BOPIXEL JAPAN

High Resolution

Pixel Shifting CameraLink Camera

Monochrome / Color CMOS

BC-OM25MCL-PS (25M, Monochrome)
BC-OC25MCL-PS (25M, Color)

Product Specifications

Table of Contents

1 Overview

This document describes the specification of the following cameras.

BC-OM25MCL-PS / BC-OC25MCL-PS

1.1 Features

This camera is ultra-high resolution with 25Mpixel high-resolution CMOS using pixel shift technology.
The maximum resolution is 419MPixel.

1.2 Spec

- PixelShift Mechanism
- CameraLink Full (8TAP)
- Frame Rate (Full Scan) : 16.9 fps @ 25MP 8bits
- CMOS Global Shutter
- Up to 256 Pixel Defect Correction (Default: ON)
- 8bits output

2 Specifications

2.1 Electronic Specifications

2.1.1 BC-OM25MCL-PS / BC-OC25MCL-PS

Model Number		**BC-OM25MCL-PS**	**BC-OC25MCL-PS**
Image Sensor		Onsemi: PYTHON 25K Monochrome CMOS	Onsemi: PYTHON 25K Color CMOS
Shutter Type		Global	
Active Pixel	1x1 Mode	5120 (H) x 5120 (V) : 25MPixel	
	2x2 Mode	10240 (H) x 10240 (V) : 104MPixel	
	3x3 Mode	15360 (H) x 15360 (V) : 236MPixel	
	4x4 Mode	20480 (H) x 20480 (V) : 419MPixel	
Pixel Size		4.5 (H) x 4.5 (V) μm	
Optical Format		APS-H	
Sync System		Free run / External trigger (Hardware / Software) / CC1 Trigger	
Maximum Frame Rate 25Mpixel Full Scan without PixelShift		16.9 fps	
ADC Resolution		10bits	
Video Format		8 bits (Mono8) ,10 bits (Mono10)	8 bit (BayerRG8) , 10 bit (BayerRG10)
Noise Level		Less than TBD LSBs (Gain 0 dB)	
Sensitivity (*1)		TBD	TBD
Exposure time		1 μseconds to 16.777 seconds	
Gain	Analog Gain	0 dB (Fixed)	
	Digital Gain	1 to 5 Times	
Black Level		0 to 20 DN	
White Balance Gain		N/A	1 to 5 Times
ROI		Horizontal: 64 to 5120 / Vertical: 4 to 5120 Adjustable Steps for size: 8 pixels in horizontal direction / 2 lines in vertical direction Adjustable Steps for offset: 2 pixels in horizontal direction / 2 lines in vertical direction	
Image Flip		Horizontal / Vertical / Horizontal and Vertical / Off	
Pixel Defect Correction		Up to 256 points	
Operational Mode		Free-run(TriggerMode:Off) / Edge-preset Trigger(TriggerMode:On , ExposureMode:Timed) / Pulse width Trigger (TriggerMode:On , ExposureMode:TriggerWidth)	
User Setting Storage		Support	
DeviceTapGeometry		Geometry_8X_1Y	
CIConfiguration		Full, EightyBit	
CameraLink Clock		72MHz	
Communication		CameraLink UART	
Interface		CameraLink Connector SDR x 2	
Protocol		GenICam Standard Version (SFNC 2.5) compliant	
Input / Output		4 x GPIO,	
Power	Input Voltage	+12V (typ.) (±10%)	
	Consumption	Maximum: 7 W, Typical: 6.2 W	

2.1 Mechanical Specifications

Model Number	**BC-OM25MCL-PS**	**BC-OC25MCL-PS**
Dimensions	80 (W) x 80 (H) x 73 (D) mm (*1)	
Material	Aluminum alloy	
Lens Mount	F Mount / Custom mount available upon request	
Interface Connectors	CameraLink Connector SDR x 2 I/O Connector: HR10A-7R-6PB (Hirose) or equivalent	
Camera Mounting	M4 screws holes (For on top, four on bottom , four on front plate)	
Weight	TBD	

(*1) excluding the F-mount and the connectors

2.2 Environmental Specifications

Model Number		**BC-OM25MCL-PS / BC-OC25MCL-PS**
Operational Temperature	Minimum	Environmental Temperature: 0 deg. C
	Maximum	Ambient Temperature: 40 deg. C
Storage Temperature		TBD
Vibration		TBD
Shock		TBD
Standard Compliancy		TBD
RoHS		RoHS Compliant

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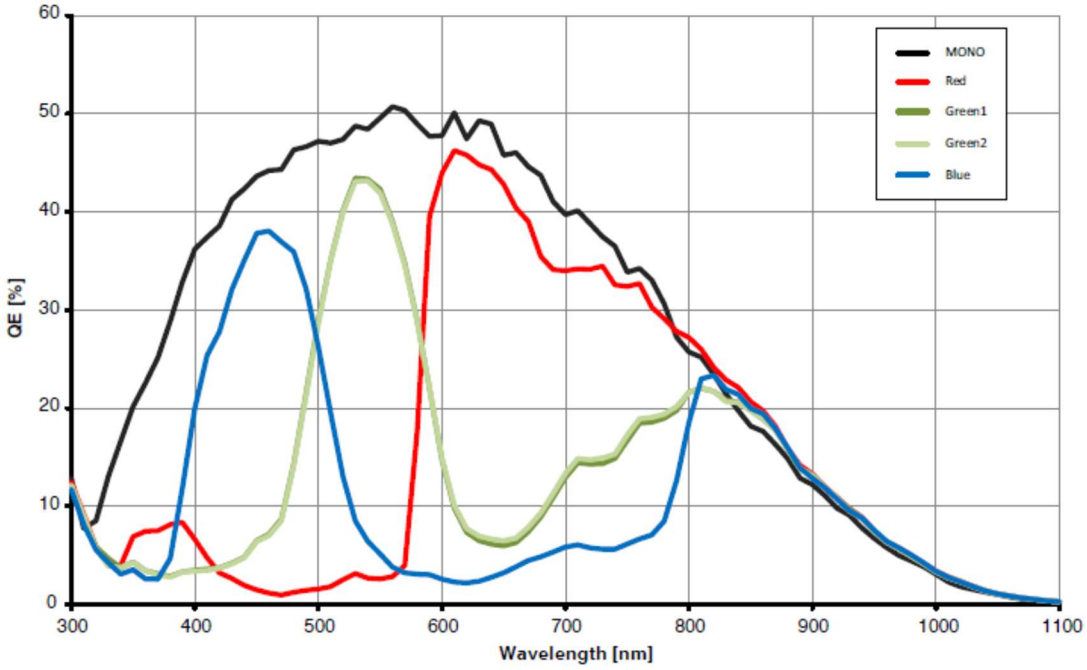
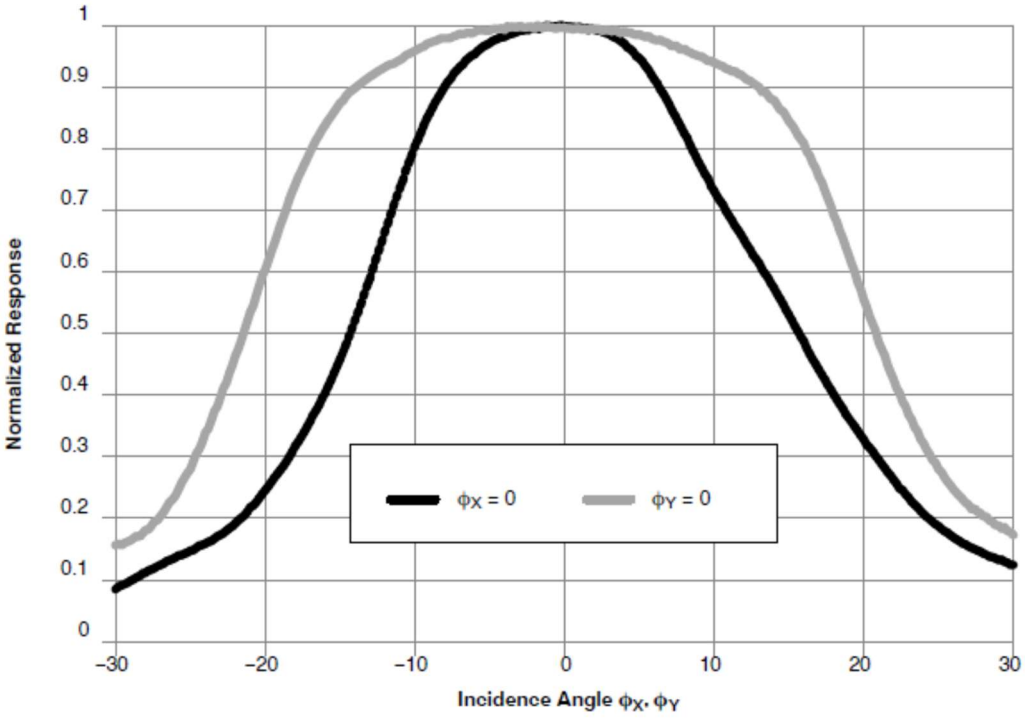
3 CMOS Informaiton

Quantum Efficiency



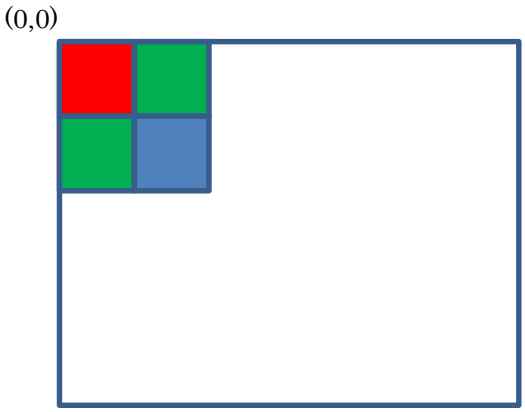
CRA



Note that the photoresponse peaks near normal incidence for center pixels.

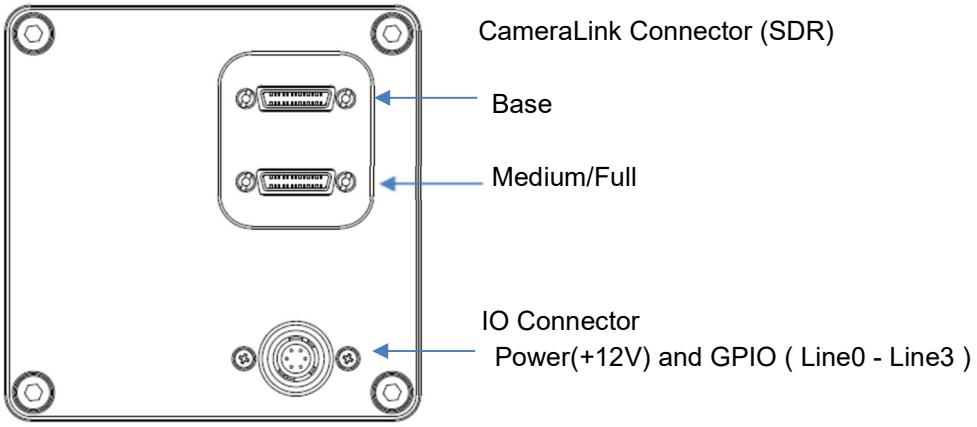
Color Filter Array

BZC-OPC25MCL-PS (Color)



4 Camera HardWare Infrmaiton

Interface



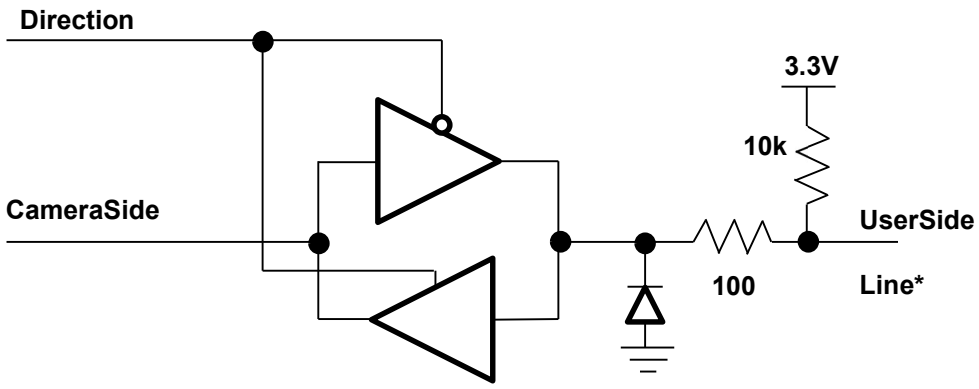
IO Connector

- HR10A-7P-6S (Hirose) or equivalent can be used.
- GPIO can select input and output by camera setting.

Pin assignment And DC characteristics

Pin No.	Signal Name	Function	DIR	Voltage	
				Low Voltage	High Voltage
1	12V	Power			
2	Line0	GPIO	IN	Less than+0.8V	+2.0 to +5.5V
			OUT	Less than+0.4V	+3.3
3	Line1	GPIO	IN	Less than+0.8V	+2.0 to +5.5V
			OUT	Less than+0.4V	+3.3
4	Line2	GPIO	IN	Less than+0.8V	+2.0 to +5.5V
			OUT	Less than+0.4V	+3.3
5	Line3	GPIO	IN	Less than+0.8V	+2.0 to +5.5V
			OUT	Less than+0.4V	+3.3
6	GND	GND	-		

Camera Line Circuit



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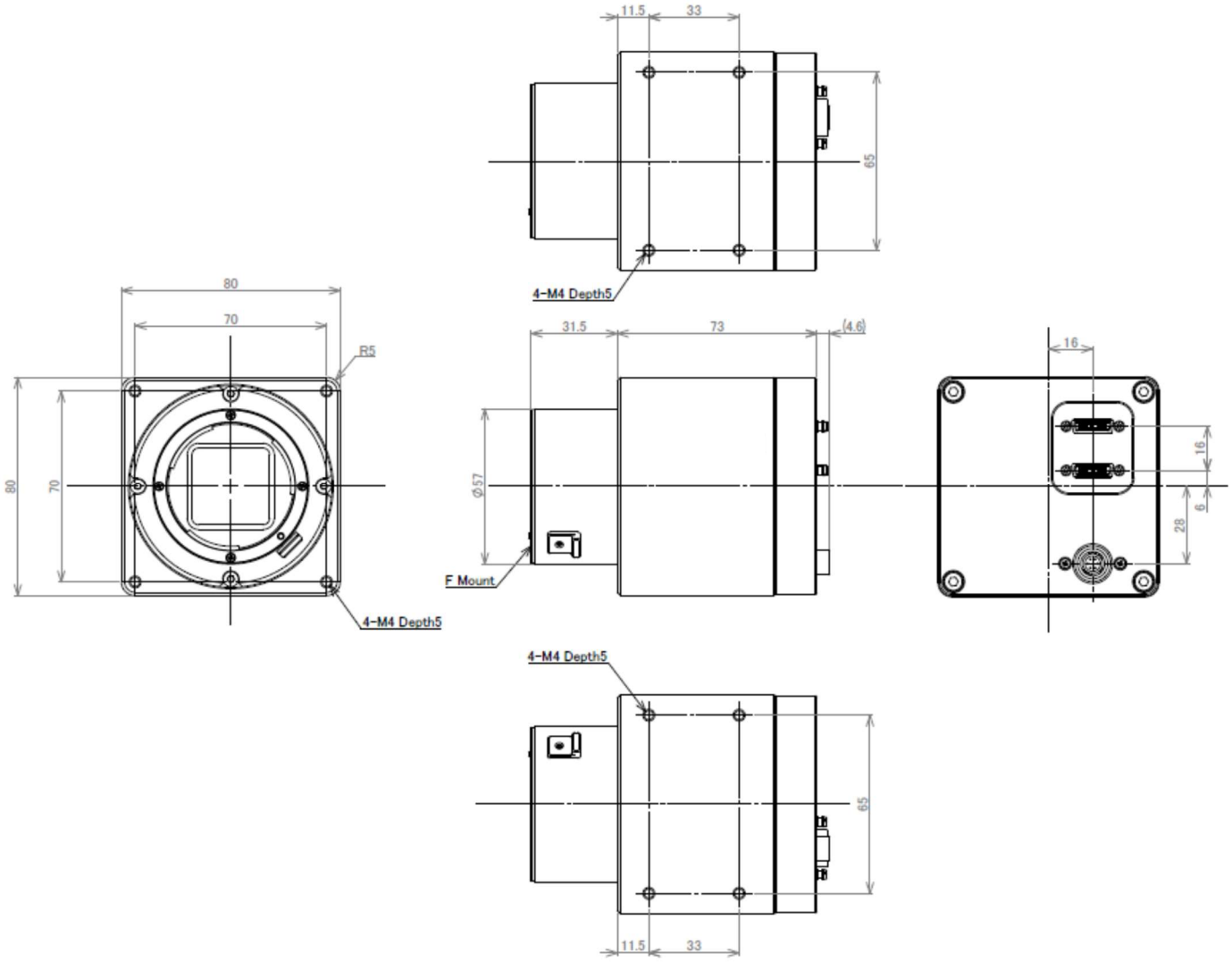
Camera Dimensions

Unit: mm



5 Camera Operation

GenICam Command Reference Table

The setting items of the camera conform to SNFC of GenICam Standard Version.
The items implemented in the camera are as follows.
Please refer to SNFC of GenICam for details of the function except the original functions of BOPIXEL.

Standard functions

GenICam command	Discription
DeviceVendorName	-
DeviceModelName	-
DeviceSerialNumber	-
DeviceUserID	-
DeviceFirmware	-
DeviceTemperature	-
DeviceSerialPortBaudRate	Baud38400 ,Baud9600, Baud57600, Baud115200, Baud230400
Width	5120 (pixel)
Height	5120 (pixel)
OffsetX	-
OffsetY	-
TestPattern	-
ReverseX	-
ReverseY	-
PixelFormat	MonochromeModel: Mono8, Mono10, ColorMode : BayerRG8, BayerRG10
TestPatternGeneratorSelector	-
AcquisitionBurstFrameCount	This can be used only when TriggerMode (Frame Burst Start) is ON and Exposuremode is Off or Timed. When PixelShiftDriveMode is set to a value other than OFF, the value is automatically set according to the PixelShiftDriveMode setting.
AcquisitionFrameRate	Refer to [FrameRate calucurate]
TriggerSelector	-
TriggerMode	-
TriggerDelay(Frame Start)	-
TriggerSource(Frame Start)	-
TriggerSoftware(Frame Start)	-
TriggerMode(Frame Start)	-
TriggerDelay(Frame Burst Start)	-

GenICam command	Discription
TriggerSource(Frame Burst Start)	-
TriggerSoftware(Frame Burst Start)	-
TriggerMode(Frame Burst Start)	Set to ON when using PixelShiftDriveMode.
ExposureMode	-
ExposureTimeSelector	-
ExposureTime	-
GainSelector	-
Gain	(DATA - BlackLevel) x (Gain / 64 + 1) + BlackLevel
BlackLevelSelector	-
BlackLevel	-
BalanceRatioSelector	
BalanceRatioSelector	(DATA - BlackLevel) x (Gain / 64 + 1) + BlackLevel
LineSelector	-
LineMode	-
LineInverter	-
LineStatus	-
LineSource	-
UseroutputSelector	-
UserOutputValue	-
DeviceTapGeometry	Geometry_8X_1Y
CIConfiguration	Set [EightyBit] when using PixelFormat with Mono10 or BayerRG10.
UserSetSelector	-
UserSetLoad	-
UserSetSave	-
UserSetDefault	-

Original functions of BOPIXEL

GenICam command	Discription
EnablePixelCorrection	When set to ON, Activates pixel correction.
PixelCorrectionHighlight	When set to ON, the pixel of the coordinate to be corrected is highlighted.
PixelCorrectionIndex	Index for Pixel Correction Data.This can be set for 256 points.
PixelCorrectionX	Set the X position.This can be set for 256 points. The pixel to be corrected is written at the factory. Users can be added.
PixelCorrectionY	Set the Y position.This can be set for 256 points. The pixel to be corrected is written at the factory. Users can be added.
LineDebounceTime	Specifies the delay in microseconds (us) to apply after receiving IO[Line*] signal and before activating it.
PixelShiftDriveMode	2x2 : 10240(H) x 10240(V) 3x3 : 15360(H) x 15360(V) 4x4 : 20480(H) x 20480(V)
EnablePixelShiftIndex	Enable to put a 1 byte pixel shift index value at the top left corner of the frame data. EnablePixelShiftIndex can be used to refer to when rearranging video on the host PC. This is useful when not used in trigger mode.

6 Image Acquisition and Camera Trigger Modes

TriggerSorce

Software

A trigger is input by a communication command from the camera.
When software trigger is used, the timing of trigger input to the camera may not be guaranteed because it depends on the operating status of the host PC.

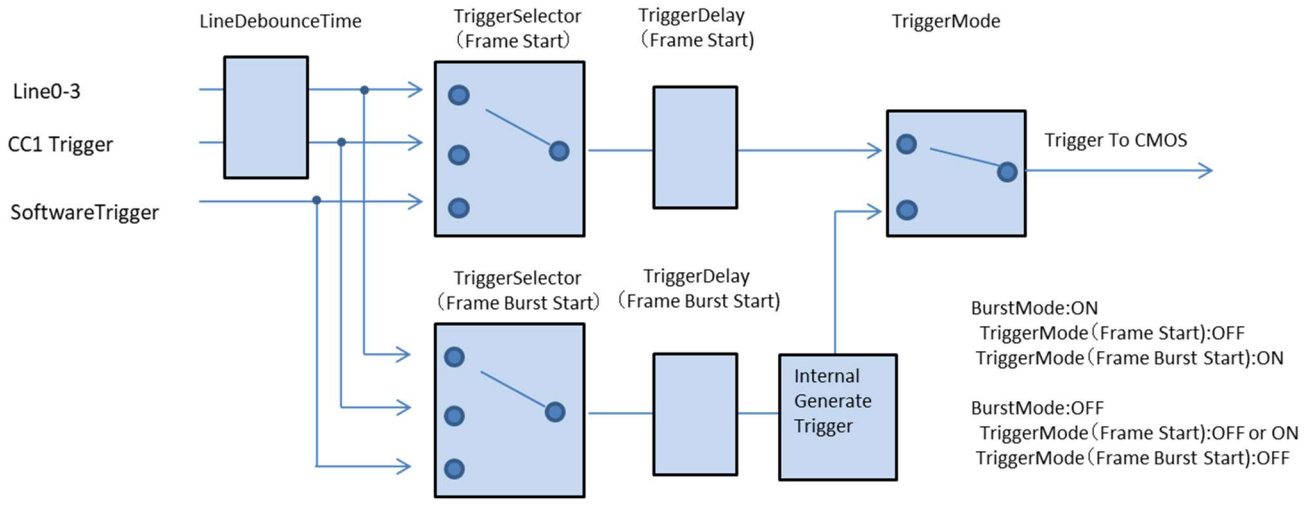
Line0-Line4

A trigger is input from the 6-pin connector (GPIO) of the camera.
When using the Line trigger, it is necessary to keep the voltage input range to the IO pin.

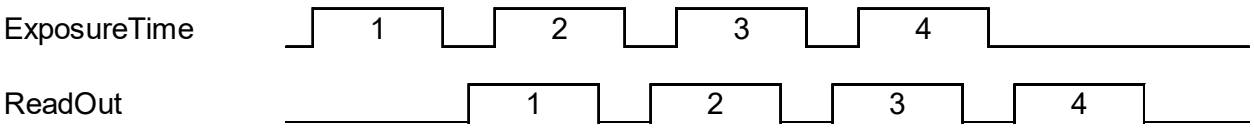
CC1

A trigger is input from the CC1 line of the grabber board.
The trigger input method from CC1 depends on the grabber board specifications.

Trigger Block Diagram

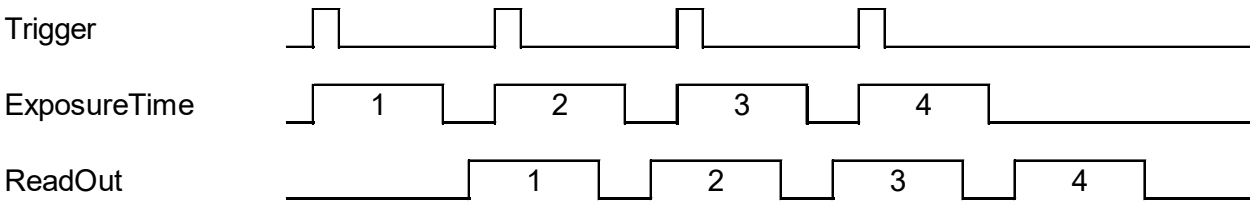


TriggerMode:OFF (Free-run)



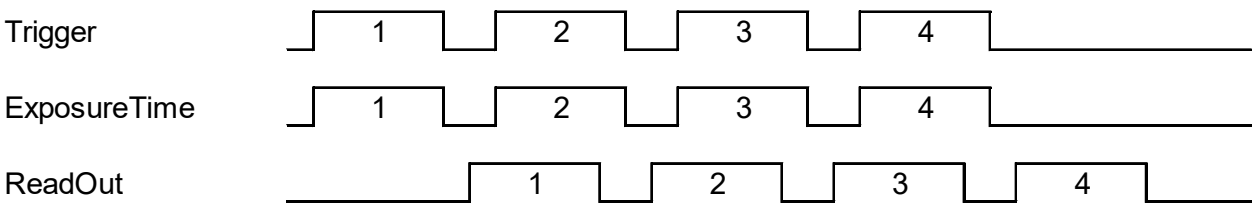
When this mode is set, camera outputs video image continuously.
The camera is exposed and outputs video image at the set [Acquisition framerate].
The exposure time is set to a maximum value within a preset [Acquisition framerate].

TriggerMode:Timed



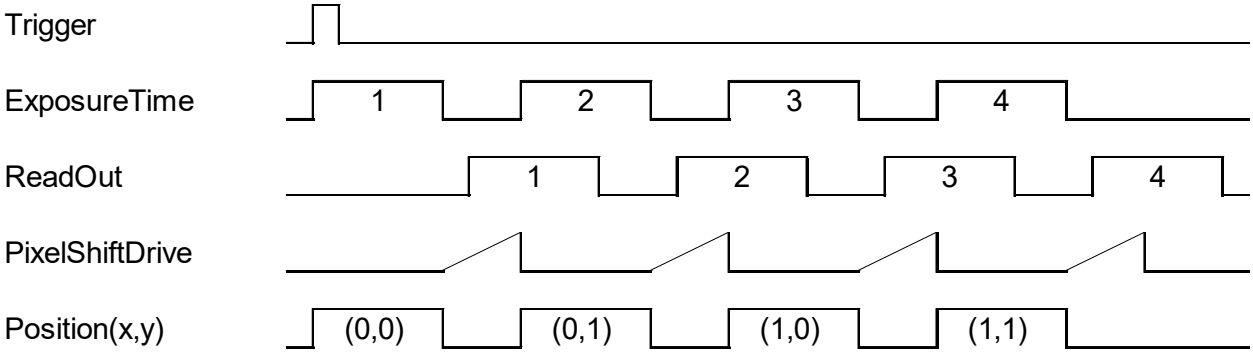
The camera is exposed within a preset [ExposureTime] and outputs video image from an external trigger.
The camera recognizes at the rising edge of the trigger signal.
There is an upper limit to the timing at which a trigger can be input.
When inputting a trigger from Line*, user can select whether the trigger signal is recognized as a rising or a falling edge using the [LineInverter] setting.
Refer to [FrameRate calucurate].

TriggerMode:PulseWidth



The camera is exposed for the same period as the external trigger and outputs the video image.
There is an upper limit to the timing at which a trigger can be input.
Refer to [FrameRate calucurate].

PixelShiftMode with ExposureMode:Timed
※PixelShiftMode:Pixelshift_2x2 setting example



This mode works when [ExposureMode] is Timed and [TriggerSelector : FrameBurstStart] is ON.
Or, when [TriggerSelector : FrameStart] and [TriggerSelector : FrameBurstStart] is OFF.

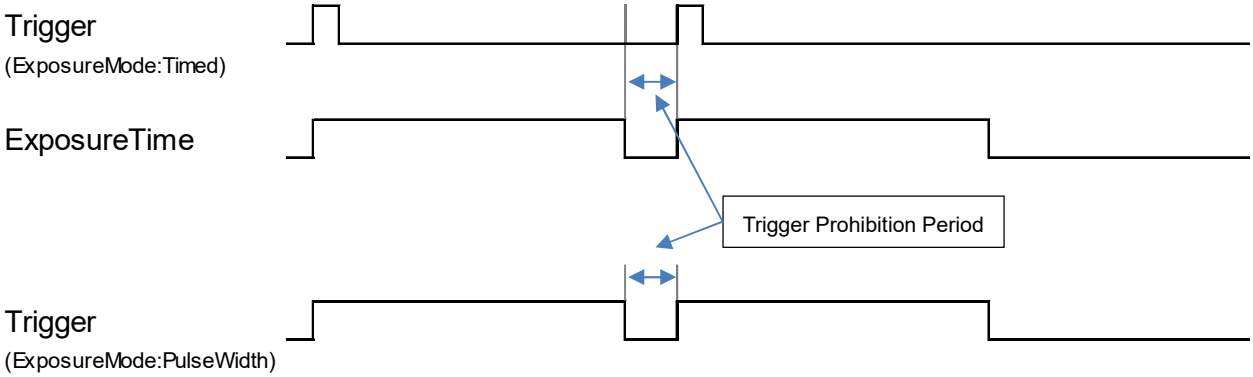
EnablePixelShiftIndex can be used to refer to when rearranging video on the host PC.
This is useful when not used in trigger mode.

The camera is exposed within a preset [ExposureTime] , shifts the pixels to moves and outputs video image from an external trigger.
There is an upper limit to the timing at which a trigger can be input.
Refer to [FrameRate calucurate].

PixelShiftMode(Setting Example)

TriggerMode (Frame Start):	OFF
TriggerMode (Frame Burst Start):	ON
ExposureMode:	Timed
PixelShiftDriveMode:	Pixelshift_2x2 setting

Trigger Prohibition Period



Trigger period has to follow the trigger prohibition period. When the trigger input into the camera, the next trigger has to wait during this period.

Trigger Prohibition Period : 343.34 [us]
Trigger Prohibition Period with PixelShiftMode : 7942.45 [us]

FrameRate calucurate

DefaultMode (Without PixelShiftMode)

72 / 824 / (Height + 30) x 1,000,000 [fps] (*1)

With PixelShiftMode

72 / 824 / (Height + 694) / PixelShiftCount x 1,000,000 [fps] (*1)

PixelShiftMode	PixelShiftCount	(H) x (V)
Off	1	5120 x 5120
2x2	4	10240 x 10240
3x3	9	15360 x 15360
4x4	16	20480 x 20480

(*1)Round down to the second decimal placel