

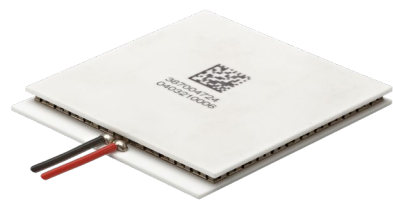
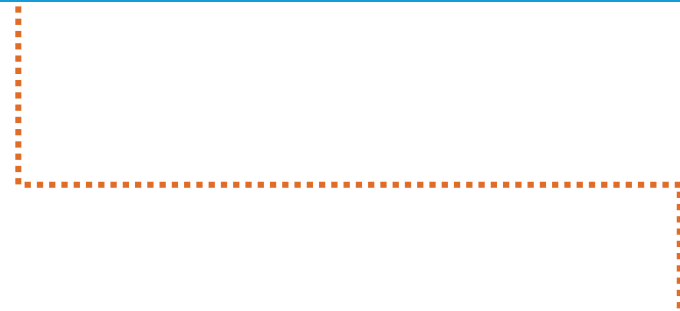


Spot Cooling for
Industrial Lasers

Introduction



Temperature changes distort laser wavelength resulting in **poor welding or less precise cutting**



Thermoelectric coolers provide spot cooling for industrial lasers



Application Overview



Industrial laser systems replace CNC machines used for

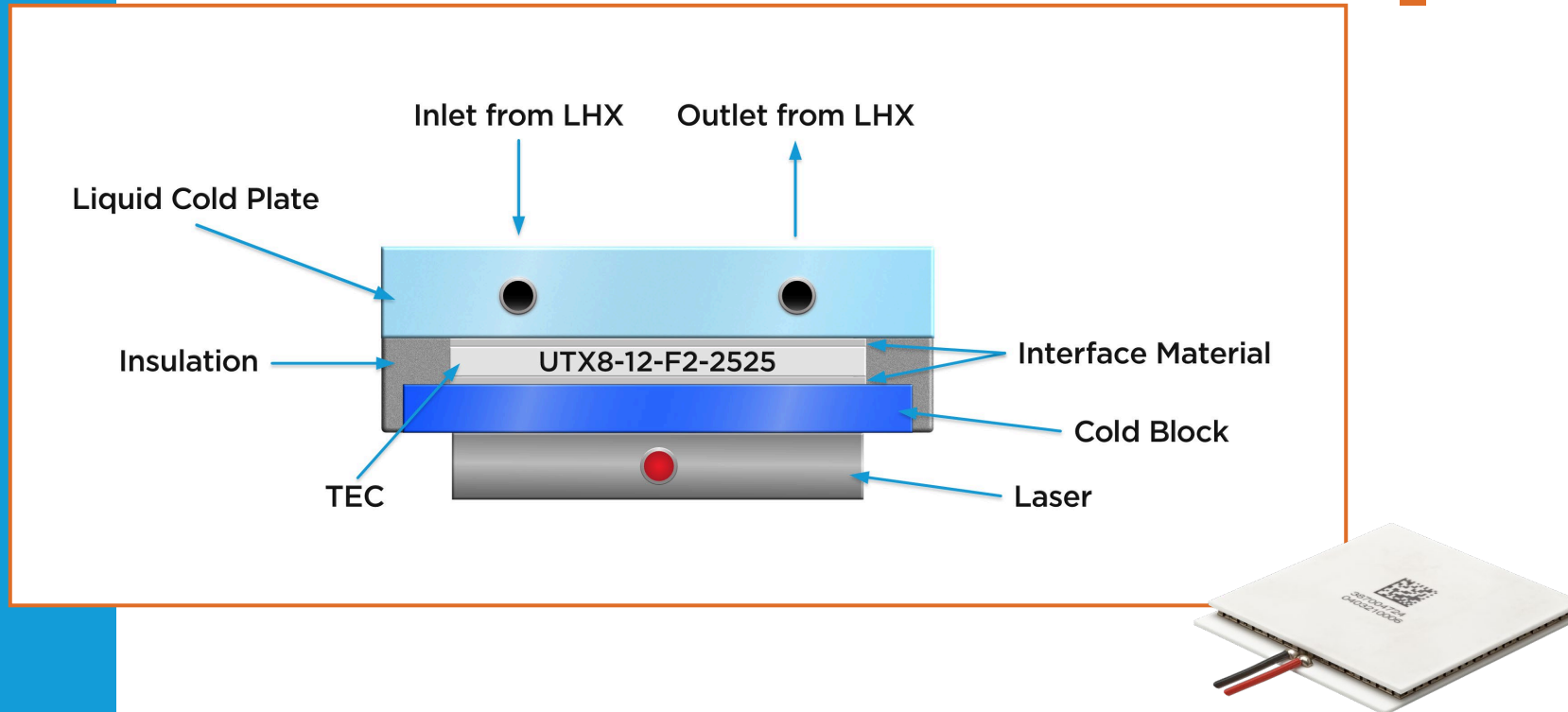
- Cutting
- Welding
- Drilling
- Etching



Requires temperature between 20 to 35°C
at $\pm 0.5^\circ\text{C}$ temperature stability

Thermoelectrics in Lasers

Thermoelectric coolers offer high reliability and a more cost-effective solution



Application Challenges



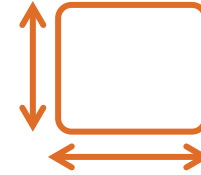
OUTGASSING

Outgassing from standard thermal interface material can coat optics



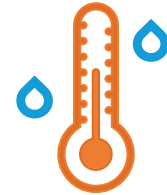
HEAT DISSIPATION

Thermoelectric cooler can exceed ability of a heat sink and fan to dissipate heat



SWAP REQUIREMENTS

Ambient liquid cooling system and cold plate can route heat where space is available



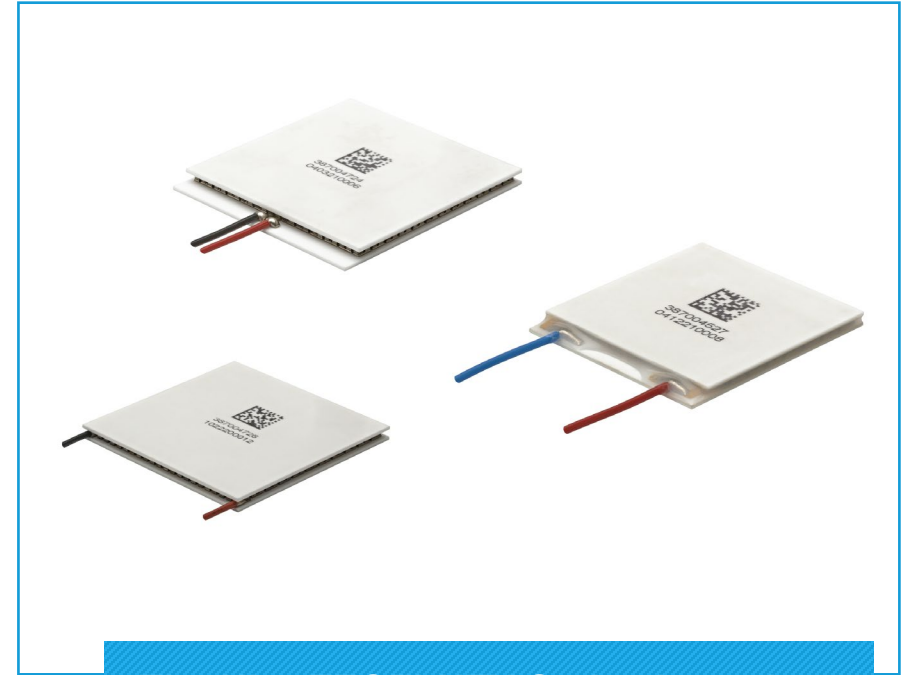
CONDENSATION

Surfaces below dew point must be isolated to prevent condensation

UltraTEC™ UTX Series

A new generation thermoelectric coolers

- **10% Cooling Capacity Boost**
Advanced thermoelectric materials for higher heat pumping capacity
- **(ΔT) up to 72°C**
Improved temperature differential with higher thermal insulating barrier
- **Precise Temperature Control**
Spot cooling allow for precise temperature control
- **Quiet operation**
No operational noise
- **Reliable Solid-State**
No moving parts, solid-state Peltier coolers significantly reduce maintenance and total ownership costs.



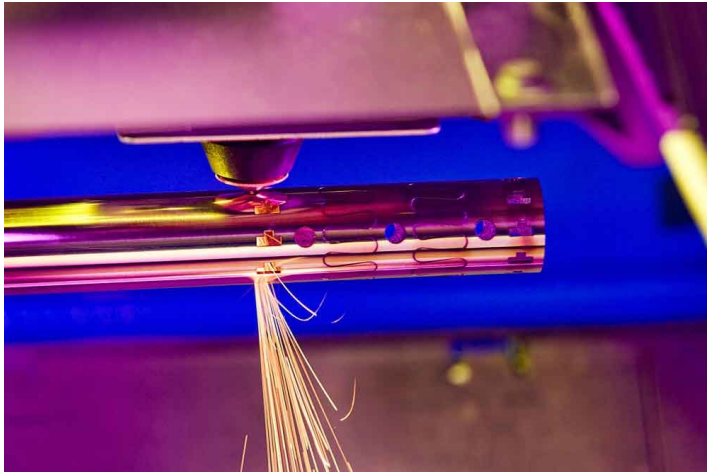
The UltraTEC™ UTX Series has a heat pumping capacity of up to 296 Watts.

Form factors range from 25 x 25 mm's
up to 55 x 55 mm's

Conclusion



Thermoelectric coolers are used for spot cooling of sensitive laser components



REQUIRE PRECISE TEMPERATURE CONTROL

Temperature Changes result in poor welding or less precise cut

THERMOELECTRICS PROVIDE SUPERIOR SPOT COOLING

Can be mounted onto the side of the lens or the fixture holding the lens as well as inside laser diodes.

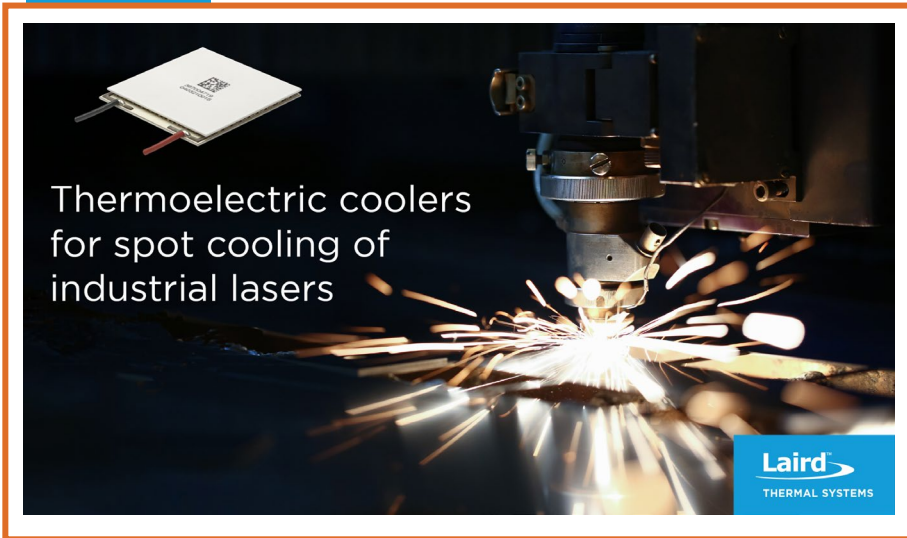
UTILIZING AN AMBIENT LIQUID COOLING SYSTEM

Will route heat where there is more space to dissipate heat away

ULTRATEC™ UTX SERIES BOOSTS COOLING CAPACITY BY 10%

Greater heat pumping capacity and higher thermal insulating barrier than standard materials.

For More Information



More information on the **UltraTEC™ UTX Series** can be found by visiting

<https://www.lairdthermal.com/products/thermoelectric-cooler-modules/peltier-utx-series>

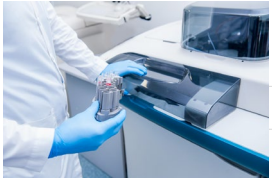
Read more about Thermoelectric Cooling for Industrial Laser in our **application note**

<https://www.lairdthermal.com/thermal-technical-library/application-notes/spot-cooling-industrial-lasers-optics>



About Laird Thermal Systems

Laird Thermal Systems develops thermal management solutions for demanding applications



Medical



Analytical



Industrial



Transportation



Telecom

- **DIVERSE PRODUCT PORTFOLIO**
Thermoelectric Coolers, Thermoelectric Cooler Assemblies, Temperature controllers and Liquid Cooling Systems
- **SOLVING COMPLEX ISSUES**
Our engineers use advanced thermal modeling and management techniques to solve complex heat and temperature control problems
- **ACCELERATING TIME-TO-MARKET**
We partner closely with our customers across the entire product development lifecycle.
- **MAXIMIZING PERFORMANCE**
Our global manufacturing and support resources help customers maximize productivity, uptime, performance and product quality

Laird Thermal Systems is the optimum choice for standard or custom thermal solutions

Learn more by visiting
www.lairdthermal.com



LairdTM

The logo features the word "Laird" in a bold, white, sans-serif font with a trademark symbol. A white swoosh underline starts under the "d" and extends to the left. Below this, the words "THERMAL SYSTEMS" are written in a bold, white, all-caps sans-serif font.

THERMAL SYSTEMS

Have a question or need more information about
Laird Thermal Systems? Please contact us via the website at www.lairdthermal.com



Spot-Cooling-for-Industrial-Lasers-Presentation-033122

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