

# Specification of Thermoelectric Module

## TES1-12739

### Description

The 127 couples, 30 mm x 30 mm size module is a single stage module which is made of our high performance ingot to achieve superior cooling performance and 70°C or larger delta Tmax, is designed for superior cooling and heating applications. 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

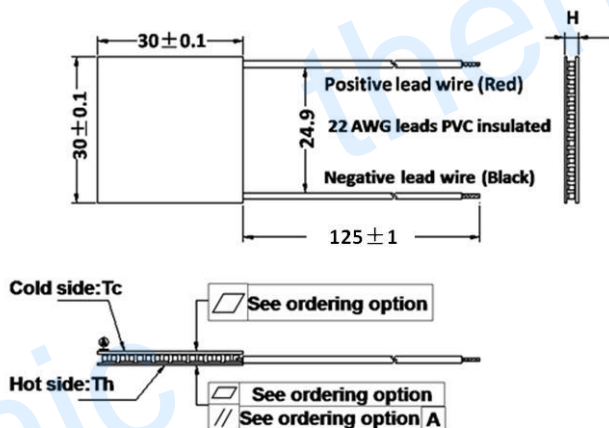
### Application

- 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)     | 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) | 16.0 | 17.3 | Voltage applied to the module at DT <sub>max</sub>  |
| I <sub>max</sub> (Amps)    | 4.6  | 4.6  | DC current through the modules at DT <sub>max</sub>   |
| Q <sub>Cmax</sub> (Watts)  | 46.2 | 49.8 | Cooling capacity at cold side of the module under DT=0 °C   |
| AC resistance (Ohms)       | 2.65 | 2.85 | 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 (Tmelt=138°C)
2. T200: CuSn (Tmelt = 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)

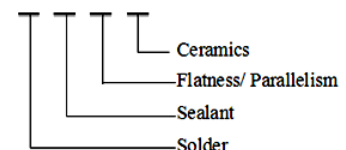
### Ordering Option

| Suffix | Thickness H (mm) | Flatness/ Parallelism (mm) | Lead wire length(mm) Standard/Optional length |
|--------|------------------|----------------------------|---|
| TF     | 0: 3.2± 0.1      | 0: 0.05/0.05               | 125±1/Specify                                 |
| TF     | 1: 3.2 ± 0.05    | 1: 0.025/0.025             | 125±1/Specify                                 |
| TF     | 2: 3.2± 0.025    | 2: 0.015/0.015             | 125±1/Specify                                 |

Eg. TF01: Thickness 3.2± 0.1 (mm) and Flatness 0.025/0.025 (mm)

### Naming for the Module

TES1-12739- X -X - X - X



TES1-12739-T100-NS-TF01-A1O

T100: BiSn(Tmelt=138°C)

NS: No sealing

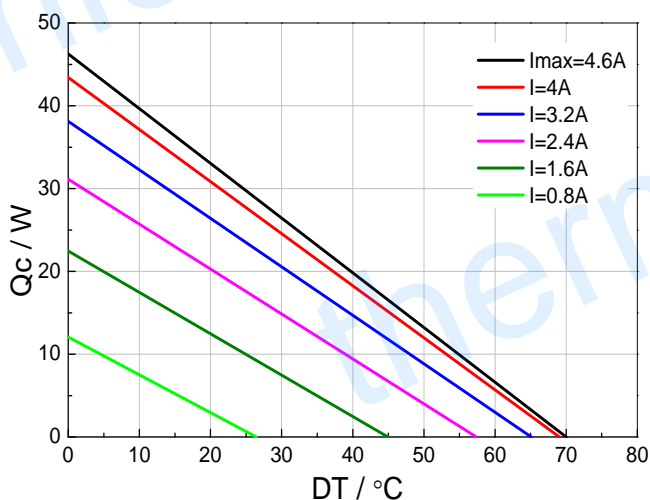
A1O: Alumina white 96%

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

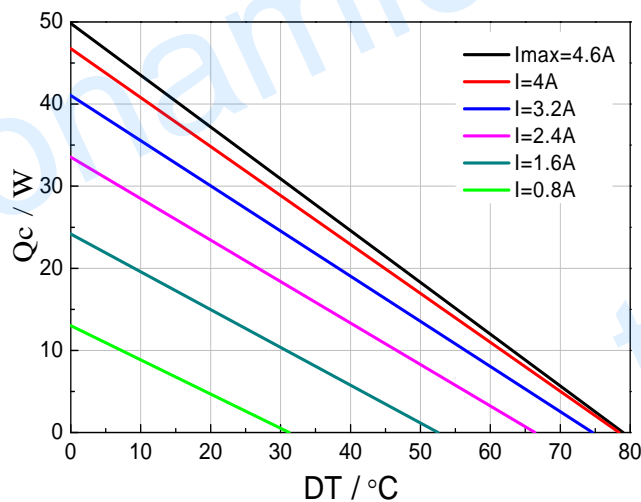
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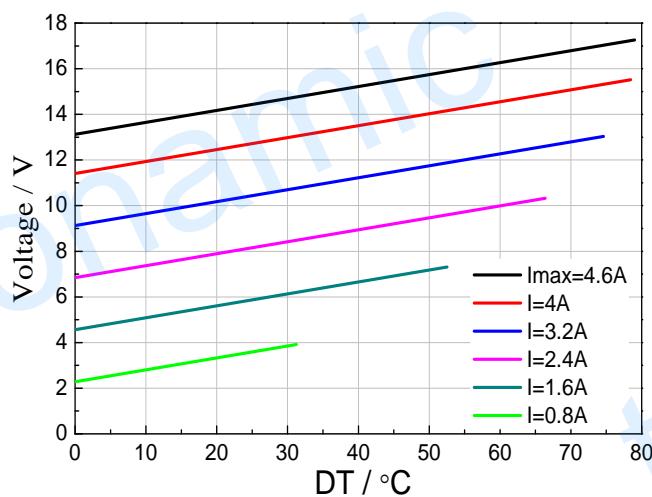
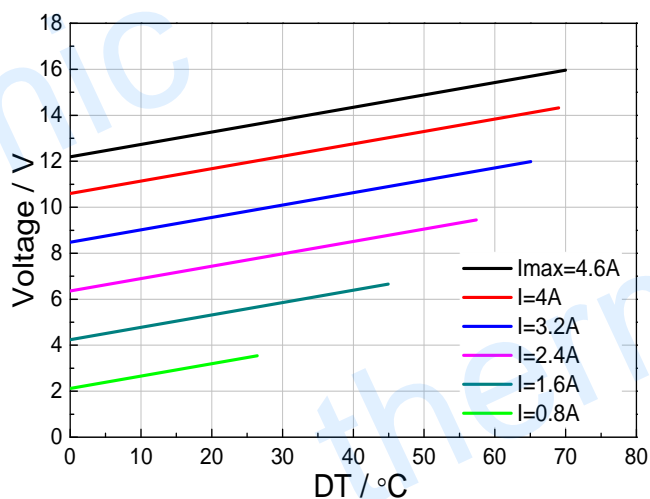
Performance Curves at  $T_h=27\text{ }^\circ\text{C}$



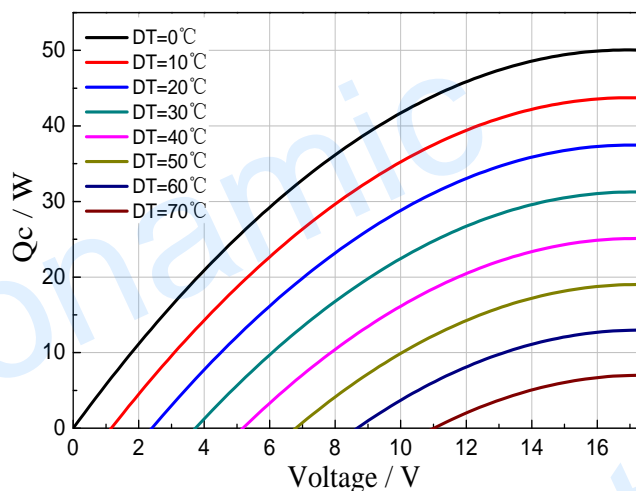
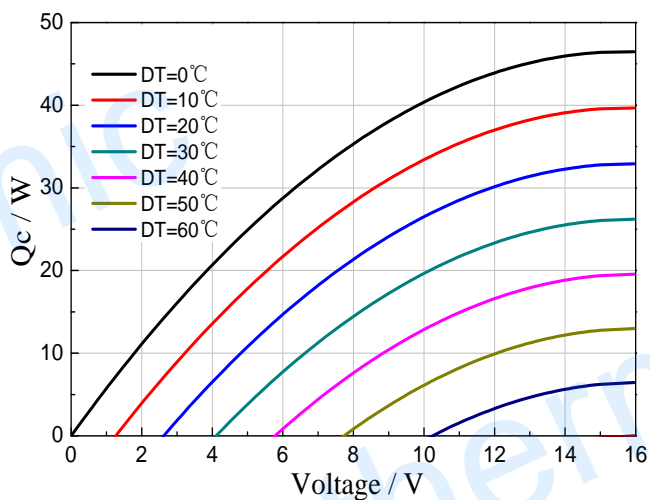
Performance Curves at  $T_h=50\text{ }^\circ\text{C}$



Standard Performance Graph  $Q_c = f(DT)$



Standard Performance Graph  $V = f(DT)$

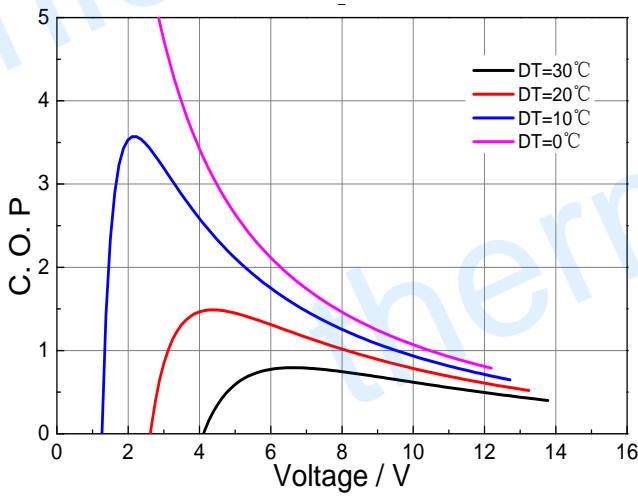


Standard Performance Graph  $Q_c = f(V)$

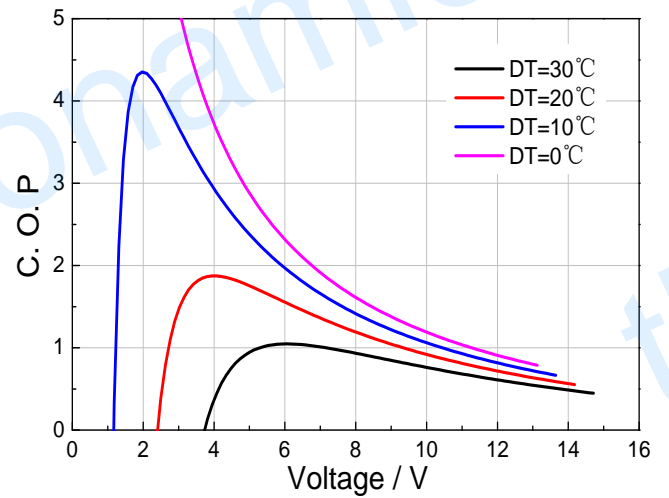
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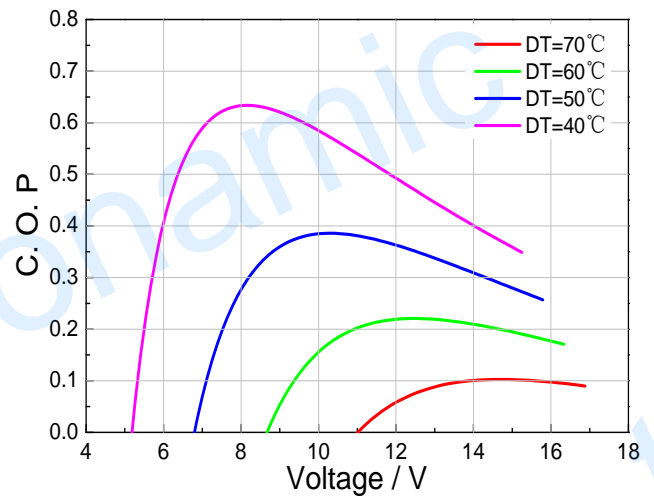
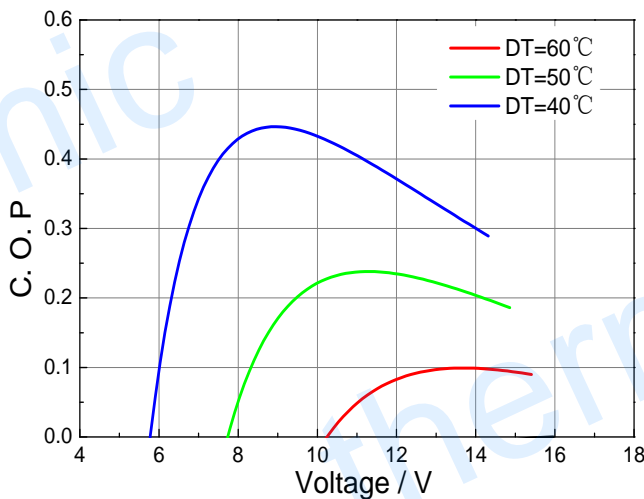
### Performance Curves at Th=27 °C



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

### Operation Caution

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

**Note:** All specifications subject to change without notice.