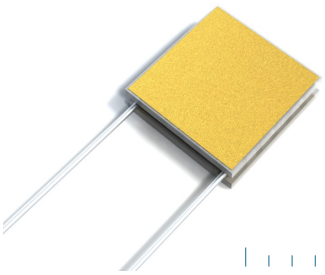
THERMOELECTRIC COOLER PERFORMANCE

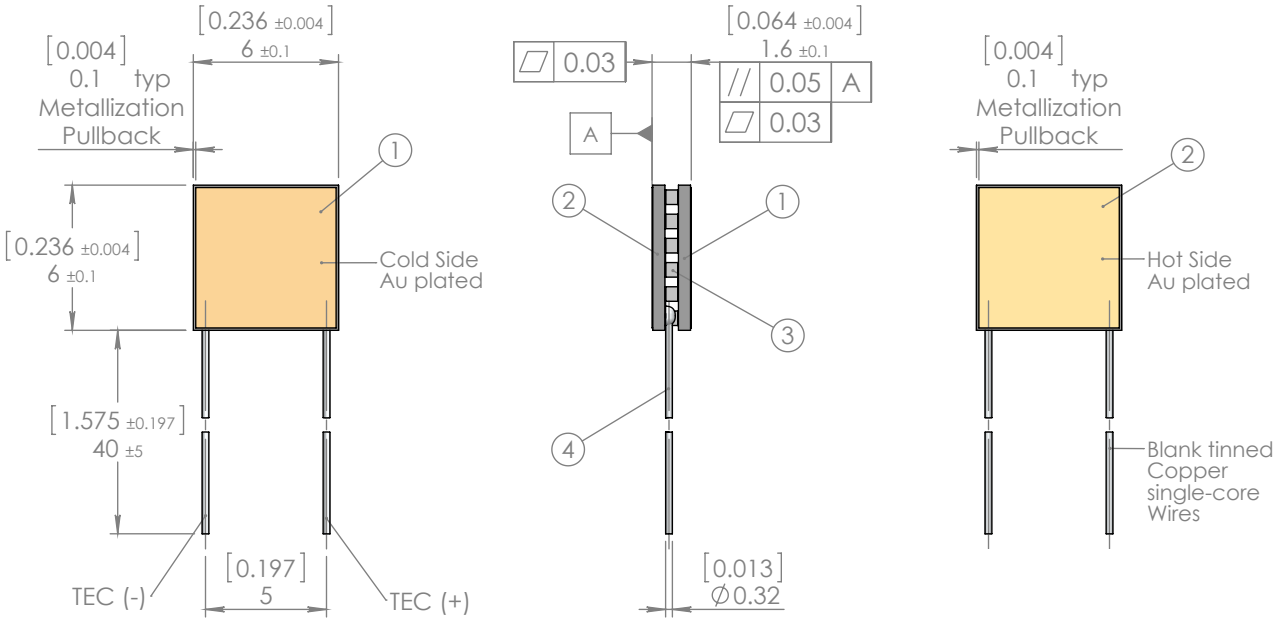


ΔTmax K	Qmax W	Imax A	Umax V	ACR Ohm	Ambient Temperature	Conditions
69	5.5	4.2	2.1	0.4	+27°C / 300K	Vacuum
74	6.0	4.2	2.3	0.4	+50°C / 323K	Dry N2
80	6.4	4.1	2.6	0.5	+75°C / 348K	Dry N2
82	6.6	4.1	2.6	0.5	+85°C / 358K	Dry N2

Note: Thermoelectric Cooler performance values are specified for optimal conditions, assuming that TEC hot side (T_{hot}) is stabilized at ambient temperature (T_{amb})

TECHNICAL DRAWING 1ML07-017-05AN05

Dimensions are in mm
Dimensions in [ ] are in inches



TEC DESCRIPTION

- Ceramics: AlN (Aluminium Nitride)
- Internal Assembly: Solder Sn-Sb (T_{melt}=230°C)
- Cold Side Surface: Au plated (0.2 - 0.3um)
- Hot Side Surface: Au plated (0.2 - 0.3um)
- Terminal Contacts: AWG-28 Wires, blank
- TEC Polarity: standard
- Bi-Te Material: high-grade, hot-extruded type
- Protective Coating: N/A (available by request)
- Integrated Thermistor: N/A (available by request)

KEY FEATURES

- Regular BiTe pellets placement technology
- RoHS EU Compliant
- REACH EU Compliant
- TELCORDIA GR-468 (MIL-883) qualified
- Classical shape (equal size of top and bottom)
- WB configuration is available by request
- Up to 225°C short time processing (for mounting)
- Wide range of additional manufacturing options (see Pages 3,4)

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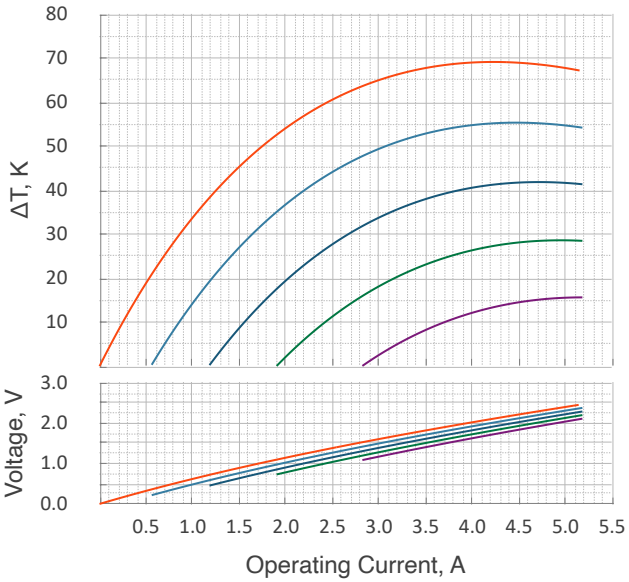
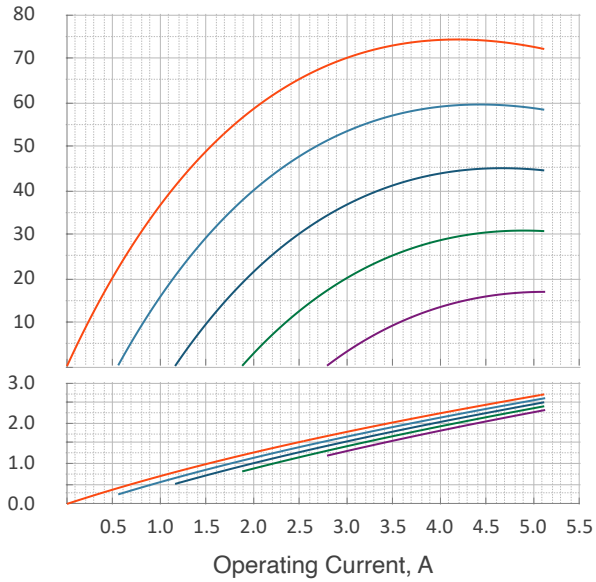
PERFORMANCE PLOTS

@27°C, Vacuum	ΔTmax K	Qmax W	Imax A	Umax V
1ML07-017-05AN05	69	5.5	4.2	2.1



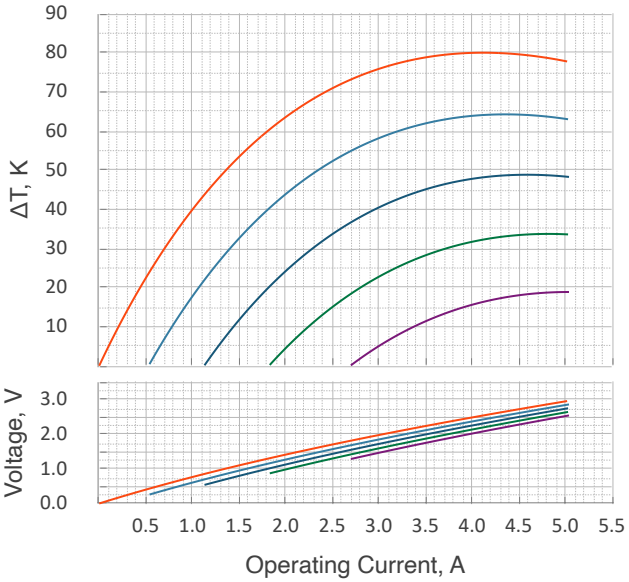
Heatload, W	0.0	1.1	2.2	3.3	4.4
% from Qmax	0%	20%	40%	60%	80%

@50°C, Dry N2	ΔTmax K	Qmax W	Imax A	Umax V
1ML07-017-05AN05	74	6.0	4.2	2.3



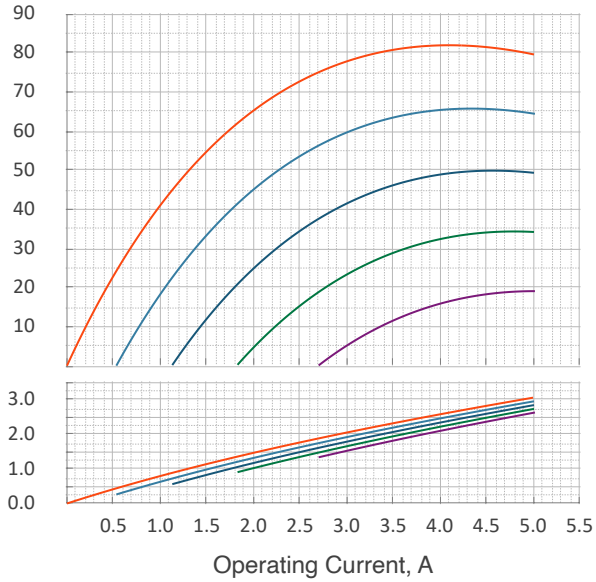
Heatload, W	0.0	1.2	2.4	3.6	4.8
% from Qmax	0%	20%	40%	60%	80%

@75°C, Dry N2	ΔTmax K	Qmax W	Imax A	Umax V
1ML07-017-05AN05	80	6.4	4.1	2.6



Heatload, W	0.0	1.3	2.6	3.9	5.1
% from Qmax	0%	20%	40%	60%	80%

@85°C, Dry N2	ΔTmax K	Qmax W	Imax A	Umax V
1ML07-017-05AN05	82	6.6	4.1	2.6



Heatload, W	0.0	1.3	2.6	4.0	5.3
% from Qmax	0%	20%	40%	60%	80%

Note: Thermoelectric cooler performance values and plots are specified at optimal conditions, assuming TEC hot side is stabilized at ambient temperature (T_{hot}=T_{amb}). The performance data is specified for four most common ambient condition modes. Please, contact TEC Microsystems GmbH directly for estimations under different conditions, if required.

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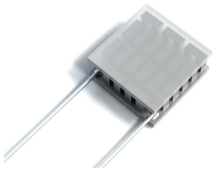
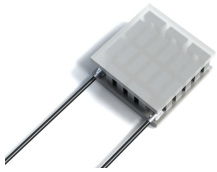
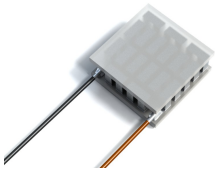
THERMOELECTRIC COOLER TERMINAL CONNECTION OPTIONS



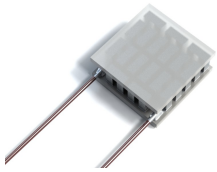
- [x] Blank Wires



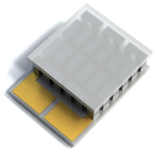
- [ ] Insulated Wires



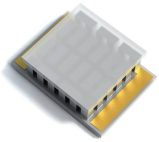
- [ ] Insulated Color-coded Wires



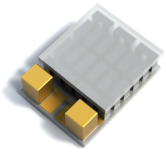
- [ ] Varnished Wires



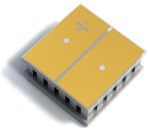
- [ ] Front WB Pads



- [ ] Side WB Pads



- [ ] WB Posts

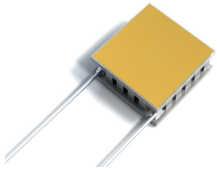


- [ ] SMD / Flip-chip (contacts on hot side)

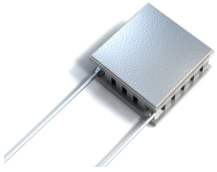
- By default thermoelectric cooler is provided with blank tinned single-core Copper wires. Various TEC terminal connection options are available by request. In the case of a thermoelectric cooler with wires, customer can select the wire type, diameter, and length.

THERMOELECTRIC COOLER SURFACE OPTIONS

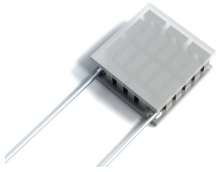
Standard ceramics surface options are available without price change.
Pre-tinning can be applied to one side of the TEC or both.
Different solder types are available for pre-tinning.



- [x] Au plated

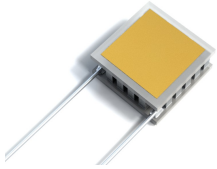


- [ ] Pre-tinned with solder

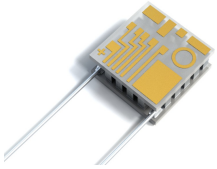


- [ ] Blank ceramics (w/o metallization)

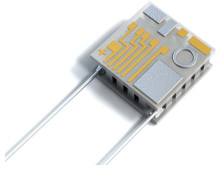
Advanced ceramics surface options, available by request.
Surface customization can be applied to one side of the TEC or both.



- [ ] Custom gap



- [ ] Customized Au pattern



- [ ] Selective pre-tinning over pattern

- By default thermoelectric cooler is provided with Au plated ceramics surfaces (both sides). Au plated surface is the universal solution, suitable for soldering and gluing. Surface type and configuration can be specified individually for each TEC side (top and bottom ceramics surfaces).

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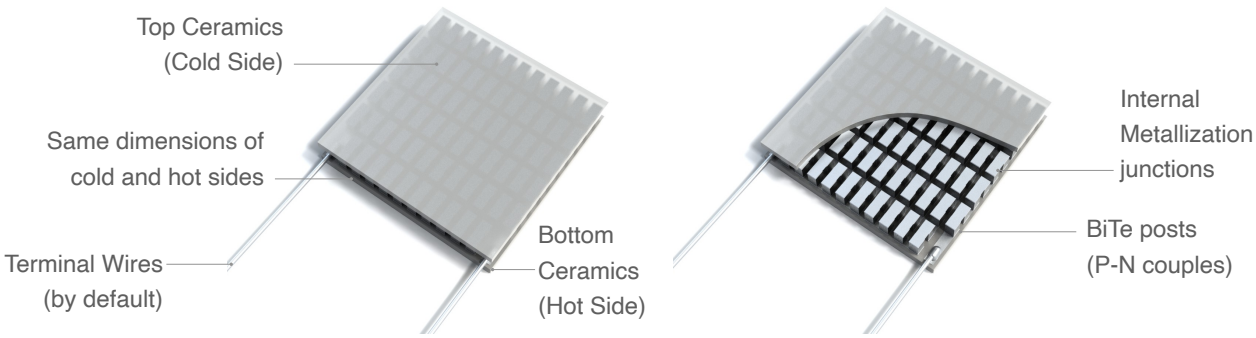
1ML07 SINGLE-STAGE TE COOLER OVERVIEW (STANDARD TEC SHAPE)



- TE Coolers with standard shapes have the same cold and hot sides by dimensions.
- TEC configurations with WB pads or WB posts are possible but require TEC hot side modification.
- TEC internal Assembly Solder by default: Sn-Sb, T_{melt}=230ºC

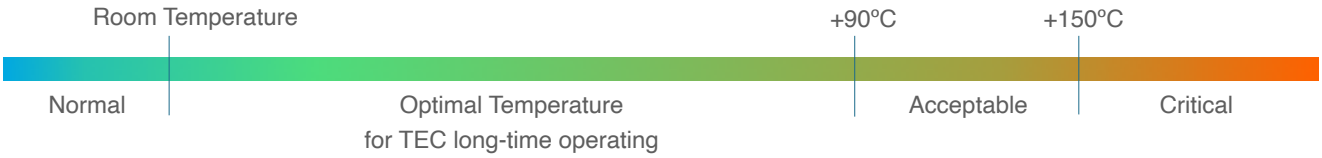
RoHS Compliant

APPLICATION TIPS

- Maximum **short time process** temperature is 220˚C (TEC assembly solder has T_{melt}=230˚C).
- Maximum **long time operating** temperature is 150˚C.
- Use thermoelectric cooler only with an appropriate heat sink attached to the hot side.
- Connect thermoelectric cooler to DC power supply in according to TEC polarity.
- Do not exceed DC current and voltage higher than Imax and Umax values.
- Use temperature ramping and avoid thermal shocks during soldering and/or baking processes.
- Check FAQ on TEC Microsystems web for more details about TECs operating and handling.

220

150



TEC Lifetime depends on Ambient Temperature (T_{amb}) and can be estimated by Arrhenius equation

Term “Lifetime” for TEC is taken from Telcordia GR-468 Standard. The criteria of failure is TEC AC Resistance (ACR) change for more than 5%. It doesn’t mean TEC stops operating, but certain performance degradation appears.

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IMPORTANT NOTES

1. Thermoelectric Cooler (TEC) performance in this datasheet is specified in typical ambient condition modes (Vacuum, +27ºC; Dry N2, +50ºC; Dry N2, +75ºC and Dry N2, +85ºC. TEC performance may differ under other conditions. Please, contact TEC Microsystems for detailed analysis and additional TEC performance info.

2. TEC ACR and Umax values are sensitive to ambient temperature. These values can be different from those specified in the datasheet at other ambient conditions. ACR and Umax rise with ambient temperature increasing.

3. TEC dTmax is specified at zero heatload, while Qmax is specified at zero dT (check Fig.1 for example). TEC dTmax and Qmax values rise with ambient temperature (check Fig. 2 for example).

4. Thermoelectric coolers have the best performance in the temperature range from near room up to +80..90ºC. TEC cooling performance is getting lower at ambient temperatures below 0ºC. TECs are not suitable to operate at cryogenic temperatures.

Fig. 1 - Understanding dT_{max} and Q_{max}

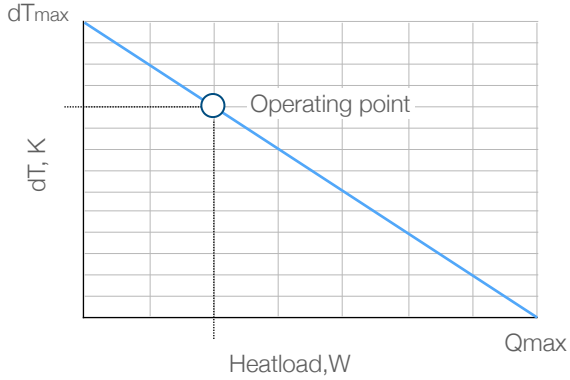
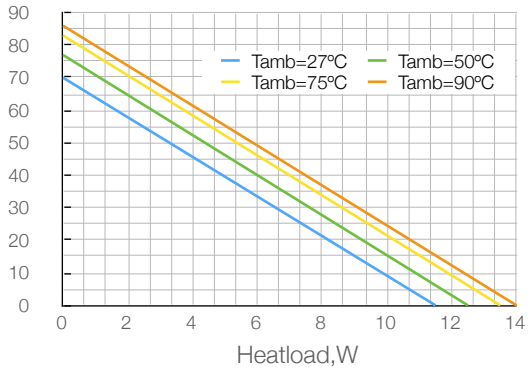


Fig. 2 - Same TEC dTmax and Qmax parameters at different ambient temperatures



5. Driving TEC at Imax or Umax level doesn't mean the max cooling performance mode. The real optimal mode may depend on operating conditions, required dT level and application heatload. In fact a better performance can be reached at operating current and voltage lower than Imax and Umax values specified in datasheet.

6. It is strongly recommended to avoid a direct mounting of the thermoelectric cooler to pure Copper, Aluminium or Nickel materials and a mounting of objects from these materials on the TEC cold side. Any material with high CTE (Coefficient of Thermal Expansion) may affect TEC lifetime and even damage TEC in case of improper mounting, thermal shock or temperature cycling. In case of the necessity of the material as mentioned above, it is recommended to use some elastic "soft" solders or glues with a large modulus of elasticity (Indium-based solders or silicon-based thermoconductive glues).

7. TEC Microsystems GmbH confirms that all thermoelectric coolers are qualified and meet the requirements of Telcordia GR-468 Standard (based on MIL-883). The up-to-date Reliability Report is available by request. TEC Microsystems GmbH warranties thermoelectric coolers lifetime no less than 250K-300K operating hours under normal application conditions.

8. Additional information about thermoelectric coolers operating and handling, all the most important questions and answers, are available on TEC Microsystems web in FAQ section (link).

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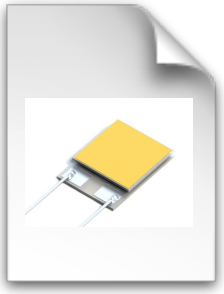

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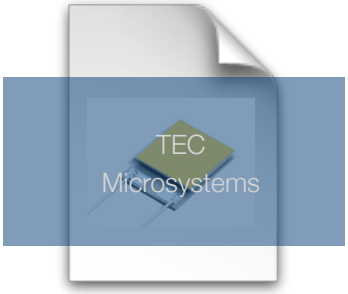

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