

### FEATURES

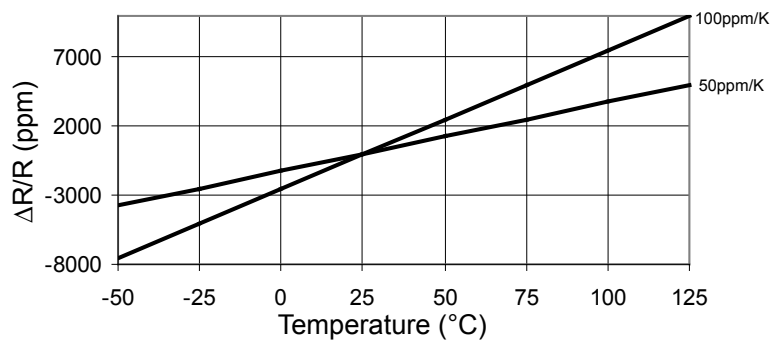
- Resistances from 0.02Ohm to 100kOhms
- Power Rating to 50Watt
- Resistance Tolerances to  $\pm 1\%$
- TCR to  $\pm 50\text{ppm/K}$
- Load Stability to 0.5%
- TO-220 Housing
- Convenient SMD D2Pak Available



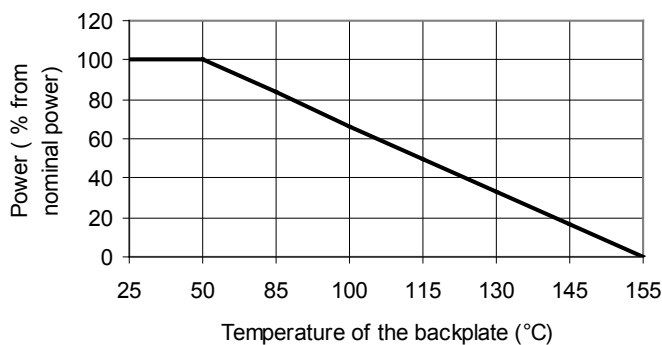
TABLE 1 – SPECIFICATIONS			
TYPE		NPR 2-T220 NPR 2-T221	NHR 2-T220 NHR 2-T221
Resistance Range		0.02 Ohms to 100kOhms	
Power Rating	Free air 70°C	1.5 W	
	With heatsink	30 W	50 W
Tolerances from 0.02 Ohms from 1.0 Ohms		2% / 5% 1% / 2% / 5%	
Thermal Resistance		3.5 K/W	2.1 K/W
Stability (1000h)		0.5%	
Temperature Coefficient 0.02 to 0.049 Ohms 0.05 to 0.099 Ohms 0.1 Ohms to 100 kOhms		$\pm 600\text{ ppm/K}$ $\pm 300\text{ ppm/K}$ $\pm 100\text{ ppm/K}$ upon request $\pm 50\text{ ppm/K}$	
Voltage Proof		2.0 kVDC	1.5 kVDC
Max. Voltage depending on resistance value			
Operating Temperature Range		-40 to 155°C	
Resistor Material		Thick Film	
Substrate		Al <sub>2</sub> O <sub>3</sub>	
Housing		PPS	
Connector Material		Cu / tinned	
Terminals		2	
Max. Torque		T220: 1 Nm T221: 0.8 Nm	

ORDERING INFORMATION
Part Number - Resistance - Contact - Tolerance
NHR 2-T221 1.1 kOhms C 1%

**FIGURE 1 – TEMPERATURE COEFFICIENT**



**FIGURE 2 – DERATING**



**Power Rating Notes -**

The NPR / NHR Series Resistors must be attached to a suitable heatsink.

The maximum internal resistor temperature is 155°C.

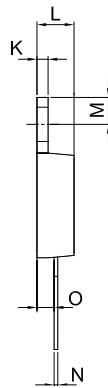
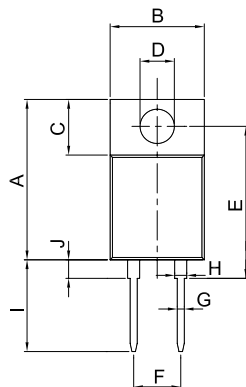
To specify an appropriate heatsink use the following formula :

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

- 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 )

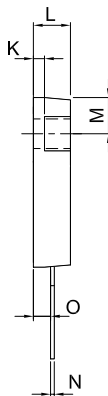
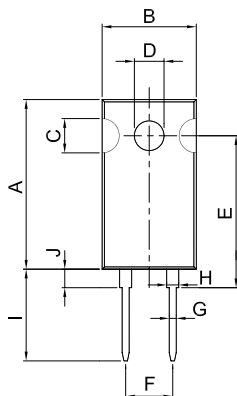
**FIGURE 3—DIMENSIONS** in mm (inches)

### NPR 2-T220



Dimension	standard contact	C-contact
A ±0.2 (±0.008)	17.30 (0.68)	
B ±0.2 (±0.008)	10.16 (0.40)	
C ±0.1 (±0.004)	6.00 (0.24)	
D ±0.1 (±0.004)	Ø3.7 (Ø0.146)	
E ±0.2 (±0.008)	16.40 (0.65)	
F ±0.1 (±0.004)	5.08 (0.20)	
G ±0.1 (±0.004)	0.76 (0.03)	
H ±0.1 (±0.004)	1.30 (0.05)	
I ±0.2 (±0.008)	10.00 (0.39)	13.80 (0.54)
J ±0.1 (±0.004)	2.00 (0.08)	
K ±0.1 (±0.004)	1.20 (0.05)	
L ±0.1 (±0.004)	4.00 (0.16)	
M ±0.1 (±0.004)	2.90 (0.11)	
N ±0.1 (±0.004)	0.40 (0.02)	
O ±0.1 (±0.004)	1.85 (0.07)	

### NHR 2-T221



Dimension	standard contact	C-contact
A ±0.2 (±0.008)	18.30 (0.72)	
B ±0.2 (±0.008)	10.16 (0.40)	
C ±0.1 (±0.004)	3.70 (0.15)	
D ±0.1 (±0.004)	Ø3.2 (Ø0.126)	
E ±0.2 (±0.008)	16.40 (0.65)	
F ±0.1 (±0.004)	5.08 (0.20)	
G ±0.1 (±0.004)	0.76 (0.03)	
H ±0.1 (±0.004)	1.30 (0.05)	
I ±0.2 (±0.008)	10.00 (0.39)	13.80 (0.54)
J ±0.1 (±0.004)	2.00 (0.08)	
K ±0.1 (±0.004)	1.20 (0.05)	
L ±0.1 (±0.004)	4.00 (0.16)	
M ±0.1 (±0.004)	3.90 (0.15)	
N ±0.1 (±0.004)	0.40 (0.02)	
O ±0.1 (±0.004)	1.85 (0.07)	