

Sensor Information

Model Name	ON Semiconductor Python 2000
Type	2/3" progressive scan CMOS
Shutter	Global Shutter
Resolution	1920 x 1200 pixels
Scan Area	9.21 mm x 5.76 mm
Pixel Size	4.8 μm x 4.8 μm

Data Quality

@ 20 °C, gain = 1, exposure time = 4 msec

Dark Noise (σ)	11 e- typical
Saturation	8500 e- typical
Dynamic Range	57 dB typical
SNR	39 dB typical
Quantum efficiency η	56 % @ 536 nm typical

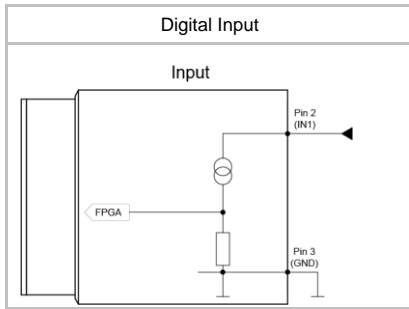
Acquisition

Resolution	1920 px x 1200 px		
Interface Frame Rate	Format	Resolution	max. Frame Rate
(depends on used interface performance)			(@ Trigger Mode) ²⁾
	Full Frame	1920 x 1200	41 fps
	Binning 2x2	960 x 600	41 fps
	Binning 2x1	960 x 1200	41 fps
	Binning 1x2	1920 x 600	41 fps
Acquisition Frame Rate ¹⁾	41 fps $t_{readout} = 24.30$ msec (max. Res. Full Frame) @ 10 bit		
Pixel Formats	Mono8, Mono10		
Partial Scan	True Partial Scan with increasing Frame Rate on Y direction, Region of Interest (ROI) arbitrary Width: minimum 16, increment 16 Height: minimum 2, increment 2		
Adjustable Acquisition Frame Rate	Off or 0.01 ... 2049 Hz		
Acquisition Mode	Continuous, Single Frame and Multi Frame		
Acquisition Status	AcquisitionActive, AcquisitionTrigger Wait		
Exposure Mode	Timed		
Shutter Mode	-		
Readout Mode	Overlapped, Sequential		

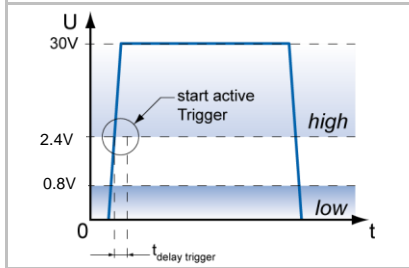
Image Pre-Processing

Analog Controls	Exposure Time (40 μsec ... 1 sec Step Size 1 μsec) Gain (0... 12 dB), Offset (0 ... 63 LSB 10 bit)
Color Models	Mono
Color Processing	-
Color Adjustment	-
Color Enhancement	-
Color Tolerance	-
Binning Horizontal	1 or 2
Binning Vertical	1 or 2
Image Flipping	no
Defect Pixel Correction	via Defect Pixel List with up to 512 Pixel Coordinates
Fix Pattern Noise Correction	yes

¹⁾ Sensor readout, different from pixel format



Trigger Mode: Start up time and valid Trigger



Process Synchronization

Trigger Mode	Off (Free Running), On (Trigger)
Trigger Overlap Type	Readout
Trigger Sources	Hardware (Line0), Software, All or Off fixed Trigger Delay out of t_{readout} : ¹⁾ 12 μsec @ 10 bit max. Trigger Delay during t_{readout} : ¹⁾ 12 μsec @ 10 bit
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
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
Output Sources	Off, ExposureActive
Line Debouncer	Low and high signal separately selectable Debouncing Time 0 ... 5 msec, Step Size: 1 μsec

Memory

Image Buffer	7 MB 1 Images (Trigger Mode) / 1 Image (Free Running Mode)
Non-volatile Memory	128 kb

Network Interface Data

Interface	Gigabit Ethernet 1000BASE-T 1000 Mbits/sec Fast Ethernet 100 BASE-T 100 Mbits/sec
Ethernet IP Configuration	Persistent IP, DHCP, LLA
Packet Size	576 ... 9000 Byte, Jumbo Frames supported
Image Buffer	1 Images (Trigger Mode) / 1 Image (Free Running Mode)

GigE Vision® Features

Events	no
Transmission via Asynchronous Message Channel	
Frame Counter	up to 2^{32}
Payload Size	0 ... 4608000 Byte
Timestamp	64 bit
Packet Delay	0 .. 2^{32} - 1 Ticks
Packet Resend	Resend Buffer: 48 MB (16 Images)
GigE Vision	v2.0 (v1.2 backward compatible)

Interfaces and Connectors

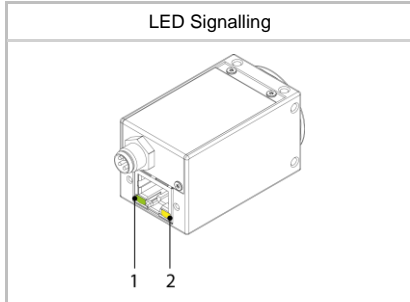
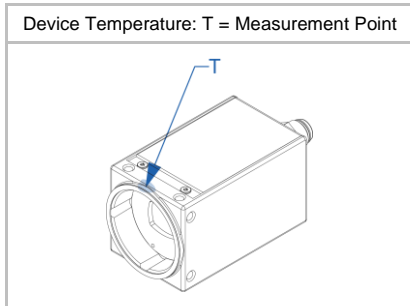
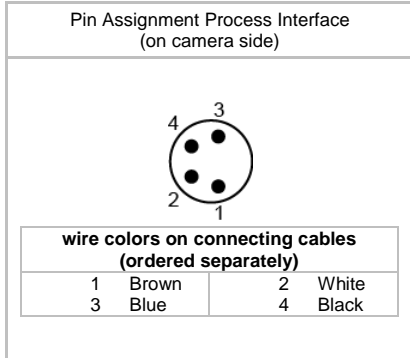
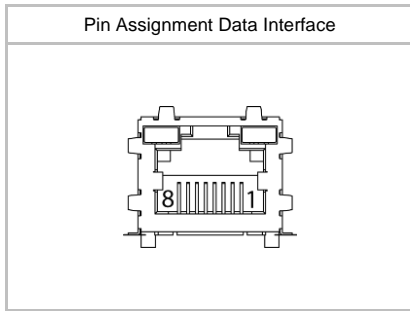
Data and Power Interface	Gigabit Ethernet Transfer Rate 1000 Mbits/sec Fast Ethernet Transfer Rate 100 Mbits/sec Connector: 8P8C Modular Jack (RJ45) screw lock type
Pin Assignment:	1 - MX1+ 5 - MX3- 2 - MX1- 6 - MX2- 3 - MX2+ 7 - MX4+ 4 - MX3+ 8 - MX4-

Process Interface	Connector: M8/4-pin (SACC-DSI-M 8MS-4CON-L180) Assignment: 1 - VCC 3 - GND (Power and OUT) (Power and IN) 2 - IN+ 4 - OUT
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* Note I/Os: Ground loops are to be avoided and can lead to destruction of the device.

¹⁾ Sensor readout, different from pixel format



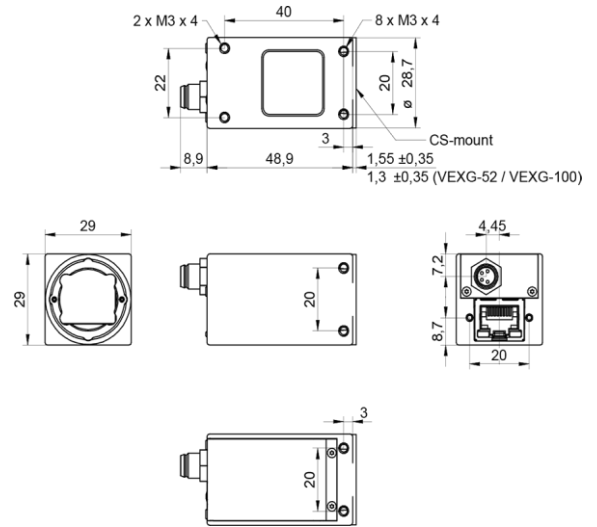
Optical Data

Lens Mount	CS-Mount
Optical Filter	-

Mechanical Data

Housing	Zinc die casting, nickel-chrome-plated IP40 (with mounted lens and GigE cable)
Protection Class	IP40 (with mounted lens and GigE cable)
Weight	120 g

Dimensions



Environmental Data

Storage Temperature	-10 °C ... +70 °C
Operating Temperature	+5 °C ... +65 °C @ T = Measurement Point
	Ambient temperature above 0 °C requires heat dissipation measures
Int. Temperature Sensor	no
Humidity	10 % ... 90 % non-condensing

LED Signalling

LED	Green flash	RX active
	Green	Link ON
	Yellow	Error
	Yellow flash	TX active

Electrical Data

Power Supply (ext.)	VCC: 12 ... 24 V DC ± 20%
	I: 100 ... 200 mA
Power over Ethernet	-
Power Consumption	approx. 2.8 W @ 12VDC and 41 fps
Digital Input	direct, without optocoupler
	$U_{IN(low)}$: 0.0 ... 0.8 VDC
	$U_{IN(high)}$: 3.3 ... 30 VDC
	I_{IN} : <10 mA
	min. Impulse Length: 2.0 µsec
Digital Output	direct, without optocoupler
	U_{EXT} : VCC
	I_{OUT} : max. 50 mA
	t_{ON} = typ. 3 µsec t_{OFF} = typ. 40 µsec

Caution



* The digital I/Os are not potential-free and do not have an overrun cut-off. Incorrect wiring (overvoltage, undervoltage or voltage reversal) can lead to defect in the electronic system.
Ground loops are to be avoided and can lead to destruction of the device.

Conformity

Conformity	CE, RoHS, REACH, EAC
KC Registration No. / Date	- / -
MTBF	72 years @ T = 45 °C / 47 years @ T = 60 °C T = Measurement Point

GenICam™ Features

Timer	-
User Sets	Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1 Parameters: any user definable Parameter
Acquisition Abort	Delay up to 24.4 msec
SFNC Version	v2.1

Factory Settings after Start-Up

Trigger Mode	Off (Free Running)
Analog Controls	Exposure Time: 4 msec, Gain: 0 dB, Offset: 0
Pixel Format	Mono8
Partial Scan	Off
Acquisition Frame Rate	-
Timer	-
Defect Pixel Correction	ON
Fixed Pattern Noise Correction	ON
Digital Input	Line0, invert = false
Digital Output	Line1, invert = false, line source = Off
GPIO 1/2	-
TriggerSource	Off

Partial Scan @ FullFrame, min Exposure, Mono8 (monochrome camera) or BayerRG8 (color camera)

	Resolution	max. fps acquisition	max. fps interface ²⁾
Full HD	1920 x 1080	45	45
SXGA	1280 x 1024	48	48
HD720	1280 x 720	63	63
XGA	1024 x 768	80	80
SVGA	800 x 600	100	100
VGA	640 x 480	162	162
CIF	352 x 288	302	301
QVGA	320 x 240		
QCIF	176 x 144		
LineScan	1920 x 1024	48	48
	1920 x 512	94	94
	1920 x 256	180	180
	1920 x 128	334	334
	1920 x 64	581	582
	1920 x 32	923	921
	1920 x 16	1308	1306
	1920 x 8	1652	1654
	1920 x 4	1901	1897
	1920 x 2	2057	2052
	1920 x 1	-	-

²⁾ depends on the used interface