

Sensor Information

| | |
|------------|---|
| Model Name | Sony IMX250 |
| Type | 2/3" progressive scan CMOS |
| Shutter | Global Shutter |
| Resolution | 2448 x 2048 pixels |
| Scan Area | 8.44 mm x 7.06 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 | 2448 px x 2048 px | | |
| Interface Frame Rate (depends on used interface performance) | Format | Resolution | max. Frame Rate (@ Trigger Mode) ²⁾ |
| | Full Frame | 2448 x 2048 | 73 fps |
| | Binning 2x2 | 1224 x 1024 | 77 fps |
| | Binning 2x1 | 1224 x 2048 | 77 fps |
| | Binning 1x2 | 2448 x 1024 | 77 fps |
| Acquisition Frame Rate ¹⁾ | 77 fps $t_{\text{readout}} = 13$ msec (max. Res. Full Frame) @ 10 bit | | |
| | 68 fps $t_{\text{readout}} = 14.6$ 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 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 | | |

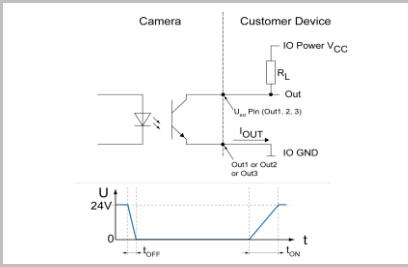
Image Pre-Processing

| | |
|-------------------|--|
| 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 |
| Gamma Correction | Gamma (0.1 ... 2 available if LUT is enabled) |
| LUT | Luminance (12 bit) |
| Color Models | Mono |
| Color Processing | - |
| Color Enhancement | - |

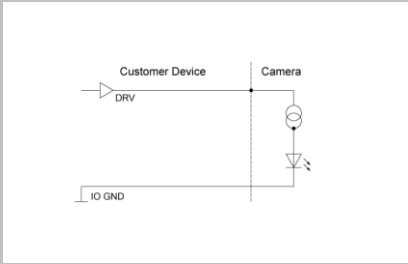
¹⁾ Sensor readout, different from pixel format

²⁾ depends on the used interface

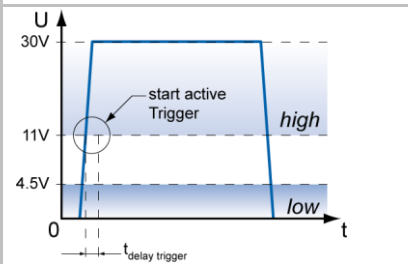
Digital Output: Low Active



Digital Input



Trigger Mode: Start up time and valid Trigger



GPIO

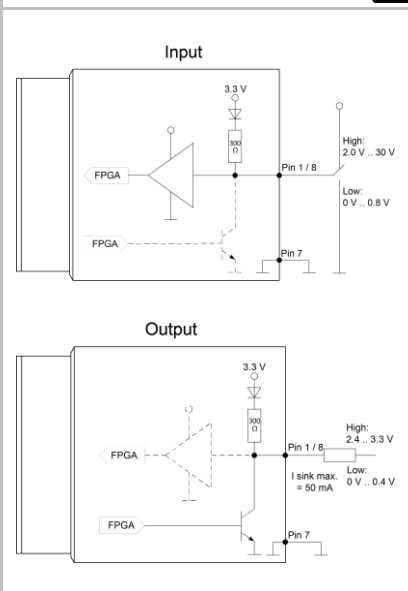


Image Pre-Processing

| | |
|-------------------------|--|
| 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 | - |

Process Synchronization

| | |
|----------------------|---|
| Trigger Mode | Off (Free Running), On (Trigger) |
| Trigger Overlap Type | Readout |
| Trigger Sources | Hardware (Line0, 1, 2), Software, Counter 1, 2 End, All or Off fixed Trigger Delay out of t _{readout} : ¹⁾ 51,8 µsec @ 10 bit 53,9 µsec @ 12 bit max. Trigger Delay during t _{readout} : ¹⁾ 52,8 µsec @ 10 bit 55,9 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} |
| Encoder Function | yes, via Counter and Trigger Source |
| PTP Function | - |

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

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|---------------------|--|
| Image Buffer | 445 MB 31 Images (Trigger Mode) / 1 Image (Free Running Mode) |
| Non-volatile Memory | 128 kb |

Interface Data

| | |
|----------------------------|-------------------------|
| Interface | USB3.0 (5000 Mbits/sec) |
| USB Vendor ID / Product ID | 0x2825 / 0x12A |

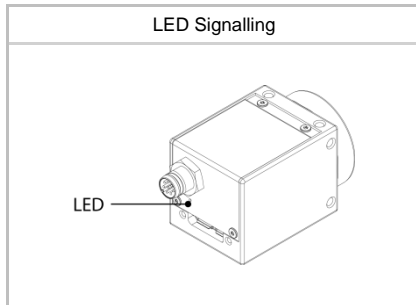
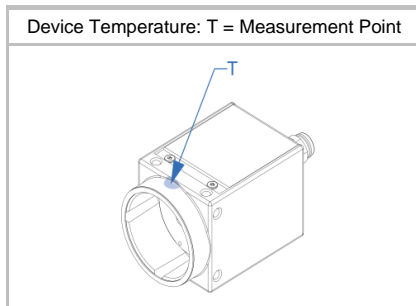
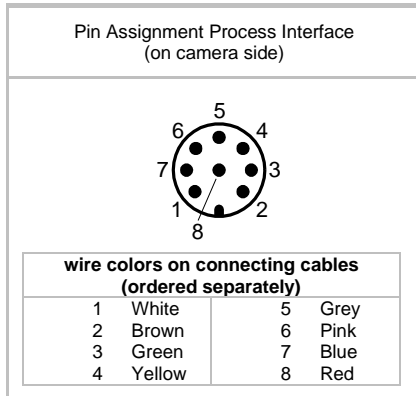
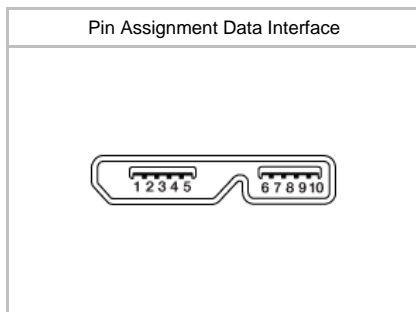
USB 3 Vision® Features

| | |
|---|--|
| Events Transmission via Asynchronous Message Channel | DeviceTemperatureStatusChanged, EventLost, ExposureEnd, ExposureStart, FrameEnd, FrameStart, FrameTransferSkipped, Line0..2 FallingEdge, Line0..2 RisingEdge, TransferBufferFull, TransferBufferReady, TriggerOverlapped, TriggerReady, TriggerSkipped |
| Frame Counter | up to 2 ³² |
| Payload Size | 0 ... 10027232 Byte |
| Timestamp | 64 bit |
| USB Vision | v1.0.1 |

Interfaces and Connectors

| | | |
|--------------------------|---|--|
| Data and Power Interface | USB 3.0 Transfer Rate 5000 Mbits/sec | USB 2.0 Transfer Rate 480 Mbits/sec |
| Connector: | USB 3.0 Micro B | |
| Pin Assignment: | 1 - VBUS 2 - D- 3 - D+ 4 - ID 5 - GND | 6 - MicB_SSTX- 7 - MicB_SSTX+ 8 - GND_DRAIN 9 - MicB_SSRX- 10 - MicB_SSRX+ |

¹⁾ Sensor readout, different from pixel format



Interfaces and Connectors

| | | |
|-------------------|-------------|---|
| Process Interface | Connector: | M8/8-pin (SACC-DSI-M8MS-8CON-M8-L180) |
| | Assignment: | 1 - GPIO (Line2) 5 - Power VCC OUT1 2 - not connected 6 - OUT1 (Line3) 3 - IN1 (Line0) 7 - GND GPIO 4 - GND IN1 8 - GPIO (Line1) |

Caution



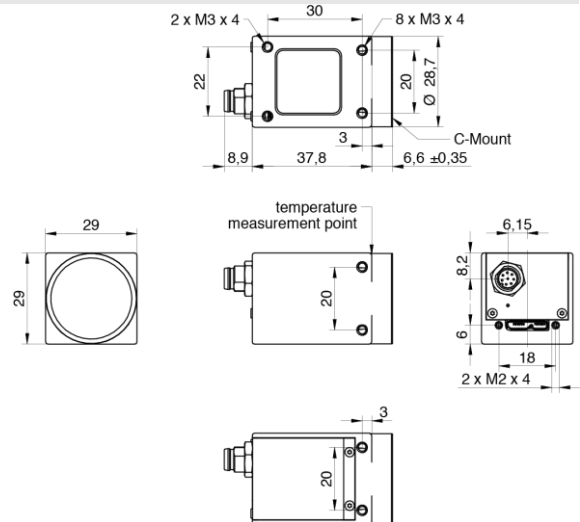
* Note GPIOs: Ground loops are to be avoided and can lead to destruction of the device.

Optical Data

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

Mechanical Data

| | |
|------------------|--|
| Housing | Zinc die casting, nickel-chrome-plated, IP40 (with mounted lens and USB 3.0 cable) |
| Protection Class | IP40 (with mounted lens and USB 3.0 cable) |
| Weight | 90 g |
| Dimensions | |



Environmental Data


| | |
|-------------------------|--|
| Storage Temperature | -10 °C ... + 70 °C |
| Operating Temperature | 0 °C ... +65 °C @ T = Measurement Point or 0 °C ... +72 °C @ internal Temperature Sensor) |
| 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 56 °C @ internal temperature sensor

LED Signalling

| | | |
|-----|-------------|------------------------------|
| LED | Green flash | Power on, no link active |
| | Green | Link active USB 3.0 |
| | Red | Error or Link active USB 2.0 |
| | Yellow | Sensor Readout activity |
| | Red flash | Update |

Electrical Data

| | |
|---|---|
| Power Supply | bus powered via USB3.0 interface |
| Power Consumption | approx. 3.4 W @ 73 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, EAC |
| KC Registration No. / Date | MSIP-REI-BkR-VCXU-50M / 28.04.2017 |
| MTBF | 56 years @ T = 45 °C / 36 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 Selector: Timer 1 TimerTriggerSource: Line0, SoftwareTrigger, ExposureStart, ExposureEnd, FrameTransferSkipped, TriggerSkipped, 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, Line0..2 and Off Counter Reset Source: Counter1End, Counter2End, Line0..2 |
| 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 |

GenICam™ Features

| | |
|------------------------------|--|
| User Sets | Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 Parameters: any user definable Parameter |
| Acquisition Abort | Delay up to 14.6 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 |
| SFNC Version | v2.4 |

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 (monochrome camera) or BayerRG8 (color camera)

| | Resolution | max. fps acquisition | max. fps interface ²⁾ |
|----------|-------------|----------------------|----------------------------------|
| Full HD | 1920 x 1080 | 143 | 143 |
| SXGA | 1280 x 1024 | 151 | 151 |
| HD720 | 1280 x 720 | 211 | 211 |
| XGA | 1024 x 768 | 198 | 198 |
| SVGA | 800 x 600 | 251 | 251 |
| VGA | 640 x 480 | 308 | 308 |
| CIF | 352 x 288 | 488 | 488 |
| QVGA | 320 x 240 | 571 | 571 |
| QCIF | 176 x 144 | 866 | 866 |
| LineScan | 2448 x 2048 | 77 | 77 |
| | 2448 x 1024 | 151 | 151 |
| | 2448 x 512 | 290 | 290 |
| | 2448 x 256 | 540 | 540 |
| | 2448 x 128 | 948 | 948 |
| | 2448 x 64 | 1522 | 1522 |
| | 2448 x 32 | 2182 | 2182 |
| | 2448 x 16 | 2786 | 2786 |
| | 2448 x 8 | 3233 | 3233 |
| | 2448 x 4 | 3515 | 3515 |
| | 2448 x 2 | 3676 | 3676 |
| 2448 x 1 | 3761 | 3761 | |

²⁾ depends on the used interface