



GigE VISION CAMERAS

Manta

User Guide

V8.2.7

FW Loaders: 40190 | 40111

Note: Lenses are not part of this product.

**Quick links**

- [Manta cameras at a glance](#) on page 15
- [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 45.

**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 45.



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 45.



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 Bildverarbeitungssysteme 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 45.



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 45 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 45.



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 45.

זהירות

סכנת כוויה

בזמן הפערת המצלמה עלולות טמפרטורות גבוהות לעלות, שיכולות לגרום לכוויות.



זהירות

פציעה מנפילת מצלמות או עדשות

מצלמה או עדשה שנופלות עלולות לגרום לפציעה.



זהירות

סכנה להחתך מתברג חד של העדשה

תברג תושבת העדשה עלול להיות חד עד כדי פציעה.



שימוש מיועד

מוצרי AlliedVision מיועדים לשילוב במערכות ממוחשבות 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 45.



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](#) 45 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 45.



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 45.



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 45.



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 45 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?

| Content | Link |
|---|--|
| GigE Features Reference, camera data sheets, Modular Concept, and 3D CAD STEP files | www.alliedvision.com/en/support/technical-documentation/manta-documentation |
| Application notes | www.alliedvision.com/en/support/faqs-application-notes |
| 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 |
| For details about camera warranty duration and sensor warranty terms. | www.alliedvision.com/en/support/warranty |

Table 1: Additional resources

| Software | Link |
|---------------------------------------|--|
| Vimba Suite and software tools | www.alliedvision.com/en/support/software-downloads |

Table 2: Download Vimba Suite and software tools

Contact us

Website, email

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Distribution partners

www.alliedvision.com/en/avt-locations/avt-distributors

Support

www.alliedvision.com/en/support

www.alliedvision.com/en/about-us/contact-us/technical-support-repair/-/rma

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Document history and conventions



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Document history

| Version | Date | Document updates |
|---------|-------------|---|
| V8.2.7 | 2024-Nov-07 | Corrected typos. |
| V8.2.6 | 2024-Jul-15 | <ul style="list-style-type: none"> Updated addresses in Contact us on page 17. Applied editorial changes. |
| V8.2.5 | 2024-Feb-06 | Updated contents in IP settings on page 240. |
| 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 51. <ul style="list-style-type: none"> 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 56. |
| V8.2.3 | 2023-Jul-10 | Firmware loader: 40111 <ul style="list-style-type: none"> Applied editorial changes. |
| V8.2.2 | 2023-Jan-27 | Release: Firmware loader: 40111 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Added firmware versions for better orientation. Updated values for exposure times and increments in Model specific specifications on page 56 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 183 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 264. Applied editorial changes. |
| V8.1.6 | 2022-May-09 | Firmware loader: 37388 <ul style="list-style-type: none"> Corrected technical drawing for Standard housing with C-Mount (default) on page 189. |
| V8.1.5 | 2022-Mar-01 | Firmware loader: 37388 <ul style="list-style-type: none"> Corrected “Focal Length versus Field of View” table for Manta G-235 series on page 226. Renamed the document from Technical Manual to User Guide. |

Table 3: Document history (sheet 1 of 12)

| Version | Date | Document updates |
|---------|-------------|---|
| V8.1.4 | 2021-Dec-08 | Release: Firmware loader: 37388 <ul style="list-style-type: none"> Applied editorial changes. |
| V8.1.3 | 2021-Oct-19 | Firmware loader: 34365 <ul style="list-style-type: none"> Fixed incorrect page numbers. Applied editorial changes. |
| V8.1.2 | 2021-Aug-19 | Firmware loader: 34365 <ul style="list-style-type: none"> Added icon for compliance with UKCA in Compliance notifications on page 43. Applied editorial changes. |
| V8.1.1 | 2021-Jul-13 | Release: Firmware loader: 34365 <ul style="list-style-type: none"> Applied editorial changes. |
| V8.1.0 | 2021-Jan-15 | Release: Firmware loader: 32702 <ul style="list-style-type: none"> Added specifications for new models, including absolute QE, spectral response, and ROI frame rates: <ul style="list-style-type: none"> Manta G-1620 series on page 168 Manta G-2040 series on page 173 Manta G-2040 series on page 173. 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 264. Updated QE and spectral response plots for Manta G-223, G-449, and G-419 NIR in Specifications on page 49. Added tables for imaging performance in Specifications on page 49. Added tables in Focal length versus field of view on page 220 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 <ul style="list-style-type: none"> Added Read before use on page 2. Added Your safety on page 46. Added Product safety on page 47. 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 234. Applied editorial changes. |

Table 3: Document history (sheet 2 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V8.0.2 | 2019-Nov-04 | Release: Firmware loader: 27877 <ul style="list-style-type: none"> Corrected technical drawings. |
| V8.0.1 | 2019-Jun-06 | <ul style="list-style-type: none"> Corrected the feature comparison table in the Specification chapter <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Updated Manta G-1236 series specifications. Applied various other minor enhancements and corrections. |
| V7.9.0 | 2018-Jan-12 | <ul style="list-style-type: none"> Initial commercial release: Manta G-040 series on page 68 <ul style="list-style-type: none"> 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 98 <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 3 of 12)

| Version | Date | Document updates |
|---------|-------------|---|
| V7.8.3 | 2017-Jun-28 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Corrected power consumption values for Manta G-319, G-507, G-895, and G-1236 series. Corrected two reported errors: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Initial commercial release: Manta G-1236 series on page 163 with: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Initial commercial release: Manta G-895 series on page 154 with: <ul style="list-style-type: none"> 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 4 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V7.5.0 | 2016-Aug-16 | <ul style="list-style-type: none"> New features for Manta G-282, G-283, G-505, and G-917 series: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Initial commercial release: Manta G-319 series on page 128 with: <ul style="list-style-type: none"> 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 149 with: <ul style="list-style-type: none"> 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 5 of 12)

| Version | Date | Document updates |
|---------|-------------|---|
| V7.3.0 | 2015-Nov-02 | <ul style="list-style-type: none"> Updated mass of all Manta type B cameras as per <i>Product Change Notification</i> 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 | <ul style="list-style-type: none"> 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 6 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V7.1.0 | 2014-Oct-07 | <ul style="list-style-type: none"> Initial commercial release: Manta G-235 series on page 115 with: <ul style="list-style-type: none"> 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 145 with <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 7 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V7.0.1 | 2013-Sep-30 | <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Initial commercial release: Manta G-419 series on page 133 with: <ul style="list-style-type: none"> 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 8 of 12)

| Version | Date | Document updates |
|---------|-------------|---|
| V6.0.1 | 2013-Mar-20 | <ul style="list-style-type: none"> Initial commercial release: Manta G-223 series on page 111 with: <ul style="list-style-type: none"> 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 120 with: <ul style="list-style-type: none"> 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 124 with: <ul style="list-style-type: none"> 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 159 with: <ul style="list-style-type: none"> 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 9 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V5.0.0 | 2012-May-15 | <ul style="list-style-type: none"> Initial commercial release: Model specific specifications on page 56 with: <ul style="list-style-type: none"> 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 89 with <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Manta G-125 series ROI frame rate. IR cut filter: <ul style="list-style-type: none"> Changed IR cut filter to type Jenofilt 217. New CAD drawings with Pin3 = Video Type Auto Iris Out. Frame memory: <ul style="list-style-type: none"> 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 10 of 12)

| Version | Date | Document updates |
|---------|-------------|--|
| V4.1.0 | 2011-Jun-24 | <ul style="list-style-type: none"> Added PoE information including: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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). <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 11 of 12)

| Version | Date | Document updates |
|---------|-------------|---|
| V4.0.0 | 2010-Oct-25 | <ul style="list-style-type: none"> Initial commercial release: Manta G-033 series on page 64 <ul style="list-style-type: none"> 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 141 <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Initial commercial release: Manta G-046 series on page 73 <ul style="list-style-type: none"> 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 81 <ul style="list-style-type: none"> 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 94 <ul style="list-style-type: none"> 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 103 <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> New manual release status |

Table 3: Document history (sheet 12 of 12)

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. |
| <i>Feature options</i> | 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:

| | |
|--------------------------------|----|
| Compliance notifications | 43 |
| Intended use | 45 |
| Copyright and trademarks | 45 |
| Your safety | 46 |
| Product safety | 47 |

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.

Allied Vision isn't a legal manufacturer of medical product. Instead, Allied Vision cameras and accessories may be used as components for medical product after design-in by the medical device manufacturer and based on a quality assurance agreement (QAA) between Allied Vision (supplier) and medical device manufacturer (customer). Allied Vision's duties in that respect are defined by ISO 13485, clause 7.2 (customer-related processes, equivalent to ISO 9001, clause 8.2).

Copyright and trademarks

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

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

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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.

Product safety

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.

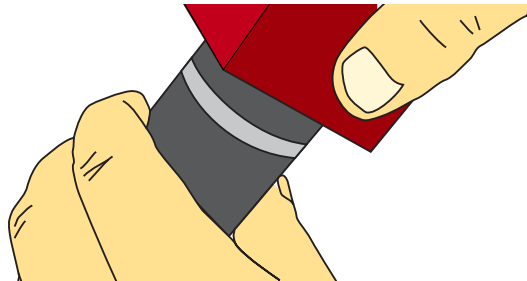


Figure 1: Holding the camera with the lens mount facing the ground

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 | 50 |
| Shock and vibration..... | 50 |
| Notes on specifications..... | 51 |
| Specifications common to all models | 55 |
| Hardware options | 55 |
| Model specific specifications | 56 |
| Camera feature availability | 183 |

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 Viewer 2.0 or later. Applicable to dual-tap cameras as detailed in the specification tables.

Image acquisition must be stopped before changing sensor tap mode.

Affected features

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

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

Table 7: Features affected when switching sensor tap mode

Absolute QE plots

Before reading the QE plots

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

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

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

Sony CCD and CMOS sensors

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

CMOSIS/ams CMOS sensors

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

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

Wavelength

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

Spectral response plots

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

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

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 | <ul style="list-style-type: none"> • Mono models: Protection glass • Color models: Type Hoya C-5000 type IR cut filter • NIR models: No filter¹ |
| 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 | <ul style="list-style-type: none"> • 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 8: 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 9: Manta G-031 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.• Frame valid state: the sensor is reading out data and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state. | | |

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

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 10: Manta G-031 (Sony ICX618) imaging performance

Absolute QE

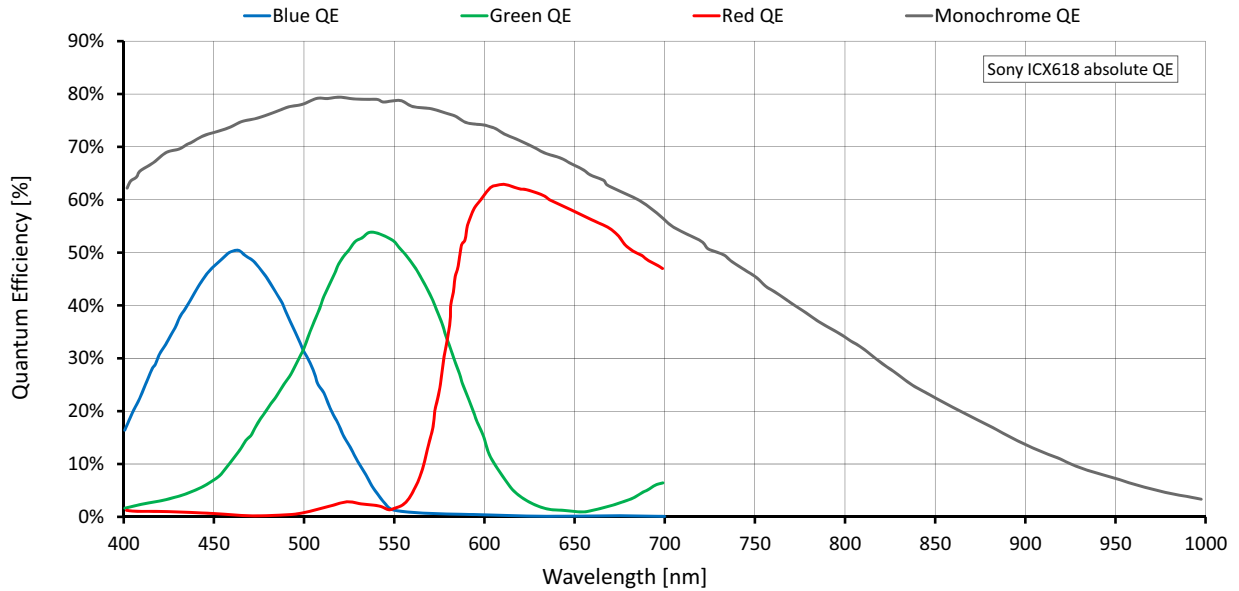


Figure 2: Manta G-031 (Sony ICX618) absolute QE

Spectral response

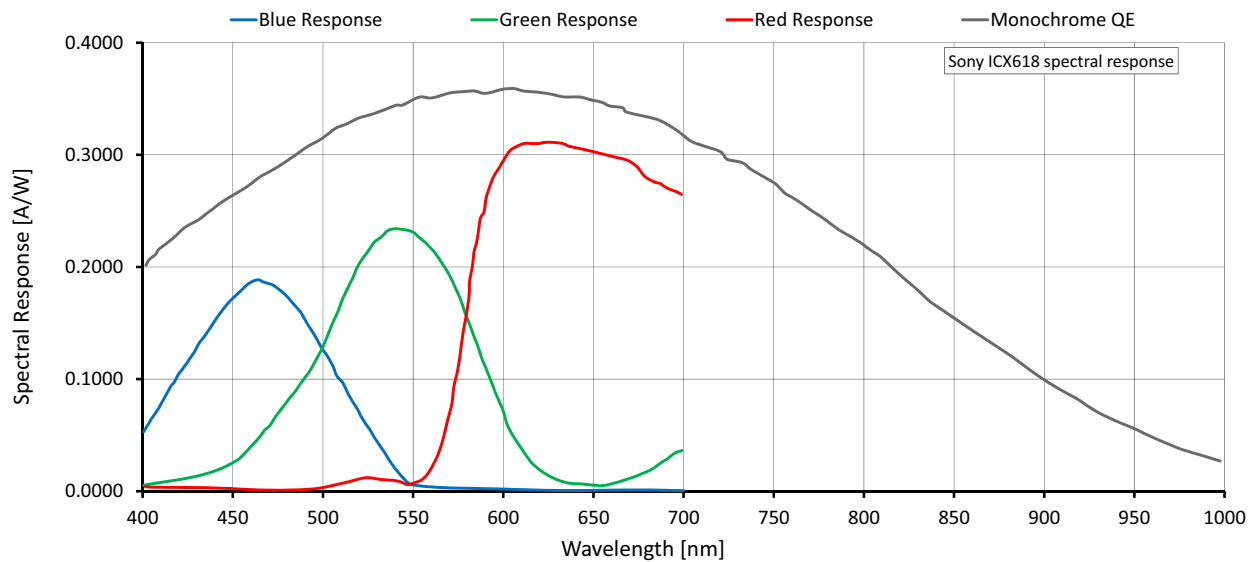


Figure 3: Manta G-031 (Sony ICX618) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 125.2 fps

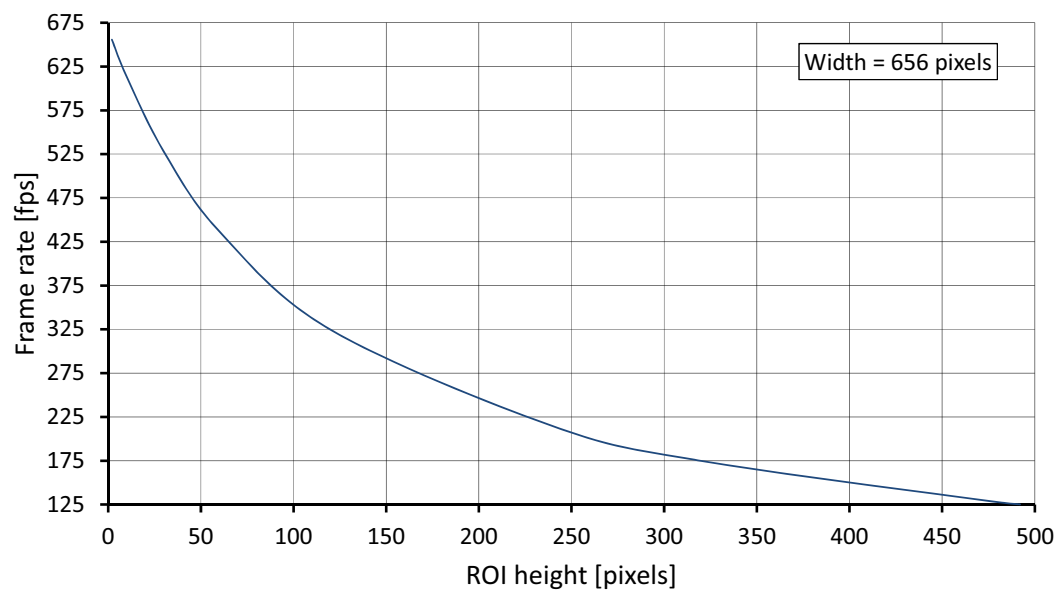


Figure 4: Manta G-031 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 492 | 125.2 | 60 | 436.7 |
| 480 | 127.7 | 30 | 527.9 |
| 320 | 174.8 | 10 | 613.2 |
| 240 | 214.4 | 2 | 655.6 |
| 120 | 324.5 | | |

Table 11: 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 12: Manta G-032 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• 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 12: 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 13: Manta G-032 (Sony ICX424) imaging performance

Absolute QE

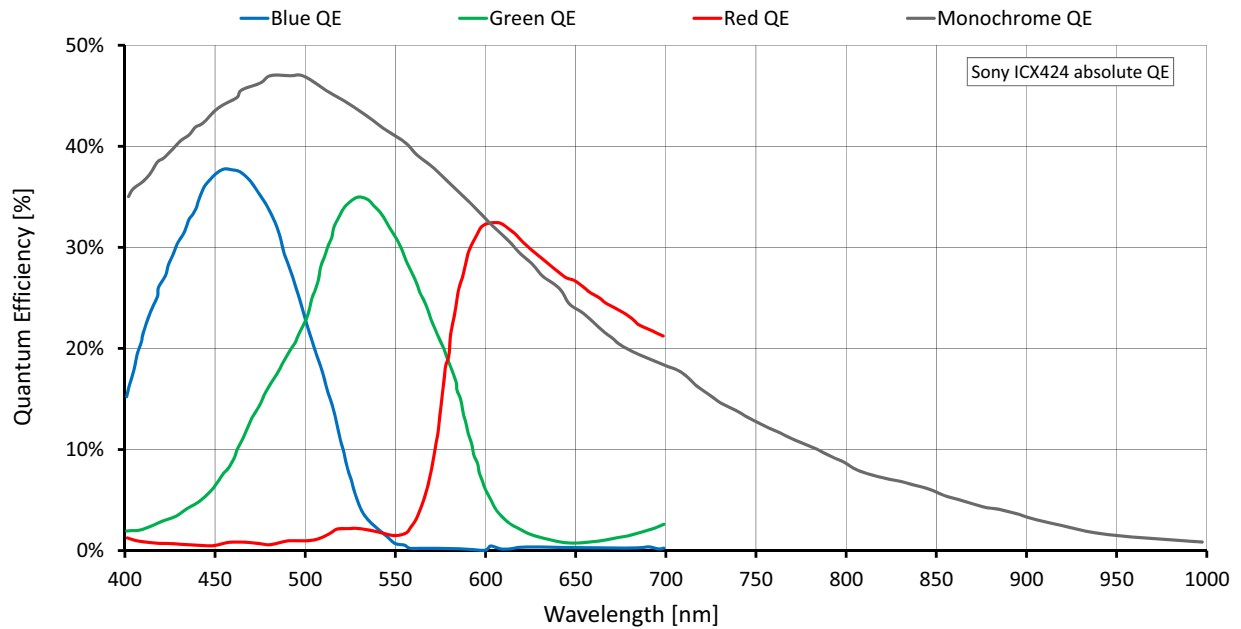


Figure 5: Manta G-032 (Sony ICX424) absolute QE

Spectral response

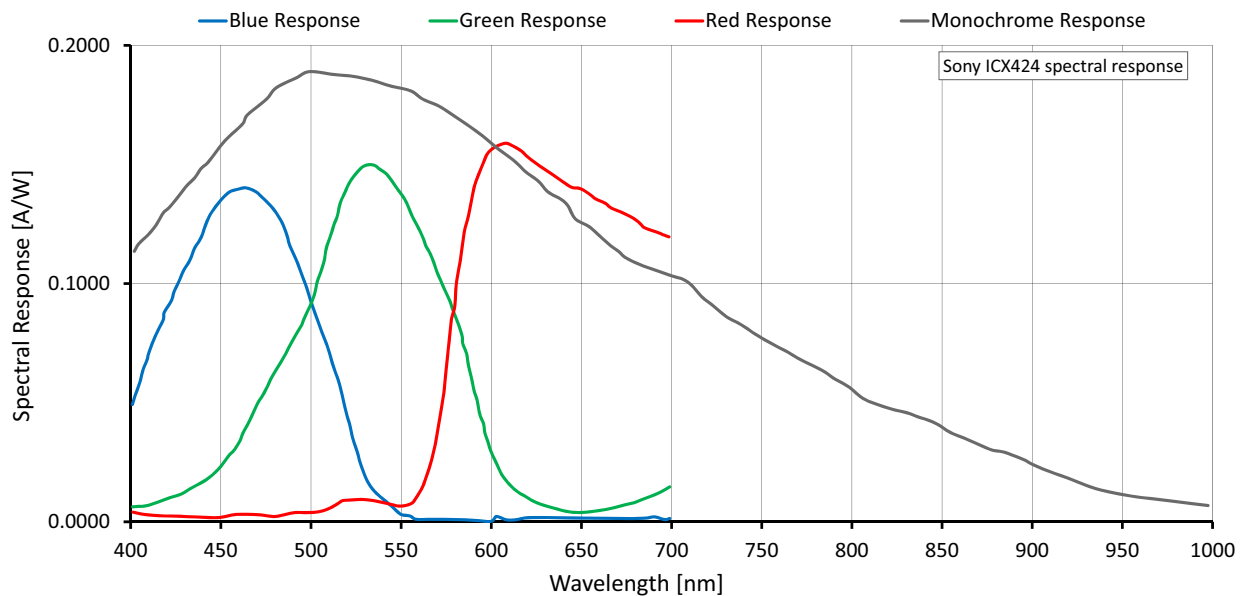


Figure 6: Manta G-032 (Sony ICX424) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 80.7 fps

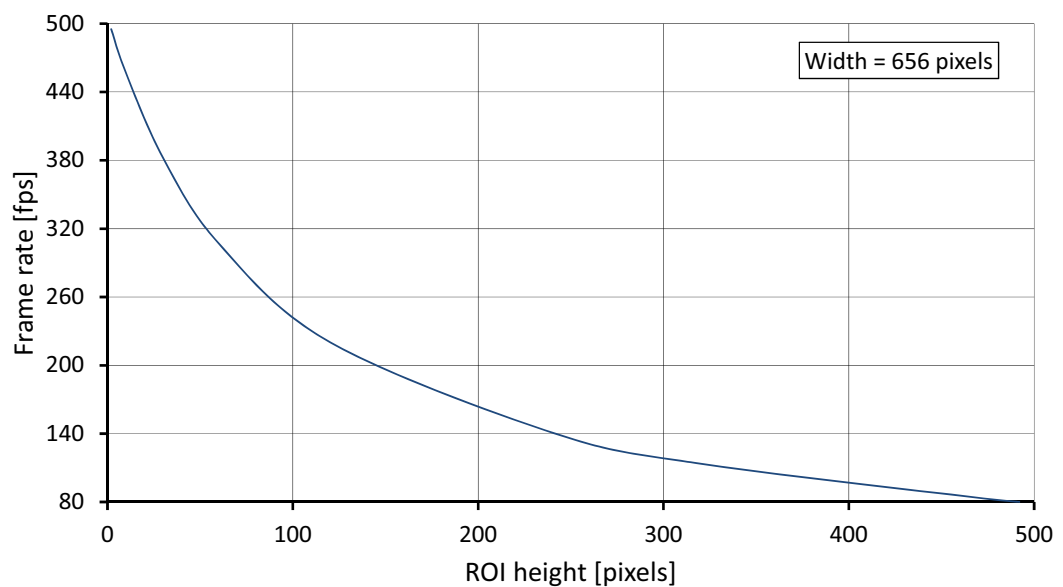


Figure 7: Manta G-032 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 492 | 80.7 | 60 | 307.1 |
| 480 | 81.8 | 30 | 382.2 |
| 320 | 113.6 | 10 | 456.6 |
| 240 | 140.9 | 2 | 495.2 |
| 120 | 220.4 | | |

Table 14: 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 15: Manta G-033 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• 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 15: 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 16: Manta G-033 (Sony ICX414) imaging performance

Absolute QE

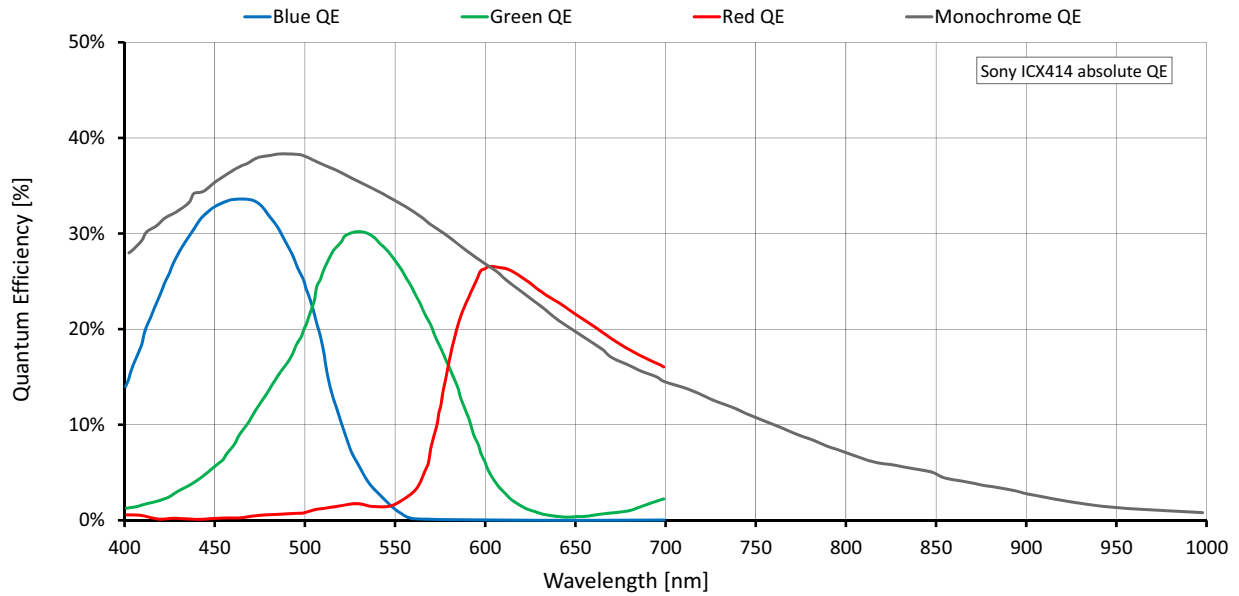


Figure 8: Manta G-033 (Sony ICX414) absolute QE

Spectral response

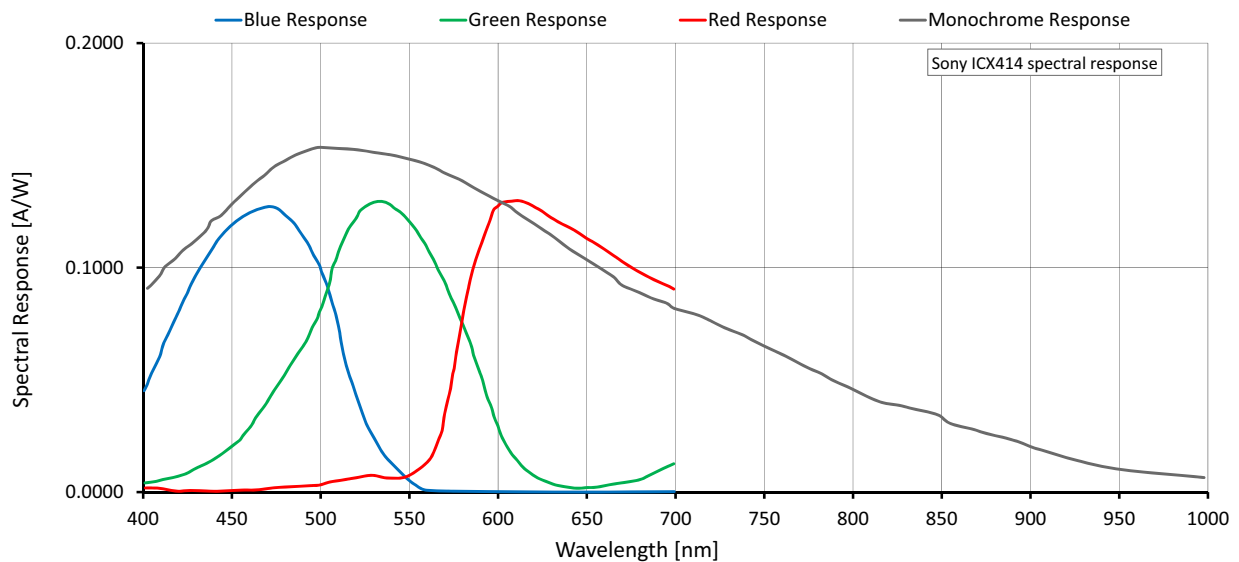


Figure 9: Manta G-033 (Sony ICX414) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 88.7 fps

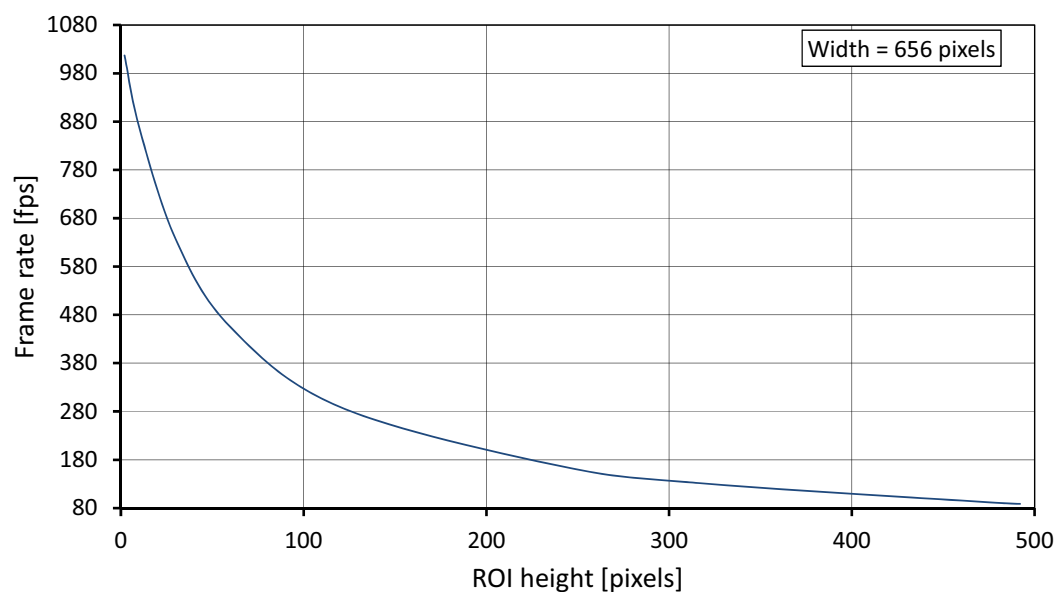


Figure 10: Manta G-033 frame rate as a function of ROI height

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

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

Table 17: 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 18: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 21.84 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 32.64 μ s |
| Trigger jitter ² | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ± 2.72 μ s |
| | Mono12, BayerRG12, YUV422Packed | ± 3.64 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | ± 5.44 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 96 μ s |
| | Mono12, BayerRG12, YUV422Packed | 133 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 204 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 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 $^{\circ}$ 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 18: 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 19: Manta G-040 (Sony IMX287) imaging performance

Absolute QE

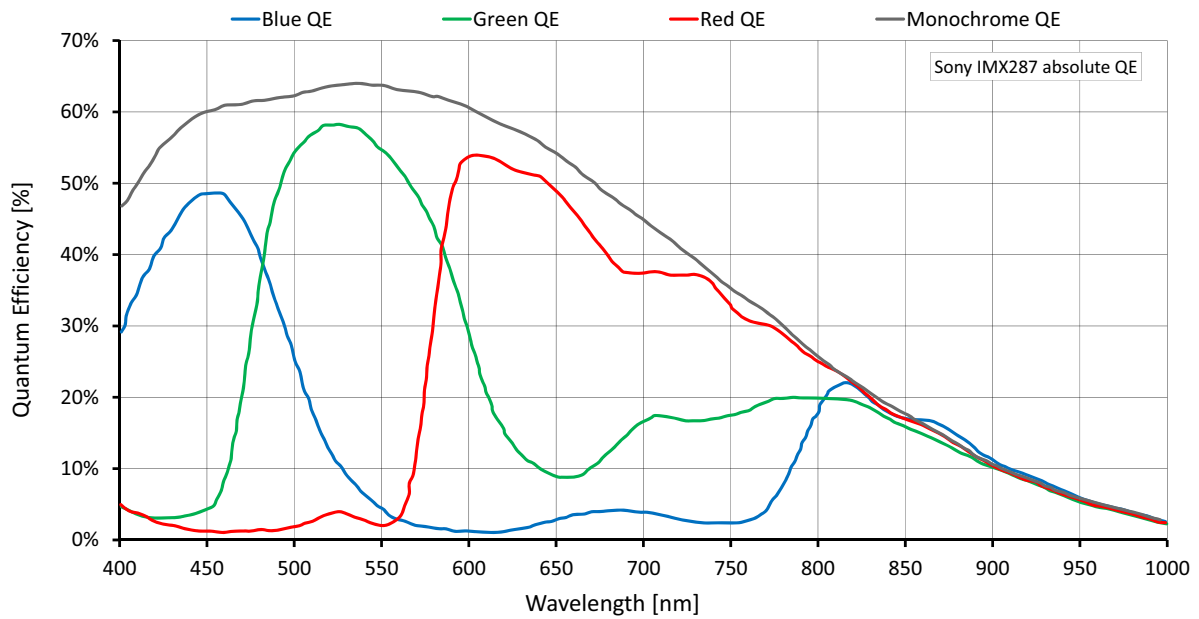


Figure 11: Manta G-040 (Sony IMX287) absolute QE

Spectral response

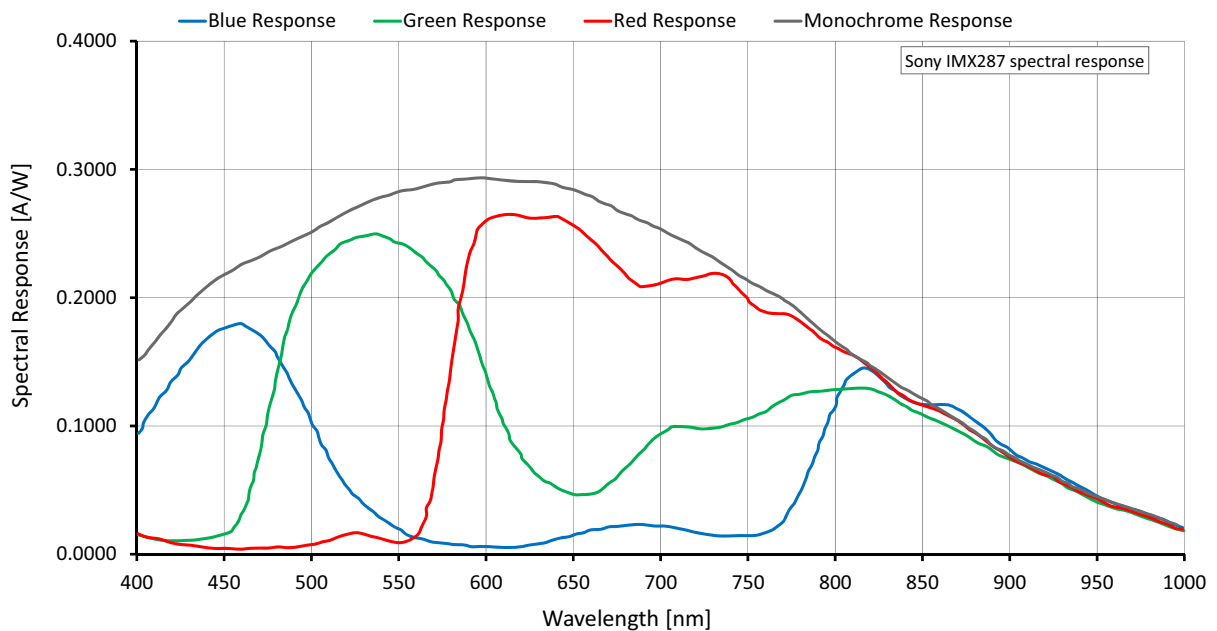


Figure 12: Manta G-040 (Sony IMX287) spectral response

ROI frame rate

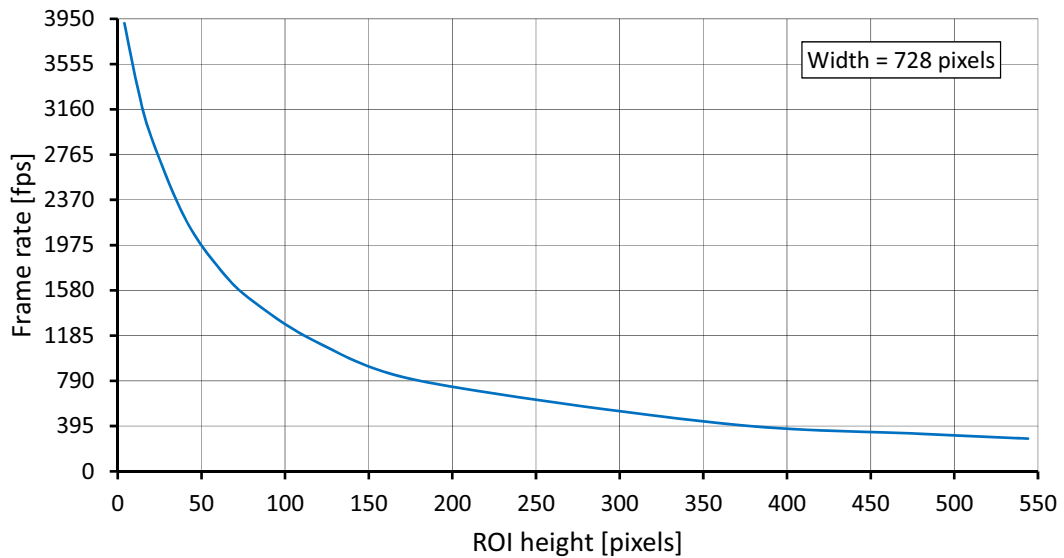


Figure 13: Manta G-040 frame rate as a function of ROI height

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

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

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

Table 20: 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 21: Manta G-046 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.• Frame valid state: the sensor is reading out data and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state. | | |

Table 21: Manta G-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 22: Manta G-046 (Sony ICX415) imaging performance

Absolute QE

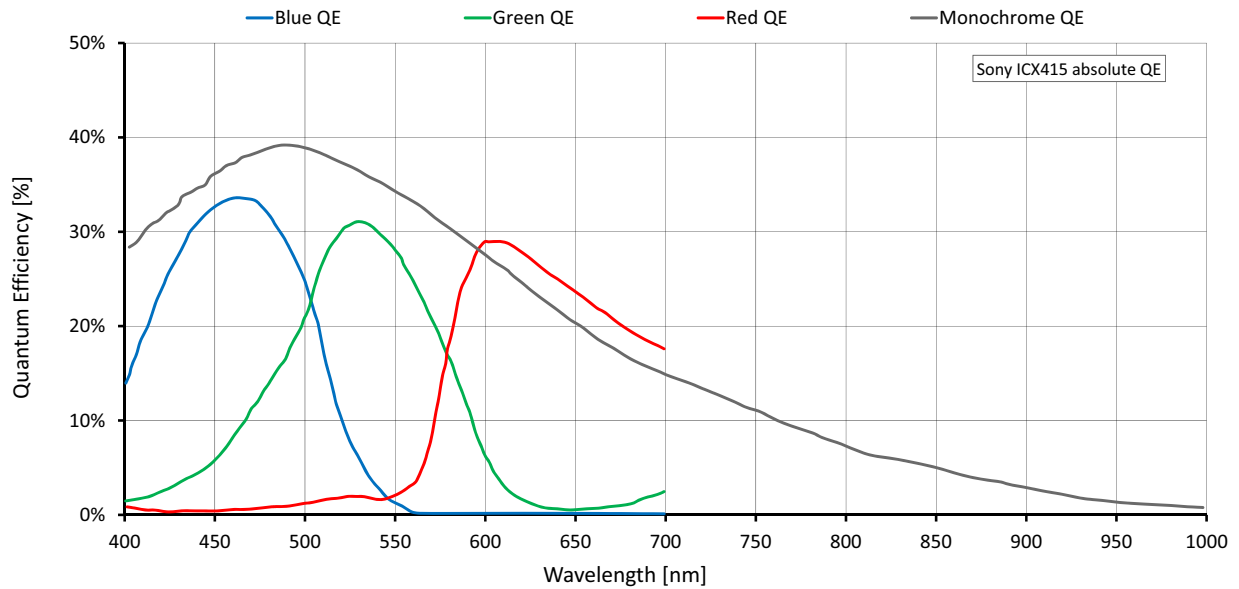


Figure 14: Manta G-046 (Sony ICX415) absolute QE

Spectral response

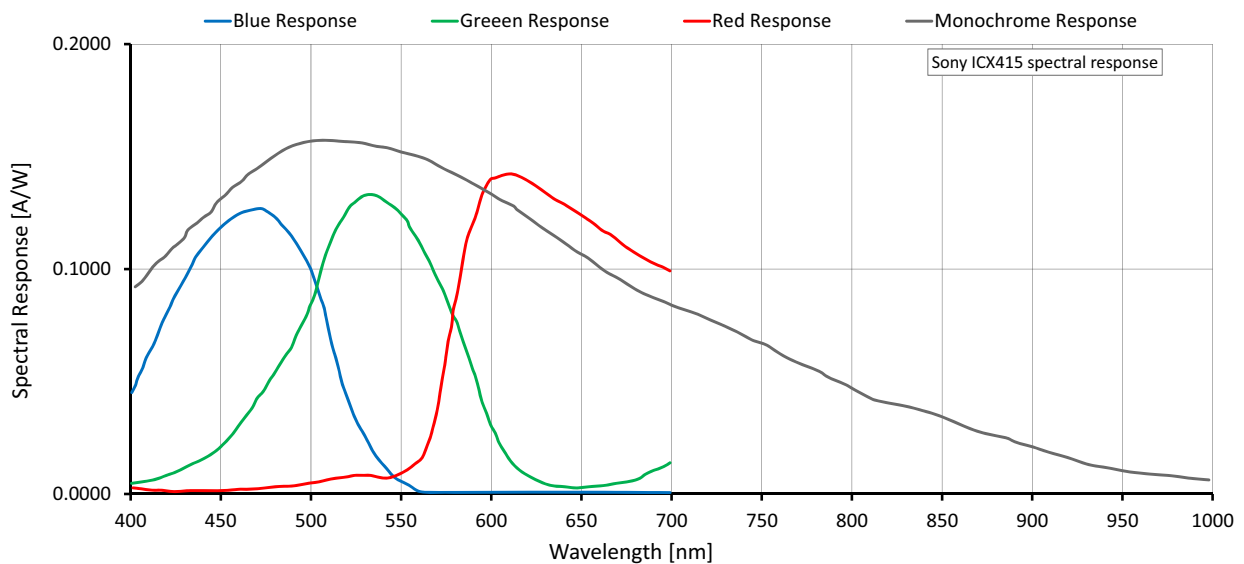


Figure 15: Manta G-046 (Sony ICX415) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 67.5 fps

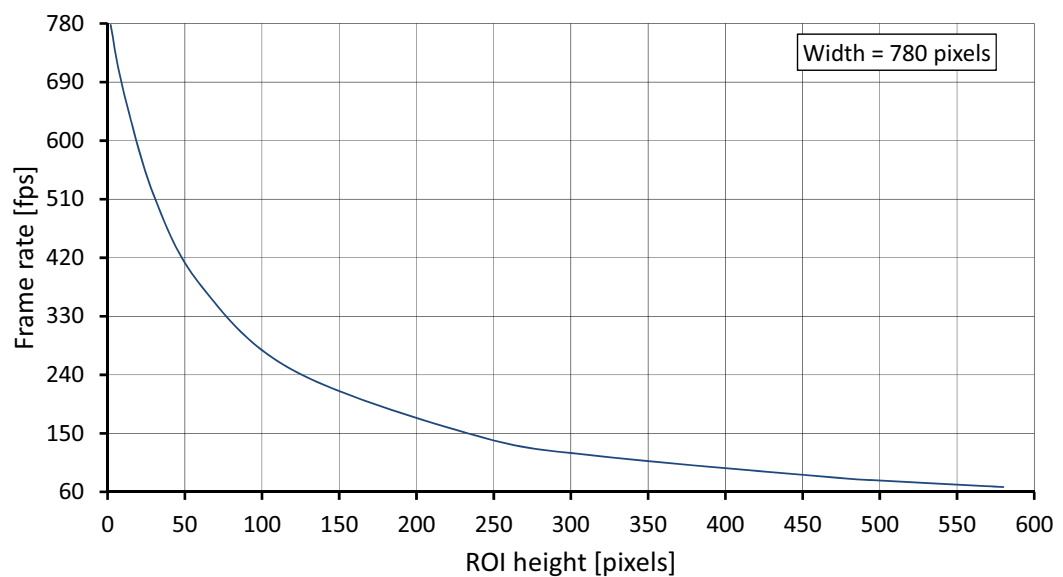


Figure 16: Manta G-046 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 580 | 67.5 | 120 | 247.1 |
| 492 | 78.4 | 60 | 378.4 |
| 480 | 80.2 | 30 | 515.2 |
| 320 | 114.6 | 10 | 678.9 |
| 240 | 145.6 | 2 | 777.7 |

Table 23: 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 24: Manta G-125 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.• Frame valid state: the sensor is reading out data and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state. | | |

Table 24: Manta G-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 25: Manta G-125 (Sony ICX445) imaging performance

Absolute QE

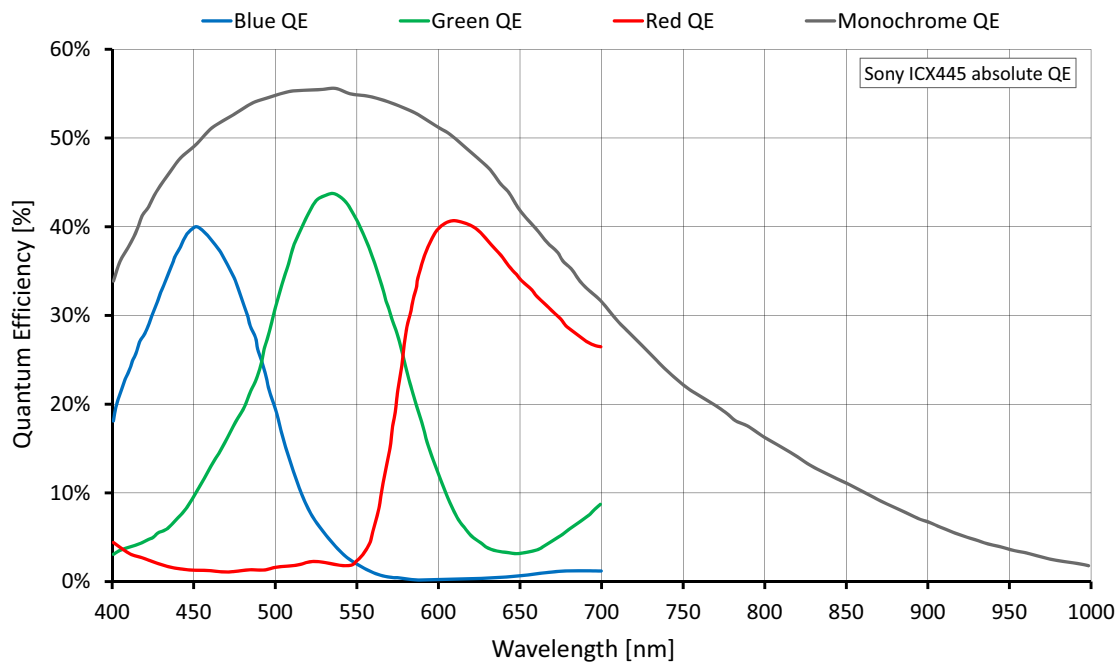


Figure 17: Manta G-125 (Sony ICX445) absolute QE

Spectral response

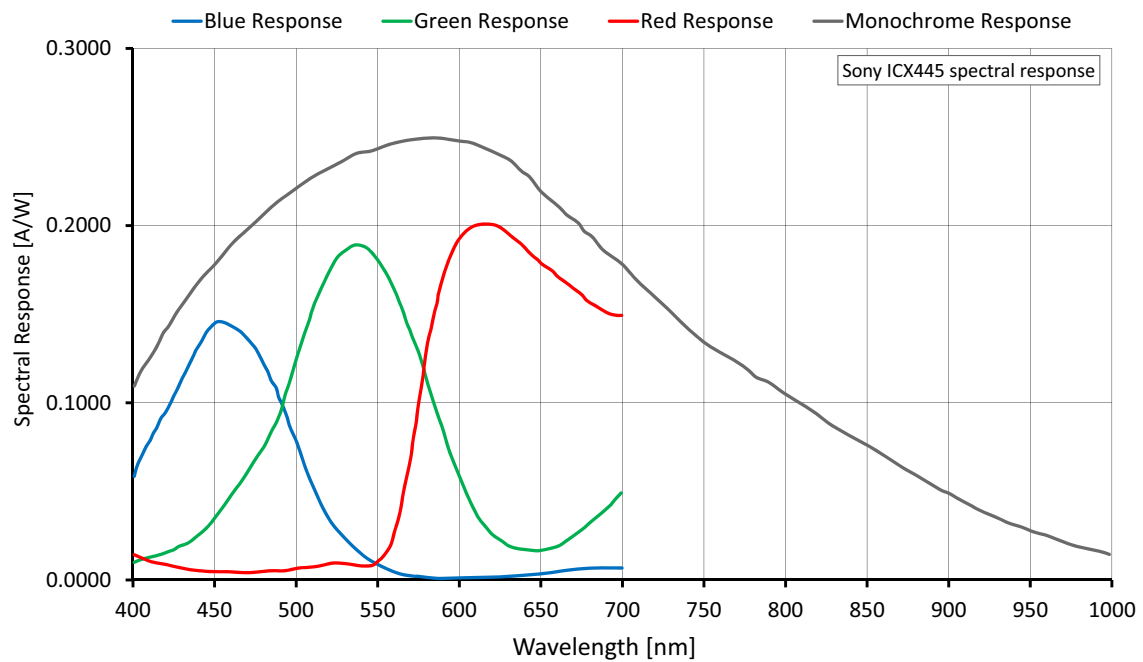


Figure 18: Manta G-125 (Sony ICX445) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 31 fps

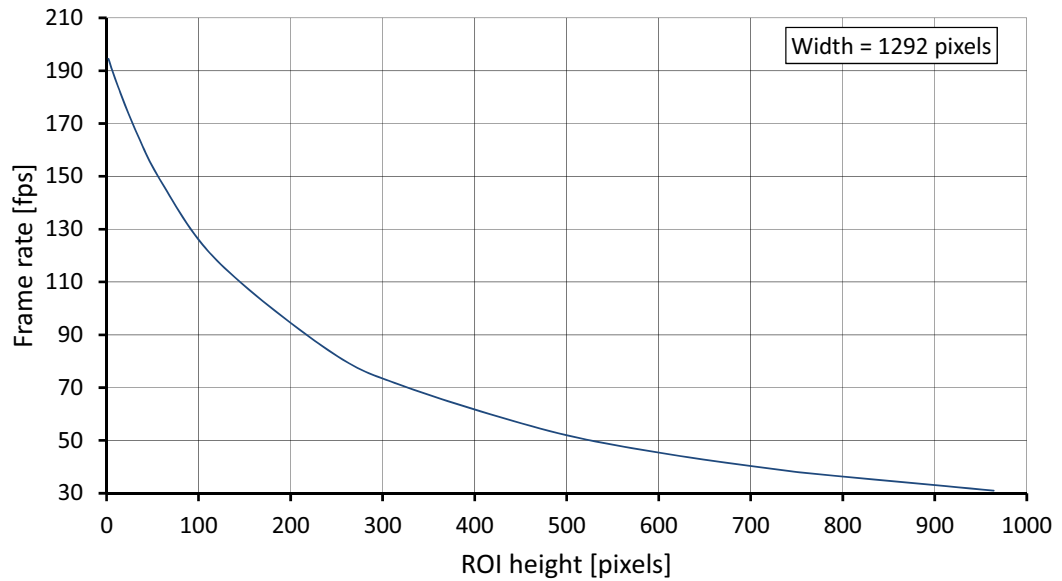


Figure 19: Manta G-125 frame rate as a function of ROI height plot

| 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 26: 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 27: Manta G-145 model series specifications (sheet 1 of 2)

| | Specification | |
|--|--|--------------|
| Feature | 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: <ul style="list-style-type: none">• 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 27: 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 28: Manta G-145 (Sony ICX285) imaging performance

Absolute QE

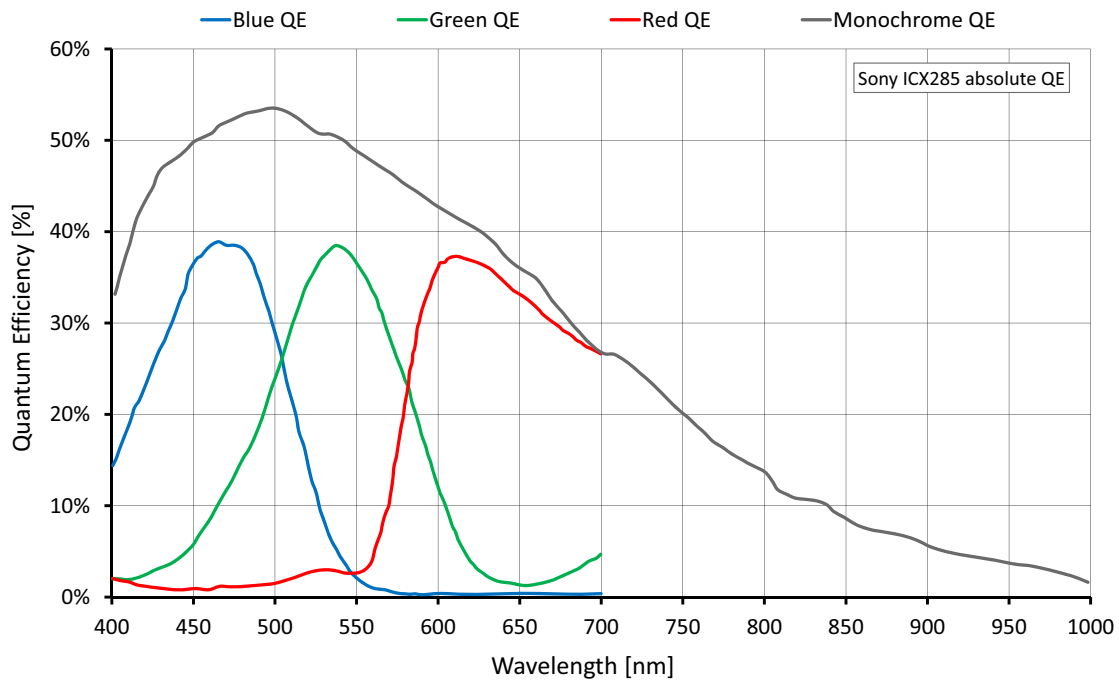


Figure 20: Manta G-145 (Sony ICX285) absolute QE

Spectral response

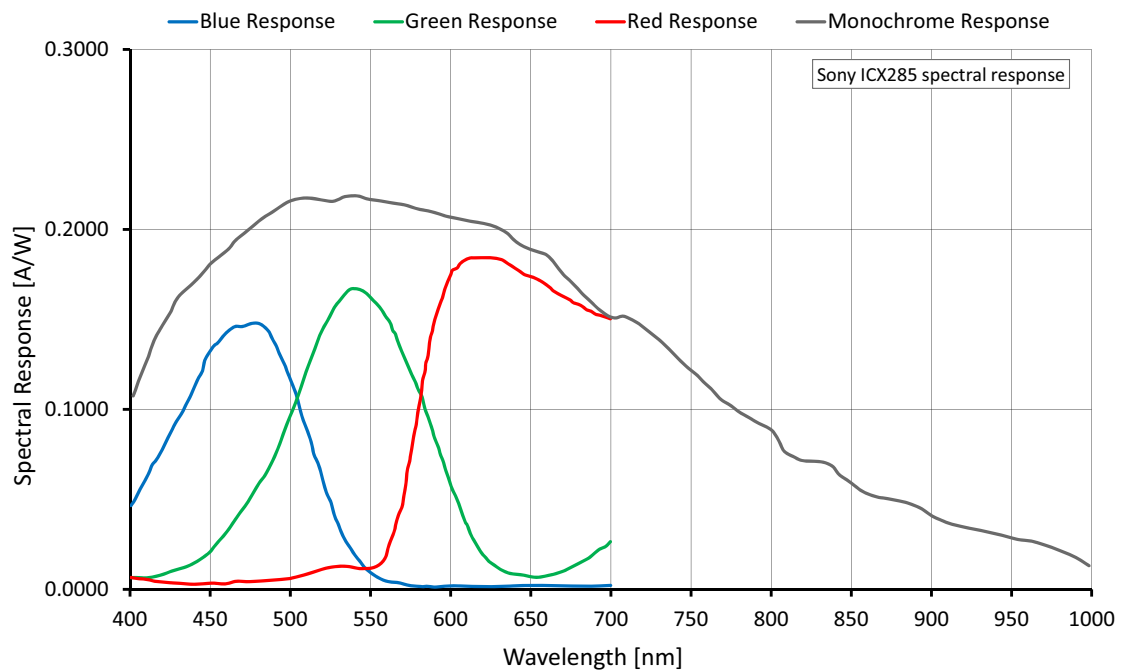


Figure 21: Manta G-145 (Sony ICX285) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 15 fps

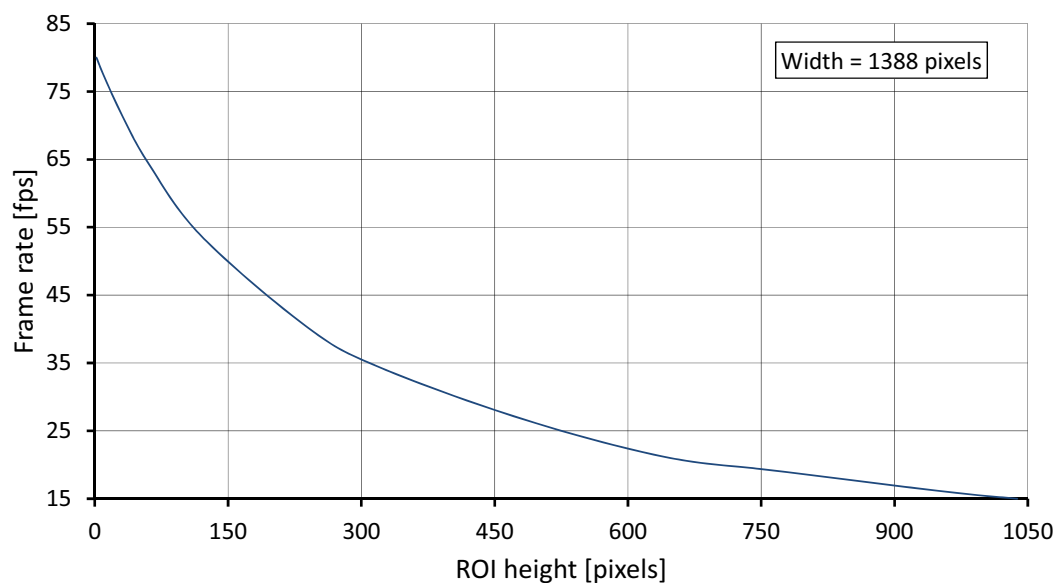


Figure 22: Manta G-145 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 1038 | 15 | 240 | 40.2 |
| 960 | 16 | 120 | 53.7 |
| 768 | 19.1 | 60 | 64.5 |
| 640 | 21.2 | 30 | 71.7 |
| 480 | 26.8 | 10 | 77.4 |
| 320 | 34.4 | 2 | 80 |

Table 29: 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 30: Manta G-145-30fps model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------------|
| Feature | 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 30: 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 31: Manta G-145-30fps (Sony ICX285) imaging performance

Absolute QE

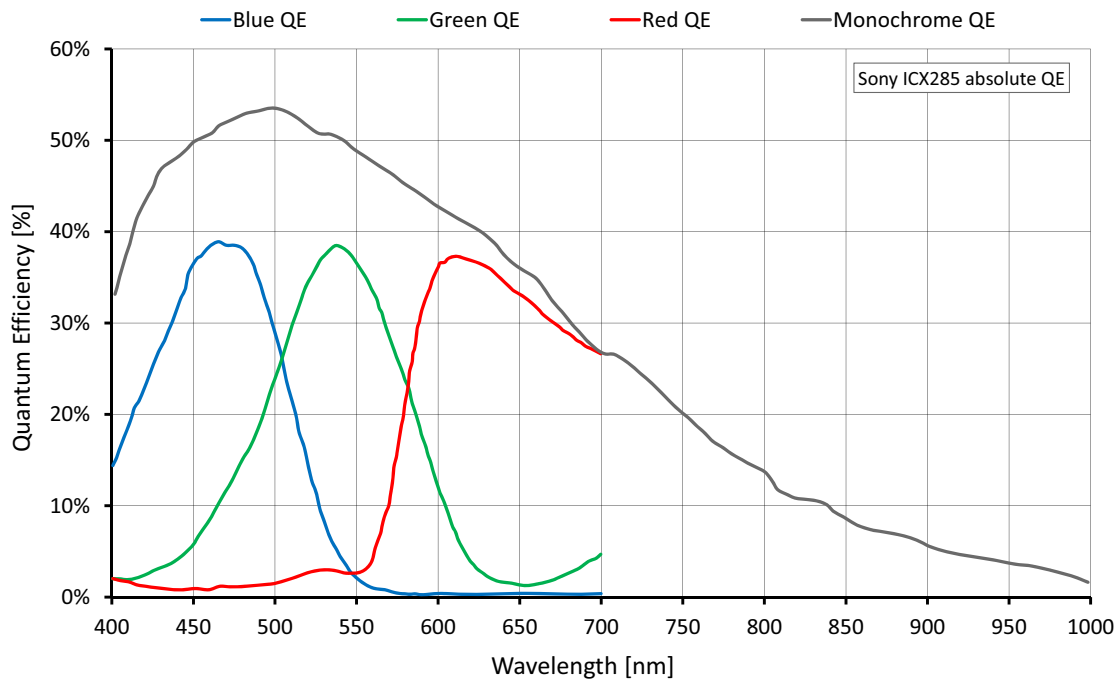


Figure 23: Manta G-145-30fps (Sony ICX285) absolute QE

Spectral response

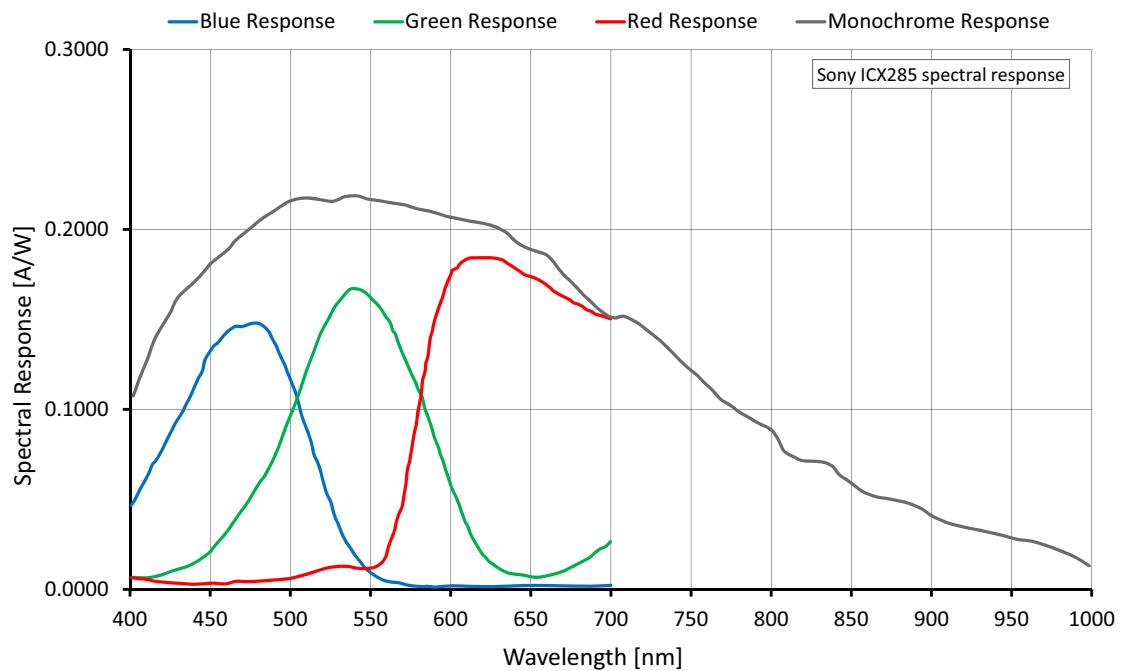


Figure 24: Manta G-145-30fps (Sony ICX285) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.1 fps

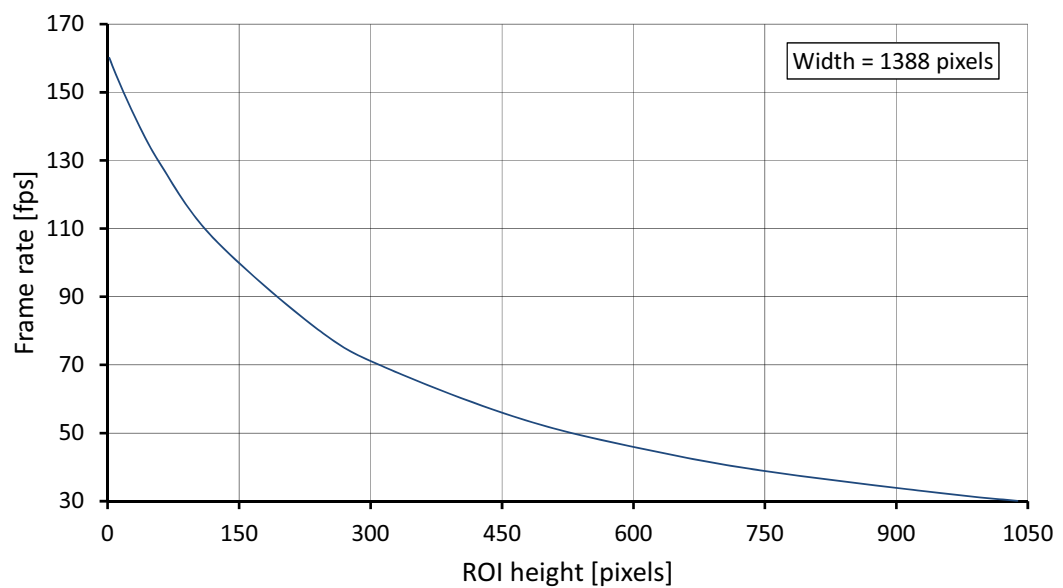


Figure 25: Manta G-145-30fps frame rate as a function of ROI height

| 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 32: 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 33: 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: <ul style="list-style-type: none"> 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 33: 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 | $1/K$ | $4.57 \text{ e}^-/\text{DN}$ |
| 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 | $\mu_{e.\text{sat}}$ | 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 | $\mu_{e.\text{min}}$ | 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 34: Manta G-145B NIR (Sony ICX285) imaging performance

Absolute QE

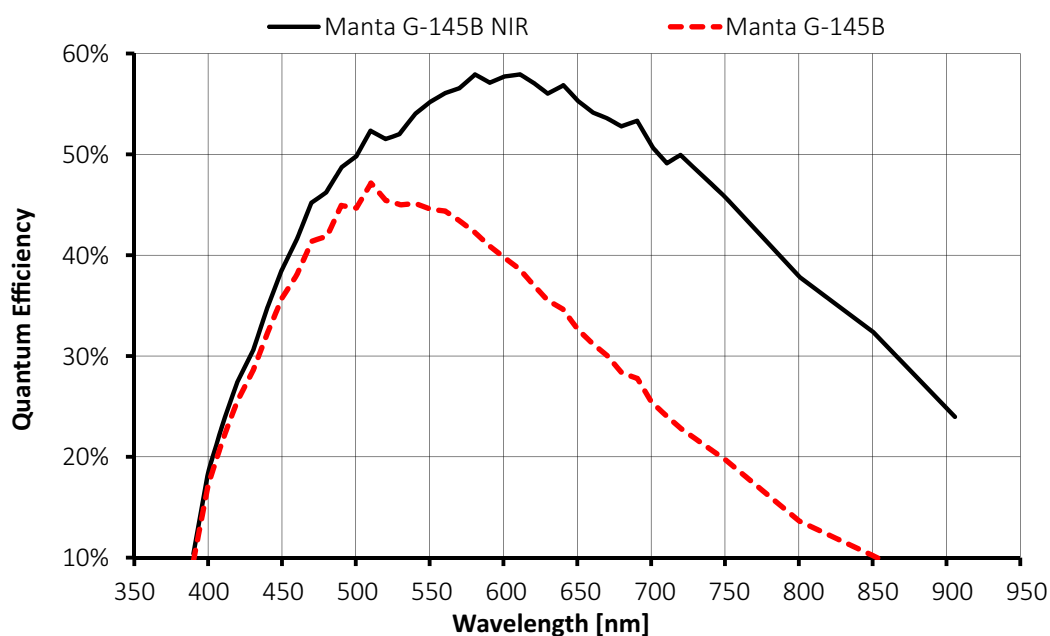


Figure 26: Manta G-145B NIR (Sony ICX285) absolute QE (NirMode=On_Fast or On_HighQuality) compared to Manta G-145B

Increase of relative response

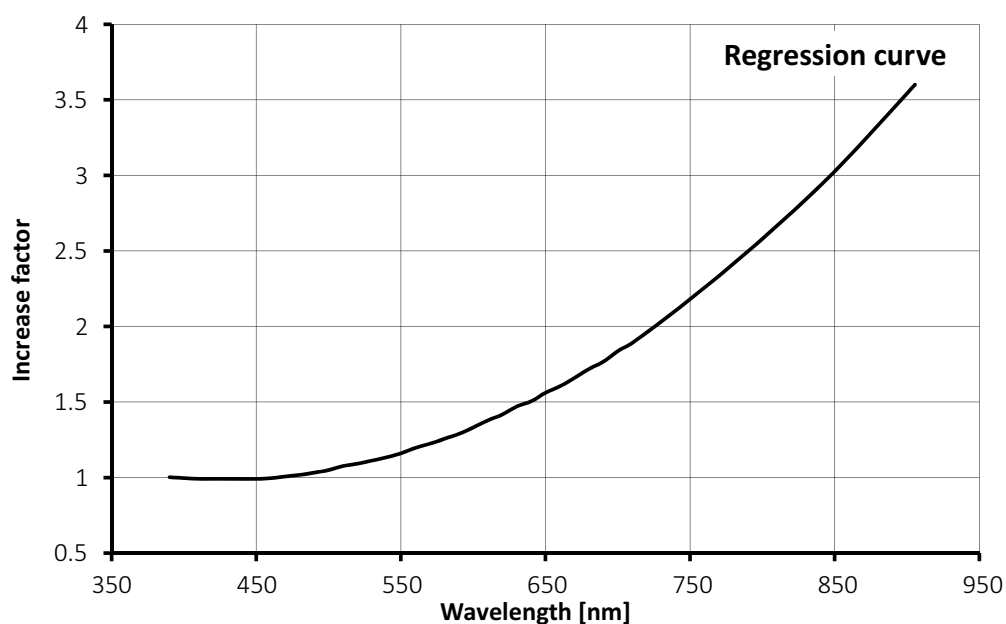


Figure 27: Increase of relative response with NIR mode set to On_HighQuality

ROI frame rate

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

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

Maximum frame rate at full resolution according formula:

15 fps for NirMode=Off/On_Fast

13.9 fps for NirMode=On_HighQuality

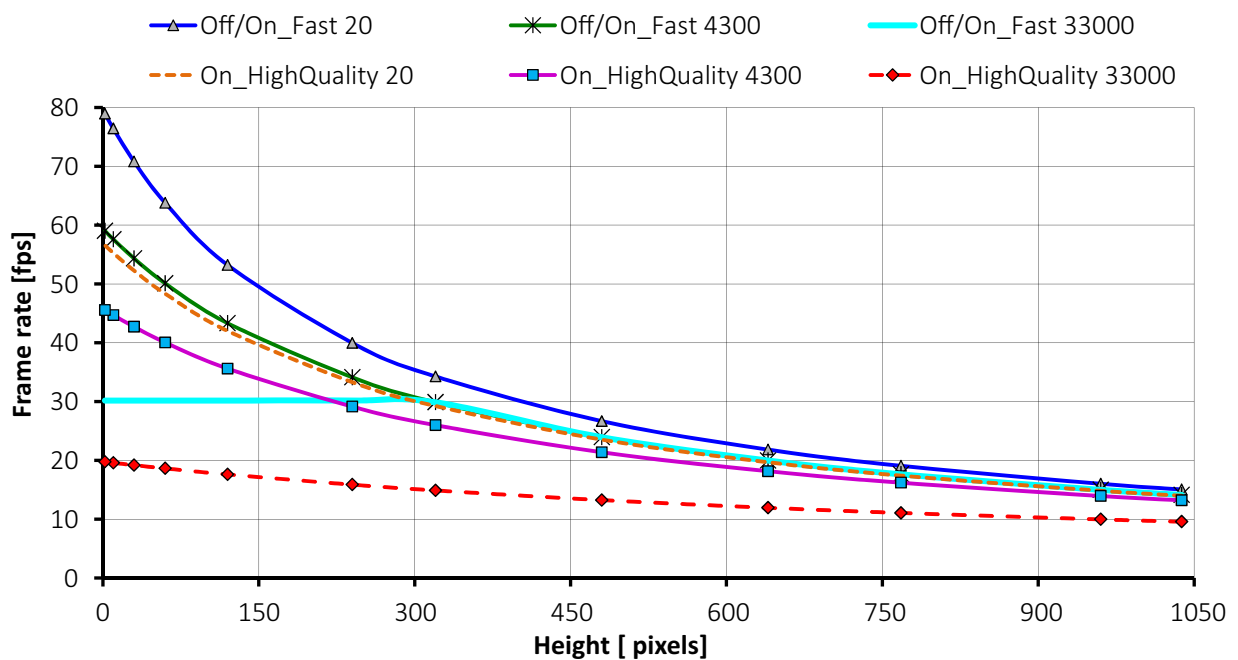


Figure 28: Frame rate as a function of ROI height [width=1388], NirMode and exposure time per μs

| NirMode Exposure time per μ s | 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 35: 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 36: Manta G-146 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• Idle state: the sensor is ready, and the camera is idle. The camera is waiting for the next trigger.• Frame valid state: the sensor is reading out data and camera is busy. If the next frame is requested by an external trigger in this state, higher latency may occur as compared to the idle state. | | |

Table 36: Manta G-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 37: Manta G-146 (Sony ICX267) imaging performance

Absolute QE

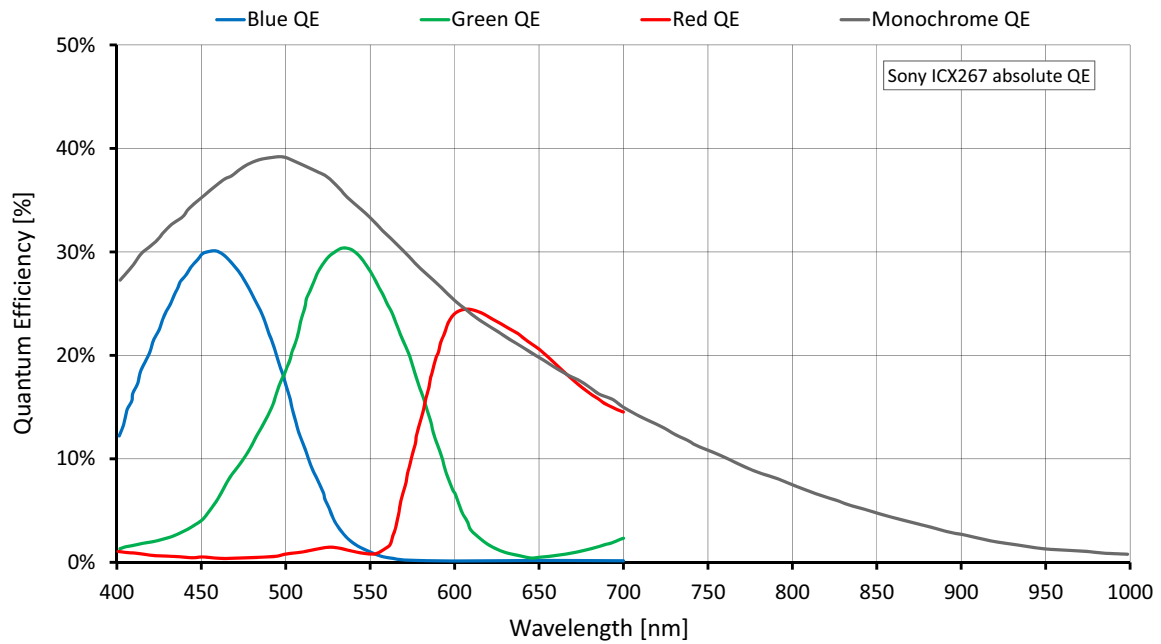


Figure 29: Manta G-146 (Sony ICX267) absolute QE

Spectral response

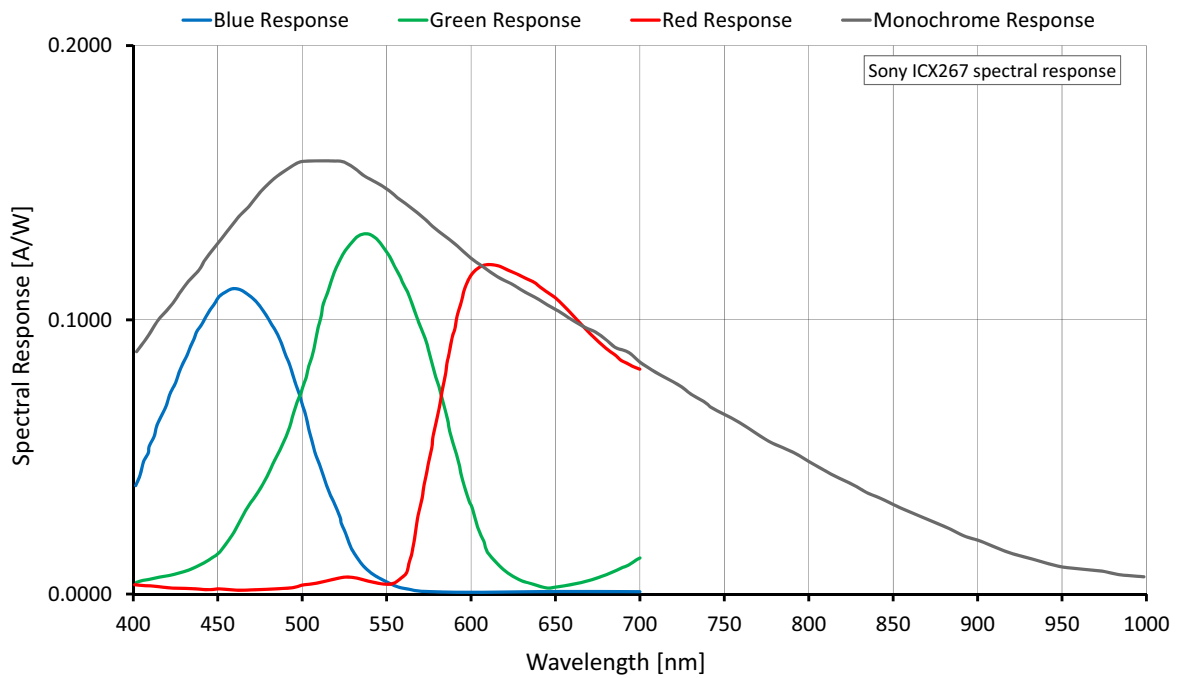


Figure 30: Manta G-146 (Sony ICX267) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 17.8 fps

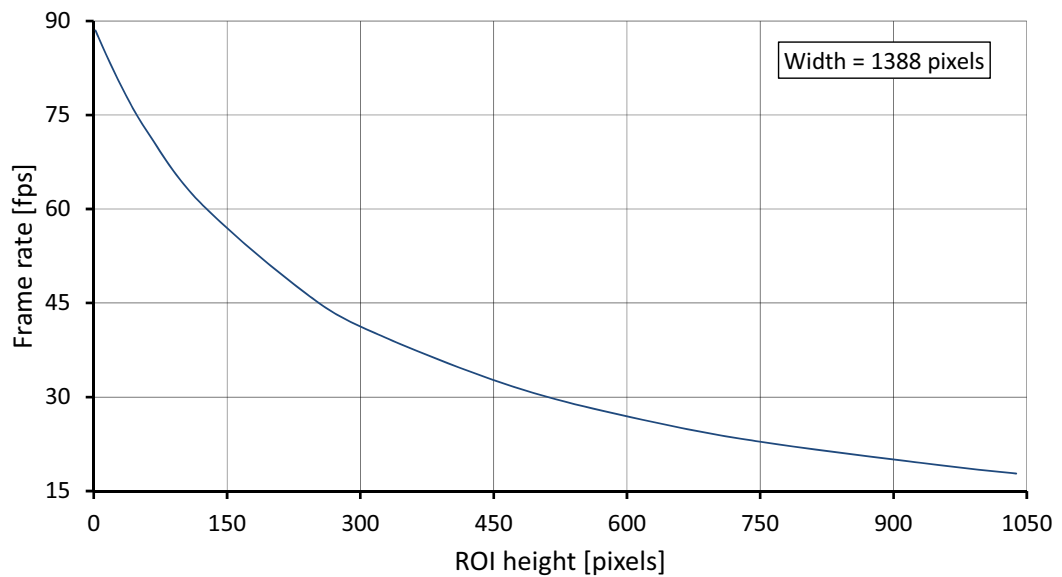


Figure 31: Manta G-146 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 1038 | 17.8 | 240 | 46.4 |
| 960 | 19 | 120 | 61 |
| 768 | 22.5 | 60 | 72.4 |
| 640 | 25.7 | 30 | 79.9 |
| 480 | 31.3 | 10 | 85.9 |
| 320 | 40 | 2 | 88.5 |

Table 38: 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 39: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 39.6 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 59.52 μ s |
| Trigger jitter ¹ | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | ± 4.96 μ s |
| | Mono12, BayerRG12, YUV422Packed | ± 6.6 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | ± 9.92 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 185 μ s |
| | Mono12, BayerRG12, YUV422Packed | 251 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 384 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 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 $^{\circ}$ 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 39: 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 40: Manta G-158 (Sony IMX273) imaging performance

Absolute QE

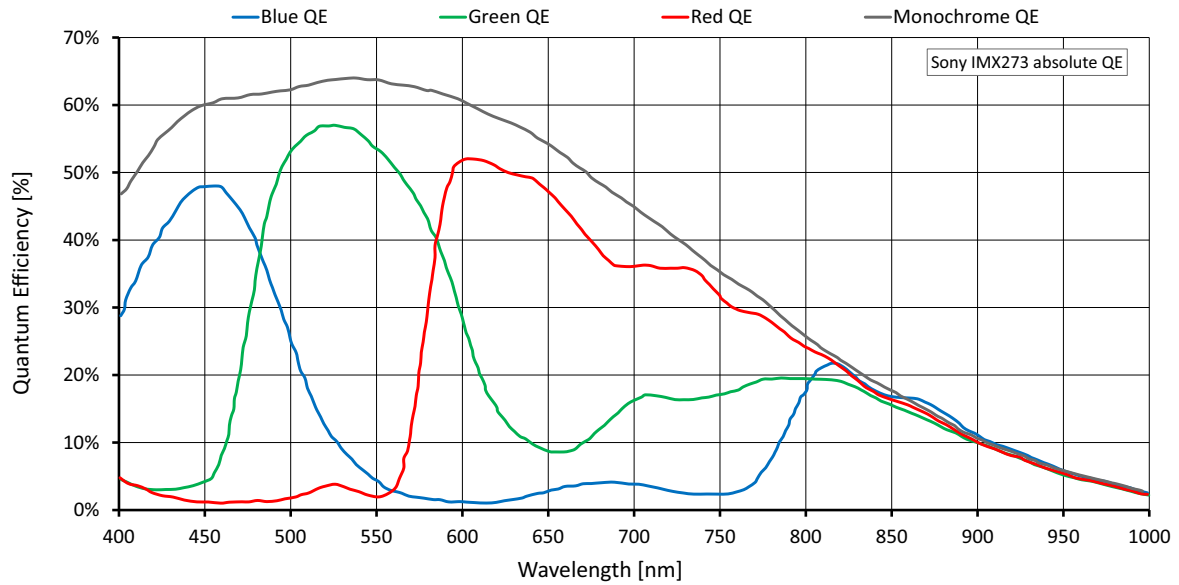


Figure 32: Manta G-158 (Sony IMX273) absolute QE

Spectral response

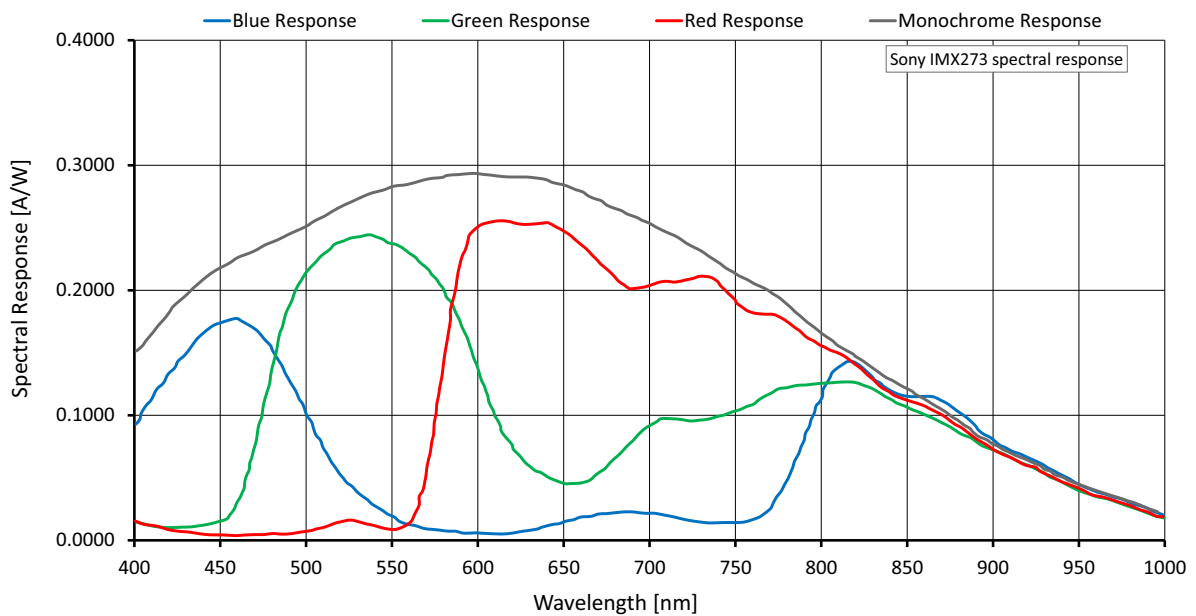


Figure 33: Manta G-158 (Sony IMX273) spectral response

ROI frame rate

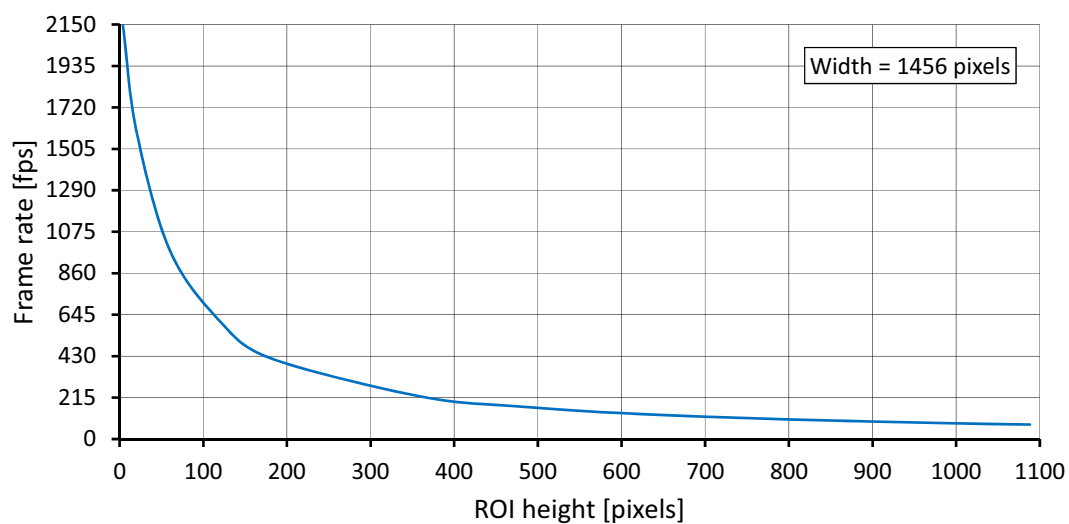


Figure 34: Manta G-158 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|--------|------------------|
| 1088 | 75.2 | 600 | 134.6 | 60 | 978.7 |
| 1080 | 75.6 | 480 | 168.3 | 20 | 1600 |
| 1024 | 79.6 | 360 | 220.6 | 4 | 2144.5 |
| 960 | 85.2 | 180 | 420 | | |
| 768 | 106 | 120 | 610.9 | | |

Table 41: 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 42: Manta G-201 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 42: 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 43: Manta G-201 (Sony ICX274) imaging performance

Absolute QE

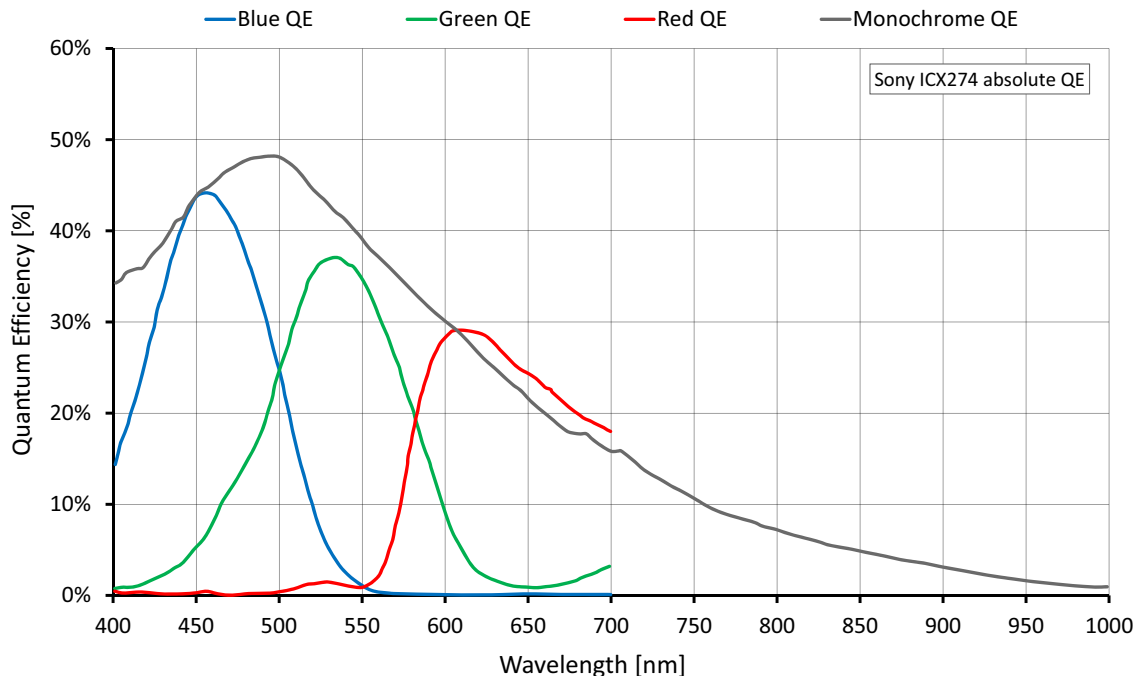


Figure 35: Manta G-201 (Sony ICX274) absolute QE

Spectral response

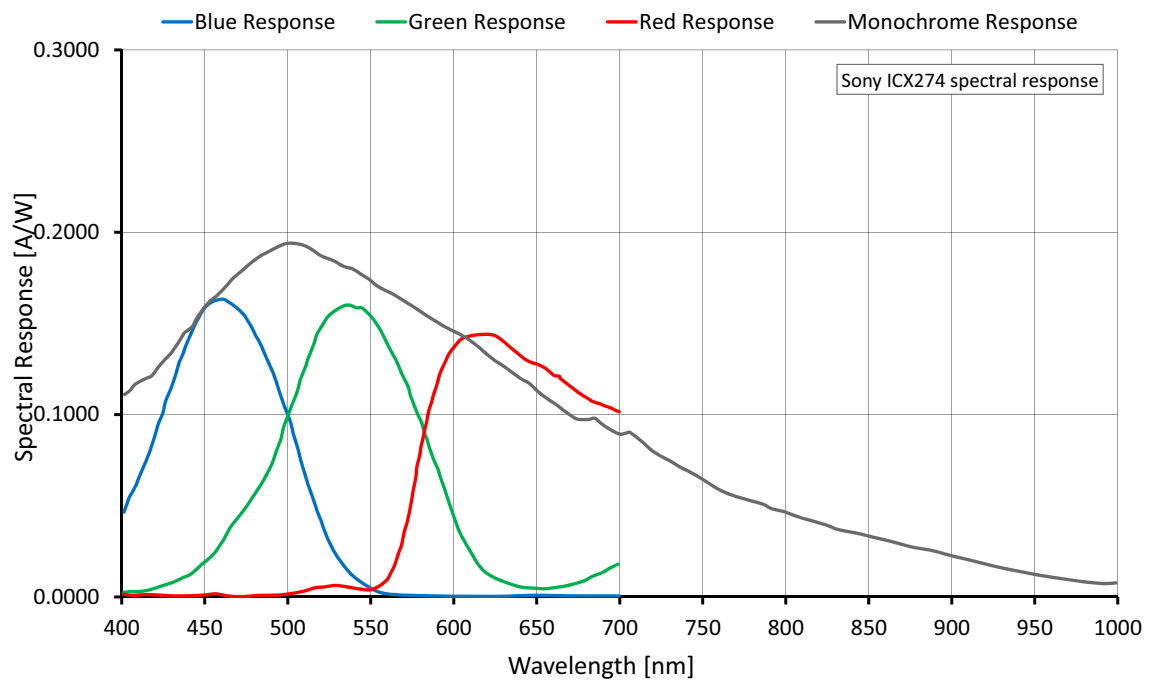


Figure 36: Manta G-201 (Sony ICX274) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 14.7 fps

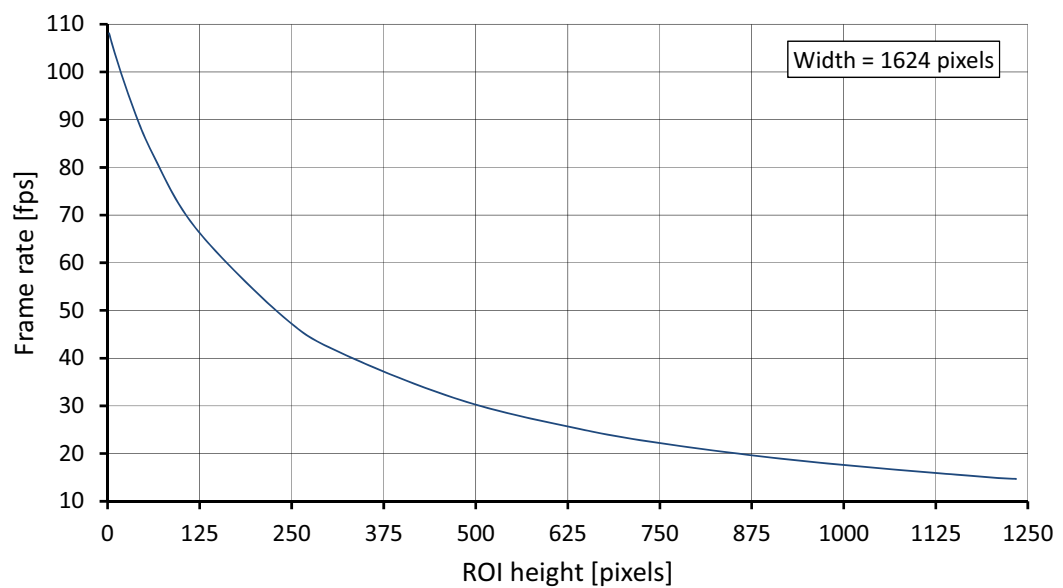


Figure 37: Manta G-201 frame rate as a function of ROI height

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

Table 44: 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 45: Manta G-201-30fps model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• 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 45: 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 46: Manta G-201-30fps (Sony ICX274) imaging performance

Absolute QE

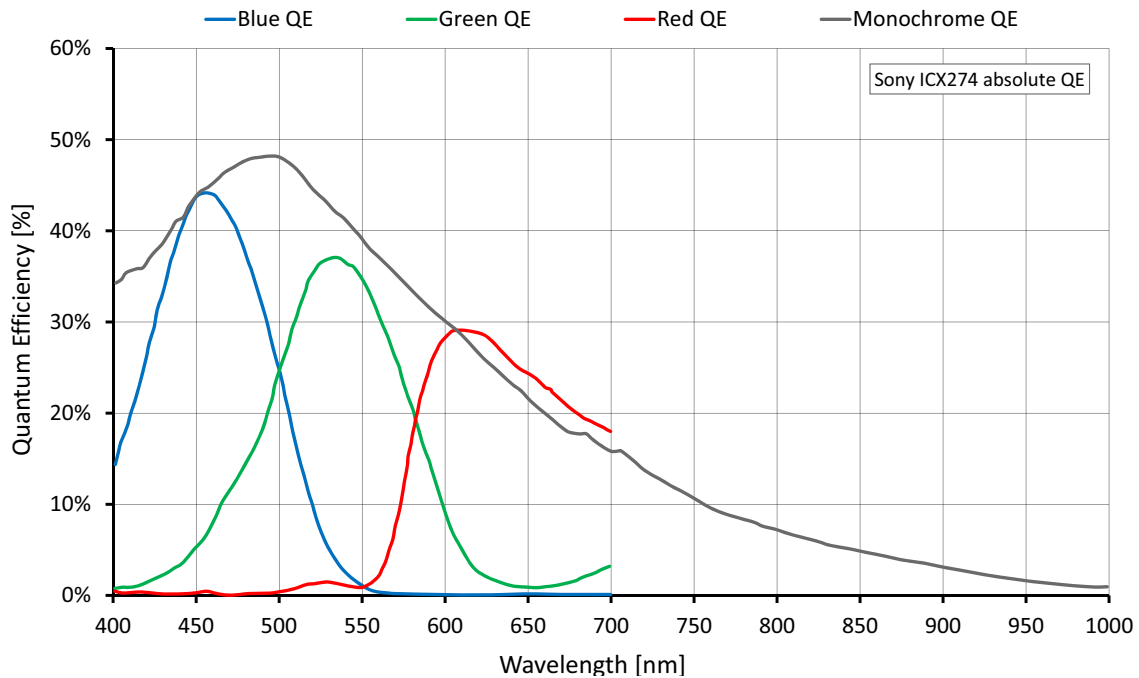


Figure 38: Manta G-201-30fps (Sony ICX274) absolute QE

Spectral response

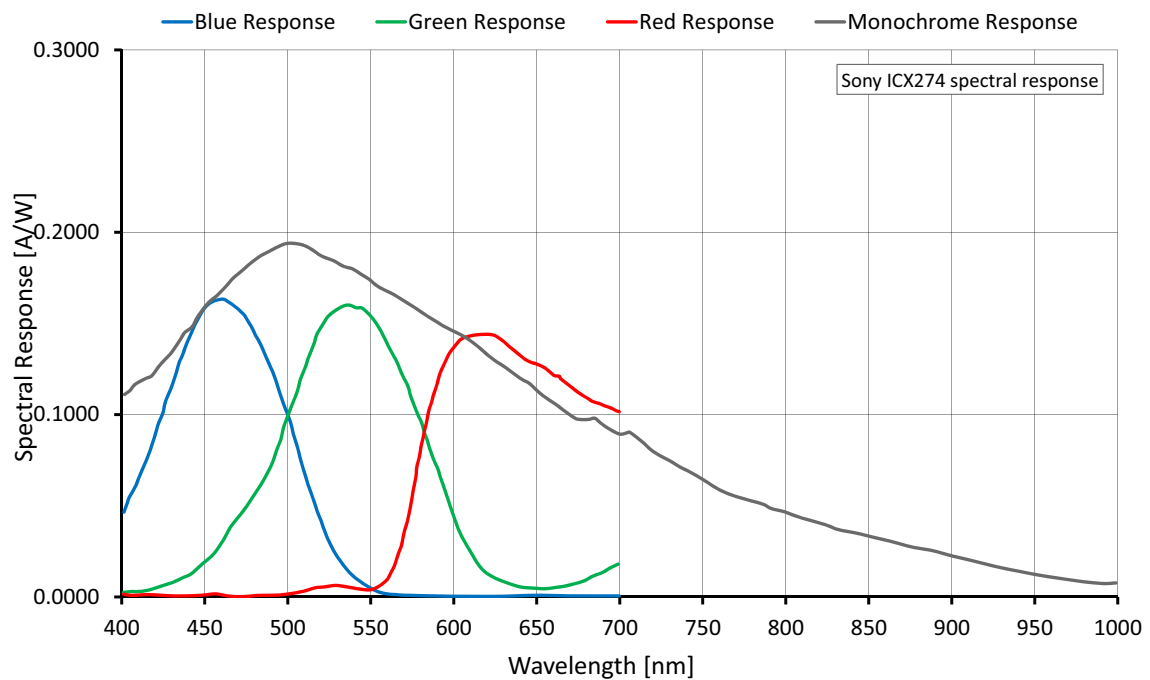


Figure 39: Manta G-201-30fps (Sony ICX274) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30 fps

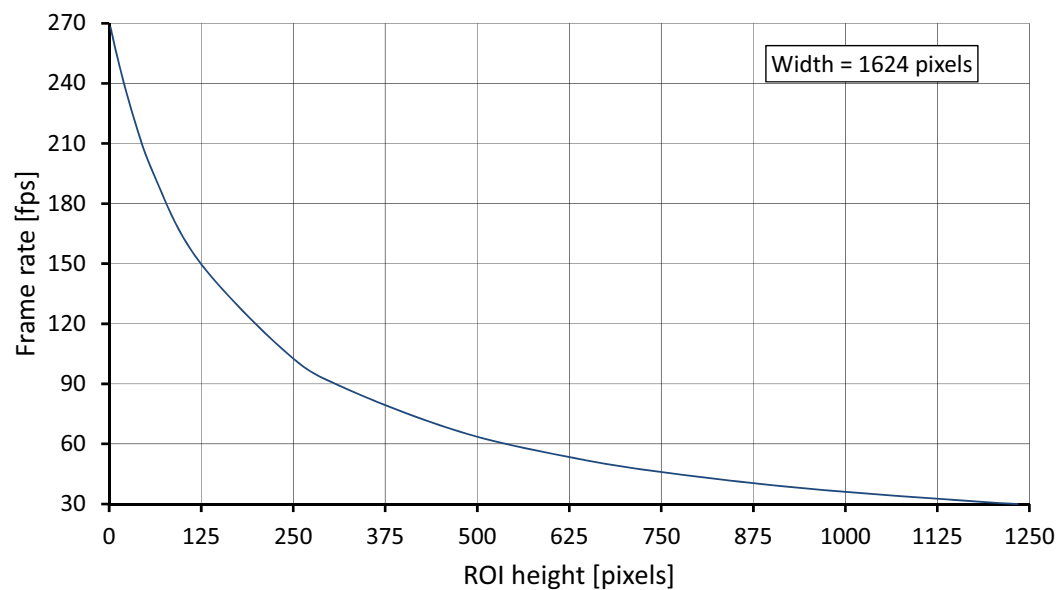


Figure 40: Manta G-201-30fps frame rate as a function of ROI height

| Height | Frame rate (fps) |
|--------|------------------|
| 1234 | 30 |
| 1200 | 30.7 |
| 960 | 37.3 |
| 768 | 45.1 |
| 640 | 52.4 |
| 480 | 65.7 |
| 320 | 87.9 |

| Height | Frame rate (fps) |
|--------|------------------|
| 240 | 105.8 |
| 120 | 152.2 |
| 60 | 195.1 |
| 30 | 227 |
| 10 | 254.8 |
| 2 | 268 |

Table 47: 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 48: Manta G-223 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 48: 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 49: Manta G-223 (CMOSIS/ams CMV2000) imaging performance

Absolute QE

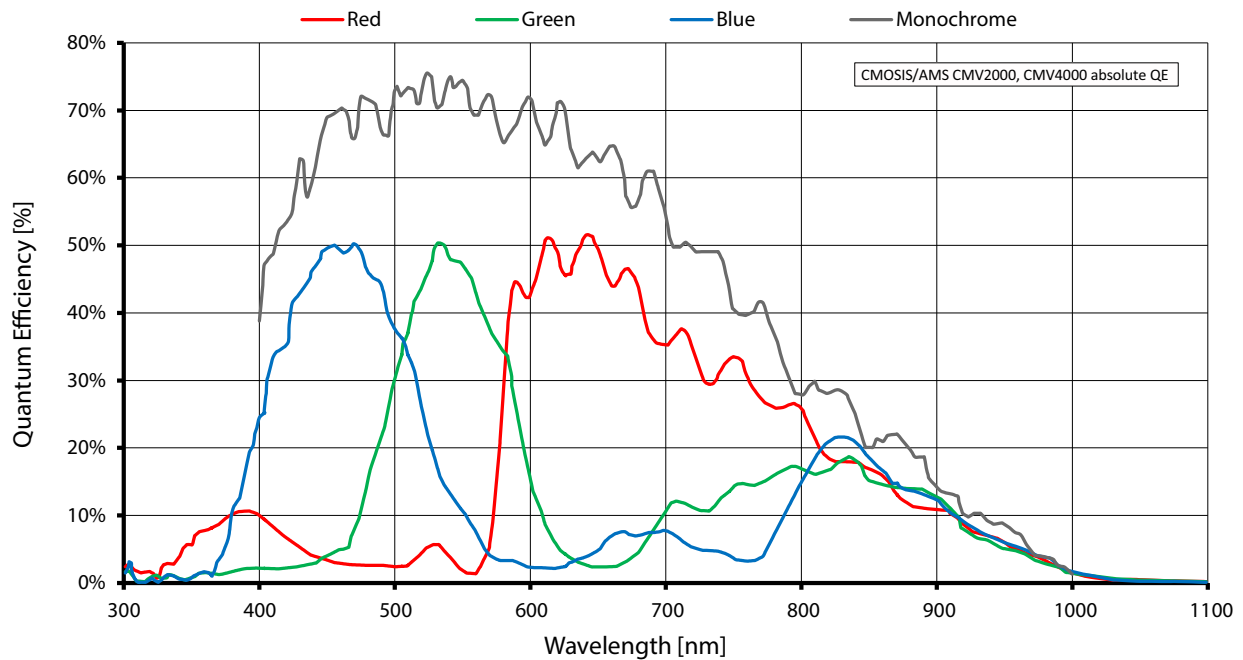


Figure 41: Manta G-223 (CMOSIS/ams CMV2000) absolute QE

Spectral response

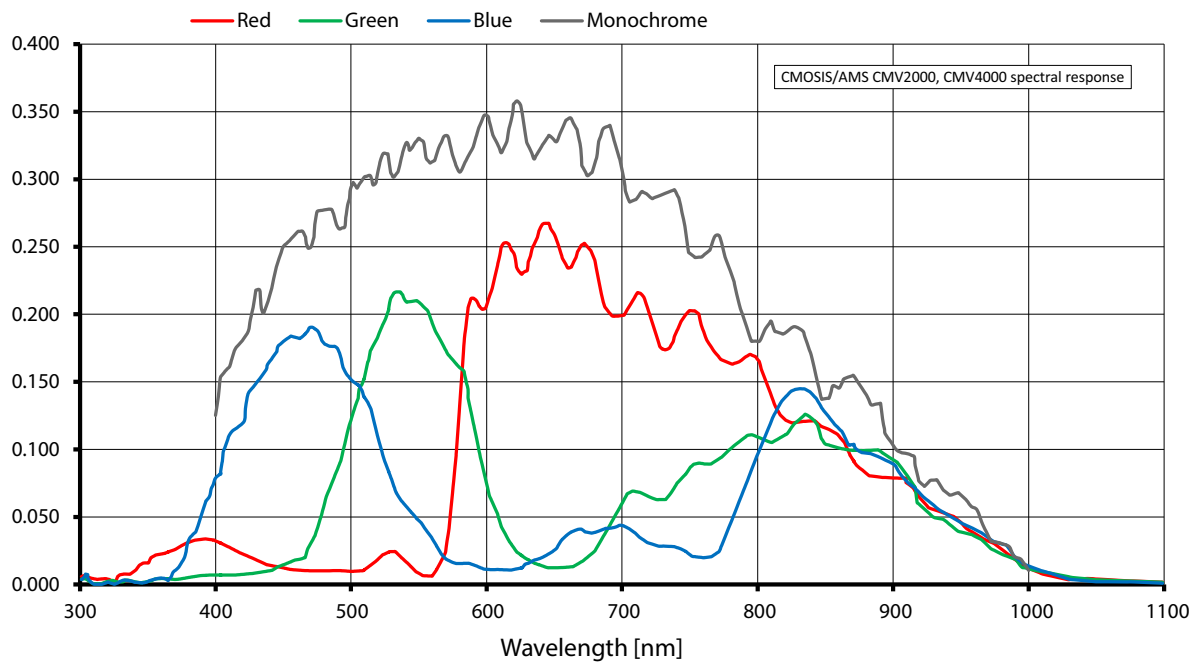


Figure 42: Manta G-223 (CMOSIS/ams CMV2000) spectral response

ROI frame rate

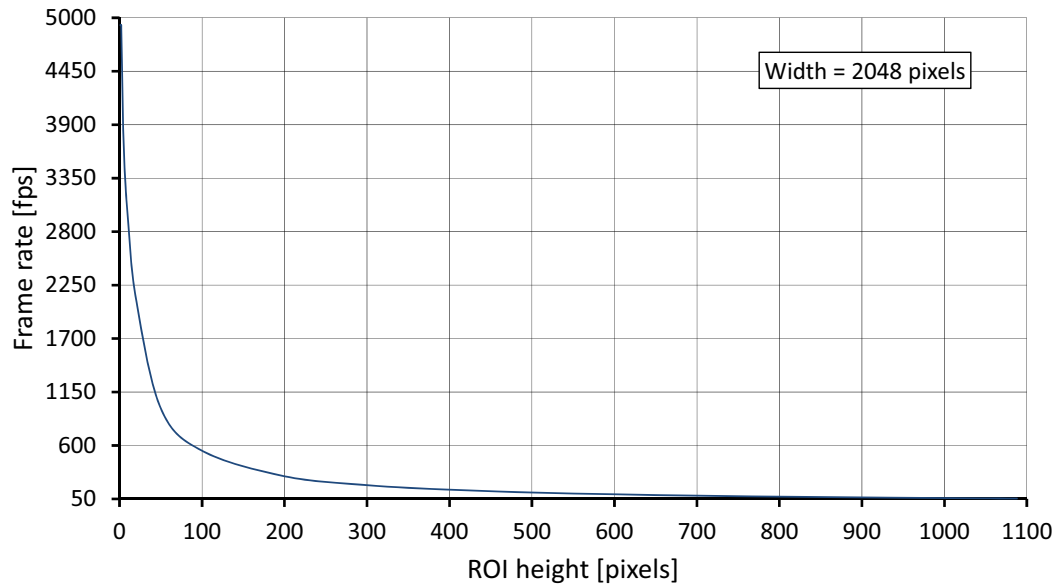


Figure 43: Manta G-223 frame rate as a function of ROI height

| 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 50: 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 51: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 53.76 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 80.64 μ s |
| Trigger jitter ² | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | ± 6.72 μ s |
| | Mono12, BayerRG12, YUV422Packed | ± 8.96 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | ± 13.44 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12, BayerRG12Packed, YUV411Packed | 188 μ s |
| | Mono12, BayerRG12, YUV422Packed | 256 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 390 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 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 $^{\circ}$ 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 51: 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 52: Manta G-235 (Sony IMX174) imaging performance

Absolute QE

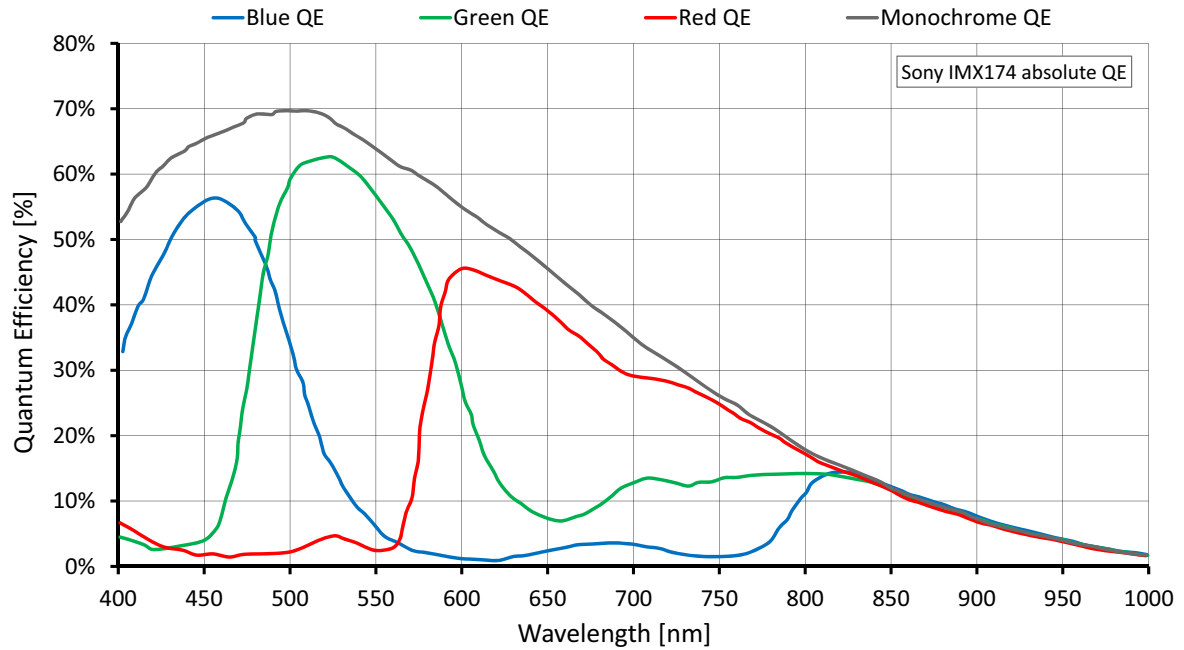


Figure 44: Manta G-235 (Sony IMX174) absolute QE

Spectral response

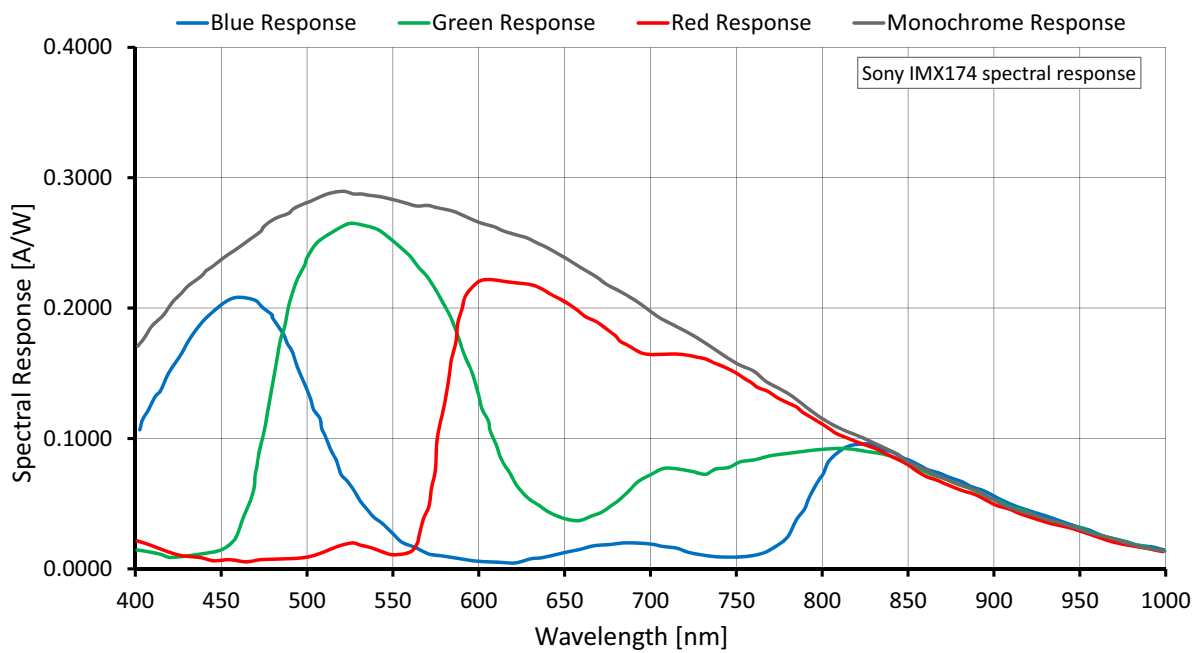


Figure 45: Manta G-235 (Sony IMX174) spectral response

ROI frame rate

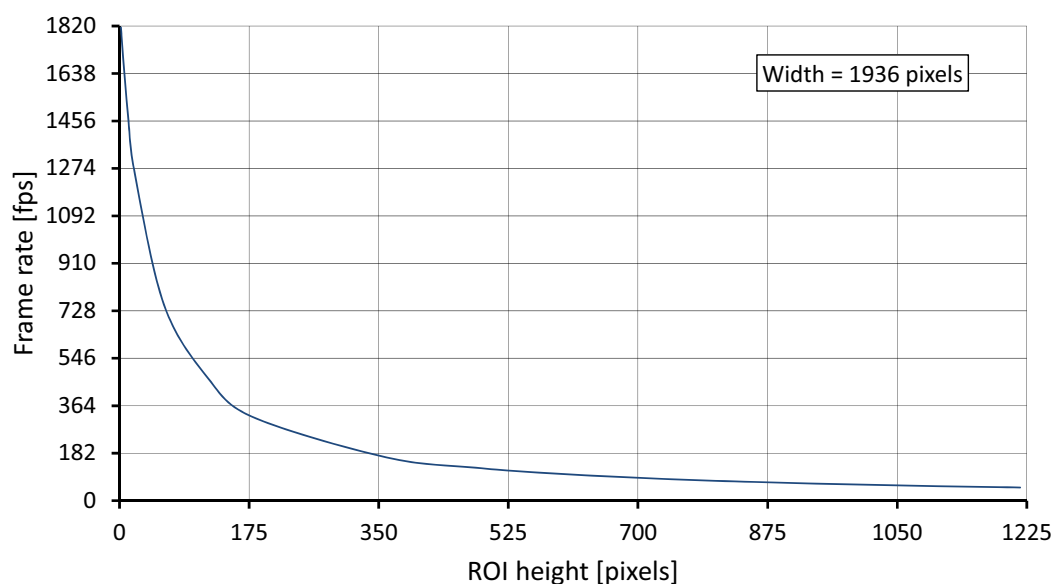


Figure 46: Manta G-235 frame rate as a function of ROI height

| 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 53: 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 Viewer 2.0 or later | |
| 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 54: Manta G-282 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 54: 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 55: Manta G-282 (Sony ICX687) imaging performance

Absolute QE

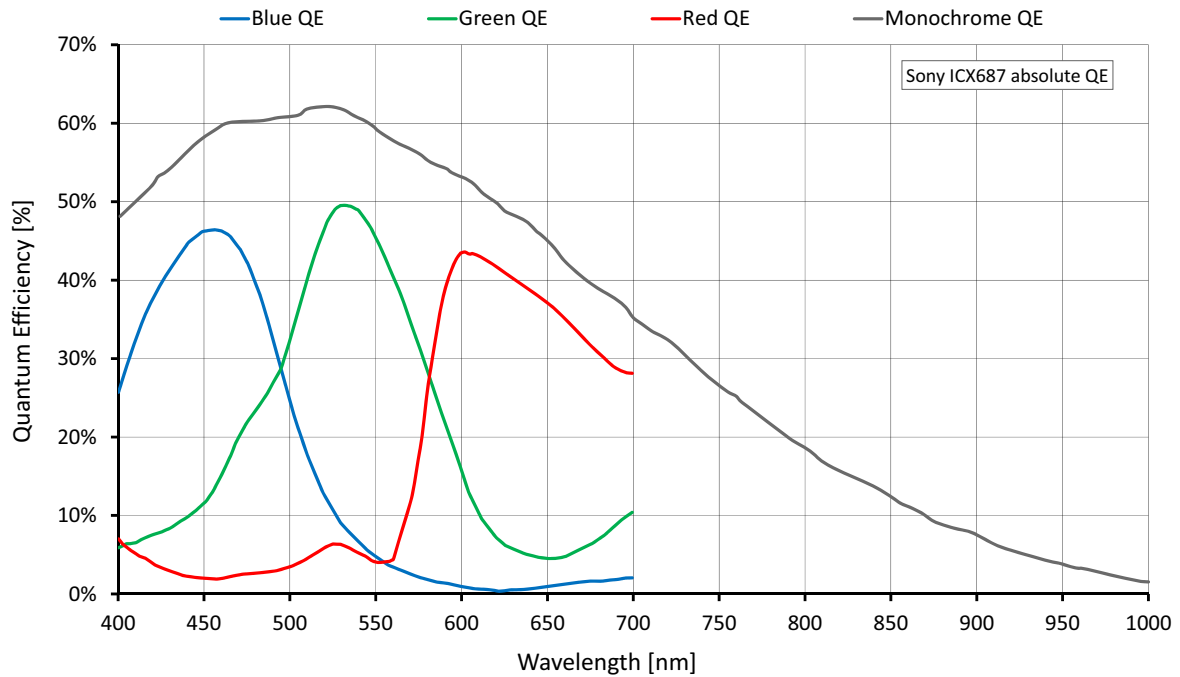


Figure 47: Manta G-282 (Sony ICX687) absolute QE

Spectral response

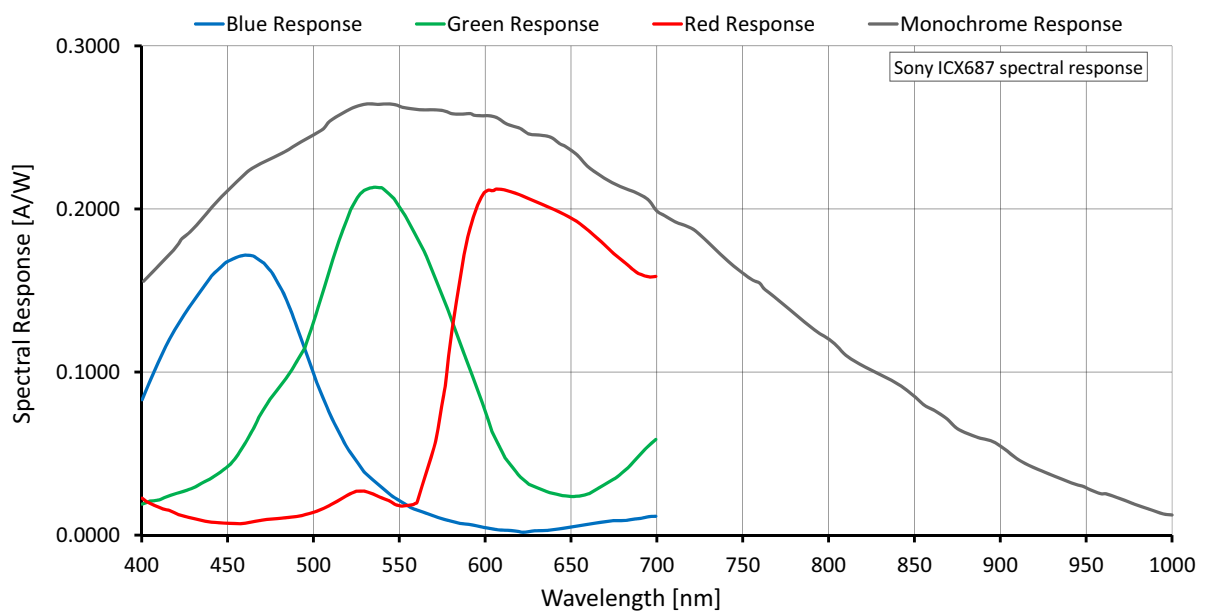


Figure 48: Manta G-282 (Sony ICX687) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.4 fps

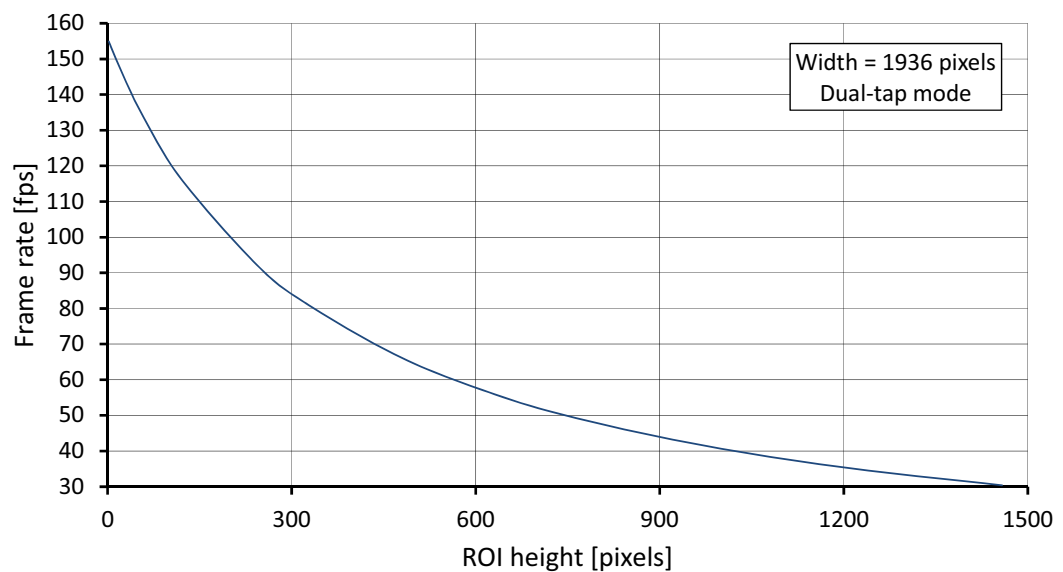


Figure 49: Manta G-282 frame rate as a function of ROI height

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

Table 56: 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 Viewer 2.0 or later | |
| 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 57: Manta G-283 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 57: 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 58: Manta G-283 (Sony ICX674) imaging performance

Absolute QE

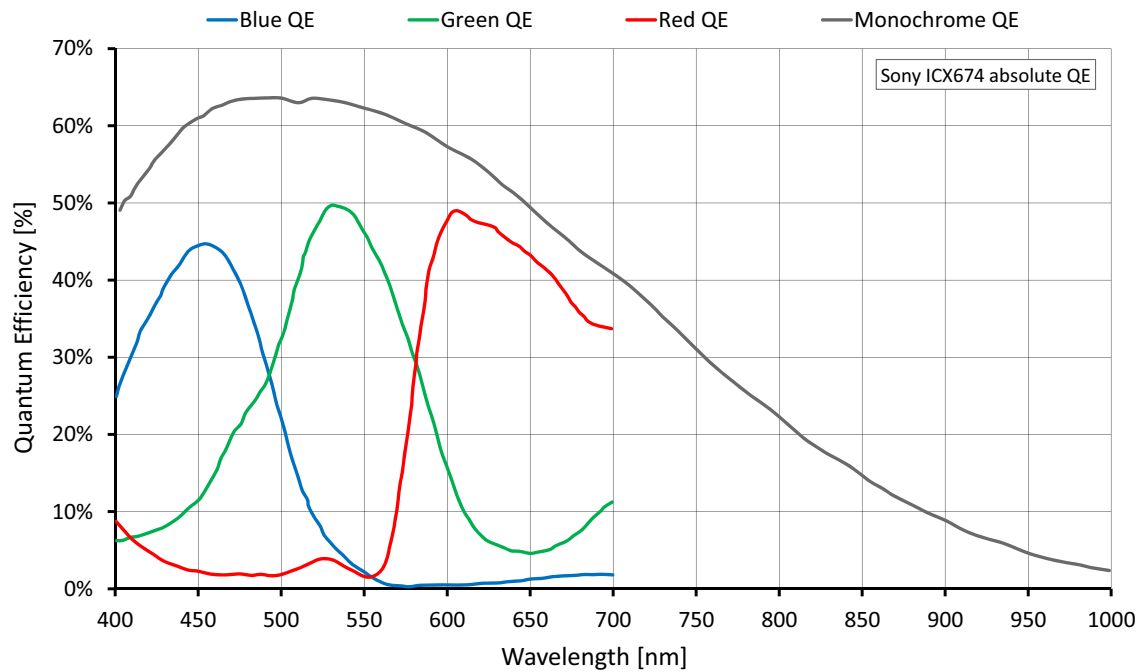


Figure 50: Manta G-283 (Sony ICX674) absolute QE

Spectral response

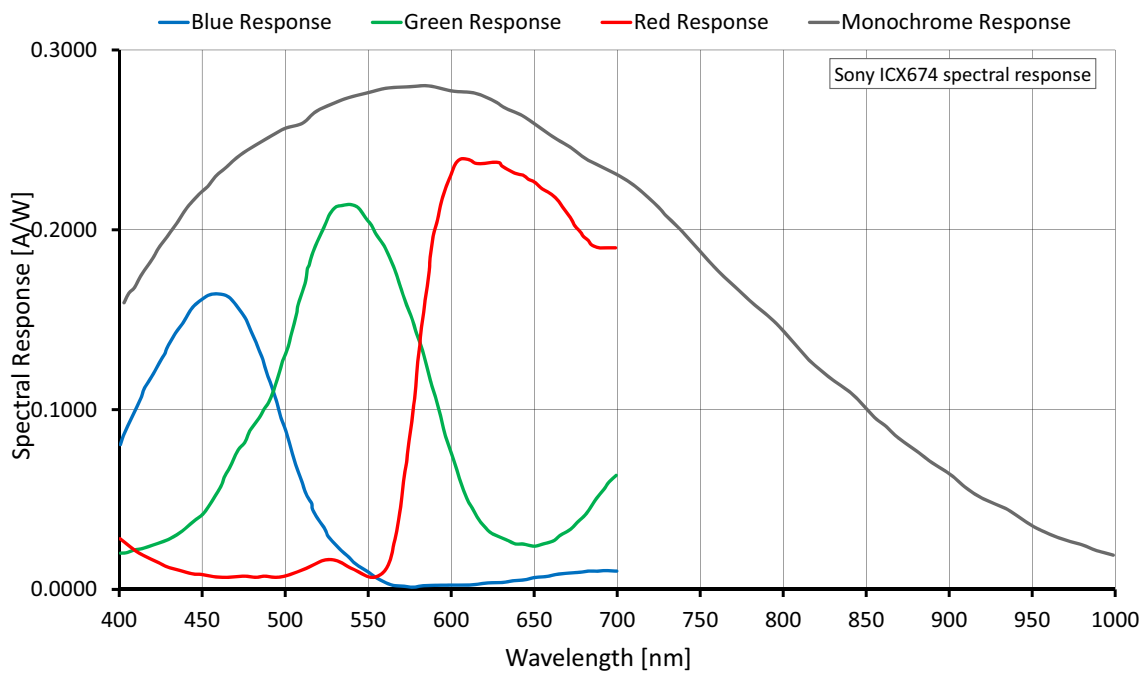


Figure 51: Manta G-283 (Sony ICX674) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 30.4 fps

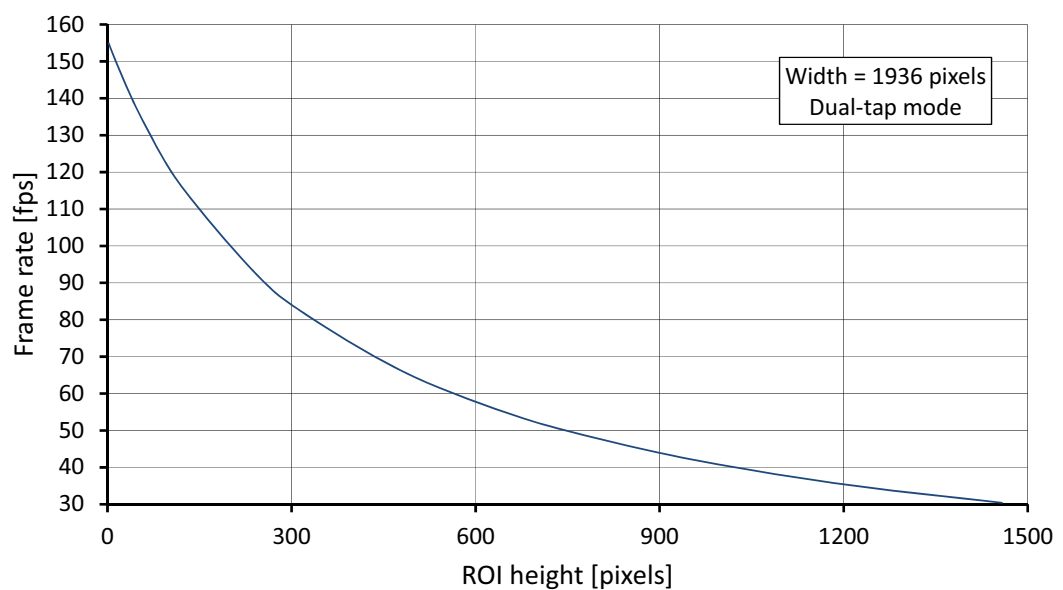


Figure 52: Manta G-283 frame rate as a function of ROI height

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

Table 59: 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 60: Manta G-319 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 60: 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 61: Manta G-319 (Sony IMX265) imaging performance

Absolute QE

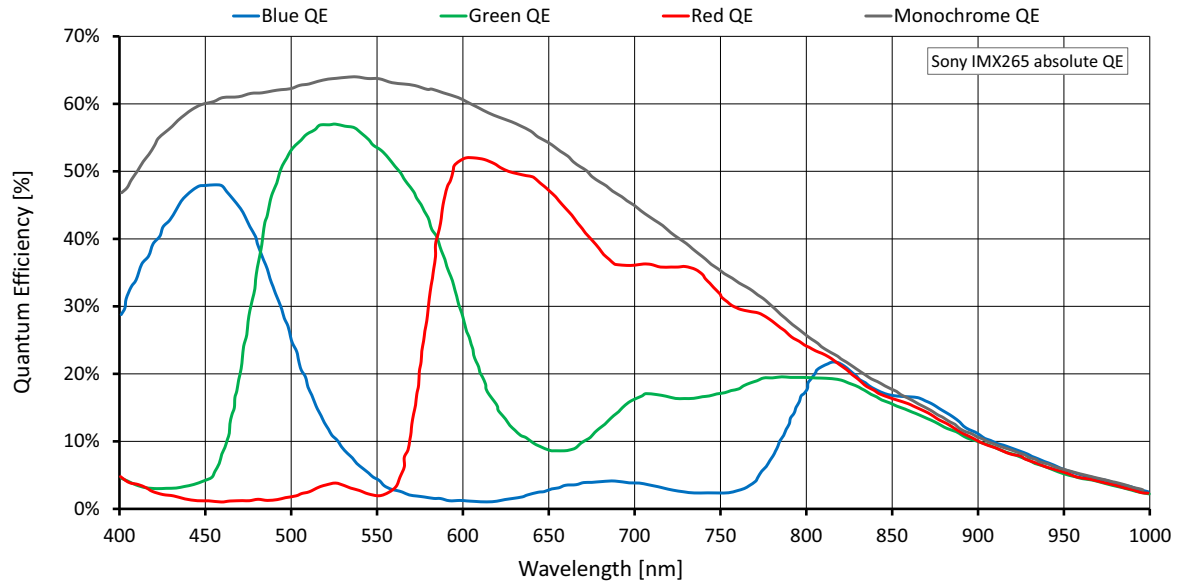


Figure 53: Manta G-319 (Sony IMX265) absolute QE

Spectral response

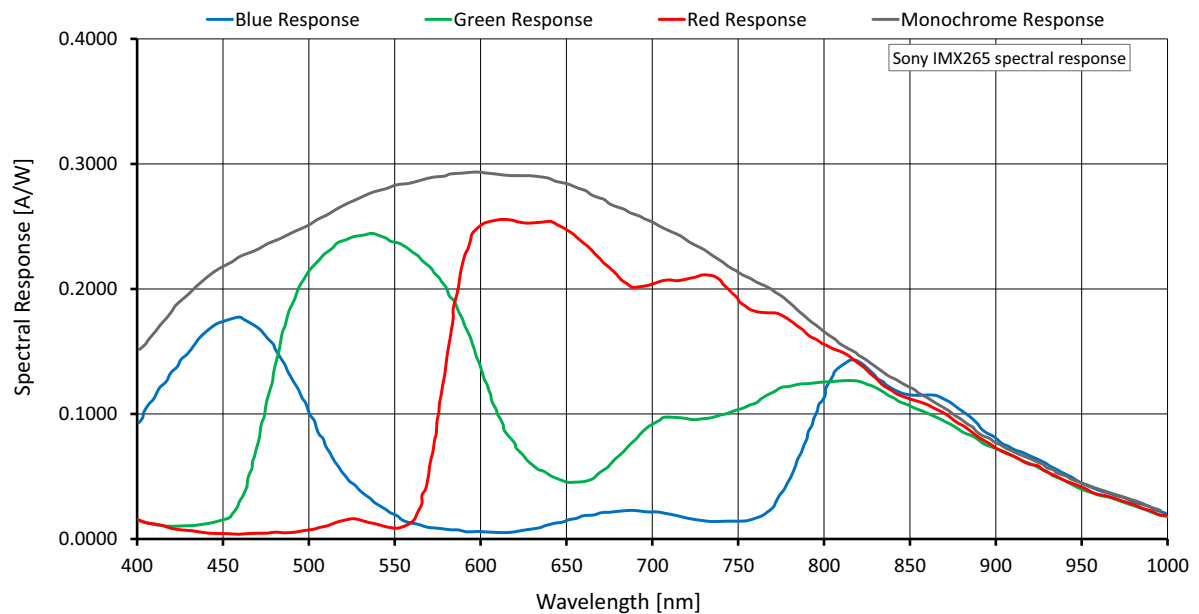


Figure 54: Manta G-319 (Sony IMX265) spectral response

ROI frame rate

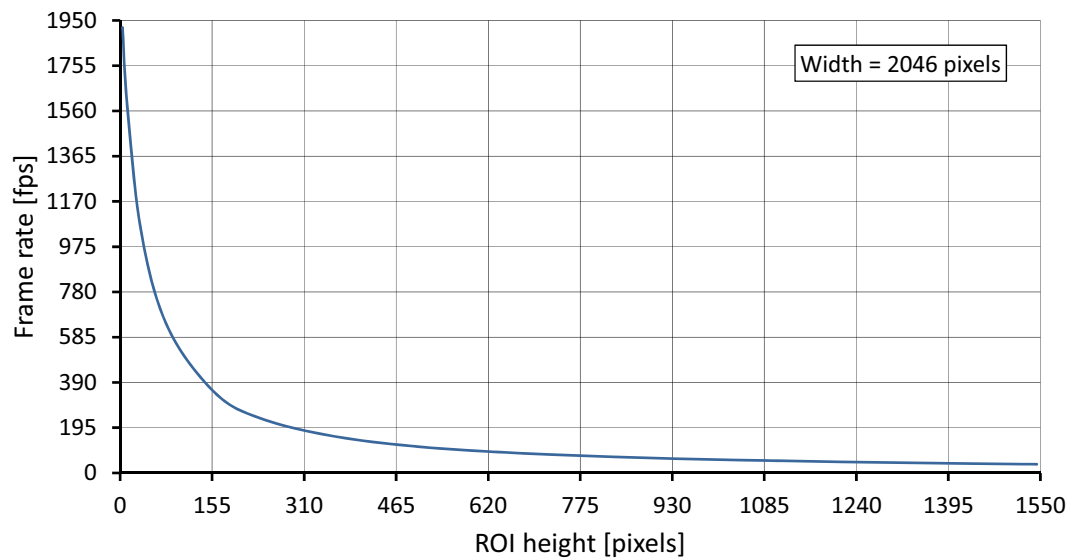


Figure 55: Manta G-319 frame rate as a function of ROI height

| 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 62: 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 63: Manta G-419 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 63: 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 64: Manta G-419 (CMOSIS/ams CMV4000) imaging performance

Absolute QE

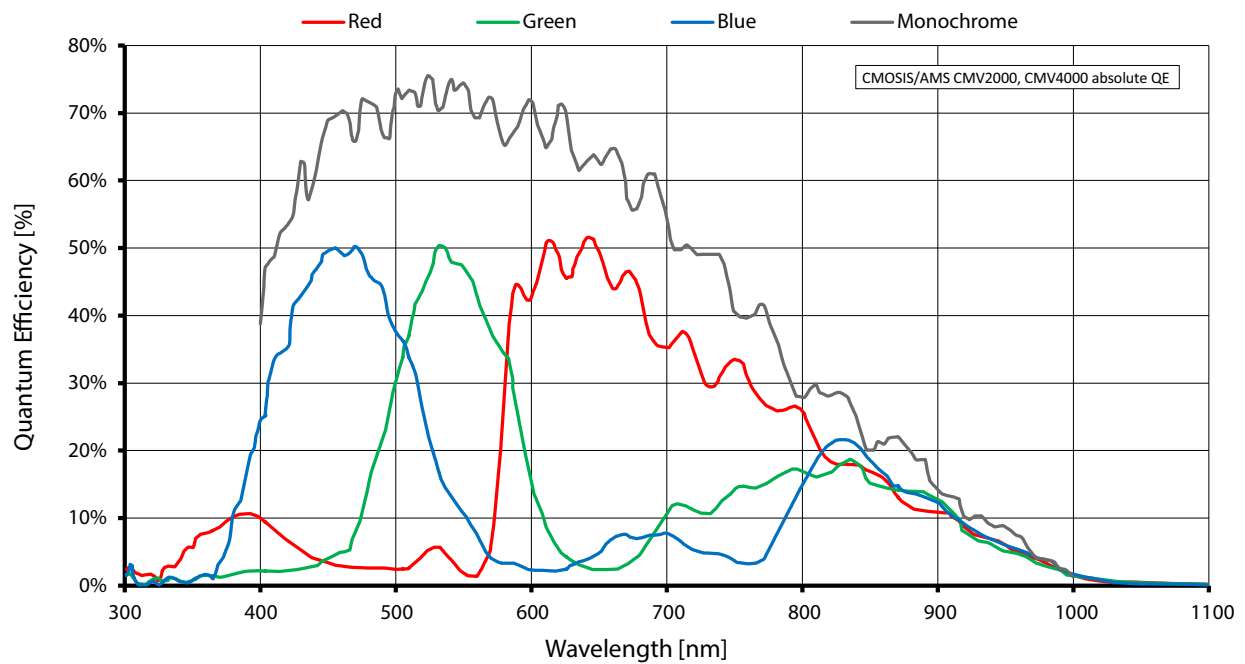


Figure 56: Manta G-419 (CMOSIS/ams CMV4000) absolute QE

Spectral response

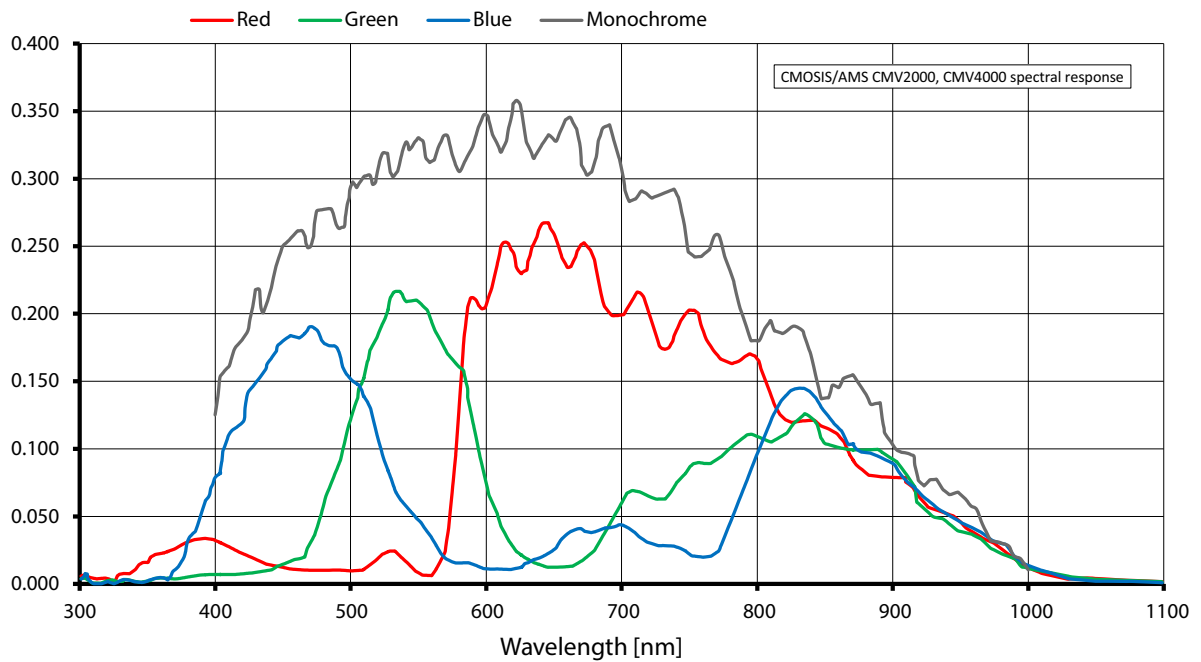


Figure 57: Manta G-419 (CMOSIS/ams CMV4000) spectral response

ROI frame rate

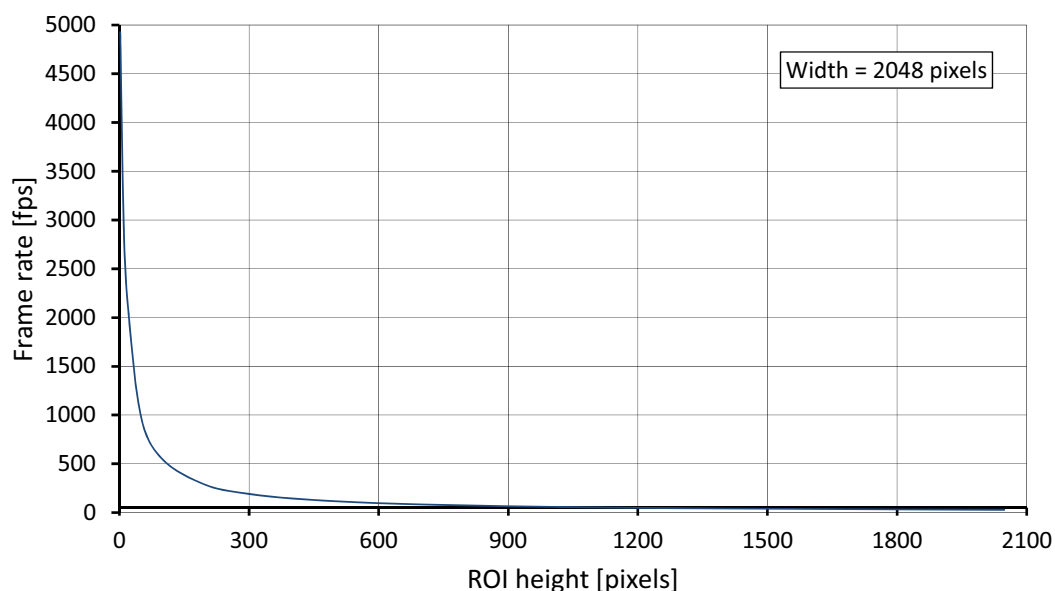


Figure 58: Manta G-419 frame rate as a function of ROI height

| 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 65: 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 66: 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 | $1/K$ | $2.4 \text{ e}^-/\text{DN}$ |
| 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 | $\mu_{e.\text{sat}}$ | 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 | $\mu_{e.\text{min}}$ | 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 67: Manta G-419B NIR (CMOSIS/ams CMV4000) imaging performance

Absolute QE

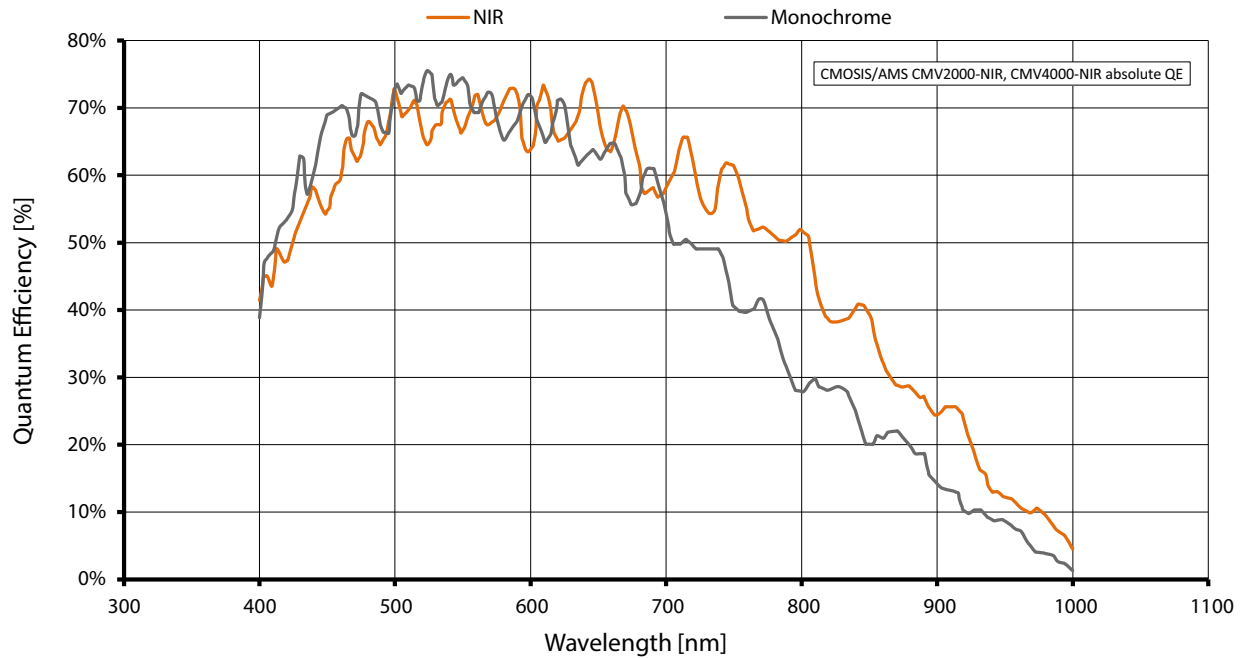


Figure 59: Manta G-419B NIR (CMOSIS/ams CMV4000) absolute QE

Spectral response

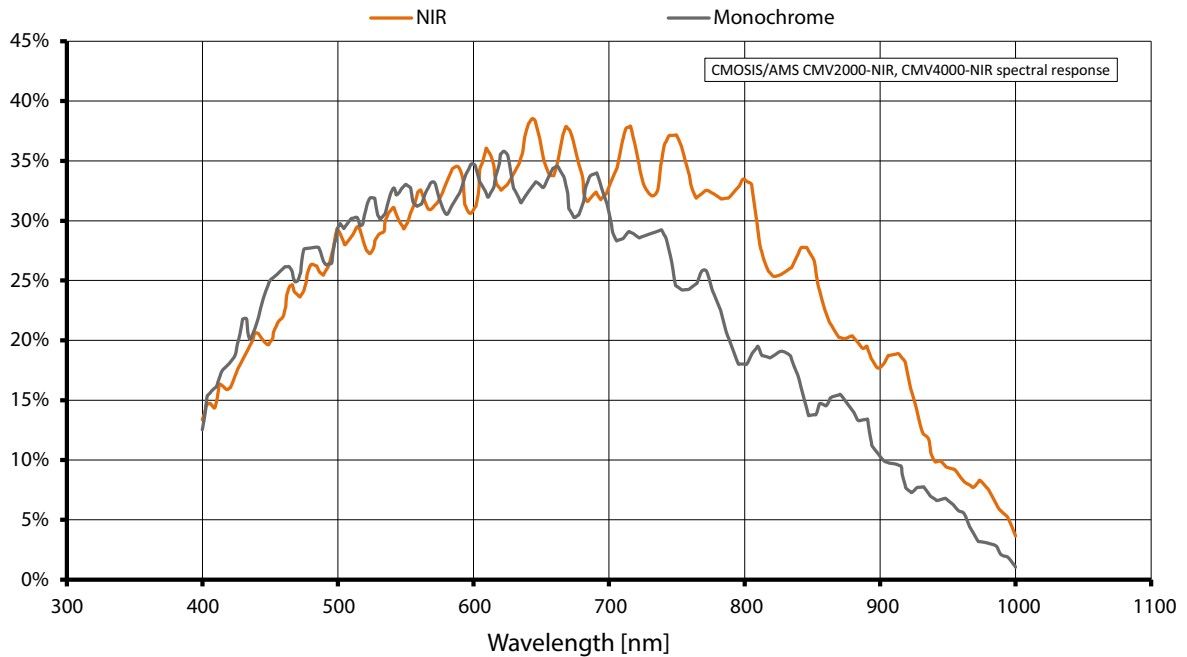


Figure 60: Manta G-419B NIR (CMOSIS/ams CMV4000) spectral response

ROI frame rate

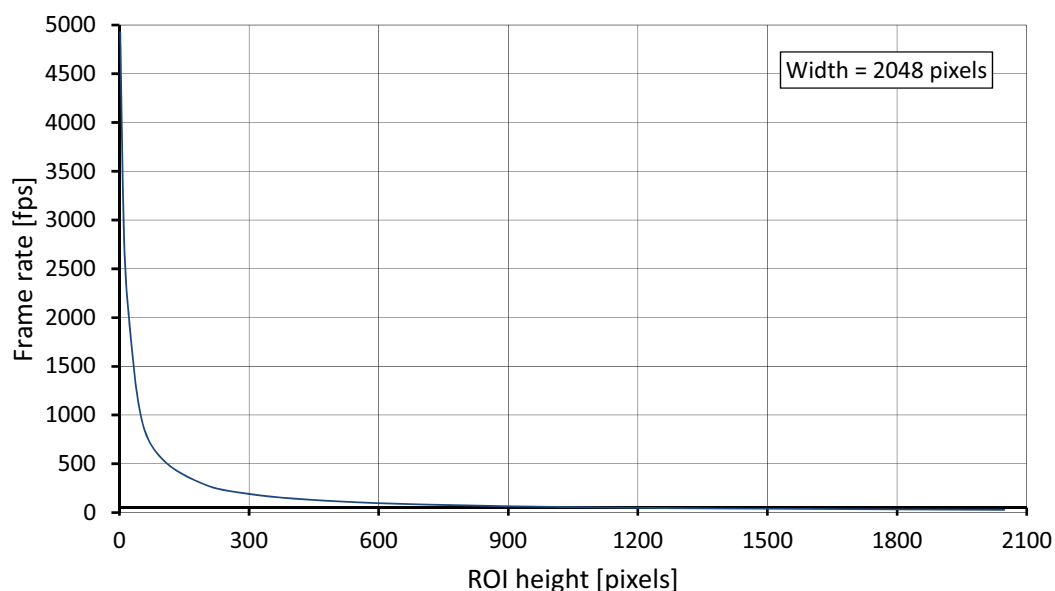


Figure 61: Manta G-419B NIR frame rate as a function of ROI height

| 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 68: 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 69: Manta G-504 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|--------------|
| Feature | 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: | | |
| <ul style="list-style-type: none">• 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 69: 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 70: Manta G-504 (Sony ICX655) imaging performance

Absolute QE

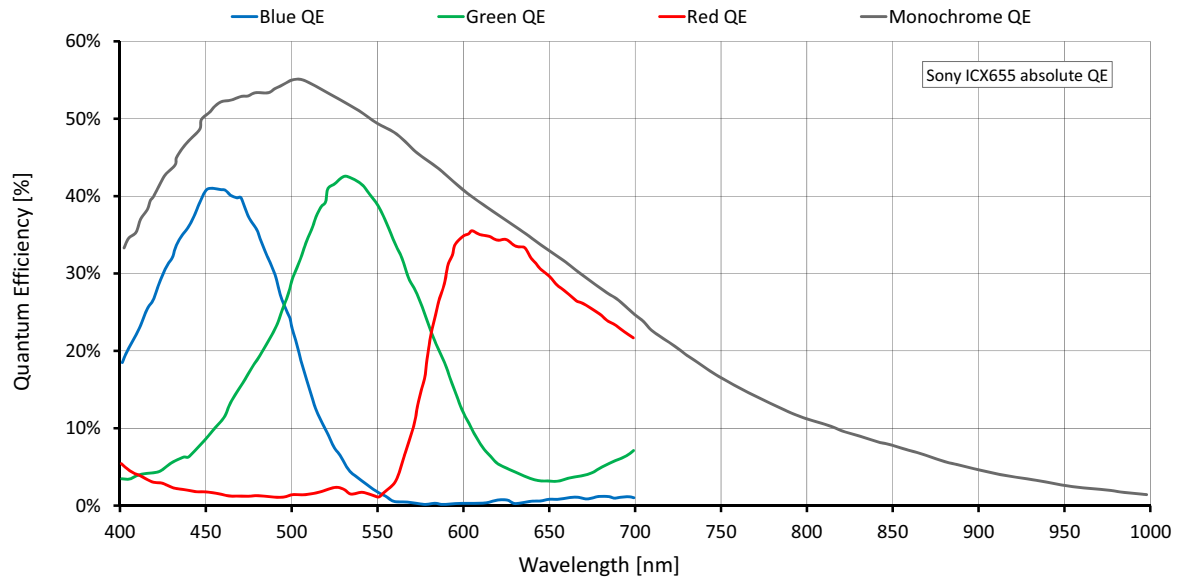


Figure 62: Manta G-504 (Sony ICX655) absolute QE

Spectral response

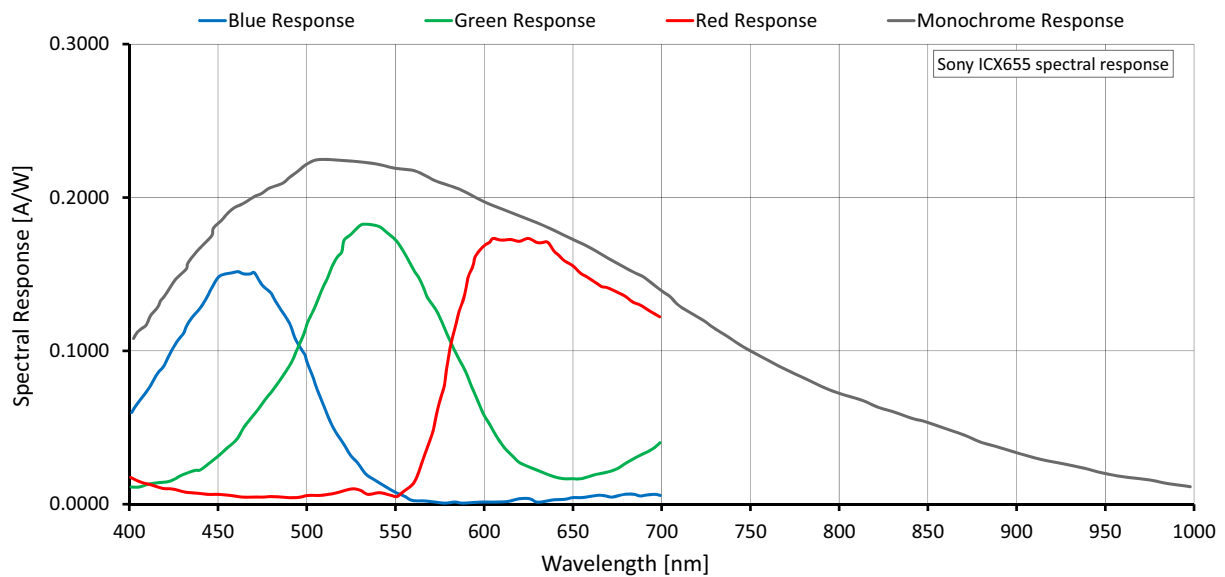


Figure 63: Manta G-504 (Sony ICX655) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 9.2 fps

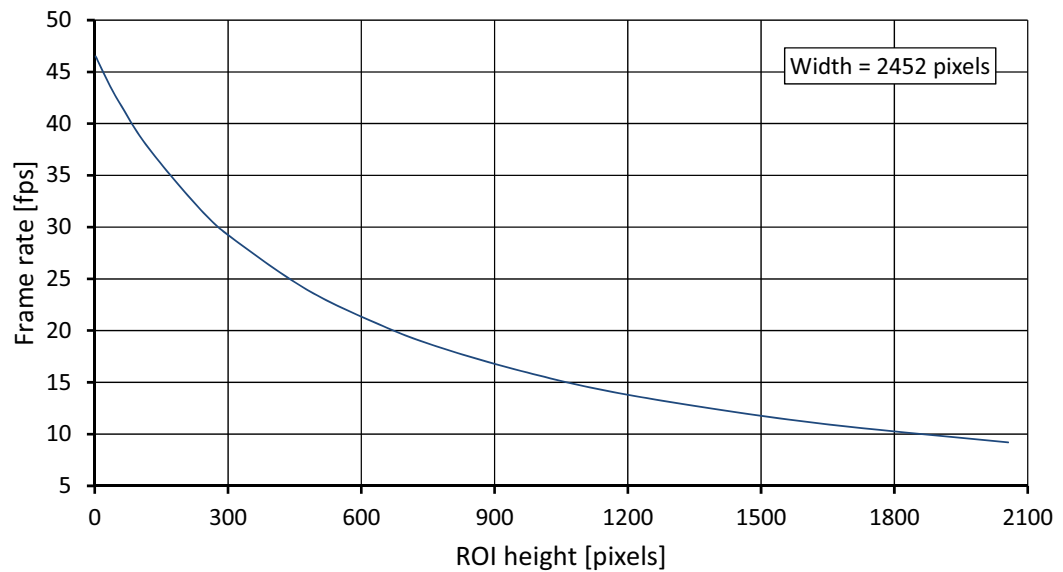


Figure 64: Manta G-504 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|
| 2056 | 9.2 | 320 | 28.6 |
| 1600 | 11.2 | 240 | 31.6 |
| 1200 | 13.8 | 120 | 37.7 |
| 960 | 16.1 | 60 | 41.7 |
| 768 | 18.5 | 30 | 44 |
| 640 | 20.6 | 10 | 45.8 |
| 480 | 23.9 | 2 | 46.5 |

Table 71: 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 72: Manta G-505 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 72: 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 73: Manta G-505 (Sony ICX625) imaging performance

Absolute QE

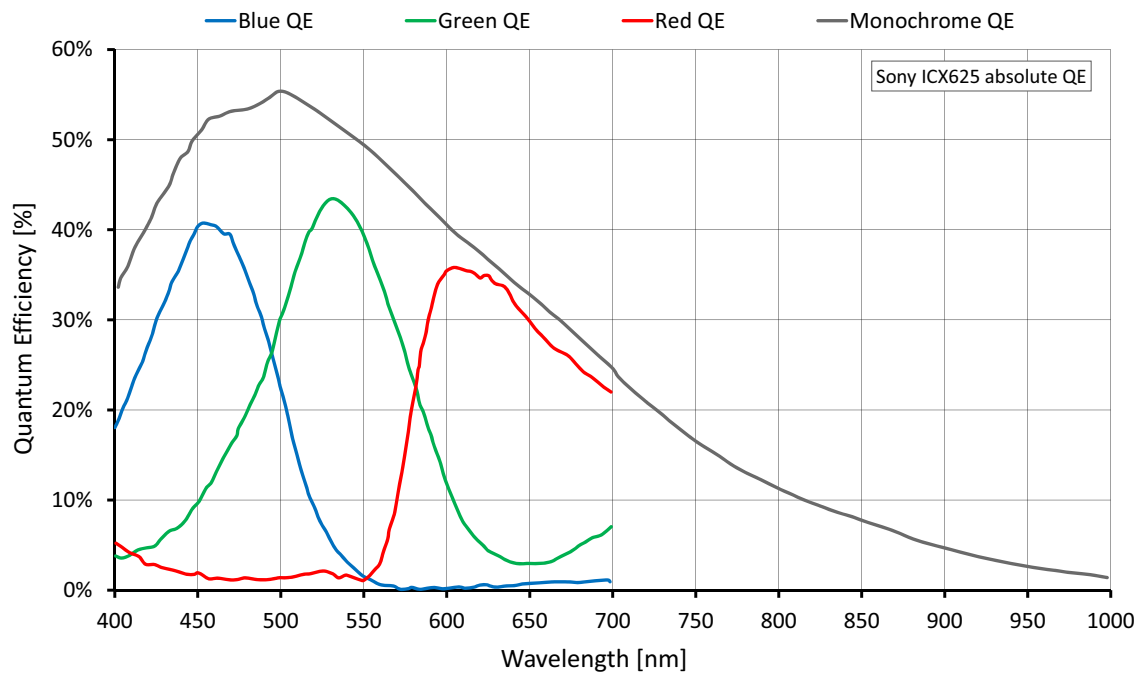


Figure 65: Manta G-505 (Sony ICX625) absolute QE

Spectral response

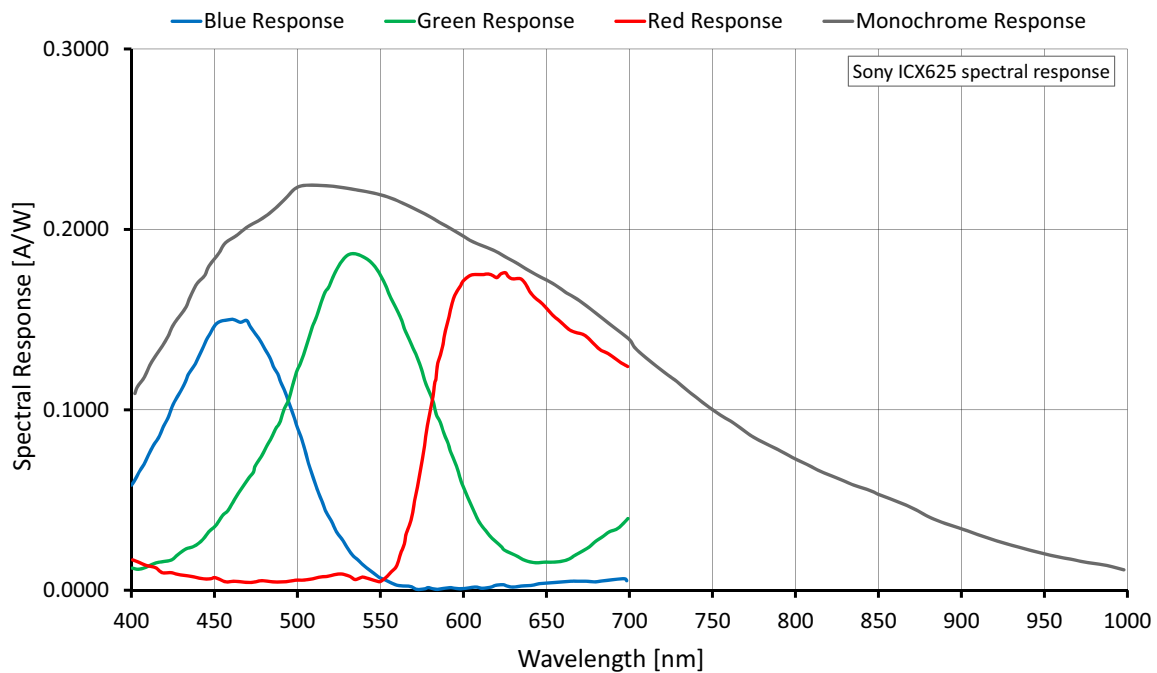


Figure 66: Manta G-505 (Sony ICX625) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 15 fps

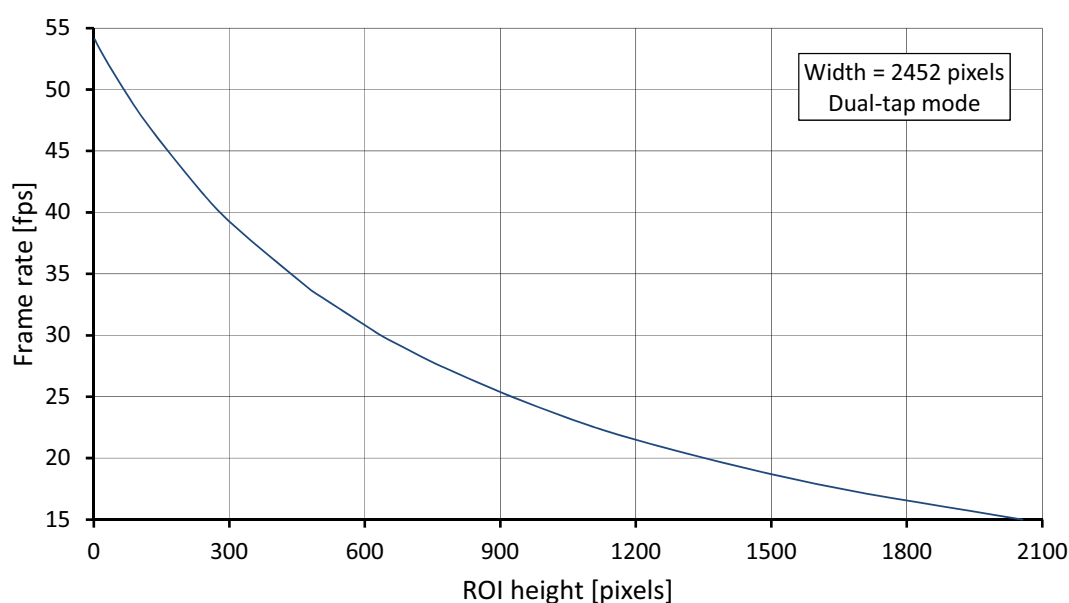


Figure 67: Manta G-505 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|--------|------------------|
| 2056 | 15 | 640 | 29.9 | 120 | 47.1 |
| 1600 | 17.9 | 614 | 30.5 | 60 | 50.4 |
| 1200 | 21.5 | 492 | 33.4 | 30 | 52.2 |
| 960 | 24.5 | 480 | 33.7 | 10 | 53.5 |
| 768 | 27.5 | 320 | 38.6 | 2 | 54.1 |
| 734 | 28.1 | 240 | 41.6 | | |

Table 74: 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 75: Manta G-507 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|--------------|
| Feature | 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 75: 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 76: Manta G-507 (Sony IMX264) imaging performance

Absolute QE

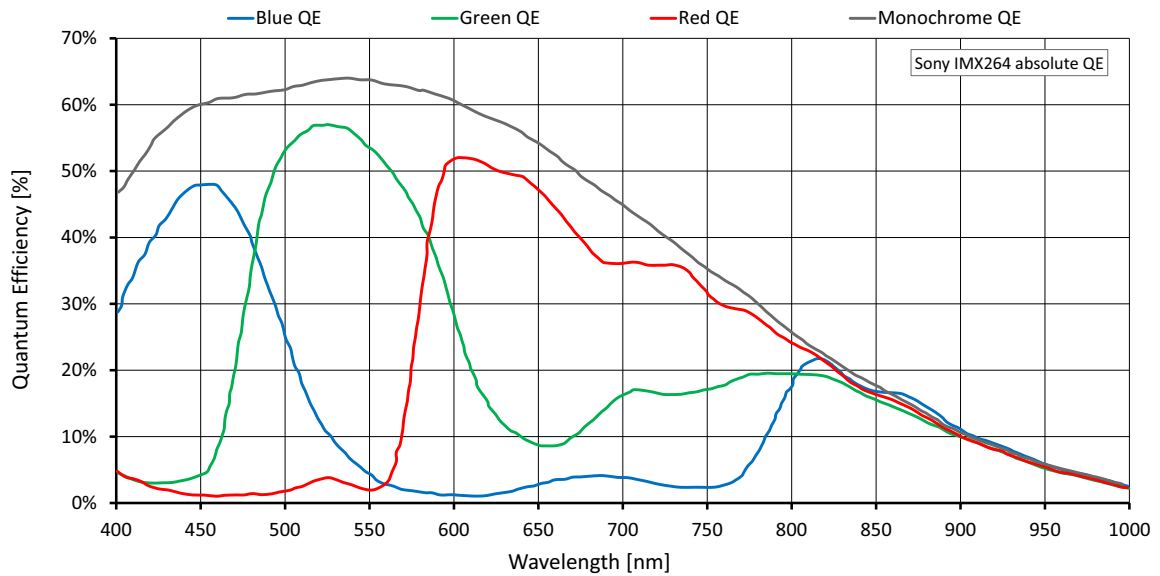


Figure 68: Manta G-507 (Sony IMX264) absolute QE

Spectral response

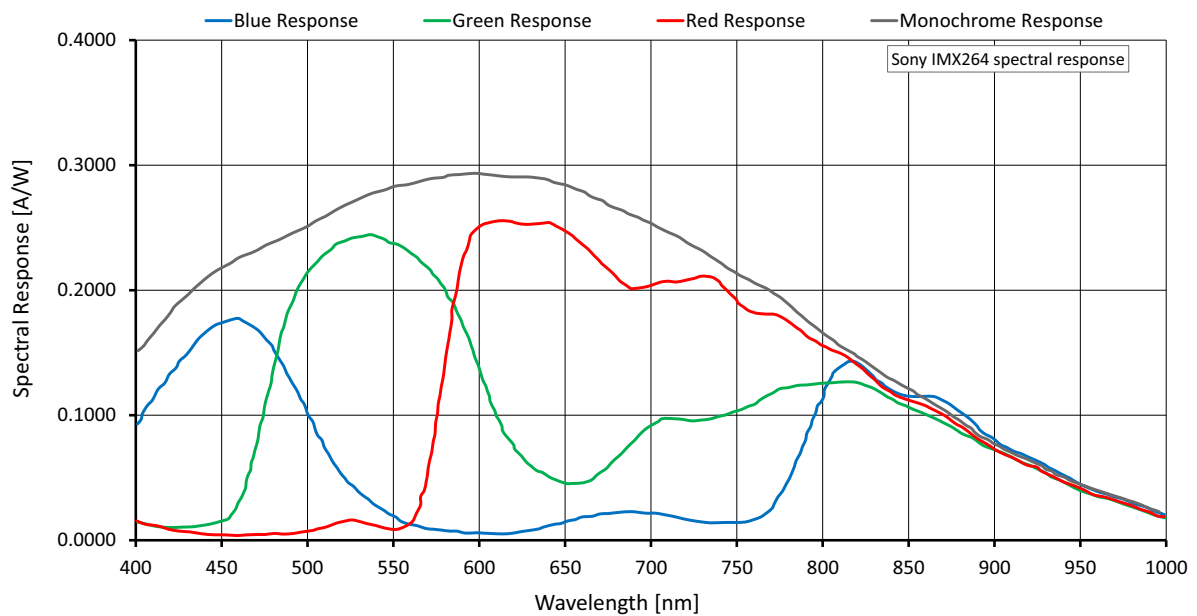


Figure 69: Manta G-507 (Sony IMX264) spectral response

ROI frame rate

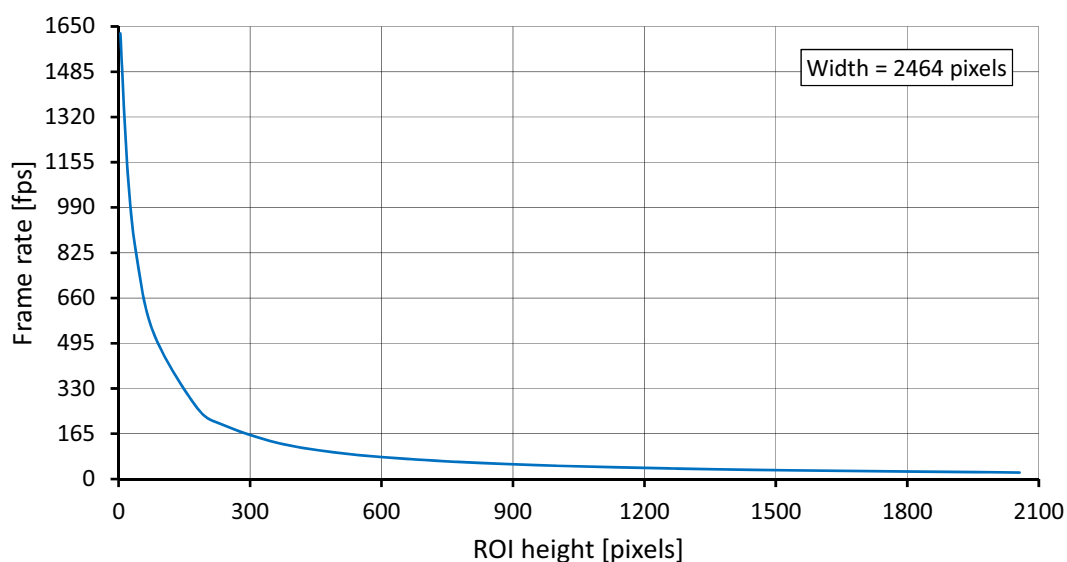


Figure 70: Manta G-507 frame rate as a function of ROI height

| 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 77: 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 78: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 111.12 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 167.04 μ s |
| Trigger jitter ² | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | \pm 13.92 μ s |
| | Mono12, BayerRG12, YUV422Packed | \pm 18.52 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | \pm 27.84 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 404 μ s |
| | Mono12, BayerRG12, YUV422Packed | 542 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 822 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 29 mm | |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only. Resolution 0.031; Accuracy \pm 1 $^{\circ}$ 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 78: 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 79: Manta G-895 (Sony IMX267) imaging performance

Absolute QE

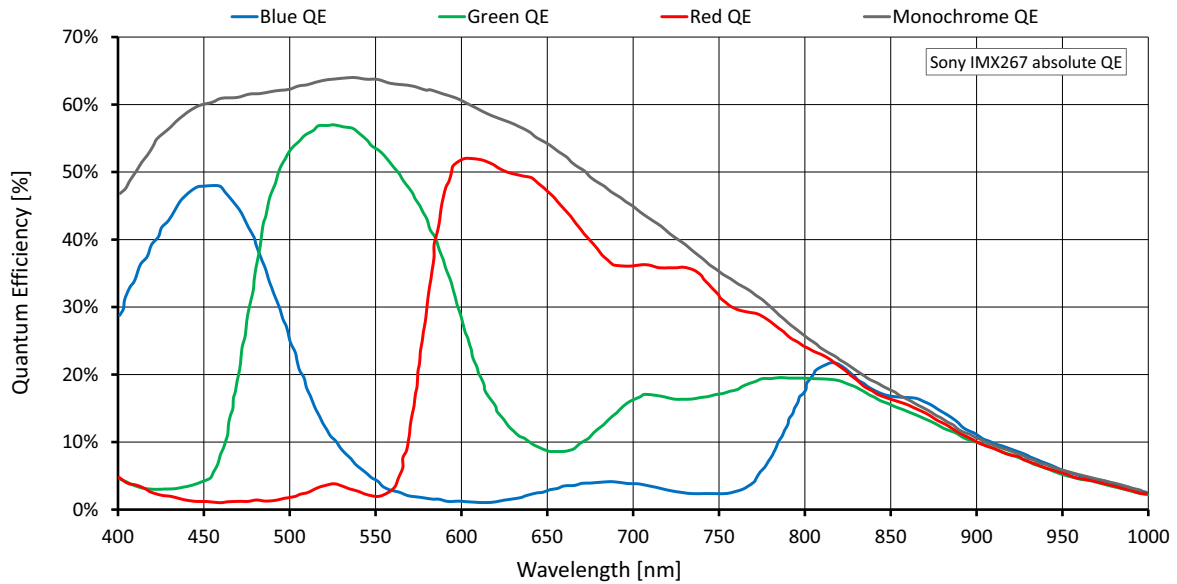


Figure 71: Manta G-895 (Sony IMX267) absolute QE

Spectral response

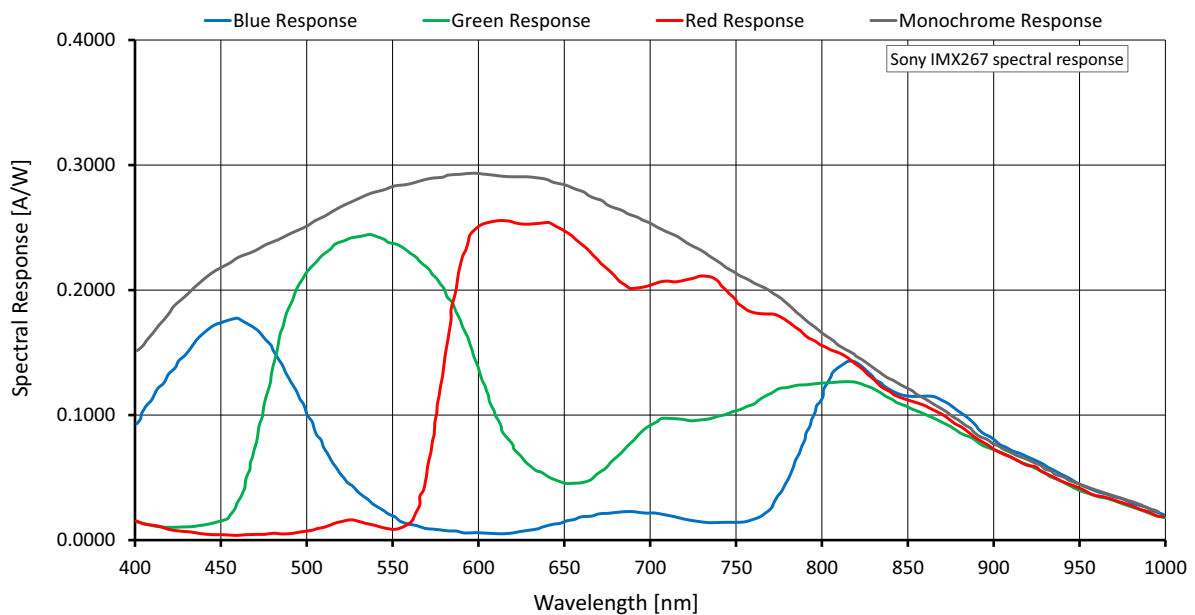


Figure 72: Manta G-895 (Sony IMX267) spectral response

ROI frame rate

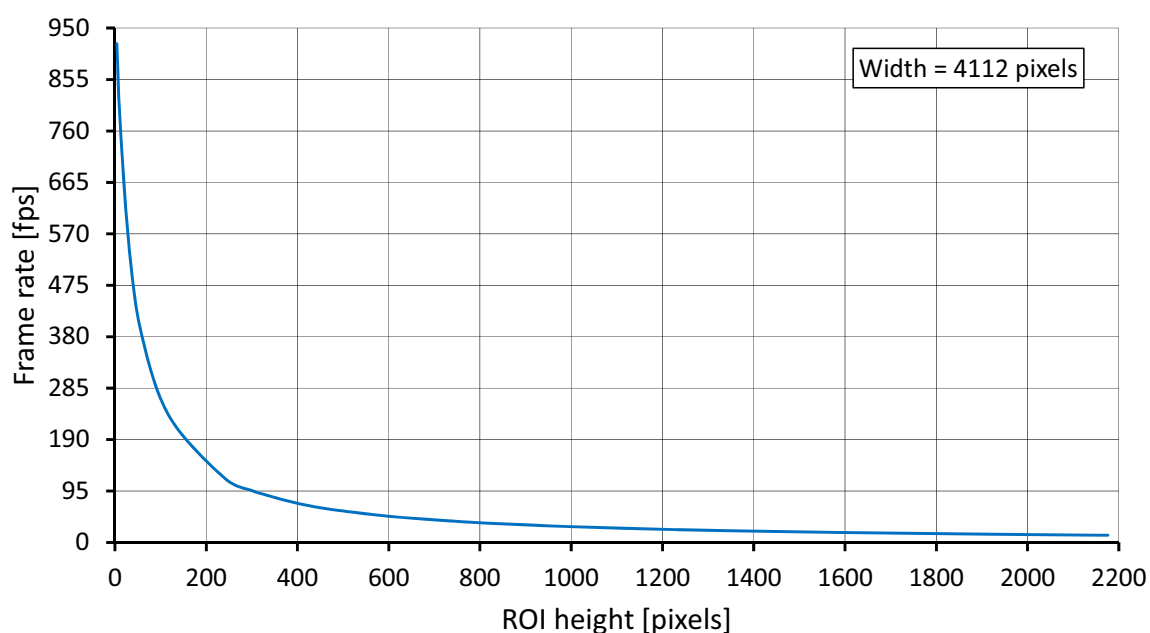


Figure 73: Manta G-895 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|--------|------------------|
| 2176 | 13.4 | 800 | 36.4 | 240 | 119 |
| 2048 | 14.3 | 768 | 37.9 | 120 | 231.7 |
| 2000 | 14.6 | 640 | 45.5 | 60 | 378.1 |
| 1600 | 18.3 | 600 | 48.4 | 32 | 536.1 |
| 1280 | 22.8 | 480 | 60.4 | 12 | 764.2 |
| 1200 | 24.4 | 400 | 72.3 | 4 | 921 |
| 1024 | 28.5 | 320 | 90.3 | | |
| 960 | 30.4 | 300 | 96 | | |

Table 80: 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 Viewer 2.0 or later | |
| 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 81: Manta G-917 model series specifications (sheet 1 of 2)

| | Specification | |
|--|--|--------------|
| Feature | 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: <ul style="list-style-type: none">• 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 81: 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 82: Manta G-917 (Sony ICX814) imaging performance

Absolute QE

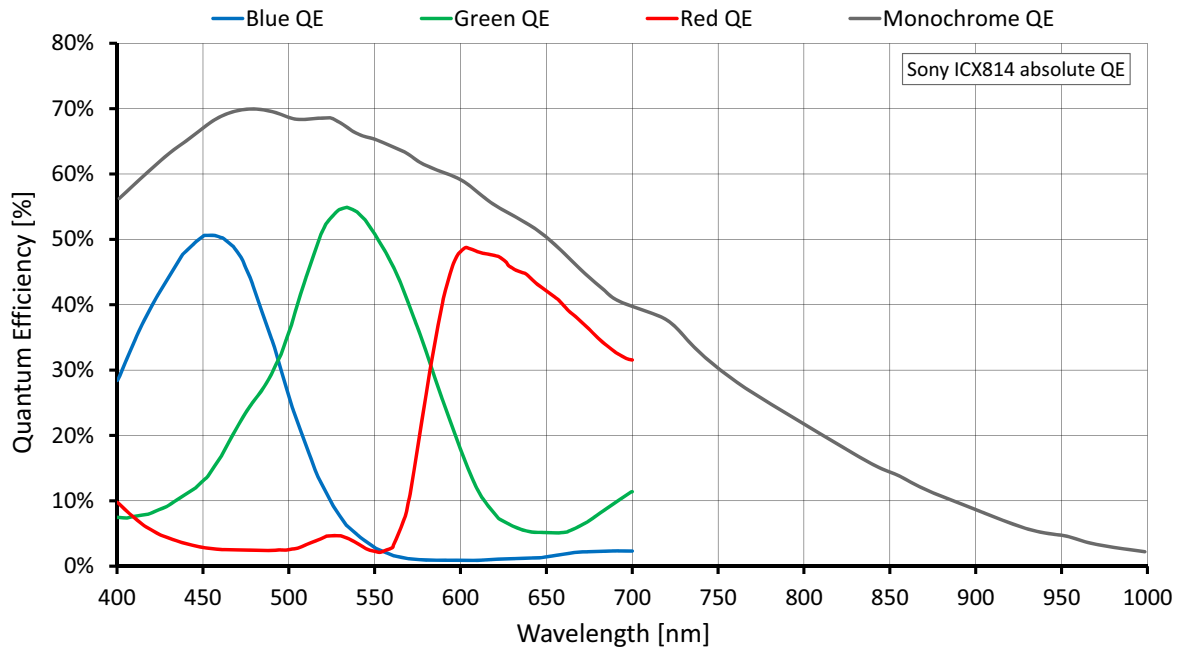


Figure 74: Manta G-917 (Sony ICX814) absolute QE

Spectral response

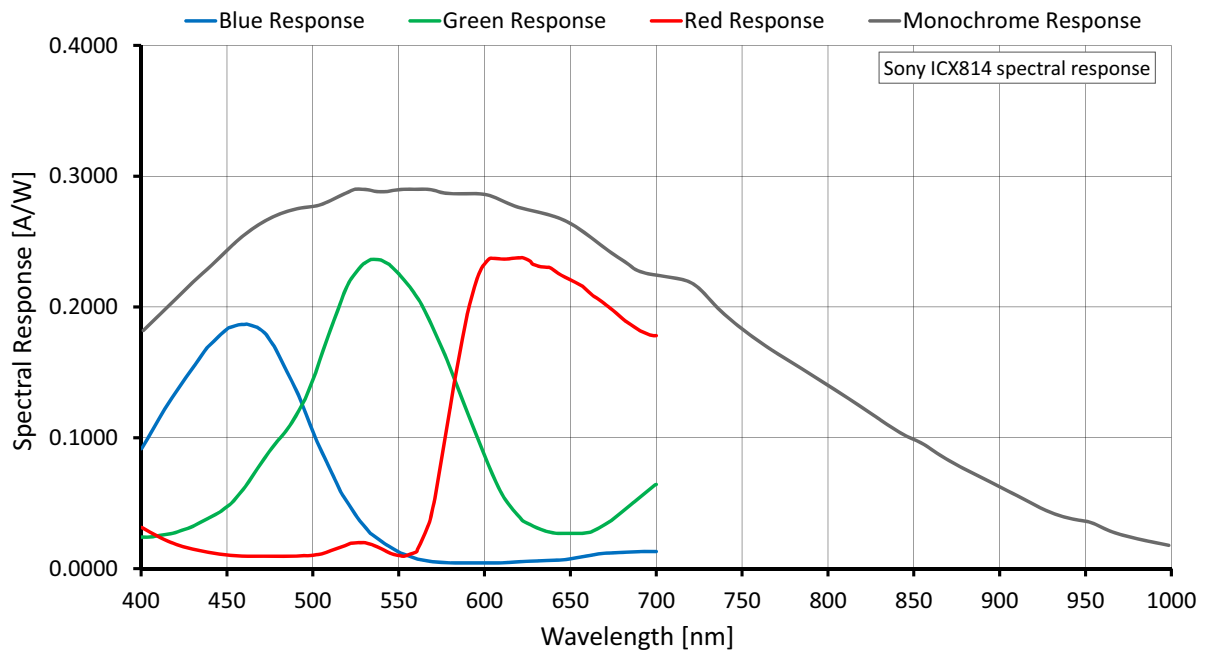


Figure 75: Manta G-917 (Sony ICX814) spectral response

ROI frame rate

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

Maximum frame rate at full resolution according formula: 10.1 fps

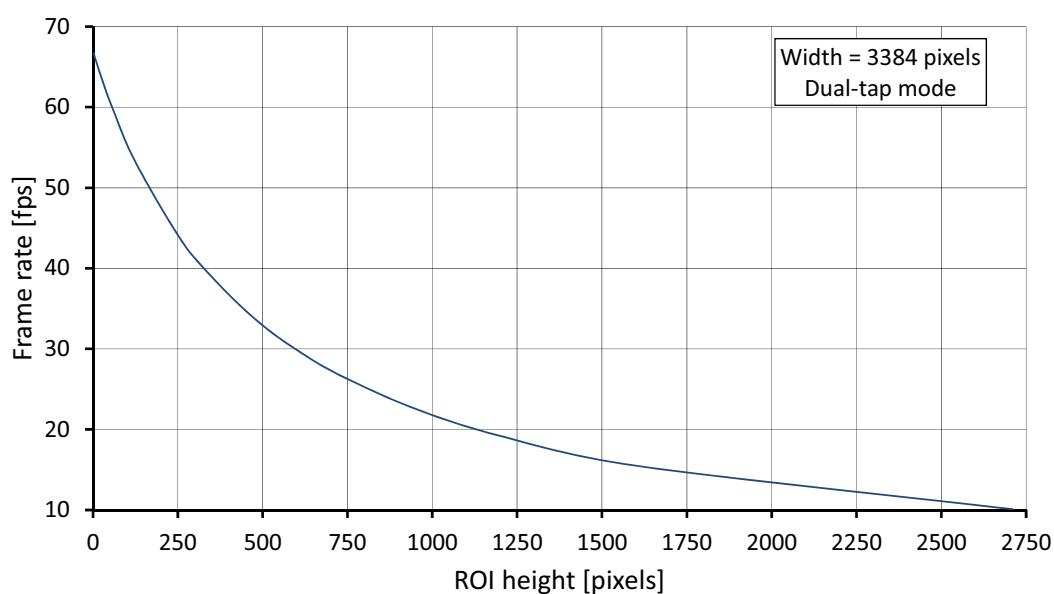


Figure 76: Manta G-917 frame rate as a function of ROI height

| 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 83: 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 84: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 111.12 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 167.04 μ s |
| Trigger jitter ¹ | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | \pm 13.92 μ s |
| | Mono12, BayerRG12, YUV422Packed | \pm 18.52 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | \pm 27.84 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 404 μ s |
| | Mono12, BayerRG12, YUV422Packed | 542 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 822 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 29 mm | |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only. Resolution 0.031; Accuracy \pm 1 $^{\circ}$ 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 84: 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 85: Manta G-1236 (Sony IMX304) imaging performance

Absolute QE

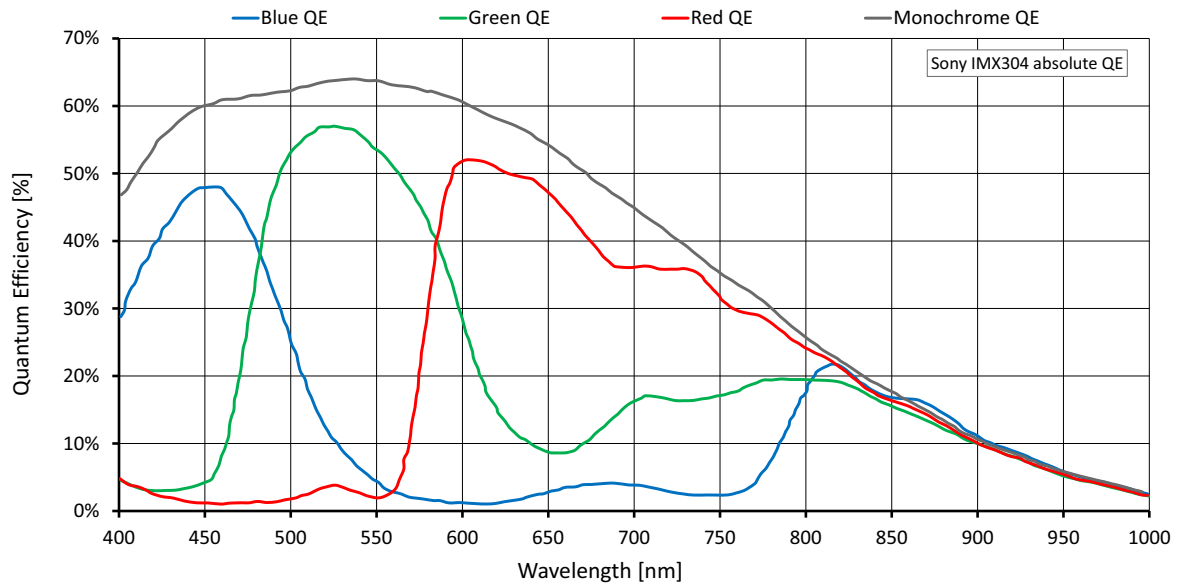


Figure 77: Manta G-1236 (Sony IMX304) absolute QE

Spectral response

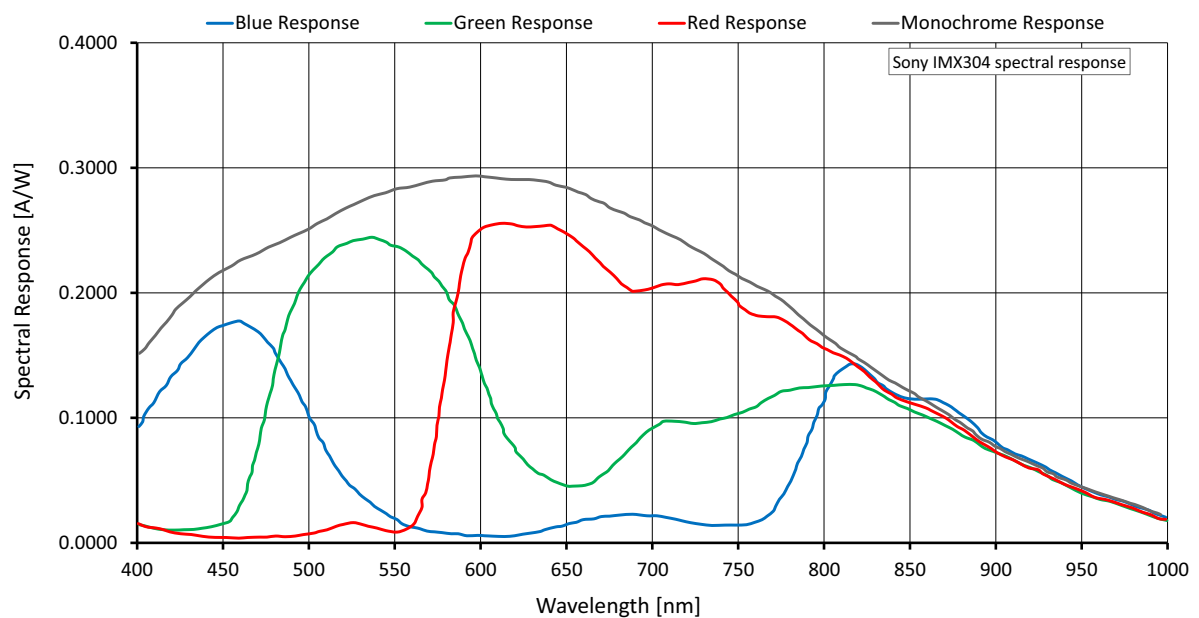


Figure 78: Manta G-1236 (Sony IMX304) spectral response

ROI frame rate

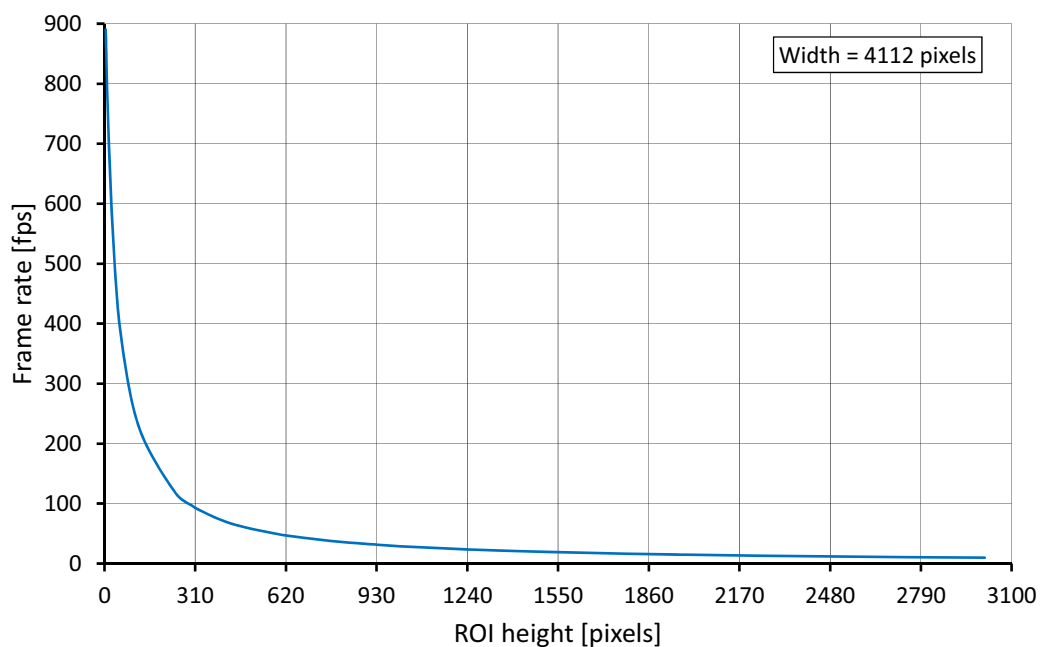


Figure 79: Manta G-1236 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|--------|------------------|
| 3008 | 9.73 | 1200 | 24.3 | 320 | 90.2 |
| 3000 | 9.76 | 1024 | 28.5 | 300 | 96 |
| 2800 | 10.46 | 960 | 30.4 | 240 | 118.9 |
| 2560 | 11.43 | 800 | 36.4 | 120 | 231.7 |
| 2400 | 12.2 | 768 | 37.9 | 60 | 378.1 |
| 2048 | 14.3 | 640 | 45.5 | 32 | 536.1 |
| 2000 | 14.6 | 600 | 48.4 | 12 | 764.2 |
| 1600 | 18.3 | 480 | 60.4 | 4 | 921 |
| 1280 | 22.8 | 400 | 72.3 | | |

Table 86: 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 87: 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 μ s |
| | Mono12, BayerRG12, YUV422Packed | 351.68 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 528.64 μ s |
| Trigger jitter ¹ | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | \pm 18.88 μ s |
| | Mono12, BayerRG12, YUV422Packed | \pm 25.12 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | \pm 37.76 μ s |
| Time between exposures | Pixel format | Value |
| | Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed | 979 μ s |
| | Mono12, BayerRG12, YUV422Packed | 1304 μ s |
| | RGB8Packed, BGR8Packed, YUV444Packed | 1961 μ s |
| Camera dimensions (L \times W \times H) | 86.3 \times 44 \times 29 mm | |
| Mass (typical) | PoE model: 200 g; Non-PoE model: 190 g | |
| Temperature monitoring | Available for main board only. Resolution 0.031; Accuracy \pm 1 $^{\circ}$ 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 87: 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 88: Manta G-1620 (Sony IMX542) imaging performance

Absolute QE

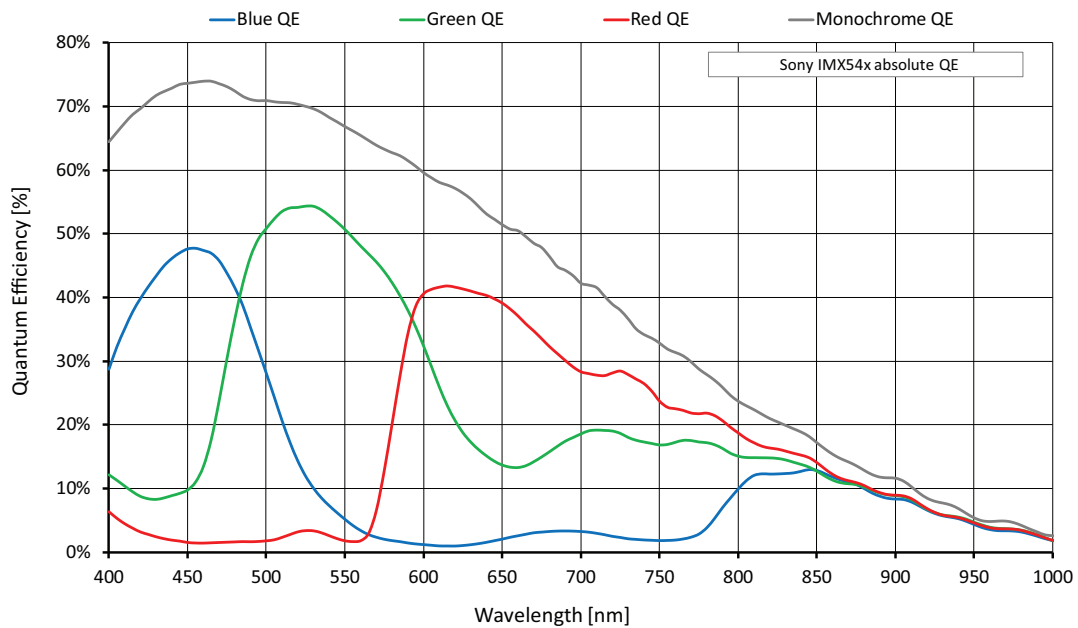


Figure 80: Manta G-1620 (Sony IMX542) absolute QE

Spectral response

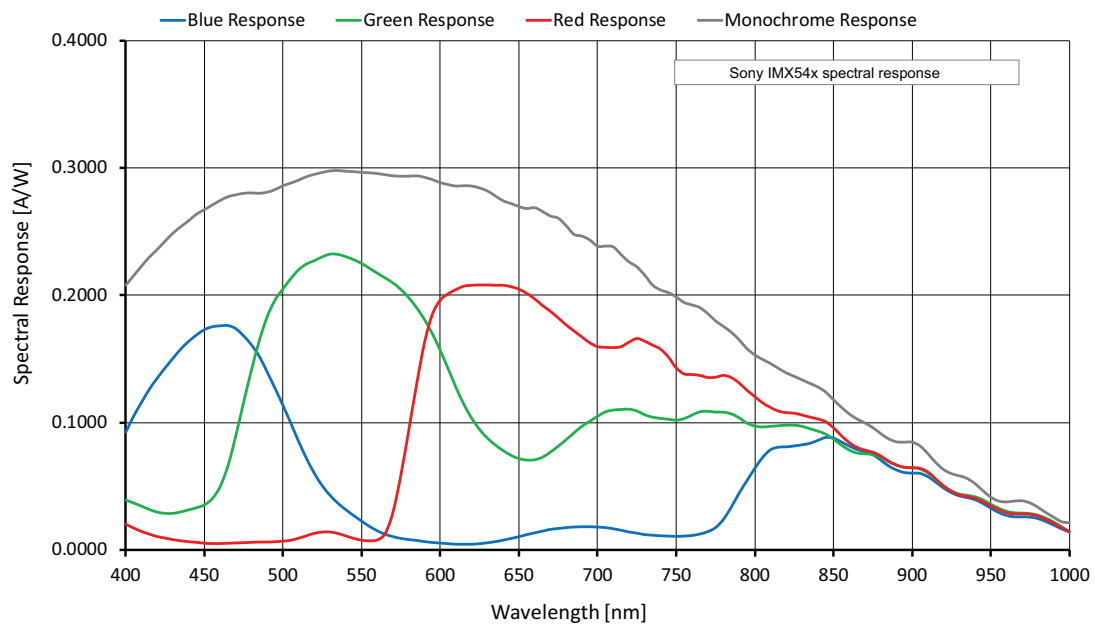


Figure 81: Manta G-1620 (Sony IMX542) spectral response

ROI frame rate

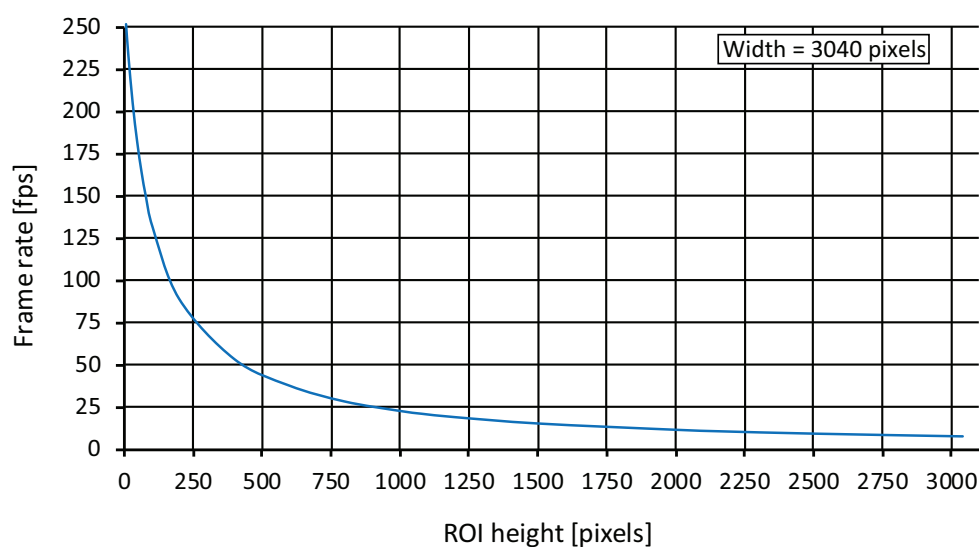


Figure 82: Manta G-1620 frame rate as a function of ROI height

| 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 89: 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 90: Manta G-2040 model series specifications (sheet 1 of 2)

| | Specification | |
|---|--|---------------|
| Feature | 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 90: 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 91: Manta G-2040 (Sony IMX541) imaging performance

Absolute QE

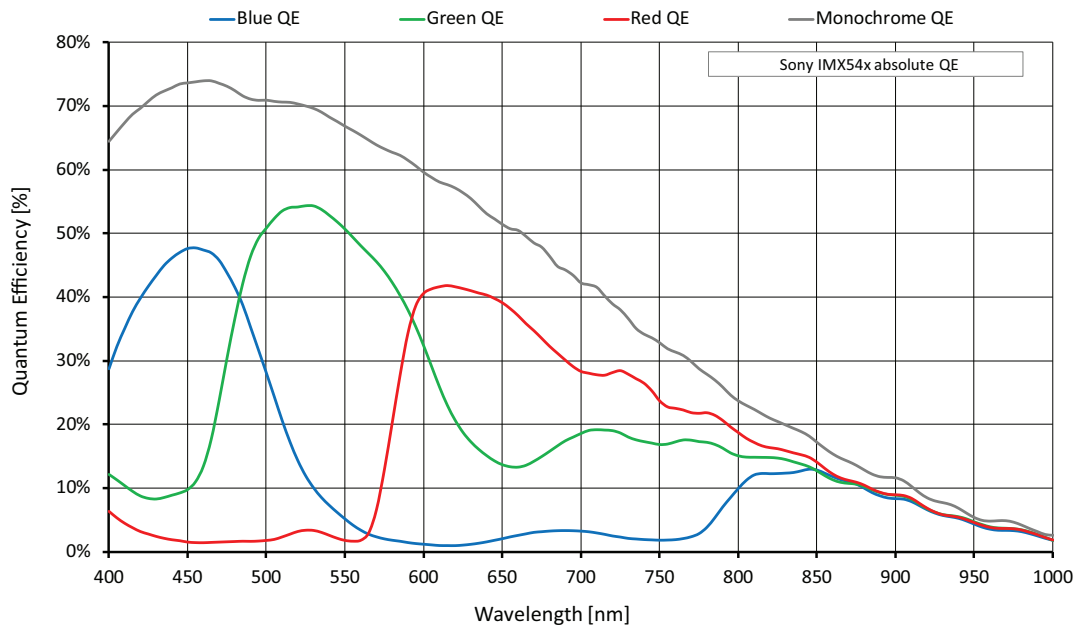


Figure 83: Manta G-2040 (Sony IMX541) absolute QE

Spectral response

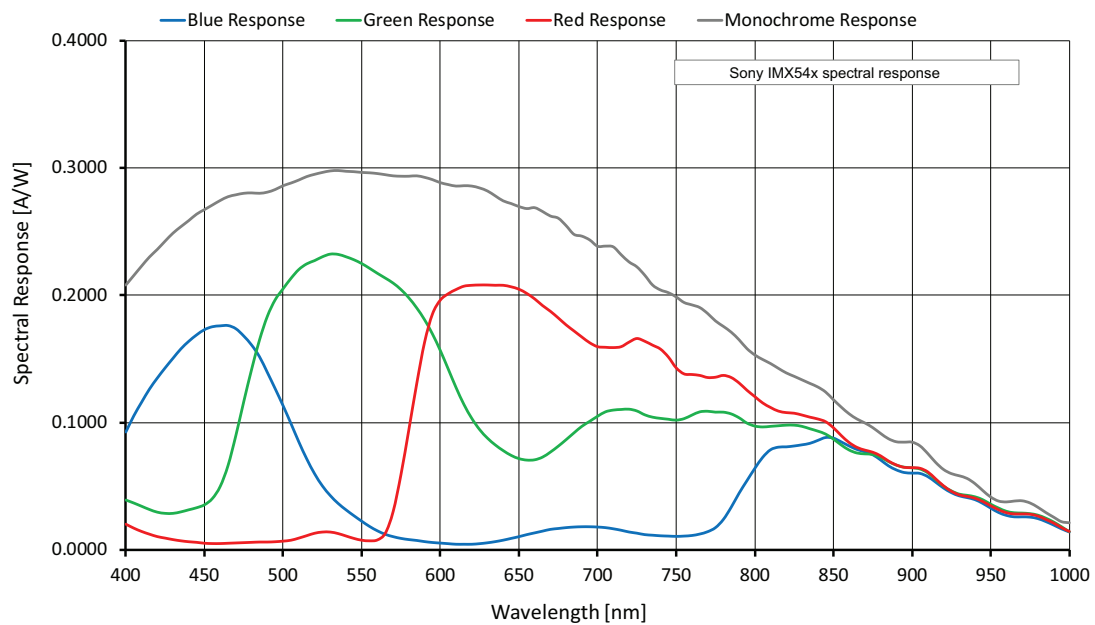


Figure 84: Manta G-2040 (Sony IMX541) spectral response

ROI frame rate

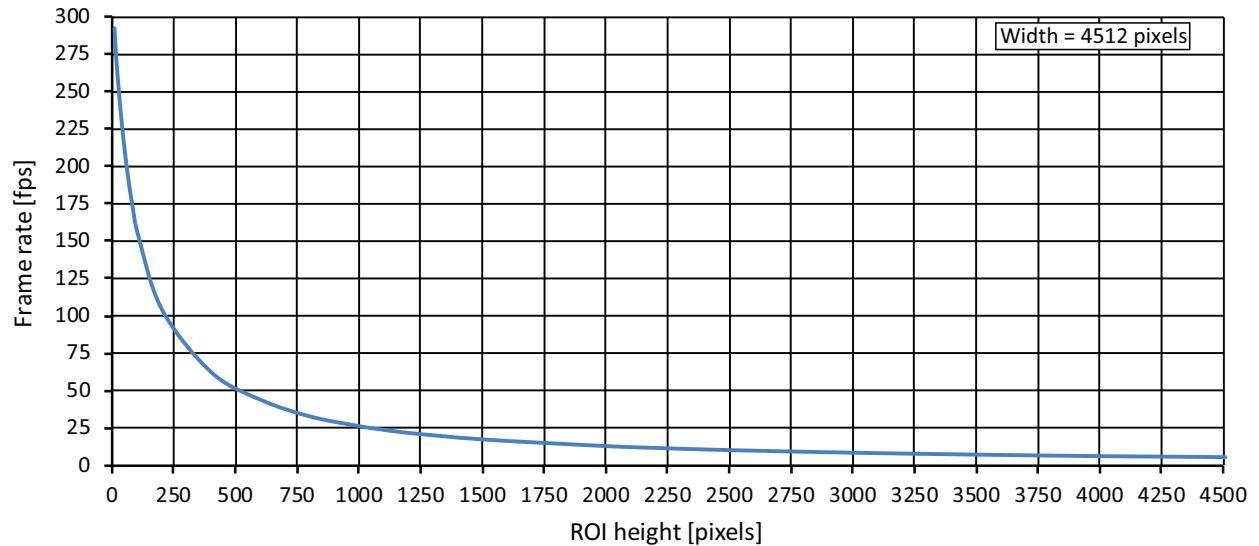


Figure 85: Manta G-2040 frame rate as a function of ROI height

| Height | Frame rate (fps) | Height | Frame rate (fps) | Height | Frame rate (fps) |
|--------|------------------|--------|------------------|--------|------------------|
| 4512 | 5.9 | 1504 | 17.7 | 104 | 153.9 |
| 4320 | 6.2 | 1200 | 22.1 | 80 | 174.5 |
| 4000 | 6.6 | 1080 | 24.6 | 64 | 191.6 |
| 3504 | 7.6 | 1000 | 26.6 | 48 | 212.5 |
| 3000 | 8.9 | 800 | 33.1 | 32 | 238.4 |
| 2504 | 10.6 | 600 | 44.2 | 16 | 127.6 |
| 2160 | 12.3 | 400 | 62.6 | 8 | 291.92 |
| 2000 | 13.3 | 200 | 104.5 | | |

Table 92: 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 93: Manta G-2460 model series specifications (sheet 1 of 2)

| | Specification | |
|-------------------------------|--|---------------|
| Feature | 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 93: 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 94: Manta G-2460 (Sony IMX540) imaging performance

Absolute QE

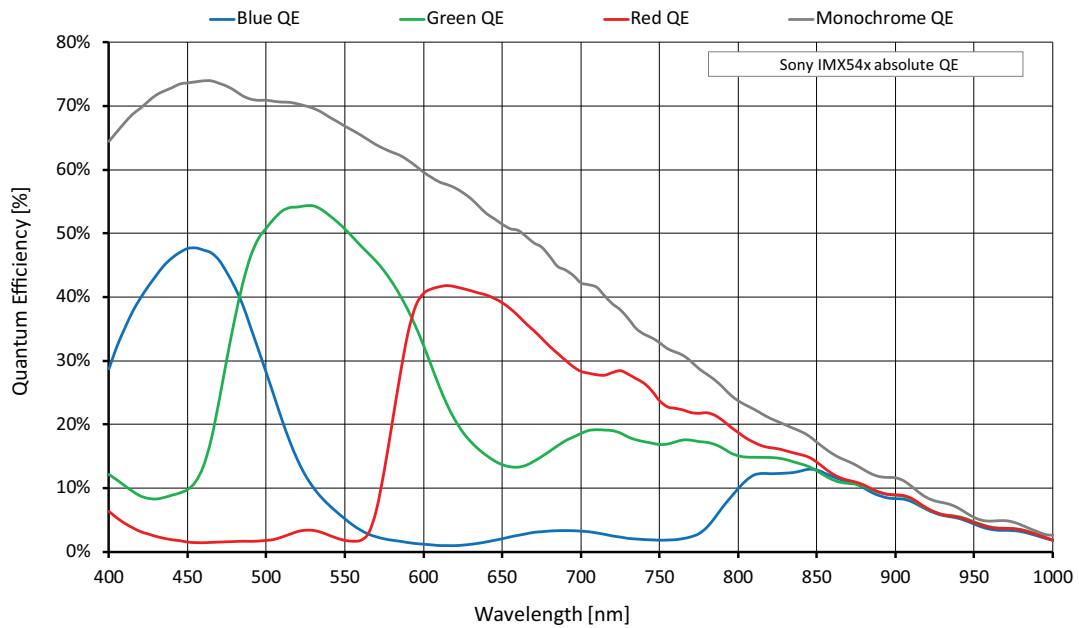


Figure 86: Manta G-2460 (Sony IMX540) absolute QE

Spectral response

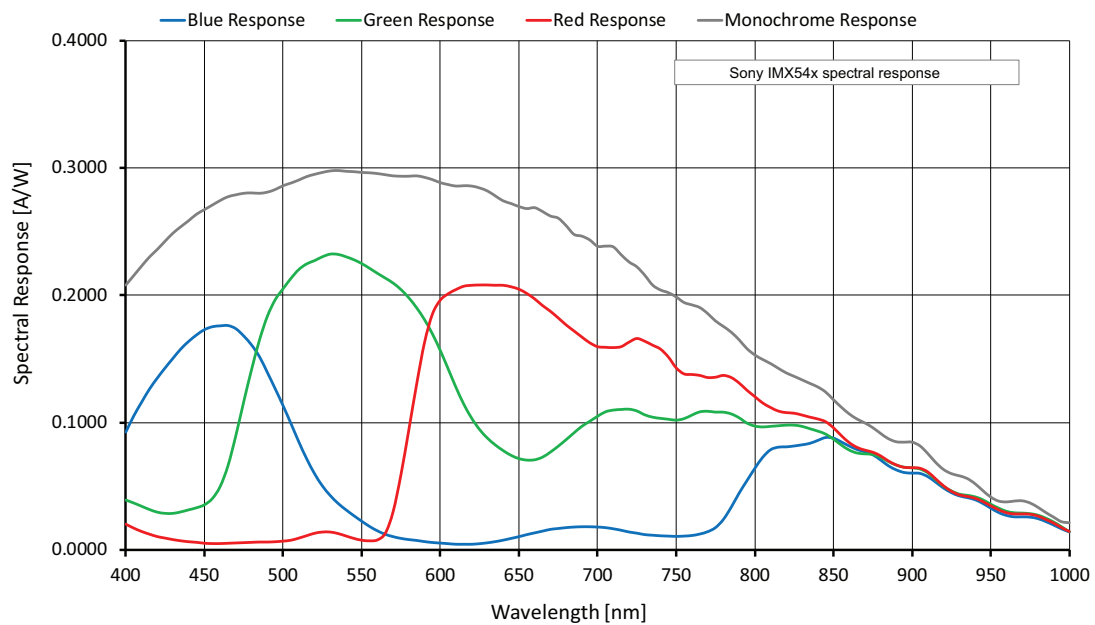


Figure 87: Manta G-2460 (Sony IMX540) spectral response

ROI frame rate

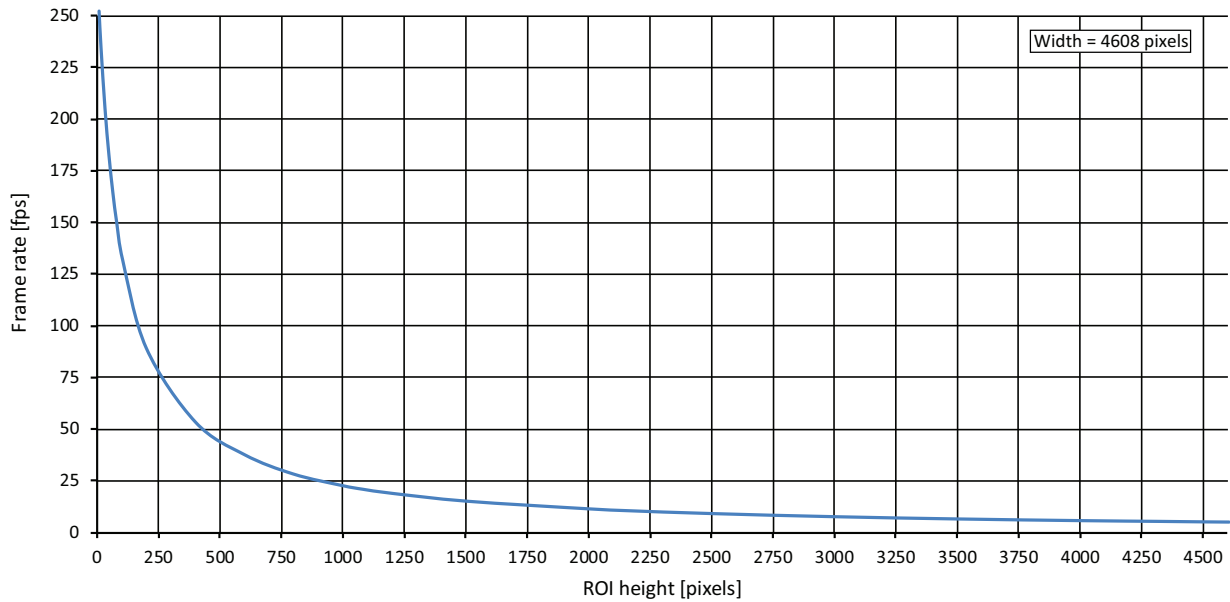


Figure 88: Manta G-2460 frame rate as a function of ROI height

| 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 95: 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 96: 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 Viewer 2.0 or later) | | | | | | | | | |
| Temperature monitoring (mainboard) | | | | | | | | | |
| User sets | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Table 97: 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 98: Image optimization feature availability by model (Type B models)

Camera control features

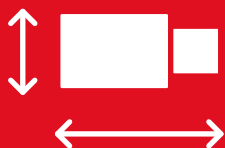
| Camera control features | Manta G-040 | Manta G-158 | Manta G-223 | Manta G-235 | Manta G-282 | Manta G-283 | Manta G-319 | Manta G-419 | Manta G-505 | Manta G-507 | Manta G-895 | Manta G-917 | Manta G-1236 | Manta G-1620 | Manta G-2040 | Manta G-2460 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 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 Viewer 2.0 or later) | | | | | ✓ | ✓ | | | | | | ✓ | | | | |
| Temperature monitoring (main board) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| User sets | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Table 99: 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 | 188 |
| Manta type A camera dimensions | 189 |
| Manta type B camera dimensions | 204 |
| Sensor position accuracy | 218 |

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.

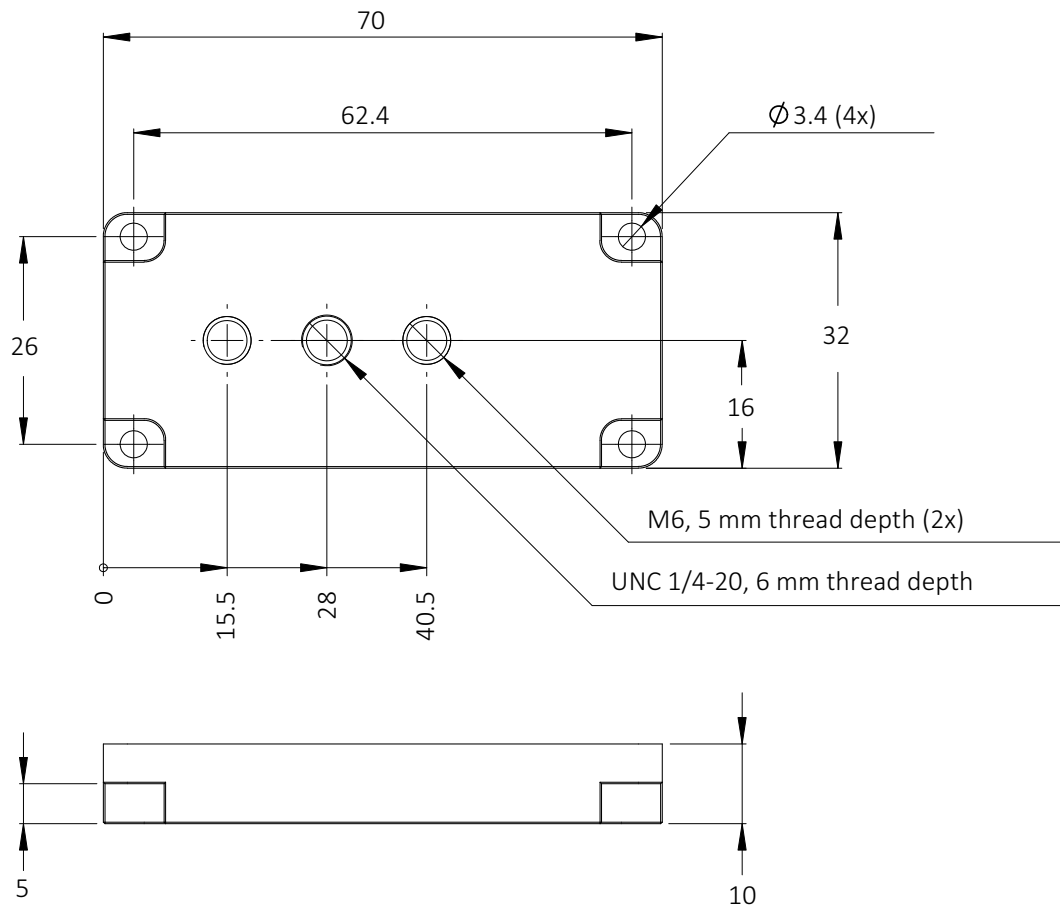


Figure 89: Tripod adapter dimensions

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

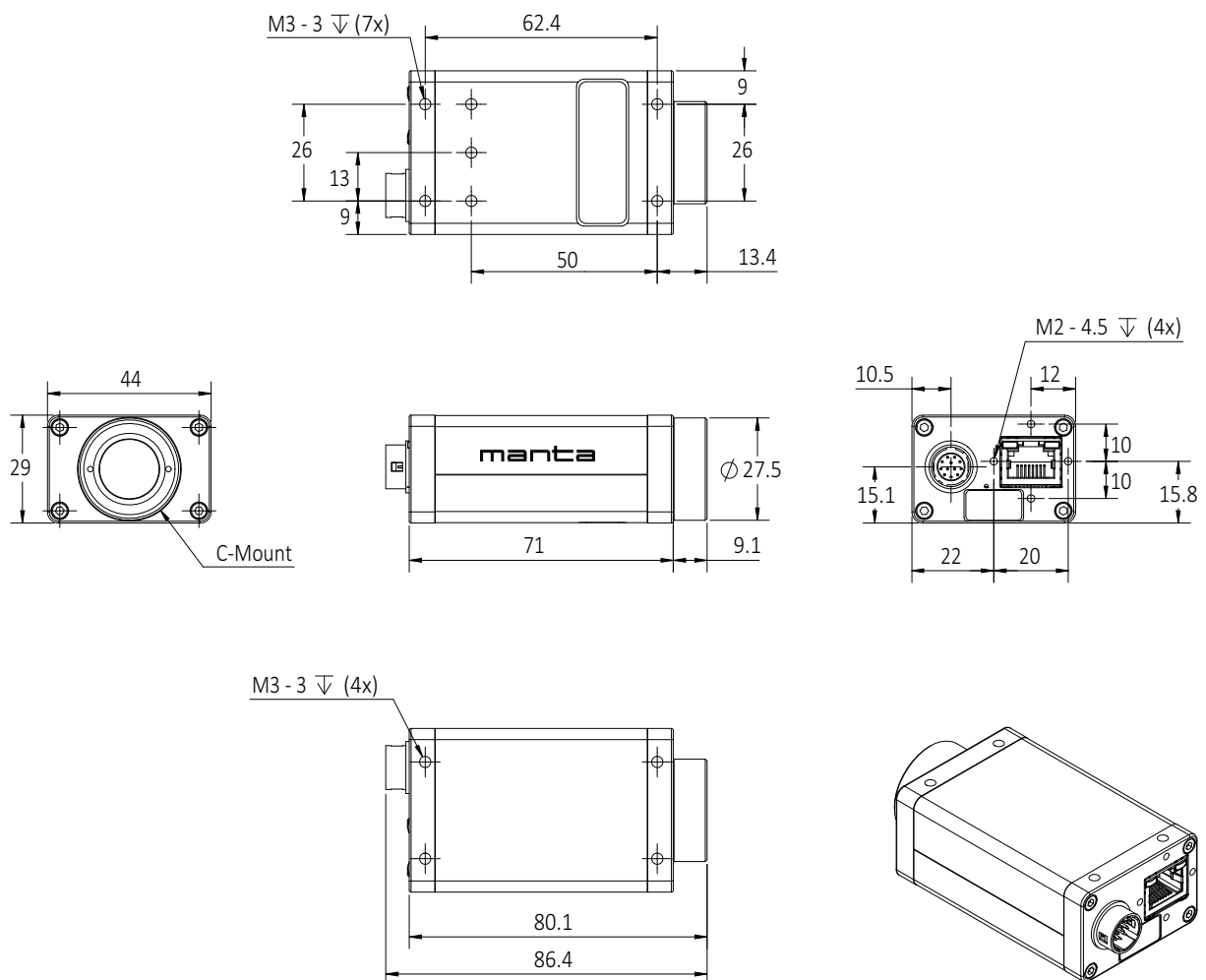


Figure 90: Manta type A standard housing C-Mount dimensions

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

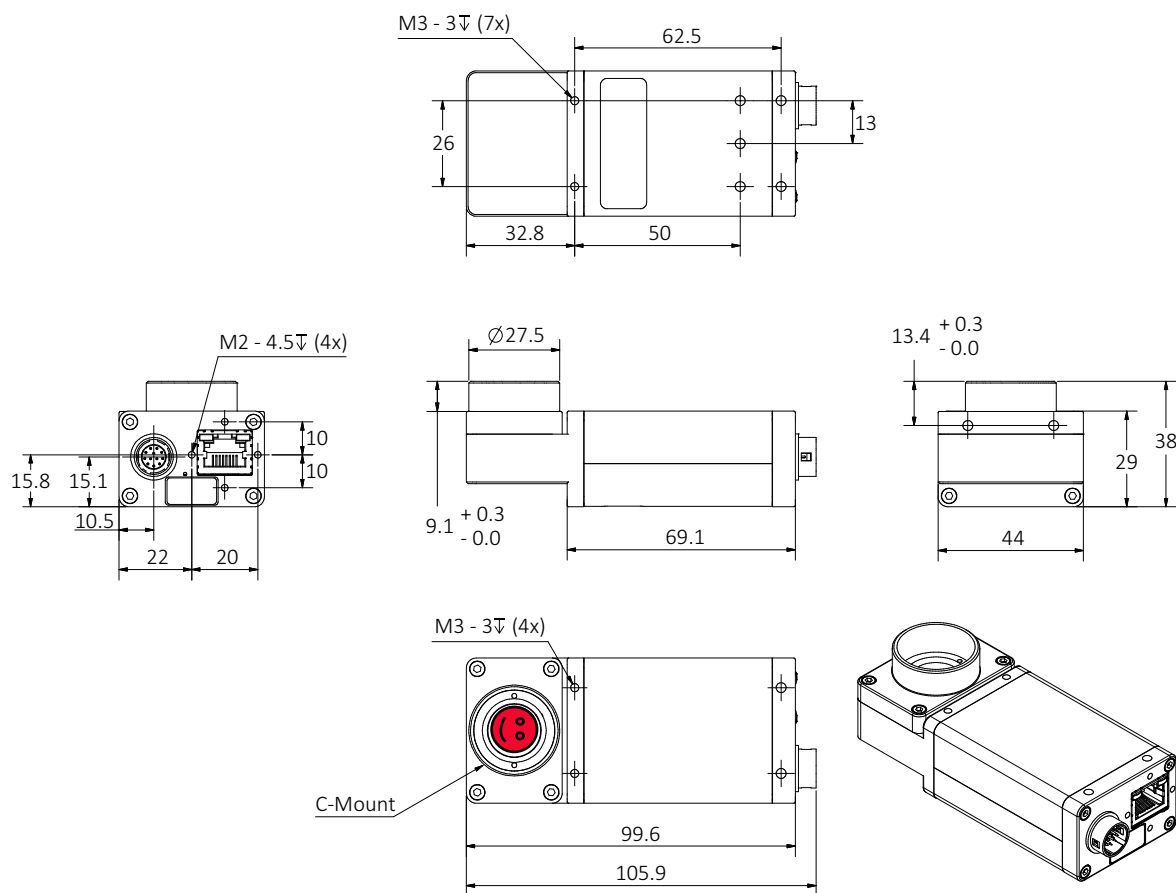


Figure 91: Manta type A W90 housing C-Mount dimensions

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

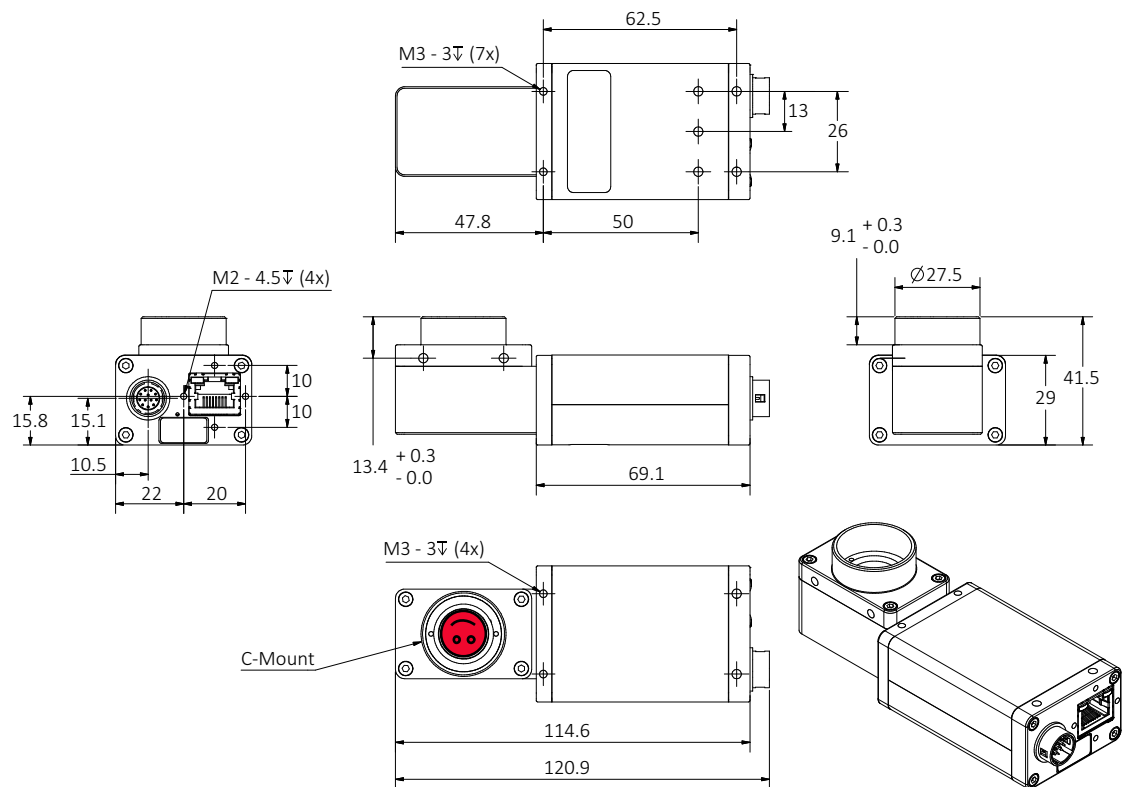


Figure 92: Manta type A W90 S90 housing C-Mount dimensions

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

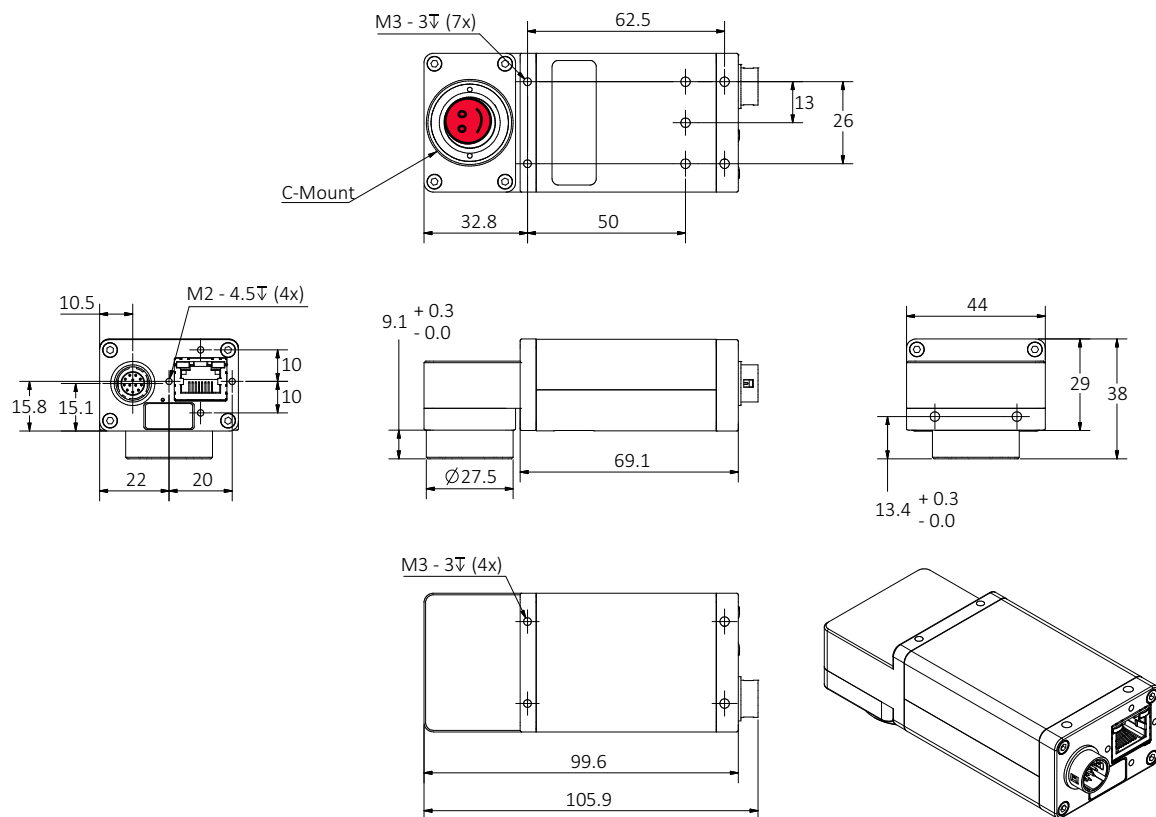


Figure 93: Manta type A W270 housing C-Mount dimensions

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

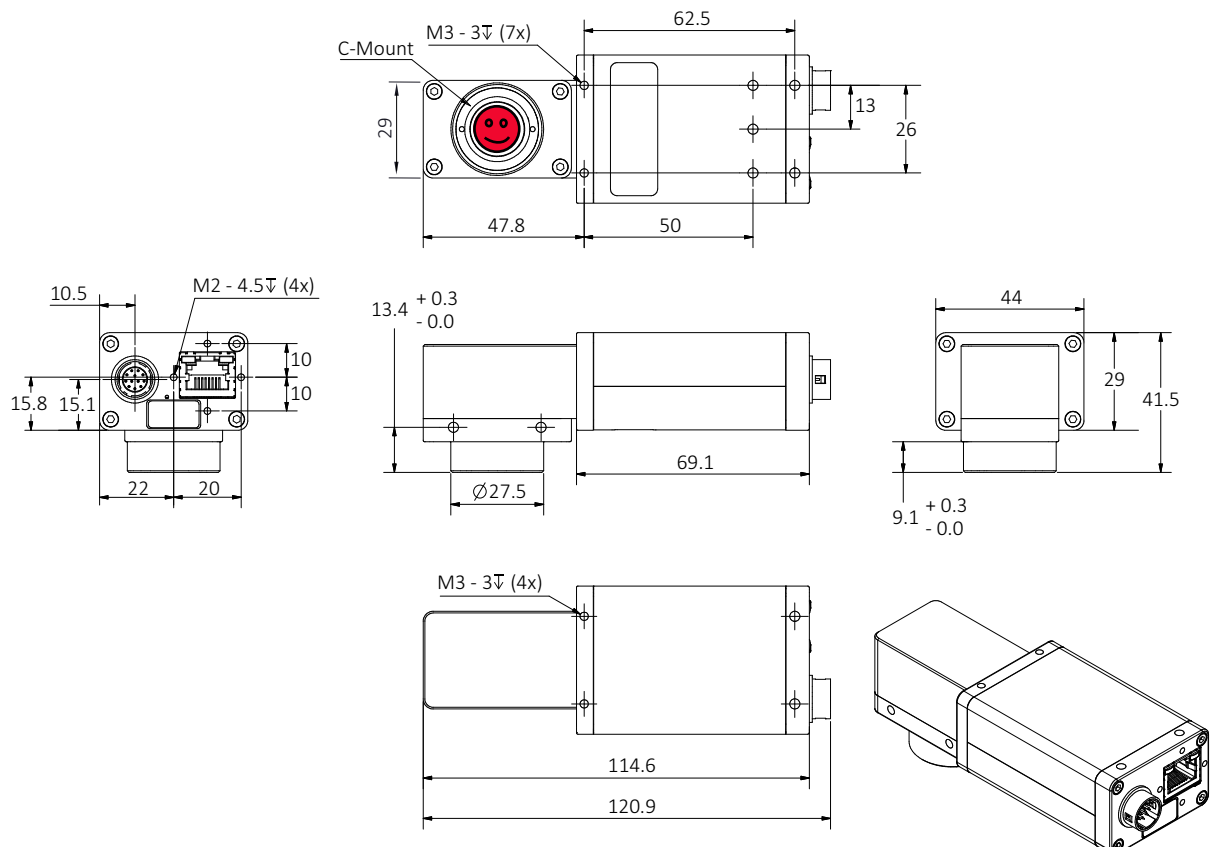


Figure 94: Manta type A W270 S90 housing C-Mount dimensions

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) 7 = GND (for Inputs)

2 = Ext PWR input 8 = Rx/D 9 = Tx/D

3 = Auto Iris (Video Type) Out 10 = Power Input (for Output ports)

4 = Input 1 11 = Input 2

5 = Not Used 12 = Output 2

6 = Output 1 13 = Chassis GND

Flex cable length:

FFC45 L = 56 mm K7500307

FFC45 L = 110 mm K7500318

FFC45 L = 152 mm 1817

FFC45 L = 200 mm 1824

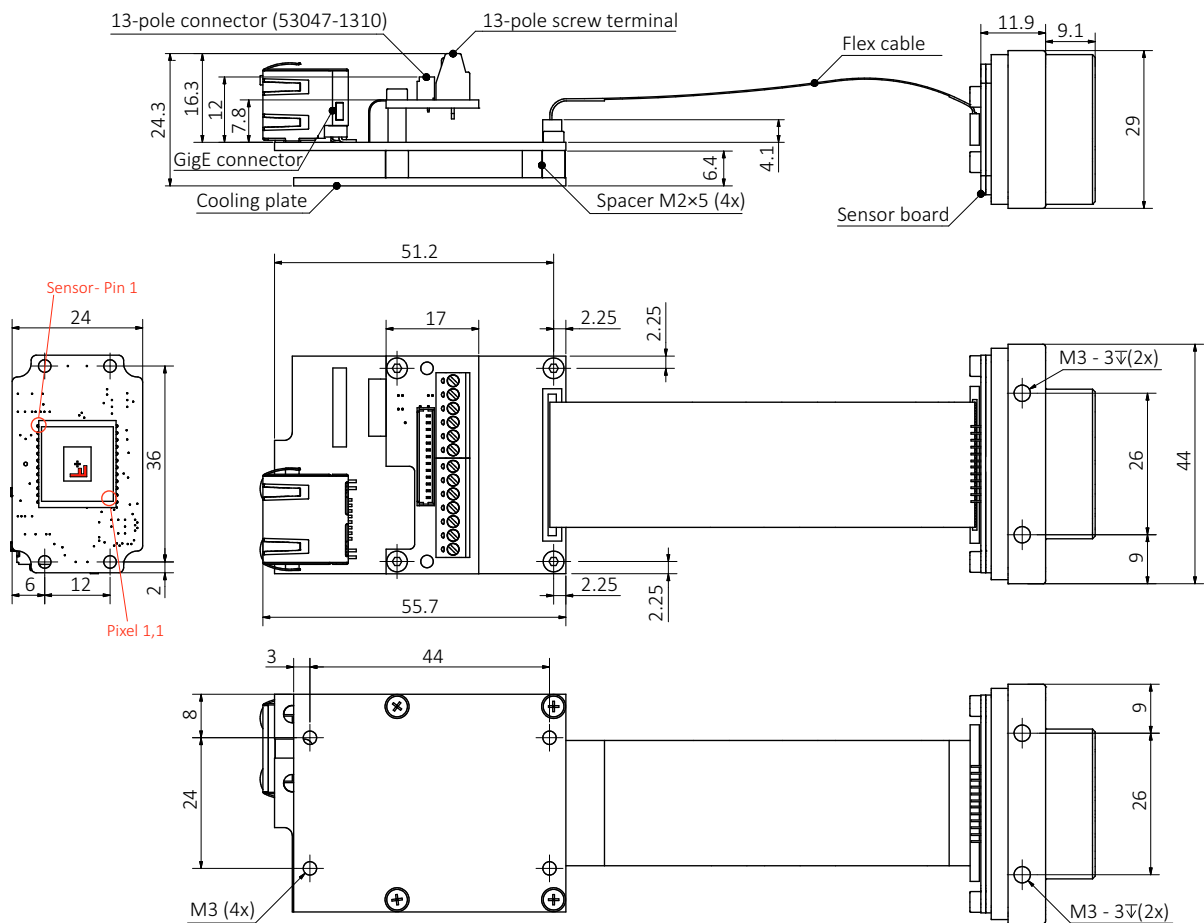


Figure 95: Manta type A board level C-Mount (non-PoE models) dimensions

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

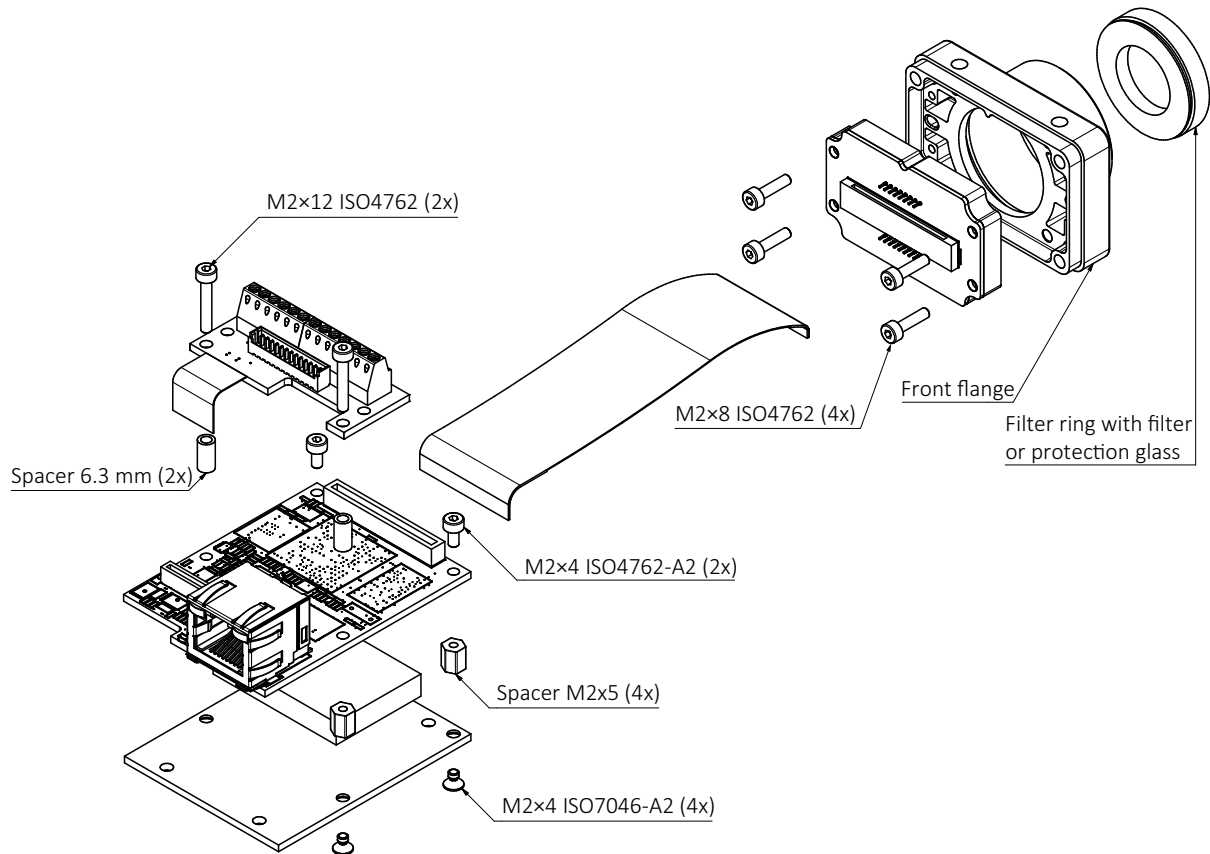


Figure 97: Manta type A board level C-Mount (non-PoE models) dimensions

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

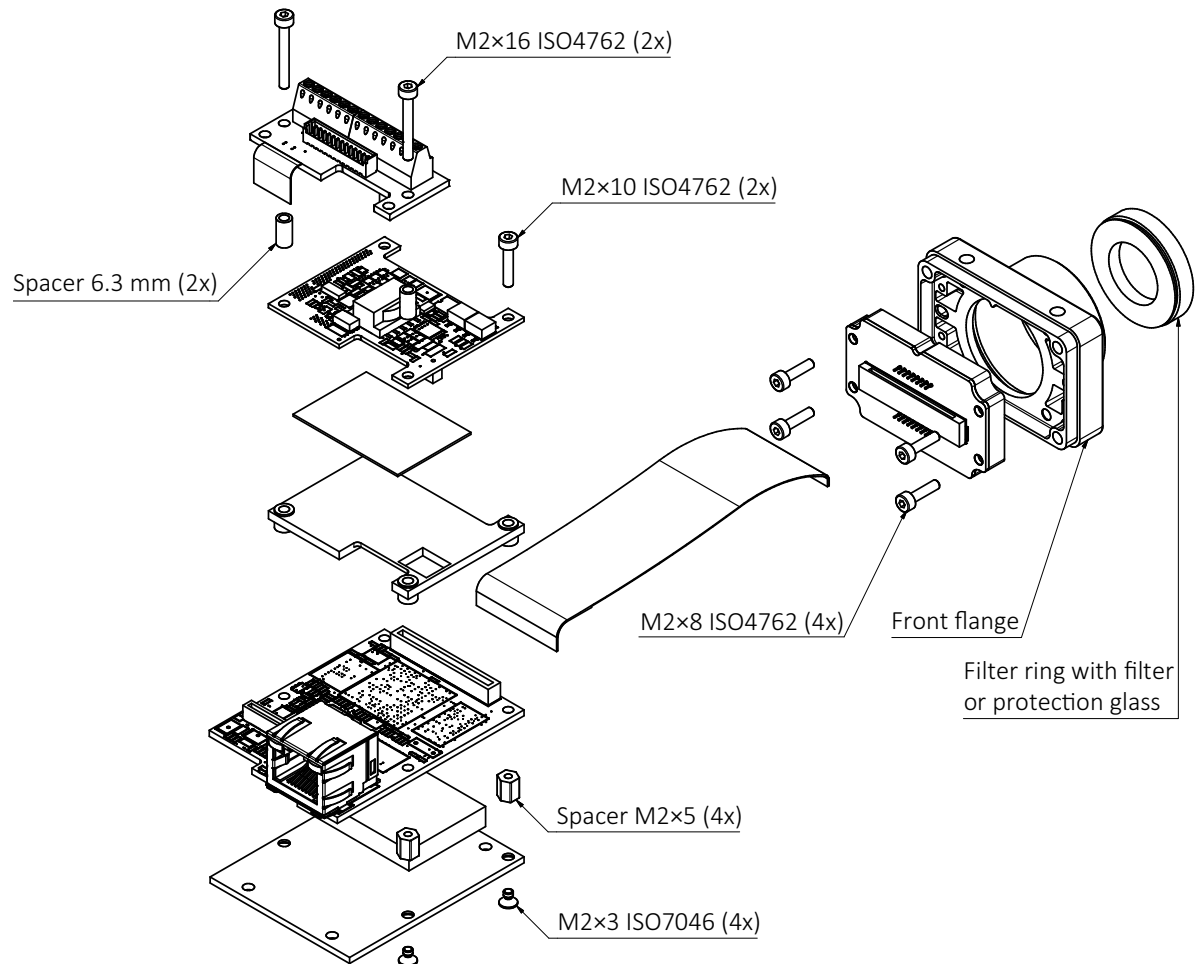


Figure 98: Manta type A board level C-Mount (PoE models) dimensions

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

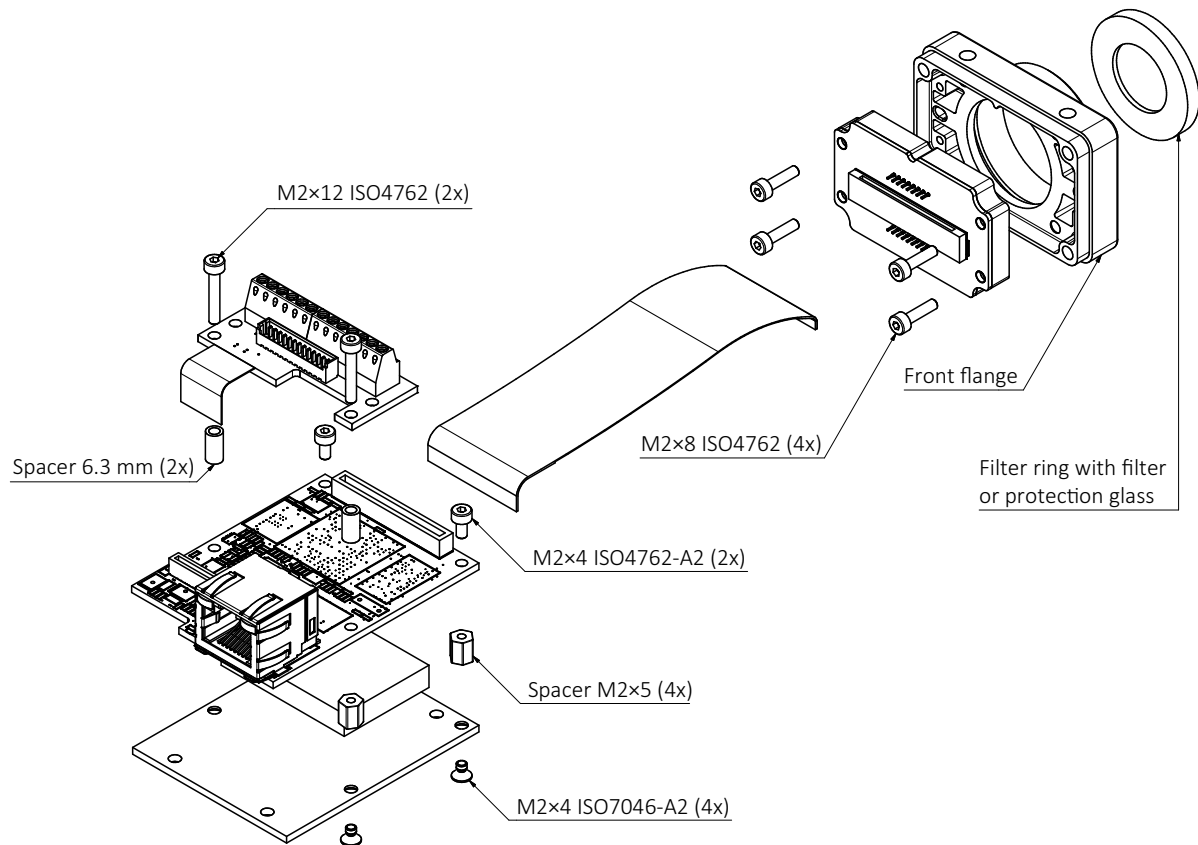


Figure 99: Manta type A board level CS-Mount (non-PoE models) dimensions

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

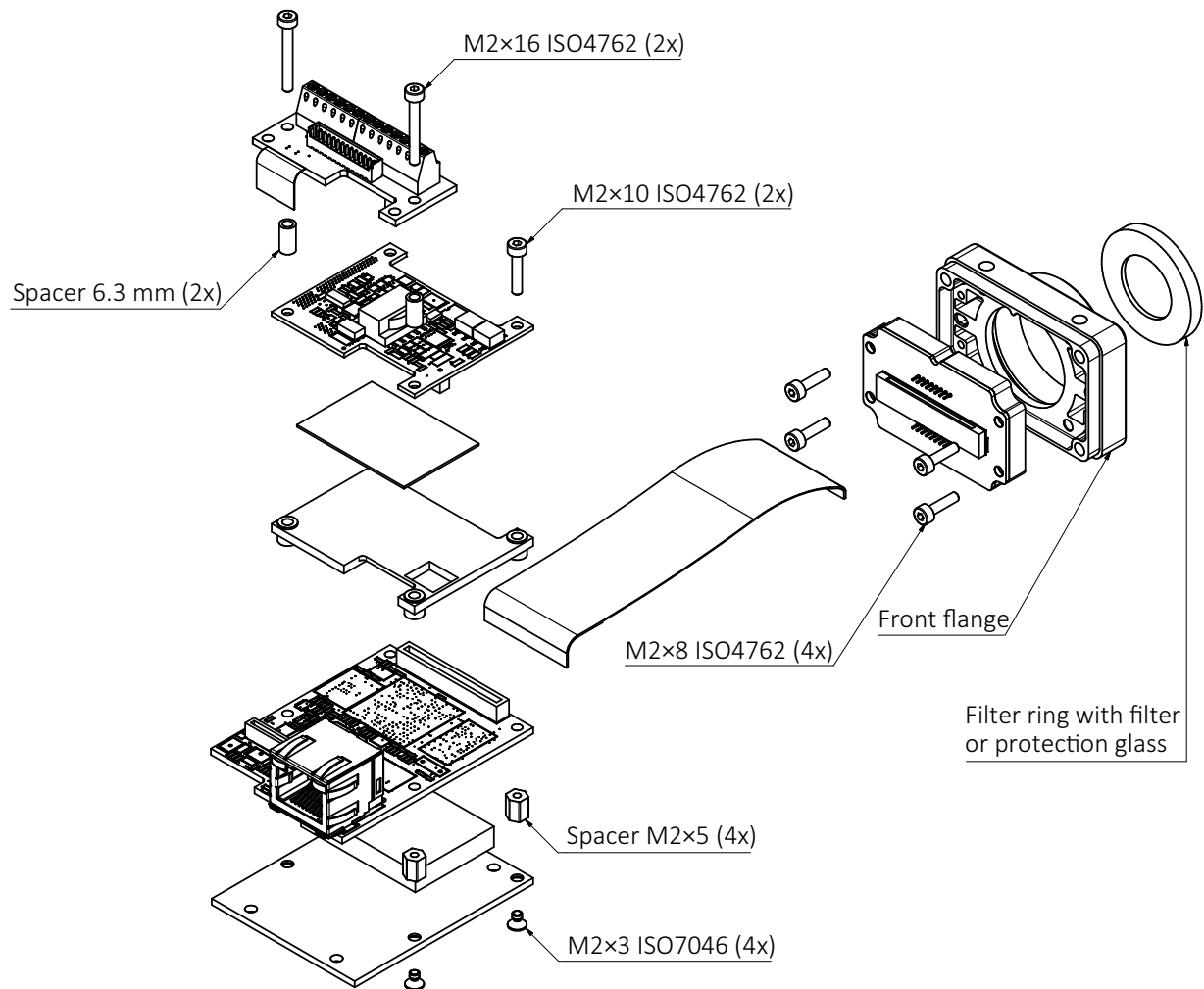


Figure 100: Manta type A board level CS-Mount (PoE models) dimensions

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

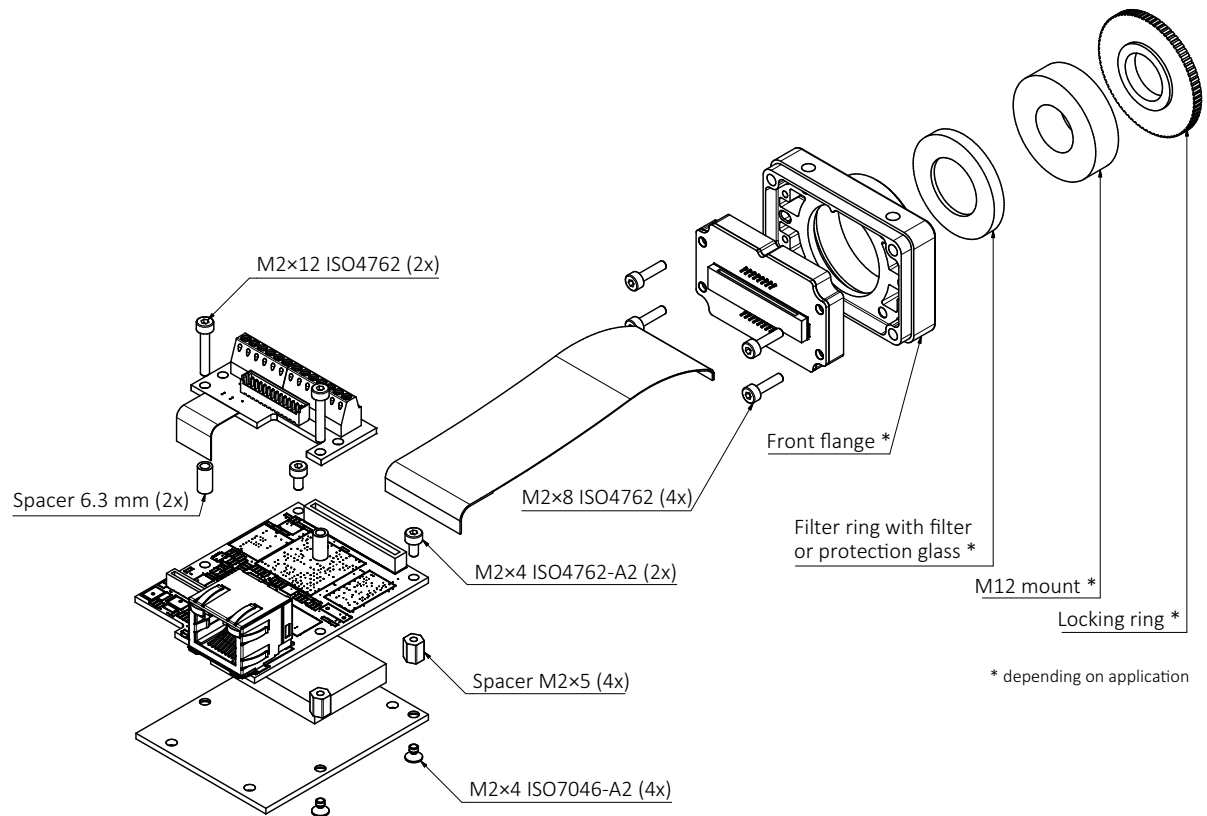


Figure 101: Manta type A board level M12-Mount (non-PoE models) dimensions

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

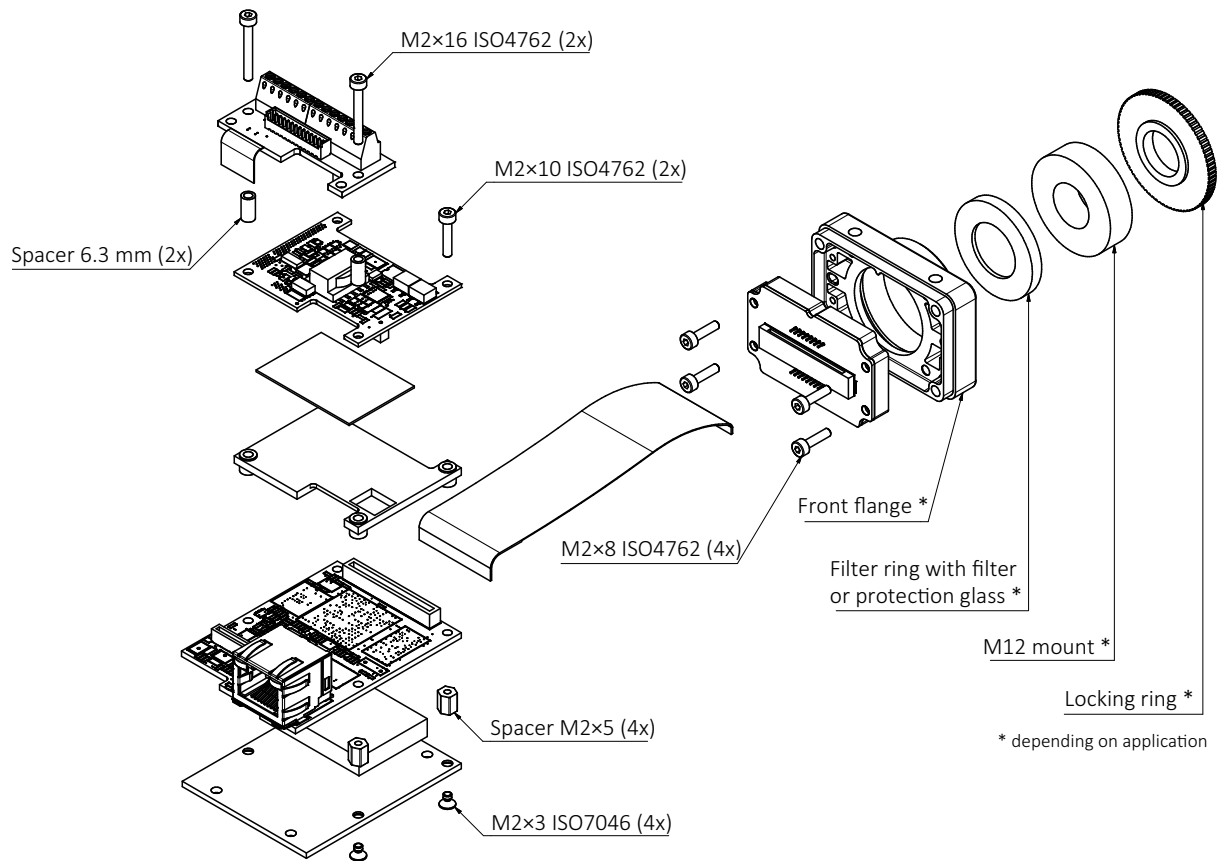


Figure 102: Manta type A board level M12-Mount (PoE models) dimensions

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.

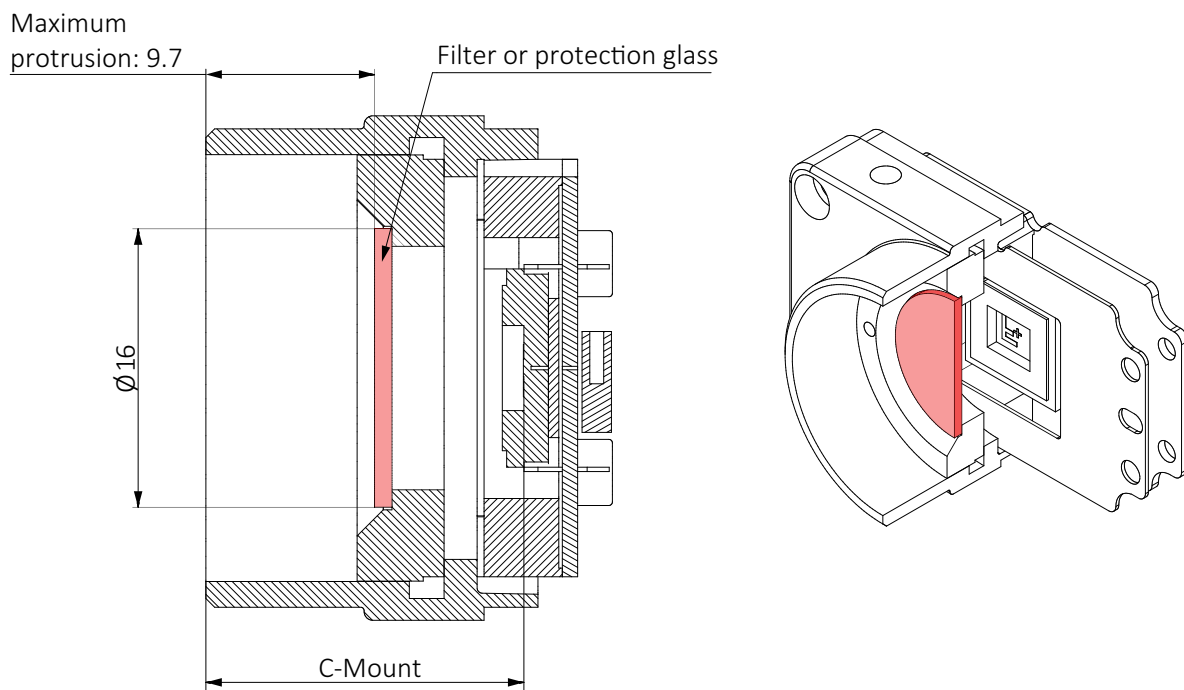


Figure 103: Manta type A C-Mount dimensions (16 mm filter)



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.

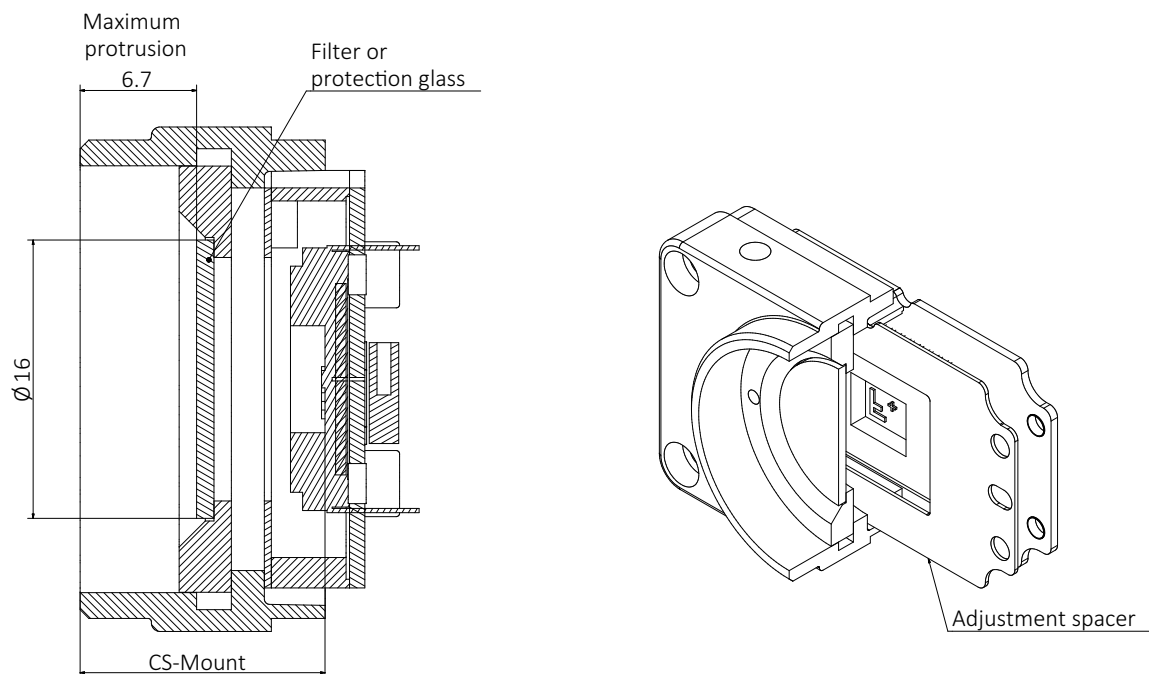


Figure 104: Manta type A CS-Mount dimensions (16 mm filter)



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

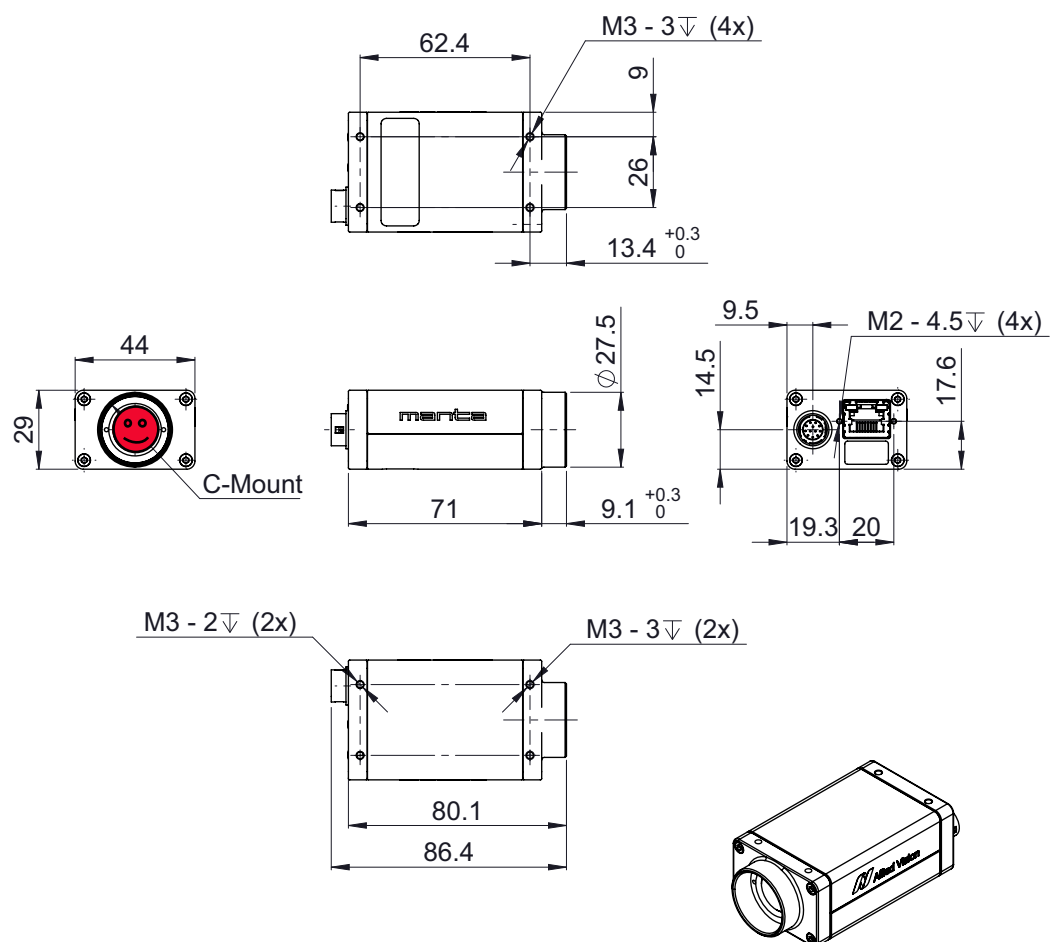


Figure 105: Manta type B standard housing C-Mount dimensions

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

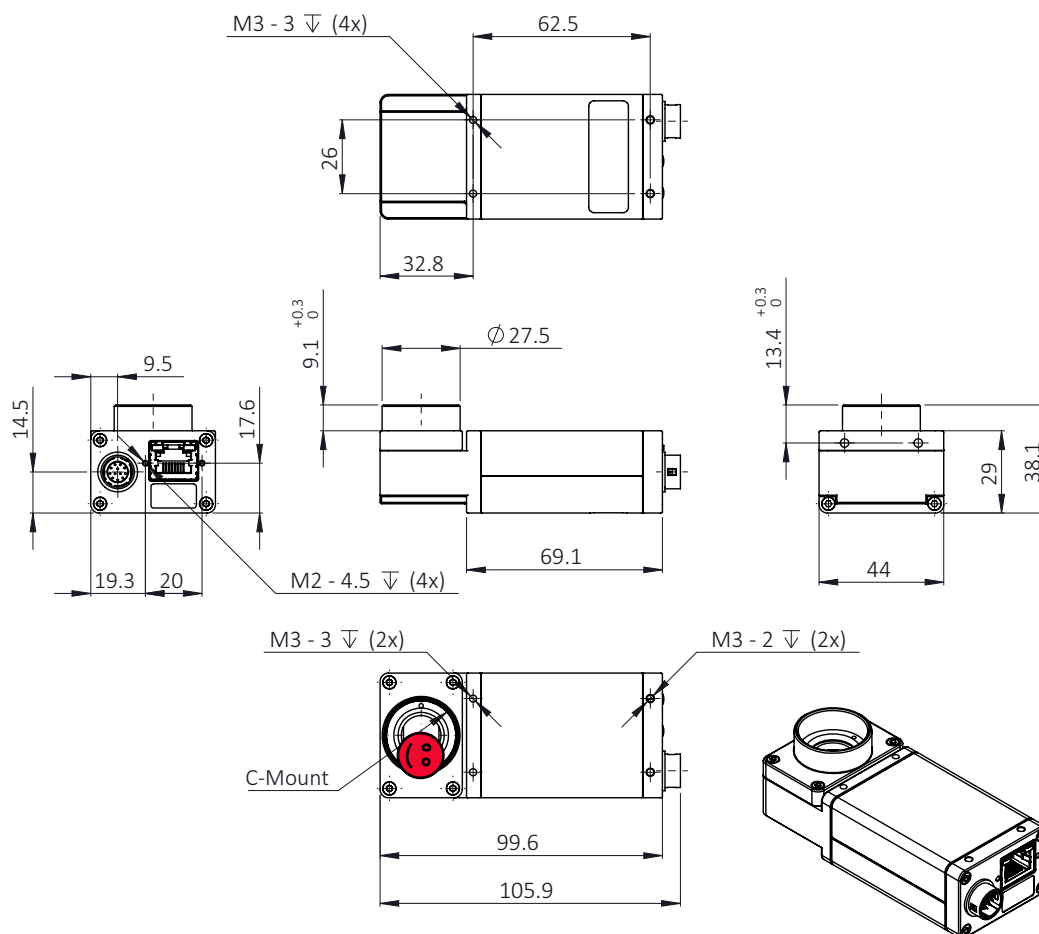


Figure 106: Manta type B W90 housing C-Mount dimensions

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

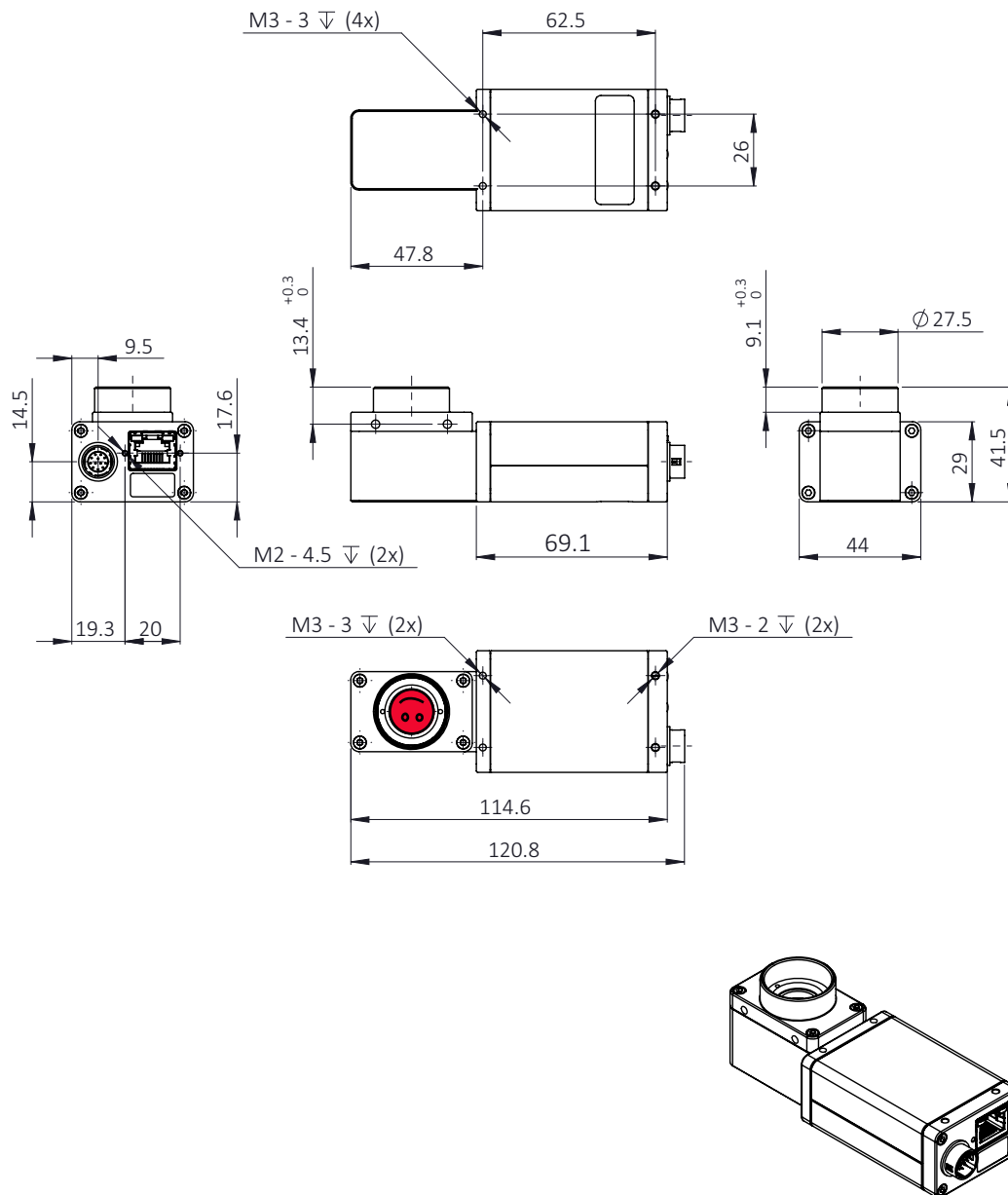


Figure 107: Manta type B W90 S90 housing C-Mount dimensions

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

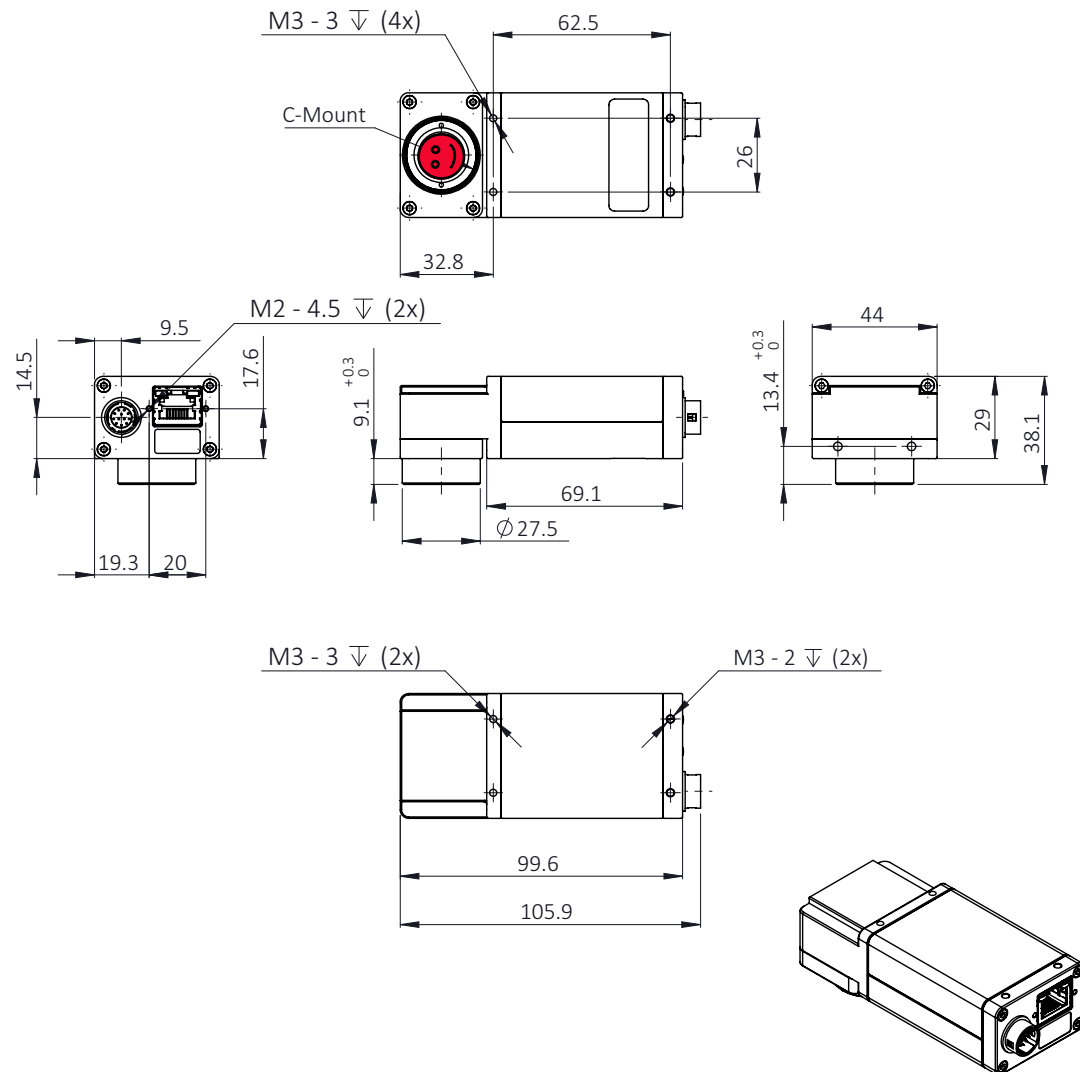


Figure 108: Manta type B W270 housing C-Mount dimensions

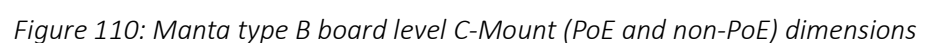
This version has the sensor tilted 270 degrees clockwise, so that it views downwards. The sensor is also rotated 90 degrees clockwise.

[illegible]

Figure 109: Manta type B W270 S90 housing C-Mount dimensions

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

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



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 = Rx/D 9 = Tx/D
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 |

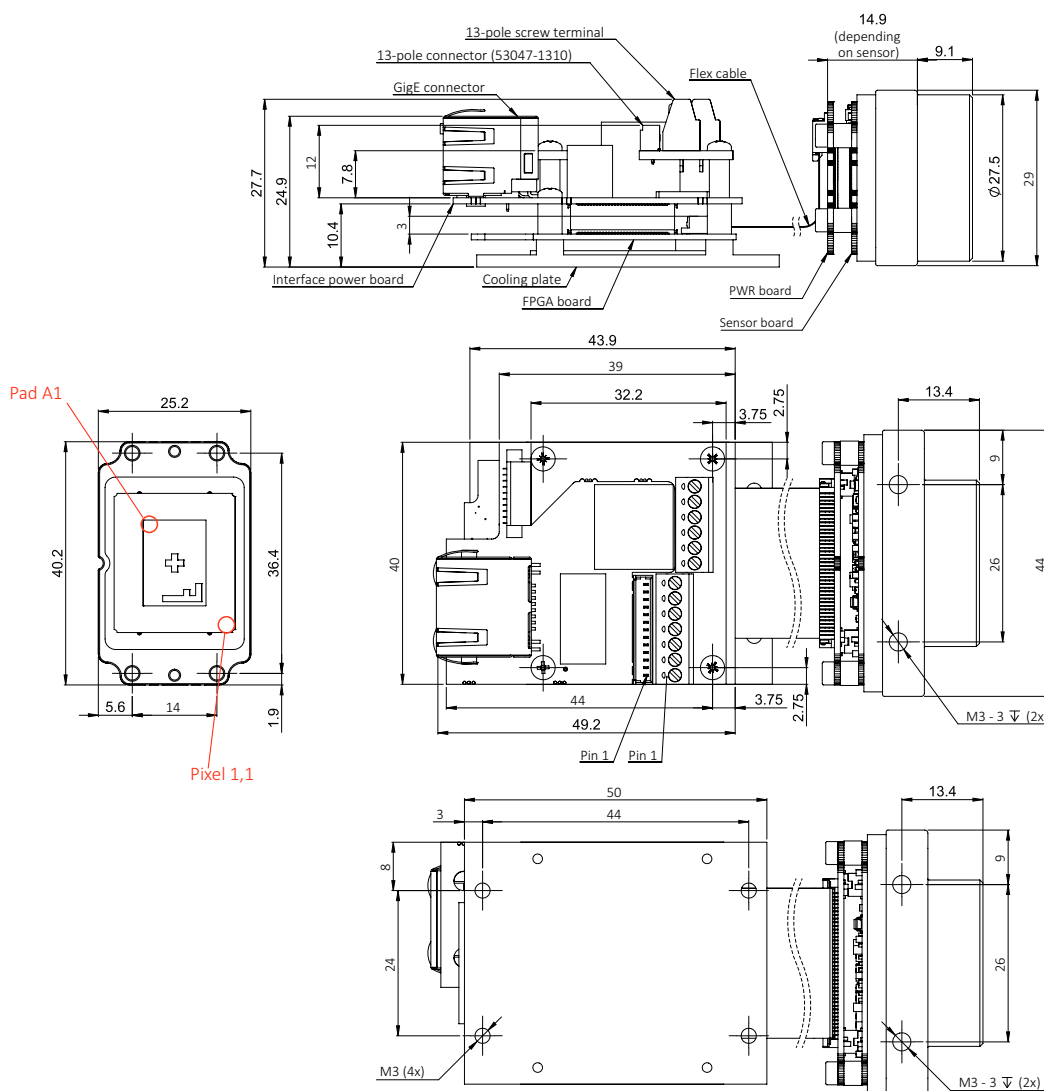


Figure 111: Manta type B board level C-Mount (PoE and non-PoE) dimensions

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

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

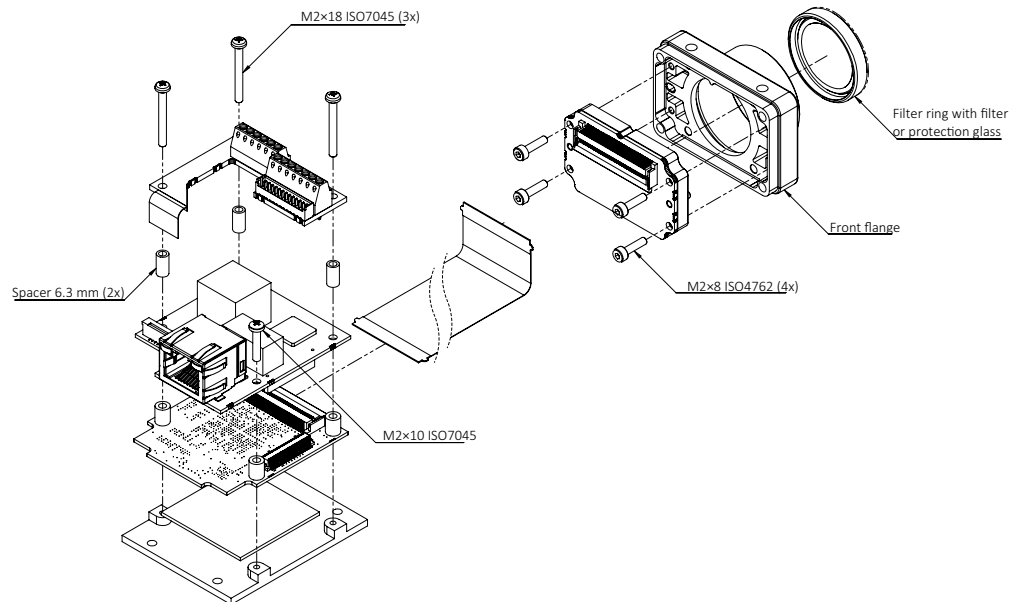


Figure 112: Manta type B board level C-Mount (PoE and non-PoE) dimensions

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

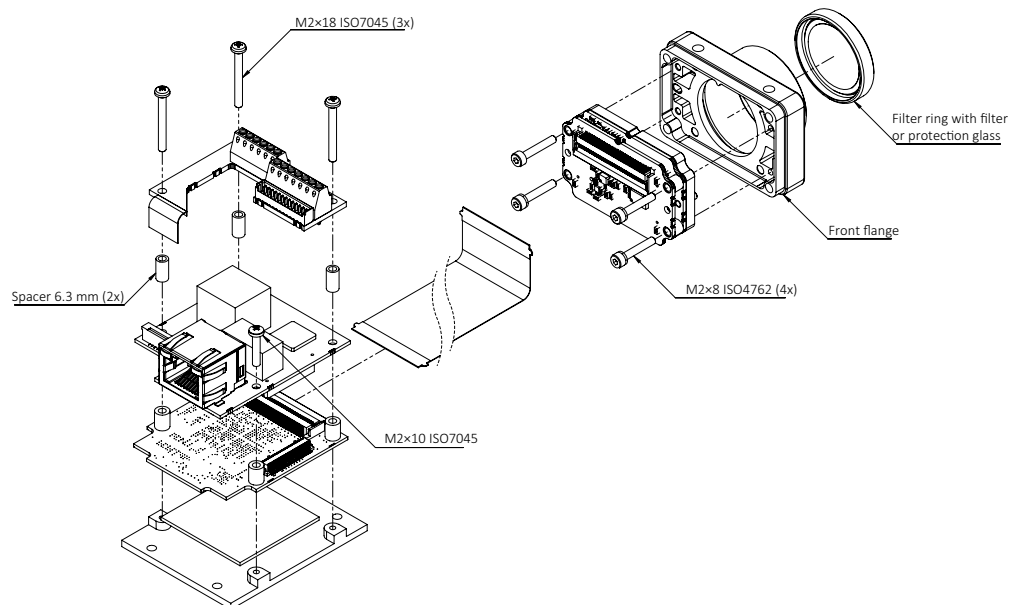


Figure 113: Manta type B board level C-Mount (PoE and non-PoE) dimensions

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

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

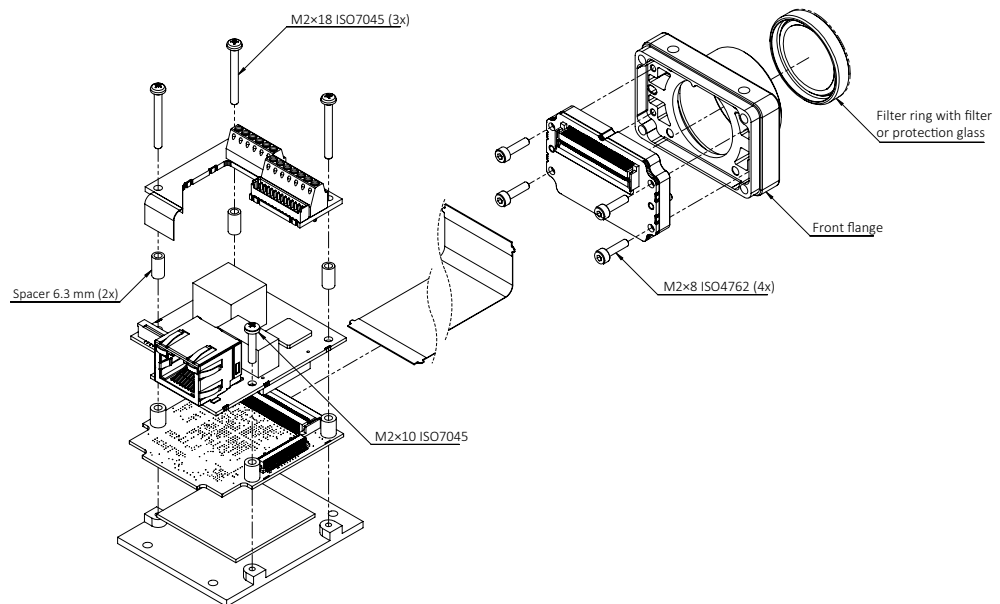


Figure 114: Manta type B board level CS-Mount (PoE and non-PoE) dimensions

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

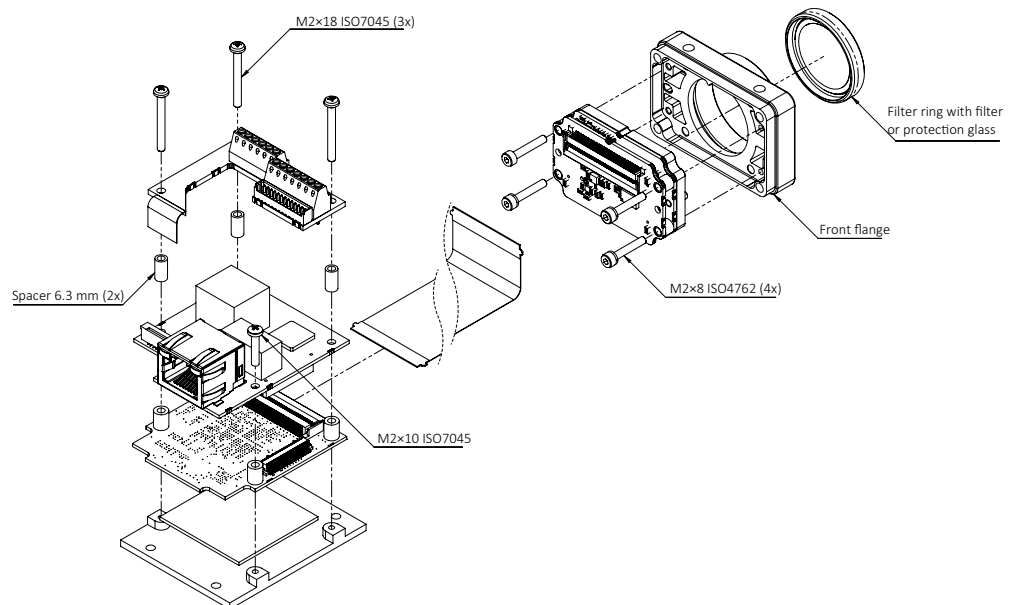


Figure 115: Manta type B board level CS-Mount (PoE and non-PoE) dimensions

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

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

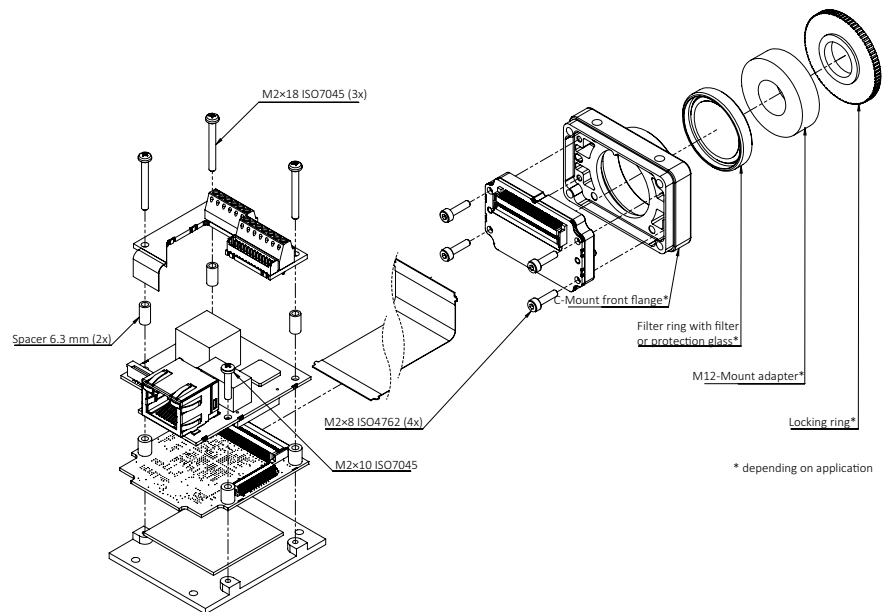


Figure 116: Manta type B board level M12-Mount (non-PoE and PoE) dimensions

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

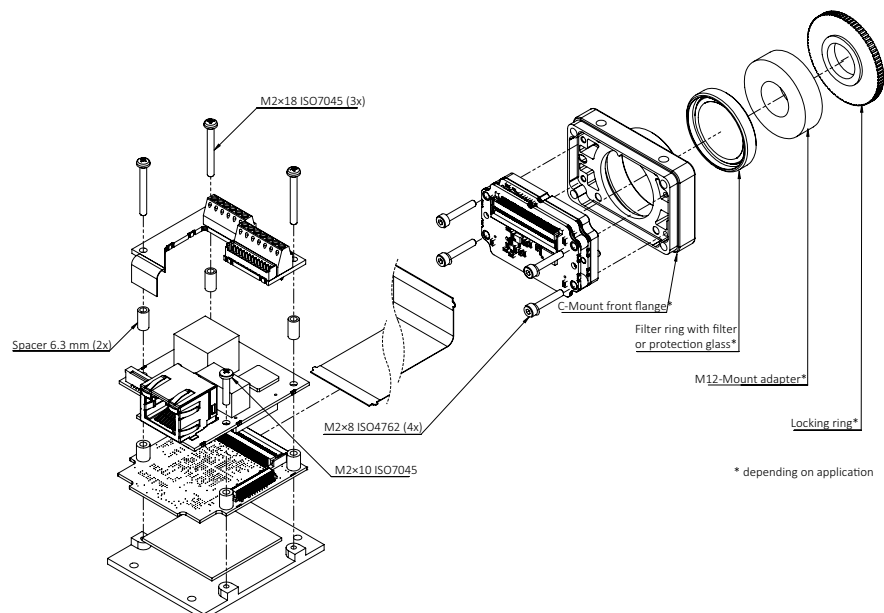


Figure 117: Manta type B board level M12-Mount (non-PoE and PoE) dimensions

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

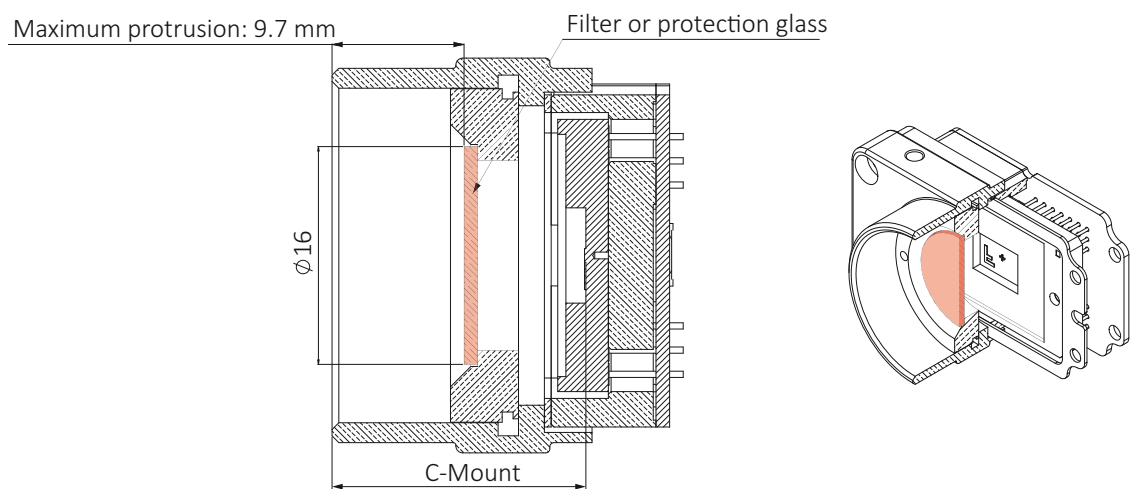


Figure 118: Manta type B C-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236, G-1620, G-2040, G-2460

Filter or Protection glass diameter: 22 mm

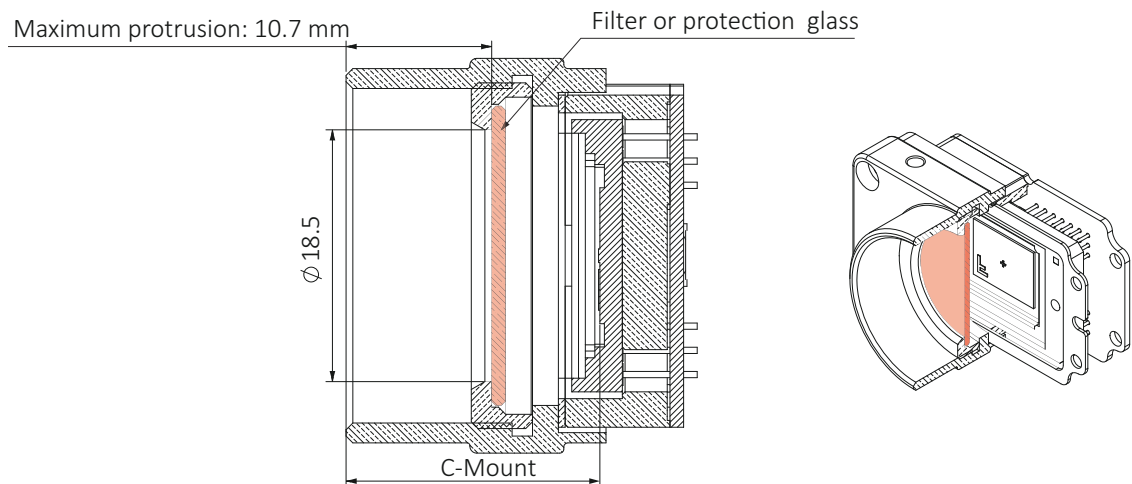


Figure 119: Manta type B C-Mount dimensions (22 mm filter)



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

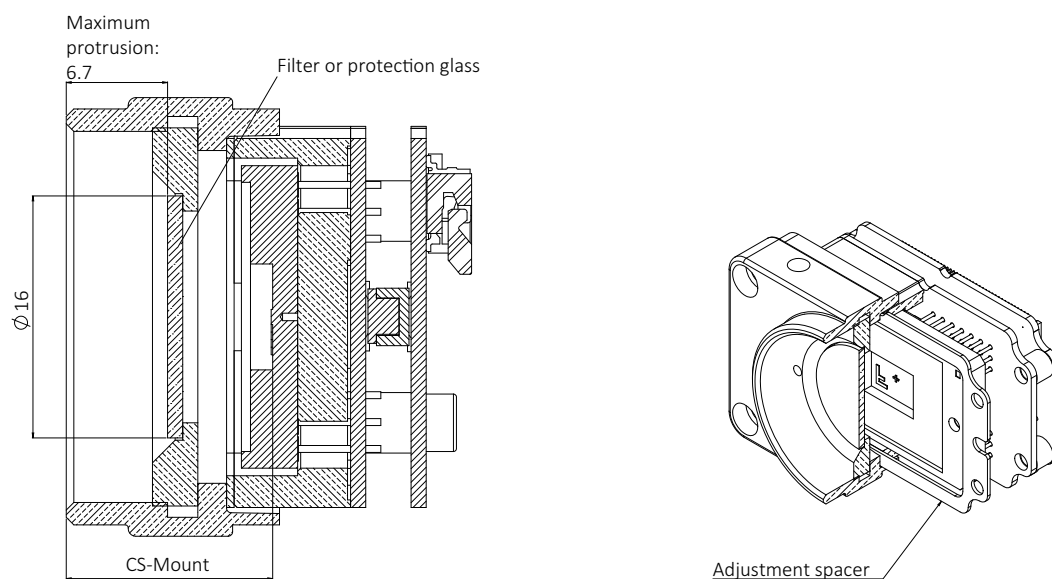


Figure 120: Manta type B CS-Mount dimensions (16 mm filter)

Manta G-223, G-419, G-895, G-1236, G-1620, G-2040, G-2460

Filter or Protection glass diameter: 22 mm

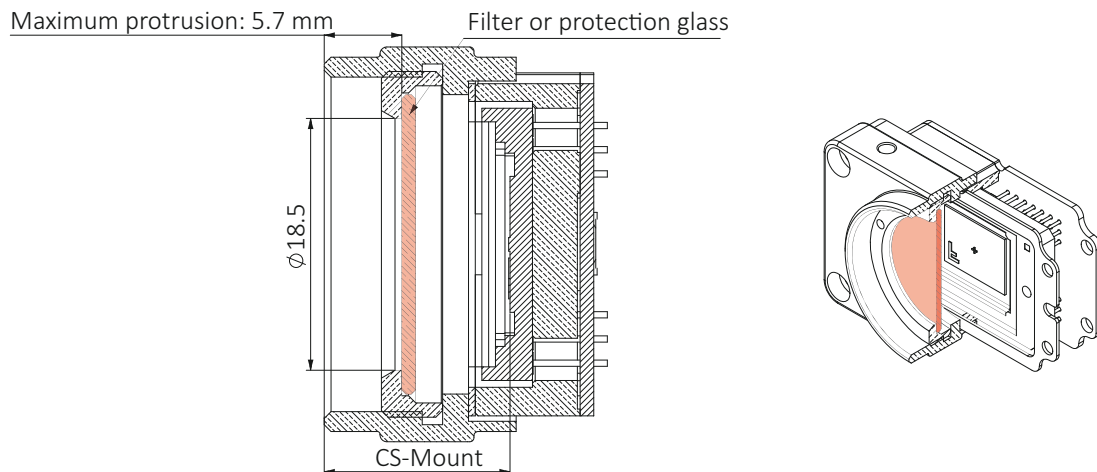


Figure 121: Manta type B CS-Mount dimensions (22 mm filter)



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

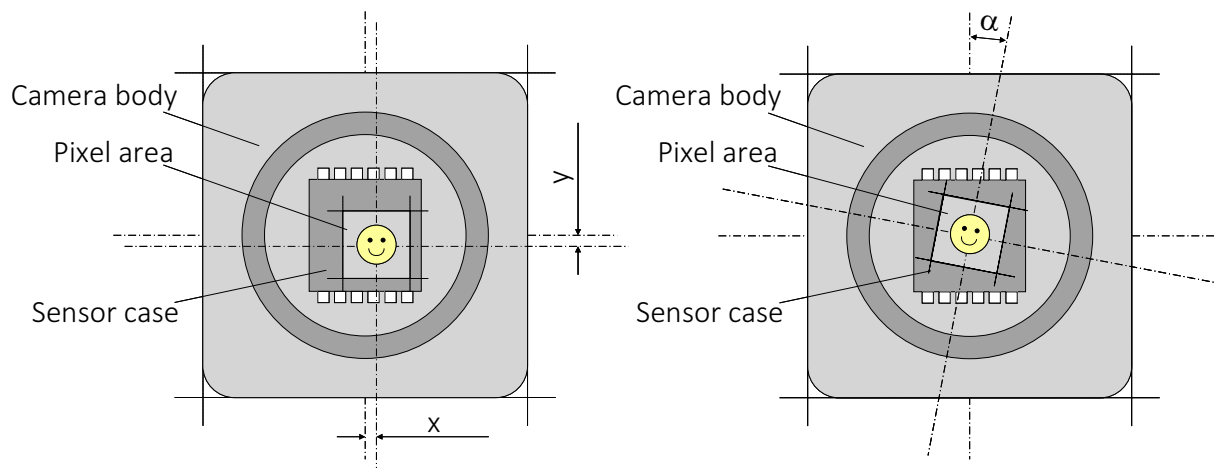


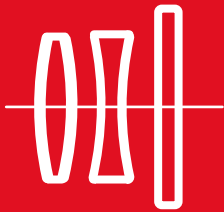
Figure 122: Sensor position accuracy

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 | $\pm 150 \mu\text{m}$ (sensor shift) |
| | z-axis | $+0 \mu\text{m}$ to $-150 \mu\text{m}$ (optical back focal length) |
| | α | $\pm 0.5^\circ$ (sensor rotation as the deviation from the parallel to the camera bottom) |

Table 100: Sensor position accuracy criteria

Filter and lenses



The chapter includes:

| | |
|---|-----|
| Focal length versus field of view | 220 |
| Optical filters | 233 |

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.

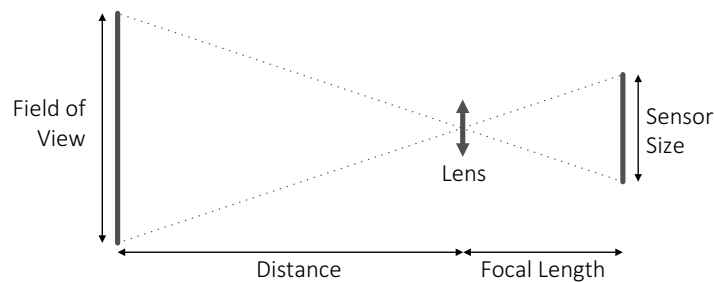


Figure 123: Focal length versus field of view

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 101: 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 102: 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 103: 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 104: 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 105: 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 106: 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 107: 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 108: 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 109: 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 110: 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 111: 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 112: 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 113: 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 114: 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 × 692 mm | 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 115: 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 116: 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 117: 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 118: 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 119: 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 120: 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 121: 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 122: 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 123: 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 124: Manta G-2460 series focal length versus field of view

Optical filters

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

All monochrome Manta cameras are equipped with protection glass (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 Hoya C-5000 IR cut filter and protection glass (ASG). Values may vary slightly by filter lot.

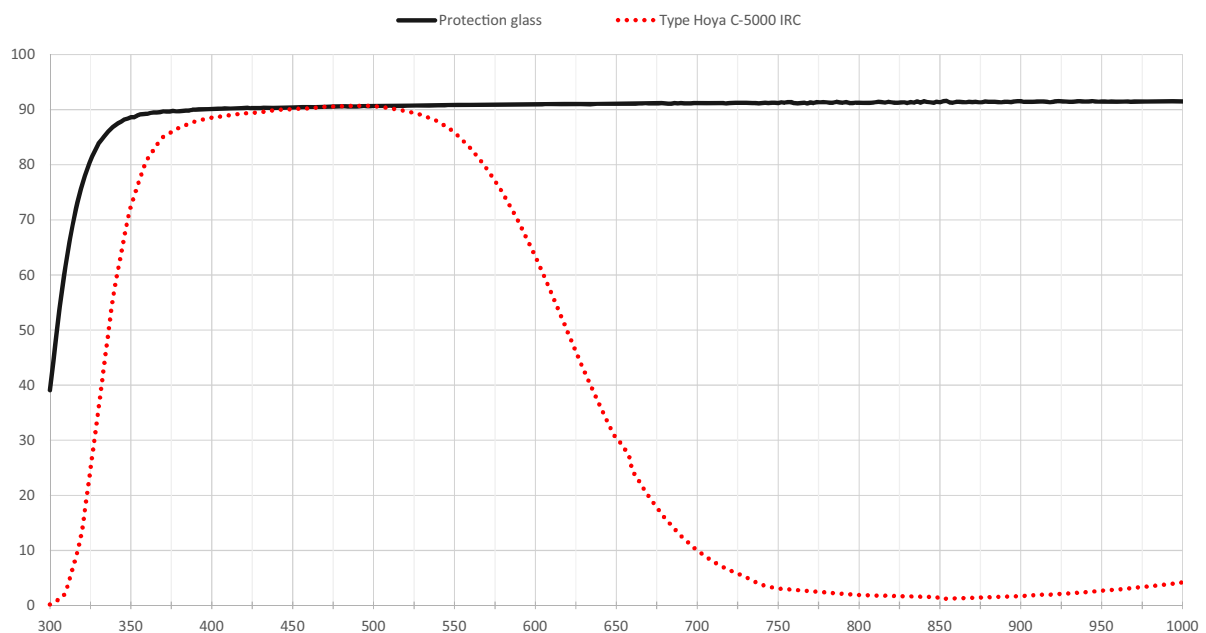


Figure 124: Optical filter spectral transmission (exemplary curves)

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



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 board 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.

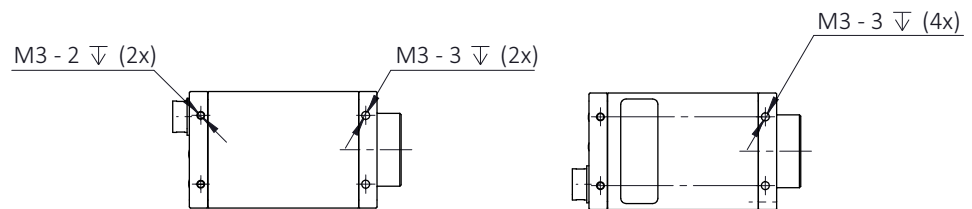


Figure 125: Mounting threads on top and bottom of housing



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 125](#)). 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 125](#), 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 125: 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 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 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 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 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 includes programming examples in C, C++, and C# and an extensive user documentation.



Download Vimba SDK from www.alliedvision.com/en/products/software. After installing, documentation is located under `\Program Files\Allied Vision\Vimba`.

Third-party software

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

GenICam-based third-party software automatically connects with Vimba's transport layers. Additionally, Vimba includes the Cognex Adapter for 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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Back panel

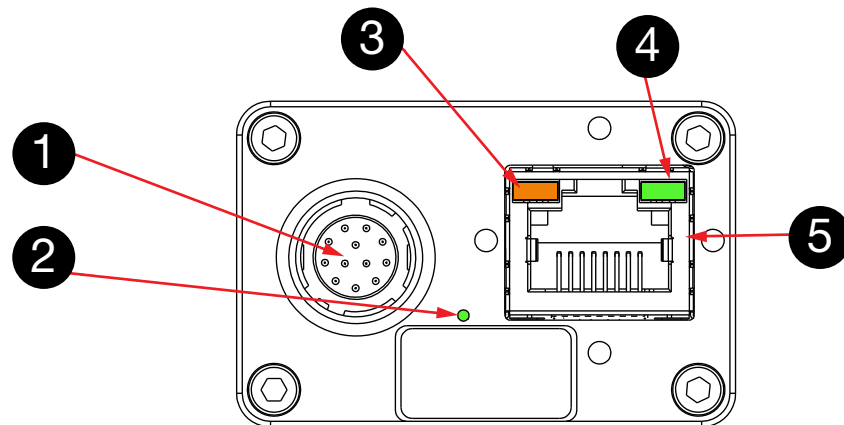


Figure 126: Rear view of Manta type A cameras

| | |
|---|---|
| 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

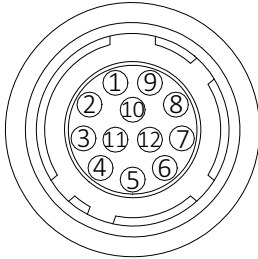
The cable side Hirose 12-pin female connector is available for purchase from Allied Vision (order code: K7600040).



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) (\geq 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 $3.3\text{ k}\Omega$ 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.

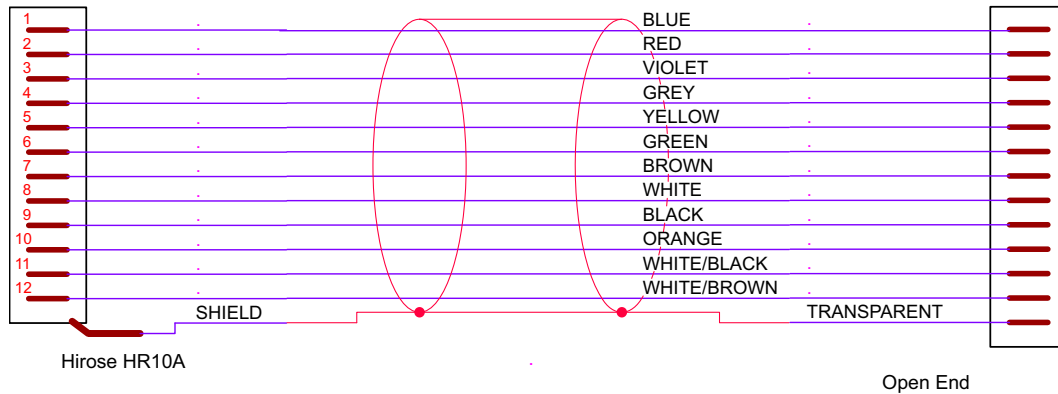


Figure 127: Manta cable color coding

Input block diagram

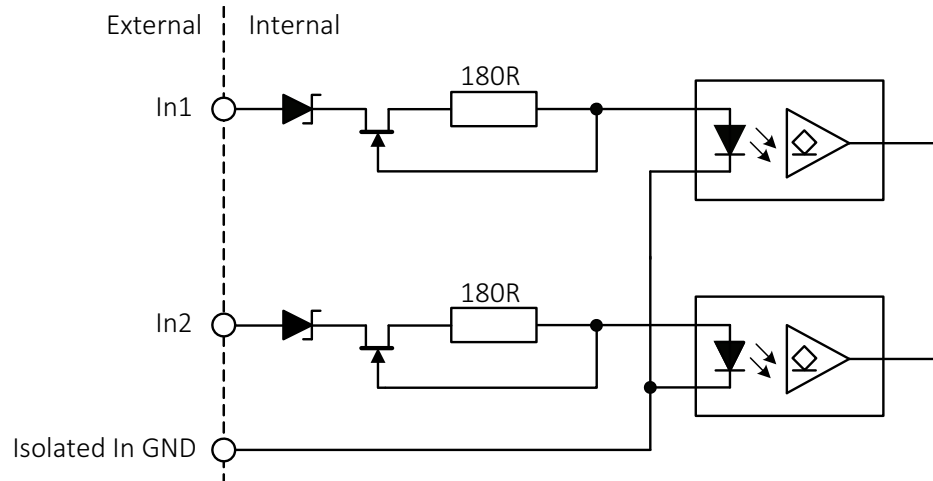


Figure 128: Input block diagram

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:

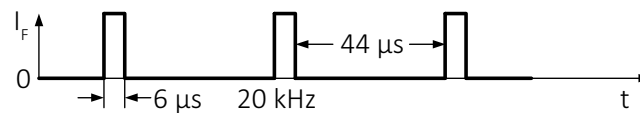


Figure 129: Minimum pulse width

Test conditions

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

Output block diagram

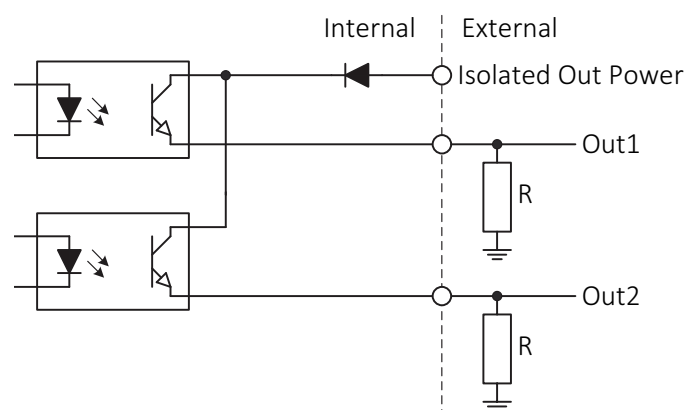


Figure 130: Output block diagram


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

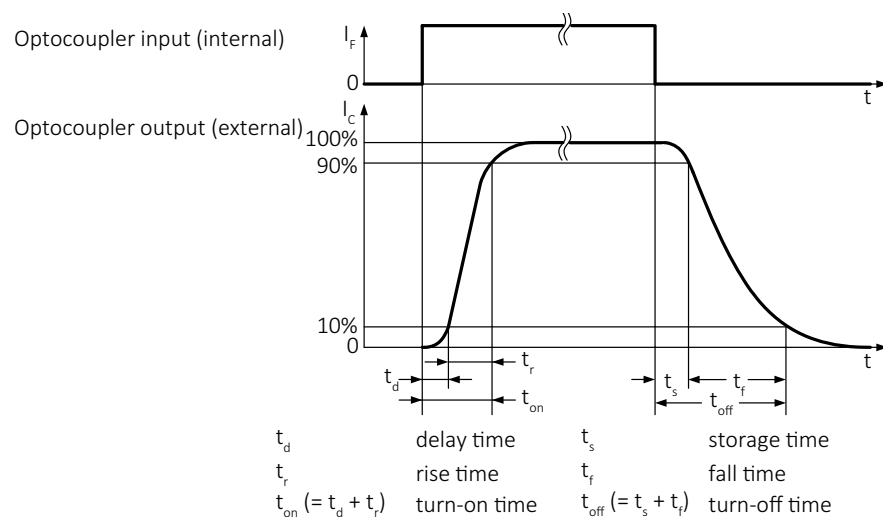


Figure 131: Output switching times

Parameters for all Manta models

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

Table 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.

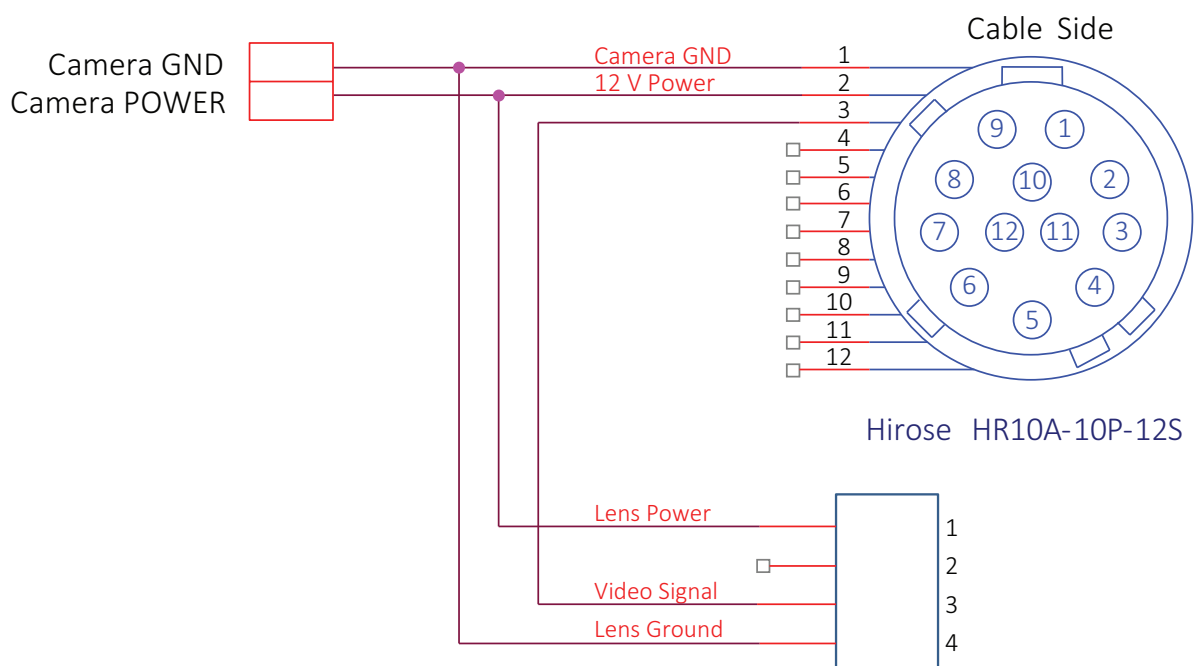


Figure 132: Auto Iris (video type) schematic

Control signals

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

Input block diagram

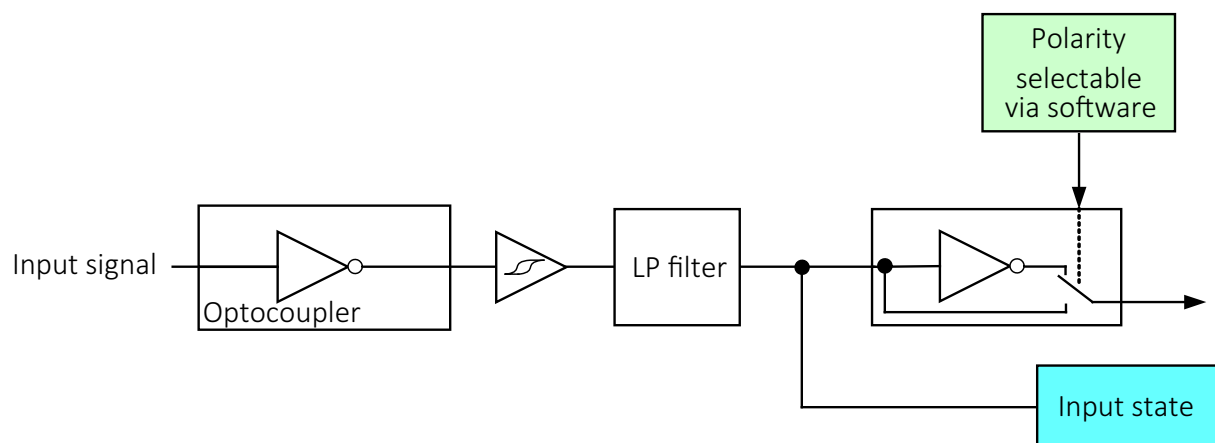


Figure 133: Input block diagram

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 SyncOutGpoLevel1s . |
| 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

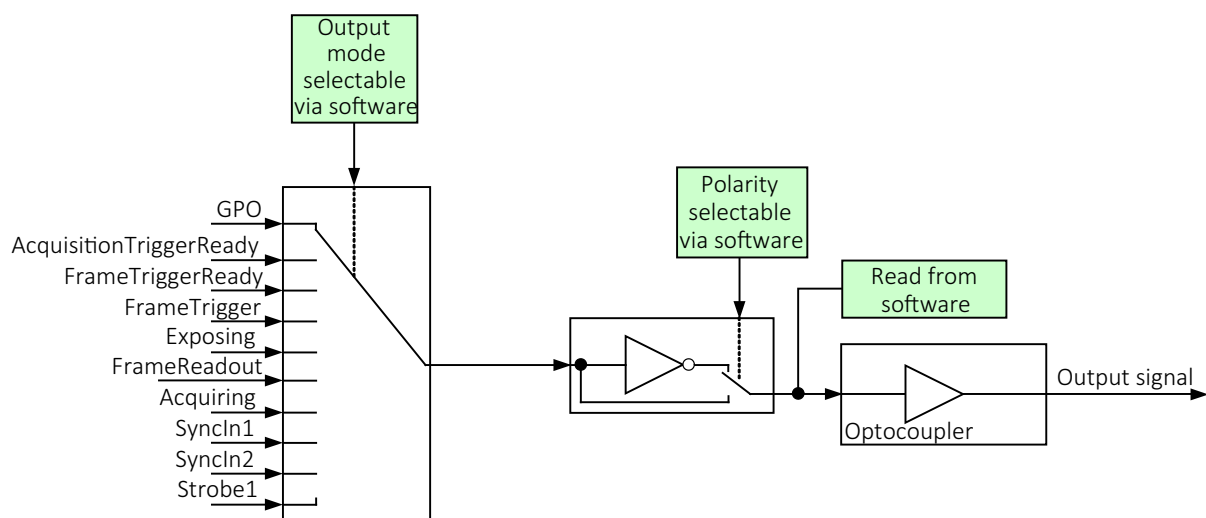


Figure 134: Output block diagram

Trigger timing concept

[Figure135](#) explains the general trigger concept. For more information on trigger timing and camera control, see the GigE Features Reference and Triggering Concept application note.

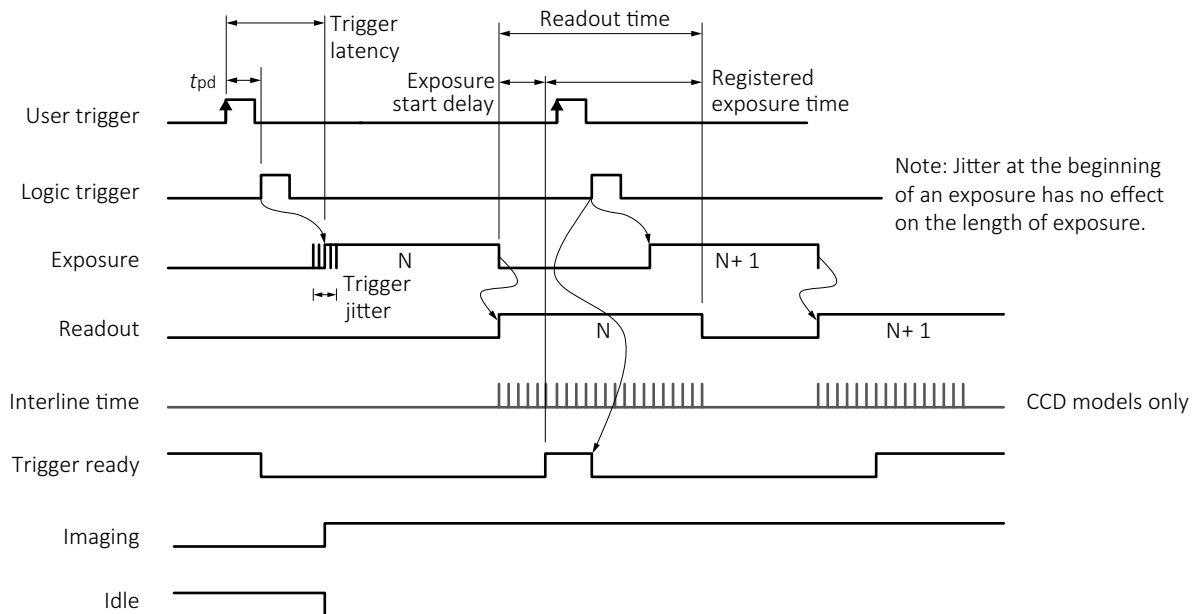


Figure 135: Internal signal waveform

| 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 μ s.
- 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

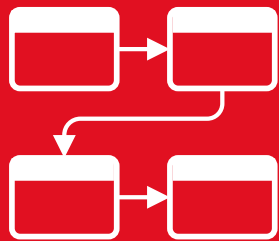
For applications requiring the shortest possible trigger latency and the smallest possible trigger jitter the user trigger signal must be applied when imaging is false and idle is true.

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 | 261 |
| Manta model series with CMOS sensors | 263 |
| Color interpolation (Bayer demosaicing) | 265 |

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

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

Manta model series with CCD sensors

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

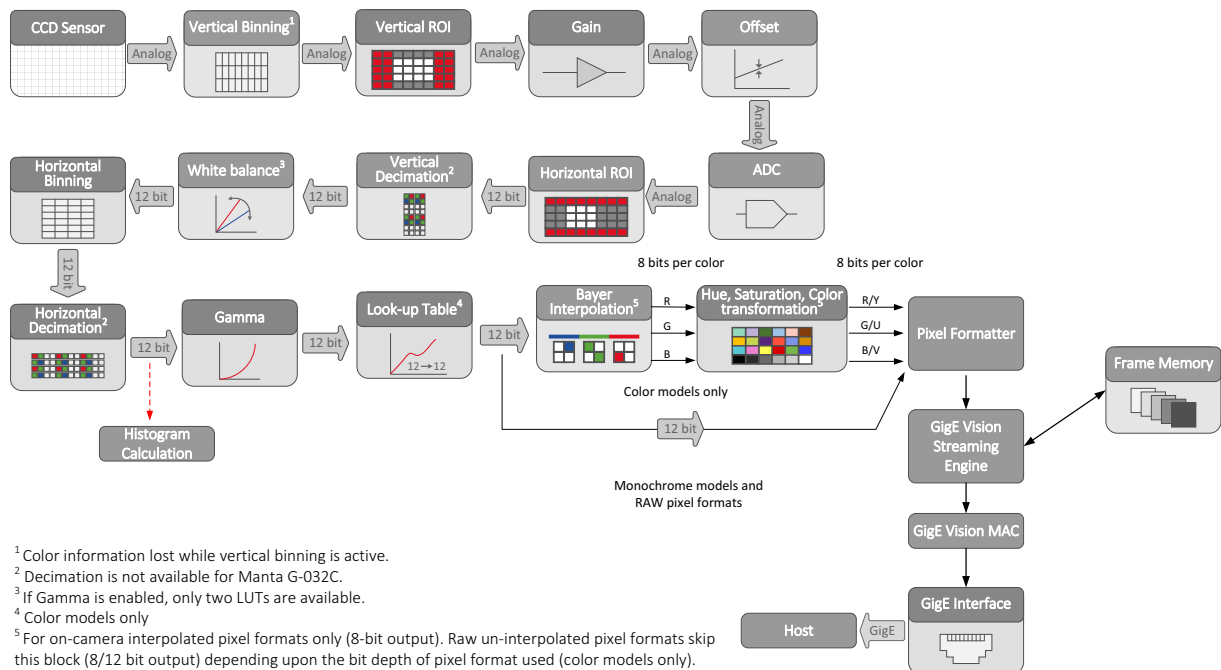


Figure 136: Image data flow for Manta G-031, G-032, G-033, G-046, G-125, G-145, G-146, G-201, and G-504 series

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

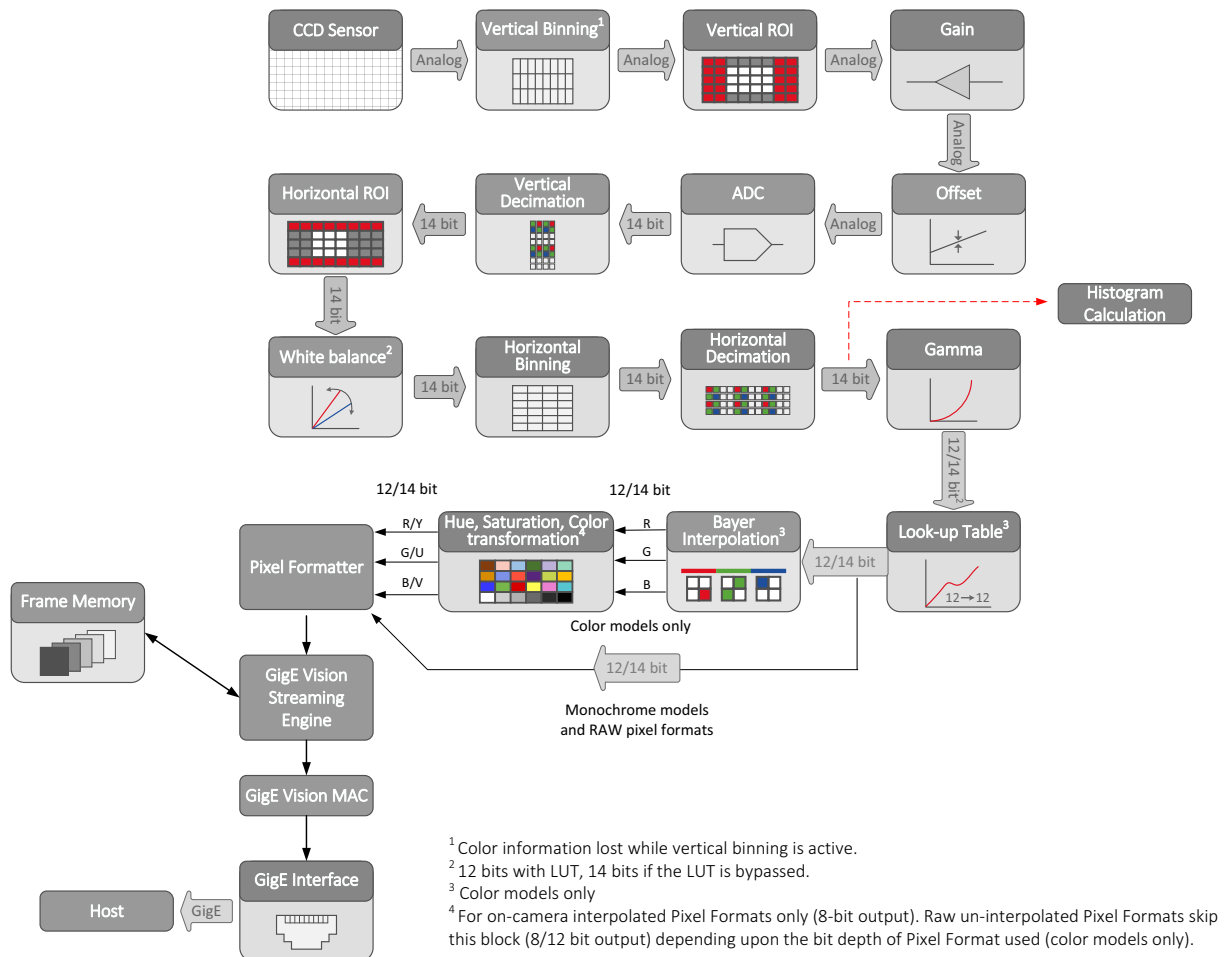


Figure 137: Image data flow for Manta G-282, G-283, G-505, and G-917 series

Manta model series with CMOS sensors

Manta G-223, G-419 series

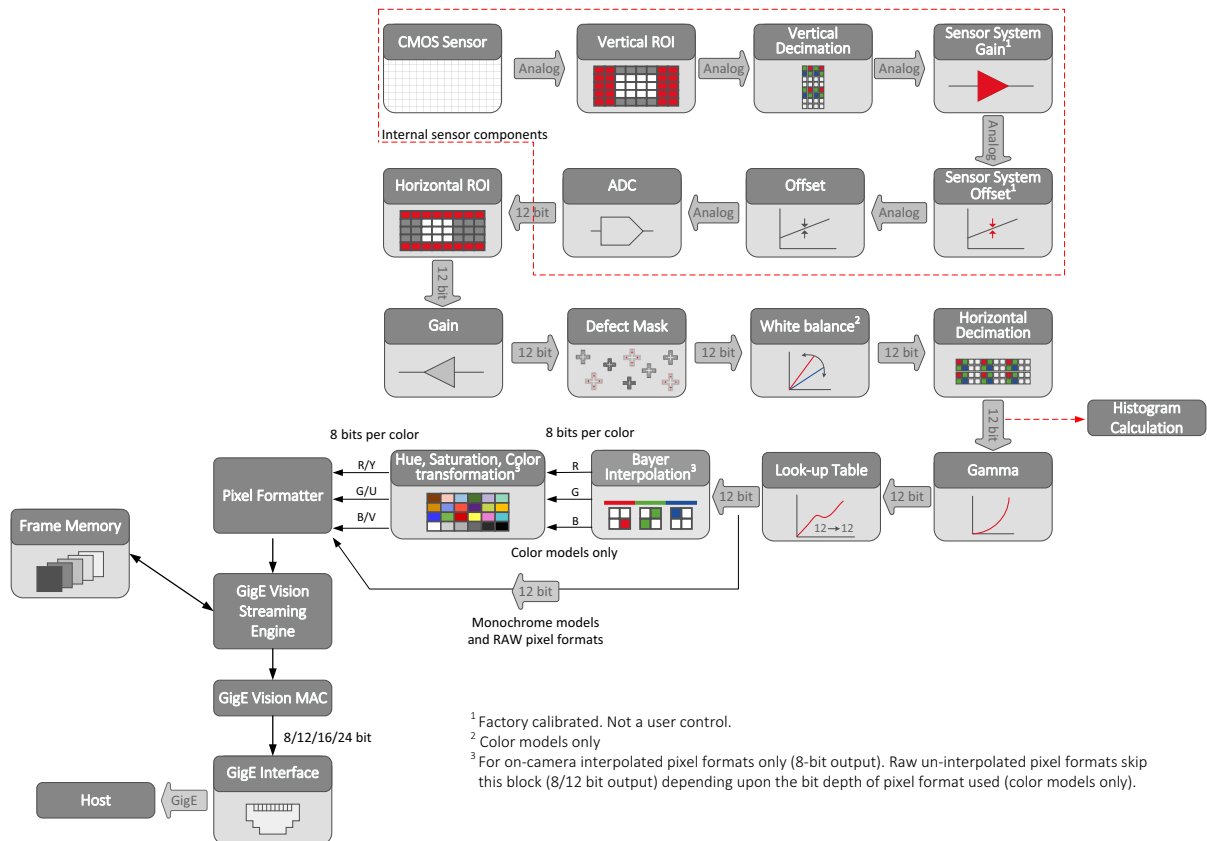
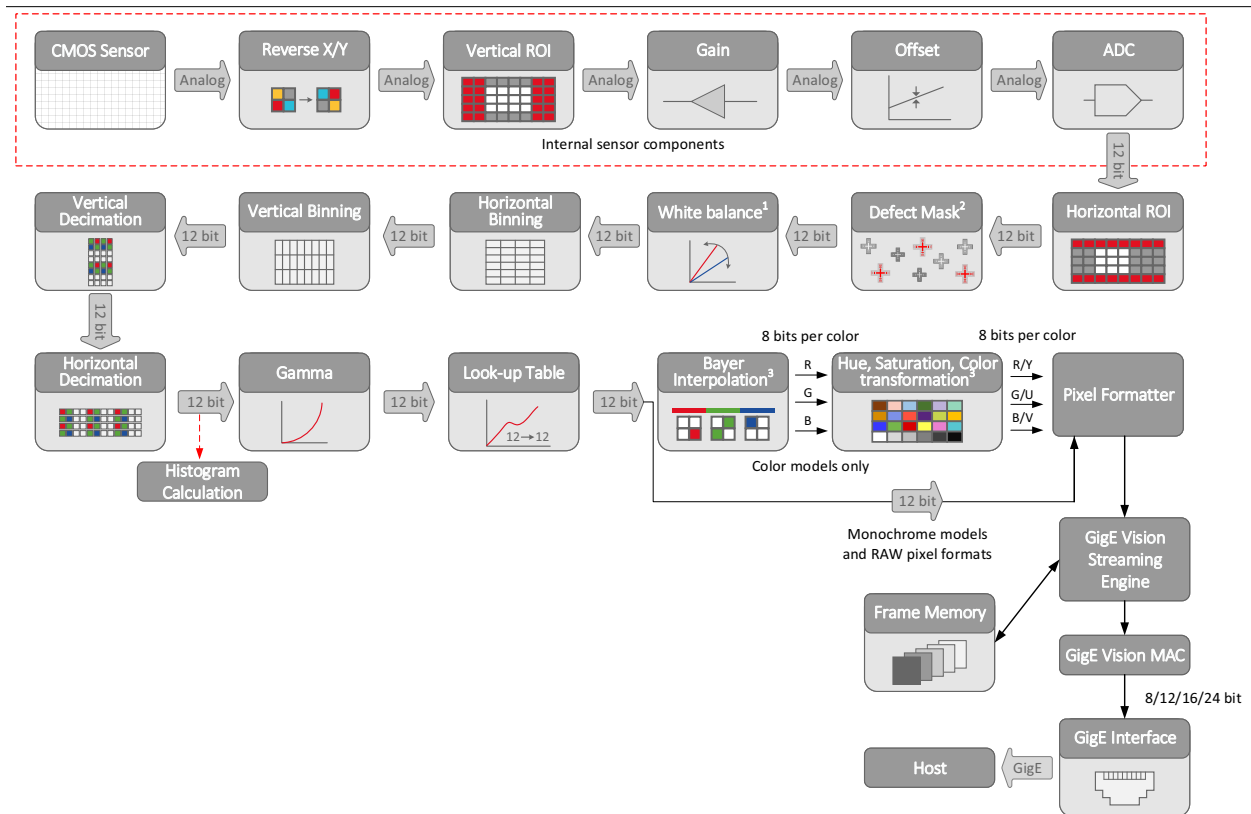


Figure 138: Image data flow for Manta G-223 and G-419 series

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 139: 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.

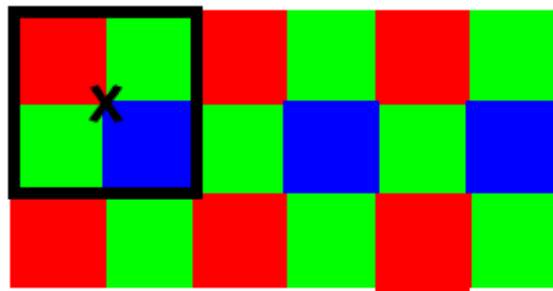


Figure 140: Bayer demosaicing (Manta type A: example of 2 × 2 matrix)

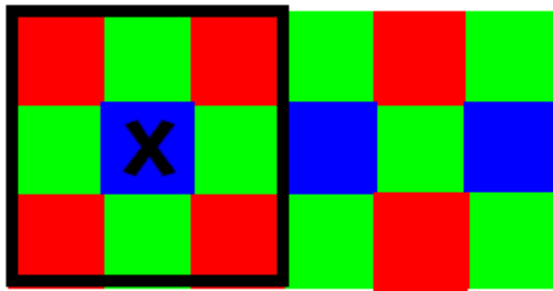


Figure 141: Bayer demosaicing (Manta type B: example of 3 × 3 matrix)

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:

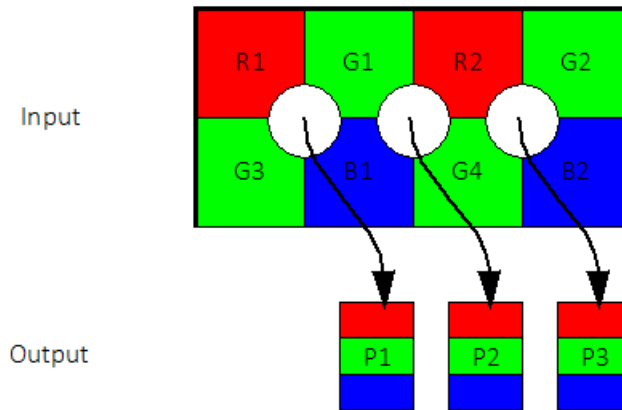


Figure 142: Bayer demosaicing (interpolation)

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

Figure 143: Bayer demosaicing (Manta type A cameras)



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

Cleaning optical components



Find safety instructions and cautions for cleaning lenses, optical filters, protection glass, and sensors.

Contents:

| | |
|---|-----|
| Keep optical components clean..... | 268 |
| Identifying impurities..... | 268 |
| Locating impurities..... | 269 |
| Materials for cleaning optical components | 270 |
| Cleaning Instructions | 270 |



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 144: 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.

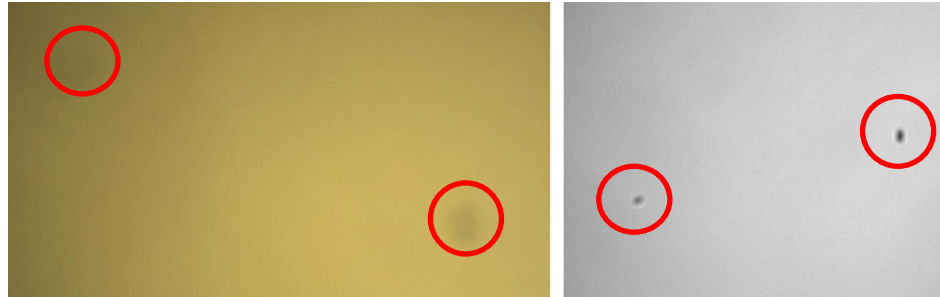


Figure 145: Image with tiny dust on the filter (left) and dust on the sensor (right)

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 may cause scratches or get caught in small gaps.
- Consumer eyeglass cleaning cloths may be pretreated with silicone harmful to optical glass.
- Aggressive cleaners like benzene, 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



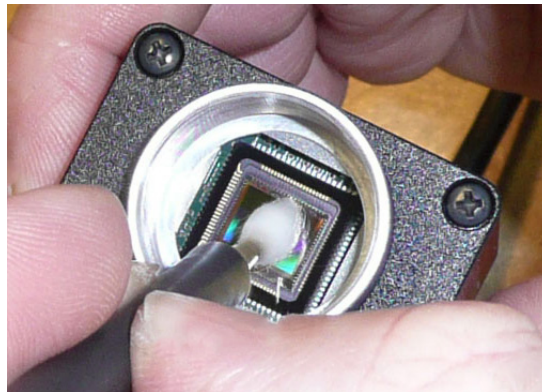
Workplace conditions:

- 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.

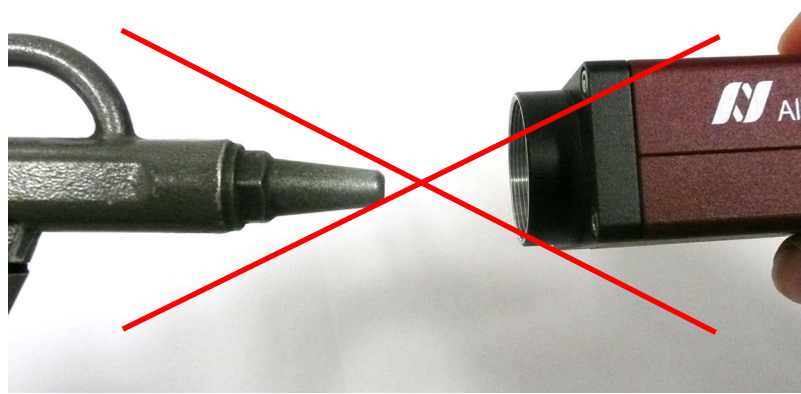


Figure 146: Don't use compressed air



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 Viewer:** 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.

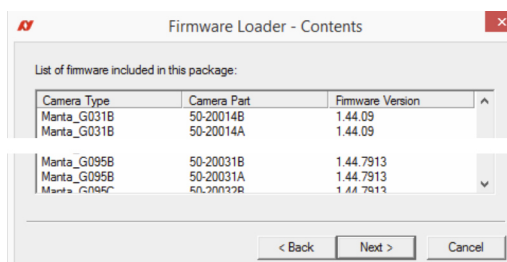
Do not unplug GigE cables or camera power supplies during firmware updates.

Updating the firmware on your Manta camera

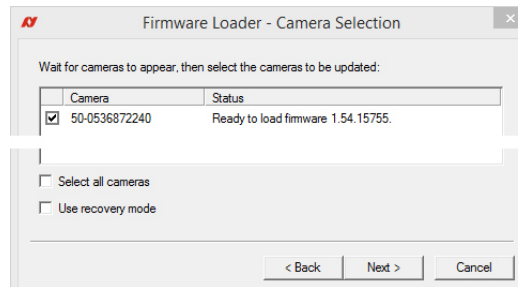
1. Launch the **Firmware Loader**.



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**.



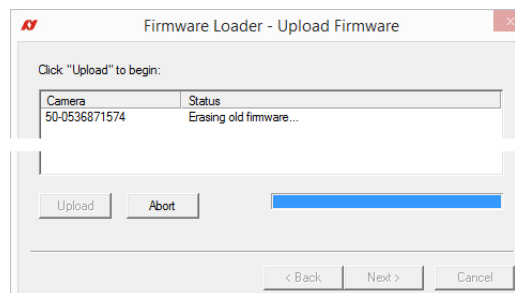
NOTICE

Damage to the camera firmware

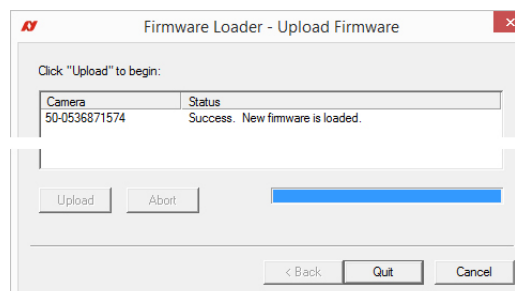
If camera cables are disconnected during a firmware update, the camera may come into a dysfunctional state.

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:

| | |
|--|-----|
| Mechanical dimensions | 278 |
| Back panel | 284 |
| Camera I/O connector pin assignment..... | 285 |

Mechanical dimensions

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

Standard housing with C-Mount (default)

Non-PoE models

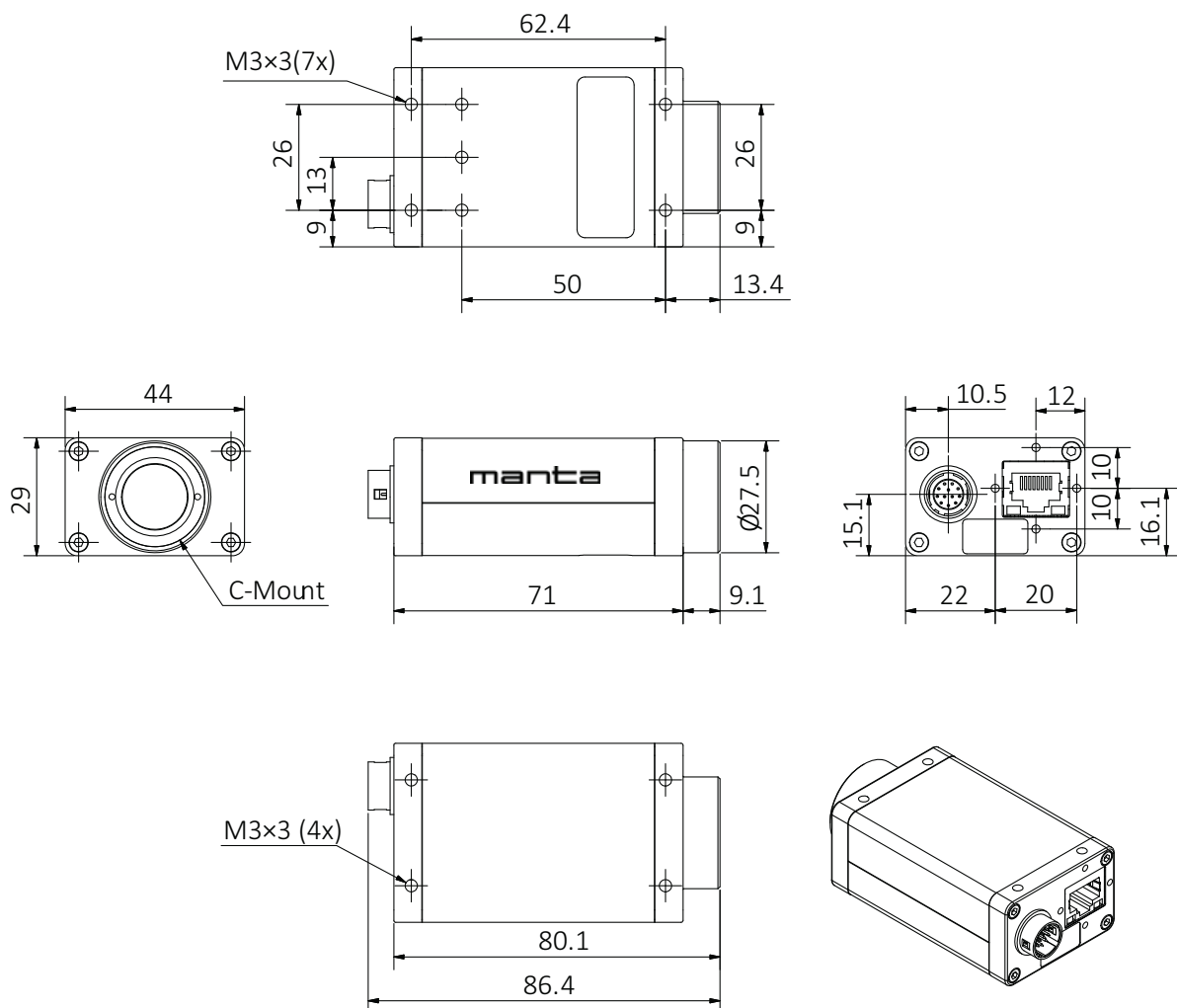


Figure 147: Standard housing C-Mount (non-PoE models) dimensions

W90 housing with C-Mount

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

Non-PoE models

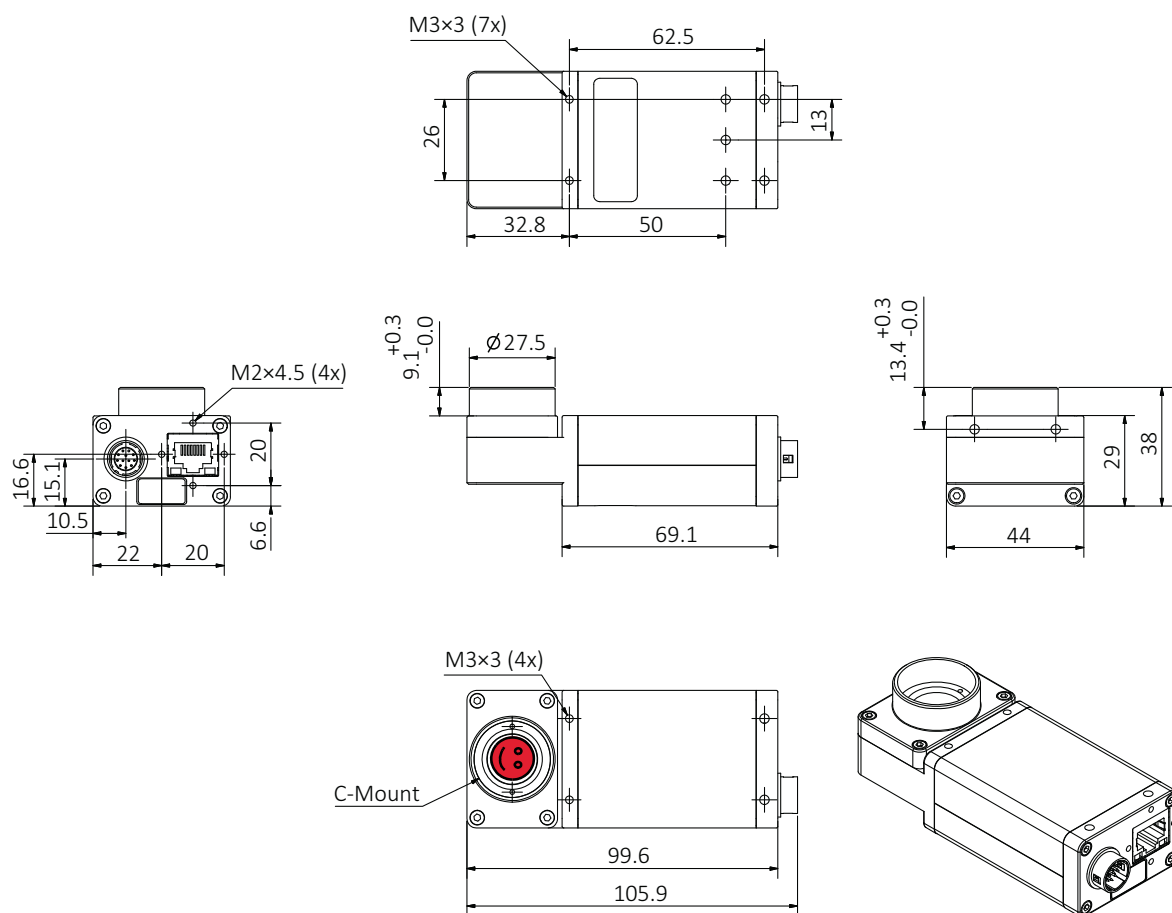


Figure 148: W90 housing C-Mount (non-PoE models) dimensions

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

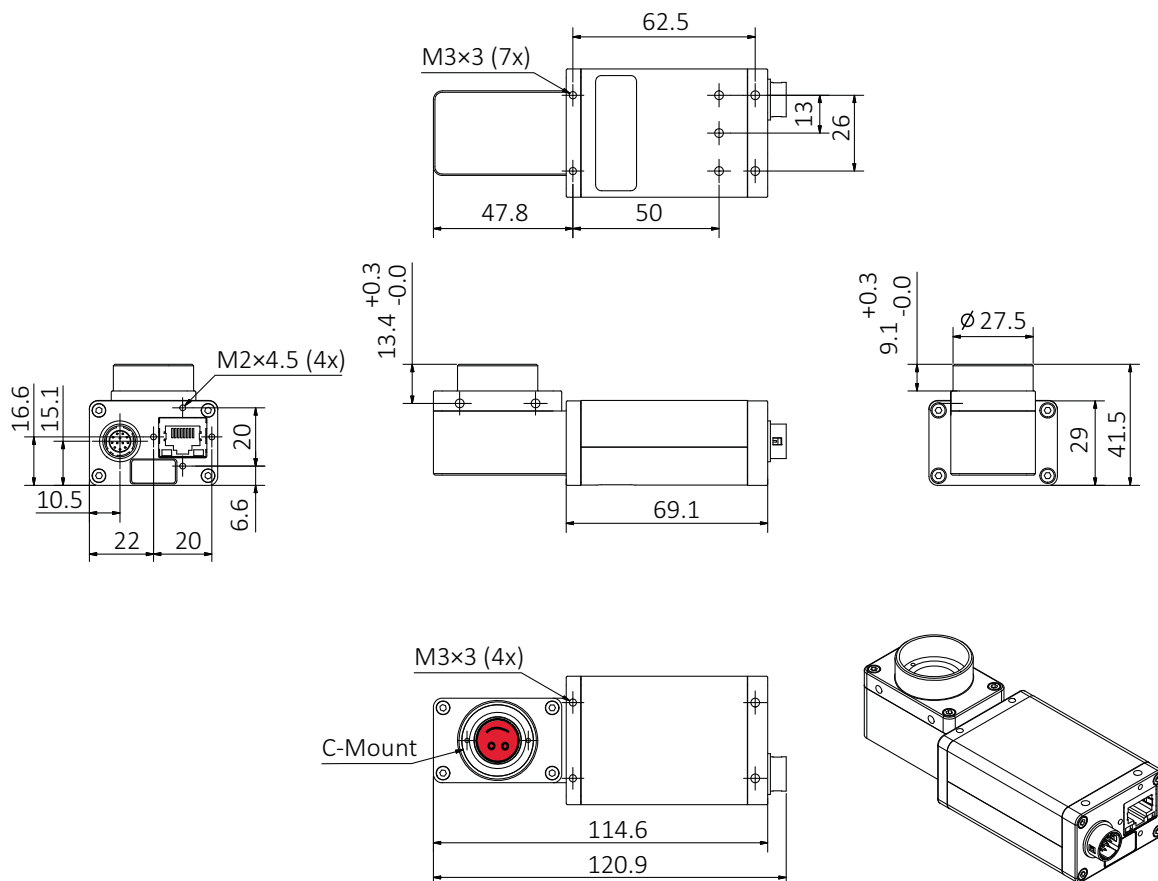


Figure 149: W90 S90 housing C-Mount (non-PoE models) dimensions

W270 housing with C-Mount

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

Non-PoE models

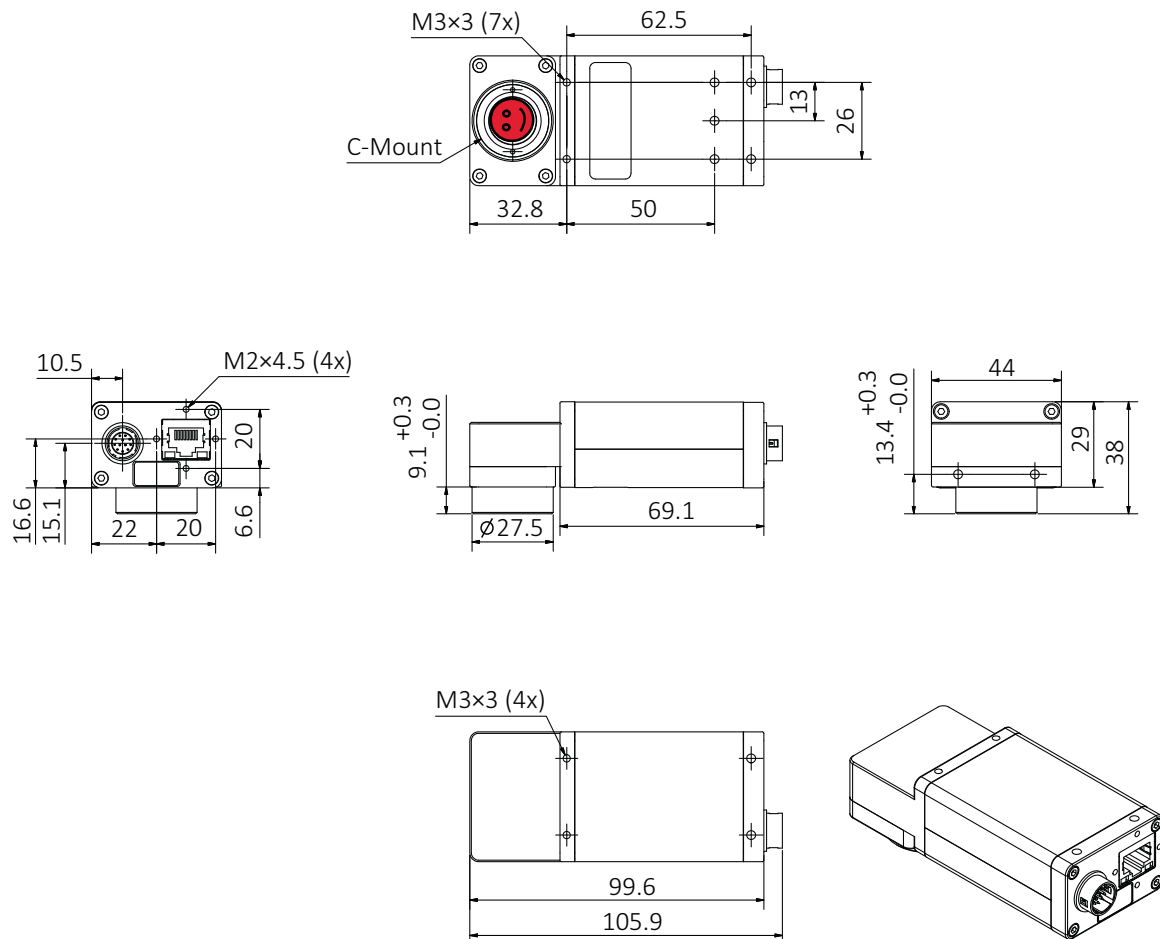


Figure 150: W270 housing C-Mount (non-PoE models) dimensions

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

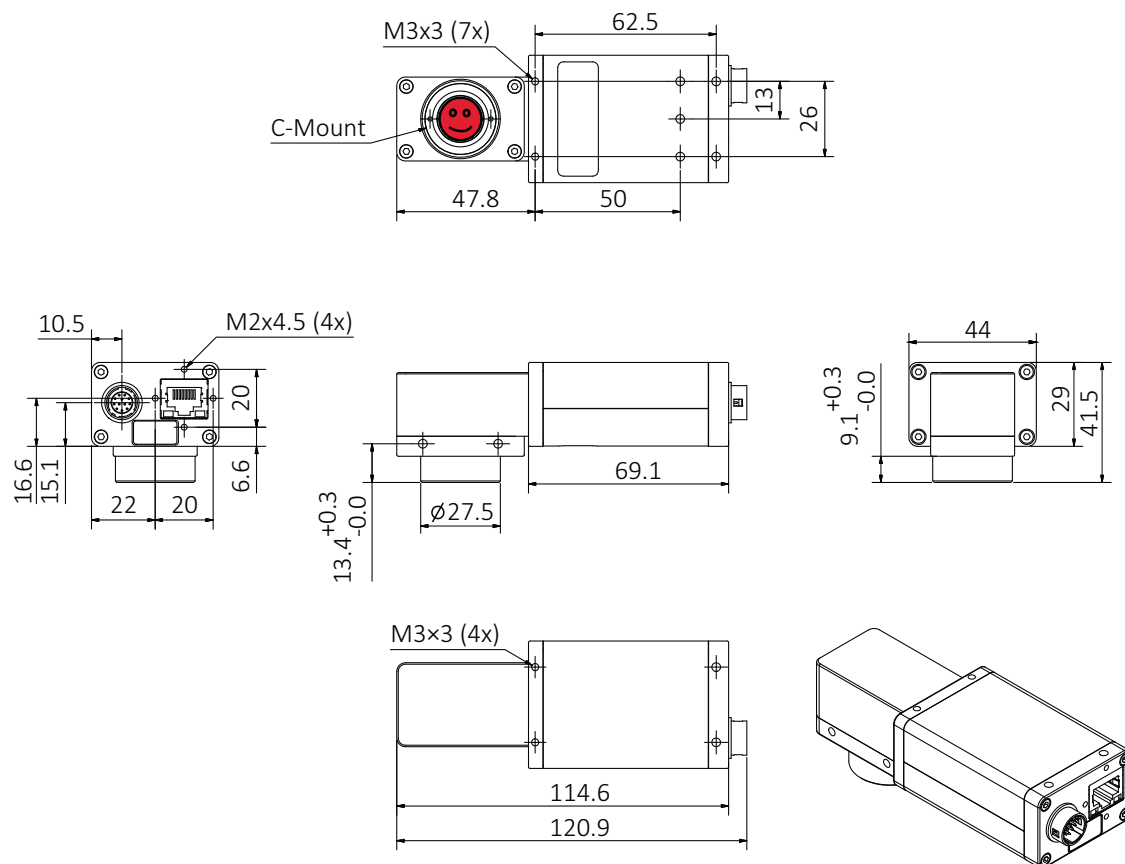


Figure 151: W270 S90 housing C-Mount (non-PoE models) dimensions

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 x 50079-8000

1 = GND (for RS232, Ext PWR)

2 = Ext PWR input

3 = PMW-Out

4 = Input 1

5 = not used

6 = Output 1

7 = GND (for Inputs)

8 = Rx D 9 = Tx D

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

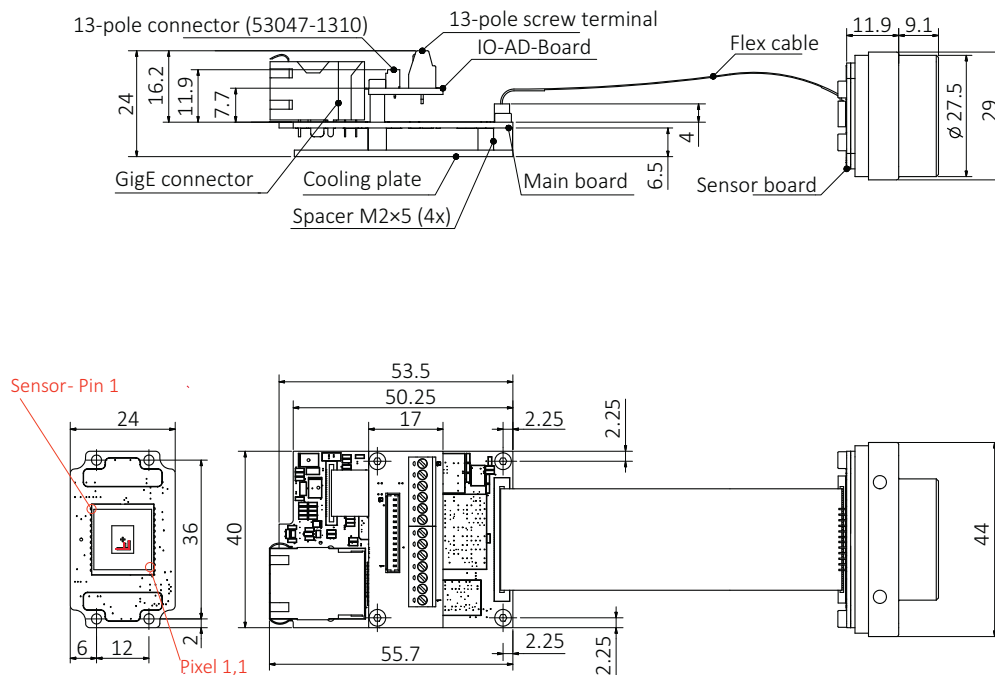


Figure 152: Board level C-Mount (non-PoE models) dimensions



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

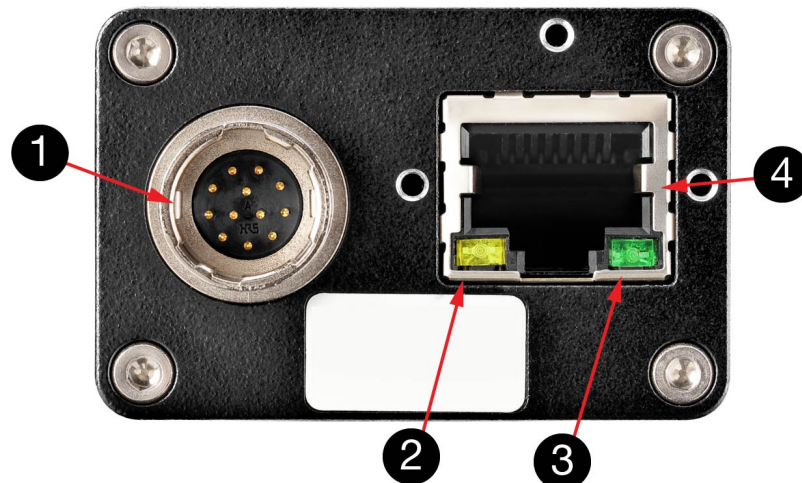


Figure 153: Rear view of non-PoE Manta cameras up to serial number 503323258

| | |
|---|-----------------------|
| 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) (\geq firmware version 01.44.00) |
| 4 | In 1 | In | $U_{in}(\text{high}) = 2.5 \text{ to } 6.0 \text{ V}$ $U_{in}(\text{low}) = 0 \text{ to } 0.8 \text{ V}$ up to 36 V with external resistor of 3.3 k Ω 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 | $U_{in}(\text{high}) = 2.5 \text{ to } 6.0 \text{ V}$ $U_{in}(\text{low}) = 0 \text{ to } 0.8 \text{ V}$ | 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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