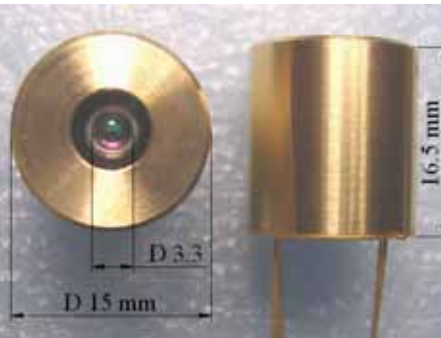
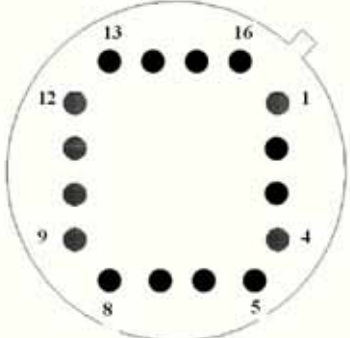


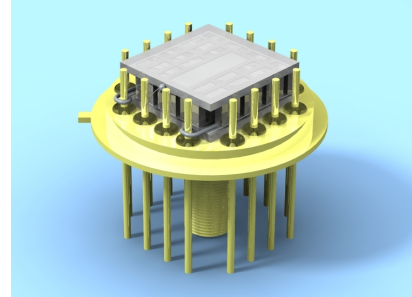
LEDxxTO8TEC			
Product view			<p>1 TEC -; 4 TEC + 8 LED (or PD) +; 13 LED (or PD) - 10, 11 thermosensor, 16 - LED (or PD) house</p>

## Specifications

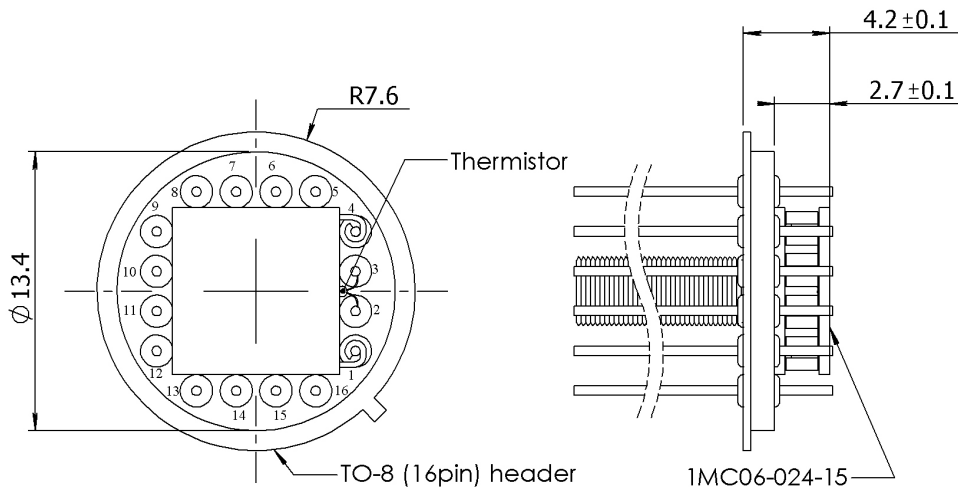
RMT Ltd.

### TO816.1MC0602415

TO-8 Style Sub-Mount						
TEC Type	Sub-Mount Performance					Thermistor kOhm
	$\Delta T_{max}$ K	$Q_{max}$ W	$I_{max}$ A	$U_{max}$ V	$R_t$ K/W	
1MC06-024-15	69	1.85	1.15	2.90	1.07	2.20



## Technical Drawing

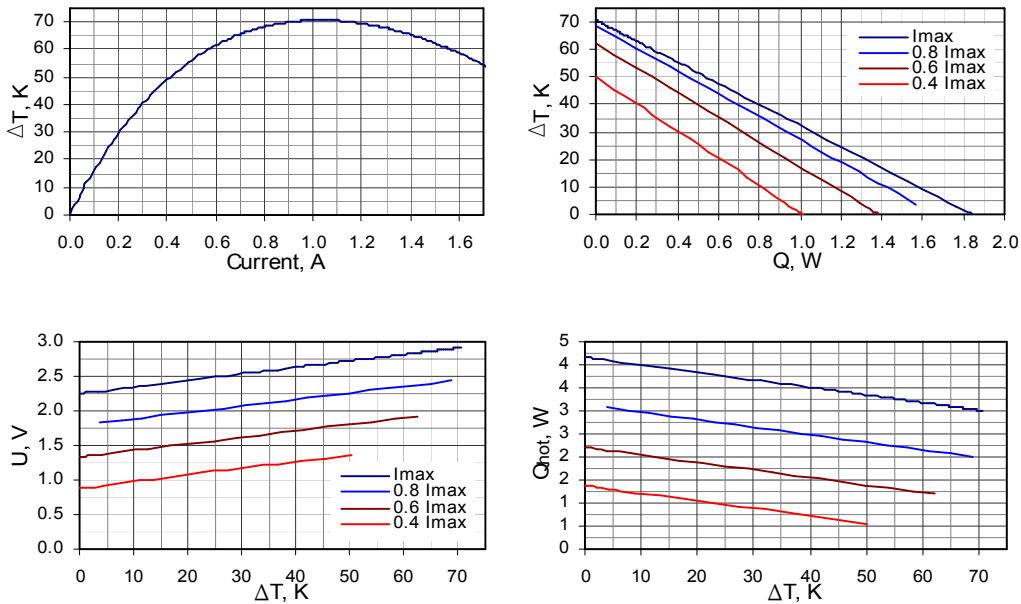


## Ordering Options

- |  |   |   |
|--|---|---|
| <p><b>A. Header material</b><br/>Kovar.</p> <p><b>B. Header finish</b><br/>1. Gold plating<br/>2. Ni plating</p> <p><b>C. TEC Mounting</b><br/>1. Soldering<br/>1.1 Solder 117 (In-Sn, <math>T_{melt}=117^{\circ}C</math>)<br/>1.2 Solder 138 (Sn-Bi, <math>T_{melt}=138^{\circ}C</math>)<br/>1.3 Solder 183 (Pb-Sn, <math>T_{melt}=183^{\circ}C</math>)<br/>2. Epoxy gluing</p> <p><b>D. TEC Leads Connection</b><br/>Soldering PbSn Alloy (<math>T_{melt}=183^{\circ}C</math>)</p> | <p><b>E. TEC Ceramics</b><br/>1. Pure <math>Al_2O_3</math> (100%)<br/>2. Alumina (<math>Al_2O_3</math> - 96%)<br/>3. Aluminum Nitride (AlN)</p> <p><b>F. TEC Cold Side Finish</b><br/>1. Clear ceramics<br/>2. Metallized<br/>2.1 Ni / Sn(Bi)<br/>2.2 Gold plating<br/>3. Metallized and Pre-tinned<br/>3.1 Rose (Pb-Sn-Bi, <math>T_{melt}=94^{\circ}C</math>)<br/>3.2 Solder 117 (In-Sn, <math>T_{melt}=117^{\circ}C</math>)<br/>3.3 Solder 138 (Sn-Bi, <math>T_{melt}=138^{\circ}C</math>)<br/>3.4 Solder 183 (Pb-Sn, <math>T_{melt}=183^{\circ}C</math>)</p> | <p><b>G. Thermistor (optional)</b><br/>1. RMT's TB type of glass- beaded NTC thermistor<br/>2. Resistance nominal on request<br/>3. Individual calibration is available (<math>-65..+85^{\circ}C</math>)</p> <p><b>H. Thermistor Mounting</b><br/>Epoxy Gluing</p> <p><b>I. Thermistor Leads Connection</b><br/>Soldering PbSn Alloy (<math>T_{melt}=183^{\circ}C</math>)</p> |
|--|---|---|

TO816.1MC0602415

Standard Performance Plots



Application tips

Cautions

- Never heat the TE sub-mount more than the temperature of the TEC mounting (Ordering Options. Item C).
- Never use the TE sub-mount without an attached heat sink at the hot (bottom) side.
- Connect the TE sub-mount to a DC power supply according to polarity.
- Do not apply a DC current higher than  $I_{max}$ .

Installation

- Soldering of object to be cooled.

Method suitable for a TE module with the metallized cold side (Ordering Options. Item F).

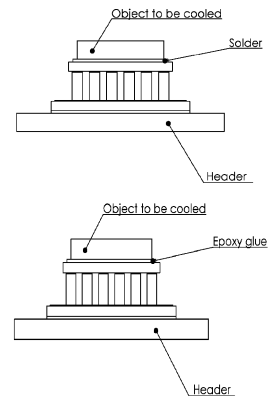
Soldering requires careful procedures:

- Never overheat TEC (Cautions. Item 1).
- Use soldering temperature exceeding the melting point of applied solder (Ordering Options. Item C) not more than 10 -15°C.

- Gluing of object to be cooled.

Up-to-date method available by glues with good thermoconductive properties. A glue is usually based on some epoxy compound filled with some thermoconductive material such as graphite or diamond powders, silver, SiN and others.

Not recommended for high vacuum applications and long operations at high temperature.



Definitions

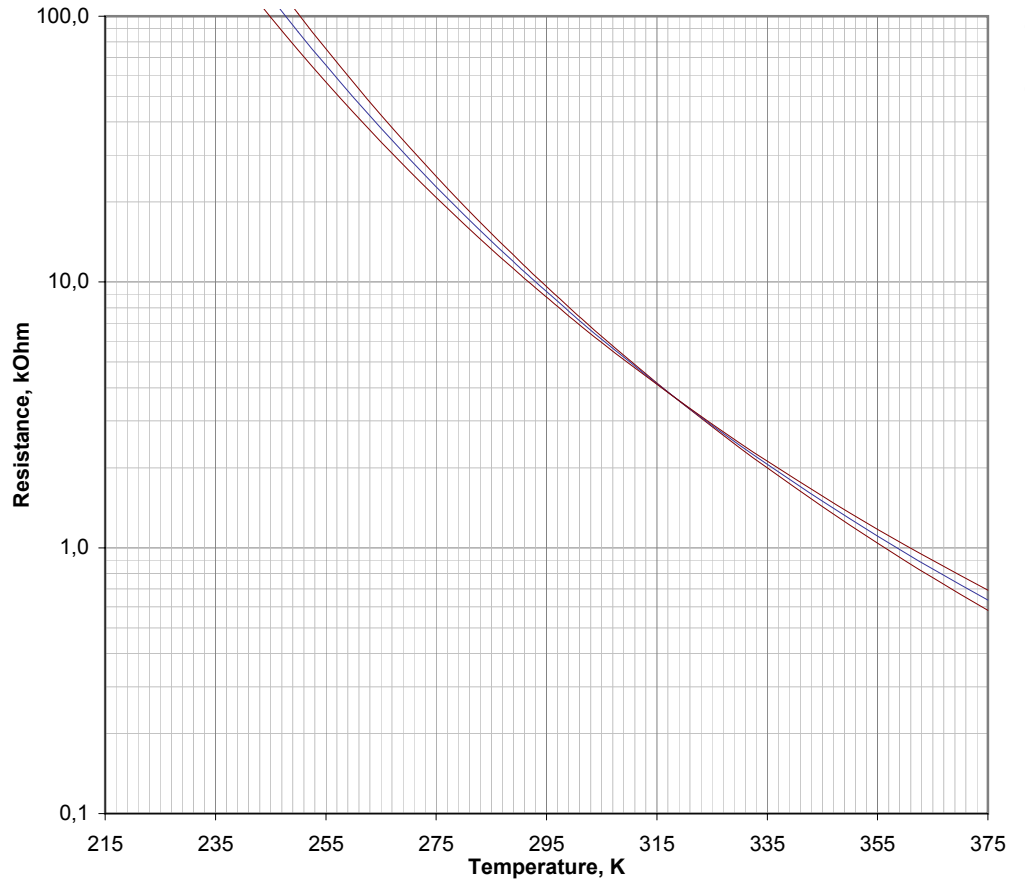
Value	Description	Notes
$\Delta T_{max}$	Maximum sub-mount temperature difference at $I=I_{max}$	Rated at $Q_{max}=0$ , at other $Q$ it should be estimated as $\Delta T = \Delta T_{max}(1 - Q/Q_{max})$
$Q_{max}$	Maximum sub-mount heat pumping capacity at $I=I_{max}$	Rated at $\Delta T=0$ , at other $\Delta T$ it should be estimated as $Q = Q_{max}(1 - \Delta T/\Delta T_{max})$
$I_{max}$	Maximum sub-mount current	Electric parameters resulting in $\Delta T_{max}$
$U_{max}$	Maximum sub-mount voltage drop	
$R_t$	Thermal resistance of the header	Calculated for a particular sub-mount (header and TE module)
$Q_{hot}$	Total heat to be dissipated from header	Consist of Electric Power ( $I \times U$ ) plus the heat pumped from cold side ( $Q$ )

## Glass beaded NTS Thermistor Calibration

Thermistor Specification

Type **TB04-103**  
Batch **TB0180506**

T, K	5%	R <sub>t</sub>	-5%	T, °C
375	0,58	0,64	0,69	102
370	0,67	0,73	0,79	97
365	0,77	0,83	0,90	92
360	0,90	0,96	1,02	87
355	1,04	1,11	1,17	82
350	1,22	1,28	1,35	77
345	1,43	1,50	1,56	72
340	1,69	1,75	1,82	67
335	2,00	2,06	2,12	62
330	2,38	2,44	2,48	57
325	2,85	2,89	2,92	52
320	3,44	3,45	3,46	47
315	4,17	4,15	4,12	42
310	5,08	5,01	4,93	37
305	6,24	6,09	5,93	32
300	7,71	7,45	7,19	27
293	10,50	10,00	9,50	20
290	12,04	11,39	10,75	17
285	15,22	14,24	13,29	12
280	19,41	17,95	16,56	7
275	24,96	22,81	20,80	2
270	32,40	29,25	26,33	-3
265	42,49	37,86	33,65	-8
260	56,29	49,49	43,40	-13
255	75,40	65,37	56,54	-18
250	102,18	87,32	74,44	-23
245	140,21	118,03	99,11	-28
240	194,95	161,56	133,55	-33
235	274,90	224,11	182,25	-38
230	393,45	315,33	252,09	-43
225	572,18	450,47	353,76	-48
220	846,39	654,04	504,13	-53
215	1275,02	966,21	730,37	-58



Formulas :

$$R_t = R_{t_0} \exp(\beta(T_0 - T)/(T T_0))$$

$$\alpha = -\beta/T^2 \times 100\%$$

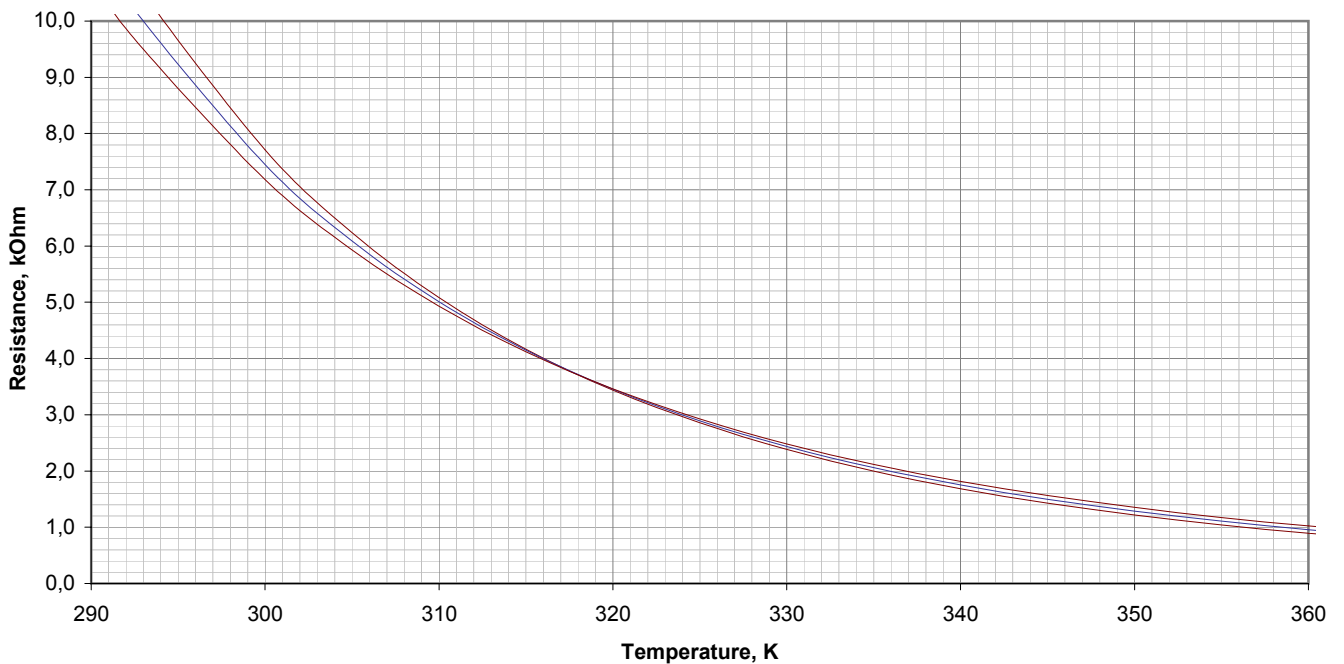
where

R<sub>t0</sub> - Resistivity at standard temperature (for this thermistor it is 293 K)

β - Beta Constant

α - negative temperature coefficient NTC (%)

β=	3876,1	3691,5	3506,9	[K <sup>-1</sup> ]
T <sub>0</sub> =		293		[K]



Thermistor Specification