

ATTENTION: This product is subject to statutory export control regulations and may require written information on intended end use and final destination! Dual Use Classification ECCN/AL: 6A003B

### Device Information

Model Name	VCXG-03SWIR.XC
Vendor Name	Baumer

### Sensor Information

Sensor Name	Sony IMX991
Type	1/4" progressive scan CMOS
Shutter	Global Shutter
Resolution	656 x 520 pixels
Scan Area	3.28 mm x 2.6 mm
Pixel Size	5 $\mu$ m x 5 $\mu$ m

### Data Quality

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

Dark Noise ( $\sigma$ )	260 e- typical
Saturation	180000 e- typical
Dynamic Range	57 dB typical
SNR	52.6 dB typical
Quantum efficiency $\eta$	69% @ 536 nm, 66% @ 631 nm typical

### Acquisition

Resolution	656 px x 520 px		
Interface Frame Rate (depends on used interface performance)	Format	Resolution	max. Frame Rate (@ Trigger Mode) <sup>2)</sup>
	Full Frame	656 x 520	237 fps
	Binning 2x2	328 x 260	237 fps
	Binning 2x1	328 x 520	237 fps
	Binning 1x2	656 x 260	237 fps

Acquisition Frame Rate <sup>1)</sup> (Burst Mode)	237 fps   $t_{readout} = 4.22$ msec (max. Res. Full Frame) @ 10 bit
	135 fps   $t_{readout} = 7.37$ msec (max. Res. Full Frame) @ 12 bit

Pixel Formats	Mono8, Mono10, Mono12, Mono12p
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Partial Scan	True Partial Scan with increasing Frame Rate on Y direction, Region of Interest (ROI) arbitrary
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	Width: minimum 16, increment 16 Height: minimum 2, increment 2
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Adjustable Acquisition Frame Rate	Off or 0,01 ... 65535 Hz
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Acquisition Mode	Continuous, Single Frame and Multi Frame
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Acquisition Status	AcquisitionActive, AcquisitionTrigger Wait
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Exposure Mode	Timed
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Shutter Mode	Global
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Readout Mode	Sequential
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### Image Pre-Processing

Analog Controls	Exposure Time (20 $\mu$ sec ... 60 sec   Step Size 1 $\mu$ sec) Gain (0 ... 48 dB), Offset (0 ... 255 LSB   12 bit)
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Auto Function	ExposureAuto and GainAuto with BrightnessAutoPriority based on BrightnessAuto ROI
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LUT	Luminance (12 bit)
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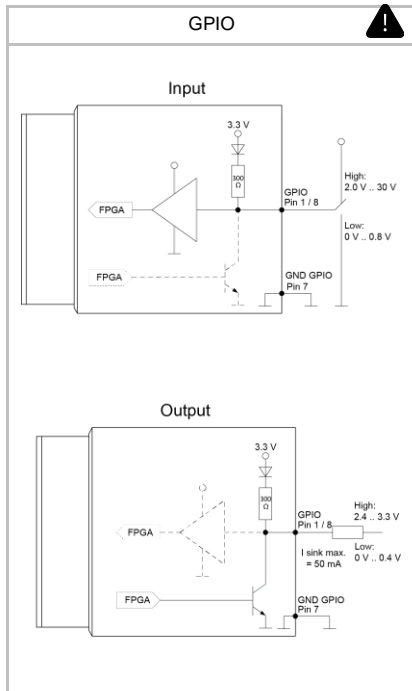
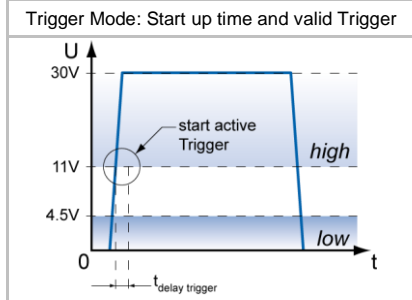
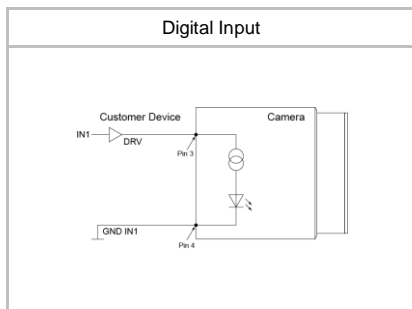
Color Models	Mono
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Color Processing	-
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Color Adjustment	-
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<sup>1)</sup> Sensor readout, different from pixel format

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



## Image Pre-Processing

Color Enhancement	-
Color Tolerance	-
Binning Horizontal	1 or 2
Binning Vertical	1 or 2
Defect Pixel Correction	yes, static DPC: Defect Pixel List with up to 8167 Pixel Coordinates, dynamic DPC: Threshold
Image Flipping	Horizontal, vertical
Fix Pattern Noise Correction	-

## Process Synchronization

Trigger Mode	Off (Free Running), On (Trigger)
Trigger Overlap Type	Readout
Trigger Sources	Hardware (Line0, 1, 2), Software, Counter 1, 2 End, Action CMD (Action 1), All or Off fixed Trigger Delay out of treadout: <sup>1)</sup> 34 µsec @ 10 bit 50 µsec @ 12 bit max. Trigger Delay during treadout: <sup>1)</sup> 34 µsec @ 10 bit 50 µsec @ 12 bit
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
External Flash Sync	via Exposure Active $t_{delay\ flash} \leq 3\ \mu sec, t_{duration} = t_{exposure}$
Encoder Function	yes, via Counter and Trigger Source
PTP Function	-

## Digital I/Os

Lines	Input: Line 0, Output: Line3, GPIO: Line 1, Line 2
Line Sources (Output)	Off, ExposureActive, Timer1, ReadoutActive, UserOutput 1-3 and TriggerReady
Line Debouncer (Input)	Low and high signal separately selectable Debouncing Time 0 ... 5 msec, Step Size: 1 µsec

## Memory

Image Buffer	1,4 MB 2 Images (Trigger Mode) / 1 Image (Free Running Mode)
Non-volatile Memory	128 kb

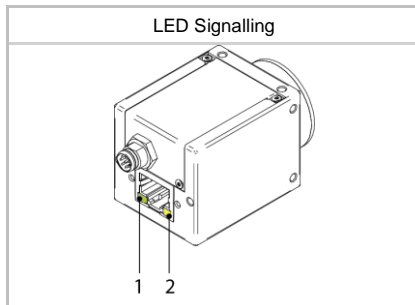
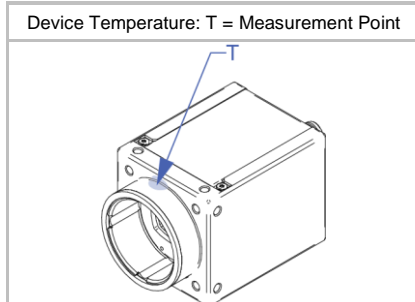
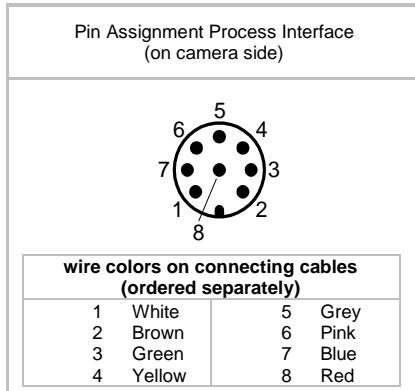
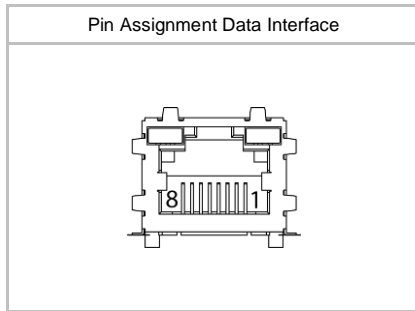
## Network Interface Data

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

## GigE Vision® Features

Events	DeviceTemperatureStatusChanged, EventLost, ExposureEnd, ExposureStart, FrameEnd, FrameStart, FrameTransferSkipped, GigEVisionError, GigEVisionHeartbeatTimeout, PrimaryApplicationSwitch, Line0..2 FallingEdge, Line0..2 RisingEdge, TransferBufferFull, TransferBufferReady, TriggerOverlapped, TriggerReady, TriggerSkipped
Transmission via Asynchronous Message Channel	
Action CMD	yes, Action 1 for Trigger
Frame Counter	up to 2 <sup>32</sup>
Payload Size	0 ... 682464 Byte
Timestamp	64 bit, resolution in nsec, increment = 8
Packet Delay	0 .. 2 <sup>32</sup> - 1 nsec
Packet Resend	Resend Buffer: 2 MB (2 Images)
GigE Vision	v2.0

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



## 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), screwable TYPE090 (according to GigE Vision Mechanical Supplement)	
	Assignment:	1 - MX1+	2 - MX1-
		3 - MX2+	4 - MX3+
		5 - MX3-	6 - MX2-
		7 - MX4+	8 - MX4-

Process Interface	Connector:	M8/8-pin (SACC-DSI-M8MS-8CON-M8-L180)
	Assignment:	1 - GPIO (Line2)      2 - Power Vcc 3 - IN1 (Line0)      4 - GND IN1 5 - Power VCC OUT    6 - OUT1 (Line3) 7 - GND (Power, GPIO) 8 - GPIO (Line1)

Caution



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

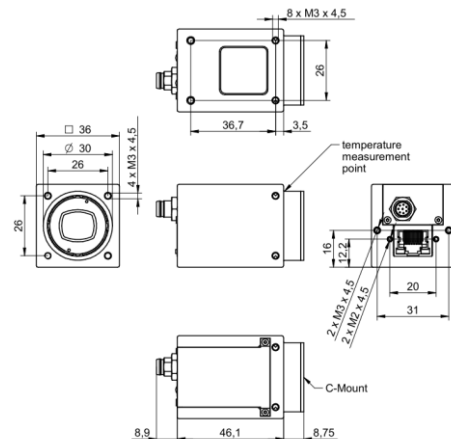
## Optical Data

Lens Mount	C-Mount
Optical Filter	-

## Mechanical Data

Housing	aluminum, baked varnish
Protection Class	IP40 (with mounted lens and GigE cable)
Weight	110 g

Dimensions



Additional Cooling Pipe	yes, connection with M3 for Push-in fitting
Cooling medium:-	compressed air, tested according ISO 8573-1:2010 classes [1:4:2]
	- liquid, compatible with aluminum, must contain bio-growth inhibitors and corrosion protection
	- maximum pressure 6 bar for compressed air and liquid

## Environmental Data


Storage Temperature	-20 °C ... + 70 °C
Operating Temperature	0 °C ... +65 °C @ T = Measurement Point or 0 °C ... +75 °C @ internal Temperature Sensor
	Note: Ambient temperature above 32 °C requires heat dissipation measures.
Int. Temperature Sensor	yes, InHouse: step size 0.0625 °C, accuracy ±0.5 °C (typ) 0 °C ... +85 °C, Sensor: step size 0.125 °C, accuracy not specified
Humidity	10 % ... 90 % non-condensing

<sup>1)</sup> the maximum temperature for Sony sensor characteristics (sensor performance) are guaranteed up to 49 °C @ Measurement Point or up to 60 °C @ internal temperature sensor

## LED Signalling

LED	LED 1	Yellow static - Error Yellow flash - TX active
	LED 2	Green static - Link ON Green flash - RX active

## Electrical Data

Power Supply (ext.)	VCC: 12 ... 24 V DC $\pm$ 20% I: 86 ... 174 mA
Power over Ethernet	-
Power Consumption	approx. 2.1 W @ 12 VDC and 237 fps (Factory Setting "Default")
Digital Input	Optocoupler $U_{IN(low)}$ : 0.0 ... 4.5 VDC $U_{IN(high)}$ : 11.0 ... 30.0 VDC $I_{IN}$ : 3.0 ... 10.0 mA min. Impulse Length: 2.0 $\mu$ sec
Digital Output	Optocoupler $U_{EXT}$ : 5 ... 30 V DC $I_{OUT}$ : max. 50 mA $t_{ON}$ = typ. 3 $\mu$ sec $t_{OFF}$ = typ. 40 $\mu$ sec
GPIO	direct, without optocoupler
GPIO used as Input:	$U_{IN(low)}$ : 0.0 ... 0.8 VDC $U_{IN(high)}$ : 2.0 ... 30.0 VDC min. Impulse Length: 2.0 $\mu$ sec
GPIO used as Output:	$U_{Out(low)}$ : 0.0 ... 0.4 VDC ( $I_{sink\ max}$ : 50 mA) $U_{Out(high)}$ : 2.4 ... 3.3VDC ( $I_{max}$ : 1 mA)
Caution 	* The General Purpose I/Os (GPIOs) are not potential-free and do not have an overrun cut-off. Incorrect wiring (overvoltage, undervoltage or voltage reversal) can lead to defects in the electronic system. Ground loops are to be avoided and can lead to destruction of the device.

## Conformity

Conformity	CE, RoHS, REACH, UL Recognized
KC Registration No. / Date	- / -
MTBF	53 years @ T = 45 °C / 34 years @ T = 60 °C T = Measurement Point

## GenICam™ Features

Short Exposure Range	-
Timer	Timer Selector: Timer 1 TimerTriggerSource: Line0, SoftwareTrigger, ExposureStart, ExposureEnd, FrameTransferSkipped, TriggerSkipped, Action 1 and Off TimerDelay: 0 $\mu$ sec ... 2 sec, Step Size: 1 $\mu$ sec TimerDuration: 4 $\mu$ sec ... 2 sec, Step Size: 1 $\mu$ sec
Counter	Counter Selector: Counter 1, Counter 2 CounterValue: 0 ... 65535 Counter Event Source: Counter1End or Counter2End, ExposureActive, FrameTransferSkipped, FrameTrigger, TriggerSkipped, Line0..2 and Off Counter Reset Source: Counter1End, Counter2End, Line0..2 and Off

## GenICam™ Features

Sequencer	Sequencer Characteristics: up to 128 sets, up to 4 possible pathes for triggered set transitions, 6 trigger sources: Counter1End, Counter2End, ExposureActive, Line0..2, ReadoutActive, Timer1End Sequencer Parameters for Exposure, Gain, Trigger, ROI and Output: ExposureTime, CounterDuration, CounterEventActivation, CounterEventSource, CounterResetSource, ExposureMode, ExposureTime, Gain, Height, OffsetX, OffsetY, TriggerMode, UserOutputValue, UserOutputValueAll, Width
User Sets	Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 Parameters: any user definable Parameter
Acquisition Abort	Delay up to 7.4 msec
Chunk Data	yes, Chunk Selector: Binning, BlackLevel, CounterValue, DeviceTemperature, ExposureTime, FrameID, Gain, Height, Image, ImageControl, LineStatusAll, OffsetX, OffsetY, PixelFormat, SequencerSetActive, Timestamp, Width
Device Temperature	InHouse and Sensor InHouse: Event generation, if temperature status changed from Normal to Underrun, Normal to High, High to Exceeded and Exceeded to Normal Exceeded (no image transfer) = max. internal temperature sensor + 1 °C Underrun (no image transfer) = min. internal temperature sensor - 1 °C
Device Link Throughput Limit	yes, up to max. Device Link Speed
Custom Data	yes, 128 Byte with CustomDataKonfiguration Mode
Optical Black Pixel Area	yes, On / Off extends the right image area by 96 optical black pixels, full frame resolution changed to 752 px x 520 px
Black Level Auto Adjust	yes, On / Off
Calibration Data	yes, camera calibration values can stored: CalibrationMatrix, CalibrationMatrixNew, CalibrationFocallenght, CalibrationAngularAperture, GeometryDistortionValue: k1, k2, p1, p2, k3, CalibrationVector: tvec, rvec and CalibrationDataVersion
SFNC Version	2.4.0

## Factory Settings after Start-Up

Ethernet IP Configuration	DHCP, LLA
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	Off
Timer/Counter/Sequencer	Off
Defect Pixel Correction	static DPC: On, dynamic DPC: On (Threshold 15 [DN8])
Fixed Pattern Noise Correction	-
Optical Black Pixel Area	Off
Black Level Auto Adjust	On
Digital Input	Line0, invert = false
Digital Output	Line3, invert = false, line source = Off
GPIO 1/2	Line1, Line2, invert = false, LineMode = Input
TriggerSource	All

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

	Resolution	max. fps acquisition	max. fps interface <sup>2)</sup>
VGA	640 x 480	255	255
CIF	352 x 288	396	396
QVGA	320 x 240	459	459
QCIF	176 x 144	688	688
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<sup>2)</sup> depends on the used interface