

# Specification of Thermoelectric Module

## TETC1-19908

### Description

The 199 couples, 40 mm × 40 mm size single module which is made of our high performance ingot to achieve superior cooling performance and 74°C or larger delta Tmax, is designed for superior cooling and heating applications. The module is able to run million thermal cycles in 70 °C temperature change range with less 3% degrading. Beyond the standard below, we can design and manufacture the custom made module according to your special requirements.

### Features

- No moving parts, no noise, and solid-state
- Compact structure, small in size, light in weight
- Environmental friendly
- RoHS compliant
- Precise temperature control
- Exceptionally reliable in quality, high performance

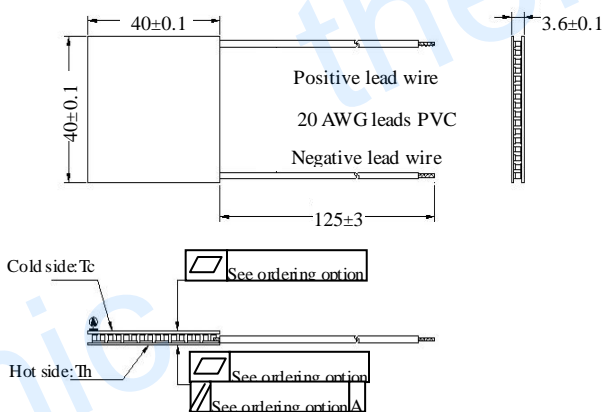
### Application

- Food and beverage service refrigerator
- Portable cooler box for cars
- Liquid cooling
- Temperature stabilizer
- CPU cooler and scientific instrument
- Photonic and medical systems

### Performance Specification Sheet

Th(°C)	27	50	Hot side temperature at environment: dry air, N <sub>2</sub>
DT <sub>max</sub> (°C)	74	83	Temperature Difference between cold and hot side of the module when cooling capacity is zero at cold side
U <sub>max</sub> (Voltage)	26.3	28.3	Voltage applied to the module at DT <sub>max</sub>
I <sub>max</sub> (amps)	8.8	8.8	DC current through the modules at DT <sub>max</sub>
Q <sub>Cmax</sub> (Watts)	147.2	160.8	Cooling capacity at cold side of the module under DT=0 °C
AC resistance(ohms)	2.25	2.4	The module resistance is tested under AC
Tolerance (%)	± 10		For thermal and electricity parameters

### Geometric Characteristics Dimensions in millimeters



### Manufacturing Options

#### A. Solder:

1. T100: BiSn (Melting Point=138°C)
2. T200: CuSn (Melting Point= 227 °C)

#### B. Sealant:

1. NS: No sealing (Standard)
2. SS: Silicone sealant
3. EPS: Epoxy sealant
4. Customer specify sealing

#### C. Ceramics:

1. Alumina (Al<sub>2</sub>O<sub>3</sub>, white 96%)(AIO)
2. Aluminum Nitride (AlN)

#### D. Ceramics Surface Options:

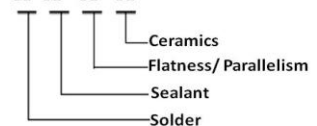
1. Blank ceramics (not metalized)
2. Metalized (Copper-Nickel plating)

### Ordering Option

Suffix	Thickness (mm)	Flatness/ Parallelism (mm)	Lead wire length(mm) Standard/Optional length
TF	0:3.6±0.1	0:0.05/0.05	125±3/Specify
TF	1:3.6±0.05	1:0.025/0.025	125±3/Specify
TF	2:3.6±0.025	2:0.015/0.015	125±3/Specify
Eg. TF01: Thickness 3.6±0.1(mm) and Flatness 0.025/0.025(mm)			

### Naming for the Module

TETC1-19908- X-X-X-X



TETC1-19908-T100-NS –TF01 -AIO

T100: BiSn (T<sub>melt</sub>=138°C)

NS: No sealing

AIO: Alumina (Al<sub>2</sub>O<sub>3</sub>, white 96%)

TF01: Thickness ±0.1(mm) and Flatness/Parallelism 0.025/0.025 (mm)

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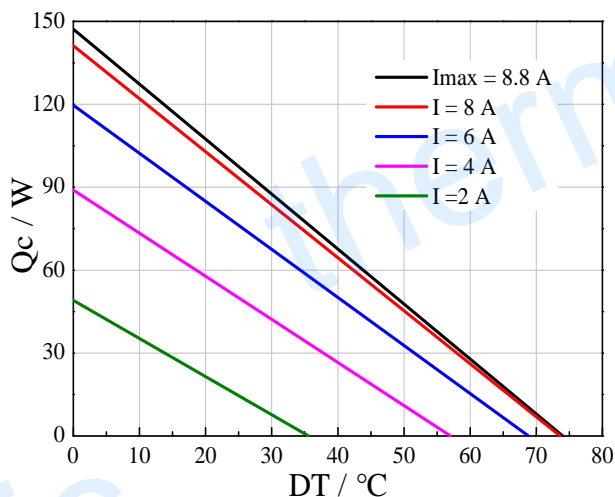
Tel: +86-791-88198288 Fax: +86-791-88198308 Email: [sales@thermonamic.com.cn](mailto:sales@thermonamic.com.cn) Web Site: [www.thermonamic.com.cn](http://www.thermonamic.com.cn)

### Operation Cautions

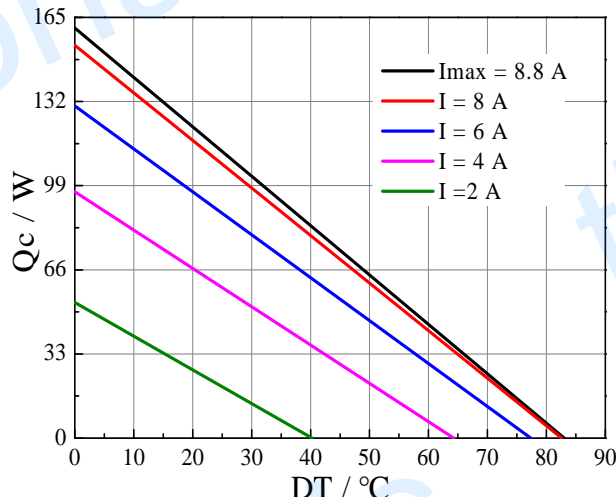
- Cold side of the module stucked on the object being cooled
- Hot side of the module mounted on a heat radiator
- Work under DC
- Operation below  $I_{max}$  or  $V_{max}$
- Operation or storage module below 100 °C

### Performance Curve

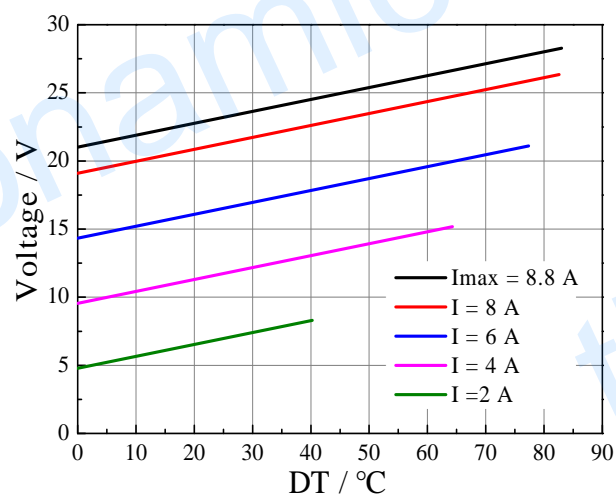
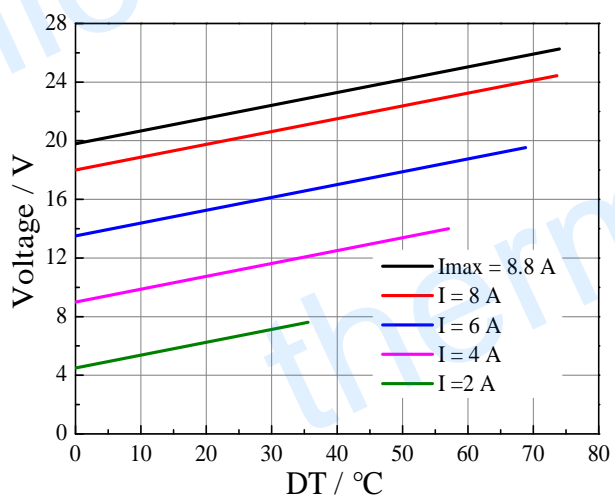
Performance Curves at  $T_h=27\text{ °C}$



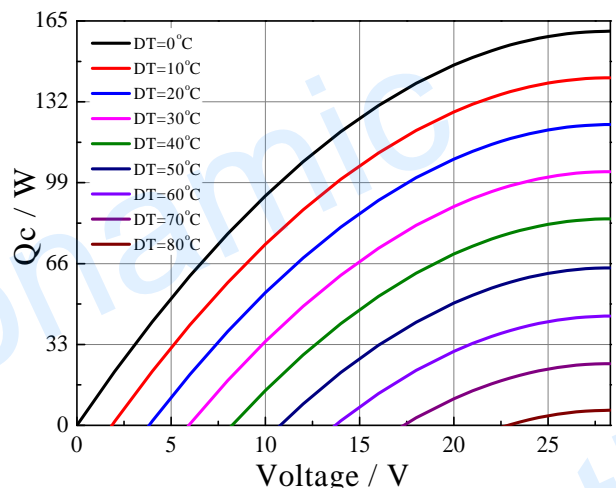
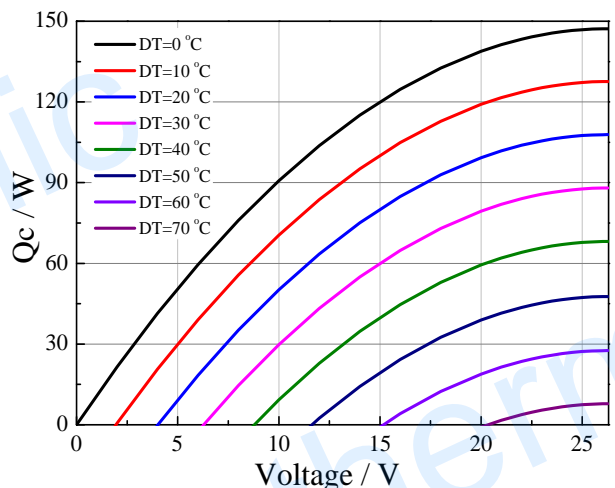
Performance Curves at  $T_h=50\text{ °C}$



Standard Performance Graph  $Q_c = f(DT)$



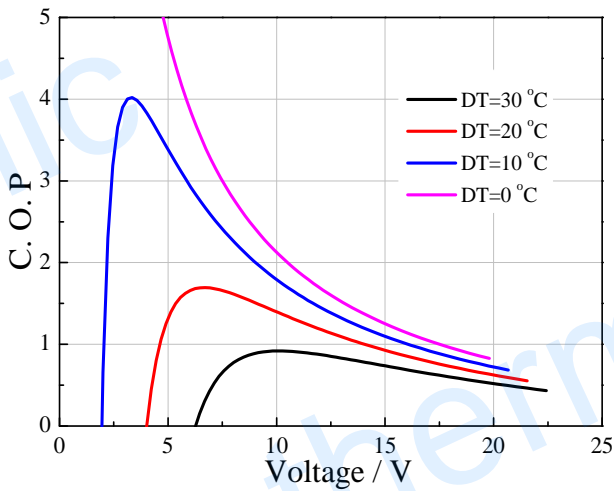
Standard Performance Graph  $V = f(\Delta T)$



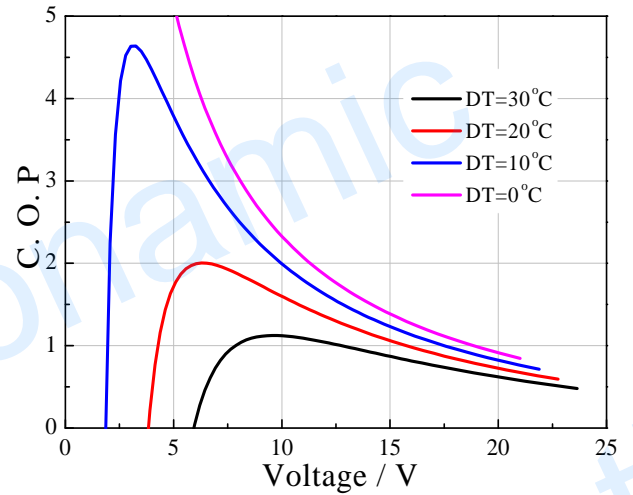
Standard Performance Graph  $Q_c = f(V)$

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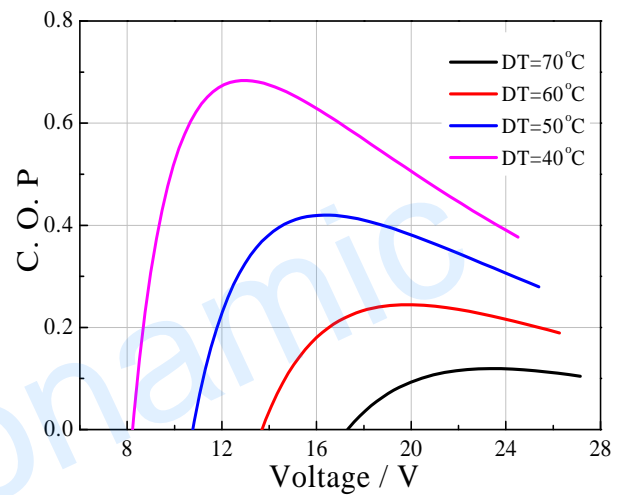
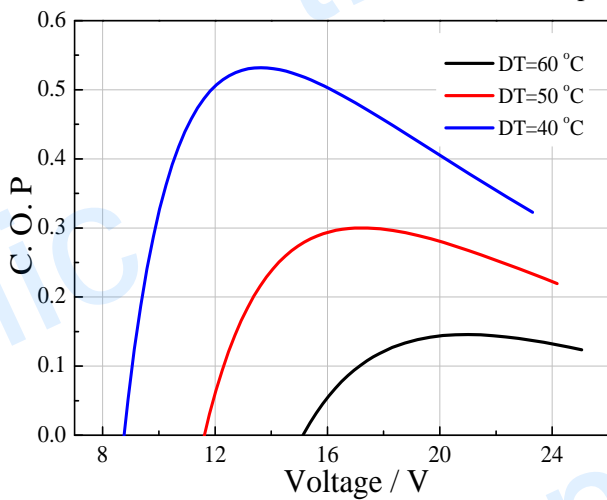
**Performance Curves at Th=27 °C**



**Performance Curves at Th=50 °C**



Standard Performance Graph COP = f(V) of  $\Delta T$  ranged from 0 to 30 °C

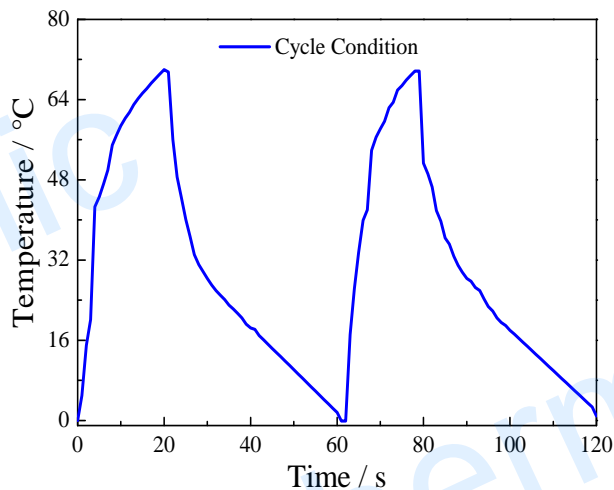


Standard Performance Graph COP = f(V) of  $\Delta T$  ranged from 40 to 60/70 °C

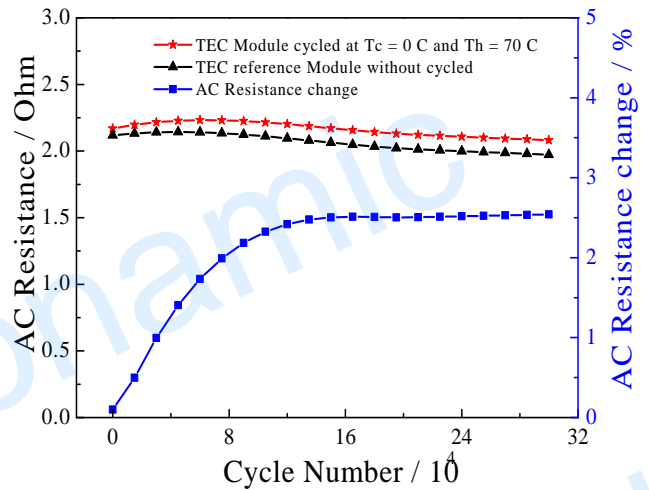
Remark: The coefficient of performance (COP) is the cooling power  $Q_c$ /Input power ( $V \times I$ ).

A typical 127 couples module is fabricated by the unique “soft” process and has demonstrated that it only has 2.5% degrading after 300,000 thermal cycling. The below graphic shows that in beginning 120,000 cycles, it degrade about 2.5%, and then go on stable with very tiny degrading in further 180,000 thermal cycles. It is derived out that the modules can go over million thermal cycles.

**TEC Thermal Cycle Lifetime Test On TETC1-12706**



Typical cooling-heating cycle



The Chart for AC Resistance and AC Resistance Changes vs. Cycle Number

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