Standard Thermistor Solutions available

<table>
<thead>
<tr>
<th>Type</th>
<th>TB04-222</th>
<th>TB04-103</th>
<th>TC04-222</th>
<th>TC04-103</th>
<th>TL103</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance</td>
<td>2.2kOhm@20ºC</td>
<td>10kOhm@20ºC</td>
<td>2.2kOhm@25ºC</td>
<td>10kOhm@25ºC</td>
<td>10kOhm@25ºC</td>
</tr>
<tr>
<td>Tolerance</td>
<td>5 %</td>
<td>5 %</td>
<td>3 %</td>
<td>3 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Mounting</td>
<td>Epoxy Gluing</td>
<td>Epoxy Gluing</td>
<td>Epoxy Gluing or Soldering</td>
<td>Epoxy Gluing or Soldering</td>
<td>Soldering</td>
</tr>
<tr>
<td>Terminal Contacts</td>
<td>Pt Wires 50um dia</td>
<td>Pt Wires 50um dia</td>
<td>Pt Wires 50um dia or AWG-34 wires</td>
<td>Pt Wires 50um dia or AWG-34 wires</td>
<td>WB</td>
</tr>
<tr>
<td>Contacts Length</td>
<td>20mm max</td>
<td>20mm max</td>
<td>Adjustable</td>
<td>Adjustable</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Glass-beaded NTC Thermistor**

Glass-beaded NTC thermistors are available with two resistance nominals: 2.2kOhm@20ºC and 10kOhm@20ºC. Terminal leads are of Pt 50um wires with max 20mm length. NTC glass-beaded types have 5% tolerance by default. Individual calibration with protocol-numbered values is available by request.

**SMT type NTC Thermistor**

SMT NTC thermistors are available with two resistance nominals: 2.2kOhm@25ºC and 10kOhm@25ºC. SMT thermistors by default are lead-less and optimal for soldering on metallized surface. It’s possible to implement wire solution by soldering Pt 50um dia wires or thin AWG-34 wire with adjustable length in both cases. SMT NTC types have 3% tolerance by default. Individual calibration with protocol-numbered values is available by request.

**Lead-less NTC Thermistor**

Lead-less NTC thermistor solution is available with 10kOhm@25ºC nominal. Lead-less thermistors by default are for WB connection only, with soldering method of mounting on metallized TEC surface.
Glass-Beaded NTC Thermistor Mounting

Standard Mounting Method

NTC glass-beaded thermistor type is mounted to TEC cold side ceramics edge by default. The mounting is made by thermoconductive epoxy gluing. Such mounting method is the most optimal for TECs with ceramics thickness 0.5mm or thicker. Thermistor position can be specified.

Customized Mounting Methods

Sometimes it’s more optimal to install thermistor as close to the object on TEC cold side as possible for precise temperature regulation. NTC glass-beaded thermistor can be mounted to any location on TEC cold side by Customer request.

Solutions for thin ceramics

Glass-beaded NTC thermistors types TB222 and TB103 have 0.4mm dia. It is possible to apply the standard mourning method with gluing to cold ceramics edge, but there is a certain risk of detachment. In case of ceramics thinner than 0.5mm it’s recommended to avoid mounting to ceramics edge and apply mounting on cold side top surface.
SMT NTC Thermistor Gluing

Standard Mounting Method
Standard NTC SMT 0204 thermistor type can be equipped with terminal wires and mounted to TEC cold side ceramics edge. The mounting is made by thermoconductive epoxy gluing. Such mounting method is the most optimal for TECs with ceramics thickness 0.5mm or thicker. Thermistor position can be specified. The most standard methods are introduced on Pic.1-4

![Pic. 1](image)

![Pic. 2](image)

![Pic. 3](image)

![Pic. 4](image)

Customized Mounting Methods
Sometimes it’s more optimal to install thermistor as close to the object on TEC cold side as possible for precise temperature regulation. NTC SMT thermistor can be mounted by gluing to any location on TEC cold side by Customer request. The alternative solution is soldering (please, check next chapter - SMT NTC Thermistor Soldering).

Solutions for thin ceramics
NTC SMT type thermistors TC222 and TC103 have 0.5x1.0x0.5mm size. It is possible to apply the standard mourning method with gluing to cold ceramics edge, but there is a big risk of detachment. In case of ceramics thinner than 0.5mm it’s recommended to avoid mounting to ceramics edge and apply mounting on cold side top surface.
SMT NTC Thermistor Soldering

Standard Mounting Method
Standard NTC SMT thermistor type be soldered to TEC ceramics, if to apply a customized metallization pattern for it. Soldering method can be more optimal than gluing in terms of mechanical stability and thermal conductivity properties. It is also necessary for vacuum applications to avoid outgassing issues.

Customized Patterns for TECs
TEC Microsystems GmbH is fully flexible with customized Au patterns development. SMT NTC thermistor can be implemented onto customized pattern. Thermistor terminal connection pads in this case can be optimized for WB or wired solution.

Advanced Solution - Protective Plate
Being soldered on cold side surface the thermistor takes place on it and may limit the area for other objects mounting. It's possible to optimize it using ceramics with holes. The thermistor can be covered by ceramics plate. The resulting cold side surface is free for other components mounting. The additional ceramics plate works also as a protection for thermistor. The hole in protective ceramics plate can be additionally filled out with thermoconductive glue.
Lead-less NTC Thermistor Soldering

**Standard Mounting Method**

Lead-less NTC thermistor can be soldered to any location on TEC cold side surface. The position can be specified by Customer. The location on cold side can be separated by metallization or localized to prevent solder spreading in critical areas.

**Solution 1:**
Thermistor is soldered to TEC cold side, solid metallization

**Solution 2:**
Customized metallization with cutout to prevent solder spreading

**Solution 3:**
Customized metallization with separated zone for thermistor

**Customized Patterns for TECs**

TEC Microsystems GmbH is fully flexible with customized Au patterns development for thermoelectric cooler cold side. Lead-less NTC thermistor can be implemented onto customized pattern on thermoelectric cooler cold side.

**Special configurations by request**

TEC Microsystems GmbH standard lead-less thermistor is small enough to provide various special configurations for Customer application. It's possible for example to install multiple thermistors on TEC cold side or add a thermistor on TEC hot side for precise temperature control.
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