



INTRODUCTION

A thermistor, or thermally sensitive resistor, is a resistor that changes resistance with a change in temperature. There are two basic types of thermistors, PTC and NTC. A PTC (Positive Temperature Coefficient) device will increase resistance with an increase in temperature; an NTC (Negative Temperature Coefficient) device will decrease resistance with an increase in temperature. QTI manufactures both PTC and NTC devices in a broad selection of styles and resistance values.

Quality Thermistor, Inc. has delivered high quality thermistors and assemblies to a worldwide market since 1977. Our modern ISO9001 certified manufacturing facility located in the USA, combined with our assembly plant in Mexico, are equipped with state of the art manufacturing equipment to completely design and manufacture a full spectrum of devices.

We at QTI pride ourselves on our friendly and knowledgeable staff. Please feel free to call, fax, or e-mail us directly with any questions you may have about thermistors and thermistor applications. Our application engineers are available to offer ideas and technical support for any of your design projects.

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POSITIVE TEMPERATURE COEFFICIENT THERMISTORS

Positive Temperature Coefficient (PTC) thermistors have a resistance gain of approximately .7% per degree centigrade and exhibit a linear resistance vs. temperature change over given increments of temperature change.

They are suitable for applications in temperature measurements, temperature control, amplifier stabilization, power control, microprocessor interfacing, and numerous other applications where temperature control/compensation is required.

OPERATING PARAMETERS

TEMPERATURE VS. "COEFFICIENT OF RESISTANCE" TABLES

The following tables will give the resistance value of the thermistor at any temperature (Rt).

To determine the resistance value of the thermistor at any temperature (Rt):

Find the temperature in the vertical column "temperature". Find the resistance range of the thermistor at 25°C (R25°C) in the appropriate horizontal column. The intersection of the two columns will give the coefficient of resistance (Rc) of the thermistor at the desired temperature. Compute as follows:

$$R_{25^{\circ}\text{C}} + (\text{Tolerance} \times R_c) = R_t + \text{Maximum Deviation}$$

R25°C = thermistor resistance at 25°C

Rc = coefficient of resistance at desired temperature

Rt = resistance of thermistor at desired temperature T

Maximum Deviation = tolerance in percent taken from Table III at a temperature other than 25°C

POWER DERATING

Power dissipation in the thermistor causes a resultant rise in the case temperature of the thermistor. The maximum allowable temperature of the thermistor is 125°C. The thermistor must be power derated according to the Derating Curve, PTC Figure 1.

PTC TABLE I - STANDARD FOR RTH42 (MIL-R-23648/19) AND QTG SERIES, QTCII

TEMPERATURE	10 TO 68 OHMS	82 TO 150 OHMS	180 TO 470 OHMS	560 TO 1200 OHMS	1500 TO 5600 OHMS	6800 TO 10,000 OHMS
*(-55°C)	0.615	0.582	0.560	0.550	0.515	0.510
-15°C	0.790	0.770	0.755	0.740	0.730	0.730
0°C	0.863	0.847	0.838	0.835	0.825	0.825
25°C	1.000	1.000	1.000	1.000	1.000	1.000
50°C	1.160	1.170	1.180	1.200	1.230	1.190
75°C	1.350	1.370	1.400	1.420	1.450	1.400
*(100°C)	1.545	1.584	1.623	1.656	1.670	1.610
*(125°C)	1.750	1.800	1.860	1.920	1.960	1.830

PTC TABLE II - STANDARD FOR RTH22 (MIL-R-23648/9) AND QTM SERIES

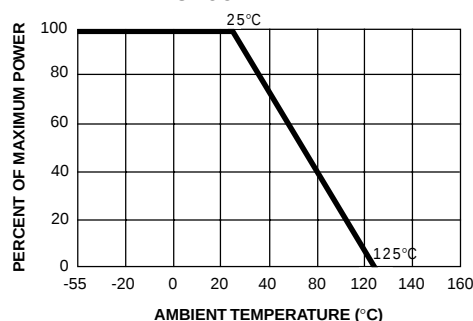
TEMPERATURE	10 TO 68 OHMS	82 TO 150 OHMS	180 TO 560 OHMS	680 TO 1500 OHMS	1800 TO 5600 OHMS	6800 TO 10,000 OHMS
*(-55°C)	0.615	0.582	0.560	0.550	0.515	0.481
-15°C	0.790	0.770	0.755	0.740	0.730	0.712
0°C	0.863	0.847	0.838	0.835	0.825	0.814
25°C	1.000	1.000	1.000	1.000	1.000	1.000
50°C	1.160	1.170	1.180	1.200	1.230	1.210
75°C	1.350	1.370	1.400	1.420	1.450	1.430
*(100°C)	1.545	1.584	1.623	1.656	1.670	1.670
*(125°C)	1.750	1.800	1.860	1.920	1.960	1.900

PTC TABLE III - DEVICE TOLERANCE AT TEMPERATURES OTHER THAN 25°C

SEQUENCE	TEMPERATURE	F +/- %	G +/- %	J +/- %	K +/- %
1	-55°C	15	17	20	25
2	-15°C	9	10	13	18
3	0°C	3	4	7	12
4	25°C	1	2	5	10
5	50°C	3	4	7	12
6	75°C	5	6	9	14
7	100°C	7	9	12	17
8	125°C	10	12	15	20

*Multipliers applicable to military grades only

PTC FIGURE 1 -
DERATING CURVE



ORDERING INFORMATION

STYLE DESIGNATION QTG12 202F

FIRST TWO RESISTANCE DIGITS 12

NUMBER OF ZEROS 20

TOLERANCE: F

K = 10% J = 5% G = 2% F = 1%

10% IS STANDARD TOLERANCE

ISO9001 CERTIFIED

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PTC COMMERCIAL GRADE STYLES

	OPERATING TEMPERATURE RANGE	STANDARD RESISTANCE RANGE	POWER RATING AT 25°C IN WATTS	THERMAL TIME CONSTANT SECONDS MAXIMUM
QTM12 - MOLDED TYPE 	-65°C TO +125°C	10 - 40K OHMS	.500* *derate per Figure 1	30
QTG12 - GLASS TYPE 	-65°C TO +125°C	10 - 10K OHMS	.125* *derate per Figure 1	55
QTG10 - GLASS TYPE 	-55°C TO +125°C	10 - 3.3K OHMS	.062* *derate per Figure 1	10

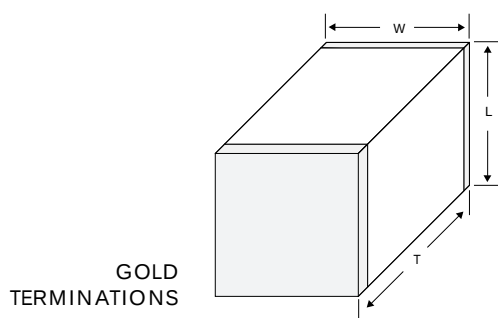
PTC MILITARY GRADE STYLES MEET OR EXCEED MIL-R-23648D

RTH22 - MIL-R-23648/9 	-55°C TO +125°C	10 - 10K OHMS	.500 @ 25°C* *derate per Figure 1	60
RTH42 - MIL-R-23648/19 	-55°C TO +125°C	10 - 10K OHMS	.250 @ 25°C* *derate per Figure 1	60



POSITIVE TEMPERATURE COEFFICIENT CHIP THERMISTOR

STANDARD CONFIGURATION



ENGINEERING INFORMATION

DISSIPATION CONSTANT DEPENDENT
ON MOUNTING

THERMAL TIME CONSTANT DEPENDENT
ON MOUNTING

RESISTANCE COEFFICIENT. SEE PTC TABLE I

MOUNTING WIRE BOND OR
CONDUCTIVE EPOXY

NOTE: FOR R/T CURVE, SEE PTC TABLE I

ORDERING INFORMATION

PART NUMBER IS FORMED AS FOLLOWS:

QTC11 - 100K

PART NUMBER ————

TOLERANCE CODE SUFFIX ————

K = 10% J = 5% G = 2% F = 1%

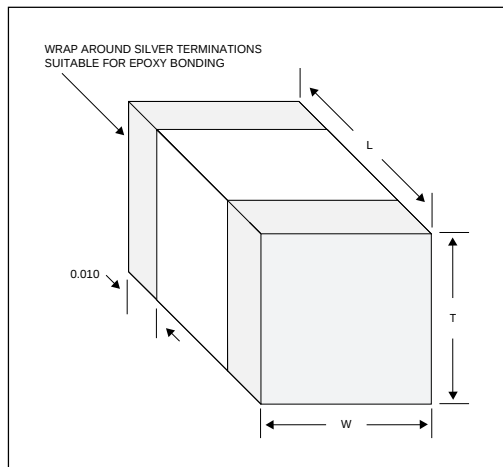
RESISTANCE OHMS @ 25°C	PART NO.	L +/- .010	W +/- .010	T +/- .010	NOMINAL D.C.*	T.C.*
10	QTC11 -100	.032	.032	.028	2MW	8 sec.
12	-120	.032	.032	.028	2MW	8 sec.
15	-150	.032	.032	.050	2MW	8 sec.
18	-180	.032	.032	.050	2MW	8 sec.
22	-220	.032	.032	.050	2MW	8 sec.
27	-270	.032	.032	.050	2MW	8 sec.
33	-330	.032	.032	.050	2MW	8 sec.
39	-390	.032	.032	.050	2MW	8 sec.
47	-470	.032	.032	.050	2MW	8 sec.
56	-560	.032	.032	.050	2MW	8 sec.
68	-680	.032	.032	.050	2MW	8 sec.
82	-820	.032	.032	.050	2MW	8 sec.
100	-101	.032	.032	.050	2MW	8 sec.
120	-121	.032	.032	.050	2MW	8 sec.
150	-151	.032	.032	.050	2MW	8 sec.
180	-181	.032	.032	.050	2MW	8 sec.
220	-221	.032	.032	.050	2MW	8 sec.
270	-271	.032	.032	.050	2MW	8 sec.
330	-331	.032	.032	.050	2MW	8 sec.
390	-391	.032	.032	.050	2MW	8 sec.
470	-471	.032	.032	.050	2MW	8 sec.
560	-561	.032	.032	.050	2MW	8 sec.
680	-681	.032	.032	.050	2MW	8 sec.
820	-821	.032	.032	.050	2MW	8 sec.
1000	-102	.032	.032	.050	2MW	8 sec.
1200	-122	.032	.032	.050	2MW	8 sec.
1500	-152	.032	.032	.050	2MW	8 sec.
1800	-182	.032	.032	.050	2MW	8 sec.
2200	-222	.038	.038	.072	2MW	8 sec.
2700	-272	.038	.038	.072	2MW	8 sec.
3300	-332	.038	.038	.072	2MW	8 sec.
3900	-392	.038	.038	.072	2MW	8 sec.
4700	-472	.038	.038	.072	2MW	8 sec.
5600	-562	.038	.038	.072	2MW	8 sec.
6800	-682	.038	.038	.072	2MW	8 sec.
8200	-822	.030	.030	.072	2MW	8 sec.
10000	-103	.022	.022	.072	2MW	8 sec.

*D.C. = DISSIPATION CONSTANT MW/C

*T.C. = TIME CONSTANT SECONDS IN FREE AIR



PTC MICROELECTRONIC SURFACE MOUNT THERMISTOR



WRAP AROUND SILVER TERMINATIONS - SUITABLE FOR EPOXY BONDING

RESISTANCE @ 25°C (Ohms)	PART NO.	W +/-0.005	T +/-0.005	L +/-0.010	NOMINAL *D.C.	NOMINAL *T.C.
33	QTCH-330X	.030	.020	.050	2mW/C	8 sec
47	QTCH-470X	.030	.022	.050	2mW/C	8 sec
100	QTCH-101X	.030	.030	.050	2mW/C	8 sec
330	QTCH-331X	.030	.020	.050	2mW/C	8 sec
470	QTCH-471X	.030	.023	.050	2mW/C	8 sec
1000	QTCH-102X	.030	.016	.050	2mW/C	8 sec
3300	QTCH-332X	.030	.020	.050	2mW/C	8 sec

*MINIMUM DISSIPATION CONSTANT

*MAXIMUM THERMAL TIME CONSTANT AS MEASURED IN FREE AIR

ORDERING INFORMATION

PART NUMBER IS FORMED AS FOLLOWS:

QTCH-____X
TOLERANCE DESIRED _____

TOLERANCE:

K=10% J=5% G=2% F=1%

ENGINEERING INFORMATION

Dissipation Constant	Dependent on Mounting
Thermal Time Constant	Dependent on Mounting
Resistance Coefficient	SEE PTC TABLE 1
Mounting	Conductive Epoxy
Power Rating	0.0625 watts @ 25°C
Operating Range	-55°C to 125°C

FOR ADDITIONAL ENGINEERING INFORMATION PLEASE CONTACT
FACTORY FOR TECHNICAL BULLETIN #QT05015-001

ISO9001 CERTIFIED

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QUALITY THERMISTOR PTC TO220 OVERTEMPERATURE PROTECTORS

Quality Thermistor's Non-Linear Positive Temperature Coefficient thermistors can function as solid state switches. The standard TO220 package is ideal for placement on or next to heat generating devices such as power transistor heat sinks. When the PTC reaches the specified transition temperature, it "switches" and can be designed to cut off power. Once the device cools, it resets itself to protect the circuit once again.

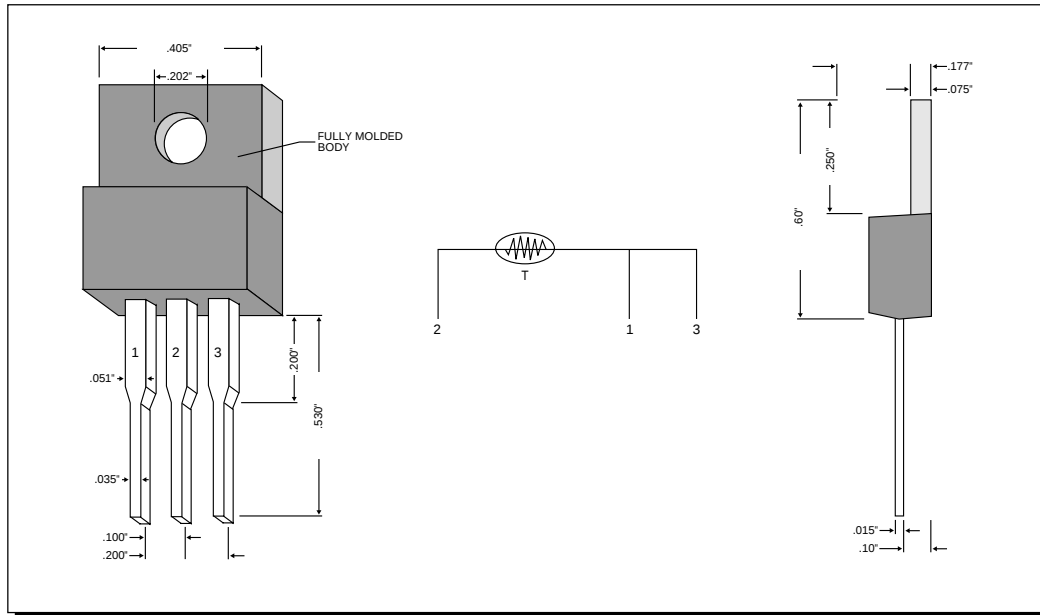


FIGURE 1

PART NUMBER	TRANSITION TEMP. °C (REF.)
QTOTP-30	30
QTOTP-40	40
QTOTP-50	50
QTOTP-60	60
QTOTP-70	70
QTOTP-80	80
QTOTP-90	90
QTOTP-100	100
QTOTP-110	110
QTOTP-120	120

TABLE I

SPECIFICATIONS

Physical Design = Per Figure 1

Resistance @ 25°C = 100Ω +/- 30%

Maximum Operating Temp = 150°C

(Temperature at which device is two times the minimum resistance)

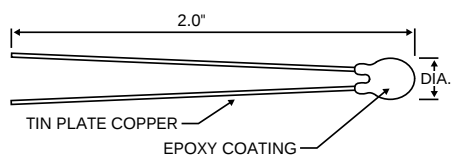
Maximum Voltage = 30 VAC



STANDARD NTC THERMISTORS

Quality Thermistor's bare leaded NTC thermistors are the ideal solution for low cost temperature measurement between the range of -55°C to +150°C. Their small size allows for PC board mounting as well as for potting into enclosures.

STANDARD CONFIGURATION



DEVICE FEATURES

Resistance values from 100Ω to 9.8 MΩ.
Epoxy Coating
Typical Dissipation Constant = 2mw/°C in still air
Typical time constant in still air= 10 Seconds
#28 AWG tinned copper leads
Interchangeable tolerances available

RESISTANCE @ 25°C (Ohms)	PART NUMBER	R-T CURVE	ALPHA (α)	BEAD DIA.
100	QTM-78	X	(-3.1%)	.095
1,000	QTM-2	Z	(-4.4%)	.125
2,252	QTM-7	Z	(-4.4%)	.095
3,000	QTM-9	Z	(-4.4%)	.095
5,000	QTM-11	Z	(-4.4%)	.095
10,000	QTM-14	Z	(-4.4%)	.095
20,000	QTM-19	Z	(-4.4%)	.095
1,000	QTM-27	Y	(-3.9%)	.095
2,000	QTM-28	Y	(-3.9%)	.095
100,000	QTM-43	V	(-4.9%)	.095
1.0 Meg**	QTM-65	P	(-5.4%)	.095
9.8 Meg**	QTM-70	R	(-6.2%)	.095

CUSTOM CONFIGURATIONS

Quality Thermistor offers one of the largest selections of Resistance vs. Temperature Curves in the industry. Many custom Resistance/Curve configurations are available. Insulated leads are also available. Contact QTI for all of your special requirements.

ORDERING INFORMATION

PART NUMBER - STANDARD

QTM-14J

TOLERANCE CODE SUFFIX

STANDARD PART NUMBER

TOLERANCE:

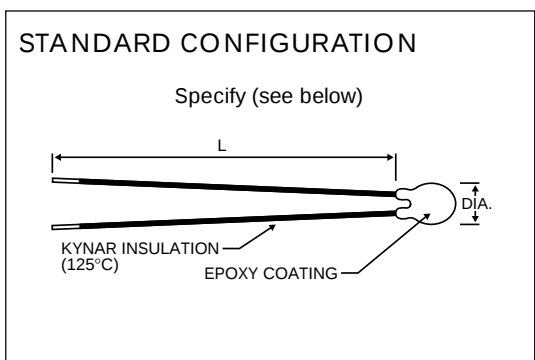
F = 1% G = 2% J = 5% K = 10%

**TOLERANCE APPLIES TO NOMINAL VALUE @ 70°C



STANDARD NTC THERMISTORS WITH INSULATED LEADS

Quality Thermistor's NTC thermistors with insulated leads provide a hassle free solution for potting into enclosures. Insulated leads can also provide a "built in" circuit board stand-off for air flow measurement.



RESISTANCE @ 25°C (Ohms)	PART NUMBER	R-T CURVE	ALPHA (°)	BEAD DIA.
1,000	QTMC__-2	Z	(-4.4%)	.125
2,252	QTMC__-7	Z	(-4.4%)	.1"
3,000	QTMC__-9	Z	(-4.4%)	.1"
5,000	QTMC__-11	Z	(-4.4%)	.1"
10,000	QTMC__-14	Z	(-4.4%)	.1"
20,000	QTMC__-19	Z	(-4.4%)	.1"
100,000	QTMC__-43	V	(-4.9%)	.1"

DEVICE FEATURES

Resistance values from 1,000Ω to 100 KΩ.
Epoxy Coating
Typical Dissipation Constant = 2mw/°C in still air
Typical time constant in still air= 10 Seconds
#28 AWG silver plated "kynar" wire
(Polyvinylidene Fluoride)
Solid conductor core wire

CUSTOM CONFIGURATIONS

Quality Thermistor offers one of the largest selections of Resistance vs. Temperature Curves in the industry. Many custom Resistance/Curve configurations are available. Other types of insulation material are also available. Contact QTI for your special requirements.

ORDERING INFORMATION

PART NUMBER - STANDARD

QTMCA-14J

TOLERANCE CODE SUFFIX

LEAD TYPE

STANDARD PART NUMBER

TOLERANCE:

F = 1% G = 2% J = 5% K = 10%

LEAD OPTIONS:

A = #28 AWG Kynar 2" Long

B = #28 AWG Kynar 6" Long

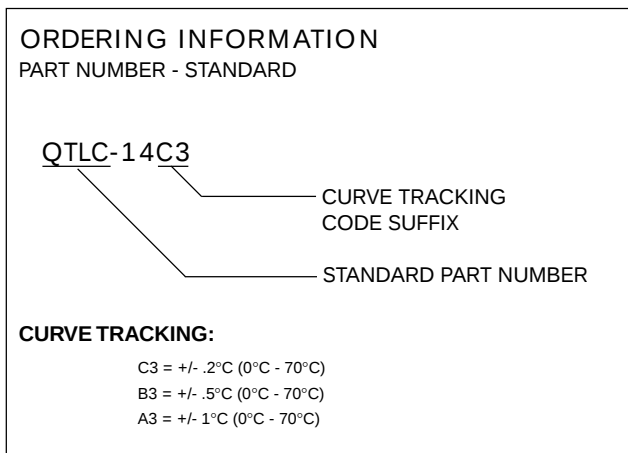
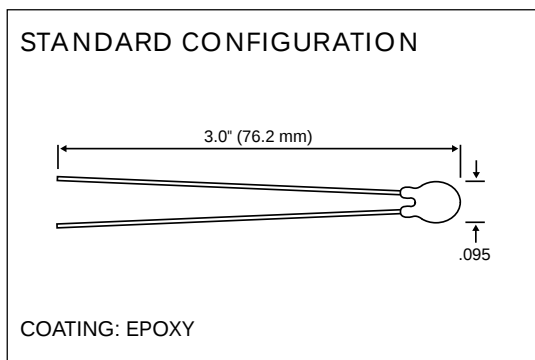
C = #28 AWG Kynar 12" Long



QTI interchangeable PRECISION NTC THERMISTORS (INDUSTRY STANDARD CURVE-TRACKER)

The name "interchangeable" is given to thermistors which have ultra-tight tolerances guaranteed to track a specific resistance-temperature curve. The QTI interchangeable thermistor offers industry standard 3" long, thin #32 Awg (.0075") bare leads.

RESISTANCE @ 25°C (Ohms)	PART NUMBER	R-T CURVE	LEAD DIA.	BEAD DIA.	COATING
2,252	QTLC-7	Z	.0075"	.095	EPOXY
5,000	QTLC-11	Z	.0075"	.095	EPOXY
10,000	QTLC-14	Z	.0075"	.095	EPOXY



CURVE Z
-4.4%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	96.40000	3.80	7.400
-50	67.06000	3.50	7.200
-45	47.08400	3.25	6.961
-40	33.66000	3.00	6.700
-35	24.28500	2.70	6.442
-30	17.70000	2.40	6.200
-25	13.03100	2.16	5.984
-20	9.71200	1.90	5.800
-15	7.29800	1.60	5.650
-10	5.53400	1.40	5.500
-5	4.23400	1.20	5.300
0	3.26600	1.00	5.100
5	2.54000	0.75	4.950
10	1.99000	0.50	4.800
15	1.57100	0.30	4.650
20	1.24900	0.10	4.500
25	1.00000	0.00	4.400
30	0.80580	0.20	4.300
35	0.65320	0.40	4.150
40	0.53260	0.60	4.000
45	0.43680	0.80	3.900
50	0.36020	1.00	3.800
55	0.29860	1.10	3.700
60	0.24880	1.20	3.600
65	0.20820	1.40	3.500
70	0.17510	1.60	3.400
75	0.14800	1.75	3.350
80	0.12560	1.90	3.300
85	0.10710	2.00	3.200
90	0.09164	2.10	3.100
95	0.07874	2.25	3.000
100	0.06792	2.40	2.900
105	0.05880	2.50	2.850
110	0.05108	2.60	2.800
115	0.04452	2.75	2.750
120	0.03894	2.90	2.700
125	0.03416	3.00	2.600
130	0.03006	3.10	2.500
135	0.02653	3.25	2.440
140	0.02348	3.40	2.400
145	0.02084	3.47	2.353
150	0.01854	3.50	2.300



QTI interchangeable with Insulated Leads

PRECISION NTC THERMISTORS (INDUSTRY STANDARD CURVE-TRACKER)

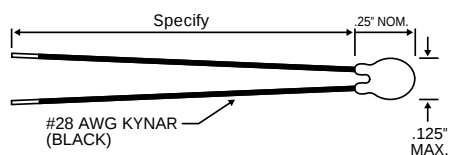
The name "interchangeable" is given to thermistors which have ultra-tight tolerances guaranteed to track a specific resistance-temperature curve. The QTI interchangeable thermistor with insulated leads is a proven design for precision temperature measurement.

RESISTANCE @ 25°C (Ohms)	PART NUMBER	R-T CURVE	LEAD DIA.	BEAD DIA.	COATING
2,252	QTLC_-7	Z	.013"	.125	EPOXY
5,000	QTLC_-11	Z	.013"	.125	EPOXY
10,000	QTLC_-14	Z	.013"	.125	EPOXY

CURVE Z
-4.4%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	96.40000	3.80	7.400
-50	67.06000	3.50	7.200
-45	47.08400	3.25	6.961
-40	33.66000	3.00	6.700
-35	24.28500	2.70	6.442
-30	17.70000	2.40	6.200
-25	13.03100	2.16	5.984
-20	9.71200	1.90	5.800
-15	7.29800	1.60	5.650
-10	5.53400	1.40	5.500
-5	4.23400	1.20	5.300
0	3.26600	1.00	5.100
5	2.54000	0.75	4.950
10	1.99000	0.50	4.800
15	1.57100	0.30	4.650
20	1.24900	0.10	4.500
25	1.00000	0.00	4.400
30	0.80580	0.20	4.300
35	0.65320	0.40	4.150
40	0.53260	0.60	4.000
45	0.43680	0.80	3.900
50	0.36020	1.00	3.800
55	0.29860	1.10	3.700
60	0.24880	1.20	3.600
65	0.20820	1.40	3.500
70	0.17510	1.60	3.400
75	0.14800	1.75	3.350
80	0.12560	1.90	3.300
85	0.10710	2.00	3.200
90	0.09164	2.10	3.100
95	0.07874	2.25	3.000
100	0.06792	2.40	2.900
105	0.05880	2.50	2.850
110	0.05108	2.60	2.800
115	0.04452	2.75	2.750
120	0.03894	2.90	2.700
125	0.03416	3.00	2.600
130	0.03006	3.10	2.500
135	0.02653	3.25	2.440
140	0.02348	3.40	2.400
145	0.02084	3.47	2.353
150	0.01854	3.50	2.300

STANDARD CONFIGURATION



COATING: EPOXY

ORDERING INFORMATION

PART NUMBER - STANDARD

QTLC-A-14C3

CURVE TRACKING
CODE SUFFIX
LEAD TYPE
STANDARD PART NUMBER

CURVE TRACKING:

C3 = +/- .2°C (0°C - 70°C)

B3 = +/- .5°C (0°C - 70°C)

A3 = +/- 1°C (0°C - 70°C)

LEAD OPTIONS:

A = #28 AWG Kynar 2" Long

B = #28 AWG Kynar 6" Long

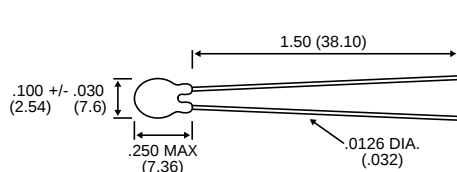
C = #28 AWG Kynar 12" Long



MILITARY GRADE NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS

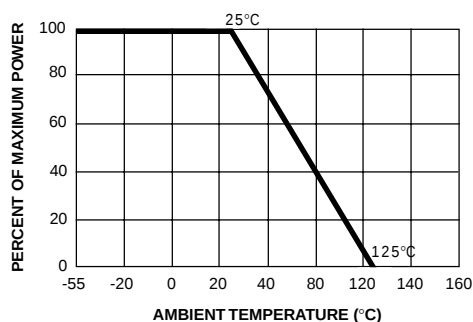
Negative Temperature Coefficient (NTC) thermistors have a very predictable resistance gain that is inversely proportional to changes in ambient temperature. Each thermistor curve has its own slope over a given temperature range. Resistance is typically specified at 25°C. Resistances at temperatures other than 25°C may be calculated using the R/T curve data sheet. This data sheet summarizes the specifications listed within MIL-R-23648/20.

STYLE RTH44 MIL-R-23648/20 QUALIFIED



NOTE:
DIMENSION IN INCHES
(MILLIMETERS IN PARENTHESES)

FIGURE 1: DERATING CURVE FOR HIGH AMBIENT TEMPERATURES



ELECTRICAL PARAMETERS:

THERMAL TIME CONSTANT: The thermal time constant shall be 25 seconds maximum.

DISSIPATION CONSTANT: The dissipation constant shall be 2 mW/°C.

POWER RATING: The thermistor shall be capable of dissipating a maximum power of .20 watt at 25°C. Thermistors shall be derated in accordance with Figure 1.

RESISTANCE AT 25°C: Zero power resistance values at 25°C. Minimum and maximum resistance values for each available resistance ratio shall be in accordance with Table I.

TABLE I: MINIMUM AND MAXIMUM RESISTANCE VALUES (AT 25°C) FOR EACH AVAILABLE RESISTANCE RATIO

RATIO 19.8 (A)	RATIO 29.4 (B)	RATIO 48.7 (C)
OHMS	OHMS	OHMS
300 MINIMUM	1K MINIMUM	15K MINIMUM
3K MAXIMUM	10K MAXIMUM	500K MAXIMUM

TABLE II: RESISTANCE TEMPERATURE CHARACTERISTICS FACTORS

TEMPERATURE (°C)	RATIO 19.8 (A)	RATIO 29.4 (B)	RATIO 48.7 (C)
-55	54.7800	100	-
-15	5.7770	7.38	8.80
0	2.8480	3.27	3.66
25	1.0000	1.00	1.00
50	.4045	.360	.320
75	.1841	.148	.116
100	.0923	.0675	.047
125	.0504	.0340	.0205

ORDERING INFORMATION

STYLE ——— RTH44 A S 15 2 F

RATIO PER TABLE II ———

S = SOLDERABLE LEADS ———

FIRST TWO RESISTANCE DIGITS ———

NUMBER OF ZEROS ———

TOLERANCE:

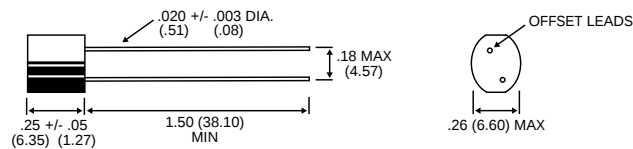
K = 10% J = 5% G = 2% F = 1%



MILITARY GRADE NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS

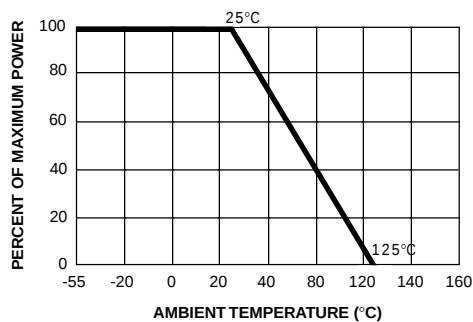
Negative Temperature Coefficient (NTC) thermistors have a very predictable resistance gain that is inversely proportional to changes in ambient temperature. Each thermistor curve has its own slope over a given temperature range. Thermistors are ordered usually at their resistance reading at 25°C. Resistances other than 25°C may be calculated using the R/T curve data sheet. This data sheet summarizes the specifications listed within MIL-R-23648/1.

STYLE RTH06 MIL-R-23648/1 QUALIFIED



NOTE:
DIMENSION IN INCHES
(MILLIMETERS IN PARENTHESIS)

FIGURE 1: DERATING CURVE FOR HIGH AMBIENT TEMPERATURES



ELECTRICAL PARAMETERS:

THERMAL TIME CONSTANT: The thermal time constant shall be 80 seconds maximum.

DISSIPATION CONSTANT: The dissipation constant shall be 5 mW/°C.

POWER RATING: The thermistor shall be capable of dissipating a maximum power of 0.5 watt at 25°C. Thermistors shall be derated in accordance to Figure 1.

RESISTANCE AT 25°C: Zero power resistance values at 25°C. Minimum and maximum resistance values for each available resistance ratio shall be in accordance with Table I.

TABLE I: MINIMUM AND MAXIMUM RESISTANCE VALUES (AT 25°C) FOR EACH AVAILABLE RESISTANCE RATIO

RATIO 19.8 (A)	RATIO 29.4 (B)	RATIO 48.7 (C)
OHMS	OHMS	OHMS
68 MINIMUM	680 MINIMUM	7.5K MINIMUM
560 MAXIMUM	4700 MAXIMUM	75K MAXIMUM

TABLE II: RESISTANCE TEMPERATURE CHARACTERISTICS FACTORS

TEMPERATURE (°C)	RATIO 19.8 (A)	RATIO 29.4 (B)	RATIO 48.7 (C)
-55	54.79	100	-
-15	5.77	7.38	8.80
0	2.85	3.27	3.66
25	1.0000	1.00	1.00
50	.405	.360	.320
75	.184	.148	.116
100	.0923	.0675	.047
125	.0503	.0340	.0205

ORDERING INFORMATION

STYLE ——— RTH06 A S 15 2 F

RATIO PER TABLE II ———

S = SOLDERABLE LEADS ———

FIRST TWO RESISTANCE DIGITS ———

NUMBER OF ZEROS ———

TOLERANCE:

K = 10% J = 5% G = 2% F = 1%



QT0805 SURFACE MOUNT THERMISTORS

Quality Thermistor's QT0805 Surface Mount thermistors are the ideal solution for temperature sensing functions found in temperature compensation networks. The patented design features "Leach Guard" terminations which are able to withstand many of today's modern automated assembly and soldering processes. Standard EIA sizing allows for tape and reel packaging designed for automated placement equipment. Contact QTI for information regarding our SMD engineering kit.

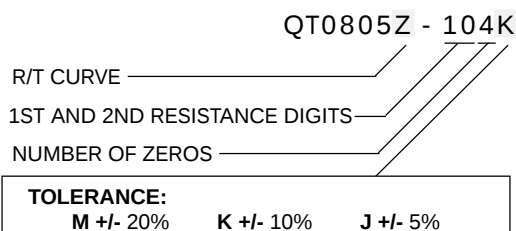
PART NUMBER	PACKAGE STYLE	RESISTANCE @ 25°C (Ohms)	R-T CURVE	*BETA (β) 75/25
QT0805K-500	0805	50	*K	2200
QT0805K-101	0805	100	*K	2200
QT0805X-102	0805	1,000	X	3000
QT0805T-202	0805	2,000	T	3181
QT0805T-502	0805	5,000	T	3181
QT0805Y-103	0805	10,000	Y	3513
QT0805Y-203	0805	20,000	Y	3513
QT0805Z-503	0805	50,000	Z	3966
QT0805Z-104	0805	100,000	Z	3966
QT0805P-685	0805	6.8 Meg	P	4829
QT0805P-106	0805	10 Meg	P	4829

ENGINEERING INFORMATION

Thermal Time Constant (Depends on Mounting)	8 seconds
Dissipation Constant (Depends on Mounting)	2 mw/°C
Temperature Range	-65°C - 150°C
Power Rating	1/8 w

ORDERING INFORMATION

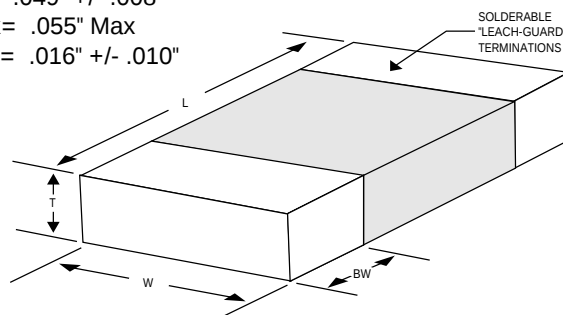
PART NUMBER IS FORMED AS FOLLOWS:



*CURVE "K" DEVICES OFFERED IN "K" & "M" TOLERANCE ONLY.

DIMENSIONS QT0805 STYLE

L= .078" +/- .008"
W= .049" +/- .008"
Thk= .055" Max
BW= .016" +/- .010"



**OTHER SIZES AND VALUES AVAILABLE, CONTACT FACTORY FOR DETAILS

FOR ADDITIONAL ENGINEERING INFORMATION PLEASE CONTACT FACTORY FOR TECHNICAL BULLETIN #QT05015-002

PATENT #5,257,003

ISO9001 CERTIFIED

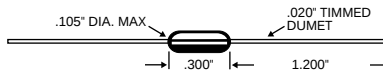
2108 CENTURY WAY BOISE, IDAHO 83709

PHONE 208-377-3373 FAX 208-376-4754
E-MAIL qti@thermistor.com



CUSTOM MONOLITHIC GLASS PACKAGES FOR NTC THERMISTORS

QTGN12



TEMPERATURE RANGE -60°C TO +150°C*

PART NUMBER	RESISTANCE 25°C	R/T CURVE	T.C.**	D.C.**
QTGN12 -1	100	X	5	2
-2	250	X	5	2
-3	500	T	5	2
-4	1,000	T	5	2
-5	1,200	Y	5	2
-6	2,000	Y	5	2
-7	3,000	Y	5	2
-8	3,300	Y	5	2
-9	4,700	Y	5	2
-10	5,000	Y	5	2
-11	7,500	Z	5	2
-12	10,000	Z	5	2
-13	20,000	Z	5	2
-14	50,000	Z	5	2
-15	100,000	V	5	2
-16	500,000	V	5	2
-17	1 Meg	V	5	2

NOTE: SEE DATA SHEET FOR R/T CURVES

* Higher temperature ranges available.

** Will vary with mounting technique, external cooling, location, etc. It is suggested that samples be obtained to use in the specific application to determine actual performance specifications.

ORDERING INFORMATION

QTGN12-XJ

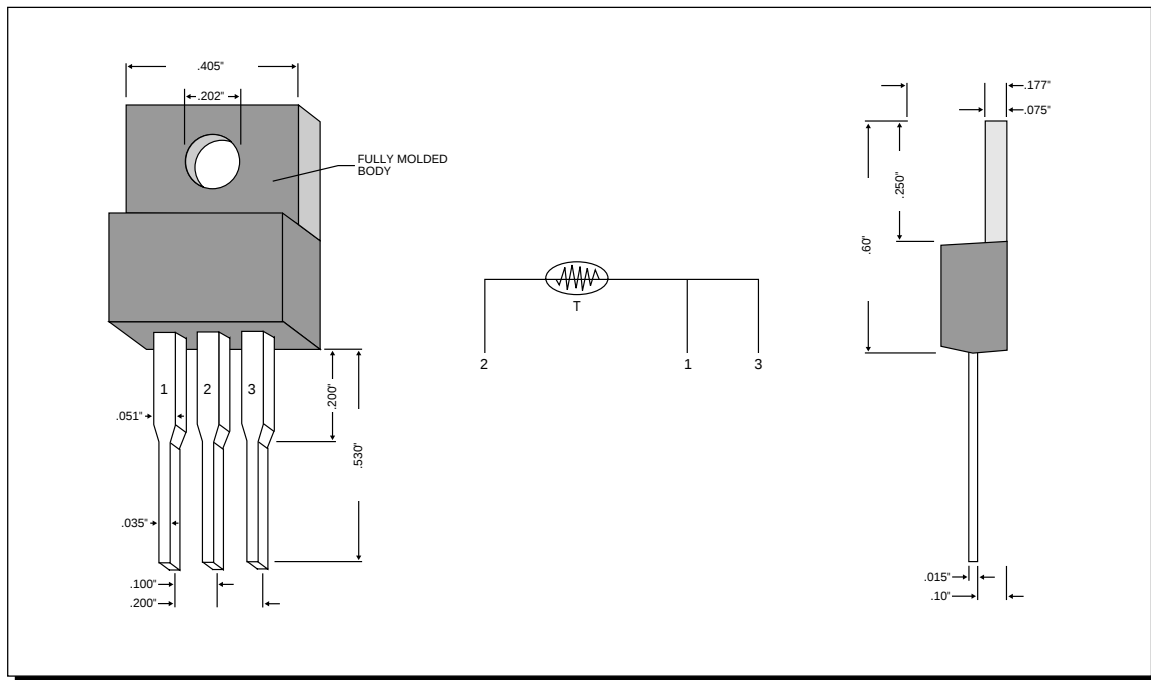
TOLERANCE:

K = 10% J = 5% G = 2% F = 1%



QTO220F NTC THERMISTOR

Heat sink temperature measurement has always posed a challenge for engineers in areas such as power supply manufacturing. The QTO220F NTC thermistor was designed for use in such applications. Based on the standard TO220 package, this device is ideal for use in hostile environments.



PART NUMBER	RESISTANCE @ 25°C	R-T CURVE
QTO220FZ-103	10,000Ω	Z
QTO220FM-303	30,000Ω	M
QTO220FM-503	50,000Ω	M
QTO220FV-104	100,000Ω	V

ORDERING INFORMATION:

INSERT TOLERANCE CODE AT END OF PART NUMBER AS FOLLOWS:

QTO220FM-303J

INSERT TOLERANCE SUFFIX

TOLERANCE:

J = 5% K = 10%

*NOTE: OTHER VALUES AND CURVES ARE AVAILABLE, CONTACT QTI FOR YOUR SPECIFIC APPLICATION.

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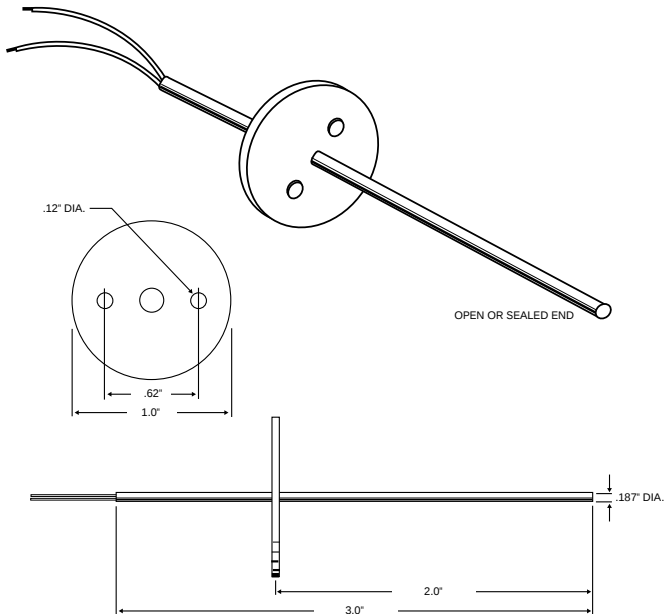
PHONE 208-377-3373 FAX 208-376-4754
E-MAIL qti@thermistor.com



THERMISTOR PROBES - GAS/AIR/LIQUID TYPES

Standard and custom probe assemblies are offered in numerous configurations for gas, air, and liquid measurement. The designs below are considered standard, but Quality Thermistor specializes in custom designs to work best for the customer's individual applications.

QTA SERIES - GAS/AIR, LIQUID PROBE



STAINLESS STEEL PROBE WITH FLANGE. AVAILABLE IN OPEN TIP (QTA-1) FOR AIR MEASUREMENT, AND CLOSED (QTA-2) FOR LIQUID MEASUREMENT. PARTS AVAILABLE IN STANDARD QTMC ELECTRICAL CONFIGURATIONS.

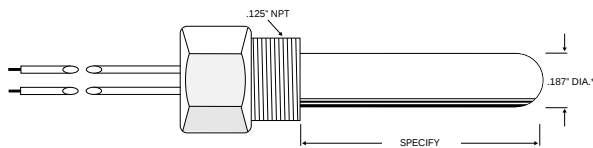
QTR - LIQUID PROBE



DURABLE GENERAL PURPOSE STAINLESS STEEL IMMERSION PROBE. 6" STANDARD LEADS. PARTS AVAILABLE IN STANDARD QTMC ELECTRICAL CONFIGURATIONS.

*OTHER DIAMETERS: .125", .156", .250" ARE ALSO AVAILABLE.

QTP - LIQUID PROBE



DURABLE STAINLESS STEEL PROBE WITH NPT HEX FITTING. IDEAL FOR MEASURING LIQUID/AIR IN ENCLOSED ENVIRONMENTS. 6" STANDARD LEADS. PARTS AVAILABLE IN STANDARD QTMC ELECTRICAL CONFIGURATIONS.

*OTHER DIAMETERS: .125", .156", .250" ARE ALSO AVAILABLE.

ORDERING INFORMATION:

QTA Z - 103 J - 6
PROBE STYLE _____
R/T CURVE _____
FIRST TWO RESISTANCE DIGITS _____
NUMBER OF ZEROS _____

TOLERANCE:

K = 10% J = 5% G = 2% F = 1%

LENGTH OF LEADS IN _____ INCHES

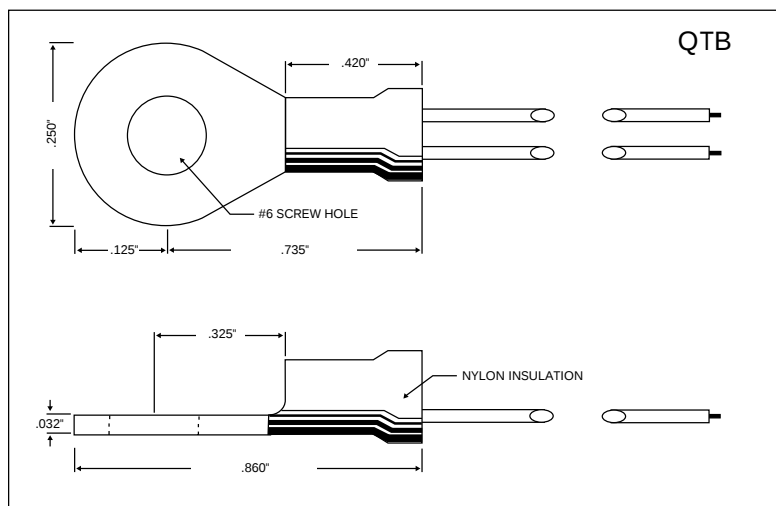
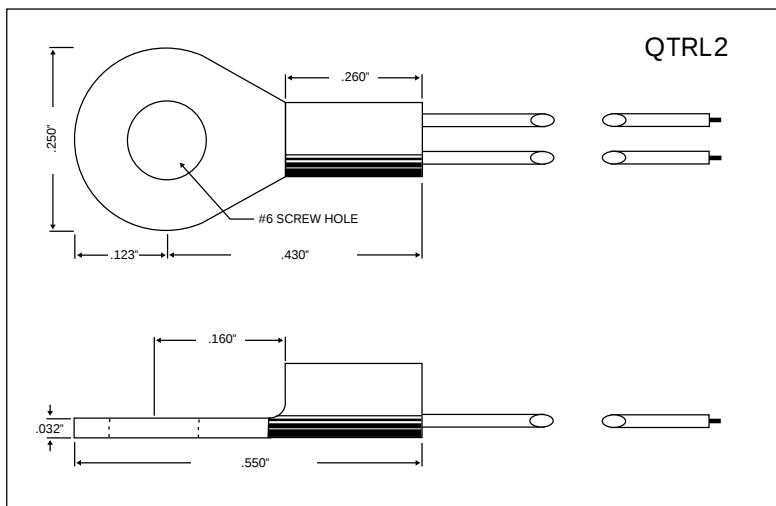
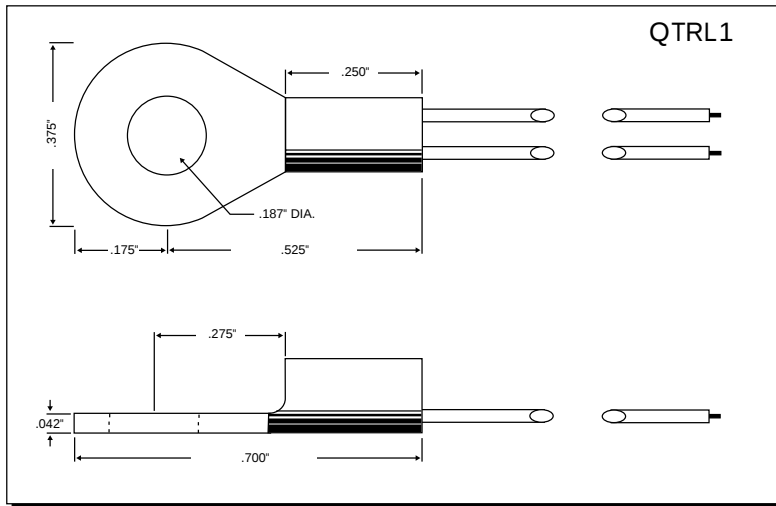
STANDARD LEAD OPTIONS:

PARTS COME STANDARD WITH #28 AWG BLACK KYNAR INSULATED LEADS IN EITHER 6", 12", OR 24" LENGTHS.

NOTE: SEE DATA SHEETS FOR R/T CURVES



THERMISTOR PROBES - SURFACE TYPE

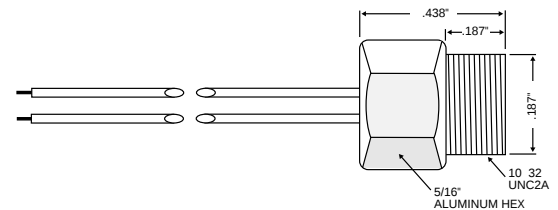


QTRL-1 / QTRL-2 / QTB PROBES

RING TONGUE LUG PROBES. EXCELLENT FOR CONTROL AND MEASUREMENT OF ANY FLAT SURFACE. STANDARD LEAD LENGTH 1.5". PARTS AVAILABLE IN STANDARD QTMC CONFIGURATIONS.

QTF SURFACE PROBE

ALUMINUM HEAT SINK SENSOR. GREAT FOR APPLICATIONS WHERE SHOCK AND VIBRATION ARE PRESENT. PARTS AVAILABLE IN STANDARD QTMC CONFIGURATIONS.



ORDERING INFORMATION:

QTRL1 Z - 103 J - 6

PROBE STYLE _____

R/T CURVE _____

FIRST TWO RESISTANCE DIGITS _____

NUMBER OF ZEROS _____

TOLERANCE:

K = 10% J = 5% G = 2% F = 1%

LENGTH OF LEADS IN _____ INCHES

STANDARD LEAD OPTIONS:

PARTS COME STANDARD WITH #28 AWG BLACK KYNAR INSULATED LEADS IN EITHER 1.5", 6", 12", OR 24" LENGTHS.

NOTE: SEE DATA SHEETS FOR R/T CURVES

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2108 CENTURY WAY BOISE, IDAHO 83709

PHONE 208-377-3373 FAX 208-376-4754
E-MAIL qti@thermistor.com



R/T CHARACTERISTICS OF NTC THERMISTORS

CURVE Z
-4.4%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	96.40000	3.80	7.400
-50	67.06000	3.50	7.200
-45	47.08421	3.25	6.961
-40	33.66000	3.00	6.700
-35	24.28525	2.70	6.442
-30	17.70000	2.40	6.200
-25	13.03128	2.16	5.984
-20	9.71200	1.90	5.800
-15	7.29800	1.60	5.650
-10	5.53400	1.40	5.500
-5	4.23400	1.20	5.300
0	3.26600	1.00	5.100
5	2.54000	0.75	4.950
10	1.99000	0.50	4.800
15	1.57100	0.30	4.650
20	1.24900	0.10	4.500
25	1.00000	0.00	4.400
30	0.80580	0.20	4.300
35	0.65320	0.40	4.150
40	0.53260	0.60	4.000
45	0.43680	0.80	3.900
50	0.36020	1.00	3.800
55	0.29860	1.10	3.700
60	0.24880	1.20	3.600
65	0.20820	1.40	3.500
70	0.17510	1.60	3.400
75	0.14800	1.75	3.350
80	0.12560	1.90	3.300
85	0.10710	2.00	3.200
90	0.09164	2.10	3.100
95	0.07874	2.25	3.000
100	0.06792	2.40	2.900
105	0.05880	2.50	2.850
110	0.05108	2.60	2.800
115	0.04452	2.75	2.750
120	0.03894	2.90	2.700
125	0.03416	3.00	2.600
130	0.03006	3.10	2.500
135	0.02653	3.25	2.440
140	0.02348	3.40	2.400
145	0.02084	3.47	2.353
150	0.01854	3.50	2.300

CURVE Y
-3.9%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	54.78000	8.90	6.500
-50	40.06000	8.20	6.100
-45	29.53146	7.49	5.909
-40	22.05000	6.80	5.800
-35	16.59240	6.18	5.613
-30	12.58000	5.60	5.400
-25	9.61546	5.01	5.238
-20	7.42200	4.40	5.100
-15	5.77700	3.80	4.950
-10	4.52700	3.30	4.800
-5	3.58000	2.80	4.650
0	2.84800	2.30	4.500
5	2.28200	1.70	4.350
10	1.83800	1.20	4.200
15	1.49200	0.70	4.100
20	1.21800	0.30	4.000
25	1.00000	0.00	3.900
30	0.82610	0.60	3.800
35	0.68620	1.00	3.700
40	0.57270	1.40	3.600
45	0.48040	1.80	3.500
50	0.40450	2.20	3.400
55	0.34270	2.60	3.300
60	0.29140	3.00	3.200
65	0.24900	3.30	3.100
70	0.21370	3.60	3.000
75	0.18410	4.00	2.900
80	0.15920	4.30	2.800
85	0.13820	4.60	2.750
90	0.12040	4.90	2.700
95	0.10530	4.20	2.600
100	0.09230	5.50	2.500
105	0.08130	5.80	2.450
110	0.07180	6.10	2.400
115	0.06360	6.40	2.350
120	0.05650	6.70	2.300
125	0.05040	6.90	2.250
130	0.04514	7.30	2.200
135	0.04057	7.58	2.176
140	0.03660	7.80	2.150
145	0.03314	8.11	2.087
150	0.03010	8.50	2.000

CURVE T
-3.5%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	36.60000	20.90	5.800
-50	27.50000	18.50	5.500
-45	20.90389	16.77	5.374
-40	16.10000	15.40	5.300
-35	12.46138	13.95	5.130
-30	9.70000	12.50	4.900
-25	7.61934	11.18	4.682
-20	6.05000	9.90	4.500
-15	4.84000	8.60	4.350
-10	3.89000	7.40	4.200
-5	3.15000	6.20	4.100
0	2.57000	5.00	4.000
5	2.10000	3.90	3.900
10	1.73000	2.70	3.800
15	1.43000	1.60	3.700
20	1.19000	0.50	3.600
25	1.00000	0.00	3.500
30	0.84100	1.40	3.400
35	0.71100	2.30	3.300
40	0.60400	3.20	3.200
45	0.51500	4.10	3.150
50	0.44200	5.00	3.100
55	0.38000	5.90	3.000
60	0.32800	6.70	2.900
65	0.28500	7.50	2.850
70	0.24800	8.20	2.800
75	0.21600	9.00	2.700
80	0.18900	9.80	2.600
85	0.16700	10.50	2.550
90	0.14700	11.20	2.500
95	0.13000	11.90	2.400
100	0.11500	12.60	2.350
105	0.10173	13.40	2.300
110	0.08996	14.20	2.250
115	0.07949	15.10	2.200
120	0.07076	16.00	2.150
125	0.06183	16.90	2.100
130	0.05436	17.90	2.050
135	0.04772	18.55	2.020
140	0.04161	19.00	2.000
145	0.03608	19.52	1.977
150	0.03119	20.10	1.950

CURVE W
-4.7%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	117.50000	4.30	7.400
-50	81.32000	3.60	7.100
-45	56.69045	3.22	6.918
-40	40.16000	3.00	6.800
-35	28.66344	2.71	6.666
-30	20.64000	2.40	6.500
-25	14.99955	2.15	6.304
-20	11.03000	1.90	6.100
-15	8.17500	1.60	5.900
-10	6.11900	1.40	5.700
-5	4.61500	1.20	5.550
0	3.51000	1.00	5.400
5	2.69000	0.75	5.250
10	2.07800	0.50	5.100
15	1.61700	0.30	4.950
20	1.26700	0.10	4.800
25	1.00000	0.00	4.700
30	0.79420	0.20	4.600
35	0.63480	0.40	4.450
40	0.51050	0.60	4.300
45	0.41290	0.80	4.200
50	0.33590	1.00	4.100
55	0.27480	1.10	4.000
60	0.22950	1.20	3.900
65	0.18670	1.40	3.800
70	0.15500	1.60	3.700
75	0.12930	1.75	3.600
80	0.10840	1.90	3.500
85	0.09120	2.00	3.400
90	0.07710	2.10	3.300
95	0.06540	2.25	3.250
100	0.05670	2.40	3.300
105	0.04760	2.50	3.100
110	0.04080	2.60	3.000
115	0.03510	2.75	2.950
120	0.03030	2.90	2.900
125	0.02630	3.00	2.850
130	0.02280	3.10	2.800
135	0.01982	3.25	2.750
140	0.01730	3.40	2.700
145	0.01516	3.47	2.650
150	0.01330	3.50	2.600

CURVE V
-4.9%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	130.60000	6.30	7.500
-50	90.06000	5.00	7.200
-45	62.48621	4.48	7.074
-40	44.03000	4.20	7.000
-35	31.23701	3.54	6.829
-30	22.35000	2.90	6.600
-25	16.14073	2.74	6.384
-20	11.80000	2.70	6.200
-15	8.69100	2.40	6.050
-10	6.45300	2.10	5.900
-5	4.83000	1.80	5.700
0	3.64300	1.40	5.500
5	2.77400	1.20	5.350
10	2.12800	0.90	5.200
15	1.64400	0.50	5.100
20	1.27800	0.20	5.000
25	1.00000	0.00	4.900
30	0.78700	0.40	4.700
35	0.62340	0.65	4.600
40	0.49680	0.90	4.500
45	0.39830	1.20	4.350
50	0.32100	1.50	4.250
55	0.26020	1.70	4.150
60	0.21200	1.90	4.050
65	0.17340	2.15	4.000
70	0.14260	2.40	3.900
75	0.11790	2.55	3.800
80	0.09780	2.70	3.700
85	0.08140	2.95	3.600
90	0.06810	3.20	3.500
95	0.05721	3.40	3.450
100	0.04820	3.60	3.400
105	0.04080	3.80	3.300
110	0.03470	4.00	3.200
115	0.02960	4.20	3.150
120	0.02530	4.40	3.100
125	0.02170	4.50	3.000
130	0.01870	4.70	3.000
135	0.01616	4.86	2.967
140	0.01400	5.00	2.900
145	0.01217	5.18	2.844
150	0.01060	5.40	2.800

NTC (%/°C) is the negative temperature coefficient of resistance as temperature (T) expressed in % resistance change per 1°C. Since one NTC resistance change is approximately equivalent to a 1°C temperature change, NTC is useful in developing interchangeable thermistor specifications, e.g., Curve Z, 10,000 ohms +/- 4.4% @ 25°C 32,660 ohms +/- 5.1% @ 0°C, 1751 ohms +/- 3.4% @ 70°C results in a +1°C interchangeable thermistor 0°C to 70°C.

MAX DEV (maximum deviation in +/- %) listed for each R/T curve is the manufacturing tolerance of the nominal R/T characteristic. It only applies to POINT MATCHED specification - not to CURVE TRACKER specifications. The listed deviation must be added to a 25°C point matched tolerance. Other point matched specifications must have the difference in deviation between the specified temperature and any other temperature of interest added to the resistance tolerance at the specified temperature. To determine the temperature tolerance at any other point of interest, divide the resulting total resistance tolerance by the NTC at that point.

ISO9001 CERTIFIED

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R/T CHARACTERISTICS OF NTC THERMISTORS (CON'T)

CURVE M
-4.2%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	79.42000	3.90	7.200
-50	56.49000	3.50	6.900
-45	40.51113	3.23	6.588
-40	29.49000	3.00	6.300
-35	21.64354	2.71	6.074
-30	16.03000	2.40	5.900
-25	11.97596	2.14	5.755
-20	9.04000	1.90	5.600
-15	6.87300	1.65	5.400
-10	5.26700	1.40	5.200
-5	4.07000	1.20	5.100
0	3.16600	1.00	4.900
5	2.48100	0.75	4.800
10	1.95800	0.50	4.700
15	1.55600	0.30	4.550
20	1.24300	0.10	4.400
25	1.00000	0.00	4.200
30	0.80900	0.20	4.000
35	0.65800	0.40	3.850
40	0.53830	0.60	3.700
45	0.44270	0.80	3.650
50	0.36570	1.00	3.600
55	0.30360	1.10	3.500
60	0.25330	1.20	3.400
65	0.21220	1.40	3.300
70	0.17860	1.60	3.200
75	0.15100	1.75	3.150
80	0.12810	1.90	3.100
85	0.10910	2.00	3.000
90	0.09330	2.10	2.900
95	0.08007	2.25	2.850
100	0.06897	2.40	2.800
105	0.05960	2.50	2.750
110	0.05167	2.60	2.700
115	0.04493	2.75	2.700
120	0.03920	2.90	2.700
125	0.03420	3.00	2.600
130	0.03010	3.10	2.500
135	0.02653	3.25	2.441
140	0.02337	3.40	2.400
145	0.02064	3.47	2.353
150	0.01834	3.50	2.300

CURVE P
-5.3%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	159.00000	25.00	7.600
-50	110.10000	17.40	7.400
-45	77.39160	15.11	7.281
-40	55.50000	15.60	7.200
-35	39.76689	15.35	7.100
-30	28.40000	14.60	7.000
-25	20.34709	14.19	6.920
-20	14.65000	13.70	6.800
-15	10.51000	12.70	6.600
-10	7.60900	11.70	6.400
-5	5.55800	10.50	6.200
0	4.09400	9.90	6.000
5	3.04100	9.10	5.850
10	2.27700	8.20	5.700
15	1.71800	7.40	5.550
20	1.30600	6.60	5.400
25	1.00000	5.90	5.250
30	0.77090	5.20	5.100
35	0.59830	4.40	5.000
40	0.46740	3.70	4.900
45	0.36470	2.90	4.750
50	0.29050	2.40	4.600
55	0.23110	1.80	4.500
60	0.18480	1.10	4.400
65	0.14870	0.65	4.300
70	0.12020	0.00	4.200
75	0.09770	0.50	4.100
80	0.07980	1.00	4.000
85	0.06550	1.50	3.900
90	0.05400	2.10	3.800
95	0.04470	2.60	3.700
100	0.03720	3.10	3.600
105	0.03119	3.50	3.550
110	0.02618	4.00	3.500
115	0.02200	4.50	3.400
120	0.01860	4.90	3.300
125	0.01580	5.30	3.200
130	0.01340	5.80	3.200
135	0.01142	6.23	3.173
140	0.00980	6.60	3.100
145	0.00846	6.95	3.005
150	0.00730	7.30	2.900

CURVE R
-6.2%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	479.00000	26.90	9.500
-50	307.00000	24.10	9.300
-45	196.70413	22.81	9.101
-40	128.00000	22.30	8.900
-35	83.16064	21.54	8.695
-30	54.00000	20.60	8.500
-25	35.20122	19.71	8.320
-20	23.38000	18.50	8.100
-15	15.84000	16.80	7.800
-10	10.85000	15.40	7.500
-5	7.50800	14.30	7.300
0	5.24600	13.20	7.100
5	3.70000	12.05	6.900
10	2.63300	10.90	6.700
15	1.89100	9.80	6.550
20	1.36900	8.70	6.400
25	1.00000	7.75	6.250
30	0.73580	6.80	6.100
35	0.54550	5.85	5.950
40	0.40730	4.90	5.800
45	0.30650	4.05	5.650
50	0.23170	3.20	5.500
55	0.17640	2.35	5.350
60	0.13580	1.50	5.200
65	0.10490	0.75	5.100
70	0.08130	0.00	5.000
75	0.06350	0.70	4.900
80	0.04980	1.40	4.800
85	0.03930	2.10	4.700
90	0.03130	2.80	4.600
95	0.02500	3.45	4.500
100	0.02000	4.10	4.400
105	0.01610	4.65	4.300
110	0.01300	5.20	4.200
115	0.01060	5.80	4.100
120	0.00870	6.40	4.000
125	0.00710	7.00	3.900
130	0.00590	7.60	3.800
135	0.00488	8.12	3.746
140	0.00400	8.60	3.700
145	0.00329	9.09	3.614
150	0.00280	9.60	3.500

CURVE S
-4.0%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	60.78000	5.00	6.500
-50	44.13000	3.90	6.000
-45	32.31143	3.45	5.870
-40	23.98000	3.30	5.900
-35	17.93125	2.98	5.806
-30	13.52000	2.60	5.600
-25	10.27869	2.33	5.369
-20	7.89100	2.10	5.200
-15	6.10200	1.80	5.100
-10	4.75400	1.50	4.900
-5	3.73100	1.30	4.800
0	2.94900	1.10	4.600
5	2.34600	0.90	4.500
10	1.87900	0.60	4.400
15	1.51300	0.40	4.300
20	1.22600	0.10	4.200
25	1.00000	0.00	4.000
30	0.81940	0.20	3.900
35	0.67520	0.40	3.800
40	0.55920	0.70	3.700
45	0.46550	0.90	3.600
50	0.38930	1.10	3.500
55	0.32700	1.20	3.450
60	0.27600	1.30	3.400
65	0.23390	1.50	3.300
70	0.19900	1.80	3.200
75	0.17000	2.00	3.100
80	0.14580	2.10	3.050
85	0.12550	2.20	3.000
90	0.10840	2.30	2.900
95	0.09393	2.50	2.800
100	0.08168	2.60	2.750
105	0.07126	2.70	2.700
110	0.06235	2.80	2.600
115	0.05473	3.00	2.550
120	0.04818	3.20	2.500
125	0.04253	3.30	2.450
130	0.03764	3.40	2.400
135	0.03340	3.54	2.363
140	0.02972	3.70	2.300
145	0.02652	3.85	2.171
150	0.02370	4.00	2.000

CURVE X
-3.1%/°C @ 25°C

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	31.90000	21.60	6.400
-50	24.30000	18.50	5.600
-45	18.60825	16.63	5.144
-40	14.40000	15.40	4.900
-35	11.27489	14.00	4.675
-30	8.93000	12.50	4.500
-25	7.11471	11.15	4.431
-20	5.69000	9.90	4.400
-15	4.56000	8.65	4.350
-10	3.68000	7.40	4.300
-5	2.99000	6.20	4.100
0	2.45000	5.00	3.900
5	2.02000	3.85	3.750
10	1.68000	2.70	3.600
15	1.42000	1.60	3.500
20	1.18000	0.50	3.400
25	1.00000	0.00	3.100
30	0.85400	1.40	3.000
35	0.73200	2.30	2.950
40	0.62800	3.20	2.900
45	0.53700	4.10	2.850
50	0.46400	5.00	2.800
55	0.40300	5.85	2.750
60	0.35000	6.70	2.700
65	0.30500	7.45	2.650
70	0.26700	8.20	2.600
75	0.23600	9.00	2.550
80	0.20800	9.80	2.500
85	0.18300	10.50	2.450
90	0.16300	11.20	2.400
95	0.14500	11.90	2.350
100	0.13000	12.60	2.300
105	0.11700	12.90	2.250
110	0.10500	13.20	2.200
115	0.09400	13.50	2.150
120	0.08500	14.25	2.100
125	0.07700	15.00	2.050
130	0.07000	15.75	2.000
135	0.06372	16.20	1.970
140	0.05800	16.50	1.950
145	0.05278	16.87	1.927
150	0.04800	17.30	1.900

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CURVE K

TEMP (°C)	RT/R25	MAX DEV	NTC
-55	11.51000	28.00	4.174
-50	9.55000	23.00	4.020
-45	7.97015	20.25	3.875
-40	6.69000	19.00	3.739
-35	5.63699	18.00	3.608
-30	4.77000	17.00	3.483
-25	4.05689	16.01	3.365
-20	3.47000	15.00	3.256
-15	2.98000	14.00	3.153
-10	2.56000	13.00	3.043
-5	2.22000	11.00	2.956
0	1.93000	9.00	2.871
5	1.67800	8.50	2.774
10	1.47000	8.00	2.704
15	1.29000	5.00	2.635
20	1.13000	3.00	2.486
25	1.00000	0.00	2.450
30	0.88450	4.00	2.414
35	0.78470	6.00	2.346
40	0.69830	8.00	2.279
45	0.62320	9.00	2.216
50	0.55780	10.00	2.154
55	0.50000	11.00	2.099
60	0.45050	12.00	2.039
65	0.40640	12.50	1.985
70	0.36750	13.00	1.933
75	0.33320	14.00	1.882
80	0.30270	15.00	1.834
85	0.27570	15.50	1.788
90	0.25160	16.00	1.743
95	0.23010	17.00	1.700
100	0.21090	18.00	1.658