

Sensor Information

| | |
|------------|----------------------------|
| Model Name | Sony IMX304 |
| Type | 1.1" progressive scan CMOS |
| Shutter | Global Shutter |
| Resolution | 4096 × 3000 pixels |
| Scan Area | 14.13 mm x 10.06 mm |
| Pixel Size | 3.45 μm x 3.45 μm |

Data Quality

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

| | |
|---------------------------|------------------------|
| Dark Noise (σ) | 2 e- typical |
| Saturation | 9500 e- typical |
| Dynamic Range | 71 dB typical |
| SNR | 40 dB typical |
| Quantum efficiency η | 67,3% @ 536 nm typical |

Acquisition

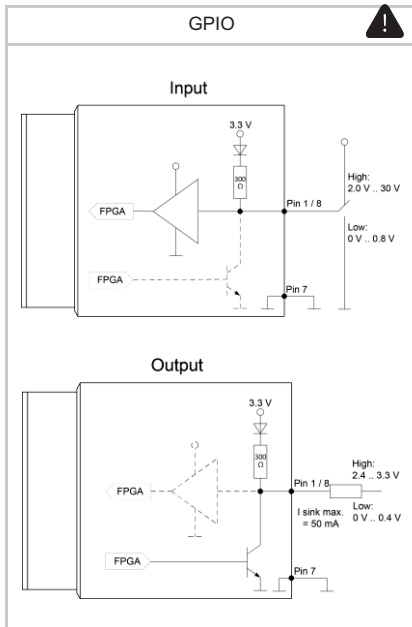
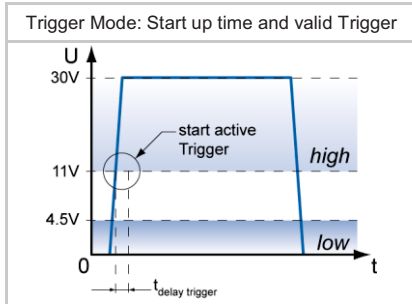
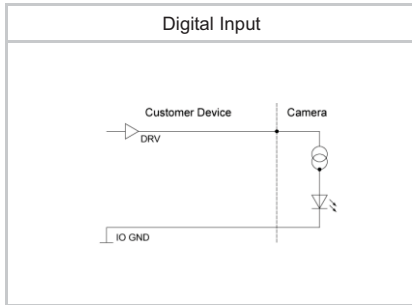
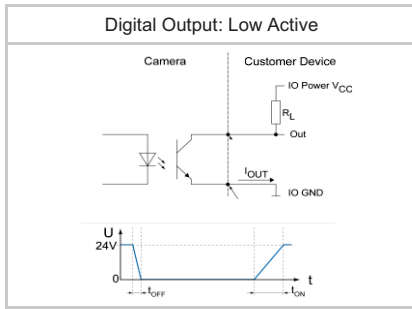
| | | | |
|---|--|-------------|---|
| Resolution | 4096 px x 3000 px | | |
| Interface Frame Rate (depends on used interface performance) | Format | Resolution | max. Frame Rate (@ Trigger Mode) ²⁾ |
| | Full Frame | 4096 x 3000 | 9 fps |
| | Binning 2x2 | 2048 x 1500 | 15 fps |
| | Binning 2x1 | 2048 x 3000 | 15 fps |
| | Binning 1x2 | 4096 x 1500 | 15 fps |
| Acquisition Frame Rate ¹⁾ (Burst Mode) | 15 fps $t_{\text{readout}} = 65.8 \text{ msec}$ (max. Res. Full Frame) @ 12 bit | | |
| 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 16, increment 16 Height: minimum 2, increment 2 | | |
| Adjustable Acquisition Frame Rate | Off or Off or 0,01 ... 829 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) |
| Gamma Correction | Gamma (0.1 ... 2 available if LUT is enabled) |
| LUT | Luminance (12 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 | - |

¹⁾ Sensor readout, different from pixel format

²⁾ depends on the used interface



¹⁾ Sensor readout, different from pixel format

Process Synchronization

| | |
|----------------------|--|
| Trigger Mode | Off (Free Running), On (Trigger) |
| Trigger Overlap Type | Readout |
| Trigger Sources | Hardware (Line0,1,2), Software, All, ActionCMD (Action 1) or Off fixed Trigger Delay out of t _{readout} : ¹⁾ 97,7 µsec @ 12 bit max. Trigger Delay during t _{readout} : ¹⁾ 114,1 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} ≤ 3 µsec, t _{duration} = t _{exposure} |

Digital I/Os

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

Memory

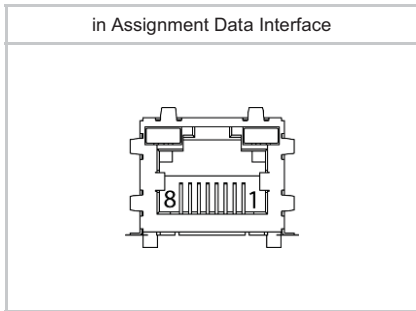
| | |
|---------------------|--|
| Image Buffer | 36 MB 1 Images (Trigger Mode) / 1 Image (Free Running Mode) |
| Non-volatile Memory | 128 kb |

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 |

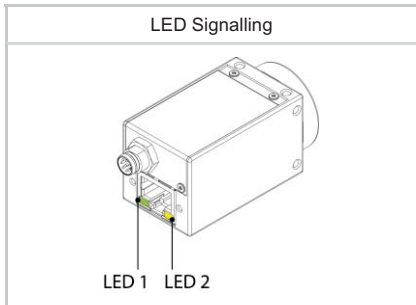
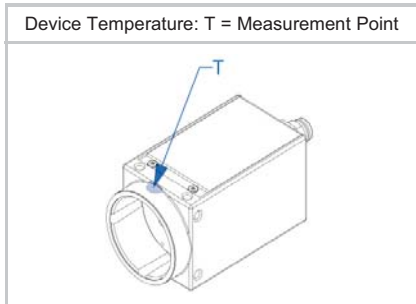
GigE Vision® Features

| | |
|---|--|
| Events | DeviceTemperatureStatusChanged, EventLost, ExposureEnd, ExposureStart, FrameEnd, FrameStart, FrameTransferSkipped, Error, GigE VisionHeartbeatTimeOut, Line0..3 FallingEdge, Line0..3 RisingEdge, PrimaryApplicationSwitch, 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 ... 24576200 Byte |
| Timestamp | 64 bit, resolution in nsec, increment = 8 |
| Packet Delay | 0 .. 2 ³² - 1 nsec |
| Packet Resend | Resend Buffer: 47 MB (2 Images) |
| GigE Vision | v2.0 (v1.2 backward compatible) |



Pin Assignment Process Interface (on camera side)

| wire colors on connecting cables (ordered separately) | | | |
|---|--------|---|------|
| 1 | White | 5 | Grey |
| 2 | Brown | 6 | Pink |
| 3 | Green | 7 | Blue |
| 4 | Yellow | 8 | Red |



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 | Assignment: | 1 - MX1+ | 2 - MX1- |
| | | 3 - MX2+ | 4 - MX3+ |
| | | 5 - MX3- | 6 - MX2- |
| | | 7 - MX4+ | 8 - MX4- |
| | 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.

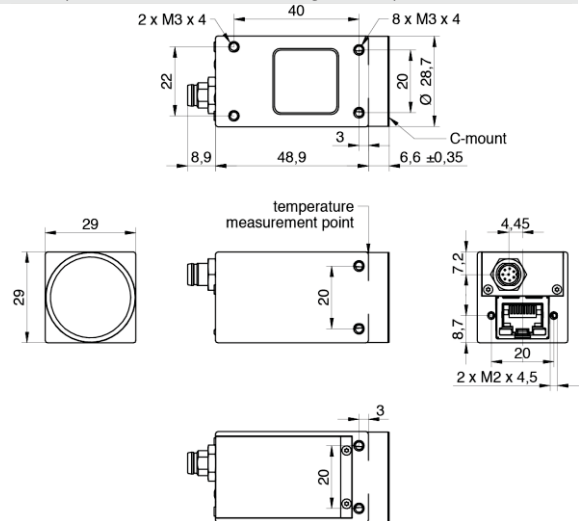
Optical Data

| | |
|----------------|---------|
| Lens Mount | C-Mount |
| Optical Filter | - |

Mechanical Data

| | |
|---------|---|
| Housing | Zinc die casting, nickel-chrome-plated, IP40 (with mounted lens and GigE cable) |
|---------|---|

Dimensions



| | |
|--------|-------|
| Weight | 120 g |
|--------|-------|

Environmental Data


| | |
|-----------------------|---|
| Storage Temperature | -10 °C ... + 70 °C |
| Operating Temperature | +5 °C ... +65 °C @ T = Measurement Point or *) +5 °C ... +75 °C @ internal Temperature Sensor 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 |

*) the maximum temperature for Sony sensor characteristics (sensor performance) are guaranteed up to 53°C @ Measurement Point or 60°C @ internal temperature sensor

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 \pm 20% I: 120 ... 242 mA |
| Power over Ethernet | Class 1 device VCC: 36 ... 57 V DC I: 73 mA @ 48 VDC |
| Power Consumption | approx. 2.9 W @ 12VDC and 9 fps approx. 3.5 W @ 48 VDC (PoE) and 9 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 μ sec |
| Digital Output | Optocoupler U_{EXT} : 5 ... 30 V DC I_{OUT} : max. 50 mA t_{ON} = typ. 3 μ sec t_{OFF} = typ. 40 μ 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 μ 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 |
| KC Registration No. / Date | MSIP-REI-BkR-VCXG-124M / 02.05.2017 |
| MTBF | 51 years @ T = 45 °C / 33 years @ T = 60 °C T = Measurement Point |

GenICam™ Features

| | |
|----------------------|--|
| Short Exposure Range | yes, ShortExposureTimeEnable Short Exposure Range 1 μ sec ... 60 sec Default Exposure Range 15 μ sec ... 60 sec |
| Timer | Timer Selector: Timer 1 TimerTriggerSource: Line0, SoftwareTrigger, ExposureStart, ExposureEnd, FrameTransferSkipped, TriggerSkipped, Action 1 and Off TimerDelay: 0 μ sec ... 2 sec, Step Size: 1 μ sec TimerDuration: 4 μ sec ... 2 sec, Step Size: 1 μ sec |
| 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 65.8 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 |
| SFNC Version | v2.3 |

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, 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 or BayerRG8

| | Resolution | max. fps acquisition | max. fps interface ²⁾ |
|----------|-------------|----------------------|----------------------------------|
| UHD (4K) | 3840 x 2160 | 20 | 14 |
| Full HD | 1920 x 1080 | 40 | 40 |
| SXGA | 1280 x 1024 | 43 | 43 |
| XGA | 1024 x 768 | 56 | 56 |
| SVGA | 800 x 600 | 70 | 70 |
| VGA | 640 x 480 | 86 | 86 |
| CIF | 352 x 288 | 135 | 135 |
| QCIF | 176 x 144 | 232 | 232 |
| LineScan | 4096 x 2048 | 22 | 15 |
| | 4096 x 1024 | 43 | 29 |
| | 4096 x 512 | 81 | 59 |
| | 4096 x 256 | 149 | 117 |
| | 4096 x 128 | 253 | 236 |
| | 4096 x 64 | 388 | 388 |
| | 4096 x 32 | 531 | 531 |
| | 4096 x 16 | 649 | 649 |
| | 4096 x 8 | 731 | 731 |
| | 4096 x 4 | 780 | 780 |
| | 4096 x 2 | 808 | 808 |
| | 4096 x 1 | - | - |

²⁾ depends on the used interface

Distribution in the UK & Ireland



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