

## DATA SHEET

**DN511**

### SUBMINIATURE PROPORTIONALLY CONTROLLED HEATER

#### 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 +15 volts to +60 Volts D.C. with out drawing excessive current at turn-on. The DN511 will supply approximatly 3 watts of heating power from a 40 Volt 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

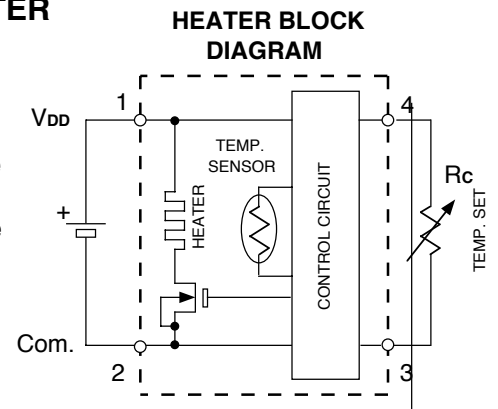
#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V <sub>DD</sub>	70	V <sub>dc</sub>
Power Dissipation	P <sub>D</sub>	7	Watts
Operating Temperature	T <sub>MAX</sub>	120	°C
Storage Temperature	T <sub>STG</sub>	-65 to +150	°C

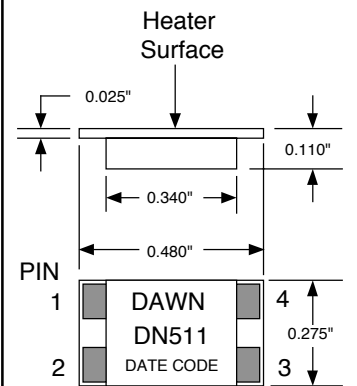
#### OPERATING CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Supply Voltage (Pin 1 to Pin 4)	V <sub>DD</sub>	+15	+60	V <sub>dc</sub>
Steady State Supply Current @ V <sub>DD</sub> = +15 V <sub>dc</sub>	I <sub>s</sub>	See Figure 2		mA <sub>dc</sub>
Temperature Variation over Operating Voltage	ΔT <sub>v</sub>		2	°C
Temperature Variation with Load	ΔT <sub>L</sub>		2	°C
Control Temperature Range	T <sub>c</sub>	T <sub>A</sub> +5	100	°C
Control Resistor Value Pin 3 to Pin 4	R <sub>s</sub>	0		Ohm
Maximum Control Temperature when R <sub>s</sub> = 0 Ohms	T <sub>MAX</sub>		120	°C
Turn on power at start-up @ V <sub>DD</sub> = +40V <sub>dc</sub>	P <sub>D</sub>	3.0		Watts

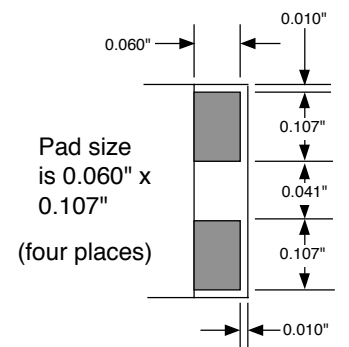
T<sub>A</sub> ---- Ambient Temperature



#### OUTLINE DIMENSIONS



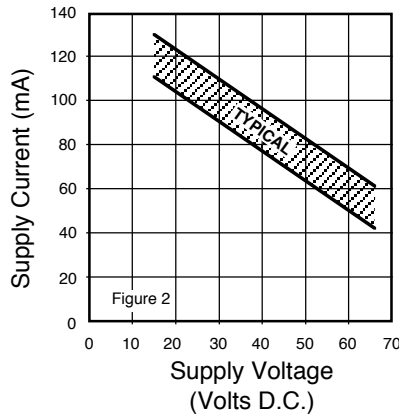
The DN511 electrical output pads are Ag/Pd/Pt and can be soldered. The solder used, such as SN95, should contain silver to prevent leaching of the pads from the substrate.



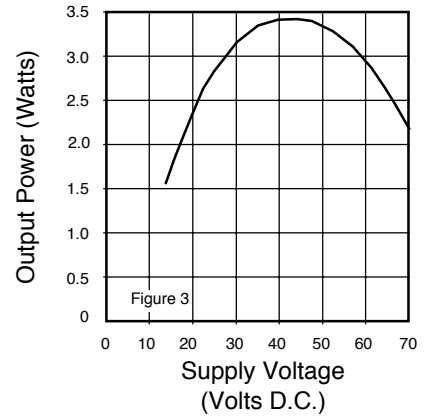
## Heater Temperature (Tc) vs. Temperature Set Resistor (Rs)

T °C	RS KΩ	T °C	RS KΩ	T °C	RS KΩ	T °C	RS KΩ
0	360.1	29	79.6	58	20.2	87	4.6
1	340.6	30	75.8	59	19.3	88	4.4
2	322.3	31	72.2	60	18.4	89	4.1
3	305.0	32	68.8	61	17.5	90	3.9
4	288.7	33	65.5	62	16.7	91	3.6
5	273.4	34	62.5	63	15.9	92	3.4
6	259.0	35	59.5	64	15.2	93	3.2
7	245.4	36	56.8	65	14.5	94	3.0
8	232.5	37	54.1	66	13.8	95	2.8
9	220.4	38	51.6	67	13.2	96	2.6
10	209.0	39	49.2	68	12.5	97	2.4
11	198.3	40	46.9	69	11.9	98	2.2
12	188.1	41	44.7	70	11.4	99	2.0
13	178.5	42	42.7	71	10.8	100	1.80
14	169.4	43	40.7	72	10.3	101	1.68
15	160.8	44	38.9	73	9.8	102	1.52
16	152.7	45	37.1	74	9.3	103	1.37
17	145.1	46	35.4	75	8.9	104	1.23
18	137.8	47	33.8	76	8.4	105	1.09
19	131.0	48	32.3	77	8.0	106	0.95
20	124.5	49	30.8	78	7.6	107	0.82
21	118.3	50	29.4	79	7.2	108	0.70
22	112.5	51	28.1	80	6.8	109	0.58
23	107.0	52	26.8	81	6.5	110	0.46
24	101.8	53	25.5	82	6.1	111	0.35
25	96.9	54	24.4	83	5.8	112	0.25
26	92.2	55	23.2	84	5.5	113	0.14
27	87.8	56	22.2	85	5.2	114	0.04
28	83.6	57	21.2	86	4.9		

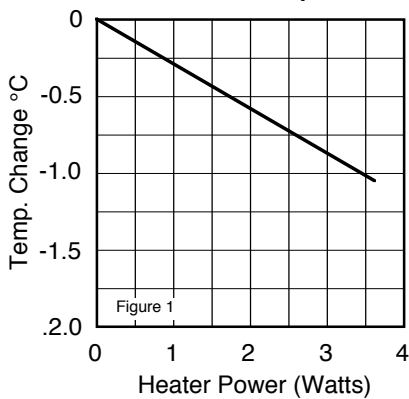
## Typical Start-up Current vs. Supply Voltage



## Heater Power Available vs. Supply Voltage



## Typical Base Temperature Change vs. Power Dissipation



The base material of the DN511 is Beryllia which provides efficient energy transfer from the heating element located inside the heater and the heating surface of the DN511. The temperature drop across the Beryllia substrate, as a function of heater power, is shown above.

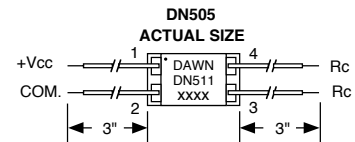
The thermal interface between the DN511 heater and the device being heated causes a temperature drop. Care should be taken to make sure that a good thermal interface exists between the two surfaces.

### NOTES:

1. All DN511 heaters are tested for gross leaks with 3M™ FC-40 Fluorinert™ at 125° C.
2. Do not reverse the voltage polarity on the input power leads. This can cause permanent damage to the device.

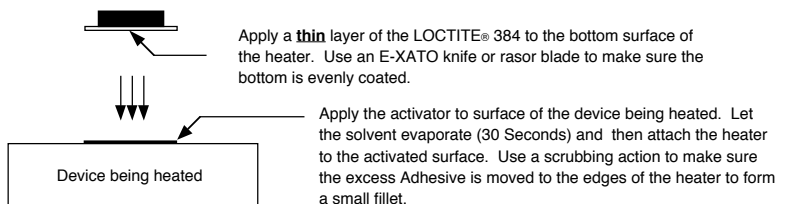
### Options

1. The DN510 is normally supplied with leads. However, the heater can be supplied without them. The leaded device has #32 gauge insulated magnet wire attached to the solder pads as shown in the figure to the right.
2. Operating temperature can be set at the factory by soldering a chip resistor between PIns 3 and 4. Consult the factory when specific heater temperatures are required.



### Instructions for Mounting the Heater with LOCTITE® 384

LOCTITE® 384 is a two part thermally conductive epoxy that works well for attaching the DN511 heater to the surface of the device being heated. Test data, technical specifications, and distributor locations for LOCTITE® 384 is presented in the applications section of this website..



### Applications

The DN511 is designed to regulate the temperature of temperature sensitive devices. One such application is using the DN511 to control the temperature of a Voltage Controlled Oscillator.

Care should be taken to thermally insulate the DN511 heater and device being heated from the surrounding environment. This will minimize the amount of power required to heat the package which in turn will reduce the temperature variation of the package over the ambient temperature extremes.

### TEMPERATURE STABILIZED VOLTAGE CONTROLLED OSCILLATOR OR SAW FILTER

