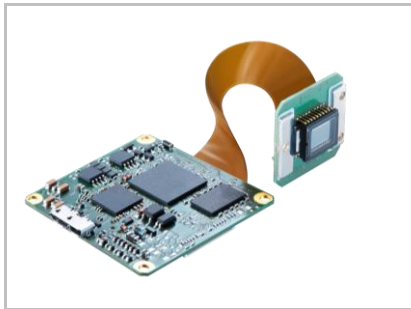


MXUC40.2 Art. No. 11115782

Technical Data

Digital Monochrome Matrix Camera Module, USB 3.0



Sensor Information

Model Name	CMOSIS CMV-4000 (version 3)
Type	1" progressive scan CMOS
Shutter	Global
Native Resolution	2044 x 2044 pixels
Scan Area	11.24 mm x 11.24 mm
Pixel Size	5.5 μm x 5.5 μm

Data Quality

@ 20 °C, gain = 1, exposure time = 32 msec

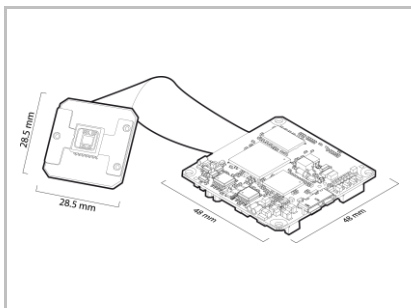
Readout Noise (σ)	0.3 LSB @ 8 bit, 4.5 LSB @ 12 bit (typical)
Dynamic Range	60 dB (typical)

Acquisition Formats

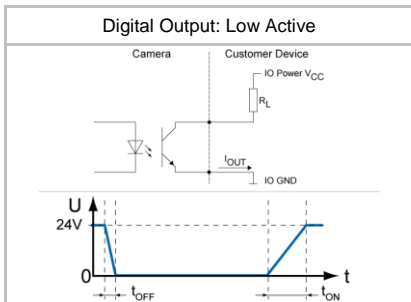
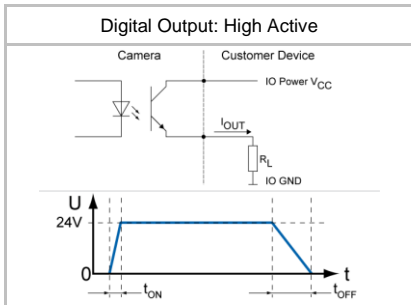
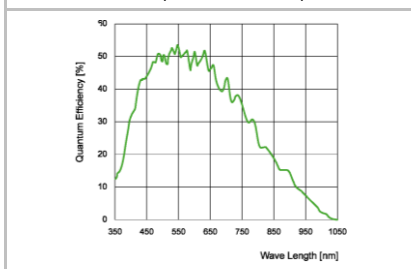
Image Formats	Format	Resolution	Frame Rate	t_{readout}
	Full Frame	2044 x 2044	29 fps	34 msec
Pixel Formats	Mono8, Mono12, Mono12p			
Partial Scan	True Partial Scan, Region of Interest (ROI) arbitrary			

Image Pre-Processing

Analog Controls	Exposure Time (20 μsec ... 1 sec Step Size 1 μsec) Gain (0 ... 18 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 Tolerance	Only on Color Cameras
Color Processing	Only on Color Cameras
Color Adjustment	Only on Color Cameras
Binning Horizontal	1 or 2
Binning Vertical	1 or 2
Image Flipping	Horizontal, vertical
Defect Pixel Correction	via Defect Pixel List with up to 255 Pixel Coordinates



Sensor Graph: Relative Response

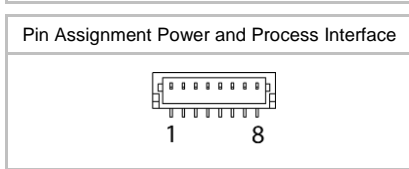
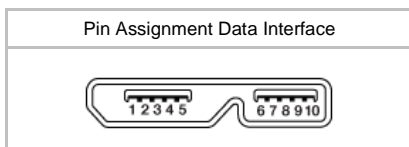
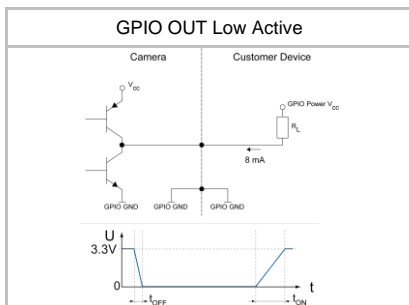
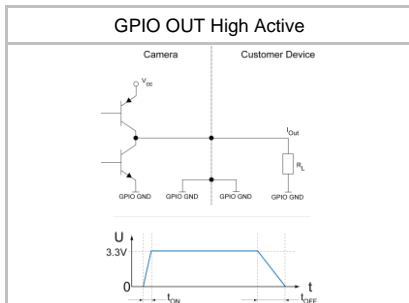
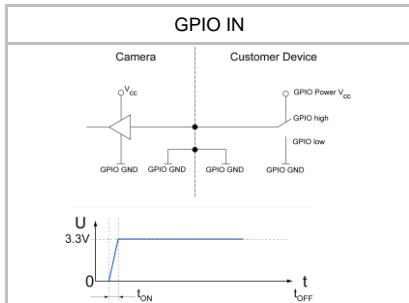
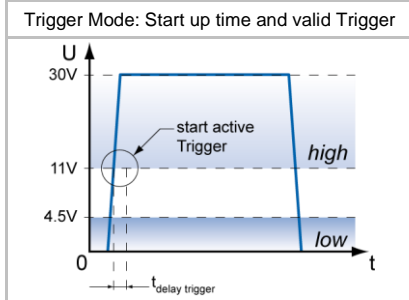
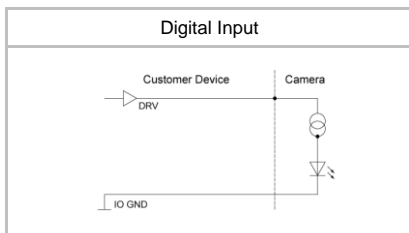


Process Synchronization

Modes	Free Running, Trigger
Free Running	Continuous or Adjustable Acquisition Frame Rate (0,01 ... 9000Hz)
Trigger Sources	Hardware, Software, All or Off
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
Sequencer Characteristics	up to 128 sets of parameters, up to 65536 loop passes, up to 65536 repetitions of sets of parameters, up to 65536 images per trigger event
Sequencer Parameters	Exposure Time, Gain Factor, Output Line, ROI Offset x, ROI offset y
External Flash Sync	via Exposure Active $t_{\text{delay flash}} \leq 3 \mu\text{sec}$, $t_{\text{duration}} = t_{\text{exposure}} + 18 \mu\text{sec}$

Digital I/Os

Lines	Input: Line 0, Output: Line3, GPIO: Line 1, Line 2
Circuit Times	Digital Output: $t_{\text{ON}} = \text{typ. } 3 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 40 \mu\text{sec}$ GPIO: $t_{\text{ON}} = \text{typ. } 1.6 \text{ nsec}$ $t_{\text{OFF}} = \text{typ. } 3 \text{ nsec}$
Output Sources	Off, ExposureActive, Line 0, Timer1 ... 3, ReadoutActive, User0 ... 2, TriggerReady, TriggerOverlapped, TriggerSkipped, Sequencer Output 0 ... 2
Line Debouncer	Low and high signal separately selectable Debouncing Time 0 ... 5 msec, Step Size: 1 μsec



Interfaces and Connectors

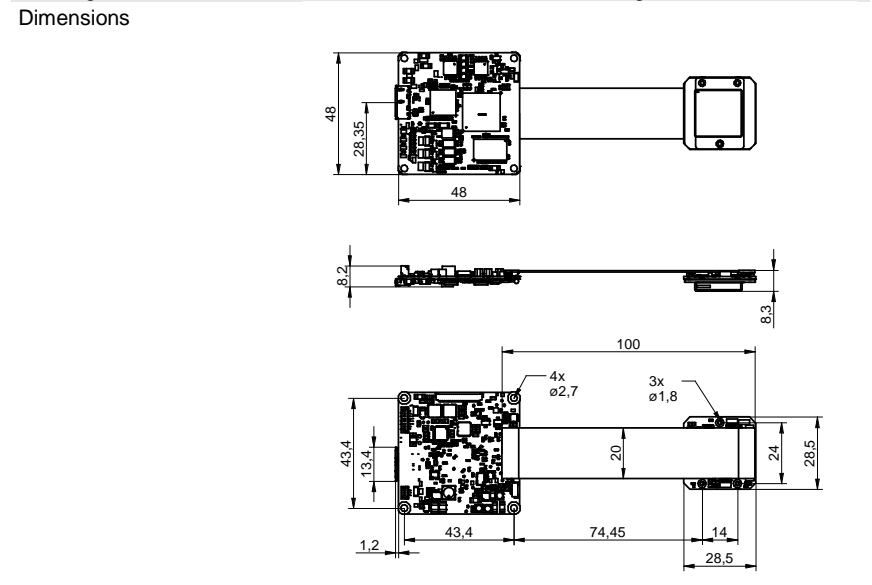
Data Interface	USB 3.0	Transfer Rate	5000 Mbits/sec
	Connector:	USB 3.0 Micro B	
Pin Assignment:	1 – VBUS	6 – MicB_SSTX-	
	2 – D-	7 – MicB_SSTX+	
	3 – D+	8 – GND_DRAIN	
	4 – ID	9 – MicB_SSRX-	
	5 – GND	10 – MicB_SSRX+	

Process Interface	Connector:	JST BM08B-SRSS-TB	
	Assignment:	1 – Shielding	5 – GPIO1*
		2 – IN1	6 – GPIO2*
		3 – IO GND	7 – IO Power VCC
		4 – OUT 1	8 – GPIO_GND

Caution * The GPIO's are configured as input by default camera settings. They must be connected to GPIO_GND if not used or not configured as output.

Mechanical Data

Housing	Board Level Module without Housing
---------	------------------------------------



Weight	23 g (without Optics Adapter)
--------	-------------------------------

Optical Data

Lens Mount	C-Mount (Adapter), S-Mount (Adapter)
Optical Filter	Dust Protection Glass

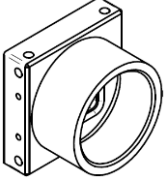
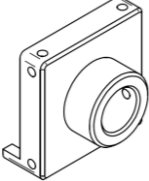
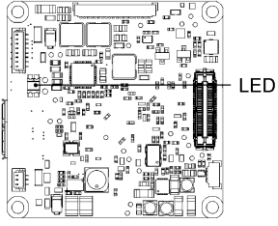
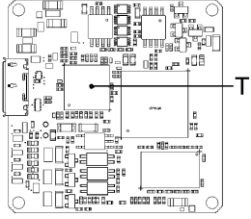
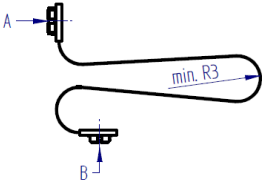


Electrical Data

Power Supply	via USB3.0 interface	
Power Consumption	approx. 2.6 W @ 29 fps	
Digital Input	$U_{IN(low)}$	0.0 ... 4.5 VDC
	$U_{IN(high)}$	11.0 ... 30.0 VDC
	I_{IN}	6.0 ... 10 mA
	min. Impulse Length:	2.0 μ sec
	Trigger Delay out of treadout:	1.0 μ sec
	max. Trigger Delay during treadout:	14.0 μ sec

Digital Output	IO Power V_{CC} :	5 ... 30 V DC
	I_{OUT} :	max. 50 mA

GPIO	GPIO Power V_{CC} :	3.3 V DC*
	I_{OUT} :	max. 8 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.

<p>C-Mount Adapter Kit (optional)</p>  <p>Art. No. 11097369 (mono) Art. No. 11097380 (color)</p>
<p>S-Mount Adapter Kit (optional)</p>  <p>Art. No. 11117913 (mono) Art. No. 11117915 (color)</p>
<p>LED Signalling</p> 
<p>Device Temperature: Measurement Points</p> 
<p>Flexprint Cable</p>  <p>Length from A to B = 94 mm</p>
<p>Conformity</p>  

LED Signalling

LED	Green	USB3.0
	Green flash	Transmitting
	Yellow	USB2.0

Environmental Data

Storage Temperature	-10 °C bis +70 °C
Operating Temperature	Depends on the thermal encapsulation
Device Temperature	T _{max} = 80 °C @ Measurement Point
Humidity	10 % ... 90 % non-condensing

Interface Data

Interface	USB3.0	5000 Mbits/sec
Image Buffer	8 Images	
USB Vendor ID / Product ID	0x2825 / 0x0108	

USB3 Vision® Features

Events Transmission via Asynchronous Message Channel	EventLost, EventDiscarded, Line0RisingEdge, Line0FallingEdge, Line1RisingEdge, Line1FallingEdge, Line2RisingEdge, Line2FallingEdge, Line3RisingEdge, Line3FallingEdge, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerReady, TriggerOverlapped, TriggerSkipped
Frame Counter	up to 2 ³²
Payload Size	0 ... 12.534.080 Byte
Timestamp	64 bit
USB3 Vision	v1.0

GeniCam™ Features

Timer	Timer Selector: Timer 1 ... 3 TimerTriggerSource: Line0, SoftwareTrigger, CommandTrigger, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerSkipped, Off TimerDelay: 0 µsec ... 2 sec, Step Size: 1 µsec TimerDuration: 10 µsec ... 2 sec, Step Size: 1 µsec
User Sets	Factory Settings: UserSet0 (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 Parameters: any user definable Parameter
Acquisition Abort	Delay up to 69 msec
SFNC	v2.0

Vendor Specific Features

FPN Correction	
HDR	

Factory Settings after Start-Up

Operation Mode	Free Running
Analog Controls	Exposure Time: 4 msec, Gain: 0 dB, Offset: 0
Pixel Format	Mono8
Partial Scan	Off
Acquisition Frame Rate	Off
Timer	Off
Defect Pixel Correction	On
Digital Input	Line0, invert = false, trigger source = All
Digital Output	Line3, invert = false, line source = Off