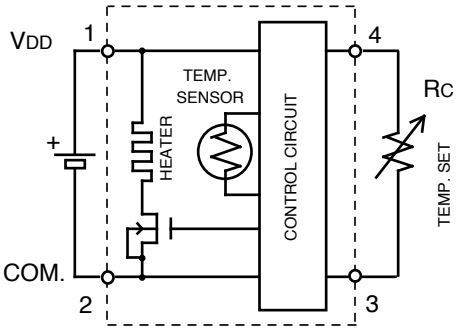
## DATA SHEET

**DN511**

# SUBMINIATURE PROPORTIONALLY CONTROLLED HEATER

### HEATER BLOCK DIAGRAM




### GENERAL DESCRIPTION

The DN511 is a subminiature proportionally controlled heater, whose temperature can be programmed with a single external resistor. A unique design allows this device to operate over a large voltage range from 15volts to +60 Volts D.C. without drawing excessive current at turn-on.Temperature of the DN511 can be set at the factory upon request. The DN511 is in a ceramic package and can supply up to 3.5 watts of power from an unregulated power supply.

### FEATURES

- BERYLLIA BASE FOR GOOD THERMAL CONDUCTION
- REGULATION TEMPERATURE FROM 5°C ABOVE AMBIENT TO 100°C
- 15 TO 70 VOLT OPERATION
- ELECTRICALLY ISOLATED FROM THE CASE

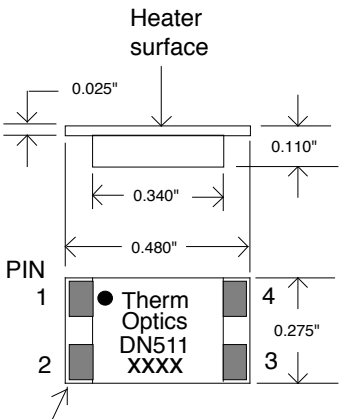
### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 70 | $V_{DC}$ |
| Power Dissipation | $P_D$ | 4 | Watts |
| Operating Temperature | $T_{MAX}$ | 120 | °C |
| Storage Temperature | $T_{MIN}$ | -65 to +150 | °C |

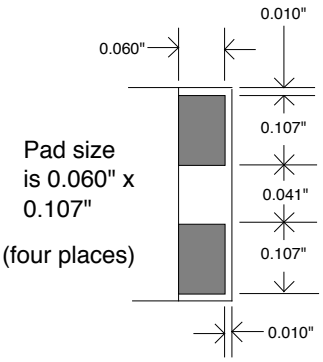
### OPERATING CHARACTERISTICS

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Supply Voltage (Pin 1 to Pin 2) | $V_{DD}$ | +15 | +60 | $V_{DC}$ |
| Supply Current at Turn on vs. Power Supply Voltage | $I_{ON}$ | See Figure 2 | | $mA_{DC}$ |
| Supply Current at Turn-on $V_{DD}$ = +30 Volts | $I_{ON}$ | 90 | 110 | $mA_{DC}$ |
| Temperature Variation over Operating Voltage | $\triangle T_V$ | | 2 | °C |
| Temperature Variation with Load | $\triangle T_L$ | | 3 | °C |
| Control Resistor Value Pin 3 to Pin 4 (See Table 1) | $R_C$ | 0 | | Ω |
| Control Temperature Range See Table 1 | $T_C$ | Ambient | 120 | °C |
| Turn on power at start-up | $P_{ON}$ | See Figure 3 | | Watts |

### OUTLINE DIMENSIONS



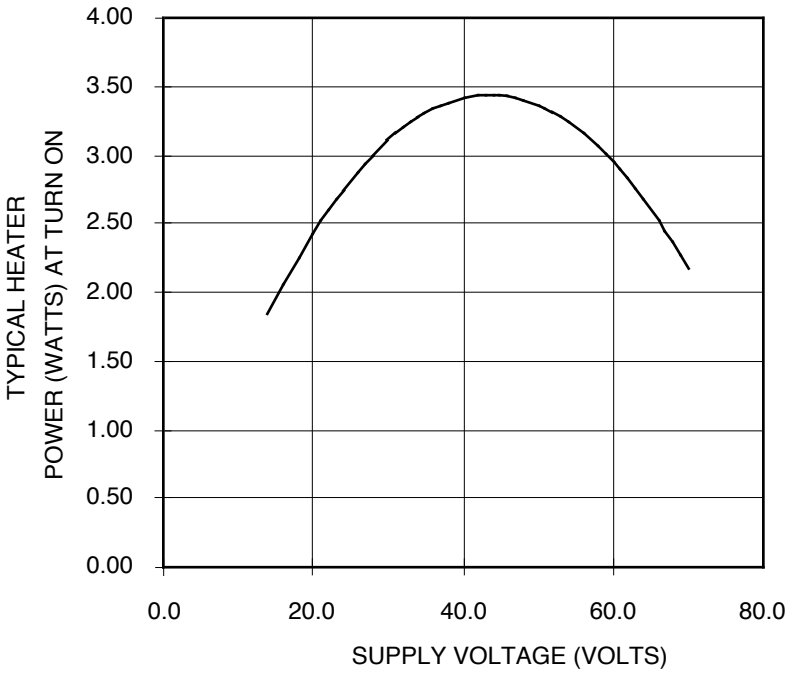

The DN511 electrical output pads are Pd-Pt-Ag and can be soldered. The solder used, such as SN-62, should contain silver to prevent leaching of the pads from the substrate.



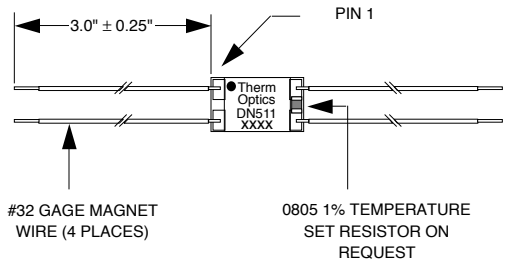
## TYPICAL CASE TEMPERATURE VS CONTROL RESISTOR

| RS KΩ | T °C | TOL. ±°C | RS KΩ | T °C | TOL. ±°C | RS KΩ | T °C | TOL. ±°C | RS KΩ | T °C | TOL. ±°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 360.1 | 0 | 3.0 | 79.6 | 29 | 2.5 | 20.2 | 58 | 3.0 | 4.6 | 87 | 3.5 |
| 340.6 | 1 | 3.0 | 75.8 | 30 | 2.5 | 19.3 | 59 | 3.0 | 4.4 | 88 | 3.5 |
| 322.3 | 2 | 3.0 | 72.2 | 31 | 2.5 | 18.4 | 60 | 3.0 | 4.1 | 89 | 3.5 |
| 305.0 | 3 | 3.0 | 68.8 | 32 | 2.5 | 17.5 | 61 | 3.5 | 3.9 | 90 | 3.5 |
| 288.7 | 4 | 3.0 | 65.5 | 33 | 2.5 | 16.7 | 62 | 3.5 | 3.6 | 91 | 3.5 |
| 273.4 | 5 | 3.0 | 62.5 | 34 | 2.5 | 15.9 | 63 | 3.5 | 3.4 | 92 | 3.5 |
| 259.0 | 6 | 3.0 | 59.5 | 35 | 2.5 | 15.2 | 64 | 3.5 | 3.2 | 93 | 3.5 |
| 245.4 | 7 | 3.0 | 56.8 | 36 | 2.5 | 14.5 | 65 | 3.5 | 3.0 | 94 | 3.5 |
| 232.5 | 8 | 3.0 | 54.1 | 37 | 2.5 | 13.8 | 66 | 3.5 | 2.8 | 95 | 3.5 |
| 220.4 | 9 | 3.0 | 51.6 | 38 | 2.5 | 13.2 | 67 | 3.5 | 2.6 | 96 | 3.5 |
| 209.0 | 10 | 3.0 | 49.2 | 39 | 2.5 | 12.5 | 68 | 3.5 | 2.4 | 97 | 3.5 |
| 198.3 | 11 | 2.5 | 46.9 | 40 | 2.5 | 11.9 | 69 | 3.5 | 2.2 | 98 | 3.5 |
| 188.1 | 12 | 2.5 | 44.8 | 41 | 3.0 | 11.4 | 70 | 3.5 | 2.0 | 99 | 3.5 |
| 178.5 | 13 | 2.5 | 42.7 | 42 | 3.0 | 10.8 | 71 | 3.5 | 1.8 | 100 | 3.5 |
| 169.4 | 14 | 2.5 | 40.7 | 43 | 3.0 | 10.3 | 72 | 3.5 | 1.68 | 101 | 3.5 |
| 160.8 | 15 | 2.5 | 38.9 | 44 | 3.0 | 9.8 | 73 | 3.5. | 1.52 | 102 | 3.5 |
| 152.7 | 16 | 2.5 | 37.1 | 45 | 3.5 | 9.3 | 74 | 3.5 | 1.37 | 103 | 3.5 |
| 145.1 | 17 | 2.5 | 35.4 | 46 | 3.0 | 8.9 | 75 | 3.5 | 1.23 | 104 | 3.5 |
| 137.8 | 18 | 2.5 | 33.8 | 47 | 3.0 | 8.4 | 76 | 3.5 | 1.09 | 105 | 3.5 |
| 131.0 | 19 | 2.5 | 33.8 | 47 | 3.0 | 8.0 | 77 | 3.5 | 0.95 | 106 | 3.5 |
| 124.5 | 20 | 2.5 | 30.8 | 49 | 3.0 | 7.6 | 78 | 3.5 | 0.82 | 107 | 3.5 |
| 118.3 | 21 | 2.5 | 29.4 | 50 | 3.0 | 7.2 | 79 | 3.5 | 0.70 | 108 | 3.5 |
| 112.5 | 22 | 2.5 | 28.1 | 51 | 3.0 | 6.8 | 80 | 3.5 | 0.58 | 109 | 3.5 |
| 107.0 | 23 | 2.5 | 26.8 | 52 | 3.0 | 6.5 | 81 | 3.5 | 0.46 | 110 | 3.5 |
| 101.8 | 24 | 2.5 | 25.5 | 53 | 3.0 | 6.1 | 82 | 3.5 | 0.35 | 111 | 3.5 |
| 96.9 | 25 | 2.5 | 24.4 | 54 | 3.0 | 5.8 | 83 | 3.5 | 0.25 | 112 | 3.5 |
| 92.2 | 26 | 2.5 | 23.2 | 55 | 3.0 | 5.5 | 84 | 3.5 | 0.14 | 113 | 3.5 |
| 87.8 | 27 | 2.5 | 22.2 | 56 | 3.0 | 5.2 | 85 | 3.5 | 0.04 | 114 | 3.5 |
| 83.6 | 28 | 2.5 | 21.2 | 57 | 3.0 | 4.9 | 86 | 3.5 | | | |

## TYPICAL HEATER POWER AT TURN ON vs. POWER SUPPLY VOLTAGE

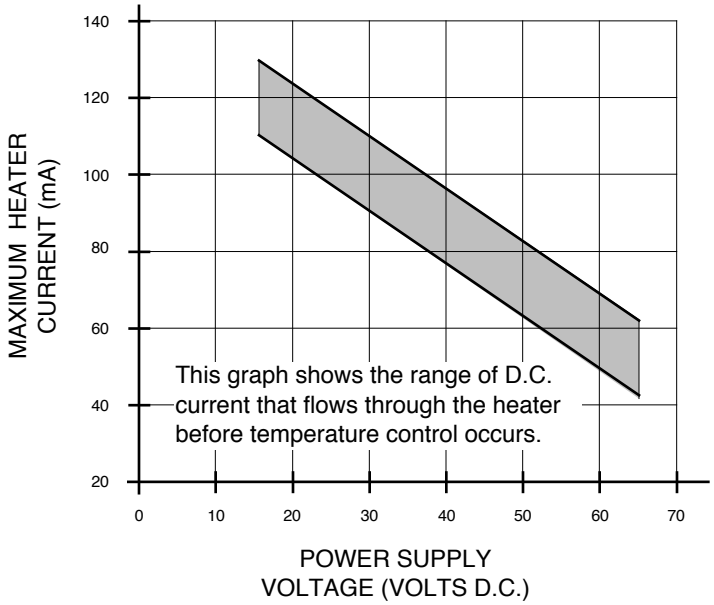



The temperature of the DN511 is supplied with four 3 inch #32 gage magnet wire as shown below. Temperature of the DN511 can be set at the factory on request




It is recommended that the DN511 heater be attached to the device being heated with a thermally conductive adhesive such as Loctite® 384. This will insure that there is minimum thermal resistance between the two surfaces.

## MAXIMUM HEATER TURN ON CURRENT vs. POWER SUPPLY VOLTAGE

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