



## Device Information

Model Name	VCXG.2-204M
Vendor Name	Baumer

## Sensor Information

Sensor Name	Sony IMX541 Gen4
Type	1.1" progressive scan CMOS
Shutter	Global Shutter
Resolution	4480 x 4496 pixels
Scan Area	12.27 mm x 12.31 mm
Pixel Size	2.74 μm x 2.74 μm

## Data Quality

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

Dark Noise ( $\sigma$ )	2.3 e- typical
Saturation	9300 e- typical
Dynamic Range	70 dB typical
SNR	40 dB typical
Quantum efficiency $\eta$	70% @ 536 nm typical

## Acquisition

Resolution	4480 px x 4496 px		
Interface Frame Rate (depends on used interface performance)	Format	Resolution	max. Frame Rate (@ Trigger Mode) <sup>2)</sup>
	Full Frame	4480 x 4496	6 fps
	Binning 2x2	2240 x 2248	23 fps
	Binning 2x1	2240 x 4496	6 fps
	Binning 1x2	4480 x 2248	6 fps

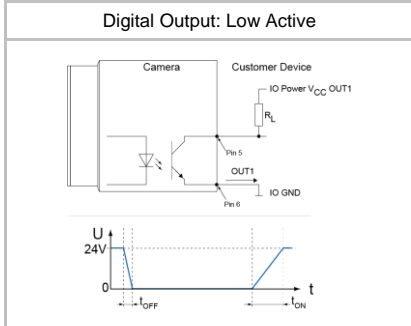
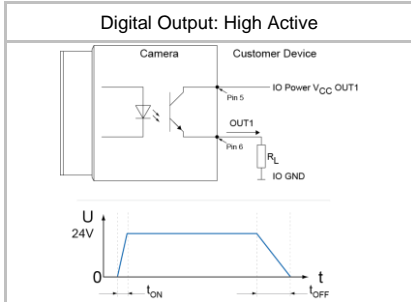
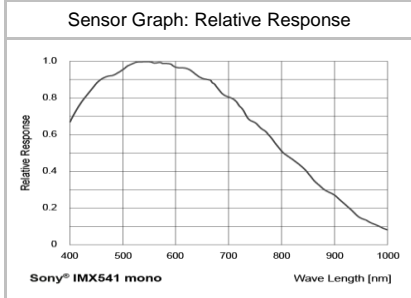
Acquisition Frame Rate <sup>1)</sup> (Burst Mode)	6 fps   $t_{\text{readout}} = 145$ msec (max. Res. Full Frame) @ 10 bit
	6 fps   $t_{\text{readout}} = 145$ msec (max. Res. Full Frame) @ 12 bit
	26 fps   $t_{\text{readout}} = 38.4$ msec (max. Res. Binning 2x2) @ 10 bit
	26 fps   $t_{\text{readout}} = 38.4$ msec (max. Res. Binning 2x2) @ 12 bit

Pixel Formats	Mono8, Mono10, Mono12, Mono12px
Partial Scan	True Partial Scan with increasing Frame Rate on Y direction, Region of Interest (ROI) arbitrary Width: minimum 32, increment 32 Height: minimum 1, increment 1
Adjustable Acquisition Frame Rate	Off or 0.01 ... 65535 Hz

Acquisition Mode	Continuous, Single Frame and Multi Frame
Acquisition Status	AcquisitionActive, AcquisitionTrigger Wait
Exposure Mode	Timed
Shutter Mode	Global
Readout Mode	Overlapped, Sequential

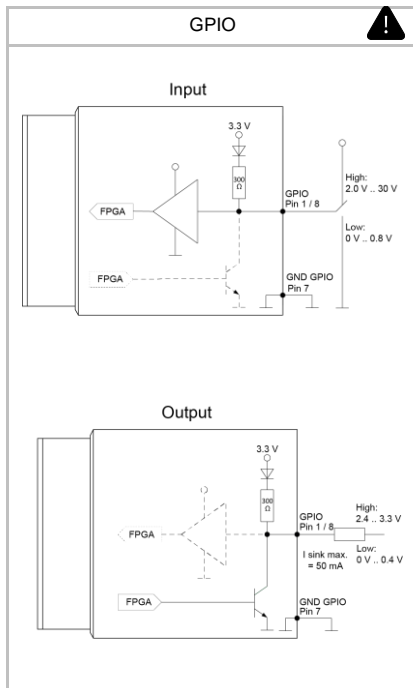
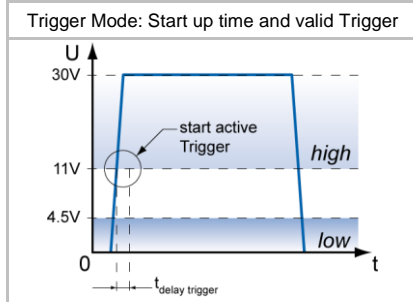
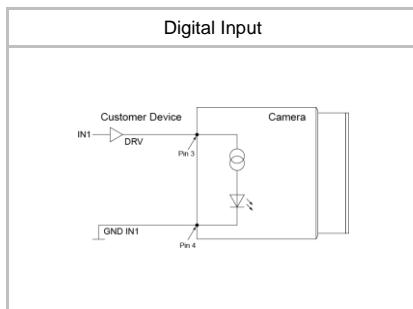
## Image Pre-Processing

Analog Controls	Exposure Time (1 μsec ... 60 sec   Step Size 1 μsec) Gain (0...48 dB), Offset (0 ... 255 LSB   12 bit)
Auto Function	ExposureAuto and GainAuto with BrightnessAutoPriority based on BrightnessAuto ROI
LUT	Luminance (12 bit)
Color Models	Mono
Color Processing	-
Color Adjustment	-



<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	via Defect Pixel List with up to 512 Pixel Coordinates
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 $t_{readout}$ : <sup>1)</sup> 295 $\mu$ sec @ 12 bit max. Trigger Delay during $t_{readout}$ : <sup>1)</sup> 295 $\mu$ sec @ 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 $\mu$ sec

## Memory

Image Buffer	231 MB 4 Images (Trigger Mode) / 1 Image (Free Running Mode)
Non-volatile Memory	128 kb

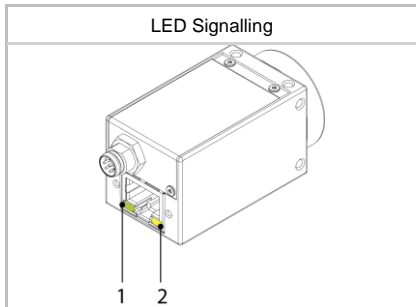
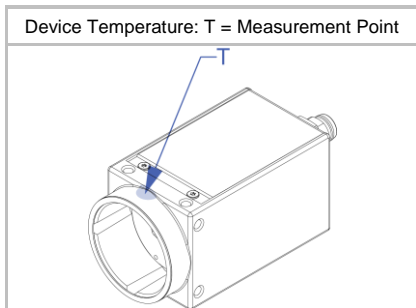
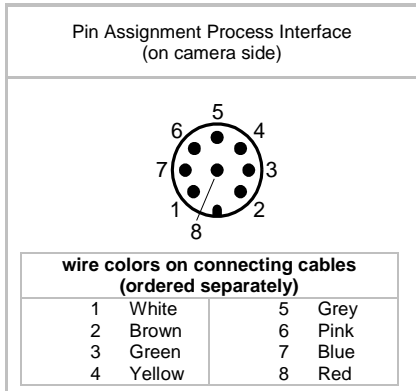
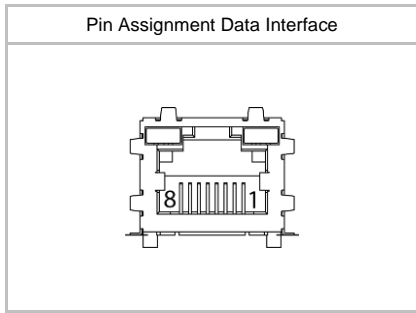
## Network Interface Data

Interface	Gigabit Ethernet 1000BASE-T 1000 Mbts/sec Fast Ethernet 100 BASE-T 100 Mbts/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, GigE VisionError, GigE VisionHeartbeatTimeOut, 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 $2^{32}$
Payload Size	0 ... 40284384 Byte
Timestamp	64 bit, resolution in nsec, increment = 8
Packet Delay	0 .. $2^{32}$ - 1 nsec
Packet Resend	Resend Buffer: 154 MB (4 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), screw lock type	
Process Interface	Connector:	M8/8-pin (SACC-DSI-M8MS-8CON-M8-L180)	
	Assignment:	1 - MX1+	2 - MX1-
		3 - MX2+	4 - MX3+
		5 - MX3-	6 - MX2-
		7 - MX4+	8 - MX4-
		Assignment:	1 - GPIO (Line2)
		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.

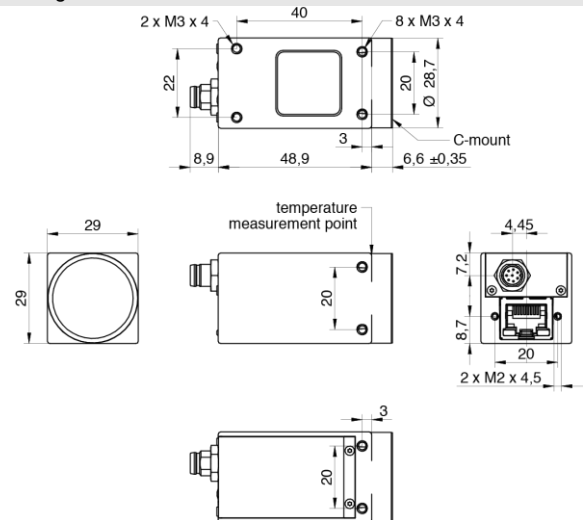
## Optical Data

Lens Mount	C-Mount
Optical Filter	-

## Mechanical Data

Housing	Zinc die casting, baked varnish
Protection Class	IP40 (with mounted lens and GigE cable)
Weight	120 g

### Dimensions



Additional Cooling Pipe	no
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## 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 30 °C requires heat dissipation measures.
Int. Temperature	yes, accuracy:
Sensor	±1 °C (typ) 0 °C ... +85 °C
Humidity	10 % ... 90 % non-condensing

<sup>\*)</sup> the maximum temperature for Sony sensor characteristics (sensor performance) are guaranteed up to 50 °C @ Measurement Point or up to 60 °C @ internal temperature sensor

## LED Signalling

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

## Electrical Data

Power Supply (ext.)	VCC: 12 ... 24 V DC $\pm$ 20% I: 141 ... 284 mA
Power over Ethernet	Class 2 device VCC: 36 ... 57 V DC I: 86 mA @ 48 VDC
Power Consumption	approx. 3.4 W @ 12 VDC and 6 fps approx. 4.1 W @ 48 VDC (PoE) and 6 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
KC Registration No. / Date	- / -
MTBF	50 years @ T = 45 °C / 32 years @ T = 60 °C T = Measurement Point

## GenICam™ Features

Short Exposure Range	yes, ShortExposureTimeEnable Short Exposure Range 1 ... 3 $\mu$ sec - 34 $\mu$ sec ... 60 sec Default Exposure Range 34 $\mu$ sec ... 60 sec
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 145 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 Event generation for Normal to High, High to Exceeded and Exceeded to Normal Exceeded (no image transfer) = max. internal temperature sensor + 1 °C
Device Link Throughput Limit	yes, up to max. Device Link Speed
Custom Data	yes, 128 Byte with CustomDataKonfiguration Mode
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	ON
Fixed Pattern Noise Correction	-
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>
HXGA	4096 x 3072	9	9
UHD (4K)	3840 x 2160	13	13
Full HD	1920 x 1080	26	26
SXGA	1280 x 1024	28	28
HD720	1280 x 720	38	38
XGA	1024 x 768	36	36
SVGA	800 x 600	44	44
VGA	640 x 480	54	54
CIF	352 x 288	80	80
QVGA	320 x 240	91	91
QCIF	176 x 144	126	126
LineScan	4480 x 4096	7	6
	4480 x 2048	14	13
	4480 x 1024	28	26
	4480 x 512	51	51
	4480 x 256	87	87
	4480 x 128	134	134
	4480 x 64	184	184
	4480 x 32	227	227
	4480 x 16	256	256
	4480 x 8	274	274
	4480 x 4	274	274
4480 x 2	274	274	
4480 x 1	274	274	

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