

## Features

- Formerly a Riedon™ product
- Resistance values as low as 0.2 Ω
- Power rating to 15 W
- Resistance tolerance to ±0.01 %
- TCR to ±1 PPM/°C
- Available in 2- and 4-terminal versions
- TO-220, TO-221 and D<sup>2</sup>PAK packages

## Applications

- Digital multimeters
- High-end audio equipment
- Precision measurement instruments

## FWU Series – Riedon™ Ultra Precision Foil Power Resistors by Bourns

### Electrical Characteristics

Bourns Models	Terminals	Power Rating		Substrate	Resistance Range (Ω)	Tolerance	TCR	
		R < 50 Ω	Power					
FWU2202, FWU2212	2	Free Air	R < 50 Ω	1.5 W	Al <sub>2</sub> O <sub>3</sub>	0.5 to 150k	±0.01 % (R ≥ 50 Ω) ±0.02 % (R ≥ 25 Ω) ±0.05 % (R ≥ 10 Ω) ±0.1 % ±0.25 % ±0.5 % ±1 %	±5 PPM/°C (-55 to +155 °C)  ±3 PPM/°C (-55 to +125 °C)  ±1 PPM/°C (+25 to +60 °C)
			R ≥ 50 Ω	1.0 W				
		Heat Sink	R < 50 Ω	10 W				
			R ≥ 50 Ω	6 W				
		Free Air	R < 50 Ω	1.5 W	AlN	T: 0.5 to 100 S: 0.5 to 5k		
			R ≥ 50 Ω	1.0 W				
		Heat Sink	R < 50 Ω	15 W				
			R ≥ 50 Ω	10 W				
FWU2204, FWU2214	4	Free Air		1.5 W	Al <sub>2</sub> O <sub>3</sub>	0.2 to 80	±0.01 % (R ≥ 50 Ω) ±0.02 % (R ≥ 50 Ω) ±0.05 % (R ≥ 10 Ω) ±0.1 % ±0.25 % ±0.5 % ±1 %	
		Heat Sink		10 W				
		Free Air		1.5 W	AlN			
		Heat Sink		15 W				

### Environmental Characteristics

Specification	Value			
Operating Temperature	-55 °C to +155 °C			
Thermal EMF	< 0.1 μV/°C			
Thermal Resistance (°C/W)	FWU2202T	R < 50 Ω	Al <sub>2</sub> O <sub>3</sub>	10.5
			AlN	7.0
		R ≥ 50 Ω	Al <sub>2</sub> O <sub>3</sub>	17.5
			AlN	10.5
	FWU2202S	R < 50 Ω	Al <sub>2</sub> O <sub>3</sub>	10.8
			AlN	6.8
		R ≥ 50 Ω	Al <sub>2</sub> O <sub>3</sub>	18.8
			AlN	10.8
FWU2204	Al <sub>2</sub> O <sub>3</sub>	10.8		
	AlN	6.8		
Dielectric Withstanding Voltage	1 kVDC			
Max. Torque (THT Type)	1 Nm			
Storage Conditions Temperature Humidity	+5 °C to +35 °C 40 % to 75 %			
Moisture Sensitivity Level	1			

### Additional Information

Click these links for more information:



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### Packaging Information

T (Through-hole).....50 pcs./tube  
E (SMD) .....500 pcs./13" reel



#### CALIFORNIA WARNING:

Can expose you to lead, a carcinogen and reproductive toxicant.

See [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Specifications are subject to change without notice. Users should verify actual device performance in their specific applications.

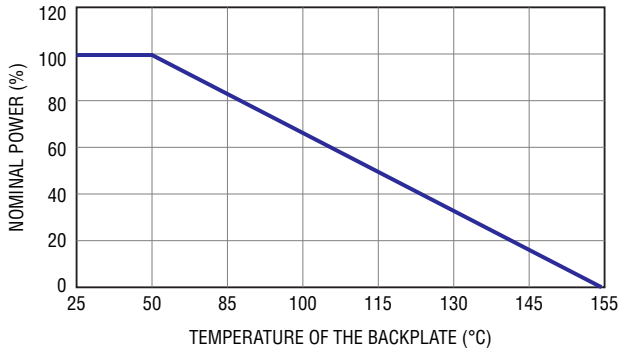
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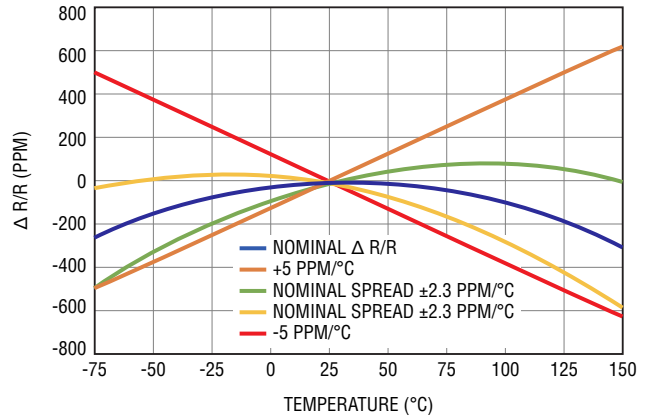
"Riedon" is a trademark of BE Services Company, Inc.

**Current Rating Thermal Derating Curve**



The PWU220 resistors must be attached to a suitable heat sink. The maximum internal resistor temperature is +155 °C.

**Temperature Coefficient**



**How To Order**

**FWU220 4 T - 10 F M 50R0 T**

Model \_\_\_\_\_  
 FWU220 = Ultra Precision Power Resistor  
 FWU221 = Ultra Precision Power Resistor

Terminals \_\_\_\_\_  
 2 = 2 pins  
 4 = 4 pins

Termination Style \_\_\_\_\_  
 T = THT (Through-hole)  
 S = SMD (Surface Mount)

Power Rating \_\_\_\_\_  
 6 = 6 W  
 10 = 10 W  
 15 = 15 W

Resistance Tolerance \_\_\_\_\_  
 L = ±0.01 %    C = ±0.25 %  
 A = ±0.05 %    D = ±0.5 %  
 B = ±0.1 %    F = ±1 %

TCR (PPM/°C) \_\_\_\_\_  
 M = ±5  
 V = ±3  
 K = ±1 (available upon request)

Resistance Value Code \_\_\_\_\_  
 <100 Ω: "R" represents decimal point  
 (example: 0R05 = 0.05 Ω, 5R00 = 5.00 Ω, 50R0 = 50 Ω)  
 ≥100 Ω: 4 digits. First three digits are significant,  
 fourth digit represents number of zeros to follow  
 (example: 1000 = 100 Ω, 5001 = 5000 Ω)

Packaging \_\_\_\_\_  
 T = Tube  
 E = Embossed Tape

**Power Rating Notes**

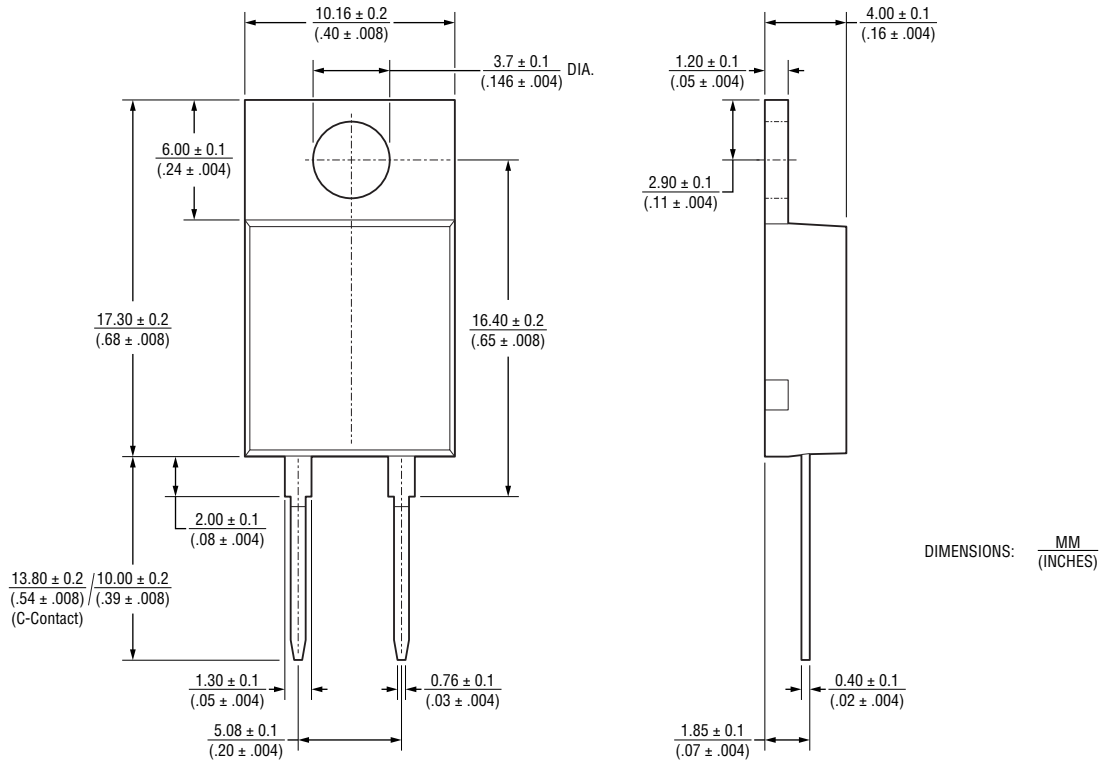
The FWU Series Resistors must be attached to a suitable heat sink. The maximum internal resistor temperature is 155 °C. To specify an appropriate heat sink use the following formula:

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

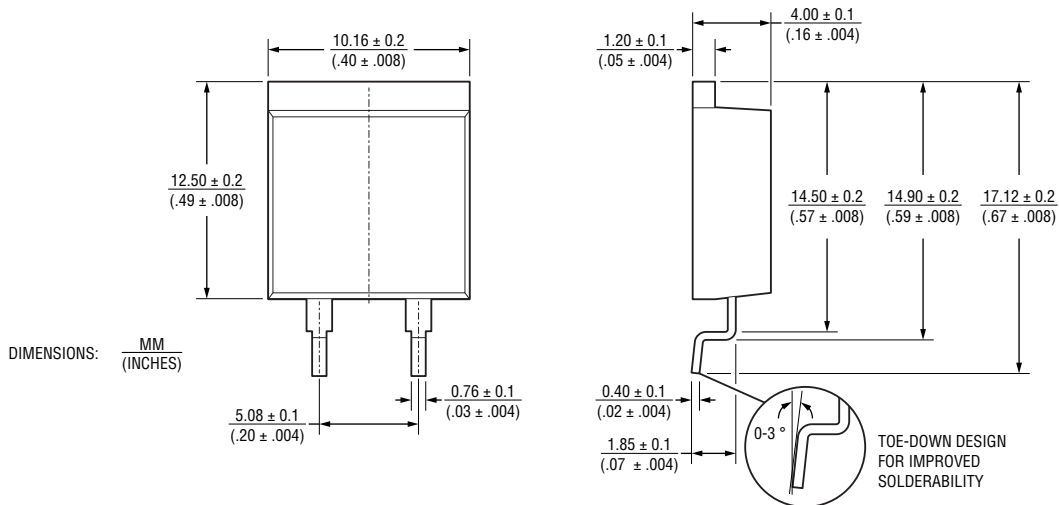
Where:  $R_{\theta H}$  = Thermal Resistance of Heat Sink (°C/W)  
 $R_{\theta R}$  = Thermal Resistance of Resistor (°C/W)  
 $T_{MAX}$  = Maximum Temperature of Resistor  
 $T_A$  = Ambient Temperature of Heat Sink (°C)  
 $P$  = Power Through Resistor (W)

Product Dimensions

FWU2202T



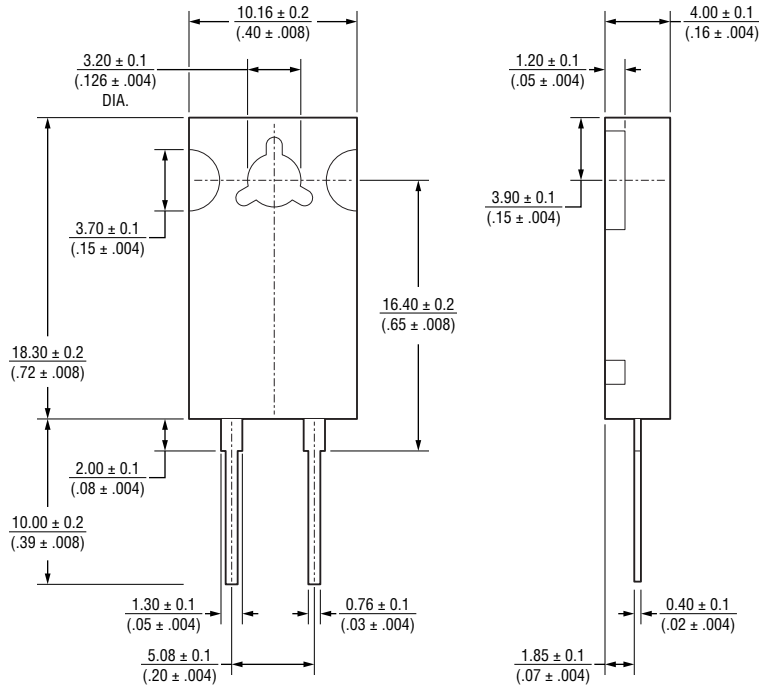
FWU2202S



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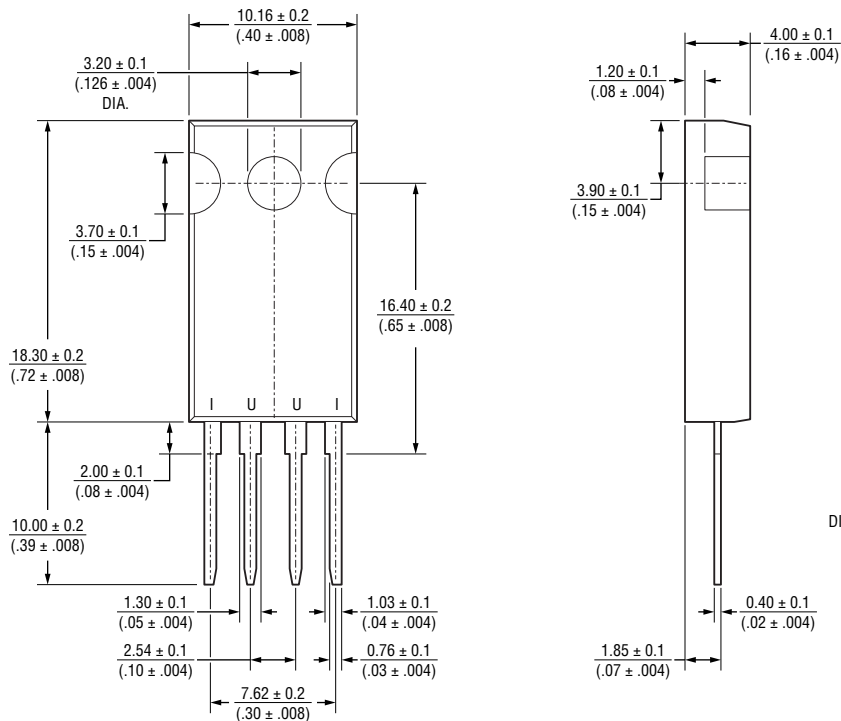
Product Dimensions (continued)

FWU2212T



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

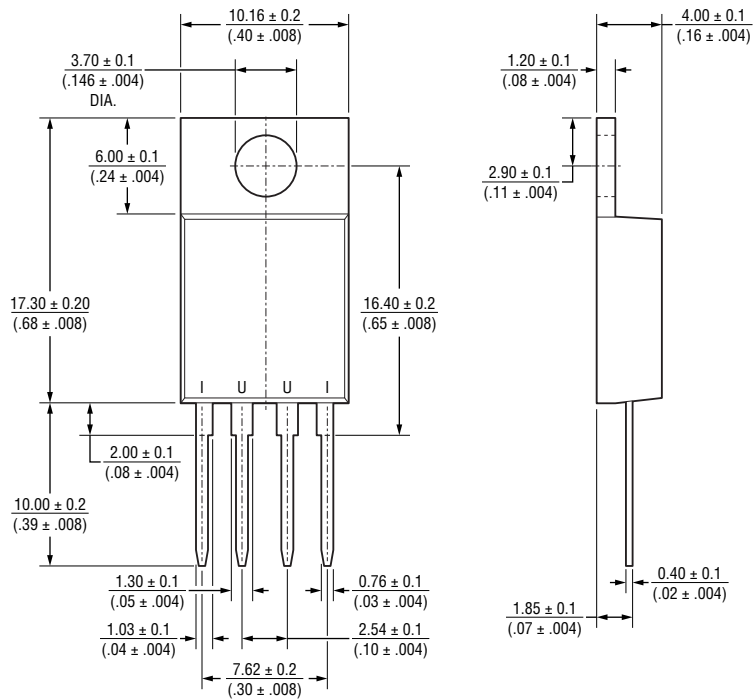
FWU2214T



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

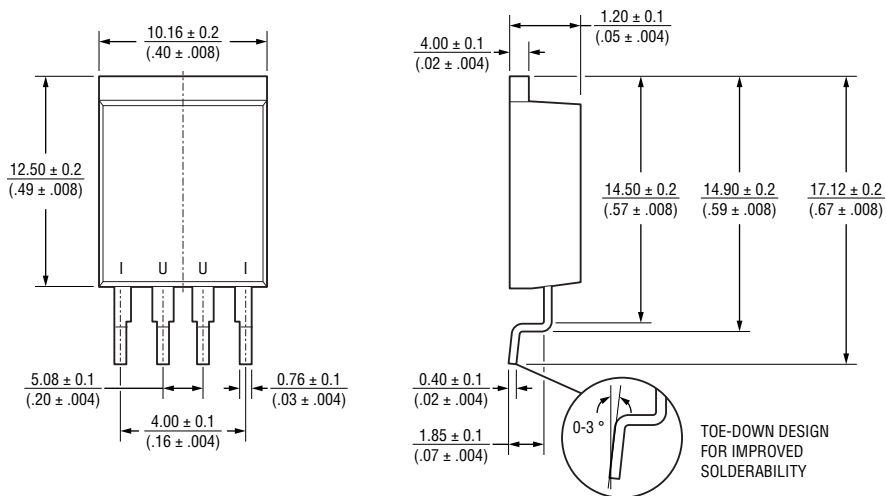
Product Dimensions (continued)

FWU2204T



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

FWU2204S



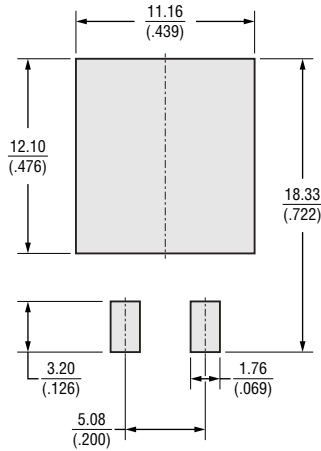
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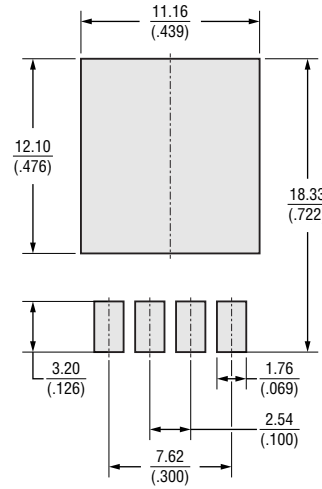
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Suggested Layout

FWU2202S

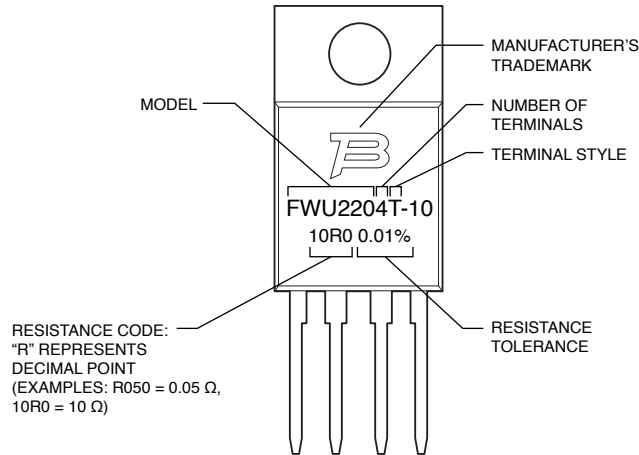


FWU2204S



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

Typical Part Marking



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