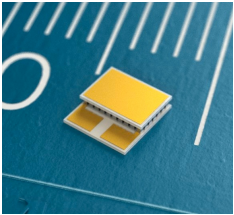


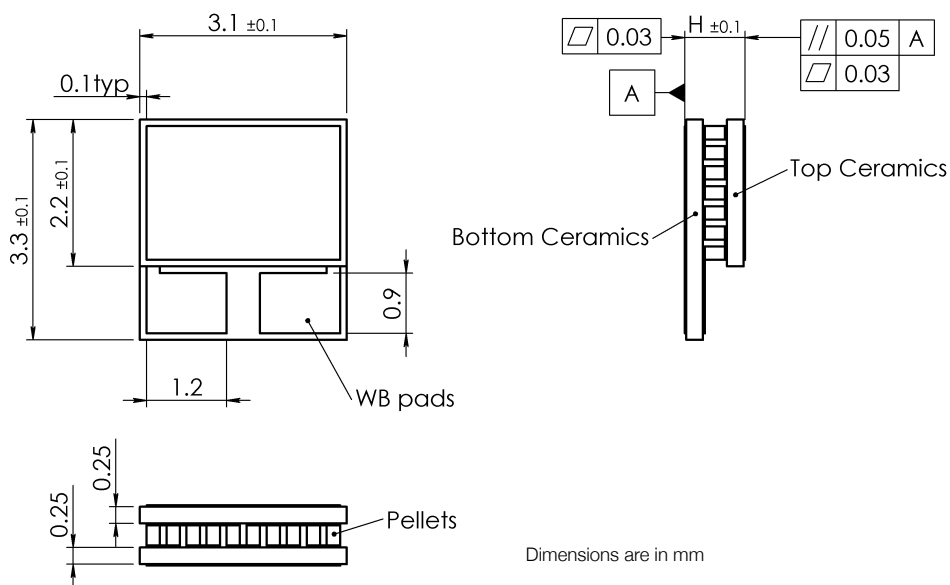
Performance Parameters

1MD02-035-xxTEG

	TEG PERFORMANCE AT SPECIFIED HOT SIDE TEMPERATURE												H mm
	Optimum Power Output Pout, W			Optimum Voltage Uout, V			Open Circuit Voltage Uoc, V			Resistance ACR, Ohm			
	85°C	55°C	35°C	85°C	55°C	35°C	85°C	55°C	35°C	85°C	55°C	35°C	
1MD02-035-03TEG	0.03	0.01	0.001	0.51	0.24	0.07	0.88	0.42	0.12	6.06	5.63	5.34	0.8

Performance values are specified for TEG cold side at +27°C, Dry Air. Optimum Power and Voltage are given at Optimum Load Resistance

Dimensions



Manufacturing options

A. TEG Assembly:

1. Solder Sn-Sb, $T_{melt}=230^{\circ}\text{C}$
(default assembly solder)
2. Solder Au-Sn, $T_{melt}=280^{\circ}\text{C}$
(optional solution, by request)

B. TEG Ceramics:

1. $\text{Al}_2\text{O}_3(100\%)$ - default
2. AlN - by request

C. Ceramics Surface Options:

1. Blank ceramics - default
2. Metallized (Au plating)
3. Metallized and pre-tinned with:
 - 3.1. In-Sn, $T_{melt} = 117^{\circ}\text{C}$
 - 3.2. Sn-Bi, $T_{melt} = 138^{\circ}\text{C}$
 - 3.3. In-Ag, $T_{melt} = 143^{\circ}\text{C}$
 - 3.4. In, $T_{melt} = 157^{\circ}\text{C}$
 - 3.5. Pb-Sn, $T_{melt} = 183^{\circ}\text{C}$
 - 3.6. Optional type (can be specified by Customer)

D. Thermistors (optional)

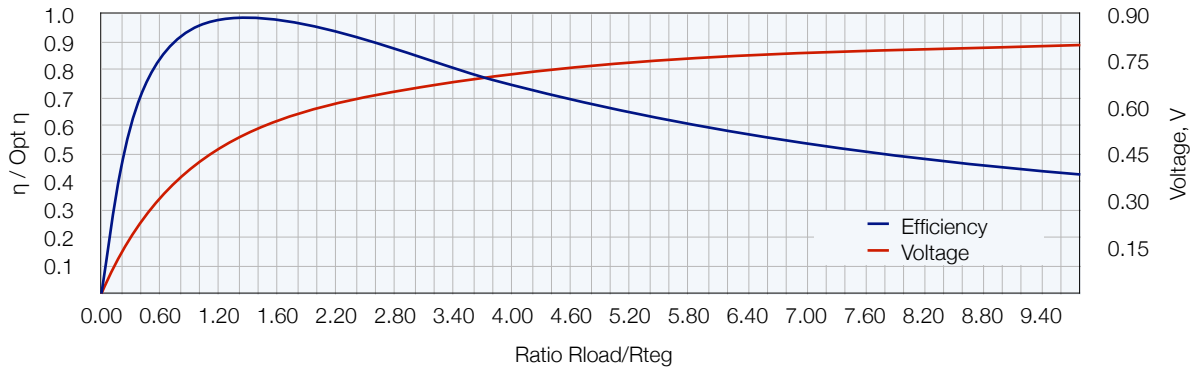
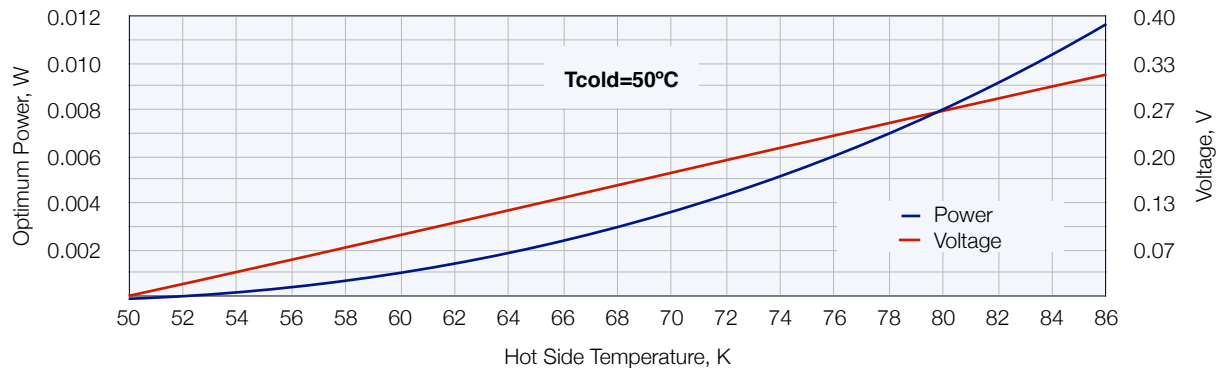
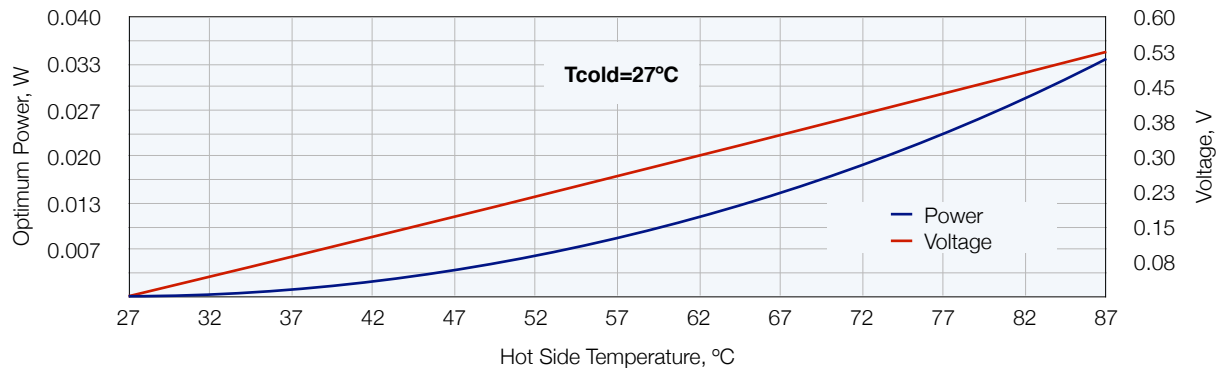
Can be mounted to ceramics edge. Calibration is available by request.

E. Terminal contacts

1. Blank, tinned Copper Wires
2. Insulated Wires
3. Insulated, color coded
4. WB pads or Posts (default)
5. Flip-Chip (optional)

Performance Data

1MD02-035-03TEG

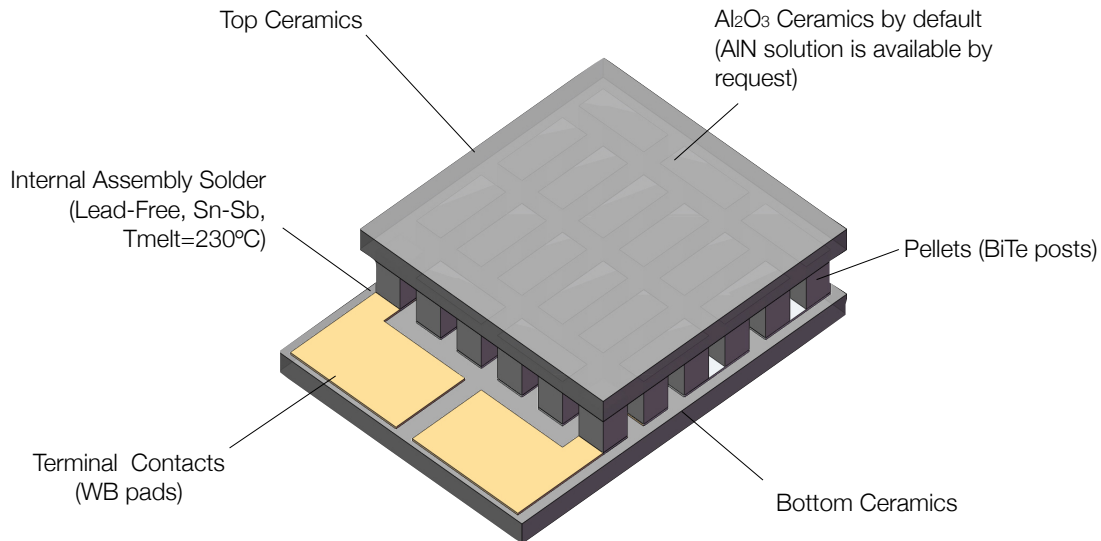


Performance data at Optimum Load Resistance (Rload)

Parameter	Units	Values at Hot Side Temperature		
		85°C	55°C	35°C
Cold Side Temperature, Tcold	°C	27	27	27
Optimum Efficiency, Opt η	%	2.67	1.34	0.39
Optimum Power, Popt	W	0.031	0.008	0.001
Optimum Voltage, Uopt	V	0.507	0.241	0.068
AC Resistance, Rteg	Ohm	6.06	5.63	5.34
Optimum Load Resistance, Rload	Ohm	8.18	7.60	7.16
Open Circuit Voltage, Uoc	V	0.88	0.42	0.12
Short Circuit Current, Isc	A	0.15	0.07	0.02
Thermal Resistance, Rt	°C/W	49.21	49.16	49.06

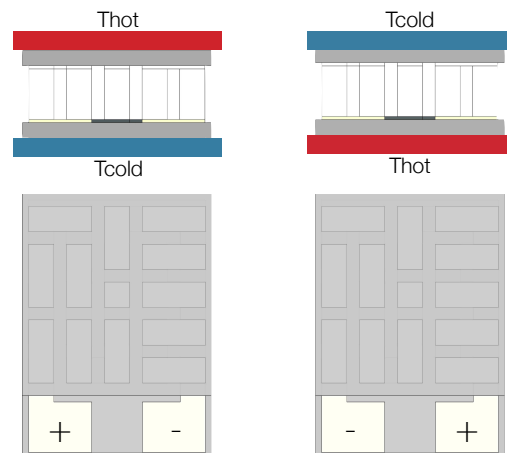
Note: Power Generation performance charts are specified in Optimum conditions, dry air, with cold side temperature set at +27°C and 50°C. Heatsink thermal resistance is not included into estimations.

Thermolectric Generator Overview



Application Tips

1. Never heat TEG module more than 200°C (TEG is assembled at 230°C).
2. TEG module to be fixed between hot and cold exchangers with an optimal thermal contact for the best efficiency. Improper contact may reduce ΔT level and power output.
3. TEG polarity depends on applied hot and cold side orientation



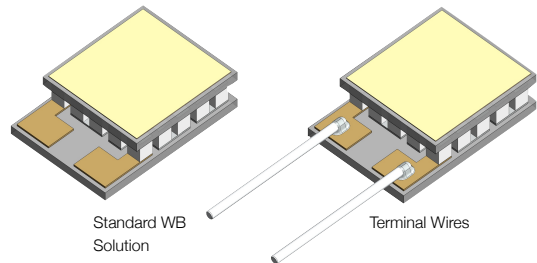
Installation

1. **Mechanical Mounting.** TEG is placed between two heat exchangers. This construction is fixed by screws or in another mechanical way. It is suitable for relatively large TEG modules (with dimensions 15x15mm² and larger). Miniature TEG types may require another assembling methods.
1. **Soldering.** This method is suitable for a TEG module with metallized outside surfaces. RMT provides this option and also makes pre-tinning for TE generators.
2. **Glueing.** It is an up-to-date method that is used by many customers due to availability of 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. The application of a specific type depends on application features and the type of a TEG module.

Additional Options

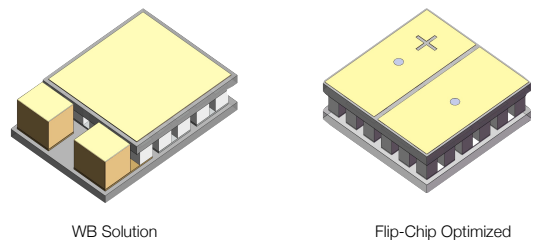
Terminal Contacts Options

The wires by default are of tinned Copper, blank (not insulated). Various options for isolated wires are available by request. The available solutions include isolated wires, isolated color-coded wires, flexible multicore wires and more.



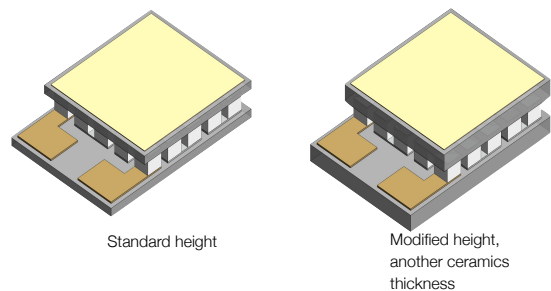
Terminal Contacts Modification

TE Generator terminal contacts can be modified from standard WB pads solution to WB posts type or Flip-Chip if required.



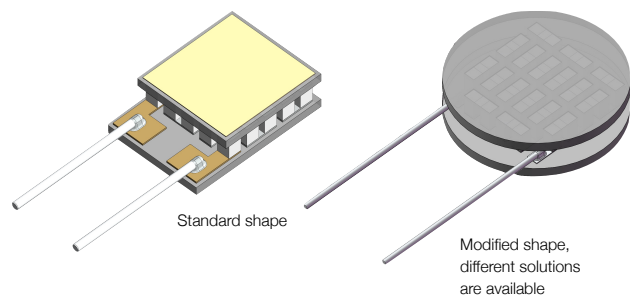
TEG Height Modification

Standard thermoelectric generator height can be modified without performance changes by using ceramics of different thickness. Standard thermoelectric generator height (specified in this datasheet) may be modified in a range -0.5...+1.0mm.

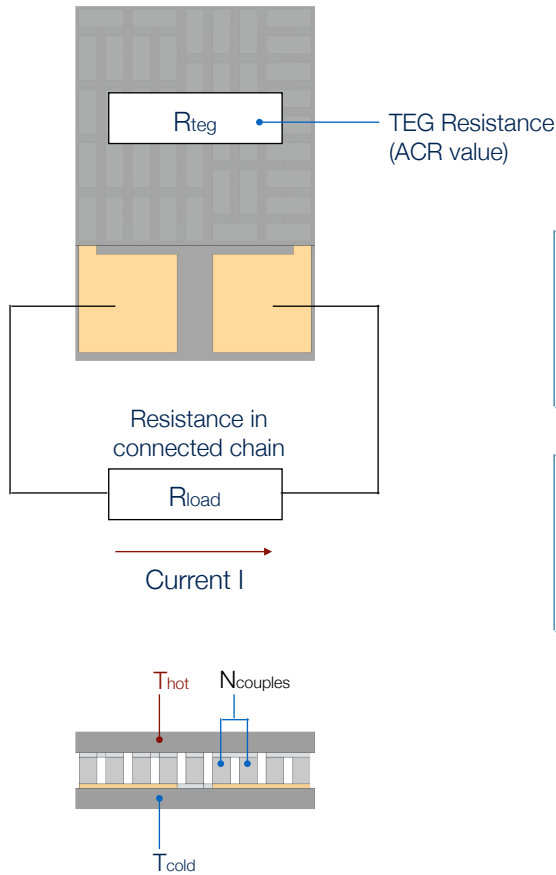


TEG Shape Modification

Standard thermoelectric generator shape can be modified without performance changes RMT has full-featured flexibility with thermoelectric generator shape and ceramics modification.



Thermoelectric Generator Basics



$$\alpha = 400\mu\text{V/K}$$

Simplified TE Generator estimations

The level of power output of thermoelectric generator in conditions specified can be estimated by the following formulas.

$$E = \alpha \times (T_{\text{hot}} - T_{\text{cold}}) \times N$$

$$I = \frac{E}{(R_{\text{teg}} + R_{\text{load}})}$$

$$P_{\text{out}} = I^2 \times R_{\text{load}}$$

Getting data from TEG type name

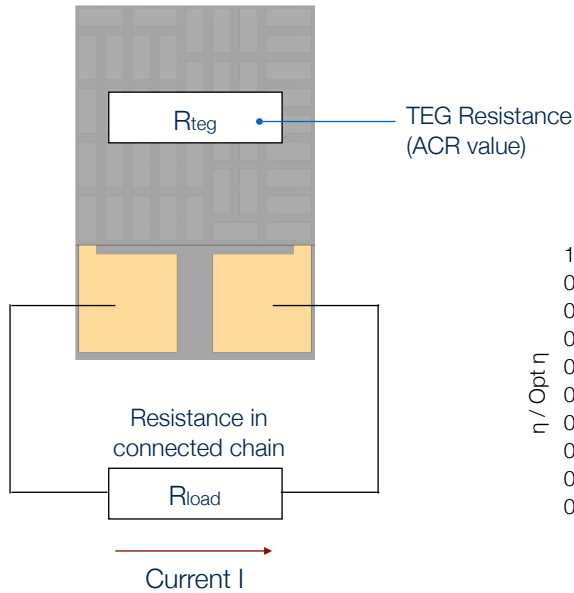
RMT thermoelectric generators have a nomenclature system that allows to get the required data for estimations quickly.

1MD02-035-05TEG
|
N_{couples}

General R_{teg} (ACR) values are specified in the datasheet in main table (page 1). Thermoelectric generator R_{teg} value depends on the ambient temperature.

For the precise estimations, please, contact RMT specialists directly.

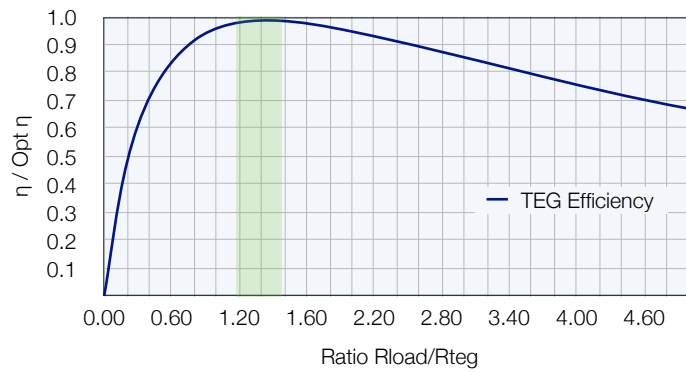
Thermoelectric Generator Basics



Resistances and TEG Efficiency

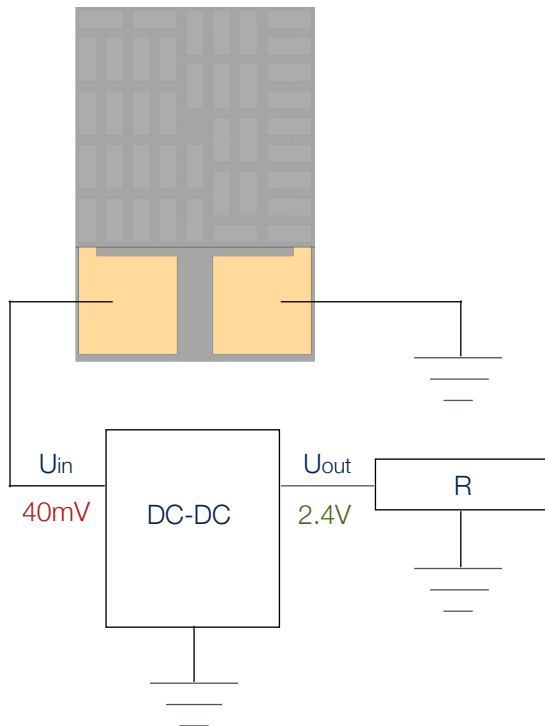
Thermoelectric generator best efficiency is reached at Load Resistance (R_{load}) close to thermoelectric generator resistance R_{teg} .

In most cases thermoelectric generator best efficiency is reached at R_{load}/R_{teg} ratio in a range 1.2 - 1.4



Output voltage and DC-DC converters

DC-DC converters are recommended to use with miniature thermoelectric generators, especially in low dT mode.



Contacts

Russia - RMT Ltd. Headquarters

Warshavskoe sh. 46, 115230, Moscow

Russia

Tel: +7-499-678-2082

Fax: +7-499-678-2083

Web: www.rmtltd.ru

Email: info@rmtltd.ru

Europe/USA - TEC Microsystems GmbH

Schwarzschildstrasse 8, 12489 Berlin

Germany

Tel: +49 30 6789 3314

Fax: +49 30 6789 3315

Web: www.tec-microsystems.com

Email: info@tec-microsystems.com

Korea - Sunflower Energy

1F, 665-6, Pungdeokcheon-dong

Suji-gu, Yongin-si, Gyeonggi-do

South Korea

Tel: +82 312767992

Fax: +82 312767993

web: <http://www.sunfl.co.kr>

China - ProTEC Ltd.

深圳市南山区登良路恒裕中心B座207

电话: +86-755-61596066

传真: +86-755-61596036

邮编: 518054

Web: www.protecltd.com

Email: info@protecltd.com

Taiwan - Wellspring & Vim Tech Corp

9F-1, No.657 Pei-an Rd.

Taipei 104

Taiwan

Tel: +886 2-85091756

Fax: +886 2-85091846

web: www.wellvim.com.tw

Email: info@wellvim.com.tw