

# Multistage Series MS2,190,10,10,12,12

## Thermoelectric Modules

The MS Series of thermoelectric modules (TEMs) are designed to reach cool down temperatures that are not achievable with single stage TEMs.

This product line is available in numerous heat pumping capacities, geometric shapes and temperature differentials. Assembled with Bismuth Telluride semiconductor material and thermally conductive Aluminum Oxide ceramics, the MS Series is designed for higher current and lower heat-pumping applications.

### FEATURES

- High temperature differential
- Precise temperature control
- Reliable solid state operation
- Environmentally friendly
- DC operation
- RoHS compliant

### APPLICATIONS

- CCD cameras
- Electron microscope
- Calibration equipment
- Photonics laser systems
- Gas analyzers
- Infrared (IR) Sensors
- Guidance Systems

### PERFORMANCE SPECIFICATIONS

|                           |      |
|---------------------------|------|
| Hot Side Temperature (°C) | 25   |
| Qmax (Watts)              | 16.4 |
| Delta Tmax (°C)           | 87   |
| Imax (Amps)               | 2.9  |
| Vmax (Volts)              | 15.6 |

| SUFFIX | THICKNESS<br>(PRIOR TO TINNING) | FLATNESS &<br>PARALLELISM | HOT<br>FACE | COLD<br>FACE | LEAD<br>LENGTH |
|--------|---------------------------------|---------------------------|-------------|--------------|----------------|
| 00     | 0.264" ± 0.008"                 | 0.001" / 0.004"           | Metallized  | Metallized   | 7.87"          |
| 11     | 0.256" ± 0.008"                 | 0.001" / 0.002"           | Lapped      | Lapped       | 7.87"          |
| 22     | 0.264" ± 0.008"                 | 0.001" / 0.004"           | Pre-tinned  | Pre-tinned   | 7.87"          |

### SEALING OPTION

| SUFFIX | SEALANT | COLOR | TEMP RANGE    | DESCRIPTION                                  |
|--------|---------|-------|---------------|--|
| RT     | RTV     | White | -60 to 204 °C | Non-corrosive, silicone adhesive sealant     |
| EP     | Epoxy   | Black | -55 to 150 °C | Low density syntactic foam epoxy encapsulant |

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Americas: +1 888.246.9050

Europe: +46.31.420530

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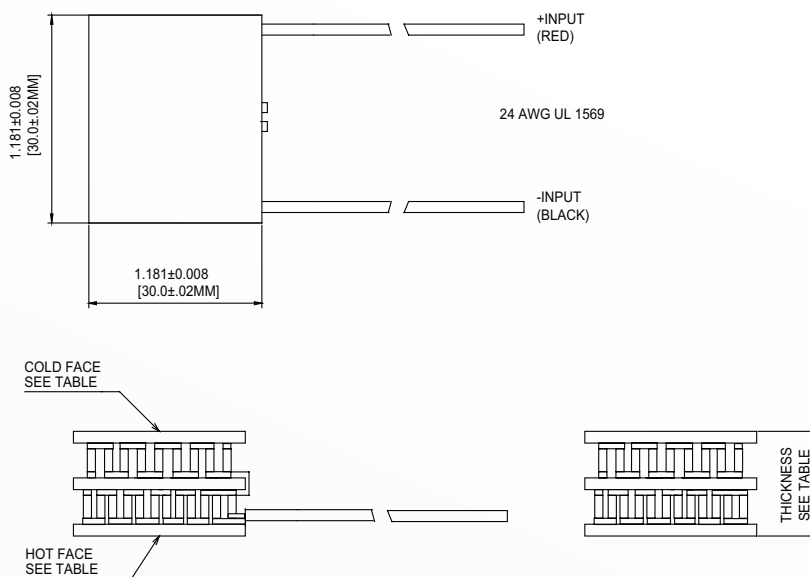
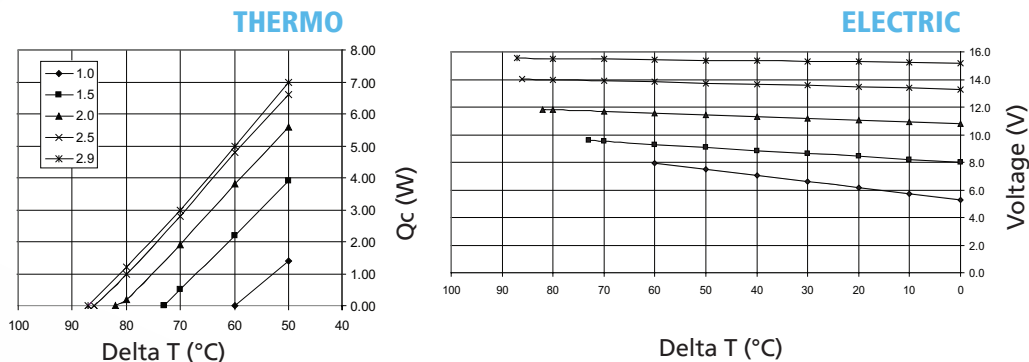
clv.customerpos@lairdtech.com

www.lairdtech.com

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## Thermoelectric Modules

Performance Curves at  $T_h = 25^\circ\text{C}$



Ceramic Material: 96% Alumina Ceramics  
Solder Construction: 138°C, Bismuth Tin (BiSn)

### OPERATING TIPS

- Max Operating Temperature:  $80^\circ\text{C}$
- Do not exceed  $I_{\text{max}}$  or  $V_{\text{max}}$  when operating module
- Reference assembly guidelines for recommended installation
- Solder tinning also available on metallized ceramics

THR-DS-MS2,190,10,10,12,12 0609

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Website :

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Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd  
Minhang District, Shanghai , China

➤ Sales :

Direct     +86 (21) 6401-6692  
  
Email        amall@ameya360.com  
  
QQ            800077892  
  
Skype        ameyasales1 ameyasales2

➤ Customer Service :

Email        service@ameya360.com

➤ Partnership :

Tel            +86 (21) 64016692-8333  
  
Email        mkt@ameya360.com