

**Multistage MS Series Thermoelectric Cooler**

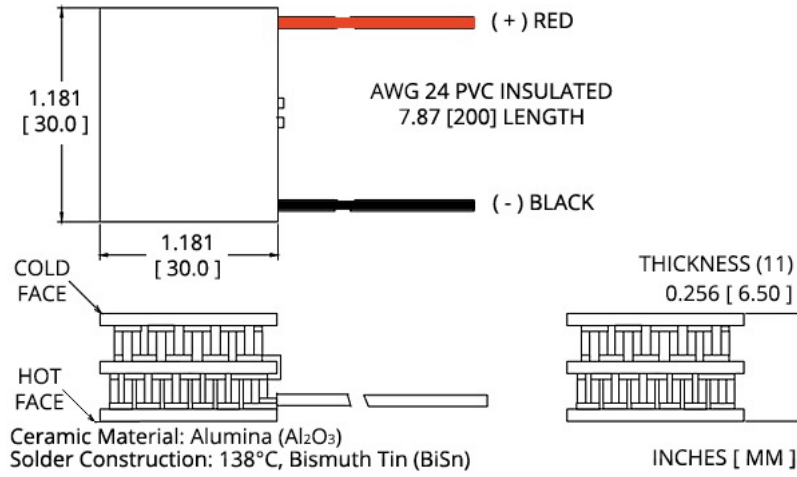
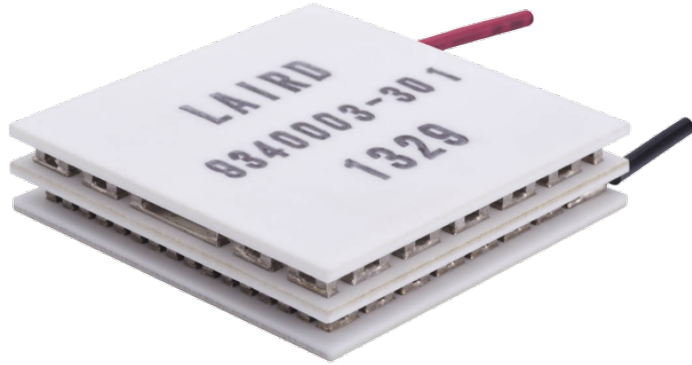
The MS2-190-10-10-12-12-11-RT-W8 multistage thermoelectric cooler is able to reach colder temperatures than single stage thermoelectric coolers. It has a maximum Qc of 15.4 Watts when  $\Delta T = 0$  and a maximum  $\Delta T$  of 91 °C at Qc = 0.

**Features**

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

**Applications**

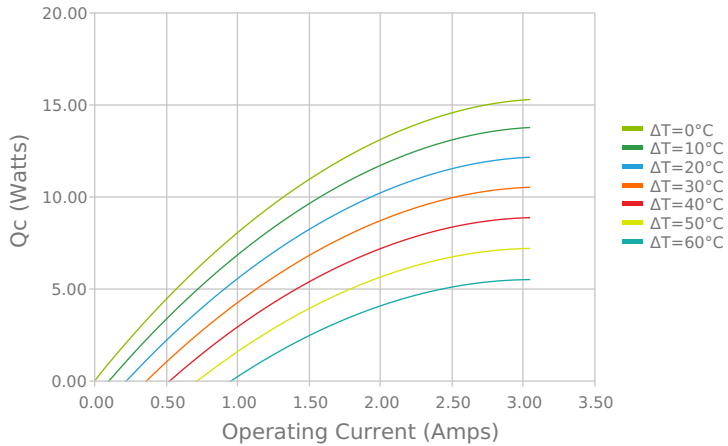
- Thermoelectric Cooling for CMOS Sensors
- Heads-Up Displays, Imaging Sensors



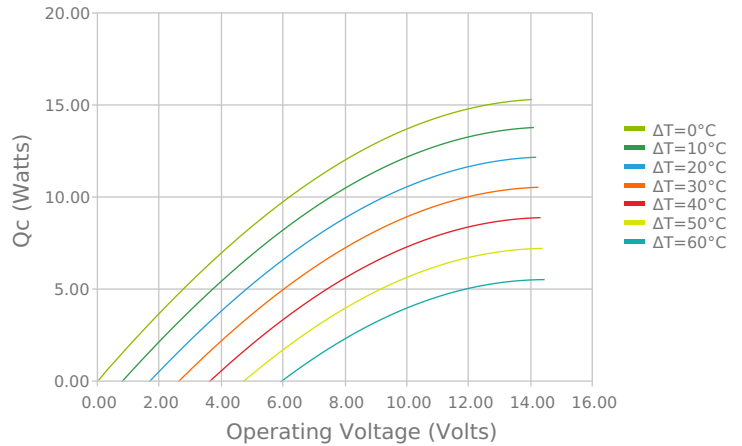
Note: Allow 0.020 in [0.5 mm] around perimeter of the thermoelectric cooler and lead wire attachment to accommodate sealant

**ELECTRICAL AND THERMAL PERFORMANCE**

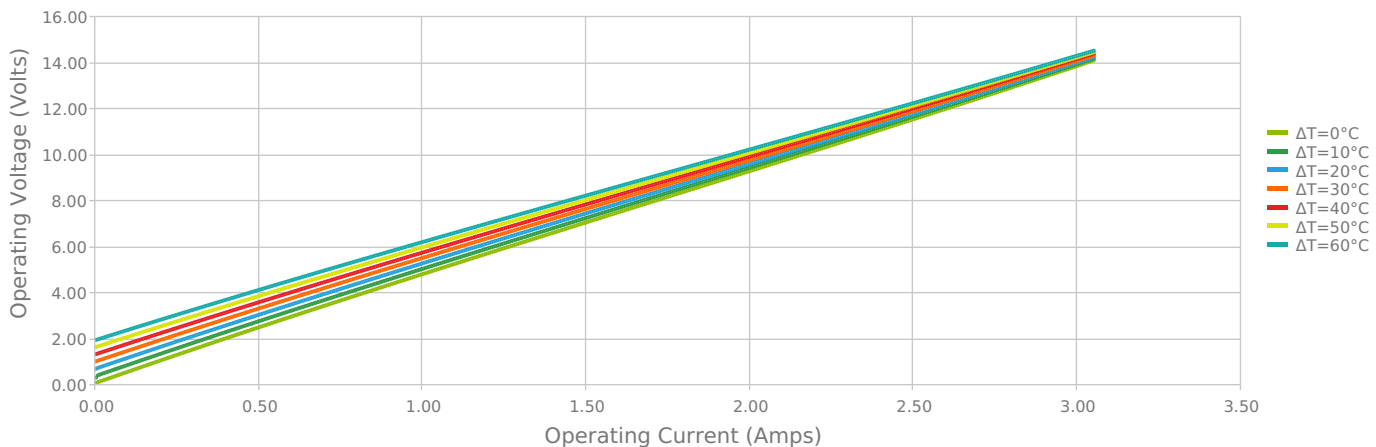
Heat Pumped at Cold Side  
 Thot = 27 °C



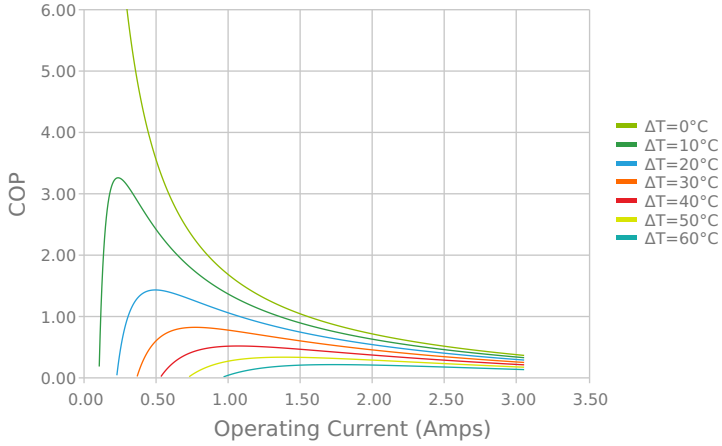
Heat Pumped at Cold Side  
 Thot = 27 °C



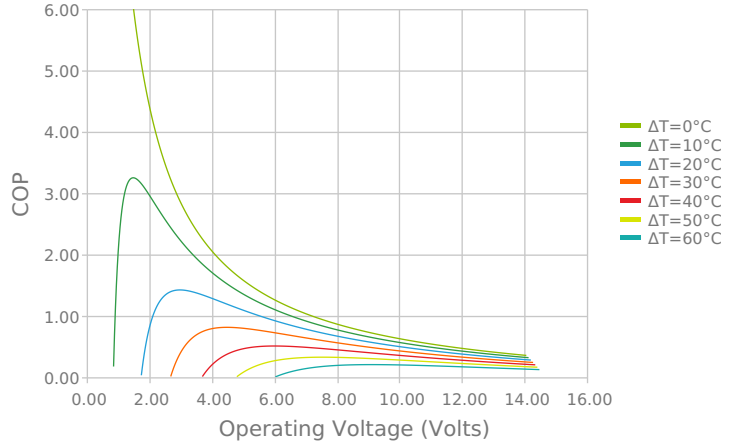
Current vs Voltage (I vs V)  
 Thot = 27 °C



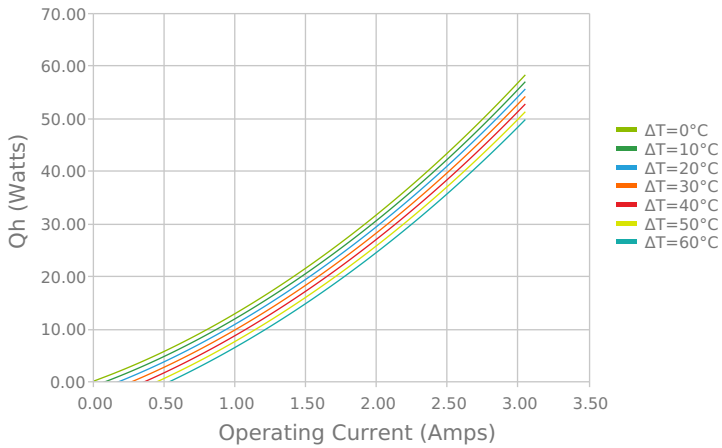
Coefficient of Performance (COP = Qc/Pin)  
 Thot = 27 °C



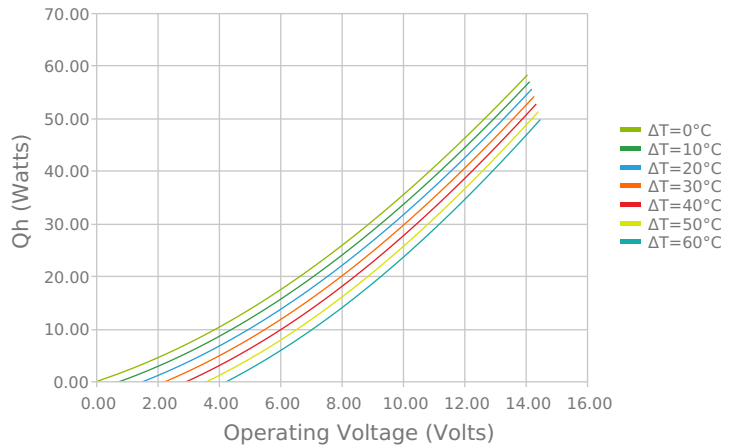
Coefficient of Performance (COP = Qc/Pin)  
 Thot = 27 °C



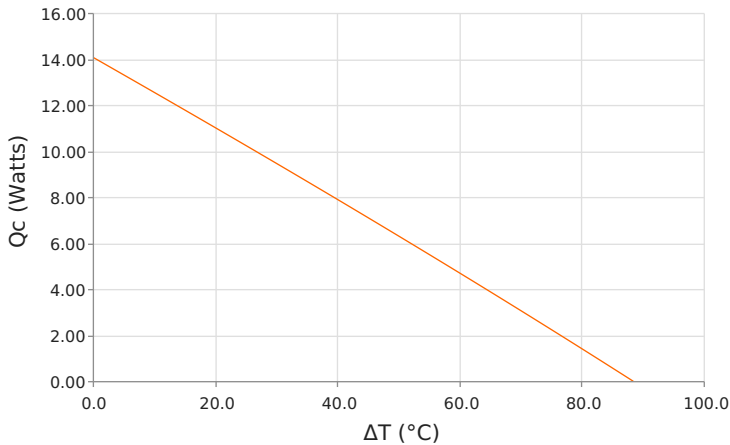
Total Heat Dissipated at Hot Side (Qh=Qc+Pin)  
 Thot = 27 °C



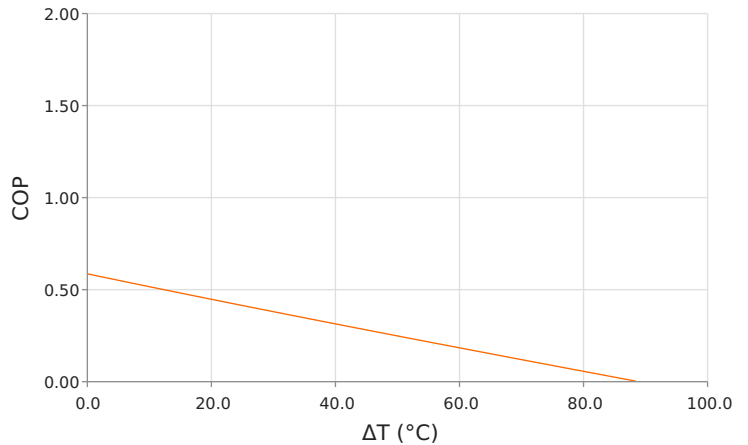
Total Heat Dissipated at Hot Side (Qh=Qc+Pin)  
 Thot = 27 °C



Heat Pumped at Cold Side (Qc)  
 Thot = 27 °C | Current = 2.3 Amps



Coefficient of Performance (COP = Qc/Pin)  
 Thot = 27 °C | Current = 2.3 Amps



## SPECIFICATIONS\*

<b>Hot Side Temperature</b>	<b>27.0 °C</b>
<b>Qcmax (<math>\Delta T = 0</math>)</b>	15.4 Watts
<b><math>\Delta T_{max}</math> (<math>Q_c = 0</math>)</b>	91.0 °C
<b>I<sub>max</sub> (I @ <math>\Delta T_{max}</math>)</b>	3.0 Amps
<b>V<sub>max</sub> (V @ <math>\Delta T_{max}</math>)</b>	14.3 Volts
<b>Module Resistance</b>	4.85 Ohms
<b>Max Operating Temperature</b>	80 °C
<b>Weight</b>	18.0 gram(s)

\* Specifications reflect thermoelectric coefficients updated March 2020

## FINISHING OPTIONS

Suffix	Thickness	Flatness / Parallelism	Hot Face	Cold Face	Lead Length
11	30.000 ±0.203 mm 1.181 ± 0.008 in	0.025 mm / 0.203 mm 0.001 in / 0.008 in	Lapped	Lapped	199.9 mm 7.87 in

## SEALING OPTIONS

Suffix	Sealant	Color	Temp Range	Description
RT	RTV	Translucent or White	-60 to 204°C	Non-corrosive, silicone adhesive

## NOTES

1. Max operating temperature: 80°C
2. Do not exceed I<sub>max</sub> or V<sub>max</sub> when operating module
3. Reference assembly guidelines for recommended installation
4. Solder tinning also available on metallized ceramics

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