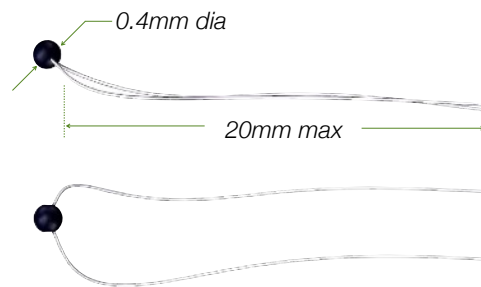


Standard Thermistor Solutions available

	TB04-222	TB04-103	TC04-222	TC04-103	TL103
Type	Glass-beaded	Glass-beaded	SMT	SMT	Lead-less
Resistance	2.2kOhm@20°C	10kOhm@20°C	2.2kOhm@25°C	10kOhm@25°C	10kOhm@25°C
Tolerance	5 %	5 %	3 %	3 %	5 %
Mounting	Epoxy Gluing	Epoxy Gluing	Epoxy Gluing or Soldering	Epoxy Gluing or Soldering	Soldering
Terminal Contacts	Pt Wires 50um dia	Pt Wires 50um dia	Pt Wires 50um dia or AWG-34 wires	Pt Wires 50um dia or AWG-34 wires	WB
Contacts Length	20mm max	20mm max	Adjustable	Adjustable	n/a

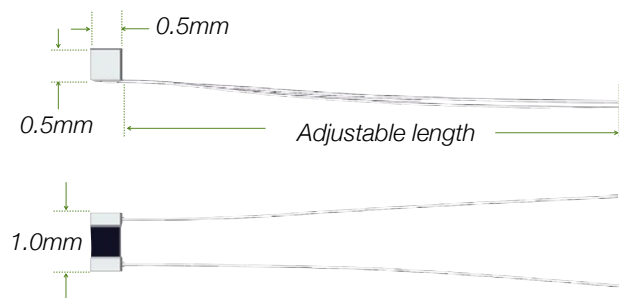
Glass-beaded NTC Thermistor

Glass-beaded NTC thermistors are available with two resistance nominals: 2.2kOhm@20°C and 10kOhm@20°C. 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.



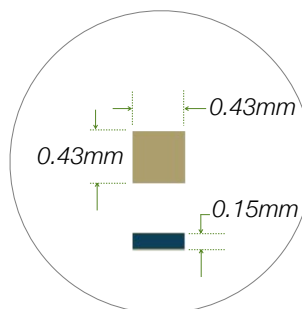
SMT type NTC Thermistor

SMT NTC thermistors are available with two resistance nominals: 2.2kOhm@25°C and 10kOhm@25°C. 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

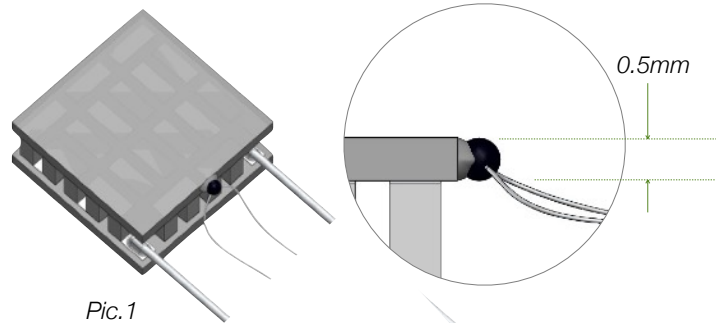
Lead-less NTC thermistor solution is available with 10kOhm@25°C nominal. Lead-less thermistors by default are for WB connection only, with soldering method of mounting on metallized TEC surface.



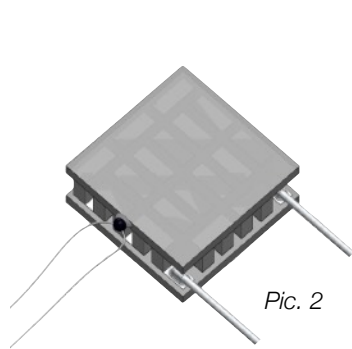
Glass-Beaded NTC Thermistor Mounting

Standard Mounting Method

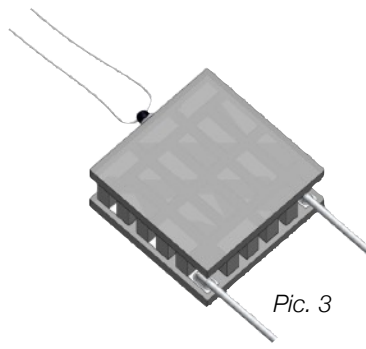
NTC glass-beaded thermistor type is mounted to TEC cold side ceramics edge by default. The mounting is made by thermoconductive epoxy gluing. Such mounting method is the most optimal for TECs with ceramics thickness 0.5mm or thicker. Thermistor position can be specified.



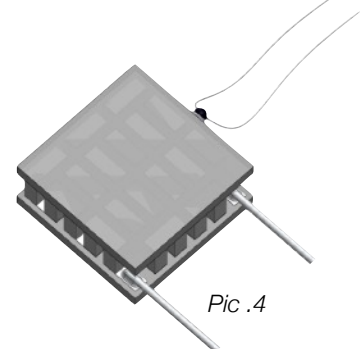
Pic.1



Pic. 2



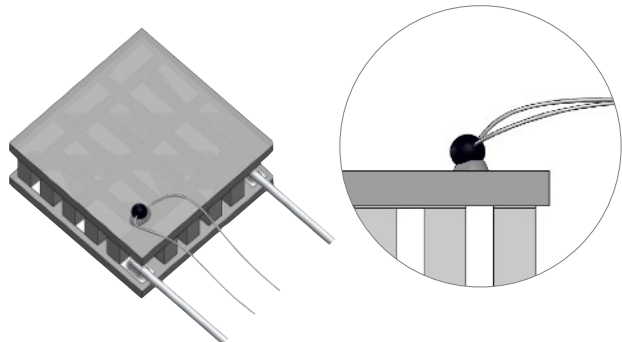
Pic. 3



Pic. 4

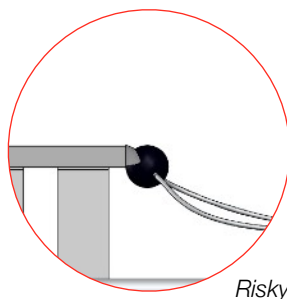
Customized Mounting Methods

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.

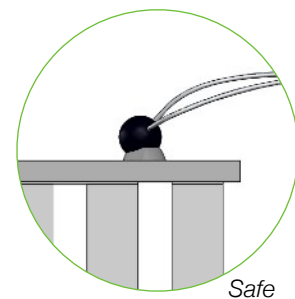


Solutions for thin ceramics

Glass-beaded NTC thermistors types TB222 and TB103 have 0.4mm dia. It is possible to apply the standard mounting 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.



Risky

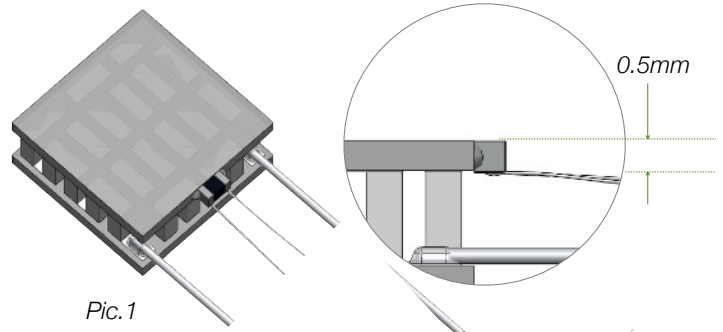


Safe

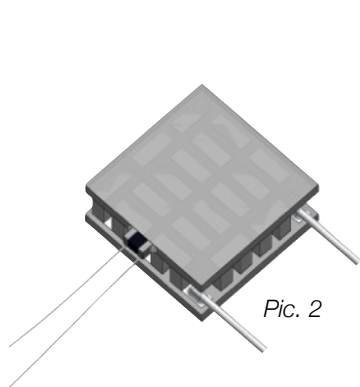
SMT NTC Thermistor Gluing

Standard Mounting Method

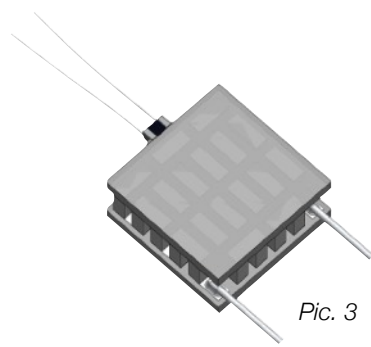
Standard NTC SMT 0204 thermistor type can be equipped with terminal wires and mounted to TEC cold side ceramics edge. The mounting is made by thermoconductive epoxy gluing. Such mounting method is the most optimal for TECs with ceramics thickness 0.5mm or thicker. Thermistor position can be specified.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



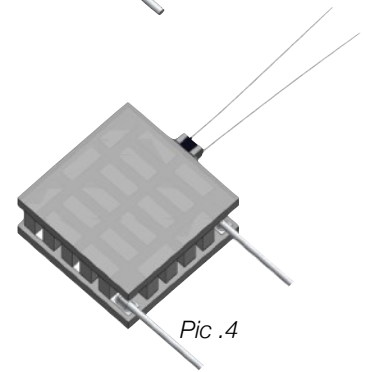
Pic.1



Pic. 2



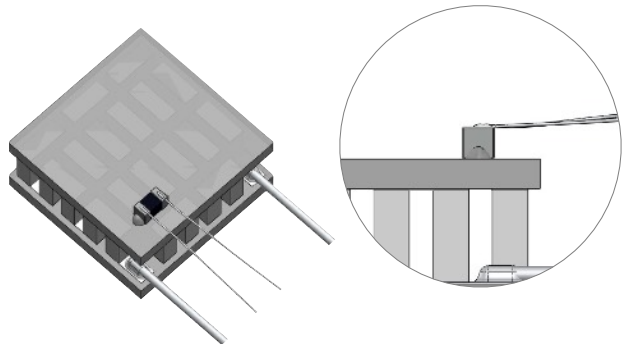
Pic. 3



Pic. 4

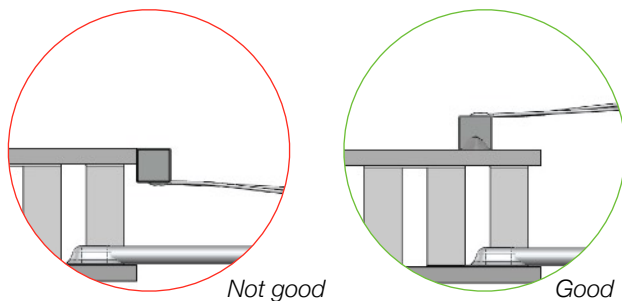
Customized Mounting Methods

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 mounting 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.



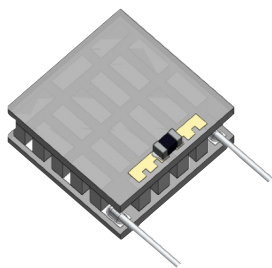
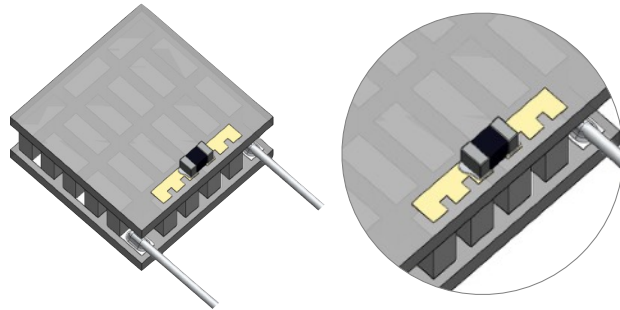
Not good

Good

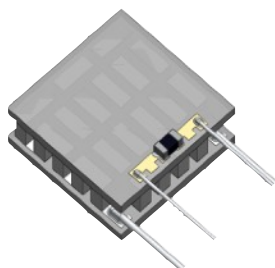
SMT NTC Thermistor Soldering

Standard Mounting Method

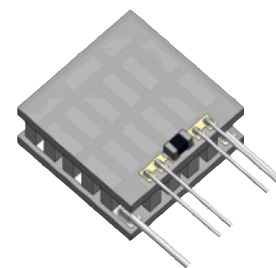
Standard NTC SMT thermistor type be soldered to TEC ceramics, if to apply a customized metallization pattern for it. Soldering method can be more optimal than gluing in terms of mechanical stability and thermal conductivity properties. It is also necessary for vacuum applications to avoid outgassing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



*SMT Solution 1:
customized Au pattern for WB
connection*



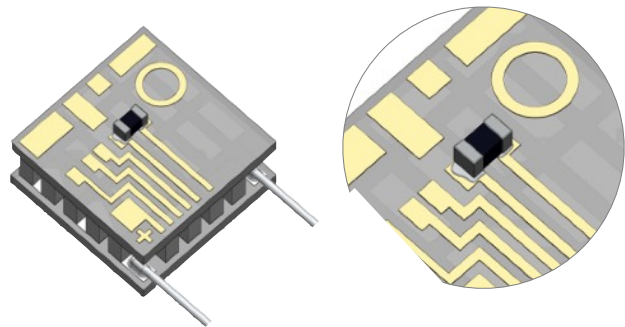
*SMT Solution 2:
customized Au pattern with 2-
wires measurement scheme*



*SMT Solution 3:
customized Au pattern with 4-
wires measurement scheme*

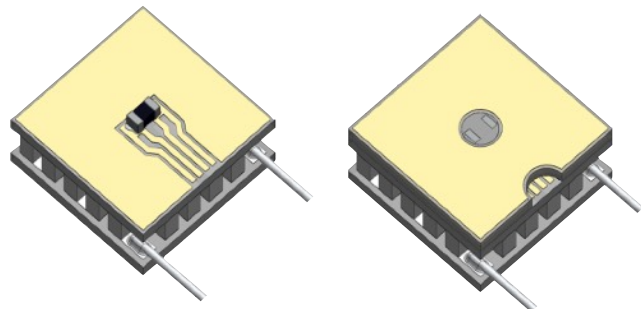
Customized Patterns for TECs

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

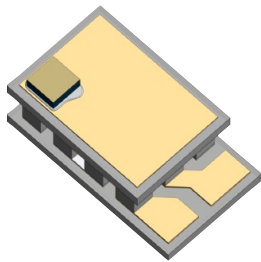
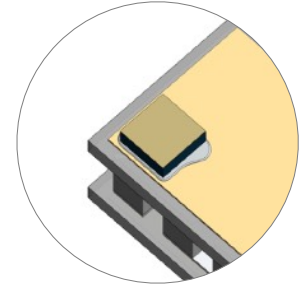
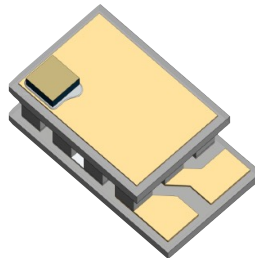
Being soldered on cold side surface the thermistor takes place on it and may limit the area for other objects mounting. It's possible to optimize it using ceramics with holes. The thermistor can be covered by ceramics plate. The resulting cold side surface is free for other components mounting. The additional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



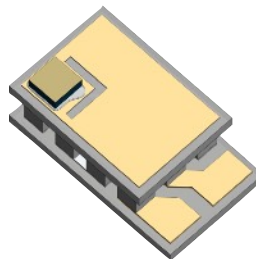
Lead-less NTC Thermistor Soldering

Standard Mounting Method

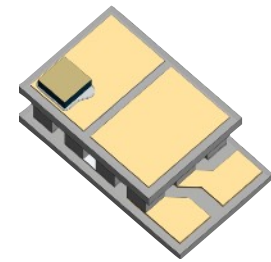
Lead-less NTC thermistor can be soldered to any location on TEC cold side surface. The position can be specified by Customer. The location on cold side can be separated by metallization or localized to prevent solder spreading in critical areas.



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



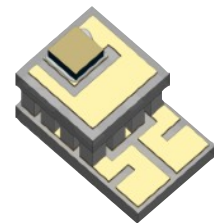
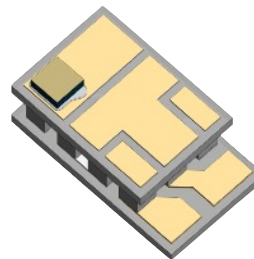
*Solution 2:
Customized metallization with
cutout to prevent solder
spreading*



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

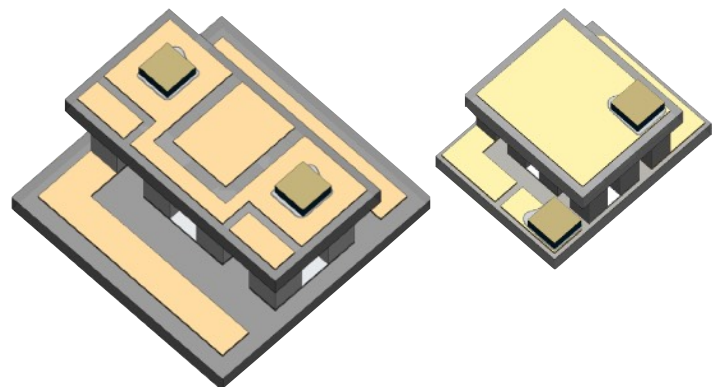
Customized Patterns for TECs

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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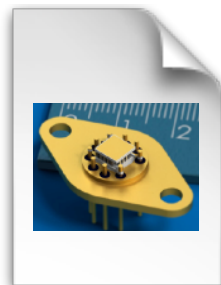
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