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Allied Vision




GigE Vision Cameras

# Manta

# Technical Manual

V8.0.2

Allied Vision Technologies GmbH // Taschenweg 2a, 07646 Stadtroda, Germany

2019-Nov-04

# Manta at a glance



**Read this manual carefully**

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

Manta cameras have a Gigabit Ethernet port and work with Gigabit Ethernet hardware and cable lengths up to 100 meters. Manta cameras are AIA GigE Vision® V1.2 and GenICam SFNC V1.2.1 compliant.

Manta cameras are offered with either a C-Mount or CS-Mount to support a wide range of lenses. An M12-Mount (S-Mount) adapter is also available.

## Scope of delivery

Your Allied Vision camera is delivered with the following components:

- Manta GigE Vision camera
- Download Instructions to gain access to the Manta Quickstart Guide. The Quickstart Guide is available in 12 languages including Chinese, Danish, Dutch, English, Finnish, French, German, Italian, Japanese, Norwegian, Spanish, and Swedish.

## What else do you need?

| Content | URL |
|---|---|
| GigE Features Reference, camera data sheets, Modular Concept, and 3D CAD STEP files | www.alliedvision.com/en/support/technical-documentation/manta-documentation |
| Technical papers and knowledge base | www.alliedvision.com/en/support/technical-papers-knowledge-base |
| Camera lenses and accessories | www.alliedvision.com/en/products/accessories |
| Download Vimba and software tools | www.alliedvision.com/en/support/software-downloads |
| Download the latest GigE firmware loader and release notes. | www.alliedvision.com/en/support/firmware |
| For details about camera warranty duration and sensor warranty terms. | www.alliedvision.com/en/support/warranty |

*Table 1: Additional resources*

# Contact Allied Vision

## Website

To directly contact Allied Vision with any inquiry, go to:

www.alliedvision.com/en/meta-header/contact

To find an Allied Vision office or distribution partner, go to:

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

## Support and general inquiries

For all camera-related queries contact us at support@alliedvision.com

For all general inquiries, contact us at info@alliedvision.com

## Sales offices

| | |
|---|---|
| • Europe, Middle East, and Africa | T// +49 36428 677-230 |
| • North and South America | Toll-free: +1 877 USA-1394<br>California: +1 408 721-1965<br>T// +1 978 225-2030 |
| • Allied Vision Asia-Pacific | T// +65 6634 9027 |
| • Sales Office China | T// +86 21 64861133 |

## Headquarters

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# Document history and conventions



This chapter includes:

- Document history
- Layout styles and symbols used in this manual
- Product naming
- Acronyms and terms used in this manual

# Document history

| Version | Date | Document updates |
|---|---|---|
| V8.0.2 | 2019-Nov-04 | • Corrected technical drawings |
| V8.0.1 | 2019-Jun-06 | • Corrected the feature comparison table in the Specification chapter<br>- Added ReverseX and ReverseY for Manta G-223 and G-419. These features were available in firmware version 01.54.18163<br>• Changed the IR cut filter section to Optical filters and included all optical filters available for the Manta camera family<br>• Added content to the Mounting the camera section<br>• Editorial changes |
| V8.0.0 | 2019-Mar-08 | • Updated Manta G-040, G-158, G-235, G-319, G-507, G-895, and G-1236 series specifications (firmware version 00.01.54.20343), see the GigE Firmware Release Notes for details on the changes<br>• Added trigger latency and trigger jitter values for Manta G-223 and G-419 series<br>• Updated symbols used in this manual<br>• Updated RoHS statement to include amendment 2015/863/EU<br>• Added content to Powering the camera via PoE in installation chapter<br>• Added Supplier Declaration of Conformity to the Installation and hardware chapter<br>• Added EMC compliance statement to Installation and hardware chapter<br>• Added shock and vibration information<br>• Various other minor enhancements and corrections |
| V7.9.1 | 2018-Mar-07 | • Updated Manta G-1236 series specifications<br>• Various other minor enhancements and corrections |
| V7.9.0 | 2018-Jan-12 | • Initial commercial release: Manta G-040 series<br>- Sony IMX287 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-158 series<br>- Sony IMX273 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Added Specifications common to all models to simplify the model specific tables<br>• 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.<br>• Various other minor enhancements and corrections<br>• Removed references to Manta G-609 series. The last time shipment period ends on February 23, 2018 as detailed in PCN 160414. |

*Table 2: Document history (sheet 1 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V7.8.3 | 2017-Jun-28 | • CMOSIS renamed to CMOSIS/ams following the acquisition of CMOSIS by ams Sensors Belgium<br>• Corrected user trigger rules<br>• Various other minor enhancements and corrections |
| V7.8.2 | 2017-May-15 | • Corrected power consumption values for Manta G-319, G-507, G-895, and G-1236 series<br>• Corrected two reported errors:<br>- Figure Manta type A CS-Mount dimensions (16 mm filter)<br>- Figure Manta type B CS-Mount dimensions (16 mm filter) |
| 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)<br>• 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 |
| V7.8.0 | 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.<br>• Corrected the technical drawings for Manta Type B board level cameras (Manta G-223, G-235, and G-419 series) and added technical drawings for Manta Type B board level cameras (Manta G-319, G-507, G-895, and G-1236 series) |
| V7.7.0 | 2016-Dec-16 | • Initial commercial release: Manta G-1236 series<br>- Sony IMX304 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• 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.<br>• Various other minor enhancements and corrections |
| V7.6.0 | 2016-Nov-25 | • Initial commercial release: Manta G-895 series<br>- Sony IMX267 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Updated board level camera regulatory statement<br>• Updated missing values in specification tables<br>• Updated absolute QE plot and added spectral response plot for Manta G-032<br>• Corrected reported errors |

*Table 2: Document history (sheet 2 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V7.5.0 | 2016-Aug-16 | • New features for Manta G-282, G-283, G-505, and G-917 series:<br>- One-tap, dual-tap switchability (except Manta G-505)<br>- Trigger over Ethernet (ToE) Action Commands feature<br>- **DeviceUserID** is now accessible via the Vimba user interface<br>• New features and changes for Manta G-505 series:<br>- Binning: changed the maximum value for **BinningX** and **BinningY** to *4*<br>- **ReverseX**<br>• Added optical filter information to specification tables<br>• Various other minor enhancements and corrections |
| V7.4.0 | 2016-Jul-08 | • Initial commercial release: Manta G-319 series<br>- Sony IMX265 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-507 series<br>- Sony IMX267 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Added spectral response plots for select camera models<br>• Updated specification tables to be consistent with the information on the product webpages<br>• Added Trigger over Ethernet Action Commands feature for supported models. For more information see the GigE Features Reference.<br>• Updated frame rate plots<br>• Updated feature list for Manta 223, G-235, and G-419 series<br>• Added Installation and hardware chapter<br>• Various other minor enhancements and corrections<br>• Updated Manta type B CCD monochrome and color image data flow diagram<br>• Updated image flow diagrams for Manta type B models (CCD and CMOS)<br>• Updated absolute QE plots for Manta G-282, G-283, G-505, and G-917 series |

*Table 2: Document history (sheet 3 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V7.3.0 | 2015-Nov-02 | • Updated mass of all Manta type B cameras as per *P*roduct Change Notification 2015-03-02.<br>• Changed the technical manual layout.<br>• Changed chapter name from Camera data path to Image data flow and updated the figures.<br>• Changed chapter name from Camera dimensions to Mechanical dimensions<br>• Merged the Resolution and ROI frame rates chapter into Specifications chapter.<br>• Added Manta at a glance section<br>• Updated Manta type B mechanical drawings<br>• Added Legislation section in Safety and legislation chapter to replace Legal notice and Conformity sections<br>• Moved Sensor position accuracy section from Appendix to Mechanical dimensions chapter and deleted Appendix<br>• Added Camera features comparison section in Specifications chapter to replace Camera smart features and Camera features sections<br>• Added Cross section: C-Mount and CS-Mount section to replace Cross section: C-Mount and Cross section: CS-Mount sections<br>• Added Cleaning optical components chapter to replace Camera cleaning and updated information<br>• Added Contact us section to replace Contacting Allied Vision section<br>• Removed references to Manta G-095B and G-095C models. The last time shipment period ends on December 31, 2016 as detailed in PCN 2015-05-03 |
| V7.2.0 | 2015-Mar-20 | • Updated Allied Vision logo<br>• Replaced references of AVT and Allied Vision Technologies to Allied Vision<br>• Updated links to new Allied Vision website<br>• Renamed Description of data path chapter to Image data flow |

*Table 2: Document history (sheet 4 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V7.1.0 | 2014-Oct-07 | • Initial commercial release: Manta G-235 series<br>- Sony IMX174 CMOS sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-505 series<br>- Sony ICX625 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Updated the following in the Specifications chapter<br>- Trigger latency and jitter values<br>- `DecimationX` and `DecimationY` control descriptions changed to GenICam factor style<br>• Added `BufferHandlingControl` and `StreamInformation` in Camera features section, applicable for **Vimba** version 1.3 or higher<br>• Updated Camera features section<br>• Added the following sections:<br>- Manta CMOS angled-head housings (type B)<br>- Manta CMOS board level variants (type B)<br>- Cross section: CS-Mount (type B) |
| V7.0.3 | 2014-Jun-09 | • Added trigger latency and jitter values in the Specifications chapter<br>• Updated and rearranged Specifications chapter<br>• Added Camera feature comparison section<br>• Preliminary Manta type B angled-head and board level variant information removed from the document until samples are available |
| V7.0.2 | 2014-May-08 | • Updated camera block diagrams<br>• Updated drawings for Manta type A board level (non-PoE models): dimensions and Manta type A board level (PoE): dimensions<br>• Updated spectral sensitivity plots<br>• Updated the note on `StreamHoldCapacity` in Specifications and Frame memory sections<br>• Added section Exceptions for non-PoE Manta cameras up to serial number 503323258<br>• Updated available color pixel formats for Manta G-223 and G-419 series<br>• Updated optional accessories in the Specifications chapter<br>• Added section Manta standard board level variants (type B)<br>• Added Hirose cable information<br>• Updated exposure time values for Manta G-145, G-223, G-282, and G-283 series<br>• Corrected frame rate formula for Manta G-145B NIR |

*Table 2: Document history (sheet 5 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V7.0.1 | 2013-Sep-30 | • Added Camera cleaning<br>• Changed maximum frame rates and gain range, added burst mode for Manta G-223 and G-419 series<br>• Added a feature of Manta type B cameras:<br>- Temperature monitoring<br>• Added `ReverseX` feature in Camera features<br>• Added Manta angled-head housings (type B)<br>• Updated maximum gain values for Manta G-283 and G-917 series<br>• Updated minimum exposure time for Manta G-145 series (including 30 fps variants)<br>• Updated the frame rate versus height plots |
| V7.0.0 | 2013-Aug-30 | • Initial commercial release: Manta G-419 series<br>- CMOSIS/ams CMV4000 CMOS sensor<br>- Specifications, absolute QE, ROI frame rate, camera lens information, and image data flow<br>• As of this version, the document refers to Vimba SDK (not PvAPI)<br>• Changed cable recommendation to Category 6 or higher<br>• Manta G-145 series (including 30 fps variants): changed framerate<br>• Camera interfaces chapter: added I/O block diagrams and the status LED description<br>• Changed minimum exposure times of Manta G-223 and G-419 series<br>• Changed ROI frame rates of Manta G-145-30fps series |
| V6.0.1 | 2013-Mar-20 | • Initial commercial release: Manta G-223 series<br>- CMOSIS/ams CMV2000 CMOS sensor<br>- Specifications, absolute QE, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-282 series<br>- Sony ICX687 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-283 series<br>- Sony ICX674 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-917 series<br>- Sony ICX814 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• These models are called Manta type B, since there are some differences to the other models that are called Manta type A (specifications, housing, image data flow, features). |

*Table 2: Document history (sheet 6 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V6.0.1 | 2013-Mar-20 | (Continued)<br>• New tripod adapter, new CAD drawings with LEDs on top of the connector<br>• In Specifications chapter, the pixel formats are listed both for PvAPI and Vimba (GenICam V1.0).<br>• Added Video iris output description chapter<br>• I/O pin assignment: 10 mA on outputs 1 and 2 (not 20 mA)<br>• Manta G-031B, G-031C: External trigger delay.<br>• Corrected the mass (200 grams) of Manta type A cameras Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504 series<br>• PoE models: compliant with Power over Ethernet IEEE 802.3at and IEEE 802.3af<br>• Deleted the Manual Overview chapter, Deleted Frame Rate Comparison of all Manta cameras<br>• New date format: year-month-day |
| V5.0.0 | 2012-May-15 | • Initial commercial release: Manta G-031 series<br>- Sony ICX618 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-145B NIR<br>- Sony ICX285 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Error found in Document history V3.0.0 by Validation Team:<br>- ***RGBA24*** and ***BGRA24*** must be named ***RGBA32*** and ***BGRA32***<br>- Added ***RGBA32*** and ***BGRA32*** color formats (except Manta G-201B-30fps and G-201C-30fps)<br>- Added frame rate diagrams<br>• Added focal length 4.0 mm in the focal length vs field of view table for the Manta G-125 series.<br>• Same main board for all Manta models:<br>• From serial number 503323258 on all Manta models including PoE and board level versions contain the same main board.<br>• Revised non-PoE model drawings and new board level PoE drawings<br>• Revised PoE descriptions regarding IEEE 802.3af and IEEE 802.3at:<br>- See note in Gigabit Ethernet port. Manta PoE models can source power from IEEE 802.3af (100 Mbps and 1000 Mbps) and from IEEE 802.3at compliant power sourcing equipment (PSE) such as switches injectors or NICs |

*Table 2: Document history (sheet 7 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V5.0.0 | 2012-May-15 | (Continued)<br>• New CAD drawings with Pin3 = Video Type Auto Iris Out<br>• Frame memory<br>- Manta G-032 series: changed from 49 to 99 frames<br>- Manta G-033 series: changed from 88 to 99 frames<br>- Manta G-046 series: changed from 35 to 70 frames<br>- Manta G-125 series: changed from 12 to 25 frames<br>- Manta G-145 series: changed from 10 to 22 frames<br>- Manta G-145-30fps series: changed from 10 to 22 frames<br>- Manta G-146 series: changed from 10 to 22 frames<br>- Manta G-201 series: changed from 8 to 16 frames<br>- Manta G-201-30fps series: changed from 8 to 16 frames<br>• Added frame rates for ROI height = 720<br>- Manta G-125 series ROI frame rate<br>• IR cut filter:<br>- Changed IR cut filter to type Jenofilt 217 |
| V4.1.0 | 2011-Jun-24 | • Added PoE information including:<br>- Power requirements, power consumption and regulations for PoE models<br>- Note about PoE capable cameras<br>- PoE cameras < 220 grams (without lens)<br>• Corrected frame rate formulas for Manta G-033 and G-504 series<br>• C-Mount and CS-Mount not adjustable, for modifications contact Customer Care and send camera to Allied Vision Technologies<br>• Manta board level:<br>- Manta board level: deleted (PWR output on demand) at Pin2<br>• Removed the Firmware update chapter (see Knowledge Base at Allied Vision Technologies Website: search for GigE Firmware Update application note)<br>• Revised image data flow block diagram.<br>• Added 30 fps variant: Manta G-145 and G-201 series<br>• Added ***Mono12Packed*** for monochrome cameras and ***Bayer12Packed*** for color cameras.<br>• Added the following camera controls: Chunk Data, **EventControls**, **StreamFramerateConstrain**, **FrameStartTriggerOverlap**, **PayloadSize**, **NonImagePayloadSize**, **SyncInGlitchFilter**, **AutoIris**, Gamma correction, LUT<br>• Manta G-145-30fps and G-201-30fps (non PoE)<br>- Have the same I/O pin assignment (input circuits and voltage range), power LED and upside down PoE plug as PoE models<br>• Manta G-145B-30fps, G-145C-30fps, G-201B-30fps, and G-201C-30fps non-PoE cameras behave like PoE cameras. |

*Table 2: Document history (sheet 8 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V4.0.1 | 2011-Jan-05 | • Changed tripod drawing: added dimensions of three big threads (M6 and UNC 1/4-20).<br>• In specifications tables color pixel formats: inserted ***Mono8***. Added note, that ***Raw8***, ***Raw16*** displayed in some viewers means the same as ***Bayer8***, ***Bayer16***.<br>• Changed GigE Vision V1.0 to V1.2 in all specification tables. |
| V4.0.0 | 2010-Oct-25 | • Initial commercial release: Manta G-033 series<br>- Sony ICX414 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-504 series<br>- Sony ICX655 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Added note that description of status LEDs can be found in Manta Hardware Installation Guide.<br>• Changed file format from Adobe FrameMaker FM7 to FM9 |
| V3.0.0 | 2010-Jun-09 | • Initial commercial release: Manta G-046 series<br>- Sony ICX415 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-145 series<br>- Sony ICX285 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-146 series<br>- Sony ICX267 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Initial commercial release: Manta G-201 series<br>- Sony ICX274 CCD sensor<br>- Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow<br>• Added spectral sensitivity note<br>• Added image memory size table<br>• With the new firmware version 01.40, due to a bug all Manta models have only 12-bit in the image data flow (even if the ADC delivers 14-bit).<br>• Due to a repaired bug in FPGA and microcontroller, the `StreamHoldCapacity` changed: Manta G-032 series from 49 frames to 99 frames, Manta G-125 series from 12 frames to 25 frames.<br>• ***RGBA24*** and ***BGRA24*** are not supported<br>• Manta board level cameras have now a cooling plate. |

*Table 2: Document history (sheet 9 of 10)*

| Version | Date | Document updates |
|---|---|---|
| V2.0.3 | 2010-Apr-15 | • New manual release status |

*Table 2: Document history (sheet 10 of 10)*

# 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 (example) | Function |
|---|---|
| **Emphasis** | Some important parts or items of the text are emphasized to make them more visible. |
| `Feature names` | GigE features names are displayed as monospaced text. |
| `Feature options` | Features options and register's options that are selectable by the user are displayed as monospaced italicized text. |
| **UI Element** | Text that's displayed, or output, by the system for the user, like parts of the GUI, dialog boxes, buttons, menus, important information, windows titles. |
| Web Reference | References to other documents or webpages, like web links, hypertext links, emails, but also cross references, that include a link the user can follow by clicking. |

*Table 3: Markup conventions used in this manual*

## Symbols and notes



**NOTICE**

**Property damage message**

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



**NOTICE**

**Material damage by electrostatic discharge (ESD)**

Precautions as described.



**CAUTION**

**Safety message**

Note to prevent physical injury.



**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.

# 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 | www.sony-semicon.co.jp |
| ams Sensors Belgium | CMOSIS/ams | www.cmosis.com |

*Table 4: Third-party product naming*

# Acronyms and terms

The following table provides a list of acronyms and terms used in this document.

| Acronym or term | Description |
|---|---|
| ADC | Analog to Digital Converter |
| AIA | Automated Imaging Association |
| CCD | Charge-coupled device |
| CMOS | Complementary metal-oxide semiconductor |

*Table 5: Acronyms and terms used in this manual (sheet 1 of 2)*

| Acronym or term | Description |
|---|---|
| EMI | Electromagnetic Interference |
| EMVA | European Machine Vision Association |
| ESD | Electrostatic Discharge |
| FIFO | First-in first-out |
| GigE | Gigabit Ethernet |
| GND | Ground (power) |
| GVSP | AIA GigE Vision Streaming Protocol |
| H × V | Horizontal × Vertical (sensor resolution measurement) |
| I/O | Input/Output |
| LUT | Look-up Table |
| MSDS | Material Safety Data Sheet |
| NIC | Network interface card |
| NIR | Near-Infrared |
| QE | Quantum efficiency |
| RoHS | Restriction of Hazardous Substances (EU directive) |
| ROI | Region of interest |
| SDK | Software Development Kit |
| SFNC | Standard Feature Naming Convention |
| $t_{pdHL}$ | Propagation delay high-to-low |

*Table 5: Acronyms and terms used in this manual (sheet 2 of 2)*

# Compliance and intended use

This chapter includes:

- Compliance notifications for the following areas:
  - Europe (CE)
  - US (FCC)
  - Canada (ICES)
- Information about application and intended use of the camera
- Copyright and trademark statement

# 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, including amendment 2015/863/EU (RoHS)

## For customers in the US

### Supplier Declaration of Conformity

Manta GigE cameras comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

#### Responsible Party – US Contact Information

Allied Vision Technologies, Inc.
102 Pickering Way – Suite 502
Exton, PA 19341
United States

T// +1 (978) 225-2030

**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 or 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 port 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.
- For usage in product with specific safety requirements a Quality Assurance Agreement with Allied Vision is required.

- The camera is intended for use in a commercial, industrial, or business environment. The test phase and programming should be carried out by advanced users.

## 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. For usage in medical product, a Quality Assurance Agreement with Allied Vision is required. Users who integrate the camera into an application must comply with the rules and regulations concerning medical devices.

# Copyright and trademarks

All text, pictures, and graphics are protected by copyright and other laws protecting intellectual property. All content is subject to change without notice.

All trademarks, logos, and brands cited in this document are property and/or copyright material of their respective owners. Use of these trademarks, logos, and brands does not imply endorsement.

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# Installation and hardware



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

# Precautions

## Electrical connections



**NOTICE**

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 when you are wearing a wrist strap, your body is grounded but your clothes are not.



**NOTICE**

Do not operate the camera beyond the environmental specifications. See the environmental specifications limits in the Specifications section of this document. Special care must be taken to maintain operating temperature as specified in the Specifications chapter.



**NOTICE**

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

**NOTICE**

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

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

**NOTICE**

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, when removed the sensor is not protected against dirt or scratches.

NIR models are shipped without optical filter or protection glass.

**NOTICE**

Some cleaning agents can damage this product. Avoid cleaning the image sensor unless absolutely necessary. See instructions on optics cleaning in this document.

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

**NOTICE**

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



**NOTICE**

- 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 ESD. To avoid possible damage, handle all static-sensitive boards and components in a static-safe work area. Observe the following procedures.
- 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 when 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.



**NOTICE**

- 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 five 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.



**NOTICE**

- 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.



**NOTICE**

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

# Mounting the camera

You can attach the camera to a base using the M3 mounting threads built into the top and bottom of the Manta camera housing. Optionally, you can use the tripod adapter to mount your Manta camera to a tripod.

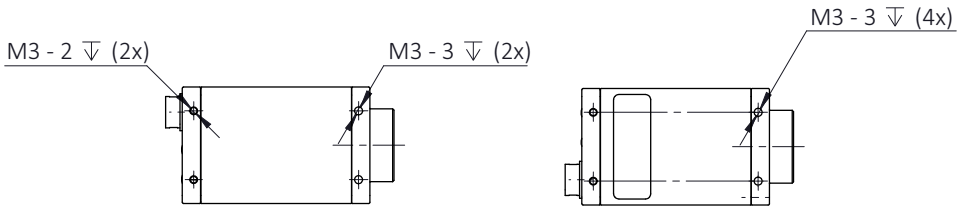



*Figure 1: Mounting threads on top and bottom of housing*

**NOTICE**

Please observe the following when mounting the camera:

- It is important to consider the maximum intrusion depth of the M3 mounting holes (see Figure 1). Using longer screws can damage the threads or bottom plate and will reduce the strength of the joint.
- Use a spacer, spring lock washer, or internal tooth lock washer to reduce the intrusion depth of longer screws.
- Tighten screws at a maximum torque of 0.48 Nm (3 mm threads) or 0.32 Nm (2 mm threads) to prevent damage of the threads.
- Apply thread-locking fluid to the screws to prevent loosening of the screws under static or vibrational loading.

# Configuring the host computer

Manta cameras can operate on 10/100 or Gigabit speed NIC. In order to reach the maximum camera frame rate, a Gigabit speed NIC with jumbo packet support is required.

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

Usage on mixed-use networks (with printers, Internet, and email) is possible but may impact camera performance (for example, frame rate). Check with your network administrator if required for network configuration.

# Installing the NIC 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 NIC, 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** after the driver has been installed.

# Optional: Modifying the NIC IP address

After the initial NIC hardware installation, connect the NIC 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 NIC address to minimize the time required for a camera to be recognized by the host application.

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

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

When systems employ multiple NICs connected to multiple cameras the address of the NICs should be set. Each NIC or NIC card port requires a unique IP address.

For example:

NIC 1:

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

NIC 2:

- IP Address: 169.254.100.2
- Subnet mask: 255.255.0.0
- Default gateway: blank

# NIC driver settings

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

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

| Property | Value |
|---|---|
| Packet size or maximum transmission unit | 8228 bytes or larger |
| Interrupt Moderation | Enable |
| Interrupt Moderation Rate | Extreme |
| Receive Buffers | Maximum value configurable |
| Transmit Buffers | 256 bytes |

*Table 6: NIC settings*

## Default packet size

The default packet size of Manta cameras is 8228 bytes. The host NIC needs to support a packet size of equal or larger size to stream from the camera.

## NIC settings

The NIC settings may also vary depending on your system configuration and the NIC manufacturer.

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

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

# Enabling jumbo packets

The properties listed for the NIC 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 NIC that supports Jumbo Frames or 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 NIC, 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 NIC. Crossover cabling is not required but does work. The camera has circuitry to determine when a crossover cable is being used.



We recommend 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 dropped frames coming from the camera.

# Optics

Manta cameras are offered with the following lens mounts: C-Mount (default), CS-Mount, or M12-Mount (S-Mount). Lenses can be purchased directly from Allied Vision or from an Allied Vision distribution partner. Users need to select the desired focal length of the lens and appropriate optical format for the target camera model.

For more information on mechanical interface options for your Manta camera, see the Modular Concept. For information on available lenses for your camera, see the Accessories webpage.

# Accessories

We offer a wide range of accessories for use with Manta cameras including:

- Gigabit Ethernet accessories including standard GigE components as well as PoE capable GigE components.
- Lenses for corresponding sensor sizes and resolutions.

For information on available lenses for your camera, see the Accessories webpage.



A list of recommended accessories is available on the Allied Vision website. See the Hardware Selection for Allied Vision GigE Cameras application note at www.alliedvision.com/en/support/technical-papers-knowledge-base.

# Software

Manta cameras work with the following software options:

- Vimba Viewer or Vimba SDK
- Third-party software solutions

# Powering up the camera

A camera power adapter for each Manta camera is available from Allied Vision. See the Specifications chapter for connector definition and voltage specifications.



**NOTICE**

Powering the camera

- Use only DC power supplies with insulated cases.
- For all power connections use only shielded cables to avoid EMI.
- PoE models can source power from:
  - IEEE 802.3af (100 Mbps and 1000 Mbps)
  - IEEE 802.3at compliant PoE power sourcing equipment devices such as switches, injectors, or network interface controller.



**NOTICE**

The camera is not intended to be connected to a DC distribution network. The maximum length for I/O cables must not exceed 30 meters.

## Powering the camera via Hirose I/O port

Cameras powered by both the Hirose I/O port and the Gigabit Ethernet port use the power provided by Hirose I/O port only.

## Powering the camera via PoE

Cameras powered by both the Hirose I/O port and the Gigabit Ethernet port use the power provided by Hirose I/O port only.

Please note the following when using PoE accessories with Allied Vision PoE-capable GigE cameras:

- PoE-capable Manta cameras conform to the IEEE 802.3af standard for GigE.
- Category 6 cables are recommended due to being 23 AWG, while Category 5 cables are 24 AWG. This can reduce heating of the cable.

- Ensure that your Power Sourcing Equipment (PSE) provides data over all four pairs.
- If the PSE uses only two out of four pairs for data, operation is limited to 10/100 Mbps. This translates to lower frame rates.
- If the PSE uses all four pairs for data, operation is in Gigabit (1000 Mbps) mode. Thus, allowing you to achieve the maximum possible frame rate.

# Connecting to host application

After you have installed the **Vimba Viewer** or third-party application to your host computer, you can connect your Manta camera via an Ethernet cable. When 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
- SDK for camera control and image acquisition
- Examples based on the provided APIs of the SDK
- Documentation and release notes
- Viewer application to operate and configure the cameras



**Vimba Viewer documentation**

Vimba Viewer documentation is included with the software download. After Vimba Viewer is installed on your host computer, documentation is located in *\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:

- Applied standards
- Technical specifications
- Absolute QE plots
- Spectral response plots (for select models)
- ROI frame rate plots
- Comparison of feature availability in Manta camera models

# Applied standards

**GigE Vision®**

The GigE Vision standard is an interface standard for digital machine vision cameras administered by the AIA that's 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 EMVA. The aim of GenICam is to provide a generic configuration interface for cameras and devices independent of the used interface technology (for example, 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 SFNC that standardizes feature names and types via an XML file or the transport layer interface (GenTL) that's used to acquire images.

# Shock and vibration

Manta type A cameras were successfully tested according to the following standards:

- IEC 60068-2-6, Sinusoidal vibration testing
- IEC 60068-2-27, Repetitive shock testing

Manta type B cameras were successfully tested according to the following standards:

- DIN ISO 9022-3-37-01-1, Random vibration testing
- DIN ISO 9022-3-30-03-1, Shock testing
- DIN ISO 9022-3-31-01-1, Bump testing

# Notes on specifications



**Manta type A and type B model series**

- Manta type A model series: Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504
- Manta type B model series: 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



**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.

## 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.

## 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.

# 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 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 GVSP packet size. The stated number of frames is typical for full resolution, *`Mono8`* or *`Bayer8`*, and `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 don't 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 results in a frame rate increase. Models with a burst mode frame rate are able to output more data than the maximum available bandwidth (124 Mbps) and provides a frame rate increase with a reduction in width.

### Resolution and ROI measurements

- Data was generated at full resolution using `StreamBytesPerSecond` = *`124`* Mbps (full bandwidth) and an 8-bit pixel format. Frame rate may be lower if using network hardware incapable of 124 Mbps.
- 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 sensor before readout. The frame rate for an ROI at the same effective height as binning is slower because the sensor 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 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 ROI and shorter exposure values.

# Sensor tap mode (CCD model series 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 |

*Table 7: Features affected when switching sensor tap mode*

# Absolute QE plots

## Before reading the QE plots

All measurements were done without protection glass or IR cut filter. With protection glass or filters, QE decreases by approximately 10 percent.

The uncertainty in measurement of the QE values is ±10 percent. This is mainly due to uncertainties in the measuring apparatus itself (Ulbricht sphere, optometer). Manufacturing tolerance of the sensor increases overall uncertainty.

The measurements for Manta G-145B NIR were done with a different method to illustrate the effect of the NIR mode.

## Sony CCD and 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 (at 448 nm, 529 nm, 632 nm) for color sensors and one measured QE value (at 529 nm) for monochrome sensors.

### CMOSIS/ams CMOS sensors

The curves in the absolute QE plots shown in this chapter are taken 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.

## Spectral response plots

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 (at 448 nm, 529 nm, 632 nm) for color sensors and one measured QE value (at 529 nm) for monochrome sensors.

The uncertainty in measurement of the spectral response values is ±10 percent.

# Specifications common to all models

The following table provides specifications common to all Manta models.

| Feature | Specification |
|---|---|
| Default lens mount | C-Mount |
| Optional lens mount | • CS-Mount<br>• M12-Mount (S-Mount) adapter |
| Default optical filter | • Monochrome models: B 270 ASG protection glass<br>• Color models: Hoya C-5000 type IR cut filter<br>• NIR models: No filter[1] |
| Optional optical filters | • B 270 ASG protection glass<br>• Jenofilt 217 IR cut filter<br>• Hoya C-5000 type IR cut filter<br>• RG715 type IR pass filter<br>• RG830 type IR pass filter |
| Default housing | Straight view |
| Optional housing[2] | • W90 housing<br>• W90 S90 housing<br>• W270 housing<br>• W270 S90 housing<br>• Board level |
| Opto-isolated I/O | 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 AUX |
| Power requirements | IEEE 802.3af PoE[2] |
| Interface standard | • IEEE 802.3 1000BASE-T (Gigabit Ethernet), IEEE 802.3af (PoE)[3]<br>• AIA GigE Vision® Standard V1.2 |
| Camera control standard | GenICam SFNC V1.2.1 |

[1] As the NIR models don't 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] Angled heads and board level housing options are not available for Manta G-282, G-283, G-505, and G-917 series

[3] PoE is applicable to models with the PoE option.

*Table 8: Specifications common to all Manta models*

# Manta G-031 series

The following table provides model series specifications. The values are valid for Manta G-031B and G-031C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-031B** | **Manta G-031C** |
| Sensor model | Sony ICX618ALA with EXview HAD CCD™ technology | Sony ICX618AQA with EXview HAD CCD™ technology |
| Resolution | 656 (H) × 492 (V); 0.3 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/4 | |
| Sensor size | 4.5 mm diagonal | |
| Pixel size | 5.6 µm × 5.6 µm | |
| Maximum frame rate at full resolution | 125.2 fps | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 32 MB | |
| StreamHoldCapacity | Up to 99 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.7 W at 12 VDC<br>Power over Ethernet: 4.3 W | |
| Trigger latency[1] | Idle state: 9.9 µs; Frame valid state: 16.5 µs | |
| Trigger jitter[1] | Idle state: ±5.3 µs; Frame valid state: ±11.9 µs | |

*Table 9: Manta G-031 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-031B** | **Manta G-031C** |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-031 model series specifications (sheet 2 of 2)*

## Absolute QE

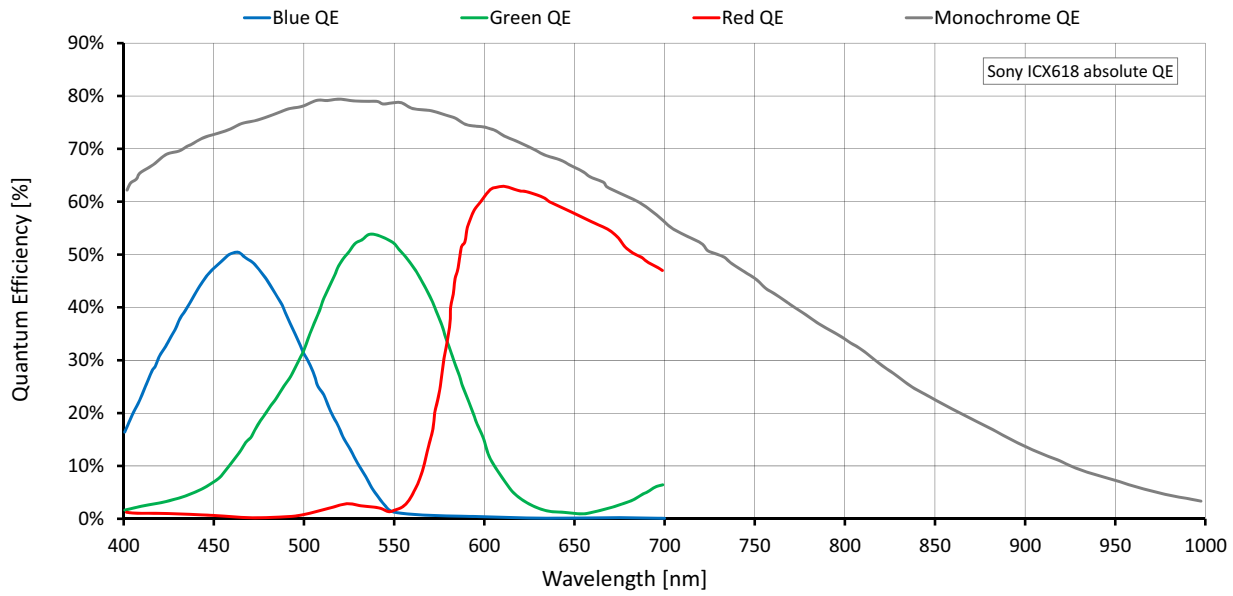



*Figure 2: Manta G-031 (Sony ICX618) absolute QE*

## Spectral response

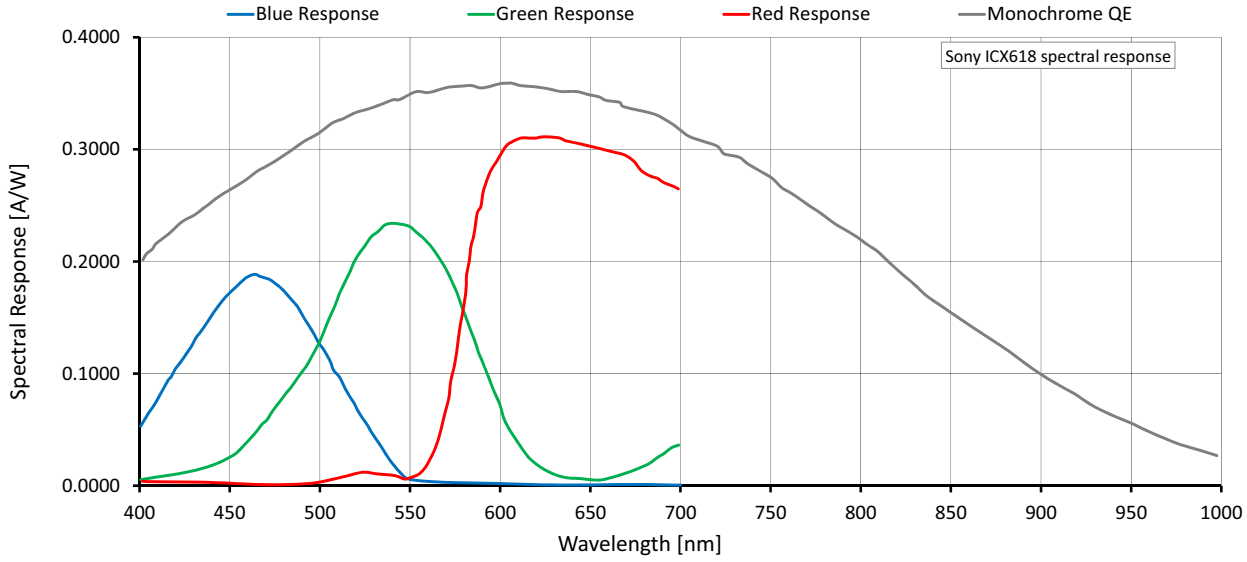



*Figure 3: Manta G-031 (Sony ICX618) spectral response*

# 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

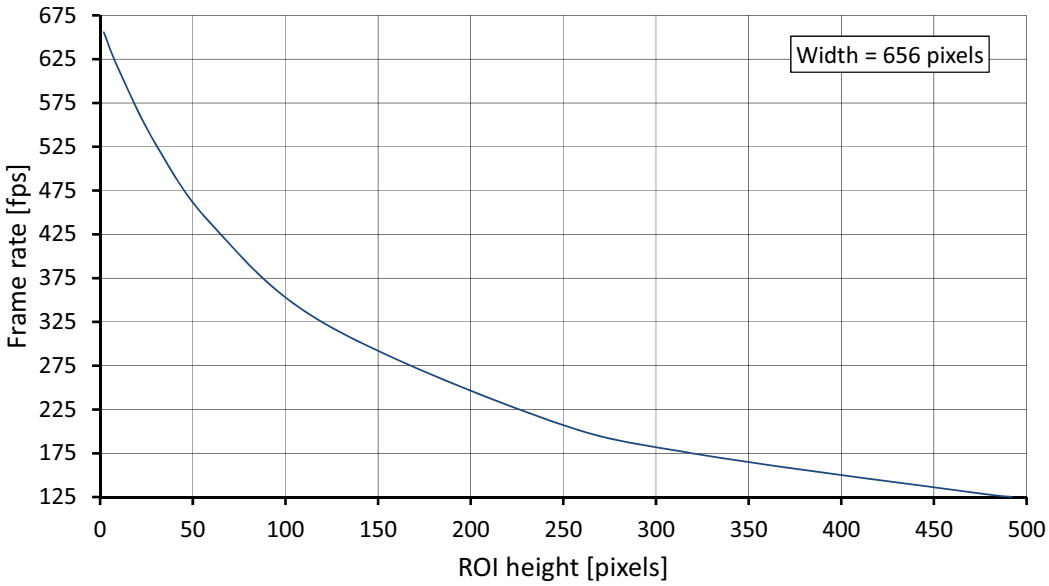



*Figure 4: Manta G-031 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 492 | 125.2 |
| 480 | 127.7 |
| 320 | 174.8 |
| 240 | 214.4 |
| 120 | 324.5 |

| Height | Frame rate (fps) |
|---|---|
| 60 | 436.7 |
| 30 | 527.9 |
| 10 | 613.2 |
| 2 | 655.6 |

*Table 10: Frame rate as a function of ROI height (Width=656 pixels)*

# Manta G-032 series

The following table provides model series specifications. The values are valid for Manta G-032B and G-032C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-032B** | **Manta G-032C** |
| Sensor model | Sony ICX424AL with HAD CCD™ technology | Sony ICX424AQ with Wfine HAD CCD™ technology |
| Resolution | 656 (H) × 492 (V); 0.3 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/3 | |
| Sensor size | 6.0 mm diagonal | |
| Pixel size | 7.4 µm × 7.4 µm | |
| Maximum frame rate at full resolution | 80.7 fps | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 32 MB | |
| StreamHoldCapacity | Up to 99 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |
| 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 | |

*Table 11: Manta G-032 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-032B** | **Manta G-032C** |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-032 model series specifications (sheet 2 of 2)*

## Absolute QE

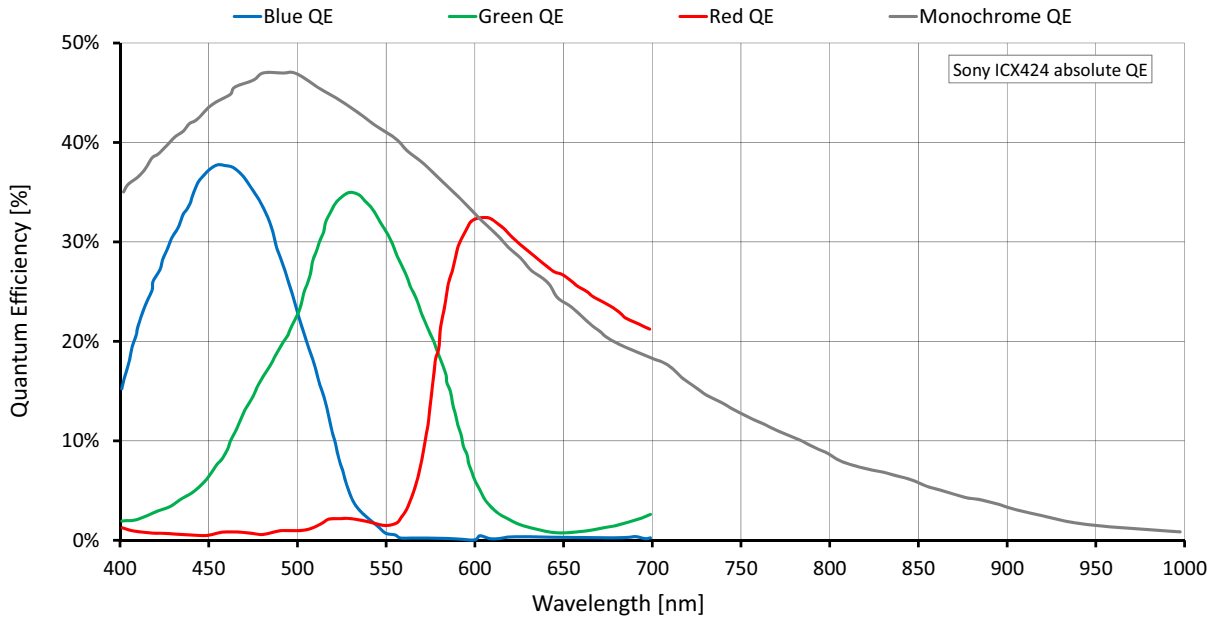



*Figure 5: Manta G-032 (Sony ICX424) absolute QE*

## Spectral response

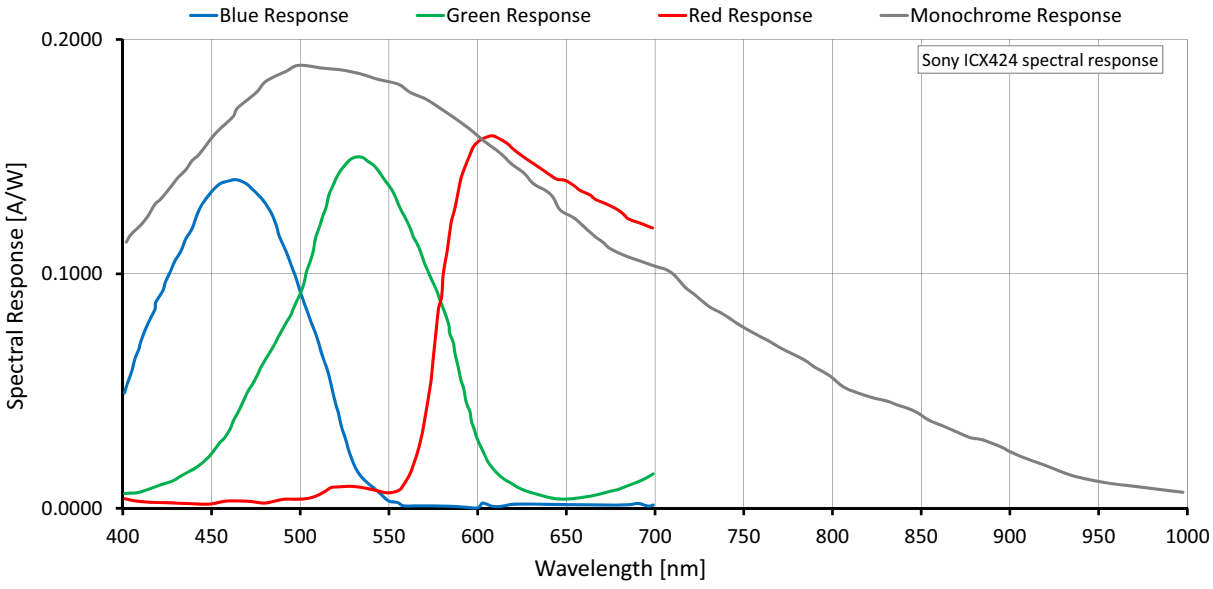



*Figure 6: Manta G-032 (Sony ICX424) spectral response*

# ROI frame rate

$$\text{Max. frame rate} = \frac{1}{24.34\ \mu s \times \text{ROI height} + 3.01\ \mu s \times (492 - \text{ROI height}) + 495.5\ \mu s}$$

Maximum frame rate at full resolution according formula: 80.7 fps

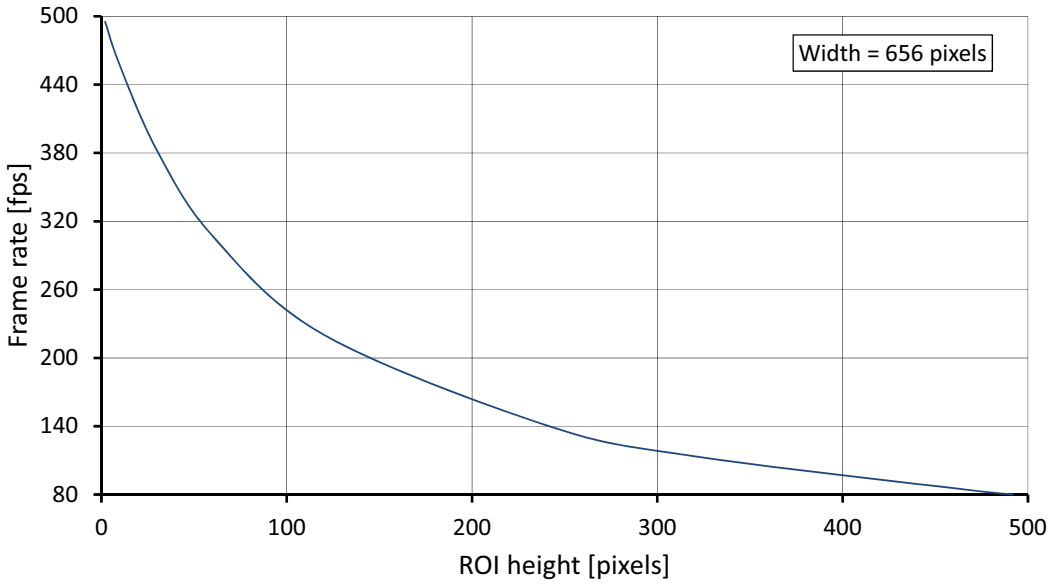



*Figure 7: Manta G-032 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 492 | 80.7 |
| 480 | 81.8 |
| 320 | 113.6 |
| 240 | 140.9 |
| 120 | 220.4 |

| Height | Frame rate (fps) |
|---|---|
| 60 | 307.1 |
| 30 | 382.2 |
| 10 | 456.6 |
| 2 | 495.2 |

*Table 12: Frame rate as a function of ROI height (Width=656 pixels)*

# Manta G-033 series

The following table provides model series specifications. The values are valid for Manta G-033B and G-033C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-033B** | **Manta G-033C** |
| Sensor model | Sony ICX414AL with HAD technology | Sony ICX414AQ with Wfine HAD CCD™ technology |
| Resolution | 656 (H) × 492 (V); 0.3 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/2 | |
| Sensor size | 8.0 mm diagonal | |
| Pixel size | 9.9 µm × 9.9 µm | |
| Maximum frame rate at full resolution | 88.7 fps | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |

*Table 13: Manta G-033 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-033B** | **Manta G-033C** |
| 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 | |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-033 model series specifications (sheet 2 of 2)*

## Absolute QE

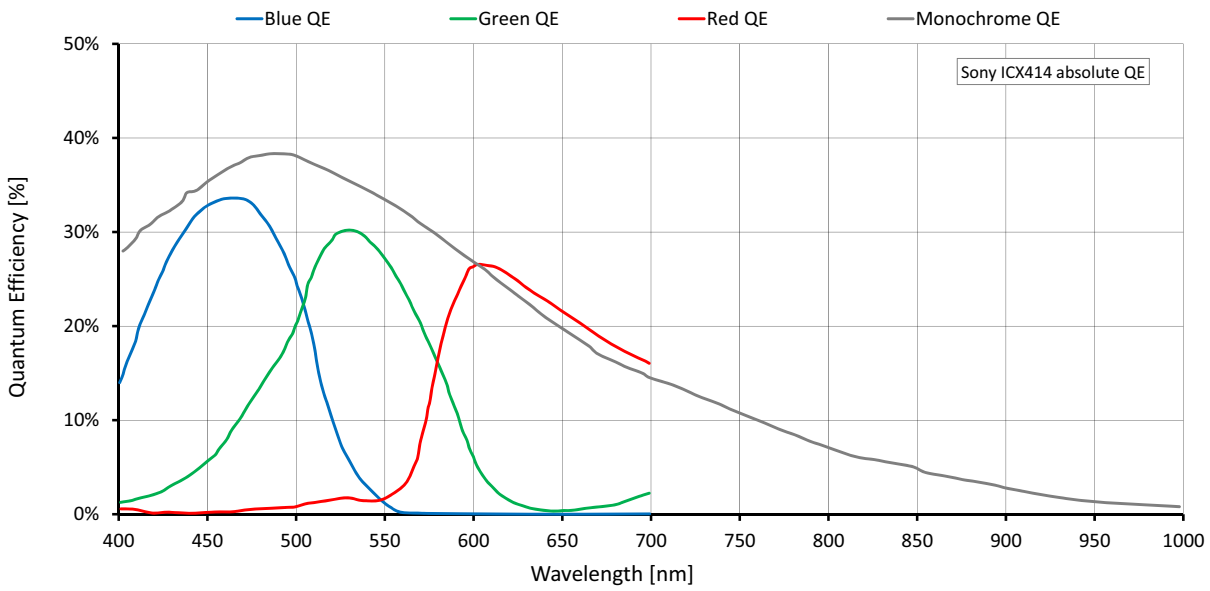



*Figure 8: Manta G-033 (Sony ICX414) absolute QE*

## Spectral response

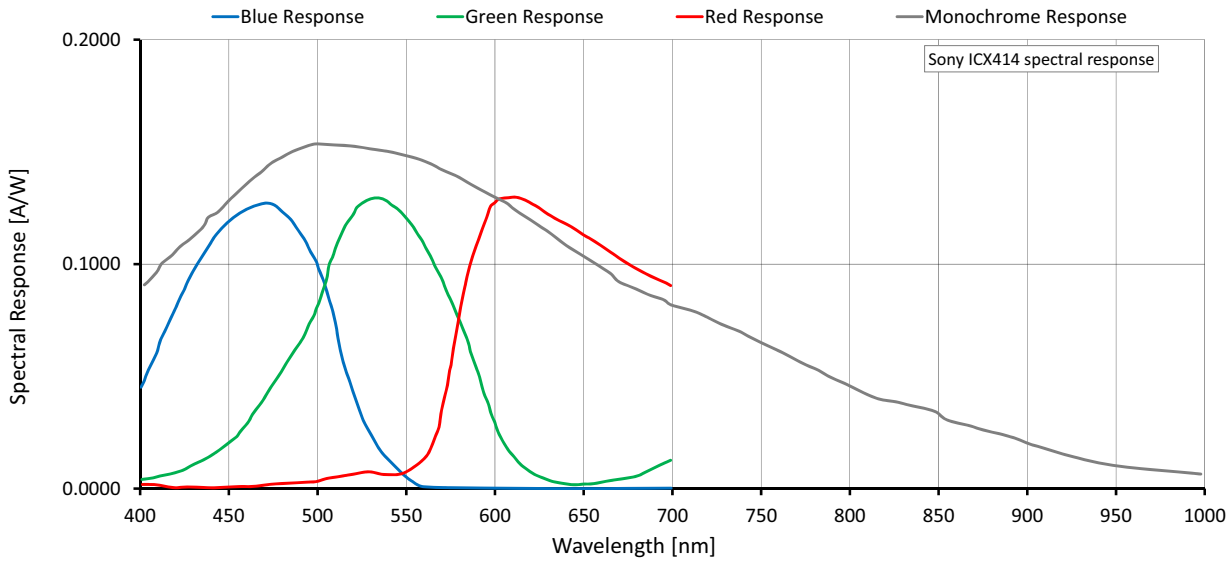



*Figure 9: Manta G-033 (Sony ICX414) spectral response*

# 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

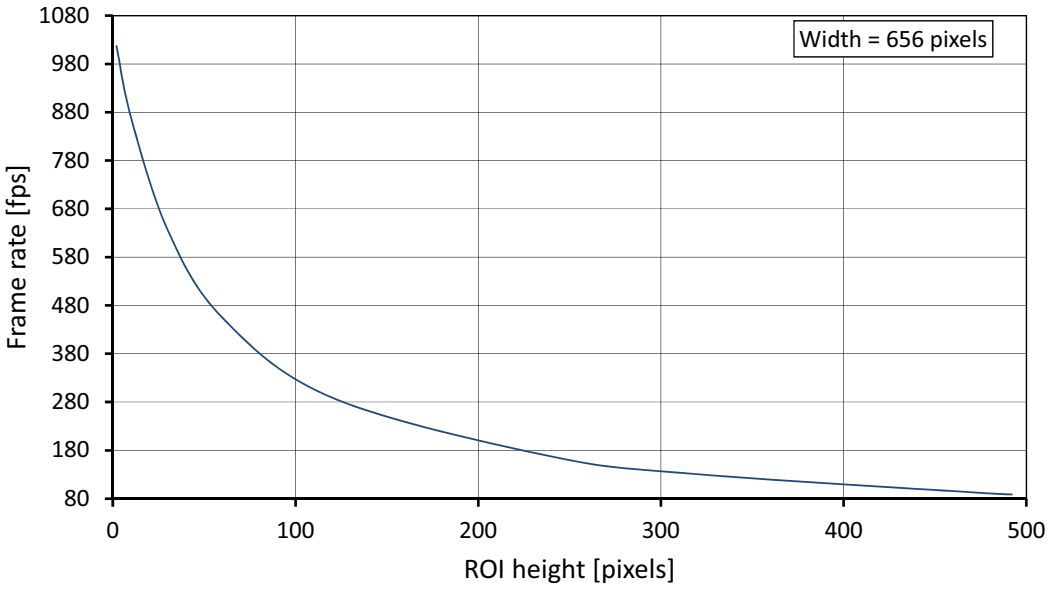



*Figure 10: Manta G-033 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 492 | 88.7 |
| 480 | 90.8 |
| 320 | 130.6 |
| 240 | 167.3 |
| 120 | 289.1 |

| Height | Frame rate (fps) |
|---|---|
| 60 | 454.5 |
| 30 | 636.6 |
| 10 | 868.7 |
| 2 | 1017.0 |

*Table 14: Frame rate as a function of ROI height (Width=656 pixels)*

# Manta G-040 series

The following table provides model series specifications. The values are valid for Manta G-040B and G-040C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-040B** | **Manta G-040C** |
| Sensor model | Sony IMX287LLR Exmor | Sony IMX287LQR Exmor |
| Resolution | 728 (H) × 544 (V); 0.4 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1/2.9 | |
| Sensor size | 6.3 mm diagonal | |
| Pixel size | 6.90 µm × 6.90 µm | |
| Maximum frame rate at full resolution[1] | 286.3 fps (313.1 fps 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure control | **Pixel format** | **Range** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 19 µs to 85.9 s; 5.44 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 21 µs to 85.9 s; 7.28 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 24 µs to 85.9 s; 10.88 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 | |

*Table 15: Manta G-040 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-040B** | **Manta G-040C** |
| Power consumption | External power: 2.77 W at 12 VDC<br>Power over Ethernet: 3.23 W | |
| Trigger latency[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 16.32 µs |
| | Mono12, BayerRG12, YUV422Packed | 21.84 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 32.64 µs |
| Trigger jitter[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±2.72 µs |
| | Mono12, BayerRG12, YUV422Packed | ±3.64 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±5.44 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 96 µs |
| | Mono12, BayerRG12, YUV422Packed | 133 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 204 µs |
| Camera 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.<br>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 313.1 fps.

[2] These values are calculated directly from the microcontroller source. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 15: Manta G-040 model series specifications (sheet 2 of 2)*

## Absolute QE

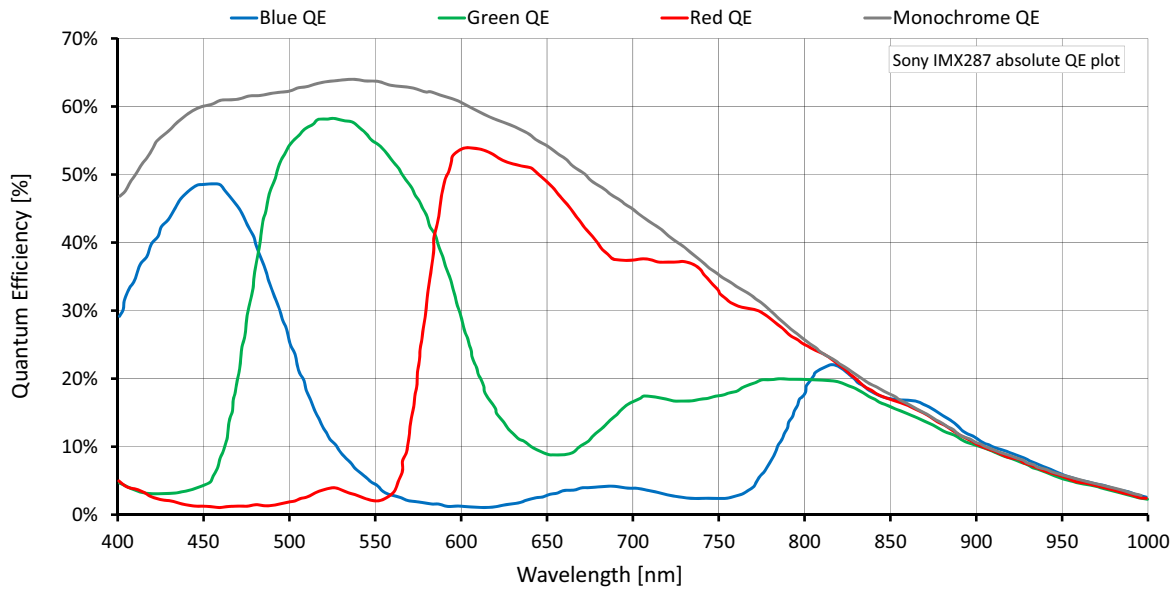



*Figure 11: Manta G-040 (Sony IMX287) absolute QE*

## Spectral response

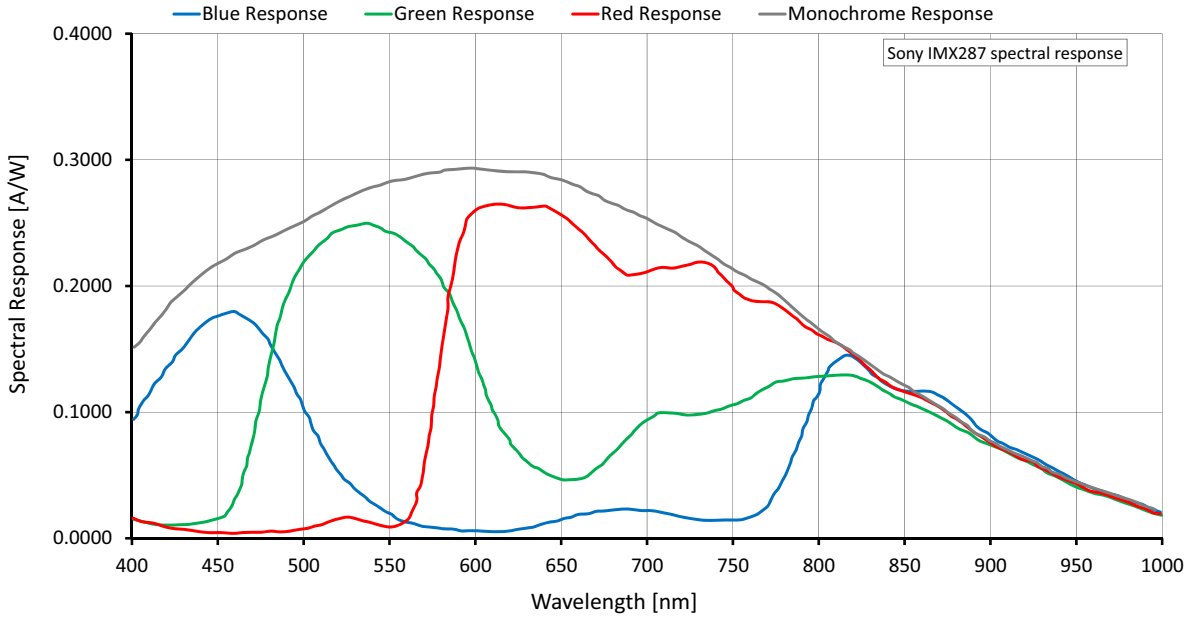



*Figure 12: Manta G-040 (Sony IMX287) spectral response*

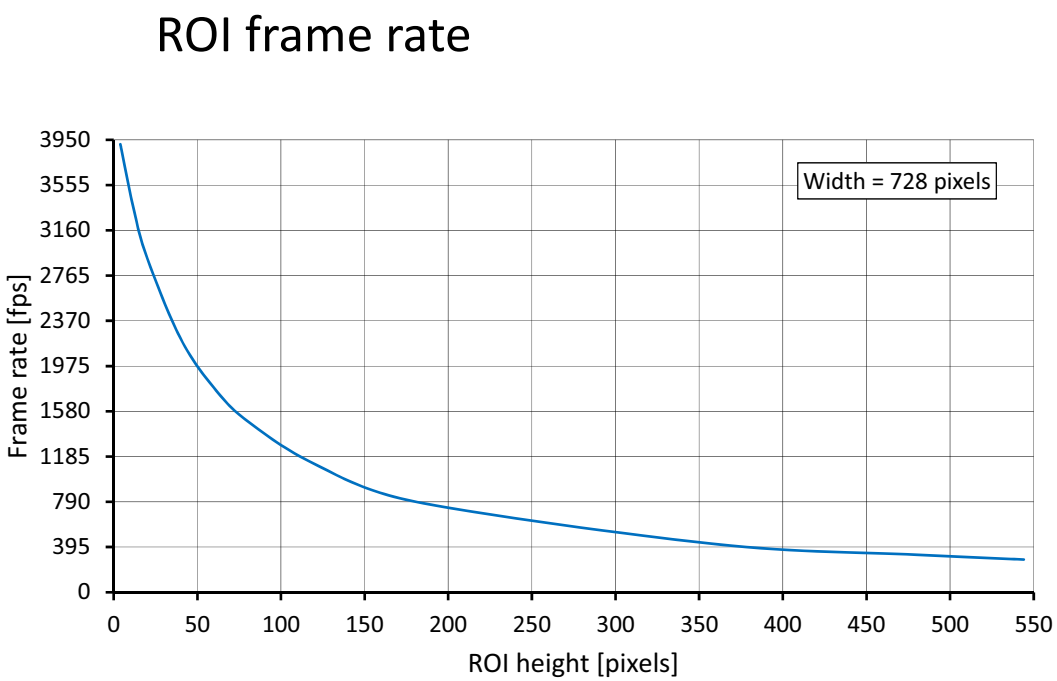



*Figure 13: Manta G-040 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 544 | 286.3 |
| 480 | 328.3 |
| 360 | 420.6 |
| 180 | 792.3 |

| Height | Frame rate (fps) |
|---|---|
| 120 | 1120.8 |
| 80 | 1494.3 |
| 60 | 1784.4 |
| 40 | 2214.3 |

| Height | Frame rate (fps) |
|---|---|
| 20 | 2918.0 |
| 12 | 3342.2 |
| 4 | 3910.8 |

*Table 16: Frame rate as a function of ROI height (Width=728 pixels)*

There is 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-046 series

The following table provides model series specifications. The values are valid for Manta G-046B and G-046C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-046B** | **Manta G-046C** |
| Sensor model | Sony ICX415AL with HAD technology | Sony ICX415AQ with Wfine HAD CCD™ technology |
| Resolution | 780 (H) × 580 (V); 0.5 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/2 | |
| Sensor size | 8.0 mm diagonal | |
| Pixel size | 8.3 µm × 8.3 µm | |
| Maximum frame rate at full resolution | 67.5 fps | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 32 MB | |
| StreamHoldCapacity | Up to 70 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |
| Trigger latency[1] | Idle state: 8.8 µs; Frame valid state: 20.5 µs | |
| Trigger jitter[1] | Idle state: ±4.9 µs; Frame valid state: ±16.6 µs | |

*Table 17: Manta G-046 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-046B | Manta G-046C |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-046 model series specifications (sheet 2 of 2)*

## Absolute QE

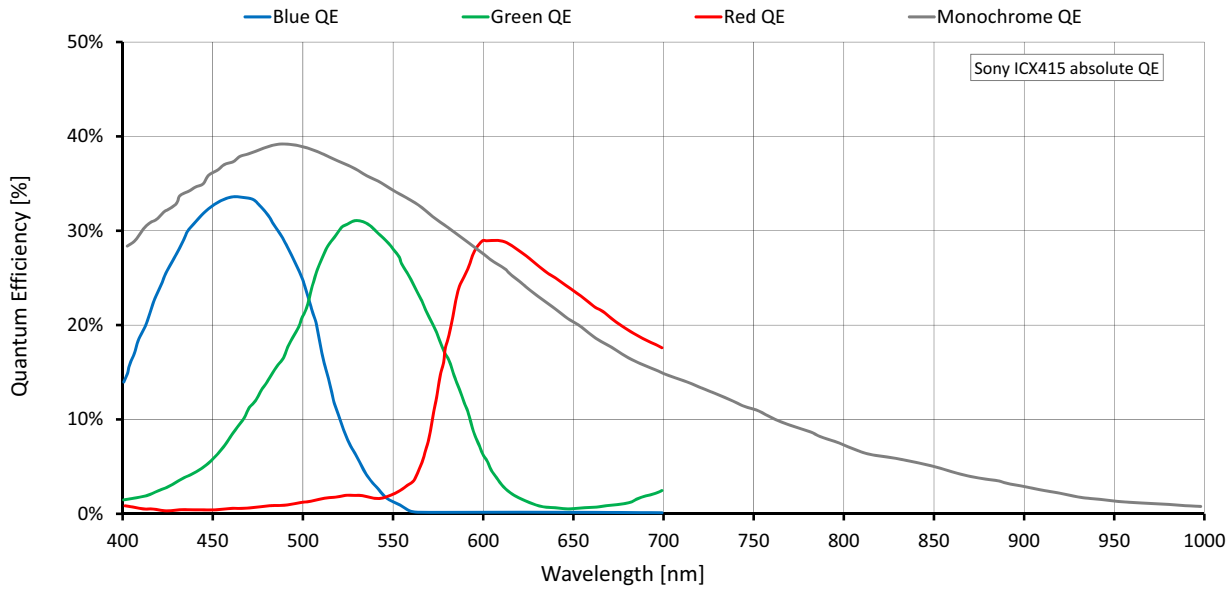



*Figure 14: Manta G-046 (Sony ICX415) absolute QE*

## Spectral response

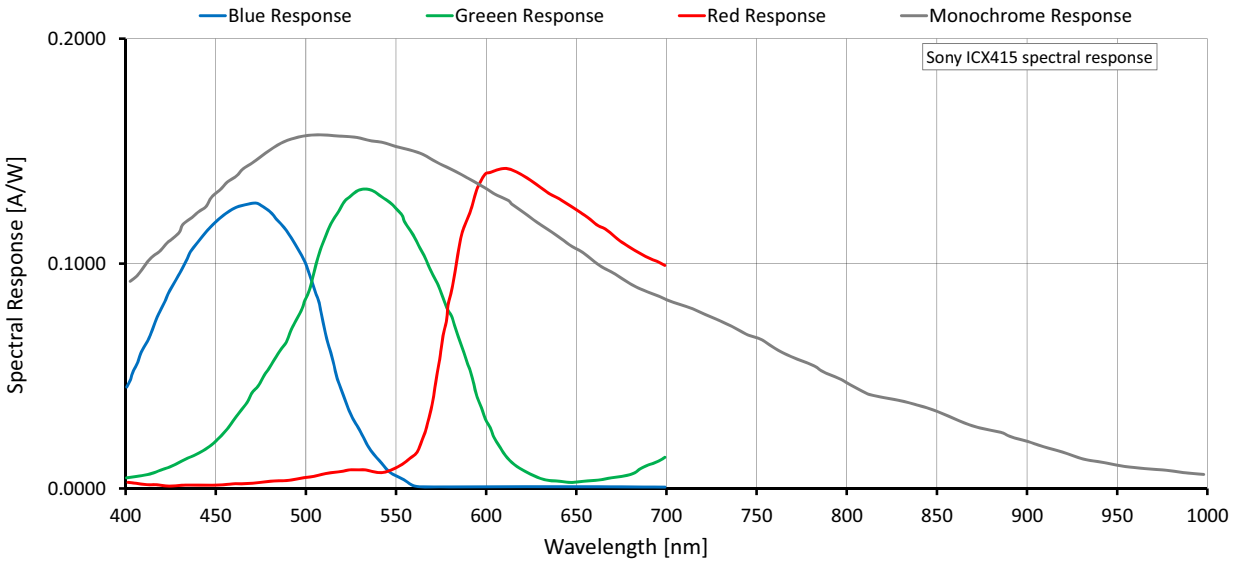



*Figure 15: Manta G-046 (Sony ICX415) spectral response*

# 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

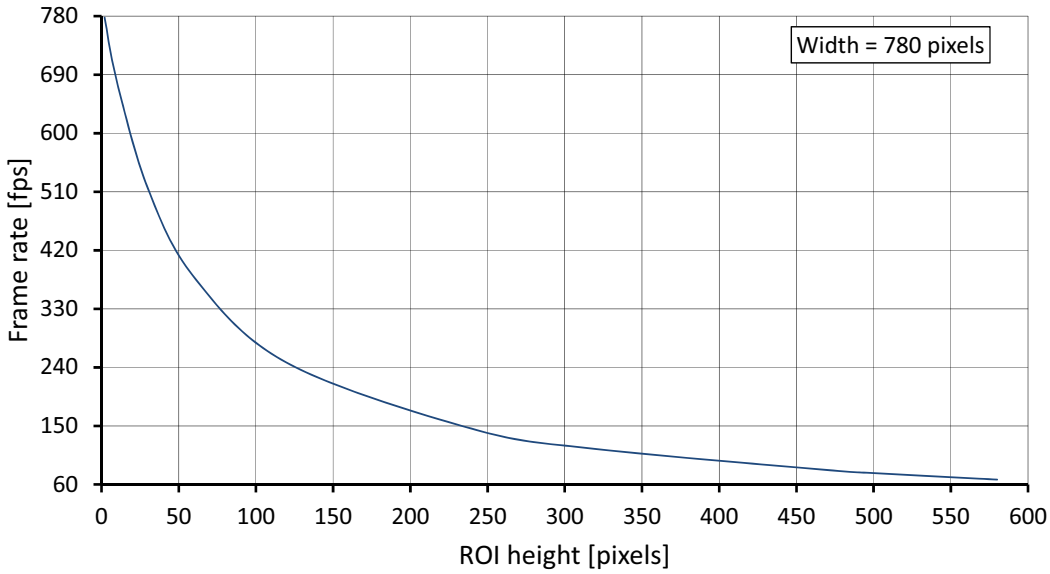



*Figure 16: Manta G-046 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 580 | 67.5 |
| 492 | 78.4 |
| 480 | 80.2 |
| 320 | 114.6 |
| 240 | 145.6 |

| Height | Frame rate (fps) |
|---|---|
| 120 | 247.1 |
| 60 | 378.4 |
| 30 | 515.2 |
| 10 | 678.9 |
| 2 | 777.7 |

*Table 18: Frame rate as a function of ROI height (Width=780 pixels)*

# Manta G-125 series

The following table provides model series specifications. The values are valid for Manta G-125B and G-125C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-125B** | **Manta G-125C** |
| Sensor model | Sony ICX445ALA with EXview HAD CCD™ technology | Sony ICX445AQA with EXview HAD CCD™ technology |
| Resolution | 1292 (H) × 964 (V); 1.2 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/3 | |
| Sensor size | 6.0 mm diagonal | |
| Pixel size | 3.75 µm × 3.75 µm | |
| Maximum frame rate at full resolution | 31.0 fps | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |
| Trigger latency[1] | Idle state: 12.3 µs; Frame valid state: 26.4 µs | |
| Trigger jitter[1] | Idle state: ±6.5 µs; Frame valid state: ±20.6 µs | |

*Table 19: Manta G-125 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-125B** | **Manta G-125C** |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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 19: Manta G-125 model series specifications (sheet 2 of 2)*

## Absolute QE

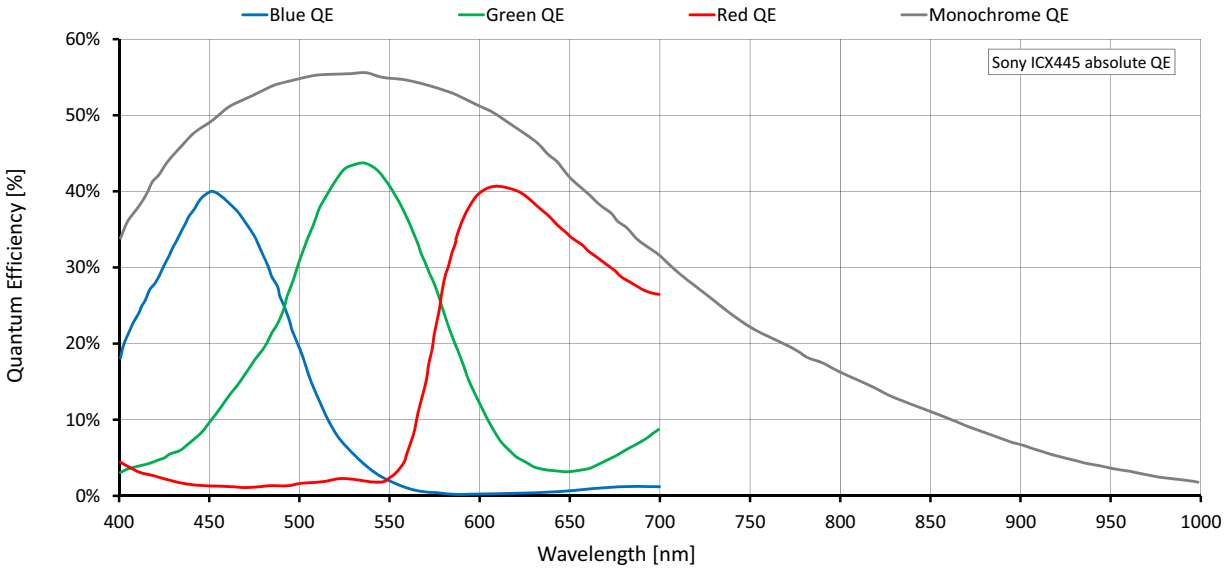



*Figure 17: Manta G-125 (Sony ICX445) absolute QE*

## Spectral response

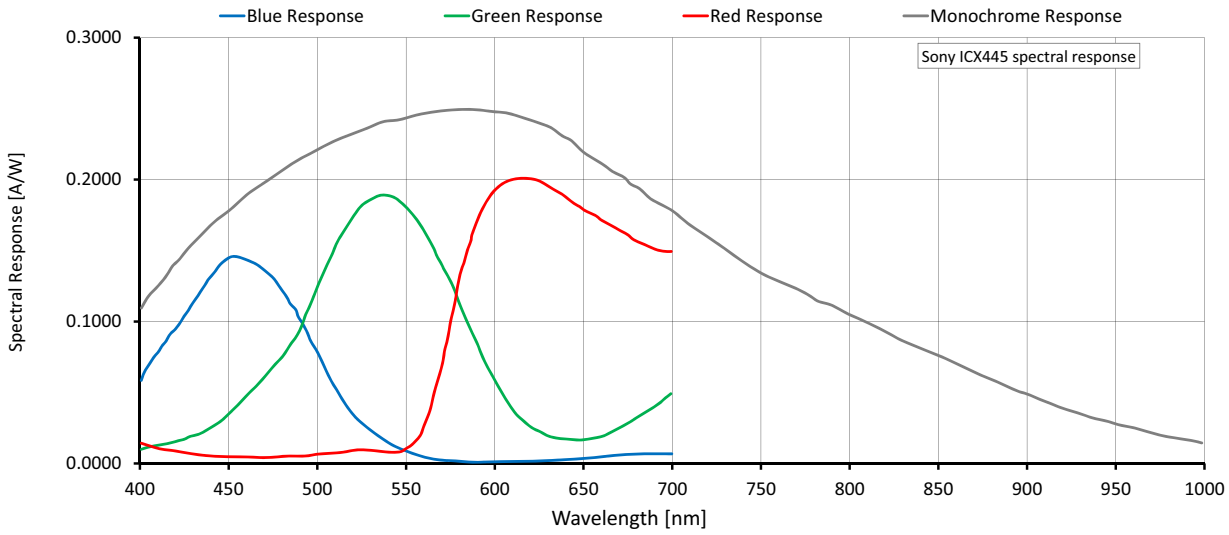



*Figure 18: Manta G-125 (Sony ICX445) spectral response*

# 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

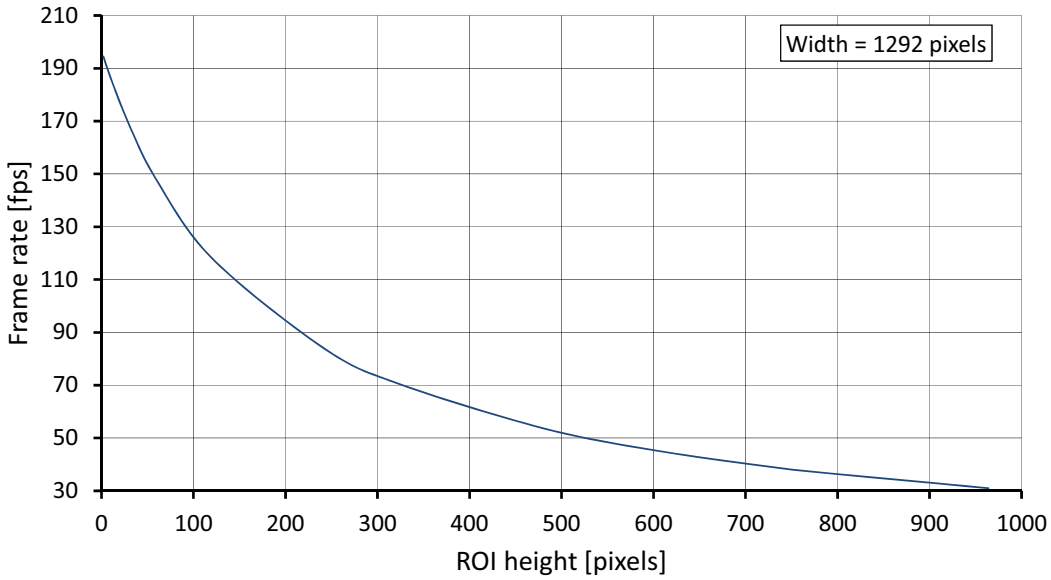



*Figure 19: Manta G-125 frame rate as a function of ROI height plot*

| Height | Frame rate (fps) |
|---|---|
| 964 | 31.0 |
| 768 | 37.4 |
| 720 | 39.4 |
| 600 | 45.4 |
| 480 | 53.7 |
| 320 | 70.9 |

| Height | Frame rate (fps) |
|---|---|
| 240 | 84.4 |
| 120 | 118.1 |
| 60 | 147.6 |
| 30 | 168.6 |
| 10 | 186.3 |
| 2 | 194.5 |

*Table 20: Frame rate as a function of ROI height (Width=1292 pixels)*

# Manta G-145 series

The following table provides model series specifications. The values are valid for Manta G-145B and G-145C models (including 30fps variants). For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-145B, G-145B-30fps** | **Manta G-145C, G-145C-30fps** |
| Sensor model | Sony ICX285AL with EXview HAD CCD™ technology | Sony ICX285AQ with EXview HAD CCD™ technology |
| Resolution | 1388 (H) × 1038 (V); 1.4 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 2/3 | |
| Sensor size | 11.0 mm diagonal | |
| Pixel size | 6.45 µm × 6.45 µm | |
| Maximum frame rate at full resolution | 15.0 fps | |
| Maximum frame rate at full resolution (30 fps variants) | 30.1 fps | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12Packed, BayerRG12 |
| Exposure time control | 43 µs to 60 s; 1 µs increments | |
| Exposure time control (30 fps variants) | 38 µs to 60 s; 1 µs increments | |

*Table 21: Manta G-145 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-145B, G-145B-30fps** | **Manta G-145C, G-145C-30fps** |
| 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 | External power: 3.7 W at 12 VDC<br>Power over Ethernet: 4.3 W | |
| Power consumption (30 fps variants) | External power: 4.5 W at 12 VDC<br>Power over Ethernet: 5.3 W | |
| Trigger latency[1] | Idle state: 19.3 µs; Frame valid state: 45.2 µs | |
| Trigger latency[1] (30 fps variants) | Idle state: 12.6 µs; Frame valid state: 25.6 µs | |
| Trigger jitter[1] | Idle state: ±9.8 µs; Frame valid state: ±35.7 µs | |
| Trigger jitter[1] (30 fps variants) | Idle state: ±6.9 µs; Frame valid state: ±19.9 µs | |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-145 model series specifications (sheet 2 of 2)*

## Absolute QE

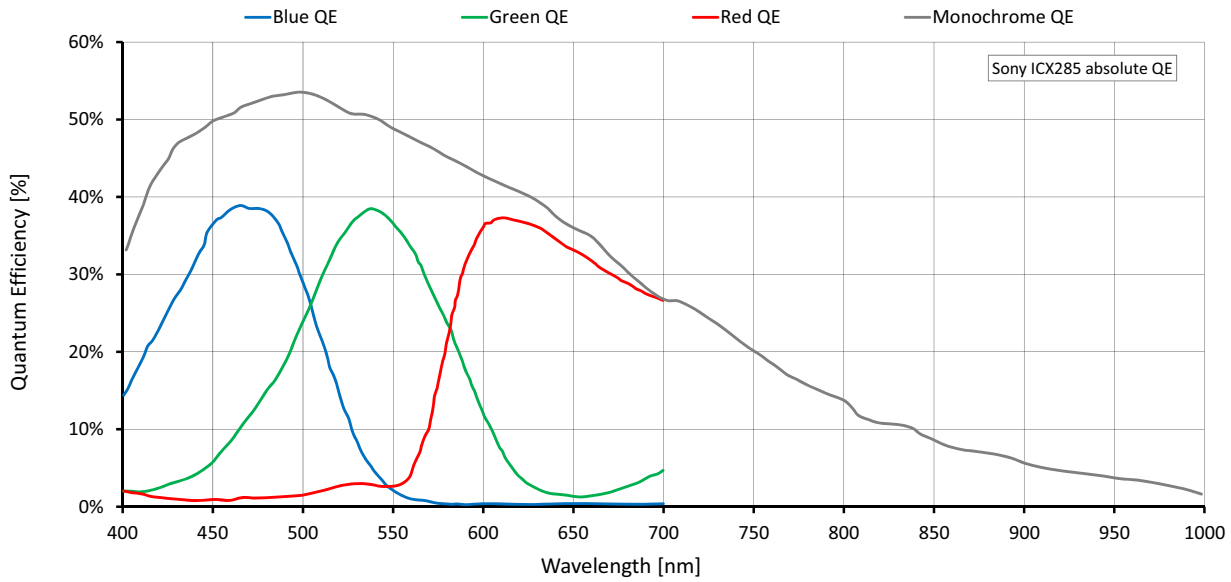



*Figure 20: Manta G-145 (Sony ICX285) absolute QE*

## Spectral response

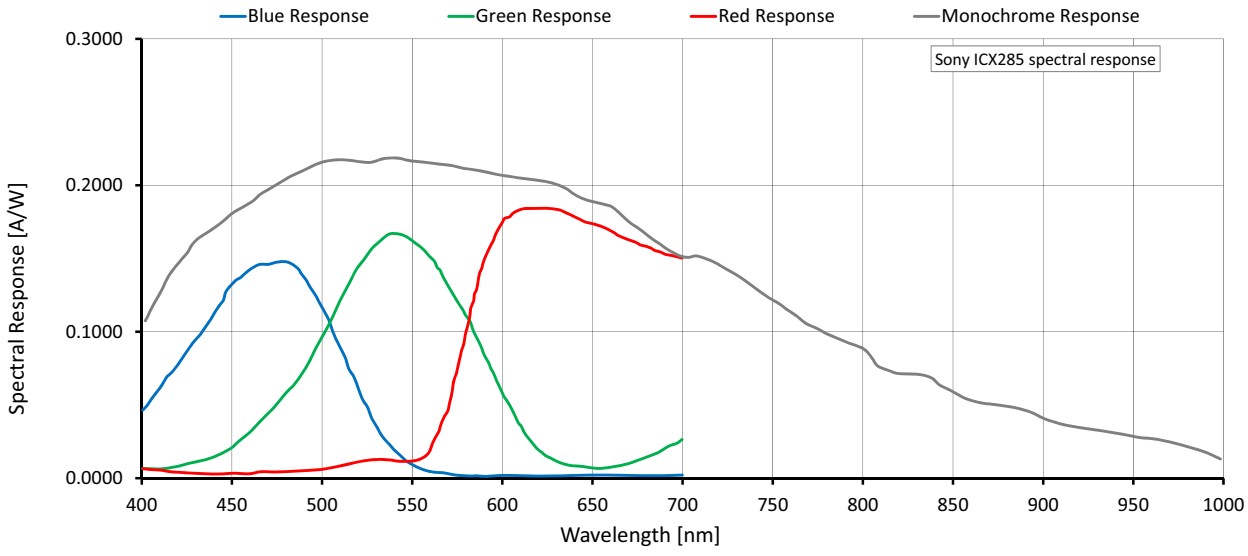



*Figure 21: Manta G-145 (Sony ICX285) spectral response*

# 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

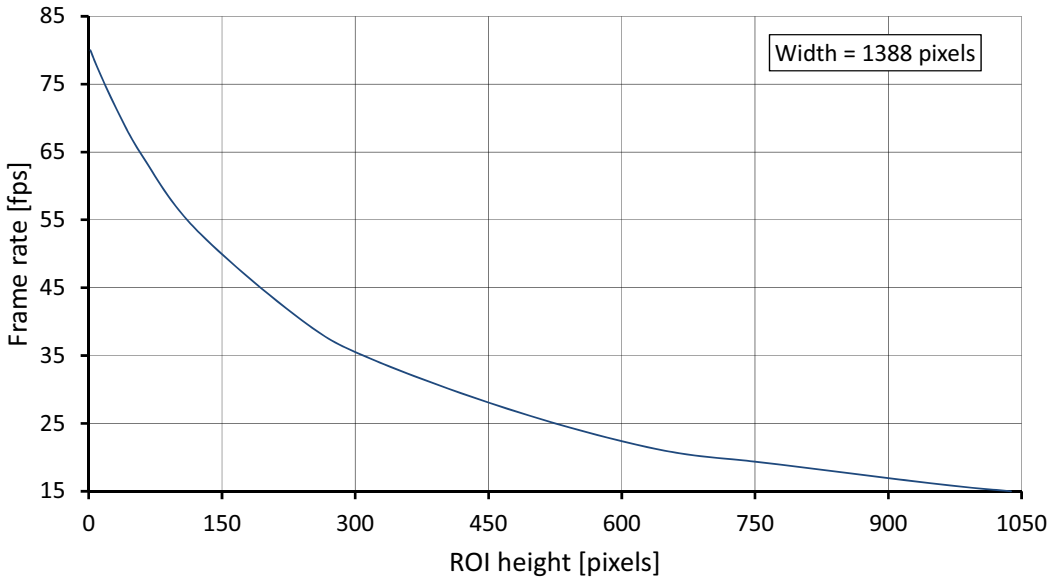



*Figure 22: Manta G-145 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1038 | 15.0 |
| 960 | 16.0 |
| 768 | 19.1 |
| 640 | 21.2 |
| 480 | 26.8 |
| 320 | 34.4 |

| Height | Frame rate (fps) |
|---|---|
| 240 | 40.2 |
| 120 | 53.7 |
| 60 | 64.5 |
| 30 | 71.7 |
| 10 | 77.4 |
| 2 | 80.0 |

*Table 22: Frame rate as a function of ROI height (Width=1388 pixels)*

# 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

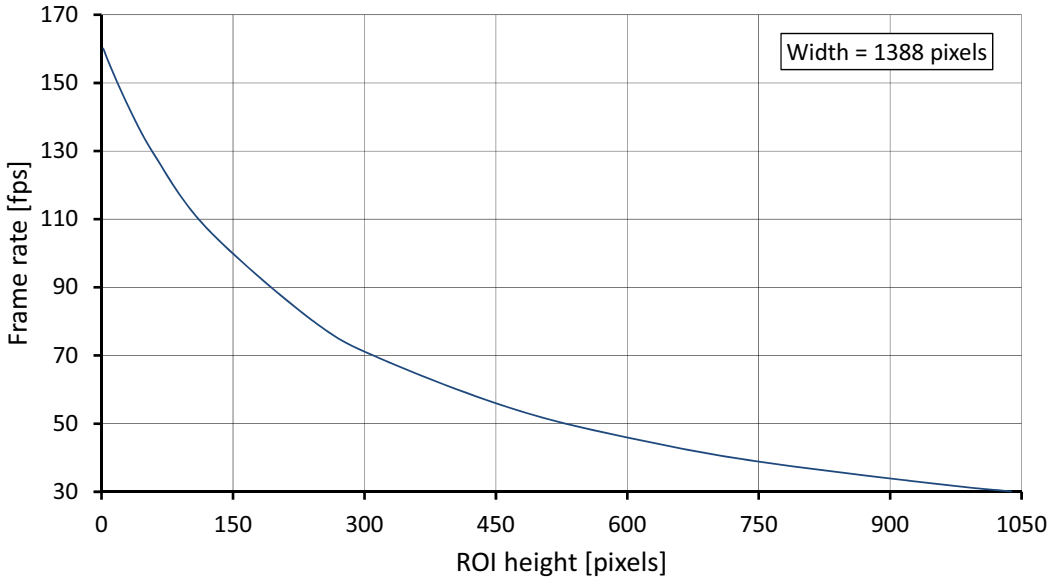



*Figure 23: Manta G-145-30fps frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1038 | 30.1 |
| 960 | 32.1 |
| 768 | 38.2 |
| 640 | 43.8 |
| 480 | 53.5 |
| 320 | 68.9 |
| 240 | 80.4 |
| 120 | 107.4 |
| 60 | 129.0 |
| 30 | 143.4 |
| 10 | 154.9 |
| 2 | 160.1 |

*Table 23: Frame rate as a function of ROI height (Width=1388 pixels)*

# Manta G-145B NIR

The following table provides model specifications. The values are valid for Manta G-145B NIR. For specifications common to all models, see Specifications common to all models.

| Feature | Specification<br>Manta G-145B NIR |
|---|---|
| Sensor model | Sony ICX285AL with EXview HAD CCD™ technology |
| Resolution | 1388 (H) × 1038 (V); 1.4 MP |
| Shutter type | Global shutter |
| Sensor type | Interline CCD, Progressive Scan |
| Sensor format | Type 2/3 |
| Sensor size | 11.0 mm diagonal |
| Pixel size | 6.45 µm × 6.45 µm |
| Maximum frame rate at full resolution | 15.0 fps (NIR mode: Off/On_Fast)<br>13.9 fps (NIR mode: On_HighQuality) |
| Maximum image bit depth | 12-bit |
| Image buffer | 32 MB |
| StreamHoldCapacity | Up to 22 frames at full resolution |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed |
| Exposure time control | 20 µs to 60 s; 1 µs increments<br>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 | External power: 4.2 W at 12 VDC<br>Power over Ethernet: 4.9 W |
| Trigger latency[1] | Idle state: 58.7 µs; Frame valid state: 58.7 µs |
| Trigger jitter[1] | Idle state: ±35.7 µs; Frame valid state: ±35.7 µs |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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 24: Manta G-145B NIR model specifications*

## Absolute QE

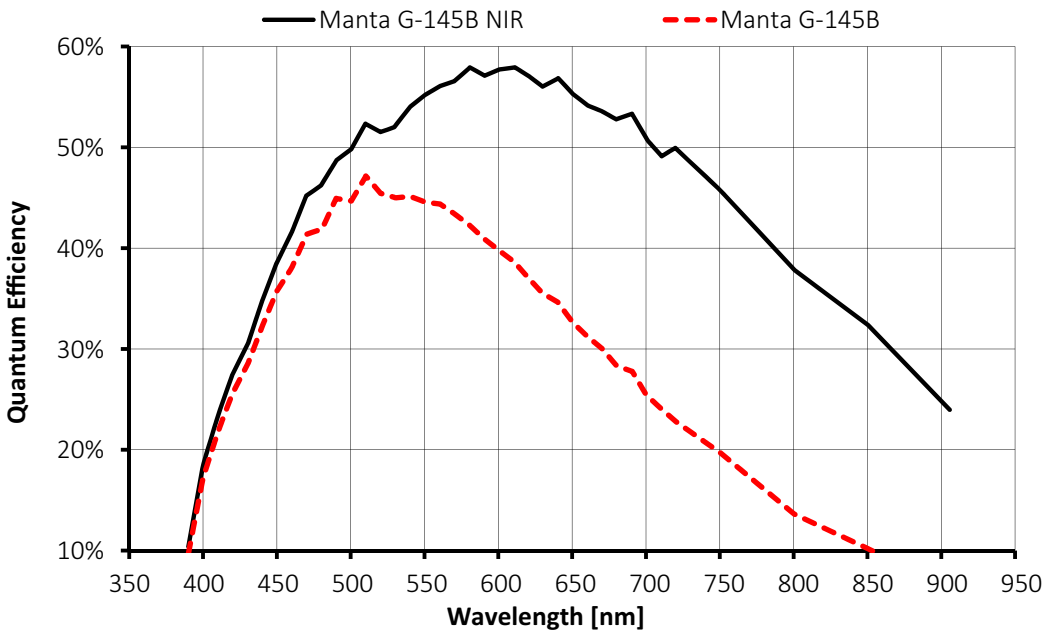



*Figure 24: Manta G-145B NIR (Sony ICX285) absolute QE (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B*

## Increase of relative response

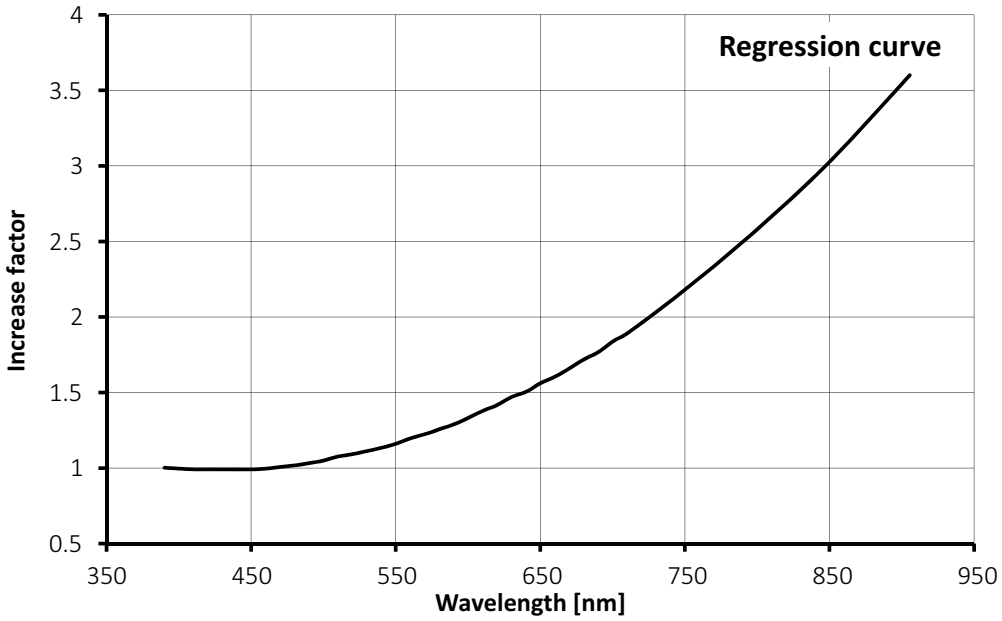



*Figure 25: Increase of relative response with NIR mode set to On_HighQuality*

# ROI frame rate

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

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

Maximum frame rate at full resolution according formula:

15.0 fps for NirMode=Off/On_Fast

13.9 fps for NirMode=On_HighQuality

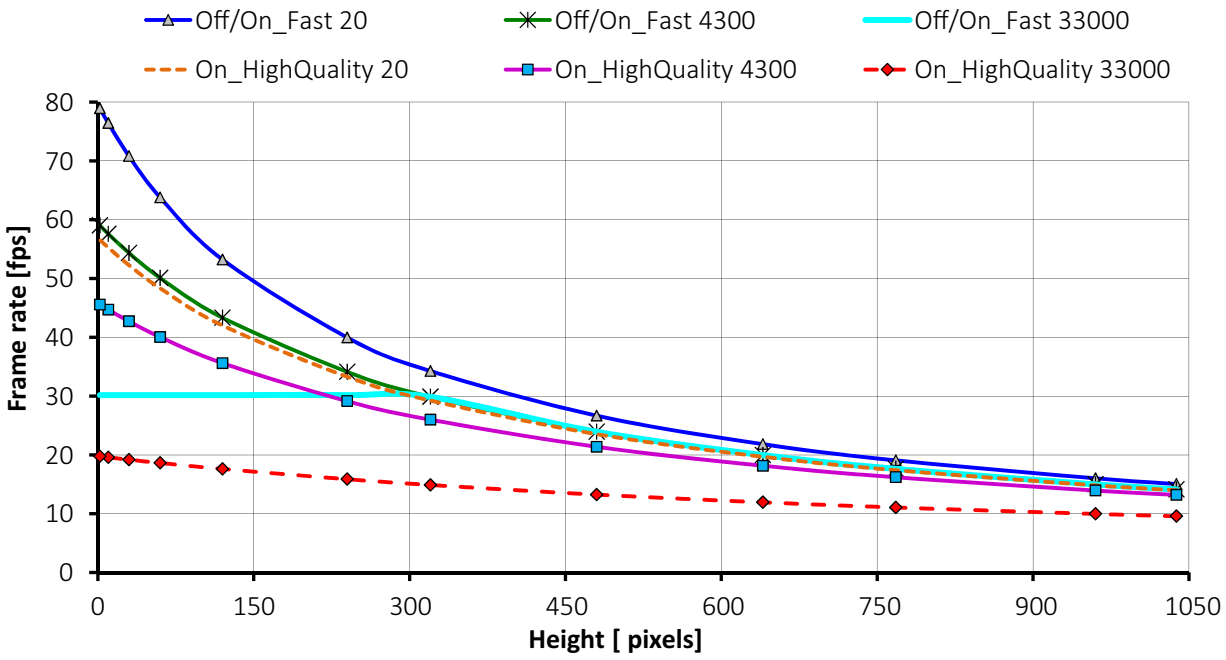



*Figure 26: Frame rate as a function of ROI height [width=1388], NirMode and exposure time per µs*

| NirMode<br>Exposure time per 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-146 series

The following table provides model series specifications. The values are valid for Manta G-146B and G-146C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-146B** | **Manta G-146C** |
| Sensor model | Sony ICX267AL with HAD technology | Sony ICX267AK with HAD technology |
| Resolution | 1388 (H) × 1038 (V); 1.4 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/2 | |
| Sensor size | 8.0 mm diagonal | |
| Pixel size | 4.65 µm × 4.65 µm | |
| Maximum frame rate at full resolution | 17.8 fps | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 32 MB | |
| StreamHoldCapacity | Up to 22 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |
| Trigger latency[1] | Idle state: 21.1 µs; Frame valid state: 42.7 µs | |
| Trigger jitter[1] | Idle state: ±9.2 µs; Frame valid state: ±30.8 µs | |

*Table 25: Manta G-146 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-146B** | **Manta G-146C** |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-146 model series specifications (sheet 2 of 2)*

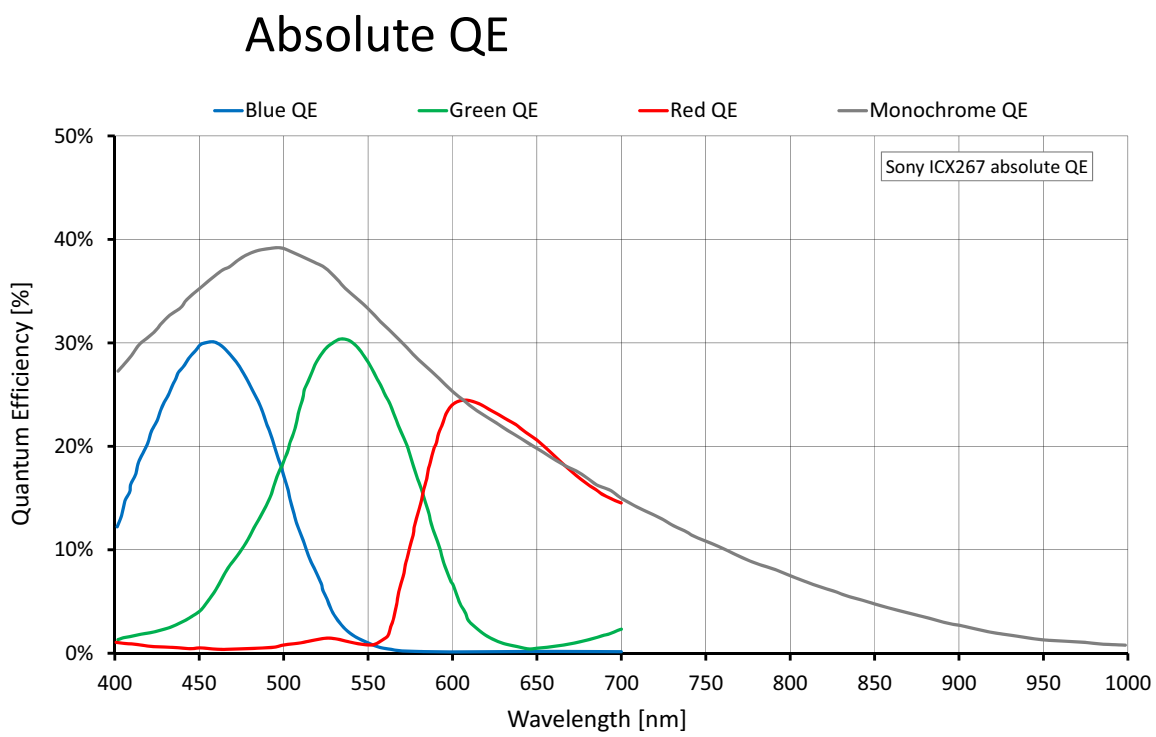



*Figure 27: Manta G-146 (Sony ICX267) absolute QE*

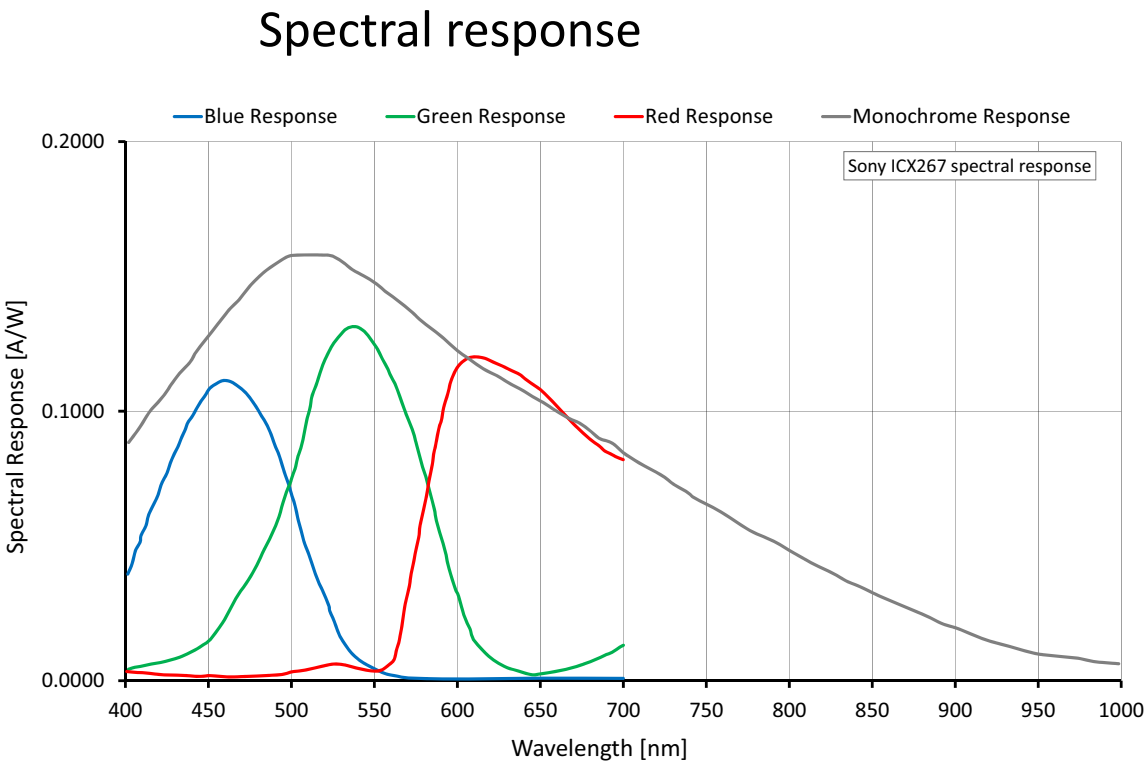



*Figure 28: Manta G-146 (Sony ICX267) spectral response*

# 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

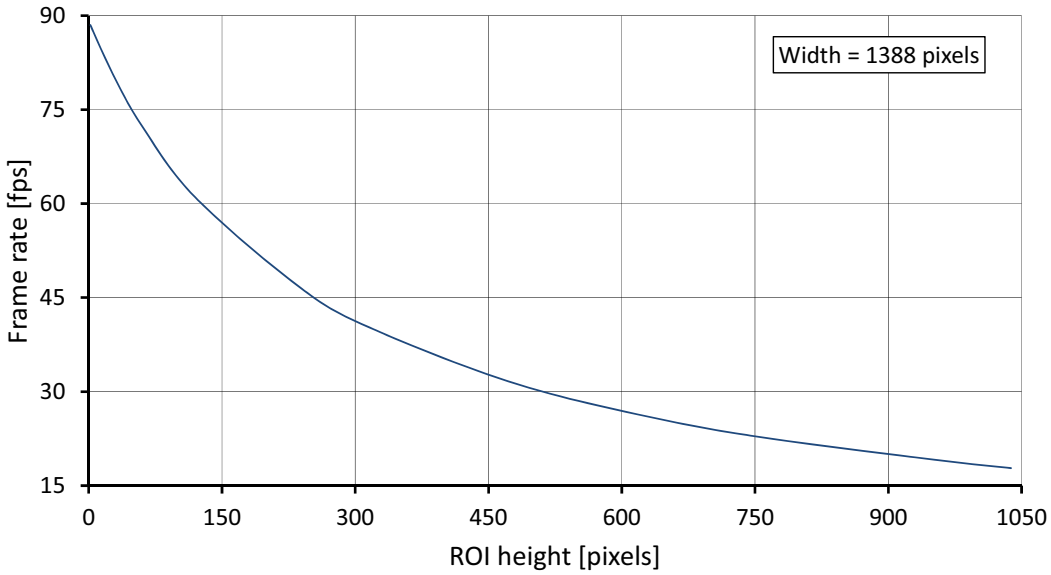



*Figure 29: Manta G-146 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1038 | 17.8 |
| 960 | 19.0 |
| 768 | 22.5 |
| 640 | 25.7 |
| 480 | 31.3 |
| 320 | 40.0 |

| Height | Frame rate (fps) |
|---|---|
| 240 | 46.4 |
| 120 | 61.0 |
| 60 | 72.4 |
| 30 | 79.9 |
| 10 | 85.9 |
| 2 | 88.5 |

*Table 26: Frame rate as a function of ROI height (Width=1388 pixels)*

# Manta G-158 series

The following table provides model series specifications. The values are valid for Manta G-158B and G-158C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-158B** | **Manta G-158C** |
| Sensor model | Sony IMX273LLR Exmor | Sony IMX273LQR Exmor |
| Resolution | 1456 (H) × 1088 (V); 1.58 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1/2.9 | |
| Sensor size | 6.3 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 75.2 fps (89.1 fps 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure control | **Pixel format** | **Range** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 23 µs to 85.9 s; 9.92 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 26 µs to 85.9 s; 13.2 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 33 µs to 85.9 s; 19.84 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 | |

*Table 27: Manta G-158 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-158B** | **Manta G-158C** |
| Power consumption | External power: 2.79 W at 12 VDC<br>Power over Ethernet: 3.26 W | |
| Trigger latency[1] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 29.76 µs |
| | Mono12, BayerRG12, YUV422Packed | 39.6 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 59.52 µs |
| Trigger jitter[1] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±4.96 µs |
| | Mono12, BayerRG12, YUV422Packed | ±6.6 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±9.92 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 185 µs |
| | Mono12, BayerRG12, YUV422Packed | 251 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 384 µs |
| Camera 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.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] These values are calculated directly from the microcontroller source. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 27: Manta G-158 model series specifications (sheet 2 of 2)*

## Absolute QE

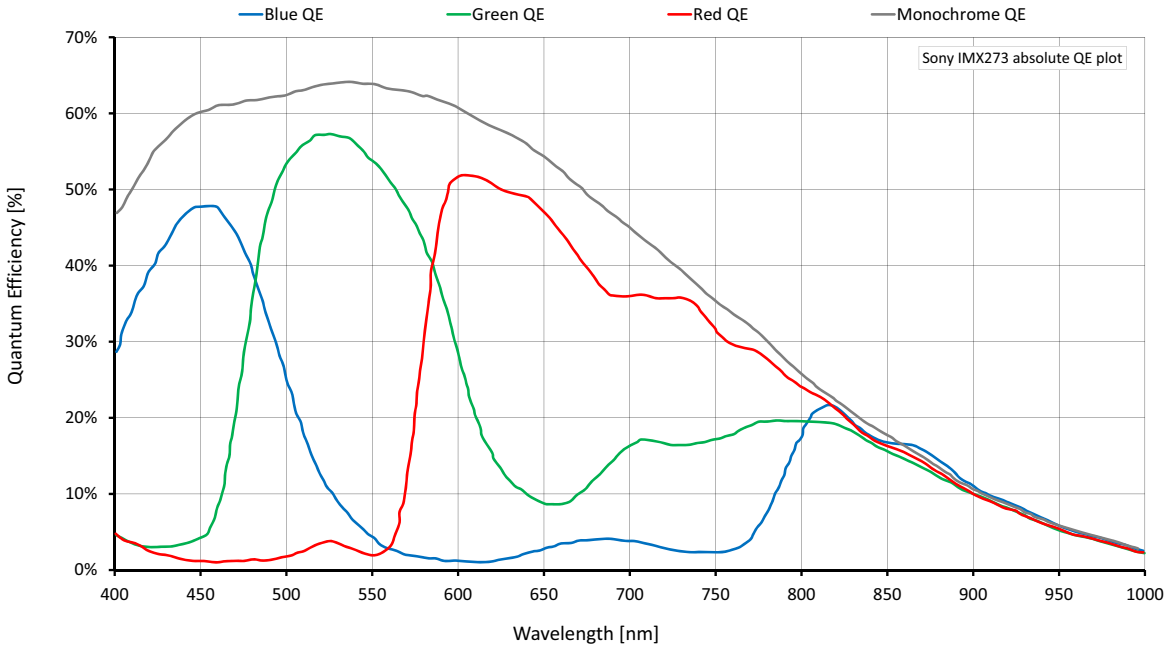



*Figure 30: Manta G-158 (Sony IMX273) absolute QE*

## Spectral response

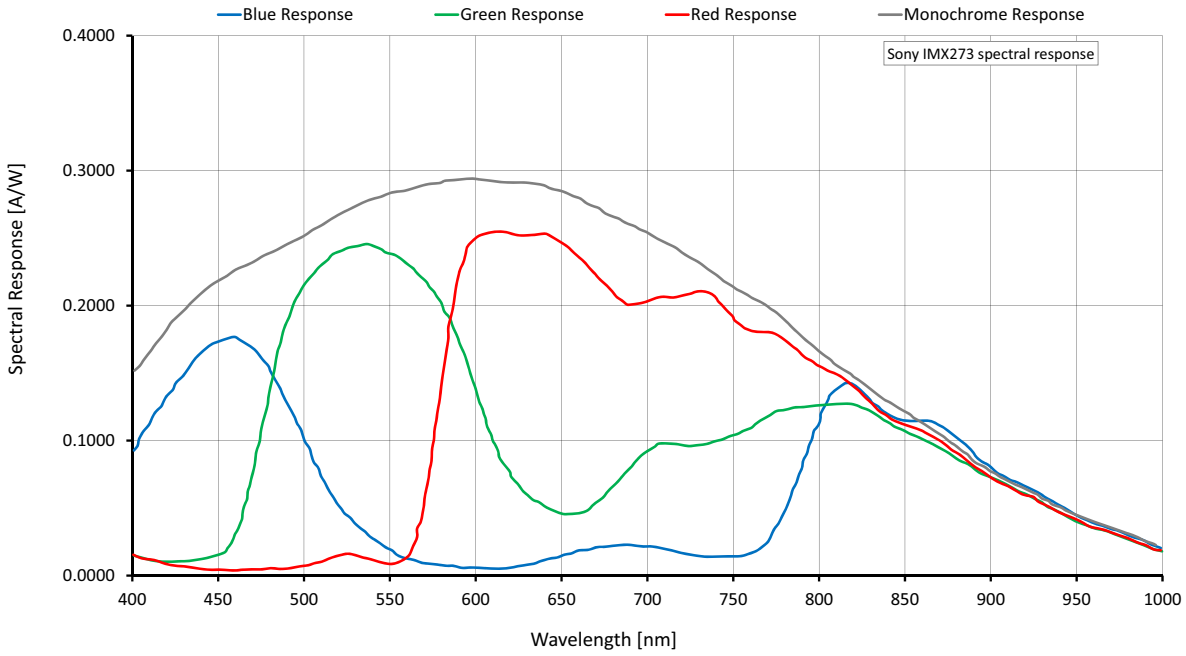



*Figure 31: Manta G-158 (Sony IMX273) spectral response*

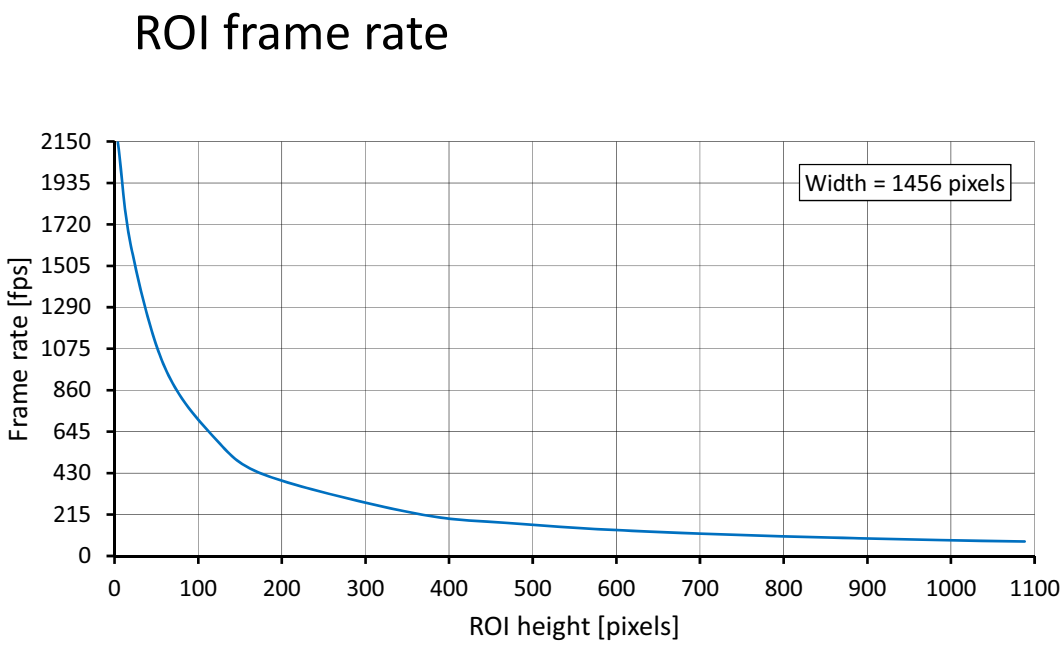



*Figure 32: Manta G-158 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1088 | 75.2 |
| 1080 | 75.6 |
| 1024 | 79.6 |
| 960 | 85.2 |
| 768 | 106.0 |

| Height | Frame rate (fps) |
|---|---|
| 600 | 134.6 |
| 480 | 168.3 |
| 360 | 220.6 |
| 180 | 420.0 |
| 120 | 610.9 |

| Height | Frame rate (fps) |
|---|---|
| 60 | 978.7 |
| 20 | 1600.0 |
| 4 | 2144.5 |

*Table 28: Frame rate as a function of ROI height (Width=1456 pixels)*

There is 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-201 series

The following table provides model series specifications. The values are valid for Manta G-201B and G-201C models (including 30fps variants). For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-201B, G-201B-30fps** | **Manta G-201C, G-201C-30fps** |
| Sensor model | Sony ICX274AL with Super HAD CCD technology | Sony ICX274AQ with Super HAD Wfine CCD™ technology |
| Resolution | 1624 (H) × 1234 (V); 2 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/1.8 | |
| Sensor size | 8.923 mm diagonal | |
| Pixel size | 4.4 µm × 4.4 µm | |
| Maximum frame rate at full resolution | 14.7 fps | |
| Maximum frame rate at full resolution (30 fps variants) | 30.0 fps | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats[1] | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12Packed, BayerRG12 |
| Exposure time control | 51 µs to 60 s; 1 µs increments | |
| Exposure time control (30 fps variants) | 10 µs to 60; 1 µs increments | |
| Gain control | 0 to 31 dB; 1 dB increments | |
| Binning | Horizontal: 1 to 8 columns; Vertical:1 to 14 rows | |

*Table 29: Manta G-201 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-201B, G-201B-30fps** | **Manta G-201C, G-201C-30fps** |
| Decimation X/Y | Horizontal and Vertical: 1, 2, 4, 8 factor | |
| Power consumption | External power: 3.6 W at 12 VDC<br>Power over Ethernet: 4.2 W | |
| Power consumption (30 fps variants) | External power: 4.6 W at 12 VDC<br>Power over Ethernet: 5.4 W | |
| Trigger latency[2] | Idle state: 17.0 µs; Frame valid state: 40.8 µs | |
| Trigger latency[2] (30 fps variants) | Idle state: 9.4 µs; Frame valid state: 21.4 µs | |
| Trigger jitter[2] | Idle state: ±7.6 µs; Frame valid state: ±31.4 µs | |
| Trigger jitter[2] (30 fps variants) | Idle state: ±5.4 µs; Frame valid state: ±17.4 µs | |
| Camera 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 support RGB8Packed and BGR8Packed only

[2] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state.

*Table 29: Manta G-201 model series specifications (sheet 2 of 2)*

## Absolute QE

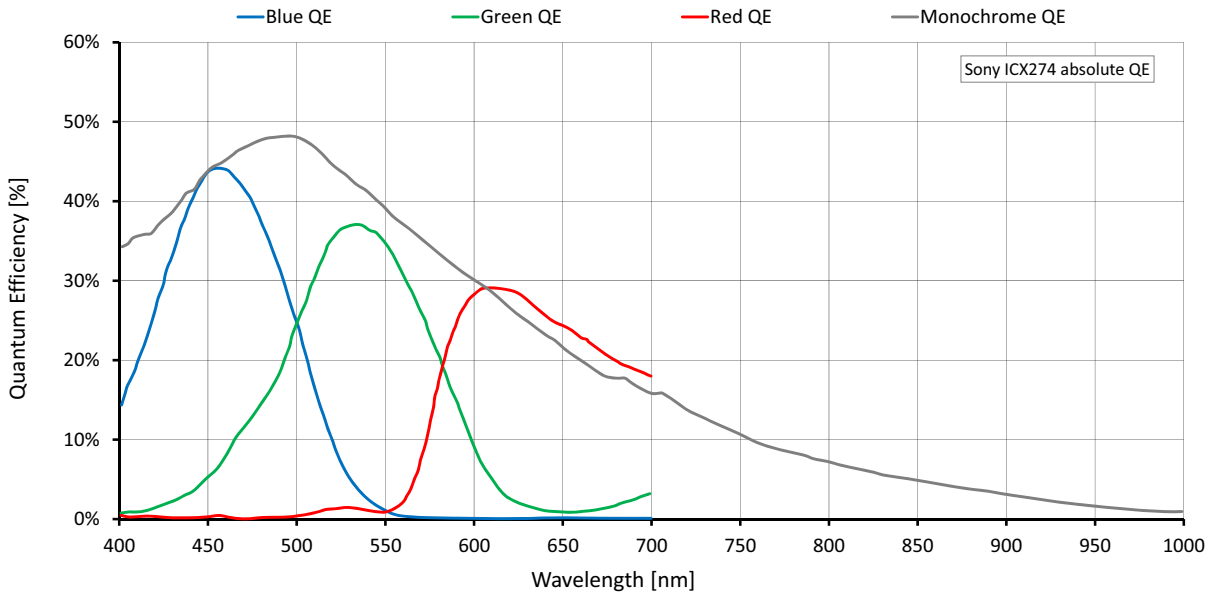



*Figure 33: Manta G-201 (Sony ICX274) absolute QE*

## Spectral response

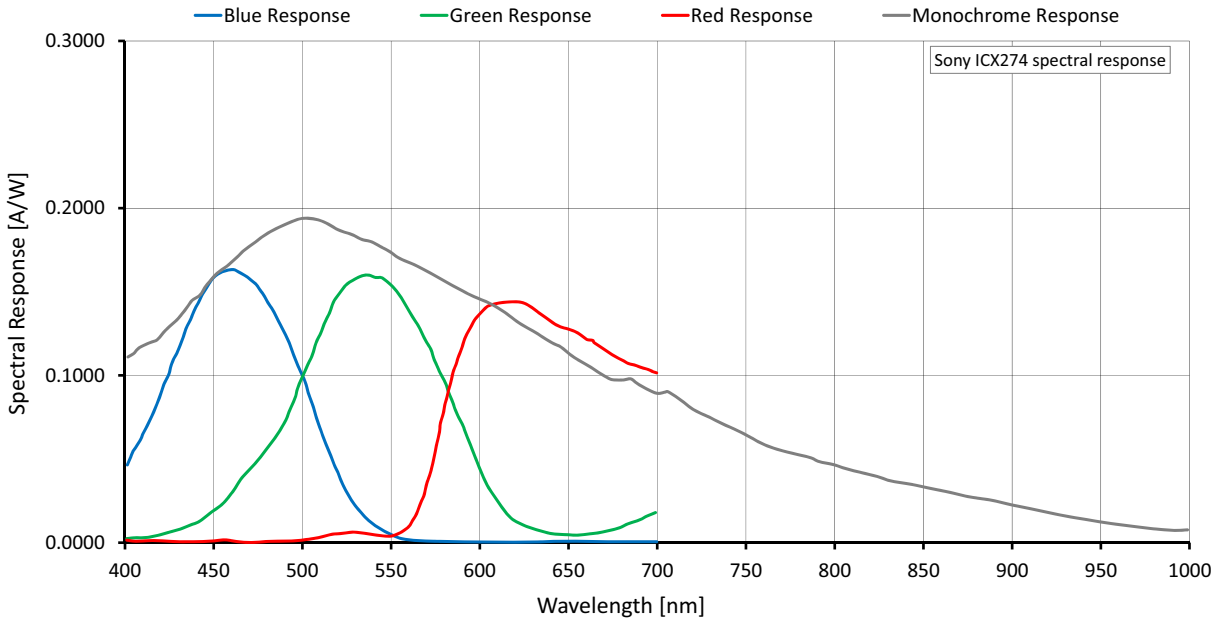



*Figure 34: Manta G-201 (Sony ICX274) spectral response*

# 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

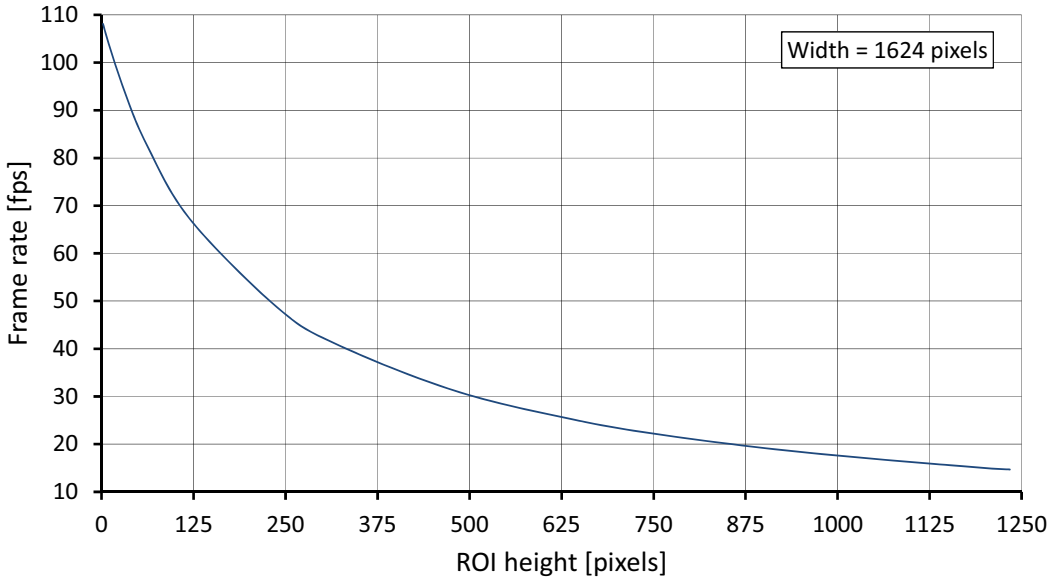



*Figure 35: Manta G-201 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1234 | 14.7 |
| 1200 | 15.0 |
| 960 | 18.2 |
| 768 | 21.8 |
| 640 | 25.2 |
| 480 | 31.2 |
| 320 | 40.9 |
| 240 | 48.5 |
| 120 | 67.2 |
| 60 | 83.2 |
| 30 | 94.5 |
| 10 | 103.8 |
| 2 | 108.1 |

*Table 30: Frame rate as a function of ROI height (Width=1624 pixels)*

# 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

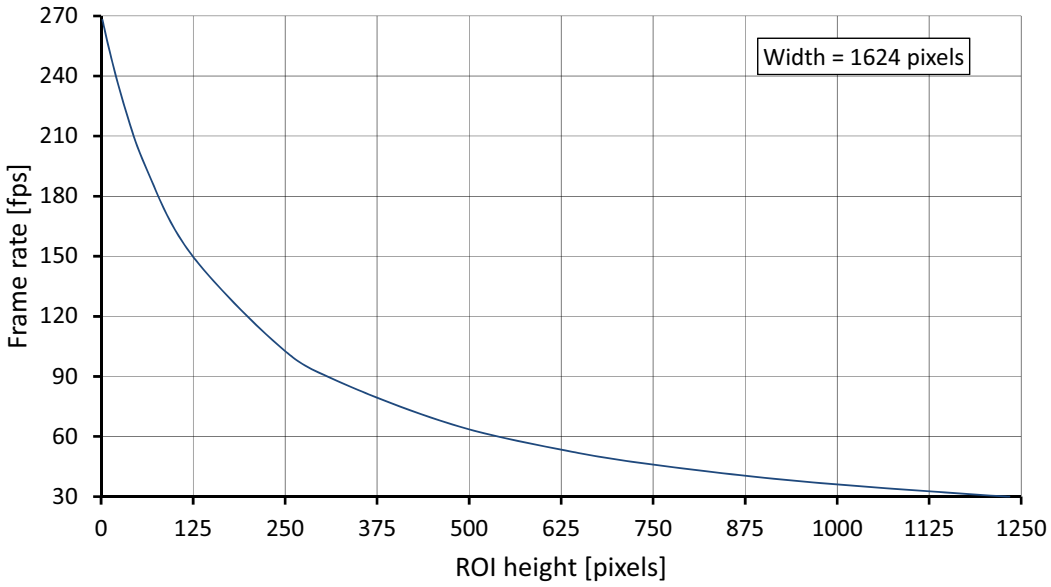



*Figure 36: Manta G-201-30fps frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1234 | 30.0 |
| 1200 | 30.7 |
| 960 | 37.3 |
| 768 | 45.1 |
| 640 | 52.4 |
| 480 | 65.7 |
| 320 | 87.9 |
| 240 | 105.8 |
| 120 | 152.2 |
| 60 | 195.1 |
| 30 | 227.0 |
| 10 | 254.8 |
| 2 | 268.0 |

*Table 31: Frame rate as a function of ROI height values (Width=1624 pixels)*

# Manta G-223 series

The following table provides model series specifications. The values are valid for Manta G-223B, G-223B NIR, and G-223C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-223B, G-223B NIR** | **Manta G-223C** |
| Sensor model | CMOSIS/ams CMV2000 with microlens | |
| Resolution | 2048 (H) × 1088 (V); 2.2 MP | |
| Shutter type | Global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 2/3 | |
| Sensor size | 12.7 mm diagonal | |
| Pixel size | 5.5 µm × 5.5 µm | |
| Maximum frame rate at full resolution | 53.7 fps (60.1 fps burst mode[1]) | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | BayerGB8, BayerGB12Packed, BayerGB12 |
| Exposure time control | 25 µs[2] 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 | External power: 2.7 W at 12 VDC<br>Power over Ethernet: 3.1 W | |
| Trigger latency[3] | 5.335 µs | |
| Trigger jitter[3] | ±0.125 µs | |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |

*Table 32: Manta G-223 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-223B, G-223B NIR | Manta G-223C |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only.<br>Resolution 0.031; Accuracy ±1 °C | |

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

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

[3] Trigger latency and trigger jitter values were measured at the external I/O (8-bit pixel format).

*Table 32: Manta G-223 model series specifications (sheet 2 of 2)*

## Absolute QE

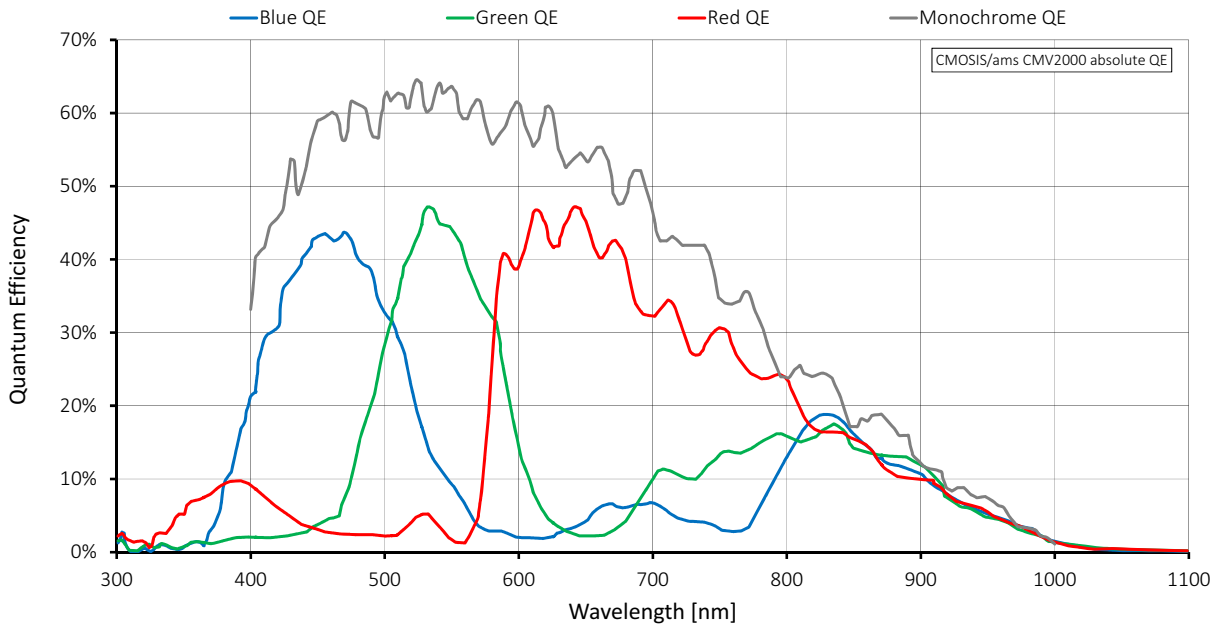



*Figure 37: Manta G-223B and G-223C (CMOSIS/ams CMV2000) absolute QE*

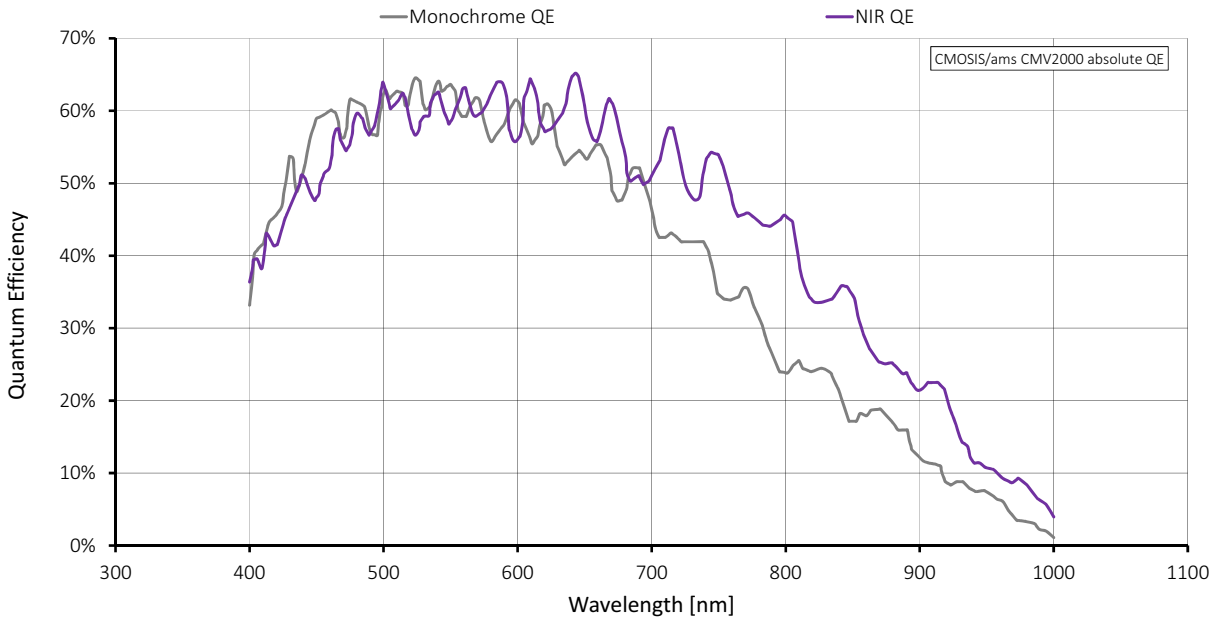



*Figure 38: Manta G-223B and G-223B NIR (CMOSIS/ams CMV2000) absolute QE*

## ROI frame rate

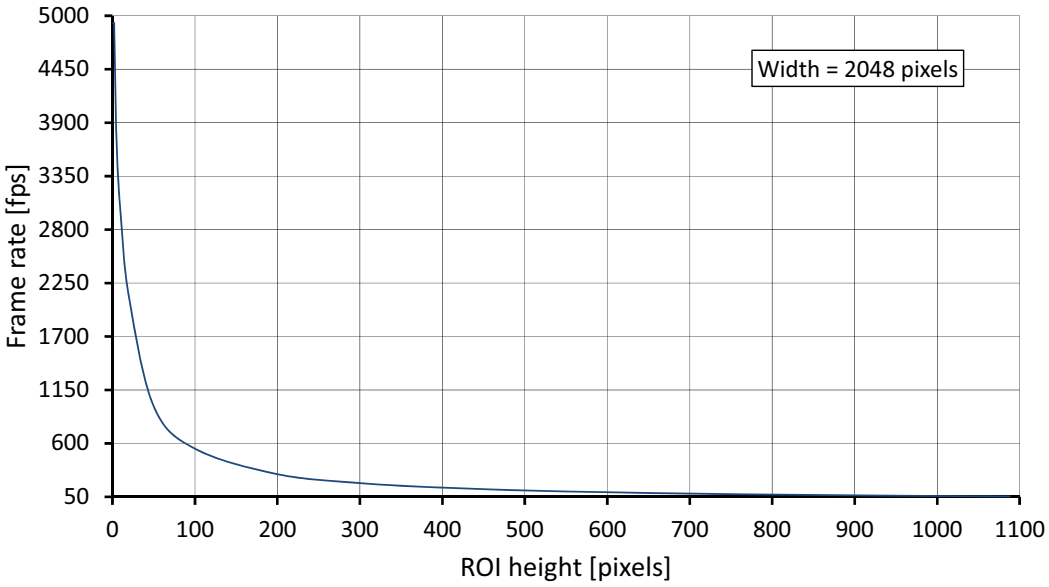



*Figure 39: Manta G-223 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1088 | 53.7 |
| 1000 | 58.4 |
| 900 | 64.8 |
| 800 | 72.8 |
| 700 | 83.1 |
| 600 | 96.8 |

| Height | Frame rate (fps) |
|---|---|
| 500 | 115.9 |
| 400 | 144.3 |
| 300 | 191.1 |
| 200 | 283.1 |
| 100 | 545.2 |
| 50 | 981.3 |

| Height | Frame rate (fps) |
|---|---|
| 20 | 2105.2 |
| 10 | 2949.8 |
| 5 | 3690.0 |
| 2 | 4926.1 |
| 1 | 4926.1 |

*Table 33: Frame rate as a function of ROI height (Width=2048 pixels)*

There is 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-235 series

The following table provides model series specifications. The values are valid for Manta G-235B and G-235C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-235B** | **Manta G-235C** |
| Sensor model | Sony IMX174LLJ Exmor | Sony IMX174LQJ Exmor |
| Resolution | 1936 (H) × 1216 (V); 2.35 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor size | Type 1/1.2<br>13.4 mm diagonal | |
| Pixel size | 5.86 µm × 5.86 µm | |
| Maximum frame rate at full resolution | 50.8 fps (59.2 fps 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure time control | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | 27 µs to 85.9 s; 13.44 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 31 µs to 85.9 s; 17.92 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 40 µs to 85.9 s; 26.88 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 | |

*Table 34: Manta G-235 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-235B** | **Manta G-235C** |
| Power consumption | External power: 2.8 W at 12 VDC<br>Power over Ethernet: 3.3 W | |
| Trigger latency[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | 40.32 µs |
| | Mono12, BayerRG12, YUV422Packed | 53.76 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 80.64 µs |
| Trigger jitter[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | ±6.72 µs |
| | Mono12, BayerRG12, YUV422Packed | ±8.96 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±13.44 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | 188 µs |
| | Mono12, BayerRG12, YUV422Packed | 256 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 390 µs |
| Camera 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.<br>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. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 34: Manta G-235 model series specifications (sheet 2 of 2)*

## Absolute QE

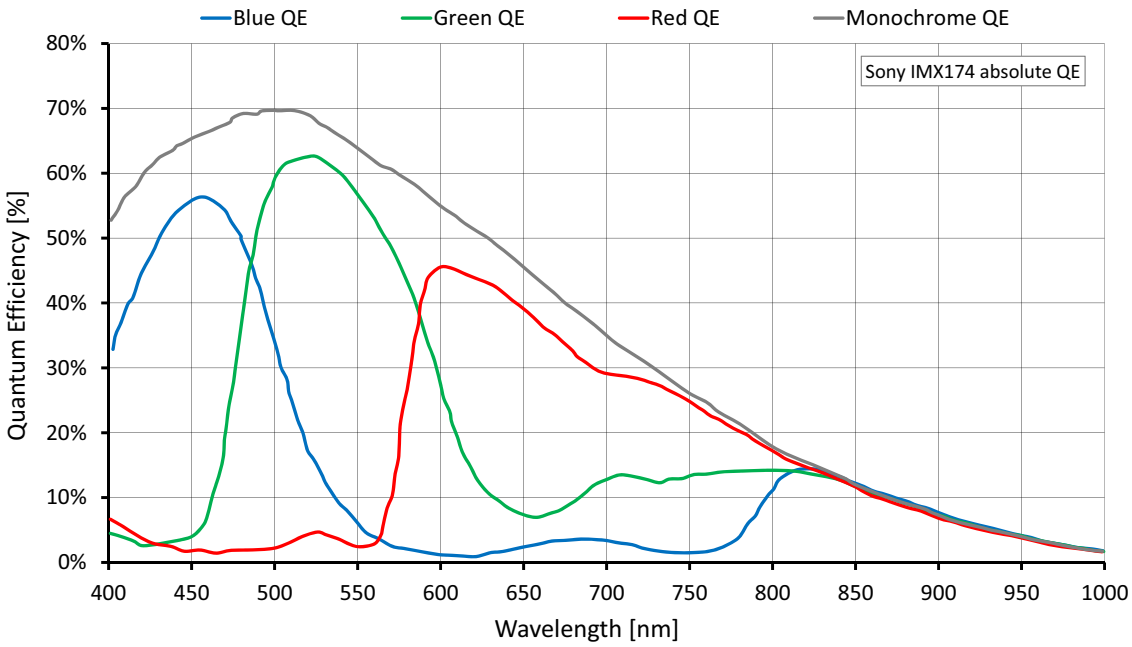



*Figure 40: Manta G-235 (Sony IMX174) absolute QE*

## Spectral response

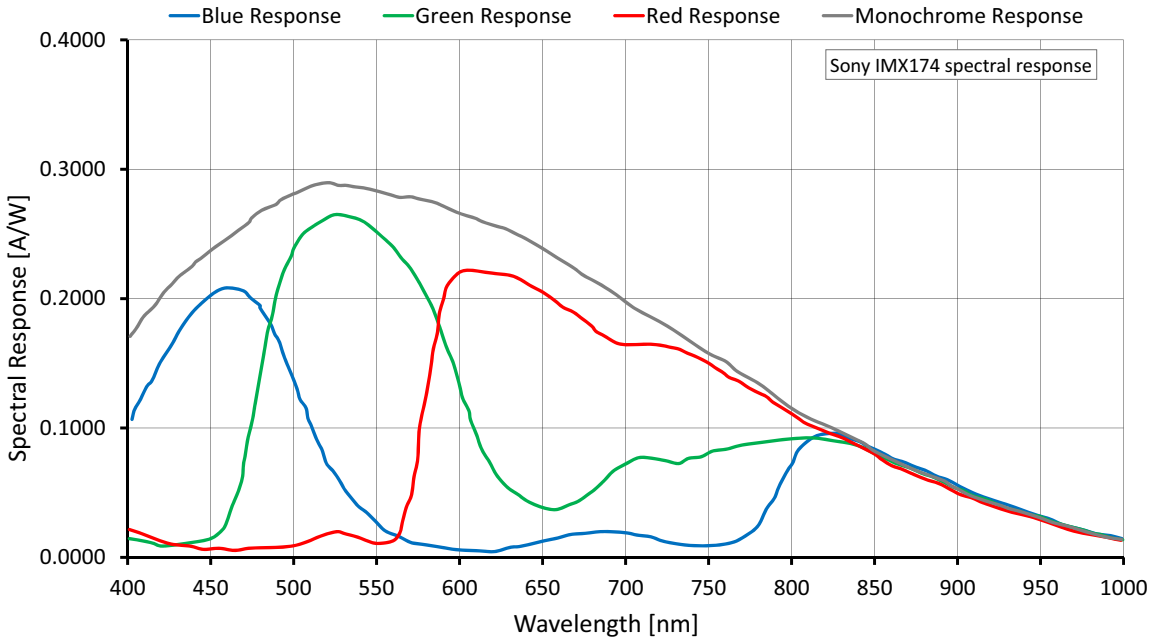



*Figure 41: Manta G-235 (Sony IMX174) spectral response*

# ROI frame rate

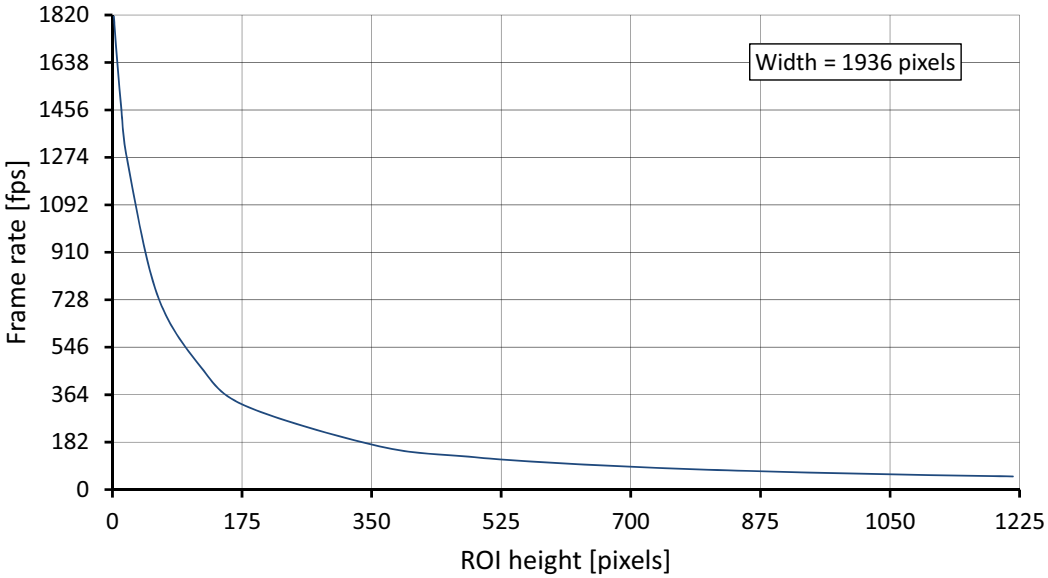



*Figure 42: Manta G-235 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1216 | 50.8 |
| 1080 | 57.0 |
| 1024 | 60.1 |
| 960 | 64.2 |
| 768 | 79.8 |
| 600 | 102.0 |
| 480 | 126.5 |
| 360 | 166.4 |

| Height | Frame rate (fps) |
|---|---|
| 180 | 320.7 |
| 120 | 467.9 |
| 60 | 751.5 |
| 20 | 1261.0 |
| 12 | 1458.8 |
| 4 | 1730.1 |
| 2 | 1814.5 |

*Table 35: Frame rate as a function of ROI height (Width= 1936 pixels)*

There is 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-282 series

The following table provides model series specifications. The values are valid for Manta G-282B and G-282C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-282B** | **Manta G-282C** |
| Sensor model | Sony ICX687ALA with EXview HAD CCD II Technology | Sony ICX687AQA with EXview HAD CCD II Technology |
| Resolution | 1936 (H) × 1458 (V); 2.8 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1/1.8 | |
| Sensor size | 8.918 mm diagonal | |
| Pixel size | 3.69 µm × 3.69 µm | |
| Maximum frame rate at full resolution | 30.4 fps (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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | 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<br>Single-tap switchable in Vimba Viewer 2.0 or later | |
| Power consumption | External power: 3.5 W at 12 VDC<br>Power over Ethernet: 4.1 W | |
| Trigger latency[1] | Idle state: 7.2 µs; Frame valid state: 18.4 µs | |

*Table 36: Manta G-282 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-282B | Manta G-282C |
| Trigger jitter[1] | Idle state: ±4.0 µs; Frame valid state: ±15.2 µs | |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-282 model series specifications (sheet 2 of 2)*

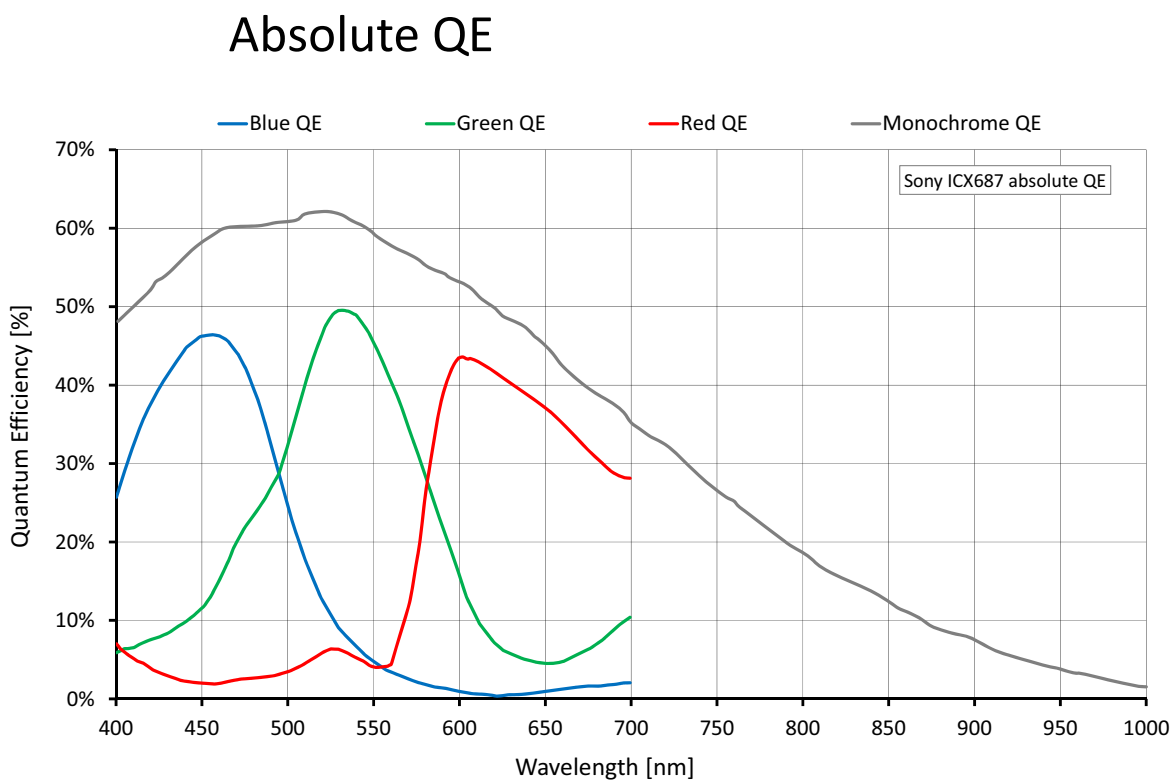



*Figure 43: Manta G-282 (Sony ICX687) absolute QE*

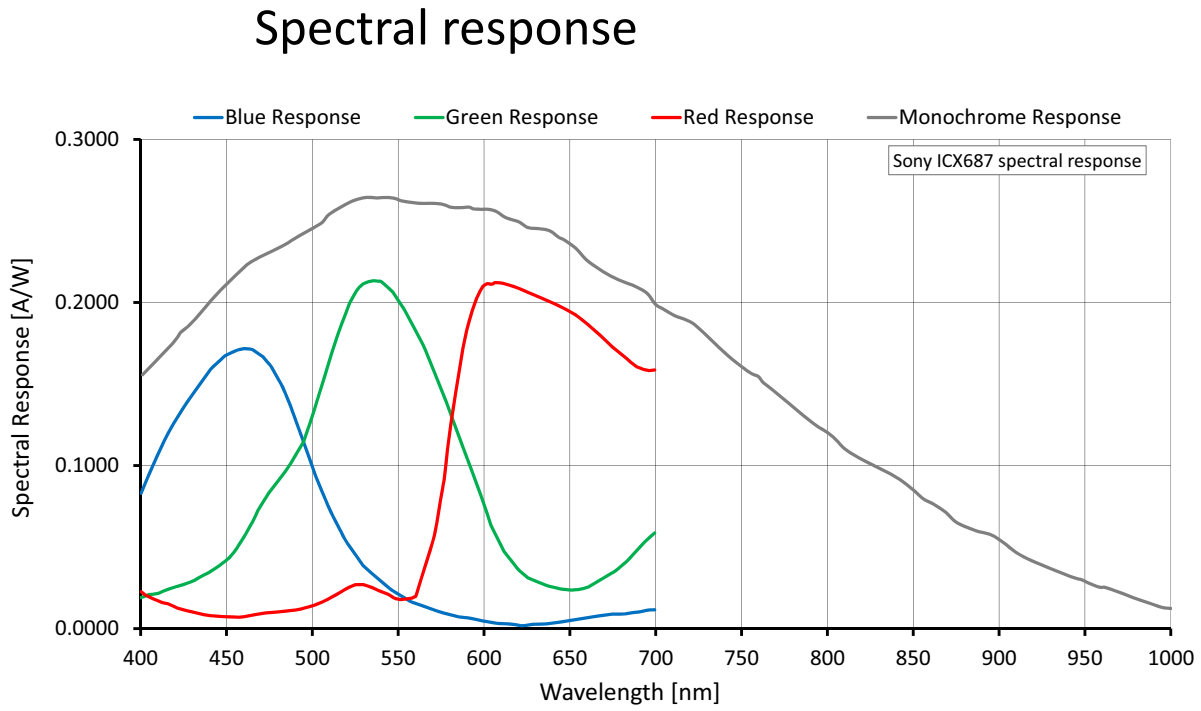



*Figure 44: Manta G-282 (Sony ICX687) spectral response*

# 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

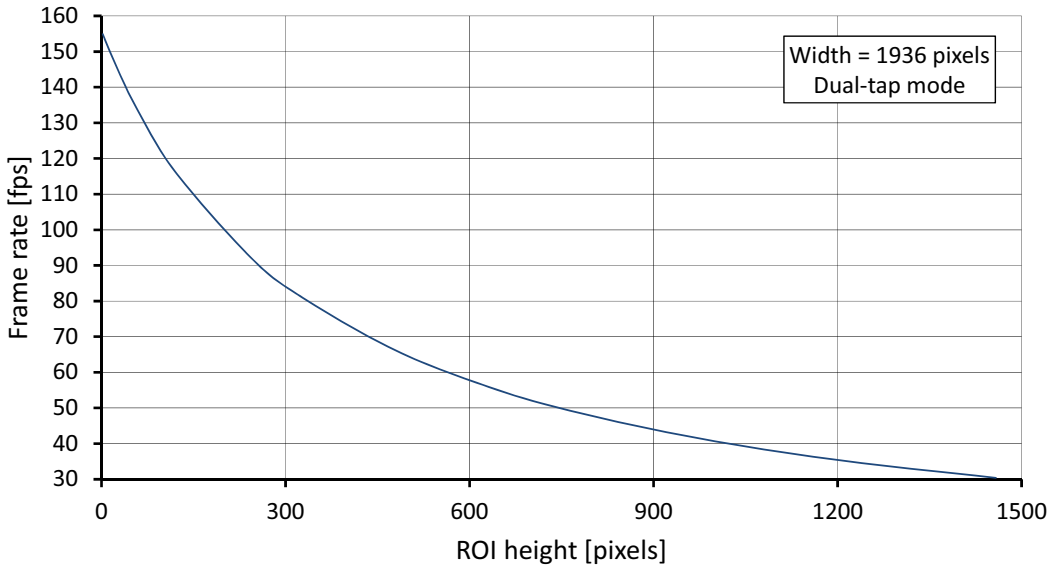



*Figure 45: Manta G-282 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1458 | 30.4 |
| 1200 | 35.4 |
| 960 | 41.9 |
| 768 | 49.1 |
| 640 | 55.4 |
| 480 | 66.1 |
| 320 | 81.8 |
| 240 | 92.8 |
| 120 | 116.3 |
| 60 | 133.2 |
| 30 | 143.6 |
| 10 | 151.5 |
| 2 | 154.9 |

*Table 37: Frame rate as a function of ROI height (Width=1936 pixels)*

# Manta G-283 series

The following table provides model series specifications. The values are valid for Manta G-283B and G-283C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-283B** | **Manta G-283C** |
| Sensor model | Sony ICX674ALG with EXview HAD II™ microlens technology | Sony ICX674AQG with EXview HAD II™ microlens technology |
| Resolution | 1936 (H) × 1458 (V); 2.8 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 2/3 | |
| Sensor size | 10.972 mm diagonal | |
| Pixel size | 4.54 µm × 4.54 µm | |
| Maximum frame rate at full resolution | 30.4 fps (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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | 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<br>Single-tap switchable in Vimba Viewer 2.0 or later | |
| Power consumption | External power: 3.7 W at 12 VDC<br>Power over Ethernet: 4.3 W | |
| Trigger latency[1] | Idle state: 7.2 µs; Frame valid state: 18.4 µs | |

*Table 38: Manta G-283 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-283B | Manta G-283C |
| Trigger jitter[1] | Idle state: ±4.0 µs; Frame valid state: ±15.2 µs | |
| Camera 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.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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 38: Manta G-283 model series specifications (sheet 2 of 2)*

## Absolute QE

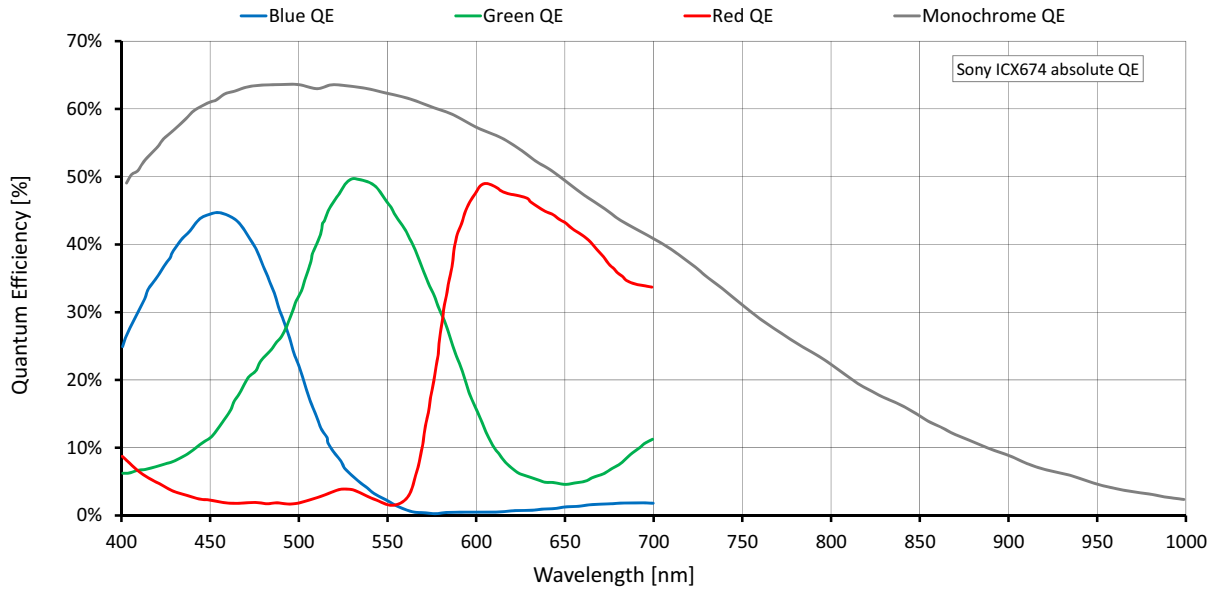



*Figure 46: Manta G-283 (Sony ICX674) absolute QE*

## Spectral response

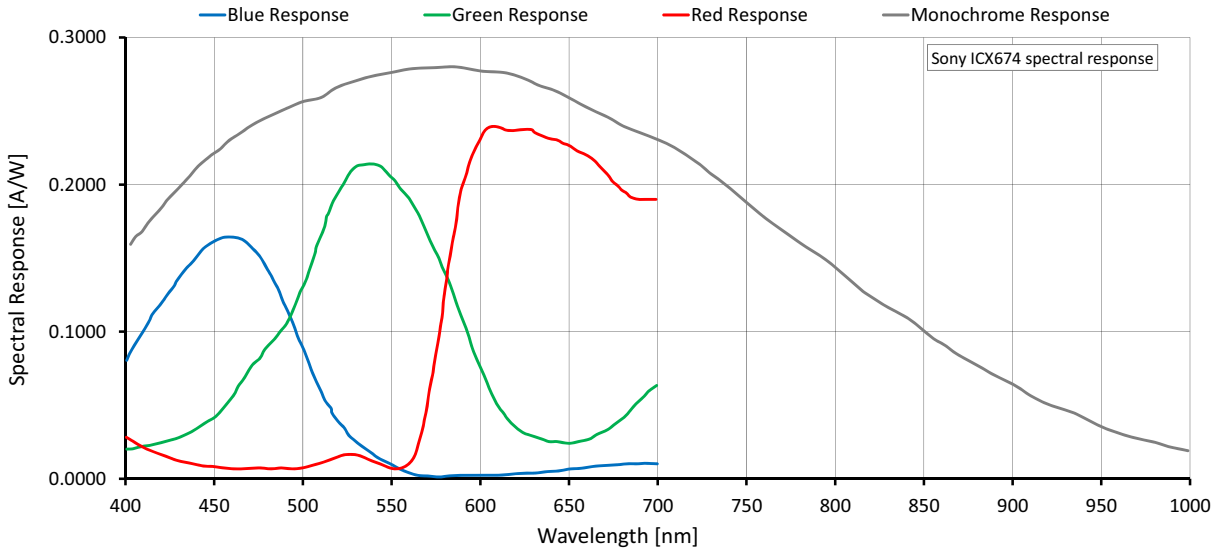



*Figure 47: Manta G-283 (Sony ICX674) spectral response*

# 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

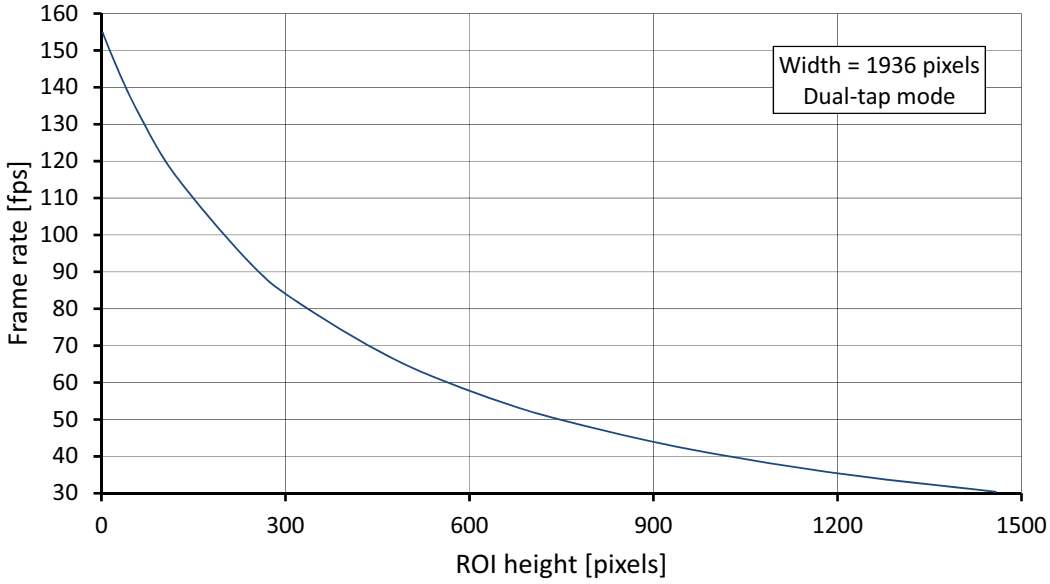



*Figure 48: Manta G-283 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1458 | 30.4 |
| 1200 | 35.4 |
| 960 | 41.9 |
| 768 | 49.1 |
| 640 | 55.4 |
| 480 | 66.1 |
| 320 | 81.8 |
| 240 | 92.8 |
| 120 | 116.3 |
| 60 | 133.2 |
| 30 | 143.6 |
| 10 | 151.5 |
| 2 | 154.9 |

*Table 39: Frame rate as a function of ROI height (Width=1936 pixels)*

# Manta G-319 series

The following table provides model series specifications. The values are valid for Manta G-319B and G-319C models. For specifications common to all models, see Specifications common to all models.

| | Specification | |
|---|---|---|
| **Feature** | **Manta G-319B** | **Manta G-319C** |
| Sensor model | Sony IMX265LLR Exmor | Sony IMX265LQR Exmor |
| Resolution | 2064 (H) × 1544 (V); 3.2 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1/1.8 | |
| Sensor size | 8.9 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 37.6 fps (45.0 fps 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed,<br>BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure time control | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 27 µs to 85.89 s; 14.08 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 32 µs to 85.89 s; 18.72 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 41 µs to 85.89 s; 28.16 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 | |

*Table 40: Manta G-319 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-319B** | **Manta G-319C** |
| Power consumption | External power: 2.7 W at 12 VDC<br>Power over Ethernet: 3.1 W | |
| Trigger latency[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 42.24 µs |
| | Mono12, BayerRG12, YUV422Packed | 56.16 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 84.48 µs |
| Trigger jitter[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±7.04 µs |
| | Mono12, BayerRG12, YUV422Packed | ±9.36 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±14.08 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 198 µs |
| | Mono12, BayerRG12, YUV422Packed | 267 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 409 µs |
| Camera 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.<br>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. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 40: Manta G-319 model series specifications (sheet 2 of 2)*

## Absolute QE

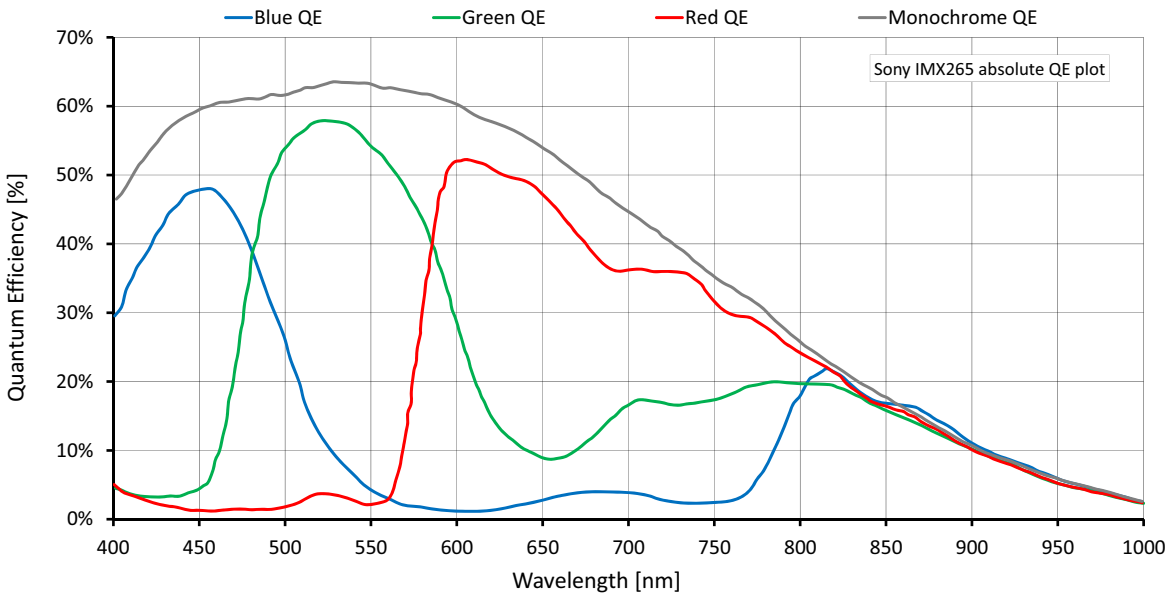



*Figure 49: Manta G-319 (Sony IMX265) absolute QE*

## Spectral response

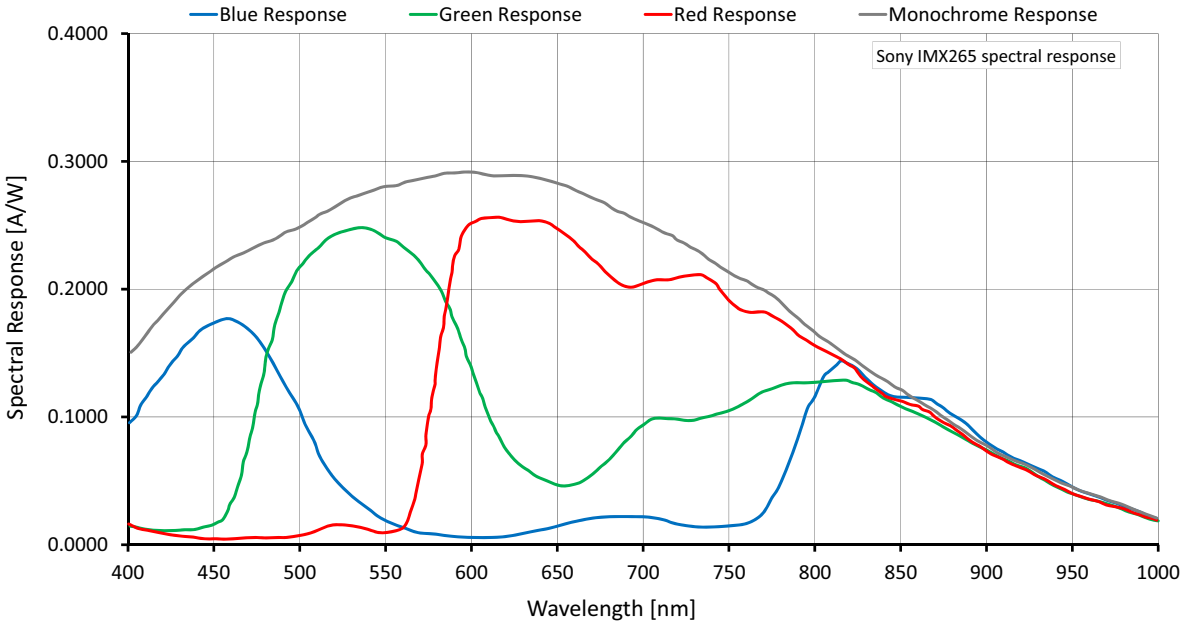



*Figure 50: Manta G-319 (Sony IMX265) spectral response*

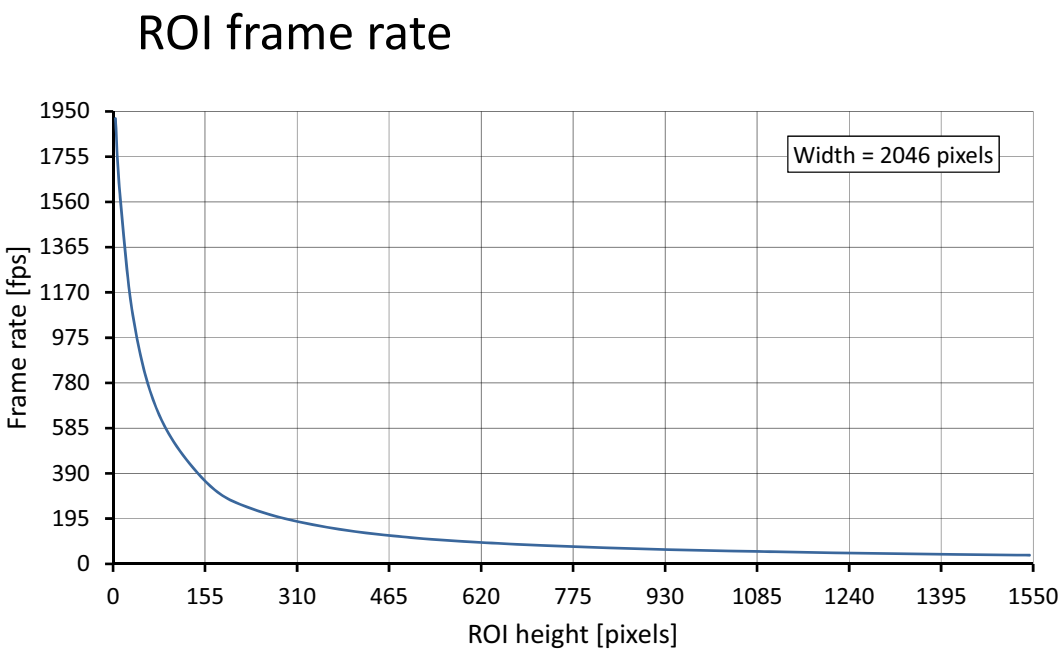



*Figure 51: Manta G-319 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 1544 | 37.6 |
| 1324 | 43.8 |
| 1280 | 45.3 |
| 1024 | 56.6 |
| 960 | 60.0 |
| 768 | 75.1 |
| 600 | 95.4 |
| 480 | 118.9 |

| Height | Frame rate (fps) |
|---|---|
| 360 | 158.1 |
| 240 | 232.1 |
| 160 | 344.7 |
| 80 | 628.4 |
| 36 | 1029.3 |
| 12 | 1578.2 |
| 4 | 1919.3 |

*Table 41: Frame rate as a function of ROI height (Width=2046 pixels)*

There is 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-419 series

The following table provides model series specifications. The values are valid for Manta G-419B, G-419B NIR, and G-419C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-419B, G-419B NIR** | **Manta G-419C** |
| Sensor model | CMOSIS/ams CMV4000 | |
| Resolution | 2048 (H) × 2048 (V); 4.2 MP | |
| Shutter type | Global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1 | |
| Sensor size | 16 mm diagonal | |
| Pixel size | 5.5 µm × 5.5 µm | |
| Maximum frame rate at full resolution | 28.6 fps (32.0 fps burst mode[1]) | |
| 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | BayerGB8, BayerGB12Packed, BayerGB12 |
| Exposure time control[2] | 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 | External power: 2.7 W at 12 VDC<br>Power over Ethernet: 3.1 W | |
| Trigger jitter[3] | 5.96 µs | |
| Trigger latency[3] | ±0.14 µs | |
| Camera dimensions (L × W × H) | 86.3 × 44 × 29 mm | |

*Table 42: Manta G-419 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-419B, G-419B NIR | Manta G-419C |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only.<br>Resolution 0.031; Accuracy ±1 °C | |

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

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

[3] Trigger latency and trigger jitter values were measured at the external I/O (8-bit pixel format).

*Table 42: Manta G-419 model series specifications (sheet 2 of 2)*

# Absolute QE

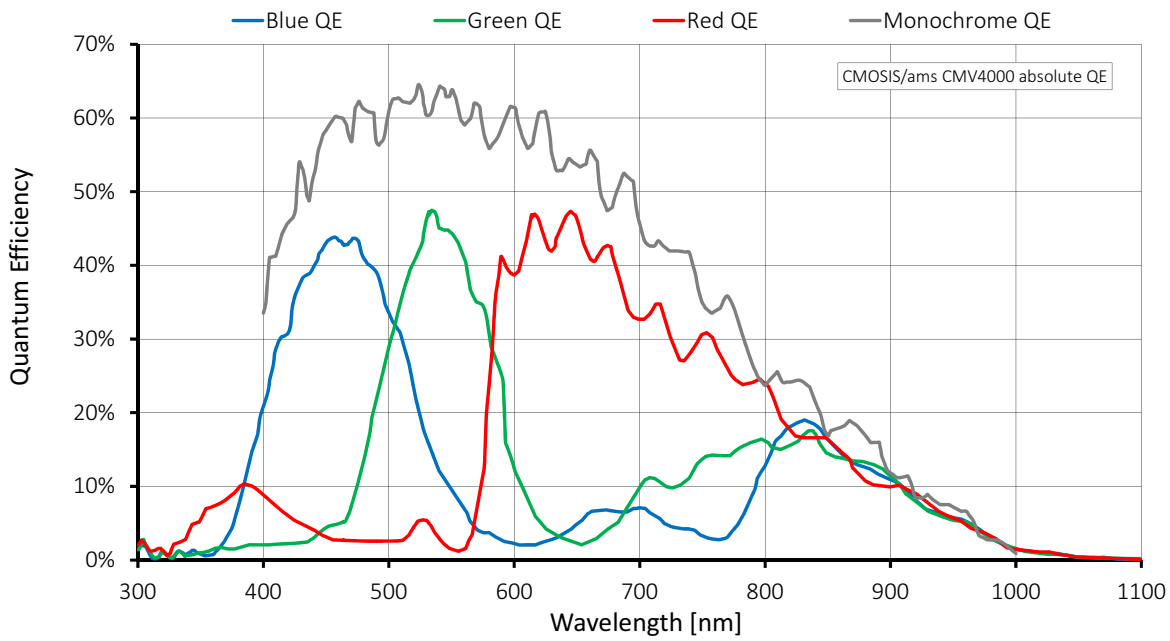



*Figure 52: Manta G-419B and G-419C (CMOSIS/ams CMV4000) absolute QE*

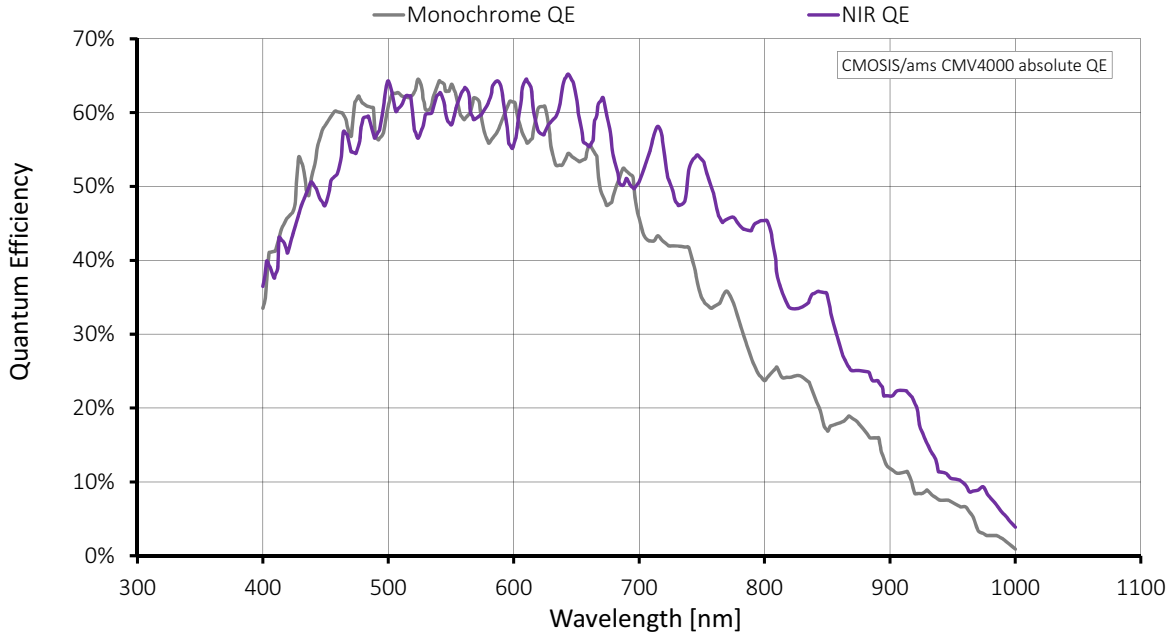



*Figure 53: Manta G-419B and G-419B NIR (CMOSIS/ams CMV4000) absolute QE*

## ROI frame rate

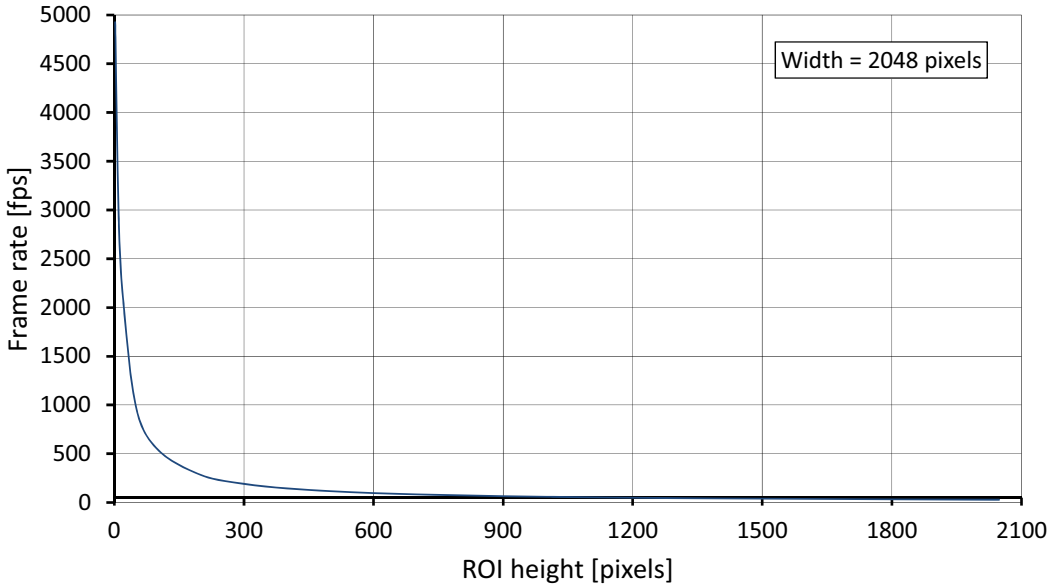



*Figure 54: Manta G-419 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 2048 | 28.6 |
| 2000 | 29.3 |
| 1800 | 32.5 |
| 1600 | 36.6 |
| 1400 | 41.8 |
| 1200 | 48.7 |
| 1000 | 58.4 |

| Height | Frame rate (fps) |
|---|---|
| 900 | 64.8 |
| 800 | 72.8 |
| 700 | 83.1 |
| 600 | 96.8 |
| 500 | 115.9 |
| 400 | 144.3 |
| 300 | 191.1 |

| Height | Frame rate (fps) |
|---|---|
| 200 | 283.1 |
| 100 | 545.2 |
| 50 | 981.3 |
| 20 | 2105.2 |
| 10 | 2949.8 |
| 2 | 4926.1 |

*Table 43: Fame rate as a function of ROI height values (Width=2048 pixels)*

There is 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-504 series

The following table provides model series specifications. The values are valid for Manta G-504B and G-504C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-504B** | **Manta G-504C** |
| Sensor model | Sony ICX655AL with Super HAD CCD™ technology | Sony ICX655AQ with Super HAD CCD™ technology |
| Resolution | 2452 (H) × 2056 (V); 5.0 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 2/3 | |
| Sensor size | 11.016 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 9.2 fps | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 32 MB | |
| StreamHoldCapacity | Up to 6 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12, Mono12Packed | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.9 W at 12 VDC<br>Power over Ethernet: 4.6 W | |
| Trigger latency[1] | Idle state: 12.8 µs; Frame valid state: 34.0 µs | |
| Trigger jitter[1] | Idle state: ±9.1 µs; Frame valid state: ±30.3 µs | |

*Table 44: Manta G-504 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-504B** | **Manta G-504C** |
| Camera dimensions (L × W × H) | 86.4 × 44 × 29 mm | |
| Mass (typical) | PoE model: 210 g; Non-PoE model: 200 g | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-504 model series specifications (sheet 2 of 2)*

## Absolute QE

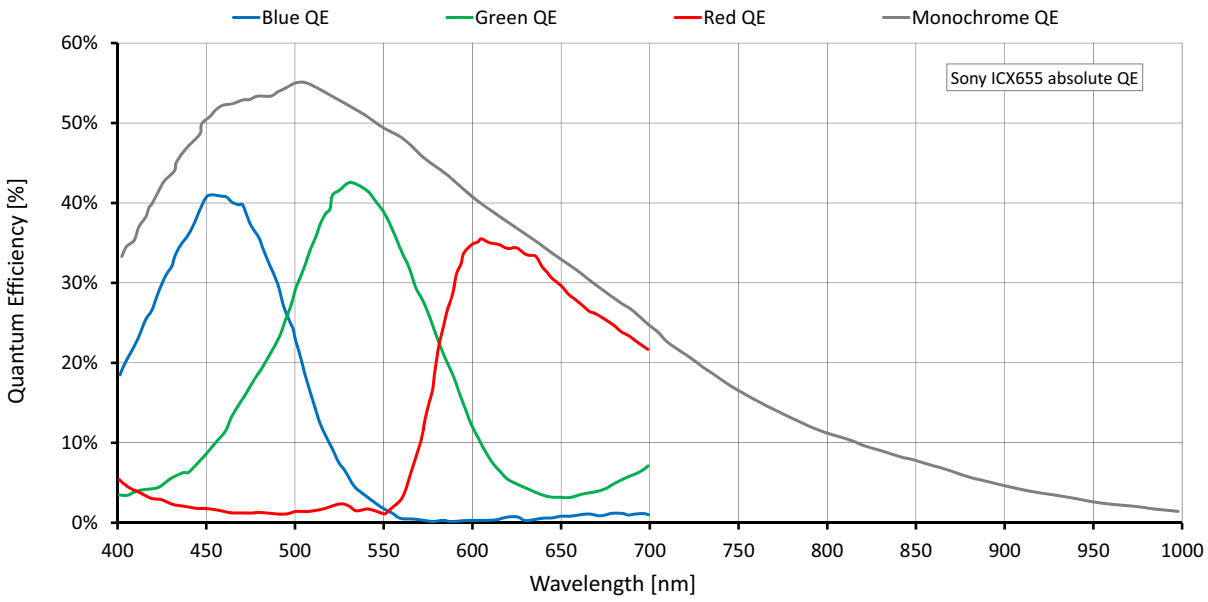



*Figure 55: Manta G-504 (Sony ICX655) absolute QE*

## Spectral response

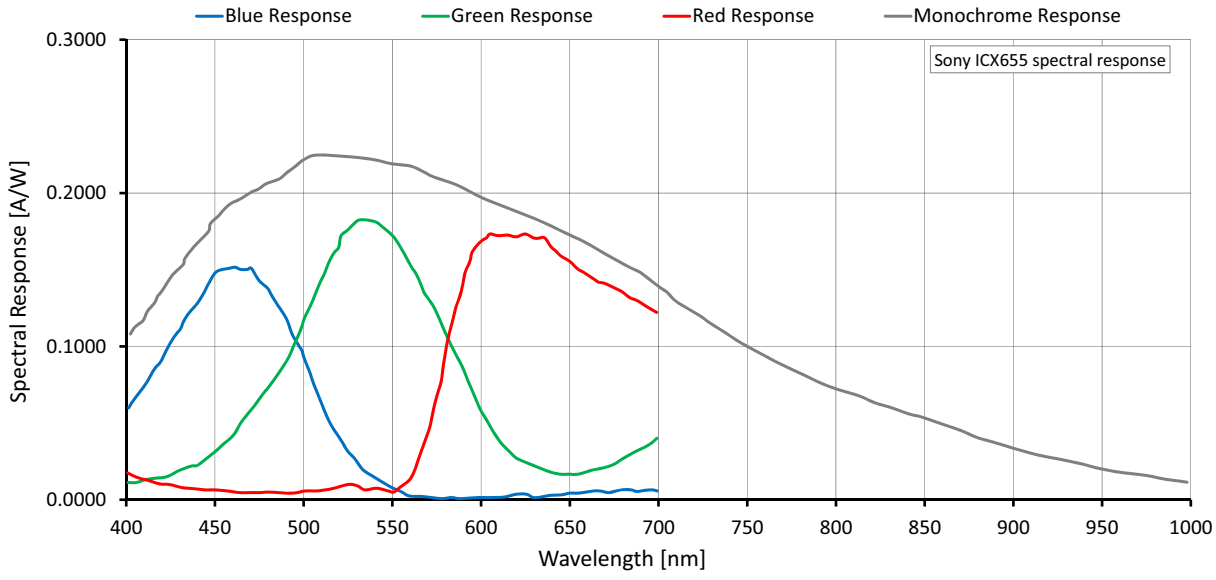



*Figure 56: Manta G-504 (Sony ICX655) spectral response*

# 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

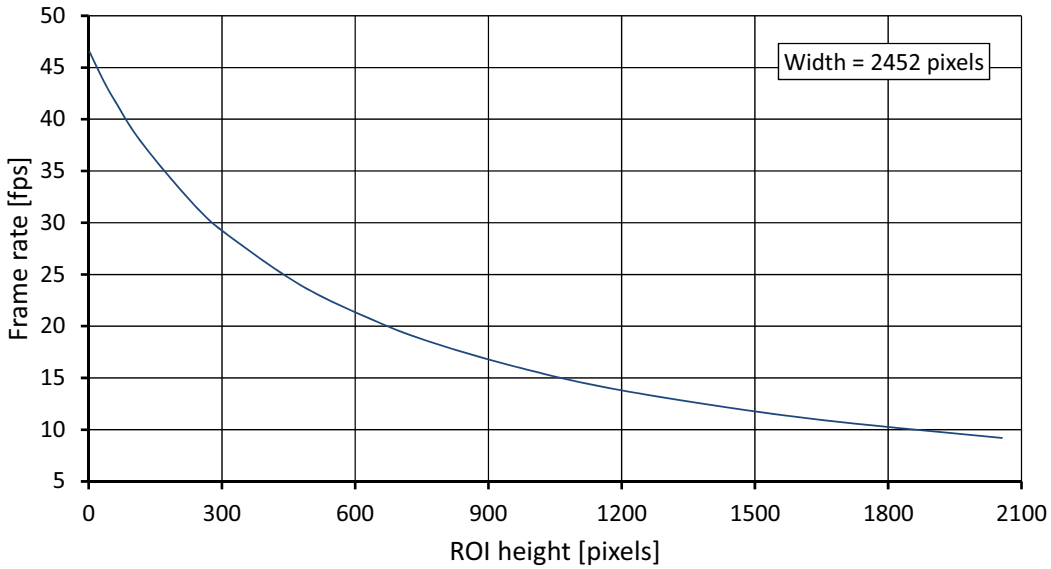



*Figure 57: Manta G-504 frame rate as a function of ROI height*

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|---|---|---|---|
| 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 |

*Table 45: Frame rate as a function of ROI height values (Width=2452 pixels)*

# Manta G-505 series

The following table provides model series specifications. The values are valid for Manta G-505B and G-505C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-505B** | **Manta G-505C** |
| Sensor model | Sony ICX625ALA with Super HAD CCD™ technology | Sony ICX625AQA with Super HAD CCD™ technology |
| Resolution | 2452 (H) × 2056 (V); 5.0 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 2/3 | |
| Sensor size | 11.016 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 15.0 fps (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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | 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 | External power: 3.9 W at 12 VDC<br>Power over Ethernet: 4.5 W | |
| Trigger latency[1] | Idle state: 7.3 µs; Frame valid state: 23.2 µs | |

*Table 46: Manta G-505 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-505B | Manta G-505C |
| Trigger jitter[1] | Idle state: ±4.0 µs; Frame valid state: ±20.0 µs | |
| Camera 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.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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-505 model series specifications (sheet 2 of 2)*

## Absolute QE

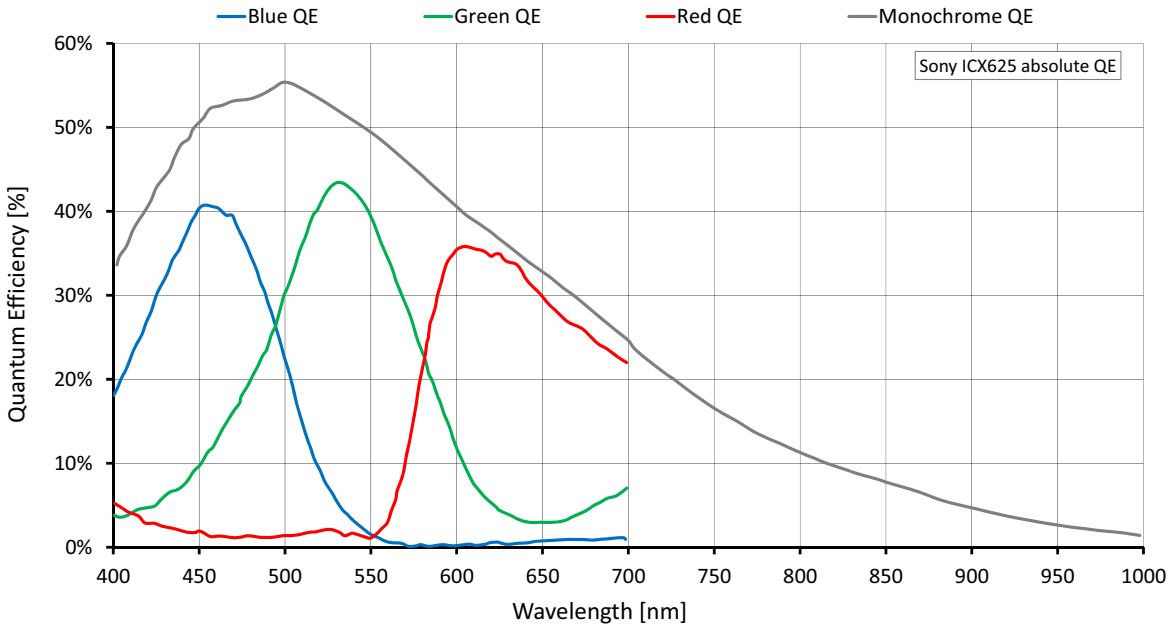



*Figure 58: Manta G-505 (Sony ICX625) absolute QE*

## Spectral response

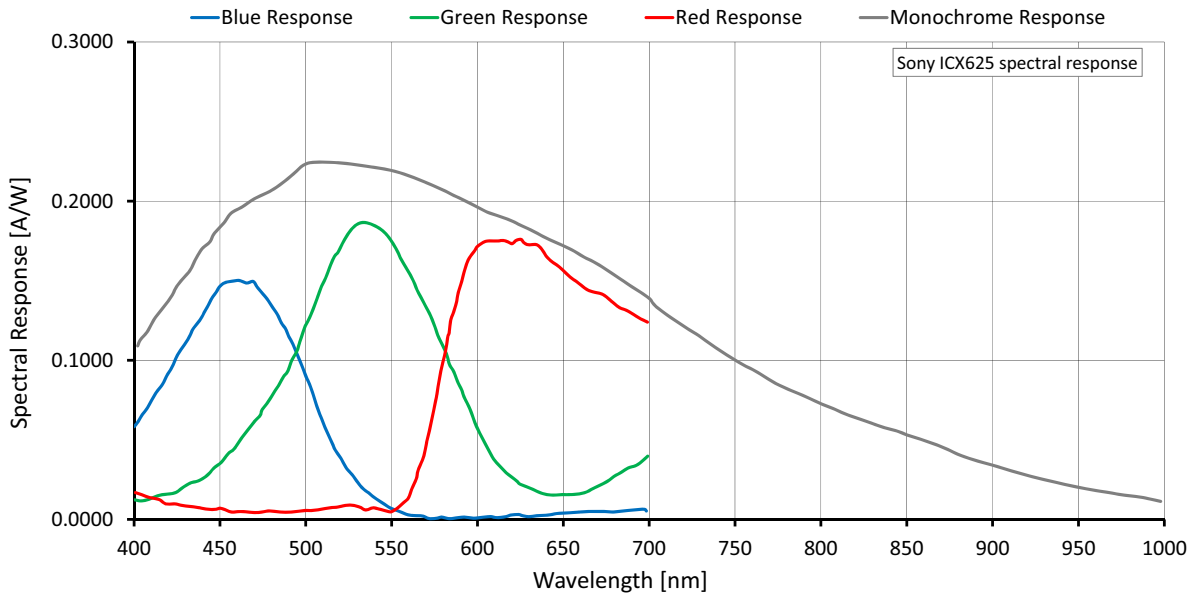



*Figure 59: Manta G-505 (Sony ICX625) spectral response*

# 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

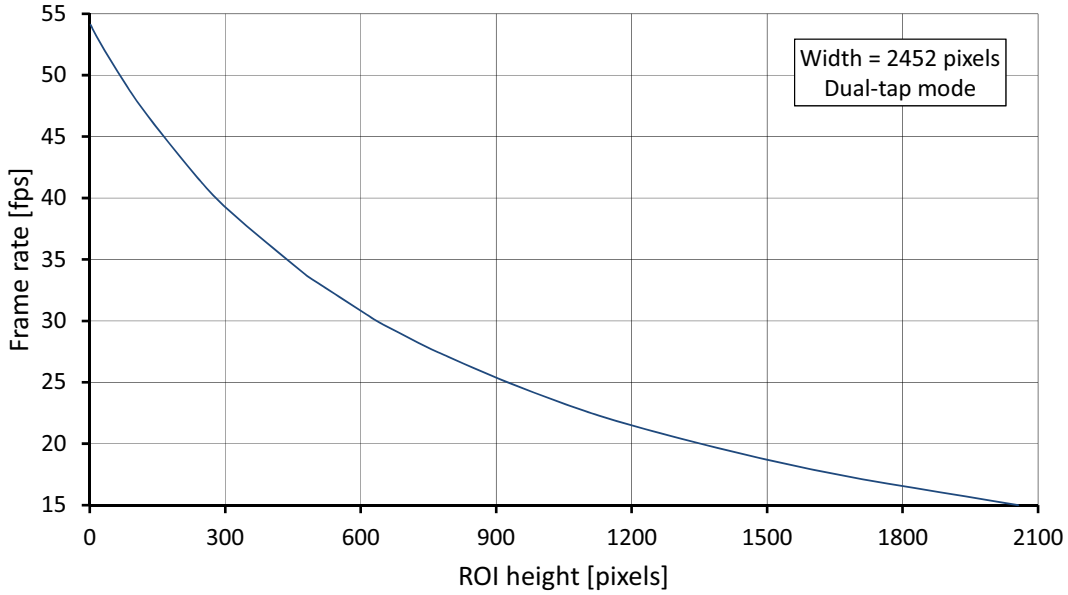



*Figure 60: Manta G-505 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 2056 | 15.0 |
| 1600 | 17.9 |
| 1200 | 21.5 |
| 960 | 24.5 |
| 768 | 27.5 |
| 734 | 28.1 |

| Height | Frame rate (fps) |
|---|---|
| 640 | 29.9 |
| 614 | 30.5 |
| 492 | 33.4 |
| 480 | 33.7 |
| 320 | 38.6 |
| 240 | 41.6 |

| Height | Frame rate (fps) |
|---|---|
| 120 | 47.1 |
| 60 | 50.4 |
| 30 | 52.2 |
| 10 | 53.5 |
| 2 | 54.1 |

*Table 47: Frame rate as a function of ROI height values (Width=2452 pixels)*

# Manta G-507 series

The following table provides model series specifications. The values are valid for Manta G-507B and G-507C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-507B** | **Manta G-507C** |
| Sensor model | Sony IMX264LLR Exmor | Sony IMX264LQR Exmor |
| Resolution | 2464 (H) × 2056 (V); 5.1 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 2/3 | |
| Sensor size | 11.1 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 23.7 fps (28.7 fps 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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure time control | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 30 µs to 85.9 s; 16.64 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 35 µs to 85.9 s; 22.16 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 47 µs to 85.9 s; 33.28 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 | |

*Table 48: Manta G-507 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-507B** | **Manta G-507C** |
| Power consumption | External power: 2.8 W at 12 VDC<br>Power over Ethernet: 3.0 W | |
| Trigger latency[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 49.92 µs |
| | Mono12, BayerRG12, YUV422Packed | 66.48 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 99.84 µs |
| Trigger jitter[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±8.32 µs |
| | Mono12, BayerRG12, YUV422Packed | ±11.08 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±16.64 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 237 µs |
| | Mono12, BayerRG12, YUV422Packed | 319 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 486 µs |
| Camera 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.<br>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. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 48: Manta G-507 model series specifications (sheet 2 of 2)*

## Absolute QE

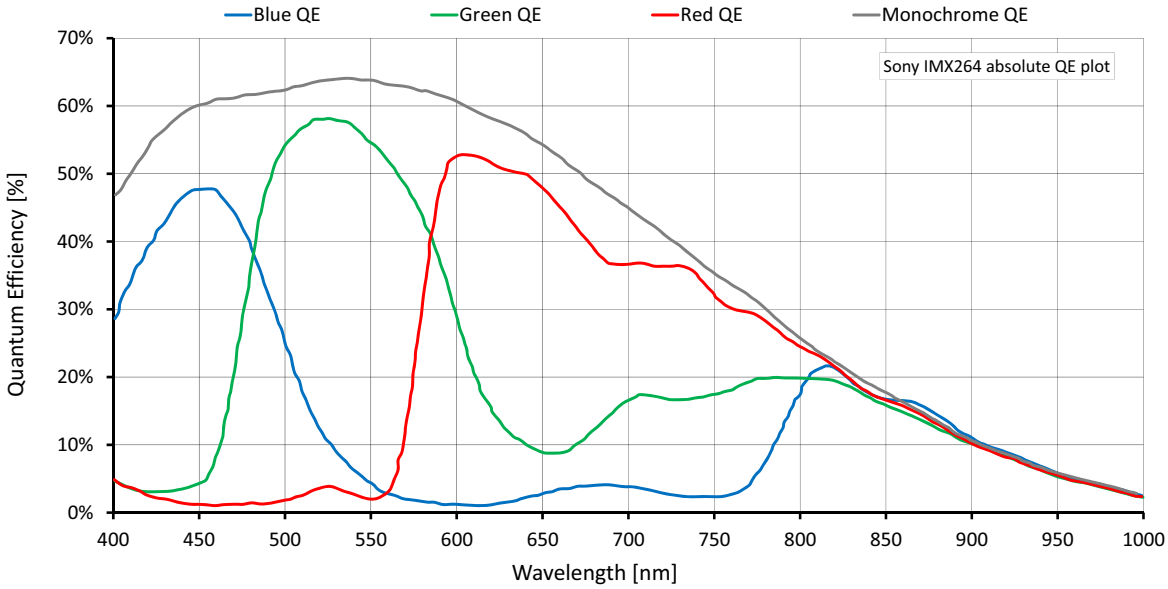



*Figure 61: Manta G-507 (Sony IMX264) absolute QE*

## Spectral response

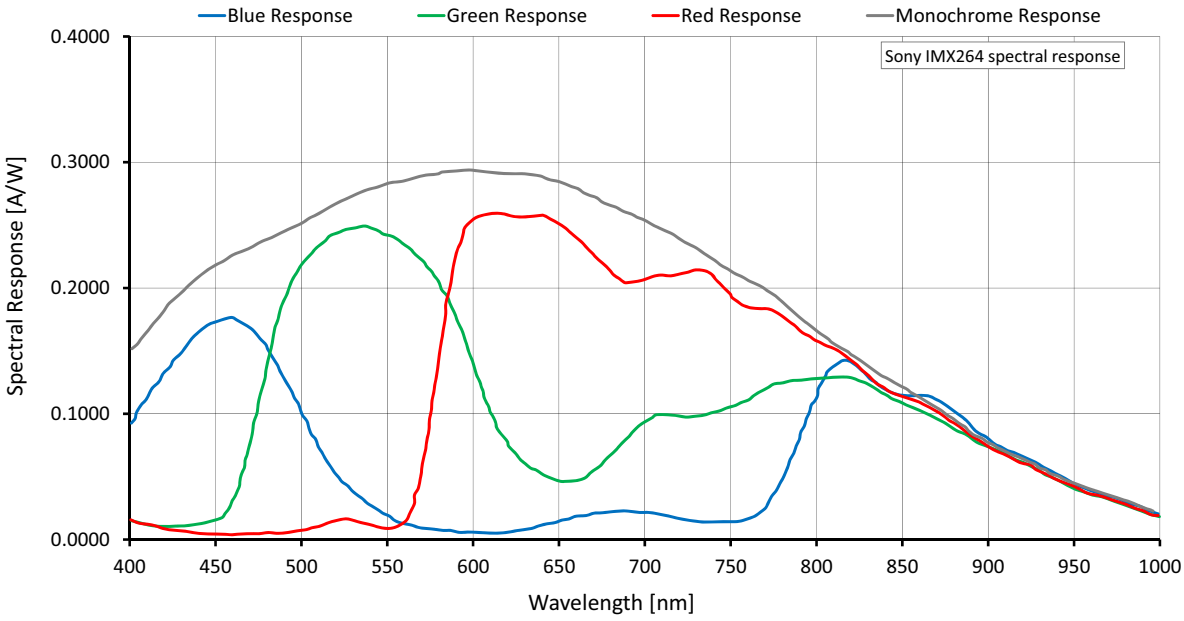



*Figure 62: Manta G-507 (Sony IMX264) spectral response*

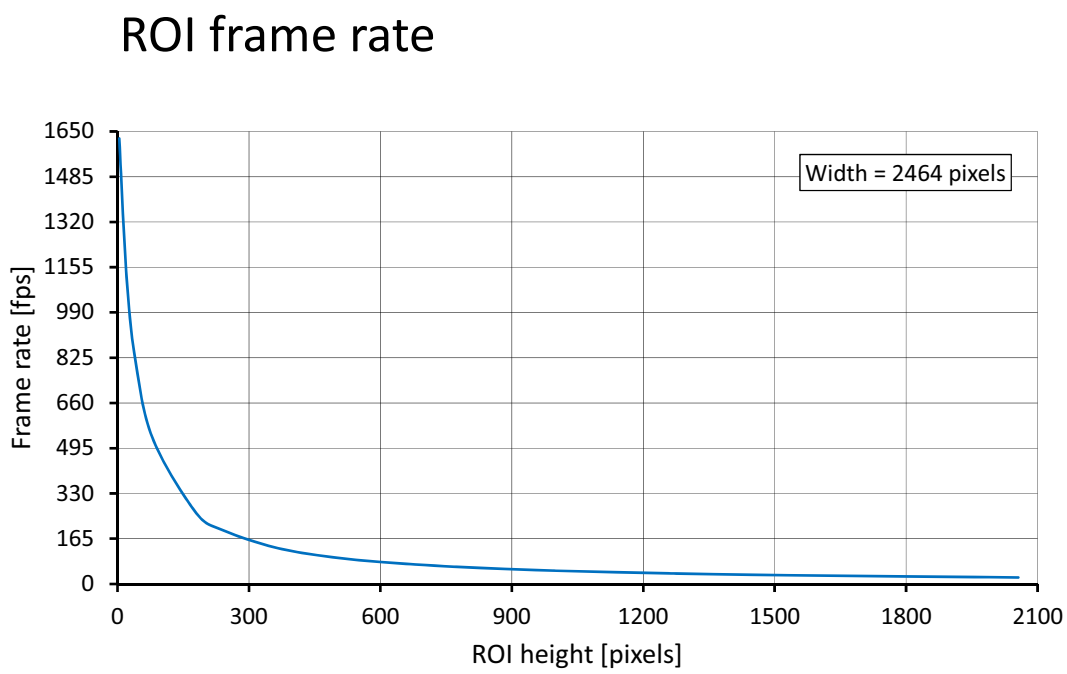



*Figure 63: Manta G-507 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 2056 | 23.7 |
| 1544 | 31.5 |
| 1324 | 36.7 |
| 1280 | 37.9 |
| 1024 | 47.3 |
| 960 | 50.4 |

| Height | Frame rate (fps) |
|---|---|
| 768 | 63.0 |
| 600 | 80.3 |
| 480 | 99.8 |
| 360 | 132.9 |
| 240 | 196.4 |
| 180 | 257.9 |

| Height | Frame rate (fps) |
|---|---|
| 80 | 531.8 |
| 40 | 823.2 |
| 20 | 1133.8 |
| 4 | 1624.2 |

*Table 49: Frame rate as a function of ROI height (Width=2464 pixels)*

There is 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-895 series

The following table provides model series specifications. The values are valid for Manta G-895B and G-895C models. For specifications common to all models, see Specifications common to all models.

| | Specification | |
|---|---|---|
| **Feature** | **Manta G-895B** | **Manta G-895C** |
| Sensor model | Sony IMX267LLR Exmor | Sony IMX267LQR Exmor |
| Resolution | 4112 (H) × 2176 (V); 8.95 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1 | |
| Sensor size | 16.1 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 13.4 fps (16.2 fps burst mode[1]) | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 128 MB | |
| StreamHoldCapacity | Up to 14 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12Packed, Mono12 | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure time control | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 42 µs to 85.89 s; 27.84 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 51 µs to 85.89 s; 37.04 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 69 µs to 85.89 s; 55.68 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 | |

*Table 50: Manta G-895 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-895B** | **Manta G-895C** |
| Power consumption | External power: 3.0 W at 12 VDC<br>Power over Ethernet: 3.3 W | |
| Trigger latency[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 83.52 µs |
| | Mono12, BayerRG12, YUV422Packed | 111.12 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 167.04 µs |
| Trigger jitter[2] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±13.92 µs |
| | Mono12, BayerRG12, YUV422Packed | ±18.52 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±27.84 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 404 µs |
| | Mono12, BayerRG12, YUV422Packed | 542 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 822 µs |
| Camera 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.<br>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. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 50: Manta G-895 model series specifications (sheet 2 of 2)*

## Absolute QE

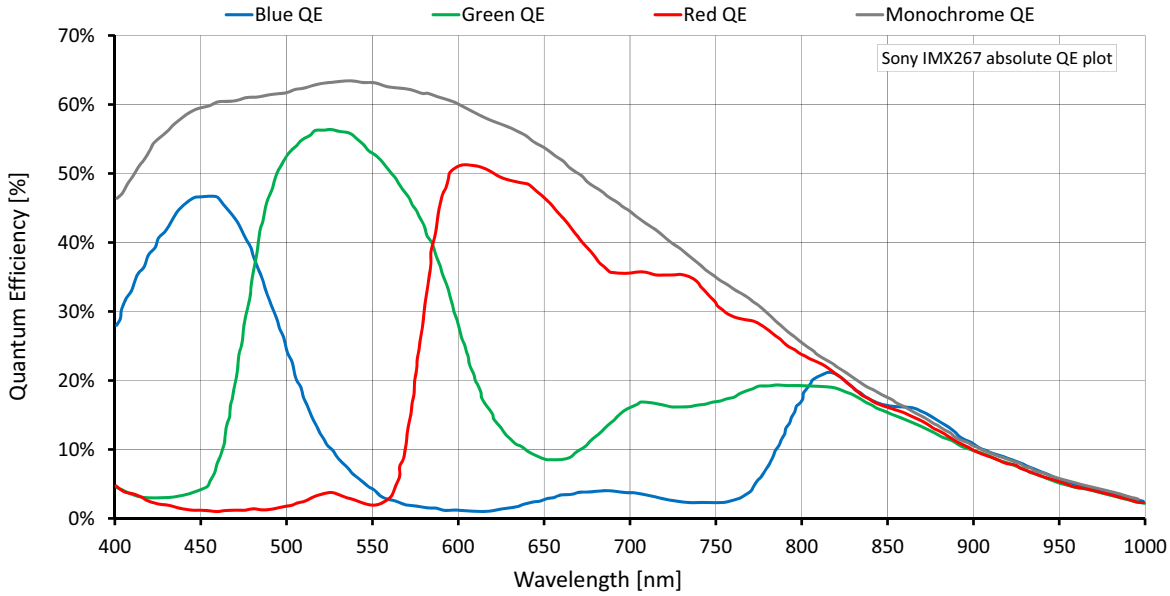



*Figure 64: Manta G-895 (Sony IMX267) absolute QE*

## Spectral response

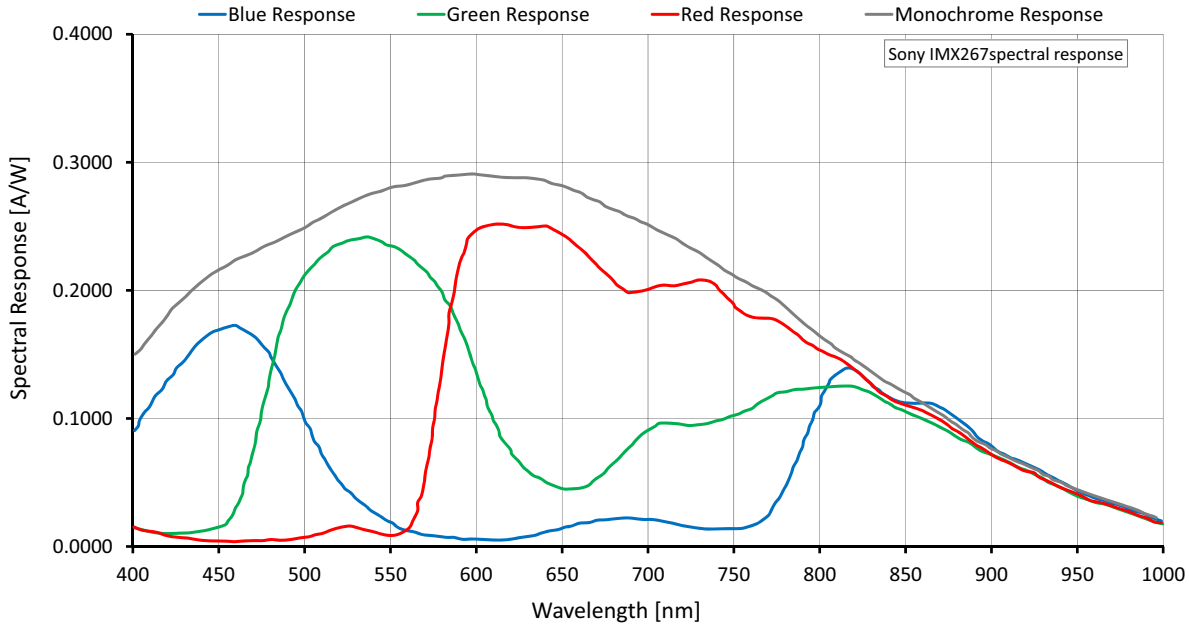



*Figure 65: Manta G-895 (Sony IMX267) spectral response*

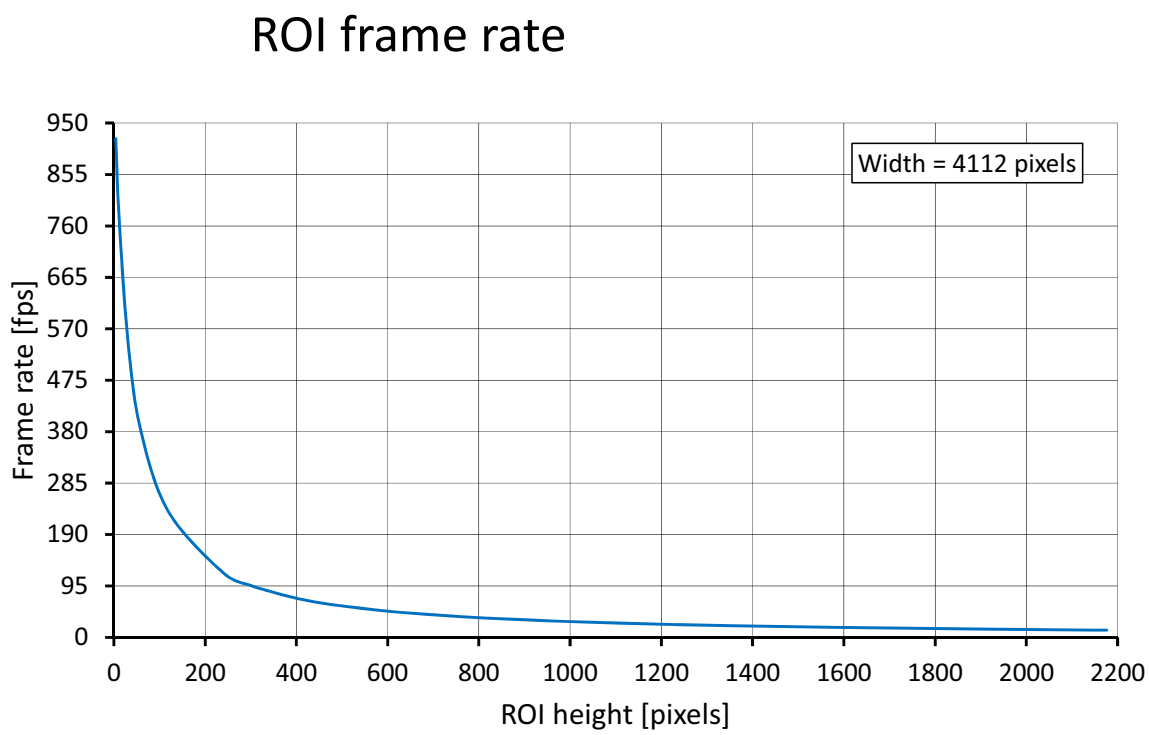



*Figure 66: Manta G-895 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 2176 | 13.4 |
| 2048 | 14.3 |
| 2000 | 14.6 |
| 1600 | 18.3 |
| 1280 | 22.8 |
| 1200 | 24.4 |
| 1024 | 28.5 |
| 960 | 30.4 |

| Height | Frame rate (fps) |
|---|---|
| 800 | 36.4 |
| 768 | 37.9 |
| 640 | 45.5 |
| 600 | 48.4 |
| 480 | 60.4 |
| 400 | 72.3 |
| 320 | 90.3 |
| 300 | 96.0 |

| Height | Frame rate (fps) |
|---|---|
| 240 | 119.0 |
| 120 | 231.7 |
| 60 | 378.1 |
| 32 | 536.1 |
| 12 | 764.2 |
| 4 | 921.0 |

*Table 51: Frame rate as a function of ROI height (Width=4112 pixels)*

There is 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-917 series

The following table provides model series specifications. The values are valid for Manta G-917B and G-917C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-917B** | **Manta G-917C** |
| Sensor model | Sony ICX814ALG with EXview HAD II™ microlens technology | Sony ICX814AQG with EXview HAD II™ microlens technology |
| Resolution | 3384 (H) × 2710 (V); 9.2 MP | |
| Shutter type | Global shutter | |
| Sensor type | Interline CCD, Progressive Scan | |
| Sensor format | Type 1 | |
| Sensor size | 15.972 mm diagonal | |
| Pixel size | 3.69 µm × 3.69 µm | |
| Maximum frame rate at full resolution | 10.1 fps (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 | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | 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<br>Single-tap switchable in Vimba Viewer 2.0 or later | |
| Power consumption | External power: 4.0 W at 12 VDC<br>Power over Ethernet: 4.7 W | |
| Trigger latency[1] | Idle state: 7.0 µs; Frame valid state: 25.1 µs | |

*Table 52: Manta G-917 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | Manta G-917B | Manta G-917C |
| Trigger jitter[1] | Idle state: ±4.0 µs; Frame valid state: ±22.1 µs | |
| Camera 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.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] It's possible to start the exposure of the next frame while the previous frame is read out:

- Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.
- Frame valid state: the sensor is reading out data 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 52: Manta G-917 model series specifications (sheet 2 of 2)*

## Absolute QE

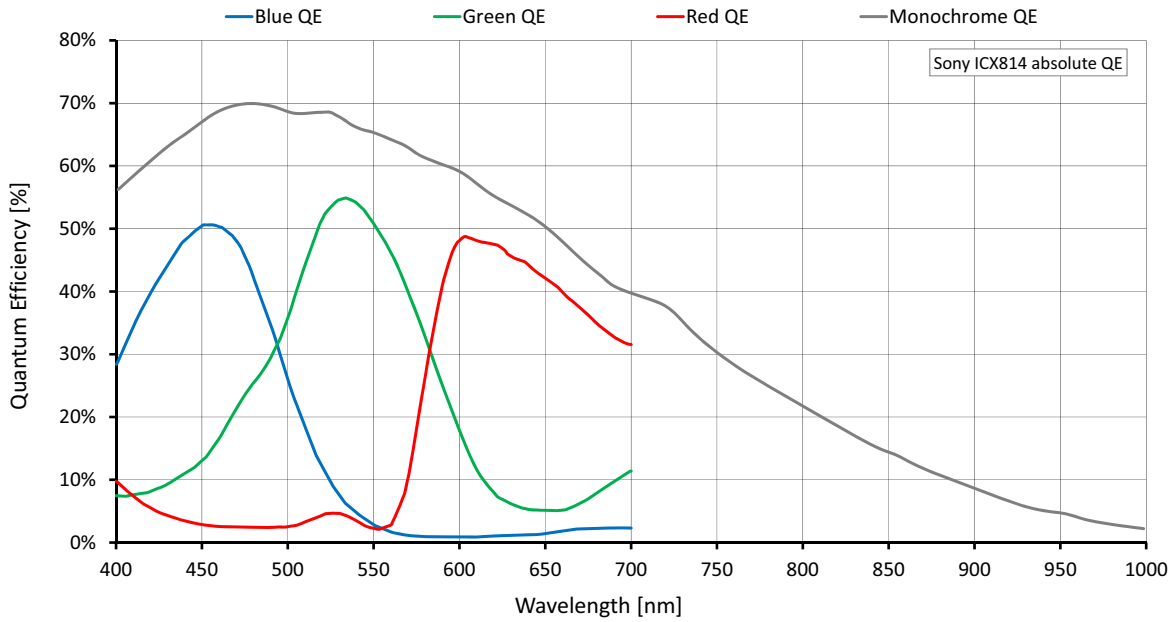



*Figure 67: Manta G-917 (Sony ICX814) absolute QE*

## Spectral response

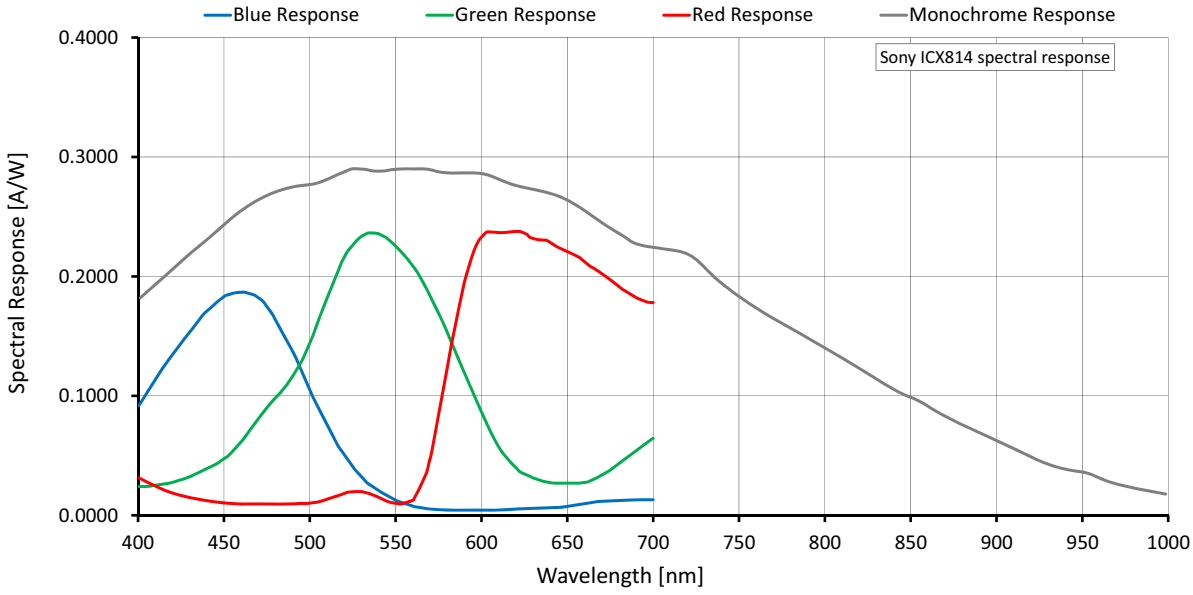



*Figure 68: Manta G-917 (Sony ICX814) spectral response*

# 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

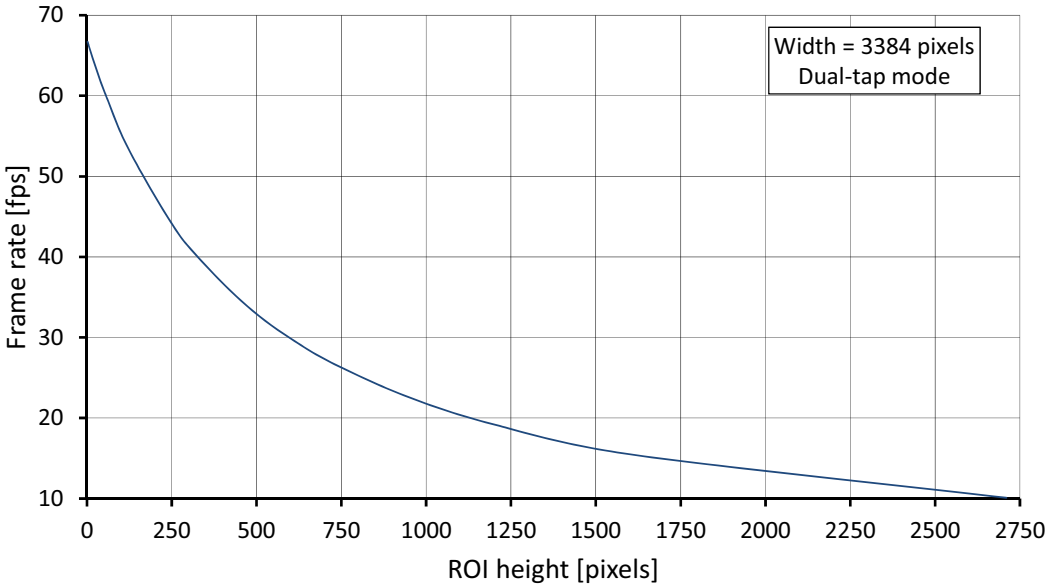



*Figure 69: Manta G-917 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 2710 | 10.1 |
| 1600 | 15.5 |
| 1200 | 19.2 |
| 960 | 22.4 |
| 768 | 25.9 |

| Height | Frame rate (fps) |
|---|---|
| 640 | 28.8 |
| 480 | 33.6 |
| 320 | 40.3 |
| 240 | 44.8 |
| 120 | 53.6 |

| Height | Frame rate (fps) |
|---|---|
| 60 | 59.6 |
| 30 | 63.0 |
| 10 | 65.6 |
| 2 | 66.7 |

*Table 53: Frame rate as a function of ROI height (Width=3384 pixels)*

# Manta G-1236 series

The following table provides model series specifications. The values are valid for Manta G-1236B and G-1236C models. For specifications common to all models, see Specifications common to all models.

| Feature | Specification | |
|---|---|---|
| | **Manta G-1236B** | **Manta G-1236C** |
| Sensor model | Sony IMX304LLR Exmor | Sony IMX304LQR Exmor |
| Resolution | 4112 (H) × 3008 (V); 12.37 MP | |
| Shutter type | Pregius® global shutter | |
| Sensor type | CMOS | |
| Sensor format | Type 1.1 | |
| Sensor size | 17.6 mm diagonal | |
| Pixel size | 3.45 µm × 3.45 µm | |
| Maximum frame rate at full resolution | 9.7 fps (11.8 fps burst mode) | |
| Maximum image bit depth | 12-bit | |
| Image buffer | 128 MB | |
| StreamHoldCapacity | Up to 10 frames at full resolution | |
| Monochrome pixel formats | Mono8, Mono12Packed, Mono12 | Mono8 |
| YUV color pixel formats | (not applicable) | YUV411Packed, YUV422Packed, YUV444Packed |
| RGB color pixel formats | (not applicable) | RGB8Packed, BGR8Packed |
| RAW pixel formats | (not applicable) | BayerRG8, BayerRG12, BayerRG12Packed |
| Exposure control | **Pixel format** | **Range** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 42 µs to 85.89 s; 27.84 µs increments |
| | Mono12, BayerRG12, YUV422Packed | 51 µs to 85.89 s; 37.04 µs increments |
| | RGB8Packed, BGR8Packed, YUV444Packed | 69 µs to 85.89 s; 55.68 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 | |

*Table 54: Manta G-1236 model series specifications (sheet 1 of 2)*

| Feature | Specification | |
|---|---|---|
| | **Manta G-1236B** | **Manta G-1236C** |
| Power consumption | External power: 3.0 W at 12 VDC<br>Power over Ethernet: 3.3 W | |
| Trigger latency[1] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 83.52 µs |
| | Mono12, BayerRG12, YUV422Packed | 111.12 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 167.04 µs |
| Trigger jitter[1] | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ±13.92 µs |
| | Mono12, BayerRG12, YUV422Packed | ±18.52 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | ±27.84 µs |
| Time between exposures | **Pixel format** | **Value** |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 404 µs |
| | Mono12, BayerRG12, YUV422Packed | 542 µs |
| | RGB8Packed, BGR8Packed, YUV444Packed | 822 µs |
| Camera 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.<br>Resolution 0.031; Accuracy ±1 °C | |

[1] These values are calculated directly from the microcontroller source. There is no differentiation between Idle and Frame valid states for this sensor.

*Table 54: Manta G-1236 model series specifications (sheet 2 of 2)*

## Absolute QE

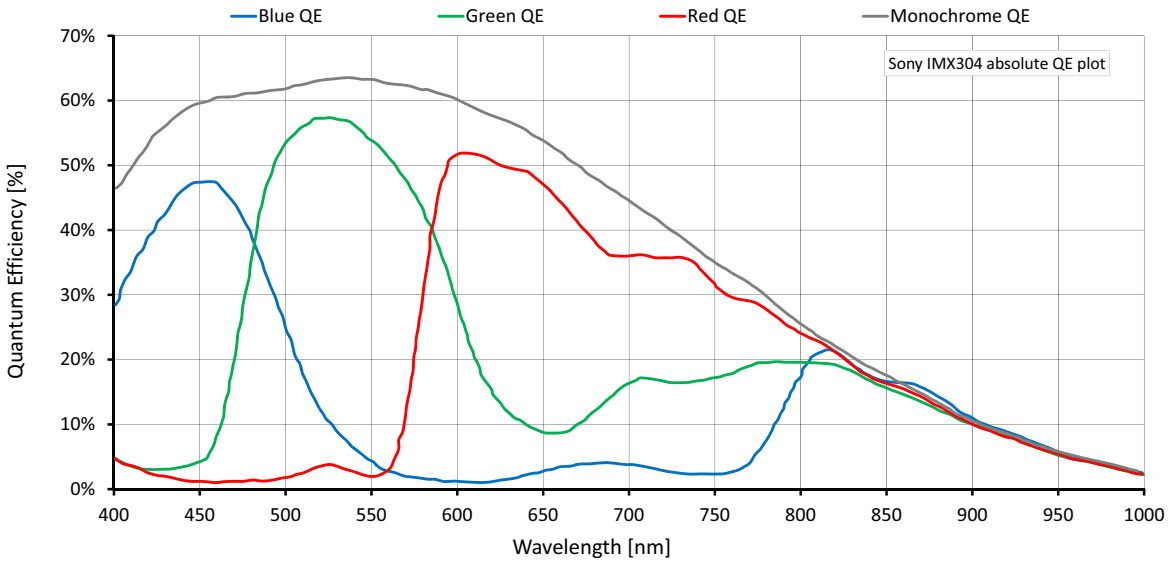



*Figure 70: Manta G-1236 (Sony IMX304) absolute QE*

## Spectral response

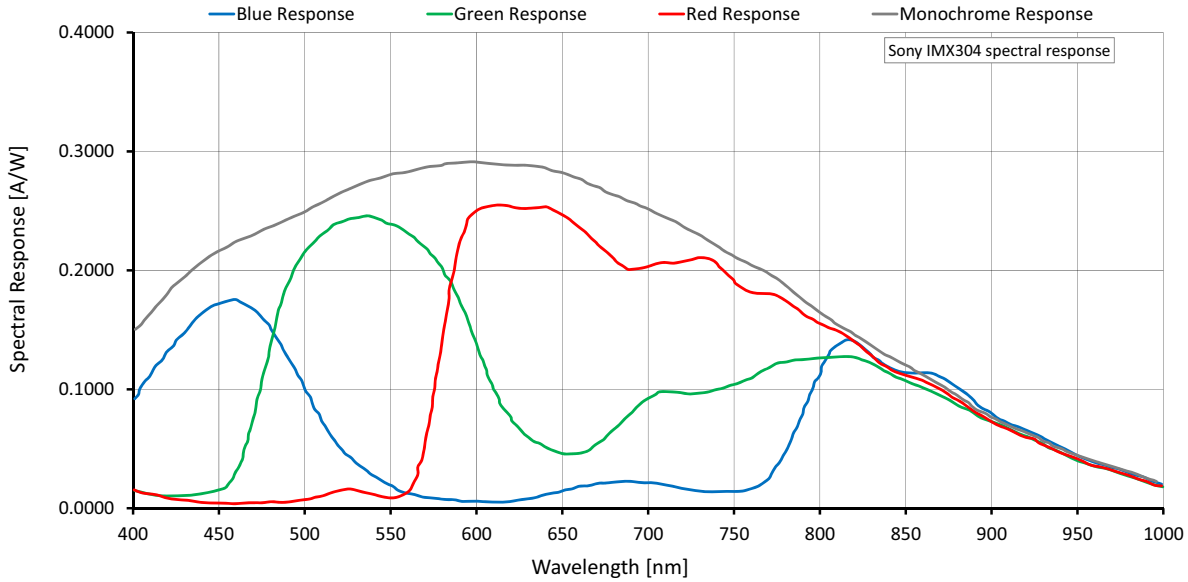



*Figure 71: Manta G-1236 (Sony IMX304) spectral response*

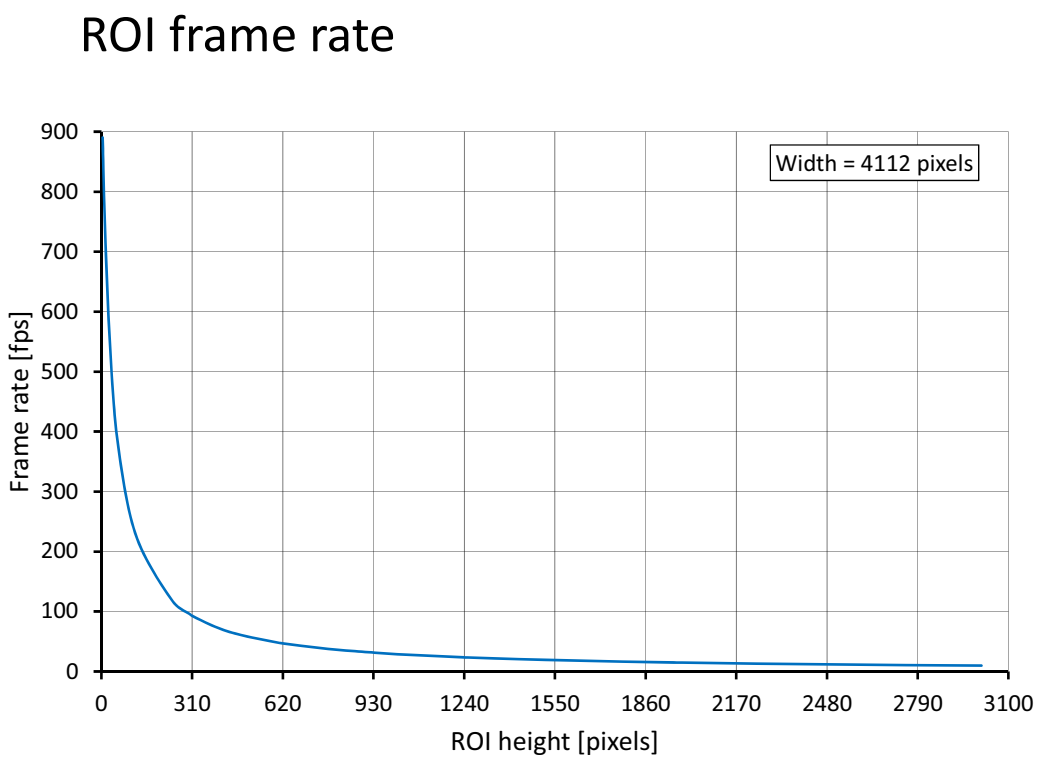



*Figure 72: Manta G-1236 frame rate as a function of ROI height*

| Height | Frame rate (fps) |
|---|---|
| 3008 | 9.73 |
| 3000 | 9.76 |
| 2800 | 10.46 |
| 2560 | 11.43 |
| 2400 | 12.2 |
| 2048 | 14.3 |
| 2000 | 14.6 |
| 1600 | 18.3 |
| 1280 | 22.8 |

| Height | Frame rate (fps) |
|---|---|
| 1200 | 24.3 |
| 1024 | 28.5 |
| 960 | 30.4 |
| 800 | 36.4 |
| 768 | 37.9 |
| 640 | 45.5 |
| 600 | 48.4 |
| 480 | 60.4 |
| 400 | 72.3 |

| Height | Frame rate (fps) |
|---|---|
| 320 | 90.2 |
| 300 | 96.0 |
| 240 | 118.9 |
| 120 | 231.7 |
| 60 | 378.1 |
| 32 | 536.1 |
| 12 | 764.2 |
| 4 | 921.0 |

*Table 55: Frame rate as a function of ROI height (Width=4112 pixels)*



There is 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

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

A complete listing of camera features, including definitions can be found on the Allied Vision Technical Documentation webpage

| Image optimization 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 gain | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Auto exposure | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Auto white balance[1] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Binning | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Black level (offset) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Decimation X/Y | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Defect Masking | | | | | | | | | | | ✓ | | | | | ✓ | | | | | | |
| Gamma correction | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Hue, saturation, color correction[1] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Three look-up tables | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Piecewise Linear HDR mode | | | | | | | | | | | ✓ | | | | | ✓ | | | | | | |
| Reverse X[2] | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Reverse Y | | | | | | | | | | | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | ✓ |
| ROI | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

[1] Only available for color models

[2] Only available for monochrome models

*Table 56: Image optimization feature comparison by model*

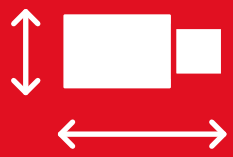
| Camera control features | Manta G-031 | Manta G-032 | Manta G-033 | Manta G-040 | Manta G-046 | Manta G-125 | Manta G-145 | Manta G-146 | Manta G-158 | Manta G-201 | Manta G-223 | Manta G-235 | Manta G-282 | Manta G-283 | Manta G-319 | Manta G-419 | Manta G-504 | Manta G-505 | Manta G-507 | Manta G-895 | 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 | | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tap mode switchable in Vimba Viewer 2.0 or later | | | | | | | | | | | | | ✓ | ✓ | | | | | | | ✓ | |
| Temperature monitoring (main board) | | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Trigger over Ethernet (Action Commands) | | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

*Table 57: Camera control feature comparison by model*



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

# 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.

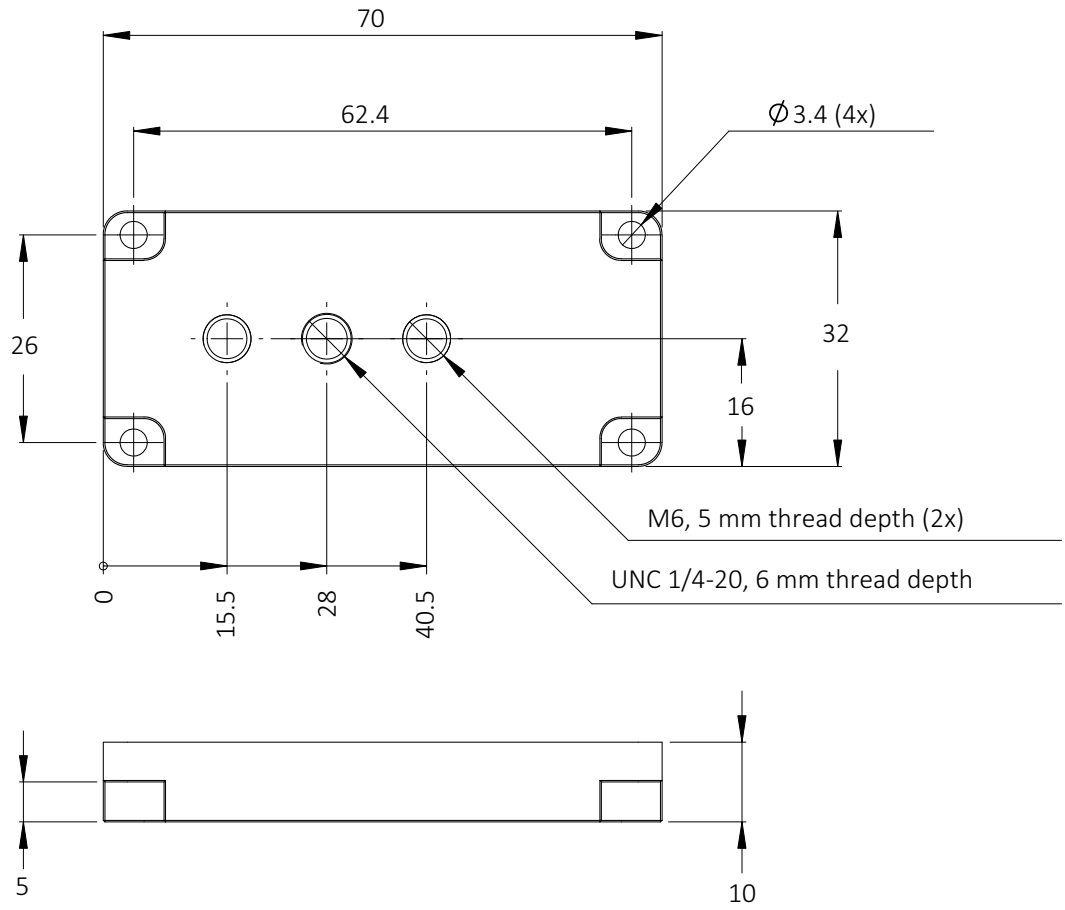



*Figure 73: Tripod adapter dimensions*

# Manta type A camera dimensions

## Standard housing with C-Mount (default)

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

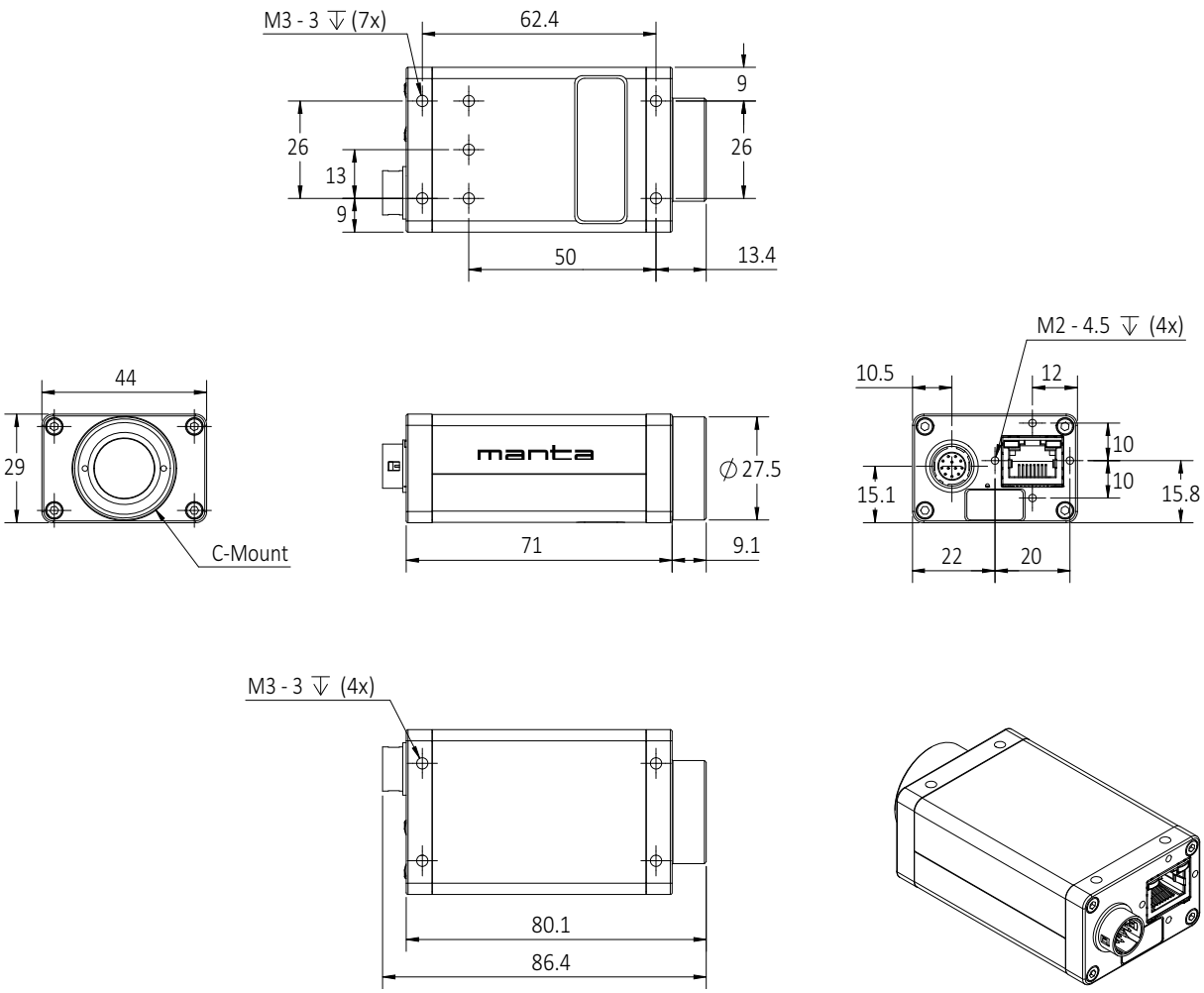



*Figure 74: Manta type A standard housing with C-Mount dimensions*

# Angled-head housings

## W90 housing with C-Mount

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

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

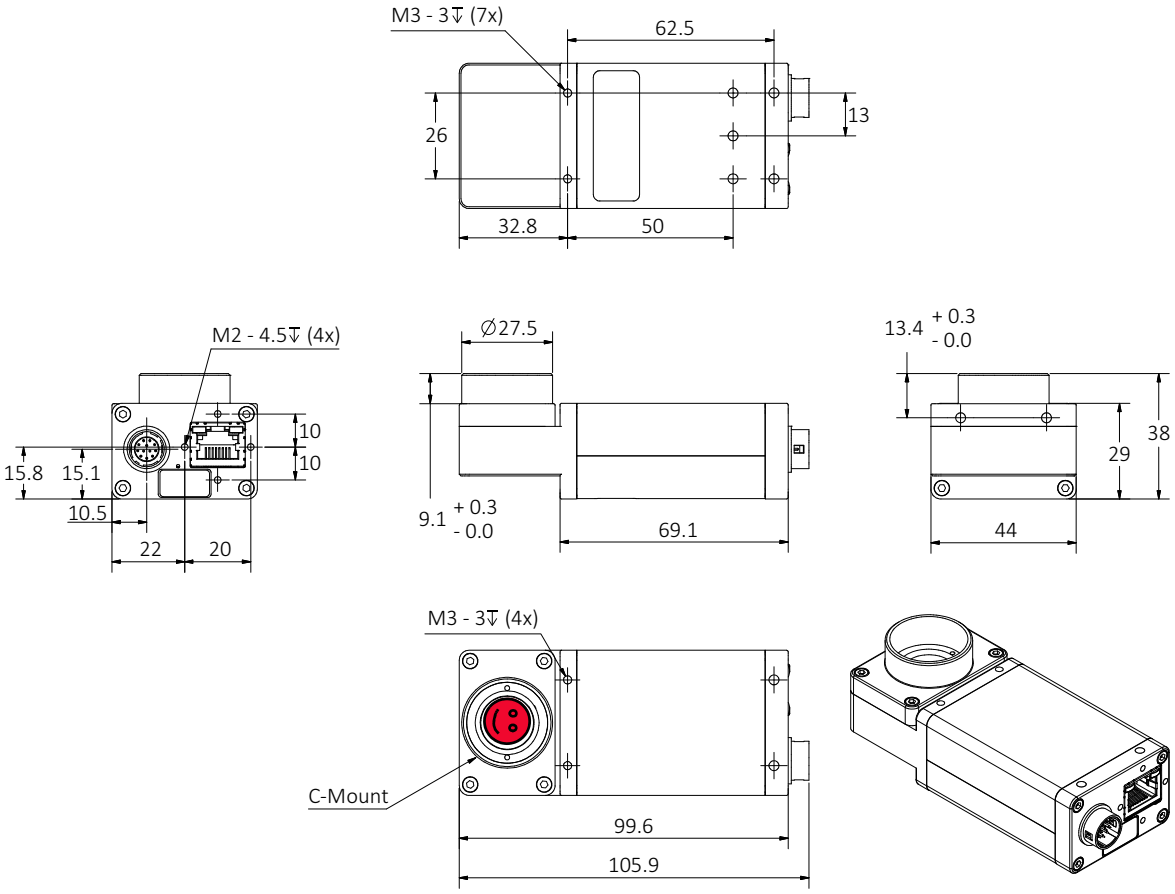



*Figure 75: Manta type A W90 housing with C-Mount dimensions*

## W90 S90 housing with C-Mount

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

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

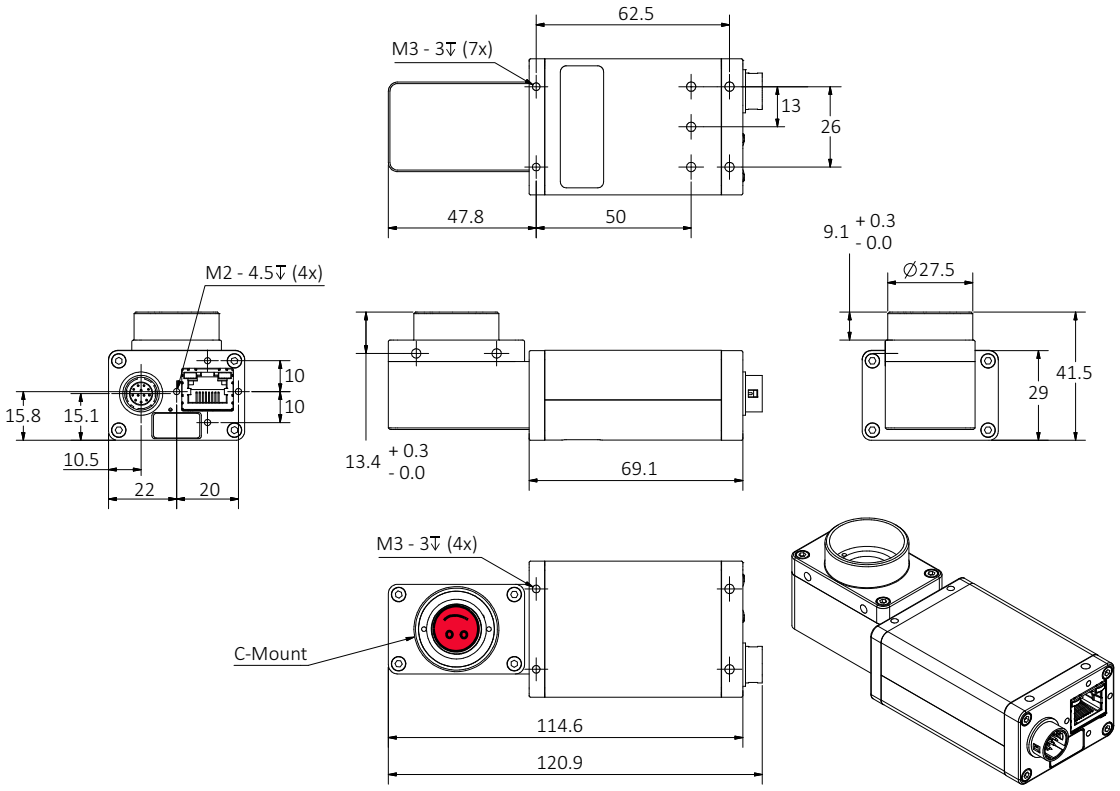



*Figure 76: Manta type A W90 S90 housing with C-Mount dimensions*

## W270 housing with C-Mount

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

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

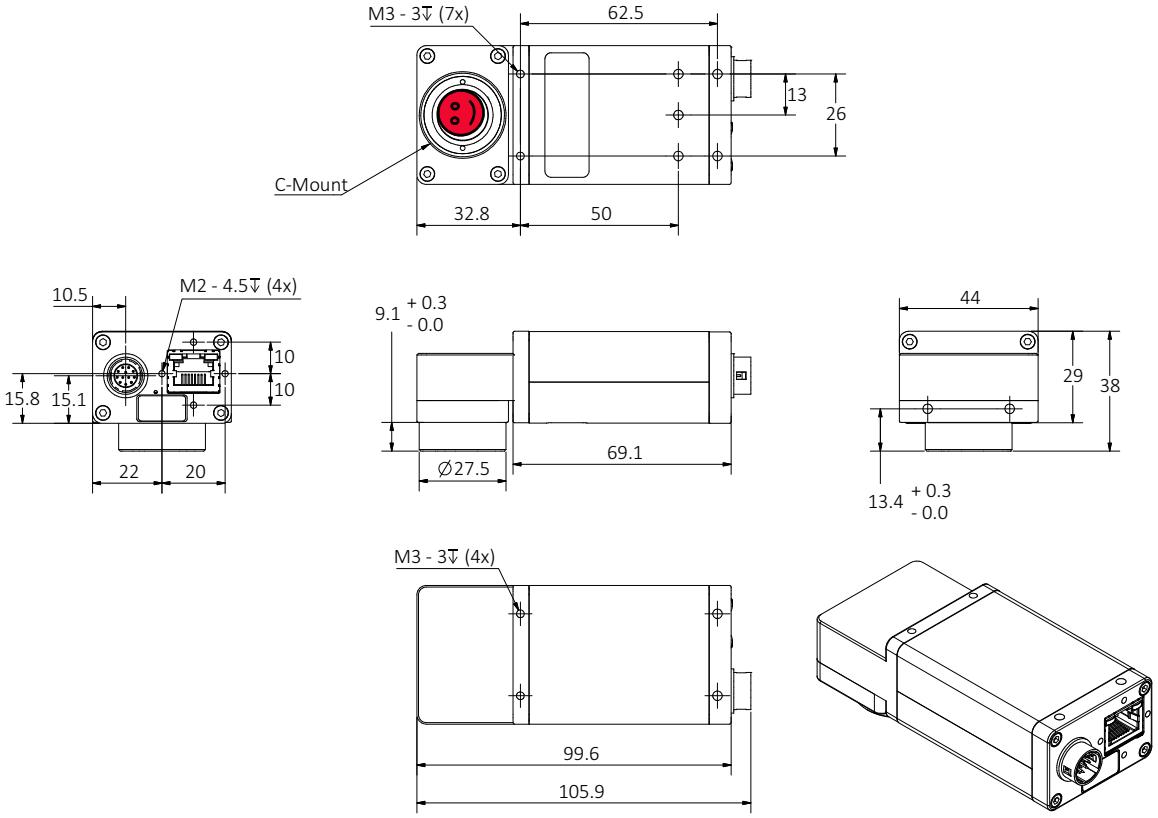



*Figure 77: Manta type A W270 housing with C-Mount dimensions*

## W270 S90 housing with C-Mount

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

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

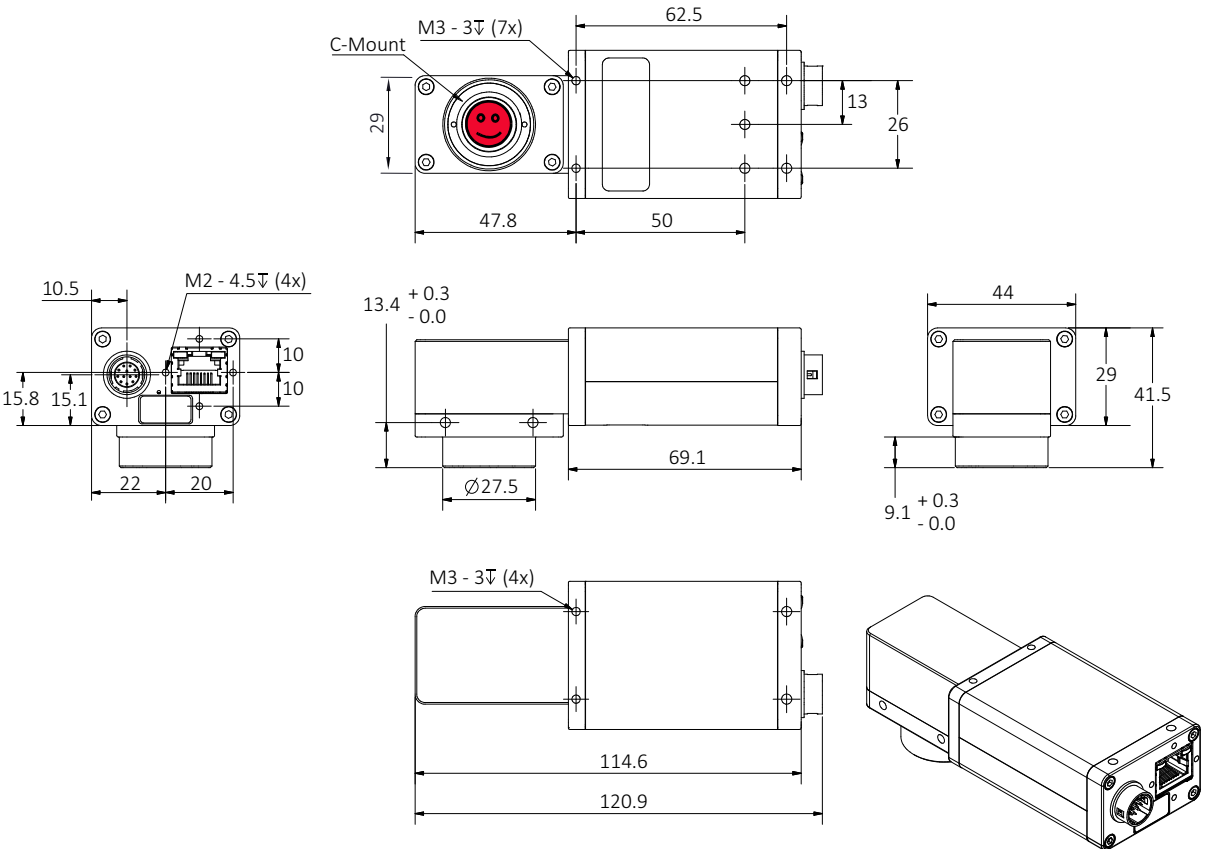



*Figure 78: Manta type A W270 S90 housing with C-Mount dimensions*

# Board level variants

## Board level with C-Mount (non-PoE models)

Model series: 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 |

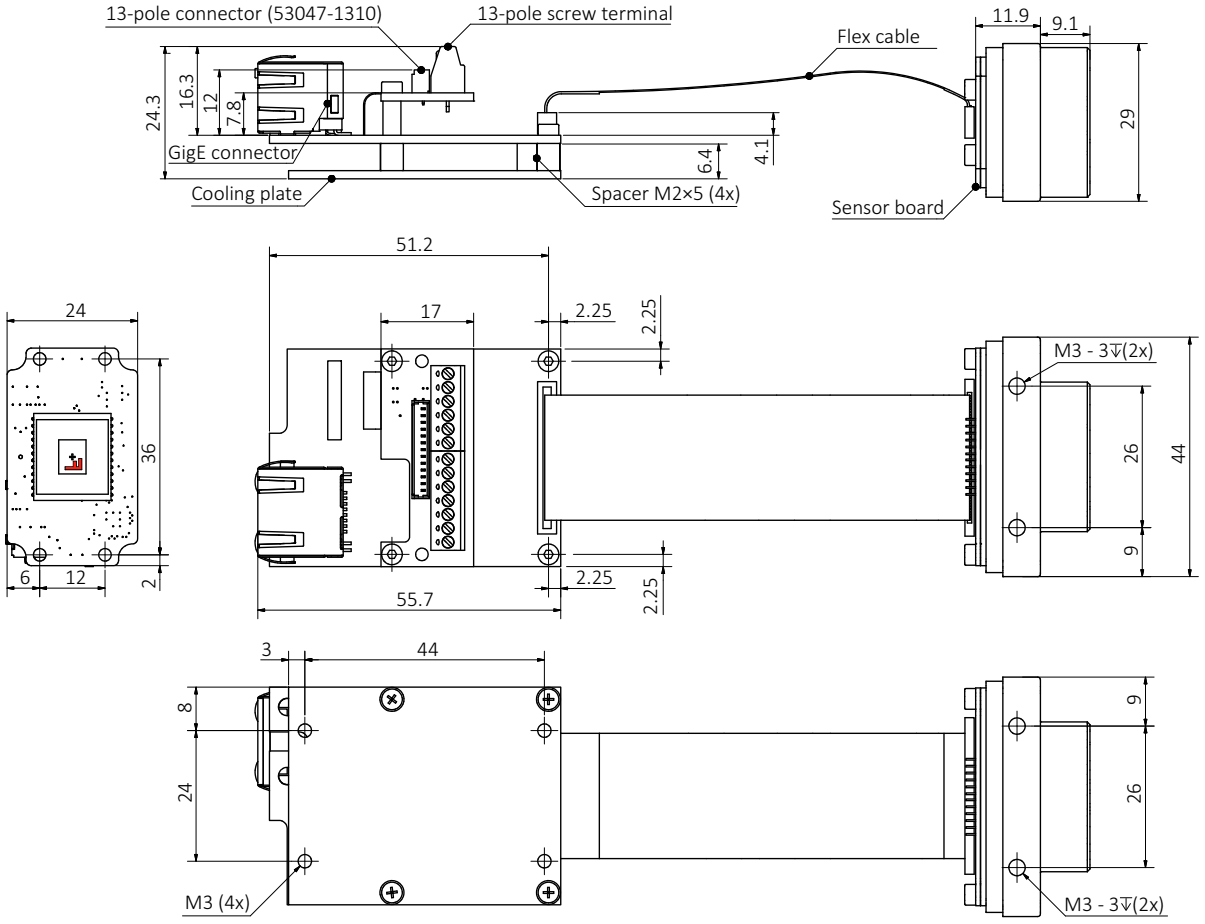



*Figure 79: Manta type A board level with C-Mount (non-PoE models) dimensions*

# Board level with C-Mount (PoE models)

Model series: 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 |

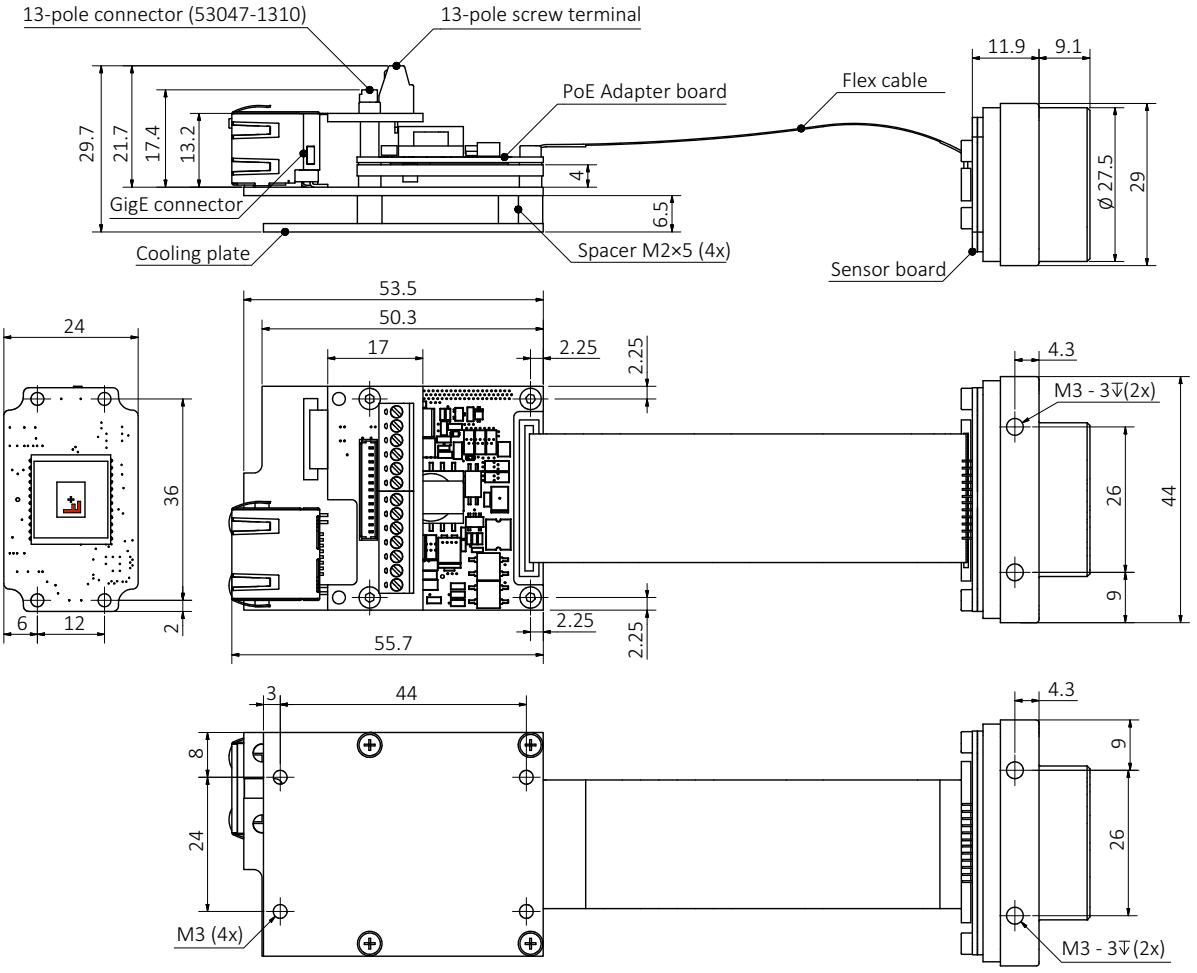



*Figure 80: Manta type A board level with C-Mount (PoE models) dimensions*

## Board level with C-Mount (non-PoE models)

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

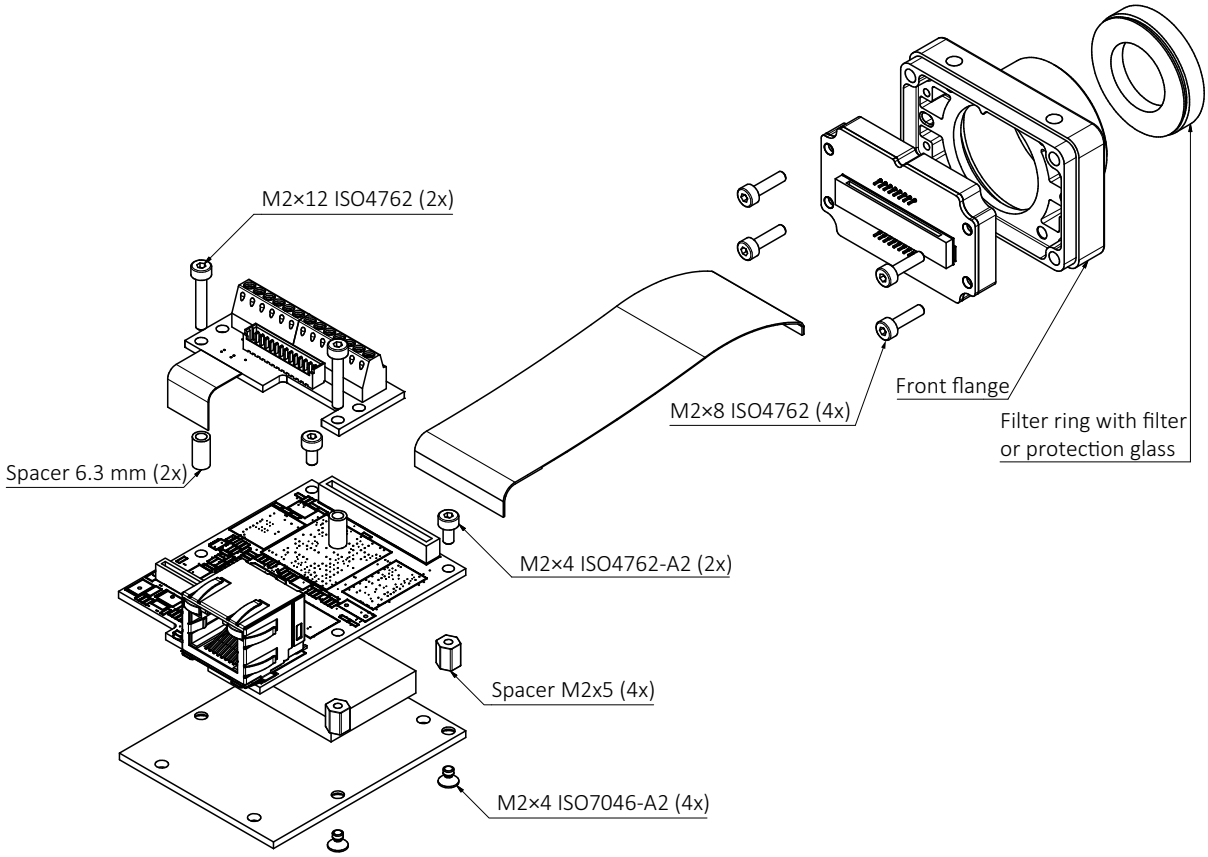



*Figure 81: Manta type A board level with C-Mount (non-PoE models)*

## Board level with C-Mount (PoE models)

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

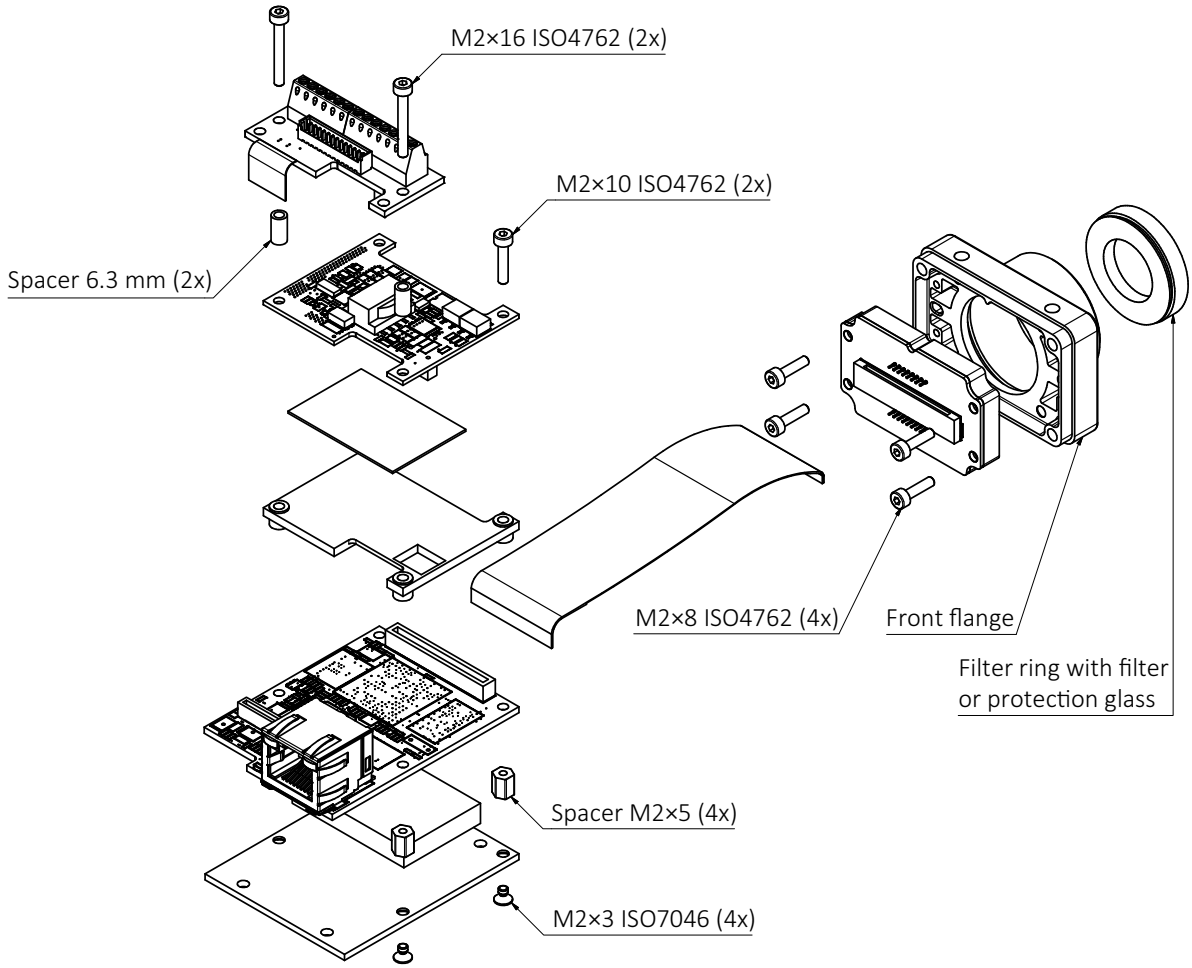



*Figure 82: Manta type A board level with C-Mount (PoE models)*

## Board level with CS-Mount (non-PoE models)

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

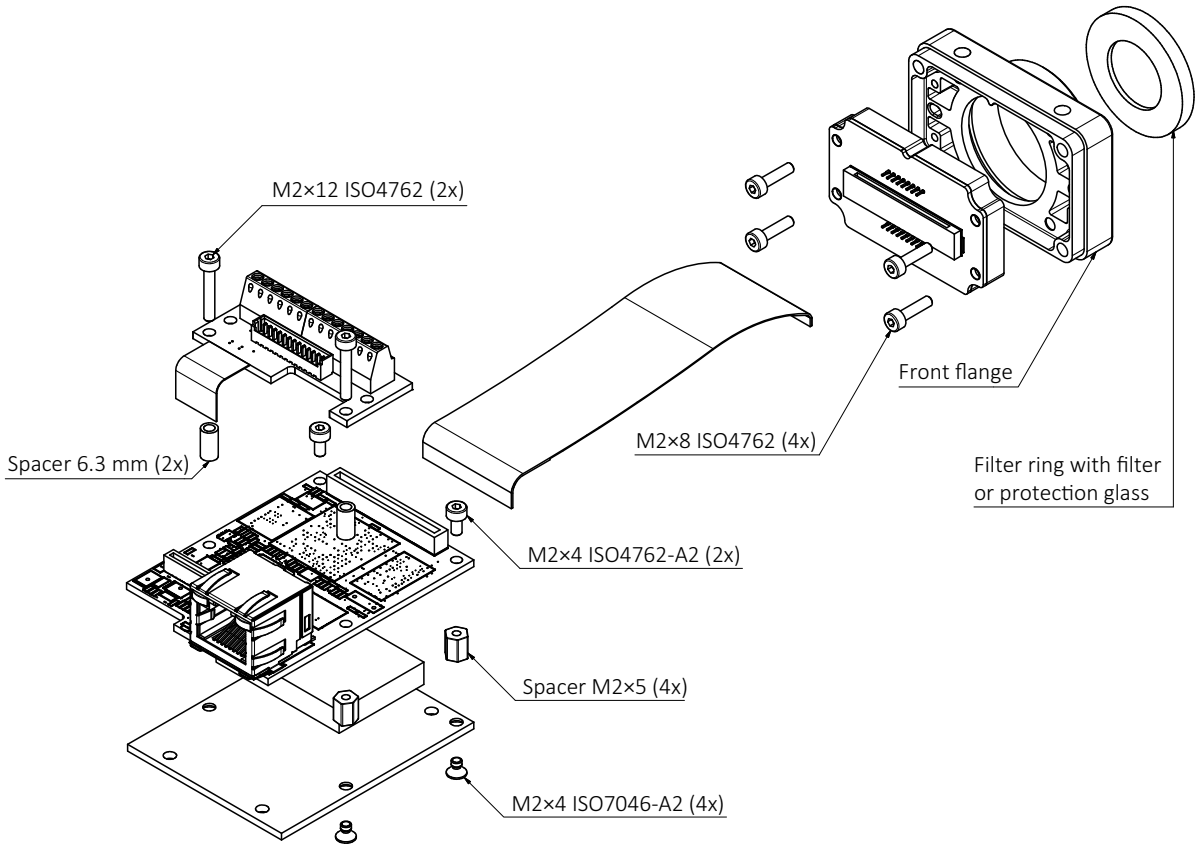



*Figure 83: Manta type A board level with CS-Mount (non-PoE models)*

## Board level with CS-Mount (PoE models)

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

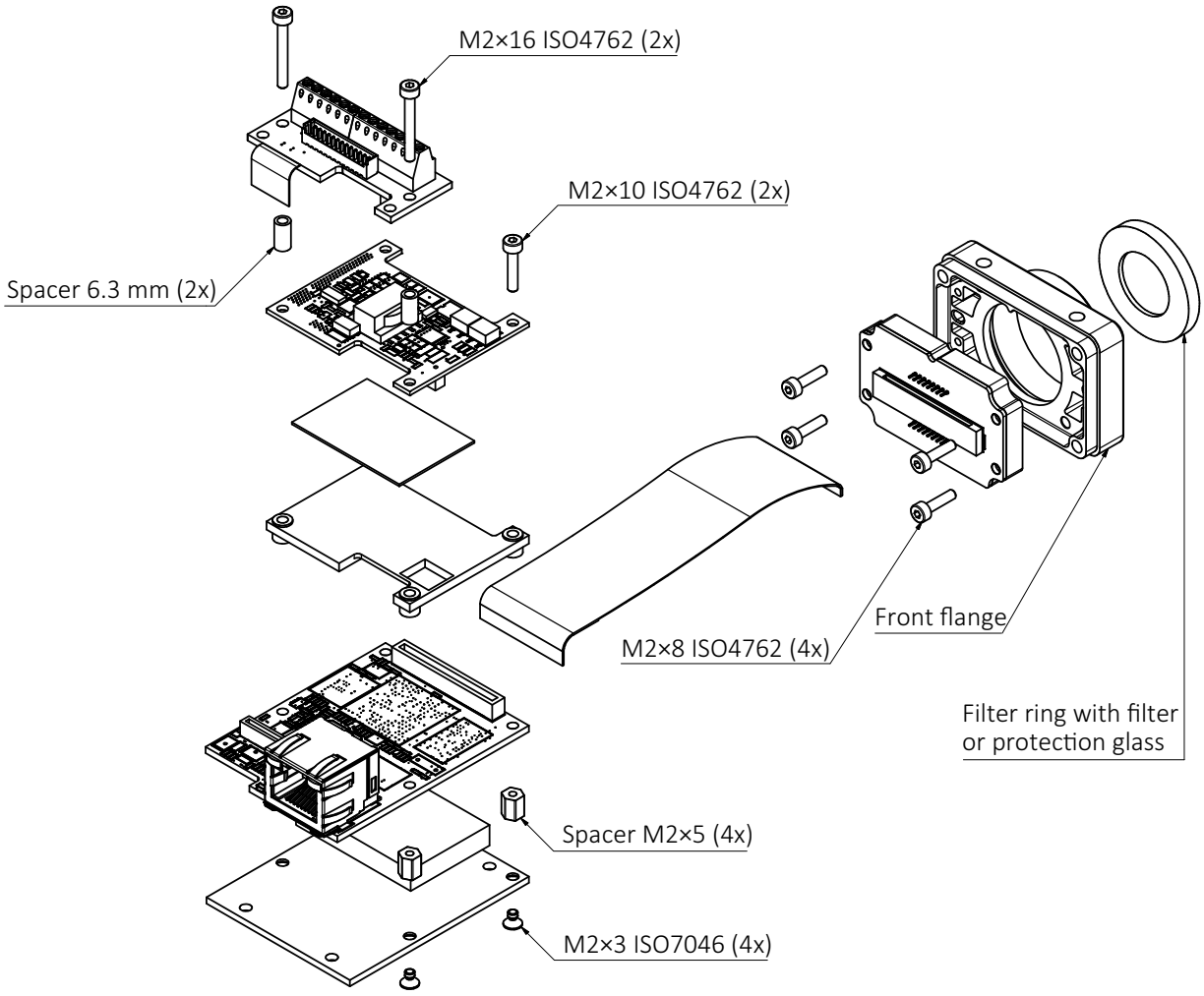



*Figure 84: Manta type A board level with CS-Mount (PoE models)*

## Board level with M12-Mount (non-PoE models)

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

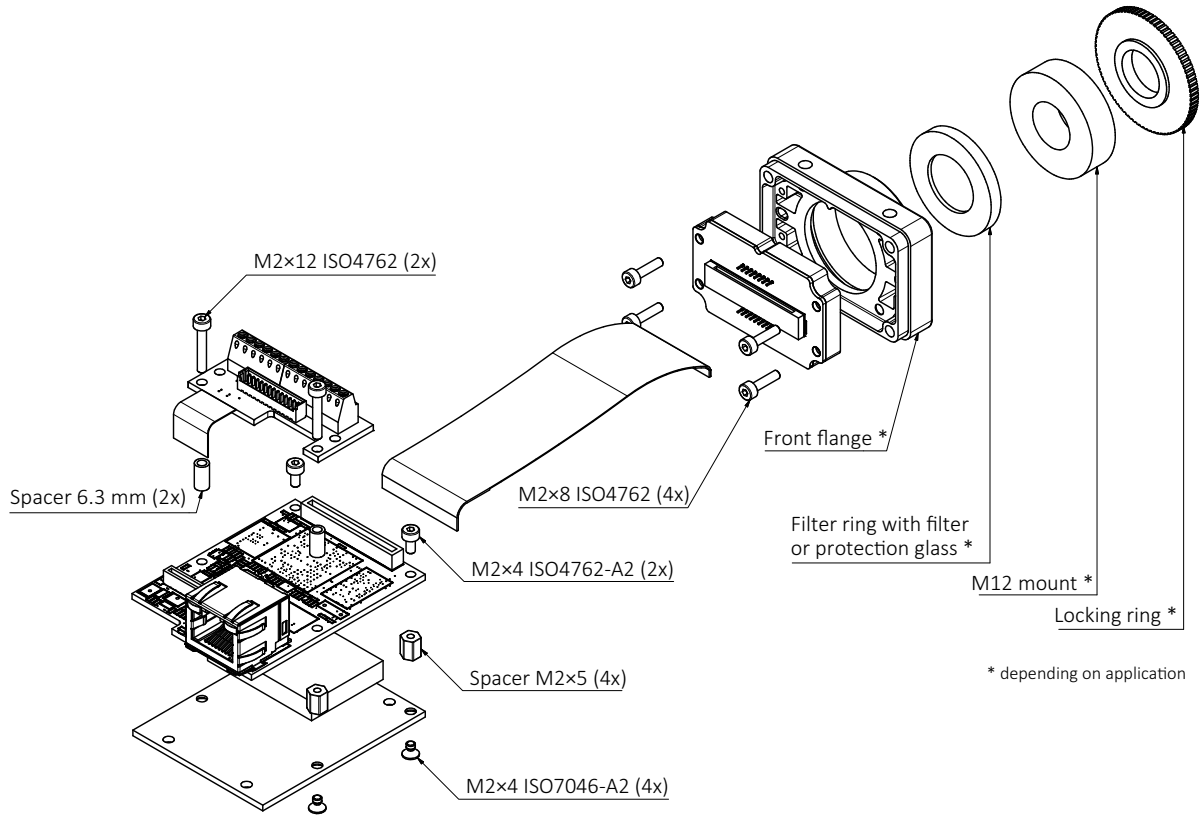



*Figure 85: Manta type A board level with M12-Mount (non-PoE models)*

## Board level with M12-Mount (PoE models)

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

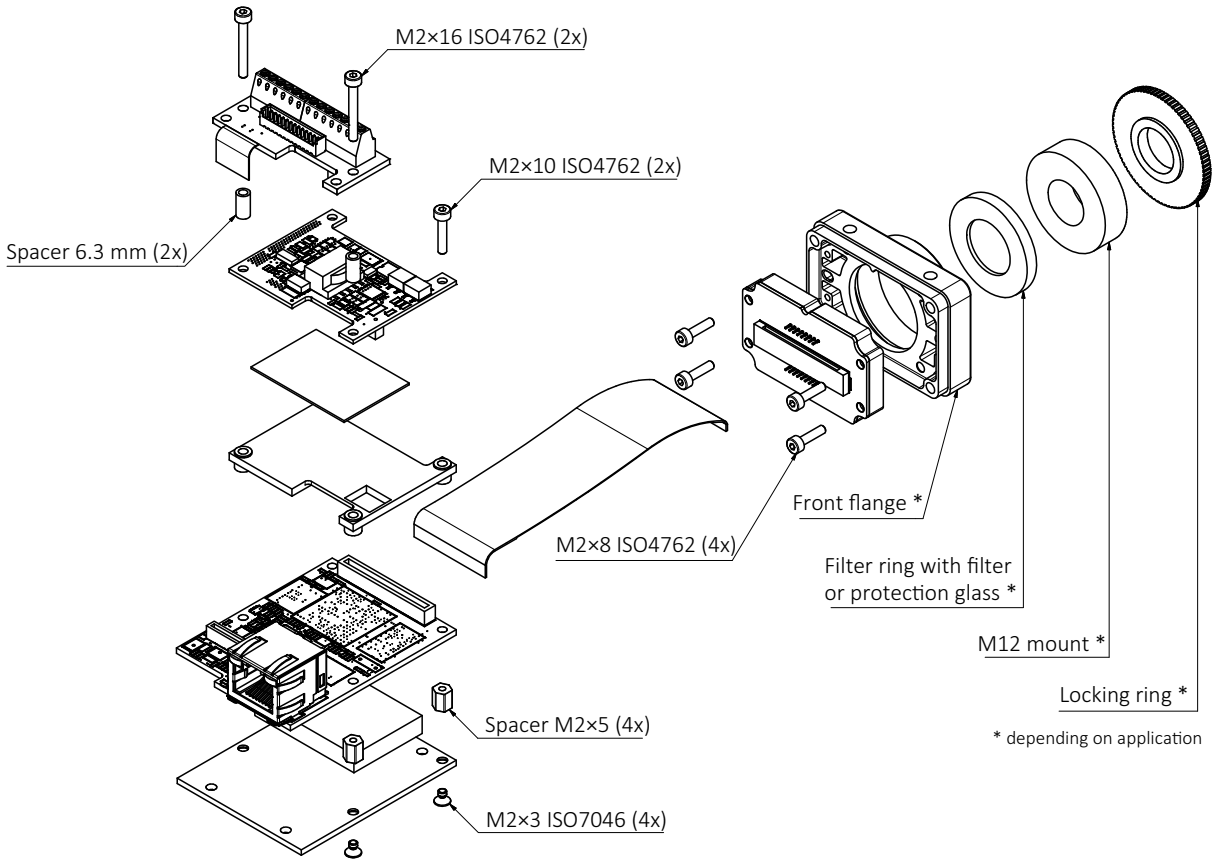



*Figure 86: Manta type A board level with M12-Mount (PoE models)*

# 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.

## Maximum protrusion

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

## 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.

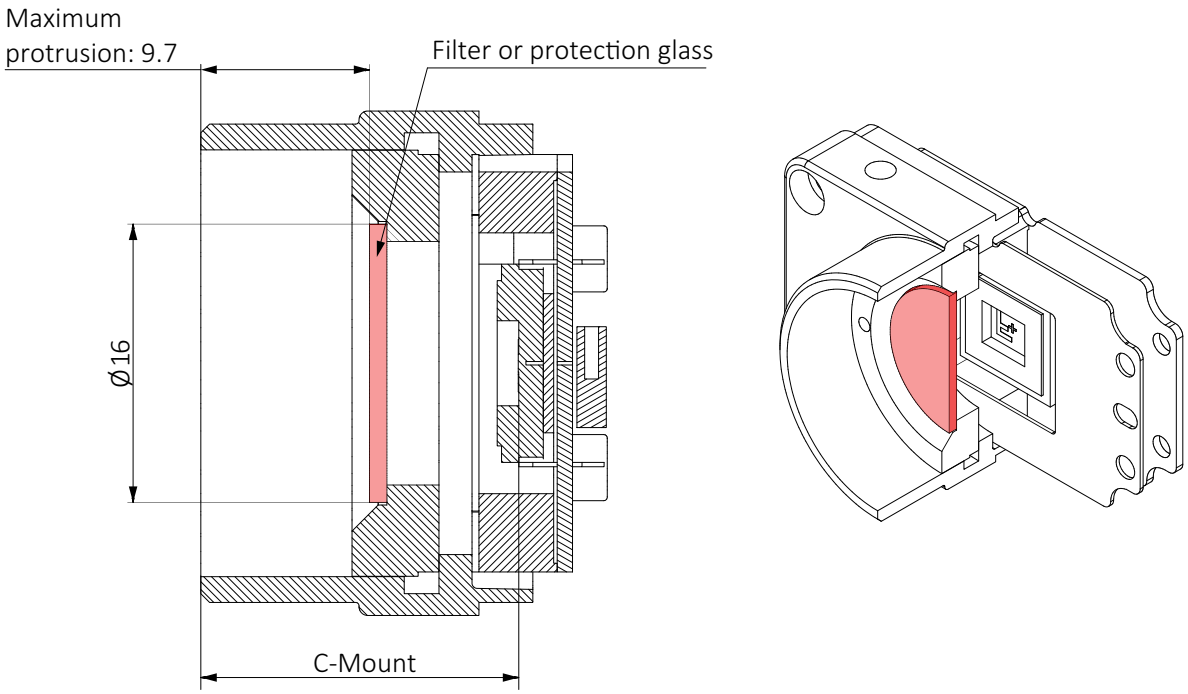



*Figure 87: Manta type A C-Mount dimensions (16 mm filter)*

**Dimensional mount adjustment**

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

# CS-Mount cross section

## Maximum protrusion

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

## 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.

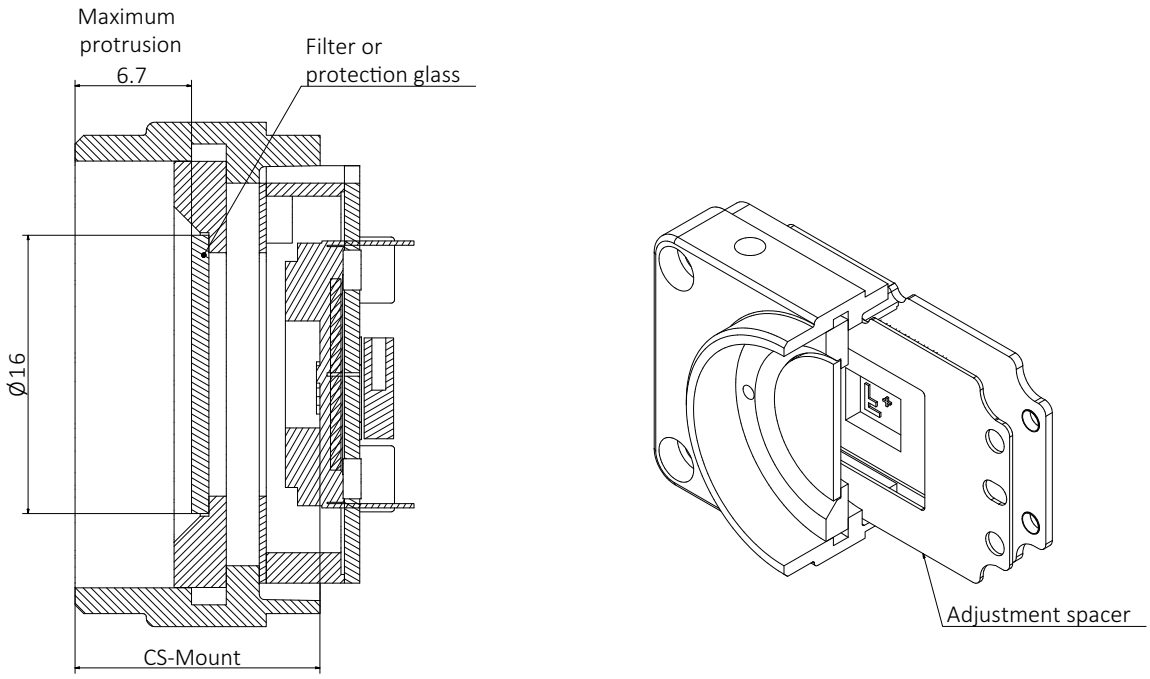



*Figure 88: Manta type A CS-Mount dimensions (16 mm filter)*

**Dimensional mount adjustment**

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

# Manta type B camera dimensions

## Standard housing with C-Mount (default)

Model series: 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

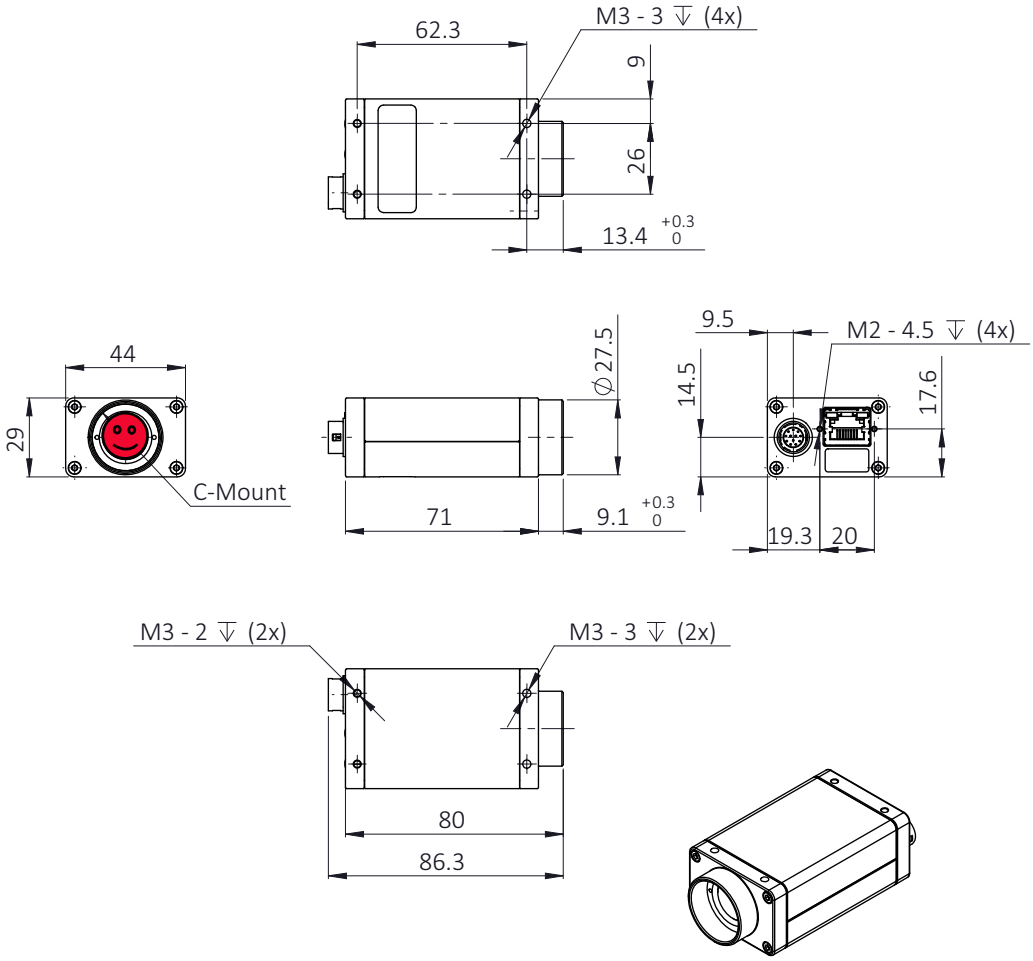



*Figure 89: Manta type B standard housing with C-Mount dimensions*

# Angled-head housings

## W90 housing with C-Mount

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

Model series: Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236

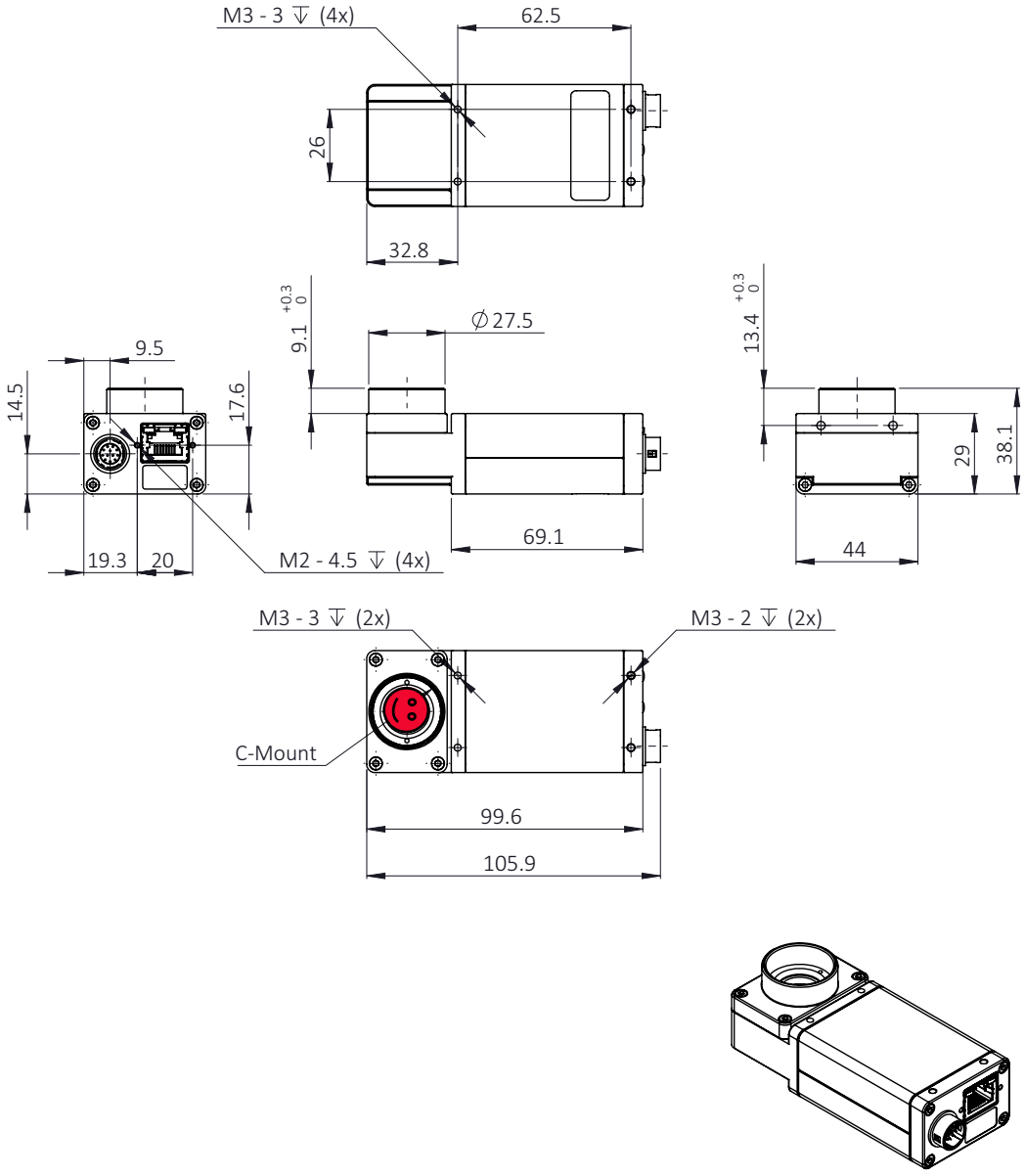



*Figure 90: Manta type B W90 housing with C-Mount dimensions*

## W90 S90 housing with C-Mount

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

Model series: Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236

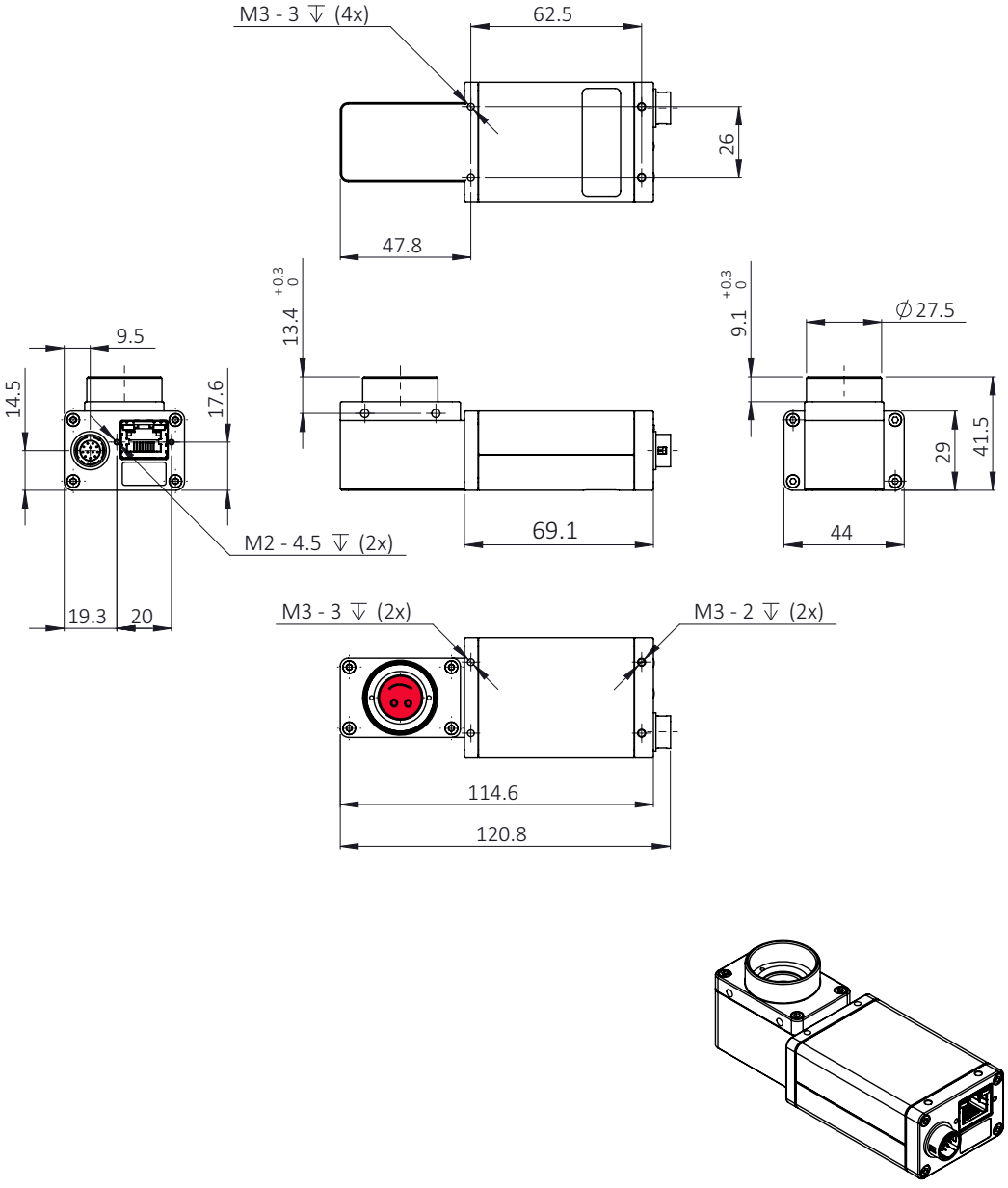



*Figure 91: Manta type B W90 S90 housing with C-Mount dimensions*

## W270 housing with C-Mount

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

Model series: Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236

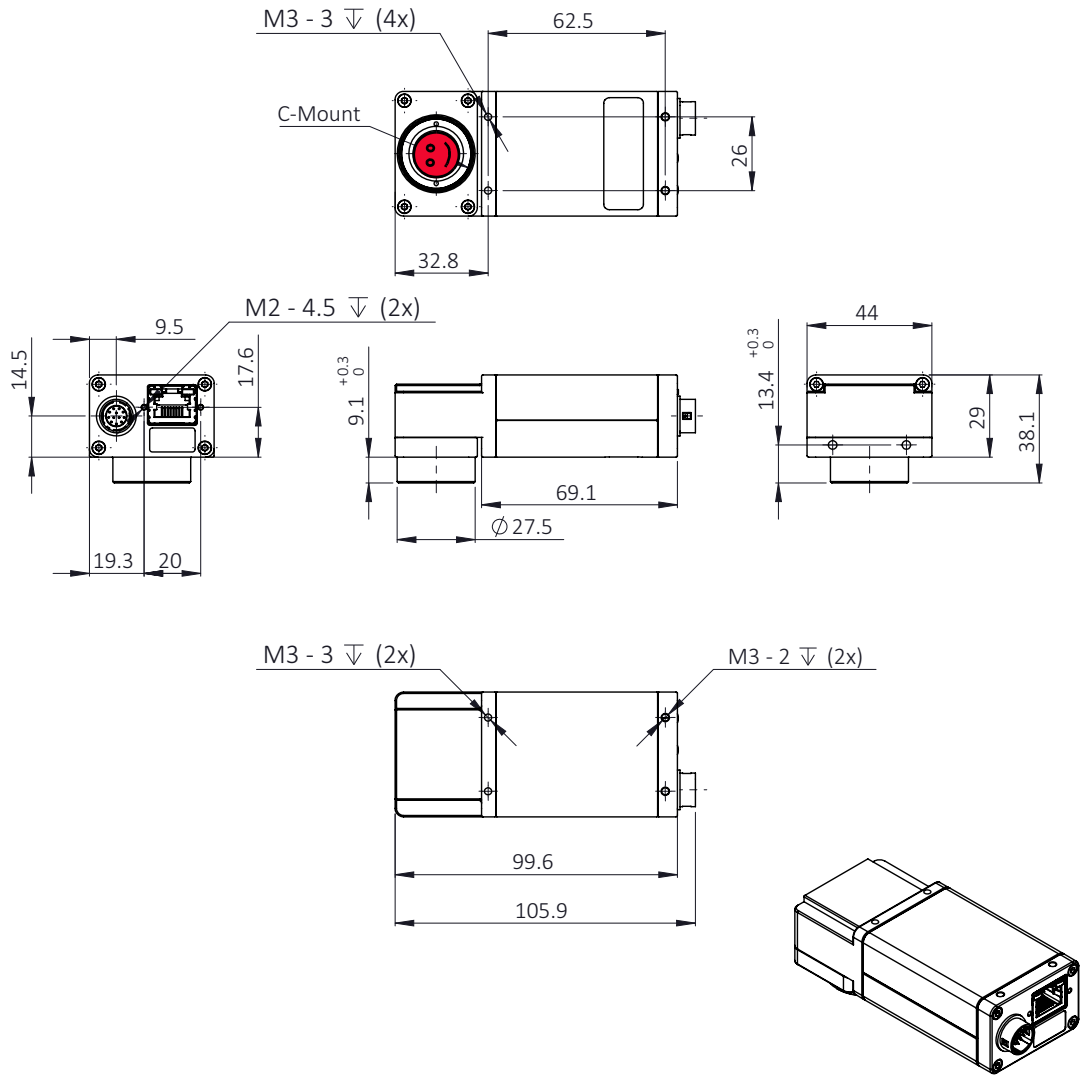



*Figure 92: Manta type B W270 housing with C-Mount dimensions*

## W270 S90 housing with C-Mount

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

Model series: Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236

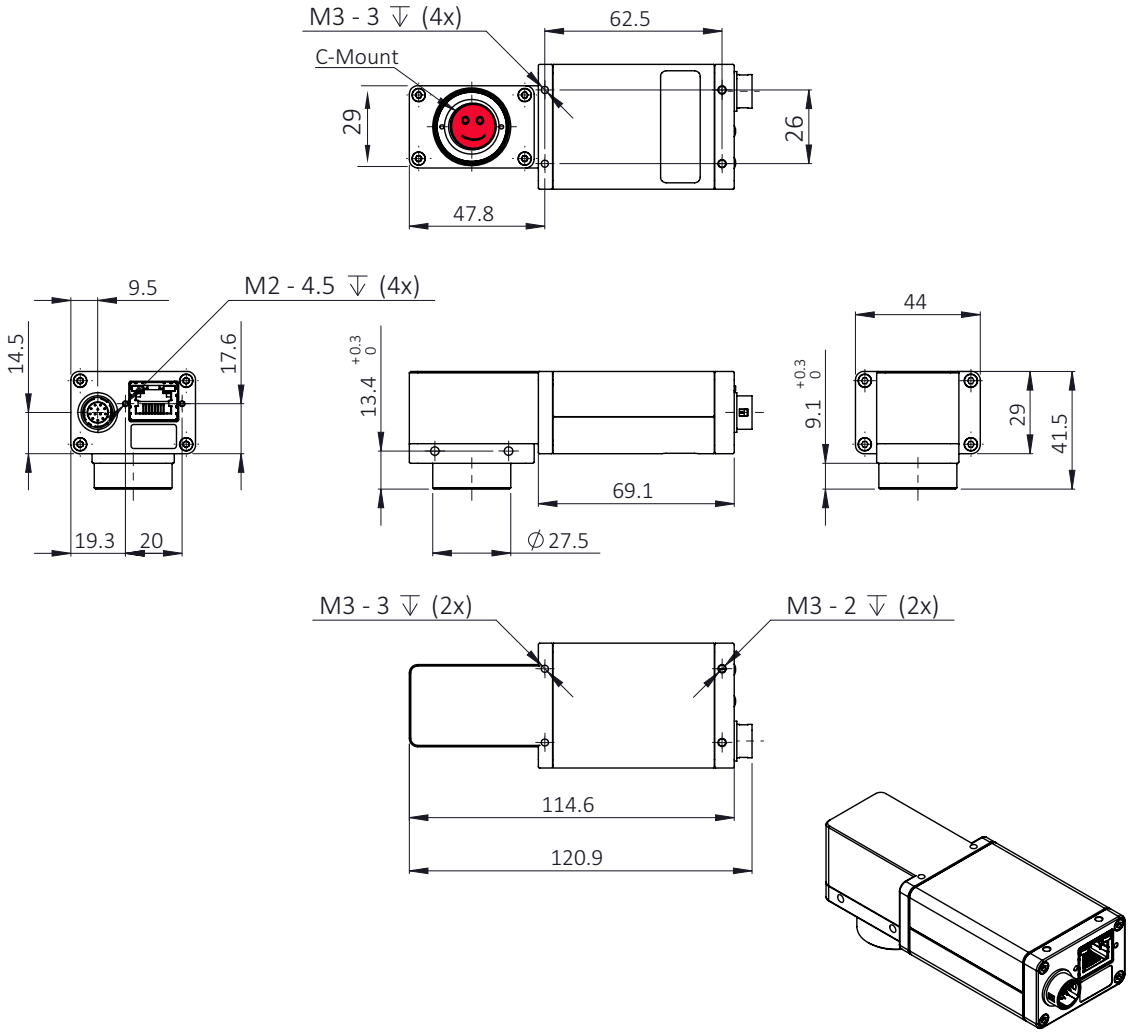



*Figure 93: Manta type B W270 S90 housing with C-Mount dimensions*

# Board level variants

## Board level with C-Mount (PoE and non-PoE models)

Model series: 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 |

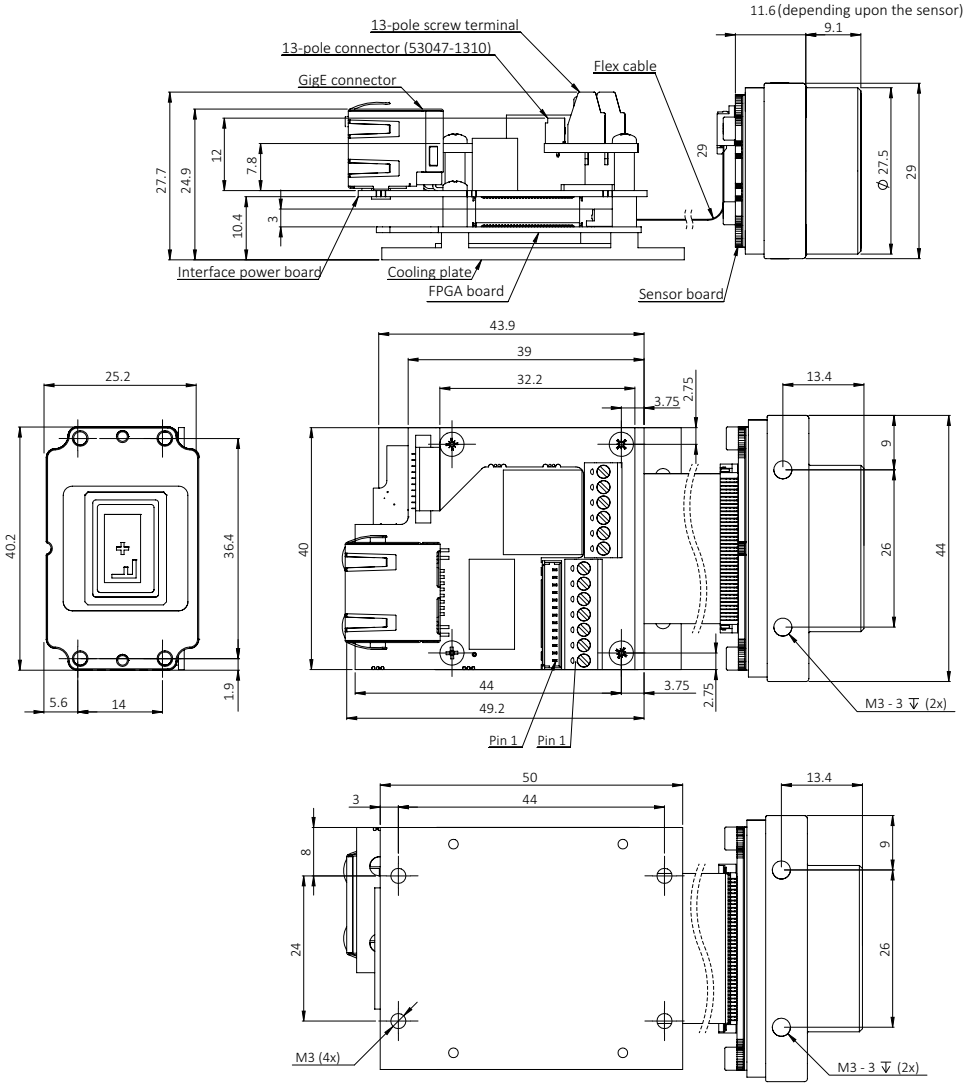



*Figure 94: Manta type B board level with C-Mount (PoE and non-PoE models) dimensions*

Model series: 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 |

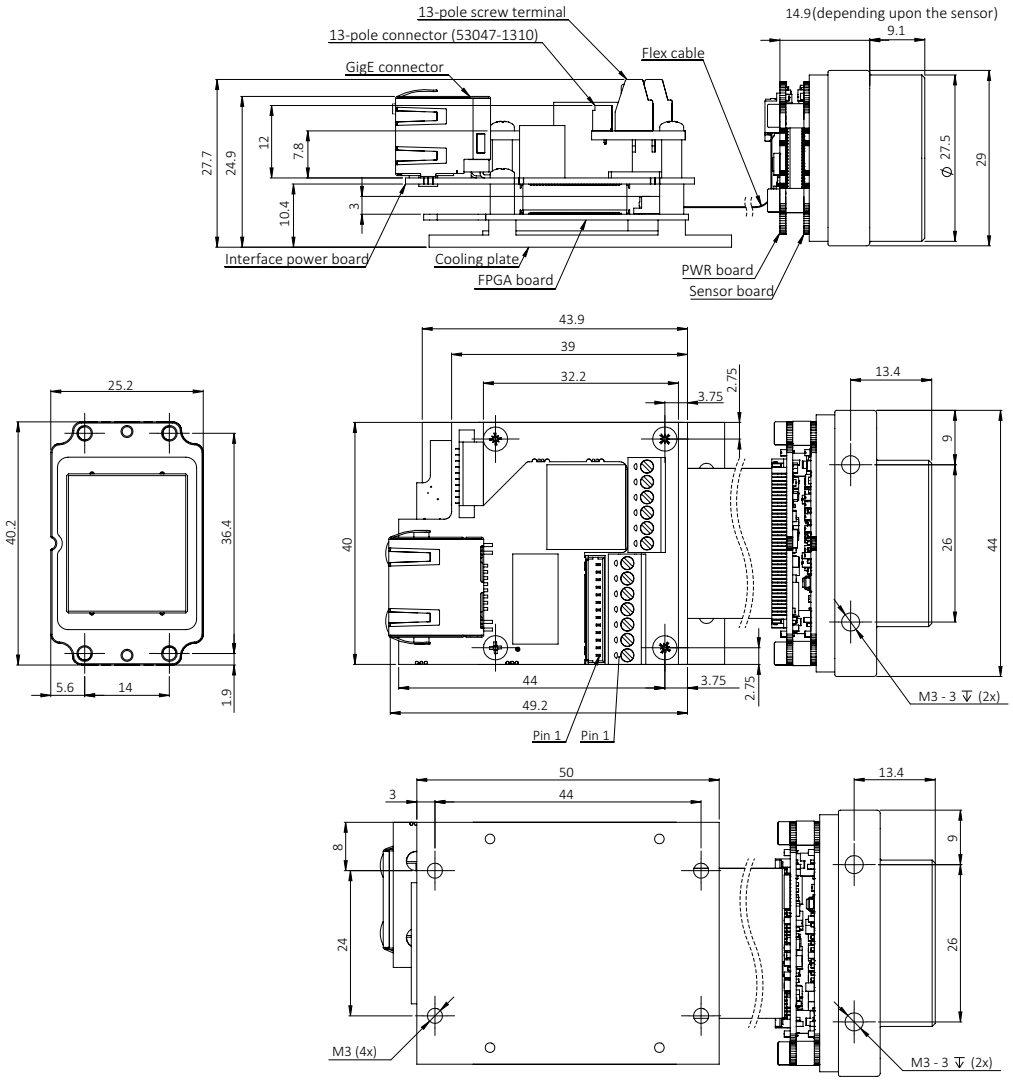



*Figure 95: Manta type B board level with C-Mount (PoE and non-PoE models) dimensions*

### Board level with C-Mount (PoE and non-PoE models)

Model series: Manta G-223, G-235, G-419

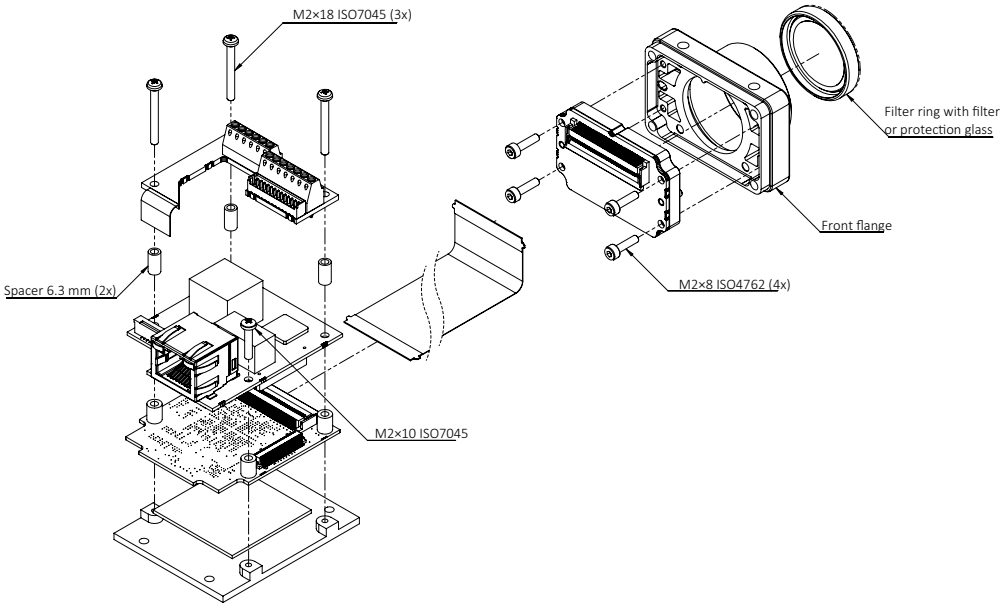



*Figure 96: Manta type B board level with C-Mount (PoE and non-PoE models) dimensions*

Model series: Manta G-040, G-158, G-319, G-507, G-895, G-1236

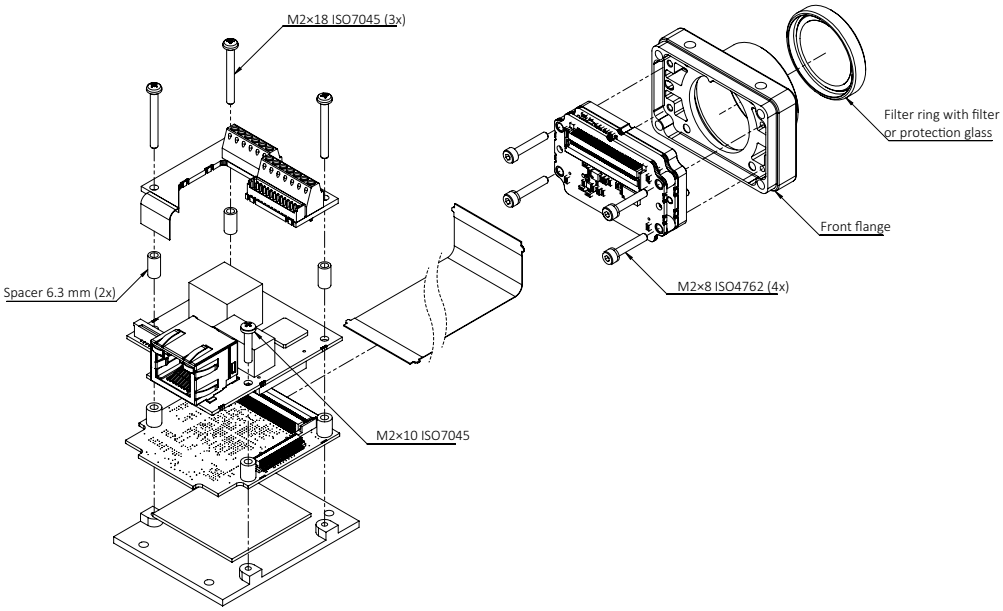



*Figure 97: Manta type B board level with C-Mount (PoE and non-PoE models) C-Mount dimensions*

### Board level with CS-Mount (PoE and non-PoE models)

Model series: Manta G-223, G-235, G-419

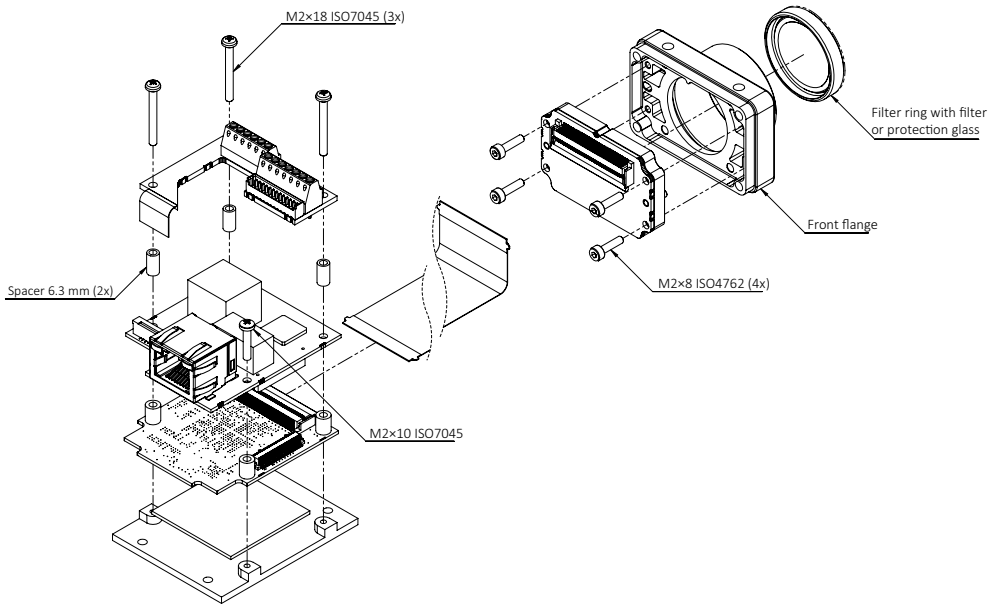



*Figure 98: Manta type B board level with CS-Mount (PoE and non-PoE models) dimensions*

Model series: Manta G-040, G-158, G-319, G-507, G-895, G-1236

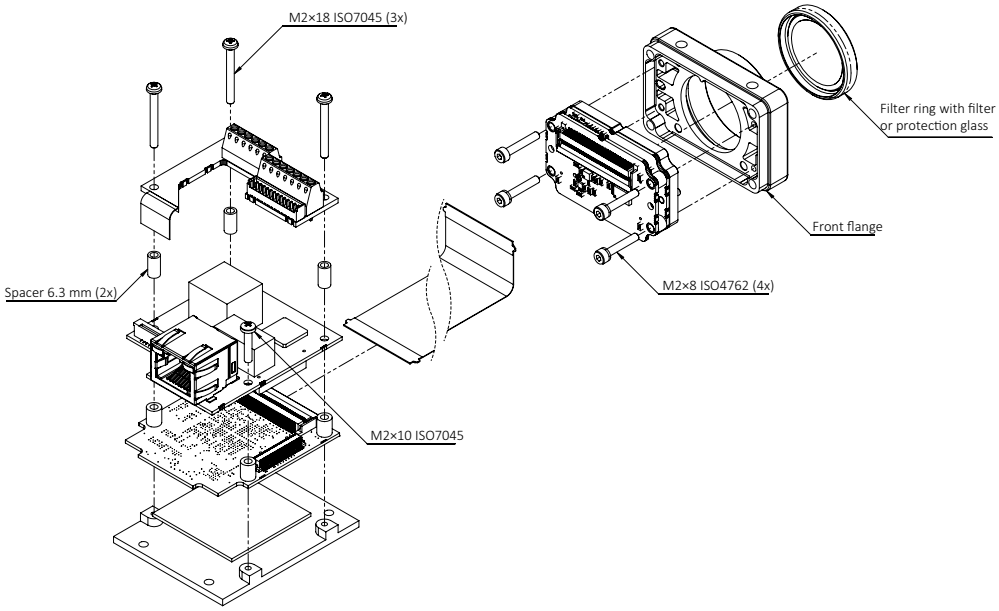



*Figure 99: Manta type B board level with CS-Mount (PoE and non-PoE models) dimensions*

## Board level with M12-Mount (PoE and non-PoE models)

Model series: Manta G-223, G-235, G-419

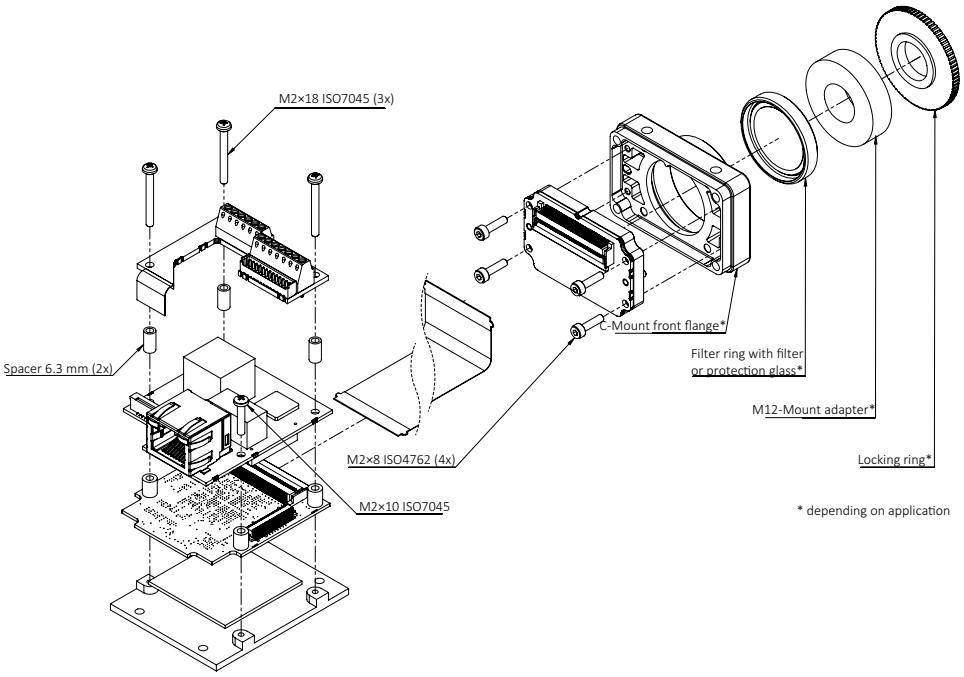



*Figure 100: Manta type B board level (non-PoE and PoE models) M12-Mount dimensions*

Model series: Manta G-040, G-158, G-319, G-507, G-895, G-1236

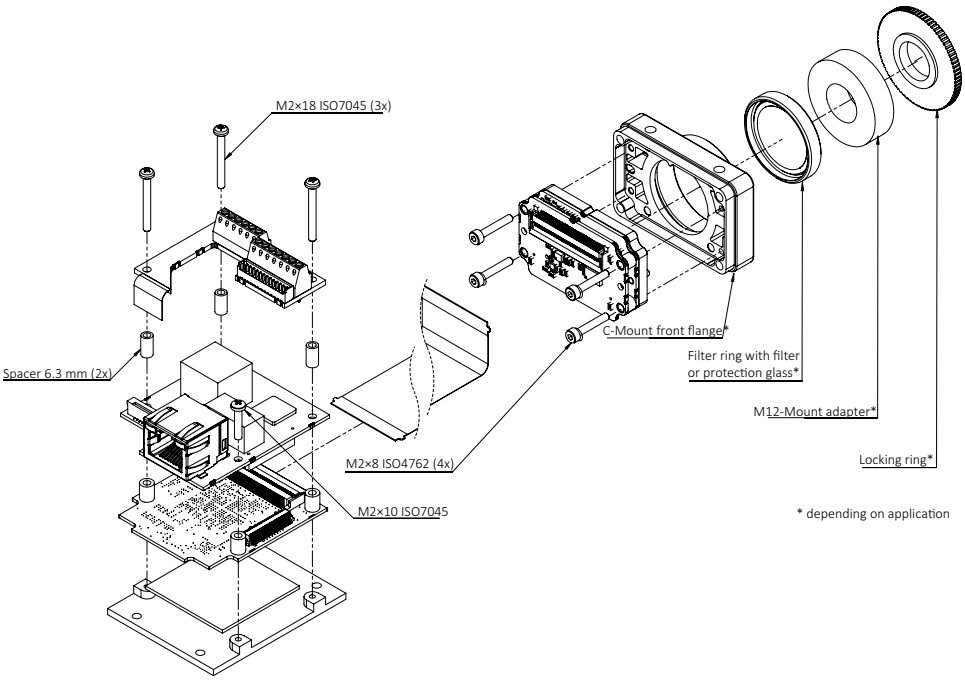



*Figure 101: Manta* type B *board level (non-PoE and PoE models) M12-Mount dimensions*

# 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.

## Maximum protrusion

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

## 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.

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

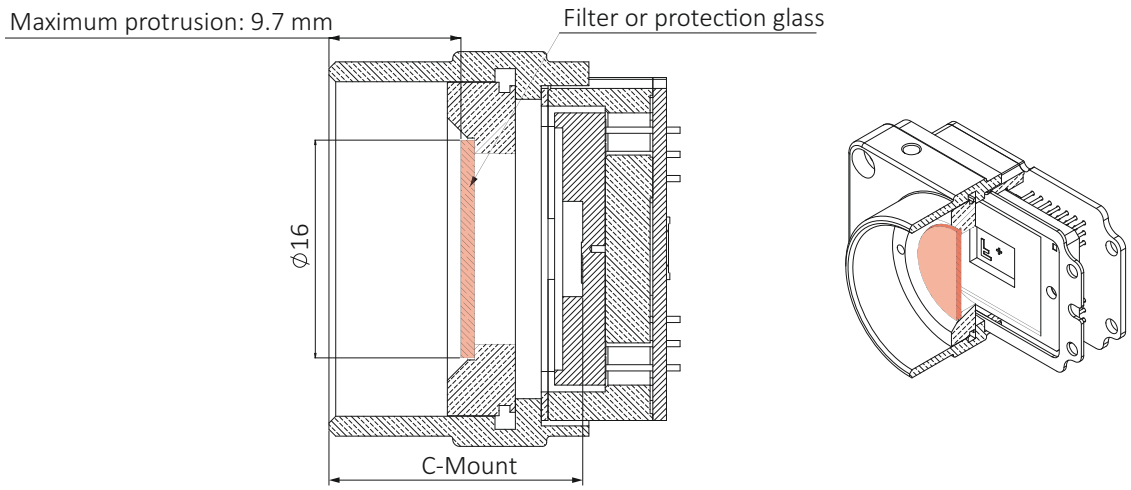



*Figure 102: Manta type B C-Mount dimensions (16 mm filter)*

- Model series: Manta G-223, G-419, G-895, G-1236
- Filter or Protection glass diameter: 22 mm

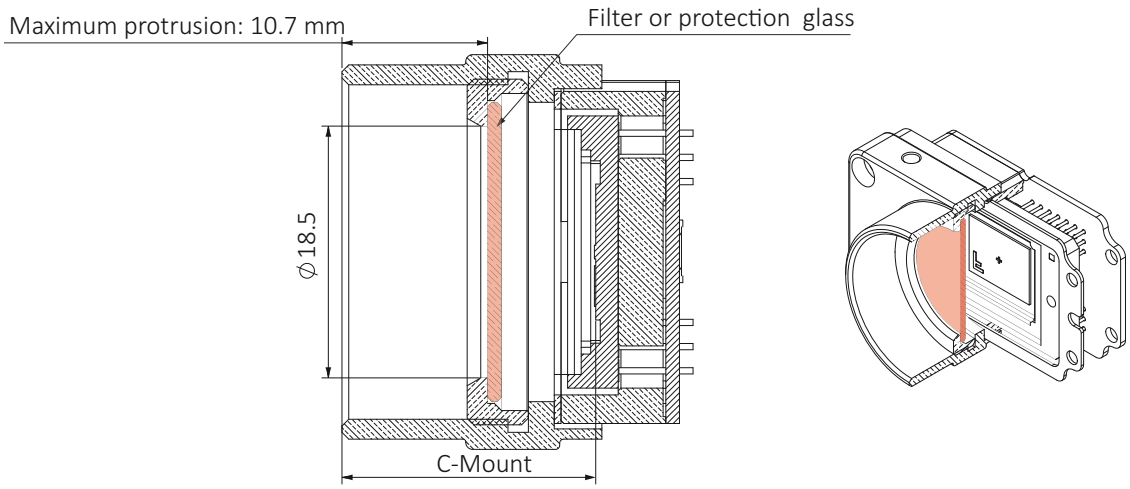



*Figure 103: Manta type B C-Mount dimensions (22 mm filter)*

**22 mm diameter filter or protection glass**

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.

**Dimensional mount adjustment**

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

# CS-Mount cross section

## Maximum protrusion

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

## 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.

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

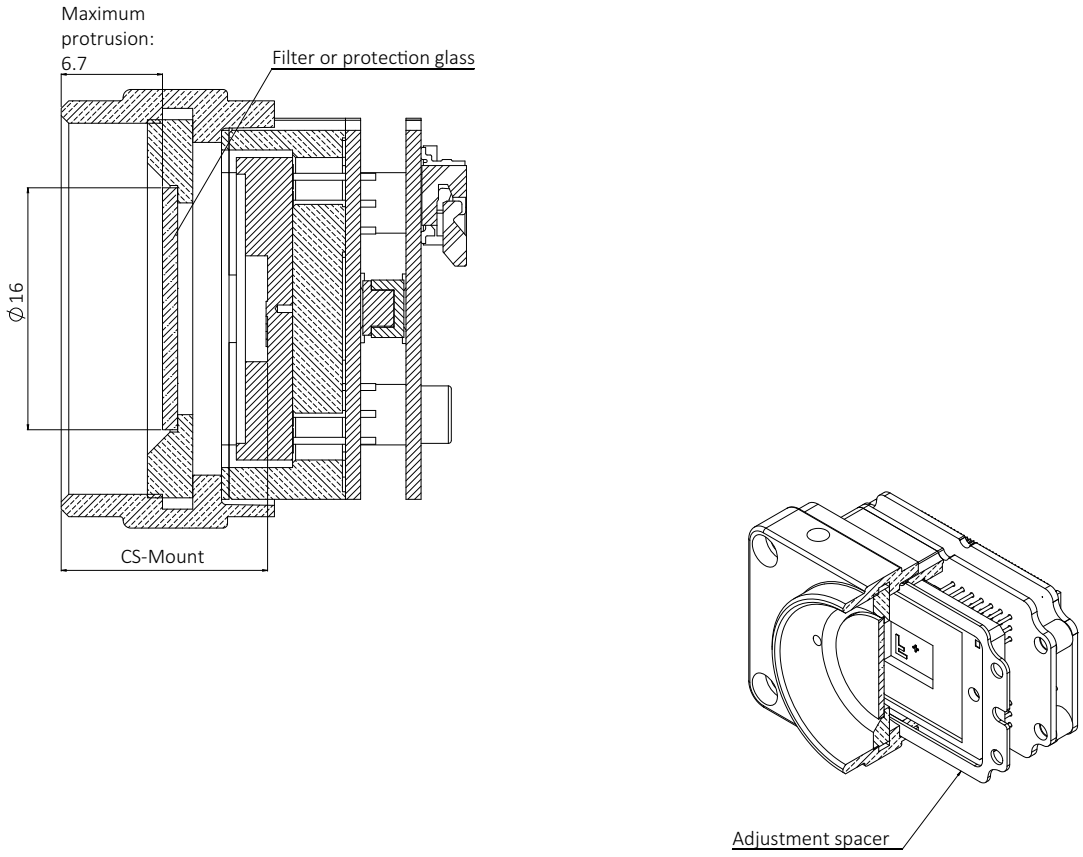



*Figure 104: Manta type B CS-Mount dimensions (16 mm filter)*

- Model series: Manta G-223, G-419, G-895, G-1236
- Filter or Protection glass diameter: 22 mm

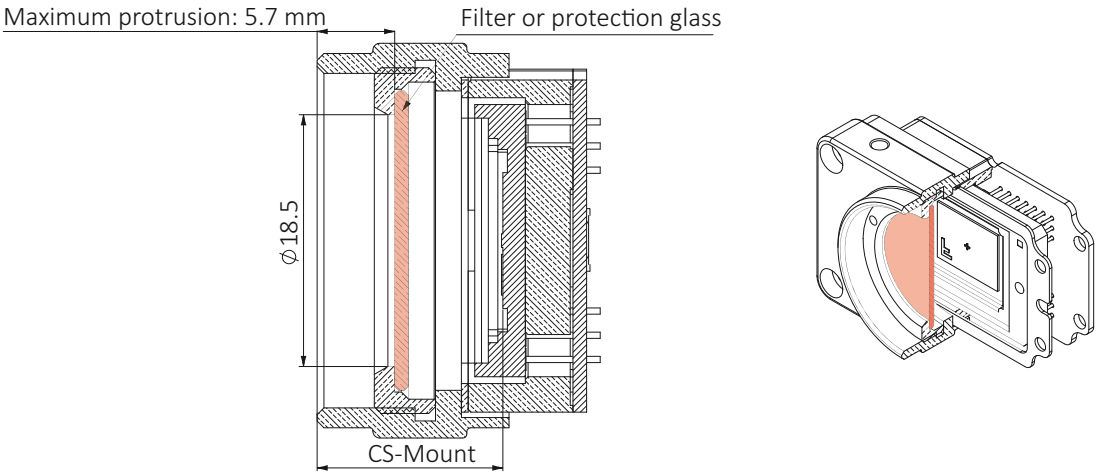



*Figure 105: Manta type B CS-Mount dimensions (22 mm filter)*

**22 mm diameter filter or protection glass**

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.

**Dimensional mount adjustment**

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

# Sensor position accuracy

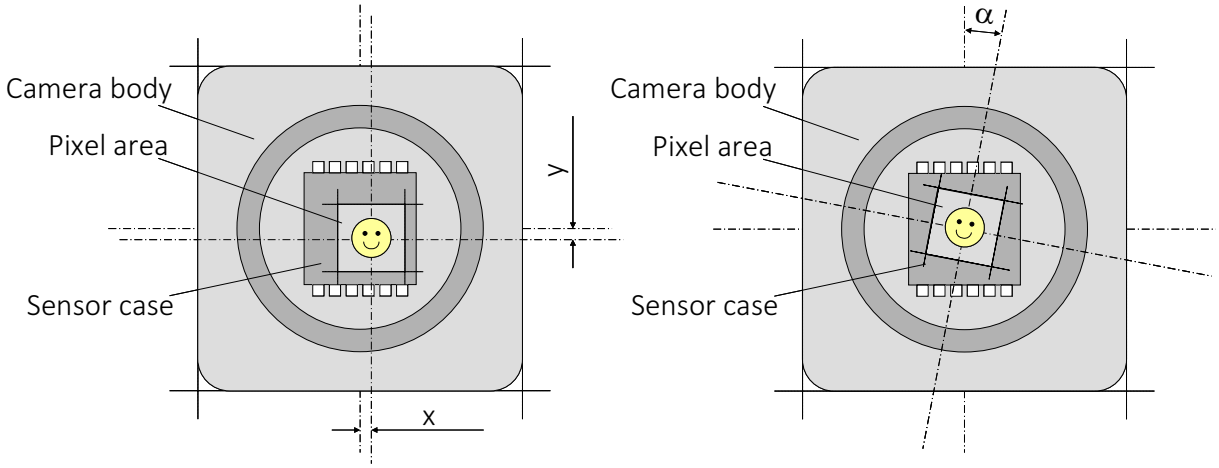



*Figure 106: Sensor position accuracy*

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-axis<br>y-axis | ±150 µm (sensor shift) |
| | z-axis | +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 58: 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

We offer 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.

Contact your Allied Vision Sales team or your Allied Vision distribution partner for information on available lenses and accessories.

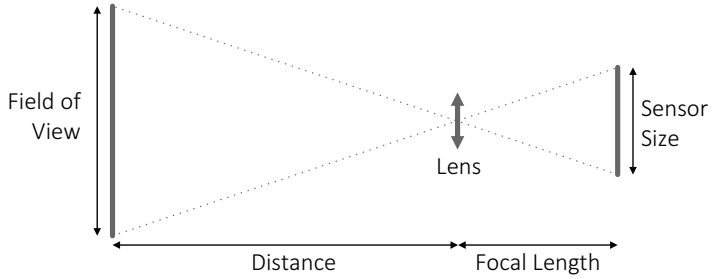



*Figure 107: Focal length versus field of view*

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.

## Manta G-031 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-031B and G-031C models.

| 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 59: Manta G-031 series focal length versus field of view*

# Manta G-032 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-032B and G-032C models.

| 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 60: Manta G-032 series focal length versus field of view*

# Manta G-033 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-033B and G-033C models.

| 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-033 series focal length versus field of view*

# Manta G-040 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-040B and G-040C models.

| 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-040 series focal length versus field of view*

# Manta G-125 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-125B and G-125C models.

| 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 63: Manta G-125 series focal length versus field of view*

# Manta G-145 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-145B, G-145B-30fps, G-145B NIR, G-145C, and G-145C-30fps models.

| 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 64: Manta G-145 series focal length versus field of view*

# Manta G-146 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-146B and G-146C models.

| 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 65: Manta G-146 series focal length versus field of view*

# Manta G-158 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-158B and G-158C models.

| 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 66: Manta G-158 series focal length versus field of view*

# Manta G-201 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-201B, G-201B-30fps, G-201C, and G-201C-30fps models.

| 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 67: Manta G-201 series focal length versus field of view*

# Manta G-223 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-223B, G-223B NIR, and G-223C models.

| 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 is recommended)

*Table 68: Manta G-223 series focal length versus field of view*

# Manta G-235 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-235B and G-235C models.

| 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 69: Manta G-235 series focal length versus field of view*

# Manta G-282 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-282B and G-282C models.

| 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 70: Manta G-282 series focal length versus field of view*

# Manta G-283 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-283B and G-283C models.

| 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 |

*Table 71: Manta G-283 series focal length versus field of view (sheet 1 of 2)*

| Focal length | Field of view | |
|---|---|---|
| | Distance = 500 mm | Distance = 1000 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 71: Manta G-283 series focal length versus field of view (sheet 2 of 2)*

# Manta G-319 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-319B and G-319C models.

| 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 72: Manta G-319 series focal length versus field of view*

# Manta G-419 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-419B, G-419B NIR, and G-419C models.

| 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 73: Manta G-419 series focal length versus field of view*

# Manta G-504 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-504B and G-504C models.

| 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 74: Manta G-504 series focal length versus field of view*

# Manta G-505 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-505B and G-505C models.

| 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 75: Manta G-505 series focal length versus field of view*

# Manta G-507 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-507B and G-507C models.

| 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 76: Manta G-507 series focal length versus field of view*

# Manta G-895 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-895B and G-895C models.

| Focal length | Field of view | |
|---|---|---|
| | Distance = 500 mm | Distance = 1000 mm |
| 12 mm | 577 × 305 mm | 1168 × 618 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 77: Manta G-895 series focal length versus field of view*

# Manta G-917 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-917B and G-917C models.

| 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 78: Manta G-917 series focal length versus field of view*

# Manta G-1236 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-1236B and G-1236C models.

| 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 79: Manta G-1236 series focal length versus field of view*

# Optical filters

All color Manta cameras are equipped with an Hoya C-5000 IR cut filter. This filter is employed to prevent infrared light from passing to the sensor. In the absence of an IR cut filter, images are dominated by red and incapable of being properly color balanced.

All monochrome Manta cameras are equipped with Protection glass B 270 (ASG). NIR Manta cameras don’t employ an IR cut filter or protection glass.

The following plot shows the filter transmission response for the default Hoya C-5000 IR cut filter and includes the optional Jenofilt 217 IR cut filter, RG715 IR pass filter, RG830 IR pass filter, and B 270 ASG protection glass.

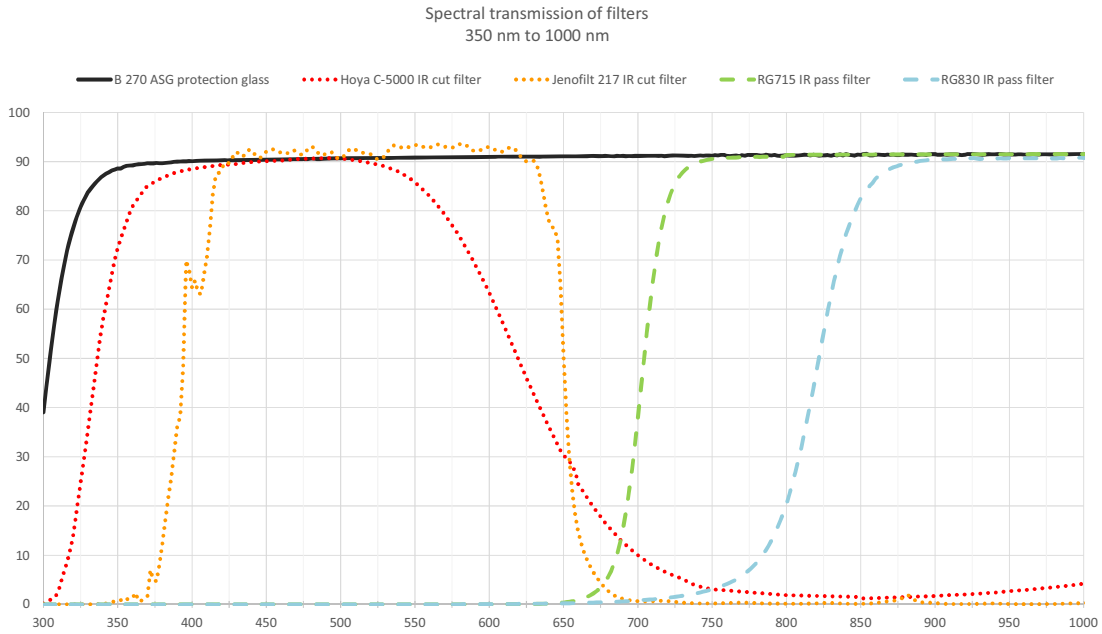
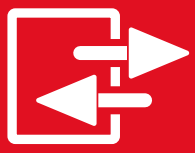



*Figure 108: Optical filter spectral transmission*

# Camera interfaces



This chapter includes:

- A general description of the I/Os (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

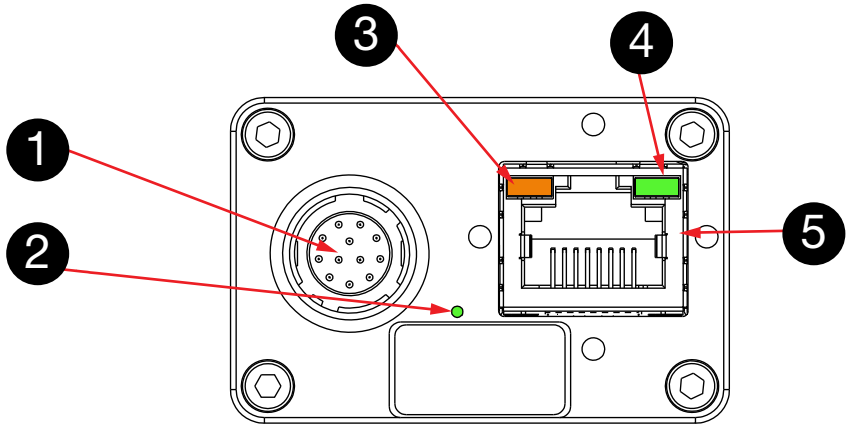



*Figure 109: Rear view of Manta type A cameras*

| | |
|---|---|
| **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 port |

*Table 80: Ports and LEDs*

# Status LEDs

## Manta type A status LEDs

The following tables describe the status LEDs of Manta type A model series: 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 Gbps established |
| Flashing orange | Ethernet activity with 1 Gbps |

*Table 81: Status LED 1*

| LED 2 color | Status |
|---|---|
| Solid green | Ethernet link with 100 Mbps established |
| Flashing green | Ethernet activity with 100 Mbps |

*Table 82: Status LED 2*

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

*Table 83: Status LED 3*

## Manta type B status LEDs

The following tables describe the status LEDs of Manta type B model series: 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 84: Status LED 1*

| LED 2 color | Status |
|---|---|
| Solid green | Ethernet link established |
| Slow flashing green | Booting routine |
| Four rapid flashes per second (4 Hz) | Transmission error.<br>Contact support@alliedvision.com |

*Table 85: Status LED 2*



Manta type B cameras don’t have a power LED (LED 3).

# Gigabit Ethernet port

The Gigabit Ethernet port conforms to the IEEE 802.3 1000BASE-T standard for Gigabit Ethernet over copper. To prevent EMI and for best performance, Category 6 (or higher) S or 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 RJ45 jack has the pin assignment according to the Ethernet standard (IEEE 802.3 1000BASE-T).
- For cameras that are PoE capable, the Gigabit Ethernet port can be used to provide power to the camera.
- Manta PoE models can source power from IEEE 802.3af (1000 Mbps) and from IEEE 802.3at compliant PSE devices such as switches injectors or NICs.
- When both the Hirose I/O port and Gigabit Ethernet port (via PoE) are used for power, the camera uses 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.

# Camera I/O connections

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.

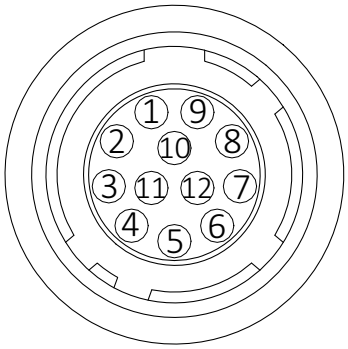
Safety-related instructions to avoid malfunctions

Read all Notes and Cautions in the Hardware and Installation chapter before using the Hirose I/O connector.

Hirose connector

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

## I/O connector pin assignment




| 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 |

*Table 86: Camera I/O connector pin assignment and color coding (sheet 1 of 2)*

| Camera side Hirose HR10- 10R-12PA(73) connector | | | | | I/O cable color code |
|---|---|---|---|---|---|
| **Pin** | **Signal** | **Direction** | **Level** | **Description** | |
| 4 | In 1 | In | Standard and PoE models:<br>$U_{in}$(high) = 3 to 24 V<br>up to 36 V with external resistor of 3.3 kΩ in series<br>$U_{in}$(low) = 0 to 1.0 V | Opto-isolated input 1 (SyncIn1) | Gray |
| 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:<br>$U_{in}$(high) = 3 to 24 V<br>$U_{in}$(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 86: Camera I/O connector pin assignment and color coding (sheet 2 of 2)*

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

www.alliedvision.com/en/support/technical-documentation/accessories-data-sheets

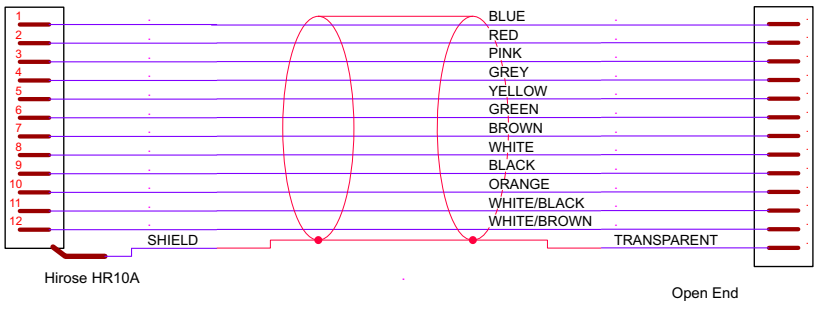



*Figure 110: Manta cable color coding*

# Input block diagram

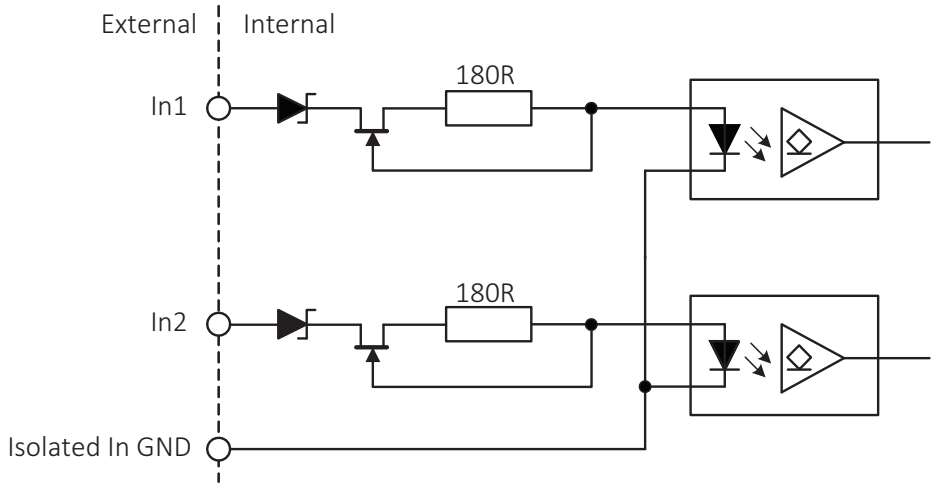



*Figure 111: Input block diagram*

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 $t_{pdHL}$ < 3.5 µs and $t_{pdHL}$ < 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 87: Input parameters*

## Minimum pulse width

The minimum pulse width for all Manta cameras is:

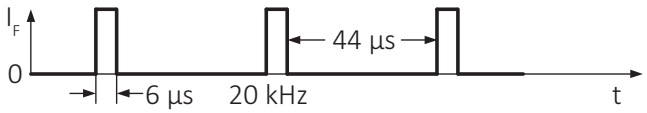



*Figure 112: Minimum pulse width*

### Test conditions

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

# Output block diagram

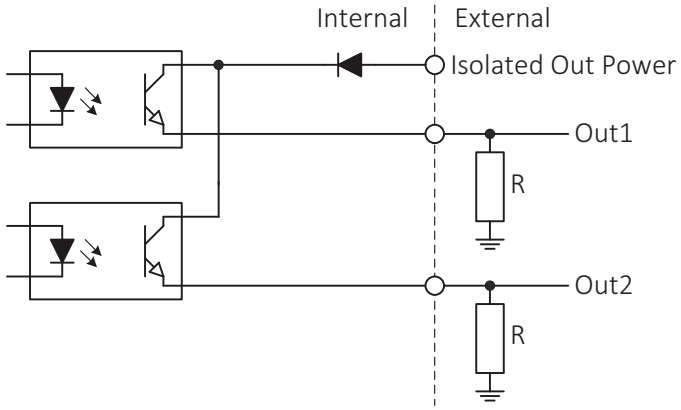



*Figure 113: Output block diagram*

**NOTICE**

- 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] A resistor is required when Out1/2 is connected to a device with < 5 mA draw, that is, high impedance.

*Table 88: Isolated out power and external resistor*

## Output switching times

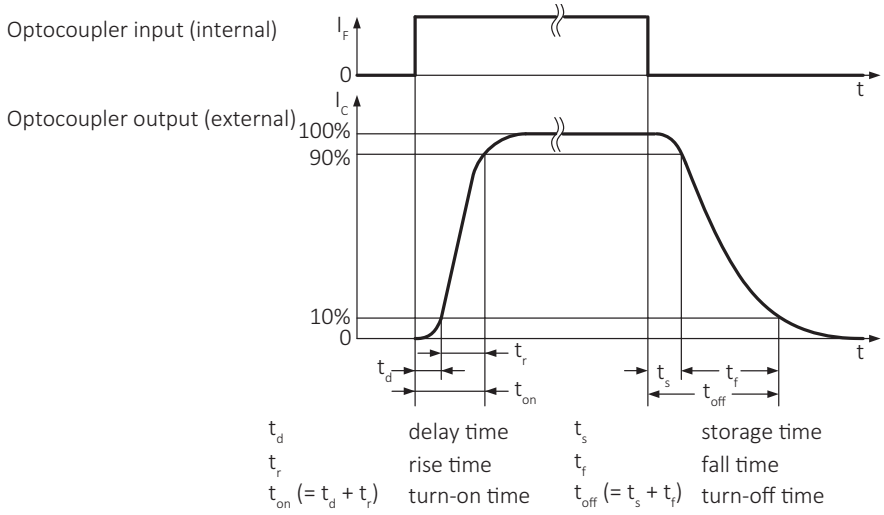



*Figure 114: Output switching times*

### 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 ± 5 µs) |

*Table 89: 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 previous table.

# Auto Iris (video type) output description

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

**NOTICE**

The following schematic uses Camera POWER to power the video iris lens and assumes Camera POWER = 12 V. Most video iris lenses operate at an 8 to 16 V input voltage. Therefore, this circuit is not appropriate when 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.

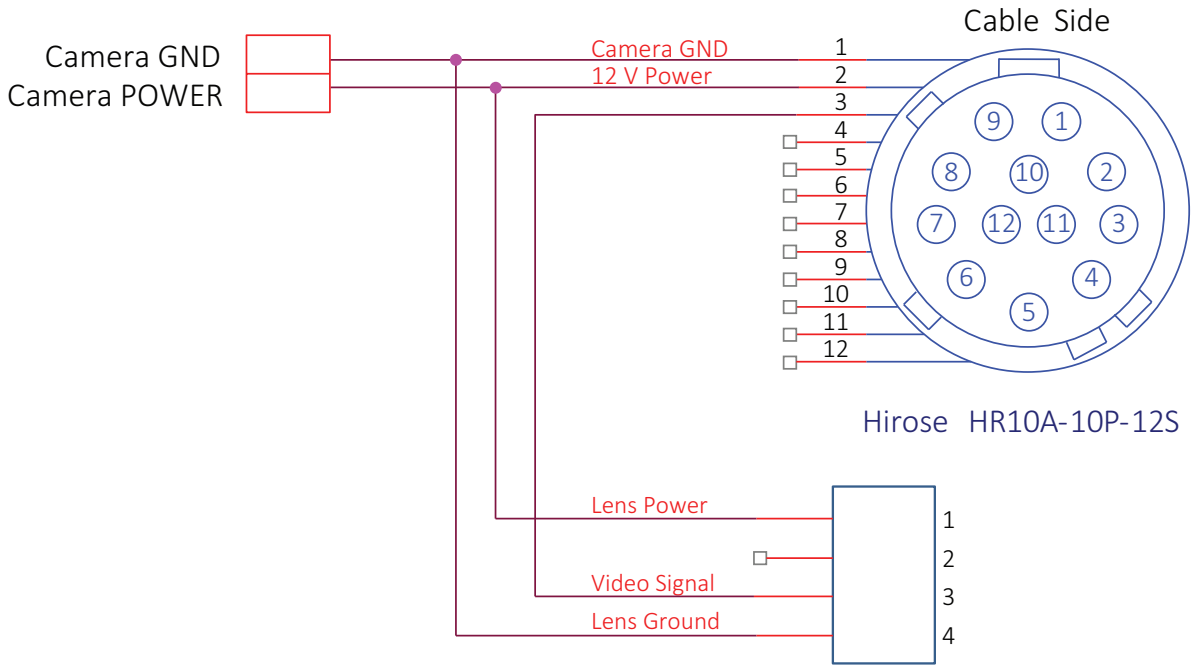



*Figure 115: Auto Iris (video type) schematic*

# Control signals

The I/Os of the camera can be configured by software. The different modes are described in this section.

## Input block diagram

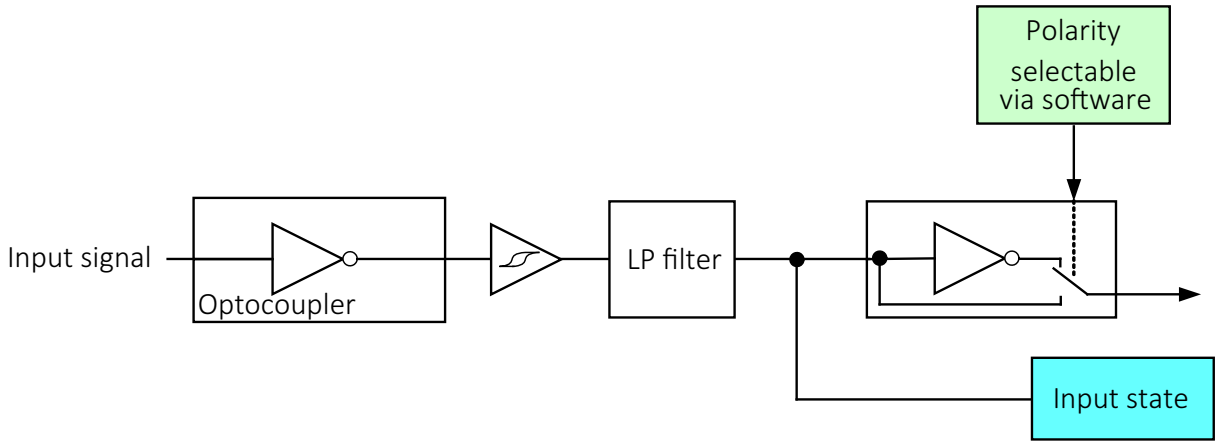



*Figure 116: Input block diagram*

## I/O 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 in the following table.

| Signal | Description |
|---|---|
| GPO | Configured to be a general purpose output, control of which is assigned to `SyncOutGpoLevels`. |
| AcquisitionTriggerReady | Active after the camera has been recognized by the host computer and is ready to start acquisition. |

*Table 90: Output signals (sheet 1 of 2)*

| Signal | Description |
|---|---|
| FrameTriggerReady | Active when the camera is in a state that accepts 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. |
| FrameReadout | Active at during frame readout, that's the transferring of image data from the sensor 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 90: Output signals (sheet 2 of 2)*

### Output block diagram

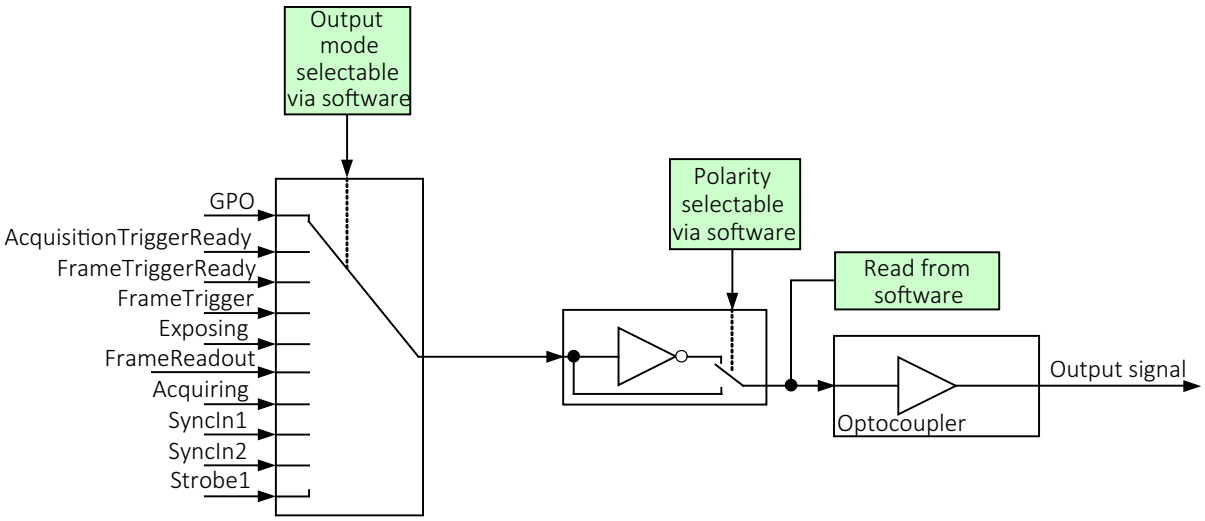



*Figure 117: Output block diagram*

# 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.

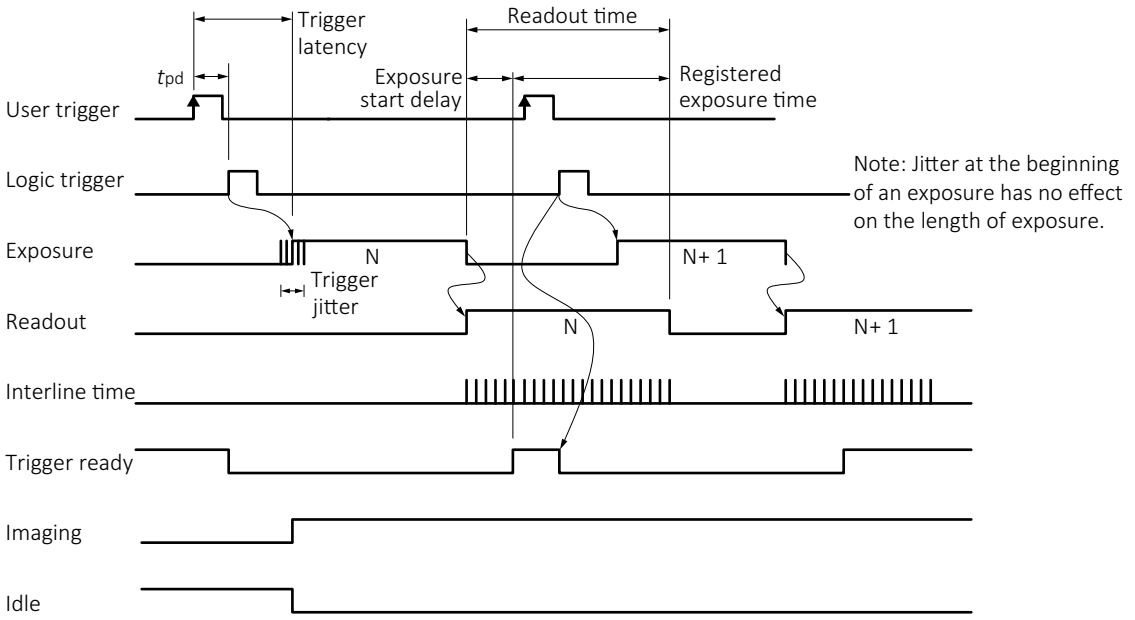



*Figure 118: Internal signal waveform (CCD-sensor models)*

The following diagram explains the general trigger concept for CMOS-sensor models.

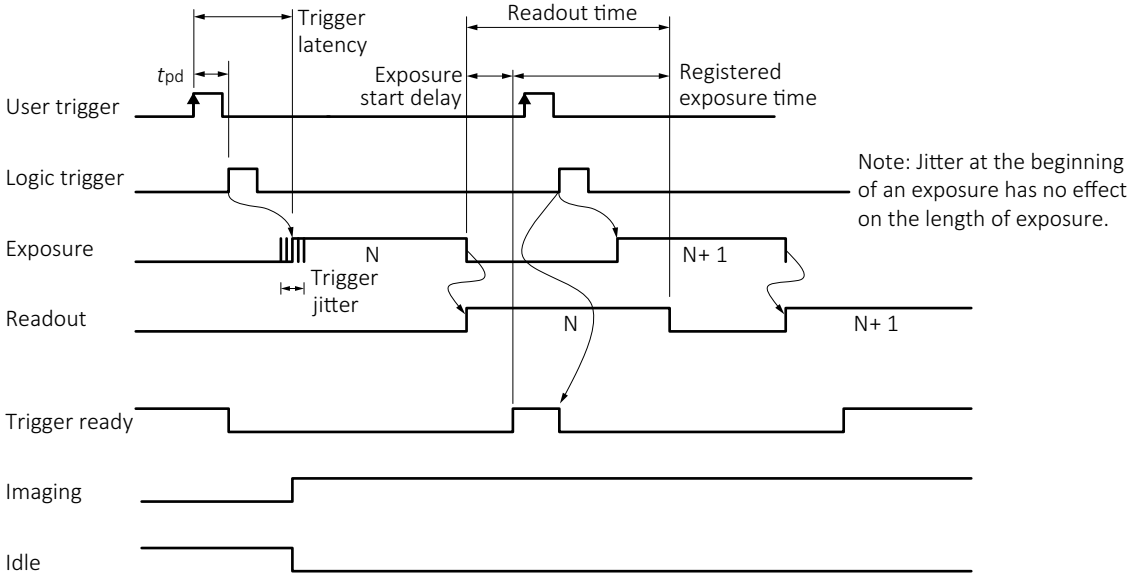



*Figure 119: Internal signal timing waveform (CMOS-sensor models)*

# 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 accepts 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 ends after the current readout. |
| Interline time | Time between sensor row readout cycles. |
| Imaging | High when the camera image sensor is either:<br>• exposing<br>• exposing and reading out data<br>• reading out data |
| Idle | High when the camera image sensor is not exposing and/or reading out data. |

*Table 91: Trigger definitions*

## Trigger rules

- The user trigger pulse width must be at least 6 µs.
- The end of exposure 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 when readout is true.
- Exposure start delay equals the readout time minus the registered exposure Time.

## Triggering during the Idle State

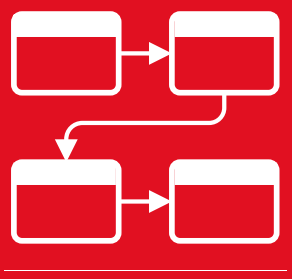
For applications requiring the shortest possible trigger latency and the smallest possible trigger jitter the user trigger signal must be applied when imaging is false and idle is true.

## 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 one 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



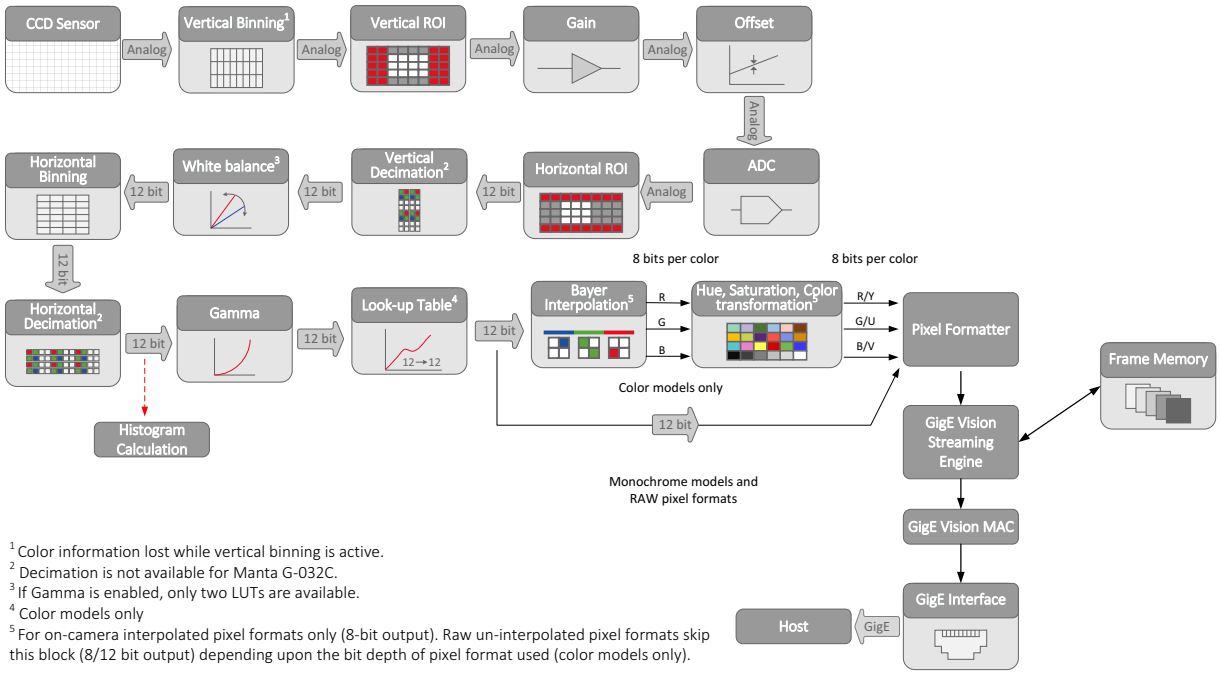
This chapter presents diagrams that illustrate data flow and bit resolution of the image data.

A complete listing of camera features, including definitions can be found on the Allied Vision Technical Documentation webpage.

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

# Manta model series with CCD sensors

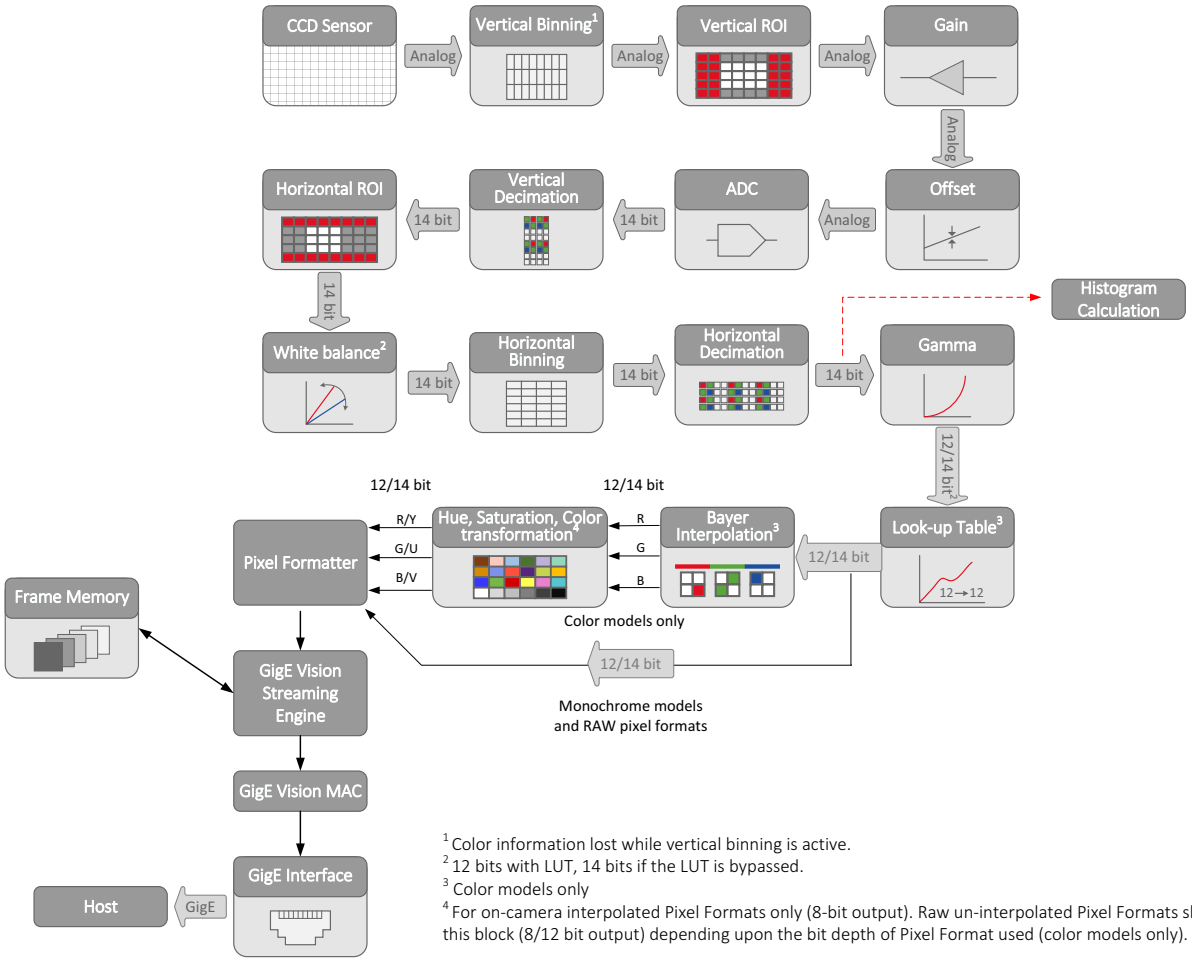
## Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504 series




[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).

*Figure 120: Image data flow for Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, and G-504 series*

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




[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).

*Figure 121: Image data flow for Manta G-282, G-283, G-505, and G-917 series*

# Manta model series with CMOS sensors

## Manta G-223, G-419 series

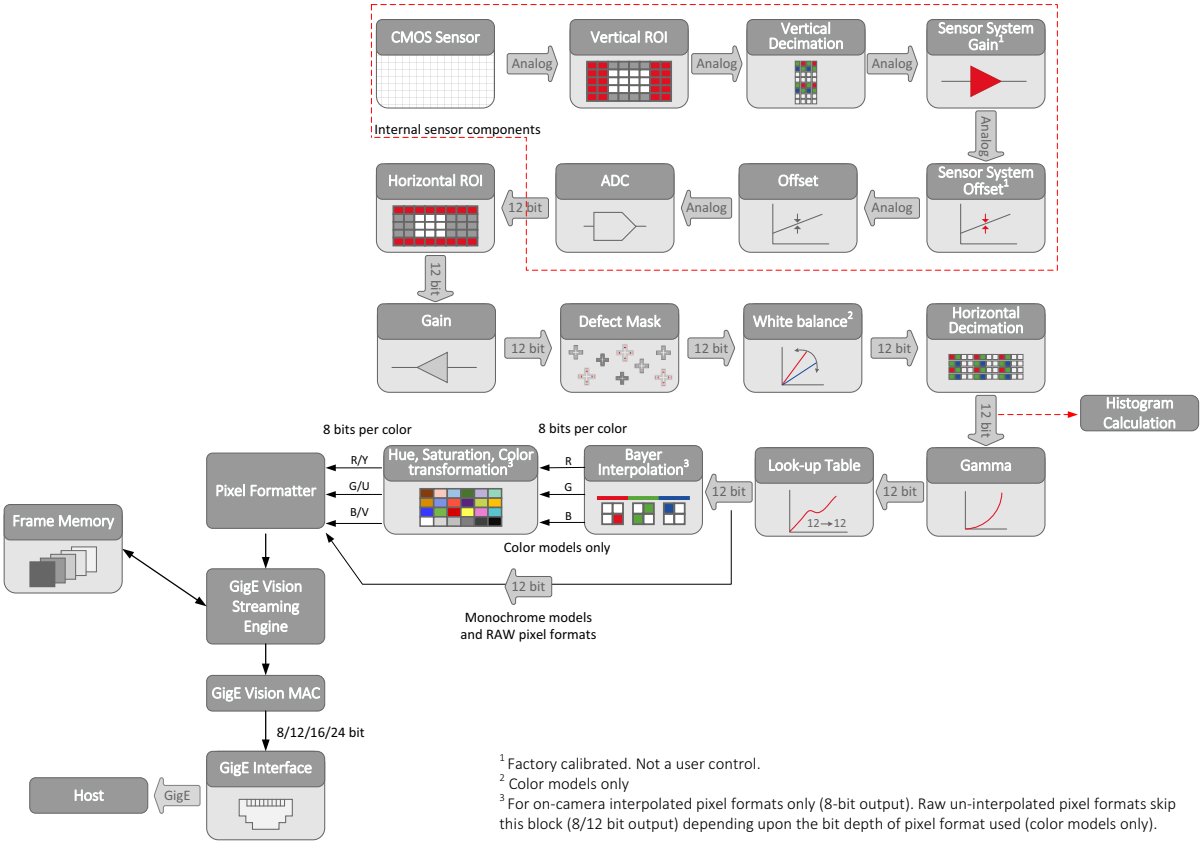



*Figure 122: Image data flow for Manta G-223 and G-419 series*

# Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236 series

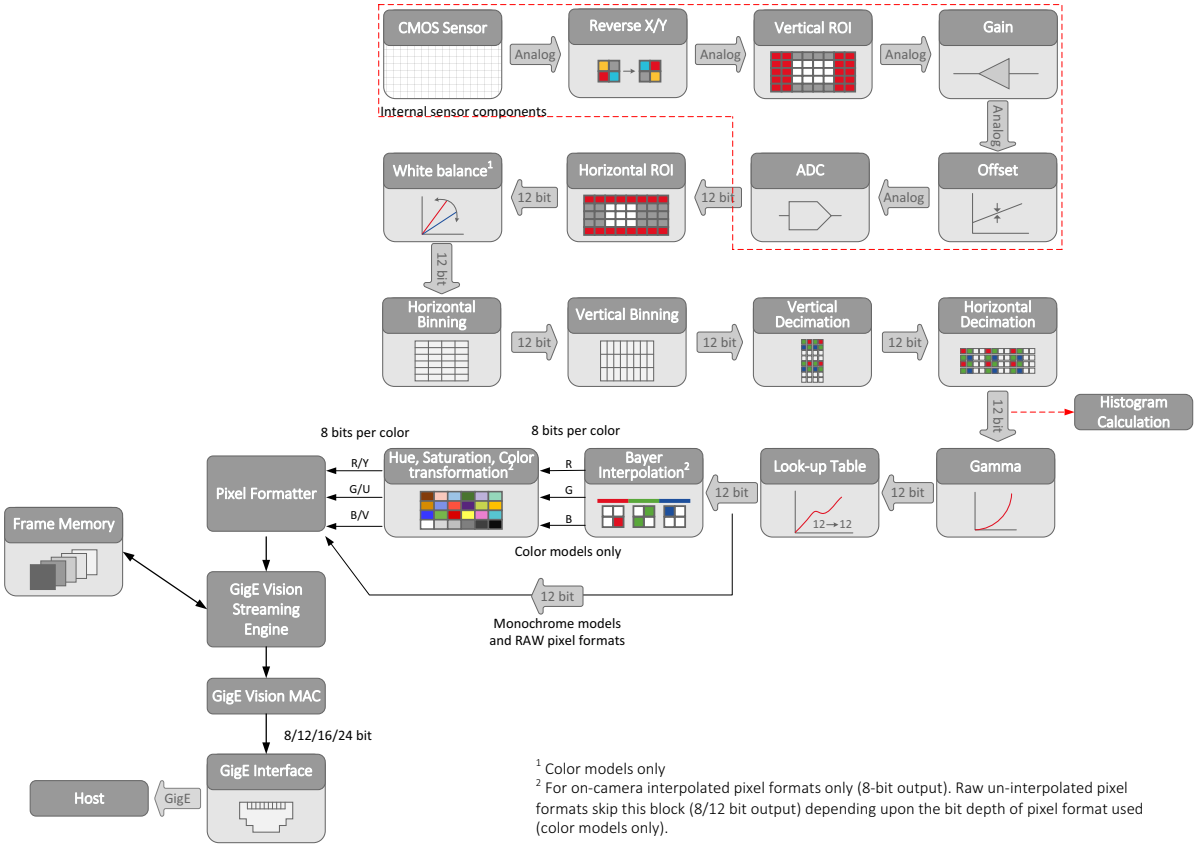



*Figure 123: Image data flow for Manta G-040, G-158, G-235, G-319, G-507, G-895, and G-1236 series*

# 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. A 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.

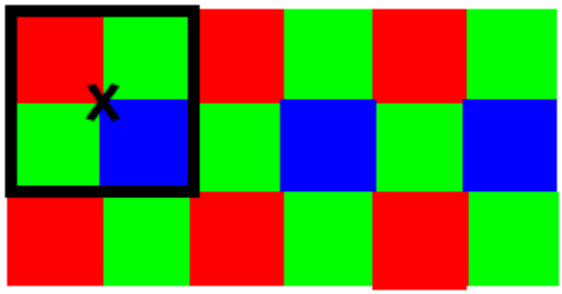


*Figure 124: Bayer demosaicing (Manta type A: example of 2 × 2 matrix)*

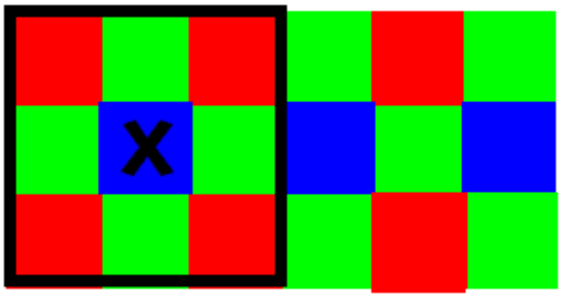


*Figure 125: Bayer demosaicing (Manta type B: example of 3 × 3 matrix)*

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 host computer
  - for Manta the first pixel of the sensor is red



When the host computer does not perform Bayer to RGB post-processing, the monochrome image is 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). Only two lines are needed for this interpolation:

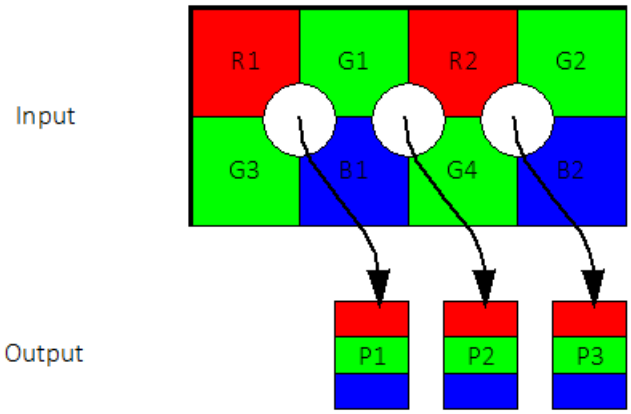



*Figure 126: Bayer demosaicing (interpolation)*

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

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

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

*Figure 127: 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 ROI, **x** and **y** resolutions must be even-numbered.

# Cleaning optical components



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

Read these instructions before you contact Allied Vision or your Allied Vision distribution partner for assistance.

Contact Allied Vision or your Allied Vision distribution partner if you are not familiar with the procedures described in this chapter.

# 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 128: 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, or 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 following figure, 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.

Don’t 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.

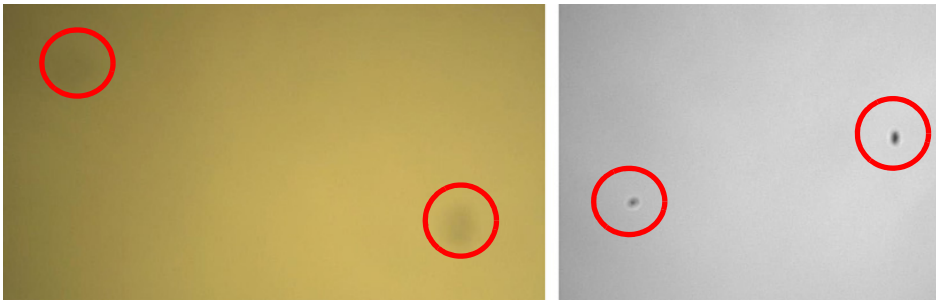


*Figure 129: Image with tiny dust on the filter (left) and dust on the sensor (right)*

# Locating impurities

Before you dismount the lens you must find out whether the impurity is on the filter, lens, or sensor.

1. Start acquiring a uniform image (for example, a white sheet of paper) with the camera.
2. To identify the affected surface, move the suspected optical component and see whether the contamination follows this movement.
   a. When you move only the lens (not the camera) and the impurity moves as well, the impurity is on the lens.
   b. When you move the IR cut filter or protection glass window and the impurity moves as well, the impurity is on the filter or protection glass. Carefully remove the filter or protection glass and clean it on both sides using the techniques explained in the next section.



3. When the impurity is neither on the lens nor the IR cut filter or protection glass, it's probably on the sensor.



**NOTICE**

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's chemically pure and free from silicones and other additives.
- Optic approved low residue cleaning liquid.



**NOTICE**

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 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



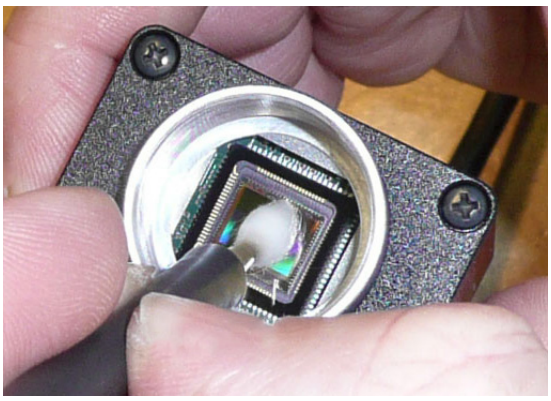
Workplace conditions:

- Perform all cleaning operations (lenses, filter or 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 must 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 whether any dirt or dust remains.
6. When dust spots remain, repeat this procedure using new clean lens cloth or tissue (as described earlier).

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.

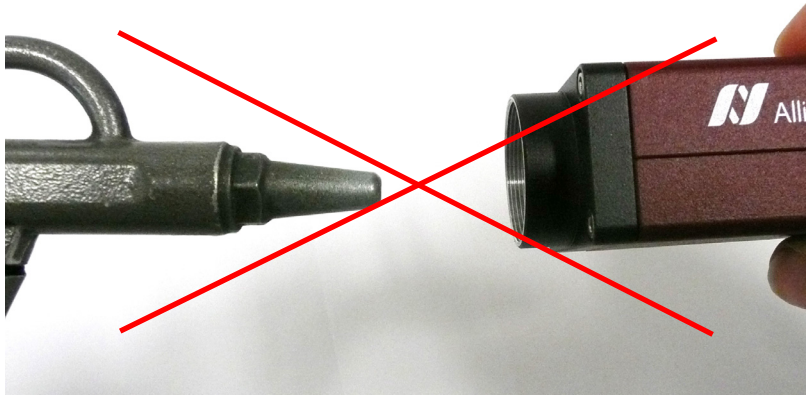


*Figure 130: Don’t use compressed air*

**NOTICE**

Possible material damage

- Compressed air at high pressure and/or shorter operating distances may push dust into the camera or 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 or 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 must be less than 1 bar (15 psi).
- Operating distance from the camera must be 5 to 30 cm.

# Firmware update



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

**Saved camera UserSets**

When new firmware contains a new feature or control, saved camera UserSets or ConfigFiles are invalidated and erased!

Before loading new firmware, backup your current camera settings.

- **Vimba Viewe**r: select the **Save Camera Settings** icon from the **Cameras** window to export the camera settings file (XML file) to the host computer.
- **GigE SampleViewer**: select the **Disk** icon from the **Cameras** window to export camera settings file (XML file) to the host computer.

**NOTICE**

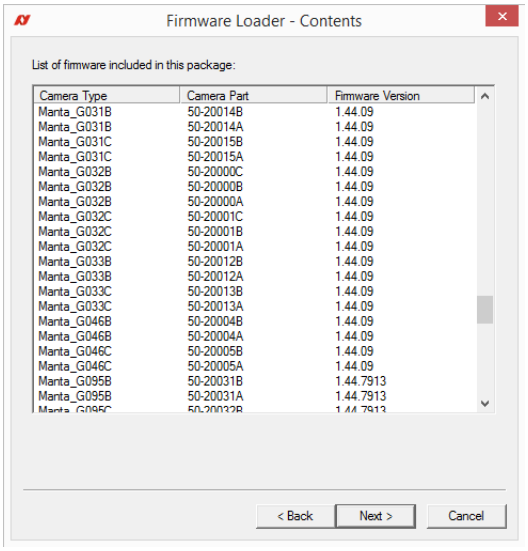
Don’t unplug the GigE cable or camera power supply during the update procedure.

## Updating the firmware on your Manta camera

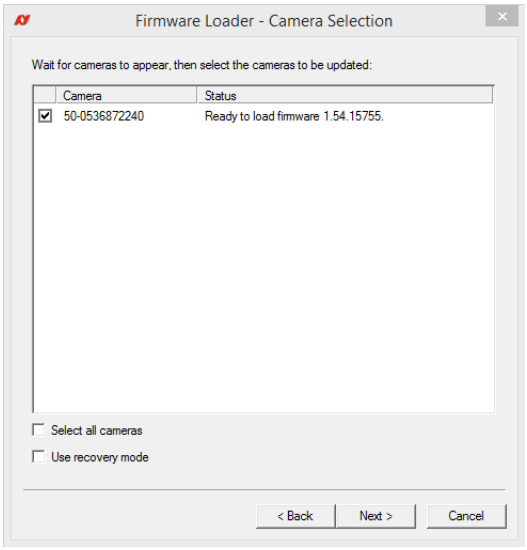
1. Launch the **Firmware Loader**.



2. Click **Next**. The **Firmware Loader** displays a list of firmware included in the package



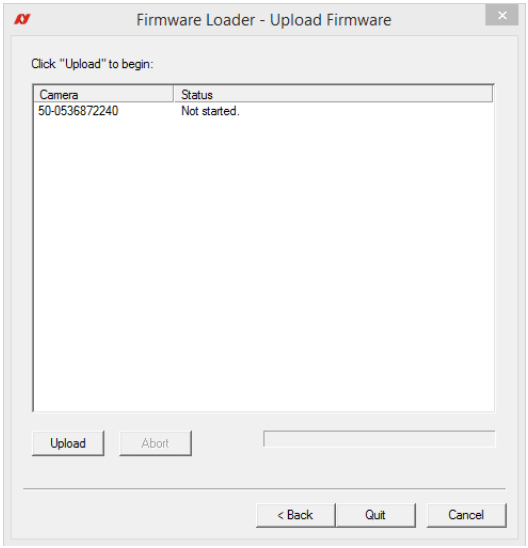

3. Click **Next**. You can select your camera model on this page.



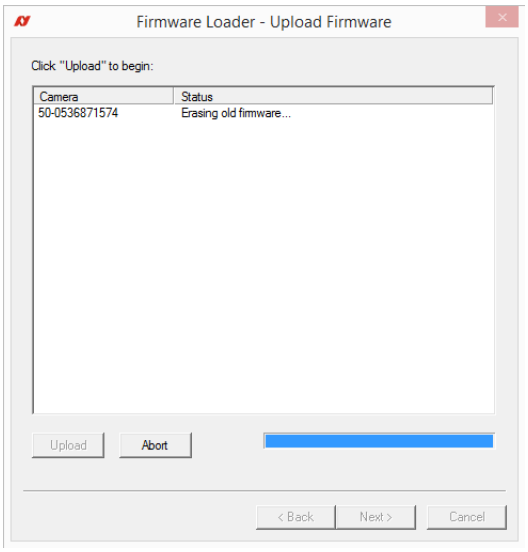



Select the **Use recovery mode** check box when the connected GigE camera is not found by the firmware loader, or when the GigE camera is listed as unavailable. When selected, power cycle the camera to enter the **Boot Loader** mode.

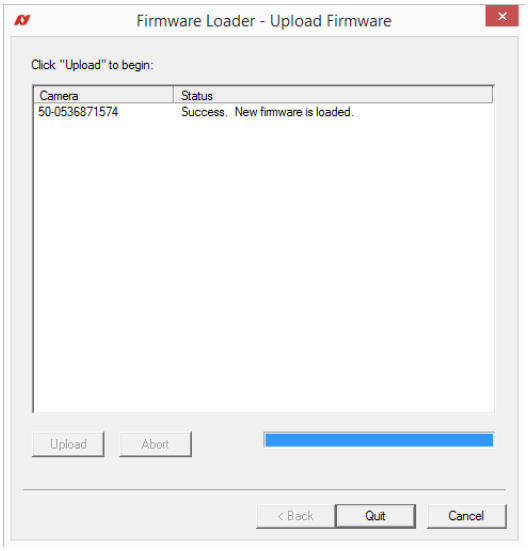
4. Click **Next**.




5. Click **Upload** to start the update. The existing firmware is erased and the new firmware is uploaded to the camera.



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






You must 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 ports

# Mechanical dimensions

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

## Standard housing with C-Mount (default)

Variant: Non-PoE models

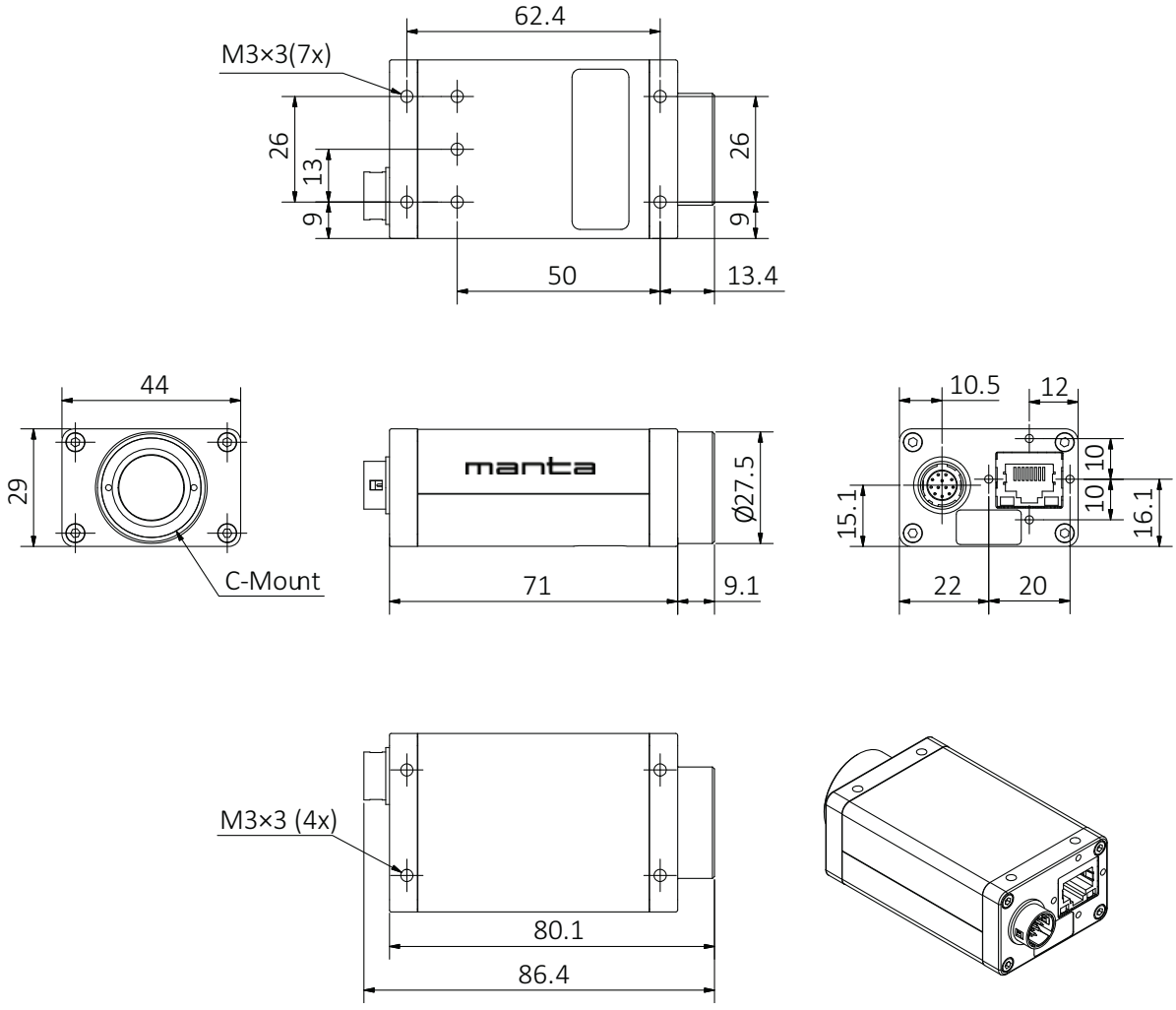



*Figure 131: Standard housing with C-Mount dimensions*

# W90 housing with C-Mount

This version has the sensor tilted 90 degrees clockwise, so that it views upwards.
Variant: Non-PoE models

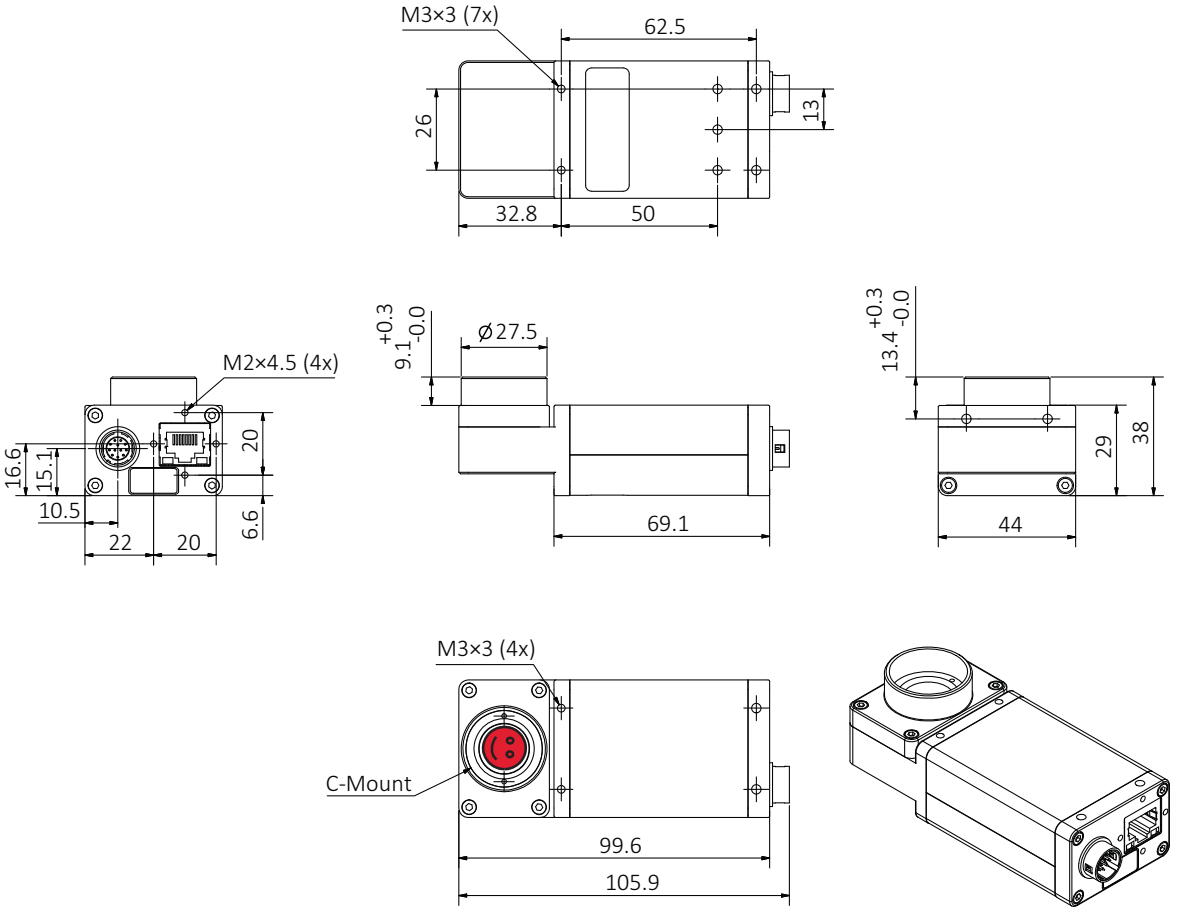



*Figure 132: W90 housing with C-Mount dimensions*

# W90 S90 housing with C-Mount

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 models

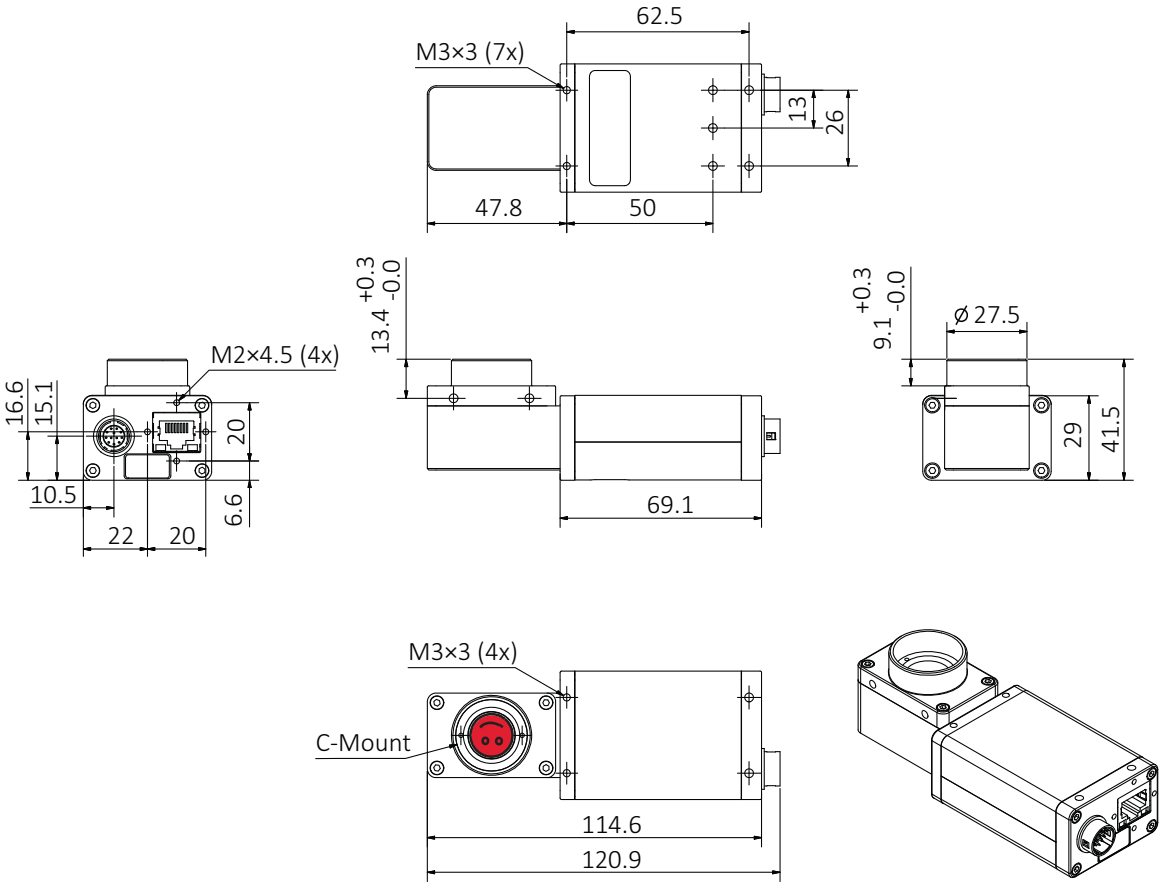



*Figure 133: W90 S90 housing with C-Mount dimensions*

# W270 housing with C-Mount

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

Variant: Non-PoE models

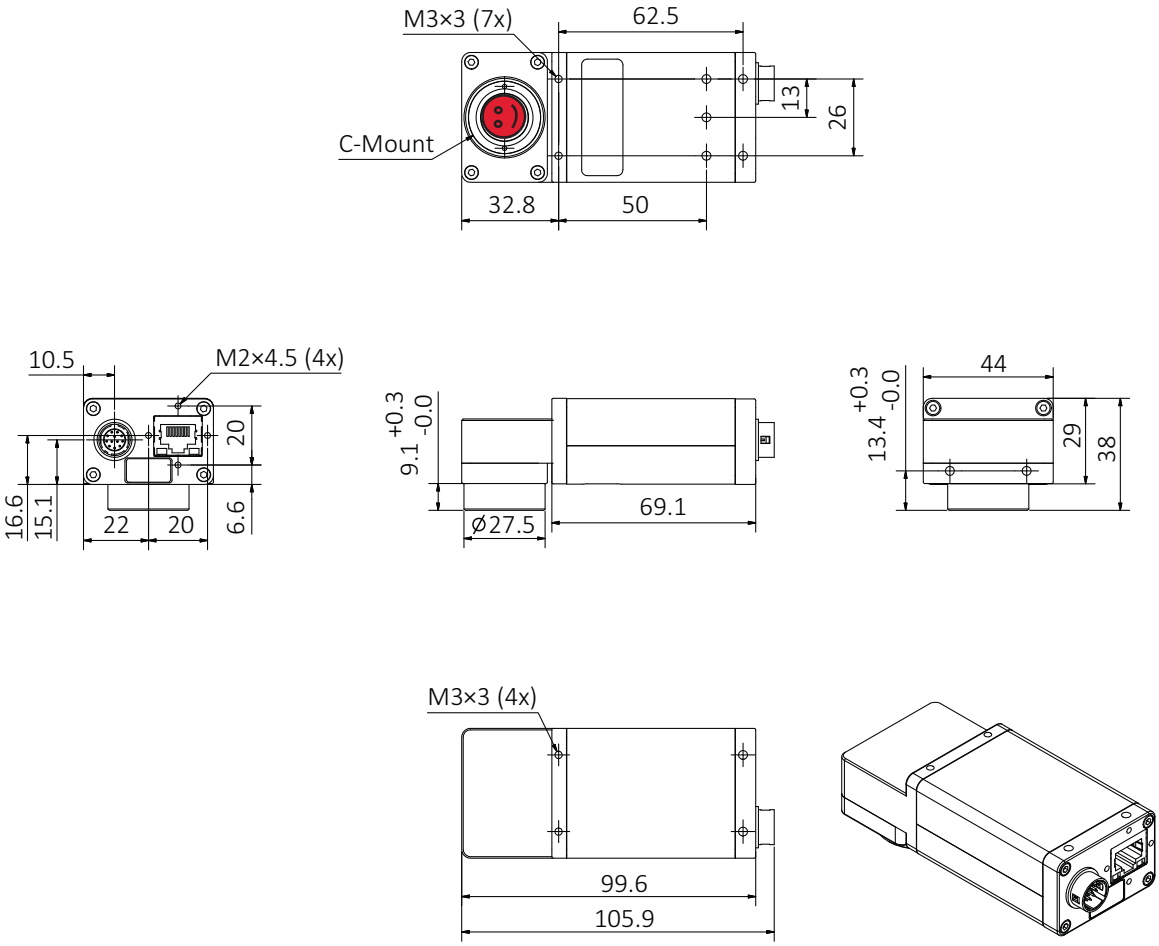



*Figure 134: W270 housing with C-Mount dimensions*

# W270 S90 housing with C-Mount

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 models

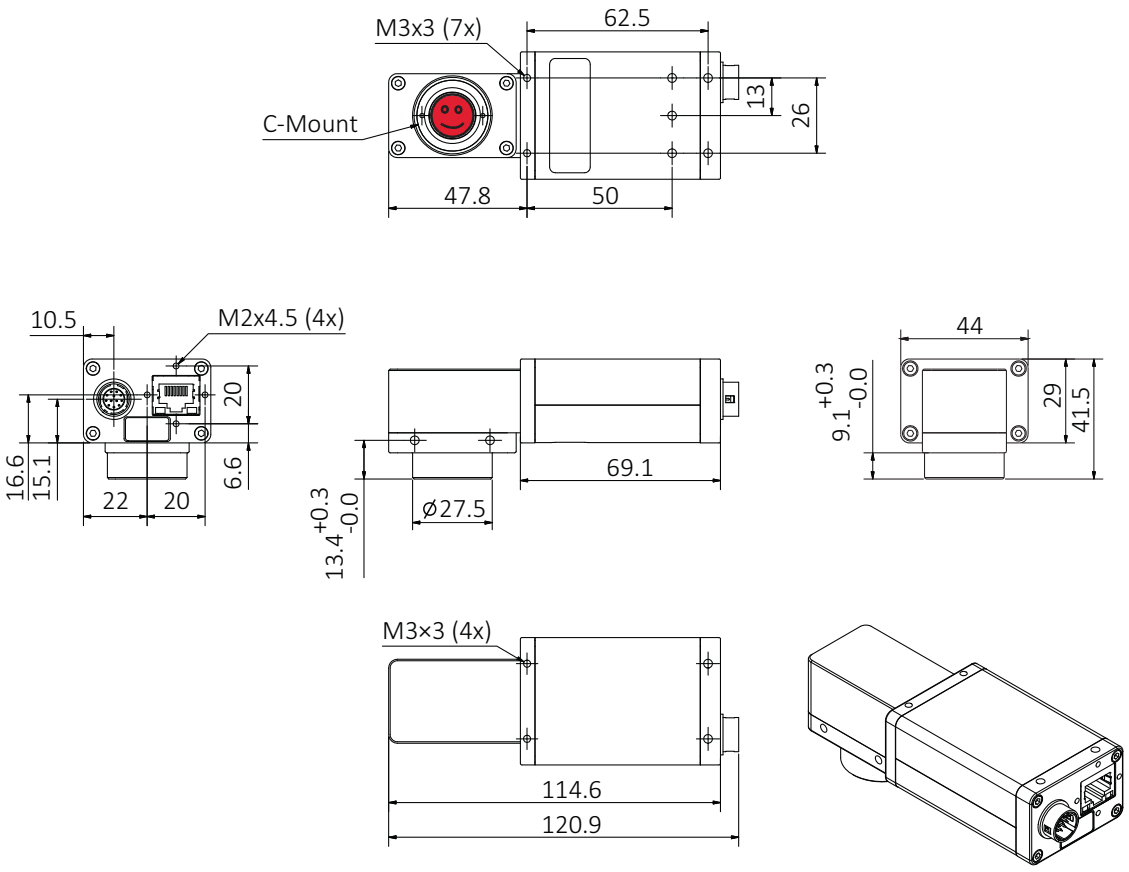



*Figure 135: W270 S90 housing with C-Mount dimensions*

# Board level with C-Mount

Variant: Non-PoE models

**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

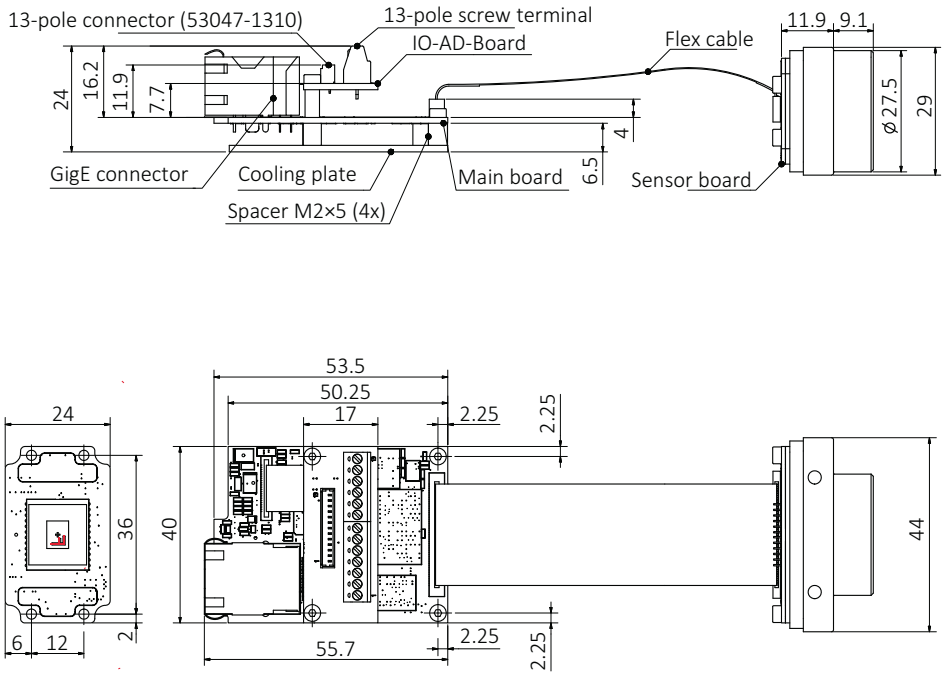



*Figure 136: Board level with C-Mount (Non-PoE models) dimensions*

**Dimensional mount adjustment**

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

# Back panel

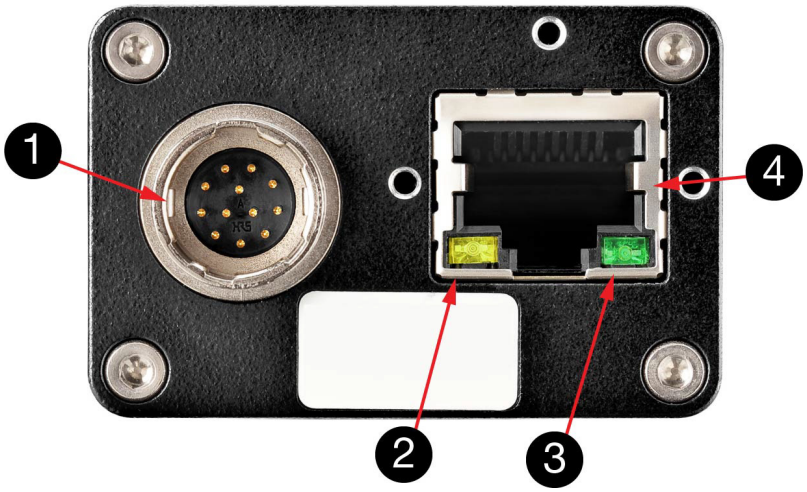



*Figure 137: Rear view of non-PoE Manta cameras up to serial number 503323258*

| | |
|---|---|
| **1** | Hirose I/O port |
| **2** | LED 1 |
| **3** | LED 2 |
| **4** | Gigabit Ethernet port |

## Status LEDs

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

| LED 1 color | Status |
|---|---|
| Solid orange | Ethernet link with 1 Gbps established |
| Flashing orange | Ethernet activity with 1 Gbps |

*Table 92: Status LED 1 of non-PoE Manta cameras up to serial number 503323258*

| LED 2 color | Status |
|---|---|
| Solid green | Ethernet link with 100 Mbps established |
| Flashing green | Ethernet activity with 100 Mbps |

*Table 93: 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-145-30fps and G-201-30fps series 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) (≥ firmware version 01.44.00) |
| 4 | In 1 | In | $U_{in}$(high) = 2.5 to 6.0 V<br>$U_{in}$(low) = 0 to 0.8 V<br>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<br>$U_{in}$(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 94: Camera I/O connector pin assignment for non-PoE Manta cameras up to serial number 503323258*

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