



Thermoelectric Coolers for Machine Vision

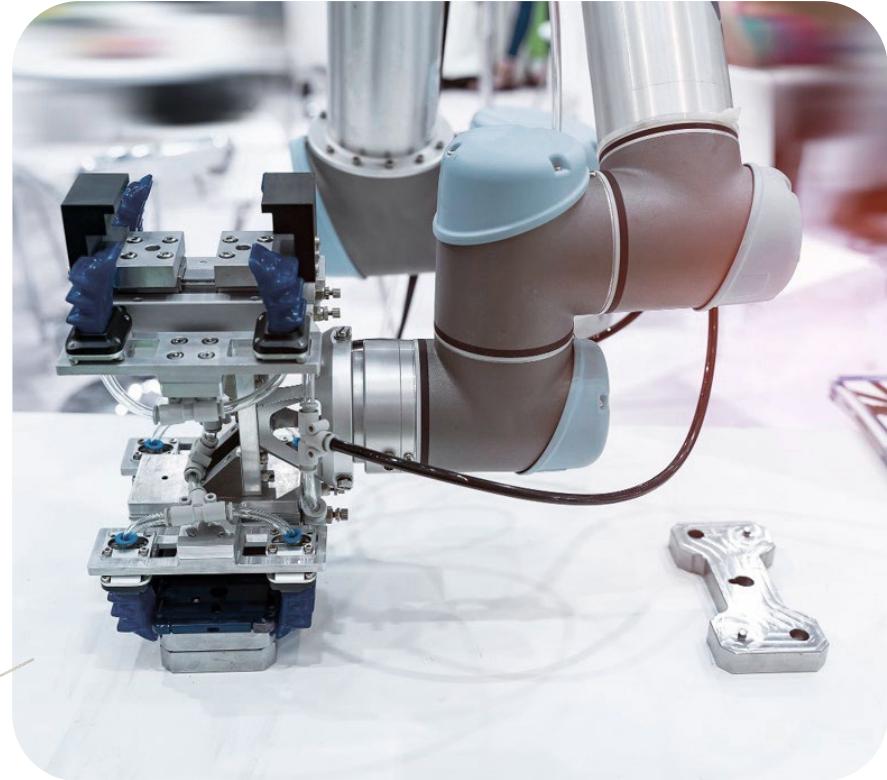
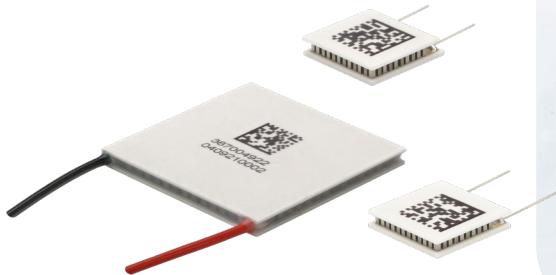


Introduction

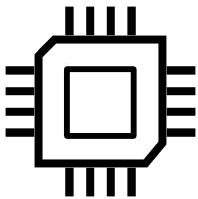
Machine vision is the replacement of human examination, assessment and decision-making



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



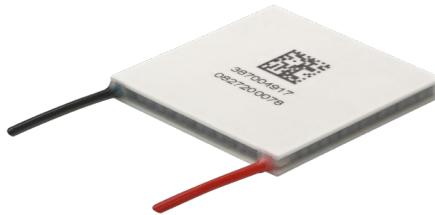
Collision Avoidance Systems



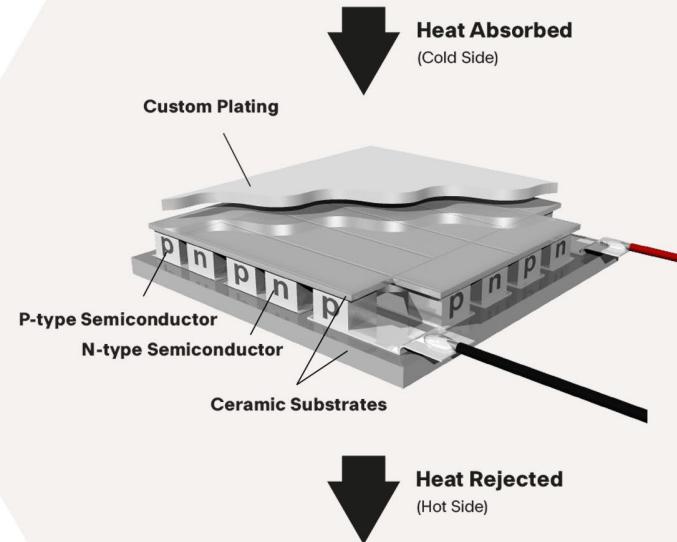
Artificial Intelligence



Thermoelectric Cooling



Thermoelectric coolers rapidly dissipate heat away from sensitive electronics



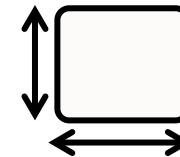
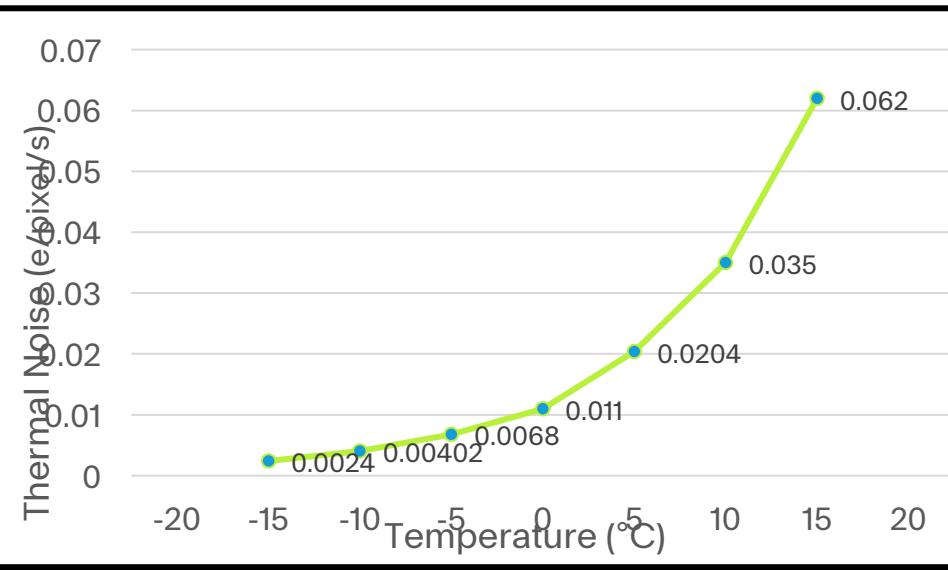


Application Challenges



Thermal Noise

Negatively affects image quality



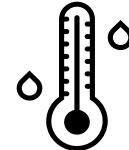
Swap Requirements

Thermoelectrics increase size, weight, power and cost of system



Thermal Shorting

Cause the thermoelectric cooler to draw more current



Condensation

Moisture can form on cold surfaces

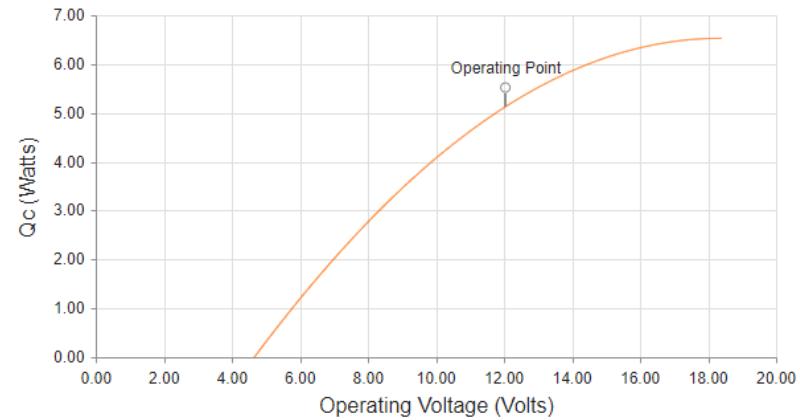
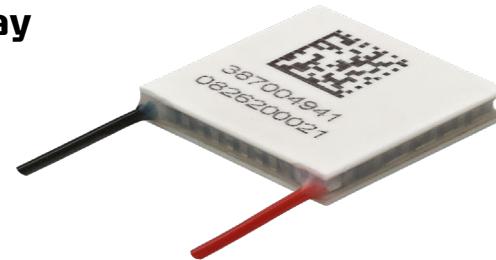
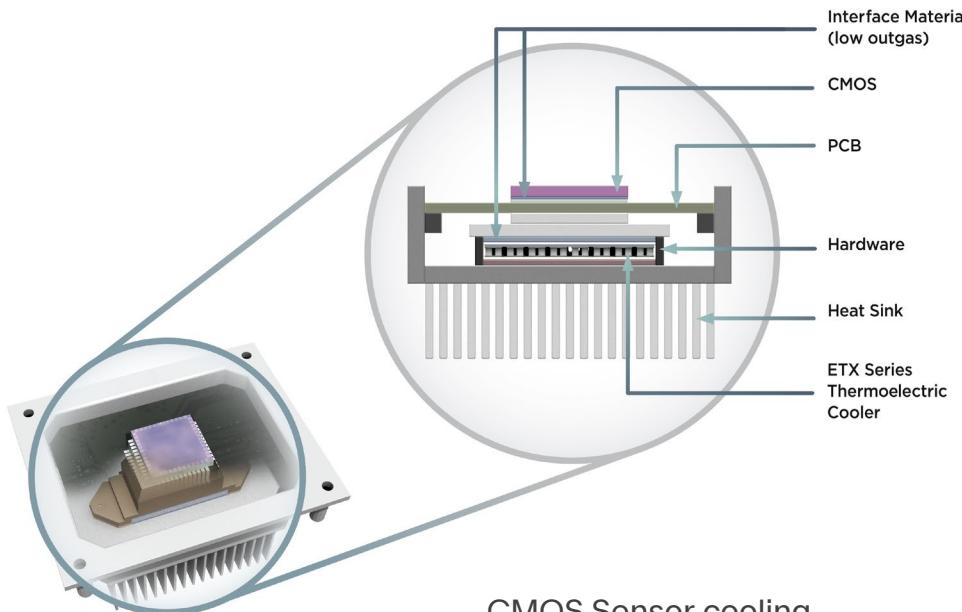


Outgassing

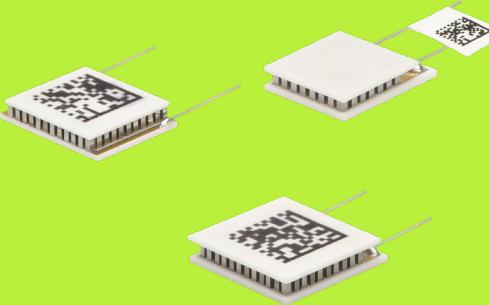
Outgassing from standard thermal interface material can coat lens

Thermoelectrics in Imaging Sensors

Compact Thermoelectric coolers rapidly dissipate heat away from sensitive imaging sensors



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 Temp Operation

Withstands temperatures up to 150°C

Environmentally Friendly

No hazardous CFC's used

Compact Form Factor

Ideal for applications with tight space constraints such as security cameras



(ΔT) up to 83°C

Features a higher thermal insulating barrier compared to standard materials

10% Cooling Capacity Boost

Assembled with advanced thermoelectric material

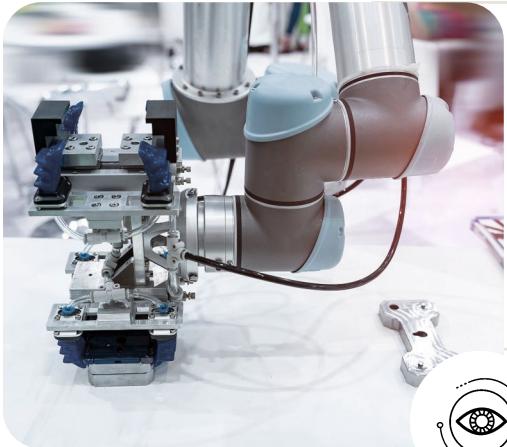
High COP

Require less input power to perform similar performance

Reliable Solid State

The robust construction assure 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.



THERMOELECTRIC COOLERS KEEP IMAGING SENSORS COOL

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

SPOT COOLING OF IMAGING SENSORS CAN BE CHALLENGING

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

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. 9

For more Information



Peltier Cooling for Machine Vision

Find more information about

[OptoTEC™ OTX/HTX Series](#)

[HiTemp ETX Series](#)

Learn more about cooling for Machine Vision in our
[Application Note](#)

About Tark Thermal Solutions

Tark Thermal Solutions 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



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Visit our website and full service hub under **tark-solutions.com**



Chat directly with our service-team via the Tool on our Website



Contact us for a personal consultation at:
sales@tark-solutions.com

**Tark Thermal Solutions
is the optimum choice
for standard or custom
thermal systems**