

## 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 ( $\sigma$ )	11 e- typical
Saturation	8500 e- typical
Dynamic Range	57 dB typical
SNR	39 dB typical
Quantum efficiency $\eta$	56 % @ 536 nm typical

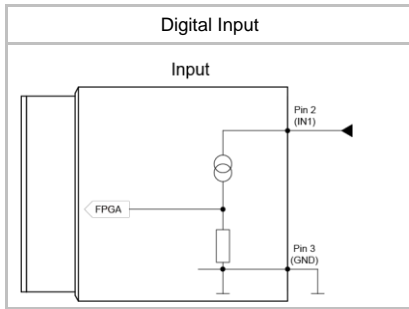
## Acquisition

Resolution	1920 px x 1200 px		
Interface Frame Rate (depends on used interface performance)	Format	Resolution	max. Frame Rate (@ Trigger Mode) <sup>2)</sup>
	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 <sup>1)</sup>	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		

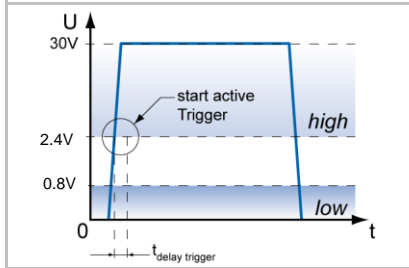
## Image Pre-Processing

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	Horizontal, vertical
Defect Pixel Correction	via Defect Pixel List with up to 512 Pixel Coordinates
Fix Pattern Noise Correction	yes

<sup>1)</sup> 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 or Off fixed Trigger Delay out of $t_{\text{readout}}$ : <sup>1)</sup> 12 $\mu\text{sec}$ @ 10 bit max. Trigger Delay during $t_{\text{readout}}$ : <sup>1)</sup> 12 $\mu\text{sec}$ @ 10 bit
Trigger Delay	-
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 $\mu\text{sec}$

## 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	-
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

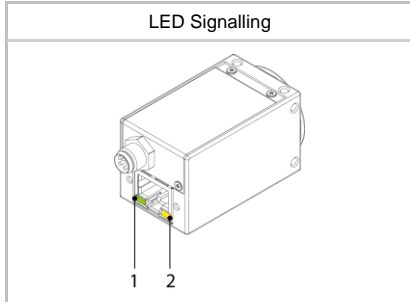
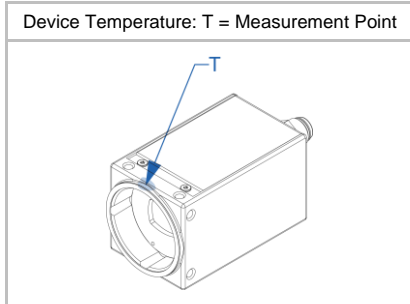
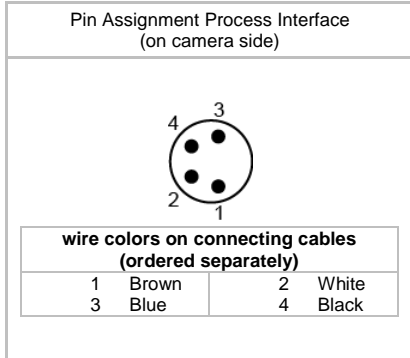
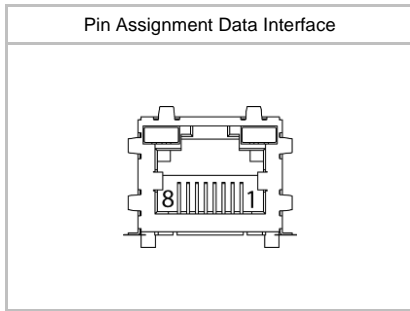
Data and Power Interface	Gigabit Ethernet	Transfer Rate	1000 Mbits/sec
	Fast Ethernet	Transfer Rate	100 Mbits/sec
	Connector:	8P8C Modular Jack (RJ45) screw lock type	
	Pin Assignment:	1 – MX1+	5 – MX3-
		2 – MX1-	6 – MX2-
		3 – MX2+	7 – MX4+
		4 – MX3+	8 – MX4-

Process Interface	Connector:	M8/4-pin (SACC-DSI-M 8MS-4CON-L180)	
	Assignment:	1 - VCC (Power and OUT)	3 - GND (Power and IN)
		2 - IN+	4 - OUT



\* Note I/Os: Ground loops are to be avoided and can lead to destruction of the device.

<sup>1)</sup> Sensor readout, different from pixel format



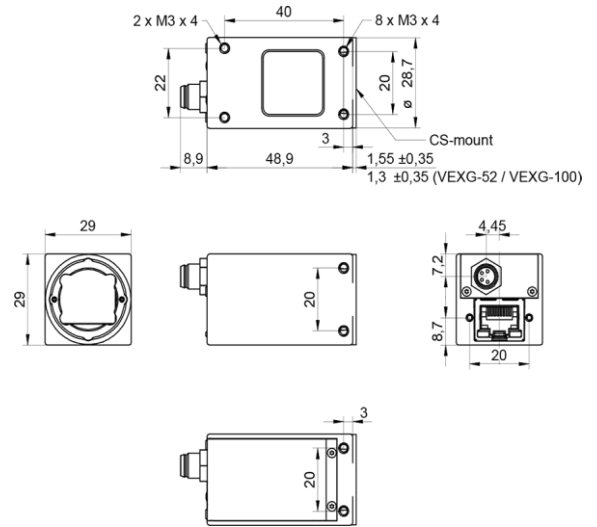
## Optical Data

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. 2.6 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 or BayerRG8

	Resolution	max. fps acquisition	max. fps interface <sup>2)</sup>
Full HD	1920 x 1080	45	45
SXGA	1280 x 1024	48	48
XGA	1024 x 768	63	63
SVGA	800 x 600	80	80
VGA	640 x 480	100	100
CIF	352 x 288	162	162
QCIF	176 x 144	302	301
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	-	-

<sup>2)</sup> depends on the used interface