

Features

- Formerly a Riedon™ product
- Resistances from 0.002 to 10 Ω
- Resistance tolerances to $\pm 0.1\%$
- TCR to ± 50 PPM/ $^{\circ}\text{C}$
- Power rating to 15 watts
- Load stability to 0.1 %
- T0-220, T0-221 housing
- Convenient SMD D²Pak available
- Isolated backplate
- Non-inductive planar construction
- RoHS compliant*

FWP220/221 Series — Riedon™ Precision Power Foil Shunt Resistors by Bourns

Specifications

Bourns Model	FWP220/221 T-2	FWP220 S-2	FWP220/221 T-4	FWP220 S-4
Resistance Range (Ω)	0.002 to 10 (other resistance values possible on request)			
Power Rating (W) - Free Air @ 70 °C With Heat Sink	1.5 15			
Thermal Resistance R _{thj-c} (°C/W)	4.8			
Tolerances from 0.002 Ω from 0.01 Ω from 0.1 Ω	2 % / 5 % 1 % / 2 % / 5 % 0.5 % / 1 % / 2 % / 5 %		1 % / 2 % / 5 % 0.1 % / 0.25 % / 0.5 % / 1 % / 2 % / 5 % —	
Stability	0.1 % / 0.2 % / 0.5 % (depends on stress)			
Temperature Coefficient	All from (+20 to +60 °C) ±50 PPM/°C		All from (+20 to +60 °C) R< 5 Ω: ±25 PPM/°C R≥ 5Ω: ±70 PPM/°C	±25 PPM/°C (+20 to +60 °C) ±50 PPM/°C (-40 to +130 °C)
Max. Current (A)	50			
Voltage Proof (VDC)	300			
Thermal EMF	< 0.1 μV/K			
Operating Temperature Range	-40 to +130 °C			
Resistor Material	CuNiMn-Foil			
Substrate	Al ₂ O ₃ or anodized aluminium			
Housing	Epoxy or PPS			
Connector Material	Cu / tinned			
Terminals	2		4	
Max. Torque	T220: 1 Nm / T221: 0.8 Nm			

How To Order

FWP 220 T 2 - R002 - F

Model _____
 FWP _____
 Housing _____
 220 _____
 221 _____
 Terminal Style _____
 T = THT (Through-hole)
 S = SMD (Surface Mount)
 Terminals _____
 2 _____
 4 _____
 Resistance _____
 "R" represents decimal point
 (example: R002 = 0.002 Ω ,
 5R00 = 5.00 Ω , 10R0 = 10 Ω)
 "L" represents m Ω for resistance
 (example: 3L20=0.0032)
 Tolerance _____
 B = $\pm 0.1\%$ F = $\pm 1\%$
 C = $\pm 0.25\%$ G = $\pm 2\%$
 D = $\pm 0.5\%$ J = $\pm 5\%$

Packaging Information

THT Terminals (T):
 Tube 50 pcs. per tube
 SMD Terminals (S):
 Tape and Reel 500 pcs. per reel

Additional Information

Click these links for more information:



CALIFORNIA WARNING: Can expose you to lead, a carcinogen and reproductive toxicant.
 See www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
 Specifications are subject to change without notice.
 Users should verify actual device performance in their specific applications.
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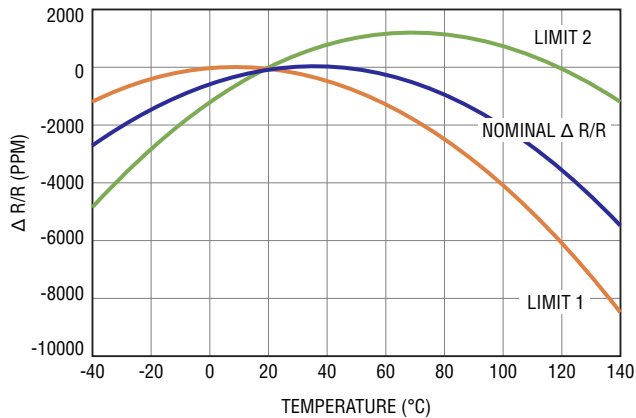
Applications

- Battery management systems
- Power supplies
- Power modules
- Frequency converters

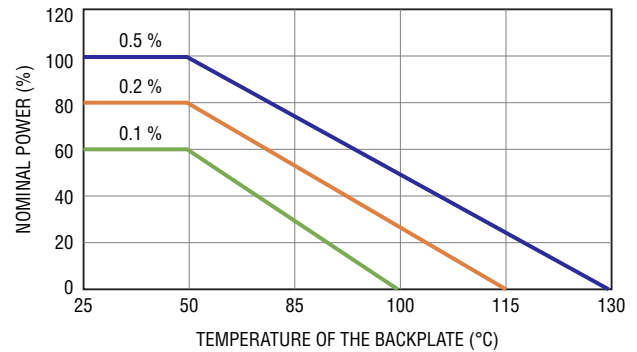
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BOURNS®

Temperature Coefficient



Power Derating Curve



Power Rating Notes

The FWP Series Resistors must be attached to a suitable heat sink. The maximum internal resistor temperature is 130 °C.

To specify an appropriate heat sink use the following formula:

$$R_{\theta H} = \frac{T_{MAX} - (P \times R_{\theta R}) - T_A}{P}$$

Where: $R_{\theta H}$ = Thermal Resistance of Heat Sink (K/W)

$R_{\theta R}$ = Thermal Resistance of Resistor (K/W)

T_{MAX} = Maximum Temperature of Resistor

T_A = Ambient Temperature of Heat Sink (°C)

P = Power Through Resistor (W)

Performance Characteristics

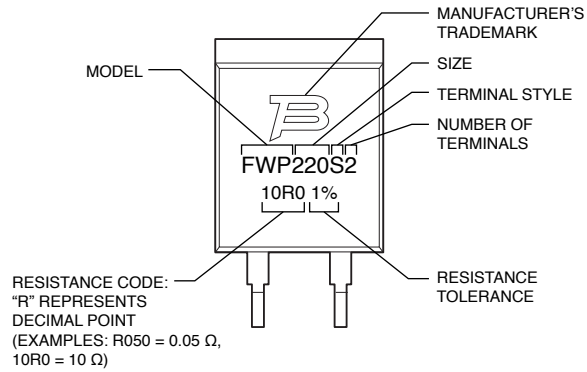
Test	Conditions	Test Method	
		Reference	Limit
Load Life	1000 hours, ON/OFF with rated power at +25 °C	MIL-STD-202 Method 108	$\Delta R < \pm 1 \%$
High Temperature Exposure	+155 °C for 1000 hours	MIL-STD-202 Method 303	$\Delta R < \pm 1 \%$
Low Temperature Storage	-55 °C for 24 hours	MIL-STD-202 Method 303	$\Delta R < \pm 0.5 \%$
Thermal Shock	-55 °C to +155 °C, 5 cycles	MIL-STD-202 Method 107	$\Delta R < \pm 0.5 \%$
Humidity Resistance	+40 °C / 90 % for 240 hours	MIL-STD-202 Method 103	$\Delta R < \pm 0.5 \%$
Resistance to Solder Heat	Solder dipping at 260 °C for 10 sec.	MIL-STD-202 Method 210	$\Delta R < \pm 0.5 \%$
Short Time Overload	2.5x rated power for 5 sec.	MIL-STD-202 Method 303	$\Delta R < \pm 0.5 \%$

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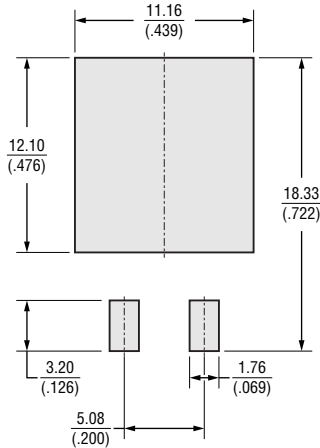
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Typical Part Marking

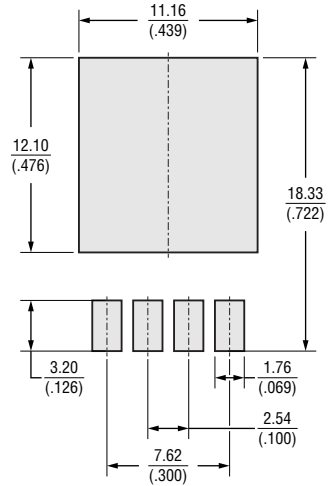


Suggested Layout

FWP220S2



FWP220S4



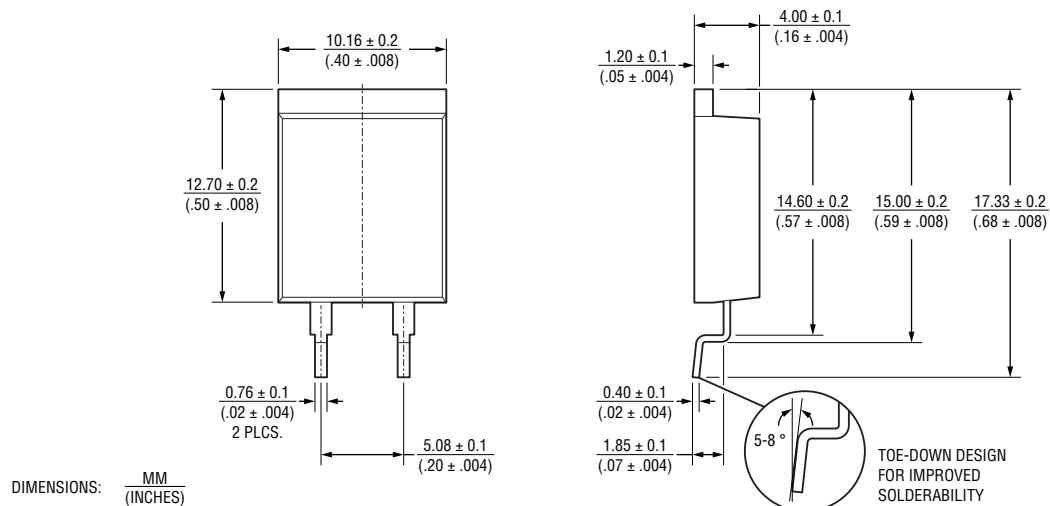
DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

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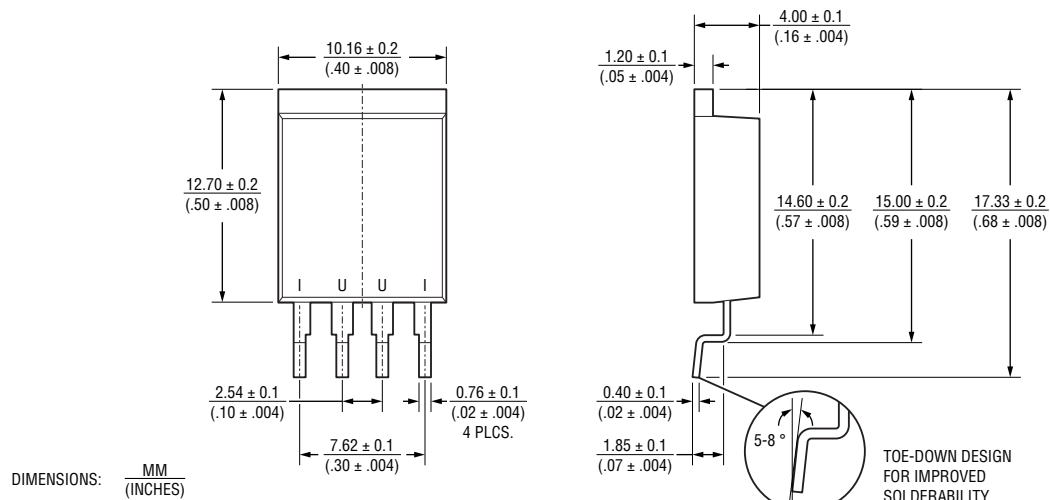
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Product Dimensions

FWP220S2



FWP220S4



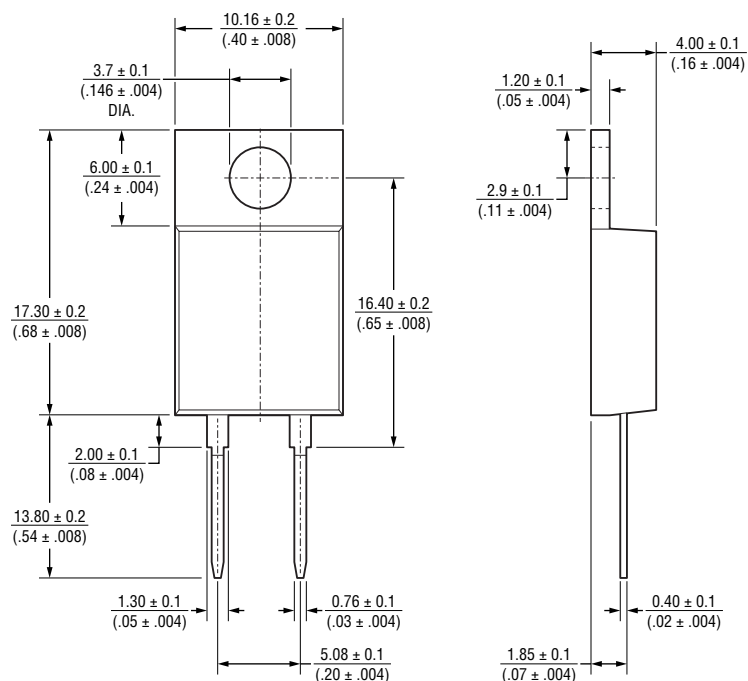
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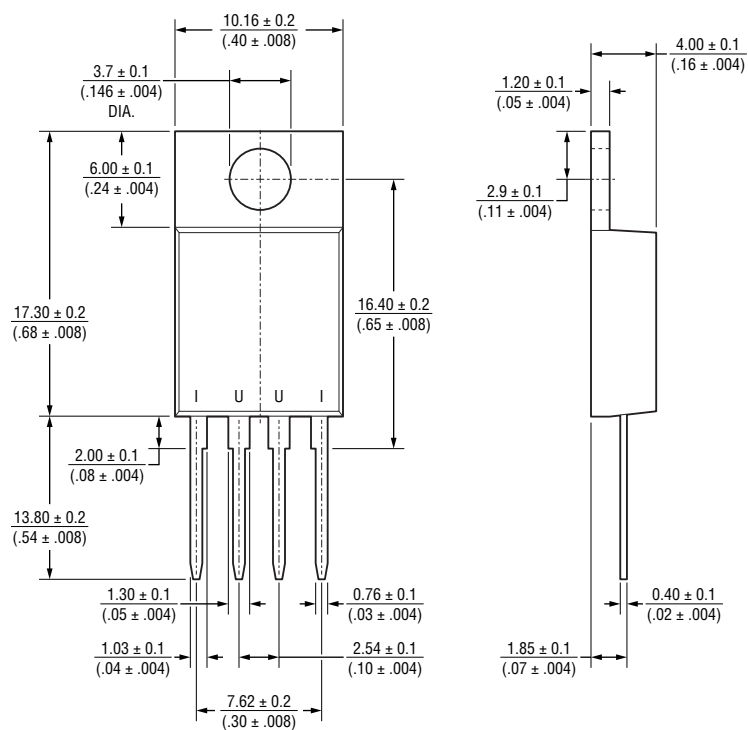
BOURNS®

FWP220T2



DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

FWP220T4

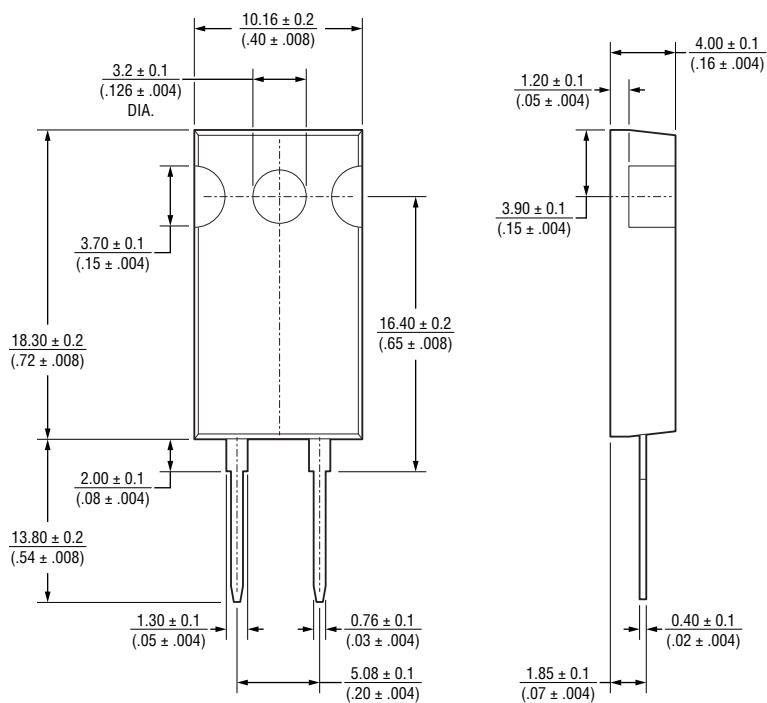


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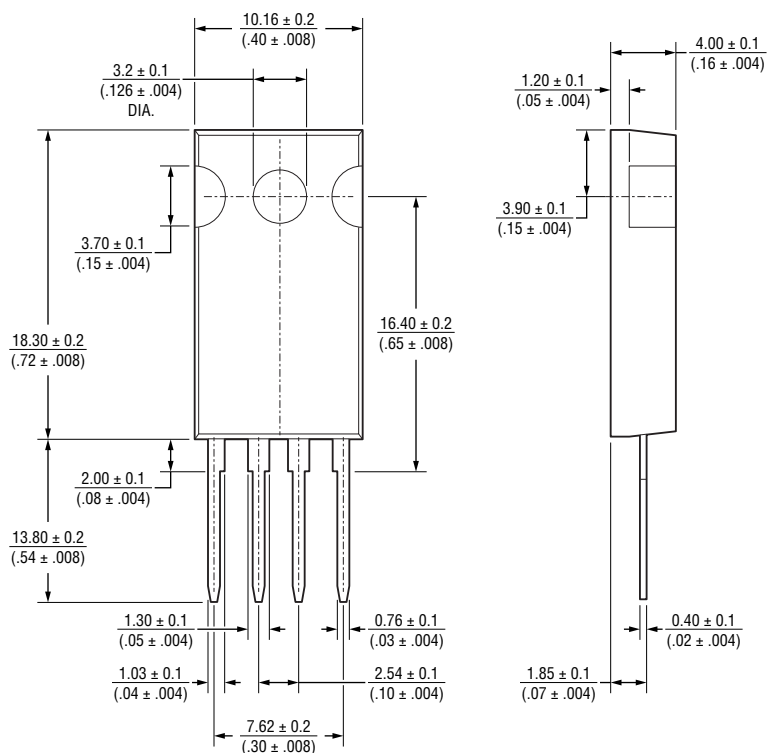
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Product Dimensions (continued)

FWP221T2

DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

FWP221T4

DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

REV. 11/25

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