

**Teledyne DALSA**  
Intelligence Surveillance Reconnaissance  
(ISR)

# ISR AND DEFENSE MISSION COMPONENTS

 **TELEDYNE**



## A HISTORY OF ROBUST, RELIABLE, AND MISSION-READY IMAGING PRODUCTS

Teledyne provides smarter mission critical products to solve the most complex Intelligence Surveillance Reconnaissance (ISR) imaging challenges. We deliver innovative and advanced solutions to provide the very height of technological advantage to our customers. With our extensive experience in ruggedized, rad-hard space, ISR and proven industrial solutions, we offer a choice of imaging modalities and robust product building blocks.

We are privileged to engage with the industry's most technology-forward ISR companies. These companies, with turnover beyond \$1 billion dollars a year, are leading the world with their innovative and progressive solutions. Working closely with our partners has allowed us to continually push the edge of our own technology, helping our partners toward their own successful solutions.

From commercial off-the-shelf products to modified versions of existing products to full custom solutions, we have you covered. Our deep experience in the development, test and deployment of sensor technology powers some of the world's most bespoke ISR systems. We'll ensure a technology path that ensures both rugged operation now, and for many years into the future.

## OUR EXPERIENCE

- Strong space and ISR heritage with more than 35 years of mission experience for both military and commercial projects
- World-leader in scanning solutions for aerospace imaging
- Proven track record developing export controlled and ITAR technologies
- Field proven ISR products:
  - Wide area persistent surveillance
  - Aerial reconnaissance (scanning technologies)
  - Battleground intelligence (scanning technologies in the visible, near IR, SWIR and LWIR)
  - Anti-missile/air defense system technology
  - Security (staring and scanning technologies)
  - Remote monitoring (staring and scanning technologies)





## WHAT TELEDYNE OFFERS

Our capabilities are built to support your long-term, mission critical needs. We offer our partners access to our industry-leading proprietary sensor technologies and product building blocks for both area (2D) and scanning (1D). Our team of industry specialists combined with our state-of-the-art facilities, (including a Class 1, ISO-certified cleanroom) provide the foundation for an unparalleled advantage and partnership.





## IN ADDITION TO OUR LEADING-EDGE TECHNOLOGIES, WE OFFER OUR CUSTOMERS SPECIALIZED CAPABILITIES AND PRODUCT ENHANCEMENTS:

- Design and production of image sensors, electronic cameras, imaging systems, and application software
- Visible, NIR, SWIR, LWIR imaging modalities
- Embedded vision capability (traditional and artificial intelligence image processing)
- Customized optical filters (discrete optic and monolithic wafer level) for multispectral and hyperspectral imaging
- Focal plane arrays
- Forward motion compensation
- Ruggedized electronics including conformal coating for MIL-STD-810 and to IP ratings
- Low noise
- Radiation hardness up to 100k rad
- Encryption integrity
- Custom interfaces
- Specialized designs for high speed (up to 100M fps in burst mode), unique form factors, SWAP, backside thinning for enhanced responsivity, low noise, extreme temperatures, thermal management, etc.
- Standard products, semi-custom (e.g. spectral filter changes, ruggedization of existing standard products, etc.) and full custom products available
- Ability to provide products for both high volume and small volume applications
- Environmental and specialized testing
- Ongoing development of SWIR and LWIR capabilities for deployment across our standard product families



## AREA/2D PRODUCTS

### STANDARD PRODUCTS

| PRODUCT   | RESOLUTION     | SPEED  |
|---|----------------|--|
| <b>GENIE NANO FAMILY</b><br>Color and Monochrome Cameras  | 0.5M up to 67M | Up to 850 fps depending upon camera interface and specifications |
| <b>KEY FEATURES</b>   |                |  |
| <ul style="list-style-type: none"> <li>• Compact</li> <li>• Can be ruggedized</li> <li>• Semi-custom options: conformal coating, Piezo forward motion compensation</li> <li>• Option for UART (RS-232). This is applicable for some cameras</li> <li>• 1 GigE, 5 GigE, 10 GigE, CL and CXP interface</li> <li>• Standard product</li> </ul> |                |  |



FOR MORE INFORMATION ON OUR  
 AREA/2D PRODUCTS, PLEASE VISIT US AT:  
<https://www.teledynedalsa.com/en/products/imaging/cameras/area-scan-cameras>

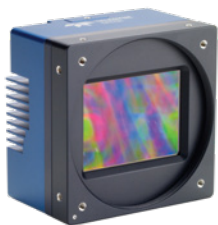


| PRODUCT   | RESOLUTION     | SPEED  |
|---|----------------|--|
| <b>LT SERIES</b><br>Color and Monochrome USB3 Cameras | 1.7M up to 67M | Up to 162 fps depending upon camera and specifications |



| KEY FEATURES   |
|--|
| <ul style="list-style-type: none"> <li>• Compact</li> <li>• Can be ruggedized</li> <li>• Semi-custom options: conformal coating, Board level available</li> <li>• USB3 interface</li> <li>• Lens controller</li> <li>• Standard product</li> </ul> |

| PRODUCT   | RESOLUTION             | SPEED |
|---|------------------------|-------|
| <b>CM-11K 86M</b><br>High resolution and high-speed camera<br>Monochrome or Color | 86M<br>6 μm pixel size | 2 fps |



| KEY FEATURES  |
|---|
| <ul style="list-style-type: none"> <li>• Piezo forward motion compensation</li> <li>• NIR response</li> <li>• In-camera image pre-processing (flat field, pixel correction)</li> <li>• Ruggedized for Open Skies Program</li> <li>• Lens options available</li> <li>• Standard product</li> </ul> |

# INFRARED PRODUCTS

## PRODUCT

### CALIBIR LWIR

Uncooled camera family



## RESOLUTION

17  $\mu\text{m}$  VGA (640 x 480)

## SPEED

30 Hz

## KEY FEATURES

- VOx
- Wafer level packaging
- 8 – 14  $\mu\text{m}$  spectral range
- Small form factors
- NETD of <50 mK to <65 mK (depending upon model); F/1.0 at 30 fps
- Dynamic Range >600°C (with NETD above)
- GigE vision, CSI-2 interface options
- Standard product with possible customization

## PRODUCT

### MICROCALIBIR

Compact Uncooled LWIR Cores



## RESOLUTION

12  $\mu\text{m}$  QVGA (320 x 240) and VGA (640 x 480)

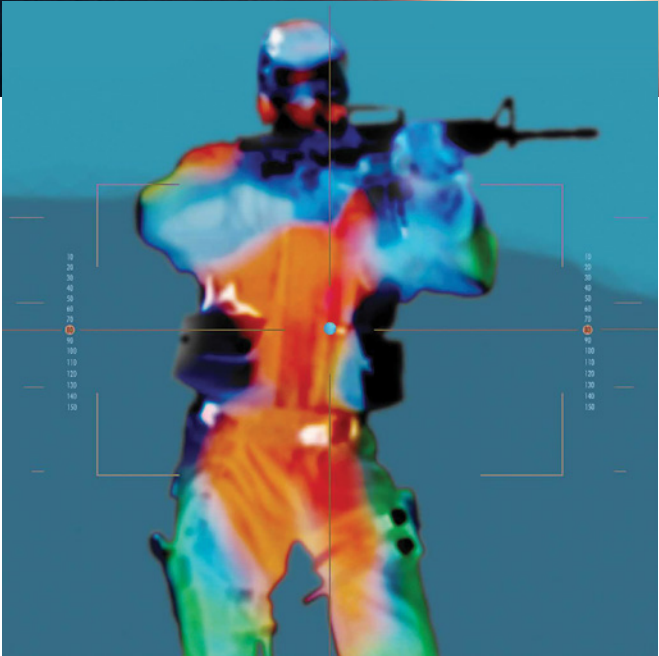
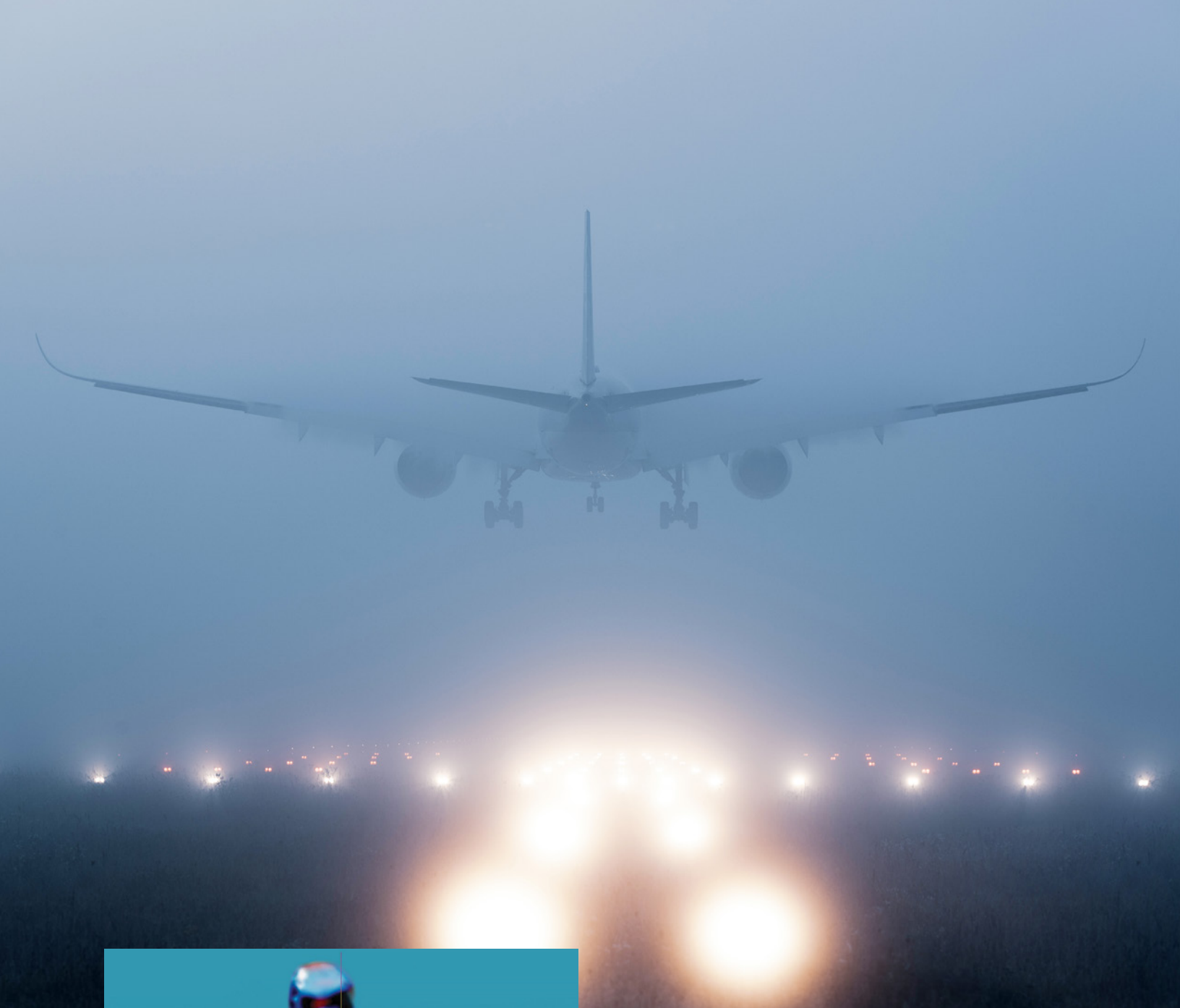
## SPEED

30/60 Hz

## KEY FEATURES

- VOx
- Deep-ADC ROIC circuit
- 8 – 14  $\mu\text{m}$  spectral range
- Small form factors: 21 mm x 21 mm x 12.9 mm core only
- NETD of <50 mK to <60 mK (depending upon model); F/1.0 at 30 fps
- Dynamic Range >600°C (with NETD above)
- Lens selection ranging from ~10 to 90-degree HFOV
- Standard product with possible customization





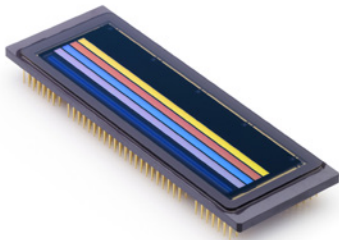
**FOR MORE INFORMATION ON  
OUR INFRARED PRODUCTS,  
PLEASE VISIT US AT:**

**[https://www.teledynedalsa.com/en/  
products/imaging/infrared-detectors](https://www.teledynedalsa.com/en/products/imaging/infrared-detectors)**

# MULTISPECTRAL PRODUCTS

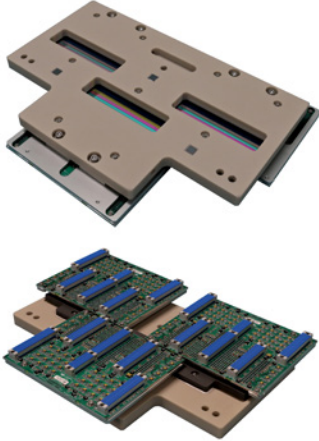
Credit: NASA, using Landsat data from the U.S. Geological Survey.


| PRODUCT  | RESOLUTION  | SPEED     |
|--|---|-----------|
| <b>IC-47, IC-49</b><br>Multispectral CMOS Charge Domain TDI Sensor   | 3,072 B1-B4 pixels, 28 $\mu\text{m}$ pixel size   | B: 10 kHz |
|  | 12,288 P1 & P2 pixels, 7 $\mu\text{m}$ pixel size | P: 40 kHz |
| <b>KEY FEATURES</b> <ul style="list-style-type: none"> <li>• 2 pan bands and 4 multispectral bands</li> <li>• Customizable multispectral bands</li> <li>• <math>\sim\frac{1}{2}</math> the power &amp; <math>\frac{1}{4}</math> the noise of typical CCD</li> <li>• Integrated multispectral filters</li> <li>• Selectable TDI stages</li> <li>• Radiation tolerance:                             <ul style="list-style-type: none"> <li>• <math>\geq 20</math> krad (Si), Co60 (TID)</li> </ul> </li> <li>• No destructive latch-up (SEL) <math>\geq 75</math> MeV/mg/cm<sup>2</sup></li> </ul> |   |           |

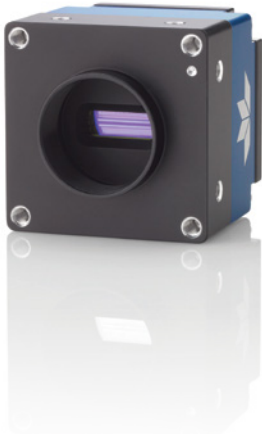


| PRODUCT   | RESOLUTION            | SPEED      |
|---|-----------------------|------------|
| <b>IC-51</b><br>Visible Multispectral CMOS TDI  | 6, 144 B1-B4 pixels   | B: 9.5 kHz |
|   | 12,288 P1 & P2 pixels | P: 38 kHz  |
| <b>KEY FEATURES</b> <ul style="list-style-type: none"> <li>• 2 pan bands and 6 multispectral bands</li> <li>• Customizable multispectral bands</li> <li>• Super Resolution possible</li> <li>• <math>\sim\frac{1}{2}</math> the power &amp; <math>\frac{1}{4}</math> the noise of typical CCD</li> <li>• Integrated multispectral filters</li> <li>• Selectable TDI stages</li> <li>• Radiation tolerance:                             <ul style="list-style-type: none"> <li>• <math>\geq 20</math> krad (Si), Co60 (TID)</li> </ul> </li> <li>• No destructive latch-up (SEL) <math>\geq 75</math> MeV/mg/cm<sup>2</sup></li> </ul> |                       |            |



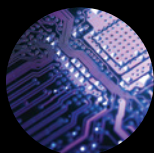
| PRODUCT  | RESOLUTION  | SPEED     |
|--|---|-----------|
| <b>FOCAL PLANE ARRAYS</b><br><b>IC-48</b>   | 9,050 B1-B4 pixels, 28 $\mu\text{m}$ pixel size   | B: 15 kHz |
|  | 36,300 P1 & P2 pixels, 7 $\mu\text{m}$ pixel size | P: 30 kHz |
| <b>KEY FEATURES</b>  |   |           |
| <ul style="list-style-type: none"> <li>• 3 sensors butted together in a single ceramic package</li> <li>• 2 pan bands and 4 multispectral bands</li> <li>• Customizable multispectral bands</li> <li>• <math>\sim\frac{1}{2}</math> the power &amp; <math>\frac{1}{4}</math> the noise of typical CCD</li> <li>• Integrated multispectral filters</li> <li>• Selectable TDI stages</li> <li>• 45 <math>\mu\text{m}</math> planarity</li> <li>• Radiation tolerance: <ul style="list-style-type: none"> <li>• <math>\geq 20</math> krad (Si), Co60 (TID)</li> <li>• No destructive latch-up (SEL) <math>\geq 75</math> MeV/mg/cm<sup>2</sup></li> </ul> </li> </ul> |   |           |

| PRODUCT   | RESOLUTION  | SPEED     |
|---|---|-----------|
| <b>47-HS-12K04F MULTISPECTRAL</b><br><b>CMOS TDI CAMERA</b>   | 3,072 B1-B4 pixels, 28 $\mu\text{m}$ pixel size   | B: 10 kHz |
|   | 12,288 P1 & P2 pixels, 7 $\mu\text{m}$ pixel size | P: 40 kHz |
| <b>KEY FEATURES</b>   |   |           |
| <ul style="list-style-type: none"> <li>• 2 pan bands and 4 multispectral bands</li> <li>• Ruggedized design for high shock and vibrations</li> <li>• Camera mounting interface is customizable</li> <li>• Area mode and TDI mode</li> <li>• Stage selection per band</li> <li>• Customizable multispectral bands</li> <li>• Camera architecture can support other Teledyne DALSA multispectral sensors</li> <li>• Radiation tolerance: <ul style="list-style-type: none"> <li>• <math>\geq 20</math> krad (Si), Co60 (TID)</li> <li>• No destructive latch-up (SEL) <math>\geq 75</math> MeV/mg/cm<sup>2</sup></li> </ul> </li> </ul> |   |           |

| PRODUCT   | RESOLUTION                                | SPEED  |
|---|---|--------|
| <b>LINEA 1D</b><br>Visible & SWIR Camera   | 1,024 pixels, 16 $\mu\text{m}$ pixel size | 40 kHz |
|   | <b>KEY FEATURES</b>                       |        |
| <ul style="list-style-type: none"> <li>• Visible response: 400 nm to 900 nm, InGaAs response: 950 nm to 1700 nm</li> <li>• HDR mode</li> <li>• Cycling mode</li> <li>• Programmable I/Os</li> <li>• Compact form factor (46 mm x 46 mm x 55 mm)</li> <li>• Configurable full well</li> <li>• GigE 7 CameraLink interface</li> <li>• Standard product</li> </ul> |   |        |

# A FULLY INTEGRATED OFFERING

As part of the Teledyne group of companies, we are made stronger by our abilities to provide access to additional capabilities:



## Teledyne e2v

Expertise in RF Power, high performance imaging and hi-rel semiconductor technologies.

[www.teledyne-e2v.com/markets/defence](http://www.teledyne-e2v.com/markets/defence)



## Teledyne Imaging Sensors

Cooled IR tactical cameras, Mercury Cadmium Telluride (HgCdTe) focal plane arrays in NIR, MWIR, and LWIR wavelengths.

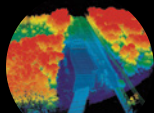
[www.teledyne-si.com/business-units/teledyne-imaging-sensors](http://www.teledyne-si.com/business-units/teledyne-imaging-sensors)



## Teledyne Scientific

Next-generation technology and products based on innovations in Materials Science, Optics, Semiconductor ICs, MEMS, Neurotechnology and Artificial Intelligence.

[www.teledyne-si.com](http://www.teledyne-si.com)



## Teledyne Optech

Fully integrated advanced lidar instruments with EO/IR cameras and related technologies such as GPS/inertial measurement systems and waveform digitization.

[www.teledyneoptech.com/en/home](http://www.teledyneoptech.com/en/home)



## Teledyne FLIR

Complete, mission proven line of high definition EO/IR sensor, camera and complete solution options providing customers with unmatched imaging solutions and superior support.

[www.flir.com/applications/government-defense](http://www.flir.com/applications/government-defense)



Credit: NASA (Mercury Dual Imaging System)

## FOR MORE INFORMATION

Email: [TDI\\_ISRolutions@Teledyne.com](mailto:TDI_ISRolutions@Teledyne.com)

Website: [teledynedalsa.com/isr](http://teledynedalsa.com/isr)



© 2021 Teledyne DALSA, a Teledyne Technologies company. All rights reserved. Specifications are subject to change. All logos, trademarks or service marks used herein are the property of their respective owners. 2021 11 22