

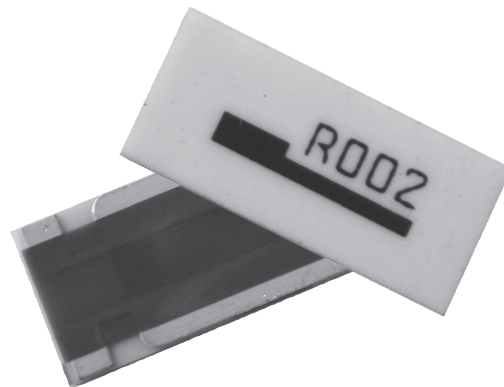


**THE DATASHEET OF  
FC4L32R010FER**



# 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 SPECIFICATIONS

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 2mΩ 3mΩ 4mΩ ~ 500mΩ	±5% ±2% ±1% ±1%	±100 ±100 ±100 ±50	0.015	FC4L90	4W	1m-4mΩ 5m-25mΩ	±1% ±0.5%, 1%	±100 ±50	0.082
FC4L64	2W	1mΩ 2mΩ 3mΩ 4m ~ 100mΩ 10m ~ 50mΩ	±5% ±2% ±1% ±1% ±0.5%	±100 ±100 ±100 ±50 ±50	0.038	FC4L110	5W	1mΩ 2mΩ 3mΩ ~ 100mΩ 10m ~ 50mΩ	±5% ±2% ±1% ±0.5%	±100 ±50 ±50 ±50	0.110

### CHARACTERISTICS

Test Condition	Maximum ΔR
<b>Max. temperature for rated power</b> 70°C	
<b>Operating temperature range</b> -55°C ~ +155°C (FC4L16: -40°C ~ +125°C)	
<b>Rated voltage</b> $\sqrt{(\text{Rated power} \times \text{Resistance value})}$ V	
<b>Overload</b> (FC4L16 only) Rated power x 1.5 for 5s	±(0.5%+0.0005Ω)
<b>In-rush current</b> Rated current 10 msec ON, 60 sec OFF, 10 cycles. (see table next page)	±(1.0% +0.0005Ω)
<b>Rapid change of temperature</b> -55°C (30min.)/+155°C (30min.), 100 cycles (FC4L16: 1000 cycles)	±(1.0% +0.0005Ω) (FC4L16: ±(2.0%+0.0005Ω))
<b>Solderability</b> 245°C ±5°C for 3 ±0.5 sec.	Min. 90% coverage (FC4L76 & 90: 95%)
<b>Endurance</b> 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))
<b>Resistance to soldering heat</b> 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)
<b>Moisture resistance</b> 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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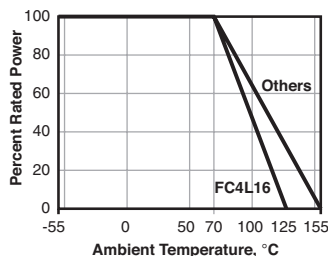
### CHARACTERISTICS

#### 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

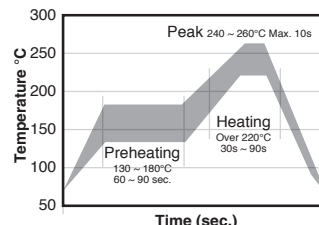
For lead free soldering (Sn-Ag-Cu solder)

Preheating: 130° ~ 180° 60s ~ 90s

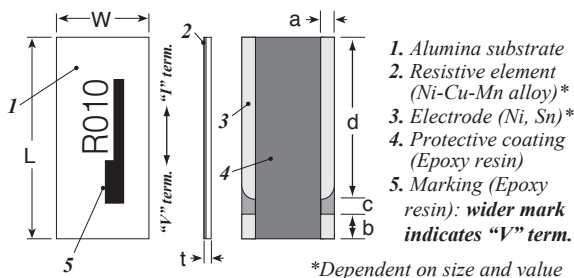
Heating: Over 220° 30s ~ 90s

Peak: 240° ~ 260° Max. 10s

Max. number of reflow: 2



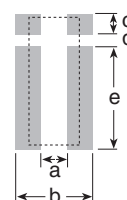
### DIMENSIONS



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

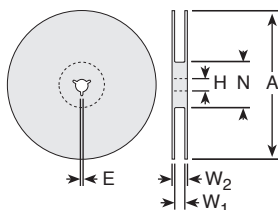


Rating	L (in.±.008/mm±0.20)	W (in./mm)	a (in./mm)	b mm ±0.15	c mm ±0.1	d mm ±0.15	t mm
FC4L16	0.063 / 1.60	0.031 / 0.8	0.010 / 0.26	0.30 ±.2	0.3 ±.2	1.0 ±.2	0.5 +.2/-0.05
FC4L32	0.126 / 3.20	0.063 / 1.6	0.014 / 0.35	0.35	0.2	2.6	0.5 +.2/-0.05
FC4L64	0.251 / 6.40	0.126 / 3.2	0.020 / 0.5	0.7	0.5	5.2	0.5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

### PACKAGING SPECIFICATIONS

#### Reel



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

(continued)

# FC4L Series

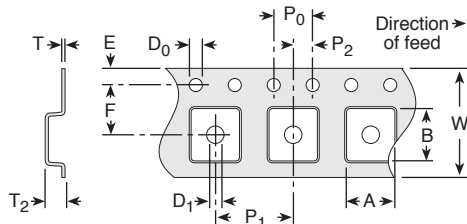
## FC4L Four Terminal Current Sense Metal Foil Construction

### PACKAGING SPECIFICATIONS

(continued)

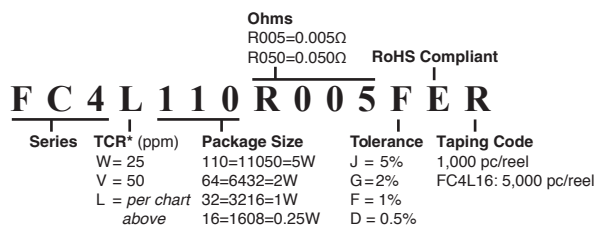
#### Tape

inches (mm)



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

### ORDERING INFORMATION



\*FC4L32 and FC4L64 values over 0.100Ω 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
			FC4L64R010DER	FC4L76R010FER	FC4L90R010FER	FC4L110R010DER
FC4L16R010FER		FC4L32R010FER	FC4L64R010FER			FC4L110R010FER
			FC4L64R015DER	FC4L76R015FER	FC4L90R015FER	FC4L110R015DER
FC4L16R015FER		FC4L32R015FER	FC4L64R015FER			FC4L110R015FER
			FC4L64R020DER	FC4L76R020FER	FC4L90R020FER	FC4L110R020DER
FC4L16R020FER		FC4L32R020FER	FC4L64R020FER			FC4L110R020FER
			FC4L64R025DER	FC4L76R025FER	FC4L90R025FER	FC4L110R025DER
FC4L16R025FER		FC4L32R025FER	FC4L64R025FER			FC4L110R025FER
			FC4L64R030DER	FC4L76R030FER	FC4L90R030FER	FC4L110R030DER
FC4L16R030FER		FC4L32R030FER	FC4L64R030FER			FC4L110R030FER
			FC4L64R050DER	FC4L76R050FER	FC4L90R050FER	FC4L110R050DER
FC4L16R050FER		FC4L32R050FER	FC4L64R050FER			FC4L110R050FER
FC4L16R100FER		FC4L32R100FER	FC4L64R100FER			FC4L110R100FER

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