

FPR FPS 2/4-T220 T221

Precision Power Shunt Resistors



- Resistances from 0.002 Ohm to 10 Ohms
- Power Rating to 15Watt
- Resistance Tolerances to $\pm 0.1\%$
- TCR to $\pm 50\text{ppm}/^\circ\text{C}$
- Load Stability to 0.1%
- TO-220 Housing
- Convenient SMD D2Pak Available
- Isolated Back Plate
- Non-Inductive Planar Construction

SPECIFICATIONS

Type	FPR 2-T220/T221	FPS 2-T220	FPR 4-T220/T221	FPS 4-T220
Resistance Range	0.002 to 10 Ohms (other resistance values possible on request)			
Power Rating - Free air 70°C With heatsink			1.5 W	15 W
Thermal Resistance Rthj-c	4.8 °C/W			
Tolerances from 0.002 Ohms from 0.01 Ohms	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 values from (20 to 60°C) R < 0.010 Ohms : $\pm 1000\text{ ppm}/^\circ\text{C}$ 0.010 \leq R < 0.040 Ohms : $\pm 500\text{ ppm}/^\circ\text{C}$ 0.040 \leq R < 0.075 Ohms : $\pm 100\text{ ppm}/^\circ\text{C}$ 0.075 \leq R : $\pm 50\text{ ppm}/^\circ\text{C}$		$\pm 30\text{ppm}/^\circ\text{C}$ (20 to 60°C) $\pm 50\text{ppm}/^\circ\text{C}$ (-40 to 130°C)	
Max. Current	50 A			
Voltage Proof	300 VDC			
Thermal EMF	< 0.1 $\mu\text{V}/\text{K}$			
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	1 Nm / T221: 0.8 Nm		1 Nm / T221: 0.8 Nm	

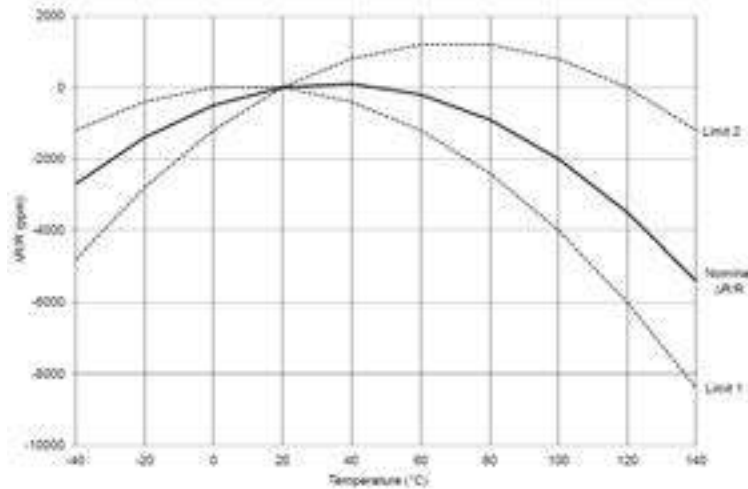
Ordering Information

Part Description: Part Type - Resistance - Tolerance
FPS 4-T220 0.01 Ohms 0.1%

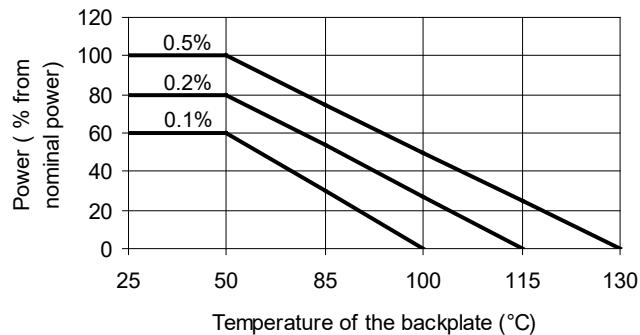


SPECIFICATIONS (continued)

Temperature Coefficient



Derating



Power Rating Notes -

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

To specify an appropriate heatsink use the following formula :

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

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

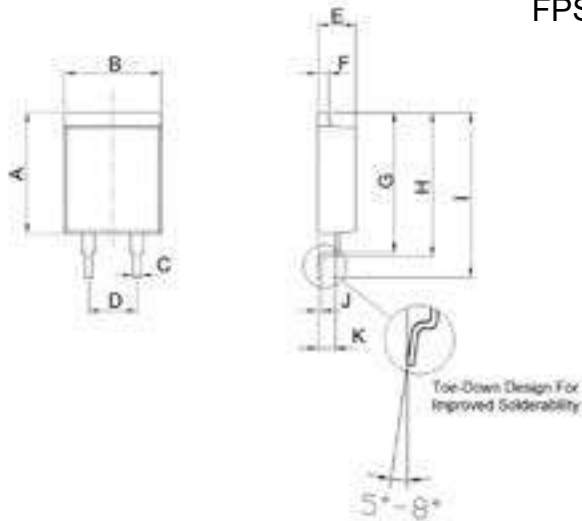
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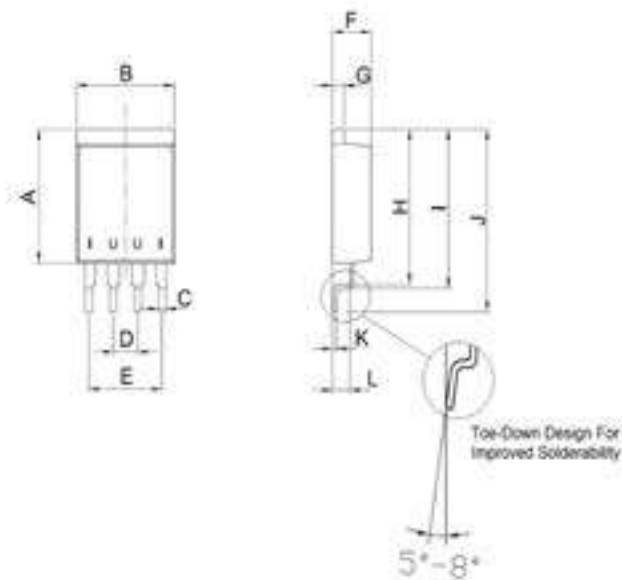
SPECIFICATIONS (continued)

Dimensions FPS 2-T220

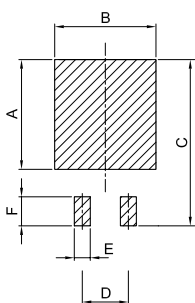


Dimension	mm	tol. (±mm)	inches	tol. (±inches)
A	12.70	0.2	0.50	0.008
B	10.16	0.2	0.40	0.008
C	0.76	0.1	0.03	0.004
D	5.08	0.1	0.20	0.004
E	4.00	0.1	0.16	0.004
F	1.20	0.1	0.05	0.004
G	14.60	0.2	0.57	0.008
H	15.00	0.2	0.59	0.008
I	17.33	0.2	0.68	0.008
J	0.40	0.1	0.02	0.004
K	1.85	0.1	0.07	0.004

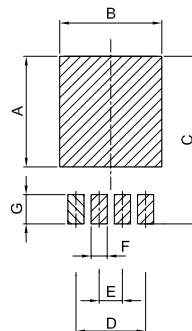
FPS 4-T220



Dimension	mm	tol. (±mm)	inches	tol. (±inches)
A	12.70	0.2	0.50	0.008
B	10.16	0.2	0.40	0.008
C	0.76	0.1	0.03	0.004
D	2.54	0.1	0.10	0.004
E	7.62	0.1	0.30	0.004
F	4.00	0.1	0.16	0.004
G	1.20	0.1	0.05	0.004
H	14.60	0.2	0.57	0.008
I	15.00	0.2	0.59	0.008
J	17.33	0.2	0.68	0.008
K	0.40	0.1	0.02	0.004
L	1.85	0.1	0.07	0.004



FPS 2-T220 Land Pattern		
Dimension	mm	inches
A	12.10	0.476
B	11.16	0.439
C	18.33	0.722
D	5.08	0.200
E	1.76	0.069
F	3.20	0.126



FPS 4-T220 Land Pattern		
Dimension	mm	inches
A	12.10	0.476
B	11.16	0.439
C	18.33	0.722
D	7.62	0.300
E	2.54	0.100
F	1.76	0.069
G	3.20	0.126

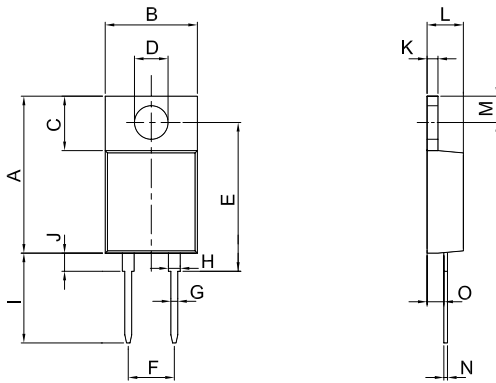
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Precision Power Shunt Resistors



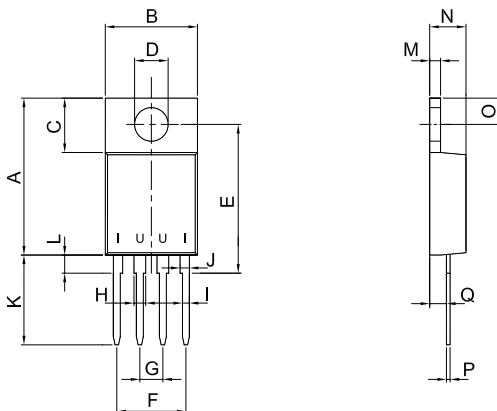
SPECIFICATIONS (continued)

FPR 2-T220



Dimension	mm	tol. (±mm)	inches	tol. (±inches)
A	17.30	0.2	0.68	0.008
B	10.16	0.2	0.40	0.008
C	6.00	0.1	0.24	0.004
D	Ø3.7	0.1	Ø0.146	0.004
E	16.40	0.2	0.65	0.008
F	5.08	0.1	0.20	0.004
G	0.76	0.1	0.03	0.004
H	1.30	0.1	0.05	0.004
I	13.80	0.2	0.54	0.008
J	2.00	0.1	0.08	0.004
K	1.20	0.1	0.05	0.004
L	4.00	0.1	0.16	0.004
M	2.90	0.1	0.11	0.004
N	0.40	0.1	0.02	0.004
O	1.85	0.1	0.07	0.004

FPR 4-T220



Dimension	mm	tol. (±mm)	inches	tol. (±inches)
A	17.30	0.2	0.68	0.008
B	10.16	0.2	0.40	0.008
C	6.00	0.1	0.24	0.004
D	Ø3.7	0.1	Ø0.146	0.004
E	16.40	0.2	0.65	0.008
F	7.62	0.2	0.30	0.008
G	2.54	0.1	0.10	0.004
H	1.30	0.1	0.05	0.004
I	0.76	0.1	0.03	0.004
J	1.03	0.1	0.04	0.004
K	13.80	0.2	0.54	0.008
L	2.00	0.1	0.08	0.004
M	1.20	0.1	0.05	0.004
N	4.00	0.1	0.16	0.004
O	2.90	0.1	0.11	0.004
P	0.40	0.1	0.02	0.004
Q	1.85	0.1	0.07	0.004

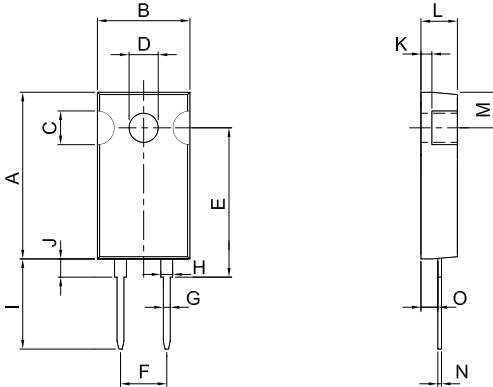
FPR FPS 2/4-T220 T221

Precision Power Shunt Resistors



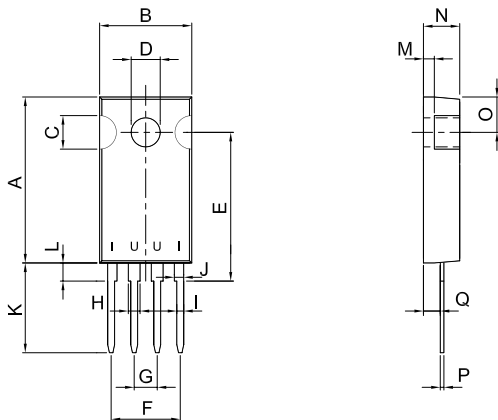
SPECIFICATIONS (continued)

FPR 2-T221



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A	18.30	0.2	0.72	0.008
B	10.16	0.2	0.40	0.008
C	3.70	0.1	0.15	0.004
D	Ø3.2	0.1	Ø0.126	0.004
E	16.40	0.2	0.65	0.008
F	5.08	0.1	0.20	0.004
G	0.76	0.1	0.03	0.004
H	1.30	0.1	0.05	0.004
I	13.80	0.2	0.54	0.008
J	2.00	0.1	0.08	0.004
K	1.20	0.1	0.05	0.004
L	4.00	0.1	0.16	0.004
M	3.90	0.1	0.15	0.004
N	0.40	0.1	0.02	0.004
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E	16.40	0.2	0.65	0.008
F	7.62	0.2	0.30	0.008
G	2.54	0.1	0.10	0.004
H	1.30	0.1	0.05	0.004
I	0.76	0.1	0.03	0.004
J	1.03	0.1	0.04	0.004
K	13.80	0.2	0.54	0.008
L	2.00	0.1	0.08	0.004
M	1.20	0.1	0.05	0.004
N	4.00	0.1	0.16	0.004
O	3.90	0.1	0.15	0.004
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