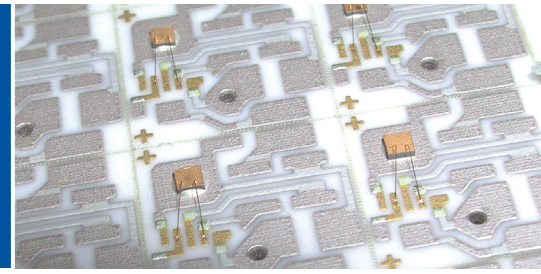


APPLICATION NOTE:

Wire bonding to NTC Gold Terminated Thermistors



Quality Thermistor, Inc. manufactures gold thick-film terminated NTC thermistors designed to meet the needs of today's hybrid circuit designers. These thermistors are designed for conductive epoxy mounting the bottom termination and wire bonding the top termination to a landing pad on a substrate. While reflow soldering the bottom termination to a substrate is possible, we recommend contacting QTI Engineering to discuss your application.

QTI's gold terminated thermistors are conducive to both gold ball bonding and wedge bonding. QTI performs all in-house qualifications using a K&S Model 1484LXQ ball bonder. The settings typically used for ball bonding on this machine are listed in Table I below. All wedge bond evaluations are sent to an independent lab for evaluation.

TABLE I. K&S BALL BONDER SPECIFICATIONS

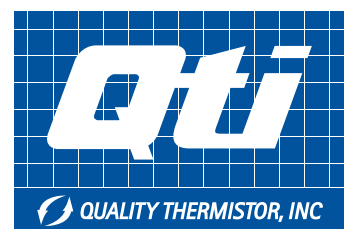
| PARAMETER | SETTING | UNITS |
|-----------------|---------|---------------|
| Bond Velocity | 5-6 | mils/msec |
| Bond Time | 14-15 | msec |
| Bond Power | 90-100 | mwatts |
| Bond Force | 70-80 | grams |
| Ball Size Ratio | 2.0x | wire diameter |
| Heat | 145 | °C |
| Wire Diameter | 0.8-1.2 | mil |

Each Military and Aerospace lot of gold terminated NTC thermistors that QTI manufactures per MIL-PRF-32192 is evaluated for wire bond integrity. QTI uses a DAGE MT-22 bond puller to perform this test. A random sample of 12 pieces is mounted to a gold thick-film pad on an alumina substrate using conductive epoxy. The parts are then gold ball bonded and subjected to a wire bond pull test per paragraph 4.8.10.3. M32192 specifies a minimum bond pull of 4.0 grams for 30 seconds, when pulled normal to the face of the die.

In addition to the M32192 wire bond evaluations, QTI frequently performs bond strength testing per MIL-STD-883, Method 2011. Customer Source Control Drawings often specify this test specification by referencing MIL-PRF-38534 Appendix C, Table C-III Class H/K Element Evaluation. Per Method 2011 of MIL-STD-883, the minimum bond pull strength is 4.0 grams for 1.2mil Au wire.

QTI also performs occasional destructive bond pulls to determine the force required for failure and to evaluate the failure method. Using 1.2mil gold wire the typical force to fail is 8-12 grams and the failure occurs at the neck of the ball bond or at the heel of the second bond.

QTI's gold terminated NTC thermistors are engineered to meet the processing requirements of today's automated equipment without sacrificing reliability, accuracy or stability. Should you have any questions regarding the ball or wedge bonding of these thermistors, please contact QTI Engineering.



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