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Image sensor modules

C15853 series

Built-in high-speed InGaAs linear image sensor, USB 3.1 Gen1 interface

This image sensor module is equipped with an InGaAs linear image sensor (G14714 series). This product has sensitivity in the near infrared region of 0.95 to 1.7 µm, and is capable of readout at a high-speed line rate of 40 klines/s. It transfers the acquired image signal to a PC via a USB 3.1 Gen1 interface. Various functions can be controlled with USB communication and an external trigger signal. The SMA connector for external trigger input is attached to the main body, making it possible to synchronize operation with external devices. Also, a C-mount compatible lens can be used for the optical interface, so no special optical design is necessary, and image acquisition can be done easily.

Features

- **High-speed line rate: 40 klines/s max.**
- **Room temperature operation**
- **Output data: 16-bit**
- **Interface: USB 3.1 Gen1**
- **High sensitivity (C15853-03)**

Applications

- **Near infrared non-destructive inspection (farm product inspection, semiconductor inspection, etc.)**
- **Sorting machines**
- **SD-OCT (C15853-03)**
- **Film thickness gauge (C15853-03)**

Specifications of built-in sensor

Parameter	C15853-01	C15853-02	C15853-03	Unit
Built-in InGaAs linear image sensor	G14714-512DE	G14714-1024DK	G14714-1024DG	-
Spectral response range	0.95 to 1.7			µm
Number of effective pixels	512	1024	1024	pixels
Pixel size*1 (H × V)	25 × 25	12.5 × 12.5	12.5 × 250	µm
Pixel pitch	25	12.5	12.5	µm
Image size*2	12.8 × 0.025	12.8 × 0.0125	12.8 × 0.25	mm
Cooling	Non-cooled type			-

*1: Region with actual sensitivity G14714-512DE: 25 × 45 µm, G14714-1024DK: 12.5 × 32.5 µm, G14714-1024DG: 12.5 × 270 µm
*2: Region with actual sensitivity G14714-512DE: 12.8 × 0.045 mm, G14714-1024DK: 12.8 × 0.0325 mm, G14714-1024DG: 12.8 × 0.27 mm

Structure (Typ. Ta=25 °C, unless otherwise noted)

Parameter	C15853-01	C15853-02	C15853-03	Unit
A/D resolution	16			bit
Interface	USB 3.1 Gen1			-
Trigger mode	Internal trigger mode/External trigger mode*3			-
Gain switching	Low/Middle Low/Middle High/High (4 levels)			-
Integration time	21 to 5000000			µs
Optical interface	C mount			-
Dimensions (W × H × D)*4	60 × 60 × 54			mm
Weight	340			g

*3: Input signal polarity (rising/falling edge) can be selected
*4: Excluding protrusions

Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Vs		-0.3	-	15	V
Input signal voltage (external trigger)	Vix	LVTTL (0/3.3 V)	-0.5	-	6.5	V
Operating temperature	Topr	No dew condensation*5	0	-	40	°C
Storage temperature	Tstg	No dew condensation*5	-20	-	70	°C

*5: When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

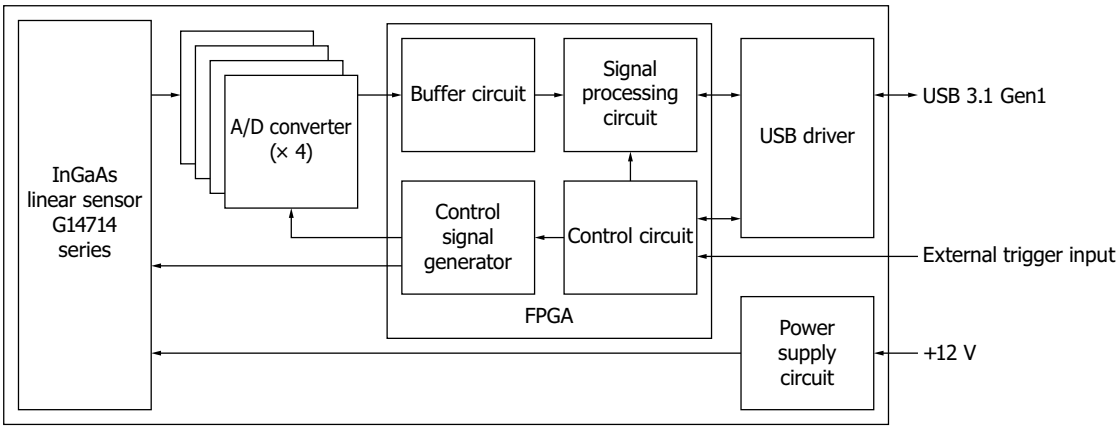
Recommended operating conditions (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Vs	11.4	12.0	12.6	V
Input signal voltage (external trigger signal)	Vih	2.0	3.3	5.5	V
	Vil	-	0	0.8	V

Electrical characteristics (Typ. Ta=25 °C, unless otherwise noted)

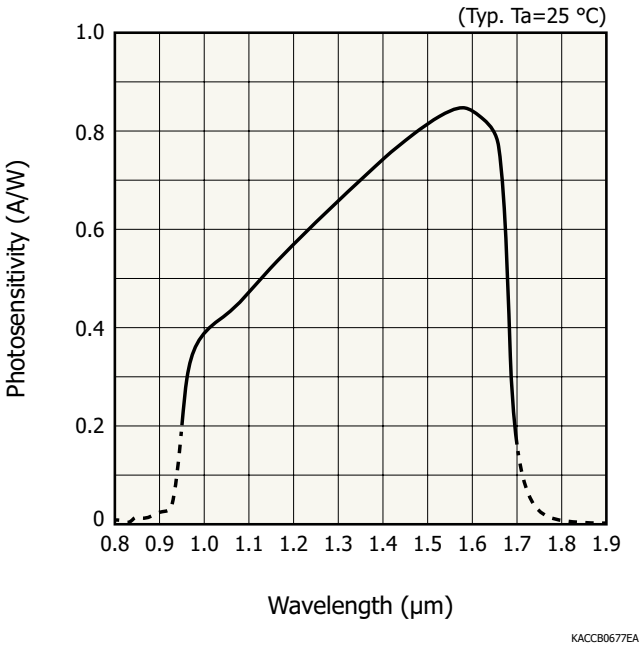
Parameter	Symbol	Condition	C15853-01			C15853-02			C15853-03			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Operating frequency	fop		-	-	15	-	-	15	-	-	15	MHz
Frame rate	-		-	-	40	-	-	40	-	-	40	klines/s
Dark current	ID	CE=1.23 μV/e⁻	-	0.5	5	-	0.5	5	-	5	50	pA
Readout noise	Nread	CE=1.23 μV/e⁻	-	1.5	3	-	1.2	2	-	1.5	3	mV rms
Dynamic range	Drange	CE=1.23 μV/e⁻	533	1167	-	800	1417	-	533	1133	-	-
Conversion efficiency	CE	Low	-	0.128	-	-	0.128	-	-	0.128	-	μV/e⁻
		Middle low	-	1.23	-	-	1.23	-	-	1.23	-	
		Middle high	-	4.0	-	-	4.0	-	-	4.0	-	
		High	-	8.0	-	-	8.0	-	-	8.0	-	
Current consumption	Ic		-	0.2	0.3	-	0.2	0.3	-	0.2	0.3	A
USB bus power current consumption	Ic_USB		-	500	700	-	500	700	-	500	700	mA

Block diagram



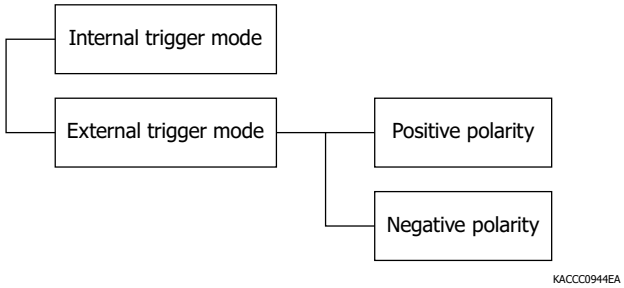
KACCC1090EB

Spectral response



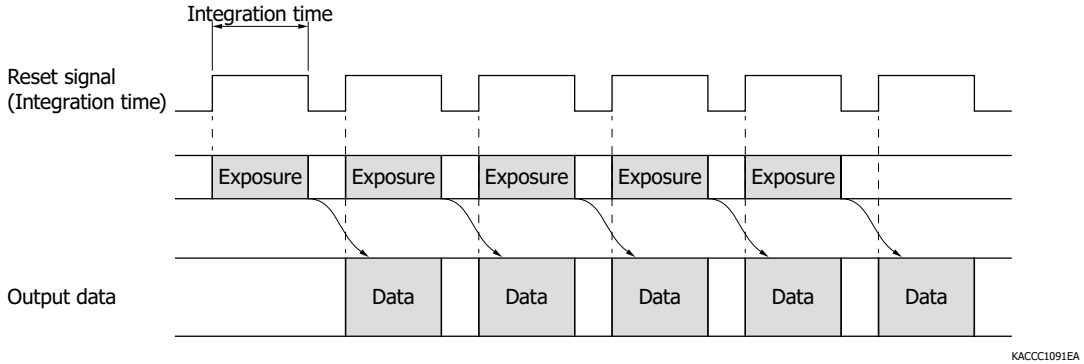
Imaging mode

There are two imaging modes: internal trigger mode, which operates with only the image sensor module, and external trigger mode, which determines exposure timing using an external trigger.



Internal trigger mode

In internal trigger mode, exposure starts at the same time as the start of measurement. The shortest integration time is 21 µs (line rate: 40 klines/s), and the line rate depends on integration time. The timing chart in internal trigger mode is shown below.



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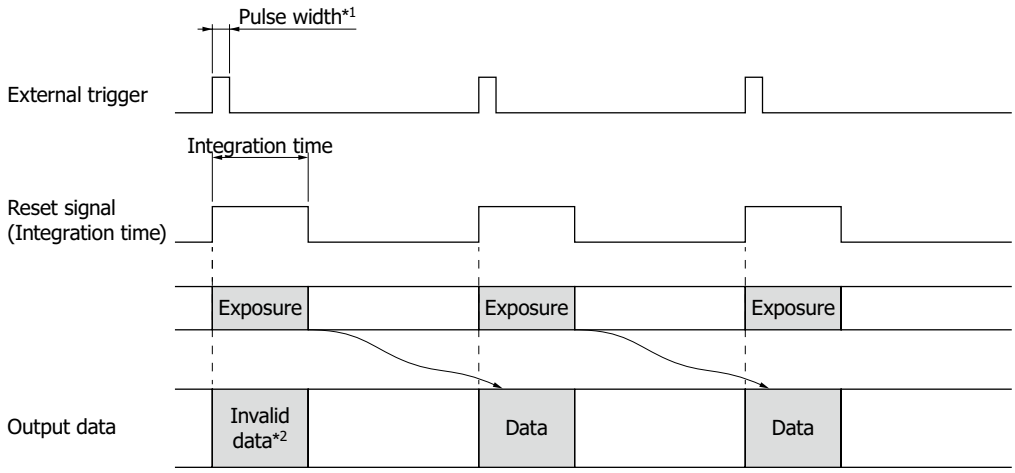
External trigger mode

In external trigger mode, the image sensor module is controlled via signals from external devices, and images are captured at certain timing. Exposure starts at the edge (rising/falling) of the external trigger. The timing chart in external trigger mode is shown below.



*1: The minimum pulse width of trigger signal is 1 µs.
To get X number of frames, X + 1 trigger signals are required.
*2: This is data exposed in the previous frame.

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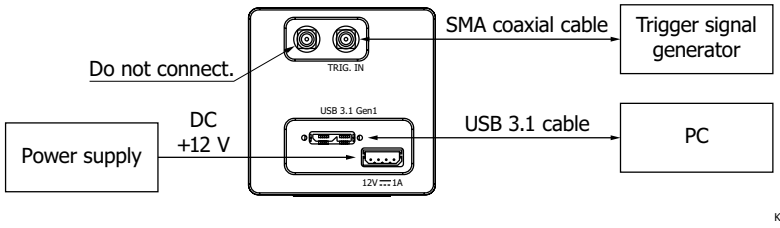
Connection example

See the figure below for connection method. Ports and cables that meet USB 3.1 Gen1 standard are required to connect this module with a PC. A 12 V power supply is required for the power supply of devices. Provide power to the external power supply apparatus by connecting the supplied power cable.
To use in external trigger mode, connect this module with an external trigger signal generator via an SMA coaxial cable.



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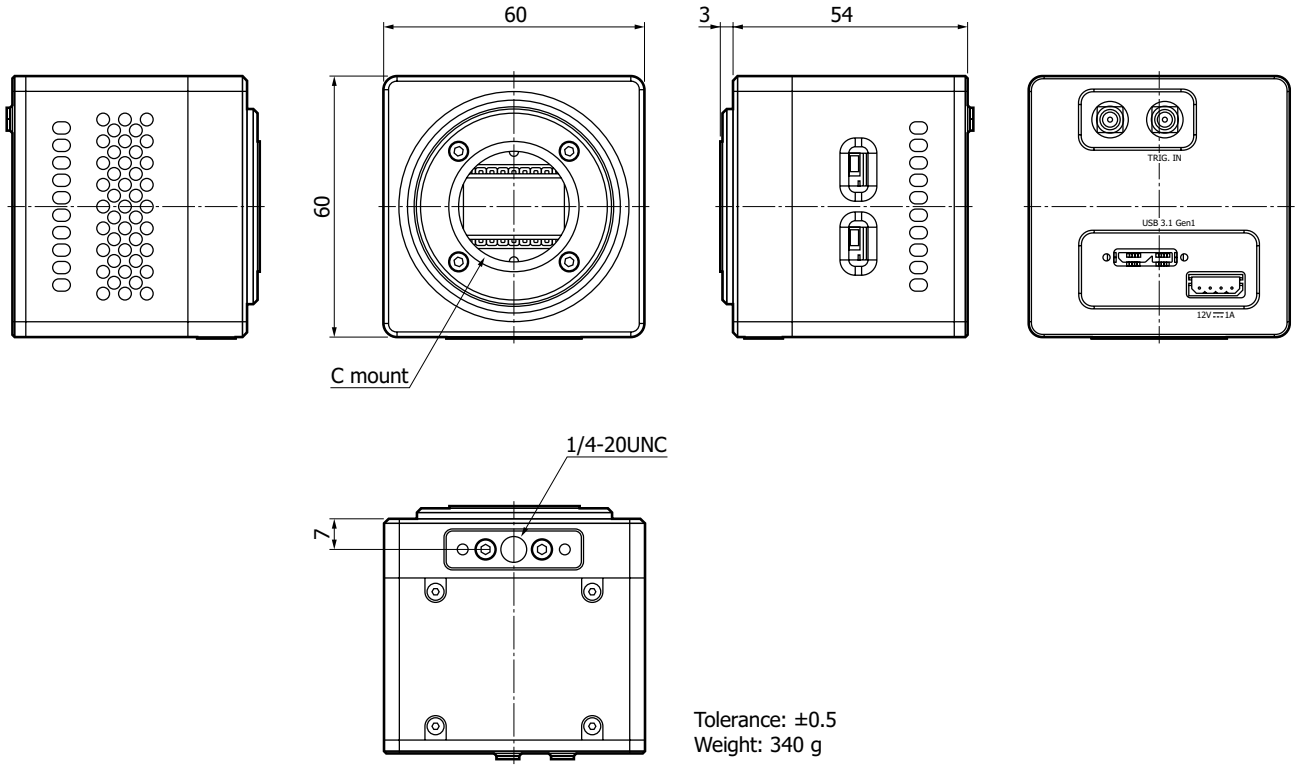
Dimensional outline (unit: mm)



Tolerance: ±0.5
Weight: 340 g

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Software

· Compatible OS: Windows 10, Windows 11
· DCAM-API (digital camera application programming interface): Download from https://dcam-api.com. It includes Hamamatsu driver software, DLL, and image capture software. DCAM-SDK, which includes the function manual and sample software, is available.

Note: The image processing library is not provided.

Accessories

· Power cable (one end unterminated)
· USB cable
· CD-ROM

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer

Image sensor modules C16091 series

It is an image sensor module incorporating a TE-cooled InGaAs linear image sensor.

Type no.	InGaAs image sensors (built-in)					
	Type no.	Spectral response range (µm)	Number of pixels (ch)	Pixel size (µm)	Pixel pitch (µm)	Image size (mm)
C16091-01	G11475-256WB	0.9 to 1.85	256	50 × 250	50	12.8 × 0.25
C16091-02	G11475-512WB		512	25 × 250	25	
C16091-03	G11476-256WB	0.9 to 2.05	256	50 × 250	50	
C16091-04	G11477-256WB	0.9 to 2.15	256	50 × 250	50	
C16091-05	G11477-512WB		512	25 × 250	25	
C16091-06	G11478-256WB	0.9 to 2.55	256	50 × 250	50	
C16091-07	G11478-512WB		512	25 × 250	25	
C16091-08	G11508-256SA	0.9 to 1.67	256	50 × 500	50	12.8 × 0.5
C16091-09	G11508-512SA		512	25 × 500	25	
C16091-10	G14237-512WA	0.85 to 1.4	512	25 × 500	25	
C16091-11	G11620-256SA	0.95 to 1.67	256	50 × 500	50	
C16091-12	G11620-512SA		512	25 × 500	25	
C16091-13	G12230-512WB*6	0.95 to 1.65 1.4 to 2.15	512	25 × 250	25	12.8 × 0.25

*6: Built-in two InGaAs chips (cutoff wavelength: 1.65 µm, 2.15 µm)

Information described in this material is current as of December 2025.
Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.
The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.
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