Allied Vision

GigE Vision Cameras

Manta

Technical Manual

V7.9.0

Manta at a glance

Manta cameras have a Gigabit Ethernet (GigE) interface and work with Gigabit Ethernet hardware and cable lengths up to 100 meters. Manta cameras are GigE Vision® V1.2 and GenICam Standard Feature Naming Convention (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 Allied Vision 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	Initial commercial release: Manta G-046B and G-046C • Sony ICX415 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-145B, G-145B-30fps, G-145C, and G-145C-30fps • Sony ICX285 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-146B and G-146C • Sony ICX267 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: G-201B, G-201B-30fps, G-201C, and G-201C-30fps • Sony ICX274 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Added spectral sensitivity note Added image memory size table With the new firmware version 01.40, 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 and G-032C from 49 frames to 99 frames, Manta G-125B and 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	Initial commercial release: Manta G-033B and G-033C • Sony ICX414 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-504B and G-504C • Sony ICX655 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Added note that description of status LEDs can be found in Manta Hardware Installation Guide. Changed file format from Adobe FrameMaker FM7 to FM9

Table 1: Document history

Version	Date	Remarks
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.
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 and 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 the Firmware update chapter (see Knowledge Base at Allied Vision Technologies Website: search for *GigE Firmware Update Application Note*) Revised data path block diagram. Added 30 fps variant: Manta G-145B-30fps, G-145C-30fps and G-201B-30fps, and 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 correction, LUT Manta G-145-30fps and G-201-30fps (non PoE) • Have the 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, and G-201C-30fps non-PoE behave like PoE cameras.

Table 1: Document history (continued)

Version	Date	Remarks
V5.0.0	2012-May-15	Initial commercial release: Manta G-031B and G-031C • Sony ICX618 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-145B NIR • Sony ICX285 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path 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-30fps and G-201C-30fps) • Added frame rate diagrams Added focal length 4.0 mm in the focal length vs field of view table for the Manta G-125. 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 interface (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)
V5.0.0	2012-May-15	New CAD drawings with Pin3 = Video Type Auto Iris Out Frame memory • Manta G-032B and G-032C: changed from 49 to 99 frames • Manta G-033B and G-033C: changed from 88 to 99 frames • Manta G-046B and G-046C: changed from 35 to 70 frames • Manta G-125B and G-125C: changed from 12 to 25 frames • Manta G-145B and G-145C: changed from 10 to 22 frames • Manta G-145B-30fps and G-145C-30fps: changed from 10 to 22 frames • Manta G-146B and G-146C: changed from 10 to 22 frames • Manta G-201B and G-201C: changed from 8 to 16 frames • Manta G-201B-30fps and G-201C-30fps: changed from 8 to 16 frames Added frame rates for ROI height = 720 • Manta G-125B and G-125C ROI frame rate IR cut filter: • Changed IR cut filter to type Jenofilt 217

Table 1: Document history (continued)

Version	Date	Remarks
V6.0.1	2013-Mar-20	Initial commercial release: Manta G-223B and G-223C • CMOSIS/ams CMV2000 CMOS sensor • Specifications, absolute QE, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-282B and G-282C • Sony ICX687 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-283B and G-283C • Sony ICX674 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-917B and G-917C • Sony ICX814 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path 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 Video iris output description chapter 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, and G-504C PoE models: compliant with Power over Ethernet IEEE 802.3at/IEEE 802.3af Deleted the *Manual Overview* chapter, Deleted *Frame Rate Comparison of all Manta cameras* New date format: year-month-day

Table 1: Document history (continued)

Version	Date	Remarks
V7.0.0	2013-Aug-30	Initial commercial release: Manta G-419B and G-419C • CMOSIS/ams CMV4000 CMOS sensor • Specifications, absolute QE, ROI frame rate information, camera lens information, and data path As of this version, the document refers to Vimba SDK (not PvAPI) Changed cable recommendation to Category 6 or higher Manta G-145B and 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 Manta G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, and G-419C Changed ROI frame rates of Manta G-145B-30fps and G-145C-30fps
V7.0.1	2013-Sep-30	Added Camera cleaning Changed maximum frame rates and gain range, added burst mode for Manta G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, and G-419C Added a feature of Manta type B cameras: • Temperature monitoring Added `ReverseX` feature in Camera features Added Manta angled-head housings (type B) Updated maximum gain values for Manta G-283B, G-283C, G-917B, and G-917C Updated minimum exposure time for Manta G-145B, G-145B-30fps, G-145C, and G-145C-30fps Updated the frame rate vs. height plots Updated links to the GigE Installation Manual through out this 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 Manta G-223B, G-223B NIR, G-223C, G-419B, G-419B NIR, and 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 Manta G-145B, G-145B-30fps, G-145B NIR, G-145C, G-145C-30fps, G-223B, G-223B NIR, G-223C, G-282B, G-282C, G-283B, and G-283C Corrected frame rate formula for Manta G-145B NIR

Table 1: Document history (continued)

Version	Date	Remarks
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
V7.1.0	2014-Oct-07	Initial commercial release: Manta G-235B and G-235C • Sony IMX174 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-505B and G-505C • Sony ICX625 CCD sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Updated the following in the Specifications chapter • Trigger latency and jitter values • `DecimationX/DecimationY` 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 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

Table 1: Document history (continued)

Version	Date	Remarks
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
		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	Initial commercial release: Manta G-319B and G-319C • Sony IMX265 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-507B and G-507C • Sony IMX267 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Added spectral response plots for select camera models Updated specification tables to be consistent with the information on the product web pages Added Trigger over Ethernet Action Commands feature for supported 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, and G-419C Added installation chapter Various other minor enhancements and corrections 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, and G-917
V7.5.0	2016-Aug-16	New features for Manta G-282, G-283, G-505, and G-917: • One-tap/dual-tap switchability (except Manta G-505) • Trigger over Ethernet (ToE) Action Commands feature • `DeviceUserID` is now accessible via the Vimba user interface New features and changes for Manta G-505B and G-505C: • Binning: changed the maximum value for `BinningX` and `BinningY` to 4 • `ReverseX` Added optical filter information to specification tables Various other minor enhancements and corrections
V7.6.0	2016-Nov-25	Initial commercial release: Manta G-895B and G-895C • Sony IMX267 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Updated board level camera regulatory statement Updated missing values in specification tables Updated absolute QE plot ands added spectral response plot for Manta G-032 Corrected reported errors

Table 1: Document history (continued)

Version	Date	Remarks
V7.7.0	2016-Dec-16	Initial commercial release: Manta G-1236B and G-1236C • Sony IMX304 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Added `ReverseX` to the following Manta Type A monochrome models: Manta G-031B, G-033B, G-046, G-125B, G-146B, G-201B, and G-504B. Various other minor enhancements and corrections
V7.8.0	2017-Jan-27	Added Piecewise Linear HDR option to Exposure Mode for the Manta G-223 and G-419 series. For more information, see the *GigE Features Reference.* Corrected the technical drawings for Manta Type B board level cameras (Manta G-223, G-235, and G-419) and added technical drawings for Manta Type B board level cameras (Manta G-319, G-507, G-895, and G-1236)
V7.8.1	2017-Apr-05	Corrected the technical drawings for Manta Type B cameras (standard housing, W90 housing, W90 S90 housing, W270 housing, and W270 S90 housing) Added cable color to camera I/O connector pin assignment including pin assignment figure and cross reference to the Allied Vision I/O cable data sheet
V7.8.2	2017-May-15	Corrected power consumption values for Manta G-319, G-507, G-895, and G-1236 Corrected two reported errors: • Figure Manta type A CS-Mount dimensions (16 mm filter) • Figure Manta type B CS-Mount dimensions (16 mm filter)
V7.8.3	2017-June-28	CMOSIS renamed to CMOSIS/ams following the acquisition of CMOSIS by ams Sensors Belgium Corrected user trigger rules Various other minor enhancements and corrections
V7.9.0	2018-Jan-12	Initial commercial release: Manta G-040B and G-040C • Sony IMX287 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Initial commercial release: Manta G-158B and G-158C • Sony IMX273 CMOS sensor • Specifications, absolute QE, spectral response, ROI frame rate information, camera lens information, and data path Added Specifications common to all models to simplify the model specific tables Simplified the *Contact us* section, please click the link to find contact information for your region or email us at one of the provided email addresses. Various other minor enhancements and corrections

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

Table 2: Styles used in this manual

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:

https://www.alliedvision.com

Product naming

Names of third-party products in this document are shortened to ease reading. Nevertheless, we respect all manufacturer rights and trademarks.

Official product name	Naming in this document	Manufacturer website
Sony Semiconductor Solutions	Sony	http://www.sony-semicon.co.jp/
ams Sensors Belgium	CMOSIS/ams	http://www.cmosis.com/

Table 3: Third-party product naming

Compliance and intended use

§

This chapter includes:

- Information about the legal requirements and restrictions for Manta cameras based on current and relevant regulations
- Particular emphasis has been given to Europe, the United States of America, and Canada
- Intended use statements

Compliance notifications

For customers in Europe

Allied Vision has demonstrated the fulfillment of the requirements relating to the Manta camera family:

- Directive 2014/30/EU (Electromagnetic compatibility)
- Directive 2011/65/EU (RoHS)
- Directive 2012/19/EU (Waste of Electric and Electronic Equipment (WEEE)

For customers in the USA

Class B digital device

Note: 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, 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 separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

We caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For customers in Canada

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

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

Pour utilisateurs au Canada

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

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

Board level models

Board level models are designed for integration and are delivered without housing on customer's request. Because housing design is critical to the electromagnetic compatibility (EMC) of a camera, no certification tests regarding electromagnetic interference have been performed for these models. Users who design board level into their systems should perform appropriate testing regarding EMC after the product design is completed. Compliance with requirements not EMC-related remains unaffected.

Avoid electromagnetic interferences

For all power and interface connections, only use shielded cables or cables recommended by Allied Vision.

Camera applications and intended use

General use

- The user is responsible for operating the camera within the specifications that are defined in this document, and within appropriate environmental conditions and technical prerequisites, to ensure trouble-free camera operation.
- The camera is compliant with current data communication standards; however, those standards do not allow for self-monitoring. Thus, the camera cannot be used as a standalone device for security-related monitoring operations.
- The camera is a hardware product. Only when used with appropriate accompanying software, the camera will produce the desired results. The realization of intelligent solutions requires additional software that is suitable to run with the camera.
- The camera is a component, it is neither a complete product, nor is it a ready-made technical solution.
- The camera-supporting software can be obtained and installed separately from the camera. Usage of the software is solely the responsibility of the user.
- The camera must not be opened. For all repair tasks, contact Allied Vision or one of Allied Vision's authorized representatives.
- Observe the intended use. The camera must only be used for purposes that are in conformity with the stated intended use.
- Additionally, refer to the warranty information on the Allied Vision website.

Use in medical devices

The camera provides basic adequacy to be used in medical devices as well, however, is not specially designated for operation in medical devices. When used as part of a medical device, a review of the specific application is necessary. Users who integrate the camera into an application must comply with the rules and regulations concerning medical devices.

Copyright and trademarks

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.

General cautions and warnings

Electrical connections

Electrostatic discharge (ESD)

The phenomenon is commonly known: when walking on a carpet, we get charged. Touching a door handle, we get an electric shock. Such electrostatic discharge (ESD) is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

- Unpacking: Remove the camera from its anti-static packaging only when your body is grounded.
- Workplace: Use a static-safe workplace with static-dissipative mat and air ionization.
- Wrist strap: Wear a static-dissipative wrist strap to ground your body.
- Clothing: Wear ESD-protective clothing. Keep components away from your body and clothing. Even if you are wearing a wrist strap, your body is grounded but your clothes are not.

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.

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.

Heat dissipation

Operation outside the allowed temperature range can damage the camera. For best performance and to protect the camera from damage, keep the housing temperature between the specified operating temperature.

Observe the following:

- To avoid camera crashes, operate the camera with a lens or lens adapter attached only.
- For maximum heat dissipation, affix the camera to a heat sink, using the mounting threads.
  - Use mounting base and heat sink with large surface areas.
  - Use a mounting base with a high thermal conductivity.
- Reduce ambient temperature. For example, in an outdoor application with direct sunlight, provide shading by an enclosure.
- Provide ventilation or other active cooling of camera, mounting base, and heat sink.

Optical components

Image sensor

Image sensors are sensitive to excessive radiation: focused sunlight, lasers, and X-rays can damage the sensor. Although Manta cameras are shipped with a protective glass or optical filter, if removed the sensor is not protected against dirt or scratches.

NIR models are shipped with no optical filter or protection glass.

Cleaning optical components

This product can be damaged by some volatile cleaning agents. Avoid cleaning the image sensor unless absolutely necessary. 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 at https://www.alliedvision.com/en/support/contact-support-and-repair.html.

Lenses

Provide the following conditions to keep dirt and droplets out of the optical system of camera and lens:

- Dust-free environment
- Low relative humidity
- No condensation

To keep dirt out of the lens mount, hold the camera with the lens mount facing the ground. Keep filter and camera back lens clean, because dirt becomes more visible the closer it gets to the sensor.

Board level cameras

Board level cameras

- Board level cameras are delivered without housing. Handle the sensor board and main board with care. Do not bend the boards. Do not touch the components or contacts on a board. Hold a board by its edges.
- Sensor board and main board are sensitive to electrostatic discharge. To avoid possible damage, handle all static-sensitive boards and components in a static-safe work area. Follow the procedures below.
- Electrostatic discharge: Static electricity can damage the sensor board or the main board of your board level cameras. To prevent static damage, discharge static electricity from your body before you touch any of your broad level camera's electronic components, such as sensor board or main board. To do so, use a static-safe work area with static-dissipative mat and wear a static-dissipative wrist strap. Do not hold any components of your board level cameras against your clothing. Even if you are wearing a wrist strap, your body is grounded but your clothes are not.
- Do not remove the sensor board and main board from its anti-static packaging unless your body is grounded.
- ESD shielding: To protect the boards from radiation of other modules or devices use a special ESD protective housing.

Board level cameras: General warnings

- Be sure that all power to your board level camera is switched off before mounting the sensor board or making connections to the camera.
- Do not connect or disconnect any cables during an electrical storm.
- Do not use your board level cameras during an electrical storm.
- To help avoid possible damage to the sensor board or main board, wait 5 seconds after power is switched off, before connecting or disconnecting any cable to the board level cameras.
- Keep your board level cameras away from radiators and heat sources.
- Avoid contact of board level cameras with liquids.

Board level cameras: Loading

- Avoid any mechanical forces to the board level cameras, the boards and its components, especially torsional, tensile and compressive forces.
- To avoid damages of the boards, provide cables with an external pull relief so that no force is applied to the connectors itself.

Board level cameras: Dirty environments

- Always use clean boards.
- To protect the board level cameras from debris always use in a clean environment or a protective housing.

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 interfaces 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). 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* at 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.

Optics

Allied Vision Manta cameras offer various mechanical interfaces for installing a lens including C-Mount and CS-Mount. Lenses can be purchased directly from Allied Vision or from an Allied Vision distributor. Users need to select the desired focal length and appropriate optical format for the target camera model.

For more information on mechanical interface options for your Manta camera, see the *Modular Concept* at https://www.alliedvision.com/en/support/technical-documentation.html.

Contact your Allied Vision Sales team or your local Allied Vision distribution partner for information on accessories and lens recommendations:

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

Accessories

Allied Vision offers a wide range of accessories for the use of Allied Vision GigE cameras and the easy integration in already existing applications including:

- Gigabit Ethernet accessories including standard GigE components as well as PoE capable GigE components.

- Lenses for corresponding sensor sizes and resolutions.

Contact your Allied Vision Sales team or your local Allied Vision distribution partner for information on accessories and lens recommendations:

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

Recommended accessories

A list of Allied Vision recommended accessories is available on the Allied Vision website. See the *Hardware Selection for Allied Vision GigE Cameras Application Note* at https://www.alliedvision.com/en/support/technical-papers-knowledge-base.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. See *Specifications* on page 34 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 (PoE models only) can source power from:
  - IEEE 802.3af (100 Mbit/s and 1000 Mbit/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.

Allied Vision software

All software packages provided by Allied Vision are free of charge and contain the following components:

- Drivers
- Software Development Kit (SDK) for camera control and image acquisition
- Examples based on the provided APIs of the SDK
- Documentation and release notes
- Viewer application to operate/configure the cameras

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*.

Third-party software

In addition to the software provided by Allied Vision, there are numerous GigE Vision standard compliant third-party software options available. In general, third-party software provides increased functionality such as image processing and video recording.

Allied Vision's Vimba SDK is based on the GenICam standard. GenICam-based third-party software automatically connects with Vimba's transport layers. Additionally, Vimba includes the Cognex Adapter for VisionPro.

Specifications

This chapter provides:

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

Notes on specifications

PoE capable models

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

Modular options

Manta cameras can be ordered with several modular options including lens mount, housing/board level, housing design, optical filter, and sensor options. For more information, see the *Modular Concept* at https://www.alliedvision.com/en/support/technical-documentation.html.

Manta type A and type B models

Manta type A models: Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B models: Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236

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 adapter, tripod, or lens.

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

Manta models up to serial number 503323258

For information regarding Manta models up to serial number 503323258, see the Appendix at the end of this technical manual.

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
- `GevSCPSPacketSize` = *8192* bytes per packet

Resolution and ROI frame rate

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 Mbit/s), and will see a frame rate increase with a reduction in width.

Resolution and ROI measurements

- Data was generated at full resolution using `StreamBytesPerSecond` = 124 Mbit/s (full bandwidth) and an 8-bit pixel format. Frame rate may be lower if using network hardware incapable of 124 Mbit/s.
- For maximum speed advantage on quad-tap CCD sensors, ROIs are center image, where `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.

Frame rate and readout

Although the sensor is capable of higher frame rates, readout is limited by GigE bandwidth and exposure value. You can improve frame rates with a reduced region of interest and shorter exposure values.

Sensor tap mode (CCD models only)

With dual-tap sensor mode you can achieve a higher frame rate than with one-tap mode. With one-tap sensor mode, you can achieve an image certain to be free of any tap-boundary artifacts. You can also use one-tap mode if you experience tap imbalance issues with your camera. You can change the sensor digitization tap mode in Vimba Viewer 2.0 or later. Applicable to dual-tap cameras as detailed in the specification tables.

Image acquisition must be stopped before changing sensor tap mode.

Affected features

This table lists features which are affected when switching from dual-tap to one-tap sensor mode.

Feature	Dual-tap mode	One-tap mode
ReverseX	Available	Not available
ReverseY	Available	Not available
DecimationHorizontal	Available	Not available
DecimationVertical	Available	Not available

Absolute quantum efficiency plots

Important notice before reading the quantum efficiency plots

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 values is ±10.25%. This is mainly due to uncertainties in the measuring apparatus itself (Ulbricht sphere, optometer, etc.). Manufacturing tolerance of the sensor increases overall uncertainty.

The measurements for Manta G-145B NIR in figure 23: and figure 24: 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.

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Absolute QE plots for CMOSIS/ams CMOS 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, 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.

Specifications common to all models

Feature	Specification
Lens mount	Default: C-Mount Optional: See the *Modular Concept*
Housing	Default: Straight view Optional: See the *Modular Concept*
Opto-isolated I/Os	2 inputs, 2 outputs
RS232	1 TxD, 1 RxD
Operating temperature	+5°C to +45°C ambient temperature (without condensation)
Storage temperature	-10°C to +70°C ambient temperature (without condensation)
Operating humidity	20 to 80% non-condensing
Power requirements	8 to 30 VDC; PoE
Interface	IEEE 802.3 1000BASE-T (Gigabit Ethernet), IEEE 802.3af (PoE)
Interface standard	GigE Vision® Standard V1.2
Camera control standard	GenICam SFNC V1.2.1

Table 4: Specifications common to all Manta models

Manta G-031B, G-031C

Feature	Specification	
	Manta G-031B	Manta G-031C
Resolution	656 (H) × 492 (V) 0.3 MP	
Sensor	Sony ICX618ALA with EXview HAD CCD™ technology	Sony ICX618AQA with EXview HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/4	
Sensor size	4.5 mm diagonal	
Pixel size	5.6 µm × 5.6 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	125.2 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	58 µs to 60 s; 1 µs increments	
Gain control	0 to 32 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 5: Manta G-031B, G-031C model specifications

Feature	Specification	
	Manta G-031B	Manta G-031C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 5: Manta G-031B, G-031C model specifications (continued)
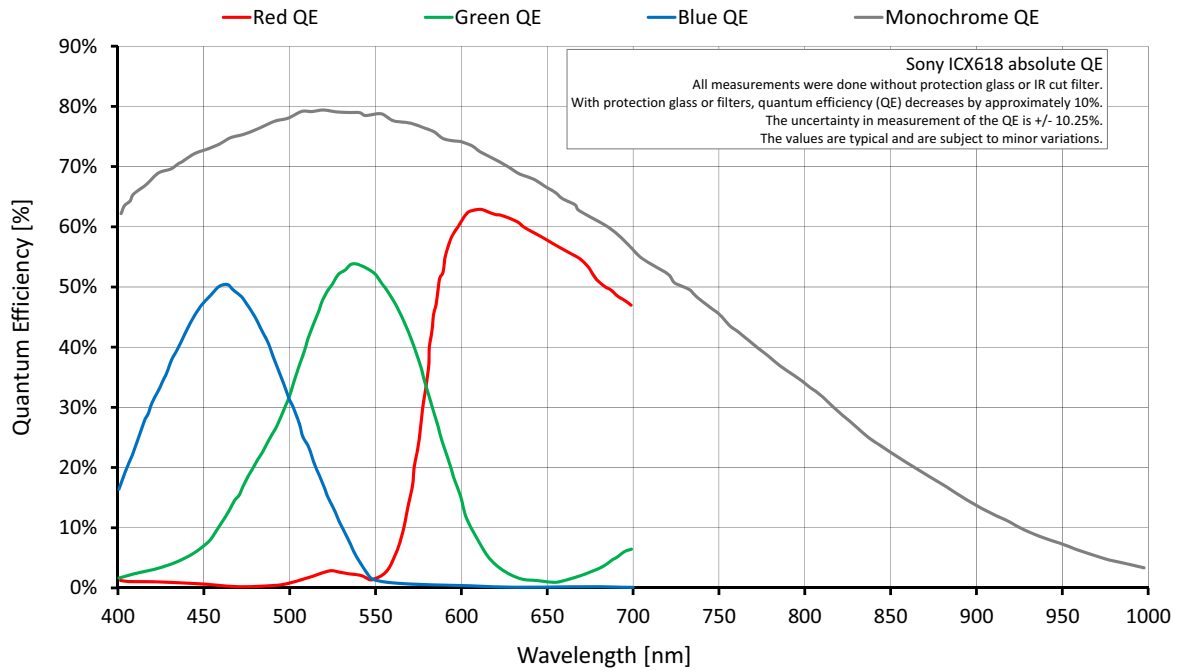
Absolute QE

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

Spectral response

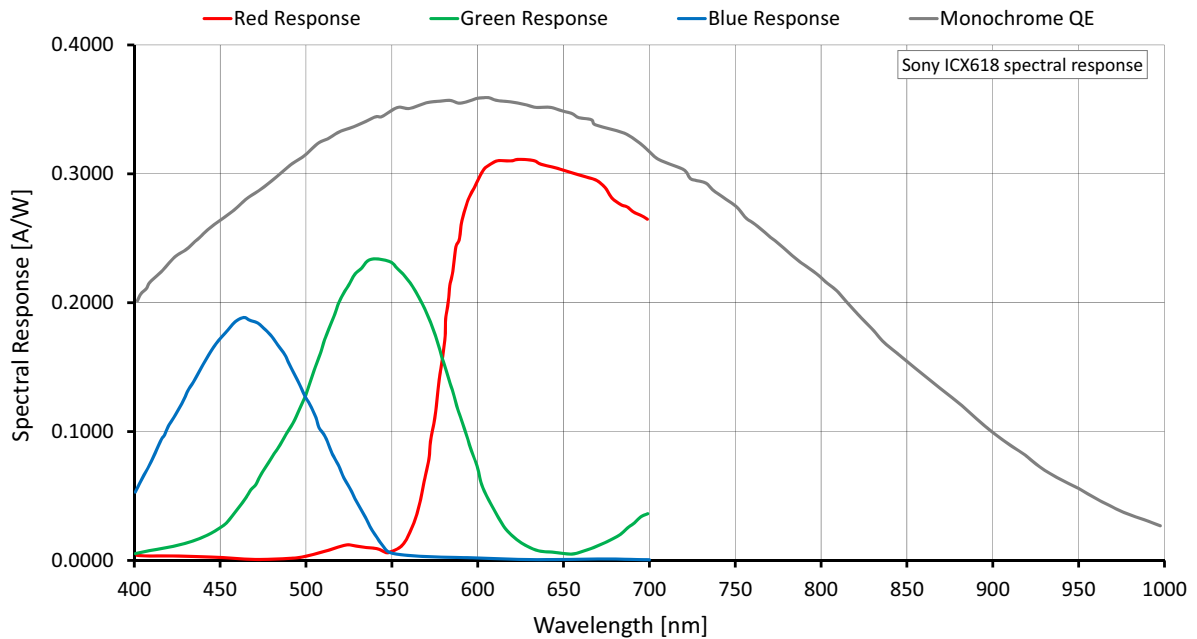*Figure 2: Manta G-031B, G-031C (Sony ICX618) spectral response*

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
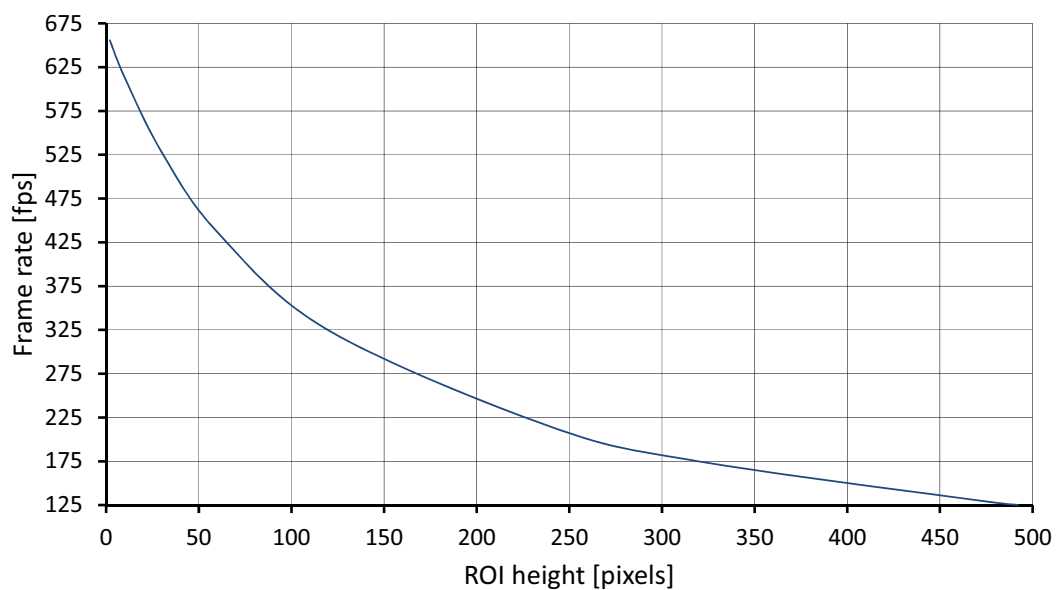
Figure 3: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]		Height (pixels)	Frame rate[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			

Width = 656 pixels

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

Table 6: Frame rate as a function of ROI height

Manta G-032B, G-032C

Feature	Specification	
	Manta G-032B	Manta G-032C
Resolution	656 (H) × 492 (V) 0.3 MP	
Sensor	Sony ICX424AL with HAD CCD™ technology	Sony ICX424AQ with Wfine HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/3	
Sensor size	6.0 mm diagonal	
Pixel size	7.4 µm × 7.4 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	80.7 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 36 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 7: Manta G-032B, G-032C model specifications

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Absolute QE

Figure 4: Manta G-032B, G-032C (Sony ICX424) absolute QE

Spectral response

Figure 5: Manta G-032C, G-032C (Sony ICX424) spectral response

ROI frame rate

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

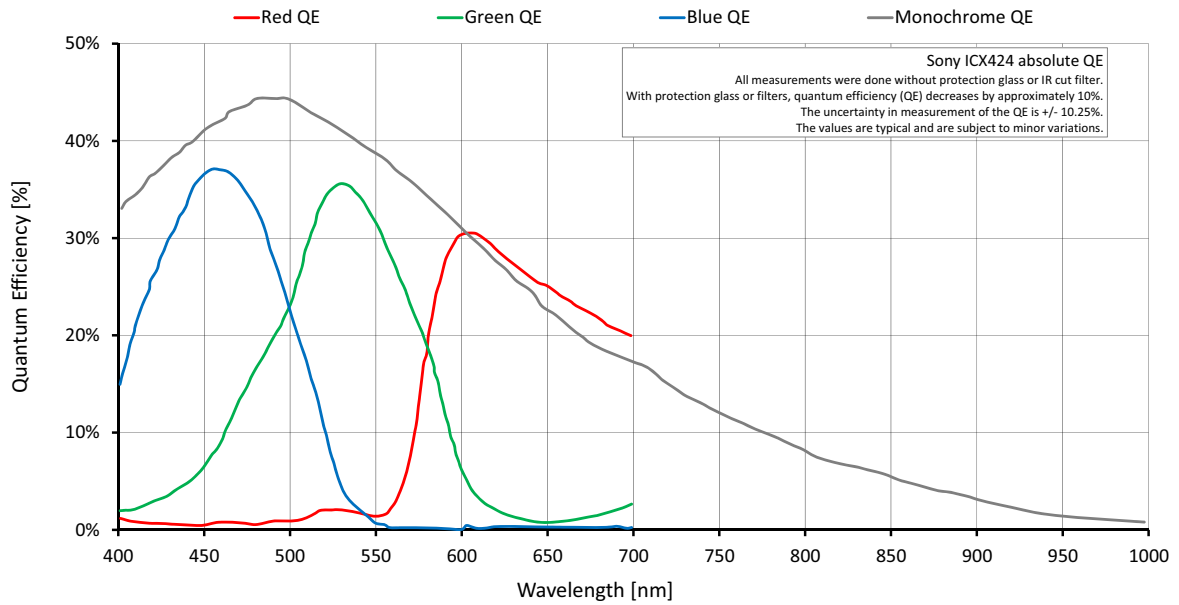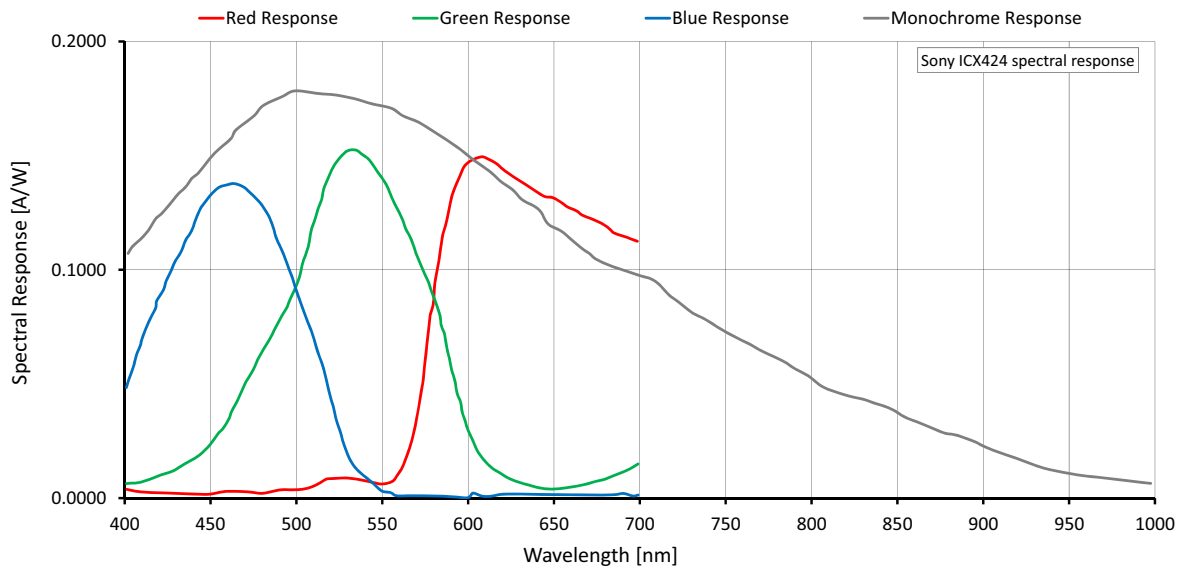Maximum frame rate at full resolution according formula: 80.7 fps
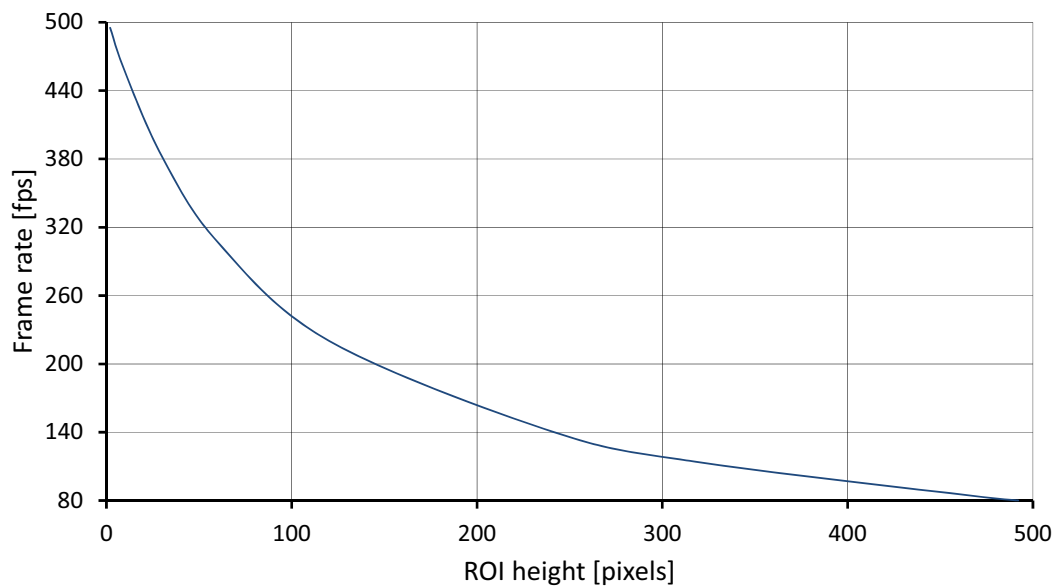
Figure 6: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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		

Width = 656 pixels

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

Table 8: Frame rate as a function of ROI height

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Manta G-033B, G-033C

Feature	Specification	
	Manta G-033B	Manta G-033C
Resolution	656 (H) × 492 (V) 0.3 MP	
Sensor	Sony ICX414AL with HAD technology	Sony ICX414AQ with Wfine HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	9.9 μm × 9.9 μm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	88.7 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 μs to 60 s; 1 μs increments	
Gain control	0 to 35 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 9: Manta G-033B, G-033C model specifications

Feature	Specification	
	Manta G-033B	Manta G-033C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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.

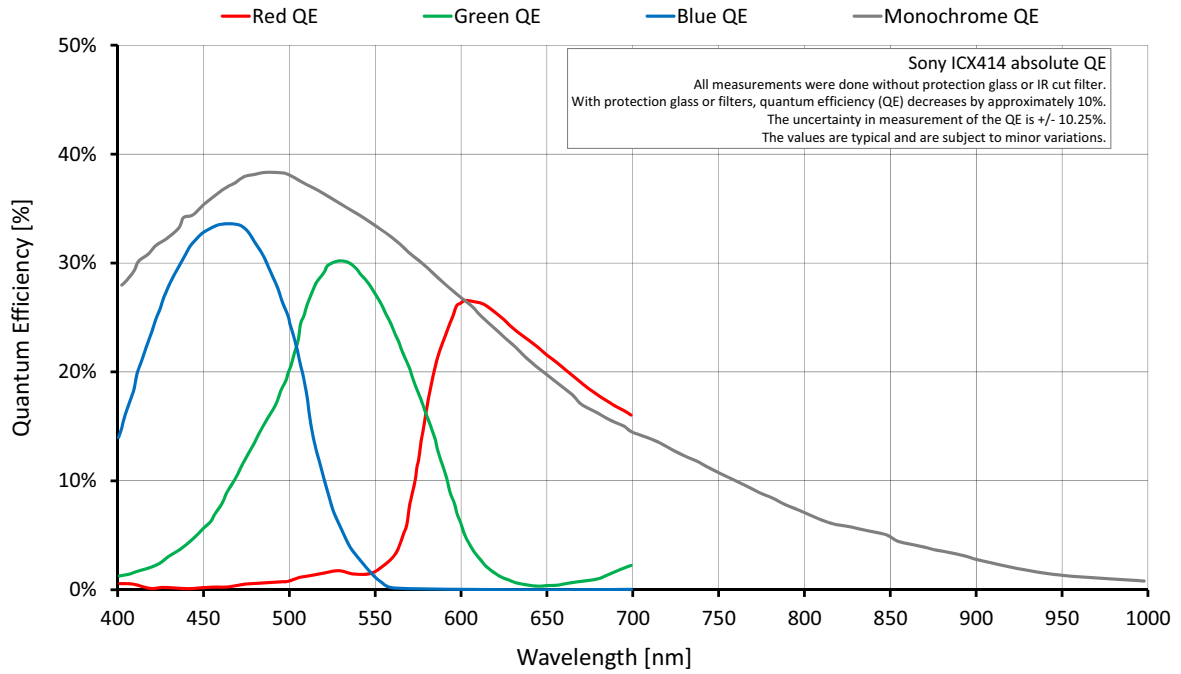*Table 9: Manta G-033B, G-033C model specifications (continued)*

Absolute QE

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

Spectral response

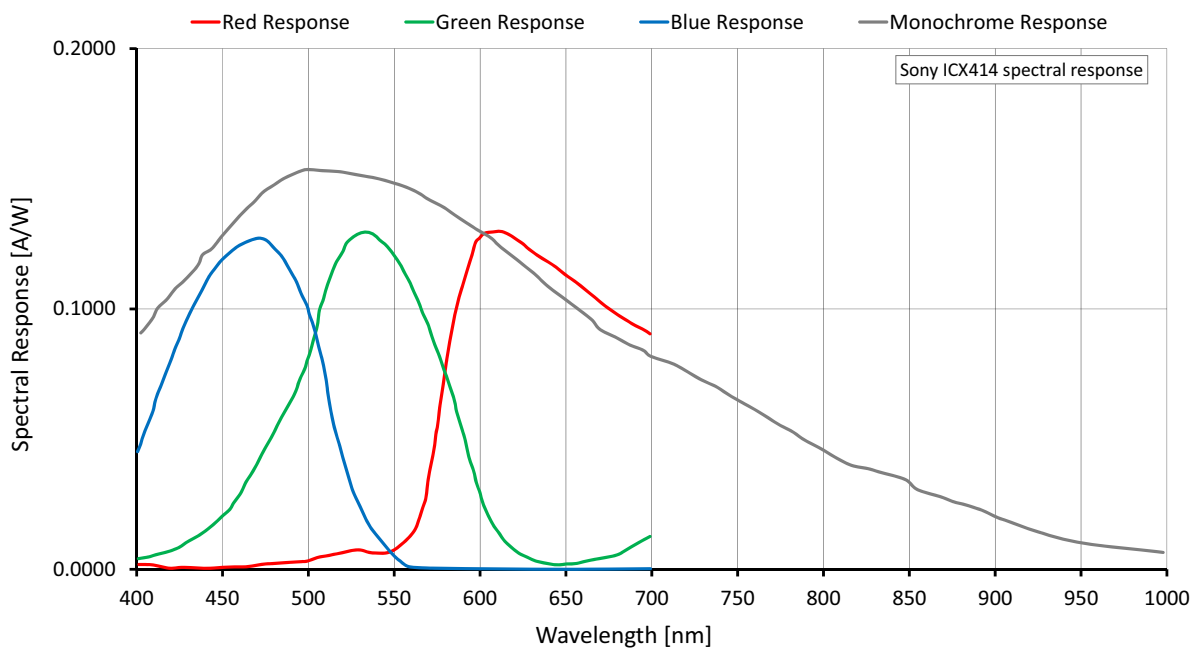*Figure 8: Manta G-033B, G-033C (Sony ICX414) spectral response*

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

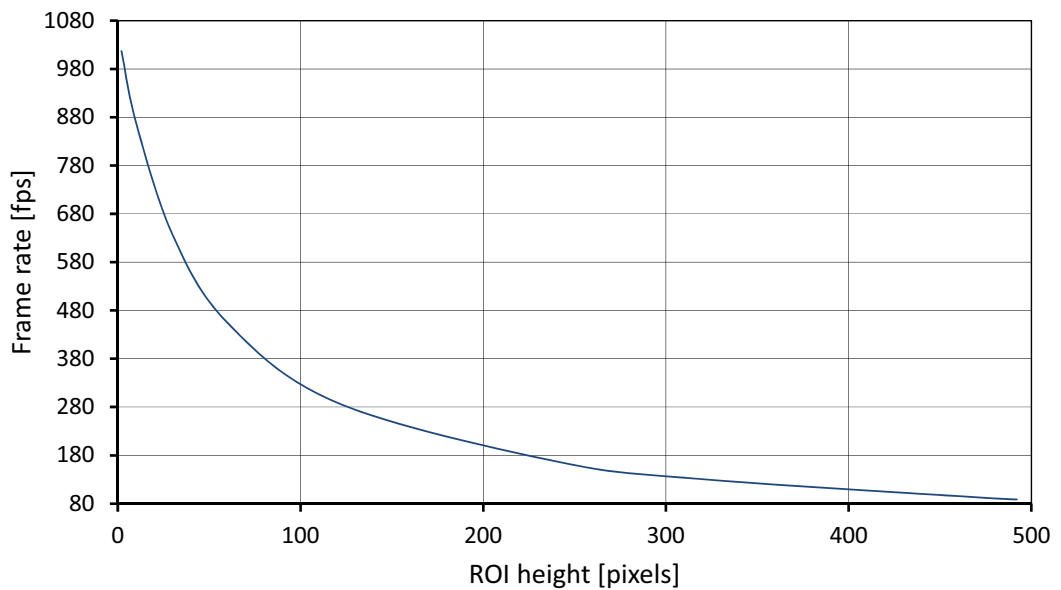*Figure 9: Frame rate as a function of ROI height*

Height (pixels)	Frame rate[1]
492	88.7
480	90.8
320	130.6
240	167.3
120	289.1

Height (pixels)	Frame rate[1]
60	454.5
30	636.6
10	868.7
2	1017.0

Width = 656 pixels

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

Table 10: Frame rate as a function of ROI height

Manta G-040B, G-040C

Feature	Specification	
	Manta G-040B	**Manta G-040C**
Resolution	728 (H) × 544 (V) 0.40 MP	
Sensor	Sony IMX287LLR Exmor with Pregius shutter pixel technology	Sony IMX287LQR Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1/2.9	
Sensor size	6.3 mm diagonal	
Pixel size	6.90 µm × 6.90 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	286 frames per second[1] 295.7 frames per second (burst mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 329 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	**Pixel format**	**Range**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	25 µs to 85.9 s; 5.76 µs increments
	Mono12, BayerRG12, YUV422Packed	29 µs to 85.9 s; 7.68 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	36 µs to 85.9 s; 11.52 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	
Power consumption	2.77 W @ 12 VDC; 3.23 W PoE	

Table 11: Manta G-040B, G-040C model specifications

	Specification	
Feature	Manta G-040B	Manta G-040C
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	17.28 µs
	Mono12, BayerRG12, YUV422Packed	23.04 µs
	RGB8Packed, BGR8Packed, YUV444Packed	34.56 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±2.88 µs
	Mono12, BayerRG12, YUV422Packed	±3.84 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±5.76 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] Higher frame rates can be achieved by adjusting the packet size. For example, when `GevSCPSPacketSize` = 3208 bytes you can achieve 295.7 frames per second.

[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.

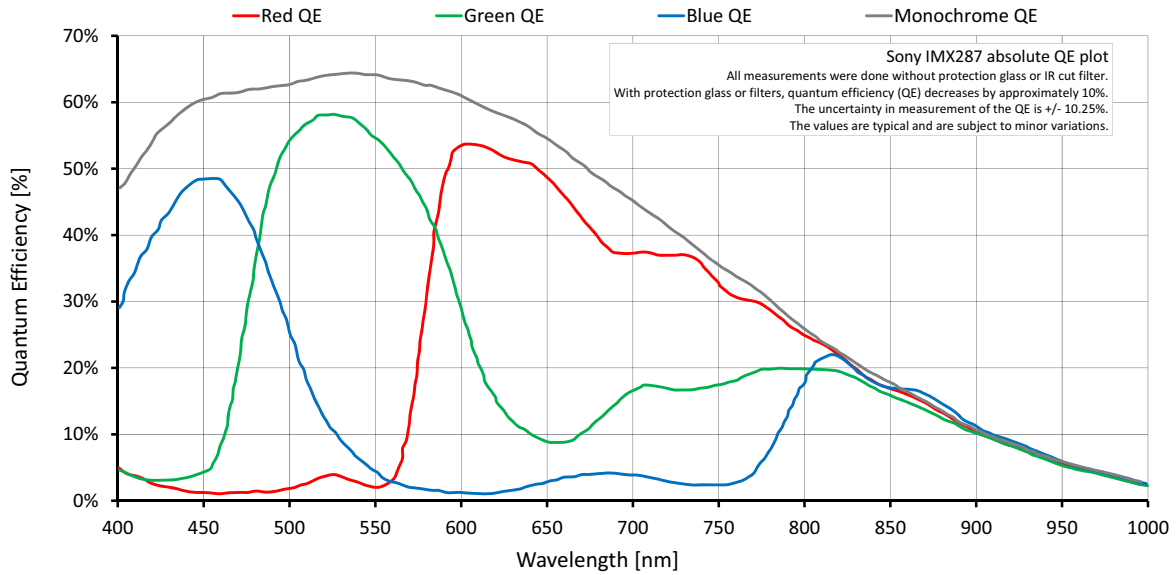*Table 11: Manta G-040B, G-040C model specifications (continued)*

Absolute QE

Figure 10: Manta G-040B, G-040C (Sony IMX287) absolute QE
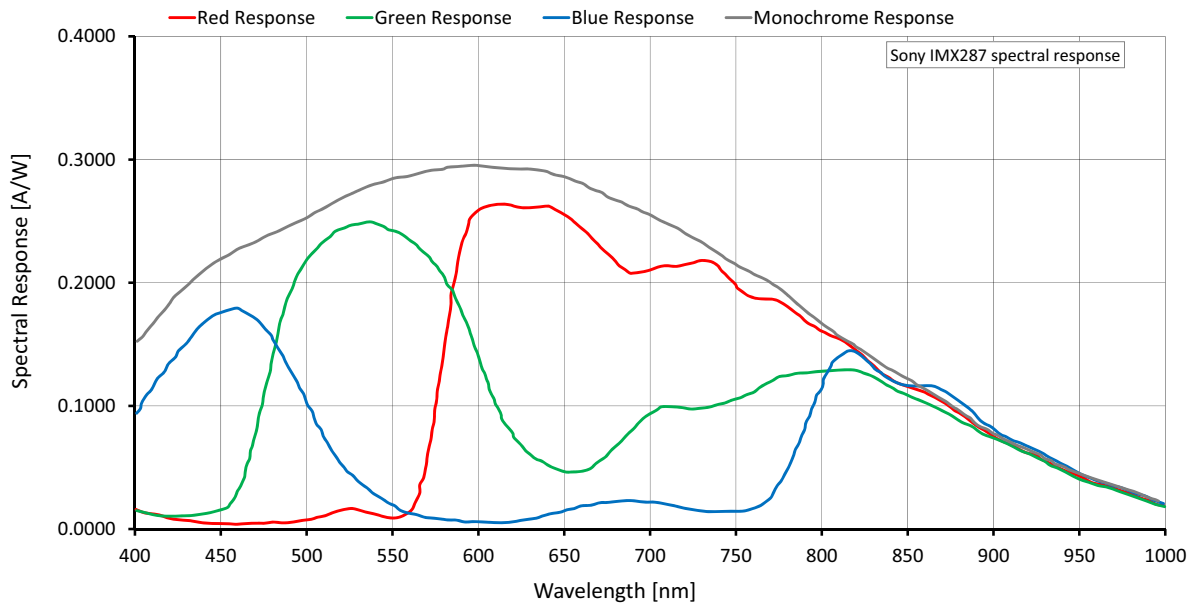
Spectral response

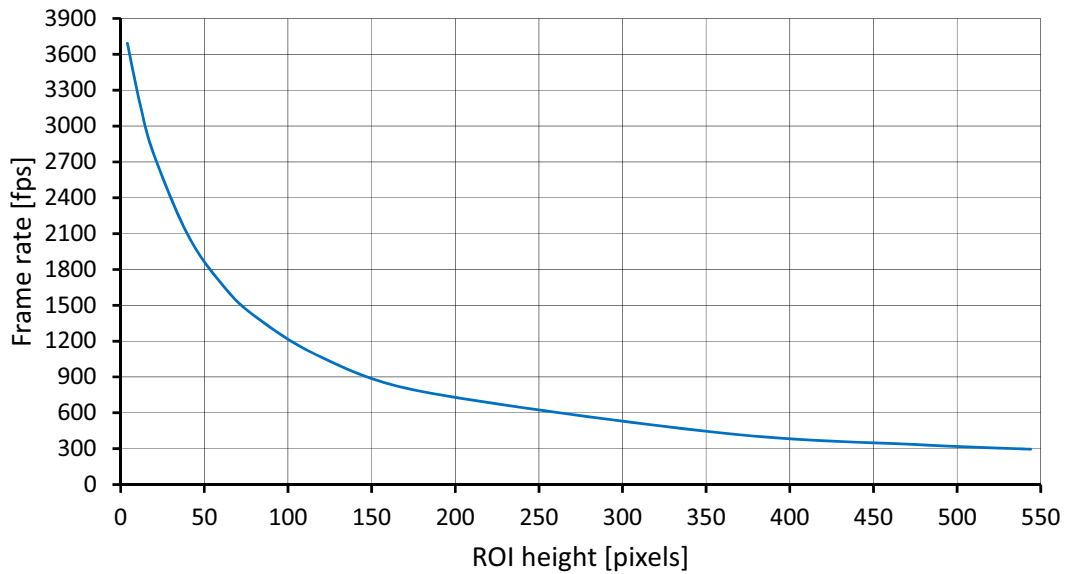*Figure 11: Manta G-040B, G-040C (Sony IMX287) spectral response*

ROI frame rate

Figure 12: Frame rate as a function of ROI height

Height (pixels)	Frame rate	Height (pixels)	Frame rate	Height (pixels)	Frame rate
544	286	120	1065	20	2755.5
480	331.9	80	1411.4	12	3156.5
360	430.7	60	1685.4	4	3692.7
180	778.5	40	2091.6		

Width = 728 pixels

Table 12: Frame rate as a function of ROI height

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.

Manta G-046B, G-046C

Feature	Specification	
	Manta G-046B	Manta G-046C
Resolution	780 (H) × 580 (V) 0.5 MP	
Sensor	Sony ICX415AL with HAD technology	Sony ICX415AQ with Wfine HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	8.3 µm × 8.3 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	67.5 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 70 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 13: Manta G-046B, G-046C model specifications

Feature	Specification	
	Manta G-046B	Manta G-046C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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.

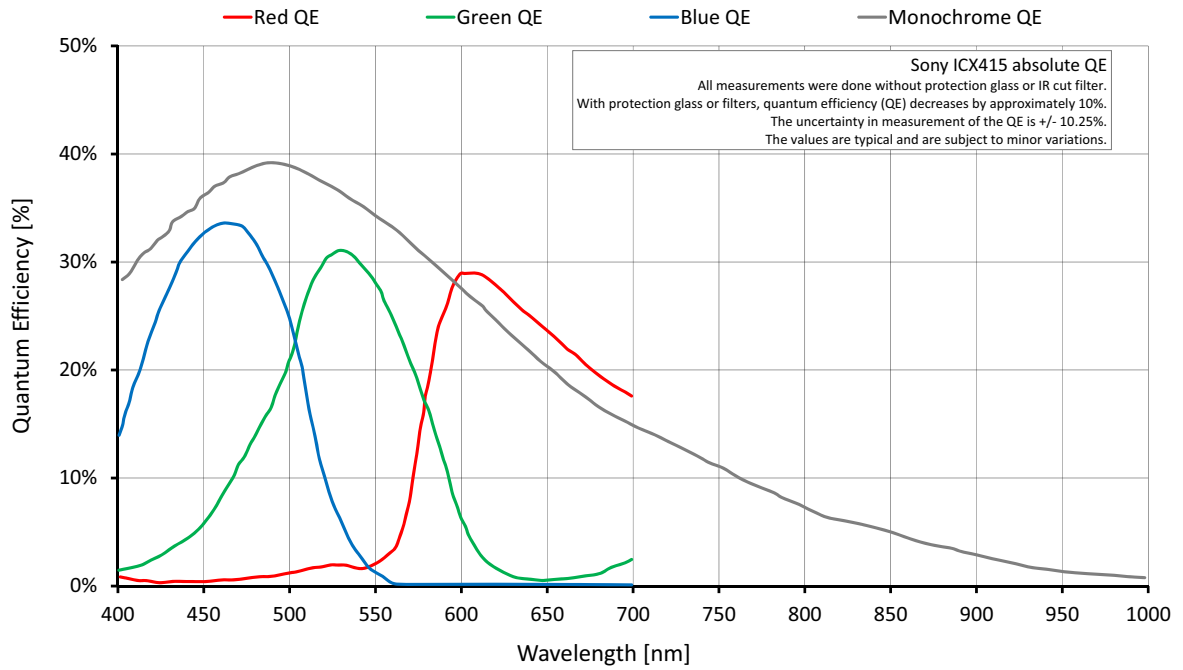*Table 13: Manta G-046B, G-046C model specifications (continued)*

Absolute QE

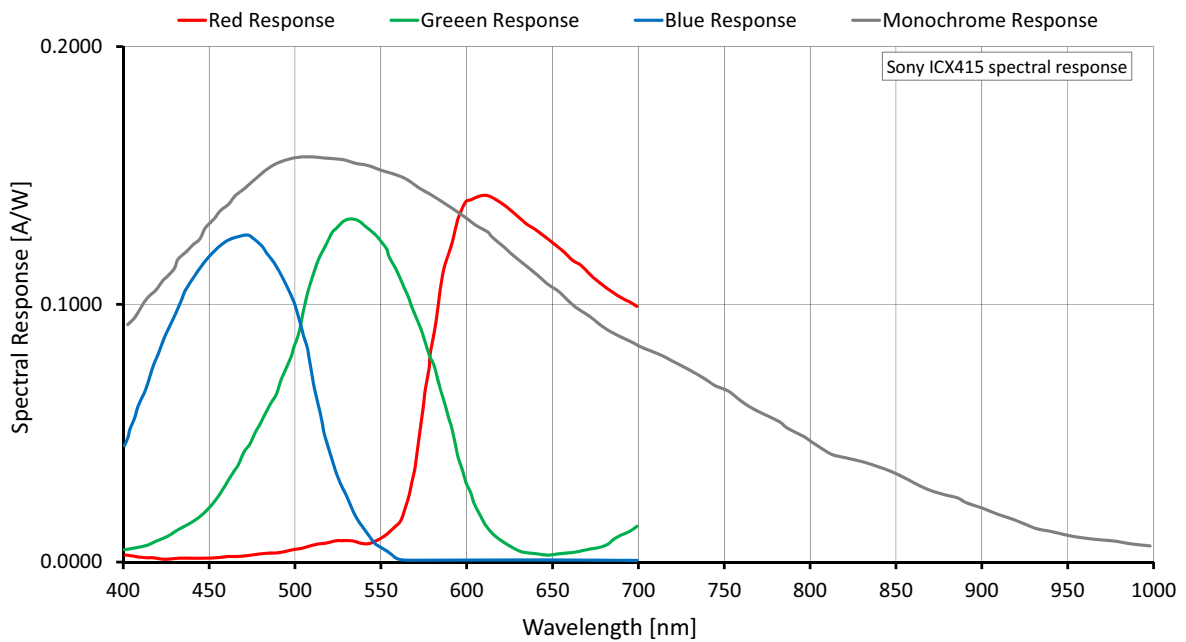*Figure 13: Manta G-046B, G-046C (Sony ICX415) absolute QE*

Spectral response

Figure 14: 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

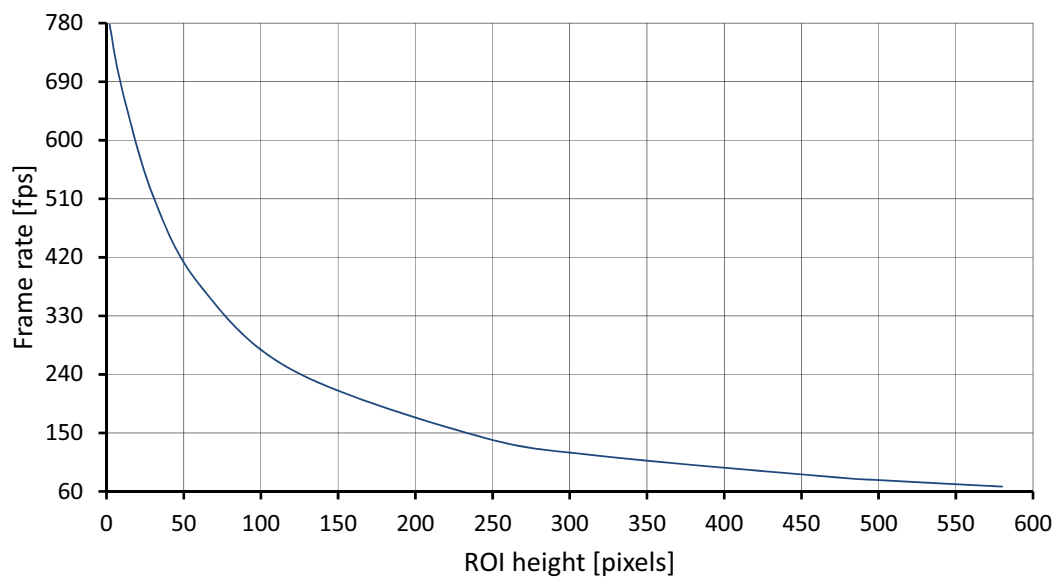*Figure 15: Frame rate as a function of ROI height*

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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

Width = 780 pixels

[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

Manta G-125B, G-125C

Feature	Specification	
	Manta G-125B	Manta G-125C
Resolution	1292 (H) × 964 (V) 1.2 MP	
Sensor	Sony ICX445ALA with EXview HAD CCD™ technology	Sony ICX445AQA with EXview HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/3	
Sensor size	6.0 mm diagonal	
Pixel size	3.75 µm × 3.75 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	31.0 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 25 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	21 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 15: Manta G-125B, G-125C model specifications

Feature	Specification	
	Manta G-125B	Manta G-125C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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.

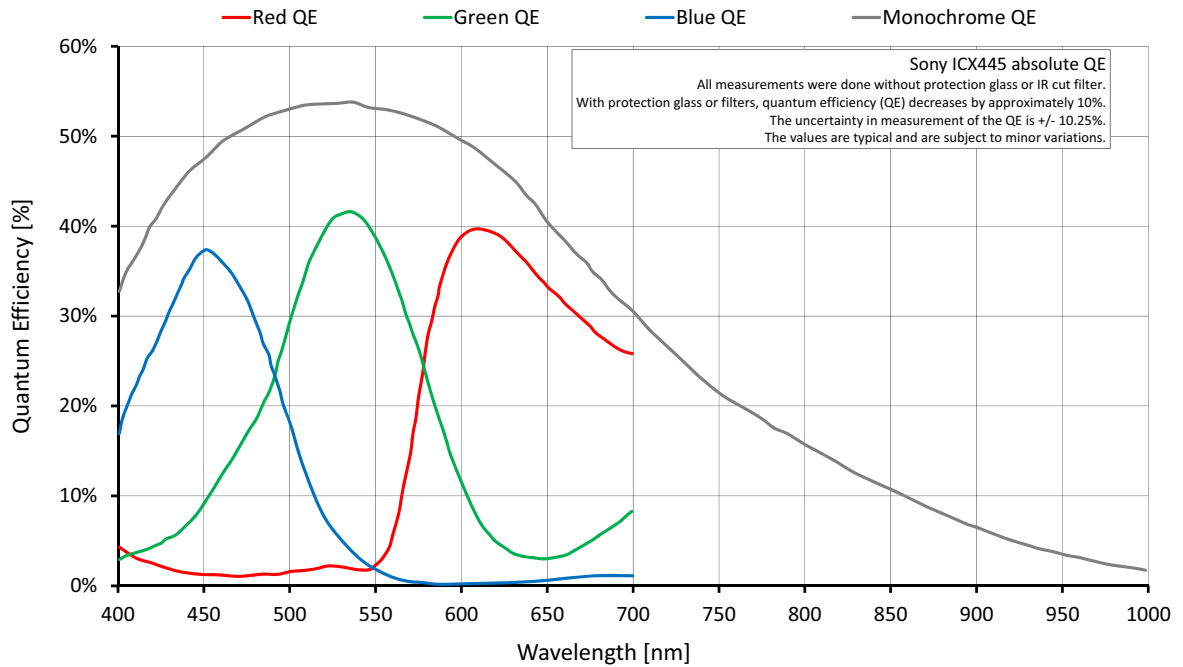*Table 15: Manta G-125B, G-125C model specifications (continued)*

Absolute QE

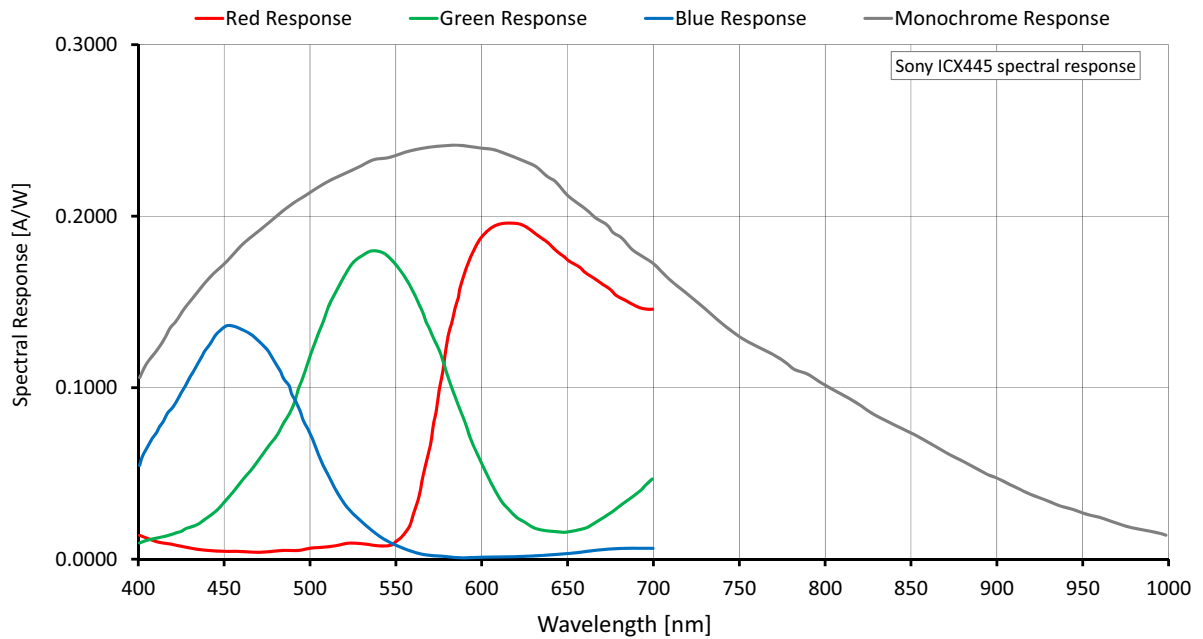*Figure 16: Manta G-125B, G-125C (Sony ICX445) absolute QE*

Spectral response

Figure 17: 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

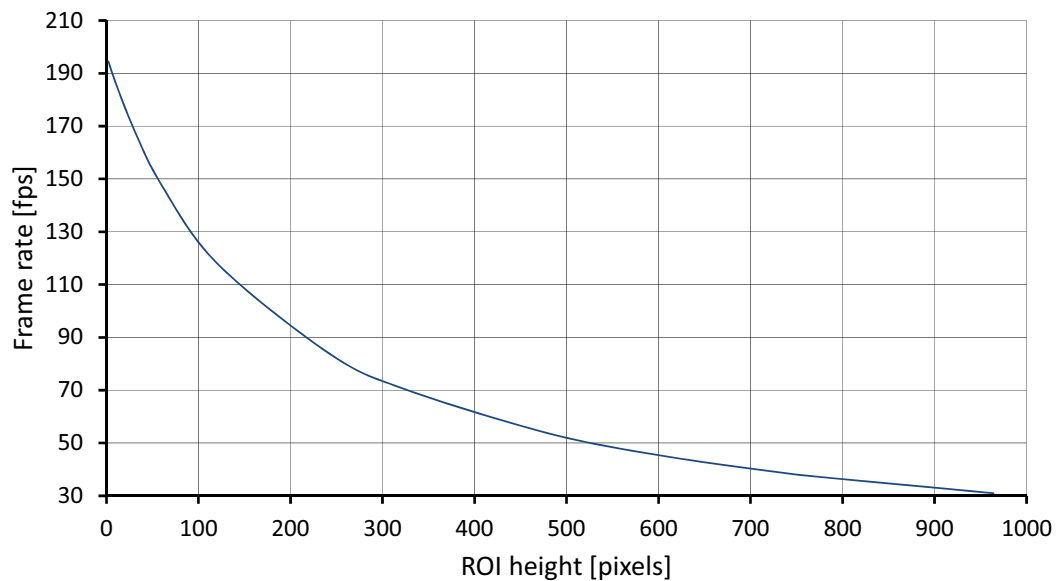Figure 18: Frame rate as a function of ROI height plot

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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

Width = 1292 pixels

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

Table 16: Frame rate as a function of ROI height

Manta G-145B, G-145C

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

Feature	Specification	
	Manta G-145B	Manta G-145C
Resolution	1388 (H) × 1038 (V) 1.4 MP	
Sensor	Sony ICX285AL with EXview HAD CCD™ technology	Sony ICX285AQ with EXview HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	11.0 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	15.0 frames per second 30.1 frames per second (30 fps variants)	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	43 µs to 60 s; 1 µs increments 38 µs to 60 s; 1 µs increments (30 fps variants)	
Gain control	0 to 33 dB; 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	
Power consumption	3.7 W @ 12 VDC; 4.3 W PoE 4.5 W @ 12 VDC; 5.3 W PoE (30 fps variants)	

Table 17: Manta G-145B, G-145C (including 30 fps variants) model specifications

Feature	Specification	
	Manta G-145B	Manta G-145C
Trigger latency[1]	Idle state: 19.3 µs; Frame valid state: 45.2 µs Idle state: 12.6 µs; Frame valid state: 25.6 µs (30 fps variants)	
Trigger jitter[1]	Idle state: ±9.8 µs; Frame valid state: ±35.7 µs Idle state: ±6.9 µs; Frame valid state: ±19.9 µs (30 fps variants)	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 17: Manta G-145B, G-145C (including 30 fps variants) model specifications (continued)
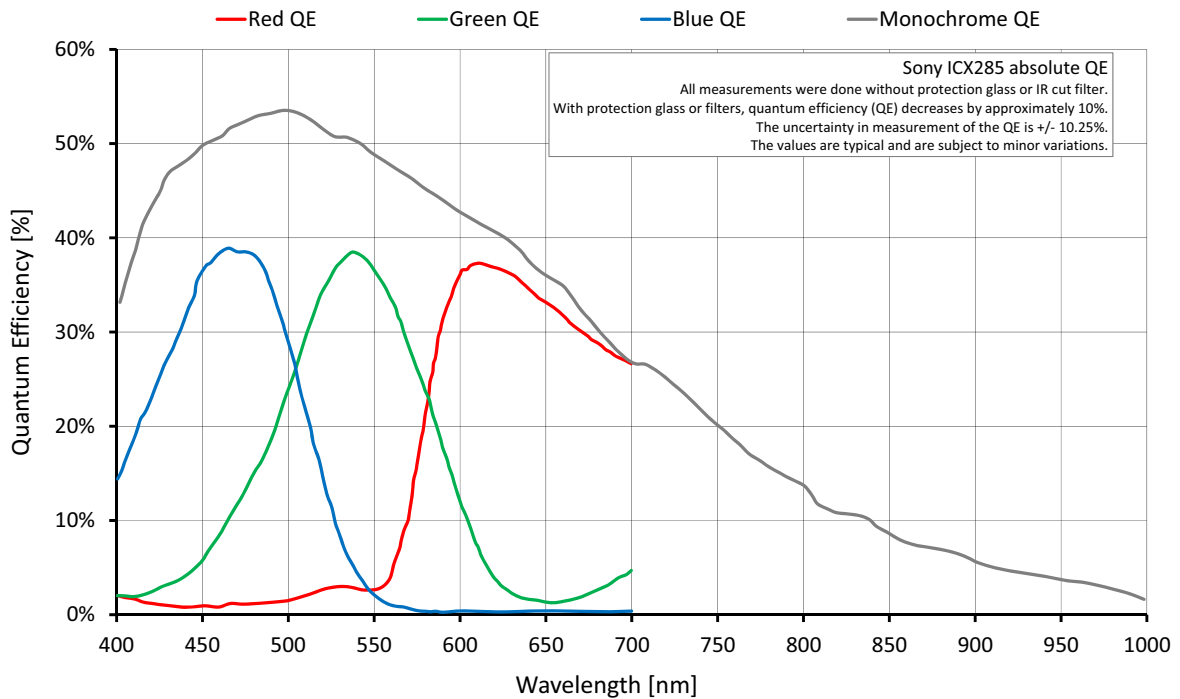
Absolute QE

Figure 19: Manta G-145B, G-145C (Sony ICX285) absolute QE

Spectral response

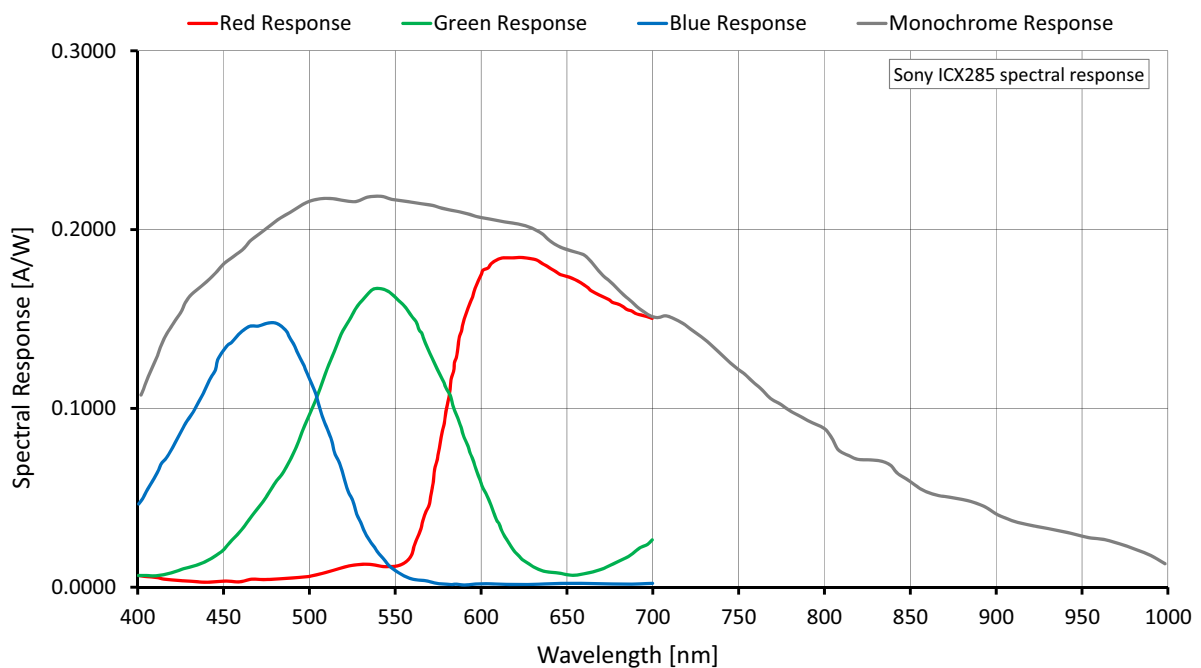*Figure 20: Manta G-145B, G-145C (Sony ICX285) spectral response*

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

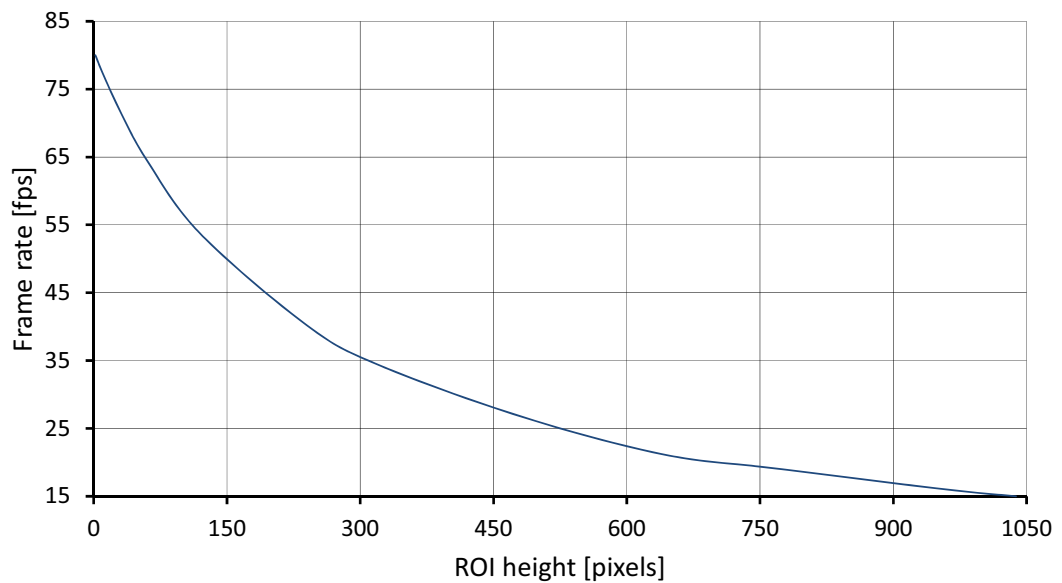*Figure 21: Frame rate as a function of ROI height*

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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

Width = 1388 pixels

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

Table 18: Frame rate as a function of ROI height

ROI frame rate for 30 fps variants

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

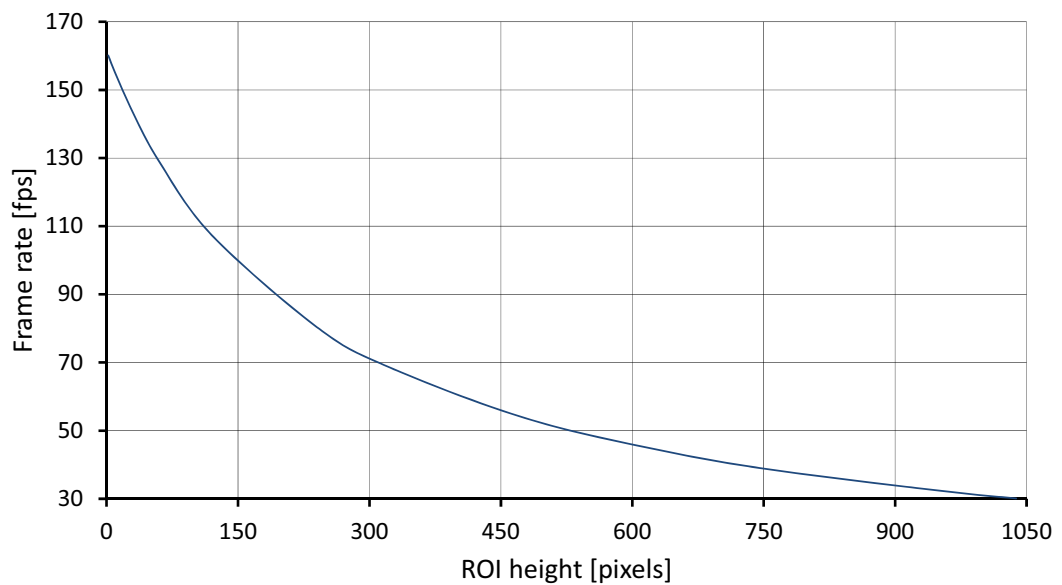Maximum frame rate at full resolution according formula: 30.1 fps

Figure 22: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]		Height (pixels)	Frame rate[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

Width = 1388 pixels

[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

Manta G-145B NIR

Feature	Specification Manta G-145B NIR
Resolution	1388 (H) × 1038 (V) 1.4 MP
Sensor	Sony ICX285AL with EXview HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan
Shutter type	Global
Sensor format	Type 2/3
Sensor size	11.0 mm diagonal
Pixel size	6.45 µm × 6.45 µm
Optical filter	No optical filter[1] Optional: See the *Modular Concept*
Maximum frame rate at full resolution	15.0 frames per second (NIR mode: Off/On_Fast) 13.9 frames per second (NIR mode: On_HighQuality)
Maximum image bit depth	12-bit
Image buffer	32 MB
StreamHoldCapacity	Up to 22 frames at full resolution
Monochrome pixel formats	Mono8, Mono12, Mono12Packed
Exposure time control	20 µs to 60 s; 1 µs increments 28 µs to 60 s for NirMode=Off/On_Fast and ExposureMode=External
Gain control	0 to 33 dB; 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
Power consumption	4.2 W @ 12 VDC; 4.9 W PoE
Trigger latency[2]	Idle state: 58.7 µs; Frame valid state: 58.7 µs
Trigger jitter[2]	Idle state: ±35.7 µs; Frame valid state: ±35.7 µs
Body dimensions (L × W × H)	86.4 × 44 × 29 mm
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g

[1] As the Manta G-145B NIR model does not have an optical filter always attach a dust cap when a lens is not attached to minimize the possibility of contaminants falling on the sensor surface.

[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 20: Manta G-145B NIR model specifications
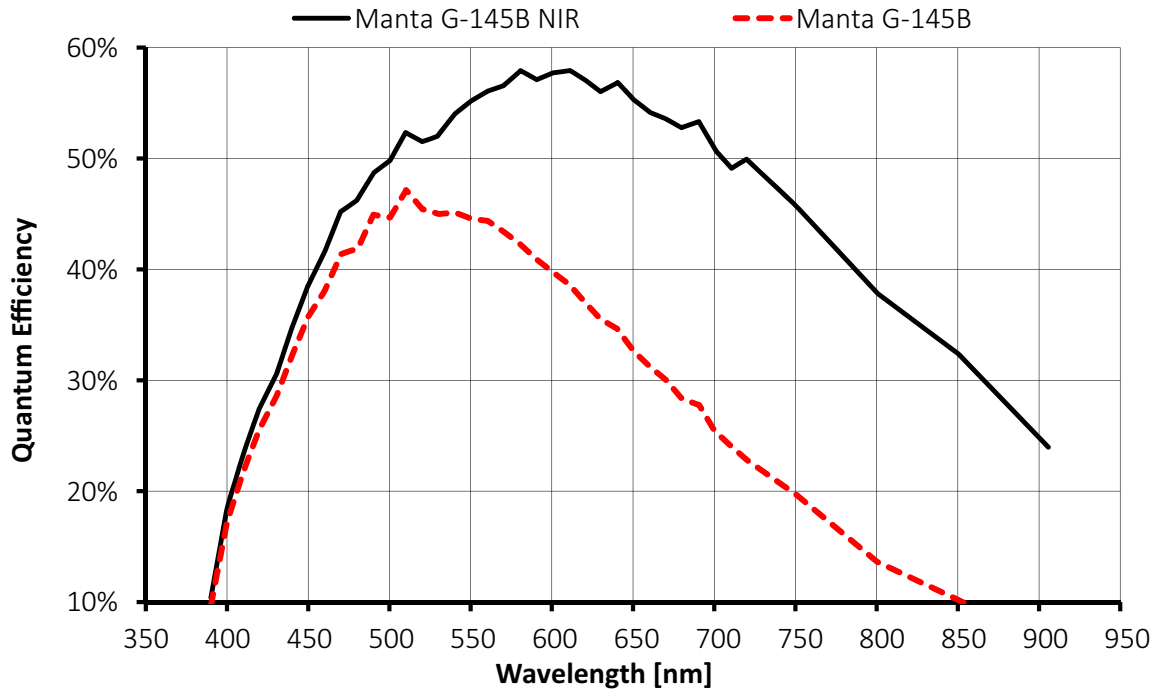
Allied Vision

Absolute QE

Figure 23: Manta G-145B NIR (Sony ICX285) absolute QE (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B
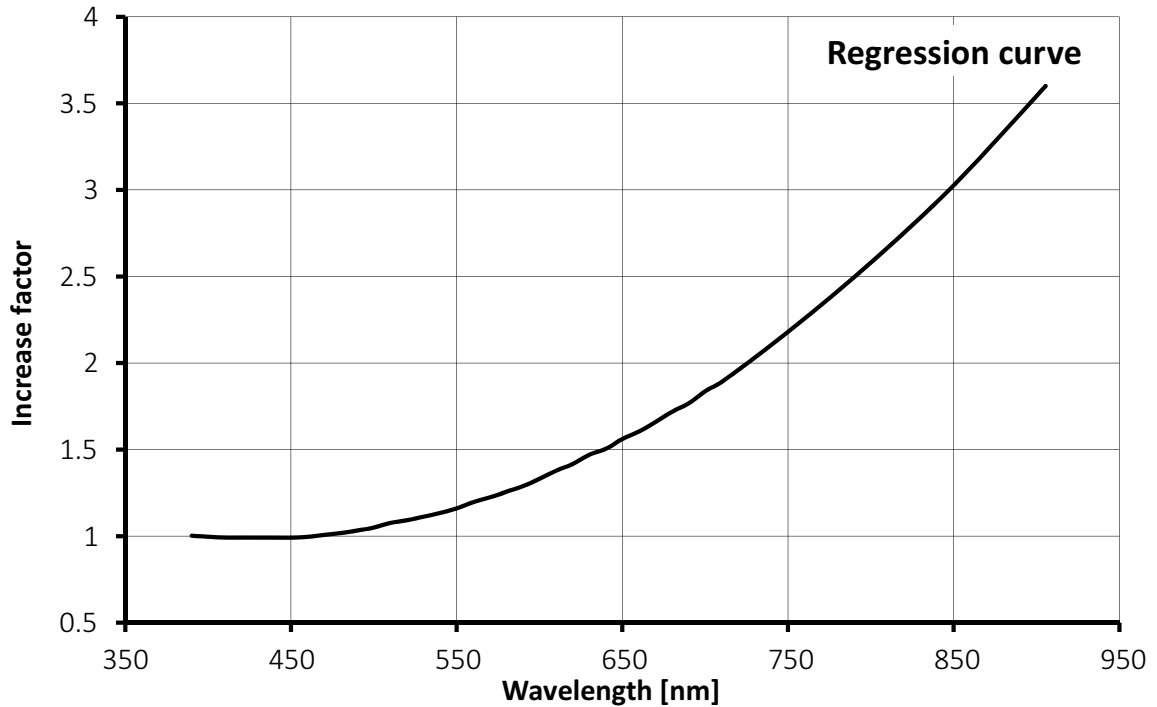
Increase of relative response

Figure 24: Increase of relative response with NIR mode set to On_HighQuality

ROI frame rate

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

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

Maximum frame rate at full resolution according formula:
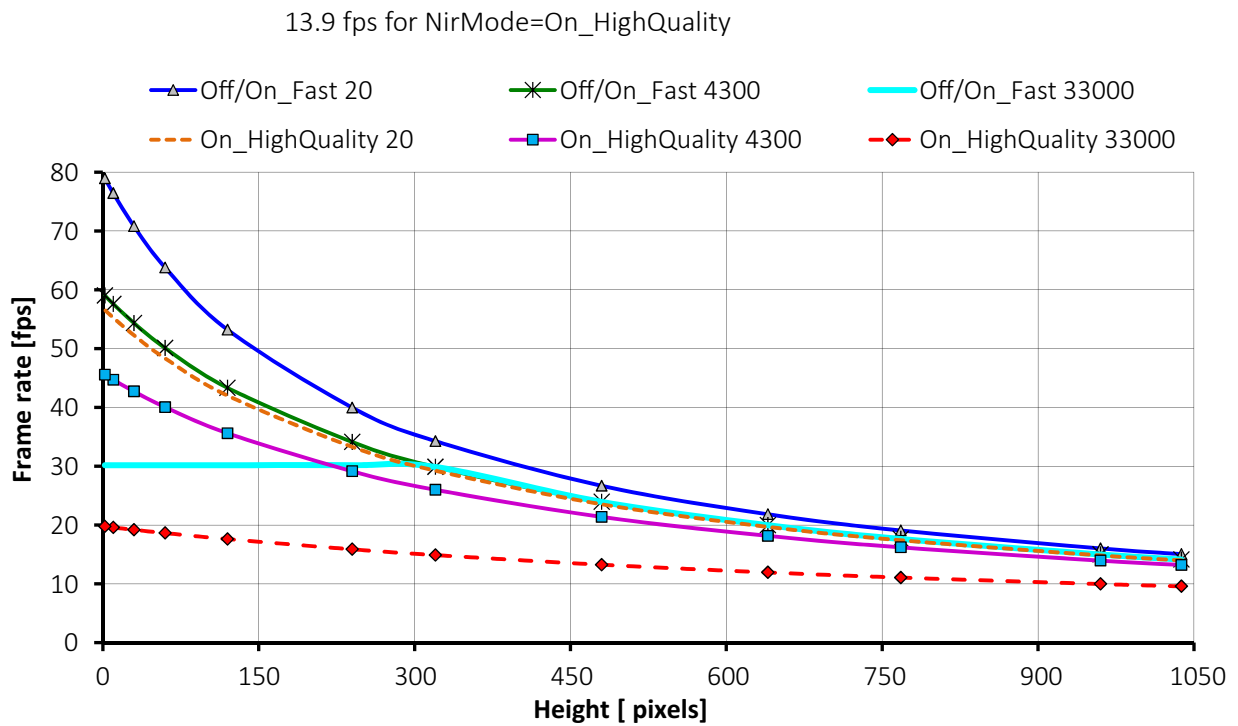
15.0 fps for NirMode=Off/On_Fast

13.9 fps for NirMode=On_HighQuality

Figure 25: Frame rate as a function of ROI height [width=1388], NirMode and exposure time / μs

NirMode Exposure 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	
	Manta G-146B	Manta G-146C
Resolution	1388 (H) × 1038 (V) 1.4 MP	
Sensor	Sony ICX267AL with HAD technology	Sony ICX267AK with HAD technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	4.65 µm × 4.65 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	17.8 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	31 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 21: Manta G-146B, G-146C model specifications

Feature	Specification	
	Manta G-146B	Manta G-146C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 21: Manta G-146B, G-146C model specifications (continued)
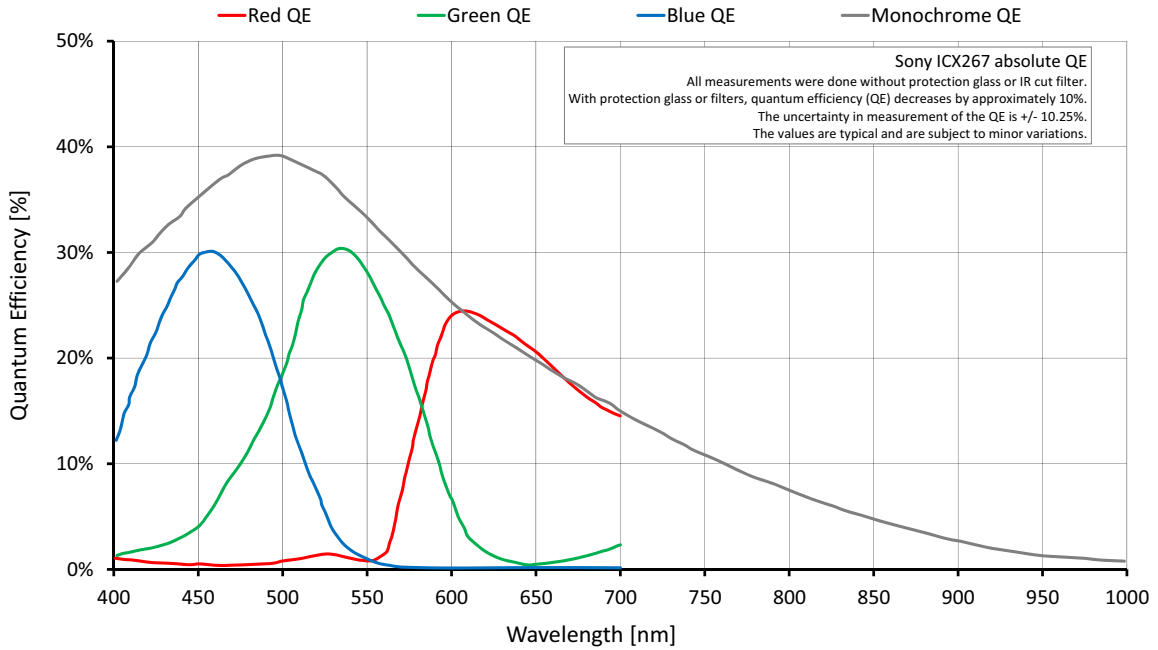
Absolute QE

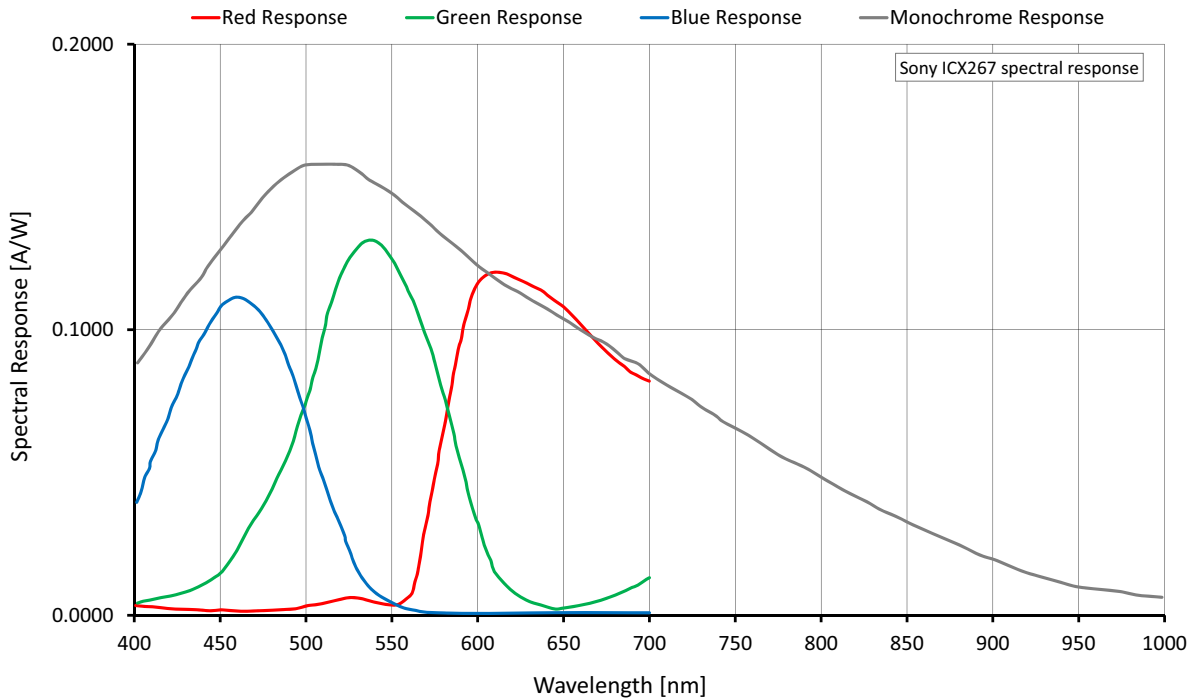*Figure 26: Manta G-146B, G-146C (Sony ICX267) absolute QE*

Spectral response

Figure 27: Manta G-146B, G-146C (Sony ICX267) spectral response

ROI frame rate

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

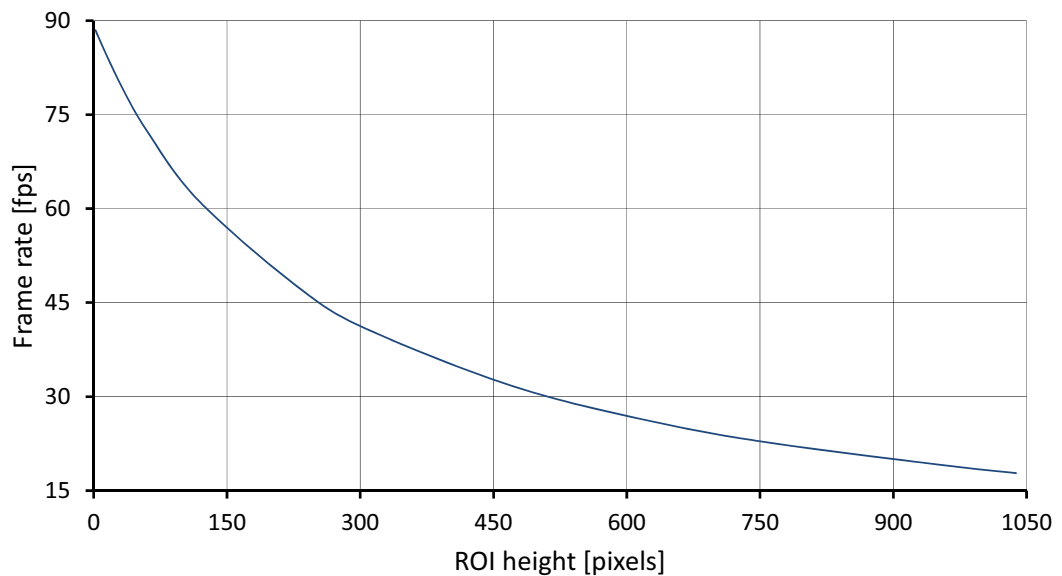Maximum frame rate at full resolution according formula: 17.8 fps

Figure 28: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[1]
1038	17.8	240	46.4
960	19.0	120	61.0
768	22.5	60	72.4
640	25.7	30	79.9
480	31.3	10	85.9
320	40.0	2	88.5

Width = 1388 pixels

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

Table 22: Frame rate as a function of ROI height

Allied Vision

Manta G-158B, G-158C

Feature	Specification	
	Manta G-158B	Manta G-158C
Resolution	1456 (H) × 1088 (V) 1.58 MP	
Sensor	Sony IMX273LLR Exmor with Pregius shutter pixel technology	Sony IMX273LQR Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1/2.9	
Sensor size	6.3 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	75.3 frames per second 83.09 frames per second (burst mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 82 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	**Pixel format**	**Range**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	35 µs to 85.9 s; 10.64 µs increments
	Mono12, BayerRG12, YUV422Packed	42 µs to 85.9 s; 14.16 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	56 µs to 85.9 s; 21.28 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	
Power consumption	2.79 W @ 12 VDC; 3.26 W PoE	

Table 23: Manta G-158B, G-158C model specifications

	Specification	
Feature	Manta G-158B	Manta G-158C
Trigger latency[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	31.92 µs
	Mono12, BayerRG12, YUV422Packed	42.48 µs
	RGB8Packed, BGR8Packed, YUV444Packed	63.84 µs
Trigger jitter[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±5.32 µs
	Mono12, BayerRG12, YUV422Packed	±7.08 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±10.64 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] 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.

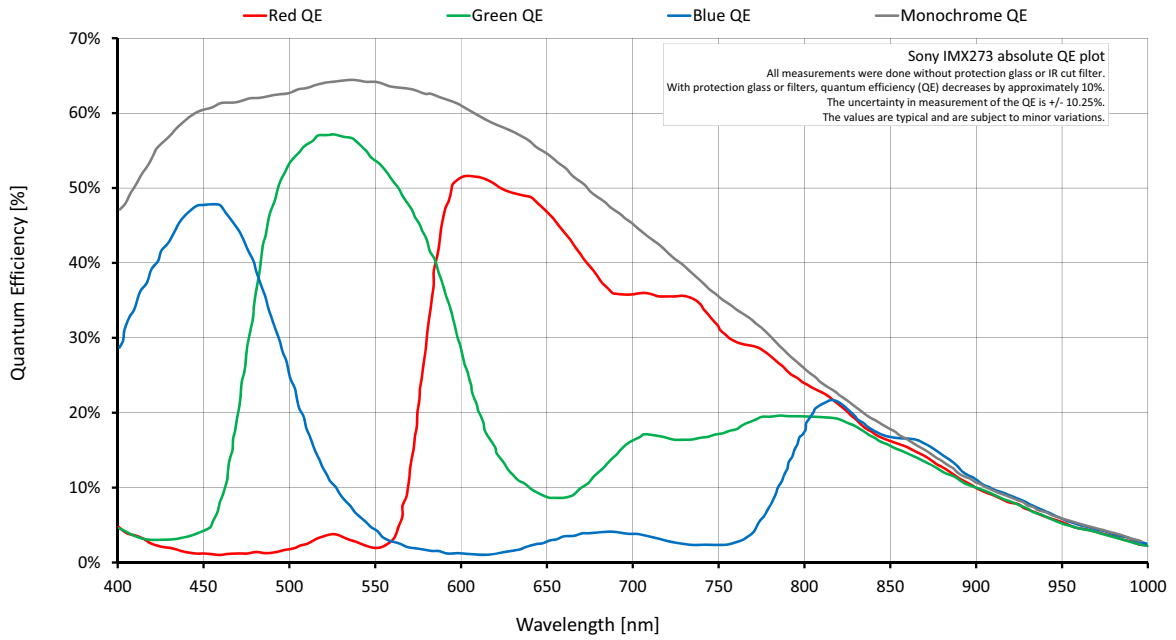*Table 23: Manta G-158B, G-158C model specifications (continued)*

Absolute QE

Figure 29: Manta G-158B, G-158C (Sony IMX273) absolute QE
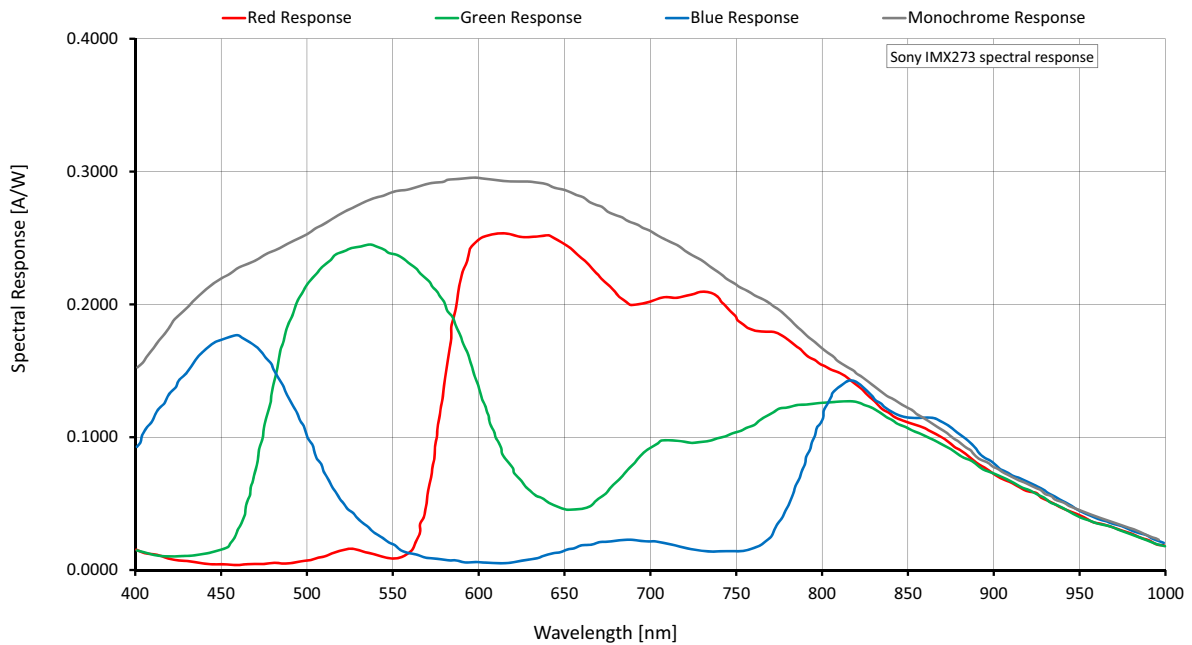
Spectral response

Figure 30: Manta G-158B, G-158C (Sony IMX273) spectral response
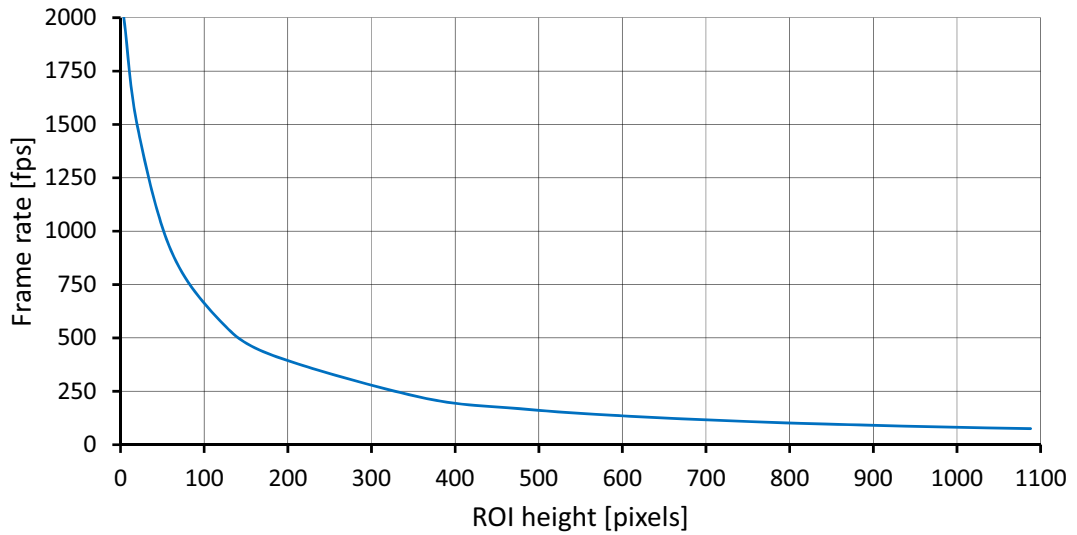
ROI frame rate

Figure 31: Frame rate as a function of ROI height

Height (pixels)	Frame rate		Height (pixels)	Frame rate		Height (pixels)	Frame rate
1088	75.3		600	135.2		60	912.4
1080	75.7		480	167.8		20	1491.6
1024	79.8		360	221.1		4	1999.6
960	84.9		180	421.4			
768	105.8		120	576.6			

Width = 1456 pixels

Table 24: Frame rate as a function of ROI height

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.

Manta G-201B, G-201C

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

Feature	Specification	
	Manta G-201B	Manta G-201C
Resolution	1624 (H) × 1234 (V) 2 MP	
Sensor	Sony ICX274AL with Super HAD CCD technology	Sony ICX274AQ with Super HAD Wfine CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/1.8	
Sensor size	8.923 mm diagonal	
Pixel size	4.4 μm × 4.4 μm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	14.7 frames per second	
Maximum frame rate at full resolution (30 fps variants)	30.0 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 16 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats[1]		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	51 μs to 60 s; 1 μs increments 10 μs to 60; 1 μs increments (30 fps variants)	
Gain control	0 to 31 dB; 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	
Power consumption	3.6 W @ 12 VDC; 4.2 W PoE 4.6 W @ 12 VDC; 5.4 W PoE (30 fps variants)	

Table 25: Manta G-201B, G-201C (including 30 fps variants) model specifications

Feature	Specification	
	Manta G-201B	Manta G-201C
Trigger latency[2]	Idle state: 17.0 µs; Frame valid state: 40.8 µs Idle state: 9.4 µs; Frame valid state: 21.4 µs (30 fps variants)	
Trigger jitter[2]	Idle state: ±7.6 µs; Frame valid state: ±31.4 µs Idle state: ±5.4 µs; Frame valid state: ±17.4 µs (30 fps variants)	
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 25: Manta G-201B, G-201C (including 30 fps variants) model specifications (continued)
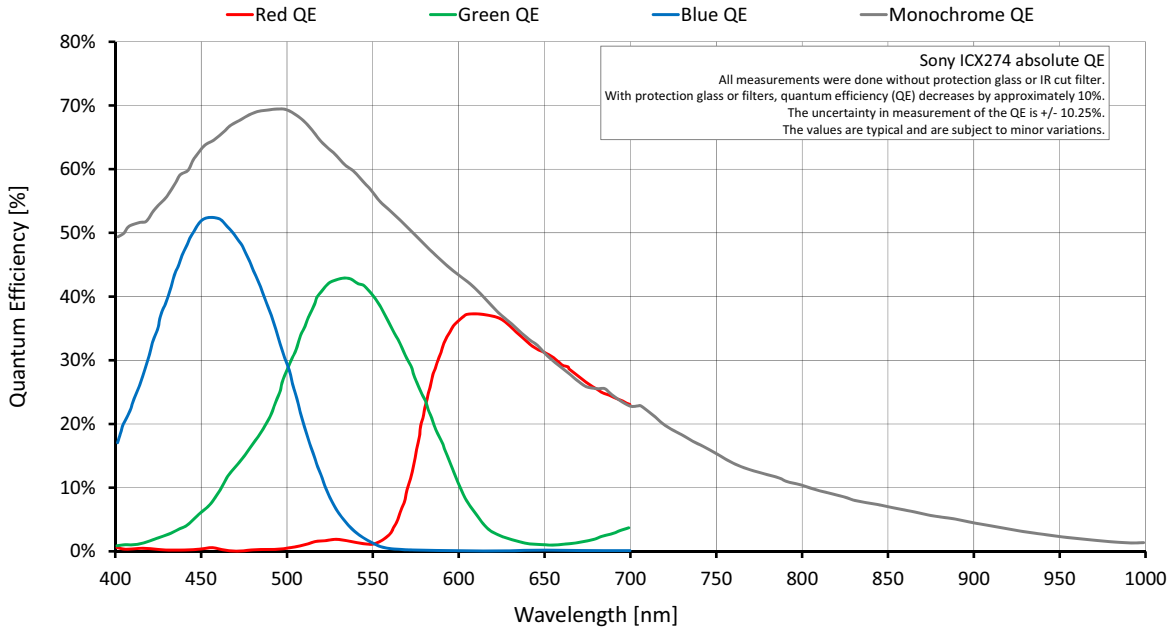
Absolute QE

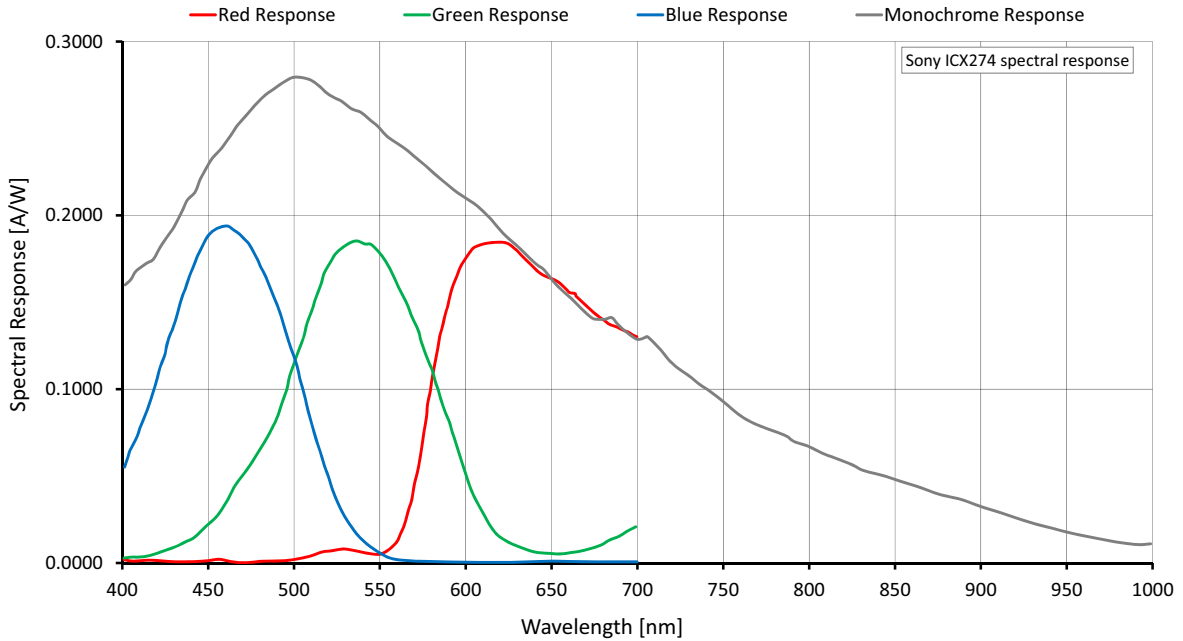*Figure 32: Manta G-201B, G-201C (Sony ICX274) absolute QE*

Spectral response

Figure 33: Manta G-201B, G-201C (Sony ICX274) spectral response

ROI frame rate

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

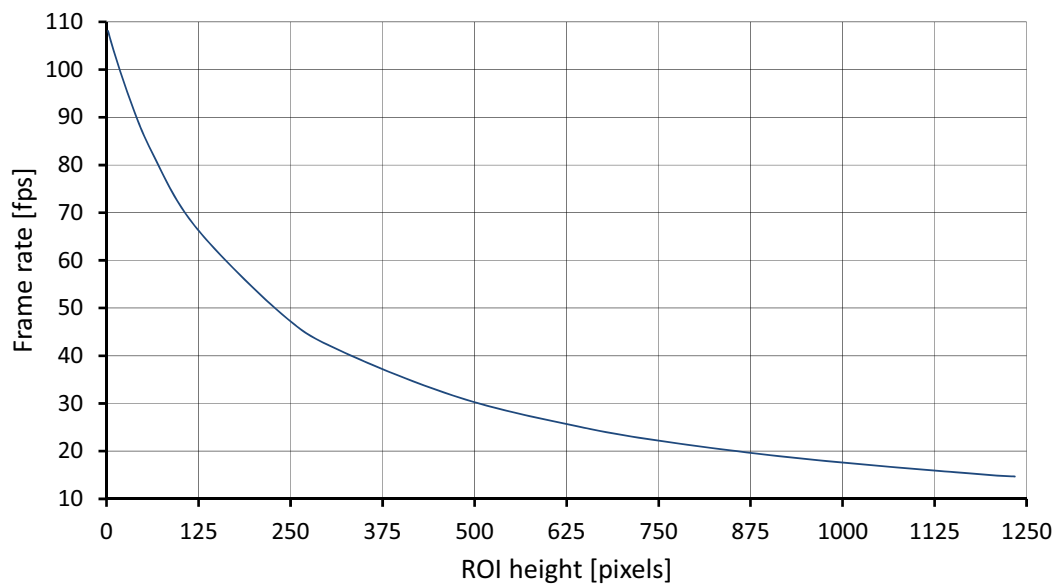Maximum frame rate at full resolution according formula: 14.7 fps

Figure 34: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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		

Width = 1624 pixels

[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

ROI frame rate for 30 fps variants

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

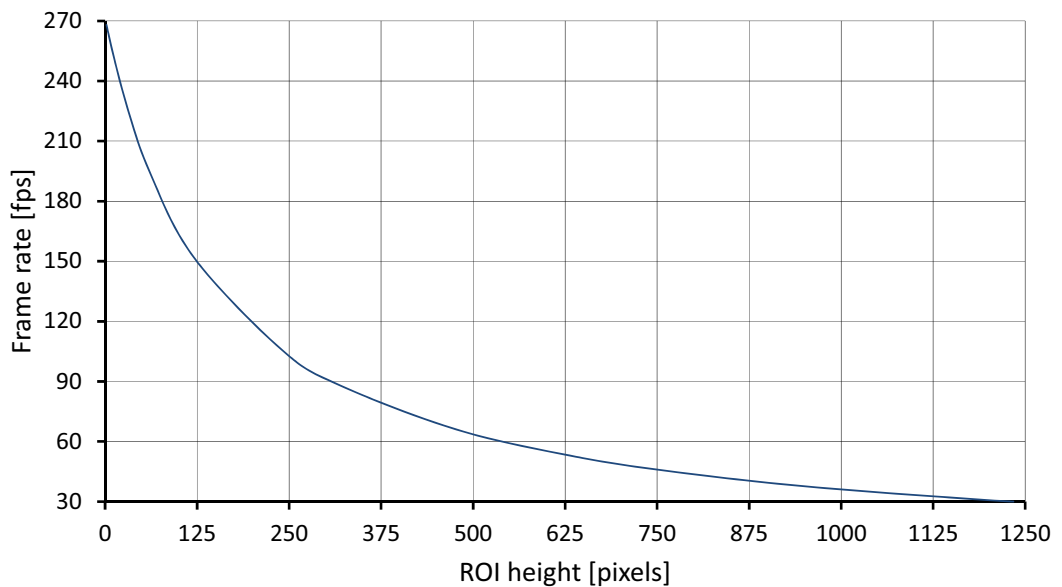Maximum frame rate at full resolution according formula: 30.0 fps

Figure 35: Frame rate as a function of ROI height

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

Width = 1624 pixels

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

Table 27: Frame rate as a function of ROI height values

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

Feature	Specification	
	Manta G-223B, G-223B NIR	Manta G-223C
Resolution	2048 (H) × 1088 (V) 2.2 MP	
Sensor	CMOSIS/ams CMV2000 with microlens	
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	12.7 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Optical filter	Default: Protection glass B 270 (ASG) No optical filter[1] (Manta G-223B NIR) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	53.7 frames per second 60.1 frames per second (burst mode[2])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 59 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	25 µs[3] to 122 s; 1 µs increments	
Gain control	0 to 26 dB; 1 dB increments	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 28: Manta G-223B, G-223B NIR, G-223C model specifications

	Specification	
Feature	Manta G-223B, G-223B NIR	Manta G-223C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] As the Manta G-223B NIR model does not have an optical filter always attach a dust cap when a lens is not attached to minimize the possibility of contaminants falling on the sensor surface.

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

[3] Camera firmware version ≤ 01.52.8151 shows minimum exposure values without frame overhead time, i.e., 1 µs. See sensor data sheet for details on frame overhead time.

Table 28: Manta G-223B, G-223B NIR, G-223C model specifications (continued)
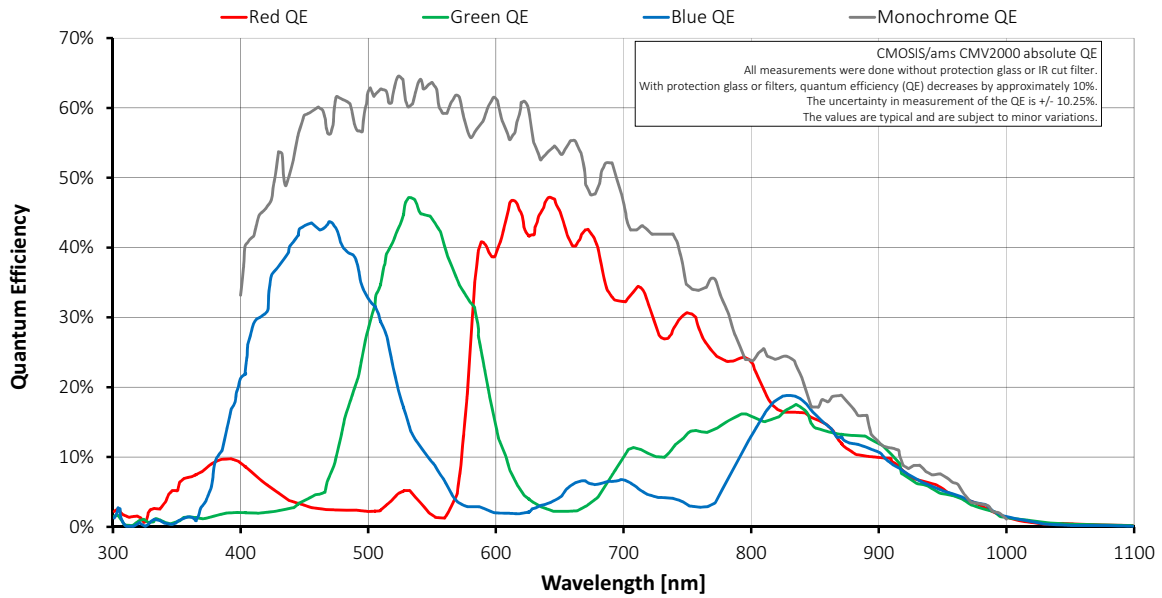
Absolute QE

Figure 36: Manta G-223B, G-223C (CMOSIS/ams CMV2000) absolute QE
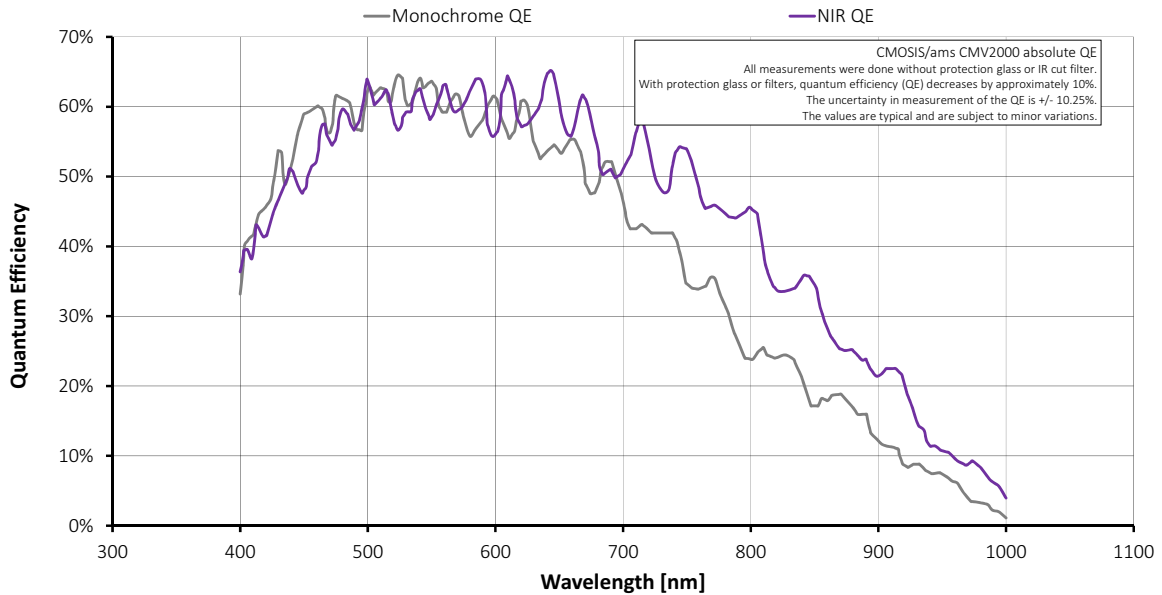
Figure 37: Manta G-223B, G-223B NIR (CMOSIS/ams CMV2000) absolute QE
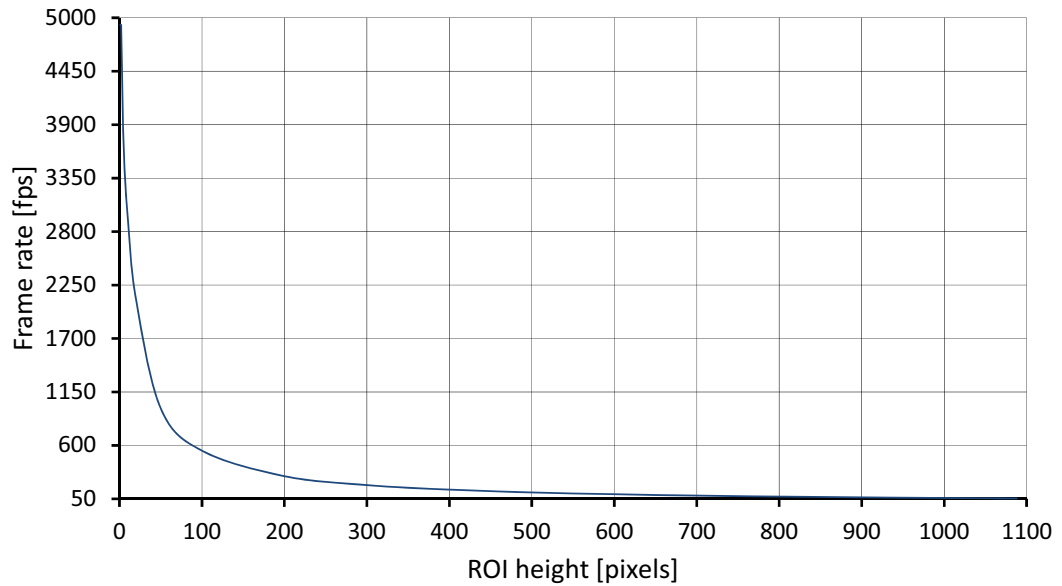
ROI frame rate

Figure 38: Frame rate as a function of ROI height

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

Width = 2048 pixels

Table 29: Frame rate as a function of ROI height

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.

Manta G-235B, G-235C

Feature	Specification	
	Manta G-235B	Manta G-235C
Resolution	1936 (H) × 1216 (V) 2.4 MP	
Sensor	Sony IMX174LLJ Exmor with Pregius shutter pixel technology	Sony IMX174LQJ Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor size	Type 1/1.2 13.4 mm diagonal	
Pixel size	5.86 µm × 5.86 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	50.7 frames per second 57.5 frames per second (burst mode[1])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 56 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	41 µs to 86 s; 14 µs increments
	Mono12, BayerRG12, YUV422Packed	50 µs to 86 s; 18 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	69 µs to 86 s; 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	
Power consumption	2.8 W @ 12 VDC; 3.3 W PoE	

Table 30: Manta G-235B, G-235C model specifications

	Specification	
Feature	Manta G-235B	Manta G-235C
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	42 µs
	Mono12, BayerRG12, YUV422Packed	55.14 µs
	RGB8Packed, BGR8Packed, YUV444Packed	84 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	±7 µs
	Mono12, BayerRG12, YUV422Packed	±9.2 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±14 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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.

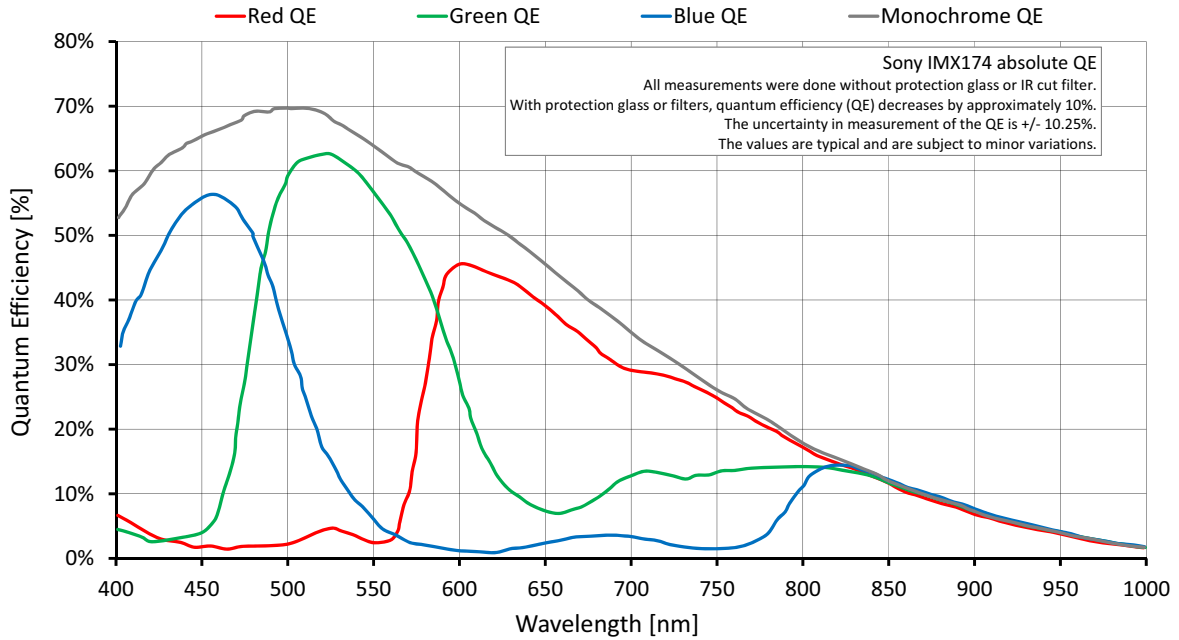*Table 30: Manta G-235B, G-235C model specifications (continued)*

Absolute QE

Figure 39: Manta G-235B, G-235C (Sony IMX174) absolute QE
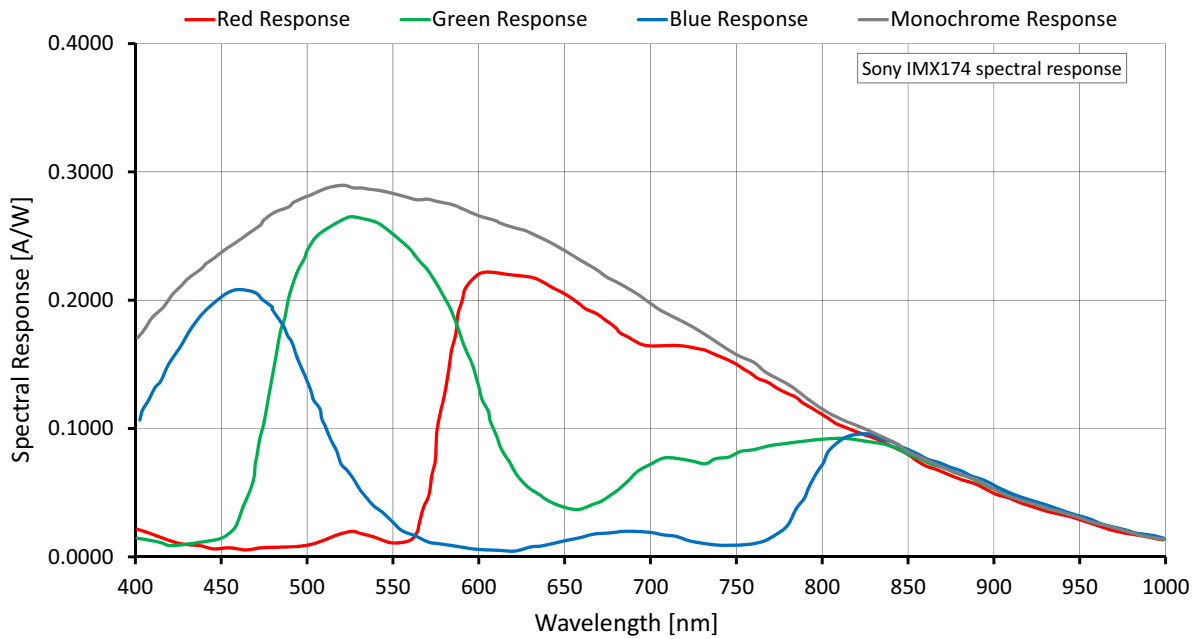
Spectral response

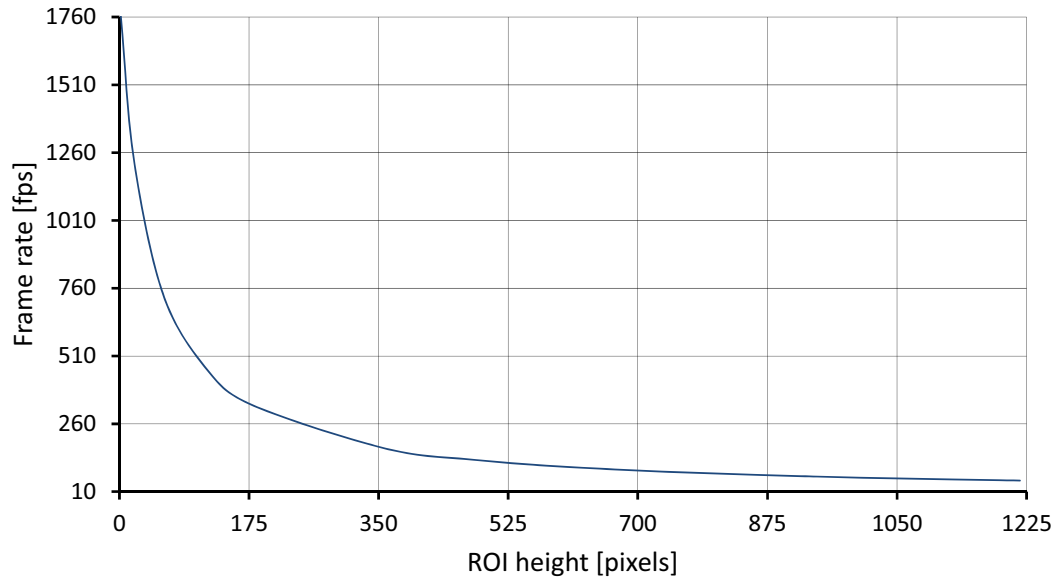*Figure 40: Manta G-235B, G-235C (Sony IMX174) spectral response*

ROI frame rate

Figure 41: Frame rate as a function of ROI height

Height (pixels)	Frame rate
1216	50.7
1080	57.1
1024	60.1
960	64.1
768	80.2
600	101.9
480	127.2

Height (pixels)	Frame rate
360	168.4
180	328.4
120	454.4
60	729.9
20	1224.6
2	1762.1

Width = 1936 pixels

Table 31: Frame rate as a function of ROI height

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.

Manta G-282B, G-282C

Feature	Specification	
	Manta G-282B	Manta G-282C
Resolution	1936 (H) × 1458 (V) 2.8 MP	
Sensor	Sony ICX687ALA with EXview HAD CCD II Technology	Sony ICX687AQA with EXview HAD CCD II Technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1/1.8	
Sensor size	8.918 mm diagonal	
Pixel size	3.69 µm × 3.69 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	30.4 frames per second (dual-tap mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 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	
Sensor taps	Dual-tap Single-tap switchable in Vimba Viewer 2.0 or later	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 32: Manta G-282B, G-282C model specifications

	Specification	
Feature	Manta G-282B	Manta G-282C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 32: Manta G-282B, G-282C model specifications (continued)
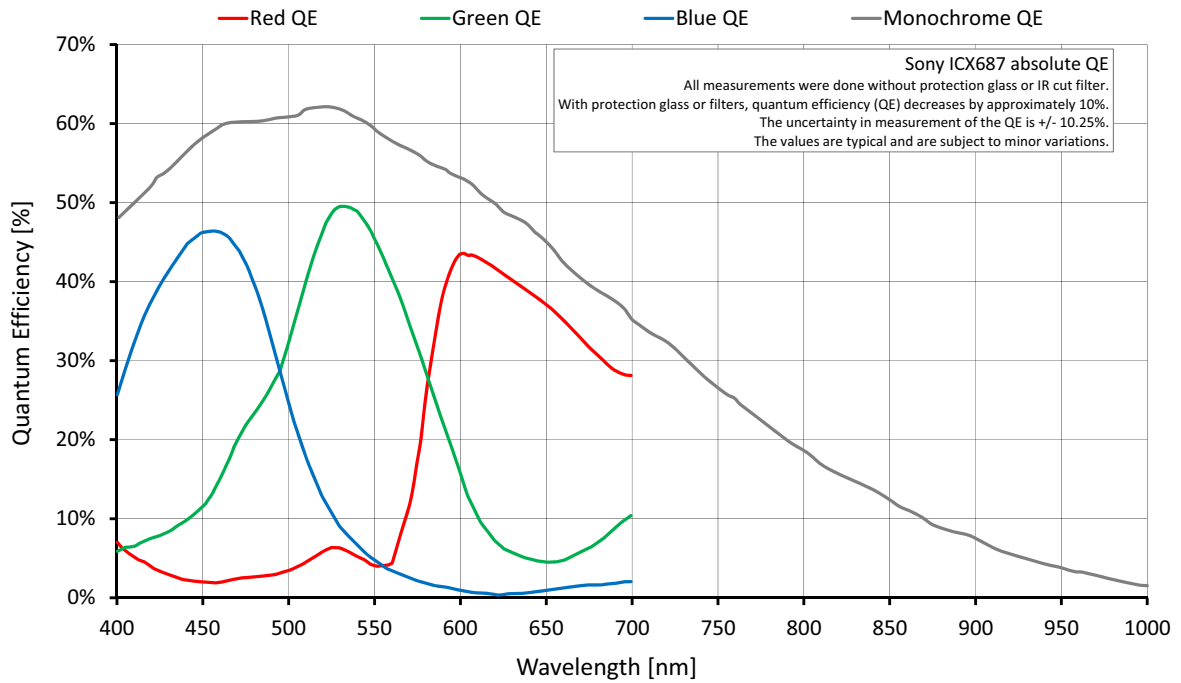
Absolute QE

Figure 42: Manta G-282B, G-282C (Sony ICX687) absolute QE

Spectral response
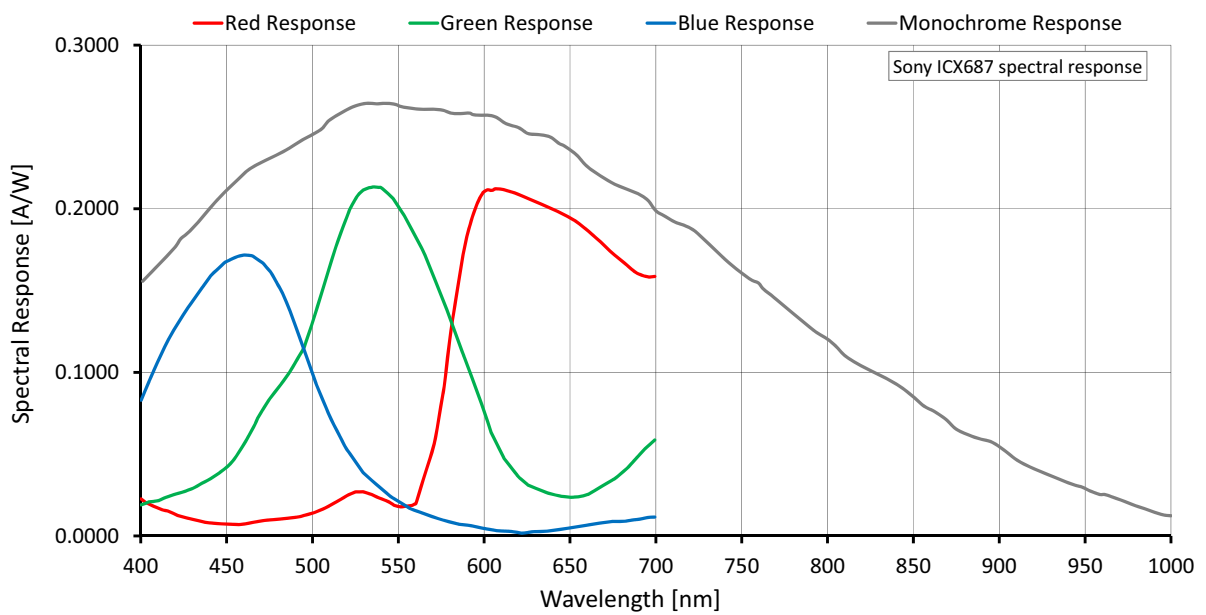
Figure 43: Manta G-282B, G-282C (Sony ICX687) spectral response

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
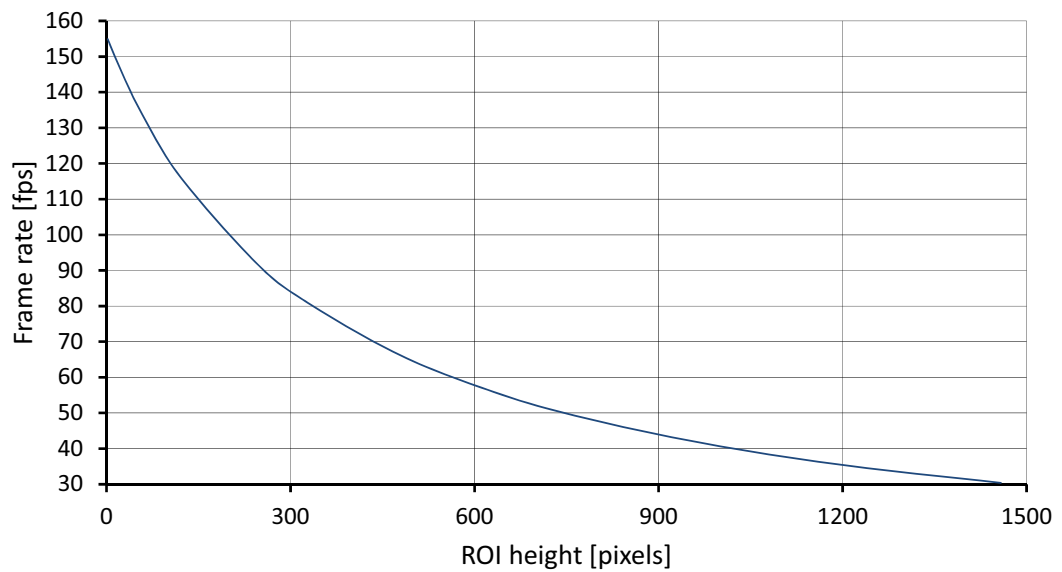
Figure 44: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]		Height (pixels)	Frame rate[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			

Width = 1936 pixels

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

Table 33: Frame rate as a function of ROI height

Manta G-283B, G-283C

Feature	Specification	
	Manta G-283B	Manta G-283C
Resolution	1936 (H) × 1458 (V) 2.8 MP	
Sensor	Sony ICX674ALG with EXview HAD II™ microlens technology	Sony ICX674AQG with EXview HAD II™ microlens technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	10.972 mm diagonal	
Pixel size	4.54 µm × 4.54 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	30.4 frames per second (dual-tap mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 33 dB; 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	
Sensor taps	Dual-tap Single-tap switchable in Vimba Viewer 2.0 or later	
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	
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 34: Manta G-283B, G-283C model specifications

Feature	Specification	
	Manta G-283B	Manta G-283C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 34: Manta G-283B, G-283C model specifications (continued)
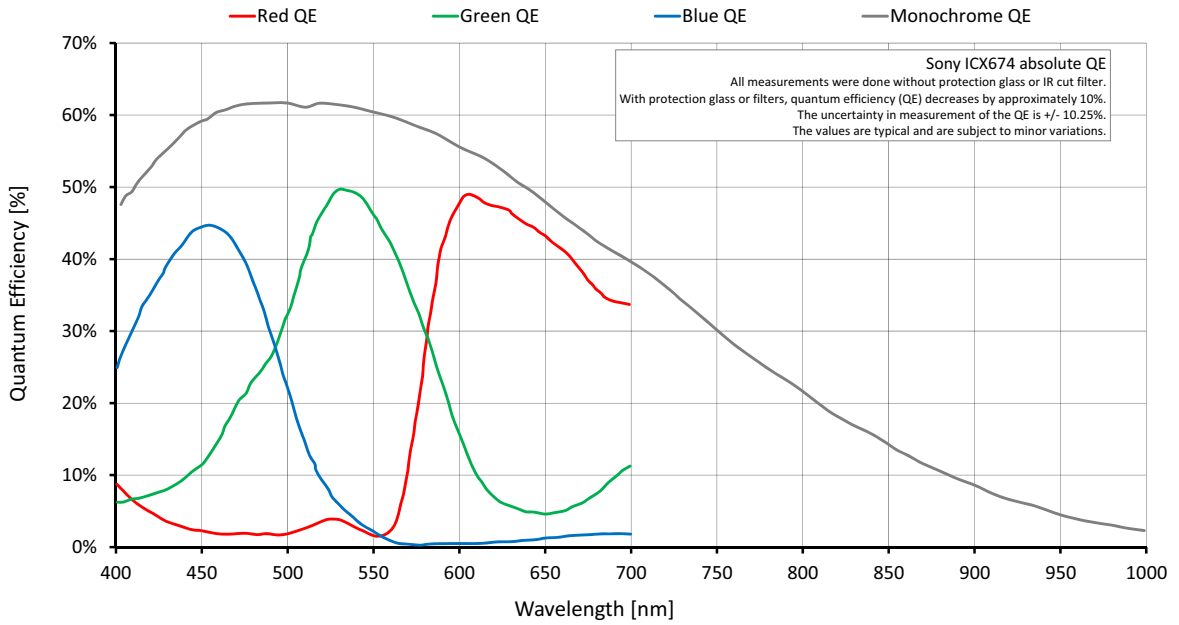
Absolute QE

Figure 45: Manta G-283B, G-283C (Sony ICX674) absolute QE

Spectral response
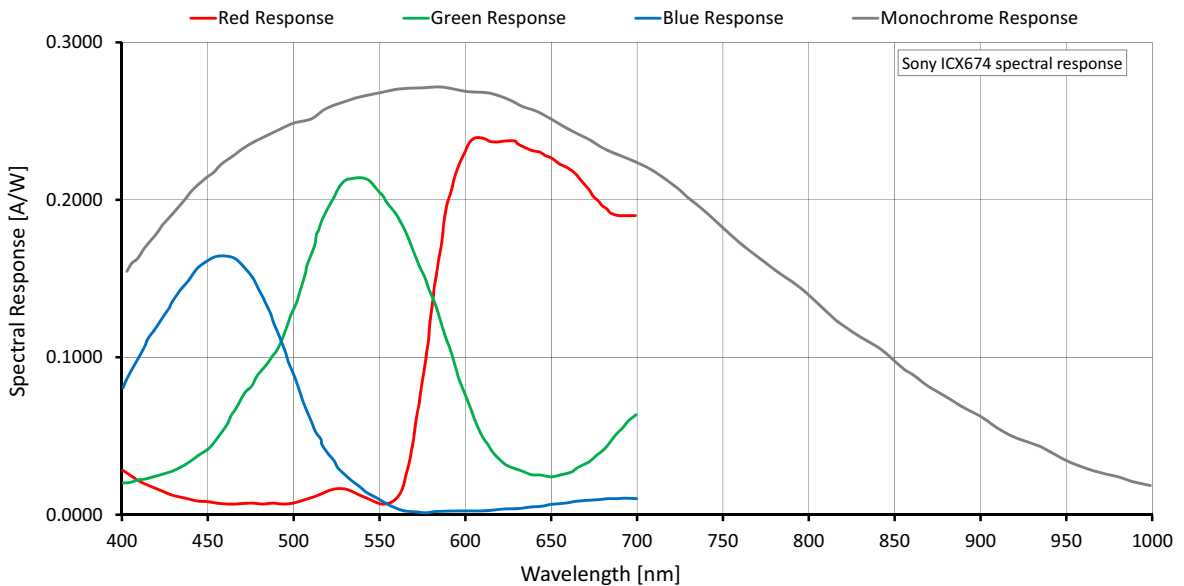
Figure 46: Manta G-283B, G-283C (Sony ICX674) spectral response

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 47: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]		Height (pixels)	Frame rate[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			

Width = 1936 pixels

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

Table 35: Frame rate as a function of ROI height

Manta G-319B, G-319C

Feature	Specification	
	Manta G-319B	**Manta G-319C**
Resolution	2064 (H) × 1544 (V) 3.2 MP	
Sensor	Sony IMX265LLR Exmor with Pregius shutter pixel technology	Sony IMX265LQR Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1/1.8	
Sensor size	8.9 mm diagonal	
Pixel size	3.45 μm × 3.45 μm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	37.6 frames per second 43.3 frames per second (burst mode[1])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 41 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	43 μs to 79.4 s; 14.6 μs increments
	Mono12, BayerRG12, YUV422Packed	52 μs to 79.4 s; 19.5 μs increments
	RGB8Packed, BGR8Packed, YUV444Packed	72 μs to 79.4 s; 29.3 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	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	

Table 36: Manta G-319B, G-319C model specifications

	Specification	
Feature	Manta G-319B	Manta G-319C
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	44.21 µs
	Mono12, BayerRG12, YUV422Packed	58.65 µs
	RGB8Packed, BGR8Packed, YUV444Packed	88.06 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±7.3 µs
	Mono12, BayerRG12, YUV422Packed	±9.75 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±14.65 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 36: Manta G-319B, G-319C model specifications (continued)
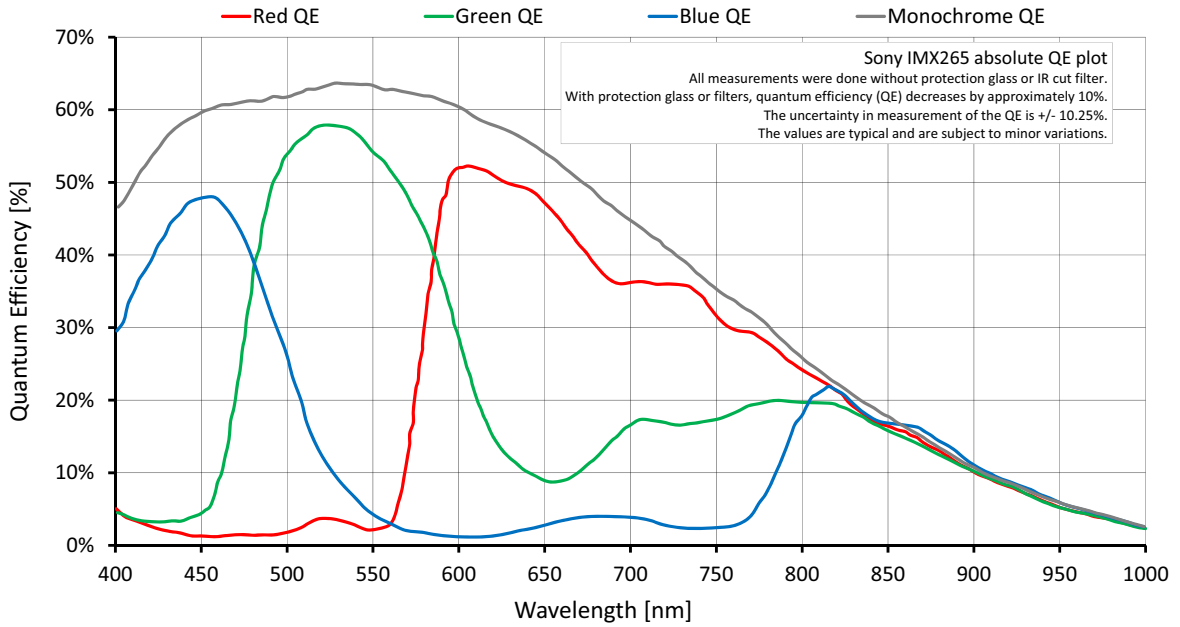
Absolute QE

Figure 48: Manta G-319B, G-319C (Sony IMX265) absolute QE

Spectral response
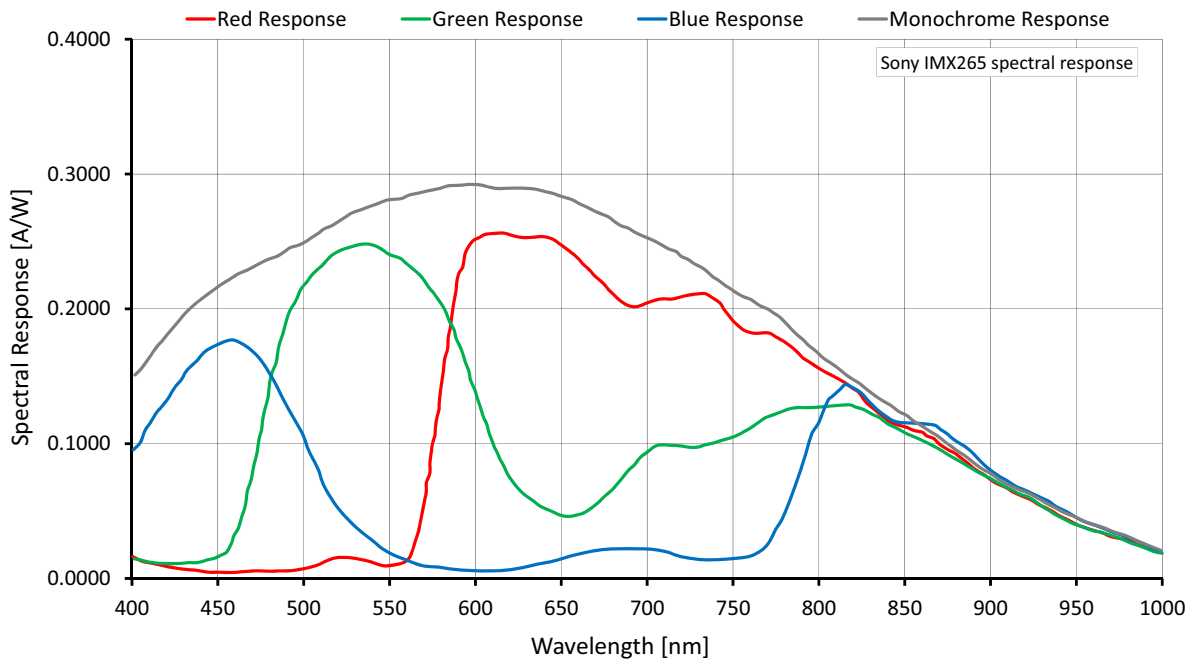
Figure 49: Manta G-319B, G-319C (Sony IMX265) spectral response
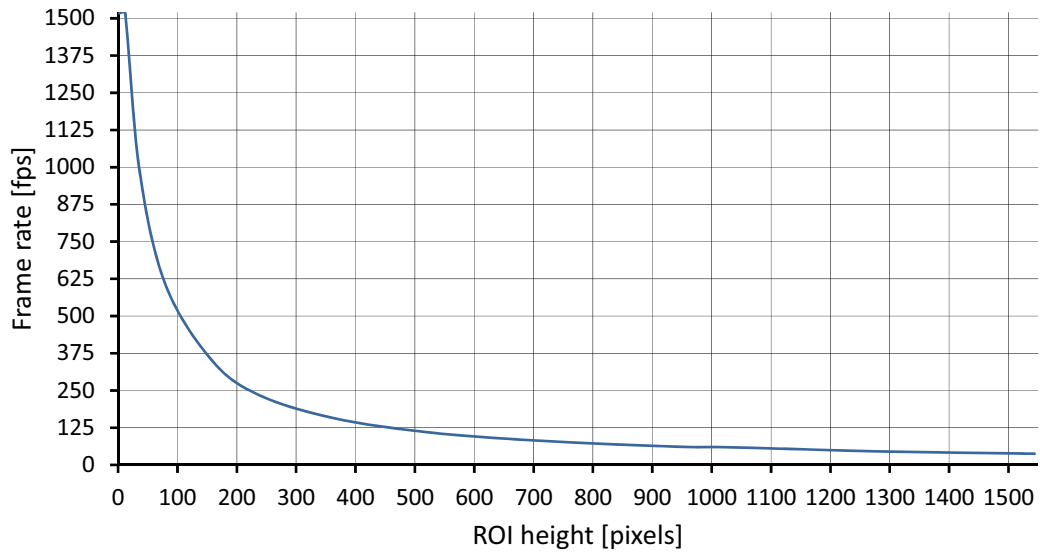
ROI frame rate

Figure 50: Frame rate as a function of ROI height

Height (pixels)	Frame rate
1544	37.6
1324	43.9
1280	45.3
1024	56.6
960	60.1
768	75.2
600	95.5
480	119.2

Height (pixels)	Frame rate
360	158.5
240	232.3
160	346.7
80	604.5
36	990.0
12	1517.0
2	1517.0

Width = 2046 pixels

Table 37: Frame rate as a function of ROI height

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.

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

Feature	Specification	
	Manta G-419B, G-419B NIR	Manta G-419C
Resolution	2048 (H) × 2048 (V) 4.2 MP	
Sensor	CMOSIS/ams CMV4000	
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1	
Sensor size	16 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Optical filter	Default: Protection glass B 270 (ASG) No optical filter[1] (Manta G-419B NIR) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	28.6 frames per second 32.0 frames per second (burst mode[2])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 31 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control[3]	50 µs to 122 s; 1 µs increments	
Gain control	0 to 26 dB; 1 dB increments	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	2.7 W @ 12 VDC; 3.1 W PoE	
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 38: Manta G-419B, G-419B NIR, G-419C model specifications

Feature	Specification	
	Manta G-419B, G-419B NIR	Manta G-419C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] As the Manta G-419B NIR model does not have an optical filter always attach a dust cap when a lens is not attached to minimize the possibility of contaminants falling on the sensor surface.

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

[3] Camera firmware version ≤ 01.52.8151 shows minimum exposure values without frame overhead time, i.e., 1 µs. See sensor data sheet for details on frame overhead time.

Table 38: Manta G-419B, G-419B NIR, G-419C model specifications (continued)
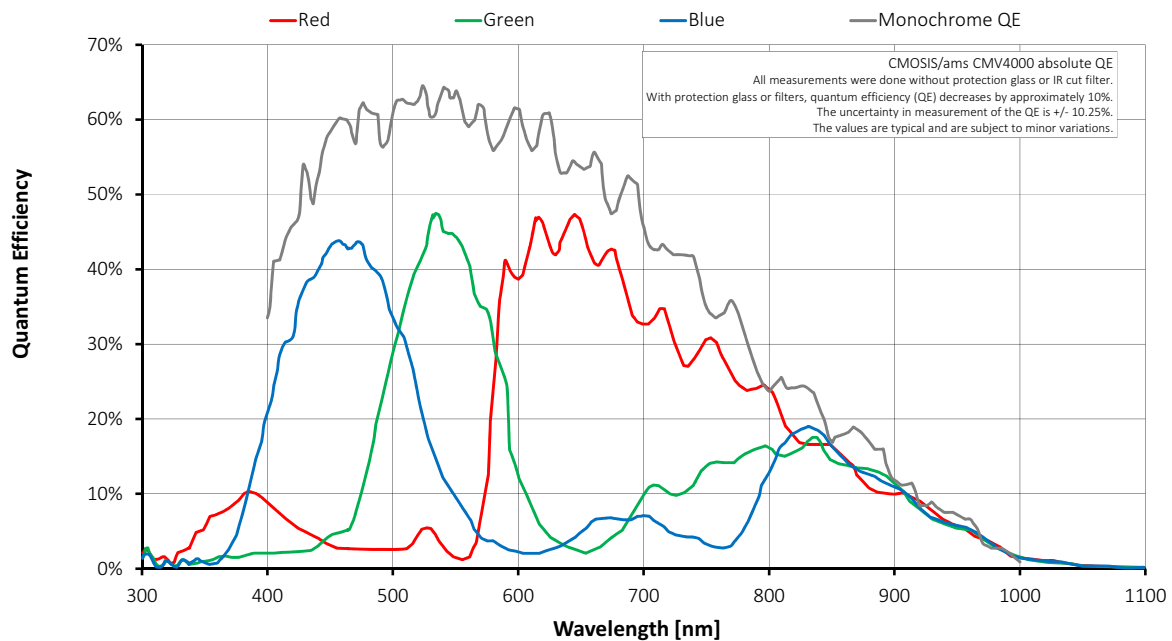
Absolute QE

Figure 51: Manta G-419B, G-419C (CMOSIS/ams CMV4000) absolute QE
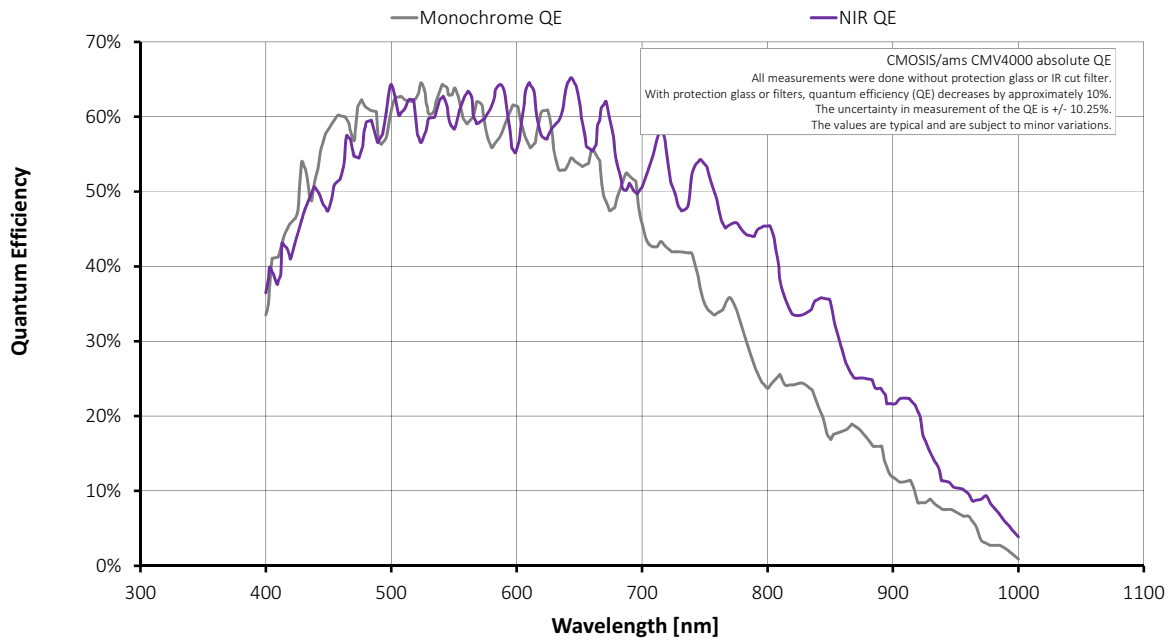
Figure 52: Manta G-419B, G-419B NIR (CMOSIS/ams CMV4000) absolute QE

ROI frame rate
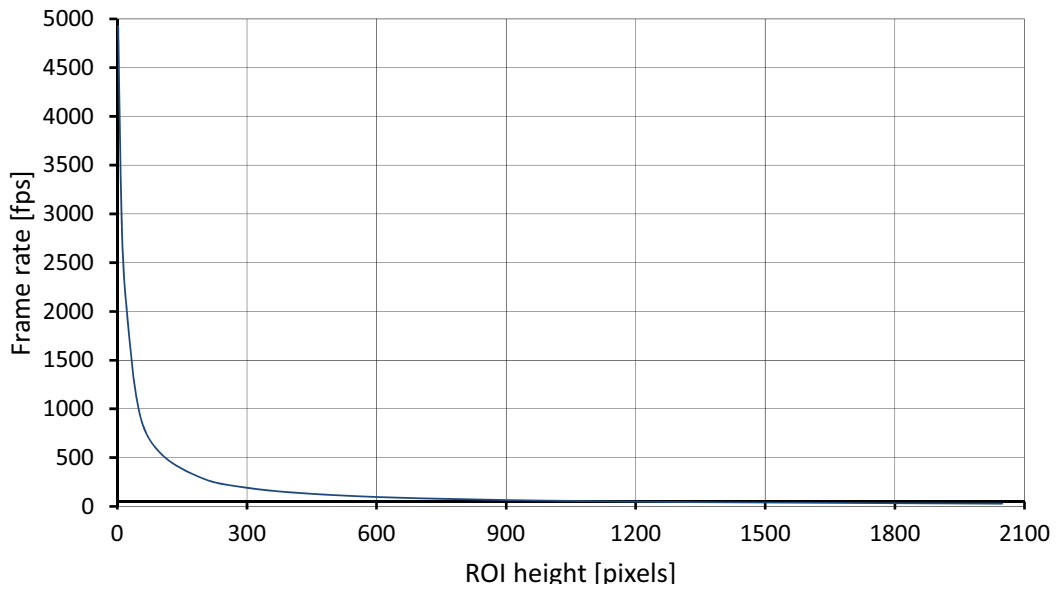
Figure 53: Frame rate as a function of ROI height

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

Width = 2048 pixels

Table 39: Frame rate as a function of ROI height values

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.

Manta G-504B, G-504C

Feature	Specification	
	Manta G-504B	Manta G-504C
Resolution	2452 (H) × 2056 (V) 5 MP	
Sensor	Sony ICX655AL with Super HAD CCD™ technology	Sony ICX655AQ with Super HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	9.2 frames per second	
Maximum image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 6 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats		BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	38 µs to 60 s; 1 µs increments	
Gain control	0 to 32 dB; 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	
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	
Body dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 40: Manta G-504B, G-504C model specifications

Feature	Specification	
	Manta G-504B	Manta G-504C
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[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 40: Manta G-504B, G-504C model specifications (continued)
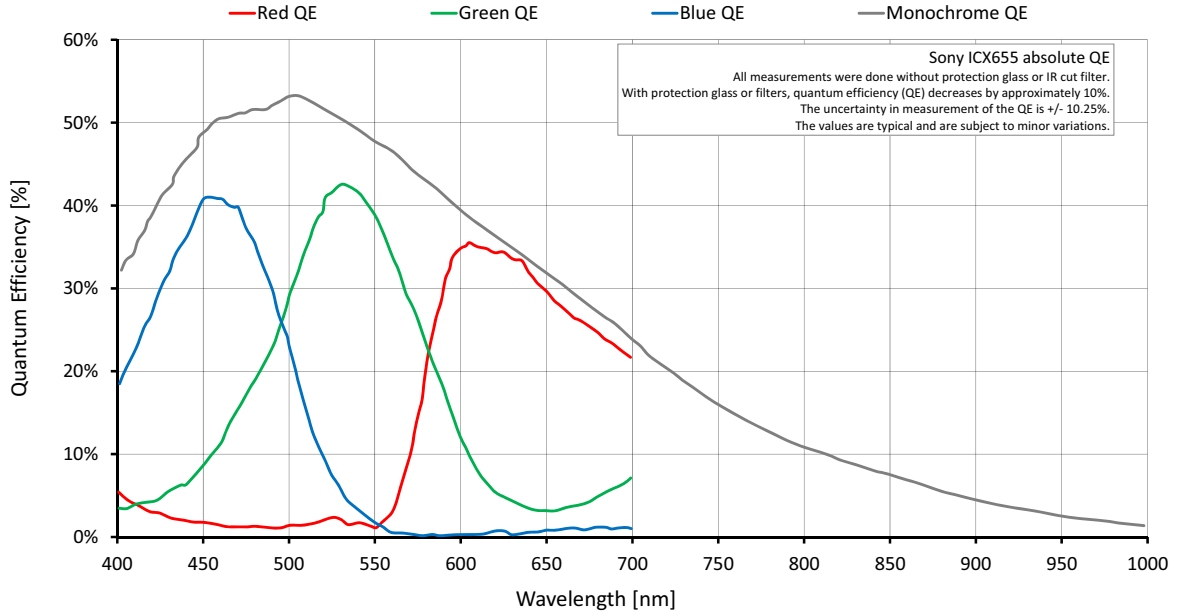
Absolute QE

Figure 54: Manta G-504B, G-504C (Sony ICX655) absolute QE

Spectral response
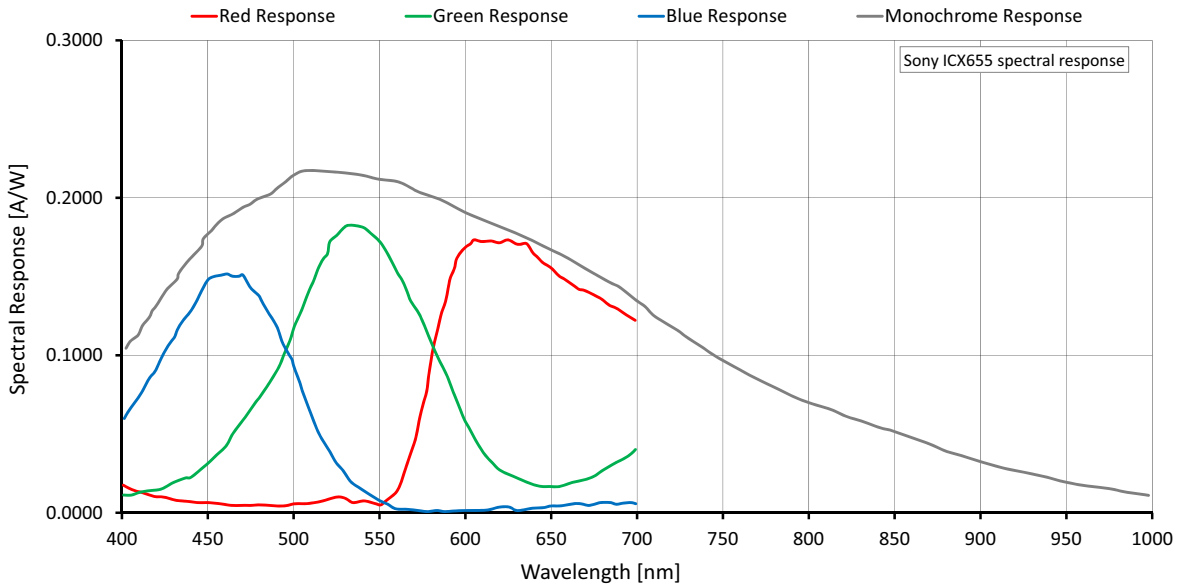
Figure 55: Manta G-504B, G-504C (Sony ICX655) spectral response

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
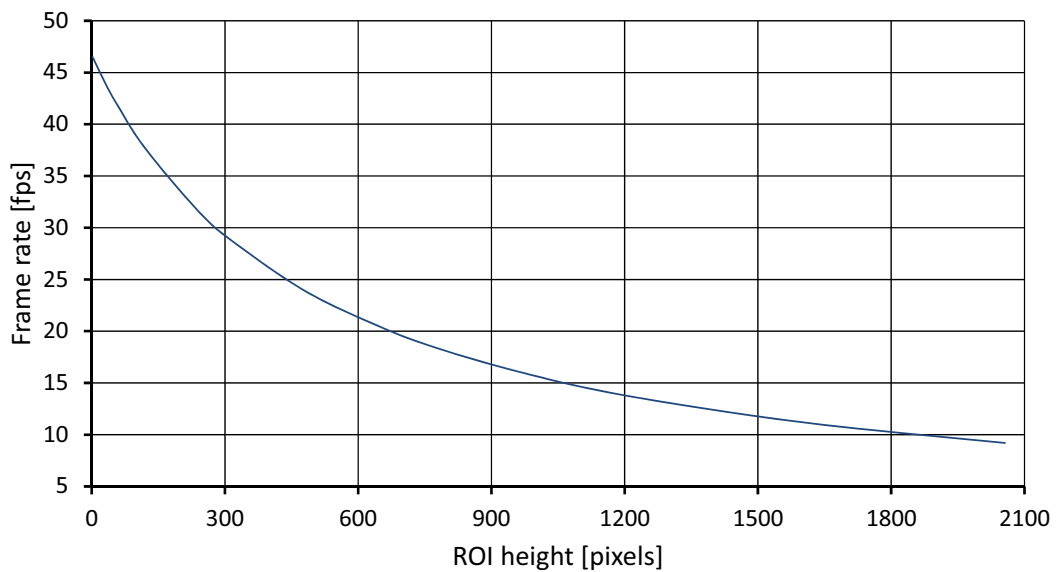
Figure 56: Frame rate as a function of ROI height

Height (pixels)	Frame rate[1]	Height (pixels)	Frame rate[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

Width = 2452 pixels

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

Table 41: Frame rate as a function of ROI height values

Manta G-505B, G-505C

Feature	Specification	
	Manta G-505B	**Manta G-505C**
Resolution	2452 (H) × 2056 (V) 5 MP	
Sensor	Sony ICX625ALA with Super HAD CCD™ technology	Sony ICX625AQA with Super HAD CCD™ technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	15.0 frames per second (dual-tap mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	49 µs to 38 s; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 4 columns; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Sensor taps	Dual-tap	
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	
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 42: Manta G-505B, G-505C model specifications

Feature	Specification	
	Manta G-505B	Manta G-505C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 42: Manta G-505B, G-505C model specifications (continued)
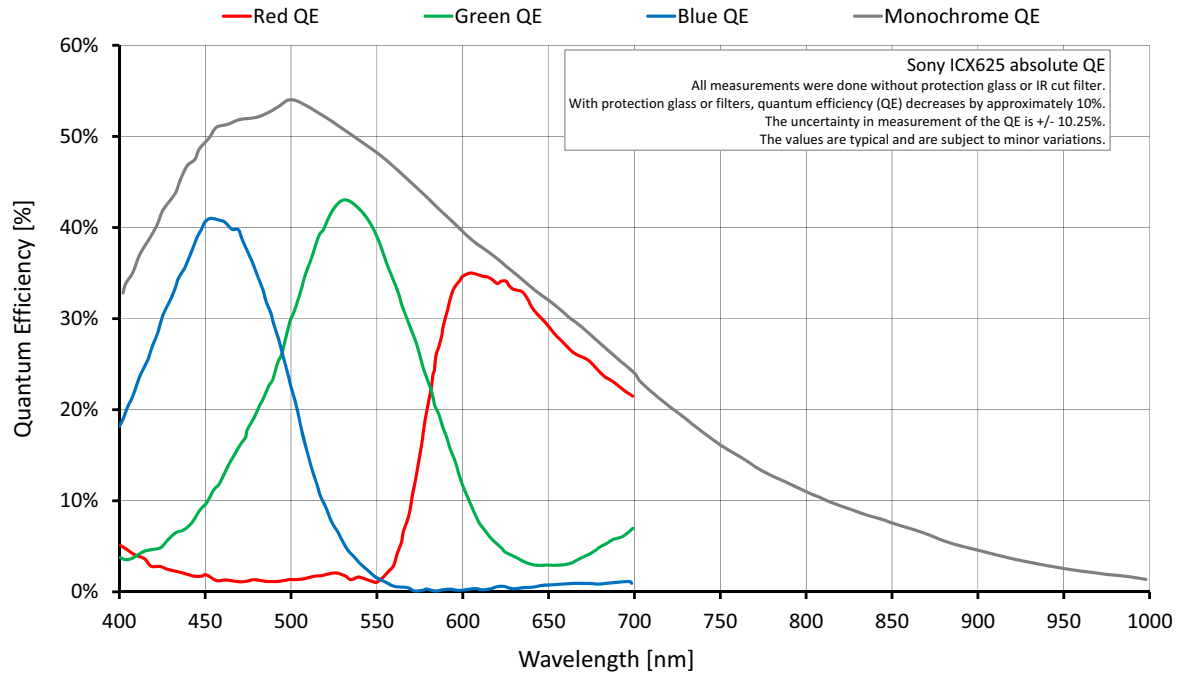
Absolute QE

Figure 57: Manta G-505B, G-505C (Sony ICX625) absolute QE

Spectral response
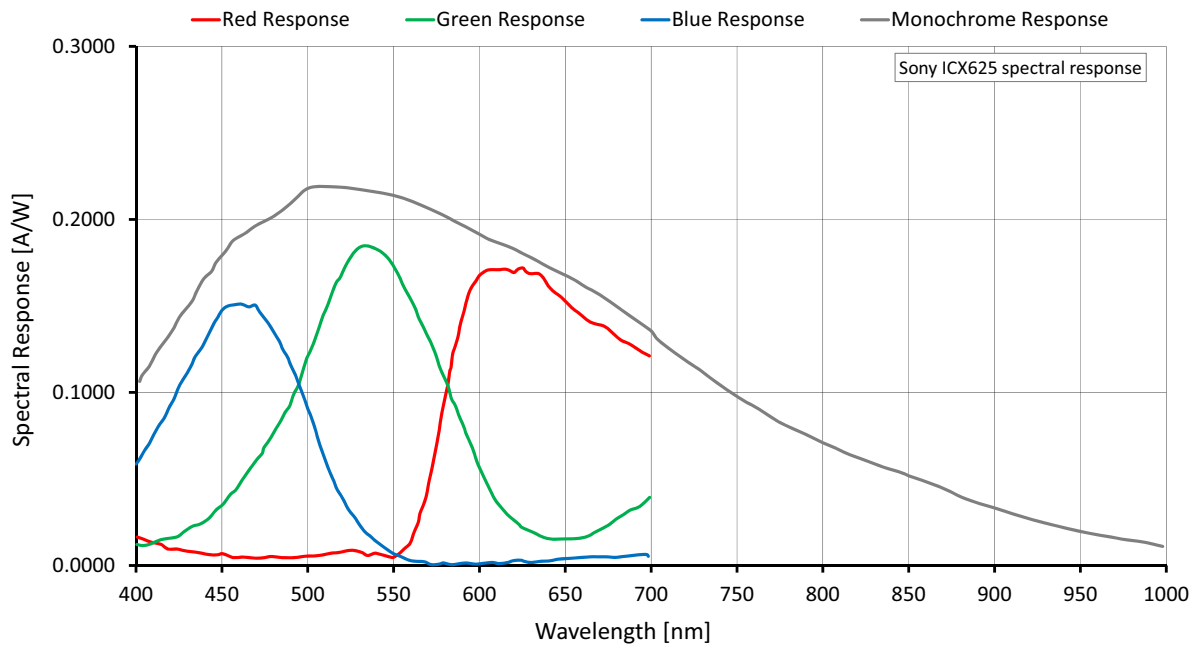
Figure 58: Manta G-505B, G-505C (Sony ICX625) spectral response

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
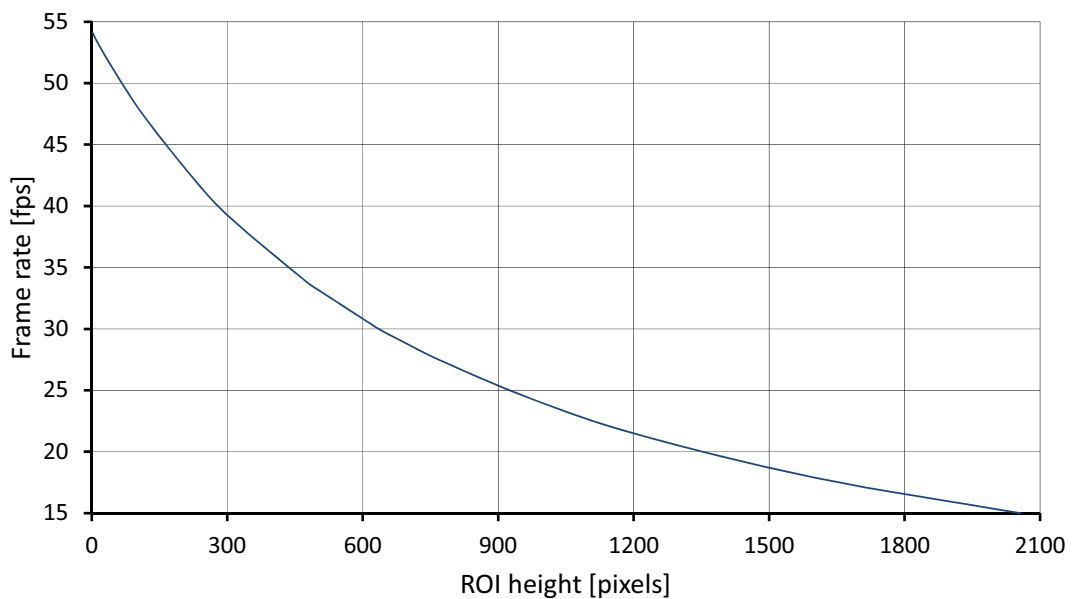
Figure 59: Frame rate as a function of ROI height

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

Width = 2452 pixels

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

Table 43: Frame rate as a function of ROI height values

Manta G-507B, G-507C

Feature	Specification	
	Manta G-507B	**Manta G-507C**
Resolution	2464 (H) × 2056 (V) 5.1 MP	
Sensor	Sony IMX264LLR Exmor with Pregius shutter pixel technology	Sony IMX264LQR Exmor with Pregius shutter pixel technology
Type	CMOS	
Shutter type	Global	
Sensor format	Type 2/3	
Sensor size	11.1 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	23.7 frames per second 27.6 frames per second (burst mode[1])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	48 µs to 85.9 s; 17.4 µs increments
	Mono12, BayerRG12, YUV422Packed	59 µs to 85.9 s; 23.1 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	83 µs to 85.9 s; 34.7 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	
Power consumption	2.8 W @ 12 VDC; 3.0 W PoE	

Table 44: Manta G-507B, G-507C model specifications

	Specification	
Feature	**Manta G-507B**	**Manta G-507C**
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	52.3 µs
	Mono12, BayerRG12, YUV422Packed	69.6 µs
	RGB8Packed, BGR8Packed, YUV444Packed	104.6 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±8.7 µs
	Mono12, BayerRG12, YUV422Packed	±11.55 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±17.35 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 44: Manta G-507B, G-507C model specifications (continued)
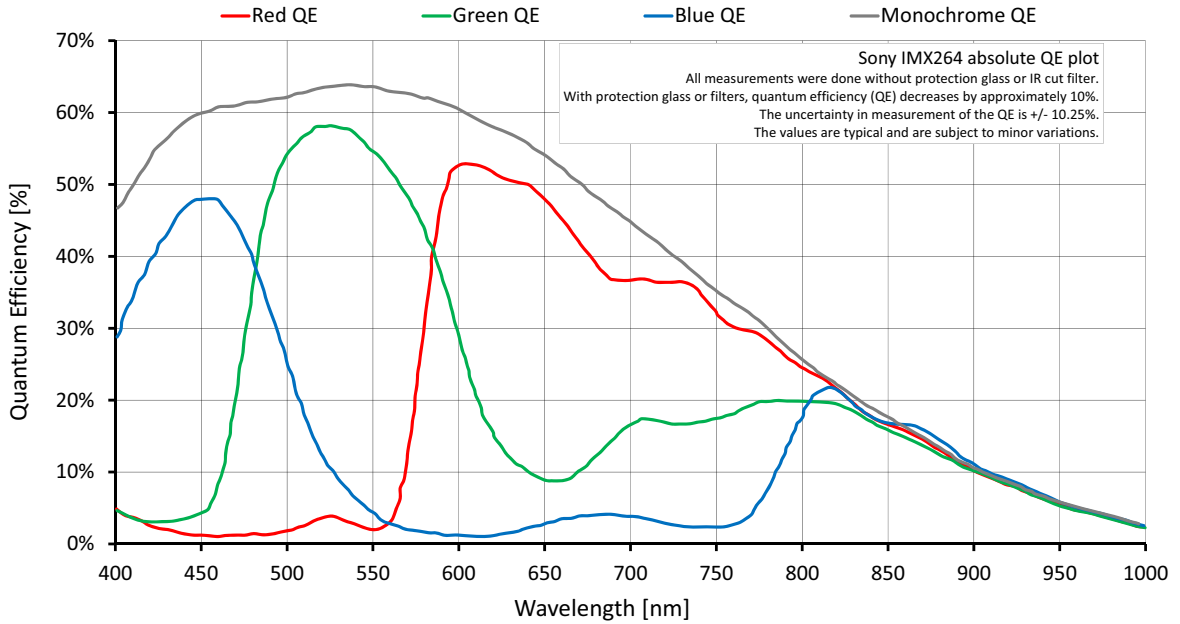
Absolute QE

Figure 60: Manta G-507B, G-507C (Sony IMX264) absolute QE

Spectral response
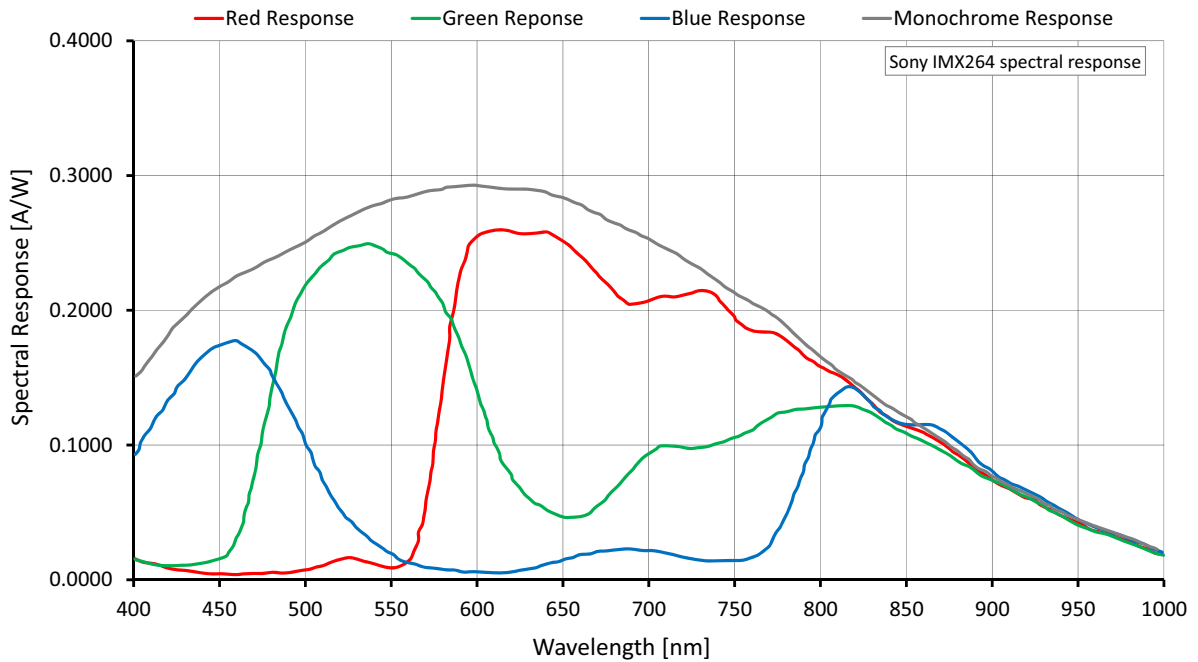
Figure 61: Manta G-507B, G-507C (Sony IMX264) spectral response
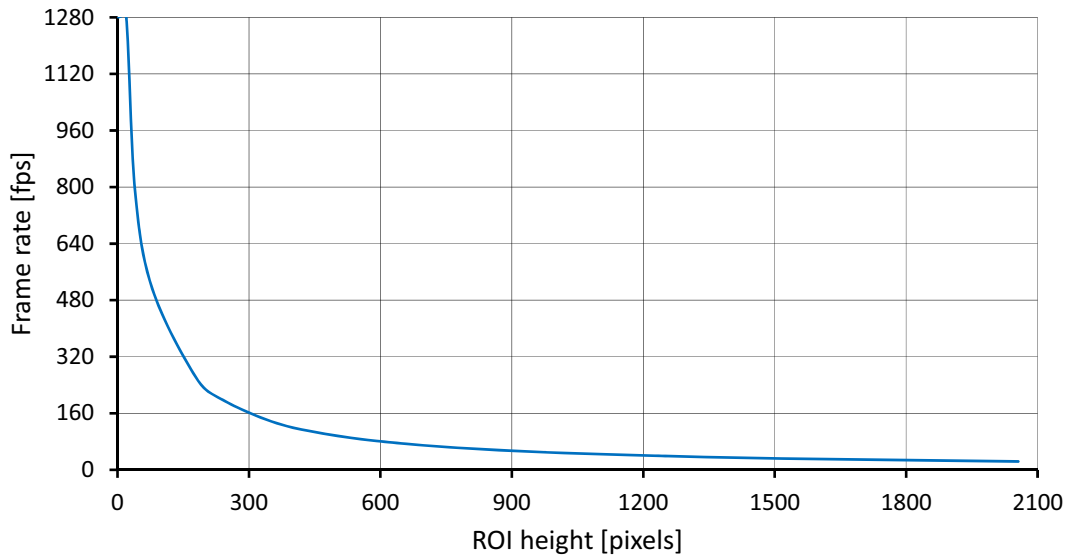
ROI frame rate

Figure 62: Frame rate as a function of ROI height

Height (pixels)	Frame rate	Height (pixels)	Frame rate	Height (pixels)	Frame rate
2056	23.7	768	62.9	80	509.8
1544	31.5	600	80.7	40	789.1
1324	36.8	480	100.5	20	1280.1
1280	38.0	360	133.3	2	1280.1
1024	47.4	240	197.9		
960	50.6	180	259.5		

Width = 2464 pixels

Table 45: Frame rate as a function of ROI height

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.

Manta G-895B, G-895C

Feature	Specification	
	Manta G-895B	Manta G-895C
Resolution	4112 (H) × 2176 (V) 8.95 MP	
Sensor	Sony IMX267LLR Exmor with Pregius shutter pixel technology	Sony IMX267LQR Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1	
Sensor size	16.1 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	13.4 frames per second 15.69 frames per second (burst mode[1])	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	71 µs to 85.9 s; 28.8 µs increments
	Mono12, BayerRG12, YUV422Packed	90 µs to 85.9 s; 38.3 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	129 µs to 85.9 s; 57.6 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	
Power consumption	3.0 W @ 12 VDC; 3.3 W PoE	

Table 46: Manta G-895B, G-895C model specifications

Feature	Specification	
	Manta G-895B	Manta G-895C
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	86.34 µs
	Mono12, BayerRG12, YUV422Packed	114.96 µs
	RGB8Packed, BGR8Packed, YUV444Packed	172.68 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±14.4 µs
	Mono12, BayerRG12, YUV422Packed	±19.16 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±28.8 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 46: Manta G-895B, G-895C model specifications (continued)*
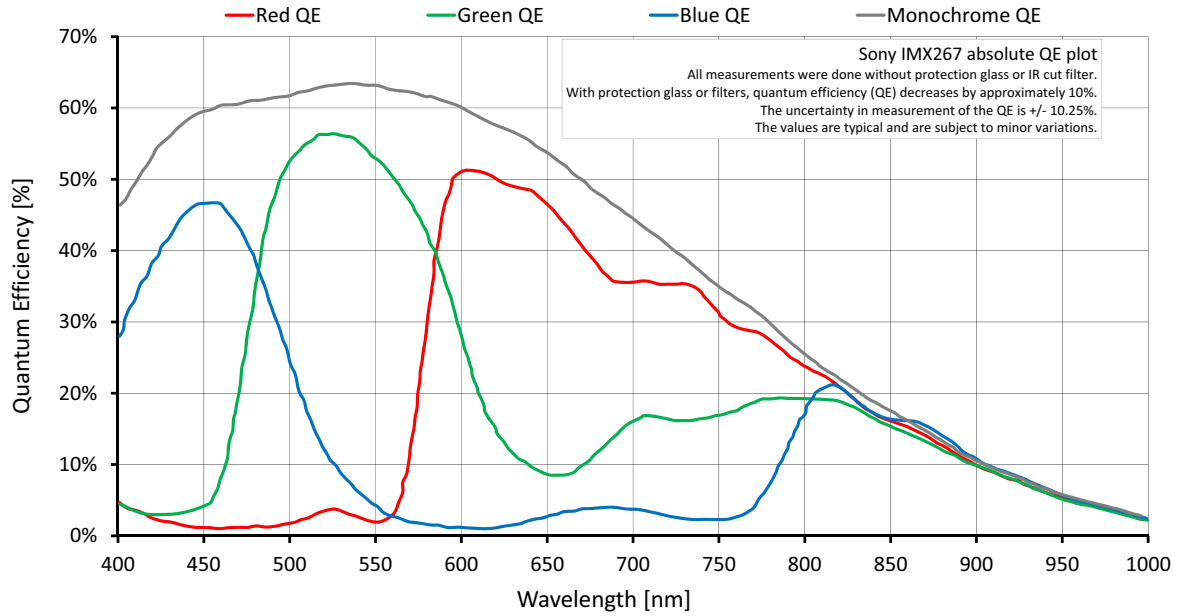
Absolute QE

*Figure 63: Manta G-895B, G-895C (Sony IMX267) absolute QE*

Spectral response
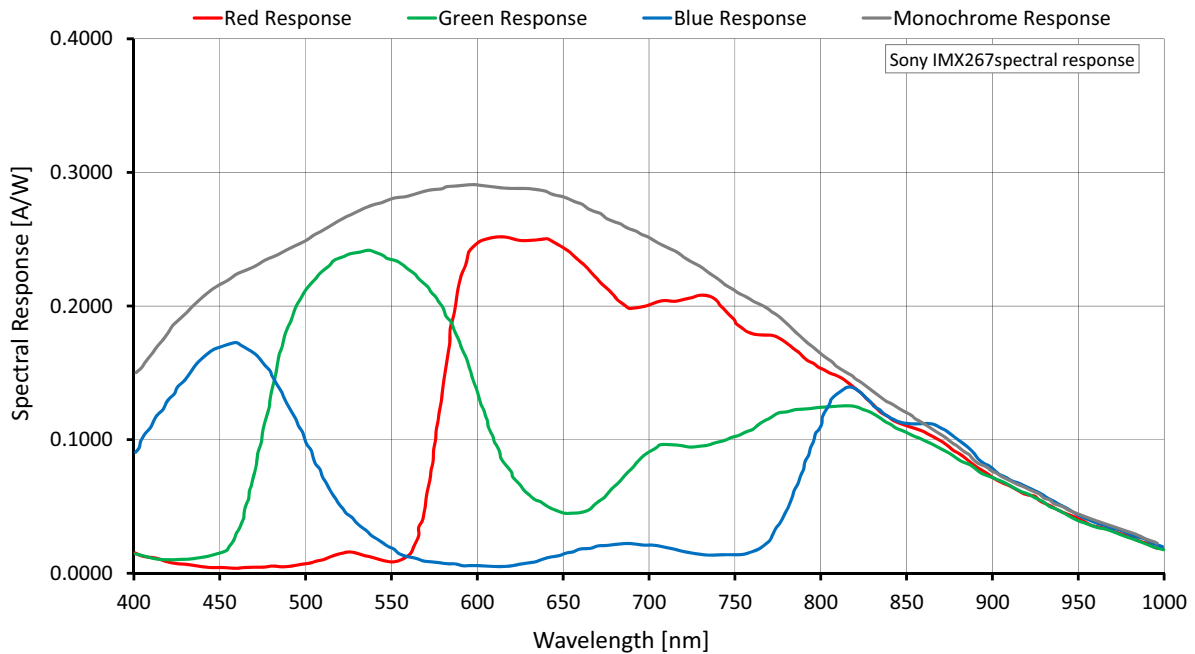
Figure 64: Manta G-895B, G-895C (Sony IMX267) spectral response
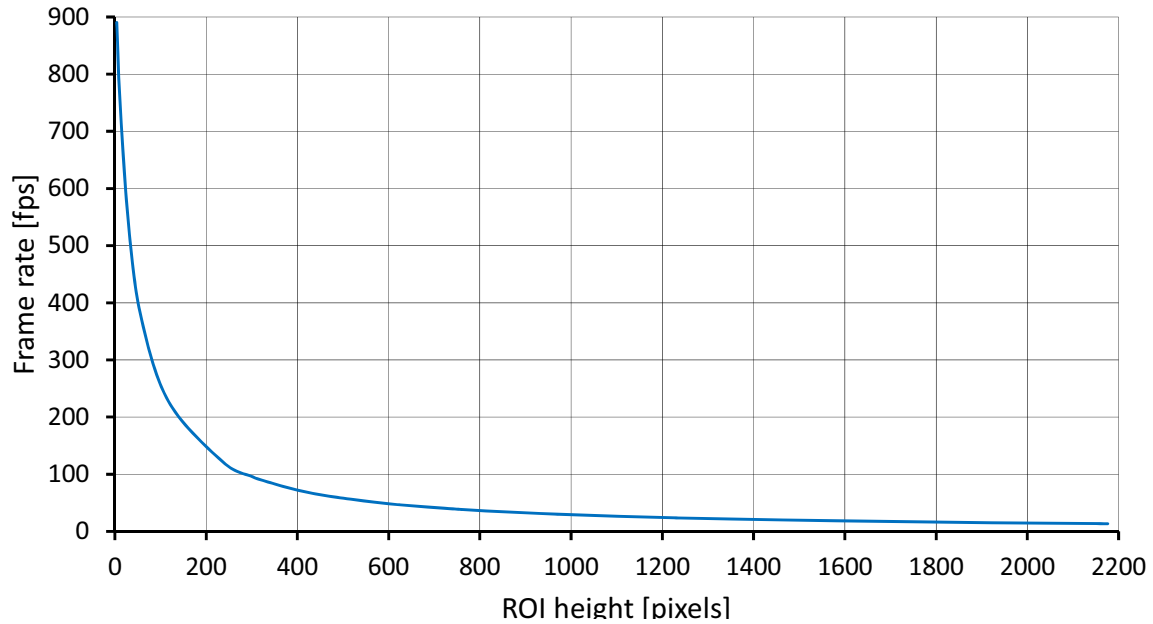
ROI frame rate

Figure 65: Frame rate as a function of ROI height

Height (pixels)	Frame rate		Height (pixels)	Frame rate		Height (pixels)	Frame rate
2176	13.4		800	36.4		240	119.7
2048	14.3		768	37.9		120	224.0
2000	14.6		640	45.5		60	365.5
1600	18.3		600	48.4		32	518.2
1280	22.8		480	60.4		12	738.8
1200	24.4		400	72.3		4	890.3
1024	28.5		320	90.2			
960	30.4		300	96.2			

Width = 4112 pixels

Table 47: Frame rate as a function of ROI height

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.

Manta G-917B, G-917C

Feature	Specification	
	Manta G-917B	Manta G-917C
Resolution	3384 (H) × 2710 (V) 9.2 MP	
Sensor	Sony ICX814ALG with EXview HAD II™ microlens technology	Sony ICX814AQG with EXview HAD II™ microlens technology
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global	
Sensor format	Type 1	
Sensor size	15.972 mm diagonal	
Pixel size	3.69 µm × 3.69 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	10.1 frames per second (dual-tap mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 14 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	42 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 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	
Sensor taps	Dual-tap Single-tap switchable in Vimba Viewer 2.0 or later	
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	
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	

Table 48: Manta G-917B, G-917C model specifications

Feature	Specification	
	Manta G-917B	Manta G-917C
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[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 48: Manta G-917B, G-917C model specifications (continued)
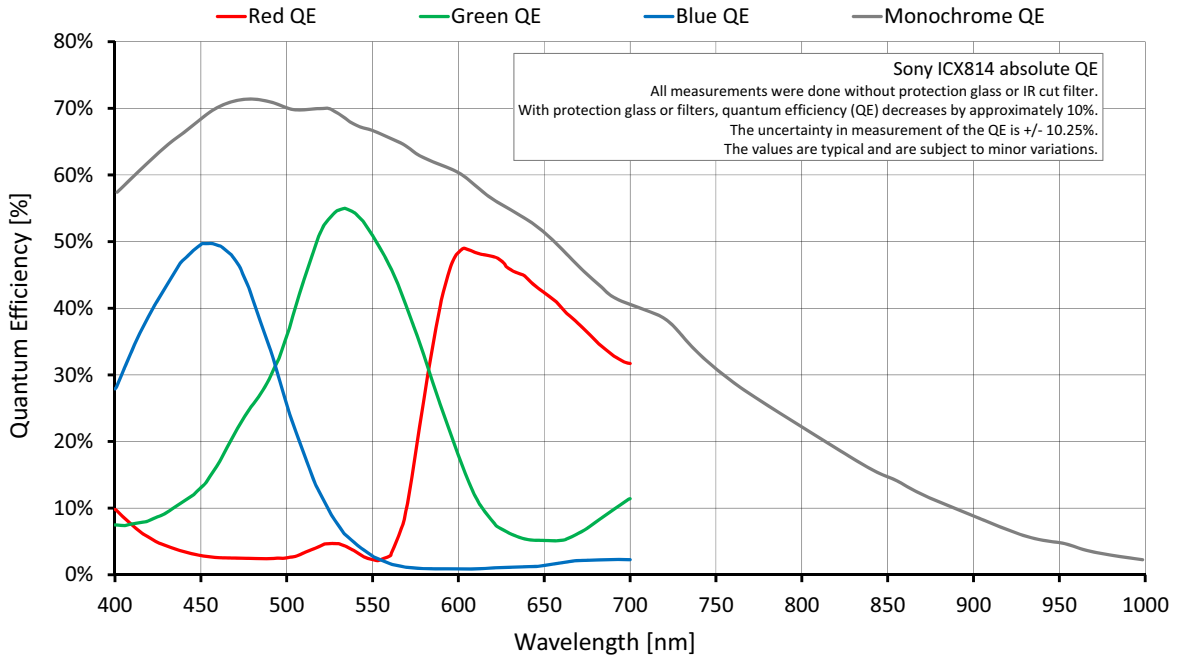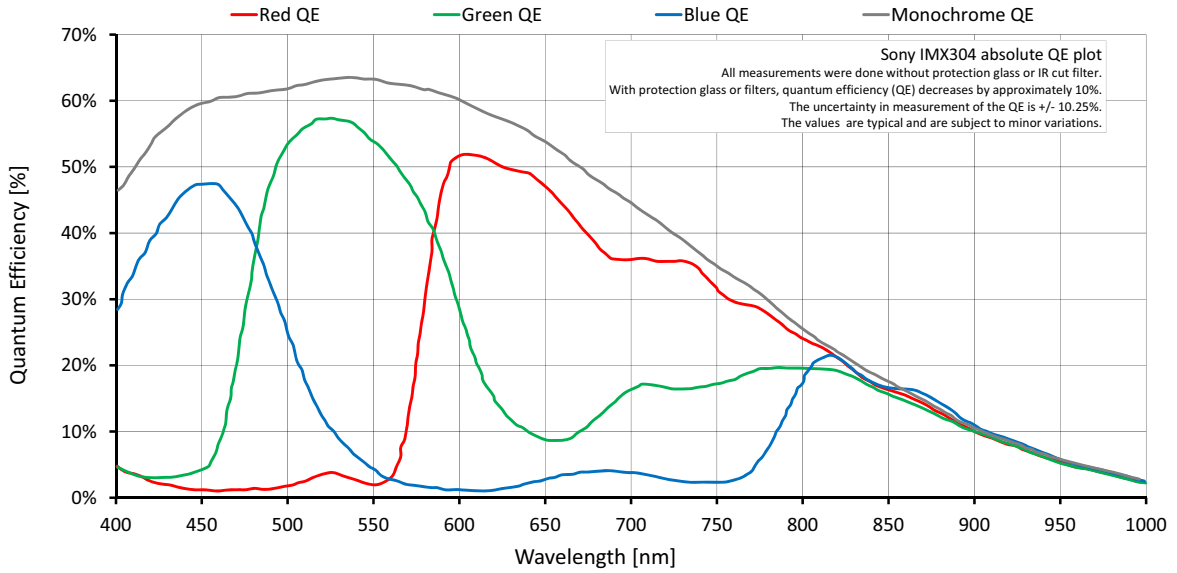
Absolute QE

Figure 66: Manta G-917B, G-917C (Sony ICX814) absolute QE

Spectral response
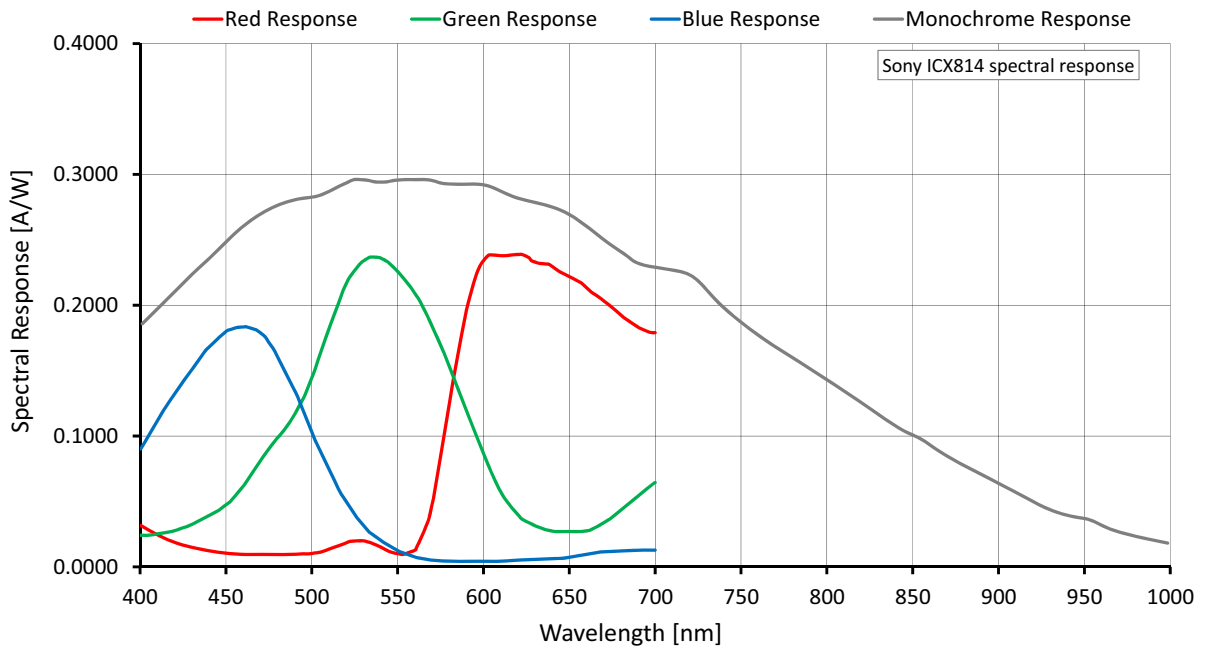
Figure 67: Manta G-917B, G-917C (Sony ICX814) spectral response

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
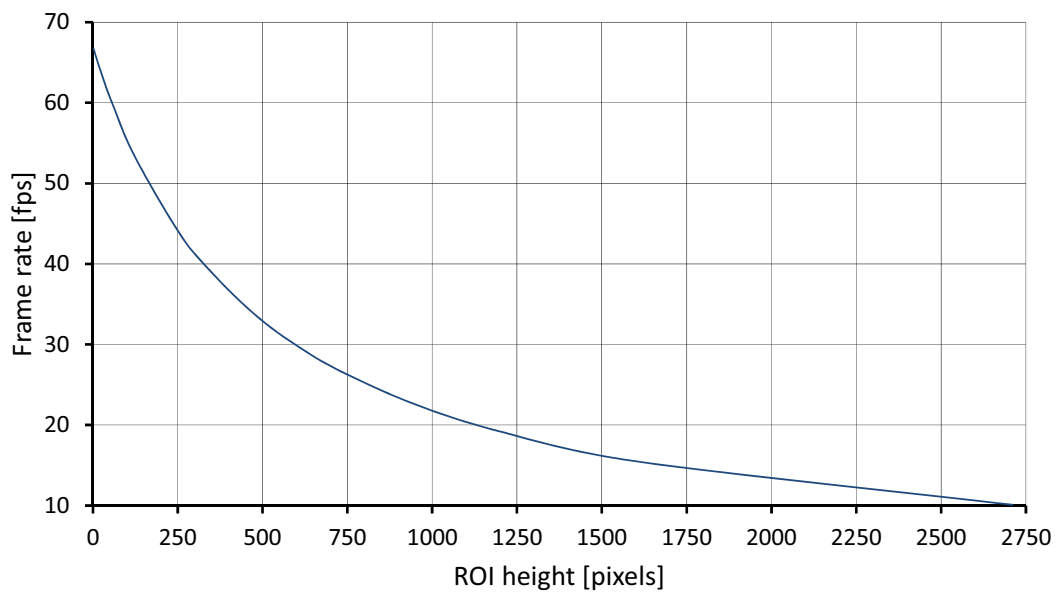
Figure 68: Frame rate as a function of ROI height

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

Width = 3384 pixels

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

Table 49: Frame rate as a function of ROI height

Manta G-1236B, G-1236C

Feature	Specification	
	Manta G-1236B	**Manta G-1236C**
Resolution	4112 (H) × 3008 (V) 12.3 MP	
Sensor	Sony IMX304LLR Exmor with Pregius shutter pixel technology	Sony IMX304LQR Exmor with Pregius shutter pixel technology
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1.1	
Sensor size	17.6 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	Default: Protection glass B 270 (ASG) Optional: See the *Modular Concept*	Default: IRC Hoya C-5000 IR cut filter Optional: See the *Modular Concept*
Maximum frame rate at full resolution	9.7 frames per second 11.4 frames per second (burst mode)	
Maximum image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats		YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats		RGB8Packed, BGR8Packed
RAW pixel formats		BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	**Pixel format**	**Range**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	71 µs to 85.89 s; 28.8 µs increments
	Mono12, BayerRG12, YUV422Packed	90 µs to 85.89 s; 38.32 µs increments
	RGB8Packed, BGR8Packed, YUV444Packed	129 µs to 85.89 s; 57.6 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	
Power consumption	3.0 W @ 12 VDC; 3.3 W PoE	

Table 50: Manta G-1236B, G-1236C model specifications

	Specification	
Feature	**Manta G-1236B**	**Manta G-1236C**
Trigger latency[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	86.4 µs
	Mono12, BayerRG12, YUV422Packed	114.96 µs
	RGB8Packed, BGR8Packed, YUV444Packed	172.8 µs
Trigger jitter[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±14.4 µs
	Mono12, BayerRG12, YUV422Packed	±19.16 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±28.8 µs
Body dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] 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 50: Manta G-1236B, G-1236C model specifications (continued)

Absolute QE

Figure 69: Manta G-1236B, G-1236C (Sony IMX304) absolute QE

Spectral response
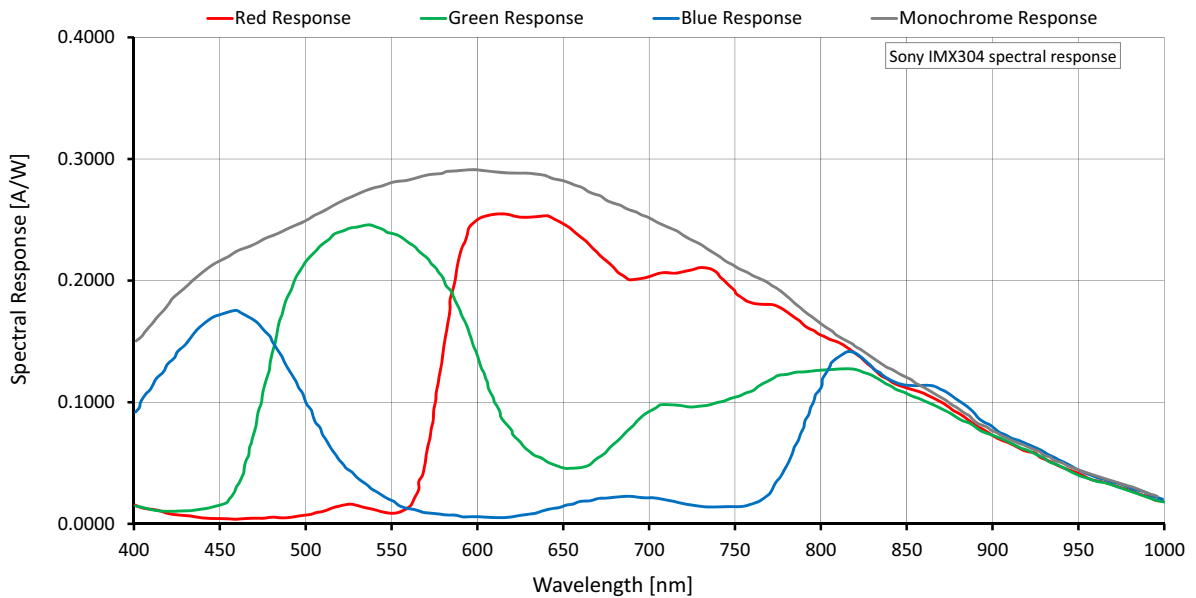
Figure 70: Manta G-1236B, G-1236C (Sony IMX304) spectral response
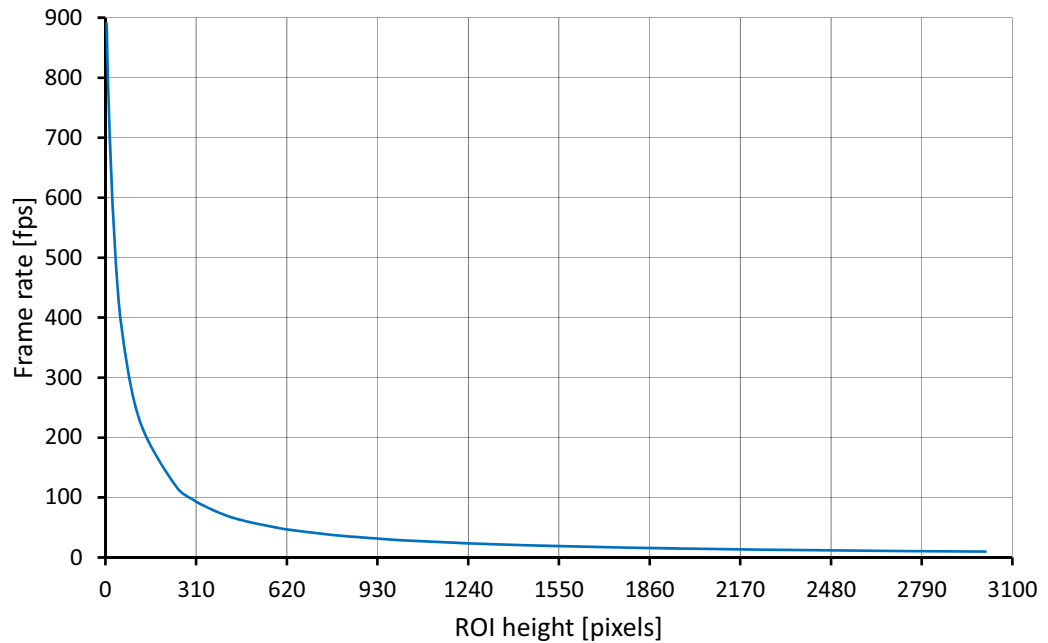
ROI frame rate

Figure 71: Frame rate as a function of ROI height

Height (pixels)	Frame rate	Height (pixels)	Frame rate	Height (pixels)	Frame rate
3008	9.73	1200	24.4	320	90.2
3000	9.76	1024	28.5	300	96.2
2800	10.46	960	30.4	240	119.7
2560	11.43	800	36.4	120	224.0
2400	12.2	768	37.9	60	365.5
2048	14.3	640	45.5	32	518.2
2000	14.6	600	48.4	12	738.8
1600	18.3	480	60.4	4	890.3
1280	22.8	400	72.3		

Width = 4112 pixels

Table 51: Frame rate as a function of ROI height

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.

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 features reference

A complete listing of camera features, including definitions can be found online:

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

Some features are firmware dependent, please refer to the *GigE Firmware Release Notes* for more information.

Image optimization features		G-031	G-032	G-033	G-040	G-046	G-125	G-145	G-146	G-158	G-201	G-223	G-235	G-282	G-283	G-319	G-419	G-504	G-505	G-507	G-895	G-917	G-1236
	Auto gain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Auto exposure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Auto white balance[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Binning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
	Black level (offset)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Decimation X/Y	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Pixel Defect Masking											✓					✓						
	Gamma correction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Hue, saturation, color correction[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Three look-up tables (LUTs)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Piecewise Linear HDR mode											✓					✓						
	Reverse X[2]	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓		✓	✓	✓	✓		✓
	Reverse Y												✓			✓					✓	✓	✓
	Region of Interest (ROI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 52: Feature comparison by model

Camera control features		Manta G-031	Manta G-032	Manta G-033	Manta G-040	Manta G-046	Manta G-125	Manta G-145	Manta G-146	Manta G-158	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-895	Manta G-917	Manta G-1236
	Auto iris (video type)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Event channel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Image chunk data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	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 (main board)				✓					✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Trigger over Ethernet (Action Commands)				✓					✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓

[1] Only available for color models

[2] Only available for monochrome models (Manta G-031B, G-033B, G-046B, G-125B, G-145B, G-146B, G-201B, G-504B)

Table 52: Feature comparison by model (continued)

Mechanical dimensions
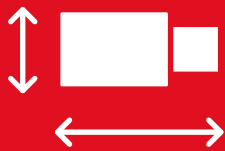
This chapter includes:

- 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.
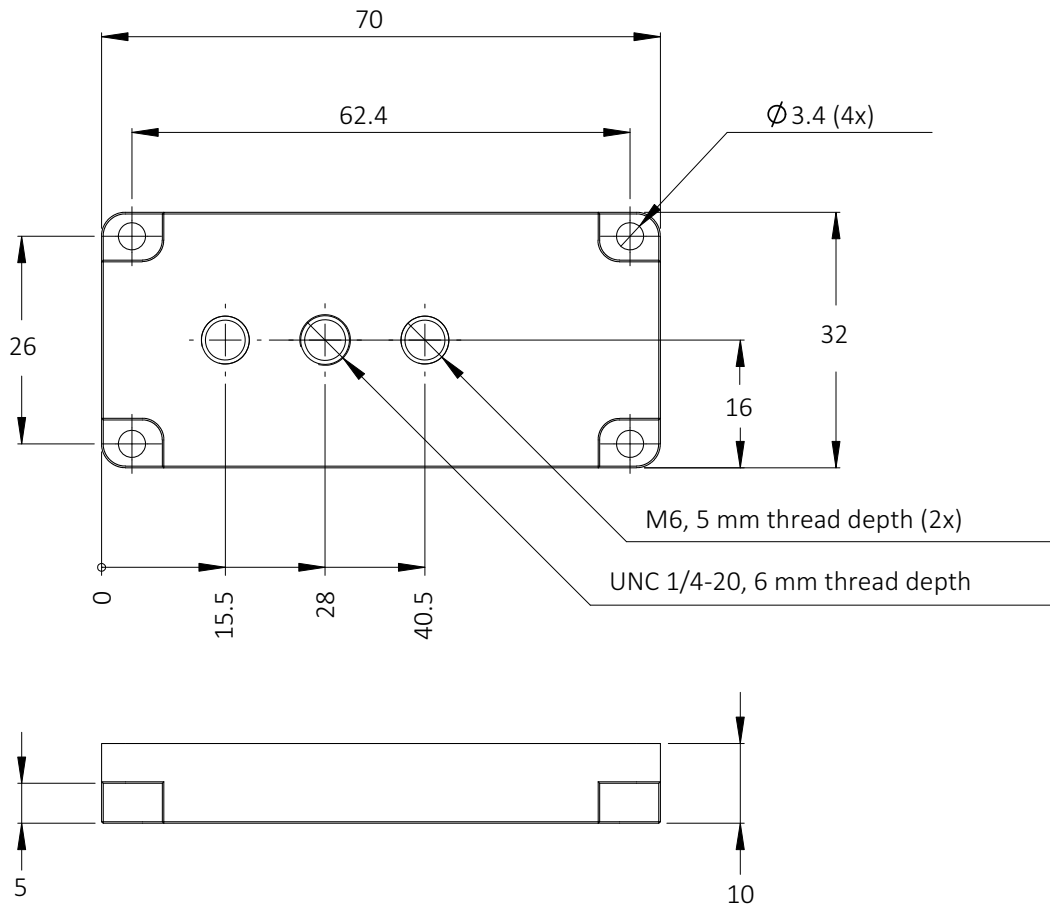
Figure 72: Tripod adapter dimensions

Camera dimensions (Manta type A)

Manta type A and type B models

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

Manta type A models: G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B models: G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236

Standard housing

Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Mount: C-Mount
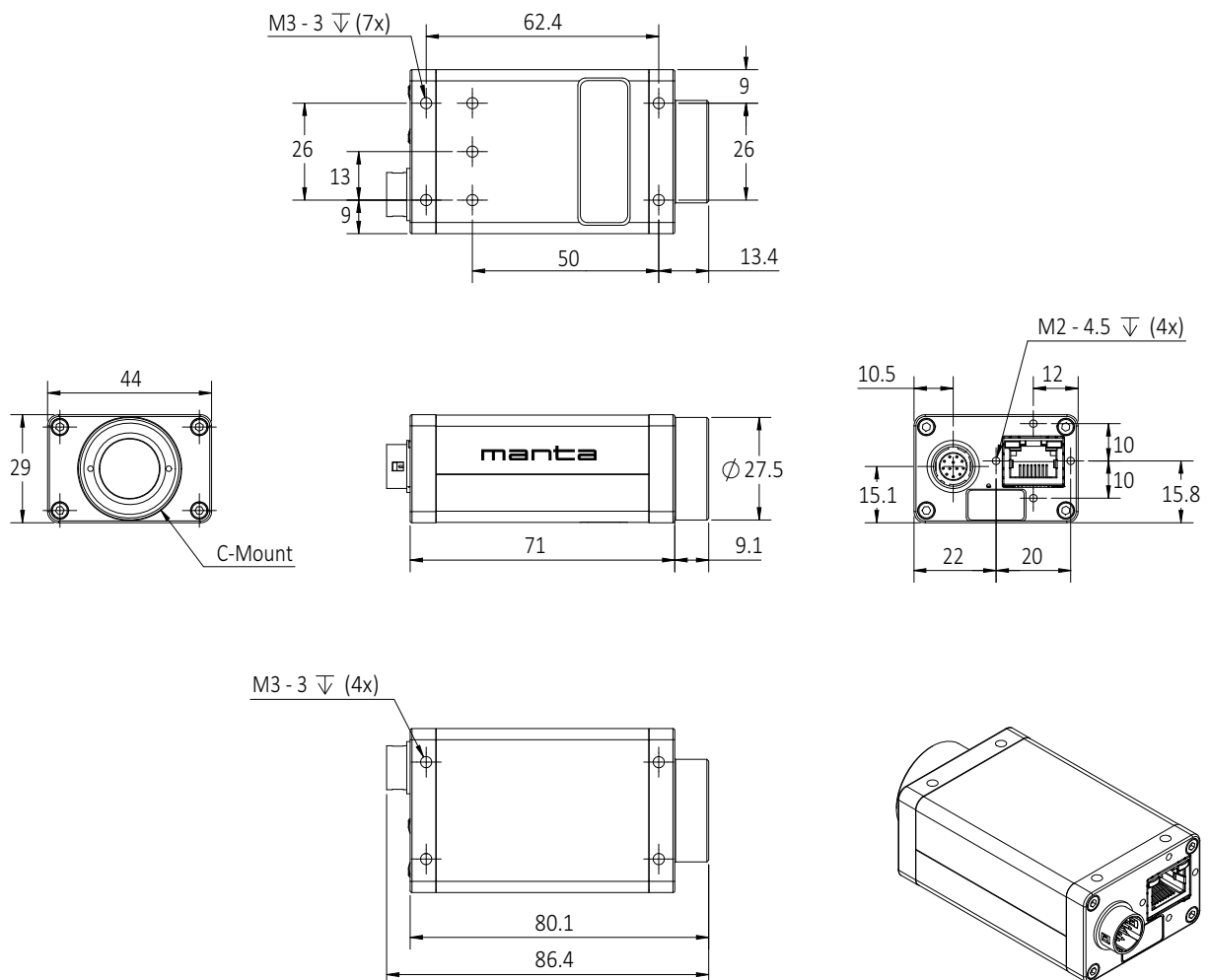
Figure 73: Manta type A standard housing dimensions (including connectors)

Angled-head housings

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
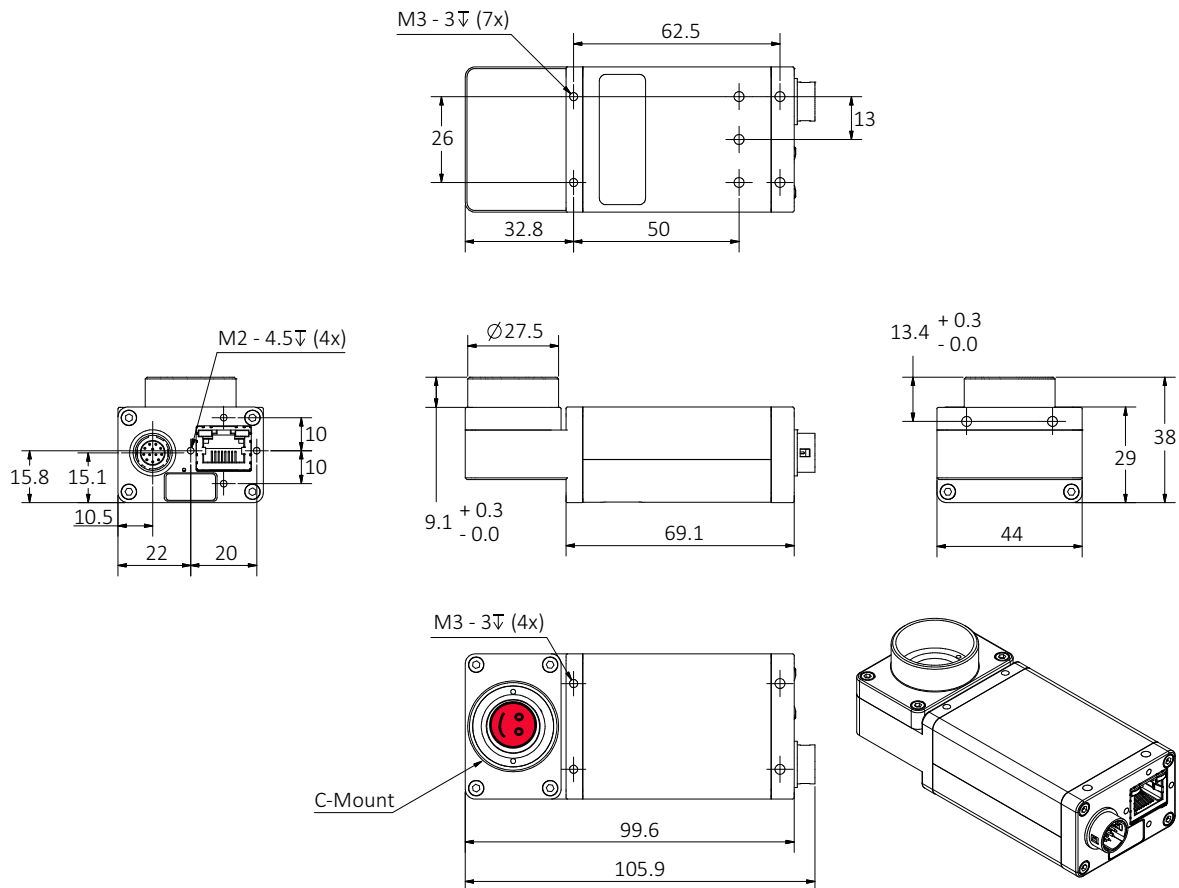
Figure 74: Manta type A W90 housing dimensions (including connectors)

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
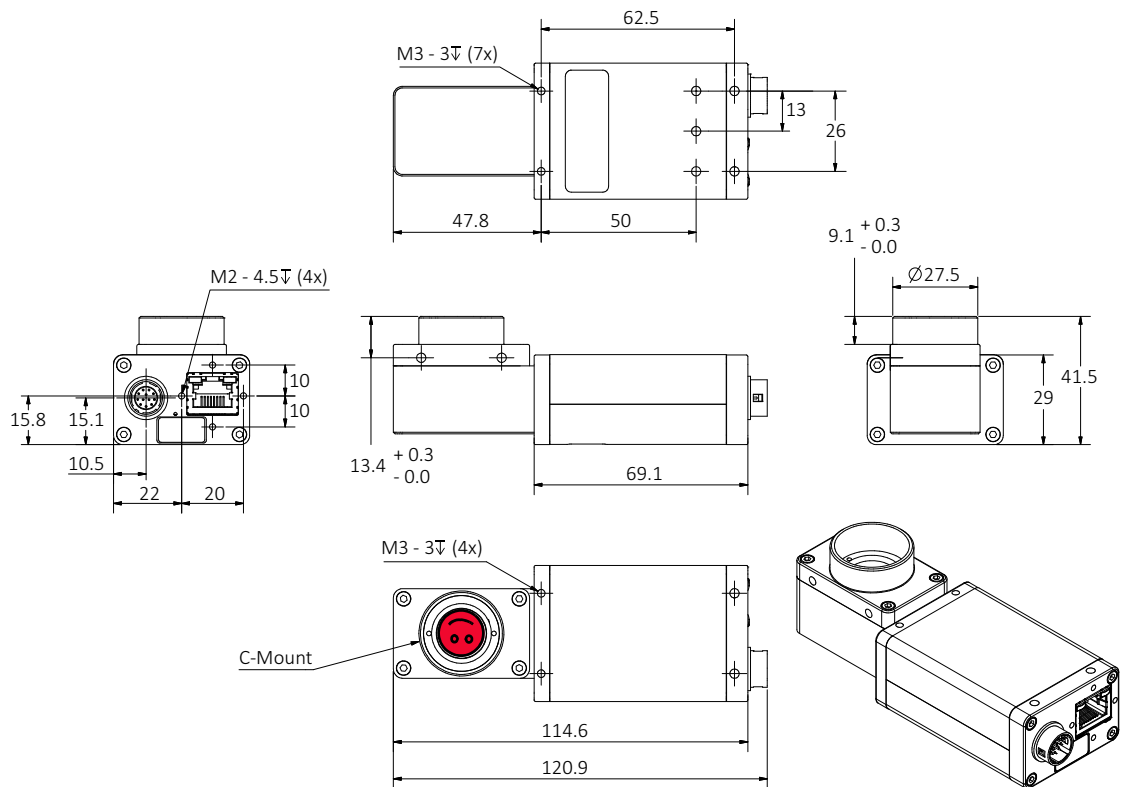
Figure 75: Manta type A W90 S90 housing dimensions (including connectors)

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
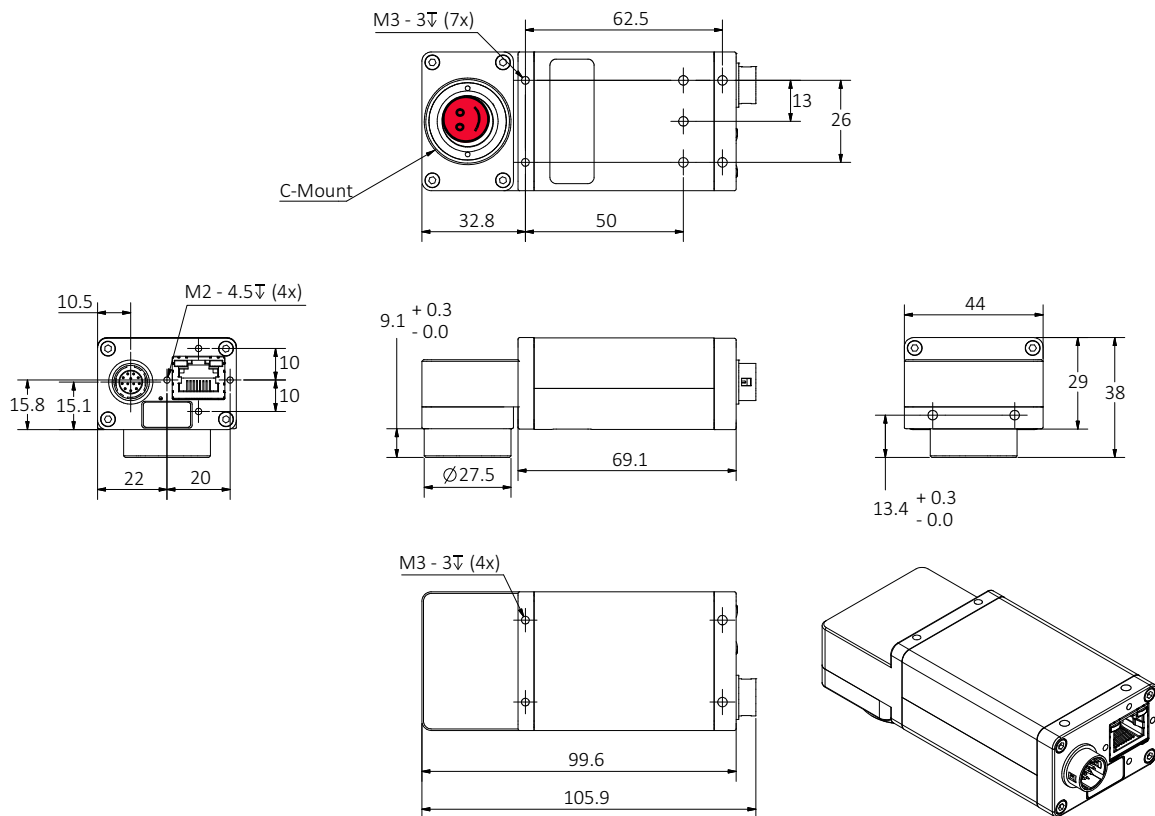
Figure 76: Manta type A W270 housing dimensions (including connectors)

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
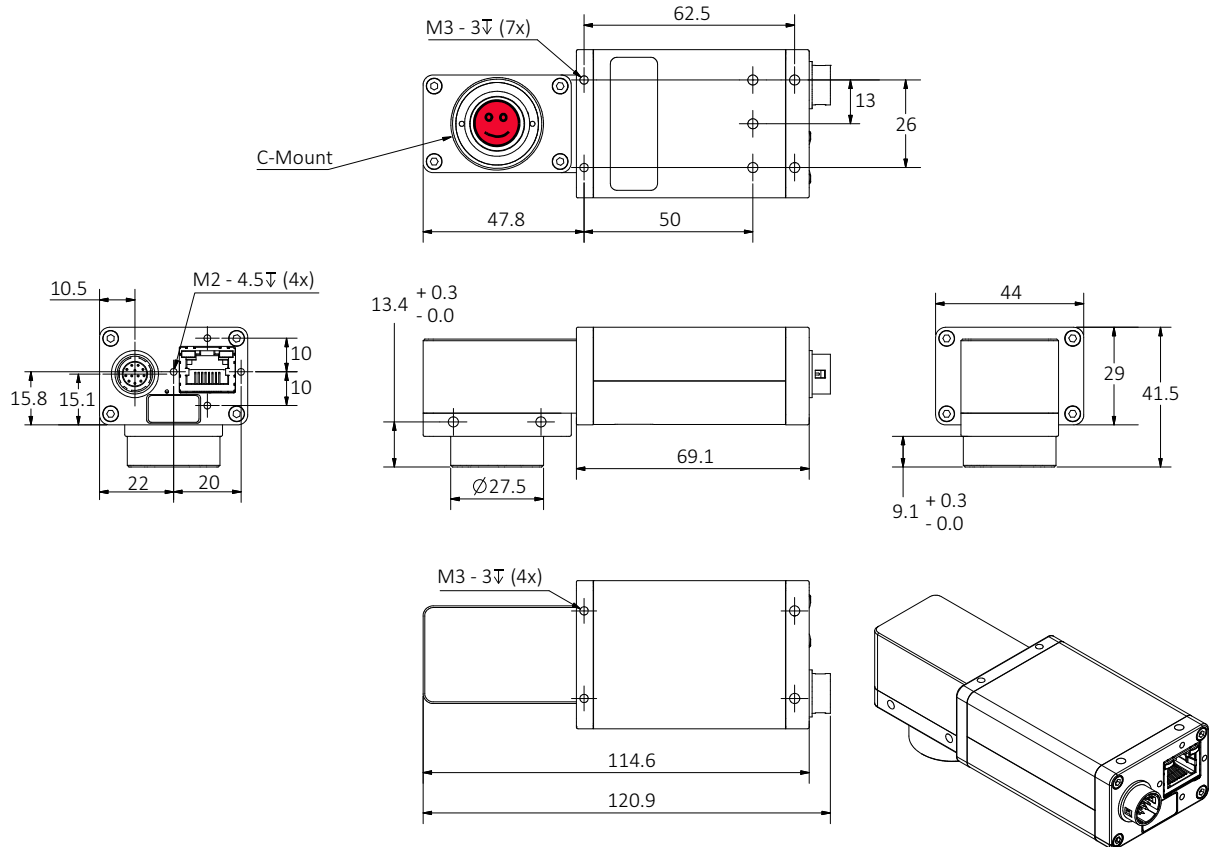
Figure 77: Manta type A W270 S90 housing dimensions (including connectors)

Board level variants

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 × 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Auto Iris (Video Type) 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
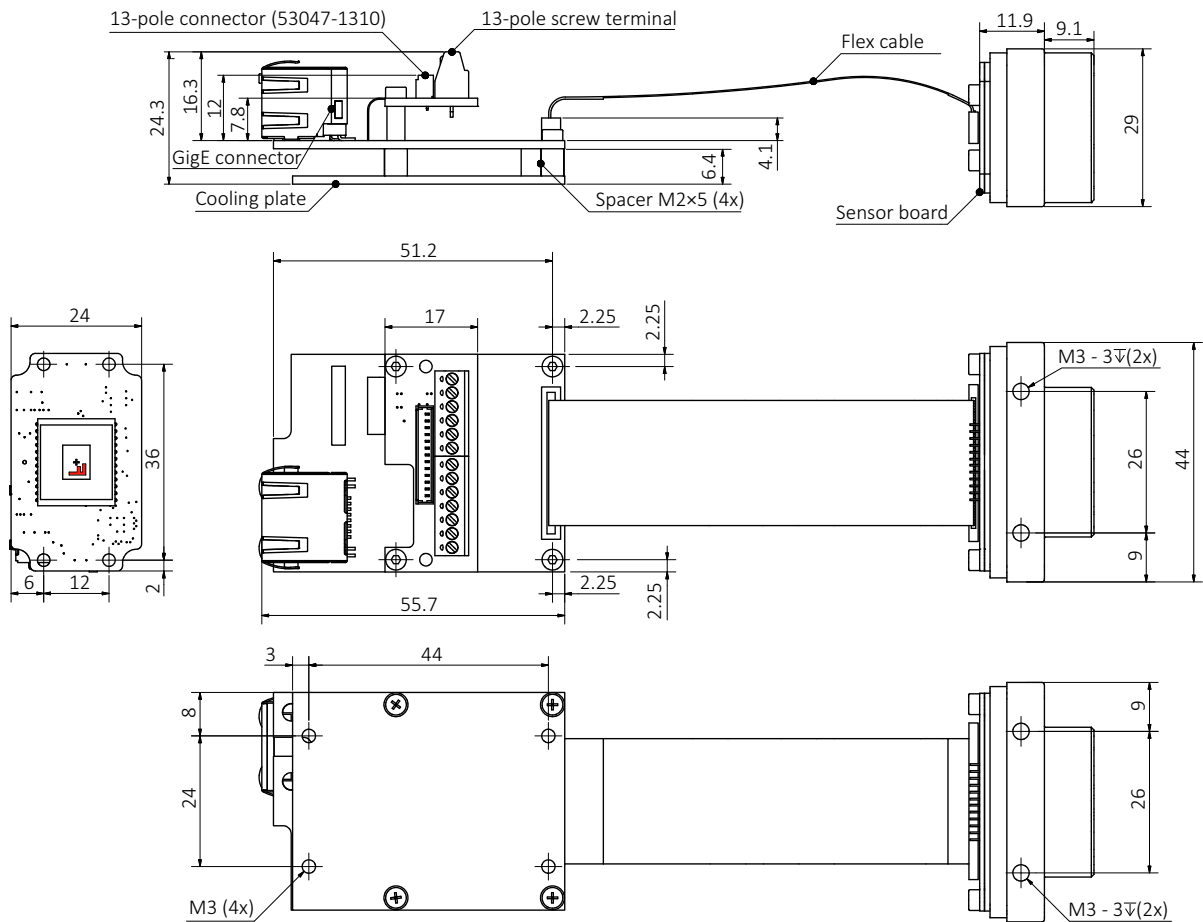
Figure 78: Manta type A board level (non-PoE) dimensions

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 × 50079-8000

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Auto Iris (Video Type) 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
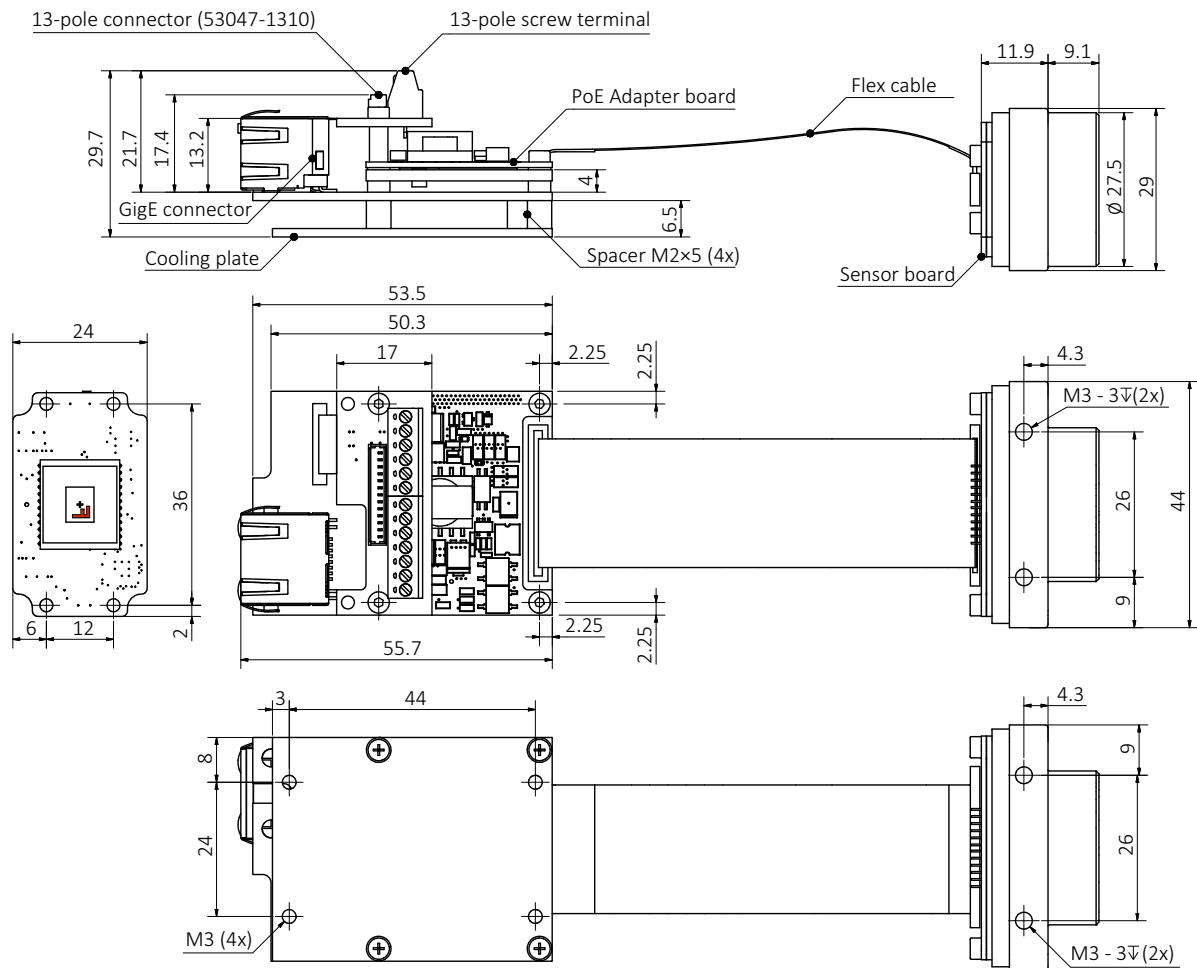
Figure 79: Manta type A board level (PoE) dimensions

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

M2×12 ISO4762 (2x)

Spacer 6.3 mm (2x)

M2×8 ISO4762 (4x)

Front flange

Filter ring with filter
or protection glass

M2×4 ISO4762-A2 (2x)

Spacer M2x5 (4x)

M2×4 ISO7046-A2 (4x)
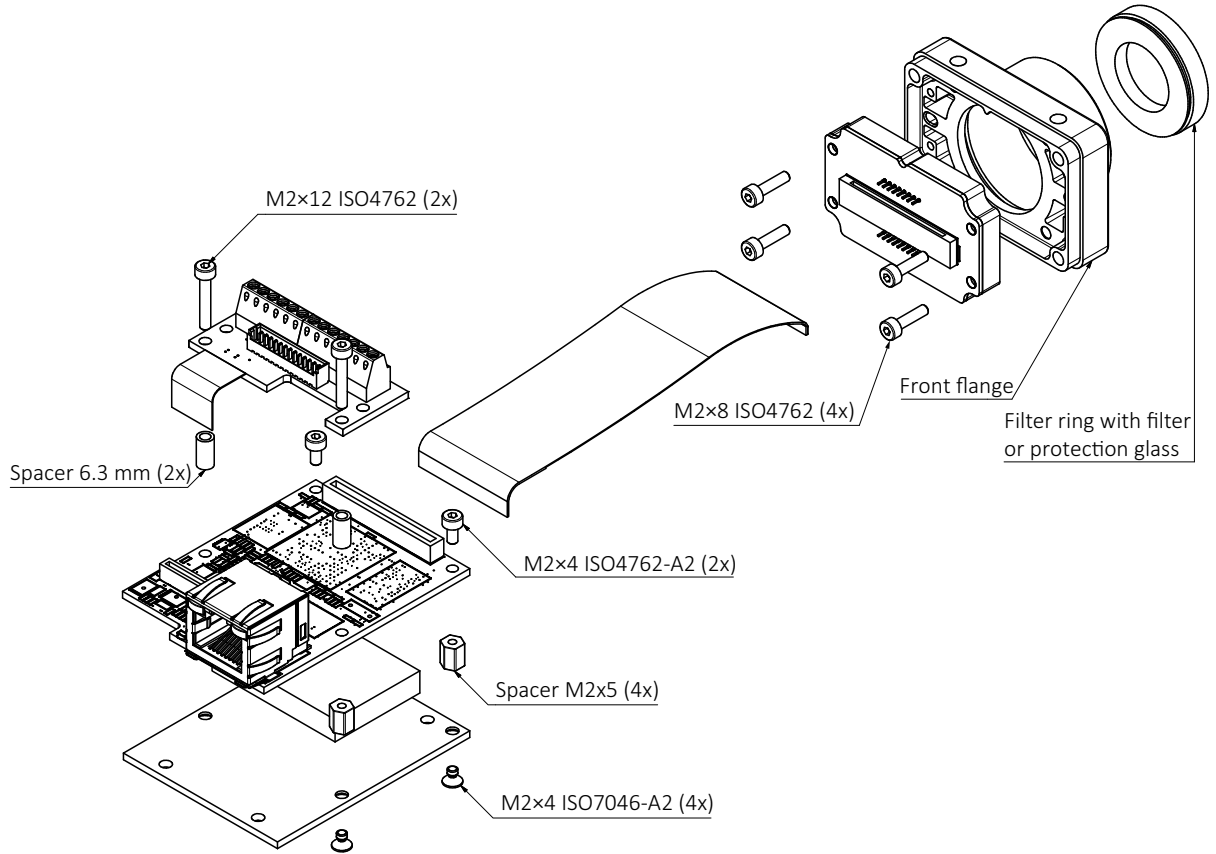
Figure 80: Manta type A board level (non-PoE) C-Mount

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

M2×16 ISO4762 (2x)

M2×10 ISO4762 (2x)

Spacer 6.3 mm (2x)

M2×8 ISO4762 (4x)

Front flange

Filter ring with filter or protection glass

Spacer M2×5 (4x)

M2×3 ISO7046 (4x)
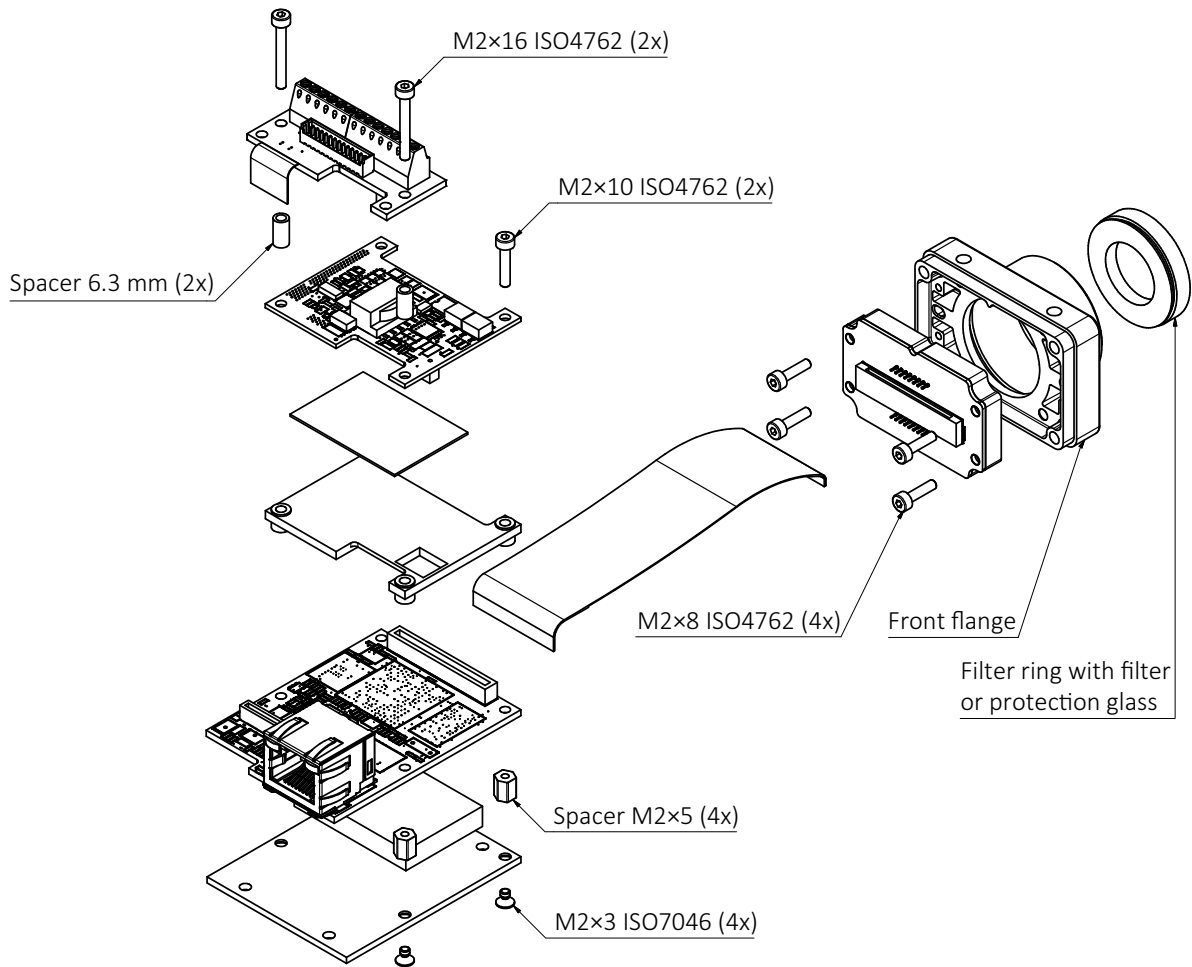
Figure 81: Manta type A board level (PoE) C-Mount

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
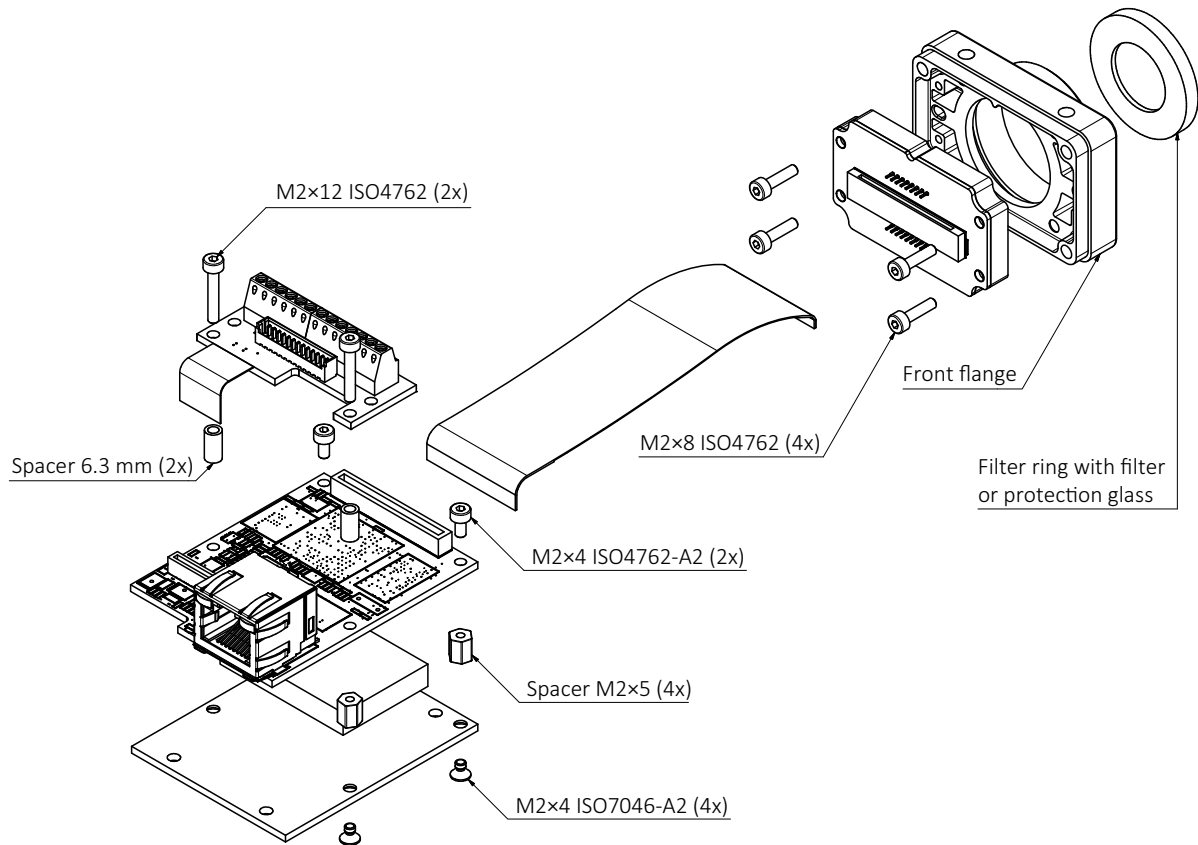
Figure 82: Manta type A board level (non-PoE) CS-Mount

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

M2×16 ISO4762 (2x)

M2×10 ISO4762 (2x)

Spacer 6.3 mm (2x)

M2×8 ISO4762 (4x)

Front flange

Filter ring with filter
or protection glass

Spacer M2×5 (4x)

M2×3 ISO7046 (4x)
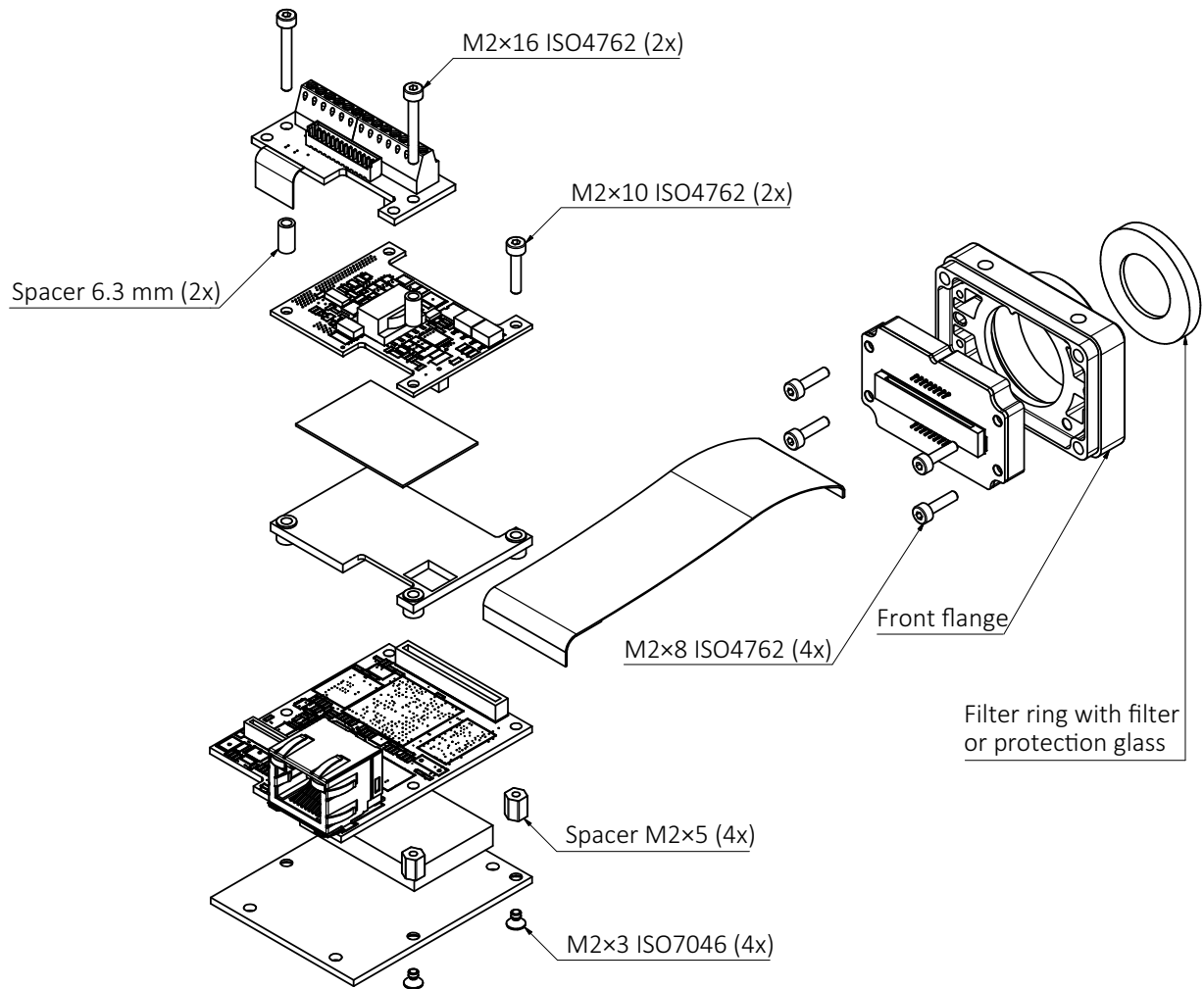
Figure 83: Manta type A board level (PoE) CS-Mount

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

M2×12 ISO4762 (2x)

Spacer 6.3 mm (2x)

Front flange *

M2×8 ISO4762 (4x)

M2×4 ISO4762-A2 (2x)

Filter ring with filter
or protection glass *

M12 mount *

Locking ring *

Spacer M2×5 (4x)

* depending on application

M2×4 ISO7046-A2 (4x)
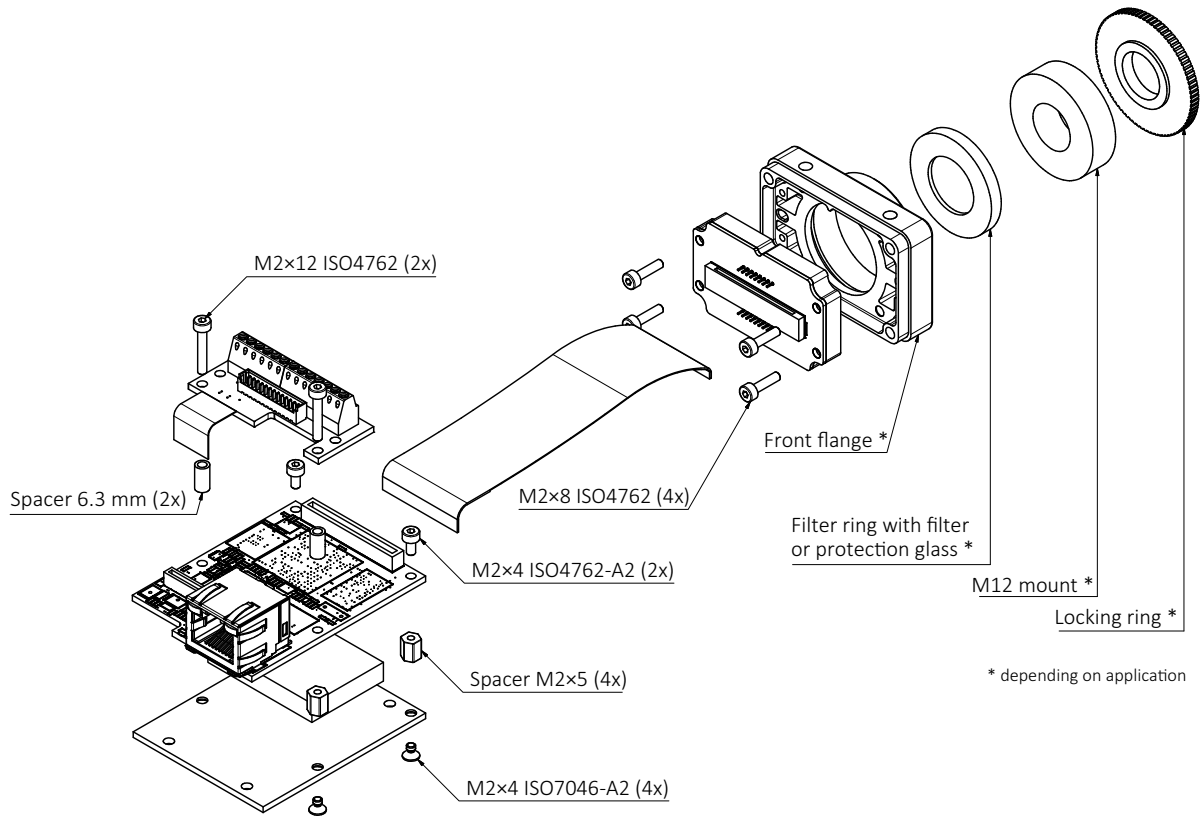
Figure 84: Manta type A board level (non-PoE) M12-Mount

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

M2×16 ISO4762 (2x)

M2×10 ISO4762 (2x)

Spacer 6.3 mm (2x)

Front flange *

M2×8 ISO4762 (4x)

Filter ring with filter
or protection glass *

M12 mount *

Locking ring *

* depending on application

Spacer M2×5 (4x)

M2×3 ISO7046 (4x)
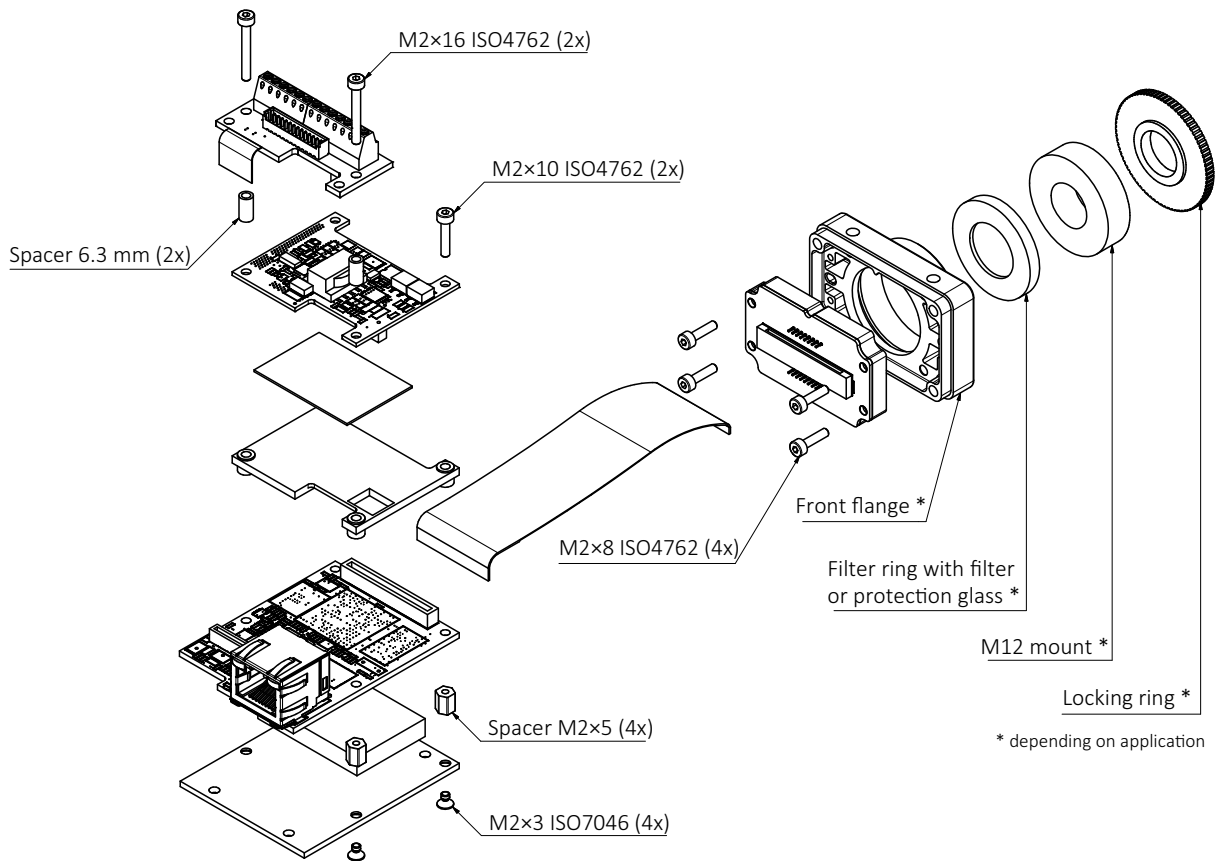
Figure 85: Manta type A board level (PoE) M12-Mount

C-Mount cross section

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

Protection glass and filter options

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

Maximum protrusion

Maximum protrusion is the distance from lens flange to the glass filter in the camera.
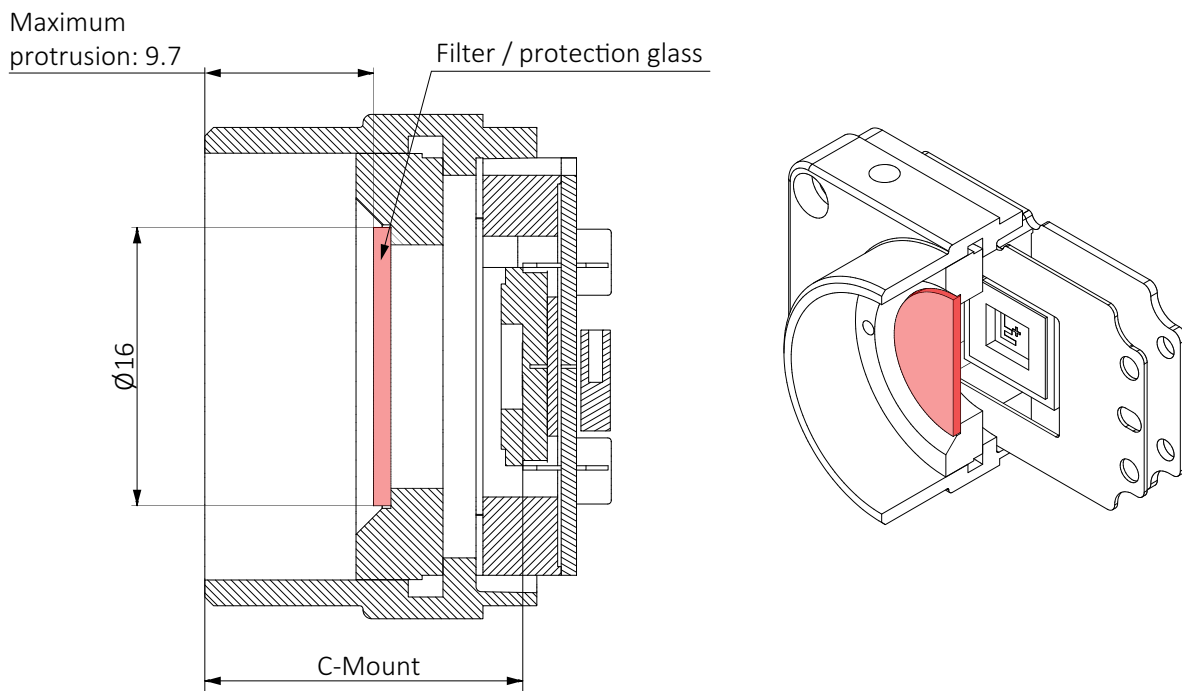
Figure 86: Manta type A C-Mount dimensions (16 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, contact Allied Vision support at https://www.alliedvision.com/en/support/contact-support-and-repair.html.

CS-Mount cross section

Protection glass and filter options

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

Maximum protrusion

Maximum protrusion is the distance from lens flange to the filter or protection glass in the camera.
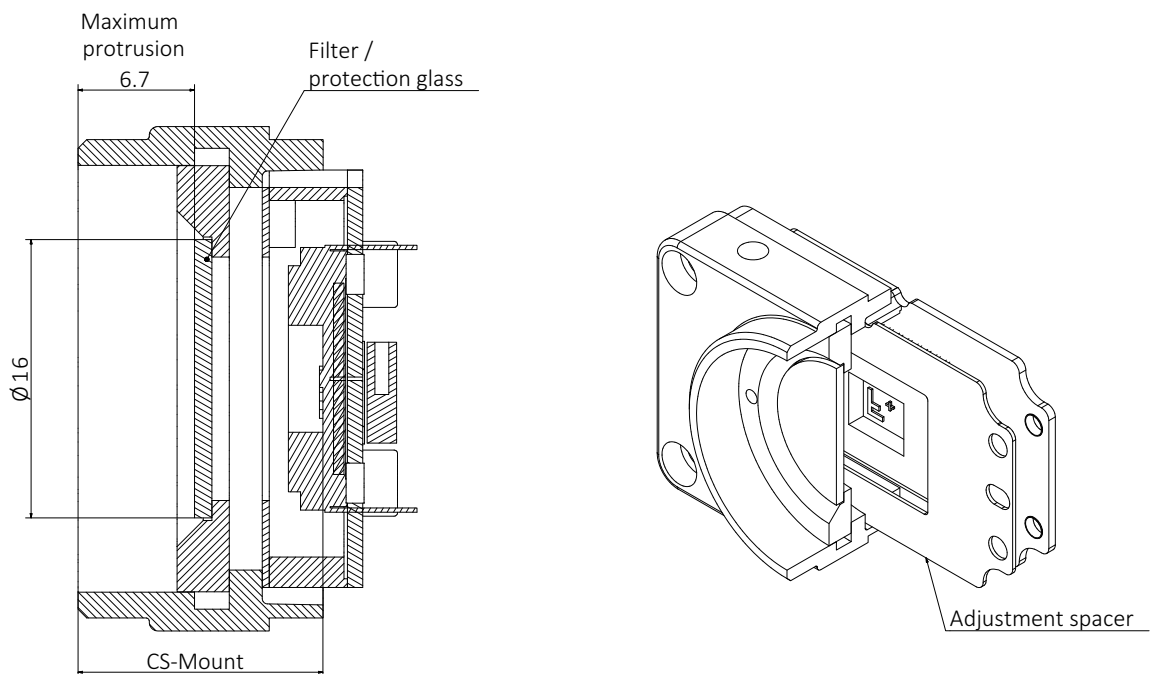
Figure 87: Manta type A CS-Mount dimensions (16 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, contact Allied Vision support at https://www.alliedvision.com/en/support/contact-support-and-repair.html.

Camera dimensions (Manta type B)

Manta type A and type B models

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

Manta type A models: G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
Manta type B models: G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236

Standard housing

Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236
Mount: C-Mount
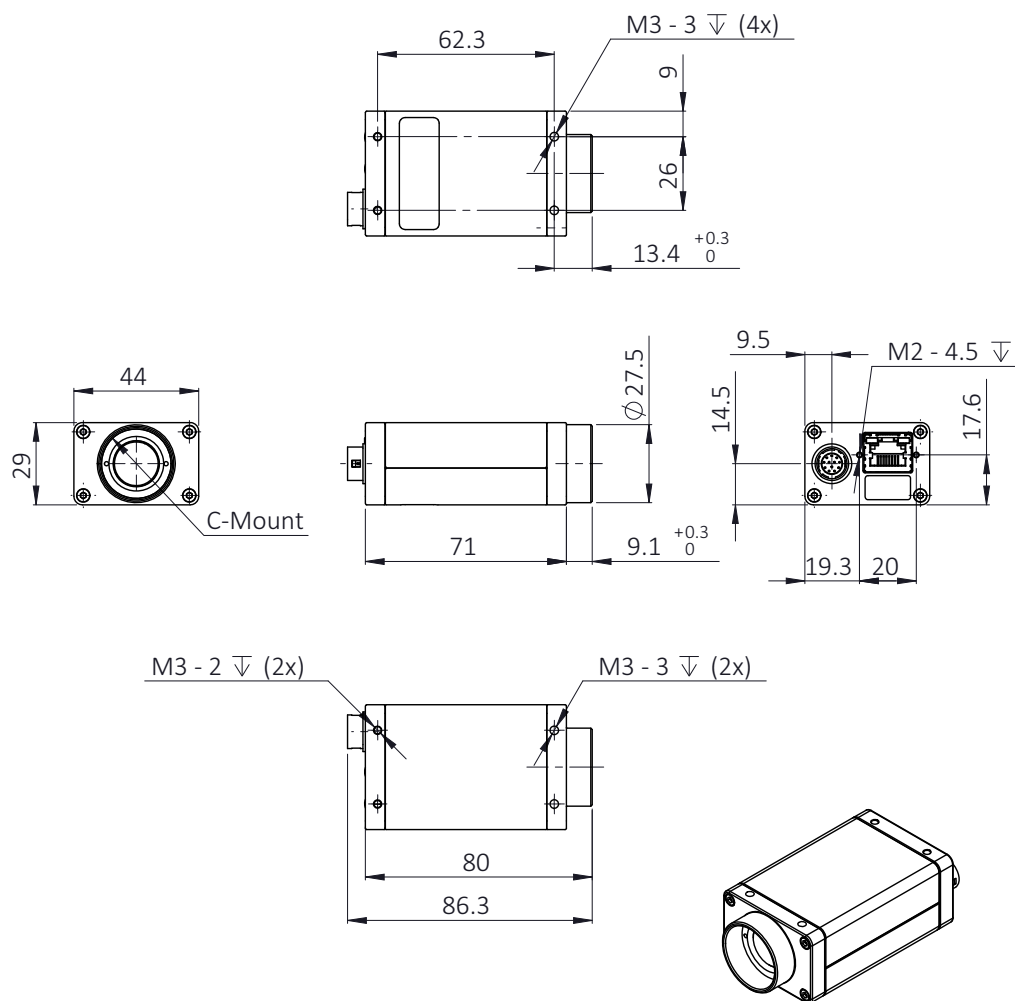
Figure 88: Manta type B standard housing dimensions (including connectors)

Angled-head housings

W90 housing

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236
Mount: C-Mount
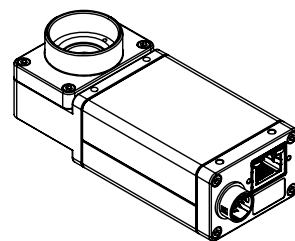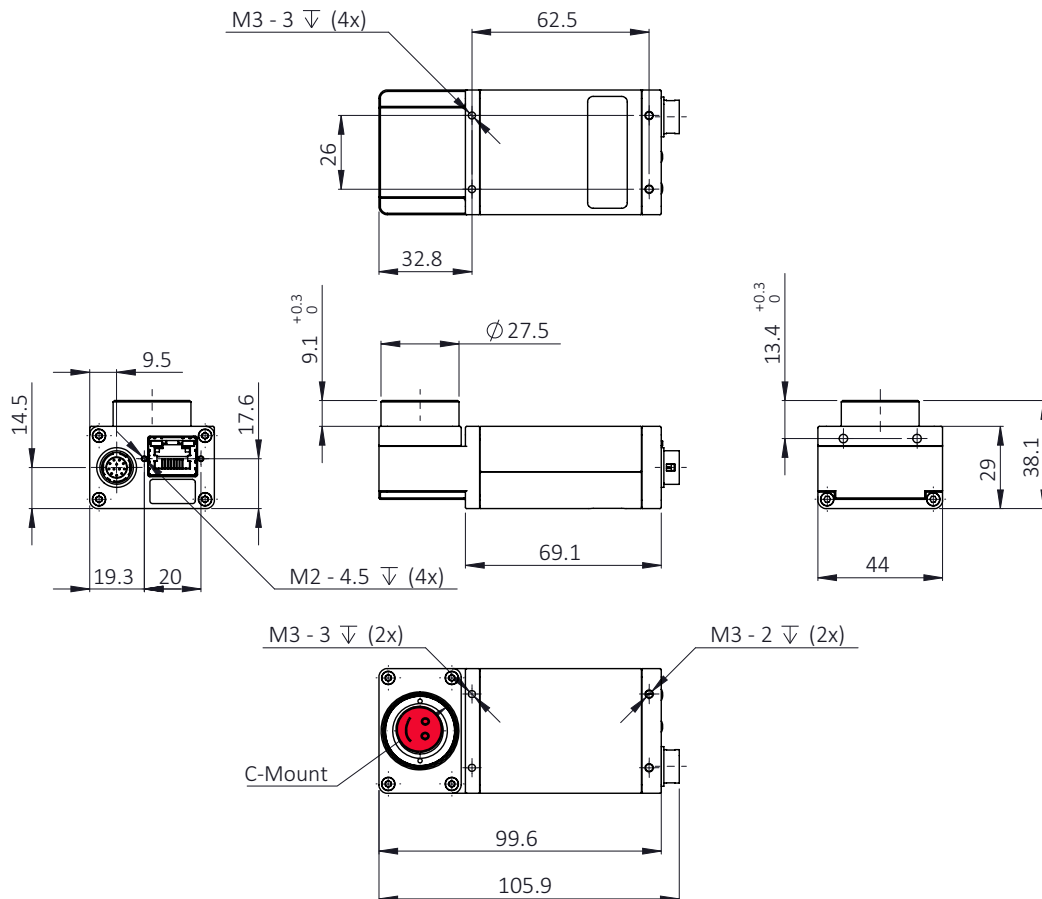
Figure 89: Manta type B W90 housing dimensions (including connectors)

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-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236
Mount: C-Mount
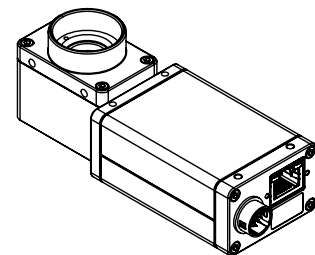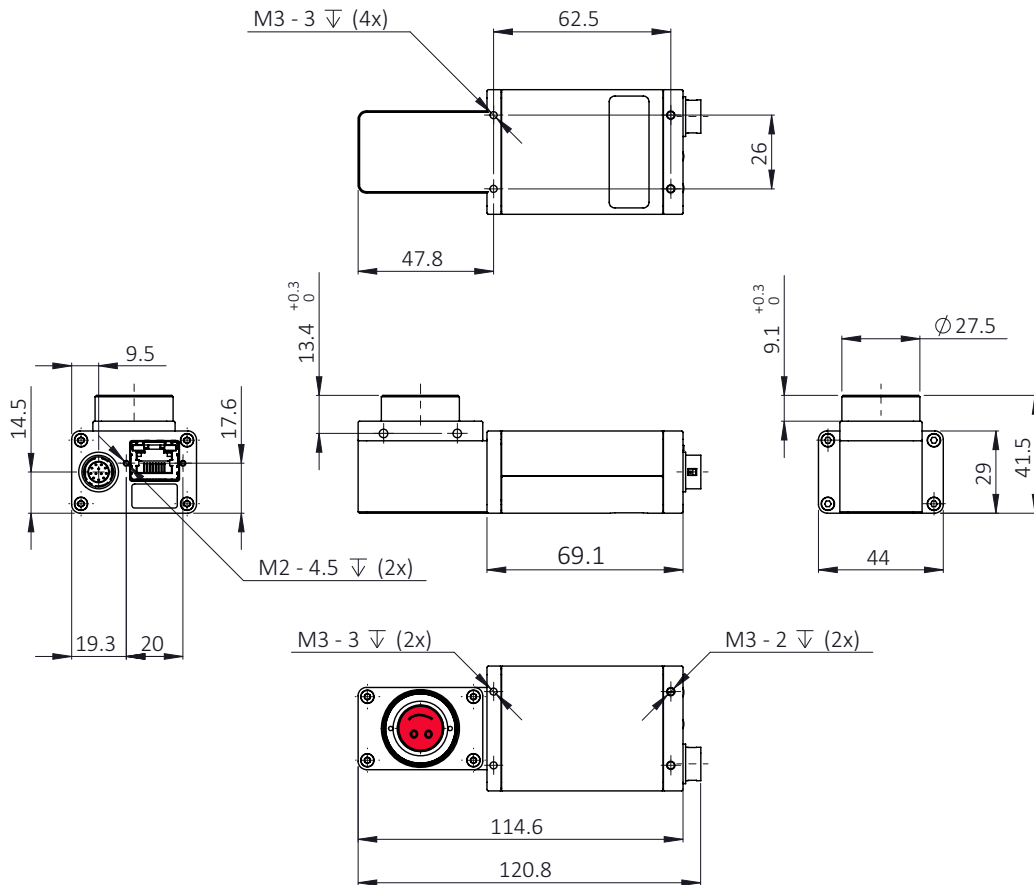
Figure 90: Manta type B W90 S90 housing dimensions (including connectors)

W270 housing

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236
Mount: C-Mount
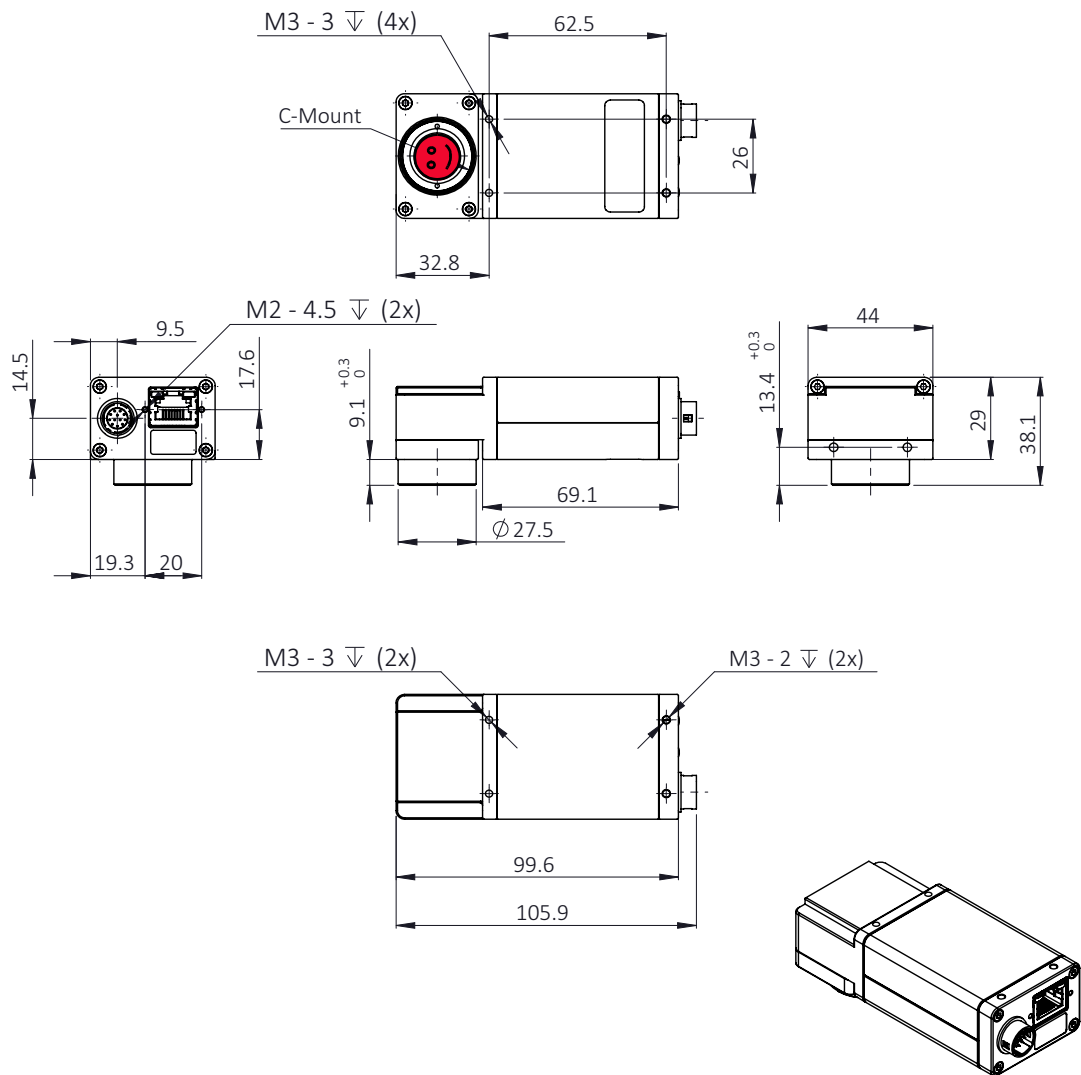
Figure 91: Manta type B W270 housing dimensions (including connectors)

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-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236
Mount: C-Mount
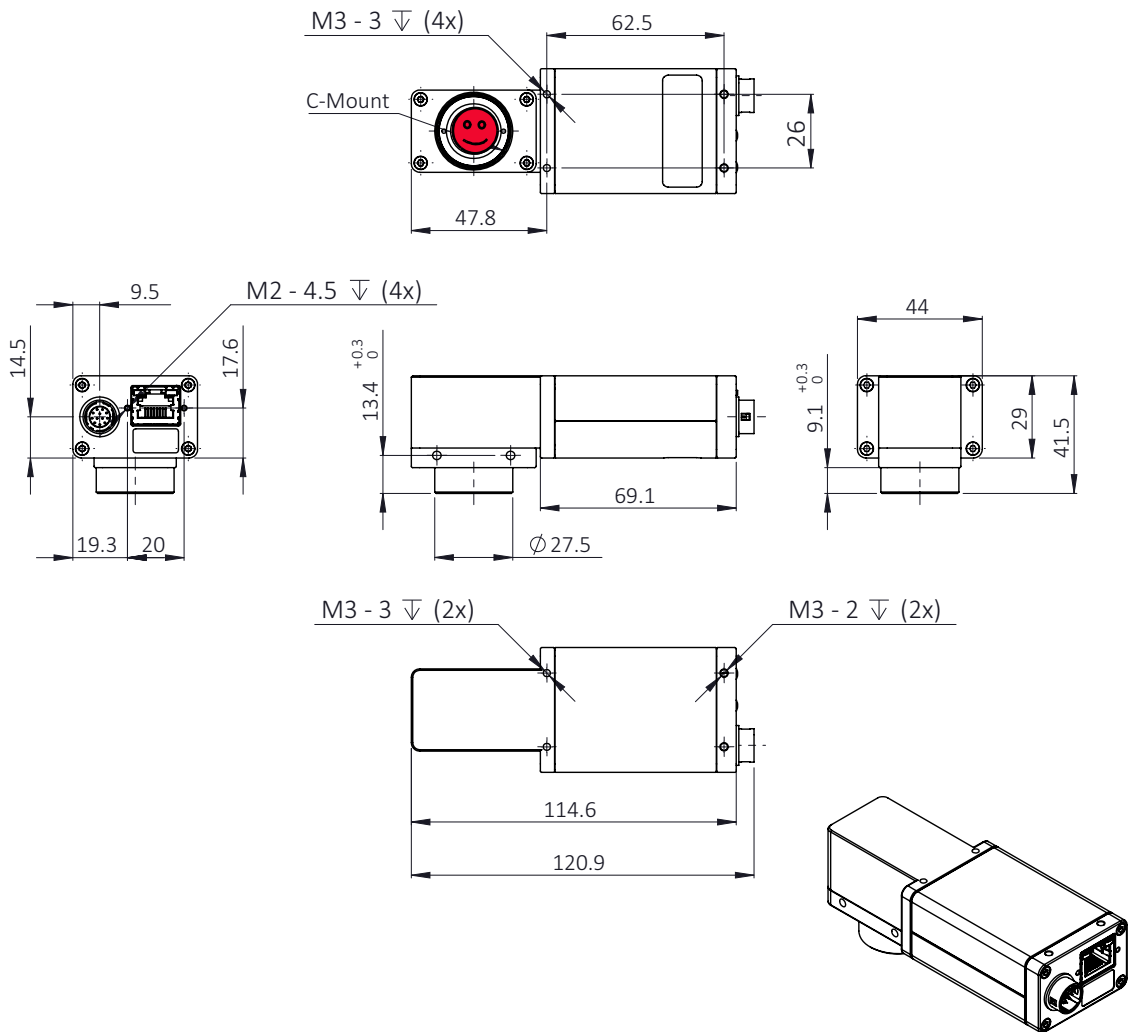
Figure 92: Manta type B W270 S90 housing dimensions (including connectors)

Board level variants

Board level (PoE and non-PoE)

Manta G-223, G-235, G-419

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

1 = GND
    (for RS232, Ext PWR)
2 = Ext PWR input (PWR output on demand)
3 = PWM Output for Auto Iris (Video Type)
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

Figure 93: Manta G-223, G-235, G-419 board level (PoE and non-PoE) dimensions

Manta G-040, G-158, G-319, G-507, G-895, G-1236

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

1 = GND
    (for RS232, Ext PWR)
2 = Ext PWR input (PWR output on demand)
3 = PWM Output for Auto Iris (Video Type)
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

Figure 94: Manta G-040, G-158, G-319, G-507, G-895, G-1236 board level (PoE and non-PoE) dimensions

Board level (PoE and non-PoE) C-Mount

Manta G-223, G-235, G-419
Mount: C-Mount
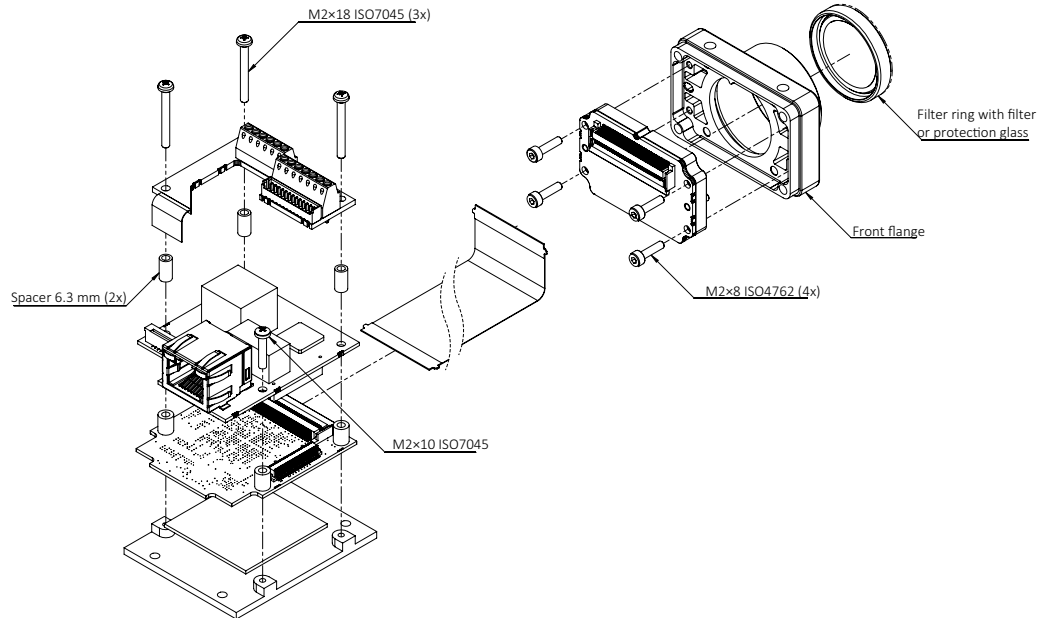
Figure 95: Manta G-223, G-235, G-419 board level (PoE and non-PoE) C-Mount

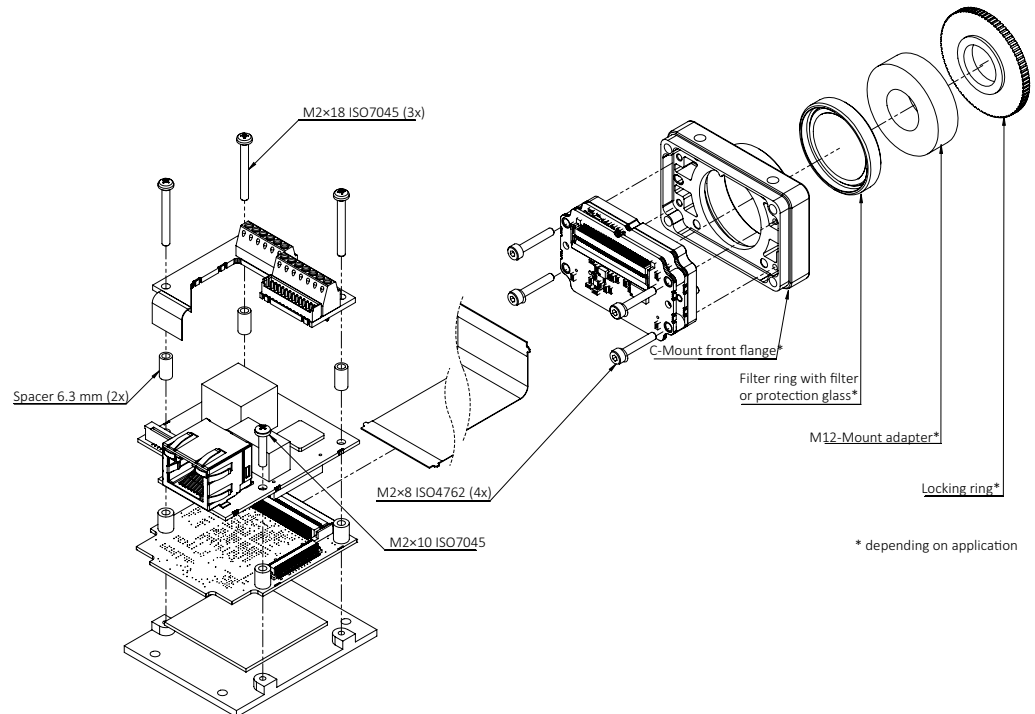Manta G-040, G-158, G-319, G-507, G-895, G-1236
Mount: C-Mount
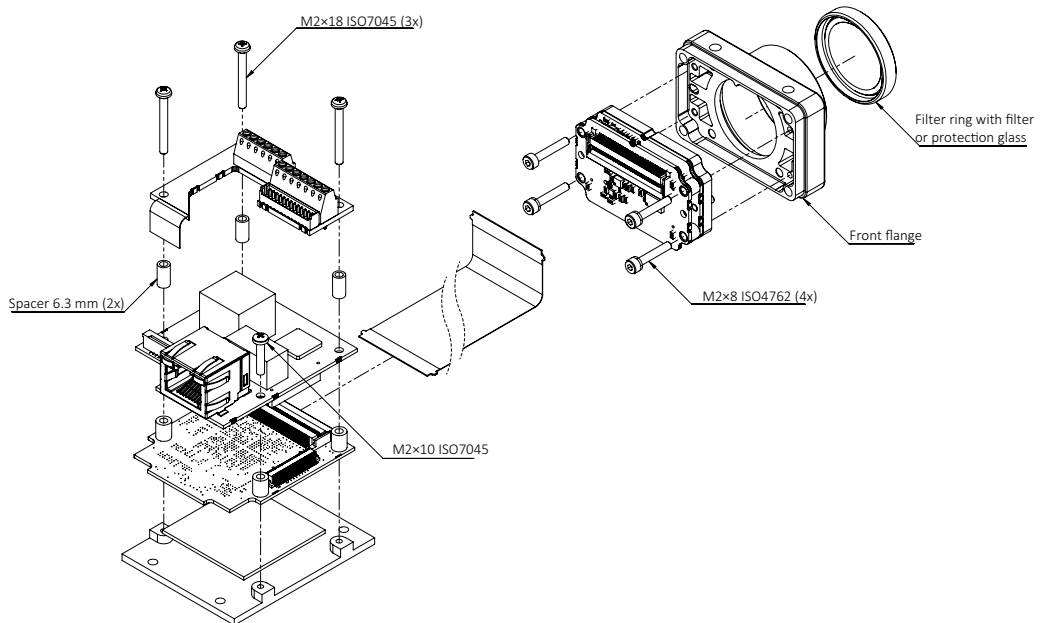
Figure 96: Manta G-040, G-158, G-319, G-507, G-895, G-1236 board level (PoE and non-PoE) C-Mount

Board level (PoE and non-PoE) CS-Mount

Manta G-223, G-235, G-419
Mount: CS-Mount
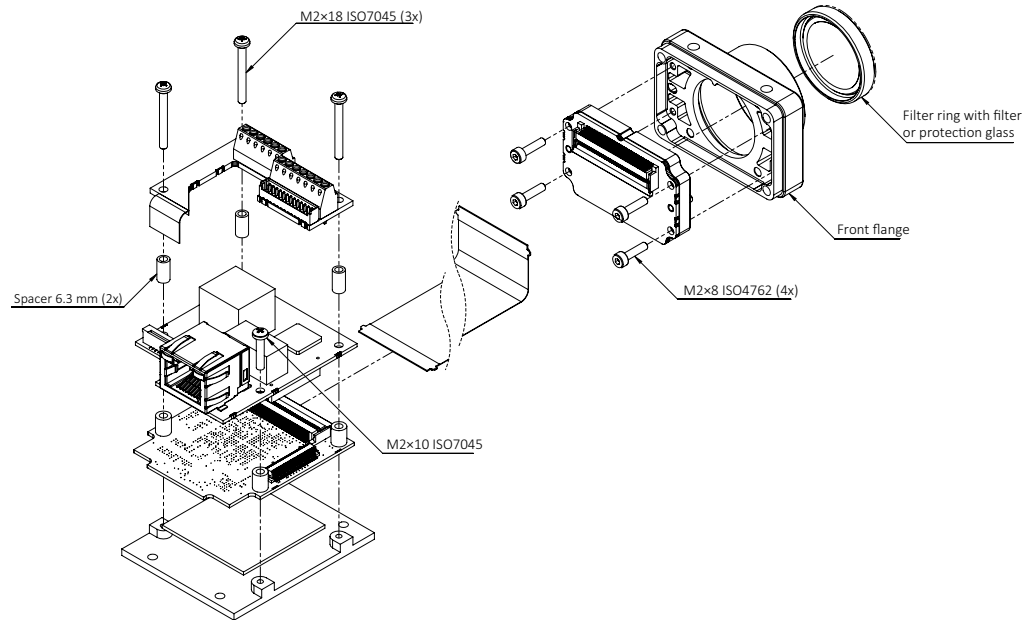
Figure 97: Manta G-223, G-235, G-419 board level (PoE and non-PoE) CS-Mount

Manta G-040, G-158, G-319, G-507, G-895, G-1236
Mount: CS-Mount
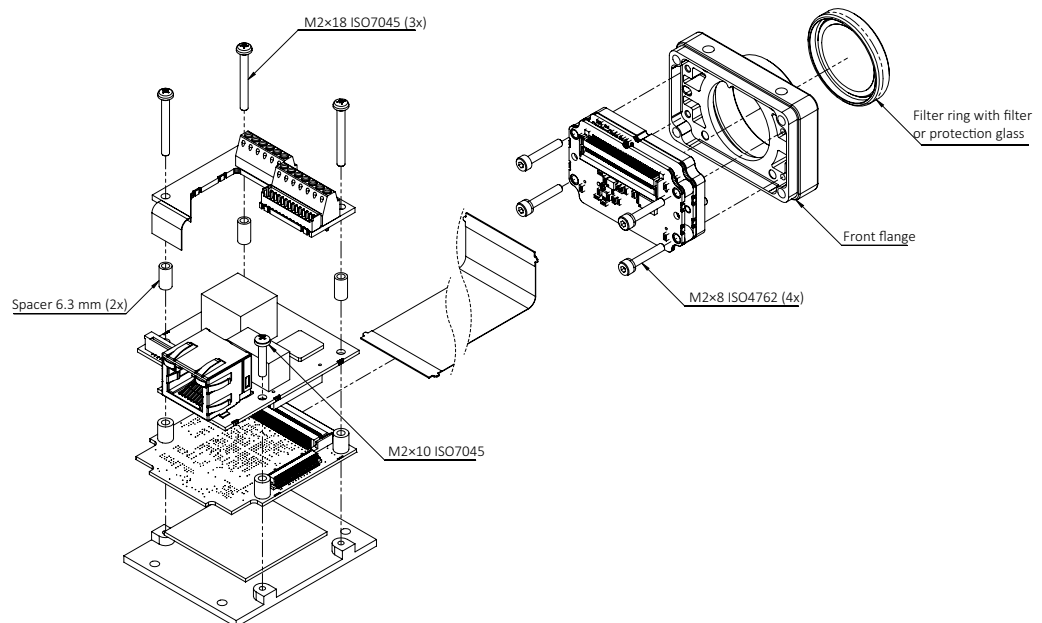
Figure 98: Manta type B board level (PoE and non-PoE) CS-Mount

Board level (PoE and non-PoE) M12-Mount

Manta G-223, G-235, G-419
Mount: M12-Mount
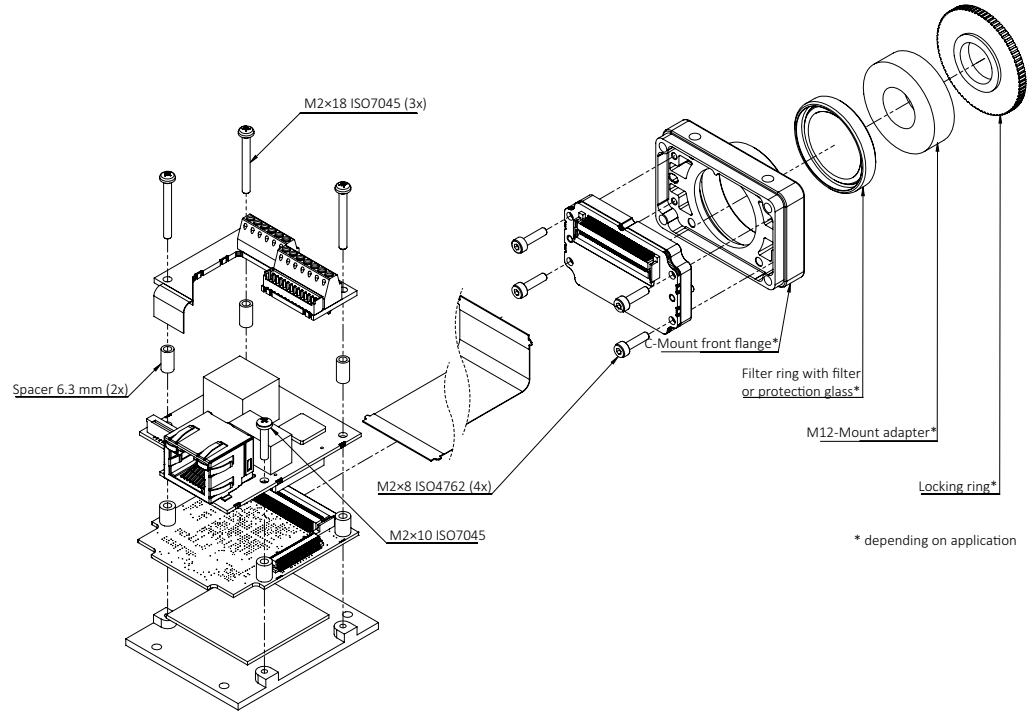
Figure 99: Manta G-223, G-235, G-419 board level (non-PoE and PoE) M12-Mount

Manta G-040, G-158, G-319, G-507, G-895, G-1236
Mount: M12-Mount

Figure 100: Manta G-040, G-158, G-319, G-507, G-895, G-1236 board level (non-PoE and PoE) M12-Mount

C-Mount cross section

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

Protection glass and filter options

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

Maximum protrusion

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

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

Manta G-040, G-158, G-235, G-319, G-507
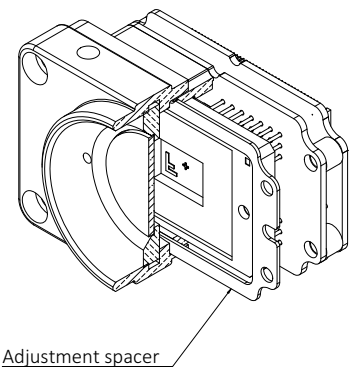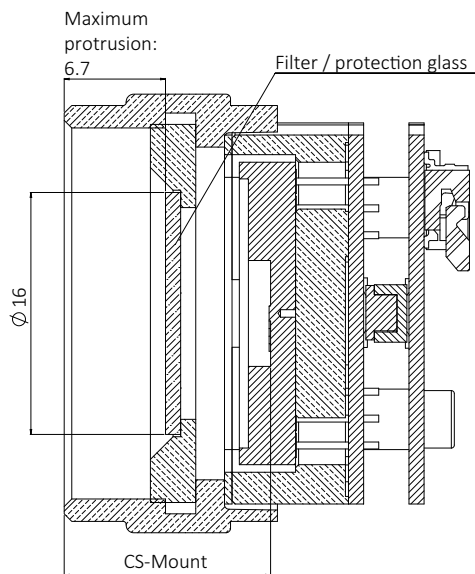Filter/Protection glass diameter: 16 mm
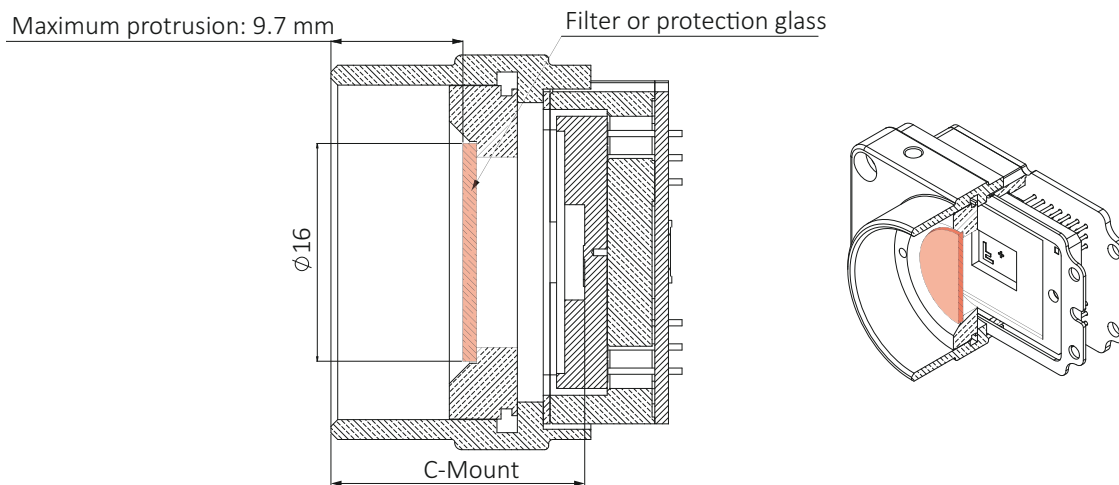
Figure 101: Manta type B C-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236
Filter/Protection glass diameter: 22 mm
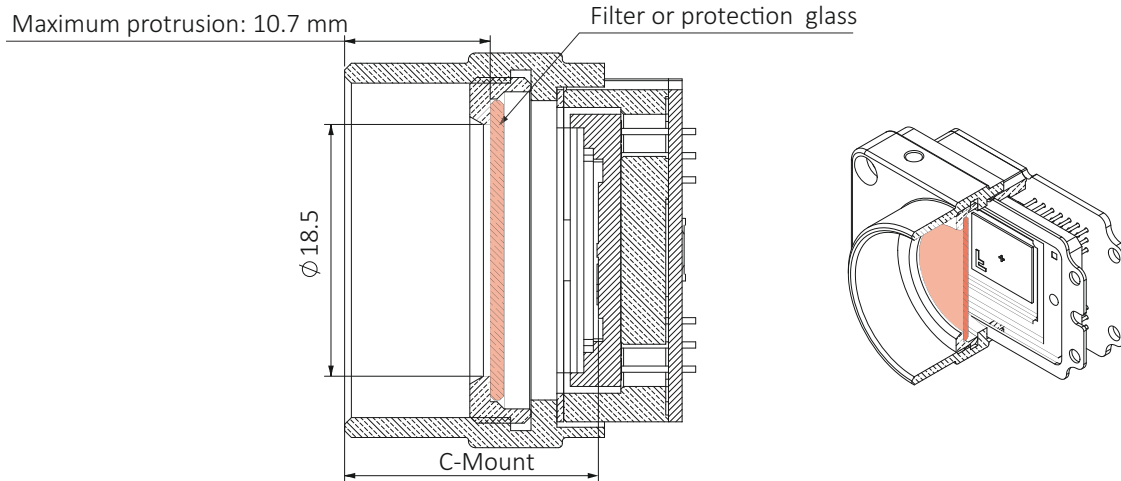
Figure 102: Manta type B C-Mount dimensions (22 mm filter)

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, contact Allied Vision support at https://www.alliedvision.com/en/support/contact-support-and-repair.html.

CS-Mount cross section

Protection glass and filter options

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

Maximum protrusion

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

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

Manta G-040, G-158, G-235, G-319, G-507
Filter/Protection glass diameter: 16 mm

Figure 103: Manta type B CS-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236
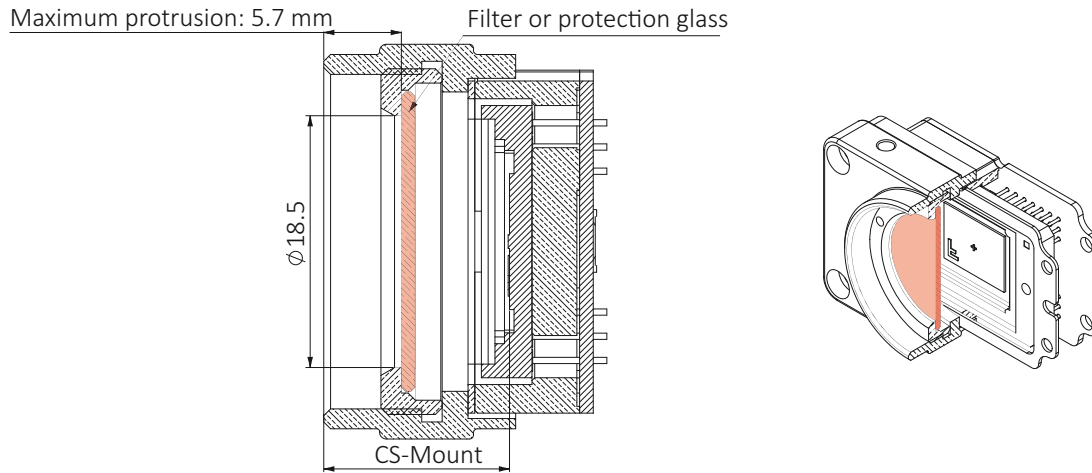Filter/Protection glass diameter: 22 mm

Figure 104: 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, contact Allied Vision support at https://www.alliedvision.com/en/support/contact-support-and-repair.html.
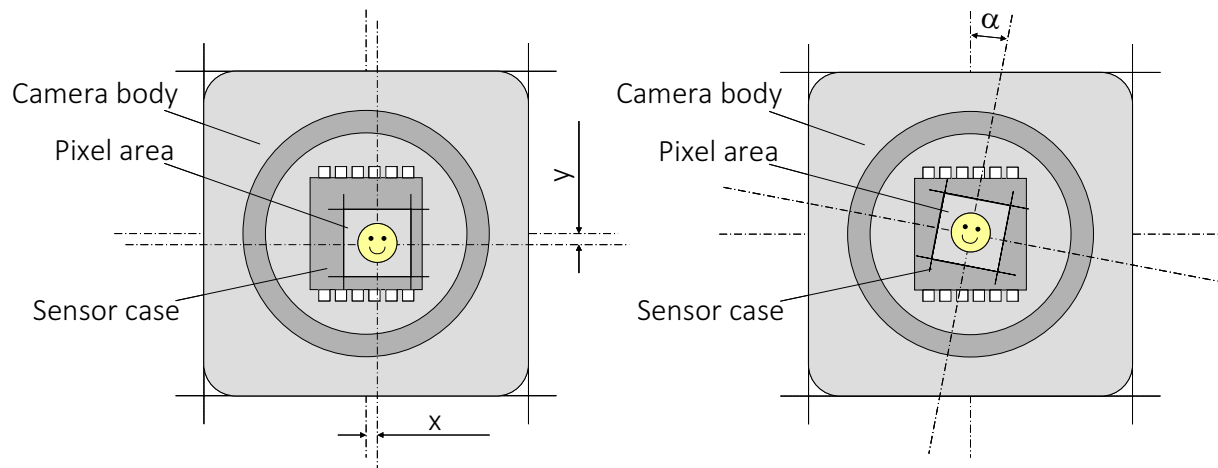
Sensor position accuracy

Figure 105: Sensor position accuracy

Unless stated otherwise, the following values are applicable:

Criteria	Subject	Properties
Alignment method		Optical alignment of photo sensitive sensor area into camera front module (lens mount front flange).
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 as the deviation from the parallel to the camera bottom)

*Table 53: 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 × height) depending on sensor size, distance and focal length of the lens.
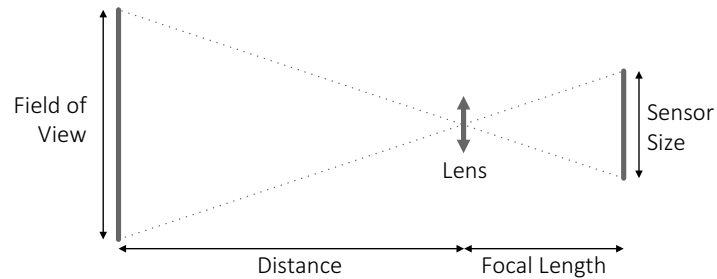
Focal length

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

Contact your Allied Vision Sales team or your Allied Vision distribution partner 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 × height depending on camera type, distance and the focal length of the lens.

Manta G-031B, G-031C

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

Table 54: Manta G-031B, G-031C focal length vs. field of view

Manta G-032B, G-032C

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

Table 55: Manta G-032B, G-032C focal length vs. field of view

Manta G-033B, G-033C

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

Table 56: Manta G-033B, G-033C focal length vs. field of view

Manta G-040B, G-040C

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
2.8 mm	888 × 666 mm	1781 × 1336 mm
4 mm	620 × 465 mm	1245 × 934 mm
4.2 mm	590 × 443 mm	1185 × 889 mm
4.8 mm	516 × 387 mm	1037 × 778 mm
6 mm	412 × 309 mm	828 × 621 mm
6.5 mm	380 × 285 mm	764 × 573 mm
8 mm	308 × 231 mm	620 × 465 mm
12 mm	203 × 153 mm	412 × 309 mm
16 mm	151 × 113 mm	308 × 231 mm
25 mm	95 × 71 mm	195 × 146 mm

Table 57: Manta G-040B, G-040C focal length vs. field of view

Manta G-125B, G-125C

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

Table 58: Manta G-125B, G-125C focal length vs. field of view

Manta G-145B, G-145C

(including Manta G-145B-30fps and G-145C-30fps)

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

Table 59: Manta G-145B, G-145C focal length vs. field of view

Manta G-145B NIR

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

Table 60: Manta G-145B NIR focal length vs. field of view

Manta G-146B, G-146C

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

Table 61: Manta G-146B, G-146C focal length vs. field of view

Manta G-158B, G-158C

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
2.8 mm	888 × 666 mm	1781 × 1336 mm
4 mm	620 × 465 mm	1245 × 934 mm
4.2 mm	590 × 443 mm	1185 × 889 mm
4.8 mm	516 × 387 mm	1037 × 778 mm
6 mm	412 × 309 mm	828 × 621 mm
6.5 mm	380 × 285 mm	764 × 573 mm
8 mm	308 × 231 mm	620 × 465 mm
12 mm	203 × 153 mm	412 × 309 mm
16 mm	151 × 113 mm	308 × 231 mm
25 mm	95 × 71 mm	195 × 146 mm

Table 62: Manta G-158B, G-158C focal length vs. field of view

Manta G-201B, G-201C

(including Manta G-201B-30fps and G-201C-30fps)

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

Table 63: Manta G-201B, G-201C focal length vs. field of view

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

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

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

Table 64: Manta G-223B, G-223B NIR, G-223C focal length vs. field of view

Manta G-235B, G-235C

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

Table 65: Manta G-235B, G-235C focal length vs. field of view

Manta G-282B, G-282C

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

Table 66: Manta G-282B, G-282C focal length vs. field of view

Manta G-283B, G-283C

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

Table 67: Manta G-283B, G-283C focal length vs. field of view

Manta G-319B, G-319C

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

Table 68: Manta G-319B, G-319C focal length vs. field of view

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

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

Table 69: Manta G-419B, G-419B NIR, G-419C focal length vs. field of view

Manta G-504B, G-504C

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

Table 70: Manta G-504B, G504C focal length vs. field of view

Manta G-505B, G-505C

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

Table 71: Manta G-505B, G-505C focal length vs. field of view

Manta G-507B, G-507C

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

Table 72: Manta G-507B, G-507C focal length vs. field of view

Manta G-895B, G-895C

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
12 mm	577 × 305 mm	1168 × 618 mm

Table 73: Manta G-895B, G-895C focal length vs. field of view

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
16 mm	429 × 227 mm	873 × 462 mm
25 mm	270 × 143 mm	553 × 293 mm
35 mm	189 × 100 mm	391 × 286 mm
50 mm	128 × 68 mm	270 × 143 mm
100 mm	57 × 30 mm	128 × 68 mm
135 mm	38 × 20 mm	91 × 48 mm

Table 73: Manta G-895B, G-895C focal length vs. field of view

Manta G-917B, G-917C

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

Table 74: Manta G-917B, G-917C focal length vs. field of view

Manta G-1236B, G-1236C

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
12 mm	577 × 422 mm	1168 × 855 mm
16 mm	429 × 314 mm	873 × 638 mm
25 mm	270 × 197 mm	553 × 405 mm
35 mm	189 × 138 mm	391 × 286 mm
50 mm	128 × 93 mm	270 × 197 mm
100 mm	57 × 42 mm	128 × 93 mm
135 mm	38 × 28 mm	91 × 67 mm

Table 75: Manta G-1236B, G-1236C focal length vs. field of view

IR cut filter

Color models are equipped with an IR cut filter. The following illustration shows the spectral transmission of the IR cut filter.
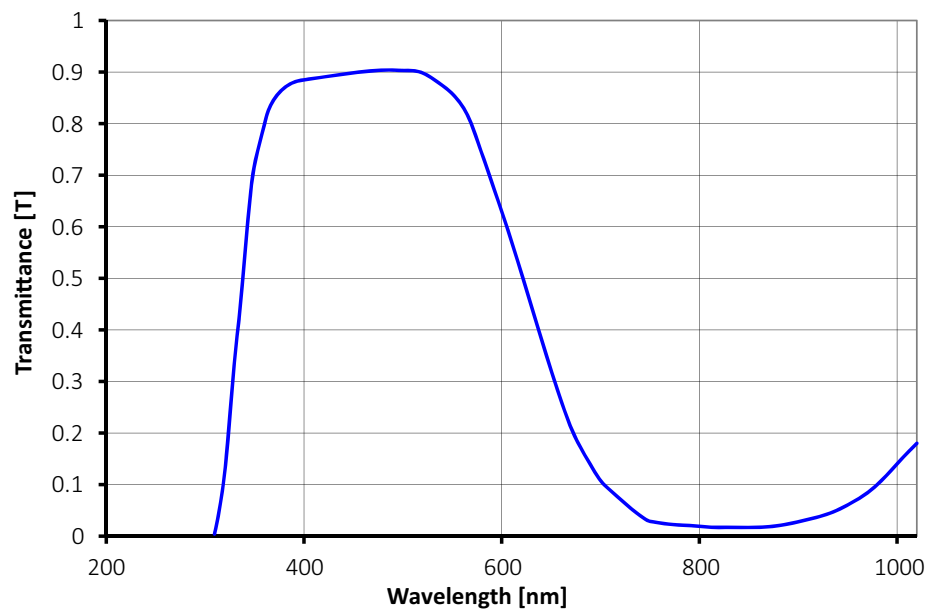
Figure 106: Approximate spectral transmission of a Hoya C-5000 type IR cut filter (may vary slightly by filter lot)

Camera interfaces
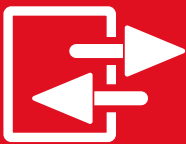
This chapter includes:

- 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
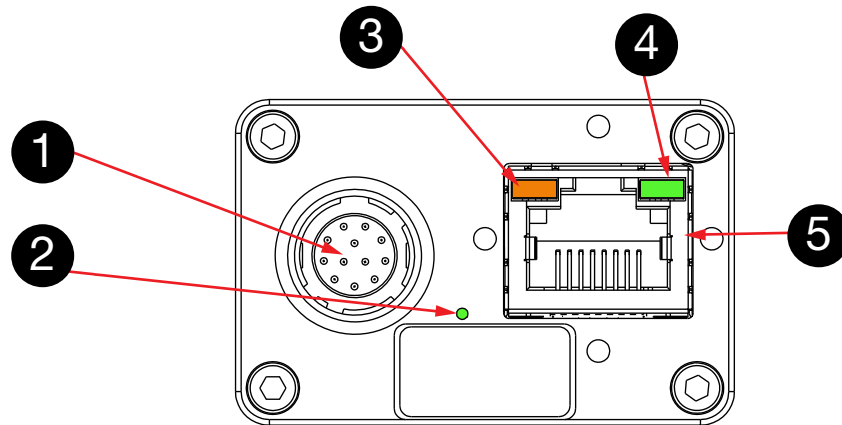
Figure 107: Rear view of Manta type A camera

1	Hirose I/O port
2	LED 3 (only for Manta type A 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 models: Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, and G-504.

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

Table 76: Status LED 1

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

Table 77: Status LED 2

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

Table 78: Status LED 3

Manta type B status LEDs

The tables below describe the status LEDs of Manta type B cameras: Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, and G-1236.

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

Table 79: 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 80: 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. Applications with longer cable lengths or harsh EMI conditions require Category 7 (or higher) cables.

- Cable lengths up to 100 meters 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 Mbit/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

Contact the Allied Vision Sales team or your local Allied Vision distribution partner for more information on available accessories:

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). 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.

Camera side Hirose HR10- 10R-12PA(73) connector					I/O cable color code
Pin	**Signal**	**Direction**	**Level**	**Description**	
1	Camera GND	In	GND for RS232 and external power	Ground for camera power supply and RS232	Blue
2	Camera Power	In	8 to 30 VDC	Camera power supply	Red
3	Auto Iris (Video Type) Out	Out	---	Auto Iris (Video Type) (≥ firmware version 01.44.00)	Pink
4	In 1	In	Standard and PoE models: 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)	Grey

Table 81: Camera I/O connector pin assignment and Manta I/O cable color coding

Camera side Hirose HR10- 10R-12PA(73) connector					I/O cable color code
Pin	Signal	Direction	Level	Description	
5	---	---	---	---	Yellow
6	Out 1	Out	Open emitter, maximum 10 mA	Opto-isolated output 1 (SyncOut1)	Green
7	Isolated In GND	In/Out	---	Isolated input signal ground	Brown
8	RxD RS232	In	RS232	Terminal receive data	White
9	TxD RS232	Out	RS232	Terminal transmit data	Black
10	Isolated Out Power	In	Common VCC for outputs, maximum 30 VDC	Power input for opto-isolated outputs	Orange
11	In 2	In	Standard and PoE models: U_{in}(high) = 3 to 24 V U_{in}(low) = 0 to 1.0 V	Opto-isolated input 2 (SyncIn2)	White/Black
12	Out 2	Out	Open emitter, maximum 10 mA	Opto-isolated output 2 (SyncOut2)	White/ Brown

Table 81: Camera I/O connector pin assignment and Manta I/O cable color coding (continued)

Cable color and pin out

For cable color and pin out information, see the *Allied Vision I/O cable data sheet*:

https://www.alliedvision.com/en/support/technical-documentation/accessories-data-sheets.html
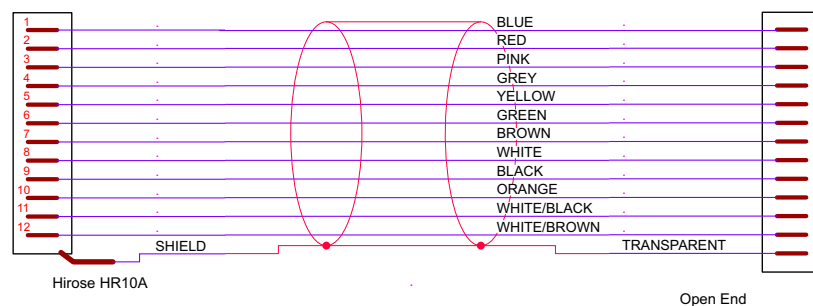
Figure 108: Manta cable color coding

Input block diagram
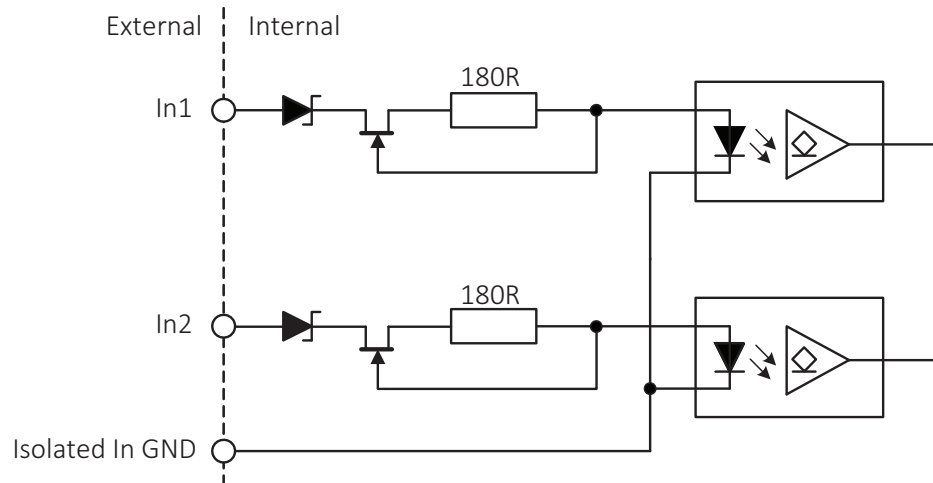
Figure 109: Input block diagram

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 up to serial number 503323258, 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 82: Input parameters

Minimum pulse width

The minimum pulse width for all Manta cameras is:
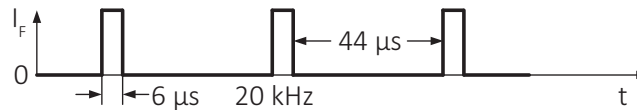
Figure 110: Minimum pulse width

Test conditions

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

Output block diagram
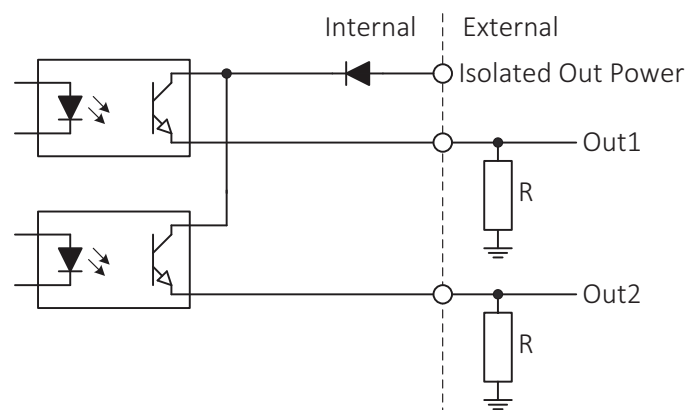
Figure 111: Output block diagram

- 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 83: Isolated out power and external resistor

Output switching times
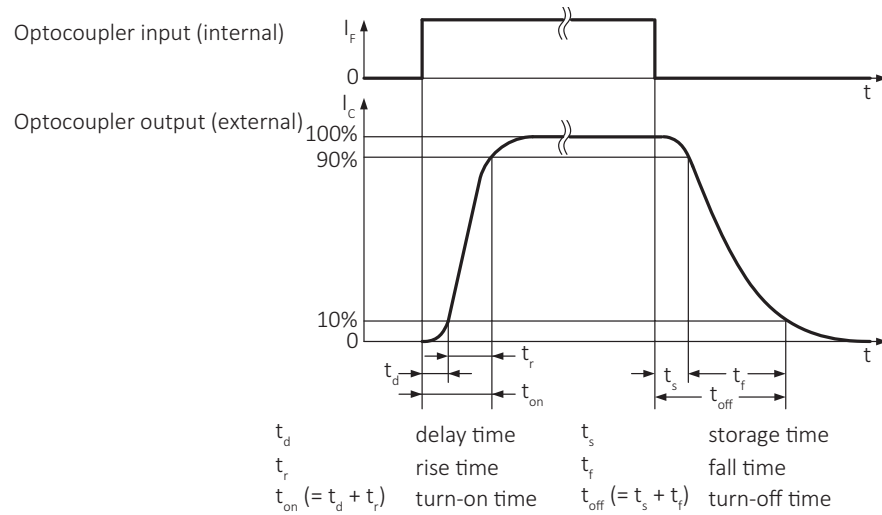
Figure 112: Output switching times

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 84: Output parameters

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.

Auto Iris (video type) 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. Consult your video type auto iris lens specifications for the appropriate drive voltage.
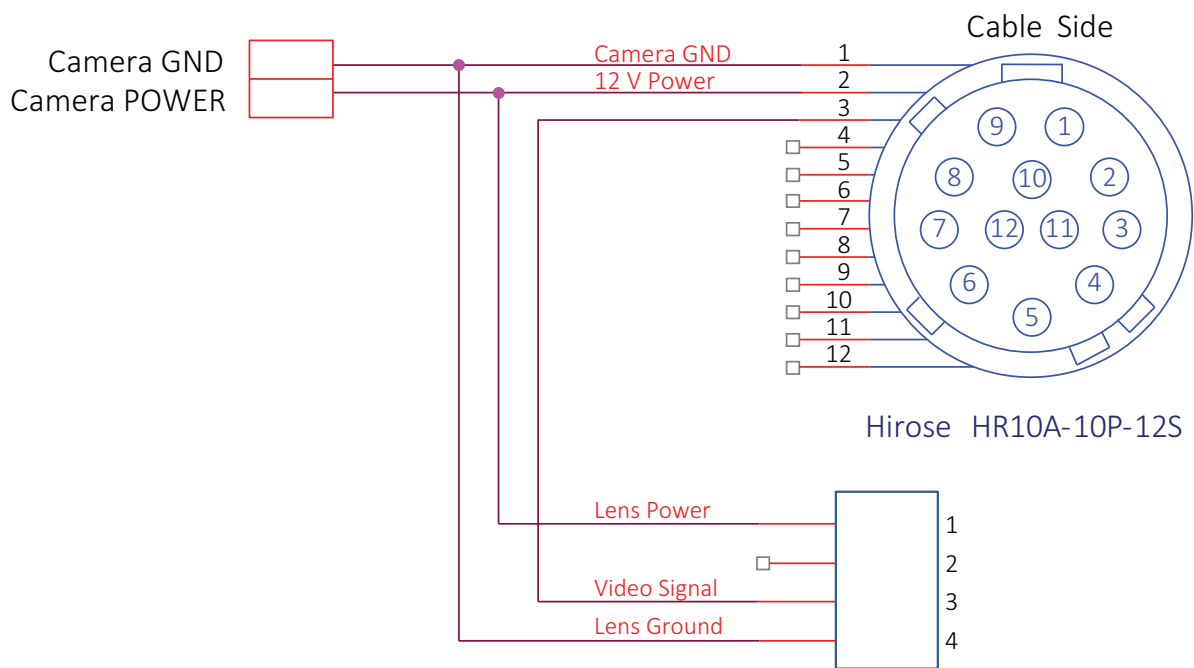
Figure 113: Auto Iris (video type) schematic

Control signals

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

Input block diagram
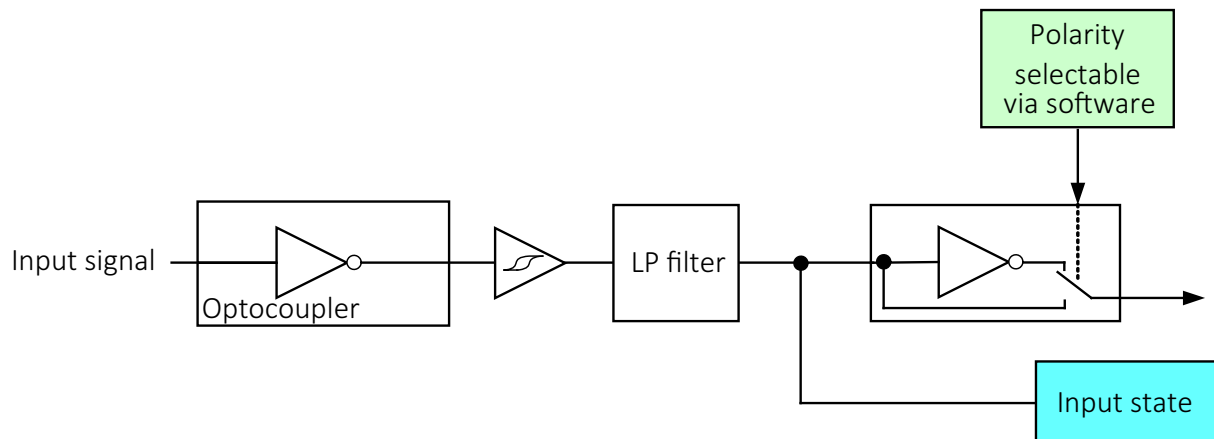
Figure 114: Input block diagram

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 85: 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 85: Output signals (continued)

Output block diagram
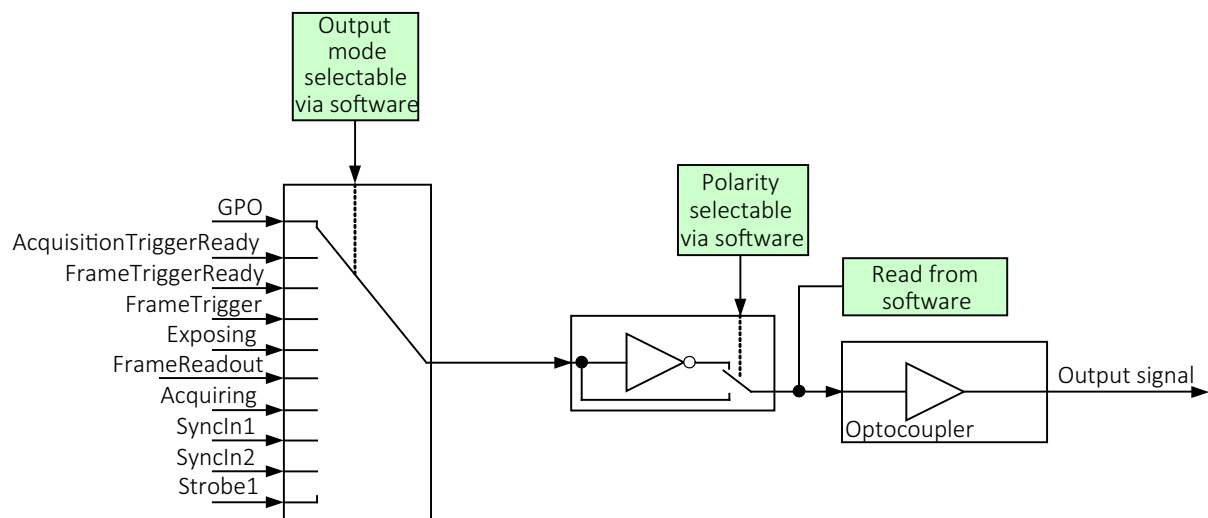
Figure 115: Output block diagram

Trigger timing concept

The following diagram explains the general trigger concept.

For more information on trigger timing and camera control, see the *GigE Features Reference* and *Triggering Concept Application Note*.
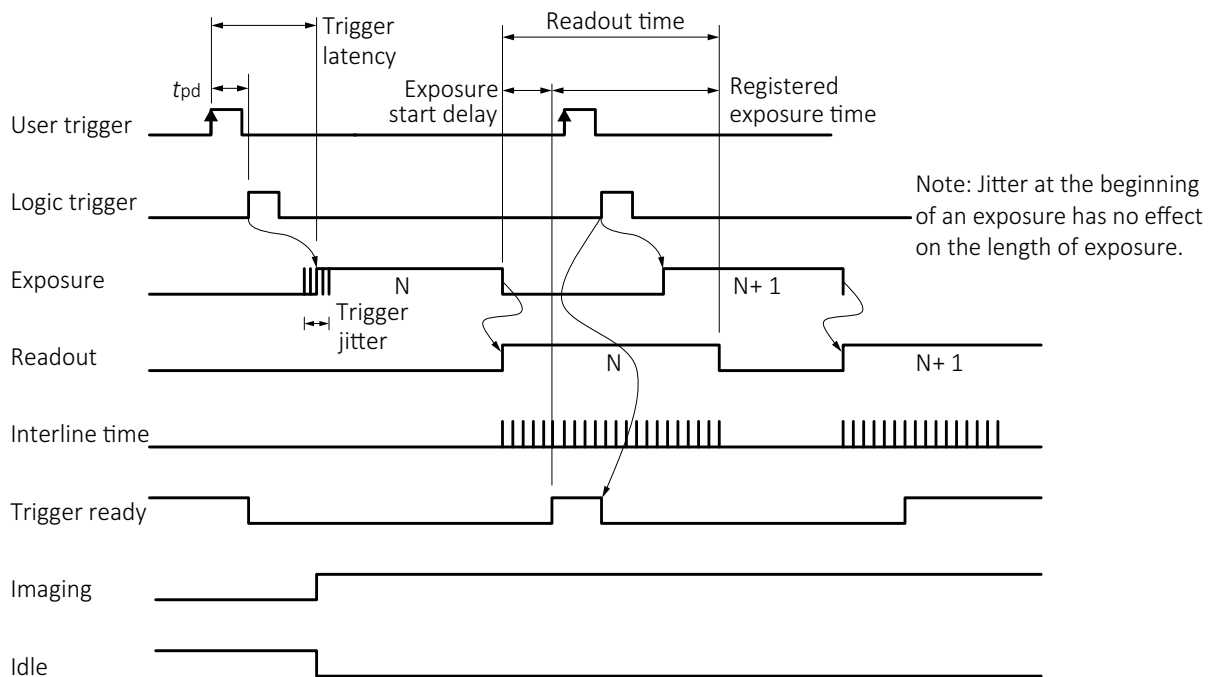
Figure 116: Trigger timing diagram

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 time	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 • exposing and reading out data • reading out data
Idle	High if the camera image sensor is not exposing and/or reading out data.

Table 86: Trigger definitions

Trigger rules

- The user trigger pulse width should be at least 6 µs.
- 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*.

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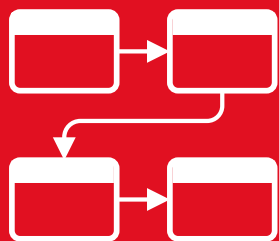
This chapter presents diagrams that illustrate data flow and bit resolution of the image data.

Allied Vision

Camera feature reference

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 models with CCD sensors

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

[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] Color models only
[5] For on-camera interpolated pixel formats only (8-bit output). Raw un-interpolated pixel formats skip this block (8/12 bit output) depending upon the bit depth of pixel format used (color models only).

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

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

Manta models with CMOS sensors

Manta G-223, G-419

[1] Factory calibrated. Not a user control.
[2] Color models only
[3] For on-camera interpolated pixel formats only (8-bit output). Raw un-interpolated pixel formats skip this block (8/12 bit output) depending upon the bit depth of pixel format used (color models only).
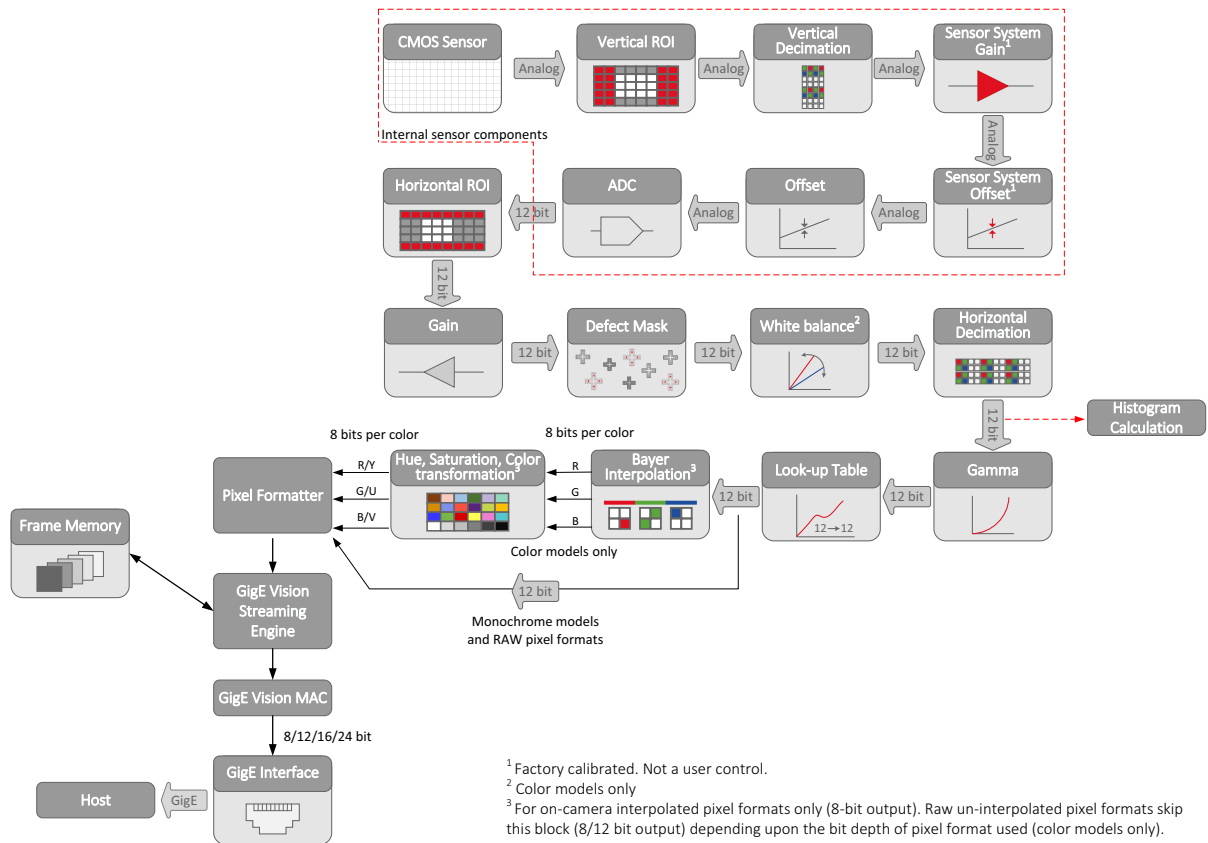
Manta G-040, G-158, G-235,G-319, G-507, G-895, G-1236

[1] Color models only
[2] For on-camera interpolated pixel formats only (8-bit output). Raw un-interpolated pixel formats skip this block (8/12 bit output) depending upon the bit depth of pixel format used (color models only).
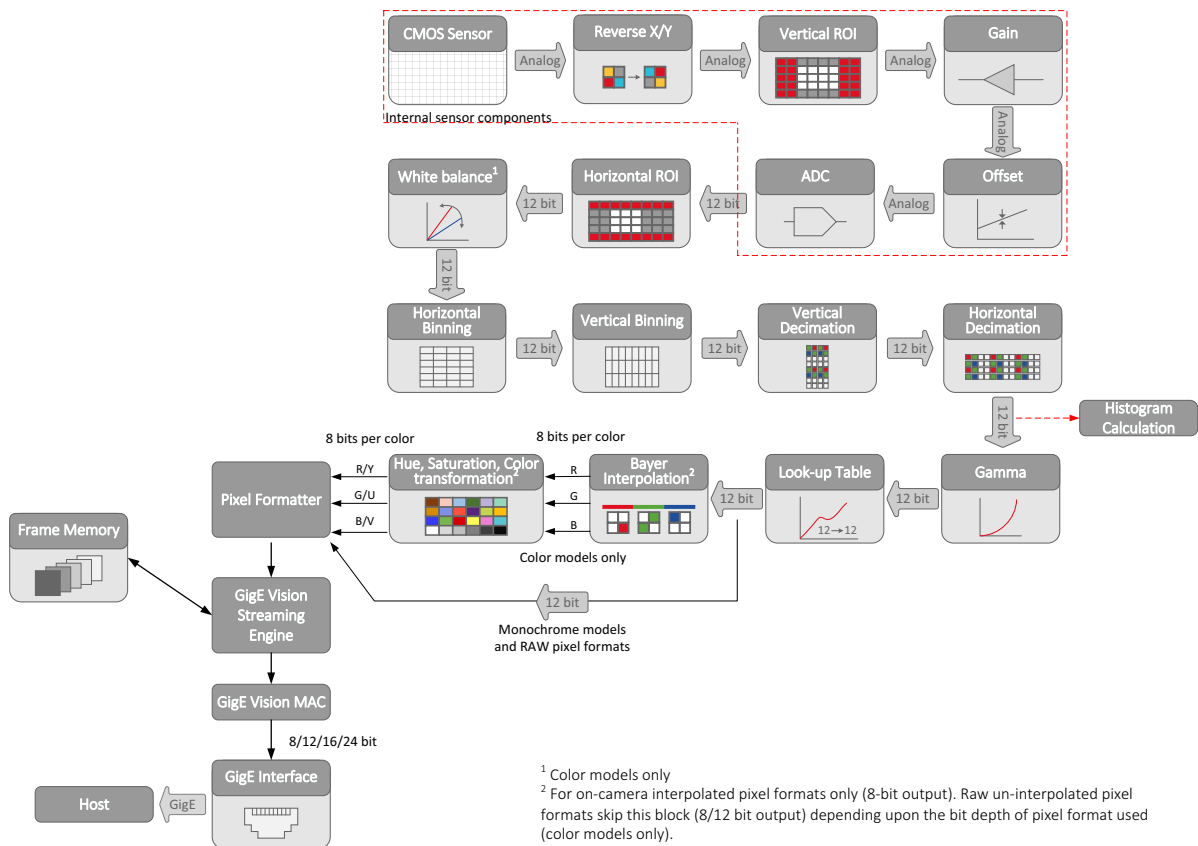
Color interpolation (Bayer demosaicing)

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 (2×2), optimized for both sharpness of contours as well as reduction of false edge coloring.
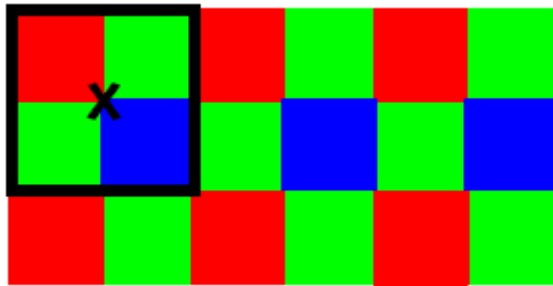
Figure 117: Bayer demosaicing (Manta type A: example of 2×2 matrix)
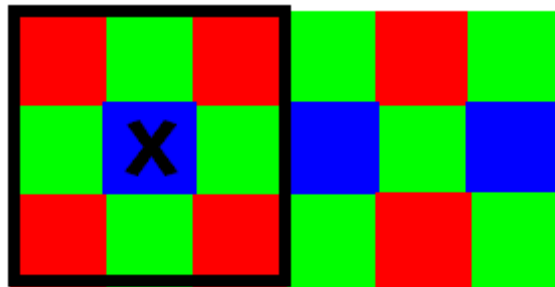
Figure 118: Bayer demosaicing (Manta type B: example of 3×3 matrix)

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:
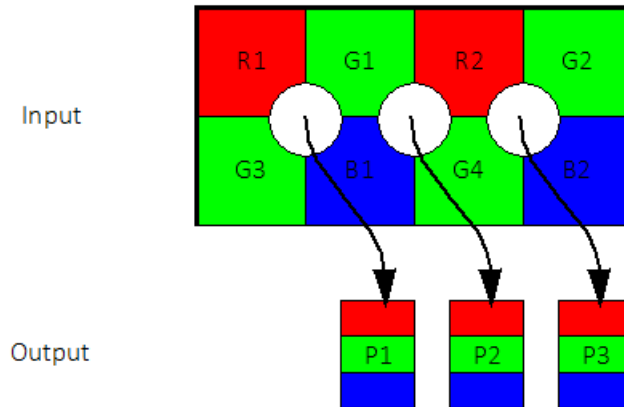
Figure 119: Bayer demosaicing (interpolation)

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

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

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

Figure 120: Bayer demosaicing (Manta type A cameras)

- Note that on the color camera, an 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 a region of interest, x and y resolutions must be even-numbered.

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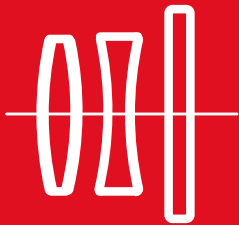
This chapter describes safety instructions and cautions for cleaning lenses, optical filters, protection glass, or sensors.

Contact Allied Vision or your Allied Vision distribution partner 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 in this chapter.
- 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 unless you are trained to clean a camera using this method.

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 lens 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 121: 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 the figure below, 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.
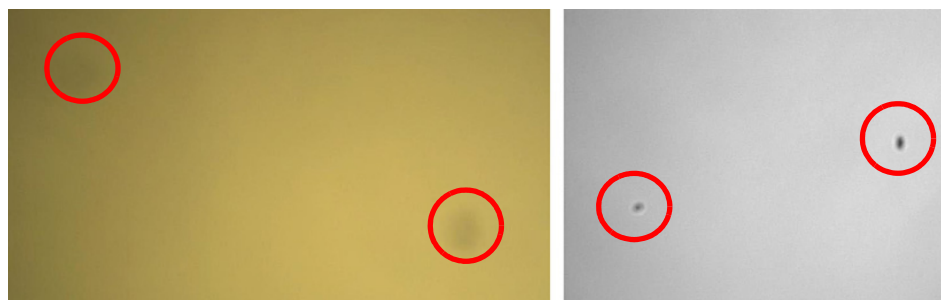
Figure 122: Image with tiny dust on the filter (left) and dust on the sensor (right)

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 16 mm 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.

Optical cleaning liquid material safety data sheets

Read the material safety data sheet (MSDS) for the optical cleaning liquid before cleaning your camera and optics. The MSDS provides important information including hazard identification, first aid measures, handling and storage, and PPE.

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.
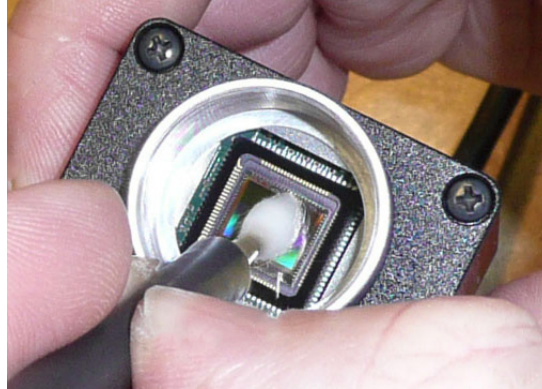
4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.

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, contact your Allied Vision distribution partner.

Cleaning with compressed air

Allied Vision does not recommend cleaning Manta cameras with compressed air.
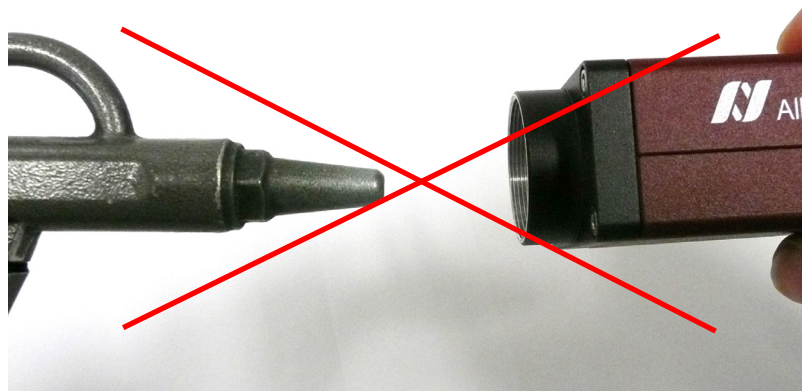
Figure 123: Do not use compressed air

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 *GigE Firmware Release Notes* from the Allied Vision website:

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

Saved camera UserSets

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

Before loading new firmware, backup your current camera settings.

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

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

Possible material damage

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

To update the firmware on your Allied Vision GigE camera

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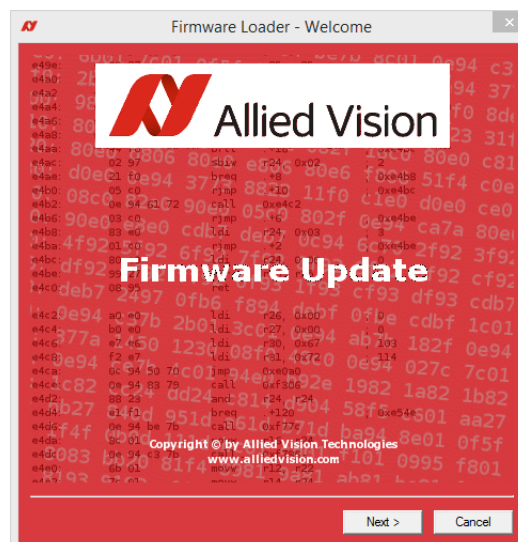
2. Click **Next**. The *Firmware Loader* displays a list of firmware included in the package
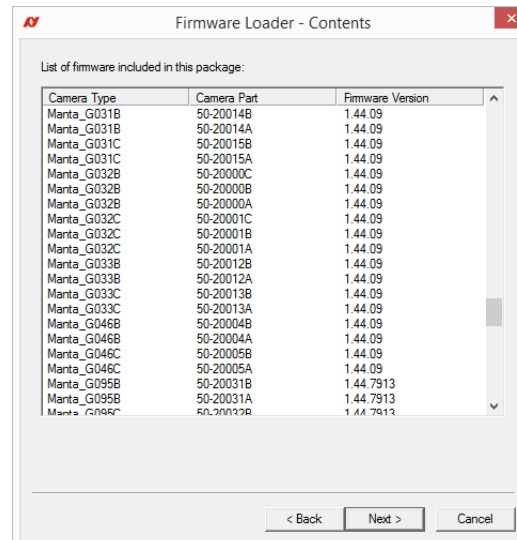
3. Click **Next**. You can select your camera model on this page.
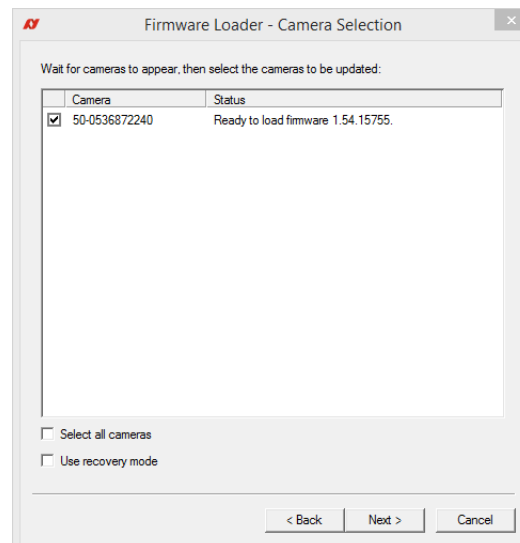
Recovery Mode

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

4. Click **Next**.
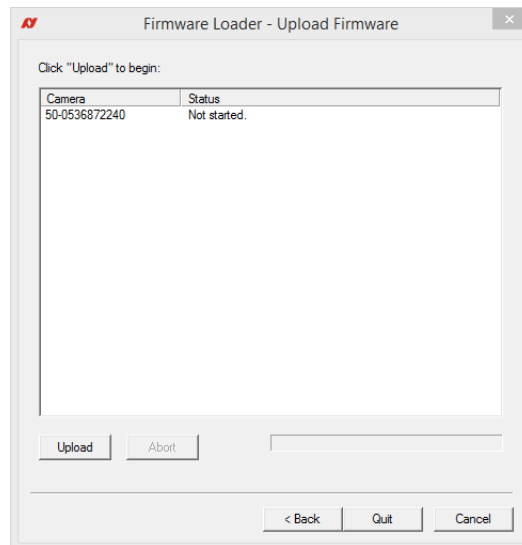
5. Click **Upload** to start the update. The existing firmware will be erased and the new firmware will be updated to the camera.
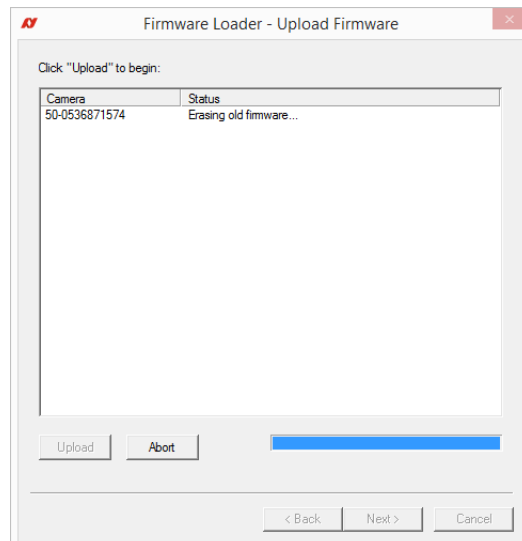
6. The **Firmware Loader** will display a success status upon completion. Click **Quit** to exit the loader.
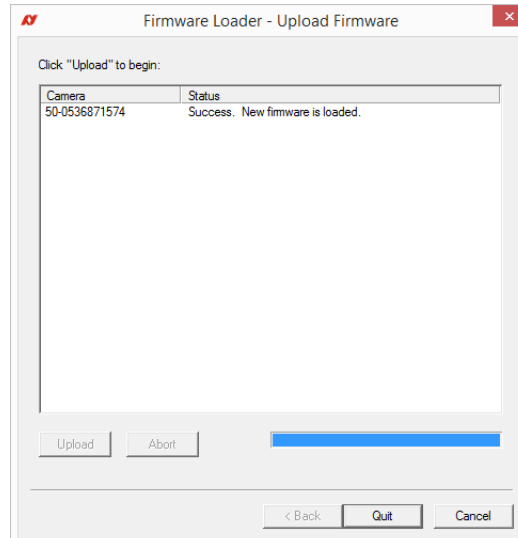
Power cycle after upgrade or downgrade

You should always power cycle the camera after a firmware upgrade or downgrade.

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.

Standard housing

Variant: Non-PoE
Lens mount: C-Mount
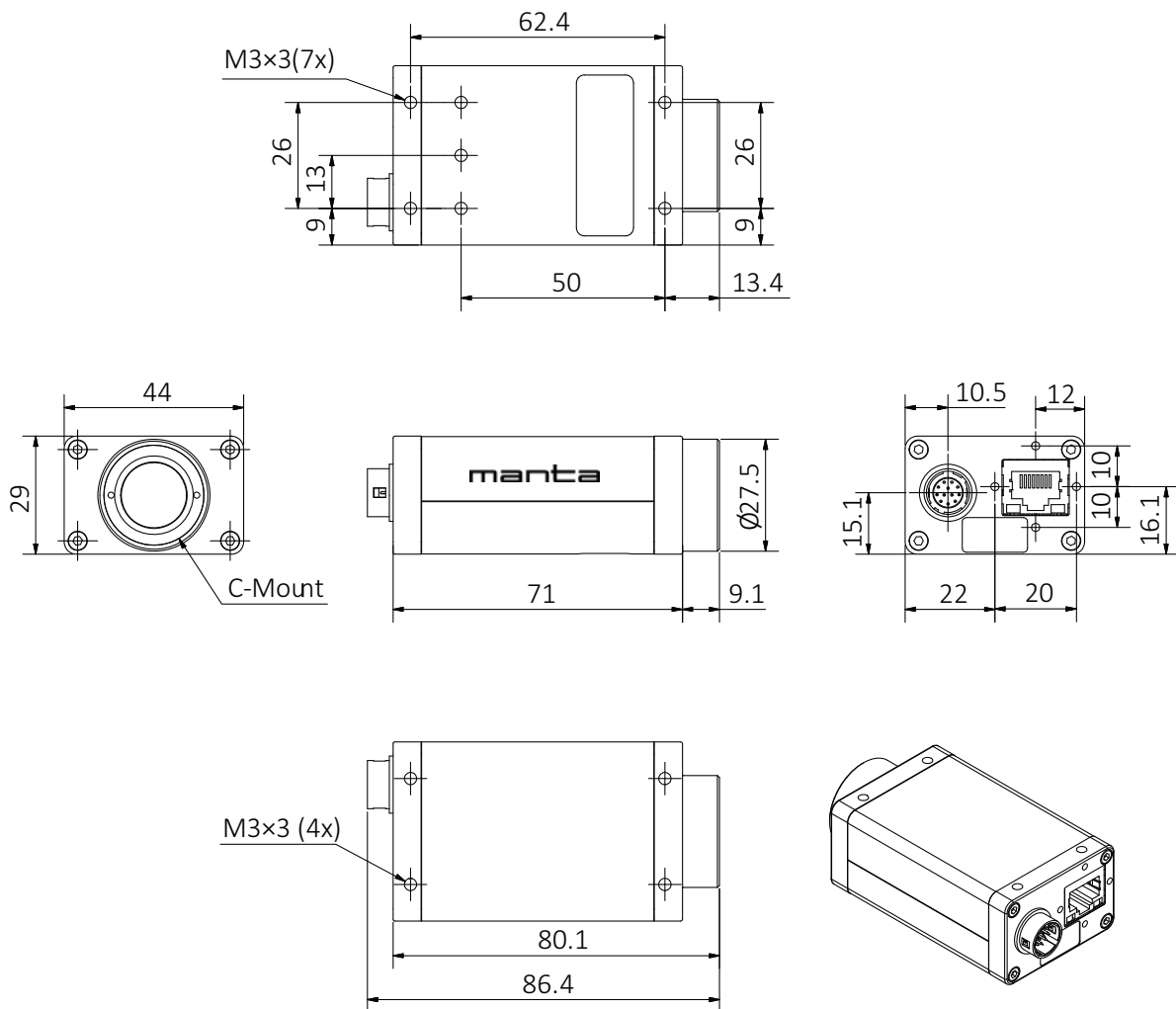
Figure 124: Standard housing dimensions (including connectors)

W90 housing

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

Variant: Non-PoE
Lens mount: C-Mount
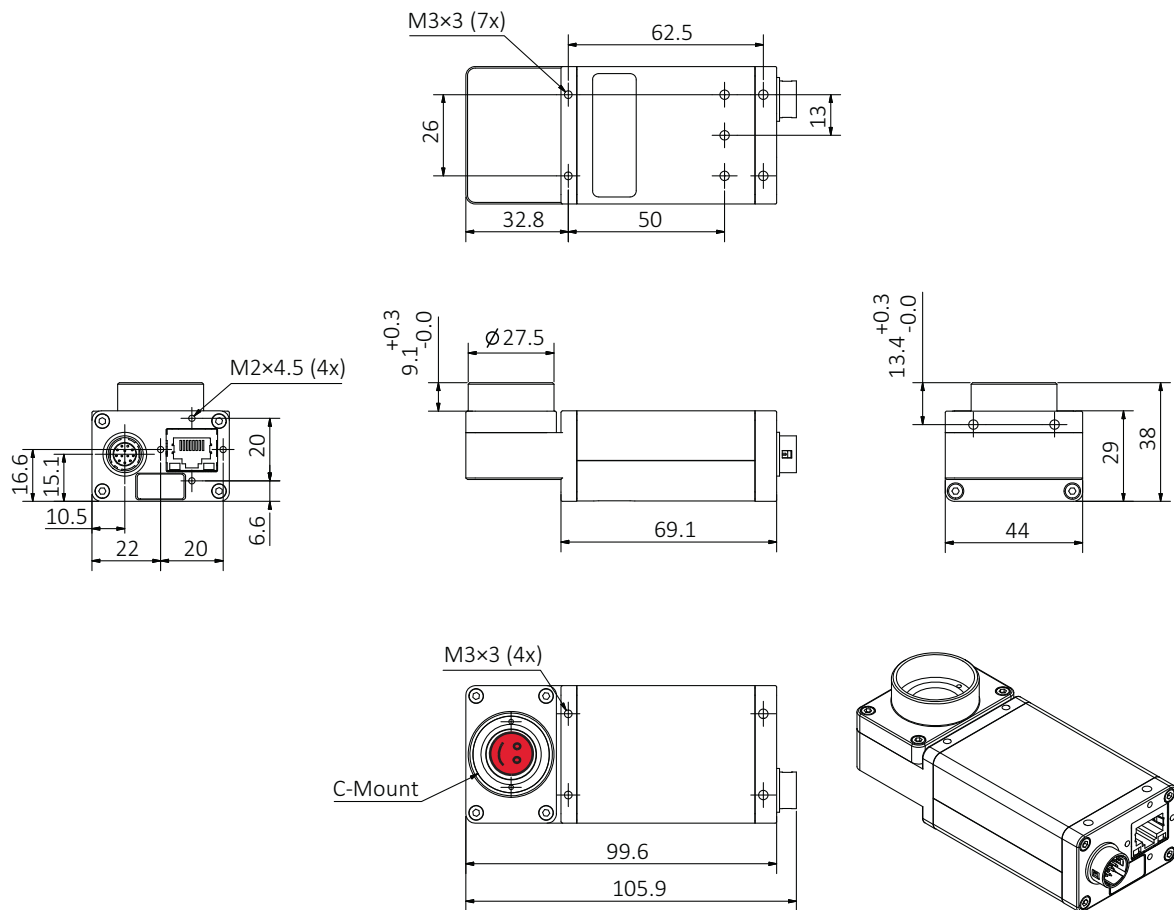
Figure 125: W90 housing dimensions (including connectors)

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
Lens mount: C-Mount
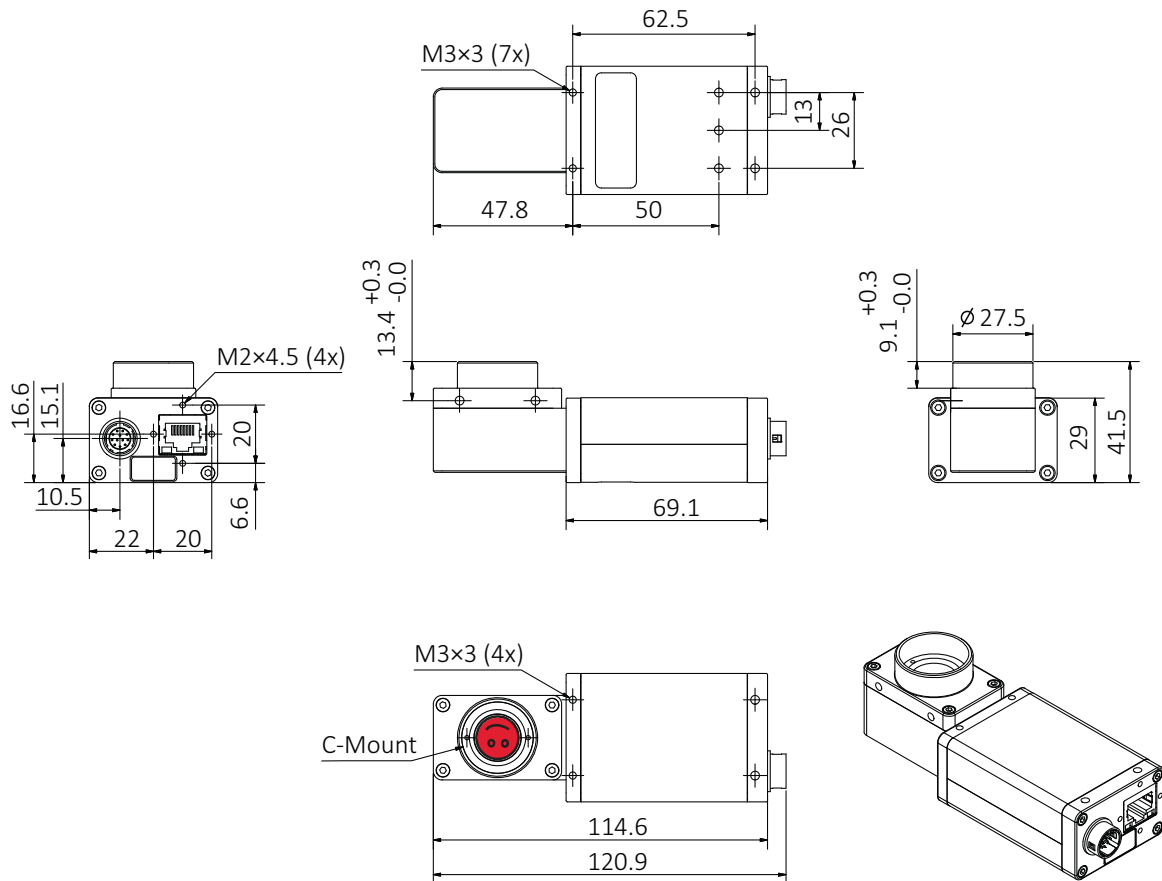
Figure 126: W90 S90 housing dimensions (including connectors)

W270 housing

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

Variant: Non-PoE
Lens mount: C-Mount
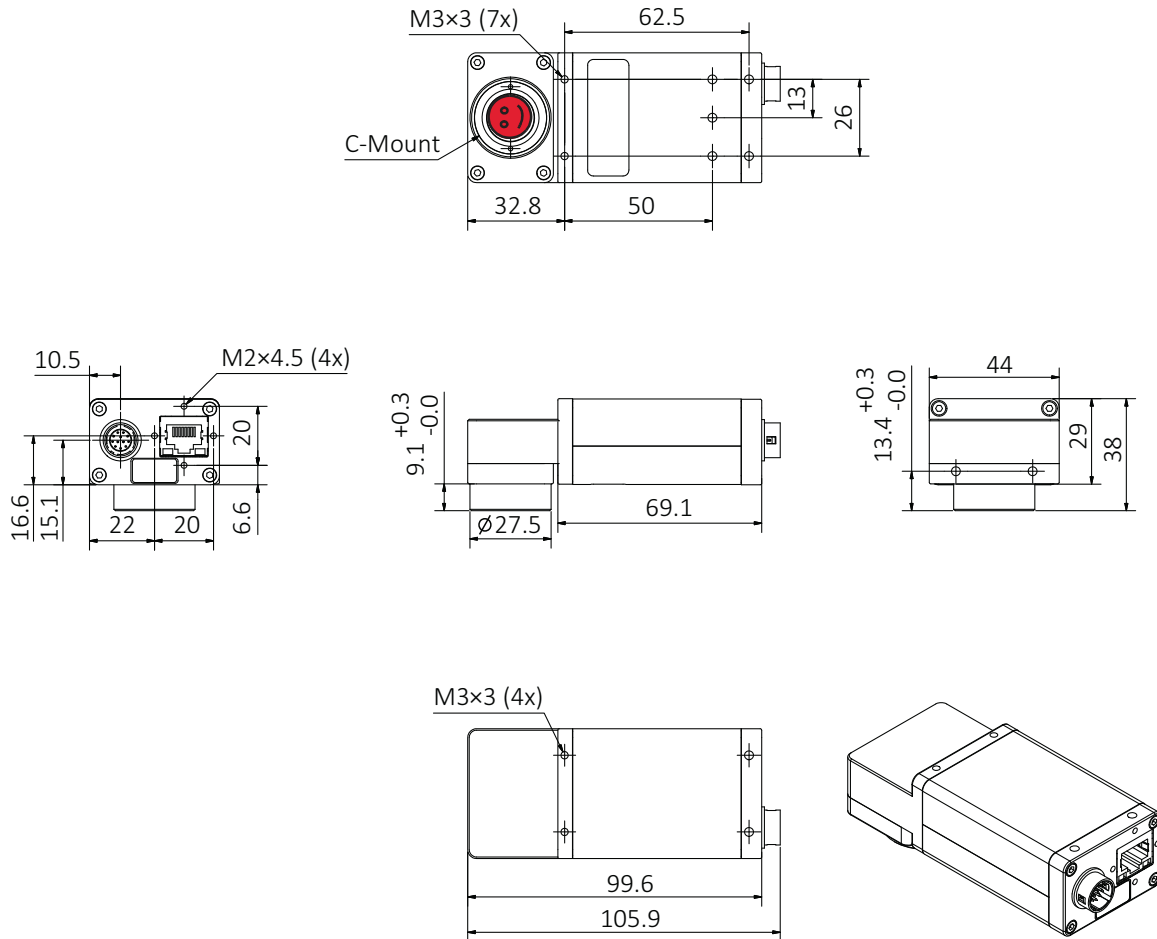
Figure 127: W270 housing dimensions (including connectors)

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
Lens mount: C-Mount
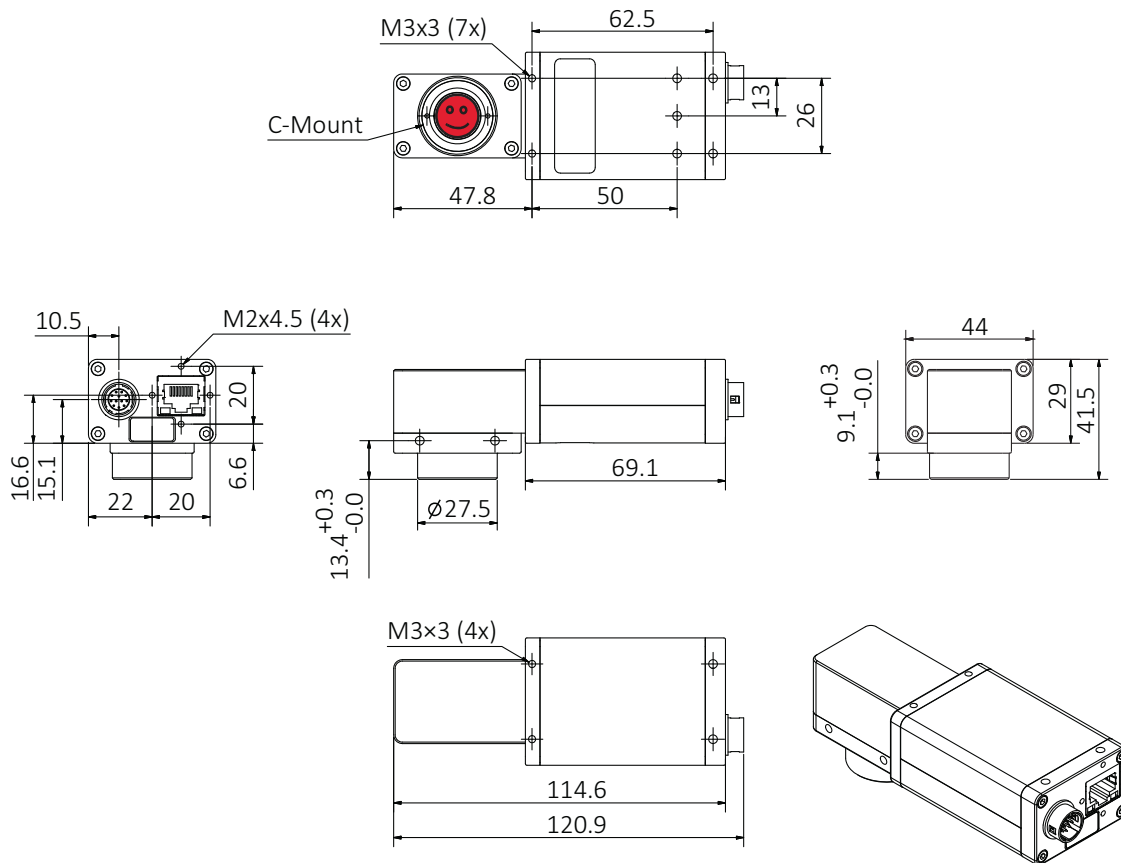
Figure 128: W270 S90 housing dimensions (including connectors)

Board level

Variant: Non-PoE

13-pole I/O connector:

Molex PicoBlade
Vertical Header 53047-1310
Receptacle Housing 51021-1300
Crimp Terminal 13 × 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 129: Board level (non-PoE) dimensions

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, contact Allied Vision support at https://www.alliedvision.com/en/support/contact-support-and-repair.html.

Back panel
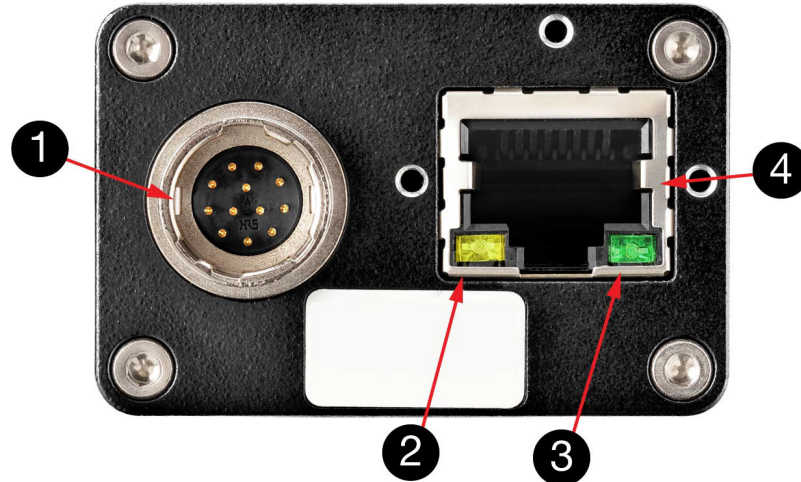
Figure 130: Rear view of non-PoE Manta cameras up to serial number 503323258

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 Gbit/s established
Flashing orange	Ethernet activity with 1 Gbit/s

Table 87: Status LED 1 of non-PoE Manta cameras up to serial number 503323258

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

Table 88: 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	Auto Iris (Video Type) Out	Out	---	Auto Iris (Video Type) ($\geq$ firmware version 01.44.00)
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 89: Camera I/O connector pin assignment for non-PoE Manta cameras up to serial number 503323258

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