

PXU-60M.Q

Technical Data Art. No.
11126065

Digital Monochrome Matrix Camera, USB 3.0

Sensor Information

Model Name	SONY ICX694AL
Type	1" progressive scan CCD, EXview HAD CCD II technology
Shutter	Global
Native Resolution	2752 x 2200 pixels
Scan Area	12.49 mm x 9.99 mm
Pixel Size	4.54 μm x 4.54 μm

Data Quality

@ 20 °C, gain = 1, exposure time = 32 msec

Readout Noise (σ)	2.5 LSB @ 12 bit (typical)
Dynamic Range	64.5 dB (typical)

Acquisition Formats

Image Formats	Format	Resolution	Frame Rate	t_{readout}
	Full Frame	2752 x 2200	25.6 fps	39 msec
	Binning 2x2	1376 x 1100	44.5 fps	22.5 msec
Pixel Formats	Mono8, Mono12p, Mono12, Mono16			
Tap Selection	One, Four			
Partial Scan	True Partial Scan, Region of Interest (ROI) arbitrary			

Image Pre-Processing

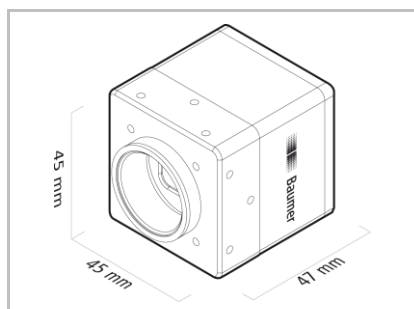
Analog Controls	Exposure Time (4 μsec ... 60 sec Step Size 1 μsec) Gain (0 ... 20 dB), Offset (0 ... 1023 1 step = 4 LSB 16 bit)
Tap Balance	Static
Gamma Correction	Gamma (0.1 ... 2 available if LUT is enabled)
LUT	Luminance (12 bit)
Color Models	Mono
Color Tolerance	Only on Color Cameras
Color Processing	Only on Color Cameras
Color Adjustment	Only on Color Cameras
Image Flipping	Horizontal, vertical or both (Reverse X, Reverse Y)
Defect Pixel Correction	via Defect Pixel List with up to 236 Pixel Coordinates

Process Synchronization

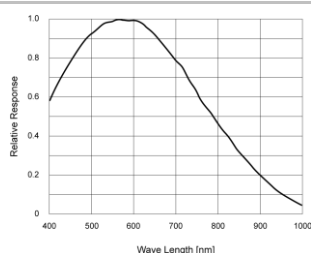
Modes	Free Running, Trigger
Free Running	Continuous or Adjustable Acquisition Frame Rate ¹ (0.01 ... 138 Hz)
Trigger Sources	Hardware, Software, All or Off
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
Sequencer Characteristics	up to 128 sets of parameters, up to 65536 loop passes, up to 65536 repetitions of sets of parameters, up to 65536 images per trigger event
Sequencer Parameters	Exposure Time, Gain Factor, Output Line, Image Format
External Flash Sync	via Exposure Active $t_{\text{delay flash}} \leq 3 \mu\text{sec}$, $t_{\text{duration}} = t_{\text{exposure}}$

Digital I/Os

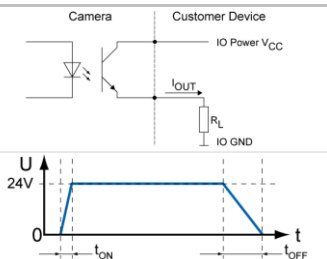
Lines	Input: Line 0, Output: Line1, Line 2, Line 3
Circuit Times	Output: $t_{\text{ON}} = \text{typ. } 3 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 40 \mu\text{sec}$
Output Sources	Off, ExposureActive, Line 0, Timer1 ... 3, ReadoutActive, User0 ... 2, TriggerReady, TriggerOverlapped, TriggerSkipped, Sequencer Output 0 ... 2
Line Debouncer	Low and high signal separately selectable Debouncing Time 0 ... 5 msec, Step Size: 1 μsec



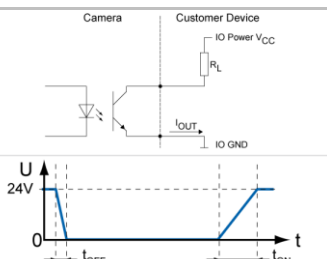
Sensor Graph: Relative Response



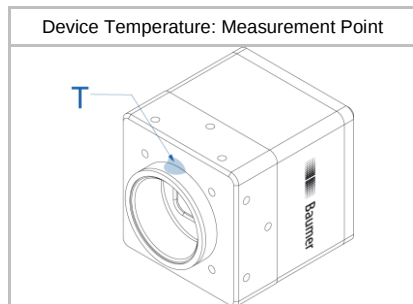
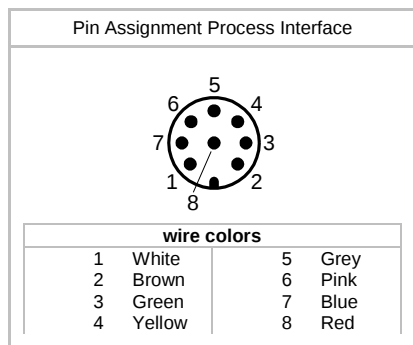
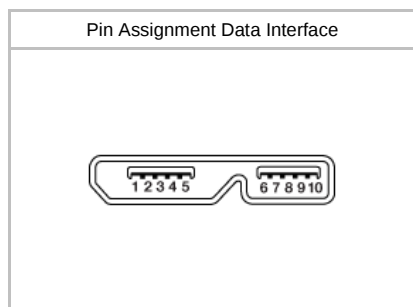
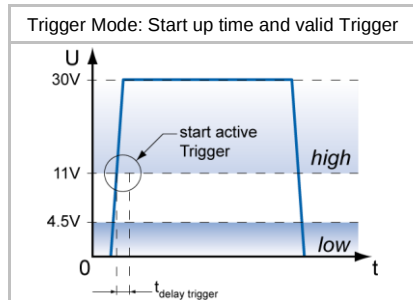
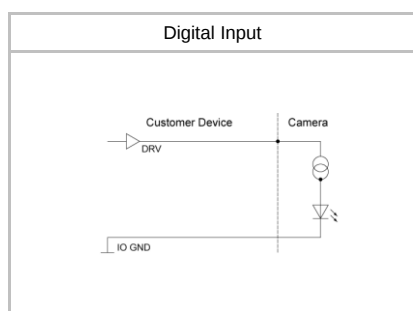
Digital Output: High Active



Digital Output: Low Active



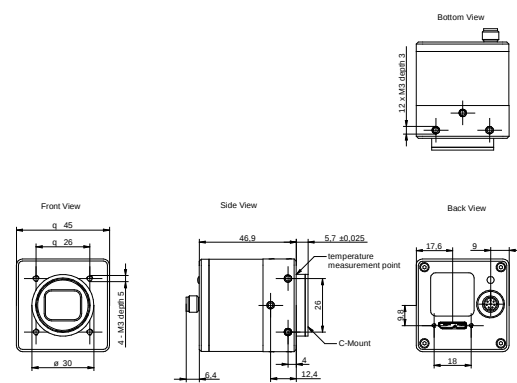
¹ Max. Acquisition Frame Rate can be achieved by using the following camera settings: min. Exposure + max. Binning + ROI | min. Size Y + Mono8



Interfaces and Connectors

Data Interface	USB 3.0 Connector: Pin Assignment:	Transfer Rate 5000 Mbits/sec USB 3.0 Micro B 1 – VBUS 2 – D- 3 – D+ 4 – ID 5 – GND 6 – MicB_SSTX- 7 – MicB_SSTX+ 8 – GND_DRAIN 9 – MicB_SSRX- 10 – MicB_SSRX+
Power and Process Interface	Connector: Assignment:	M8/8-pin (SACC-DSI-M8FS-8CONM10-L180 SH) 1 – OUT3 2 – Power VCC+ 3 – IN1 4 – IO GND 5 – IO Power VCC 6 – OUT1 7 – Power GND 8 – OUT2

Mechanical Data

Housing	Aluminum, IP40
Dimensions	
Weight	153 g

Optical Data

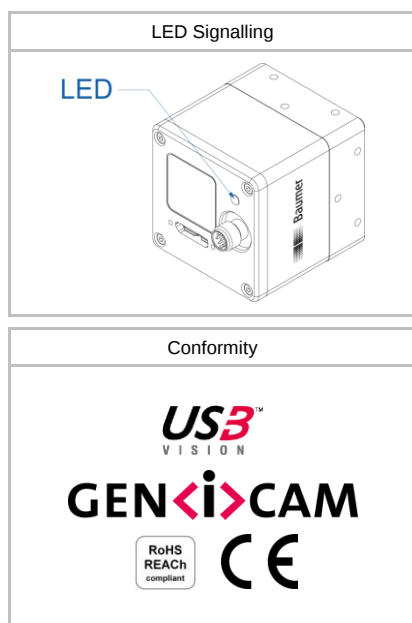
Lens Mount	C-Mount
Optical Filter	Dust Protection Glass

Electrical Data

Power Supply	VCC: 12 ... 24 V DC ± 20% I: 210 ... 420 mA
Power Consumption	approx. 5 W @ 25 fps
Digital Input	$U_{IN(low)}$: 0.0 ... 4.5 VDC $U_{IN(high)}$: 11.0 ... 30.0 VDC I_{IN} : 6.0 ... 10 mA min. Impulse Length: 2.0 µsec Trigger Delay out of treadout: 1.0 µsec max. Trigger Delay during treadout: One Tap and OneAndThree: 62.5 µsec Four Tap and OneAndTwo: 31.4 µsec
Digital Output	IO Power V _{CC} : 5 ... 30 V DC I _{OUT} : max. 50 mA

LED Signalling

LED	Green flash Green Red Yellow Red flash	Power on Link active USB3.0 Link active USB2.0 TX activity Update
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Environmental Data

Storage Temperature	-10 °C ... +70 °C
Operating Temperature	+5°C ... +70°C (at housing measurement point) +5°C...+40°C (ambient, without cooling)
Maximum Device Temperature	80 °C (at internal sensor)
Humidity	10 % ... 90 % non-condensing

Interface Data

Interface	USB 3.0 5000 Mbits/sec
Image Buffer	9 Images
USB Vendor ID / Product ID	0x2825 / 0x0116

USB3 Vision® Features

Events Transmission via Asynchronous Message Channel	EventLost, EventDiscarded, Line0RisingEdge, Line0FallingEdge, Line1RisingEdge, Line1FallingEdge, Line2RisingEdge, Line2FallingEdge, Line3RisingEdge, Line3FallingEdge, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerReady, TriggerOverlapped, TriggerSkipped
Frame Counter	up to 2 ³²
Payload Size	0 ... 12.109.072 Byte
Timestamp	64 bit
USB3 Vision	v1.0

GenICam™ Features

Timer	Timer Selector: Timer 1 ... 3 TimerTriggerSource: Line0, SoftwareTrigger, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerSkipped, Off TimerDelay: 0 µsec ... 2 sec, Step Size: 1 µsec TimerDuration: 10 µsec ... 2 sec, Step Size: 1 µsec
User Sets	Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 Parameters: any user definable Parameter
Acquisition Abort	Delay up to 39.5 msec
SFNC	v2.1

Factory Settings after Start-Up

Operation Mode	Free Running
Analog Controls	Exposure Time: 32 msec, Gain: 0 dB, Offset: 0
Pixel Format	Mono8
Tap Selection	4
Partial Scan	Off
Acquisition Frame Rate	Off
Timer	Off
Transmission Delay	Off
Defect Pixel Correction	On
Digital Input	Line0, invert = false, trigger source = All
Digital Output	Line1, Line2, Line3, invert = false, line source = Off