



TARK THERMAL
SOLUTIONS

Thermoelectric Coolers for Machine Vision



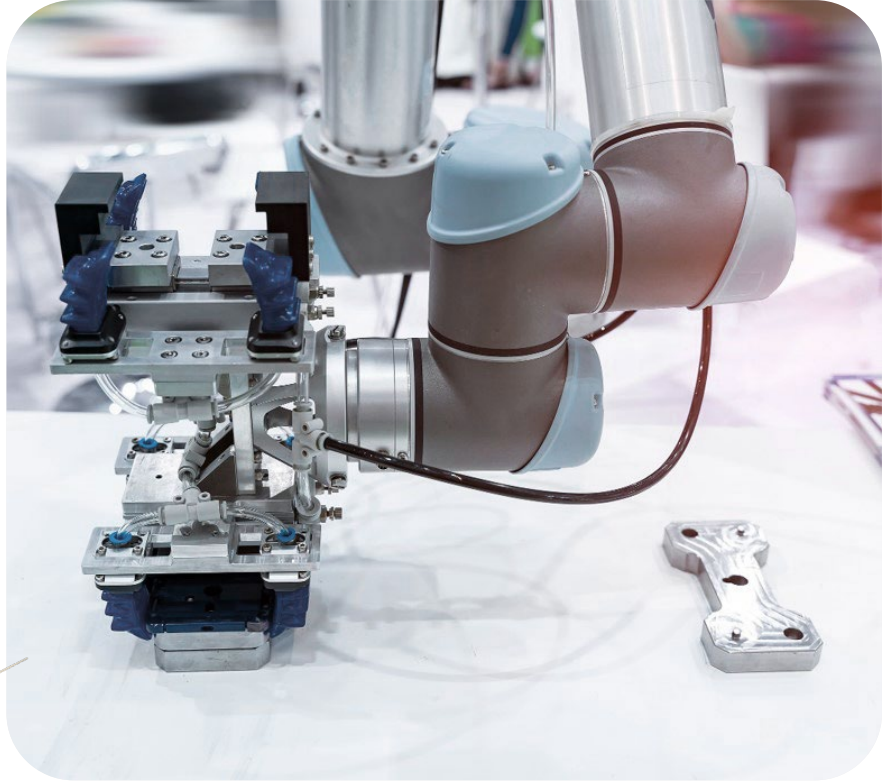
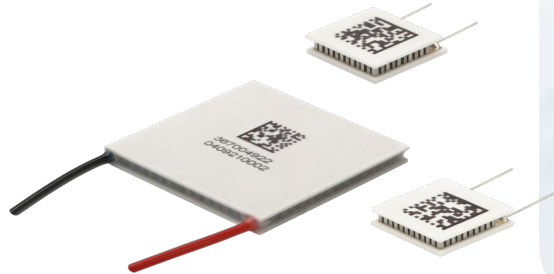


Introduction

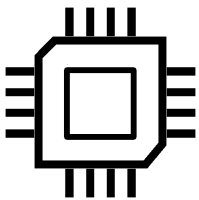
Machine vision is the replacement of human **examination, assessment and decision-making**



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:

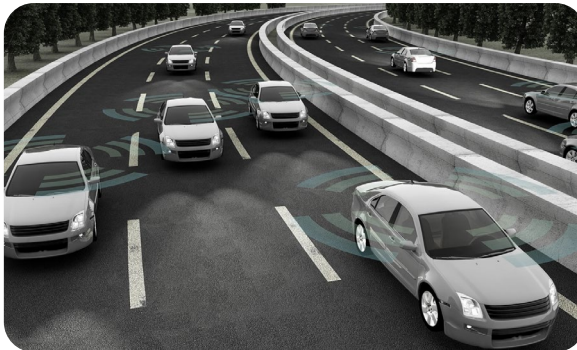
CCD (charge-coupled device) sensors

CMOS (complementary metal-oxide semiconductor) sensors

Inspection Systems



Collision Avoidance Systems

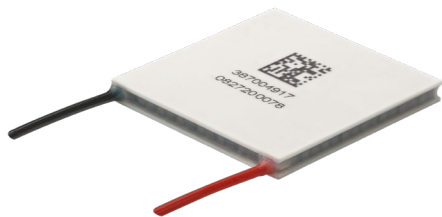


Artificial Intelligence

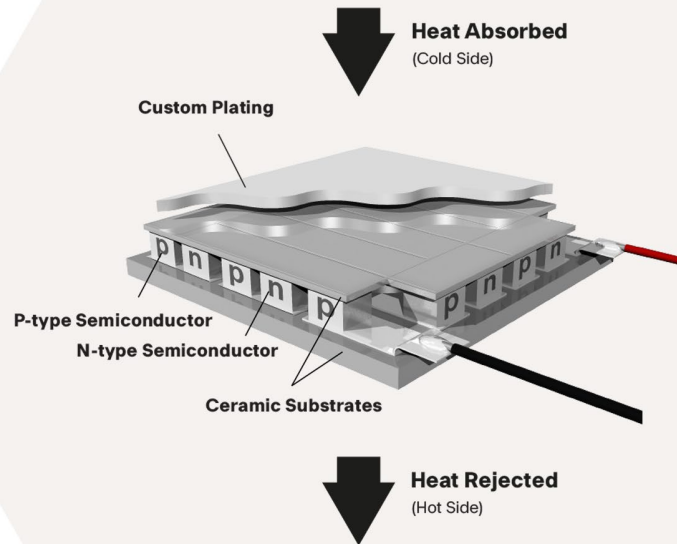




Thermoelectric Cooling



Thermoelectric coolers
rapidly dissipate heat away from
sensitive electronics



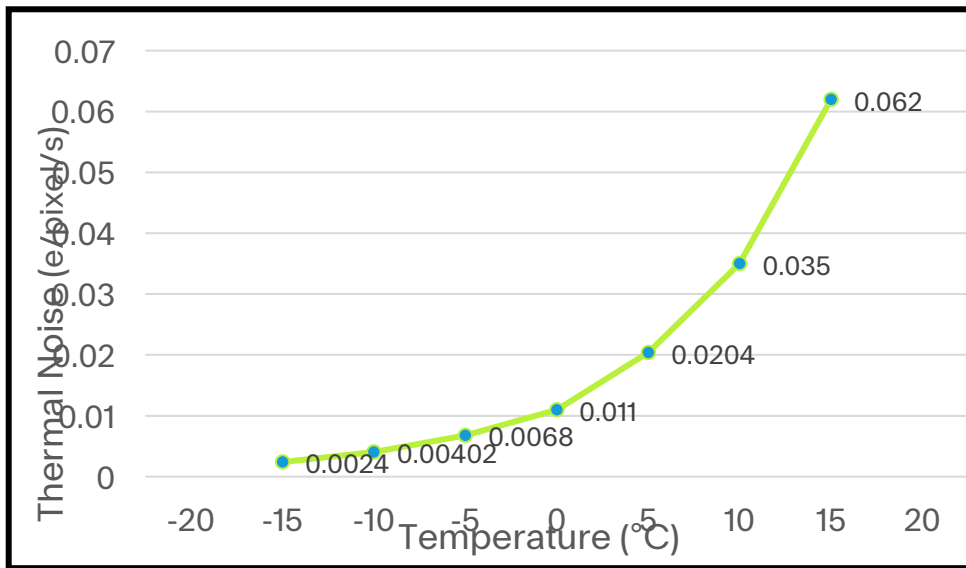


Application Challenges

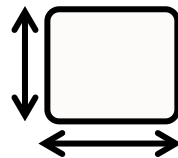


THERMAL NOISE

Negatively affects image quality



TTS



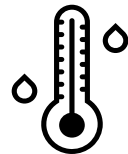
SWAP REQUIREMENTS

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

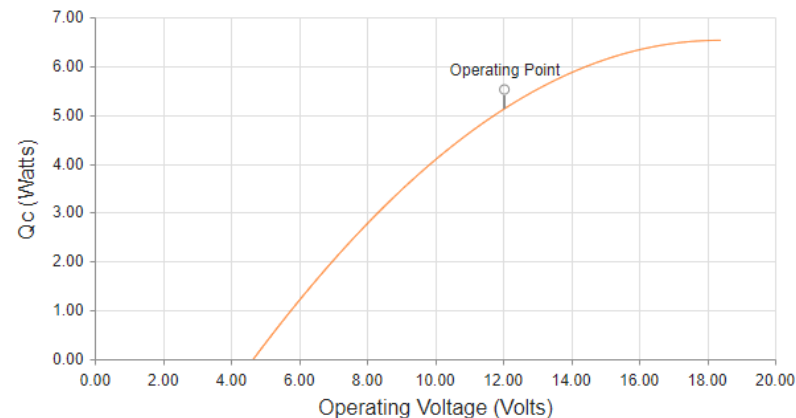
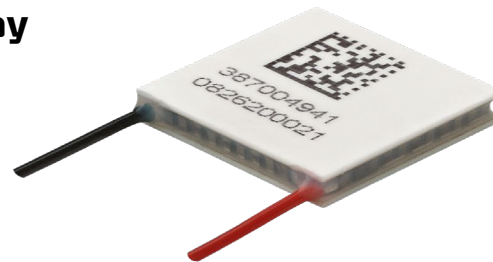
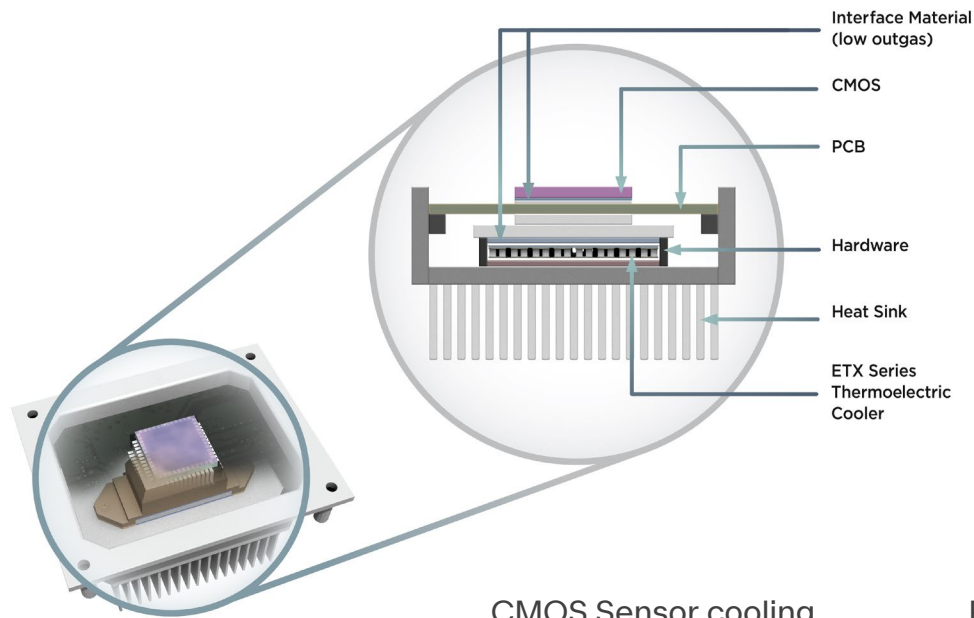


OUTGASSING

Outgassing from standard thermal interface material can coat lens

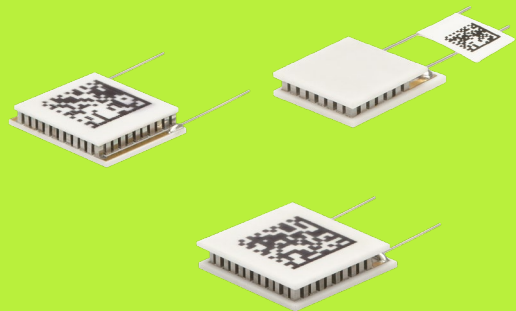
Thermoelectrics in Imaging Sensors

Compact Thermoelectric coolers rapidly dissipate heat away from sensitive imaging sensors



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 Temp Operation

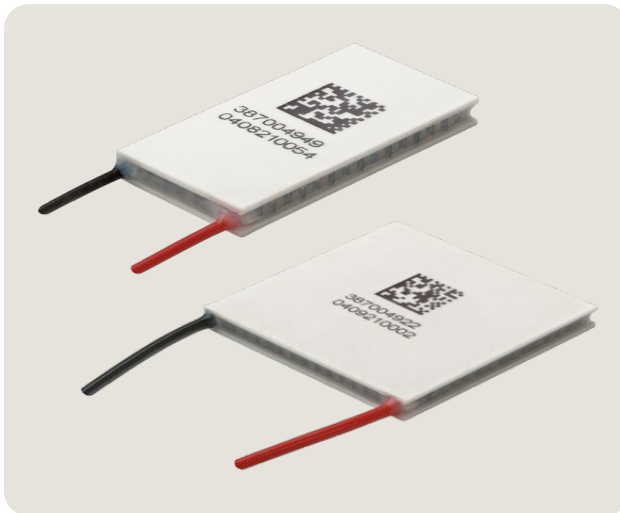
Withstands temperatures up to 150°C

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**.

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**. 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



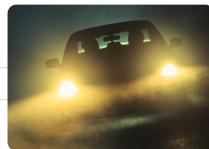
Medical



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



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



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**