TELEDYNE IMAGING
Everywhereyoulook™

Our Newest Vision Solutions
to Solve Your Vision Challenges

Industrial Vision Solutions

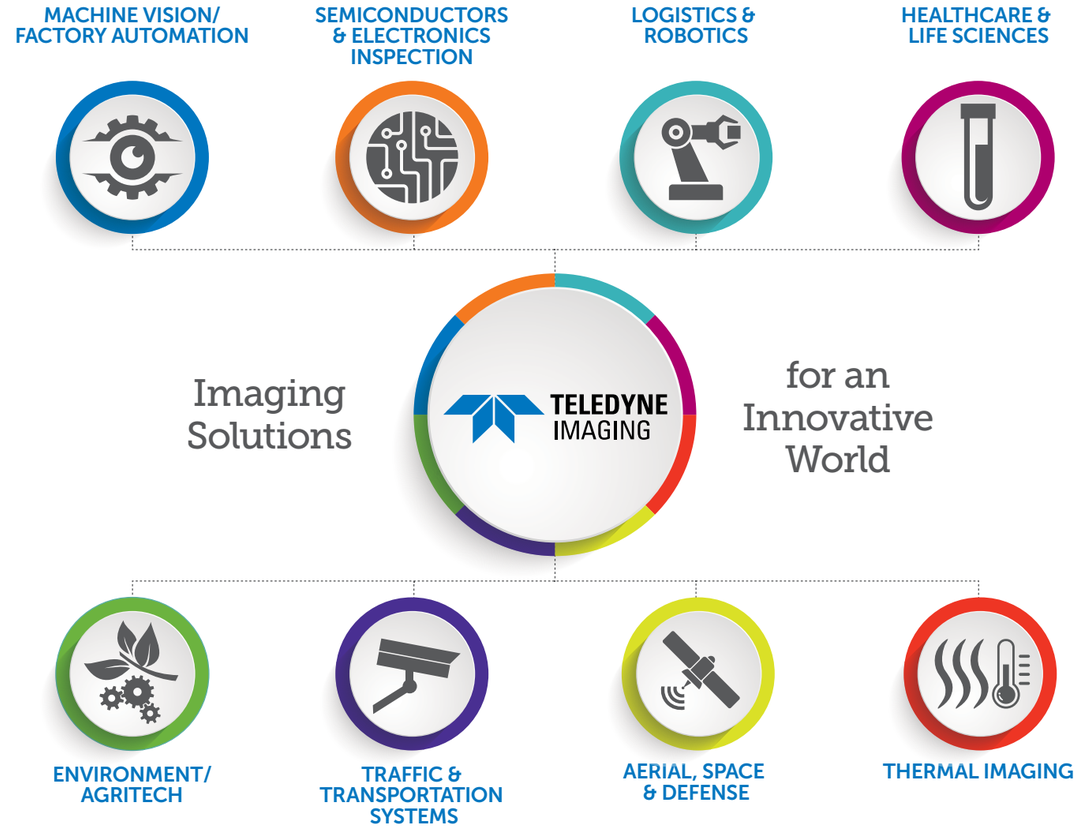
Teledyne DALSA | Teledyne e2v | Teledyne ICM | Teledyne Lumenera
Teledyne Photometrics | Teledyne Princeton Instruments

High Performance | Innovative | Proven | Smart Robust | Cost Effective

Teledyne Imaging designs, engineers, and manufactures digital imaging components, software, and sub-systems serving a global marketplace, across dozens of business segments, and hundreds of applications.

Our imaging technology begins with the visible spectrum, and extends far beyond it, from deep infrared through extreme UV and all the way to X-ray frequencies.

Our products define the top end of performance in the world's most demanding digital imaging applications.



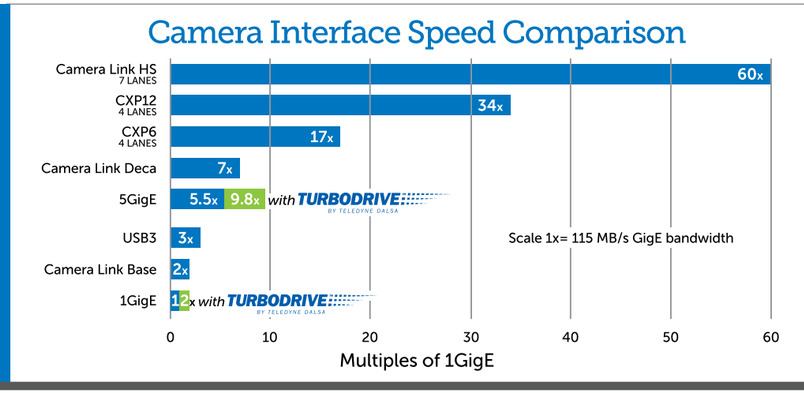
2D Area Scan Cameras
For Visible Light / NIR Spectrum

From cost-efficient board level cameras to full-featured high performance cameras, Teledyne Imaging provides a broad and deep area scan camera portfolio to meet the challenges of today's imaging applications.

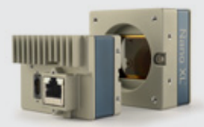
The Right Sensors. The Right Interface.

Teledyne Imaging area scan cameras are based on the industry's most innovative image sensor technology from manufacturers including Sony®, On Semiconductor® and of course our own Teledyne imagers.

Teledyne Imaging area scan cameras offers support for a variety of interfaces, such as GigE Vision (1 to 5 GigE), USB3, Camera Link, Camera Link HS, and CoaXPress, to allow seamless integration with virtually any imaging system.



TURBODRIVE BY TELEDYNE DALSA

Falcon	Up to 7 GB/s	 **Falcon4-CLHS** From 11 MP @ 600 fps to 86 MP @ 16 fps with CLHS interface and Optical cable.
Genie Nano CXP	Up to 2.5 GB/s	 **Genie Nano-CXP** From 16 to 67 MP resolution with CoaXPress® 6 Gbps technology.
Genie Nano CL Genie Nano 5GigE	850 MB/s 595 MB/s	 **Genie Nano-CL** CMOS 5 to 25 MP with proven Camera Link® interface.  **Genie Nano-5GigE** CMOS 3 to 45 MP resolution with TurboDrive™ technology and 5GigE interface.
Lt Series USB3 Vision Genie Nano 1GigE	350 MB/s 115 MB/s	 **Lumenera Lt Series** From 1 to 31 MP resolution with USB Vision interface.  **Genie Nano-1GigE** CMOS VGA to 25 MP with our exclusive TurboDrive technology.






Genie™ Nano

Compact Cameras with Unprecedented Speed and Uncompromised Image Quality

Genie Nano redefines low cost performance. Genie Nano starts with industry leading CMOS image sensors and adds proprietary camera technology for breakthrough speed, a robust build quality for wide operating temperature, and an unmatched feature set—all at an incredible price.

Flexible Camera Interface Selection

Available in GigE, 5GigE, Camera Link, and CoaXPress versions and resolutions from VGA to 67 megapixels, the Nano delivers high speed, low noise, and global shutters.

GENIE NANO KEY FEATURES

- Uses standard PC Ethernet port & hardware (GigE)
- Simplified set-up with field proven Sapera LT software featuring CamExpert
- Engineered to accommodate industrial environment with a ruggedized, screw mount, RJ-45 connector

PROGRAMMABILITY

- Higher frame rates achievable in partial scan mode
- Multi-exposure feature
- Multi-ROI feature
- Metadata support
- IEEE1588 (Precise Time Protocol) support for multi-camera synchronization (GigE models)

GiGE VISION · CAMERA Link · CXP

HOW TO BUY
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Our Genie Nano Cameras

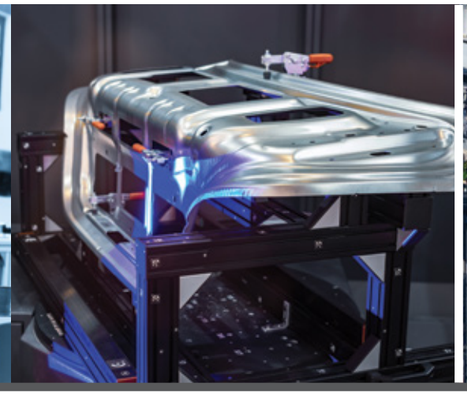
Genie Nano 1GigE	Genie Nano 5GigE	Genie Nano Camera Link	Genie Nano CoaXPress
CMOS VGA to 25 MP with our exclusive TurboDrive for the highest frame rates in the industry. Powerful features including burst mode, cycling mode, HDR, T2IR, and Precision Time Protocol (IEEE 1588). Models for mono, color, and NIR response, with lens mounts including C, CS, and F-mount.	CMOS 3 MP to 45 MP and all the great features of the 1GigE series but with powerful 5GigE interface make this an easy upgrade to more speed. Our TurboDrive enables even higher throughput: 10 Gbps bandwidth with no changes to your 5 Gbps cabling or hardware.	With the latest high performance CMOS image sensors from 5 MP to 25 MP, Genie Nano CL lets you take advantage of higher frame rates, higher resolution, and higher performance without having to change the rest of your existing Camera Link system infrastructure.	Designed for full-throttle performance. Genie Nano-CXP delivers the maximum throughput from leading-edge high resolution CMOS image sensors from 16 to 67 MP. Robust build quality, wide operating temperature, and an unmatched feature set—all at an incredible price.

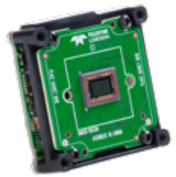
Break the GigE Limit

TURBODRIVE BY TELEDYNE DALSA

TurboDrive is a mode of operation used to push past the Gigabit Ethernet speed ceiling, allowing a GigE Vision camera to send pixel information at often double GigE bandwidth with no changes in hardware, speeding up line and frame rates beyond the nominal link capacity.





Lumenera™ Lt Series

Compact, Lightweight USB3 Cameras Designed to Meet the Challenges of Today's Imaging Applications

Flexibility in Features and Form Factors

Teledyne Lumenera's Lt Series Cameras offer a more compact and lower cost imaging solution and are designed specifically to meet the challenges of today's modern imaging systems that strive to provide advanced vision performance while using less power, less space, and fitting increasingly tight industry budgets.

From board level camera versions ideal for use with embedded systems or when system space is tight, to fully enclosed cameras with powerful features like P-Iris control in variable lighting conditions, the Teledyne Lumenera Lt Series cameras provides the flexibility in features and form factors for a wide variety of imaging applications.

LUMENERA Lt SERIES KEY FEATURES

- USB3 Vision interface
- Wide selection of a Global and Rolling CMOS sensors to meet the diverse imaging requirements
- High sensitivity with both front and back illuminated sensors (BSI)
- Side mounted USB connectors for ease of use in OEM solutions
- High sensitivity with pixel sizes from 2 µm to 3.45 µm
- High dynamic range, high speed, low read noise
- Flexible, proven 32 and 64-bit operating system compatibility for: Windows, Linux, Linux for embedded system platforms, and single board computers (SBCs).

TYPICAL APPLICATIONS

- Aerial Imaging
- Precision Agriculture
- Outdoor Imaging
- Intelligent Traffic Systems (ITS)
- Portable / OEM Devices
- Robotic Inspection
- Life Science

USB3 VISION

HOW TO BUY

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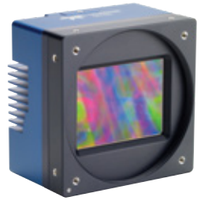
- teledynelumenera.com



Falcon™ 4-CLHS

True High Performance: High-Speed Global Shutter CMOS Cameras

Built to Perform

When you need true high performance imaging, turn to the Falcon4-CLHS. Using Teledyne Imaging's advanced CMOS architectures, the Falcon4-CLHS offers unique, unprecedented capabilities for large area, high resolution, high speed imaging. Models include 11.2M at 609 fps and 86M at 16 fps, both with a Camera Link HS interface using an optical cable.

The Falcon4-CLHS M4480 & M4400 are the newest members of the Falcon4 camera family and deliver a new series of easy-to-use, CLHS interface cameras specifically engineered for industrial imaging applications requiring high speed data transfer. These models can reach multiple thousand frames per second in partial scan mode, and have a very large pixel full well of over 160 ke when using the sensor binning mode.

FALCON4-CLHS KEY FEATURES

- Reduced dark noise levels and improved dark offset
- Improved sensitivity, including NIR response
- In-camera image pre-processing (flat field, pixel correction)
- Large full well when using in-sensor binning >160 ke
- Global shutter and exposure control
- Thousands of frames per second in Partial Scan Mode (ROI)

TYPICAL APPLICATIONS

- Electronic Inspection
- Aerial Imaging
- Flat Panel Inspection
- Semiconductor
- High Speed 3D Imaging
- Surveillance
- Motion Tracking and Analysis

CAMERA Link HS

HOW TO BUY

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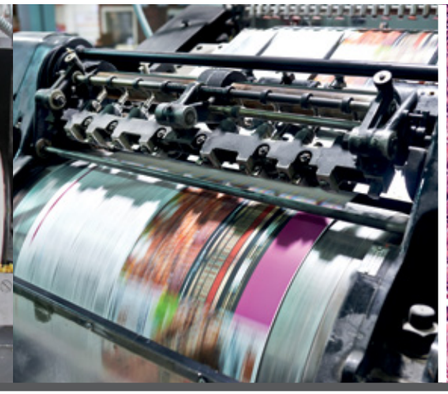
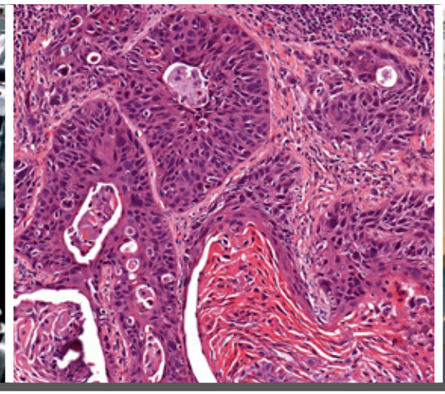
- teledynedalsa.com

1D Line Scan Cameras

Single Line, Multi-line, & TDI Technology at its Best

The feature-rich Linea cameras, with advanced CMOS sensor technology are available in 2k, 4k, 8k, 16k and 32k resolutions, with specific models for near and short-wave infrared (NIR, SWIR) applications. Linea cameras offer GigE, Camera Link, Camera Link HS, and Fiber interfaces making them ideal for a wide variety of applications.

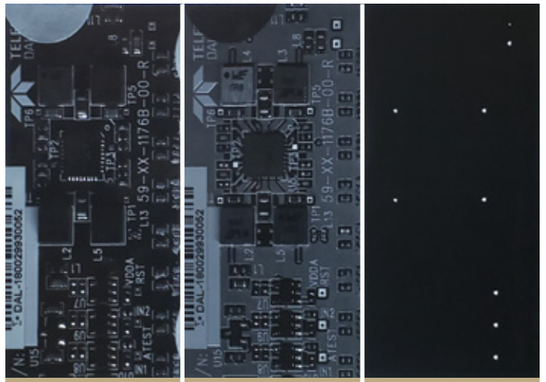



Industry Leading Performance

Linea SWIR	Linea Lite	Linea	Linea ML	Linea HS
Up to 41 Mpix/s	Up to 200 Mpix/s	Up to 1.2 Gpix/s	Up to 4.9 Gpix/s	Up to 13.1 Gpix/s
• 512 and 1024 pixel InGaAs • 40 kHz line rate • GigE	• 2k–4k multi-line CMOS • Up to 50 kHz line rate • GigE	• 2k–16k CMOS • Up to 71 kHz line rate • GigE, Camera Link, and CLHS	• 8k and 16k multi-line CMOS • Up to 300 kHz line rate • CLHS, fiber options	• 8k, 16k, and 32k resolution • Charge domain CMOS TDI • Up to 400 kHz line rate • CLHS, fiber options
GigE Vision	GigE Vision, TurboDrive BY TELEDYNE DALSA	GigE Vision, TurboDrive BY TELEDYNE DALSA, Camera Link, Camera Link HS	Camera Link HS	Camera Link HS

Innovation from the Line Scan Leader



Darkfield | Brightfield | Backlight

MULTIFIELD CAMERA SEQUENTIAL MODE

Reduce time and complexity required to capture both brightfield and darkfield images. With multiple strobed light sources, one monochrome Linea ML camera can capture brightfield and darkfield images simultaneously in a single pass.

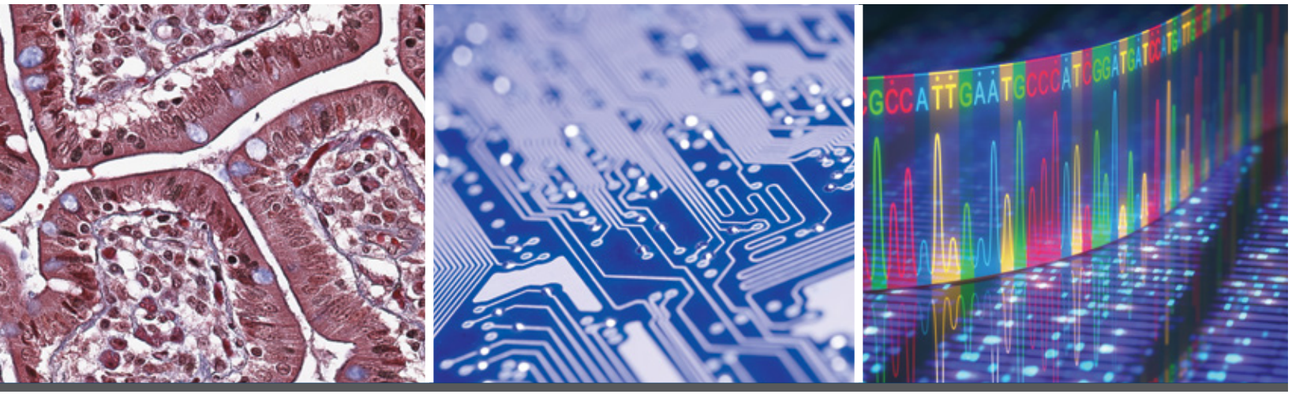
FIBER FACTS

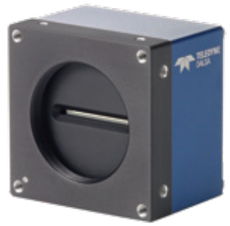
Teledyne's high-performance line scan cameras leverage optical fiber cable with a CLHS interface to achieve high speed connections over very long distances—CLHS delivers up to 8.4 GB/s over a single fiber optic cable up to hundreds of meters.

Fiber cables and connectors have made huge advances in robustness, flexibility, convenience and affordability and are well suited for machine vision applications.

1D Line Scan Cameras

Single Line, Multi-line, & TDI Technology at its Best





Linea

The orginal Linea was designed powerful enough to use anywhere and affordable enough to use everywhere. Small and low cost, while delivering high perfromance, innovative mono and color performance with resolutions from 2k to 16k, and line rates up to 71 kHz. GigE Vision®, Camera Link® (CL) or Camera Link HS (CLHS) interface options.

LINEA FEATURES

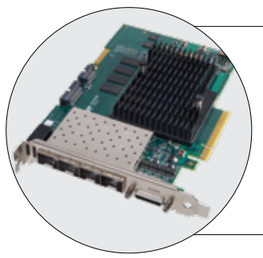
- TurboDrive for line rates that break through the GigE limit
- Programmable camera triggering, signalling and synchronization
- Full-fledged smart flat field and lens shading correction
- Multiple user coefficient sets and multiple FFC calibration sets
- AOI and ROI — Multiple Area and Regions of Interest

Linea Lite

Compact and remarkably cost effective, Linea Lite makes line scan more accessible than ever. This base unit offers multi line mono and color performance with resolutions from 2k to 4k and line rates up to 50 kHz with a GigE Vision® interface.

LINEA LITE FEATURES

- TurboDrive for line rates that break through the GigE limit
- Programmable camera triggering, signalling and synchronization
- Full-fledged smart flat field and lens shading correction
- Multiple user coefficient sets and multiple FFC calibration sets
- AOI and ROI — Multiple Area and Regions of Interest



Pair with Xtium2 for Ultimate Performance

Linea CL and CLHS cameras pair with Teledyne's Xtium™ series of high-performance frame grabbers. Representing a breakthrough in data throughput the Xtium supports native fiber optic cabling for the Camera Link HS interface, allowing longer cable lengths (up to hundreds of meters) that are rugged enough for industrial environments even while lowering system costs.

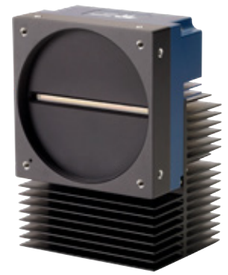
Linea ML

Trilinear CMOS

The Linea ML brings unmatched price-performance: industry-leading throughput with advanced trilinear CMOS technology that is still affordable. Delivers multiline architecture that enables powerful inspection techniques including HDR, color, multispectral analysis, and multi-field imaging (single-pass bright/darkfield). Available in 8k and 16k resolutions with CLHS and a native fiber optic interface for long cabling.

LINEA ML FEATURES

- High speed: up to 300 kHz line rate
- Three native colors (RGB), Bi-directional
- Independent exposure control per line (start and end of exposure)
- Long fiber optic cable
- Programmability for ease of integration and low system cost



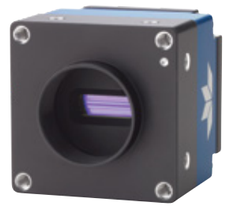
Linea HS: CMOS TDI

A New Definition of Speed

The Linea HS is powered by the industry's most advanced charge domain CMOS TDI to achieve line rates up to 400 kHz at an incredible 32k resolution — over 13.1 Gpixels/sec. Unique features like high dynamic range (HDR) and Multifield synchronization drive performance through a next-generation CLHS interface, delivering unmatched throughput over fiber optic cable.

LINEA HS FEATURES

- High Sensitivity Charge Domain CMOS TDI
- HDR Imaging
- Synchronized IO to control external lighting from the camera
- Multifield synchronization for simultaneous brightfield/darkfield imaging—up to four spectrally independent views in a single pass
- Fiber optic cables up to hundreds of meters



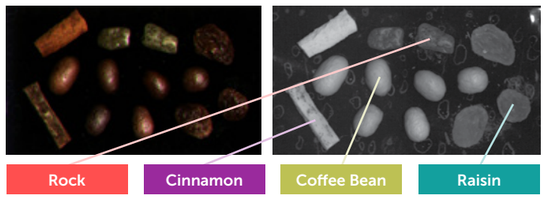
Linea SWIR

Teledyne's short-wave infrared (SWIR) GigE line scan camera features a cutting-edge InGaAs sensor in a compact package for a wide variety of applications. The uncooled sensor features 40 kHz line rate with horizontal resolution of 512 pixels or 1024 pixels, delivering great responsivity in wavelengths hidden to human eyes.

LINEA SWIR FEATURES

- 1024-pixel resolution—12.5 µm pixel size
- 950 to 1700 nm spectral band
- 40 kHz line rate
- HDR mode
- Cycling mode

An example of a food sorting application. Linea SWIR enables **more efficient** detection.



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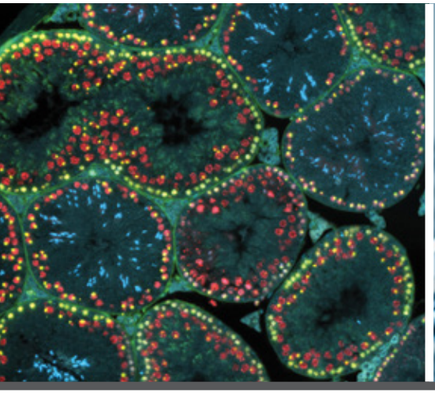
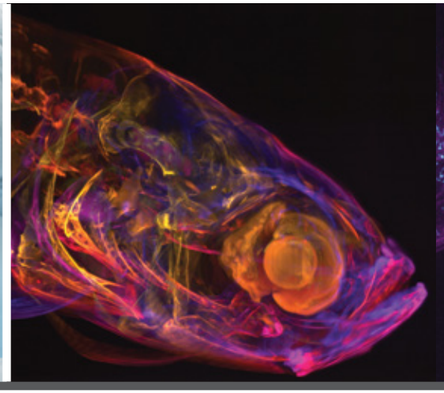
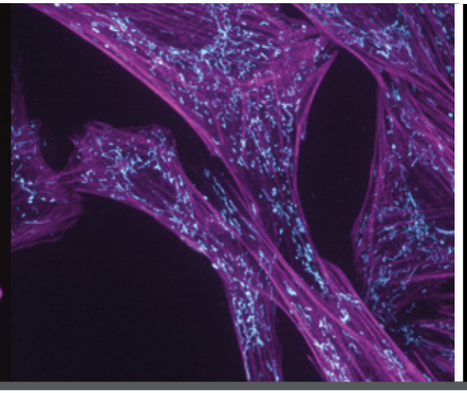
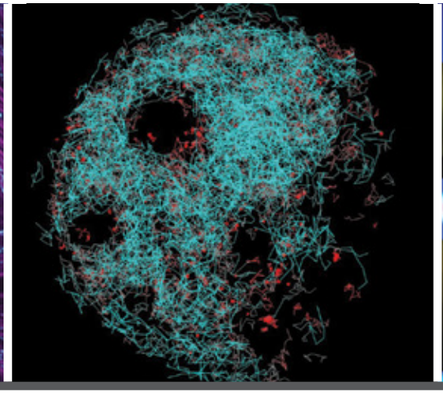
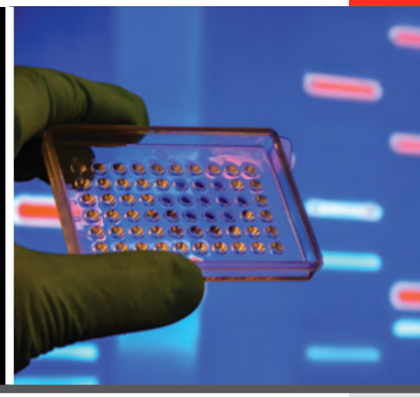
Scientific Cameras



Advanced Camera Technology High Performance Scientific Imaging | Life Sciences

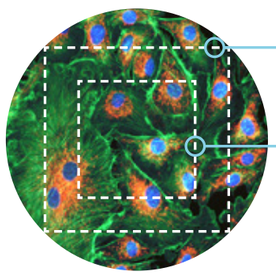
Teledyne is a global leader in cameras for life science imaging. We engineer high performance devices using Scientific CMOS (sCMOS), CCD, EMCCD, emICCD, and InGaAs to support demanding, ultra-low-light, high-speed, quantitative bio-research applications.

Kinetix sCMOS Cameras

The Kinetix back-illuminated sCMOS cameras from Teledyne Photometrics deliver a framerate and field of view unmatched by any other sCMOS device for life science imaging. This, combined with the most balanced pixel size and near perfect quantum efficiency, makes the Kinetix the camera of choice for high-speed and large field-of-view imaging applications such as calcium imaging, voltage imaging, high content imaging and multichannel fluorescence.

KINETIX FEATURES

- 10 megapixels, 400 fps
- 29.4 mm diagonal field of view
- 1.2 e- read noise
- 95% quantum efficiency
- 6.5 µm x 6.5 µm Pixel Area



HOW TO BUY

See Our Website

- teledynephotometrics.com
- teledyneprincetoninstruments.com

Prime sCMOS Cameras

Teledyne Photometrics Prime™ series of 95% quantum efficient, back-illuminated sCMOS cameras are designed to support the most demanding applications, such as the lowest light fluorescence imaging. Available with three sensor formats to maximize field-of-view, the Prime BSI and Prime BSI Express sCMOS cameras offer the perfect balance between high resolution imaging and sensitivity, making them the optimal choice for spinning disk confocal microscopy, super resolution microscopy and single molecule imaging.

PRIME™ FEATURES

- 95% quantum efficiency
- 4.2 megapixels, up to 95 fps
- Up to 25mm diagonal field of view
- 1 e- read noise

PI-MAX 4 Camera

The PI-MAX® 4 intensified (EM)CCD cameras from Teledyne Princeton Instruments provide the ultimate solution for time-resolved imaging and spectroscopy. With less than 500 picosecond gating, a double imaging feature and sustained intensifier gating repetition rate, the PI-MAX 4 is optimized for multiple high-repetition-based applications such as combustion, plasma physics, fluorescence lifetime imaging microscopy (FLIM) and nanotechnology.

PI-MAX® 4 FEATURES

- <500 psec gating
- 1 MHz sustained intensifier gating repetition rate
- >10000 spectra per second
- Ultimate sensitivity
- Highest linearity with emICCD option

NIRvana Cameras

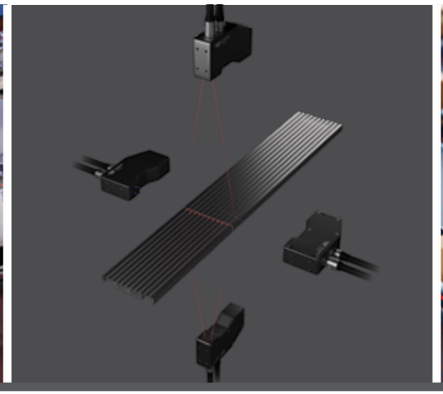
The NIRvana® HS InGaAs camera from Teledyne Princeton Instruments delivers ultra high-speed imaging and high NIR/NIR-II sensitivity to power even the most demanding near-infrared imaging applications. Taking advantage of liquid nitrogen cooling, the NIRvana provides the highest sensitivity and combines it with high frame rates and flexibility.

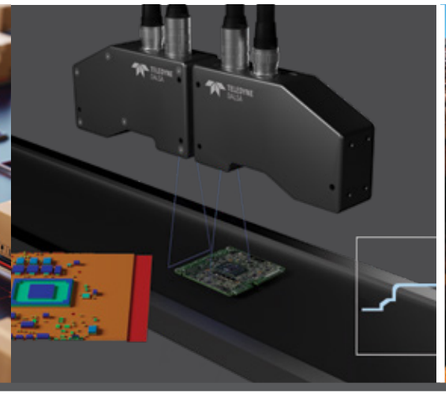
NIRvana® FEATURES

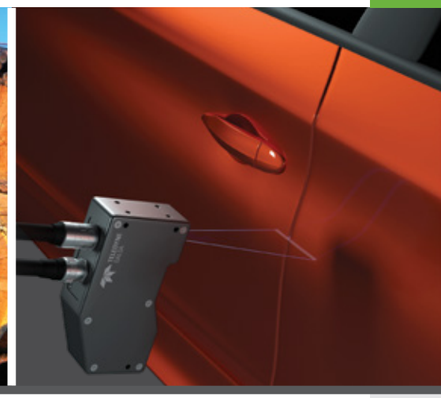
- 900 – 1700 nm sensitivity
- 20 µm pixel size sensor
- 640 x 512 pixels
- Up to 250 fps imaging
- Cryogenically or thermoelectrically cooled
- GigE interface
- Lifetime vacuum guarantee

3D Imaging Technology

Increasing automation and monitoring, the use of robotics, and other aspects of Industry 4.0 initiatives are driving demand for 3D imaging solutions that offer high levels of accuracy and distance measurement. This is essential in complex object recognition and dimensioning applications and for handling complex interaction situations such as the growing trend for human/robot co-working.





Z-Trak2 AVAILABLE CONFIGURATIONS

Depth of Field	Field of View
4 mm	9-10 mm
15 mm	23-27 mm
30 mm	46-57 mm
100 mm	95-157 mm
250 mm	166-325 mm
600 mm	428-978 mm

Z-Trak: 3D Profile Sensor for In-Line Inspections

The Z-Trak™ 3D profile sensors use laser triangulation to deliver high-resolution, real-time height measurements, providing reliable and repeatable results in varying operating conditions. Models handle object widths from 8.5 mm to 1520 mm and height ranges of 4 mm to 1100 mm.

All Z-Trak models are factory calibrated and offered with either a blue or red eye-safe laser (Class 2M or 3R) to suit the surface reflectance and operating environment.

These GigE Vision compliant lightweight IP67 rated profile sensors support Power-Over-Ethernet (POE) to simplify factory wiring and lower cost.

Z-Trak2

The new Z-Trak2 Series ushers in a new era of 3D profile sensors for high-speed 3D applications. These models deliver scan speeds up to 45 kHz combined with a suite of powerful features needed for in-line real-time height measurements for defect detection, identification, and guidance in electronics, semiconductor, automotive and factory automation markets segments.

FEATURES

- **S-Series:** 2048 points/profile at 45 kHz using 5GigE interface
- **V-Series:** 2048 points/profile at 10 kHz using 1GigE interface
- Unified Measurement Space for circular and linear sensor configurations
- Built-in reflection detection algorithms to handle highly reflective surfaces
- Multi-Sensor Synchronization using single, low cost setup

HOW TO BUY
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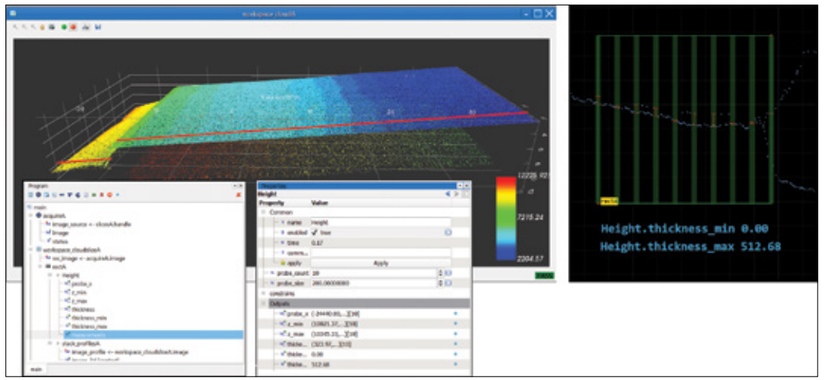
Software for Unified Measurement Space: Sherlock 3D



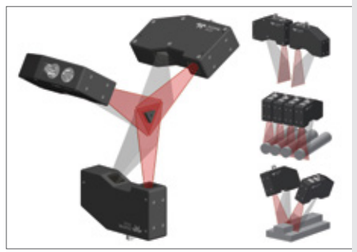
Z-Trak Software

Z-Trak's free software bundle is anchored by Teledyne DALSA's Sherlock 3D, a powerful and flexible package with strong graphical tools. Z-Trak also supports our Sapera LT SDK and Sapera Processing software packages.

Single and Multi-Sensor Configurations

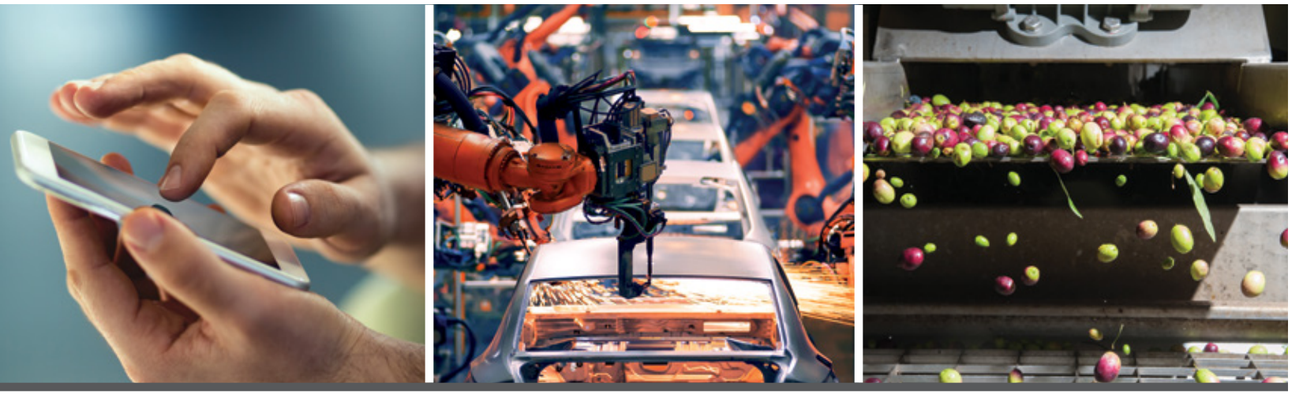
Multiple sensors can be combined together to create an expanded FOV or to eliminate occlusions. Units can be synchronized together using standard network switches to ± 1 µs precision.





Frame Grabbers

Industry-Leading Digital Frame Grabber Boards



Xtium™2 Family

Image Acquisition and Processing Boards for PCIe Gen3 Platform

Designed for industrial and biomedical imaging applications, Teledyne DALSA's image capture cards deliver industry-leading performance and reliability on Microsoft and Linux platforms.

From standard off-the-shelf products for low-cost high-volume applications to semi-custom or bespoke models with real-time embedded processing, Teledyne DALSA has a frame grabbers solution for you. Teledyne DALSA is committed to supporting both third party and in-house cameras. This continually growing list of supported cameras includes hundreds of different camera models from a number of major machine vision camera vendors.

Teledyne DALSA's Xtium2 series features PCIe Gen3 x8 platform and supports CoaXPress® 2.x (CXP12) and AIA's Camera Link HS® (CLHS). The Xtium series features the PCIe Gen2 x4/x8 platform and supports AIA's Camera Link®, CLHS, and CXP interfaces.

CLHS PX8 Series

- **Image Acquisition:** 7 lanes of 10.3 Gbps; 8.4 GB/s
- **Data Forwarding:** 7 lanes of 10.3 Gbps; 8.4 GB/s allows distributed processing
- **Host Transfer:** 6.8 GB/s with zero CPU overhead
- **Protocol Efficiency:** 64/66-bit encoding delivers 97% efficiency
- **Single Cable:** Fiber cable (AOC) delivers longer length at max. camera rate
- **3 Models** to balance price and performance needs

FIBER OPTIONS
- Active Optical Cables (AOC)

CLHS FX8 Series

- **Multi-Camera Support:** 1x4-lane, 2x2-lane, 1x4-lane or 1x2-lane with 2x1-lane
- **SFP+ Industry Standard Interface:** Cable length up to 300 m
- **Image Acquisition:** 4 CLHS lanes of 10.3 Gbps; 4.8 GB/s
- **Protocol Efficiency:** 64/66-bit encoding delivers 97% efficiency
- **Data Forwarding:** 2-lanes at max. camera rate allows distributed processing
- **Host Transfer:** 6.8 GB/s with zero CPU overhead
- **2 Models** to balance price and performance needs

FIBER OPTIONS
- Fiber Optics SFP+

CXP12 Series

- PCI Express Gen3 x8 platform
- CXP 2.0 — supports CXP operations at 12.5, 6.25, 5, 3.125, 2.5 and 1.0 Gbps
- Image acquisition up to 4.8 GB/s; host transfers up to 6.8 GB/s
- Multi-Camera Support: 1x4-ch, 2x2-ch, 4x1-ch or 1x2-ch with 2x1-ch
- Combined operations with CXP ver. 2.x and 1.x cameras
- Power over CXP (PoCXP)

CONNECTOR OPTIONS
- 1 to 4 cables

HOW TO BUY
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Xtium2-CLHS PX8
Premium Performance

Xtium2-CLHS PX8 HR
High Resolution

Xtium2-CLHS PX8 LC
Cost-Effective

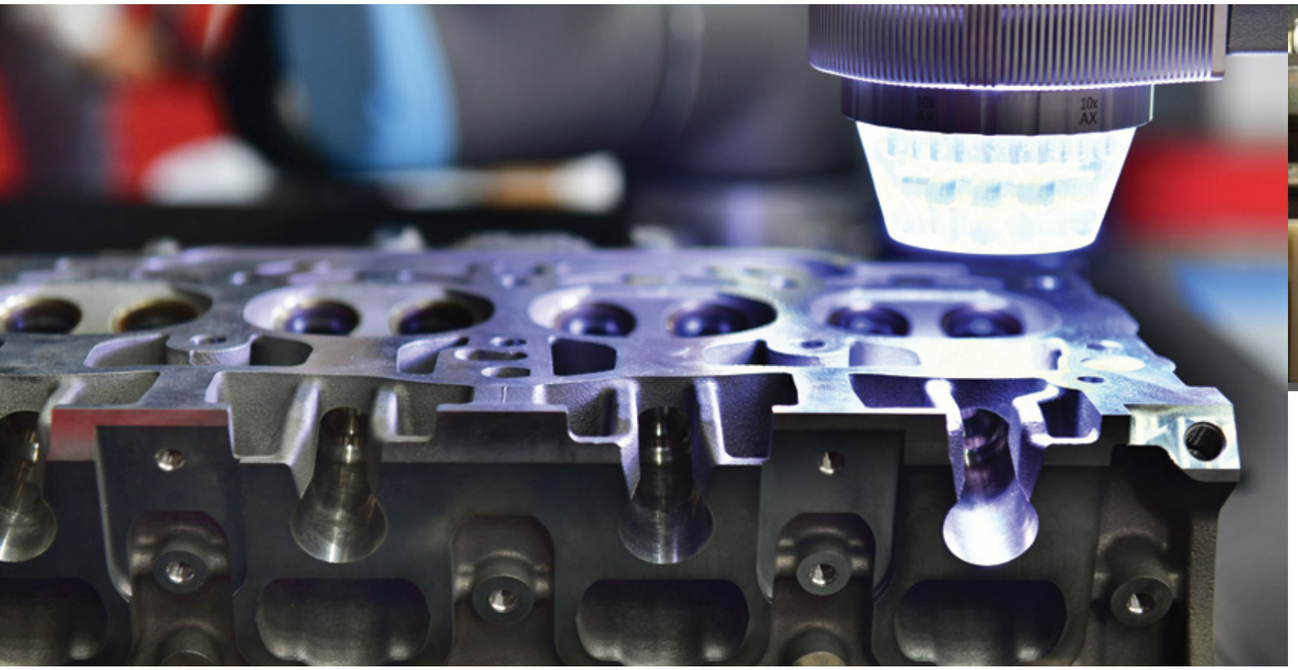
Xtium2-CLHS FX8
Native Fiber Connectors

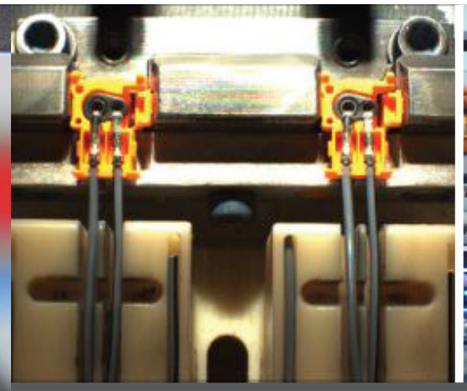
Xtium2-CLHS FX8 LC
Cost-Effective Fiber

Xtium2-CXP12
CoaXPress

Vision Systems

Complete, Compact, Self-Contained for End-Users

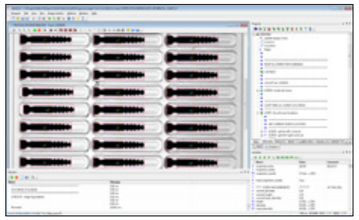




Designed for factory floor deployment, Teledyne Imaging's innovative multi-camera vision systems and smart cameras offer scalable solutions to satisfy a wide range of application needs, from positioning robotic handlers to complete assembly verification.

Vision Application Software

These "all-in-one" software products have been deployed in thousands of installations around the globe, providing advanced tools, design flexibility and system versatility to suit diverse application needs across all industries. Built to run on our single and multi-point vision systems, our easy-to-use iNspect and Sherlock design platforms save you time and reduce vision development costs without compromising system performance or reliability.



Sherlock™

Sherlock is an advanced machine vision software that can be applied to a wide variety of automated inspection tasks. This graphical design environment provides a rich suite of proven tools and capabilities that have been deployed in thousands of installations worldwide.

SHERLOCK

- Program and camera flexibility
- Enhanced vision capabilities
- Suitable for most applications
- Supports mixing of cameras
- Area or line scan applications
- BOA, VICORE, GEVA & PC ready

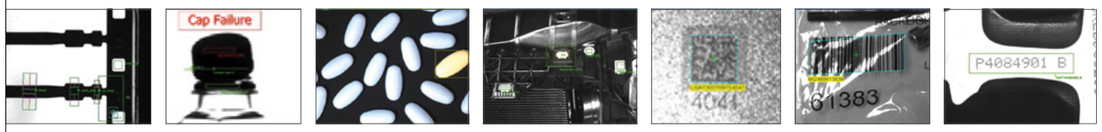
iNspect™

iNspect Express is a vision application specifically designed to simplify the design and deployment of automated inspection on the factory floor. iNspect Express offers both new and experienced users a practical tool for delivering uncompromised functionality that can be readily applied to a wide range of manufacturing tasks.

iNspect

- Easy to set up and maintain
- Point and click interface
- Core vision capabilities
- Suitable for many applications
- Supports multiple cameras
- Mono or color applications
- BOA, BOA Spot, VICORE, GEVA, and PC ready

TYPICAL USES ACROSS THE SPECTRUM OF MANUFACTURING APPLICATIONS



HOW TO BUY

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Vision Systems

Single-Point Inspection Systems

BOA™

Vision Systems for Automation

Easy to set up and deploy, BOA products are highly integrated vision systems specifically designed for industrial use. Complete with choice of embedded application software, BOA offers a robust and flexible automated inspection system that is easy to integrate and deploy on the factory floor.

BOA
- Original model, smallest form factor
- 640 x 480 to 1600 x 1200 CCD sensors
- C-mount lens
- Two performance models: BOA 50, BOA 200

BOA2

More Pixels, More Power

A complete vision system in one smart camera. Featuring our highest smart camera resolution yet, BOA2 combines lighting, image capture, processing, and easy-to-use embedded vision software into a convenient single device with a variety of I/O and mounting options.

BOA2 XA
- High resolution model, periscope form factor
- 2M, 3M and 5M CMOS global shutter
- C-mount lens
- Integrated light option (2M version only)

Vision Sensors

BOA Spot

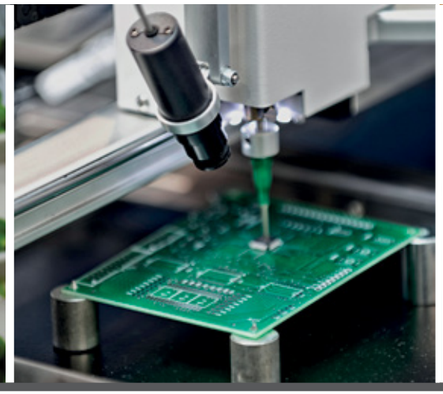
Vision System Performance at Vision Sensor Pricing

Simple, affordable, and reliable performance for quality inspection. No matter what you create on your production line, BOA Spot helps improve quality, reduce scrap, and increase throughput.

BOA SPOT
- Program and camera flexibility
- Low cost model, slim line design
- 640 x 480 and 1280 x 960 CMOS sensors
- M12 or C-mount lens
- Integrated light on M12 version

ALL OF THE ELEMENTS OF AN INDUSTRIAL MACHINE VISION SOLUTION:
- Easy to set up and maintain
- 100% automatic inspection
- Unlimited use of tools
- Image transfers to FTP server
- Hardware job change
- Industrial I/O and PLC protocols
- Password protection
- Low cost of ownership

VISION SYSTEMS BUILT TO THRIVE IN HARSH INDUSTRIAL ENVIRONMENTS



Multi-Point Inspection Systems

VICORE™

Compact, Versatile, Smart Vision System

VICORE is a dual camera vision system that combines a variety of Teledyne sensor and software technologies to deliver performance, flexibility and ease-of-integration for applications in industrial automation. This versatile system offers excellent performance for inspection applications using traditional 2D imaging, thermal imaging, 3D imaging, or a combination.

VICORE MACHINE VISION SYSTEMS
- Program and camera flexibility
- Designed for Automaton
- Performance, flexibility, and ease-of-integration for dual camera applications
- Compatible with a wide variety of 2D, 3D, and thermal cameras
- Convenient, front-accessible connections for cameras, I/O and system components including dedicated industrial Ethernet port
- Include embedded application software

GEVA™

Multi-Camera Vision Systems

The GEVA vision platform provides the performance and flexibility to meet the challenging requirements of multi-camera applications. Inspect multiple parts, assemblies or surfaces at the same time. These systems are equipped with multi-core processors, high-speed camera ports and versatile I/O options to match your application and factory integration requirements.

GEVA MACHINE VISION SYSTEMS
- Program and camera flexibility
- Built to thrive in harsh industrial environments
- Equipped with multi-core processors, high-speed camera ports, and versatile I/O options
- Compatible with a wide variety of cameras
- Include embedded application software

HOW TO BUY

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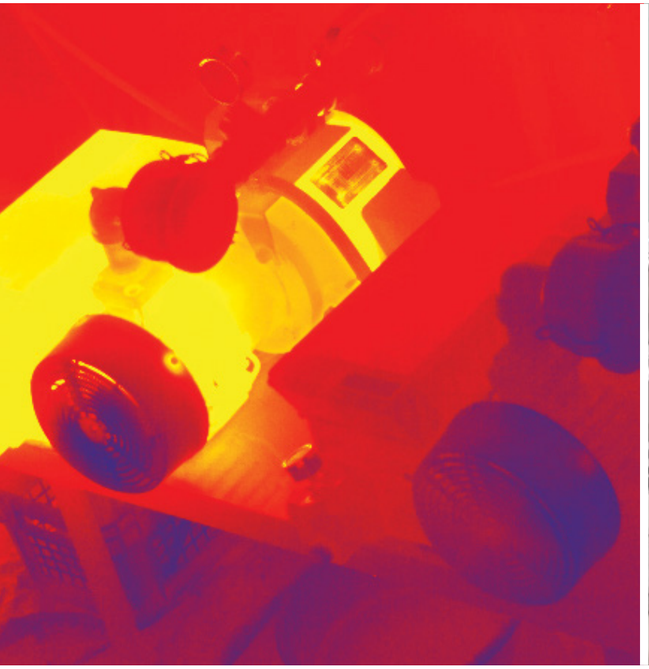
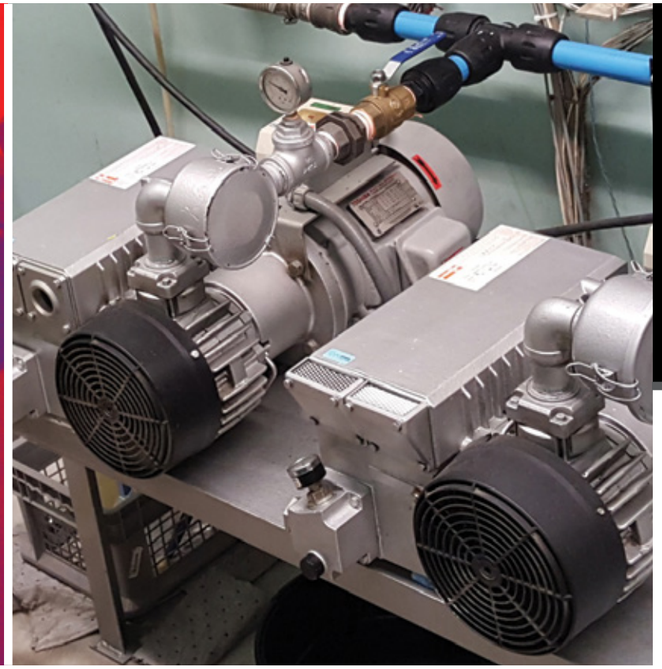
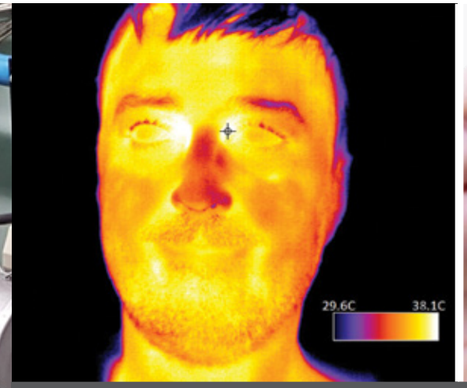
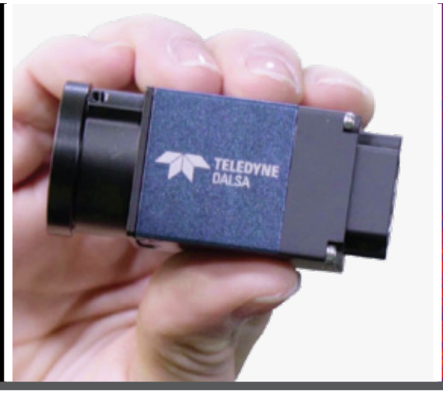
Infrared Detectors

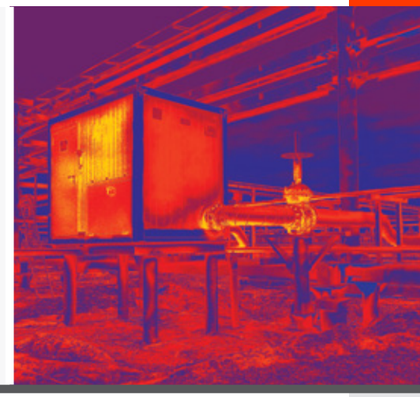
Calibir — Microbolometer











Long Wavelength Infrared (LWIR) detectors detect thermal energy (heat), making them ideal for an ever-widening range of applications including defense, machine vision, firefighter security and surveillance, unmanned drones, environmental monitoring and most recently, detecting elevated skin temperature. Teledyne's LWIR microbolometer detectors not only deliver outstanding thermal imaging performance, they enable small, light, low-power camera solutions because they do not require bulky cooling.

Calibir GX Family

The Calibir GX is a new family of uncooled LWIR cameras featuring our latest microbolometer sensor, designed, fabricated, and packaged in our own foundry. With great sensitivity in longwave infrared range (8-14 µm), the cameras features both shutter and shutterless operation and rapid image output on power up while delivering uniform response over the entire operating temperature range, making it an ideal component for thermal imaging systems requiring uninterrupted image acquisition.

CALIBIR FEATURES

- 8-14 µm wavelengths
- VGA and QVGA
- NETD <50 mK
- Up to 60 fps
- Temperature accuracy up to +/- 1°C

HOW TO BUY

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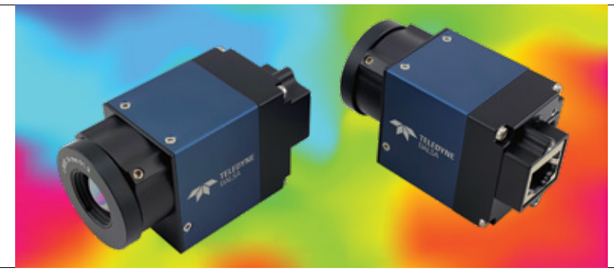
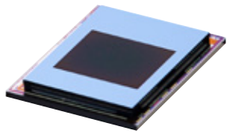
SUPERIOR DYNAMIC RANGE

The Calibir GX family has an exceptional range of over 600°C with consistent NETD <0.05°C, enabled by an advanced 21-bit ADC design that still allows easy signal calibration and unprecedented radiometric detail. The GXM model covers most industrial applications, but for the much smaller range of elevated skin temperature screening, the GXF model is specifically calibrated to deliver extra precision and accuracy from 25°C to 45°C.

RADIOMETRIC CAPABILITY

Calibir GX has nonuniformity correction and is factory calibrated for precise, accurate radiometric performance to give you reliable absolute temperature data.





Microbolometer Sensor

Teledyne vanadium oxide (VOx) based microbolometer long-wave infrared detectors cover wavelengths from 8-14 µm. Our wafer-level packaging (WLP) approach to microbolometer manufacturing in an optimized MEMS infrastructure gives us the ability to dramatically alter the traditional price-performance tradeoff.

Industrial X-Ray

Industry-leading Performance with Cutting-edge Features



Innovative Light, Safe User-Friendly Wide X-Ray Product Range

Teledyne DALSA offers large-area CMOS digital x-ray detectors that deliver high-speed, high-performance x-ray imaging with a fast, reliable PC interface for easy integration into X-ray systems. Sister company Teledyne ICM offers high quality portable X-ray equipment for non-destructive testing (NDT) and security applications. We serve a wide variety of industries such as oil and gas, construction, electronics, aerospace, military and explosive ordnance disposal (EOD), border controls, VIP protection and luggage scanning.

NDT Applications

(Non-Destructive Testing)

Portable X-Ray Generators

CPSERIES

Designed to facilitate the life of operators on the field and beyond, the **CP**SERIES is the perfect partner for a quick, easy and accurate radiography of any material. Regardless of your application, the **CP**SERIES will providing you with the best weight to power ratio in the world. Available in directional, panoramic, as well as in crawler configuration, the series will deliver the operator a sharp, clear and detailed image of any hidden defects. The constant potential capabilities of the **CP**SERIES makes it the perfect partner for state-of-the-art digital x-ray detectors such as the Teledyne ICM's GO-SCAN, the first ever ground-up design, fully integrated portable digital X-ray solution.

HOW TO BUY
See Our Website
• teledyneicm.com

CPBatteries

Ultra-light, compact and battery operated constant potential portable X-Ray generators product range. They are the perfect tool for specific NDT applications that require repetitive short exposures. Their versatility also makes them the ideal piece of equipment for security applications.

In combination with the FLATSCAN15 XS, the FLATSCAN30 XS and other digital X-Ray detectors, the **CP**Batteries will—thanks to their small focal spot and constant potential X-Ray output—enhance image quality and definitely contribute to a reduced exposure time.

Go-Scan Series

From the high resolution and light weight of a CMOS x-ray detector to the very large area of an aSi panel, the **Go**-Scan Series is the all-around NDT solution for portable digital radiography inspection, delivering image quality, ease of use, handiness, and reliability. For CUI (Corrosion Under Insulation) pipe inspection, the **Go**-Scan C-View has been specifically developed for convenience and performance.

X-Ray Detectors for Industrial Application

Innovative CMOS and CCD X-Ray detectors, tailored specifically to meet the diverse needs of non-destructive testing (NDT) for any industrial applications.

- **High image quality:** very low noise and improved signal-to-noise ratio (SNR) with respect to aSi based and even other CMOS-based competing products.
- **High speed imaging:** CMOS detectors set an industry benchmark for speed at full resolution, while remaining lag- and artifact-free.
- **High resolution:** the small pixel pitch combined with proprietary optical stack give rise to high spatial resolution (or MTF) performance.
- **Innovative design:** our sixth-generation proprietary technology enables radiation hard pixel design, with adjustable saturation dose levels that make our detectors suitable for all industrial applications.
- **Long lifetime:** the built-in radiation-hardness of our detectors enables long operating lifetime and less frequent calibration routines.

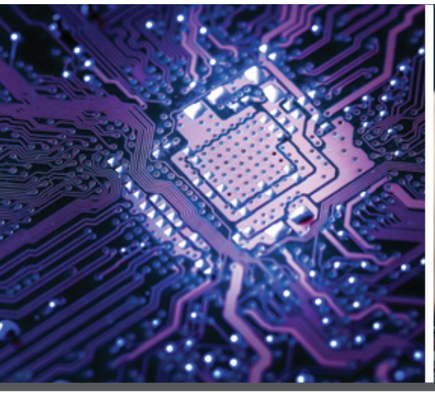
FlatscanXS Series

Operating in conjunction with our Constant Potential X-Ray sources, **CP Batteries**, these innovative portable X-Ray scanner systems deliver you a sharp, clear and detailed image of any suspicious object. It will assist Bomb Squad operators in ensuring immediate and accurate decision making. The **FLATSCAN**30XS and **FLATSCAN**15XS deliver state-of-the art image, are easier to use and more reliable in harsh RF environments than any other competing system.

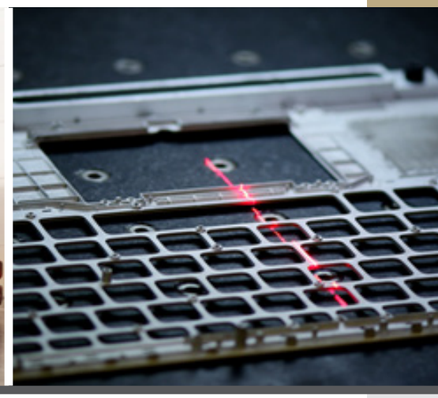
CMOS Image Sensors

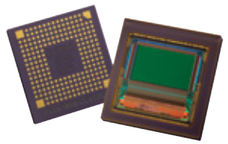
Powerful, Innovative Sensors for Almost any Application

Teledyne e2v's CMOS image sensors and subsystems deliver high performance across many applications including machine vision and automation, medical and life sciences, logistics and robotics and the environment, food and recycling. Our unique approach involves listening to the market and application challenges of customers and partnering with them to provide innovative standard, semi-custom or fully custom imaging solutions.



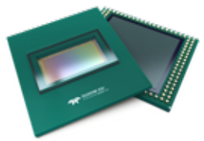






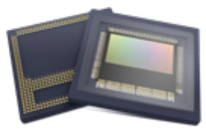
Emerald CMOS Sensor Family

Featuring a small global shutter pixel, the Emerald™ family of CMOS image sensors have an innovative design with superior low-noise performances, compact format, easy integration and a wide range of embedded features. They are ideal for applications such as factory automation, traffic and surveillance and are available in resolutions from 2 to 67 Megapixels.



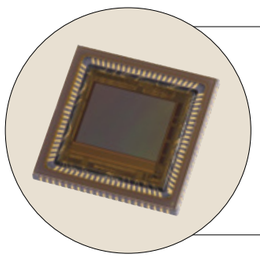
Snappy CMOS Sensor Family

Optimized to enable fast and accurate scanning of 1D and 2D barcodes, the Snappy™ CMOS image sensor family enables scanner end products to offer enhanced productivity and throughput in logistics, sorting, retail point of sale, and many other associated verticals. Snappy is available in 2 or 5 Megapixels.



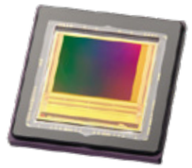
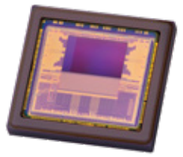
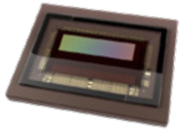
Lince CMOS Sensor Family

The Lince™ series of high-speed CMOS image sensors are suitable for any kind of environment, due to their large global shutter pixels, which provide high performances from low light to very bright conditions. Available in resolutions ranging from 1.3 to 11 Megapixels they are ideal for high speed machine vision, broadcasting and security.



Custom Image Sensor Solutions

For over 10 years, our Teledyne e2v team has partnered with a fast growing portfolio of new customers to co-develop a range of truly innovative custom CMOS image sensors. Image sensors are tailored to optimally solve specific customer application challenges with 95% of projects successful in their first silicon (an unprecedented industry track record).

CMOS Image Sensors for 3D

Teledyne e2v has developed the Bora and Hydra3D CMOS image sensors for **Time of Flight (ToF)** and the Flash CMOS image sensors for laser triangulation 3D imaging. To meet the technical challenges of a customer's particular market/application, we also offer evaluation kits, reference designs and simulation models to help support system development and shorten the time to market. Our design capabilities (at both sensor and system level) also enable us to develop a derivative of an existing sensor, customization at system level or to make a fully custom design.

Time of Flight
Bora

The Bora CMOS image sensor has been developed specifically for ToF 3D detection and distance measurement to support the latest industrial applications, including vision guided robotics, logistics and surveillance.

BORA
- Innovative 10 µm pixel design
- 1280 x 1024 pixels
- Excellent sensitivity and a gated global shutter mode, enables gating times as fast as 42 ns

Hydra3D

The Hydra3D ToF CMOS image sensor, the first high resolution three-tap pixel sensor, serves the latest industrial and outdoor applications.

HYDRA3D
- Innovative 10 µm three-tap cutting-edge pixel
- 832 x 600 pixels
- Transfer times as low as 20 ns
- High depth resolution, precision and speed
- Real-time operation at short, mid- and long-range distances

Laser Triangulation
Flash

Flash is a family of CMOS image sensors designed to target 3D laser profiling/displacement applications and high speed, high resolution inspection.

FLASH
- 6 µm CMOS global shutter pixel
- Available in 2k or 4k resolution
- 2k frame rates up to 1500 fps (8 bit), 25.6 Gbps throughput
- 4k frame rates up to 1800 fps (8 bit), 61.4 Gbps throughput

HOW TO BUY
See Our Website
- teledyne-e2v.com

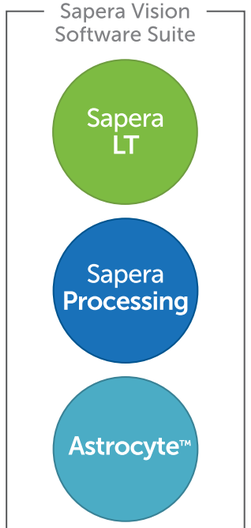
Software Development Kit

Sapera Vision Suite with New AI Module

Proven Performance. Highly Flexible Graphical User Interface.

Our latest Sapera™ Vision Software suite delivers a new AI module, giving you the ability to train neural networks with multiple deep learning architectures. Building on Sapera's field proven image acquisition, control, processing and analysis functions, it empowers you to to design, develop and deploy high-performance machine vision applications.

The Sapera AI SDK contains essential core development modules plus AI runtimes and a dedicated training application (Astrocyte) with a highly flexible graphical user interface that allows you to easily use your own images to build and train models to use at runtime.



Sapera™ LT

Acquisition and Control Libraries

Sapera LT is an image acquisition and control SDK for Teledyne DALSA'S cameras and frame grabbers. Sapera LT supports image acquisition from devices based on standards including 2D/3D GigE Vision™, CameraLink® and CameraLink HS™. Free with Teledyne DALSA Hardware. Includes CamExpert GUI for configuring cameras.

Sapera Processing

Image Processing and AI Libraries

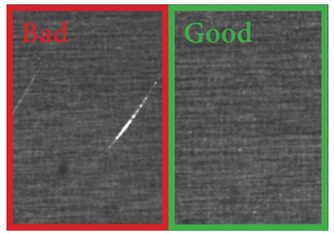
The core development platform includes over 400 image processing primitive and industrial strength image analysis tools such as pattern finding, 1D and 2D barcode and OCR tools for part identification and detection, color processing tool, separation and measurement applications, blob analysis tool and inspection metrology tool for real-world 2D/3D dimensional measurements, and new Artificial intelligence (AI) inference based on models imported from our Astrocyte training tool.

Astrocyte™

AI Training Graphical Tool

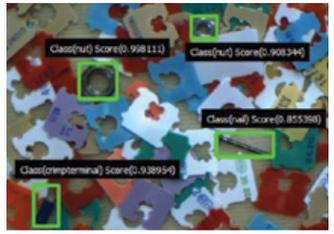
Astrocyte is an application based on artificial intelligence dedicated to training neural networks on 2D images for various applications. Through a highly flexible graphical user interface users can bring in their own image samples and train neural networks to perform classification, object detection, segmentation and noise reduction. Astrocyte allows visualizing and interpreting models for performance/accuracy as well as exporting these models to files for later use at runtime with Sapera Processing.

Sapera/Astrocyte AI Architectures



Classification

For detect identification, character recognition, presence detection, food sorting, and more. Astrocyte supports classification neural networks including Resnet-18, Resnet-50, and Resnet-101.

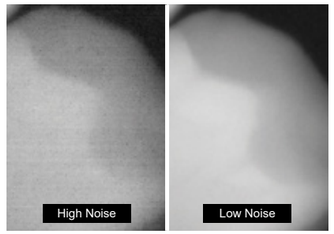


Object Detection

For presence detection, object tracking, defect localization, sorting, and more. Astrocyte supports object detection neural networks including SSD300, SSD512 and SSDLite.

Segmentation

Used for defect sorting/qualification, food sorting, shape analysis, and more. Astrocyte supports segmentation neural networks including DeepLabV3-Resnet-50, DeepLabV3-Resnet-101, and Unet.



Noise Reduction

An important building block in applications such as digital photography, medical image analysis, remote sensing, surveillance and digital entertainment. Astrocyte supports noise reduction neural networks including Residual Channel Attention Network (RCAN).



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