Sintec Optronics

STN Series Uncooled MWIR Infrared Cameras

1. Uncooled 128x128pixels MWIR Infrared Camera

Features
- Uncooled MWIR 128x128 pixels infrared camera with high-speed frame rates up to 4000 frames per second
- Configurable ROI windowing (allows faster frame rates)
- Maximum added value and affordability to ensure a full integration in the industry 4.0 applications
- Multiple industrial applications: machine vision, laser process monitoring, gas detection, QA

Typical Applications
- Additive manufacturing
- Industrial process monitoring
- Machine vision
- Gas and flame detection
- Spectroscopy
- Glass manufacturing quality assurance
- R&D industries
- Automotive industry
- Home appliance manufacturing
- Metallurgy and steel industry
- Petrochemical industry
- Glass manufacturing industry

Additive manufacturing monitoring | Manufacturing process control | Machine vision applications | Gas and spectroscopy | Fire detection

Sintec Optronics

Specifications
- Detector type: VPD PbSe FPA with digital interface, uncooled operation
- Array format: 128x128 (16384 pixels)
- Pixel size: 50x50um (square format)
- Spectral range: MWIR, 1.0μm to 5.0μm
- Peak wavelength of detection: 3.7microns
- Integration time: 10-1000μs, selectable
- Raw data communication, 14 bit
- Interfaces: GigE version2.0 (GenICam compatible) with PoE; Multipurpose DI/DO connector (trigger IN/OUT) (cable sold separately)
- Maximum frame rate: 4000fps
- ROI windowing function
- Mechanical shutter for 1-pt offset correction
- Start-up time: < 10 seconds
- Power supply: PoE, 8 W (non-PoE operation requires 12 VDC)
- Metal housing with rear connectors and tripod screw holes (M3 and M4)
- Dimensions and weight (w/o optics): 66(L)x62(W)x62(H)(mm), 400 grams
- Optics (standard option): f=35 mm, F#1.1, FoV 10.5°x10.5°, AR coating (1-5μm), manual focus with CS-mount interface
- Software included: acquisition and visualization SW; SDK available for custom software programming
- Minimum temperature of detection: 100ºC

Part number	STN-16K	STN-16K+
Maximum frame rate	2000 images per second @ 128×128 Allows higher frame rates using embedded ROI windowing functions	4000 images per second @ 128×128 Allows higher frame rates using embedded ROI windowing functions
Windowing modes	128×128 64×64 (center of FPA) 32×32 (center of FPA) 1×128 (center of FPA)	Size and position of the ROI: configurable via SW
Acquisition mode	128×128: Interlaced mode 64×64, 32×32, 1×128: Snapshot acquisition	All modes: Snapshot acquisition
NUC correction tables	Software correction	Hardware correction (4 tables stored)
Data transmission modes	RAW data, 14 bit	Selectable: – RAW data, 14 bit – NUC corrected, 16 bit – High-speed mode RAW/NUC: 12bit

Sintec Optronics
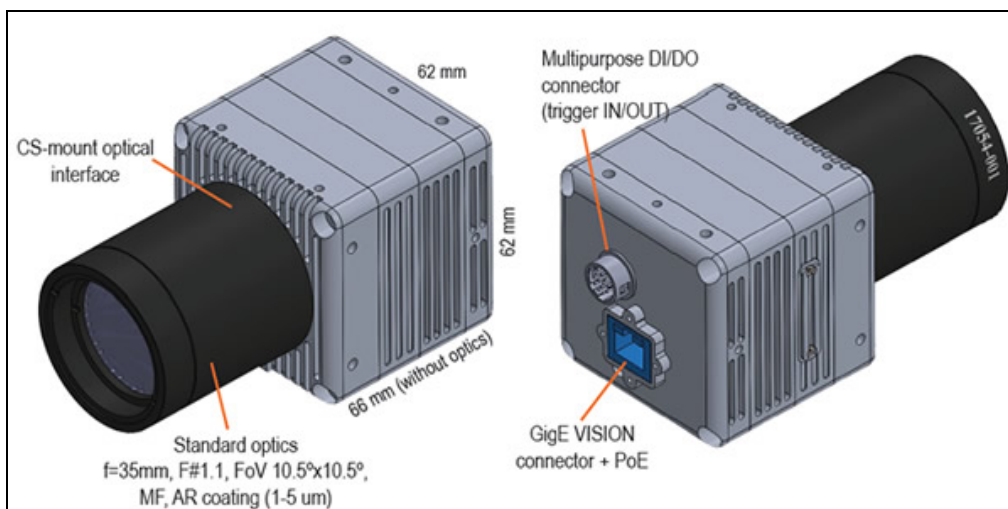
2. Uncooled MWIR(1-5um) Camera

Features

- Uncooled MWIR camera IP67-rated with industrial USB connection and 1 kHz frame rate
- Optimized size and affordable cost to ensure a perfect integration in the production process: priced for cost sensitive machine vision applications!

Applications

- Industrial manufacturing process control (welding, cutting, etc.)
- Industrial automation
- Laser process monitoring
- Gas and fl ame detection
- Machine vision
- OEM integration

Industries

- Automotive industry
- Home appliance manufacturing
- Metallurgy and steel industry
- Glass manufacturing
- Petrochemical industry

Specifications

- Part number: STN-1024
- Miniaturized uncooled infrared MWIR camera for industrial applications
- Band of detection: MWIR (1 - 5 microns)
- Peak wavelength of detection: 3.7 microns
- FPA resolution: 32x32 (1024 pixels)
- Shutter incorporated for 1-pt offset correction
- Integration time: adjustment via software (100 – 500 us)
- Maximum frame rate: 1000 Hz (slower rates are possible)
- Global-shutter (snapshot) image acquisition
- Electrical interface: USB powered, industrial M12 mini-USB connector in the back (optional: connector in the bottom part)
- Communication interface: USB 2.0, high-speed (up to 480 Mbps)
- Data transmission: raw data, 10 bits
- Lens: f=24 mm, F#1.2, FoV 10.2ºx10.2º (IP67-rated)
- Optional lens: f=48 mm, F#1.6, FoV 5.1ºx5.1º (IP67-rated)

![Sintec Optronics logo]

- Integrated temperature sensor
- Dimensions (in mm): 98.0 (L) x 49.5 (W) x 61.0 (H) (connector in the back)
- Weight: 250 grams
- Minimum temperature of detection: 100 ºC
- IP67-rated metal housing with CS-mount optics interface
- Water-block and DLC coating for harsh environment
- Software included: NIT SOFTWARE SUITE (Acquisition and visualization SW)
- DLL for custom software development available
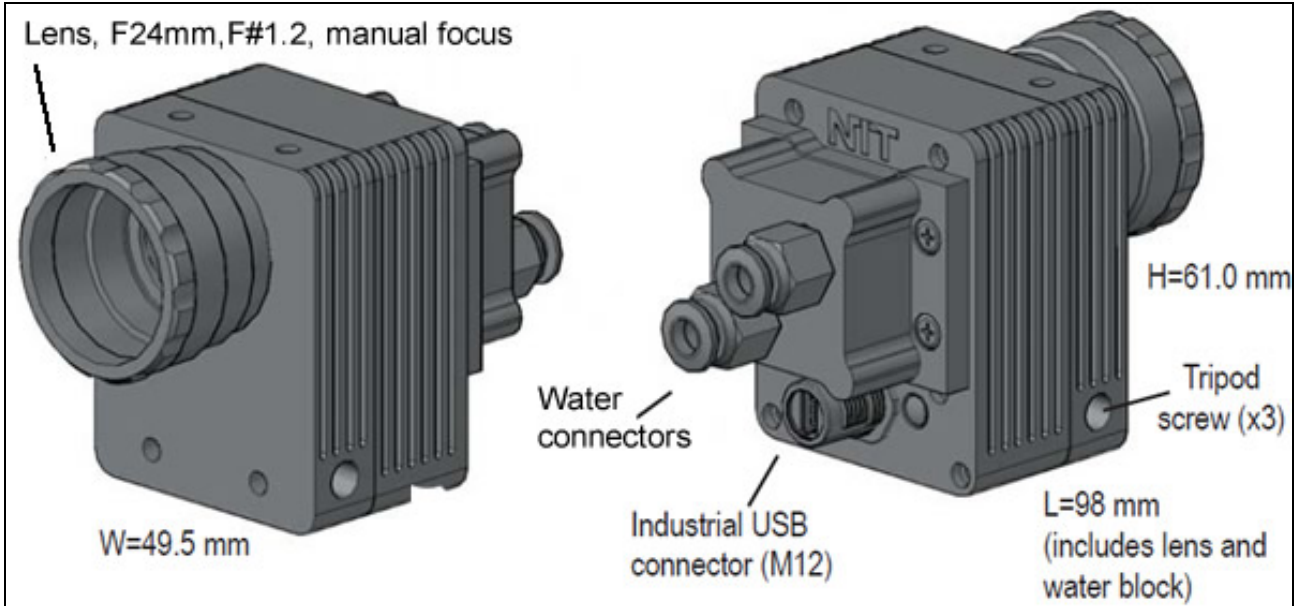
3. Inline Infrared Imaging Monitoring System for industrial Processes (Laser & Arc Welding, LMD/cladding, WAAM, others)


- Inline infrared imaging monitoring system for industrial process monitoring
- Continuous monitoring and measurement of the melt pool and heat-affected-zone (HAZ) geometry
- Ensures quality monitoring
- Allows coaxial integration and off-axis operation
- Standalone operation
- 2-alarm levels configuration, PC data ogging
- Main applications: laser welding, LMD, cladding, WAAM, others

Part number	STN-I3MS
Components	Infrared camera with real-time processing electronics and waterblock connection box, multi I/O cable (3 m), power supply (24 VDC) Software package for system configuration, datalogging and log files analysis

	Infrared emitter for optical calibration
Process compatibility	Laser and arc welding, LMD, cladding, WAAM, others
Mechanical integration	Coaxial & off-axis operation
Laser optics compatibility (coaxial integration)	Transmission of infrared signal (above 1.1 um) from the process area to the optical port is required
Output	Analog signal output (0 VDC - 10 VDC) proportional to width of melt pool / HAZ Configurable span
Dimensions (mm)	Infrared camera: 88 mm x 60 mm x 92 mm Connection box: 124.5x102x28mm
Weight	0.5 kg
Power supply	24 VDC, 6 W; Power supply included
Imaging lens	CaF2, f=50 mm, F#2.25 with manual focus mechanism (other focal lengths available)
Mechanical enclosure (camera)	IP67 rated mechanical enclosure with embedded heatsink Embedded waterblock for air /water cooling
Mechanical interface (front side of optics)	C-mount thread with counter thread for tight adjustment
Field of view Resolution per pixel	Coaxial: dependent on the optical system installed in the laser optics Offaxis: FoV=3.7°x3.7° (focal length f=50 mm)
Infrared camera	VPD PbSe camera, 64x64 pixels (pixel size: 50 microns) MWIR response (1 -5 um), frame rate 1000 images per second
Communication interface	Gigabit Ethernet (RJ-45)
Software	Acquisition and Configuration SW v.1.0; Visualization SW v.2.1
Minimum requirements	PC with processor i5, RAM memory: 8 GB Hard disk available: 1 GB, O.S.: Windows 10 or later (32/64 bits)
Process monitoring configuration	Selectable configurations: manual, tracks, continuous track length (tracks mode), alarm levels, alarm delay laser ON delay & auto detection
Indicators	Melt pool / HAZ width, Infrared image, laser status, alarm (2 configurable alarm levels)
Other features	Laser ON/OFF digital input (opto-coupled) Monitoring alarm digital output (opto-coupled), process data logging, circular & rectangular region-of-Interest (ROI)
Accessories	3-color light pole indicator

## 4. Closed Loop Control for Laser Power in LMD/Cladding Processes

Sintec Optronics
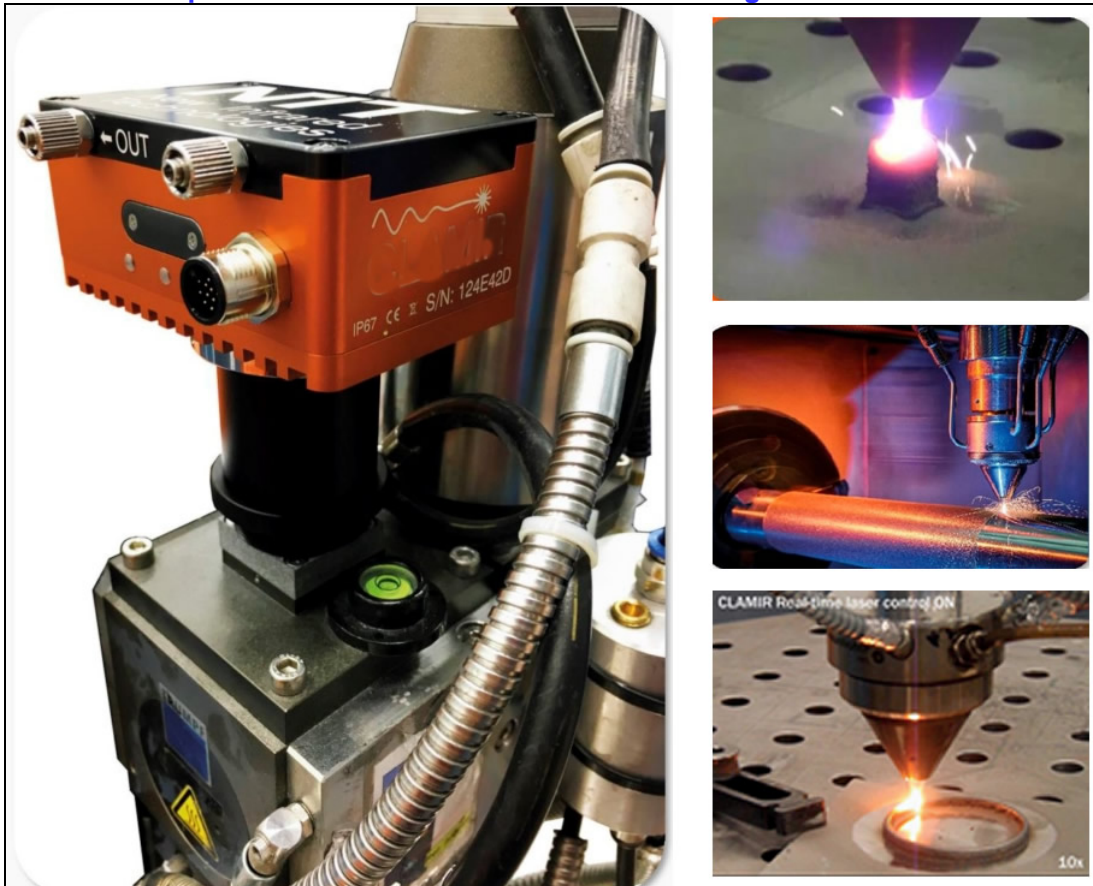
- Continuous monitoring and measurement of the melt pool geometry
- Closed-loop control of the laser power during the complete process, ensuring quality and repeatibility
- Compatible with most of laser optics and powders
- Easy mechanical integration and quick configuration
- Consistent operation, no need of reconfiguration during the process
- Main applications: LMD and cladding

Part number	STN-C
Components	Infrared camera with real-time processing electronics and waterblock connection box, multi I/O cable (3 m), power supply (24 VDC), software package for system configuration, data logging and log files analysis, infrared emitter for optical calibration
Process compatibility	LMD process (Laser Metal Deposition) cladding
Optical compatibility	Transmission of infrared signal (above 1.1 um) from the process area to the optical port is required
Material compatibility	Steel powder, Stainless steel powder, Stellite powder, Inconel, others
Laser power control	Analog signal output for laser power control, 0-10VDC
Dimensions (mm)	Infrared camera: 88x60xmm connection box: 124.5x102x28mm
Weight	0.5 kg
Power supply	24VDC, 6W, power supply included
Imaging lens	CaF2, f=50mm with manual focus mechanism (other focal lengths available)
Mechanical enclosure (camera)	IP67 rated mechanical enclosure with embedded heatsink Embedded waterblock for air /water cooling
Mechanical interface to laser optics	C-mount thread with counter thread for tight adjustment
Field of view Resolution per pixel	Dependent on the optical system installed in the laser head and diameter of the noozle
Infrared camera	VPD PbSe camera, 64x64 pixels (pixel size: 50 microns), MWIR response (1-5 um), frame rate 1000 images per second
Communication interface	Gigabit Ethernet (RJ-45)
Software	Acquisition and configuration SW v.2.0; Visualization SW v.2.1
Minimum requirements	PC with processor i5, RAM memory: 8 GB; Hard disk available: 1 GB, O.S.: Windows 10 or later (32/64 bits)
Process control	Selectable modes: automatic, manual
Process configuration	Selectable process configuration: tracks, continuous, initial laser power, track length (tracks mode) laser ON delay & auto detection, feedback control parameters
Indicators	Melt pool width, laser power, infrared image, laser status
Other features	Laser ON/OFF digital input (opto-coupled); Monitoring alarm digital output (opto-coupled); Process data logging, Circular & rectangular region-of-interest (ROI)

STI Series Uncooled Terahertz Cameras

1. Uncooled Terahertz Camera Imager

Electromagnetic waves are around us in many different forms: light waves, radio waves, micro waves. We have been using their properties for years. Terahertz waves (THz) are the electromagnetic waves with frequencies between 100GHz and 10THz. THz radiation lies between microwaves and infrared light regions of the spectrum.
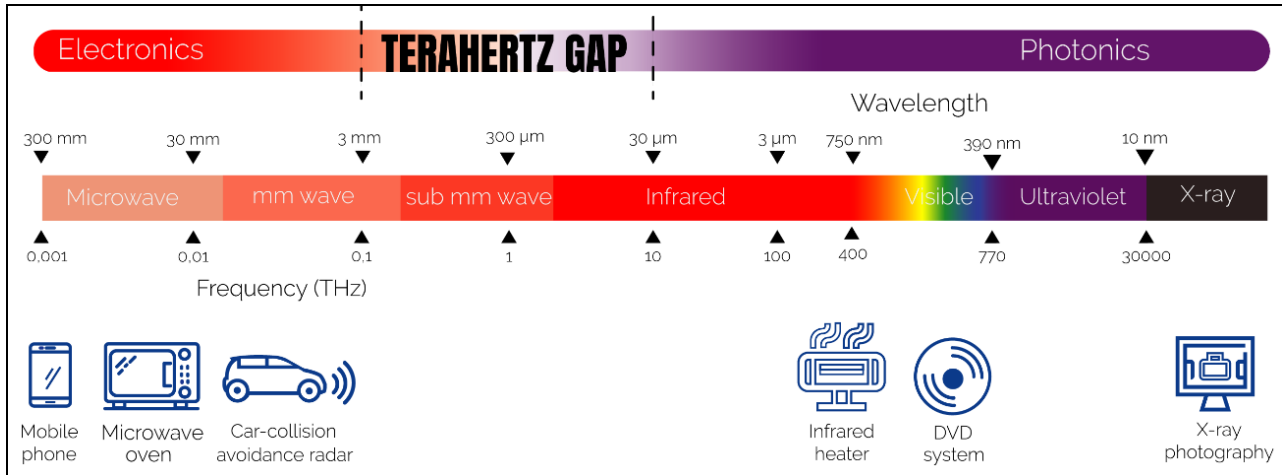
THz radiation have unique properties, it can go through a wide variety of non-conducting materials. They are low in energy (~4.1 meV) and non-ionizing so they are not harmful. We can use THz imaging technology for non-invasive and non-destructive testing in various fields like food, industry, medicine, etc

THz waves are absorbed by some liquids like water, and this property can be used to measure the internal moisture of various objects.

The terahertz waveband ranges from 100GHz to 10THz. At these frequencies, the electromagnetic waves have unique and interesting properties:

● These waves penetrate non-polar materials such as plastic, ceramic, wood and fabric;
● These waves are highly absorbed by water and moisture;
● The energy used is very low and these waves are non-ionizing;

With this terahertz imager, you can see through materials, making it ideal for developing your non-destructive testing solutions, for detecting and inspecting defects in wood, paper/cardboard, polymers and plastics, ceramics, composites, plants, food, as well as for evaluating humidity rates in these same materials.

What's more, these terahertz waves are non-ionizing and therefore pose no risk to the human body, making this technology an attractive alternative to non-damaged testing (NDT) X-ray solutions.

SEE INSIDE
THE MATTER SAFELY
Terahertz innovative imaging technology paves the way
to non-destructive testing and to research in the field of terahertz waves.

APPLICATIONS
- Characterization of THz sources
- Non-destructive testing
- Life sciences
- Scientific Instruments

BENEFITS
- Video rate
- High sensitivity
- High resolution
- Large field

MICROBOLOMETER TECHNOLOGY
Antenna is coupled to micro-bolometer pixel architecture and micro-bolometer array sensor is built above CMOS ROIC.
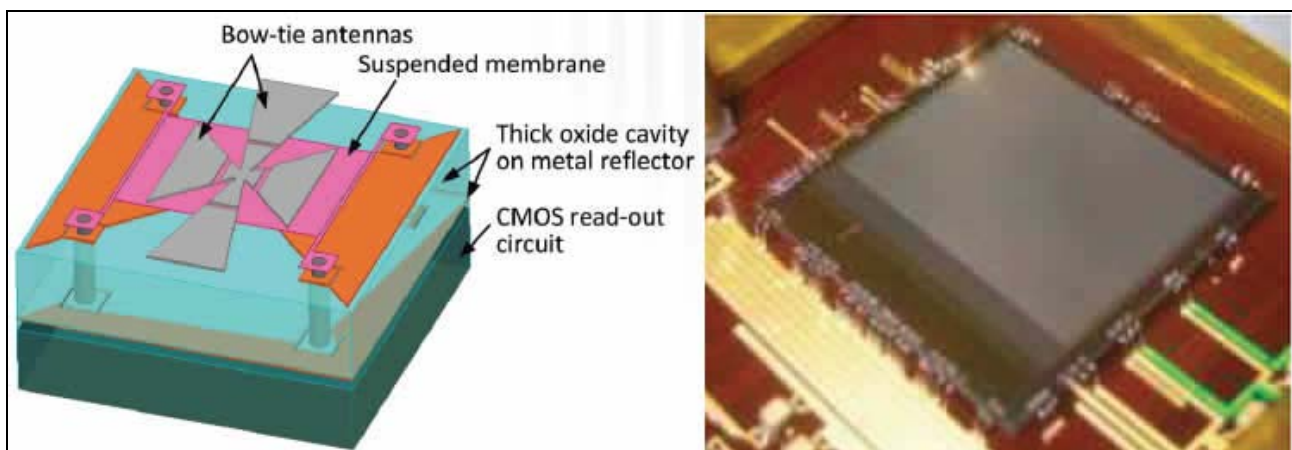
LABORATORY: THz BEAM CHARACTERIZATION

![Sintec Optronics]

The terahertz camera is essential for any laboratory or R&D institutions that carry out research in the field of THz waves and explores THz potential in various applications medical imaging, oncology etc. The wide range of coverage (0.1THz to 5THz) combined with an unrivalled bolometric sensor sensitivity makes the terahertz camera a perfect tool for visualisation /qualification of your terahertz laser source.
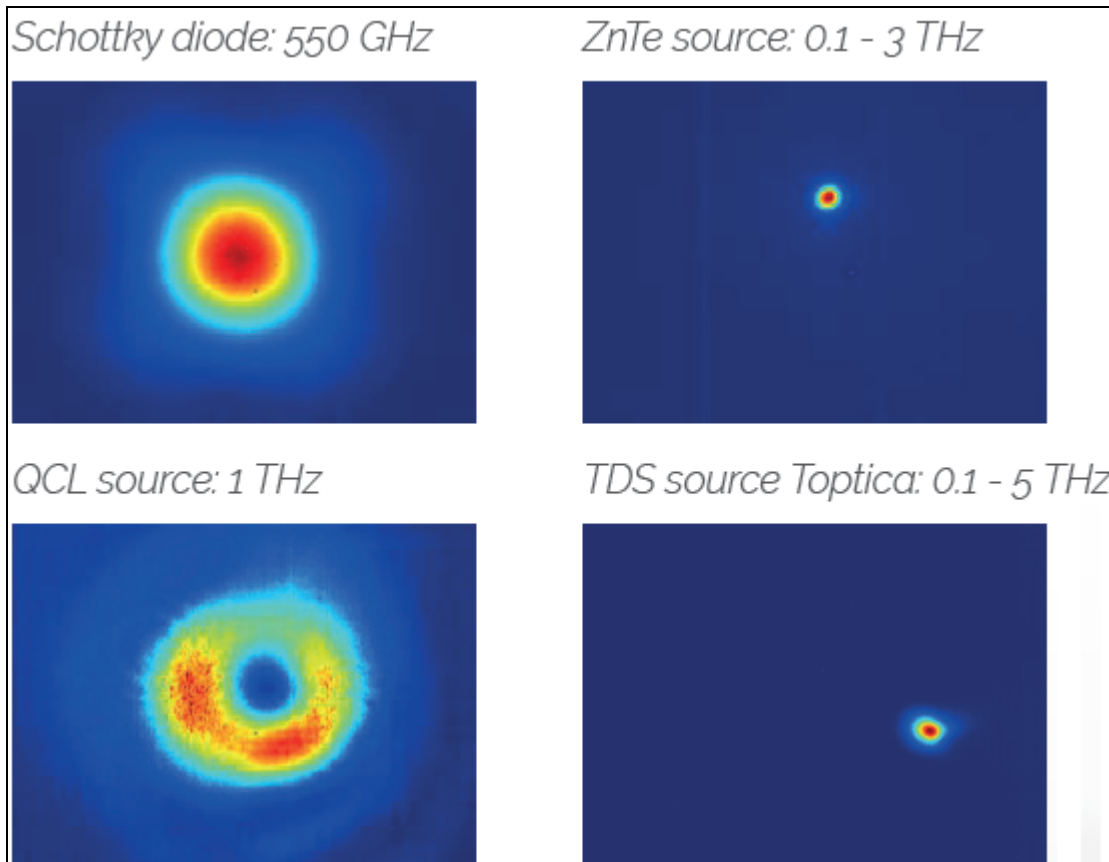
NDT / QUALITY CONTROL

Additionally, our terahertz camera eases the non-destructive testing of advanced materials used in various industries and industrial quality control. THz non-hazardous imaging technology reveals previously invisible defects inside the subject matter.

Our non-contact THz penetrating imaging system can detect manufacturing defects or imperfections inside parts during production, in real-time by seeing through the materials. THz imaging technology is ideal for industries needing to inspect materials such as plastic, ceramic, composites, polymers, wood, cardboard and paper, textile and fibers and leather.

USER FRIENDLY SOFTWARE
• Direct access via the USB3
• Dynamic black reference
• Lighting correction
• Software development kit included
• LabVIEW drivers available

SPECIFICATIONS

Part number	STI-TZP	STI-TZF
Sensitivity	From **20** pW per pixel	From 30 pW per pixel
Spectral range	0.1 - 5 THz	
Sensor	320x240 pixels micro-bolometer uncooled technology	
Sensor window	HRFZ - silicon with double-sided AR treatment	
Pixel size	50 µm	
Frame rate	25 Hz	

Depth raw data	16 bits
Supply voltage	USB 3.0

OBJECTIVE LENS RANGE

Part number	Lens x0.25	Lens x1
Material	HRFZ - Silicon	HRFZ - Silicon
Frequency range	0.1 - 5 THz	0.1 - 0.8 THz
Magnification	x0.25 at 200 mm	x1 at 100 mm
Focal	50 mm	50 mm
Aperture	F/0.8	Numerical Aperture: 0.3
Field of view	64x48 mm at 200 mm	16x12 mm at 100 mm
AR coating	Parylene C	Parylene C

2. 10000x7096 CMOS Sensor Industrial Camera

The STI-70 is a 70 Mpixels digital color camera designed for industrial machine vision, document scanning, medical and scientific imaging. It is built with the latest CMOS sensor generation offering an exceptional image quality. iMDC70 camera delivers up to one image every 3 seconds in full resolution and reaches higher frequencies pictures in windowed mode. It comes with a USB 3.0 interface and has focus control functions.

MAIN FEATURES
- Camera 10000x7096 pixels of 3.1µmx3.1µm
- CMOS rolling shutter color sensor with micro lenses
- 53DB dynamic
- Image acquisition up to 0.36 image / second at full resolution
- Preview mode of 2496x1774 pixels at 10 images/sec.
- USB3.0 interface
- Piloting focus and lens functions

APPLICATIONS
- PCB inspection, wafer, flat screens, LCD
- Aerial photography, aeronautics and aerospace
- Scientific & research
- Medical & healthcare
- Book scanning and large document scanning
- Sports & medias
- Food & agriculture
- Robotics and industrial control
- Etc… wherever image capture is required

SPECIFICATIONS

|	
Part number	STI-70
Image capture:	CMOSIS CHR70
Sensor:	CMOS Bayer RGB, Rolling Shutter
Nb. of pixels:	10 000 (h) x 7 096 (v)
Pixel size:	3.1 µm x 3.1 µm
IR filter:	To be added at the front of the lens
Optical format:	31 mm (h) x 22 mm (v) (~35 mm)
Mount:	F (Nikkor): - Focus electrical control for Nikon G lenses
Output:	16 bits image format 12 bits digitizing
Speed:	0.36 i/sec.
Sensitivity:	0.15 A/W @ 555 nm (tbc)
S/N ratio:	53 dB
Shutter speed:	1 ms to 500 ms
White balance:	Software
Non-uniformity correction:	Software
Test pattern:	Yes
Image acquisition:	0.36 fps full resolution; Programmable ROI; 10 i/sec. in preview mode (2496 x 1774 pixels)
Synchronization methods:	Free run
Exposure:	Signal exposure out on M8 connector
Temperature sensor:	Yes
Interface:	USB3.0 interface
Electrical power:	12 VDC +/- 10%
Consumption:	6.6 W
Operating temperature:	From 0°C to 40°C
Dimensions:	119 (L) x 134.5 (H) x 100.8 (P)
Weight:	1 kg without lens
Norm:	CE
Mounting:	Mechanical plate with Kodak screw

SPECTRAL RESPONSE
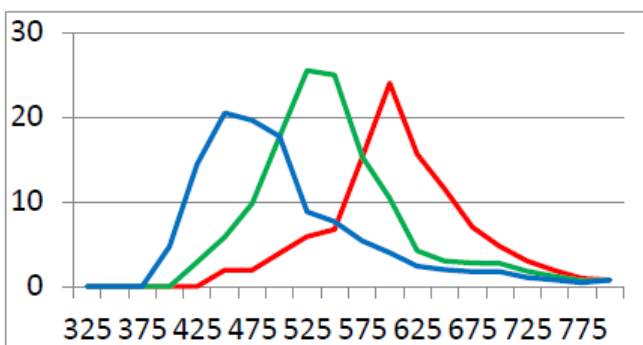
SOFTWARE

STI-70 camera comes with a Windows SDK and a viewer allowing to configure camera parameters and to display images.

CONNECTOR

Pin No.	Designation
1	+12V
2	Input
3	GND
4	Exposure out
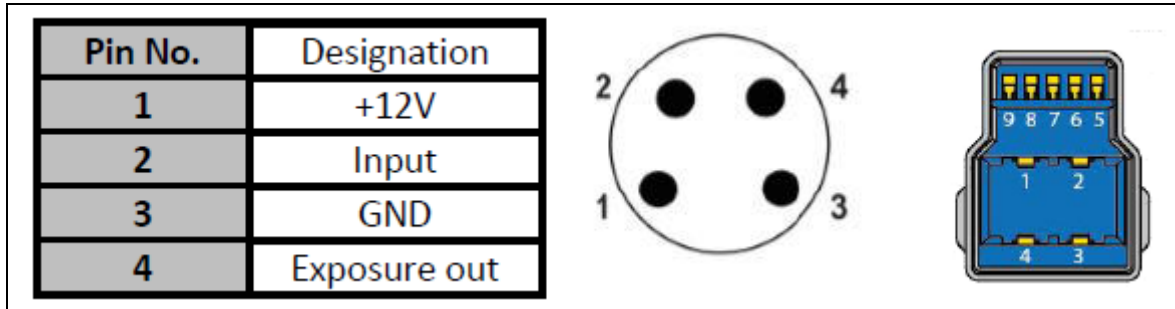
DIMENSION

PLAN MONTURE NIKON
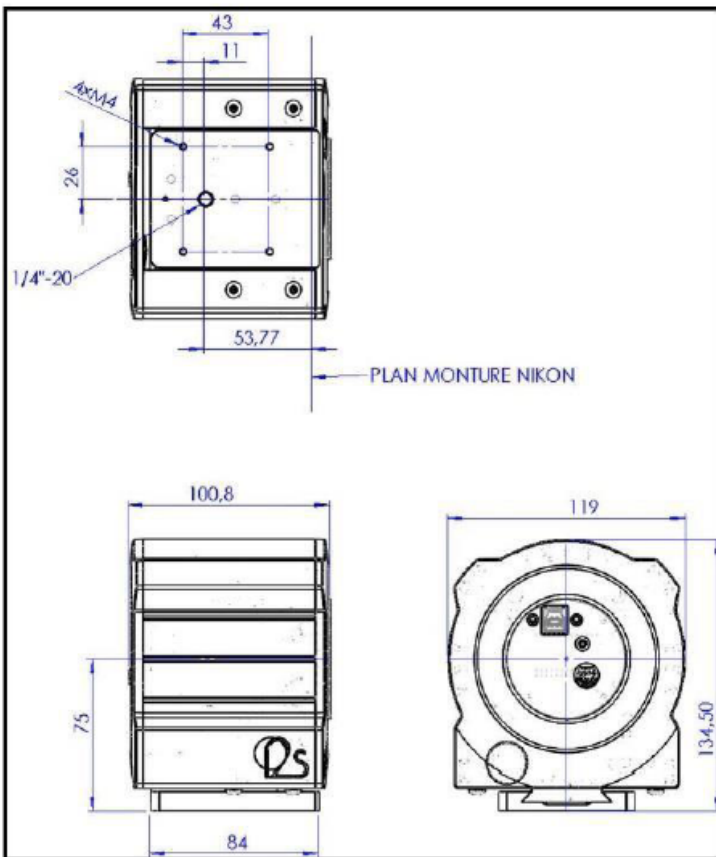
3. 10000x7096 CMOS Sensor True Color Industrial Camera

The STI-TrueColor is a 70 Mpixels digital color camera designed for industrial machine vision, document scanning, medical and scientific imaging. Built with the latest CMOS sensor generation, it offers an exceptional image quality. Each color plan is made from 70 Mpixels which are really grabbed by the sensor, no interpolation is used to demosaic the image.

MAIN FEATURES

- Camera 10000x7096 pixels of 3.1 µm x 3.1 µm
- True color mode / Standard demosaic mode, separated color plan
- No false color – No Moiré effect
- CMOS rolling shutter color sensor with micro lenses
- 53 db dynamic
- One full resolution image every 3. seconds
- Preview mode of 2496x1774 pixels at 10 images/sec.
- USB3.0 interface
- Piloting focus and lens functions

APPLICATIONS

- PCB inspection, wafer, flat screens, LCD
- Scientific & research
- Medical & healthcare
- Book scanning and large document scanning
- Food & agriculture
- Robotics and industrial control
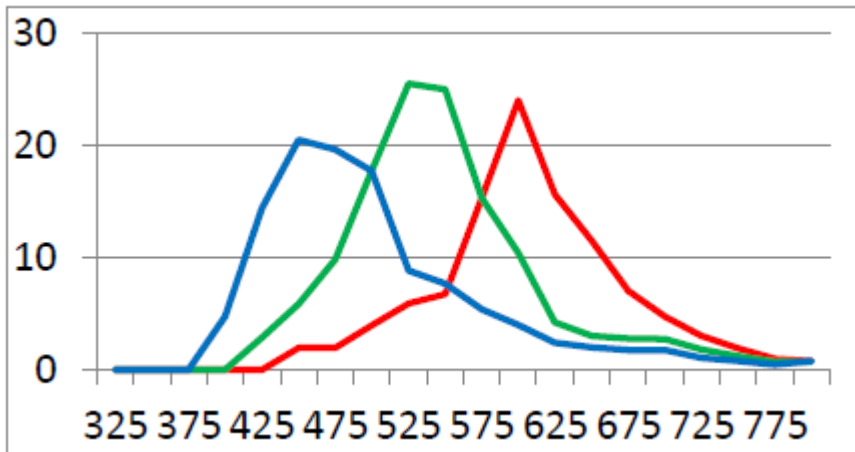- Etc… wherever image capture is required

Regular Bayer camera
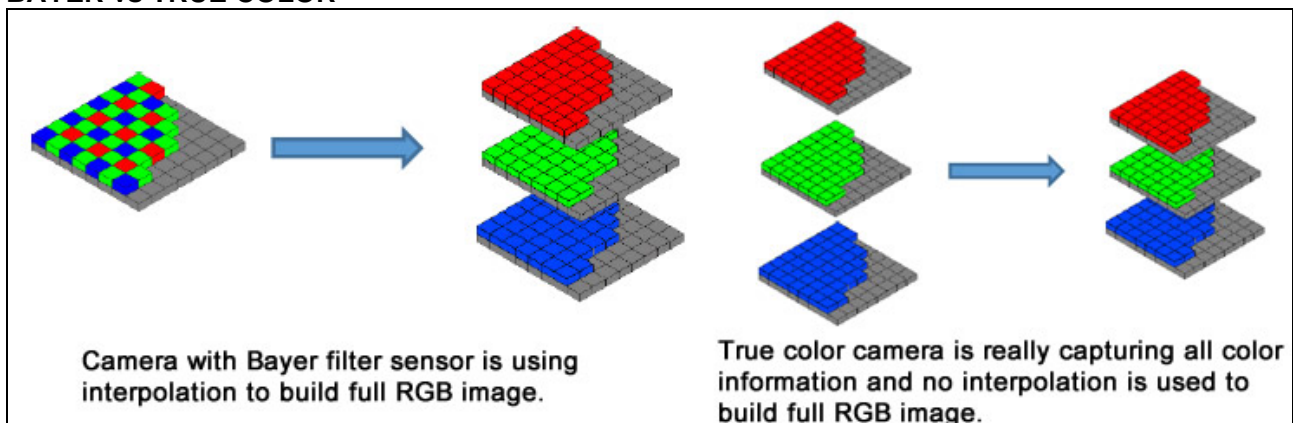
True color camera : no moiré

SPECIFICATIONS

Part number	STI-TrueColor
Image capture:	CMOSIS CHR70
Sensor:	CMOS RGB, Rolling Shutter
Nb. of pixels:	10 000 (h) x 7 096 (v)
Pixel size	3.1 µm x 3.1 µm
IR filter	To be added at the front of the lens
Optical format	31 mm (h) x 22 mm (v) (~35 mm)
Mount	F (Nikkor): - Focus electrical control for Nikon G lenses

Output	16 bits image format; 12 bits digitizing
Speed	0.28 i/sec.
Sensitivity	0.15 A/W @ 555 nm (tbc)
S/N ratio	53 dB
Shutter speed	1 ms to 500 ms
White balance	Software
Non-uniformity correction	Software
Test pattern	Yes
Image acquisition	0.28 fps full resolution; Programmable ROI; 10 i/sec. in preview mode (2496 x 1774 pixels)
Synchronization methods	Free run
Exposure	Signal exposure out on M8 connector
Temperature sensor	Yes
Interface	USB3.0 interface
Electrical power	12 VDC +/- 10%
Consumption	6.6 W
Operating temperature	From 0°C to 40°C
Dimensions	119 (L) x 134.5 (H) x 117.5 (P)
Weight	2 kg
Norm	CE
Mounting	Mechanical plate with Kodak screw

SPECTRAL RESPONSE

BAYER vs TRUE COLOR

Camera with Bayer filter sensor is using interpolation to build full RGB image.

True color camera is really capturing all color information and no interpolation is used to build full RGB image.

SOFTWARE

STI-TrueColor camera comes with a Windows SDK and a viewer allowing to configure camera parameters and to display images.

CONNECTOR

Sintec Optronics

Pin No.	Designation
1	+12V
2	Input
3	GND
4	Exposure out