Allied Vision



GigE Vision Cameras

Manta

User Guide

See Model IDs covered by this user guide on page 44 for the hardware versions of Manta cameras that are used in DoC (EU declaration of conformity) documents.

Note: Lenses are not part of this product.

V8.4.0

FW Loaders: 40190 | 40111

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

2025-Nov-02

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- Contact us on page 17
- Contents on page 18

Read before use

EN - English

Safety

Before using the camera, read these safety instructions. Observe the warnings at all times. Use the camera only as stated in the Intended use on page 47.



CAUTION

Risk of burns

A camera in operation can reach temperature levels which could cause burns.



CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.



CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Intended use

Intended use of Allied Vision product is the integration into vision systems by professionals. All Allied Vision product is sold in a B2B setting.

Cameras without closed housings

Cameras without housing or with incomplete housing must be shielded against EMC emission by professionals according to local EMC provisions.

DA - Dansk

Sikkerhed

Læs sikkerhedsanvisningerne, før kameraet bruges. Overhold alle advarsler. Brug kun kameraet som anført i Intended use på side 47.



FORSIGTIG

Forbrændingsfare

Når kameraet bruges, kan det blive meget varmt og forårsage forbrændinger.



FORSIGTIG

Kvæstelser, hvis kameraet eller linser falder ned

Falder kameraet eller linsen ned, kan dette forårsage kvæstelser.



FORSIGTIG

Fare for snitsår på linsemodulets skarpe kanter

Linsemodulets gevind kan have skarpe kanter.

Tilsigtet brug

Allied Vision produktets tilsigtede brug er en indbygning i et visionssystem, udført af fagfolk. Alle Allied Vision produkter sælges i B2B.

Kameraer uden lukket hus

Kameraer uden hus eller uden komplet hus skal beskyttes mod EMC emissioner iht. lokale EMC bestemmelser.

DE - Deutsch

Sicherheit

Bevor Sie die Kamera benutzen, lesen Sie diese Sicherheitshinweise. Beachten Sie diese Hinweise immer. Verwenden Sie die Kamera nur wie beschrieben in Intended use auf Seite 47.



VORSICHT

Gefahr von Verbrennungen

Im Betrieb kann die Kamera Temperaturen erreichen, die zu Verbrennungen führen.



VORSICHT

Verletzung durch fallende Kameras oder Objektive

Eine fallende Kamera oder ein fallendes Objektiv kann Verletzungen verursachen.



VORSICHT

Schnitte durch scharfkantige Objektivgewinde

Objektivgewinde können scharfe Kanten haben.

Bestimmungsgemäßer Gebrauch

Allied Vision Produkte sind bestimmt für die Integration in Bildverarbeitungs-systeme durch Fachpersonal. Alle Allied Vision Produkte werden in einer B2B-Umgebung verkauft.

Kameras ohne geschlossenes Gehäuse

Für Kameras ohne Gehäuse oder mit unvollständigem Gehäuse muss die Abschirmung gegen EMV-Emissionen gemäß den örtlichen EMV-Bestimmungen durchgeführt werden.

ES - Español

Seguridad

Antes de utilizar la cámara lea estas instrucciones de seguridad. Observe las advertencias en todo momento. Utilice la cámara solo tal y como se estipula en el Intended use en la página 47.



ATENCIÓN

Riesgo de quemaduras

Una cámara en funcionamiento puede alcanzar temperaturas que podrían provocar quemaduras.



ATENCIÓN

Lesiones en caso de que las cámaras o las lentes se caigan

Si una cámara o una lente se cae puede provocar lesiones.



ATENCIÓN

Riesgo de cortes debido a los bordes afilados del objetivo

Las roscas de los objetivos pueden tener bordes afilados.

Uso previsto

El uso previsto del producto Allied Vision es la integración en el sistema de visión por parte de profesionales. Todos los productos Allied Vision se venden dentro de una relación B2B.

Cámaras sin carcasa cerrada

Las cámaras sin carcasa o con una carcasa incompleta deben protegerse contra las emisiones CEM por parte de profesionales de acuerdo con las disposiciones locales sobre la CEM.

FI - Suomi

Turvallisuus

Lue nämä turvallisuusohjeet ennen kameran käyttöä. Noudata varoituksia joka hetki. Käytä kameraa ainoastaan kohdassa Intended use sivulla 47 kuvatulla tavalla.



HUOMIO

Palovammojen vaara

Käytössä olevan kameran saavuttamat lämpötilatasot voivat aiheuttaa palovammoja.



HUOMIO

Putoavien kameroiden tai linssien aiheuttamat vammat

Putoava kamera tai linssi voi aiheuttaa vammoja.



HUOMIO

Linssien kiinnikkeiden terävien reunojen aiheuttamien viiltovammojen vaara

Linssin kiinnikkeiden kierteiden reunat voivat olla teräviä.

Käyttötarkoitus

Allied Vision-tuotteen käyttötarkoitus on integrointi kuvajärjestelmiin ammattilaisten toimesta. Kaikki Allied Vision-tuotteet myydään B2B-ympäristössä.

Kamerat, joissa ei ole suljettuja koteloita

Ammattilaisten on suojattava kamerat, joissa ei ole koteloa tai joiden kotelo on epätäydellinen, EMC-päästöiltä paikallisten EMC-määräysten mukaisesti.

FR - Français

Sécurité

Veuillez lire ces consignes de sécurité avant d'utiliser la caméra. Respectez continuellement les avertissements. Utilisez la caméra uniquement comme indiqué sous Intended use, page 47.



ATTENTION

Risque de brûlures

Une caméra en service peut atteindre des niveaux de température susceptibles d'entraîner des brûlures.



ATTENTION

Blessures en cas de chute de caméras ou d'objectifs

La chute d'une caméra ou d'un objectif peut entraîner des blessures.



ATTENTION

Risque de coupures sur les bords tranchants des montures d'objectif

Les filetages des montures d'objectif peuvent présenter des bords tranchants.

Utilisation prévue

L'utilisation prévue du produit Allied Vision est son intégration dans des systèmes de vision par le soin de professionnels. Tout produit Allied Vision est vendu dans un cadre B2B.

Caméras sans boîtier fermé

Les caméras sans boîtier fermé ou à boîtier incomplet doivent être blindées contre les émissions CEM par le soin de professionnels conformément aux dispositions CEM locales.

עברית - HE

בטיחות

לפני השימוש במצלמה, עליך לקרוא את הוראות הביטחון האלו. עליך לממש הוראות ביטחון אלו תמיד.
השימוש במצלמה הוא רק לפי מה שכתוב ב"כוונת השימוש" (Intended use) בעמוד 47.

זהירות



סכנת כוויה

בזמן הפעלת המצלמה עלולותטמפרטורות גבוהות לעלות, שיכולות לגרום לכוויות.

זהירות



פציעה מנפילת מצלמות או עדשות

מצלמה או עדשה שנופלות עלולות לגרום לפציעה.

זהירות



סכנה להחתך מתבריג חד של העדשה

תבריג תושבת העדשה עלול להיות חד עד כדי פציעה.

שימוש מיועד

מוצרי AlliedVision מיועדים לשילוב במערכות ממוחשבת לעיבוד צילומים ע"י אנשי מקצוע.
כל מוצרי AlliedVision נמכרים לשימוש בסביבת B2B.

IT - Italiano

Sicurezza

Leggere queste istruzioni per la sicurezza prima di utilizzare la telecamera. Osservare sempre tutte le avvertenze. Utilizzare la telecamera come descritto alla sezione Intended use a pagina 47.



ATTENZIONE

Pericolo di ustioni

Durante il funzionamento una telecamera può raggiungere temperature elevate che possono essere causa di ustioni.



ATTENZIONE

Lesioni dovute alla caduta di telecamere o lenti

La caduta di una telecamera o di una lente può causare delle lesioni.



ATTENZIONE

Pericolo di tagliarsi sui bordi affilati degli attacchi della lente

I bordi della filettatura dell'attacco della lente possono essere affilati.

Uso previsto

Il prodotto Allied Vision è concepito per essere integrato in sistemi di monitoraggio in campo professionale. Tutti i prodotti Allied Vision sono venduti in uno scenario B2B.

Telecamere senza custodia chiusa

Le telecamere senza custodia o con una custodia incompleta devono essere protette dalle emissioni elettromagnetiche in ambienti professionali in conformità con le norme CEM nazionali.

JA – 日本語

安全性

本カメラを使用する前に、この安全の手引きをお読みください。常に、警告事項を守ってください。必ず、Intended use 47 ページの通りに、本カメラを使用してください。



注意

やけどの危険性

作動中のカメラは、やけどを引き起こす温度まで熱くなる恐れがあります。



注意

カメラまたはレンズの落下によるけが

カメラまたはレンズが落下すると、けがをする恐れがあります。



注意

レンズマウントの鋭利な端部で切り傷の危険性

レンズマウントのギザギザの部分が鋭利である可能性があります。

用途

Allied Vision製品は、専門家が視覚装置に統合することを意図したものです。すべてのAllied Vision製品は、企業間取り引き用に販売されています。

ハウジングで閉じられていないカメラ

ハウジングのないカメラまたはハウジングが不完全なカメラは、現地の電磁両立性（EMC）規定に従い、専門家によって、EMCエミッションから保護される必要があります。

NL - Nederlands

Veiligheid

Lees deze veiligheidsinstructies voordat u de camera gaat gebruiken. Neem deze waarschuwingen altijd in acht. Gebruik de camera uitsluitend, zoals aangegeven in het Intended use op pagina 47.



VOORZICHTIG

Risico van verbranding

Een camera die gebruikt wordt, kan temperatuurwaarden bereiken die brandwonden kunnen veroorzaken.



VOORZICHTIG

Letsel door vallende camera's of lenzen

Een vallende camera of lens kan letsel veroorzaken.



VOORZICHTIG

Risico van snijwonden door scherpe randen van lensbevestigingen

Het schroefdraad van de lensbevestiging kan scherpe randen hebben.

Beoogd gebruik

Het beoogde gebruik van het Allied Vision-product is de integratie in optische systemen door professionals. Alle Allied Vision-producten worden verkocht in de B2B-markt.

Camera's zonder gesloten behuizing

Camera's zonder behuizing of met een onvolledige behuizing moeten door professionals worden beschermd tegen EMC-straling door EMC-beschermingen ter plaatse.

NO - Norsk

Sikkerhet

Les disse sikkerhetsinstruksene før du bruker kameraet. Følg advarslene til en hver tid. Bruk kun kameraet i samsvar med Intended use på side 47.



FORSIKTIG

Risiko for brannskader

Et kamera i bruk kan nå temperaturnivåer som kan forårsake brannskader.



FORSIKTIG

Skade ved fallende kameraer eller linser

Et fallende kamera eller en fallende linse kan forårsake skade.



FORSIKTIG

Risiko for kutt fra skarpe kanter på linsefester

Sporene på linsefestet kan ha skarpe kanter.

Tiltenkt bruk

Den tiltenkte bruken av Allied Vision-produktet er integrering i visjonssystemer av profesjonelle. Alle Allied Vision-produkter selges i en forretning til forretning-situasjon.

Kameraer uten lukkede kamerahus

Kameraer uten kamerahus eller med ufullstendige kamerahus må beskyttes mot EMC-utslipp av fagfolk i henhold til lokale EMC-bestemmelser.

SV - Svenska

Säkerhet

Läs igenom säkerhetsinstruktionerna innan du använder kameran. Var hela tiden särskilt uppmärksam på varningarna. Använd enbart kameran på det sätt som anges i Intended use på sida 47.



VARNING

Risk för brännskada

En kamera i drift kan komma upp i temperaturer som kan orsaka brännskador.



VARNING

Risk för skador från fallande kameror eller objektiv

Fallande kameror eller objektiv kan förorsaka skador.



VARNING

Risk för skärsår från vassa kanter på objektivfattningar

Objektivets gängor kan ha vassa kanter.

Avsedd användning

Den avsedda användningen av Allied Vision-produkter är integrering i visionssystem av fackmän. Samtliga Allied Vision-produkter säljs i en B2B-miljö.

Kameror utan slutna kamerahus

Kameror utan eller med ofullständiga kamerahus måste skyddas mot elektromagnetiska emissioner av fackmän enligt lokala bestämmelser för elektromagnetiska emissioner.

ZH - 简体中文版

安全需知

使用本相机前，请阅读本安全说明书。请务必遵守相关警告 和 Intended use 于第 47 页 .



注意事项

烫伤风险

相机操作过程中温度可能上升并导致烫伤风险。



注意事项

相机或者镜头跌落造成伤害

相机或者镜头可能会跌落并造成伤害。



注意事项

镜头接口的锐利边缘划伤风险

镜头接口螺纹边缘可能较为锐利。

预期用途

Allied Vision 产品的预期用途是由专业人士整合到视觉系统中。所有 Allied Vision 的产品均通过 B2B 渠道销售。

无封闭式外壳相机

使用不带外壳或外壳不完整的相机时，必须由专业人员根据当地的 EMC 规定，对其进行 EMC 屏蔽。

Manta cameras at a glance



Get an overview of Manta camera documentation.



Read this user guide carefully

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

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

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

Scope of delivery

Your Allied Vision camera is delivered with the following components:

- Manta GigE Vision camera
- Download Instructions for First Camera Operation

What else do you need?

Item	Link
GigE Features Reference, camera data sheets, Modular Concept, and 3D CAD STEP files	www.alliedvision.com/en/support/technical-documentation/manta-documentation
Camera lenses and accessories	www.alliedvision.com/en/products/accessories
Download the latest GigE firmware loader and release notes.	www.alliedvision.com/en/support/firmware-downloads
Warranty duration, sensor warranty	www.alliedvision.com/en/company/legal-and-compliance/legal-and-privacy/terms-and-conditions
Vimba X SDK and software tools	www.alliedvision.com/en/products/software/vimba-x-sdk/

Table 1: Additional resources

Contact us

Quick links

Products
www.alliedvision.com/en/products

Distribution partners
www.alliedvision.com/en/company/where-to-buy

Contact
www.alliedvision.com/en/company/contact-us
Info@alliedvision.com

Support
www.alliedvision.com/en/support

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Worldwide network

www.alliedvision.com/en/company/about-us/locations/office-locations

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Document history and conventions



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Document history

Version	Date	Document updates
V8.4.0	2025-Nov-02	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) • Added data for the Model ID on the title page and in Camera identification on page 44. • Updated Contact us on page 17. • Restructured Liability, trademarks, and copyright on page 48. • Renamed previous "Product safety" to How to avoid product damage on page 49. • Applied editorial changes.
V8.3.0	2025-Jul-28	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) Changed entries for Vimba to Vimba X.
V8.2.9	2025-Jul-09	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) • Removed UKCA logo from Compliance notifications on page 45. • Removed contents for ISO 13485 and updated definitions for Intended use on page 47.
V8.2.8	2025-Feb-25	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) Renamed Type Hoya C-5000 IR cut filter to Type IRC 625 colored glass IR cut filter in Specifications common to all models on page 58 and in Optical filters on page 236.
V8.2.7	2024-Nov-07	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) Corrected typos.
V8.2.6	2024-Jul-15	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) • Updated addresses in Contact us on page 17. • Applied editorial changes.
V8.2.5	2024-Feb-06	**Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) Updated contents in IP settings on page 243.

Table 3: Document history (sheet 1 of 13)

Version	Date	Document updates
V8.2.4	2024-Jan-29	**Release: Firmware loader**: 40190 (Manta CCD 1-Tap) **Firmware loader**: 40111 (Manta CMOS 2-Tap) See Manta CCD 1-Tap versus CMOS 2-Tap on page 54. • Changed reference from FW versions to FW Loader versions on the title page and in this table. • Manta G-031,-032,-033,-046,-125,-145,-145-30fps,-146,-201, -201-30fps,-504: Reduced values for power consumption by 1.0 W in Model specific specifications on page 59.
V8.2.3	2023-Jul-10	**Firmware loader**: 40111 • Applied editorial changes.
V8.2.2	2023-Jan-27	**Release: Firmware loader**: 40111 • Added note that lenses are not part of the product. • Updated Hebrew contents in Read before use on page 2.
V8.2.1	2022-Aug-17	**Firmware loader**: 39784 Added Hebrew contents to Read before use on page 2.
V8.2.0	2022-Aug-16	**Release: Firmware loader**: 39784 • Added firmware versions for better orientation. • Updated values for exposure times and increments in Model specific specifications on page 59 onwards for Manta G-040, G-158, G-235, G-319, G-507, G-895, and G-1236 models. • Added support for Pixel Defect Masking in Camera feature availability on page 186 for Manta G-040, G-158, G-235, G-319, G-507, G-895, and G-1236 models; and to the image data flow for Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460 series on page 267. • Applied editorial changes.
V8.1.6	2022-May-09	**Firmware loader**: 37388 • Corrected technical drawing for Standard housing with C-Mount (default) on page 192.
V8.1.5	2022-Mar-01	**Firmware loader**: 37388 • Corrected “Focal Length versus Field of View” table for Manta G-235 series on page 229. • Renamed the document from Technical Manual to User Guide.
V8.1.4	2021-Dec-08	**Release: Firmware loader**: 37388 • Applied editorial changes.
V8.1.3	2021-Oct-19	**Firmware loader**: 34365 • Fixed incorrect page numbers. • Applied editorial changes.

Table 3: Document history (sheet 2 of 13)

Version	Date	Document updates
V8.1.2	2021-Aug-19	**Firmware loader**: 34365 • Added icon for compliance with UKCA in Compliance notifications on page 45. • Applied editorial changes.
V8.1.1	2021-Jul-13	**Release: Firmware loader**: 34365 • Applied editorial changes.
V8.1.0	2021-Jan-15	**Release: Firmware loader**: 32702 • Added specifications for new models, including absolute QE, spectral response, and ROI frame rates: - Manta G-1620 series on page 171 - Manta G-2040 series on page 176 - Manta G-2040 series on page 176. • Updated the image data path description for Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460 series on page 267. • Updated QE and spectral response plots for Manta G-223, G-449, and G-419 NIR in Specifications on page 52. • Added tables for imaging performance in Specifications on page 52. • Added tables in Focal length versus field of view on page 223 for the new models. • Added IP Class content. • Removed references to Manta G-223B NIR. The last time shipment period end of June 30, 2021. For more information, refer to the Product Change Notification. • Applied editorial changes.
V8.0.3	2020-Jun-05	**Firmware loader**: 27877 • Added Read before use on page 2. • Added Your safety on page 48. • Added How to avoid product damage on page 49. • Added time between exposures values for Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-223, G-282, G-283, G-419, G-504, and G-505. • Added power supply order codes. • Updated Installing the camera on page 237. • Applied editorial changes.
V8.0.2	2019-Nov-04	**Release: Firmware loader**: 27877 • Corrected technical drawings.

Table 3: Document history (sheet 3 of 13)

Version	Date	Document updates
V8.0.1	2019-Jun-06	• Corrected the feature comparison table in the Specification chapter - Added ReverseX and ReverseY for Manta G-223 and G-419. These features were available in firmware version 01.54.18163. • Changed the IR cut filter section to Optical filters and included all optical filters available for the Manta camera family. • Added content to the Mounting the camera section. • Applied editorial changes.
V8.0.0	2019-Mar-08	• Updated Manta G-040, G-158, G-235, G-319, G-507, G-895, and G-1236 series specifications (firmware version 00.01.54.20343), see the GigE Firmware Release Notes for details on the changes. • Added trigger latency and trigger jitter values for Manta G-223 and G-419 series. • Updated symbols used in this manual. • Updated RoHS statement to include amendment 2015/863/EU. • Added content to Powering the camera via PoE in installation chapter. • Added Supplier Declaration of Conformity to the Installation and hardware chapter. • Added EMC compliance statement to Installation and hardware chapter. • Added shock and vibration information. • Applied various other minor enhancements and corrections.
V7.9.1	2018-Mar-07	• Updated Manta G-1236 series specifications. • Applied various other minor enhancements and corrections.
V7.9.0	2018-Jan-12	• Initial commercial release: Manta G-040 series on page 71 - Sony IMX287 CMOS sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-158 series on page 101 - Sony IMX273 CMOS sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Added Specifications common to all models to simplify the model specification tables.
V7.9.0	2018-Jan-12	• Simplified the Contact us section, please click the link to find contact information for your region or email us at one of the provided email addresses. • Various other minor enhancements and corrections. • Removed references to Manta G-609B and G-609C models. The last time shipment period ends on February 23, 2018. For more information, refer to the Product Change Notification.

Table 3: Document history (sheet 4 of 13)

Version	Date	Document updates
V7.8.3	2017-Jun-28	• CMOSIS renamed to CMOSIS/ams following the acquisition of CMOSIS by ams Sensors Belgium. • Corrected user trigger rules. • Applied various other minor enhancements and corrections.
V7.8.2	2017-May-15	• Corrected power consumption values for Manta G-319, G-507, G-895, and G-1236 series. • Corrected two reported errors: - Figure Manta type A CS-Mount dimensions (16 mm filter) - Figure Manta type B CS-Mount dimensions (16 mm filter).
V7.8.1	2017-Apr-05	• Corrected the technical drawings for Manta Type B cameras (standard housing, W90 housing, W90 S90 housing, W270 housing, and W270 S90 housing). • Added cable color to camera I/O connector pin assignment including pin assignment figure and cross reference to the Allied Vision I/O cable data sheet.
V7.8.0	2017-Jan-27	• Added Piecewise Linear HDR option to Exposure Mode for the Manta G-223 and G-419 series. For more information, see the GigE Features Reference. • Corrected the technical drawings for Manta Type B board level cameras (Manta G-223, G-235, and G-419 series) and added technical drawings for Manta Type B board level cameras (Manta G-319, G-507, G-895, and G-1236 series).
V7.7.0	2016-Dec-16	• Initial commercial release: Manta G-1236 series on page 166 with: - Sony IMX304 CMOS sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Added `ReverseX` to the following Manta Type A monochrome models: Manta G-031B, G-033B, G-046, G-125B, G-146B, G-201B, and G-504B. • Applied various other minor enhancements and corrections.
V7.6.0	2016-Nov-25	• Initial commercial release: Manta G-895 series on page 157 with: - Sony IMX267 CMOS sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Updated board level camera regulatory statement. • Updated missing values in specification tables. • Updated absolute QE plot and added spectral response plot for Manta G-032. • Corrected reported errors.

Table 3: Document history (sheet 5 of 13)

Version	Date	Document updates
V7.5.0	2016-Aug-16	• New features for Manta G-282, G-283, G-505, and G-917 series: - One-tap, dual-tap switchability (except Manta G-505) - Trigger over Ethernet (ToE) Action Commands feature - **DeviceUserID** is now accessible via the Vimba user interface. • New features and changes for Manta G-505 series: - Binning: changed the maximum value for **BinningX** and **BinningY** to *4* - **ReverseX.** • Added optical filter information to specification tables. • Applied various other minor enhancements and corrections.
V7.4.0	2016-Jul-08	• Initial commercial release: Manta G-319 series on page 131 with: - Sony IMX265 CMOS sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-507 series on page 152 with: - Sony IMX267 CMOS sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Added spectral response plots for select camera models. • Updated specification tables to be consistent with the information on the product webpages. • Added Trigger over Ethernet Action Commands feature for supported models. For more information see the GigE Features Reference. • Updated frame rate plots. • Updated feature list for Manta 223, G-235, and G-419 series. • Added Installation and hardware chapter. • Various other minor enhancements and corrections. • Updated Manta type B CCD monochrome and color image data flow diagram. • Updated image flow diagrams for Manta type B models (CCD and CMOS). • Updated absolute QE plots for Manta G-282, G-283, G-505, and G-917 series.

Table 3: Document history (sheet 6 of 13)

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

Table 3: Document history (sheet 7 of 13)

Version	Date	Document updates
V7.1.0	2014-Oct-07	• Initial commercial release: Manta G-235 series on page 118 with: - Sony IMX174 CMOS sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-505 series on page 148 with - Sony ICX625 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Updated the following in the Specifications chapter: - Trigger latency and jitter values - `DecimationX` and `DecimationY` control descriptions changed to GenICam factor style. • Added `BufferHandlingControl` and `StreamInformation` in Camera features section, applicable for **Vimba** version 1.3 or higher. • Updated Camera features section. • Added the following sections: - Manta CMOS angled-head housings (type B) - Manta CMOS board level models (type B) - Cross section: CS-Mount (type B).
V7.0.3	2014-Jun-09	• Added trigger latency and jitter values in the Specifications chapter. • Updated and rearranged Specifications chapter. • Added Camera feature comparison section. • Preliminary Manta type B angled-head and board level variant information removed from the document until samples are available.
V7.0.2	2014-May-08	• Updated camera block diagrams. • Updated drawings for Manta type A board level (non-PoE models): dimensions and Manta type A board level (PoE): dimensions. • Updated spectral sensitivity plots. • Updated the note on `StreamHoldCapacity` in Specifications and Frame memory sections. • Added section Exceptions for non-PoE Manta cameras up to serial number 503323258. • Updated available color pixel formats for Manta G-223 and G-419 series • Updated optional accessories in the Specifications chapter. • Added section Manta standard board level models (type B.) • Added Hirose cable information. • Updated exposure time values for Manta G-145, G-223, G-282, and G-283 series. • Corrected frame rate formula for Manta G-145B NIR.

Table 3: Document history (sheet 8 of 13)

Version	Date	Document updates
V7.0.1	2013-Sep-30	• Added Camera cleaning. • Changed maximum frame rates and gain range, added burst mode for Manta G-223 and G-419 series. • Added a feature of Manta type B cameras: - Temperature monitoring. • Added `ReverseX` feature in Camera features. • Added Manta angled-head housings (type B). • Updated maximum gain values for Manta G-283 and G-917 series. • Updated minimum exposure time for Manta G-145 series (including 30 fps models). • Updated the frame rate versus height plots.
V7.0.0	2013-Aug-30	• Initial commercial release: Manta G-419 series on page 136 with: - CMOSIS/ams CMV4000 CMOS sensor - Specifications, absolute QE, ROI frame rate, camera lens information, and image data flow. • As of this version, the document refers to Vimba SDK (not PvAPI). • Changed cable recommendation to Category 6 or higher. • Manta G-145 series (including 30 fps models): changed framerate. • Camera interfaces chapter: added I/O block diagrams and the status LED description. • Changed minimum exposure times of Manta G-223 and G-419 series. • Changed ROI frame rates of Manta G-145-30fps series.

Table 3: Document history (sheet 9 of 13)

Version	Date	Document updates
V6.0.1	2013-Mar-20	• Initial commercial release: Manta G-223 series on page 114 with: - CMOSIS/ams CMV2000 CMOS sensor - Specifications, absolute QE, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-282 series on page 123 with: - Sony ICX687 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-283 series on page 127 with - Sony ICX674 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-917 series on page 162 with: - Sony ICX814 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • These models are called Manta type B, since there are some differences to the other models that are called Manta type A (specifications, housing, image data flow, features). • New tripod adapter, new CAD drawings with LEDs on top of the connector. • In Specifications chapter, the pixel formats are listed both for PvAPI and Vimba (GenICam V1.0). • Added Video iris output description chapter. • I/O pin assignment: 10 mA on outputs 1 and 2 (not 20 mA). • Manta G-031B, G-031C: External trigger delay. • Corrected the mass (200 grams) of Manta type A cameras Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504 series. • PoE models: compliant with Power over Ethernet IEEE 802.3at and IEEE 802.3af. • Deleted the Manual Overview chapter, Deleted Frame Rate Comparison of all Manta cameras. • Changed date format to: year-month-day.

Table 3: Document history (sheet 10 of 13)

Version	Date	Document updates
V5.0.0	2012-May-15	• Initial commercial release: Model specific specifications on page 59 with: - Sony ICX618 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-145B NIR on page 92 with - Sony ICX285 CCD sensor - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Error found in Document history V3.0.0 by Validation Team: - ***RGBA24*** and ***BGRA24*** must be named ***RGBA32*** and ***BGRA32*** - Added ***RGBA32*** and ***BGRA32*** color formats (except Manta G-201B-30fps and G-201C-30fps) - Added frame rate diagrams. • Added focal length 4.0 mm in the focal length vs field of view table for the Manta G-125 series. • Same main board for all Manta models: • From serial number 503323258 on all Manta models including PoE and board level versions contain the same main board. • Revised non-PoE model drawings and new board level PoE drawings • Revised PoE descriptions regarding IEEE 802.3af and IEEE 802.3at: - See note in Gigabit Ethernet port. Manta PoE models can source power from IEEE 802.3af (100 Mbps and 1000 Mbps) and from IEEE 802.3at compliant power sourcing equipment (PSE) such as switches injectors or NICs. • Added frame rates for ROI height = 720. - Manta G-125 series ROI frame rate. • IR cut filter: - Changed IR cut filter to type Jenofilt 217. • New CAD drawings with Pin3 = Video Type Auto Iris Out. • Frame memory: - Manta G-032 series: changed from 49 to 99 frames - Manta G-033 series: changed from 88 to 99 frames - Manta G-046 series: changed from 35 to 70 frames - Manta G-125 series: changed from 12 to 25 frames - Manta G-145 series: changed from 10 to 22 frames - Manta G-145-30fps series: changed from 10 to 22 frames - Manta G-146 series: changed from 10 to 22 frames - Manta G-201 series: changed from 8 to 16 frames - Manta G-201-30fps series: changed from 8 to 16 frames.

Table 3: Document history (sheet 11 of 13)

Version	Date	Document updates
V4.1.0	2011-Jun-24	• Added PoE information including: - Power requirements, power consumption and regulations for PoE models - Note about PoE capable cameras - PoE cameras < 220 grams (without lens). • Corrected frame rate formulas for Manta G-033 and G-504 series. • C-Mount and CS-Mount not adjustable, for modifications contact Customer Care and send camera to Allied Vision Technologies. • Manta board level: - Manta board level: deleted (PWR output on demand) at Pin2. • Removed the Firmware update chapter (see Knowledge Base at Allied Vision Technologies Website: search for GigE Firmware Update application note). • Revised image data flow block diagram. • Added 30 fps variant: Manta G-145 and G-201 series. • Added ***Mono12Packed*** for monochrome cameras and ***Bayer12Packed*** for color cameras. • Added the following camera controls: Chunk Data, `EventControls`, `StreamFramerateConstrain`, `FrameStartTriggerOverlap`, `PayloadSize`, `NonImagePayloadSize`, `SyncInGlitchFilter`, `AutoIris`, Gamma correction, LUT. • Manta G-145-30fps and G-201-30fps (non PoE). - Have the same I/O pin assignment (input circuits and voltage range), power LED and upside down PoE plug as PoE models. • Manta G-145B-30fps, G-145C-30fps, G-201B-30fps, and G-201C-30fps non-PoE cameras behave like PoE cameras.
V4.0.1	2011-Jan-05	• Changed tripod drawing: added dimensions of three big threads (M6 and UNC 1/4-20). • In specifications tables color pixel formats: inserted ***Mono8***. Added note, that ***Raw8***, ***Raw16*** displayed in some viewers means the same as ***Bayer8***, ***Bayer16***. • Changed GigE Vision V1.0 to V1.2 in all specification tables.

Table 3: Document history (sheet 12 of 13)

Version	Date	Document updates
V4.0.0	2010-Oct-25	• Initial commercial release: Manta G-033 series on page 67 - Sony ICX414 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-504 series on page 144 - Sony ICX655 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Added note that description of status LEDs can be found in Manta Hardware Installation Guide. • Changed file format from Adobe FrameMaker FM7 to FM9.
V3.0.0	2010-Jun-09	• Anitial commercial release: Manta G-046 series on page 76 - Sony ICX415 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-145 series on page 84 - Sony ICX285 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-146 series on page 97 - Sony ICX267 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Initial commercial release: Manta G-201 series on page 106 - Sony ICX274 CCD sensor. - Specifications, absolute QE, spectral response, ROI frame rate, camera lens information, and image data flow. • Added spectral sensitivity note. • Added image memory size table: - With the new firmware version 01.40, due to a bug all Manta models have only 12-bit in the image data flow (even if the ADC delivers 14-bit). • Due to a repaired bug in FPGA and microcontroller, the `StreamHoldCapacity` changed: Manta G-032 series from 49 frames to 99 frames, Manta G-125 series from 12 frames to 25 frames. • ***RGBA24*** and ***BGRA24*** are not supported. • Added information that Manta board level cameras have now a cooling plate.
V2.0.3	2010-Apr-15	• New manual release status

Table 3: Document history (sheet 13 of 13)

Document conventions

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

Typographic styles

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

Table 4: Typographic styles

Symbols and notes



CAUTION

Risk of burns

Precautions are described



CAUTION

Injury by falling cameras or lenses

Precautions are described



CAUTION

Risk of cuts by sharp edges of lens mounts

Precautions are described



NOTICE

Material damage

Precautions are described.



NOTICE

Material damage by electrostatic discharge (ESD)

Precautions as described.



Avoiding malfunctions

Precautions are described.



Practical tip

Additional information helps to understand or ease handling the camera.



Additional information

Web address or reference to an external source with more information is shown.

Product naming

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

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

Table 5: Third-party product naming

Acronyms and terms

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

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

Table 6: Acronyms and terms used in this document (sheet 1 of 2)

Acronym or term	Description
EMVA	European Machine Vision Association
ESD	Electrostatic Discharge
FIFO	First-in first-out
GigE	Gigabit Ethernet
GND	Ground (power)
GVSP	AIA GigE Vision Streaming Protocol
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
LUT	Look-up Table
M12-Mount	M-12 Mount (S-Mount)
MSDS	Material Safety Data Sheet
Mono	Monochrome
NIC	Network interface card
NIR	Near-Infrared
PoE	Power over Ethernet
QE	Quantum efficiency
RoHS	Restriction of Hazardous Substances (EU directive)
ROI	Region of interest
SDK	Software Development Kit
SFNC	Standard Feature Naming Convention
t_{pdHL}	Propagation delay high-to-low

Table 6: Acronyms and terms used in this document (sheet 2 of 2)

Compliance, safety, and intended use

§

This chapter includes:

Camera identification 44
Compliance notifications 45
Intended use 47
Liability, trademarks, and copyright 48
Your safety 48
How to avoid product damage 49

Camera identification

You can identify your Manta camera like this:

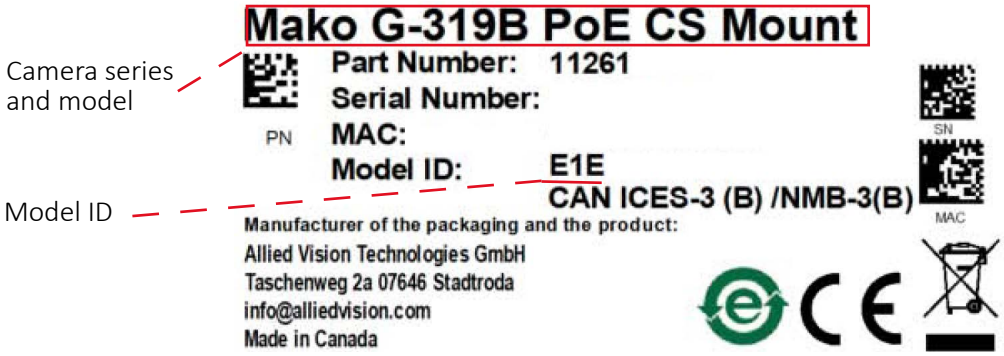


Figure 1: Shipping box label

The camera's housing is labeled with equivalent information.

Model IDs covered by this user guide

The DoC (EU declaration of conformity) documents refer to the following hardware versions of closed housing and board level Manta cameras:

Hardware option[1]	Model ID
Manta Type **A** (Closed Housing)	E1F
Manta Type **A** BL (Board Level)	E1G
Manta Type **B** (Closed Housing)	E1H
Manta Type **B** BL (Board Level)	E1I [(2)]
[1] See next. | [2] The third letter "I" represents "i" in upper case.	

Table 7: Hardware options and model IDs

Manta Types A and B models

Manta cameras divide into 2 groups of cameras with different housing dimensions. (See Specifications on page 52 for details):

Type A	Type B
Manta G-031, -032, -033, -046, -125, -145, -146, -201, -504	Manta G-040, -158, -223, -235, -282, -283, -319, -419, -505, -507, -895, -917, -1236, -1620, -2040, -2460

Table 8: Manta Types A and B

Compliance notifications



National regulations on disposal must be followed.

For customers in the US



Class B digital device

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

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

Supplier Declaration of Conformity

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

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

Party issuing Supplier's Declaration of Conformity

Allied Vision Technologies GmbH
Taschenweg 2a
07646 Stadtroda, Germany
T// +49 (36428) 677-106
quality@alliedvision.com

Responsible party - US contact information

Allied Vision Technologies, Inc.
102 Pickering Way – Suite 502
Exton, PA 19341, USA
T// +1 978 225 2030

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

For customers in Canada

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

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

Pour utilisateurs au Canada

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

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

Board level models

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

Avoid electromagnetic interferences

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

Intended use

Allied Vision's objective is the development, design, production, maintenance, servicing and distribution of digital cameras and components for image processing. We are offering standard products as well as customized solutions.

Intended use of Allied Vision product is the integration into Vision systems by professionals. All Allied Vision product is sold in a B2B setting.

Unless expressly agreed otherwise, we design, manufacture, and supply in accordance with the standards of the machine vision industry.

In the event of requirements going beyond this, the customer must:

- Notify us of the special use for each model before the first order is placed so that the models in question can be separated out from the standard processes using their own part numbers, and
- Conclude a quality assurance agreement with us prior to purchasing, to define its requirements in a legally secure manner.

This may require a surcharge, as our prices are very tightly tailored to standard requirements.

Liability, trademarks, and copyright

Allied Vision has tested the product under the described conditions. The customer assumes all risk of product damage, application compromise or potential failure, and Sales Warranty loss related to deviation from the described conditions. Allied Vision's acknowledgement of such deviations in the customer's modified product or applications does not constitute advice for use. No Warranty is offered or implied by Allied Vision regarding the customer's assumed risk or legal responsibilities with such modified products or applications.

All text, pictures, and graphics are protected by copyright and other laws protecting intellectual property. All content is subject to change without notice. All trademarks, logos, and brands cited in this document are property and/or copyright material of their respective owners. Use of these trademarks, logos, and brands does not imply endorsement.

Your safety

This section informs about issues related to your personal safety. Descriptions explain how to avoid hazards and operate Manta cameras safely.

Handling lens mounts

The lens mount thread has sharp edges. Be careful these edges do not cut your skin when mounting or unmounting lenses.

Handling hot cameras

If you hold the camera in your hands during operation, your skin may get hurt. If you touch the camera when it is heated up, we recommend wearing protective gloves.

Providing optimum heat dissipation

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

Observe the following:

- To avoid camera crashes, operate the camera with a lens or lens adapter attached only.

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

Camera mounting

Manta cameras must be mounted using the mounting threads. If vibration is higher than specified, cameras can disconnect from the mounting. Falling cameras can hurt you. To avoid personal injury:

- Mount the camera according to the instructions in the installation chapter.
- Ensure, shock and vibration do not exceed the specified range as specified in the specifications chapter.
- For heavy or long lenses, use a lens support and apply tests.

How to avoid product damage

To prevent material damage, read the following to understand how to safely handle and operate the camera.

Electrical connections

ESD

ESD is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

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

Cable connections

Provide sufficient strain relief for all cable connections to avoid short circuits and malfunctions.

Camera power

Operating the camera beyond the specified range damages the camera. Cameras can be powered using the I/O connector at an input range of 8 to 30 VDC, using a limited power source (LPS), according to IEC 62368-1 with maximum 2 A.
The camera is not intended to be connected to a DC distribution network.
The maximum length for I/O cables must not exceed 30 meters.

Alternatively, cameras can be powered over Ethernet. However, power consumption and heat generation are higher than with external power, using the I/O connector.

- Make sure that PoE power sourcing equipment is at least compliant to IEEE 802.3af/at.
- Only use power supplies that meet the insulation requirement according to PELV or SELV. For details, please refer to IEC 61140.
- If using external power supplies by third-party manufacturers, observe polarity to avoid damage to the camera electronics.
- Avoid damage to the camera from high output current or voltage. Connecting the camera to a device exceeding the allowed maximum current (10 mA per output) can damage the camera. Providing Isolated Out Power > 30 Volts may damage the camera.

Optical components

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

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

When camera or lens are stored:

- Cover the lens mount with a protection foil or cap.
- Cover front and back lens with caps.

Sensor

Sensors are sensitive to excessive radiation: focused sunlight, UV light, lasers, and X-rays can damage the sensor. Dirt and scratches can damage the sensor as well. Manta cameras do not need additional cleaning. Cameras are cleaned before shipping. Incorrect cleaning can damage the sensor or the filter. Therefore, never clean the sensor or the filter.

Protect the camera filter and the sensor from dirt, because dirt becomes more visible the closer it gets to the sensor. In addition, keep the back lens clean. Hold the camera with the lens mount facing the ground to keep dirt out of the lens mount.

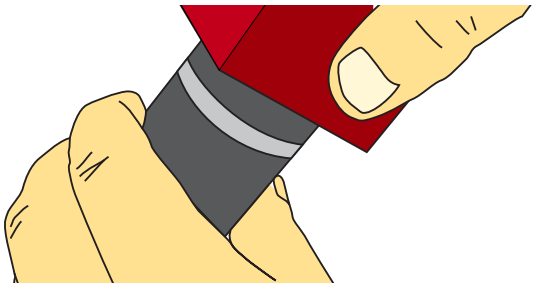


Figure 2: Holding the camera with the lens mount facing the ground

Lenses

Maximum protrusion

The sensor, filter, lens, or camera electronics can be damaged if a lens exceeding maximum protrusion is mounted to the camera. Use lenses with a maximum protrusion within camera specifications.

Specifications



Find the technical specifications for your Manta camera, including imaging performance, absolute QE, spectral response (for selected models), and ROI frame rates.

Contents:

Applied standards 53
Shock and vibration..... 53
Notes on specifications..... 54
Specifications common to all models..... 58
Hardware options 58
Model specific specifications..... 59
Camera feature availability 186

Applied standards

GigE Vision

The GigE Vision standard is an interface standard for digital machine vision cameras administered by the AIA that's widely supported in the machine vision industry. In contrast, Gigabit Ethernet is the network GigE Vision is built upon.

GenICam

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

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

IP class

Equipped with a lens as intended, housed Manta cameras comply with IP30 class according to IEC 60529.

Shock and vibration

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

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

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

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

Notes on specifications

Manta CCD 1-Tap versus CMOS 2-Tap

Manta CCD 1-Tap (“type A”): Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504

Manta CMOS 2- Tap (“type B”): Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236, G-1620, G-2040, G-2460



Manta models up to serial number 503323258

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

PoE capable models

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

Modular options

Manta cameras can be ordered with several modular options including lens mount, housing, board level, housing design, optical filter, and sensor options.

Dimensions and mass

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

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

Frame memory

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

Number of frames

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

Resolution and ROI frame rate

ROI frame rate is listed after the specification table. The resulting frame rate from changing sensor height from full image to a single line. Unless otherwise noted, sensors don't give an increase in readout speed with a reduction in width. However, in cases where a camera is limited by frame rate due to bandwidth restrictions, a reduction in width results in a frame rate increase. Models with a burst mode frame rate are able to output more data than the maximum available bandwidth (124 Mbps) and provides a frame rate increase with a reduction in width.

Resolution and ROI measurements

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

Frame rate for CCD sensors

The frame rate is a theoretical maximum frame rate of the CCD sensor according to the given formula.

Frame rate and readout

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

Sensor tap mode (CCD models only)

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

Image acquisition must be stopped before changing sensor tap mode.

Affected features

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

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

Table 9: Features affected when switching sensor tap mode

Absolute QE plots

Before reading the QE plots

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

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

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

Sony CCD and CMOS sensors

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

CMOSIS/ams CMOS sensors

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

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

Wavelength

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

Spectral response plots

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

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

Imaging performance

Imaging performance data is based on the evaluation methods in the EMVA 1288 Release 3.1 standard for characterization of image sensors and cameras. Measurements are typical values measured at full resolution without optical filter.

Specifications common to all models

The following table provides specifications common to all Manta models.

Feature	Specification
Default lens mount	C-Mount
Default optical filter	• Mono models: Protection glass • Color models: Type IRC 625 colored glass IR cut filter • NIR models: No filter[1]
Opto-isolated I/O	2 inputs, 2 outputs
RS232	1 TxD, 1 RxD
Operating temperature	+5 °C to +45 °C ambient temperature (without condensation)
Storage temperature	-10 °C to +70 °C ambient temperature (without condensation)
Operating humidity	20 to 80% non-condensing
Power requirements	8 to 30 VDC AUX
Power requirements	IEEE 802.3af PoE[2]
Interface standard	• IEEE 802.3 1000BASE-T (Gigabit Ethernet), IEEE 802.3af (PoE)[3] • AIA GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1

[1] As the NIR models don't have an optical filter always attach a dust cap when a lens is not attached to minimize the possibility of contaminants falling on the sensor surface.

[2] Angled heads and board level housing options are not available for Manta G-282, G-283, G-505, and G-917 series

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

Table 10: Specifications common to all Manta models

Hardware options

Some Manta models are available with angled heads or as board level cameras. The Modular Concept informs about these options and other options for lens mounts, optical filters, and protection glass (ASG).

Modular Concept

See the Modular Concept for hardware options, including information on ordering at www.alliedvision.com/en/support/technical-documentation/manta-documentation.

Model specific specifications

Manta G-031 series

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

Feature	Specification	
	Manta G-031B	**Manta G-031C**
Sensor model	Sony ICX618ALA	Sony ICX618AQA
Resolution	656 (H) × 492 (V); 0.3 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/4	
Sensor size	4.5 mm diagonal	
Pixel size	5.6 µm × 5.6 µm	
Max. frame rate at full resolution	125.2 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	58 µs to 60 s; 1 µs increments	
Gain control	0 to 32 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.3 W	
Trigger latency[1]	Idle state: 9.9 µs; Frame valid state: 16.5 µs	
Trigger jitter[1]	Idle state: ±5.3 µs; Frame valid state: ±11.9 µs	

Table 11: Manta G-031 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-031B	Manta G-031C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	15 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 11: Manta G-031 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-031B[1]	Manta G-031C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	71 %	54 %
Quantum efficiency at 632 nm	η		62 %
Inverse of overall system gain	1/K	4.62 e^-/DN	4.69 e^-/DN
Temporal dark noise	σ_{d0}	12.9 e^-	14.2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.9 e^-	0.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.91 %	1.3 %
Saturation capacity	$\mu_{e.sat}$	17900 e^-	18300 e^-
Signal to noise ratio at saturation	SNR_{max}	42.5 dB, 7.1 bits	42.6 dB, 7.1 bits
Dynamic range	DR	62.4 dB, 10.4 bits	61.8 dB, 10.3 bits
Absolute sensitivity threshold	$\mu_{e.min}$	13.5 e^-	14.8 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 8.72, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 8.90, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 12: Manta G-031 (Sony ICX618) imaging performance

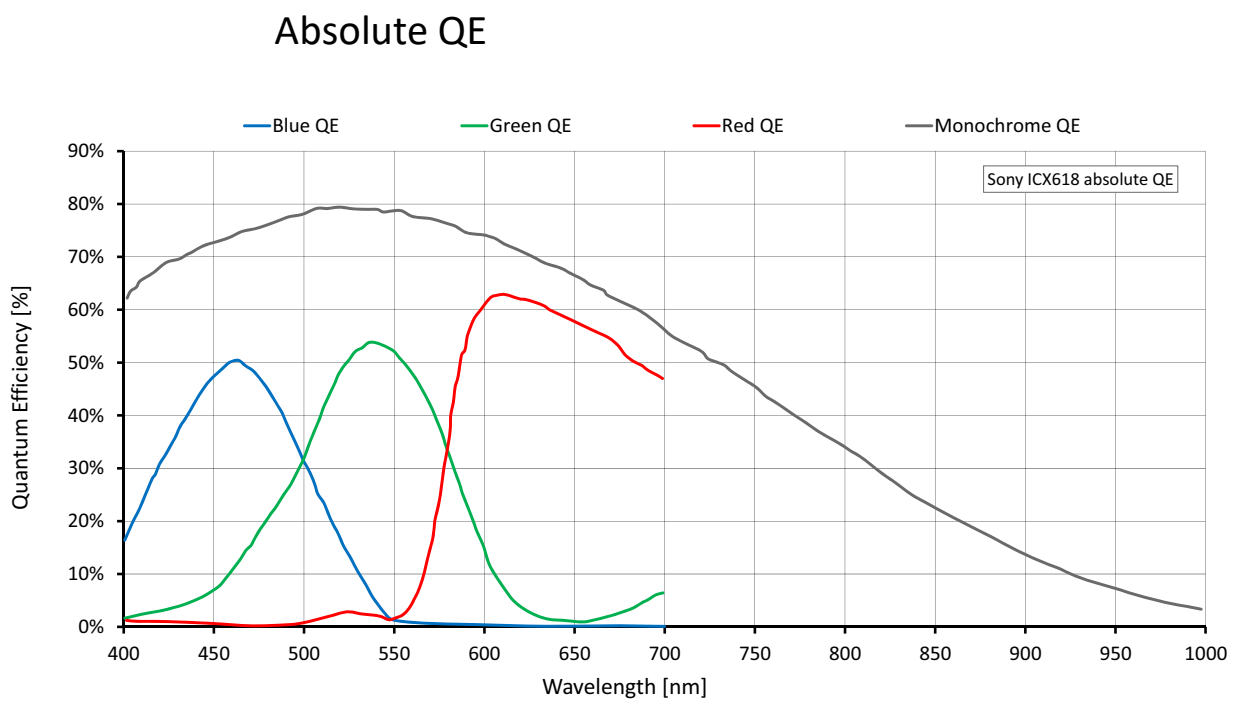


Figure 3: Manta G-031 (Sony ICX618) absolute QE

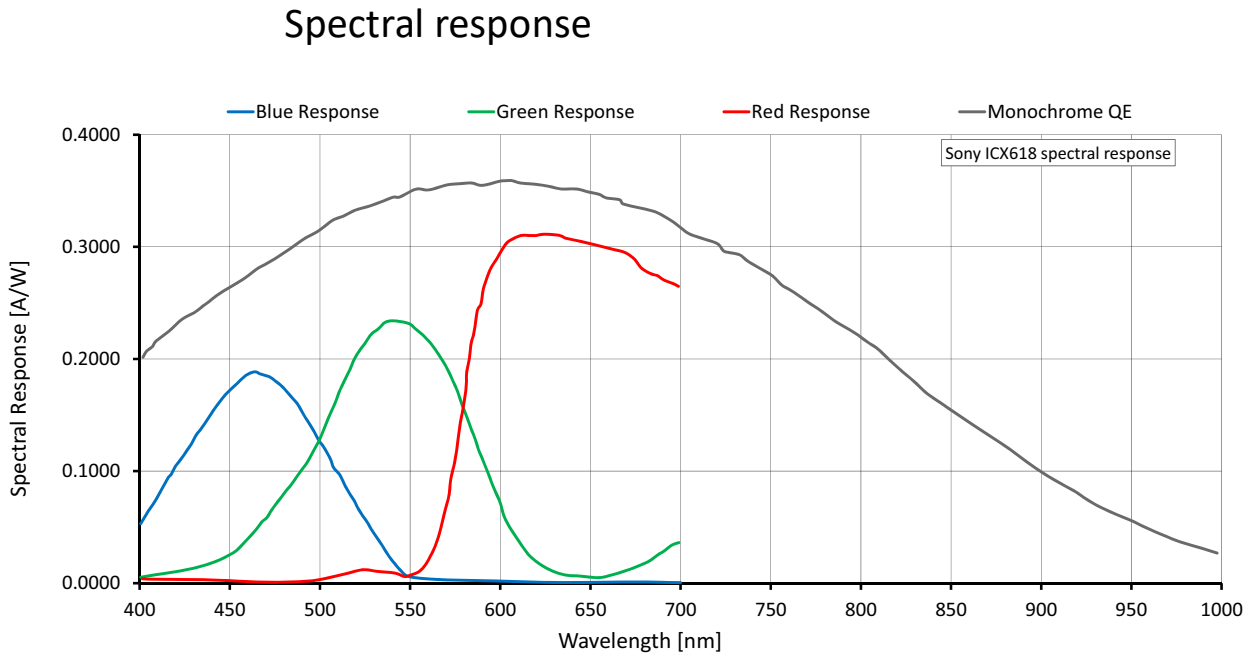


Figure 4: Manta G-031 (Sony ICX618) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 125.2 fps

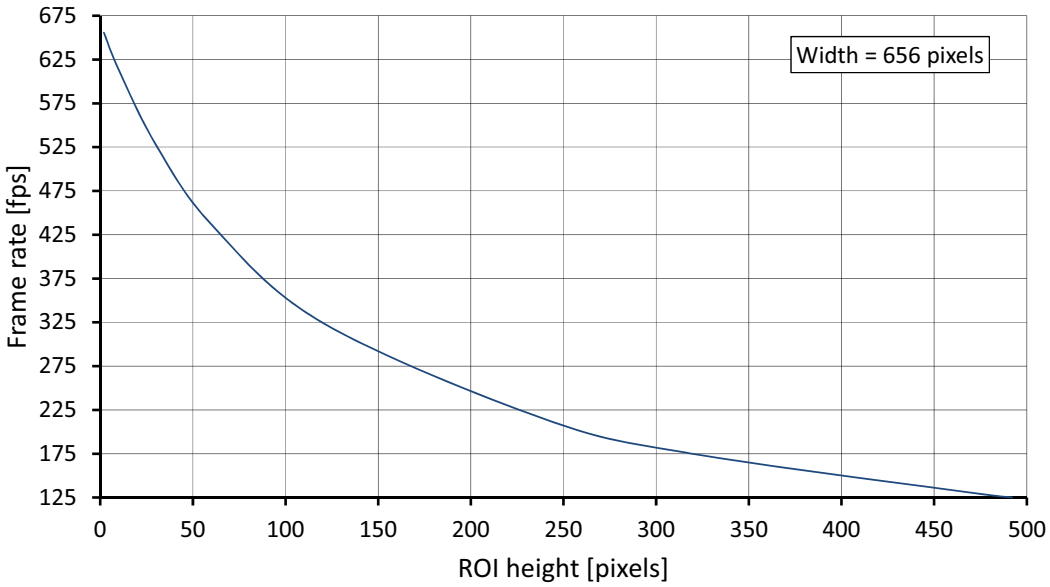


Figure 5: Manta G-031 frame rate as a function of ROI height

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

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

Table 13: Frame rate as a function of ROI height (Width=656 pixels)

Manta G-032 series

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

Feature	Specification	
	Manta G-032B	**Manta G-032C**
Sensor model	Sony ICX424AL	Sony ICX424AQ
Resolution	656 (H) × 492 (V); 0.3 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/3	
Sensor size	6 mm diagonal	
Pixel size	7.4 µm × 7.4 µm	
Max. frame rate at full resolution	80.7 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 36 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[1]	Idle state: 8 µs; Frame valid state: 18.7 µs	
Trigger jitter[1]	Idle state: ±5.5 µs; Frame valid state: ±16.2 µs	

Table 14: Manta G-032 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-032B	Manta G-032C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	283 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 14: Manta G-032 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-032B[1]	Manta G-032C[2]
Quantum efficiency at 448 nm	η		37 %
Quantum efficiency at 529 nm	η	44 %	36 %
Quantum efficiency at 632 nm	η		31 %
Inverse of overall system gain	1/K	4.29 e^-/DN	4.3 e^-/DN
Temporal dark noise	σ_{d0}	12.7 e^-	14 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.9 e^-	2.4 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.9 %
Saturation capacity	$\mu_{e.sat}$	16900 e^-	16900 e^-
Signal to noise ratio at saturation	SNR_{max}	42.3 dB, 7 bits	42.3 dB, 7 bits
Dynamic range	DR	62.1 dB, 10.3 bits	61.3 dB, 10.2 bits
Absolute sensitivity threshold	$\mu_{e.min}$	13.2 e^-	14.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 12.89, Temperature: 20 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 9.65, Temperature: 20 °C, Pixel format: BayerRG12.

Table 15: Manta G-032 (Sony ICX424) imaging performance

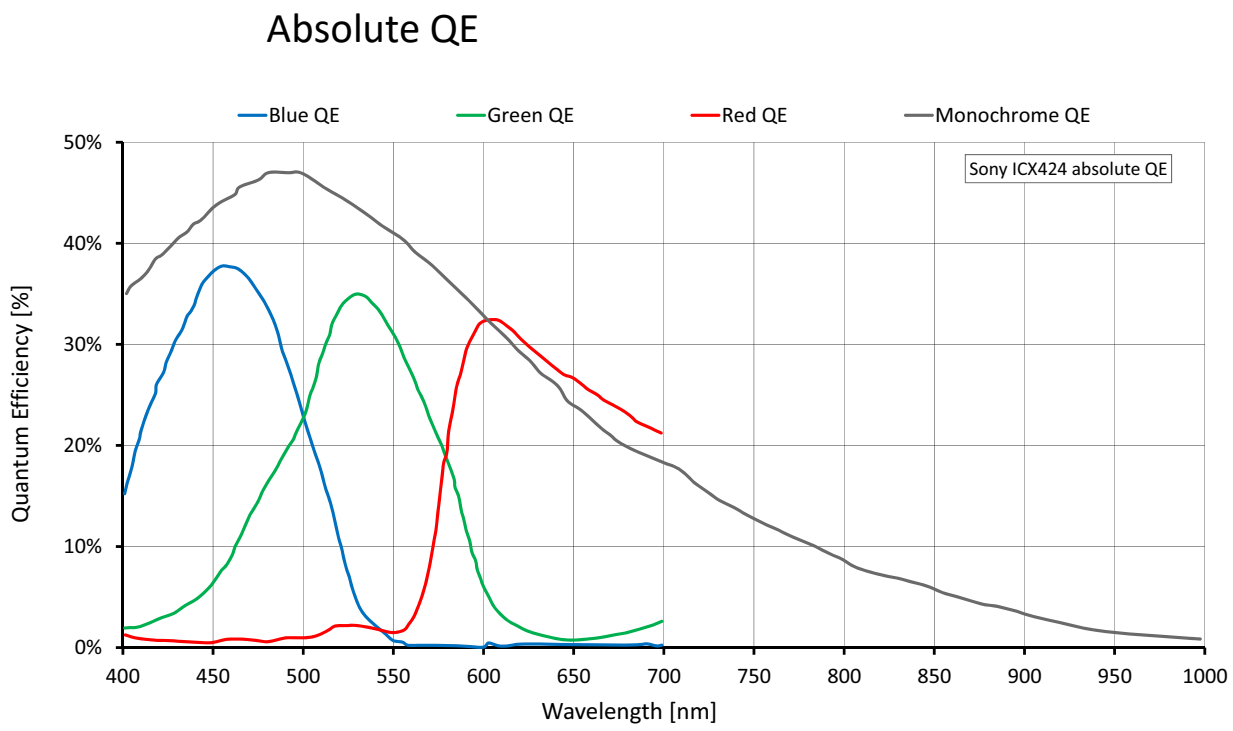


Figure 6: Manta G-032 (Sony ICX424) absolute QE

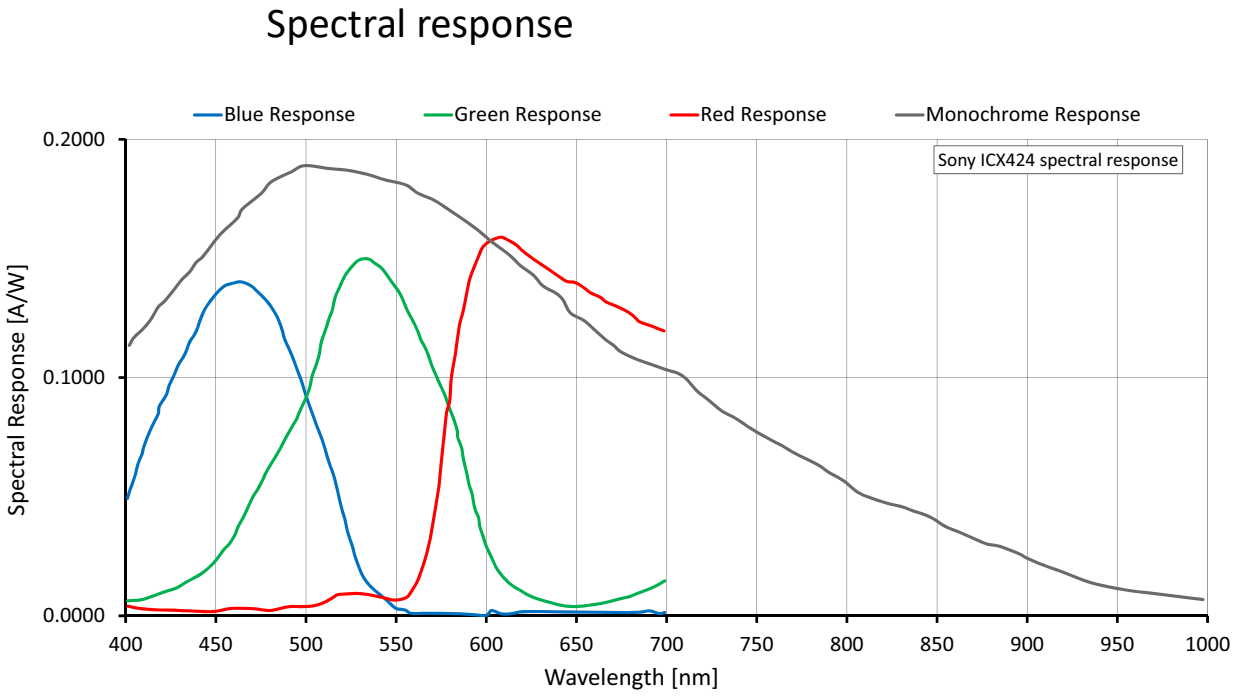


Figure 7: Manta G-032 (Sony ICX424) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 80.7 fps

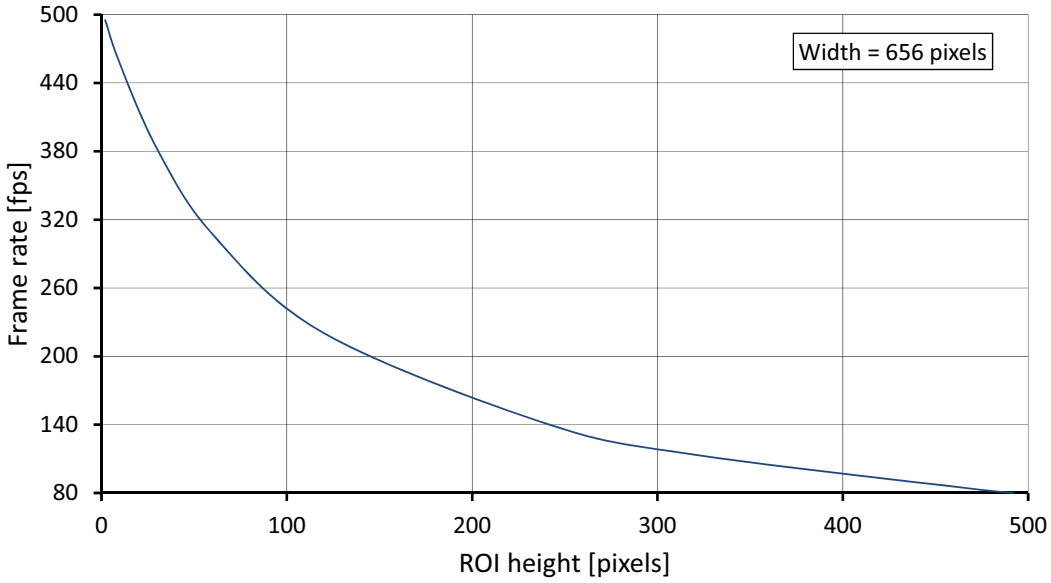


Figure 8: Manta G-032 frame rate as a function of ROI height

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

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

Table 16: Frame rate as a function of ROI height (Width=656 pixels)

Manta G-033 series

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

Feature	Specification	
	Manta G-033B	**Manta G-033C**
Sensor model	Sony ICX414AL	Sony ICX414AQ
Resolution	656 (H) × 492 (V); 0.3 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/2	
Sensor size	8 mm diagonal	
Pixel size	9.9 µm × 9.9 µm	
Max. frame rate at full resolution	88.7 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 99 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 35 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Opto-isolated I/Os	2 inputs, 2 outputs	
RS232	1 TxD, 1 RxD	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[1]	Idle state: 8.6 µs; Frame valid state: 19.1 µs	
Trigger jitter[1]	Idle state: ±4.8 µs; Frame valid state: ±15.3 µs	

Table 17: Manta G-033 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-033B	Manta G-033C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	93 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 17: Manta G-033 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-033B[1]	Manta G-033C[2]
Quantum efficiency at 448 nm	η		33 %
Quantum efficiency at 529 nm	η	38 %	31 %
Quantum efficiency at 632 nm	η		28 %
Inverse of overall system gain	1/K	5.73 e^-/DN	5.94 e^-/DN
Temporal dark noise	σ_{d0}	18.4 e^-	19.3 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	2.1 e^-	2.2 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.5 %
Saturation capacity	$\mu_{e.sat}$	22500 e^-	23600 e^-
Signal to noise ratio at saturation	SNR_{max}	43.5 dB, 7.2 bits	43.7 dB, 7.3 bits
Dynamic range	DR	61.5 dB, 10.2 bits	61.9 dB, 10.2 bits
Absolute sensitivity threshold	$\mu_{e.min}$	19 e^-	19.9 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 9.65, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 9.85, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 18: Manta G-033 (Sony ICX414) imaging performance

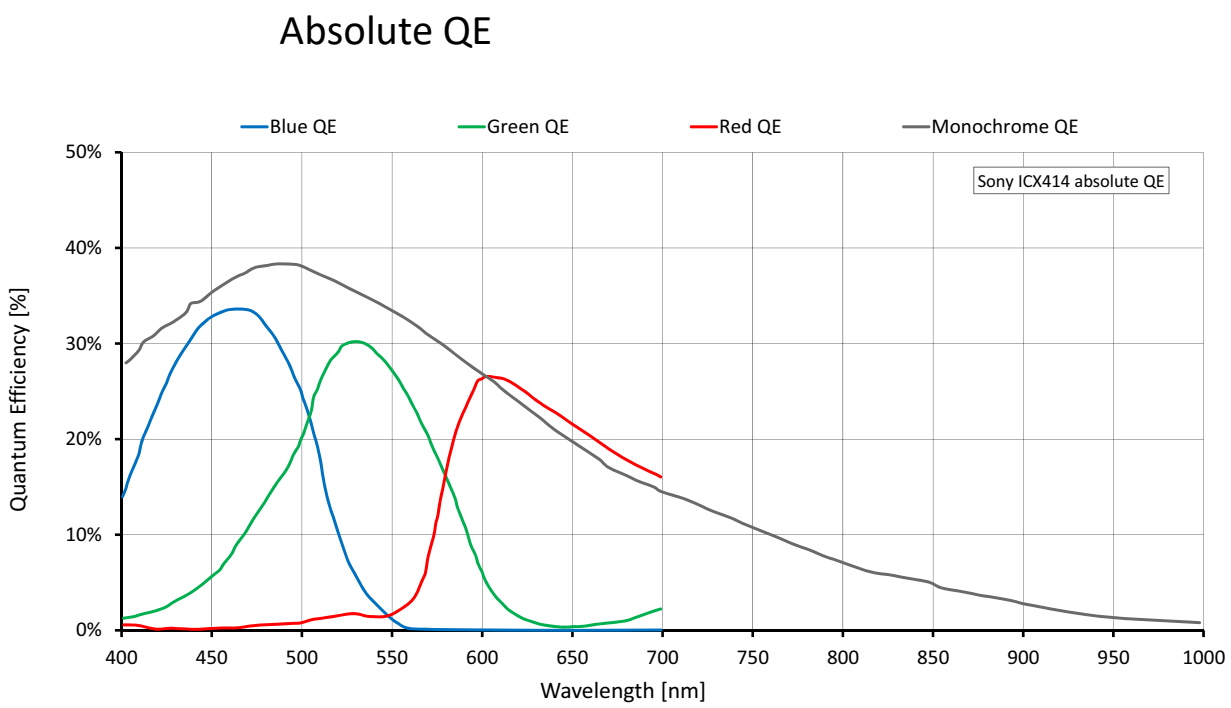


Figure 9: Manta G-033 (Sony ICX414) absolute QE

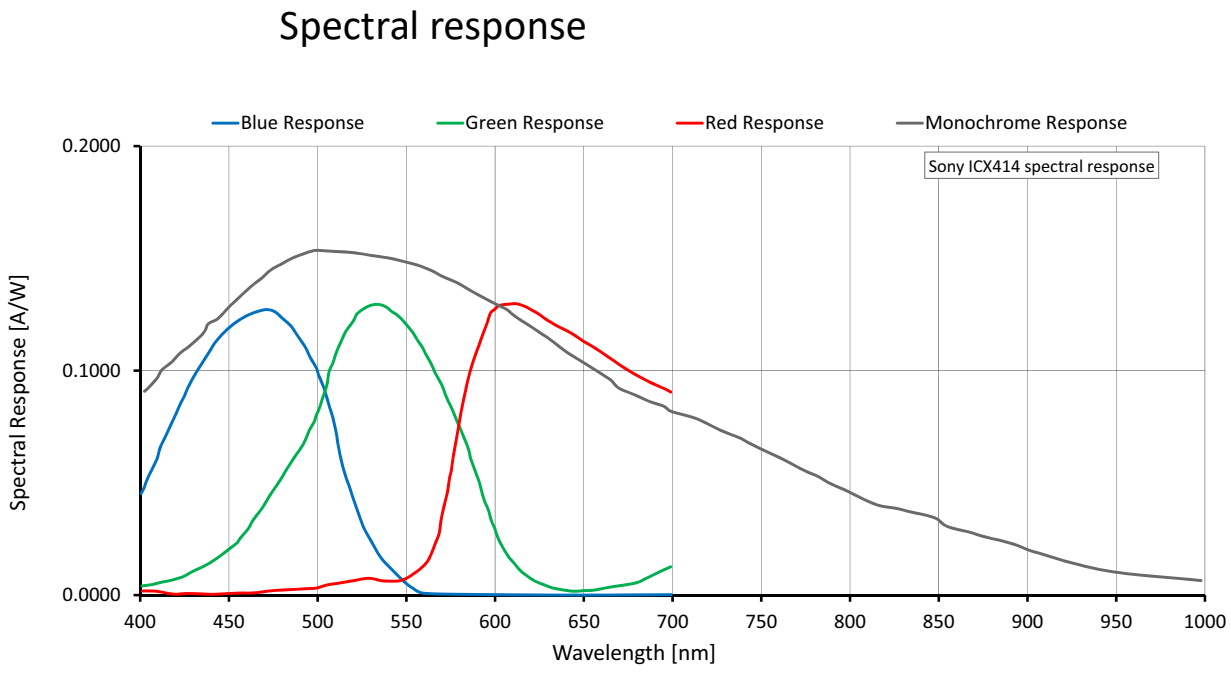


Figure 10: Manta G-033 (Sony ICX414) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 88.7 fps

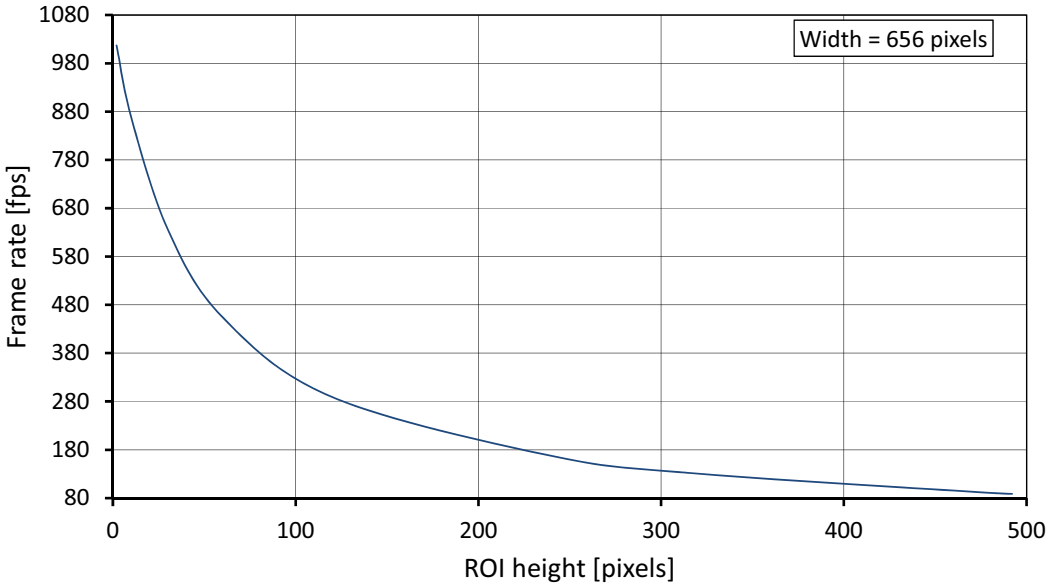


Figure 11: Manta G-033 frame rate as a function of ROI height

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

Height	Frame rate (fps)
60	454.5
30	636.6
10	868.7
2	1017

Table 19: Frame rate as a function of ROI height (Width=656 pixels)

Manta G-040 series

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

Feature	Specification	
	Manta G-040B	**Manta G-040C**
Sensor model	Sony IMX287LLR Exmor	Sony IMX287LQR Exmor
Resolution	728 (H) × 544 (V); 0.4 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1/2.9	
Sensor size	6.3 mm diagonal	
Pixel size	6.9 µm × 6.9 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution[1]	286.3 fps (313.1 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 329 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.77 W at 12 VDC; PoE: 3.23 W	

Table 20: Manta G-040 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-040B	**Manta G-040C**
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	16.32 µs
	Mono12, BayerRG12, YUV422Packed	21.84 µs
	RGB8Packed, BGR8Packed, YUV444Packed	32.64 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±2.72 µs
	Mono12, BayerRG12, YUV422Packed	±3.64 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±5.44 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	96 µs
	Mono12, BayerRG12, YUV422Packed	133 µs
	RGB8Packed, BGR8Packed, YUV444Packed	204 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

[1] Higher frame rates can be achieved by adjusting the packet size. For example, when `GevSCPSPacketSize` = ***3208*** bytes you can achieve 313.1 fps.

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

Table 20: Manta G-040 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-040B[1]	Manta G-040C[2]
Quantum efficiency at 448 nm	η		49 %
Quantum efficiency at 529 nm	η	64 %	58 %
Quantum efficiency at 632 nm	η		54 %
Inverse of overall system gain	1/K	5.2 e^-/DN	5.24 e^-/DN
Temporal dark noise	σ_{d0}	3.1 e^-	3.1 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1 e^-	1 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.4 %	0.5 %
Saturation capacity	$\mu_{e.sat}$	20800 e^-	20700 e^-
Signal to noise ratio at saturation	SNR_{max}	43.2 dB, 7.2 bits	43.2 dB, 7.2 bits
Dynamic range	DR	74.4 dB, 12.4 bits	74.3 dB, 12.3 bits
Absolute sensitivity threshold	$\mu_{e.min}$	4 e^-	4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 3, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 3, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 21: Manta G-040 (Sony IMX287) imaging performance

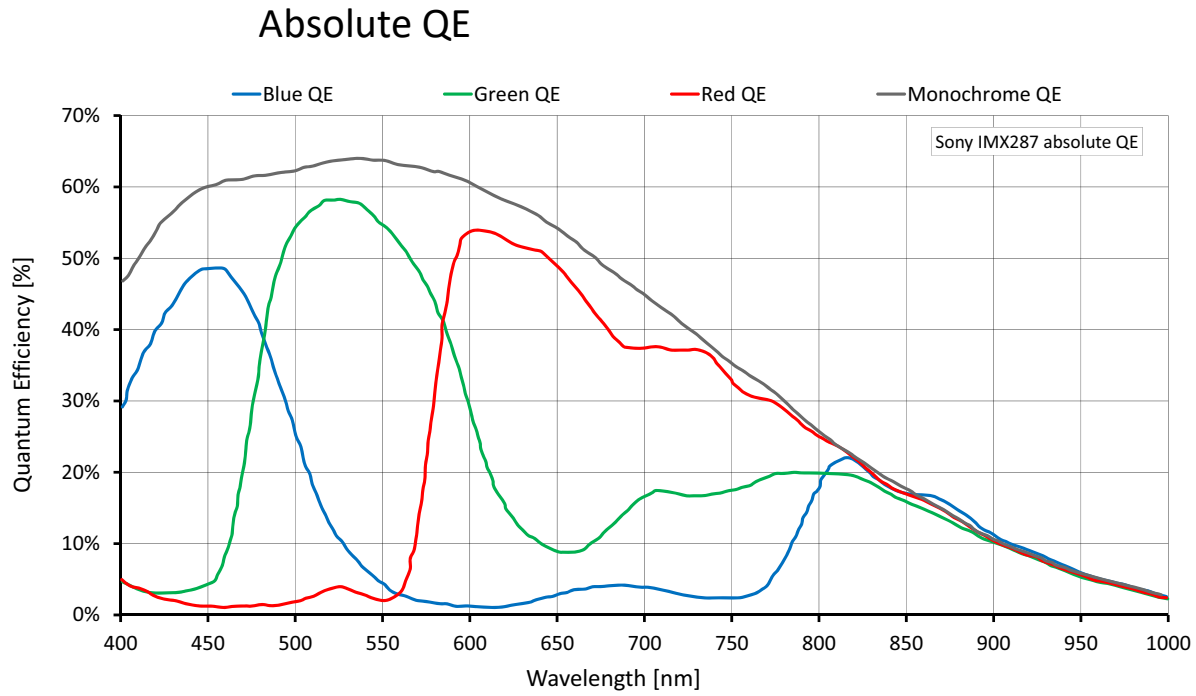


Figure 12: Manta G-040 (Sony IMX287) absolute QE

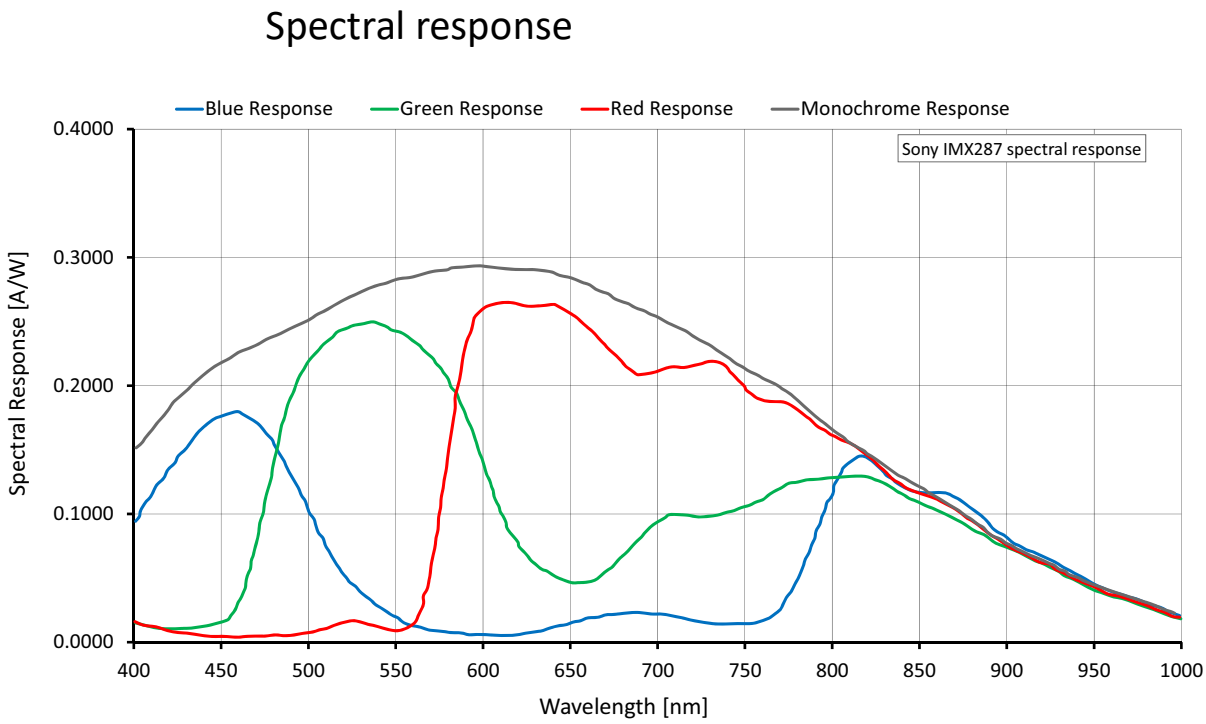


Figure 13: Manta G-040 (Sony IMX287) spectral response

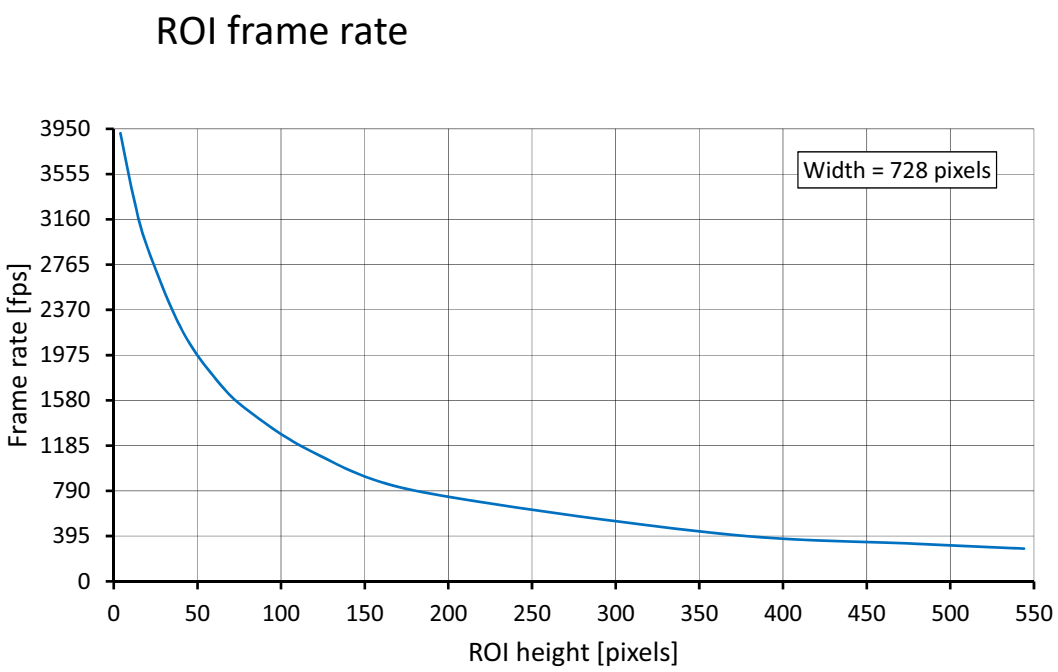


Figure 14: Manta G-040 frame rate as a function of ROI height

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

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

Height	Frame rate (fps)
20	2918
12	3342.2
4	3910.8

Table 22: Frame rate as a function of ROI height (Width=728 pixels)

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

Manta G-046 series

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

Feature	Specification	
	Manta G-046B	**Manta G-046C**
Sensor model	Sony ICX415AL	Sony ICX415AQ
Resolution	780 (H) × 580 (V); 0.5 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/2	
Sensor size	8 mm diagonal	
Pixel size	8.3 µm × 8.3 µm	
Max. frame rate at full resolution	67.5 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 70 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	26 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[1]	Idle state: 8.8 µs; Frame valid state: 20.5 µs	
Trigger jitter[1]	Idle state: ±4.9 µs; Frame valid state: ±16.6 µs	

Table 23: Manta G-046 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-046B	Manta G-046C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	114 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 23: Manta G-046 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-046B[1]	Manta G-046C[2]
Quantum efficiency at 448 nm	η		33 %
Quantum efficiency at 529 nm	η	37 %	31 %
Quantum efficiency at 632 nm	η		29 %
Inverse of overall system gain	1/K	3.97 e^-/DN	4.17 e^-/DN
Temporal dark noise	σ_{d0}	21.1 e^-	22.6 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	6.2 e^-	4.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.7 %	0.9 %
Saturation capacity	$\mu_{e.sat}$	15700 e^-	16500 e^-
Signal to noise ratio at saturation	SNR_{max}	42 dB, 7 bits	42.2 dB, 7 bits
Dynamic range	DR	57.2 dB, 9.5 bits	57 dB, 9.5 bits
Absolute sensitivity threshold	$\mu_{e.min}$	21.6 e^-	23.1 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 13.33, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 17.17, Temperature: ~38 °C Pixel format: BayerRG12.

Table 24: Manta G-046 (Sony ICX415) imaging performance

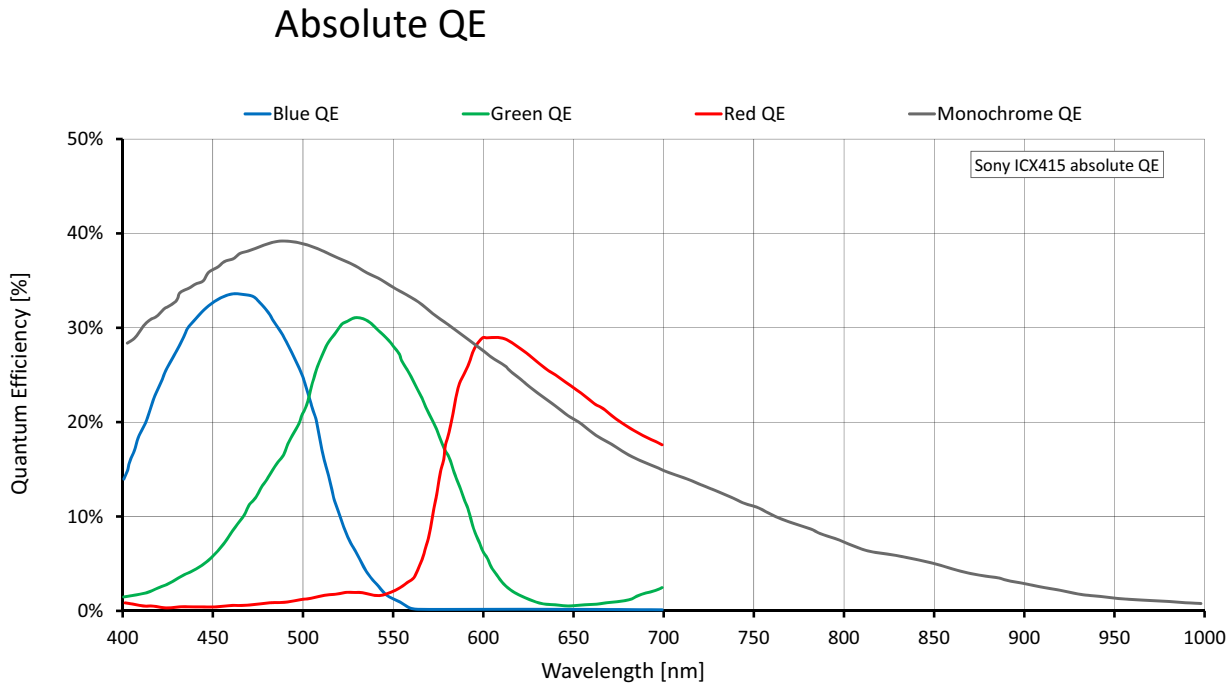


Figure 15: Manta G-046 (Sony ICX415) absolute QE

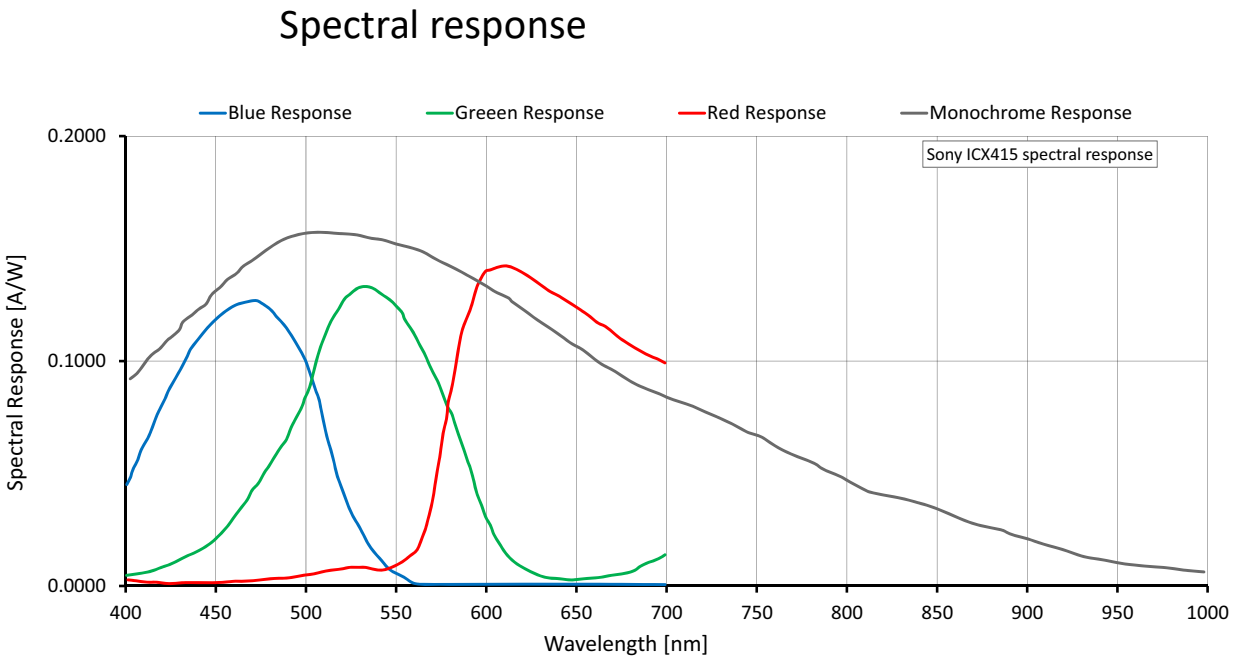


Figure 16: Manta G-046 (Sony ICX415) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 67.5 fps

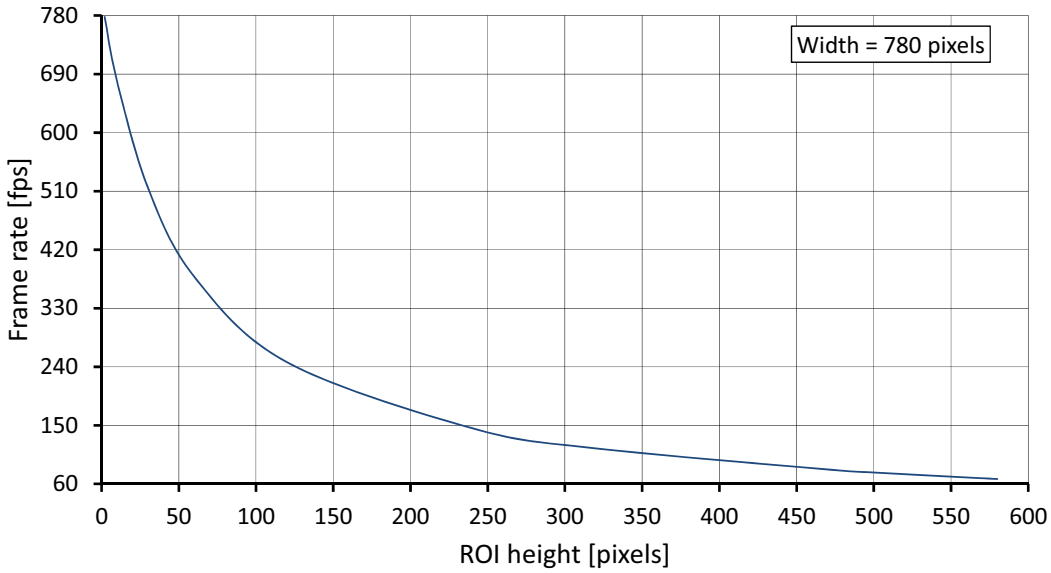


Figure 17: Manta G-046 frame rate as a function of ROI height

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

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

Table 25: Frame rate as a function of ROI height (Width=780 pixels)

Manta G-125 series

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

Feature	Specification	
	Manta G-125B	**Manta G-125C**
Sensor model	Sony ICX445ALA	Sony ICX445AQA
Resolution	1292 (H) × 964 (V); 1.2 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/3	
Sensor size	6 mm diagonal	
Pixel size	3.75 µm × 3.75 µm	
Max. frame rate at full resolution	31 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 25 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerGR12
Exposure time control	21 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[1]	Idle state: 12.3 µs; Frame valid state: 26.4 µs	
Trigger jitter[1]	Idle state: ±6.5 µs; Frame valid state: ±20.6 µs	

Table 26: Manta G-125 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-125B	**Manta G-125C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	63 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 26: Manta G-125 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-125B[1]	Manta G-125C[2]
Quantum efficiency at 448 nm	η		40 %
Quantum efficiency at 529 nm	η	55 %	44 %
Quantum efficiency at 632 nm	η		40 %
Inverse of overall system gain	1/K	1.84 e^-/DN	1.93 e^-/DN
Temporal dark noise	σ_{d0}	7.1 e^-	8.9 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.1 e^-	1 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.7 %	0.7 %
Saturation capacity	$\mu_{e.sat}$	7100 e^-	7400 e^-
Signal to noise ratio at saturation	SNR_{max}	38.5 dB, 6.4 bits	38.7 dB, 6.4 bits
Dynamic range	DR	59.4 dB, 9.9 bits	57.9 dB, 9.6 bits
Absolute sensitivity threshold	$\mu_{e.min}$	7.6 e^-	9.4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 10.05, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 14, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 27: Manta G-125 (Sony ICX445) imaging performance

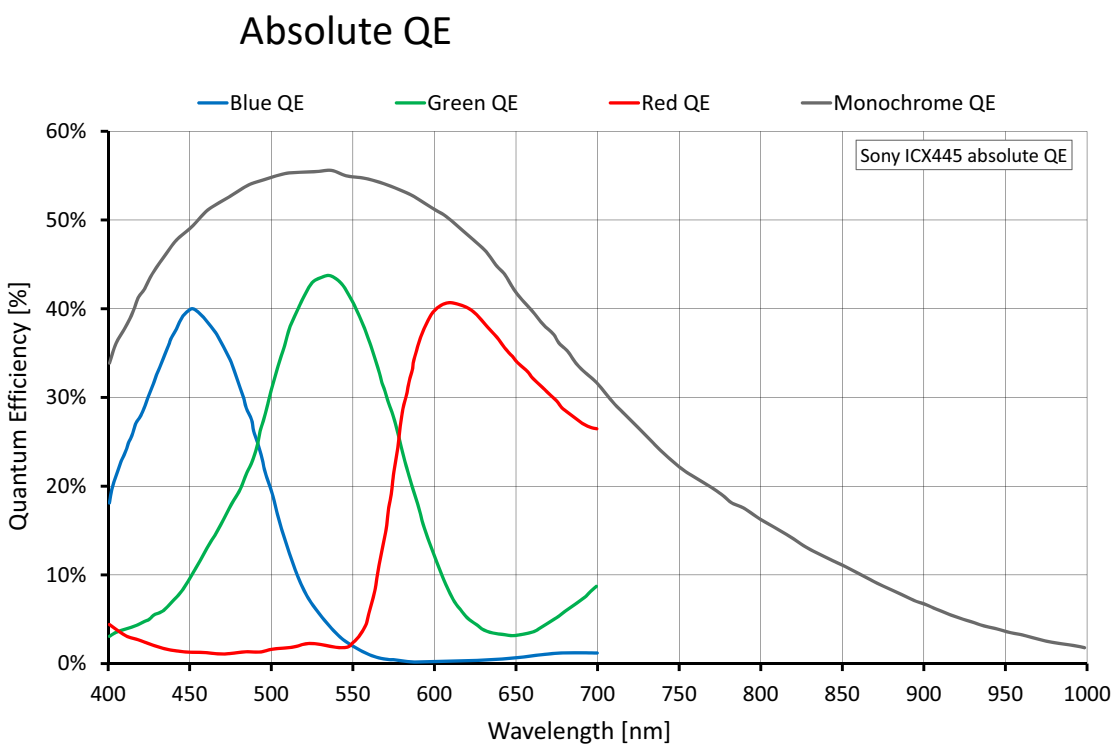


Figure 18: Manta G-125 (Sony ICX445) absolute QE

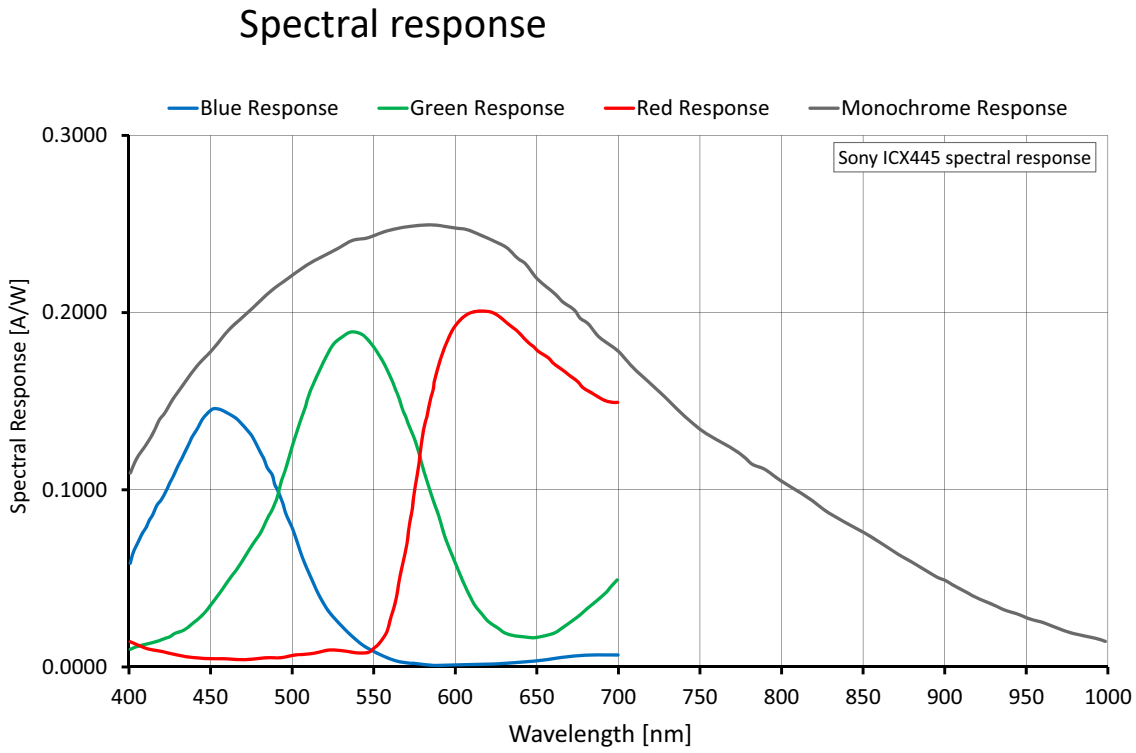


Figure 19: Manta G-125 (Sony ICX445) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 31 fps

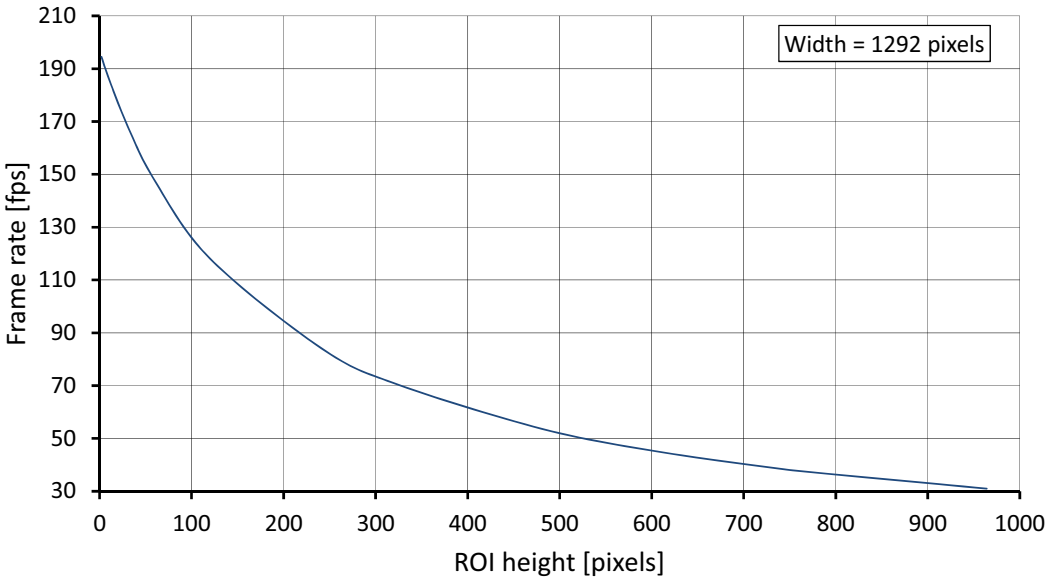


Figure 20: Manta G-125 frame rate as a function of ROI height plot

Height	Frame rate (fps)	Height	Frame rate (fps)
964	31	240	84.4
768	37.4	120	118.1
720	39.4	60	147.6
600	45.4	30	168.6
480	53.7	10	186.3
320	70.9	2	194.5

Table 28: Frame rate as a function of ROI height (Width=1292 pixels)

Manta G-145 series

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

Feature	Specification	
	Manta G-145B	**Manta G-145C**
Sensor model	Sony ICX285AL	Sony ICX285AQ
Resolution	1388 (H) × 1038 (V); 1.4 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Max. frame rate at full resolution	15 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	43 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.3 W	
Trigger latency[1]	Idle state: 19.3 µs; Frame valid state: 45.2 µs	
Trigger jitter[1]	Idle state: ±9.8 µs; Frame valid state: ±35.7 µs	

Table 29: Manta G-145 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-145B	**Manta G-145C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	106 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 29: Manta G-145 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-145B[1]	Manta G-145C[2]
Quantum efficiency at 448 nm	η		39 %
Quantum efficiency at 529 nm	η	54 %	37 %
Quantum efficiency at 632 nm	η		36 %
Inverse of overall system gain	1/K	4.59 e^-/DN	4.71 e^-/DN
Temporal dark noise	σ_{d0}	10.4 e^-	9.4 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	2.2 e^-	1.3 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.7 %	1 %
Saturation capacity	$\mu_{e.sat}$	18100 e^-	18300 e^-
Signal to noise ratio at saturation	SNR_{max}	42.6 dB, 7.1 bits	42.6 dB, 7.1 bits
Dynamic range	DR	64.3 dB, 10.7 bits	65.2 dB, 10.8 bits
Absolute sensitivity threshold	$\mu_{e.min}$	11 e^-	10 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 10, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 12.89, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 30: Manta G-145 (Sony ICX285) imaging performance

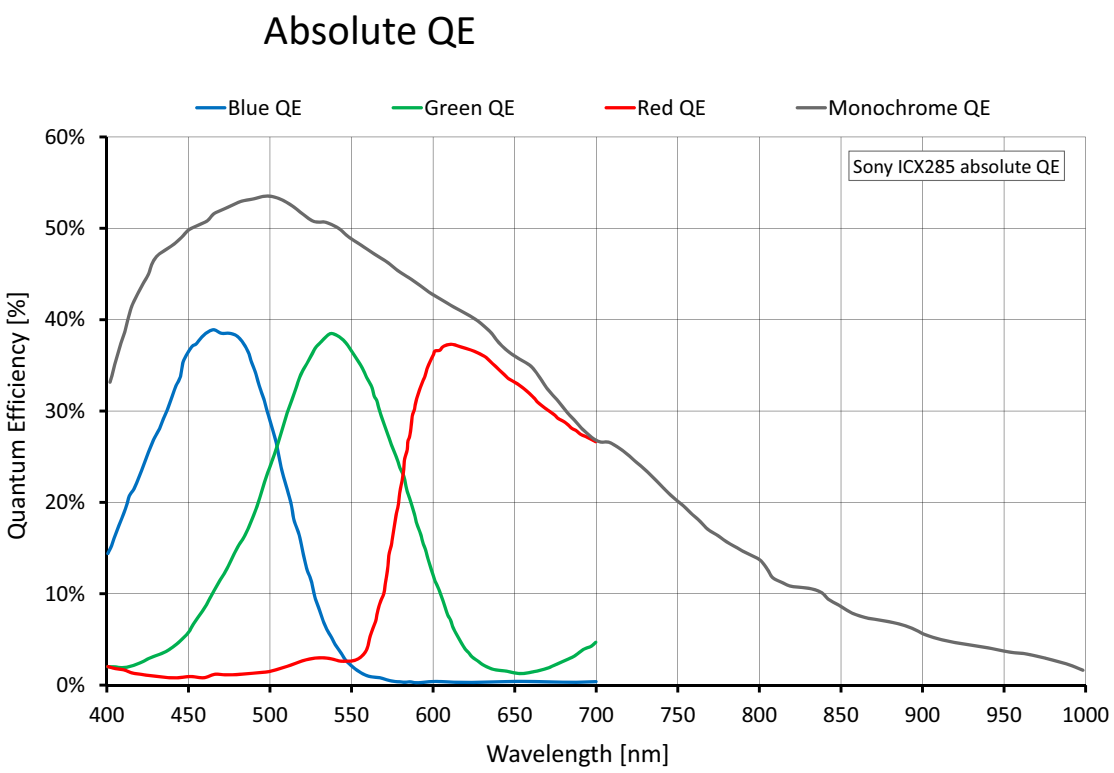


Figure 21: Manta G-145 (Sony ICX285) absolute QE

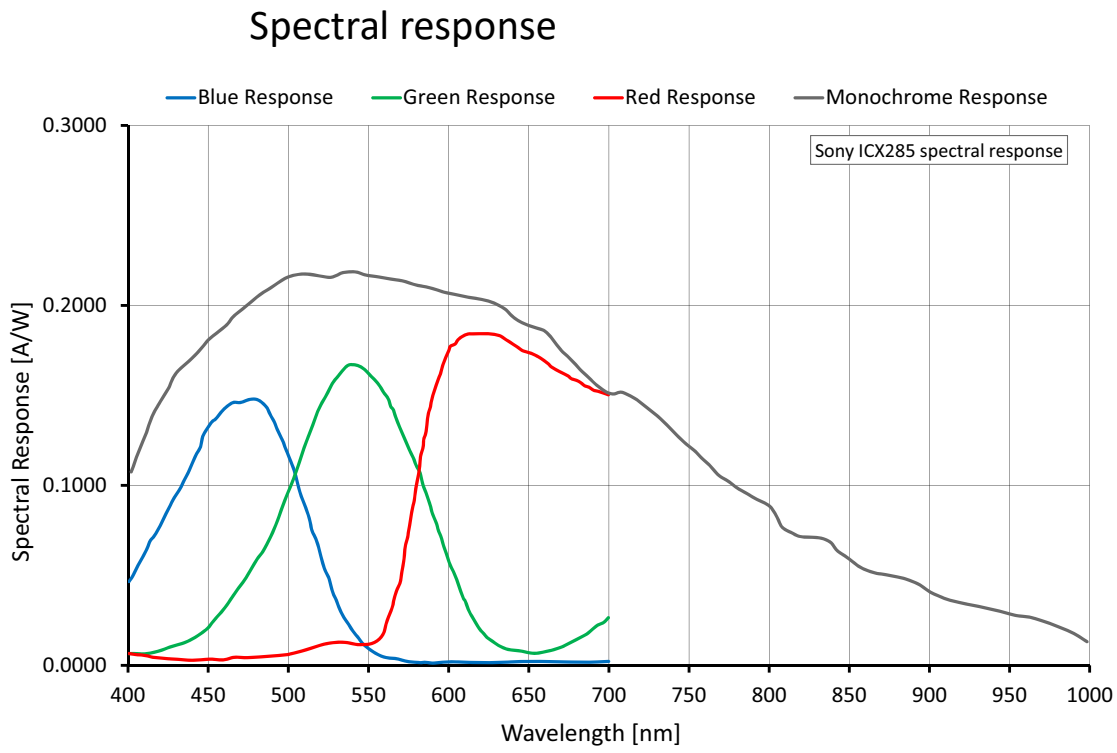


Figure 22: Manta G-145 (Sony ICX285) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 15 fps

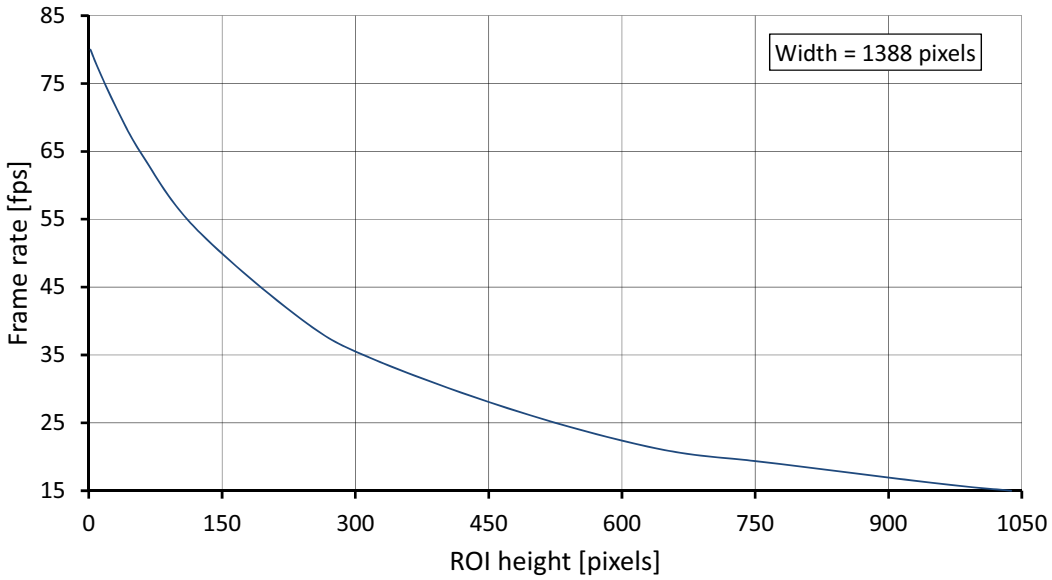


Figure 23: Manta G-145 frame rate as a function of ROI height

Height	Frame rate (fps)
1038	15
960	16
768	19.1
640	21.2
480	26.8
320	34.4

Height	Frame rate (fps)
240	40.2
120	53.7
60	64.5
30	71.7
10	77.4
2	80

Table 31: Frame rate as a function of ROI height (Width=1388 pixels)

Manta G-145-30fps series

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

Feature	Specification	
	Manta G-145B-30fps	**Manta G-145C-30fps**
Sensor model	Sony ICX285AL	Sony ICX285AQ
Resolution	1388 (H) × 1038 (V); 1.4 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Max. frame rate at full resolution	30.1 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	38 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.5 W at 12 VDC; PoE: 4.3 W	
Trigger latency[1]	Idle state: 12.6 µs; Frame valid state: 25.6 µs	
Trigger jitter[1]	Idle state: ±6.9 µs; Frame valid state: ±19.9 µs	

Table 32: Manta G-145-30fps model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-145B-30fps	**Manta G-145C-30fps**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	35 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 32: Manta G-145-30fps model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-145B-30fps[1]	Manta G-145C-30fps[2]
Quantum efficiency at 448 nm	η		39 %
Quantum efficiency at 529 nm	η	54 %	38 %
Quantum efficiency at 632 nm	η		36 %
Inverse of overall system gain	1/K	4.42 e^-/DN	4.71 e^-/DN
Temporal dark noise	σ_{d0}	11.5 e^-	19 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	5.1 e^-	6.4 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.8 %	1.2 %
Saturation capacity	$\mu_{e.sat}$	16300 e^-	16500 e^-
Signal to noise ratio at saturation	SNR_{max}	42.1 dB, 7 bits	42.2 dB, 7 bits
Dynamic range	DR	62.6 dB, 10.4 bits	58.5 dB, 9.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	12 e^-	19.5 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 10.05, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 15.46, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 33: Manta G-145-30fps (Sony ICX285) imaging performance

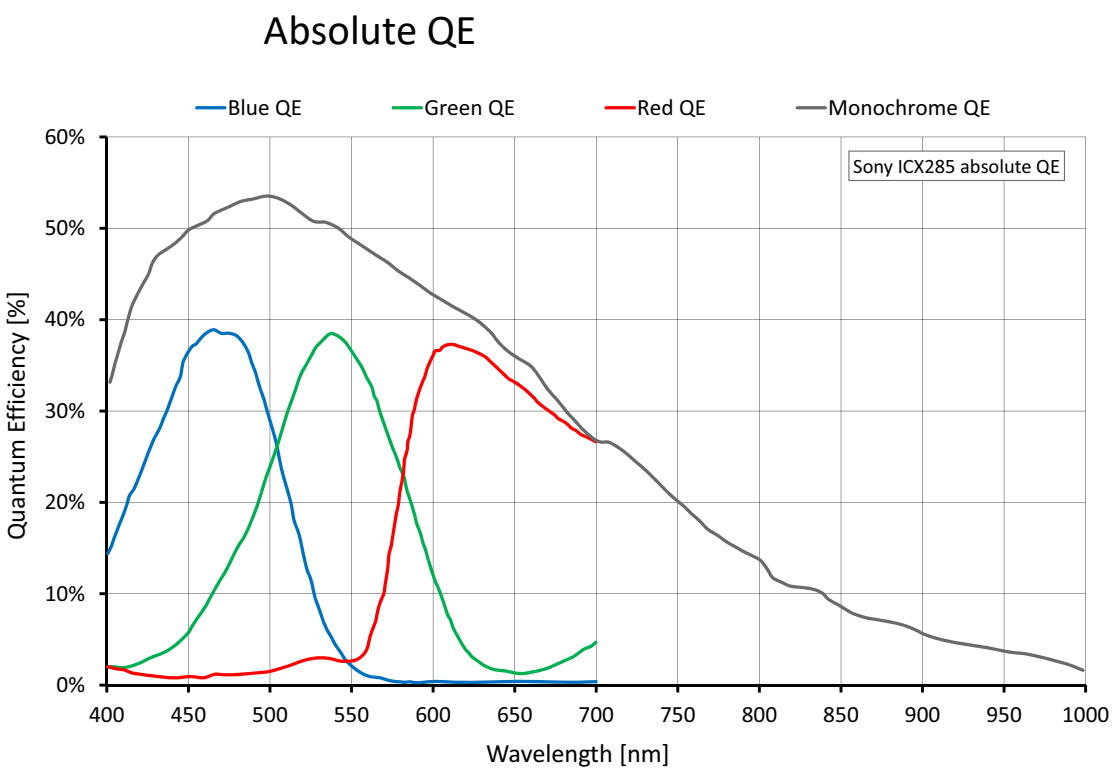


Figure 24: Manta G-145-30fps (Sony ICX285) absolute QE

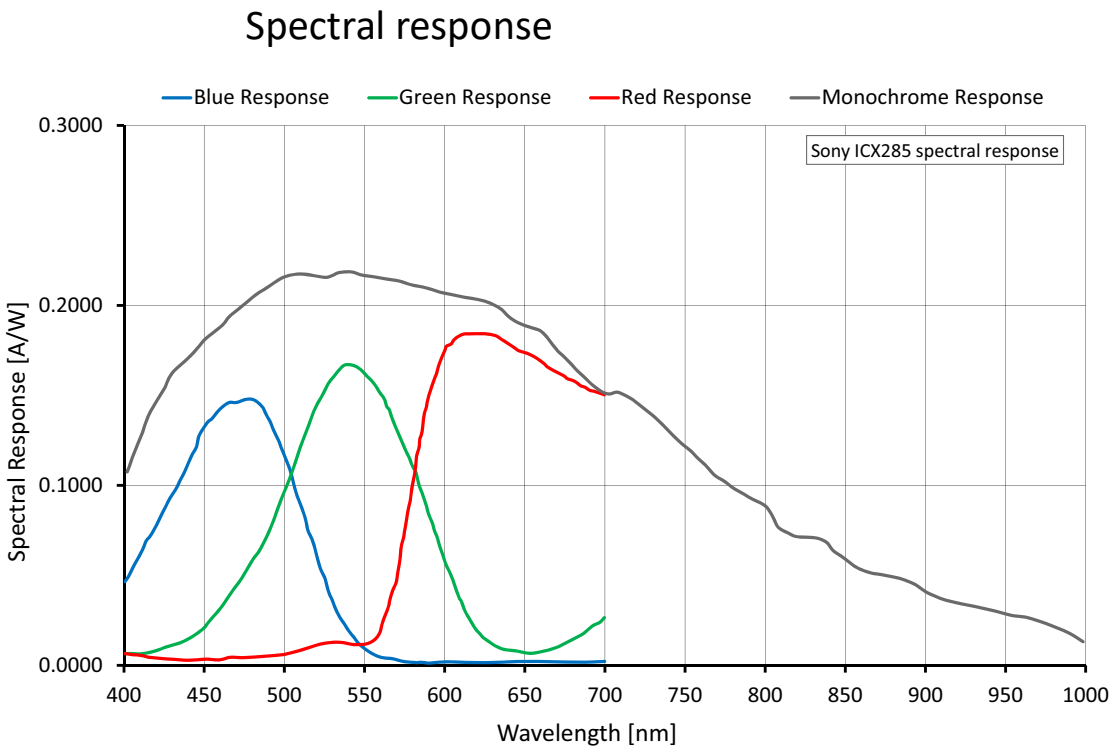


Figure 25: Manta G-145-30fps (Sony ICX285) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.1 fps

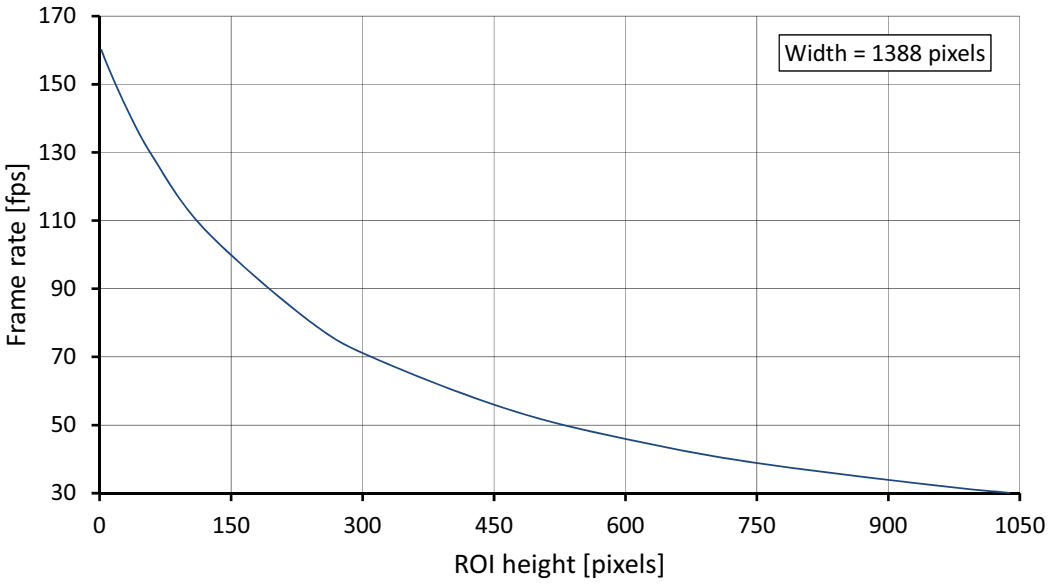


Figure 26: Manta G-145-30fps frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1038	30.1	240	80.4
960	32.1	120	107.4
768	38.2	60	129
640	43.8	30	143.4
480	53.5	10	154.9
320	68.9	2	160.1

Table 34: Frame rate as a function of ROI height (Width=1388 pixels)

Manta G-145B NIR

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

Feature	Specification Manta G-145B NIR	
Sensor model	Sony ICX285AL	
Resolution	1388 (H) × 1038 (V); 1.4 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Max. frame rate at full resolution	15 fps (NIR mode: Off/On_Fast) 13.9 fps (NIR mode: On_HighQuality)	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	
Exposure time control	20 µs to 60 s; 1 µs increments 28 µs to 60 s for NirMode=Off/On_Fast and ExposureMode=External	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.2 W at 12 VDC; PoE: 3.9 W	
Trigger latency[1]	Idle state: 58.7 µs; Frame valid state: 58.7 µs	
Trigger jitter[1]	Idle state: ±35.7 µs; Frame valid state: ±35.7 µs	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed	106 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	

Table 35: Manta G-145B NIR model specifications (sheet 1 of 2)

Feature	Specification Manta G-145B NIR
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g

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

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

Table 35: Manta G-145B NIR model specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-145B NIR[1]
Quantum efficiency at 529 nm	η	54 %
Quantum efficiency at 850 nm	η	22 %
Inverse of overall system gain	$1/K$	4.57 e^-/DN
Temporal dark noise	σ_{d0}	8.8 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	1.3 %
Saturation capacity	$\mu_{e.sat}$	17900 e^-
Signal to noise ratio at saturation	SNR_{max}	42.5 dB, 7.1 bits
Dynamic range	DR	65.6 dB, 10.9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	9.4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 5.67, Temperature: ~38 °C, Pixel format: Mono12.

Table 36: Manta G-145B NIR (Sony ICX285) imaging performance

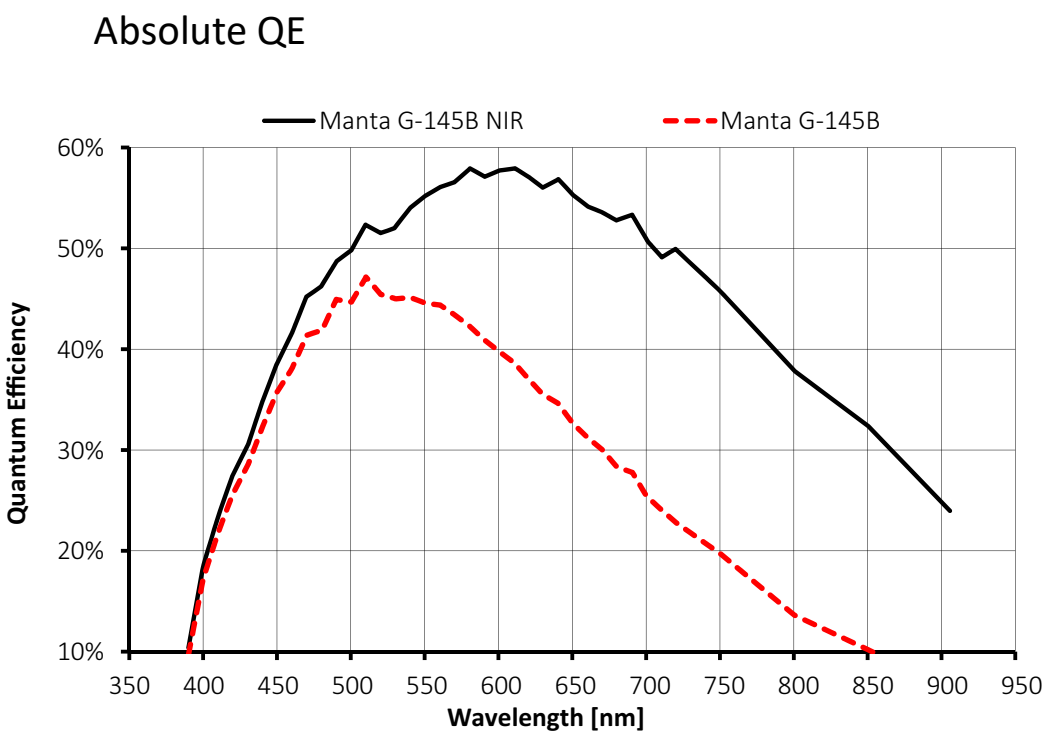


Figure 27: Manta G-145B NIR (Sony ICX285) absolute QE (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B

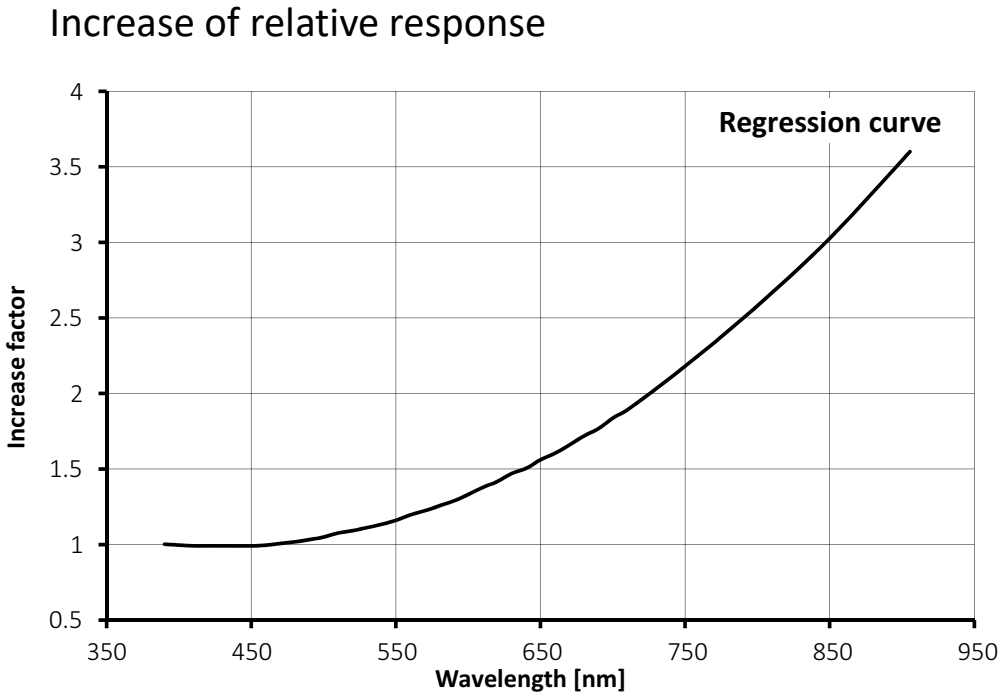


Figure 28: Increase of relative response with NIR mode set to On_HighQuality

ROI frame rate

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

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

Maximum frame rate at full resolution according formula:

15 fps for NirMode=Off/On_Fast

13.9 fps for NirMode=On_HighQuality

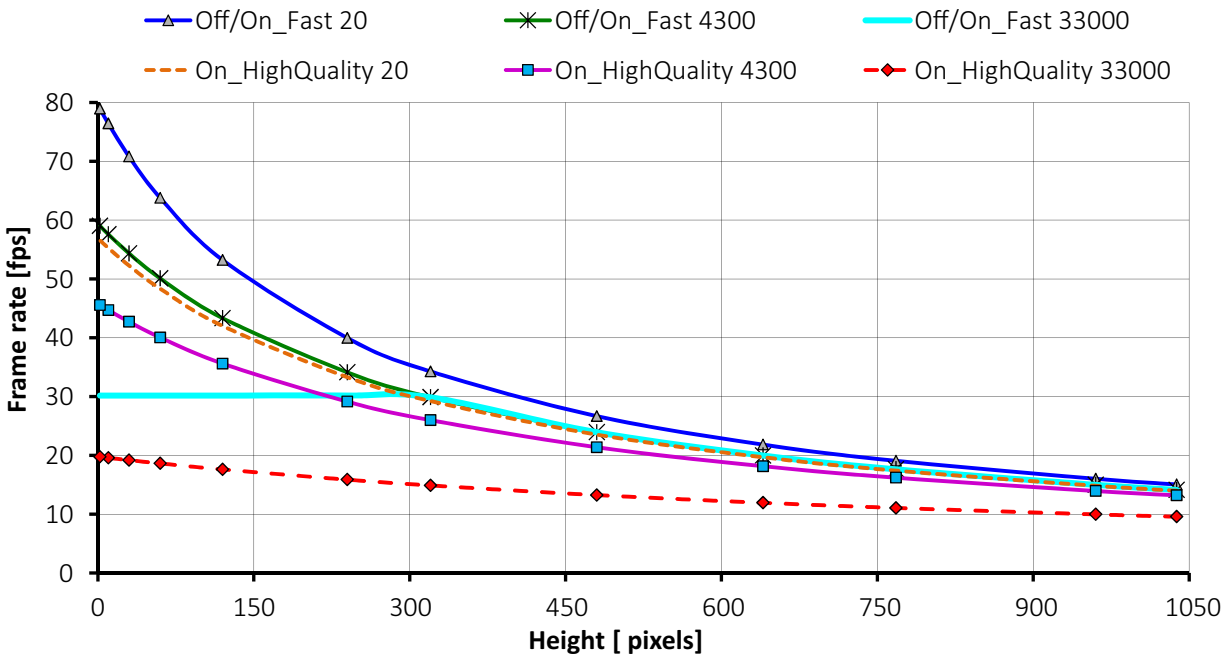


Figure 29: Frame rate as a function of ROI height [width=1388], NirMode and exposure time per µs

NirMode Exposure time per µs	Off/On_Fast 20	Off/On_Fast 4300	Off/On_Fast 33000	On_HighQuality 20	On_HighQuality 4300	On_HighQuality 33000
ROI height						
1038	15	14.1	14.1	13.9	13.2	9.5
960	16	14.9	14.9	14.8	13.9	9.9
768	19	17.6	17.6	17.4	16.2	11
640	21.8	19.9	19.9	19.6	18.1	11.9
480	26.6	23.9	23.9	23.5	21.3	13.2
320	34.2	29.8	29.8	29.2	25.9	14.8
240	39.9	34.1	30.1	33.2	29.1	15.8
120	53.2	43.3	30.1	42	35.6	17.6
60	63.7	50.1	30.1	48.3	40	18.6
30	70.8	54.3	30.1	52.2	42.7	19.1
10	76.4	57.5	30.1	55.2	44.7	19.5
2	78.9	59	30.1	56.5	45.5	19.7

Table 37: Frame rate as a function of ROI height (Width=1388 pixels)

Manta G-146 series

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

Feature	Specification	
	Manta G-146B	**Manta G-146C**
Sensor model	Sony ICX267AL	Sony ICX267AK
Resolution	1388 (H) × 1038 (V); 1.4 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/2	
Sensor size	8 mm diagonal	
Pixel size	4.65 µm × 4.65 µm	
Max. frame rate at full resolution	17.8 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 22 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	31 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[1]	Idle state: 21.1 µs; Frame valid state: 42.7 µs	
Trigger jitter[1]	Idle state: ±9.2 µs; Frame valid state: ±30.8 µs	

Table 38: Manta G-146 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-146B	Manta G-146C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	88 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 38: Manta G-146 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-146B[1]	Manta G-146C[2]
Quantum efficiency at 448 nm	η		32 %
Quantum efficiency at 529 nm	η	41 %	31 %
Quantum efficiency at 632 nm	η		24 %
Inverse of overall system gain	1/K	2.89 e^-/DN	2.92 e^-/DN
Temporal dark noise	σ_{d0}	12.4 e^-	13.5 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	2.5 e^-	2.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.7 %	1 %
Saturation capacity	$\mu_{e.sat}$	11400 e^-	11400 e^-
Signal to noise ratio at saturation	SNR_{max}	40.6 dB, 6.7 bits	40.6 dB, 6.7 bits
Dynamic range	DR	58.9 dB, 9.8 bits	58.2 dB, 9.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	12.9 e^-	14 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 12.3, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 13.89, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 39: Manta G-146 (Sony ICX267) imaging performance

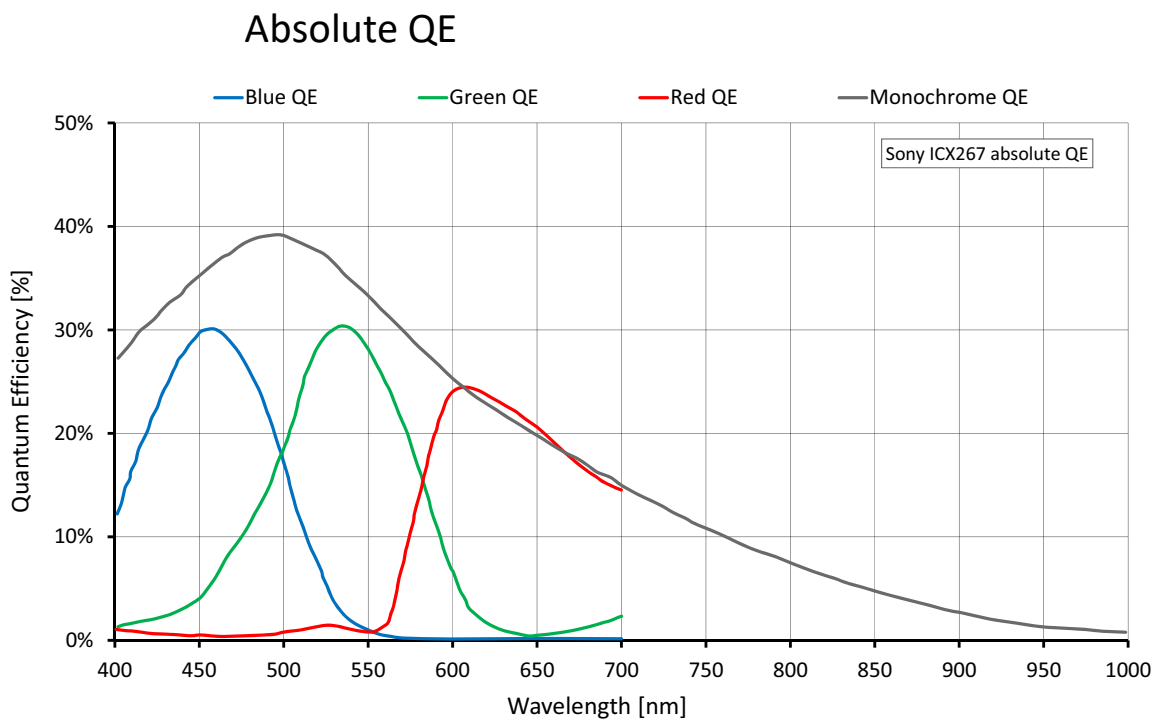


Figure 30: Manta G-146 (Sony ICX267) absolute QE

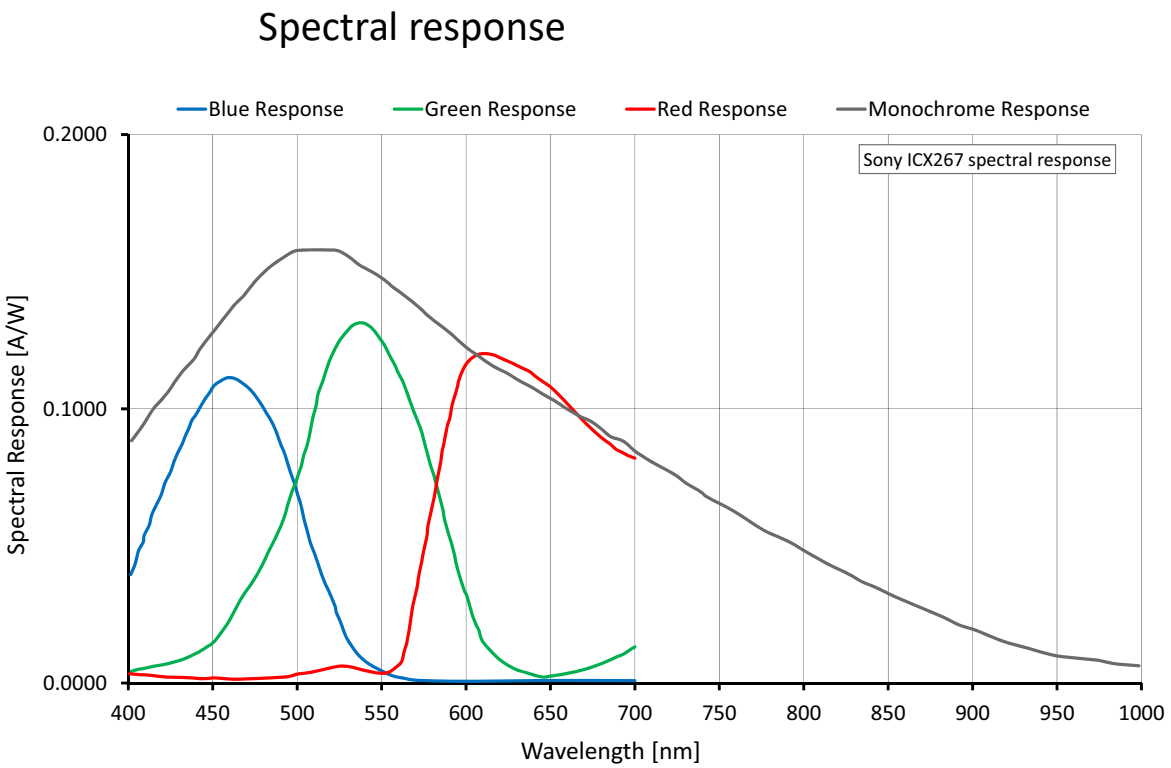


Figure 31: Manta G-146 (Sony ICX267) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 17.8 fps

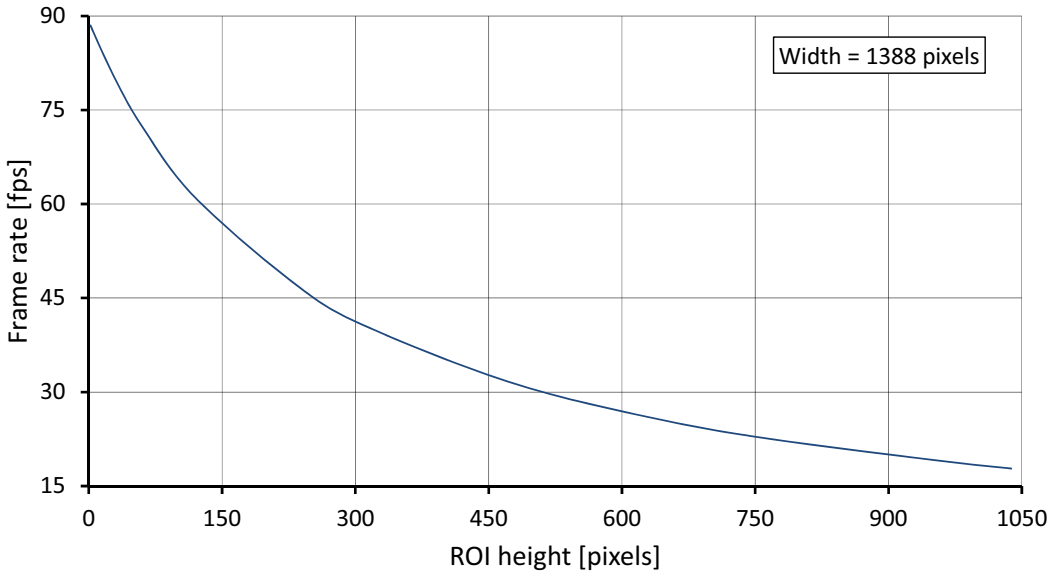


Figure 32: Manta G-146 frame rate as a function of ROI height

Height	Frame rate (fps)
1038	17.8
960	19
768	22.5
640	25.7
480	31.3
320	40

Height	Frame rate (fps)
240	46.4
120	61
60	72.4
30	79.9
10	85.9
2	88.5

Table 40: Frame rate as a function of ROI height (Width=1388 pixels)

Manta G-158 series

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

Feature	Specification	
	Manta G-158B	**Manta G-158C**
Sensor model	Sony IMX273LLR Exmor	Sony IMX273LQR Exmor
Resolution	1456 (H) × 1088 (V); 1.58 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1/2.9	
Sensor size	6.3 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	75.2 fps (89.1 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 82 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.79 W at 12 VDC; PoE: 3.26 W	

Table 41: Manta G-158 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-158B	**Manta G-158C**
Trigger latency[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	29.76 µs
	Mono12, BayerRG12, YUV422Packed	39.6 µs
	RGB8Packed, BGR8Packed, YUV444Packed	59.52 µs
Trigger jitter[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±4.96 µs
	Mono12, BayerRG12, YUV422Packed	±6.6 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±9.92 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	185 µs
	Mono12, BayerRG12, YUV422Packed	251 µs
	RGB8Packed, BGR8Packed, YUV444Packed	384 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

Table 41: Manta G-158 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-158B[1]	Manta G-158C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	64 %	57 %
Quantum efficiency at 632 nm	η		52 %
Inverse of overall system gain	1/K	2.66 e^-/DN	2.61 e^-/DN
Temporal dark noise	σ_{d0}	2.1 e^-	2.1 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.6 e^-	0.8 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.6 %
Saturation capacity	$\mu_{e.sat}$	10500 e^-	10300 e^-
Signal to noise ratio at saturation	SNR_{max}	40.2 dB, 6.7 bits	40.1 dB, 6.7 bits
Dynamic range	DR	71.6 dB, 11.9 bits	71.5 dB, 11.9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.8 e^-	2.7 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 3, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 3, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 42: Manta G-158 (Sony IMX273) imaging performance

Absolute QE

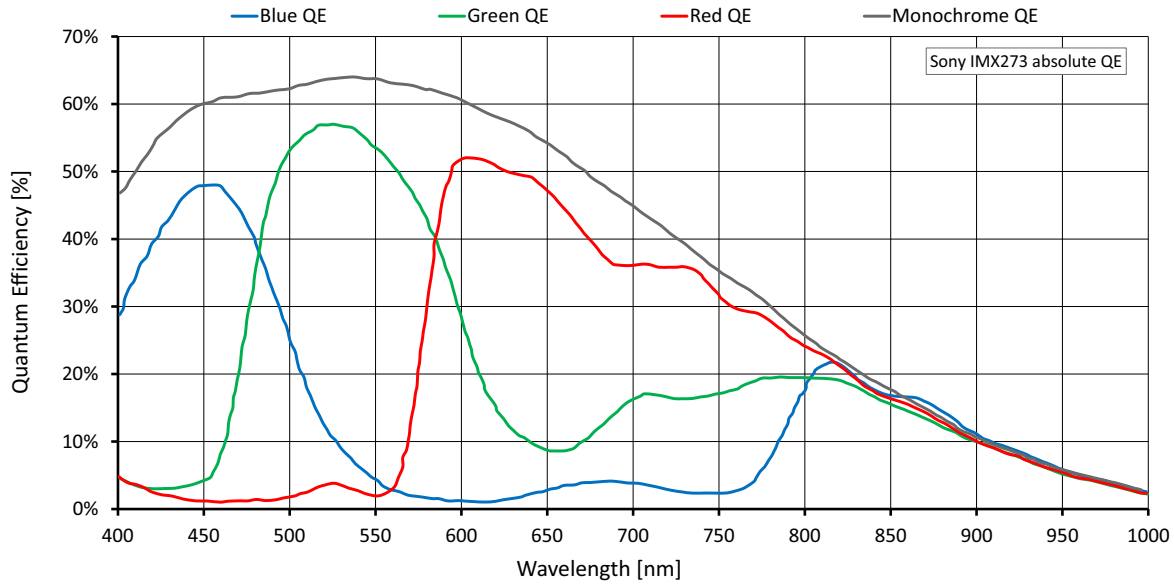


Figure 33: Manta G-158 (Sony IMX273) absolute QE

Spectral response

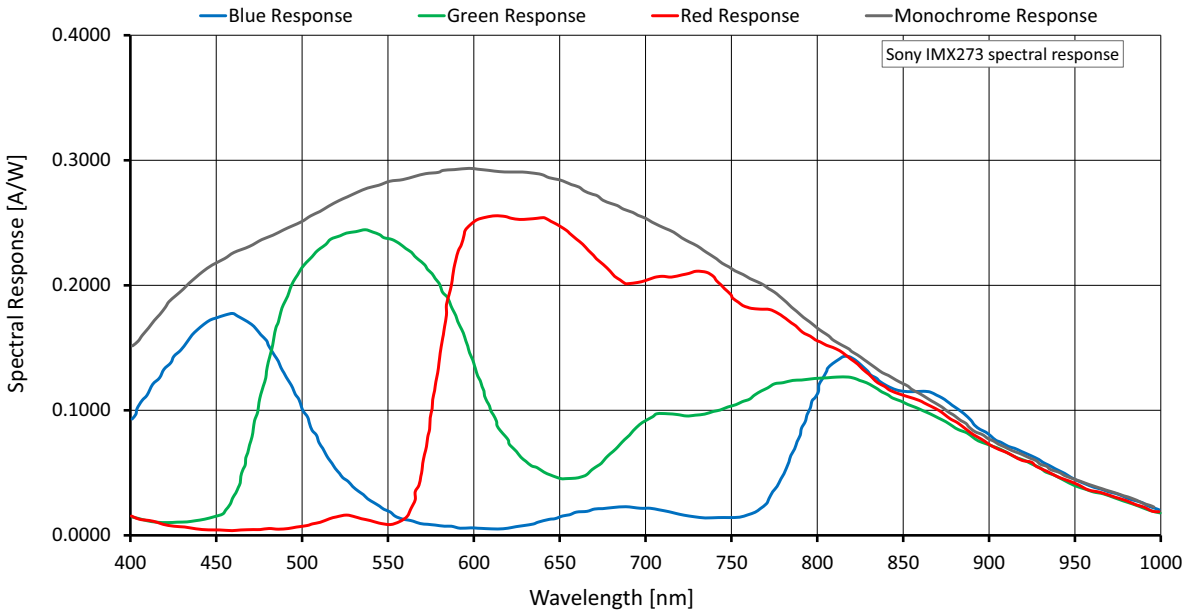


Figure 34: Manta G-158 (Sony IMX273) spectral response

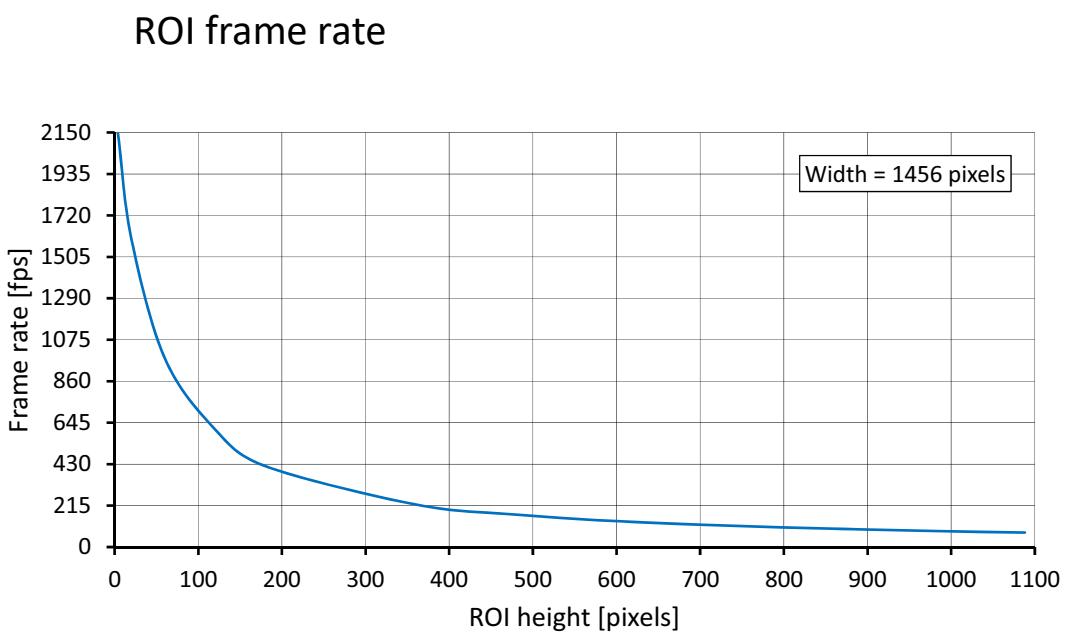


Figure 35: Manta G-158 frame rate as a function of ROI height

Height	Frame rate (fps)
1088	75.2
1080	75.6
1024	79.6
960	85.2
768	106

Height	Frame rate (fps)
600	134.6
480	168.3
360	220.6
180	420
120	610.9

Height	Frame rate (fps)
60	978.7
20	1600
4	2144.5

Table 43: Frame rate as a function of ROI height (Width=1456 pixels)

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

Manta G-201 series

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

Feature	Specification	
	Manta G-201B	**Manta G-201C**
Sensor model	Sony ICX274AL	Sony ICX274AQ
Resolution	1624 (H) × 1234 (V); 2 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/1.8	
Sensor size	8.923 mm diagonal	
Pixel size	4.4 µm × 4.4 µm	
Max. frame rate at full resolution	14.7 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 16 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats[1]	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	51 µs to 60 s; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical:1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.6 W at 12 VDC; PoE: 3.2 W	
Trigger latency[2]	Idle state: 17 µs; Frame valid state: 40.8 µs	
Trigger jitter[2]	Idle state: ±7.6 µs; Frame valid state: ±31.4 µs	

Table 44: Manta G-201 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-201B	**Manta G-201C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	60 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[1] Manta G-201B supports RGB8Packed and BGR8Packed only

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

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

Table 44: Manta G-201 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-201B[1]	Manta G-201C[2]
Quantum efficiency at 448 nm	η		45 %
Quantum efficiency at 529 nm	η	48 %	37 %
Quantum efficiency at 632 nm	η		29 %
Inverse of overall system gain	$1/K$	1.77 e^-/DN	1.77 e^-/DN
Temporal dark noise	σ_{d0}	8.9 e^-	9.4 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.8 e^-	1.4 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.9 %
Saturation capacity	$\mu_{e.sat}$	6900 e^-	6900 e^-
Signal to noise ratio at saturation	SNR_{max}	38.4 dB, 6.4 bits	38.4 dB, 6.4 bits
Dynamic range	DR	57.3 dB, 9.5 bits	56.9 dB, 9.4 bits
Absolute sensitivity threshold	$\mu_{e.min}$	19.7 e^-	9.9 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 14.50, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 15.05, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 45: Manta G-201 (Sony ICX274) imaging performance

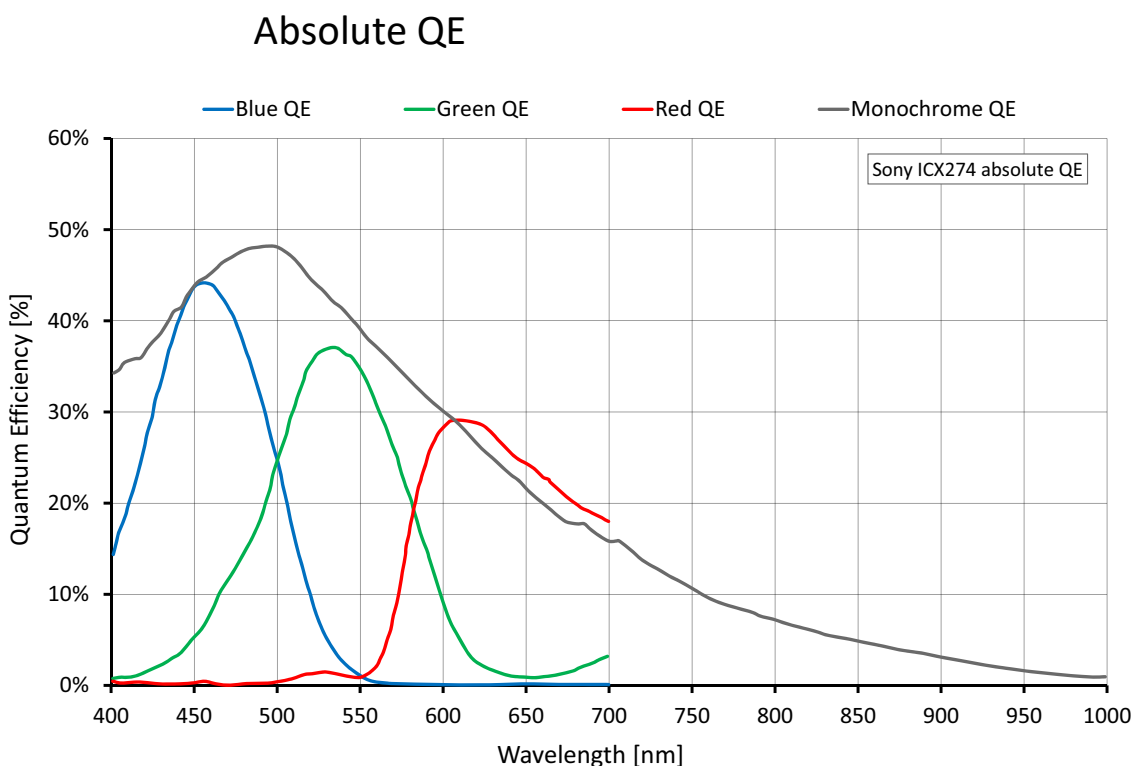


Figure 36: Manta G-201 (Sony ICX274) absolute QE

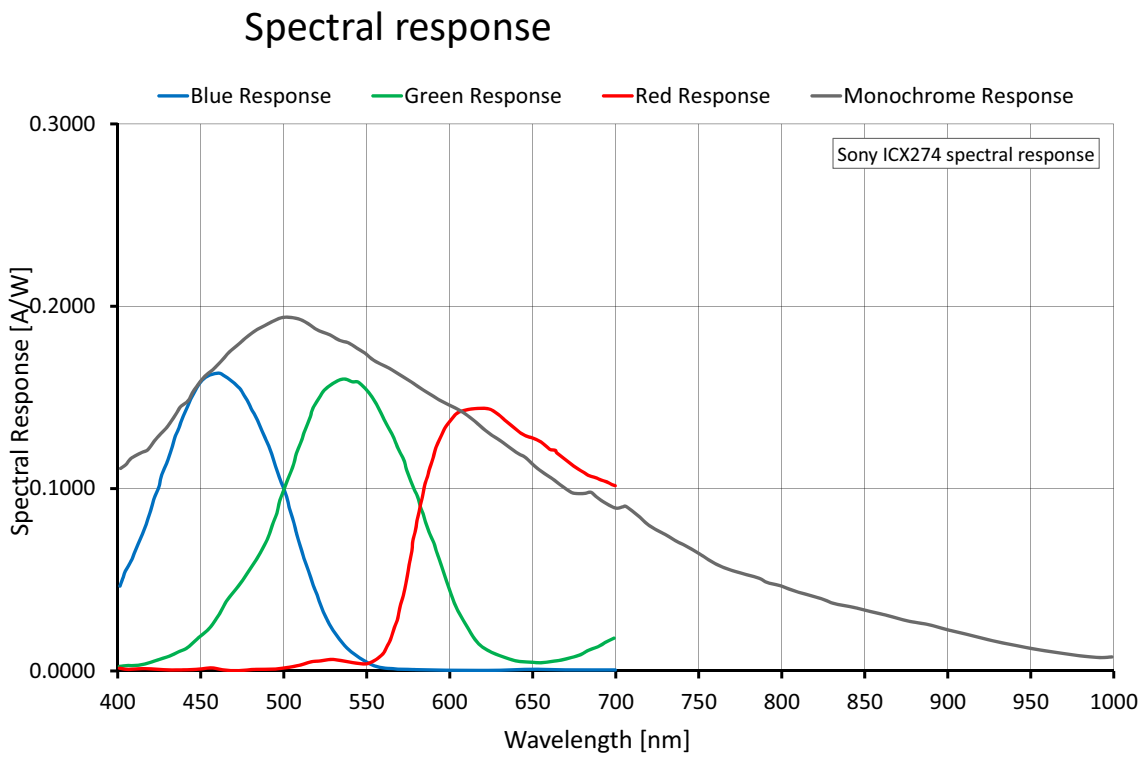


Figure 37: Manta G-201 (Sony ICX274) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 14.7 fps

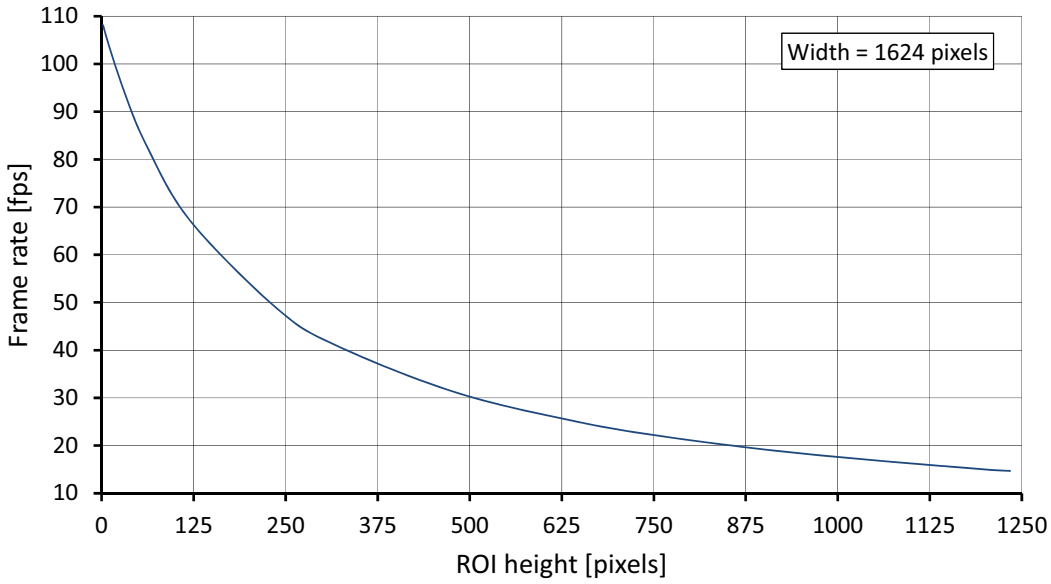


Figure 38: Manta G-201 frame rate as a function of ROI height

Height	Frame rate (fps)
1234	14.7
1200	15
960	18.2
768	21.8
640	25.2
480	31.2
320	40.9
240	48.5
120	67.2
60	83.2
30	94.5
10	103.8
2	108.1

Table 46: Frame rate as a function of ROI height (Width=1624 pixels)

Manta G-201-30fps series

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

Feature	Specification	
	Manta G-201B-30fps	**Manta G-201C-30fps**
Sensor model	Sony ICX274AL	Sony ICX274AQ
Resolution	1624 (H) × 1234 (V); 2 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/1.8	
Sensor size	8.923 mm diagonal	
Pixel size	4.4 µm × 4.4 µm	
Max. frame rate at full resolution	30 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 16 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats[1]	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	10 µs to 60; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical:1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.6 W at 12 VDC; PoE: 4.4 W	
Trigger latency[2]	Idle state: 9.4 µs; Frame valid state: 21.4 µs	
Trigger jitter[2]	Idle state: ±5.4 µs; Frame valid state: ±17.4 µs	

Table 47: Manta G-201-30fps model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-201B-30fps	**Manta G-201C-30fps**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	72 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

[1] Manta G-201C-30fps support RGB8Packed and BGR8Packed only

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

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

Table 47: Manta G-201-30fps model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-201B[1]	Manta G-201C[2]
Quantum efficiency at 448 nm	η		50 %
Quantum efficiency at 529 nm	η	59 %	41 %
Quantum efficiency at 632 nm	η		32 %
Inverse of overall system gain	1/K	2.35 e^-/DN	2.33 e^-/DN
Temporal dark noise	σ_{d0}	11.9 e^-	13.4 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	5.1 e^-	4 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.9 %
Saturation capacity	$\mu_{e.sat}$	9300 e^-	9200 e^-
Signal to noise ratio at saturation	SNR_{max}	39.7 dB, 6.6 bits	39.6 dB, 6.6 bits
Dynamic range	DR	57.5 dB, 9.5 bits	56.4 dB, 9.4 bits
Absolute sensitivity threshold	$\mu_{e.min}$	12.4 e^-	13.9 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 22.70, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 24.61, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 48: Manta G-201-30fps (Sony ICX274) imaging performance

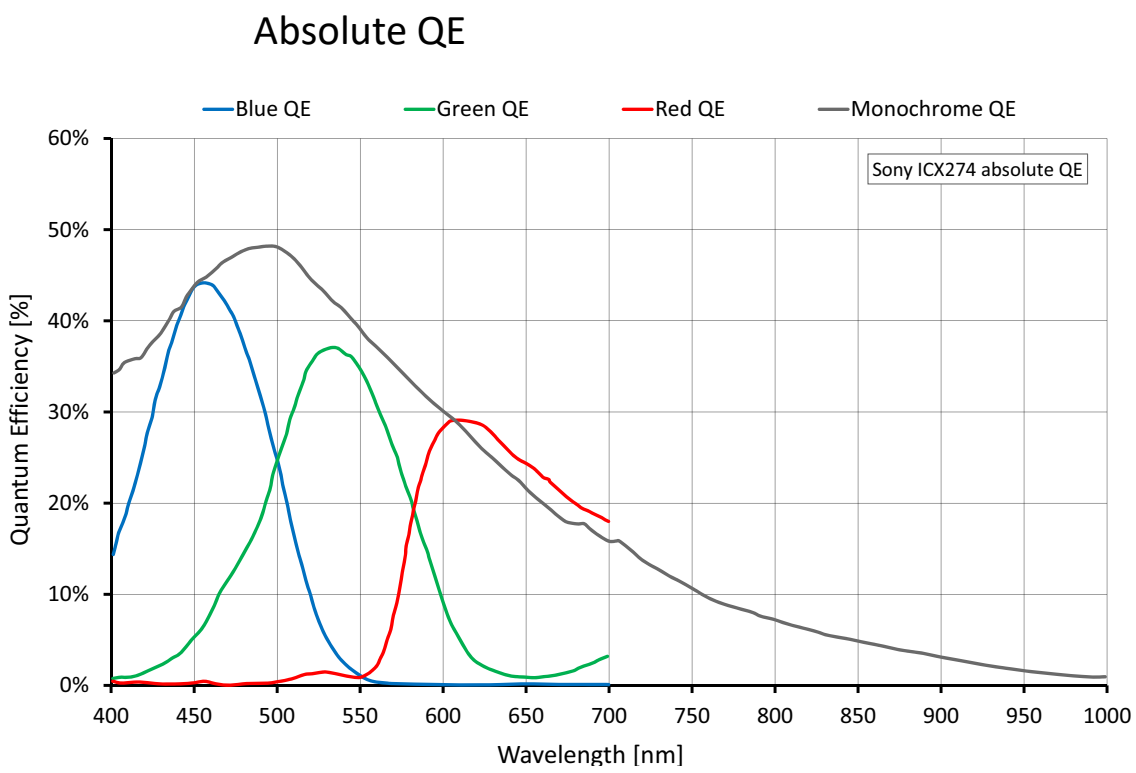


Figure 39: Manta G-201-30fps (Sony ICX274) absolute QE

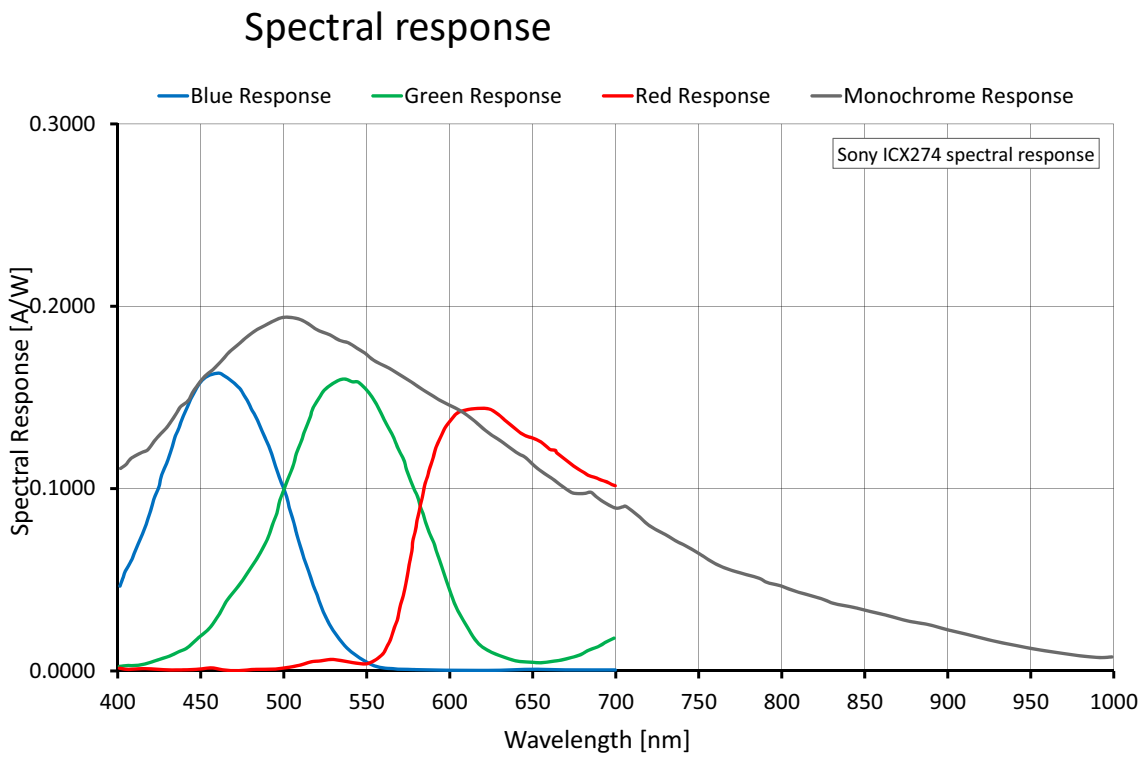


Figure 40: Manta G-201-30fps (Sony ICX274) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30 fps

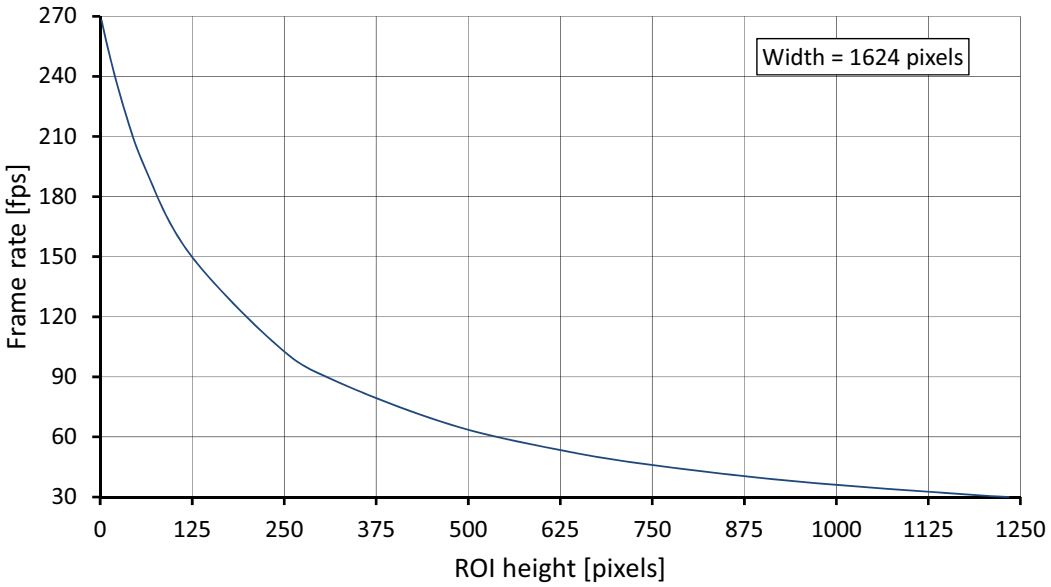


Figure 41: Manta G-201-30fps frame rate as a function of ROI height

Height	Frame rate (fps)
1234	30
1200	30.7
960	37.3
768	45.1
640	52.4
480	65.7
320	87.9
240	105.8
120	152.2
60	195.1
30	227
10	254.8
2	268

Table 49: Frame rate as a function of ROI height values (Width=1624 pixels)

Manta G-223 series

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

Feature	Specification	
	Manta G-223B	**Manta G-223C**
Sensor model	CMOSIS/ams CMV2000 with microlens	
Resolution	2048 (H) × 1088 (V); 2.2 MP	
Shutter type	Global shutter	
Sensor type	CMOS	
Sensor format	Type 2/3	
Sensor size	12.7 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Max. frame rate at full resolution	53.7 fps (60.1 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 59 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	25 µs[2] to 122 s; 1 µs increments	
Gain control	0 to 26 dB; 1 dB increments	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.1 W	
Trigger latency[3]	5.335 µs	
Trigger jitter[3]	±0.125 µs	

Table 50: Manta G-223 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-223B	Manta G-223C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	69 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

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

Table 50: Manta G-223 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-223B[1]	Manta G-223C[2]
Quantum efficiency at 448 nm	η		49 %
Quantum efficiency at 529 nm	η	72 %	50 %
Quantum efficiency at 632 nm	η		46 %
Inverse of overall system gain	1/K	2.4 e^-/DN	2.4 e^-/DN
Temporal dark noise	σ_{d0}	13.3 e^-	11.1 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	11.8 e^-	9.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	1 %	1.1 %
Saturation capacity	$\mu_{e.sat}$	9400 e^-	9500 e^-
Signal to noise ratio at saturation	SNR_{max}	39.7 dB, 6.6 bits	39.8 dB, 6.6 bits
Dynamic range	DR	56.7 dB, 9.4 bits	58.3 dB, 9.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	13.8 e^-	11.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 6.32, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 6.32, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 51: Manta G-223 (CMOSIS/ams CMV2000) imaging performance

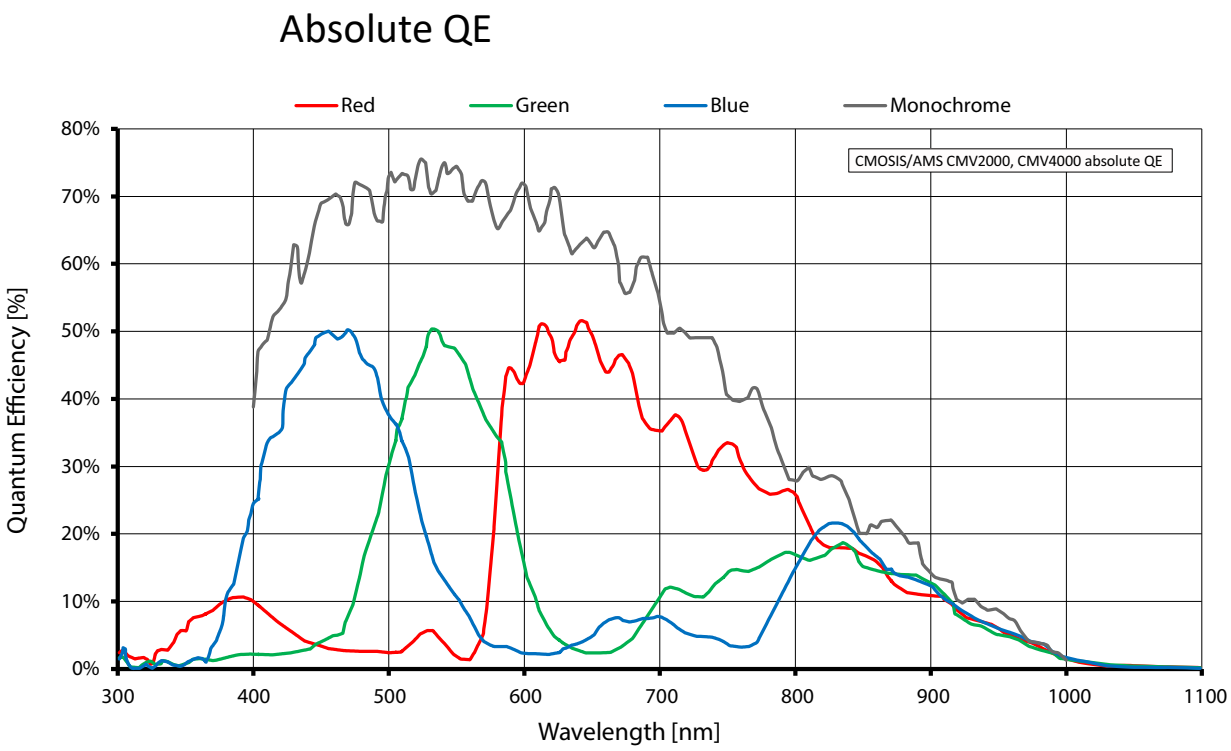


Figure 42: Manta G-223 (CMOSIS/ams CMV2000) absolute QE

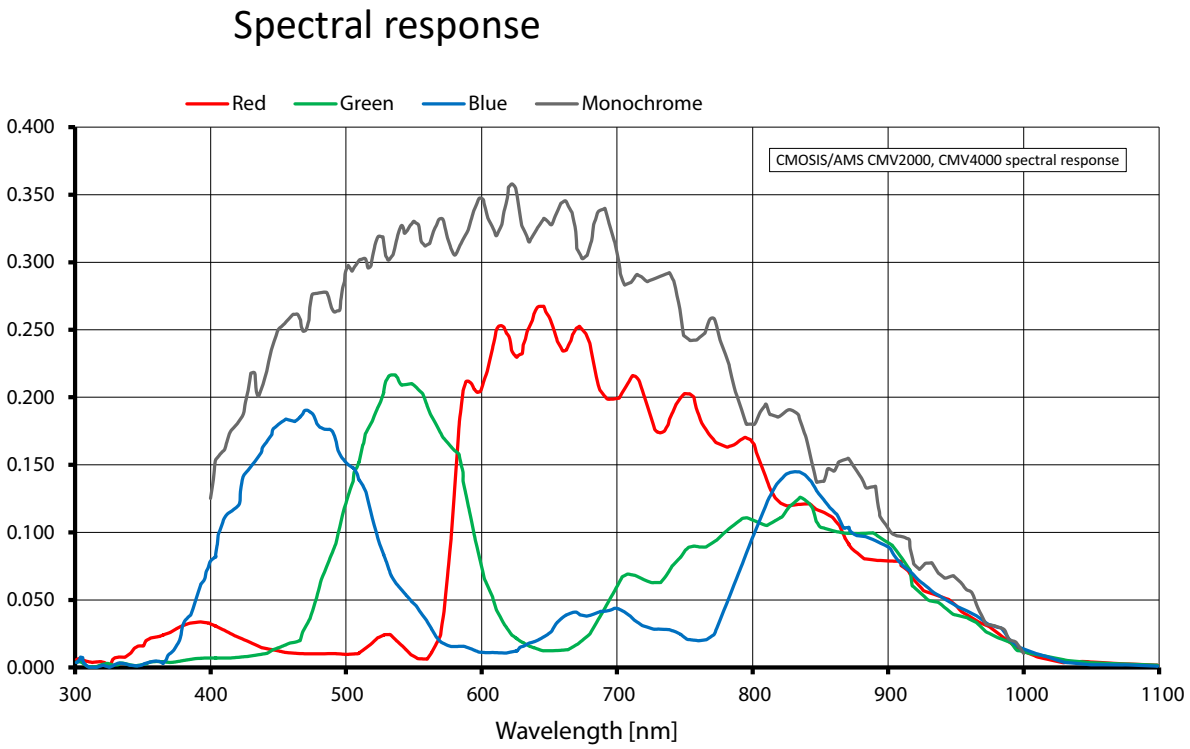


Figure 43: Manta G-223 (CMOSIS/ams CMV2000) spectral response

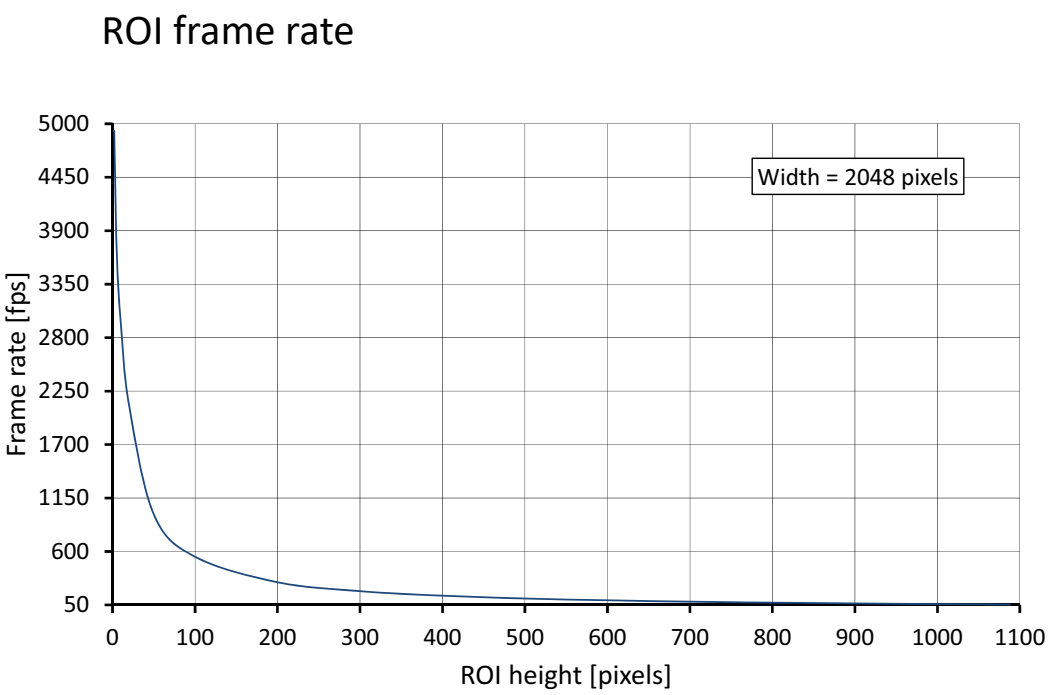


Figure 44: Manta G-223 frame rate as a function of ROI height

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

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

Height	Frame rate (fps)
20	2105.2
10	2949.8
5	3690
2	4926.1
1	4926.1

Table 52: Frame rate as a function of ROI height (Width=2048 pixels)

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

Manta G-235 series

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

Feature	Specification	
	Manta G-235B	**Manta G-235C**
Sensor model	Sony IMX174LLJ Exmor	Sony IMX174LQJ Exmor
Resolution	1936 (H) × 1216 (V); 2.35 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1/1.2	
Sensor size	13.4 mm diagonal	
Pixel size	5.86 µm × 5.86 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	50.8 fps (59.2 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 56 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.8 W at 12 VDC; PoE: 3.3 W	

Table 53: Manta G-235 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-235B	**Manta G-235C**
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	40.32 µs
	Mono12, BayerRG12, YUV422Packed	53.76 µs
	RGB8Packed, BGR8Packed, YUV444Packed	80.64 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	±6.72 µs
	Mono12, BayerRG12, YUV422Packed	±8.96 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±13.44 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed	188 µs
	Mono12, BayerRG12, YUV422Packed	256 µs
	RGB8Packed, BGR8Packed, YUV444Packed	390 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 53: Manta G-235 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-235B[1]	Manta G-235C[2]
Quantum efficiency at 448 nm	η		58 %
Quantum efficiency at 529 nm	η	70 %	64 %
Quantum efficiency at 632 nm	η		47 %
Inverse of overall system gain	1/K	8.1 e^-/DN	8.3 e^-/DN
Temporal dark noise	σ_{d0}	6.2 e^-	6.2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.9 e^-	0.8 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.4 %
Saturation capacity	$\mu_{e.sat}$	32000 e^-	32900 e^-
Signal to noise ratio at saturation	SNR_{max}	45.1 dB, 7.5 bits	45.2 dB, 7.5 bits
Dynamic range	DR	73 dB, 12.1 bits	73.3 dB, 12.2 bits
Absolute sensitivity threshold	$\mu_{e.min}$	7.2 e^-	7.1 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 54: Manta G-235 (Sony IMX174) imaging performance

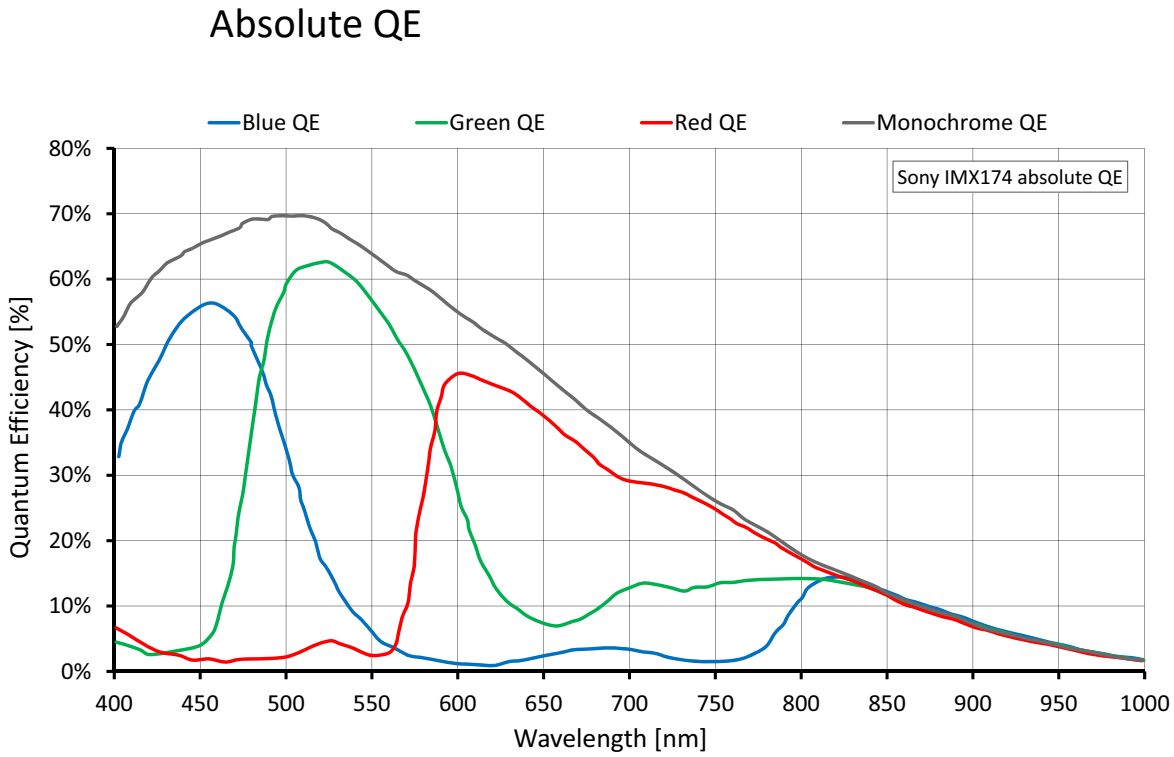


Figure 45: Manta G-235 (Sony IMX174) absolute QE

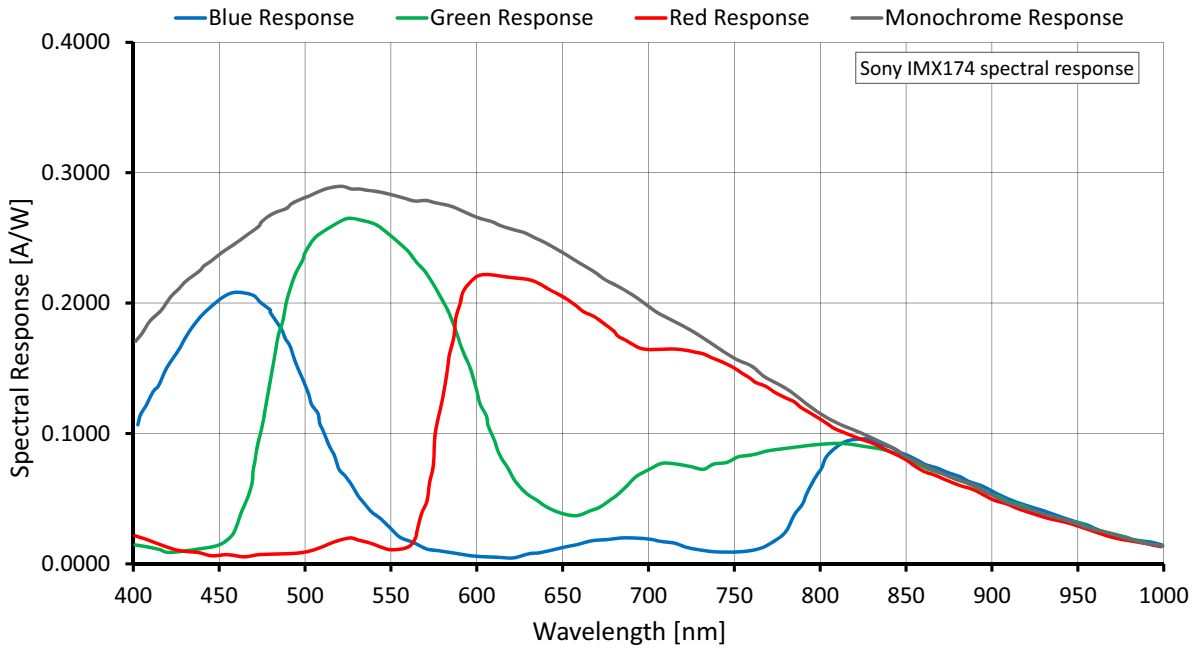


Figure 46: Manta G-235 (Sony IMX174) spectral response

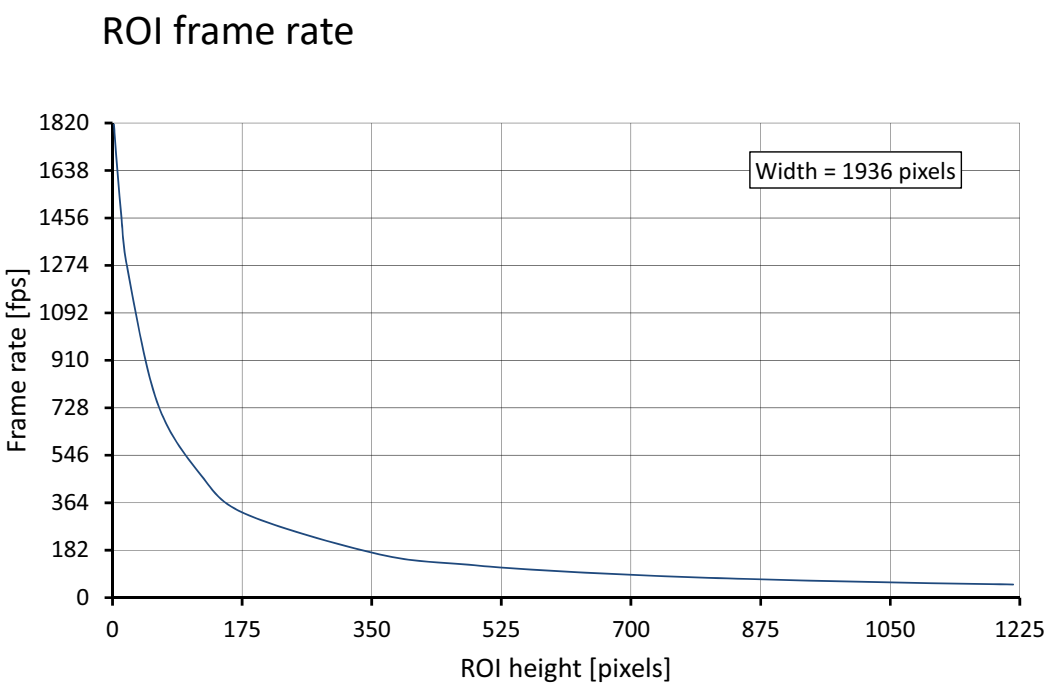


Figure 47: Manta G-235 frame rate as a function of ROI height

Height	Frame rate (fps)
1216	50.8
1080	57
1024	60.1
960	64.2
768	79.8
600	102
480	126.5
360	166.4

Height	Frame rate (fps)
180	320.7
120	467.9
60	751.5
20	1261
12	1458.8
4	1730.1
2	1814.5

Table 55: Frame rate as a function of ROI height (Width= 1936 pixels)

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

Manta G-282 series

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

Feature	Specification	
	Manta G-282B	**Manta G-282C**
Sensor model	Sony ICX687ALA	Sony ICX687AQA
Resolution	1936 (H) × 1458 (V); 2.8 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/1.8	
Sensor size	8.918 mm diagonal	
Pixel size	3.69 µm × 3.69 µm	
Max. frame rate at full resolution	30.4 fps (dual-tap mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Sensor taps	Dual-tap Single-tap switchable in Vimba X Viewer	
Power consumption	External power: 3.5 W at 12 VDC; PoE: 4.1 W	
Trigger latency[1]	Idle state: 7.2 µs; Frame valid state: 18.4 µs	
Trigger jitter[1]	Idle state: ±4 µs; Frame valid state: ±15.2 µs	

Table 56: Manta G-282 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-282B	**Manta G-282C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	47 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 56: Manta G-282 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-282B[1]	Manta G-282C[2]
Quantum efficiency at 448 nm	η		46 %
Quantum efficiency at 529 nm	η	62 %	50 %
Quantum efficiency at 632 nm	η		44 %
Inverse of overall system gain	$1/K$	0.7 e^-/DN	2.7 e^-/DN
Temporal dark noise	σ_{d0}	10.8 e^-	10.5 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.9 e^-	3.2 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.9 %	0.7 %
Saturation capacity	$\mu_{e.sat}$	10300 e^-	10300 e^-
Signal to noise ratio at saturation	SNR_{max}	40.1 dB, 6.7 bits	40.1 dB, 6.7 bits
Dynamic range	DR	59.2 dB, 9.8 bits	59.4 dB, 9.9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	11.3 e^-	11 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 57: Manta G-282 (Sony ICX687) imaging performance

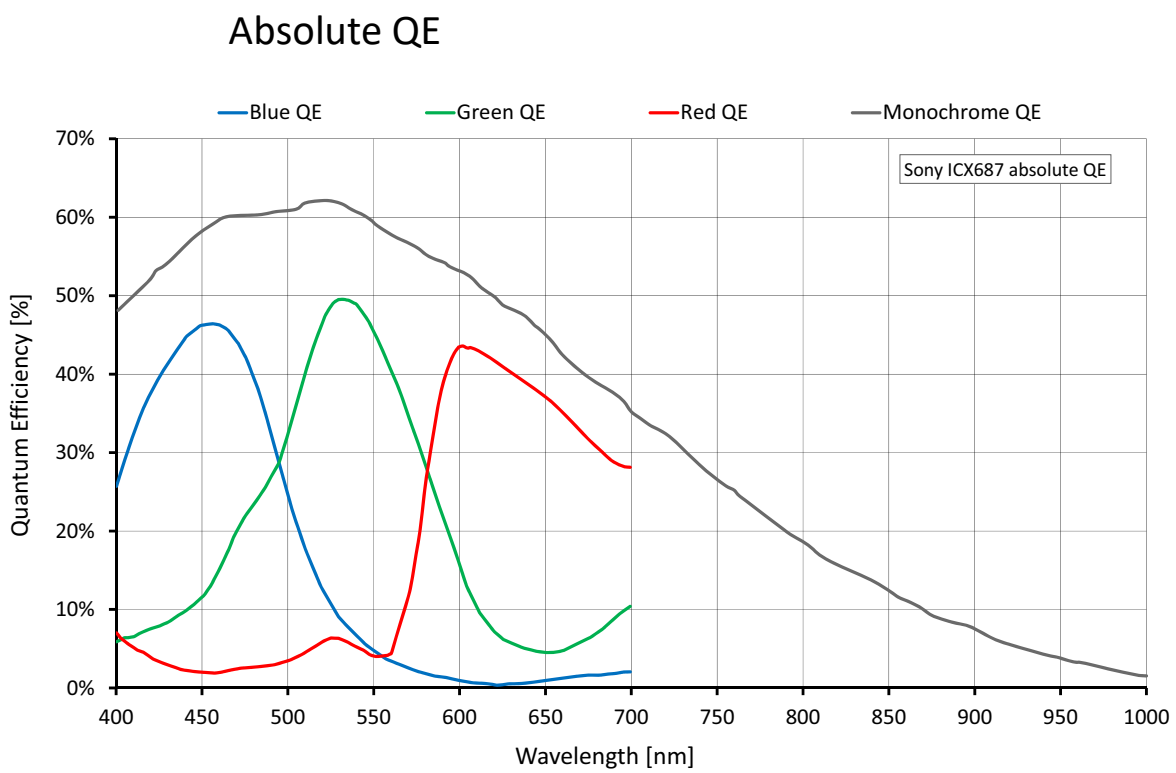


Figure 48: Manta G-282 (Sony ICX687) absolute QE

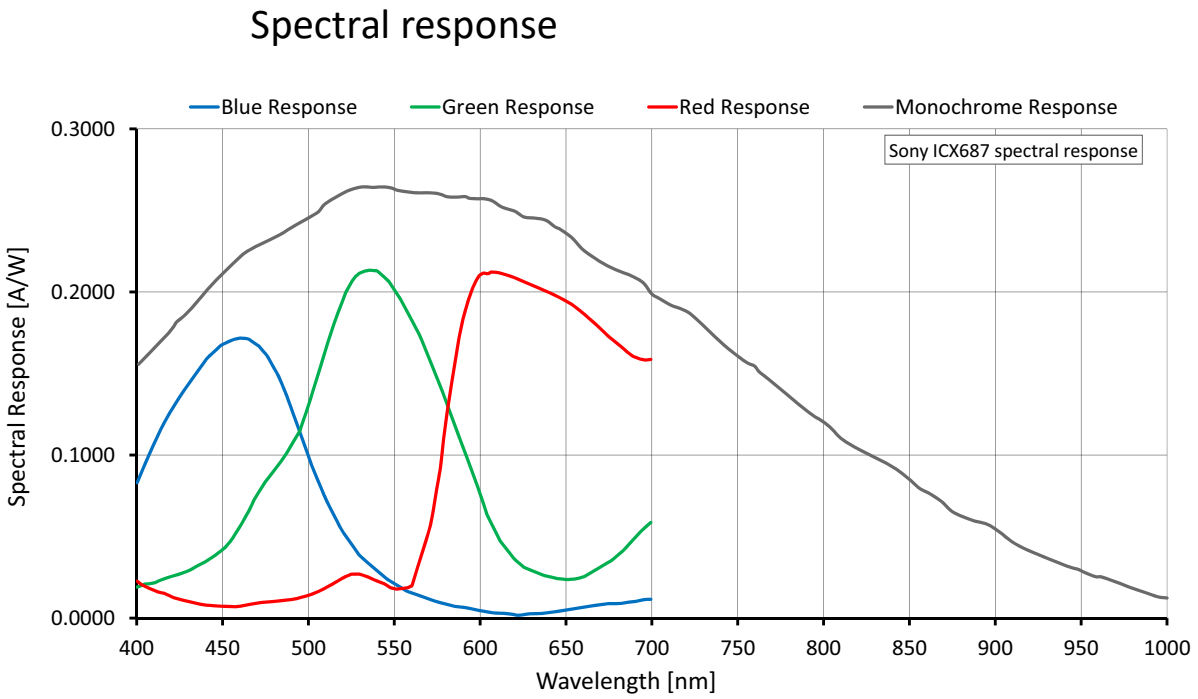


Figure 49: Manta G-282 (Sony ICX687) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.4 fps

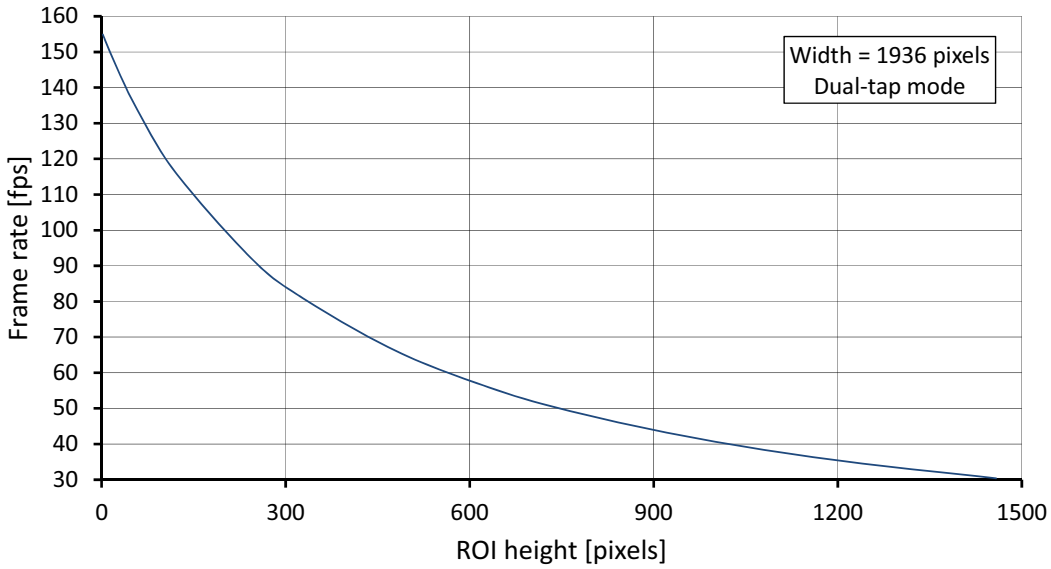


Figure 50: Manta G-282 frame rate as a function of ROI height

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

Table 58: Frame rate as a function of ROI height (Width=1936 pixels)

Manta G-283 series

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

Feature	Specification	
	Manta G-283B	**Manta G-283C**
Sensor model	Sony ICX674ALG	Sony ICX674AQG
Resolution	1936 (H) × 1458 (V); 2.8 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	10.972 mm diagonal	
Pixel size	4.54 µm × 4.54 µm	
Max. frame rate at full resolution	30.4 fps (dual-tap mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 47 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	41 µs to 38 s; 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Sensor taps	Dual-tap Single-tap switchable in Vimba X Viewer	
Power consumption	External power: 3.7 W at 12 VDC; PoE: 4.3 W	
Trigger latency[1]	Idle state: 7.2 µs; Frame valid state: 18.4 µs	
Trigger jitter[1]	Idle state: ±4 µs; Frame valid state: ±15.2 µs	

Table 59: Manta G-283 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-283B	**Manta G-283C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	47 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 59: Manta G-283 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-283B[1]	Manta G-283C[2]
Quantum efficiency at 448 nm	η		75 %
Quantum efficiency at 529 nm	η	66 %	80 %
Quantum efficiency at 632 nm	η		78 %
Inverse of overall system gain	$1/K$	1 e^-/DN	4 e^-/DN
Temporal dark noise	σ_{d0}	10 e^-	9.8 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	8.3 e^-	5 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.7 %
Saturation capacity	$\mu_{e.sat}$	15800 e^-	15500 e^-
Signal to noise ratio at saturation	SNR_{max}	42 dB, 7 bits	41.9 dB, 7 bits
Dynamic range	DR	63.5 dB, 10.6 bits	63.5 dB, 10.6 bits
Absolute sensitivity threshold	$\mu_{e.min}$	10.5 e^-	10.4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 60: Manta G-283 (Sony ICX674) imaging performance

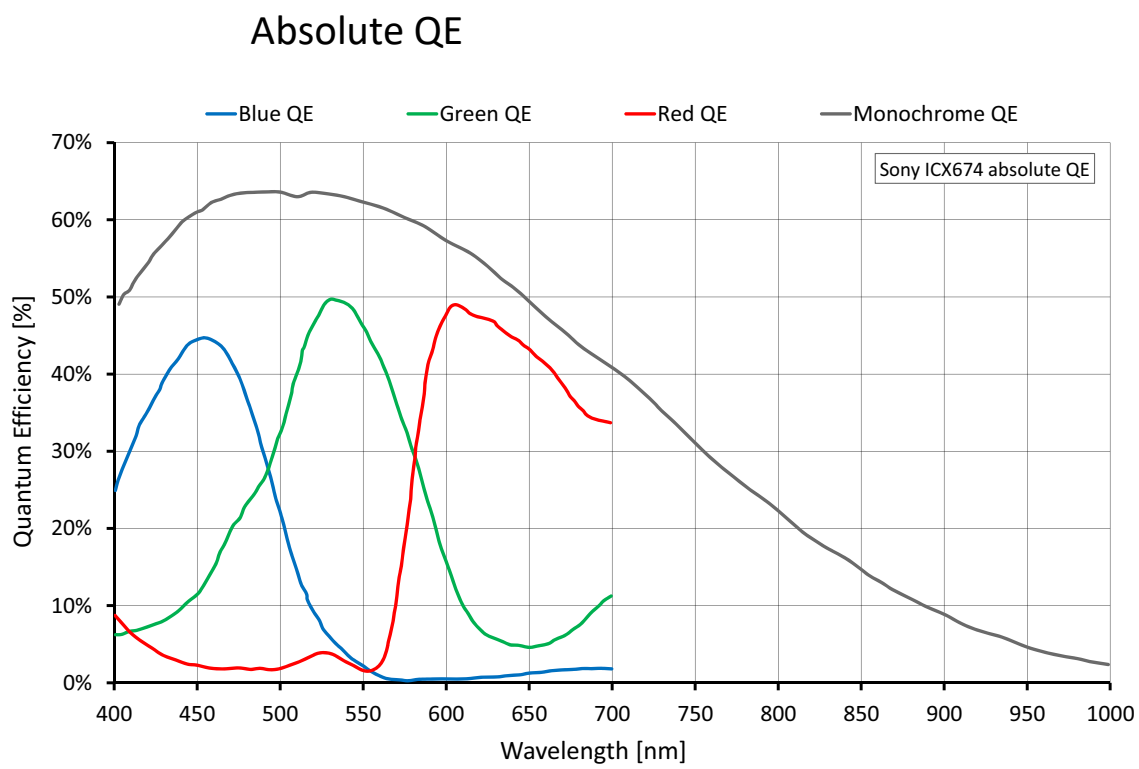


Figure 51: Manta G-283 (Sony ICX674) absolute QE

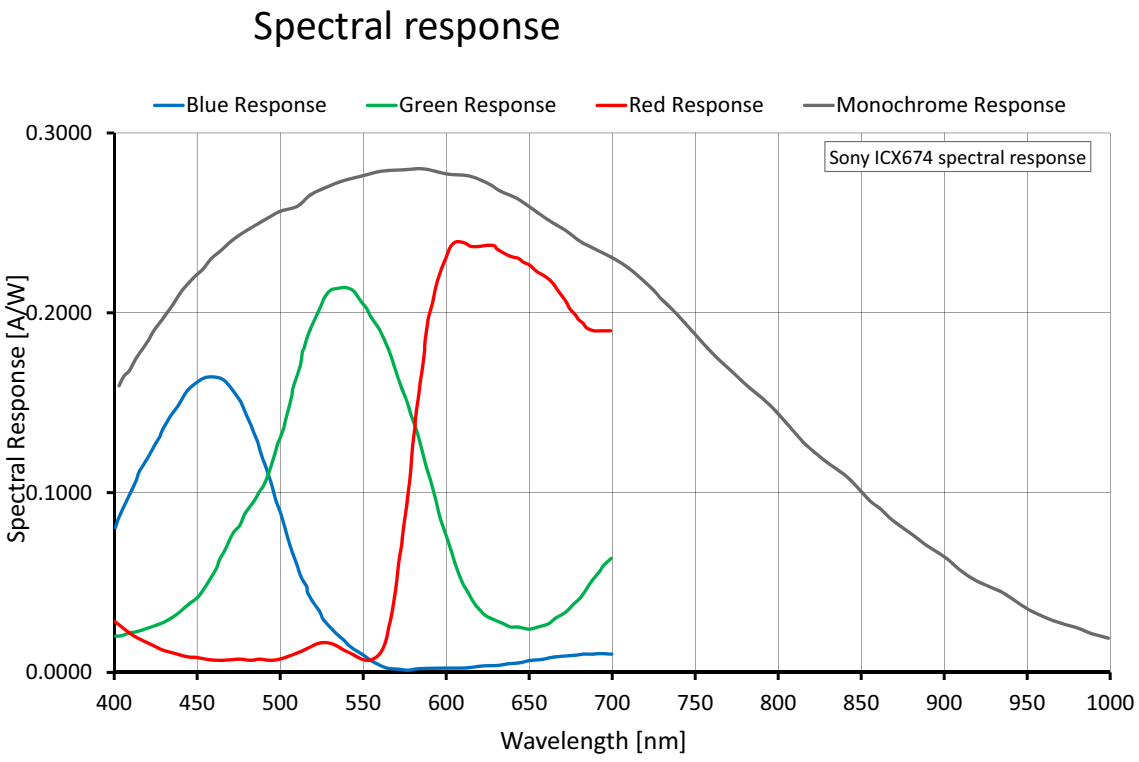


Figure 52: Manta G-283 (Sony ICX674) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.4 fps

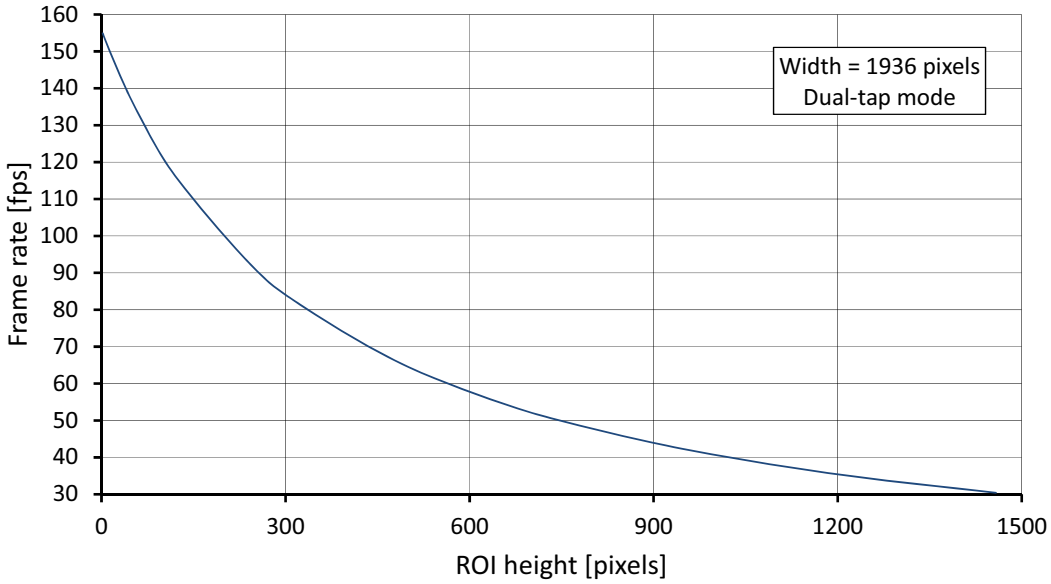


Figure 53: Manta G-283 frame rate as a function of ROI height

Height	Frame rate (fps)
1458	30.4
1200	35.4
960	41.9
768	49.1
640	55.4
480	66.1
320	81.8

Height	Frame rate (fps)
240	92.8
120	116.3
60	133.2
30	143.6
10	151.5
2	154.9

Table 61: Frame rate as a function of ROI height (Width=1936 pixels)

Manta G-319 series

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

Feature	Specification	
	Manta G-319B	**Manta G-319C**
Sensor model	Sony IMX265LLR Exmor	Sony IMX265LQR Exmor
Resolution	2064 (H) × 1544 (V); 3.2 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1/1.8	
Sensor size	8.9 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	37.6 fps (45 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 41 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.1 W	
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	42.24 µs
	Mono12, BayerRG12, YUV422Packed	56.16 µs

Table 62: Manta G-319 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-319B	**Manta G-319C**
	RGB8Packed, BGR8Packed, YUV444Packed	84.48 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±7.04 µs
	Mono12, BayerRG12, YUV422Packed	±9.36 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±14.08 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	198 µs
	Mono12, BayerRG12, YUV422Packed	267 µs
	RGB8Packed, BGR8Packed, YUV444Packed	409 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 62: Manta G-319 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-319B[1]	Manta G-319C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	64 %	58 %
Quantum efficiency at 632 nm	η		52 %
Inverse of overall system gain	1/K	2.7 e^-/DN	2.7 e^-/DN
Temporal dark noise	σ_{d0}	1.9 e^-	2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.7 e^-	0.6 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.6 %
Saturation capacity	$\mu_{e.sat}$	10600 e^-	10600 e^-
Signal to noise ratio at saturation	SNR_{max}	40.3 dB, 6.7 bits	40.3 dB, 6.9 bits
Dynamic range	DR	72.3 dB, 12 bits	72.2 dB, 12 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.6 e^-	2.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 63: Manta G-319 (Sony IMX265) imaging performance

Absolute QE

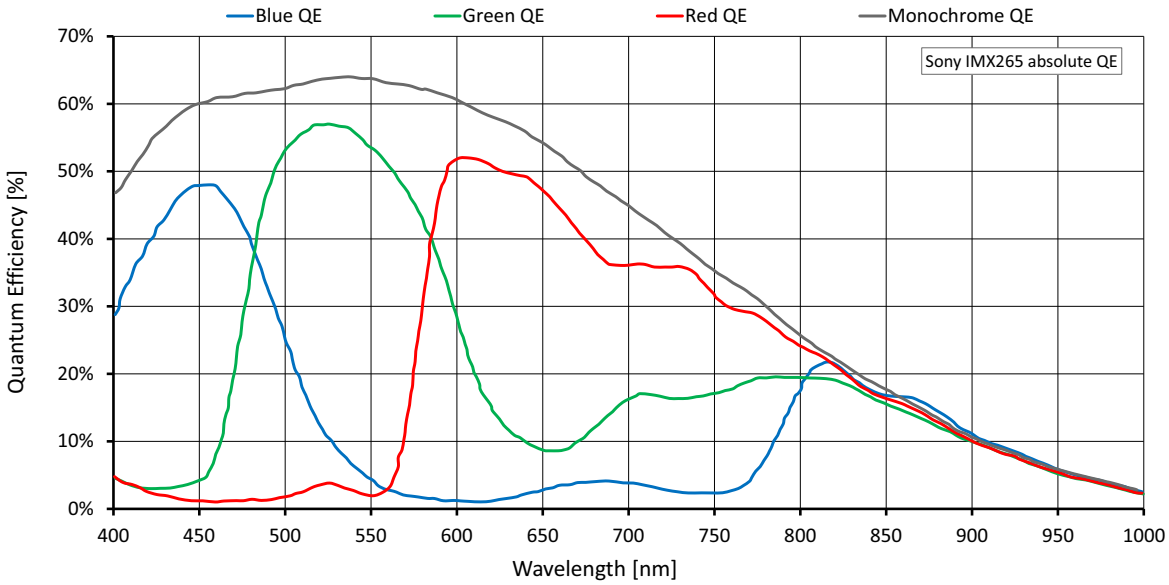


Figure 54: Manta G-319 (Sony IMX265) absolute QE

Spectral response

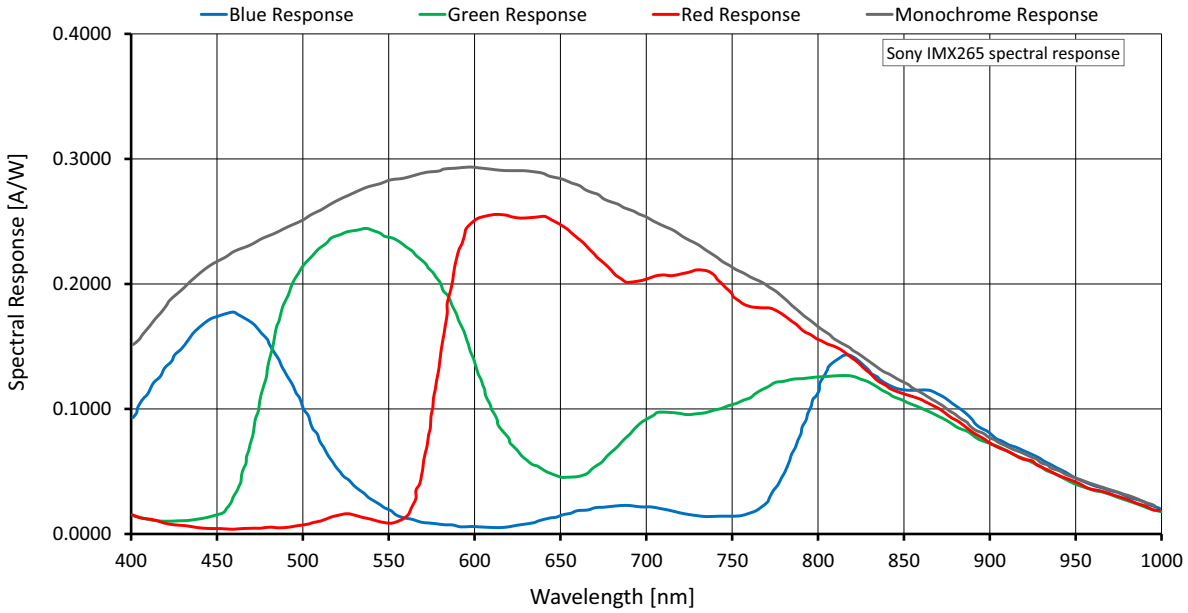


Figure 55: Manta G-319 (Sony IMX265) spectral response

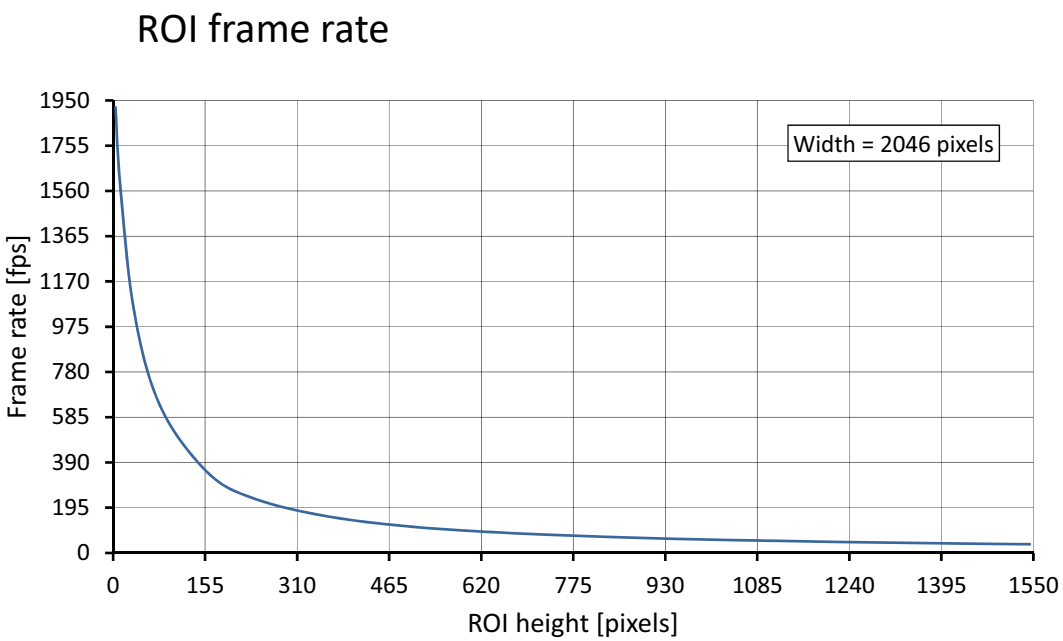


Figure 56: Manta G-319 frame rate as a function of ROI height

Height	Frame rate (fps)
1544	37.6
1324	43.8
1280	45.3
1024	56.6
960	60
768	75.1
600	95.4
480	118.9

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

Table 64: Frame rate as a function of ROI height (Width=2046 pixels)

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

Manta G-419 series

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

Feature	Specification	
	Manta G-419B	**Manta G-419C**
Sensor model	CMOSIS/ams CMV4000	
Resolution	2048 (H) × 2048 (V); 4.2 MP	
Shutter type	Global shutter	
Sensor type	CMOS	
Sensor format	Type 1	
Sensor size	16 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Max. frame rate at full resolution	28.6 fps (32 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 31 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control[2]	50 µs to 122 s; 1 µs increments	
Gain control	0 to 26 dB; 1 dB increments	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.1 W	
Trigger jitter[3]	5.96 µs	
Trigger latency[3]	±0.14 µs	

Table 65: Manta G-419 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-419B	**Manta G-419C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	107 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

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

Table 65: Manta G-419 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-419B[1]	Manta G-419C[2]
Quantum efficiency at 448 nm	η		49 %
Quantum efficiency at 529 nm	η	74 %	49 %
Quantum efficiency at 632 nm	η		47 %
Inverse of overall system gain	$1/K$	2.4 e^-/DN	2.4 e^-/DN
Temporal dark noise	σ_{d0}	13.7 e^-	10.9 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	13.8 e^-	10.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	1.2 %	1.1 %
Saturation capacity	$\mu_{e.sat}$	9600 e^-	9500 e^-
Signal to noise ratio at saturation	SNR_{max}	39.8 dB, 6.6 bits	39.8 dB, 6.6 bits
Dynamic range	DR	56.5 dB, 9.4 bits	58.1 dB, 9.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	14.2 e^-	11.5 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 7.58, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 6.32, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 66: Manta G-419 (CMOSIS/ams CMV4000) imaging performance

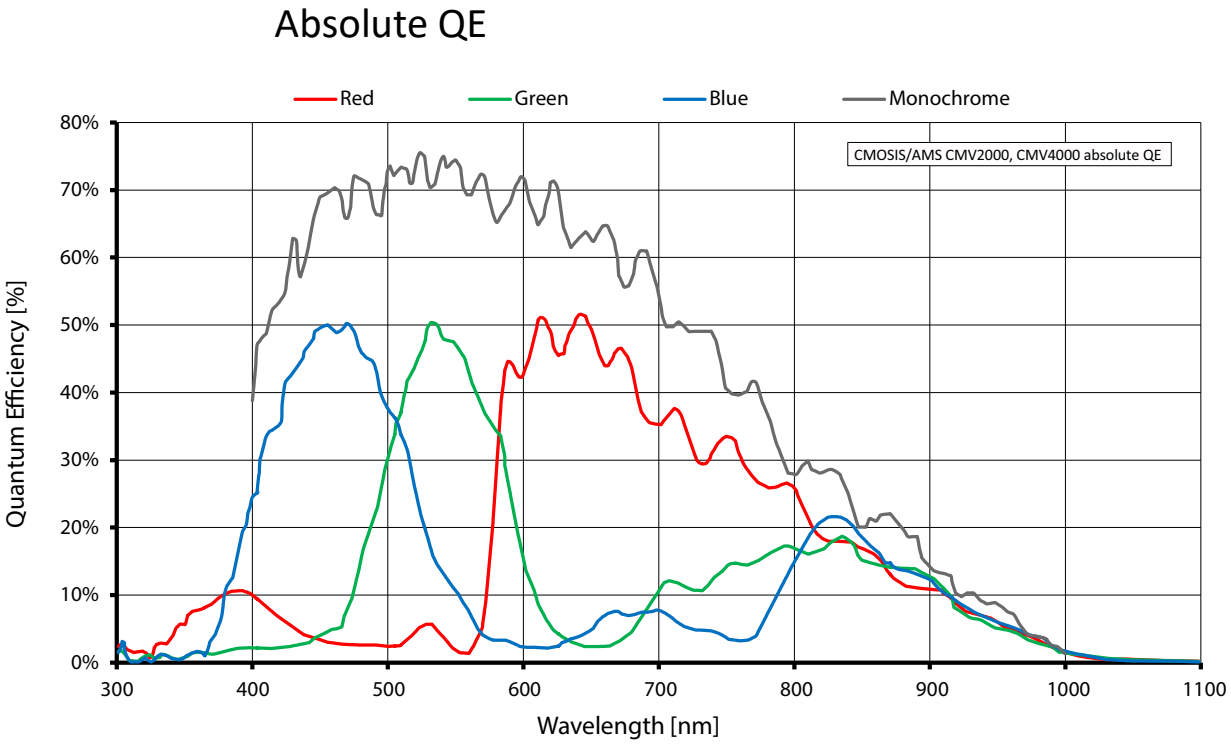


Figure 57: Manta G-419 (CMOSIS/ams CMV4000) absolute QE

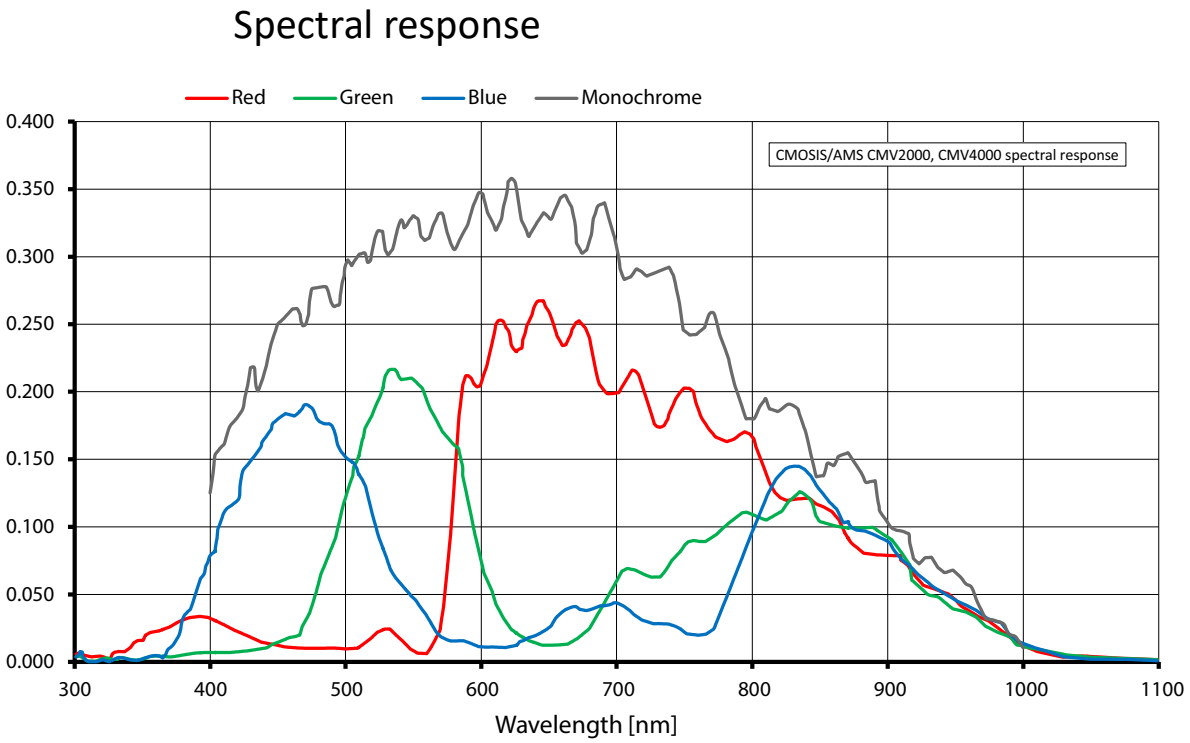


Figure 58: Manta G-419 (CMOSIS/ams CMV4000) spectral response

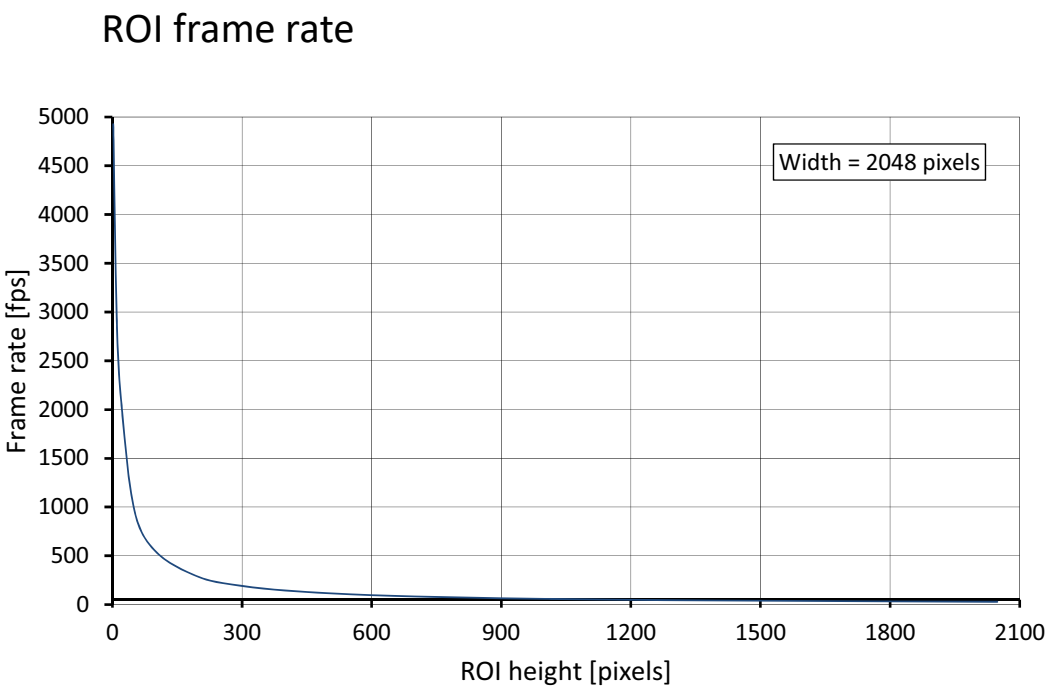


Figure 59: Manta G-419 frame rate as a function of ROI height

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

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

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

Table 67: Fame rate as a function of ROI height values (Width=2048 pixels)

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

Manta G-419B NIR

The following table provides Manta G-419B NIR specifications. For specifications common to all models, see Specifications common to all models.

Feature	Specification Manta G-419B NIR
Sensor model	CMOSIS/ams CMV4000
Resolution	2048 (H) × 2048 (V); 4.2 MP
Shutter type	Global shutter
Sensor type	CMOS
Sensor format	Type 1
Sensor size	16 mm diagonal
Pixel size	5.5 µm × 5.5 µm
Max. frame rate at full resolution	28.6 fps (32 fps burst mode[1])
Max. image bit depth	12-bit
Image buffer	128 MB
StreamHoldCapacity	Up to 31 frames at full resolution
Mono pixel formats	Mono8, Mono12, Mono12Packed
Exposure time control[2]	50 µs to 122 s; 1 µs increments
Gain control	0 to 26 dB; 1 dB increments
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor
Power consumption	External power: 2.7 W at 12 VDC; PoE: 3.1 W
Trigger jitter[3]	5.96 µs
Trigger latency[3]	±0.14 µs
Time between exposures	107 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C

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

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

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

Table 68: Manta G-419B NIR specifications

Imaging performance

Measurement	Symbol	Manta G-419B NIR[1]
Quantum efficiency at 529 nm	η	77 %
Quantum efficiency at 850 nm	η	40 %
Inverse of overall system gain	1/K	2.4 e^-/DN
Temporal dark noise	σ_{d0}	9.5 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	8.6 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	1 %
Saturation capacity	$\mu_{e.sat}$	9500 e^-
Signal to noise ratio at saturation	SNR_{max}	39.8 dB, 6.6 bits
Dynamic range	DR	60 dB, 10 bits
Absolute sensitivity threshold	$\mu_{e.min}$	13.4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 6.41, Temperature: ~38 °C, Pixel format: Mono12.

Table 69: Manta G-419B NIR (CMOSIS/ams CMV4000) imaging performance

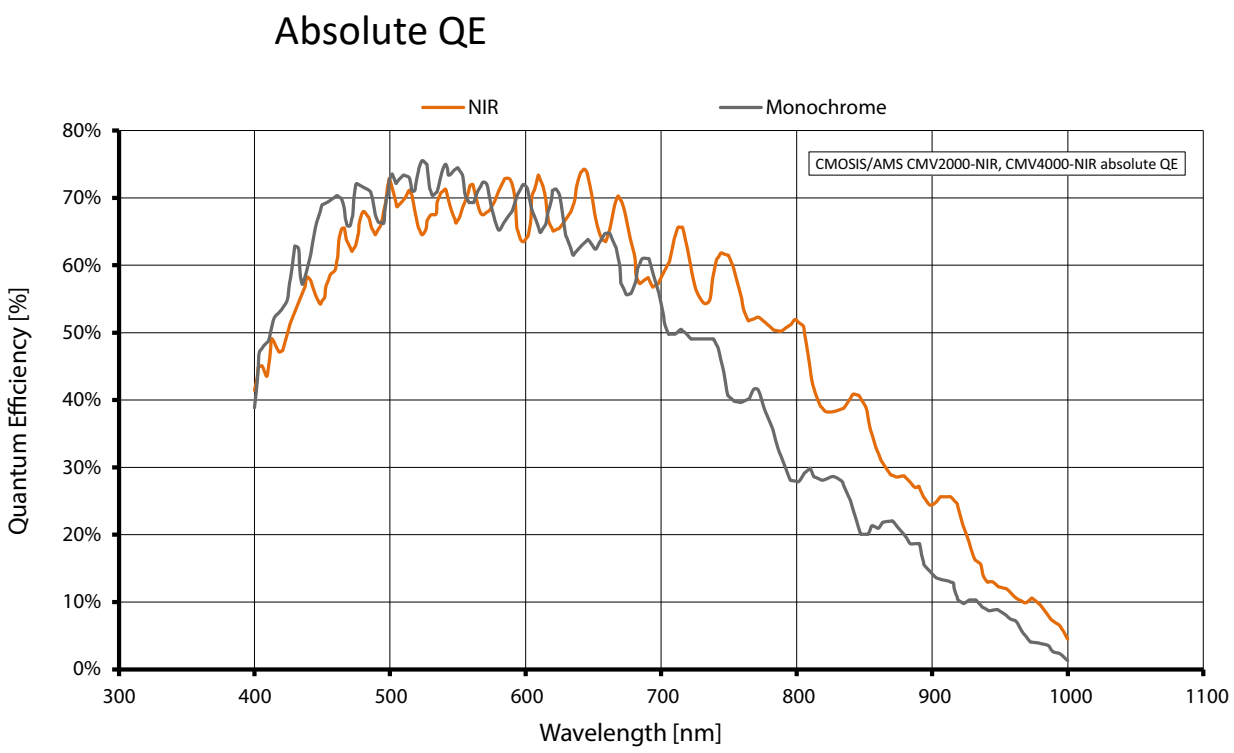


Figure 60: Manta G-419B NIR (CMOSIS/ams CMV4000) absolute QE

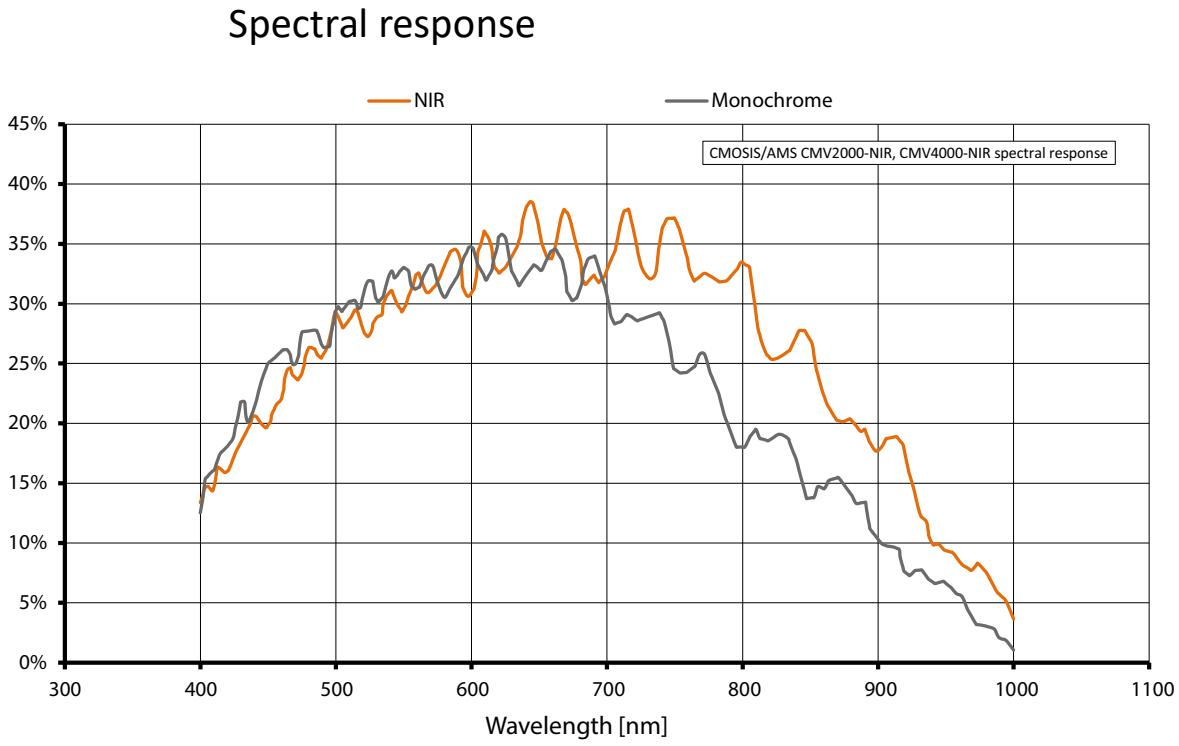


Figure 61: Manta G-419B NIR (CMOSIS/ams CMV4000) spectral response

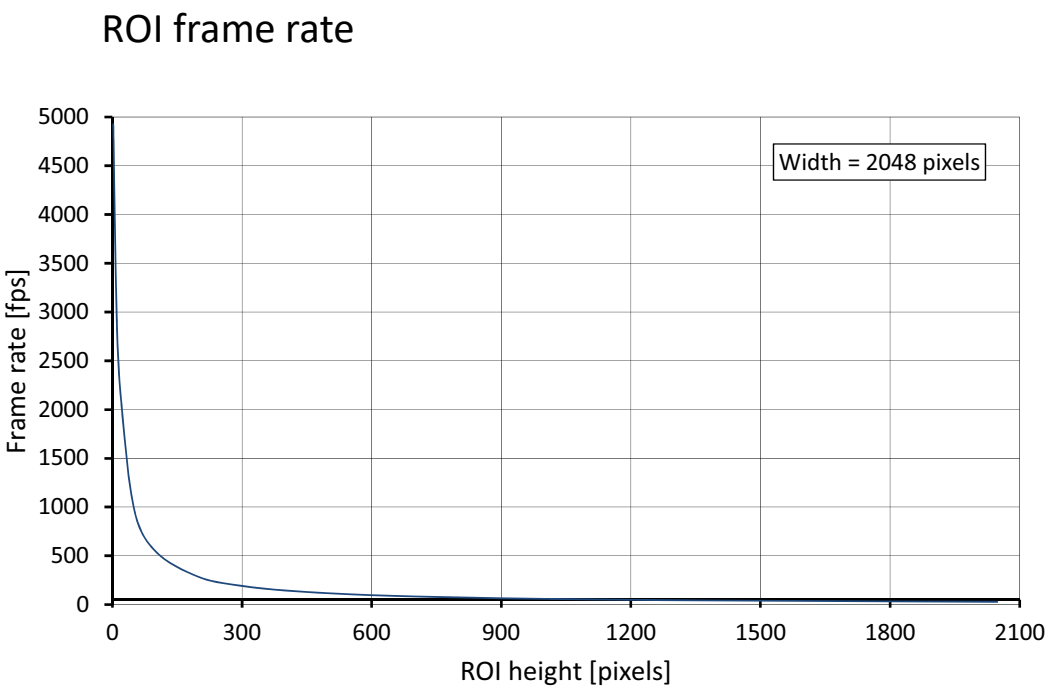


Figure 62: Manta G-419B NIR frame rate as a function of ROI height

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

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

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

Table 70: Fame rate as a function of ROI height values (Width=2048 pixels)

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

Manta G-504 series

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

Feature	Specification	
	Manta G-504B	**Manta G-504C**
Sensor model	Sony ICX655AL	Sony ICX655AQ
Resolution	2452 (H) × 2056 (V); 5 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Max. frame rate at full resolution	9.2 fps	
Max. image bit depth	12-bit	
Image buffer	32 MB	
StreamHoldCapacity	Up to 6 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerGB8, BayerGB12Packed, BayerGB12
Exposure time control	38 µs to 60 s; 1 µs increments	
Gain control	0 to 32 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.9 W at 12 VDC; PoE: 3.6 W	
Trigger latency[1]	Idle state: 12.8 µs; Frame valid state: 34 µs	
Trigger jitter[1]	Idle state: ±9.1 µs; Frame valid state: ±30.3 µs	

Table 71: Manta G-504 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-504B	Manta G-504C
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerGB8, Mono12Packed, BayerGB12Packed, YUV411Packed	29 µs
Camera dimensions (L × W × H)	86.4 × 44 × 29 mm	
Mass (typical)	PoE model: 210 g; Non-PoE model: 200 g	

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

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

Table 71: Manta G-504 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-504B[1]	Manta G-504C[2]
Quantum efficiency at 448 nm	η		41 %
Quantum efficiency at 529 nm	η	57 %	44 %
Quantum efficiency at 632 nm	η		35 %
Inverse of overall system gain	1/K	1.78 e^-/DN	1.66 e^-/DN
Temporal dark noise	σ_{d0}	13.5 e^-	11.8 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.9 e^-	1.2 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.8 %
Saturation capacity	$\mu_{e.sat}$	6900 e^-	6500 e^-
Signal to noise ratio at saturation	SNR_{max}	38.4 dB, 6.4 bits	38.1 dB, 6.3 bits
Dynamic range	DR	53.9 dB, 8.9 bits	54.4 dB, 9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	14 e^-	12.3 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 20.93, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 19.70, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 72: Manta G-504 (Sony ICX655) imaging performance

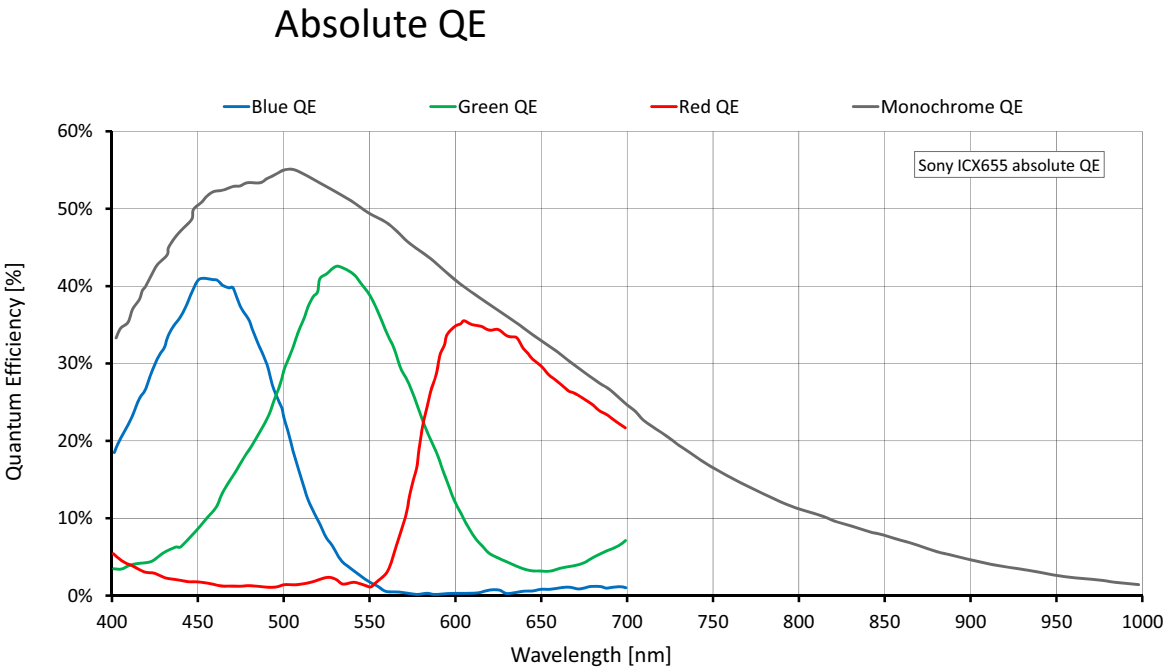


Figure 63: Manta G-504 (Sony ICX655) absolute QE

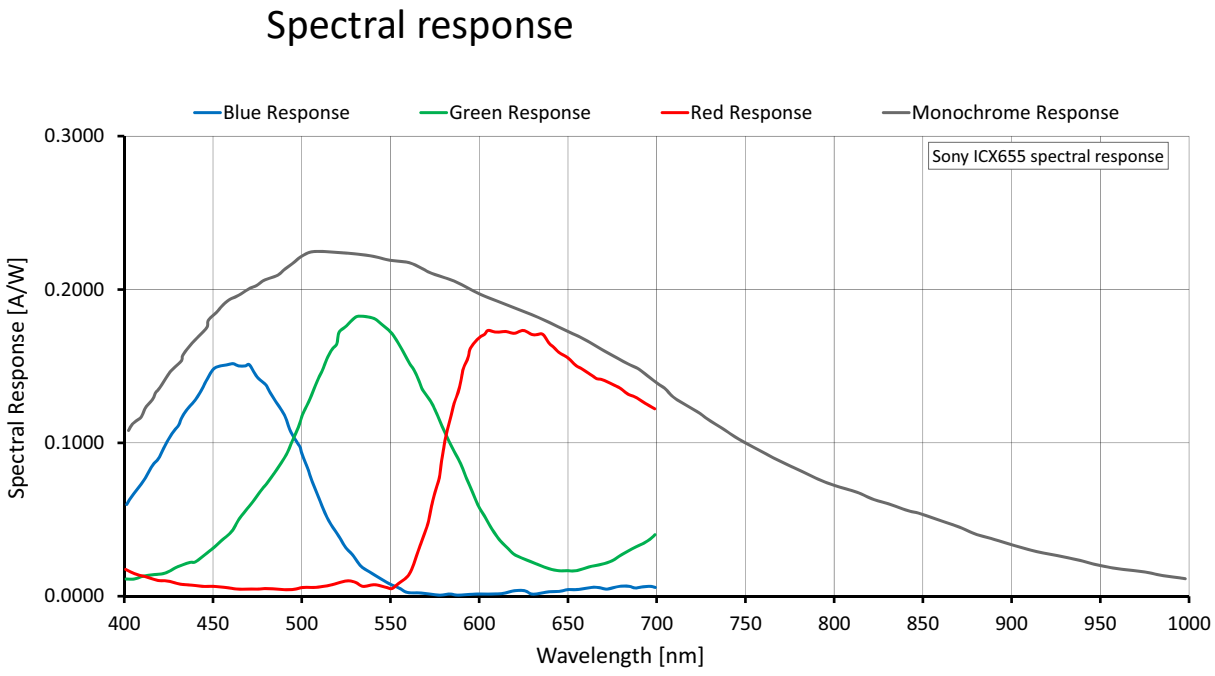


Figure 64: Manta G-504 (Sony ICX655) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 9.2 fps

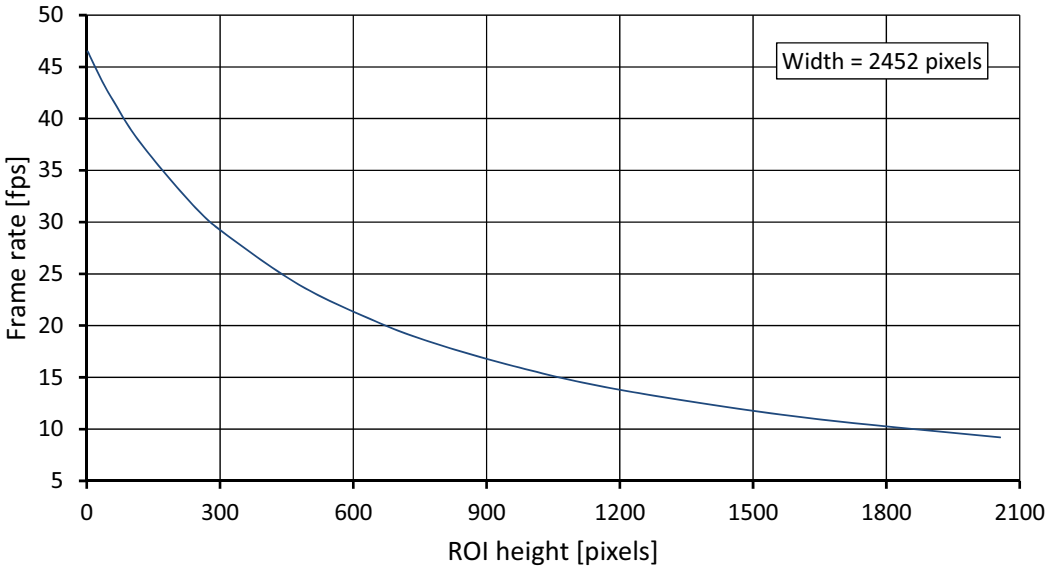


Figure 65: Manta G-504 frame rate as a function of ROI height

Height	Frame rate (fps)
2056	9.2
1600	11.2
1200	13.8
960	16.1
768	18.5
640	20.6
480	23.9

Height	Frame rate (fps)
320	28.6
240	31.6
120	37.7
60	41.7
30	44
10	45.8
2	46.5

Table 73: Frame rate as a function of ROI height values (Width=2452 pixels)

Manta G-505 series

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

Feature	Specification	
	Manta G-505B	**Manta G-505C**
Sensor model	Sony ICX625ALA	Sony ICX625AQA
Resolution	2452 (H) × 2056 (V); 5 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Max. frame rate at full resolution	15 fps (dual-tap mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	49 µs to 38 s; 1 µs increments	
Gain control	0 to 31 dB; 1 dB increments	
Binning	Horizontal: 1 to 4 columns; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Sensor taps	Dual-tap	
Power consumption	External power: 3.9 W at 12 VDC; PoE: 4.5 W	
Trigger latency[1]	Idle state: 7.3 µs; Frame valid state: 23.2 µs	
Trigger jitter[1]	Idle state: ±4 µs; Frame valid state: ±20 µs	

Table 74: Manta G-505 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-505B	**Manta G-505C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	76 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 74: Manta G-505 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-505B[1]	Manta G-505C[2]
Quantum efficiency at 448 nm	η		41 %
Quantum efficiency at 529 nm	η	57 %	44 %
Quantum efficiency at 632 nm	η		37 %
Inverse of overall system gain	$1/K$	0.5 e^-/DN	2 e^-/DN
Temporal dark noise	σ_{d0}	8.8 e^-	8.8 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	4.3 e^-	4.2 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.8 %
Saturation capacity	$\mu_{e.sat}$	7504 e^-	7700 e^-
Signal to noise ratio at saturation	SNR_{max}	38.8 dB, 6.4 bits	38.9 dB, 6.5 bits
Dynamic range	DR	58.1 dB, 9.7 bits	58.3 dB, 9.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	9.3 e^-	9.4 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 75: Manta G-505 (Sony ICX625) imaging performance

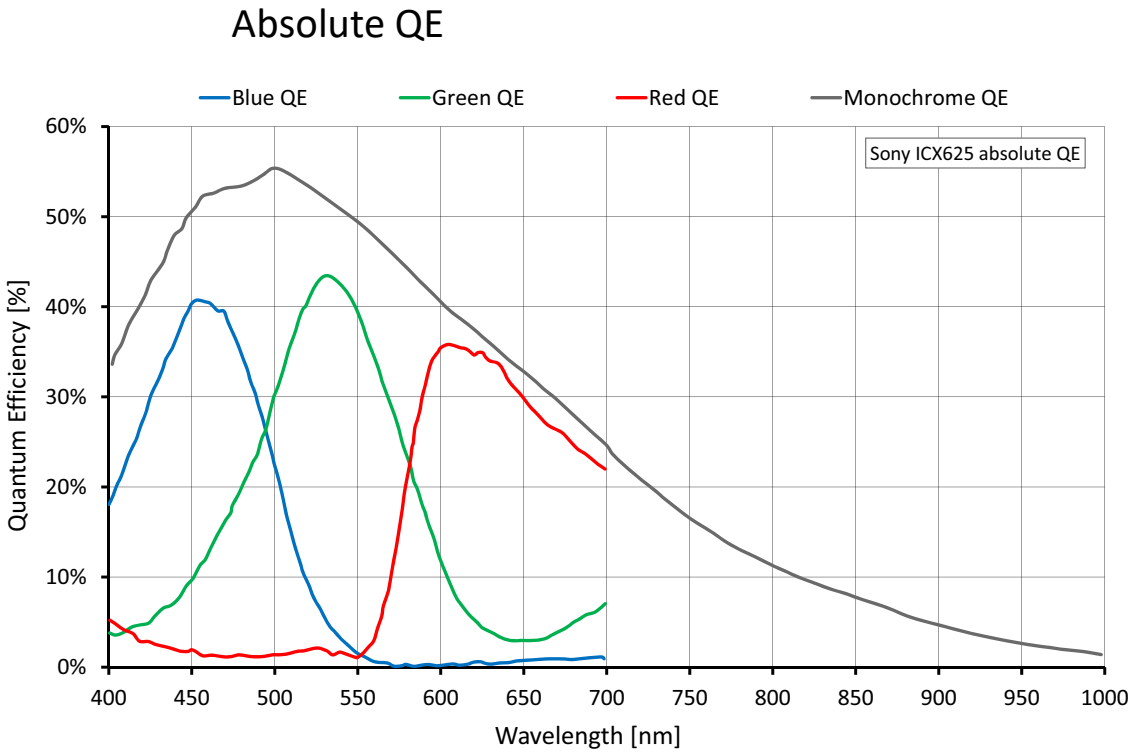


Figure 66: Manta G-505 (Sony ICX625) absolute QE

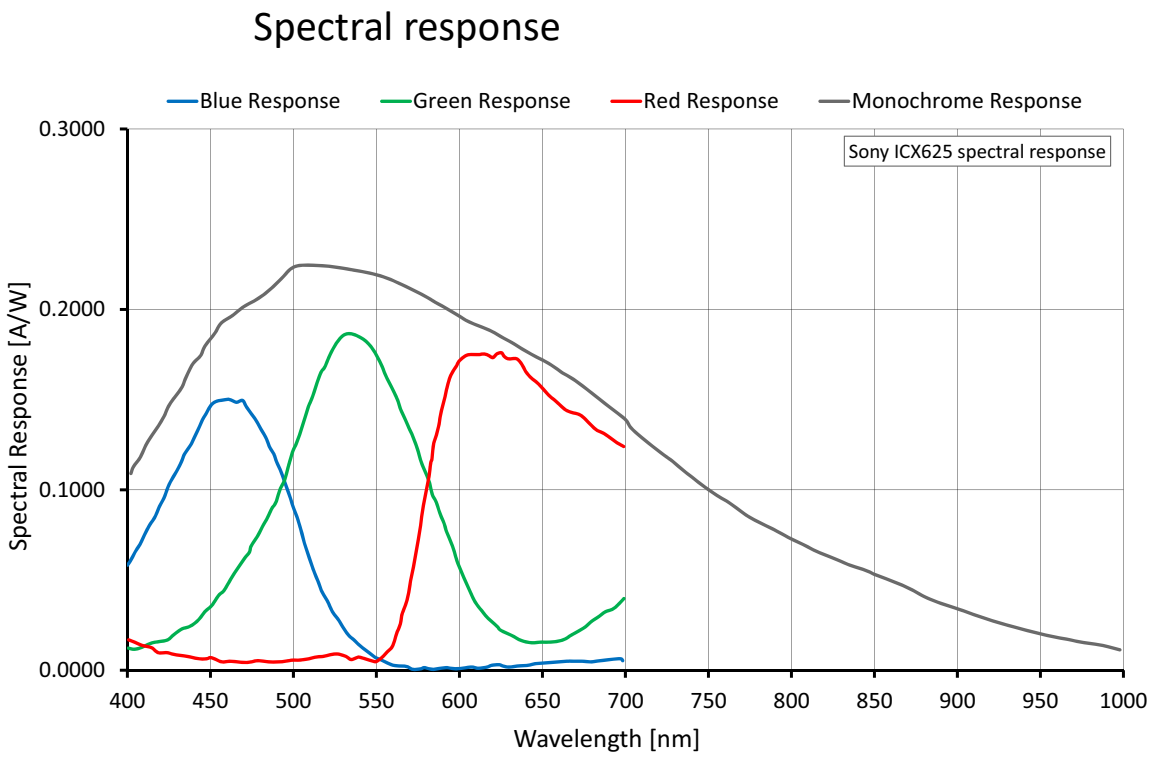


Figure 67: Manta G-505 (Sony ICX625) spectral response

ROI frame rate

$$\text{Max. frame rate} = \frac{1}{32{,}18\,\mu s \times \text{ROI height} + 8{,}81\,\mu s \times (2056 - \text{ROI height}) + 321{,}82\,\mu s}$$

Maximum frame rate at full resolution according formula: 15 fps

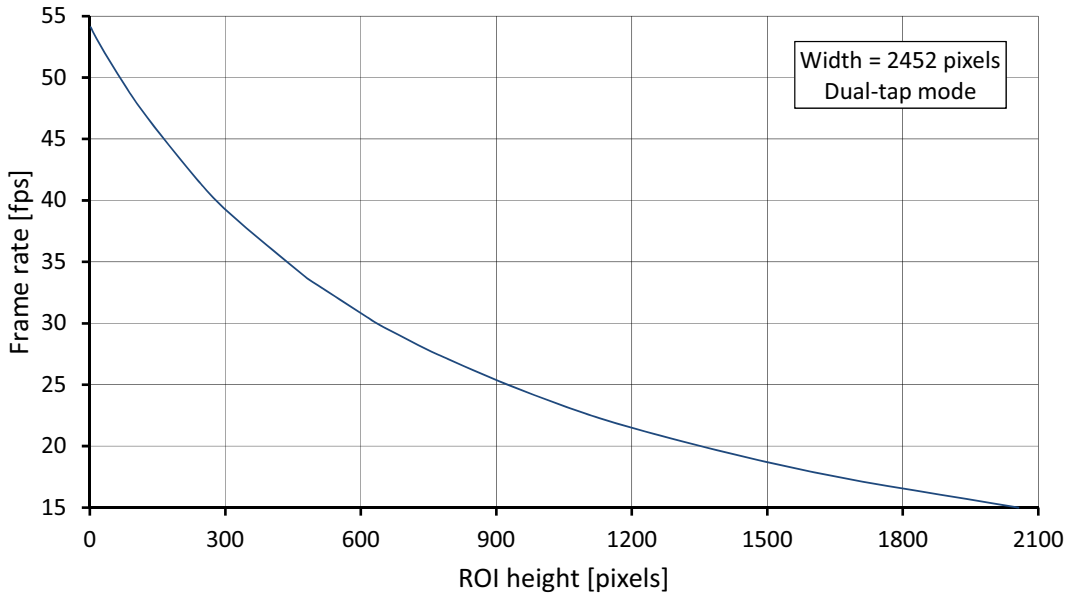


Figure 68: Manta G-505 frame rate as a function of ROI height

Height	Frame rate (fps)
2056	15
1600	17.9
1200	21.5
960	24.5
768	27.5
734	28.1

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

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

Table 76: Frame rate as a function of ROI height values (Width=2452 pixels)

Manta G-507 series

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

Feature	Specification	
	Manta G-507B	**Manta G-507C**
Sensor model	Sony IMX264LLR Exmor	Sony IMX264LQR Exmor
Resolution	2464 (H) × 2056 (V); 5.1 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 2/3	
Sensor size	11.1 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	23.7 fps (28.7 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 26 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 2.8 W at 12 VDC; PoE: 3 W	

Table 77: Manta G-507 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-507B	**Manta G-507C**
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	49.92 µs
	Mono12, BayerRG12, YUV422Packed	66.48 µs
	RGB8Packed, BGR8Packed, YUV444Packed	99.84 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±8.32 µs
	Mono12, BayerRG12, YUV422Packed	±11.08 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±16.64 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	237 µs
	Mono12, BayerRG12, YUV422Packed	319 µs
	RGB8Packed, BGR8Packed, YUV444Packed	486 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 77: Manta G-507 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-507B[1]	Manta G-507C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	64 %	58 %
Quantum efficiency at 632 nm	η		53 %
Inverse of overall system gain	1/K	2.7 e^-/DN	2.7 e^-/DN
Temporal dark noise	σ_{d0}	2 e^-	2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.9 e^-	0.6 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.8 %
Saturation capacity	$\mu_{e.sat}$	10600 e^-	10600 e^-
Signal to noise ratio at saturation	SNR_{max}	40.3 dB, 6.7 bits	40.3 dB, 6.7 bits
Dynamic range	DR	72.1 dB, 12 bits	72.1 dB, 12 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.6 e^-	2.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 78: Manta G-507 (Sony IMX264) imaging performance

Absolute QE

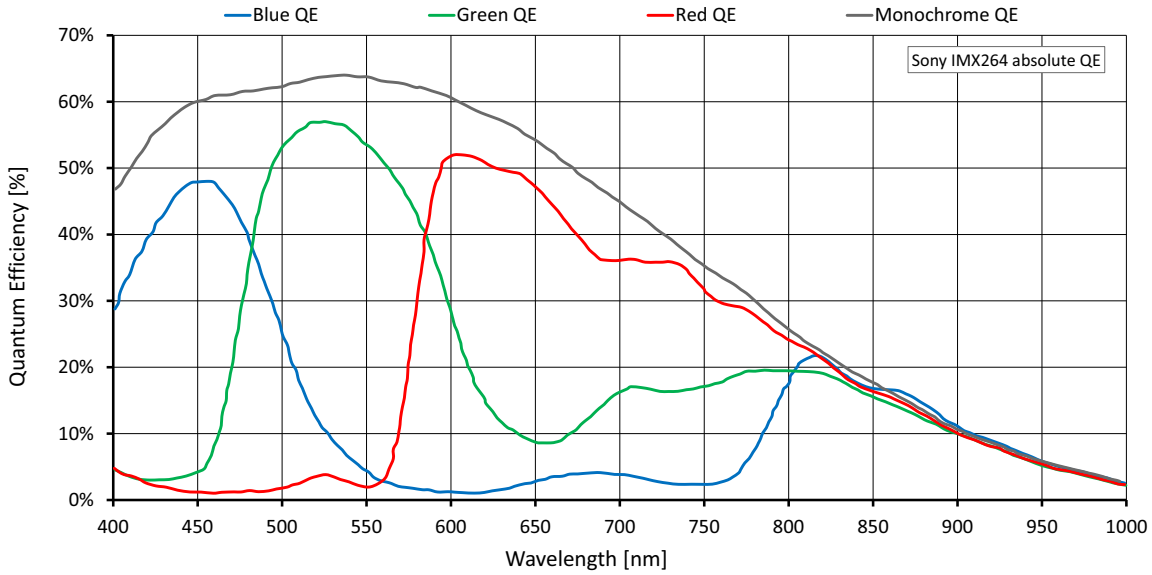


Figure 69: Manta G-507 (Sony IMX264) absolute QE

Spectral response

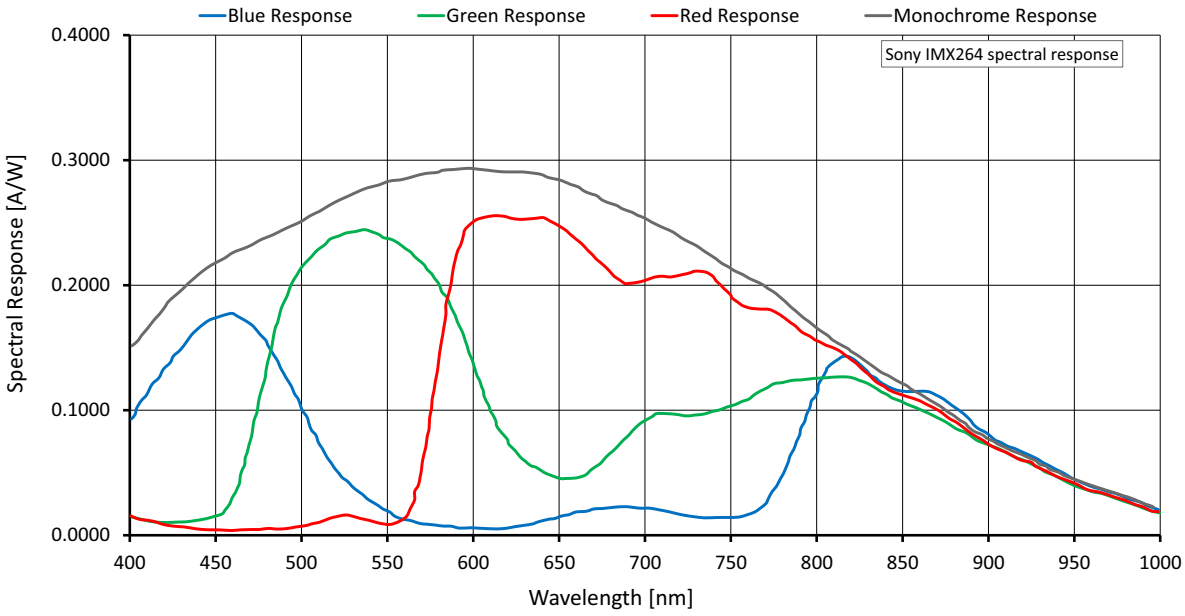


Figure 70: Manta G-507 (Sony IMX264) spectral response

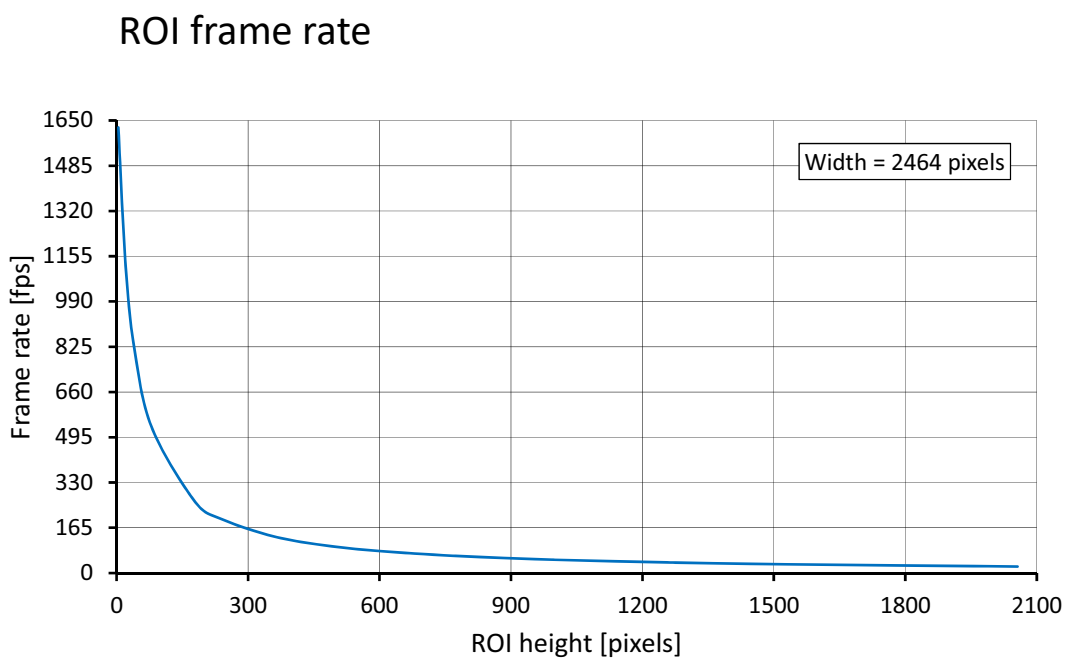


Figure 71: Manta G-507 frame rate as a function of ROI height

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

Height	Frame rate (fps)
768	63
600	80.3
480	99.8
360	132.9
240	196.4
180	257.9

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

Table 79: Frame rate as a function of ROI height (Width=2464 pixels)

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

Manta G-895 series

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

Feature	Specification	
	Manta G-895B	**Manta G-895C**
Sensor model	Sony IMX267LLR Exmor	Sony IMX267LQR Exmor
Resolution	4112 (H) × 2176 (V); 8.95 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1	
Sensor size	16.1 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	13.4 fps (16.2 fps burst mode[1])	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 14 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3 W at 12 VDC; PoE: 3.3 W	

Table 80: Manta G-895 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-895B	**Manta G-895C**
Trigger latency[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	83.52 µs
	Mono12, BayerRG12, YUV422Packed	111.12 µs
	RGB8Packed, BGR8Packed, YUV444Packed	167.04 µs
Trigger jitter[2]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±13.92 µs
	Mono12, BayerRG12, YUV422Packed	±18.52 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±27.84 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	404 µs
	Mono12, BayerRG12, YUV422Packed	542 µs
	RGB8Packed, BGR8Packed, YUV444Packed	822 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 80: Manta G-895 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-895B[1]	Manta G-895C[2]
Quantum efficiency at 448 nm	η		47 %
Quantum efficiency at 529 nm	η	63 %	56 %
Quantum efficiency at 632 nm	η		51 %
Inverse of overall system gain	1/K	2.65 e^-/DN	2.63 e^-/DN
Temporal dark noise	σ_{d0}	2.1 e^-	2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	0.7 e^-	0.7 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.7 %
Saturation capacity	$\mu_{e.sat}$	10500 e^-	10400 e^-
Signal to noise ratio at saturation	SNR_{max}	40.2 dB, 6.7 bits	40.1 dB, 6.7 bits
Dynamic range	DR	71.8 dB, 11.9 bits	71.9 dB, 11.9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.7 e^-	2.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.74, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.74, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 81: Manta G-895 (Sony IMX267) imaging performance

Absolute QE

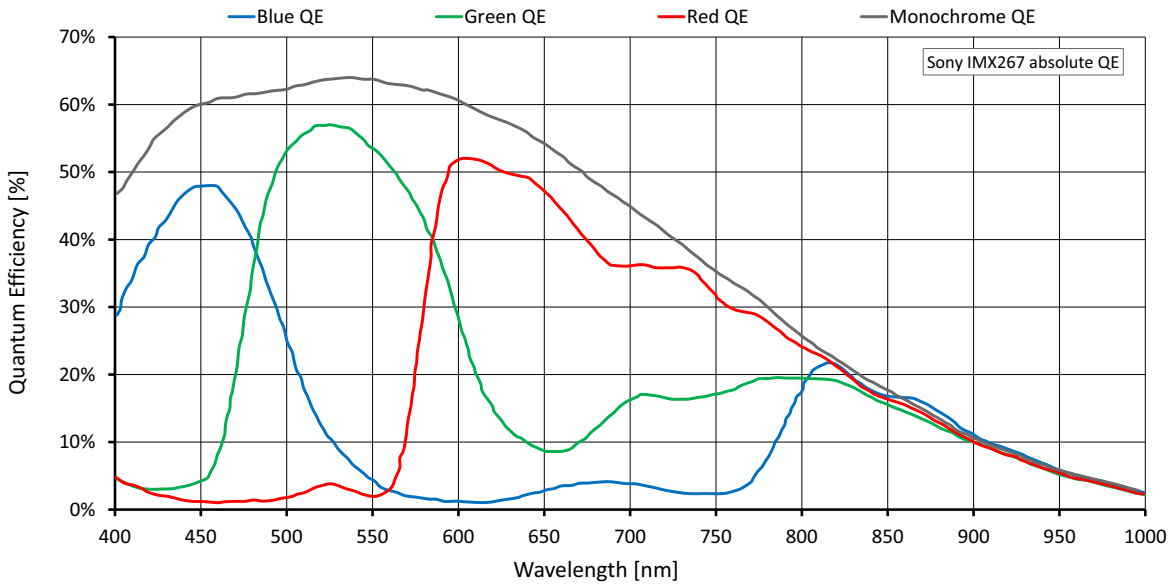


Figure 72: Manta G-895 (Sony IMX267) absolute QE

Spectral response

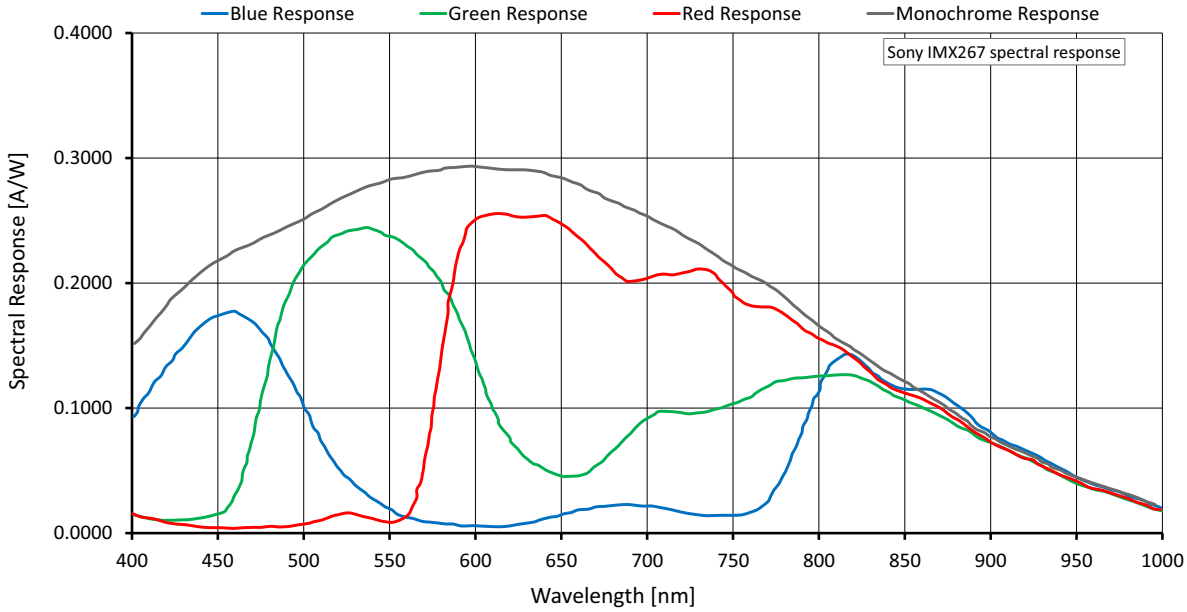


Figure 73: Manta G-895 (Sony IMX267) spectral response

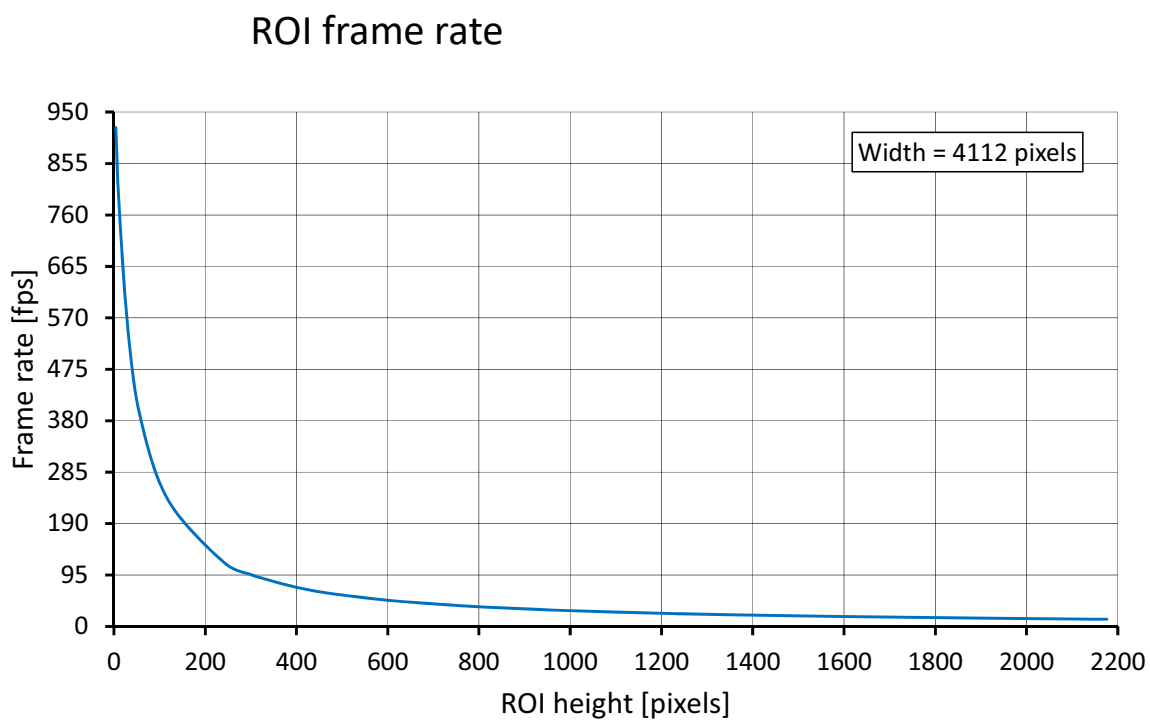


Figure 74: Manta G-895 frame rate as a function of ROI height

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

Height	Frame rate (fps)
800	36.4
768	37.9
640	45.5
600	48.4
480	60.4
400	72.3
320	90.3
300	96

Height	Frame rate (fps)
240	119
120	231.7
60	378.1
32	536.1
12	764.2
4	921

Table 82: Frame rate as a function of ROI height (Width=4112 pixels)

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

Manta G-917 series

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

Feature	Specification	
	Manta G-917B	**Manta G-917C**
Sensor model	Sony ICX814ALG	Sony ICX814AQG
Resolution	3384 (H) × 2710 (V); 9.2 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1	
Sensor size	15.972 mm diagonal	
Pixel size	3.69 µm × 3.69 µm	
Max. frame rate at full resolution	10.1 fps (dual-tap mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 14 frames at full resolution	
Mono pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12Packed, BayerRG12
Exposure time control	42 µs to 38 s; 1 µs increments	
Gain control	0 to 32 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Sensor taps	Dual-tap Single-tap switchable in Vimba X Viewer	
Power consumption	External power: 4 W at 12 VDC; PoE: 4.7 W	
Trigger latency[1]	Idle state: 7 µs; Frame valid state: 25.1 µs	
Trigger jitter[1]	Idle state: ±4 µs; Frame valid state: ±22.1 µs	

Table 83: Manta G-917 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-917B	**Manta G-917C**
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	47 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

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

Table 83: Manta G-917 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-917B[1]	Manta G-917C[2]
Quantum efficiency at 448 nm	η		52 %
Quantum efficiency at 529 nm	η	69 %	55 %
Quantum efficiency at 632 nm	η		49 %
Inverse of overall system gain	$1/K$	0.6 e^-/DN	2.6 e^-/DN
Temporal dark noise	σ_{d0}	9.5 e^-	9.5 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	4.5 e^-	8.1 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.5 %
Saturation capacity	$\mu_{e.sat}$	9900 e^-	10000 e^-
Signal to noise ratio at saturation	SNR_{max}	40 dB, 6.6 bits	40 dB, 6.7 bits
Dynamic range	DR	60 dB, 10 bits	60.1 dB, 10 bits
Absolute sensitivity threshold	$\mu_{e.min}$	10 e^-	10 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 84: Manta G-917 (Sony ICX814) imaging performance

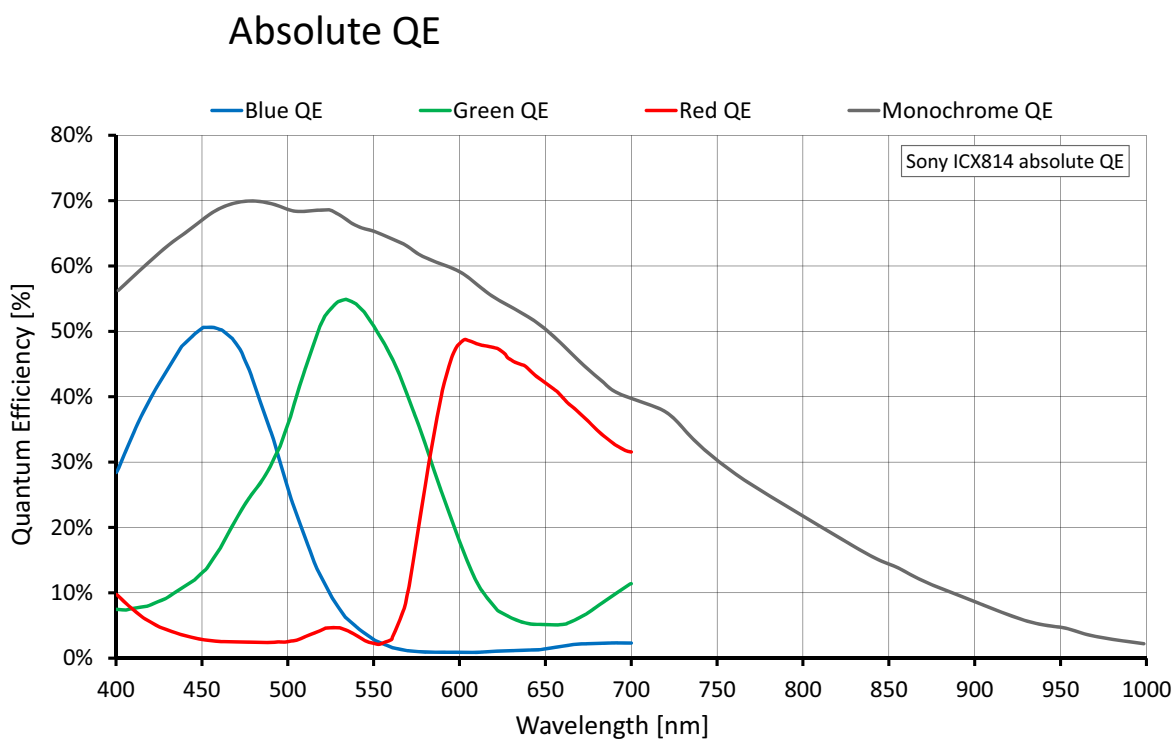


Figure 75: Manta G-917 (Sony ICX814) absolute QE

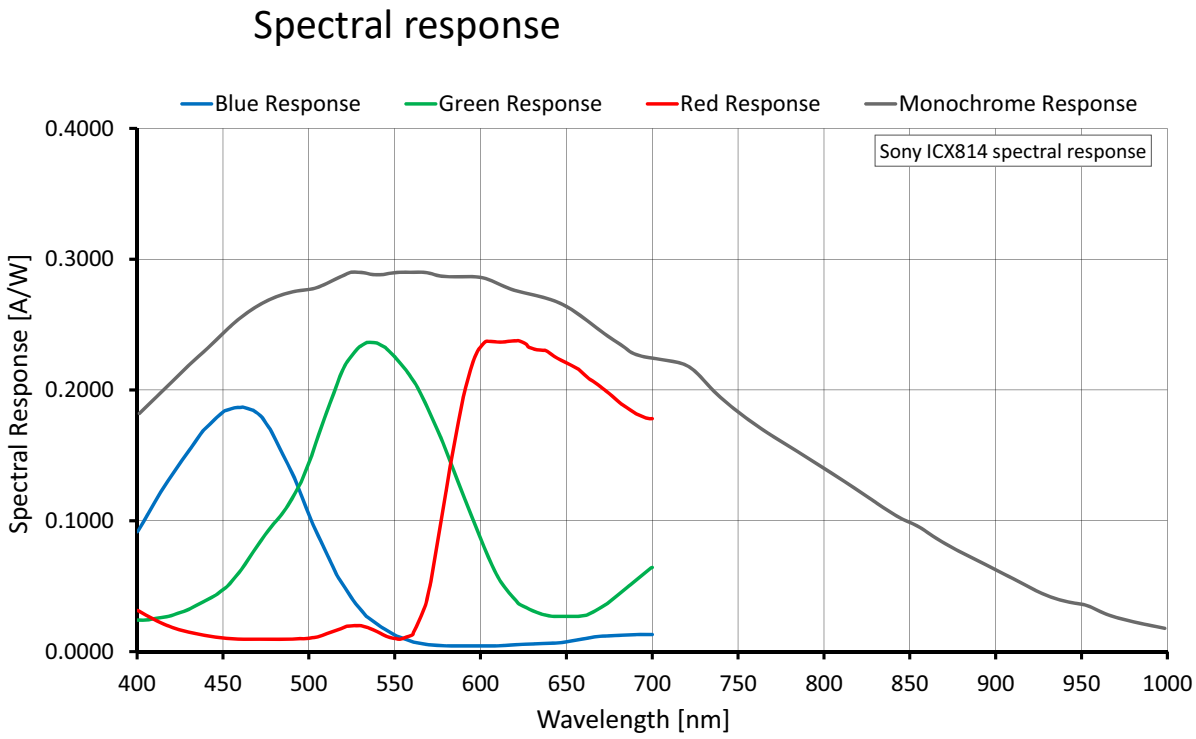


Figure 76: Manta G-917 (Sony ICX814) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 10.1 fps

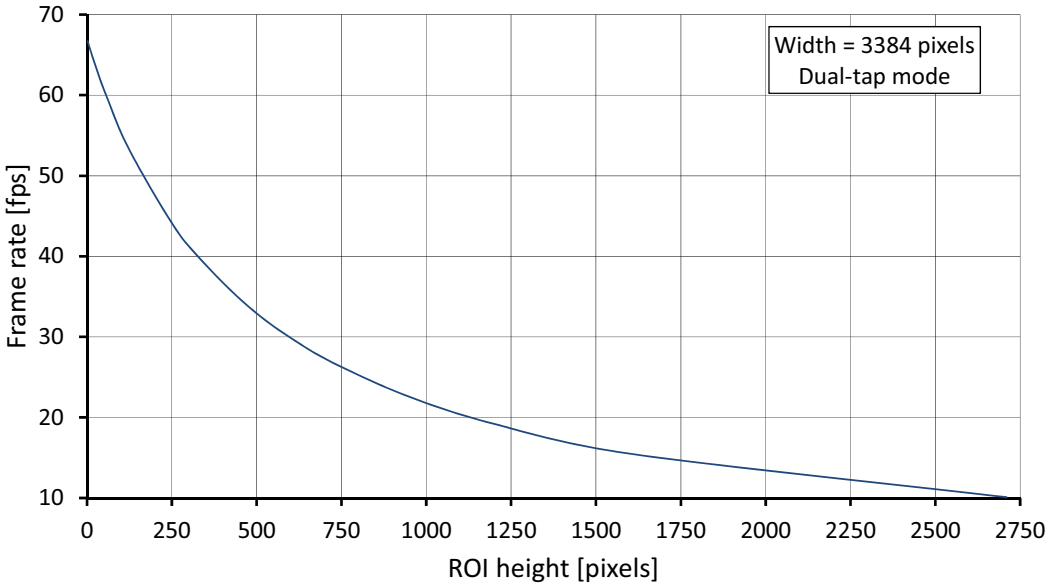


Figure 77: Manta G-917 frame rate as a function of ROI height

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

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

Height	Frame rate (fps)
60	59.6
30	63
10	65.6
2	66.7

Table 85: Frame rate as a function of ROI height (Width=3384 pixels)

Manta G-1236 series

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

Feature	Specification	
	Manta G-1236B	**Manta G-1236C**
Sensor model	Sony IMX304LLR Exmor	Sony IMX304LQR Exmor
Resolution	4112 (H) × 3008 (V); 12.37 MP	
Shutter type	Pregius global shutter	
Sensor type	CMOS	
Sensor format	Type 1.1	
Sensor size	17.6 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Chief ray angle	0 degrees	
Max. frame rate at full resolution	9.7 fps (11.8 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 10 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	16 µs to 85.89 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3 W at 12 VDC; PoE: 3.3 W	

Table 86: Manta G-1236 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-1236B	**Manta G-1236C**
Trigger latency[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	83.52 µs
	Mono12, BayerRG12, YUV422Packed	111.12 µs
	RGB8Packed, BGR8Packed, YUV444Packed	167.04 µs
Trigger jitter[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±13.92 µs
	Mono12, BayerRG12, YUV422Packed	±18.52 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±27.84 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	404 µs
	Mono12, BayerRG12, YUV422Packed	542 µs
	RGB8Packed, BGR8Packed, YUV444Packed	822 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

Table 86: Manta G-1236 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-1236B[1]	Manta G-1236C[2]
Quantum efficiency at 448 nm	η		47 %
Quantum efficiency at 529 nm	η	64 %	57 %
Quantum efficiency at 632 nm	η		52 %
Inverse of overall system gain	1/K	2.65 e^-/DN	2.61 e^-/DN
Temporal dark noise	σ_{d0}	2.1 e^-	2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.1 e^-	1 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.6 %	0.8 %
Saturation capacity	$\mu_{e.sat}$	10400 e^-	10300 e^-
Signal to noise ratio at saturation	SNR_{max}	40.2 dB, 6.7 bits	40.1 dB, 6.7 bits
Dynamic range	DR	71.8 dB, 11.9 bits	71.9 dB, 11.9 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.7 e^-	2.6 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: 0.743, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 87: Manta G-1236 (Sony IMX304) imaging performance

Absolute QE

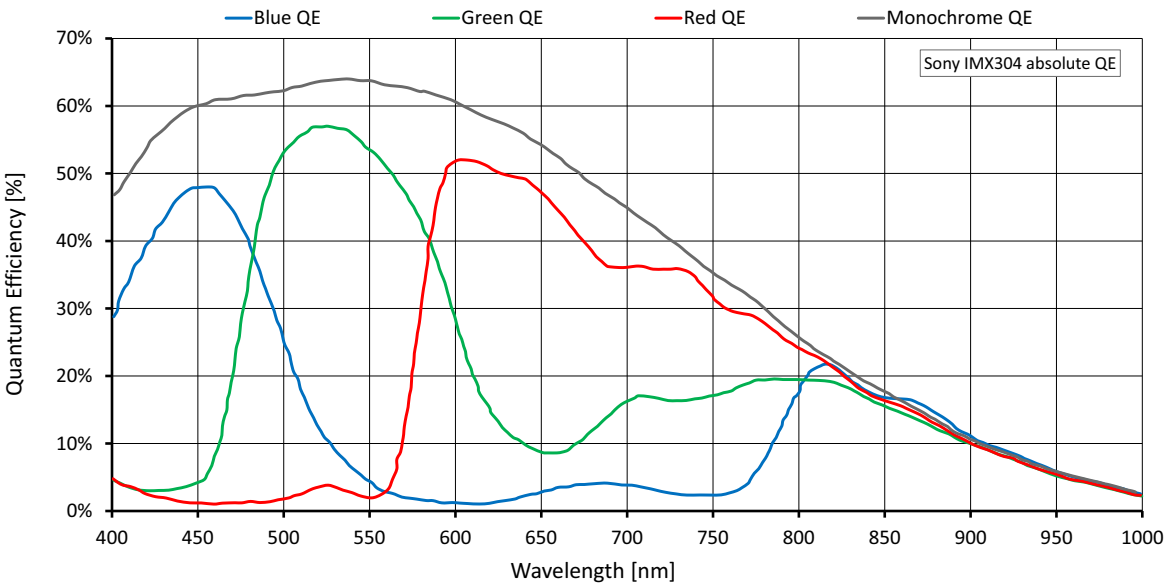


Figure 78: Manta G-1236 (Sony IMX304) absolute QE

Spectral response

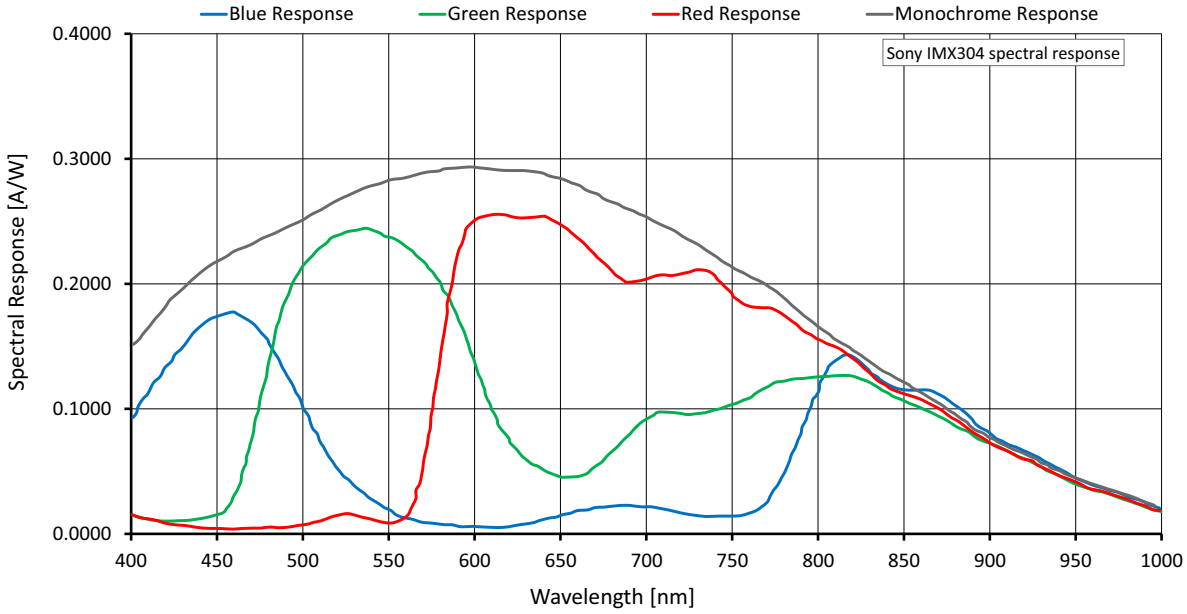


Figure 79: Manta G-1236 (Sony IMX304) spectral response

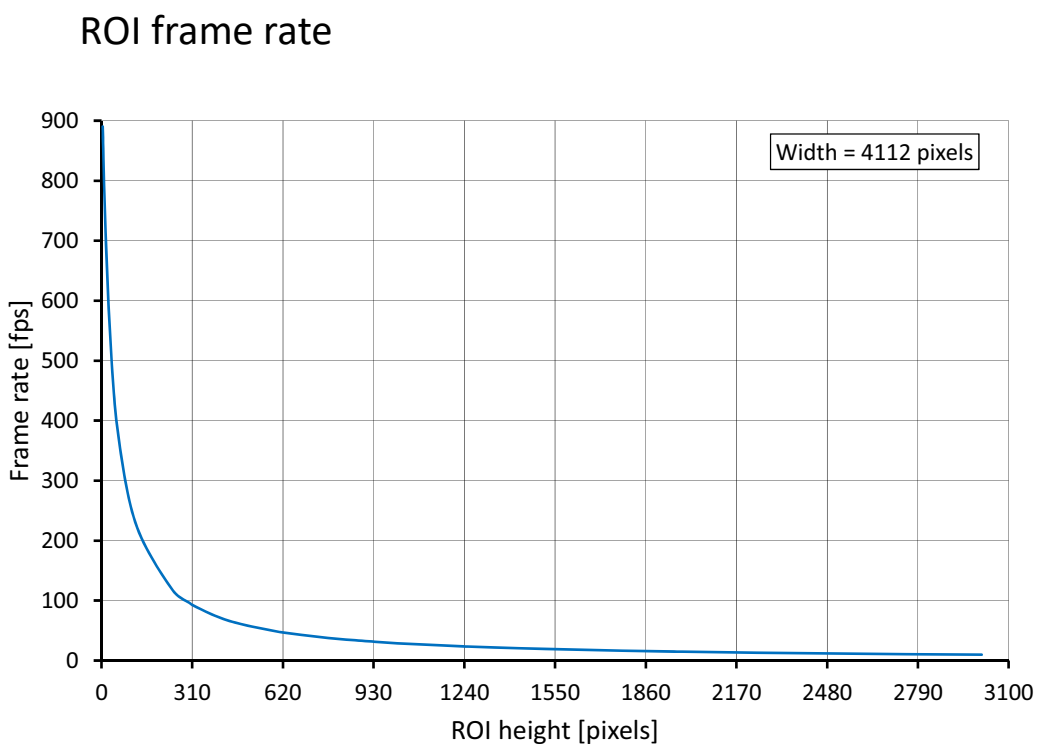


Figure 80: Manta G-1236 frame rate as a function of ROI height

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

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

Height	Frame rate (fps)
320	90.2
300	96
240	118.9
120	231.7
60	378.1
32	536.1
12	764.2
4	921

Table 88: Frame rate as a function of ROI height (Width=4112 pixels)

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

Manta G-1620 series

The following table provides model series specifications. The values are valid for Manta G-1620B and G-1620C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Manta G-1620B	**Manta G-1620C**
Sensor model	Sony IMX542-AAMJ	Sony IMX542-AAQJ
Resolution	5328 (H) × 3040 (V); 16.2 MP	
Shutter type	Pregius S global shutter	
Sensor type	CMOS	
Sensor format	Type 1.1	
Sensor size	16.8 mm diagonal	
Pixel size	2.74 µm × 2.74 µm	
Chief ray angle	0 deg	
Max. frame rate at full resolution	7.4 fps (8.4 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 8 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	4 µs to 171.8 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.3 W at 12 VDC; PoE: 3.9 W	

Table 89: Manta G-1620 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-1620B	**Manta G-1620C**
Trigger latency[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	264.32 µs
	Mono12, BayerRG12, YUV422Packed	351.68 µs
	RGB8Packed, BGR8Packed, YUV444Packed	528.64 µs
Trigger jitter[1]	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±18.88 µs
	Mono12, BayerRG12, YUV422Packed	±25.12 µs
	RGB8Packed, BGR8Packed, YUV444Packed	±37.76 µs
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	979 µs
	Mono12, BayerRG12, YUV422Packed	1304 µs
	RGB8Packed, BGR8Packed, YUV444Packed	1961 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

Table 89: Manta G-1620 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-1620B[1]	Manta G-1620C[2]
Quantum efficiency at 448 nm	η		46 %
Quantum efficiency at 529 nm	η	69 %	52 %
Quantum efficiency at 632 nm	η		40 %
Inverse of overall system gain	1/K	2.43 e^-/DN	2.52 e^-/DN
Temporal dark noise	σ_{d0}	2.2 e^-	2.2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.25 e^-	1.18 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.6 %
Saturation capacity	$\mu_{e.sat}$	9500 e^-	9400 e^-
Signal to noise ratio at saturation	SNR_{max}	39.8 dB, 6.6 bits	39.8 dB, 6.6 bits
Dynamic range	DR	70.7 dB, 11.7 bits	70.6 dB, 11.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.8 e^-	2.8 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 90: Manta G-1620 (Sony IMX542) imaging performance

Absolute QE

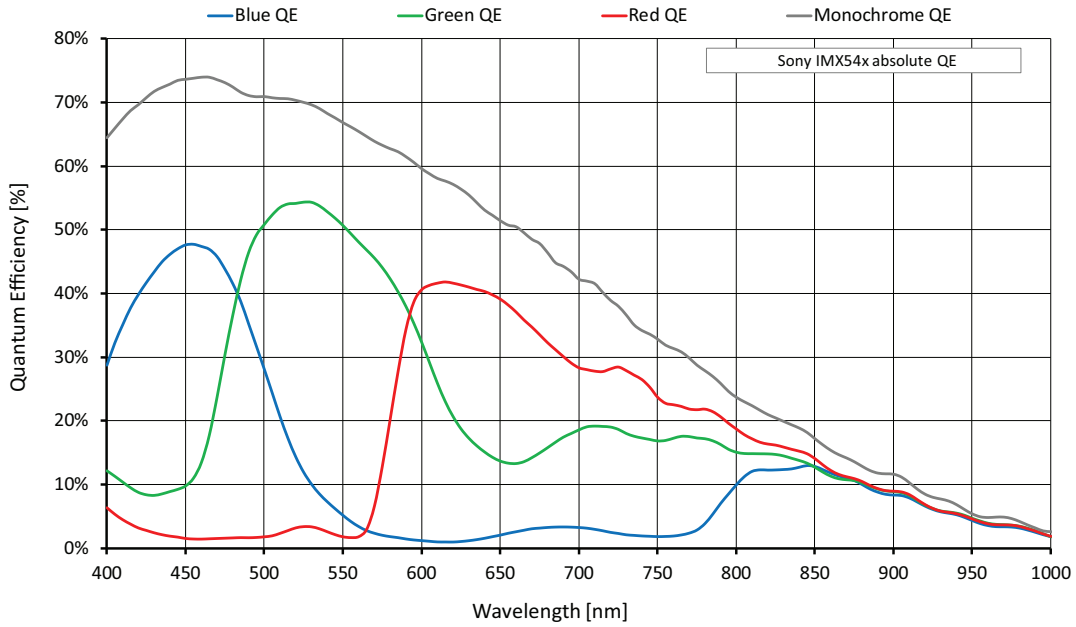


Figure 81: Manta G-1620 (Sony IMX542) absolute QE

Spectral response

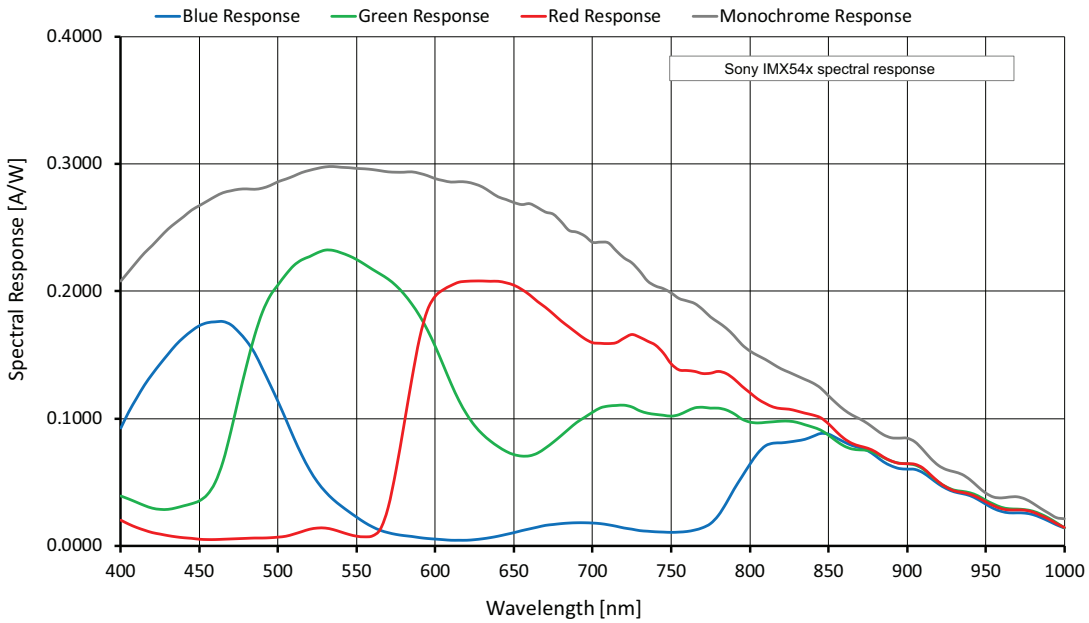


Figure 82: Manta G-1620 (Sony IMX542) spectral response

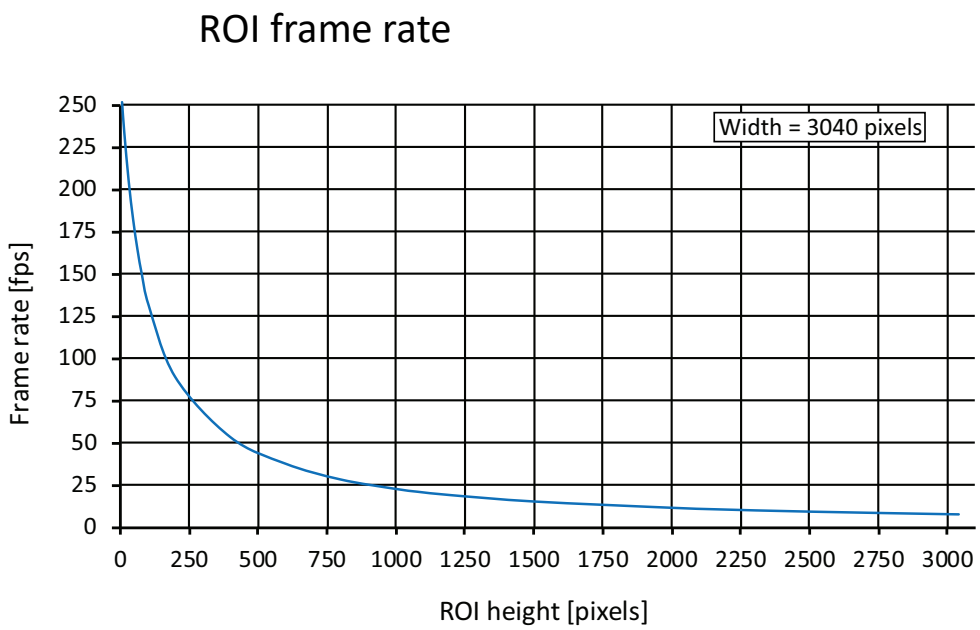


Figure 83: Manta G-1620 frame rate as a function of ROI height

Height	Frame rate (fps)
3040	7.4
3000	7.5
2504	9
2160	10.4
2000	11.3
1504	15
1200	18.8

Height	Frame rate (fps)
1080	20.8
1000	22.5
800	28.1
600	37.5
400	53.3
200	89.1
104	131.7

Height	Frame rate (fps)
80	149.6
64	164.4
48	182.6
32	205.2
16	234.2
8	252.1

Table 91: Frame rate as a function of ROI height (Width=5328 pixels)

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

Manta G-2040 series

The following table provides model series specifications. The values are valid for Manta G-2040B and G-2040C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Manta G-2040B	**Manta G-2040C**
Sensor model	Sony IMX541-AAMJ	Sony IMX541-AAQJ
Resolution	4512 (H) × 4512 (V); 20.4 MP	
Shutter type	Pregius S global shutter	
Sensor type	CMOS	
Sensor format	Type 1.1	
Sensor size	17.5 mm diagonal	
Pixel size	2.74 µm × 2.74 µm	
Chief ray angle	0 deg	
Max. frame rate at full resolution	5.9 fps (6.7 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 6 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	4 µs to 171.8 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.3 W at 12 VDC; PoE: 3.9 W	

Table 92: Manta G-2040 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-2040B	**Manta G-2040C**
Trigger latency[1]	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	224 µs
16-bit	Mono12, BayerRG12, YUV422Packed	297.92 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	448 µs
Trigger jitter[1]	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±16 µs
16-bit	Mono12, BayerRG12, YUV422Packed	±21.28 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	±32 µs
Time between exposures	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	830 µs
16-bit	Mono12, BayerRG12, YUV422Packed	1104 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	1662 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

Table 92: Manta G-2040 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-2040B[1]	Manta G-2040C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	70 %	54 %
Quantum efficiency at 632 nm	η		41 %
Inverse of overall system gain	1/K	2.40 e^-/DN	2.39 e^-/DN
Temporal dark noise	σ_{d0}	2.1 e^-	2.1 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.38 e^-	1.36 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.5 %
Saturation capacity	$\mu_{e.sat}$	9400 e^-	9400 e^-
Signal to noise ratio at saturation	SNR_{max}	39.7 dB, 6.6 bits	39.7 dB, 6.6 bits
Dynamic range	DR	70.8 dB, 11.8 bits	70.7 dB, 11.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.7 e^-	2.8 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 93: Manta G-2040 (Sony IMX541) imaging performance

Absolute QE

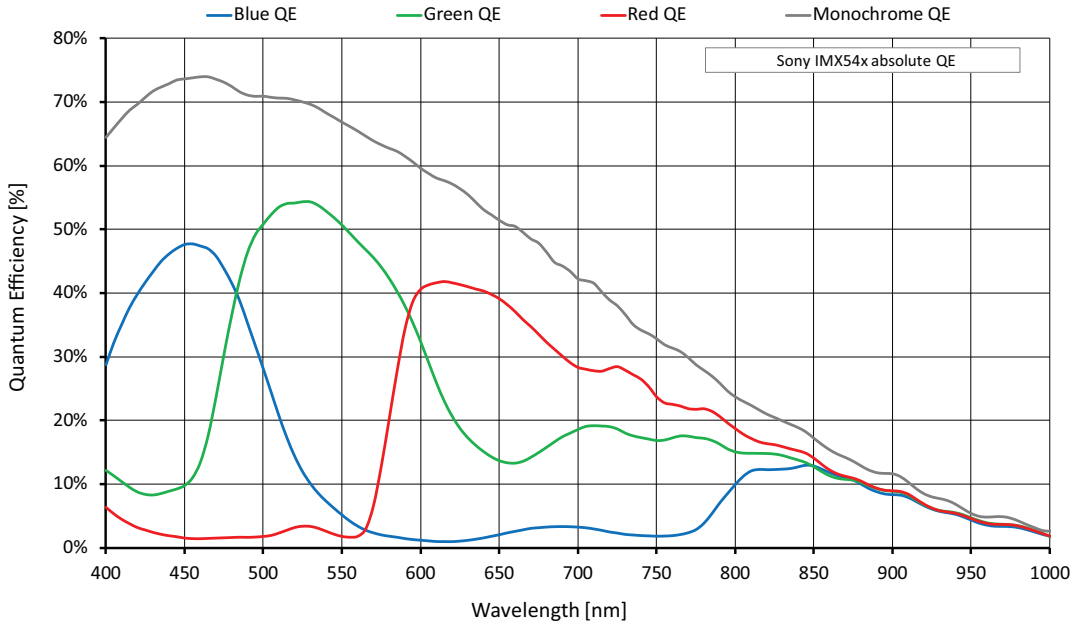


Figure 84: Manta G-2040 (Sony IMX541) absolute QE

Spectral response

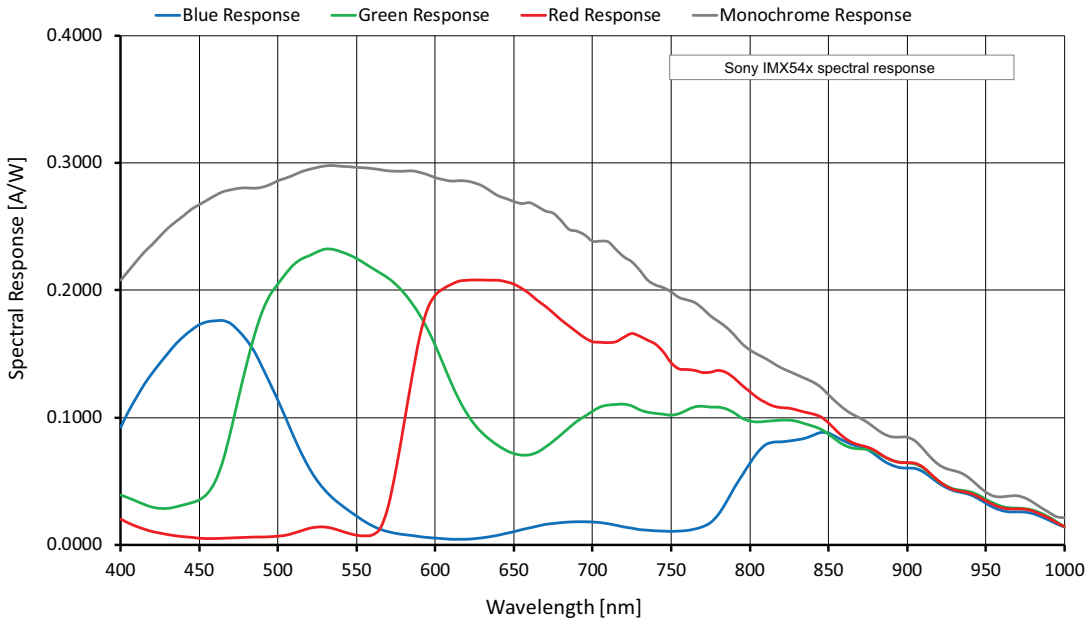


Figure 85: Manta G-2040 (Sony IMX541) spectral response

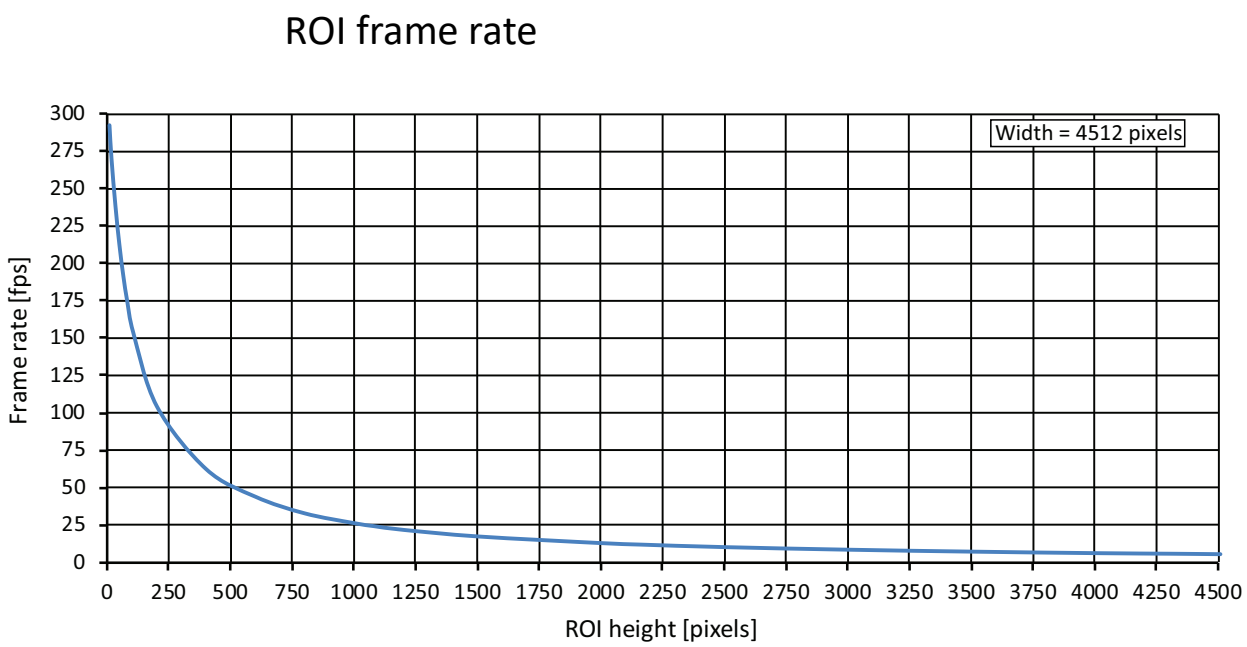


Figure 86: Manta G-2040 frame rate as a function of ROI height

Height	Frame rate (fps)
4512	5.9
4320	6.2
4000	6.6
3504	7.6
3000	8.9
2504	10.6
2160	12.3
2000	13.3

Height	Frame rate (fps)
1504	17.7
1200	22.1
1080	24.6
1000	26.6
800	33.1
600	44.2
400	62.6
200	104.5

Height	Frame rate (fps)
104	153.9
80	174.5
64	191.6
48	212.5
32	238.4
16	127.6
8	291.92

Table 94: Frame rate as a function of ROI height (Width=4512 pixels)



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

Manta G-2460 series

The following table provides model series specifications. The values are valid for Manta G-2460B and G-2460C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Manta G-2460B	**Manta G-2460C**
Sensor model	Sony IMX540-AAMJ	Sony IMX540-AAQJ
Resolution	5328 (H) × 4608 (V); 24.6 MP	
Shutter type	Pregius S global shutter	
Sensor type	CMOS	
Sensor format	Type 1.2	
Sensor size	19.3 mm diagonal	
Pixel size	2.74 µm × 2.74 µm	
Chief ray angle	0 deg	
Max. frame rate at full resolution	4.9 fps (5.6 fps burst mode)	
Max. image bit depth	12-bit	
Image buffer	128 MB	
StreamHoldCapacity	Up to 5 frames at full resolution	
Mono pixel formats	Mono8, Mono12Packed, Mono12	Mono8
YUV color pixel formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure control	4 µs to 171.8 s; 1 µs increments	
Gain control	0 to 40 dB; 0.1 dB increments	
Binning	Horizontal: 1 to 4 pixels; Vertical: 1 to 4 rows	
Decimation X/Y	Horizontal and Vertical: 1, 2, 4, 8 factor	
Power consumption	External power: 3.2 W at 12 VDC; PoE: 3.9 W	

Table 95: Manta G-2460 model series specifications (sheet 1 of 2)

Feature	Specification	
	Manta G-2460B	**Manta G-2460C**
Trigger latency[1]	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	264.32 µs
16-bit	Mono12, BayerRG12, YUV422Packed	351.68 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	528.64 µs
Trigger jitter[1]	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	±18.88 µs
16-bit	Mono12, BayerRG12, YUV422Packed	±25.12 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	±37.76 µs
Time between exposures	**Pixel format**	**Value**
8/12-bit	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	979 µs
16-bit	Mono12, BayerRG12, YUV422Packed	1304 µs
24-bit	RGB8Packed, BGR8Packed, YUV444Packed	1961 µs
Camera dimensions (L × W × H)	86.3 × 44 × 29 mm	
Mass (typical)	PoE model: 200 g; Non-PoE model: 190 g	
Temperature monitoring	Available for main board only. Resolution 0.031; Accuracy ±1 °C	

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

Table 95: Manta G-2460 model series specifications (sheet 2 of 2)

Imaging performance

Measurement	Symbol	Manta G-2460B[1]	Manta G-2460C[2]
Quantum efficiency at 448 nm	η		48 %
Quantum efficiency at 529 nm	η	70 %	54 %
Quantum efficiency at 632 nm	η		42 %
Inverse of overall system gain	1/K	2.38 e^-/DN	2.39 e^-/DN
Temporal dark noise	σ_{d0}	2.2 e^-	2.2 e^-
Dark signal non-uniformity ($DSNU_{1288}$)	σ_0	1.54 e^-	1.93 e^-
Photo response non-uniformity ($PRNU_{1288}$)	S_g	0.5 %	0.8 %
Saturation capacity	$\mu_{e.sat}$	9300 e^-	9400 e^-
Signal to noise ratio at saturation	SNR_{max}	39.7 dB, 6.6 bits	39.7 dB, 6.6 bits
Dynamic range	DR	70.5 dB, 11.7 bits	70.6 dB, 11.7 bits
Absolute sensitivity threshold	$\mu_{e.min}$	2.8 e^-	2.8 e^-

[1] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: Mono12.

[2] The following camera settings and test conditions were used: Gain: 0, Offset: xx, Temperature: ~38 °C, Pixel format: BayerRG12.

Table 96: Manta G-2460 (Sony IMX540) imaging performance

Absolute QE

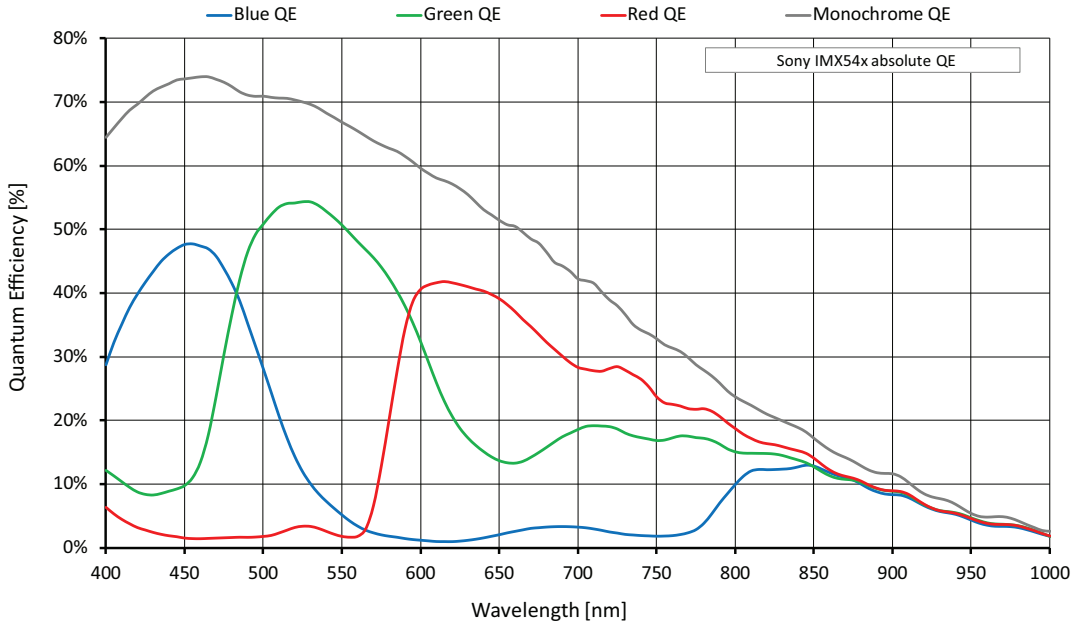


Figure 87: Manta G-2460 (Sony IMX540) absolute QE

Spectral response

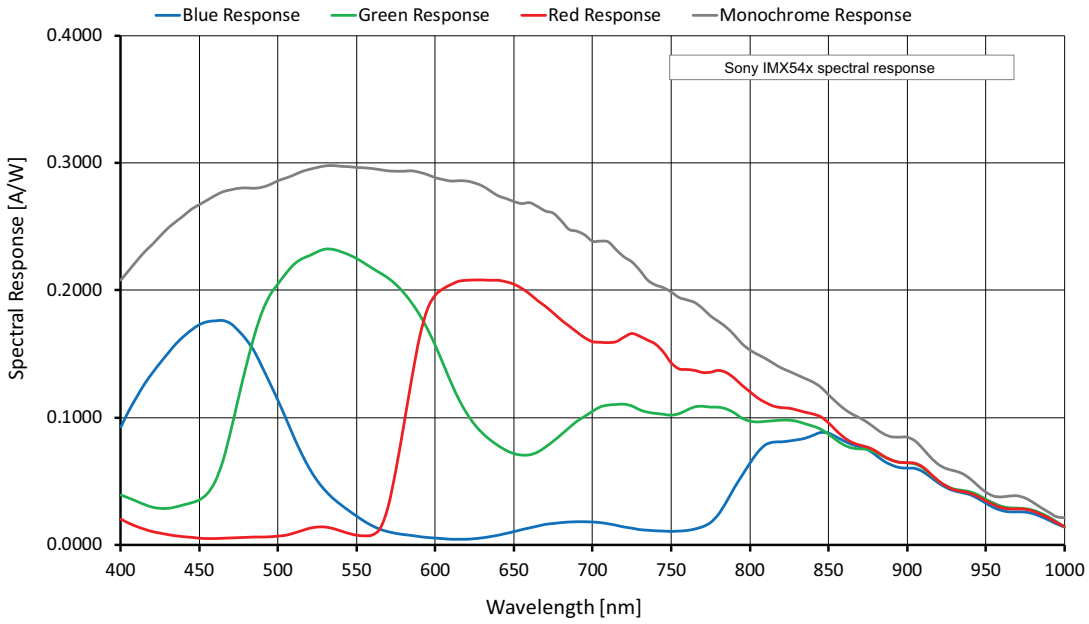


Figure 88: Manta G-2460 (Sony IMX540) spectral response

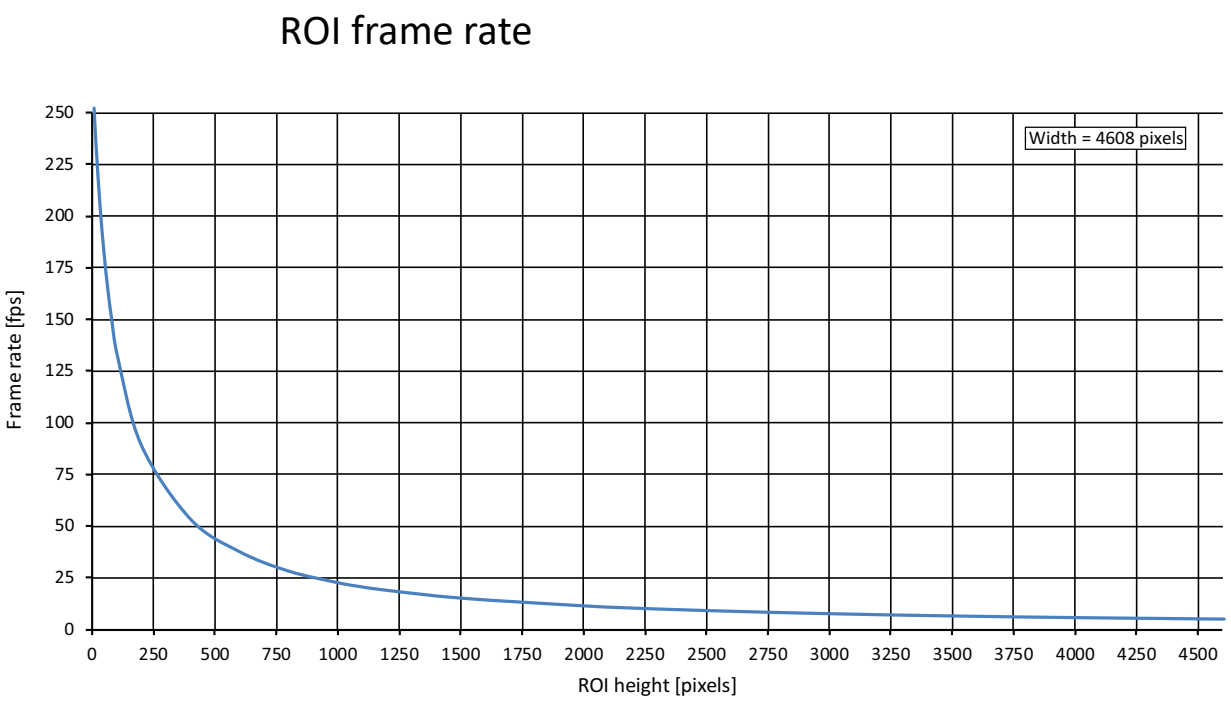


Figure 89: Manta G-2460 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)	Height	Frame rate (fps)
4608	4.9	2000	11.3	200	89.1
4504	5	1504	15	104	131.7
4320	5.23	1200	18.8	80	149.6
4000	5.6	1080	20.8	64	164.4
3504	6.4	1000	22.5	48	182.6
3000	7.5	800	28.1	32	205.2
2504	9	600	37.5	16	234.2
2160	10.4	400	53.3	8	252.1

Table 97: Frame rate as a function of ROI height (Width=5328 pixels)

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

Camera feature availability

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

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

Manta Type A models

Image optimization features

Image optimization features	Manta G-031	Manta G-032	Manta G-033	Manta G-046	Manta G-125	Manta G-145	Manta G-146	Manta G-201	Manta G-504
Auto exposure	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto gain	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto white balance[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓
Binning	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black level	✓	✓	✓	✓	✓	✓	✓	✓	✓
Color transformation (incl. hue, saturation)[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decimation X/Y	✓		✓	✓	✓	✓	✓	✓	✓
Gamma	✓	✓	✓	✓	✓	✓	✓	✓	✓
HDR mode									
3 LUTs (look-up tables)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pixel Defect Masking									
Reverse X[2]	✓		✓	✓	✓	✓	✓	✓	✓
Reverse Y									
ROI (region of interest)	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] Only available for color models

[2] Only available for monochrome models

Table 98: Image optimization feature availability by model (Type A models)

Camera control features

Camera control features	Manta G-031	Manta G-032	Manta G-033	Manta G-046	Manta G-125	Manta G-145	Manta G-146	Manta G-201	Manta G-504
Action commands, incl. ToE (trigger over Ethernet)									
Auto iris (video type)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event channel	✓	✓	✓	✓	✓	✓	✓	✓	✓
Image chunk data	✓	✓	✓	✓	✓	✓	✓	✓	✓
I/O and trigger control	✓	✓	✓	✓	✓	✓	✓	✓	✓
PTP (IEEE 1588 Precision Time Protocol)									
Stream hold	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tap mode (switchable in Vimba X Viewer)									
Temperature monitoring (mainboard)									
User sets	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 99: Camera control feature availability by model (Type A models)



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

Manta Type B models

Image optimization features

Image optimization features	Manta G-040	Manta G-158	Manta G-223	Manta G-235	Manta G-282	Manta G-283	Manta G-319	Manta G-419	Manta G-505	Manta G-507	Manta G-895	Manta G-917	Manta G-1236	Manta G-1620	Manta G-2040	Manta G-2460
Auto exposure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto gain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto white balance[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Binning	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Black level	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Color transformation (incl. hue, saturation)[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decimation X/Y	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gamma	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
HDR mode			✓					✓								
3 LUTs (look-up tables)[3]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pixel Defect Masking[2]	✓	✓	✓	✓			✓	✓		✓	✓		✓	✓	✓	✓
Reverse X[4]	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓
Reverse Y			✓	✓			✓	✓		✓	✓		✓	✓	✓	✓
ROI (region of interest)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] Only available for color models

[2] For more information, see the Defect Mask Loader Tool application note.

[3] Manta G-1620, G-2040, and G-2460 series have one look-up table.

[4] Only available for monochrome models

Table 100: Image optimization feature availability by model (Type B models)

Camera control features

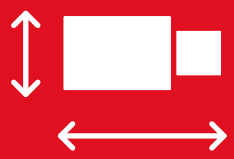
Camera control features	Manta G-040	Manta G-158	Manta G-223	Manta G-235	Manta G-282	Manta G-283	Manta G-319	Manta G-419	Manta G-505	Manta G-507	Manta G-895	Manta G-917	Manta G-1236	Manta G-1620	Manta G-2040	Manta G-2460
Action commands, incl. ToE (trigger over Ethernet)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto iris (video type)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event channel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Image chunk data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I/O and trigger control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PTP (IEEE 1588 Precision Time Protocol)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stream hold	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tap mode (switchable in Vimba X Viewer)					✓	✓						✓				
Temperature monitoring (main board)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
User sets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 101: Camera control feature availability by model (Type B models)



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

Mechanical dimensions



Find CAD drawings and dimensions, values for maximum protrusion and filter diameter. Learn about sensor position accuracy.

Contents:

Tripod adapter 191
Manta type A camera dimensions 192
Manta type B camera dimensions 207
Sensor position accuracy 221

Tripod adapter

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

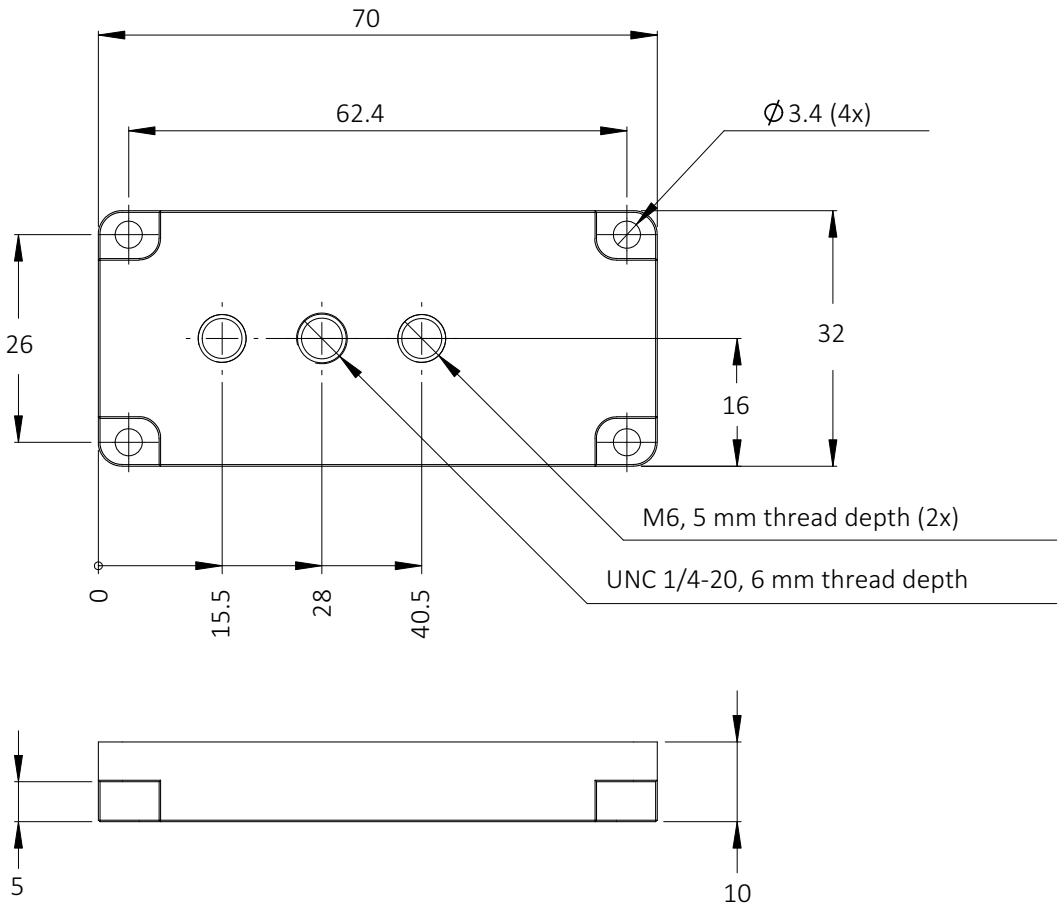


Figure 90: Tripod adapter dimensions

Manta type A camera dimensions

Standard housing with C-Mount (default)

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

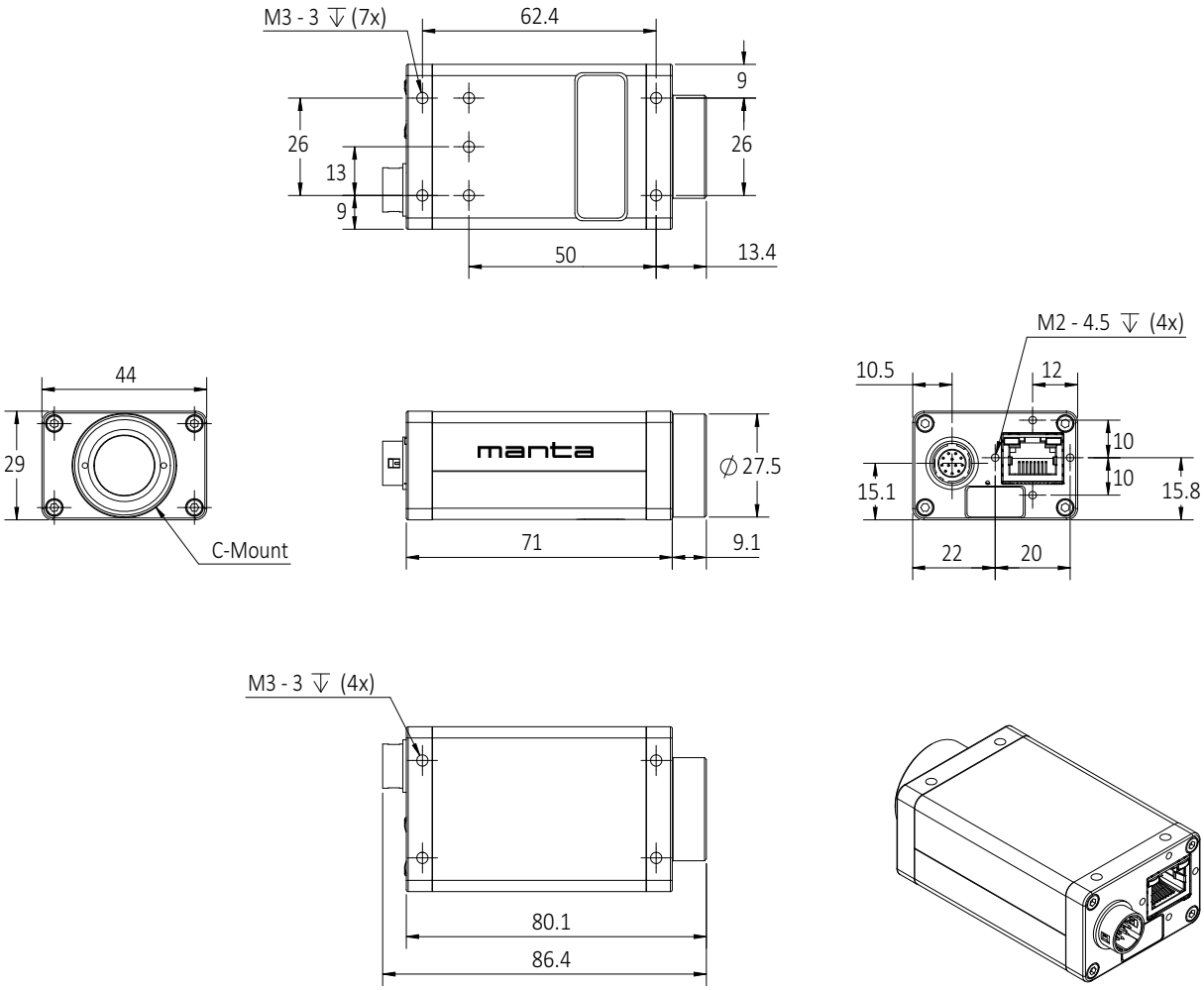


Figure 91: Manta type A standard housing C-Mount dimensions

Angled-head housings

W90 housing with C-Mount

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

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

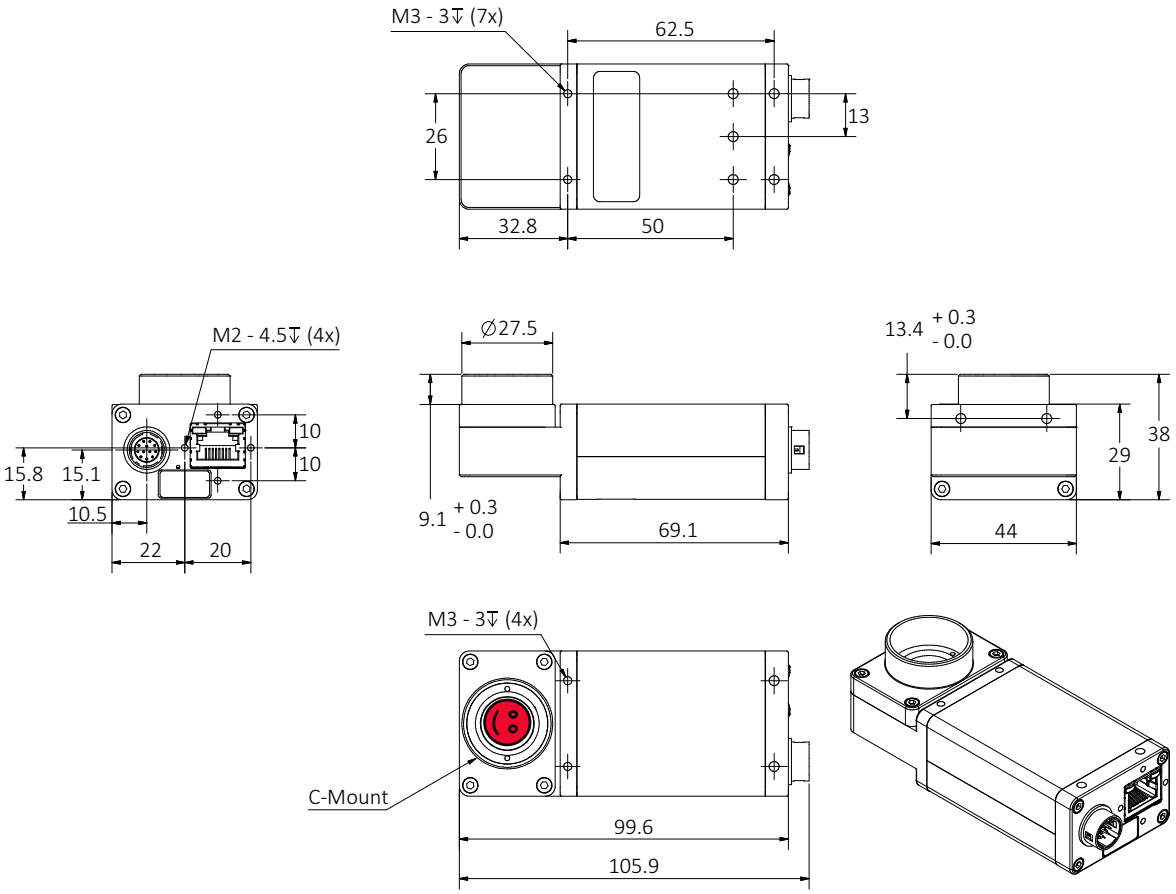


Figure 92: Manta type A W90 housing C-Mount dimensions

W90 S90 housing with C-Mount

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

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

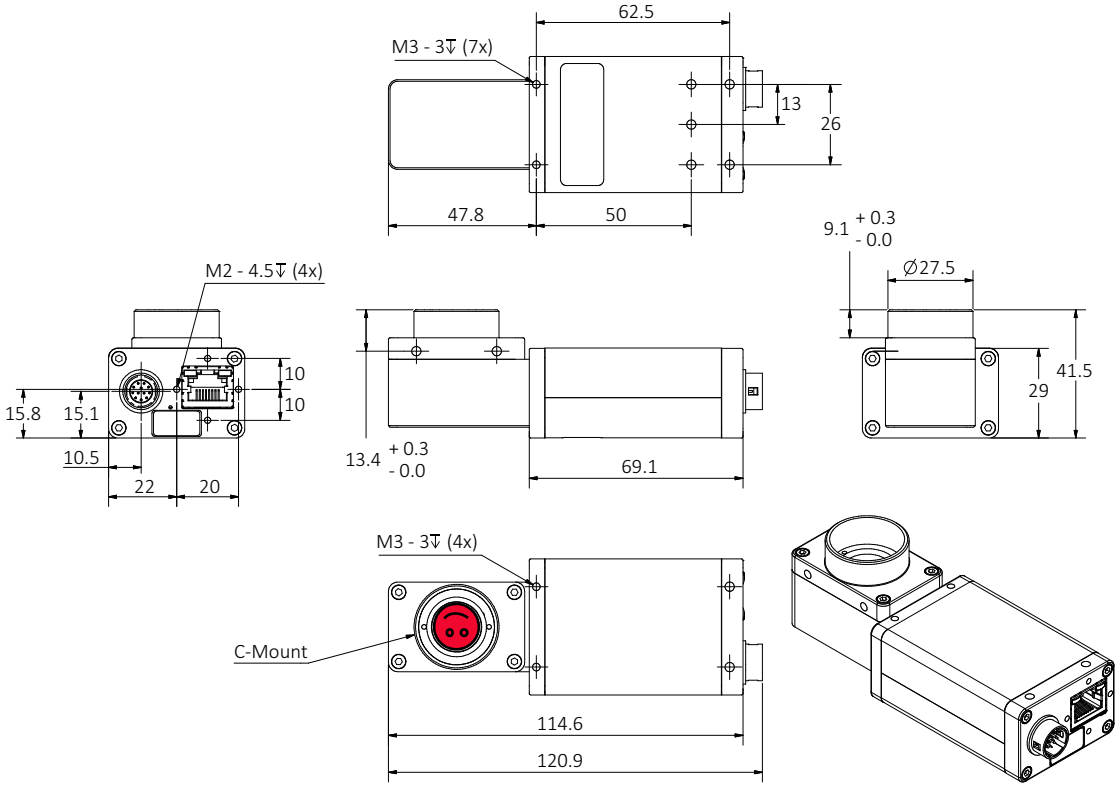


Figure 93: Manta type A W90 S90 housing C-Mount dimensions

W270 housing with C-Mount

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

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

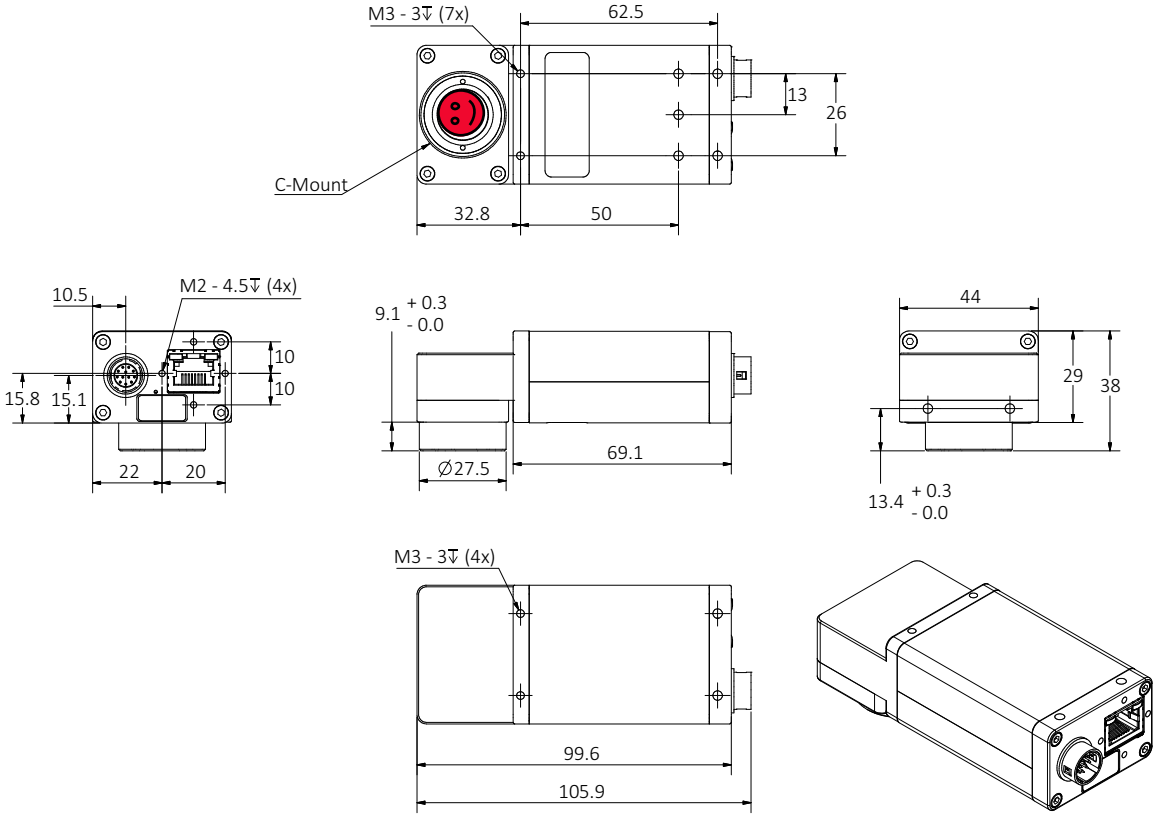


Figure 94: Manta type A W270 housing C-Mount dimensions

W270 S90 housing with C-Mount

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

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

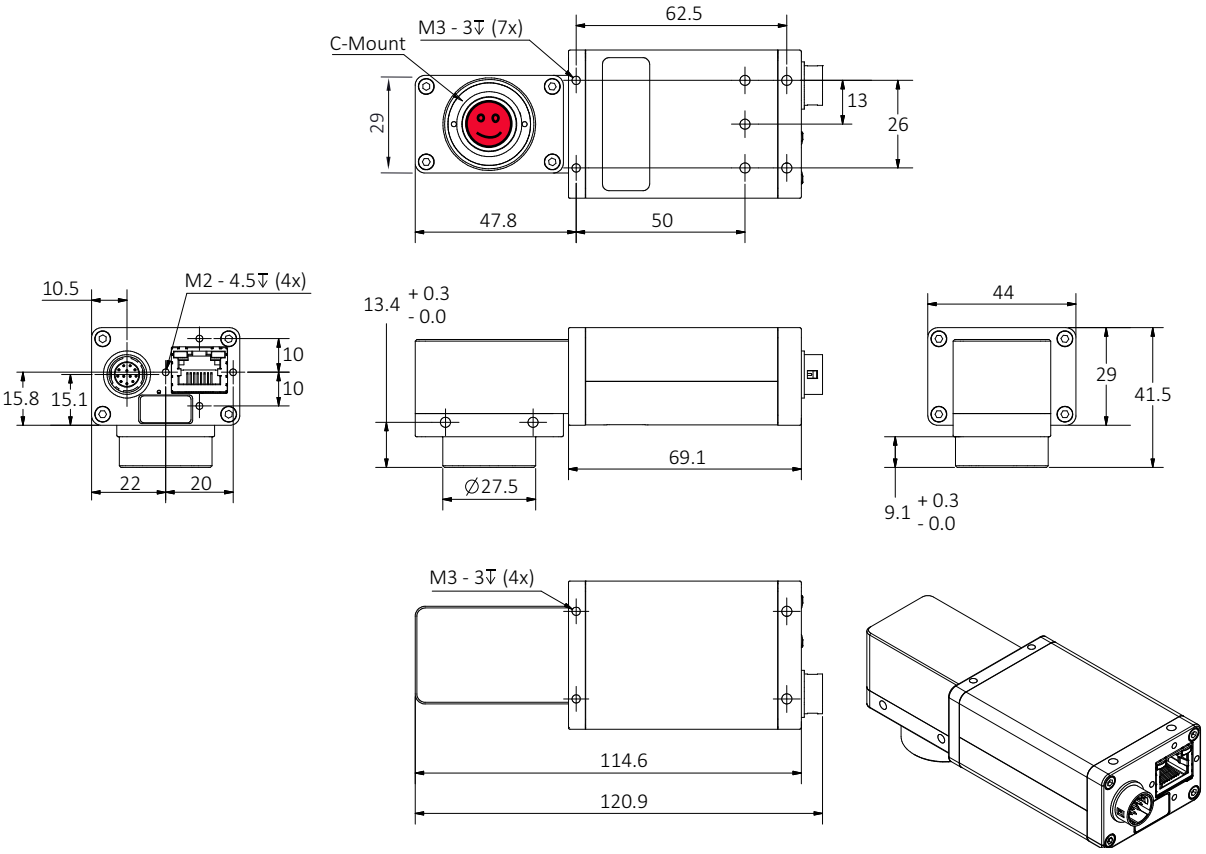


Figure 95: Manta type A W270 S90 housing C-Mount dimensions

Board level models

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

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

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

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Auto Iris (Video Type) Out
4 = Input 1
5 = Not Used
6 = Output 1
7 = GND (for Inputs)
8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

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

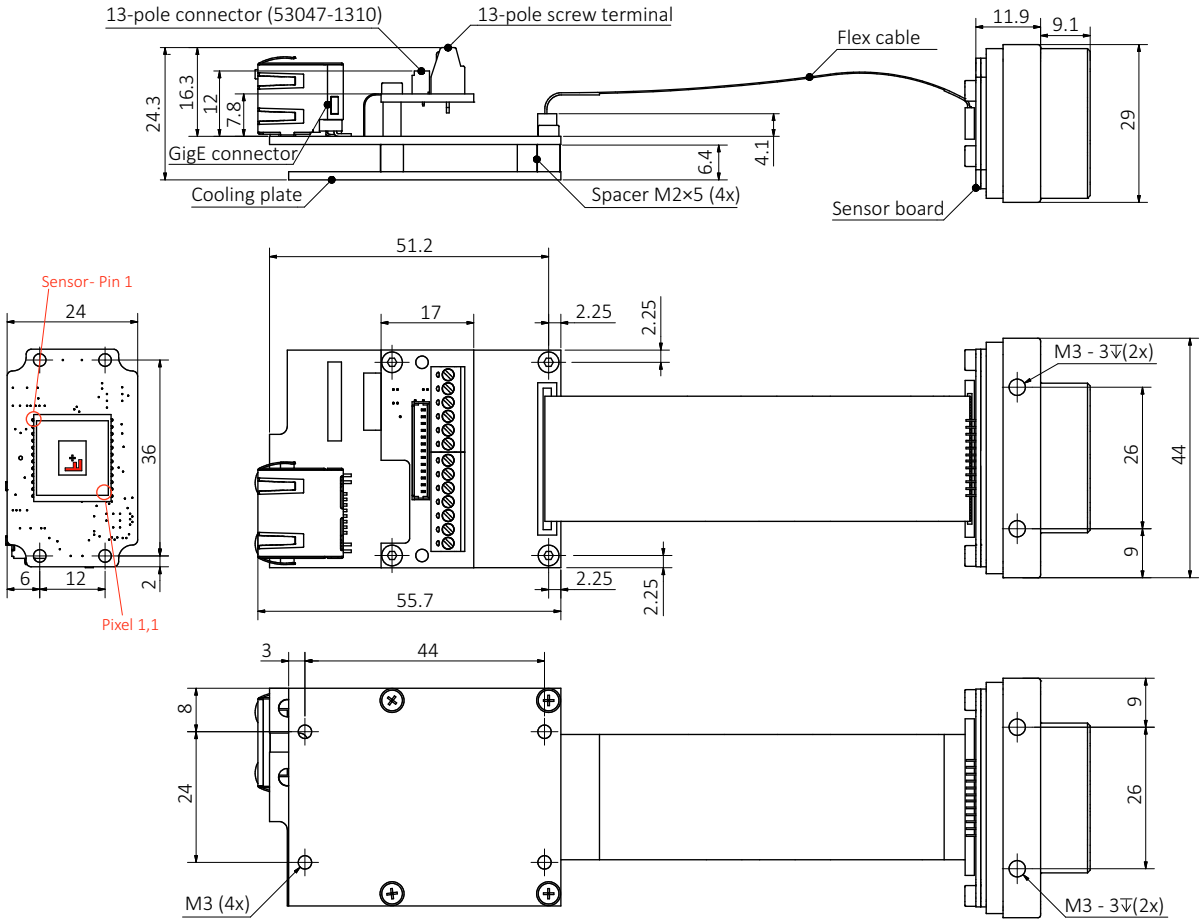


Figure 96: Manta type A board level C-Mount (non-PoE models) dimensions

Board level with C-Mount (PoE models)

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

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

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = Auto Iris (Video Type) Out
4 = Input 1
5 = Not Used
6 = Output 1
7 = GND (for Inputs)
8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

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

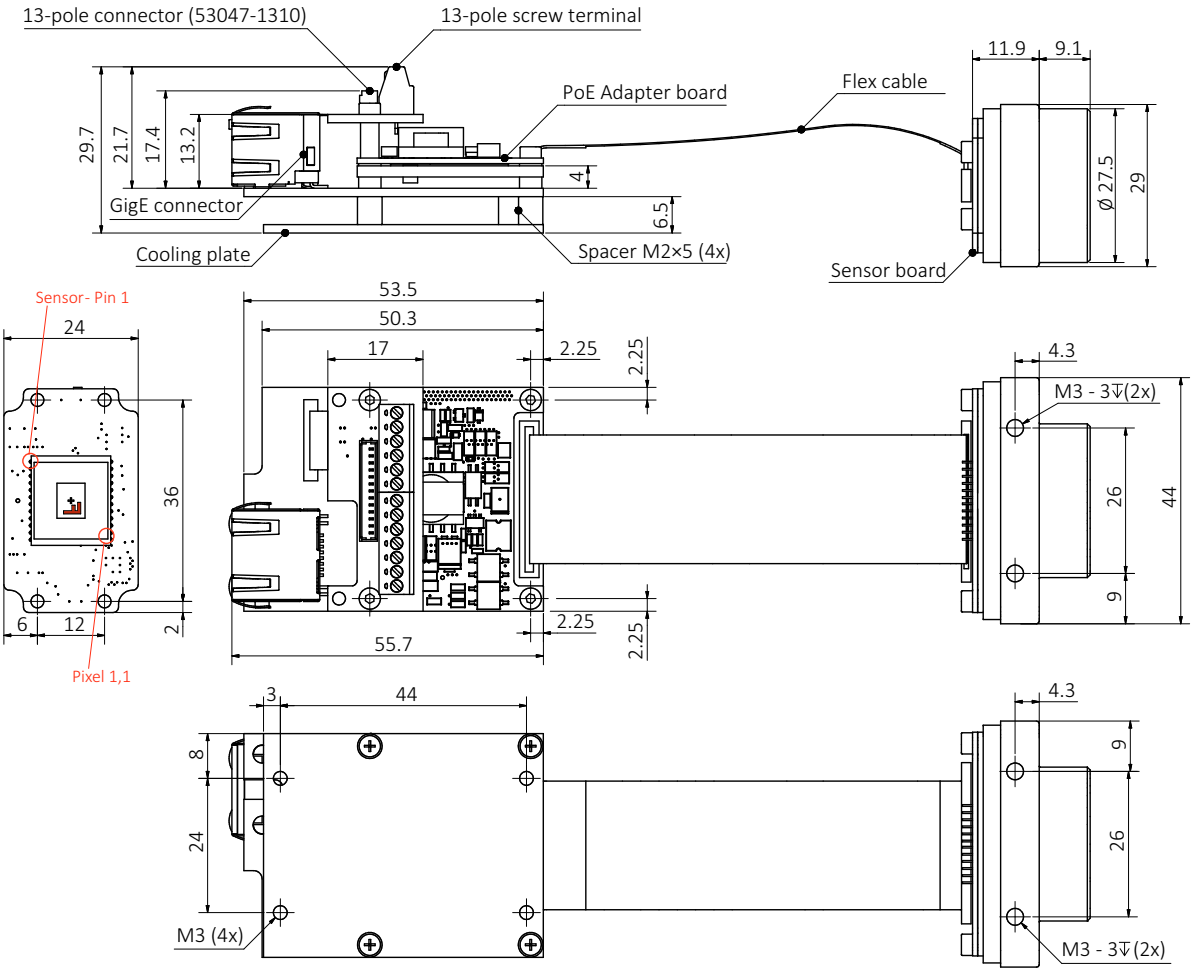


Figure 97: Manta type A board level C-Mount (PoE models) dimensions

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

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

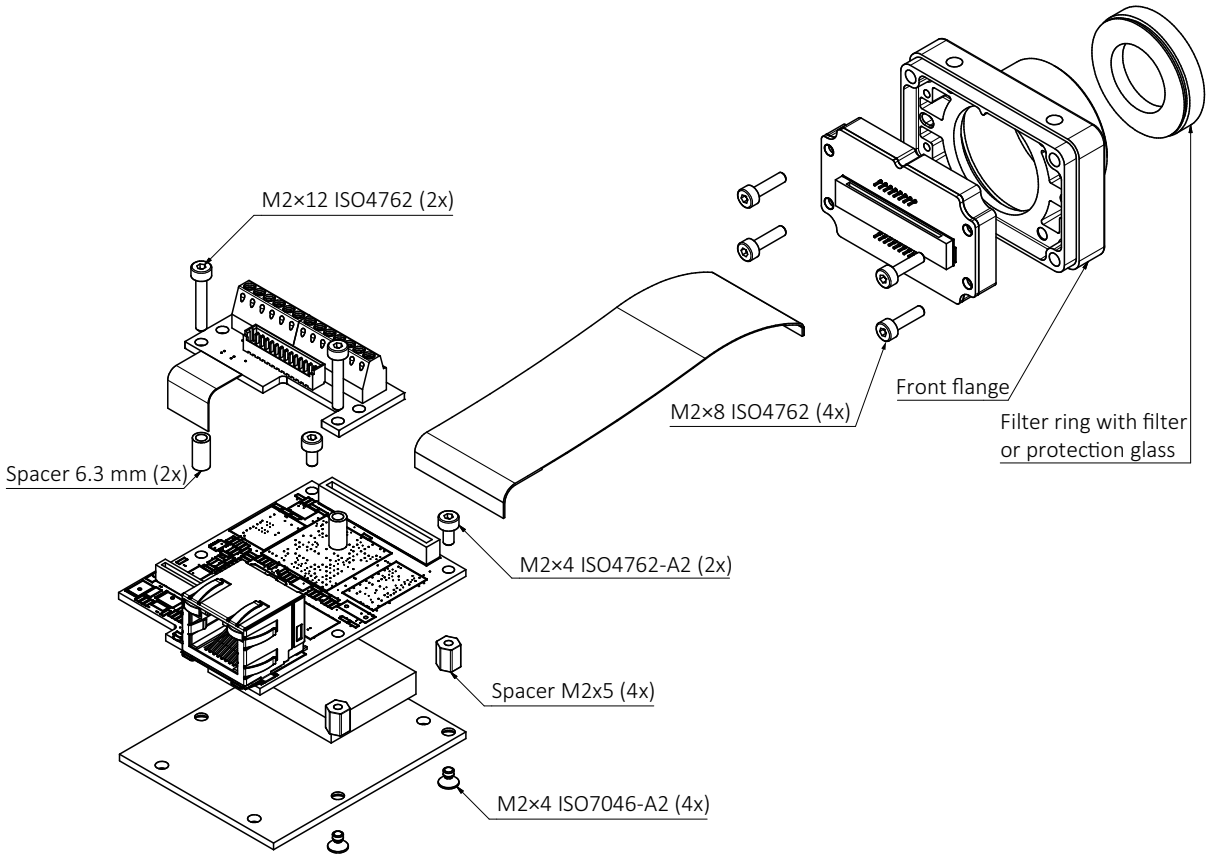


Figure 98: Manta type A board level C-Mount (non-PoE models) dimensions

Board level with C-Mount (PoE models)

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

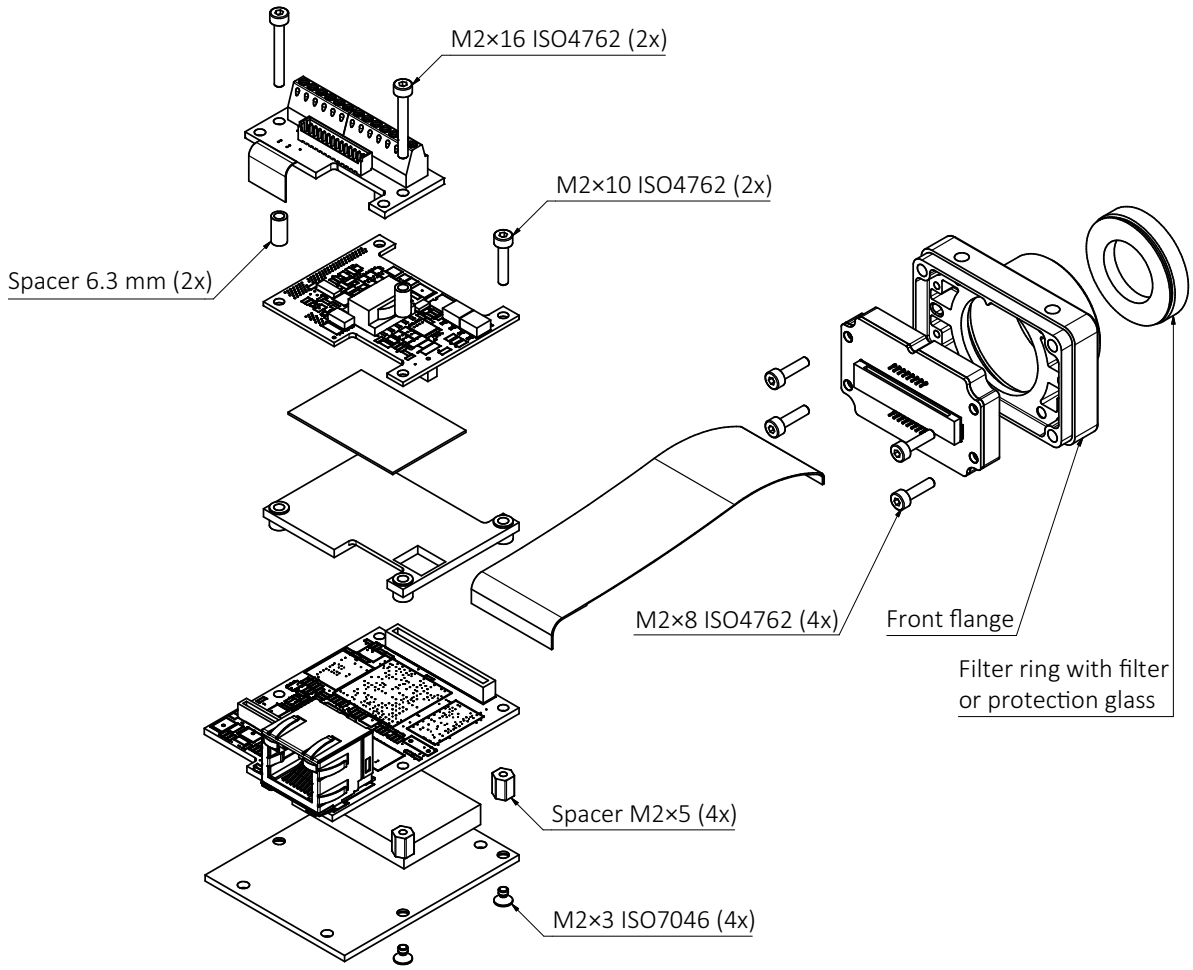


Figure 99: Manta type A board level C-Mount (PoE models) dimensions

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

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

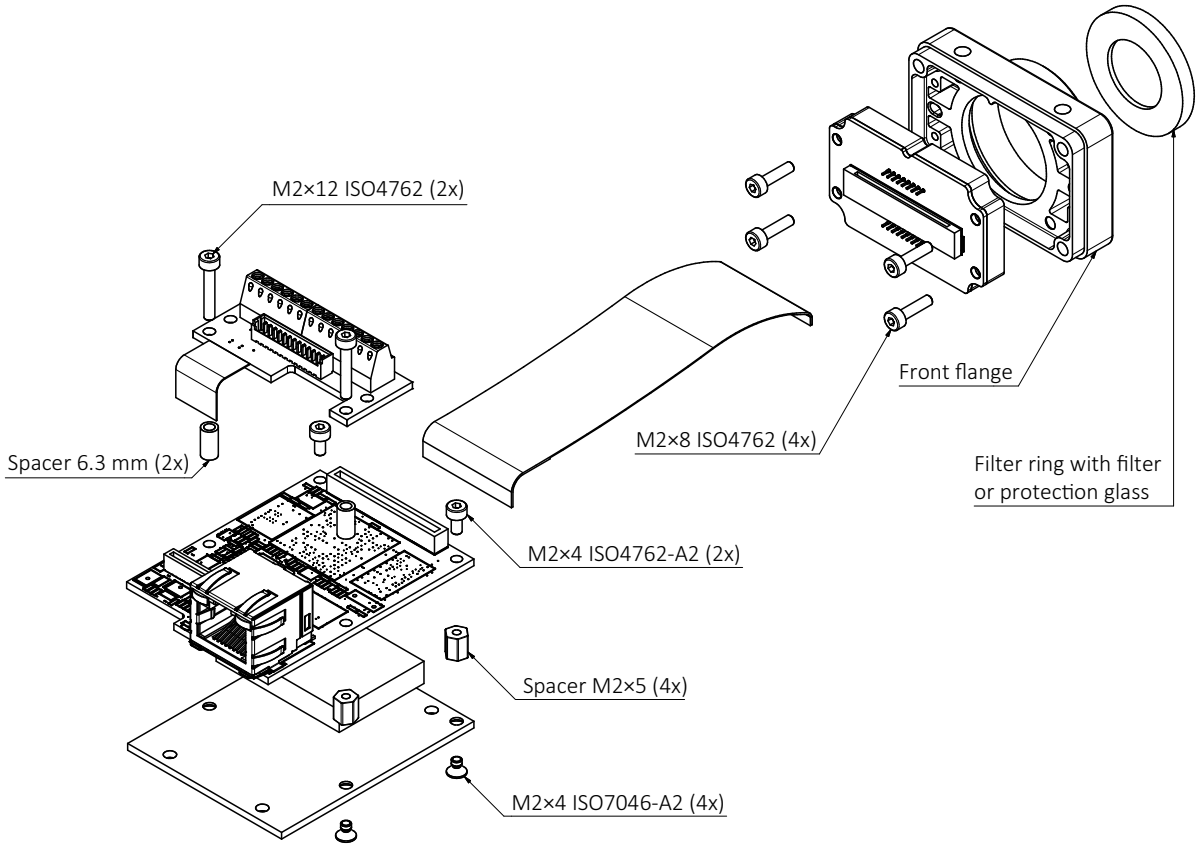


Figure 100: Manta type A board level CS-Mount (non-PoE models) dimensions

Board level with CS-Mount (PoE models)

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

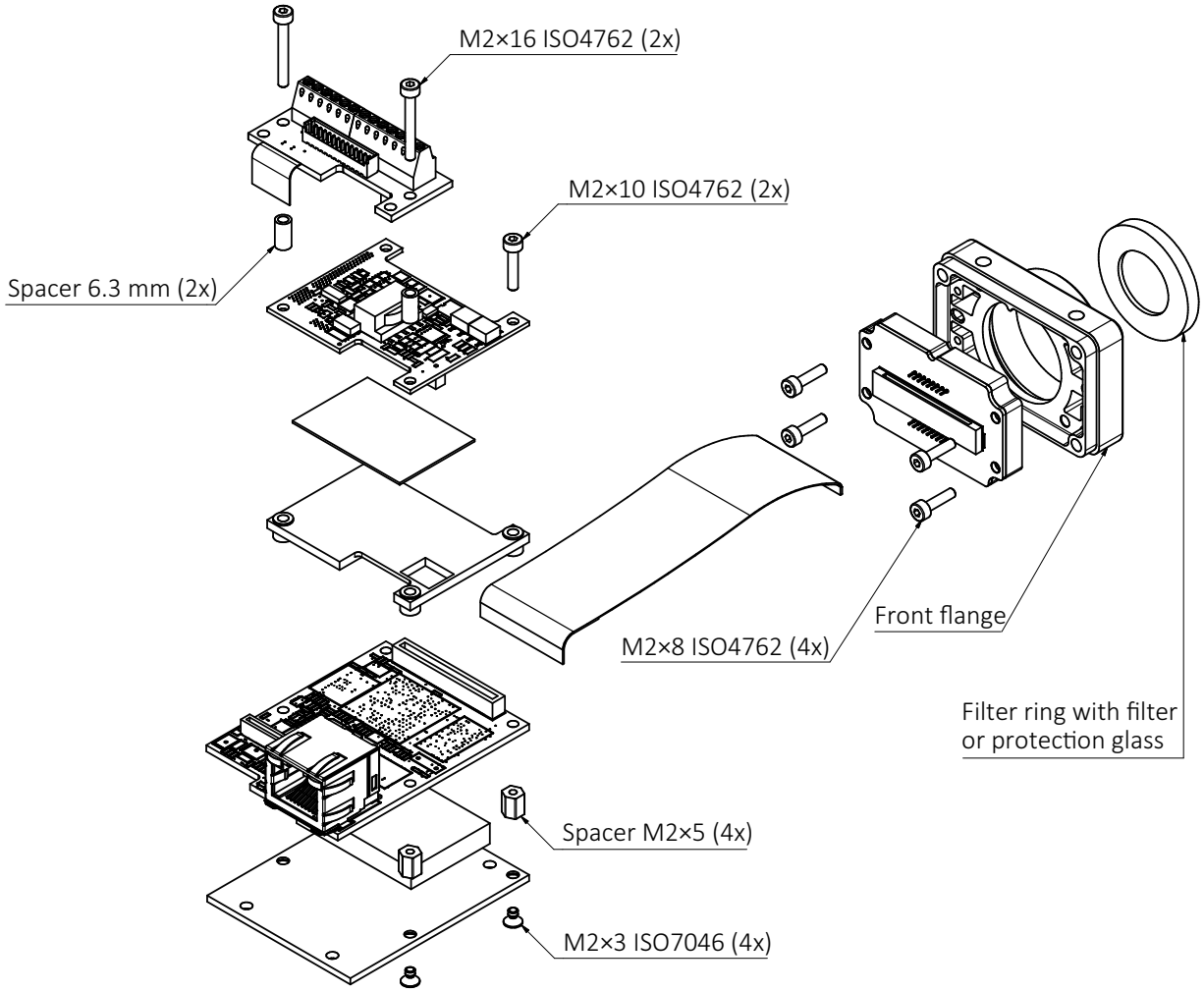


Figure 101: Manta type A board level CS-Mount (PoE models) dimensions

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

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

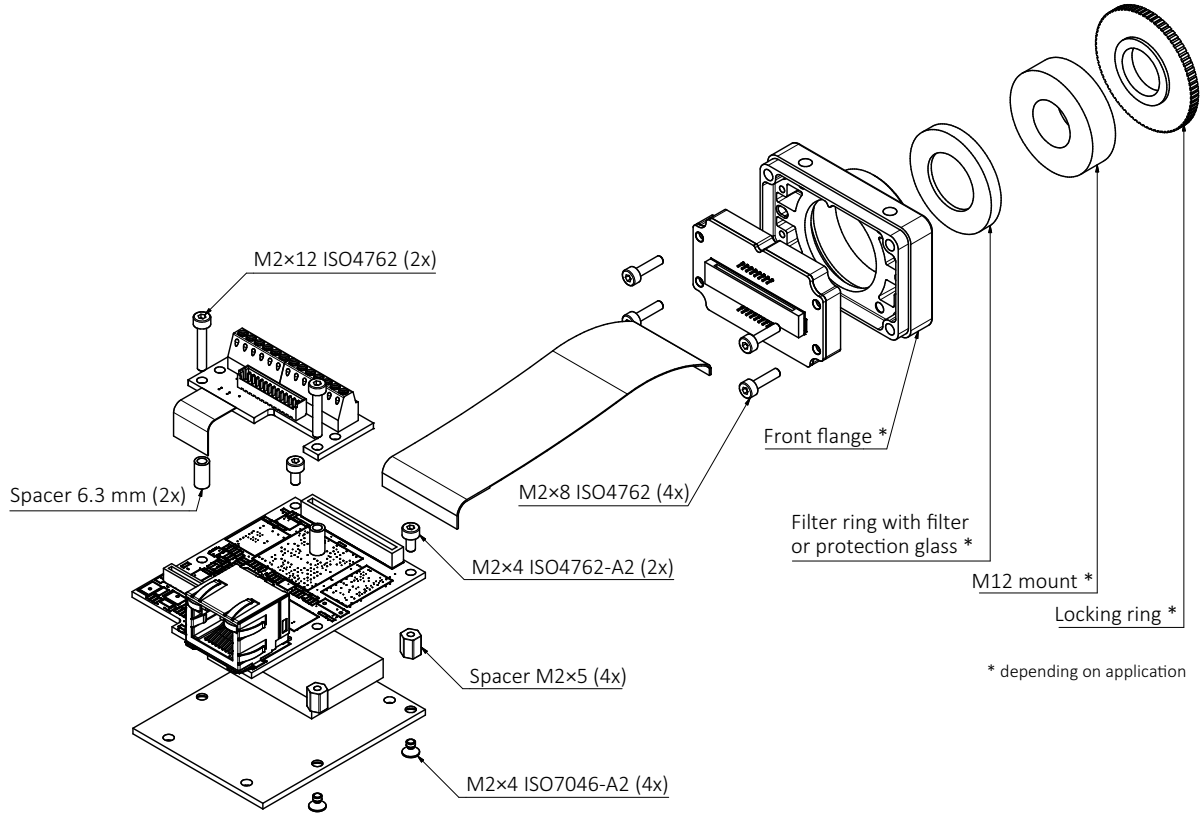


Figure 102: Manta type A board level M12-Mount (non-PoE models) dimensions

Board level with M12-Mount (PoE models)

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

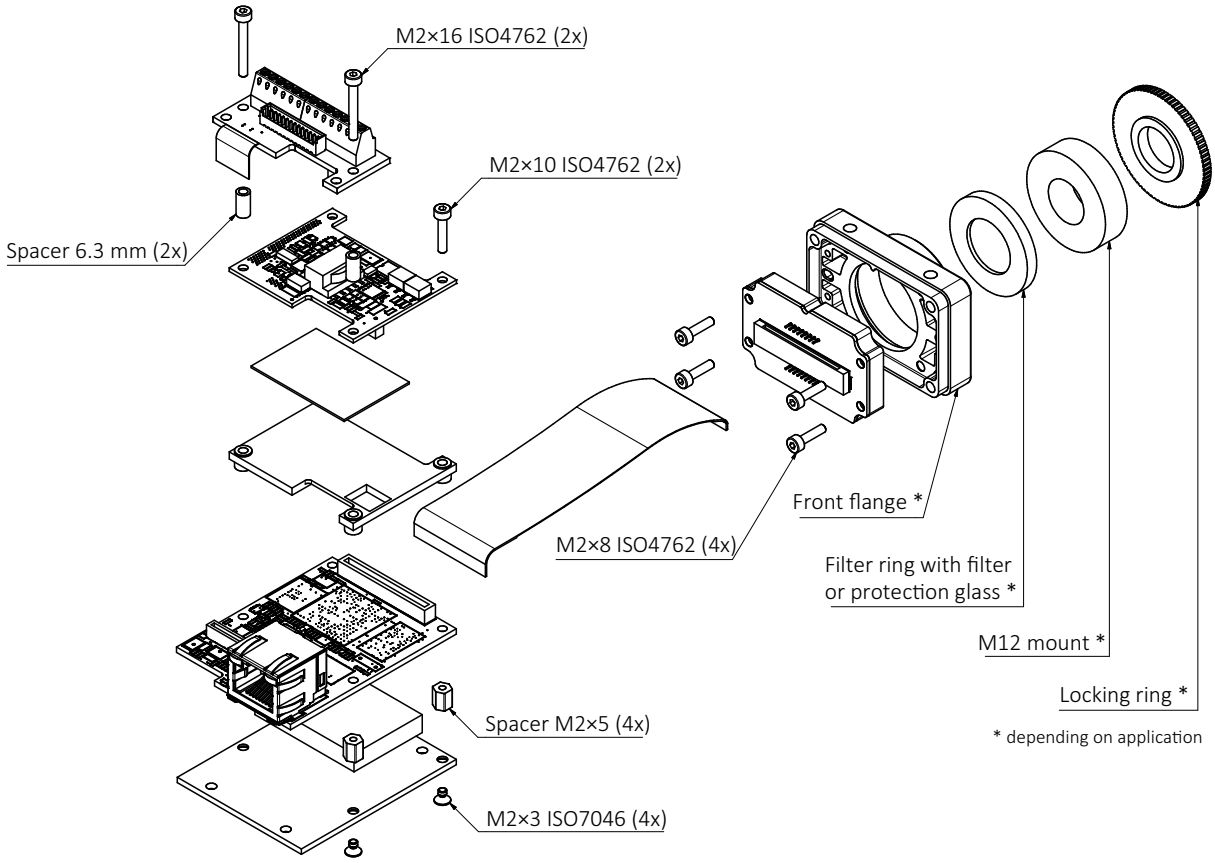


Figure 103: Manta type A board level M12-Mount (PoE models) dimensions

C-Mount cross section

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

Maximum protrusion

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

Protection glass and filter options

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

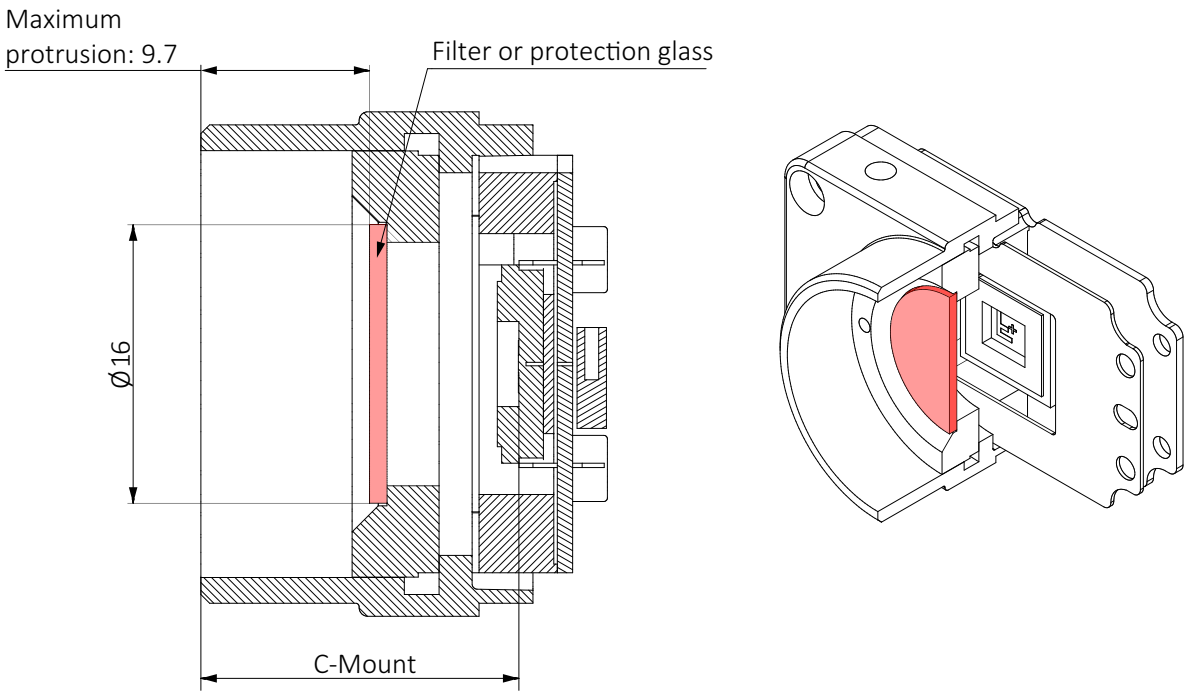


Figure 104: Manta type A C-Mount dimensions (16 mm filter)

Dimensional mount adjustment

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

CS-Mount cross section

Maximum protrusion

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

Protection glass and filter options

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

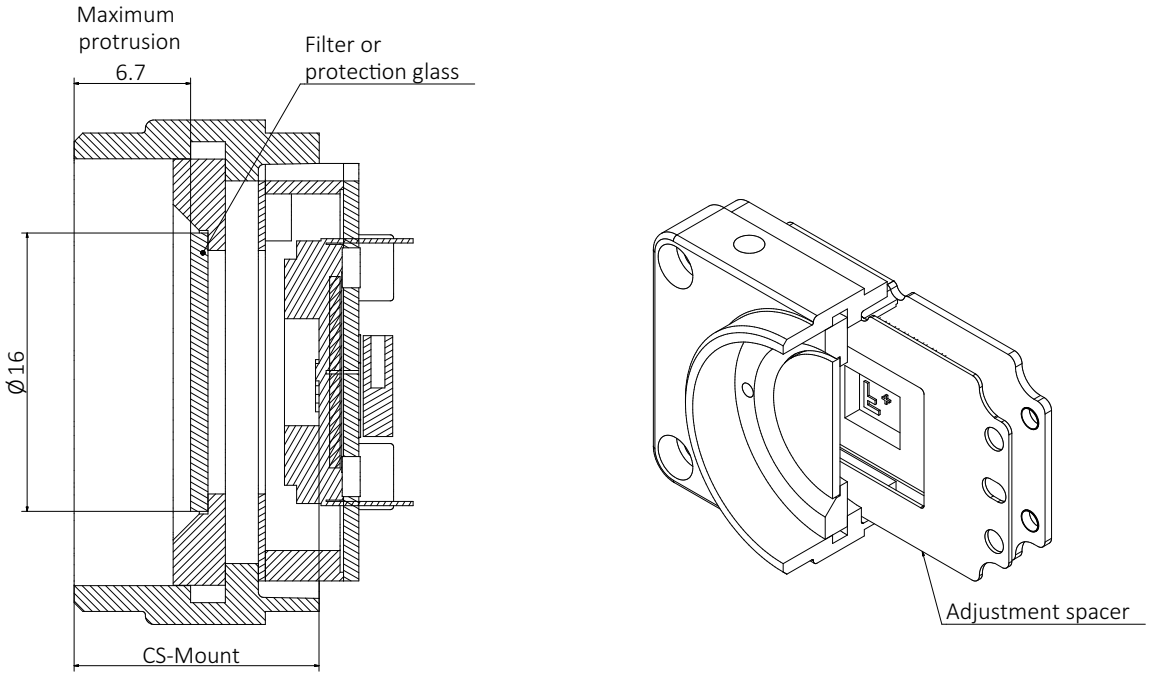


Figure 105: Manta type A CS-Mount dimensions (16 mm filter)

Dimensional mount adjustment

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

Manta type B camera dimensions

Standard housing with C-Mount (default)

Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236, G-1620, G-2040, G-2460

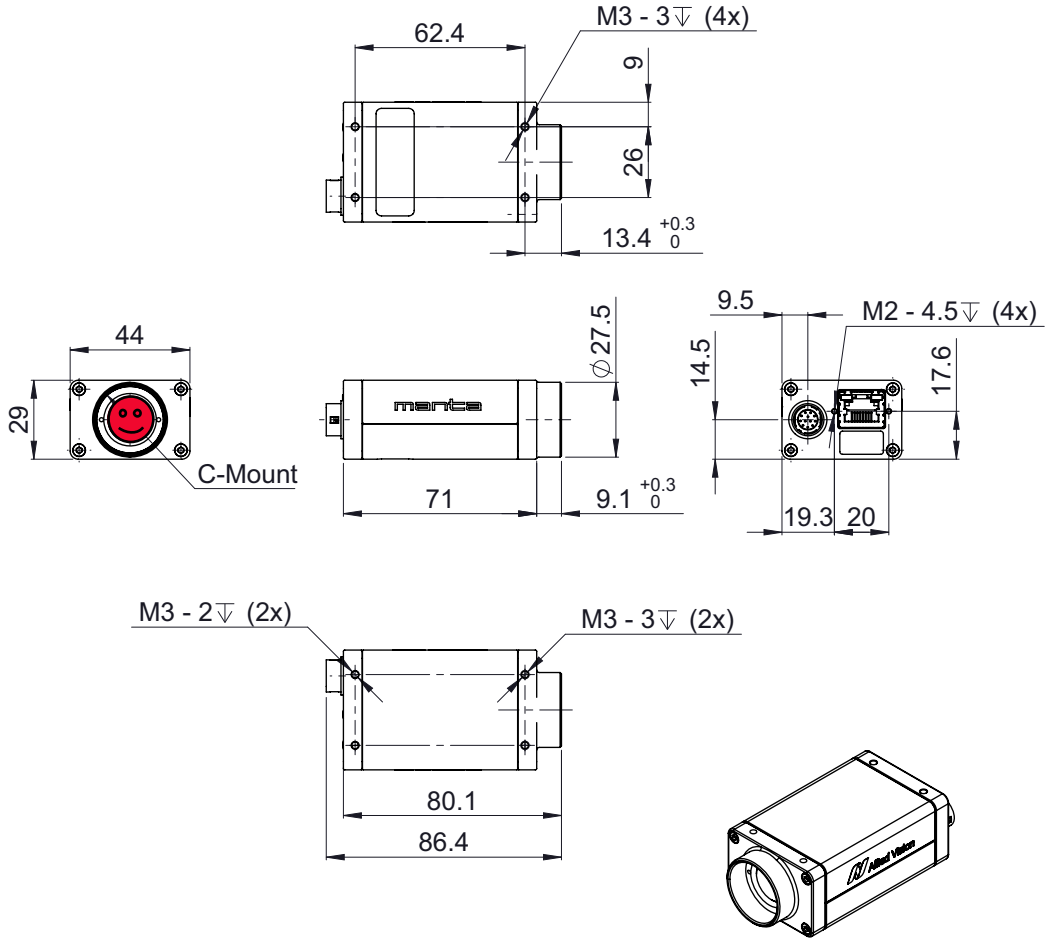


Figure 106: Manta type B standard housing C-Mount dimensions

Angled-head housings

W90 housing with C-Mount

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236, G-1620, G-2040, G-2460

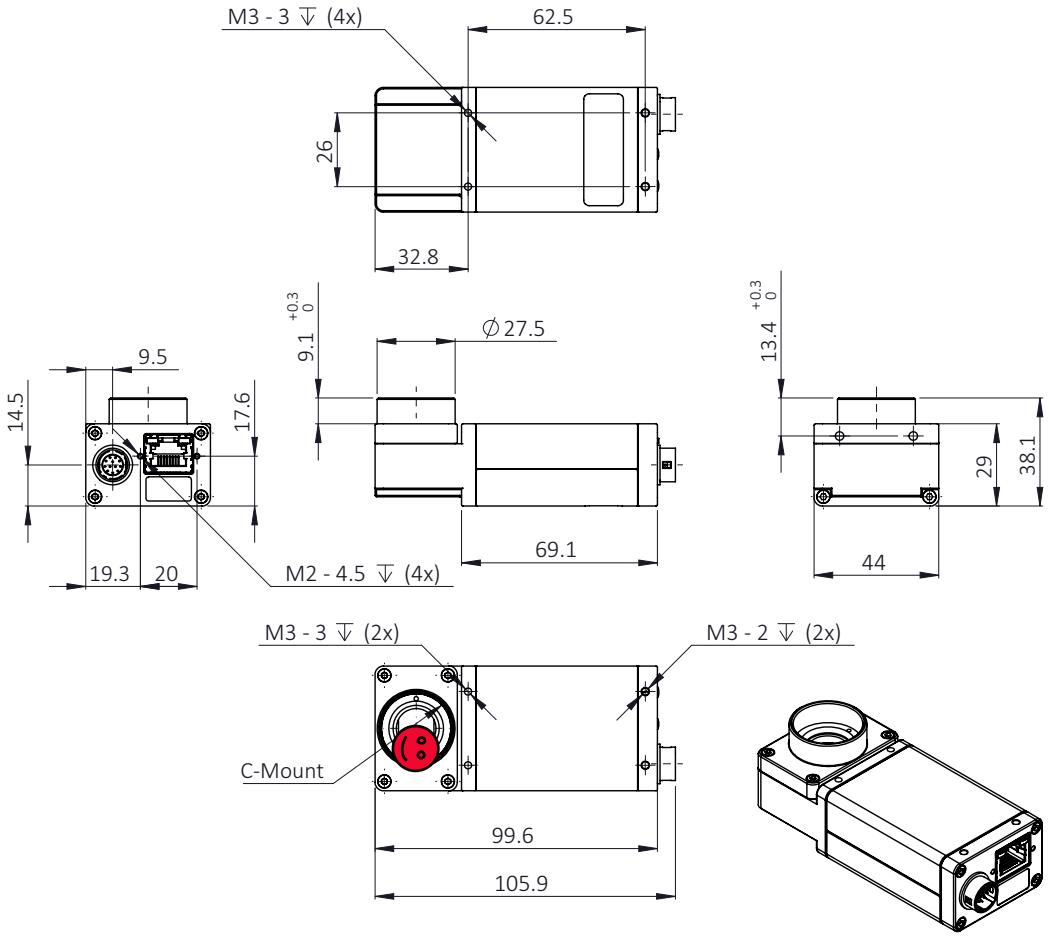


Figure 107: Manta type B W90 housing C-Mount dimensions

W90 S90 housing with C-Mount

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236, G-1620, G-2040, G-2460

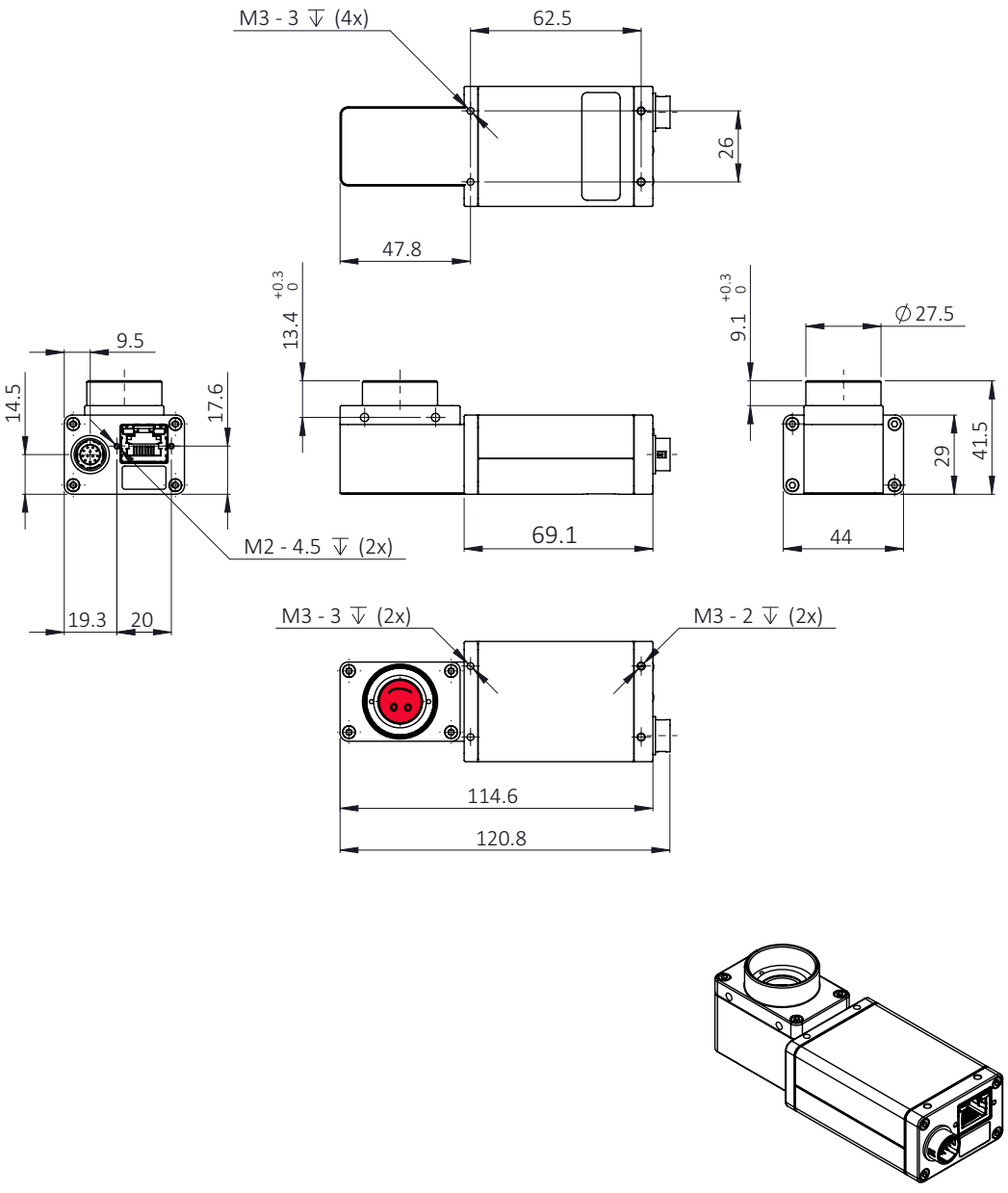


Figure 108: Manta type B W90 S90 housing C-Mount dimensions

W270 housing with C-Mount

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236, G-1620, G-2040, G-2460

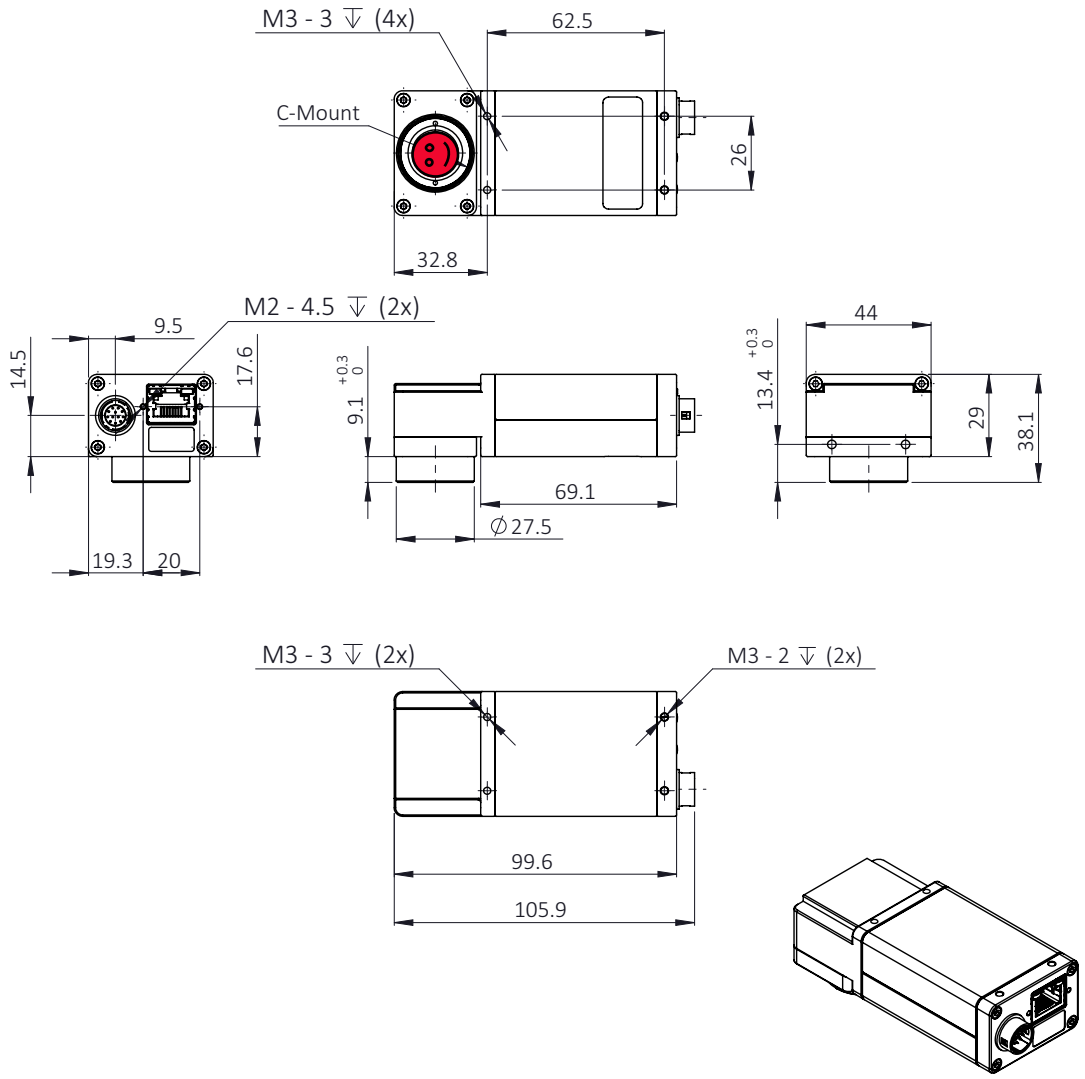


Figure 109: Manta type B W270 housing C-Mount dimensions

W270 S90 housing with C-Mount

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

Manta G-040, G-158, G-223, G-235, G-319, G-419, G-507, G-895, G-1236, G-1620, G-2040, G-2460

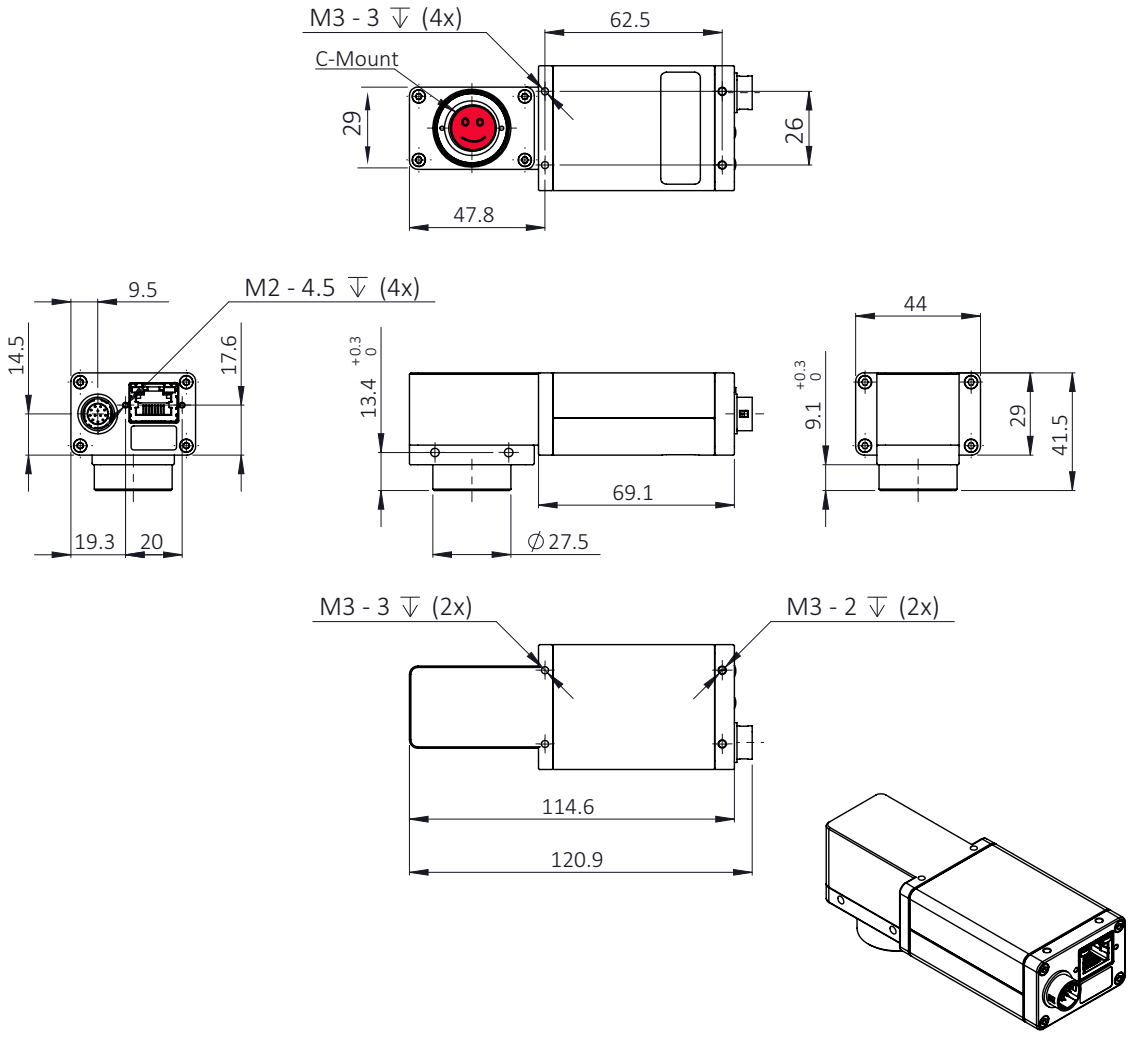


Figure 110: Manta type B W270 S90 housing C-Mount dimensions

Board level models

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

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

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

1 = GND
(for RS232, Ext PWR)
2 = Ext PWR input (PWR output on demand)
3 = PWM Output for Auto Iris (Video Type)
4 = Input 1
5 = Not Used
6 = Output 1

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

Flex cable length:

FPC80 L = 60 mm	5568-01
FPC80 L = 110 mm	5569-01
FPC80 L = 150 mm	5570-01
FPC80 L = 200 mm	5571-01

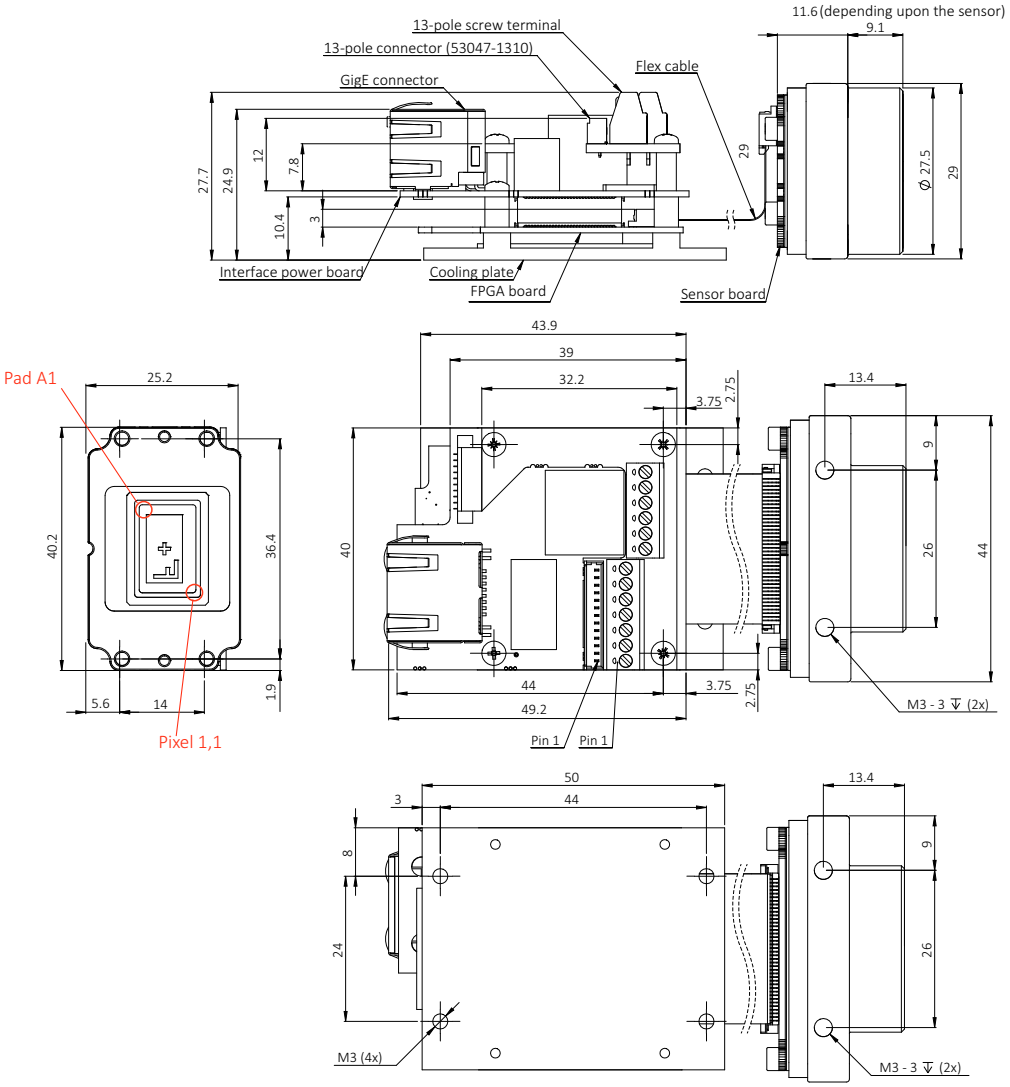


Figure 111: Manta type B board level C-Mount (PoE and non-PoE) dimensions

Manta G-040, G-158, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460

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

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

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

Flex cable length:

FPC80 L = 60 mm	5568-01
FPC80 L = 110 mm	5569-01
FPC80 L = 150 mm	5570-01
FPC80 L = 200 mm	5571-01

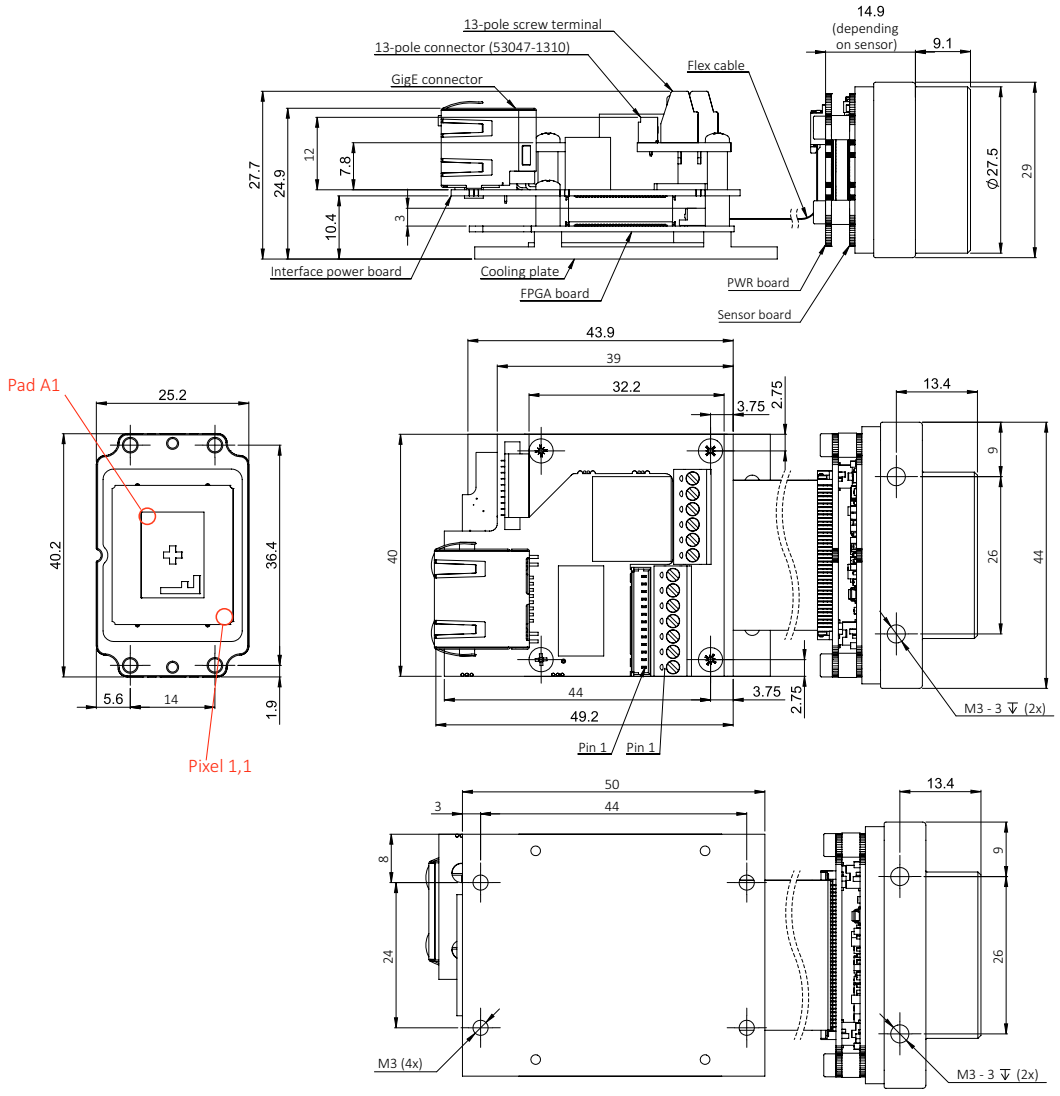


Figure 112: Manta type B board level C-Mount (PoE and non-PoE) dimensions

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

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

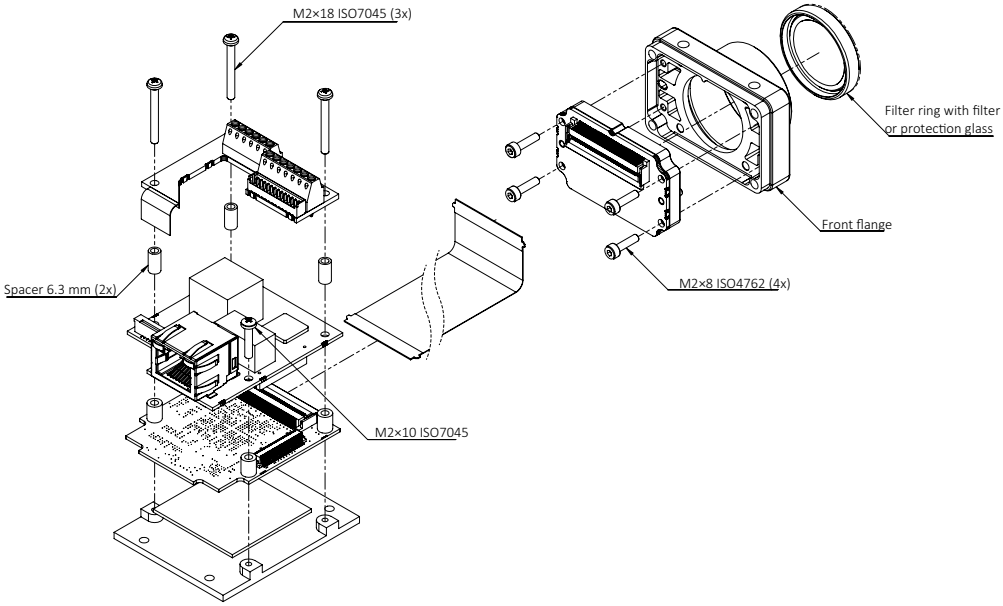


Figure 113: Manta type B board level C-Mount (PoE and non-PoE) dimensions

Manta G-040, G-158, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460

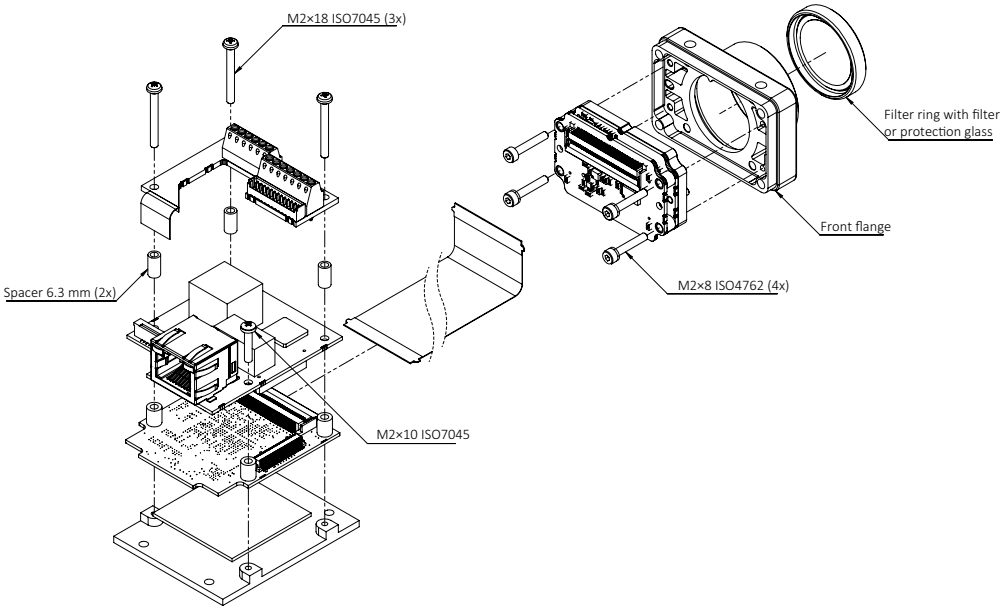


Figure 114: Manta type B board level C-Mount (PoE and non-PoE) dimensions

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

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

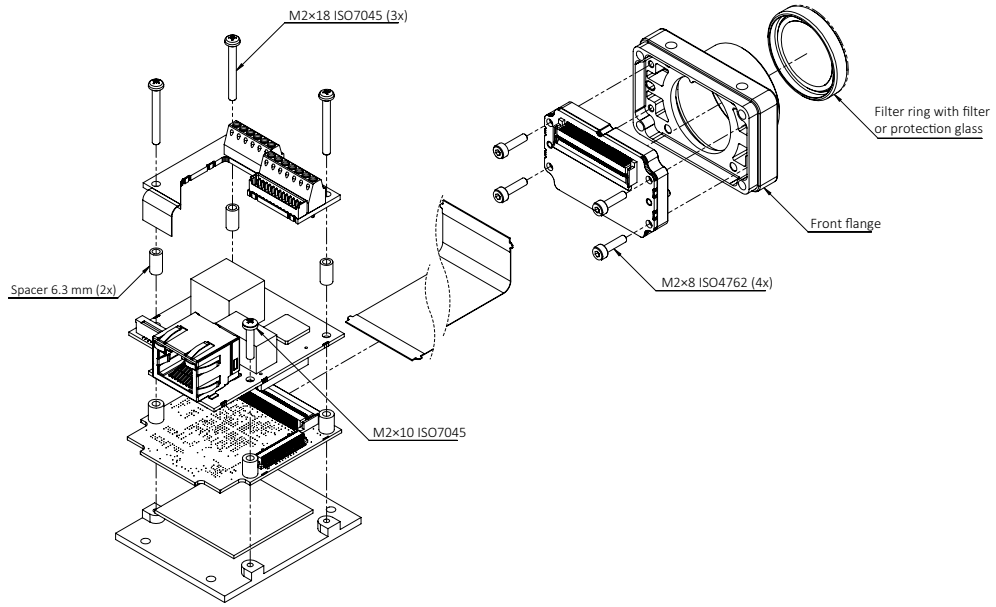


Figure 115: Manta type B board level CS-Mount (PoE and non-PoE) dimensions

Manta G-040, G-158, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460

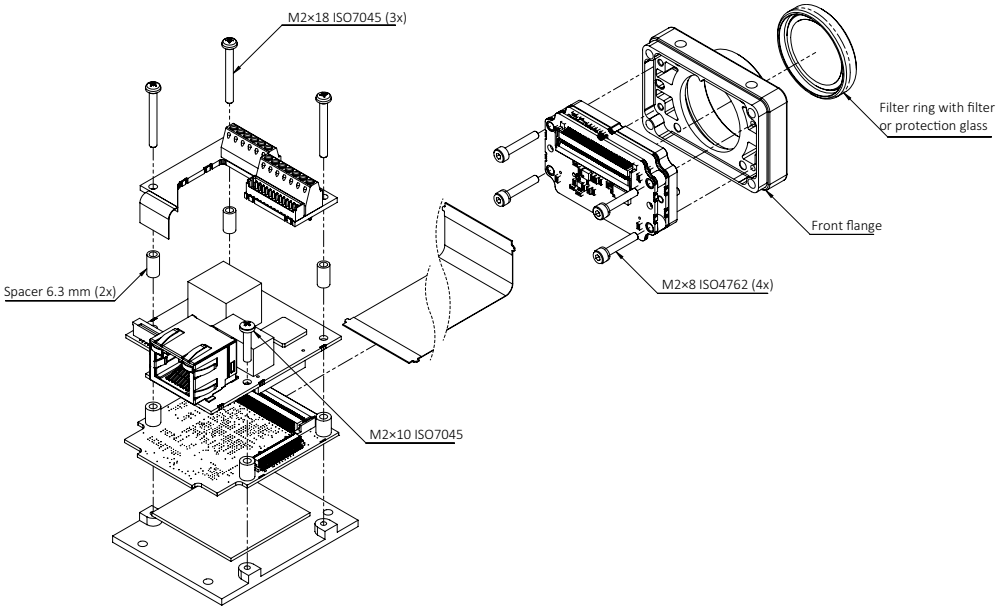


Figure 116: Manta type B board level CS-Mount (PoE and non-PoE) dimensions

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

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

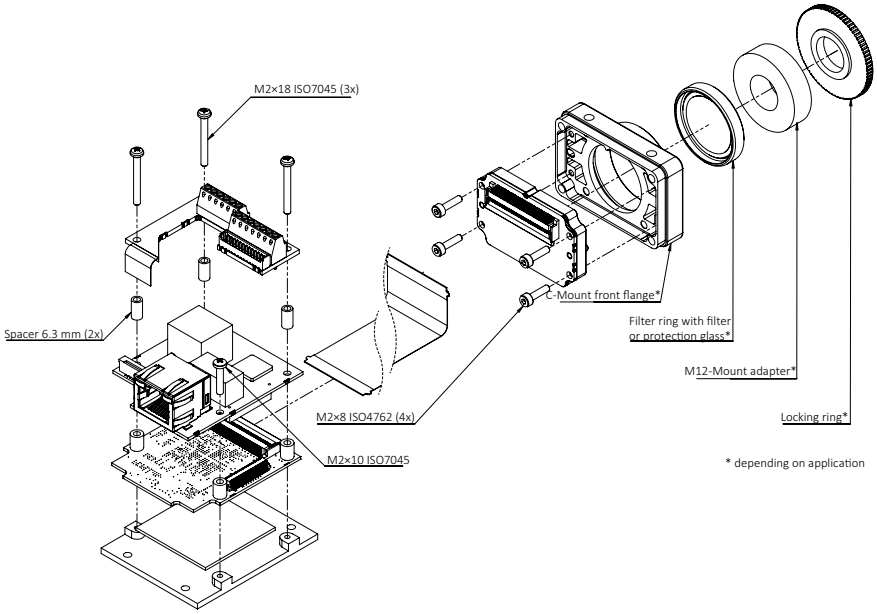


Figure 117: Manta type B board level M12-Mount (non-PoE and PoE) dimensions

Manta G-040, G-158, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460

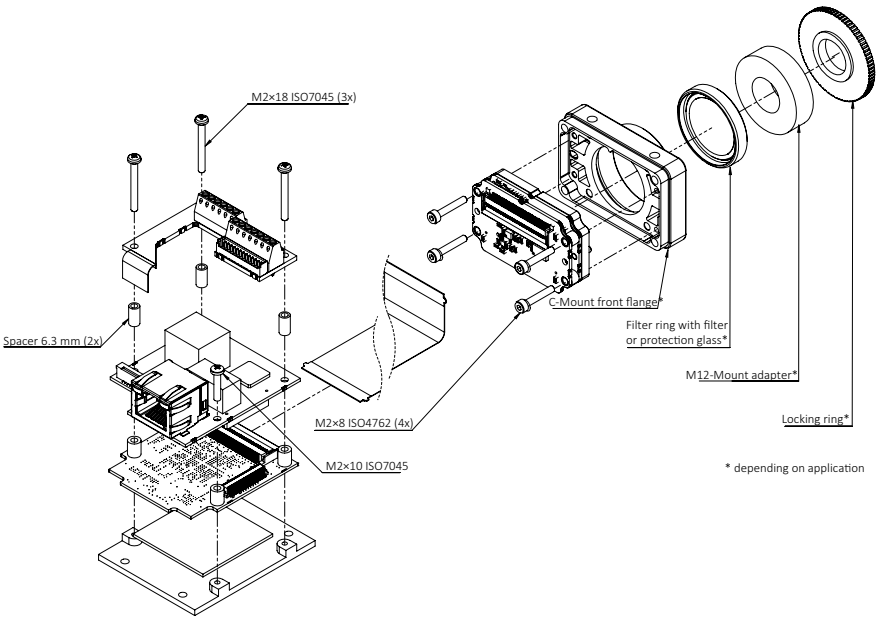


Figure 118: Manta type B board level M12-Mount (non-PoE and PoE) dimensions

C-Mount cross section

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

Maximum protrusion

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

Protection glass and filter options

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

Manta G-040, G-158, G-235, G-319, G-507

Filter or Protection glass diameter: 16 mm

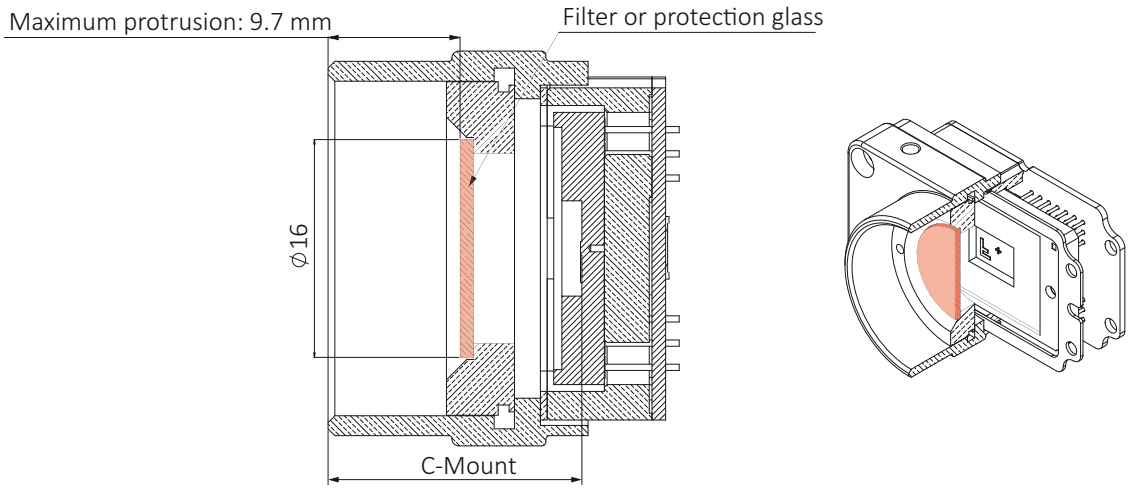


Figure 119: Manta type B C-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236, G-1620, G-2040, G-2460

Filter or Protection glass diameter: 22 mm

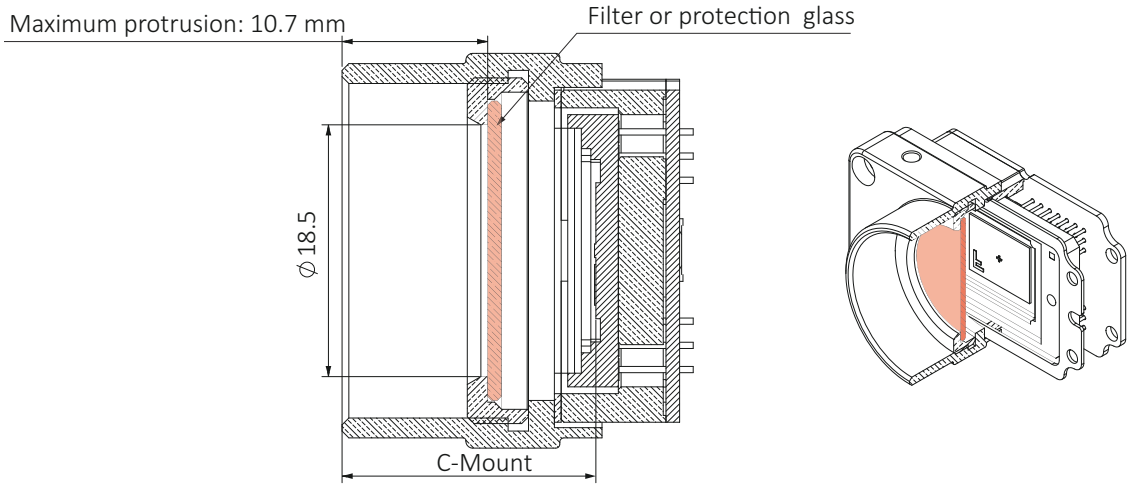


Figure 120: Manta type B C-Mount dimensions (22 mm filter)

22 mm diameter filter or protection glass

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

Dimensional mount adjustment

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

CS-Mount cross section

Maximum protrusion

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

Protection glass and filter options

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

Manta G-040, G-158, G-235, G-319, G-507

Filter or Protection glass diameter: 16 mm

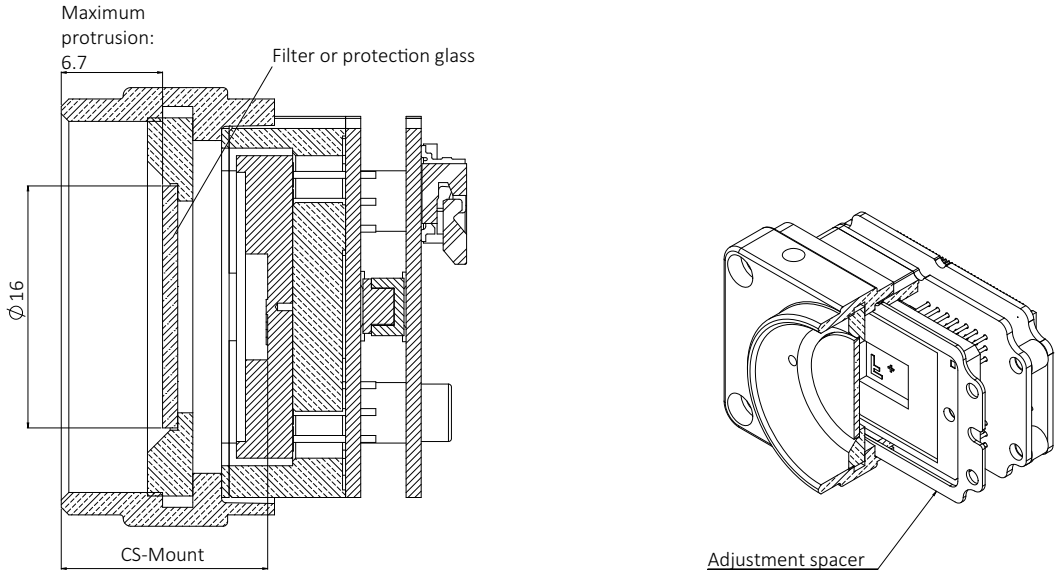


Figure 121: Manta type B CS-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236, G-1620, G-2040, G-2460

Filter or Protection glass diameter: 22 mm

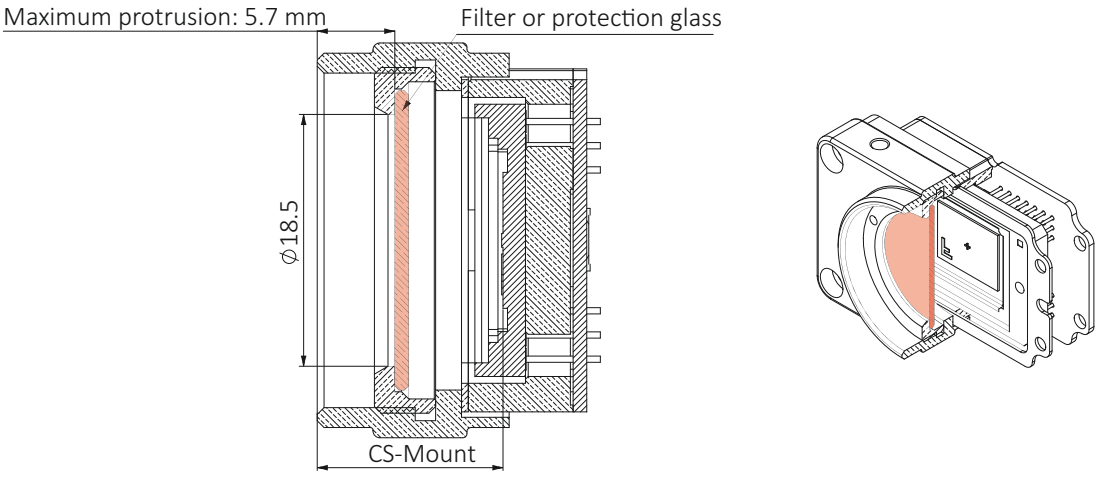


Figure 122: Manta type B CS-Mount dimensions (22 mm filter)

22 mm diameter filter or protection glass

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

Dimensional mount adjustment

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

Sensor position accuracy

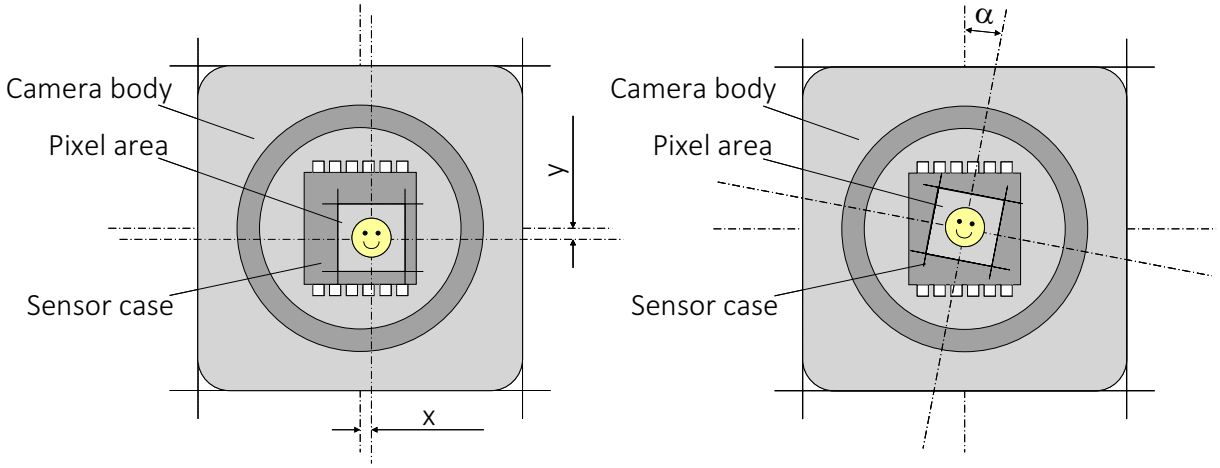


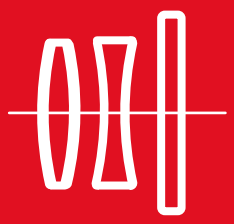
Figure 123: Sensor position accuracy

Unless stated otherwise, the following values are applicable:

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

Table 102: Sensor position accuracy criteria

Filter and lenses



The chapter includes:

Focal length versus field of view 223
Optical filters 236

Focal length versus field of view

About this chapter

This section presents tables that list selected fields of view (FOV) depending on sensor size, distance, and focal length of the lens.

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

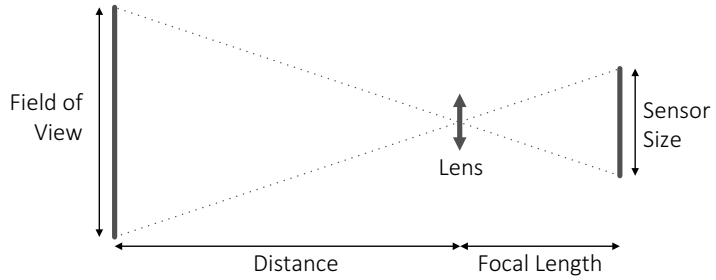


Figure 124: Focal length versus field of view

Parameters in tables

The distance to the object is measured from the first principal the plane of the lens to the object. For some lenses, manufacturers do not define the principal plane position. Production spread causes tolerances for all values, including actual focal lengths. Calculations apply for image reproduction without distortion. Therefore, values do not apply for fisheye lenses.

Please ask your Allied Vision Sales representative in case you need more information.

Optical vignetting with certain lenses

Lenses with short focal lengths may show optical vignetting at the edges of the image. Microlenses on the sensor pixels can increase the effect. This applies especially for focal lengths below 8 mm.

For demanding applications, we suggest testing camera and lens to find a suitable setup. If you have questions, please contact your Allied Vision Sales representative.

Model values

Manta G-031 series

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

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

Table 103: Manta G-031 series focal length versus field of view

Manta G-032 series

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

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

Table 104: Manta G-032 series focal length versus field of view

Manta G-033 series

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

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

Table 105: Manta G-033 series focal length versus field of view

Manta G-040 series

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

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

Table 106: Manta G-040 series focal length versus field of view

Manta G-125 series

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

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

Table 107: Manta G-125 series focal length versus field of view

Manta G-145 series

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

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

Table 108: Manta G-145 series focal length versus field of view

Manta G-146 series

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

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

Table 109: Manta G-146 series focal length versus field of view

Manta G-158 series

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

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

Table 110: Manta G-158 series focal length versus field of view

Manta G-201 series

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

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

Table 111: Manta G-201 series focal length versus field of view

Manta G-223 series

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

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

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

Table 112: Manta G-223 series focal length versus field of view

Manta G-235 series

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

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	698 × 438 mm	1407 × 884 mm
10 mm	556 × 349 mm	1123 × 705 mm
12 mm	461 × 290 mm	934 × 587 mm
16 mm	343 × 216 mm	698 × 438 mm
25 mm	216 × 135 mm	442 × 278 mm
35 mm	151 × 95 mm	313 × 196 mm
50 mm	102 × 64 mm	216 × 135 mm

Table 113: Manta G-235 series focal length versus field of view

Manta G-282 series

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

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

Table 114: Manta G-282 series focal length versus field of view

Manta G-283 series

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

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

Table 115: Manta G-283 series focal length versus field of view

Manta G-319 series

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

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

Table 116: Manta G-319 series focal length versus field of view

Manta G-419 series

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

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

Table 117: Manta G-419 series focal length versus field of view

Manta G-504 series

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

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

Table 118: Manta G-504 series focal length versus field of view

Manta G-505 series

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

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

Table 119: Manta G-505 series focal length versus field of view

Manta G-507 series

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

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

Table 120: Manta G-507 series focal length versus field of view

Manta G-895 series

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

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
12 mm	577 × 305 mm	1168 × 618 mm
16 mm	429 × 227 mm	873 × 462 mm
25 mm	270 × 143 mm	553 × 293 mm
35 mm	189 × 100 mm	391 × 286 mm
50 mm	128 × 68 mm	270 × 143 mm
100 mm	57 × 30 mm	128 × 68 mm
135 mm	38 × 20 mm	91 × 48 mm

Table 121: Manta G-895 series focal length versus field of view

Manta G-917 series

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

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

Table 122: Manta G-917 series focal length versus field of view

Manta G-1236 series

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

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

Table 123: Manta G-1236 series focal length versus field of view

Manta G-1620 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-1620B and G-1620C models.

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
5 mm	1445 × 825 mm	2905 × 1658 mm
6 mm	1202 × 686 mm	2419 × 1380 mm
8 mm	898 × 512 mm	1810 × 1033 mm
12 mm	594 × 339 mm	1202 × 686 mm
16 mm	442 × 252 mm	898 × 512 mm
25 mm	277 × 158 mm	569 × 325 mm
35 mm	194 × 111 mm	403 × 230 mm
50 mm	131 × 75 mm	277 × 158 mm
75 mm	83 × 47 mm	180 × 103 mm

Table 124: Manta G-1620 series focal length versus field of view

Manta G-2040 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-2040B and G-2040C models.

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
6 mm	1018 × 1018 mm	2048 × 2048 mm
8 mm	760 × 760 mm	1533 × 1533 mm
12 mm	503 × 503 mm	1018 × 1018 mm
16 mm	374 × 374 mm	760 × 760 mm
25 mm	235 × 235 mm	482 × 482 mm
35 mm	164 × 164 mm	341 × 341 mm
50 mm	111 × 111 mm	235 × 235 mm
75 mm	70 × 70 mm	152 × 152 mm
85 mm	60 × 60 mm	133 × 133 mm

Table 125: Manta G-2040 series focal length versus field of view

Manta G-2460 series

The following table provides the field of view for various focal lengths. The values are valid for Manta G-2460B and G-2460C models.

Focal length	Field of view	
	Distance = 500 mm	Distance = 1000 mm
8 mm	898 × 776 mm	1810 × 1566 mm
12 mm	594 × 513 mm	1202 × 1040 mm
16 mm	442 × 382 mm	898 × 776 mm
25 mm	277 × 240 mm	569 × 492 mm
35 mm	194 × 168 mm	403 × 348 mm
50 mm	131 × 114 mm	277 × 240 mm
75 mm	83 × 72 mm	180 × 156 mm

Table 126: Manta G-2460 series focal length versus field of view

Optical filters

All color Manta cameras are equipped with a type IRC 625 colored glass IR cut filter. This filter is employed to prevent infrared light from passing to the sensor. In the absence of an IR cut filter, images are dominated by red and incapable of being properly color balanced.

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

The following plot shows the filter transmission response for the default type IRC 625 colored glass IR cut filter and protection glass (ASG). Values may vary slightly be filter lot.

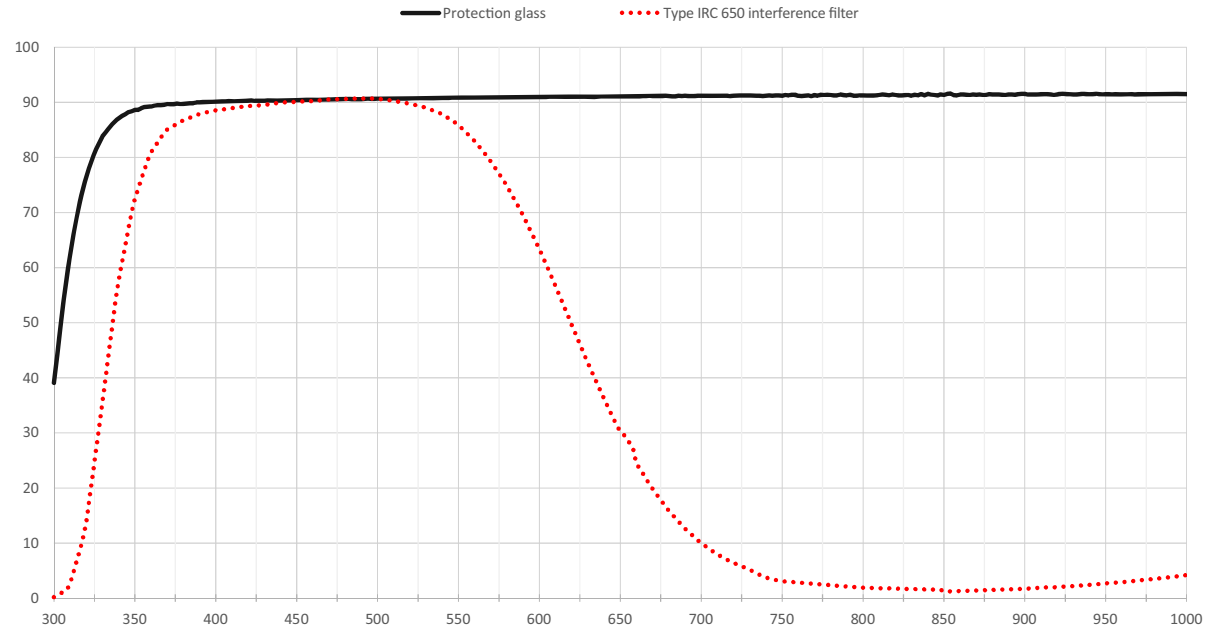


Figure 125: Optical filter spectral transmission (exemplary curves)

The Modular Concept informs about various options for optical filters and protection glass (ASG).

Modular Concept

See the Modular Concept for hardware options, including information on ordering at www.alliedvision.com/en/support/technical-documentation/manta-documentation.

Installing the camera



Learn about the components required for your vision system including configuring the host computer, NIC settings, and connecting your Manta camera.

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Touching hot cameras 238
Electrostatic discharge 238
Board level cameras 239
Mounting the camera 240
Mounting the lens 241
Configuring the host computer 242
Connecting the camera 244
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Accessories 248

Touching hot cameras



CAUTION

Risk of burns

A camera in operation can reach temperature levels which could cause burns.

- Wear protective gloves when you touch a camera that is heated up.
- Ensure proper cooling of the camera.

Electrostatic discharge



NOTICE

ESD is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

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

Board level cameras



NOTICE

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



NOTICE

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



NOTICE

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



NOTICE

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

Mounting the camera



CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use a lens support for heavy lenses.

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

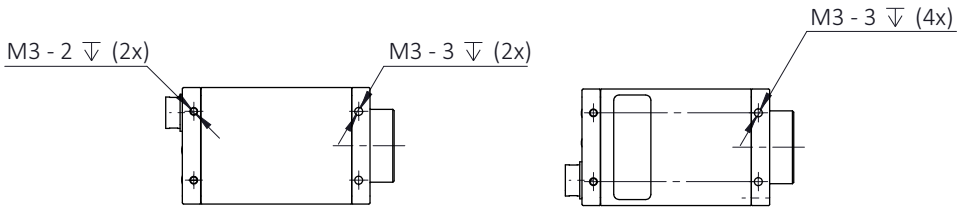


Figure 126: Mounting threads on top and bottom of housing



NOTICE

Please observe the following when mounting the camera:

- It is important to consider the maximum intrusion depth of the M3 mounting holes (see Figure 126). Using longer screws can damage the threads or bottom plate and will reduce the strength of the joint.
- Use a spacer, spring lock washer, or internal tooth lock washer to reduce the intrusion depth of longer screws.
- Tighten screws at a maximum torque of 0.48 Nm (3 mm threads) or 0.32 Nm (2 mm threads) to prevent damage of the threads.
- Apply thread-locking fluid to the screws to prevent loosening of the screws under static or vibrational loading.

Mounting the lens



CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use a lens support for heavy lenses.



CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Be careful when mounting or unmounting lenses.



NOTICE

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

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

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



NOTICE

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

NIR models are shipped without optical filter or protection glass.



NOTICE

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

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

Manta cameras offer various lens mounts for installing a lens including C-Mount, CS-Mount, and M12-Mount (S-Mount). Lenses can be purchased directly from Allied Vision or from an Allied Vision distribution partner. Users need to select the desired focal length of the lens and appropriate optical format for the target camera model.

For more information on lens mount options for your Manta camera, see the Modular Concept. For information on available lenses and accessories for your camera, see the Accessories webpage.

Configuring the host computer

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

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

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

Installing the NIC driver

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

To update the driver manually

1. Click the **Start** icon and select **Control Panel** in the menu.
2. Click **View by Large Icons** and select **Device Manager** in the list.
3. Under **Network Adapters**, locate the Ethernet NIC, right-click the entry, and select **Update Driver Software** in the menu.
4. Select the **Search automatically for updated driver software or Browse my computer for driver software**.
5. Click **Close** after the driver has been installed.

IP settings

After the initial NIC hardware installation, connect the NIC directly to the camera. The default configuration assigns an IP address automatically using the LLA (Link-Local Address) range of 169.254.xxx.xxx or an address defined by the DHCP (Dynamic Host Configuration Protocol) server, if present. This setup is a typical solution for single-camera operation or multiple cameras connected to the same NIC.

If you are going to operate multiple cameras on different networks, you can use the following configuration as a template.

All network devices (such as NICs, hubs or GigE cameras) require unique IP addresses. But connected devices must share the same address space. In the example shown in Table 127, 3 cameras are connected to a common host PC, using 2 separate NICs. The address space for NIC 1 is 192.168.**100**, for NIC 2 it is 192.168.**101**:

Device	IP address	Subnet mask	Default gateway
NIC 1	192.168.100.1	255.255.255.0	Blank
Camera 1 connected to NIC 1	192.168.100.2	255.255.255.0	Blank
NIC 2	192.168.101.1	255.255.255.0	Blank
Camera 2 connected to NIC 2	192.168.101.2	255.255.255.0	Blank
Camera 3 connected to NIC 2	192.168.101.3	255.255.255.0	Blank

Table 127: Static IP addresses for NICs and connected cameras

Optimize system performance

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

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

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

Table 6: NIC settings

Default packet size

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

NIC settings

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

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

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

Enabling jumbo packets

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

To enable jumbo packets

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

Connecting the camera

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



We recommend Category 6 (CAT-6) or higher rated Ethernet cables for Manta cameras. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or dropped frames coming from the camera.

Powering up the camera

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



A 12 V power adapter with Hirose connector is available for purchase from Allied Vision:

- Order code: 13869 (Desktop power supply without connection cable)
- Order code: 13866 (AC power cable, 1.8 m, US to C13)
- Order code: 13865 (AC power cable, 1.8 m, EU to C13)



NOTICE

Powering the camera:

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



NOTICE

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



NOTICE

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



NOTICE

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

Observe the following:

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



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

Powering the camera via Hirose I/O port

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

Powering the camera via PoE

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

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

- PoE-capable Manta cameras conform to the IEEE 802.3af standard for GigE.
- Category 6 cables are recommended due to being 23 AWG, while Category 5 cables are 24 AWG. This can reduce heating of the cable.
- Ensure that your Power Sourcing Equipment (PSE) provides data over all four pairs.
- If the PSE uses only two out of four pairs for data, operation is limited to 10/100 Mbps. This translates to lower frame rates.
- If the PSE uses all four pairs for data, operation is in Gigabit (1000 Mbps) mode. Thus, allowing you to achieve the maximum possible frame rate.

Connecting to the host application

After you have installed the **Vimba X Viewer** or third-party application to your host computer, you can connect your Manta camera via an Ethernet cable. When your camera is not PoE powered, connect the Hirose cable to power the camera.

Allied Vision software

Software packages provided by Allied Vision are free of charge and contain such as:

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

Vimba X is Allied Vision's GenICam-based SDK with transport layers for all Allied Vision cameras with GigE Vision, USB3 Vision, IEEE 1394, and Camera Link interface. Vimba X runs on Windows, Linux, and Linux for ARM. You can port your source code from Windows to Linux or cross-compile from a Linux PC to an embedded system.

Vimba X provides APIs for C, C++, and .NET. Users who quickly want to develop a straightforward application love the simplicity of the C API or the .NET API.

Advanced users with high demands appreciate the C++ API, which is designed as a highly efficient and sophisticated API for advanced object-oriented programming including the STL (standard template library), shared pointers, and interface classes.

Vimba X includes programming examples in C, C++, and C# and an extensive user documentation.



Download Vimba X SDK from www.alliedvision.com/en/products/software/vimba-x-sdk/.

After installing, documentation is located under \Program Files\Allied Vision\Vimba X.

Third-party software

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

GenICam-based third-party software automatically connects with the transport layers of Vimba X. Additionally, the separate Vimba X Cognex Adapter supports Cognex VisionPro.

Configuring the camera

After the host PC is configured, it is necessary to configure the parameters in the camera to establish the connection with best performance. It is necessary to note the value for the feature `GevSCPSPacketSize` which defines the size of the network packets and also the size of the feature `StreamBytesPerSecond` which controls the available bandwidth of the network interface.

If just one camera is connected, the maximum value can be used and therefore set to 124,000,000. When using multiple cameras simultaneously on one network adapter through a switch, we recommend to divide the available amount of `StreamBytesPerSecond` by the number of connected cameras. When two cameras with the same parameter share the available bandwidth, the usable maximum value for each camera is 62,000,000.

Accessories

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

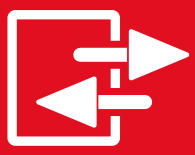
- Gigabit Ethernet accessories including standard GigE components as well as PoE capable GigE components.
- Lenses for corresponding sensor sizes and resolutions.

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



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

Camera interfaces



This chapter includes:

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Control signals 259
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Back panel

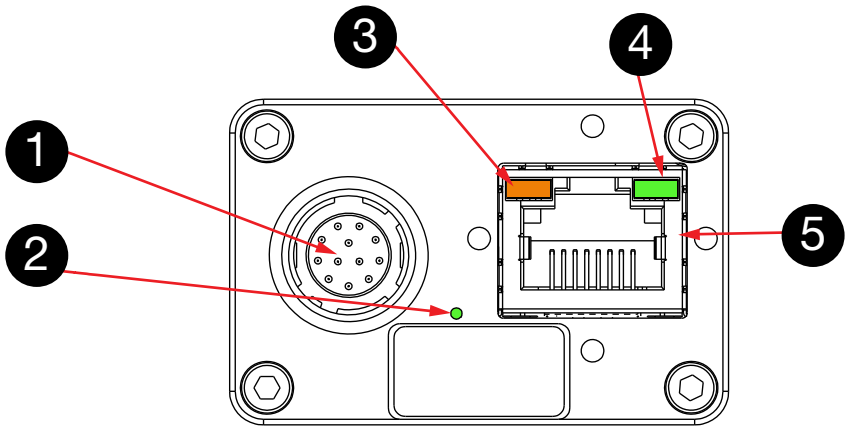


Figure 127: Rear view of Manta type A cameras

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

Table 7: Ports and LEDs

Status LEDs

Manta type A status LEDs

The following tables describe the status LEDs of Manta type A model series: Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, and G-504.

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

Table 8: Status LED 1

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

Table 9: Status LED 2

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

Table 10: Status LED 3

Manta type B status LEDs

The following tables describe the status LEDs of Manta type B model series: Manta G-040, G-158, G-223, G-235, G-282, G-283, G-319, G-419, G-505, G-507, G-895, G-917, G-1236, G-1620, G-2040, and G-2460.

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

Table 11: Status LED 1

LED 2 color	Status
Solid green	Ethernet link established
Slow flashing green	Booting routine
Four rapid flashes per second (4 Hz)	Transmission error. Please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Table 12: Status LED 2



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

Gigabit Ethernet port

The Gigabit Ethernet port conforms to the IEEE 802.3 1000BASE-T standard for Gigabit Ethernet over copper. To prevent EMI and for best performance, Category 6 (or higher) S or STP cables and connectors are recommended. Applications with longer cable lengths or harsh EMI conditions require Category 7 (or higher) cables.



- Cable lengths up to 100 meters are supported.
- The 8-pin RJ45 jack has the pin assignment according to the Ethernet standard (IEEE 802.3 1000BASE-T).
- For cameras that are PoE capable, the Gigabit Ethernet port can be used to provide power to the camera.
- Manta PoE models can source power from IEEE 802.3af (1000 Mbps) and from IEEE 802.3at compliant PSE devices such as switches injectors or NICs.
- When both the Hirose I/O port and Gigabit Ethernet port (via PoE) are used for power, the camera uses the power from the Hirose I/O port.

PoE capable cameras

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

Main board for Manta models

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

Accessories

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

Camera I/O connections

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



Safety-related instructions to avoid malfunctions

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



Hirose connector

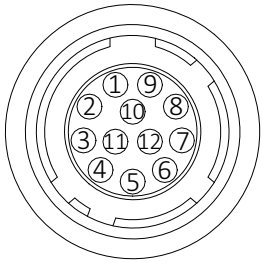
The cable side Hirose 12-pin female connector is available for purchase from Allied Vision (order code: K7600040).



A 12 V power adapter with Hirose connector is available for purchase from Allied Vision:

- Order code: 13869 (Desktop power supply without connection cable)
- Order code: 13866 (AC power cable, 1.8 m, US to C13)
- Order code: 13865 (AC power cable, 1.8 m, EU to C13)

I/O connector pin assignment



Camera side Hirose HR10- 10R-12PA(73) connector					I/O cable color code
Pin	**Signal**	**Direction**	**Level**	**Description**	
1	Camera GND	In	GND for RS232 and external power	Ground for camera power supply and RS232	Blue
2	Camera Power	In	8 to 30 VDC	Camera power supply	Red
3	Auto Iris (Video Type) Out	Out	---	Auto Iris (Video Type) (≥ firmware version 01.44.00)	Violet
4	In 1	In	Standard and PoE models: U_{in}(high) = 3 to 24 V up to 36 V with external resistor of 3.3 kΩ in series U_{in}(low) = 0 to 1.0 V	Opto-isolated input 1 (SyncIn1)	Gray
5	---	---	---	---	Yellow
6	Out 1	Out	Open emitter, maximum 10 mA	Opto-isolated output 1 (SyncOut1)	Green
7	Isolated In GND	In/Out	---	Isolated input signal ground	Brown
8	RxD RS232	In	RS232	Terminal receive data	White
9	TxD RS232	Out	RS232	Terminal transmit data	Black
10	Isolated Out Power	In	Common VCC for outputs, maximum 30 VDC	Power input for opto-isolated outputs	Orange
11	In 2	In	Standard and PoE models: U_{in}(high) = 3 to 24 V U_{in}(low) = 0 to 1.0 V	Opto-isolated input 2 (SyncIn2)	White/Black
12	Out 2	Out	Open emitter, maximum 10 mA	Opto-isolated output 2 (SyncOut2)	White/Brown

Table 13: Camera I/O connector pin assignment and color coding

For cable color and pin out information, see the Allied Vision I/O cable overview:
www.alliedvision.com/fileadmin/content/documents/products/accessories/cable/datasheet/IO-Cable_Overview_DataSheet.pdf.

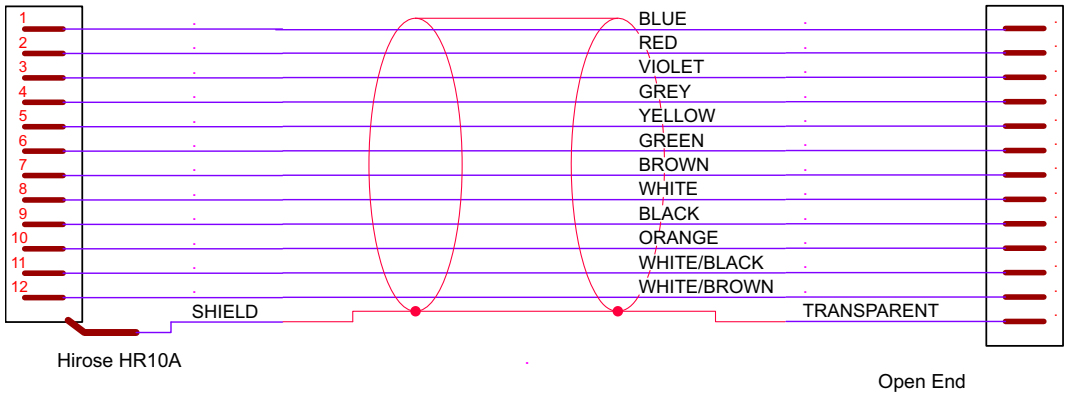


Figure 128: Manta cable color coding

Input block diagram

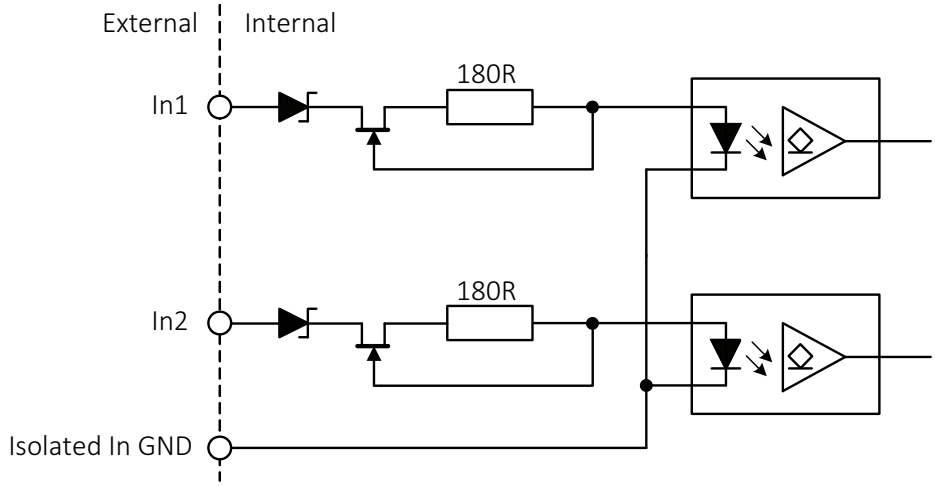


Figure 129: Input block diagram

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

For customers who designed their system for Manta cameras with serial numbers up to serial number 503323258, use your systems with an external resistor without any restrictions.

Input parameters

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

Table 14: Input parameters

Minimum pulse width

The minimum pulse width for all Manta cameras is:

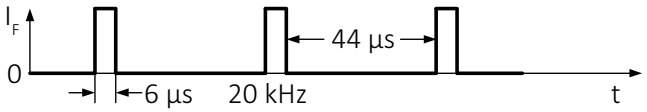


Figure 130: Minimum pulse width

Test conditions

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

Output block diagram

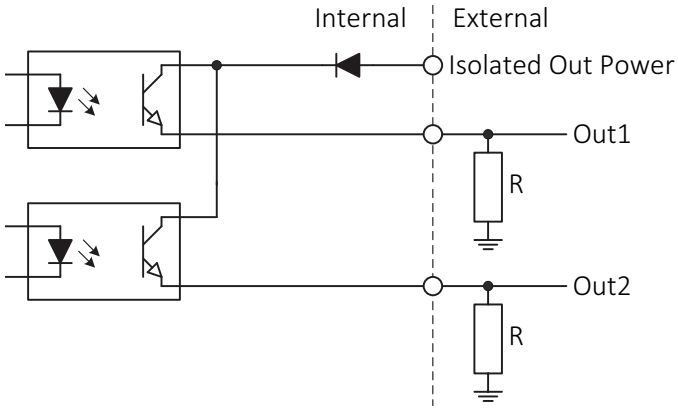


Figure 131: Output block diagram

NOTICE

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

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

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

Table 15: Isolated out power and external resistor

Output switching times

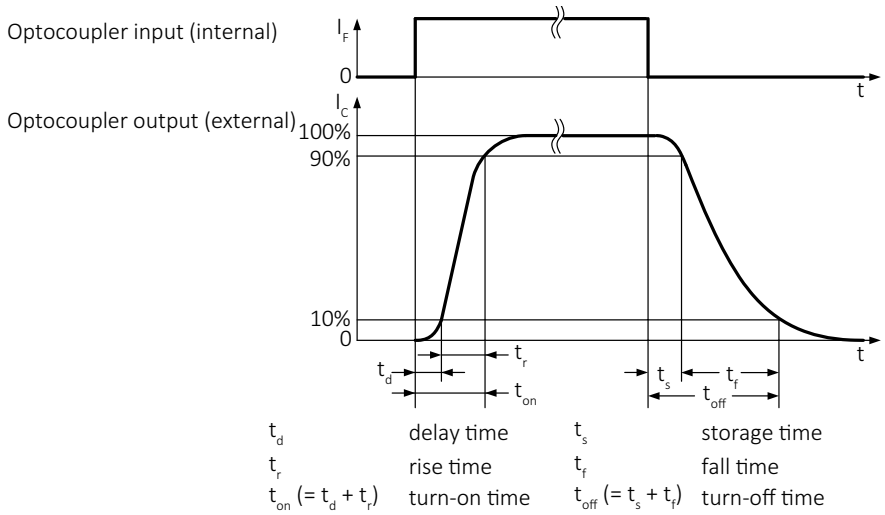


Figure 132: Output switching times

Parameters for all Manta models

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

Table 16: Output parameters

Test conditions

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

Higher external values increase the times in the previous table.

Auto Iris (video type) output description

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

NOTICE

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

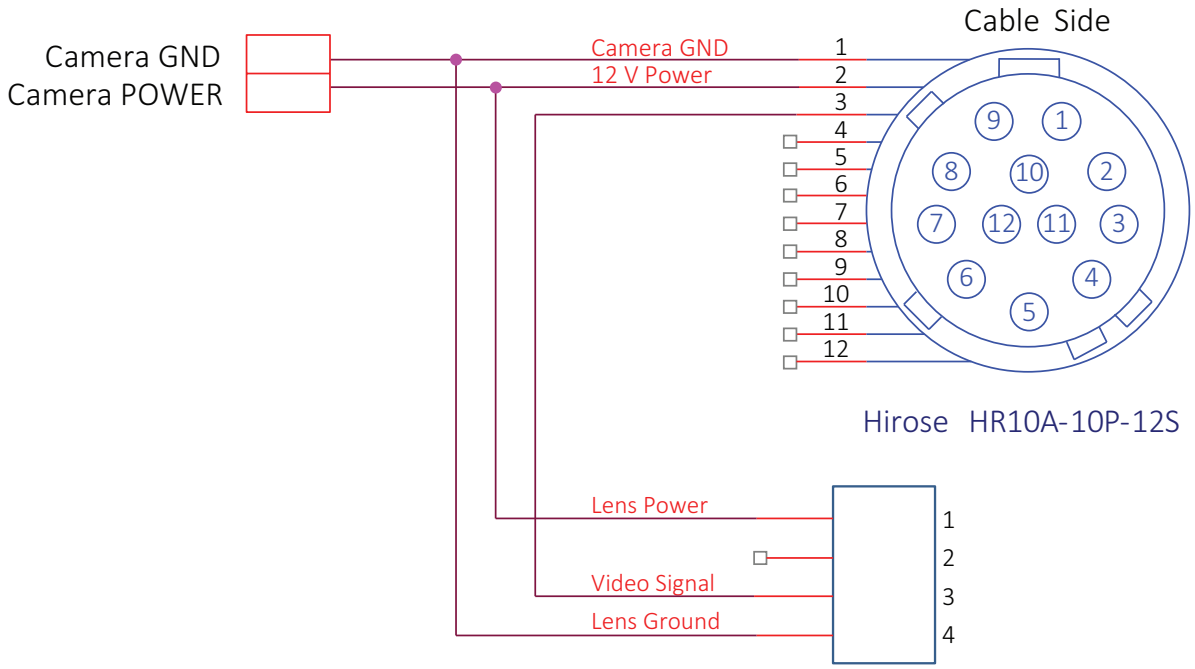


Figure 133: Auto Iris (video type) schematic

Control signals

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

Input block diagram

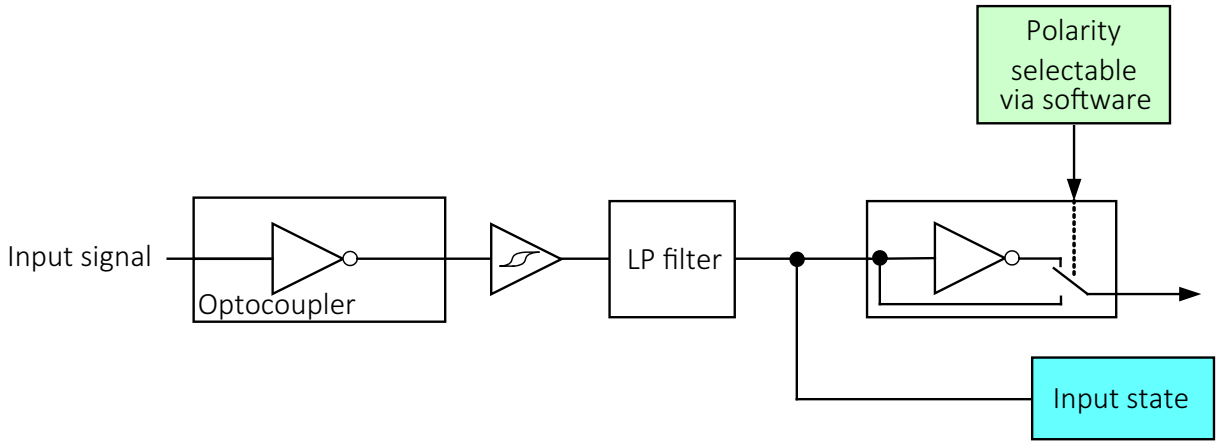


Figure 134: Input block diagram

I/O pin control

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

Output signals

Output signals are configured by software. Any signal can be placed on any output. The main output signals are described in the following table.

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

Table 17: Output signals

Output block diagram

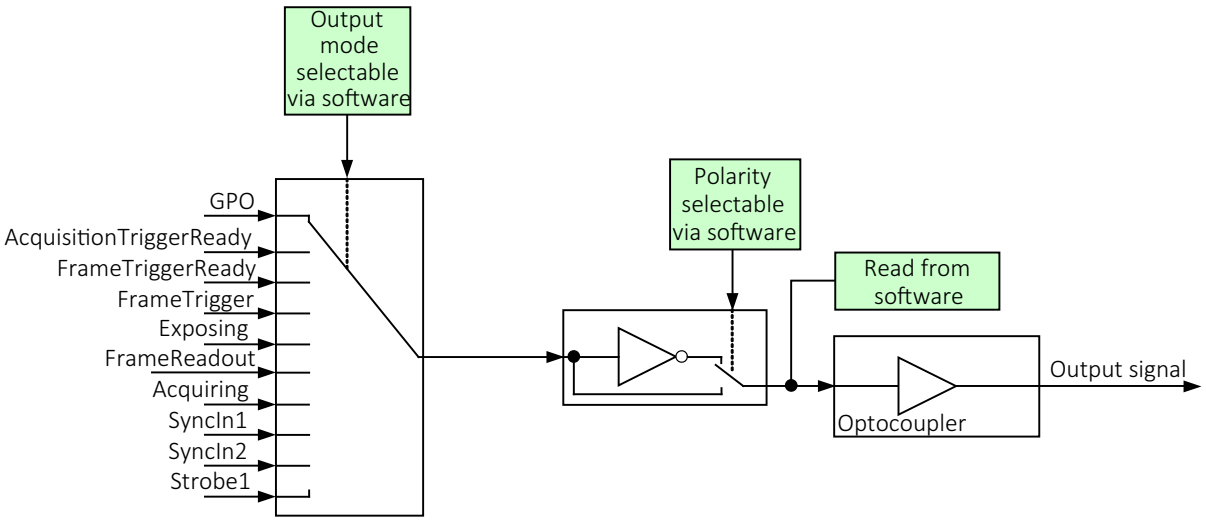


Figure 135: Output block diagram

Trigger timing concept

Figure136 explains the general trigger concept. For more information on trigger timing and camera control, see the GigE Features Reference and Triggering Concept application note.

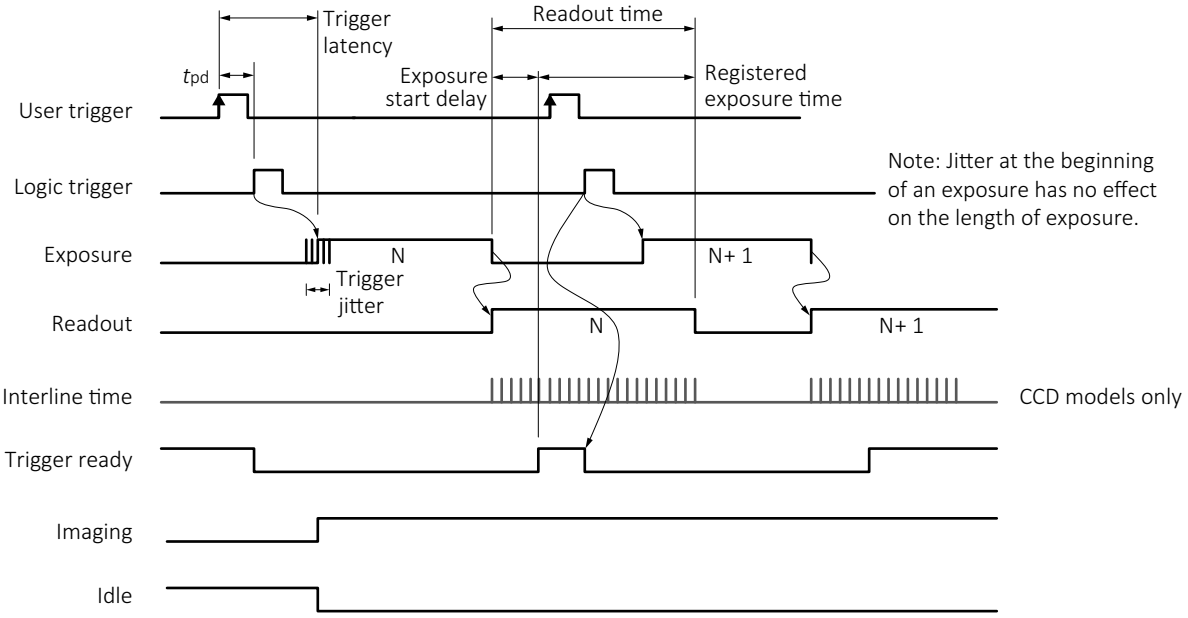


Figure 136: Internal signal waveform

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

Table 18: Trigger definitions

Trigger rules

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

Triggering during the Idle State

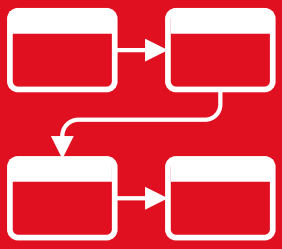
For applications requiring the shortest possible trigger latency and the smallest possible trigger jitter the user trigger signal must be applied when imaging is false and idle is true.

Triggering during the Readout State

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, then the user trigger signal should be applied as soon as a valid trigger ready is detected. In this case, trigger latency and trigger jitter can be up to one line time since exposure must always begin on an interline boundary.

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

Image data flow



Find diagrams that illustrate data flow and bit resolution of the image data.

Contents:

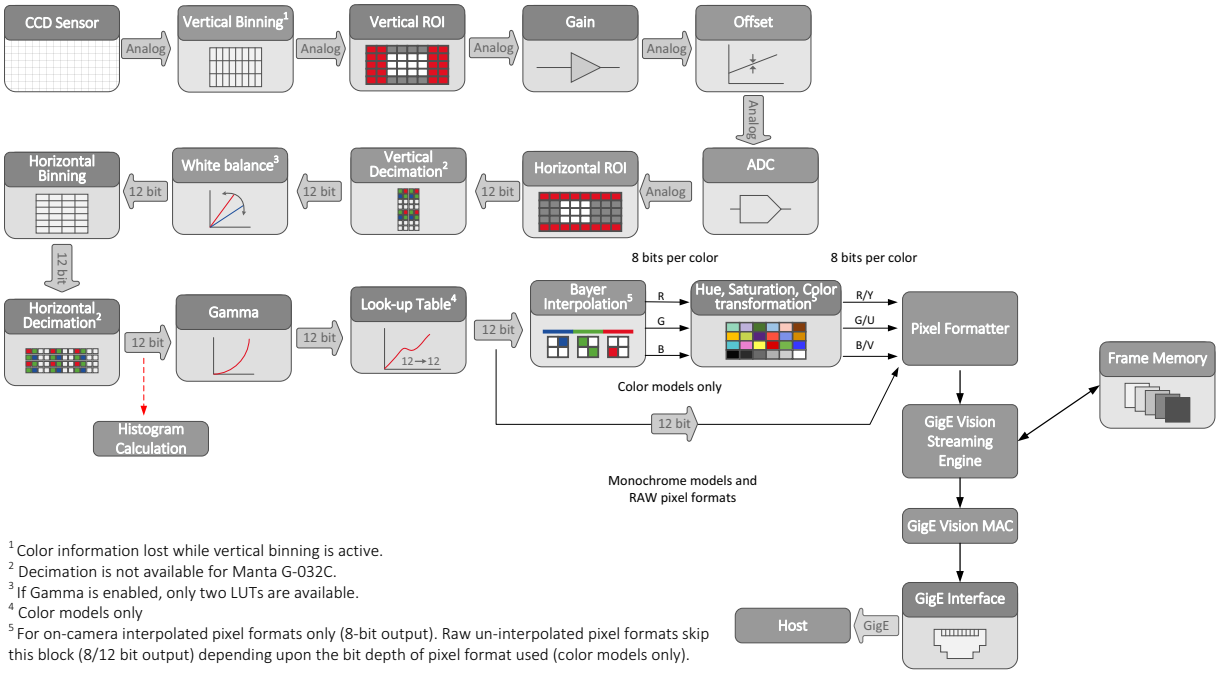
Manta model series with CCD sensors 264
Manta model series with CMOS sensors 266
Color interpolation (Bayer demosaicing) 268

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

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

Manta model series with CCD sensors

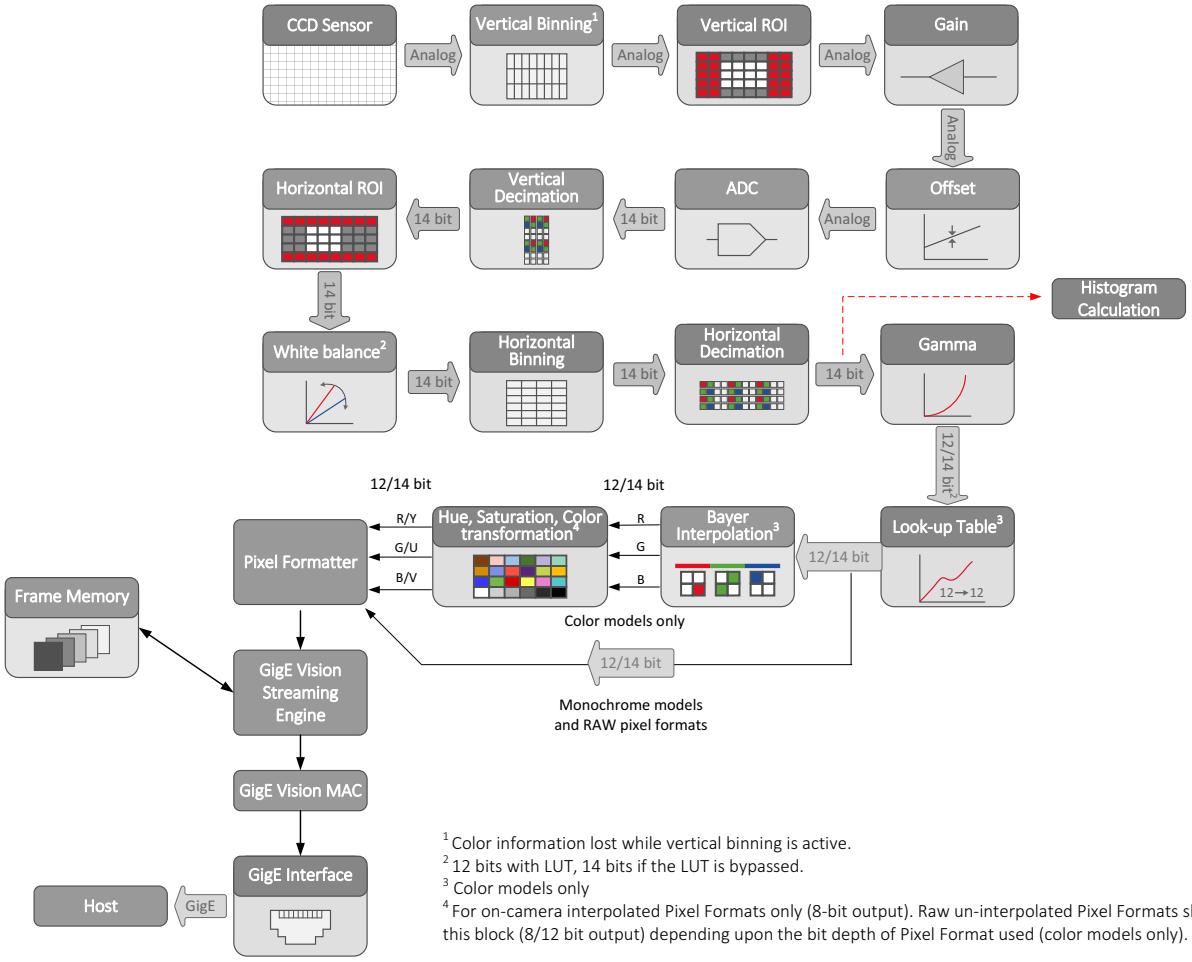
Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, G-504 series



[1] Color information lost while vertical binning is active.
[2] Decimation is not available for Manta G-032C.
[3] If Gamma is enabled, only two LUTs are available.
[4] Color models only
[5] For on-camera interpolated pixel formats only (8-bit output). Raw un-interpolated pixel formats skip this block (8/12 bit output) depending upon the bit depth of pixel format used (color models only).

Figure 137: Image data flow for Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, and G-504 series

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



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

Figure 138: Image data flow for Manta G-282, G-283, G-505, and G-917 series

Manta model series with CMOS sensors

Manta G-223, G-419 series

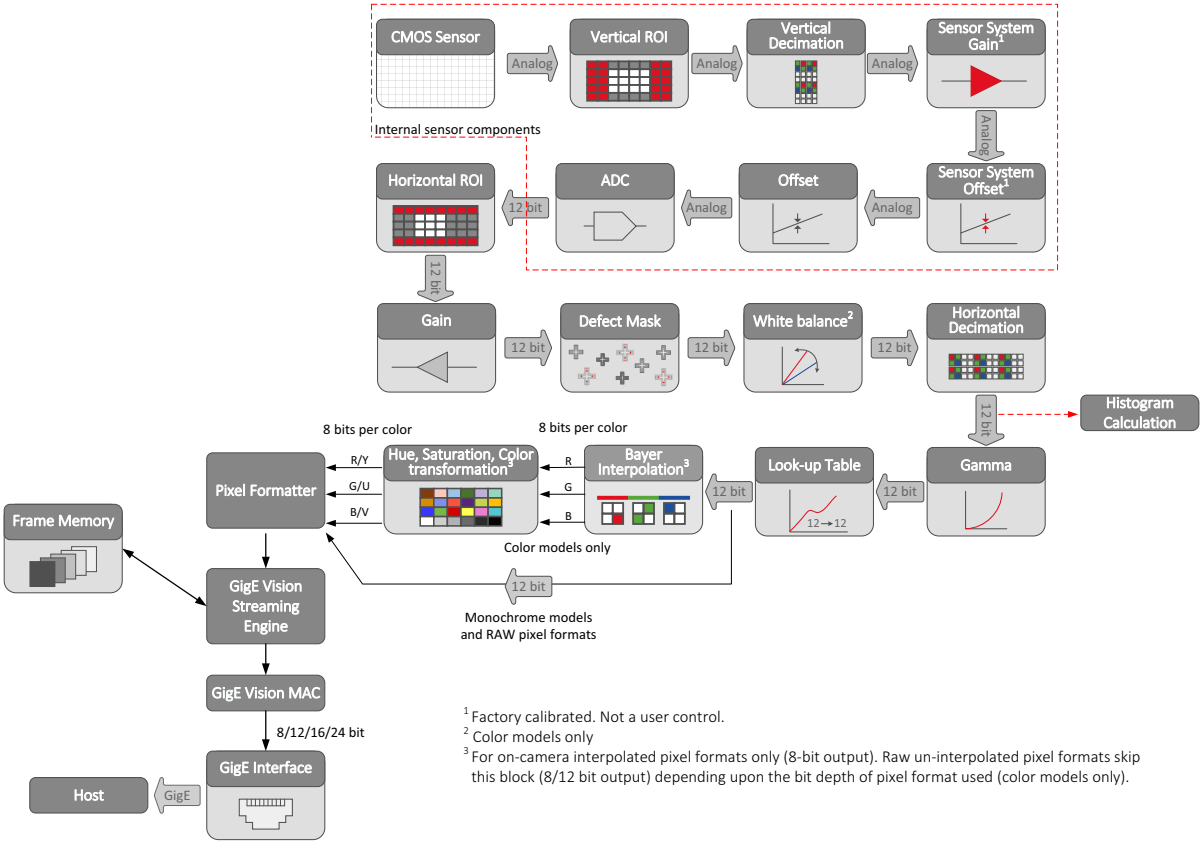
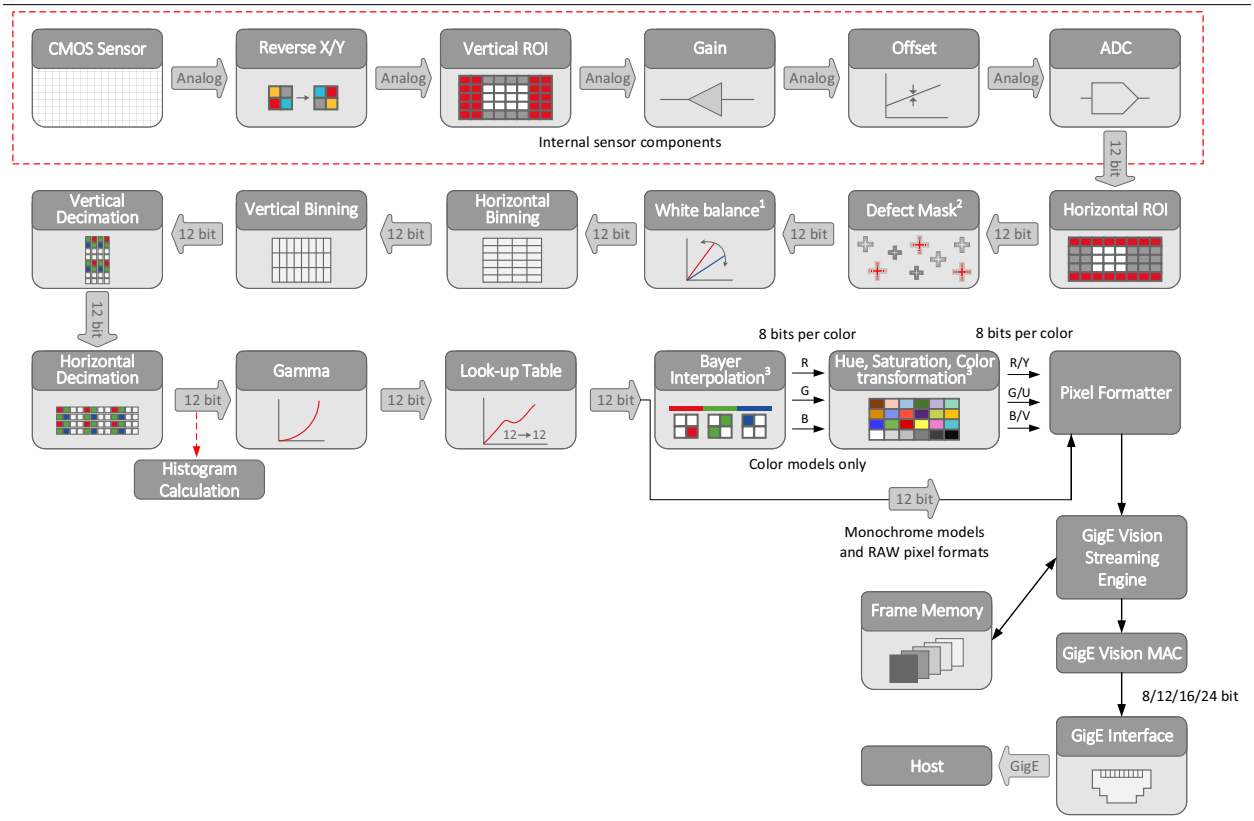


Figure 139: Image data flow for Manta G-223 and G-419 series

Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236, G-1620, G-2040, G-2460 series



[1] Color models only

[2] Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236, G-1620, G-2040, and G-2460 only.

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

Figure 140: Image data flow for Manta G-040, G-158, G-235, G-319, G-507, G-895, G-1236, G-1620, G-2040, and G-2460 series

Color interpolation (Bayer demosaicing)

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

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

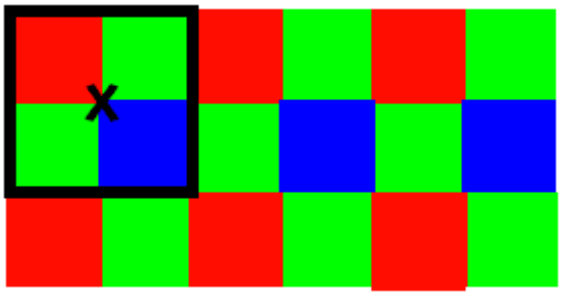


Figure 141: Bayer demosaicing (Manta type A: example of 2 × 2 matrix)

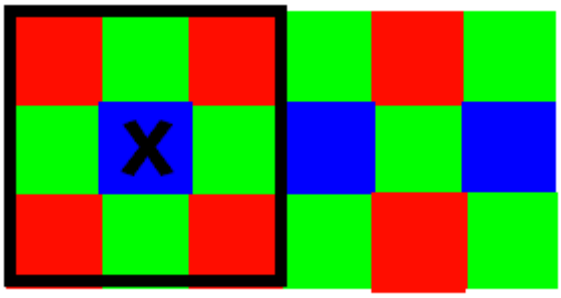


Figure 142: Bayer demosaicing (Manta type B: example of 3 × 3 matrix)

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

RAW mode is primarily used to:

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

When the host computer does not perform Bayer to RGB post-processing, the monochrome image is superimposed with a checkerboard pattern.

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

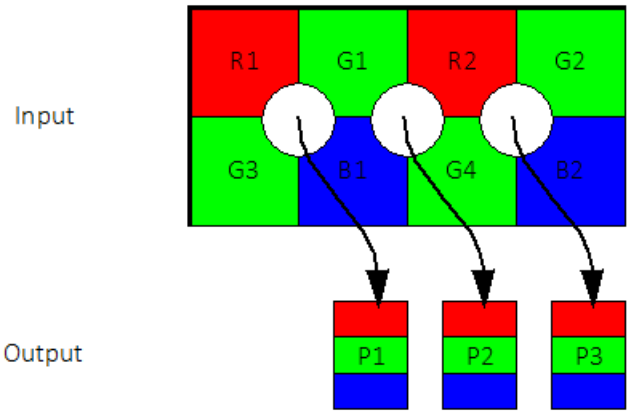


Figure 143: Bayer demosaicing (interpolation)

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

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

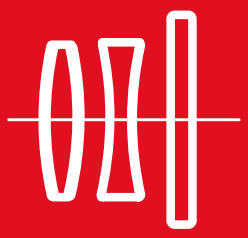
$$P1_{blue} = B1 \qquad P2_{blue} = B1 \qquad P3_{blue} = B2$$

Figure 144: Bayer demosaicing (Manta type A cameras)

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

Allied Vision

Cleaning optical components



Find safety instructions and cautions for cleaning lenses, optical filters, protection glass, and sensors.

Contents:

Keep optical components clean 271
Identifying impurities 271
Locating impurities 272
Materials for cleaning optical components 273
Cleaning Instructions 273

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

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

Keep optical components clean

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

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



Figure 145: Illustration of camera orientation when removing lens or dust cap

Identifying impurities

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

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

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

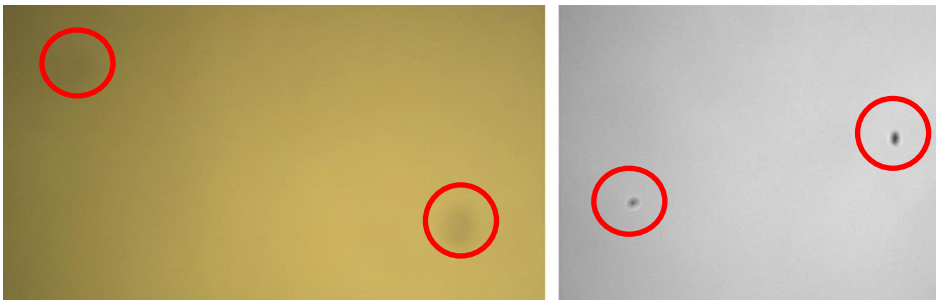


Figure 146: Image with tiny dust on the filter (left) and dust on the sensor (right)

Locating impurities

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

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



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



NOTICE

Removing IR cut filter or protection glass

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

Materials for cleaning optical components



Use only these cleaning materials for optical components

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



NOTICE

Never use these cleaning materials for optical components:

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



Optical cleaning liquid material safety data sheets

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

Cleaning Instructions



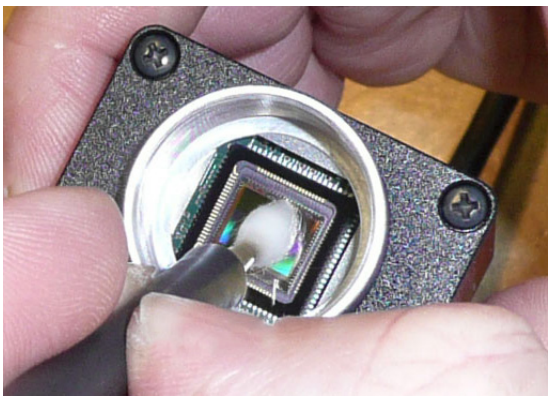
Workplace conditions:

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

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



3. Hold the camera sensor diagonally upwards. Ensure that the camera is away from your body to prevent particles like skin flakes from falling on the sensor.



4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.
5. When you have finished cleaning, examine the surface in a strong light. Take an out-of-focus picture of a flat, illuminated surface to see whether any dirt or dust remains.
6. When dust spots remain, repeat this procedure using new clean lens cloth or tissue (as described earlier).

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

Cleaning with compressed air

Allied Vision does not recommend cleaning Manta cameras with compressed air.

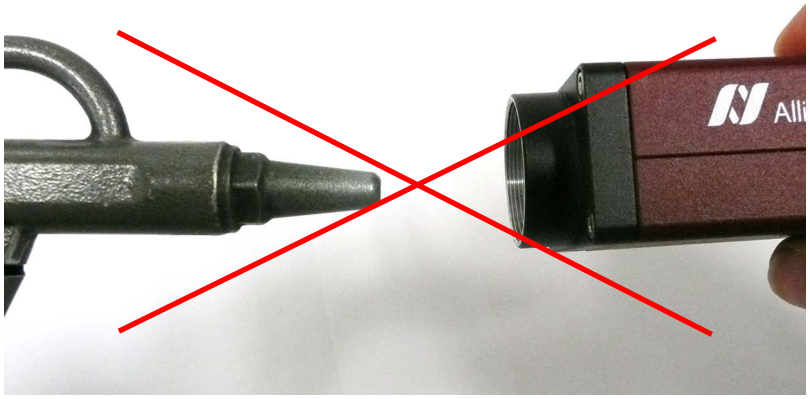


Figure 147: Don't use compressed air

NOTICE

Possible material damage

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

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

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

Compressed air pressure and operating distance

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

Firmware update



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

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

Before loading new firmware, backup your current camera settings.

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

NOTICE

Damage to the camera firmware

If camera cables are disconnected during a firmware update, the camera may come into a dysfunctional state.

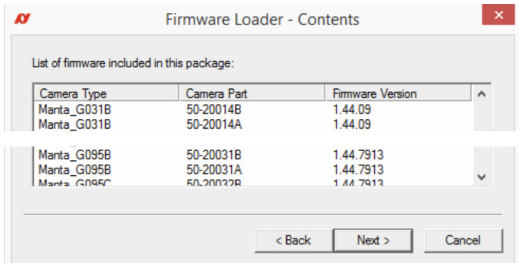
Do not unplug GigE cables or camera power supplies during firmware updates.

Updating the firmware on your Manta camera

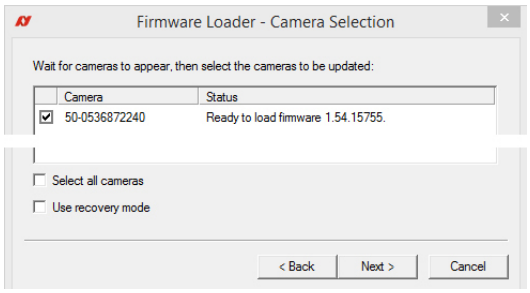
1. Launch the **Firmware Loader**.



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



3. Click **Next**. Available cameras are displayed as serial numbers. Select the camera you want to update.



Recovery Mode

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

4. Click **Next**.

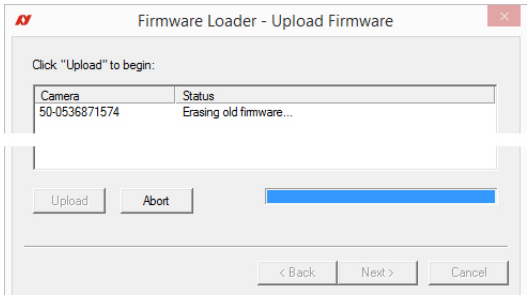
NOTICE

Damage to the camera firmware

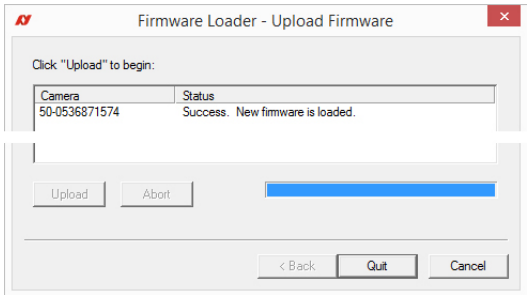
If camera cables are disconnected during a firmware update, the camera may come into a dysfunctional state.

Do not unplug GigE cables or camera power supplies during firmware updates.

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



6. The **Firmware Loader** completion. Click **Quit** to exit the loader.





Power cycle after firmware updates

You must always power cycle the camera after the firmware has been updated.



Issues with the firmware update

If you are unable to load camera firmware, or your camera is not recognized by the firmware loader when using recovery mode, please visit www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma for technical support.

Appendix

Find information for older Manta cameras up to serial number 503323258:

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Back panel 287
Camera I/O connector pin assignment 288

Mechanical dimensions

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

Standard housing with C-Mount (default)

Non-PoE models

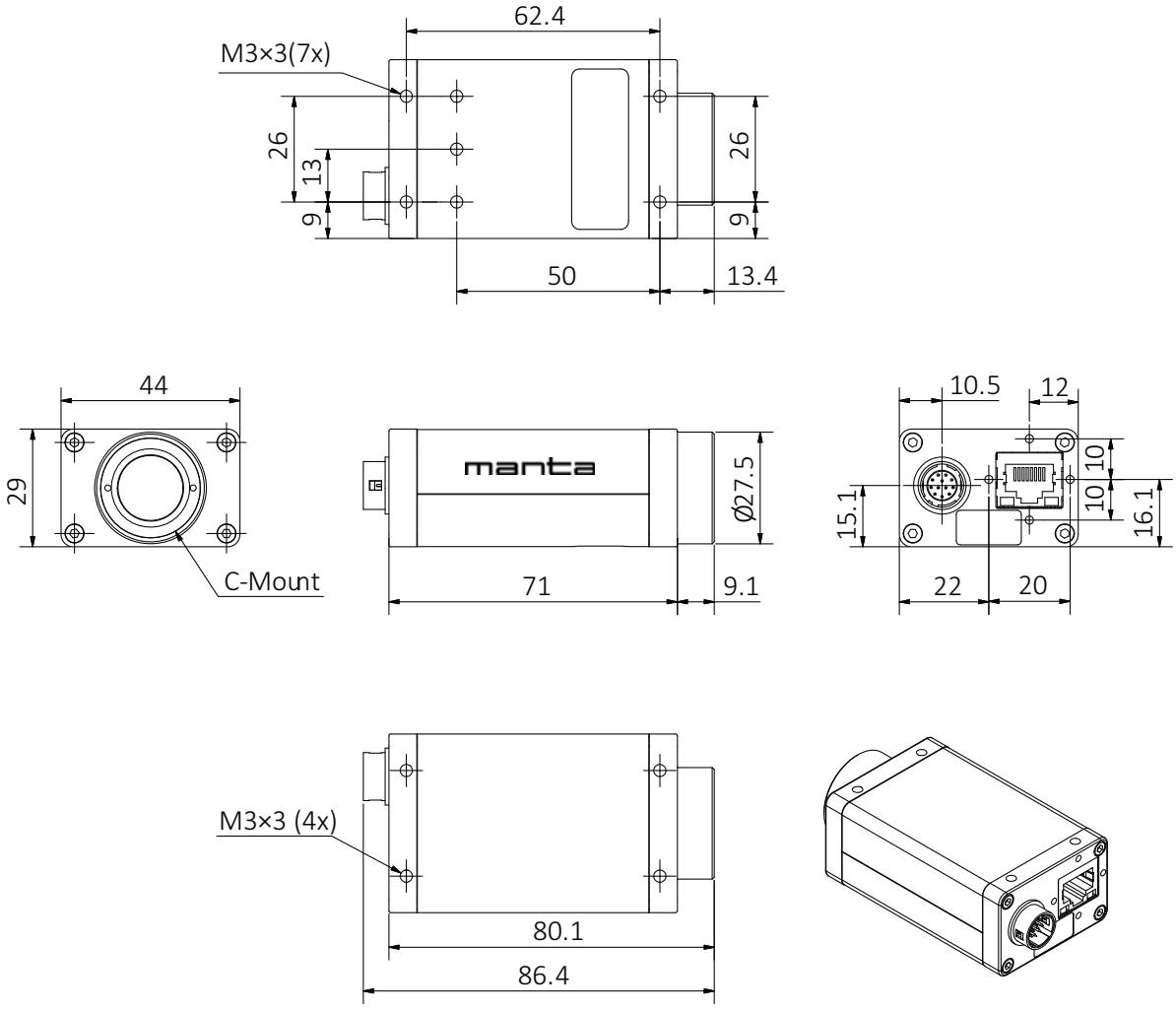


Figure 148: Standard housing C-Mount (non-PoE models) dimensions

W90 housing with C-Mount

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

Non-PoE models

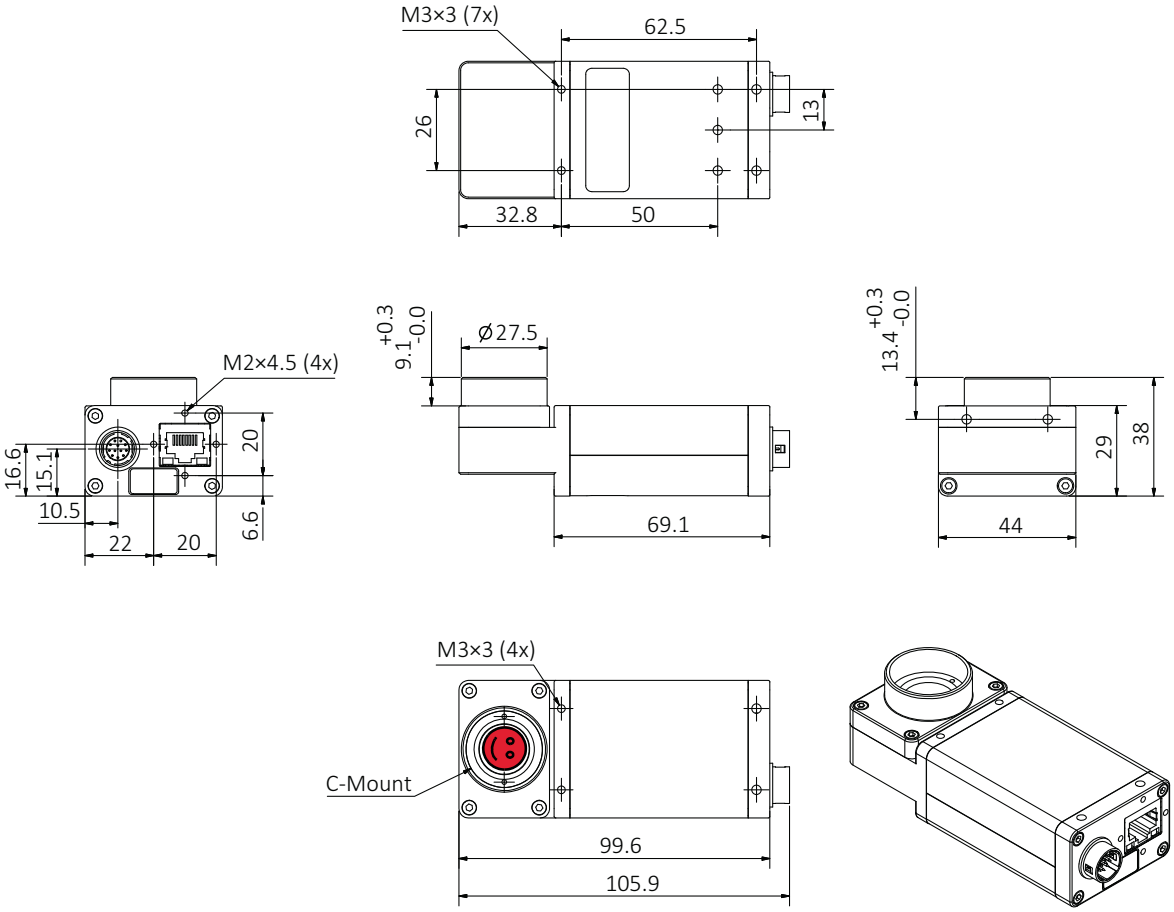


Figure 149: W90 housing C-Mount (non-PoE models) dimensions

W90 S90 housing with C-Mount

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

Non-PoE models

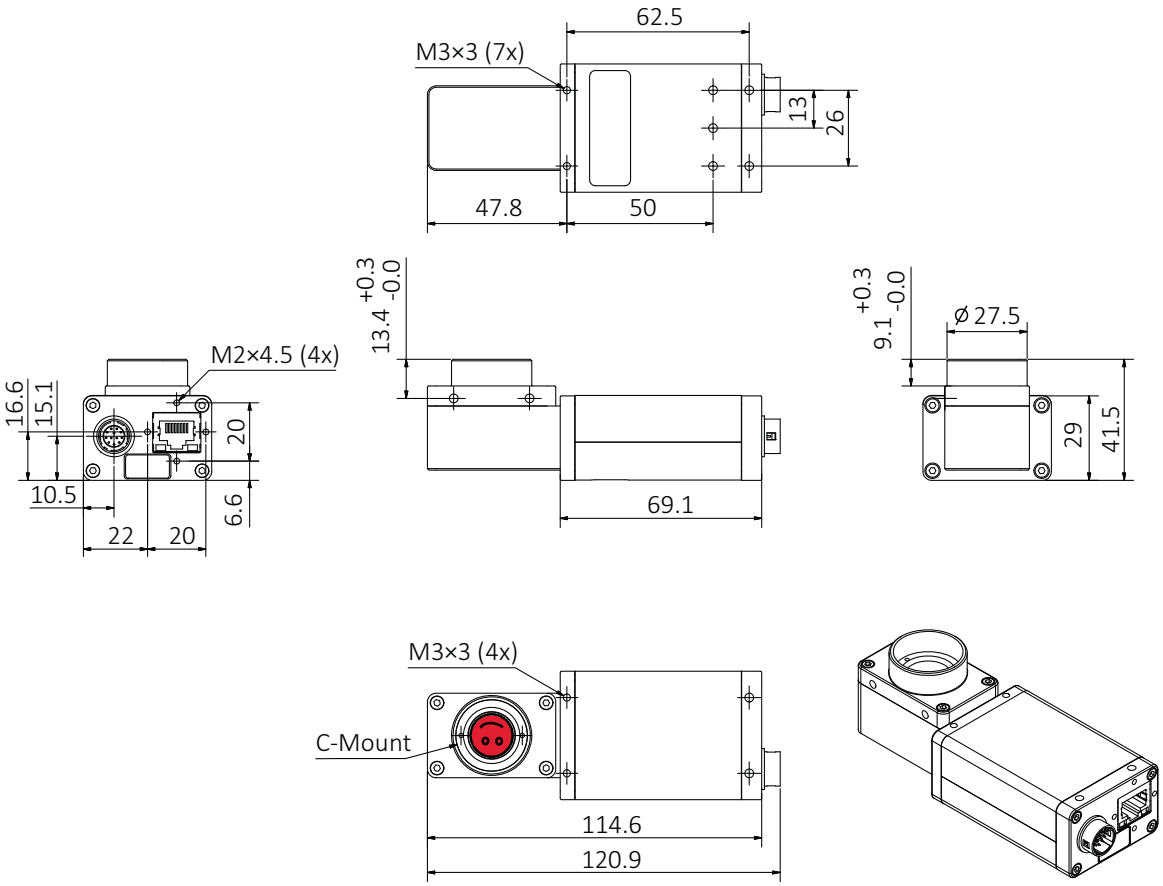


Figure 150: W90 S90 housing C-Mount (non-PoE models) dimensions

W270 housing with C-Mount

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

Non-PoE models

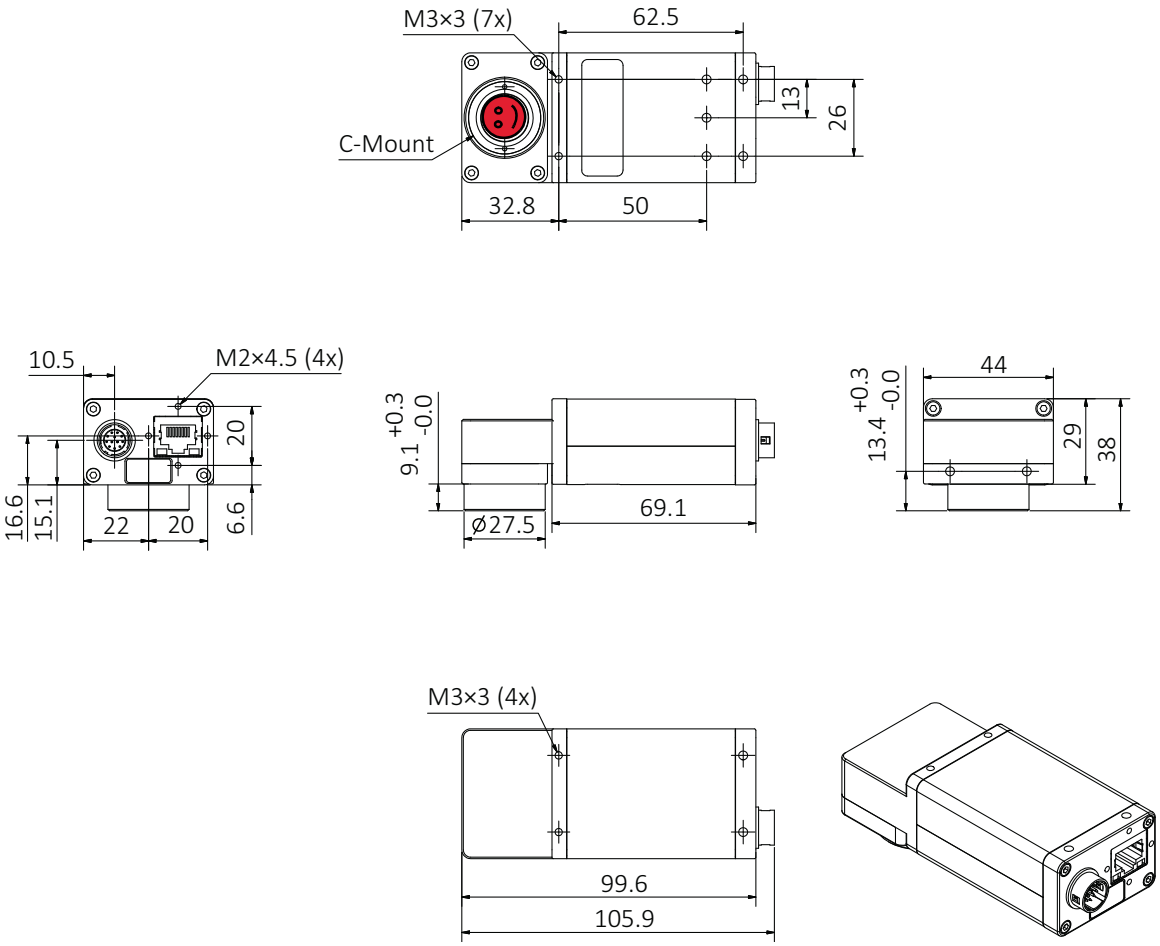


Figure 151: W270 housing C-Mount (non-PoE models) dimensions

W270 S90 housing with C-Mount

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

Non-PoE models

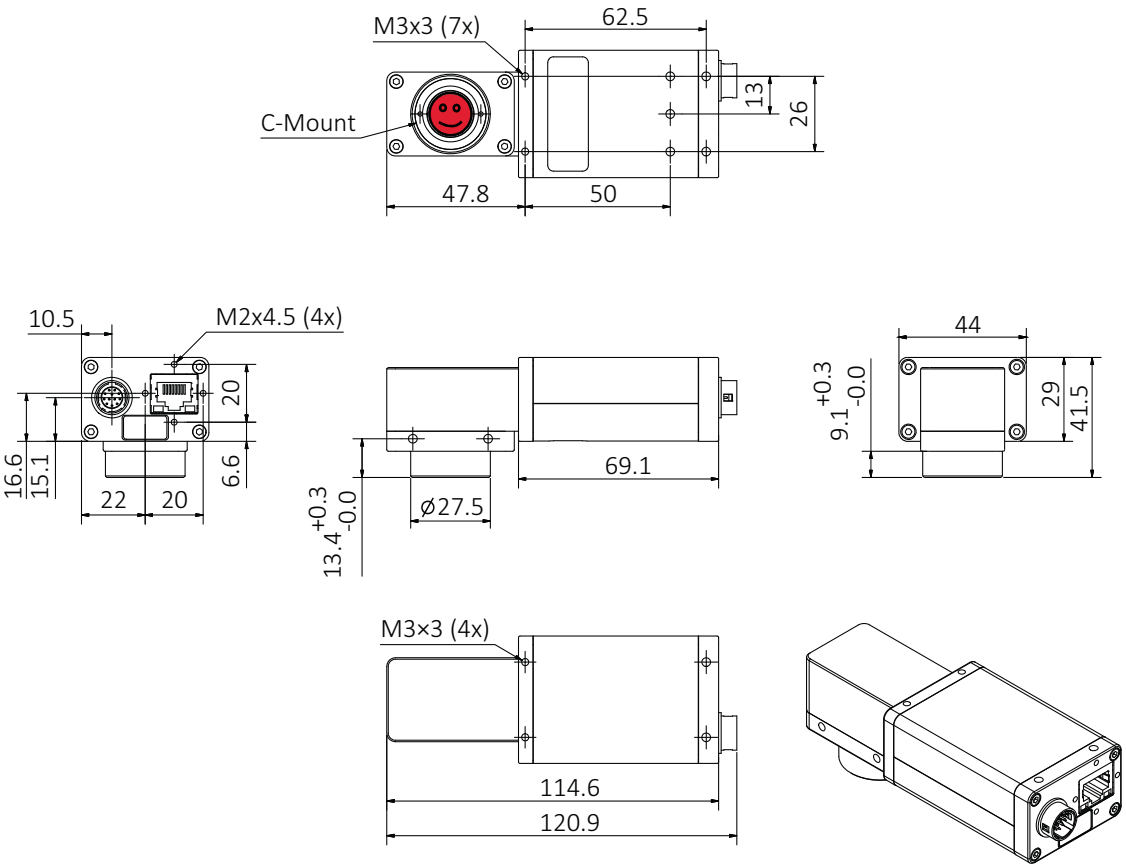


Figure 152: W270 S90 housing C-Mount (non-PoE models) dimensions

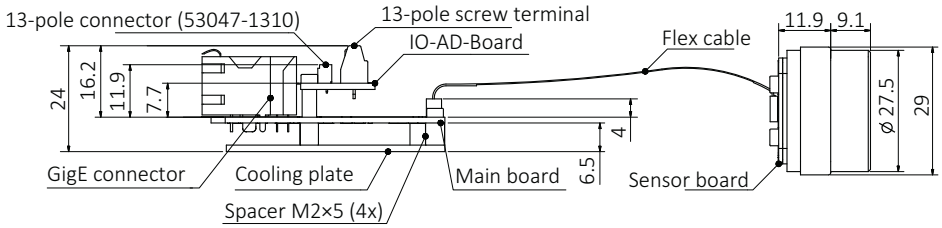
Board level with C-Mount

Non-PoE models

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

1 = GND (for RS232, Ext PWR)
2 = Ext PWR input
3 = PMW-Out
4 = Input 1
5 = not used
6 = Output 1
7 = GND (for Inputs)
8 = RxD 9 = TxD
10 = Power Input (for Output ports)
11 = Input 2
12 = Output 2
13 = Chassis GND

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



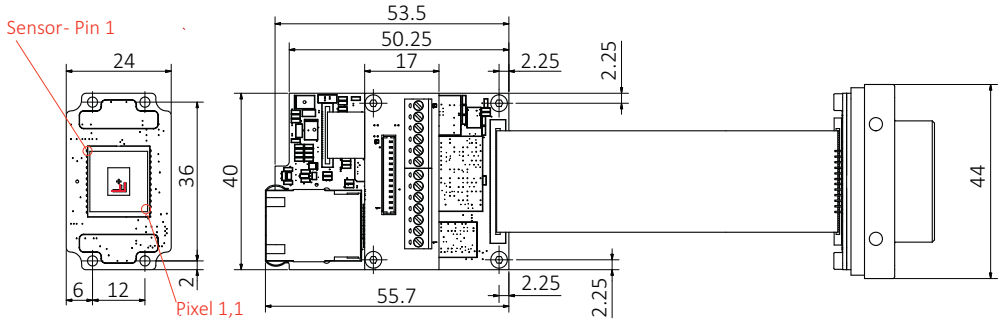


Figure 153: Board level C-Mount (non-PoE models) dimensions

Dimensional mount adjustment

Dimensional mount adjustment cannot be done by the customer. If you need any mount related adjustments, please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Back panel

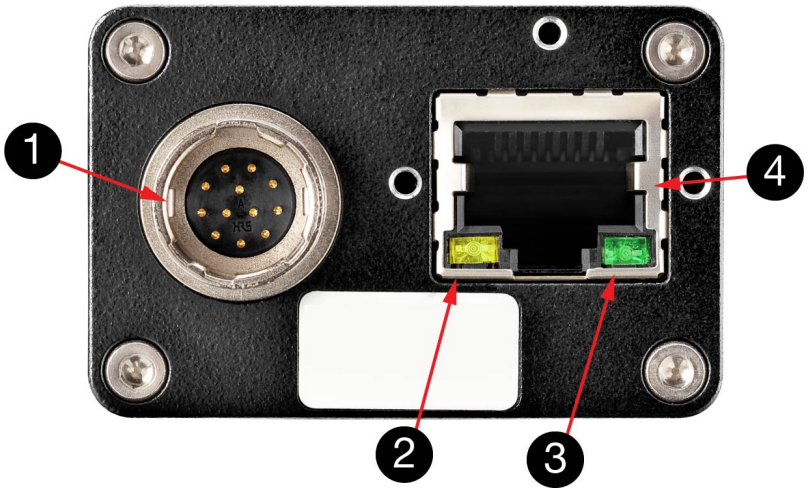


Figure 154: Rear view of non-PoE Manta cameras up to serial number 503323258

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

Status LEDs

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

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

Table 19: Status LED 1 of non-PoE Manta cameras up to serial number 503323258

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

Table 20: Status LED 2 of non-PoE Manta cameras up to serial number 503323258

Camera I/O connector pin assignment

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



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

Pin	Signal	Direction	Level	Description
1	Camera GND	In	GND for RS232 and external power	Ground for camera power supply and RS232
2	Camera Power	In	8 to 30 VDC	Camera power supply
3	Auto Iris (Video Type) Out	Out	---	Auto Iris (Video Type) (≥ firmware version 01.44.00)
4	In 1	In	U_{in}(high) = 2.5 to 6.0 V U_{in}(low) = 0 to 0.8 V up to 36 V with external resistor of 3.3 kΩ in series	Opto-isolated input 1 (SyncIn1)
5	---	---	---	---
6	Out 1	Out	Open emitter, maximum 20 mA	Opto-isolated output 1 (SyncOut1)
7	Isolated In GND	In/Out	---	Isolated input signal ground
8	RxD RS232	In	RS232	Terminal receive data
9	TxD RS232	Out	RS232	Terminal transmit data
10	Isolated Out Power	In	Common VCC for outputs maximum 30 VDC	Power input for opto-isolated outputs
11	In 2	In	U_{in}(high) = 2.5 to 6.0 V U_{in}(low) = 0 to 0.8 V	Opto-isolated input 2 (SyncIn2)
12	Out 2	Out	Open emitter, maximum 20 mA	Opto-isolated output 2 (SyncOut2)

Table 21: Camera I/O connector pin assignment for non-PoE Manta cameras up to serial number 503323258

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