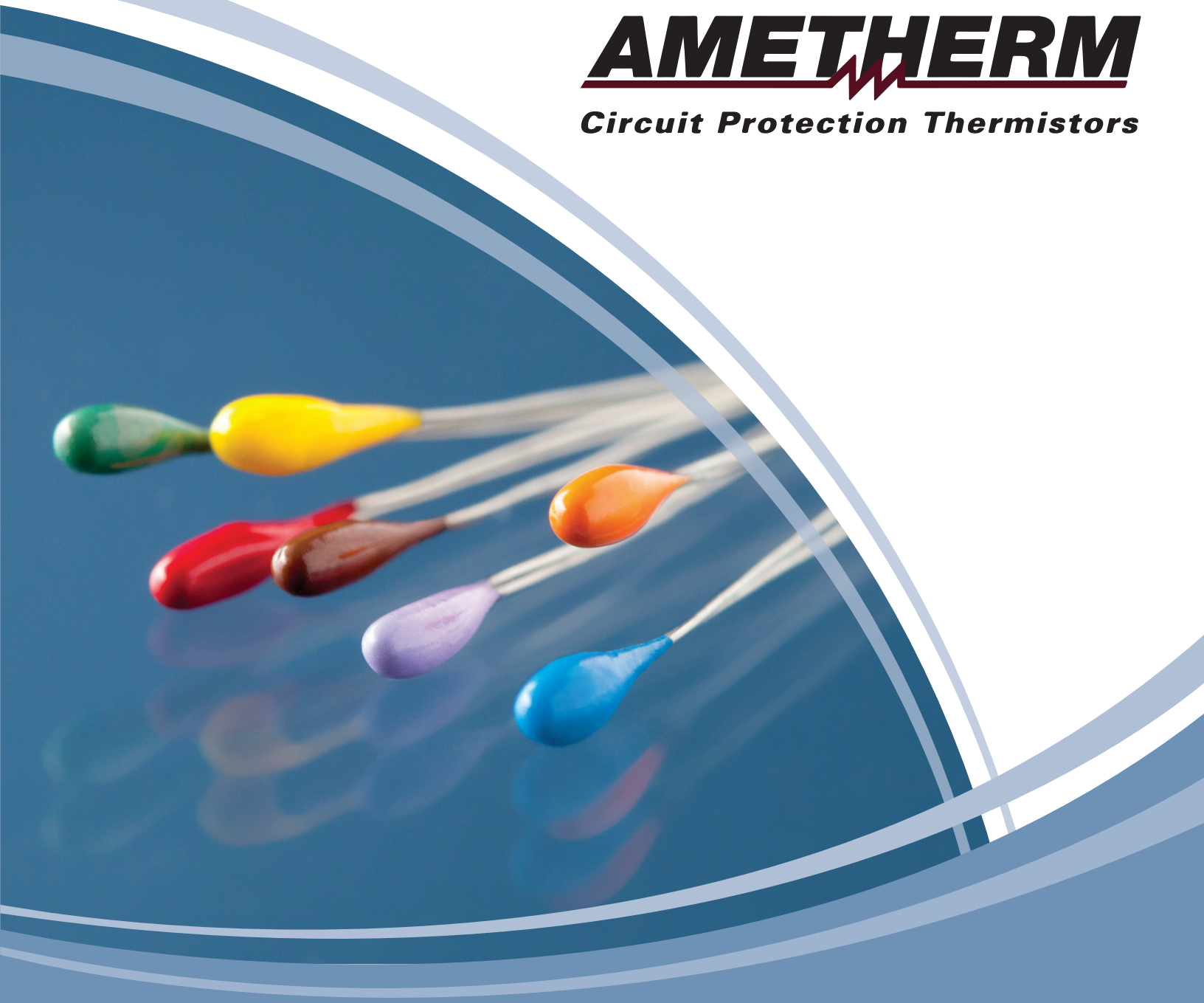
AMETHERM

Circuit Protection Thermistors



ACCU-CURVE™ Precision Interchangeable Thermistors

Extremely Accurate Temperature Sensing for Medical, Industrial, Automotive, HVAC, and Aerospace Applications

Ametherm's Interchangeable ACCU-CURVE™ NTC thermistors provide a high degree of measurement accuracy over the -0°C to +70°C temperature range. With a fast response time and long-term stability, these cost effective devices are ideal for a wide range of applications.

Available at Digi-Key Corporation

800-808-2434 • www.ametherm.com

Precision Temperature Measurement & Control Devices

NTC THERMISTORS

Negative Temperature Coefficient (NTC) thermistors are thermally sensitive semiconductor resistors which exhibit a decrease in resistance as absolute temperature increases. Change in the resistance of the NTC thermistor can be brought about either by a change in the ambient temperature or internally by self-heating resulting from current flowing through the device. Most of the practical applications of NTC thermistors are based on these material characteristics.

INTERCHANGEABLE THERMISTORS

Ametherm manufactures precision resistance-temperature matched ACCU-CURVE™ thermistors. These devices offer interchangeability over a broad temperature range and eliminate the need to individually calibrate or provide circuit compensation for part variability. Accurate temperature measurement to ±0.1°C is available over the 0°C to 70°C temperature range. Standard ohmic values at 25°C range from 2,252 to 100,000 ohms.

THERMISTOR TERMINOLOGY FOR TEMPERATURE MEASUREMENT & CONTROL DEVICES

• **D.C.** – The dissipation constant is the ratio, normally expressed in milliwatts per degree C (mw/°C), at a specified ambient temperature, of a change in power dissipated in a thermistor to the resultant change in body temperature.

• **T.C.** – The thermal time constant is the time required for a thermistor to change 63.2% of the total difference between its initial and final body temperature when subjected to a step function change in temperature under zero-power conditions and is normally expressed in seconds (S).

• **Alpha (Ω) or Temperature Coefficient of Resistance** – The temperature coefficient of resistance is the ratio at a specified temperature, T, of the rate of change of zero-power resistance with temperature to the zero-power resistance of the thermistor. The temperature coefficient is commonly expressed in percent per degree C (%/°C).

ACCU-CURVE™ FEATURES

- Wide Ohmic Value Range
- Accurate & Stable
- D.C. 1mW/°C
- Fast Thermal Response Time
- T.C. 10 Sec. in Air
- Compact Epoxy Package Style
- High Sensitivity

Applications

There are numerous ways of measuring temperature electronically. Improvements in thermistor technology, coupled with the introduction of integrated circuitry, have made precision temperature measurement systems very cost effective. Microprocessors, A/D converters, interface electronics and displays are readily available. Circuit designs with built-in thermistor resistance-temperature algorithms have gained wide spread acceptance in precision temperature metrology. ACCU-CURVE™ style thermistors are used in many applications that require a high degree of accuracy and reliability.

Some of the most popular applications of NTC ACCU-CURVE™ thermistors include:

- Temperature Measurement & Control
- Temperature Sensors

SELECTION CONSIDERATIONS FOR NTC ACCU-CURVE™ DEVICES

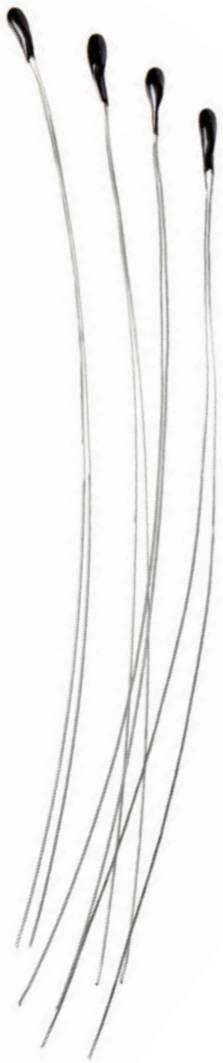
Interchangeable ACCU-CURVE™ NTC thermistors are usually selected when a high degree of measurement accuracy is required over a wide temperature range. By modifying the Alpha equation, the resistance and temperature tolerances can be calculated for various temperature intervals. Because thermistors are non-linear with respect to their resistance-temperature characteristics, Alpha therefore is non-linear across their resistance-temperature range. As an example, a thermistor material curve with an Alpha of -4.4%/°C @ 25°C will have an Alpha of -3.8%/°C @ 50°C. For practical applications we recommend that the standardized R/T curves be used.

ACCU-CURVE™ thermistors can dissipate 1mW/°C. As a result, the possibility of error induced by excessive current flow, which would defeat the level of accuracy these devices are capable of representing, may exist in some circuits. To prevent this type of error, Ametherm recommends that circuit design engineers select the highest R value their circuit will tolerate for applications > 5 Volts to minimize any self-heating of the thermistor device. Refer to the ACCU-CURVE™ Specifications table for resistance values and temperature tolerances.

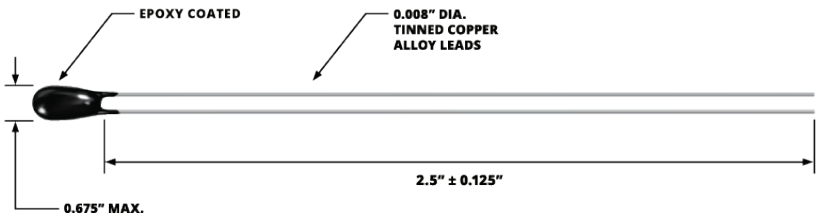
Ametherm offers two standard R/T curves, "C" & "W", with temperature coefficients of resistance (Ω) of -4.4%/°C and -4.7%/°C, and Beta (ß) values of 3965°K and 4250°K. To determine the nominal resistance value of a thermistor at a specified temperature, multiply its resistance at 25°C value by the corresponding RT/R25 value for the desired temperature and applicable R-T curve from the ACCU-CURVE™.

ACCU-CURVE™ Specifications

Part Number	Resistance @ 25°C (Ω)	Accuracy Between 0°C to 70 °C	Dissipation Constant mW/°C	Thermal Time Constant = sec	Beta Value Measured Between 0°C and 50°C	Operating Temperature Range °C	Max Power Rating (mW)	Color (Optional):
ACC101	2252	+/-0.1°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Brown
ACC001	2252	+/-0.2°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Brown
ACC011	2252	+/-0.5°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Brown
ACC021	2252	+/-1.0°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Brown
ACC102	3000	+/-0.1°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Red
ACC002	3000	+/-0.2°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Red
ACC012	3000	+/-0.5°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Red
ACC022	3000	+/-1.0°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Red
ACC103	5000	+/-0.1°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Orange
ACC003	5000	+/-0.2°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Orange
ACC013	5000	+/-0.5°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Orange
ACC023	5000	+/-1.0°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Orange
ACC104	10,000	+/-0.1°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Yellow
ACC004	10,000	+/-0.2°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Yellow
ACC014	10,000	+/-0.5°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Yellow
ACC024	10,000	+/-1.0°C	≥ 2	≤ 3.5	3892°K	0°C ≈ 70°C	250	Yellow
ACW105	30,000	+/-0.1°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Green
ACW005	30,000	+/-0.2°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Green
ACW015	30,000	+/-0.5°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Green
ACW025	30,000	+/-1.0°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Green
ACW106	50,000	+/-0.1°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Blue
ACW006	50,000	+/-0.2°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Blue
ACW016	50,000	+/-0.5°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Blue
ACW026	50,000	+/-1.0°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Blue
ACW107	100,000	+/-0.1°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Violet
ACW007	100,000	+/-0.2°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Violet
ACW017	100,000	+/-0.5°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Violet
ACW027	100,000	+/-1.0°C	≥ 2	≤ 3.5	4143°K	0°C ≈ 70°C	250	Violet
*ACM011	10,000	+/-0.5°C	≥ 0.7	≤6	3435°K	-40C≈105C	300	Black
*ACY011	10,000	+/-0.5°C	≥ 0.7	≤6	3977°K	-40C≈105C	300	Black
*ACL011	50,000	+/-0.5°C	≥ 0.7	≤6	3950°K	-40C≈105C	300	Black



* Denotes the following:
  - Different Beta
  - Operating temperature change
  - Maximum power allowed



ACC-XXX "C" CURVE

TEMP. °C	RT/R25
0	3.265
1	3.103
2	2.950
3	2.805
4	2.669
5	2.539
6	2.417
7	2.301
8	2.192
9	2.088
10	1.990
11	1.897
12	1.809
13	1.725
14	1.646
15	1.571
16	1.500
17	1.432
18	1.368
19	1.307
20	1.249
21	1.194
22	1.142
23	1.092
24	1.045
25	1.000
26	0.9573
27	0.9167
28	0.8777
29	0.8407
30	0.8057
31	0.7723
32	0.7403
33	0.7097
34	0.6807
35	0.6530
36	0.6267
37	0.6017
38	0.5777
39	0.5547
40	0.5327
41	0.5117
42	0.4917
43	0.4727
44	0.4543
45	0.4370
46	0.4200
47	0.4040
48	0.3890
49	0.3743
50	0.3603
51	0.3467
52	0.3340
53	0.3217
54	0.3099
55	0.2986
56	0.2878
57	0.2774
58	0.2675
59	0.2579
60	0.2488
61	0.2400
62	0.2316
63	0.2235
64	0.2157
65	0.2083
66	0.2011
67	0.1942
68	0.1876
69	0.1813
70	0.1752

ACC-XXX "W" CURVE

TEMP. °C	RT/R25
0	3.265
1	3.103
2	2.950
3	2.805
4	2.669
5	2.539
6	2.417
7	2.301
8	2.192
9	2.088
10	1.990
11	1.897
12	1.809
13	1.725
14	1.646
15	1.571
16	1.500
17	1.432
18	1.368
19	1.307
20	1.249
21	1.194
22	1.142
23	1.092
24	1.045
25	1.000
26	0.9573
27	0.9167
28	0.8777
29	0.8407
30	0.8057
31	0.7723
32	0.7403
33	0.7097
34	0.6807
35	0.6530
36	0.6267
37	0.6017
38	0.5777
39	0.5547
40	0.5327
41	0.5117
42	0.4917
43	0.4727
44	0.4543
45	0.4370
46	0.4200
47	0.4040
48	0.3890
49	0.3743
50	0.3603
51	0.3467
52	0.3340
53	0.3217
54	0.3099
55	0.2986
56	0.2878
57	0.2774
58	0.2675
59	0.2579
60	0.2488
61	0.2400
62	0.2316
63	0.2235
64	0.2157
65	0.2083
66	0.2011
67	0.1942
68	0.1876
69	0.1813
70	0.1752

ACCU-CURVE™ Resistance / Temperature Conversion Tables

To determine the nominal resistance value of a thermistor at a specified temperature, multiply its R_T / R_{25} value for the desired temperature and R-T curve from the table above by its nominal resistance at 25 °C.

Contact us today for more information or to order your free samples.

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