

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

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



## Sensor Information

Model Name	Gpixel GMAX3249
Type	2" progressive scan CMOS
Shutter	Global Shutter
Resolution	7008 x 7000 pixels
Scan Area	22.4 mm x 22.4 mm
Pixel Size	3.2 μm x 3.2 μm

## Data Quality

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

Dark Noise ( $\sigma$ )	5 e- typical
Saturation	11000 e- typical
Dynamic Range	66 dB typical
SNR	40 dB typical
Quantum efficiency $\eta$	61% @ 536 nm typical

## Acquisition

Resolution	7008 px x 7000 px		
Interface Frame Rate (depends on used interface performance)	Format	Resolution	max. Frame Rate (@ Trigger Mode) <sup>2)</sup>
	Full Frame	7008 x 7000	11 fps
	Binning 2x2	3504 x 3500	11 fps
	Binning 2x1	3504 x 7000	11 fps
	Binning 1x2	7008 x 3500	11 fps

Acquisition Frame Rate <sup>1)</sup> 11 fps |  $t_{\text{readout}} = 86.74$  msec (max. Res. Full Frame) @ 12 bit (Burst Mode)

Pixel Formats Mono8, Mono10, Mono12, Mono12p

Partial Scan True Partial Scan with increasing Frame Rate on Y direction, Region of Interest (ROI) arbitrary  
Width: minimum 32, increment 16  
Height: minimum 1, increment 1

Multi ROI Up to 8 non-overlapping regions

Ad. Acquisition Frame Rate Off or 0,01 ... 65535 Hz

Acquisition Mode Continuous, Single Frame and Multi Frame

Acquisition Status AcquisitionActive, AcquisitionTrigger Wait

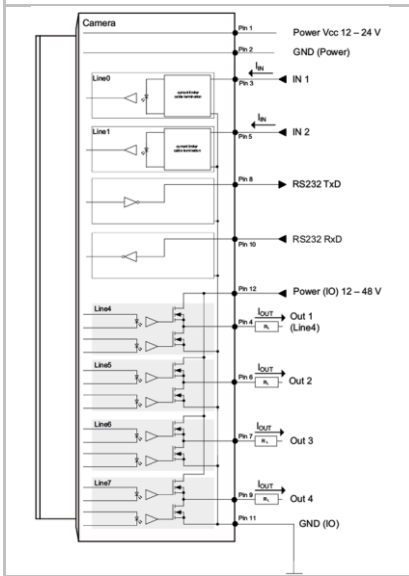
Exposure Mode Timed

Readout Mode Overlapped, Sequential

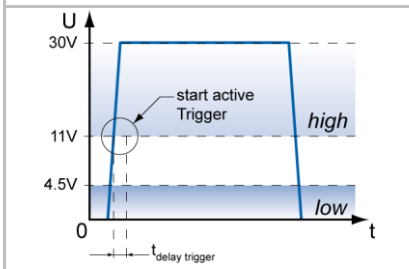
## Image Pre-Processing

Analog Controls	Exposure Time (20 μsec ... 60 sec   Step Size 1 μsec) Gain (0...30 dB), Offset (-256 ... 255 LSB   12 bit)
Auto Functions	ExposureAuto and GainAuto with BrightnessAutoPriority based on BrightnessAuto ROI
Gamma Correction	Gamma (0.1 ... 2   available if LUT is enabled)
LUT	Luminance (12 bit)
Color Models	Mono
Color Processing	-
Color Enhancement	-
Color Tolerance	-
Binning	Horizontal: 1 or 2, Vertical: 1 or 2
Image Flipping	Horizontal, vertical
Defect Pixel Correction	via Defect Pixel List with up to 512 Pixel Coordinates
Shading Correction	Brightness correction per tile of 64x64 pixels
Sharpening	-
HDR	Yes, up to +25 dB, non-linear output with tone mapping
Image Compression	Baseline JPEG (ISO/IEC 10918-1)

Digital Input / Output: principle circuit diagram



Trigger Mode: Start up time and valid Trigger



## Process Synchronization

Trigger Mode	Off (Free Running), On (Trigger)
Trigger Overlap Type	Readout
Trigger Sources	Hardware (Line0,1), Software, All, ActionCMD (Action 1) or Off fixed Trigger Delay out of t <sub>readout</sub> : <sup>1)</sup> 17,8 µsec @ 12 bit max. Trigger Delay during t <sub>readout</sub> : <sup>1)</sup> 30,1 µsec @ 12 bit
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
External Flash Sync	via Exposure Active t <sub>delay flash</sub> ≤ 1 µsec, t <sub>duration</sub> = t <sub>exposure</sub>
Encoder Function	yes, via Counter and Trigger Source
Precision Time Protocol (PTP) Function	IEEE1588-2008 clock synchronization, default profile 1.0, master and slave mode

## Digital I/Os

Lines	Input: Line 0 .. 1, Output: Line 4 .. 7, GPIO: no, RS232: Line 2 .. 3
Output Sources	Off, ExposureActive, Timer1, ReadoutActive, UserOutput 1-3 and TriggerReady
Output Line Mode	yes, Tri-State, PushPull, OpenDrain, OpenSource
Output PWM function	yes, Line 4 .. 7 PWM Mode: Off, One Pulse, FixedFrequency PWM feature: PWMDuration, PWMDutyCycle Configuration Mode for lightning protection: MaxPWMDuration, MaxPWMDutyCycle
Line Debouncer	Low and high signal separately selectable Debouncing Time 0 ... 5 msec, Step Size: 1 µsec

## Memory

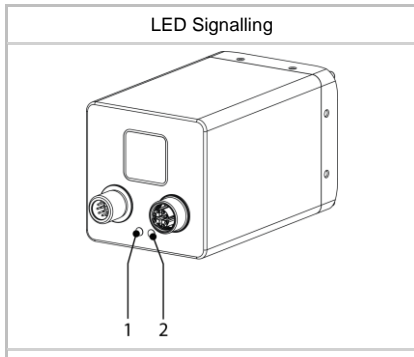
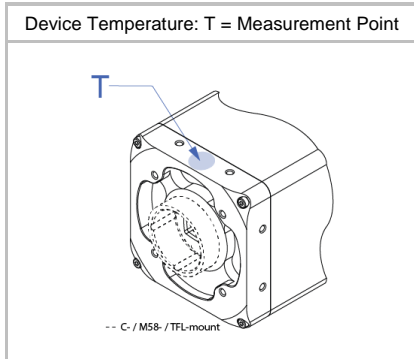
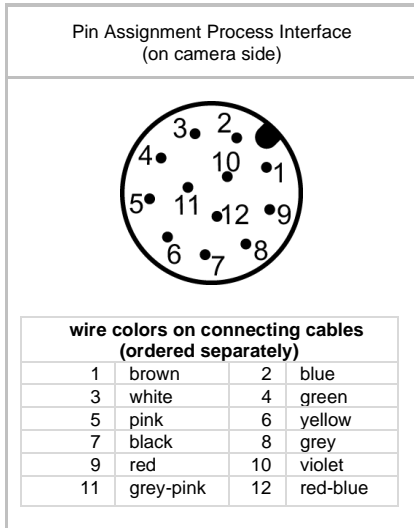
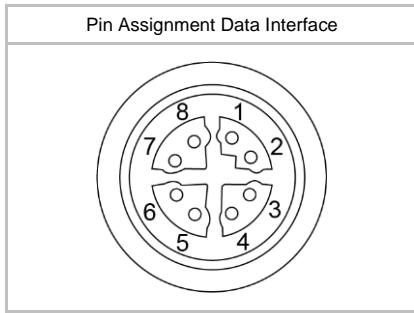
Image Buffer	1024 MB 21 Images (Trigger Mode) / 1 Image (Free Running Mode)
Non-volatile Memory	128 kb

## Network Interface Data

Interface	10 Gigabit Ethernet 10GBASE-T 10.000 Mbits/sec 5 Gigabit Ethernet 5GBASE-T 5.000 Mbits/sec 2.5 Gigabit Ethernet 2.5GBASE-T 2.500 Mbits/sec Gigabit Ethernet 1000BASE-T 1.000 Mbits/sec Fast Ethernet 100BASE-T 100 Mbits/sec
Ethernet IP Configuration	Persistent IP, DHCP, LLA
Packet Size	576 ... 9000 Byte, Jumbo Frames supported

## GigE Vision® Features

Events Transmission via Asynchronous Message Channel	DeviceTemperatureStatusChanged, EventLost, ExposureEnd, ExposureStart, FrameEnd, FrameStart, FrameTransferSkipped, Error, GigEVisionHeartbeatTimeOut, Line0..3 FallingEdge, Line0..3 RisingEdge, PrimaryApplicationSwitch, TransferBufferFull, TransferBufferReady, TriggerOverlapped, TriggerReady, TriggerSkipped
Action CMD	yes, Action 1 for Trigger
Frame Counter	up to 2 <sup>32</sup>
Payload Size	0 ... 98112624 Byte
Timestamp	64 bit, resolution in nsec, increment = 8
Packet Delay	0 .. 2 <sup>32</sup> - 1 nsec
Packet Resend	
GigE Vision	v2.0



## Interfaces and Connectors

Data and Power Interface	10 Gigabit Ethernet	Transfer Rate	10.000 Mbits/sec
	5 Gigabit Ethernet	Transfer Rate	5.000 Mbits/sec
	2.5 Gigabit Ethernet	Transfer Rate	2.500 Mbits/sec
	Gigabit Ethernet	Transfer Rate	1.000 Mbits/sec
	Fast Ethernet	Transfer Rate	100 Mbits/sec
Connector:	M12 / 8-pol x-coded (SACC-CI-M12FS-8CON-L180-10G)		
Assignment:	1 - MX1+	2 - MX1-	
	3 - MX2+	4 - MX2-	
	5 - MX4+	6 - MX4-	
	7 - MX3-	8 - MX3+	

Process Interface	Connector:	M12/12-pin a-coded (SACC-CI-M12MS-12CON-L180)
Assignment:	1 - Power Vcc	2 - GND (Power)
	3 - IN1 (Line0)	4 - OUT1 (Line4)
	5 - IN2 (Line1)	6 - OUT2 (Line5)
	7 - OUT3 (Line6)	8 - RS232 TxD (Line2)
	9 - OUT4 (Line7)	10 - RS232 RxD (Line3)
	11 - GND (IO)	12 - Power (IO)

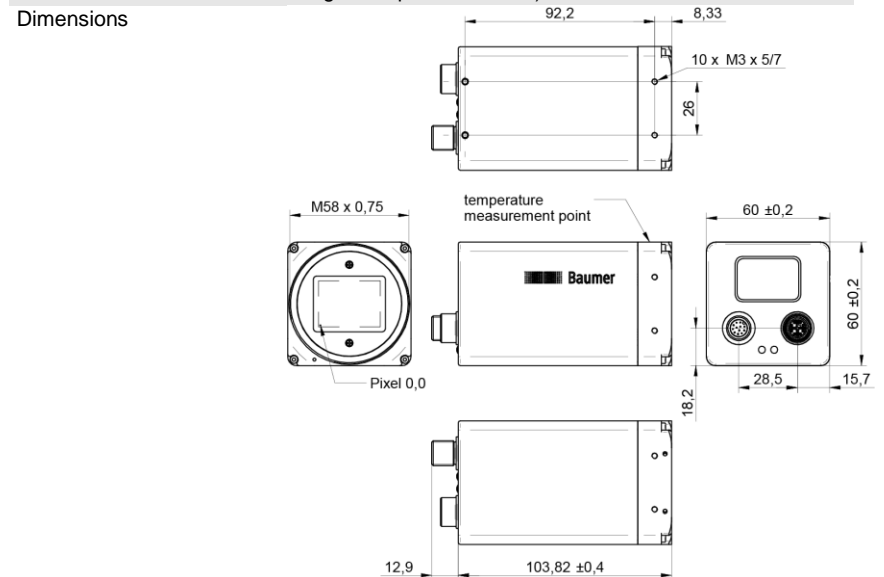
Lens Control Interface (located within support)	NA
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## Optical Data

Lens Mount	M58-Mount
Optical Filter	-

## Mechanical Data

Housing	aluminum, hard anodized, IP40 (with mounted lens and 5 GigE, Integrated JPEG Image Compression cable)
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Weight	485 g
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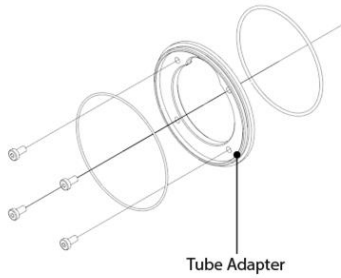
## Environmental Data

Storage Temperature	-30 °C ... + 70 °C
Operating Temperature	-30 °C ... +70 °C @ T = Measurement Point or -30 °C ... +70 °C @ internal Temperature Sensor Ambient temperature above 25 °C requires heat dissipation measures.
Int. Temperature Sensor	yes, accuracy: ±2 °C (typ) -40 °C ... 0°C ±1 °C (typ) 0 °C ... +85 °C
Humidity	10 % ... 90 % non-condensing

## LED Signaling

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

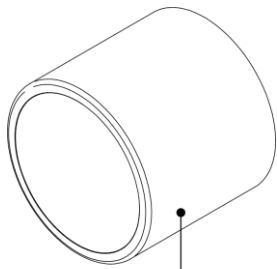
**Optional accessories for IP65/67 protection (ordered separately)**



Tube Adapter

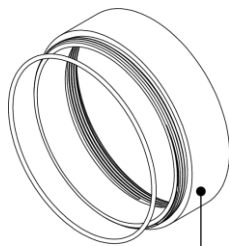
including seals and screws

Article Number	Diameter	Length
11193125	Ø 65 mm	2 mm



tube

Article Number	Diameter	Cover Glass	Length
11185374	Ø 65 mm	Acryl	58 mm
11195426	Ø 65 mm	Tempered laminated safety glass	58 mm



distance ring

including seal

Article Number	Diameter	Length
11185376	Ø 65 mm	6 mm
11185375	Ø 65 mm	12 mm
11198906	Ø 65 mm	36 mm

**Electrical Data**

Power Supply (ext.)	bus powered via USB3.0 interface
Power over Ethernet	NA
Power Consumption	approx. 10.1 W @ 24VDC and 11 fps (Factory Setting "Default")
Digital Input	Isolated, short circuit protection $U_{IN(low)}$ : 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 µsec
Digital Output	Isolated, short circuit protected $U_{EXT}$ : 12 ... 48 V DC [Power (IO)] $I_{OUT}$ : Continuously: max. 1.5 A PWM $t_{ON}$ max 1s / Duration max 40%: max. 2.5 A (Max. current for each output itself or sumery of all outputs) $t_{ON}$ = < 0.2 µsec $t_{OFF}$ = < 0.2 µsec max. Frequency: 500 kHz
GPIO	NA
RS232	RS232 compatible, not optically isolated Baud Rate: up to 115200, data bits: 8, stop bits: 1, Parity: none, flow control: none
Liquid lens control	NA

**Conformity**

Conformity	CE, RoHS, REACH, UL recognized, EAC
KC Registration No. / Date	- / -
MTBF	24 years @ T = 45 °C / 15 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 µsec ... 2 sec, Step Size: 1 µsec TimerDuration: 4 µsec ... 2 sec, Step Size: 1 µsec
Counter	Counter Selector: Counter 1, Counter 2 CounterValue: 0 ... 65535 Counter Event Source: Counter1End or Counter2End, ExposureActive, FrameTransferSkipped, FrameTrigger, TriggerSkipped and Off Counter Reset Source: Counter1End, Counter2End, Line0 and Off
Sequencer	Sequencer Characteristics: up to 128 sets, up to 4 possible pathes for triggered set transitions, 6 trigger sources: Counter1End, Counter2End, ExposureActive, Line0, 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

## GenICam™ Features

User Sets	Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 Parameters: any user definable Parameter
Acquisition Abort	Delay up to 86.8 msec
Chunk Data	yes, Chunk Selector: Binning, Black Level, DeviceTemperature, ExposureTime, FrameID, Gain, Height, Image, ImageControl, LineStatusAll
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
SFNC Version	v2.4.0

## 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	Off
Timer/Counter/Sequencer	Off
Defect Pixel Correction	ON
Fixed Pattern Noise Correction	-
Digital Input	Line0 .. 1, invert = false, line format = Tri State
Digital Output	Line4 .. 7, invert = false, line source = Off, line format = Open Source
GPIO	NA
TriggerSource	All

## ROI Frame Rates, min Exposure, 8 bit sensor readout, Mono8 or BayerRG8

	Resolution	max. fps acquisition	max. fps interface <sup>2)</sup>
HXGA	4096 x 3072	26	26
UHD (4K)	3840 x 2160	37	37
Full HD	1920 x 1080	73	73
SXGA	1280 x 1024	76	76
XGA	1024 x 768	101	101
SVGA	800 x 600	128	128
VGA	640 x 480	159	159
CIF	352 x 288	255	255
QCIF	176 x 144	469	469
Full Line	7008 x 4096	19	16
	7008 x 2048	39	32
	7008 x 1024	76	64
	7008 x 512	149	128
	7008 x 256	284	257
	7008 x 128	517	515
	7008 x 64	876	876
	7008 x 32	1339	1339
	7008 x 16	1823	1823
	7008 x 8	2225	2225
	7008 x 4	2497	2497
	7008 x 2	2663	2663
	7008 x 1	2663	2663

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

## Integrated JPEG Image Compression

JPEG compression	Compression of 8 bit monochrome images with configurable compression rate / image quality based on "JPEG still image data compression standard" from William B. Pennebaker and Joan L. Mitchell (1993)			
Image format	According to GigE Vision standard 2.x payload type JPEG Transmitted image can be directly saved to JPEG file			
Compression quality	Selectable, 10 (highest) .. 95% (lowest compression rate)			
Compression examples (depends on actual image)	Resolution 7008 x 7000 pixels, Frame rate 11 fps			
	JPEG quality	Compression ratio	File size	Bandwidth
	90%	1:8	7.8 MB	686 Mbit/s
	80%	1:13	4.8 MB	422 Mbit/s
	70%	1:18	3.5 MB	308 Mbit/s
	50%	1:27	2.3 MB	246 Mbit/s
Rate control	Yes, fixed bit rate or fixed quality			
Preview image	NA, User can decompress every Nth image for monitoring purposes			