

# QTI SENSING SOLUTIONS GUIDE

**Qti**

Sensing Solutions

[WWW.THERMISTOR.COM](http://WWW.THERMISTOR.COM)



# ABOUT QTI

QTI is a privately-held manufacturer of temperature sensors and assemblies. Founded in 1977, we have grown to be the trusted supplier of temperature sensing solutions for many world leaders in equipment manufacturing.

Our four locations allow us increased manufacturing capacity and greater control over the quality of our parts, from thermistor fabrication through finished probe assembly. We also maintain a full thermistor test lab capable of performing a variety of stress and accelerated life testing for thermistors used in military and aerospace applications.

## WHY QTI? WE...

### ■ ARE THE EXPERTS IN THERMISTOR MANUFACTURING

QTI designs and manufactures the thermistors used in our probes, so we are assured that customers receive the most stable, accurate and reliable sensors available.

### ■ TEST 100% FOR ACCURACY

All of the temperature probes manufactured by QTI are 100% inspected for accuracy in temperature-controlled baths to ensure proper electrical and curve-fit tolerances. Calibration data is available as an option on all of the probes we manufacture.

### ■ CARE ABOUT THE DETAILS

Our proprietary manufacturing processes and the materials used in manufacturing ensure proper sensor placement to optimize thermal time response and minimize thermal load on the sensing element.

### ■ PROVIDE DESIGN ASSISTANCE

While we trust that the information provided within this catalog will assist you, there is no substitute for candid one-to-one dialog. We encourage you to contact QTI to discuss specific design, sales or customer support needs.

### ■ MANUFACTURE IN THE USA

We own and manage all of our facilities, allowing us production schedule flexibility and control of all processes and materials. Our thermistors are manufactured in the USA, not overseas, under strict controls.

## WHY USE A THERMISTOR?

### ■ ECONOMICAL COST

Thermistors are the economical choice in temperature sensing. Not only are they less expensive to purchase, but there are no calibration costs during installation or during the service life of the sensor. In addition, interchangeable thermistors can be swapped out without calibration.

### ■ QUICK TEMPERATURE RESPONSE

Due to their small size, thermistors can respond very quickly to slight changes in temperature.

### ■ NO CALIBRATION REQUIRED

Properly manufactured thermistors are aged to reduce drift before leaving the factory. Therefore, thermistors can provide a stable resistance output over long periods of time.

### ■ GREATER ACCURACY AND RESOLUTION

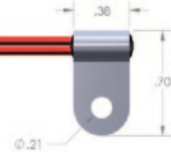
Thermistors are available with base resistances (at 25°C) ranging from tens to millions of ohms. This high resistance reduces the effect of resistance in the lead wires, which can cause significant errors with low resistance devices such as RTDs.

# SURFACE PROBES

## FLAG RING LUG (QT06025 SERIES)



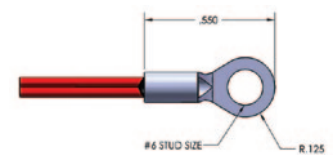
- Available in a variety of sizes with or without insulation
- Standard lug sizes #4 to #12 with additional styles available
- Typical wire sizes #24-28 AWG
- Material: tinned copper or nickel-plated steel



## RING LUG (QT06009 SERIES)



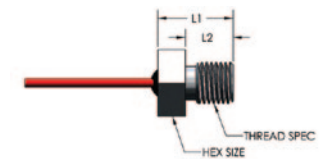
- Available in a variety of sizes with or without insulation
- Standard lug sizes #4 to #12 with additional styles available
- Typical wire sizes #24-28 AWG
- Material: tinned copper or nickel plated steel



## HEX NUT PROBE (QT06007 SERIES)



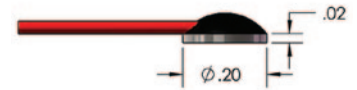
- General purpose, rugged design
- Typical wire sizes #26-28 AWG
- Material: stainless steel, brass, titanium, aluminum
- Available with or without O-rings
- Available in metric and reverse threads



## FLAT DISC PROBE (QT06022 SERIES)



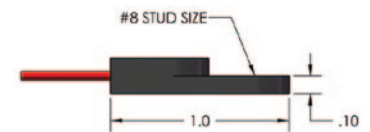
- Versatile, multi-purpose surface sensor
- Standard sizes are 0.33" and 0.21"
- Typical wire sizes #24-28 AWG
- Can be overmolded
- Material: stainless steel, copper, aluminum



## MOLDED RING LUG PROBE (QT06024A SERIES)



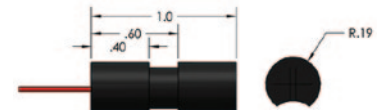
- Ideal for high humidity environments
- Operating Temp range: -40°C to 80°C
- Typical wire size #22 AWG
- Material: molded plastic



## PIPE MOUNT PROBE (QT06024B SERIES)



- Ideal for high humidity environments
- Operating Temp range: -40°C to 80°C
- Typical wire size #22 AWG
- Material: molded plastic



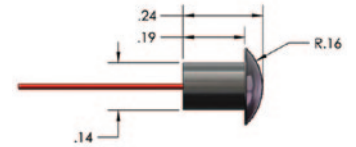


# GENERAL PURPOSE PROBES

## RIVET STYLE PROBES (QT06027 SERIES)



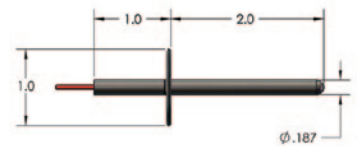
- Available in a variety of sizes
- Designed for harsh environments
- Ideal for overmolding
- Material: stainless steel, anodized aluminum



## FLANGED, OPEN OR CLOSED TIP (QT06004 SERIES)



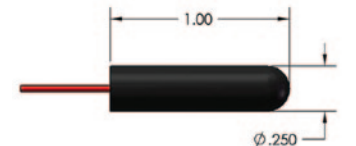
- Available in a variety of sizes with or without brazed flange
- Flange can be screwed or riveted in place
- Typical wire sizes #22-28 AWG
- Material: stainless steel



## MOLDED TUBE PROBES (QT06024C SERIES)



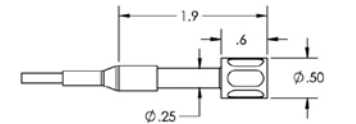
- Available in a variety of sizes with or without brazed flange
- Flange can be screwed or riveted in place
- Typical wire sizes #22-28 AWG
- Material: stainless steel



## BIRDCAGE PROBES (QT06035 SERIES)



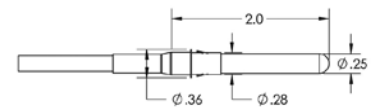
- Ideal for high humidity environments
- Operating temperature range: -40°C to 80°C
- Typical wire size #22 AWG
- Material: molded plastic



## CLIP-IN AIR SENSOR (QT06037 SERIES)



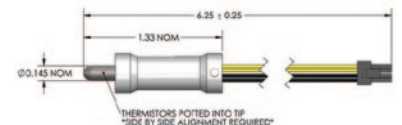
- Typical wire #22-26 AWG
- Material: stainless steel or nickel plated brass
- Incorporated press-in clip
- Ideal for air temperature sensing in HVAC applications (install in plenums or blower housings)



## LUER-LOCK PROBES (QT06040 SERIES)



- Typical wire size #24-30 AWG
- Compatible with standard luer fittings
- Available with two thermistors for redundancy
- Used in a wide variety of medical applications from organ transport to blood oxygenators

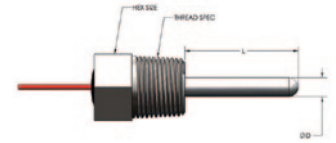


# LIQUID PROBES

## PIPE AND SAE THREADED FITTING WITH TUBE (QT06001 SERIES)



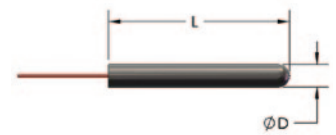
- General purpose, rugged high-pressure design
- Typical wire sizes #22-28 AWG
- Material: stainless steel, brass, titanium
- Straight thread option with or without O-rings



## CLOSED END TUBE (QT06005 SERIES)



- Versatile, multi-purpose sensor
- Standard sizes are 0.040" to 0.250" in diameter
- Typical wire sizes #22-32 AWG
- Material: stainless steel, brass, titanium, Inconel, Hastelloy



## INSPECTION PROBE (QT06028 SERIES)



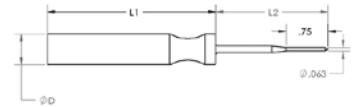
- Ideal for spot inspection
- Typical wire/cable sizes #22-28 AWG
- Material: stainless steel with plastic or metal handle
- Available with straight or T handle



## FAST RESPONSE-STEPPED HOUSING (QT06028 SS SERIES)



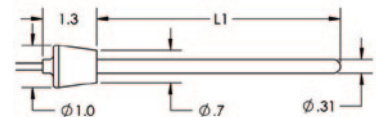
- Typical wire sizes #22-28 AWG
- Material: stainless steel
- Available with stepped housings for fast response
- Food grade stainless steel



## BOTTLE PROBES (QT06038 SERIES)



- Typical wire size #24-28 AWG, coil cord
- Material: stainless steel
- Integral rubber stopper for inserting into wine bottles or equivalent
- Ideal for temperature monitoring in wine cabinets, cellars, etc.

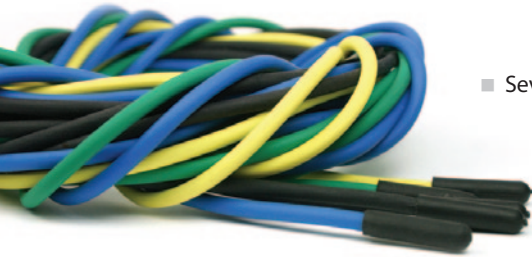


# WATERPROOF SENSORS

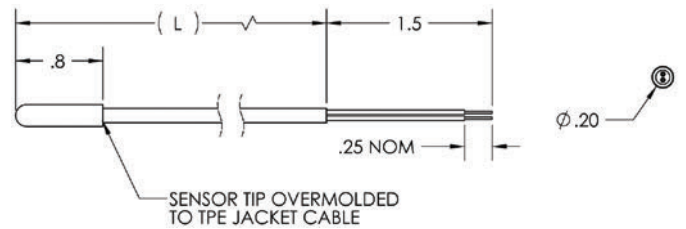
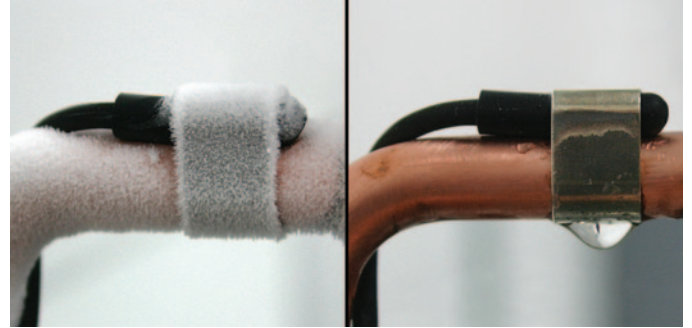
## QTIP68 SENSOR

Waterproof to IP68 rating, this sensor is designed to weather the harsh freeze/thaw cycles found in HVAC and Refrigeration environments.

- Made from double insulated thermoplastic rubber
- Ruggedized housing and corrosion resistant cable
- Waterproof rating to IP68
- Based on the most common NTC thermistor curves in the industry
- Ideal for harsh freeze/thaw cycles
- Possible applications: refrigeration and air conditioning equipment and high humidity environments
- Optional clip mount for easy installation on copper tubing
- Resistance values customizable



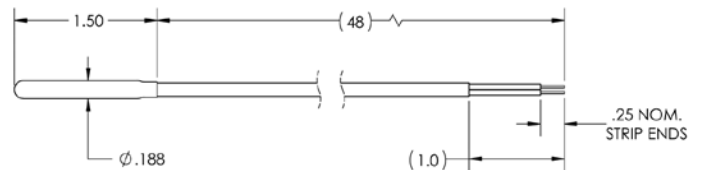
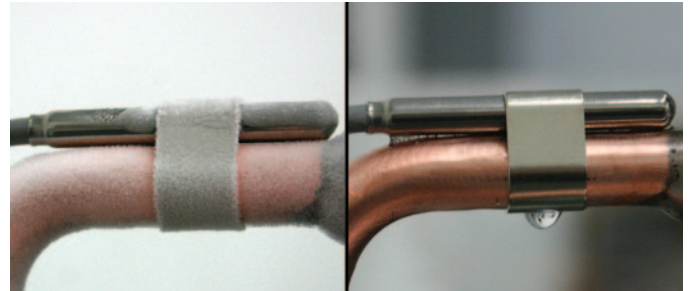
■ Several cable colors available



## QTSSP SWAGE SENSOR

The waterproof QTSSP sensor excels in severe environments where response time is critical.

- Robust sensor for a broad range of sensing applications
- Operating temperature range:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- Ideal for industrial applications where response time is critical
- Swaged end provides cable strain relief and improves moisture resistance
- QTI-manufactured thermistor (made in the USA) provides unrivaled accuracy, stability and reliability
- Optional clip mount for easy installation on copper tubing



## OPTIONAL CLIP MOUNT

Save installation time and improve the performance of the QTIP68 and QTSSP sensors by clipping them to copper tubing. Our standard clip made from stainless steel is compatible with copper tubing. A variety of clip sizes are available to suit most refrigeration applications.

Clip sizes available: 1/4", 3/8", 1/2", 5/8", 7/8" and 1 1/8".  
1/4" and 3/8" clips are 0.38" wide. All other clips are 0.625" wide.



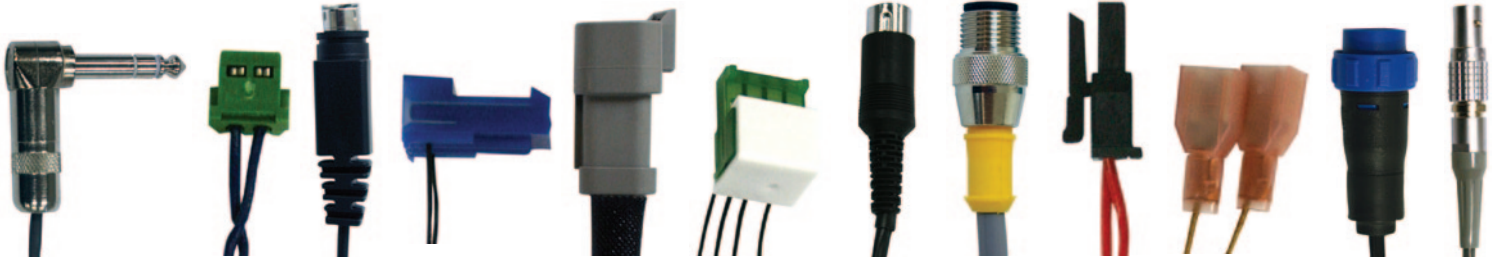




# VALUE ADDED CAPABILITIES

## CONNECTORS

Let QTI add a connector to your temperature probe to save you time and money. Connectors protect against displacement and increase resistance to vibration, water, oils and pressure. We offer connectors from AMP (TE), Molex, JST, Switchcraft, Deutsch, TURCK, ITT Cannon, Delphi and others.



## HOOK UP CABLES AND CABLE ASSEMBLIES

QTI's cable and cable assemblies incorporate the latest materials science to meet rigorous electrical, mechanical and environmental requirements. Our cables are engineered for the most demanding applications to offer the highest-in-class performance. They are valued in multiple industries for delivering signal integrity, and mechanical robustness in the harshest environments.



## CUSTOM AND STANDARD MOLDED STRAIN RELIEFS AND HANDLES

QTI can offer custom designed over molded wire strain reliefs and handles for applications where "end user" construction or human interface will be required. Contact QTI for a complete list of capabilities in this area.



## VALUE ADDED PROBE PACKAGING AND LABELING

QTI can add special labeling to any of our probe assemblies. Probe marking, lead tags, heat shrink labels, colored cables and others are our specialty. We can also single package and coil package with your label if you desire. Please contact QTI for a complete list of options available.



# DIRECTEMP™ USB THERMOMETERS



- Custom probe and cable configuration
- NIST traceable certification available
- Data logging and alert notification software included
- Able to run multiple sensors

Available tolerances	+/- 0.5°C (0°C to 70°C) +/- 0.1°C (0°C to 100°C) +/- 0.05°C (0°C to 70°C)
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Resolution 0.01°C

RoHS compliant Yes

Current draw <100mA

## AVAILABLE INTERFACE OPTIONS

### HID configuration

**(Plug and Play, DirecTemp software included)**

- Automatic driver installation in Microsoft Windows
- DirecTemp data logging software included for Windows
- Stream data to a plot and record to file for future analysis
- Compatible with Windows (XP, Vista, 7 and 8) and Mac OS 32- and 64-bit systems

### USB-SERIAL CONFIGURATION

**(Virtual Com Port, For OEM and Proprietary Software Applications)**

- Virtual serial device
- Designed for integration with custom third party software applications
- Free demo software and LabVIEW VI included
- Communication protocol information available upon request
- Compatible with Linux, Windows, and Mac OS systems  
Additional programming language examples available

\* User specified single point temperatures and tolerances available

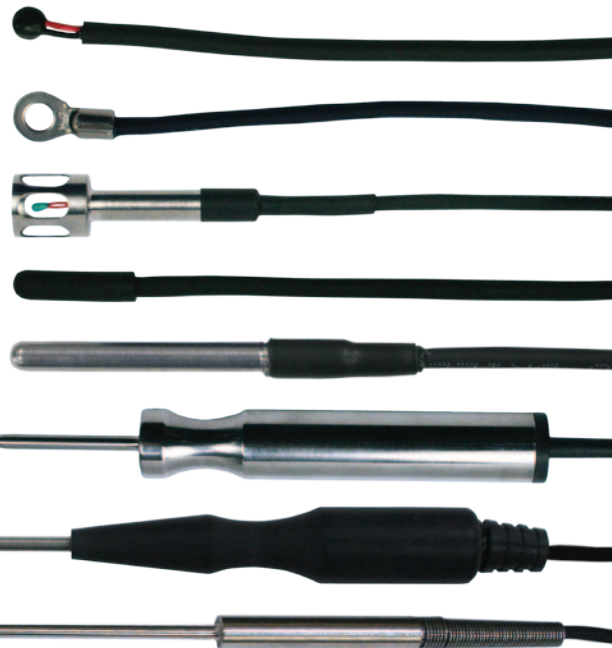
**Warning: Do not use in human life support applications.**

This device is not designed nor intended to operate in situations where human injury will result in the event of a failure.



- Multiple probe styles are available. Pictured below are DTU6022 (flat disc), DTU6009 (ring lug), DTU6035 (air), DTU6024C (IP68 waterproof), DTU6005 (closed-end tube), DTU6028S (fast response probe), DTU6028P (plastic-handled probe) and DTU6005-008 (immersion probe.)

Please contact QTI for additional probe styles.



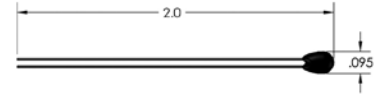


# NTC THERMISTOR ELEMENTS

## POINT MATCHED THERMISTORS (QTMC SERIES)



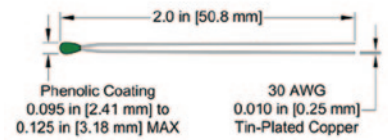
- Available in a variety of wire types and lengths
- Typical wire sizes #26-30 AWG
- Leads: Kynar, PVC, Teflon, tin-plated copper
- Resistance values from 100 ohms to 9.8 M ohms
- Temperature range: -55°C to 155°C
- RoHS compliant parts available



## INTERCHANGEABLE THERMISTORS (E100, T100 SERIES)



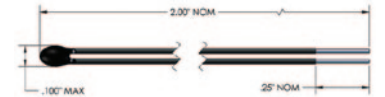
- Typical diameter 0.080" to 0.095" max
- Operating temperature range: -50°C to 150°C
- Typical wire sizes #28-32 AWG
- Leads: tin-plated copper or nickel
- Material: phenolic, epoxy coatings
- RoHS compliant parts available
- Available in point matched tolerances



## POINT MATCHED THERMISTORS WITH INSULATED LEADS (QTMCA, QTMCB, QTMCC SERIES)



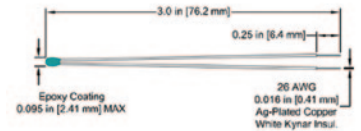
- Typical diameter 0.1" max
- Operating temperature range: -55°C to 150°C
- Typical wire size #28 AWG
- Leads: Kynar
- Material: epoxy
- Typical Dissipation Constant = 2mW/°C in still air
- Typical Time Constant in still air = 8 seconds
- RoHS compliant parts available



## INTERCHANGEABLE THERMISTORS WITH INSULATED LEADS (E200, T200 SERIES)



- Typical diameter 0.055"-0.095"
- Operating temperature range: 0°C to 70°C
- Typical wire size #26-38 AWG
- Leads: solid copper, silver-plated copper, nickel
- Material: epoxy
- RoHS compliant parts available
- Available in interchangeable tolerances

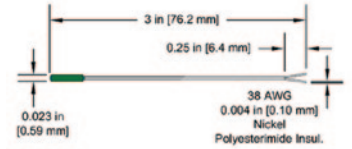


# MINI/MICRO NTC THERMISTORS

## MICRO THERMISTORS (E320 SERIES)



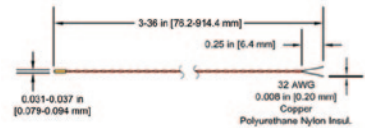
- Typical diameter 0.023"
- Operating temperature range: 0°C to 70°C
- Typical wire size #38 AWG
- Leads: solid nickel, Polyesterimide insulation
- Material: epoxy, polyimide
- Typical Dissipation Constant = 0.2mW/°C in still air
- Typical Time Constant in still air = 3 seconds
- RoHS compliant
- Available in point matched and interchangeable tolerances



## MINIATURE THERMISTORS (E330 SERIES)



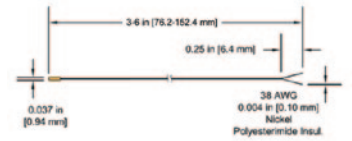
- Typical diameter 0.0031" to 0.037"
- Operating temperature range: 0°C to 70°C
- Typical wire sizes #32 AWG
- Leads: solid copper, polyesterhane insulation
- Material: epoxy, polyimide
- Typical Dissipation Constant = 1mW/°C in still air
- Typical Time Constant in still air = 4 seconds
- RoHS compliant
- Available in point matched and interchangeable tolerances



## MINIATURE THERMISTORS (E340 SERIES)



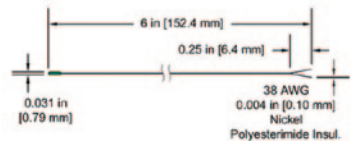
- Typical diameter 0.037"
- Operating temperature range: 0°C to 70°C
- Typical wire size #38 AWG
- Leads: solid nickel, Polyesterimide insulation
- Material: epoxy, polyimide
- Typical Dissipation Constant = 1mW/°C in still air
- Typical Time Constant in still air = 4 seconds
- RoHS compliant
- Available in point matched and interchangeable tolerances



## MINIATURE THERMISTORS (E350 SERIES)



- Typical diameter 0.031"
- Operating temperature range: 0°C to 70°C
- Typical wire size #38 AWG
- Leads: solid nickel, Polyesterimide insulation
- Material: epoxy, polyimide
- Typical Dissipation Constant = 0.5mW/°C in still air
- Typical Time Constant in still air = 4 seconds
- RoHS compliant
- Available in point matched and interchangeable tolerances



■ Scale of E340 Series miniature thermistor probes



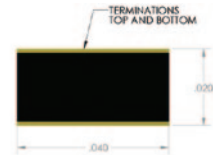


# NTC/SMD THERMISTOR CHIPS

## GOLD THICK-FILM TERMINATED DIE (T021)



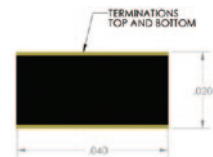
- Part sizes 0.040" square to 0.011" square
- Resistance values from 100 ohms to 20 M ohms
- Available with gold or silver terminations
- Hybrid attachment (wire bond/epoxy)
- RoHS compliant
- Typical Dissipation Constant = 0.0625W, derate to 0 at 125°C
- Typical Time Constant in still air = 10 seconds
- Tolerances: 1%, 2%, 5%, 10%



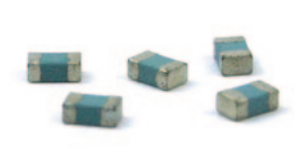
## GOLD THIN-FILM TERMINATED DIE (T041)



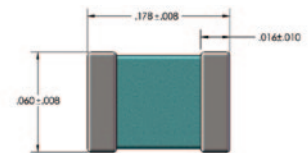
- Part sizes 0.040" square to 0.011" square
- Resistance values from 100 ohms to 20 M ohms
- Available with gold or silver terminations
- Hybrid attachment (wire bond/solder)
- RoHS compliant
- Typical Dissipation Constant = 0.0625W, derate to 0 at 125°C
- Typical Time Constant in still air = 10 seconds
- Tolerances: 1%, 2%, 5%, 10%
- Ideal for reflow soldering die to board and wire-bonding die top side
- Pre-deposited solder eliminates need for solder paste on board



## QT0805 NTC SERIES THERMISTORS



- Standard EIA 0805 package size
- Resistance values from: 50 ohms to 10 M ohms
- Available with gold, pure tin or tin/lead terminations
- Typical Dissipation Constant = 2 mW/°C in still air
- Typical Time Constant in still air = 8 seconds max
- Tolerances: 1%, 2%, 5%, 10%
- Operating range: -65°C to 150°C
- Power rating: 0.125 watts max
- Available waffle packed or tape and reel
- Available in Z/D, S/F, T, Y, X, P and V curves



- Scale of T041 thermistor chips



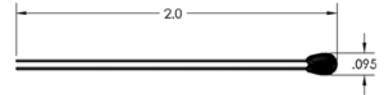


# NTC MILITARY THERMISTORS

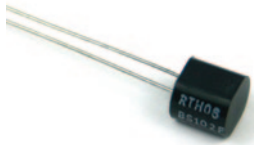
## RTH44 MIL-PRF-23648/20



- Resistance values from 300 ohms to 500k ohms
- Operating temp range -55°C to 125°C
- Meets or exceeds MIL-PRF 23648
- Typical Dissipation Constant = 2mW/°C in still air
- Tolerance: 1%, 2%, 5%, 10%
- Power rating: 0.2 watts at 25°C max
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## RTH06 MIL-PRF-23648/1



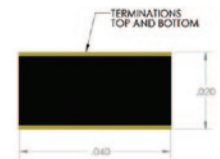
- Resistance values from 68 ohms to 75k ohms
- Typical Dissipation Constant = 5mW/°C in still air
- Thermal Time Constant in still air = 80 seconds max
- Temp Range: -55°C to 125°C
- Meets or exceeds MIL-PRF 23648
- Power rating: 0.5 watts at 25°C max
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## M32192/3 NTC THERMISTOR DIE



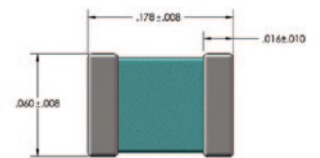
- Resistance values from 15 ohms to 20 M ohms
- Typical Dissipation Constant = 0.625mW/°C in still air
- Thermal Time Constant in still air = 10 seconds max
- Power rating: 0.0625W, derate to 0 at 125 °C
- Available with a variety of termination finishes
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## M32192/4 NTC EIA 0805 PACKAGE



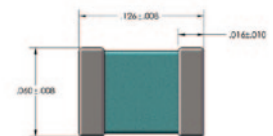
- Typical Dissipation Constant = 2mW/°C in still air
- Thermal Time Constant in still air = 8 seconds max
- Power rating: 0.125 watts at 25°C max
- Available with a variety of termination finishes
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## M32192/5 NTC EIA 1206 PACKAGE



- Thermal Time Constant: 8 seconds max in still air \*
- Dissipation Constant: 2 mW/°C min in still air \*
- Power rating: 0.25 W at 25°C, derate to 0 W at 125°C
- Resistance at 25°C: 470 ohms to 10 M ohms
- Operating temperature range: -55°C to 125°C
- Storage temperature range: -65°C to 150°C
- \*Thermal time constant and dissipation constant may vary depending on mounting

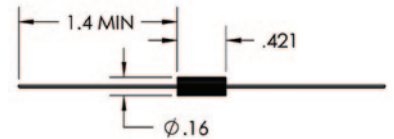


# PTC MILITARY THERMISTORS

## RTH22 MIL-PRF-23648/9



- Positive temperature coefficient: 0.7%/°C
- Resistance values from 10 ohms to 10k ohms
- Operating temperature range -55°C to 125°C
- Meets or exceeds MIL-PRF 23648
- Tolerance: 5%, 10%
- Power rating: 0.5 watts at 25°C
- Thermal Time Constant in still air = 60 seconds max
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## RTH42 MIL-PRF-23648/19



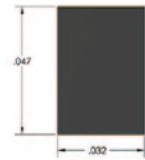
- Positive temperature coefficient: 0.7%/°C
- Resistance values from 10 ohms to 10k ohms
- Operating temp range -55°C to 125°C
- Meets or exceeds MIL-PRF 23648
- Tolerance: 5%, 10%
- Power rating: 0.250 watts at 25°C
- Thermal Time Constant in still air = 60 seconds max
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## M32192/1 PTC THERMISTOR DIE



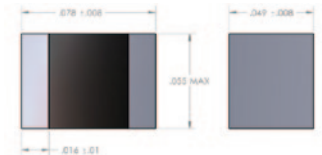
- Positive temperature coefficient: 0.7%/°C
- Resistance values from 10 ohms to 10k ohms
- Typical Dissipation Constant = 1.25mW/°C in still air
- Thermal Time Constant in still air = 30 seconds max
- Power rating: 0.125W, derate to 0 at 125°C
- Complete specifications can be obtained by contacting the Defense Logistics Agency



## M32192/2 PTC EIA 0805 PACKAGE



- Positive temperature coefficient: 0.7%/°C
- Typical Dissipation Constant = 2.5mW/°C in still air
- Thermal Time Constant in still air = 30 seconds max
- Power rating: 0.250 watts at 25°C max
- Available with a variety of termination finishes
- Complete specifications can be obtained by contacting the Defense Logistics Agency

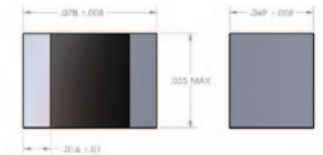


# SPACEFLIGHT-QUALIFIED THERMISTORS

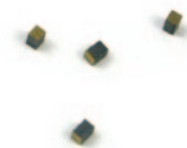
## SPACE LEVEL NASA GSFC S-311-P-827/31, 32



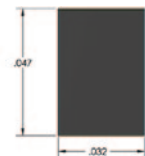
- PTC thermistor
- Resistance values from 150 ohms to 2k ohms
- Acceptable for use in NASA space programs specifying quality level (Grade) 1 parts
- Available with Sn/Pb or gold termination
- Meets Level 1 classification per EEE-INST-002
- Single lot traceability



## SPACE LEVEL NASA GSFC S-311-P-827/33, 34



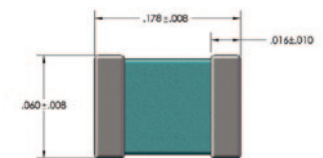
- PTC thermistor
- Resistance values from 75 ohms to 1.5k ohms
- Acceptable for use in NASA space programs specifying quality level (Grade) 1 parts
- Meets Level 1 classification per EEE-INST-002
- Single lot traceability



## SPACE LEVEL NASA GSFC S-311-P-827/01, 02, 03, 04



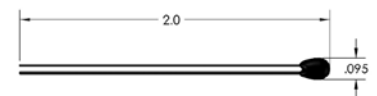
- NTC thermistor
- Available in 50k and 100k ohms
- Interchangeable tolerances to +/- 0.5°C (0°C to 70°C)
- Acceptable for use in NASA space programs specifying quality level (Grade) 1 parts
- Available with Sn/Pb or gold termination
- Meets Level 1 classification per EEE-INST-002
- Single lot traceability



## SPACE LEVEL NASA GSFC S-311-P-18



- NTC thermistor
- Resistance values from 2.252k to 30k ohms
- Interchangeable tolerances to +/- 0.1°C (0°C to 70°C)
- Acceptable for use in NASA space programs specifying quality level (Grade) 1 parts
- Single lot traceability



## QTI TEST LAB

QTI maintains an extensive test laboratory, designed with military and aerospace customers in mind. This test lab is ISO 9001:2000 and AS9100 Revision B certified. We are also qualified to perform all tests dictated by the Department of Defense, Defense Logistics Agency MIL-PRF-23648, and MIL-PRF-32192 specifications. In addition we have the facilities to perform many of the tests specified in MIL-STD-202, MIL-STD-883 and Aerospace qualification tests.

Testing services provided upon customer request:

- Power burn-in
- Temperature cycling
- Moisture testing (resistance)
- Shock and vibration testing
- Temperature characterization
- Space-level screening
- QCI military testing
- Cryo-chamber conditioning
- Wafer evaluation
- Die shear
- Wire bonding/evaluation
- Sectioning

Testing capabilities:

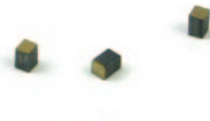
- Environmental: 150m Torr to 150 PSI
- -180°C to 1400°C
- Up to 100% relative humidity
- DC power: 0 to 6000 volts
- 0 to 100 amps
- Inspection: 0x to 100x optical
- Digital image capture
- Shock/vibration: 30g to 1500g
- 75Hz to 2000Hz
- Wire bond pull: 0g to 100g
- Die shear: 0g to 10 Kg
- Solderability: per all military specs
- Density: 0.001 to 61 g/cm<sup>3</sup>



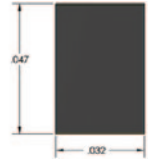


# PTC THERMISTORS

## PTC THERMISTOR DIE (QTC11)



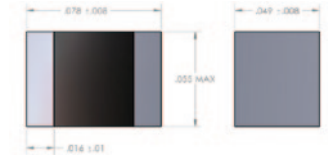
- Part size: 0.032" x 0.032" square
- Part thickness: 0.028", 0.050" or 0.072"
- Resistance values from: 10 ohms to 10k ohms
- Gold terminations
- Board attachment by either wire bonding or conductive epoxy
- RoHS compliant
- Typical Dissipation Constant = 2mW/°C in still air
- Typical Time Constant in still air = 8 seconds
- Tolerances: 1%, 2%, 5%, 10%
- Operating range: -55°C to 125°C
- Positive temperature coefficient: 0.7%/°C



## QTC0805 PTC SERIES THERMISTORS



- Standard EIA 0805 package size
- Resistance values from: 22 ohms to 36k ohms
- Available with gold or silver terminations
- Typical Dissipation Constant = 2.5mW/°C in still air
- Typical Time Constant in still air = 30 seconds max
- Tolerances: 1%, 2%, 5%, 10%
- Operating range: -55°C to 100°C
- Power rating: 0.250 watts at 25°C derated to 100°C
- Available waffle packed or tape and reel
- Positive temperature coefficient: 0.7%/°C



## GLASS AXIAL PTC THERMISTORS (QTG12)



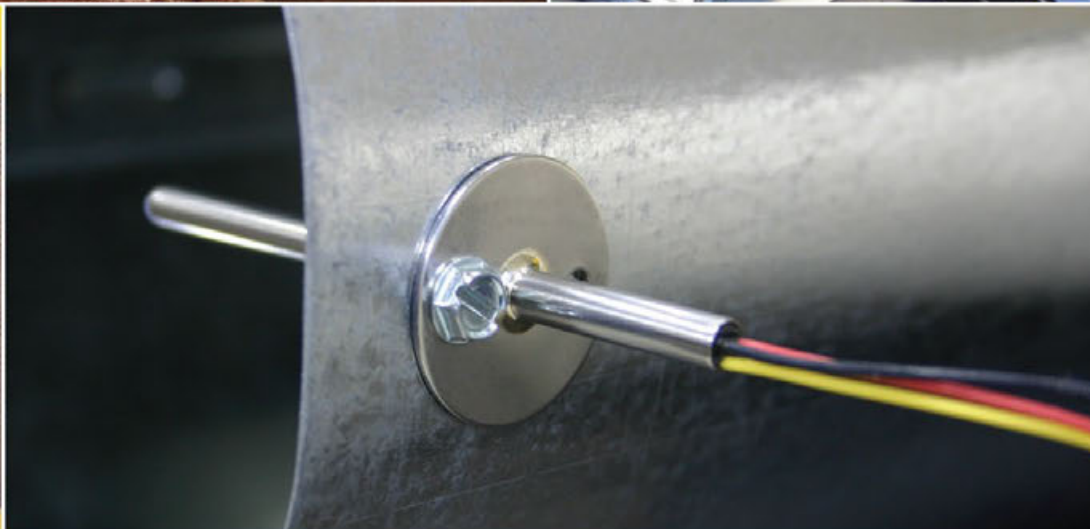
- Standard DO35 package size
- Resistance values from: 10 ohms to 10k ohms
- Typical Time Constant in still air = 55 seconds max
- Tolerances: 1%, 2%, 5%, 10%
- Operating range: -65°C to 125°C
- Power rating: 0.125 watts at 100°C
- Available loose or tape and reel
- RoHS compliant available
- Commercial version of RTH42 (MIL-PRF 23648)
- Positive temperature coefficient: 0.7%/°C



## R/T CHARACTERISTICS FOR MIL-PRF-23648, MIL-PRF-32192 and S-311-P-827 PTC THERMISTORS

Temp°C	10-75 ohms	82 -160 ohms	180-510 ohms	560-1,800 ohms	1,800-6,200 ohms	6,800-10,000 ohms
25/125 ratio	0.53 - 0.55	0.53-0.55	0.53-0.55	0.53-.055	0.53-0.55	0.53-0.55
-55	0.615	0.582	0.56	0.55	0.515	0.51
-15	0.079	0.77	0.74	0.74	0.73	0.73
0	0.863	0.847	0.835	0.835	0.825	0.825
25	1	1	1	1	1	1
50	1.16	1.17	1.2	1.2	1.23	1.19
75	1.35	1.37	1.42	1.42	1.45	1.4
100	1.545	1.584	1.656	1.656	1.67	1.61
125	1.75	1.8	1.92	1.92	1.96	1.83

Numbers above are for reference only. Consult the specific performance specification for actual R/T multipliers by part style; MIL-PRF-23648/9, MIL-PRF-32192/1 and /2, and S-311-P-827-31, -32, -33, and -34.



**Qti**  
Sensing Solutions

2108 Century Way Boise, Idaho 83709 USA  
T: (208) 377-3373, 800-554-4784  
F: (208) 376-4754  
qtisales@thermistor.com  
www.thermistor.com