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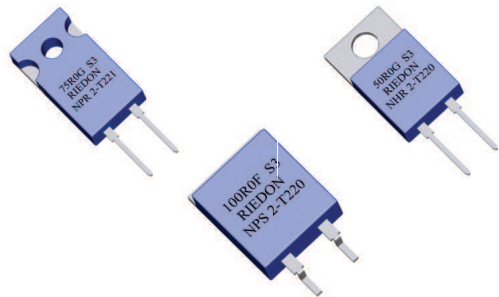
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NPR NPS 2-T220 NHR NHS 2-T220 T221

Power Resistors



- Resistances from 0.02Ohm to 100kOhms
- Power Rating to 50Watt
- Resistance Tolerances to $\pm 1\%$
- TCR to $\pm 50\text{ppm}/^\circ\text{C}$
- Load Stability to 0.5%
- TO-220 Housing
- Convenient SMD D2Pak Available

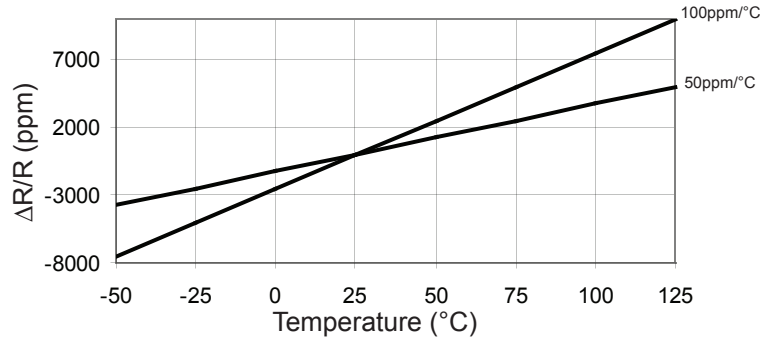


SPECIFICATIONS

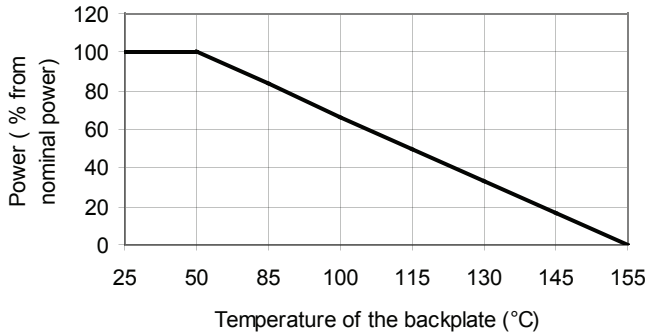
| Type | NPR / NPS | NHR / NHS | | | | | | | | | | | | | | | | |
|--|--|----------------------|------------------|----------------------------|---|----|----|----|-----|-----|----|-----|----|-----|-----|------|------|------|
| Resistance Range | 0.02 Ohms to 100kOhms | 0.02 Ohms to 15kOhms | | | | | | | | | | | | | | | | |
| Power rating free air 70°C with heatsink | 1.5 W 30 W | 1.5 W 50 W | | | | | | | | | | | | | | | | |
| Thermal Resistance Rthj-c | 3.5 K/W | 2.1 K/W | | | | | | | | | | | | | | | | |
| Tolerances from 0.02 Ohms from 1.0 Ohms | 2% / 5% 1% / 2% / 5% | | | | | | | | | | | | | | | | | |
| Stability | 0.5% | | | | | | | | | | | | | | | | | |
| Temperature Coefficient 0.02 to 0.049 Ohms 0.05 to 0.099 Ohms 0.1 Ohms to 100 kOhms | $\pm 600\text{ ppm}/^\circ\text{C}$ $\pm 300\text{ ppm}/^\circ\text{C}$ $\pm 100\text{ ppm}/^\circ\text{C}$ upon request $\pm 50\text{ ppm}/^\circ\text{C}$ | | | | | | | | | | | | | | | | | |
| Voltage Proof | 2.0 kVDC | 1.5 kVDC | | | | | | | | | | | | | | | | |
| Max. Voltage depending on resistance value | <table border="1"> <caption>Max. Working Voltage vs Resistance</caption> <thead> <tr> <th>Resistance (Ohm)</th> <th>Max. Working Voltage (VDC)</th> </tr> </thead> <tbody> <tr><td>2</td><td>10</td></tr> <tr><td>10</td><td>20</td></tr> <tr><td>100</td><td>100</td></tr> <tr><td>1k</td><td>200</td></tr> <tr><td>5k</td><td>500</td></tr> <tr><td>10k</td><td>1000</td></tr> <tr><td>100k</td><td>1000</td></tr> </tbody> </table> | | Resistance (Ohm) | Max. Working Voltage (VDC) | 2 | 10 | 10 | 20 | 100 | 100 | 1k | 200 | 5k | 500 | 10k | 1000 | 100k | 1000 |
| Resistance (Ohm) | Max. Working Voltage (VDC) | | | | | | | | | | | | | | | | | |
| 2 | 10 | | | | | | | | | | | | | | | | | |
| 10 | 20 | | | | | | | | | | | | | | | | | |
| 100 | 100 | | | | | | | | | | | | | | | | | |
| 1k | 200 | | | | | | | | | | | | | | | | | |
| 5k | 500 | | | | | | | | | | | | | | | | | |
| 10k | 1000 | | | | | | | | | | | | | | | | | |
| 100k | 1000 | | | | | | | | | | | | | | | | | |
| Operating Temperature Range | -40 to 155°C | | | | | | | | | | | | | | | | | |
| Resistor Material | Thick Film | | | | | | | | | | | | | | | | | |
| Substrate | Al ₂ O ₃ | | | | | | | | | | | | | | | | | |
| Housing | Epoxy or PPS | | | | | | | | | | | | | | | | | |
| Connector Material | Cu tinned | | | | | | | | | | | | | | | | | |
| Terminals | 2 | | | | | | | | | | | | | | | | | |
| Max. Torque | T220: 1 Nm T221: 0.8 Nm | | | | | | | | | | | | | | | | | |

SPECIFICATIONS (continued)

Temperature Coefficient



Derating



Power Rating Notes -

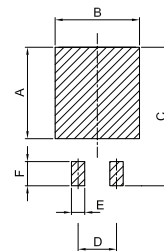
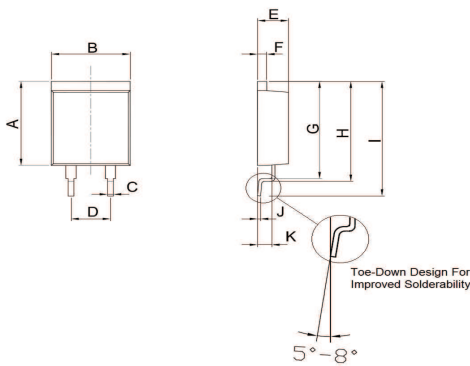
The NPR / NHR Series Resistors must be attached to a suitable heatsink. The maximum internal resistor temperature is 155°C. To specify an appropriate heatsink use the following formula :

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

Where: $R_{\theta H}$ = Thermal Resistance of 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)

Dimensions

NPS / NHS 2-T220

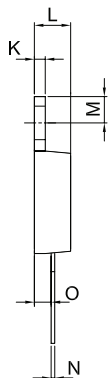
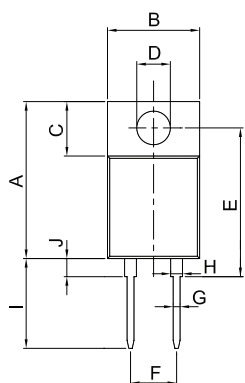


| Dimension | mm | tol. (±mm) | inches | tol. (±inches) |
|-----------|-------|------------|--------|----------------|
| A | 12.70 | 0.2 | 0.50 | 0.008 |
| B | 10.16 | 0.2 | 0.40 | 0.008 |
| C | 0.76 | 0.1 | 0.03 | 0.004 |
| D | 5.08 | 0.1 | 0.20 | 0.004 |
| E | 4.00 | 0.1 | 0.16 | 0.004 |
| F | 1.20 | 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 |

| 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 |

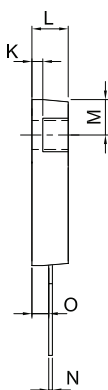
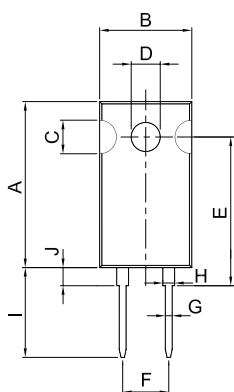
SPECIFICATIONS (continued)

NPR / NHR 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 |

NPR / NHR 2-T221



| Dimension | mm | tol. (±mm) | inches | tol. (±inches) |
|-----------|-------|---------------|--------|-------------------|
| 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 |
| O | 1.85 | 0.1 | 0.07 | 0.004 |

Ordering Information

Part Description: Part Type - Resistance - Contact - Tolerance
 NHR 2-T221 C 1.1 kOhms 1%