



C11514

## Driver circuit for InGaAs linear image sensor (G11135 series, G14006-512DE)

The C11514 is a driver circuit developed for InGaAs linear image sensors (G11135 series, G14006-512DE). The driver circuit consists of an analog video signal processing circuit (16-bit A/D converter), digital control section, interface, and power supply. The circuit converts analog video signals received from an image sensor into digital signals and outputs them. A PC is connected to the circuit through the CameraLink connector (Base Configuration) and used to control the C11514 and retrieve data. The power to the circuit is supplied from the DC jack using the supplied cable. Further, The C11514 has a BNC connector for external trigger input and a BNC connector for pulse output that can be used to synchronize with external devices. This product comes with application software (DCam-CL) that runs on Microsoft® Windows® 10 (64-bit). It can be used to easily operate the C11514 from the PC connected via CameraLink interface. This product also includes DLLs that the user can use to create original control programs.

### Features

- Built-in 16-bit A/D converter
- Interface: CameraLink
- Supply voltage: Single +5 VDC
- External synchronization function
- Gain and offset adjustment function

### Applications

- Non-destructive inspection
- Sorting machines
- G11135 series, G14006-512DE control and data acquisition

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The C11514 is compatible with the following InGaAs linear image sensors (Sensor sold separately).

Type no.	Total number of pixels	Number of effective pixels	Pixel size [ $\mu\text{m}$ (H) $\times$ $\mu\text{m}$ (V)]	Pixel pitch ( $\mu\text{m}$ )	Image size (mm)
G11135-256DD	256	256	50 $\times$ 50	50	12.8 $\times$ 0.05
G11135-512DE	512	512	25 $\times$ 25	25	12.8 $\times$ 0.025
G14006-512DE	512	512	25 $\times$ 25	25	12.8 $\times$ 0.025

### Structure

Parameter	Specification	Unit
Output type	Digital	-
A/D resolution	16	bit
Interface	CameraLink (Base Configuration)	-

### Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vdd	Ta=25 °C	0 to +6.0	V
Input signal voltage*1	Vi	Ta=25 °C	0 to Vdd	V
Operating temperature*2	Topr		0 to +50	°C
Storage temperature*2	Tstg		-20 to +70	°C

\*1: Trigger input

\*2: No dew condensation

When there is a temperature difference between a product and the surrounding area in high humidity environment, 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.

### Electrical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Scan rate*3	fop		-	5	-	MHz
Line rate*4	LR	G11135-256DD	-	-	15723	lines/s
		G11135-512DE			8710	
		G14006-512DE			8710	
Conversion gain	Gc	Gain 1	-	31.6	-	μV/ADU
		Gain 5	-	158	-	
Trigger output voltage	High level	-	Vdd=+5 V	3.8	-	Vdd
	Low level					
Trigger input voltage	High level	-	Vdd=+5 V	3.5	-	Vdd
	Low level					
Current consumption	I		-	-	420	mA

\*3: Fixed

\*4: Theoretical line rate value determined by the internal operation timing of the driver circuit.

### Electrical and optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Readout noise*5	Nr	Gain 1	-	15	-	ADU
		Gain 5	-	75	-	
Dynamic range	DR	Gain 1	-	3000	-	-
		Gain 5	-	600	-	
Operating voltage*6	Vop		4.75	5	5.25	V

\*5: Integration capacitance: 0.1 pF

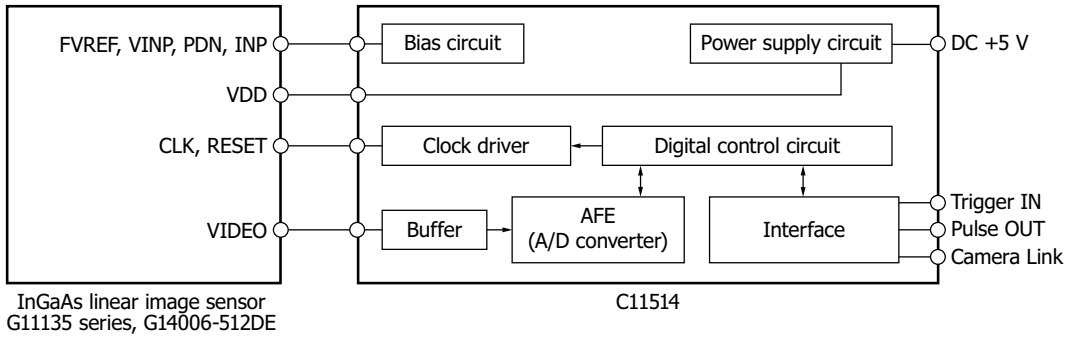
\*6: DC power supply

### Function

Parameter	Specification	
Data acquisition mode	Internal synchronization mode	Data is acquired according to the trigger timing from the application software.
	External synchronization mode	The start of integration, integration time, and the number of lines of the acquisition data are controlled by the input pulses to the TRIGGER_IN connector.
Gain adjustment	The output ADU can be varied in the range of 1 to 5 times.	
Offset adjustment	This function adds any value to the output ADU by digital setting which can be varied within a specified range.	
Pulse output setting	This is used to set the pulse signal to output from the PULSE_OUT connector (output on/off, signal polarity, delay time, pulse width). This signal is output in sync with the start of the integration time of the InGaAs image sensor. The signal output level is H-CMOS compatible.	
Integration capacitance switch function	This function changes the integration amplifier's capacitance in the InGaAs image sensor. The integration capacitance can be switched between 0.1 pF and 1 pF. The default value is 0.1 pF. For more details, refer to the G11135 series, G14006-512DE datasheets.	
Storage of settings	Settings for data acquisition and the like can be saved in the circuit's internal memory.	

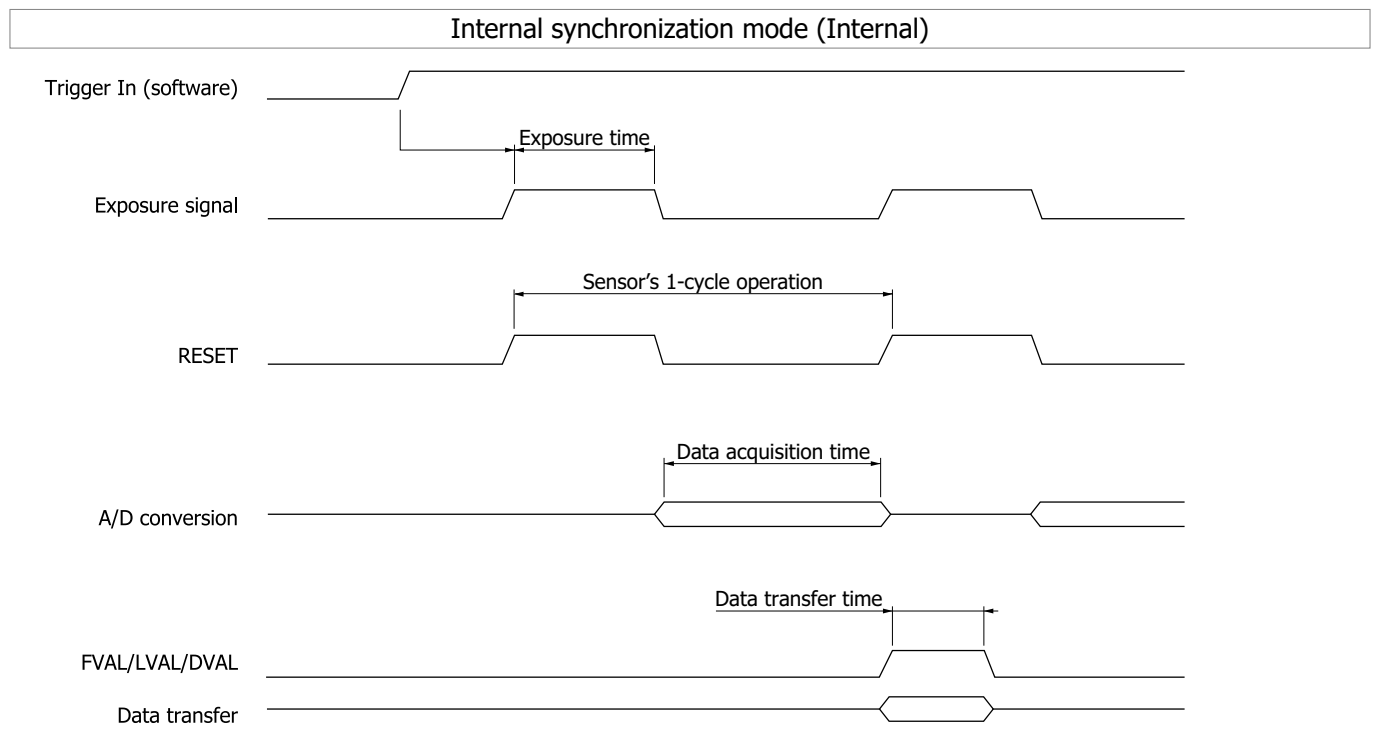
Note: For details on each function, refer to the instruction manual that comes with the product.

**Block diagram**



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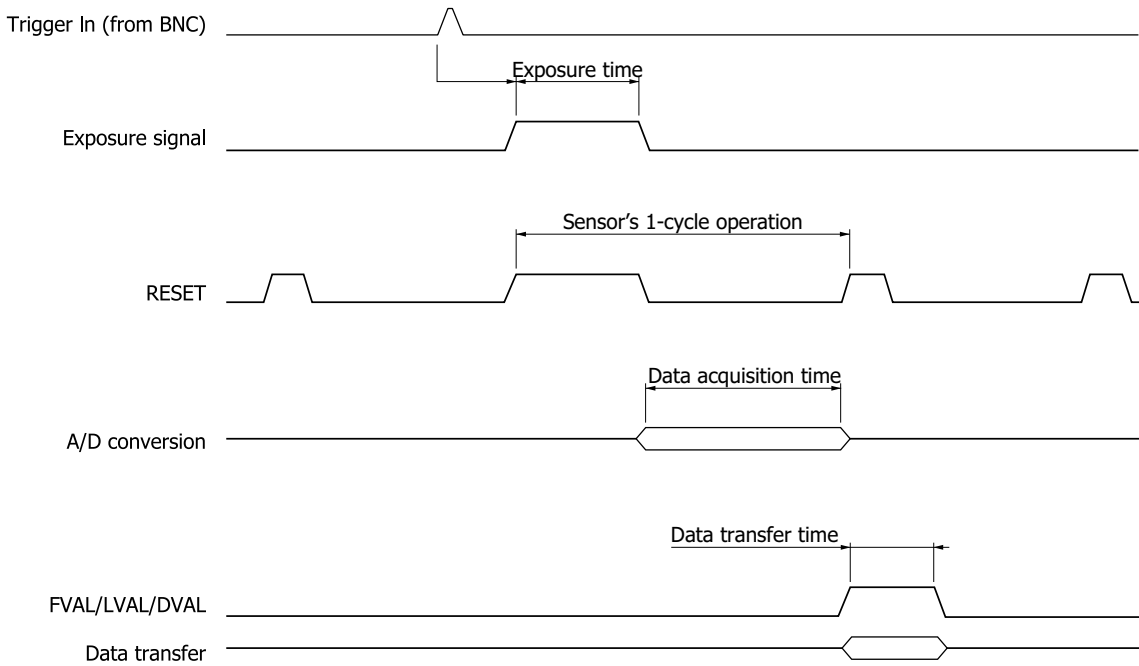
**Timing chart**



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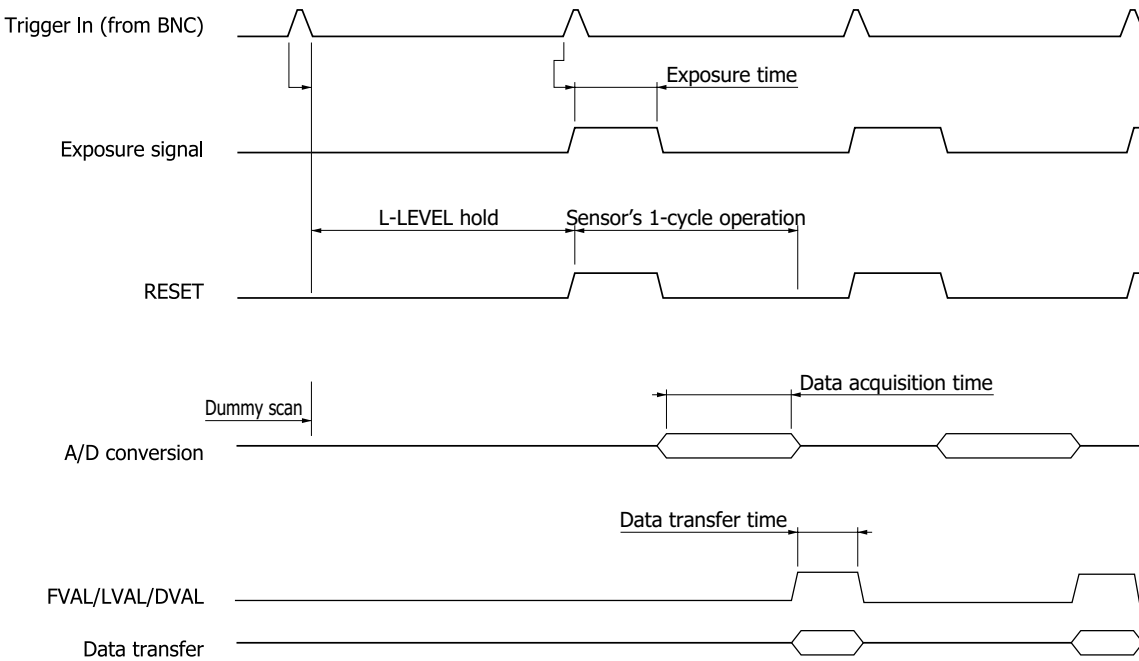
External synchronization mode

External Edge 1



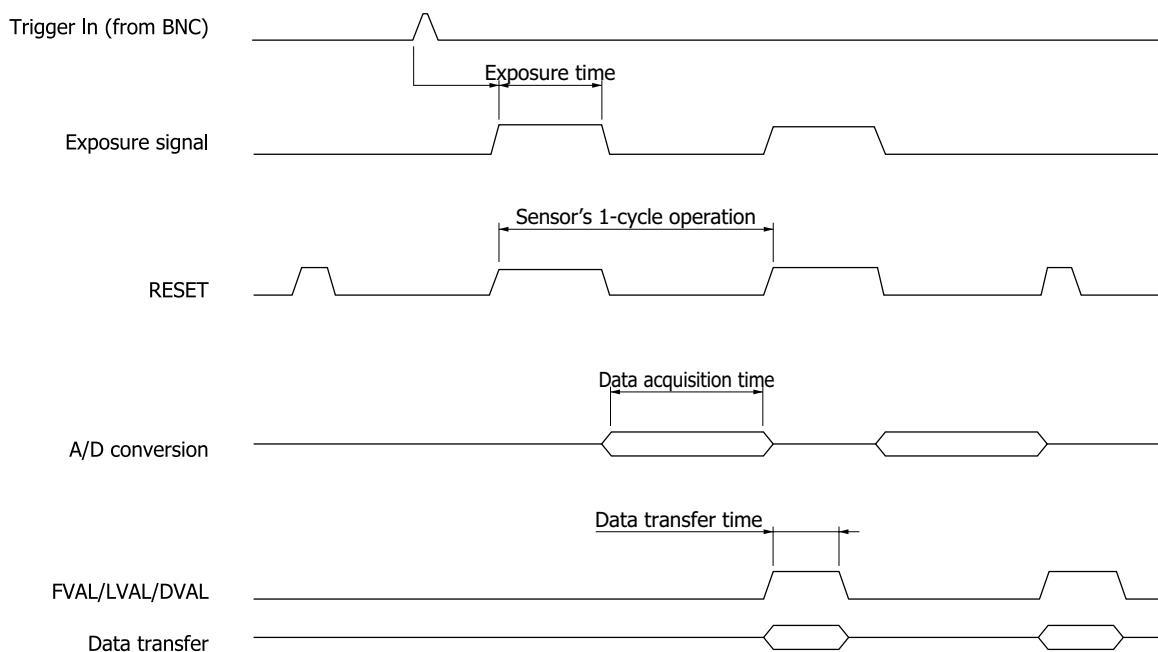
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External Edge 2



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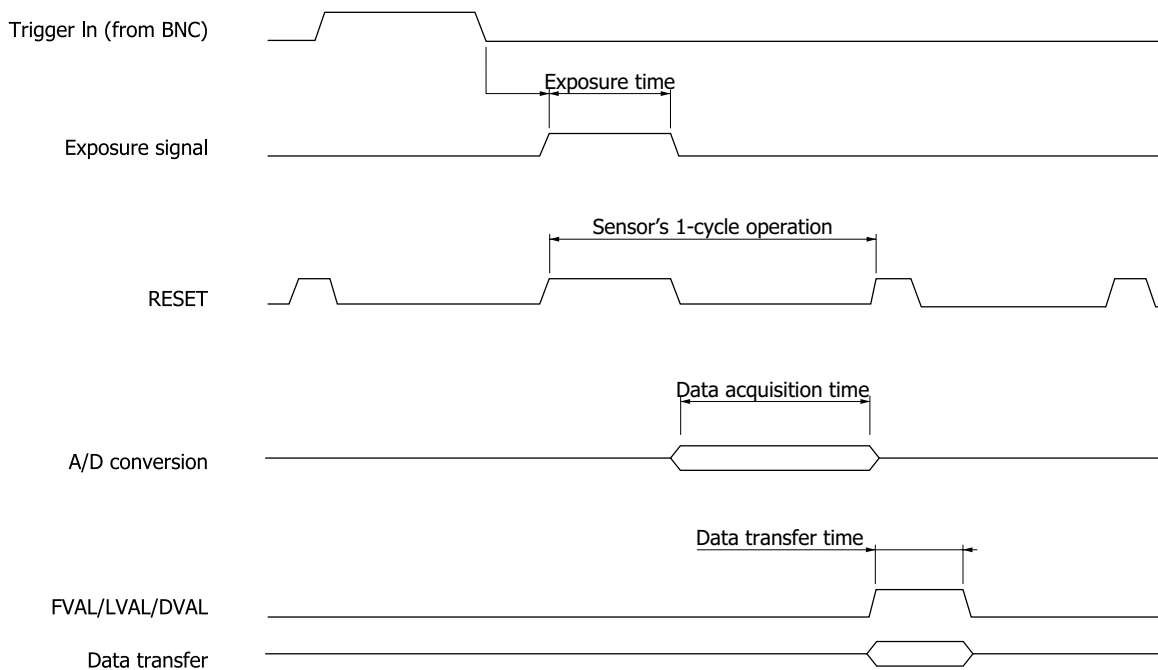
External Edge 3\*5



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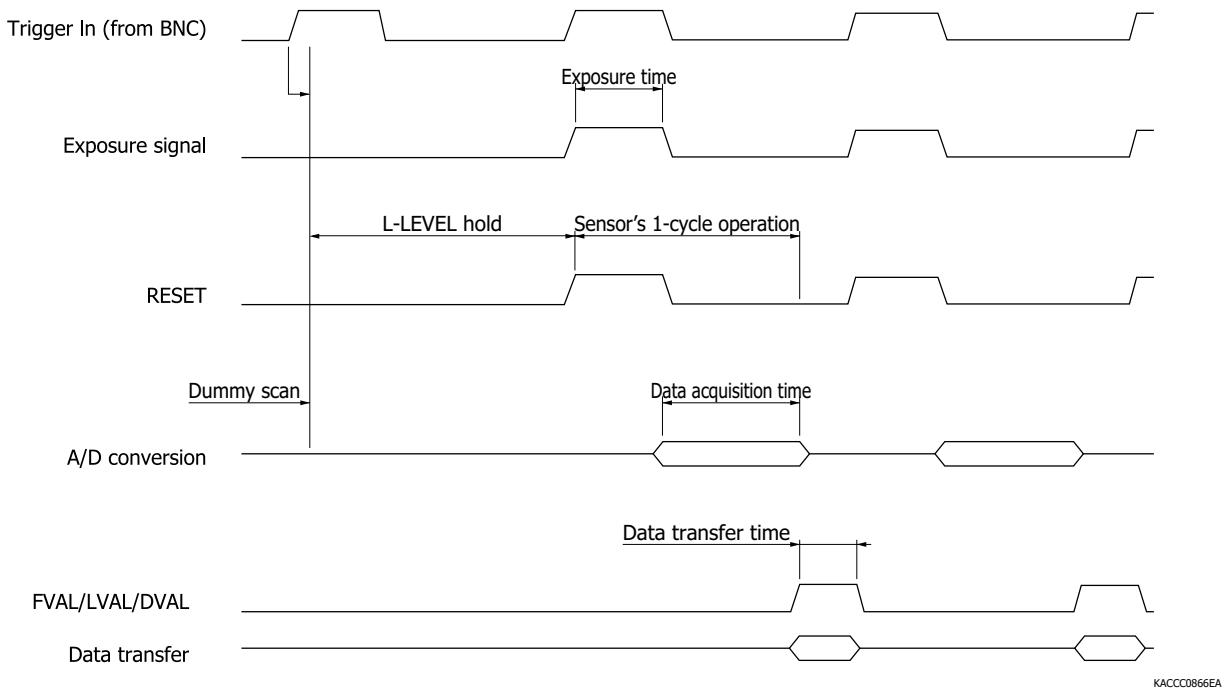
\*5: When acquiring 2-line data

External Level 1

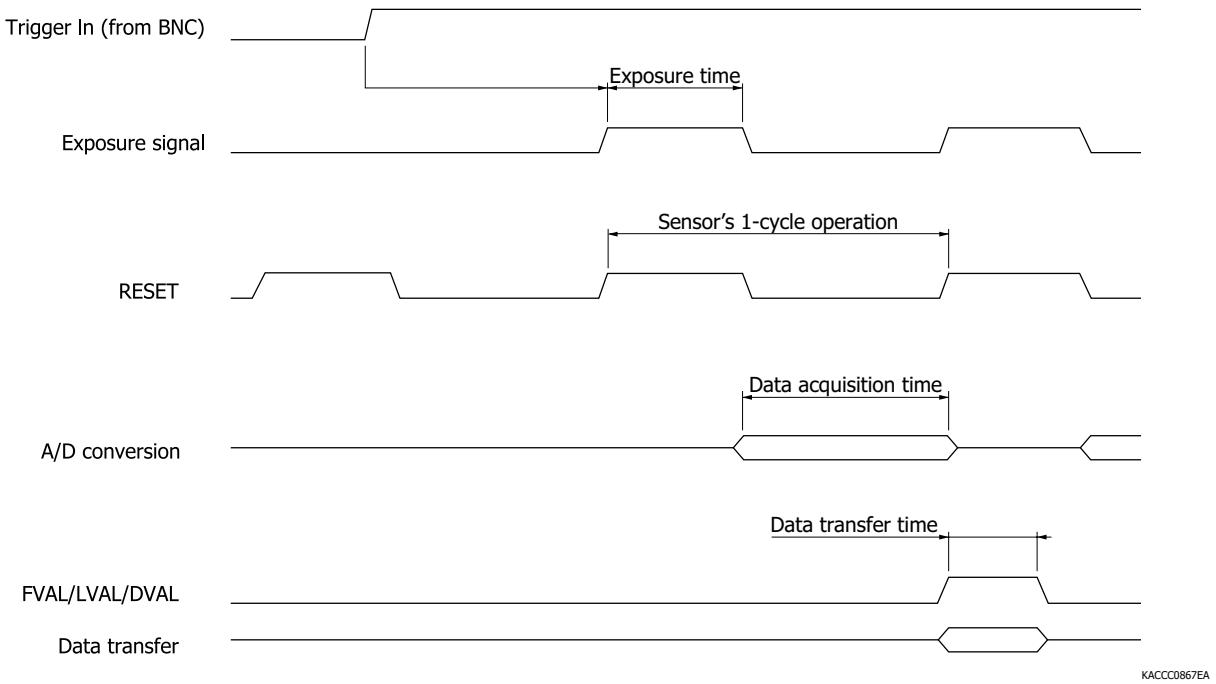


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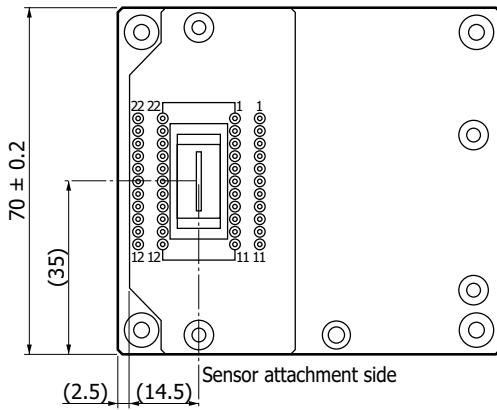
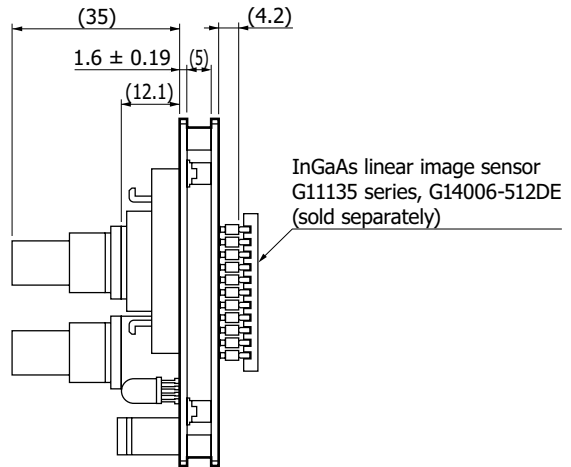
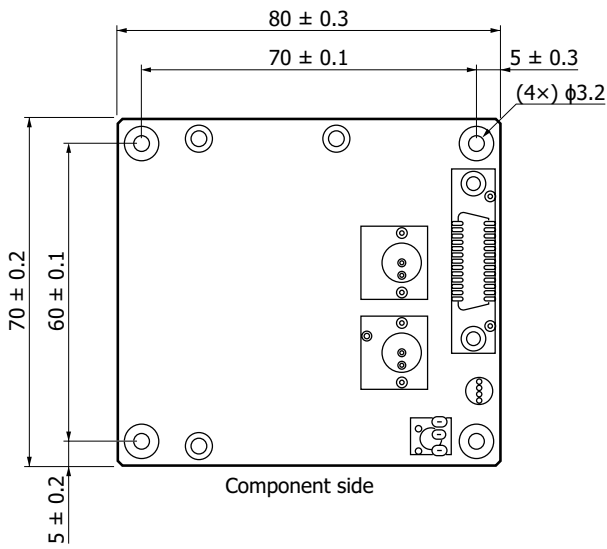
External Level 2



External Gated



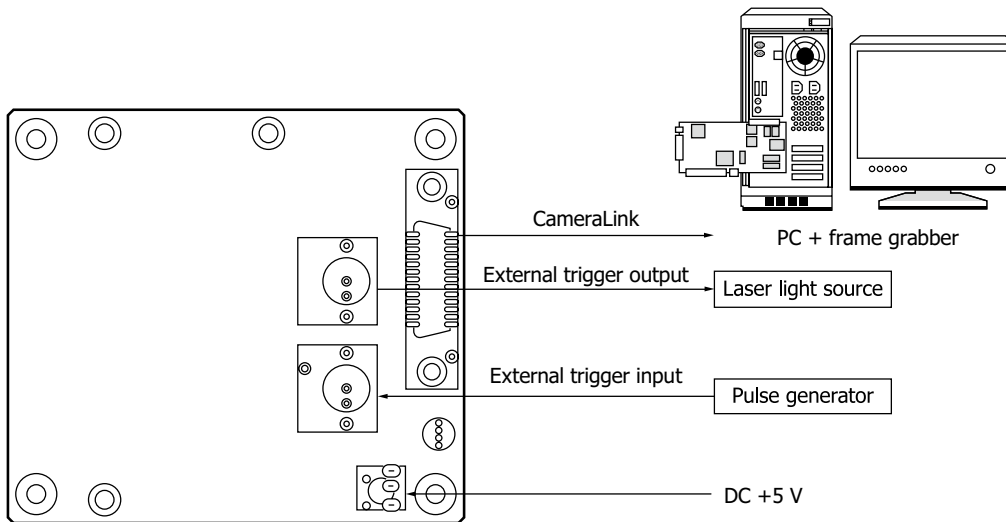
**Dimensional outline (unit: mm)**



Values in parentheses indicate reference values.  
Weight: 70 g (excluding the sensor)

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**Connection example**



[C11514]

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**Accessories**

- Application software (DCam-CL)
- SDK
- DC cable

NOTE: A National Instruments frame grabber board and NI-IMAQ are required to use the supplied application software (DCam-CL) and SDK. Operation of the following frame grabber boards has been verified. Please contact each frame grabber board to the manufacturer.

Manufacturer	Model No.	Supported OS	Driver
National Instruments	PCIe-1427	Windows® 10 (64-bit)	National Instruments tool (supplied with NI-IMAQ)
	PCIe-1433		

**Related information**

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

- Precautions
- Disclaimer

**Compatible product datasheets**

Available at our website ([www.hamamatsu.com](http://www.hamamatsu.com))

- InGaAs linear image sensor G11135-256DD, G11135-512DE, G14006-512DE



Information described in this material is current as of March 2022.

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.

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