

¹⁾ Sensor readout, different from pixel format

²⁾ Depends on the used interface



Sensor Information

Model Name	Sony IMX536
Type	2/3" progressive scan CMOS
Shutter	Global Shutter
Resolution	2848 x 2832 pixels
Scan Area	7.8 mm x 7.76 mm
Pixel Size	2.74 µm x 2.74 µm

Data Quality

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

Dark Noise (σ)	2.2 e- typical
Saturation	9000 e- typical
Dynamic Range	72 dB typical
SNR	40 dB typical
Quantum efficiency η	42% @ 465 nm, 49% @ 536 nm, 39% @ 631 nm typical

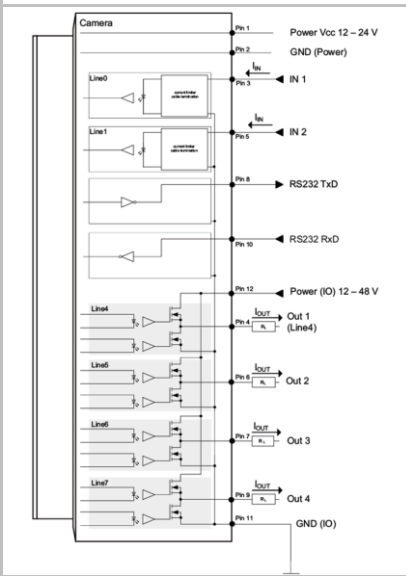
Acquisition

Resolution	2848 px x 2832 px		
Interface Frame Rate (depends on used interface performance)	Format	Resolution	max. Frame Rate (@ Trigger Mode) ²⁾
	Full Frame	2848 x 2832	150 fps
	Binning 2x2	1424 x 1416	172 fps
	Binning 2x1	1424 x 2832	172 fps
	Binning 1x2	2848 x 1416	172 fps
Acquisition Frame Rate ¹⁾ (Burst Mode)	172 fps $t_{\text{readout}} = 5.79$ msec (max. Res. Full Frame) @ 8 bit		
	149 fps $t_{\text{readout}} = 6.68$ msec (max. Res. Full Frame) @ 10 bit		
	123 fps $t_{\text{readout}} = 8.14$ msec (max. Res. Full Frame) @ 12 bit		
Pixel Formats	BayerRG8, BayerRG10, BayerRG12, BayerRG12p Mono8, Mono10, Mono12, Mono12p, RGB8, BGR8		
Partial Scan	True Partial Scan with increasing Frame Rate on Y direction, Region of Interest (ROI) arbitrary Width: minimum 64, increment 32 Height: minimum 2, increment 2		
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		

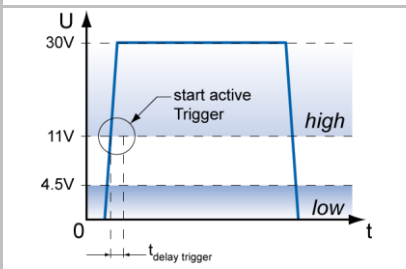
Image Pre-Processing

Analog Controls	Exposure Time (1 µsec ... 60 sec Step Size 1 µsec) Gain (0...48 dB), Offset (0 ... 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, Raw Bayer, RGB and BGR
Color Processing	Integrated color processor with superb quality (5x5)
Color Enhancement	Color Transformation to sRGB color space by optimized Matrix for 3000 K, 5000 K, 6500 K, 9500 K Lightsource or User defined Matrix
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	Edge sharpening and noise reduction
HDR	-
Image Compression	-

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 treadout: ¹⁾ 99 µsec @ 8 bit 98 µsec @ 10 bit 109 µsec @ 12 bit max. Trigger Delay during treadout: ¹⁾ 99 µsec @ 8 bit 98 µsec @ 10 bit 109 µsec @ 12 bit
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
External Flash Sync	via Exposure Active $t_{\text{delay flash}} \leq 1 \mu\text{sec}$, $t_{\text{duration}} = t_{\text{exposure}}$
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 (reserved for future use)
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

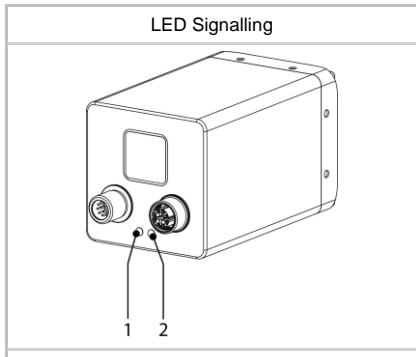
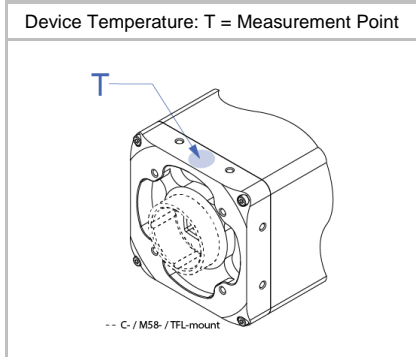
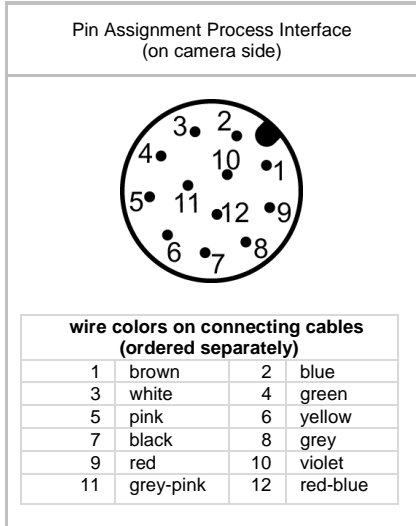
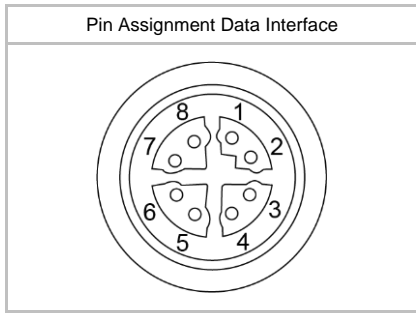
Image Buffer	1024 MB 127 Images (Trigger Mode) / 1 Image (Free Running Mode)
Non-volatile Memory	128 kb

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, FrameTranferSkipped, Error, GigE VisionHeartbeatTimeOut, Line0..3 FallingEdge, Line0..3 RisingEdge, PrimaryApplicationSwitch, TransferBufferFull, TransferBufferReady, TriggerOverlapped, TriggerReady, TriggerSkipped
Action CMD	yes, Action 1 for Trigger
Frame Counter	up to 2 ³²
Payload Size	0 ... 24196848 Byte
Timestamp	64 bit, resolution in nsec, increment = 8
Packet Delay	0 .. 2 ³² - 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)	Connector:	6 pin (JST BM06B-SRSS-TB)	
	Assignment:	1 - Power (lens)	2 - GND (lens)
		2 - UART RxD	4 - UART TxD
		5 - NC	6 - NC

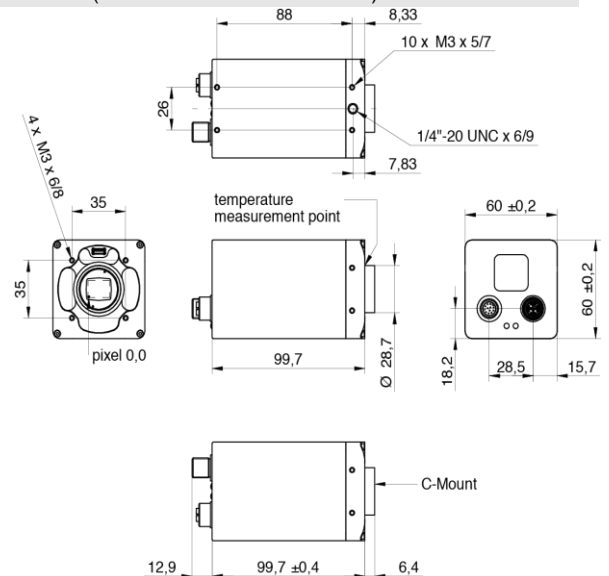
Optical Data

Lens Mount	C-Mount
Optical Filter	IR cut filter

Mechanical Data

Housing	aluminum, hard anodized, IP40 (with mounted lens and 10 GigE cable) IP65/67 (with mounted tube and cable)
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Dimensions



Weight	485 g
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Environmental Data

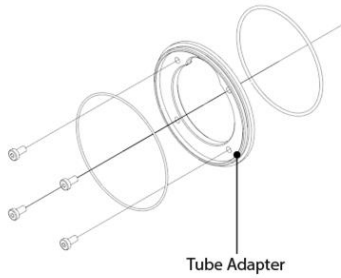
Storage Temperature	-10 °C ... + 70 °C
Operating Temperature	0 °C ... +60 °C @ T = Measurement Point or *) 0 °C ... +69 °C @ internal Temperature Sensor Ambient temperature above 26 °C requires heat dissipation measures.
Int. Temperature Sensor	yes, accuracy: ±2 °C (typ) -40 °C ... 0 °C ±1 °C (typ) 0 °C ... +85 °C
Humidity	10 % ... 90 % non-condensing

*) the maximum temperature for Sony sensor characteristics (sensor performance) are guaranteed up to 50°C @ Measurement Point or 55°C @ internal temperature sensor

LED Signaling

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

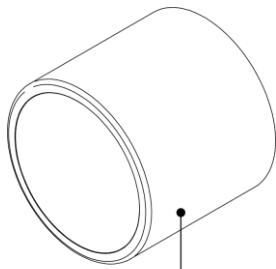
Optional accessories for IP65/67 protection (ordered separately)



Tube Adapter

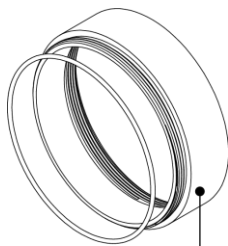
including seals and screws

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.)	VCC: 24 V DC ± 20% I: 454 mA
Power over Ethernet	NA
Power Consumption	approx. 10.9 W @ 24VDC and 150 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 (reserved for future use)	RS232 compatible, not optically isolated Baud Rate: up to 115200, data bits: 8, stop bits: 1, Parity: none, flow control: none
Liquid lens control	Support for Corning (Varioptic) Caspian C-39N0 series (C-C-39N0-160-R33, C-C-39N0-250-R33, up to 2/3") VCC: 5 V DC ± 20% , I: 100 mA, UART 3.3 V

Conformity

Conformity	CE, RoHS, REACH, UL recognized
KC Registration No. / Date	- / -
MTBF	26 years @ T = 45 °C / 17 years @ T = 60 °C T = Measurement Point

GenICam™ Features

Short Exposure Range	yes, ShortExposureTimeEnable Short Exposure Range 1 µsec ... 60 sec Default Exposure Range 6 µsec ... 60 sec
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 paths 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 8.2 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	BayerRG8
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 ²⁾
Full HD	1920 x 1080	440	440
SXGA	1280 x 1024	459	459
XGA	1024 x 768	568	568
SVGA	800 x 600	677	677
VGA	640 x 480	784	784
CIF	352 x 288	1057	1057
QCIF	176 x 144	1412	1412
Full Line	2848 x 2048	259	244
	2848 x 1024	459	459
	2848 x 512	753	753
	2848 x 256	1119	1119
	2848 x 128	1466	1466
	2848 x 64	1736	1736
	2848 x 32	1912	1912
	2848 x 16	2016	2016
	2848 x 8	2016	2016
	2848 x 4	2016	2016
2848 x 2	2016	2016	
2848 x 1	-	-	

²⁾ depends on the used interface speed