2mΩ~100mΩ	3.6	5.6	11.2
FCSL150	1mΩ	2.0	8.4	15.2
	2mΩ~100mΩ	5.0	8.4	15.2

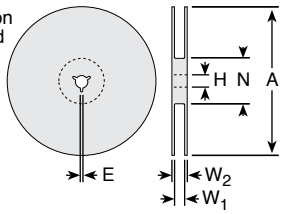
PACKAGING SPECIFICATIONS

Tape (in./mm)



	FCSL64	FCSL76	FCSL90	FCSL110	FCSL150
A	0.135 *(3.43 ±0.2)*	0.163 (4.15 ±0.10)	0.191 (4.85 ±0.10)	0.213 (5.40 ±0.10)	0.327 (8.30 ±0.1)
B	0.261 *(6.63 ±0.2)*	0.313 (7.95 ±0.10)	0.368 (9.35 ±0.10)	0.453 (11.50 ±0.10)	0.614 (15.60 ±0.1)
W	0.472 *(12.0 ±0.3)*	0.630 (16.00 ±0.30)	0.630 (16.00 ±0.30)	0.945 (24.00 ±0.30)	0.945 (24.00 ±0.2)
E	0.069 *(1.75 ±0.1)*	0.295 (7.50 ±0.10)	0.295 (7.50 ±0.10)	0.453 (11.50 ±0.10)	0.069 (1.75 ±0.1)
F	0.217 *(5.5 ±0.05)*	0.069 (1.75 ±0.10)	0.069 (1.7 ±0.10)	0.069 (1.75 ±0.10)	0.453 (11.50 ±0.1)
P_0	0.157 *(4.0 ±0.1)*	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.10)	0.157 (4.00 ±0.1)
P_1	0.157 *(4.0 ±0.1)*	0.315 (8.00 ±0.10)	0.315 (8.00 ±0.10)	0.315 (8.00 ±0.10)	0.472 (12.00 ±0.1)
P_2	0.079 *(2.0 ±0.05)*	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.10)	0.079 (2.00 ±0.1)
D_0	0.059 *(1.5 +0.1/-0)*	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 +0.05/-0)
D_1	0.059 *(1.5 +0.2/-0)*	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 ±0.10)	0.059 (1.50 +0.05/-0)
T	0.008 *(0.2 ±0.05)*	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)	0.012 (0.30 ±0.05)
T_2	0.059 *(1.5 max.)*	0.047 (1.2 ±0.15)	0.047 (1.2 ±0.15)	0.047 (1.2 ±0.15)	0.091 (2.3 ±0.1)

Reel (in./mm)



	FCSL64	FCSL76/90	FCSL110	FCSL150
A	7.087 *(180 +0/-3)*	7.087 *(180 +0/-3)*	7.087 *(180 ±2.0)*	12.992 (330±2.0)
H	0.512 *(13 ±0.2)*	0.512 *(13 ±0.2)*	0.512 *(13 ±0.2)*	0.512 (13±0.2)
E	0.079 *(2.0 ±0.5)*	0.079 *(2.0 ±0.5)*	0.079 *(2.0 ±0.5)*	0.079 (2.0 ±0.5)
N	0.236 *(60 +1/-0)*	0.236 *(60 +1/-0)*	0.827 *(21 ±0.8)*	3.937 (100±1.0)
W_1	0.518 *(13.0 ±0.3)*	0.669 *(17.0 ±0.3)*	1.000 *(25.4 ±1.0)*	1.000 (25.4 ±1.0)
W_2	0.669 *(17.0 ±1.4)*	0.764 *(19.4 ±1.0)*	1.157 *(29.4 ±1.0)*	1.157 (29.4 ±1.0)

ORDERING INFORMATION

RoHS Compliant

F C S L 6 4 R 0 0 5 J E R

Series	Package Size	Ohms	Tolerance	Taping Code
	64=6432=2W	R005 =0.005Ω	J = 5%	1,000 pc/reel
	76=7638=3W	R050 =0.050Ω	G = 2%	(10W: 500pc/reel)
	90=9045=4W		F = 1%	
	110=11050=5W		D = 0.5%	
	150=15075=10W			

Standard Part Numbers

Ohms	2 Watts	3 Watts	4 Watts	5 Watts	10 Watt
0.0010	FCSL64R001JE	FCSL76R001JE	FCSL90R001JE	FCSL110R001JE	FCSL150R001JE
0.0020	FCSL64R002GE	FCSL76R002GE	FCSL90R002GE	FCSL110R002GE	FCSL150R002GE
0.0050	FCSL64R005FE	FCSL76R005FE	FCSL90R005FE	FCSL110R005FE	FCSL150R005FE
0.0100	FCSL64R010FE	FCSL76R010FE	FCSL90R010FE	FCSL110R010FE	FCSL150R010FE
0.0250	FCSL64R025FE	FCSL76R025FE	FCSL90R025FE	FCSL110R025FE	FCSL150R025FE
0.0500	FCSL64R050FE	FCSL76R050FE	FCSL90R050FE	FCSL110R050FE	FCSL150R050FE
0.0150	FCSL64R015FE	FCSL76R015FE	FCSL90R015FE	FCSL110R015FE	FCSL150R015FE
0.0200	FCSL64R020FE	FCSL76R020FE	FCSL90R020FE	FCSL110R020FE	FCSL150R020FE
0.0300	FCSL64R030FE	FCSL76R030FE	FCSL90R030FE	FCSL110R030FE	FCSL150R030FE
0.1000	FCSL64R100FE	FCSL76R100FE	FCSL90R100FE	FCSL110R100FE	FCSL150R100FE