



Technical Manual

AVT GigE Vision Cameras

V7.0.1

30 September 2013

Legal notice

For customers in the U.S.A.

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

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

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

For customers in Canada

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

Pour utilisateurs au Canada

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

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Introduction

Manta Technical Manual describes in depth the technical specifications, dimensions, all pixel formats, bandwidth and frame rate related subjects.

For information on hardware installation, safety warnings, pin assignments on I/O connectors and GigE port connectors, read the **AVT GigE Installation Manual**.

For information on camera features, read the **AVT GigE Camera and Driver Features** document.

Note



Please read through this manual carefully.

We assume that you have read already the **AVT GigE Installation Manual** and that you have installed the hardware and software on your PC or laptop (Gigabit Ethernet network card, cables).

<http://www.alliedvisiontec.com/emea/support/downloads/product-literature/manta.html>

Document history

Version	Date	Remarks
V2.0.3	15.04.10	New Manual - RELEASE status
V3.0.0	09.06.10	Added Manta G-046, G-145, G-201, G-146: - chapter Manta G-046B/C on page 30 - chapter Manta G-145B/C (-30fps) on page 36 - chapter Manta G-146B/C on page 40 - chapter Manta G-201B/C (-30fps) on page 42 - chapter Spectral sensitivity on page 57 Table 42 : Image memory size (typical; see note above) on page 130 - chapter Manta G-046B/C: ROI frame rates on page 136 - chapter Manta G-145B/C: ROI frame rates on page 139 - chapter Manta G-146B/C: ROI frame rates on page 143 - chapter Manta G-201B/C: ROI frame rates on page 144
to be continued on next page		

Table 1: Document history

Version	Date	Remarks
continued from last page		
V3.0.0 [continued]	09.06.10 [continued]	[continued] - With the new firmware 1.40 due to a bug all Manta models have only 12 bit in the data path (even if the ADC delivers 14 bit): See Figure 76: Block diagram monochrome camera (type A, Manta G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504) on page 118 and Figure 77: Block diagram color camera (type A, Manta G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504) on page 118. - Due to a repaired bug in FPGA and microcontroller, the StreamHoldCapacity changed: Manta G-032 from 49 frames to 99 frames, Manta G-125 from 12 frames to 25 frames: see chapter Manta G-032B/C on page 26 and chapter Manta G-125B/C on page 34 - RGBA24 and BGRA24 are not supported, see chapter Specifications on page 24. - Manta board level cameras have now a cooling plate: see - chapter Manta board level (PoE): dimensions on page 89 - chapter Manta board level (PoE): C-Mount on page 91 - chapter Manta board level (PoE): CS-Mount on page 93 - chapter Manta board level (PoE): M12-Mount on page 95 - Added chapter Firmware update on page 87
V4.0.0	25.10.10	- Added the information, that description of status LEDs can be found in Manta Hardware Installation Guide, see Note on page 104 - Changed file format from FM7 to FM9 Added Manta G-033B/C (sensor: Sony ICX 414) and Manta G-504B/C (sensor: Sony ICX 655): Manta G-033B/C on page 28 Manta G-504B/C on page 52 Spectral sensitivity on page 57. Camera lenses on page 75 Table 42 : Image memory size (typical; see note above) on page 130 - chapter Resolution and ROI frame rates on page 133 - Manta angled head models: chapter Manta W90 on page 82
to be continued on next page		

Table 1: Document history

Version	Date	Remarks
continued from last page		
V4.0.1	05.01.11	- Changed tripod drawing: added dimensions of three big holes (M6 and UNC 1/4-20) in Figure 42: Tripod dimensions on page 80. - In specifications tables color pixel formats: inserted Mono8. Added Note, that Raw8, Raw16 displayed in some viewers means the same as Bayer8, Bayer16: see chapter Specifications on page 24. - Changed GigE Vision V1.0 to V1.2 in all specification tables in chapter Specifications on page 24.
V4.1.0	24.06.11	Added PoE: - Added power requirements, power consumption and regulations for Manta PoE models: see chapter Specifications on page 24. - Added note about PoE capable cameras in chapter Specifications on page 24 and chapter Gigabit Ethernet port on page 105 - PoE cameras < 220 g (without lens): see chapter Specifications on page 24. Corrected frame rate formulas for Manta G-033/G504: - See chapter Manta G-033B/C: ROI frame rates on page 135 and chapter Manta G-504B/C: ROI frame rates on page 150 C-/CS-Mount no more adjustable, for modifications contact Customer Care and send camera to AVT: - See C-/CS-Mount descriptions in specification tables in chapter Specifications on page 24. - See chapter Adjustment of the C-Mount on page 102 - See chapter Adjustment of the CS-Mount on page 87 Manta board level: - Manta board level: deleted (PWR output on demand) at Pin2: in Figure 51: Manta board level (PoE) dimensions on page 89 Added new address: - Added Singapore address in chapter Contacting Allied Vision Technologies on page 6 Removed Chapter Firmware update (see Knowledge Base at AVT Website: search for Application Note GigE Firmware Update)
to be continued on next page		

Table 1: Document history

Version	Date	Remarks
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[continued] V4.1.0	[continued] 24.06.11	Manta firmware upgrade: - Revised data path block diagram in chapter Block diagrams of the cameras on page 118 - Added 30fps variant for Manta G-145-30fps and Manta G-201-30fps: - see chapter Manta G-145B/C (-30fps) on page 36 and Formula 9: Manta G-145-30fps: theoretical maximum frame rate of CCD on page 140 and chapter Frame memory on page 129 - chapter Manta G-201B/C (-30fps) on page 42 and chapter Frame memory on page 129 - Added Mono12Packed for monochrome cameras and Bayer12Packed for color cameras: see chapter Specifications on page 24. - Added the following camera controls in chapter Camera features on page 120.: - Chunk Data - EventControls - StreamFramerateConstrain - FrameStartTriggerOverlap - PayloadSize - NonImagePayloadSize - SyncInGlitchFilter - AutoIris - Gamma - LUT Manta G-145-30fps and Manta G-201-30fps (non PoE) ... have same I/O pin assignment (input circuits and voltage range), power LED and upside down PoE plug as PoE models: see Exception on page 70 Manta G-145-30fps / 201-30fps non-PoE behave like PoE cameras. on page 71
to be continued on next page		

Table 1: Document history

Version	Date	Remarks
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V5.0.0	15.05.12	Error found in Document history V3.0.0 by Validation Team: • RGBA24 and BGRA24 should be named RGBA32 and BGRA32 on page 8 • Added RGBA32 and BGRA32 color formats (except Manta G-201-30fps) in chapter Specifications on page 24. • Added frame rate diagrams in chapter Resolution and ROI frame rates on page 133. New: Manta G-145 NIR: • NirMode in chapter Camera features on page 120: inserted NirMode (only type A NIR) on page 112 • New: For the three NirModes: chapter Manta G-145B NIR: ROI frame rates on page 141 – chapter Manta G-145B NIR on page 38 – Figure 21 : Spectral sensitivity of Manta G-145B NIR (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B on page 65 – Figure 22 : Increase of relative response for Manta G-145B NIR with NIR mode set to On_HighQuality on page 65 – chapter : Image memory size (typical; see note above) on page 130 – chapter Manta G-145B NIR: ROI frame rates on page 141 – Chapter Manta cameras: frame rate comparison on page 129
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Table 1: Document history

Version	Date	Remarks
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V5.0.0 [continued]	15.05.12 [continued]	New sensors ICX618 and ICX692: Manta G-031 (ICX618): - chapter Manta G-031B/C on page 24 Figure 7: Spectral sensitivity of Manta G-031B on page 58 Figure 8: Spectral sensitivity of Manta G-031C (without IR cut filter) on page 58 - New: Table 20: Focal length vs. field of view (Manta G-031) on page 76 - chapter : Image memory size (typical; see note above) on page 130 - chapter Manta G-031B/C: ROI frame rates on page 133 - Chapter Manta cameras: frame rate comparison on page 129 Manta G-095C (ICX692): - chapter Manta G-095B/C on page 32 - Added focal length 4.0 mm in Table 22: Focal length vs. field of view (Manta G-095/125) on page 76 Figure 16: Spectral sensitivity of Manta G-095C (without IR cut filter) on page 62 - chapter : Image memory size (typical; see note above) on page 130 - chapter Manta G-095B/C: ROI frame rates on page 137 - Chapter Manta cameras: frame rate comparison on page 129 - Added Manta G-031 and Manta G-095 in Chapter Manta cameras: frame rate comparison on page 129
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Table 1: Document history

Version	Date	Remarks
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V5.0.0 [continued]	15.05.12 [continued]	Same main board for all Manta models: From serial number 503323258 on all Manta models incl. PoE and board level versions contain the same main board. - chapter Gigabit Ethernet port on page 105 - chapter Camera I/O connector pin assignment (incl. PoE) on page 106 Revised non-PoE drawings and new board level PoE drawings: - chapter Manta board level (non-PoE): dimensions on page 88 - chapter Manta board level (PoE): dimensions on page 89 - chapter Manta board level (non-PoE): C-Mount on page 90 - chapter Manta board level (PoE): C-Mount on page 91 - chapter Manta board level (non-PoE): CS-Mount on page 92 - chapter Manta board level (PoE): CS-Mount on page 93 - chapter Manta board level (non-PoE): M12-Mount on page 94 - chapter Manta board level (PoE): M12-Mount on page 95 Revised PoE descriptions regarding 802.3af and 802.3at: - See note in Gigabit Ethernet port on page 105 (Manta PoE models can source power from 802.3af (100 MBit/s and 1000 MBit/s) and from 802.3at compliant PSE devices (Power Sourcing Equipment): such as switches injectors or NICs.) New CAD drawings with Pin3 = Video Type Auto Iris Out - chapter Manta board level (non-PoE): dimensions on page 88 - chapter Manta board level (PoE): dimensions on page 89 Frame memory - Manta G-032B/C: changed from 49 to 99 frames. - Manta G-033B/C: changed from 88 to 99 frames. - Manta G-046B/C: changed from 35 to 70 frames. - Manta G-125B/C: changed from 12 to 25 frames. - Manta G-145B/C: changed from 10 to 22 frames. - Manta G-145B/C-30fps: changed from 10 to 22 frames. - Manta G-146B/C: changed from 10 to 22 frames. - Manta G-201B/C: changed from 8 to 16 frames. - Manta G-201B/C-30fps: changed from 8 to 16 frames.
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Table 1: Document history

Version	Date	Remarks
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V5.0.0 [continued]	15.05.12 [continued]	Added frame rates for ROI height = 720 - chapter Manta G-095B/C: ROI frame rates on page 137 - chapter Manta G-125B/C: ROI frame rates on page 138 IR cut filter: - Changed IR cut filter to (<i>type Jenofilt 217</i>): see Figure 41: Approximate spectral transmission of IR cut filter (may vary slightly by filter lot) (type Hoya C5000) on page 75
V5.0.1	23.05.12	For Manta G-095C: Corrected frame rate value (at ROI height 720): 40.77 fps, see chapter Manta G-095B/C: ROI frame rates on page 137.
V6.0.1	2013-Mar-20	Major changes: Added new Manta models: Manta G-223 / 282 / 283 / 609 / 917. These models are called Manta type B, since there are some differences to the other models that are called Manta type A (specifications, housing, data path, features). New tripod adapter, new CAD drawings with LEDs on top of the connector, see Camera dimensions (type A) on page 80 and Camera dimensions (type B) on page 96. In chapter Specifications on page 24, the pixel formats are listed both for PvAPI and VIMBA (GenICam V1.0). Added chapter Video iris output description on page 112. I/O pin assignment: 10 mA on outputs 1 and 2 (not 20 mA), see Camera I/O connector pin assignment (incl. PoE) on page 106 Minor changes: Manta G-031: External trigger delay, see chapter Specification Manta G-031B/C on page 24. Corrected the mass (200 g) of Manta type A cameras (G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504). PoE models: compliant with Power over Ethernet IEEE 802.3at/af Deleted the Chapter <i>Manual Overview</i> Deleted <i>Frame Rate Comparison of all Manta cameras</i> New date format: year-month-day
to be continued on next page		

Table 1: Document history

Version	Date	Remarks
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V7.0.0	2013-Aug-30	Added new Manta models: Manta G- 095B, G-419B/C As of this version, the document refers to AVT's VIMBA SDK (not PvAPI) Changed cable recommendation to Category 6 or higher, see chapter Gigabit Ethernet port on page 105 Manta G-145B/C-30 fps: changed framerate Chapter chapter Camera interfaces on page 104: added input/output block diagrams and the status LED description Changed minimum exposure times of Manta G-223 /G-419, see chapter Specification Manta G-223B/C (NIR) on page 44 and chapter Specification Manta G-419B/C (NIR) on page 50 Changed ROI frame rates of Manta G-145 (-30 fps), see chapter Frame rates Manta G-145 as function of ROI height[width=1388] on page 139 and following
V7.0.1	2013-Sep-30	Added Camera cleaning instructions on page 18 Changed maximum frame rates and gain range, added burst mode for Manta G-223, G-419, see Specification Manta G-223B/C (NIR) on page 44, Specification Manta G-419B/C (NIR) on page 50 and chapter Resolution and ROI frame rates on page 133 Added a feature of Manta type B cameras (G-223 / 282 / 283 / 419 / 609 / 917): temperature monitoring, see chapter Specifications on page 24 Added ReverseX feature in chapter Camera features on page 120 Added Manta angled-head housings (type B) on page 98 Updated Maximum gain values for Manta G-283B/C and Manta G-917B/C Updated minimum exposure time for Manta G-145B/C (-30fps) Updated the frame rate vs. height graphs in chapter Resolution and ROI frame rates on page 133 Updated links to the AVT GigE installation manual through out the manual

Table 1: Document history

Conventions used in this manual

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

Styles

Style	Function	Example
Bold	Programs, inputs or highlighting important things	bold
Courier	Code listings etc.	Input
Upper case	Register	REGISTER
Italics	Modes, fields	<i>Mode</i>
Parentheses and/or blue	Links	(Link)

Table 2: Styles

Symbols

Note This symbol highlights important information.



Caution This symbol highlights important instructions. You have to follow these instructions to avoid malfunctions.



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



Example:

<http://www.alliedvisiontec.com>

More information

For more information on hardware and software read the following:

- **AVT GigE Installation Manual** describes the hardware installation procedures for AVT GigE cameras. Additionally, it includes safety instructions and information about camera interfaces (GigE port, PoE, I/O connectors, input and output).
- **AVT GigE Camera and Driver Features** describes the camera features of the AVT GigE SDK (Vimba) and feature related items.

www



For **downloading the AVT GigE Installation Manual** and **AVT GigE Camera and Driver Features** go to:

<http://www.alliedvisiontec.com/emea/support/downloads/product-literature/manta.html>

www



All **software packages** (including **documentation** and **release notes**) provided by AVT can be downloaded from:

<http://www.alliedvisiontec.com/emea/products/software.html>

Before operation

Target group This **Technical Manual** is the guide to detailed technical information of the camera and **is written for experts**.

Getting started For a quick guide how to get started read the **AVT GigE Installation Manual** first.

Note



Please read through this manual carefully before operating the camera.

Caution



Before operating any AVT camera, read the **safety instructions** and **ESD warnings** in the **AVT GigE Installation Manual**.

Camera cleaning instructions

This chapter describes safety instructions/cautions valid for **Manta** cameras in case of cleaning lenses, optical filters/protection glass or sensors.

Note



- Please read these instructions before you contact your AVT camera dealer for assistance.
- Ask your AVT camera dealer if you are not familiar with the procedures described below.

Warranty

Caution



Warranty precautions

- To ensure your warranty remains in effect:
 - Do not open the camera housing.
 - Follow instructions described below.
 - Use only optical quality tissue/cloth if you must clean a lens or filter.
 - Use only optics cleaner (60% ethyl alcohol, 40% ether). Never use aggressive cleaners like benzene or spirit. Such cleaners may destroy the surface.
 - **Do not use compressed air which can push dust into camera and lens.**
- AVT does not warranty against any physical damage to the sensor/filter/protection glass or lenses. **Use utmost care when cleaning optical components.**

Avoiding the necessity of camera cleaning

When screwing/unscrewing the camera lens or dust cap, hold the camera with the C-Mount / CS-Mount opening towards the floor as shown in figure 1. This minimizes the possibility of any contaminants falling on the glass surface. Always store cameras and lenses with dust-caps installed.



Figure 1: Illustration of camera orientation when removing lens or dust cap

Is it an impurity? – Identifying impurities

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

As shown in figure 2, impurities (dust, particles or fluids) on the sensor or optical components appear as a dark area, patch or spot on the image and remain fixed in the preview window while you rotate the camera over the target.

Do not confuse this with a pixel defect which appears as a distinct point. Particles can either rest loosely or can be more or less stuck to the optical surface.

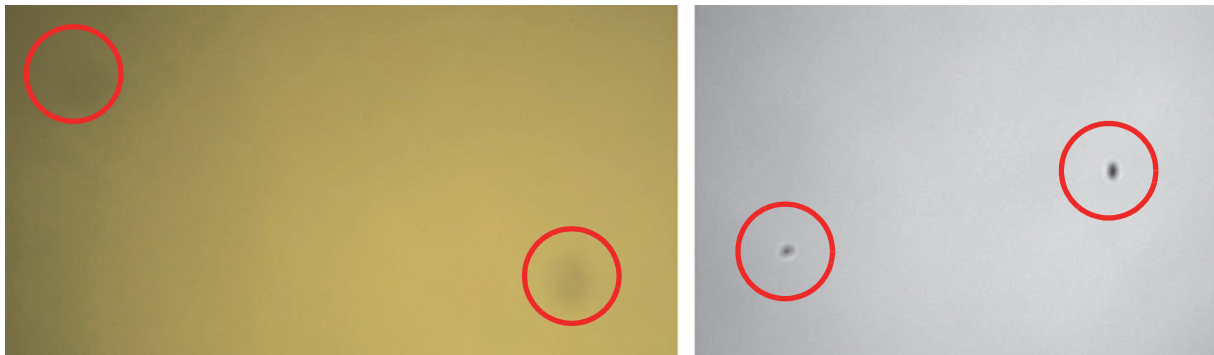


Figure 2: Image with tiny dust on the filter (left) and dust on the sensor (right)

Where is the impurity? – Locating impurities

Before you dismount the lens you should find out if the impurity is on the filter, lens or sensor. Therefore, you should capture a uniform image (e.g. a white sheet of paper) with the camera. The affected optical surface is identified when a suspected optical component is moved and the dirt follows this movement.

1. If you move only the lens (not the camera) and the impurity moves as well, the impurity is on the lens.
2. If you move the IR cut filter/protection glass window and the impurity moves as well:

Please carefully remove the filter/protection glass and clean it on both sides using the techniques explained below.

Note



- Taking out the filter requires special care.
- Ask your dealer to help you if you are not confident with the procedure.



Figure 3: Removing IR cut filter/protection glass using special tool (E9020001)

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

Cleaning Instructions

Perform all cleaning operations (lenses, filter/protection glass, and sensor) in a **dust-free clean-room**. The optical components are very fragile so it is important to avoid touching them with your fingers or any hard material.

1. Unplug the camera from any power supply before cleaning.
2. Apply a small amount of optics cleaner (60% ethyl alcohol, 40% ether) to a clean, new lens cleaning tissue.

Acceptable material includes medical-grade sterile optical cotton, or lens tissue that is chemically pure and free from silicones and other additives.

- **Do not** use cosmetic cotton.
- **Do not** use consumer eyeglass cleaning cloths pre-treated with silicon.

The cotton or lens tissue should be moist, but not dripping. Please hold the camera away from your body to avoid falling particles like flakes from skin on the sensor. Hold the camera sensor diagonally upwards.



Figure 4: Medical-grade sterile optical cotton

3. 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.
4. When you've finished cleaning, examine the surface in a strong light. Take an out-of-focus picture of a flat, illuminated surface to see if any dirt or dust remains.
5. If dust spots remain, repeat this procedure using new clean lens tissue (as described above).

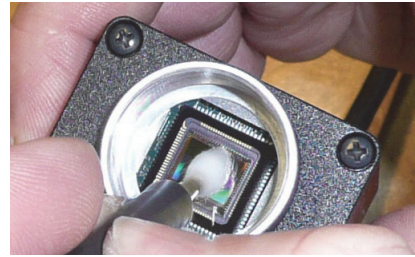


Figure 5: Sensor cleaning



Figure 6: Do not use compressed air

Caution

- Never wipe lenses with dry swabs or tissue—this causes scratches.
- Do not use any disposable cotton cosmetic swabs; they may contain contaminants.

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

Caution

- Use an air blower/compressed air only if you are familiar with cleaning a camera with this instrument.
- **Compressed air may push dust into cameras and lenses.** Therefore, keep the pressure at a moderate strength only:
 - The pressure at the tube should be less than 1 bar (15 psi)
 - Operating distance: 5–30 cm

7. Gently blow the impurities off with dust-filtered, oil-free air (< 1 bar). Using ionized air helps to remove any dirt stuck to the optical component because of static electricity.

Note

If dust spots remain after cleaning twice, please contact your AVT dealer.



MANTA GigE cameras

Manta Manta cameras have a **Gigabit Ethernet interface**.

GigE GigE is the abbreviation for **Gigabit Ethernet**.

All AVT Manta cameras are GigE Vision V1.2 compliant cameras with Gigabit Ethernet interface. AVT Manta cameras work with Gigabit Ethernet hardware and cable lengths up to 100 m.

GigE Vision The GigE Vision standard is an interface standard for digital machine vision cameras widely supported in the industrial imaging industry. In contrast, GigE (Gigabit Ethernet) is the network GigE Vision is built upon.

GenICam GenICam is the command structure for the GigE Vision camera controls. GenICam is administered by the European Machine Vision Association (EMVA). GenICam establishes a common camera control interface allowing third-party software to communicate with cameras from various manufacturers without customization. AVT GigE cameras are GenICam V1.0 compliant.

www



For further information on the highlights of Manta cameras and the whole range of **AVT GigE cameras**, read the data sheets and brochures on the website of Allied Vision Technologies:

<http://www.alliedvisiontec.com/emea/products/cameras.html>

Conformity

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

- CE, following the provisions of 2004/108/EG directive
(**Manta** board level cameras do not have CE)
- FCC Part 15 Class B
(**Manta** board level cameras: prepared for FCC Class B)
- RoHS (2011/65/EU)
- CE
- WEEE 

We declare, under our sole responsibility, that the previously described **AVT Manta** cameras conform to the directives of the CE.

FCC – Class B 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 environment. This device complies 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. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

Specifications

Caution



Before operating any AVT camera, read the **safety instructions** and **ESD warnings** in the **AVT GigE Installation Manual**.

<http://www.alliedvisiontec.com/emea/support/downloads/product-literature/manta.html>

Note



PoE capable cameras

How can I distinguish between PoE capable cameras and cameras that are not PoE capable?

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

Manta G-031B/C

Feature	Specification
Sensor	Type 1/4 (diag. 4.5 mm) progressive scan SONY IT CCD ICX618AL/AQ with EXview HAD CCD II microlens
Effective chip size	3.6 mm x 2.7 mm
Cell size	5.6 µm x 5.6 µm
Resolution (maximum)	656 x 492 pixels
Lens mount	C-Mount: 17.526 mm (in air); Ø 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); Ø 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 125 fps
Gain control	Manual: 0–32 dB (1 dB/step); auto gain (select. ROI)
Exposure time	58 µs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 40 seconds in 1 µs increments
Fixed rate control	0.01 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger

Table 3: Specification Manta G-031B/C

Feature	Specification
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 99 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), no decimation (no sub-sampling), user sets, LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.7 W (@ 12 V DC); PoE: typical < 3.9 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens);
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 3: Specification Manta G-031B/C

Manta G-032B/C

Feature	Specification
Sensor	Type 1/3 (diag. 6 mm) progressive scan SONY IT CCD ICX424AL/AQ with HAD microlens
Effective chip size	4.9 mm x 3.6 mm
Cell size	7.4 μ m x 7.4 μ m
Resolution (maximum)	656 x 492 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	12 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 80 fps
Gain control	Manual: 0–36 dB (1 dB/step); auto gain (select. ROI)
Exposure time	26 μ s to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μ s increments
Fixed rate control	0.01 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 99 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), no decimation (no sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 4: Specification Manta G-032B/C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.6 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 4: Specification Manta G-032B/C

Manta G-033B/C

Feature	Specification
Sensor	Type 1/2 (diag. 8 mm) progressive scan SONY IT CCD ICX414AL/AQ with HAD microlens
Effective chip size	6.5 mm x 4.9 mm
Cell size	9.9 μm x 9.9 μm
Resolution (maximum)	656 x 492 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 88 fps
Gain control	Manual: 0–35 dB (1 dB/step); auto gain (select. ROI)
Exposure time	26 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 99 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)

Table 5: Specification Manta G-033B/C

Feature	Specification
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.6 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 5: Specification Manta G-033B/C

Manta G-046B/C

Feature	Specification
Sensor	Type 1/2 (diag. 8 mm) progressive scan SONY IT CCD ICX415AL/AQ with HAD microlens
Effective chip size	6.5 mm x 4.8 mm
Cell size	8.3 μm x 8.3 μm
Resolution (maximum)	780 x 580 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 67 fps
Gain control	Manual: 0–31 dB (1 dB/step); auto gain (select. ROI)
Exposure time	26 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 70 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)

Table 6: Specification Manta G-046B/C

Feature	Specification
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.6 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 6: Specification Manta G-046B/C

Manta G-095B/C

Feature	Specification
Sensor	Type 1/3 (diag. 6 mm) progressive scan SONY IT CCD ICX692AL/AQ with EXview HAD CCD II microlens
Effective chip size	6.04 mm x 4.0 mm
Cell size	4.08 μm x 4.08 μm
Resolution (maximum)	1292 x 734 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 40 fps
Gain control	Manual: 0–32 dB (1 dB/step); auto gain (select. ROI)
Exposure time	45 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 34 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), no decimation (no sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 7: Specification Manta G-095C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.7 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 7: Specification Manta G-095C

Manta G-125B/C

Feature	Specification
Sensor	Type 1/3 (diag. 6 mm) progressive scan SONY IT CCD ICX445ALA/AQA with EXview HAD microlens
Effective chip size	4.8 mm x 3.6 mm
Cell size	3.75 μm x 3.75 μm
Resolution (maximum)	1292 x 964 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 30 fps
Gain control	Manual: 0–31 dB (1 dB/step); auto gain (select. ROI)
Exposure time	21 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 25 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)

Table 8: Specification Manta G-125B/C

Feature	Specification
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.6 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 8: Specification Manta G-125B/C

Manta G-145B/C (-30fps)

Feature	Specification
Sensor	Type 2/3 (diag. 11 mm) progressive scan SONY IT CCD ICX285AL/AQ with EXview HAD microlens
Effective chip size	9.0 mm x 6.7 mm
Cell size	6.45 μ m x 6.45 μ m
Resolution (maximum)	1388 x 1038 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerGR12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	G-145B/C: Up to 15 fps G-145B/C -30fps: Up to 30 fps
Gain control	Manual: 0–33 dB (1 dB/step); auto gain (select. ROI)
Exposure time	G-145B/C: 38 μ s to 43 s G-145B/C -30fps: 37 μ s to 38 s Auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μ s increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 22 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation

Table 9: Specification Manta G-145B/C (: -30fps)

Feature	Specification
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	G-145B/C: Typical < 3.7 W (@ 12 V DC); PoE: typical < 3.8 W G-145B/C -30fps: Typical < 4.5 W (@ 12 V DC); PoE: typical < 4.5 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 9: Specification Manta G-145B/C (:-30fps)

Manta G-145B NIR

Feature	Specification
Sensor	Type 2/3 (diag. 11 mm) progressive scan SONY IT CCD ICX285AL with EXview HAD microlens
Effective chip size	9.0 mm x 6.7 mm
Cell size	6.45 μm x 6.45 μm
Resolution (maximum)	1388 x 1038 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Mono8, Mono12Packed, Mono12
Frame rates	Up to 15.04 fps (NIR mode: Off/On_Fast) Up to 13.98 fps (NIR mode: On_HighQuality)
Gain control	Manual: 0–33 dB (1 dB/step); auto gain (select. ROI)
Exposure time	20 μs to 60 s; auto shutter (select. ROI) 28 μs to 60 s for NirMode=Off/On_Fast and ExposureMode=External
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 22 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning), decimation (sub-sampling), config files (user sets), LUT
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 10: Specification Manta G-145B NIR

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 4.2 W (@ 12 V DC); PoE : typical < 4.4 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	-
Optional accessories	Protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 10: Specification Manta G-145B NIR

Manta G-146B/C

Feature	Specification
Sensor	Type 1/2 (diag. 8 mm) progressive scan SONY IT CCD ICX267AL/AK with HAD microlens
Effective chip size	6.5 mm x 4.8 mm
Cell size	4.65 μ m x 4.65 μ m
Resolution (maximum)	1388 x 1038 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerGB8, BayerGB12Packed, BayerGB12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 17 fps
Gain control	Manual: 0–33 dB (1 dB/step); auto gain (select. ROI)
Exposure time	31 μ s to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μ s increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 22 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)

Table 11: Specification Manta G-146B/C

Feature	Specification
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.6 W (@ 12 V DC); PoE : typical < 3.8 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 11: Specification Manta G-146B/C

Manta G-201B/C (-30fps)

Feature	Specification
Sensor	Type 1/1.8 (diag. 8.9 mm) progressive scan SONY IT CCD ICX274AL/AQ with Super HAD microlens
Effective chip size	7.1 mm x 5.4 mm
Cell size	4.40 μ m x 4.40 μ m
Resolution (maximum)	1624 x 1234 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed (not -30fps), BGRA8Packed (not -30fps)
Frame rates	G-201B/C: Up to 14 fps G-201B/C -30fps: Up to 30 fps
Gain control	Manual: 0–31 dB (1 dB/step); auto gain (select. ROI)
Exposure time	G-201B/C: 51 μ s to 60 s G-201B/C -30fps: 10 μ s to 60 s Auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μ s increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 16 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation

Table 12: Specification Manta G-201B/C (: -30fps)

Feature	Specification
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	G-201B/C: Typical < 3.6 W (@ 12 V DC); PoE: typical < 3.8 W G-201B/C -30fps: Typical < 4.6 W (@ 12 V DC); PoE: typical < 4.5 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 12: Specification Manta G-201B/C (:–30fps)

Manta G-223B/C (NIR)

Feature	Specification
Sensor	Type 2/3 (diag. 8 mm, 1 inch lens recommended) CMOS sensor: CMOSIS CMV2000 (monochrome/color) with microlenses and global shutter The monochrome version is also available as NIR enhanced variant (Manta G-223B NIR) . Except for the sensor response, the technical data of the NIR enhanced variant are identical with Manta G-223B .
Effective chip size	11.26 mm x 5.98 mm
Cell size	5.5 µm x 5.5 µm
Resolution (maximum)	2048 x 1088 pixels
Lens mount	C-Mount: 17.526 mm (in air); Ø 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 64 on page 102)
ADC	12 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 53 fps @124MB/s (60 fps with burst mode, see StreamFrameRateConstrain in AVT GigE Cameras and Driver Features document)
Gain control	Manual: 0–26 dB (1dB/step); auto gain (select. ROI)
Exposure time	18 µs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 µs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 59 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 128 MByte image memory, decimation (sub-sampling), config files (user sets), LUT, temperature monitoring (resolution 0.031, accuracy ±1 °C) only color: auto white balance, color correction, hue, saturation

Table 13: Specification Manta G-223B/C (NIR)

Feature	Specification
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical 2.7 W (@ 12 V DC); PoE: typical 3.2 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 13: Specification Manta G-223B/C (NIR)

Manta G-282B/C

Feature	Specification
Sensor	Type 1/1.8 (diag. 8.9 mm) progressive scan SONY IT CCD ICX687ALA/AQA with EXview HAD II microlenses
Effective chip size	7.14 mm x 5.38 mm
Cell size	3.69 μm x 3.69 μm
Resolution (maximum)	1936 x 1458 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 64 on page 102)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 30 fps
Gain control	Manual: 0–32 dB (1 dB/step); auto gain (select. ROI)
Exposure time	41 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 47 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets); LUT, temperature monitoring (resolution 0.031, accuracy ± 1 $^{\circ}\text{C}$) only color: auto white balance, color correction, hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 14: Specification Manta G-282B/C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.5 W (@ 12 V DC); PoE : typical < 4.1 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 14: Specification Manta G-282B/C

Manta G-283B/C

Feature	Specification
Sensor	Type 2/3 (diag. 11.0 mm) progressive scan SONY IT CCD ICX674ALG/AQG with EXview HAD II microlenses
Effective chip size	8.79 mm x 6.62 mm
Cell size	4.54 μm x 4.54 μm
Resolution (maximum)	1936 x 1458 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 30 fps
Gain control	Manual: 0–33 dB (1 dB/step); auto gain (select. ROI)
Exposure time	41 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 47 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT, temperature monitoring (resolution 0.031, accuracy ± 1 $^{\circ}\text{C}$) only color: auto white balance, color correction, hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 15: Specification Manta G-283B/C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.7 W (@ 12 V DC); PoE: typical < 4.3 W
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 15: Specification Manta G-283B/C

Manta G-419B/C (NIR)

Feature	Specification
Sensor	Type 1/1 (diag. 15.93 mm) CMOS sensor: CMOSIS CMV4000 (monochrome/color) with microlenses and global shutter The monochrome version is also available as NIR enhanced variant (Manta G-419B NIR) . Except for the sensor response, the technical data of the NIR enhanced variant are identical with Manta G-419B.
Effective chip size	11.26 mm x 11.26 mm
Cell size	5.5 μm x 5.5 μm
Resolution (maximum)	2048 x 2048 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 64 on page 102)
ADC	12 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 28 fps @124MB/s (32 fps with burst mode, see StreamFrameRateConstrain in AVT GigE Cameras and Driver Features document)
Gain control	Manual: 0–26 dB (1dB/step); auto gain (select. ROI)
Exposure time	34 μs to 126 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 252 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 31 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 128 MByte image memory, decimation (sub-sampling), config files (user sets), LUT, temperature monitoring (resolution 0.031, accuracy ± 1 °C) only color: auto white balance, color correction, hue, saturation

Table 16: Specification Manta G-419B/C (NIR)

Feature	Specification
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical 2.7 W (@ 12 V DC); PoE: typical 3.2 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 16: Specification Manta G-419B/C (NIR)

Manta G-504B/C

Feature	Specification
Sensor	Type 2/3 (diag. 11 mm) progressive scan SONY IT CCD ICX655AL/AQ with Super HAD microlens
Effective chip size	8.5 mm x 7.1 mm
Cell size	3.45 μm x 3.45 μm
Resolution (maximum)	2452 x 2056 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 48 on page 86) CS-Mount: 12.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 5.1 mm (see figure 49 on page 87)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerGB8, BayerGB12Packed, BayerGB12, Mono8, RGB8Packed, YUV411Packed, YUV422Packet, YUV444Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
Frame rates	Up to 9 fps
Gain control	Manual: 0–32 dB (1 dB/step); auto gain (select. ROI)
Exposure time	38 μs to 60 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60 seconds in 1 μs increments
Fixed rate control	1 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	32 MByte, up to 6 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, 32 MByte image memory, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT only color: auto white balance, color correction, edge filter (sharpness), hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)

Table 17: Specification Manta G-504B/C

Feature	Specification
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.9 W (@ 12 V DC); PoE : typical < 3.9 W (maximal frame rates at full resolution)
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	200 g (without lens)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 17: Specification Manta G-504B/C

Manta G-609B/C

Feature	Specification
Sensor	Type 1 (diag. 15.989 mm) progressive scan SONY IT CCD ICX694ALG/AQG with EXview HAD II microlenses
Effective chip size	12.49 mm x 10.02 mm
Cell size	4.54 μm x 4.54 μm
Resolution (maximum)	2752 x 2206 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 64 on page 102)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 15 fps
Gain control	Manual: 0–33 dB (1 dB/step); auto gain (select. ROI)
Exposure time	41 μs to 38 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 19 seconds in 1 μs increments
Fixed rate control	0.026 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 21 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT, temperature monitoring (resolution 0.031, accuracy ± 1 $^{\circ}\text{C}$) only color: auto white balance, color correction, hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 18: Specification Manta G-609B/C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical < 3.9 W (@ 12 V DC); PoE: typical 4.6 W
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome: protection glass Color: IR cut filter
Optional accessories	Monochrome: IR cut filter, IR pass filter Color: protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 18: Specification Manta G-609B/C

Manta G-917B/C

Feature	Specification
Sensor	Type 1 (diag. 15.972 mm) progressive scan SONY IT CCD ICX814 ALG/AQG with EXview HAD II microlenses
Effective chip size	12.5 mm x 10.0 mm
Cell size	3.69 μm x 3.69 μm
Resolution (maximum)	3384 x 2710 pixels
Lens mount	C-Mount: 17.526 mm (in air); $\varnothing$ 25.4 mm (32 tpi) Maximum protrusion: 9.7 mm (see figure 64 on page 102)
ADC	14 bit
Pixel format	Only monochrome: Mono8, Mono12Packed, Mono12 Only color: BayerRG8, BayerRG12Packed, BayerRG12, Mono8, RGB8Packed, YUV411Packed, YUV422Packed, YUV444Packed, BGR8Packed
Frame rates	Up to 10 fps
Gain control	Manual: 0–32 dB (1 dB/step); auto gain (select. ROI)
Exposure time	42 μs to 38 s; auto shutter (select. ROI)
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 19 seconds in 1 μs increments
Fixed rate control	0.026 fps to maximum frame rate (steps of 0.1 fps)
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync Out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
Internal image memory	128 MByte, up to 14 frames Note  The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.
Smart functions	Auto gain control, auto exposure control, binning (monochrome binning, also for color cameras; but no color binning), decimation (sub-sampling), config files (user sets), LUT, temperature monitoring (resolution 0.031, accuracy ± 1 $^{\circ}\text{C}$) only color: auto white balance, color correction, hue, saturation
I/O	Two configurable optocoupled inputs, two configurable optocoupled outputs RS232 port (serial port)
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Camera control interface	GenICam V1.0 compliant

Table 19: Specification Manta G-917B/C

Feature	Specification
Power requirements	DC 8–30 V only via 12-pin HIROSE: external power supply needed or PoE models: compliant with Power over Ethernet IEEE 802.3at/af
Power consumption	Typical 4 W (@ 12 V DC); PoE : typical 4.6 W
Dimensions	86.4 mm x 44 mm x 29 mm (L x W x H); including connectors, without tripod and lens
Mass	150 g (without lens, PoE and non-PoE camera)
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Regulations	CE, FCC Class B, RoHS (2011/65/EU)
Standard accessories	Monochrome : protection glass Color : IR cut filter
Optional accessories	Monochrome : IR cut filter, IR pass filter Color : protection glass Tripod adapter
On request	Gigabit Ethernet network card, Gigabit Ethernet network cables
Software packages	Free of charge, see http://www.alliedvisiontec.com/html

Table 19: Specification Manta G-917B/C

Spectral sensitivity

Note



All measurements were done without protection glass / without filter.

The uncertainty in measurement of the QE values is $\pm 10\%$.

This is due to:

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

The measurements for Manta G-145B NIR in figure 21 and figure 22 were done with a different method to illustrate the effect of the NIR mode.

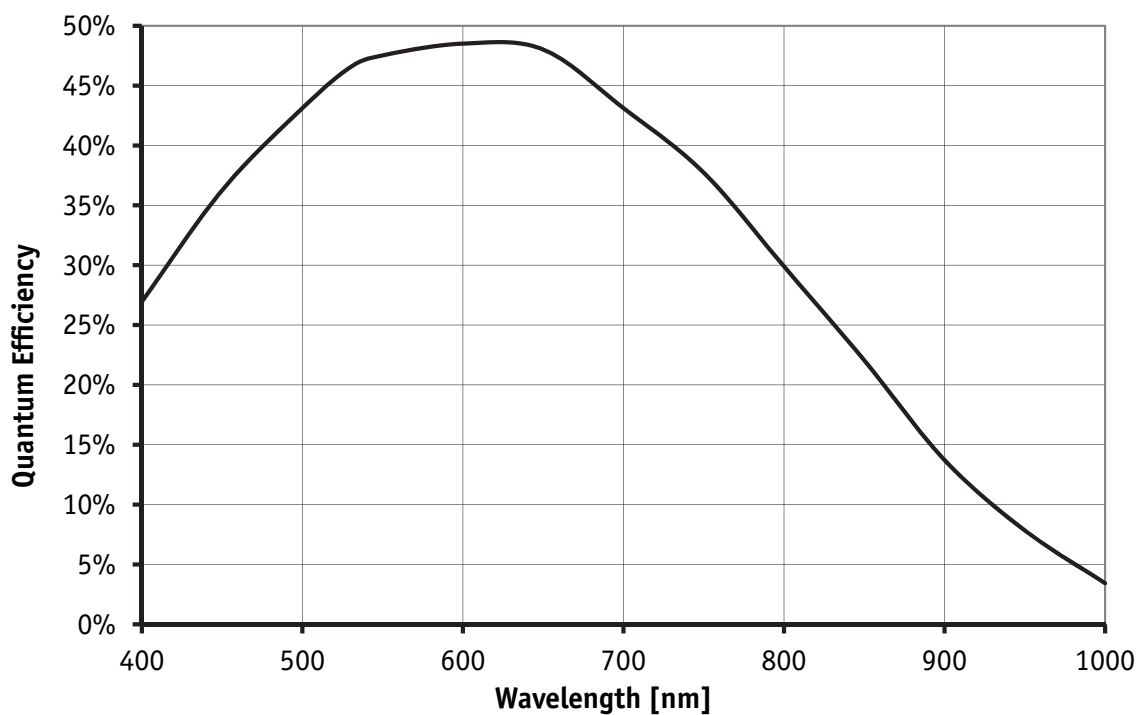


Figure 7: Spectral sensitivity of Manta G-031B

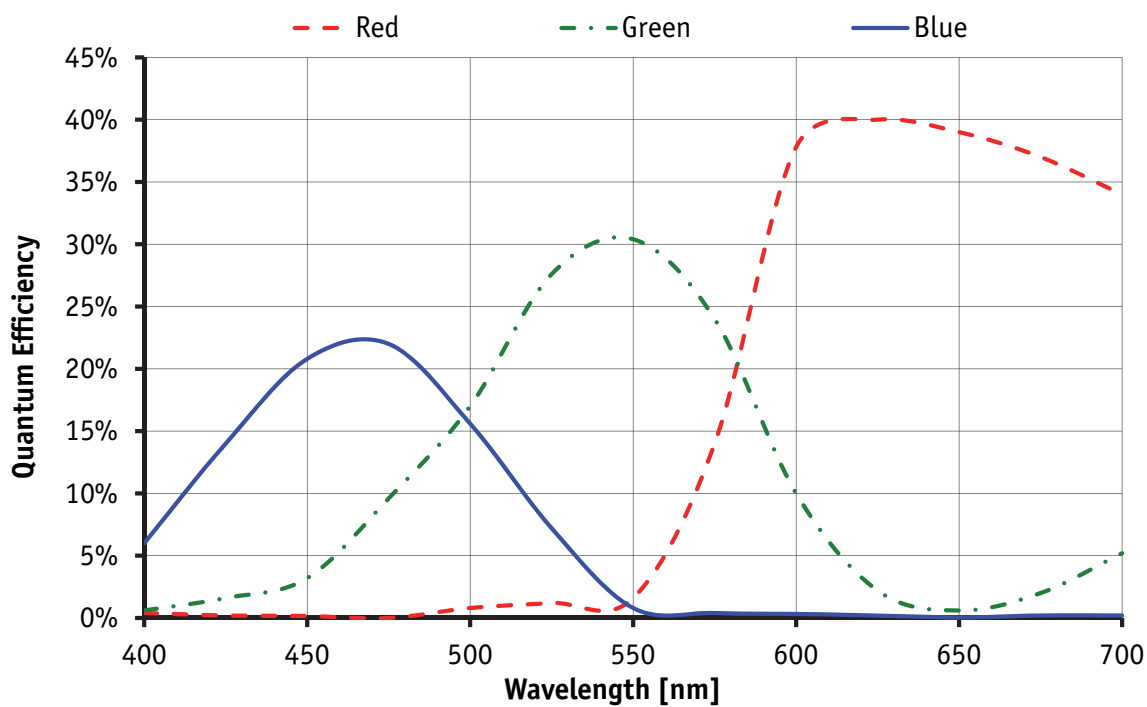


Figure 8: Spectral sensitivity of Manta G-031C (without IR cut filter)

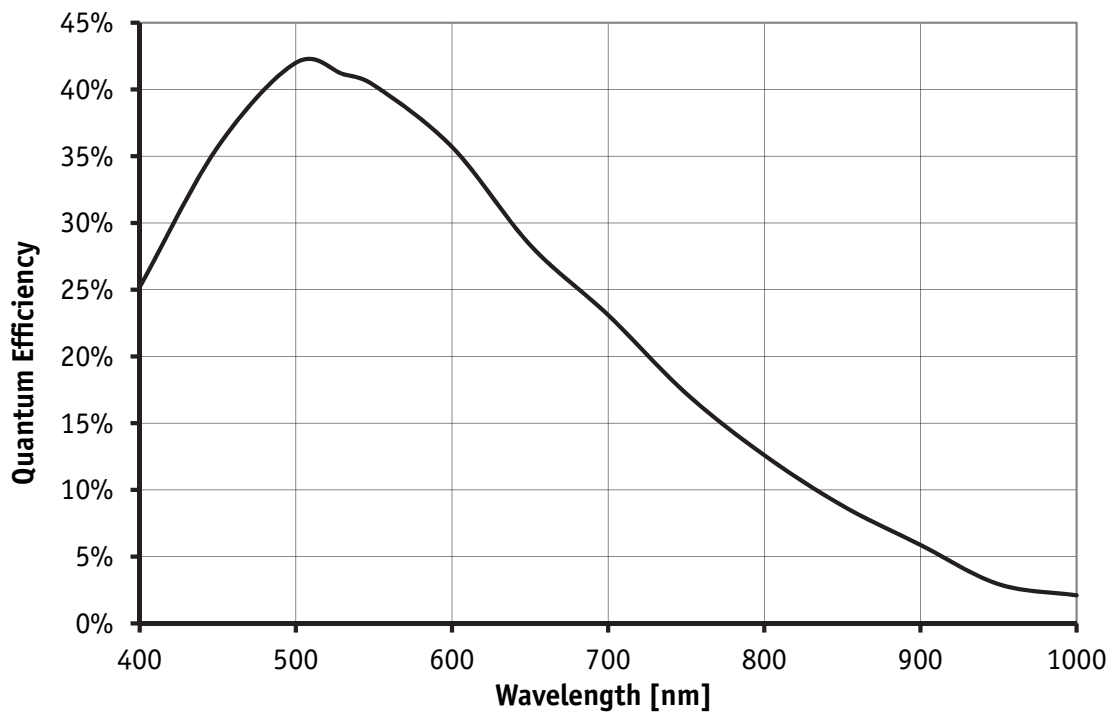


Figure 9: Spectral sensitivity of Manta G-032B

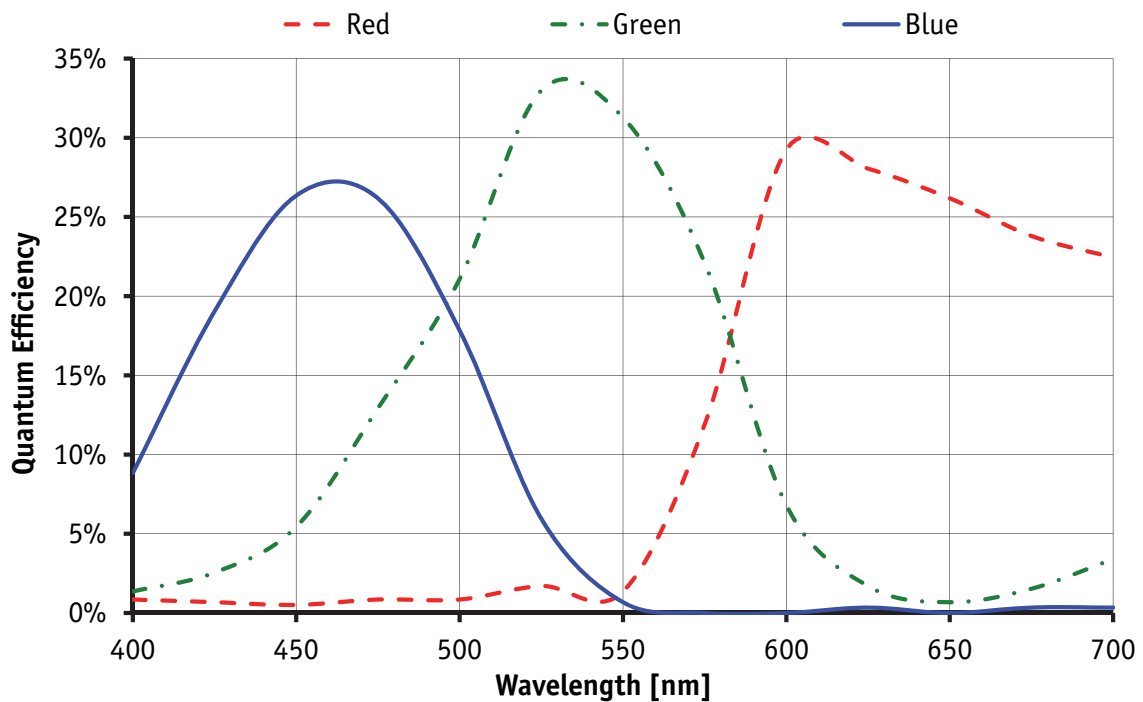


Figure 10: Spectral sensitivity of Manta G-032C (without IR cut filter)

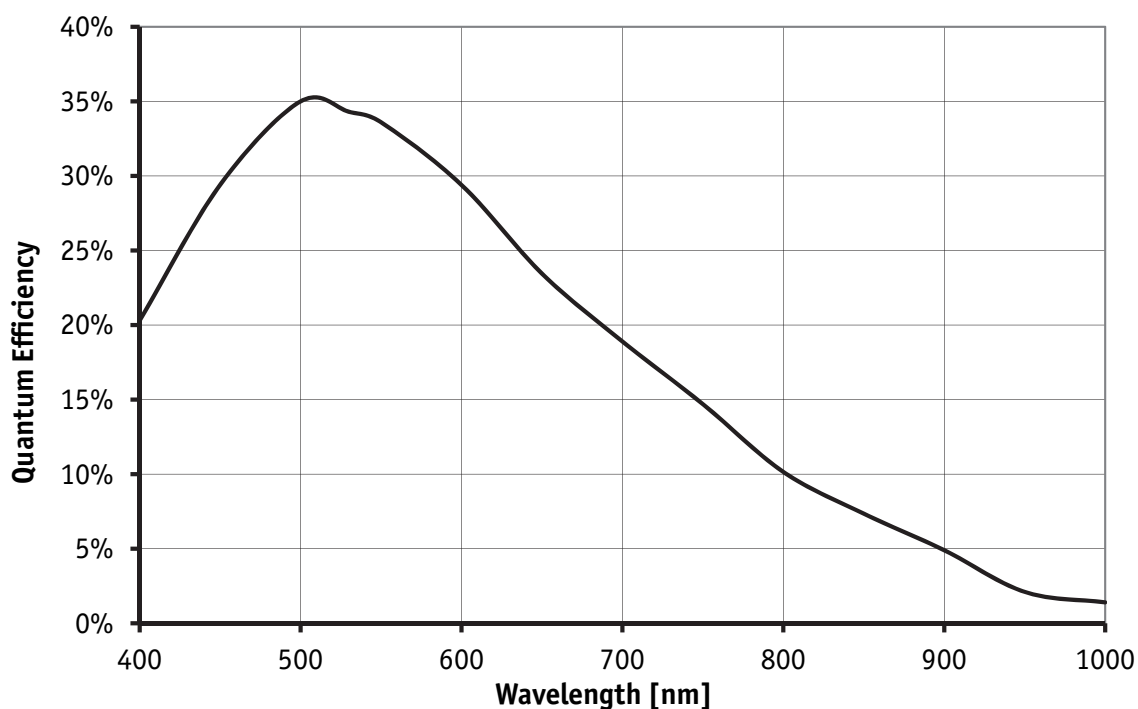


Figure 11: Spectral sensitivity of Manta G-033B

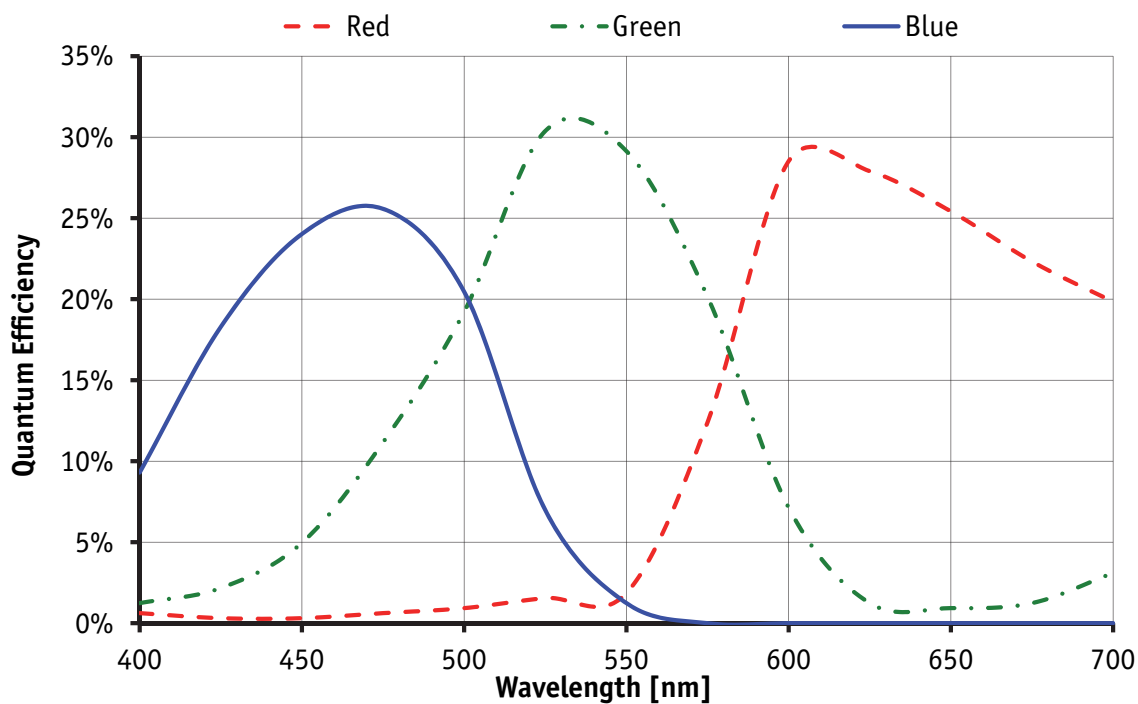


Figure 12: Spectral sensitivity of Manta G-033C (without IR cut filter)

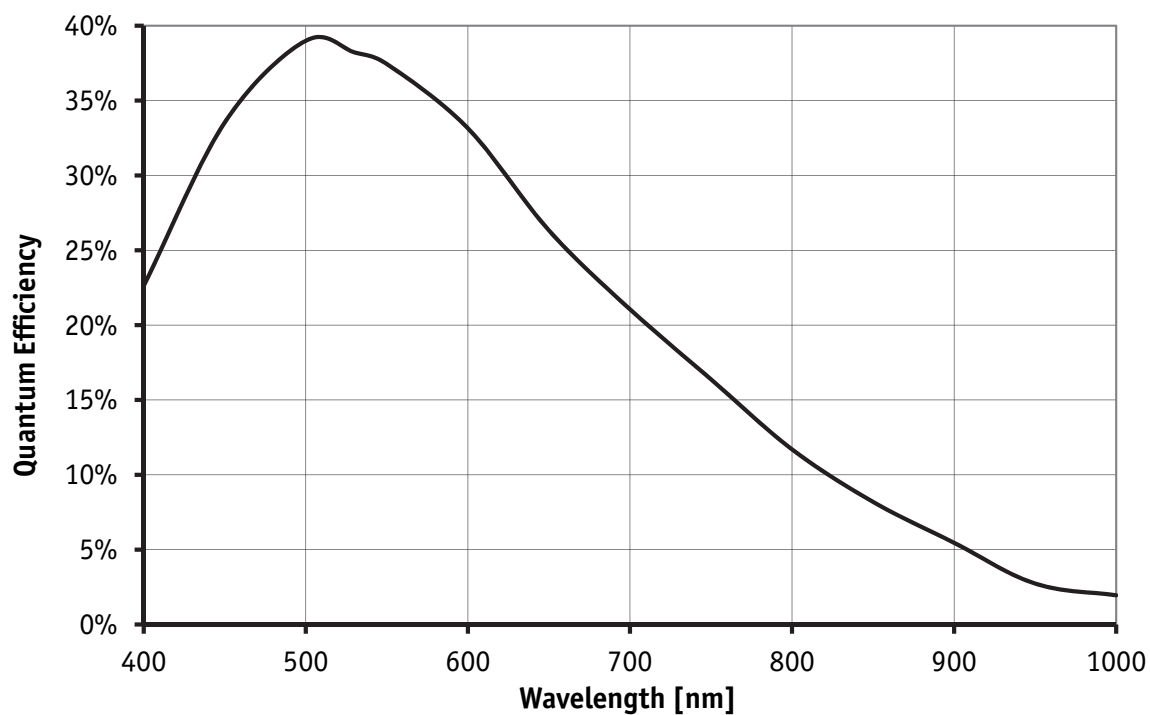


Figure 13: Spectral sensitivity of Manta G-046B

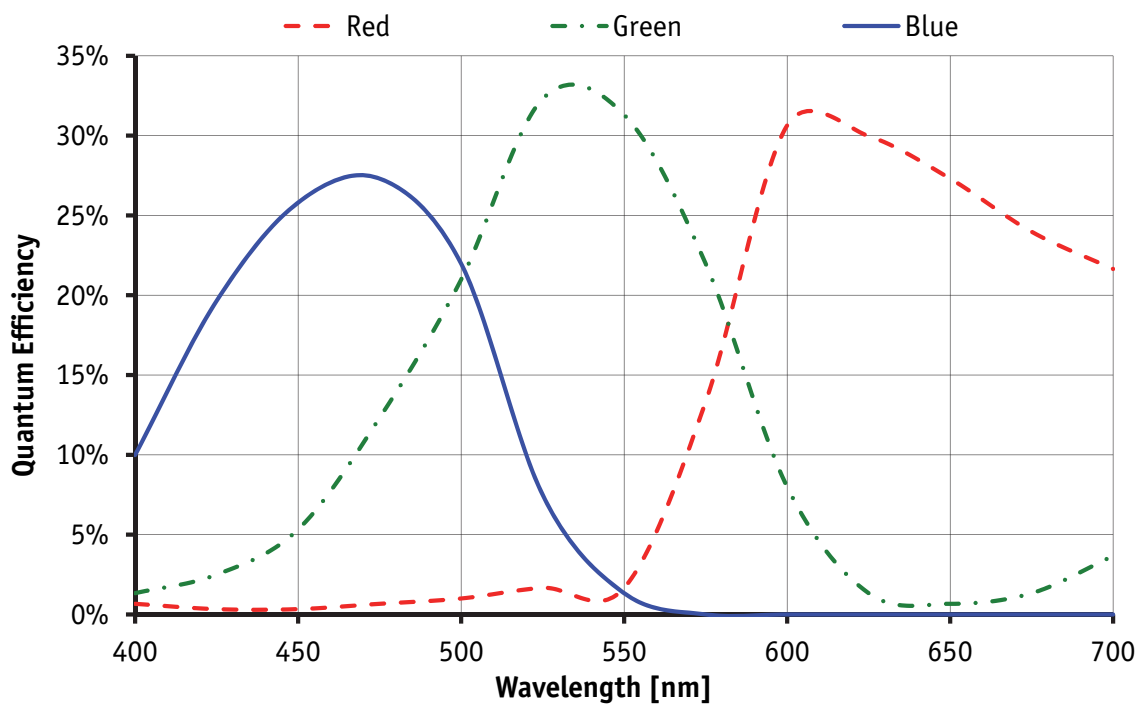


Figure 14: Spectral sensitivity of Manta G-046C (without IR cut filter)

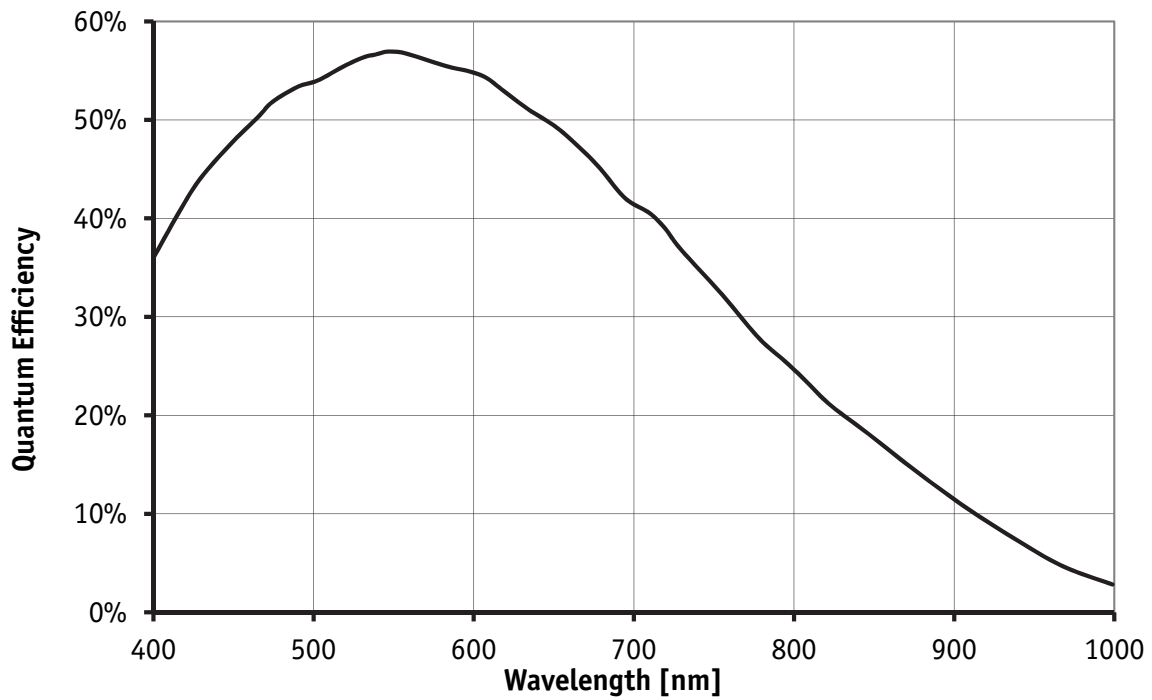


Figure 15: Spectral sensitivity of Manta G-095B

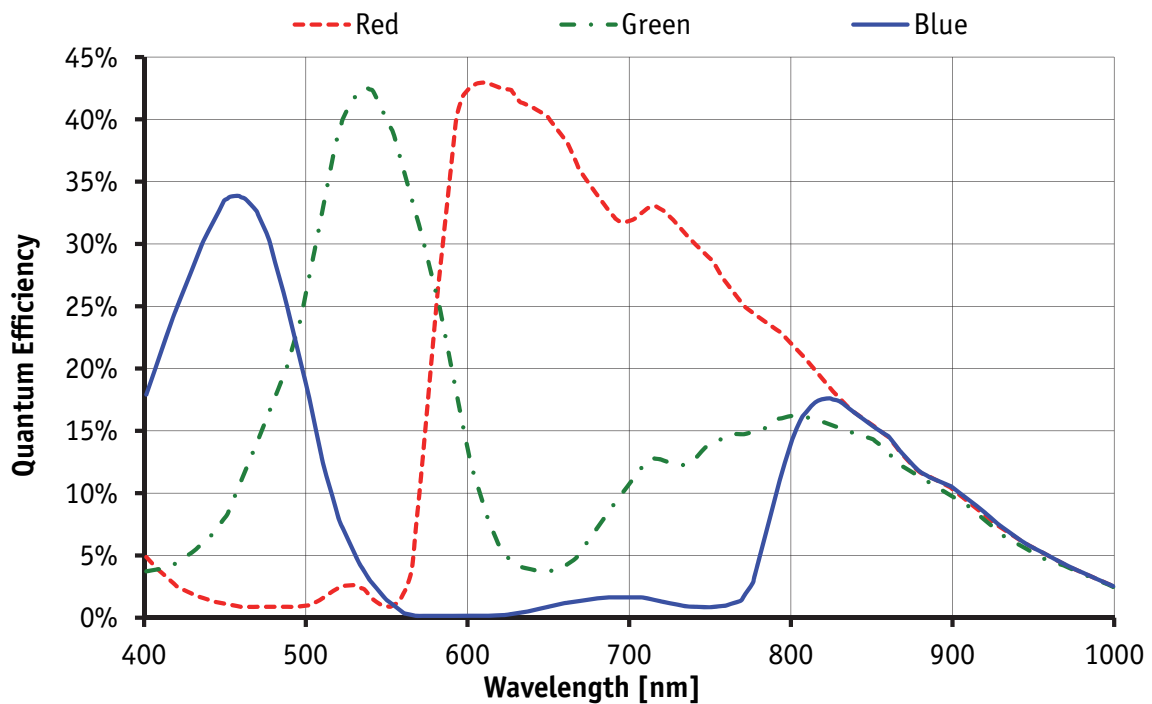


Figure 16: Spectral sensitivity of Manta G-095C (without IR cut filter)

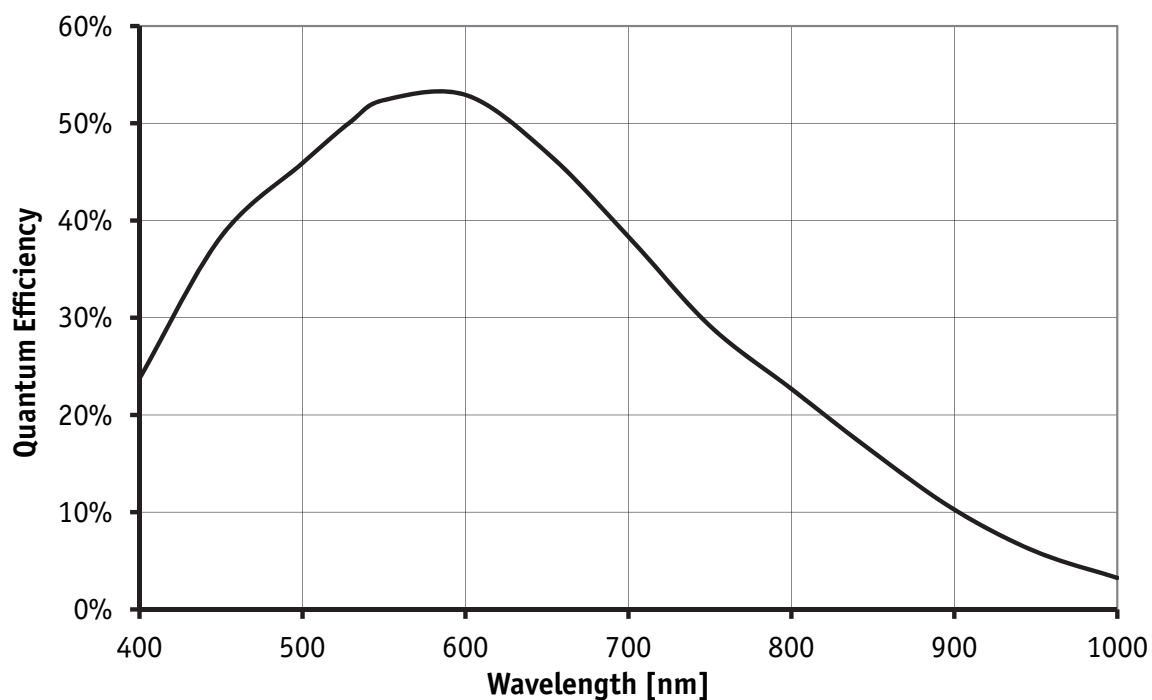


Figure 17: Spectral sensitivity of Manta G-125B

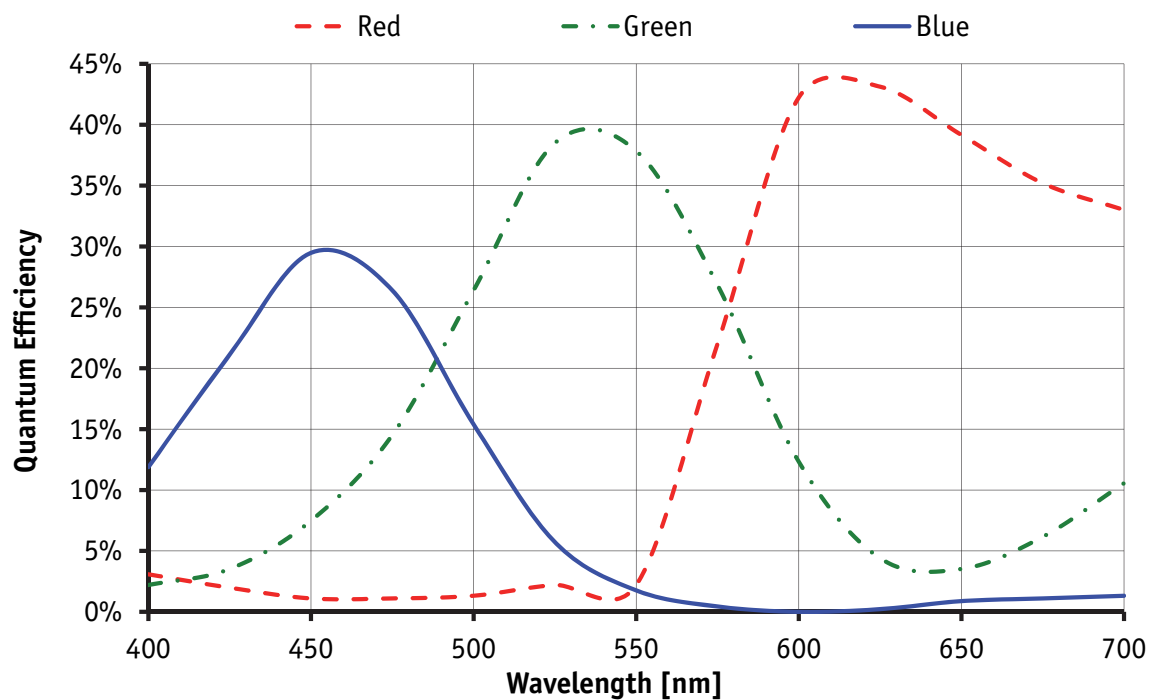


Figure 18: Spectral sensitivity of Manta G-125C (without IR cut filter)

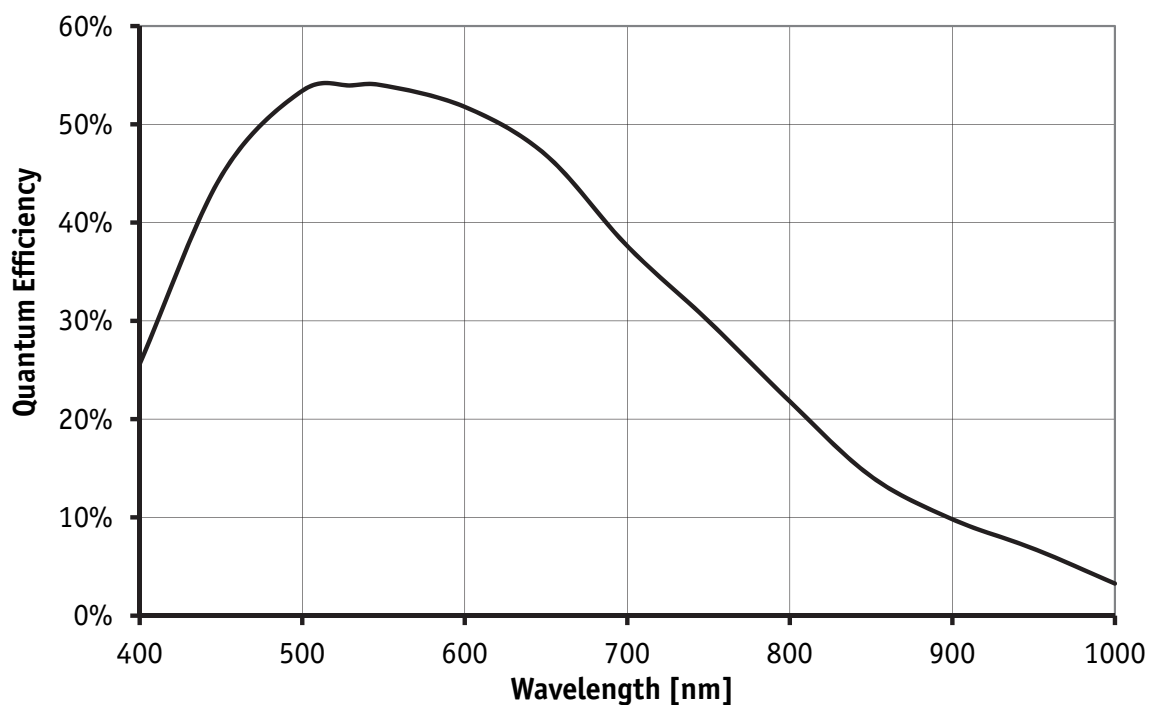


Figure 19: Spectral sensitivity of Manta G-145B

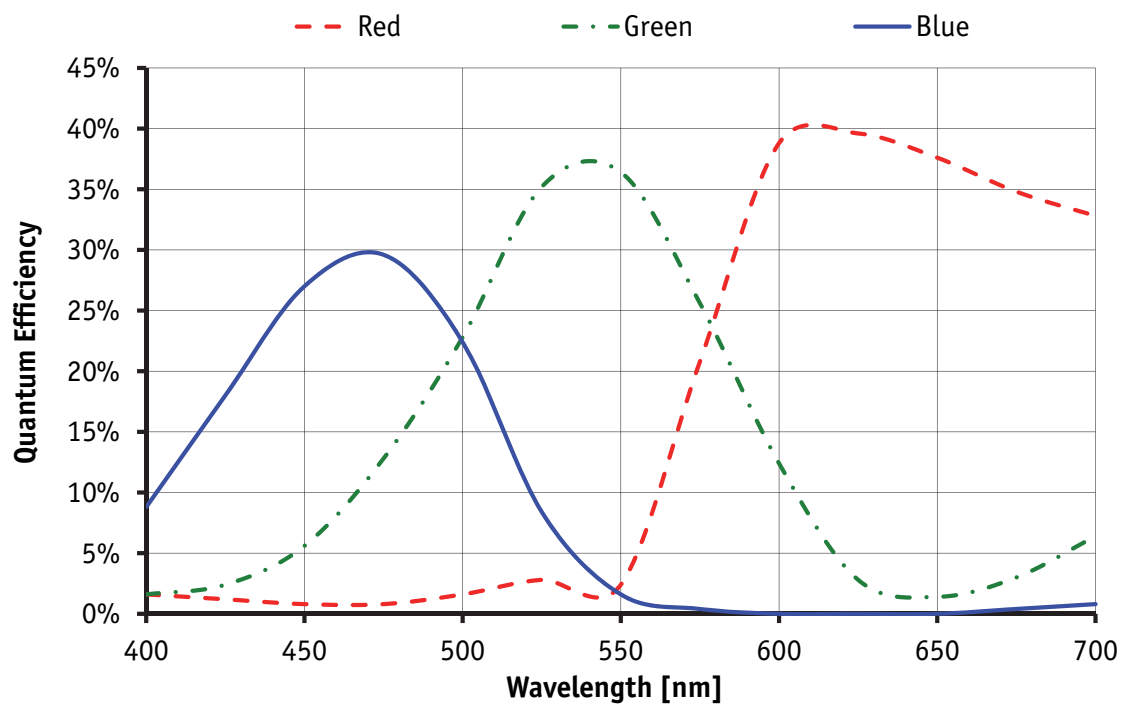


Figure 20: Spectral sensitivity of Manta G-145C (without IR cut filter)

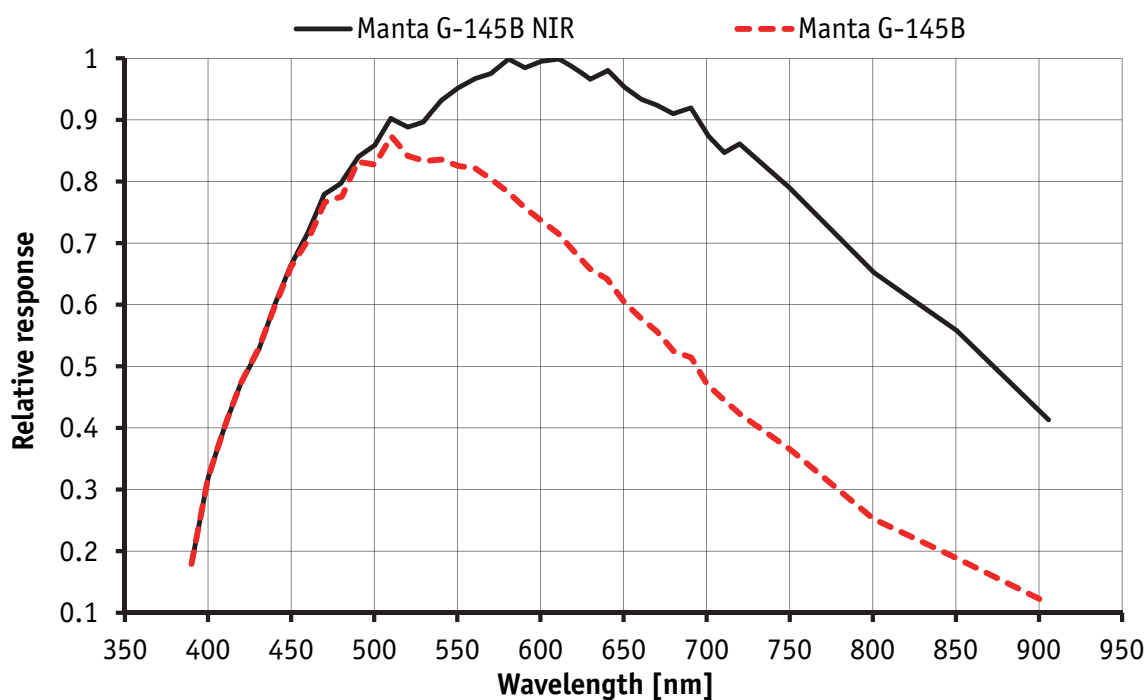


Figure 21: Spectral sensitivity of Manta G-145B NIR (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B

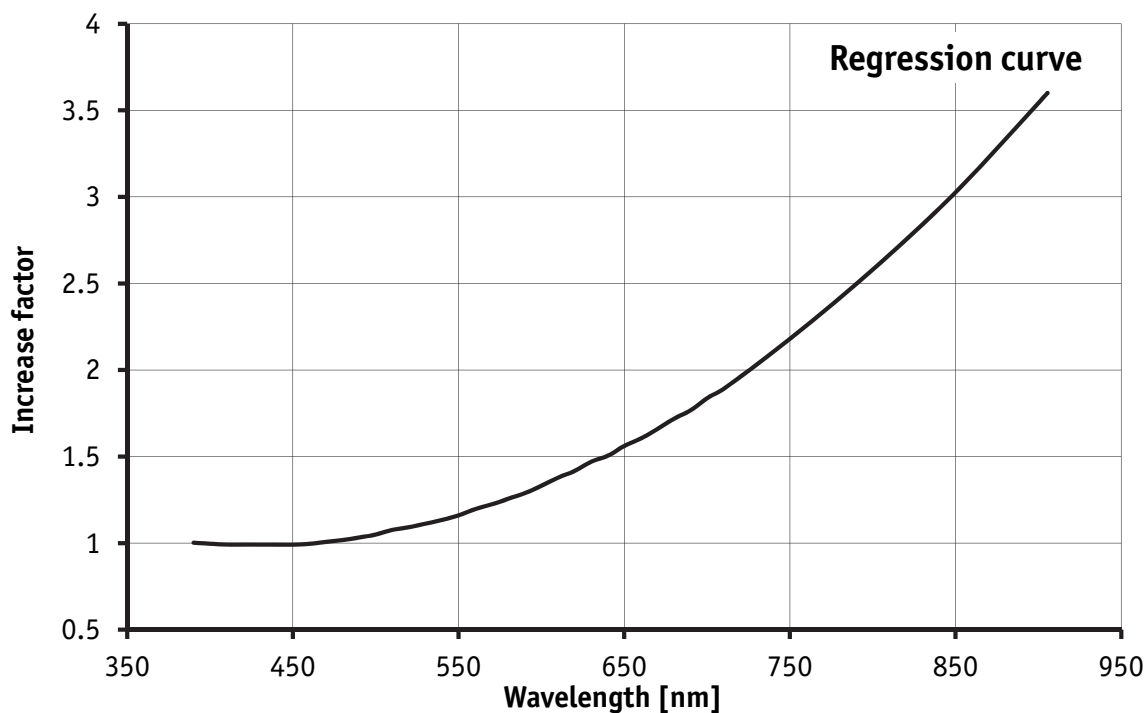


Figure 22: Increase of relative response for Manta G-145B NIR with NIR mode set to On_HighQuality

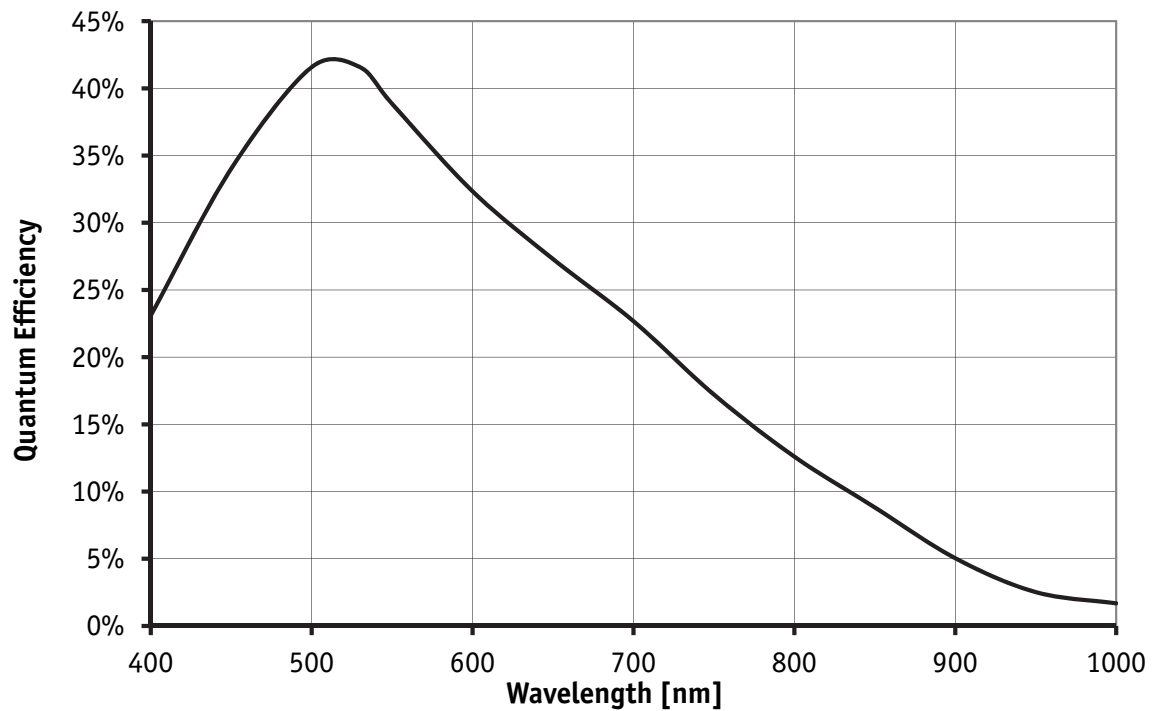


Figure 23: Spectral sensitivity of Manta G-146B

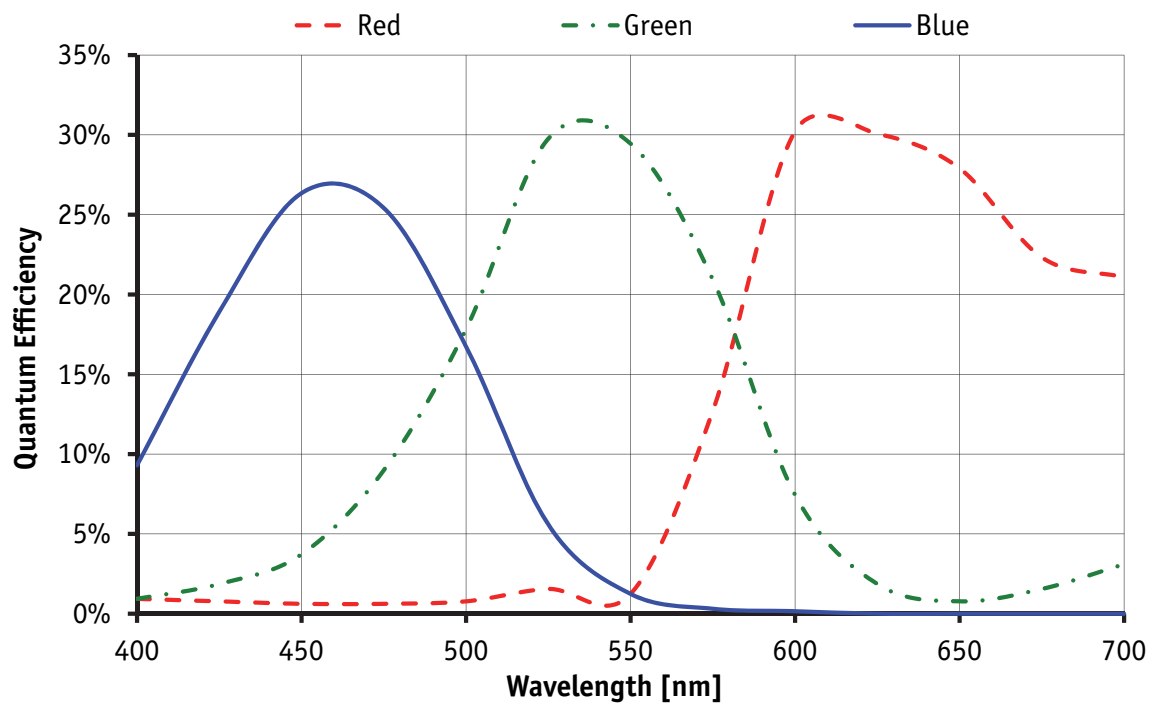


Figure 24: Spectral sensitivity of Manta G-146C (without IR cut filter)

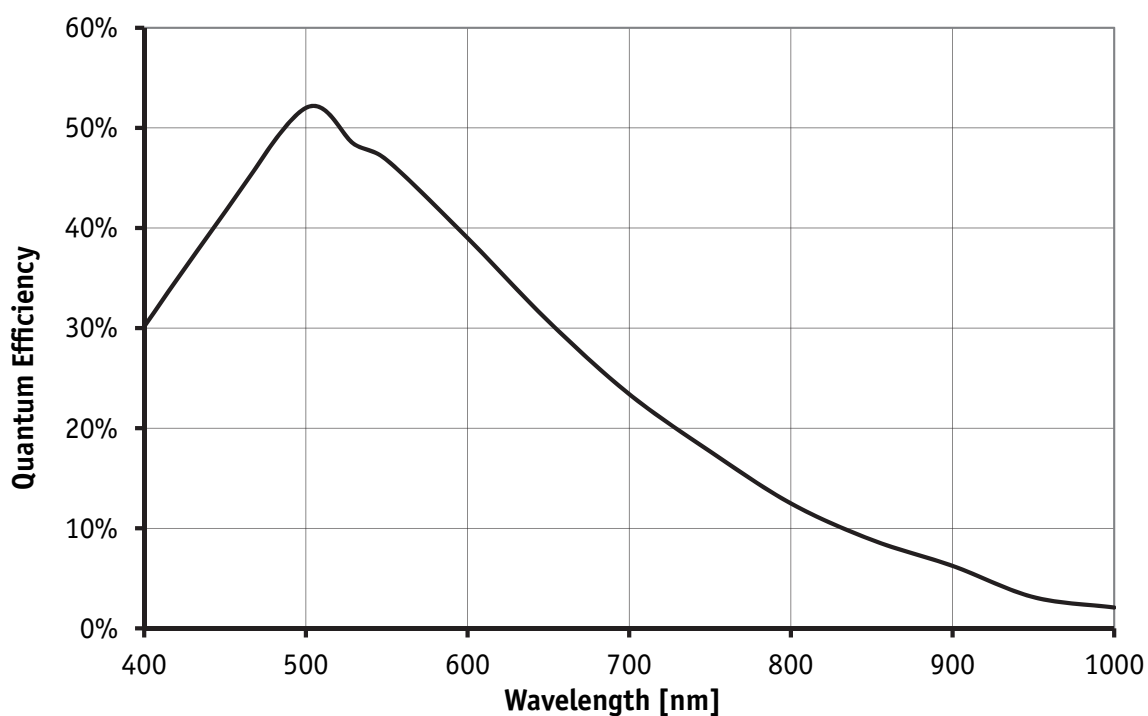


Figure 25: Spectral sensitivity of Manta G-201B

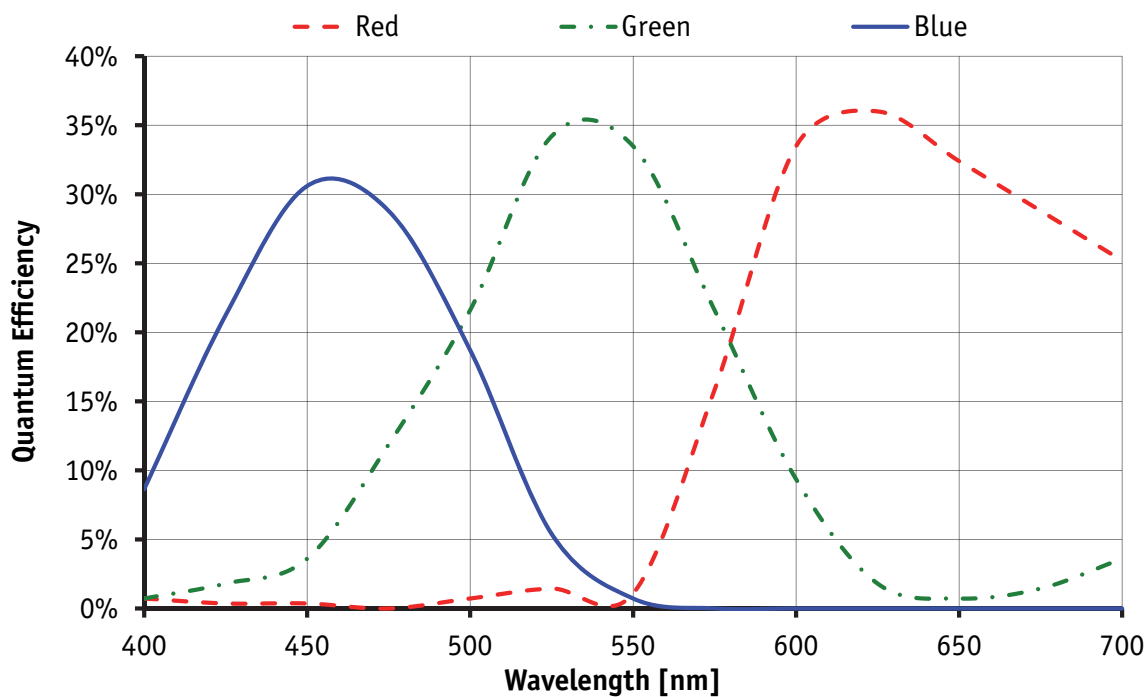


Figure 26: Spectral sensitivity of Manta G-201C (without IR cut filter)

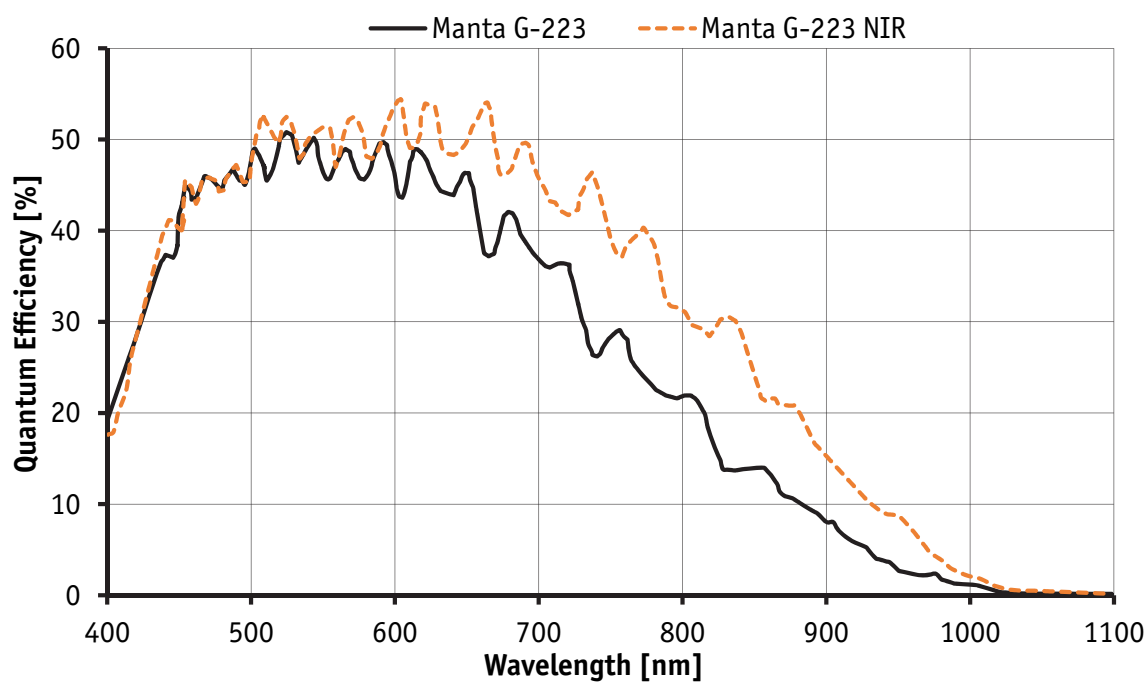


Figure 27: Spectral sensitivity of Manta G-223B (NIR)

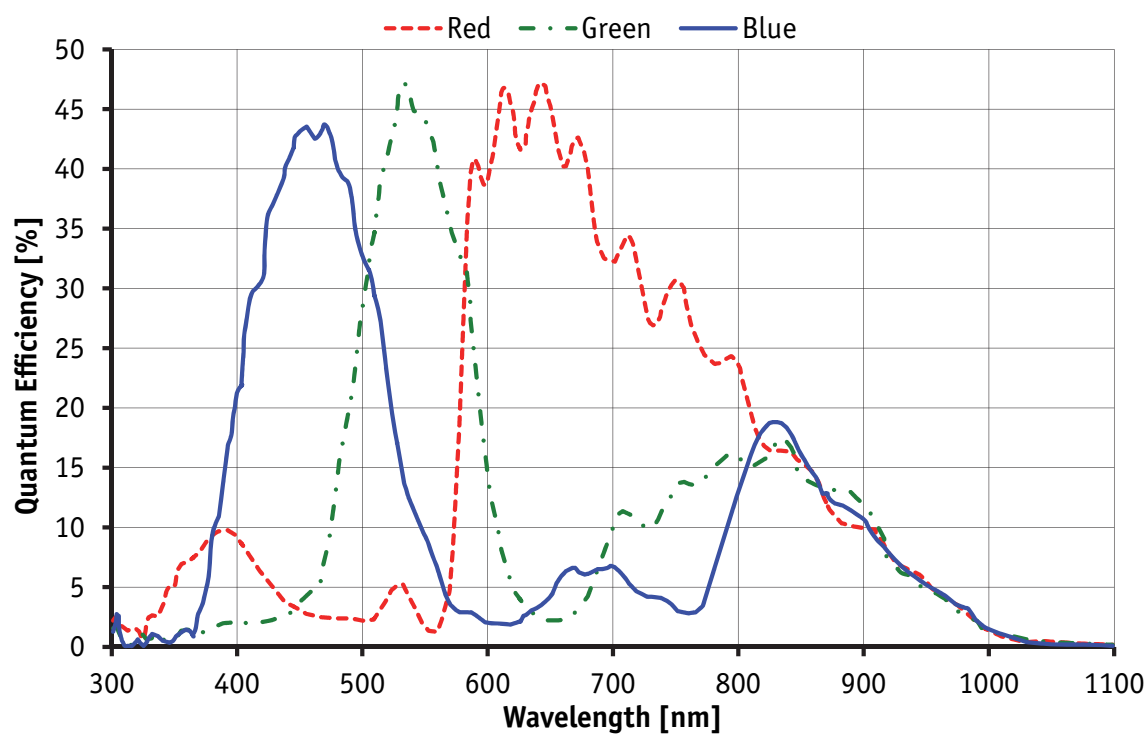


Figure 28: Spectral sensitivity of Manta G-223C (without IR cut filter)

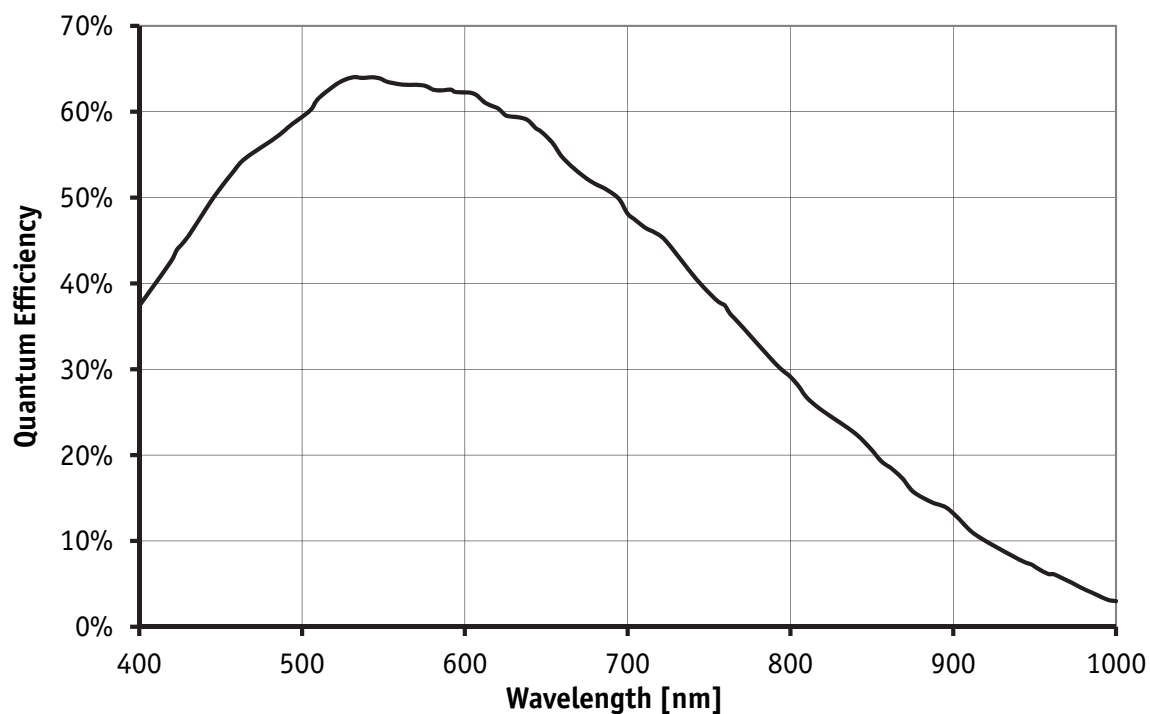


Figure 29: Spectral sensitivity of Manta G-282B

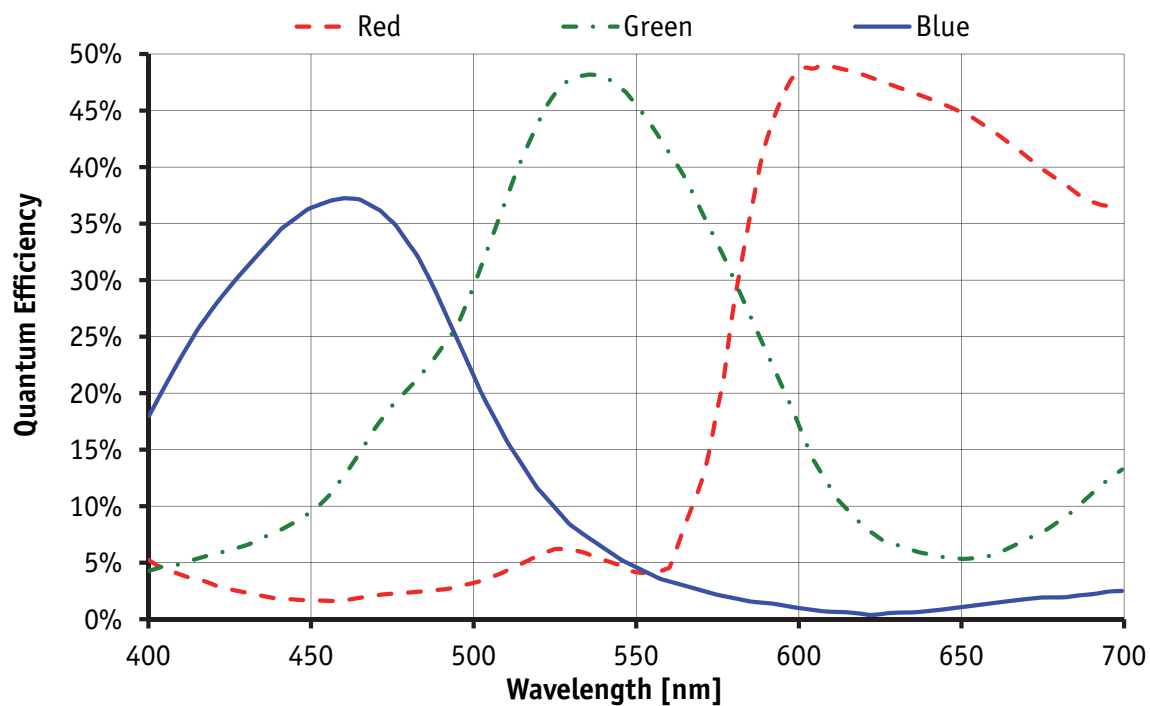


Figure 30: Spectral sensitivity of Manta G-282C (without IR cut filter)

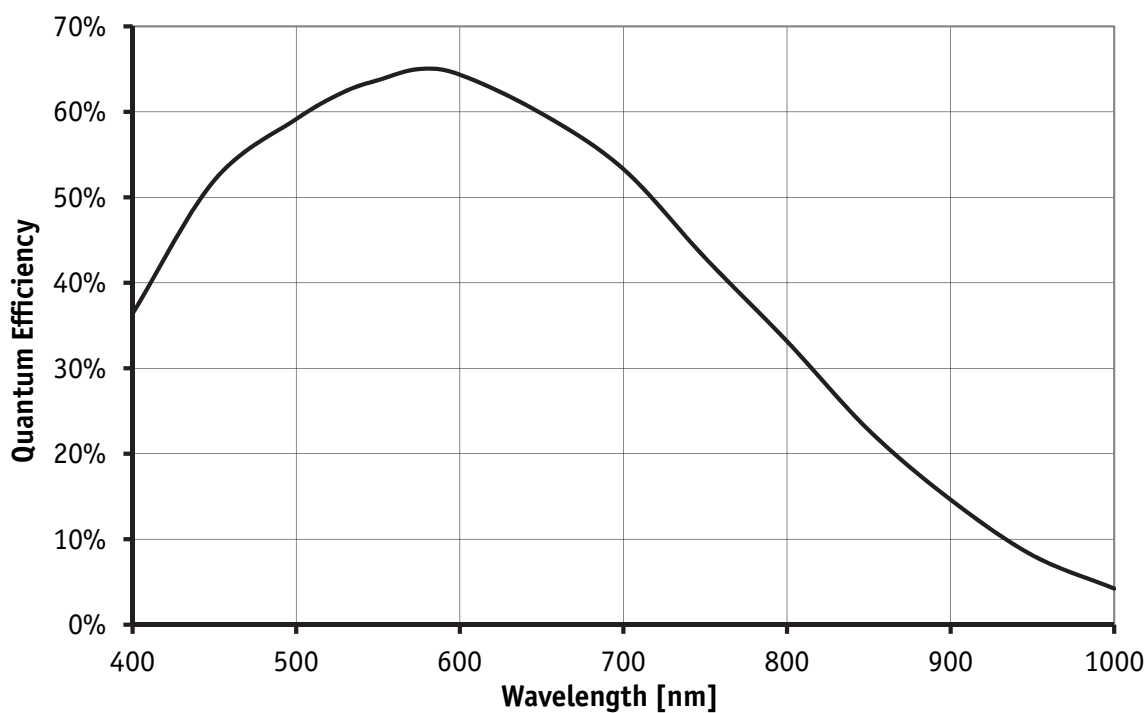


Figure 31: Spectral sensitivity of Manta G-283B

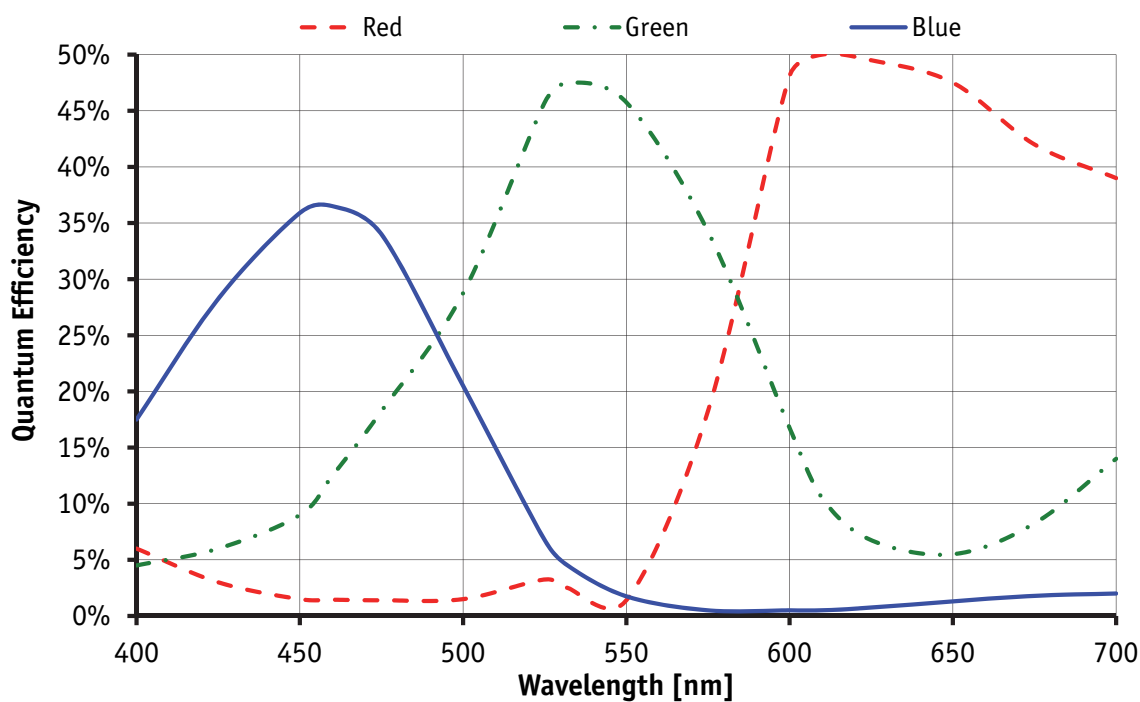


Figure 32: Spectral sensitivity of Manta G-283C (without IR cut filter)

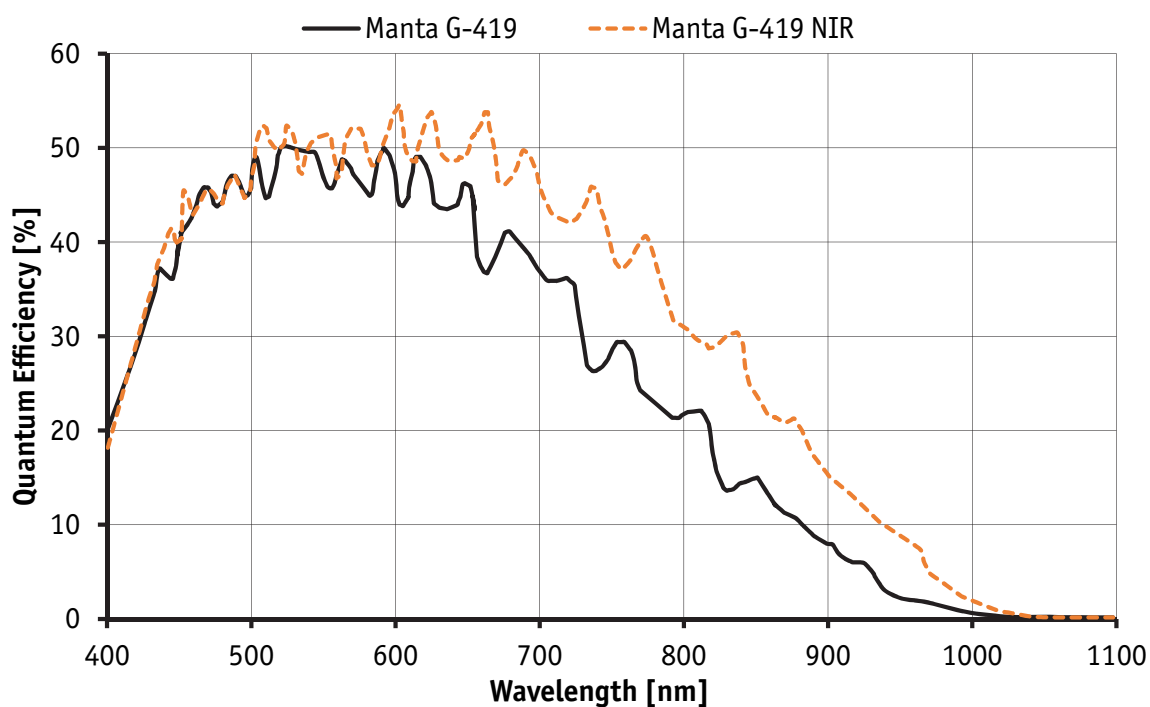


Figure 33: Spectral sensitivity of Manta G-419B

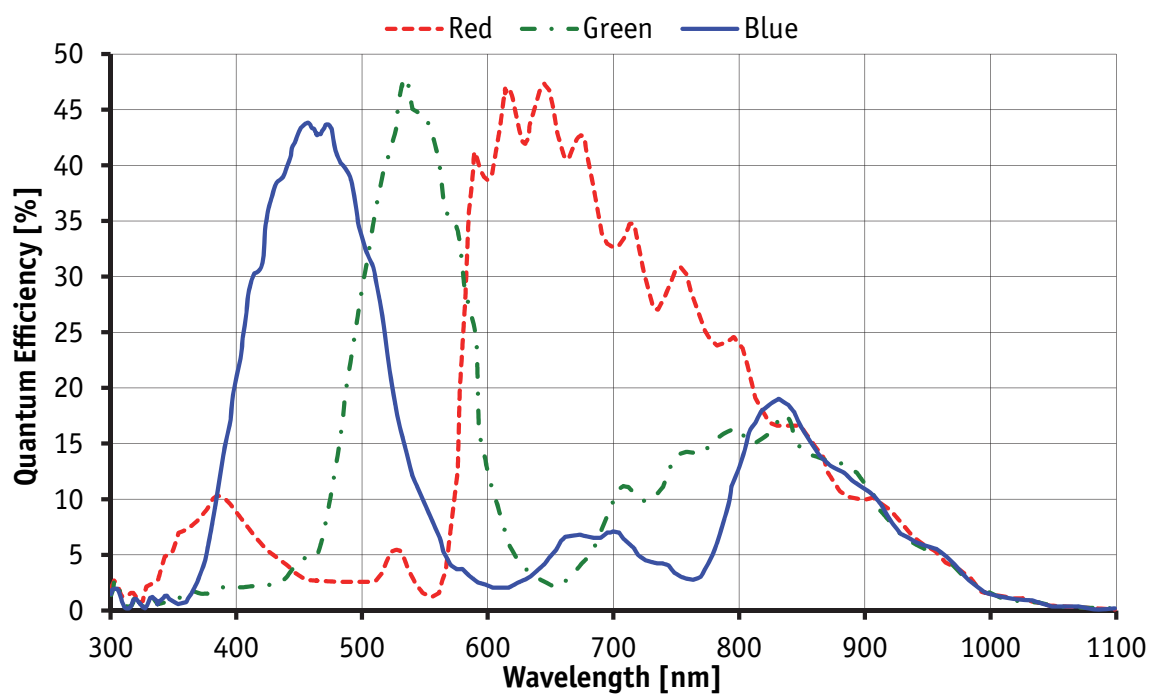


Figure 34: Spectral sensitivity of Manta G-419C (without IR cut filter)

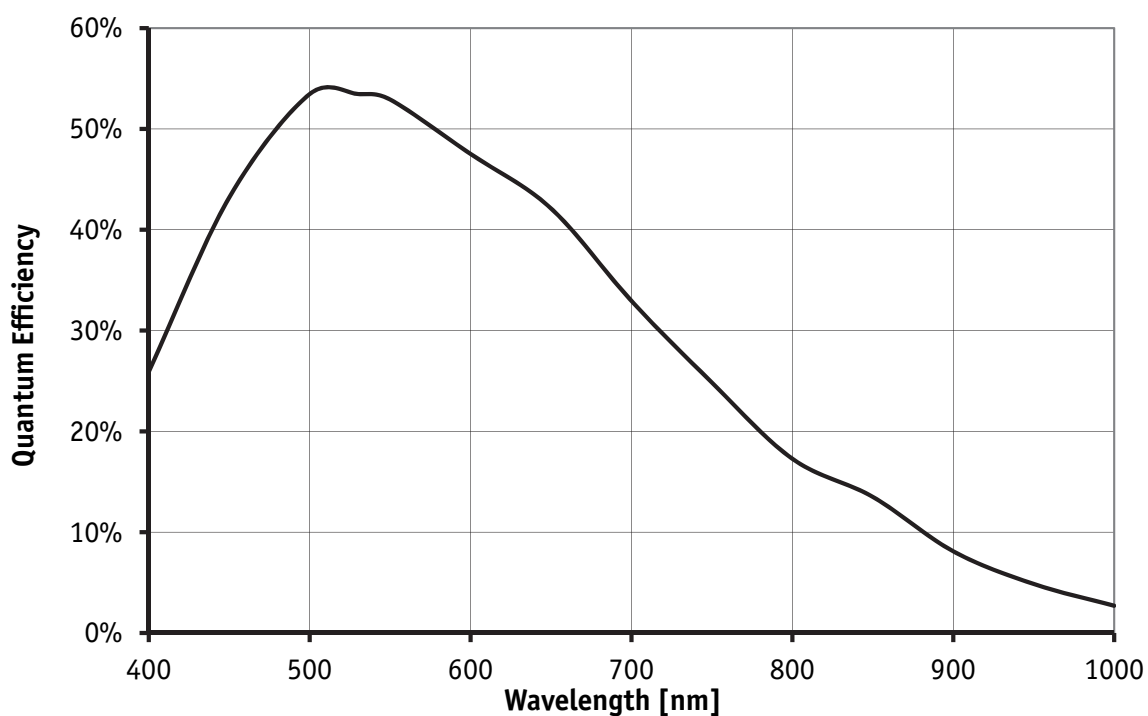


Figure 35: Spectral sensitivity of Manta G-504B

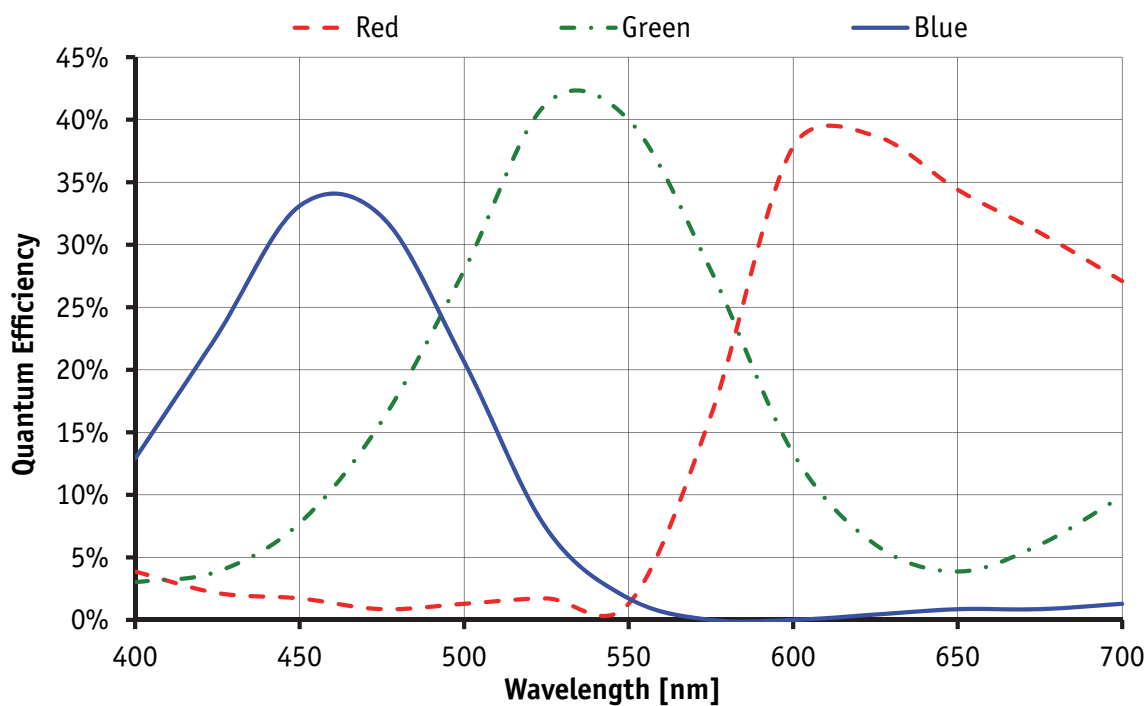


Figure 36: Spectral sensitivity of Manta G-504C (without IR cut filter)

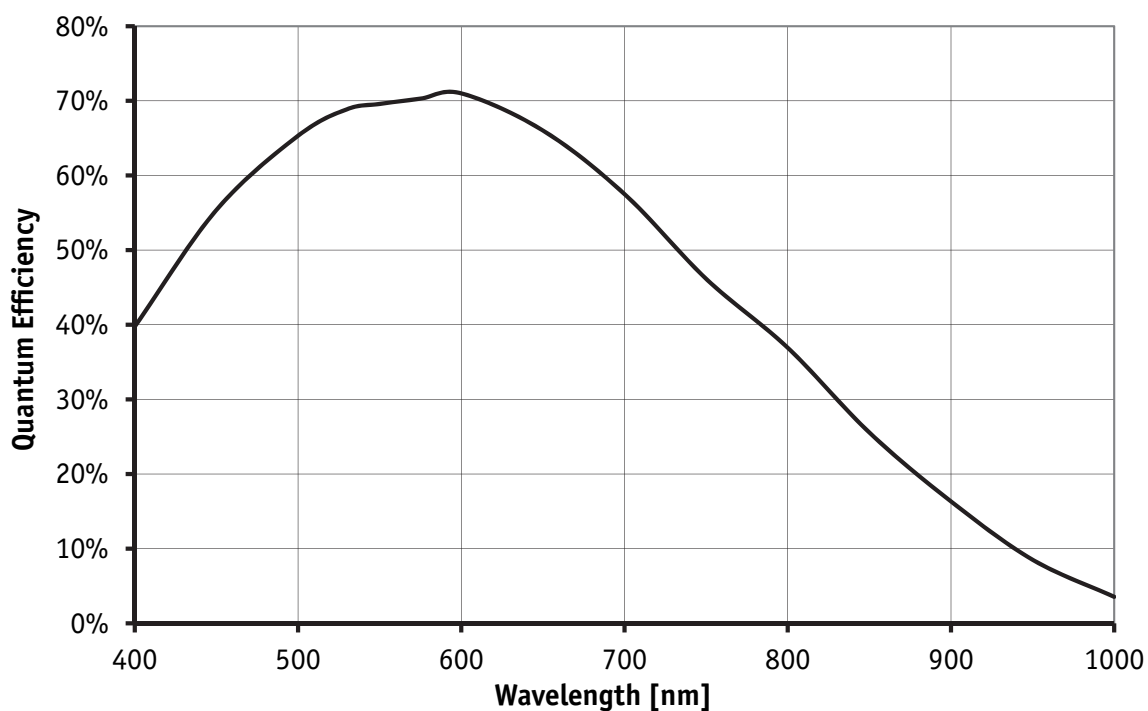


Figure 37: Spectral sensitivity of Manta G-609B

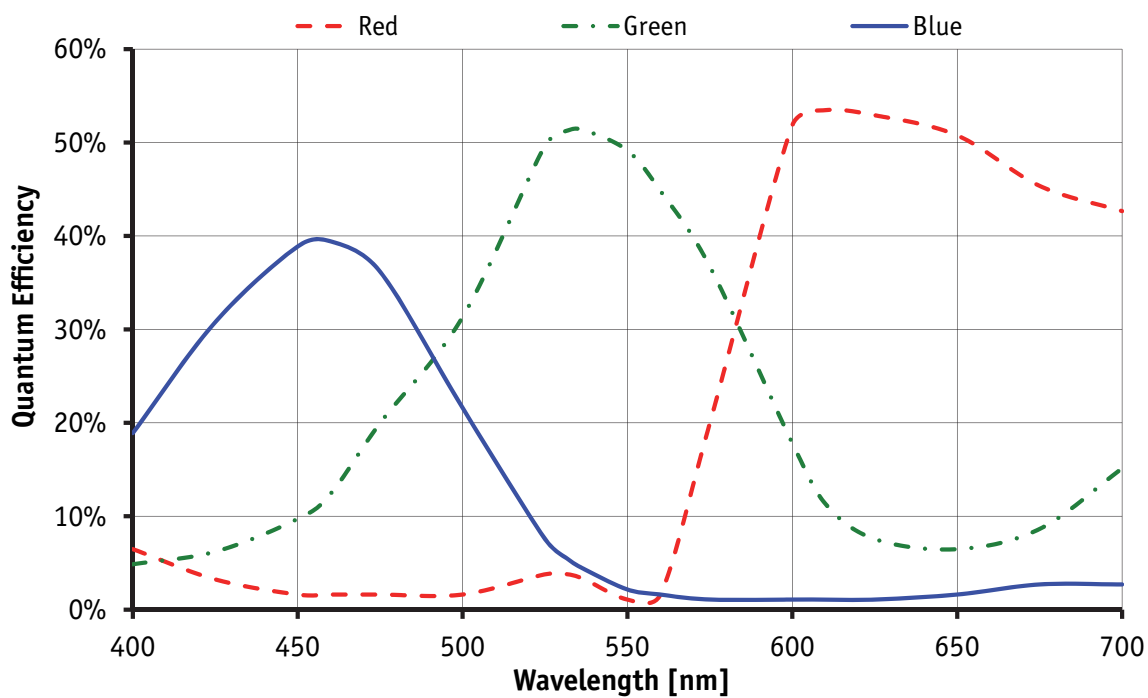


Figure 38: Spectral sensitivity of Manta G-609C (without IR cut filter)

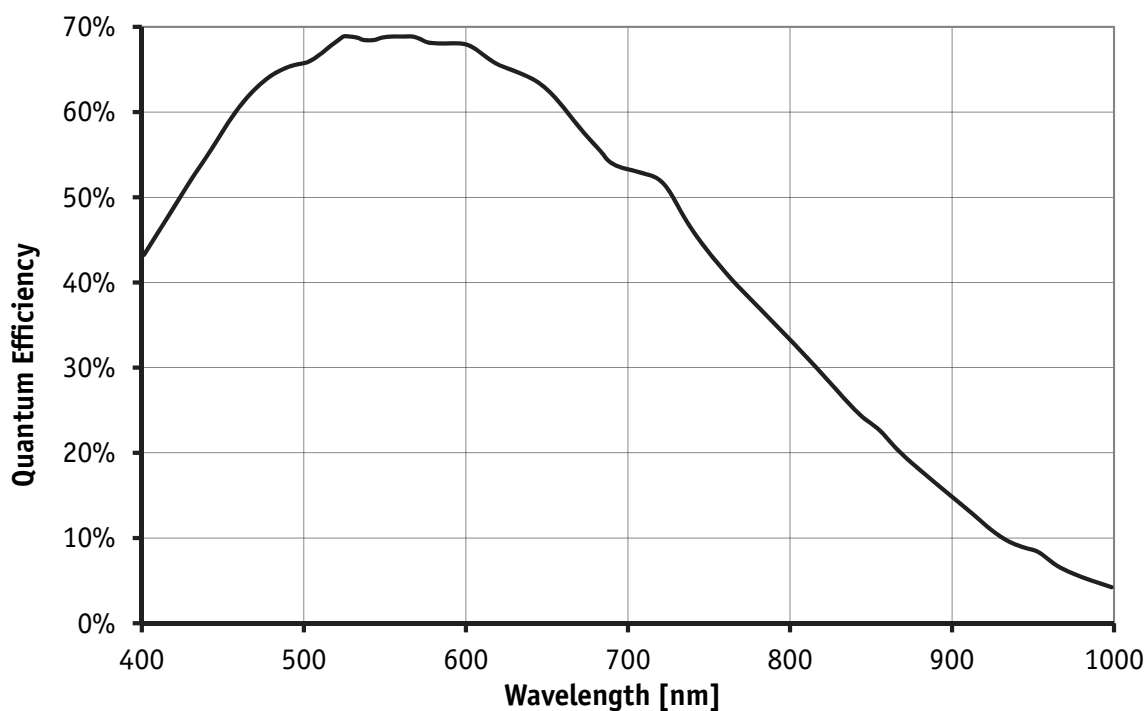


Figure 39: Spectral sensitivity of Manta G-917B

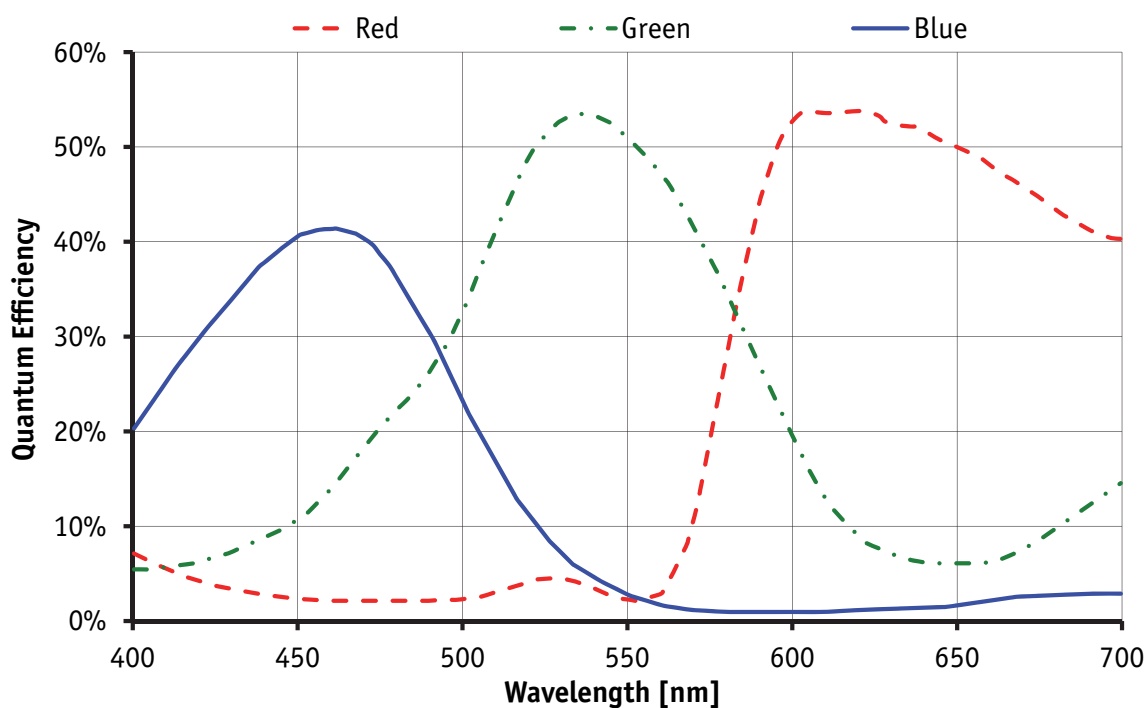


Figure 40: Spectral sensitivity of Manta G-917C (without IR cut filter)

Filter and lenses

- **Monochrome** cameras are equipped with **protection glass**.
- **Color** cameras are equipped with **IR cut filter**.

IR cut filter: spectral transmission

The following illustration shows the spectral transmission of the IR cut filter:

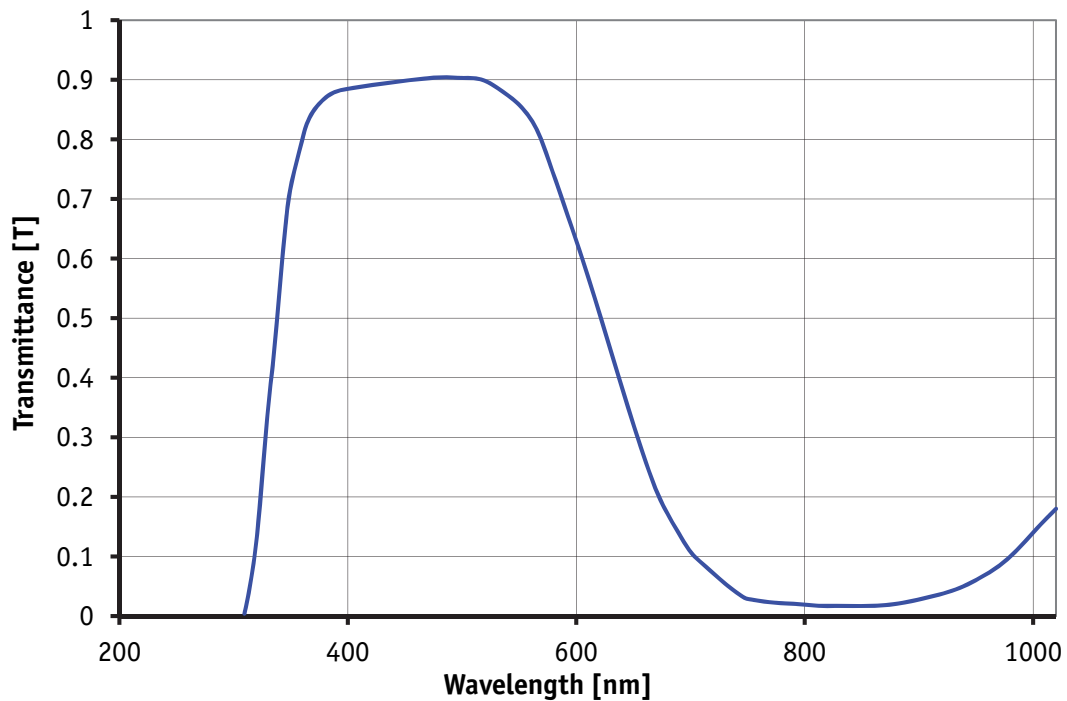


Figure 41: Approximate spectral transmission of IR cut filter (may vary slightly by filter lot)
(type Hoya C5000)

Camera lenses

AVT offers different lenses from a variety of manufacturers.

www



For more information go to:

<http://www.alliedvisiontec.com/emea/products/accessories/lenses.html>

Here you find suitable lenses for AVT camera families and models.

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

Note

Lenses with focal lengths < 8 mm may show shading in the edges of the image due to microlenses on the sensor's pixel.
Ask your dealer if you require non C-Mount lenses.

Focal length for type 1/4 sensors: Manta G-031	Distance = 500 mm	Distance = 1000 mm
2.8 mm	655 mm x 490 mm	1314 mm x 983 mm
4 mm	458 mm x 342 mm	919 mm x 687 mm
6 mm	304 mm x 227 mm	611 mm x 457 mm
8 mm	227 mm x 170 mm	458 mm x 342 mm
12 mm	150 mm x 112 mm	304 mm x 227 mm
16 mm	112 mm x 83 mm	227 mm x 170 mm
25 mm	70 mm x 52 mm	114 mm x 108 mm

Table 20: Focal length vs. field of view (Manta G-031)

Focal length for type 1/3 sensor: Manta G-032	Distance = 500 mm	Distance = 1000 mm
4.0 mm	608 mm x 446 mm	1220 mm x 896 mm
4.8 mm	506 mm x 371 mm	1016 mm x 746 mm
8 mm	301 mm x 221 mm	608 mm x 446 mm
12 mm	199 mm x 146 mm	403 mm x 296 mm
16 mm	148 mm x 109 mm	301 mm x 221 mm
25 mm	93 mm x 68 mm	191 mm x 140 mm
35 mm	65 mm x 48 mm	135 mm x 99 mm

Table 21: Focal length vs. field of view (Manta G-032)

Focal length for type 1/3 sensors: Manta G-095/125	Distance = 500 mm	Distance = 1000 mm
4.0 mm	595 mm x 446 mm	1195 mm x 896 mm
4.8 mm	495 mm x 371 mm	995 mm x 746 mm
8 mm	295 mm x 221 mm	595 mm x 446 mm
12 mm	195 mm x 146 mm	395 mm x 296 mm
16 mm	145 mm x 109 mm	295 mm x 221 mm
25 mm	91 mm x 68 mm	187 mm x 140 mm
35 mm	64 mm x 48 mm	132 mm x 99 mm

Table 22: Focal length vs. field of view (Manta G-095/125)

Focal length for type 1/2 sensors: Manta G-033/046/146 Distance = 500 mm Distance = 1000 mm		
4.8 mm	660 mm x 495 mm	1327 mm x 995 mm
8 mm	394 mm x 295 mm	794 mm x 595 mm
12 mm	260 mm x 195 mm	527 mm x 395 mm
16 mm	194 mm x 145 mm	394 mm x 295 mm
25 mm	122 mm x 91 mm	250 mm x 187 mm
35 mm	85 mm x 64 mm	176 mm x 132 mm
50 mm	58 mm x 43 mm	122 mm x 91 mm

Table 23: Focal length vs. field of view (Manta G-033/046/146)

Focal length for type 1/1.8 sensors: Manta G-201 Distance = 500 mm Distance = 1000 mm		
4.8 mm	740 mm x 549 mm	1488 mm x 1103 mm
8 mm	441 mm x 327 mm	890 mm x 660 mm
12 mm	292 mm x 216 mm	591 mm x 438 mm
16 mm	217 mm x 161 mm	441 mm x 327 mm
25 mm	136 mm x 101 mm	280 mm x 207 mm
35 mm	95 mm x 71 mm	198 mm x 147 mm
50 mm	65 mm x 48 mm	136 mm x 101 mm

Table 24: Focal length vs. field of view (Manta G-201)

Focal length for type 1/1.8 sensors: Manta G-282 Distance = 500 mm Distance = 1000 mm		
4.8 mm	737 mm x 555 mm	1480 mm x 1115 mm
6 mm	588 mm x 443 mm	1183 mm x 891 mm
6.5 mm	542 mm x 408 mm	1091 mm x 822 mm
8 mm	439 mm x 331 mm	885 mm x 667 mm
10 mm	350 mm x 264 mm	707 mm x 533 mm
12 mm	290 mm x 219 mm	588 mm x 443 mm
16 mm	216 mm x 163 mm	439 mm x 331 mm
25 mm	136 mm x 102 mm	278 mm x 210 mm
35 mm	95 mm x 71 mm	197 mm x 148 mm
50 mm	64 mm x 48 mm	136 mm x 102 mm
75 mm	40 mm x 30 mm	88 mm x 66 mm
90 mm	33 mm x 25 mm	72 mm x 54 mm

Table 25: Focal length vs. field of view (Manta G-282)

Focal length for type 2/3 sensors: Manta G-145/504	Distance = 500 mm	Distance = 1000 mm
4.8 mm	908 mm x 681 mm	1825 mm x 1368 mm
8 mm	541 mm x 406 mm	1091 mm x 818 mm
12 mm	358 mm x 268 mm	725 mm x 543 mm
16 mm	266 mm x 200 mm	541 mm x 406 mm
25 mm	167 mm x 125 mm	343 mm x 257 mm
35 mm	117 mm x 88 mm	243 mm x 182 mm
50 mm	79 mm x 59 mm	167 mm x 125 mm

Table 26: Focal length vs. field of view (Manta G-145/504)

Focal length for type 2/3 sensor: Manta G-283	Distance = 500 mm	Distance = 1000 mm
4.8 mm	907 mm x 683 mm	1822 mm x 1373 mm
6 mm	724 mm x 545 mm	1456 mm x 1097 mm
6.5 mm	667 mm x 503 mm	1344 mm x 1012 mm
8 mm	541 mm x 407 mm	1090 mm x 821 mm
10 mm	431 mm x 324 mm	870 mm x 655 mm
12 mm	357 mm x 269 mm	724 mm x 545 mm
16 mm	266 mm x 200 mm	541 mm x 407 mm
25 mm	167 mm x 126 mm	343 mm x 258 mm
35 mm	117 mm x 88 mm	242 mm x 183 mm
50 mm	79 mm x 60 mm	167 mm x 126 mm
75 mm	50 mm x 38 mm	108 mm x 82 mm
90 mm	40 mm x 30 mm	89 mm x 67 mm

Table 27: Focal length vs. field of view (Manta G-283)

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

Table 28: Focal length vs. field of view (Manta G-223)

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

Focal length for type 1 sensor for Manta G-419	Distance = 500 mm	Distance = 1000 mm
8 mm	692 mm x 692mm	1396 mm x 1396 mm
10 mm	552 mm x 552 mm	1114 mm x 1114 mm
12 mm	458 mm x 458 mm	928 mm x 928 mm
16 mm	340 mm x 340 mm	692 mm x 692 mm
25 mm	214 mm x 214 mm	439 mm x 439 mm
35 mm	150 mm x 150 mm	310 mm x 310 mm
50 mm	101 mm x 101 mm	214 mm x 214 mm
75 mm	64 mm x 64 mm	139 mm x 139 mm
90 mm	51 mm x 51 mm	104 mm x 104 mm

Table 29: Focal length vs. field of view (Manta G-419)

Focal length for type 1 sensors for Manta G-609/917	Distance = 500 mm	Distance = 1000 mm
8 mm	768 mm x 616 mm	1549 mm x 1242 mm
10 mm	612 mm x 491 mm	1237 mm x 992 mm
12 mm	508 mm x 407 mm	1028 mm x 825 mm
16 mm	378 mm x 303 mm	768 mm x 616 mm
25 mm	237 mm x 190 mm	487 mm x 391 mm
35 mm	166 mm x 133 mm	344 mm x 276 mm
50 mm	112 mm x 90 mm	237 mm x 190 mm
75 mm	71 mm x 57 mm	154 mm x 124 mm
90 mm	57 mm x 46 mm	126 mm x 101 mm

Table 30: Focal length vs. field of view (Manta G-609/917)

Camera dimensions (type A)

Note



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

Manta type A cameras: G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504

Manta type B cameras: G-223 / 282 / 283 / 419 / 609 / 917, see [Camera dimensions \(type B\)](#) on page 96.

Note



For information on **sensor position accuracy:**

(sensor shift x/y, optical back focal length z and sensor rotation α) see [Sensor position accuracy of AVT Manta cameras](#) on page 153.

Tripod adapter

This tripod adapter (AVT order number 5153) ...

- ... can be used for Manta cameras (type A and type B).
- ... is only designed for standard housings.

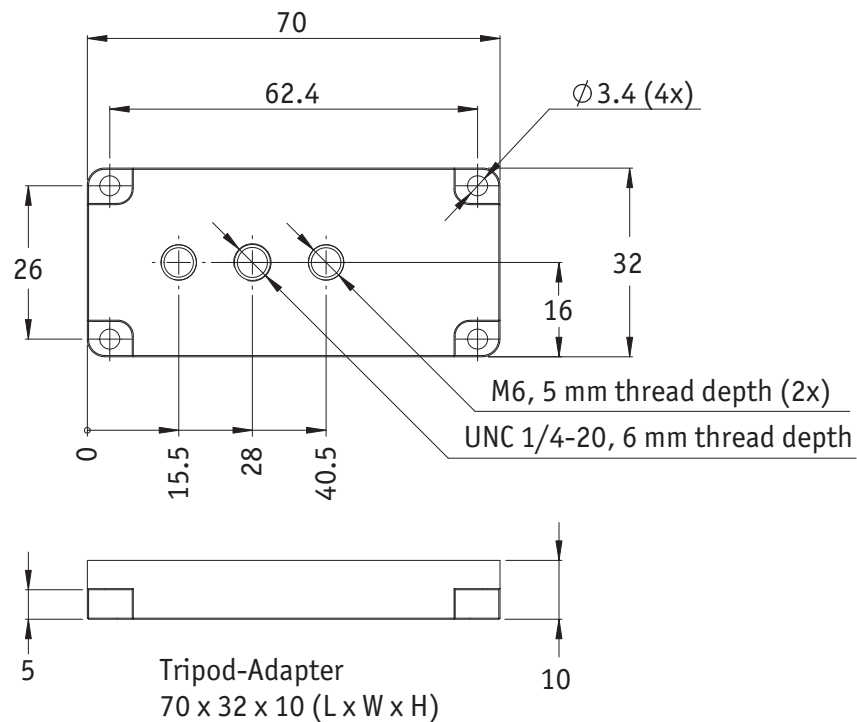


Figure 42: Tripod dimensions

MANTA standard housing (type A)

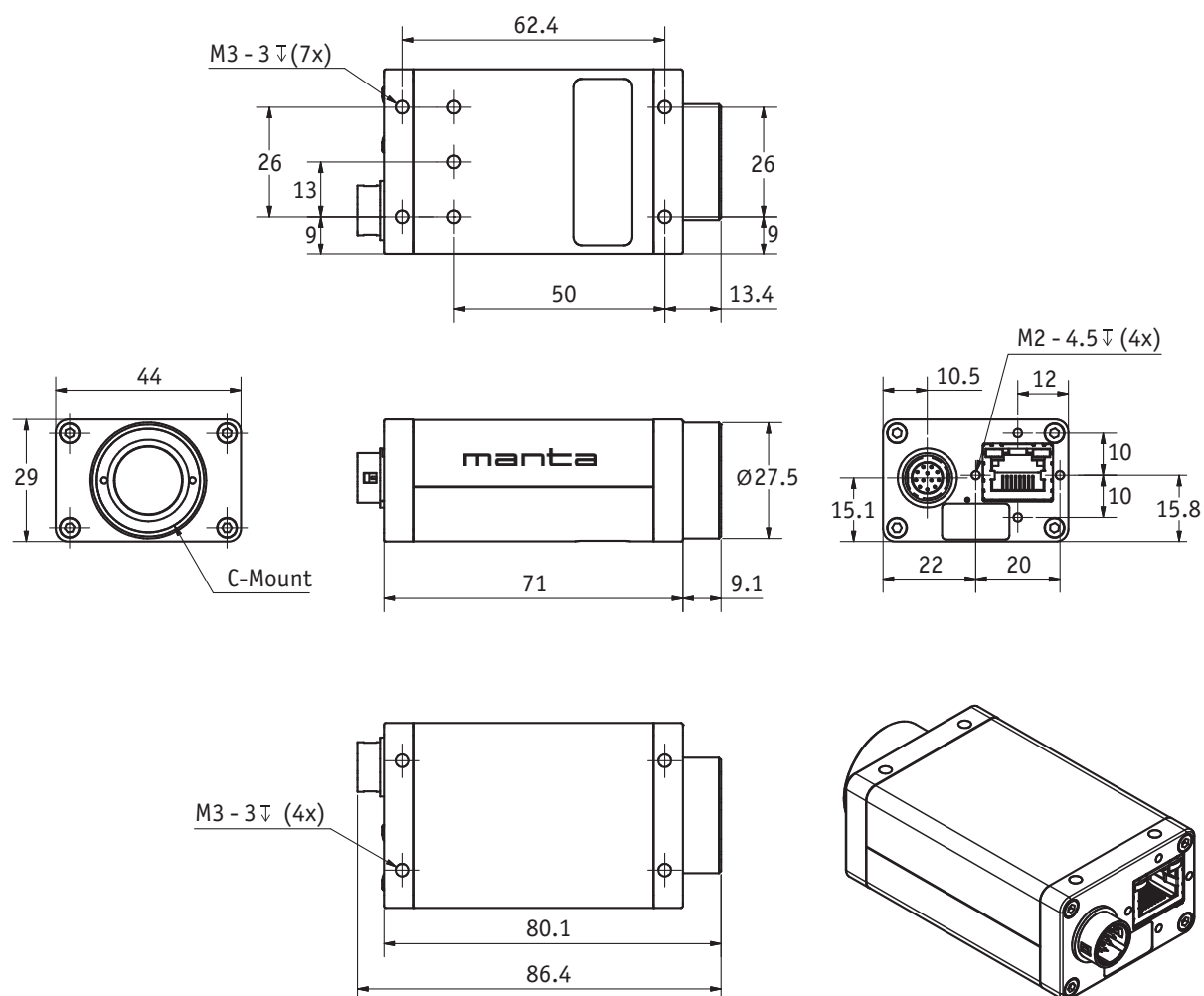


Figure 43: Camera dimensions standard housing type A
G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504

Manta standard angled-head housings (type A)

Manta W90

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

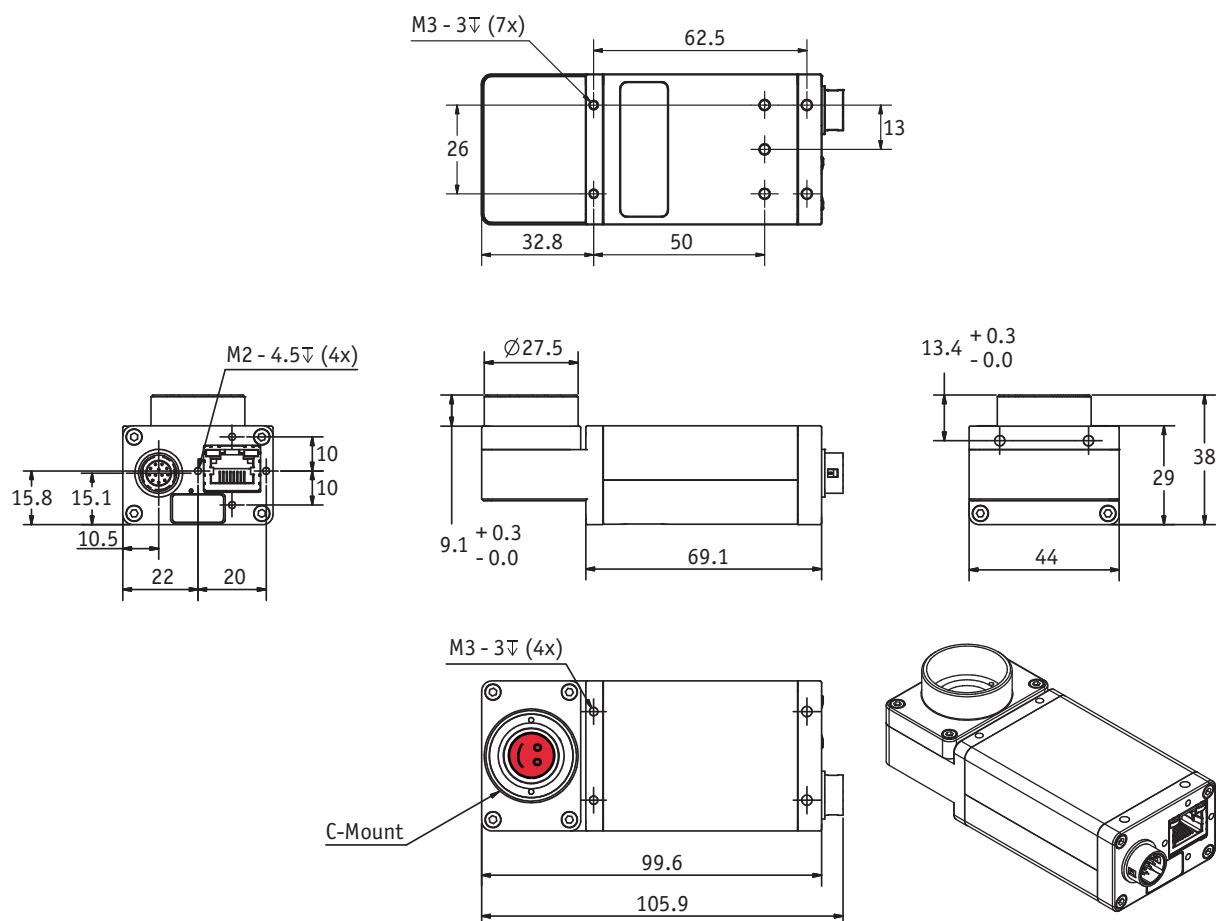


Figure 44: Manta W90 (type A)

Manta W90 S90

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

The sensor is also rotated by 90 degrees clockwise.

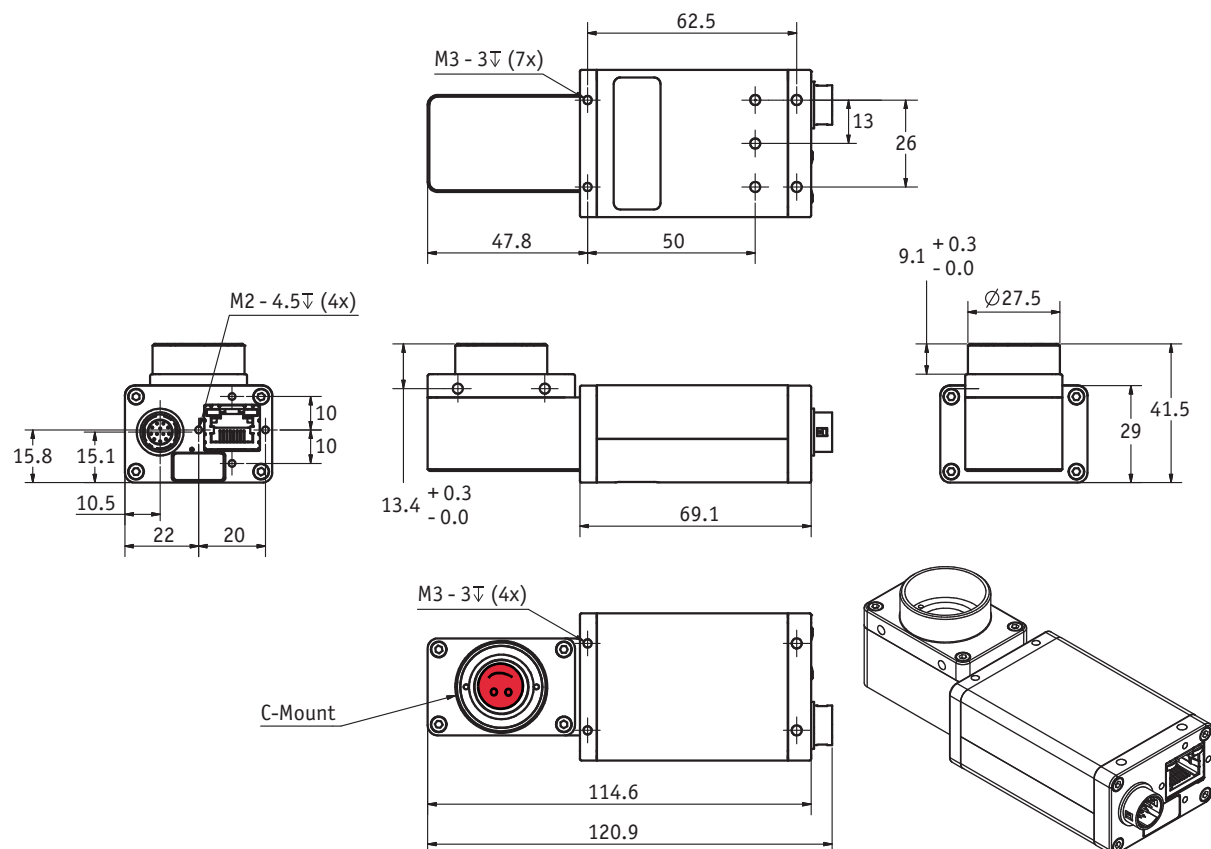


Figure 45: Manta W90 S90 (type A)

Manta W270

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

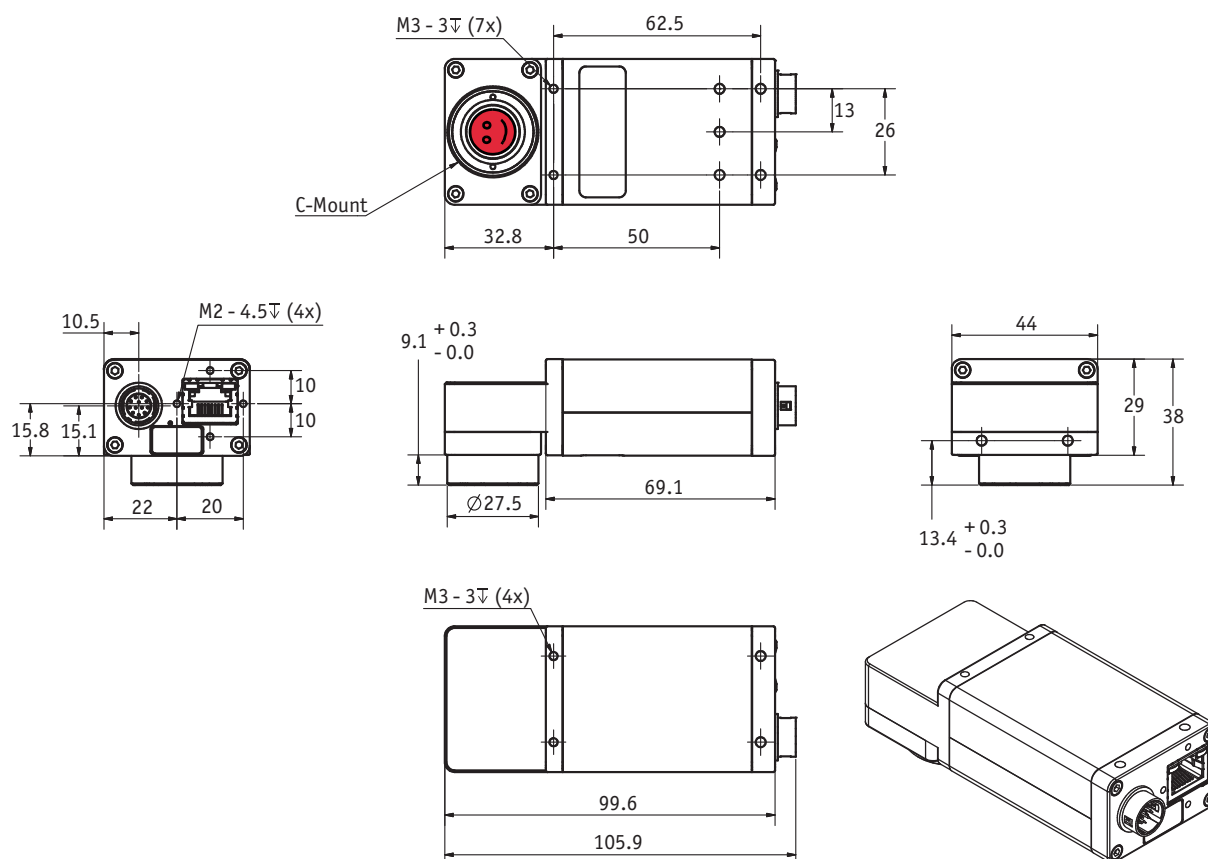


Figure 46: Manta W270 (type A)

Manta W270 S90

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

The sensor is also rotated by 90 degrees clockwise.

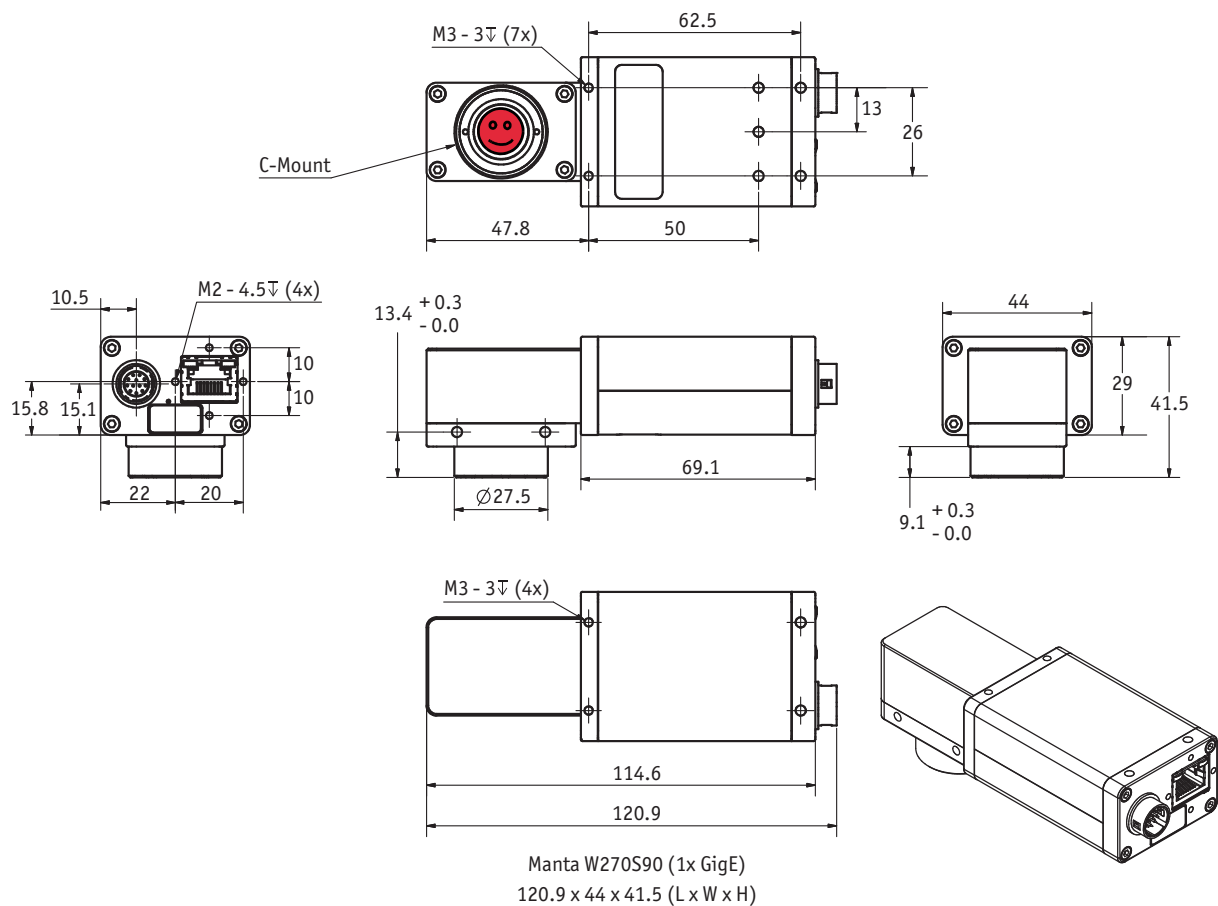


Figure 47: Manta W270 S90 (type A)

Cross section: C-Mount (type A cameras)

- All monochrome Manta cameras are equipped with a protection glass.
- All color Manta cameras are equipped with the same IR cut filter.

Note

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

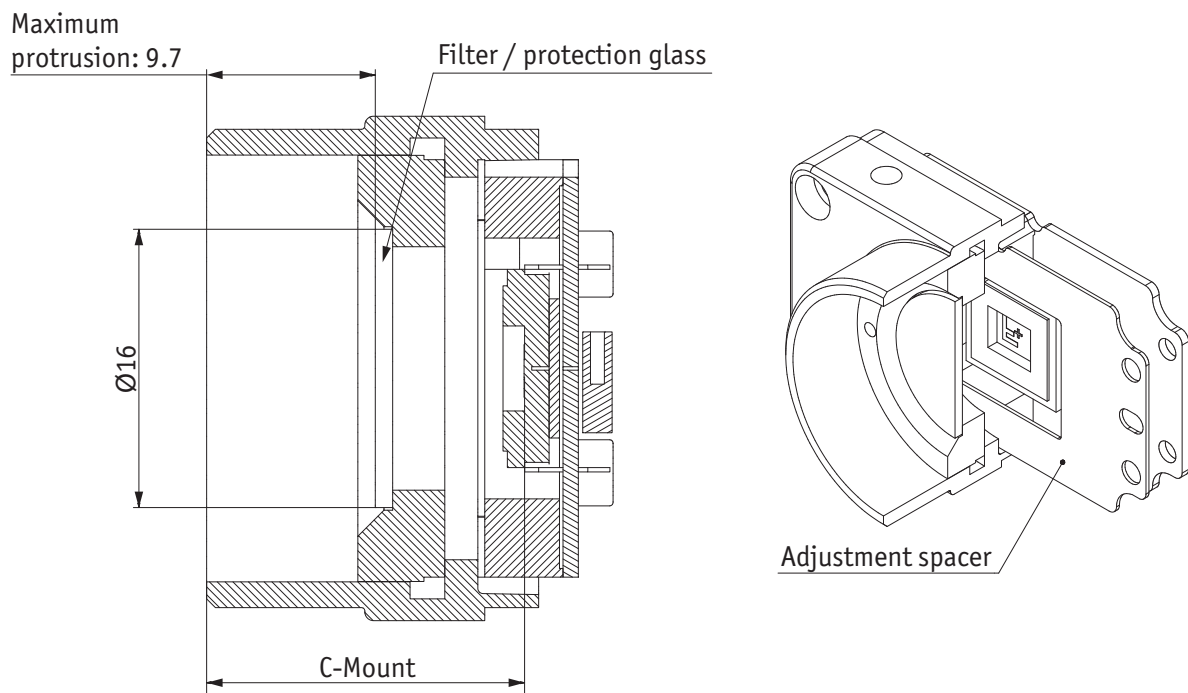


Figure 48: Manta C-Mount dimensions (16 mm filter, type A)

Cross section: CS-Mount (type A)

www



Choose protection glass or filter according to the
AVT Modular Camera Concept.

<http://www.alliedvisiontec.com/emea/support/downloads/product-literature/manta.html>

Note



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

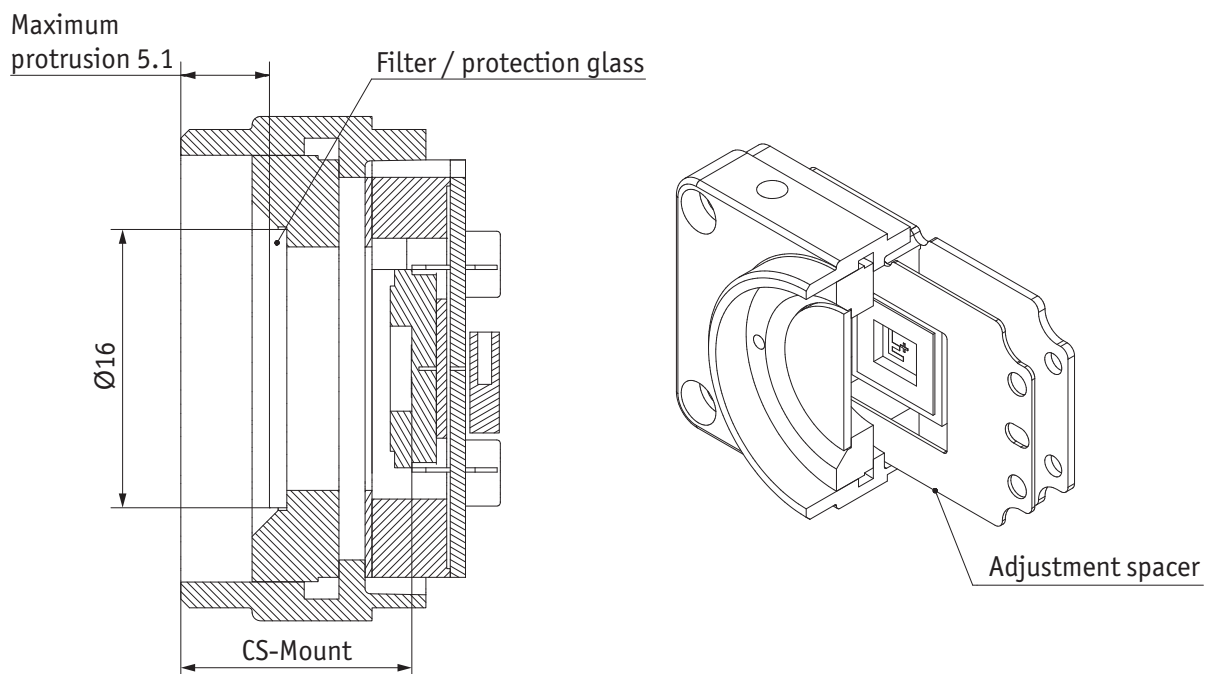


Figure 49: Manta CS-Mount dimensions (type A)

Adjustment of the CS-Mount

The dimensional adjustment cannot be done by the customer. All modifications have to be done by the AVT factory.

Note



If you need any modifications, please contact Customer

Care: For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Manta standard board level variants (type A)

Note

Only type A Manta cameras are available as board level version.



Manta board level (non-PoE): dimensions

13-pole I/O connector:

Molex PicoBlade

Vertical Header 53047-1310

Receptacle Housing 51021-1300

Crimp Terminal 13 x 50079-8000

1 = GND (for RS232, Ext PWR)

2 = Ext PWR input

3 = Video Type Auto Iris Out

4 = Input 1

5 = not used

6 = Output 1

7 = GND (for Inputs)

8 = Rx D 9 = Tx D

10 = Power Input (for Output ports)

11 = Input 2

12 = Output 2

13 = Chassis GND

FFC45 cable length:

FFC45 L = 56 mm K7500307

FFC45 L = 110 mm K7500318

FFC45 L = 152 mm 1817

FFC45 L = 200 mm 1824

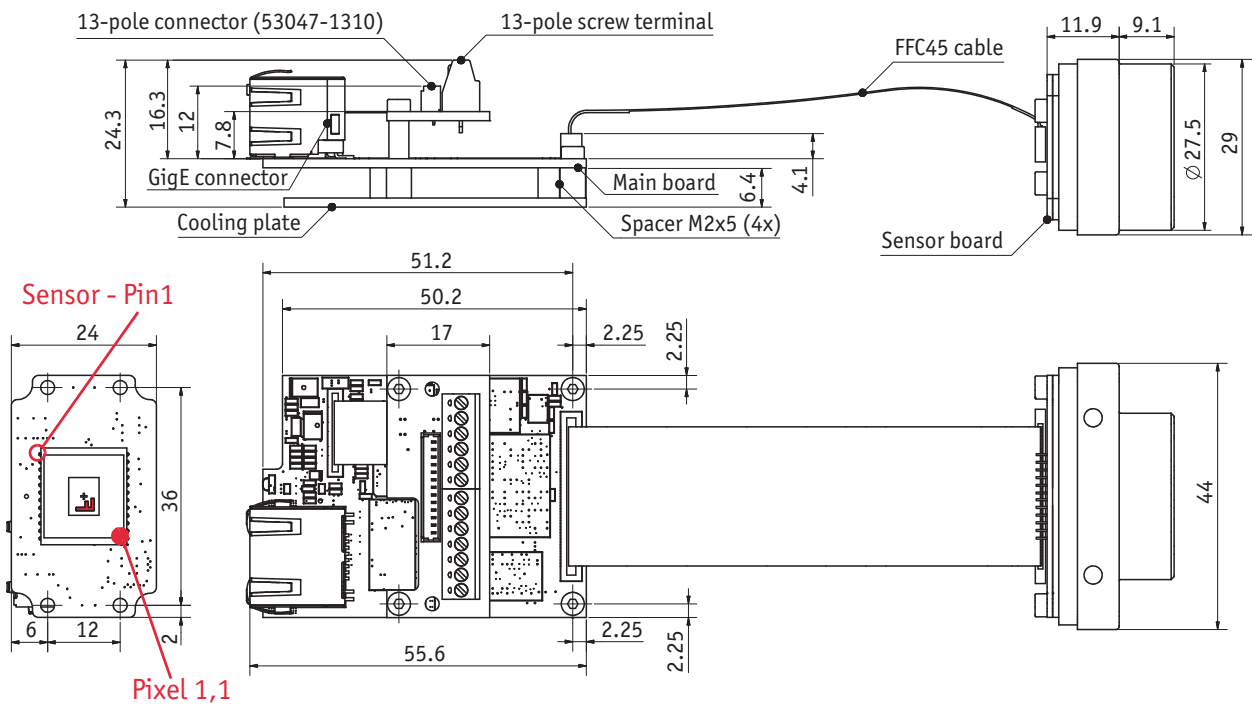


Figure 50: Manta board level (non-PoE) dimensions

Manta board level (PoE): dimensions

13-pole I/O connector:

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

1 = GND (for RS232, Ext PWR) 7 = GND (for Inputs)
2 = Ext PWR input 8 = Rx D 9 = Tx D
3 = Video Type Auto Iris Out 10 = Power Input (for Output ports)
4 = Input 1 11 = Input 2
5 = not used 12 = Output 2
6 = Output 1 13 = Chassis GND

FFC45 cable length:

FFC45 L = 56 mm K7500307
FFC45 L = 110 mm K7500318
FFC45 L = 152 mm 1817
FFC45 L = 200 mm 1824

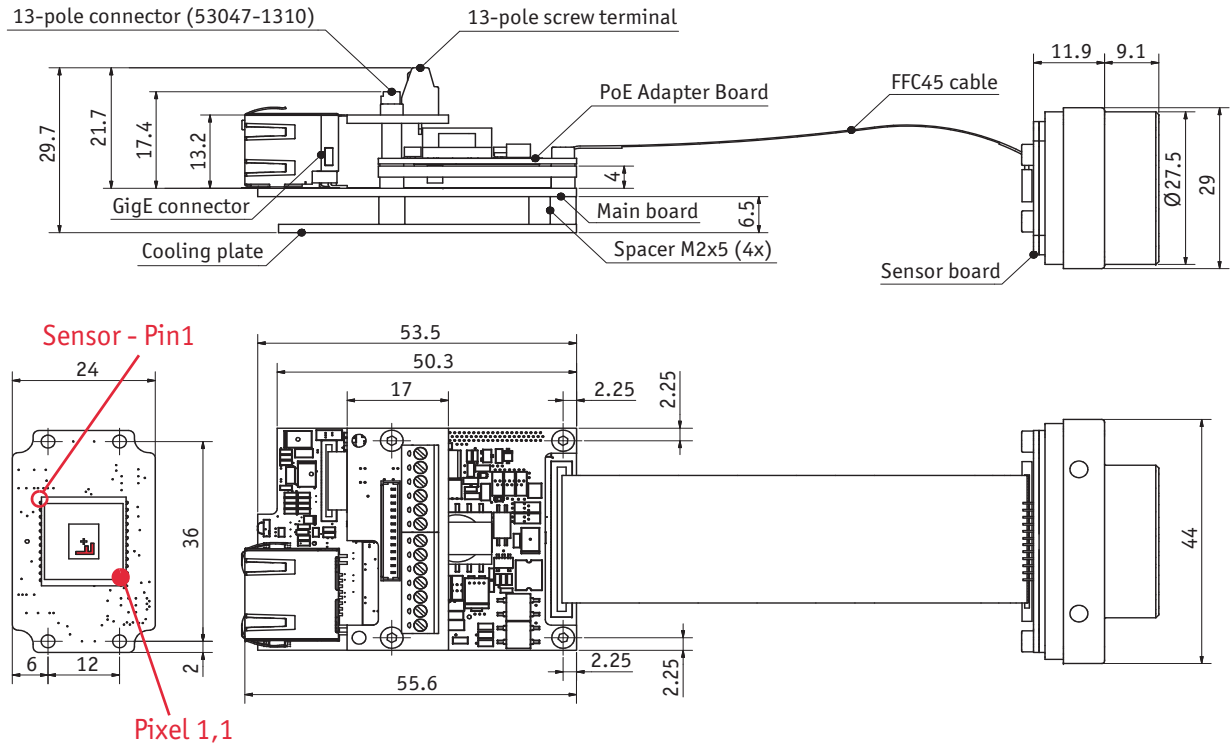


Figure 51: Manta board level (PoE) dimensions

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

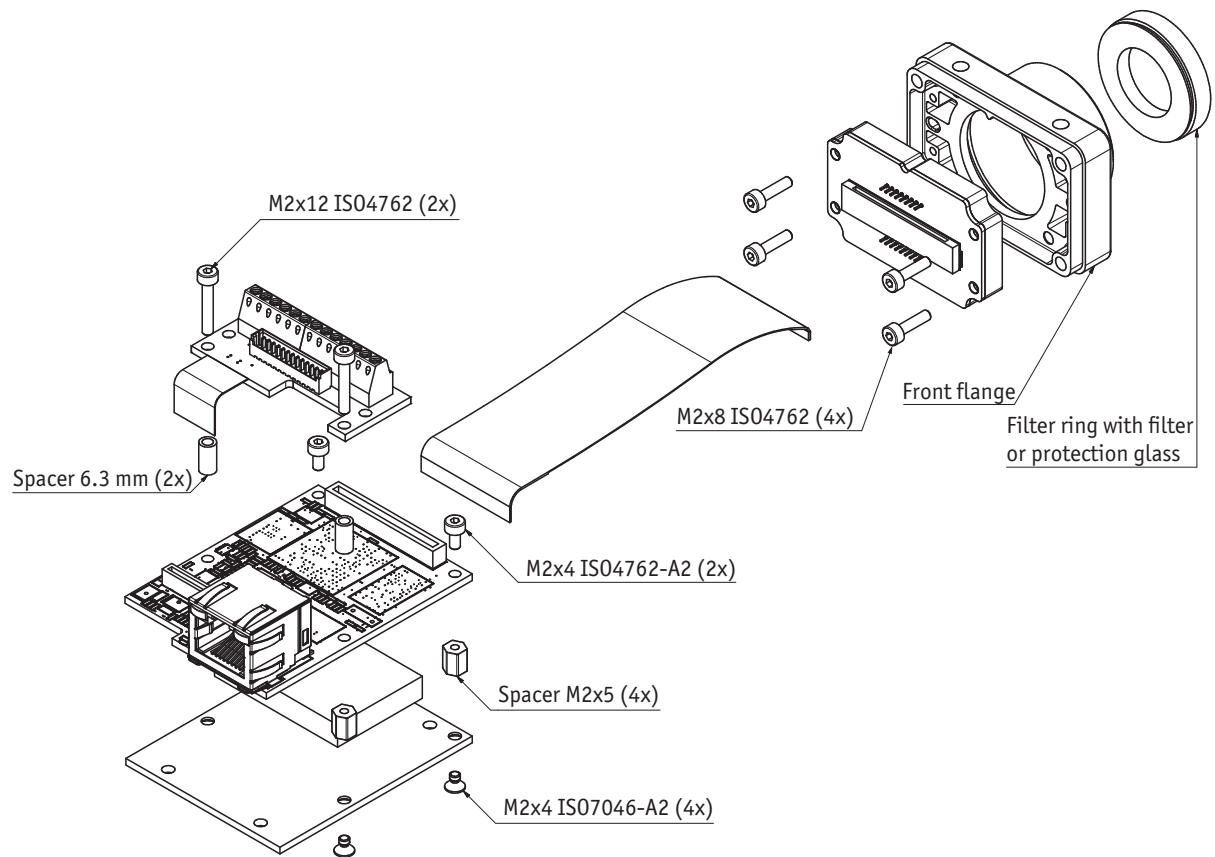


Figure 52: Manta board level (non-PoE): C-Mount

The dimensional adjustment cannot be done by the customer. All adjustments have to be done by the AVT factory.

Note



If you need any adjustments, please contact Customer Care:

For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Manta board level (PoE): C-Mount

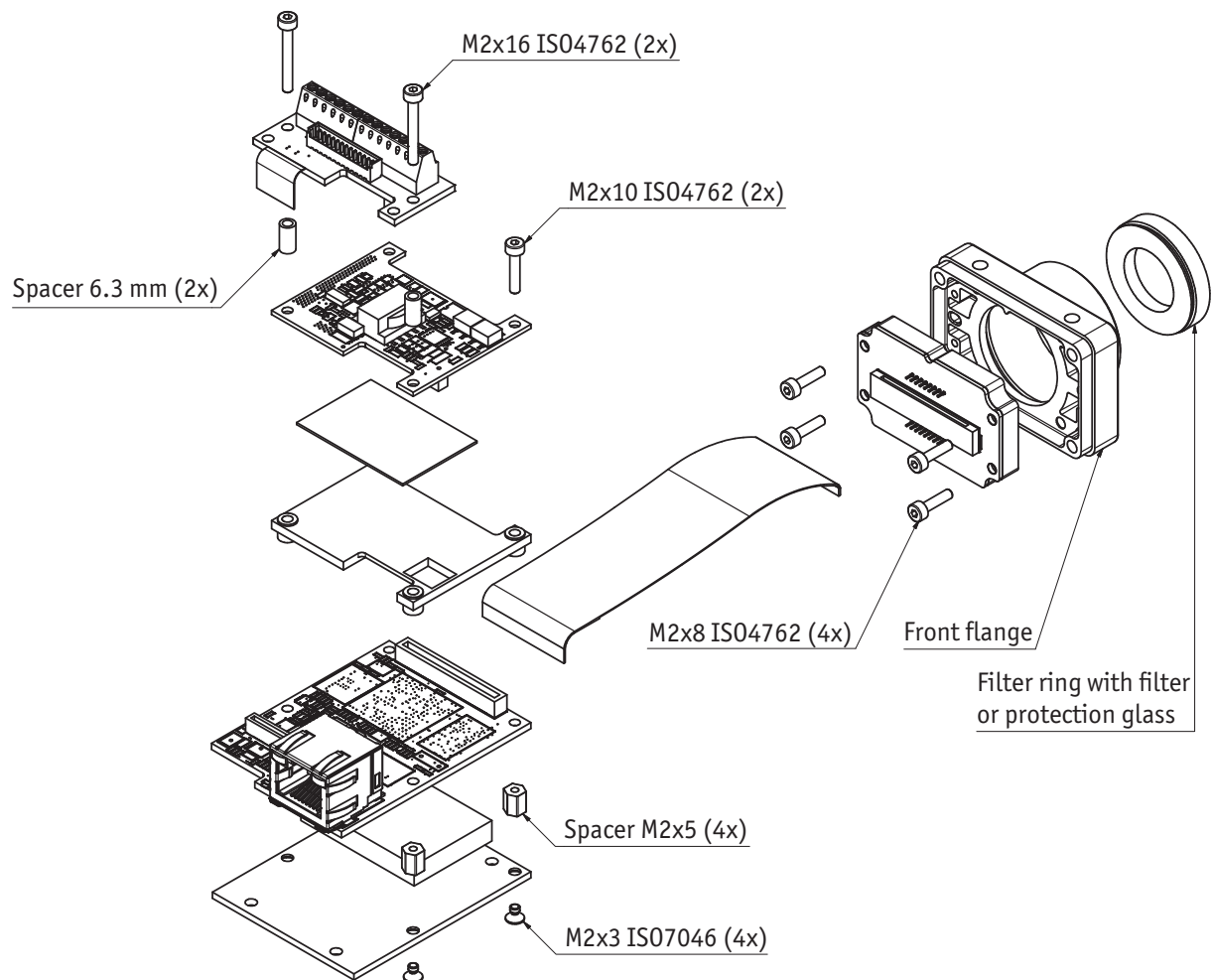


Figure 53: Manta board level (PoE): C-Mount

The dimensional adjustment cannot be done by the customer. All adjustments have to be done by the AVT factory.

Note



If you need any adjustments, please contact Customer Care:
For phone numbers and e-mail:
See [Contacting Allied Vision Technologies](#) on page 6.

Manta board level (non-PoE): CS-Mount

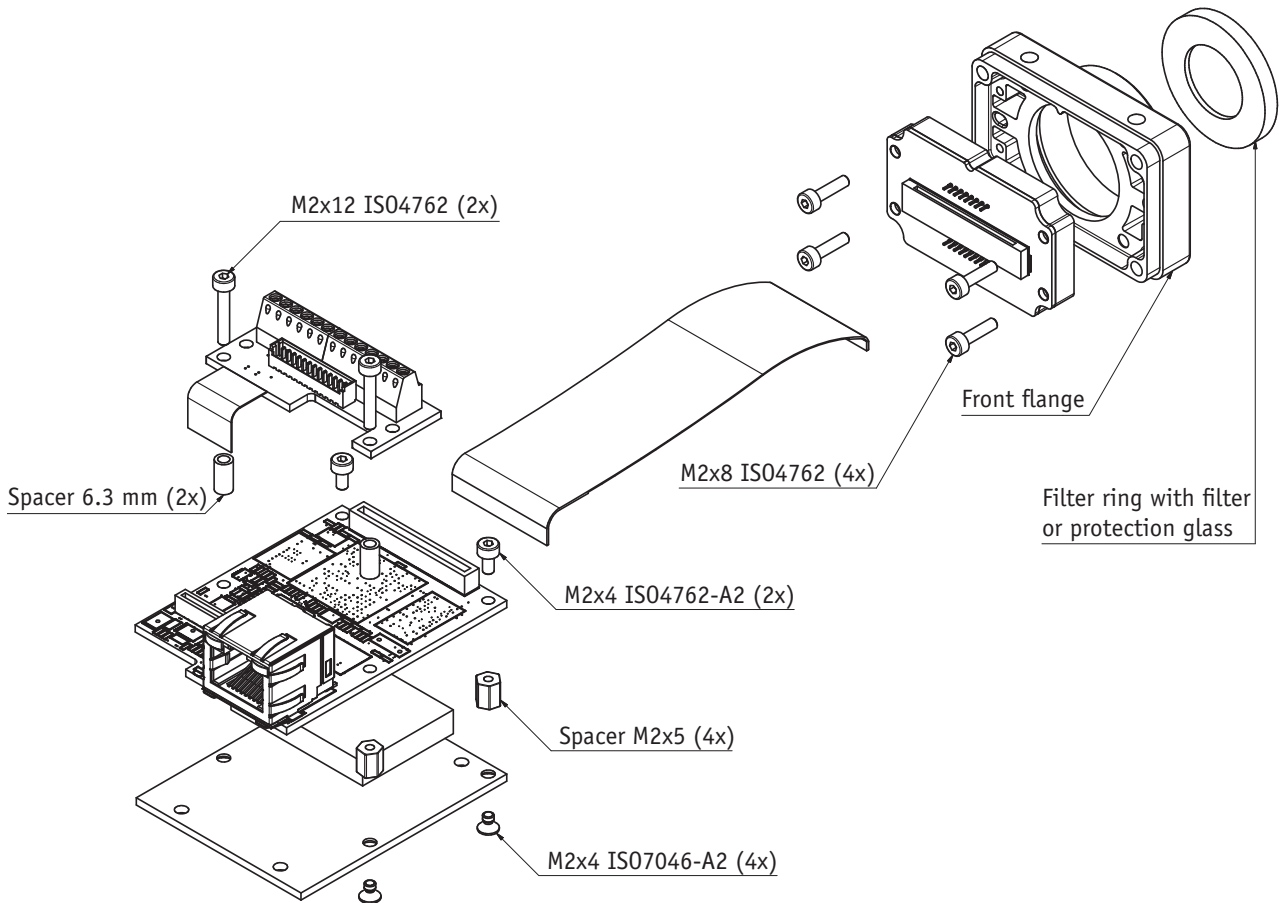


Figure 54: Manta board level (non-PoE): CS-Mount

The dimensional adjustment cannot be done by the customer. All adjustments have to be done by the AVT factory.

Note



If you need any adjustments, please contact Customer Care:

For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Manta board level (PoE): CS-Mount

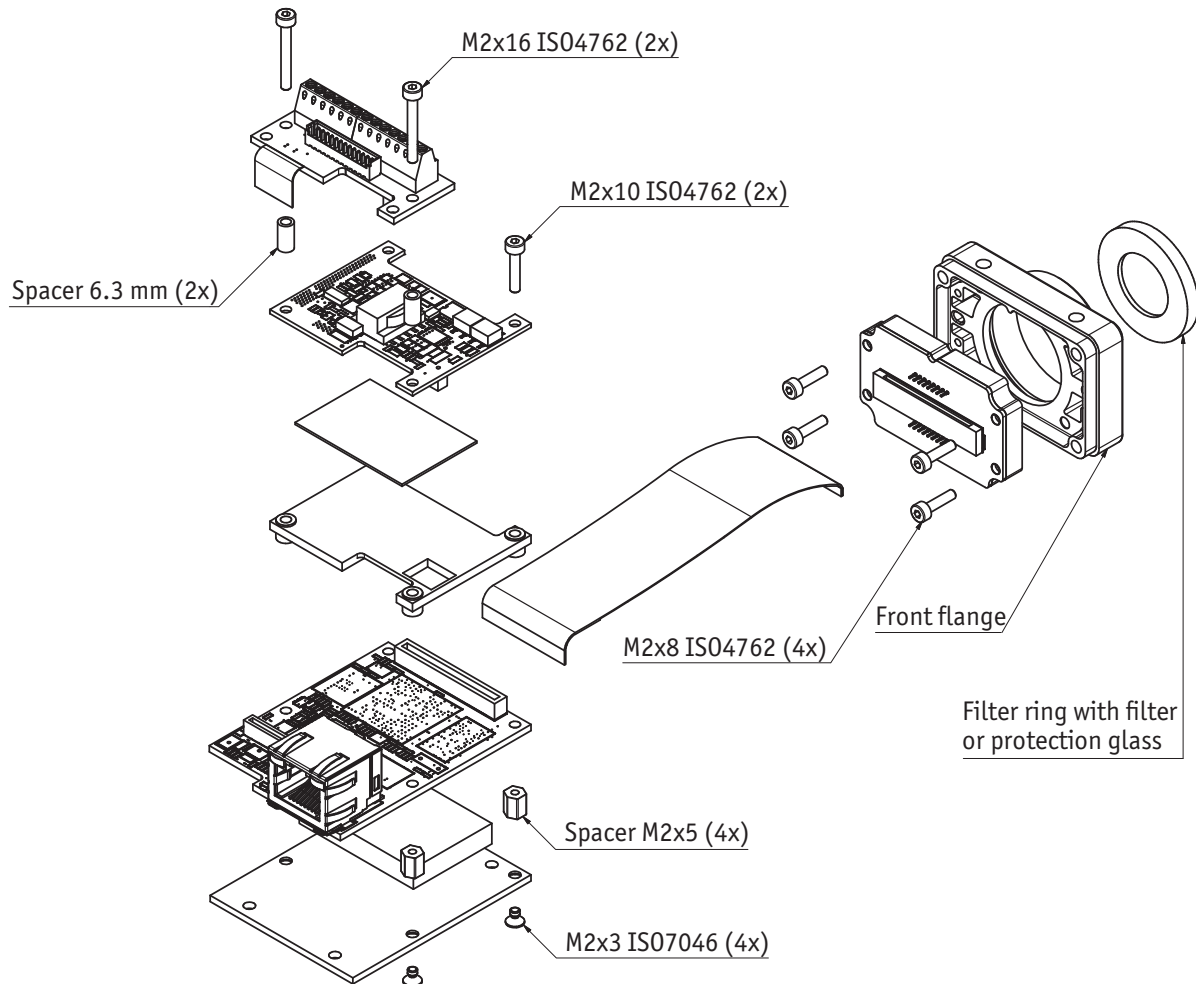


Figure 55: Manta board level (PoE): CS-Mount

The dimensional adjustment cannot be done by the customer. All adjustments have to be done by the AVT factory.

Note

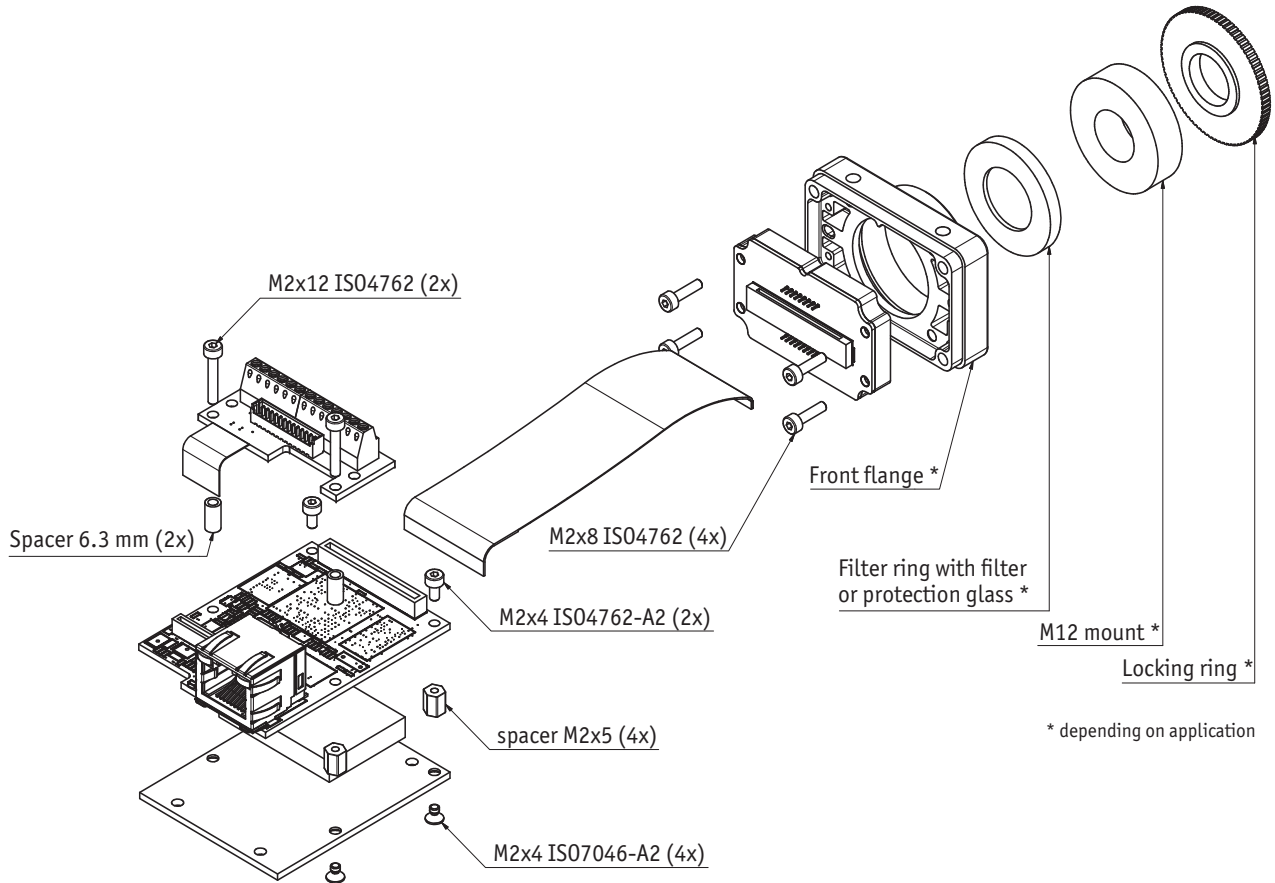


If you need any adjustments, please contact Customer Care:

For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

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



* depending on application

Figure 56: Manta board level (non-PoE): M12-Mount

The dimensional adjustment cannot be done by the customer (depending on application). All adjustments have to be done by the AVT factory.

Note



If you need any adjustments, please contact Customer Care:

For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Manta board level (PoE): M12-Mount

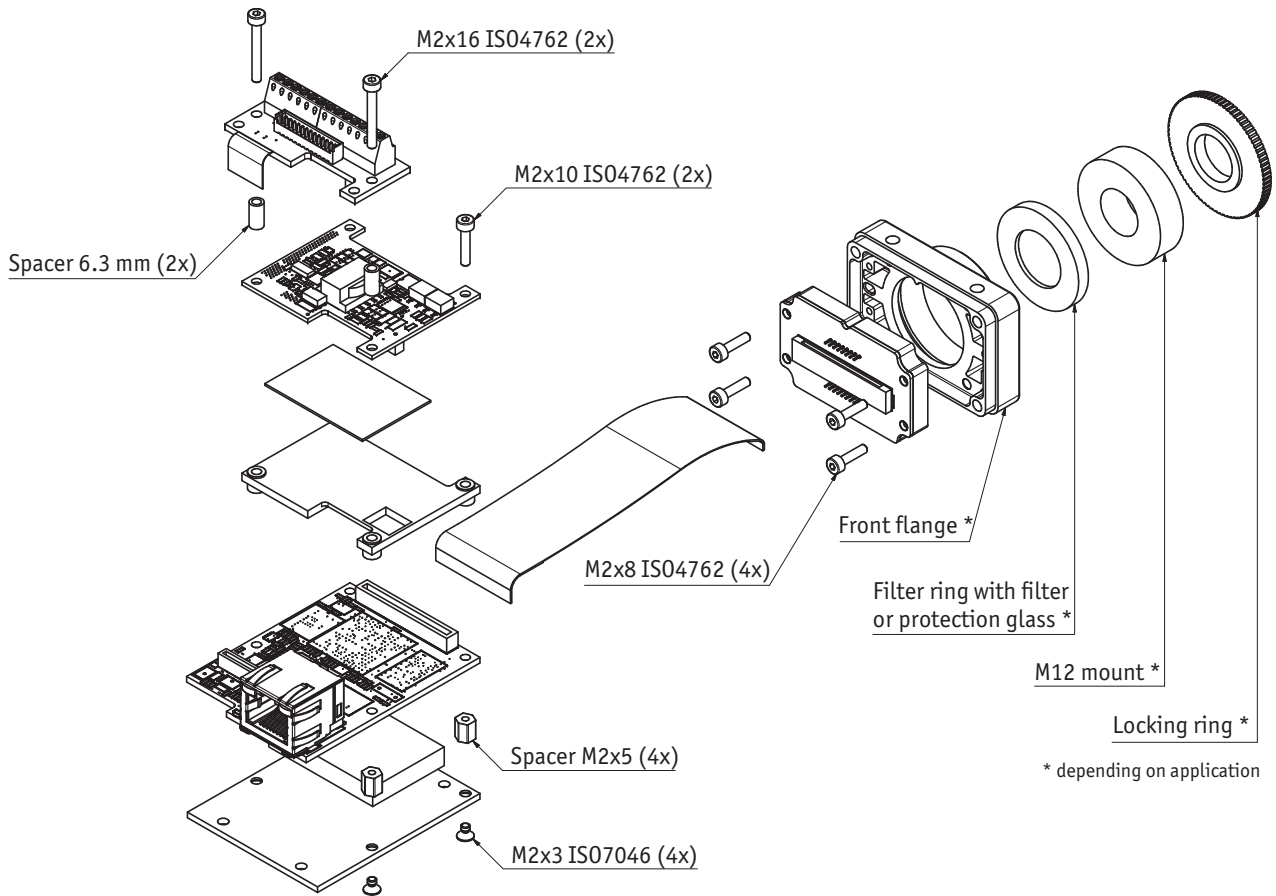


Figure 57: Manta board level (PoE): M12-Mount

The dimensional adjustment cannot be done by the customer (depending on application). All adjustments have to be done by the AVT factory.

Note



If you need any adjustments, please contact Customer Care:

For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Camera dimensions (type B)

Note



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

Manta type A cameras: G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504, see [Camera dimensions \(type A\)](#) on page 80

Manta type B cameras: G-223 / 282 / 283 / 419 / 609 / 917

Note



For information on **sensor position accuracy:**

(sensor shift x/y, optical back focal length z and sensor rotation α) see [Sensor position accuracy of AVT Manta cameras](#) on page 153.

Tripod adapter

This five hole tripod adapter (AVT order number 5153) ...

- ... can be used for Manta cameras (type A and type B).
- ... is only designed for standard housings.

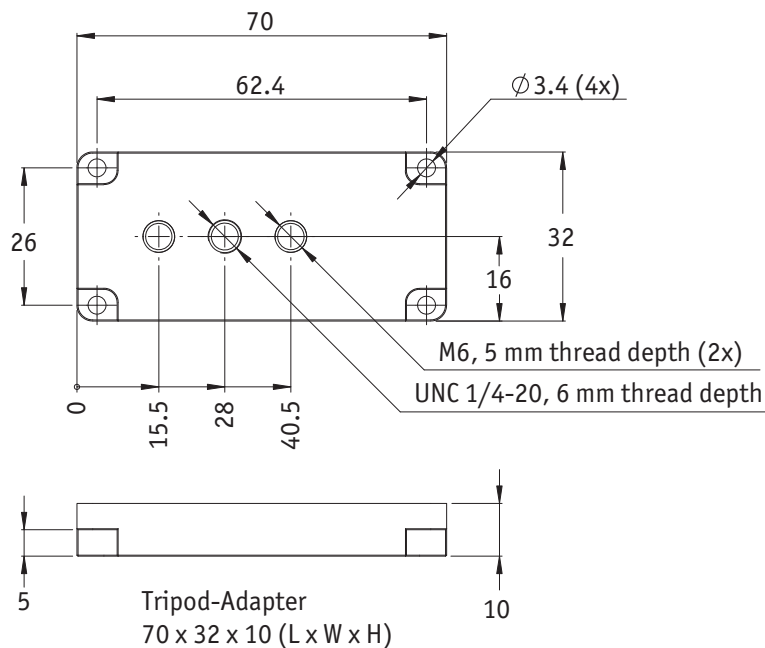


Figure 58: Tripod dimensions

Manta standard housing (type B)

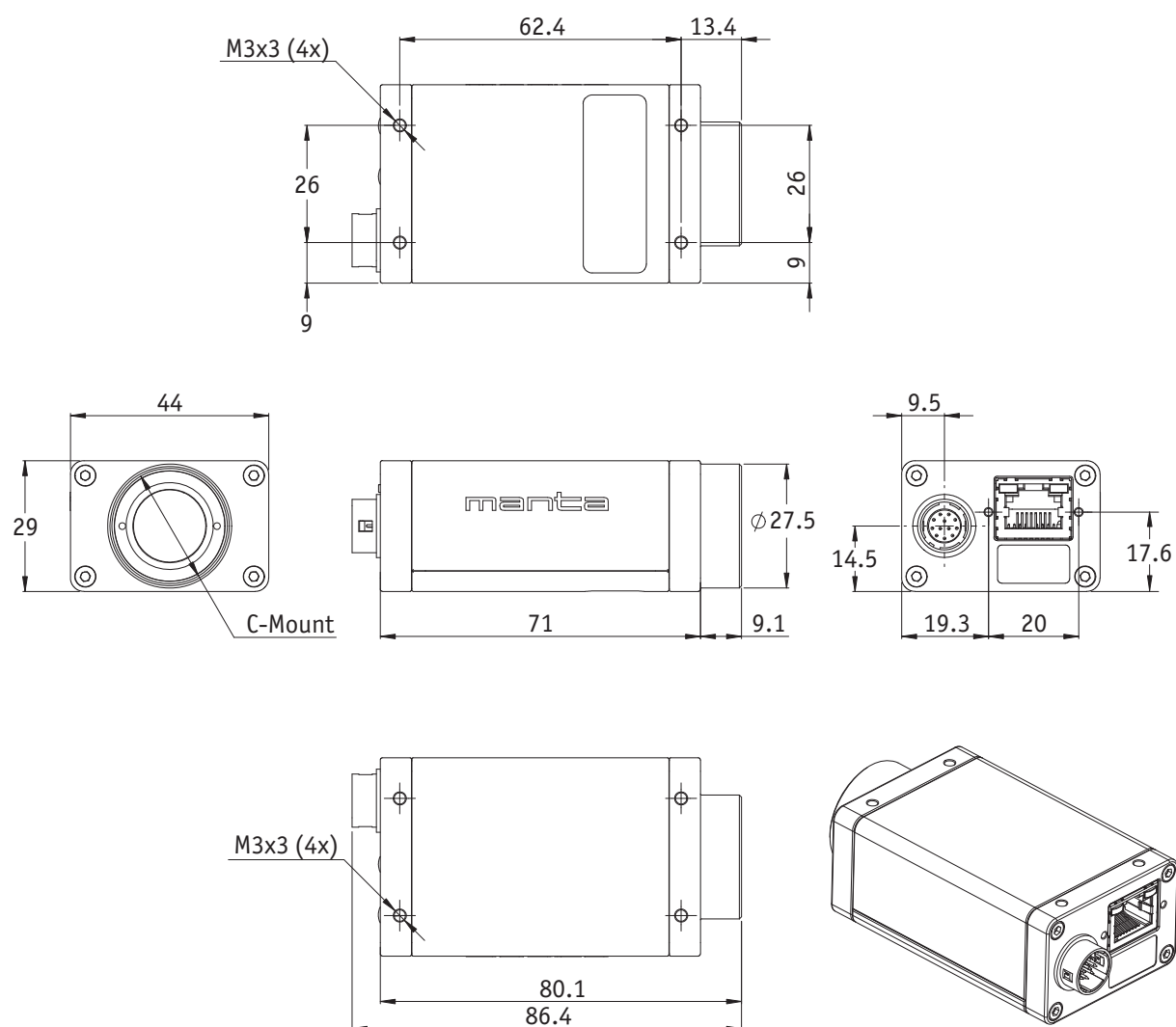


Figure 59: Camera dimensions type B
G-223 / 282 / 283 / 419 / 609 / 917

Manta angled-head housings (type B)

Manta W90

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

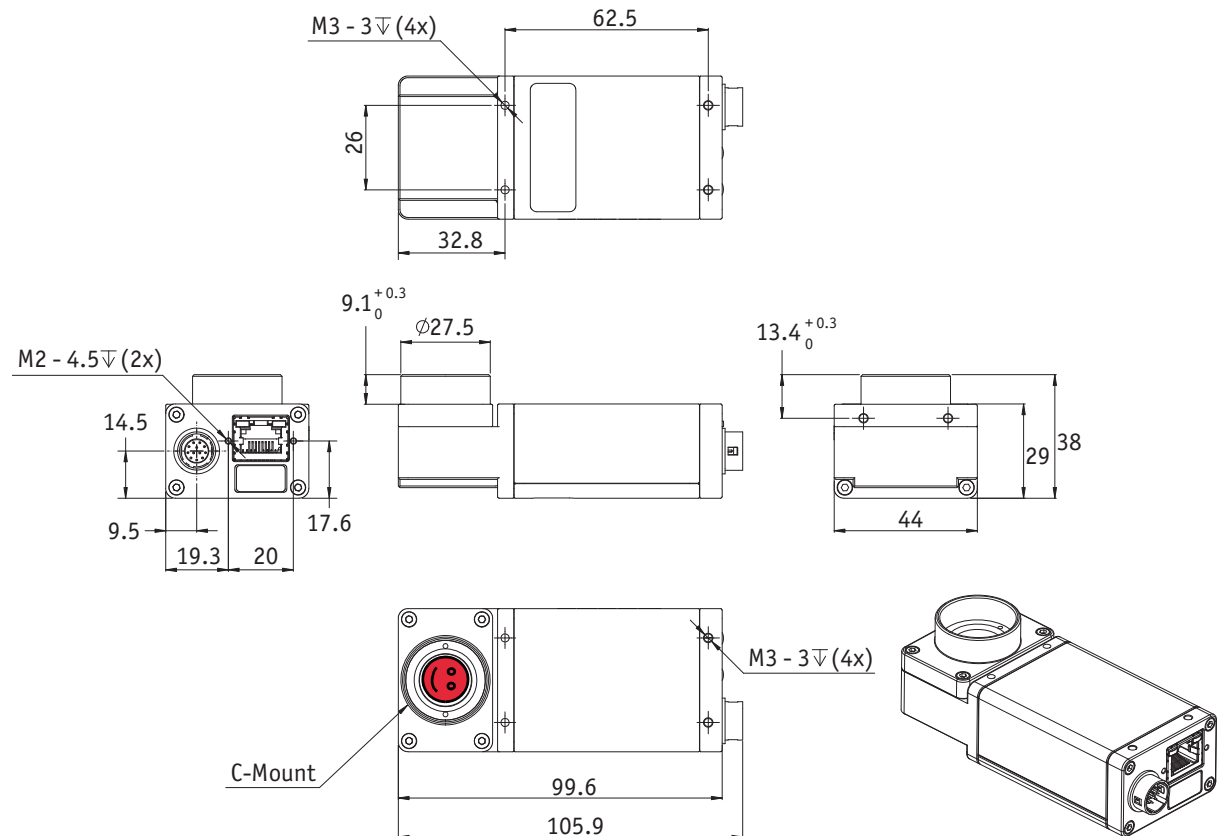


Figure 60: Manta W90 (type B)

Manta W90 S90

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

The sensor is also rotated by 90 degrees clockwise.

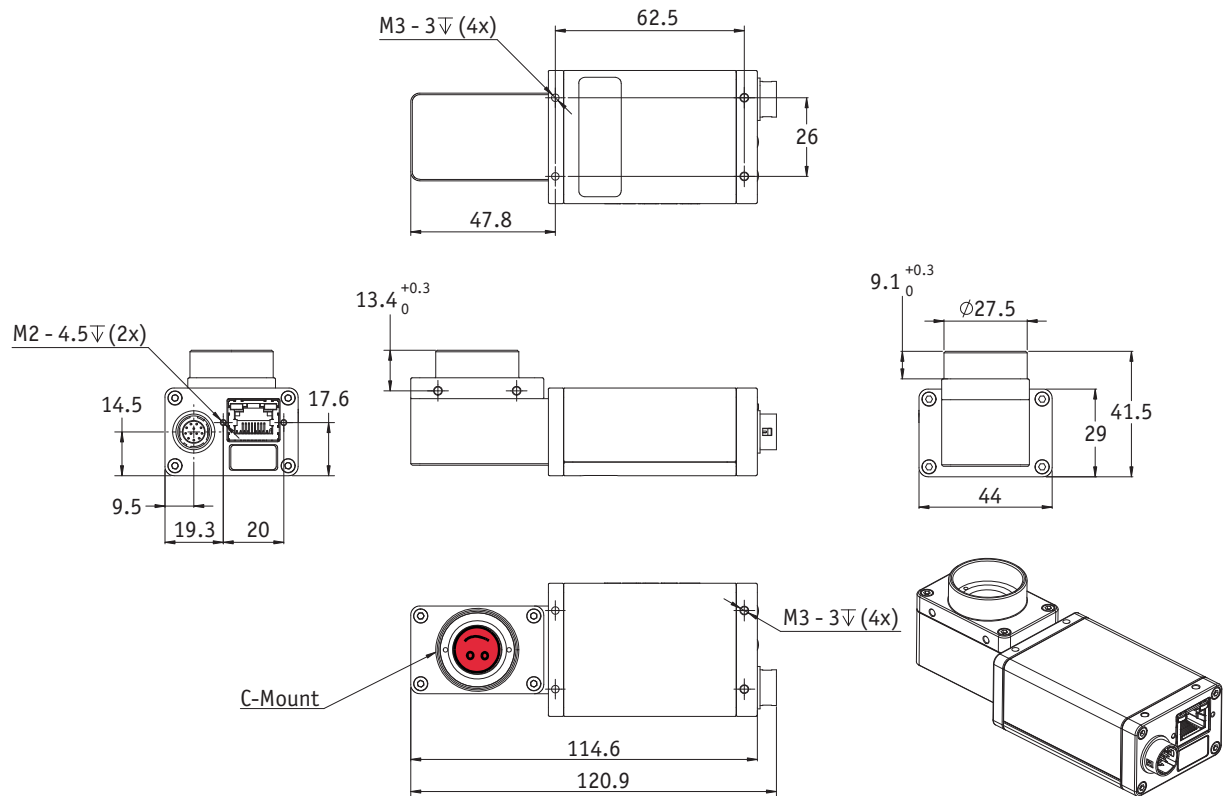


Figure 61: Manta W90 S90 (type B)

Manta W270

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

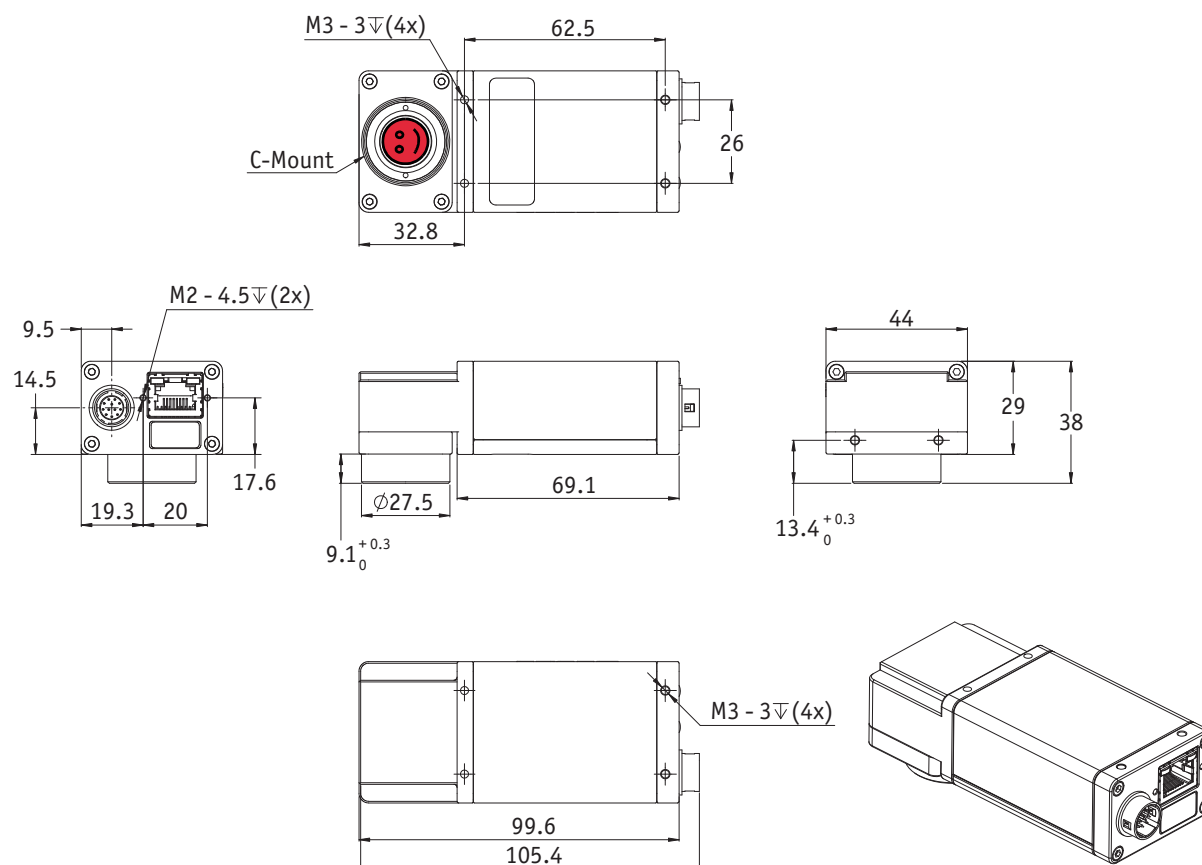


Figure 62: Manta W270 (type B)

Manta S270 S90

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

The sensor is also rotated by 90 degrees clockwise.

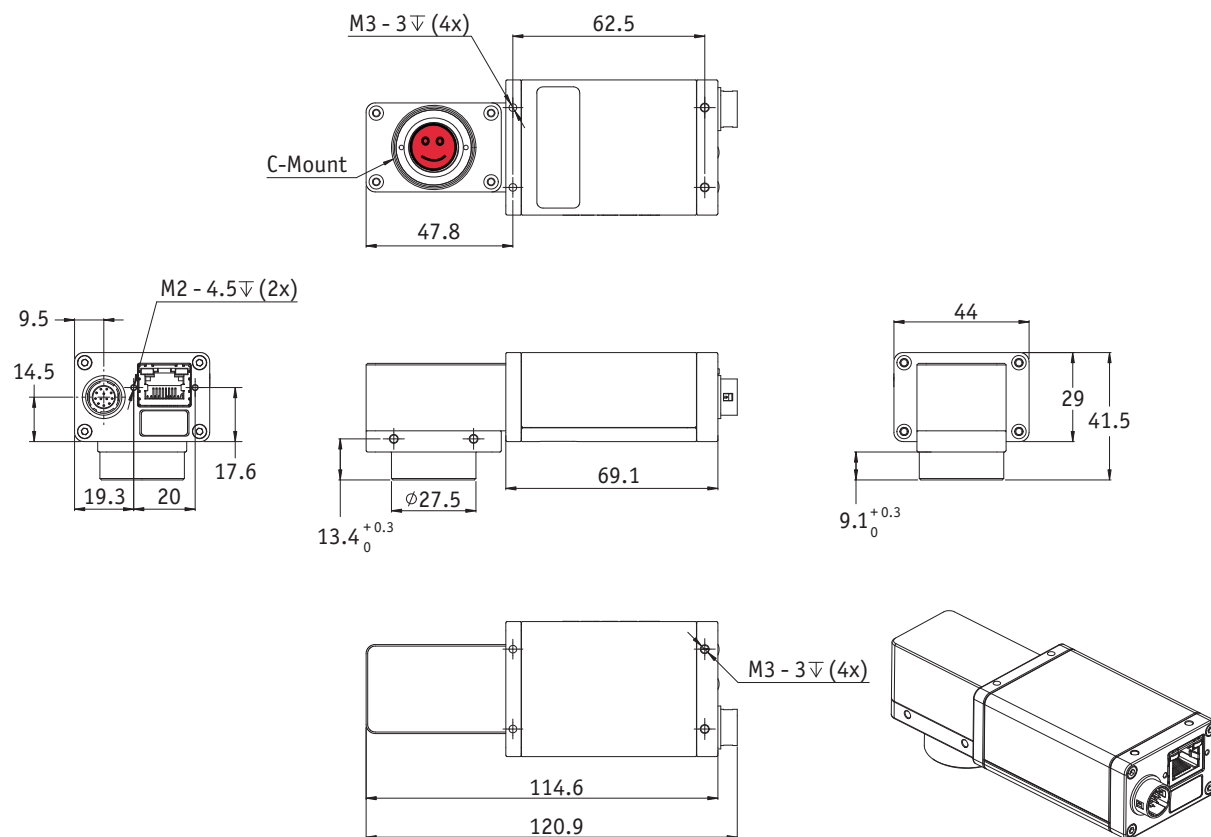


Figure 63: Manta W270 S90 (type B)

Cross section: C-Mount (type B)

Note



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

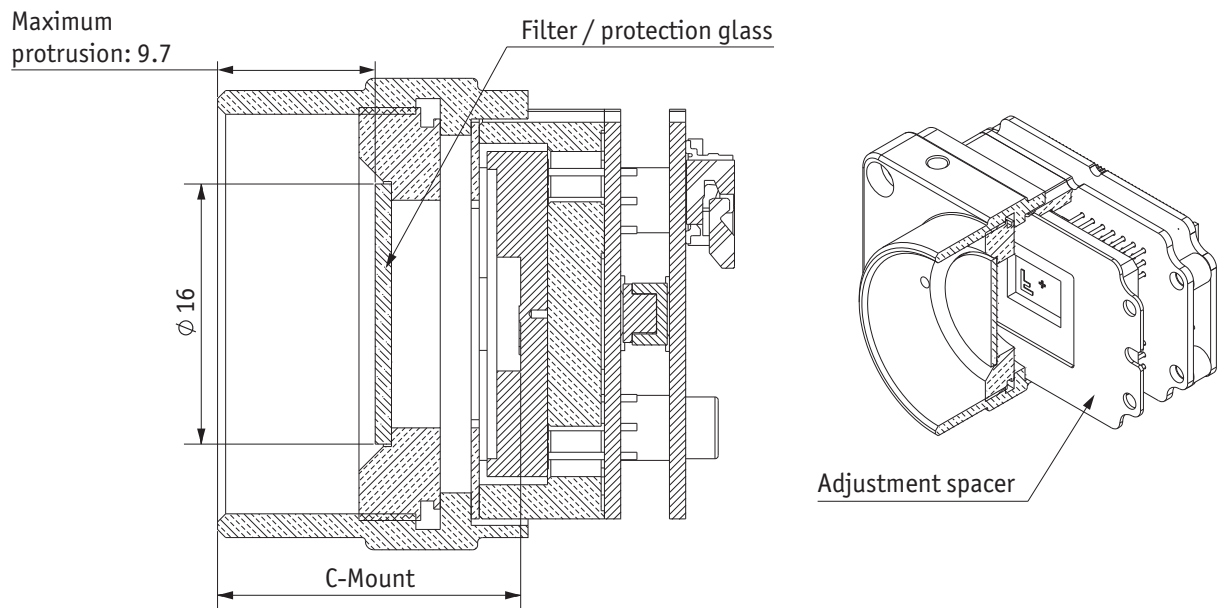


Figure 64: Manta C-Mount dimensions (16 mm filter)

Adjustment of the C-Mount

The dimensional adjustment cannot be done by the customer. All modifications have to be done by the AVT factory.

Note



If you need any modifications, please contact Customer

Care: For phone numbers and e-mail:

See [Contacting Allied Vision Technologies](#) on page 6.

Cross section: C-Mount (type B)

Note



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

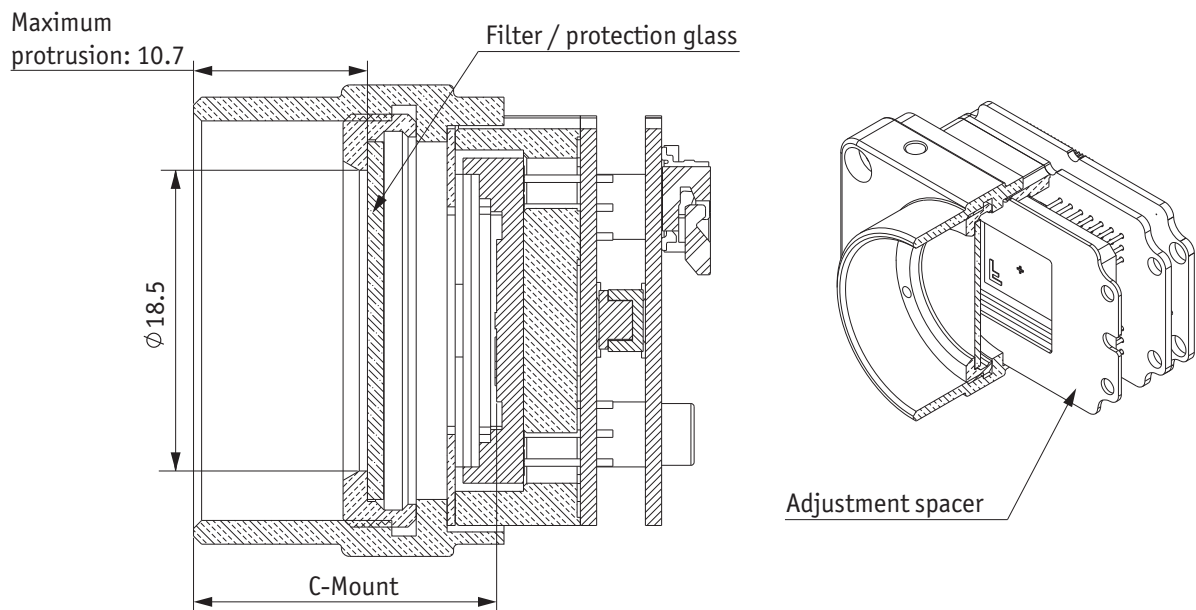


Figure 65: Manta C-Mount dimensions (22 mm filter)

Adjustment of the C-Mount

The dimensional adjustment cannot be done by the customer. All modifications have to be done by the AVT factory.

Note



If you need any modifications, please contact Customer Care: For phone numbers and e-mail:
See [Contacting Allied Vision Technologies](#) on page 6.

Camera interfaces

This chapter gives you information on Gigabit Ethernet port, inputs and outputs and trigger features.

Note

Read all **Notes** and **Cautions** in the **AVT GigE Installation Manual** before using any interfaces.



www

For accessories like cables see:



<http://www.alliedvisiontec.com/emea/products/accessories/gige-accessories.html>

Gigabit Ethernet port

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

Note



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

Same main board for all Manta models

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

PoE and non PoE

- How can I distinguish between PoE capable cameras and cameras that are not PoE capable?
 - **PoE** capable cameras have the letters **PoE** written on the camera's label on the back side and the bottom side of the camera.

Accessories

- Cables are available from AVT:
<http://www.alliedvisiontec.com/emea/products/accessories/gige-accessories.html>
- Ask your local dealer for more details.

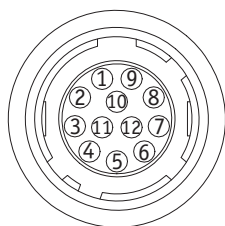
Camera I/O connector pin assignment (incl. PoE)

Note



From serial number **503323258** on all Manta models including PoE and board level versions contain the same main board:

- All I/O circuits have the same properties.
- For **Manta models with older serial number:** use the [Manta Technical Manual V4.1.0](#)



Pin	Signal	Direction	Level	Description
1	Camera GND	In	GND for RS232 and ext. power	Ground for camera power supply and RS232
2	Camera Power	In	8–30 V DC	Camera power supply
3	Video Type Auto Iris Out	Out	---	Video type auto iris (≥ FW 1.44)
4	In 1	In	Standard and PoE cameras: $U_{in}(\text{high}) = 3\text{--}24\text{ V}$ up to 36 V with external resistor of 3.3 k Ω in series $U_{in}(\text{low}) = 0\text{--}1.0\text{ V}$	Input 1 (SyncIn1)
5	---	---	---	---
6	Out 1	Out	Open emitter, max. 10 mA	Output 1 (SyncOut1)
7	Isolated IO GND	In/Out	Common GND for In/Out	Isolated input and output 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 max. 30 V DC	Power input for opto-isolated outputs
11	In 2	In	Standard and PoE cameras: $U_{in}(\text{high}) = 3\text{--}24\text{ V}$ $U_{in}(\text{low}) = 0\text{--}1.0\text{ V}$	Input 2 (SyncIn2)
12	Out 2	Out	Open emitter, max. 10 mA	Output 2(SyncOut2)

Table 31: Camera I/O connector pin assignment

Note



Read all **Notes** and **Cautions** in the [AVT GigE Installation Manual](#) before using the I/O connector.

Manta input block diagram

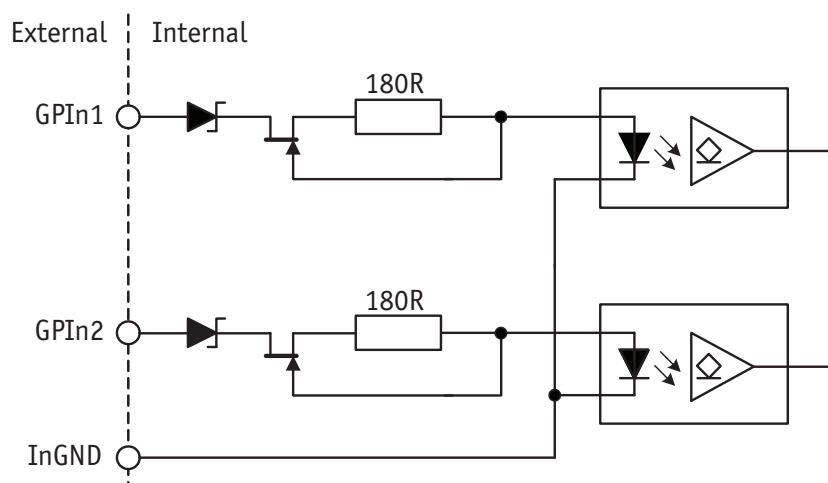


Figure 66: Manta input block diagram

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

Note



For customers who designed their system for Manta cameras with serial numbers prior to the above mentioned hardware change:

Use your systems with an external resistor without any restrictions.

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

Table 32: Manta input parameters

Manta delay and minimum pulse width

The **minimum pulse width** for all Manta cameras is:

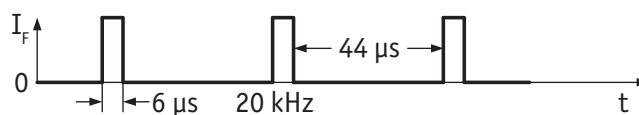


Figure 67: Manta minimum pulse width

Test conditions

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

Manta output block diagram

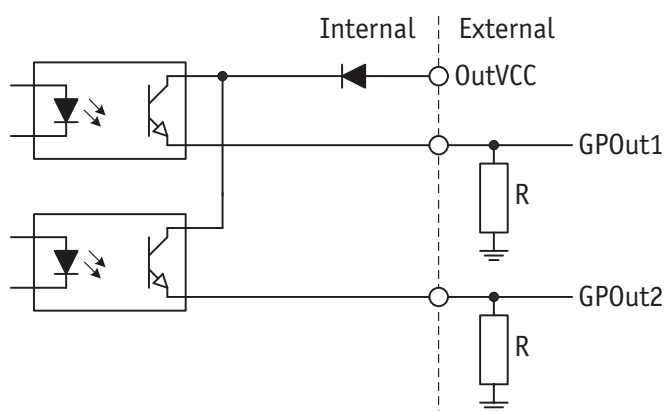


Figure 68: Manta: output block diagram

Caution



Manta

- **Max. 10 mA per output**
- **OutVCC > 30 V may damage the camera.**

OutVCC	Resistor value*	
5 V	1.0 k Ω	at ~ 5 mA minimum required current draw
12 V	2.4 k Ω	
24 V	4.7 k Ω	

* Resistor required if GP0ut1/2 connected to a device with < 5 mA draw, i.e. high impedance

Figure 69: Manta: OutVCC and external resistor

Manta delay

The cycle delay for all Manta cameras is:

$t_{pdLH} < 3.5 \mu s$ and $t_{pdHL} < 30 \mu s$

Note



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

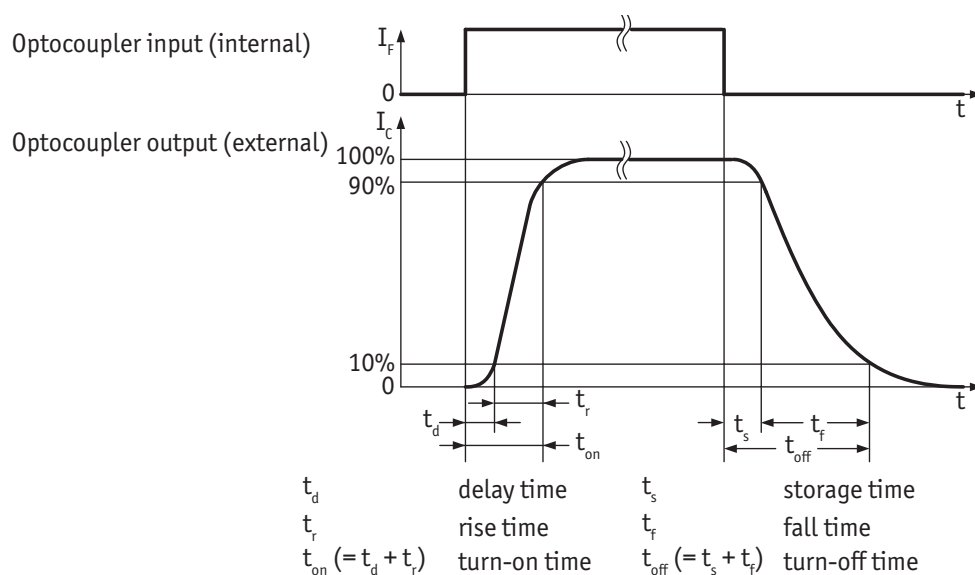


Figure 70: Manta output switching times

For all Manta models:

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

Table 33: Parameters for Manta

Test conditions

Output: external 2.4 k Ω resistor to GND, power input for output ports set to 12 V.

Note

Higher external values increase the times in the table above.



Status LEDs

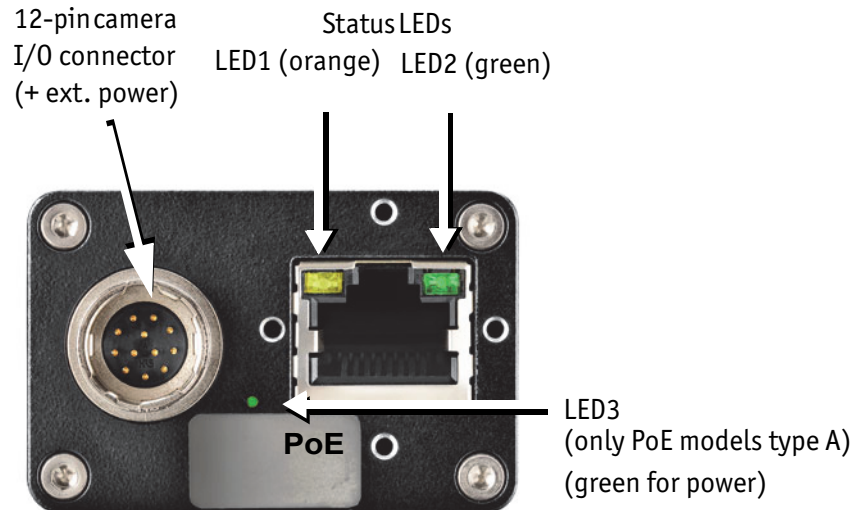


Figure 71: Example: Rear view of Manta camera

type A: Manta G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504

type B: Manta G-223 / 282 / 283 / 419 / 609 / 917

Status LEDs Manta type A

The tables below describe the status LEDs of Manta type A (G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504) cameras.

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

Table 34: Status LED 1 (orange)

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

Table 35: Status LED 2 (green)

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

Table 36: Status LED3

Status LEDs Manta type B

The tables below describe the status LEDs of Manta type B cameras (G-223 / 282 / 283 / 419 / 609 / 917).

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

Table 37: Status LED 1 (orange)

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

Table 38: Status LED 2 (green)

Note Manta type B cameras do not have a Power LED.



Video iris output description

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

Caution



Damage to the lens

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

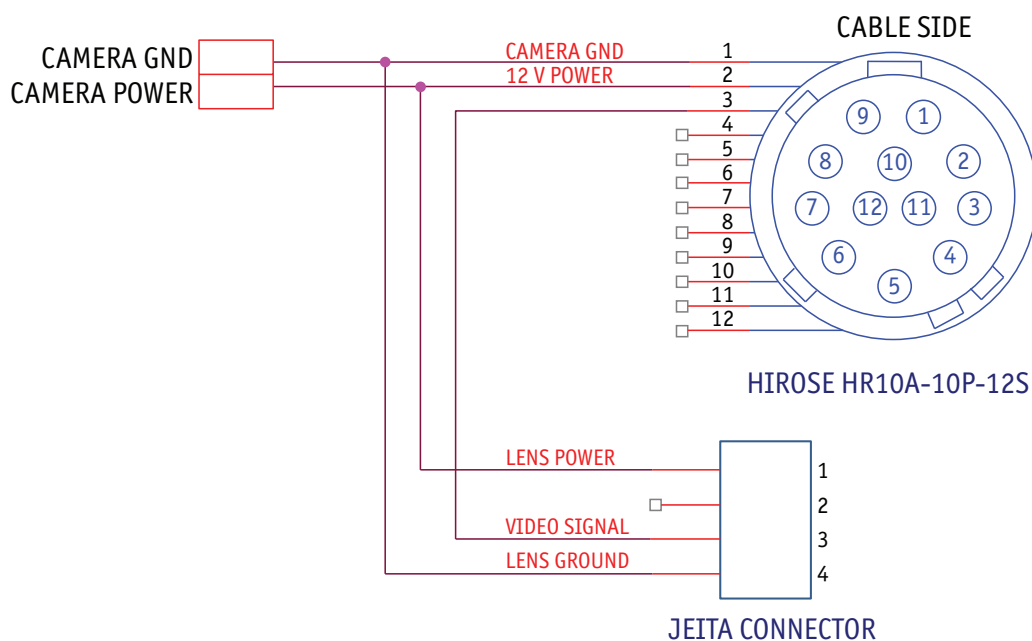


Figure 72: Manta video iris schematic

Control signals

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

Inputs

Note

For a general description of the **outputs** and **warnings** see the [AVT GigE Installation Manual](#).

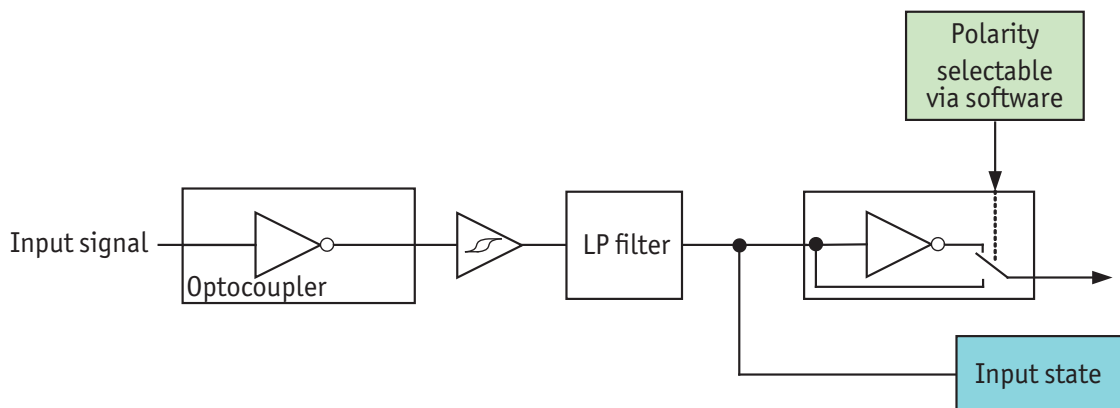


Figure 73: Input block diagram

Input/output pin control

All input and output signals running over the camera I/O connector are controlled by the I/O strobe commands. See [AVT GigE Camera and Driver Features](#) for more details.

Outputs

Note

For a general description of the **outputs** and **warnings** see the [AVT GigE Installation Manual](#).



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

Signal	Description
GPO	Configured to be a general purpose output, control of which is assigned to SyncOutGpoLevels
AcquisitionTriggerReady	Active once the camera has been recognized by the host PC and is ready to start acquisition
FrameTriggerReady	Active when the camera is in a state that will accept the next frame trigger
FrameTrigger	Active when an image has been initiated to start. This is a logic trigger internal to the camera, which is initiated by an external trigger or software trigger event
Exposing	Active for the duration of sensor exposure
FrameReadout	Active at during frame readout, i.e. the transferring of image data from the CCD to camera memory
Imaging	High when the camera image sensor is either exposing and/or reading out data
Acquiring	Active during an acquisition stream
SyncIn1	Active when there is an external trigger at SyncIn1
SyncIn2	Active when there is an external trigger at SyncIn2
Strobe1	The output signal is controlled according to Strobe1 settings

Table 39: Output signals

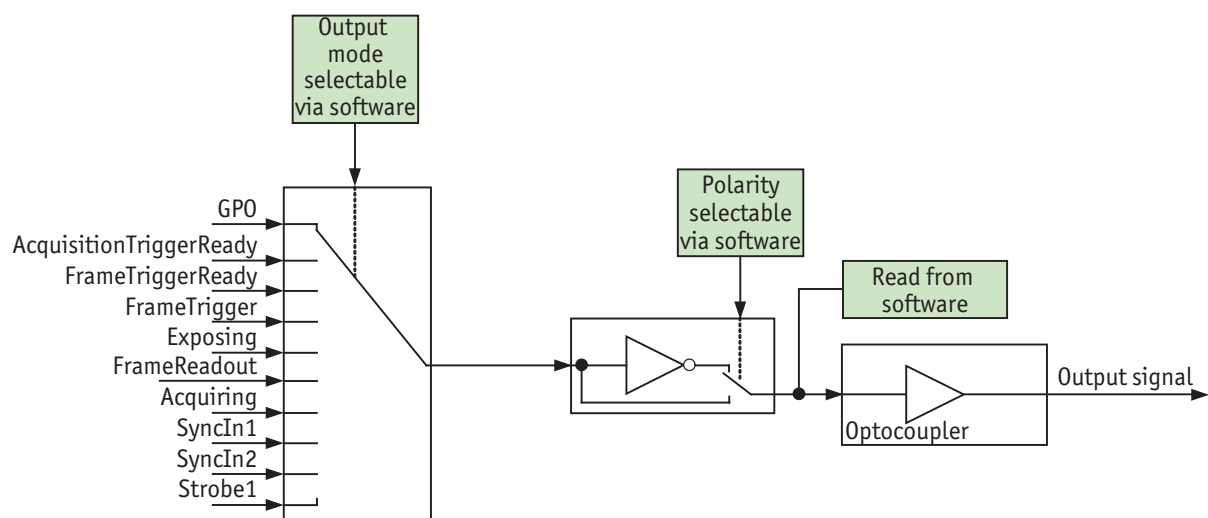


Figure 74: Output block diagram

Trigger timing diagram

The following diagram explains the trigger concept in general.

Note

For trigger description on camera control basis see [AVT GigE Camera and Driver Features](#) document.

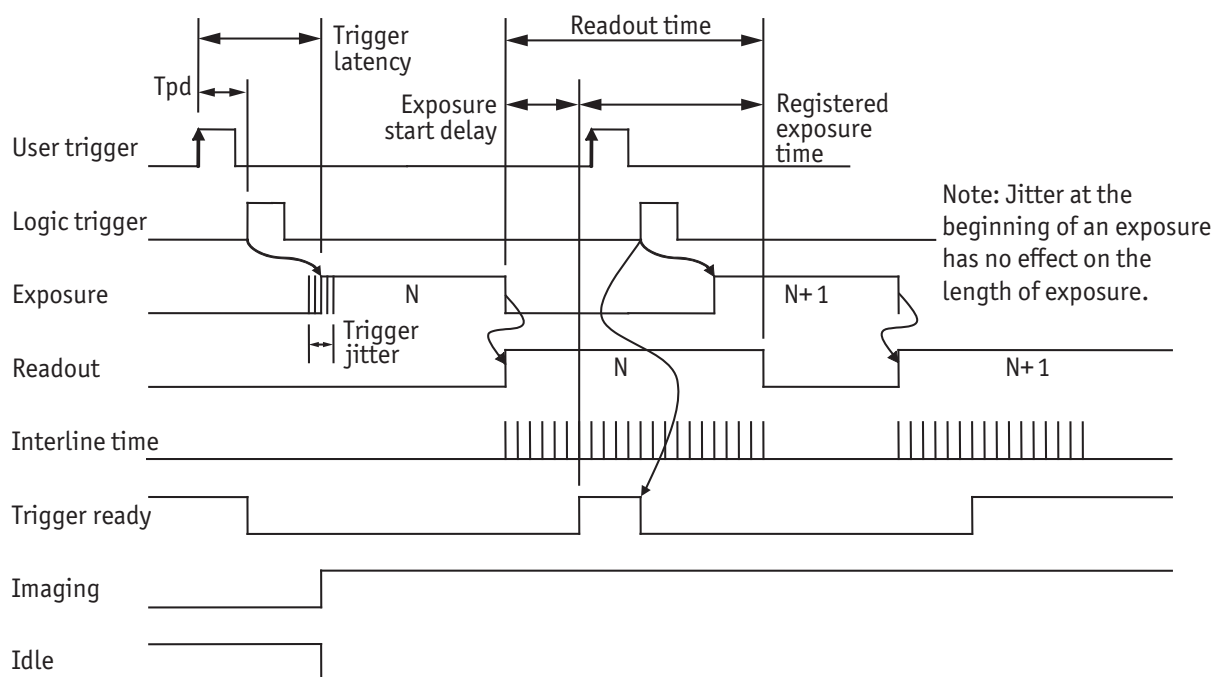


Figure 75: Trigger timing diagram

Notes on triggering

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)
T_{pd}	Propagation delay between the User trigger and the Logic trigger

Table 40: Trigger definitions

Term	Definition
Exposure	High when the camera image sensor is integrating light.
Readout	High when the camera image sensor is reading out data.
Trigger latency	Time delay between the user trigger and the start of exposure
Trigger jitter	Error in the trigger latency time
Trigger ready	Indicates to the user that the camera will accept the next trigger.
Registered exposure time	Exposure time value currently stored in the camera memory.
Exposure start delay	Registered Exposure Time subtracted from the Readout time and indicates when the next exposure cycle can begin such that the exposure will end after the current Readout.
Interline time	Time between sensor row readout cycles.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Idle	High if the camera image sensor is not exposing and/or reading out data.

Table 40: Trigger definitions

Trigger rules

Note



The **user trigger pulse width** should be at least three times the width of the trigger latency as indicated in [Specifications](#) on page 24.

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

Triggering during the Idle State

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

Triggering during the Readout State

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, then the User trigger signal should be applied as soon as a valid trigger Ready is detected.

In this case, trigger Latency and trigger jitter can be up to 1 line time since exposure must always begin on an Interline boundary.

www



For a more detailed description of the trigger concept for **advanced users** and special scenarios, see:

http://www.alliedvisiontec.com/fileadmin/content/PDF/Support/Application_Notes/AppNote_-_Triggering_concept.pdf

Description of the data path

Block diagrams of the cameras

The following diagrams illustrate the data flow and the bit resolution of image data. The individual blocks are described in more detail in the **AVT GigE Camera and Driver Features** document.

Manta type A: monochrome cameras

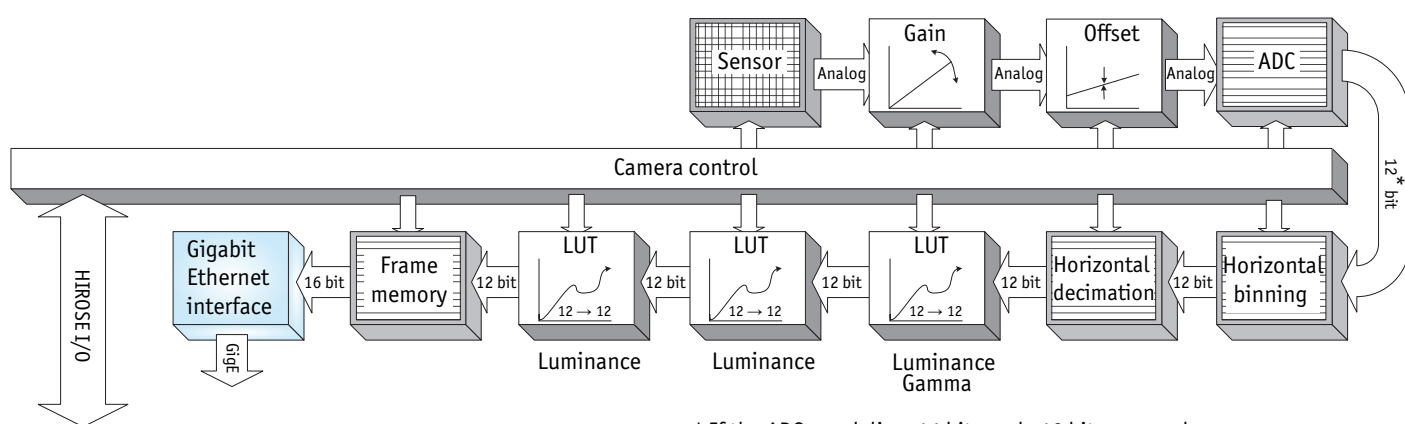


Figure 76: Block diagram monochrome camera
(type A, Manta G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504)

Manta type A: color cameras

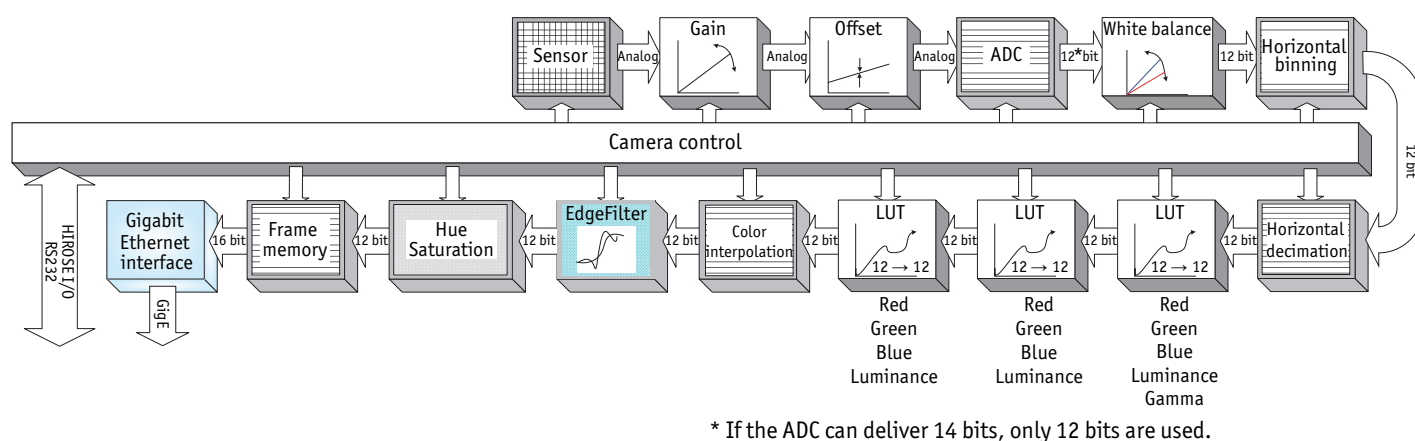
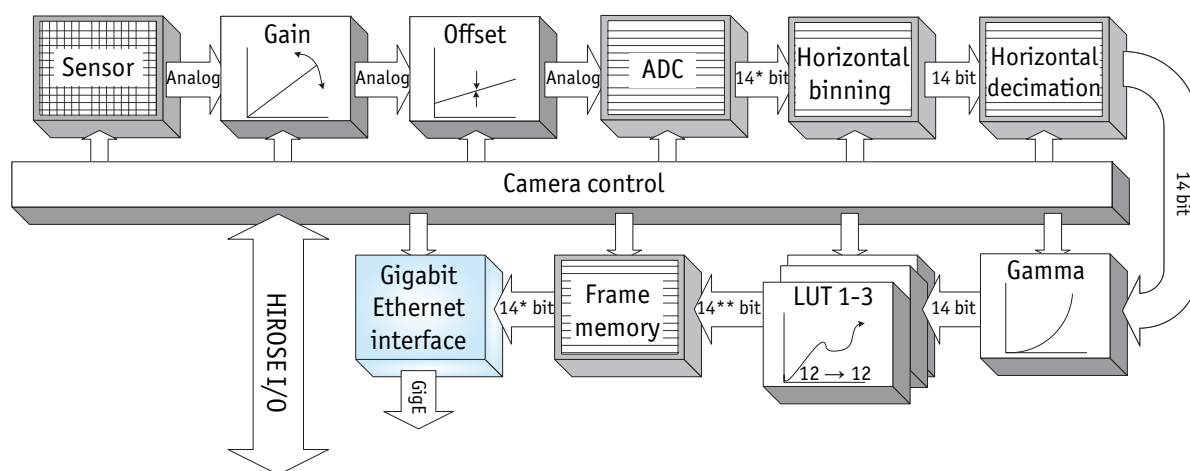


Figure 77: Block diagram color camera
(type A, Manta G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504)

Manta type B: monochrome cameras

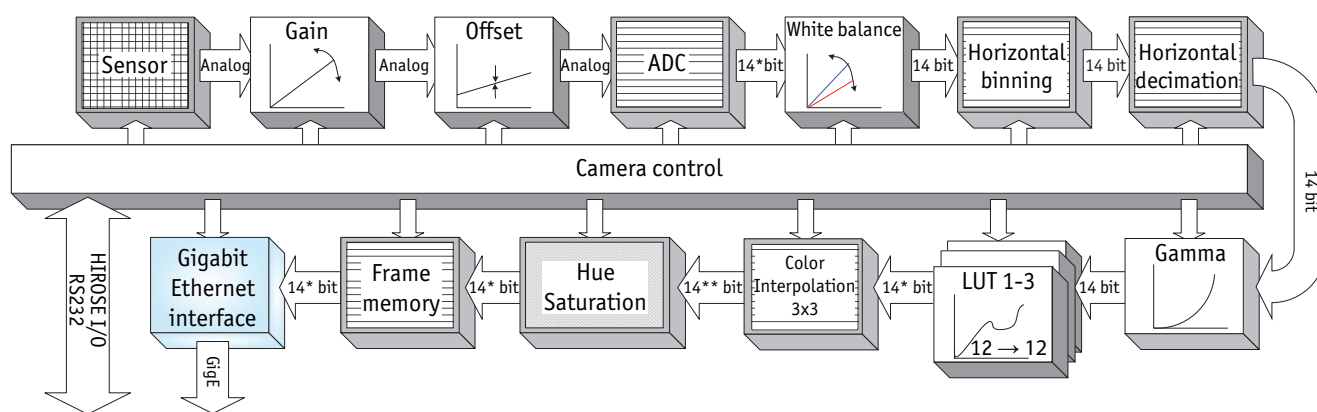


* 12 bits in the whole data path with CMOS sensors

**14 bits if the LUT is bypassed. With activated LUT, 12 bits are used.

Figure 78: Block diagram Manta monochrome camera
(type B, Manta G-223 / 282 / 283 / 419 / 609 / 917)

Manta type B: color cameras



* 12 bits in the whole data path with CMOS sensors

**14 bits if the LUT is bypassed. With activated LUT, 12 bits are used.

Figure 79: Block diagram Manta color camera
(type B, Manta G-223 / 282 / 283 / 419 / 609 / 917)

Camera features

This chapter describes the camera features as displayed with the viewer of AVT's VIMBA SDK.

www



For a detailed description of all GigE camera controls, refer to the **AVT GigE Camera and Driver Features**:

http://www.alliedvisiontec.com/fileadmin/content/PDF/Software/Prosilica_software/Prosilica_firmware/AVT_GigE_Camera_and_Driver_Features.pdf

Note



Manta type A cameras: G-031 / 032 / 033 / 046 / 095 / 125 / 145 / 146 / 201 / 504

Manta type B cameras: G-223 / 282 / 283 / 419 / 609 / 917

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
Acquisition			
	AcquisitionAbort		
	AcquisitionFrameCount		
	AcquisitionFrameRateAbs		
	AcquisitionFrameRateLimit		
	AcquisitionMode		
		Continuous	
		SingleFrame	
		MultiFrame	
		Recorder	
	AcquisitionStart		
	AcquisitionStop		
	RecorderPreEventCount		
	Trigger		
		TriggerActivation	
			RisingEdge
			FallingEdge
			AnyEdge
			LevelHigh
			LevelLow
		TriggerDelayAbs	
		TriggerMode	
			On
			Off

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
		TriggerOverlap	
			Off
			PreviousFrame
		TriggerSelector	
			FrameStart
			AcquisitionStart
			AcquisitionEnd
			AcquisitionRecord
		TriggerSoftware	
		TriggerSource	
			Freerun
			Line1
			FixedRate
			Software
Controls			
	BlackLevelControl		
		BlackLevel	
		BlackLevelSelector	
	ColorTransformationControl		
		ColorTransformationMode	
			Off
			Manual
			Temp6500K
		ColorTransformationSelector	
			RBGtoRGB
		ColorTransformationValue	
		ColorTransformationValueSelector	
	DSPSubregion		
		DSPSubregionBottom	
		DSPSubregionLeft	
		DSPSubregionRight	
		DSPSubregionTop	
	EdgeFilter (only type A cameras)		
		Smooth2	
		Smooth1	
		Off	
		Sharpen1	
		Sharpen2	
	DefectMask (reserved for future use)		
		DefectMaskColumnEnable	
	Exposure		
		ExposureAuto	

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
			Off
			Once
			Continuous
			other
		ExposureAutoControl	
			ExposureAutoAdjustTol
			ExposureAutoAlg
			ExposureAutoMax
			ExposureAutoMin
			ExposureAutoOutliers
			ExposureAutoRate
			ExposureAutoTarget
		ExposureMode	
			Timed
		ExposureTimeAbs	
	GainControl		
		Gain	
		GainAuto	
			Off
			Once
			Continuous
		GainAutoControl	
			GainAutoAdjustTol
			GainAutoMax
			GainAutoMin
			GainAutoOutliers
			GainAutoRate
			GainAutoTarget
		GainSelector	
	Gamma		
	Hue		
	Iris		
		IrisAutoTarget	
		IrisMode	
			Disabled
			Video
			VideoOpen
			VideoClose
		IrisVideoLevel	
		IrisVideoLevelMax	
		IrisVideoLevelMin	
	LUTControl		

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
		LUTEnable	
		LUTIndex	
		LUTInfo	
			LUTAddress
			LUTBitLengthIn
			LUTBitLengthOut
			LUTSize
		LUTLoad (only type A cameras, applicable to each single LUT)	
		LUTLoadAll (only type B cameras, applicable to all LUTs)	
		LUTMode	
			Luminance
			Red
			Green
			Blue
		LUTSave (only type A cameras, applicable to each single LUT)	
		LUTSaveAll (only type B cameras, applicable to all LUTs)	
		LUTSelector	
			LUT1
			LUT2
			LUT3
		LUTValue	
	NirMode (only G-145B NIR)		
		Off	
		On_HighQuality	
		On_Fast	
	Saturation		
	SubstrateVoltage (reserved for future use)		
		VsubValue	
	Whitebalance		
		BalanceRatioAbs	
		BalanceRatioSelector	
			Red
			Blue
		BalanceWhiteAuto	
			Off
			Once
			Continuous
		BalanceWhiteAutoControl	
			BalanceWhiteAutoAdjustTol
			BalanceWhiteAutoRate
DeviceStatus (only type B cameras)			
	DeviceTemperature		

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
	DeviceTemperatureSelector		
EventControl			
	EventData		
		EventAcquisitionEndFrameID	
		EventAcquisitionEndTimestamp	
		EventAcquisitionRecordTriggerFrameID	
		EventAcquisitionRecordTriggerTimestamp	
		EventAcquisitionStartFrameID	
		EventAcquisitionStartTimestamp	
		EventErrorFrameID	
		EventErrorTimestamp	
		EventExposureEndFrameID	
		EventExposureEndTimestamp	
		EventFrameTriggerFrameID	
		EventFrameTriggerReadyFrameID	
		EventFrameTriggerReadyTimestamp	
		EventFrameTriggerTimestamp	
		EventLine1FallingEdgeFrameID	
		EventLine1FallingEdgeTimestamp	
		EventLine1RisingEdgeFrameID	
		EventLine1RisingEdgeTimestamp	
		EventLine2FallingEdgeFrameID	
		EventLine2FallingEdgeTimestamp	
		EventLine2RisingEdgeFrameID	
		EventLine2RisingEdgeTimestamp	
		EventLine3FallingEdgeFrameID	
		EventLine3FallingEdgeTimestamp	
		EventLine3RisingEdgeFrameID	
		EventLine3RisingEdgeTimestamp	
		EventLine4FallingEdgeFrameID	
		EventLine4FallingEdgeTimestamp	
		EventLine4RisingEdgeFrameID	
		EventLine4RisingEdgeTimestamp	
		EventOverflowFrameID	
		EventOverflowTimestamp	
		EventPtpSyncLockedFrameID (Ptp: only type B cameras)	
		EventPtpSyncLockedTimestamp	
		EventPtpSyncLostFrameID	
		EventPtpSyncLostTimestamp	
	EventID		
		EventAcquisitionEnd	
		EventAcquisitionRecordTrigger	

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
		EventAcquisitionStart	
		EventError	
		EventExposureEnd	
		EventFrameTrigger	
		EventFrameTriggerReady	
		EventLine1FallingEdge	
		EventLine1RisingEdge	
		EventLine2FallingEdge	
		EventLine2RisingEdge	
		EventLine3FallingEdge	
		EventLine3RisingEdge	
		EventLine4FallingEdge	
		EventLine4RisingEdge	
		EventOverflow	
		EventPtpSyncLocked (Ptp: only type B cameras)	
		EventPtpSyncLost	
	EventNotification		
		Off	
		On	
	EventSelector		
		AcquisitionStart	
		AcquisitionEnd	
		FrameTrigger	
		ExposureEnd	
		AcquisitionRecordTrigger	
		PtpSyncLost (Ptp: only type B cameras)	
		PtpSyncLocked	
		Line1RisingEdge	
		Line1FallingEdge	
		Line2RisingEdge	
		Line2FallingEdge	
		Line3RisingEdge	
		Line3FallingEdge	
		Line4RisingEdge	
		Line4FallingEdge	
		FrameTriggerReady	
	EventsEnable1		
GigE			
	BandwidthCtrlMode		
		StreamBytesPerSecond	
		SCPD	
		Both	

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
	ChunkModeActive		
	Configuration		
		IP Configuration Mode	
	Current		
		Current Default Gateway	
		Current IP Address	
		Current Subnet Mask	
	Device MAC address		
	GVCP		
		Command Retries	
		Command Timeout	
		Heartbeat Interval	
	GevSCPSPacketSize		
	NonImagePayloadSize		
	Ptp (only type B cameras)		
		PtpAcquisitionGateTime	
		PtpMode	
		PtpStatus	
	PayloadSize		
	Persistent		
		Persistent Default Gateway	
		Persistent IP Address	
		Persistent Subnet Mask	
	StreamBytesPerSecond		
	StreamFrameRateConstrain		
	StreamHold		
		StreamHoldCapacity	
		StreamHoldEnable	
			Off
			On
	Timestamp		
		GevTimestampControlLatch	
		GevTimestampControlReset	
		GevTimestampTickFrequency	
		GevTimestampValue	
I0			
	Strobe		
		StrobeDelay	
		StrobeDuration	
		StrobeDurationMode	
			Source
			Controlled

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
		StrobeSource	
			AcquisitionTrigger-
			FrameTriggerReady
			FrameTrigger
			Exposung
			FrameReadout
			Acquiring
			LineIn1
			LineIn2
	SyncIn		
		SyncInGlitchFilter	
		SyncInLevels	
		SyncInSelector	
			SyncIn1
			SyncIn2
	SyncOut		
		SyncOutLevels	
		SyncOutPolarity	
			Normal
			Invert
		SyncOutSelector	
			SyncOut1
			SyncOut2
		SyncOutSource	
			GPO
			AcquisitionTriggerReady
			FrameTriggerReady
			Exposing
			FrameReadout
			Imaging
			Acquiring
			LineIn1
			LineIn2
			Strobe1
ImageFormat			
	Height		
	HeightMax		
	ImageSize		
	OffsetX		
	OffsetY		
	PixelFormat		
	ReverseX		

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
	Width		
	WidthMax		
ImageMode			
	BinningHorizontal		
	BinningVertical		
	DecimationHorizontal (not G-031 / G-032)		
	DecimationVertical (not G-031 / G-032)		
	SensorHeight		
	SensorWidth		
Info			
	DeviceFirmwareVersion		
	DeviceID		
	DeviceModelName		
	DevicePartNumber		
	DeviceScanType		
	DeviceVendorName		
	FirmwareVerBuild		
	FirmwareVerMajor		
	FirmwareVerMinor		
	SensorBits		
	SensorType		
SavedUserSets			
	UserSetDefaultSelector		
		Default	
		UserSet1	
		UserSet2	
		UserSet3	
	UserSetLoad		
	UserSetSave		
	UserSetSelector		
		Default	
		UserSet1	
		UserSet2	
		UserSet3	
Stream			
	Info		
		GSVP Filter Version	
	Multicast		
		MulticastEnable	
		Multicast IP Address	
	Settings		
		GSVP Adjust Packet Size	

Table 41: Manta camera features

Hierarchy level 1	Hierarchy level 2	Hierarchy level 3	Hierarchy level 4
		GSVP Burst Size	
		GSVP Driver Selector	
		GSVP Host Receive Buffers	
		GSVP Max Look Back	
		GSVP Max Requests	
		GSVP Max Wait Size	
		GSVP Missing Size	
		GSVP Packet Size	
		GSVP Tilting Size	
		GSVP Timeout	
Statistics			
	Stat Frame Rate		
	Stat Frames Delivered		
	Stat Frames Dropped		
	Stat Frames Rescued		
	Stat Frames Shoved		
	Stat Frames Underrun		
	Stat Local Rate		
	Stat Packets Missed		
	Stat Packets Received		
	Stat Packets Requested		
	Stat Packets Resent		
	Stat Time Elapsed		

Table 41: Manta camera features

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 Gigabit Ethernet network.

Manta cameras are equipped with a RAM. Table 42 on page 130 shows how many frames can be stored by each model.

Note



The number of frames (StreamHoldCapacity) depends on resolution and pixel format. Listed number of frames is typical for full resolution and Mono8/Bayer8.

The memory operates according to the FIFO (first in, first out) principle. This makes addressing for individual images unnecessary.

Type A/type B	Model	Memory size	Pixel format/ resolution
Manta type A models	Manta G-031B/C	32 MB memory: 99 frames	Mono8/ full resolution
	Manta G-032B/C	32 MB memory: 99 frames	
	Manta G-033B/C	32 MB memory: 99 frames	
	Manta G-046B/C	32 MB memory: 70 frames	
	Manta G-095C	32 MB memory: 34 frames	
	Manta G-125B/C	32 MB memory: 25 frames	
	Manta G-145B/C	32 MB memory: 22 frames	
	Manta G-145B/C-30fps	32 MB memory: 22 frames	
	Manta G-145B NIR	32 MB memory: 22 frames	
	Manta G-146B/C	32 MB memory: 22 frames	
	Manta G-201B/C	32 MB memory: 16 frames	
	Manta G-201B/C-30fps	32 MB memory: 16 frames	
	Manta G-504B/C	32 MB memory: 6 frames	
Manta type B models	Manta G-223B/C	128 MB memory: 59 frames	Mono8/ full resolution
	Manta G-282B/C	128 MB memory: 47 frames	
	Manta G-283B/C	128 MB memory: 47 frames	
	Manta G-419B/C	128 MB memory: 31 frames	
	Manta G-609B/C	128 MB memory: 21 frames	
	Manta G-917B/C	128 MB memory: 14 frames	

Table 42: Image memory size (typical; see note above)

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 → RGB color interpolation already takes place in all Manta color version cameras.

In color interpolation a red, green or blue value is determined for each pixel. An AVT proprietary Bayer demosaicing algorithm is used for this interpolation (2x2), optimized for both sharpness of contours as well as reduction of false edge coloring.

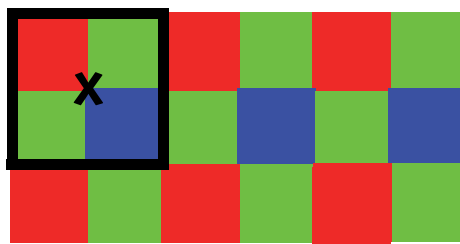


Figure 80: Bayer demosaicing (Manta type A: example of 2x2 matrix)

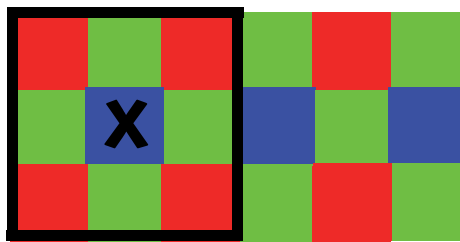


Figure 81: Bayer demosaicing (Manta type B: example of 3x3 matrix)

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

RAW mode is primarily used to

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

Note



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

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

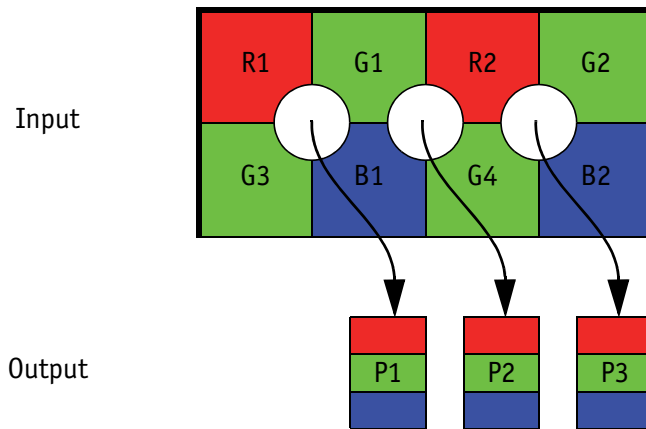


Figure 82: Bayer demosaicing (interpolation)

$$\begin{array}{lll}
 P1_{\text{red}} = R1 & P2_{\text{red}} = R2 & P3_{\text{red}} = R2 \\
 P1_{\text{green}} = \frac{G1 + G3}{2} & P2_{\text{green}} = \frac{G1 + G4}{2} & P3_{\text{green}} = \frac{G2 + G4}{2} \\
 P1_{\text{blue}} = B1 & P2_{\text{blue}} = B1 & P3_{\text{blue}} = B2
 \end{array}$$

Formula 1: Bayer demosaicing (type A cameras)

Note



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

Resolution and ROI frame rates

Manta G-031B/C: ROI frame rates

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

Formula 2: **Manta G-031**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 125.23 fps

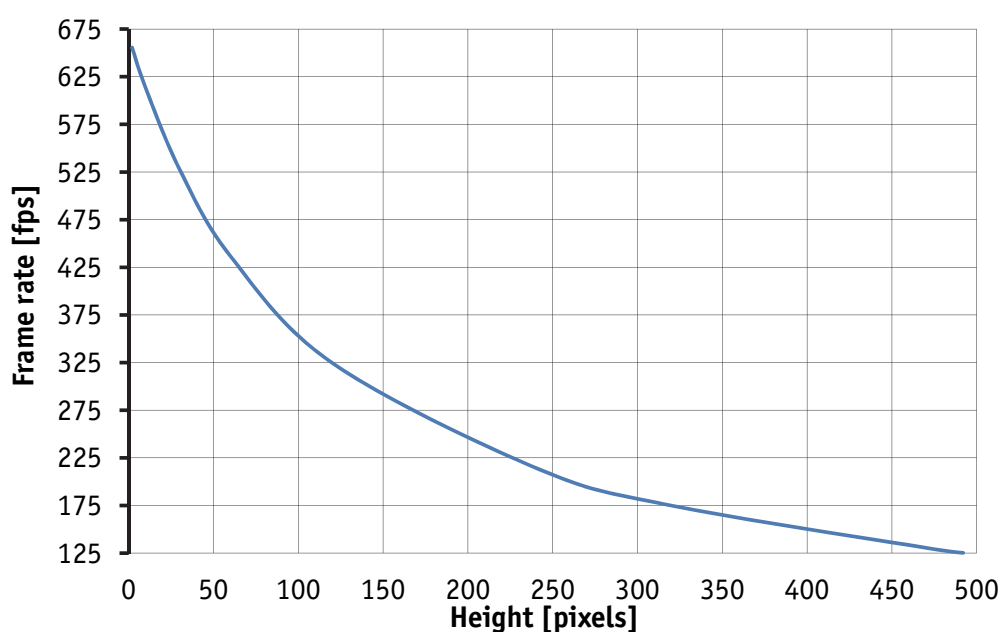


Table 43: Frame rates **Manta G-031** as function of ROI height[width=656]

ROI height	CCD*
492	125.23
480	127.76
320	174.89
240	214.45
120	324.58
60	436.71
30	527.90
10	613.27
2	655.68

Table 44: Frame rates (fps) of **Manta G-031** as function of ROI height (pixel) [width=656]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-032B/C: ROI frame rates

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

Formula 3: **Manta G-032**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 80.71 fps

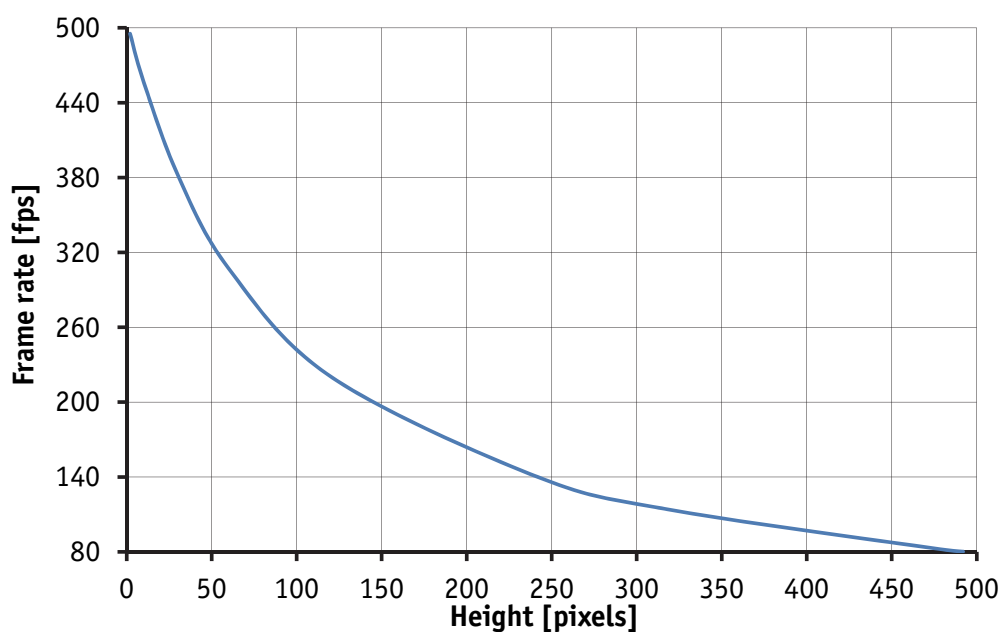


Table 45: Frame rates **Manta G-032** as function of ROI height[width=656]

ROI height	CCD*
492	80.17
480	81.87
320	113.61
240	140.93
120	220.46
60	307.10
30	382.22
10	456.68
2	495.28

Table 46: Frame rates (fps) of **Manta G-032** as function of ROI height (pixel) [width=656]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-033B/C: ROI frame rates

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

Formula 4: **Manta G-033**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 88.78 fps

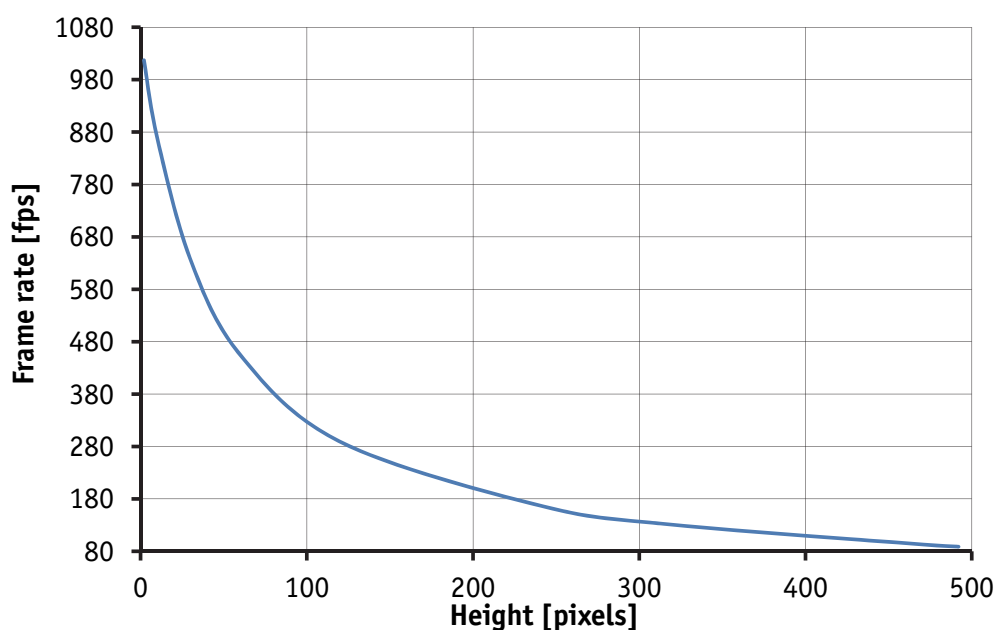


Table 47: Frame rates **Manta G-033** as function of ROI height[width=656]

ROI height	CCD*
492	88.78
480	90.81
320	130.63
240	167.32
120	289.11
60	454.52
30	636.65
10	868.72
2	1017.00

Table 48: Frame rates (fps) of **Manta G-033** as function of ROI height (pixel) [width=656]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-046B/C: ROI frame rates

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

Formula 5: **Manta G-046**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 67.54 fps

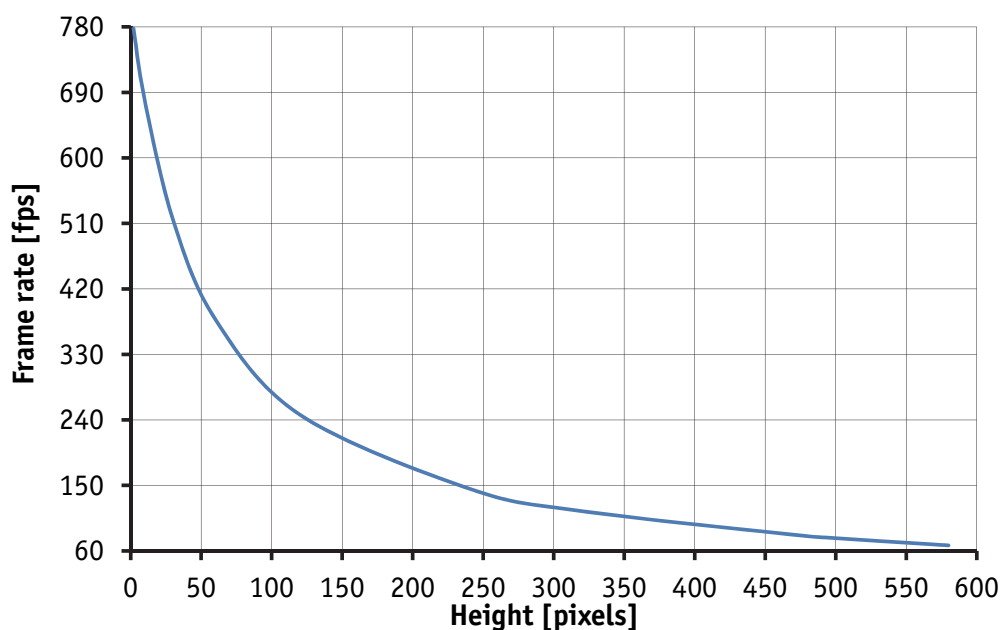


Table 49: Frame rates **Manta G-046** as function of ROI height[width=780]

ROI height	CCD*
580	67.54
492	78.45
480	80.22
320	114.63
240	145.63
120	247.17
60	378.44
30	515.27
10	678.92
2	777.72

Table 50: Frame rates (fps) of **Manta G-046** as function of ROI height (pixel) [width=780]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-095B/C: ROI frame rates

$$\text{max. frame rate of CCD} = \frac{1}{33.52\mu\text{s} \times \text{ROI height} + 4.87\mu\text{s} \times (734 - \text{ROI height}) + 327.80\mu\text{s}}$$

Formula 6: **Manta G-095**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 40.11 fps

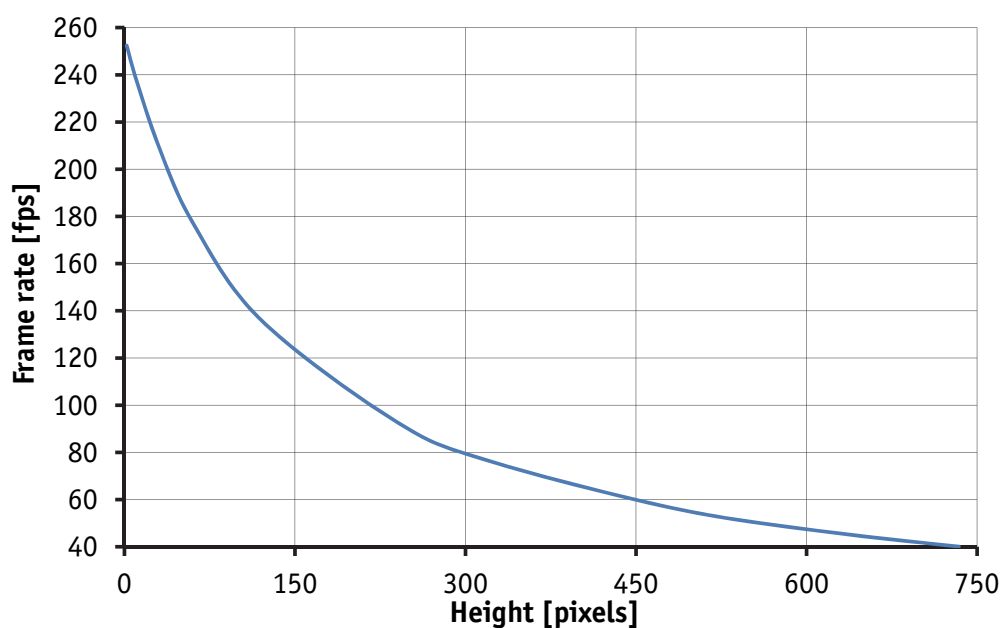


Table 51: Frame rates **Manta G-095** as function of ROI height[width=1292]

ROI height	CCD*
734	40.11
720	40.77
600	47.41
480	56.65
320	76.51
240	92.77
120	136.21
60	177.48
30	209.92
10	238.61
2	252.41

Table 52: Frame rates (fps) of **Manta G-095** as function of ROI height (pixel) [width=1292]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-125B/C: ROI frame rates

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

Formula 7: **Manta G-125**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 31.02 fps

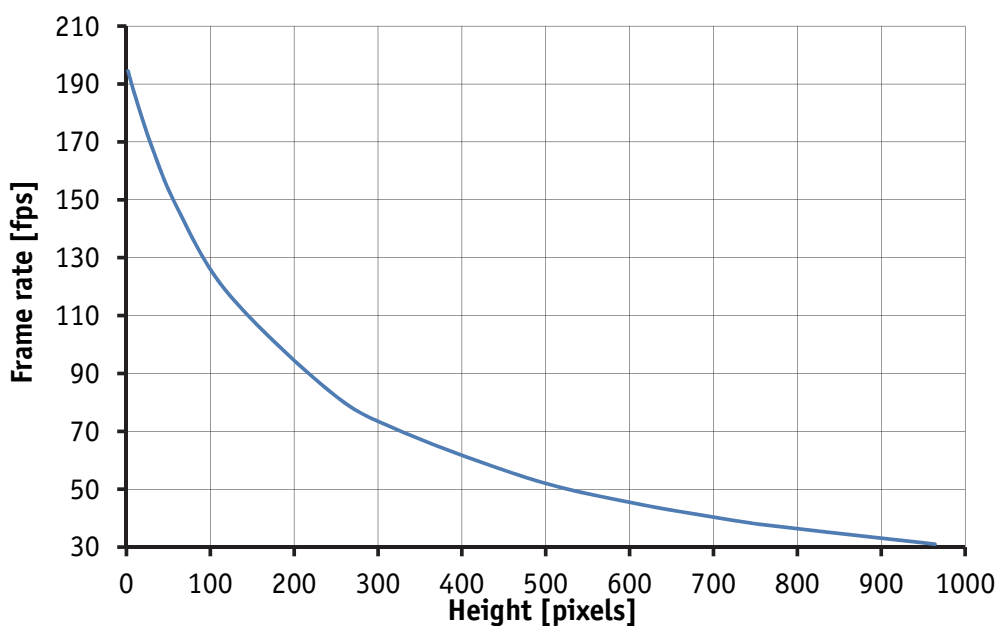


Table 53: Frame rates **Manta G-125** as function of ROI height[width=1292]

ROI height	CCD*
964	31.02
768	37.43
720	39.42
600	45.48
480	53.74
320	70.92
240	84.42
120	118.13
60	147.60
30	168.63
10	186.33
2	194.50

Table 54: Frame rates (fps) of **Manta G-125** as function of ROI height (pixel) [width=1292]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-145B/C: ROI frame rates

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

Formula 8: **Manta G-145**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 15.09 fps

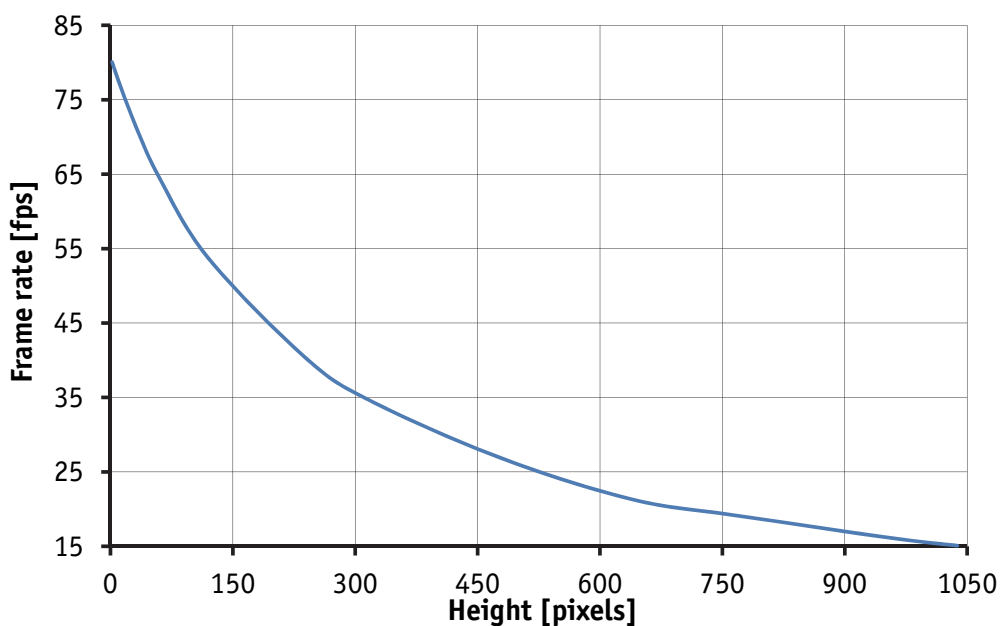


Table 55: Frame rates **Manta G-145** as function of ROI height[width=1388]

ROI height	CCD*
1038	15.09
960	16.07
768	19.13
640	21.29
480	26.80
320	34.48
240	40.24
120	53.71
60	64.50
30	71.71
10	77.48
2	80.06

Table 56: Frame rates (fps) of **Manta G-145** as function of ROI height (pixel) [width=1388]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-145B/C-30fps: ROI frame rates

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

Formula 9: **Manta G-145-30fps**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 30.17 fps

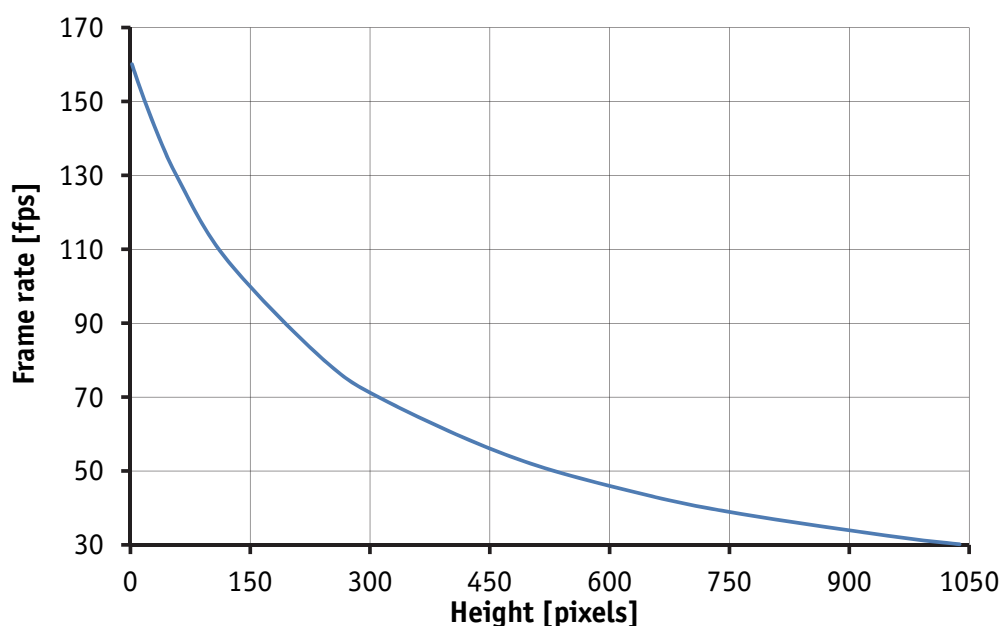


Table 57: Frame rates **Manta G-145-30fps** as function of ROI height[width=1388]

ROI height	CCD*
1038	30.17
960	32.13
768	38.26
640	43.83
480	53.59
320	68.95
240	80.47
120	107.41
60	129.00
30	143.42
10	154.96
2	160.11

Table 58: Frame rates (fps) of **Manta G-145-30fps** as function of ROI height (pixel) [width=1388]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-145B NIR: ROI frame rates

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

Formula 10: **Manta G-145B NIR**: theoretical maximum frame rate of CCD [NirMode=**Off/On_Fast**]

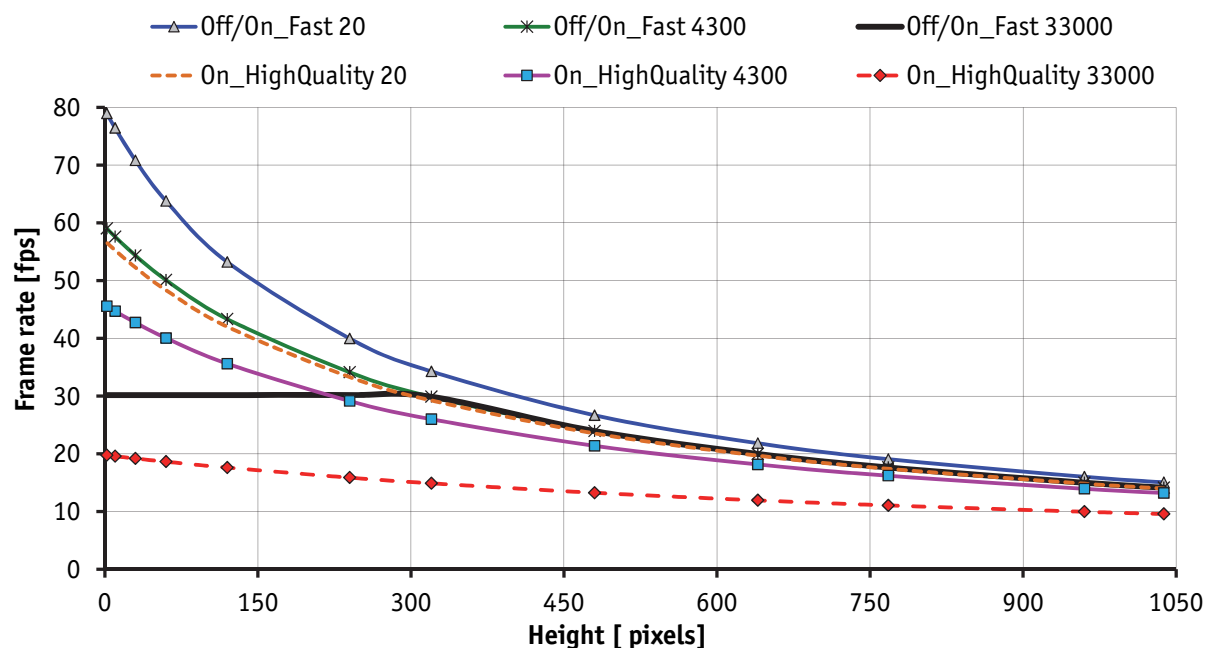
$$\text{max. frame rate of CCD} = \frac{1}{11.46\mu\text{s} \times \text{ROI height} + 63.39\mu\text{s} \times (1038 - \text{ROI height}) + (5653.89 + \text{Exposure time})\mu\text{s}}$$

Formula 11: **Manta G-145B NIR**: theoretical maximum frame rate of CCD [NirMode=**On_HighQuality**]

Maximum frame rate at full resolution according formula:

15.05 fps for NirMode=Off/On_Fast

13.99 fps for NirMode=On_HighQuality



Formula 12: Frame rates* **Manta G-145B NIR** as function of ROI height[width=1388], NirMode and exposure time / μ s

* All values: CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

NirMode	Off/On_Fast	Off/On_Fast	Off/On_Fast	On_HighQuality	On_HighQuality	On_HighQuality
Exp. time/ μ s	20	4300	33000	20	4300	33000
ROI height						
1038	15.05	14.14	14.13	13.99	13.20	9.57
960	16.02	14.99	14.99	14.83	13.95	9.96
768	19.07	17.63	17.63	17.40	16.20	11.06
640	21.83	19.97	19.96	19.68	18.15	11.93
480	26.67	23.94	23.93	23.53	21.38	13.25
320	34.27	29.89	29.88	29.25	25.99	14.89
240	39.96	34.12	30.17	33.29	29.14	15.87
120	53.20	43.34	30.17	42.01	35.61	17.61
60	63.78	50.10	30.17	48.33	40.05	18.63
30	70.81	54.34	30.17	52.27	42.71	19.19
10	76.43	57.59	30.17	55.27	44.70	19.58
2	78.94	59.00	30.17	56.57	45.54	19.74

Formula 13: Frame rates* (fps) of **Manta G-145B NIR** as function of ROI height (pixel) [width=1388], NirMode and exposure time / μ s

* All values: CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-146B/C: ROI frame rates

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

Formula 14: **Manta G-146**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 17.88 fps

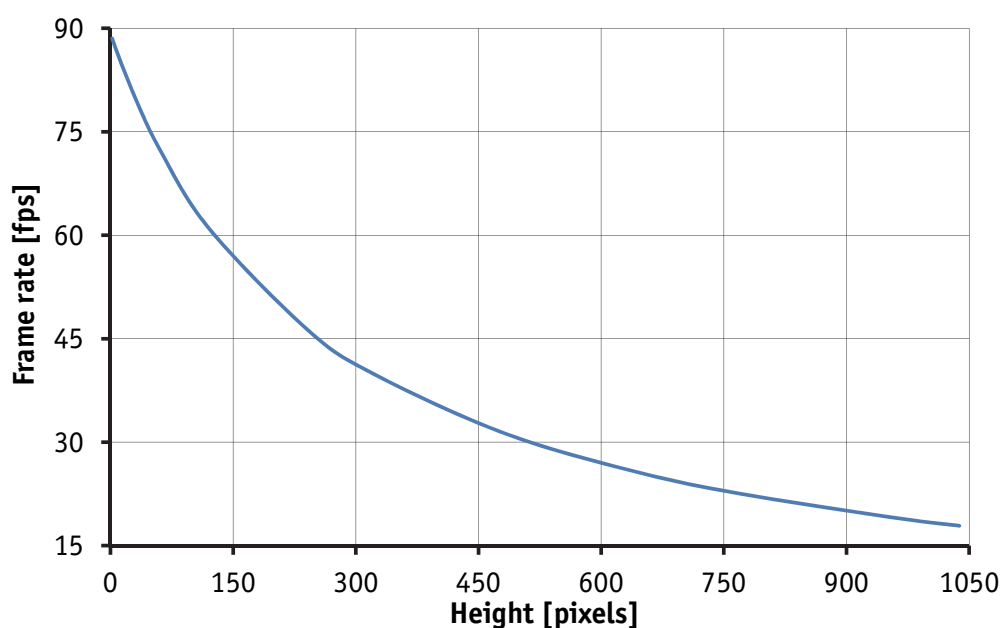


Table 59: Frame rates **Manta G-146** as function of ROI height[width=1388]

ROI height	CCD*
1038	17.88
960	19.02
768	22.57
640	25.78
480	31.36
320	40.00
240	46.40
120	61.05
60	72.49
30	79.98
10	85.90
2	88.53

Table 60: Frame rates (fps) of **Manta G-146** as function of ROI height (pixel) [width=1388]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-201B/C: ROI frame rates

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

Formula 15: **Manta G-201**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 14.71 fps

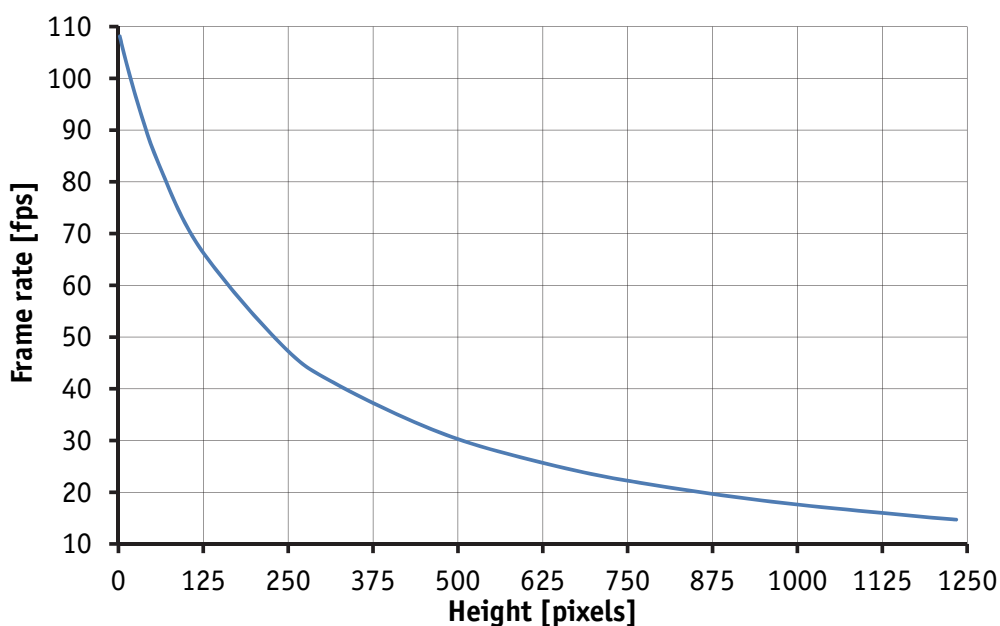


Table 61: Frame rates **Manta G-201** as function of ROI height[width=1624]

ROI height	CCD*
1234	14.71
1200	15.07
960	18.21
768	21.84
640	25.21
480	31.21
320	40.97
240	48.56
120	67.24
60	83.25
30	94.51
10	103.86
2	108.15

Table 62: Frame rates (fps) of **Manta G-201** as function of ROI height (pixel) [width=1624]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-201B/C-30fps: ROI frame rates

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

Formula 16: **Manta G-201-30fps**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 30.0 fps

Maximum frame rate at 1600 x 1200 (measured): 31.02 fps

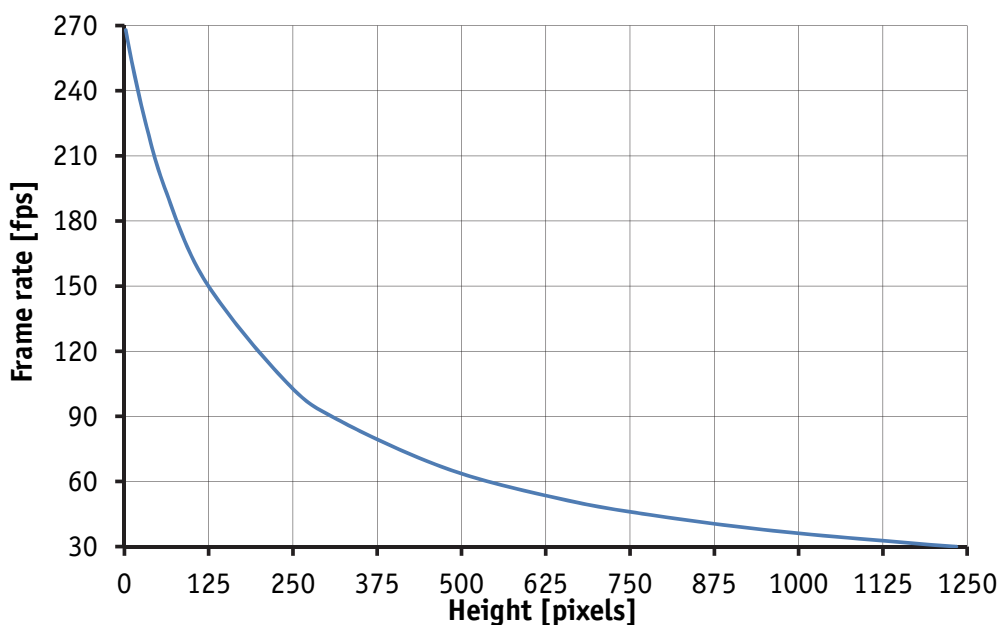


Table 63: Frame rates **Manta G-201-30fps** as function of ROI height[width=1624]

ROI height	CCD*
1234	30.00
1200	30.75
960	37.38
768	45.17
640	52.45
480	65.71
320	87.92
240	105.81
120	152.28
60	195.11
30	227.05
10	254.86
2	268.00

Table 64: Frame rates (fps) of **Manta G-201** as function of ROI height (pixel) [width=1624]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-223B/C (NIR): ROI frame rates

Maximum frame rate at 1088 x 2048 (measured): 53.7 fps
(higher frame rates are possible with burst mode)

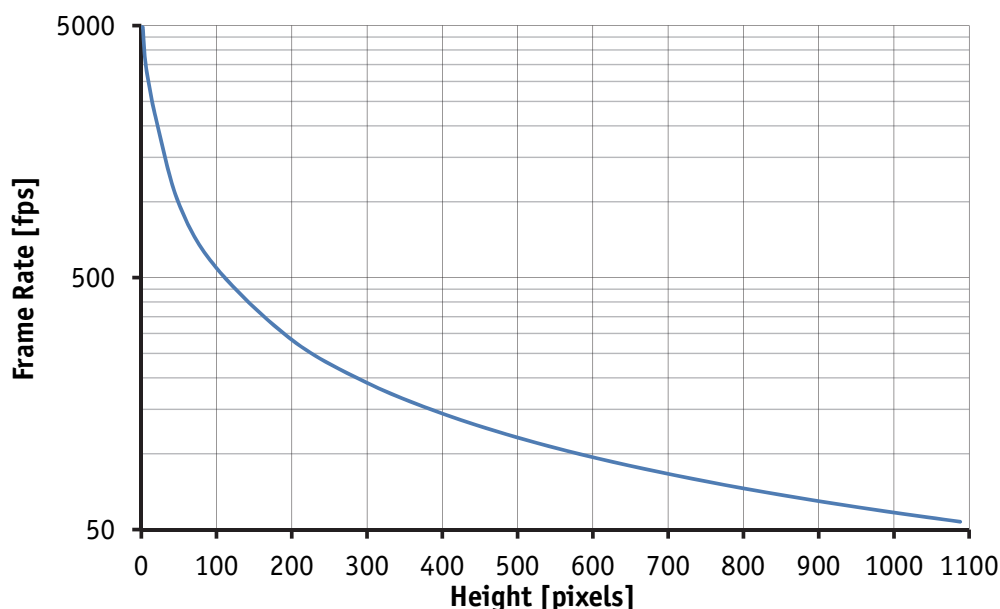


Table 65: Frame rates **Manta G-223** as function of ROI height [**width=2048**]

ROI height	fps*
1088	53.7
1000	58.4
900	64.8
800	72.8
700	83.1
600	96.8
500	115.9
400	144.3
300	191.1
200	283.1
100	545.2
50	981.3
20	2105.2
10	2949.8
5	3690.0
2	4926.1
1	4926.1

Table 66: Frame rates (fps) of **Manta G-223** as function of ROI height [**width=2048**]

* fps= measured maximum frame rate @ 124 MB/s

Manta G-282B/C: ROI frame rates

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

Formula 17: **Manta G-282**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 30.42 fps

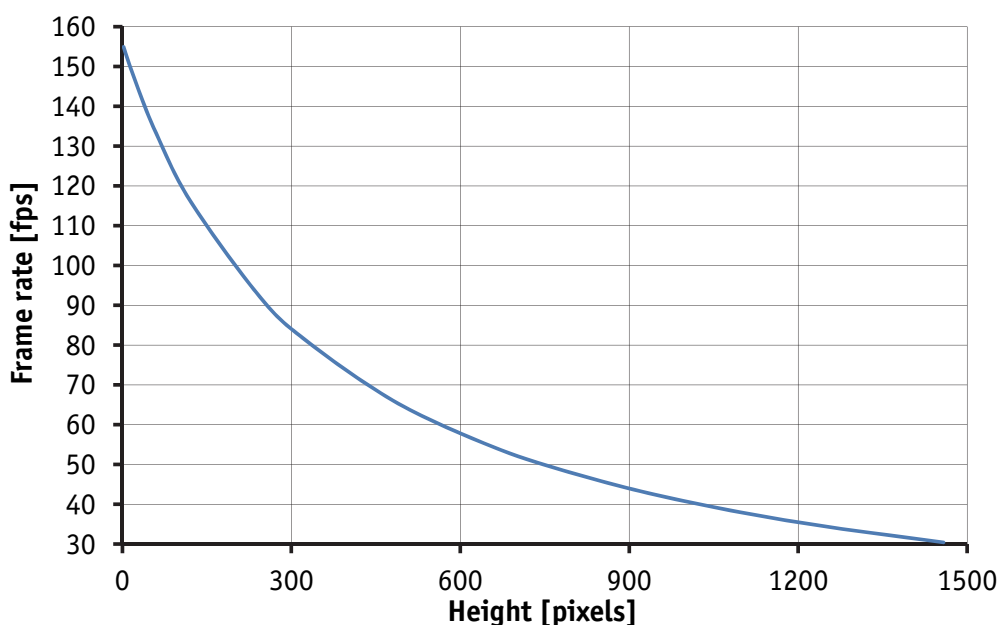


Table 67: Frame rates **Manta G-282** as function of ROI height[width=1458]

ROI height	CCD*
1458	30.42
1200	35.47
960	41.95
768	49.13
640	55.46
480	66.11
320	81.81
240	92.83
120	116.34
60	133.21
30	143.62
10	151.51
2	154.92

Table 68: Frame rates (fps) of **Manta G-282** as function of ROI height (pixel) [width=1458]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-283B/C: ROI frame rates

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

Formula 18: **Manta G-283**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 30.42 fps

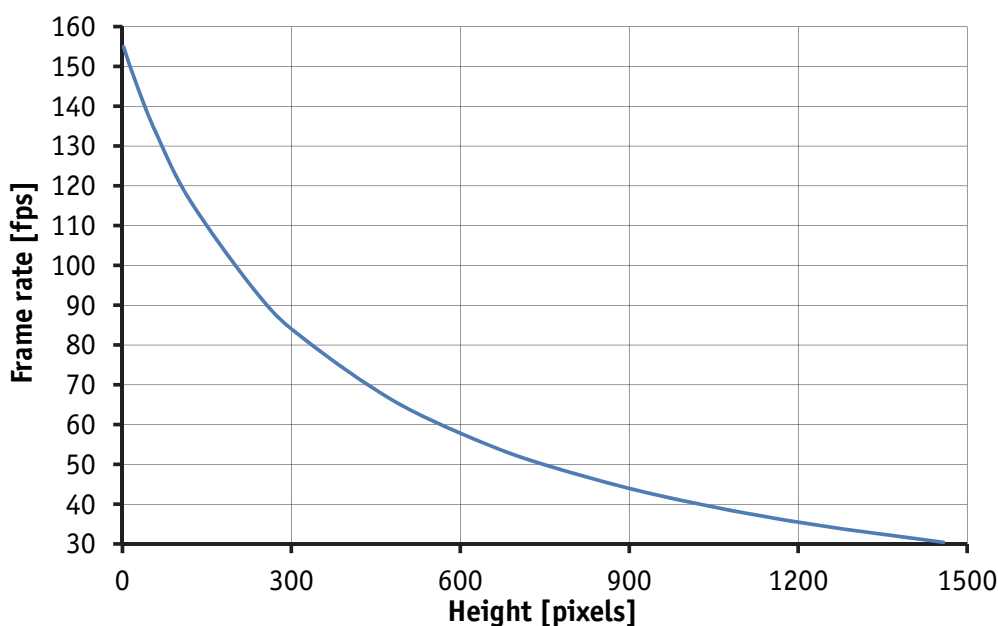


Table 69: Frame rates **Manta G-283** as function of ROI height[width=1458]

ROI height	CCD*
1458	30.42
1200	35.47
960	41.95
768	49.13
640	55.46
480	66.11
320	81.81
240	92.83
120	116.34
60	133.21
30	143.62
10	151.51
2	154.92

Table 70: Frame rates (fps) of **Manta G-283** as function of ROI height (pixel) [width=1458]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-419B/C (NIR): ROI frame rates

Max. frame rate at 2048 x 2048 (measured): 28.6 fps (higher frame rates are possible with burst mode)

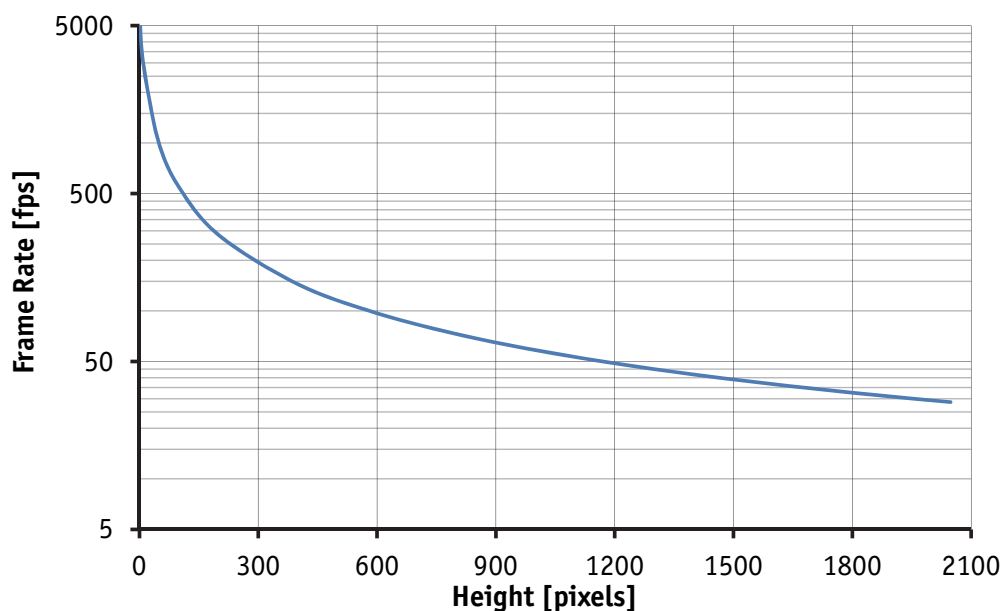


Table 71: Frame rates **Manta G-419 fps** as function of ROI height [**width=2048**]

ROI height	fps*
2048	28.6
2000	29.3
1800	32.5
1600	36.6
1400	41.8
1200	48.7
1000	58.4
900	64.8
800	72.8
700	83.1
600	96.8
500	115.9
400	144.3
300	191.1
200	283.1
100	545.2
50	981.3
20	2105.2
10	2949.8
5	3690.0
2	4926.1
1	4926.1

Table 72: Frame rates (fps) of **Manta G-419** as function of ROI height [**width=2048**]

* fps= measured maximum frame rate @ 124 MB/s

Manta G-504B/C: ROI frame rates

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

Formula 19: **Manta G-504**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 9.23 fps

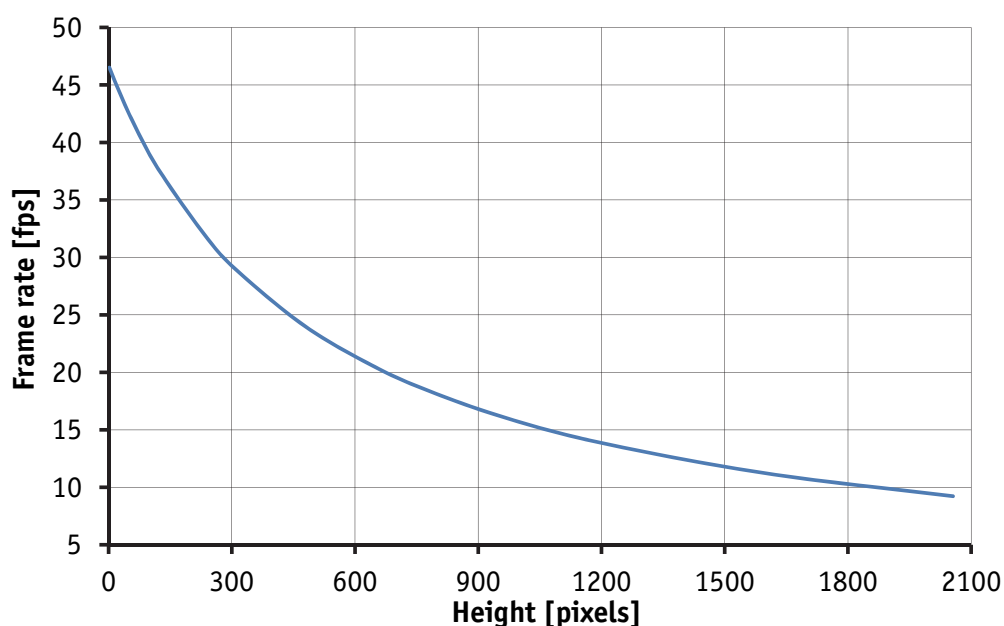


Table 73: Frame rates **Manta G-504** as function of ROI height[width=2452]

ROI height	CCD*
2056	9.23
1600	11.22
1200	13.86
960	16.12
768	18.55
640	20.63
480	23.97
320	28.62
240	31.68
120	37.75
60	41.75
30	44.09
10	45.80
2	46.52

Table 74: Frame rates (fps) of **Manta G-504** as function of ROI height (pixel) [width=2452]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-609B/C: ROI frame rates

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

Formula 20: **Manta G-609**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 15.24 fps

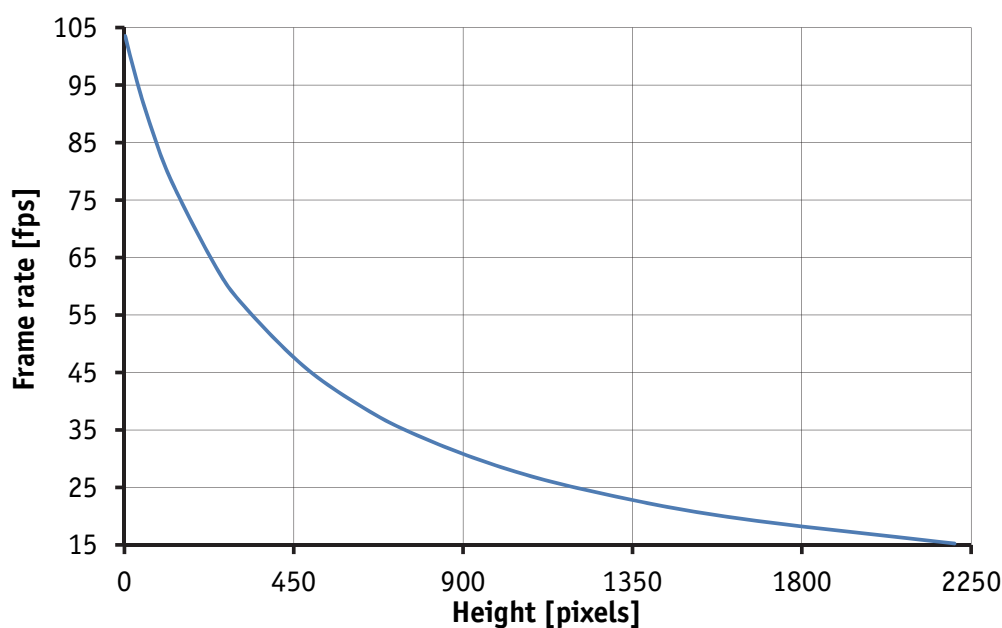


Table 75: Frame rates **Manta G-609** as function of ROI height[width=2206]

ROI height	CCD*
2206	15.24
1600	19.91
1200	24.96
960	29.43
768	34.36
640	38.68
480	45.89
320	56.41
240	63.71
120	79.04
60	89.86
30	96.46
10	101.43
2	103.56

Table 76: Frame rates (fps) of **Manta G-609** as function of ROI height (pixel) [width=2206]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Manta G-917B/C: ROI frame rates

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

Formula 21: **Manta G-609**: theoretical maximum frame rate of CCD

Maximum frame rate at full resolution according formula: 10.16 fps

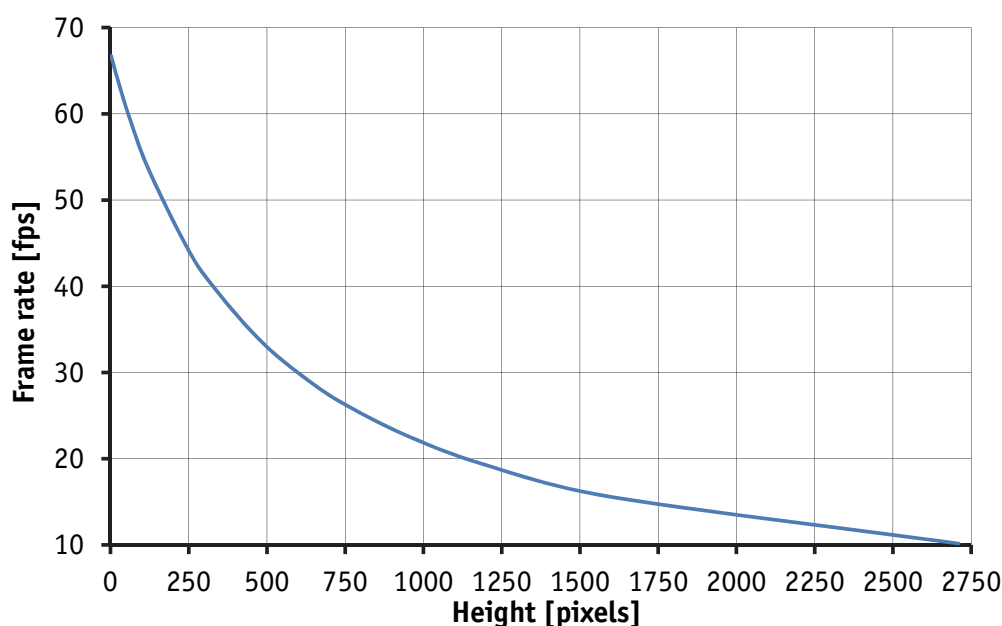


Table 77: Frame rates **Manta G-609** as function of ROI height[width=2710]

ROI height	CCD*
2710	10.16
1600	15.57
1200	19.26
960	22.47
768	25.91
640	28.86
480	33.65
320	40.34
240	44.80
120	53.69
60	59.61
30	63.09
10	65.64
2	66.72

Table 78: Frame rates (fps) of **Manta G-917** as function of ROI height (pixel) [width=2752]

* CCD = theoretical maximum frame rate (in fps) of CCD according to given formula

Appendix

Sensor position accuracy of AVT Manta cameras

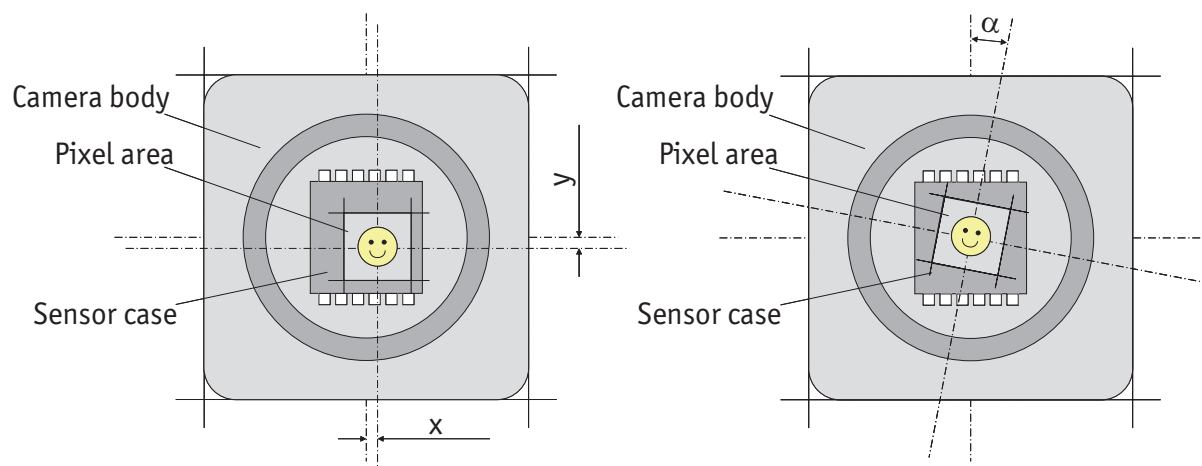


Figure 83: AVT sensor position accuracy

Method of positioning

Optical alignment of the photo sensitive sensor area into the camera front module (lens mount front flange).

Reference points

Sensor: center of the pixel area (photo sensitive cells).

Camera: Center of the camera front flange (outer case edges).

Accuracy

x/y: +/- 150 μ m (sensor shift)

z: +0 μ m to -150 μ m (optical back focal length)

α : +/- 0.5° (sensor rotation)

Note

x/y - tolerances between the C-Mount hole and the pixel area may be higher.



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