![Allied Vision logo]

Allied Vision

Manta

Technical Manual

V7.4.0

Manta at a glance

Manta cameras have a Gigabit Ethernet (GigE) interface and work with Gigabit Ethernet hardware and cable lengths up to 100 m. Manta cameras are GigE Vision® V1.2 and GenICam SFNC V1.2.1 compliant.

Applied standards

GigE Vision® The GigE Vision standard is an interface standard for digital machine vision cameras administered by the Automated Imaging Association (AIA) that is widely supported in the machine vision industry. In contrast, Gigabit Ethernet is the network GigE Vision is built upon.

GenICam™ GenICam is a machine vision standard hosted by the European Machine Vision Association (EMVA). The aim of GenICam is to provide a generic configuration interface for cameras and devices independent of the used interface technology (i.e., GigE Vision, USB3 Vision, DCAM IEEE 1394, Camera Link). This approach enables proper interoperability between GenICam compliant hardware and software solutions without the need for customization.

The GenICam standard consists of multiple modules that specify tasks to be solved. Allied Vision cameras and software make use of these modules, like the Standard Feature Naming Convention (SFNC) that standardizes feature names and types via an XML file or the transport layer interface (GenTL) that is used to grab images.

What else do you need?

Content	URL
Camera data sheets GigE Installation Manual GigE Features Reference Modular Concept 3D CAD STEP files Software and firmware downloads	https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html
Technical papers and knowledge base	https://www.alliedvision.com/en/support/technical-papers-knowledge-base.html

Read this manual carefully

Learn how to protect your camera from damage and fully understand its functions.

Contact us

Connect with Allied Vision by function

https://www.alliedvision.com/en/meta-header/contact.html

Find an Allied Vision office or distribution partner

https://www.alliedvision.com/en/about-us/where-we-are.html

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Document history and conventions

This chapter includes:

- Document history
- Layout styles and symbols used in this manual

Document history

Version	Date	Remarks
V2.0.3	2010-Apr-15	New manual release status
V3.0.0	2010-Jun-09	Added new models: Manta G-046B, G-046C, G-145B, G-145C (including 30 fps variants), G-146B, G-146C, G-201B, G-201C (including 30 fps variants).
		Added Spectral sensitivity note.
		Added Image memory size table.
		Added ROI frame rate data for the following models: Manta G-046B, G-046C, G-145B, G-145C, G-146B, G-146C, G-201B, G-201C
		With the new firmware version 1.40, due to a bug all Manta models have only 12-bit in the data path (even if the ADC delivers 14 bit).
		Due to a repaired bug in FPGA and microcontroller, the *StreamHoldCapacity* changed: Manta G-032B & G-032C from 49 frames to 99 frames, Manta G-125B & G-125C from 12 frames to 25 frames.
		RGBA24 and BGRA24 are not supported.
		Manta board level cameras have now a cooling plate.
V4.0.0	2010-Oct-25	Added note that description of status LEDs can be found in Manta Hardware Installation Guide.
		Changed file format from Adobe FrameMaker FM7 to FM9
		Added Manta G-033B, G-033C (sensor: Sony ICX414) and G-504B, G-504C (Sony ICX655).
V4.0.1	2011-Jan-05	Changed tripod drawing: added dimensions of three big holes (M6 and UNC 1/4-20).
		In specifications tables color pixel formats: inserted Mono8. Added note, that Raw8, Raw16 displayed in some viewers means the same as Bayer8, Bayer16.
		Changed GigE Vision V1.0 to V1.2 in all specification tables.

Table 1: Document history

Version	Date	Remarks
V4.1.0	2011-Jun-24	Added PoE information including: • Power requirements, power consumption and regulations for PoE models. • Note about PoE capable cameras • PoE cameras < 220 g (without lens) Corrected frame rate formulas for Manta G-033, G-504: C-Mount/CS-Mount not adjustable, for modifications contact Customer Care and send camera to Allied Vision Technologies Manta board level: • Manta board level: deleted (PWR output on demand) at Pin2 Removed Chapter Firmware update (see Knowledge Base at Allied Vision Technologies Website: search for Application Note GigE Firmware Update) Revised data path block diagram. Added 30 fps variant: Manta G-145B, G-145C-30fps and G-201B, G-201C-30fps Added Mono12Packed for monochrome cameras and Bayer12Packed for color cameras. Added the following camera controls: Chunk Data, EventControls, `StreamFramerateConstrain`, `FrameStartTriggerOverlap`, `PayloadSize`, `NonImagePayloadSize`, `SyncInGlitchFilter`, `AutoIris`, Gamma, LUT Manta G-145-30fps and G-201-30fps (non PoE) • ... have same I/O pin assignment (input circuits and voltage range), power LED and upside down PoE plug as PoE models Manta G-145B, G-145C-30fps and G-201B, G-201C-30fps non-PoE behave like PoE cameras.
V5.0.0	2012-May-15	Error found in Document history V3.0.0 by Validation Team: • RGBA24 and BGRA24 should be named RGBA32 and BGRA32 • Added RGBA32 and BGRA32 color formats (except Manta G-201B/C-30fps) • Added frame rate diagrams New model added: Manta G-145B NIR. New sensors Sony ICX618 for Manta G-031 Added focal length 4.0 mm in the focal length vs field of view table for the Manta G-125. Added Manta G-031 Same main board for all Manta models: From serial number 503323258 on all Manta models including PoE and board level versions contain the same main board. Revised non-PoE drawings and new board level PoE drawings Revised PoE descriptions regarding IEEE 802.3af and IEEE 802.3at: • See note in Gigabit Ethernet port (Manta PoE models can source power from IEEE 802.3af (100 MBit/s and 1000 MBit/s) and from IEEE 802.3at compliant power sourcing equipment (PSE) such as switches injectors or NICs.)

Table 1: Document history (continued)

Version	Date	Remarks
V5.0.0 [continued]	2012-May-15 [continued]	New CAD drawings with Pin3 = Video Type Auto Iris Out
		Frame memory
		• Manta G-032B, G-032C: changed from 49 to 99 frames.
		• Manta G-033B, G-033C: changed from 88 to 99 frames.
		• Manta G-046B, G-046C: changed from 35 to 70 frames.
		• Manta G-125B, G-125C: changed from 12 to 25 frames.
		• Manta G-145B, G-145C: changed from 10 to 22 frames.
		• Manta G-145B, G-145C-30fps: changed from 10 to 22 frames.
		• Manta G-146B, G-146C: changed from 10 to 22 frames.
		• Manta G-201B, G-201C: changed from 8 to 16 frames.
		• Manta G-201B, G-201C-30fps: changed from 8 to 16 frames.
		Added frame rates for ROI height = 720
		• G-125B, G-125C ROI frame rate
		IR cut filter:
		Changed IR cut filter to *(type Jenofilt 217)*
V6.0.1	2013-Mar-20	Added new models: Manta G-223B, G223C, G-282B, G282C, G-283B, G283C, G-609B, G-609C, G-917B, G-917C. These models are called Manta type B, since there are some differences to the other models that are called Manta type A (specifications, housing, data path, features).
		New tripod adapter, new CAD drawings with LEDs on top of the connector
		In Specifications chapter, the pixel formats are listed both for PvAPI and Vimba (GenICam V1.0).
		Added chapter Video iris output description
		I/O pin assignment: 10 mA on outputs 1 and 2 (not 20 mA)
		Manta G-031B/G-031C: External trigger delay.
		Corrected the mass (200 g) of Manta type A cameras Manta G-031B, G-031C, G-032B, G-032C, G-033B, G-032C, G-046B, G-046C, G-125B, G-125C, G-145B, G-145C, G-146B, G-146C, G-201B, G-201C, G-504B, G-504C
		PoE models: compliant with Power over Ethernet IEEE 802.3at/IEEE 802.3af
		Deleted the Chapter *Manual Overview,* Deleted *Frame Rate Comparison of all Manta cameras*
		New date format: year-month-day
V7.0.0	2013-Aug-30	Added new models: Manta G-419B, G-419C
		As of this version, the document refers to Vimba SDK (not PvAPI)
		Changed cable recommendation to Category 6 or higher
		Manta G-145B, G-145C (including 30 fps variants): changed framerate
		Camera interfaces chapter: added input/output block diagrams and the status LED description
		Changed miminum exposure times of G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, G-419C
		Changed ROI frame rates of Manta G-145B-30fps, G-145C-30fps

Table 1: Document history (continued)

Version	Date	Remarks
V7.0.1	2013-Sep-30	Added Camera cleaning
		Changed maximum frame rates and gain range, added burst mode for G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, G-419C
		Added a feature of Manta type B cameras (G-223B, G-223C, G-282B, G-282C, G-283B, G-283C, G-609B, G-609C, G-917B, G-917C): temperature monitoring
		Added ReverseX feature in Camera features
		Added Manta angled-head housings (type B)
		Updated maximum gain values for G-283B, G-283C, G-917B, G-917C
		Updated minimum exposure time for G-145B, G-145C (-30fps)
		Updated the frame rate vs. height graphs
		Updated links to the GigE installation manual through out the manual
V7.0.2	2014-May-08	Updated Camera block diagrams
		Updated drawings for Manta type A board level (non-PoE): dimensions and Manta type A board level (PoE): dimensions
		Updated spectral sensitivity plots
		Updated the note on *StreamHoldCapacity* in Specifications and Frame memory sections
		Added section Exceptions for non-PoE Manta cameras up to serial number 503323258
		Updated available color pixel formats for G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, G-419C
		Updated optional accessories in the Specifications chapter
		Added section Manta standard board level variants (type B)
		Added Hirose cable information
		Updated exposure time values for G-145B NIR, G-145B, G-145C (-30fps), G-223B, G-223B NIR, G-223C, G-282B, G-282C, G-283B, G-283C
		Corrected frame rate formula for G-145B NIR
V7.0.3	2014-Jun-09	Added trigger latency and jitter values in the Specifications chapter
		Updated and rearranged Specifications chapter
		Added Camera feature comparison section
		Preliminary Manta type B angled-head and board level variant information removed from the document until samples are available

Table 1: Document history (continued)

Version	Date	Remarks
V7.1.0	2014-Oct-07	Updated the following in the Specifications chapter • Trigger latency and jitter values • Decimation X/Y control descriptions changed to GenICam factor style Added *BufferHandlingControl* and *StreamInformation* in Camera features section, applicable for Vimba v1.3 or higher Updated Camera features section Added new camera models Manta G-505B, G-505C: Specifications, Camera lens information, Description of data path, ROI frame rate information Added new camera models Manta G-235B, G-235C: Specifications, Camera lens information, Description of data path ROI frame rate information Added the following sections: • Manta CMOS angled-head housings (type B) • Manta CMOS board level variants (type B) • Cross section: CS-Mount (type B)
V7.2.0	2015-Mar-20	Updated Allied Vision logo Replaced references of AVT and Allied Vision Technologies to Allied Vision Updated links to new Allied Vision website Renamed Description of data path chapter to Camera data path
V7.3.0	2015-Nov-02	Updated mass of all Manta type B cameras as per Product Change Notification 2015-03-02. Changed the technical manual layout. Changed chapter name from 'Camera data path' to Image data flow and updated the figures. Changed chapter name from 'Camera dimensions' to Mechanical dimensions. Merged the 'Resolution and ROI frame rates' chapter into Specifications chapter. Added Manta at a glance section Added General safety notes section Updated Manta type B mechanical drawings Added Legislation section in Safety and legislation chapter to replace 'Legal notice' and 'Conformity' sections Moved 'Sensor position accuracy' section from Appendix to 'Mechanical dimensions' chapter and deleted 'Appendix' Added Camera features comparison section in Specifications chapter to replace 'Camera smart features' and 'Camera features' sections Added Cross section: C-Mount and CS-Mount section to replace 'Cross section: C-Mount' and 'Cross section: CS-Mount' sections Added Cleaning optical components chapter to replace 'Camera cleaning' and updated information Added Contact us section to replace 'Contacting Allied Vision' section

Table 1: Document history (continued)

Version	Date	Remarks
V7.4.0	2016-July-08	Added new camera models: Manta G-319B, G-319C, G-507B, G-507C
		Added spectral response plots for select camera models
		Updated specification tables to be consistent with the information on the product web pages
		Added Reverse X/Y to Manta G-223, G-419
		Added Trigger over Ethernet Action Commands feature for all models. For more information see the GigE Features Reference.
		Updated frame rate plots
		Updated feature list for Manta 223B, G-223B NIR, G-223C, G235B, G-235C, G-419B, G-419B NIR, G-419C
		Added installation chapter
		Various other minor enhancements and corrections
		Added REACH (EC 1907/2006) to regulations section
		Updated Manta type B CCD monochrome and color image flow diagram
		Updated image flow diagrams for Manta type B cameras (CCD and CMOS)
		Updated absolute QE plots for Manta G-282, G-283, G-505, G-609, G-917

Table 1: Document history (continued)

Manual conventions

To give this manual an easily understood layout and to emphasize important information, the following typographical styles and symbols that are used.

Styles

Style	Function	Example
Bold	Program names, UI elements, highlighting important things	**bold**
Italics	Publication names, UI non-interactive elements	*Italics*
Courier New	Code listings, feature names	`Input`
Courier New Italics	Feature options	*`Mode`*
Blue	Cross references, web page links, email links	Link

Symbols

Safety Note

Note to prevent physical injury.

Possible material damage

This symbol addresses important information to avoid material damage; however, is not related to physical injury.

Damage to the camera by electrostatic discharge (ESD)

This symbol addresses important information to avoid material damage by ESD.

Safety-related instructions to avoid malfunctions

This symbol indicates important or specific instructions or procedures that are related to product safety. You have to follow these instructions to avoid malfunctions.

Practical hint

This symbol highlights a practical hint that helps to better understand the camera's features and functions, and to make better use of it.

Further information available online

This symbol highlights URLs for further information. The URL itself is shown in blue. Example:

http://www.alliedvision.com

Safety and regulations

This chapter includes:

- General safety notes for Manta cameras
- Information about the legal requirements and restrictions for Manta cameras based on current and relevant regulations
- Particular emphasis has been given to regulations of the European Economic Area (CE, RoHS, REACH, WEEE) as well as regulations of the United States of America (FCC) and Canada (ICES)

General safety notes

Avoid damage to the camera by ESD

Inadequate protection of the camera from ESD can damage the camera permanently. Read the safety instructions and ESD warnings in the *GigE Installation Manual*.

Do not operate the camera beyond the environmental specifications

See environmental specifications limits in the Specifications section of this document. Special care must be taken to maintain a reasonable operating temperature. If the camera is operated in temperatures higher than the specified range, the camera should be mounted on a heat sink.

Verify all external connections

Verify all external connections in terms of voltage levels, power requirements, voltage polarity, and signal integrity prior to powering the device.

Do not disassemble the camera housing

This camera contains sensitive internal components. The warranty is void if the camera is disassembled.

Keep shipping material

Poor packaging of the product may cause damage during shipping.

Cleaning optical components

This product can be damaged by some volatile cleaning agents. Avoid cleaning the image sensor unless absolutely necessary. Please see instructions on optics cleaning in this document.

Allied Vision can clean your camera as a service for you, if necessary. For more information, contact Allied Vision support.

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Regulations

European Economic Area requirements

CE and RoHS

Allied Vision Technologies declares under its sole responsibility that all standard cameras of the Manta family to which this declaration relates are in conformity with the following standard(s) or other normative document(s):

• CE, following the provisions of 2004/108/EC directive
• RoHS (2011/65/EU)

Board level models

Board level models are delivered without housing. Because housing design is critical to the electromagnetic interference characteristics of a camera, no CE certification tests regarding electromagnetic interference have been performed for board level models. Users who design board level models into their systems should perform appropriate testing regarding electromagnetic interference after the product design is completed.

REACH

Allied Vision Technologies products are in compliance with the Regulation (EC) No 1907/2006 REACH.

WEEE

This product must be disposed of in compliance with the directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

FCC – Class B Device

For customers in the U.S.A.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interferences will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the distance between the equipment and the receiver.
• Use a different line outlet for the receiver.
• Consult a radio or TV technician for help.

Allied Vision

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment. The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart B of Part 15 of FCC Rules.

Board level models

Manta board level models are prepared for FCC Class B.

Industry Canada Equipment Standard for Digital Equipment (ICES)

CAN ICES-3 (A) / NMB-3 (A)

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in the Radio Interference Regulations.

Pour utilisateurs au Canada

Cet appareil est conforme aux normes classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

Life support applications

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Allied Vision Technologies customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Allied Vision Technologies for any damages resulting from such improper use or sale.

Other legal notices

Trademarks

Unless stated otherwise, all trademarks shown in this document of Allied Vision Technologies are brands protected by law. All other product or company names may be trademarks of their respective owners.

Warranty

The information provided by Allied Vision Technologies is supplied without any guarantees or warranty whatsoever, be it specific or implicit. Also excluded are all implicit warranties concerning the negotiability, the suitability for specific applications or the non-breaking of laws and patents. Even if we assume that the information supplied to us is accurate, errors and inaccuracy may still occur.

Copyright

All texts, pictures and graphics are protected by copyright and other laws protecting intellectual property. It is not permitted to copy or modify them for trade use or transfer, nor may they be used on websites.

Installation and hardware

This chapter describes the components required for your vision system including configuring the host computer, Ethernet adapter settings, and connecting your Manta camera.

Configuring the host computer

Allied Vision GigE Vision cameras can operate on 10/100 or Gigabit speed Ethernet adapters. In order to reach the maximum camera frame rate, a Gigabit speed Ethernet adapter with jumbo packet support is required.

If your host computer has an available Ethernet interface, this can be used with Allied Vision GigE cameras. We recommend that your camera system uses a dedicated Ethernet interface not shared with Internet or local area networks. If more ports are needed, or your existing Ethernet adapter is unable to operate at Gigabit Ethernet speeds, installing additional hardware may be required.

Usage on mixed-use networks (with printers, Internet/email, etc.) is possible but may impact camera performance (e.g., framerate). Please check with your IT administrator if required for network configuration.

Installing the Ethernet adapter driver

Install the network card driver from your network card manufacturer. If no installation application is provided, update the driver manually.

To update the driver manually

1. Click the **Start icon** and select *Control Panel* in the menu.

2. Click **View by Large Icons** and select *Device Manager* in the list.

3. Under *Network Adapters*, locate the Ethernet network adapter, right-click the entry, and select *Update Driver Software* in the menu.

4. Select the *Search automatically for updated driver software* or *Browse my computer for driver software*.

5. Click **Close** once the driver has been installed.

Optional: Modifying Ethernet adapter IP address

After initial Ethernet adapter hardware installation, connect the Ethernet adapter directly to the camera. The default configuration assigns an IP address automatically using the Link-Local Address range of 169.254.xxx.xxx or an address defined by the DHCP server, if present.

Users can fix the adapter address to minimize the time required for a camera to be recognized by the host application. Systems that employ multiple Ethernet adapters connected to multiple cameras will also be required to fix the address of the Ethernet adapter.

To connect to the camera, edit the host PC's adapter settings and configure the following settings:

- IP Address: 169.254.100.1
- Subnet mask: 255.255.0.0
- Default gateway: blank

Ethernet adapter driver settings

The Ethernet adapter should be adjusted to improve system performance when using a GigE Vision camera. This performance is related to minimizing CPU usage and dropped or resent packets.

Edit the Ethernet adapter driver properties according to the values in the table below. The names and availability of the properties listed may vary depending on adapter manufacturer and model.

Property	Value
Packet size/maximum transmission unit (MTU)	8228 bytes or larger
Interrupt Moderation	Enable
Interrupt Moderation Rate	Extreme
Receive Buffers	Maximum value configurable
Transmit Buffers	256 bytes

Default packet size

The default packet size of Allied Vision GigE cameras is 8228 bytes. The host network adapter needs to support a packet size of equal or larger size to stream from the camera.

Ethernet adapter

For desktop systems, use a PCI Express bus Ethernet adapter. For laptops, use an expansion slot via an ExpressCard®.

A list of Allied Vision recommended Ethernet adapters is available on the Allied Vision website. See the Hardware Selection for Allied Vision GigE Cameras application note:

https://www.alliedvision.com/en/support/technical-papers-knowledge-base.html

Ethernet adapter settings

The Ethernet adapter settings may also vary depending on your system configuration and the network adapter manufacturer.

Enabling jumbo packets

Jumbo Frames/Jumbo Packets

The properties listed for the network adapter may include either **Jumbo Packet** or **Jumbo Frames** depending on the manufacturer. If neither is listed under properties, your network card may not support this feature. You must use a network adapter that supports Jumbo Frames/Jumbo Packets.

To enable jumbo packets

1. Click the **Start** icon and select *Control Panel* in the menu.
2. Click **View by Large Icons** and select *Device Manager* in the list.
3. Under *Network Adapters*, locate the Ethernet network adapter, right-click the entry, and select *Properties* in the menu.
4. Select the *Advanced* tab.
5. Select the property *Jumbo Packet* and set the value to *9014 Bytes*.
6. Click **OK** to save the setting.

Connecting your camera

Use a Category 6 or higher rated Ethernet cable to connect the Manta camera to the host adapter. Crossover cabling is not required but does work. The camera has circuitry to determine if a crossover cable is being used.

Allied Vision recommends Category 6 (Cat 6) or higher rated Ethernet cables for Manta cameras. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or image data coming from the camera.

Please contact your Allied Vision sales representative or your local Allied Vision dealer for information on accessories and lens recommendations:

https://www.alliedvision.com/en/about-us/where-we-are.html

Downloading camera drivers

Allied Vision GigE cameras work with any or all of the following software options.

Vimba Viewer or Vimba SDK:

https://www.alliedvision.com/en/products/software

Third-party software solutions:

https://www.alliedvision.com/en/products/software/third-party-libraries.html

Powering up the camera

A camera power adapter for each GigE camera is available from Allied Vision. Please see *Specifications* on page 28 for connector definition and voltage specifications.

For Manta cameras

- Use only DC power supplies with insulated cases.
- For all power connections use only shielded cables to avoid electromagnetic interferences.
- Manta cameras can source power from:
  - IEEE 802.3af (100 Mb/s and 1000 Mb/s), and
  - IEEE 802.3at compliant PoE power sourcing equipment (PSE) devices such as switches, injectors, or network interface controller (NIC).

Connecting to host application

Once you have installed the **Vimba Viewer** or third-party application to your host computer, you can connect your Allied Vision GigE camera via an Ethernet cable. If your camera is not PoE powered, connect the Hirose cable to power the camera.

GigE Installation Manual

For information on starting your camera and connecting to a host application, see the GigE Installation Manual:

https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html

Allied Vision recommends Category 6 (Cat 6) or higher rated Ethernet cables for Manta cameras. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or image data coming from the camera.

Vimba Viewer documentation

Vimba Viewer documentation is included with the software download. Once Vimba Viewer is installed on your host PC, documentation is located under *\Program Files\Allied Vision\Vimba*.

Specifications

This chapter provides:

- Technical specifications
- Absolute quantum efficiency plots
- Spectral response plots (for select CCD models)
- ROI height vs. frame rate plots
- Comparison of feature availability in Manta camera models

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Notes on specifications

PoE capable cameras

PoE capable cameras have the letters PoE written on the camera's label on the bottom side of the camera.

Type A and Type B cameras

Manta type A cameras: G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B cameras: G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-609, G-917

Dimensions and mass

The dimensions listed in the following tables are for Manta standard housing (straight view) models. Dimensions include connectors but not the tripod and lens.

The mass listed in the following tables are for Manta standard housing (straight view) PoE and non-PoE models. Mass does not include the tripod and lens.

Frame memory

Normally, an image is captured and transported in consecutive steps. The image is taken, read out from the sensor, digitized and sent over the GigE network. Manta cameras are equipped with an image buffer. The memory operates according to the first in, first out (FIFO) principle. Specification tables for each camera show how many frames can be stored by each model.

Number of frames

The number of frames (`StreamHoldCapacity`) depends on resolution, pixel format, and GigE Vision Streaming Protocol (GVSP) packet size. The stated number of frames is typical for full resolution, Mono8/Bayer8, and a `GevSCPSPacketSize` = *8192* bytes per packet.

Resolution and ROI frame rate

Resolution and ROI frame rate is listed after the specification table. The resulting frame rate from changing sensor height from full image to a single line. Unless otherwise noted, sensors do not give an increase in readout speed with a reduction in width. However, in cases where a camera is limited by frame rate due to bandwidth restrictions, a reduction in width will give a frame rate increase.

Cameras with a "burst mode" frame rate are able to output more data than the maximum available bandwidth (124 MB/s), and will see a frame rate increase with a reduction in width.

Resolution and ROI measurements

- Data was generated using `StreamBytesPerSecond` = 124 MB/s (full bandwidth) and an 8-bit pixel format. Frame rate may be lower if using network hardware incapable of 124 MB/s.
- For maximum speed advantage on quad-tap CCD sensors, ROIs are center image, where feature `OffsetY` = (full sensor height – ROI height)/2.
- There is no frame rate increase with reduced width unless otherwise noted.
- `BinningVertical` is vertical row summing on CCD before readout. The frame rate for an ROI at the same effective height as binning will be slower because the CCD still needs to read out the "fast readout rows" in ROI mode.

Frame rate for CCD sensors

The frame rate is a theoretical maximum frame rate (frames per second) of the CCD sensor according to the given formula.

Absolute quantum efficiency plots

Important notice before reading the quantum efficiency plots

All measurements were done without protection glass / IR cut filter. With protection glass or filters, quantum efficiency (QE) decreases by approximately 10%.

The uncertainty in measurement of the QE values is ±10%.

This is due to:

- Manufacturing tolerance of the sensor
- Uncertainties in the measuring apparatus itself (Ulbricht sphere, optometer, etc.)

The measurements for Manta G-145B NIR in figure 20: and figure 21: were done with a different method to illustrate the effect of the NIR mode.

Absolute QE plots for Sony CCD/CMOS sensors

Sony provides relative response curves in their sensor data sheets. To create the absolute QE plots shown in this chapter, the relative response was converted to a normalized QE response and then adjusted as per three measured QE values (@ 448 nm, 529 nm, 632 nm) for color sensors and one measured QE value (@ 529 nm) for monochrome sensors.

Absolute QE plots for OnSemi CCD sensors

The curves in the absolute QE plots shown in this chapter are from the sensor manufacturer data sheet.

The information was correct at the time of publishing. Sensor specifications may change without notice.

Wavelength

The wavelength range in the absolute QE plots is based on the information available in the sensor manufacturer data sheet at the time of publishing. Many color sensors are documented by the sensor manufacturer only for wavelengths from 400 nm to 700 nm.

For additional wavelength information, please contact the sensor manufacturer.

Spectral response plots

For select CCD models

Sony provides relative response curves in their sensor data sheets. To create the spectral response plots shown in this chapter, the relative response was adjusted as per three measured QE values (@ 448 nm, 529 nm, 632 nm) for color sensors and one measured QE value (@ 529 nm) for monochrome sensors.

Allied Vision

Manta G-031B, G-031C

Feature	Specification	
Resolution	656 (H) x 492 (V) 0.3 MP	
Sensor	Manta G-031B: Sony ICX618ALA with EXview HAD CCD™ technology	Manta G-031C: Sony ICX618AQA with EXview HAD CCD™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/4 4.5 mm diagonal	
Cell size	5.6 µm x 5.6 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	125.2 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome formats	Manta G-031B: Mono8, Mono12, Mono12Packed	Manta G-031C: Mono8
Color formats (YUV)	Manta G-031B: N/A	Manta G-031C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-031B: N/A	Manta G-031C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-031B: N/A	Manta G-031C: BayerRG8, BayerRG12Packed, BayerGR12
Exposure control	58 µs to 60 s; 1 µs increments	
Gain control	0 to 32 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.7 W @ 12 VDC; 4.3 W PoE	
Trigger latency[1]	Idle state: 9.9 µs; Frame valid state: 16.5 µs	
Trigger jitter[1]	Idle state: 5.3 µs; Frame valid state: 11.9 µs	

Table 2: Manta G-031B, G-031C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

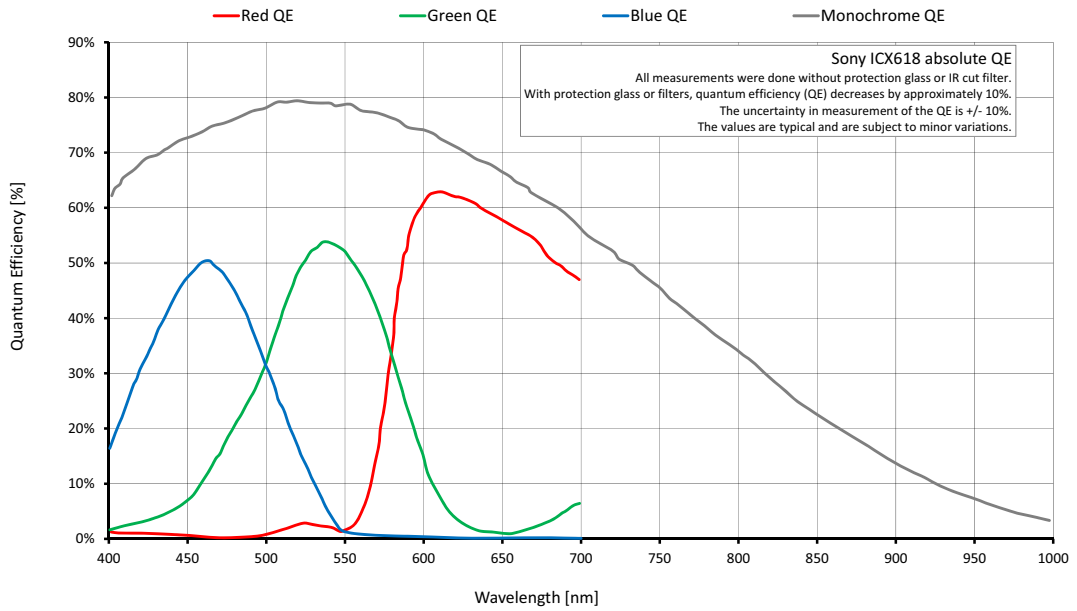*Table 2: Manta G-031B, G-031C camera specifications (continued)*

Absolute QE

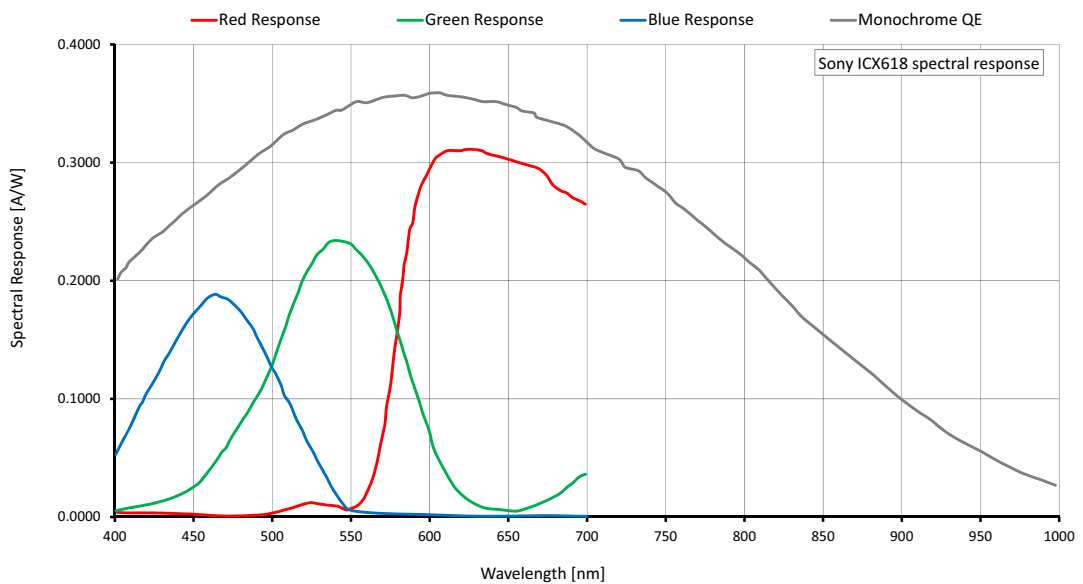*Figure 1: Manta G-031B, G-031C (Sony ICX618) absolute QE*

Spectral response

Figure 2: Manta G-031B, G-031C (Sony ICX618) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{15.7\mu s \times \text{ROI height} + 2.53\mu s \times (492 - \text{ROI height}) + 252.74\mu s}$$

Maximum frame rate at full resolution according formula: 125.2 fps

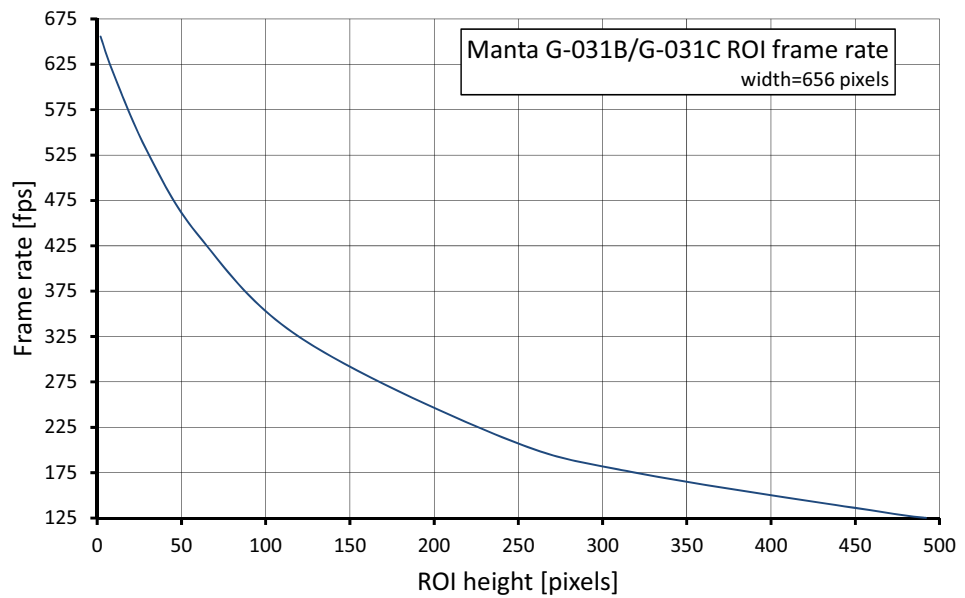*Figure 3: Frame rate as a function of ROI height plot*

Height [pixels]	Frame rate [fps][1]		Height [pixels]	Frame rate [fps][1]
492	125.2		60	436.7
480	127.7		30	527.9
320	174.8		10	613.2
240	214.4		2	655.6
120	324.5			

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 3: Frame rate as a function of ROI height table

Manta G-032B, G-032C

Feature	Specification	
Resolution	656 (H) x 492 (V) 0.3 MP	
Sensor	Manta G-032B: Sony ICX424AL with HAD technology	Manta G-032C: Sony ICX424AQ with Wfine CCD™ HAD technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/3 6.0 mm diagonal	
Cell size	7.4 μm x 7.4 μm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	80.7 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome formats	Manta G-032B: Mono8, Mono12, Mono12Packed	Manta G-032C: Mono8
Color formats (YUV)	Manta G-032B: N/A	Manta G-032C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-032B: N/A	Manta G-032C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-032B: N/A	Manta G-032C: BayerRG8, BayerRG12Packed, BayerGR12
Exposure control	26 μs to 60 s; 1 μs increments	
Gain control	0 to 36 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE	
Trigger latency[1]	Idle state: 8.0 μs; Frame valid state: 18.7 μs	
Trigger jitter[1]	Idle state: 5.5 μs; Frame valid state: 16.2 μs	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	

Table 4: Manta G-032B, G-032C camera specifications

Feature	Specification
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 4: Manta G-032B, G-032C camera specifications (continued)
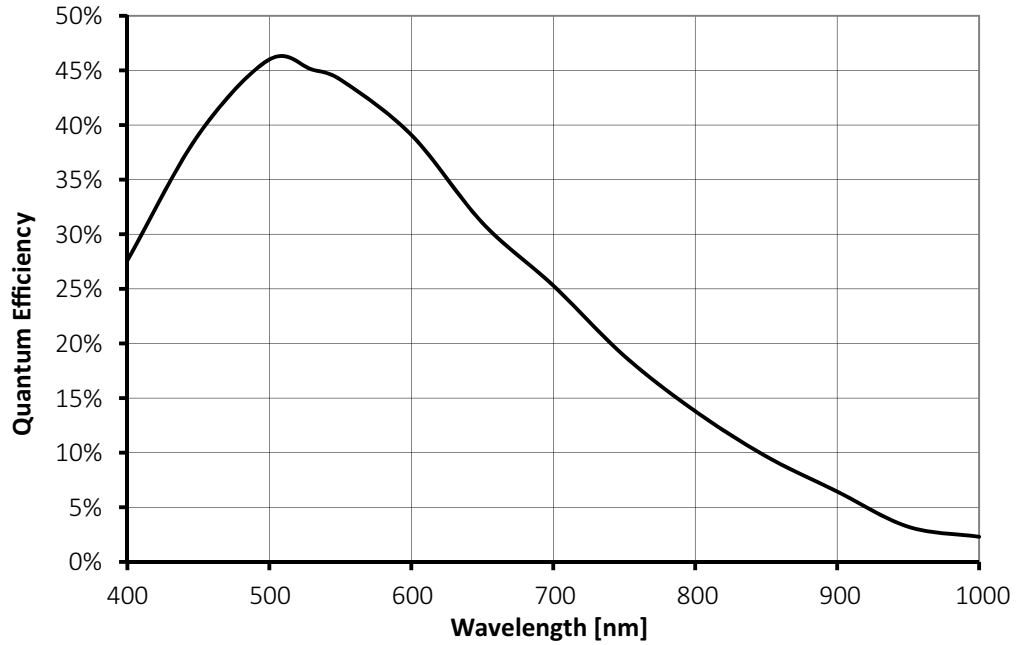
Absolute QE

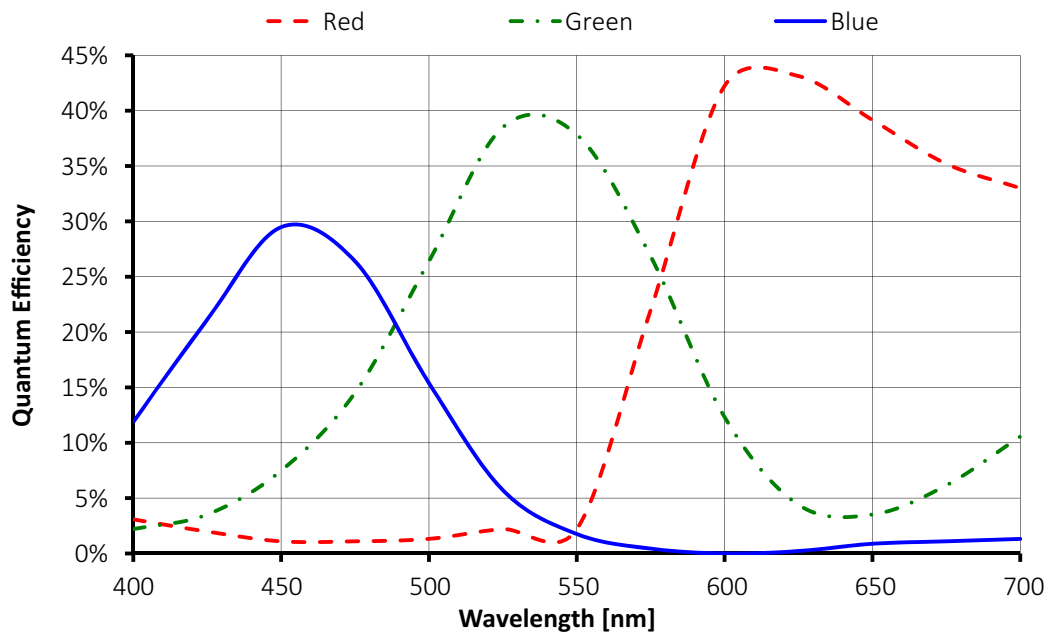*Figure 4: Manta G-032B (Sony ICX424) absolute QE (without protection/cover glass)*

Figure 5: Manta G-032C (Sony ICX424) absolute QE (without IR cut filter)

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{24.34\mu s \times \text{ROI height} + 3.01\mu s \times (492 - \text{ROI height}) + 495.50\mu s}$$

Maximum frame rate at full resolution according formula: 80.7 fps

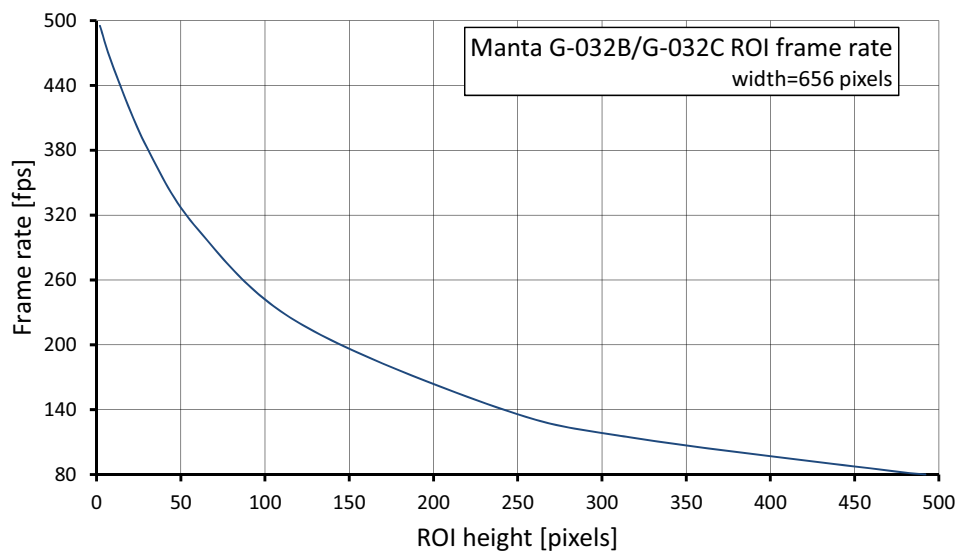*Figure 6: Frame rate as a function of ROI height plot*

Height [pixels]	Frame rate [fps][1]		Height [pixels]	Frame rate [fps][1]
492	80.1		60	307.1
480	81.8		30	382.2
320	113.6		10	456.6
240	140.9		2	495.2
120	220.4			

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 5: Frame rate as a function of ROI height table

Manta G-033B, G-033C

Feature	Specification	
Resolution	656 (H) x 492 (V) 0.3 MP	
Sensor	Manta G-033B: Sony ICX414AL with HAD technology	Manta G-033C: Sony ICX414AQ with Wfine CCD™ HAD technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/2 8.0 mm diagonal	
Cell size	9.9 µm x 9.9 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	88 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome formats	Manta G-033B: Mono8, Mono12, Mono12Packed	Manta G-033C: Mono8
Color formats (YUV)	Manta G-033B: N/A	Manta G-033C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-033B: N/A	Manta G-033C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-033B: N/A	Manta G-033C: BayerRG8, BayerRG12Packed, BayerGR12
Exposure control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 35 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE	
Trigger latency[1]	Idle state: 8.6 µs; Frame valid state: 19.1 µs	
Trigger jitter[1]	Idle state: 4.8 µs; Frame valid state: 15.3 µs	

Table 6: Manta G-033B, G-033C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

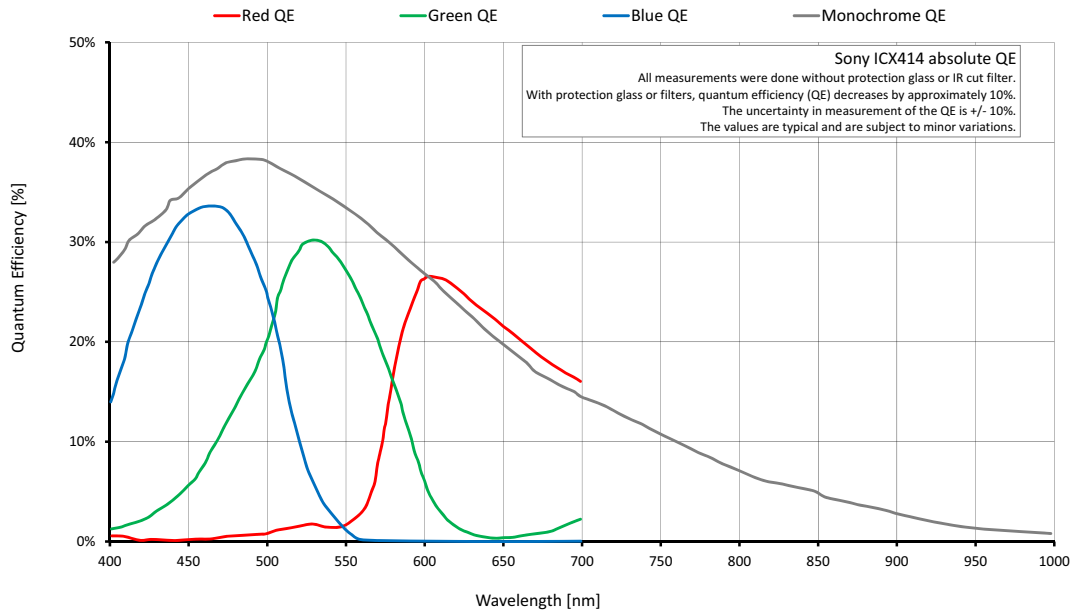*Table 6: Manta G-033B, G-033C camera specifications (continued)*

Absolute QE

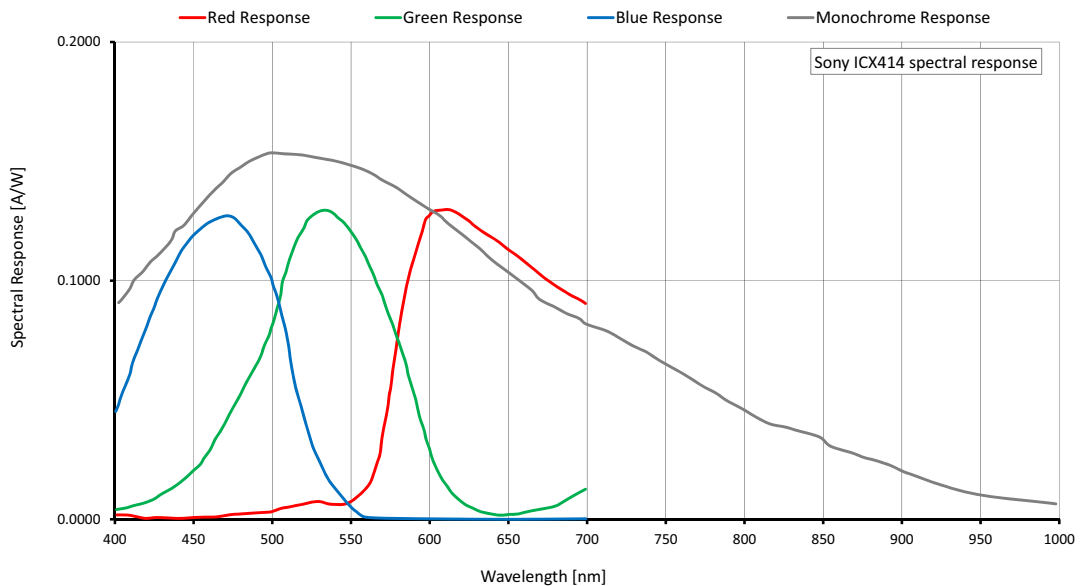*Figure 7: Manta G-033B, G-033C (Sony ICX414) absolute QE*

Spectral response

Figure 8: Manta G-033B, G-033C (Sony ICX414) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{22.49\mu s \times \text{ROI height} + 1.51\mu s \times (492 - \text{ROI height}) + 198.4\mu s}$$

Maximum frame rate at full resolution according formula: 88.7 fps

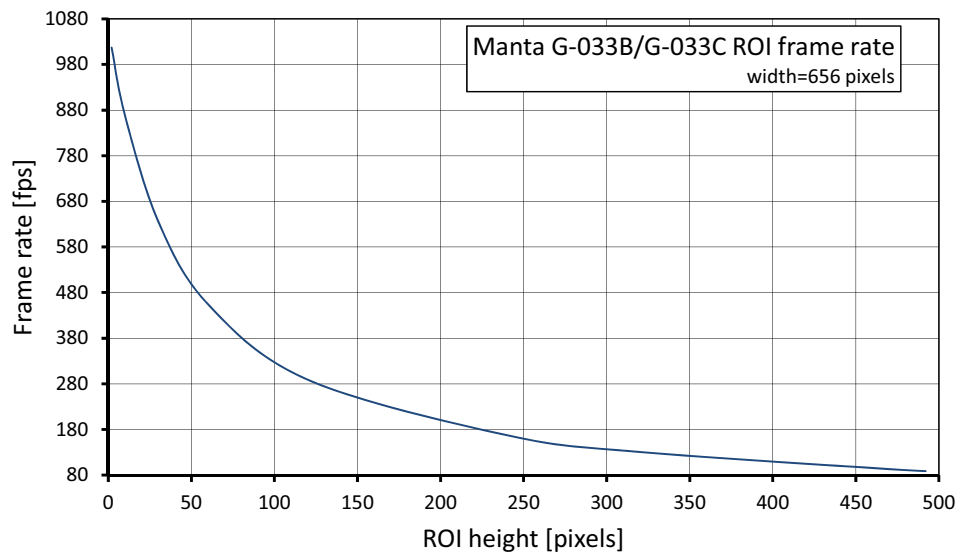*Figure 9: Frame rate as a function of ROI height plot*

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
492	88.7	60	454.5
480	90.8	30	636.6
320	130.6	10	868.7
240	167.3	2	1017.0
120	289.1		

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 7: Frame rate as a function of ROI height table

Manta G-046B, G-046C

Feature	Specification	
Resolution	780 (H) x 580 (V) 0.5 MP	
Sensor	Manta G-046B: Sony ICX415AL with HAD technology	Manta G-046C: Sony ICX415AQ with Wfine CCD™ HAD technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/2 8.0 mm diagonal	
Cell size	8.3 µm x 8.3 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	67.5 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 70 frames at full resolution	
Monochrome formats	Manta G-046B: Mono8, Mono12, Mono12Packed	Manta G-046C: Mono8
Color formats (YUV)	Manta G-046B: N/A	Manta G-046C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-046B: N/A	Manta G-046C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-046B: N/A	Manta G-046C: BayerRG8, BayerRG12Packed, BayerGR12
Exposure control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE	
Trigger latency[1]	Idle state: 8.8 µs; Frame valid state: 20.5 µs	
Trigger jitter[1]	Idle state: 4.9 µs; Frame valid state: 16.6 µs	

Table 8: Manta G-046B, G-046C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

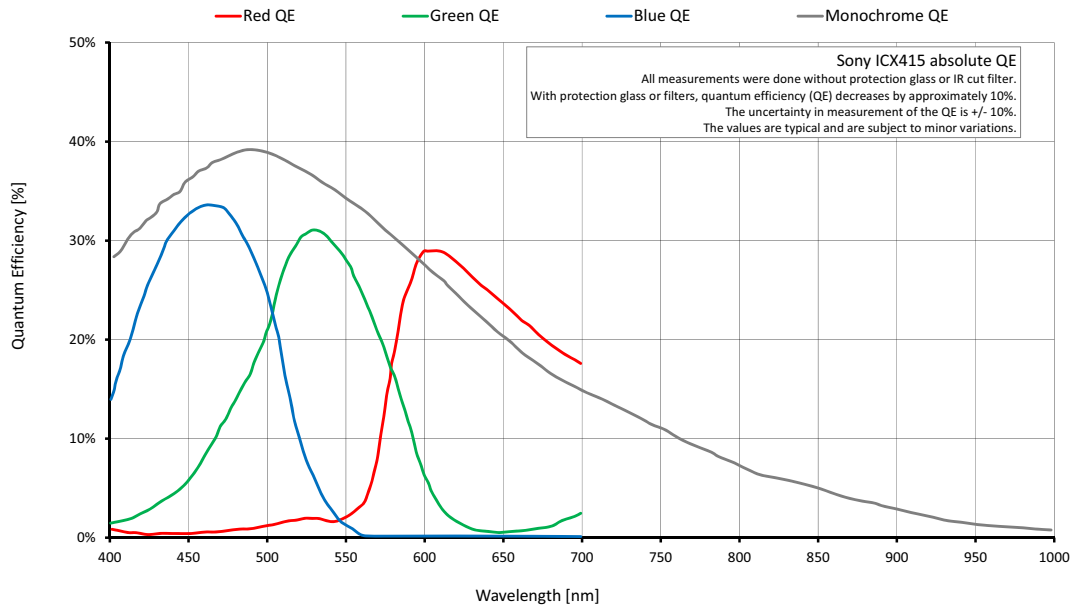*Table 8: Manta G-046B, G-046C camera specifications (continued)*

Absolute QE

Figure 10: Manta G-046B, G-046C (Sony ICX415) absolute QE

Spectral response

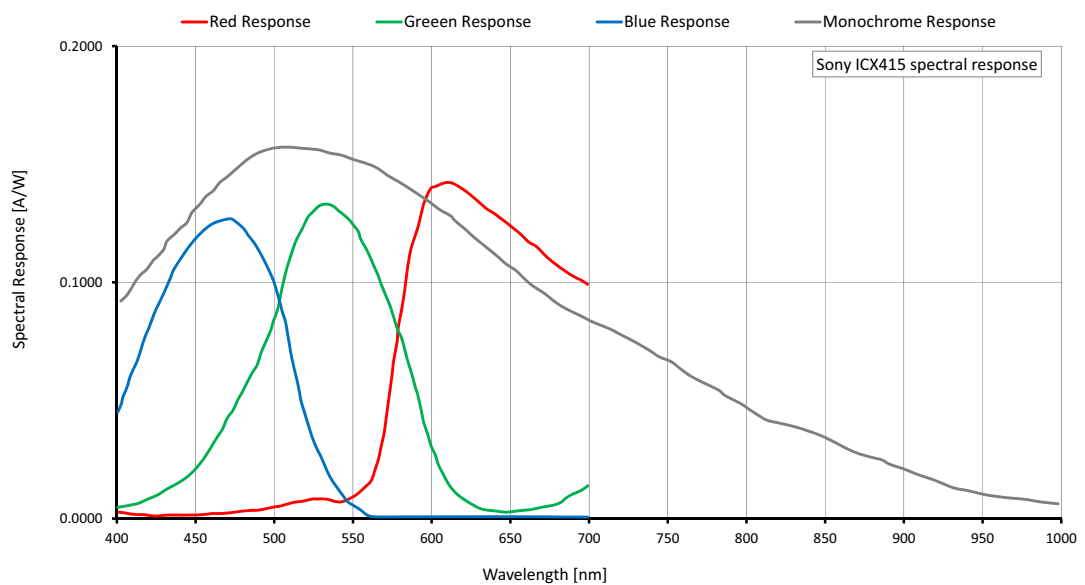*Figure 11: Manta G-046B, G-046C (Sony ICX415) spectral response*

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{25.14\mu s \times \text{ROI height} + 1.75\mu s \times (580 - \text{ROI height}) + 224.03\mu s}$$

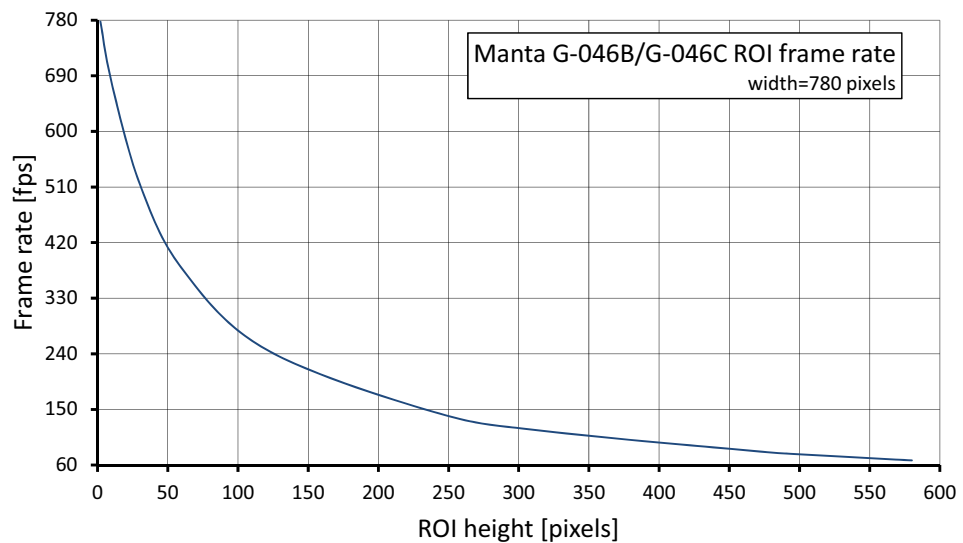Maximum frame rate at full resolution according formula: 67.5 fps

Figure 12: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
580	67.5	120	247.1
492	78.4	60	378.4
480	80.2	30	515.2
320	114.6	10	678.9
240	145.6	2	777.7

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 9: Frame rate as a function of ROI height table

Manta G-125B, G-125C

Feature	Specification	
Resolution	1292 (H) x 964 (V) 1.2 MP	
Sensor	Manta G-125B: Sony ICX445ALA with EXview HAD CCD™ technology	Manta G-125C: Sony ICX445AQA with EXview HAD CCD™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/3 6.0 mm diagonal	
Cell size	3.75 μm x 3.75 μm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	30 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 25 frames at full resolution	
Monochrome formats	Manta G-125B: Mono8, Mono12, Mono12Packed	Manta G-125C: Mono8
Color formats (YUV)	Manta G-125B: N/A	Manta G-125C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-125B: N/A	Manta G-125C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-125B: N/A	Manta G-125C: BayerRG8, BayerRG12Packed, BayerGR12
Exposure control	21 μs to 60 s; 1 μs increments	
Gain control	0 to 31 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE	
Trigger latency[1]	Idle state: 12.3 μs; Frame valid state: 26.4 μs	
Trigger jitter[1]	Idle state: 6.5 μs; Frame valid state: 20.6 μs	

Table 10: Manta G-125B, G-125C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 10: Manta G-125B, G-125C camera specifications (continued)
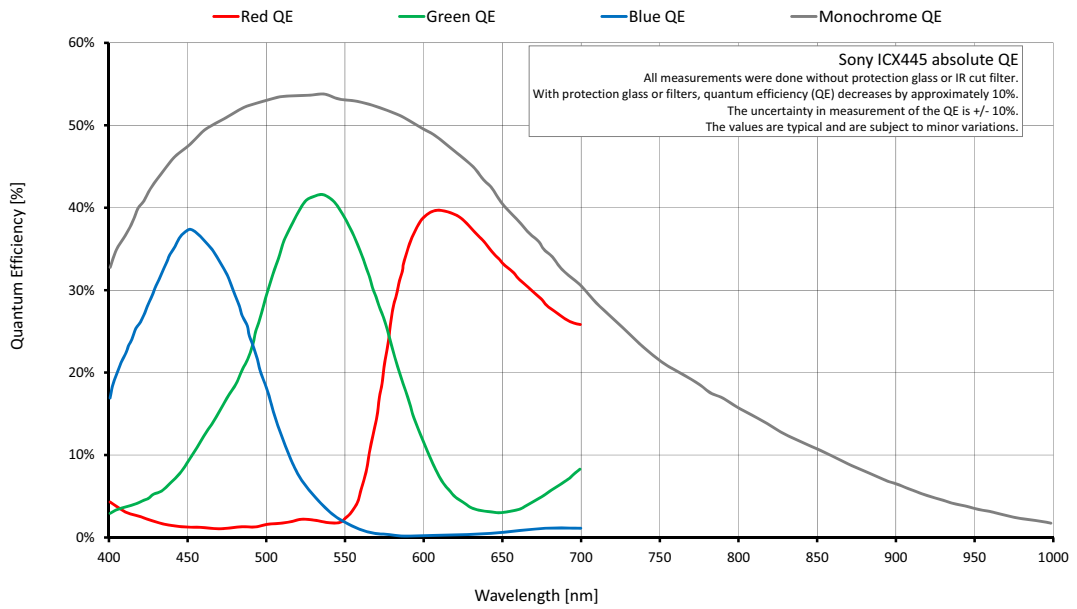
Absolute QE

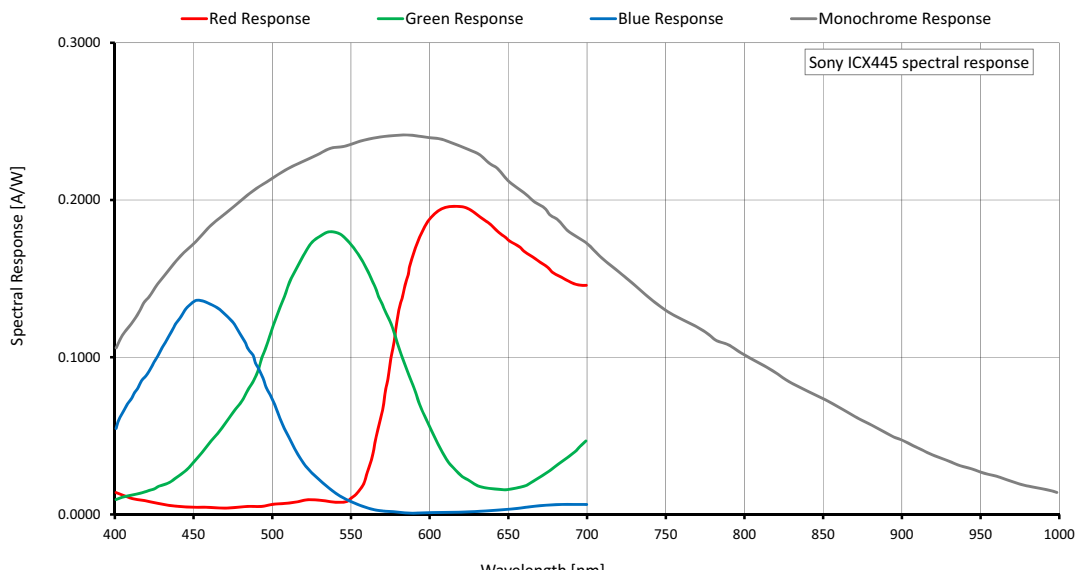*Figure 13: Manta G-125B, G-125C (Sony ICX445) absolute QE*

Spectral response

Figure 14: Manta G-125B, G-125C (Sony ICX445) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{33.21\mu s \times \text{ROI height} + 5.04\mu s \times (964 - \text{ROI height}) + 226.52\mu s}$$

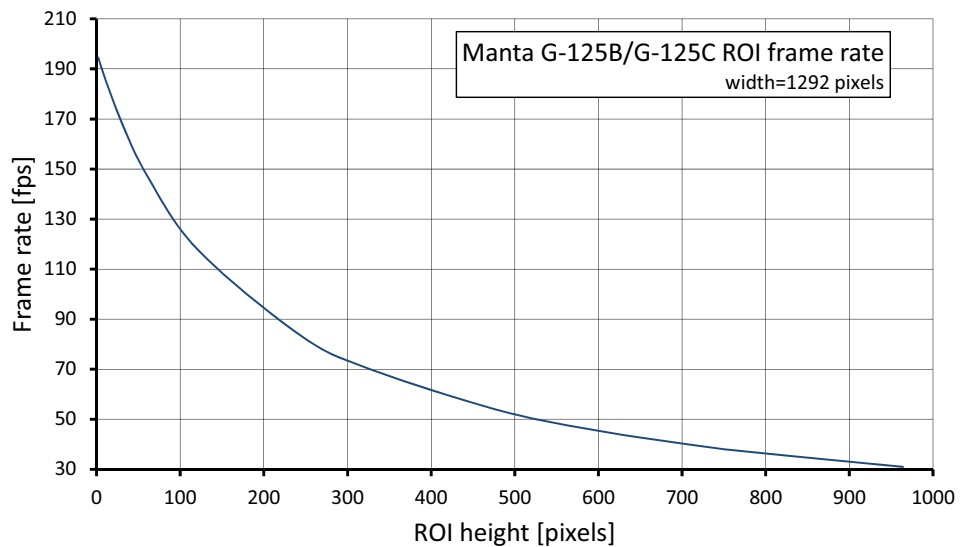Maximum frame rate at full resolution according formula: 31.0 fps

Figure 15: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
964	31.0	240	84.4
768	37.4	120	118.1
720	39.4	60	147.6
600	45.4	30	168.6
480	53.7	10	186.3
320	70.9	2	194.5

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 11: Frame rate as a function of ROI height table

Manta G-145B, G-145C (including 30 fps variants)

Feature	Specification	
Resolution	1388 (H) x 1038 (V) 1.4 MP	
Sensor	Manta G-145B: Sony ICX285AL with EXview HAD CCD™ technology	Manta G-145C: Sony ICX285AQ with EXview HAD CCD™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 2/3 11.0 mm diagonal	
Cell size	6.45 µm x 6.45 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	Manta G-145B: 15 fps Manta G-145B-30fps: 30.1 fps	Manta G-145C: 15 fps Manta G-145C-30fps: 30.1 fps
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Monochrome formats	Manta G-145B: Mono8, Mono12, Mono12Packed	Manta G-145C: Mono8
Color formats (YUV)	Manta G-145B: N/A	Manta G-145C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-145B: N/A	Manta G-145C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-145B: N/A	Manta G-145C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	Manta G-145B, G-145C: 43 µs to 60 s Manta G-145B-30fps, G-145C-30fps: 38 µs to 60 s	
Gain control	0 to 33 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical:1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	

Table 12: Manta G-145B, G-145C (including 30 fps variants) camera specifications

Feature	Specification
RS232	1 TxD, 1 RxD
Voltage requirements	8 to 30 VDC; PoE
Power consumption	Manta G-145B, G-145C: 3.7 W @ 12 VDC; 4.3 W PoE Manta G-145B-30fps, G-145C-30fps: 4.5 W @ 12 VDC; 5.3 W PoE
Trigger latency[1]	Manta G-145B, G-145C: Idle state: 19.3 µs; Frame valid state: 45.2 µs Manta G-145B-30fps, G-145C-30fps: Idle state: 12.6 µs; Frame valid state: 25.6 µs
Trigger jitter[1]	Manta G-145B, G-145C: Idle state: 9.8 µs; Frame valid state: 35.7 µs Manta G-145B-30fps, G-145C-30fps: Idle state: 6.9 µs; Frame valid state: 19.9 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 12: Manta G-145B, G-145C (including 30 fps variants) camera specifications
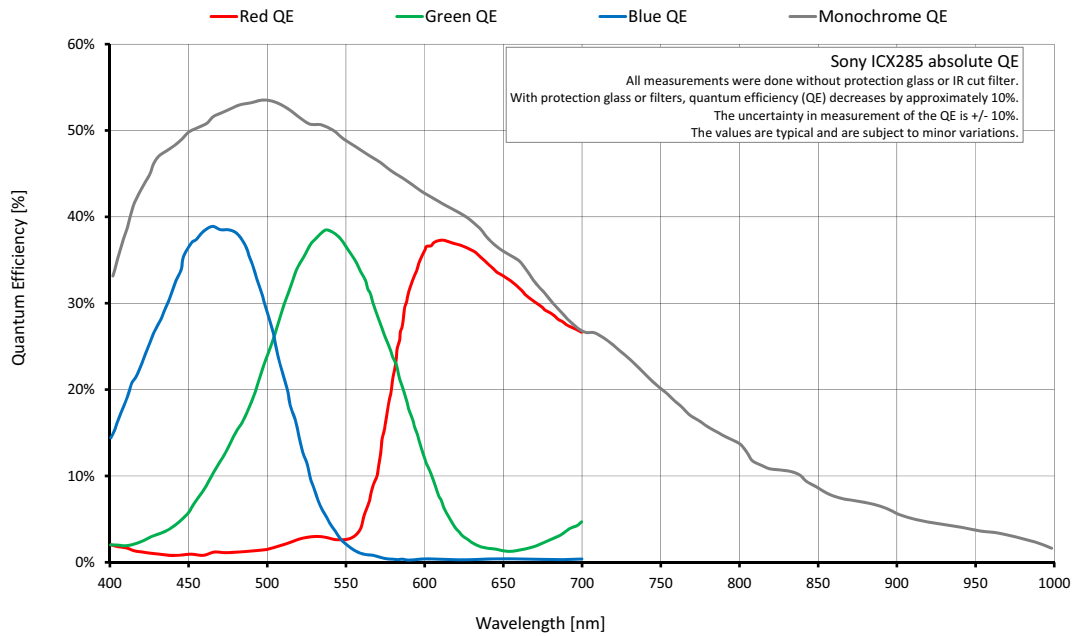
Absolute QE

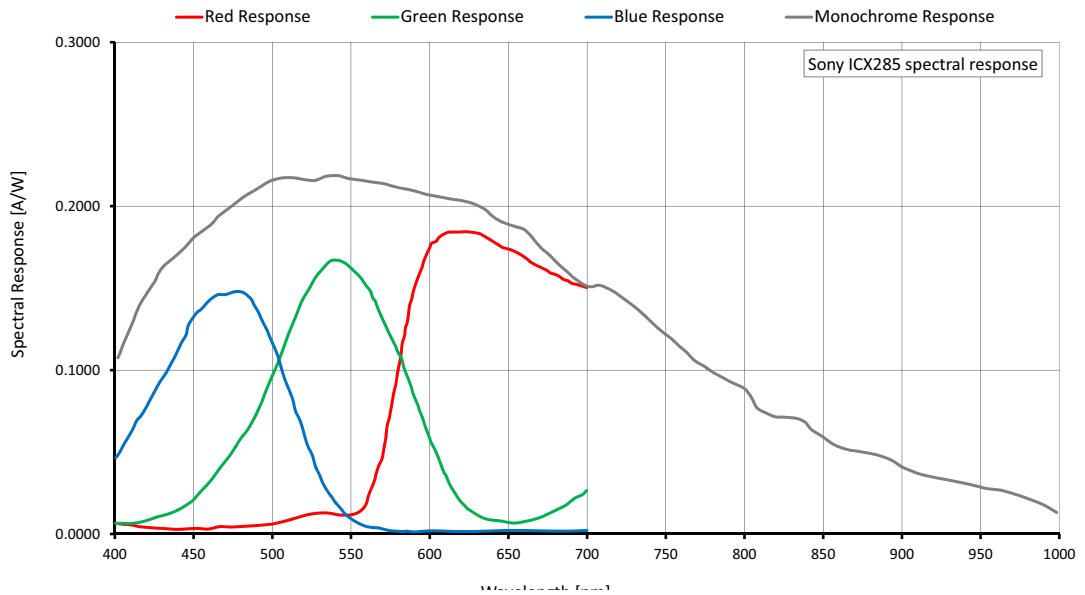*Figure 16: Manta G-145B, G-145C (Sony ICX285) absolute QE*

Spectral response

Figure 17: Manta G-145B, G-145C (Sony ICX285) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{63.39\mu s \times \text{ROI height} + 5.86\mu s \times (1038 - \text{ROI height}) + 491.75\mu s}$$

Maximum frame rate at full resolution according formula: 15.0 fps

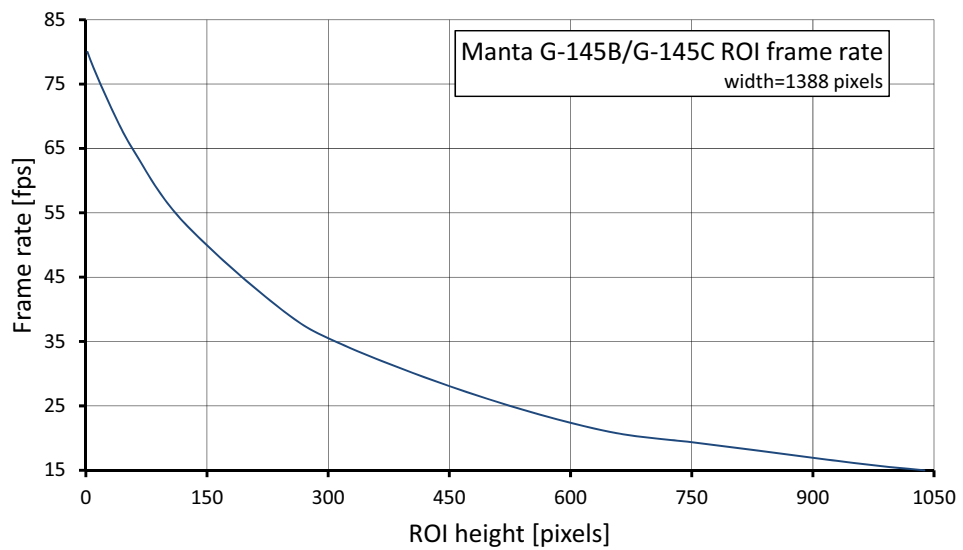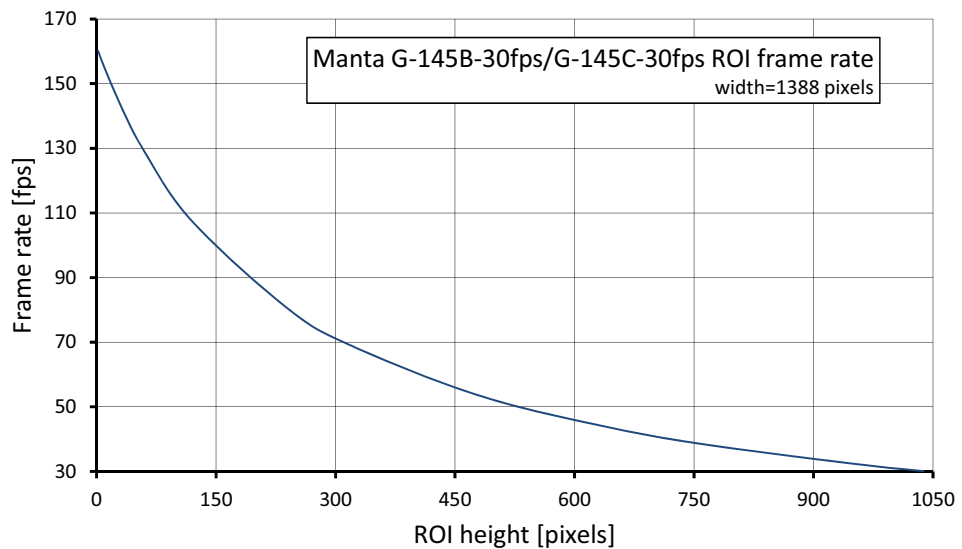*Figure 18: Frame rate as a function of ROI height plot*

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1038	15.0	240	40.2
960	16.0	120	53.7
768	19.1	60	64.5
640	21.2	30	71.7
480	26.8	10	77.4
320	34.4	2	80.0

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 13: Frame rate as a function of ROI height table

ROI frame rate for 30 fps variants

$$\text{Max. frame rate} = \frac{1}{31.7\mu s \times \text{ROI height} + 4.71\mu s \times (1038 - \text{ROI height}) + 245.88\mu s}$$

Maximum frame rate at full resolution according formula: 30.1 fps

Figure 19: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1038	30.1	240	80.4
960	32.1	120	107.4
768	38.2	60	129.0
640	43.8	30	143.4
480	53.5	10	154.9
320	68.9	2	160.1

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 14: Frame rate as a function of ROI height table

Manta G-145B NIR

Feature	Specification
Resolution	1388 (H) x 1038 (V) 1.4 MP
Sensor	Sony ICX285AL with EXview HAD CCD™ technology
Type	Interline CCD, Progressive Scan
Sensor size	Type 2/3 11.0 mm diagonal
Cell size	6.45 µm x 6.45 µm
Lens mount	Standard: C-Mount Optional: See the Modular Concept
Housing variants	Standard: Straight view Optional: See the Modular Concept
Maximum frame rate at full resolution	15.0 fps (NIR mode: Off/On_Fast) 13.9 fps (NIR mode: On_HighQuality)
Maximum image bit depth	12-bit
Image buffer	32 MB
StreamHoldCapacity	Up to 22 frames at full resolution
Monochrome formats	Mono8, Mono12, Mono12Packed
Exposure control	20 µs to 60 s 28 µs to 60 s for NirMode=Off/On_Fast and ExposureMode=External
Gain control	0 to 33 dB; 0.1 dB increments
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor
Opto-isolated I/Os	2 inputs, 2 outputs
RS232	1 TxD, 1 RxD
Voltage requirements	8 to 30 VDC; PoE
Power consumption	4.2 W @ 12 VDC; 4.9 W PoE
Trigger latency[1]	Idle state: 58.7 µs; Frame valid state: 58.7 µs
Trigger jitter[1]	Idle state: 35.7 µs; Frame valid state: 35.7 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2

Table 15: Manta G-145B NIR camera specifications

Feature	Specification
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 15: Manta G-145B NIR camera specifications (continued)
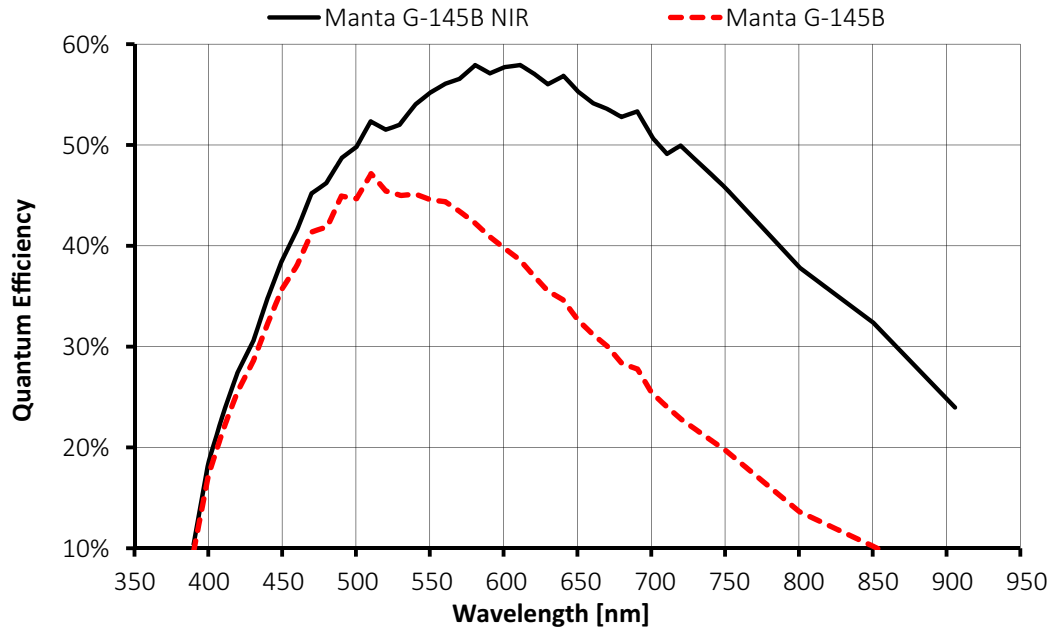
Absolute QE

Figure 20: Manta G-145B NIR (Sony ICX285) absolute QE (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B

Increase of relative response
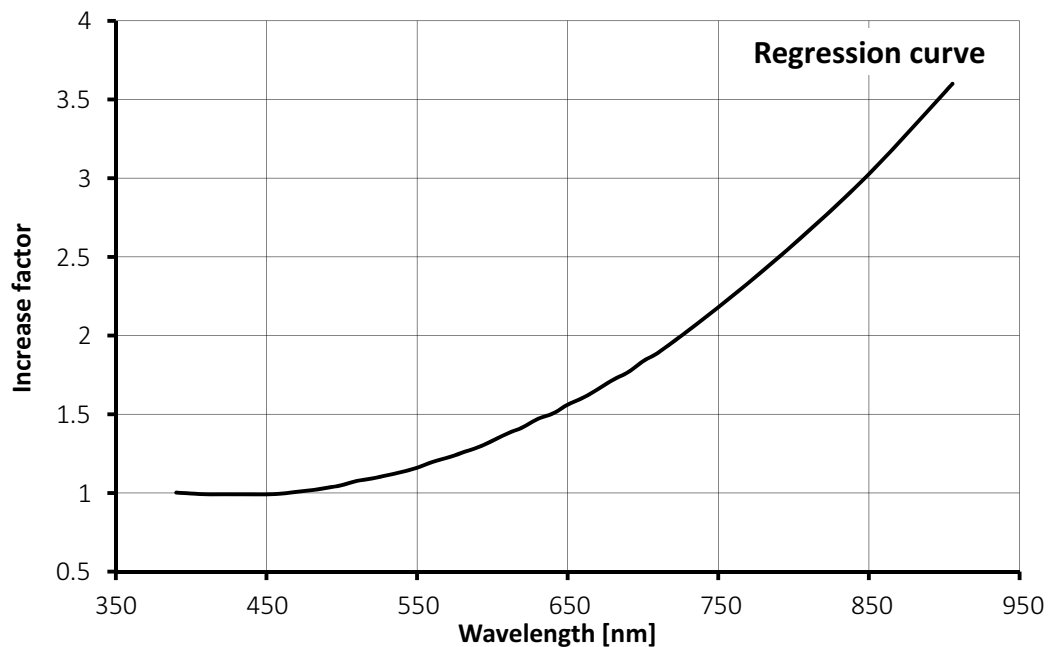
Figure 21: Increase of relative response with NIR mode set to On_HighQuality

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{\text{MAX}(63.39\mu s \times \text{ROI height} + 11.46\mu s \times (1038 - \text{ROI height}) + 644\mu s + \text{MIN}(4300;\text{Expotime});\text{Expotime} + 142.86\mu s)}$$

$$\text{Max. frame rate} = \frac{1}{63.39\mu s \times \text{ROI height} + 11.4\,\mu s \times (1038 - \text{ROI height}) + (5653.89 + \text{Expotime})\mu s}$$

Maximum frame rate at full resolution according formula:

15.0 fps for NirMode=Off/On_Fast

13.9 fps for NirMode=On_HighQuality
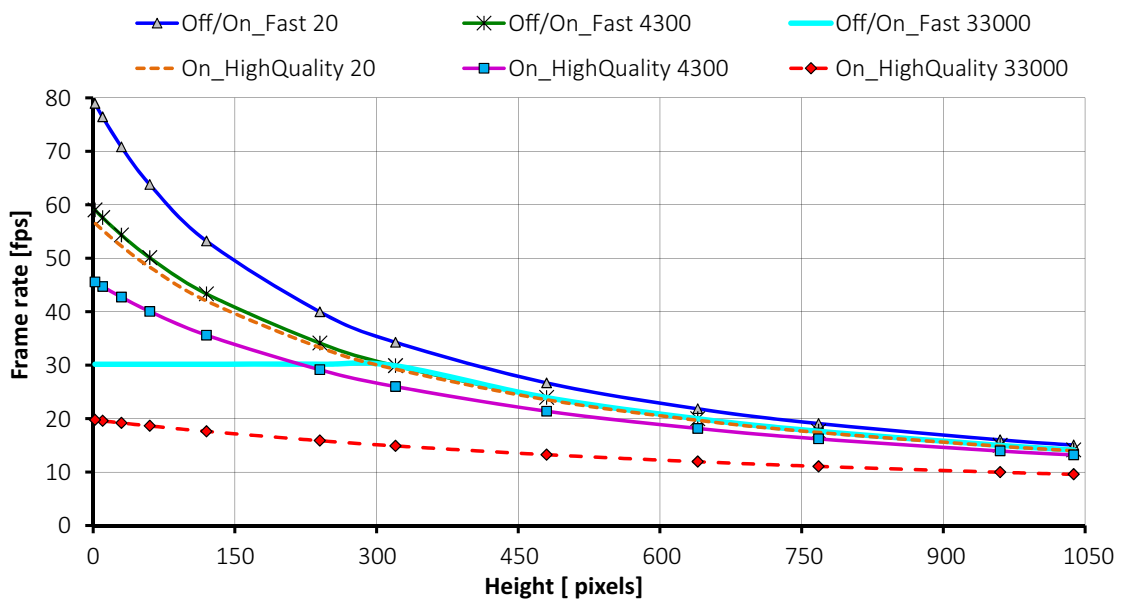
Figure 22: Frame rate as a function of ROI height [width=1388], NirMode and exposure time / μs

NirMode Exp. time/µs	Off/On_Fast 20	Off/On_Fast 4300	Off/On_Fast 33000	On_HighQuality 20	On_HighQuality 4300	On_HighQuality 33000
ROI height						
1038	15.0	14.1	14.1	13.9	13.2	9.5
960	16.0	14.9	14.9	14.8	13.9	9.9
768	19.0	17.6	17.6	17.4	16.2	11.0
640	21.8	19.9	19.9	19.6	18.1	11.9
480	26.6	23.9	23.9	23.5	21.3	13.2
320	34.2	29.8	29.8	29.2	25.9	14.8
240	39.9	34.1	30.1	33.2	29.1	15.8
120	53.2	43.3	30.1	42.0	35.6	17.6
60	63.7	50.1	30.1	48.3	40.0	18.6
30	70.8	54.3	30.1	52.2	42.7	19.1
10	76.4	57.5	30.1	55.2	44.7	19.5
2	78.9	59.0	30.1	56.5	45.5	19.7

Manta G-146B, G-146C

Feature	Specification	
Resolution	1388 (H) x 1038 (V) 1.4 MP	
Sensor	Manta G-146B: Sony ICX267AL with Wfine CCD™ HAD technology	Manta G-146C: Sony ICX267AK with Wfine CCD™ HAD technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/2 8.0 mm diagonal	
Cell size	4.65 µm x 4.65 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	17.8 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Monochrome formats	Manta G-146B: Mono8, Mono12, Mono12Packed	Manta G-146C: Mono8
Color formats (YUV)	Manta G-146B: N/A	Manta G-146C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-146B: N/A	Manta G-146C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-146B: N/A	Manta G-146C: BayerGB8, BayerGB12Packed, BayerGB12
Exposure control	31 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 output	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE	
Trigger latency[1]	Idle state: 21.1 µs; Frame valid state: 42.7 µs	
Trigger jitter[1]	Idle state: 9.2 µs; Frame valid state: 30.8 µs	

Table 16: Manta G-146B, G-146C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 16: Manta G-146B, G-146C camera specifications (continued)
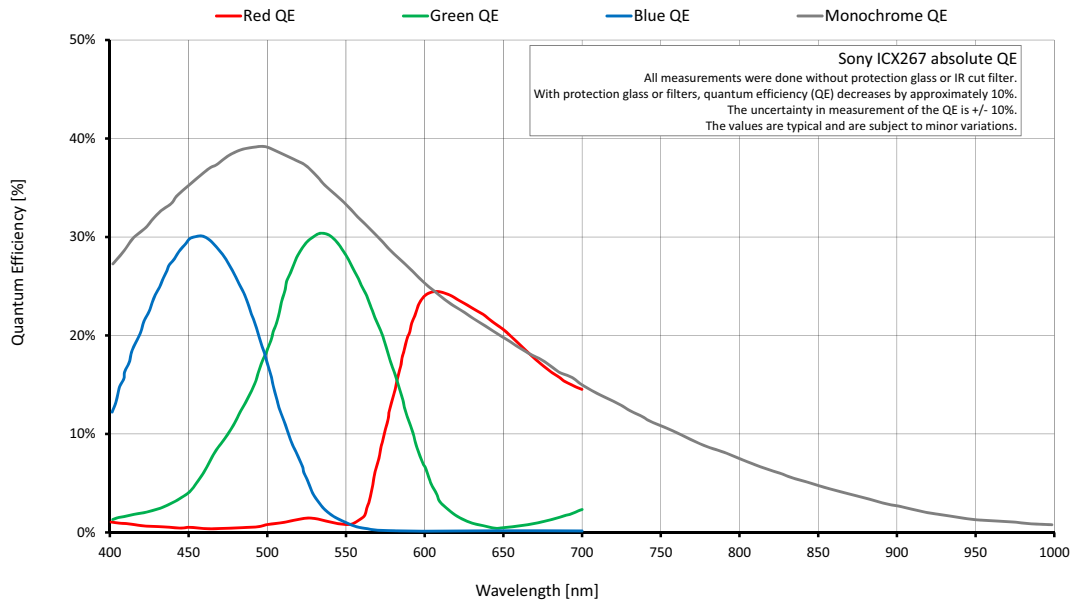
Absolute QE

Figure 23: Manta G-146B, G-146C (Sony ICX267) absolute QE

Spectral response
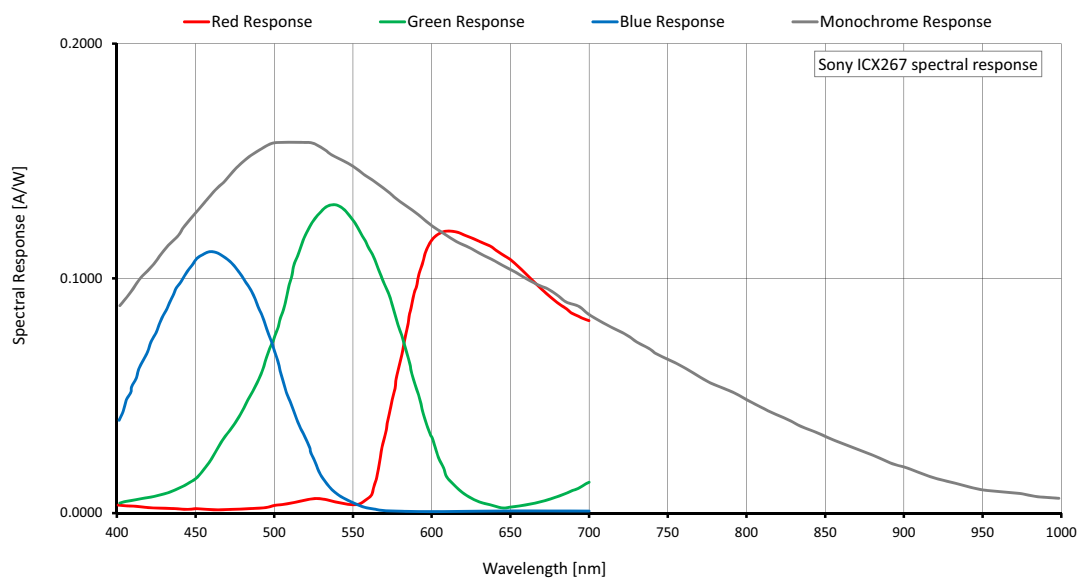
Figure 24: Manta G-146B, G-146C (Sony ICX267) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{53.54\,\mu s \times \text{ROI height} + 10.46\,\mu s \times (1038 - \text{ROI height}) + 352\,\mu s}$$

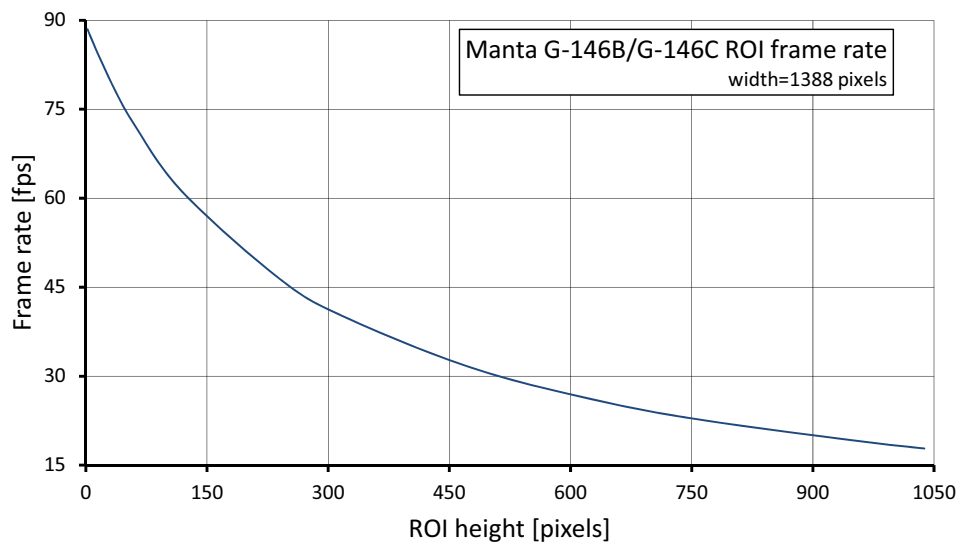Maximum frame rate at full resolution according formula: 17.8 fps

Figure 25: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]
1038	17.8
960	19.0
768	22.5
640	25.7
480	31.3
320	40.0

Height [pixels]	Frame rate [fps][1]
240	46.4
120	61.0
60	72.4
30	79.9
10	85.9
2	88.5

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 17: Frame rate as a function of ROI height tables

Manta G-201B, G-201C (including 30 fps variants)

Feature	Specification	
Resolution	1624 (H) x 1234 (V) 2 MP	
Sensor	Manta G-201B: Sony ICX274AL with Super HAD CCD technology	Manta G-201C: Sony ICX274AQ with Wfine CCD™ Super HAD technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/1.8 8.923 mm diagonal	
Cell size	4.4 µm x 4.4 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	Manta G-201B, G-201C: 14.7 fps Manta G-201B-30fps, G-201C-30fps: 30.0 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 16 frames at full resolution	
Monochrome formats	Manta G-201B: Mono8, Mono12Packed, Mono12	Manta G-201C: Mono8
Color formats (YUV)	Manta G-201B: N/A	Manta G-201C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-201B: N/A	Manta G-201C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-201B: N/A	Manta G-201C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	Manta G-201B, 201C: 51 µs to 60 s Manta G-201B, G-201C-30fps: 10 µs to 60	
Gain control	0 to 31 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical:1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	

Table 18: Manta G-201B, G-201C (including 30 fps variants) camera specifications

Feature	Specification
Power consumption	Manta G-201B, G-201C: 3.6 W @ 12 VDC; 4.2 W PoE Manta G-201B-30fps, G-201C-30fps: 4.6 W @ 12 VDC; 5.4 W PoE
Trigger latency[2]	Manta G-201B, G-201C: Idle state: 17.0 µs; Frame valid state: 40.8 µs Manta G-201B-30fps, G-201C-30fps: Idle state: 9.4 µs; Frame valid state: 21.4 µs
Trigger jitter[2]	Manta G-201B, G-201C: Idle state: 7.6 µs; Frame valid state: 31.4 µs Manta G-201B-30fps, G-201C-30fps: Idle state: 5.4 µs; Frame valid state: 17.4 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

1 Manta G-201B, G-201C-30fps has RGB8Packed and BGR8Packed only

[2] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 18: Manta G-201B, G-201C (including 30 fps variants) camera specifications
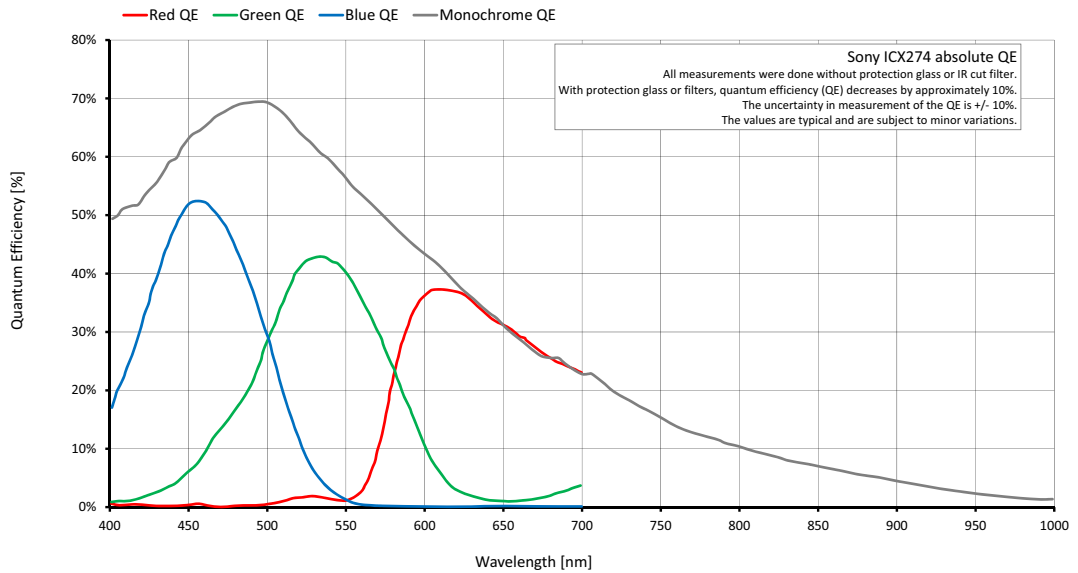
Absolute QE

Figure 26: Manta G-201B, G-201C (Sony ICX274) absolute QE
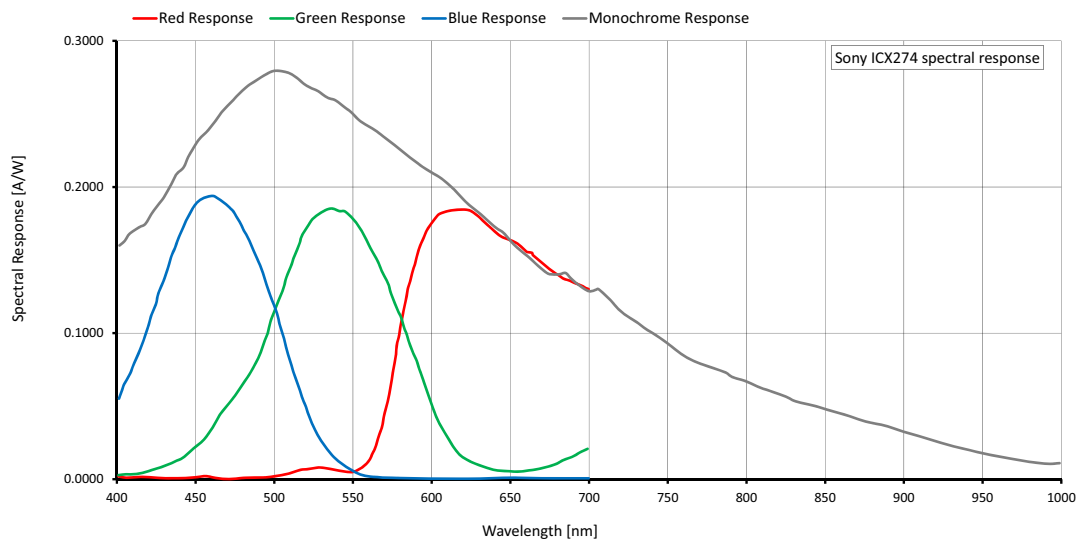
Figure 27: Manta G-201B, G-201C (Sony ICX274) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{54.81\mu s \times \text{ROI height} + 7.14\mu s \times (1234 - \text{ROI height}) + 340.03\mu s}$$

Maximum frame rate at full resolution according formula: 14.7 fps

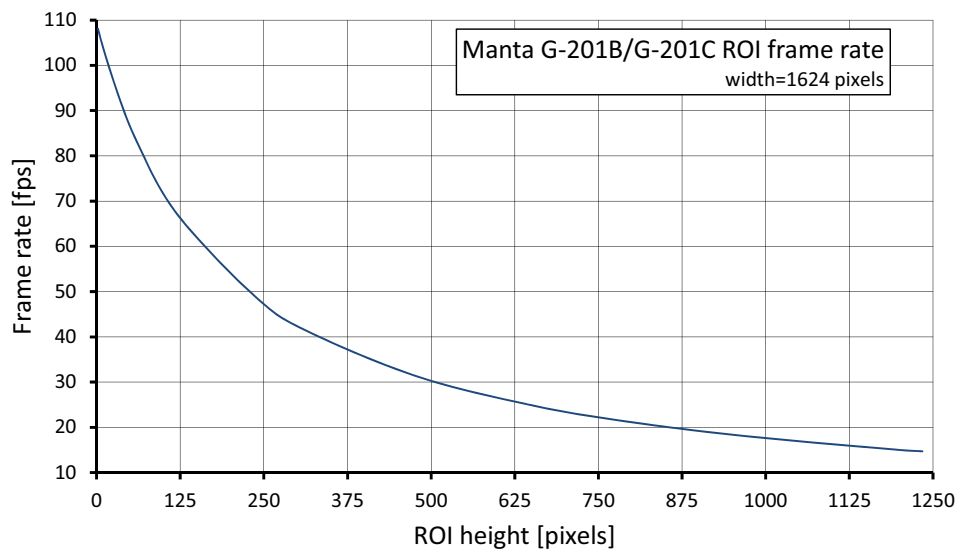*Figure 28: Frame rate as a function of ROI height plot*

Height [pixels]	Frame rate [fps][1]		Height [pixels]	Frame rate [fps][1]
1234	14.7		240	48.5
1200	15.0		120	67.2
960	18.2		60	83.2
768	21.8		30	94.5
640	25.2		10	103.8
480	31.2		2	108.1
320	40.9			

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 19: Frame rate as a function of ROI height table

ROI frame rate for 30 fps variants

$$\text{Max. frame rate} = \frac{1}{26.87\mu s \times \text{ROI height} + 2.84\mu s \times (1234 - \text{ROI height}) + 178.72\mu s}$$

Maximum frame rate at full resolution according formula: 30.0 fps

Maximum frame rate at 1600 x 1200 (measured): 31.0 fps
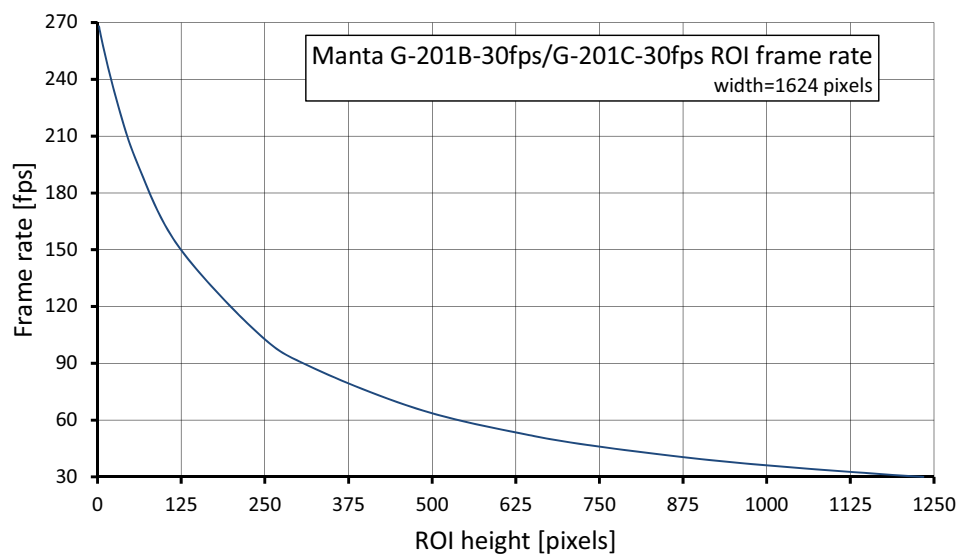
Figure 29: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]
1234	30.0
1200	30.7
960	37.3
768	45.1
640	52.4
480	65.7
320	87.9

Height [pixels]	Frame rate [fps][1]
240	105.8
120	152.2
60	195.1
30	227.0
10	254.8
2	268.0

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 20: Frame rate as a function of ROI height table

Manta G-223B, G-223B NIR, G-223C

Feature	Specification	
Resolution	2048 (H) x 1088 (V) 2.2 MP	
Sensor	CMOSIS CMV2000 with microlens and global shutter	
Type	CMOS	
Sensor size	Type 2/3 12.7 mm diagonal	
Cell size	5.5 µm x 5.5 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	53.7 fps @ 124 MB/s; 60.1 burst mode[1]	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 59 frames at full resolution	
Monochrome formats	Manta G-223B, G-223B NIR: Mono8, Mono12, Mono12Packed	Manta G-223C: Mono8
Color formats (YUV)	Manta G-223B, G-223B NIR: N/A	Manta G-223C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-223B, G-223B NIR: N/A	Manta G-223C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-223B, G-223B NIR: N/A	Manta G-223C: BayerGB8, BayerGB12Packed, BayerGB12
Exposure control	$18\ \mu s^2$ to 126 s; 1 µs increments	
Gain control	0 to 26 dB; 0.1 dB increments	
Binning	N/A	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	
Storage temperature	-10°C to +70°C ambient temperature (without condensation)	
Body dimensions (L x W x H)	86.4 x 44 x 29 mm	

Table 21: Manta G-223B, G-223B NIR, G-223C camera specifications

Feature	Specification
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] For more information on `StreamFrameRateConstrain`, see the GigE Features Reference.

[2] Camera firmware v1.52.8151 shows minimum exposure values without frame overhead time, i.e., 1 μs. See sensor data sheet for details on frame overhead time. This will be fixed in the next firmware release.

Table 21: Manta G-223B, G-223B NIR, G-223C camera specifications (continued)
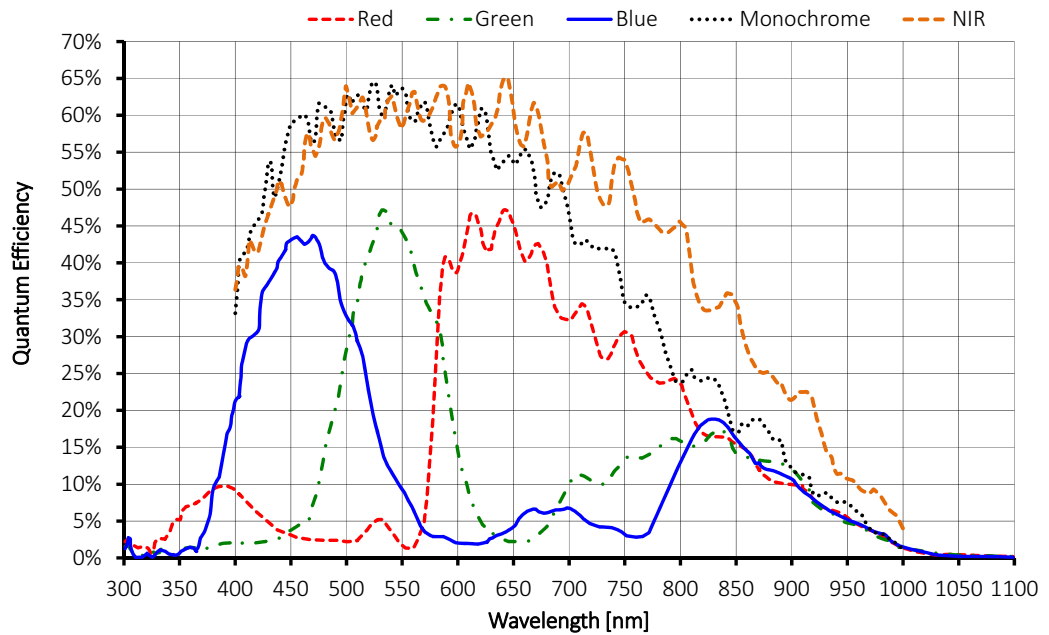
Absolute QE

Figure 30: Manta G-223B/G-223B NIR/G-223C (CMOSIS CMV2000) absolute QE (without IR cut filter)

ROI frame rate

Maximum frame rate at 2048 (H) x 1088 (V) (measured): 53.7 fps
(higher frame rates are possible with burst mode)
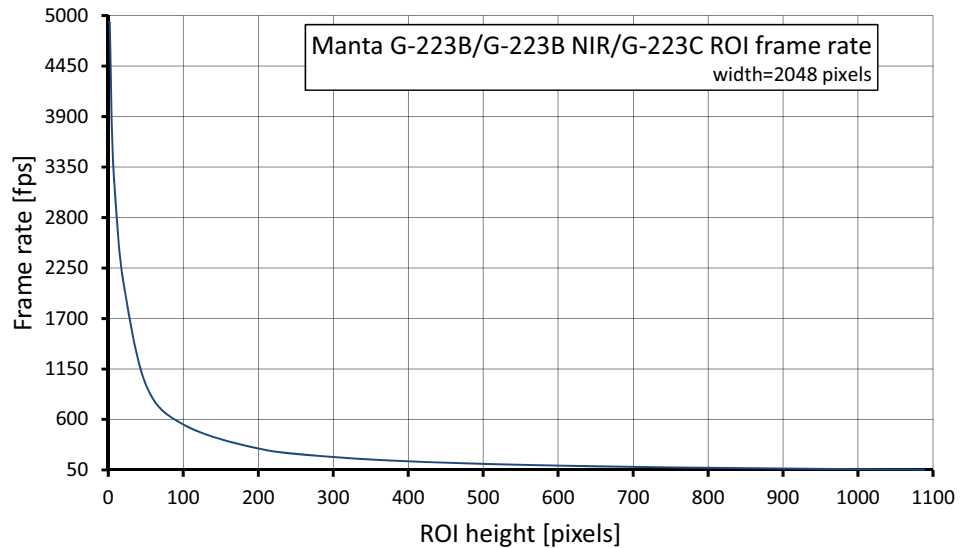
Figure 31: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1088	53.7	200	283.1
1000	58.4	100	545.2
900	64.8	50	981.3
800	72.8	20	2105.2
700	83.1	10	2949.8
600	96.8	5	3690.0
500	115.9	2	4926.1
400	144.3	1	4926.1
300	191.1		

[1] There will be an increase in frame rate with reduced width if the camera is bandwidth limited.

Table 22: Frame rate as a function of ROI height table

Manta G-235B, G-235C

Feature	Specification	
Resolution	1936 (H) x 1216 (V) 2.4 MP	
Sensor	Manta G-235B: Sony IMX174LLJ Exmor with Pregius® global shutter	Manta G-235C: Sony IMX174LQJ Exmor with Pregius® global shutter
Type	CMOS, Progressive Scan	
Sensor size	Type 1/1.2 13.4 mm diagonal	
Cell size	5.86 µm x 5.86 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	50.77 fps @ 124 MB/s 57.52 fps burst mode[1]	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 56 frames at full resolution	
Monochrome formats	Manta G-235B: Mono8, Mono12Packed, Mono12	Manta G-235C: Mono8
Color formats (YUV)	Manta G-235B: N/A	Manta G-235C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-235B: N/A	Manta G-235C: RGB8Packed, BGR8Packed
RAW formats	Manta G-235B: N/A	Manta G-235C: BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	Manta G-235B: • Mono8, Mono12Packed: 41 µs to 86 s in 14 µs increments • Mono12: 50 µs to 86 s in 18 µs increments	Manta G-235C: • Mono8, BayerRG8, BayerRG12Packed, YUV411Packed: 41 µs to 86 s in 14 µs increments • BayerRG12, YUV422Packed: 50 µs to 86 s in 18 µs increments • RGB8Packed, BGR8Packed, YUV444Packed: 69 µs to 86 s in 28 µs increments
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	

Table 23: Manta G-235B, G-235C camera specifications

Feature	Specification
RS232	1 TxD, 1 RxD
Voltage requirements	8 to 30 VDC; PoE
Power consumption	2.8 W @ 12 VDC; 3.3 W PoE
Trigger latency[2]	RGB8Packed, BGR8Packed, YUV444Packed: 83.41 µs
	Mono12, BayerRG12, YUV422Packed: 55.14 µs
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed: 41.8 µs
Trigger jitter[2]	RGB8Packed, BGR8Packed, YUV444Packed: 13.8 µs
	Mono12, BayerRG12, YUV422Packed: 9.2 µs
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed: 6.9 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] For more information on `StreamFrameRateConstrain`, see the GigE Features Reference.

[2] These values are calculated directly from the microcontroller source. These values are only valid for pixel formats < 16-bit per pixel and applicable in both Idle and Frame valid states:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 23: Manta G-235B, G-235C camera specifications (continued)

Absolute QE

All measurements were done without protection glass or IR cut filter.
With protection glass or filters, quantum efficiency (QE) decreases by approximately 10%.
The uncertainty in measurement of the QE is +/- 10%.
The values are typical and are subject to minor variations.
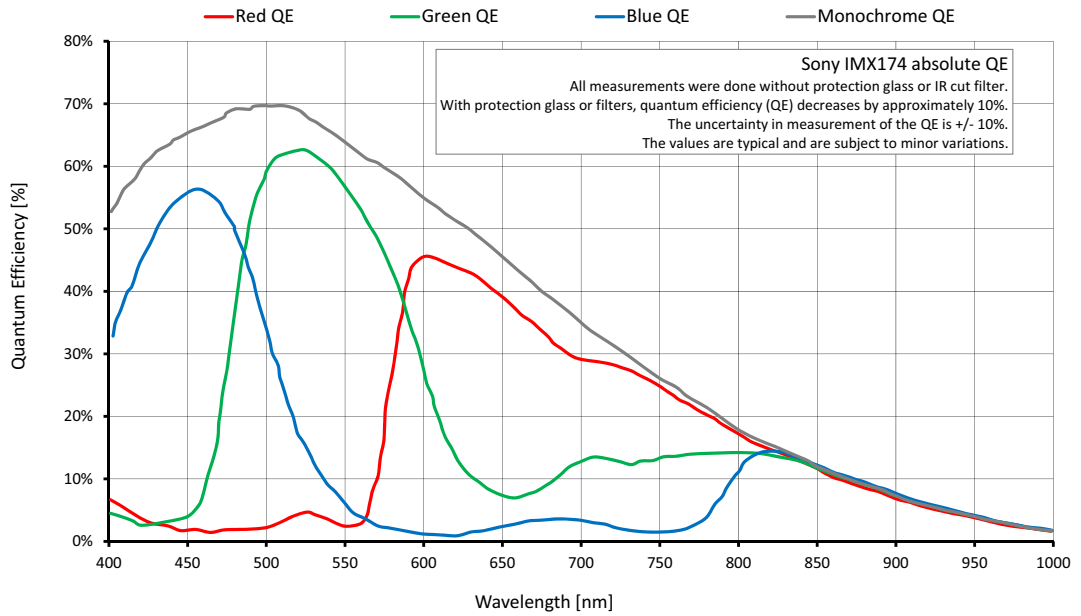
Figure 32: Manta G-235B, G-235C (Sony IMX174) absolute QE

Spectral response
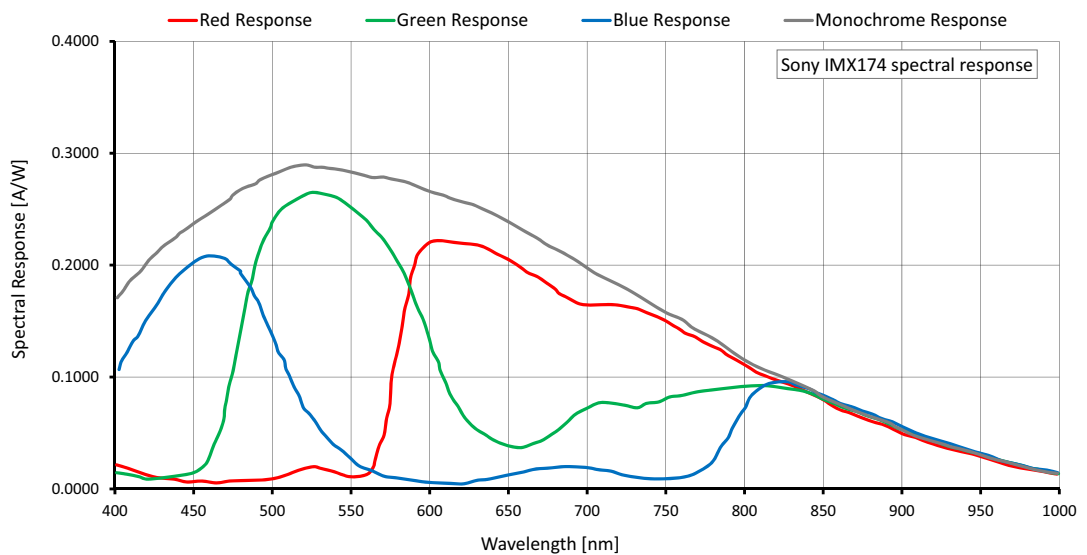
Figure 33: Manta G-235B, G-235C (Sony IMX174) spectral response

ROI frame rate

Maximum frame rate at 1936 x 1216 (measured): 50.77 fps
(higher frame rates are possible with burst mode)
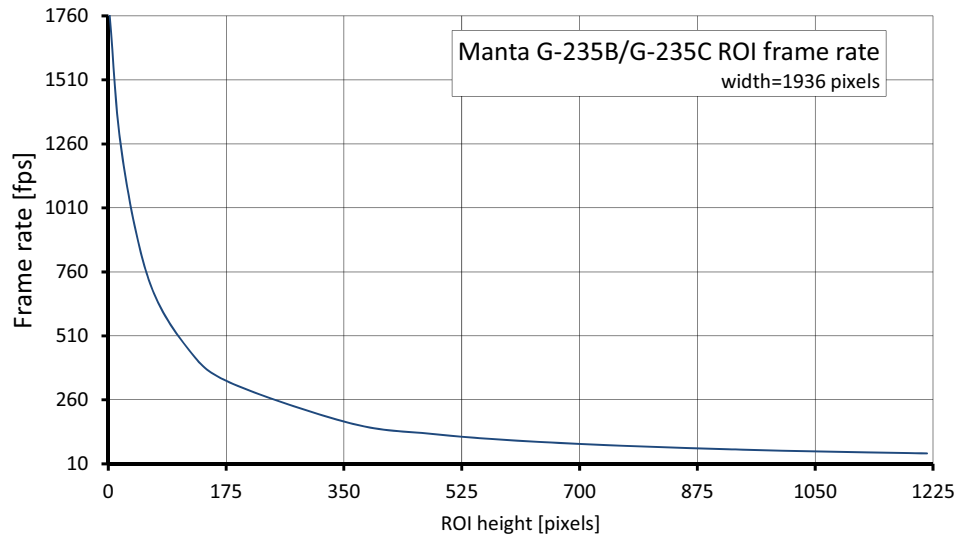
Figure 34: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1216	50.77	360	168.42
1080	57.07	180	328.42
1024	60.11	120	454.44
960	64.11	60	729.87
768	80.19	20	1224.59
600	101.91	2	1762.12
480	127.2		

[1] There will be an increase in frame rate with reduced width if the camera is bandwidth limited. Reducing the exposure time may result in higher frame rates.

Table 24: Frame rate as a function of ROI height table

Manta G-282B, G-282C

Feature	Specification	
Resolution	1936 (H) x 1458 (V) 2.8 MP	
Sensor	Manta G-282B: Sony ICX687ALA with EXview HAD CCD II™ technology	Manta G-282C: Sony ICX687AQA with EXview HAD CCD II™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/1.8 8.918 mm diagonal	
Cell size	3.69 µm x 3.69 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	30.4 fps	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Monochrome formats	Manta G-282B: Mono8, Mono12, Mono12Packed	Manta G-282C: Mono8
Color formats (YUV)	Manta G-282B: N/A	Manta G-282C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-282B: N/A	Manta G-282C: RGB8Packed, BGR8Packed
RAW formats	Manta G-282B: N/A	Manta G-282C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.5 W @ 12 VDC; 4.1 W PoE	
Trigger latency[1]	Idle state: 7.2 µs; Frame valid state: 18.4 µs	
Trigger jitter[1]	Idle state: 4.0 µs; Frame valid state: 15.2 µs	
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)	

Table 25: Manta G-282B/G-282C camera specifications

Feature	Specification
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

*Table 25: Manta G-282B/G-282C camera specifications (continued)*
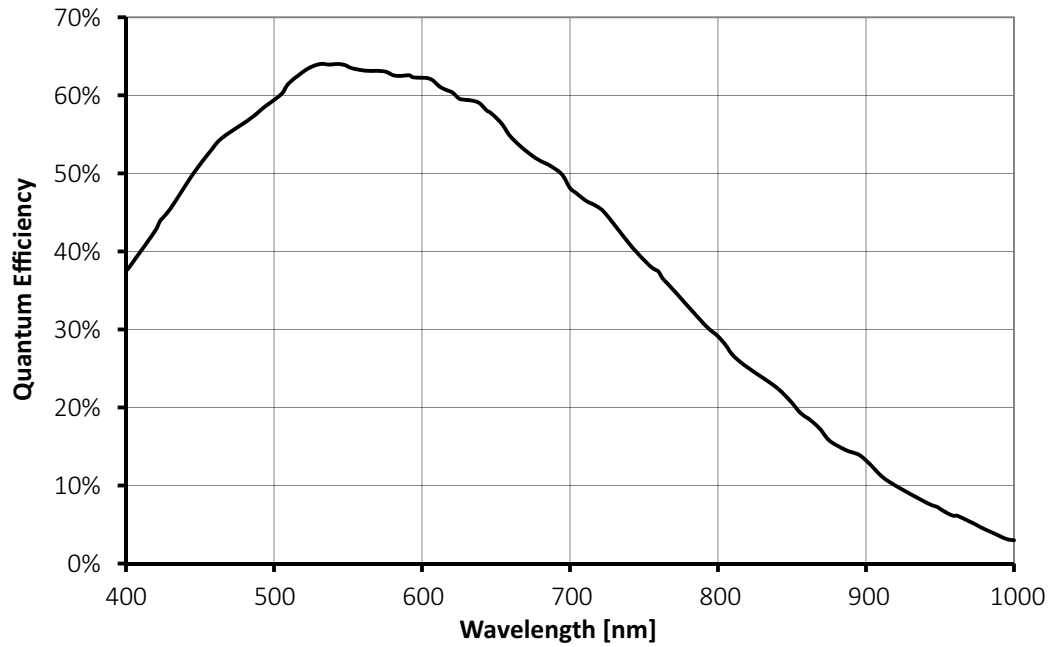
Absolute QE

Figure 35: Manta G-282B (Sony ICX687) absolute QE (without protection/cover glass)
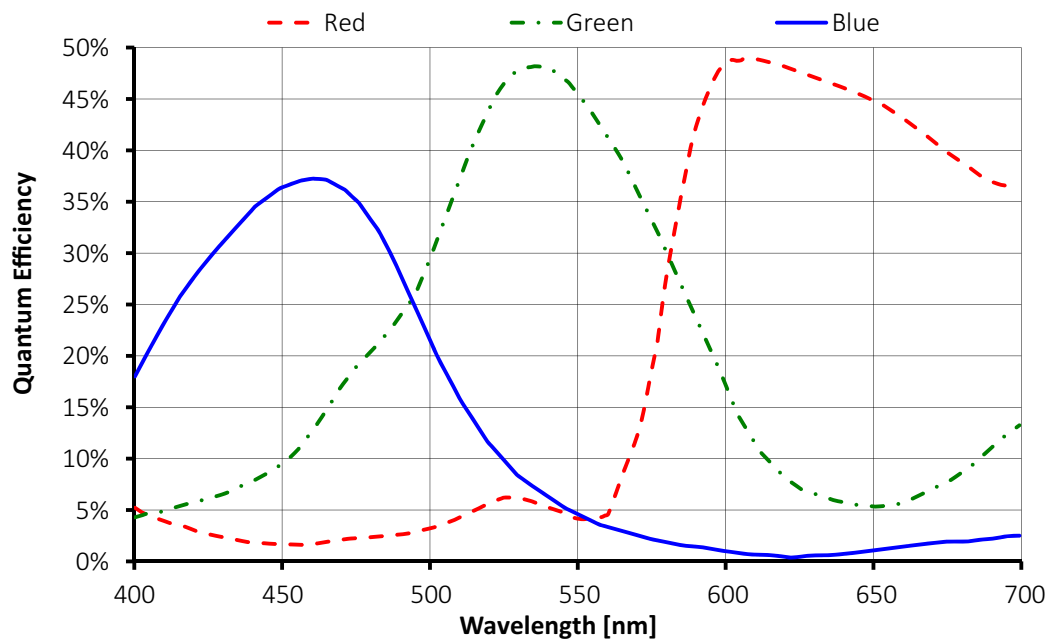
Figure 36: Manta G-282C (Sony ICX687) absolute QE (without IR cut filter)

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{22.27\mu s \times \text{ROI height} + 4.36\mu s \times (1459 - \text{ROI height}) + 221.78\mu s}$$

Maximum frame rate at full resolution according formula: 30.4 fps

Figure 37: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]
1458	30.4
1200	35.4
960	41.9
768	49.1
640	55.4
480	66.1
320	81.8

Height [pixels]	Frame rate [fps][1]
240	92.8
120	116.3
60	133.2
30	143.6
10	151.5
2	154.9

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 26: Frame rate as a function of ROI height table

Manta G-283B, G-283C

Feature	Specification	
Resolution	1936 (H) x 1458 (V) 2.8 MP	
Sensor	Manta G-283B: Sony CCD ICX674ALG with EXview HAD CCD II™ technology	Manta G-283C: Sony CCD ICX674AQG with EXview HAD CCD II™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 2/3 10.972 mm diagonal	
Cell size	4.54 µm x 4.54 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	30.4 fps	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Monochrome formats	Manta G-283B: Mono8, Mono12, Mono12Packed	Manta G-283C: Mono8
Color formats (YUV)	Manta G-283B: N/A	Manta G-283C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-283B: N/A	Manta G-283C: RGB8Packed, BGR8Packed
RAW formats	Manta G-283B: N/A	Manta G-283C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 33 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.7 W @ 12 VDC; 4.3 W PoE	
Trigger latency[1]	Idle state: 7.2 µs; Frame valid state: 18.4 µs	
Trigger jitter[1]	Idle state: 4.0 µs; Frame valid state: 15.2 µs	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	

Table 27: Manta G-283B, G-283C camera specifications

Feature	Specification
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 27: Manta G-283B, G-283C camera specifications (continued)
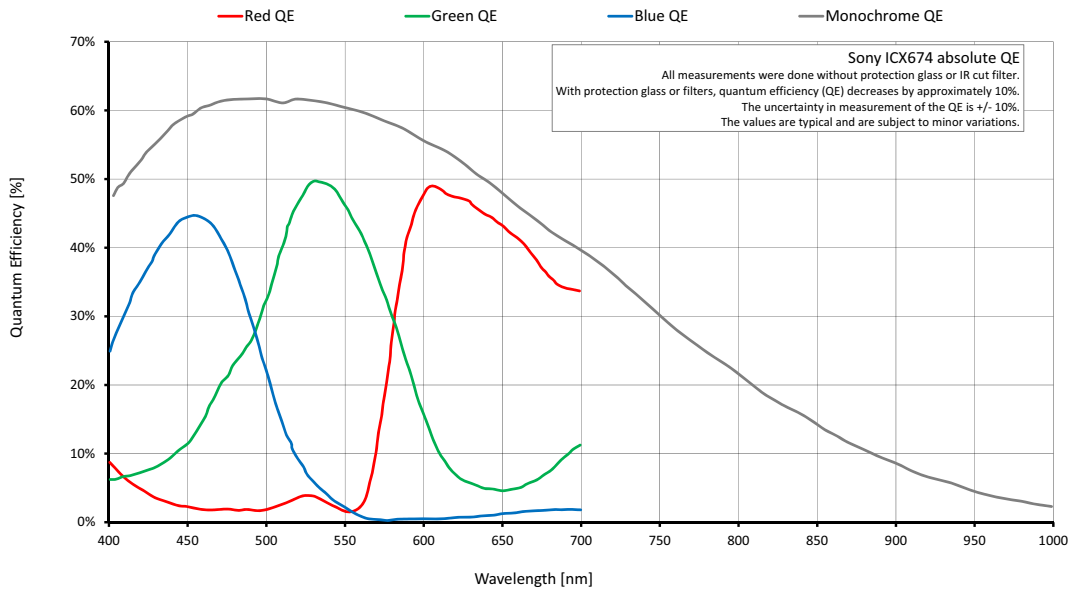
Absolute QE

Figure 38: Manta G-283B, G-283C (Sony ICX674) absolute QE

Spectral response
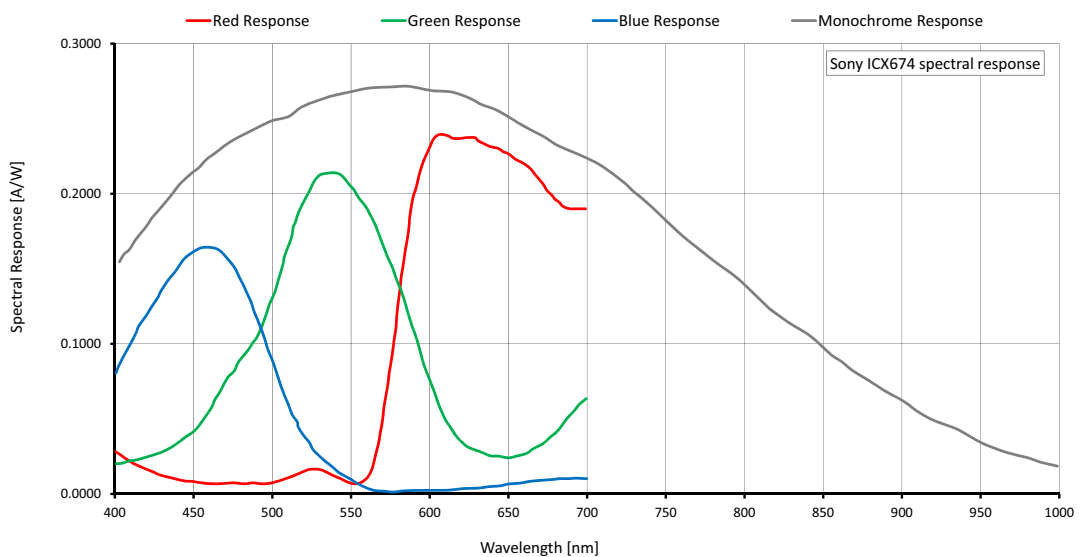
Figure 39: Manta G-283B, G-283C (Sony ICX674) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{22.27\mu s \times \text{ROI height} + 4.36\mu s \times (1459 - \text{ROI height}) + 221.78\mu s}$$

Maximum frame rate at full resolution according formula: 30.4 fps

Figure 40: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1458	30.4	240	92.8
1200	35.4	120	116.3
960	41.9	60	133.2
768	49.1	30	143.6
640	55.4	10	151.5
480	66.1	2	154.9
320	81.8		

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 28: Frame rate as a function of ROI height table

Manta G-319B, G-319C

Feature	Specification	
Resolution	2064 (H) x 1544 (V) 3.2 MP	
Sensor	Manta G-319B: Sony IMX265LLR-C Exmor with Pregius® global shutter	Manta G-319C: Sony IMX265LQR-C Exmor with Pregius® global shutter
Type	CMOS, Progressive Scan	
Sensor size	Type 1/1.8 8.9 mm diagonal	
Cell size	3.45 µm x 3.45 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	37.61 fps @ 124 MB/s 43.31 fps burst mode[1]	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 41 frames at full resolution	
Monochrome formats	Manta G-319B: Mono8, Mono12Packed, Mono12	Manta G-319C: Mono8
Color formats (YUV)	Manta G-319B: N/A	Manta G-319C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-319B: N/A	Manta G-319C: RGB8Packed, BGR8Packed
RAW formats	Manta G-319B: N/A	Manta G-319C: BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	Manta G-319B: • Mono8: 43 µs to 79.4 s in 14.64 µs increments • Mono12: 52 µs to 79.4 s in 19.52 µs increments • Mono12Packed: 43 µs to 79.4 s in 14.64 µs increments	Manta G-319C: • Mono8, BayerRG8, BayerRG12Packed, YUV411Packed: 43 µs to 79.4 s in 14.64 µs increments • BayerRG12, YUV422Packed: 52 µs to 79.4 s in 19.52 µs increments • RGB8Packed, BGR8Packed, YUV444Packed: 72 µs to 79.4 s in 29.28 µs increments
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	

Table 29: Manta G-319B, G-319C camera specifications

Feature	Specification	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Trigger latency[2]	Manta G-319B: • Mono8, Mono12Packed: 44.21 µs • Mono12: 58.65 µs	Manta G-319C: • Mono8, BayerRG8, Bayer12Packed, YUV411Packed: 44.21 µs • BayerRG12, YUV422Packed: 58.65 µs • RGB8Packed, BGR8Packed, YUV444Packed: 88.06 µs
Trigger jitter[2]	Manta G-319B: • Mono8, Mono12Packed: 7.3 µs • Mono12: 9.7 µs	Manta G-319C: • Mono8, BayerRG8, Bayer12Packed, YUV411Packed: 7.3 µs • BayerRG12, YUV422Packed: 9.7 µs • RGB8Packed, BGR8Packed, YUV444Packed: 14.5 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	
Storage temperature	-10°C to +70°C ambient temperature (without condensation)	
Body dimensions (L x W x H)	86.4 x 44 x 29 mm	
Mass	PoE model: 200 g Non-PoE model: 190 g	
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)	
Interface standard	GigE Vision Standard V1.2	
Camera control standard	GenICam SFNC V1.2.1 compliant	
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES	

[1] For more information on `StreamFrameRateConstrain`, see the GigE Features Reference.

[2] These values are calculated directly from the microcontroller source. These values are only valid for pixel formats < 16-bit per pixel and applicable in both Idle and Frame valid states:
• Idle state: sensor is ready and camera is idle, waiting for the next trigger
• Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 29: Manta G-319B, G-319C camera specifications (continued)

Absolute QE

Figure 41: Manta G-319B, G-319C (Sony IMX265) absolute QE

Spectral response
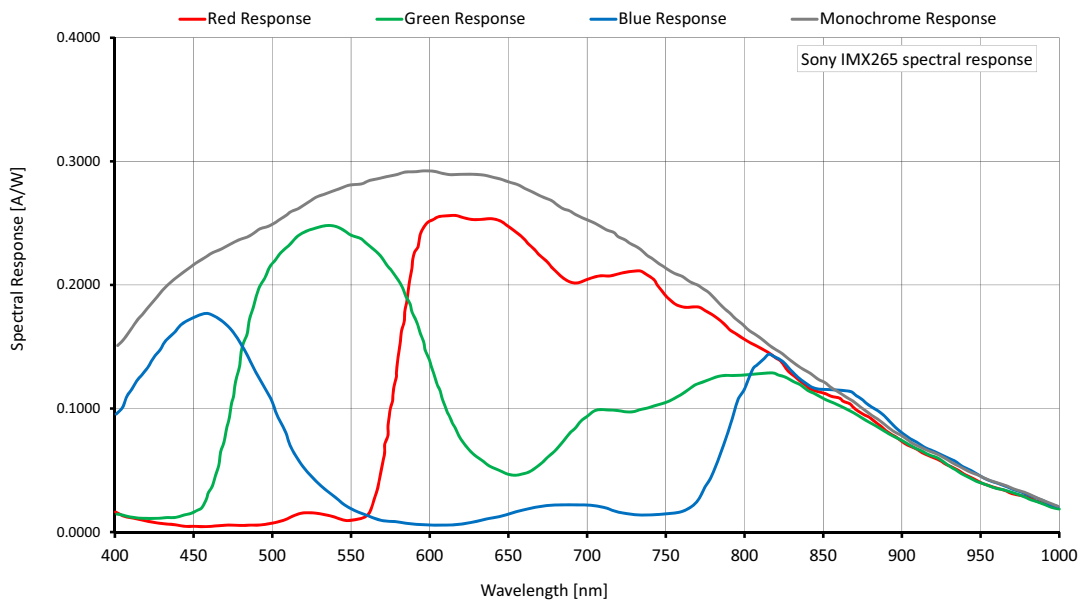
Figure 42: Manta G-319B, G-319C (Sony IMX265) spectral response

ROI frame rate

Maximum frame rate at 2064 (H) x 1544 (V) (measured): 37.61 fps
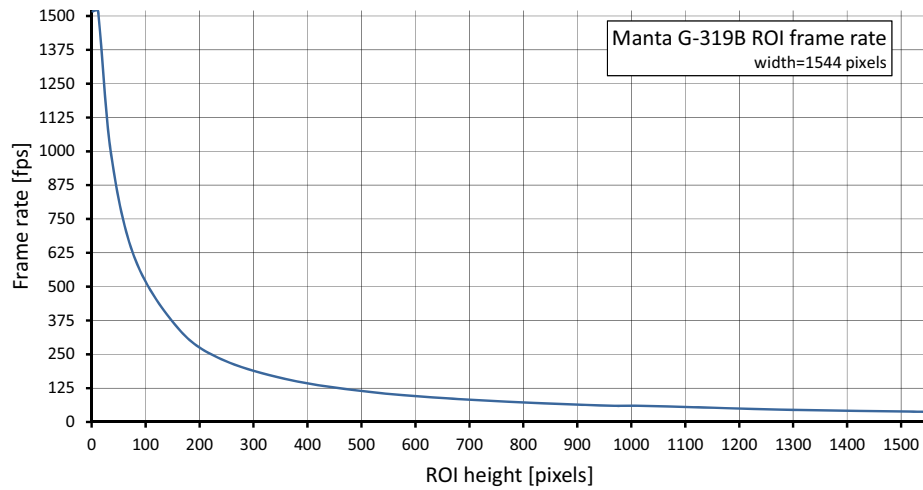(higher frame rates are possible with burst mode)

Figure 43: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
1544	37.61	360	158.48
1324	43.87	240	232.33
1280	45.32	160	346.72
1024	56.59	80	604.48
960	60.12	36	990.00
768	75.22	12	1517.00
600	95.53	2	1517.00
480	119.20		

[1] There will be an increase in frame rate with reduced width if the camera is bandwidth limited. Reducing the exposure time may result in higher frame rates.

Table 30: Frame rate as a function of ROI height table

Manta G-419B, G-419B NIR, G-419C

Feature	Specification	
Resolution	2048 (H) x 2048 (V) 4.2 MP	
Sensor	CMOSIS CMV4000 with microlens and global shutter	
Type	CMOS	
Sensor size	Type 1 16 mm diagonal	
Cell size	5.5 µm x 5.5 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	28.6 fps @ 124 MB/s 32 fps burst mode[1]	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 31 frames at full resolution	
Monochrome formats	Manta G-419B, G-419B NIR: Mono8, Mono12, Mono12Packed	Manta G-419C: Mono8
Color formats (YUV)	Manta G-419B, G-419B NIR: N/A	Manta G-419C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-419B, G-419B NIR: N/A	Manta G-419C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-419B, G-419B NIR: N/A	Manta G-419C: BayerGB8, BayerGB12Packed, BayerGB12
Exposure control[2]	34 µs to 126 s; 1 µs increments	
Gain control	0 to 26 dB; 0.1 dB increments	
Binning	N/A	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	
Storage temperature	-10°C to +70°C ambient temperature (without condensation)	
Body dimensions (L x W x H)	86.4 x 44 x 29 mm	

Table 31: Manta G-419B, G-419B NIR, G-419C camera specifications

Feature	Specification
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] For more information on `StreamFrameRateConstrain`, see the GigE Features Reference.

[2] Camera firmware v1.52.8151 shows minimum exposure values without frame overhead time, i.e., 1 µs. See sensor data sheet for details on frame overhead time. This will be fixed in the next firmware release.

Table 31: Manta G-419B, G-419B NIR, G-419C camera specifications (continued)
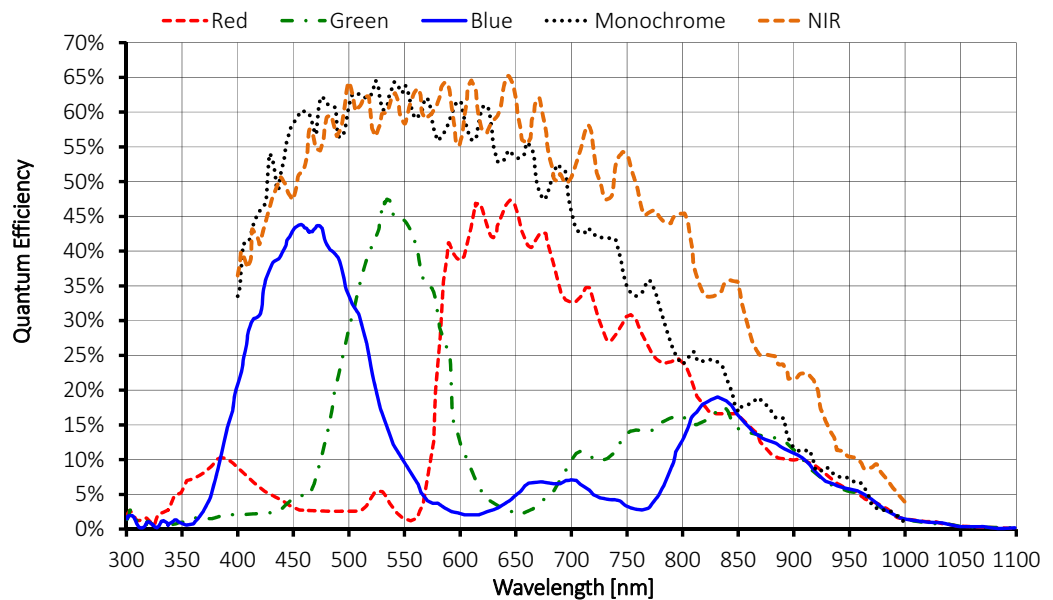
Absolute QE

Figure 44: Manta G-419B, G-419B NIR, G-419C (CMOSIS CMV4000) absolute QE

ROI frame rate

Maximum frame rate at 2048 (H) x 2048 (V) (measured): 28.6 fps
(higher frame rates are possible with burst mode)
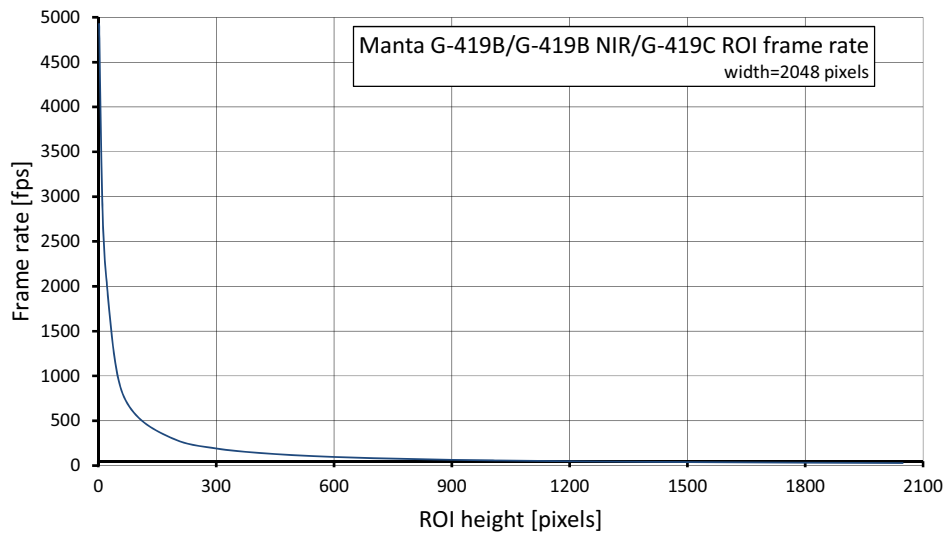
Figure 45: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]		Height [pixels]	Frame rate [fps][1]
2048	28.6		600	96.8
2000	29.3		500	115.9
1800	32.5		400	144.3
1600	36.6		300	191.1
1400	41.8		200	283.1
1200	48.7		100	545.2
1000	58.4		50	981.3
900	64.8		20	2105.2
800	72.8		10	2949.8
700	83.1		2	4926.1

[1] There will be an increase in frame rate with reduced width if the camera is bandwidth limited.

Table 32: Frame rate as a function of ROI height values

Manta G-504B, G-504C

Feature	Specification	
Resolution	2452 (H) x 2056 (V) 5 MP	
Sensor	Manta G-504B: Sony ICX655AL with Super HAD CCD™ technology	Manta G-504C: Sony ICX655AQ with Super HAD CCD™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 2/3 11.016 mm diagonal	
Cell size	3.45 μm x 3.45 μm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	9.2 fps	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 6 frames at full resolution	
Monochrome formats	Manta G-504B: Mono8, Mono12, Mono12Packed	Manta G-504C: Mono8
Color formats (YUV)	Manta G-504B: N/A	Manta G-504C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-504B: N/A	Manta G-504C: RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW formats	Manta G-504B: N/A	Manta G-504C: BayerGB8, BayerGB12Packed, BayerGB12
Exposure control	38 μs to 60 s; 1 μs increments	
Gain control	0 to 32 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.9 W @ 12 VDC; 4.6 W PoE	
Trigger latency[1]	Idle state: 12.8 μs; Frame valid state: 34.0 μs	
Trigger jitter[1]	Idle state: 9.1 μs; Frame valid state: 30.3 μs	

Table 33: Manta G-504B, G-504C camera specifications

Feature	Specification
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 210 g Non-PoE model: 200 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

*Table 33: Manta G-504B, G-504C camera specifications (continued)*
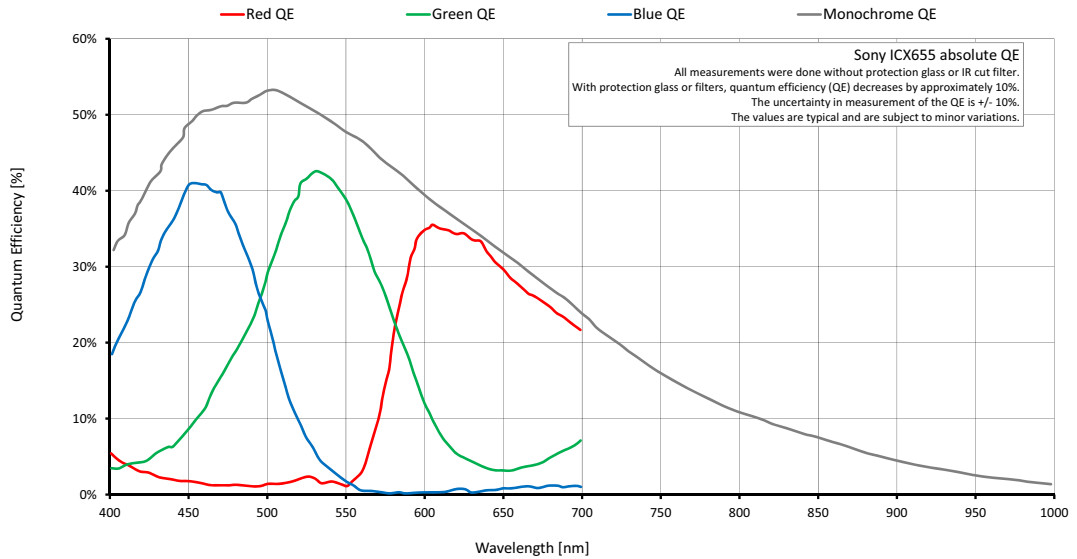
Absolute QE

Figure 46: Manta G-504B, G-504C (Sony ICX655) absolute QE

Spectral response
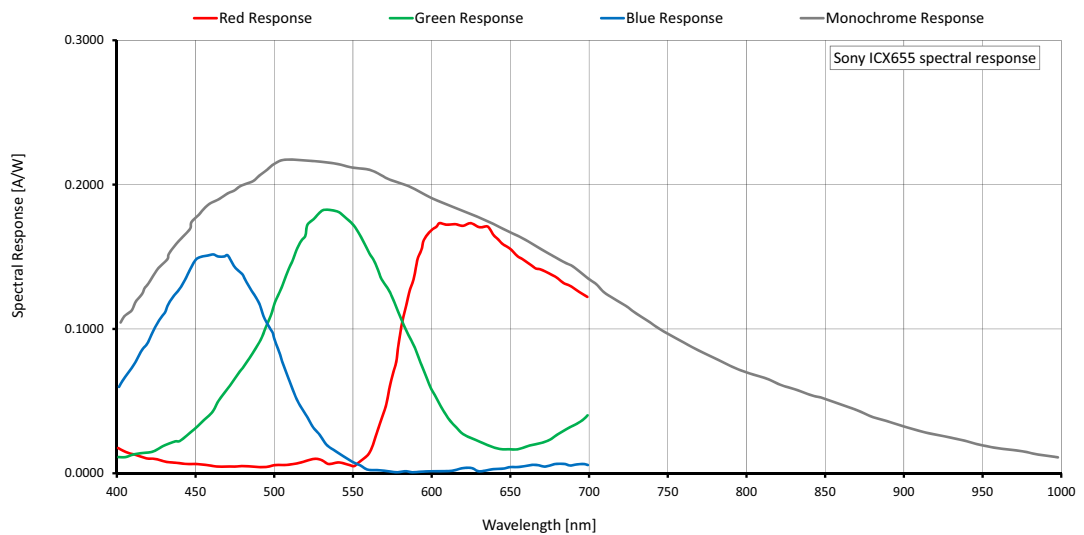
Figure 47: Manta G-504B, G-504C (Sony ICX655) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{52.55\mu s \times \text{ROI height} + 10.27\mu s \times (2056 - \text{ROI height}) + 295.62\mu s}$$

Maximum frame rate at full resolution according formula: 9.2 fps
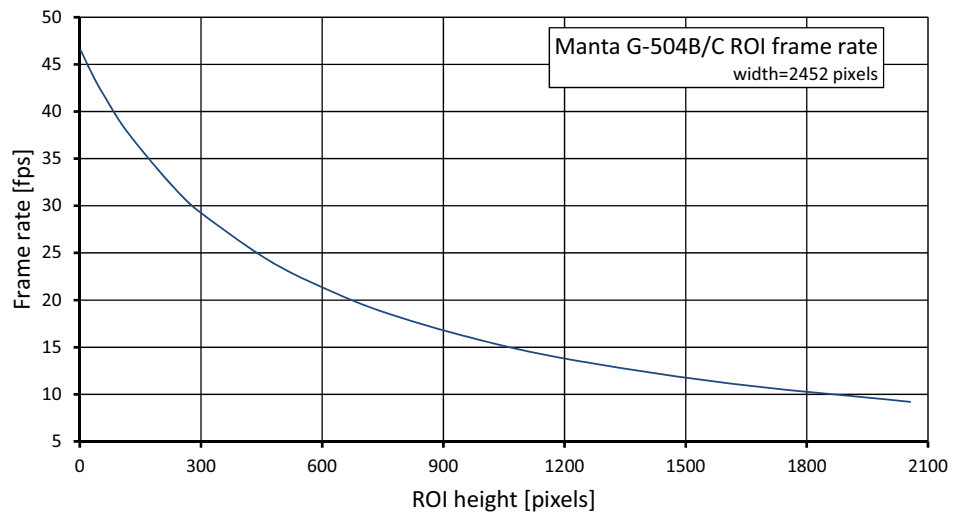
Figure 48: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
2056	9.2	320	28.6
1600	11.2	240	31.6
1200	13.8	120	37.7
960	16.1	60	41.7
768	18.5	30	44.0
640	20.6	10	45.8
480	23.9	2	46.5

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to given formula.

Table 34: Frame rate as a function of ROI height values

Manta G-505B, G-505C

Feature	Specification	
Resolution	2452 (H) x 2056 (V) 5 MP	
Sensor	Manta G-505B: Sony ICX625ALA with Super HAD CCD™ technology	Manta G-505C: Sony ICX625AQA with Super HAD CCD™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 2/3 11.016 mm diagonal	
Cell size	3.45 µm x 3.45 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	15 fps	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome formats	Manta G-505B: Mono8, Mono12, Mono12Packed	Manta G-505C: Mono8
Color formats (YUV)	Manta G-505B: N/A	Manta G-505C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-505B: N/A	Manta G-505C: RGB8Packed, BGR8Packed
RAW formats	Manta G-505B: N/A	Manta G-505C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	49 µs to 38 s; 1 µs increments	
Gain control	0 to 31 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.9 W @ 12 VDC; 4.5 W PoE	
Trigger latency[1]	Idle state: 7.3 µs; Frame valid state: 23.2 µs	
Trigger jitter[1]	Idle state: 4.0 µs; Frame valid state: 20.0 µs	
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)	

Table 35: Manta G-505B, G-505C camera specifications

Feature	Specification
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES WEEE (2002/96/EC), FCC Class B

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 35: Manta G-505B, G-505C camera specifications (continued)
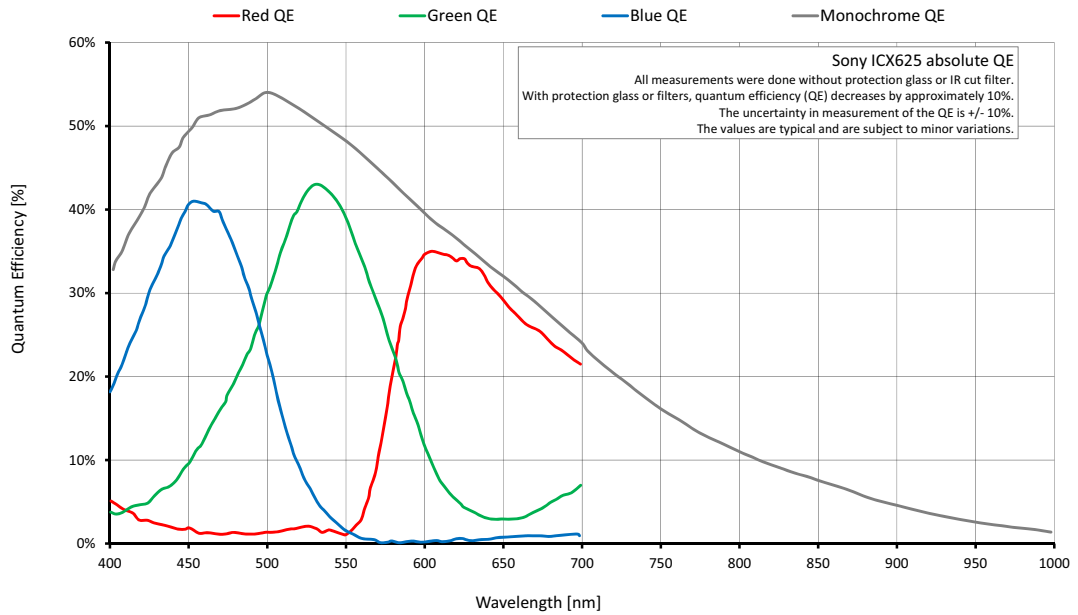
Absolute QE

Figure 49: Manta G-505B, G-505C (Sony ICX625) absolute QE

Spectral response
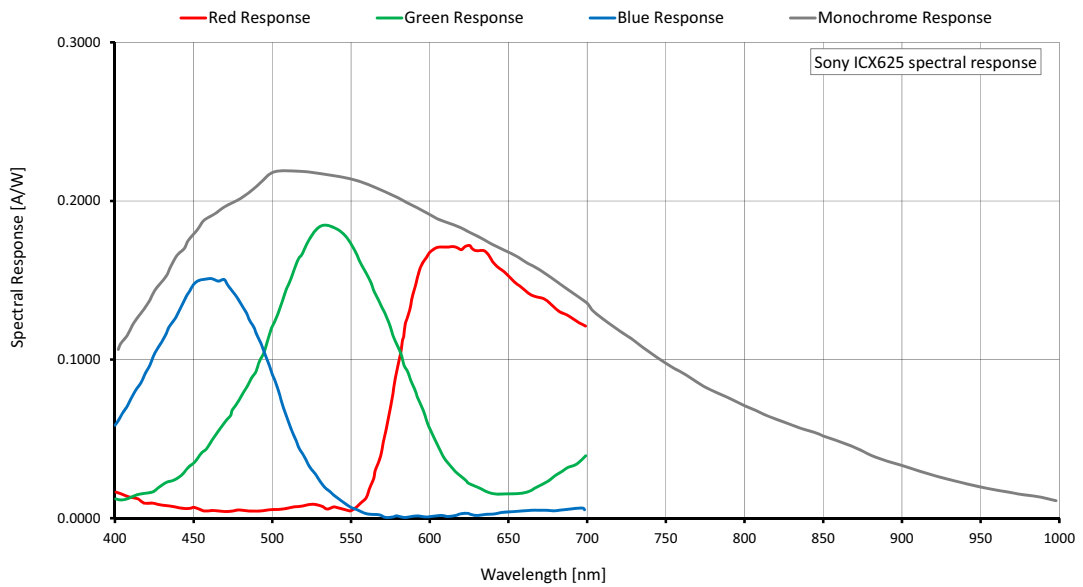
Figure 50: Manta G-505B, G-505C (Sony ICX625) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{32.18\,\mu s \times \text{ROI height} + 8.81\,\mu s \times (2056 - \text{ROI height}) + 321.82\,\mu s}$$

Maximum frame rate at full resolution according formula: 15.0 fps
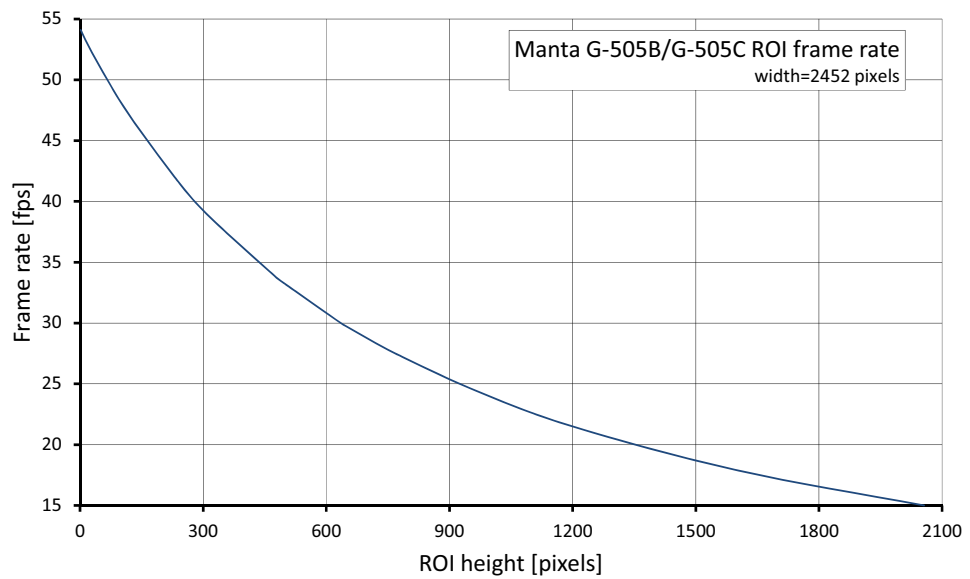
Figure 51: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
2056	15.0	480	33.7
1600	17.9	320	38.6
1200	21.5	240	41.6
960	24.5	120	47.1
768	27.5	60	50.4
734	28.1	30	52.2
640	29.9	10	53.5
614	30.5	2	54.1
492	33.4		

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to the given formula.

Table 36: Frame rate as a function of ROI height values

Manta G-507B, G-507C

Feature	Specification	
Resolution	2464 (H) x 2056 (V) 5.1 MP	
Sensor	Manta G-507B: Sony IMX264LLR-C Exmor with Pregius® global shutter	Manta G-507C: Sony IMX264LQR-C Exmor with Pregius® global shutter
Type	CMOS, Progressive Scan	
Sensor size	Type 2/3 11.1 mm diagonal	
Cell size	3.45 µm x 3.45 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	23.7 fps @ 124 MB/s 27.57 fps burst mode[1]	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome formats	Manta G-507B: Mono8, Mono12Packed, Mono12	Manta G-507C: Mono8
Color formats (YUV)	Manta G-507B: N/A	Manta G-507C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-507B: N/A	Manta G-507C: RGB8Packed, BGR8Packed
RAW formats	Manta G-507B: N/A	Manta G-507C: BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	Manta G-507B: • Mono8, Mono12Packed: 48 µs to 85.89 s in 17.36 µs increments • Mono12: 59 µs to 85.89 s in 23.12 µs increments	Manta G-507C: • Mono8, BayerRG8, BayerRG12Packed, YUV411Packed: 48 µs to 85.89 s in 17.36 µs increments • BayerRG12, YUV422Packed: 59 µs to 85.89 s in 23.12 µs increments • RGB8Packed, BGR8Packed, YUV444Packed: 83 µs to 85.89 s in 34.72 µs increments
Gain control	0 to 40 dB; 0.1dB increments	
Binning	Horizontal: 1 to 4 pixels Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	

Table 37: Manta G-507B, G-507C camera specifications

Feature	Specification	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Trigger latency[2]	Manta G-507B: • Mono12: 69.6 µs • Mono8, Mono12Packed: 52.25µs	Manta G-507C: • Mono8, BayerRG8, Bayer12Packed, YUV411Packed: 52.25 µs • BayerRG12, YUV422Packed: 69.6 µs • RGB8Packed, BGR8Packed, YUV444Packed: 104.57 µs
Trigger jitter[2]	Manta G-507B: • Mono12: 11.5 µs • Mono8, Mono12Packed: 8.68 µs	Manta G-507C: • Mono8, BayerRG8, Bayer12Packed, YUV411Packed: 8.68 µs • BayerRG12, YUV422Packed: 11.5 µs • RGB8Packed, BGR8Packed, YUV444Packed: 17.3 µs
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	
Storage temperature	-10°C to +70°C ambient temperature (without condensation)	
Body dimensions (L x W x H)	86.4 x 44 x 29 mm	
Mass	PoE model: 200 g Non-PoE model: 190 g	
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)	
Interface standard	GigE Vision Standard V1.2	
Camera control standard	GenICam SFNC V1.2.1 compliant	
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES	

[1] For more information on `StreamFrameRateConstrain`, see the GigE Features Reference.

[2] These values are calculated directly from the microcontroller source. These values are only valid for pixel formats < 16-bit per pixel and applicable in both Idle and Frame valid states:
• Idle state: sensor is ready and camera is idle, waiting for the next trigger
• Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 37: Manta G-507B, G-507C camera specifications (continued)
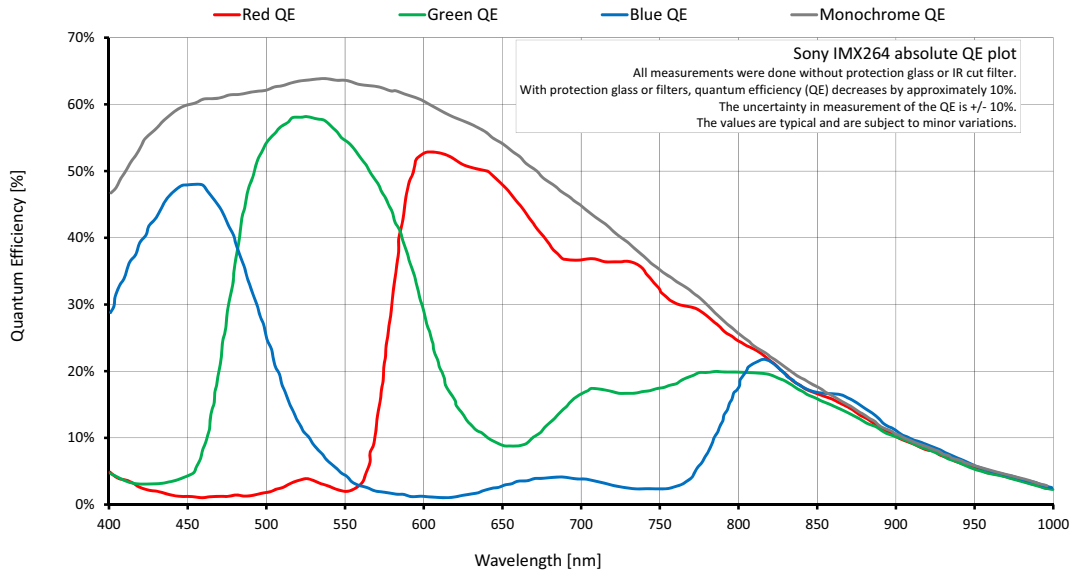
Absolute QE

Figure 52: Manta G-507B, G-507C (Sony IMX264) absolute QE
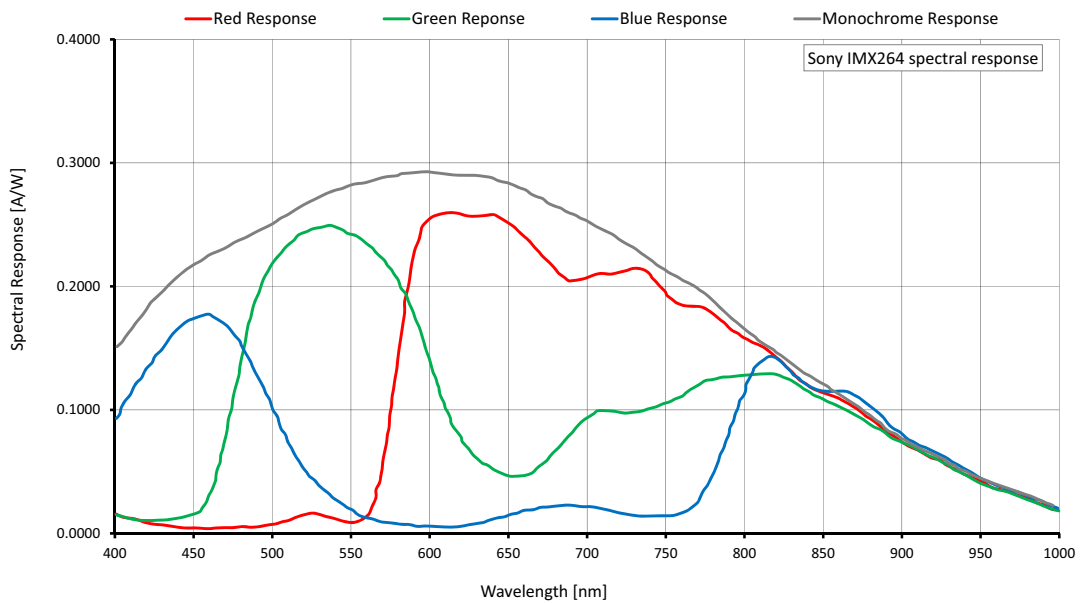
Spectral response

Figure 53: Manta G-507B, G-507C (Sony IMX264) spectral response

ROI frame rate

Maximum frame rate at 2464 (H) x 2056 (V) (measured): 23.7 fps
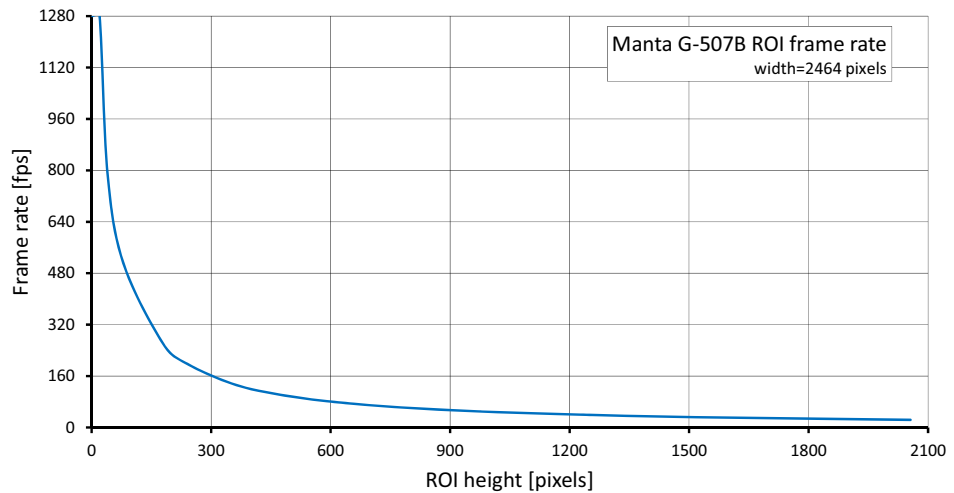(higher frame rates are possible with burst mode)

Figure 54: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
2056	23.70	480	100.53
1544	31.52	360	133.34
1324	36.78	240	197.95
1280	38.02	180	259.47
1024	47.41	80	509.78
960	50.61	40	789.08
768	62.95	20	1280.08
600	80.67	2	1280.08

[1] There will be an increase in frame rate with reduced width if the camera is bandwidth limited. Reducing the exposure time may result in higher frame rates.

Table 38: Frame rate as a function of ROI height table

Manta G-609B, G-609C

Feature	Specification	
Resolution	2752 (H) x 2206 (V) 6.1 MP	
Sensor	Manta G-609B: Sony ICX694ALG with EXview HAD CCD II™ technology	Manta G-609C: Sony ICX694AQG with EXview HAD CCD II™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1 15.989 mm diagonal	
Cell size	4.54 µm x 4.54 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	15 fps	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 21 frames at full resolution	
Monochrome formats	Manta G-609B: Mono8, Mono12, Mono12Packed	Manta G-609C: Mono8
Color formats (YUV)	Manta G-609B: N/A	Manta G-609C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-609B: N/A	Manta G-609C: RGB8Packed, BGR8Packed
RAW formats	Manta G-609B: N/A	Manta G-609C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 33 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	3.9 W @ 12 VDC; 4.6 W PoE	
Trigger latency[1]	Idle state: 7.2 µs; Frame valid state: 22.0 µs	
Trigger jitter[1]	Idle state: 4.0 µs; Frame valid state: 18.8 µs	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	

Table 39: Manta G-609B, G-609C camera specifications

Feature	Specification
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 39: Manta G-609B, G-609C camera specifications (continued)
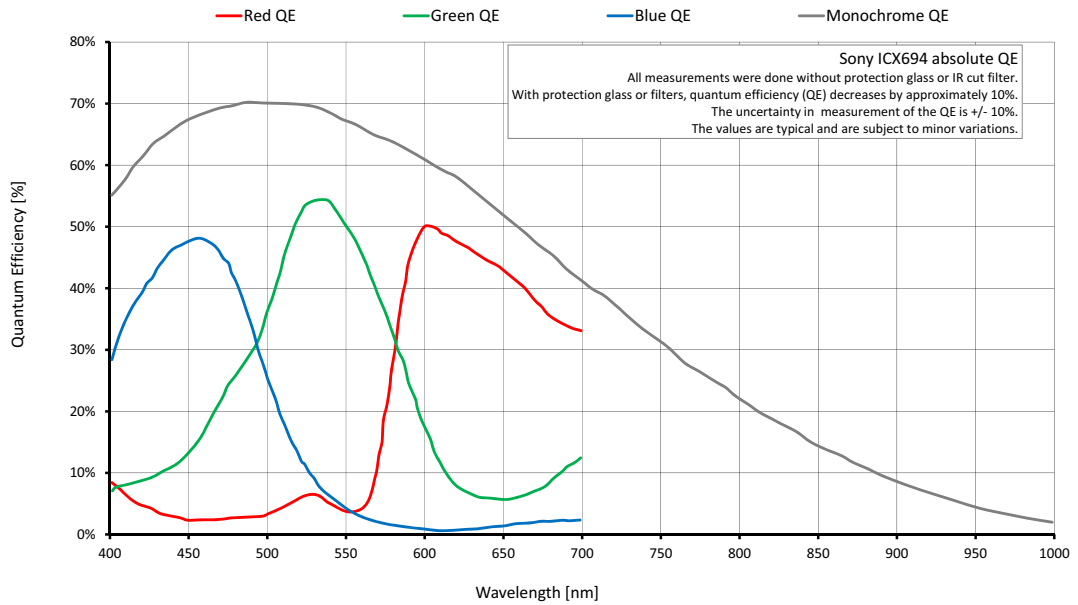
Absolute QE

Figure 55: Manta G-609B, G-609C (Sony ICX694) absolute QE
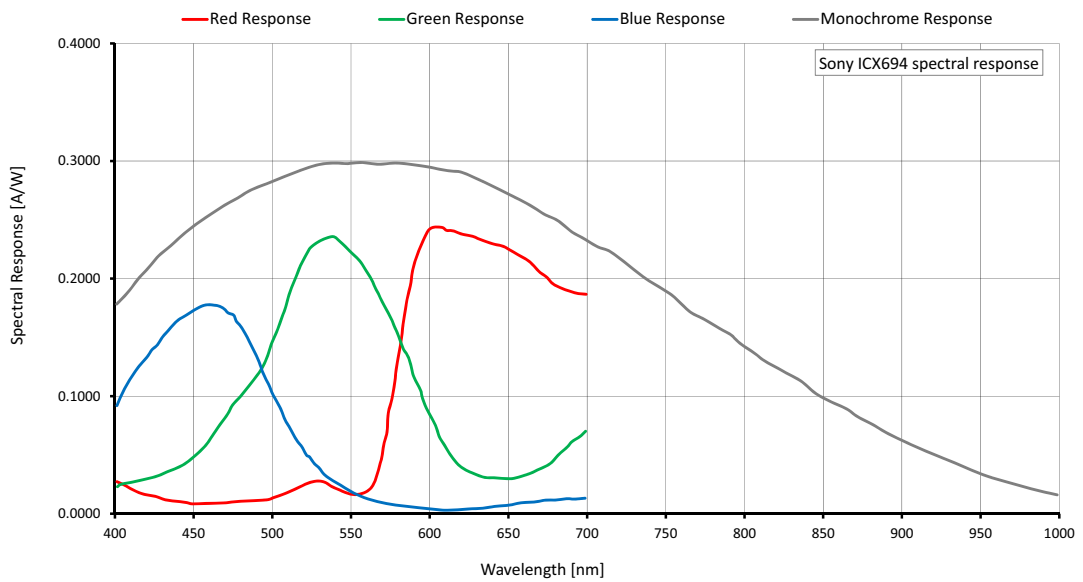
Figure 56: Manta G-609B, G-609C (Sony ICX694) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{29.71\mu s \times \text{ROI height} + 4.36\mu s \times (2207 - \text{ROI height}) + 229.22\mu s}$$

Maximum frame rate at full resolution according formula: 15.2 fps
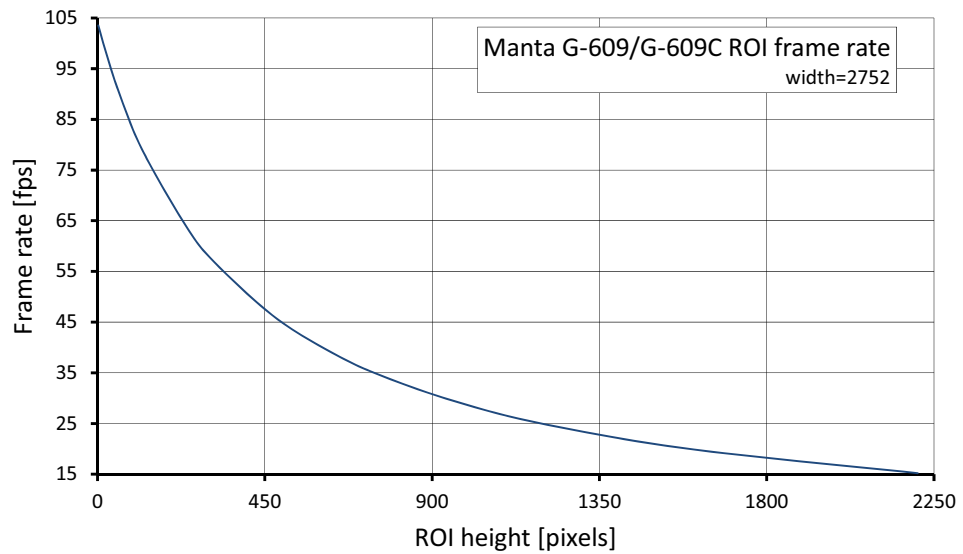
Figure 57: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]		Height [pixels]	Frame rate [fps][1]
2206	15.2		320	56.4
1600	19.9		240	63.7
1200	24.9		120	79.0
960	29.4		60	89.8
768	34.3		30	96.4
640	38.6		10	101.4
480	45.8		2	103.5

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to the given formula.

Table 40: Frame rate as a function of ROI height values

Manta G-917B, G-917C

Feature	Specification	
Resolution	3384 (H) x 2710 (V) 9.2 MP	
Sensor	Manta G-917B: Sony ICX814ALG with EXview HAD CCD II™ technology	Manta G-907C: Sony ICX814AQG with EXview HAD CCD II™ technology
Type	Interline CCD, Progressive Scan	
Sensor size	Type 1/1 15.972 mm diagonal	
Cell size	3.69 µm x 3.69 µm	
Lens mount	Standard: C-Mount Optional: See the Modular Concept	
Housing variants	Standard: Straight view Optional: See the Modular Concept	
Maximum frame rate at full resolution	10.1 fps	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 14 frames at full resolution	
Monochrome formats	Manta G-917B: Mono8, Mono12, Mono12Packed	Manta G-917C: Mono8
Color formats (YUV)	Manta G-917B: N/A	Manta G-917C: YUV411Packed, YUV422Packed, YUV444Packed
Color formats (RGB)	Manta G-917B: N/A	Manta G-917C: RGB8Packed, BGR8Packed
RAW formats	Manta G-917B: N/A	Manta G-917C: BayerRG8, BayerRG12Packed, BayerRG12
Exposure control	42 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Voltage requirements	8 to 30 VDC; PoE	
Power consumption	4.0 W @ 12 VDC; 4.7 W PoE	
Trigger latency[1]	Idle state: 7.0 µs; Frame valid state: 25.1 µs	
Trigger jitter[1]	Idle state: 4.0 µs; Frame valid state: 22.1 µs	
Operating temperature	+5°C to +45°C ambient temperature (without condensation)	

Table 41: Manta G-917B, G-917C camera specifications

Feature	Specification
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Body dimensions (L x W x H)	86.4 x 44 x 29 mm
Mass	PoE model: 200 g Non-PoE model: 190 g
Interface	IEEE 802.3 1000BASE-T, IEEE 802.3af (PoE)
Interface standard	GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1 compliant
Regulations	CE, RoHS, REACH, WEEE, FCC, ICES

[1] It is possible to start the exposure of the next frame while the previous frame is read out:
- Idle state: sensor is ready and camera is idle, waiting for the next trigger
- Frame valid state: sensor is reading out and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

Table 41: Manta G-917B, G-917C camera specifications (continued)
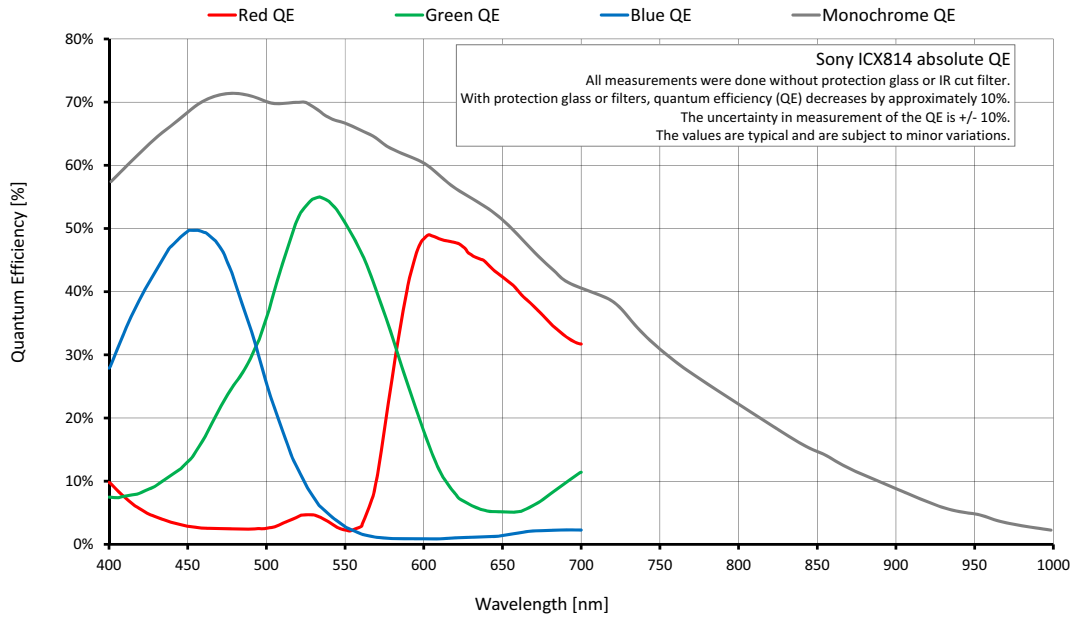
Absolute QE

Figure 58: Manta G-917B, G-917C (Sony ICX814) absolute QE
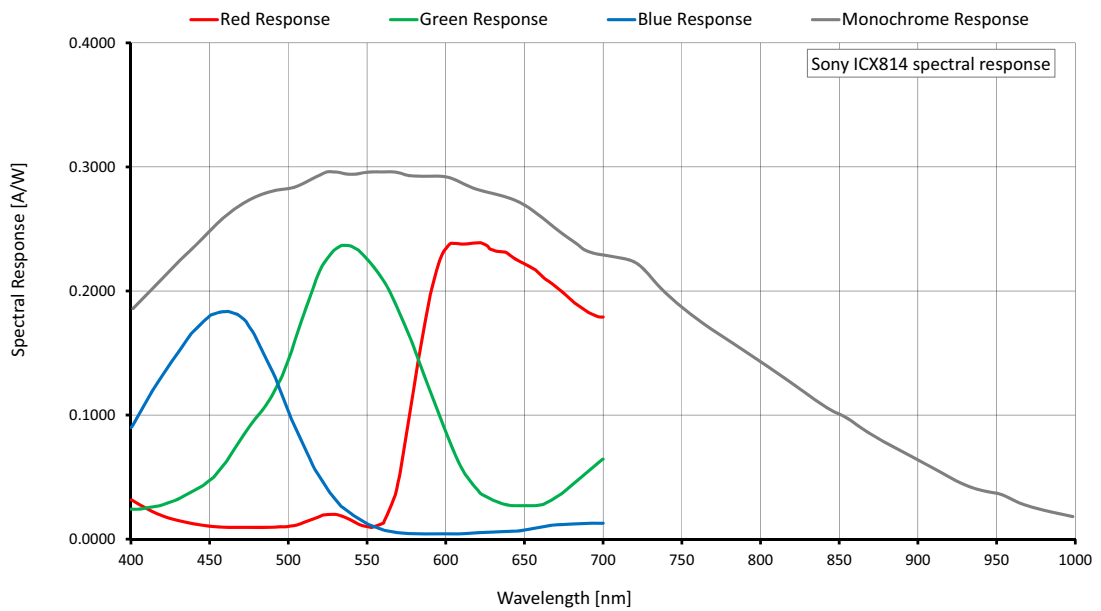
Figure 59: Manta G-917B, G-917C (Sony ICX814) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{29.71\mu s \times \text{ROI height} + 4.36\mu s \times (2207 - \text{ROI height}) + 229.22\mu s}$$

Maximum frame rate at full resolution according formula: 10.1 fps

Manta G-917/C ROI frame rate
width=3384 pixels
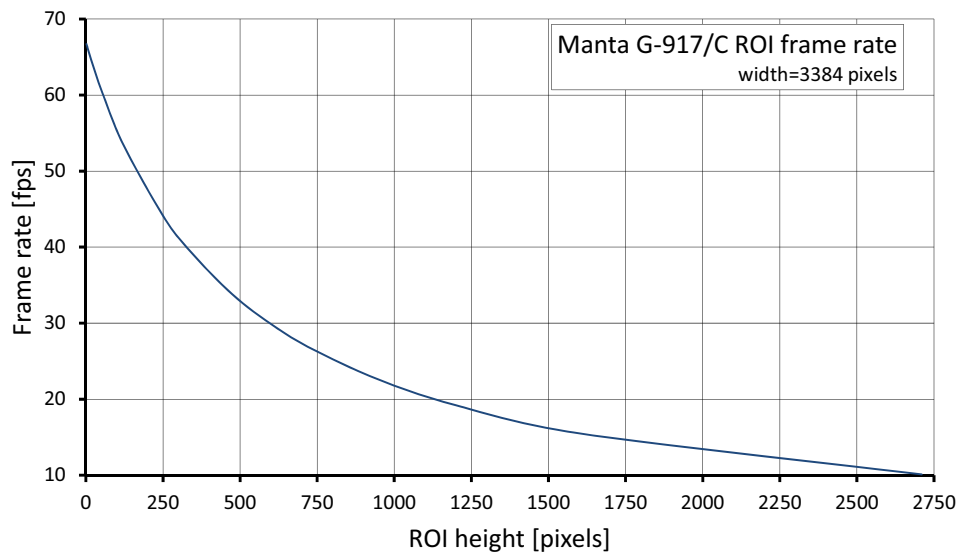
Figure 60: Frame rate as a function of ROI height plot

Height [pixels]	Frame rate [fps][1]	Height [pixels]	Frame rate [fps][1]
2710	10.1	320	40.3
1600	15.5	240	44.8
1200	19.2	120	53.6
960	22.4	60	59.6
768	25.9	30	63.0
640	28.8	10	65.6
480	33.6	2	66.7

[1] Frame rate = theoretical maximum frame rate (in frames per second) of the CCD sensor according to the given formula.

Table 42: Frame rate as a function of ROI height table

Camera feature comparison

Allied Vision cameras support a number of standard and extended features. The table below identifies a selection of capabilities and compares the availability of features in Manta models.

Camera control document

A complete listing of camera controls, including control definitions can be found online:
- Vimba and third-party users: GigE Features Reference
- PvAPI users: GigE Camera and Driver Attributes document

		Manta G-031	Manta G-032	Manta G-033	Manta G-046	Manta G-125	Manta G-145	Manta G-146	Manta G-201	Manta G-223	Manta G-235	Manta G-282	Manta G-283	Manta G-319	Manta G-419	Manta G-504	Manta G-505	Manta G-507	Manta G-609	Manta G-917
Image optimization features	Auto gain	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Auto exposure	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Auto white balance	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Auto iris (video type)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Binning	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔		✔	✔	✔	✔	✔
	Decimation X/Y	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Column Defect Masking																			
	Piecewise linear HDR									✔					✔					
	Pixel Defect Masking									✔					✔					
	Gamma	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Color correction, hue, saturation[1]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Look-up tables (LUTs)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	BlackLevel (Offset)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Reverse X/Y									✔	✔			✔	✔			✔		
	Region of interest (ROI)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Table 43: Feature comparison by model

		Manta G-031	Manta G-032	Manta G-033	Manta G-046	Manta G-125	Manta G-145	Manta G-146	Manta G-201	Manta G-223	Manta G-235	Manta G-282	Manta G-283	Manta G-319	Manta G-419	Manta G-504	Manta G-505	Manta G-507	Manta G-609	Manta G-917
Camera control features	Event channel	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Image chunk data	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Lens control (video)									✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
	Stream hold	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Storable user sets (config files)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Sync out modes	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	IEEE 1588 Precision Time Protocol (PTP)									✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
	Tap mode switchable in Vimba Viewer 2.0 or later																			
	Temperature monitoring[2] (main board)									✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
	Trigger over Ethernet	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

[1] Only available for color models
[2] Accuracy ±1 °C, resolution 0.031

Table 43: Feature comparison by model (continued)

Mechanical dimensions
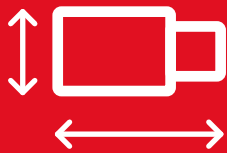
This chapter includes:

- CAD drawings and dimensions of Manta tripod adapter, camera housing, and variants
- Maximum protrusion distance and filter diameter for C-Mount and CS-Mount
- Sensor position accuracy

Tripod adapter

The tripod adapter (Allied Vision order code 5153) can be used for Manta cameras (type A and type B) and is designed for standard housings.
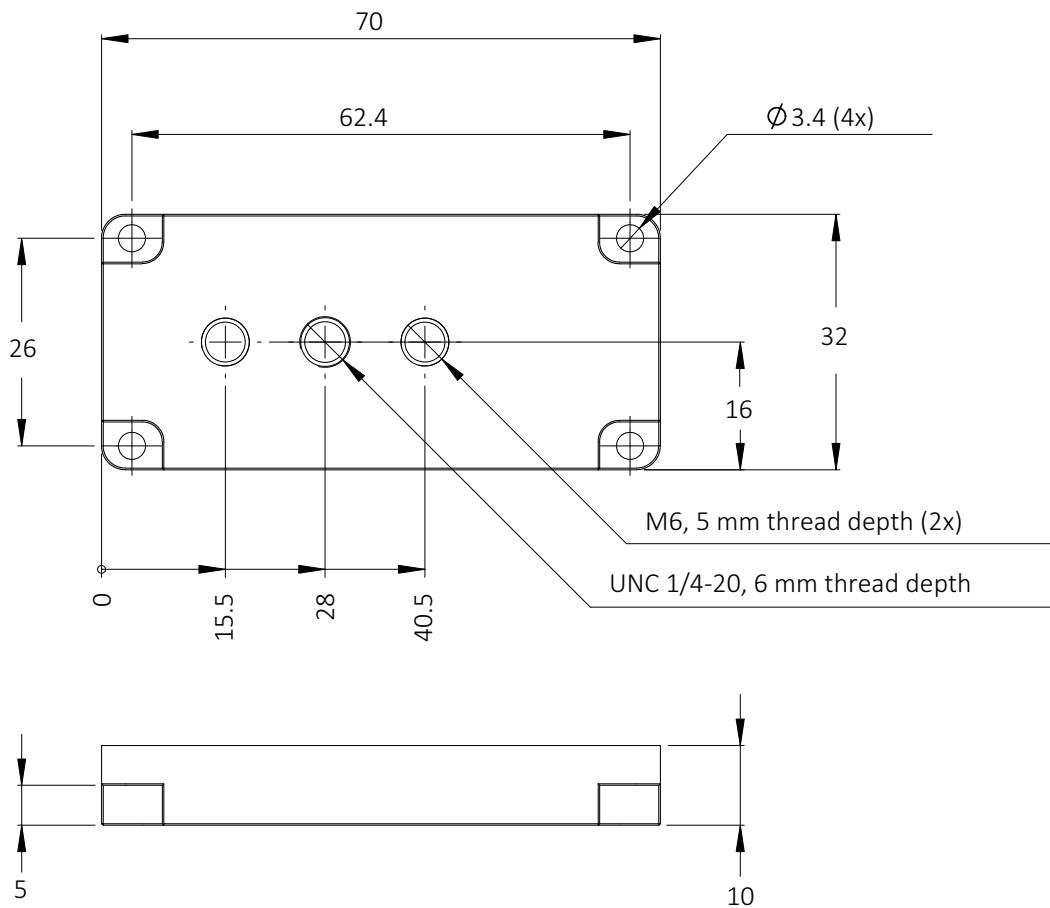
Figure 61: Tripod adapter dimensions

Camera dimensions (type A)

Type A and Type B cameras

Manta type A cameras have different housings than Manta type B cameras.

Manta type A cameras: G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B cameras: G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-609, G-917

Manta standard housing

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
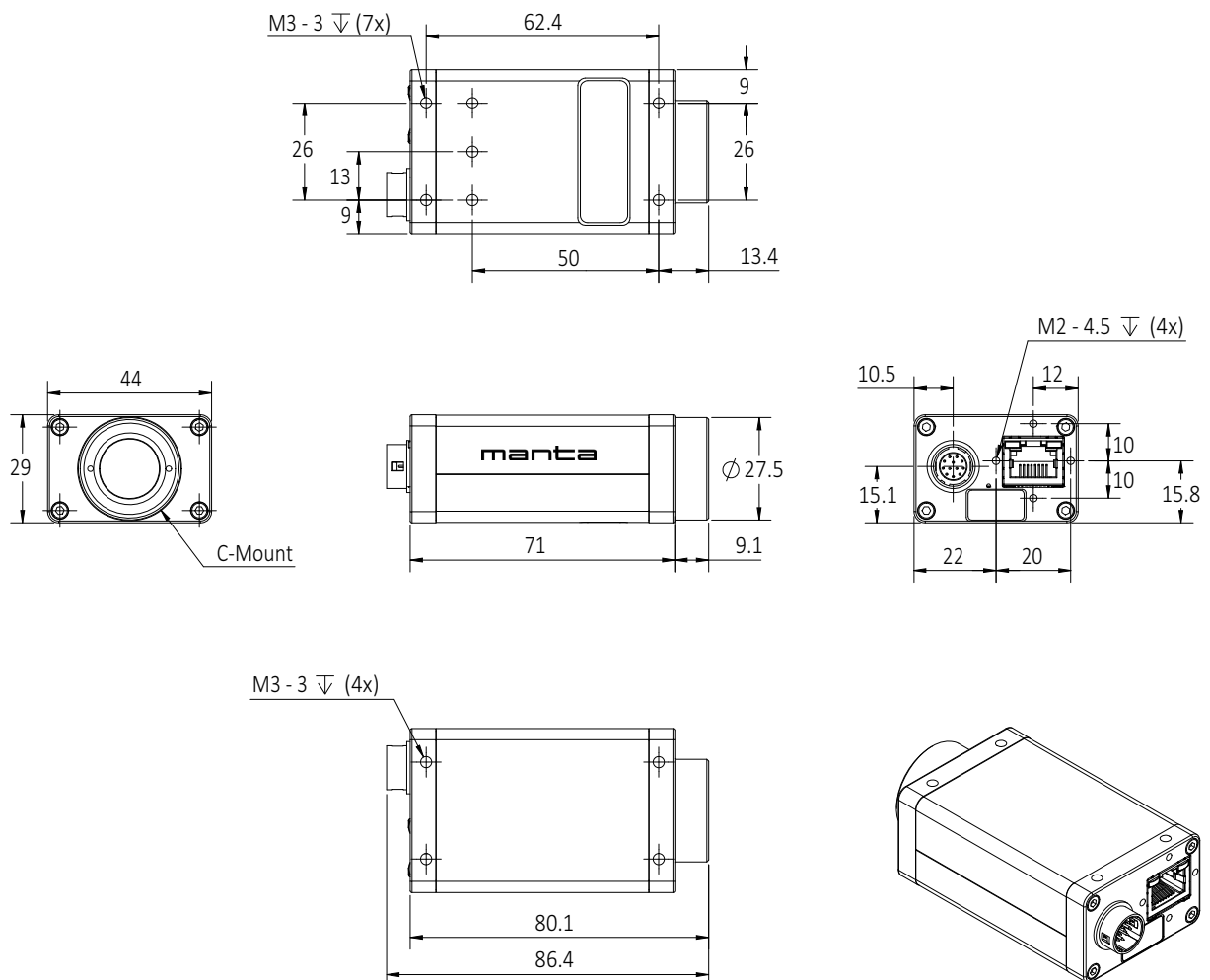
Figure 62: Manta type A standard housing dimensions (including connectors)

Manta angled-head housings

Manta W90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards.

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
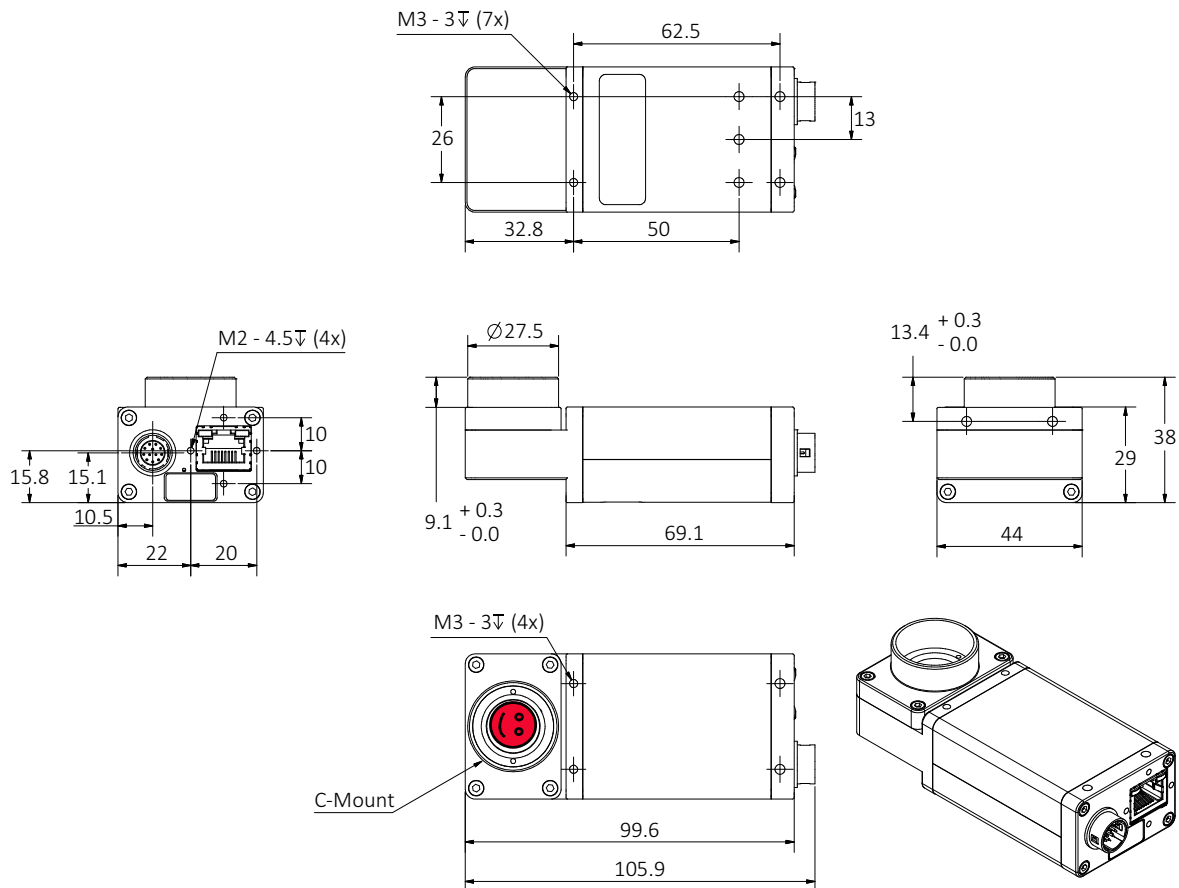
Figure 63: Manta type A W90 housing dimensions (including connectors)

Manta W90 S90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards. The sensor is also rotated 90 degrees clockwise.

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
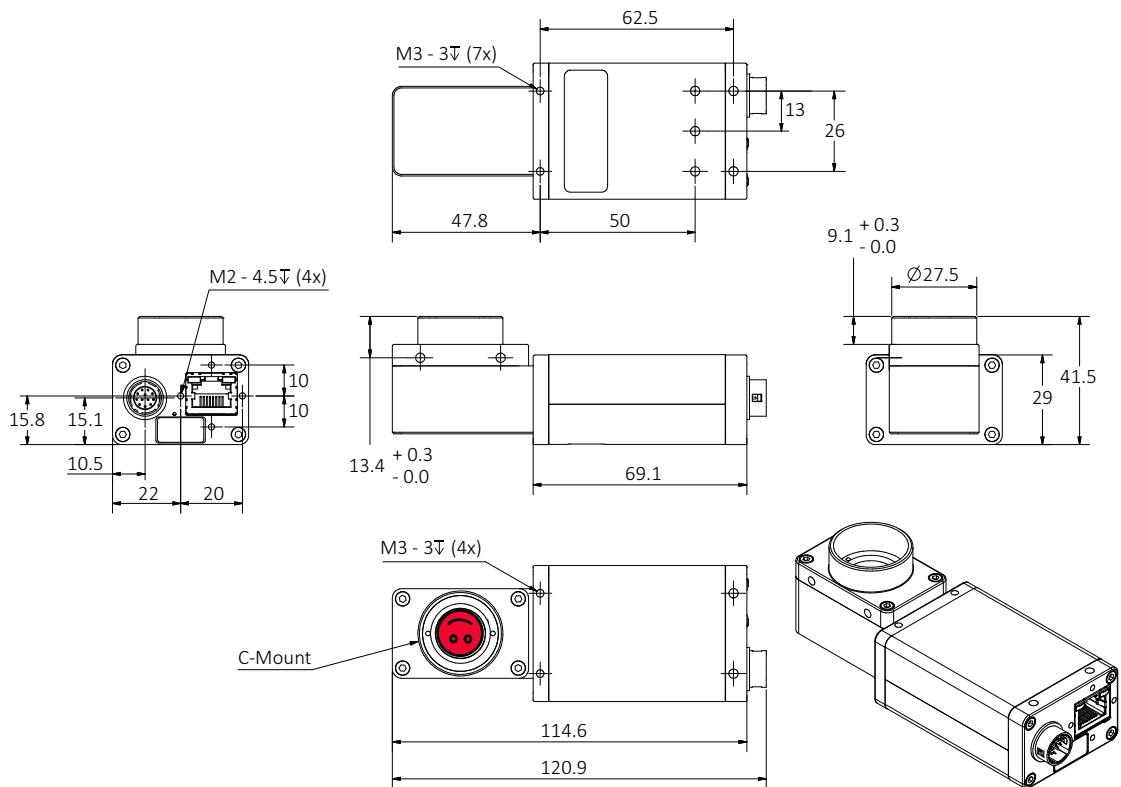
Figure 64: Manta type A W90 S90 housing dimensions (including connectors)

Manta W270 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards.

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
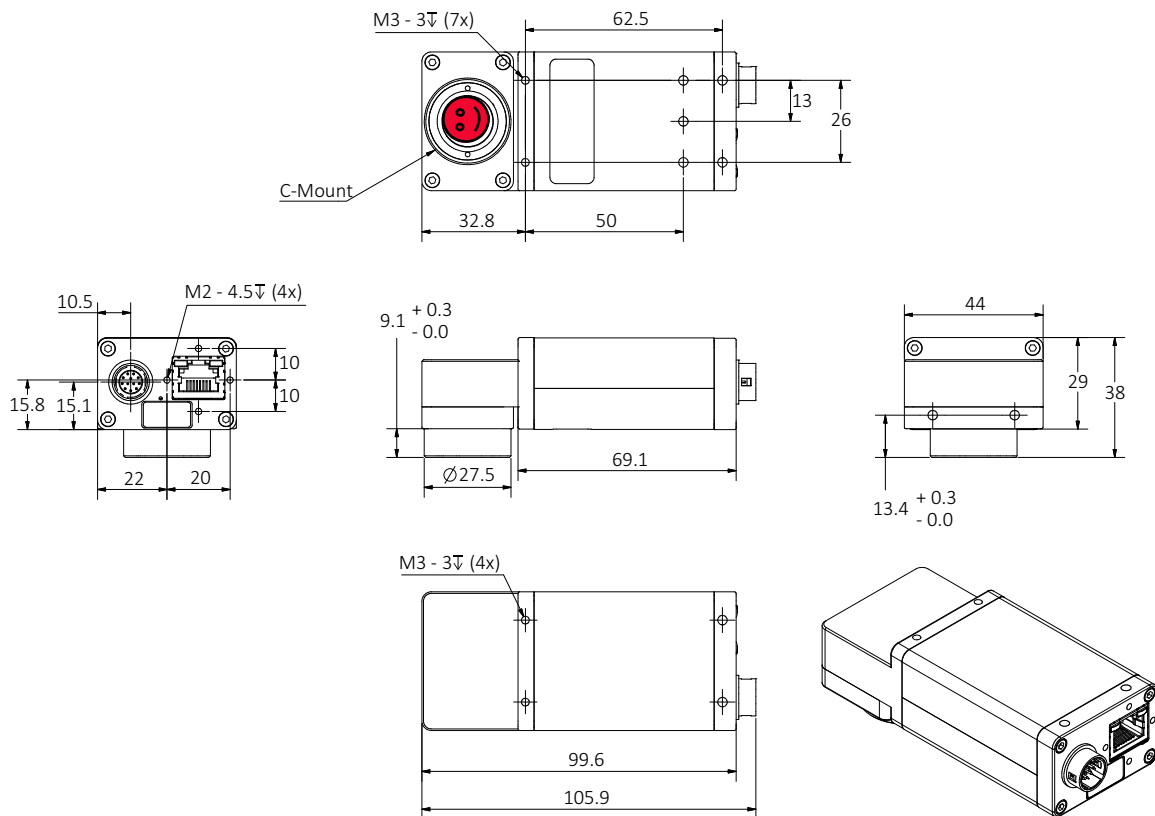
Figure 65: Manta type A W270 housing dimensions (including connectors)

Manta W270 S90 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards. The sensor is also rotated 90 degrees clockwise.

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
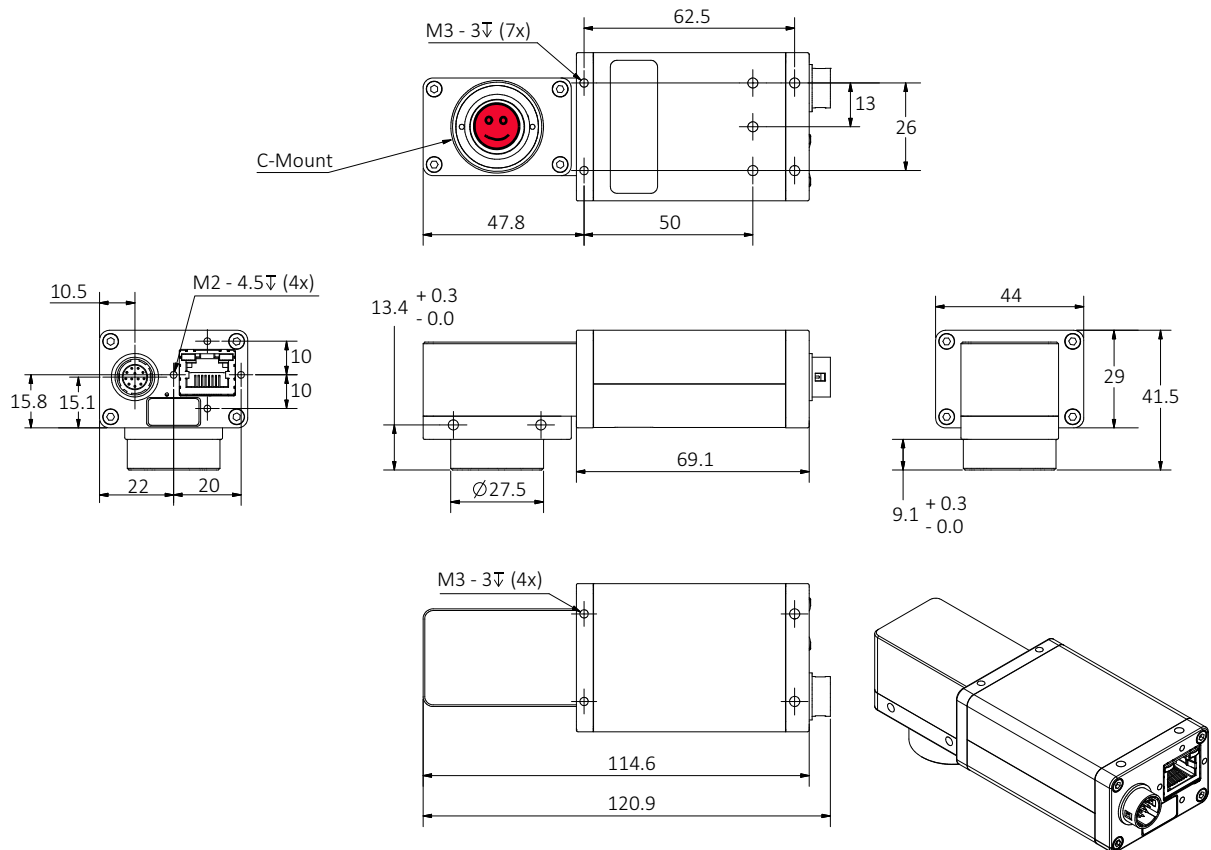
Figure 66: Manta type A W270 S90 housing dimensions (including connectors)

Manta board level variants

Manta board level (non-PoE)

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Variant: Non-PoE

13-pole I/O connector:
Molex PicoBlade
Vertical Header 53047-1310
Receptacle Housing 51021-1300
Crimp Terminal 13 x 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Video Type Auto Iris Out
4 = Input 1
5 = not used
6 = Output 1

7 = GND (for Inputs)
8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

Flex cable length:
FFC45 L =   56 mm   K7500307
FFC45 L = 110 mm   K7500318
FFC45 L = 152 mm   1817
FFC45 L = 200 mm   1824
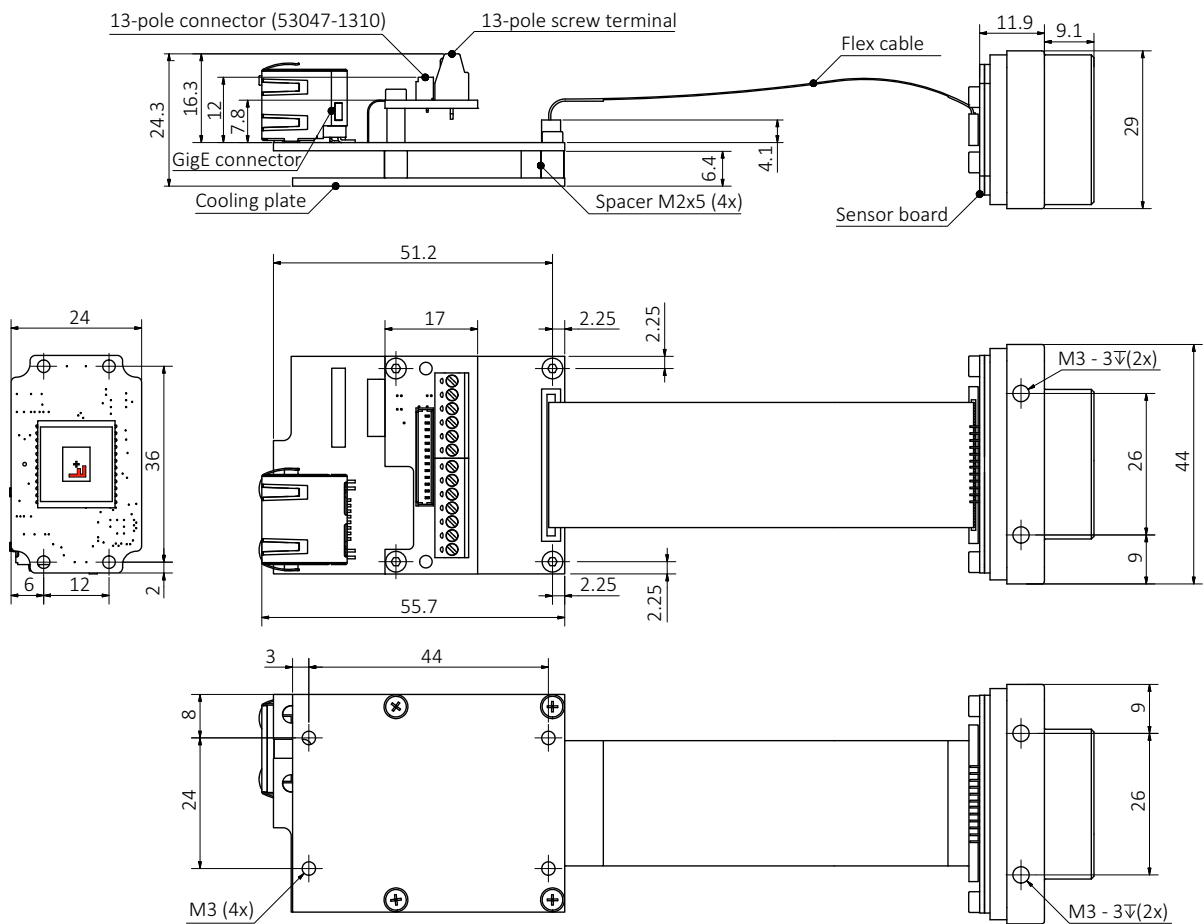
Figure 67: Manta type A board level (non-PoE) dimensions

Manta board level (PoE)

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504

13-pole I/O connector:
Molex PicoBlade
Vertical Header 53047-1310
Receptacle Housing 51021-1300
Crimp Terminal 13 x 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Video Type Auto Iris Out
4 = Input 1
5 = not used
6 = Output 1

7 = GND (for Inputs)
 8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

Flex cable length:
FFC45 L = 56 mm K7500307
FFC45 L = 110 mm K7500318
FFC45 L = 152 mm 1817
FFC45 L = 200 mm 1824
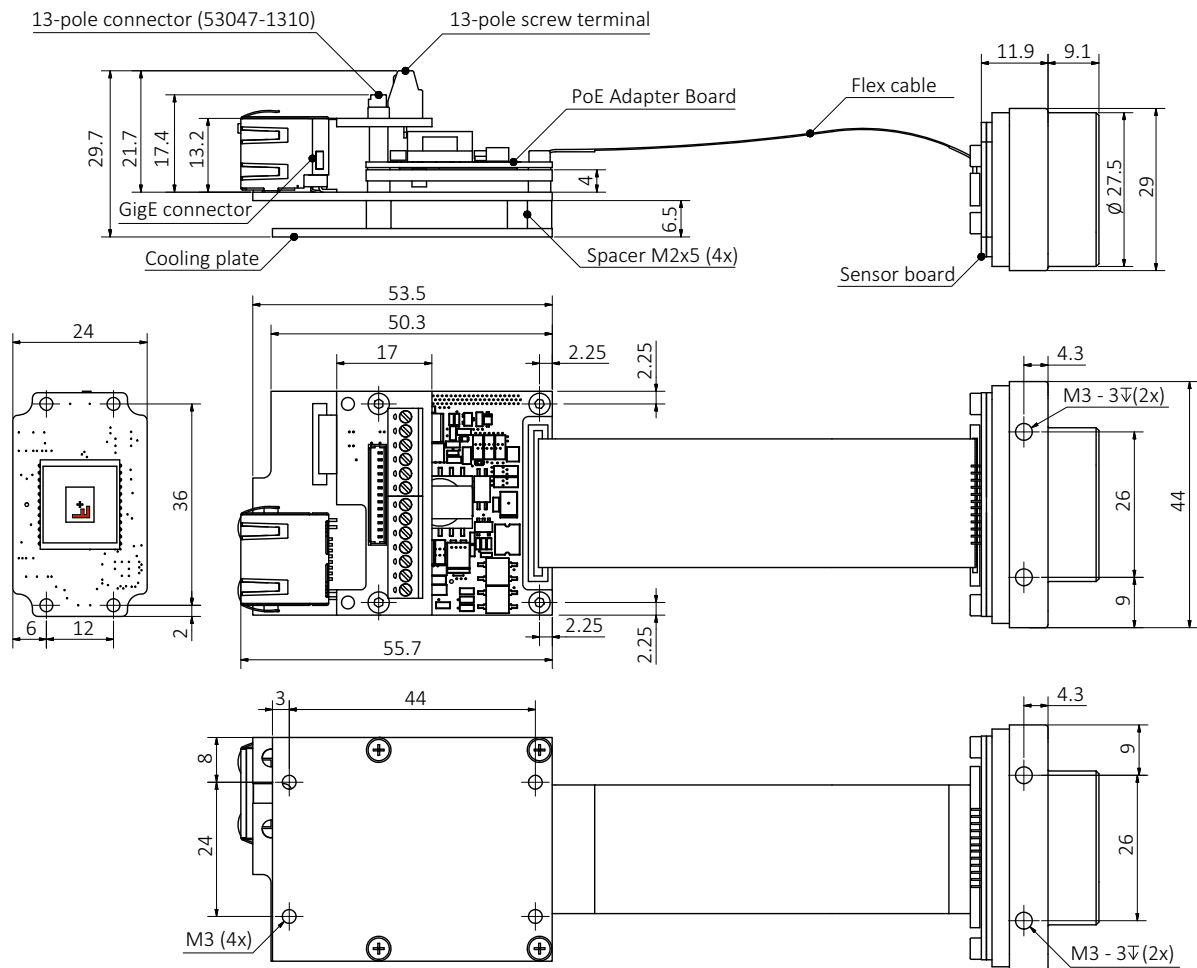
Figure 68: Manta type A board level (PoE) dimensions

Manta board level (non-PoE) C-Mount

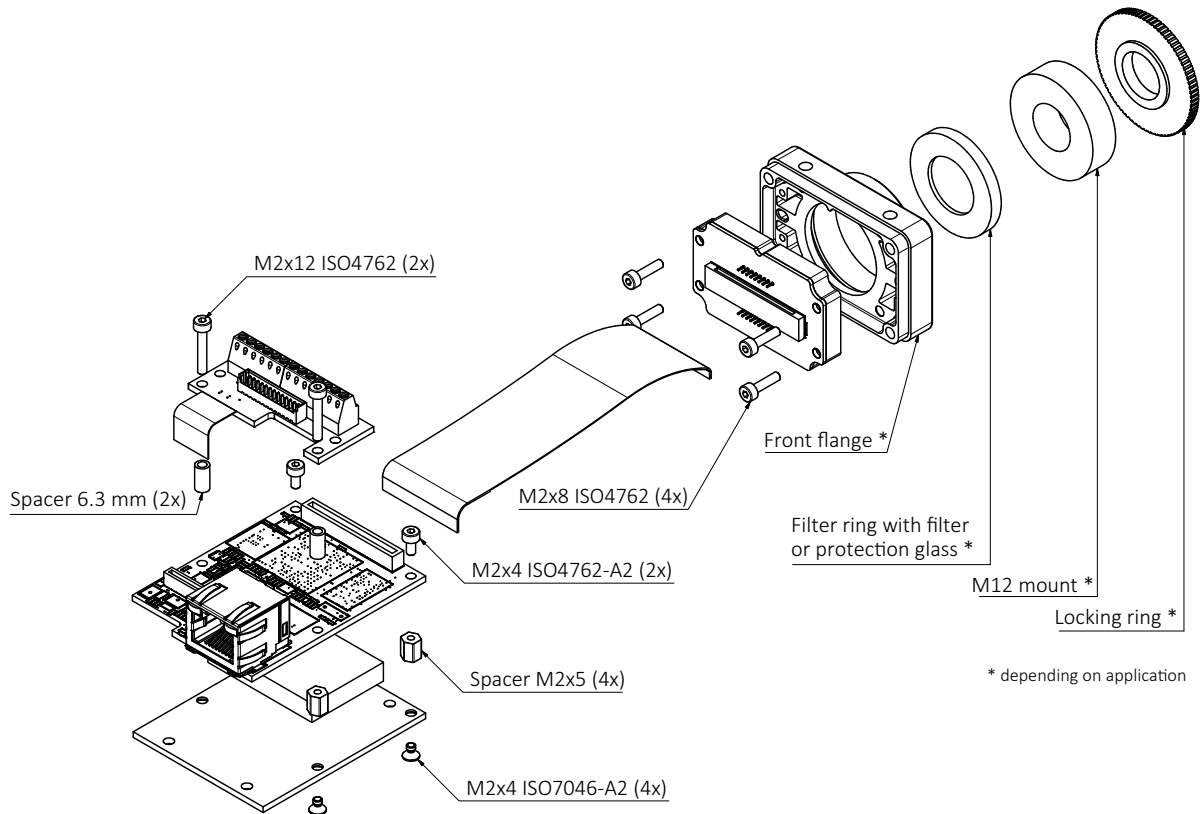Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
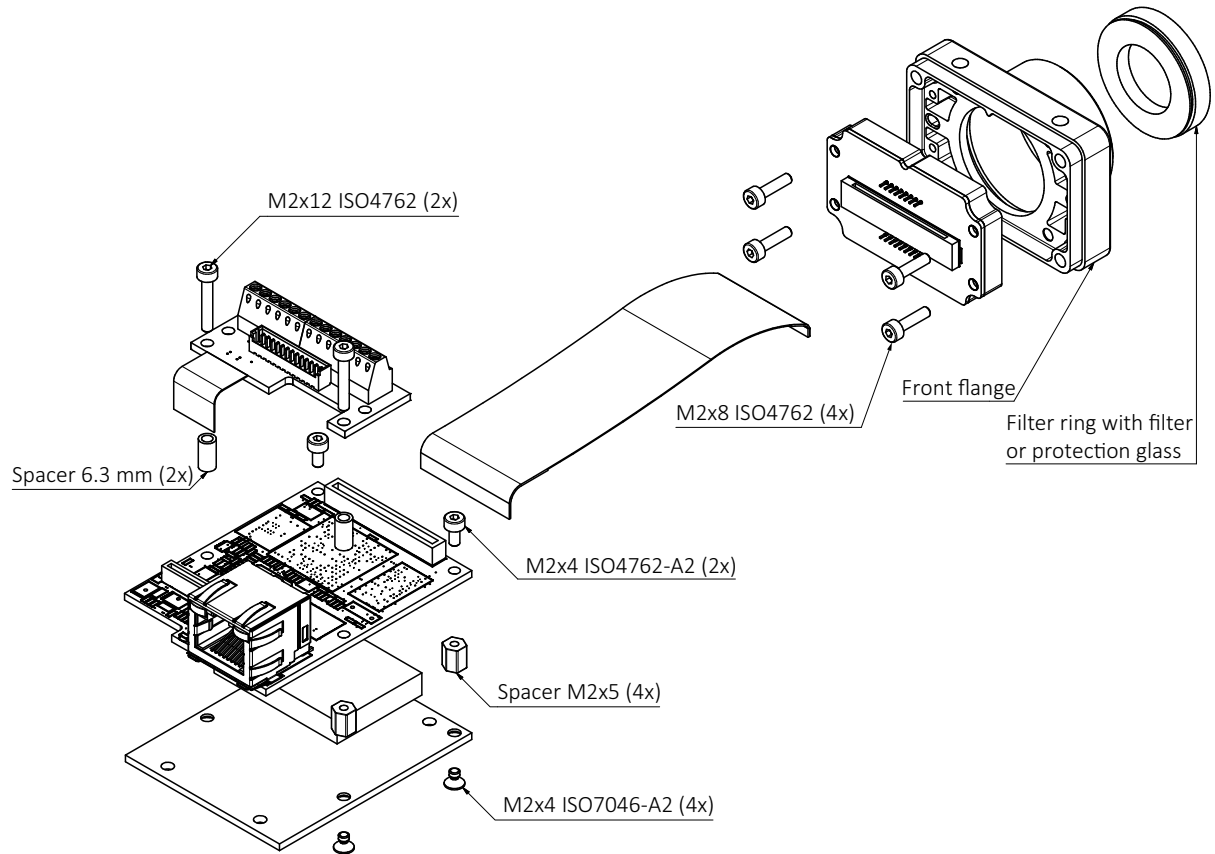
Figure 69: Manta type A board level (non-PoE) C-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (PoE) C-Mount

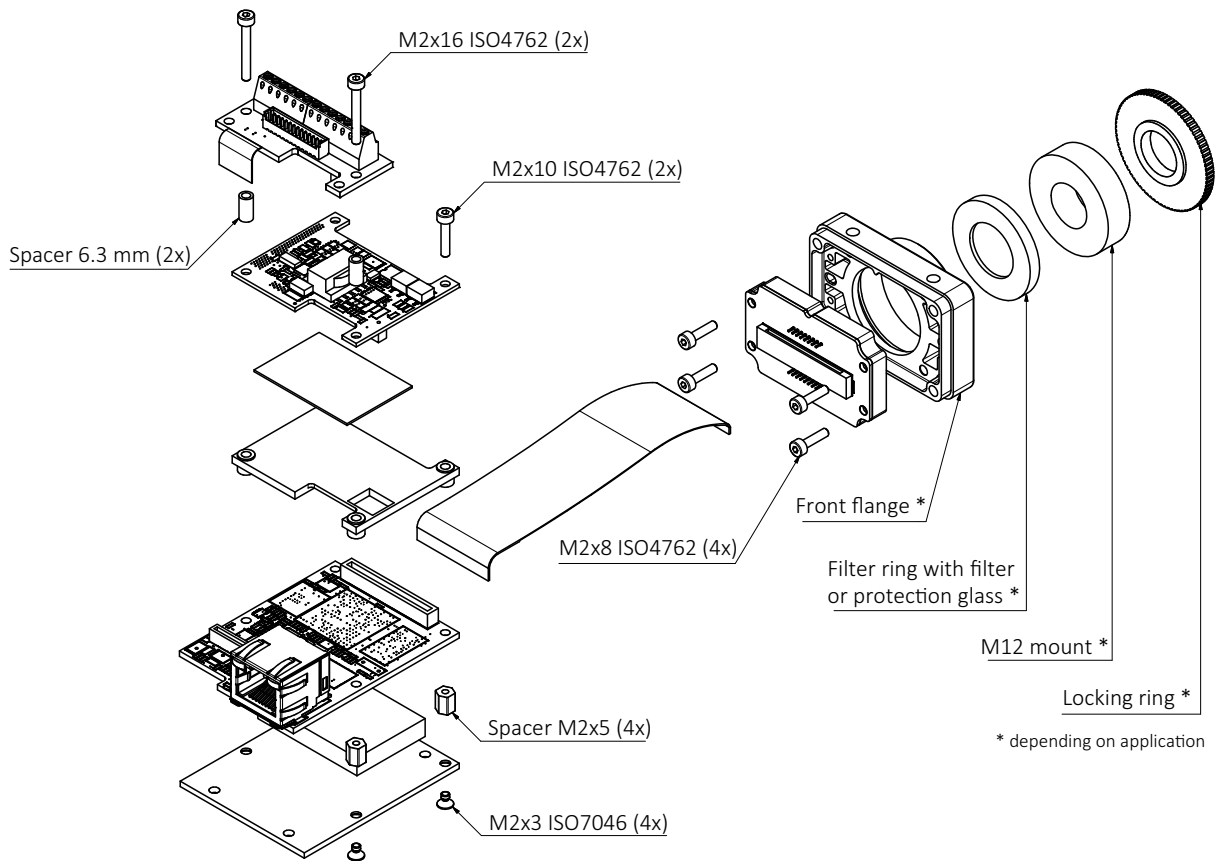Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
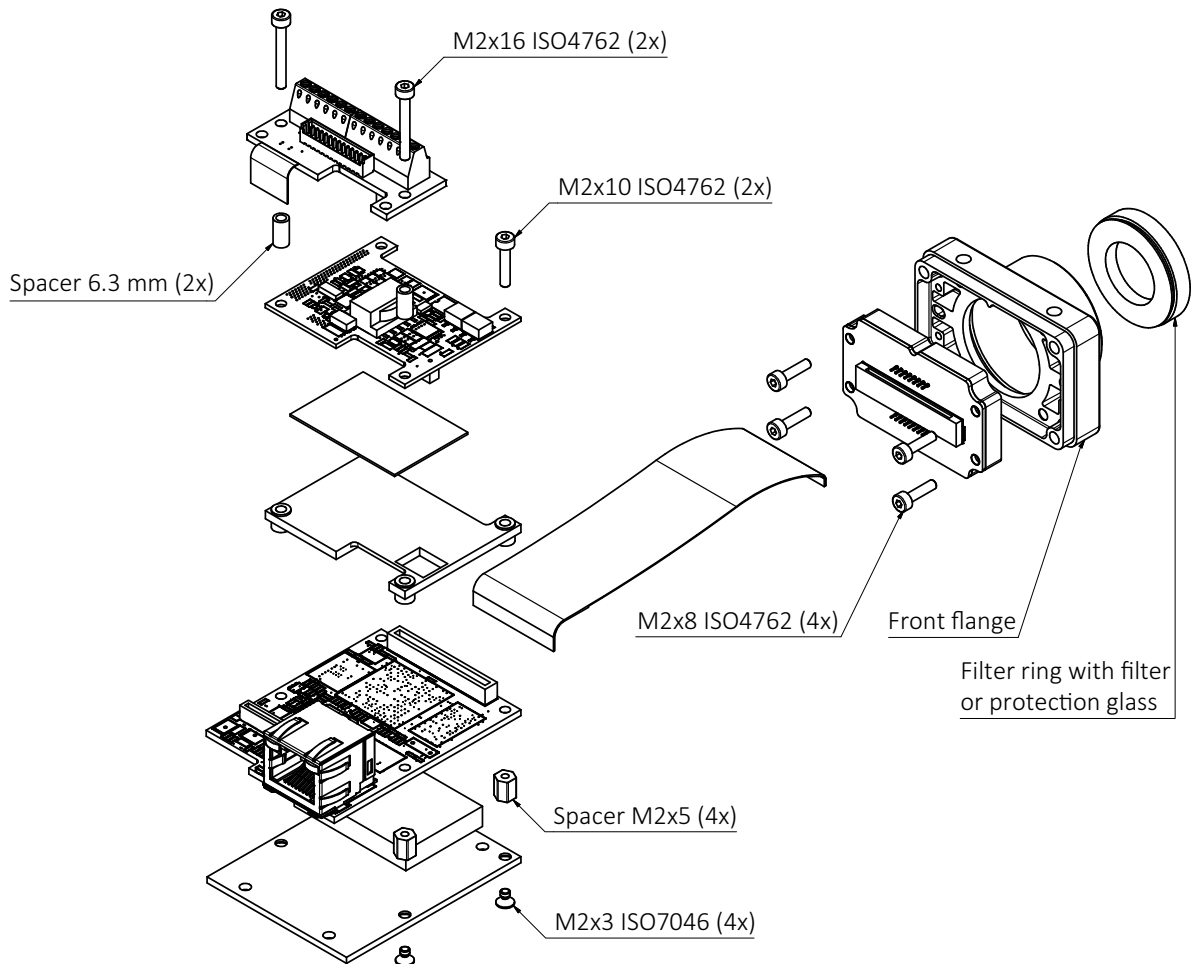
Figure 70: Manta type A board level (PoE) C-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (non-PoE) CS-Mount

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: CS-Mount
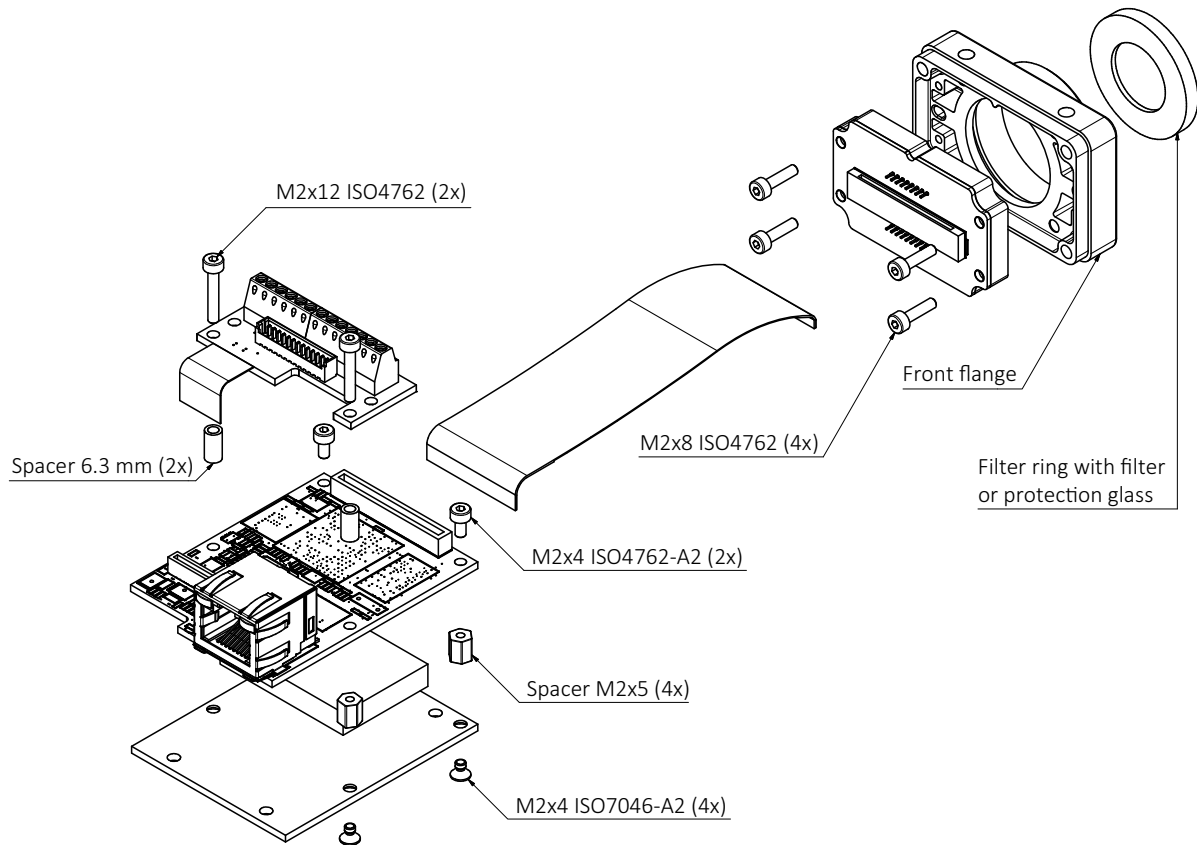
Figure 71: Manta type A board level (non-PoE) CS-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (PoE) CS-Mount

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: CS-Mount
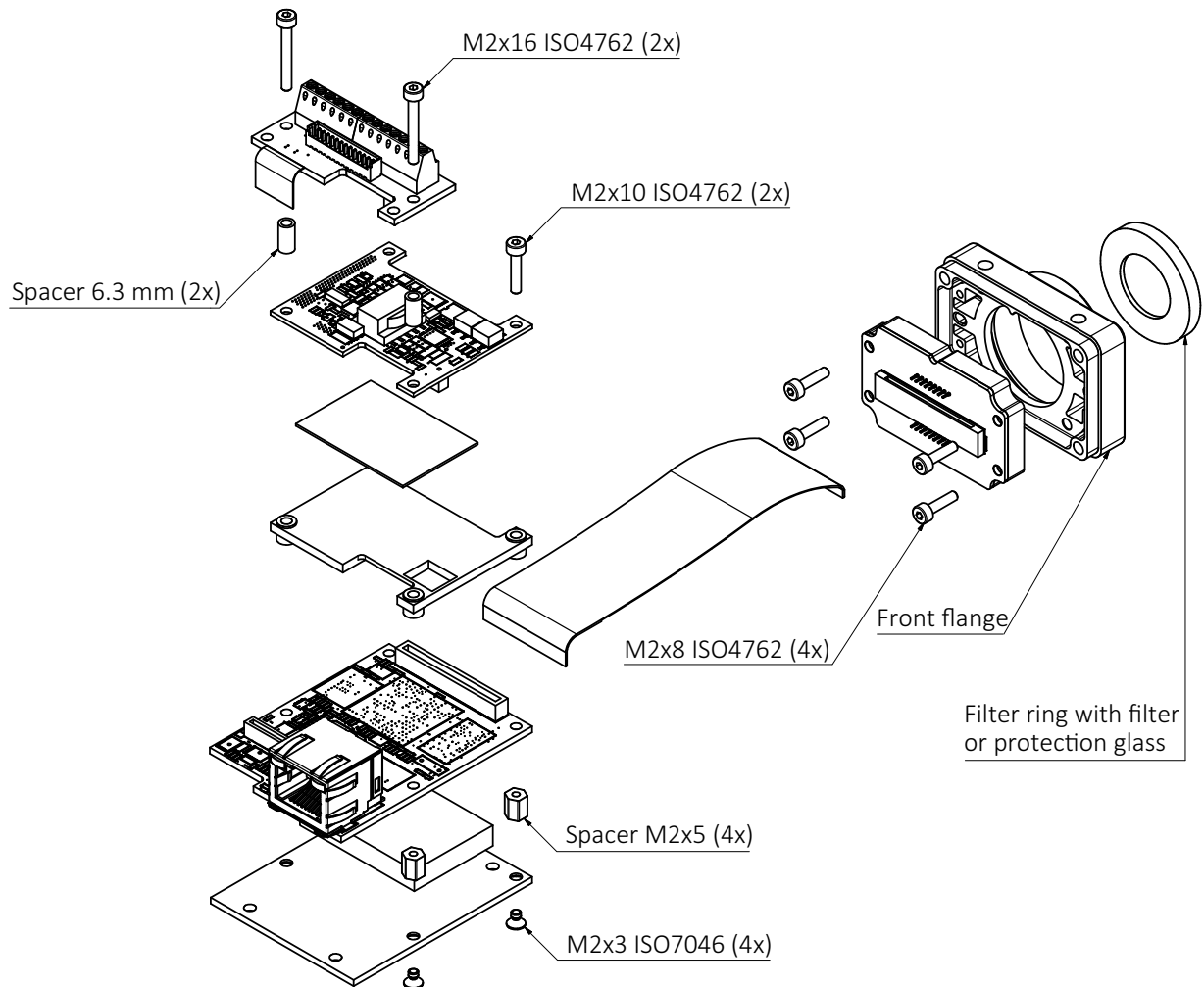
Figure 72: Manta type A board level (PoE) CS-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (non-PoE) M12-Mount

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: M12-Mount

Figure 73: Manta type A board level (non-PoE) M12-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (PoE) M12-Mount

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: M12-Mount

Figure 74: Manta type A board level (PoE) M12-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

C-Mount cross section

All monochrome Manta type A cameras are equipped with a protection glass. All color Manta type A cameras are equipped with an IR cut filter.

Protection glass and filter options

Allied Vision offers several filter options for both monochrome and color Manta cameras. Choose protection glass or filter according to the Modular Concept.

https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html

Maximum protrusion

Maximum protrusion is the distance from lens flange to the glass filter in the camera.

Maximum protrusion: 9.7

Filter / protection glass

Ø16
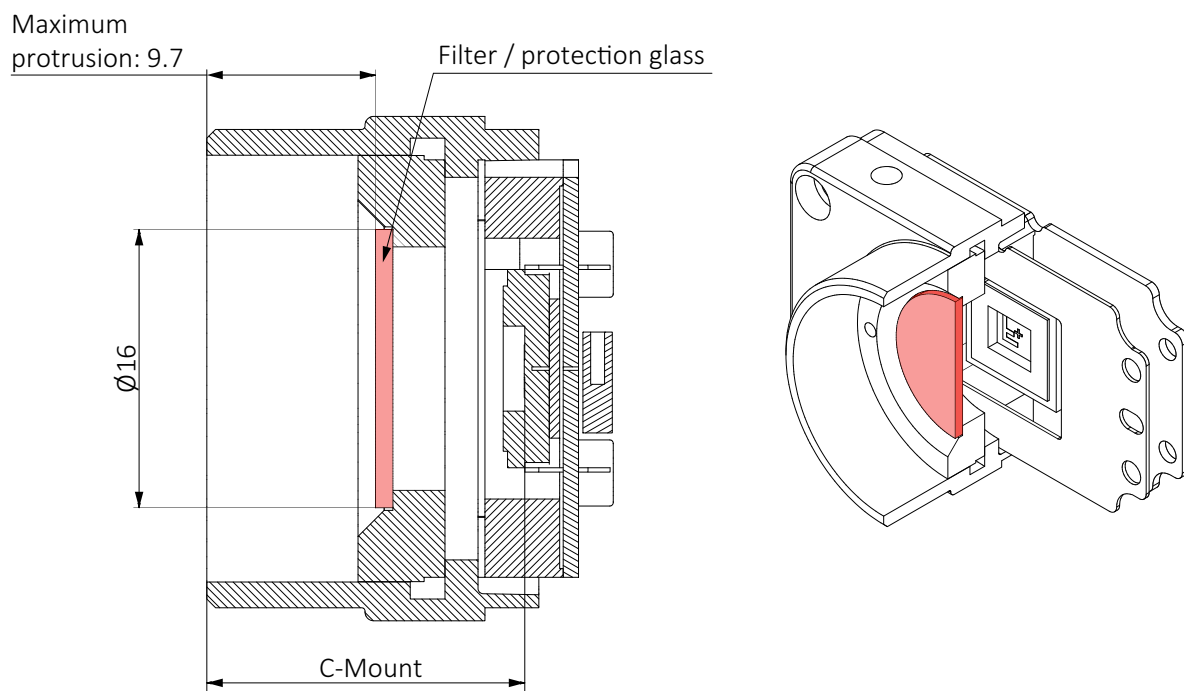
C-Mount

Figure 75: Manta type A C-Mount dimensions (16 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

CS-Mount cross section

Protection glass and filter options

Allied Vision offers several filter options for both monochrome and color Manta cameras. Choose protection glass or filter according to the Modular Concept.

https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html

Maximum protrusion

Maximum protrusion is the distance from lens flange to the filter / protection glass in the camera.
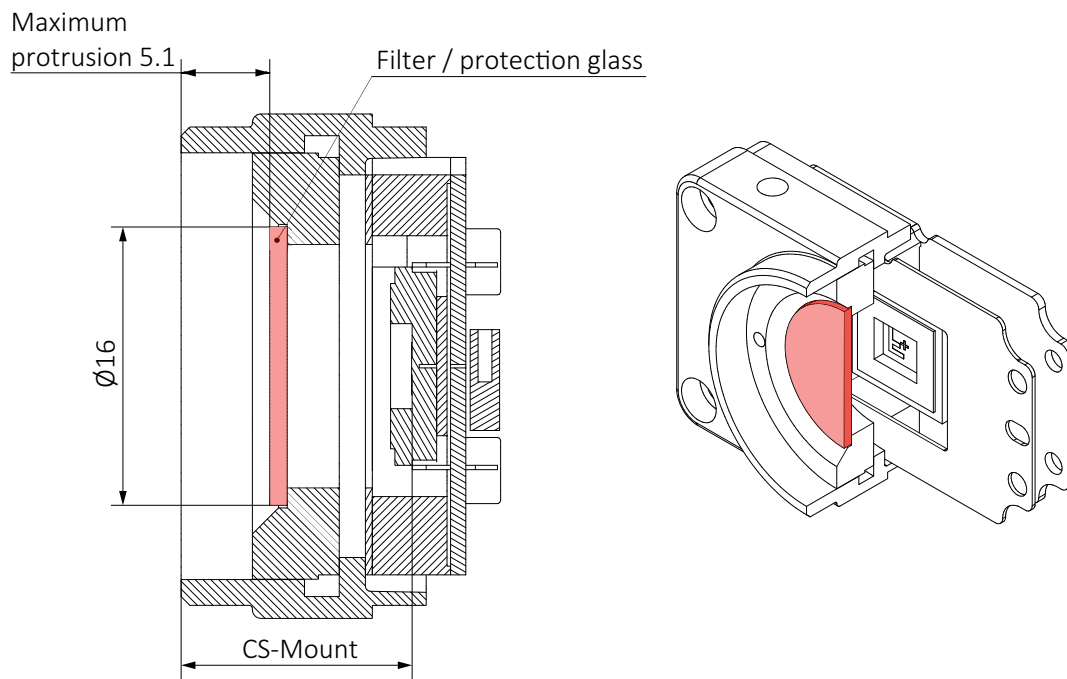
Figure 76: Manta type A CS-Mount dimensions (16 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Camera dimensions (type B)

Type A and Type B cameras

Manta type A cameras have different housings than Manta type B cameras.

Manta type A cameras: G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B cameras: G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-609, G-917

Manta standard housing

Manta G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-609, G-917
Mount: C-Mount
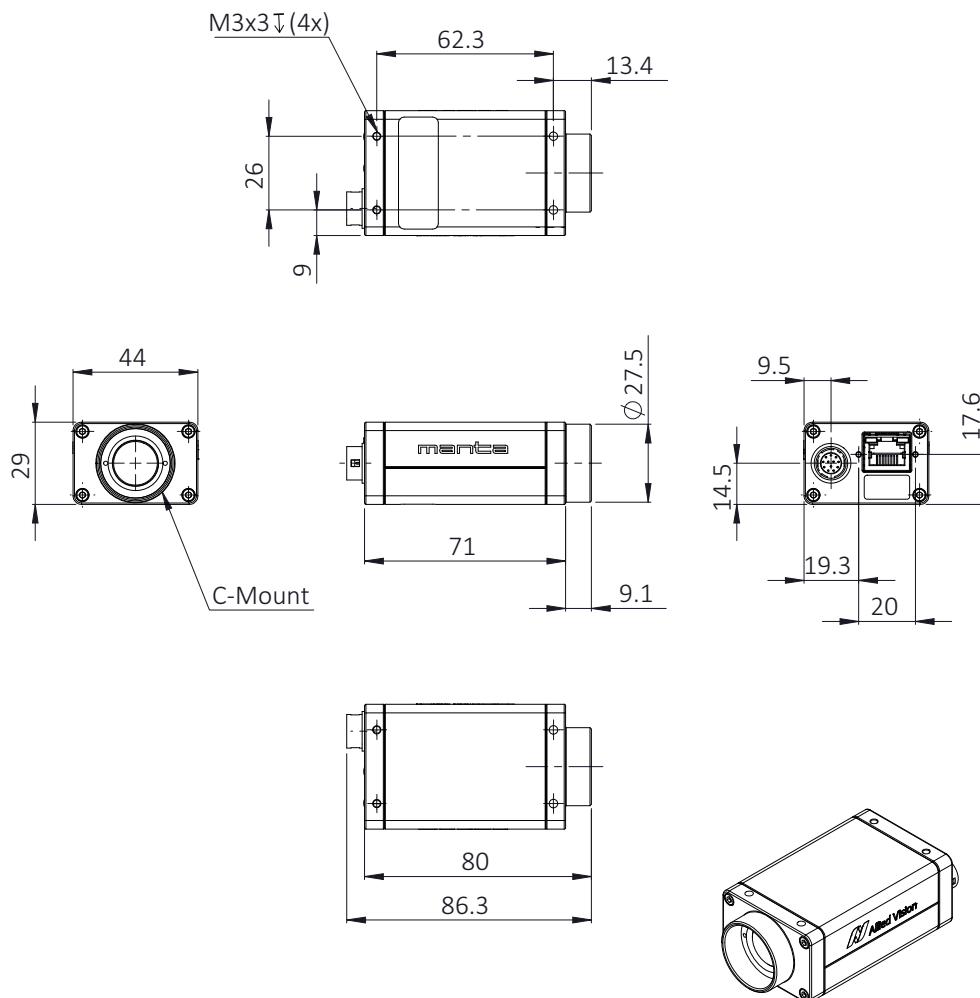
Figure 77: Manta type B standard housing dimensions (including connectors)

Manta angled-head housings

Manta W90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards.

Manta G-223, G-235, G-319, G-419, G-507
Mount: C-Mount
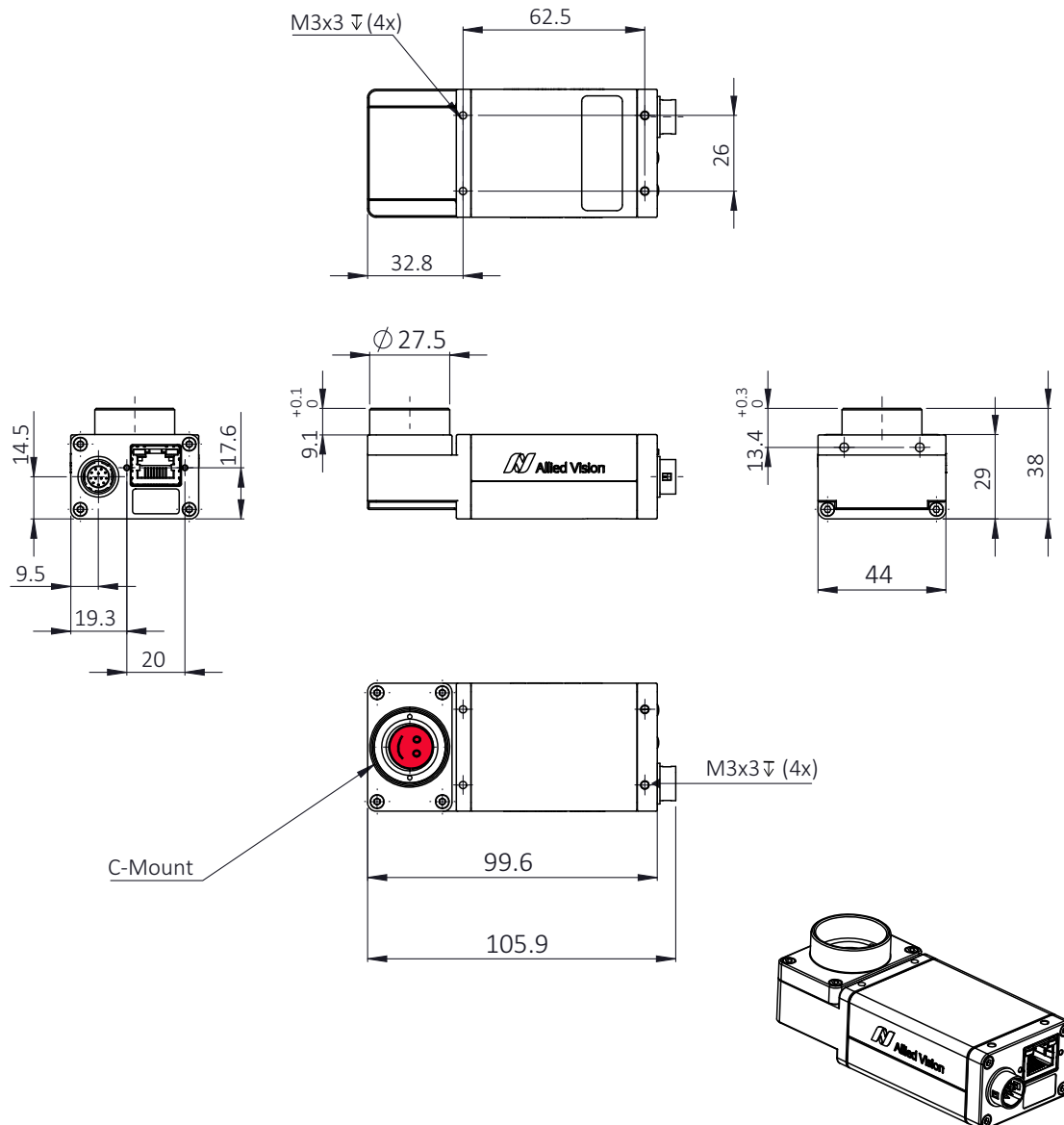
Figure 78: Manta type B W90 housing dimensions (including connectors)

Manta W90 S90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards. The sensor is also rotated 90 degrees clockwise.
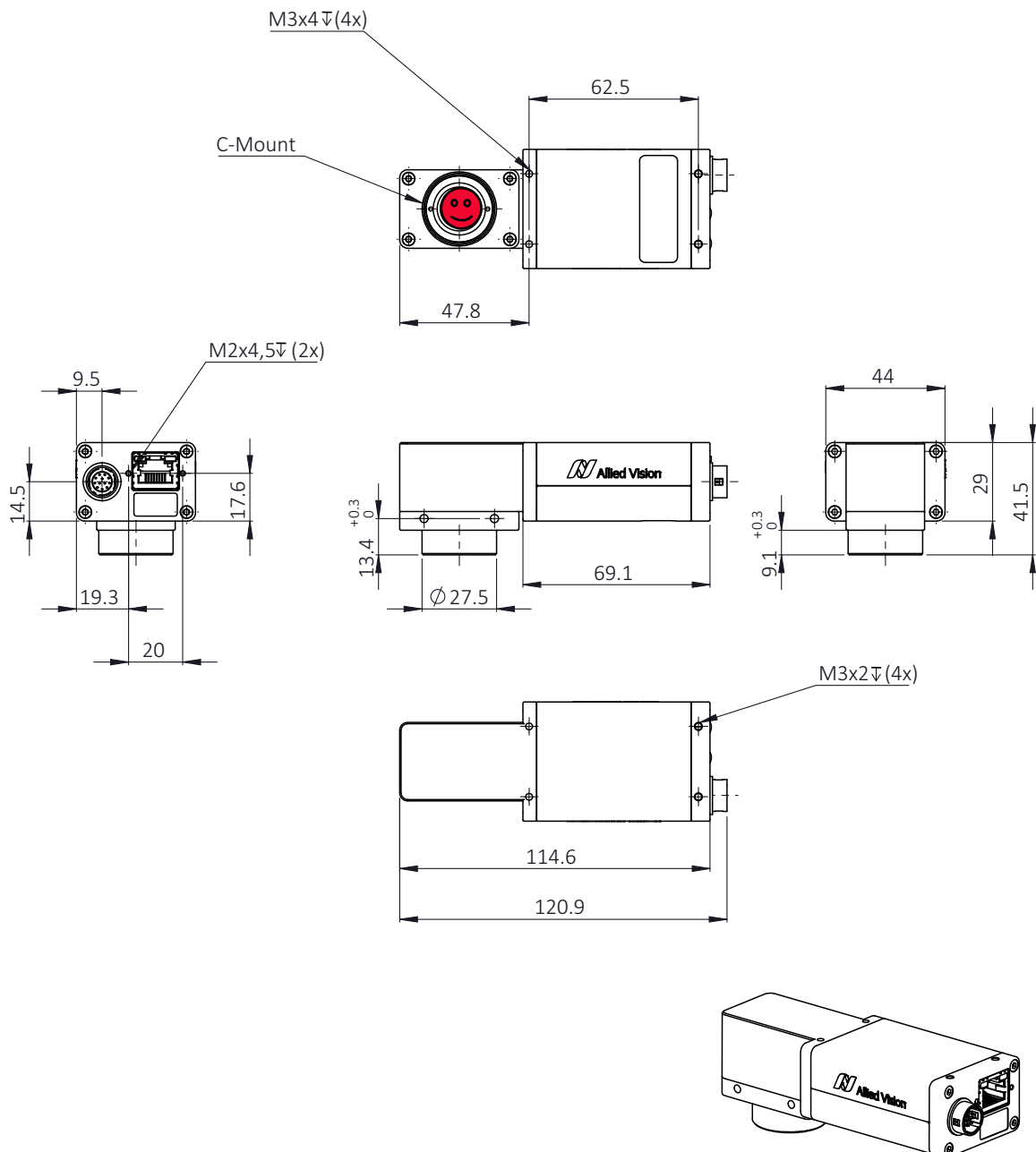
Manta G-223, G-235, G-319, G-419, G-507
Mount: C-Mount
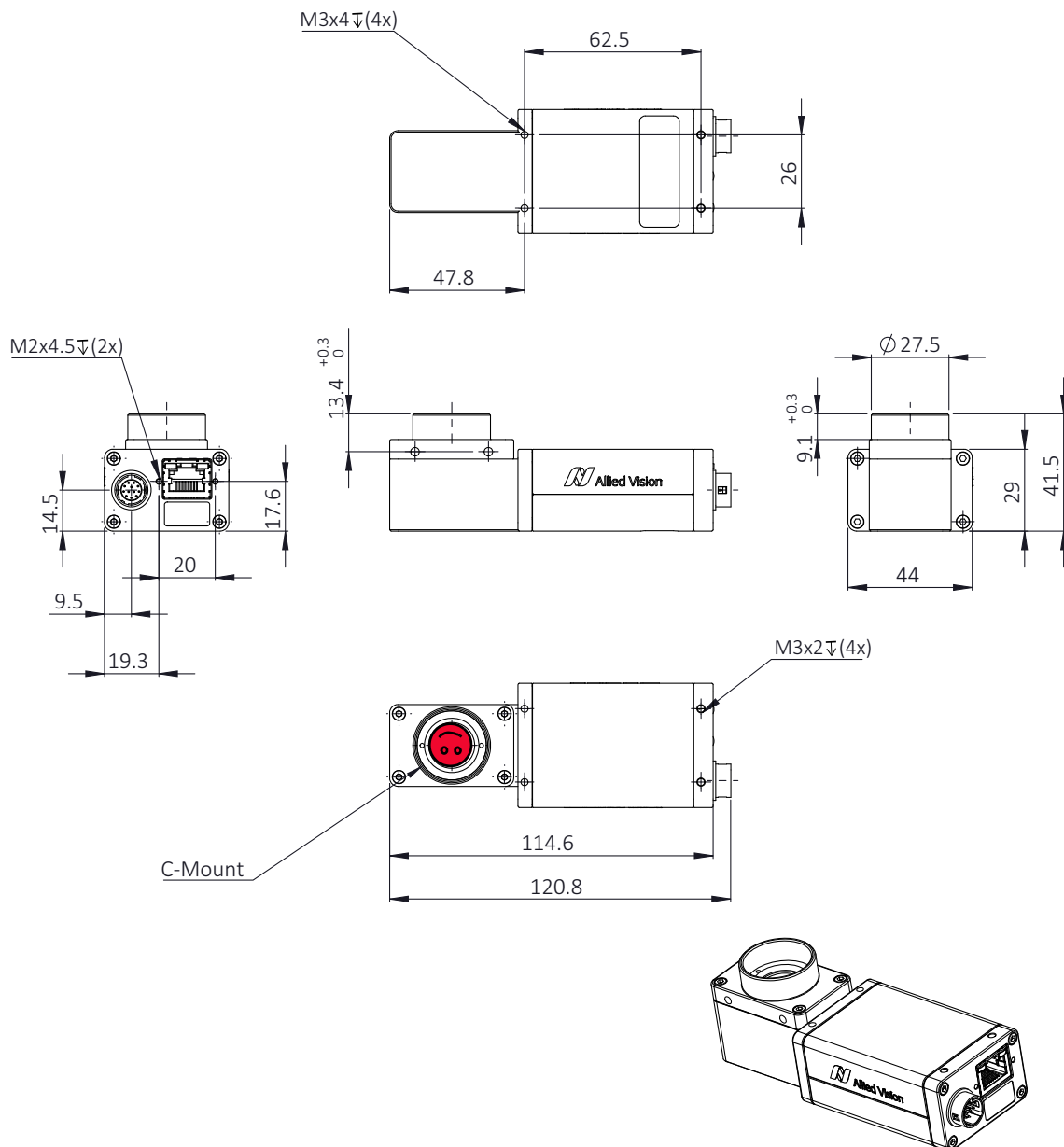
Figure 79: Manta type B W90 S90 housing dimensions (including connectors)

Manta W270 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards.

Manta G-223, G-235, G-319, G-419, G-507
Mount: C-Mount
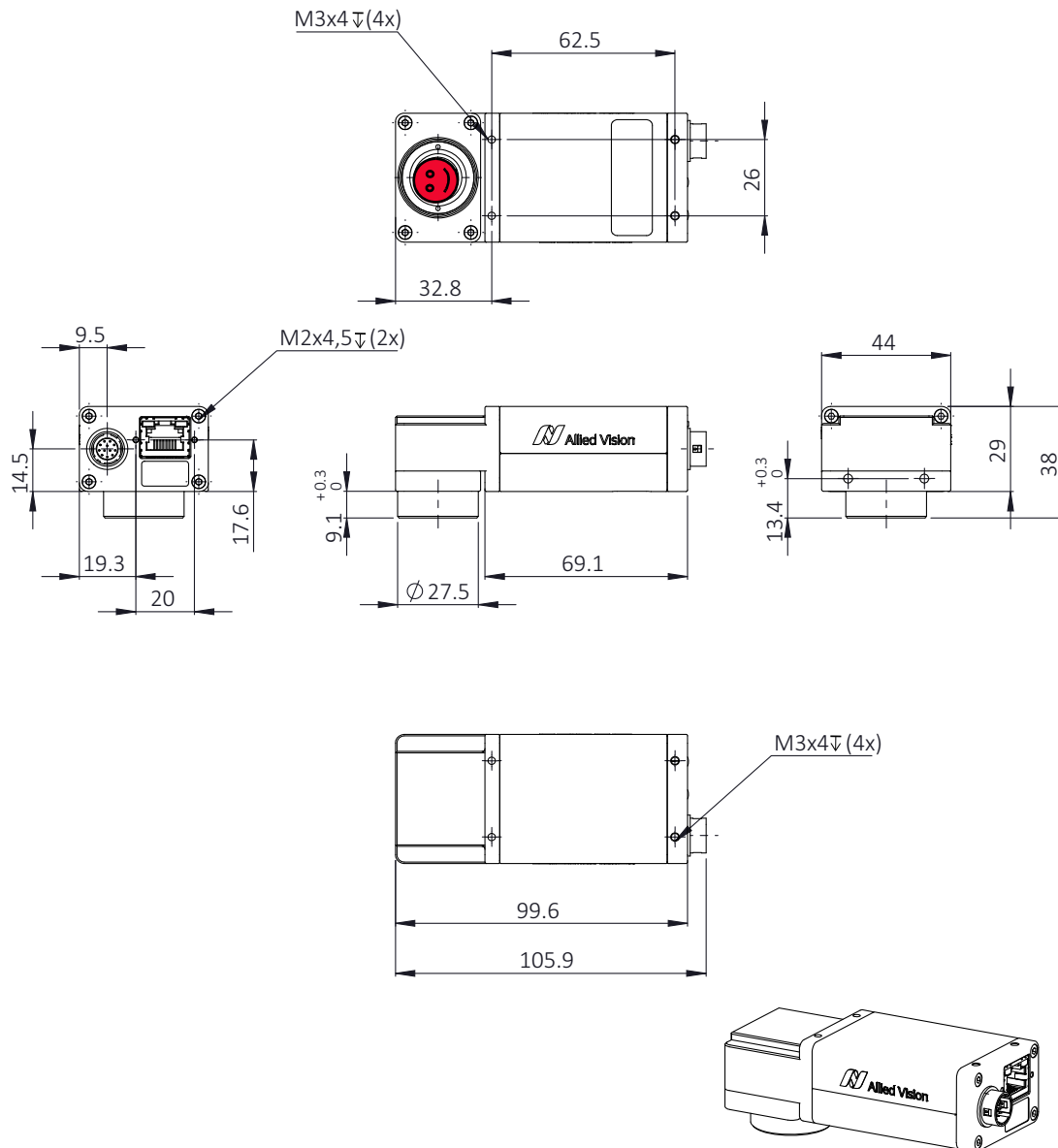
Figure 80: Manta type B W270 housing dimensions (including connectors)

Manta W270 S90 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards. The sensor is also rotated 90 degrees clockwise.

Manta G-223, G-235, G-319, G-419, G-507
Mount: C-Mount

Figure 81: Manta type B W270 S90 housing dimensions (including connectors)

Manta board level variants

Manta board level (PoE and non-PoE)
Manta G-223, G-235, G-319, G-419, G-507

13-pole I/O connector:

Molex PicoBlade
Vertical Header 53047-1310
Receptacle Housing 51021-1300
Crimp Terminal 13 x 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Video Type Auto Iris Out
4 = Input 1
5 = not used
6 = Output 1

7 = GND (for Inputs)
8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

Flex cable length:

FPC80 L = 60 mm   5568-01
FPC80 L = 110 mm 5569-01
FPC80 L = 150 mm 5570-01
FPC80 L = 200 mm 5571-01
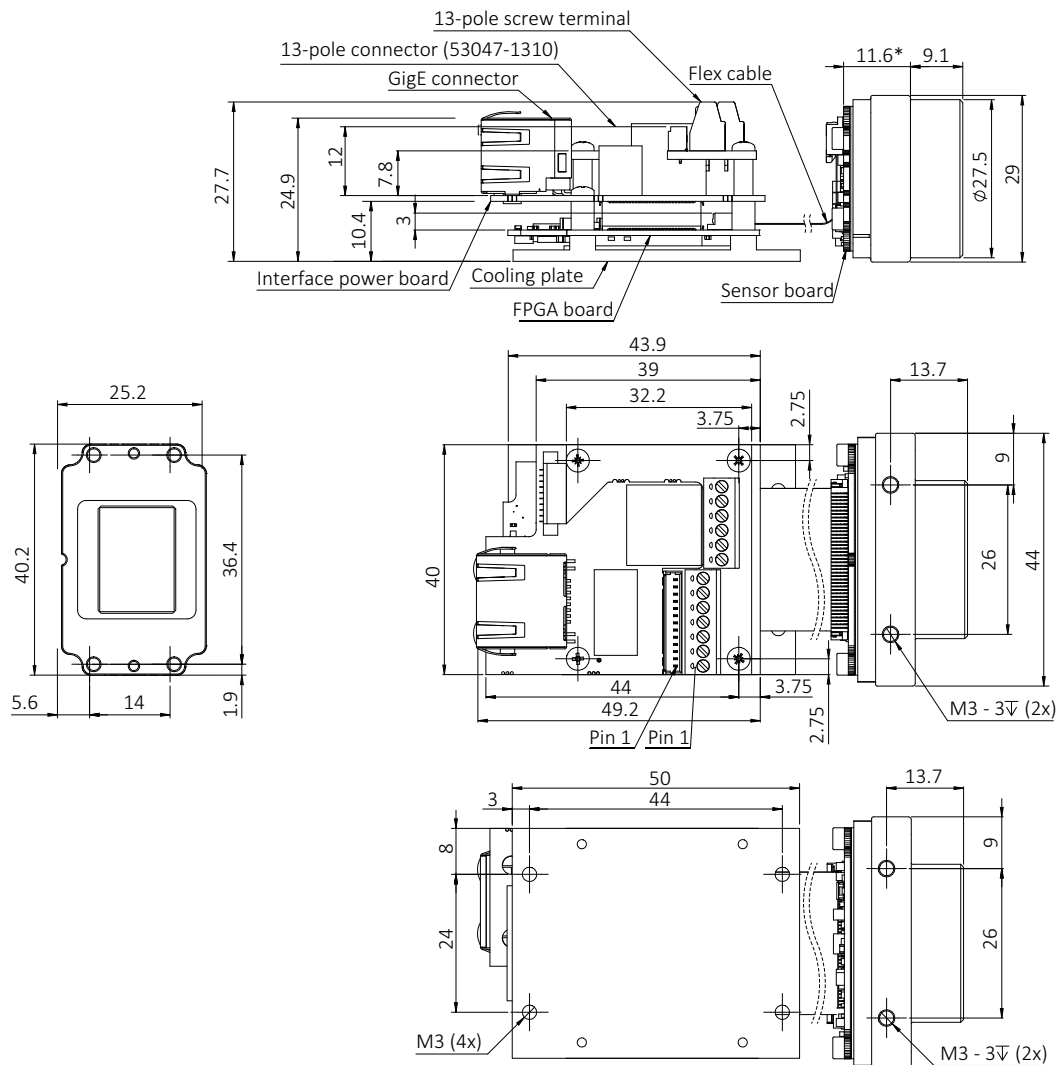
*Depending upon the sensor

Figure 82: Manta type B board level (PoE and non-PoE) dimensions

Manta board level (PoE and non-PoE) C-Mount

Manta G-223, G-235, G-319, G-419, G-507
Mount: C-Mount
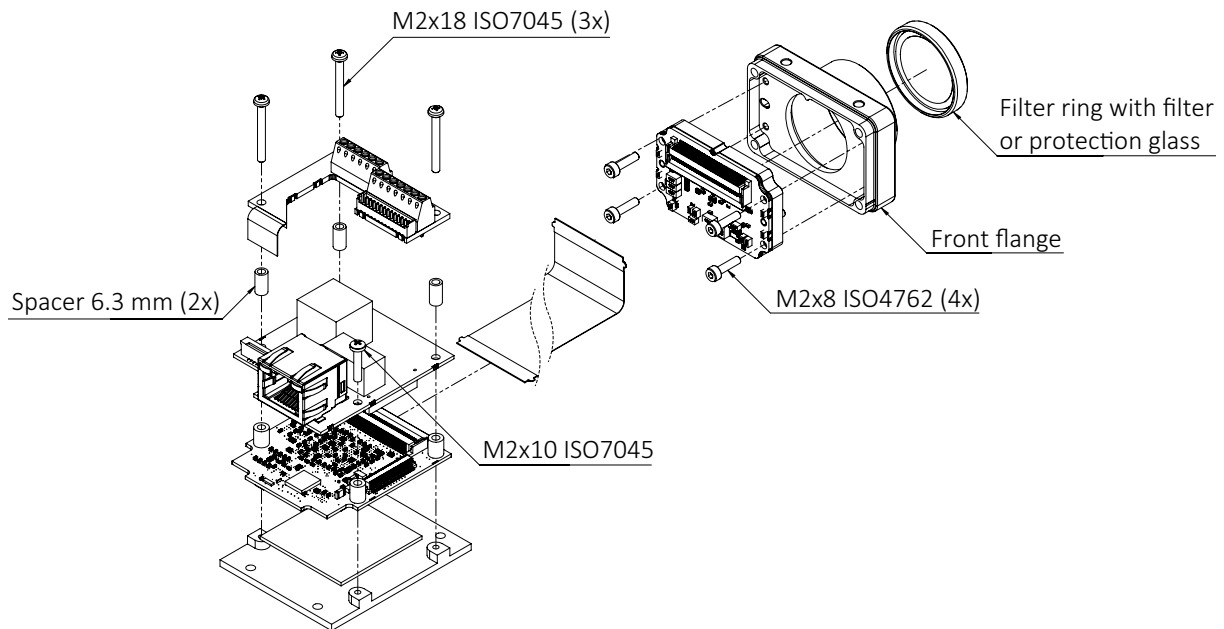
Figure 83: Manta type B board level (PoE and non-PoE) C-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (PoE and non-PoE) CS-Mount
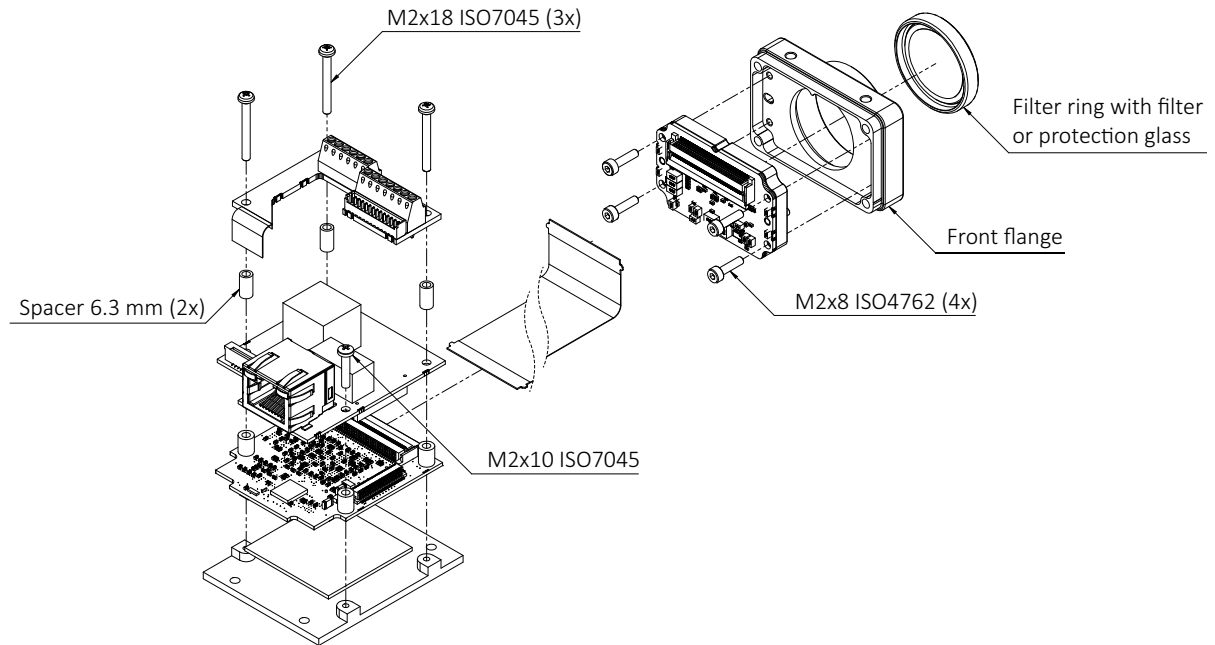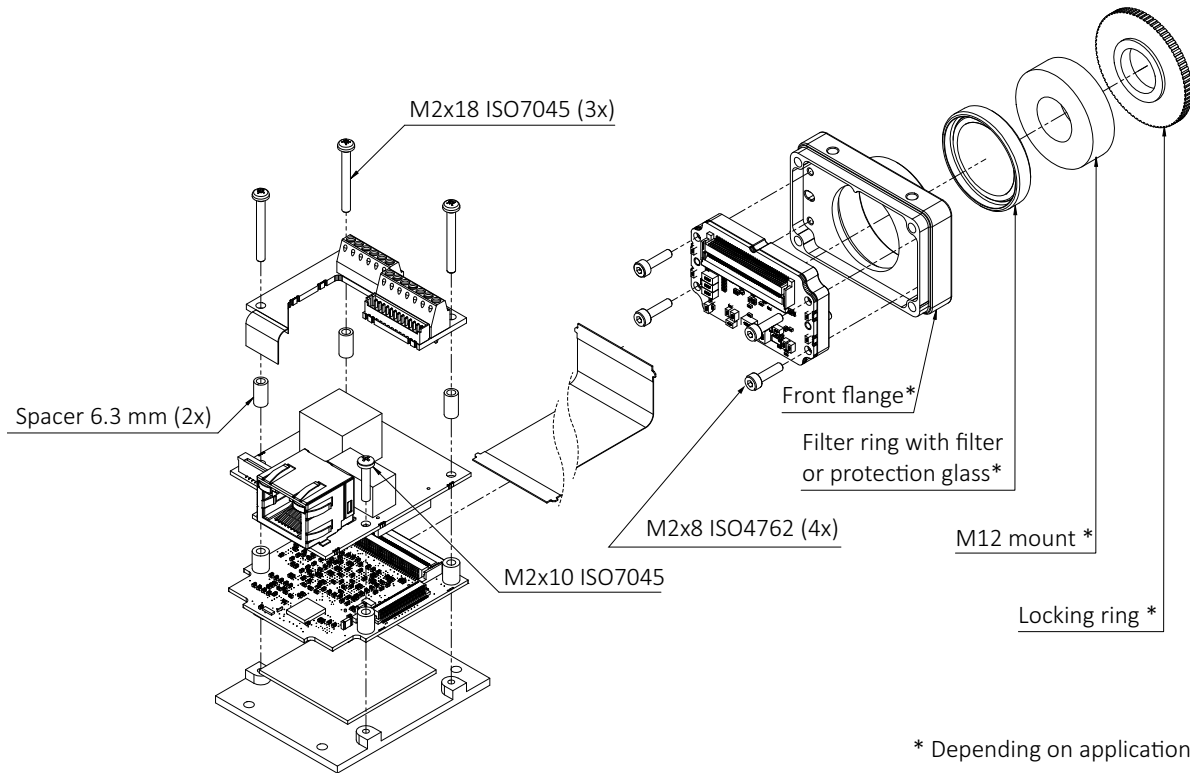
Manta G-223, G-235, G-319, G-419, G-507
Mount: CS-Mount

Figure 84: Manta type B board level (PoE and non-PoE) CS-Mount

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Manta board level (PoE and non-PoE) M12-Mount

Manta G-223, G-235, G-319, G-419, G-507
Mount: M12-Mount

M2x18 ISO7045 (3x)

Spacer 6.3 mm (2x)

M2x10 ISO7045

M2x8 ISO4762 (4x)

Front flange*

Filter ring with filter
or protection glass*

M12 mount *

Locking ring *

* Depending on application

Figure 85: Manta type B board level (non-PoE and PoE) M12-Mount

Need mount adjustment?

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

C-Mount cross section

All monochrome Manta type B cameras are equipped with a protection glass. All color Manta type B cameras are equipped with an IR cut filter.

Protection glass and filter options

Allied Vision offers several filter options for both monochrome and color Manta cameras. Choose protection glass or filter according to the Modular Concept.

https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html

Maximum protrusion

Maximum protrusion is the distance from lens flange to the filter / protection glass in the camera.

Manta type B cameras with sensor size ≥ 1" diagonal are equipped with a 22 mm diameter filter or protection glass. All other Manta type B cameras are equipped with a 16 mm diameter filter or protection glass.

Manta G-235, G-282, G-283, G-319, G-505, G-507
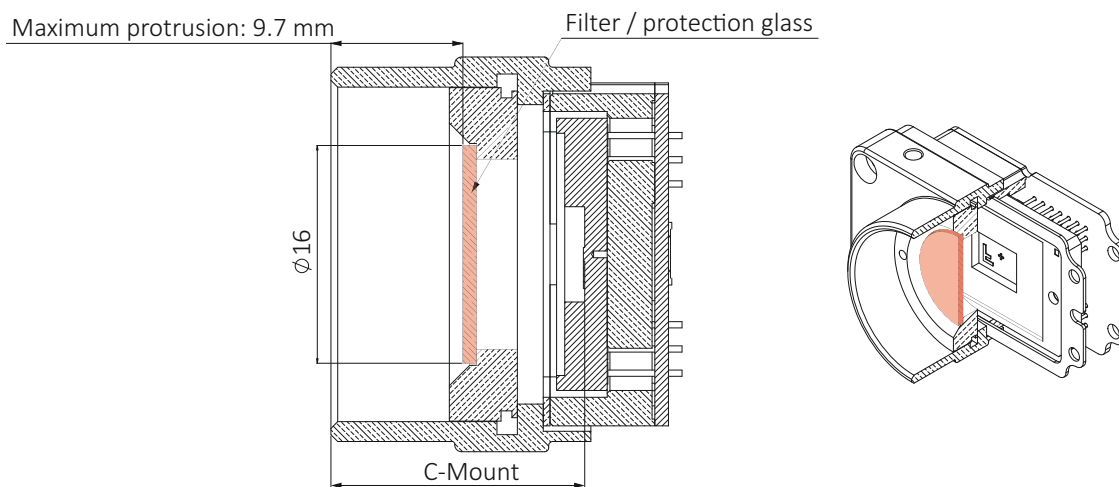Filter/Protection glass diameter: 16 mm

Figure 86: Manta type B C-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-609, G-917
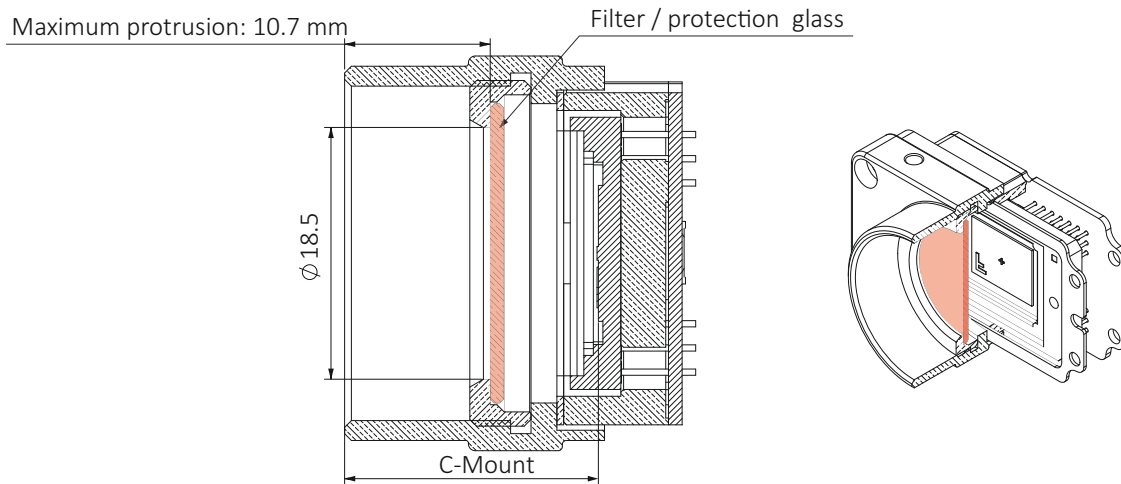Filter/Protection glass diameter: 22 mm

Figure 87: Manta type B C-Mount dimensions (22 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

CS-Mount cross section

Protection glass and filter options

Allied Vision offers several filter options for both monochrome and color Manta cameras. Choose protection glass or filter according to the Modular Concept.

https://www.alliedvision.com/en/support/technical-documentation/manta-documentation.html

Maximum protrusion

Maximum protrusion is the distance from lens flange to the filter / protection glass in the camera.

Manta type B cameras with sensor size ≥ 1inch diagonal are equipped with a 22 mm diameter filter / protection glass. All other Manta type B cameras are equipped with a 16 mm diameter filter / protection glass.

Manta G-235, G-282, G-283, G-319, G-505, G-507
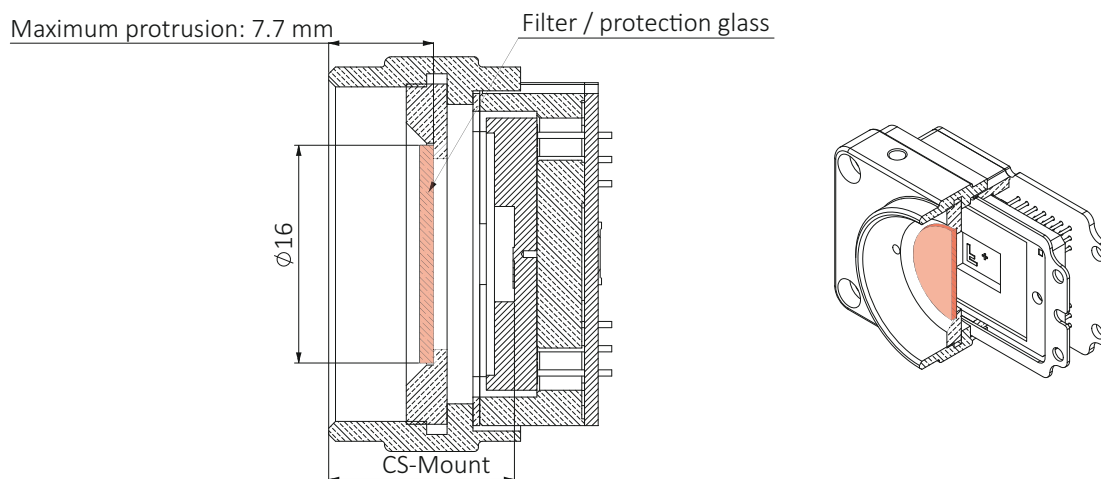Filter/Protection glass diameter: 16 mm

Figure 88: Manta type B CS-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-609, G-917
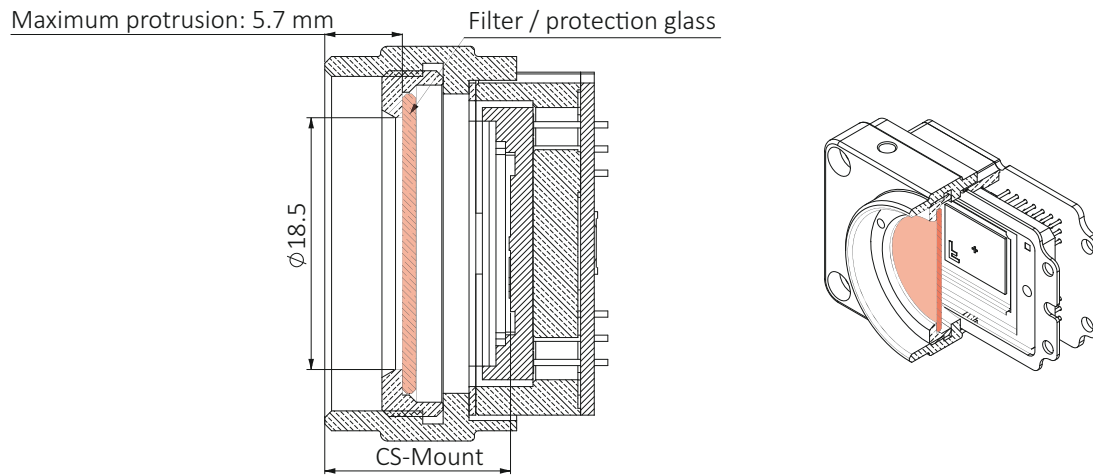Filter/Protection glass diameter: 22 mm

Figure 89: Manta type B CS-Mount dimensions (22 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.
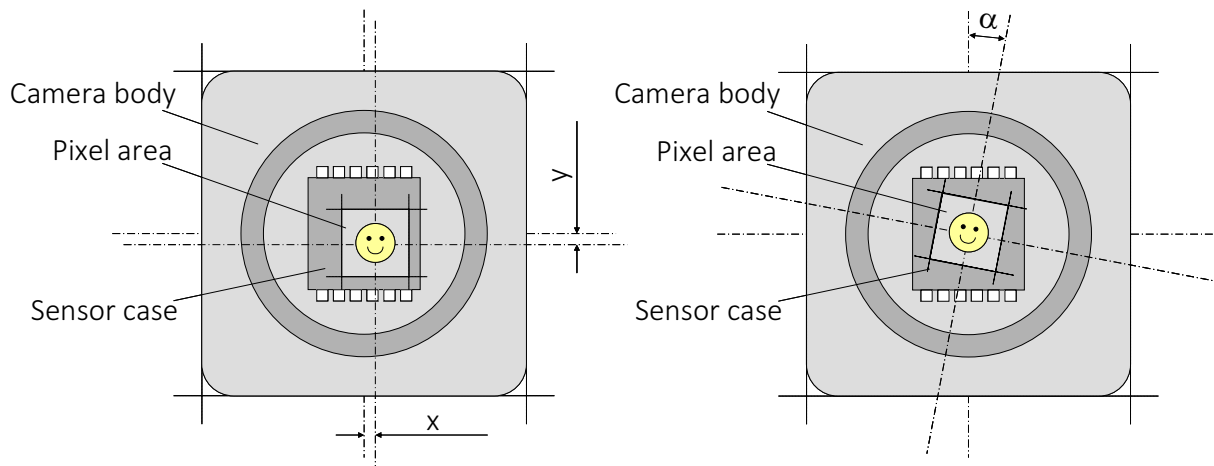
Sensor position accuracy

Figure 90: Allied Vision sensor position accuracy

Unless stated otherwise, the following values are applicable:

Criteria	Subject	Properties
Reference Point	Sensor	Center of pixel area (photo sensitive cells)
	Camera	Center of camera front flange (outer case edges)
Accuracy	x/y	±150 μm (sensor shift)
	z	+0 μm to -150 μm (optical back focal length)
	α	±0.5° (sensor rotation)
Alignment		Optical alignment of photo sensitive sensor area into camera front module (lens mount front flange).

*Table 44: Sensor position accuracy criteria*

Filter and lenses

This chapter includes information on:

- Suitable lens formats for Manta camera models
- Standard IR cut filter and its transmission characteristics

Camera lenses

Allied Vision offers different lenses from a variety of manufacturers. This section presents tables that list selected image field of view (width x height) depending on sensor size, distance and focal length of the lens.
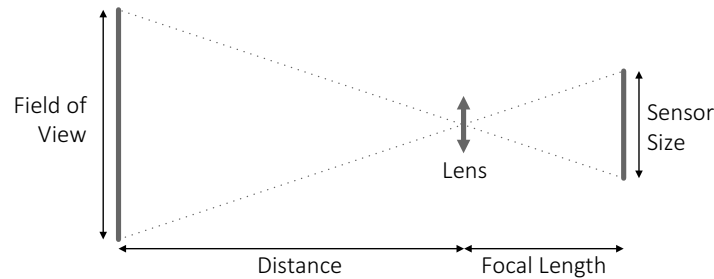
Focal length

Lenses with focal lengths < 8 mm may show shading in the edges of the image due to microlenses on the sensor.

The exact values vary and depend on the respective lens.

Accessories

Please contact your Allied Vision sales representative or your Allied Vision distributor for information on available accessories:

https://www.alliedvision.com/en/about-us/where-we-are.html

The following tables list selected image formats in width x height depending on camera type, distance and the focal length of the lens.

Manta G-031B, G-031C

Focal length for type 1/4 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
2.8 mm	655 x 490 mm	1314 x 983 mm
4 mm	458 x 342 mm	919 x 687 mm
6 mm	304 x 227 mm	611 x 457 mm
8 mm	227 x 170 mm	458 x 342 mm
12 mm	150 x 112 mm	304 x 227 mm
16 mm	112 x 83 mm	227 x 170 mm
25 mm	70 x 52 mm	114 x 108 mm

Table 45: Manta G-031B, G-031C focal length vs. field of view

Manta G-032B, G-032C

Focal length for type 1/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.0 mm	608 x 446 mm	1220 mm x 896 mm
4.8 mm	506 x 371 mm	1016 mm x 746 mm
8 mm	301 x 221 mm	608 mm x 446 mm
12 mm	199 x 146 mm	403 mm x 296 mm
16 mm	148 x 109 mm	301 mm x 221 mm
25 mm	93 x 68 mm	191 mm x 140 mm
35 mm	65 x 48 mm	135 mm x 99 mm

Table 46: Manta G-032B, G-032C focal length vs. field of view

Manta G-033B, G-033C

Focal length for type 1/2 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	660 x 495 mm	1327 x 995 mm
8 mm	394 x 295 mm	794 x 595 mm
12 mm	260 x 195 mm	527 x 395 mm
16 mm	194 x 145 mm	394 x 295 mm
25 mm	122 x 91 mm	250 x 187 mm
35 mm	85 x 64 mm	176 x 132 mm
50 mm	58 x 43 mm	122 x 91 mm

Table 47: Manta G-033B, G-033C focal length vs. field of view

Manta G-046B, G-046C

Focal length for type 1/2 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	660 x 495 mm	1327 x 995 mm
8 mm	394 x 295 mm	794 x 595 mm
12 mm	260 x 195 mm	527 x 395 mm
16 mm	194 x 145 mm	394 x 295 mm
25 mm	122 x 91 mm	250 x 187 mm
35 mm	85 x 64 mm	176 x 132 mm
50 mm	58 x 43 mm	122 x 91 mm

Table 48: Manta G-046B, G-046C focal length vs. field of view

Manta G-125B, G-125C

Focal length for type 1/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.0 mm	595 x 446 mm	1195 x 896 mm
4.8 mm	495 x 371 mm	995 x 746 mm
8 mm	295 x 221 mm	595 x 446 mm
12 mm	195 x 146 mm	395 x 296 mm
16 mm	145 x 109 mm	295 x 221 mm
25 mm	91 x 68 mm	187 x 140 mm
35 mm	64 x 48 mm	132 x 99 mm

Table 49: Manta G-125B, G-125C focal length vs. field of view

Manta G-145B, G-145C (including 30 fps variants)

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	908 x 681 mm	1825 x 1368 mm
8 mm	541 x 406 mm	1091 x 818 mm
12 mm	358 x 268 mm	725 x 543 mm
16 mm	266 x 200 mm	541 x 406 mm
25 mm	167 x 125 mm	343 x 257 mm
35 mm	117 x 88 mm	243 x 182 mm
50 mm	79 x 59 mm	167 x 125 mm

Table 50: Manta G-145B, G-145C (including 30 fps variants) focal length vs. field of view

Manta G-145B NIR

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	908 x 681 mm	1825 x 1368 mm
8 mm	541 x 406 mm	1091 x 818 mm
12 mm	358 x 268 mm	725 x 543 mm
16 mm	266 x 200 mm	541 x 406 mm
25 mm	167 x 125 mm	343 x 257 mm

Table 51: Manta G-145B NIR focal length vs. field of view

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
35 mm	117 x 88 mm	243 x 182 mm
50 mm	79 x 59 mm	167 x 125 mm

Table 51: Manta G-145B NIR focal length vs. field of view (continued)

Manta G-146B, G-146C

Focal length for type 1/2 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	660 x 495 mm	1327 x 995 mm
8 mm	394 x 295 mm	794 x 595 mm
12 mm	260 x 195 mm	527 x 395 mm
16 mm	194 x 145 mm	394 x 295 mm
25 mm	122 x 91 mm	250 x 187 mm
35 mm	85 x 64 mm	176 x 132 mm
50 mm	58 x 43 mm	122 x 91 mm

Table 52: Manta G-146B, G-146C focal length vs. field of view

Manta G-201B, G-201C (including 30 fps variants)

Focal length for type 1/1.8 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	740 x 549 mm	1488 x 1103 mm
8 mm	441 x 327 mm	890 x 660 mm
12 mm	292 x 216 mm	591 x 438 mm
16 mm	217 x 161 mm	441 x 327 mm
25 mm	136 x 101 mm	280 x 207 mm
35 mm	95 x 71 mm	198 x 147 mm
50 mm	65 x 48 mm	136 x 101 mm

Table 53: Manta G-201B, G-201C (including 30 fps variants) focal length vs. field of view

Manta G-223B, G-223B NIR, G-223C

Focal length for type 2/3 sensor[1]	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	1162 x 617 mm	2335 x 1240 mm
6 mm	927 x 492 mm	1865 x 991 mm
6.5 mm	855 x 454 mm	1721 x 914 mm
8 mm	692 x 368 mm	1396 x 742 mm
10 mm	552 x 293 mm	1114 x 597 mm
12 mm	458 x 243 mm	927 x 492 mm
16 mm	341 x 181 mm	692 x 369 mm
25 mm	214 x 114 mm	439 x 223 mm
35 mm	150 x 79 mm	310 x 165 mm
50 mm	101 x 54 mm	214 x 114 mm
75 mm	64 x 34 mm	139 x 74 mm
90 mm	51 x 27 mm	114 x 60 mm

[1] A 2/3 inch lens may cause vignetting (1 inch lens recommended)

Table 54: Manta G-223B, G-223B NIR, G-223C focal length vs. field of view

Manta G-235B, G-235C

Focal length for type 1/1.2 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	698 x 181 mm	1407 x 364 mm
10 mm	556 x 144 mm	1123 x 291 mm
12 mm	461 x 119 mm	934 x 242 mm
16 mm	343 x 89 mm	698 x 181 mm
25 mm	216 x 56 mm	442 x 115 mm
35 mm	151 x 39 mm	313 x 81 mm
50 mm	102 x 26 mm	216 x 56 mm

Table 55: Manta G-235B, G-235C focal length vs. field of view

Manta G-282B, G-282C

Focal length for type 1/1.8 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	737 x 555 mm	1480 x 1115 mm
6 mm	588 x 443 mm	1183 x 891 mm
6.5 mm	542 x 408 mm	1091 x 822 mm
8 mm	439 x 331 mm	885 x 667 mm
10 mm	350 x 264 mm	707 x 533 mm
12 mm	290 x 219 mm	588 x 443 mm
16 mm	216 x 163 mm	439 x 331 mm
25 mm	136 x 102 mm	278 x 210 mm
35 mm	95 x 71 mm	197 x 148 mm
50 mm	64 x 48 mm	136 x 102 mm
75 mm	40 x 30 mm	88 x 66 mm
90 mm	33 x 25 mm	72 x 54 mm

Table 56: Manta G-282B, G-282C focal length vs. field of view

Manta G-283B, G-283C

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
4.8 mm	907 x 683 mm	1822 x 1373 mm
6 mm	724 x 545 mm	1456 x 1097 mm
6.5 mm	667 x 503 mm	1344 x 1012 mm
8 mm	541 x 407 mm	1090 x 821 mm
10 mm	431 x 324 mm	870 x 655 mm
12 mm	357 x 269 mm	724 x 545 mm
16 mm	266 x 200 mm	541 x 407 mm
25 mm	167 x 126 mm	343 x 258 mm
35 mm	117 x 88 mm	242 x 183 mm
50 mm	79 x 60 mm	167 x 126 mm
75 mm	50 x 38 mm	108 x 82 mm
90 mm	40 x 30 mm	89 x 67 mm

Table 57: Manta G-283B, G-283C focal length vs. field of view

Manta G-319B, G-319C

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
5 mm	705 x 525 mm	1417 x 1055 mm
6 mm	586 x 436 mm	1180 x 878 mm
8 mm	438 x 326 mm	883 x 657 mm
10 mm	349 x 260 mm	705 x 525 mm
12 mm	290 x 216 mm	586 x 436 mm
16 mm	215 x 160 mm	438 x 326 mm
25 mm	135 x 101 mm	278 x 207 mm
35 mm	95 x 70 mm	196 x 146 mm
50 mm	64 x 48 mm	135 x 101 mm
75 mm	40 x 30 mm	88 x 65 mm

Table 58: Manta G-319B, G-319C focal length vs. field of view

Manta G-419B, G-419B NIR, G-419C

Focal length for type 1 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	692 x 692mm	1396 x 1396 mm
10 mm	552 x 552 mm	1114 x 1114 mm
12 mm	458 x 458 mm	928 x 928 mm
16 mm	340 x 340 mm	692 x 692 mm
25 mm	214 x 214 mm	439 x 439 mm
35 mm	150 x 150 mm	310 x 310 mm
50 mm	101 x 101 mm	214 x 214 mm
75 mm	64 x 64 mm	139 x 139 mm
90 mm	51 x 51 mm	104 x 104 mm

Table 59: Manta G-419B, G-419B NIR, G-419C focal length vs. field of view

Manta G-504B, G-504C

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	**Distance = 1000 mm**
4.8 mm	908 x 681 mm	1825 x 1368 mm
8 mm	541 x 406 mm	1091 x 818 mm
12 mm	358 x 268 mm	725 x 543 mm
16 mm	266 x 200 mm	541 x 406 mm
25 mm	167 x 125 mm	343 x 257 mm
35 mm	117 x 88 mm	243 x 182 mm
50 mm	79 x 59 mm	167 x 125 mm

Table 60: Manta G-504B, G504C focal length vs. field of view

Manta G-505B, G-505C

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	**Distance = 1000 mm**
6 mm	700 x 585 mm	1408 x 1176 mm
8 mm	523 x 437 mm	1054 x 880 mm
12 mm	346 x 289 mm	700 x 585 mm
16 mm	257 x 215 mm	523 x 437 mm
25 mm	162 x 135 mm	332 x 277 mm
35 mm	113 x 94 mm	234 x 196 mm
50 mm	77 x 64 mm	162 x 135 mm

Table 61: Manta G-505B, G-505C focal length vs. field of view

Manta G-507B, G-507C

Focal length for type 2/3 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
5 mm	842 x 703 mm	1692 x 1413 mm
8 mm	523 x 437 mm	1054 x 880 mm
10 mm	417 x 348 mm	842 x 703 mm
12 mm	346 x 289 mm	700 x 585 mm
16 mm	257 x 215 mm	523 x 437 mm
25 mm	162 x 135 mm	332 x 277 mm
35 mm	113 x 94 mm	234 x 196 mm
50 mm	77 x 40 mm	162 x 135 mm
75 mm	48 x 40 mm	105 x 88 mm

Table 62: Manta G-507B, G-507C focal length vs. field of view

Manta G-609B, G-609C

Focal length for type 1 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	768 x 616 mm	1549 x 1242 mm
10 mm	612 x 491 mm	1237 x 992 mm
12 mm	508 x 407 mm	1028 x 825 mm
16 mm	378 x 303 mm	768 x 616 mm
25 mm	237 x 190 mm	487 x 391 mm
35 mm	166 x 133 mm	344 x 276 mm
50 mm	112 x 90 mm	237 x 190 mm
75 mm	71 x 57 mm	154 x 124 mm
90 mm	57 x 46 mm	126 x 101 mm

Table 63: Manta G-609B, G-609C focal length vs. field of view

Manta G-917B, G-917C

Focal length for type 1 sensor	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	768 x 616 mm	1549 x 1242 mm
10 mm	612 x 491 mm	1237 x 992 mm
12 mm	508 x 407 mm	1028 x 825 mm
16 mm	378 x 303 mm	768 x 616 mm
25 mm	237 x 190 mm	487 x 391 mm
35 mm	166 x 133 mm	344 x 276 mm
50 mm	112 x 90 mm	237 x 190 mm
75 mm	71 x 57 mm	154 x 124 mm
90 mm	57 x 46 mm	126 x 101 mm

Table 64: Manta G-917B, G-917C focal length vs. field of view

IR cut filter

Color cameras are equipped with an IR cut filter. The following illustration shows the spectral transmission of the IR cut filter.
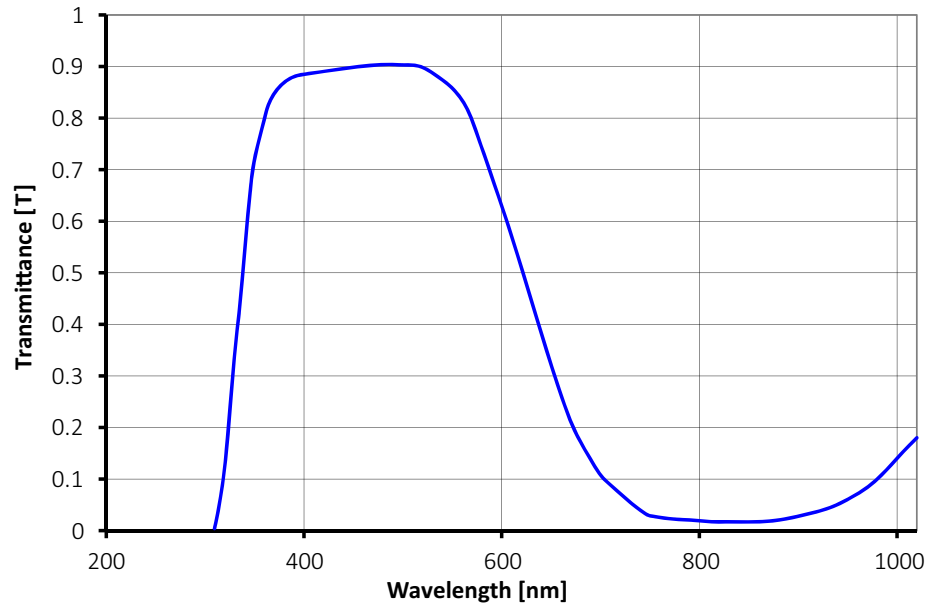
Figure 91: Approximate spectral transmission of a Hoya C-5000 type IR cut filter (may vary slightly by filter lot)

Camera interfaces
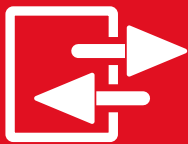
This chapter includes:

- A general description of the inputs and outputs (including trigger features)
- I/O connector pin assignments
- I/O block diagrams
- A general description of trigger rules such as timing diagram and definitions

Back panel
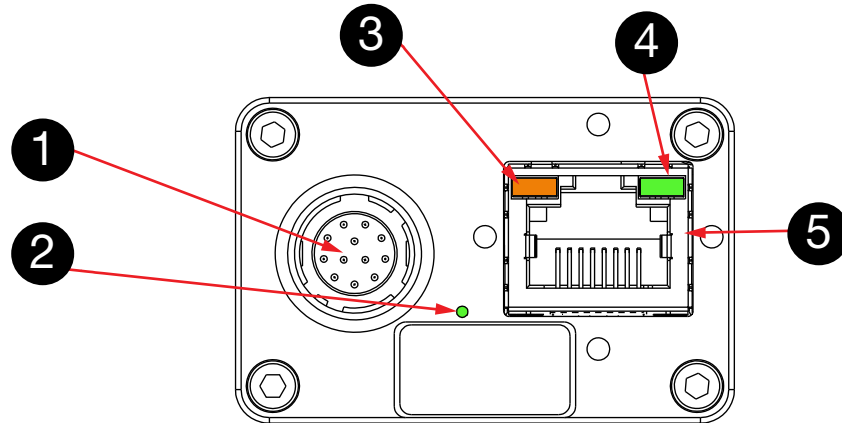
Figure 92: Rear view of Manta type A camera

1	Hirose I/O port
2	LED 3 (only for type A camera models with PoE)
3	LED 1
4	LED 2
5	Gigabit Ethernet interface

Status LEDs

Manta type A status LEDs

The tables below describe the status LEDs of Manta type A cameras.

Manta G-031B, G-031C, G-032B, G-032C, G-033B, G-033C, G-046B, G-046C, G-125B, G-125C, G-145B, G-145B NIR, G-145C, G-146B, G-146C, G-201B, G-201C, G-504B, G-504C

LED 1 color	Status
Solid orange	Ethernet link with 1 Gb/s established
Flashing orange	Ethernet activity with 1 Gb/s

Table 65: Status LED 1

LED 2 color	Status
Solid green	Ethernet link with 100 Mb/s established
Flashing green	Ethernet activity with 100 Mb/s

Table 66: Status LED 2

LED 3 color	Status
Solid green	Camera is powered (Hirose or PoE)
LED off	No power

Table 67: Status LED 3

Manta type B status LEDs

The tables below describe the status LEDs of Manta type B cameras.

Manta G-223B, G-223B NIR, G-223C, G-235B, G-235C, G-282B, G-282C, G-283B, G-283C, G-319B, G-319C, G-419B, G-419B NIR, G-419C, G-505B, G-505C, G-507B, G-507C, G-609B, G-609C, G-917B, G-917C

LED 1 color	Status
Solid orange	Ethernet link established
Flashing orange	Network traffic

Table 68: Status LED 1

LED 2 color	Status
Solid green	Ethernet link established
Slow flashing green	Booting routine
Four rapid flashes per second	Transmission error. Contact support@alliedvision.com

Table 69: Status LED 2

Manta type B cameras do not have a power LED (LED 3).

Gigabit Ethernet interface

The Gigabit Ethernet interface conforms to the IEEE 802.3 1000BASE-T standard for Gigabit Ethernet over copper. To prevent electromagnetic interference (EMI) and for best performance, Category 6 (or higher) S/STP cables and connectors are recommended.

- Cable lengths up to 100 m are supported.
- The 8-pin RJ-45 jack has the pin assignment according to the Ethernet standard (IEEE 802.3 1000BASE-T).
- For cameras that are PoE capable, the Gigabit Ethernet interface can be used to provide power to the camera.
- Manta PoE models can source power from IEEE 802.3af (1000 Mb/s) and from IEEE 802.3at compliant PSE devices (Power Sourcing Equipment) such as switches injectors or NICs.
- If both the Hirose I/O port and Gigabit Ethernet interface (via PoE) are used for power, the camera will only use the power from the Hirose I/O port.

PoE capable cameras

PoE capable cameras have the letters PoE written on the camera's label on the bottom side of the camera.

Main board for Manta models

From serial number 503323258 on, all Manta models including PoE and board level variants contain the same main board.

Accessories

Please contact the Allied Vision sales team or your local Allied Vision distributor for information on accessories offered by Allied Vision:

https://www.alliedvision.com/en/meta-header/contact-us.html

Camera I/O connector pin assignment (including PoE)

Read all *Notes and Cautions* in the GigE Installation Manual before using the Hirose I/O port.

Hirose connector

The cable side Hirose 12-pin female connector is available for purchase from Allied Vision. Order code: K7600040.

Pin	Signal	Direction	Level	Description
1	Camera GND	In	GND for RS232 and external power	Ground for camera power supply and RS232
2	Camera Power	In	8 to 30 VDC	Camera power supply
3	Video Type Auto Iris Out	Out	---	Video type auto iris ($\geq$ firmware version 1.44)
4	In 1	In	Standard and PoE cameras: U_{in}(high) = 3 to 24 V up to 36 V with external resistor of 3.3 kΩ in series U_{in}(low) = 0 to 1.0 V	Opto-isolated input 1 (SyncIn1)
5	---	---	---	---
6	Out 1	Out	Open emitter, maximum 10 mA	Opto-isolated output 1 (SyncOut1)
7	Isolated In GND	In/Out	---	Isolated input signal ground
8	RxD RS232	In	RS232	Terminal receive data
9	TxD RS232	Out	RS232	Terminal transmit data

Table 70: I/O connector pin assignment

Pin	Signal	Direction	Level	Description
10	Isolated Out Power	In	Common VCC for outputs, maximum 30 VDC	Power input for opto-isolated outputs
11	In 2	In	*Standard and PoE* cameras: U_{in}(high) = 3 to 24 V U_{in}(low) = 0 to 1.0 V	Opto-isolated input 2 (SyncIn2)
12	Out 2	Out	Open emitter, maximum 10 mA	Opto-isolated output 2(SyncOut2)

Table 70: I/O connector pin assignment (continued)

The general purpose I/O port uses a Hirose HR10-10R-12PA(73) connector on the camera side. The mating cable connector is Hirose HR10A-10P-12S.

Input block diagram
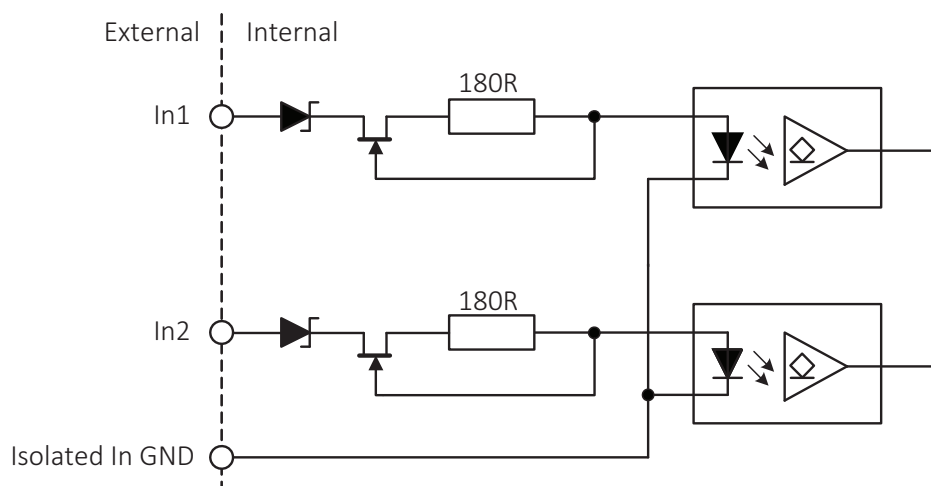
Figure 93: Input block diagram

The inputs can be connected directly to the system for voltages up to 24 VDC. An external resistor is not necessary.

For customers who designed their system for Manta cameras with serial numbers prior to the above mentioned hardware change use your systems with an external resistor without any restrictions.

Cycle delay

The cycle delay for all Manta cameras is tpdLH < 3.5 μs and tpdHL < 30 μs.

For this reason, we recommend to trigger on the rising edge. This guarantees a reaction time that is as fast as possible.

Parameter	Value
U_{in} (low)	0 to 1.0 V
U_{in} (high)	3 to 24 V
Current (constant-current source)	3 to 4 mA

Table 71: Input parameters

Minimum pulse width

The minimum pulse width for all Manta cameras is:

Figure 94: Minimum pulse width

Test conditions

The input signal was driven with 3.3 V and no external additional series resistor.

Output block diagram
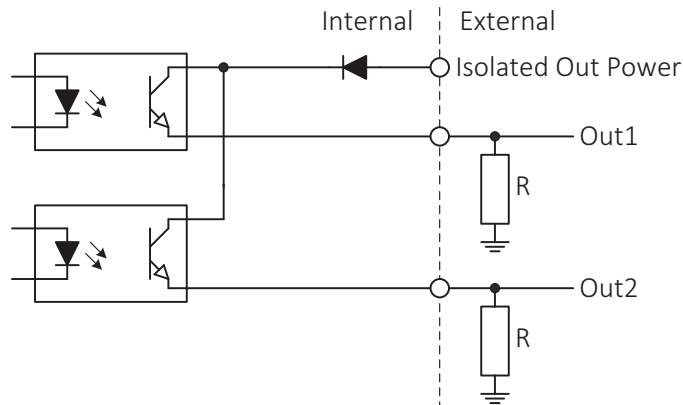
Figure 95: Output block diagram

- *Maximum 10 mA per output*
- *Isolated out power > 30 V may damage the camera.*

Isolated out power	Resistor value[1]	
5 V	1.0 kΩ	at ~ 5 mA minimum required current draw
12 V	2.4 kΩ	
24 V	4.7 kΩ	

[1] Resistor required if Out1/2 connected to a device with < 5 mA draw, i.e., high impedance.

Table 72: Isolated out power and external resistor

Output switching times
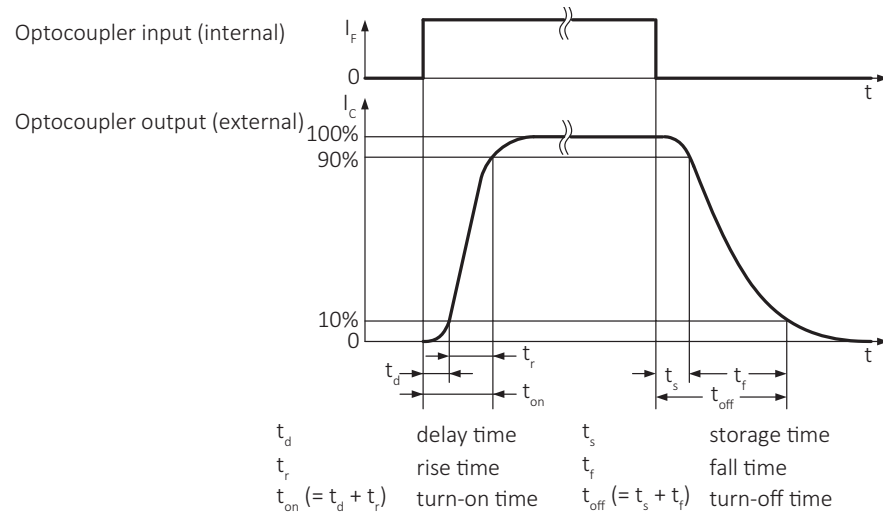
Figure 96: Output switching times

Parameters for all Manta models

Parameter and value	
$t_d \approx 1$ μs	$t_s \approx 26$ μs
$t_r \approx 1$ μs	$t_f \approx 21$ μs
$t_{on} = t_d + t_r \approx 2$ μs	$t_{off} = t_s + t_f \approx 47$ μs (t_{off} can deviate by $\pm$ 5 μs)

Table 73: Parameters for Manta

Test conditions

Output: external 2.4 kΩ resistor to GND, isolated out power set to 12 V.

Higher external values increase the times in the table above.

Video iris output description

Manta cameras provide built-in video type auto-iris controls.

Damage to the lens

The following schematic uses Camera POWER to power the video iris lens and assumes Camera POWER = 12 V. Most video iris lenses operate at a 8 to 16 V input voltage. Therefore, this circuit is not appropriate if using a 24 V camera power supply. Doing so may irreparably damage your lens. Please consult your video iris lens specifications for the appropriate drive voltage.
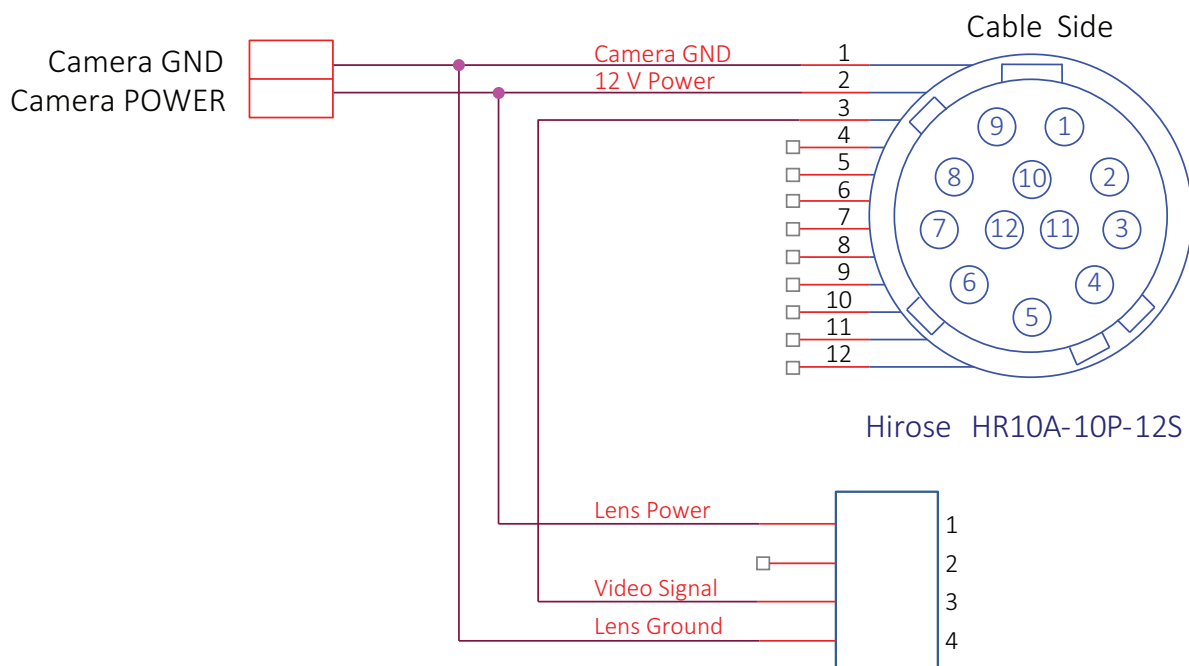
Figure 97: Video iris schematic

Control signals

The inputs and outputs of the camera can be configured by software. The different modes are described below.

Input block diagram
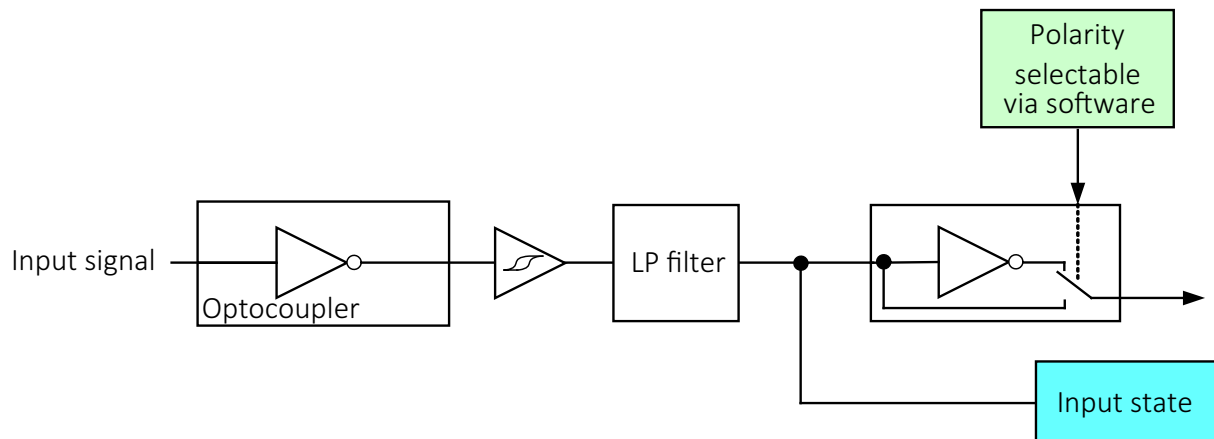
Figure 98: Input block diagram

Input/output pin control

All input and output signals running over the camera I/O connector are controlled by the I/O strobe commands. For more information, see the GigE Features Reference.

Output signals

Output signals are configured by software. Any signal can be placed on any output. The main output signals are described below.

Signal	Description
GPO	Configured to be a general purpose output, control of which is assigned to `SyncOutGpoLevels`.
AcquisitionTriggerReady	Active once the camera has been recognized by the host PC and is ready to start acquisition.
FrameTriggerReady	Active when the camera is in a state that will accept the next frame trigger.
FrameTrigger	Active when an image has been initiated to start. This is a logic trigger internal to the camera, which is initiated by an external trigger or software trigger event.
Exposing	Active for the duration of sensor exposure.

Table 74: Output signals

Signal	Description
FrameReadout	Active at during frame readout, i.e. the transferring of image data from the CCD to camera memory.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Acquiring	Active during an acquisition stream.
SyncIn1	Active when there is an external trigger at `SyncIn1`.
SyncIn2	Active when there is an external trigger at `SyncIn2`.
Strobe1	The output signal is controlled according to `Strobe1` settings.

Table 74: Output signals (continued)

Output block diagram
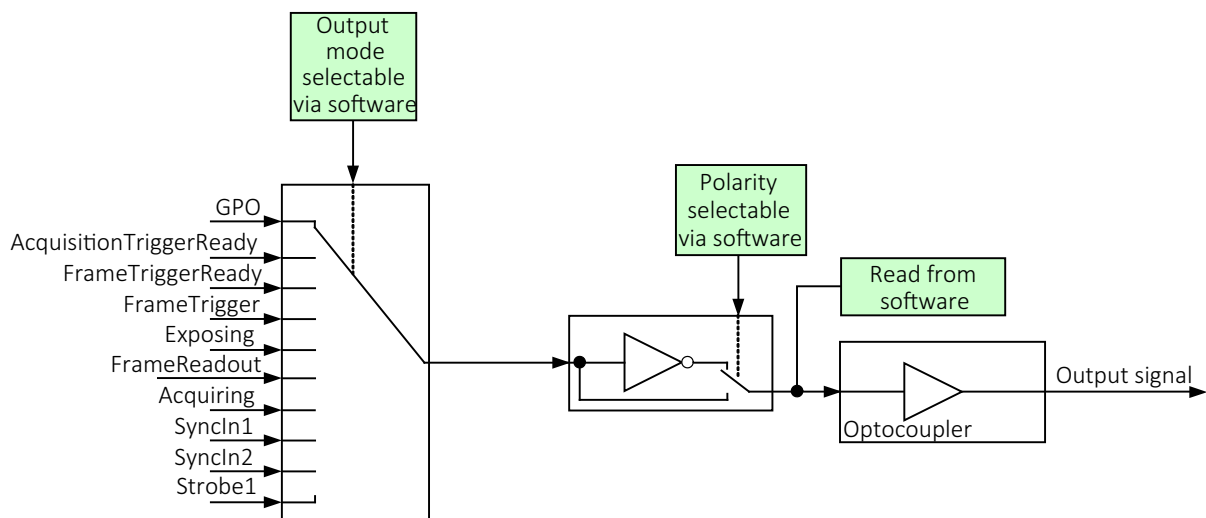
Figure 99: Output block diagram

Trigger timing diagram

The following diagram explains the general trigger concept.

For more information on trigger timing and camera control, see the GigE Features Reference.
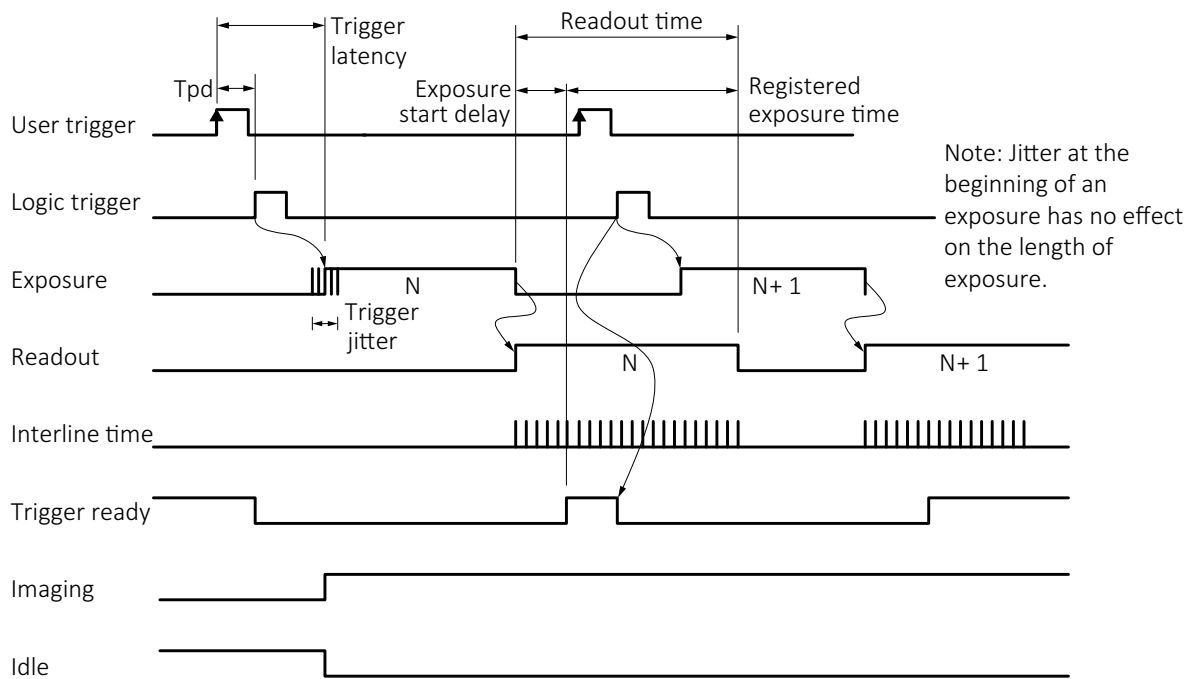
Figure 100: Trigger timing diagram

Trigger definitions

Term	Definition
User trigger	Trigger signal applied by the user (hardware trigger, software trigger).
Logic trigger	Trigger signal seen by the camera internal logic (not visible to the user).
Tpd	Propagation delay (t_{pd}) between the User trigger and the Logic trigger.
Exposure	High when the camera image sensor is integrating light.
Readout	High when the camera image sensor is reading out data.
Trigger latency	Time delay between the user trigger and the start of exposure.
Trigger jitter	Error in the trigger latency time.
Trigger ready	Indicates to the user that the camera will accept the next trigger.
Registered exposure time	Exposure time value currently stored in the camera memory.
Exposure start delay	Registered Exposure Time subtracted from the Readout time and indicates when the next exposure cycle can begin such that the exposure will end after the current Readout.
Interline time	Time between sensor row readout cycles.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Idle	High if the camera image sensor is not exposing and/or reading out data.

Table 75: Trigger definitions

Trigger rules

The user trigger pulse width should be at least three times the width of the trigger latency as indicated in *Specifications* on page 28.

- The end of exposure will always trigger the next Readout.
- The end of exposure must always end after the current Readout.
- The start of exposure must always correspond with the Interline Time if Readout is true.
- Exposure start delay equals the Readout time minus the Registered Exposure Time.

Triggering during the Idle State

For applications requiring the shortest possible trigger Latency and the smallest possible trigger jitter the User trigger signal should be applied when Imaging is false and Idle is true.

Triggering during the Readout State

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, then the *User Trigger* signal should be applied as soon as a valid *Trigger Ready* is detected. In this case, *Trigger Latency* and *Trigger Jitter* can be up to 1 line time since exposure must always begin on an Interline boundary.

For a more detailed description of the trigger concept for advanced users and special scenarios, see the Triggering Concept application note:

https://www.alliedvision.com/en/support/technical-papers-knowledge-base.html

Image data flow

This chapter presents diagrams that illustrate data flow and bit resolution of the image data.

Camera control documents

A complete description of individual features can be found online:

- Vimba and third-party users: GigE Features Reference
- PvAPI users: GigE Camera and Driver Attributes document

Manta type A monochrome CCD cameras

Manta G-031B, G-032B, G-033B, G-046B, G-125B, G-145B, G-146B, G-201B, G-504B
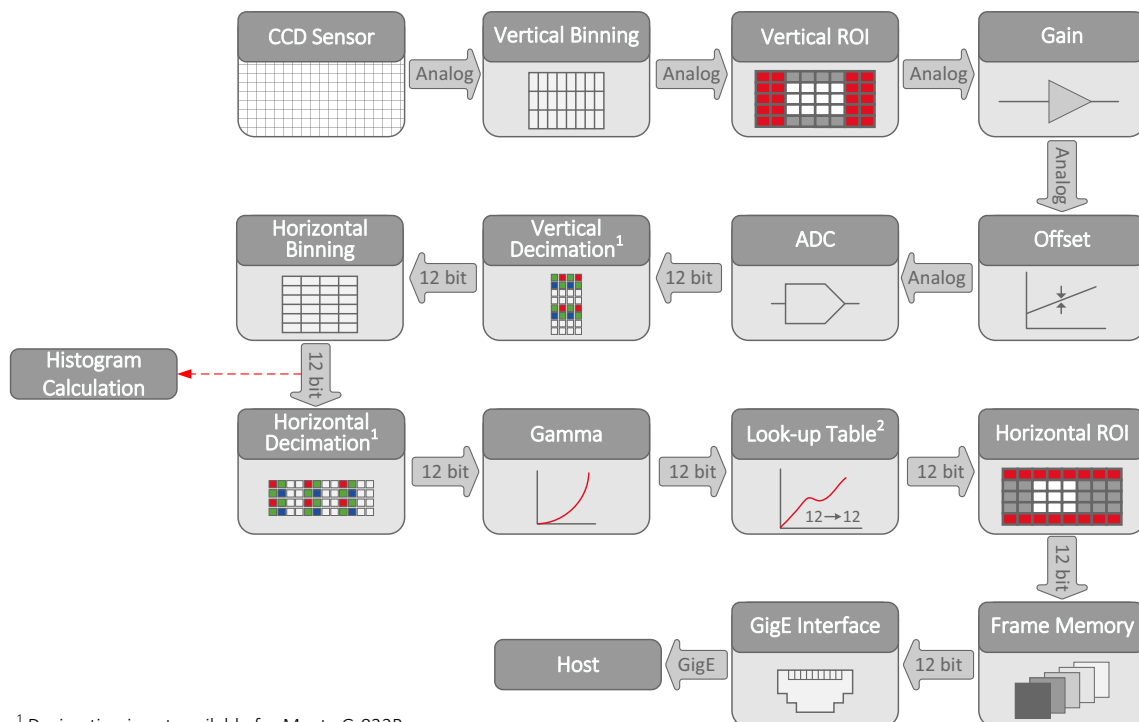
[1] Decimation is not available for Manta G-032B.
[2] If Gamma is enabled, only two LUTs are available.

Allied Vision

Manta type A color CCD cameras

Manta G-031C, G-032C, G-033C, G-046C, G-125C, G-145C, G-146C, G-201C, G-504C
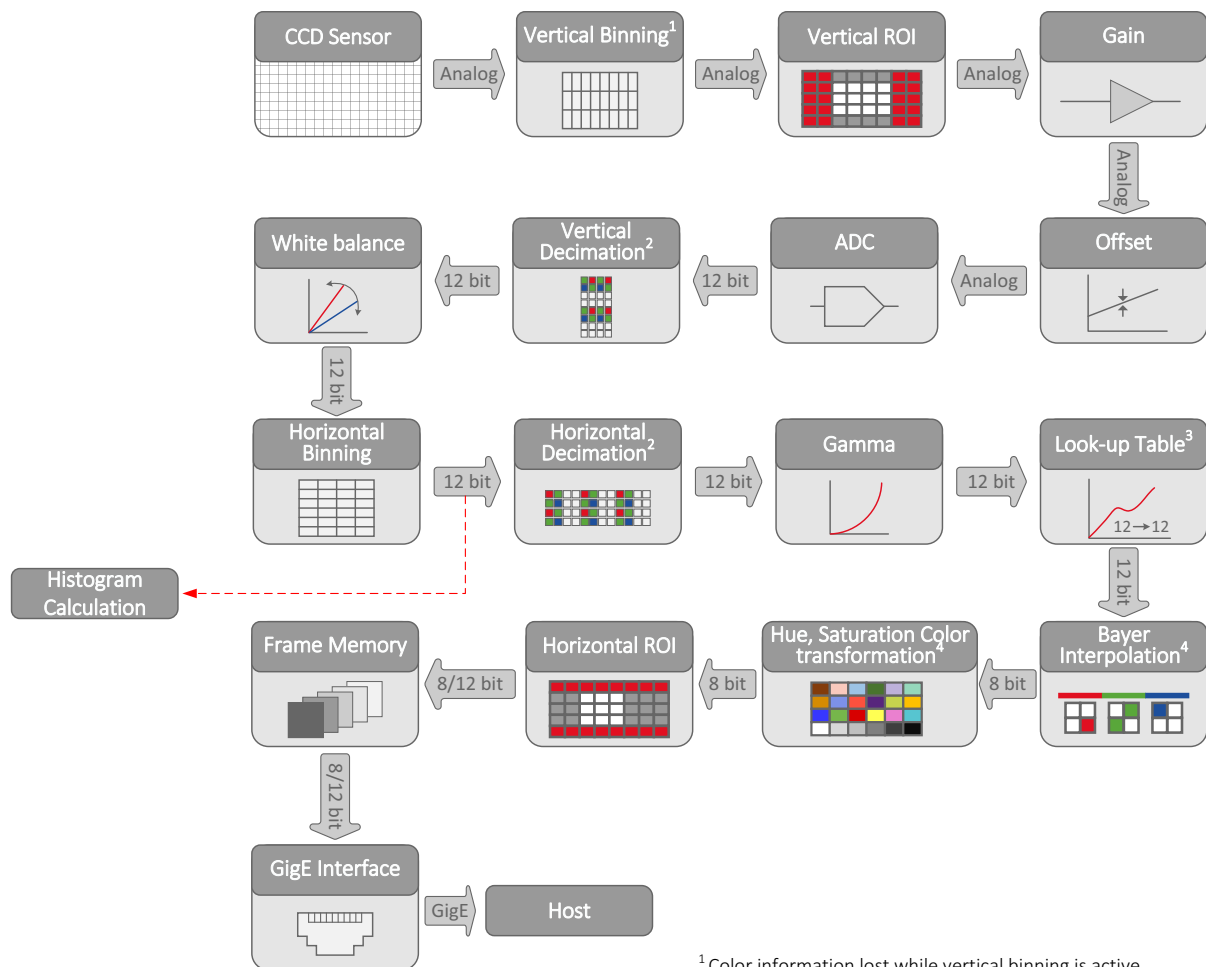
[1] Color information lost while vertical binning is active.
[2] Decimation is not available for Manta G-032C.
[3] If Gamma is enabled, only two LUTs are available.
[4] For on-camera interpolated *PixelFormats* only (8-bit output). Raw un-interpolated *PixelFormats* skip this block (8/12 bit output) depending upon the bit depth of PixelFormat used.

Manta type B monochrome and color CCD cameras

Manta G-282B, G-283B, G-505B, G-609B, G-917B

[1] Color information lost while vertical binning is active.
[2] 12 bits with LUT, 14 bits if the LUT is bypassed.
[3] For on-camera interpolated *PixelFormats* only (8-bit output).
Raw un-interpolated *PixelFormats* skip this block (8/12 bit output) depending upon the bit depth of PixelFormat used.

Allied Vision
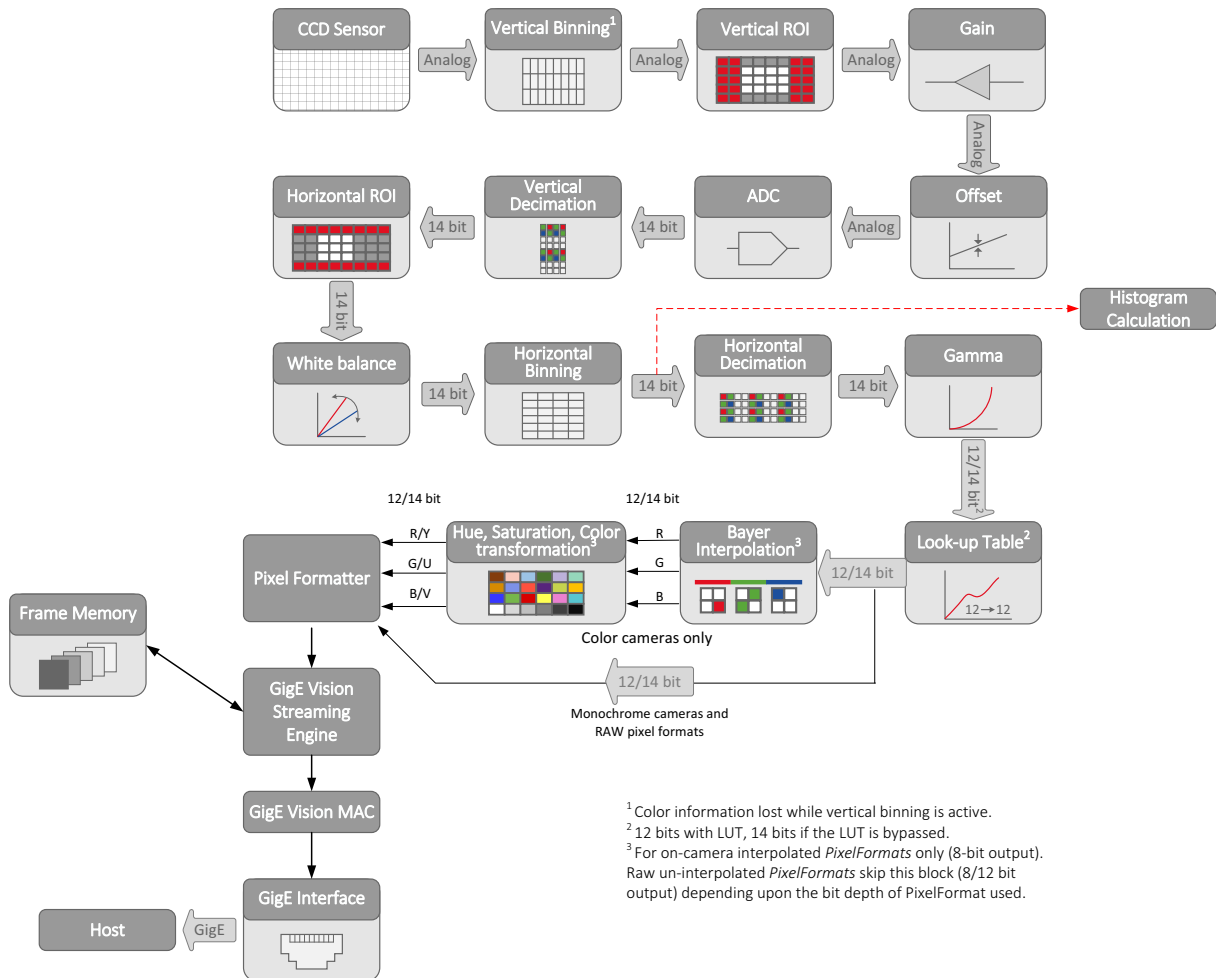
Manta type B monochrome CMOS cameras

Manta G-223B, G-223B NIR, G-419B, G-419B NIR

Internal sensor components

CMOS Sensor → Analog → Vertical ROI → Analog → Vertical Decimation → Analog → Sensor System Gain[1] → Analog → Sensor System Offset[1] → Analog → Offset → Analog → ADC → 12 bit → Horizontal ROI → 12 bit → Gain → 12 bit → Defect Mask → 12 bit → Horizontal Decimation → 12 bit → Gamma → 12 bit → Look-up Table (12→12) → 12 bit → Pixel Formatter → GigE Vision Streaming Engine ↔ Frame Memory

Histogram Calculation

GigE Vision Streaming Engine → GigE Vision MAC → 8/12/16 bit → GigE Interface → GigE → Host

[1] Factory calibrated. Not a user control.

Manta G-235B, G-319B, G-507B

Manta type B color CMOS cameras

Manta G-223C, G-419C

[1] Factory calibrated. Not a user control.
[2] For on-camera interpolated *PixelFormats* only (8-bit output). Raw un-interpolated *PixelFormats* skip this block (8/12 bit output) depending upon the bit depth of PixelFormat used.

Manta G-235C, G-319C, G-507C

[1] For on-camera interpolated *PixelFormats* only (8-bit output). Raw un-interpolated *PixelFormats* skip this block (8/12 bit output) depending upon the bit depth of PixelFormat used.
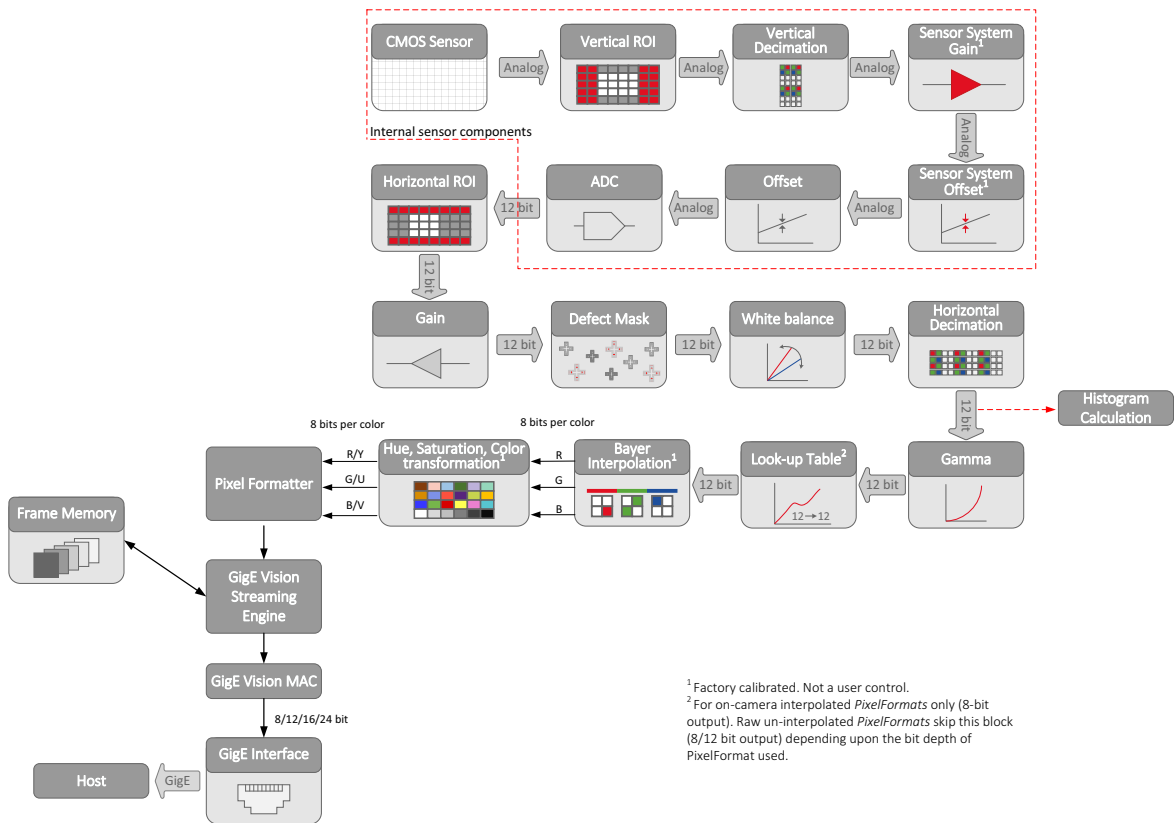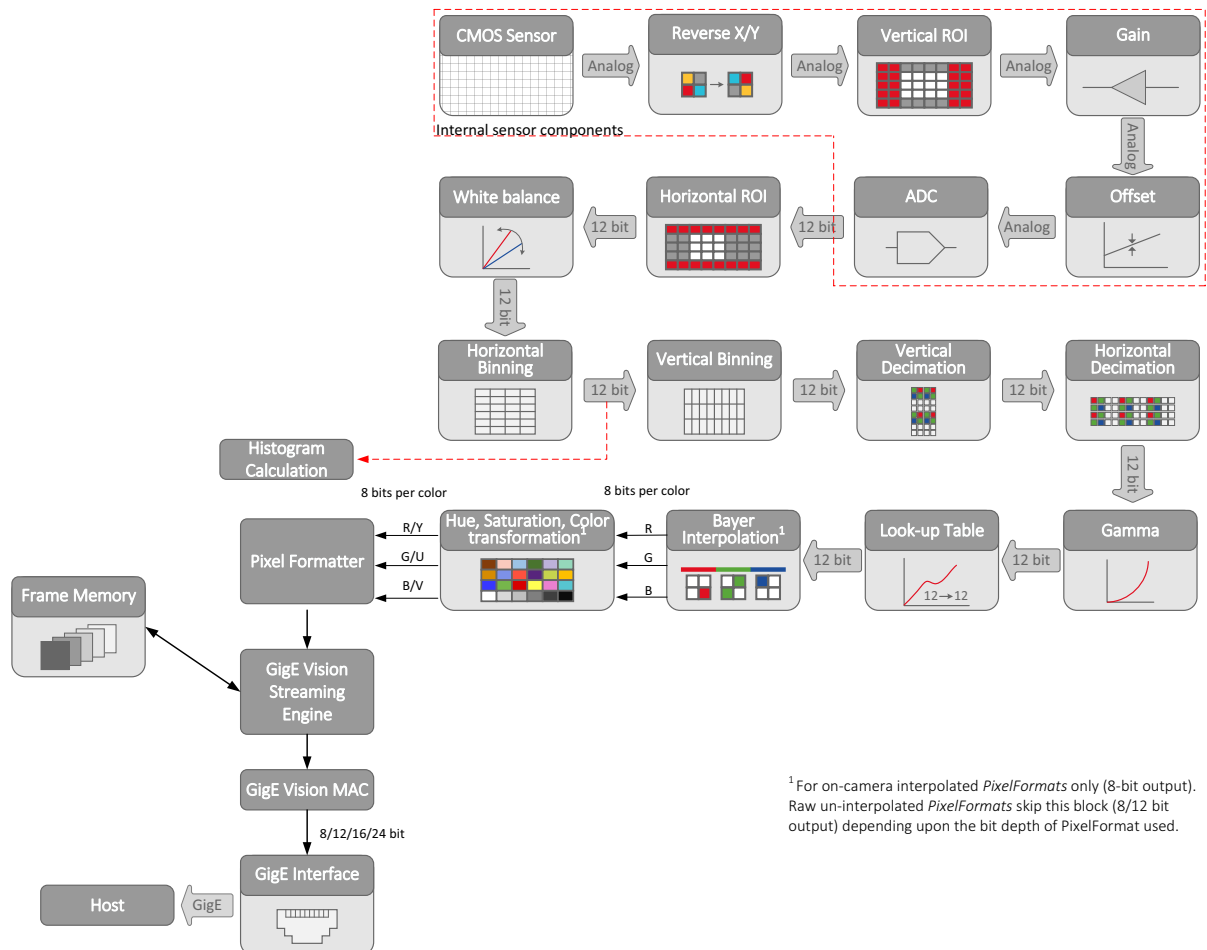
Color interpolation (Bayer demosaicing)

The color sensors capture the color information via so-called primary color (R-G-B) filters placed over the individual pixels in a Bayer mosaic layout. An effective Bayer to RGB color interpolation already takes place in all Manta color version cameras.

In color interpolation a red, green or blue value is determined for each pixel. An Allied Vision proprietary Bayer demosaicing algorithm is used for this interpolation (2x2), optimized for both sharpness of contours as well as reduction of false edge coloring.
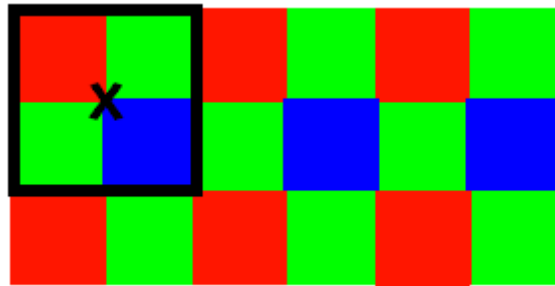
Figure 101: *Bayer demosaicing (Manta type A: example of 2x2 matrix)*
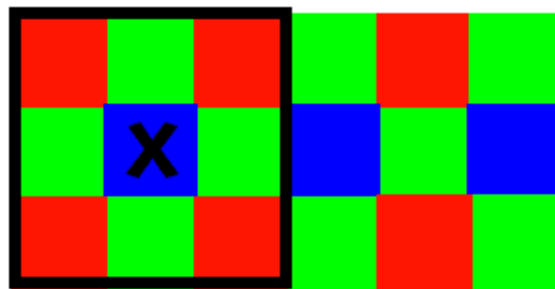
Figure 102: *Bayer demosaicing (Manta type B: example of 3x3 matrix)*

Color processing can be bypassed by using the RAW image transfer.

RAW mode is primarily used to:

- save bandwidths on the Gigabit Ethernet network
- achieve higher frame rates
- use different Bayer demosaicing algorithms on the PC
    - for Manta the first pixel of the sensor is red

If the PC does not perform Bayer to RGB post-processing, the monochrome image will be superimposed with a checkerboard pattern.

In color interpolation a red, green or blue value is determined for each pixel (P1= first pixel; P2= second pixel; etc). Only two lines are needed for this interpolation:
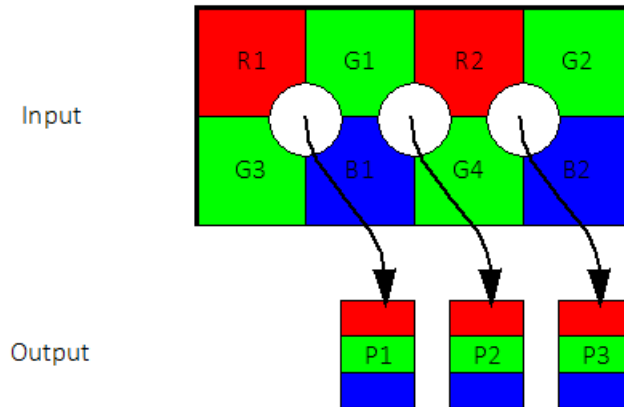
Figure 103: *Bayer demosaicing (interpolation)*

$$P1_{red} = R1 \qquad P2_{red} = R2 \qquad P3_{red} = R2$$

$$P1_{green} = \frac{G1 + G3}{2} \qquad P2_{green} = \frac{G1 + G4}{2} \qquad P3_{green} = \frac{G2 + G4}{2}$$

$$P1_{blue} = B1 \qquad P2_{blue} = B1 \qquad P3_{blue} = B2$$

Figure 104: *Bayer demosaicing (type A cameras)*

- Please note that on the color camera, a incorrectly colored border of one or two pixel wide forms on the left and right image borders. This is also a consequence of Bayer demosaicing as the image width displayed on the color camera is not scaled down.
- Using ROI, x and y resolutions must be even-numbered.

Cleaning optical components

This chapter describes safety instructions and cautions for cleaning lenses, optical filters, protection glass, or sensors.

Please read these instructions before you contact Allied Vision or your Allied Vision camera distributor for assistance.

Ask Allied Vision or your Allied Vision camera distributor if you are not familiar with the procedures described below.

Warranty

For details about camera warranty duration and sensor warranty terms, go to:

https://www.alliedvision.com/en/support/warranty

Warranty precautions

To ensure your warranty remains in effect:

- Do not open the camera housing.
- Follow instructions described below.
- Use only optical quality tissue/cloth if you must clean a lens or filter.
- Use only optics cleaner (60% ethyl alcohol, 40% ether). Do not use aggressive cleaners like benzine or spirit. Such cleaners may damage the surface.
- Do not use compressed air which can push dust into camera and lens.

Allied Vision does not warranty against any physical damage to the sensor, filter, protection glass, or lenses. Use utmost care when cleaning optical components.

Keep optical components clean

The best way to ensure the camera remains clean is to avoid penetration of foreign substances into the camera.

When screwing or unscrewing the camera lens or dust cap, hold the camera with the C-Mount or CS-Mount opening towards the floor. This minimizes the possibility of any contaminants falling on the glass surface. Always store cameras and lenses with dust-caps on.

Figure 105: *Illustration of camera orientation when removing lens or dust cap*

Identifying impurities

If you observe any image artifacts in your video preview of your Manta camera you may have impurities either on the lens, filter/protection glass, or on the sensor protection glass. Every Manta camera is cleaned prior to sealing and shipment; however, impurities may develop due to handling or unclean environments.

As shown in figure 106:, impurities (dust, particles or fluids) on the sensor or optical components appear as a dark area, patch or spot on the image and remain fixed in the preview window while you rotate the camera over the target.

Do not confuse this with a pixel defect which appears as a distinct point. Particles can either rest loosely or can be more or less stuck to the optical surface.
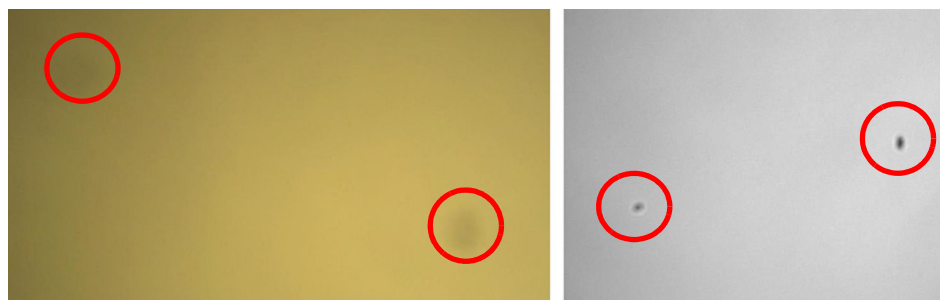
Figure 106: *Image with tiny dust on the filter (left) and dust on the sensor (right)*

Locating impurities

Before you dismount the lens you should find out if the impurity is on the filter, lens, or sensor.

1. Start acquiring a uniform image (e.g. a white sheet of paper) with the camera.

2. To identify the affected surface, move the suspected optical component and see if the contamination follows this movement.

    a. If you move only the lens (not the camera) and the impurity moves as well, the impurity is on the lens.

    b. If you move the IR cut filter/protection glass window and the impurity moves as well, the impurity is on the filter/protection glass. Carefully remove the filter/protection glass and clean it on both sides using the techniques explained in the next section.

3. If the impurity is neither on the lens nor the IR cut filter/protection glass, it is probably on the sensor.

Removing IR cut filter or protection glass

To remove IR cut filter or protection glass use the special tool (Allied Vision order code E9020001 for 16mm filter and order code 3851 for 22 mm filter).

Materials for cleaning optical components

Use only these cleaning materials for optical components

- Optic approved lens cotton, cloth, or tissue that is chemically pure and free from silicones and other additives.
- Optic approved low residue cleaning liquid.

Never use these cleaning materials for optical components

- Dry swabs or tissue may cause scratches.
- Metal tools may cause scratches.
- Disposable cotton cosmetic swabs may contain contaminants harmful to optical glass.
- Cosmetic cotton my cause scratches or get caught in small gaps.
- Consumer eyeglass cleaning cloths may be pretreated with silicone harmful to optical glass.
- Aggressive cleaners like benzine, acetone, or spirits may damage the surface.

Cleaning Instructions

Workplace conditions

- Perform all cleaning operations (lenses, filter/protection glass, and sensor) in a dust-free clean-room.
- Avoid touching the optical components with your fingers or any hard material.
- Nitrile cleanroom gloves or powder free latex gloves are recommended to maintain low particulate levels.
- Use an ESD mat to prevent damage from an electrostatic discharge.

1. Unplug the camera from any power supply before cleaning.
2. Apply a small amount of cleaning liquid to a new lens cleaning cotton, cloth, or tissue. The cotton, cloth, or lens tissue should be moist, but not dripping.

3. Hold the camera sensor diagonally upwards. Ensure that the camera is away from your body to prevent particles like skin flakes from falling on the sensor.
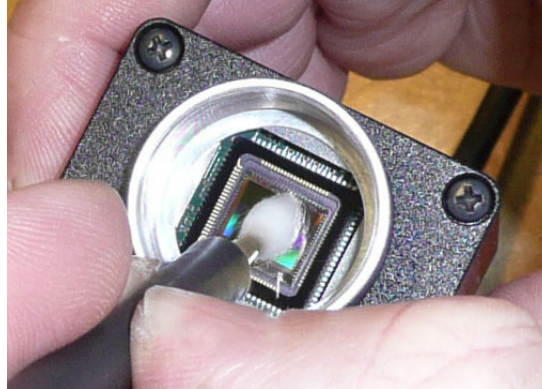
4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.

5. When you have finished cleaning, examine the surface in a strong light. Take an out-of-focus picture of a flat, illuminated surface to see if any dirt or dust remains.

6. If dust spots remain, repeat this procedure using new clean lens cloth or tissue (as described above).

Cleaning issues

If you notice that the camera lens or sensor is not clean after attempting to clean twice, or if you have any questions regarding cleaning your camera, please contact your Allied Vision distributor.

![Allied Vision]

Cleaning with compressed air

Allied Vision does not recommend cleaning Manta cameras with compressed air.
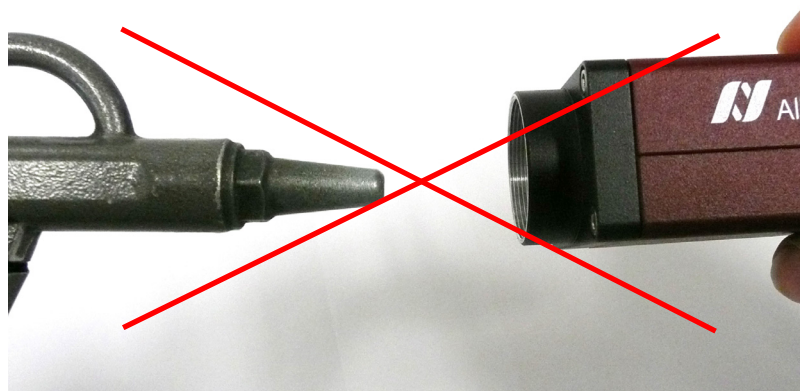
Figure 107: *Do not use compressed air*

Possible material damage

- Compressed air at high pressure and/or shorter operating distances may push dust into the camera/lens and physically damage the camera, sensor, or optical components.
- Propellant from non-optic approved compressed air products may leave a residue on the camera or lens and may physically damage the camera, sensor, or optical components.
- Compressed air may contain oil or moisture that could contaminate or damage the optical components.
- Use an air blower/compressed air only if you are familiar with cleaning a camera using this method.

If you want to clean your camera with compressed air despite of all the warnings:

- Use an optic approved compressed air product or compressor.
- Use an anti-static ionizer attachment to reduce the risk of static-caused damage.
- Use a filter to remove moisture and oil from the air.
- Use short directed bursts of air to remove impurities.

Compressed air pressure and operating distance

- Keep the compressed air pressure at a moderate strength only. Pressure at the nozzle should be less than 1 bar (15 psi).
- Operating distance from the camera should be 5 to 30 cm.

Firmware update

This chapter includes instruction on how to update the firmware on your Allied Vision Manta camera.

Download the latest GigE firmware loader and release notes from the Allied Vision website:

https://www.alliedvision.com/en/support/firmware

Saved camera UserSets

If new firmware contains a new feature/control, saved camera UserSets/ ConfigFiles will be invalidated and erased!

Before loading new firmware, backup your current camera settings.

GigE SampleViewer: select the **Disk** icon from the **Cameras** window to export camera settings file (XML) to the host PC.

Vimba Viewer: select the **Save Camera Settings** icon from the **Cameras** window to export the camera settings file (XML) to the host PC.

To update the firmware on your Allied Vision GigE camera

1. Launch the Allied Vision Firmware Loader.

2. Click **Next**. The Firmware Loader displays a list of firmware included in the package
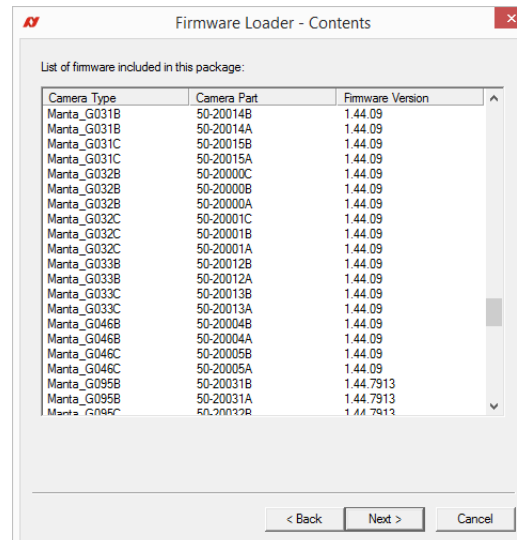
3. Click **Next**. You can select your camera model on this page.
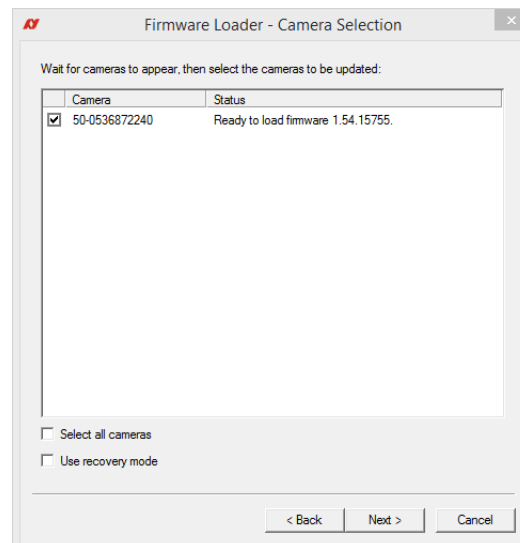
Recovery Mode

Select the **Use recovery mode** check box if the connected GigE camera is not found by the firmware loaded, or if the GigE camera is listed as unavailable. When selected, power cycle the camera to enter the Boot Loader mode.

4. Click **Next**.
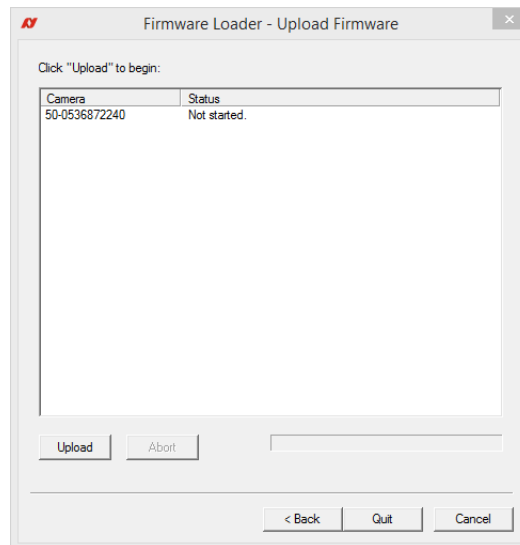
5. Click **Upload** to start the update. The existing firmware will be erased and the new firmware will be updated to the camera.
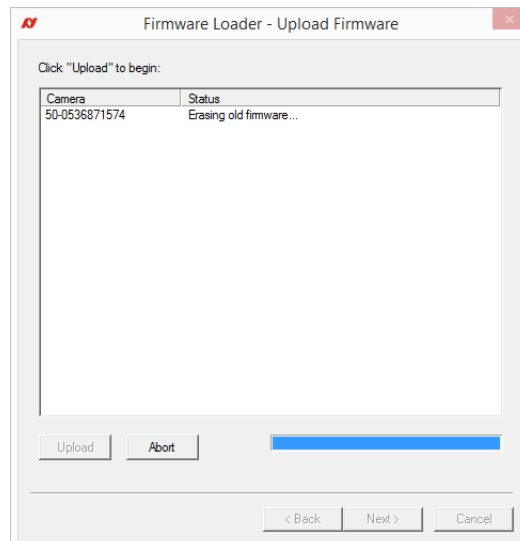
Possible material damage

Do not unplug the GigE cable or camera power supply during the update procedure.

6. The Firmware Loader will display a success status upon completion. Click **Quit** to exit the loader.
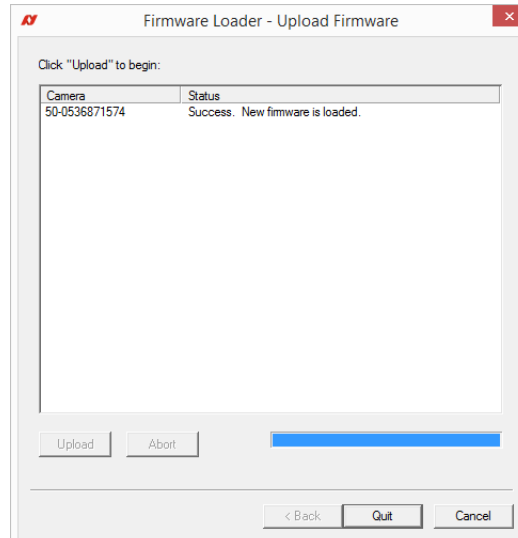
Appendix

The appendix includes the following information for older Manta cameras up to serial number 503323258:

- Mechanical dimensions
- Camera interfaces

Mechanical dimensions

Exceptions for non-PoE Manta cameras up to serial number 503323258.

Manta standard housing

Variant: Non-PoE
Mount: C-Mount
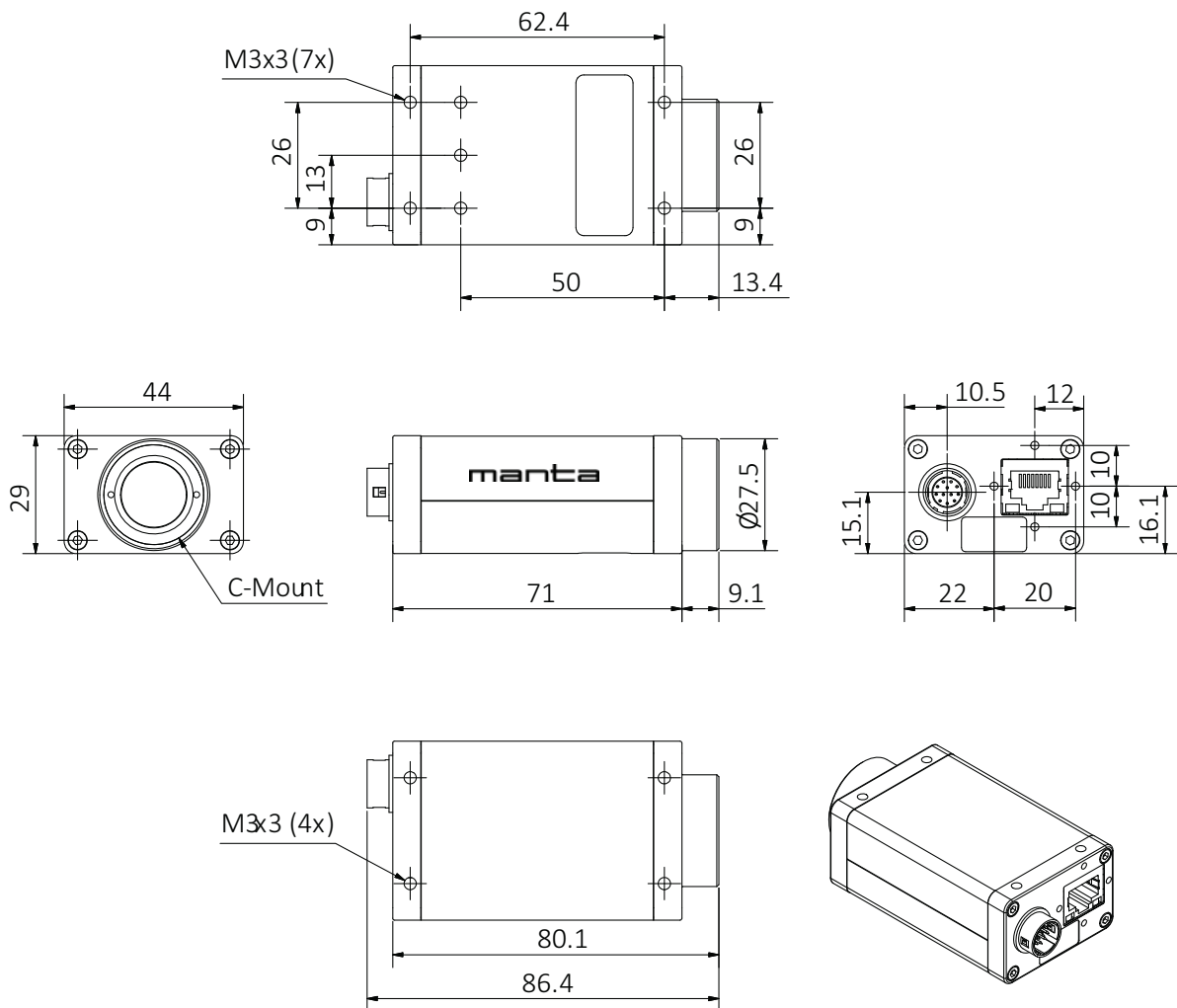
Figure 108: Manta standard housing dimensions (including connectors)

Manta W90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards.

Variant: Non-PoE
Mount: C-Mount
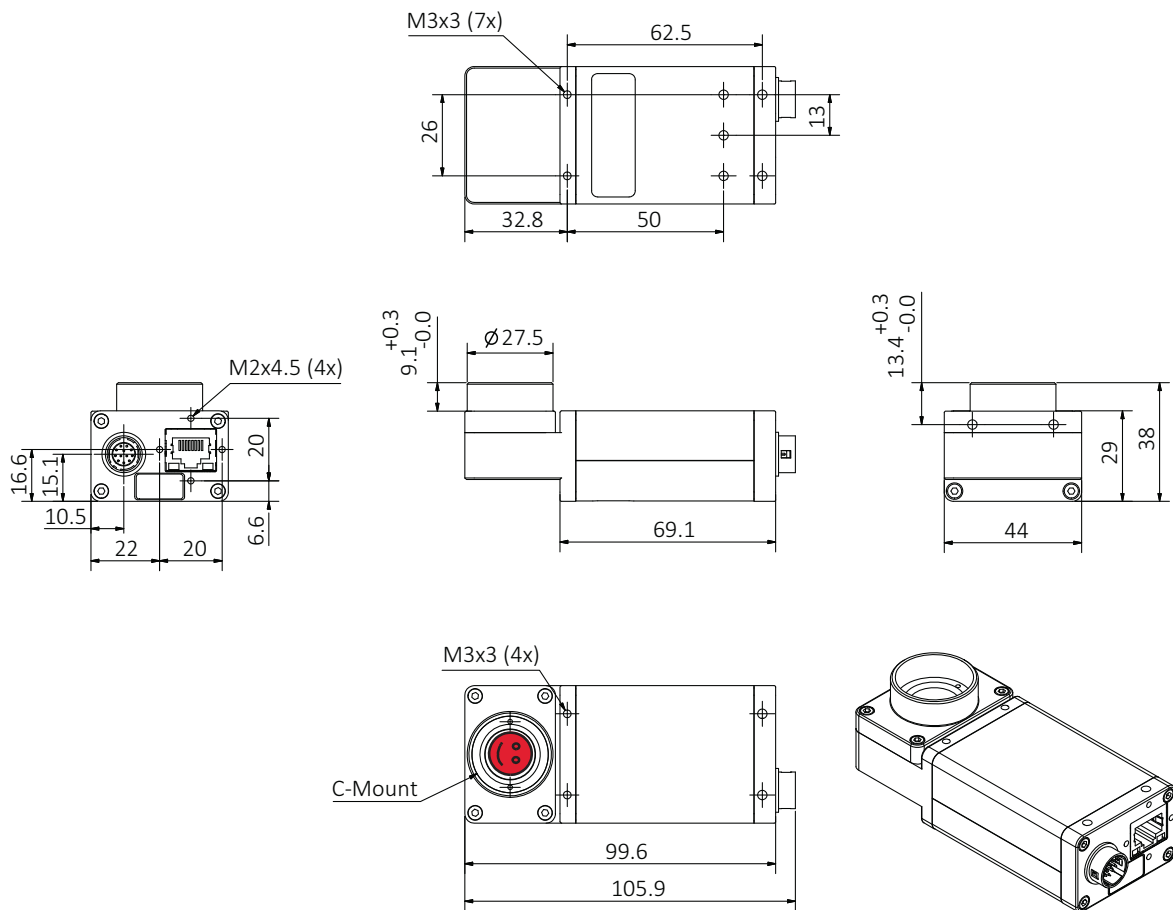
Figure 109: Manta W90 housing dimensions (including connectors)

Manta W90 S90 housing

This version has the sensor tilted 90 degrees clockwise, so that it views upwards. The sensor is also rotated 90 degrees clockwise.

Variant: Non-PoE
Mount: C-Mount
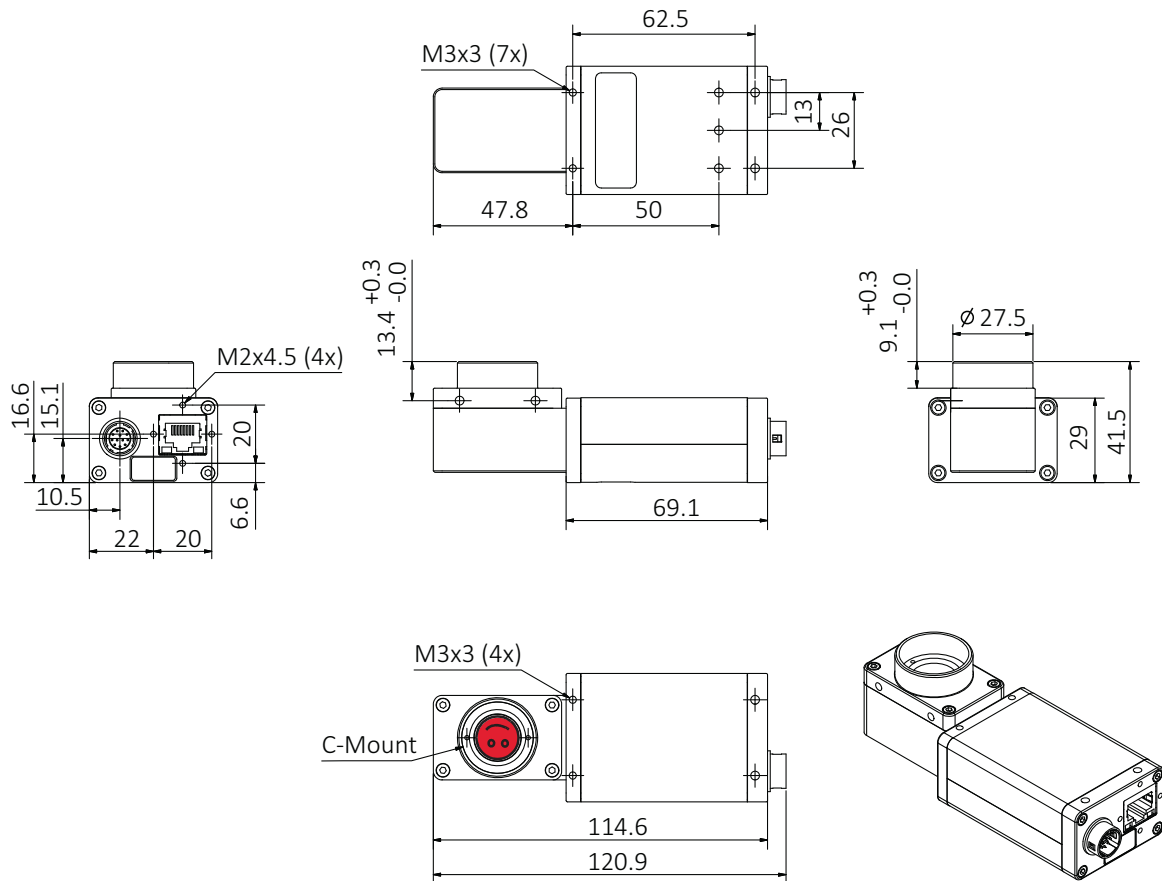
Figure 110: Manta W90 S90 housing dimensions (including connectors)

Manta W270 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards.

Variant: Non-PoE
Mount: C-Mount
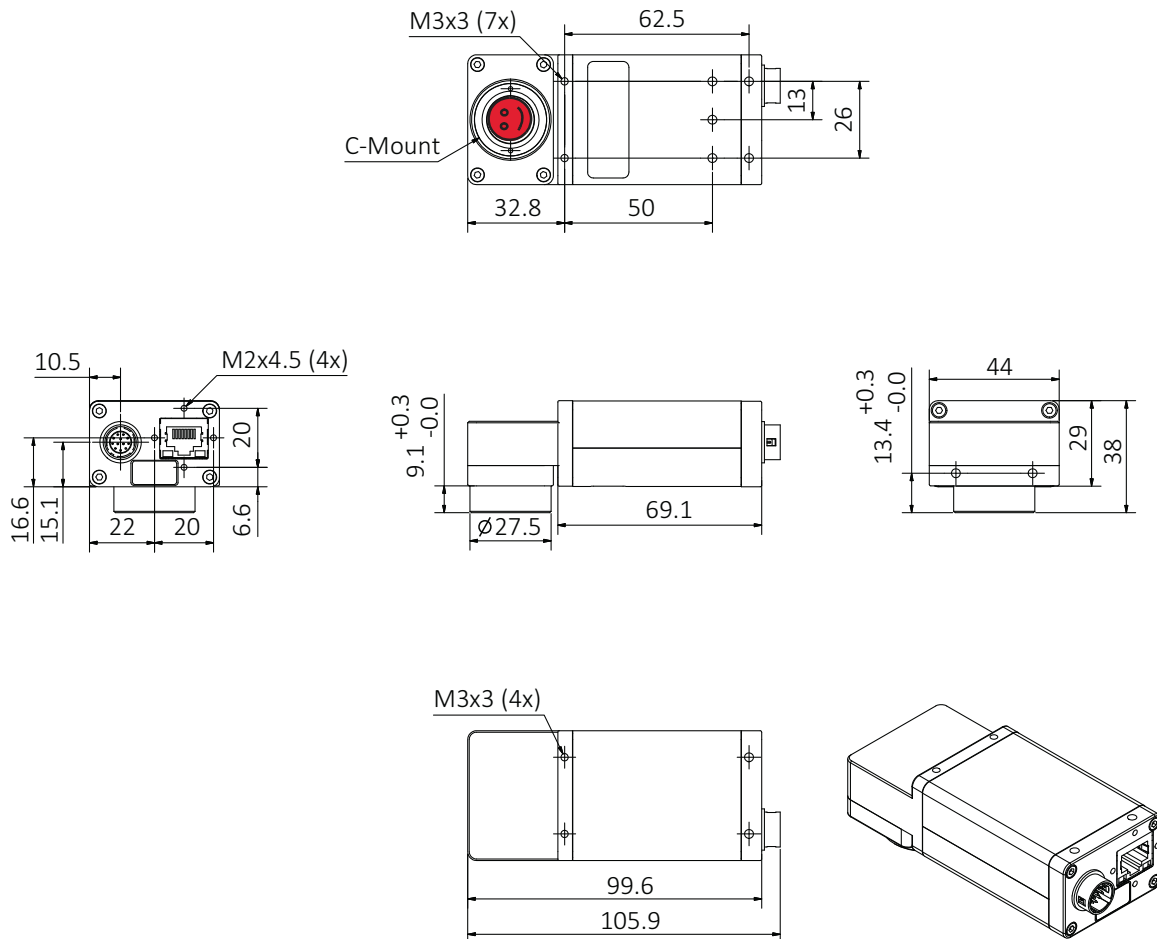
Figure 111: Manta W270 housing dimensions (including connectors)

Manta W270 S90 housing

This version has the sensor tilted 270 degrees clockwise, so that it views downwards. The sensor is also rotated 90 degrees clockwise.

Variant: Non-PoE
Mount: C-Mount
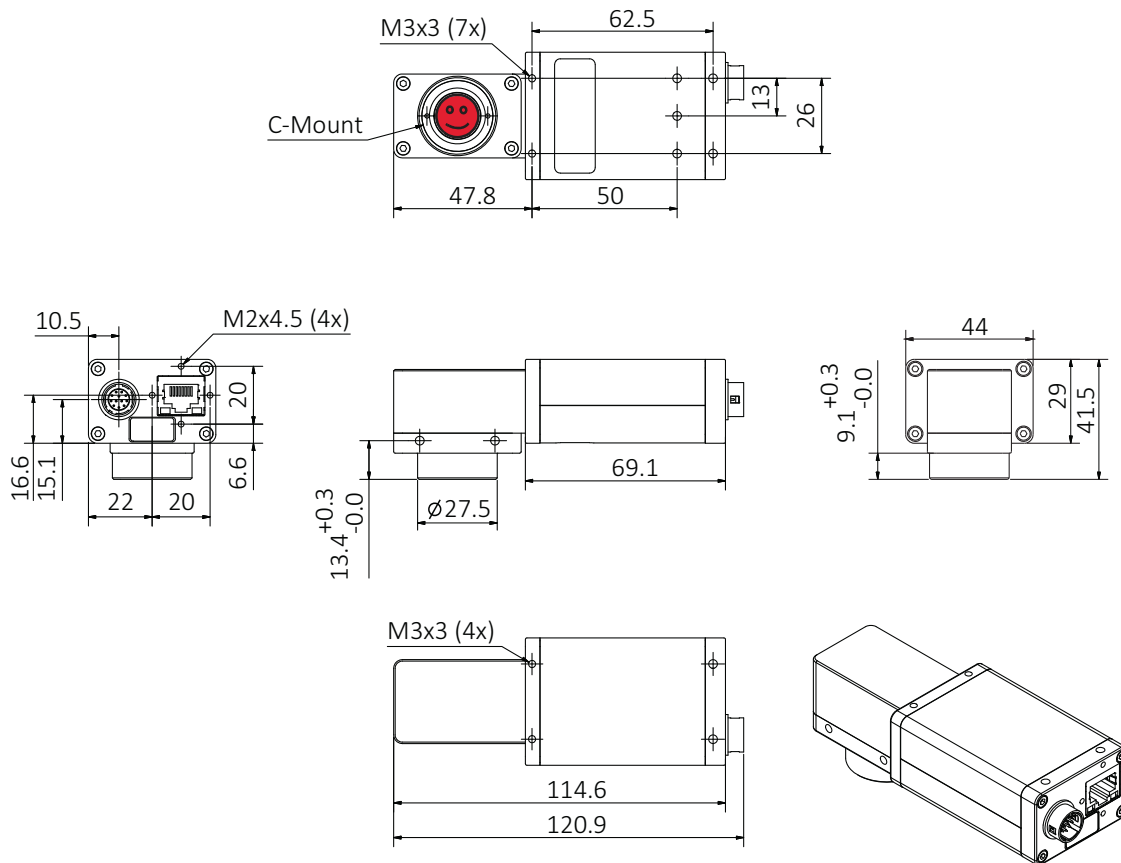
Figure 112: Manta W270 S90 housing dimensions (including connectors)

Manta board level

Variant: Non-PoE

13-pole I/O connector:
Molex PicoBlade
Vertical Header 53047-1310
Receptacle Housing 51021-1300
Crimp Terminal 13 x 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = PMW-Out
4 = Input 1
5 = not used
6 = Output 1

7 = GND (for Inputs)
 8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

Flex cable length:
FFC45 L =   56 mm   K7500307
FFC45 L = 110 mm   K7500318
FFC45 L = 152 mm   1817
FFC45 L = 200 mm   1824

Figure 113: Manta board level (non-PoE) dimensions

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact Allied Vision.

Back panel
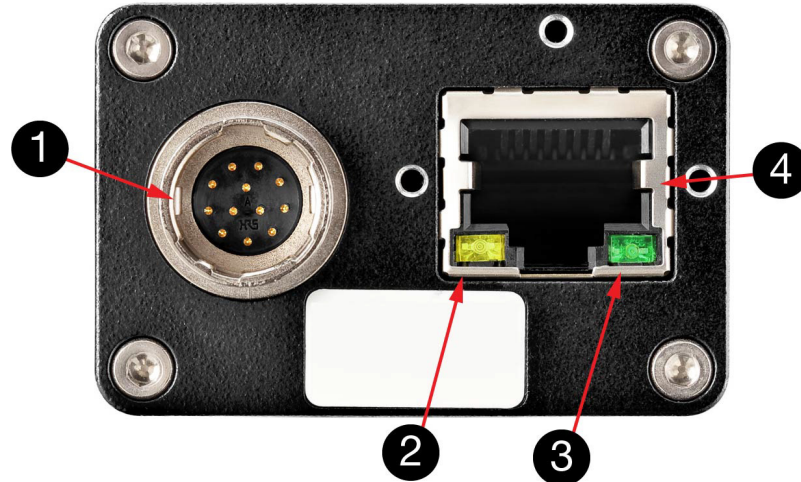
Figure 114: Rear view of non-PoE Manta cameras up to serial number 503323258

1	Hirose I/O port
2	LED 1
3	LED 2
4	Gigabit Ethernet interface

Status LEDs

The tables below describe the status LEDs of non-PoE Manta cameras up to serial number 503323258.

LED 1 color	Status
Solid orange	Ethernet link with 1 Gb/s established
Flashing orange	Ethernet activity with 1 Gb/s

Table 76: Status LED 1 of non-PoE Manta cameras up to serial number 503323258

LED 2 color	Status
Solid green	Ethernet link with 100 Mb/s established
Flashing green	Ethernet activity with 100 Mb/s

Table 77: Status LED 2 of non-PoE Manta cameras up to serial number 503323258

Camera I/O connector pin assignment

The following table lists and describes the camera I/O pin assignment for non-PoE Manta cameras up to serial number 503323258.

Manta G-145B-30fps, G-145C-30fps, G-201B-30fps, and G-201C-30fps non-PoE cameras up to serial number 503323258 behave like PoE cameras.

Pin	Signal	Direction	Level	Description
1	Camera GND	In	GND for RS232 and external power	Ground for camera power supply and RS232
2	Camera Power	In	8 to 30 VDC	Camera power supply
3	Video Type Auto Iris Out	Out	---	Video type auto iris (≥ firmware version 1.44)
4	In 1	In	U_{in}(high) = 2.5 to 6.0 V U_{in}(low) = 0 to 0.8 V up to 36 V with external resistor of 3.3 kΩ in series	Opto-isolated input 1 (SyncIn1)
5	---	---	---	---
6	Out 1	Out	Open emitter, maximum 20 mA	Opto-isolated output 1 (SyncOut1)
7	Isolated In GND	In/Out	---	Isolated input signal ground
8	RxD RS232	In	RS232	Terminal receive data
9	TxD RS232	Out	RS232	Terminal transmit data
10	Isolated Out Power	In	Common VCC for outputs maximum 30 VDC	Power input for opto-isolated outputs
11	In 2	In	U_{in}(high) = 2.5 to 6.0 V U_{in}(low) = 0 to 0.8 V	Opto-isolated input 2 (SyncIn2)
12	Out 2	Out	Open emitter, maximum 20 mA	Opto-isolated output 2(SyncOut2)

Table 78: Camera I/O connector pin assignment for non-PoE Manta cameras up to serial number 503323258

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