Vishay Dale Thin Film



High Frequency 60 GHz High Power 1 W Thin Film Surface Mount Chip Resistor



## LINKS TO ADDITIONAL RESOURCES



FCHP 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 %.

Aluminum nitride substrate allows for higher power capability versus standard frequency chip resistor.

Modelithics and Vishay have partnered to offer free access of highly accurate, scalable advanced simulation models. Request the Modelithics Vishay model library: www.modelithics.com/mvp/vishay

### FEATURES

- Thin film microwave resistors
- Operating frequency to 60 GHz
- Small standard case size (0402)
- High power (1 W)
- Small internal reactance (< 10 mΩ)</li>
- Edge sense trimmed block resistors
- High thermal conductivity aluminum nitride substrate
- Ohmic range (50  $\Omega$  and 100  $\Omega$ )
- Low TCR (down to ± 25 ppm/°C)
- Epoxy bondable, wire bondable, and solderable termination styles
- Modelithics<sup>®</sup> library available
- Flame retardant per AEC-Q200-001
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

#### Note

This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

#### APPLICATIONS

- · 5G base stations and small cells
- RF and microwave test systems
- Connected car
- Internet of things (IoT)

STANDARD ELECTRICAL SPECIFICATIONS					
TEST	SPECIFICATIONS	TEST CONDITIONS			
Material	Passivated nichrome	-			
Resistance Range	50 Ω / 100 Ω	-			
TCR: Absolute	± 25 ppm/°C to ± 100 ppm/°C	-55 °C to +125 °C			
Tolerance: Absolute	± 0.1 % to ± 5.0 %	+25 °C			
Stability: Absolute	$\Delta R \pm 0.50 \%$	1000 h at 100 °C			
Stability: Ratio	-	-			
Voltage Coefficient	0.1 ppm/V	-			
Working Voltage	30 V	-			
Operating Temperature Range	-55 °C to +155 °C	-			
Storage Temperature Range	-55 °C to +155 °C	-			
Noise	< -35 dB	-			
Shelf Life Stability: Absolute	△ <i>R</i> ± 0.01 % 1 year at +25				



FCHP

FREE Available GREEN (5-2008)

RoHS\* Available HALOGEN



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COMPONENT RATINGS						
CASE SIZE POWER RATING (mW)		WORKING VOLTAGE (V)	RESISTANCE RANGE ( $\Omega$ )			
0402	1000 (1)	30	50 / 100			

Note

 $^{(1)}\,$  Dependent on component mounting by user



MECHANICAL SPECIFICATIONS				
Resistive Element	Passivated nichrome			
Substrate Material	Aluminum nitride			
Terminations	Pre-soldered or gold			
Lead (Pb)-free Option	100 % matte tin			
Tin/Lead Option	Tin lead solder			
Lead (Pb)-free Finish and Tin / Lead	Electroplated			



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GLOBAL PART NUMBER INFORMATION							
New Global Part Numbering: FCHP       F     C     H     P     0	0402E1000BSTS 4 0 2	<b>E</b> 1	0 0 0	BS	TS		
GLOBAL MODEL FCHP G402 GLOBAL GASE GHARACTERISTIC E = 25 ppm/°C H = 50 ppm/°C K = 100 ppm/°C	The first 3 digits are significant	TOLERANCE $B = 0.1 \%$ $D = 0.5 \%$ $F = 1 \%$ $G = 2 \%$ $J = 5 \%$	TERMINATION (1, 2, or 3 digits) T = top sided Au (gold) term Au over Ni epoxy bond only RoHS- compliant - e4 B = wraparound Sn/Pb solder nickel barrier G = wraparound Au over Ni (gold) termination epoxy bondable RoHS- compliant - e4 S = wraparound lead (Pb)-free solder RoHS- compliant - e3	BS = BULK 100 min., 1 n W0 = WAFFL 100 min., 100 WS = WAFFL 100 min., 1 n WI = 100 mir (item single le WP = 100 mir (package uni date code) TAPE AND R T0 = 100 mir	E ) mult. E hult. h, 1 mult. ot date code) n., 1 mult. t single lot EEL h, 100 mult. h, 300 mult. h, 300 mult. h, 500 mult. h, 1 mult.		
Historical Part Number Example: FCHP0402E1000BST1 (for reference purposes only)							
FCHP 0402	E	1000	В	S	Т		
SERIES CASE SIZE	TCR CHARACTERISTIC	RESISTANCE	TOLERANCE	ERMINATION	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.

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FCHP

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www.vishay.com







#### Note

- (1)
- Chip surface temperature measured using FLIR SC645 thermal imaging system. Thermal imaging and load life testing conducted by mounting device to a 1.6" x 3.7" test card with 3.5 mil copper plating on both sides. Thermal vias on 50 mil centers were utilized for heat transfer between surfaces



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4 For technical questions, contact: thinfilm@vishay.com Document Number: 60162

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