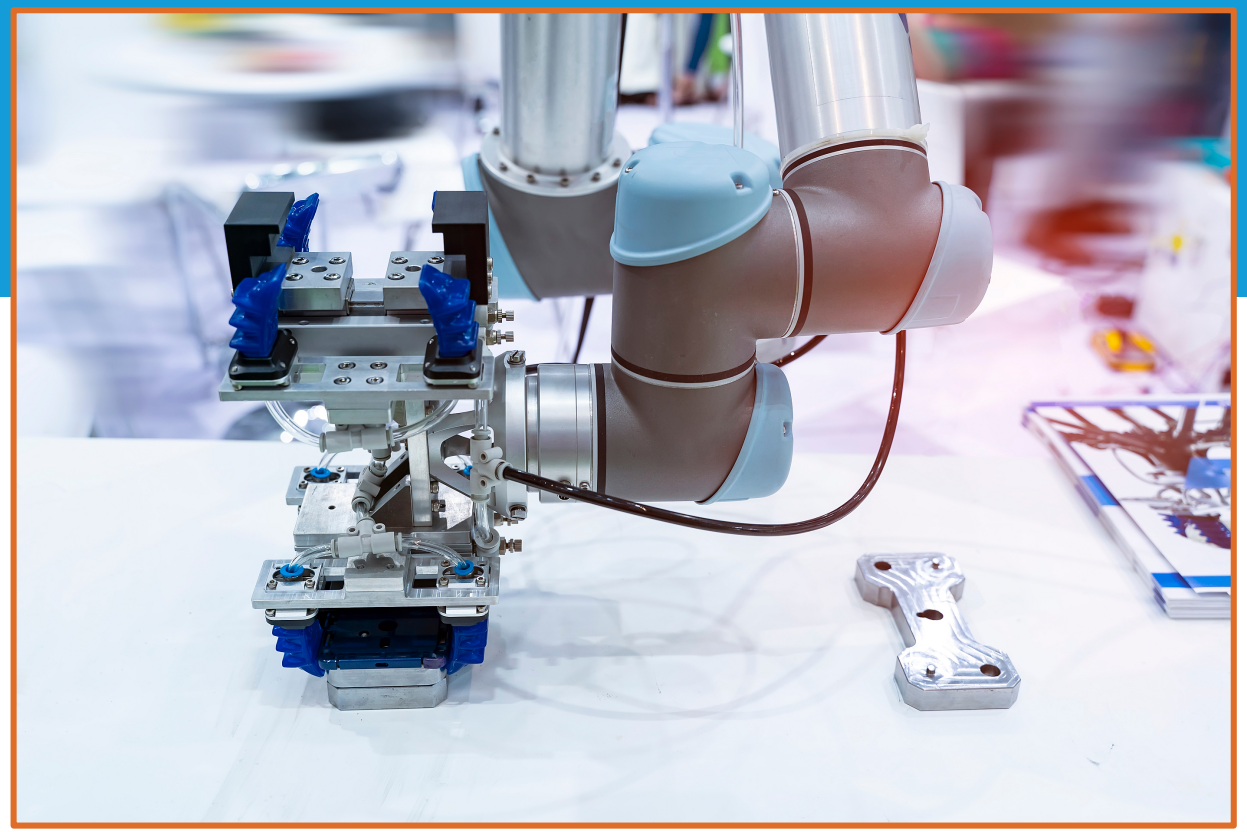
Laird™
THERMAL SYSTEMS

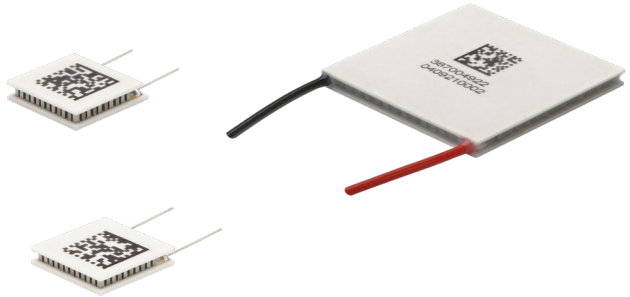
Thermoelectric Coolers **for Machine Vision**

Introduction



Machine vision is the replacement of human **examination**, **assessment** and **decision-making**

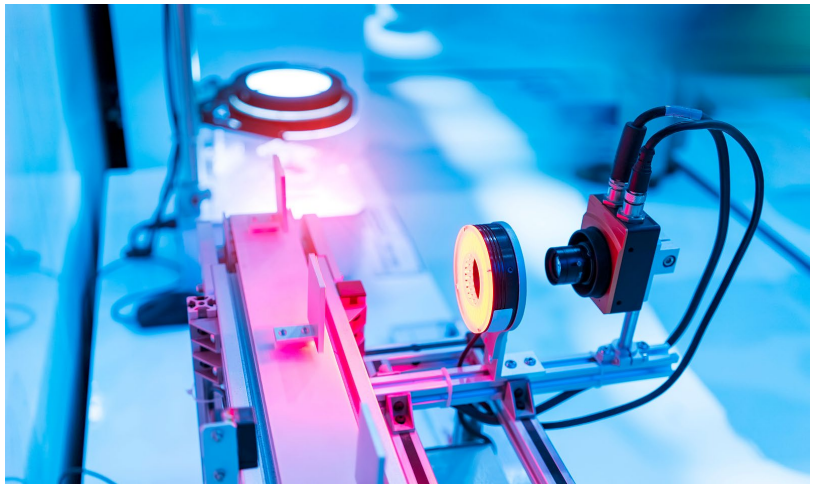
Active Cooling is required for Machine Vision Systems to deliver optimal image resolution.



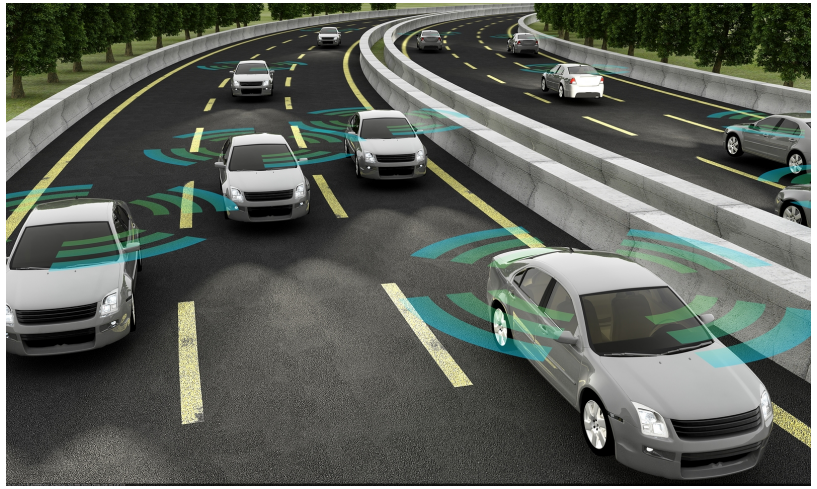
Application Overview

Machine vision applications use two main types of imaging sensors:

CCD (charge-coupled device) sensors
CMOS (complementary metal-oxide semiconductor) sensors



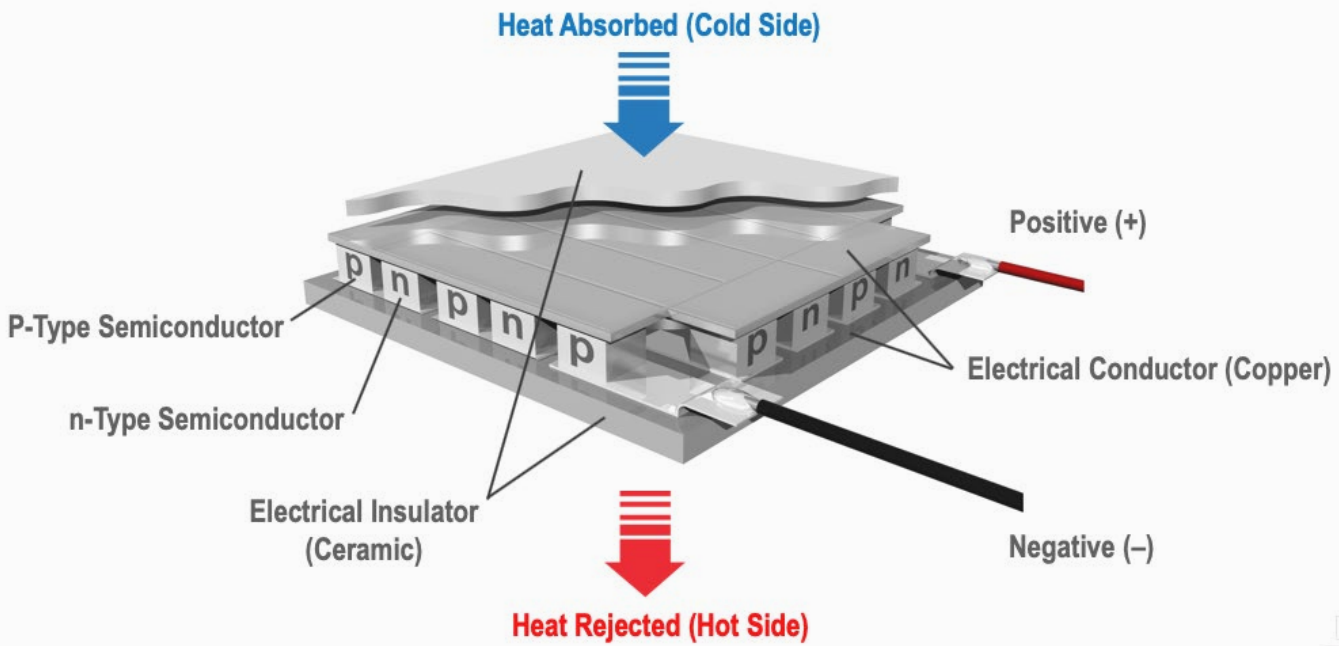
Inspection Systems



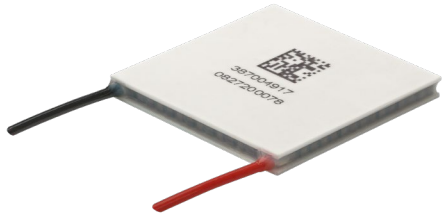
Collision Avoidance Systems

Artificial Intelligence

Thermoelectric Cooling



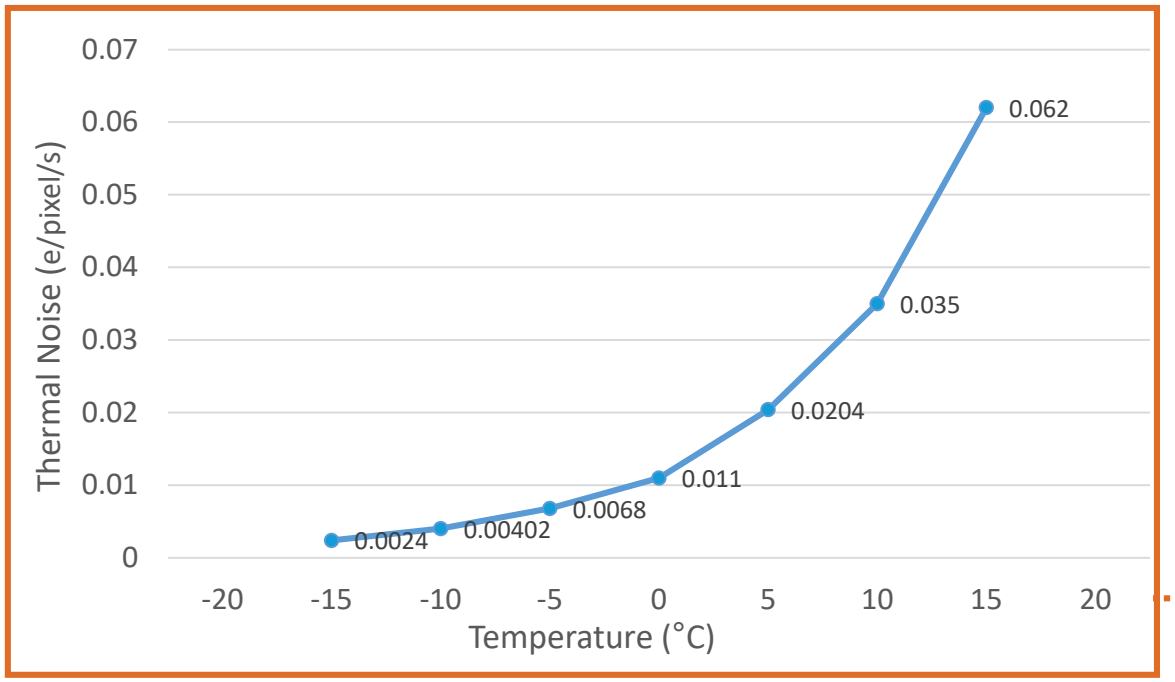
Thermoelectric coolers rapidly dissipate heat away from sensitive electronics



Application Challenges

THERMAL NOISE

Negatively affects image quality



SWAP REQUIREMENTS

Thermoelectrics increase size, weight, power and cost of system

CONDENSATION

Moisture can form on cold surfaces

THERMAL SHORTING

Cause the thermoelectric cooler to draw more current

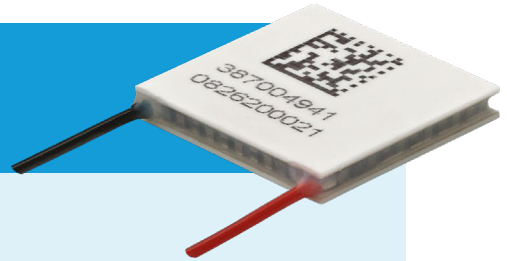
OUTGASSING

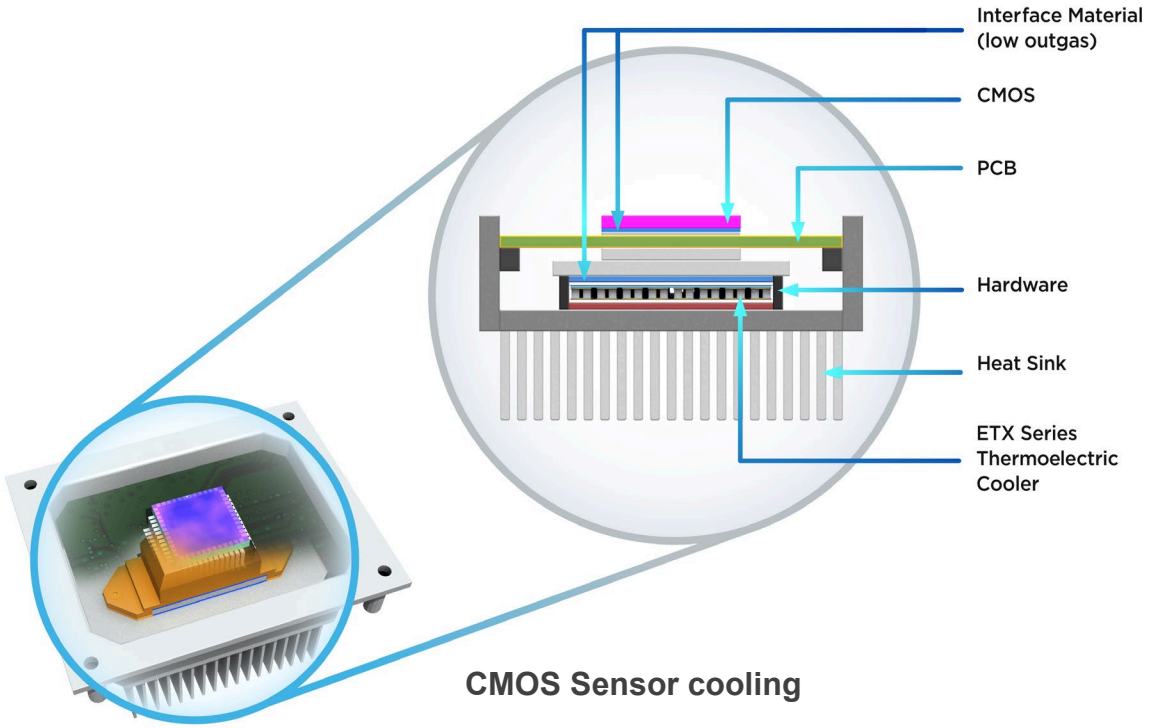
Outgassing from standard thermal interface material can coat lens

Thermoelectrics in Imaging Sensors

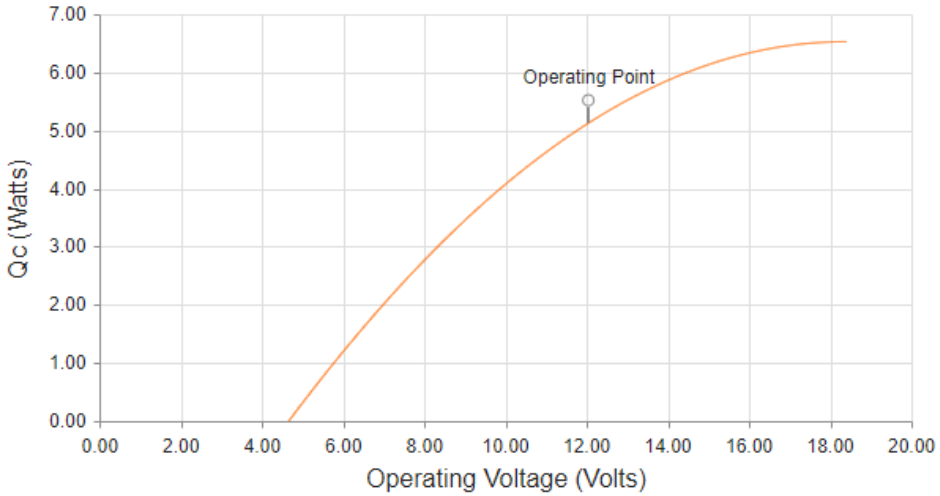
Laird THERMAL SYSTEMS

Compact Thermoelectric coolers rapidly dissipate heat away from sensitive imaging sensors



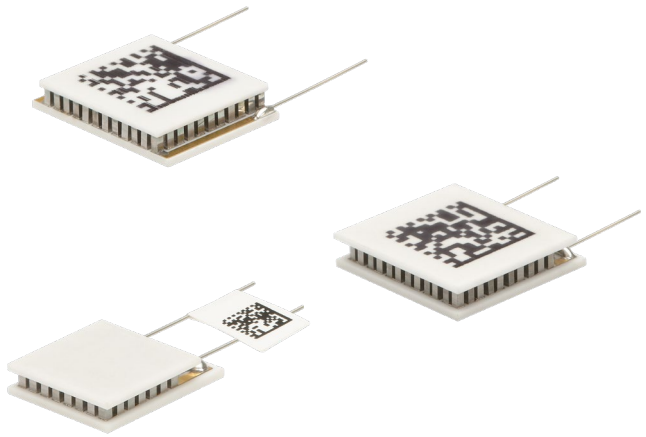


CMOS Sensor cooling



Performance curve of thermoelectric cooler at 12 VDC

OptoTEC™ OTX/HTX Series



The OptoTEC™ OTX/HTX Series deliver high heat pumping capacity in a footprint smaller than 3 X 4 mm

HIGH PERFORMANCE

HIGH TEMPERATURE OPERATION

OTX: 120°C

HTX: 150 °C

HIGH COP

MINIATURE FORM FACTOR

MEETS TELECORDIA REQUIREMENTS

LONG-LIFE OPERATION

HiTemp ETX Series

High Temperature Operation

Proprietary construction withstands temperatures up to 150°C

10% Cooling Capacity Boost

Assembled with advanced thermoelectric material

Environmentally Friendly

No hazardous CFC's used

(ΔT) up to 83°C

Features a higher thermal insulating barrier compared to standard materials

Compact Form Factor

Ideal for applications with tight space constraints

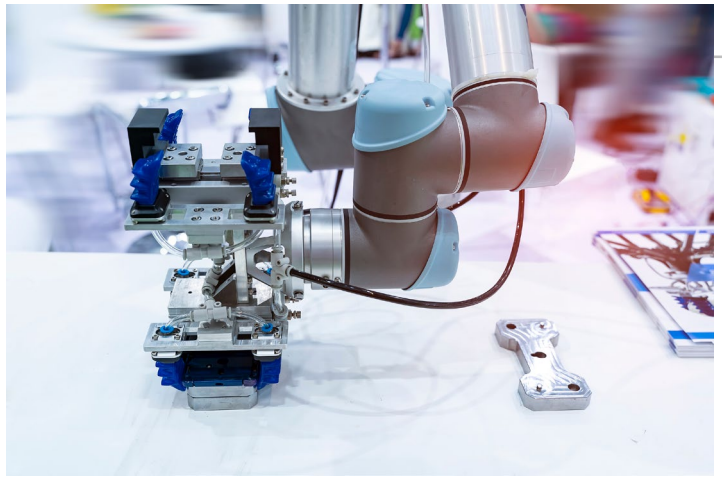
High COP

Require less input power to perform same cooling performance

Reliable Solid-State

Robust construction assures long-life operation

Conclusion



MACHINE VISION SYSTEM APPLICATIONS REQUIRE ACTIVE COOLING

Heat generated by surrounding electronics must be efficiently dissipated to **ensure high-quality images**.

SPOT COOLING OF IMAGING SENSORS CAN BE CHALLENGING

Thermal noise, **space constraints** and **condensation protection** must be considered when designing a thermal solution.

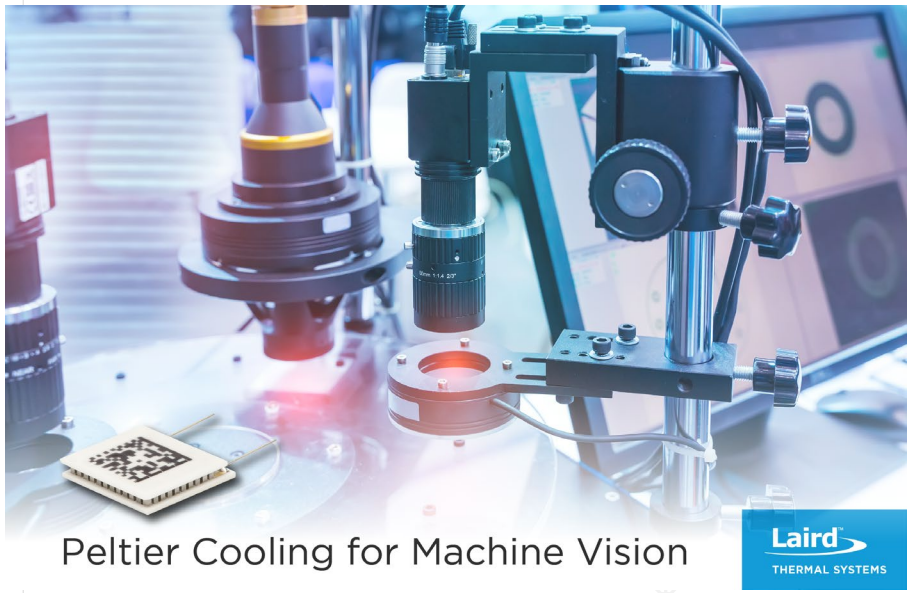
THERMOELECTRIC COOLERS KEEP IMAGING SENSORS COOL

High Temperature thermoelectric coolers **utilize the Peltier effect** to cool the sensor below its maximum operating temperature.

NEXT GENERATION THERMOELECTRIC COOLERS BOOST COOLING CAPACITY BY 10%

Designed to **survive high-temperature** environments, the OptoTEC™ OTX/HTX and HiTemp ETX Series offer cooling from 0.4 to 322 Watts in a **compact form factor**.

For More Information



Find more information about
OptoTEC™ OTX/HTX Series
HiTemp ETX Series

Learn more about cooling for Machine Vision in our
Application Note

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

Laird™

THERMAL SYSTEMS

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