Thermoelectric cooler documentation

2TE_1_VIGO

rev. 9/17

Performance Parameters

TEC Type	ΔTmax K	Qmax W	Imax A	Umax V	H mm	h mm	** ACR Ohm	Ra µm	*** Centering mm	Hermeticity cc He / sec	Ceramics
2TE_1	94±2	0.4±0.02	1.3±0.07	0.9±0.05	3.7±0.1	1	0.69±10%	0 – 0.1	0.2	10^{-8}	Al_2O_3

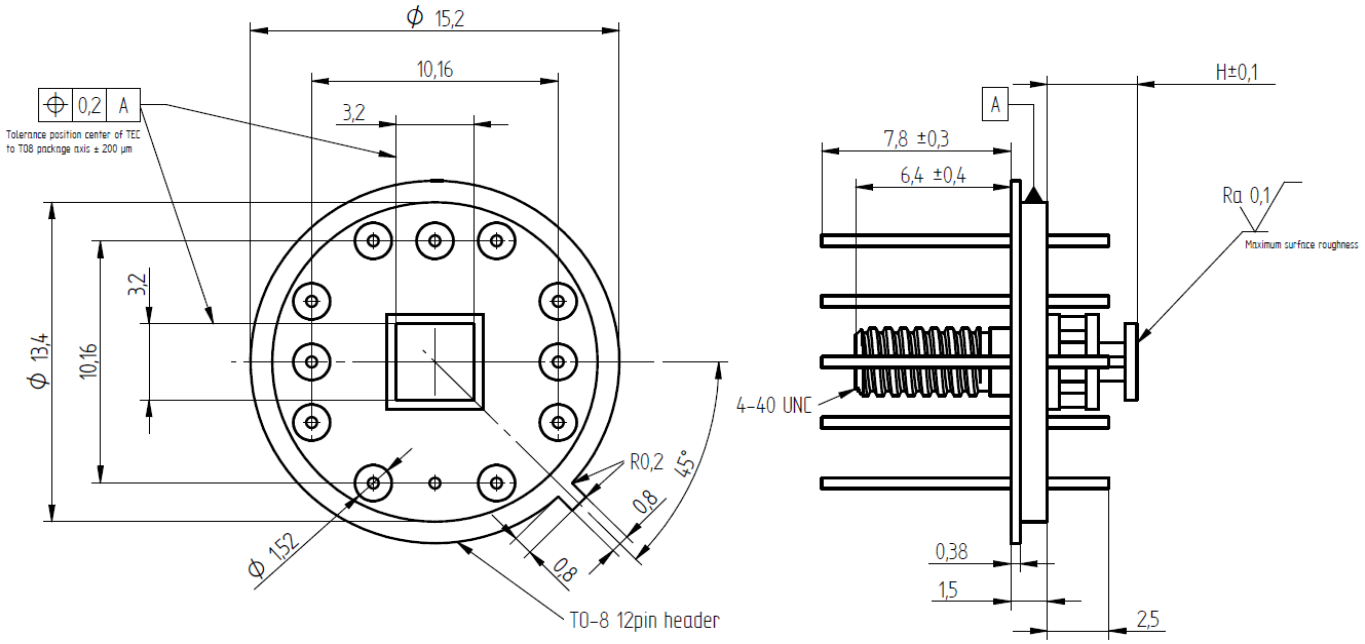
Performance data are given at 300K, vacuum

* Roughness of the top plate

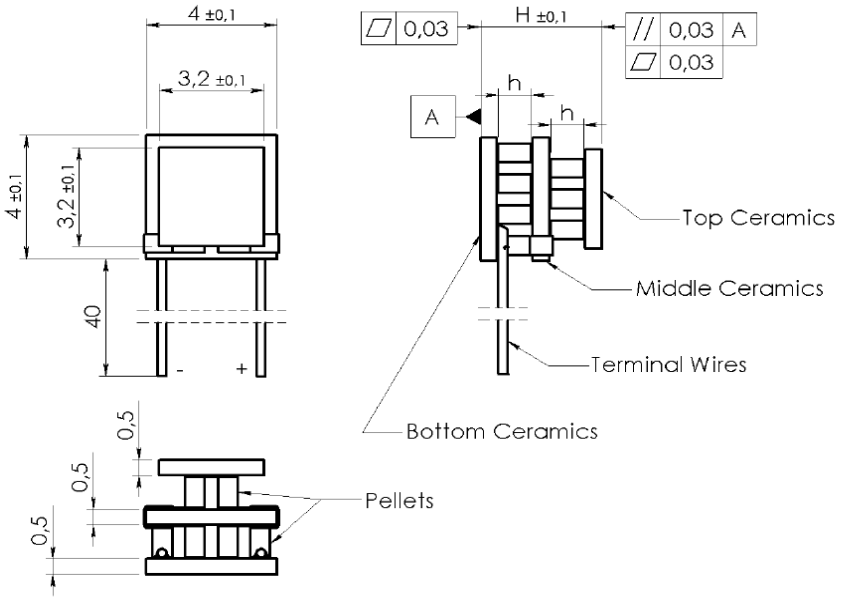
** Tolerance in batch should not exceed than ±5%

*** Tolerance position center of TEC to TO8 package axis

Technical Drawing



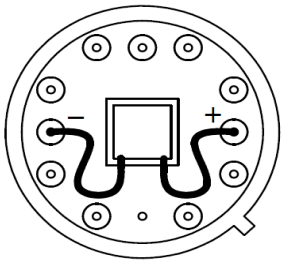
Technical Drawing TEC



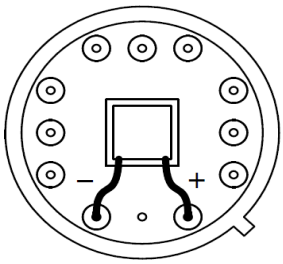
Material

Header Base	Header pins	Glass Seal	Mounting Screw	Finishing Plating Type
CRS (Cold Rolled Steel)	ASTM F-15 Alloy Kovar	Corning Glass non-transparent	CRS (Cold Rolled Steel)	Galvanic Au
Au plated 1.27 um	Au plated 1.27 um	Corning 7052 or equivalent	4-40 UNC type metric M3x0.5	1.27 um Au over 1.27-3.8 um Sulfamate Ni

Pinout

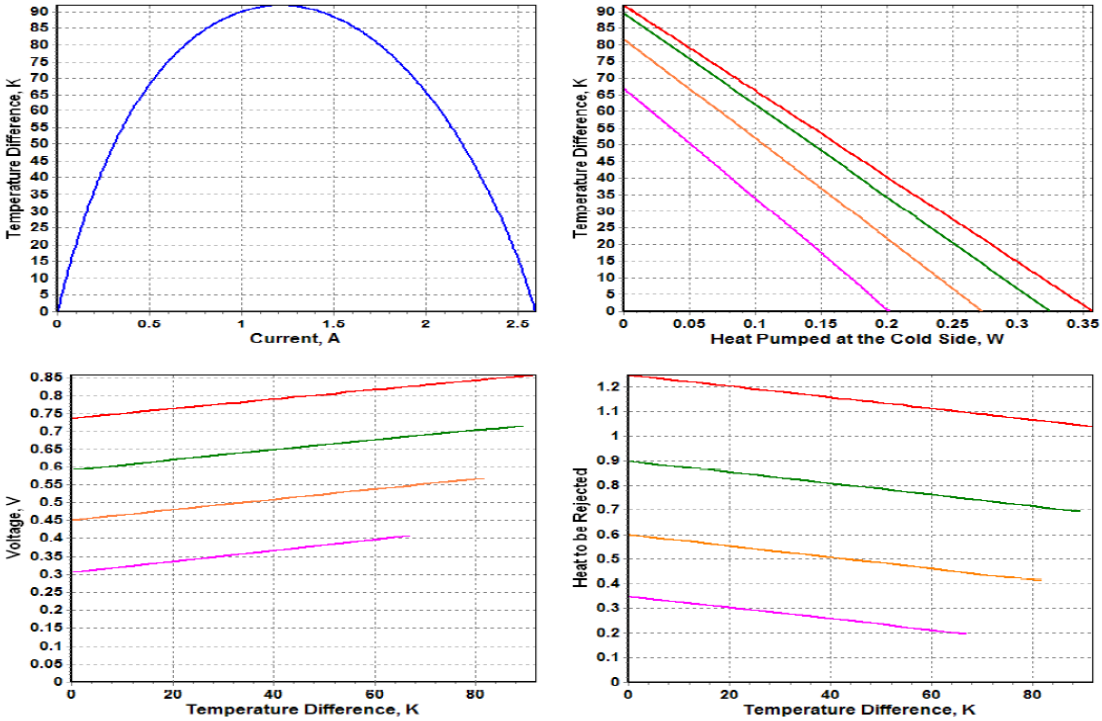


Normal



Modified

Performance Plots



Color Legend: Imax, 0.8 Imax, 0.6 Imax, 0.4 Imax

Mounting paramiters

TEC mounting, method	Soldering, 206°C, Sn-Ag-Cu-In
TEC assembly, method	Soldering, 230°C, Sn-Sb
Wireless mounting	Soldering, 230°C, Sn-Sb

Application Tips

1. Never heat TE module more than 200°C (TEC assembled at 230°C).
2. Never use TE module without attached heat sink at hot (bottom) side.
3. Connect TE module to DC power supply according to polarity.
4. Do not apply DC current higher than Imax.

Installation

1. Soldering of object to be cooled.

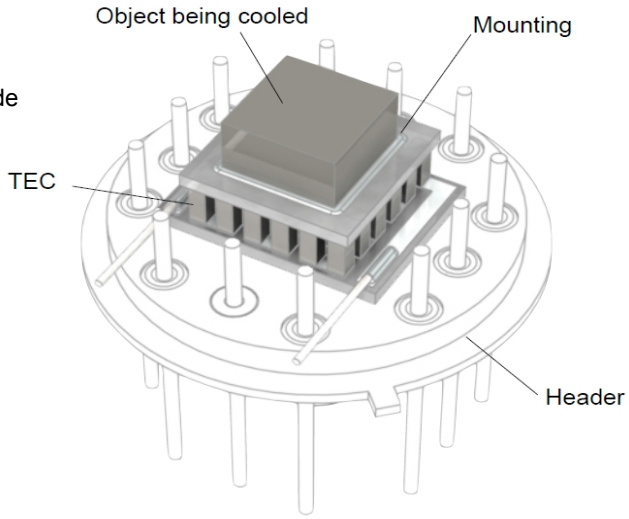
   Method suitable for a TE module with the metallized cold side (Ordering Options. Item F). Soldering requires careful procedures:

   A) Never overheat TEC (Cautions. Item 1).

   B) Use solder with melting point less than TEC mounting solder (Ordering Options. Item C).

2. Gluing of object to be cooled.

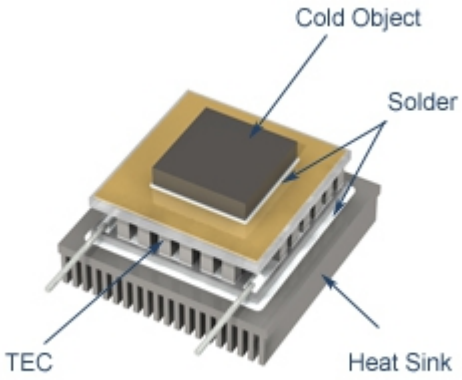
   Method available by glues with good thermoconductive properties. Not recommended for high vacuum applications and long operations at high temperature.



Reliability

Mechanical Shock	The test shall be performed according to MIL-STD-883 (Method 2002.4,Condition B). TECs are subjected to 1500 g level shock for pulse duration of 0.5 ms both directions in all three axis.
Vibration	The test shall be performed according to MIL-STD-883 (Method 2007.3,Condition A). TECs under the test are vibrated at variable frequency sequence (controlled from 20 to 2000 Hz and back down 20 Hz) four times in all three axis, peak acceleration of 20 g.
Shear Force	The test shall be performed according to MIL-STD-883 (Method 2019).
High Temperature Storage	The test shall be performed for a minimum of 2000 hours at the TEC maximum-rating storage temperature.
Temperature Cycling	The test shall be performed according to MIL-STD-883 (Method 1010.8,Condition B). TECs are alternately exposed to environment temperatures of -55°C and +125°C with holding time of 10 minutes at each temperature. The test shall be preformed for at least 100 cycles.
Thermal Shock	The test shall be performed according to MIL-STD-883 (Method 1011.9,Condition A). TECs are alternately immersed in water kept at 0°C and +100°C with a 5 minute holding time at each temperature. This cycle is repeated 20 times.
Intermittent Life	The test shall be performed according to MIL-STD-883 (Method 1006). The test shall be performed with ambient temperature equal to or greater than maximal operation temperature (i.e. 85°C). The TECs shall be cycled on and off for minimum of 5000 cycles. The duty cycle is 1.5 minutes on (during this time the TEC should reach at least 90% of DTmax) and 4.5 minutes off.
Steady State Life	The test shall be performed according to MIL-STD-883 (Method 1005.8). TECs are subjected to 125°C for a period 1000 hours while being powered by the maximum rated current.

Mounting by soldering



The TEC is soldered by a soft solder to a heat-conducting header, and a cooled object is soldered by a similar way on the cold side of the TE module. The thermal contact and mechanical durability is provided by the used solder.

Advantages

The method provide good mechanical durability, good thermal contact between the surfaces. It is suitable for vacuum applications as it does not cause outgassing. No need for additional space as in case of mechanical mounting. Partial disassembling is possible.

Application

It is the main mounting method for single- and multistage micromodules. For large modules it is limited because a risk of mechanical strain owing to a difference of thermal expansions of contacting surfaces.

Restrictions

Is not applicable for large size TECs (more than 15-20 mm). Professional personnel is required for the mounting method. There is a risk to damage TECs during procedures. TEC must have metallized surfaces suitable for soldering.

Procedure

- Clean and degrease the heat sink surface and remove any heavy oxidation. Make sure that there are no burrs, chips, or other foreign material in the module mounting area.
- Pre-tin the heat sink surface in the module mounting area with the appropriate solder.

Note: The selected solder must have a melting point lower than or equal to the rated maximum processing temperature of the TE device being installed. When tinning the heat sink with solder, the heat sink's temperature should be just high enough so that the solder will melt but in no case should the temperature be raised more than the maximum value specified for the TEC.

- Apply soldering flux to the TE module's hot side and place the module on the pre-tinned area of the heat sink. Allow the module to «float» in the solder pool and apply a back and forth turning motion on the module to facilitate solder tinning of the module surface.

Note: A tendency for the module to drag on the solder surface rather than to float is an indication that the amount of solder is insufficient. In the case, remove the module and add more solder to the heat sink.

- After several seconds the module surface should be tinned satisfactorily. Clamp or weight load the module in the desired position, remove the heat sink from the heat source, and allow the assembly to cool. When sufficiently cooled, degrease the assembly to remove flux residue.
- Rinse mount with TEC in hot water, then scrub with cleaning solution and rinse again with hot water, brushing away any excess flux residue around the pins. Wash with hot water and dry with forced air. To insure complete removal of moisture, dry the entire assembly in an oven for 30 minutes at 60°C.

Changes in revisions

Rev Nr.	Date	Change
Rev 1	10/10/16	initial version
Rev 2	20/10/16	Technical drawing, soldering method, pinout
Rev 3	25/10/16	Adding HERMETICITY
Rev 4	02/11/16	Adding Material
Rev 5	19/12/16	Added field Ceramics in parameters
Rev 6	17/01/17	Changed ACR tolerance and added batch tolerance, changed Ra parameter
Rev 7	23/01/17	Changed Ra parameter
Rev 8	06/03/17	Added length of the pins on the stand
Rev 9	07/04/17	Reviewed ACR tolerance