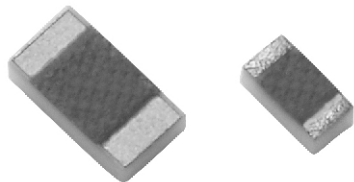


## High Frequency (up to 20 GHz) Resistor, Thin Film Surface Mount Chip



FC series chip resistors are designed with low internal reactance. They function as almost pure resistors on a very high range of frequencies. The specialized laser edge trimming allows for precision tolerances to 0.1 %.

### FEATURES

- Small standard size 0402 case size
- Edge trimmed block resistors
- Alumina substrate high purity (99.6 %)
- Ohmic range (10  $\Omega$  to 1000  $\Omega$ )
- Small internal reactance (< 10 m $\Omega$ )
- Low TCR (down to  $\pm 25$  ppm/ $^{\circ}$ C)
- Epoxy bondable termination available
- Compliant to RoHS directive 2002/95/EC



**RoHS\***  
COMPLIANT

### APPLICATIONS

- Low noise amplifiers
- Attenuation
- Line termination

### STANDARD ELECTRICAL SPECIFICATIONS

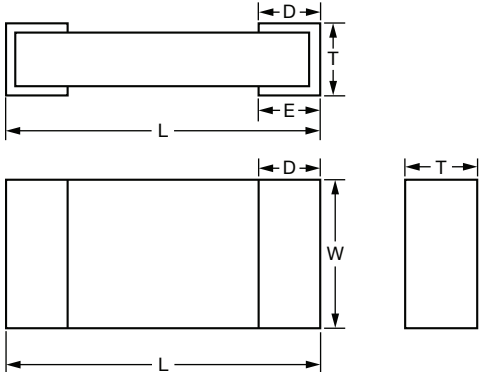
TEST	SPECIFICATIONS	CONDITIONS
Material	Passivated nichrome	-
Resistance Range	10 $\Omega$ to 1000 $\Omega$	Case size dependent
TCR: Absolute	$\pm 25$ ppm/ $^{\circ}$ C (standard) ( $\geq 50$ $\Omega$ ) to $\pm 100$ ppm/ $^{\circ}$ C	- 55 $^{\circ}$ C to + 125 $^{\circ}$ C
Tolerance: Absolute	$\pm 0.1$ % to $\pm 5.0$ %	+ 25 $^{\circ}$ C
Stability: Absolute	$\Delta R \pm 0.02$ %	2000 h at 70 $^{\circ}$ C
Stability: Ratio	-	-
Voltage Coefficient	0.1 ppm/V	-
Working Voltage	30 V to 75 V	-
Operating Temperature Range	- 55 $^{\circ}$ C to + 125 $^{\circ}$ C	-
Storage Temperature Range	- 55 $^{\circ}$ C to + 150 $^{\circ}$ C	-
Noise	< - 35 dB	-
Shelf Life Stability: Absolute	$\Delta R \pm 0.01$ %	1 year at + 25 $^{\circ}$ C

### COMPONENT RATINGS

CASE SIZE	POWER RATING (mW)	WORKING VOLTAGE (V)	RESISTANCE RANGE ( $\Omega$ )
0402	50	30	16 to 1000
0505	125	37	20 to 1000
0603	125	50	10 to 1000
0805	200	50	10 to 1000
1005	250	75	10 to 1000
1206	330	75	10 to 1000

\* Pb containing terminations are not RoHS compliant, exemptions may apply

**DIMENSIONS** in inches (millimeters)

	CASE SIZE	LENGTH	WIDTH W (± 0.005)	THICKNESS MIN./MAX.	TOP PAD D (± 0.005)	BOTTOM PAD E (± 0.005)
	0402	0.040 ± 0.003 (1.016 ± 0.076)	0.020 (0.508)	0.015 (0.381)	0.012 (0.305)	0.015 (0.381)
	0505	0.050 ± 0.005 (1.270 ± 0.127)	0.050 (1.270)	0.015 (0.381)	0.012 (0.305)	0.015 (0.381)
	0603	0.064 ± 0.006 (1.626 ± 0.153)	0.032 (0.813)	0.015 (0.381)	0.012 (0.305)	0.015 (0.381)
	0805	0.080 ± 0.006 (2.032 ± 0.153)	0.050 (1.270)	0.015 (0.381)	0.016 ± 0.008 (0.407 ± 0.254)	0.015 (0.381)
	1005	0.100 ± 0.008 (2.540 ± 0.204)	0.053 (1.347)	0.025 (0.635)	0.020 + 0.005/- 0.010 (0.508 + 0.127/- 0.254)	
	1206	0.126 ± 0.008 (3.201 ± 0.204)	0.063 (1.601)	0.025 (0.635)	0.020 + 0.005/- 0.010 (0.508 + 0.127/- 0.254)	

**MECHANICAL SPECIFICATIONS**

Resistive Element	Passivated nichrome
Substrate Material	Alumina
Terminations	Pre-soldered or gold
Lead (Pb)-free Option	96.5 % Sn, 3.0 % Ag, 0.5 % Cu
Tin/Lead Option	Sn63
Lead (Pb)-free Finish and Tin/Lead	Hot solder dip

**GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: FC1206E1001BBTS

F	C	1	2	0	6	E	1	0	0	1	B		B		T	S
F	C	1	2	0	6	K	1	0	0	0	B	T	B	S	T	S

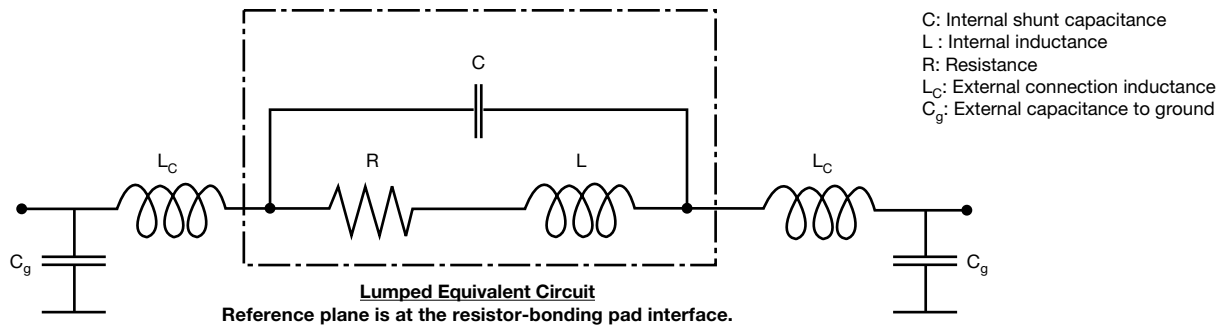
GLOBAL MODEL	CASE SIZE	TCR CHARACTERISTIC	RESISTANCE	TOLERANCE	TERMINATION (1, 2 or 3 digits)	PACKAGING
FC	0402 0505 0603 0805 1005 1206	E = 25 ppm/°C H = 50 ppm/°C K = 100 ppm/°C	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point.  Example: 10R0 = 10 Ω 1000 = 100 Ω 1001 = 1 kΩ	B = 0.1 % D = 0.5 % F = 1 % G = 2 % J = 5 %	T = Top sided Au (gold) term Au over Ni epoxy bondable RoHS compliant - e4 B = Wraparound Sn/Pb solder 63 % Sn/37 % Pb w/nickel barrier G = Wraparound Au over Ni (gold) termination epoxy bondable RoHS compliant - e4 TB = Top sided Sn/Pb solder 63 % Sn/37 % Pb w/nickel barrier TBS = Top sided lead (Pb)-free solder w/nickel barrier RoHS compliant - e1 S = Wraparound lead (Pb)-free solder 96.5 % Sn/3.0 % Ag/0.5 % Cu RoHS compliant - e1	BS = BULK 100 min., 1 mult WS = WAFFLE 100 min., 1 mult  TAPE AND REEL T0 = 100 min., 100 mult T1 = 1000 min., 1000 mult <sup>(1)</sup> T3 = 300 min., 300 mult T5 = 500 min., 500 mult TF = Full reel TS = 100 min., 1 mult

Historical Part Number example: FC1206E1001BBT (for reference purposes only)

FC	1206	E	1001	B	B	T
SERIES	CASE SIZE	TCR CHARACTERISTIC	RESISTANCE	TOLERANCE	TERMINATION	PACKAGING

**Note**<sup>(1)</sup> Preferred packaging code

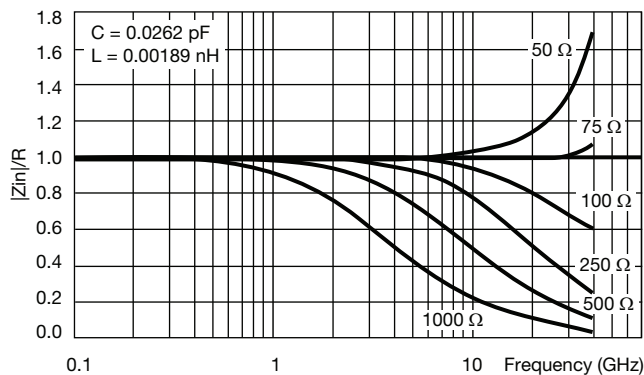
## TYPICAL HIGH FREQUENCY PERFORMANCE ELECTRICAL MODEL AND TESTING



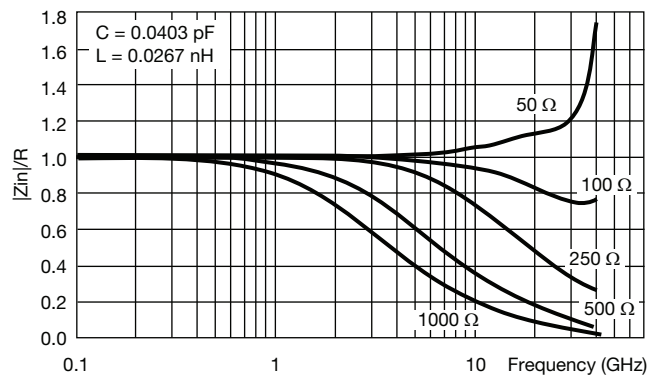
The lumped circuit above was used to model the data at the bonding pad-resistor reference plane. High frequency testing was performed by Modelithics, Inc. on parts mounted to quartz test boards. Quartz test boards were chosen to minimize the contribution of the board effects at high frequencies. Future testing will be performed on various industry standard board types. Vishay in partnership with Modelithics, Inc. will develop substrate scalable models for the FC series resistors. These models will be available for industry standard design software packages and will allow the designer to accurately model their wireless and microwave printed boards.

### INTERNAL IMPEDANCE

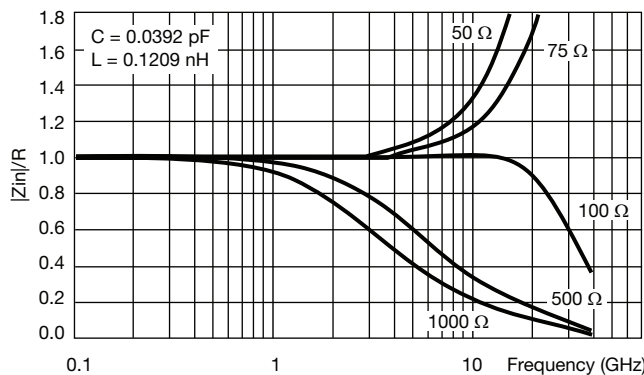
#### 0402 Flip chip

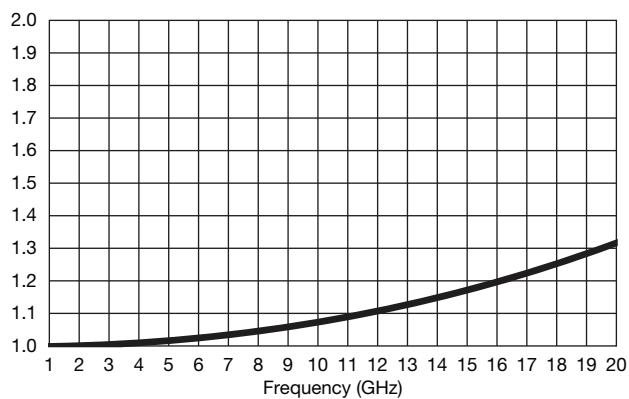
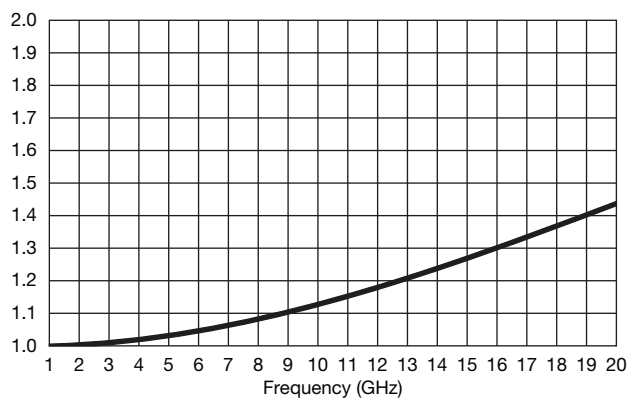


#### 0603 Flip chip



#### 0402 Wraparound



**VSWR FC Series 0402 size 50  $\Omega$** **VSWR FC Series 0402 size 100  $\Omega$** 



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