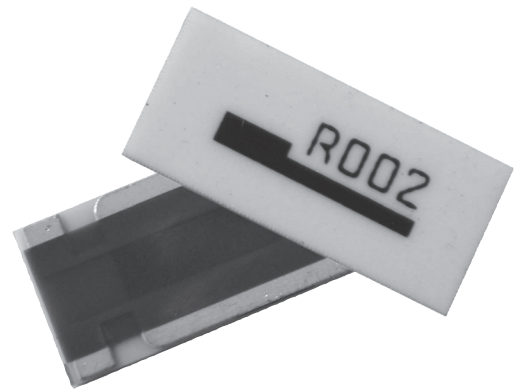


FC4L Series

FC4L Four Terminal Current Sense
Metal Foil Construction



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)

Ohmite offers the low TCR FC4L series in 0.25 watts up to 5 watts and values down to 1 milli-ohm. Great stability is achieved by employing a Ni-Cu-Mn resistive element. The FC4L series affords the user an added advantage of a built in 4-terminal design with 2 larger electrodes for current management and 2 smaller electrodes for current measurement.

SERIES SPECIFICATION

Series	Power Rating	Resistance Range	Tol.	TCR (ppm/°C)	Weight (g)	Series	Power Rating	Resistance Range	Tol.	TCR (ppm/°C)	Weight (g)
FC4L16	0.25W	5m,10m,20m, 50mΩ~100mΩ	±1%	±50	0.004	FC4L76	3W	1m-4mΩ 5m-25mΩ	±1% ±0.5%, 1%	±100 ±50	0.062
FC4L32	1W	1mΩ	±5%	±100	0.015	FC4L90	4W	4m-4mΩ	±1%	±100	0.082
		2mΩ	±2%	±100		5m-25mΩ		±0.5%, 1%	±50		
		3mΩ	±1%	±100		FC4L110	5W	1mΩ	±5%	±100	0.110
		4mΩ~500mΩ	±1%	±50				2mΩ	±2%	±50	
FC4L64	2W	1mΩ	±5%	±100	0.038	3mΩ ~ 100mΩ	±1%	±50			
		2mΩ	±2%	±100		10m ~ 50mΩ	±0.5%	±50			
		3mΩ	±1%	±100							
		4m ~ 100mΩ	±1%	±50							
		10m ~ 50mΩ	±0.5%	±50							

CHARACTERISTICS

Test	Condition	Maximum ΔR
Max. temperature for rated power	70°C	
Operating temperature range	-55°C ~ +155°C (FC4L16: -40°C ~ +125°C)	
Rated voltage	√(Rated power x Resistance value) V	
Overload (FC4L16 only)	Rated power x 1.5 for 5s	±(0.5%+0.0005Ω)
In-rush current	Rated current 10 msec ON, 60 sec OFF, 10 cycles. (see table next page)	±(1.0% +0.0005Ω)
Rapid change of temperature	-55°C (30min.)/+155°C (30min.), 100 cycles (FC4L16: 1000 cycles)	±(1.0% +0.0005Ω) (FC4L16: ±(2.0%+0.0005Ω))
Solderability	245°C ±5°C for 3 ±0.5 sec.	Min. 90% coverage (FC4L76 & 90: 95%)
Endurance	70°C ±3°C, Rated voltage 1.5h ON, 0.5h OFF, 1000h (FC4L76 & 90: 100°C)	±(1.0% +0.0005Ω) (FC4L76 & 90: ±(3.0%+0.5mΩ))
Resistance to soldering heat	260°C ±5°C for 10 ±1 sec. (FC4L76 & 90: 20 ±1)	±(1.0% +0.0005Ω) (FC4L16: ±0.5%) (FC4L76 & 90: No evidence of mechanical damage)
Moisture resistance	60°C ±2°C, 90~95% RH, Rated voltage 1.5h ON, 0.5h OFF, 1,000h (76 & 90: 85 ±2°C, 85±5%RH, 10% Rated power, 1,000h)	±(2.0% +0.0005Ω) (FC4L16: ±1.0%) (FC4L76 & 90: ±(3% +0.0005Ω))

FC4L Series

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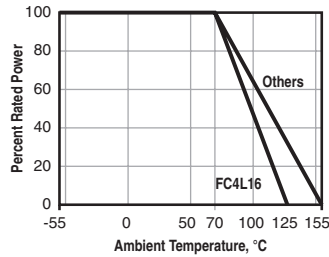
CHARACTERISTICS

In-rush current

Series	Power Rating	Resistance Range	In-rush Power	Max. Current
FC4L16	0.25 watt	5m, 10mΩ	2.5W	5A
FC4L32	1 watt	1mΩ~9mΩ 10mΩ~500mΩ	25W 12.5W	45A 24A
FC4L64	2 watt	1mΩ~9mΩ 10mΩ~100mΩ	100W 50W	85A 35A
FC4L76	3 watt	1mΩ~9mΩ 10mΩ~***mΩ	110W 55W	90A 40A
FC4L90	4 watt	1mΩ~9mΩ 10mΩ~***mΩ	120W 60W	95A 45A
FC4L110	5 watt	1mΩ~50mΩ	100W	100A

In-rush current = $\sqrt{\text{(in-rush power/resistance value)}}$, or max. current, whichever is smaller

Derating



Recommended Reflow Temperature Profile

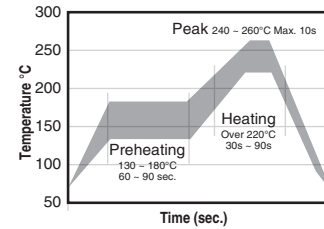
For lead free soldering (Sn-Ag-Cu solder)

Preheating: 130°~180° 60s~90s

Heating: Over 220° 30s~90s

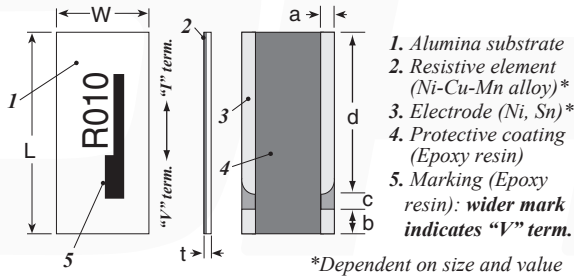
Peak: 240°~260° Max. 10s

Max. number of reflow: 2



DIMENSIONS

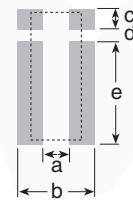
mm/in.



1. Alumina substrate
2. Resistive element (Ni-Cu-Mn alloy)*
3. Electrode (Ni, Sn)*
4. Protective coating (Epoxy resin)
5. Marking (Epoxy resin): wider mark indicates "V" term.

*Dependent on size and value

Land Pattern



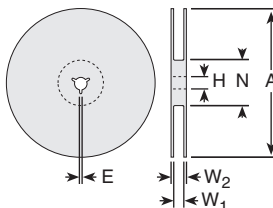
Rating	L (mm ±0.20/in.±.008)	W (mm ±0.031)	a (mm/in.)	b mm ±0.15	c mm ±0.1	d mm ±0.15	t mm
FC4L16	1.60/0.063	0.8/0.031	0.26/0.010	0.30 ±.2	0.3 ±.2	1.0 ±.2	0.5 +.2/-0.05
FC4L32	3.20/0.126	1.6/0.063	0.35/0.014	0.35	0.2	2.6	0.5 +.2/-0.05
FC4L64	6.40/0.251	3.2/0.126	0.5/0.020	0.7	0.5	5.2	0.5 +.2/-0.05
FC4L76	7.60±0.3mm/ 0.30	3.8±0.3mm/ 0.15	0.55±0.2mm/ 0.02	0.75 ±0.2mm	0.60 ±0.2mm	6.15 ±0.3mm	0.60 ±.20
FC4L90	9.00±0.3mm/ 0.35	4.5±0.3mm/ 0.18	0.65±0.2mm/ 0.03	0.90 ±0.2mm	0.75 ±0.2mm	7.25 ±0.3mm	0.60 ±.20
FC4L110	11.0/0.433	5.0/0.197	0.7/0.028	1.4	1.1	8.5	0.5 +.2/-0.05

(mm)	a	b	c	d	e
FC4L16	0.25	1.2	0.40	0.30	1.2
FC4L32	0.4	2.7	0.35	0.3	2.7
FC4L64	2.0	4.4	0.7	0.5	5.4
FC4L76	2.4	4.80	0.95	0.45	6.60
FC4L90	2.8	5.60	1.10	0.55	7.80
FC4L110	3.2	5.6	1.6	1.1	8.7

PACKAGINGS PECIFICATIONS

Reel

mm/in.



	FC4L16	FC4L32 & 64	FC4L76 & 90	FC4L110
A	180 +0/-3 (7.087)	180 +0/-3 (7.087)	180+1.0/-3.0 (7.087)	180 +0/-3 (7.087)
H	13 ±0.2 (0.512)	13 ±0.2 (0.512)	13 ±0.2 (0.512)	13 ±0.2 (0.512)
E	2.0 ±0.5 (0.079)	2.0 ±0.5 (0.079)	2.0 ±0.5 (0.079)	2.0 ±0.5 (0.079)
N	60 +1/-0 (2.362)	60 +1/-0 (2.362)	60 +1/-0 (2.362)	21 ±0.8 (0.827)
W1	9.0 ±0.3 (0.354)	13.0 ±0.3 (0.512)	21 ±0.8 (0.827)	25.4 ±1.0 (1.000)
W2	13.0 ±0.3 (0.512)	17.0 ±1.4 (0.669)	17.0 ±.3 (0.669)	29.4 ±1.0 (1.157)

(continued)

FC4L Series

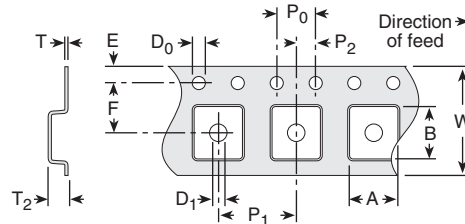
FC4L Four Terminal Current Sense Metal Foil Construction

PACKAGING SPECIFICATIONS

(continued)

Tape

mm (in.)



	FC4L16	FC4L32	FC4L64	FC4L76	FC4L90	FC4L110
A	0.95±0.05 (0.037)	1.90 ±0.1 (0.075)	3.43 ±0.2 (0.135)	4.15 ±0.20 (0.163)	4.85 ±0.20 (0.191)	5.40 ±0.10 (0.213)
B	1.85±0.05 (0.073)	3.50 ±0.1 (0.138)	6.63 ±0.2 (0.261)	7.95 ±0.20 (0.313)	9.35 ±0.20 (0.368)	11.50 ±0.10 (0.453)
W	8.00±0.10 (0.315)	8.00 ±0.2 (0.315)	12.0 ±0.3 (0.472)	16.00 ±0.30 (0.630)	16.00 ±0.30 (0.630)	24.00 ±0.30 (0.945)
F	3.50±0.05 (0.138)	3.50 ±0.05 (0.138)	1.75 ±0.1 (0.069)	7.50 ±0.10 (0.295)	7.50 ±0.10 (0.295)	1.75 ±0.10 (0.069)
E	1.75±0.10 (0.069)	1.75 ±0.1 (0.069)	5.5 ±0.05 (0.217)	1.75 ±0.10 (0.069)	1.75 ±0.10 (0.069)	11.50 ±0.10 (0.453)
P0	4.00±0.10 (0.157)	4.0 ±0.1 (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)
P1	4.00±0.10 (0.157)	4.0 ±0.1 (0.157)	4.0 ±0.1 (0.157)	8.00 ±0.10 (0.315)	8.00 ±0.10 (0.315)	8.00 ±0.10 (0.315)
P2	2.00±0.05 (0.079)	2.0 ±0.05 (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)
D0	1.50+0.10/-0 (0.059)	1.50 +0.1/-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)
D1	0.60±0.05 (0.024)	1.00 +0.2/-0 (0.039)	1.5 +0.2/-0 (0.059)			1.50 ±0.10 (0.059)
T	0.20±0.05 (0.008)	0.20 ±0.05 (0.008)	0.20 ±0.05 (0.008)	0.30 ±0.10 (0.012)	0.30 ±0.10 (0.012)	0.30 ±0.05 (0.012)
T2	0.55±0.05 (0.022)	1.00 ±0.2 (0.039)	1.5 (0.059) max.	1.60 (0.063) max.	1.60 (0.063) max.	1.2 ±0.15 (0.047)

ORDERING INFORMATION

Ohms					
R005=0.005Ω					
R050=0.050Ω					
RoHS Compliant					
FC4L110R005FER					
Series	TCR* (ppm)	Package Size	Tolerance	Taping Code	
	W = 25	110=11050=5W	J = 5%	1,000 pc/reel	
	V = 50	64=6432=2W	G = 2%	FC4L16: 5,000 pc/reel	
	L = per chart above	32=3216=1W	F = 1%		
		16=1608=0.25W	D = 0.5%		

*FC4L32 and FC4L64 values over 0.1000Ω only

Standard Part Numbers for FC4L series

	0.25 watt	1 watt	2 watt	3 watt	4 watt	5 watt
		FC4L32R001JER	FC4L64R001JER	FC4L76R001GER	FC4L90R001GER	FC4L110R001JER
		FC4L32R002GER	FC4L64R002GER	FC4L76R002FER	FC4L90R002FER	FC4L110R002GER
		FC4L32R003FER	FC4L64R003FER	FC4L76R003FER	FC4L90R003FER	FC4L110R003FER
FC4L16R005FER		FC4L32R005FER	FC4L64R005FER	FC4L76R005FER	FC4L90R005FER	FC4L110R005FER
FC4L16R010FER		FC4L32R010FER	FC4L64R010DER	FC4L76R010FER	FC4L90R010FER	FC4L110R010DER
FC4L16R015FER		FC4L32R015FER	FC4L64R015DER	FC4L76R015FER	FC4L90R015FER	FC4L110R015DER
FC4L16R020FER		FC4L32R020FER	FC4L64R020DER	FC4L76R020FER	FC4L90R020FER	FC4L110R020DER
FC4L16R025FER		FC4L32R025FER	FC4L64R025DER	FC4L76R025FER	FC4L90R025FER	FC4L110R025DER
FC4L16R030FER		FC4L32R030FER	FC4L64R030DER			FC4L110R030DER
		FC4L32R030FER	FC4L64R030FER			FC4L110R030FER
FC4L16R050FER		FC4L32R050FER	FC4L64R050DER			FC4L110R050DER
FC4L16R100FER		FC4L32R100FER	FC4L64R050FER			FC4L110R050FER
			FC4L64R100FER			FC4L110R100FER