

InGaAs CAMERA LINE UP CATALOG



Near-infrared imaging with InGaAs cameras

InGaAs cameras are highly sensitive to the near-infrared region and are widely used in various fields, including internal inspection of silicon wafers and semiconductor devices, laser beam alignment, and solar cell evaluation.

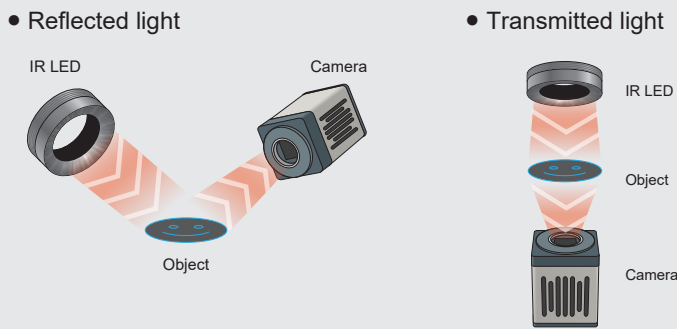
Our InGaAs cameras offer high sensitivity in the near-infrared wavelength range of 950 nm to 1700 nm.

Both area sensors and line sensors are available, allowing flexible selection based on application needs.

Imaging methods: Reflection and transmission

Near-infrared imaging with InGaAs cameras can be performed using two methods: reflection and transmission.

By selecting the appropriate method based on the characteristics of the target and the observation purpose, a wide range of imaging needs—from surface conditions to internal structures—can be effectively addressed.

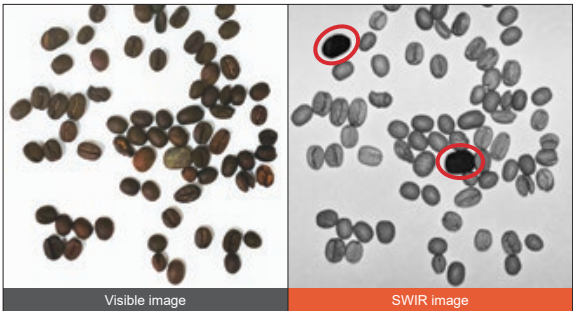


APPLICATION

Foreign object detection

Stones mixed with coffee beans are hard to distinguish in visible images due to similar size and color, but are easily identified in near-infrared images.

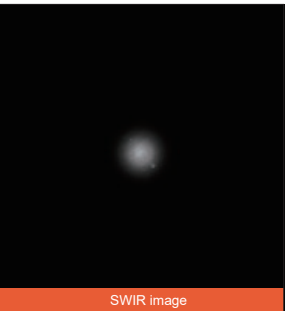
Sample: Coffee beans
Foreign object: Stone
Wavelength: 1200 nm
Illumination: Reflection
Camera: InGaAs Line Scan Camera C15333-10E



Laser beam profiling

Near-infrared laser spread and intensity can be observed using an optical magnification system.

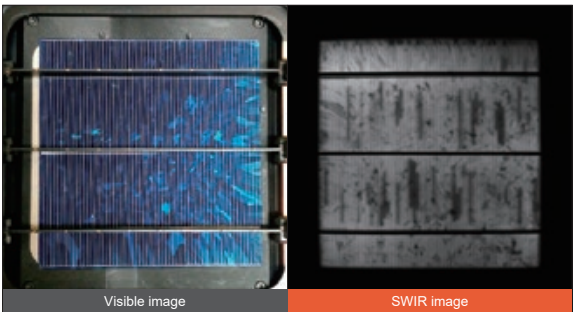
Sample: Laser source
Wavelength: 1300 nm
Camera: InGaAs Camera C14041-10U



Solar cell EL inspection

By observing electroluminescence (EL) images generated by applying current to solar cells, defects can be detected.

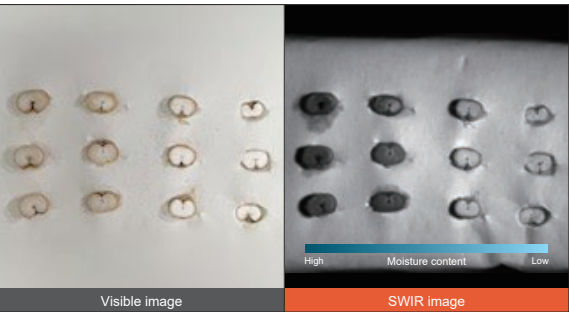
Sample: Solar cell
Camera: InGaAs Camera C12741-03



Moisture distribution observation

Near-infrared light enables visualization of moisture distribution that is difficult to detect with visible light.

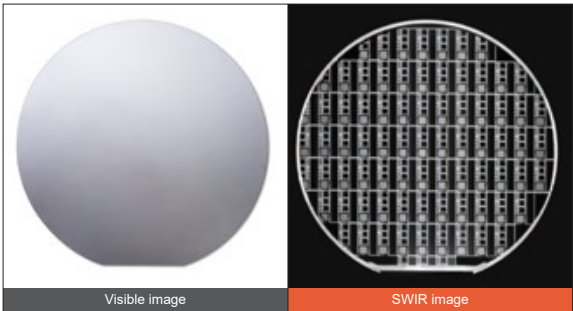
Sample: Barley
Wavelength: 1450 nm
Illumination: Reflection
Camera: InGaAs Camera C12741-03



Internal inspection of semiconductor wafers

Internal patterns of silicon wafers can be observed using near-infrared light.

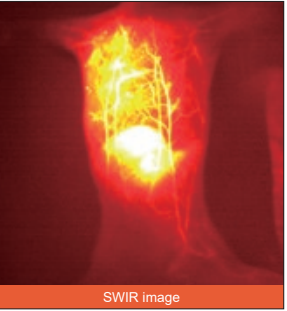
Sample: Silicon wafer
Wavelength: 1100 nm
Illumination: Transmission
Camera: InGaAs Line Scan Camera C15333-10E



Small animal imaging

Enables deep tissue observation in laboratory animals using near-infrared light.

Sample: Mouse
Wavelength: 1200 nm
Illumination: Reflection
Camera: InGaAs Camera C12741-11



SPECIFICATIONS

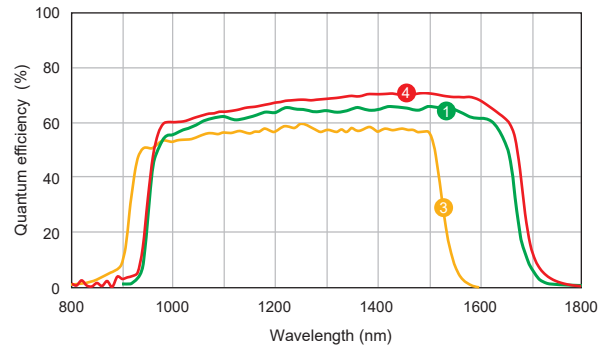
											
Product number		C14041-10U-02		C12741-03-02		C16741-40U		C12741-11		C15333-10E04-02	
Imaging device		InGaAs sensor		InGaAs sensor		InGaAs sensor		InGaAs sensor		InGaAs line sensor	
Sensitivity wavelength range								 (−70 °C)			
Effective number of pixels (H×V)		320 × 256		640 × 512		1280 × 1024		640 × 512		1024 × 1	
Pixel size ([H]μm×[V]μm)		20 × 20		20 × 20		5 × 5		20 × 20		12.5 × 12.5	
Effective area ([H]mm×[V]mm)		6.4 × 5.12		12.8 × 10.24		6.40 × 5.12		12.8 × 10.24		12.8 × 0.0125	
Full well capacity (electrons) (Typ.)		-		-		-		300 000		-	
Cooling method		Peltier cooling (Forced-air cooled)		Peltier cooling (Forced-air cooled)		Peltier cooling (Forced-air cooled / Natural-air cooled)		Peltier cooling (Forced-air cooled / Water cooled)		-	
Cooling temperature	Forced-air cooling (°C)	+10 (Ambient temperature: +25 °C)		+10 (Ambient temperature: +25 °C)		+14.5 to +15.5 (Forced-air cooled)* ¹ +19.5 to +20.5 (Natural-air cooled)* ²		−60 (Ambient temperature: +25 °C)		-	
	Water cooled (°C)	-		-		-		−70 (Ambient temperature: +25 °C, Water temperature: +25 °C)		-	
Frame rate (frame/s)		216.6 (Rolling shutter) 214.3 (Global shutter)		59.774		71.53 (Full resolution)		7.2		Internal mode: 40 kHz* ³ * ⁴ Edge trigger: 20 kHz* ³ * ⁴ Sync readout: 40 kHz* ³	
Readout noise (electrons) rms Typ.		-		-		-		500		-	
Dark current (electrons/pixel/s) Typ.		-		-		-		300 (Forced-air cooled) / 130 (Water cooled)		-	
Sub-array		-		-		✓		-		-	
Digital output (bit)		14		14		12, 8		16		14	
Exposure time		4.6 ms to 1 s (Rolling shutter) 100 μs to 1 s (Global shutter)		16.7 ms to 1 s		20.46 μs to 1 s (13.09 μs steps)		138.5 ms to 10 s (Rolling shutter) 100 μs to 10 s (Rolling shutter)		21 μs to 1 s	
External trigger input mode	Edge trigger	✓		✓		✓		✓		✓	
	Level trigger	✓		✓		✓		✓		-	
	Start trigger	✓		✓		✓		✓		-	
	Sync readout	-		-		-		-		✓	
Trigger enable function		-		-		-		-		✓	
Trigger delay function (s)		0 to 1 (10 μs steps)		0 to 1 (10 μs steps)		0 to 10 (10 μs steps)		0 to 10 (10 μs steps)		-	
Trigger input connect		SMA		SMA		SMA		SMA, Camera Link		SMA, 12 pin	
Trigger output		-		-		-		3ch programmable timing outputs Trigger ready output Global exposure timing output		-	
Trigger output connector		-		-		-		SMA		-	
Binning		-		-		2×2		2×2 / 4×4		-	
Interface		USB 3.0* ⁵		USB 3.0* ⁵ , EIA		USB3.1 Gen 1		Camera Link base configuration		Gigabit Ethernet	
Connector		USB 3.0 Micro-B		USB 3.0 Micro-B		USB Type-C		Mini-Camera Link		-	
Image processing	Background subtraction	✓		✓		✓		-		✓	
	Shading correction	✓		✓		✓		-		✓	
Other function		-		-		-		-		Flip, Buried data	
Lens mount		C-mount		C-mount		C-mount		C-mount		C-mount	
Power supply		DC +12 V		DC +12 V		DC +12 V		AC 100 V to AC 240 V 50 Hz/60 Hz		DC 12 V	
Power consumption		Approx. 16 W		Approx. 16 W		Approx. 15 W		Approx. 150 VA		6 W (max.)	
Ambient operating temperature (°C)		0 to +40* ⁶		0 to +40* ⁶		0 to +35* ⁶		0 to +40		0 to +40	
Ambient operating humidity (%)		30 to 80* ⁷		30 to 80* ⁷		30 to 80* ⁷		30 to 80* ⁷		30 to 80* ⁷	
Ambient storage temperature (°C)		−10 to +50		−10 to +50		−10 to +50		−10 to +50		−10 to +50	
Ambient storage humidity (%)		90 max.* ⁷		90 max.* ⁷		90 max.* ⁷		90 max.* ⁷		90 max.* ⁷	

*1 Default is forced air cooled.
*2 To maintain the proper temperature of the enclosure, please take measures such as installing a heat dissipation mechanism.
*3 Line rate
*4 21 μs exposure time
*5 Equivalent to USB 3.1 Gen 1
*6 Recommended operating ambient temperature: +22 °C to +28 °C
*7 With no condensation

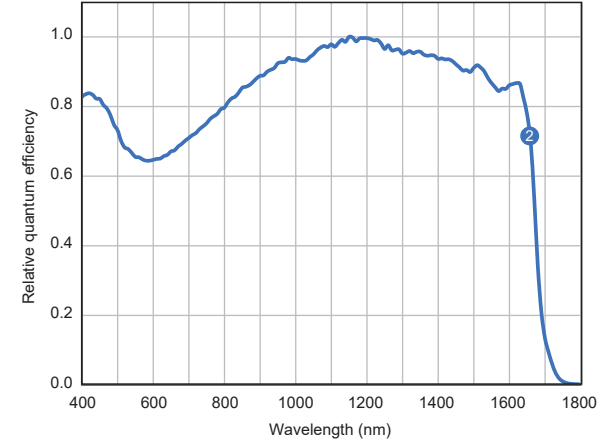
Depending on the exposure time or ambient temperature, brighter or darker pixels than the surrounding area or uneven patterns may appear in the image. This comes from the characteristics of the InGaAs sensor and is not a defect or failure of the camera.

Spectral response

- Quantum efficiency (Typ.)
C14041, C12741, C15333



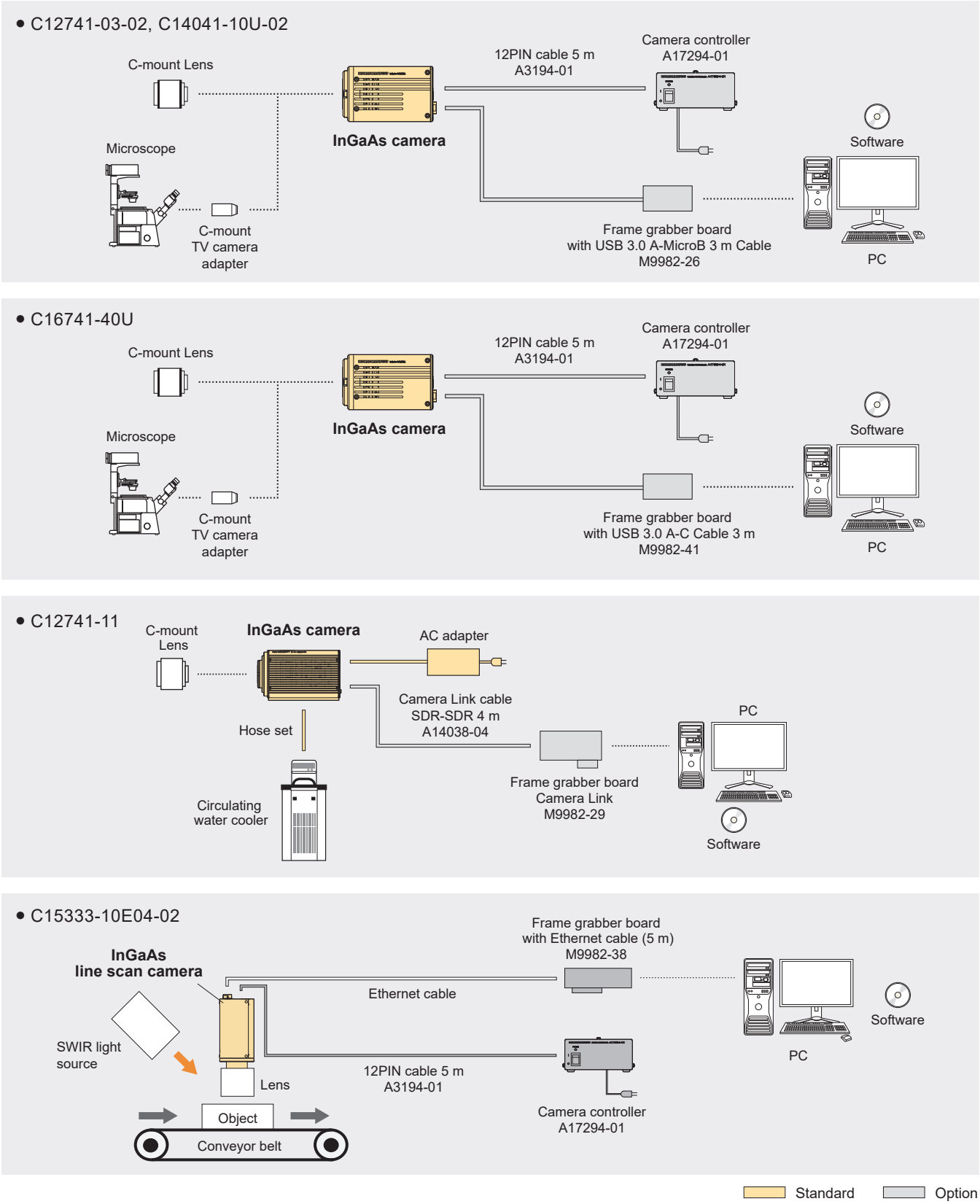
- Relative quantum efficiency (Typ.)
C16741



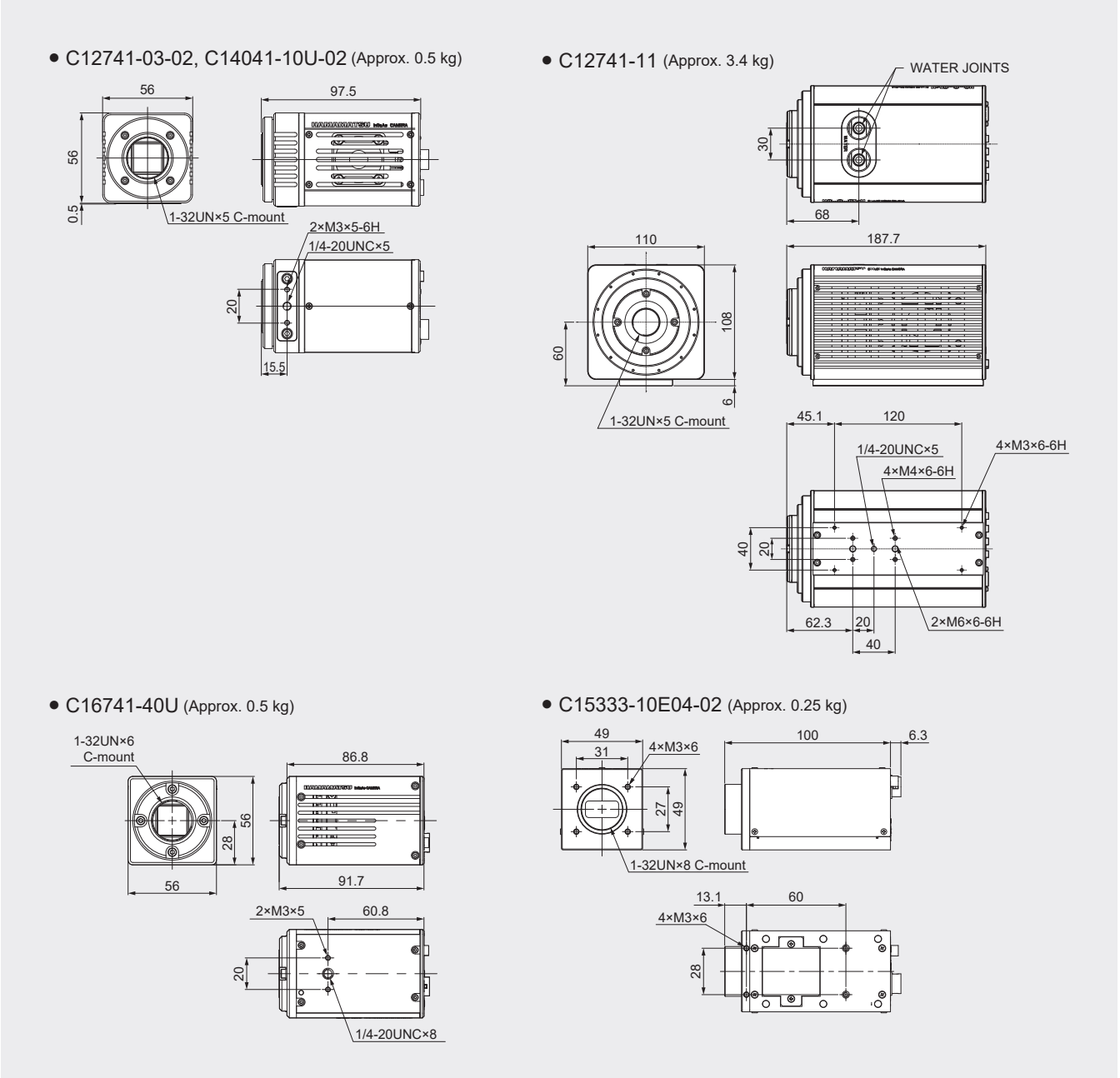
* This is a relative quantum efficiency calculated on the basis of the quantum efficiency at 1150 nm.

SPECIFICATIONS

System configurations



Dimensional outlines



Options

Product number	Product name	C14041-10U-02	C12741-03-02	C12741-11	C16741-40U	C15333-10E04-02
A17294-01	Camera controller	✓	✓	-	✓	✓
A3194-01	12PIN cable 5 m	✓	✓	-	✓	✓
M9982-26	Frame grabber board with USB 3.0 A-MicroB 3 m Cable	✓	✓	-	-	-
M9982-29	Frame grabber board Camera Link	-	-	✓	-	-
M9982-38	Frame grabber board with Ethernet cable (5 m)	-	-	-	-	✓
M9982-41	Frame grabber board with USB 3.0 A-C Cable 3 m	-	-	-	✓	-
A14038-04	Camera Link cable SDR-SDR 4 m	-	-	✓	-	-
A12106-05	External trigger cable SMA-BNC 5 m	✓	✓	✓	✓	✓
A12107-05	External trigger cable SMA-SMA 5 m	✓	✓	✓	✓	✓
A15631-01	Base plate	-	-	-	-	✓

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 - 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.
 - These products are 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 these products will meet the specific intended use of the customer.
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