



Graphic  
enlarged  
for  
detail

### TCS651

100 kΩ NTC Bead Head Thermistor



TCS651 NTC THERMISTOR

#### GENERAL DESCRIPTION:

These ±1% thermistors are conformally coated, two-lead thermistors for applications where embedding the thermistor is required. The coating is baked on phenolic for durability and long term stability. They have solid nickel wires with Teflon® insulation to provide isolation when assembled in metal housings.

#### FEATURES:

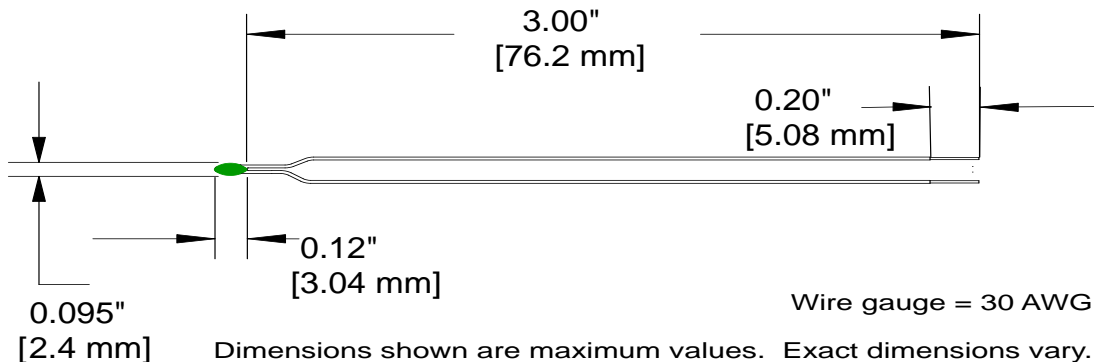
- Low Cost
- Small Size -- Conformally Coated
- Wide Resistance Range
- Available in 5 Different R-T Curves
- 1% Tolerance
- 3" Long Solid Nickel Wire Leads
- Teflon® Insulation Provides Isolation from Metal Housing
- RoHS Compliant (by exemption)

**Thermal Resistance or Dissipation Constant is 2-3 mW / °C.**

**Thermal Time Constant is 6-14 seconds.**

Thermistor Selection Guide			
MODEL	R @ 25°C	10 μA RANGE	100 μA RANGE
TCS605	5 kΩ	-55 to -2°C	-20 to +33°C
TCS610	10 kΩ	-45 to +13°C	-8 to +50°C
TCS10K5	10 kΩ	-45 to +13°C	-8 to +50°C
TCS620	20 kΩ	-35 to +28°C	+6 to +69°C
TCS650	50 kΩ	-18 to +49°C	+25 to +92°C
TCS651	100 kΩ	-6 to +67°C	+41 to +114°C

**Figure 1**  
Dimensions



**RESISTANCE VERSUS TEMPERATURE RESPONSE**

**TCS651 100 kΩ THERMISTOR @ 25°C**

10 μA TEMPERATURE RANGE: -6 to +67°C

100 μA TEMPERATURE RANGE: +41 to +114°C

TEMP (°C)	R <sub>T</sub> (Ω)	VOLT (V) (10 μA)	VOLT (V) (100 μA)
-6	488000	4.880	
-5	462000	4.620	
-4	437000	4.370	
-3	413000	4.130	
-2	391000	3.910	
-1	371000	3.710	
<b>0</b>	<b>351000</b>	<b>3.510</b>	
1	333000	3.330	
2	315000	3.150	
3	299000	2.990	
4	284000	2.840	
5	269000	2.690	
6	255000	2.550	
7	243000	2.430	
8	230000	2.300	
9	219000	2.190	
10	207800	2.078	
11	197600	1.976	
12	187800	1.878	
13	178700	1.787	
14	170000	1.700	
15	161700	1.617	
16	154000	1.540	
17	146600	1.466	
18	139600	1.396	
19	133000	1.330	
20	126700	1.267	
21	120800	1.208	
22	115200	1.152	
23	109900	1.099	
24	104800	1.048	
<b>25</b>	<b>100000</b>	<b>1.000</b>	
26	95450	0.954	
27	91130	0.911	
28	87020	0.870	
29	83130	0.831	
30	79420	0.794	
31	75900	0.759	
32	72560	0.725	
33	69380	0.693	

TEMP (°C)	R <sub>T</sub> (Ω)	VOLT (V) (10 μA)	VOLT (V) (100 μA)
34	66360	0.663	
35	63480	0.634	
36	60740	0.607	
37	58140	0.581	
38	55660	0.556	
39	53300	0.533	
40	51050	0.510	
41	48910	0.489	4.891
42	46860	0.468	4.680
43	44920	0.449	4.492
44	43060	0.430	4.306
45	41290	0.412	4.129
46	39610	0.396	3.960
47	38000	0.380	3.800
48	36460	0.364	3.640
49	34990	0.349	3.499
50	33590	0.335	3.359
51	32250	0.322	3.225
52	30980	0.309	3.098
53	29760	0.297	2.976
54	28590	0.285	2.859
55	27480	0.274	2.748
56	26410	0.264	2.641
57	25390	0.253	2.539
58	24420	0.244	2.442
59	23480	0.234	2.348
60	22590	0.225	2.259
61	21740	0.217	2.174
62	20920	0.209	2.092
63	20140	0.201	2.014
64	19390	0.193	1.939
65	18670	0.186	1.867
66	17980	0.179	1.798
67	17320	0.173	1.732
68	16690		1.669
69	16080		1.608
70	15500		1.550
71	14950		1.495
72	14410		1.441
73	13900		1.390

TEMP (°C)	R <sub>T</sub> (Ω)	VOLT (V) (10 μA)	VOLT (V) (100 μA)
74	13410		1.341
75	12930		1.293
76	12480		1.248
77	12040		1.204
78	11630		1.163
79	11220		1.122
80	10840		1.084
81	10470		1.047
82	10110		1.011
83	9770		0.977
84	9440		0.944
85	9120		0.912
86	8820		0.882
87	8520		0.852
88	8240		0.824
89	7970		0.797
90	7710		0.771
91	7460		0.746
92	7210		0.721
93	6980		0.698
94	6760		0.676
95	6540		0.654
96	6330		0.633
97	6130		0.613
98	5940		0.594
99	5750		0.575
100	5570		0.557
101	5400		0.540
102	5230		0.523
103	5070		0.507
104	4910		0.491
105	4760		0.476
106	4620		0.462
107	4480		0.448
108	4340		0.434
109	4210		0.421
110	4080		0.408
111	3960		0.396
112	3840		0.384
113	3730		0.373
114	3620		0.362

You can approximate the response of a thermistor with the Steinhart-Hart Equation. The A, B, and C values listed below apply to the following equation. The coefficients are optimized for the ranges covered by the reference currents.

$$\frac{1}{T} = A + B \times \ln R + C \times (\ln R)^3, \text{ where } R \text{ is ohms and } T \text{ is Kelvin.}$$

**Steinhart-Hart Coefficients**

10 μA RANGE		100 μA RANGE	
A	8.2458E-04	A	8.47031E-04
B	2.0913E-04	B	2.0561E-04
C	7.9780E-08	C	9.2670E-08

**CERTIFICATION:**

Wavelength Electronics (Wavelength) certifies that this product met it's published specifications at the time of shipment. Wavelength further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by that organization's calibration facilities, and to the calibration facilities of other International Standards Organization members.

**WARRANTY:**

This Wavelength product is warranted against defects in materials and workmanship for a period of one (1) year from date of shipment. During the warranty period, Wavelength will, at its option, either repair or replace products which prove to be defective.

**WARRANTY SERVICE:**

For warranty service or repair, this product must be returned to the factory. An RMA is required for products returned to Wavelength for warranty service. The Buyer shall prepay shipping charges to Wavelength and Wavelength shall pay shipping charges to return the product to the Buyer upon determination of defective materials or workmanship. However, the Buyer shall pay all shipping charges, duties, and taxes for products returned to Wavelength from another country.

**LIMITATIONS OF WARRANTY:**

The warranty shall not apply to defects resulting from improper use or misuse of the product or operation outside published specifications.

No other warranty is expressed or implied. Wavelength specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

**EXCLUSIVE REMEDIES:**

The remedies provided herein are the Buyer's sole and exclusive remedies. Wavelength shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.



**WAVELENGTH ELECTRONICS, INC.**  
 51 Evergreen Drive  
 Bozeman, Montana, 59715  
 phone: (406) 587-4910 Sales/Tech Support  
 fax: (406) 587-4911  
 e-mail: [sales@teamwavelength.com](mailto:sales@teamwavelength.com)  
 web: [www.teamwavelength.com](http://www.teamwavelength.com)



**NOTICE:**

The information contained in this document is subject to change without notice. Wavelength will not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Wavelength.

**SAFETY:**

There are no user serviceable parts inside this product. Return the product to Wavelength for service and repair to ensure that safety features are maintained.

**LIFE SUPPORT POLICY:**

As a general policy, Wavelength Electronics, Inc. does not recommend the use of any of its products in life support applications where the failure or malfunction of the Wavelength product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Wavelength will not knowingly sell its products for use in such applications unless it receives written assurances satisfactory to Wavelength that the risks of injury or damage have been minimized, the customer assumes all such risks, and there is no product liability for Wavelength. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (for any use), auto transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, ventilators of all types, and infusion pumps as well as other devices designated as "critical" by the FDA. The above are representative examples only and are not intended to be conclusive or exclusive of any other life support device.

REVISION HISTORY		
REVISION	DATE	NOTES
REV. A	18-Jun-08	Added technical detail per customer request
REV. B	28-Sep-09	Updated to reflect RoHS compliance
REV. C	4-Feb-11	Updated dimensions in Figure 1
REV. D	30-Aug-13	Added wire gauge and extended warranty