

# Specification of Thermoelectric Module

**TETC1-127012**

## Description

The 127 couples, 40 mm × 40 mm 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

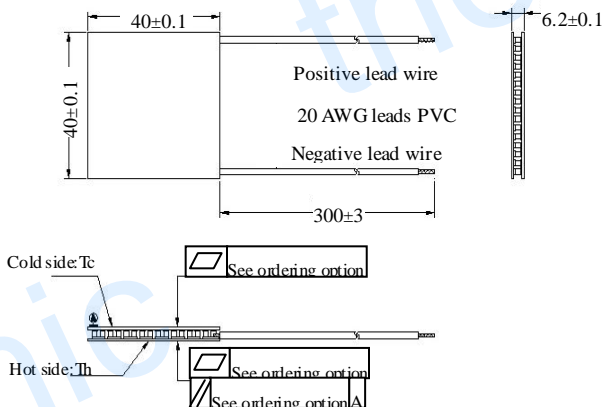
## Application

- 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)	16.8	18.2	Voltage applied to the module at DT <sub>max</sub>
I <sub>max</sub> (amps)	1.98	1.98	DC current through the modules at DT <sub>max</sub>
Q <sub>Cmax</sub> (Watts)	20.7	22.3	Cooling capacity at cold side of the module under DT=0 °C
AC resistance(ohms)	6.5	7.0	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:

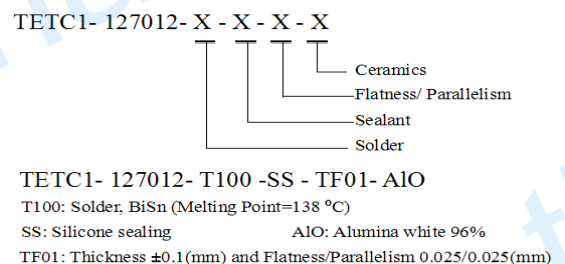
1. Blank ceramics (not metalized)
2. Metalized (Copper-Nickel plating)

## Ordering Option

Suffix	Thickness (mm)	Flatness/ Parallelism (mm)	Lead wire length(mm) Standard/Optional length
TF	0:6.2±0.1	0:0.05/0.05	300±3/Specify
TF	1:6.2±0.05	1:0.025/0.025	300±3/Specify
TF	2:6.2±0.025	2:0.015/0.015	300±3/Specify

Eg. TF01: Thickness 6.2±0.1(mm) and Flatness 0.025/0.025(mm)

## Naming for the Module



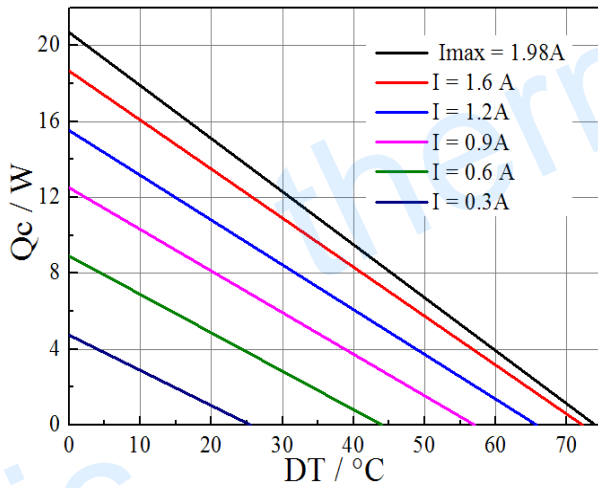
Creative technology with fine manufacturing processes provides you the reliable and quality products

### Operation Cautions

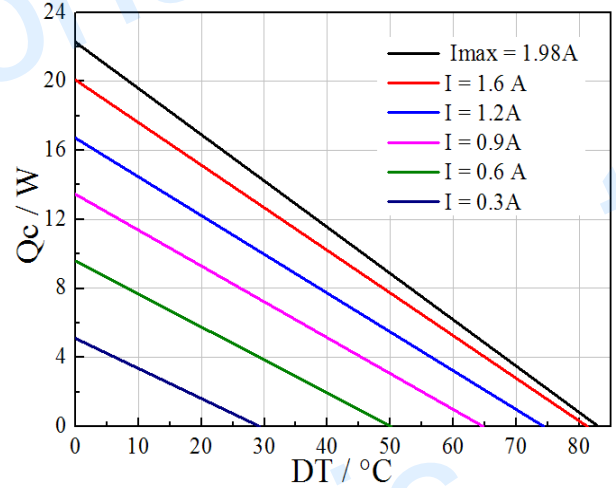
- Cold side of the module stuck on the object being cooled
- Hot side of the module mounted on a heat radiator
- Work under DC
- Operation below  $I_{max}$  or  $V_{max}$
- Storage module below 100 °C

### Performance Curve

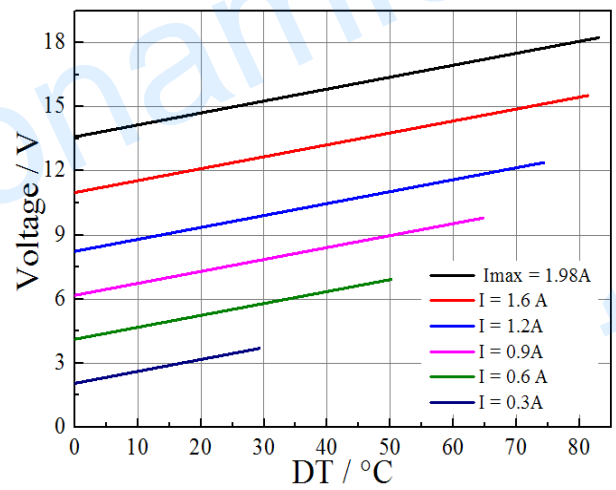
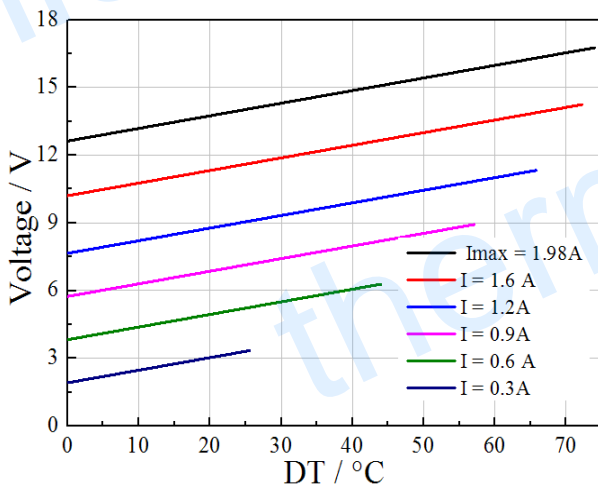
Performance Curves at  $T_h=27\text{ °C}$



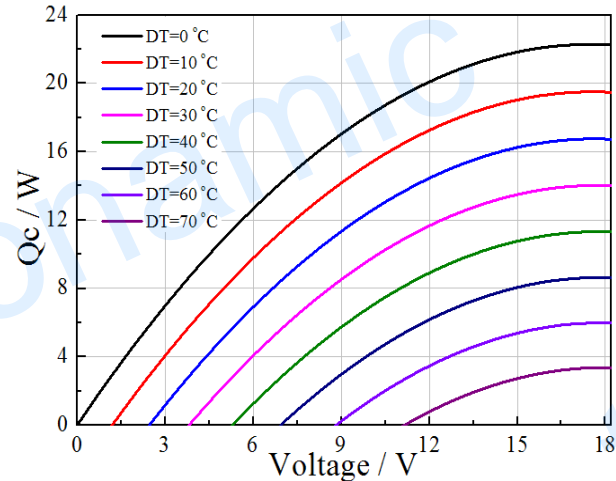
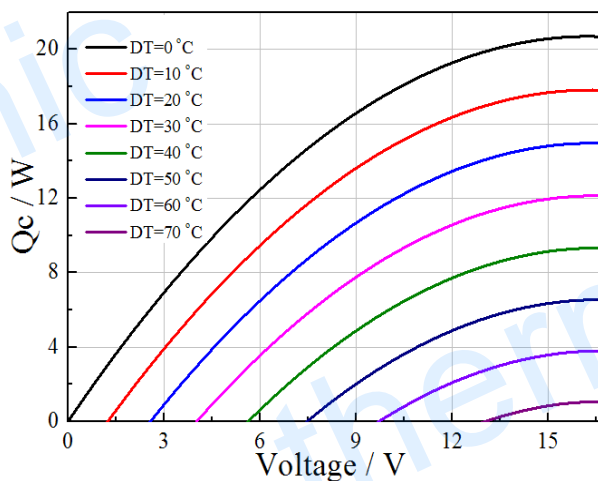
Performance Curves at  $T_h=50\text{ °C}$



Standard Performance Graph  $Q_c = f(DT)$



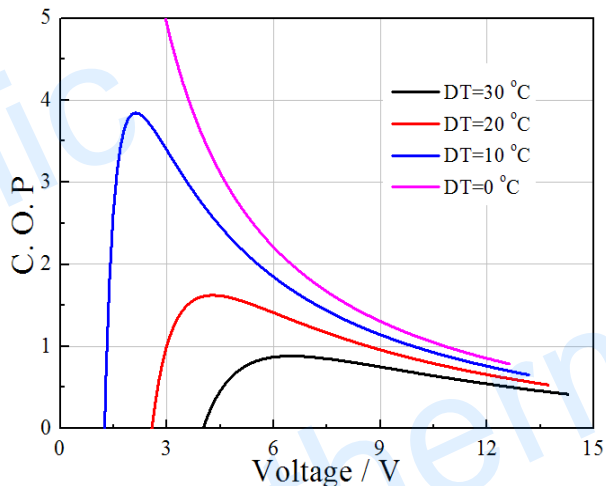
Standard Performance Graph  $V = f(\Delta T)$



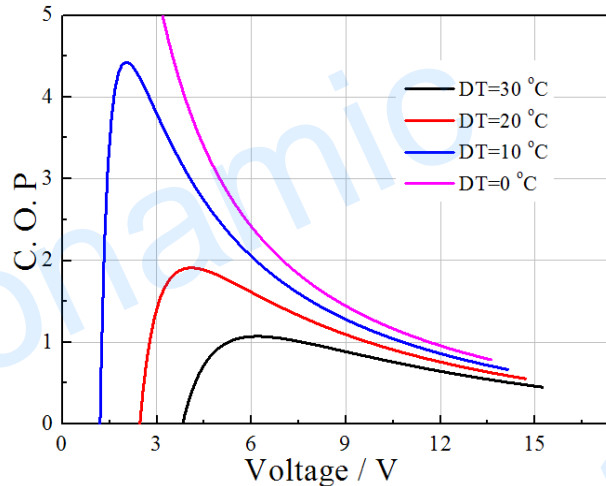
Standard Performance Graph  $Q_c = f(V)$

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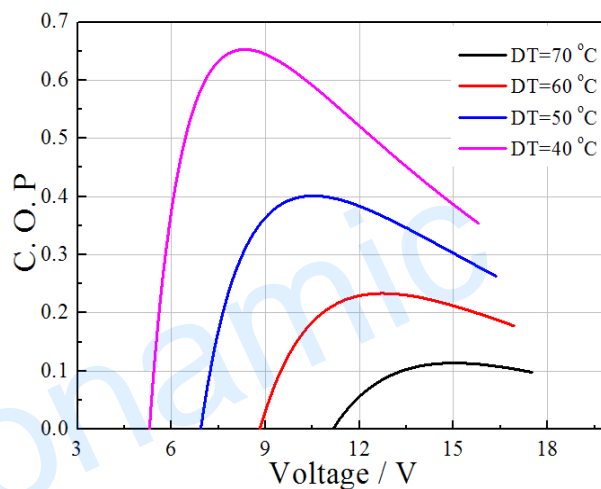
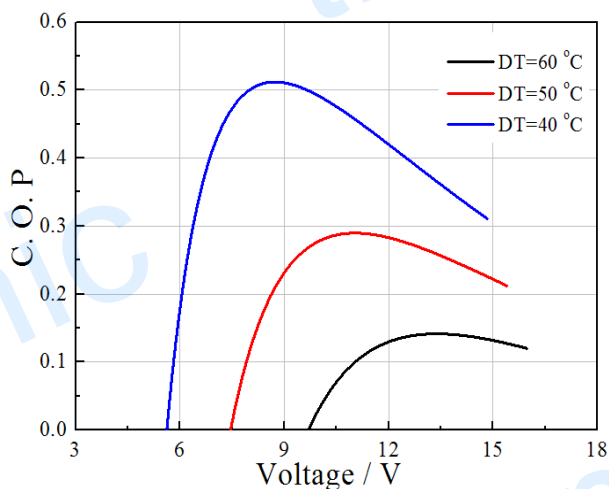
**Performance Curves at Th=27 °C**



**Performance Curves at Th=50 °C**



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

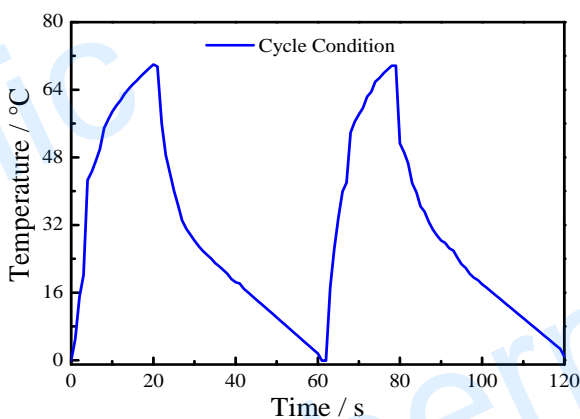


Standard Performance Graph COP = f(V) of ΔT ranged from 40 to 60/70 °C

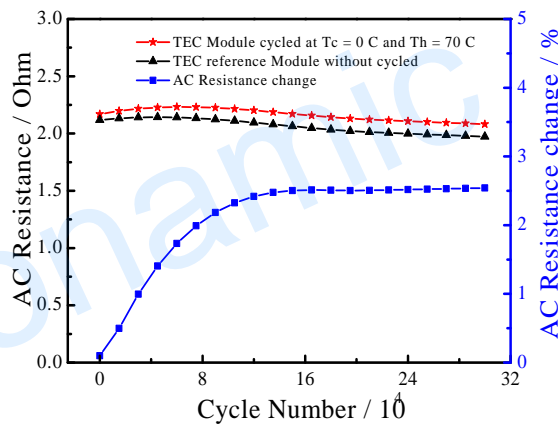
Remark: The coefficient of performance (COP) is the cooling power  $Q_c$ /Input power ( $V \times I$ ).

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