



Hardware Manual

VisionCam XM / LM / EB

Version 2.0 – March 2022

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1 Handling and Safety Instructions



Depending on the operating conditions, the housing temperature can exceed 60 °C. There is a risk of injury!



Electrical installation should be executed without power applied to the device and connected devices.



EMC conformity according to EN/IEC 61000-6-2:2005 is qualified for cable lengths ≤ 30 m.



Only open the housing if advised by IMAGO!

→ Warranty void if product is opened without authorization by IMAGO.



Please take special note of the voltage range which may be applied to the device. Otherwise, permanent damage to the device may result!



Due to the characteristics and physical principles inside flash memory, **memory cards have a finite lifetime** dictated by the number of write operations. Therefore, take care of the regular write operations to prevent an early flash damage.

2 Introduction

The heart of the VisionCam is a very powerful dual core ARM Cortex-A15 which brings your application to the next level. We deliver the camera with a modern Debian based Linux OS, which gives the customer the capabilities to use popular programs and libraries. Debian currently provides about 59.000 packages.

The integrated Real-Time Communication Controller (*RTCC*) controls the I/Os. It ensures proper timing of trigger signals without the influence of the Linux OS. IMAGO provides an easy-to-use SDK with software libraries.

There are three models with different sensor types available:

- *VisionCam XM*: Area scan sensor
- *VisionCam LM*: Line scan sensor
- *VisionCam EB*: Event-based sensor

2.1 Main features

- Processor TI Sitara
 - 2× ARM Cortex-A15 1.5 GHz
 - 1 GB DDR3 RAM
- Vision Sensor:
 - CMOS sensors up to 5 Megapixels
 - Line scan sensors up to 8k pixels
 - Event-Based sensor up to 50 million events per second
- Real-Time Communication Controller
 - Controls vision- & automation-specific interfaces
 - Digital in- & outputs
 - Encoder
 - Camera Trigger
 - LED Controller
 - Contains functional units for controlling I/Os in real time:
 - *Trigger unit*: creation of trigger signals, derived from other inputs (e.g. encoder)
 - *I/O Scheduler*: applies values stored in a FIFO to outputs in real time (based on trigger event, encoder position, or timer value)
 - *Multiplexer*: flexible connection of functional units with each other
 - Operates independently from ARM processor and OS
 - Easy-to-use high-level API for C++ and Python
- LED Controller:
 - Up to 2 A per strobe pulse with current regulation
 - Integrated LED ring light
 - Output for external LED light heads
- Digital In- & Outputs:
 - Opto-isolated with adjustable debouncing
 - Status LEDs
- Other Interfaces
 - RS-232 interface
 - Optional RS-422 in- & outputs (e.g. for Encoder)
 - Optional support for Ethernet Fieldbus interfaces
- Storage
 - µSD card, accessible under service hatch (SD, SDHC, SDXC)
- Housing
 - Passive cooling without heat sink
 - IP65 versions available
 - Lens mount options
 - Area scan: C-mount, CS-mount, S-mount and integrated lenses
 - Line scan: M42, L-mount, F-mount or C-mount



2.2 Configurations

	VisionCam XM	VisionCam LM	VisionCam EB
Sensor type	Area Scan	Line Scan	Event-based
Lens mount	C-mount CS-mount S-mount	M42 L-mount, F-mount, C-mount	C-mount
Ethernet	1 Gbit/s - RJ-45 1 Gbit/s - M12 (IP65)	1 Gbit/s - RJ-45	1 Gbit/s - M12 (IP65)
Dig. I/Os	2× IN / 4× OUT	2× IN / 4× OUT	2× IN / 4× OUT
LED ring light	Optional	–	–
RS-232	1×	1×	1×
RS-422	–	3× IN, 3× OUT	–

2.3 Block Diagram

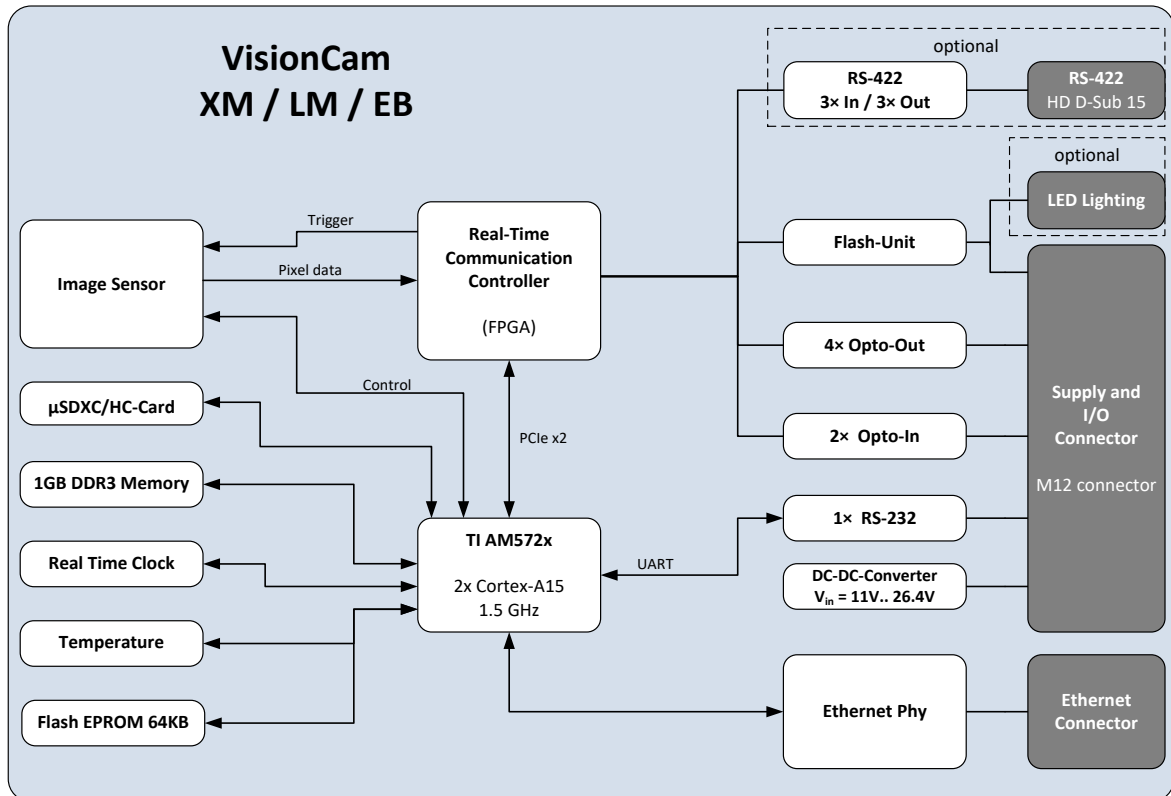


Figure 1: VisionCam structure diagram

3 Technical Data

3.1 Operating Conditions

Power Supply:

Parameter	Min	Typ.	Max	Unit
Supply voltage	11		26.4	V
Supply voltage for use with internal ring light		24		V
Supply current ¹ (@24V)		0.25		A

RS-232:

Parameter	Min	Typ.	Max	Unit
RX signal input range	- 25		25	V
TX output voltage swing ($R_L = 3\text{ k}\Omega$)	± 5	± 5.4		V
Data rate, $R_L = 3\text{ k}\Omega$, $C_L = 1000\text{ pF}$	1200		115200	bps

Digital Input:

Parameter	Min.	Typ.	Max.	Unit
Input voltage range	0		30	V
Input current range (limited by internal circuit)	0		21	mA
Threshold voltage	6		11	V
Threshold current		1	5	mA
Input delay			250	ns

Digital Output:

Parameter	Min.	Typ.	Max.	Unit
Common VCC supply voltage ($V_{CC} - V_{OUT}$)			30	V
Output current, saturated operation: ($V_{CC} - V_{OUT}$) < 1 V			10	mA
Turn-On time (24 V common VCC, 10 mA)		5		μs
Turn-Off time (24 V common VCC, 10 mA)		15		μs

¹ Actual current draw depends on hardware configuration and CPU/system load

Flash (Strobe) Unit:

Parameter	Min	Typ.	Max	Unit
Strobe current range	0.02		2	A
Strobe current step size		10		mA
Continuous current ($V_{\text{Supply}}=24\text{ V}$, $V_{\text{Load}}=20\text{ V}$)			130	mA
Minimum flash duration (2 A)		10		μs
Flash duration step size		1		μs
Turn-on delay (2 A)		8		μs
Turn-on delay (100 mA)		80		μs
Turn-off delay (2 A)		3		μs
Turn-off delay (100 mA)		50		μs

RS-422:

Parameter	Min.	Typ.	Max.	Unit
Receiver differential input threshold	-200		200	mV
Receiver input hysteresis		45		mV
Receiver data rate			10	Mbps
Transmitter differential driver output, $R_L = 100\ \Omega$	2			V
Transmitter differential driver output, open			3.3	V
Transmitter data rate			2	Mbps
5V supply output current			350	mA
12V supply output current			100	mA

Environment:

Parameter	Value
Dimensions	See section 6: Mechanical Drawings
Weight	180 g ... 310 g
Operating temperature	0 °C ... +50 °C
Operating humidity, relative, non-condensing	5 % ... 85 %
Storage temperature	-30 °C ... +70 °C
Storage humidity, relative, non-condensing	5 % ... 95 %
International protection class	IP65 with M12 Ethernet connector, IP20 with RJ45 Ethernet connector

3.2 SoC

The VisionCam uses the TI Sitara AM572x SoC.

TI Sitara AM572x	
CPU	2x ARM Cortex-A15 (32 bit)
CPU frequency	1.5 GHz
Memory	1 GB DDR3

3.3 Storage

The VisionCam uses a microSD card as mass storage device. It is accessible under a service hatch.

The card stores the bootloader, FPGA firmware and the Linux file system.

SD, SDHC and SDXC (> 32 GB) cards are supported. The maximum interface speed supported is UHS-I (104 MB/s).

3.4 Real-Time Clock

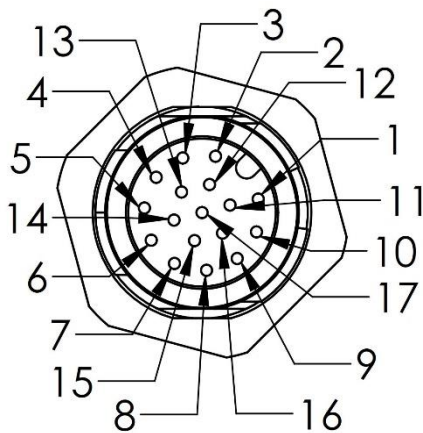
The VisionCam provides a Real-Time Clock which is buffered by a supercapacitor. The capacitor takes about one day of active power supply to charge fully up. Then, it can then supply the clock for about one week.

The time can be adjusted with Linux either manually, by a NTP server on the internet, or by a local NTP server.

4 Interfaces

4.1 Power and I/O connector

A 17-pin M12 A-coded male connector is used for power supply and I/O signals.



Pin Number	Function
1	Power supply GND
2	Power supply (+)
3	RS-232 TX
4	RS-232 RX
5	Digital IN0
6	Digital IN1
7	Digital IN Common GND
8	Digital OUT0
9	Digital OUT1
10	Digital OUT2
11	Digital OUT3
12	Digital OUT Common VCC
13	Reserved
14	Reserved
15	External LED current +
16	External LED current -
17	Reserved

We recommend using shielded cables, for example:

Length	Product	IMAGO order code
1.5 m	Phoenix contact 1430284 "SAC-17P- 1,5-35T/FS SH SCO"	10004440
3 m	Phoenix contact 1430297 "SAC-17P- 3,0-35T/FS SH SCO"	10004441
5 m	Phoenix contact 1430307 "SAC-17P- 5,0-35T/FS SH SCO"	10004442

There are also angled and solder versions available.

4.1.1 Digital I/O

The digital I/O interface provides two opto-isolated inputs and four opto-isolated outputs. The input group is electrically isolated from the output group. Both groups are also isolated from other VisionCam circuits and interfaces.

The following illustration shows the corresponding electrical equivalent circuit:

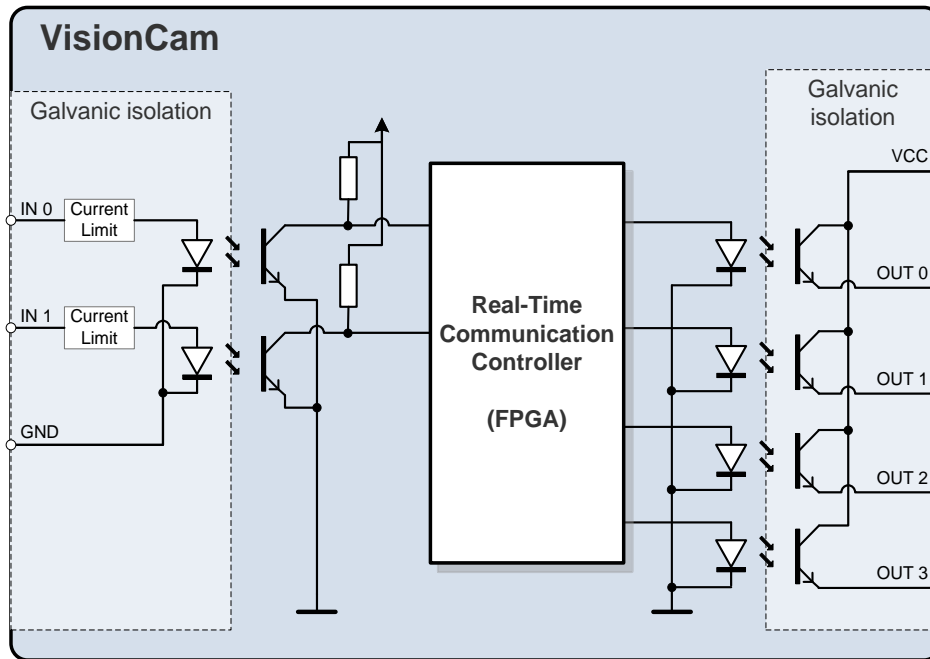


Figure 2: Simplified digital I/O circuit

The input group requires external connection of a shared GND reference.

For the output group, the user must provide a shared supply voltage to the VCC pin. See chapter 4.1 for the connector pinout.

4.1.2 RS-232

The RS-232 interface is normally used as additional console device for Linux. It can also be configured for use by a custom application.

The TX and RX signals use the power supply GND pin 1 as reference potential. Make sure that the remote device uses the same GND reference.

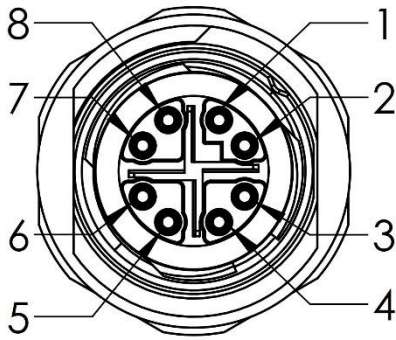
Default settings for the serial interface:

Setting	Value
Baud rate	115200 bps
Parity	None
Data bits	8
Stop bits	1
Flow control	None

Please note that the bootloader U-Boot also uses the serial interface during the boot process. It can be interrupted if a character is received on the RS-232 interface after power-on. The device will then wait for user input and not boot into the OS.

4.2 1 Gbit/s Ethernet M12 (IP65)

This option provides an 8-pin M12 X-coded female connector for Ethernet. It is available for the VisionCam XM and the VisionCam EB.



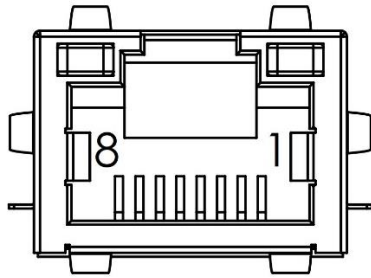
Pin Number	Function
1	D1+
2	D1-
3	D2+
4	D2-
5	D4+
6	D4-
7	D3-
8	D3+

We recommend using shielded cables, for example:

Length	Product	IMAGO order code
1 m	Phoenix contact 1407471 "NBC-MSX/ 1,0-94F/R4AC SCO"	10007049
2 m	Phoenix contact 1407472 "NBC-MSX/ 2,0-94F/R4AC SCO"	10007050
5 m	Phoenix contact 1407473 "NBC-MSX/ 5,0-94F/R4AC SCO"	10008076

4.3 1 Gbit/s Ethernet RJ45 (IP20)

This option provides an 8P8C modular jack (RJ45) for Ethernet. It is available for the VisionCam XM and the VisionCam LM.

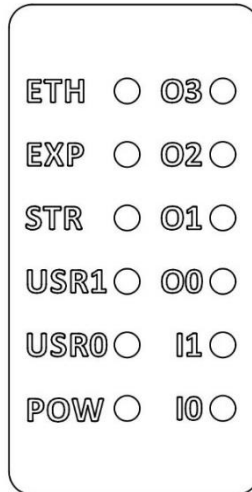


Pin Number	Function
1	D1+
2	D1-
3	D2+
4	D3+
5	D3-
6	D2-
7	D4+
8	D4-

LED	Function
Left	Ethernet activity (blinking)
Right	Link status (up / down)

We recommend using shielded Cat 5e cables.

4.4 Status LEDs



LED	Green	Red / Yellow
ETH ²	Ethernet link is up	Ethernet activity (blinking)
EXP	Sensor exposure active	
STR	Internal strobe active	External strobe output active
USR1	Programmable by SDK (LED 2)	
USR0	Programmable by SDK (LED 0)	Programmable by SDK (LED 1)
POW	Power on, FPGA configured	Power on, FPGA not configured
I0 ... I1	Digital input status	
O0 ... O3	Digital output status	

² The ETH LED is inactive for the RJ45 connector version.

4.6 LED Flash Controller

The LED Flash Controller is designed as a current source. Output current, flash duration and other parameters can be set via software.

The following diagram shows the simplified internal structure for the LED Controller:

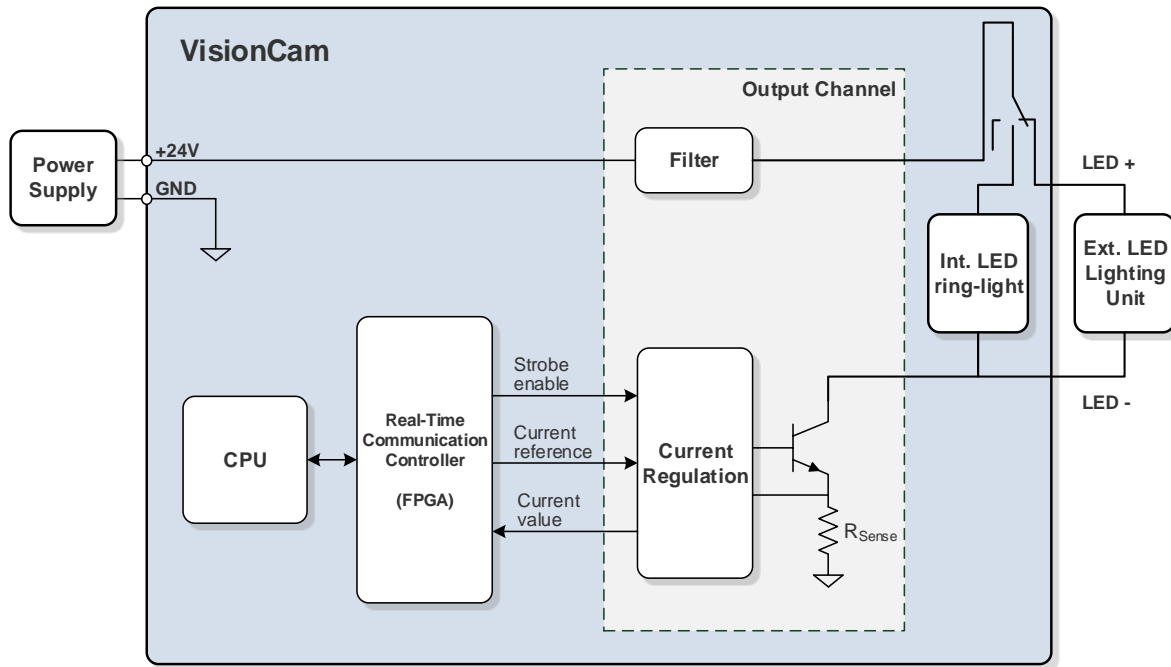


Figure 3: LED Controller structure

The software API allows selection between the internal ring-light (optional) and the external connector. See chapter 4.1 for connector pinout.

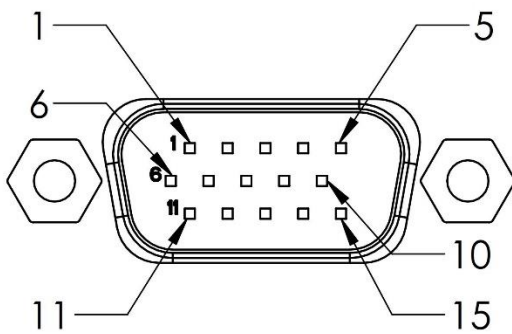
When initializing the strobe controller using the API, the user has to specify a load voltage for the given current value (see `SetLimits()` and `SetFixedCurrent()`). This information is used to protect the internal circuit against overload by increasing the minimum OFF-time or by limiting the current value. If there load voltage is not exactly known, lower values should be used because this provides more protection.

With the internal ring-light, the following load voltages should be used:

Current (mA)	Load voltage (V)
100...499	8
500...999	10
1000...1499	12
1500...1999	15
2000	17

4.7 RS-422

The optional RS-422 interface uses a D-SUB15 HD male connector and provides three input and three output signals. The inputs are typically used with a rotary encoder for example.



Pin	Function
1	In1-
2	In2-
3	Out2-
4	Out1-
5	+5 V
6	GND
7	In1+
8	In2+

Pin	Function
9	Out2+
10	Out1+
11	In0+
12	In0-
13	Out0+
14	Out0-
15	+12 V

Connector pins 5 and 15 provide a 5 V / 12 V power supply for RS-422 encoders. See chapter 3 for current limits.



Do not insert a plug while the device is powered. There is a risk of making a short circuit on the supply output pins with the connector shield.

5 Image Sensors

This chapter will give you a short overview about the available sensors for the VisionCam. On the next pages you will find more detailed information for each sensor.

Area Scan Sensors:

	Aptina WVGA MT9V032M MT9V032C	e2v SXGA EV76C560M EV76C560C	e2v UXGA EV76C570M EV76C570C	ON Semi. NOIP3SN5000A
Optical format	1/3"	1/1.8"	1/1.8"	1.1"
Resolution	752 × 480	1280 × 1024	1600 × 1200	2592 × 2048
Framerate (full resolution)	63 fps	45 fps	39 fps	40 fps
Framerate (VGA)	74 fps	95 fps	92 fps	460 fps
Type	Monochrome or Bayer pattern	Monochrome or Bayer pattern	Monochrome or Bayer pattern	Monochrome or Bayer pattern

Event-Based Sensor:

Prophesee PPS3MVCD	
Optical format	3/4" (12mm diagonal)
Resolution	640 × 480 (VGA)
Event rate (full resolution)	50 million events per second
Pixel size	15 μm × 15 μm

Line Scan Sensors:

	ams Dragster DR-2k-7	ams Dragster DR-4k-7	ams Dragster DR-4k-3.5	ams Dragster DR-8k-3.5
Number of pixels	1 × 2048	1 × 4096	1 × 4096	1 × 8192
Pixel size	7 μm × 7 μm	7 μm × 7 μm	3.5 μm × 3.5 μm	3.5 μm × 3.5 μm
Sensitive length	14.34 mm	28.67 mm	14.34 mm	28.67 mm
Max. line rate	80 kHz	80 kHz	80 kHz	46 kHz
Type	Monochrome	Monochrome	Monochrome	Monochrome

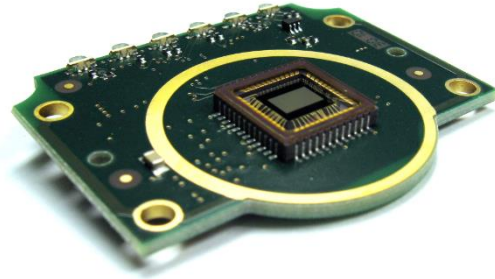
Dual-Line Scan Sensors:

	ams Dragster DR-2x2k-7	ams Dragster DR-2x4k-7	ams Dragster DR-2x2k-7-RGB	ams Dragster DR-2x4k-7-RGB
Number of pixels	2 × 2048	2 × 4096	2 × 2048	2 × 4096
Pixel size	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm
Sensitive length	14.34 mm	28.67 mm	14.34 mm	28.67 mm
Max. scan rate	80 kHz	46 kHz	80 kHz	46 kHz
Type	Monochrome	Monochrome	Bayer filter	Bayer filter

5.1 Aptina WVGA MT9V032M / MT9V032C

Overview:

- Full resolution: 752 x 480
- Up to 63 fps
- Monochrome or RGB Bayer pattern
- Partial scan function (AOI) to increase the frame rate, e.g. ~74 fps @ VGA
- 8-bit or 10-bit image data
- True Global Shutter



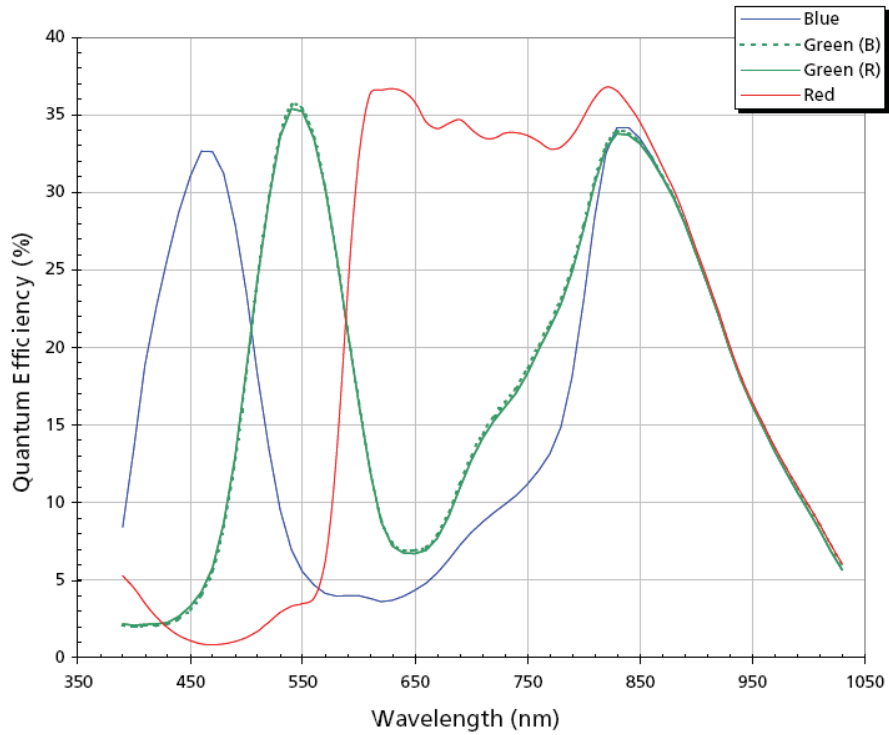
Sensor	Technology	CMOS
	Optical Format	1/3"
	Resolution	752 x 480 pixels
	Framerate (full resolution)	63 fps
	Partial Scan	Yes
	Color	Monochrome or Bayer pattern
	Pixel Size	6.0 μm x 6.0 μm
	Pixel Defects	According to manufacturer's specification

Processing	Pixel Clock	26.6 MHz
	A/D Converter	10-bit or 12-bit with companding
	Exposure	80 μs ... 2 s
	Digital Gain	0.25x ... 3.75x
	Test Image	Yes
	Bayer demosaicing (MT9V032C)	FPGA: 3x 8-bit RGB pixel output

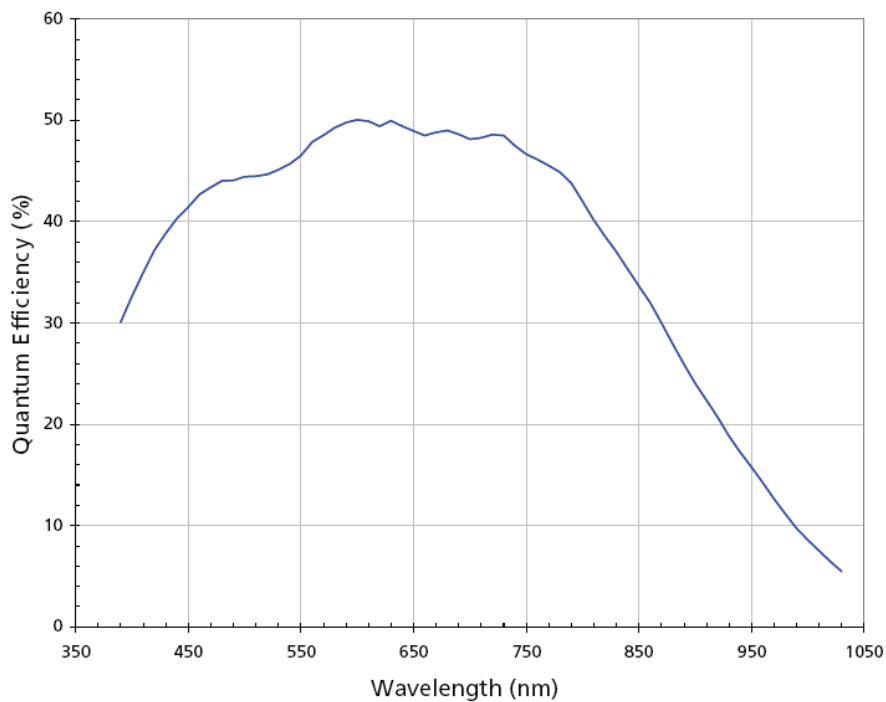
Analog	Sensitivity	572 LSBs / 90 lux (10 bit)
	DSNU	Typ. 2.3 LSBs
	PRNU	Typ. 1.3 %
	Dynamic Range	Typ. 54.4 dB
	SNR	Typ. 37.3 dB

Trigger	Trigger Modes	Free Run, SW-Trigger, HW-Trigger via RTCC
	Trigger Delay	1 μs ... 1 s
	Exposure Indicator output	Yes

Typical Quantum Efficiency – Color Version



Typical Quantum Efficiency – Monochrome Version



5.2 e2v SXGA EV76C560M / EV76C560C

Overview:

- Full resolution: 1280 x 1024
- Up to 45 fps
- Monochrome or RGB Bayer pattern
- Partial scan function (AOI) to increase frame rate, e.g. ~95 fps @ VGA
- 10-bit or 8-bit image data
- True Global Shutter



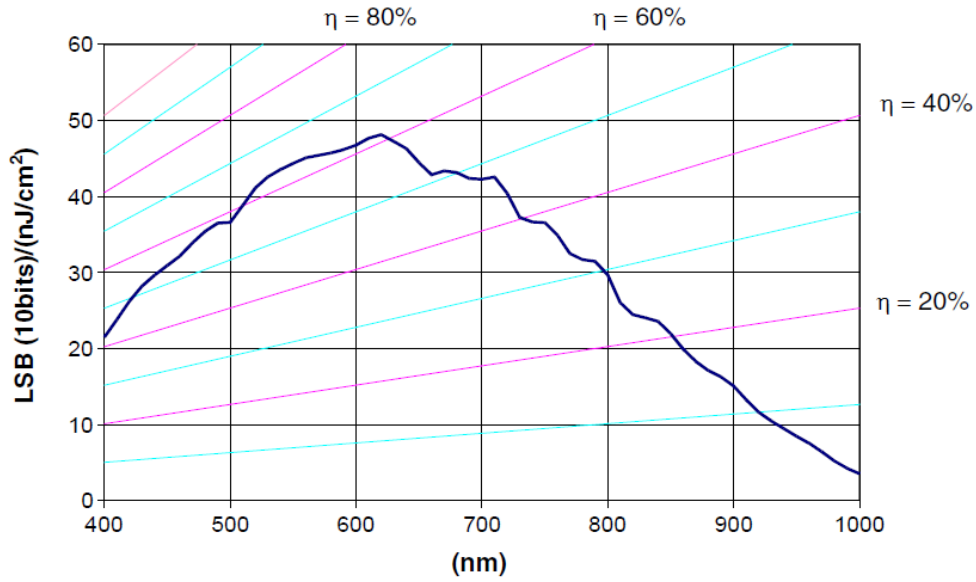
Sensor	Technology	CMOS
	Optical Format	1/1.8"
	Resolution	1280 x 1024
	Framerate (full resolution)	45 fps
	Partial Scan	Yes
	Color	Monochrome or Bayer pattern
	Pixel Size	5.3 μm x 5.3 μm
	Pixel Defects	According to manufacturer's specification

Processing	Pixel Clock	86.45 MHz
	A/D Converter	10-bit
	Exposure	1 μs ... 2 s
	Digital Gain	1x ... 15.875x
	Test Image	Yes
	Bayer demosaicing (EV76C560C)	Yes, 3x 8-bit RGB pixel output

Analog	Black level (Offset)	Yes
	Automatic Black Level Correction with Dark Lines	Yes
	Responsivity	6.4 V / lux-sec
	SNR _{MAX}	41 dB
	Dynamic Range	62 dB

Trigger	Trigger Modes	Free Run, SW-Trigger, HW-Trigger via RTCC
	Trigger Delay	1 μs ... 1 s
	Exposure Indicator Output	Yes

Spectral Response and Quantum Efficiency



5.3 e2v UXGA EV76C570M / EV76C570C

Overview:

- Full resolution: 1600 x 1200
- Up to ~39 fps
- Monochrome or RGB Bayer pattern
- Partial scan function (AOI) to increase frame rate, e.g. ~92 fps @ VGA
- 10-bit or 8-bit image data
- True Global Shutter



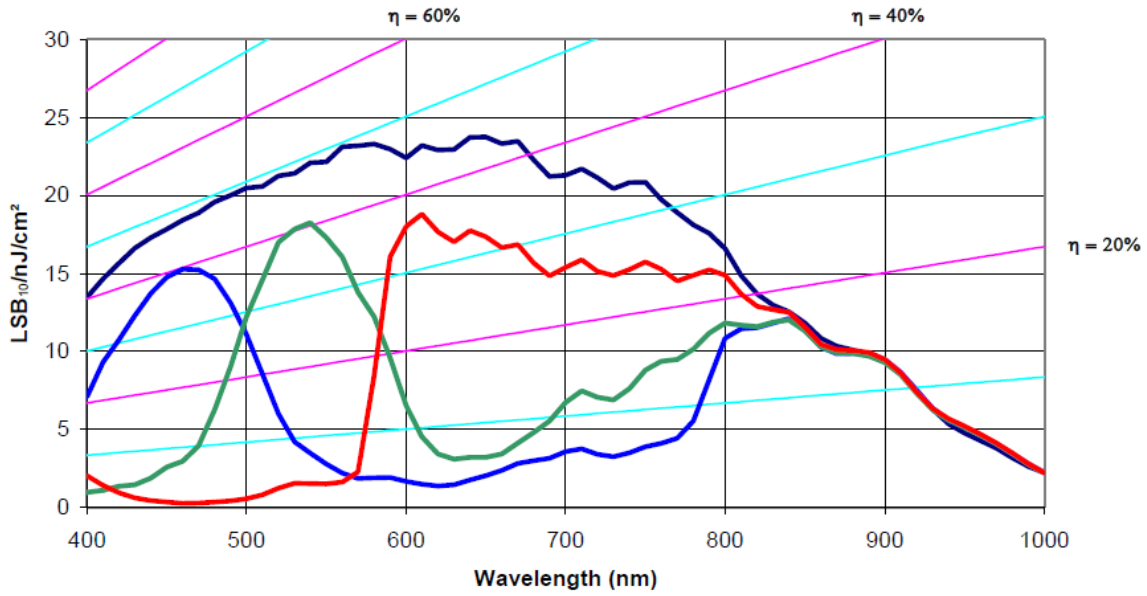
Sensor	Technology	CMOS
	Optical Format	1/1.8"
	Resolution	1600 x 1200
	Framerate (full resolution)	39 fps
	Partial Scan	Yes
	Color	Monochrome or Bayer pattern
	Pixel Size	4.5 μm x 4.5 μm
	Pixel Defects	According to manufacturer's specification

Processing	Pixel Clock	86.45 MHz
	A/D Converter	10-bit
	Exposure	1 μs ... 2 s
	Digital Gain	1x ... 15.875x
	Test Image	Yes
	Bayer demosaicing (EV76C570C)	Yes, 3x 8-bit RGB pixel output

Analog	Black level (Offset)	Yes
	Automatic Black Level Correction with Dark Lines	Yes
	Responsivity	7.4 V / lux-sec
	SNR _{MAX}	41 dB
	Dynamic Range	66 dB

Trigger	Trigger Modes	Free Run, SW-Trigger, HW-Trigger via RTCC
	Trigger Delay	1 μs ... 1 s
	Exposure Indicator Output	Yes

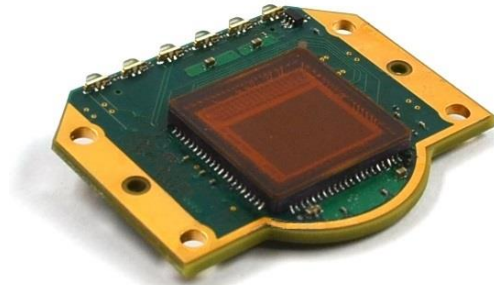
Spectral Response and Quantum Efficiency



5.4 ON Semi. PYTHON 5000 NOIP3SN5000A

Overview:

- Full resolution: 2592 x 2048
- Monochrome or RGB Bayer pattern
- 8-bit image data
- Up to 40 fps at full resolution
- Partial scan function (AOI) to increase frame rate, e.g. ~460 fps @ VGA
- Sequencer with 8 AOIs
- True Global Shutter



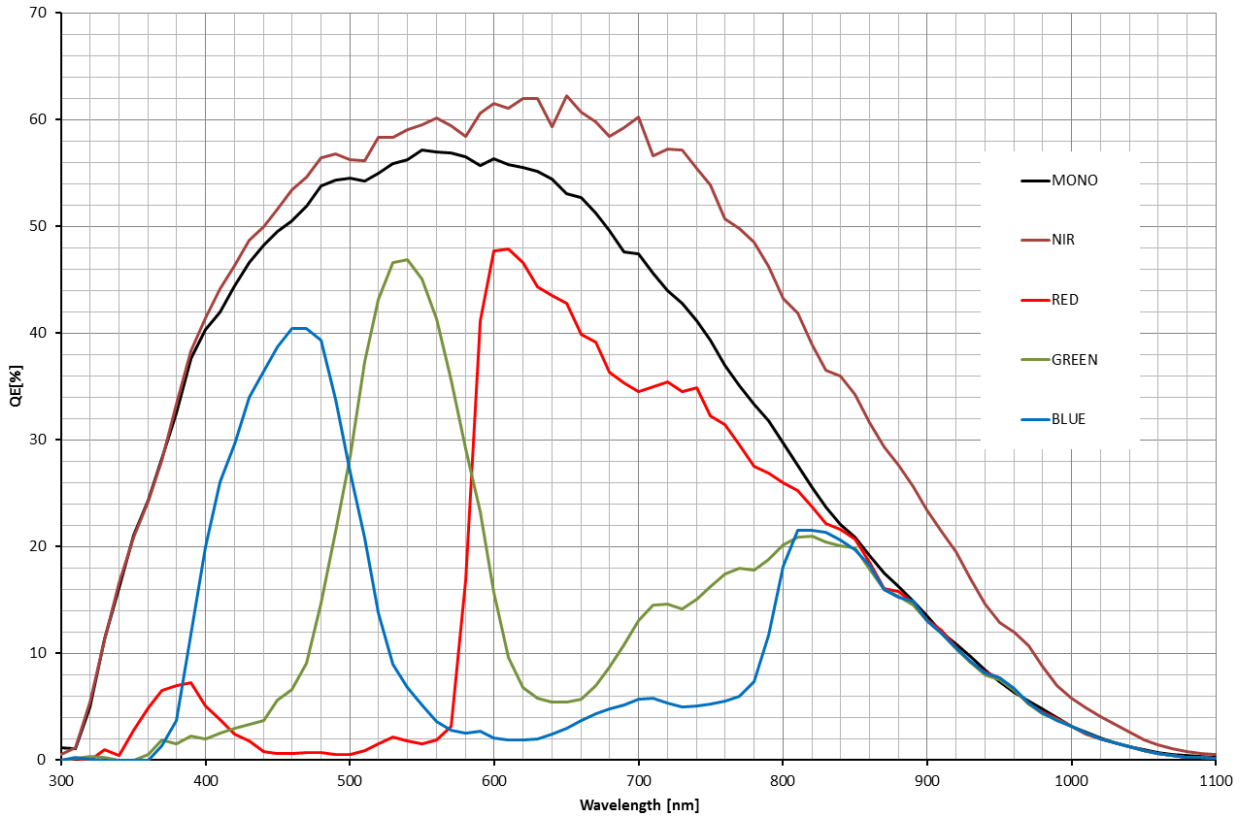
Sensor	Technology	CMOS
	Optical Format	1"
	Resolution	2592 x 2048
	Framerate (full resolution)	40 fps
	Partial Scan	Yes
	Color	Monochrome or Bayer pattern
	Pixel Size	4.8 μm x 4.8 μm
	Pixel Defects	According to manufacturer's specification

Processing	Pixel Clock	320 MHz (LVDS 4x)
	A/D Converter	11-bit
	Exposure time	1 μs ... 2 s
	Digital Gain	0.0078x ... 31x
	Test Image	Yes
	Bayer demosaicing	No

Analog	Black level (Offset)	Yes
	Automatic Black Level Correction with Dark Lines	Yes
	Responsivity	7.5 V / lux-sec
	SNR _{MAX}	40 dB
	Dynamic Range	60 dB

Trigger	Trigger Modes	Free Run, SW-Trigger, HW-Trigger via RTCC
	Trigger Delay	1 μs ... 1 s
	Exposure Indicator Output	Yes

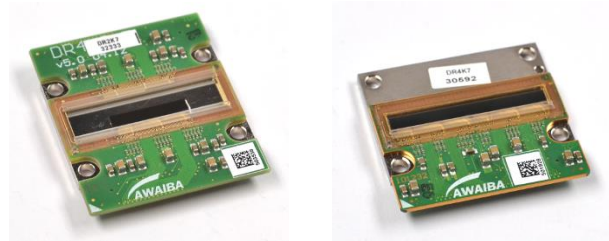
Spectral Response and Quantum Efficiency



5.5 ams Dragster DR-2k-7, DR-4k-7, DR-4k-3.5, DR-8k-3.5

Overview:

- 3.5 μm or 7 μm pixel size
- Up to 80 kHz line rate
- 12-bit pixel processing
- 8-bit or 10-bit pixel data output

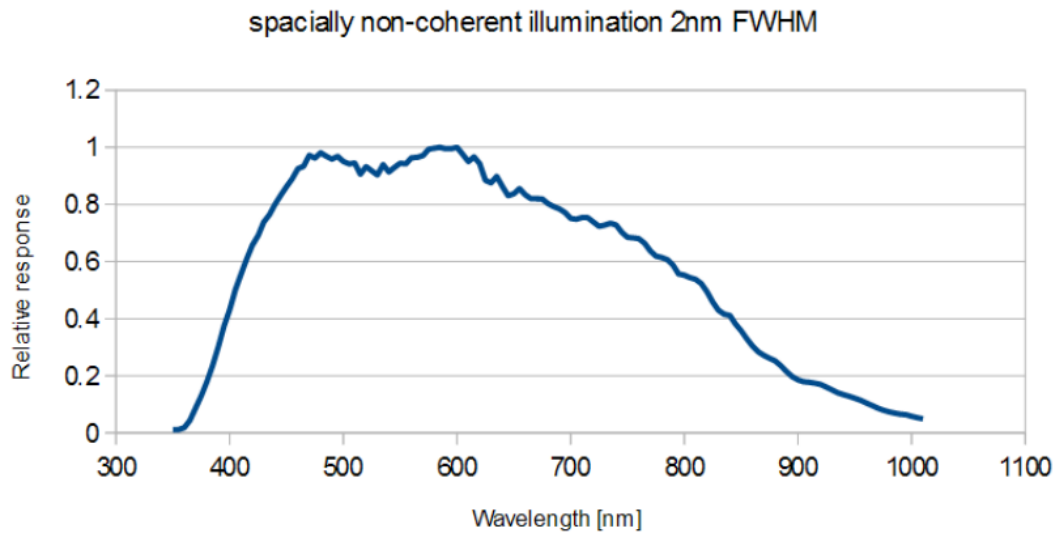


		DR-2k-7	DR-4k-7	DR-4k-3.5	DR-8k-3.5
Sensor	Pixel Size	7 μm x 7 μm		3.5 μm x 3.5 μm	
	Number of Pixels	1 x 2048	1 x 4096	1 x 4096	1 x 8192
	Color	Monochrome			

Analog	ADC Resolution	13-bit			
	ADC Gain	-6 dB ... 20 dB			
	Black level Offset	Yes			
	Full Well Capacity	30 ... 65 ke-		15 ... 35 ke-	
	Responsivity	77 DN/nJ/cm ² @12bit		39 DN/nJ/cm ² @12bit	
	PRNU rms	typ. 0.7%, max. 3%		typ. 0.8%, max. 3%	
	Temporal Noise Dark rms	typ. 1.5 DN/12bit max. 4 DN/12bit		typ. 1.6 DN/12bit max. 5 DN/12bit	
	Non-Linearity	typ. 2%, max. 5%		typ. 2%, max. 5%	

FPGA	Trigger Modes	Free run, programmable line period, Line triggered (by RTCC)				
	Trigger Delay	1 μs				
	Exposure Time	2 μs ... 6.5 ms				
	Max. Line Rate (full width)	8 Bit Output	80 kHz	80 kHz	80 kHz	46 kHz
		10 Bit Output	80 kHz	46 kHz	46 kHz	23 kHz
	Internal Pixel Processing	12-bit				
	Shading Correction	Pixel gain: 0 ... 4.0, 9-bit gain resolution				
Additional Features	Automatic black level correction Mirrored readout mode AOI selection for increasing the scan rate Insertion of line counters into pixel data					

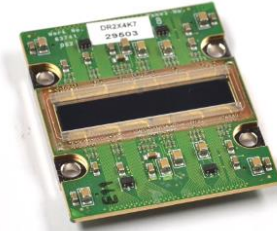
Relative Spectral Response:



5.6 ams Dragster DR-2x2k-7(-RGB), DR-2x4k-7(-RGB)

Overview:

- Dual line sensor, with optional RGB Bayer filter
- 7 μm pixel size
- Up to 80 kHz scan rate / 160 kHz line rate
- 12-bit pixel processing
- 8-bit or 10-bit pixel data output
- Hardware demosaicing with 24 Bit RGB pixel data

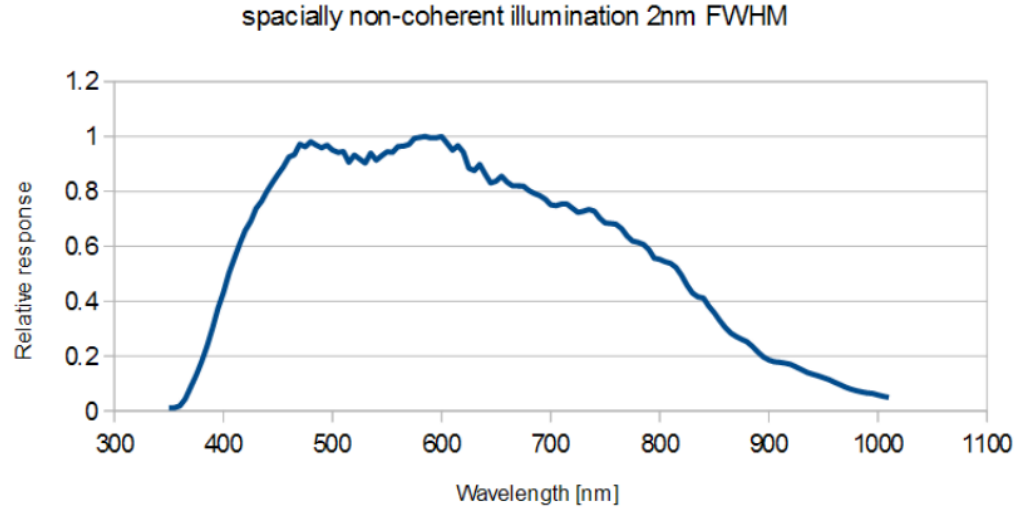


Sensor		DR-2x2k-7(-RGB)	DR-2x4k-7(-RGB)
	Pixel Size	7 μm x 7 μm	
	Number of Pixels	2 x 2048	2 x 4096
	Color	Monochrome or RGB Bayer filter	

Analog	ADC Resolution	13-bit	
	ADC Gain	-6 dB ... 20 dB	
	Black level Offset	Yes	
	Full Well Capacity	30 ... 65 ke-	
	Responsivity	77 DN/nJ/cm ² @12bit	
	PRNU rms	typ. 0.7%, max. 3%	
	Temporal Noise Dark rms	typ. 1.5 DN/12bit, max. 4 DN/12bit	
Non-Linearity	typ. 2%, max. 5%		

FPGA	Trigger Modes	Free run with programmable line period Line triggered (by RTCC)		
	Trigger Delay	1 μs		
	Exposure Time	2 μs ... 6.5 ms		
	Max. Scan Rate (two lines, full width)	8 Bit Raw	80 kHz	46 kHz
		10 Bit Raw	46 kHz	23 kHz
		24 Bit RGB	61 kHz	30 kHz
		32 Bit RGBx	46 kHz	23 kHz
	Internal Pixel Processing	12-bit		
Shading Correction	Pixel gain: 0 ... 4.0, 9-bit gain resolution			
Additional Features	Automatic black level correction Mirrored readout mode AOI selection for increasing the scan rate Adjustable line delay between both lines to compensate transport direction Insertion of trigger and line counters into pixel data RGB Demosaicing			

Relative Spectral Response



RGB Bayer Pattern

The dual line color sensor uses an RGB filter with the following arrangement:

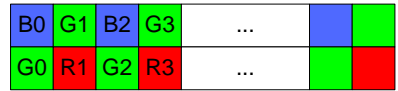
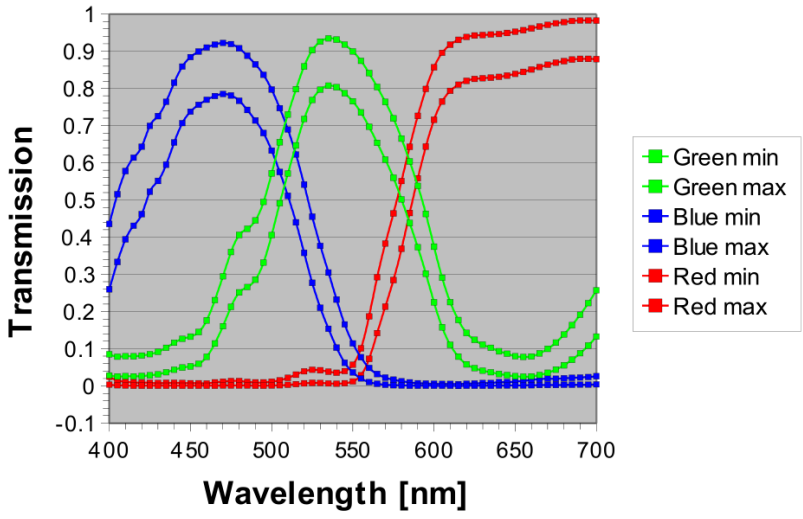


Figure 4: RGB color filter arrangement

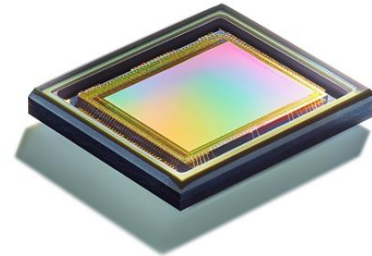
RGB Filter Transmission



5.7 Prophesee PPS3MVCD

Overview:

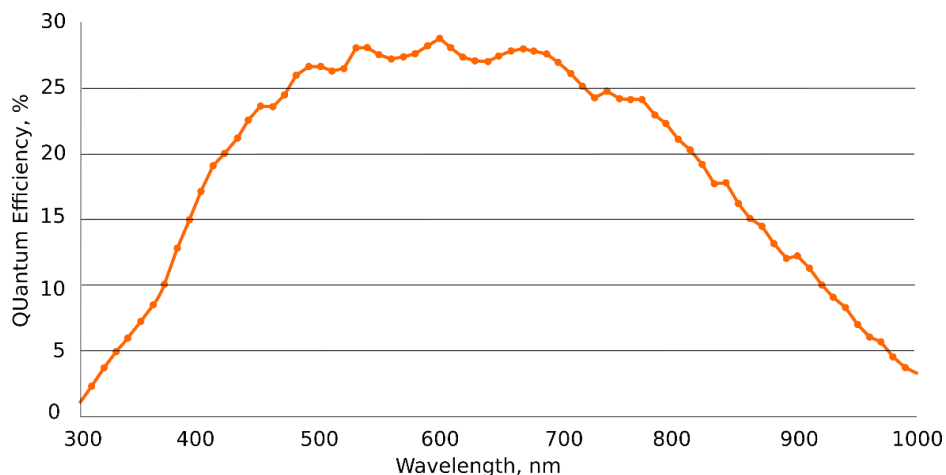
- Event-based vision sensor
- 640x480 (VGA) pixel
- High Dynamic Range (HDR) beyond 120 dB
- Programmable Region of Interest (ROI)
- Event time stamping by external trigger events
- A HAL Plugin for the Metavision API is provided
- Remote device streaming over Ethernet for using Metavision on a PC is also supported



Sensor	Pixel Size	15 μm x 15 μm
	Number of Pixels	640 x 480
	Optical format	3/4"

Analog	Dynamic range	> 120 dB
	Nominal Contrast Threshold	Standard user setting: 25 %
	Low-light Cut-Off	0.08 lux
	Response Latency (max @ low-light cut off)	7700 μs
	Response Latency (typ. contrast, 10lx)	200 μs
	Response Latency (contrast > 1000lx)	100 μs
	Maximum readout throughput	50 Mevents/s
	Max background (BG) rate	9 events/s
Contrast Thresh Non-Uniformity	3.7 %	

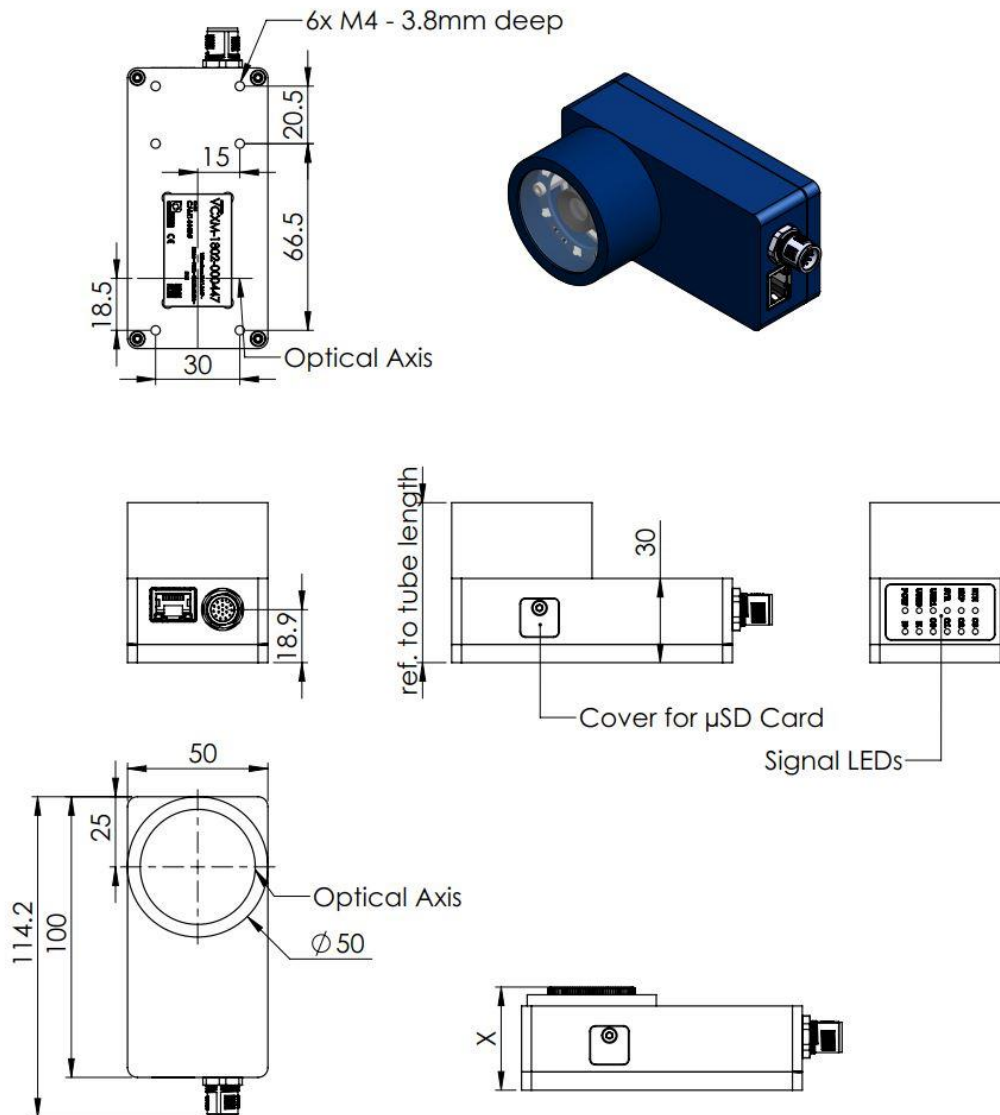
Quantum efficiency



Additional information about the sensor can be found at <https://support.prophesee.ai>

6 Mechanical Drawings

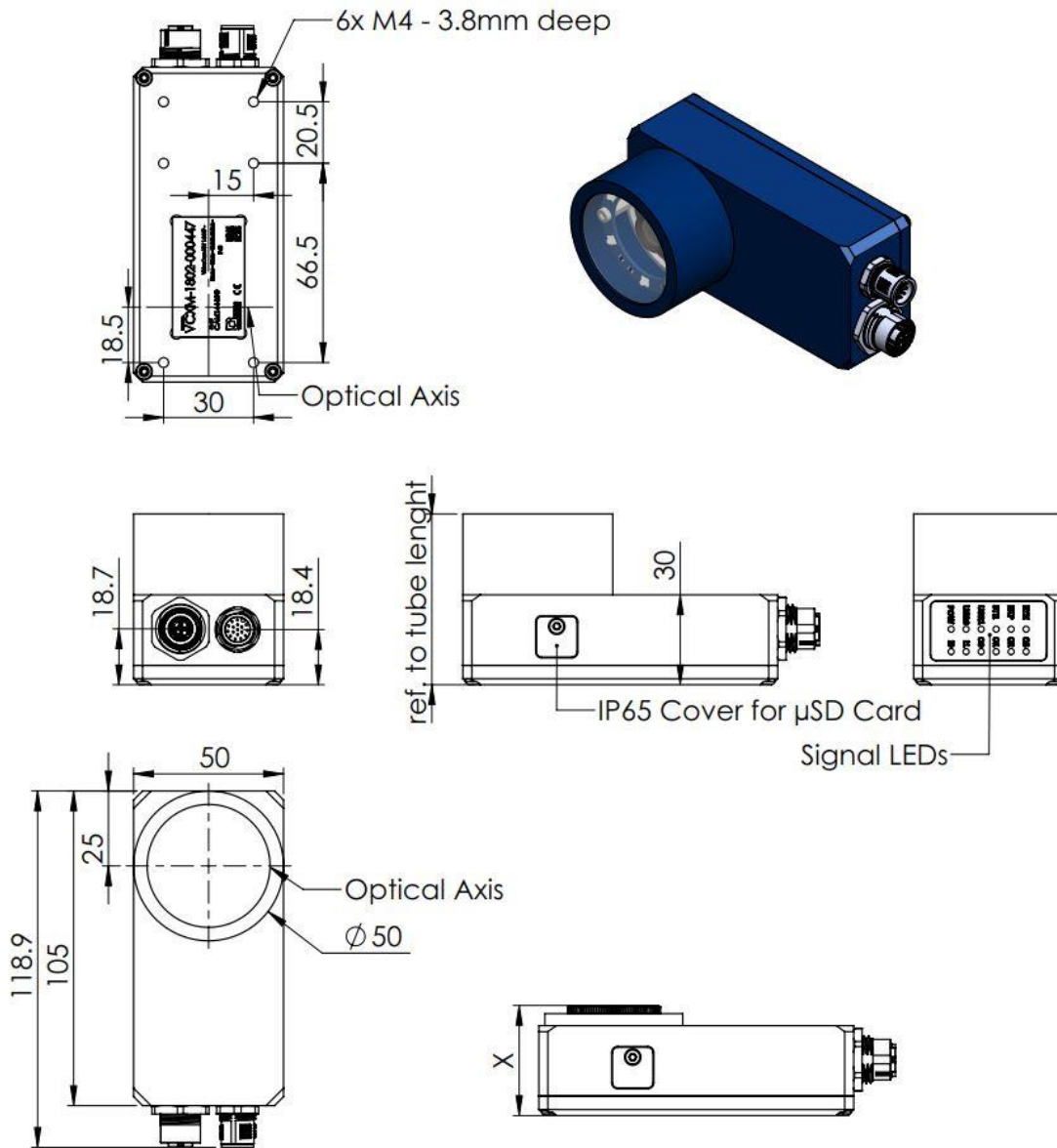
6.1 VisionCam XM - RJ45 Ethernet



C-MOUNT SENSORS	X (FFD TO BACK PANEL DISTANCE) [mm]
e2v EV76C560M / EV76C560C	36.75 ± 0.2
e2v EV76C570M / EV76C570C	36,75 ± 0.2
On Semi PYTHON 5000 NOIP3SN5000A	37,15 ± 0.2

Figure 5: RJ45 Ethernet

6.2 VisionCam XM / EB - M12 Ethernet (IP65)



C-MOUNT SENSORS	X (FFD TO BACK PANEL DISTANCE) [mm]
e2v EV76C560M / EV76C560C	36.75 ± 0.2
e2v EV76C570M / EV76C570C	36,75 ± 0.2
On Semi PYTHON 5000 NOIP3SN5000A	37,15 ± 0.2

Figure 6: M12 Ethernet

6.3 VisionCam LM - RJ45 Ethernet

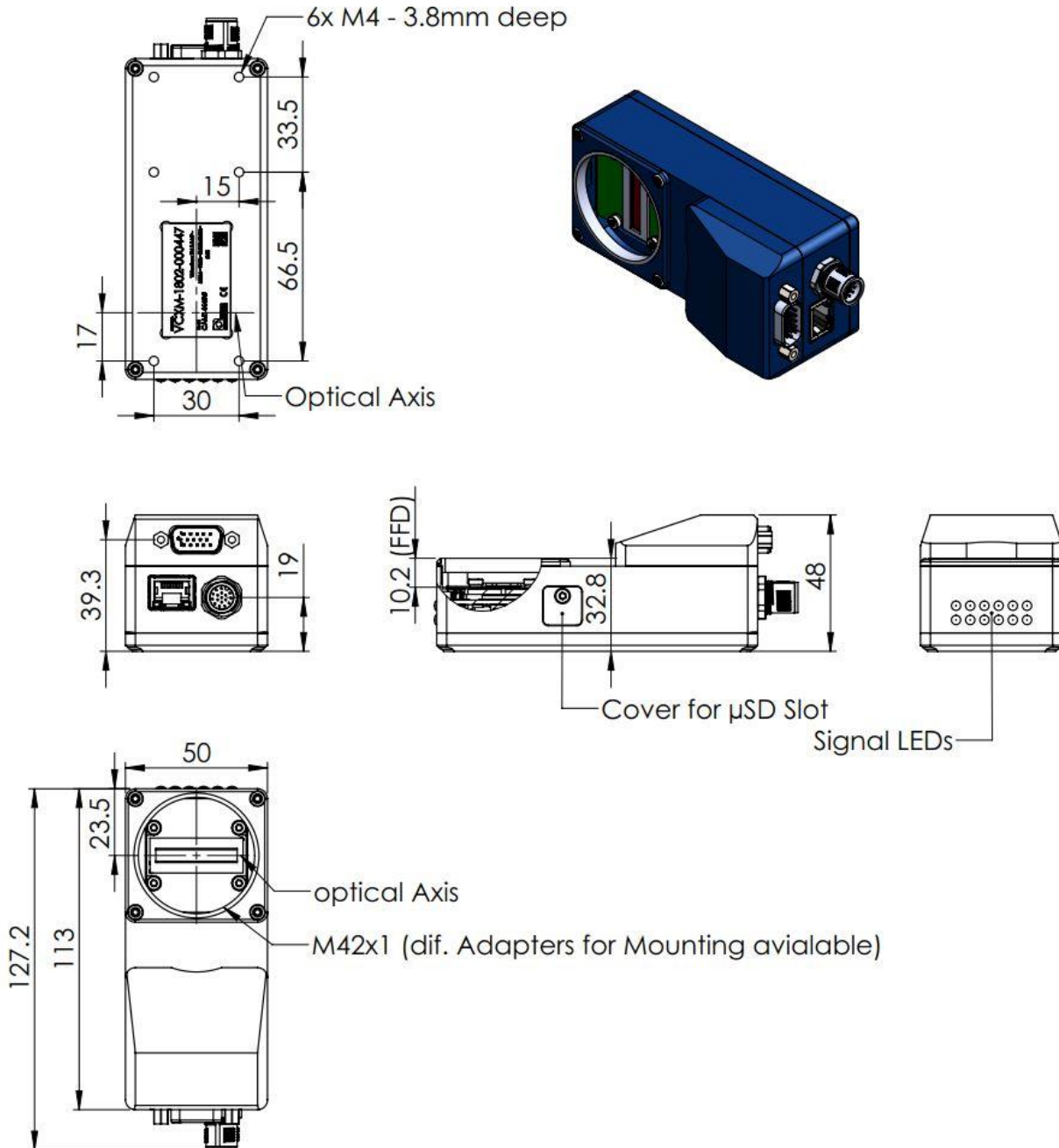


Figure 7: VisionCam LM

6.4 Additional Information (Tubes and BFD for S-Mount)

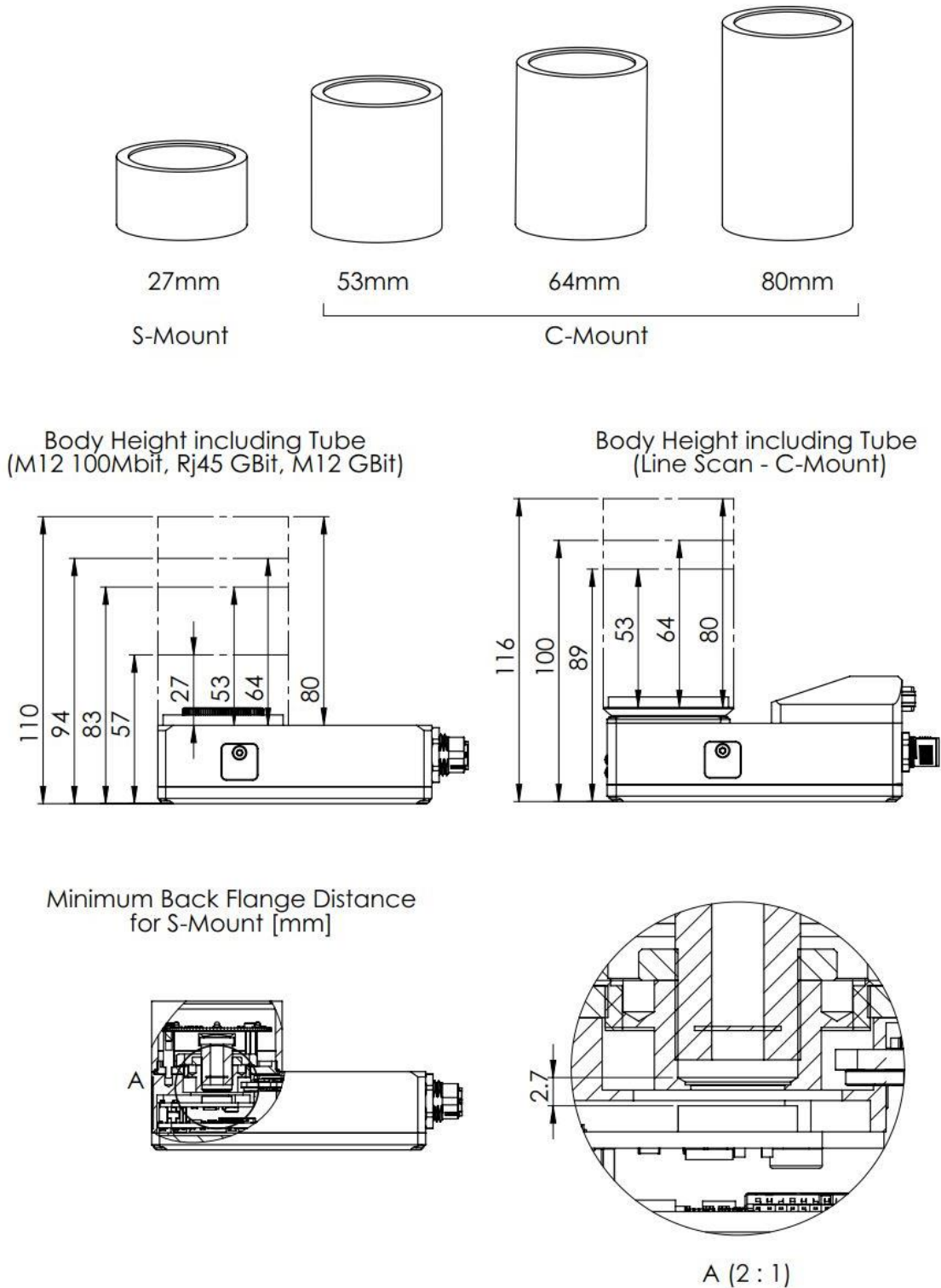


Figure 8: Available Tubes Height and minimum BFD for S-Mount

7 Support

Finally, if you have any open questions, the IMAGO support team is happy to assist you in any cases. For direct contact to the support, please use our ticket system: <https://imago.freshdesk.com>

The SDK documentation is available online: <https://api.imago.tech>

Visit the IMAGO Download Portal to get access to the latest documentation and Linux releases:
www.imago-technologies.com/technical-documentation

8 History

Revision	Date	Changes
0.9	Jan-2017	Initial pre-release
	Mar-2017	Text revision
1.0	Mar-2017	First version
1.1	Apr-2017	Fixed broken layout and page number
1.2	Aug-2017	Update WVGA min shutter time Add PYTHON 5000 Sensor. Remove Camera Type with Hirose connector for IO.
1.3	Mar-2018	Added M12 Gbit/s Ethernet Connector
1.4	Mar-2018	Added RS-422 interface; Added Dragster sensors
1.5	Apr-2018	Renew mechanical Drawings, Renew Connector drawings, Table layout
1.6	Jul-2018	Text revisions
1.7	-2018	Add information about internal ring light; Add Dragster mono dual-line sensors; Move detailed Dragster RGB information to FGCamera library documentation
1.8	Jul-2019	Added Event-based sensor info
1.9	May-2020	Updated order codes
2.0	Mar-2022	Add sections SoC, Storage, Real-Time Clock and RS-232 Remove obsolete hardware configurations (100 Mbit/s M12, Aptina MT9M021) Update section RS-422 Update Operating Conditions Update event-based sensor specification