

# Specification of Thermoelectric Module

TES1-03540

## Description

The 35 couples, 20 mm × 10 mm size module which is made of selected high performance ingot to achieve superior cooling performance and greater delta T up to 70 °C, designed for superior cooling 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

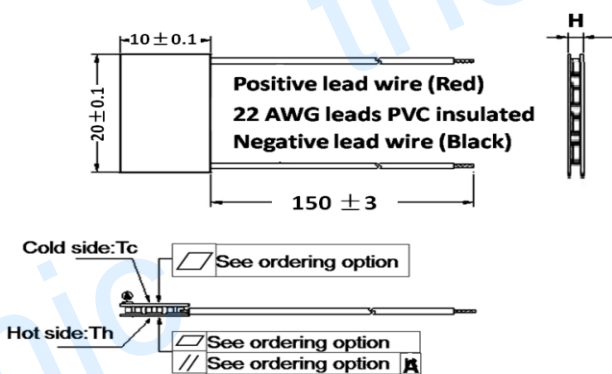
## Application

- 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)	70	79	Temperature Difference between cold and hot side of the module when cooling capacity is zero at cold side
U <sub>max</sub> (Voltage)	4.5	4.8	Voltage applied to the module at DT <sub>max</sub>
I <sub>max</sub> (amps)	4.1	4.1	DC current through the modules at DT <sub>max</sub>
Q <sub>Cmax</sub> (Watts)	11.3	12.1	Cooling capacity at cold side of the module under DT=0 °C
AC resistance (ohms)	0.83	0.89	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)
2. T200: CuSn (T<sub>melt</sub> = 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%)
2. Aluminum Nitride (AlN)

### D. Ceramics Surface Options:

1. Blank ceramics (not metallized)
2. Metallized (Au plating)

## Ordering Option

Suffix	Thickness H(mm)	Flatness/ Parallelism (mm)	Lead wire length(mm) Standard/Optional length
TF	0:3.6 ± 0.1	0:0.1/0.13	150 ± 3/Specify
TF	1:3.6 ± 0.05	1:0.08/0.1	150 ± 3/Specify
TF	2:3.6 ± 0.025	2:0.05/0.08	150 ± 3/Specify

Eg. TF01: Thickness 3.6 ± 0.1(mm) and Flatness 0.08/0.1(mm)

## Naming for the Module

TES1- 03540- X -X - X - X



TES1- 03540-T200-NS -TF01 -AIO

T200: CuSn (T<sub>melt</sub>=227°C)

NS: No sealing

AIO: Alumina, white 96%

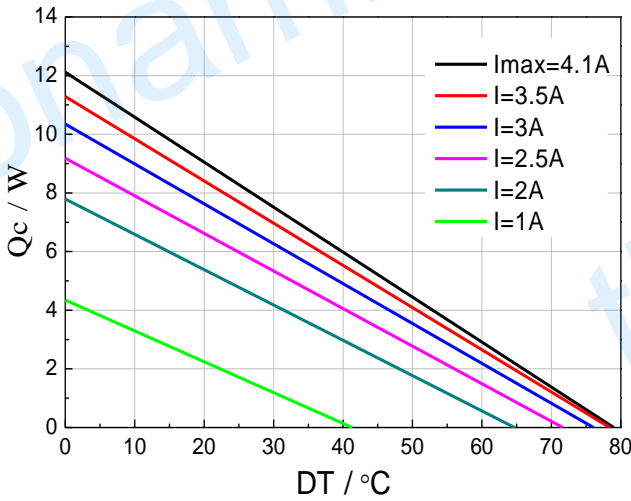
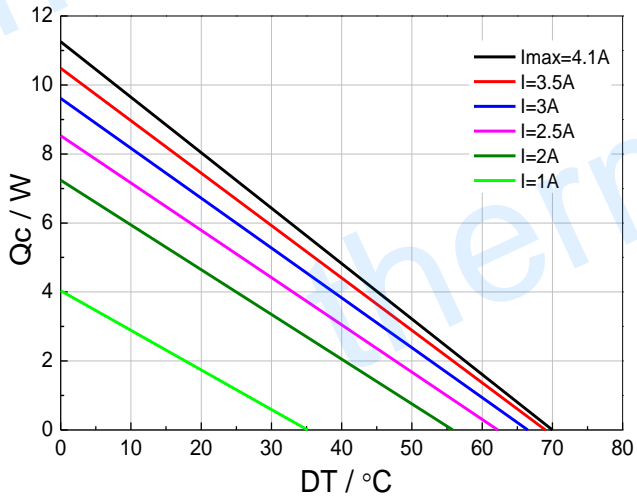
TF01: Thickness ± 0.1 (mm) and Flatness/Parallelism 0.08/0.1 (mm)

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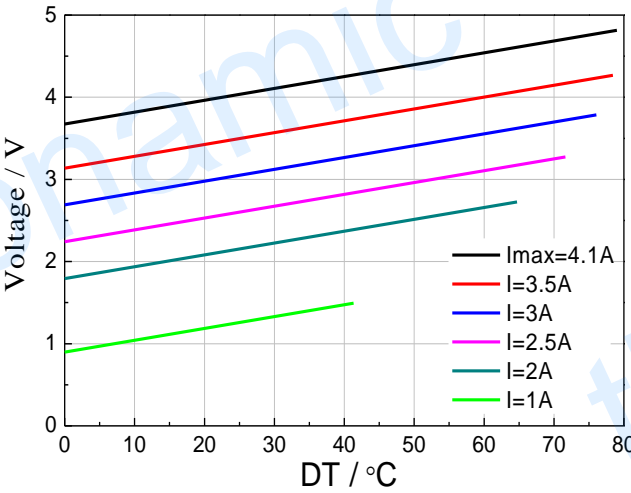
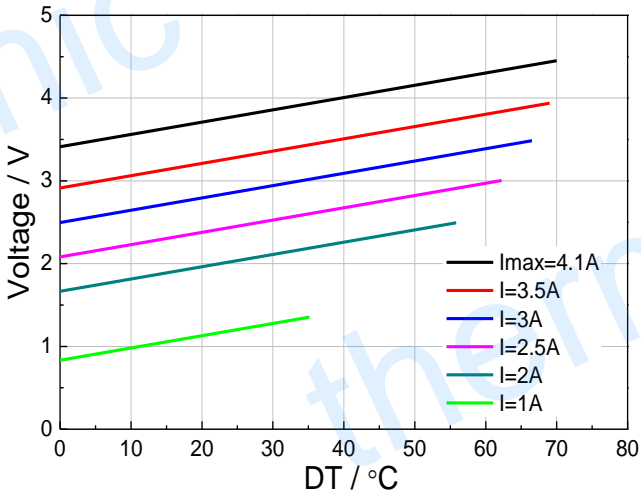
**TES1-03540**

**Performance Curves at Th=27 °C**

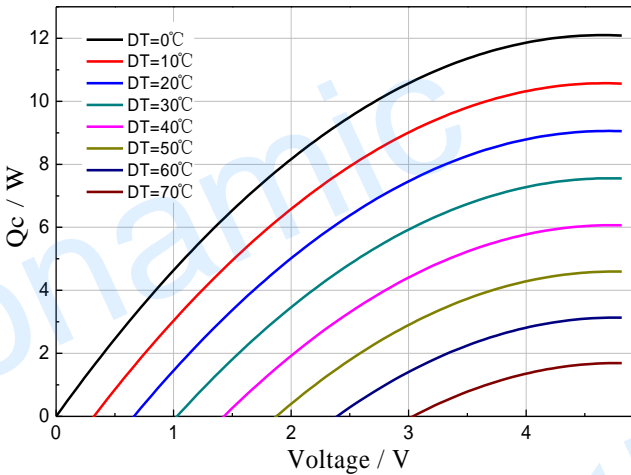
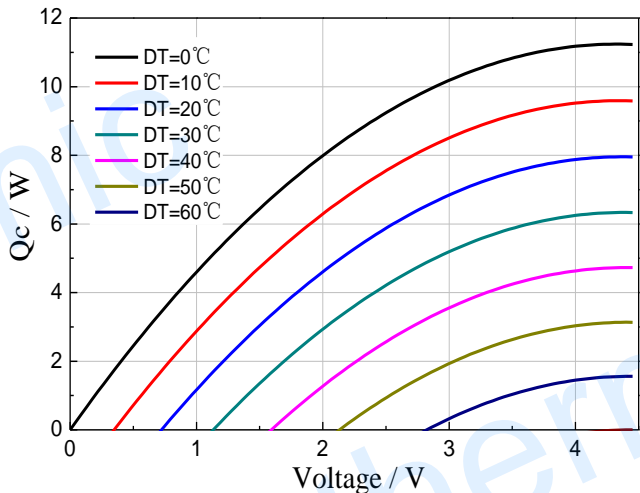
**Performance Curves at Th=50 °C**



Standard Performance Graph  $Q_c = f(DT)$



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

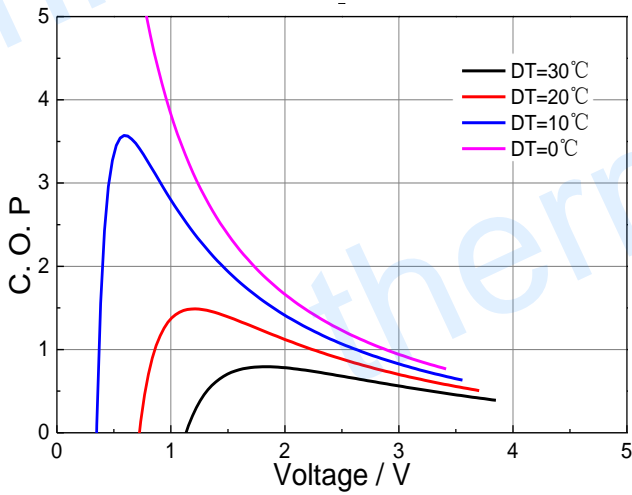


Standard Performance Graph  $Q_c = f(V)$

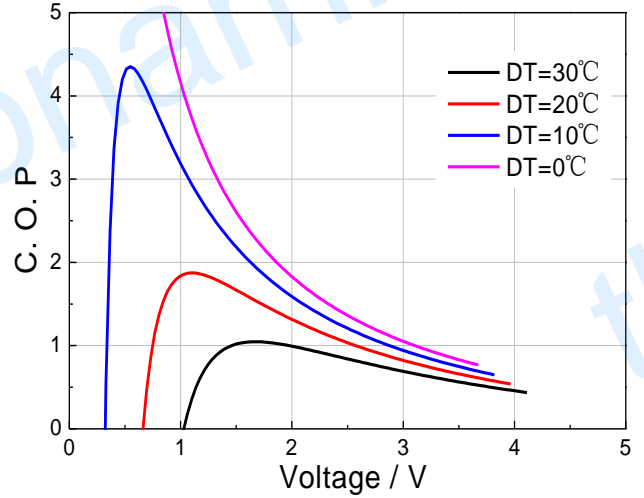
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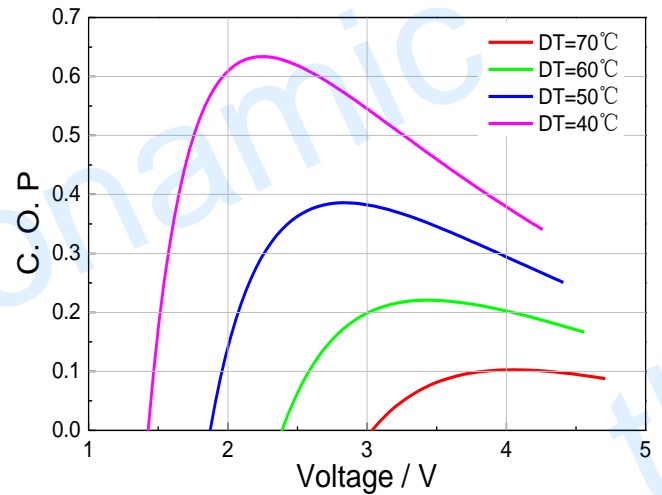
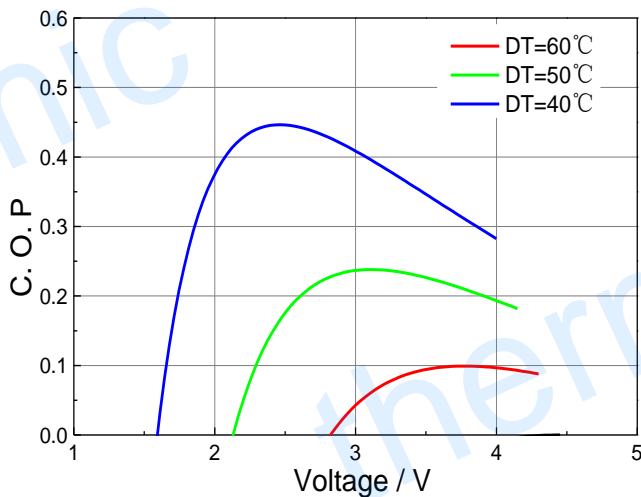
### Performance Curves at Th=27 °C



### 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 ( $V \times I$ ).

### Operation Cautions

- Operation humidity is from 20% relative humidity to 80% relative humidity.
- Cold side of the module stuck on the object being cooled
- Hot side of the module mounted on a heat radiator
- Storage module below 100 °C
- Operation below  $I_{max}$  or  $V_{max}$
- Work under DC