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Driver circuits for CCD image sensor

C11287 C11288

Driver circuit for CCD image sensor (S10420/S11071/S11510 series)

The C11287 and C11288 are driver circuits designed for HAMAMATSU CCD image sensor S10420/S11071/S11510 series. The C11287 and C11288 can be used in spectrometer when combined with the S10420/S11071/S11510 series.
The C11287 and C11288 hold a CCD driver circuit, analog video signal processing circuit (14-bit A/D converter), timing generator, control circuit and power supply. The C11287 and C11288 convert analog video signals from a CCD into digital signals and outputs them. The USB connector (USB 2.0) provided as a standard feature easily connects to a PC for the C11287 and C11288 control and data acquisition. No additional power supply for the C11287 is needed since power is supplied from the PC through the USB connector. The C11287 and C11288 also have a BNC connector for external trigger input and pulse output. The C11287 and C11288 are compact, lightweight and very easy to handle.
Application software (DCam-USB) that comes with the C11287 and C11288 allows easy operation from a PC running on Windows 7 (32-bit, 64-bit). A function library (DCamUSB.DDL) included with the application software helps you to develop your own software. This software is available with DLL to help you develop your own software programs under various developmental environments.

Features

- **Built-in 14-bit A/D converter**
- **Adjustable offset**
- **Adjustable gain**
- **Interface of computer: USB 2.0**
- **Power supply: USB bus power (C11287)**
  DC+5 V (C11288)

Applications

- **Spectrometer**
- **Control of CCD image sensor (S10420/S11071/S11510 series) and data aquisition**

The table below shows CCD image sensor applicable for the C11287/C11288.
Since the C11287 and C11288 do not include a CCD image sensor, so select the desired sensor and order it separately.

Type no.	CCD area image sensor				
	Type no.	Number of pixels	Number of active pixels	Pixel size (μm)	Active area [mm (H) × mm (V)]
C11287	S10420-1004-01	1044 × 22	1024 × 16	14 × 14	14.336 × 0.224
	S10420-1006-01	1044 × 70	1024 × 64		14.336 × 0.896
	S10420-1104-01	2068 × 22	2048 × 16		28.672 × 0.224
	S10420-1106-01	2068 × 70	2048 × 64		28.672 × 0.896
	S11510-1006	1044 × 70	1024 × 64		14.336 × 0.896
	S11510-1106	2068 × 70	2048 × 64		28.672 × 0.896
C11288	S11071-1004	1044 × 22	1024 × 16	14 × 14	14.336 × 0.224
	S11071-1006	1044 × 70	1024 × 64		14.336 × 0.896
	S11071-1104	2068 × 22	2048 × 16		28.672 × 0.224
	S11071-1106	2068 × 70	2048 × 64		28.672 × 0.896

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

Parameter		Condition	C11287				C11288				Unit
			S10420-1004-01	S10420-1006-01, S11510-1000	S10420-1104-01	S10420-1106-01, S11510-1106	S11071-1004	S11071-1006	S11071-1104	S11071-1106	
Scanning			250 k				4 M				Hz
Frame readout time			4.8	5.7	8.9	9.8	0.62	1.58	0.79	1.75	ms
Data transfer time			4.3	4.3	8.4	8.4	0.22	0.22	0.44	0.44	
Total transfer time			4.8	5.7	8.9	9.8	0.84	1.80	1.23	2.19	
A/D conversion resolution		16383ADU	14								bit
Conversion gain			12.2								e^-/ADU
Readout noise			3				7				ADU
Dynamic range			5461				2730				-
Interface			USB 2.0								-
Supply voltage	C11287	360 mA typ.	DC + 4.5 to 5.5								V
	C11288	650 mA typ.									
Storage temperature			-20 to + 70								°C
Operating temperature			0 to + 50								°C
Operating humidity		No condensation	70 max.								%
Dimension			80 (H) × 70 (W)				80 (H) × 80 (W)				mm
Weight			Approx. 60				Approx. 65				g

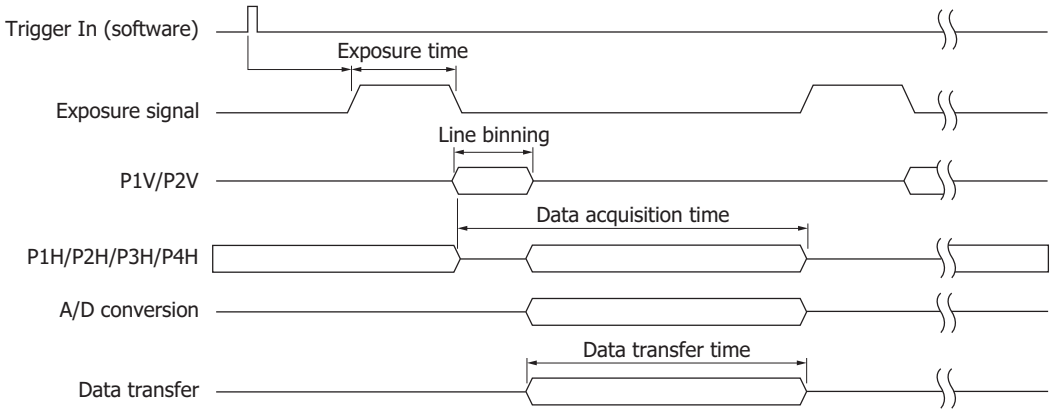
Functions

Parameter		Specification
Operating mode setting	Suspend mode (LED-off)	The power supply is turned off.
	Standby mode (LED-white)	It is Standby state, in which the data acquisition is possible.
	Data transfer mode (LED-green, aqua, blue)	In this mode, the driver circuit sends the data to PC.
Selectable data acquisition modes	Internal synchronous mode ("INT" mode)	Data is acquired on the basis of the trigger timing generated by application software.
	External synchronous mode 1 ("EXT.EDGE" mode)	Data is acquired in synchronization with the external trigger signal input from the BNC connector. In synchronization with an edge of the external trigger signal, data is accumulated for the set integration time and is then output.
	External synchronous mode 2 ("EXT.LEVEL" mode)	Data is acquired in synchronization with the external trigger signal input from the BNC connector. Data is accumulated for a period equal to the pulse width of the external trigger signal and is then output.
Gain adjustment		The gain value can be varied in the range of "1 to 10" with the step of 1. Default value is "1".
Offset adjustment		The offset value can be varied in the range of "0 to 1020" with the step of 4. Default value is "40".
Pulse output signal setting		It is possible to set the timing of the pulse output signal that is output from the "BNC connector for pulse output" of the driver circuit.

Timing chart

C11287

■ Internal synchronous mode ("INT" mode)



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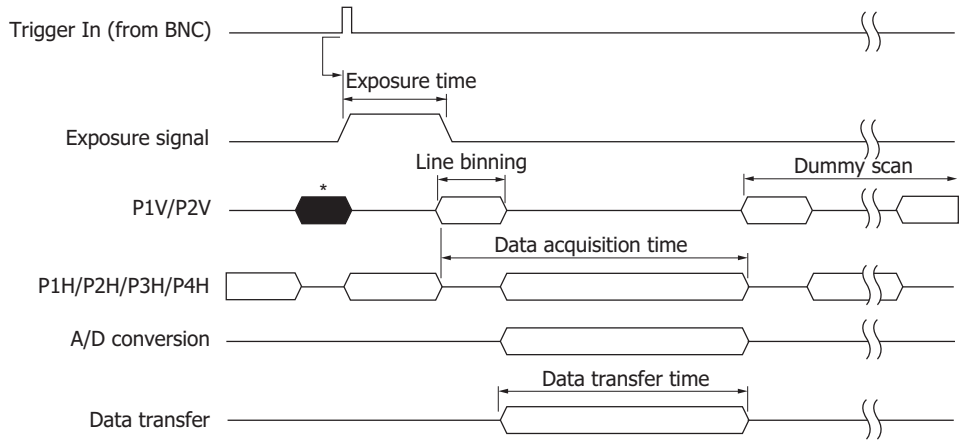
■ External synchronous mode 1 ("EXT.EDGE" mode)



* When an external trigger signal is input, accumulation is started immediately.

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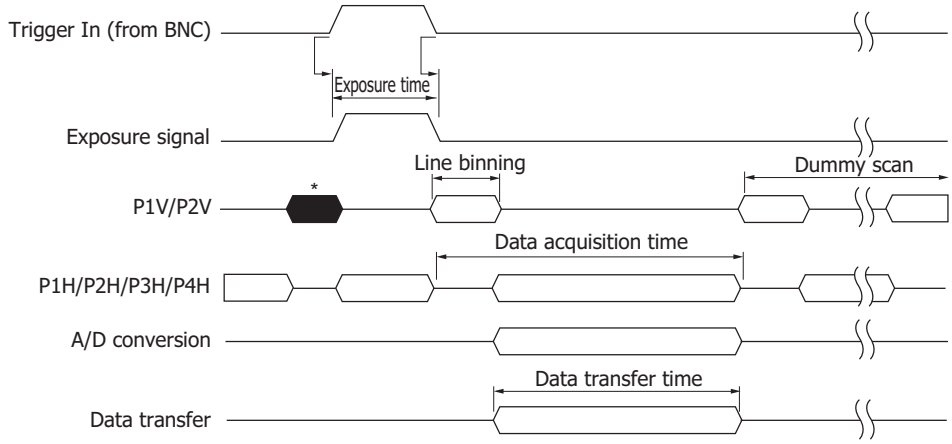
■ External synchronous mode 2 ("EXT.LEVEL" mode)



* When an external trigger signal is input, accumulation is started immediately.

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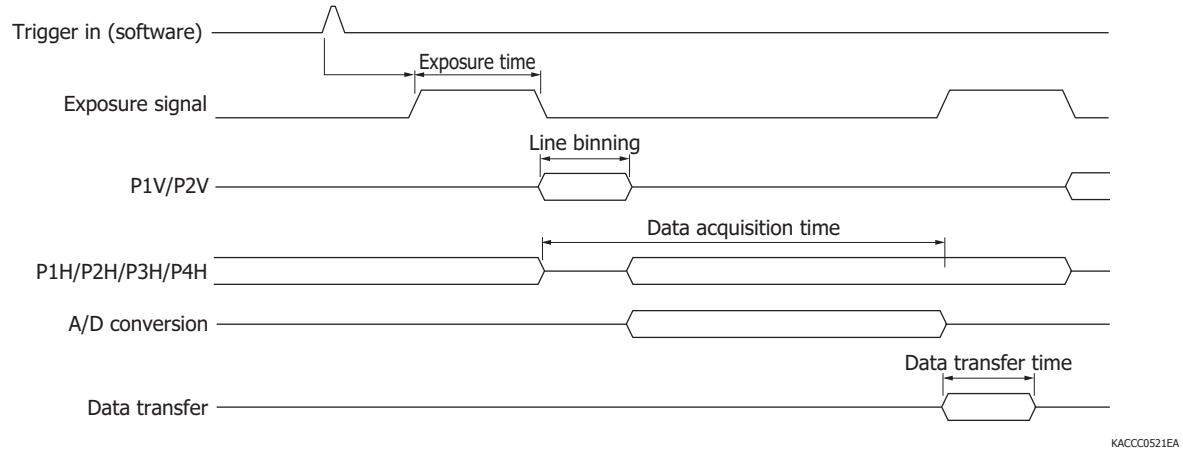
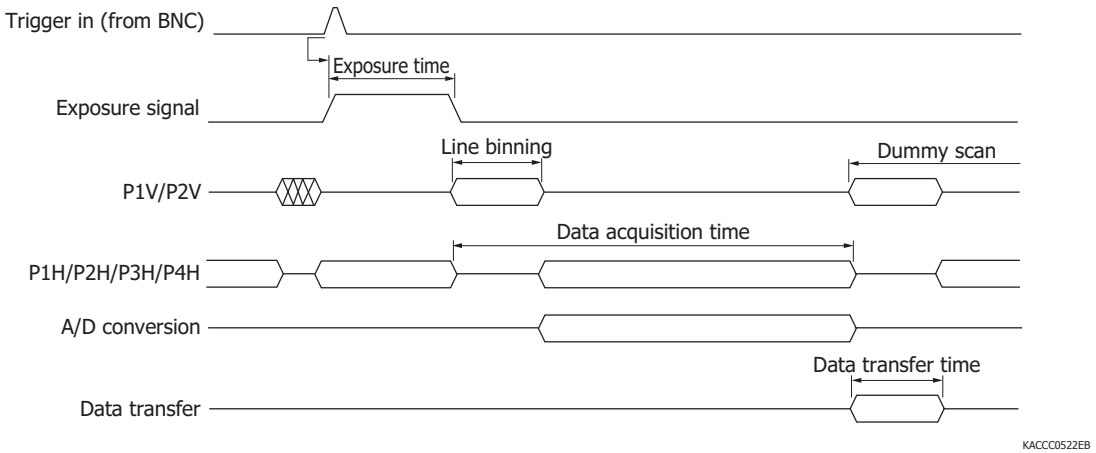
C11288

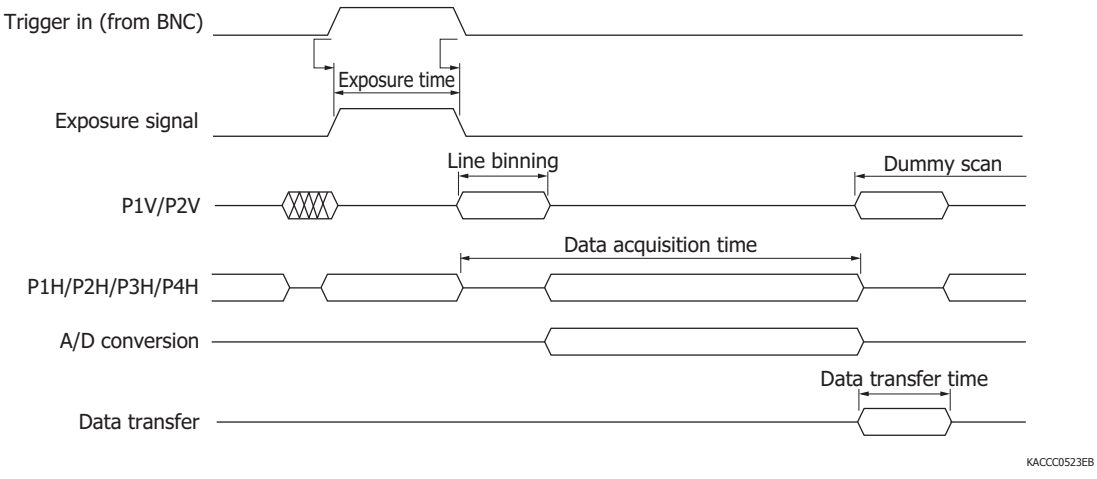
■ Internal synchronous mode ("INT" mode)



■ External synchronous mode 1 ("EXT.EDGE" mode)

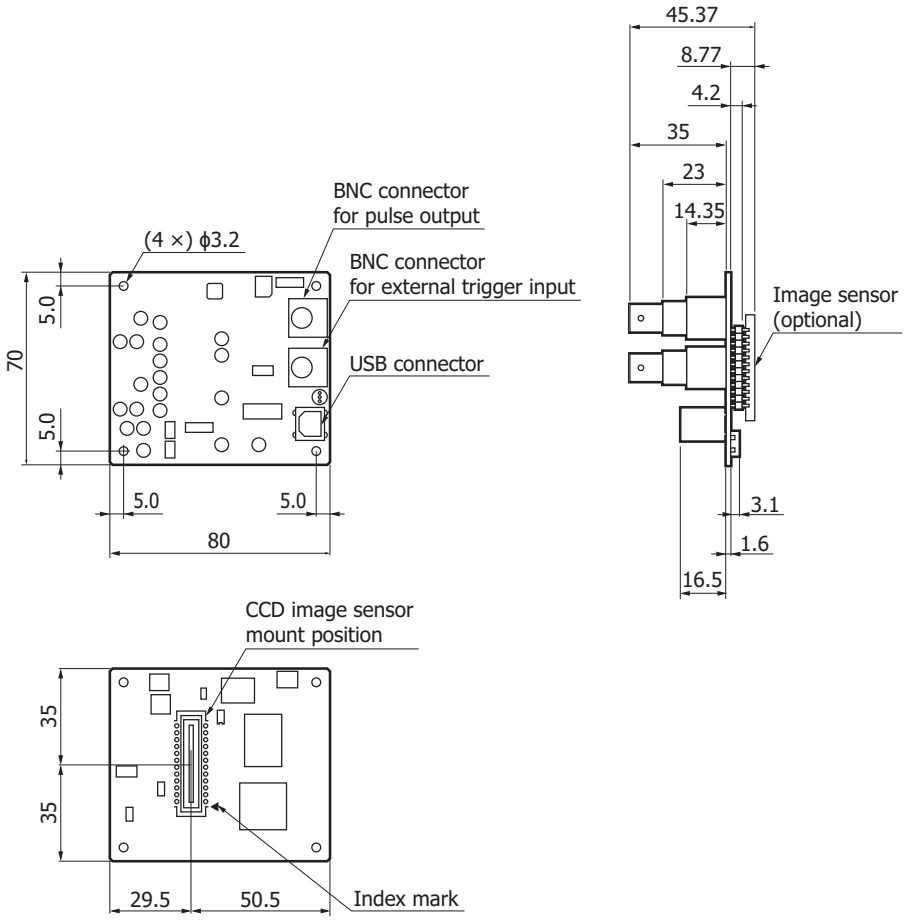


■ External synchronous mode 2 ("EXT.LEVEL" mode)



Dimensional outlines (unit: mm)

C11287



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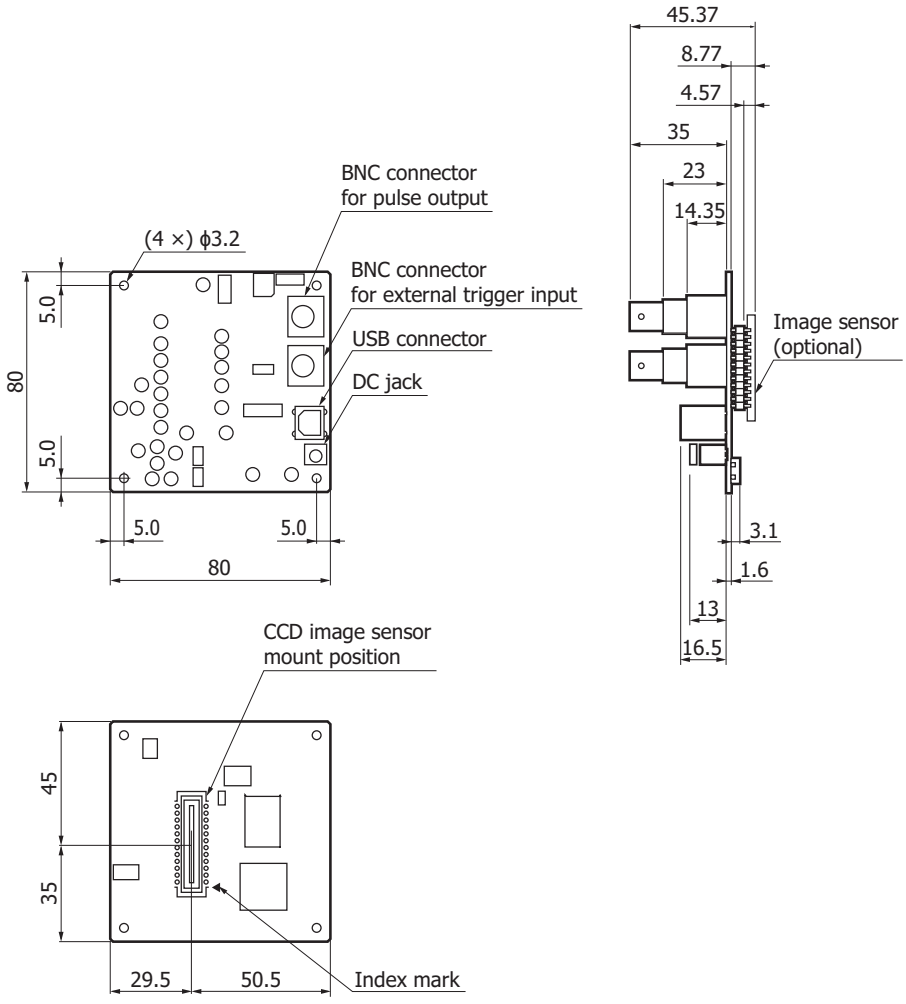

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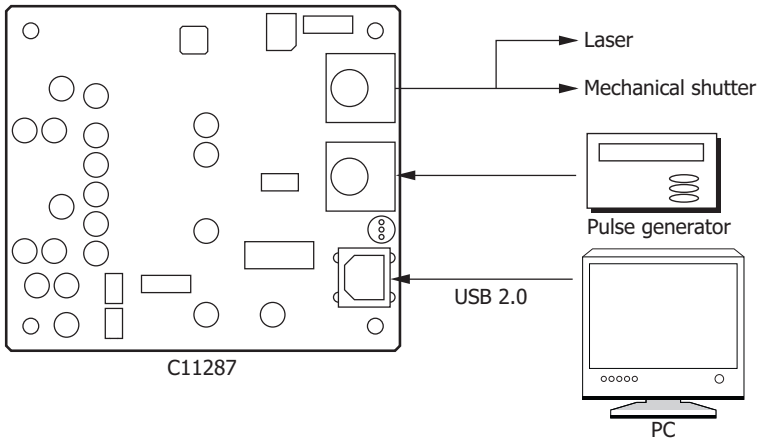
Connection examples

Refer to the following diagram to connect hardware peripherals.

C11287



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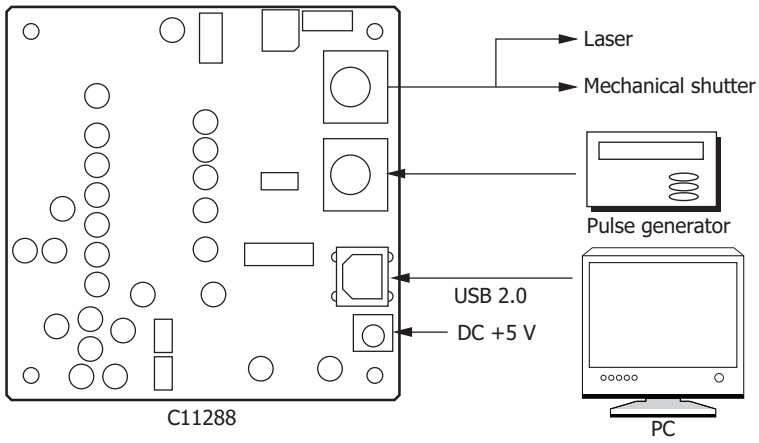

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Accessories

· CD-ROM (includes C11287/C11288 instruction manual, application software, SDK)
· USB cable
· AC adapter (C11288)

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Cat. No. KACC1173E03 Jul. 2014 DN