

# Specification of Thermoelectric Module

## TETC1-12506L1

### Description

The 125 couples, 40mm x 50mm size single module is made of selected high performance ingot and fabricated by our unique “soft” processes to achieve superior cooling/heating performance. The module is able to run million thermal cycles in 70 °C temperature change range with less 3% degrading. It is good for the need of frequently cooling down and heating up to 100 °C applications. If higher operation or processing temperature is required, please specify, 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

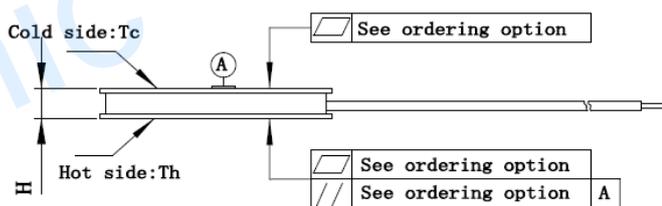
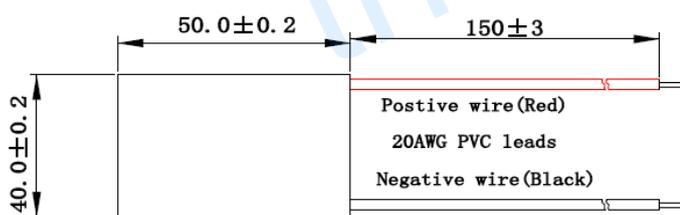
### Application

- 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)	16.1	17.3	Voltage applied to the module at DT <sub>max</sub>
I <sub>max</sub> (Amps)	6.0	6.0	DC current through the modules at DT <sub>max</sub>
Q <sub>Cmax</sub> (Watts)	63.1	67.9	Cooling capacity at cold side of the module under DT=0 °C
AC resistance (Ohms)	2.00	2.15	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 (T<sub>melt</sub> = 138 °C)

#### B. Sealant:

1. SS: Silicone sealant

#### C. Ceramics:

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

#### D. Ceramics Surface Options:

1. Blank ceramics (not metalized)

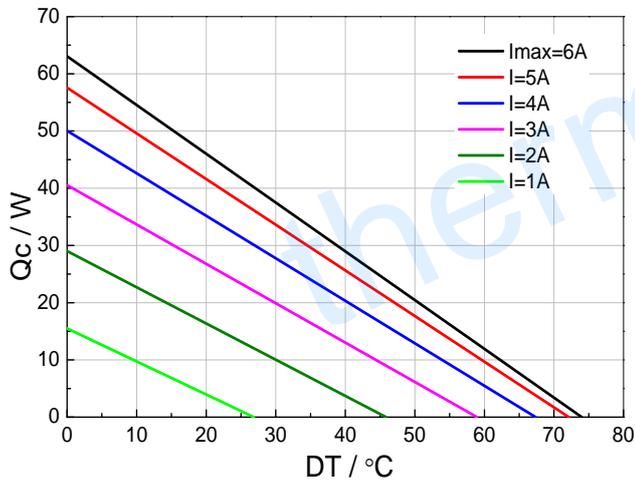
### Ordering Option

Suffix	Thickness (mm)	Flatness/ Parallelism (mm)	Lead wire length(mm) Standard/Optional length
TF	0: 3.0±0.1	0:0.08/0.08	150±3/Specify

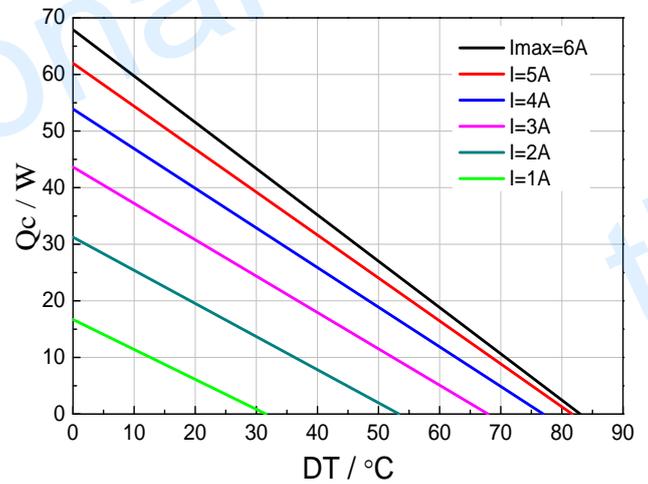
### Operation Cautions

- 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

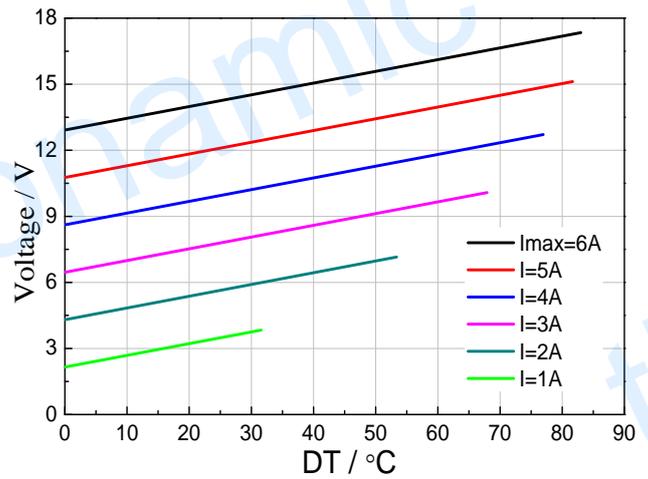
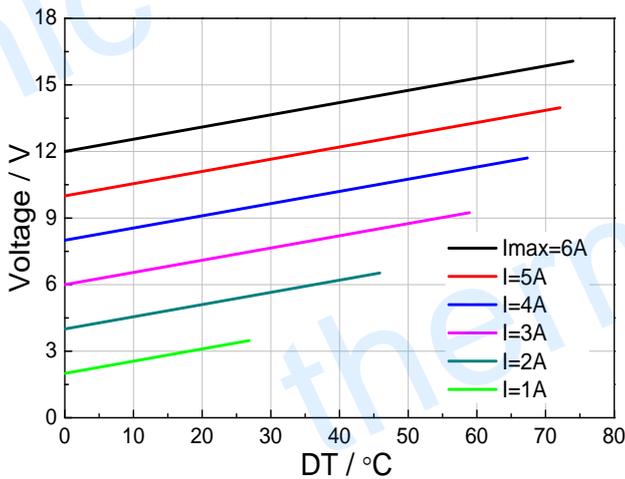
#### Performance Curves at $T_h=27\text{ }^\circ\text{C}$



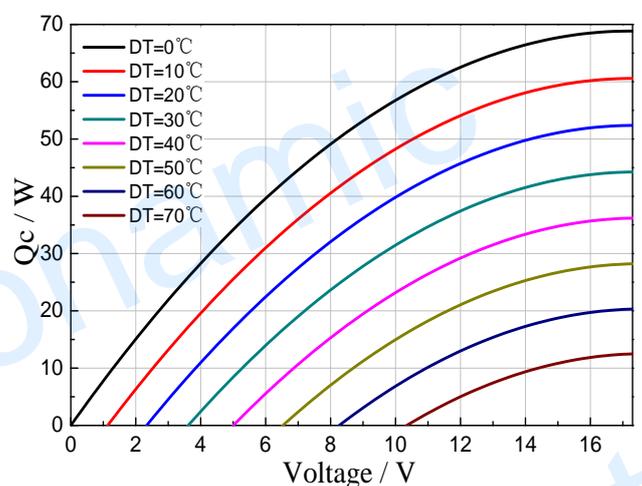
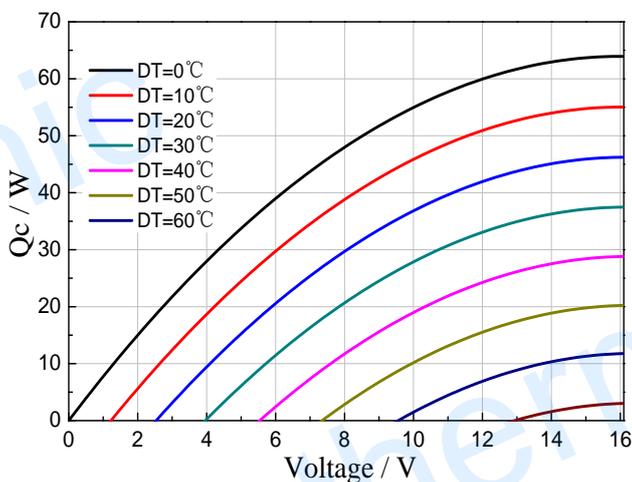
#### Performance Curves at $T_h=50\text{ }^\circ\text{C}$



Standard Performance Graph  $Q_c = f(DT)$



Standard Performance Graph  $V = f(DT)$

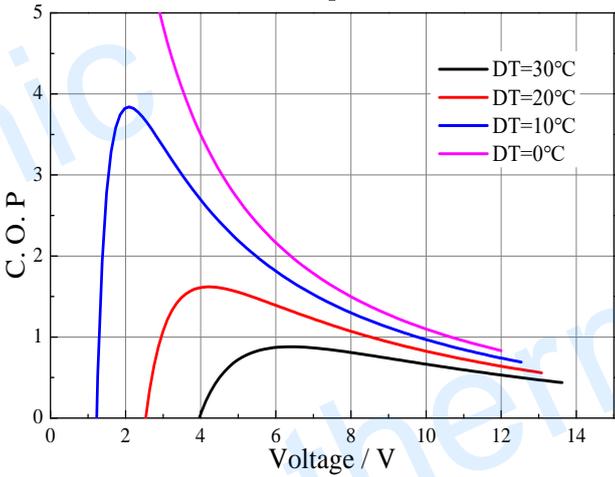


Standard Performance Graph  $Q_c = f(V)$

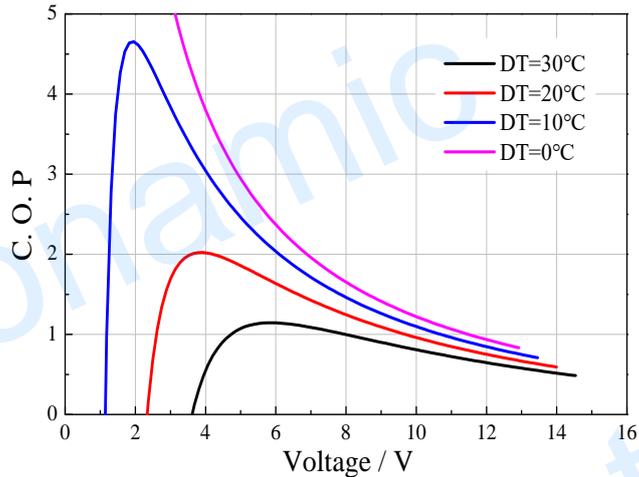
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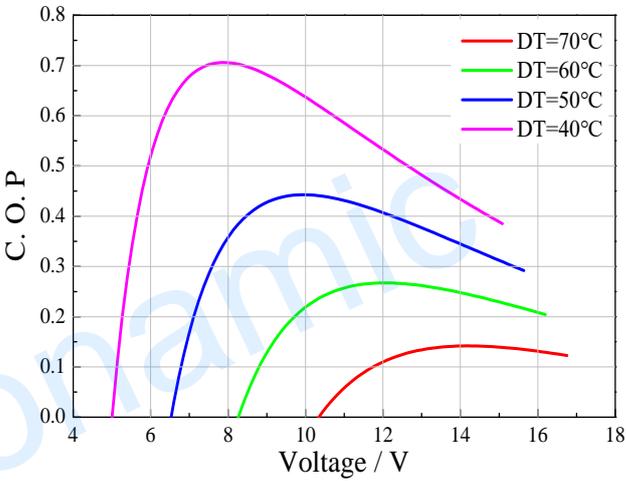
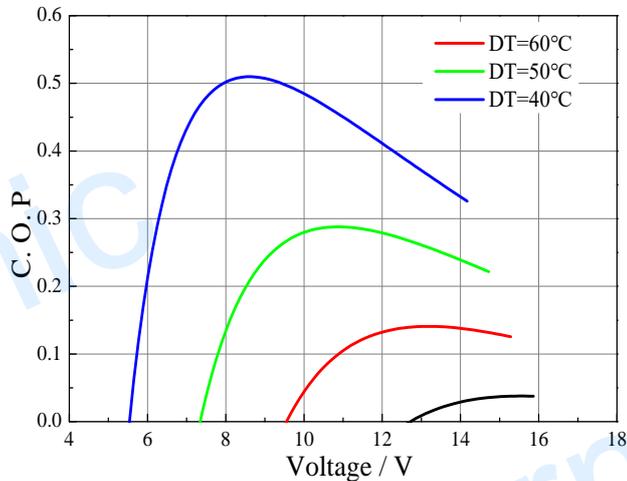
**Performance Curves at Th=27 °C**



**Performance Curves at Th=50 °C**



Standard Performance Graph COP = f(V) of DT ranged from 0 to 30 °C

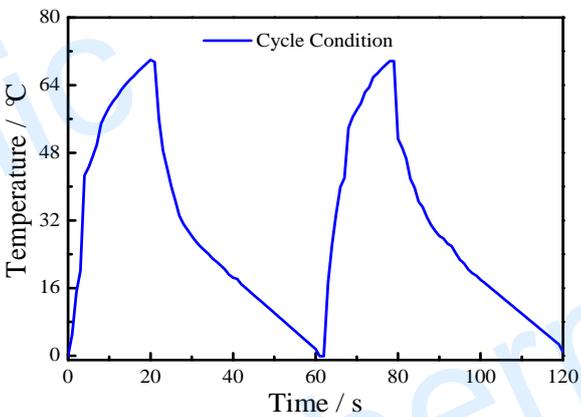


Standard Performance Graph COP = f(V) of DT ranged from 40 to 60/70 °C

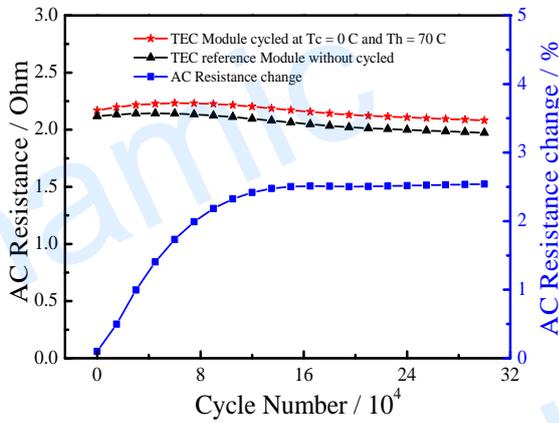
Remark: The coefficient of performance (COP) is the cooling power  $Q_c$ /Input power ( $V \times I$ ).

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