

# 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

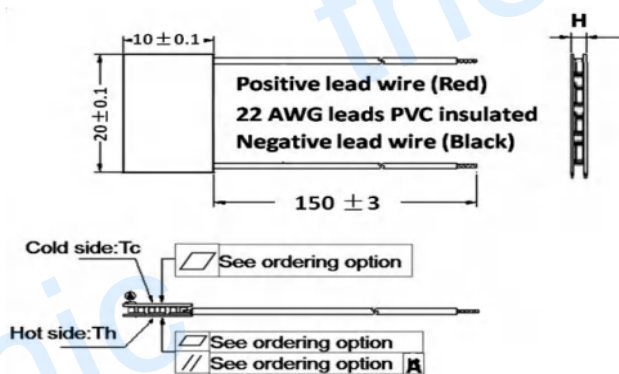
## Application

- 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



## Ordering Option

| Suffix | Thickness<br>H(mm) | Flatness/<br>Parallelism (mm) | Lead wire length(mm)<br>Standard/Optional length |
|--------|--------------------|-------------------------------|--|
| TF     | 0:3.6 ± 0.1        | 0:0.05/0.05                   | 150 ± 3/Specify                                  |
| TF     | 1:3.6 ± 0.03       | 1:0.02/0.02                   | 150 ± 3/Specify                                  |

Eg. TF01: Thickness 3.6 ± 0.1(mm) and Flatness 0.02/0.02(mm)

## Manufacturing Options

### A. Solder:

1. T100: BiSn (Tmelt=138°C)
2. T200: CuAgSn (Tmelt = 217°C)
3. T240: SbSn (Tmelt = 240°C)

### B. Sealant:

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

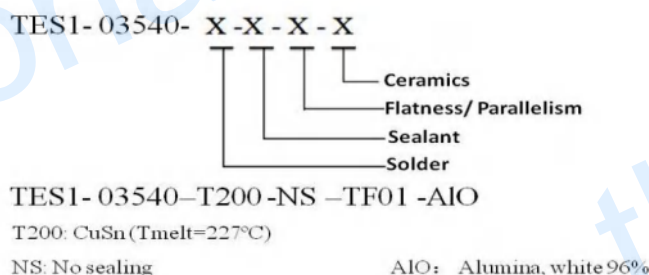
### C. Ceramics:

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

### D. Ceramics Surface Options:

1. Blank ceramics (not metalized)
2. Metalized

## Naming for the Module

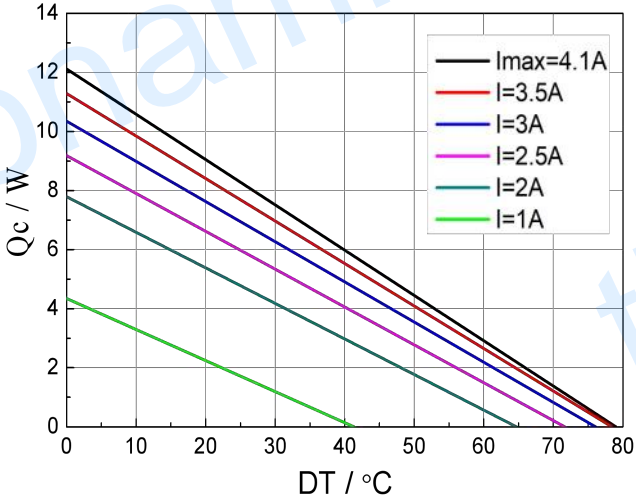
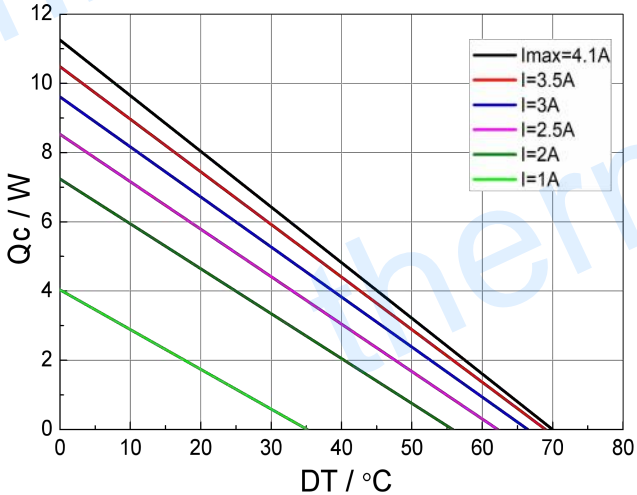


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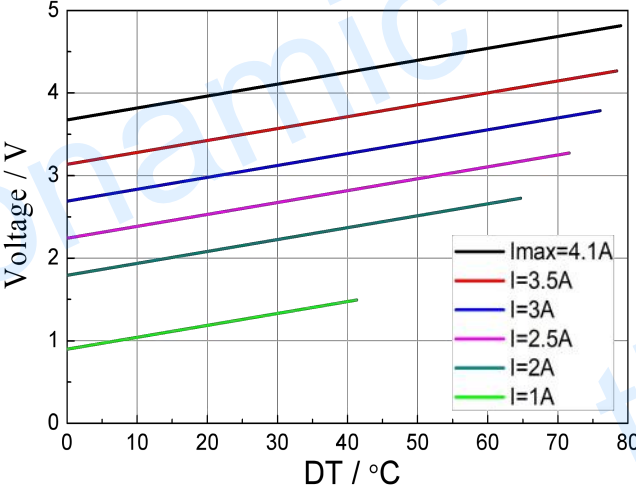
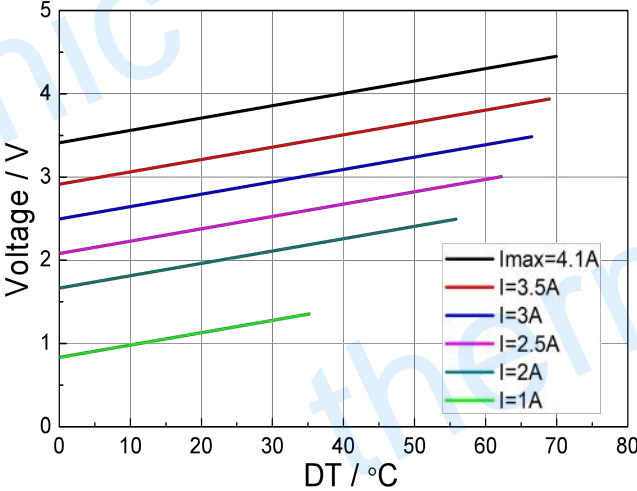
**TES1-03540**

## Performance Curves at Th=27 °C

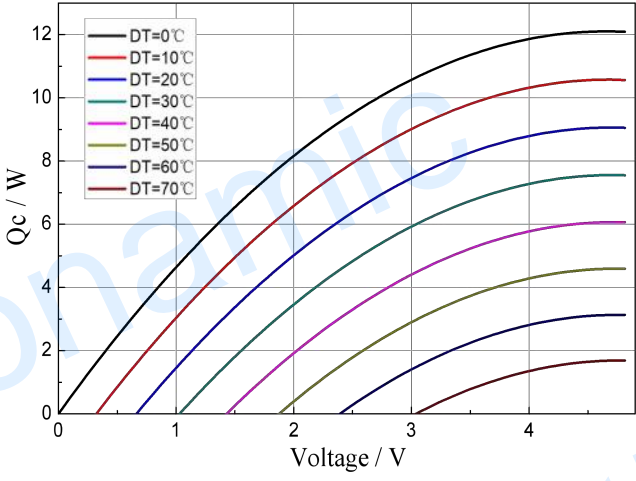
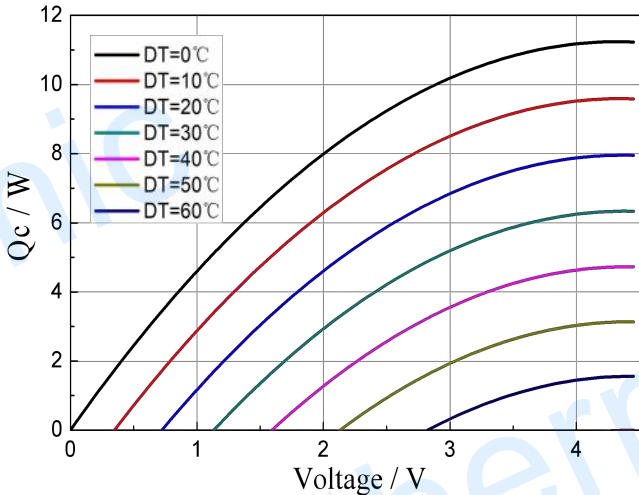
## Performance Curves at Th=50 °C



Standard Performance Graph  $Q_c = f(DT)$



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

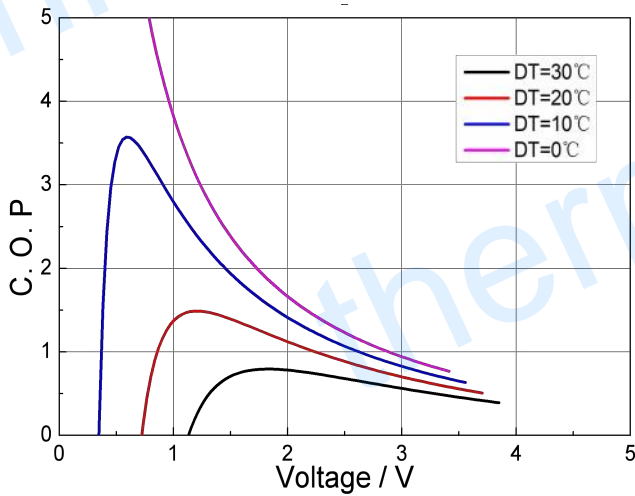


Standard Performance Graph  $Q_c = f(V)$

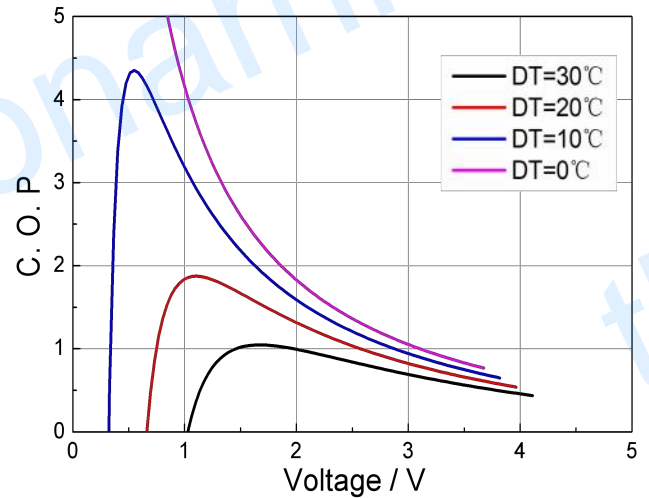
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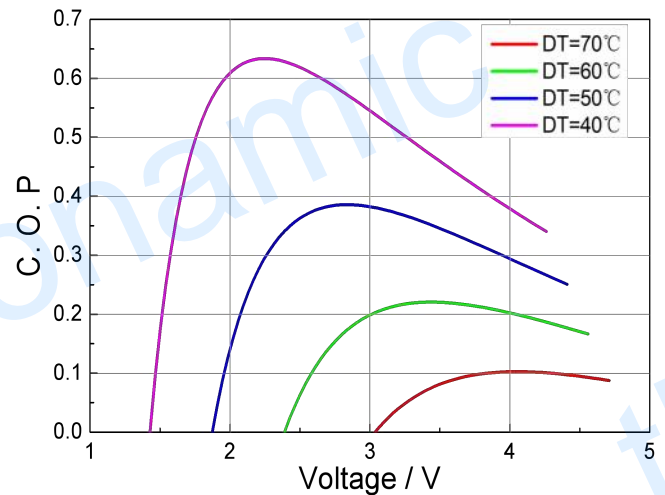
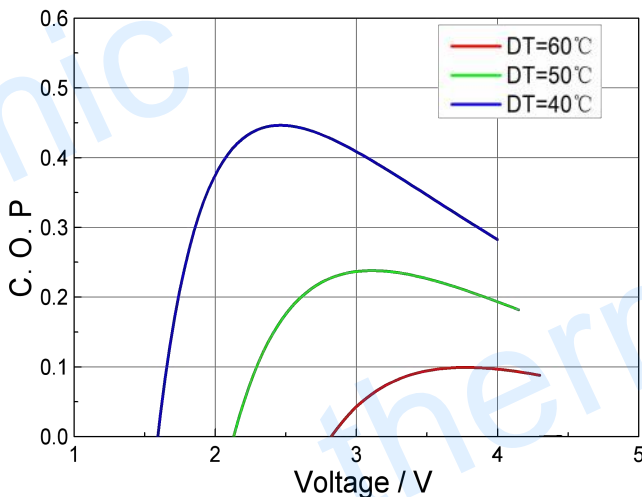
### Performance Curves at Th=27 °C



### 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.
- Attach the cold side of module to the object to be cooled
- Attach the hot side of module to a heat radiator for heat dissipating
- Storage module below 100 °C
- Operation below  $I_{max}$  or  $V_{max}$
- Work under DC