Thermo Electric Generation Module

MFG Part Number：GM250-449-10-12

A thermoelectric power generating (TEG) module is one kind of power generating device which uses the Seebeck Effect in order to covert heat into electricity directly.

Characteristics:

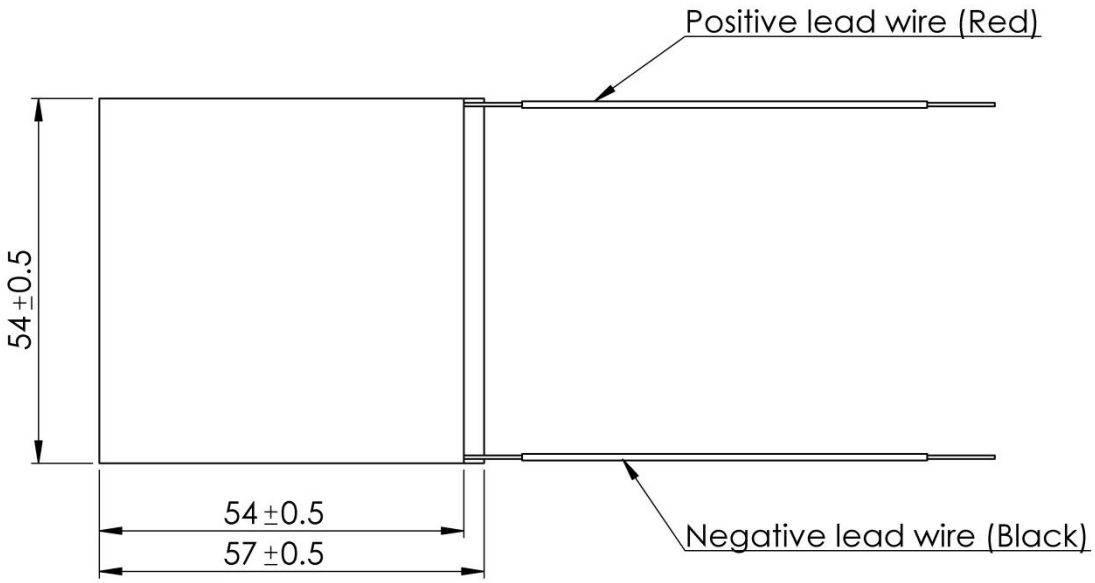
- Compact structure (no moving parts)
- Reliable performance
- Maintenance-free
- Noise-free operation
- Low-carbon as it is a "green" technology

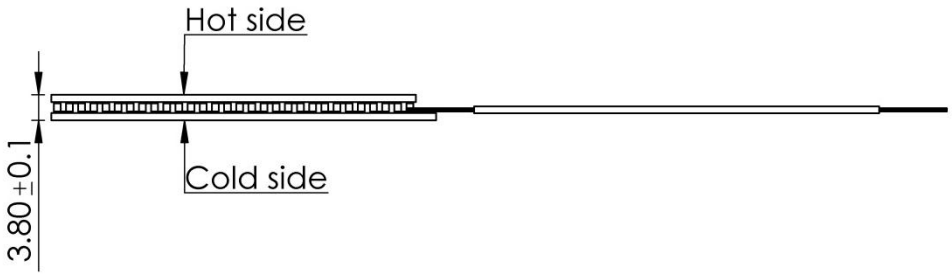
The selection of the heat source of the TEG is extensive. It is capable of generating DC electricity continuously as long as there is a temperature difference applied at the two sides of the module. Except for the thermoelectric material, another important factor which affects the generating capacity and the conversion efficiency of the TEG module is the temperature difference. Increasing the temperature difference between the two sides of the module (the hot side and the cold side), increases both the generating capacity and hence the conversion efficiency of the module.

Performance Parameters

Parameters for Hot Side Temp 250℃ and Cold Side 30℃	
Matched Load Output Power	22.3W
Matched Load Resistance	9.76Ω ± 15%
Open Circuit Voltage	29.5V
Matched Load Output Current	1.51A
Matched Load Output Voltage	14.75V
Heat Flow Through Module	~446W
Maximum. Compress. (non destructive)	1MPa
Max Operation Temperature	Hot side : 250℃ Cold side: 175℃

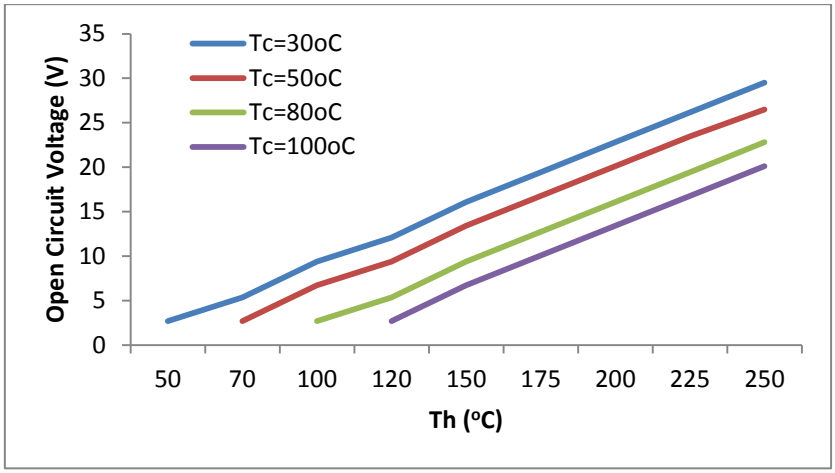
Dimensions: *Drawing



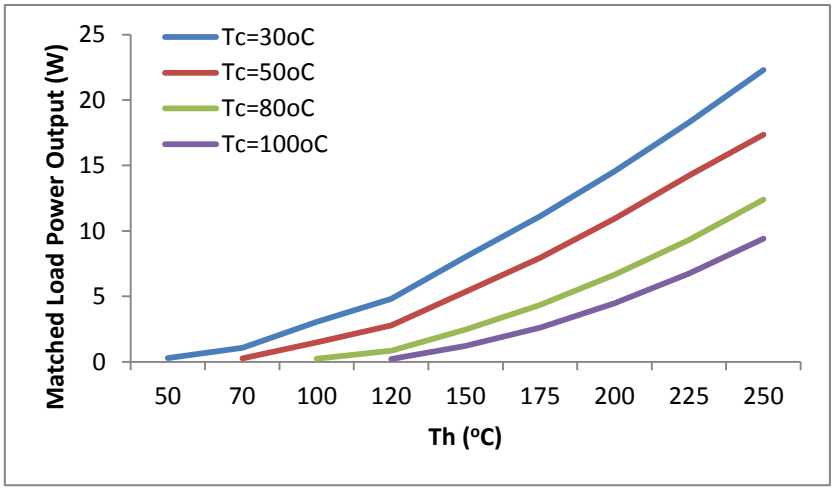


Performance Graphs:

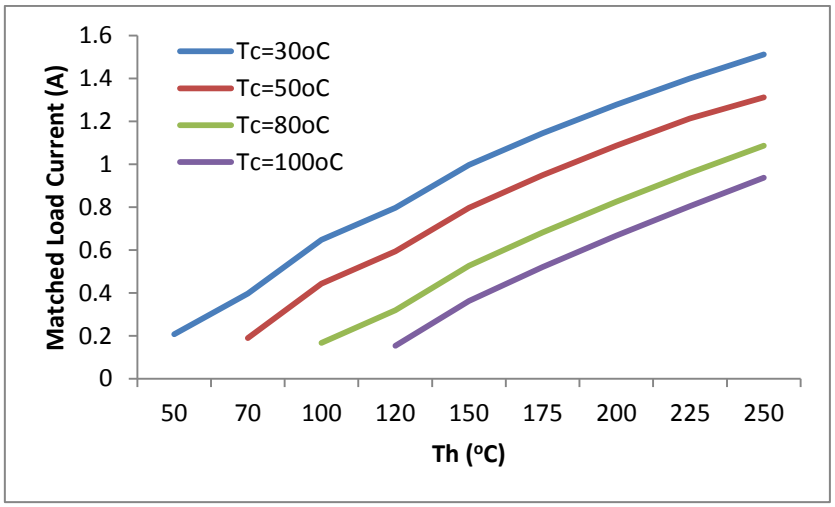
Graph indicating Open circuit voltage v. Hot side temperature with various fixed cold sides



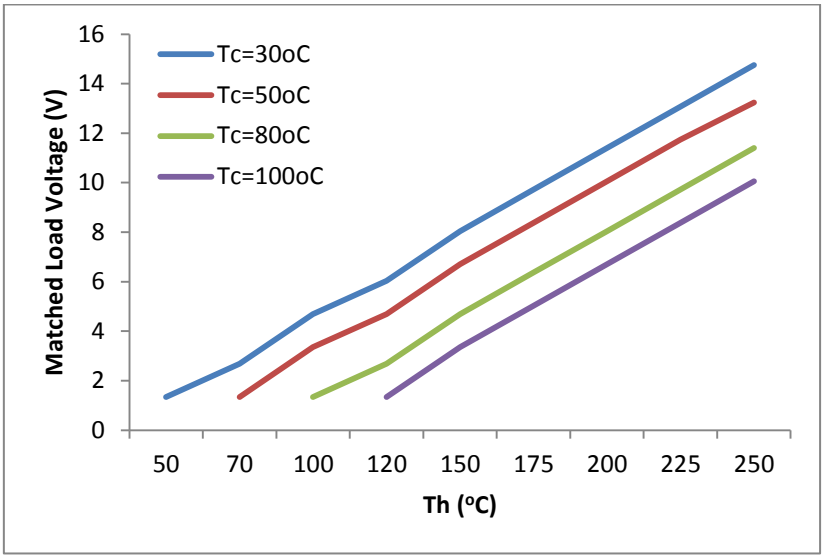
Matched Load Output Power v. Hot side temperature for various fixed cold sides



Matched Load Current v. Hot side temperature for various fixed cold sides



Matched Load Output Voltage v Hot side for various fixed cold sides



Matched Load Resistance v. Hot side for various fixed cold sides

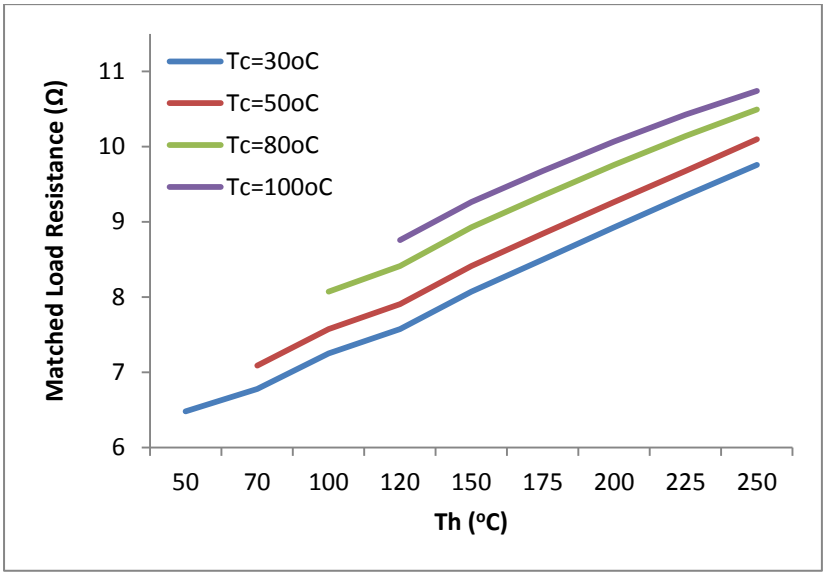
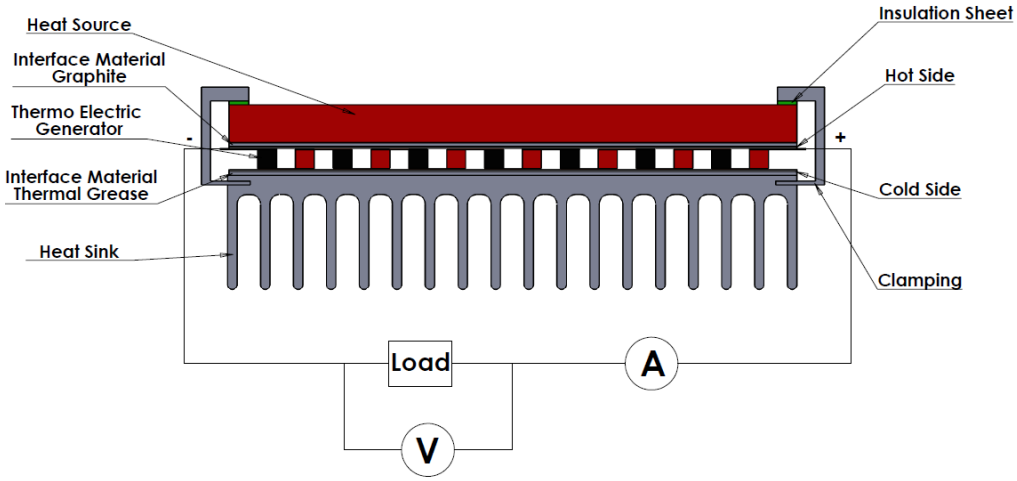


Diagram:



Formulae for calculating Thermoelectric Properties (Best Fit derived from measured material characteristics)

- Thermal conductivity

$$k_n = (0.0000334545 \times T^2 - 0.023350303 \times T + 5.606333)\frac{W}{mK}$$

$$k_p = (0.0000361558 \times T^2 - 0.026351342 \times T + 6.22162)W/mK$$

- Seebeck Coefficient

$$\alpha_n = (0.001530736 \times T^2 - 1.08058874 \times T - 28.338095) \times 10^{-6}\frac{V}{K}$$

$$\alpha_p = (-0.003638095 \times T^2 + 2.74380952 \times T - 296.214286) \times 10^{-6}\frac{V}{K}$$

- Electrical Conductivity

$$\sigma_p = (0.015601732 \times T^2 - 15.708052 \times T + 4466.38095) \times 10^2 S/m$$

$$\sigma_n = (0.01057143 \times T^2 - 10.16048 \times T + 3113.71429) \times 10^2 S/m$$

where the subscript n refers to the n-type thermoelement and the subscript p refers to the p-type thermoelement.It should be noted here that the electrical conductivity relates to the electrical resistivity as follows: $\rho = \frac{1}{\sigma}$

thus, where electrical resistivity is needed, one can calculated first the electrical conductivity through the aforementioned formulae and then reverse to calculate the electrical resistivity.

Scope

This specification is applied to thermoelectric generation module supplied under the European Thermodynamics brand.

Revision of these specifications may occur without consultation or notification, Issue number and date will be revised.