InGaAs line scan camera

C15333-10E04

◀ Si wafer pattern inspection
(Left: SWIR image,
Right: Visible image)

Liquid level inspection of packaged smoothie ▶
(Left: Visible image,
Right: SWIR image)

Suitable for in-line non-destructive inspection

SWIR (short wavelength infrared) imaging is a great solution for non-destructive inspection. It sees under the surface, differentiates materials based on their SWIR spectral signatures, and offers a safe and convenient way to ensure product quality. Example applications include checking liquid volumes in packages, inspecting contents of sealed containers, and detecting damages and contaminants in agricultural products. In addition, applications in the semiconductor industry include Si wafer pattern inspection and solar cell defect detection. Integrating SWIR imaging into production lines requires cameras such as the C15333-10E04 InGaAs line scan camera, whose high SWIR sensitivity and fast line rate are ideal for real time, in-line non-destructive inspection.
Compare to the conventional model, the C15333-10E04 has improved usability by adding an edge trigger function, which can shoot with a certain exposure time even the conveyor belt speed is changed while shooting. It also becomes compatible with a trigger enable function, which shoots only when an object is passing in front of the camera.

Applications

- **Food and agricultural products**
  damage inspection, quality screening, material discrimination etc.
- **Semiconductors**
  Si wafer pattern inspection, solar cell inspection by EL/PL etc.
- **Industry**
  moisture content, leak detection, container inspection etc.

Features

- SWIR sensitivity from 950 nm to 1700 nm
- 1024 pixel linear array
- Maximum line rate 40 kHz
- Interface: Employs Gigabit Ethernet
- Equipped with high quality images
  (Background subtraction, Real time shading correction)

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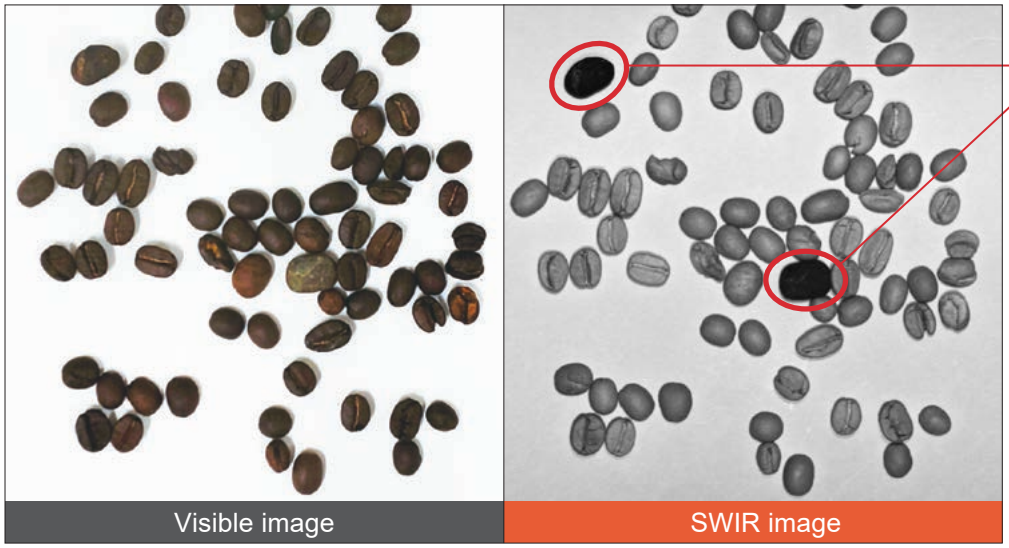
Imaging examples

Contaminant detection

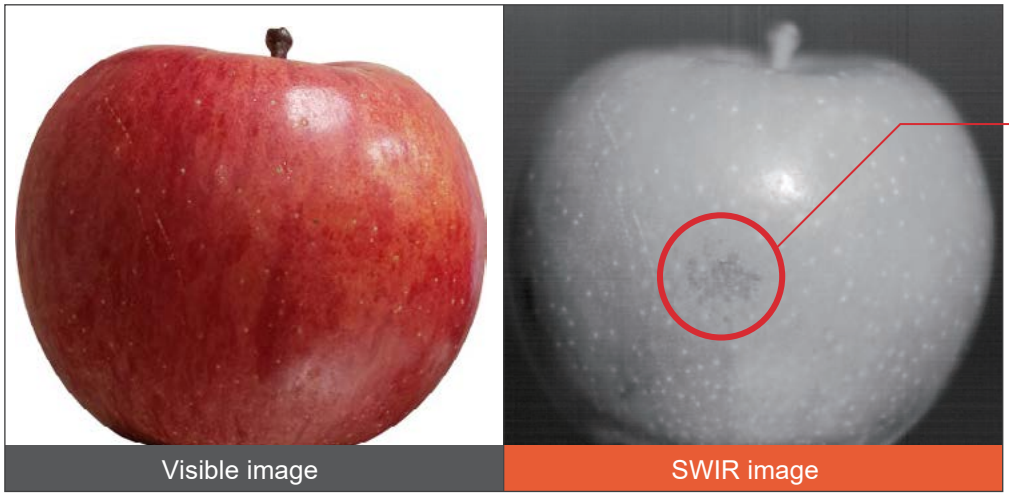
Stones that are difficult to detect in visible images because of their similar size and hue can be easily detected in SWIR images.



Sample: Coffee beans
Contaminant: Stones
Wavelength: 1200 nm
Illumination: Reflection

Damage inspection

It is possible to detect damages on apples that are difficult to distinguish visually.



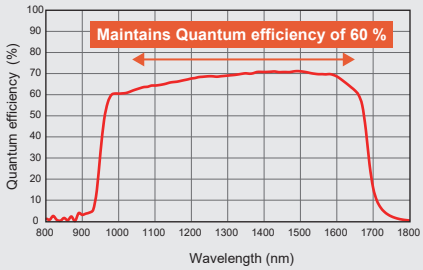
Sample: Apple
Wavelength: 1450 nm
Illumination: Reflection

Key features

of InGaAs line scan camera C15333-10E04

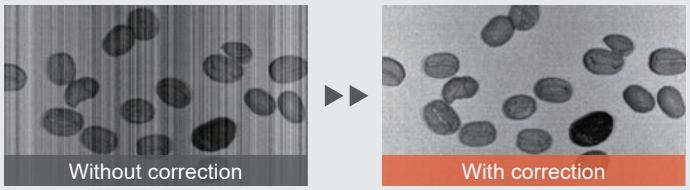
High sensitivity in SWIR

This camera covers wavelengths from 950 nm to 1700 nm, with QE above 60 % from wide range.



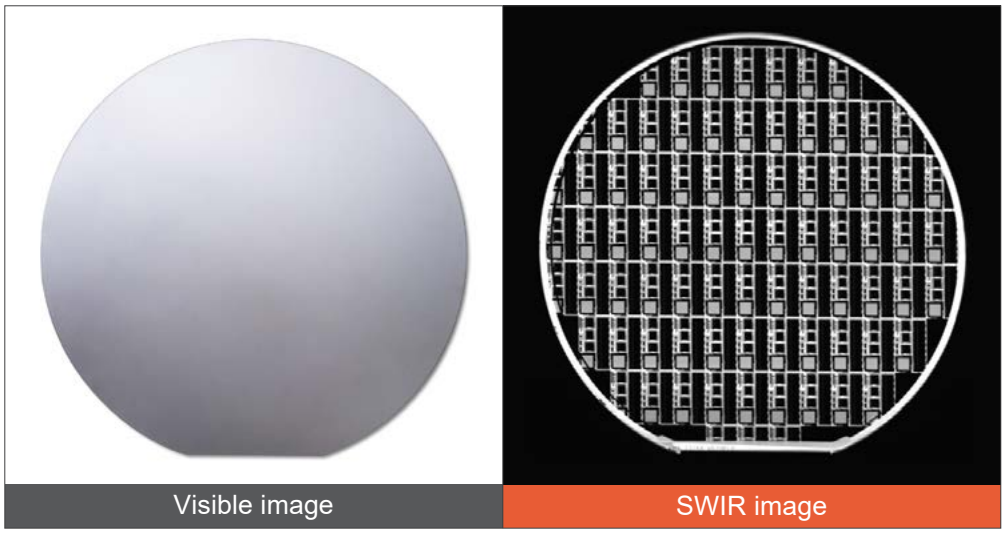
High quality images

Hamamatsu's circuit design enables low read noise and high performance. Pixel correction functions correct hot pixels, sensor variation, and intensity variation.



Semiconductor wafer pattern inspection

The internal pattern of Si wafers can be observed.

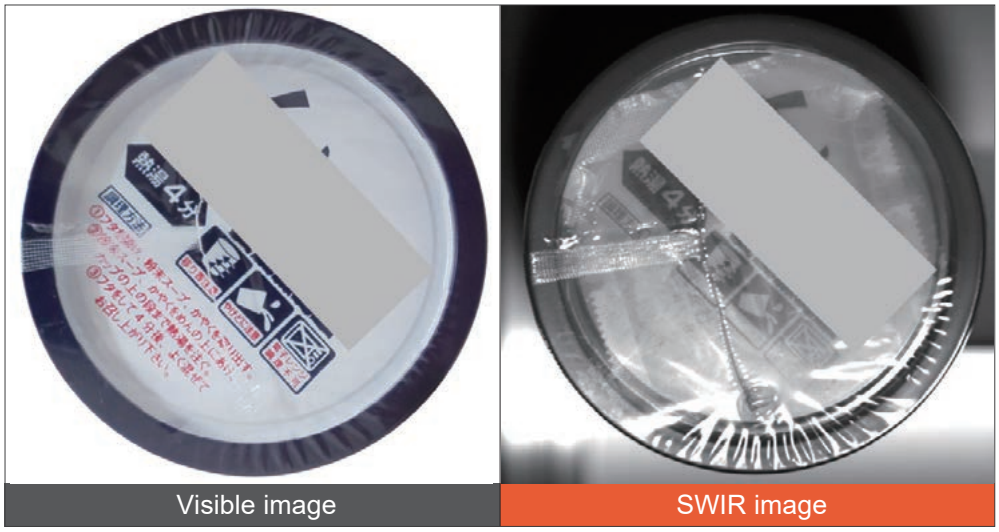


Visible image | SWIR image

Sample: Si wafer
Wavelength: 1100 nm
Illumination: Transmission

Container inspection

The contents of packaged plastic containers, such as instant food, can be checked.



Visible image | SWIR image

Sample: Instant noodles
Wavelength: 1200 nm
Illumination: Reflection

Employs Gigabit Ethernet interfaces

This camera employs Gigabit Ethernet interfaces, which are widely used in industrial fields.
It supports GigE Vision.

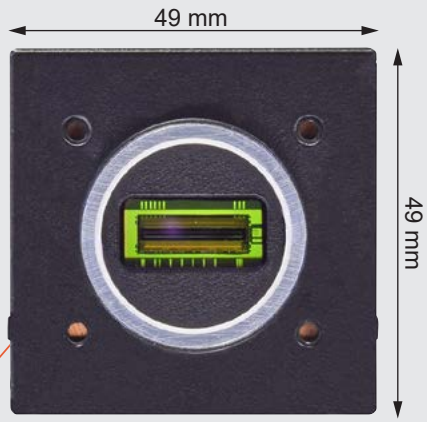
GiGE VISION®

Compact design

Its compact and lightweight design makes the camera easy to integrate into inspection systems.

- Size: 49 mm (W) × 49 mm (H) × 100 mm (D)*
- Weight: Approx. 250 g

*Not including protrusions.

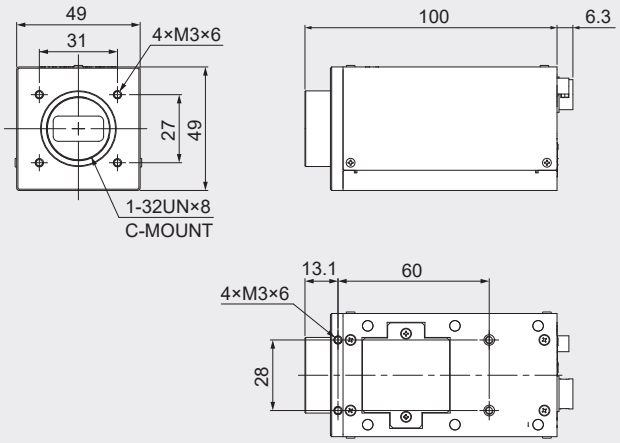


Specifications

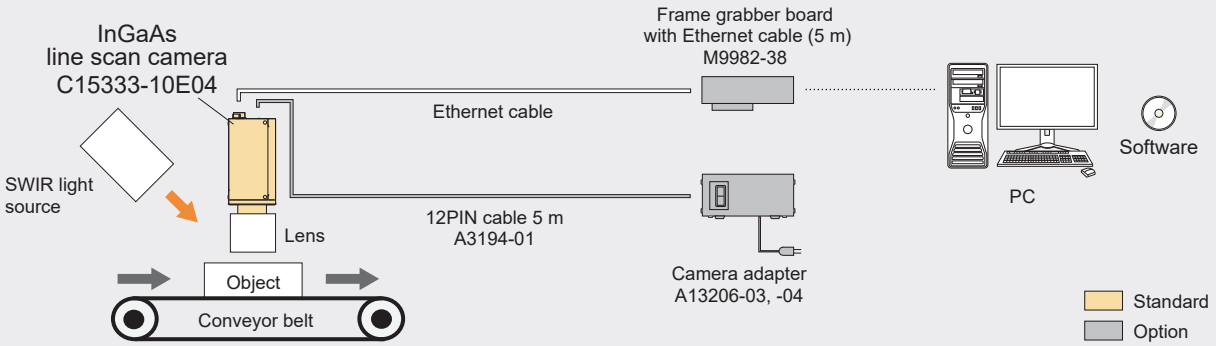
Product number	C15333-10E04
Imaging device	InGaAs line sensor
Effective number of pixels	1024 (H) × 1 (V)
Pixel size	12.5 µm (H) × 12.5 µm (V)
Effective area	12.8 mm (H) × 0.0125 mm (V)
Maximum line rate	Internal mode: 40 kHz (21 µs exposure time) Edge trigger: 20 kHz (21 µs exposure time) Sync readout: 40 kHz
Digital output	14 bit
Exposure time	21 µs to 1 s
External trigger input mode	Edge trigger, Sync readout
Trigger enable function	Support
Trigger input connector	SMA or 12 pin HIROSE connector
Interface	Gigabit Ethernet
Image processing	Background subtraction, Real time shading correction
Other function	Flip, Buried data
Lens mount	C-mount
Power supply	DC 12 V
Power consumption	6 W max.
Ambient operating temperature	0 ˚C to +40 ˚C
Ambient operating humidity	30 % to 80 % (with no condensation)
Ambient storage temperature	−10 ˚C to +50 ˚C
Ambient storage humidity	90 % max. (with no condensation)

Dimensional outlines (Unit: mm)

● Camera (Approx. 0.25 kg)



System configuration example (Illumination: Reflection)



Options

Product number	Product name
A13206-03, -04	Camera adapter
A3194-01	12PIN cable 5 m
A15631-01	Base plate
A12106-05	External trigger cable SMA-BNC 5 m
A12107-05	External trigger cable SMA-SMA 5 m
M9982-38	Frame grabber board with Ethernet cable (5 m)

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- Subject to local technical requirements and regulations, availability of products included in this brochure may vary. Please consult your local sales representative.
- The product described in this brochure is designed to meet the written specifications, when used strictly in accordance with all instructions.
- The spectral response specified in this brochure is typical value and not guaranteed.
- The measurement examples in this brochure are not guaranteed.
- Please note the near-infrared images in this brochure are taken for test purpose; the images do not reflect actual qualities of the products on the market.
- This product is used by customers in combination with belt conveyors, etc., and the inspection details may be affected by the installation location, installation environment, inspection speed, type of inspection target, etc. When building a system, it is necessary for the customer to pay close attention, and we do not guarantee that this product will meet the specific intended use of the customer.
- Specifications and external appearance are subject to change without notice.

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