Allied Vision

GigE Vision Cameras

Prosilica GC

User Guide

V2.5.4

Note: Lenses are not part of this product.

2024-Feb-06

Allied Vision

Quick links

- Prosilica GC 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 33.

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.

DA - Dansk

Sikkerhed

Læs sikkerhedsanvisningerne, før kameraet bruges. Overhold alle advarsler. Brug kun kameraet som anført i Intended use på side 33.

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.

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 33.

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

VORSICHT
Verletzung durch fallende Kameras oder Objektive
Eine fallende Kamera oder ein fallendes Objektiv kann Verletzungen verursachen.

VORSICHT
Schnitte durch scharfkantige Objektivgewinde
Objektivgewinde können scharfe Kanten haben.

Bestimmungsgemäßer Gebrauch

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

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 33.

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.

FI - Suomi

Turvallisuus

Lue nämä turvallisuusohjeet ennen kameran käyttöä. Noudata varoituksia joka hetki. Käytä kameraa ainoastaan kohdassa Intended use sivulla 33 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.

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 33.

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.

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 33.

זהירות

סכנת כוויה
בזמן הפערת המצלמה עלולותטמפרטורות גבוהות לעלות, שיכולות לגרום לכוויות.

זהירות

פציעה מנפילת מצלמות או עדשות
מצלמה או עדשה שנופלות עלולות לגרום לפציעה.

זהירות

סכנה להחתך מתבריג חד של העדשה
תבריג תושבת העדשה עלול להיות חד עד כדי פציעה.

שימוש מיועד

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

IT - Italiano

Sicurezza

Leggere queste istruzioni per la sicurezza prima di utilizzare la telecamera. Osservare sempre tutte le avvertenze. Utilizzare la telecamera come descritto alla sezione Intended use a pagina 33.

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.

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 33 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。

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 33.

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.

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 33.

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.

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 33.

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.

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 33 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。

Prosilica GC cameras at a glance

Get an overview of Prosilica GC camera documentation.

Read this document carefully

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

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

Scope of delivery

Your Allied Vision camera is delivered with the following components:
- Prosilica GC GigE Vision camera
- Download Instructions

What else do you need?

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

Table 1: Additional resources

Contact us

Website, email

General
www.alliedvision.com/en/contact
info@alliedvision.com

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

Offices

Europe, Middle East, and Africa (Headquarters)

Allied Vision Technologies GmbH
Taschenweg 2a
07646 Stadtroda, Germany
T// +49 36428 677-0 (Reception)
T// +49 36428 677-230 (Sales)
F// +49 36428 677-28

Asia-Pacific

China

Allied Vision Technologies
(Shanghai) Co., Ltd.
2-2109 Hongwell Int. Plaza
1602# ZhongShanXi Road
Shanghai 200235, China
T// +86 21 64861133

Singapore

Allied Vision Technologies Asia Pte. Ltd
82 Playfair Rd, #07-01 D'Lithium
Singapore 368001
T// +65 6634 9027

North, Central, and South America

Canada

Allied Vision Technologies Canada Inc.
300 – 4621 Canada Way
Burnaby, BC V5G 4X8, Canada
T// +1 604 875 8855

USA

Allied Vision Technologies, Inc.
102 Pickering Way- Suite 502
Exton, PA 19341, USA
Toll-free// +1-877-USA-1394
T// +1 978 225 2030

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Document history and conventions

This chapter includes:

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

Document history

Version	Date	Remarks
V2.5.4	2024-Feb-06	Updated contents in IP settings on page 42.
V2.5.3	2023-Jul-10	Editorial changes
V2.5.2	2023-Jan-27	• Added note that lenses are not part of the product. • Updated Hebrew contents in Read before use on page 2.
V2.5.1	2022-Aug-23	• Removed contents related to Power over Ethernet (PoE) in Camera power on page 36. Prosilica GC cameras do not support PoE. • Editorial changes
V2.5.0	2022-Aug-19	• Renamed from Technical Manual to User Guide. • Added Hebrew contents to Read before use on page 2. • Editorial changes
V2.4.7	2021-Dec-08	Editorial changes
V2.4.6	2021-Aug-19	• Added icon for compliance with UKCA in Compliance notifications on page 31 • Editorial changes
V2.4.5	2021-Jul-06	Editorial changes
V2.4.4	2020-Jun-05	• Added Read before use on page 2 • Added Your safety on page 34 • Added Product safety on page 36 • Updated order codes for power supplies • Updated Installing the camera on page 38 • Added time between exposure values for Prosilica GC1290, GC2450 hardware revision D and all hardware revision A models in the Appendix • Editorial updates
V2.4.3	2019-Jul-08	• Changed the IR cut filter section to Optical filters and included all optical filters available for the Prosilica GC camera family • Added Mounting the camera to Hardware and Installation chapter • Editorial changes
V2.4.2	2019-Mar-08	• Added Supplier Declaration of Conformity to Compliance and intended use chapter • Added EMC compliance statements to Installation and hardware chapter • Added shock and vibration information • Editorial changes
V2.4.1	2018-Jun-19	• Updated symbols used in this manual • Updated RoHS statement to include amendment 2015/863/EU

Table 2: Document history (sheet 1 of 5)

Version	Date	Remarks
V2.4.0	2017-Dec-15	• Updated exposure time values (GC660, GC1290, GC1380H, GC2450) and gain values (GC1600H, GC2450) for latest firmware • Added Specifications common to all models to simplify the model specific tables • Simplified the Contact us section, please click the link to find contact information • for your region or email us at one of the provided email addresses. • Various other minor enhancements and corrections
V2.3.0	2017-Oct-18	• Removed references to Prosilica GC660, GC1290, GC1380H, GC1600H, and GC2450 hardware revision A models in the Appendix. The last time shipment period for these models ended on **June 30, 2017** as detailed in PCN AVTPR-112. These hardware revision A models were replaced by hardware revision D models. • Changed Cell size terminology to Pixel size • Various other minor improvements and corrections
V2.2.3	2017-May-24	• Corrected the measurements for the Prosilica GC750 • Added note to all models that dimensions include connectors and C-Mount • Updated the measurements to reflect the dimensions shown in the technical drawing
V2.2.2	2017-Apr-07	• 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
V2.2.1	2017-Feb-10	• Updated QE plot and added spectral response plots • Corrected error in Installation and hardware chapter

Table 2: Document history (sheet 2 of 5)

Version	Date	Remarks
V2.2.0	2016-July-04	• Changed the technical manual layout • Changed chapter name from Camera dimensions to Mechanical dimensions • Moved Sensor position accuracy section from Appendix to Mechanical dimensions chapter • Added Appendix for all older Prosilica GC hardware revision A models • Added Cleaning optical components chapter to replace Cleaning optics section in V2.1.0 • Added Contact us section to replace Contacting Allied Vision section in V2.1.0 • Added D revision feature changes for Prosilica GC660, GC1290, GC1380H, GC1600H, and GC2450 model series • Added Installation chapter • Removed image flow chapter and added the diagrams to the Appendix • Added new image flow diagram for new Prosilica GC hardware revision D models at the end of the Specifications chapter • Updated frame rate information • Aligned the information in the Specification tables with the information on the product web pages • Various other minor improvements and corrections • New trigger latency and trigger jitter values for Prosilica GC hardware revision D models • Updated absolute QE plots and new spectral response plots for all hardware revision D models • For Prosilica GC660 model series, the image width was changed from 659 to 658. It was changed to 658 so that the color version would image with Vimba when using default values. • Prosilica GC hardware revision A models support five user sets. Prosilica GC hardware revision D models support three user sets. • Added optical filter information to specification tables • New features for hardware revision D models include: - Gamma correction - Three look-up tables - Hue, saturation, and color transformation - Main board temperature readout

Table 2: Document history (sheet 3 of 5)

Version	Date	Remarks
V2.1.0	2015-Mar-20	• Updated Allied Vision logo • Replaced old links with new Allied Vision website links • Changed file name from 'GigE Camera and Driver Features' to 'GigE Features Reference' • Changed chapter name from 'Description of data path' to 'Camera data path' • Replaced the optical flange focal distance section with C-Mount flange focal distance section • Updated datapath diagram for Prosilica GC: color models Updated exposure control and power requirements in Specifications chapter
V2.0.8	2013-Nov-26	• Added chapter Description of the data path • Updated the Index
V2.0.7	2013-Oct-02	• Added optical flange focal distance and maximum lens protrusion information • Updated Cleaning optics section • Updated vertical binning values in Specifications chapter • Updated Table 17 • Updated links for PvAPI SDK
V2.0.6	2013-Jul-05	• Added contact information for Allied Vision Technologies (Shanghai) Co. Ltd. • Updated the links to Allied Vision GigE Installation Manual • Added links to Allied Vision GigE Camera and Driver Features document
V2.0.5	2013-May-07	• Updated the exposure control values in the Specifications chapter • Added Vimba SDK link in the Additional references section • Updated Allied Vision recommended cabling to Cat 6 or higher in the Gigabit Ethernet interface section
V2.0.4	2013-Mar-26	• Added Status LEDs section • Added appendix • Updated the RoHS directive • Updated the pixel format naming according to the GenICam naming convention • Added caution regarding the drive voltage for the video iris lens • Added frame rate formulas in the Resolution and ROI frame rates chapter
V2.0.1	2011-Oct-07	• Added note to figure 34
V2.0.0	2011-Jul-22	New manual release status
V.2.0.3	2013-Jan-14	• Updated the exposure control values • Updated the Frame rate versus Height graphs • Removed the internal I/O circuit diagram

Table 2: Document history (sheet 4 of 5)

Version	Date	Remarks
V.2.0.2	2012-Sep-21	• Renamed Camera IO signals • Reworked cleaning optics section

Table 2: Document history (sheet 5 of 5)

Manual conventions

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

Typographic styles

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

Table 3: 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 manual	Manufacturer website
Sony Semiconductor Solutions	Sony	Sony-semicon.co.jp
ON Semiconductor	ON Semi	Onsemi.com

Table 4: Third-party product naming used in this manual

Acronyms and terms

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

Acronym or term	Description
AIA	Automated Imaging Association
CAD	Computer aided design
Cat 6	Category 6, Ethernet cable
CCD	Charge-coupled device
CMOS	Complementary metal-oxide semiconductor
DHCP	Dynamic Host Control Protocol
EMVA	European Machine Vision Association
ESD	Electrostatic discharge
FIFO	First-in first-out
GigE	Gigabit Ethernet
GND	Ground (power)
GPIO	General purpose input and output
GVSP	GigE Vision Streaming Protocol
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
MSDS	Material safety data sheet
NIC	Network interface card
QE	Quantum efficiency
RoHS	Restriction of Hazardous Substances Directive
ROI	Region of interest
SDK	Software Development Kit
SFNC	Standard Feature Naming Convention
TTL I/O	Transistor-transistor logic input/output
TxD and RxD	Transmit and receive
WEEE	Waste Electrical and Electronic Equipment
XML	Extensible Markup Language

Table 5: Acronyms and terms used in this document

Compliance, safety, and intended use

§

This chapter includes:

- Compliance notifications
- Information about intended use of the camera
- Copyright and trademark statement
- Your safety
- Product safety

Compliance notifications

National regulations on disposal must be followed.

For customers in the US

Class A digital device

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

Prosilica GC 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 A limits for radio noise emissions set out in the Radio Interference Regulations.

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

Pour utilisateurs au Canada

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

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

Avoid electromagnetic interferences

For all power and interface 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.

Your safety

This section informs about issues related to your personal safety. Descriptions explain how to avoid hazards and operate Prosilica GC 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

Prosilica GC 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 5 to 25 VDC, using a limited power source (LPS), according to IEC 62368-1 with minimum 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.

- 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.

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. Prosilica GC 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.
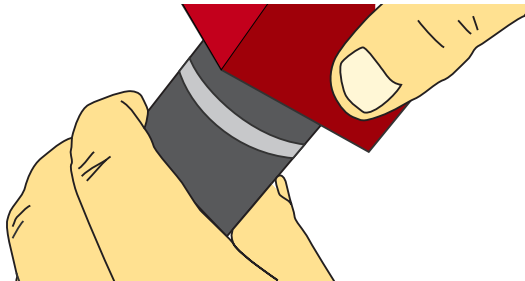
Figure 1: Holding the camera with the lens mount facing the ground

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.

Installing the camera

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

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

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, bottom, and front of the camera housing. Optionally, you can use the tripod adapter to mount your Prosilica GC camera to a tripod.
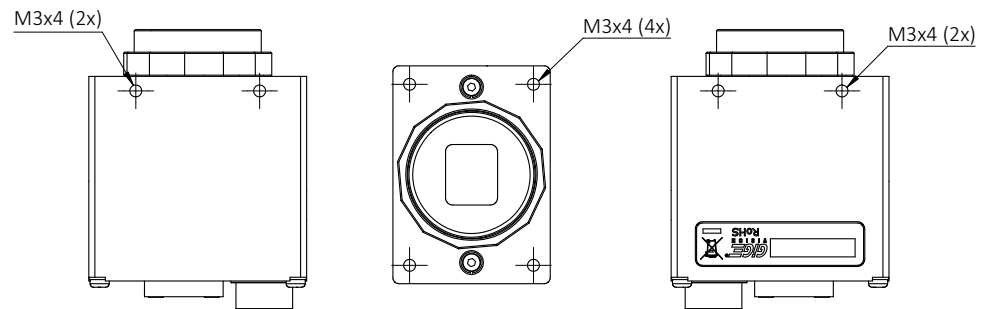

Figure 2: Mounting threads on top, bottom, and front of housing

NOTICE

Please observe the following when mounting the camera:

- It is important to consider the maximum intrusion depth of the M3 mounting holes. 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.
- Apply low-strength thread-locking fluid to the screws to prevent loosening of the screws under 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

As monochrome 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.

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.

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

For more information on lens mount options for your Prosilica GC camera, see the Modular Concept. For information on available lenses and accessories for your camera, see the Accessories webpage.

Configuring the host computer

Prosilica GC cameras can operate on 10/100 or Gigabit speed NICs. 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 your Prosilica GC camera. We recommend that your camera system uses a dedicated Ethernet port not shared with Internet or local area networks. If more ports are needed, or your existing NIC is unable to operate at GigE speeds, installing additional hardware may be required.

Usage on mixed-use networks (with printers, Internet, 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 6_, 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 6: Static IP addresses for NICs and connected cameras

Optimize system performance

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

Edit the NIC driver properties according to the values in the following table. The names and availability of the properties listed may vary depending on adapter 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 7: NIC settings

Default packet size

The default packet size of Prosilica GC cameras is 8228 bytes. The host network adapter 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 Allied Vision recommended Ethernet adapters 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 network adapter may include either **Jumbo Packet** or **Jumbo Frames** depending on the manufacturer. If neither is listed under properties, your network card may not support this feature. You must use a network adapter that supports Jumbo Frames or Jumbo Packets.

To enable jumbo packets

1. Click the **Start** icon and select **Control Panel** in the menu.
2. Click **View by Large Icons** and select **Device Manager** in the list.
3. Under **Network Adapters**, locate the Ethernet NIC, right-click the entry, and select **Properties** in the menu.
4. Select the **Advanced** tab.
5. Select the property **Jumbo Packet** and set the value to 9014 Bytes.
6. Click **OK** to save the setting.

Connecting your camera

Use a CAT6 or higher rated Ethernet cable to connect the camera to the host adapter. Crossover cabling is not required but does work. The camera has circuitry to determine if a crossover cable is being used.

We recommend CAT6 or higher rated Ethernet cables for Prosilica GC cameras. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or image data coming from the camera.

Powering up the camera

A camera power adapter for each GigE camera is available from Allied Vision. See Specifications 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

- Use only DC power supplies with insulated cases.
- For all power connections use only shielded cables to avoid electromagnetic interferences.

NOTICE

Don't operate the camera beyond the environmental specifications. See environmental specifications limits in the Specifications section of this document. Special care must be taken to maintain a reasonable operating temperature.

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 between the specified operating temperature.

Observe the following:

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

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.

Connecting to host application

Once you have installed the **Vimba Viewer** or third-party application to your host computer, you can connect your Allied Vision GigE camera via an Ethernet cable. Connect the Hirose cable to power the camera 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 your 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

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

- GigE accessories including standard GigE components.
- Lenses for corresponding sensor sizes and resolutions.

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

A list of Allied Vision recommended accessories is available on the Allied Vision website. See the Hardware Selection for Allied Vision GigE Cameras Application Note at www.alliedvision.com/en/support/faqs-application-notes.

Specifications

This chapter provides:

- Applied standards
- Technical specifications
- Absolute QE plots
- Spectral response plots
- ROI frame rate plots
- Camera feature availability for hardware revision D models (serial number 21XXD-XXXXX)
- Image data flow diagram

Applied standards

GigE Vision

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

GenICam

GenICam is a machine vision standard hosted by the 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 is used to grab images.

Shock and vibration

Prosilica GC cameras were successfully tested according to the following standards:
- MIL-STD 810 F 514.5, Random vibration testing
- MIL-STD 810 F 516.5, Shock testing
- If you need more details, please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Notes on specifications

This section defines the conditions for specifications stated in this chapter.

Dimensions and mass

Dimensions include C-Mount and connectors but not the tripod and lens.
Mass does not include the tripod and lens.

Hardware revision

This chapter includes camera specifications for all Prosilica GC models (hardware revision D). For previous Prosilica GC models (hardware revision A) see Appendix.

Prosilica GC hardware revision D models and firmware are not compatible with Prosilica GC hardware revision A models.

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. Prosilica GC cameras are equipped with an image buffer. The memory operates according to the FIFO principle. Specification tables 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 a `GevSCPSPacketSize = 8192` bytes per packet.

Resolution and ROI frame rate

This section charts 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.

Resolution and ROI measurements

- Data was generated using `StreamBytesPerSecond` = *124* Mbps (full bandwidth), minimum exposure, full resolution, and an 8-bit pixel format. Frame rate may be lower if using network hardware incapable of 124 Mbps.
- ROIs are taken as a center image for maximum speed advantage, where feature `OffsetY` = (full sensor height – ROI height)/2.
- `BinningVertical` is vertical row summing of charge on sensor sensors 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 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 an ROI and shorter exposure values.

Absolute QE plots

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

The uncertainty in measurement of the QE values is ±10%. This is mainly due to uncertainties in the measuring apparatus itself (Ulbricht sphere, optometer).

Manufacturing tolerance of the sensor increases overall uncertainty.

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.

ON Semi CCD sensors

The curves in the absolute QE plots shown in this chapter are from the sensor manufacturer data sheet. The information was correct at the time of publishing. Sensor specifications may change without notice.

Wavelength

The wavelength range in the absolute QE plots reflects 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

The curves in the spectral response plots shown in this chapter were calculated from measured quantum efficiencies at 448 nm, 529 nm, and 632 nm. The shape of the curve is taken from the sensor data sheet, but the values have been adjusted based on these measured values.

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

Specifications common to all models

The following table provides specifications common to all Prosilica GC hardware revision D models.

Feature	Specification
Default lens mount	C-Mount
Default optical filter	• Monochrome models: No filter • Color models: Type IRC30 IR cut filter
TTL (non-isolated) I/Os	1 input, 1 output
Opto-isolated I/Os	1 input, 1 output
RS232	1
Operating temperature	0 °C to +50 °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	5 to 25 VDC
Interface standards	• IEEE 802.3 1000BASE-T (GigE) • GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1
Camera dimensions (L × W × H)	• Monochrome models: 58.7 × 45.7 × 33 mm • Color models: 59 × 45.7 × 33 mm
Temperature monitoring	Available for main board only. Resolution: 0.031; Accuracy: ± 1 °C

Table 8: Specifications common to all Prosilica GC hardware revision D models

Hardware options

The Modular Concept informs about CS-Mount option and options for optical filters and protection glass.

Modular Concept

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

Prosilica GC660 series

The following table provides model series specifications. The values are valid for Prosilica GC660 and GC660C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC660	**Prosilica GC660C**
Sensor model	Sony ICX618ALA	Sony ICX618AQA
Resolution	658 (H) × 494 (V); 0.3 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/4	
Sensor size	4.5 mm diagonal	
Pixel size	5.6 μm × 5.6 μm	
Maximum frame rate at full resolution	121 fps	
Bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	64 MB	
StreamHoldCapacity	Up to 194 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	10 μs to 72.9 s; 1 μs increments	
Gain control	0 to 34 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to 14 rows	
Power consumption	3.0 W at 12 VDC	
Trigger latency	0.9 μs for non-isolated I/O; 0.9 μs for isolated I/O	
Trigger jitter	±50 ns for non-isolated I/O; ±50 ns for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 μs for isolated I/O	
Mass (typical)	105 g	

Table 9: Prosilica GC660 model series specifications
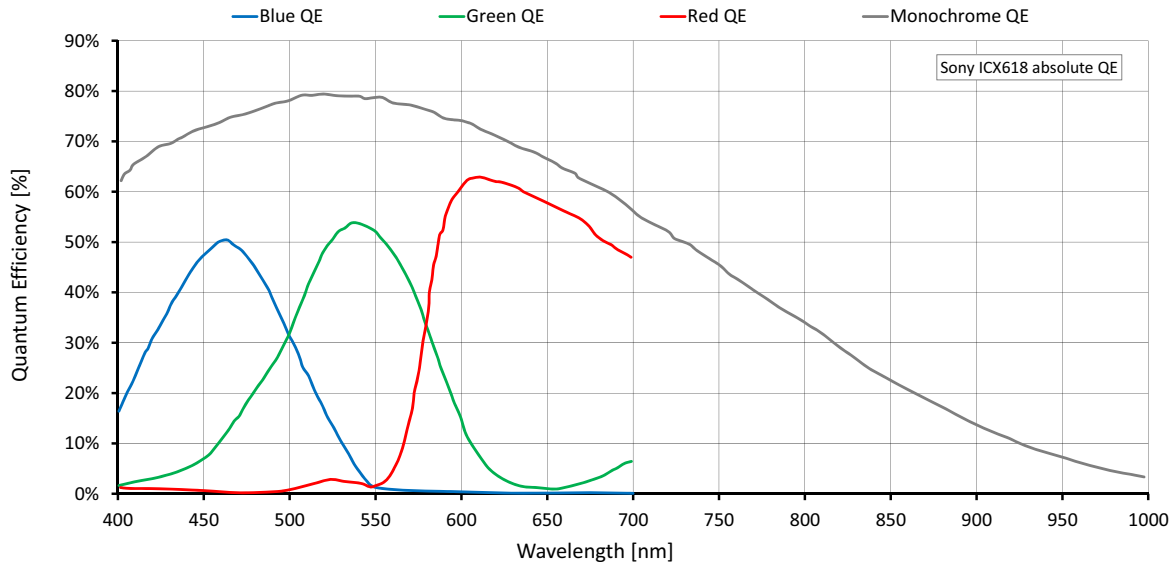
Absolute QE

Figure 3: Prosilica GC660 (Sony ICX618) absolute QE
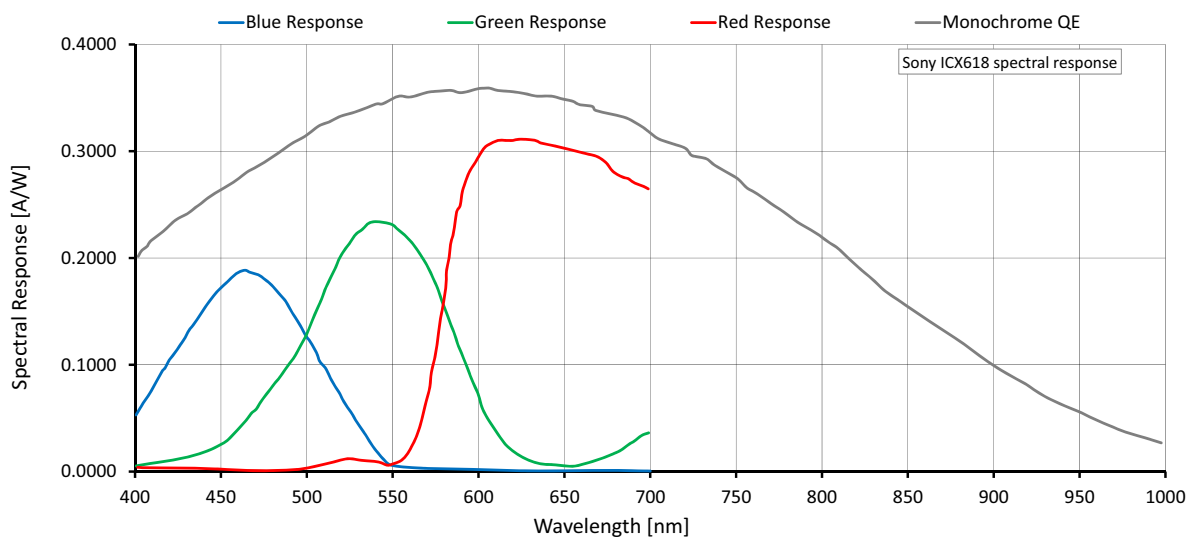
Spectral response

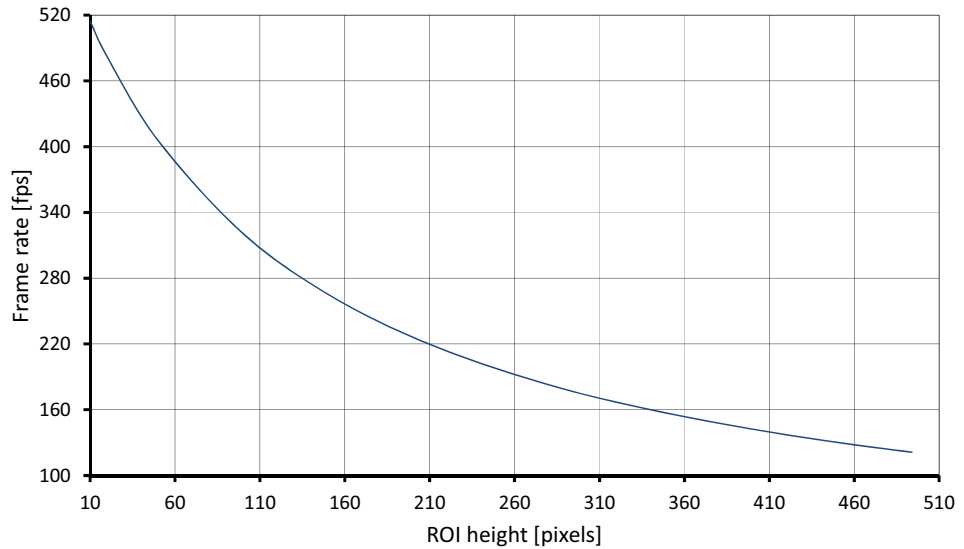*Figure 4: Prosilica GC660 (Sony ICX618) spectral response*

ROI frame rate

Figure 5: Prosilica GC660 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
494	121.18	200	226.23
450	130.23	150	265.35
400	142.31	100	320.82
350	156.86	50	405.61
300	174.32	20	482.06
250	197.16	10	514.37

Table 10: Frame rate as a function of ROI height (Width=658 pixels)

Prosilica GC1290 series

The following table provides model series specifications. The values are valid for Prosilica GC1290 and GC1290C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1290	**Prosilica GC1290C**
Sensor model	Sony ICX445ALA	Sony ICX445AQA
Resolution	1280 (H) × 960 (V); 1.2 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/3	
Sensor size	6.0 mm diagonal	
Pixel size	3.75 µm × 3.75 µm	
Maximum frame rate at full resolution	33 fps	
Bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	64 MB	
StreamHoldCapacity	Up to 52 frames at full resolution	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	12 µs to 72.4 s; 1 µs increments	
Gain control	0 to 24 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to 14 rows	
Power consumption	3 W at 12 VDC	
Trigger latency	1.7 µs for non-isolated I/O; 1.7 µs for isolated I/O	
Trigger jitter	±50 ns for non-isolated I/O; ±50 ns for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	87 µs
Mass (typical)	106 g	

Table 11: Prosilica GC1290 model series specifications
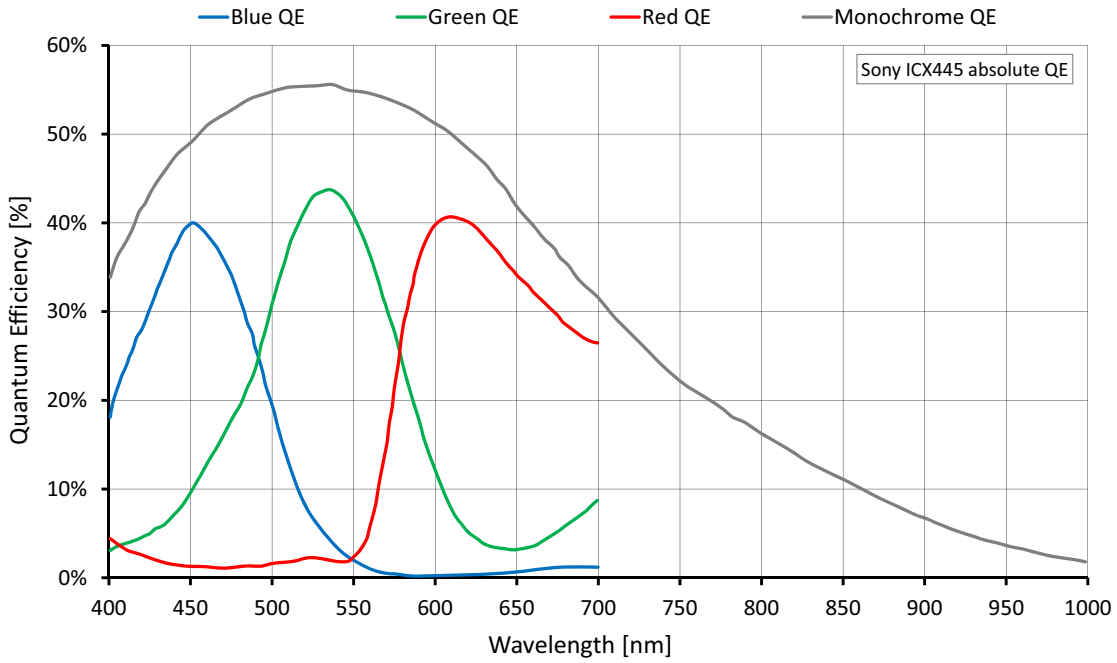
Absolute QE

Figure 6: Prosilica GC1290 (Sony ICX445) absolute QE
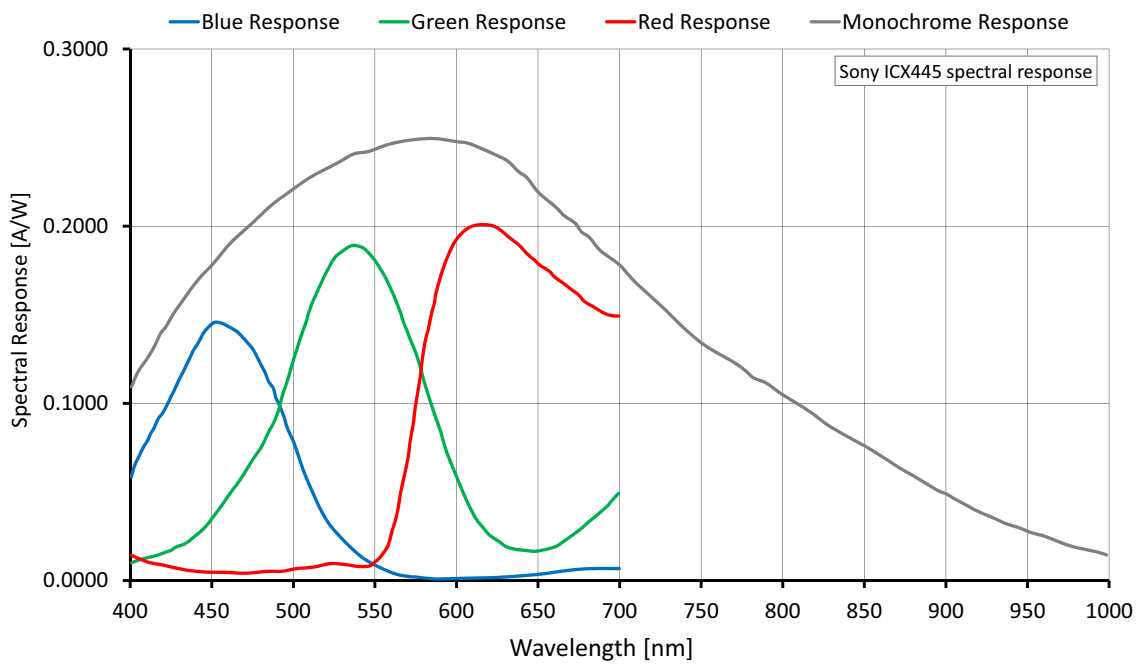
Spectral response

Figure 7: Prosilica GC1290 (Sony ICX445) spectral response
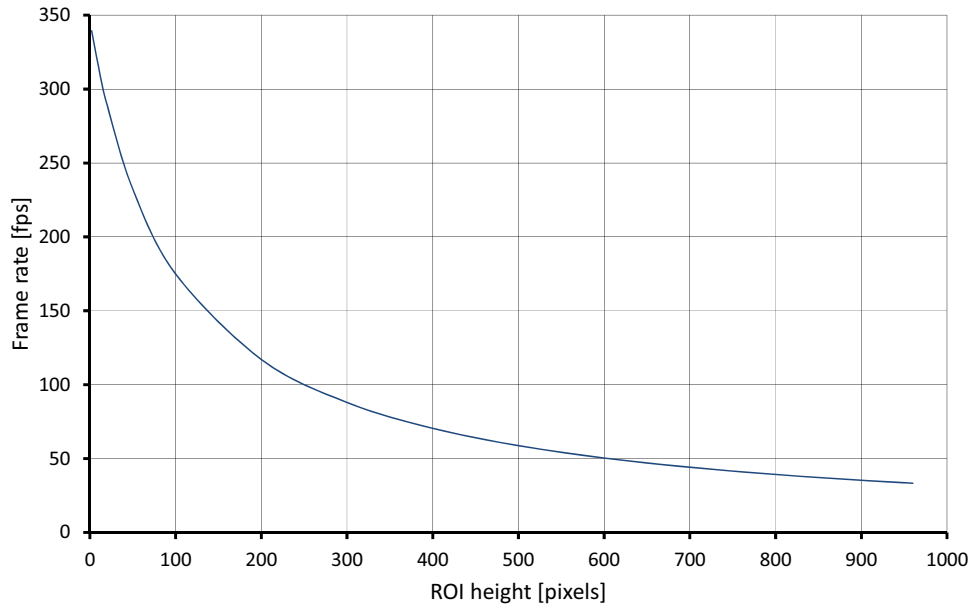
ROI frame rate

Figure 8: Prosilica GC1290 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
960	33.31	300	87.96
900	35.30	200	117.07
800	39.21	100	174.96
700	44.10	50	232.41
600	50.38	20	289.45
500	58.75	10	315.23
400	70.45	2	339.43

Table 12: Frame rate as a function of ROI height (Width=1280 pixels)

Prosilica GC1380H series

The following table provides model series specifications. The values are valid for Prosilica GC1380H and GC1380CH models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1380H	**Prosilica GC1380CH**
Sensor model	Sony ICX285AL	Sony ICX285AQ
Resolution	1360 (H) × 1024 (V); 1.4 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.0 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Maximum frame rate at full resolution	30 fps	
A/D	12-bit	
Image buffer	64 MB	
StreamHoldCapacity	Up to 46 frames at full resolution	
Bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	10 µs to 72.9 s; 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns Vertical: 1 to 14 rows	
Power consumption	3.3 W at 12 VDC	
Trigger latency	1.9 µs for non-isolated I/O; 1.9 µs for isolated I/O	
Trigger jitter	±50 ns for non-isolated I/O; ±50 ns for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Mass (typical)	111 g	

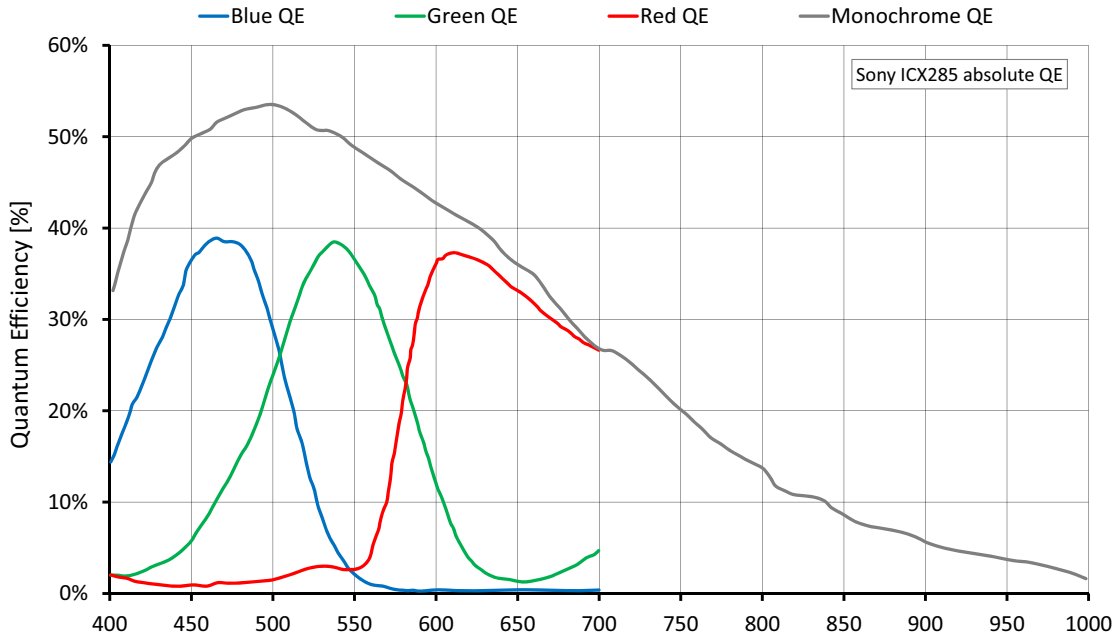*Table 13: Prosilica GC1380H model series specifications*

Absolute QE

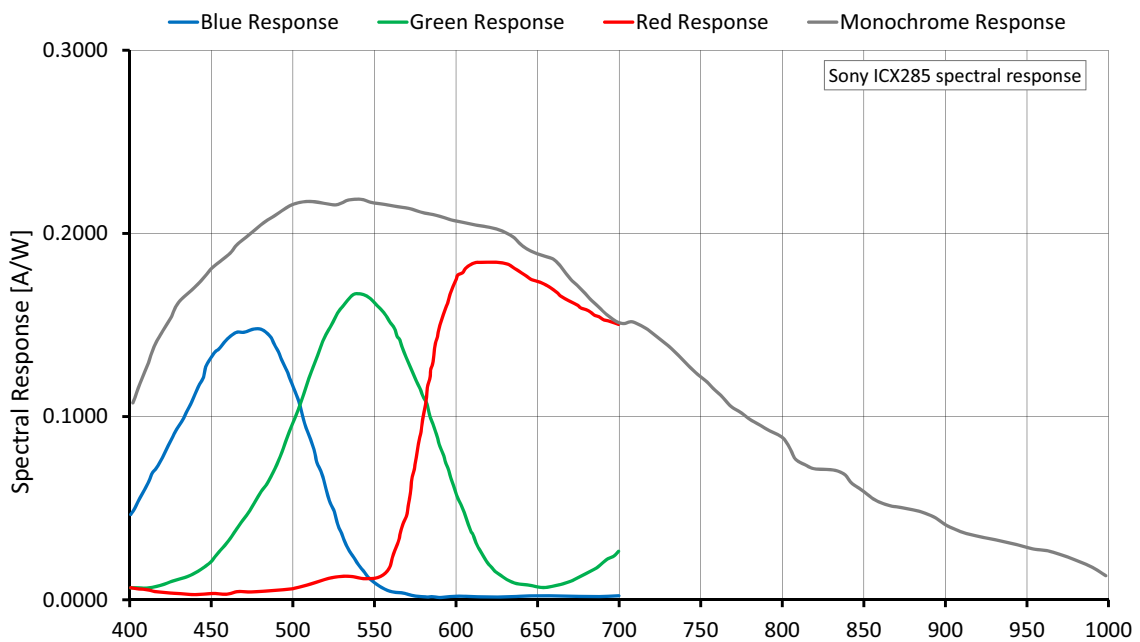*Figure 9: Prosilica GC1380H (Sony ICX285) absolute QE*

Spectral response

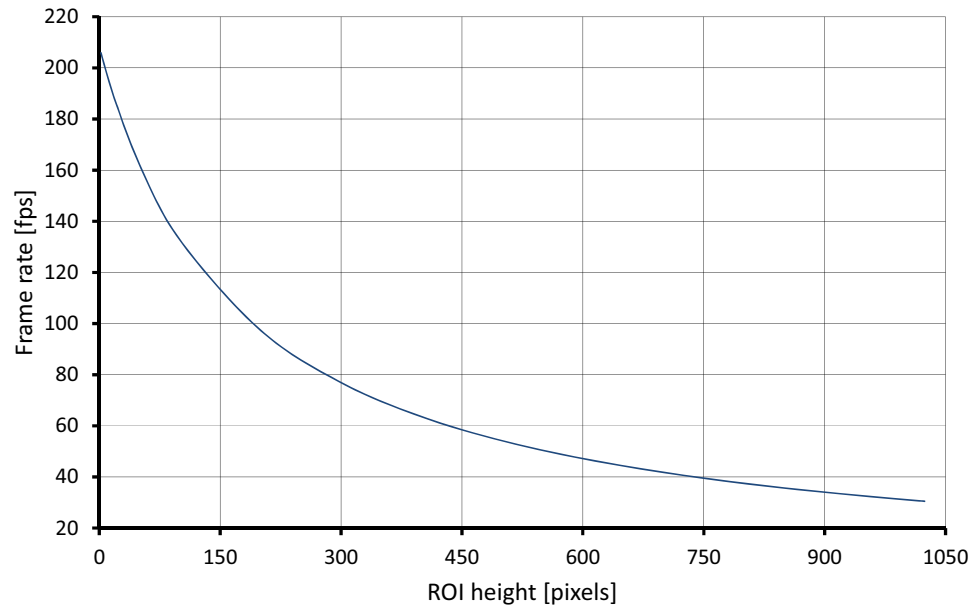*Figure 10: Prosilica GC1380H (Sony ICX285) spectral response*

ROI frame rate

Figure 11: Prosilica GC1380H frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1024	30.48	300	76.89
1000	31.1	200	97.36
900	34	100	132.68
800	37.48	50	162.08
700	41.76	20	186.93
600	47.15	10	197.01
500	54.13	2	205.88
400	63.53		

Table 14: Frame rate as a function of ROI height (Width=1360 pixels)

Prosilica GC1600H series

The following table provides model series specifications. The values are valid for Prosilica GC1600H and GC1600CH models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1600H	**Prosilica GC1600CH**
Sensor model	Sony ICX274AL	Sony ICX274AQ
Resolution	1620 (H) × 1220 (V); 2 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/1.8	
Sensor size	8.923 mm diagonal	
Pixel size	4.4 µm × 4.4 µm	
Maximum frame rate at full resolution	25 fps	
A/D	12-bit	
Image buffer	64 MB	
StreamHoldCapacity	Up to 33 frames at full resolution	
Maximum image bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	10 µs to 68.7 s; 1 µs increments	
Gain control	0 to 30 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to 14 rows	
Power consumption	3.3 W at 12 VDC	
Trigger latency	1.2 µs for non-isolated I/O; 1.2 µs for isolated I/O	
Trigger jitter	±50 ns for non-isolated I/O; ±50 ns for isolated I/O	
Propagation delay (t_{pd})	20 ns for non-isolated I/O; 0.5 µs for isolated I/O	
Mass (typical)	105 g	

Table 15: Prosilica GC1600H model series specifications
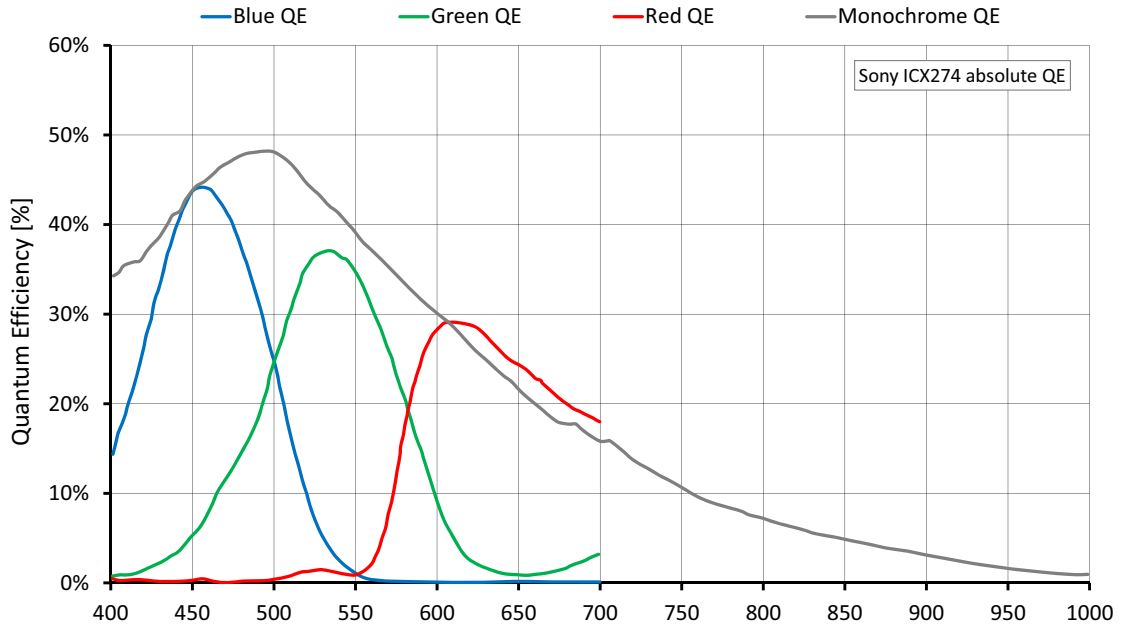
Absolute QE

Figure 12: Prosilica GC1600H (Sony ICX274) absolute QE

Spectral response

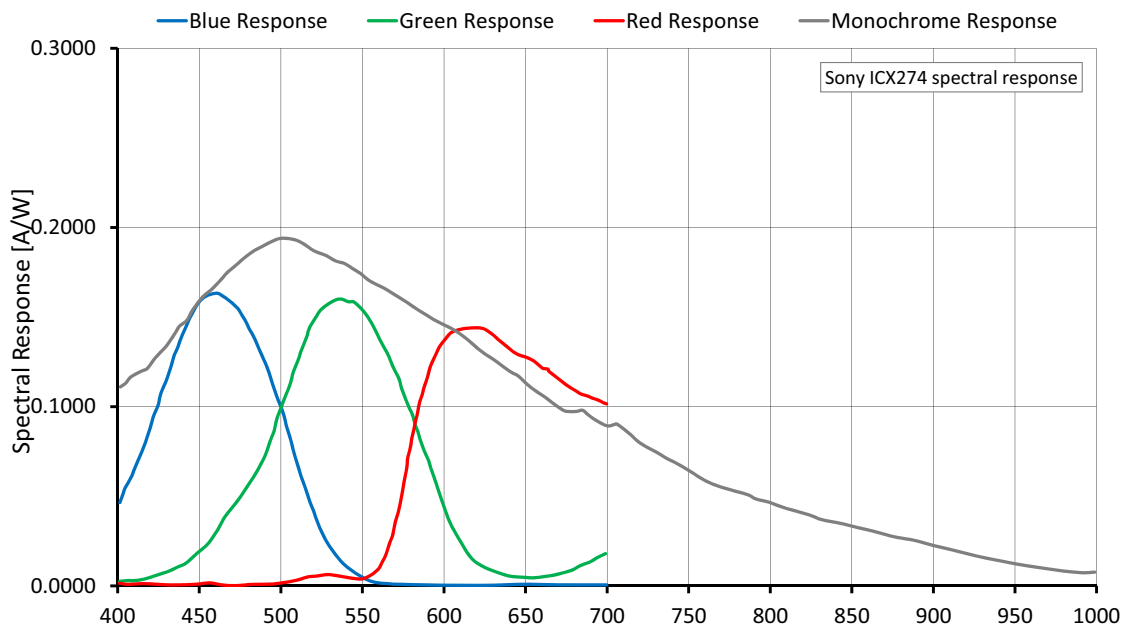*Figure 13: Prosilica GC1600H (Sony ICX274) spectral response*
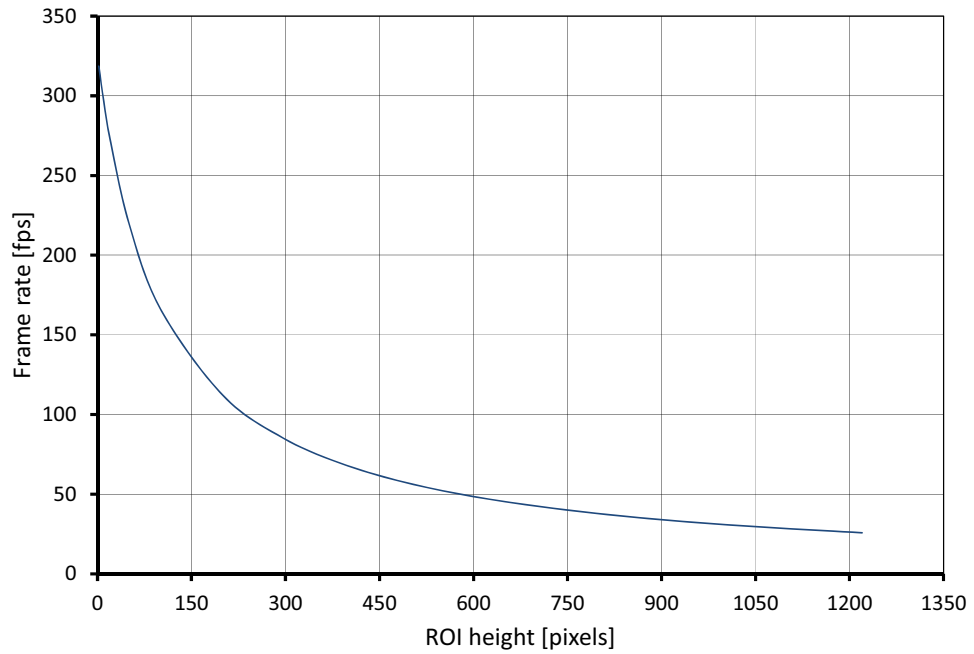
ROI frame rate

Figure 14: Prosilica GC1600H frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1220	25.82	400	67.72
1100	28.39	300	84.42
1000	30.96	200	112.06
900	34.04	100	166.62
800	37.8	50	220.22
700	42.49	20	272.89
600	48.52	10	296.53
500	56.53	2	318.62

Table 16: Frame rate as a function of ROI height (Width=1620 pixels)

Prosilica GC2450 series

The following table provides model series specifications. The values are valid for Prosilica GC2450 and GC24500C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC2450	**Prosilica GC2450C**
Sensor model	Sony ICX625ALA	Sony ICX625AQA
Resolution	2448 (H) × 2050 (V); 5 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 μm × 3.45 μm	
Maximum frame rate at full resolution	15 fps	
A/D	12-bit	
Image buffer	64 MB	
StreamHoldCapacity	Up to 12 frames at full resolution	
Maximum image bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerRG12Packed
Exposure time control	10 μs to 48.0 s; 1 μs increments	
Gain control	0 to 24 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to 14 rows	
Power consumption	3.8 W at 12 VDC	
Trigger latency	0.8 μs for non-isolated I/O; 0.8 μs for isolated I/O	
Trigger jitter	±50 ns for non-isolated I/O; ±50 ns for isolated I/O	
Propagation delay (t_{pd})	20 ns for non-isolated I/O; 1.3 μs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	25 μs
Mass (typical)	106 g	

Table 17: Prosilica GC2450 model series specifications
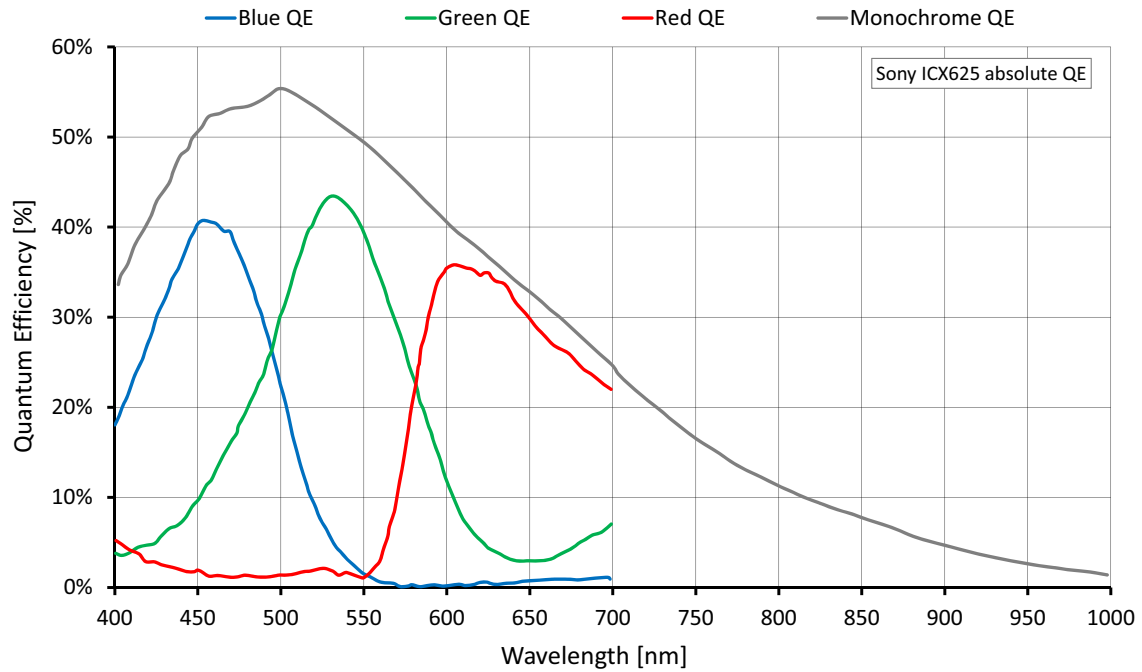
Absolute QE

Figure 15: Prosilica GC2450 (Sony ICX625) absolute QE
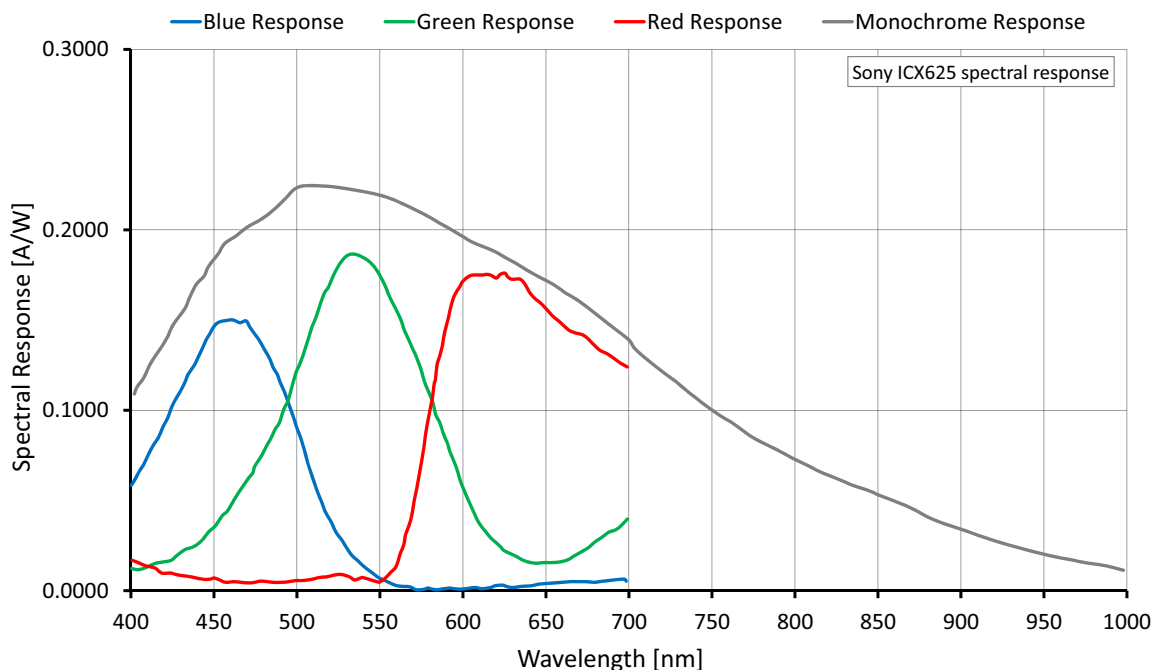
Spectral response

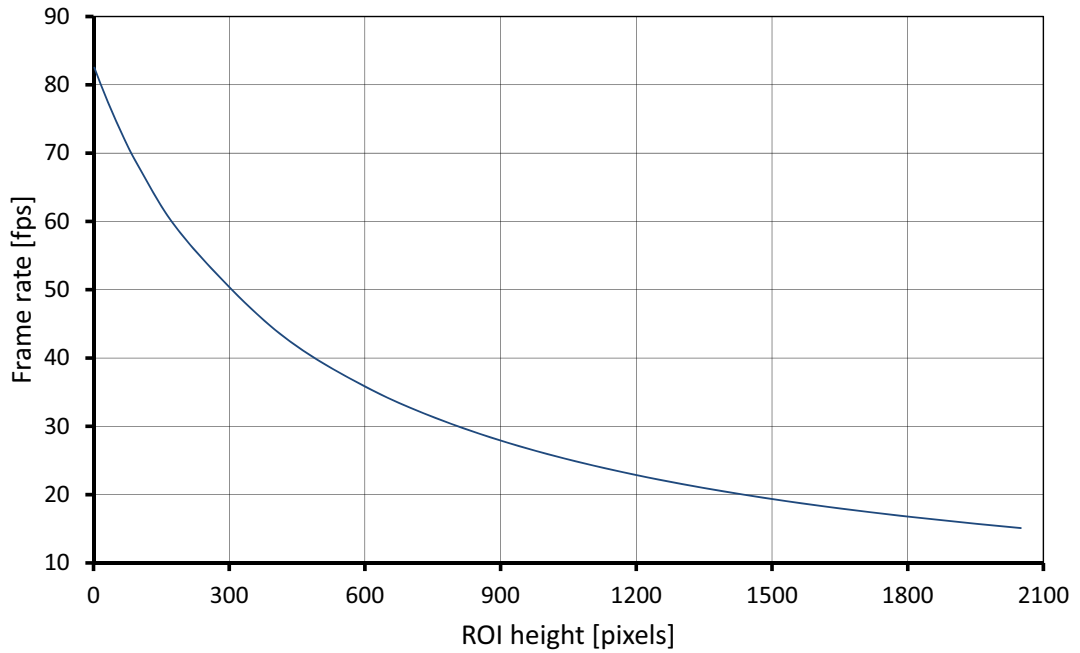*Figure 16: Prosilica GC2450 (Sony ICX625) absolute QE*

ROI frame rate

Figure 17: Prosilica GC2450 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
2050	15.11	600	35.84
2000	15.42	400	44.21
1800	16.79	200	57.66
1600	18.42	100	68
1400	20.4	50	74.7
1200	22.87	20	79.4
1000	26.01	10	81.1
800	30.14	2	82.51

Table 18: Frame rate as a function of ROI height (Width=2448 pixels)

Prosilica GC model frame rate comparison
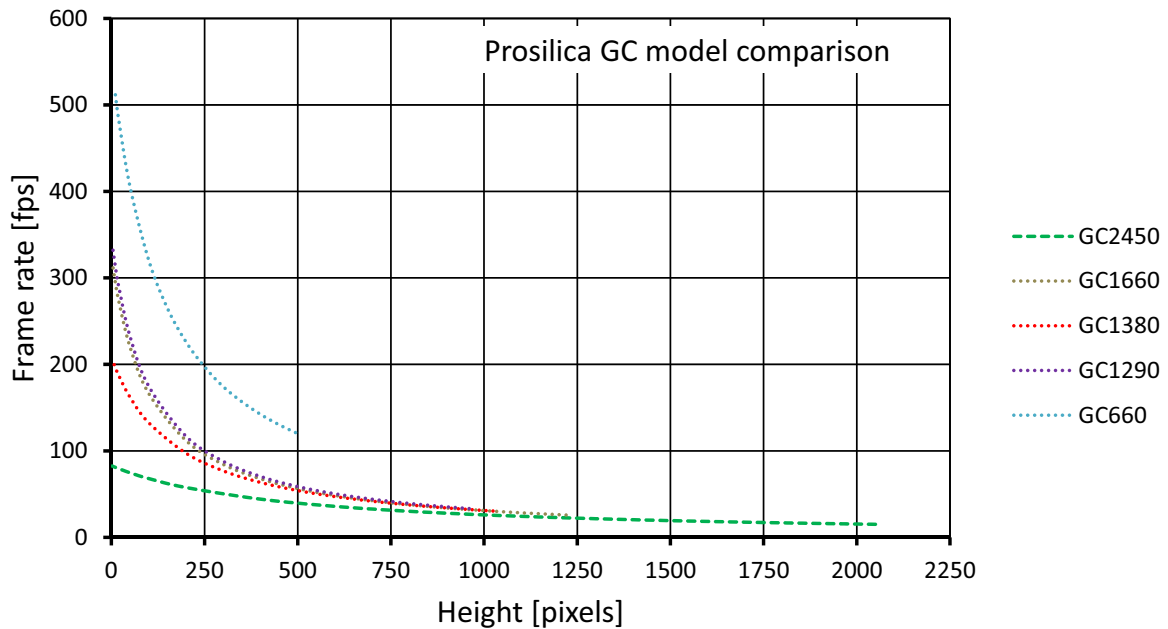
Figure 18: Maximum frame rate comparison for select models

Prosilica GC model comparison

Model series	Sensor	Sensor type	Sensor format	Resolution	Frame rate	StreamHold Capacity
GC660	Sony ICX618	CCD	Type 1/4	658 × 494	121 fps	≤ 194 frames
GC1290	Sony ICX445	CCD	Type 1/3	1280 × 960	33 fps	≤ 52 frames
GC1380H	Sony ICX285	CCD	Type 2/3	1360 × 1024	30 fps	≤ 46 frames
GC1600H	Sony ICX274	CCD	Type 1/1.8	1620 × 1220	25 fps	≤ 33 frames
GC2450	Sony ICX625	CCD	Type 2/3	2448 × 2050	15 fps	≤ 12 frames

Table 19: Prosilica GC model overview

Camera feature highlights

Allied Vision cameras support a number of standard and extended features. The following table identifies a selection of capabilities of the Prosilica GC camera family.

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

Feature	Description
Gain control	Manual and auto
Exposure time control	Manual and auto
White balance	Red and blue channel; manual and auto control
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay	0 to 60* s; 1 µs increments
Fixed rate control	0.001 fps to maximum frame rate
Imaging modes	Free-running, external trigger, fixed rate, software trigger
Sync out modes	Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO
ROI	Independent × and y control with 1 pixel resolution
Multicast	Streaming to multiple computers
Event channel	In-camera events including exposure start and trigger are asynchronously broadcast to the host computer
Image chunk data	Captured images are bundled with feature information such as exposure and gain value
Color matrix	Correct color rendering for specific color temperature
Gamma, hue, and saturation	Adjust image gamma, hue, and saturation
IEEE 1588 Precision Time Protocol (PTP)	Synchronize clocks of multiple cameras using multicast messaging
* May vary depending on the camera model	

Figure 19: Prosilica GC camera and driver feature highlights

Camera feature availability

Allied Vision cameras support a number of standard and extended features. The following table identifies a selection of capabilities and compares the availability of features in Prosilica GC hardware revision D camera models.

A complete listing of camera features, including definitions can be found on the Allied Vision Technical Documentation web page..
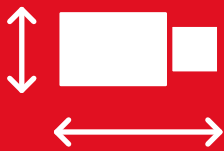
Image optimization features	GC660	GC1290	GC1380H	GC1600H	GC2450
Auto exposure	✓	✓	✓	✓	✓
Auto gain	✓	✓	✓	✓	✓
Auto white balance (color models only)	✓	✓	✓	✓	✓
Binning (Sum)	✓	✓	✓	✓	✓
Black level	✓	✓	✓	✓	✓
Color transformation (incl. hue, saturation; color models)	✓	✓	✓	✓	✓
Gamma	✓	✓	✓	✓	✓
3 LUTs (look-up tables)	✓	✓	✓	✓	✓
ROI (region of interest)	✓	✓	✓	✓	✓

Table 20: Image optimization feature availability by model

Camera control features	GC660	GC1290	GC1380H	GC1600H	GC2450
Event channel	✓	✓	✓	✓	✓
Image chunk data	✓	✓	✓	✓	✓
I/O and trigger control	✓	✓	✓	✓	✓
PTP (IEEE 1588 Precision Time Protocol)	✓	✓	✓	✓	✓
Serial I/Os (RS232)	✓	✓	✓	✓	✓
Stream hold	✓	✓	✓	✓	✓
Temperature monitoring (main board)	✓	✓	✓	✓	✓
3 User sets	✓	✓	✓	✓	✓

Table 21: Camera control feature availability by model

Image data flow

The following diagram illustrates the data flow image data.

Prosilica GC hardware revision D models

[1] Color information is lost when vertical binning is active.
[2] Color pixel formats can be 12 or 14 bits per pixel depending on the pixel format selected. Monochrome and RAW pixel formats can be 8, 12, or 14 bits per pixel depending on the pixel format selected.
[3] The number of bits per pixel varies depending on the pixel format selected.
[4] The output from frame memory to the GigE interface is dependent on the pixel format selected.

Figure 20: Image flow diagram for Prosilica GC (hardware revision D) models

Mechanical dimensions

This chapter includes:

- CAD drawings and dimensions of standard housing models
- Sensor position accuracy
- Maximum protrusion distance and filter diameter for C-Mount and CS-Mount
- Optical filters description

Prosilica GC model housing (C-Mount)

Prosilica GC660, GC1290, GC1380H, C1600H, GC2450
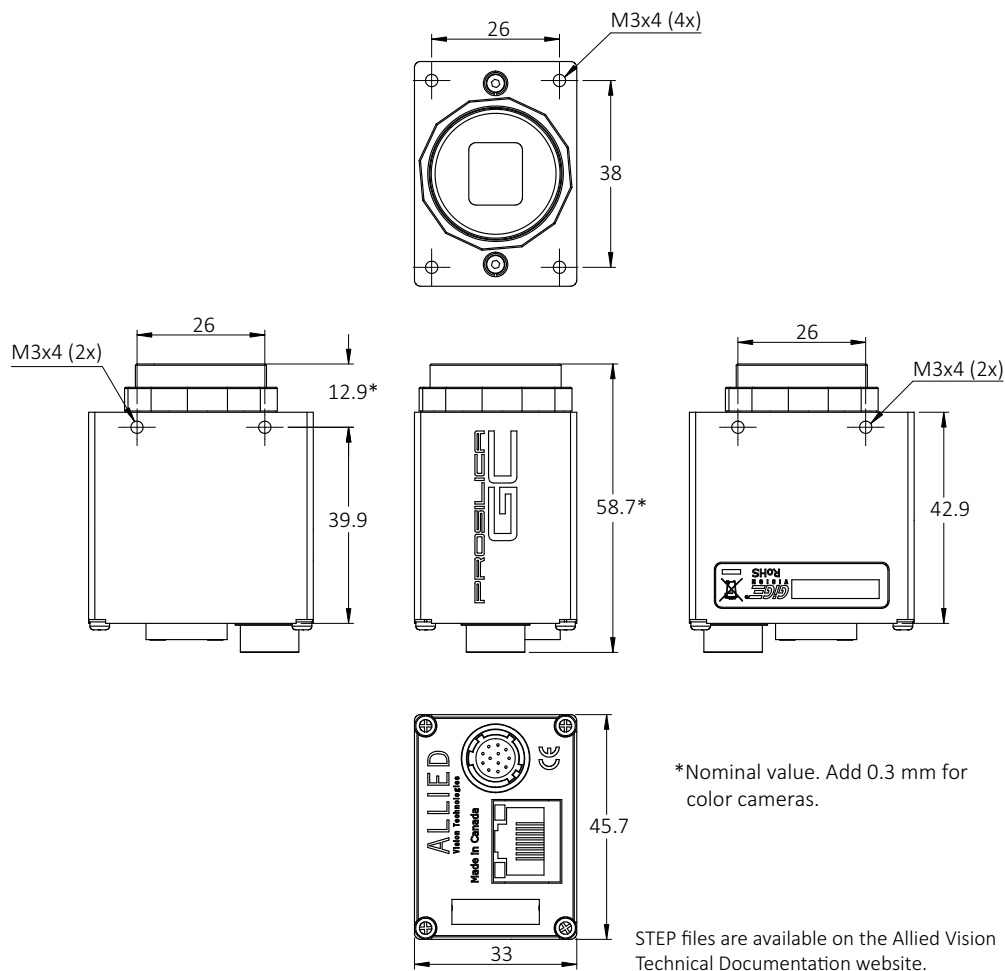
Figure 21: Prosilica GC model housing dimensions

*Nominal value. Add 0.3 mm for color cameras.

STEP files are available on the Allied Vision Technical Documentation website.

Tripod adapter

A Prosilica GC camera can be mounted on a camera tripod by using a mounting plate. The same tripod adapter can be used for all models within the Prosilica GC camera family.

Prosilica GC tripod adapter

Contact your Allied Vision Sales representative or your local Allied Vision distribution partner to purchase the Prosilica GC tripod adapter (Allied Vision order code 02-5002A).
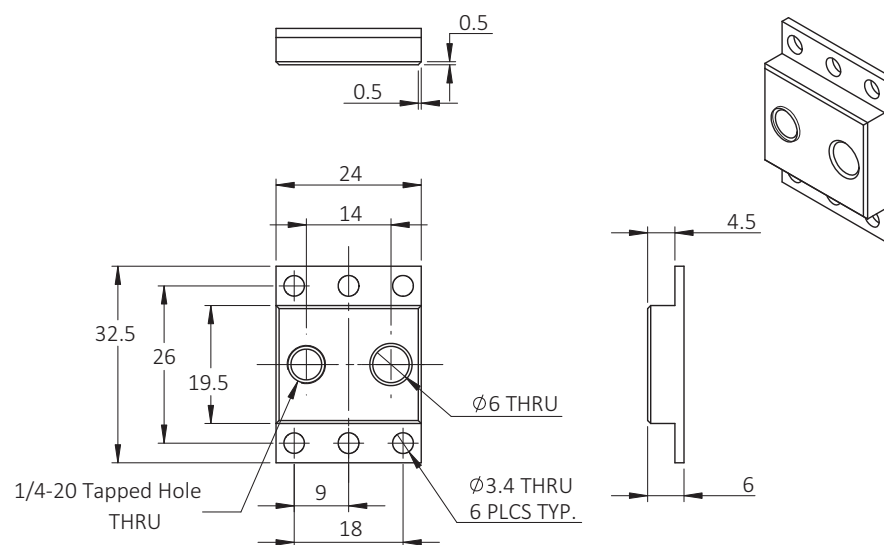
Figure 22: Tripod adapter for Prosilica GC series

Flange focal distance

C-Mount

Flange focal distance is the optical distance from the mounting flange to image sensor die. Prosilica GC C-Mount cameras are optically calibrated to a standard 17.526 mm optical flange focal distance, with a ±10 µm tolerance.

C-Mount

Prosilica GC cameras are shipped with adjustable C-Mount. The camera can also be built with a CS-Mount with a standard 12.50 mm optical flange focal distance and a ± 10 µm tolerance.

Adjustment of C-Mount

The C-Mount is adjusted at the factory and should not require adjusting. If for some reason the lens mount requires adjustment, use the following method.
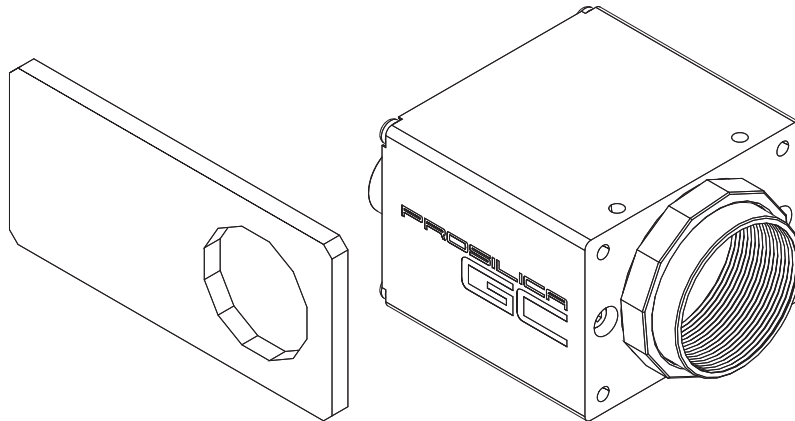
Figure 23: Prosilica GC camera and locking wrench

Loosen the locking ring

Use an adjustable wrench to loosen the locking ring. Be careful not to scratch the camera. When the locking ring is loose, unthread the ring a few turns from the camera face.

Lens tool - adjustment wrench

Contact the Allied Vision Sales team or your local Allied Vision distribution partner to purchase the hexagonal lens adjustment wrench for Prosilica GC cameras with C or CS locking ring (Allied Vision order code 02-5003A).

Adjusting the lens to infinity

Precondition: Use a C-Mount compatible lens that allows an infinity focus

1. Set the lens to infinity and image a distant object (10 to 15 meters). Make sure the lens is firmly threaded onto the C-Mount ring.
2. Rotate the lens and C-Mount ring until the image is focused.
3. Carefully tighten the locking ring and recheck focus.

Lens protrusion for C-Mount cameras

Lens protrusion is the distance from outer edge of C-Mount ring to contact point of first surface internal to C-Mount ring. For color models this surface is the IR-filter holder, and for monochrome models this surface is the internal camera front plate (see Figure 22). Table 20 presents lens protrusion values for Prosilica GC models with C-Mount.

Section A-A for C-Mount monochrome cameras

Section A-A for C-Mount color cameras
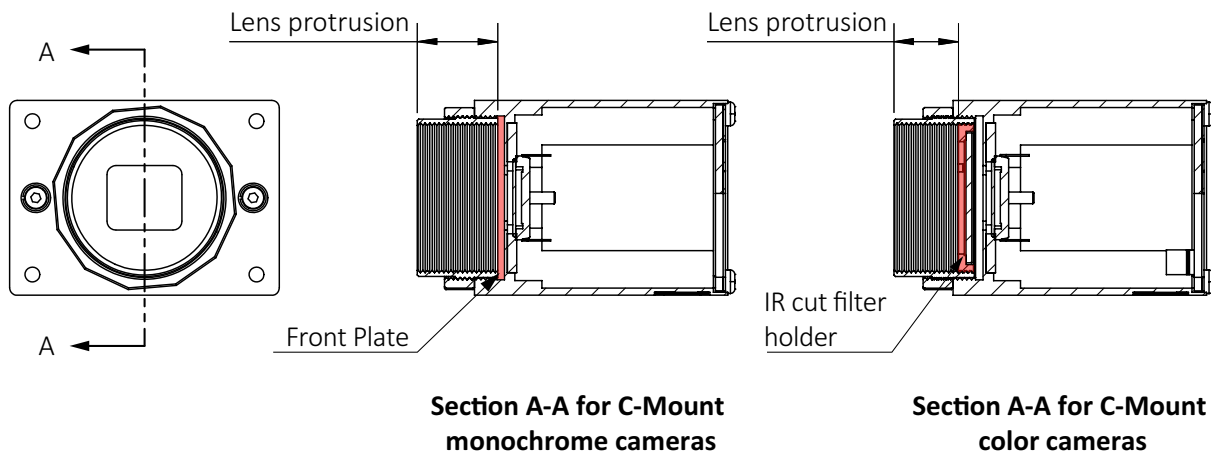
Figure 24: Cross section of typical Prosilica GC assembly with C-Mount

Model	Lens protrusion [mm]
GC660	13.64
GC660C	11.01
GC1290	13.64
GC1290C	12.20
GC1380H	13.64

Model	Lens protrusion [mm]
GC1380CH	8.31
GC1600CH	6.98
GC1600H	13.64
GC2450	13.64
GC2450C	10.93

Table 22: Lens protrusion for Prosilica GC models with C-Mount

Sensor position accuracy
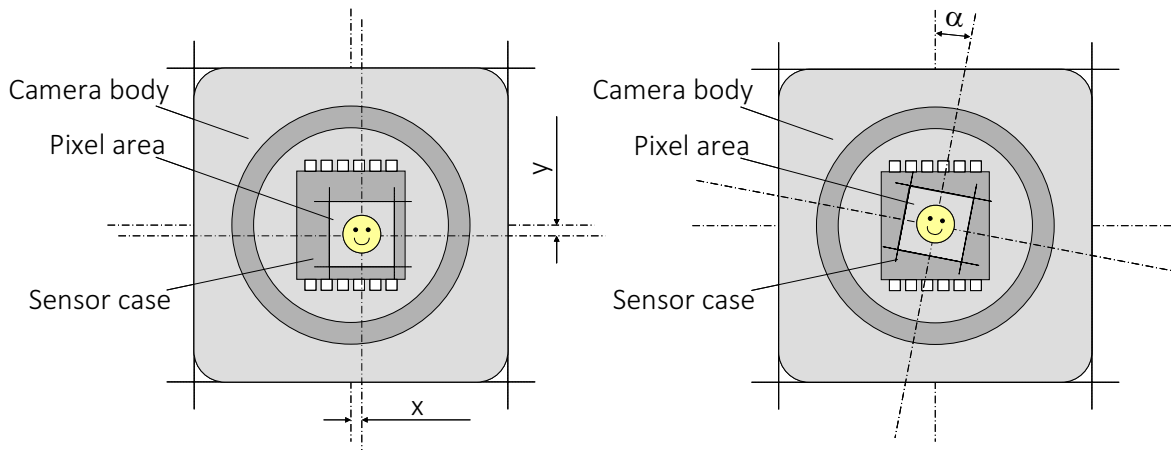
Figure 25: Sensor position accuracy

The following table defines the manufacturing accuracy of fitting sensors into Prosilica GC cameras.

Criteria	Subject	Properties
Reference Point	Sensor	Center of pixel area (photo sensitive cells)
	Camera	Center of camera front flange (outer case edges)
Accuracy	x-axis y-axis	±400 µm (sensor shift)
	z-axis	±10 µm (optical back focal distance)
	α	± 1 degree (sensor rotation)
Alignment method		Optical alignment of photo sensitive sensor area into camera front module (lens mount front flange).

Table 23: Sensor position accuracy criteria

Optical filters

All Prosilica GC color models are equipped with an infrared block filter (IR cut filter). This filter is employed to prevent infrared light from passing to the sensor. In the absence of an IR filter, images are dominated by red and incapable of being properly color balanced. Monochrome models don't employ an IR cut filter.

The following figure shows the filter transmission response for the Type IRC30 IR cut filter and the optional protection glass. Values may vary slightly by filter lot.
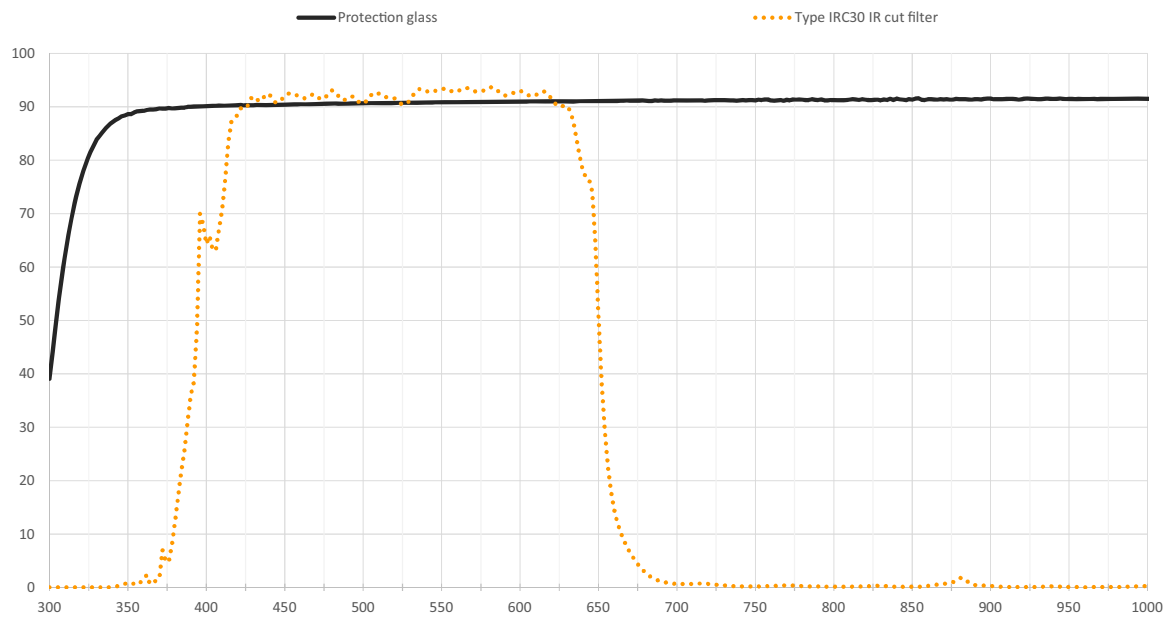
Figure 26: IR cut filter transmission response (exemplary curves)

Camera interfaces
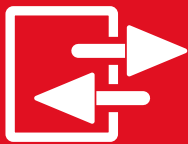
This chapter includes:

- A general description of the inputs and outputs (including trigger features)
- I/O connector pin assignments
- I/O block diagrams
- A general description of trigger rules such as timing diagram and definitions

Back panel

This section provides information on GigE port, inputs and outputs, and trigger features.
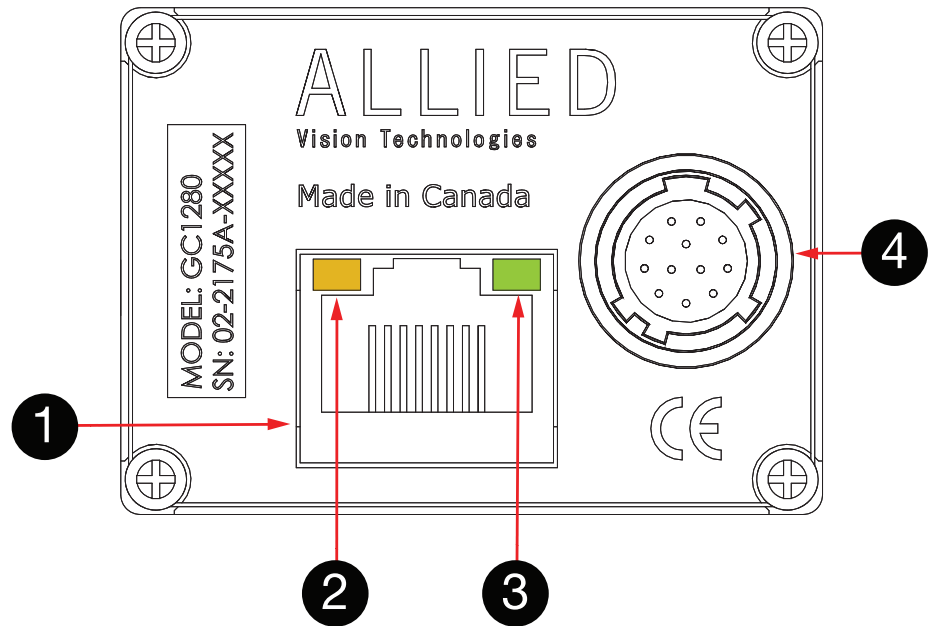
Figure 27: Prosilica GC GigE port, Hirose I/O port, and LEDs

1	GigE port
2	LED1
3	LED2
4	Hirose I/O port

Status LEDs

The color of the LEDs has the following meaning.

	LED color	Status
LED1	Flashing orange or solid orange	Ethernet activity
LED2	Flashing green	Camera is powered
	Solid green	Camera is booted, and link with the host is established

Table 24: Status of LEDs

Once the camera is booted, **LED2** remains solid green as long as the camera is powered, even if connection with the host is lost.

GigE port

The GigE port conforms to the IEEE 802.3 1000BASE-T standard for GigE over copper. Allied Vision recommends using Category 6 or higher compatible cabling and connectors for best performance.

See the Hardware Selection for Allied Vision GigE Cameras application note for a list of recommended Ethernet adapters.

A standard NIC is available for purchase from Allied Vision:
Order code: 02-3002A
Model: Intel Pro 1000/PT

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).

Allied Vision recommends using locking-screw cables from Components Express, Inc. for a perfect fit. Visit the CEI product configurator to customize the cable according to your needs.

Camera I/O connector pin assignment
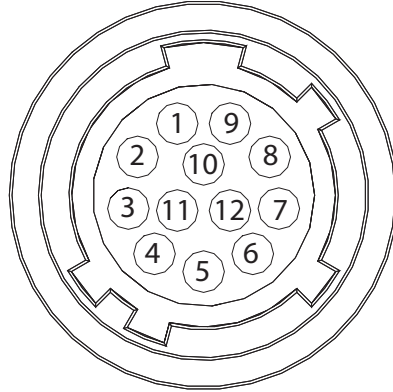
Camera side Hirose HR10A-10R-12PB connector					I/O cable color code
Pin	**Signal**	**Direction**	**Level**	**Description**	
1	Camera GND	In	Not applicable	Ground for external camera power supply	Blue
2	Camera Power	In	5 to 25 VDC	Camera power supply	Red
3	In 1	In	U_{in}(high) = 5 to 24 V U_{in}(low) = 0 to 0.8 V	Input 1 opto-isolated (SyncIn1)	Pink
4	Out 1	Out	Open emitter max. 20 mA	Output 1 opto-isolated (SyncOut1)	Gray
5	Isolated IO GND	In/Out	Not applicable	Isolated input and output signal ground (Common GND)	Yellow
6	Video iris	Out	Not applicable	PWM signal for iris control	Green
7	Reserved	Not applicable	Not applicable	Not applicable	Brown
8	TxD RS232	Out	RS232	Terminal transmit data	White
9	RxD RS232	In	RS232	Terminal receive data	Black
10	Signal GND	Not applicable	Not applicable	Ground for RS232 and non-isolated IO	Orange
11	In 2	In	LVTTL maximum 3.3 V	Input 2 non-isolated (SyncIn2)	White and Black
12	Out 2	Out	LVTTL maximum 3.3 V	Output 2 non-isolated (SyncOut2)	White and Brown

Table 25: I/O connector pin assignment and I/O cable color coding

The GPIO port uses a Hirose HR10A-10R-12PB connector on the camera side. The mating cable connector is Hirose HR10A-10P-12S.

The cable side Hirose connector is available for purchase from Allied Vision (Allied Vision order code K7600040).

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
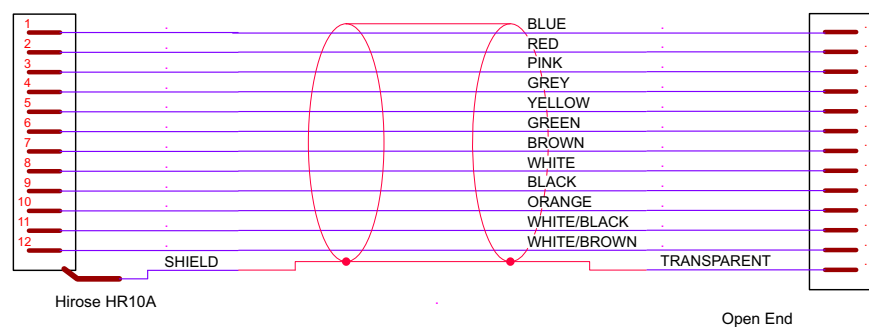

Figure 28: Prosilica GC cable color coding

I/O definition

Camera power

The Prosilica GC camera family has recently been updated to offer an expanded input power voltage range. The camera serial number is used to differentiate between cameras that offer 5 to 16 VDC and those that offer 5 to 25 VDC.

NOTICE

Input power voltage range

- Serial number: 02-XXXXX-06000 to 02-XXXXX-07999: 5 to 16 V. 12 V nominal.
- Serial number: ≥ 02-XXXXX-08XXX: 5 to 25 V. 12 V nominal

For more information on the power voltage range update for the Prosilica GC family, see the Prosilica GC Power Voltage Specification Update application note:

www.alliedvision.com/en/support/faqs-application-notes

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)

Isolated IO ground

The Isolated IO GND connection provides the user ground reference and return path for In 1, and Out 1. It is recommended that the ground wiring be physically close to the I/O wiring to prevent parasitic coupling. For example, a good cable design connects In 1 to one conductor of a twisted pair, Isolated IO GND to the second conductor of the same twisted pair.

RxD RS232 and TxD RS232

These signals are RS232 compatible. These signals are not optically isolated. Tie RS232 ground to Signal GND to complete the RS232 circuit.

For complete RS232 description and usage, see the RS232 Port GigE Cameras application note:

www.alliedvision.com/en/support/faqs-application-notes

Input triggers

Input triggers allow the camera to be synchronized to an external event. The camera can be programmed to trigger on the rising edge, falling edge, both edges, or level of the signal. The camera can also be programmed to capture an image at some programmable delay time after the trigger event.

In 1 (opto-isolated)

In 1 is optically isolated and can be used in electrically noisy environments to prevent false trigger events. Tie trigger ground to Isolated IO GND to complete the trigger circuit. Compared to the non-isolated trigger, In 1 has a longer propagation time. It can be driven from 5 to 24 Volts with a minimum current source of 10 mA. See Camera I/O opto-isolated user circuit example for wiring information.

In 2 (non-isolated)

In 2 is not electrically isolated and can be used when environmental noise is inconsequential and faster trigger response is required. The required trigger signal is low voltage TTL 3.3 Volts. Tie trigger ground to Signal GND to complete the trigger circuit. See Camera I/O non-isolated user circuit example for wiring information.

NOTICE

Input voltage limit

Exceeding 5.1 Volts on In 2 can permanently damage the camera.

Output signals

Output signals can be assigned to a variety of internal camera signals via software. They can be configured to active high or active low. The internal camera signals are listed as follows:

Exposing	Corresponds to when camera is integrating light.
Trigger Ready	Indicates when the camera is ready to accept a trigger signal.
Trigger Input	A relay of the trigger input signal used to daisy chain the trigger signal for multiple cameras.
Readout	Valid when camera is reading out data.
Imaging	Valid when camera is exposing or reading out.
Strobe	Programmable pulse based on one of the previously listed events.
GPO	User programmable binary output.

Out 1 (opto-isolated)

Out 1 signal is optically isolated and requires a user voltage with a suitable pull up resistor. Tie signal ground to Isolated IO GND to complete the external circuit. See the Camera I/O opto-isolated user circuit example for wiring information.

Out 2 (non-isolated)

Out 2 signal is not electrically isolated and can be used when environmental electrical noise is inconsequential and faster trigger response is required. Use Signal GND to complete the external circuit. The output signal is a low voltage TTL, maximum 3.3 Volts. Not suitable for driving loads in excess of 24 mA. See the Camera I/O opto-isolated user circuit example for wiring information.

Signal ground

Signal Ground must be connected to the user's external circuit ground if In 2 or Out 2 is to be used, or if the RS232 port is to be used. Note that Signal Ground is common with Camera GND; however, it is good practice to provide a separate ground connection for power and signal.

Video iris

This signal can be used to drive the video input of a video iris lens. See the Video iris output section for wiring information.

Reserved

These signals are reserved for future use and should be left disconnected.

Video iris output

Prosilica GC cameras provide built-in auto iris controls for controlling video-type auto-iris lenses. These lenses are available from many popular security lens companies including Pentax, Fujinon, Tamron, and Schneider.

Remote iris lens control allows the camera to be more adaptable to changing light conditions. It allows the user to manually control the exposure and gain values and rely solely on the auto iris for adjustment to ambient lighting.

NOTICE

The following schematic uses CAMERA POWER to power the video iris lens, and assumes CAMERA POWER = 12 Volts. Most video iris lenses operate at a 8 to 16 Volts input voltage. Therefore, this circuit is not appropriate if using a 24 Volts camera power supply. Doing so may irreparably damage your lens. Consult your video iris lens specifications for the appropriate drive voltage.
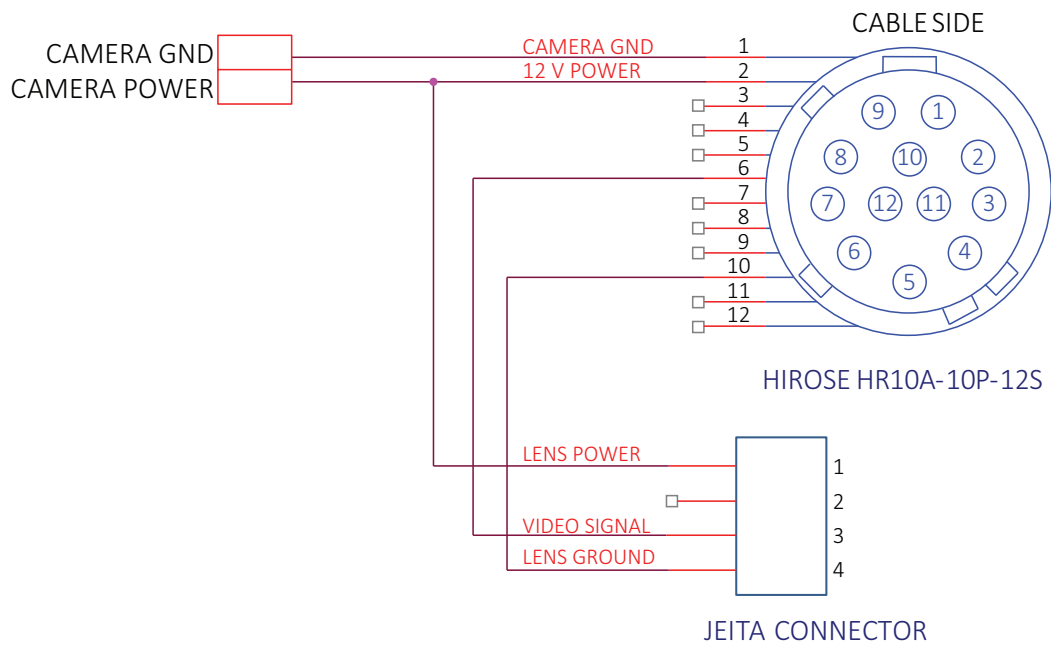
Figure 29: Prosilica GC video iris schematic

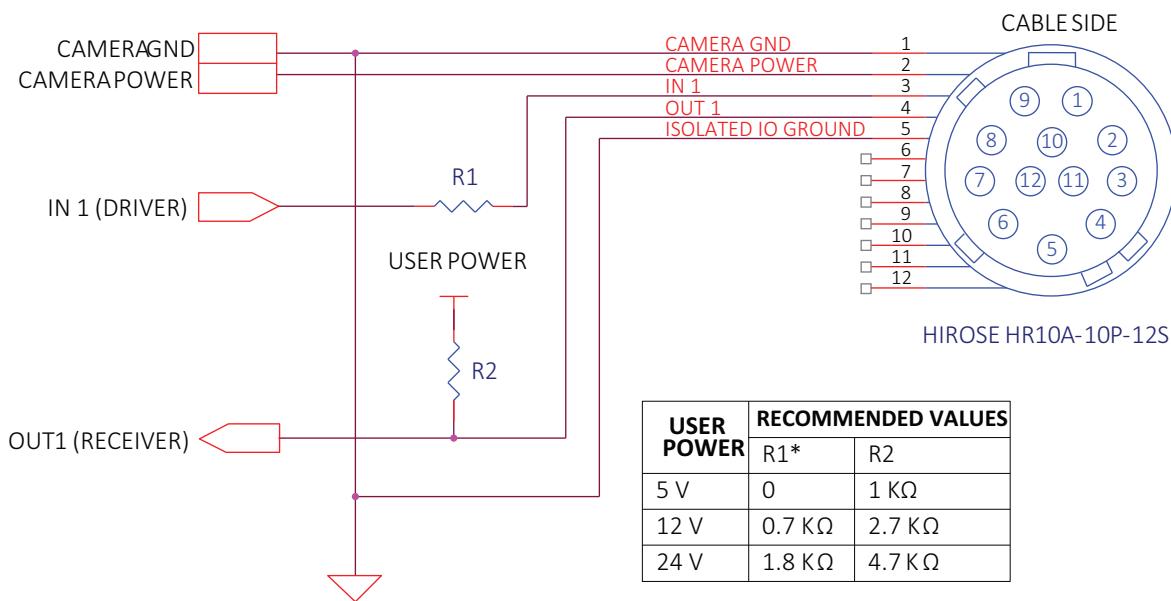# Camera trigger

Camera I/O opto-isolated user circuit example

Figure 30: Prosilica GC opto-isolated user circuit

USER POWER	RECOMMENDED VALUES	
	R1*	R2
5 V	0	1 KΩ
12 V	0.7 KΩ	2.7 KΩ
24 V	1.8 KΩ	4.7 KΩ

*Cameras with serial number: 02-XXXXX-0XXXX, R1 necessary for input greater than 5 Volts. Cameras with serial number: 02-XXXXX-1XXXX, no R1 necessary, 5 to 24 Volts.

NOTICE

Input: Incoming trigger must be able to source 10 mA.

Output: User power, with pull-up resistor R2 is required.

Isolated output is connected to the open collector of Fairchild MOCD207. The corresponding transistor emitter is connected to isolated ground. See the Fairchild MOCD207 data sheet for more detailed information.

Camera I/O non-isolated user circuit example
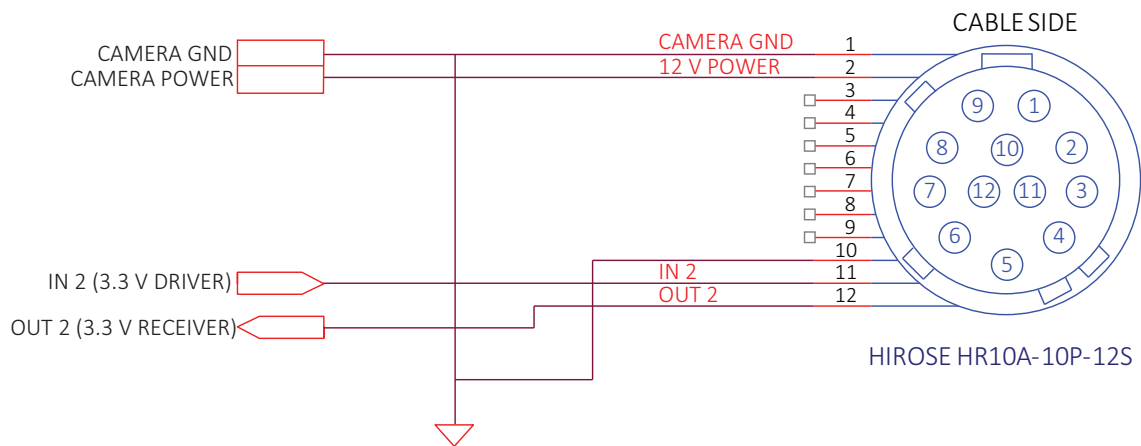
Figure 31: Prosilica GC non-isolated user circuit

NOTICE
Input: Incoming trigger must be able to source 10 µA, at 3.3 Volts. Input trigger voltage greater than 5.5 Volts will damage the camera.
Output: The maximum sync output current is 24 mA, at 3.3 Volts.

The non-isolated trigger circuit is connected to a Texas Instruments SN74LVC2G241 buffer and driver inside the camera. See the Texas Instruments SN74LVC2G241 for more detailed information.

Trigger timing diagram
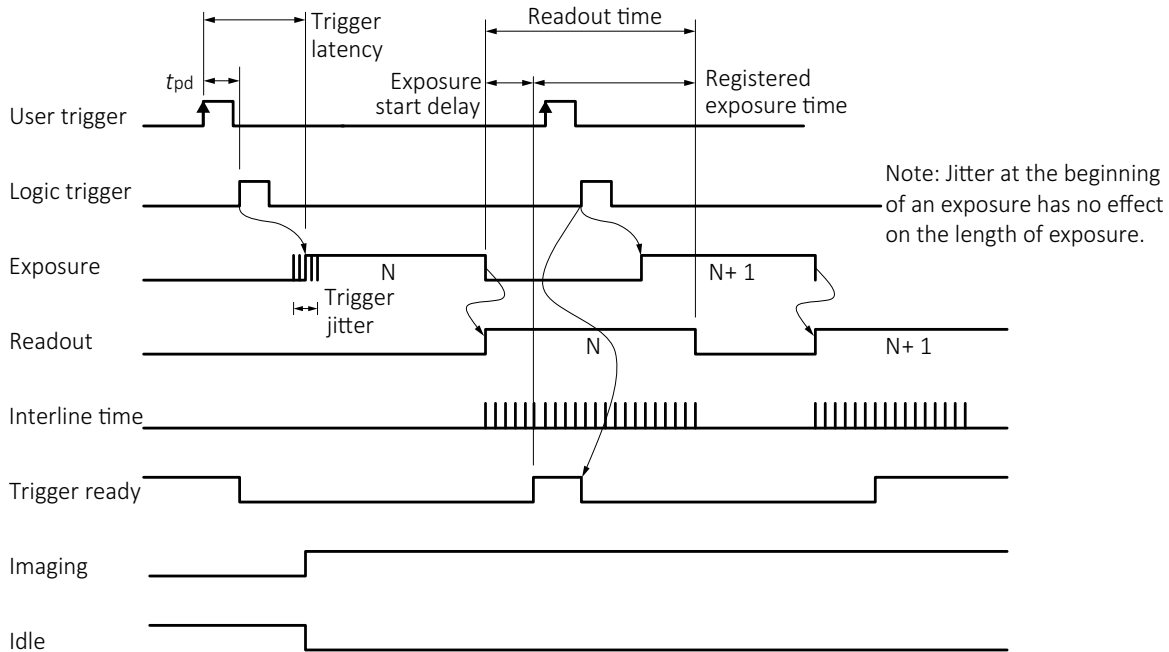
Figure 32: Prosilica GC internal signal timing waveform

Notes on triggering

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

Table 26: Explanation of signals in timing diagram

Trigger rules

The user trigger pulse width should be at least three times the width of the trigger latency as indicated in Specifications.

- The end of exposure will always trigger the next readout.
- The end of exposure must always end after the current readout.
- The start of exposure must always correspond with the interline time if readout is true.
- Exposure start delay equals the readout time minus the registered exposure time.

Triggering during the idle state

For applications requiring the shortest possible Trigger Latency and the smallest possible Trigger Jitter the User Trigger signal should be applied when Imaging is false and Idle is true. In this case, Trigger Latency and Trigger Jitter are as indicated in the camera Specifications section.

Triggering during the readout state

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, apply the User Trigger signal as soon as a valid Trigger Ready is detected. In this case, Trigger Latency and Trigger Jitter can be up to one row 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:

www.alliedvision.com/en/support/faqs-application-notes

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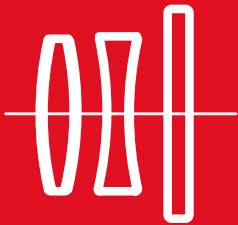
This chapter describes safety instructions and cautions for cleaning lenses, optical filters, protection glass, or sensors.

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

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

Keep optical components clean

The best way to ensure the camera remains clean is to avoid penetration of foreign substances into the camera.

When screwing or unscrewing the camera lens or dust cap, hold the camera with the 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.

Identifying impurities

If you observe any image artifacts in your video preview of your Prosilica GC camera you may have impurities either on the lens, filter or protection glass, or on the sensor protection glass. Every Prosilica GC 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.
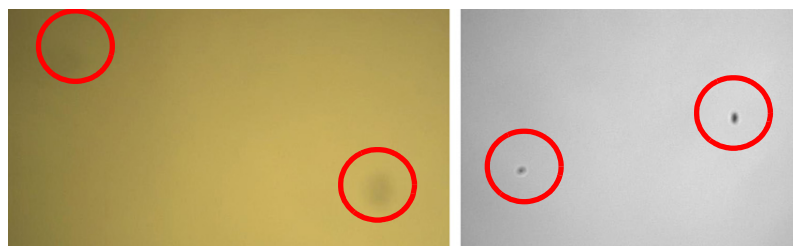

Figure 33: : Image with tiny dust on the filter (left) and dust on the sensor (right)

Locating impurities

Before you dismount the lens you should find out if the impurity is on the filter, lens, or sensor.

1. Start acquiring a uniform image (for example, a white sheet of paper) with the camera.
2. To identify the affected surface, move the suspected optical component and see if the contamination follows this movement.
   a. If you move only the lens (not the camera) and the impurity moves as well, the impurity is on the lens.
   b. If you move the IR cut filter 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. If the impurity is neither on the lens nor the IR cut filter or protection glass, it is probably on the sensor.

NOTICE

A pin spanner wrench (Allied Vision order code: E9020001) suitable for IR filter removal is available for purchase from Allied Vision for all Prosilica GC cameras.

Materials for cleaning optical components

Use only these cleaning materials for optical components:
- Optic approved lens cotton, cloth, or tissue that is chemically pure and free from silicones and other additives.
- Optic approved low residue cleaning liquid.

NOTICE

Never use these cleaning materials for optical components:
- Dry swabs or tissue may cause scratches.
- Metal tools may cause scratches.
- Disposable cotton cosmetic swabs may contain contaminants harmful to optical glass.
- Cosmetic cotton my cause scratches or get caught in small gaps.
- Consumer eyeglass cleaning cloths may be pretreated with silicone harmful to optical glass.
- Aggressive cleaners like benzine, acetone, or spirits may damage the surface.

Optical cleaning liquid material safety data sheets

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

Cleaning Instructions

Workplace conditions:

- Perform all cleaning operations (lenses, filter or protection glass, and sensor) in a dust-free clean-room.
- Avoid touching the optical components with your fingers or any hard material.
- Nitrile cleanroom gloves or powder free latex gloves are recommended to maintain low particulate levels.
- Use an ESD mat to prevent damage from an electrostatic discharge.

1. Unplug the camera from any power supply before cleaning.
2. Apply a small amount of cleaning liquid to a new lens cleaning cotton, cloth, or tissue. The cotton, cloth, or lens tissue should be moist, but not dripping.

3. Hold the camera sensor diagonally upwards. Ensure that the camera is away from your body to prevent particles like skin flakes from falling on the sensor.
4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.
5. When you have finished cleaning, examine the surface in a strong light. Take an out-of-focus picture of a flat, illuminated surface to see if any dirt or dust remains.
6. If dust spots remain, repeat this procedure using new clean lens tissue (as described).

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 or Allied Vision support.

Cleaning with compressed air

Allied Vision does not recommend cleaning Prosilica GC cameras with compressed air.

NOTICE
• 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 should be less than 1 bar (15 psi).
- Operating distance from the camera should be 5 to 30 cm.

Firmware update

This chapter includes instructions on updating the firmware on your Allied Vision Prosilica GC camera.

Saved camera user sets

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

Before loading new firmware, backup your current camera settings.

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

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

NOTICE

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

To update the firmware on your Allied Vision GigE camera

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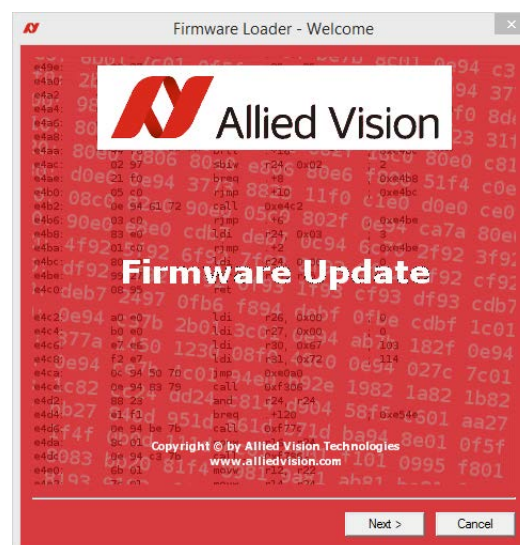
Step 2:   Click **Next**. The *Firmware Loader* displays a list of firmware included in the package.
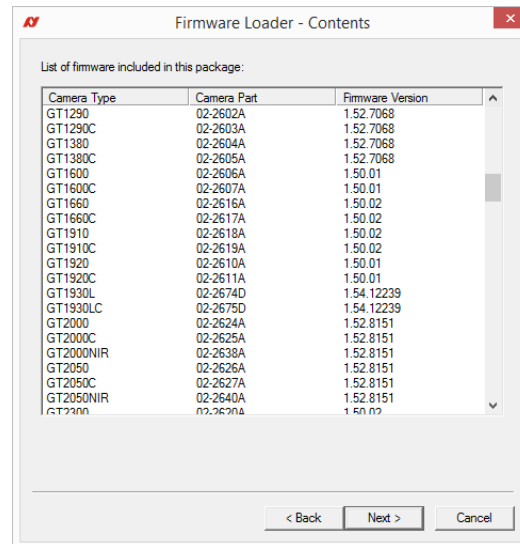
Step 3:   Click **Next**. You can select your camera model on this page.
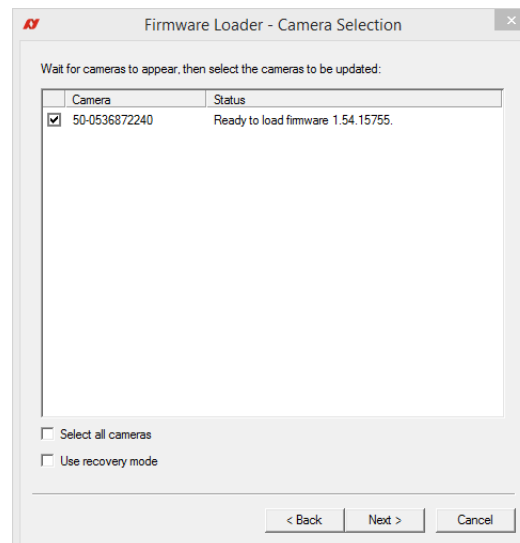
Recovery Mode

Select the **Use recovery mode** check box if the connected GigE camera is not found by the firmware loader, or if the GigE camera is listed as unavailable. When selected, power cycle the camera to enter the **Boot Loader** mode.
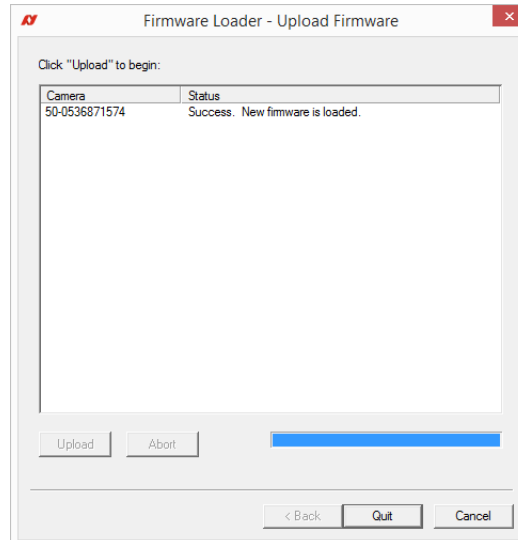
Step 4:   Click **Next**.
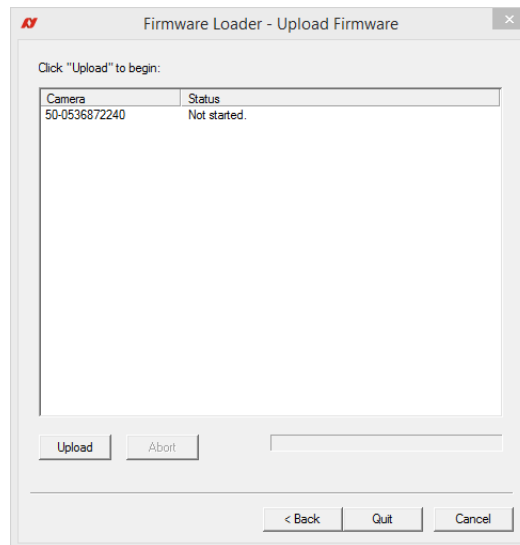
Step 5:   Click **Upload** to start the update. The existing firmware will be erased and the new firmware will be updated to the camera.
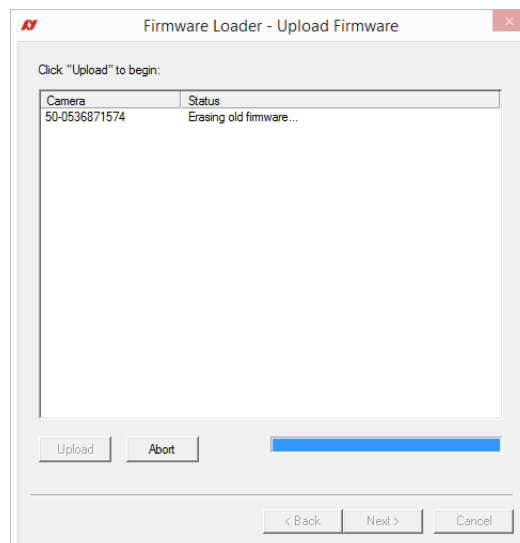
Step 6: The *Firmware Loader* will display a success status upon completion. Click **Quit** to exit the loader.

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

Appendix

The appendix includes the following information for older Prosilica GC cameras up to serial number 02-21XXA (hardware revision A):

- Specification tables
- Absolute QE plots
- Spectral response plots (selected models)
- ROI frame rate plots
- Camera feature availability of hardware version A models
- Image data flow diagrams
- Mechanical dimensions

Specifications common to all models

Feature	Specification
Default lens mount	C-Mount
Optional lens mount	CS-Mount
Default optical filter	• Monochrome models: No filter • Color models: Type IRC30 IR cut filter
Optional optical filters	• Type IRC30 IR cut filter • Protection glass
TTL (non-isolated) I/Os	1 input, 1 output
Opto-isolated I/Os	1 input, 1 output
RS232	1
Operating temperature	0 °C to +50 °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	• 5 to 16 VDC: Cameras with serial number 02-XXXXX-06000 to 02-XXXXX-07999 • 5 to 25 VDC: Cameras with serial number ≥ 02-XXXXX-08XXX
Interface standards	• IEEE 802.3 1000BASE-T (GigE) • GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1
Camera dimensions[1] (L × W × H)	• Monochrome models: 58.7 × 45.7 × 33 mm • Color models: 59 × 45.7 × 33 mm

[1] The Prosilica GC family offers both CCD and CMOS sensor models. CCD cameras utilize additional circuitry required for A/D conversion. As a result, CMOS models offer a shorter mechanical package than CCD models (50.6 × 45.7 × 33 mm).

Table 27: Specifications common to all Prosilica GC hardware revision A models

Prosilica GC650 series

The following table provides model series specifications. The values are valid for Prosilica GC650 (02-2110A) and GC650C (02-2111A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC650	**Prosilica GC650C**
Sensor model	Sony ICX424AL	Sony ICX424AQ
Resolution	659 (H) × 493 (V); 0.3 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/3	
Sensor size	6 mm diagonal	
Pixel size	7.4 µm × 7.4 µm	
Maximum frame rate at full resolution	90 fps	
Maximum image bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	16 MB	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Gain control	0 to 19 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Power consumption	3.3 W at 12 VDC	
Trigger latency	1.0 µs for non-isolated I/O; 2.8 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	121 µs
Mass (typical)	104 g	

Table 28: Prosilica GC650 model series specifications
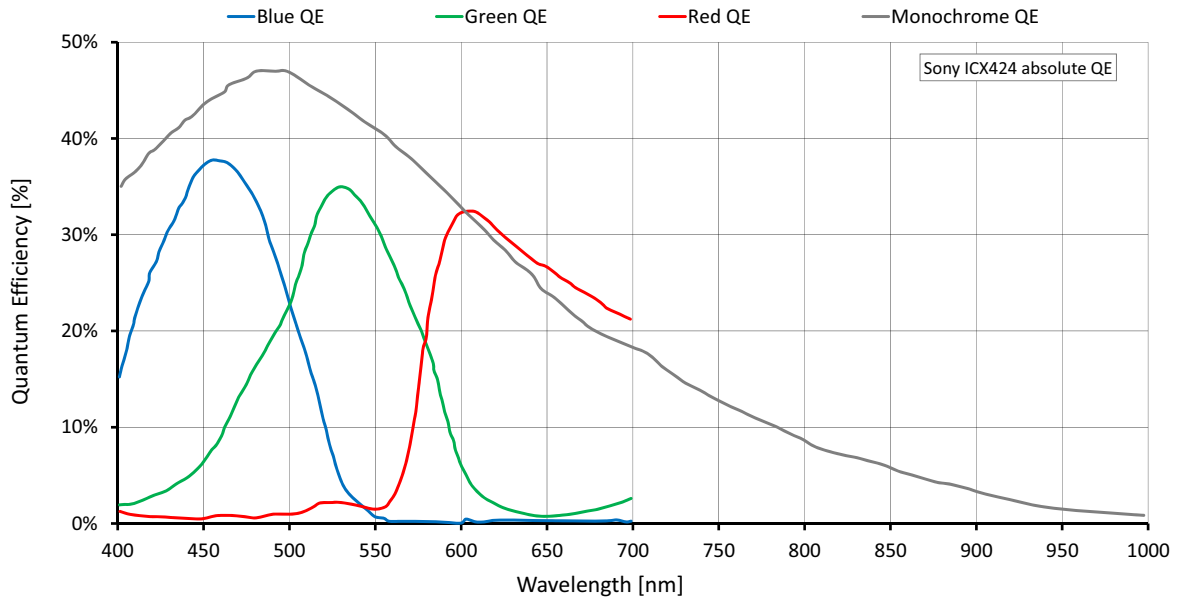
Absolute QE

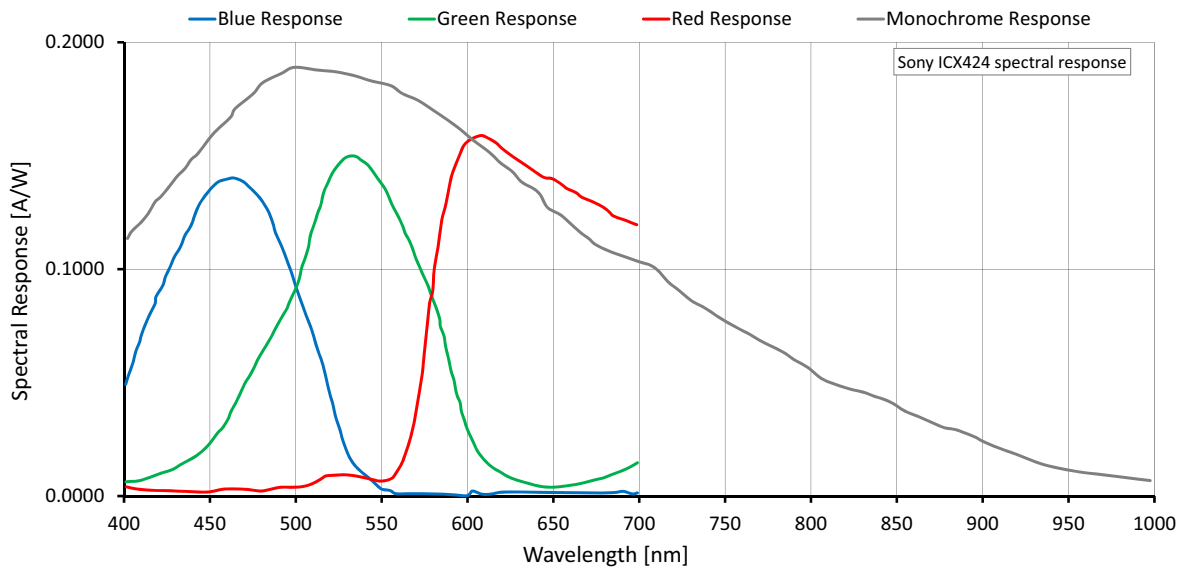*Figure 34: Prosilica GC650 (Sony ICX424) absolute QE*

Spectral response

Figure 35: Prosilica GC650 (Sony ICX424) spectral response

ROI frame rate

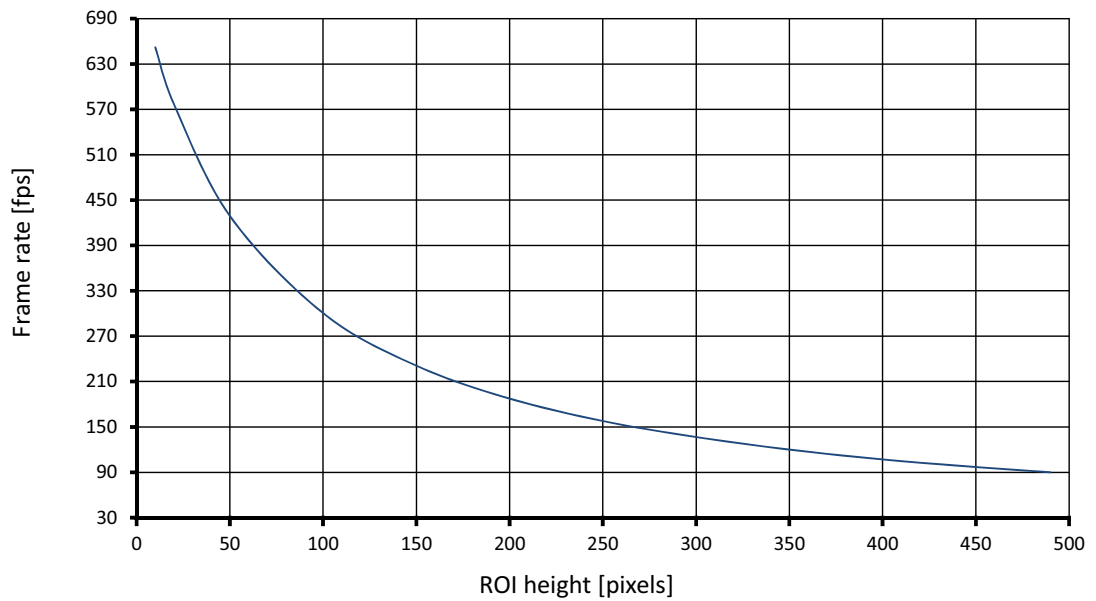$$\text{Frame rate} \;=\; \frac{1}{19{,}94 \; \mu s \times \text{Height} + 1224{,}13 \; \mu s}$$

Figure 36: Prosilica GC650 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
490	90.0	200	187.5
450	97.0	150	231.0
400	107.0	100	300.4
350	120.0	50	428.9
300	136.6	20	577.0
250	157.8	10	652.0

Table 29: Frame rate as a function of ROI height (Width=659 pixels)

Prosilica GC655 series

The following table provides model series specifications. The values are valid for Prosilica GC655 (02-2115A) and GC655C (02-2116A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC655	**Prosilica GC655C**
Sensor model	Sony ICX414AL	Sony ICX414AQ
Resolution	659 (H) × 493 (V); 0.3 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	9.9 µm × 9.9 µm	
Maximum frame rate at full resolution	90 fps	
Maximum image bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	16 MB	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Gain control	0 to 22 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Power consumption	3.0 W at 12 VDC	
Trigger latency	1.0 µs for non-isolated I/O; 2.8 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	121 µs
Mass (typical)	105 g	

Table 30: Prosilica GC655 model series specifications

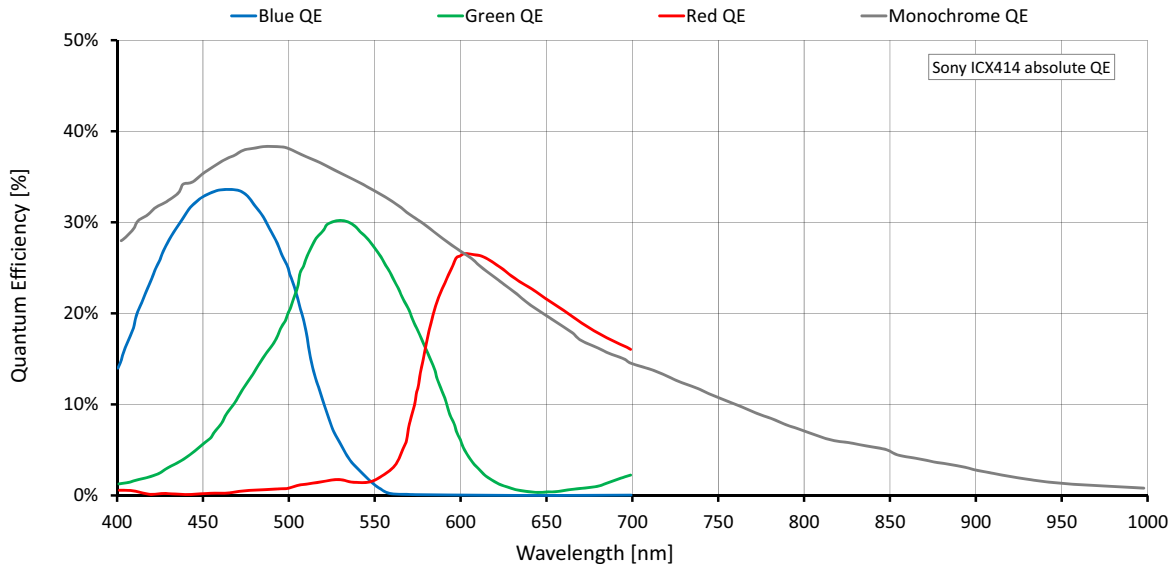Allied Vision

Absolute QE

Figure 37: Prosilica GC655 (Sony ICX414) absolute QE

Spectral response

Figure 38: Prosilica GC655 (Sony ICX414) spectral response

ROI frame rate

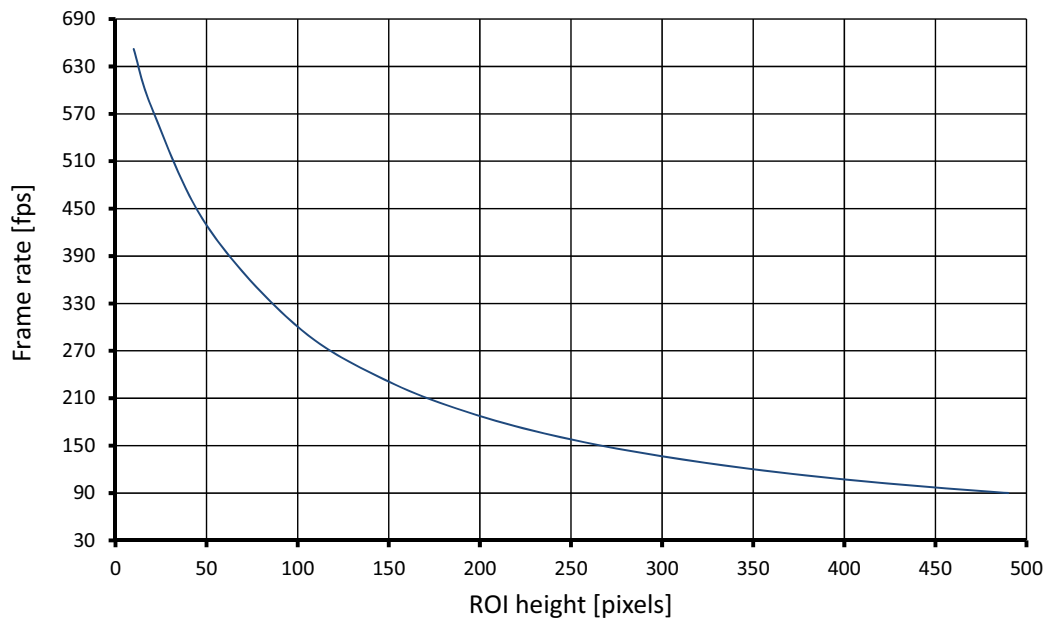$$\text{Frame rate} = \frac{1}{19{,}94 \text{ µs} \times \text{Height} + 1224{,}14 \text{ µs}}$$

Figure 39: Prosilica GC655 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
490	90.0	200	187.5
450	97.0	150	231.0
400	107.2	100	300.4
350	120.1	50	428.9
300	136.6	20	577.0
250	157.8	10	652.0

Table 31: Frame rate as a function of ROI height (Width=659 pixels)

Prosilica GC750 series

The following table provides model series specifications. The values are valid for Prosilica GC750 (02-2160A) and GC750C (02-2161A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC750	**Prosilica GC750C**
Sensor model	ON Semi MT9V022	
Resolution	752 (H) × 480 (V); 0.4 MP	
Sensor type	CMOS	
Shutter type	Global	
Sensor format	Type 1/3	
Sensor size	5.35 mm diagonal	
Pixel size	6 μm × 6 μm	
Maximum frame rate at full resolution	67 fps	
Maximum image bit depth	8-bit, 10-bit	
A/D	10-bit	
Image buffer	16 MB	
Monochrome pixel formats	Mono8, Mono10	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	Not applicable	BayerBG8, BayerBG10
Exposure time control	30 μs to 60 s; 1 μs increments	
Gain control	0 to 48 dB	
Power consumption	2.2 W at 12 VDC	
Trigger latency	31 μs for non-isolated I/O; 43 μs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 μs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 μs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	91 μs
Mass (typical)	85 g	

Table 32: Prosilica GC750 model series specifications
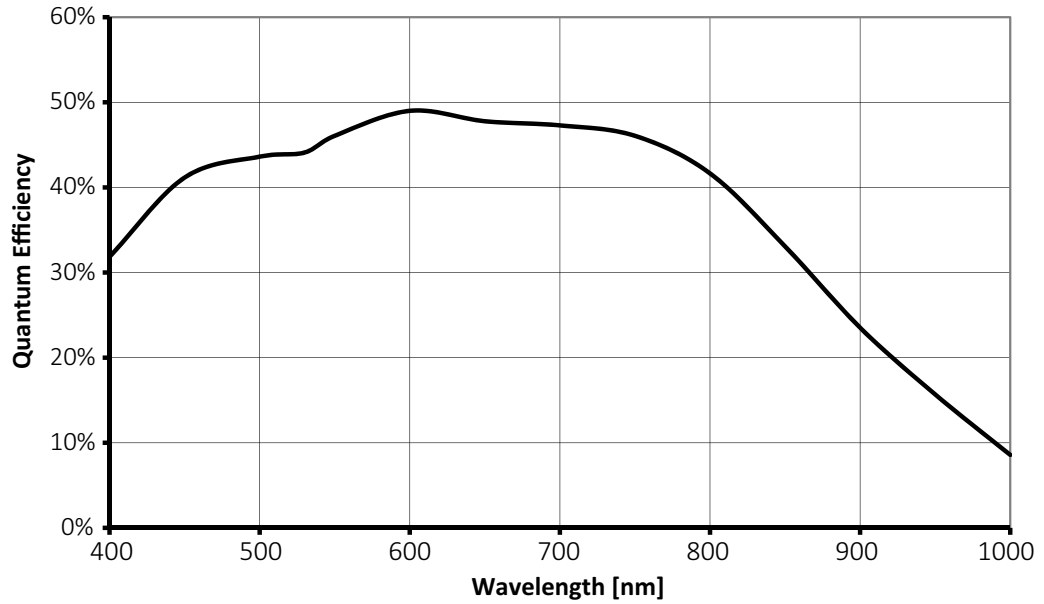
Absolute QE

Figure 40: Prosilica GC750 (ON Semi MT9V022) absolute QE
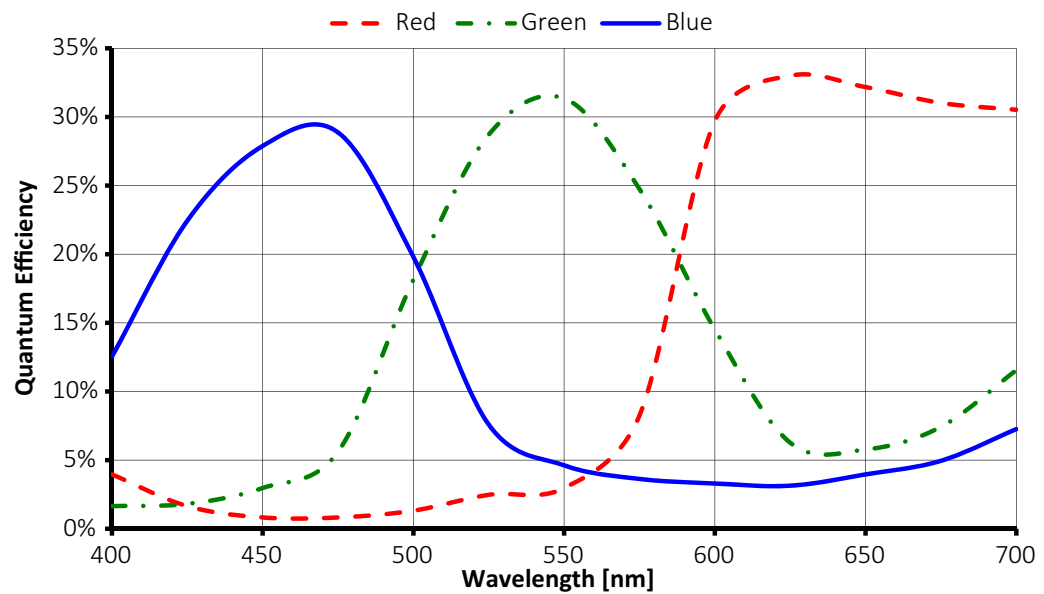

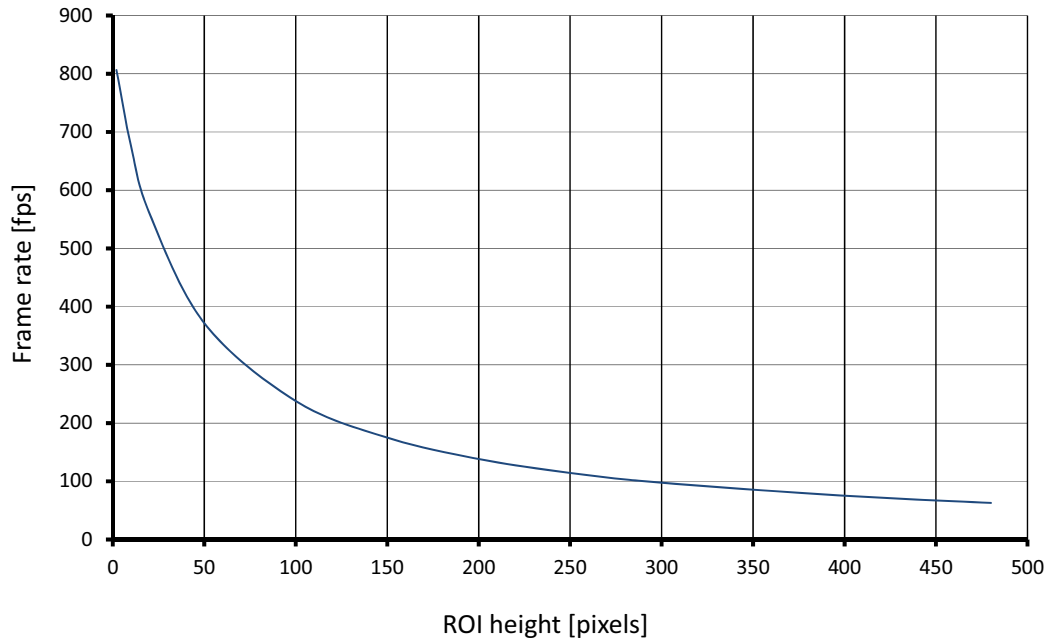*Figure 41: Prosilica GC750C (ON Semi MT9V022) absolute QE*

ROI frame rate

Figure 42: Prosilica GC750 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
480	62.9	100	238.0
400	75.3	50	371.7
300	97.6	20	560.6
250	114.5	10	674.9
200	138.4	2	806.4
150	175.1		

Table 33: Frame rate as a function of ROI height (Width=752 pixels)

Prosilica GC780 series

The following table provides model series specifications. The values are valid for Prosilica GC780 (02-2117A) and GC780C (02-2118A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC780	**Prosilica GC780C**
Sensor model	Sony ICX415AL	Sony ICX415AQ
Resolution	782 (H) × 582 (V); 0.5 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	8.3 µm × 8.3 µm	
Maximum frame rate at full resolution	63.9 fps	
Maximum image bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	16 MB	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Gain control	0 to 26 dB	0 to 23 dB
Power consumption	2.8 W at 12 VDC	
Trigger latency	1 µs for non-isolated I/O; 2.8 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	113 µs
Mass (typical)	100 g	

Table 34: Prosilica GC780 model series specifications
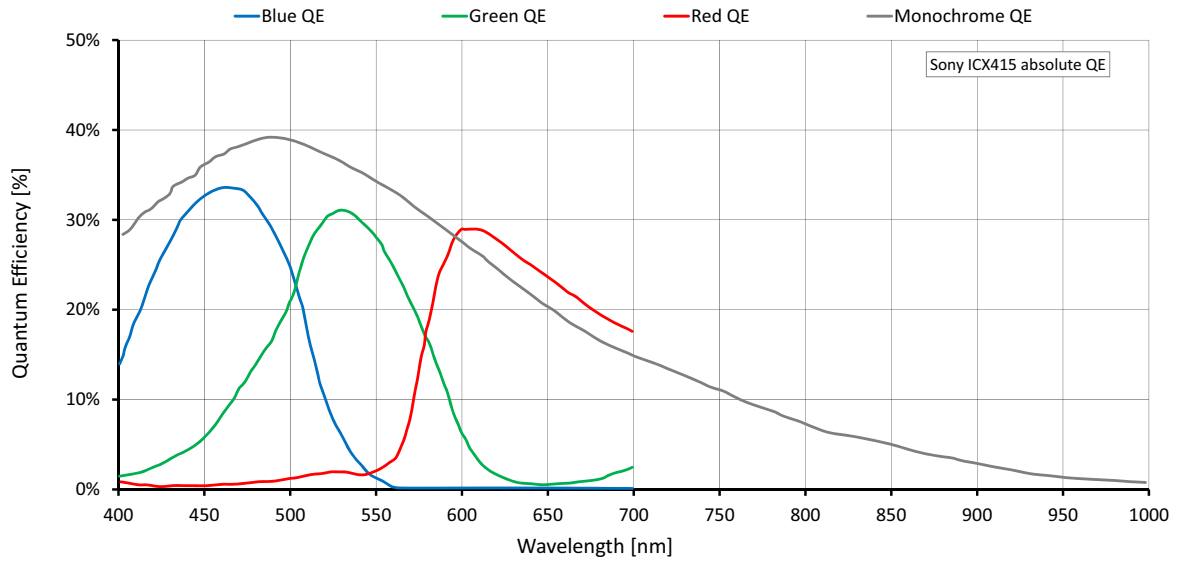
Absolute QE

Figure 43: Prosilica GC780 (Sony ICX415) absolute QE

Spectral response

Figure 44: Prosilica GC780 (Sony ICX415) spectral response

ROI frame rate

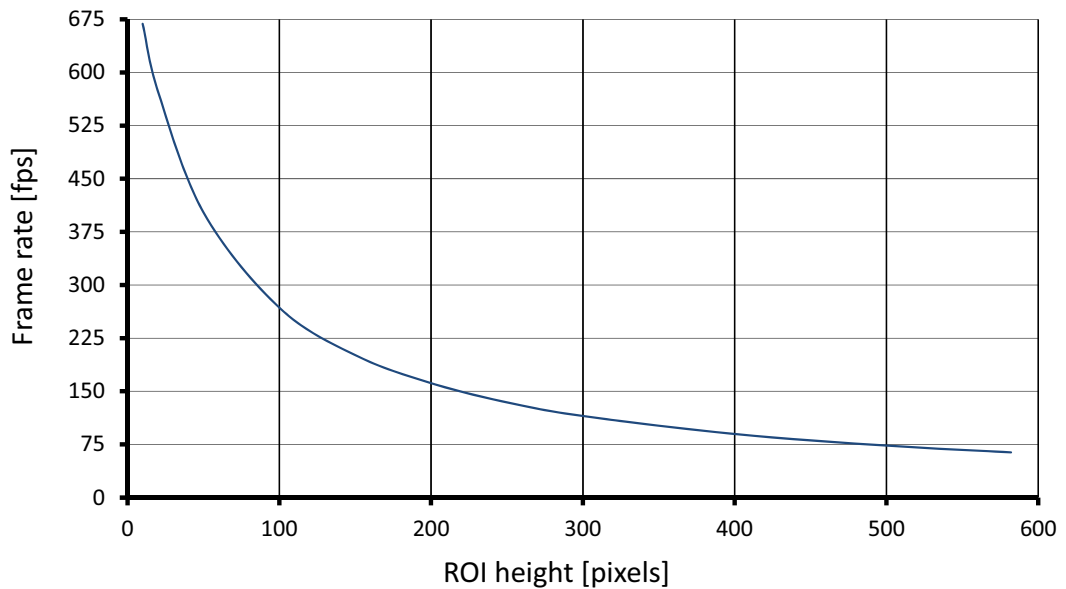$$\text{Frame rate} = \frac{1}{24{,}70\ \mu s \times \text{Height} + 1139{,}14\ \mu s}$$

Figure 45: Prosilica GC780 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
582	63.9	150	201.1
500	73.4	100	268.1
400	89.8	50	402.6
300	115.2	20	573.8
250	134.5	10	668.6
200	161.5		

Table 35: Frame rate as a function of ROI height (Width= 782 pixels)

Prosilica GC1020 series

The following table provides model series specifications. The values are valid for Prosilica GC1020 (02-2165A, 02-2165B) and GC1020C (02-2166A, 02-2166B) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1020	**Prosilica GC1020C**
Sensor model	Sony ICX204AL	Sony ICX204AK
Resolution	1024 (H) × 768 (V); 0.8 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor size	Type 1/3	
Sensor size	6.0 mm diagonal	
Pixel size	4.65 µm × 4.65 µm	
Maximum frame rate at full resolution	33 fps	
Maximum image bit depth	8-bit, 12-bit	
A/D	12-bit	
Image buffer	16 MB	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Gain control	0 to 22 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Opto-coupled I/Os	1 input, 1 output	
Power consumption	2.9 W at 12 VDC	
Trigger latency	2.8 µs for non-isolated I/O; 4.5 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	123 µs
Mass (typical)	99 g	

Table 36: Prosilica GC1020 model series specifications
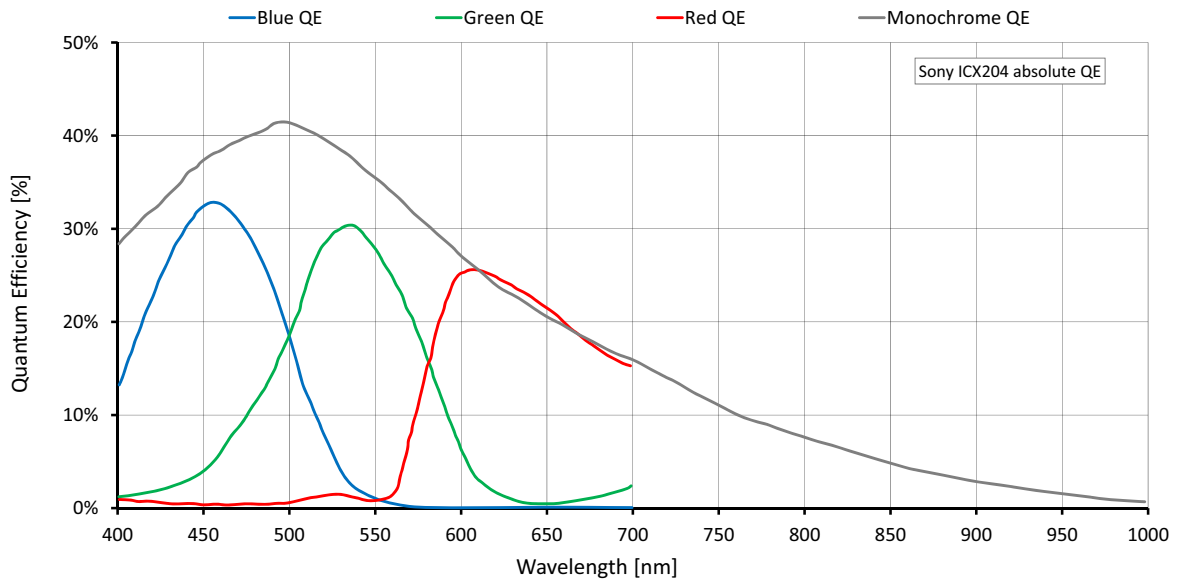
Absolute QE

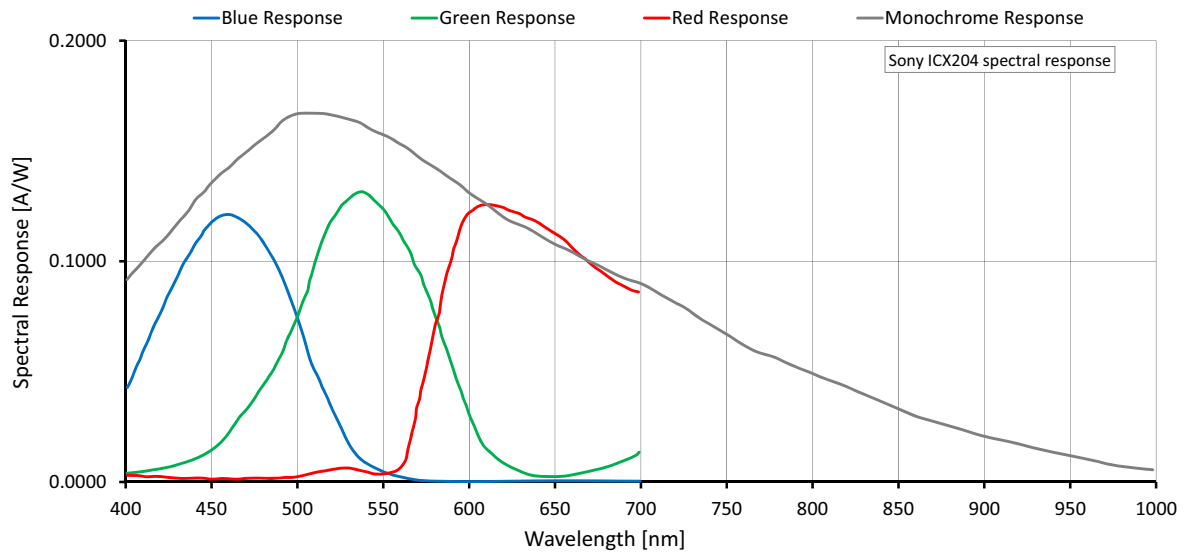*Figure 46: Prosilica GC1020 (Sony ICX204) absolute QE*

Spectral response

Figure 47: Prosilica GC1020 (Sony ICX204) spectral response

ROI frame rate

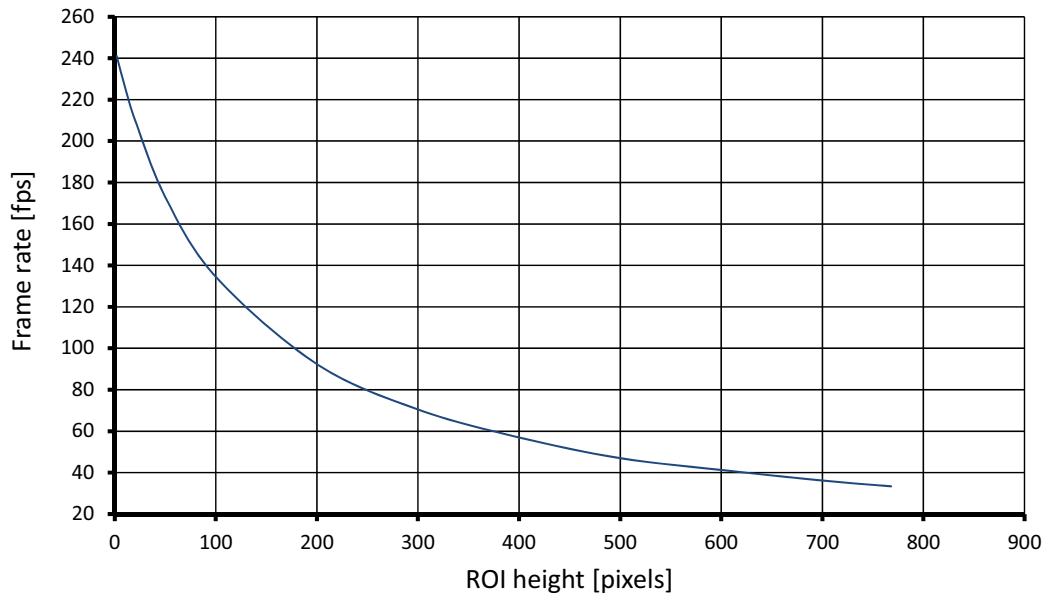$$\text{Frame rate} = \frac{1}{33,56 \ \mu s \times Height + 3971,23 \ \mu s}$$

Figure 48: Prosilica GC1020 frame rate as a function of ROI height

Height	Frame rate (fps)
768	33.4
700	36.2
600	41.3
500	47.0
400	57.0
300	70.5

Height	Frame rate (fps)
200	92.4
100	134.5
50	173.0
20	210.3
10	226.3
2	241.0

Table 37: Frame rate as a function of ROI height (Width=1024 pixels)

Prosilica GC1350 series

The following table provides model series specifications. The values are valid for Prosilica GC1350 (02-2130A) and GC1350C (02-2131A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1350	**Prosilica GC1350C**
Sensor model	Sony ICX205AL	Sony ICX205AK
Resolution	1360 (H) × 1024 (V); 1.4 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/2	
Sensor size	8.0 mm diagonal	
Pixel size	4.65 µm × 4.65 µm	
Maximum frame rate at full resolution	20 fps	
A/D	12-bit	
Image buffer	16 MB	
Maximum image bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Gain control	0 to 25 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Power consumption	3 W at 12 VDC	
Trigger latency	3.5 µs for non-isolated I/O; 5 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	107 µs
Mass (typical)	100 g	

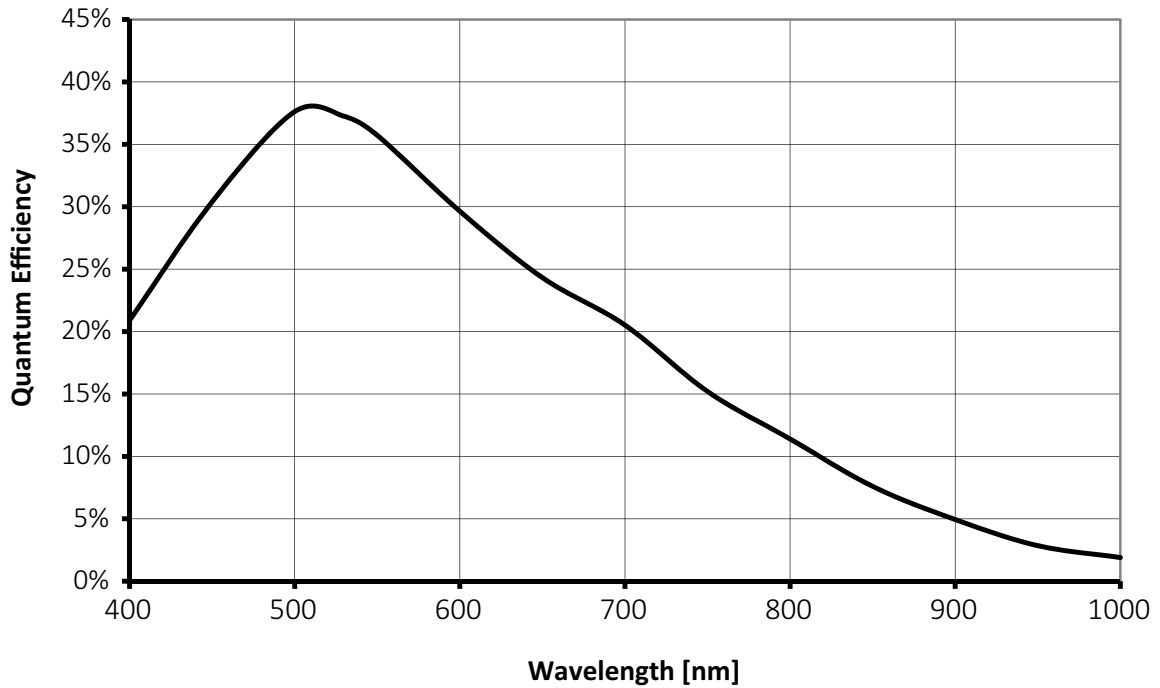*Table 38: Prosilica GC1350 model series specifications*

Absolute QE

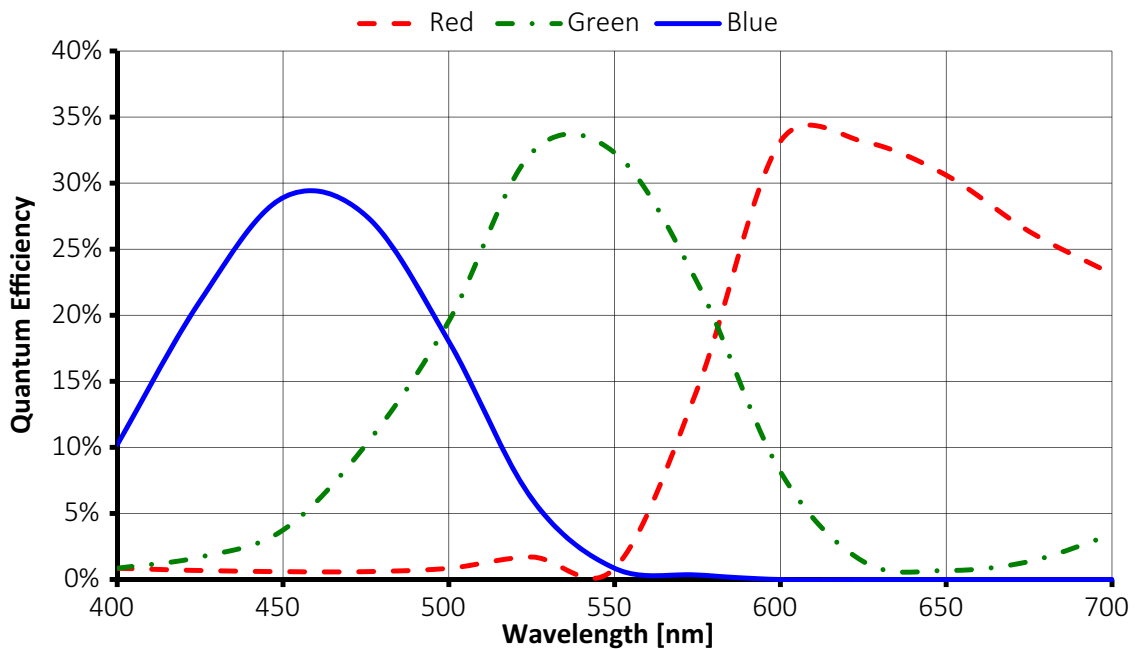*Figure 49: Prosilica GC1350 (Sony ICX205) absolute QE*

Figure 50: Prosilica GC1350C (Sony ICX205) absolute QE

ROI frame rate

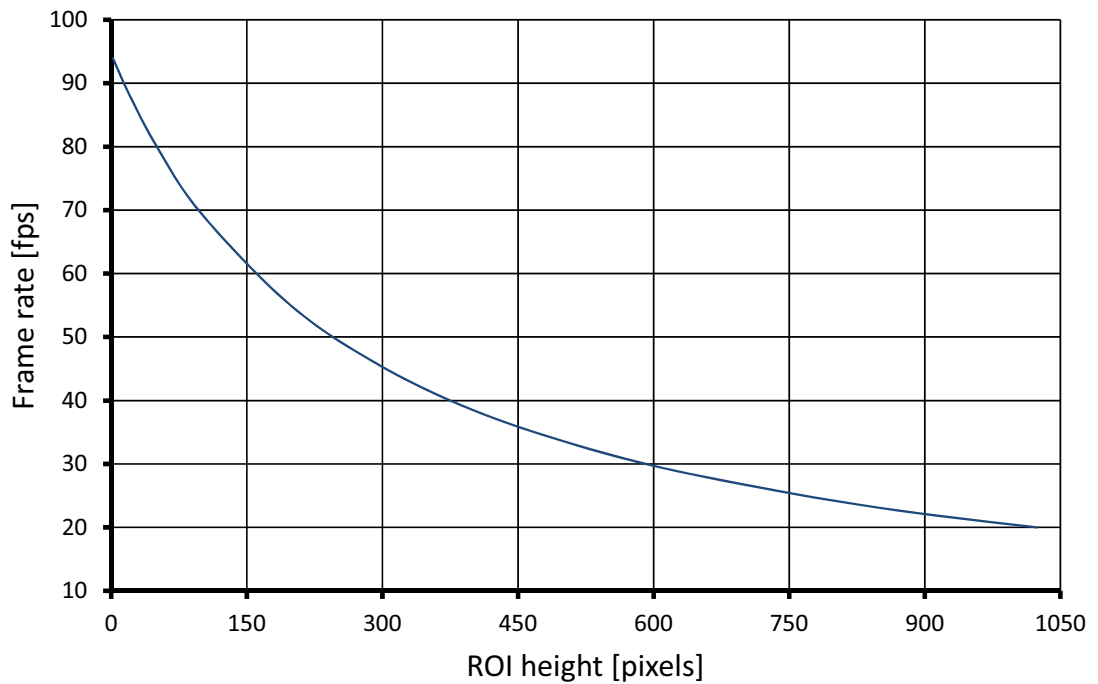$$\text{Frame rate} = \frac{1}{38{,}35 \text{ μs} \times \text{Height} + 10457{,}12 \text{ μs}}$$

Figure 51: Prosilica GC1350 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1024	20.0	300	45.3
1000	20.4	200	54.8
900	22.1	100	69.4
800	24.2	50	80.1
700	26.8	20	88.2
600	29.7	10	91.3
500	33.6	2	93.9
400	38.5		

Table 39: Frame rate as a function of ROI height (Width=1360 pixels)

Prosilica GC1380 series

The following table provides model series specifications. The values are valid for Prosilica GC1380 (02-2140A) and GC1380C (02-2141A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1380	**Prosilica GC1380C**
Sensor model	Sony ICX285AL	Sony ICX285AQ
Resolution	1360 (H) × 1024 (V); 1.4 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 2/3	
Sensor size	11.0 mm diagonal	
Pixel size	6.45 µm × 6.45 µm	
Maximum frame rate at full resolution	20.2 fps	
A/D	12-bit	
Image buffer	16 MB	
Maximum image bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	8 µs to 116.8 s; 1 µs increments	
Gain control	0 to 27 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to full resolution	
Power consumption	3.3 W at 12 VDC	
Trigger latency	3.7 µs for non-isolated I/O; 5 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	125 µs
Mass (typical)	104 g	

Table 40: Prosilica GC1380 model series specifications

Allied Vision

Absolute QE

Figure 52: Prosilica GC1380 (Sony ICX285) absolute QE

Spectral response

Figure 53: Prosilica GC1380 (Sony ICX285) spectral response

ROI frame rate

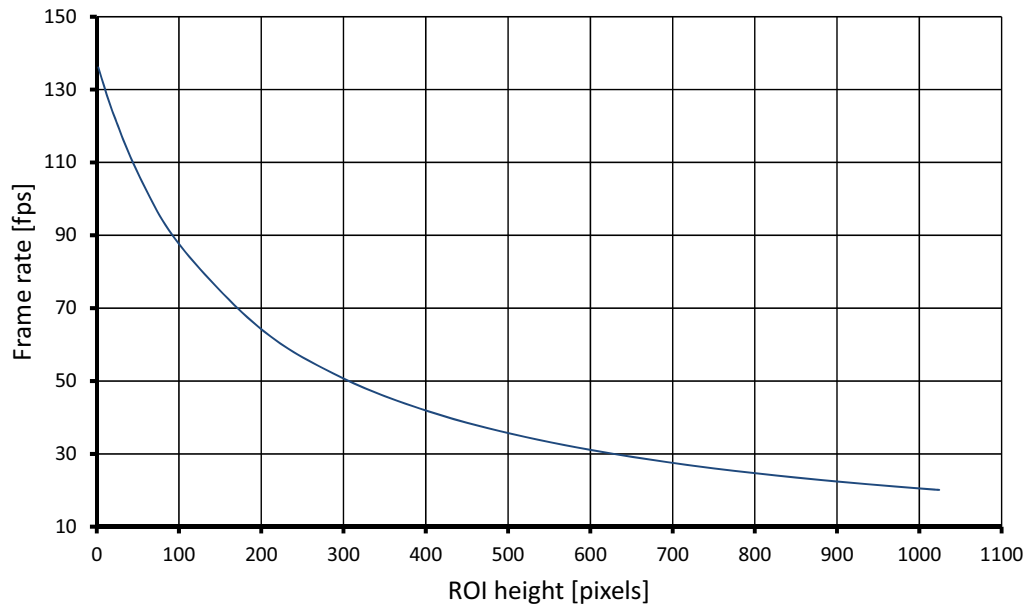$$\text{Frame rate} = \frac{1}{41{,}45 \ \mu s \times Height + 7148{,}57 \ \mu s}$$

Figure 54: Prosilica GC1380 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1024	20.1	300	50.7
1000	20.5	200	64.2
900	22.4	100	87.6
800	24.7	50	107.1
700	27.5	20	123.5
600	31.1	10	130.2
500	35.7	2	136.1
400	41.9		

Table 41: Frame rate as a function of ROI height (Width=1360 pixels)

Prosilica GC1600 series

The following table provides model series specifications. The values are valid for Prosilica GC1600 (02-2150A) and GC1600C (02-2151A) models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GC1600	**Prosilica GC1600C**
Sensor model	Sony ICX274AL	Sony ICX274AQ
Resolution	1620 (H) × 1220 (V); 2 MP	
Sensor type	Interline CCD, Progressive Scan	
Shutter type	Global shutter	
Sensor format	Type 1/1.8	
Sensor size	8.923 mm diagonal	
Pixel size	4.4 µm × 4.4 µm	
Maximum frame rate at full resolution	15 fps	
A/D	12-bit	
Image buffer	16 MB	
Maximum image bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixels formats	Not applicable	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	Not applicable	RGB8Packed, BGR8Packed
RAW pixel formats	Not applicable	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	10 µs to 116.8 s; 1 µs increments	
Gain control	0 to 21 dB	
Binning (Sum)	Horizontal: 1 to 8 columns, Vertical: 1 to 14 rows	
Power consumption	3.3 W at 12 VDC	
Trigger latency	2.3 µs for non-isolated I/O; 4 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O; ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O; 1.3 µs for isolated I/O	
Time between exposures	**Pixel format**	**Value**
	Mono8, Mono12Packed, BayerRG8, BayerRG12Packed, YUV411Packed	115 µs
Mass (typical)	97 g	

Table 42: Prosilica GC1600 model series specifications

Absolute QE

Figure 55: Prosilica GC1600 (Sony ICX274) absolute QE

Spectral response

Figure 56: Prosilica GC1600 (Sony ICX274) spectral response

ROI frame rate

$$\text{Frame rate} \ = \ \frac{1}{48,80 \ \mu s \times Height + 6431,90 \ \mu s}$$

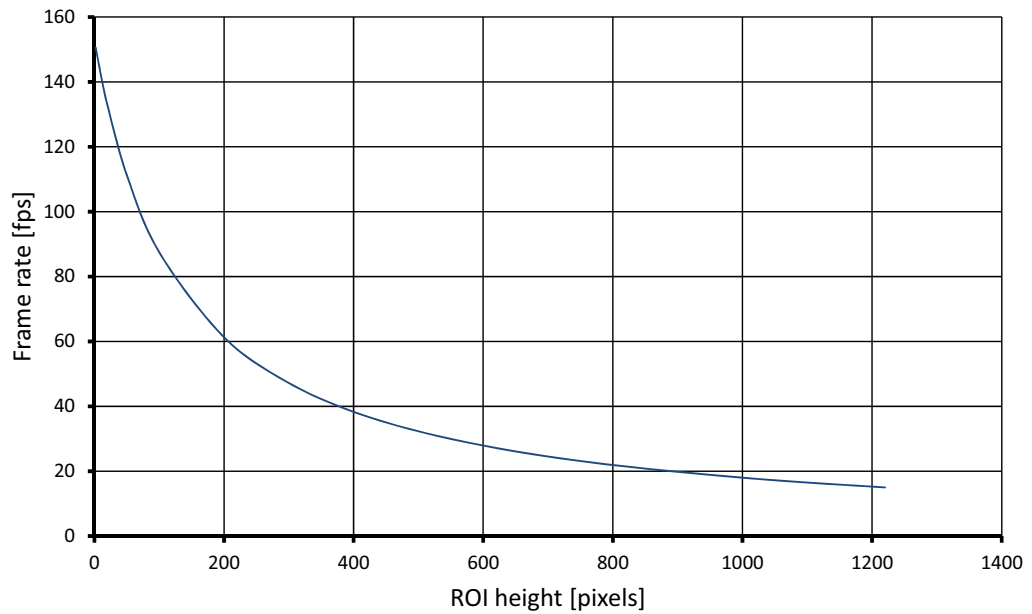*Figure 57: Prosilica GC1600 frame rate as a function of ROI height*

Height	Frame rate (fps)	Height	Frame rate (fps)
1220	15.0	400	38.3
1100	16.5	300	47.2
1000	18.0	200	61.3
900	19.8	100	87.5
800	21.9	50	111.3
700	24.5	20	132.9
600	27.9	10	142.2
500	32.3	2	150.6

Table 43: Frame rate as a function of ROI height (Width=1620 pixels)

Prosilica GC model comparison
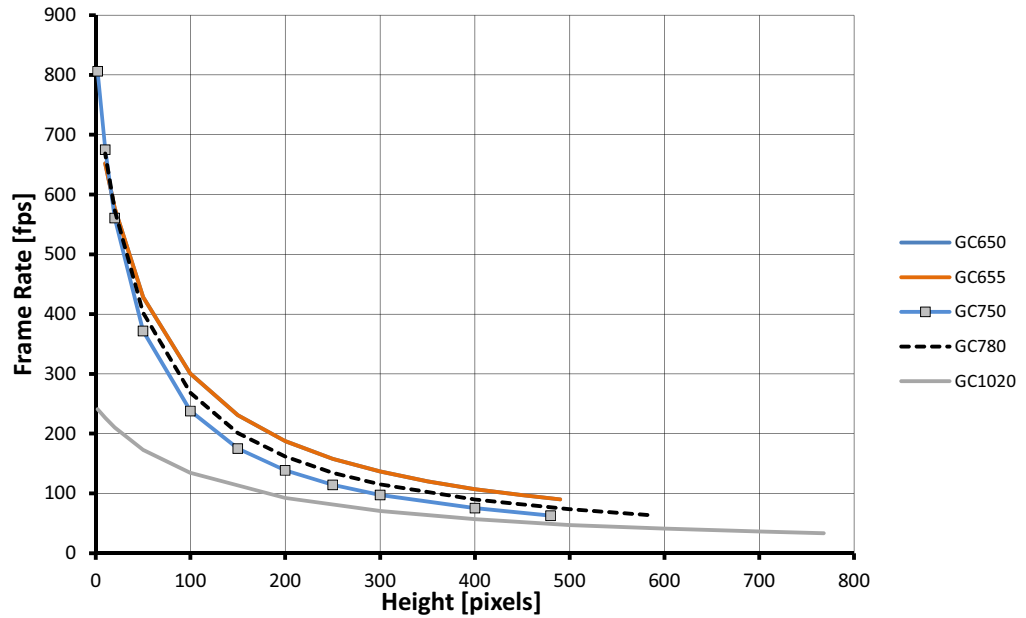
Figure 58: Maximum frame rate comparison for select models
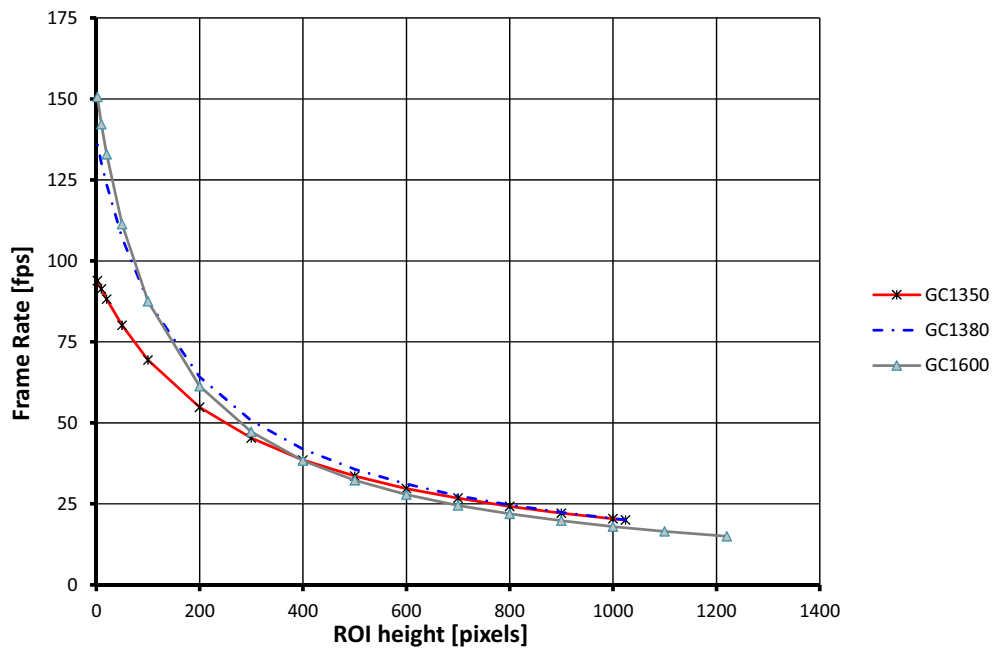
Figure 59: Maximum frame rate comparison for select models

Camera feature availability

Allied Vision cameras support a number of standard and extended features. The following table identifies a selection of capabilities and compares the availability of features in Prosilica GC hardware revision A camera models.

Image optimization features	GC650	GC655	GC750	GC780	GC1020	GC1350	GC1380	GC1600
Auto gain	✓	✓	✓	✓	✓	✓	✓	✓
Auto exposure	✓	✓	✓	✓	✓	✓	✓	✓
Auto white balance	✓	✓	✓	✓	✓	✓	✓	✓
Binning	✓	✓		✓	✓	✓	✓	✓
Decimation X/Y								
Black level (Offset)								
Region of Interest (ROI)	✓	✓	✓	✓	✓	✓	✓	✓

Table 44: Image optimization feature availability by model

Camera control features	GC650	GC655	GC750	GC780	GC1020	GC1350	GC1380	GC1600
Event channel	✓	✓	✓	✓	✓	✓	✓	✓
Image chunk data	✓	✓	✓	✓	✓	✓	✓	✓
Five storable user sets (config files)	✓	✓	✓	✓	✓	✓	✓	✓
RS232	✓	✓	✓	✓	✓	✓	✓	✓
IEEE 1588 Precision Time Protocol (PTP)	✓	✓	✓	✓	✓	✓	✓	✓
StreamHold	✓	✓	✓	✓	✓	✓	✓	✓
Sync out modes	✓	✓	✓	✓	✓	✓	✓	✓

Table 45: Camera control feature availability by model

Image data flow

The following diagrams illustrate the data flow and the bit resolution of image data.

Prosilica GC monochrome models

[1] Factory calibrated. Not a user control.
[2] 10 bits are used for Prosilica GC750.
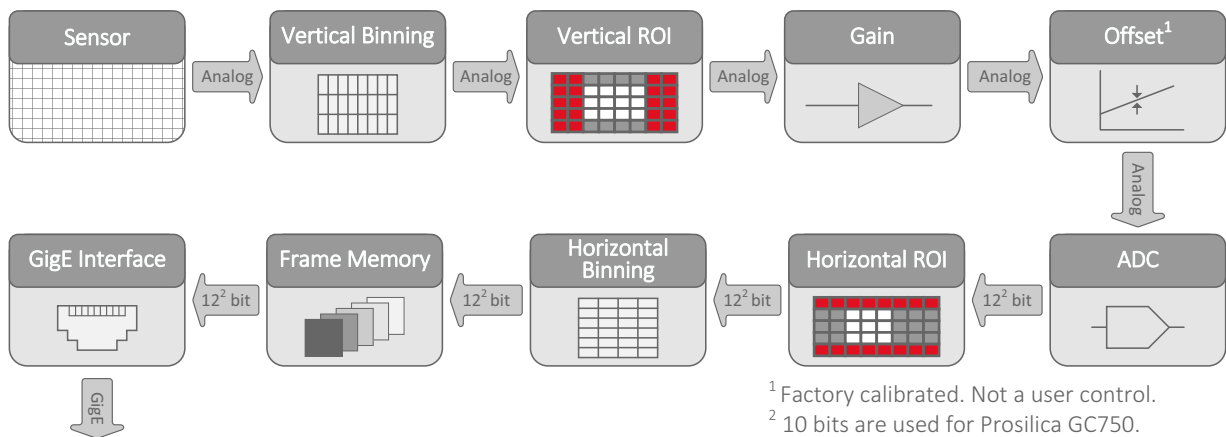
Figure 60: Image data flow of monochrome Prosilica GC models

Prosilica GC color models

[1] Color information lost while vertical binning is active.
[2] Factory calibrated. Not a user control.
[3] For on-camera interpolated PixelFormats only (8-bit output).
Raw un-interpolated PixelFormats skip this block (8/12 bit output depending upon the bit depth of PixelFormat used).
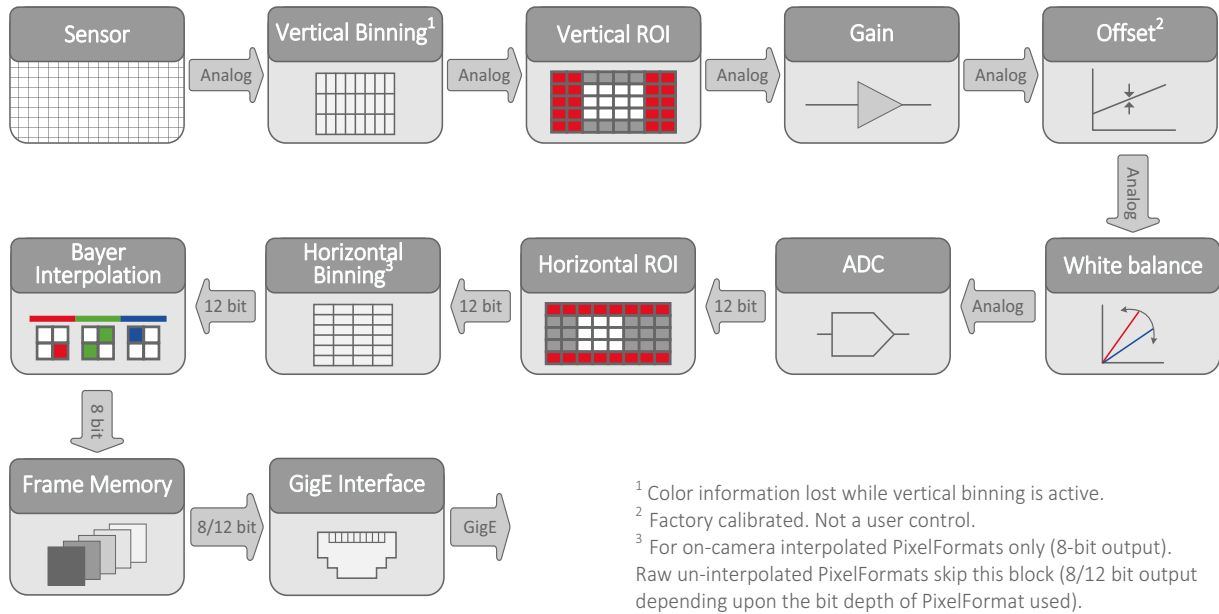
Figure 61: Image data flow diagram of color Prosilica GC models (except GC750C)

Prosilica GC750C

[1] Color information lost while vertical binning is active.
[2] Factory calibrated. Not a user control.
[3] For on-camera interpolated PixelFormats only (8-bit output).
Raw un-interpolated PixelFormats skip this block (10-bit output).
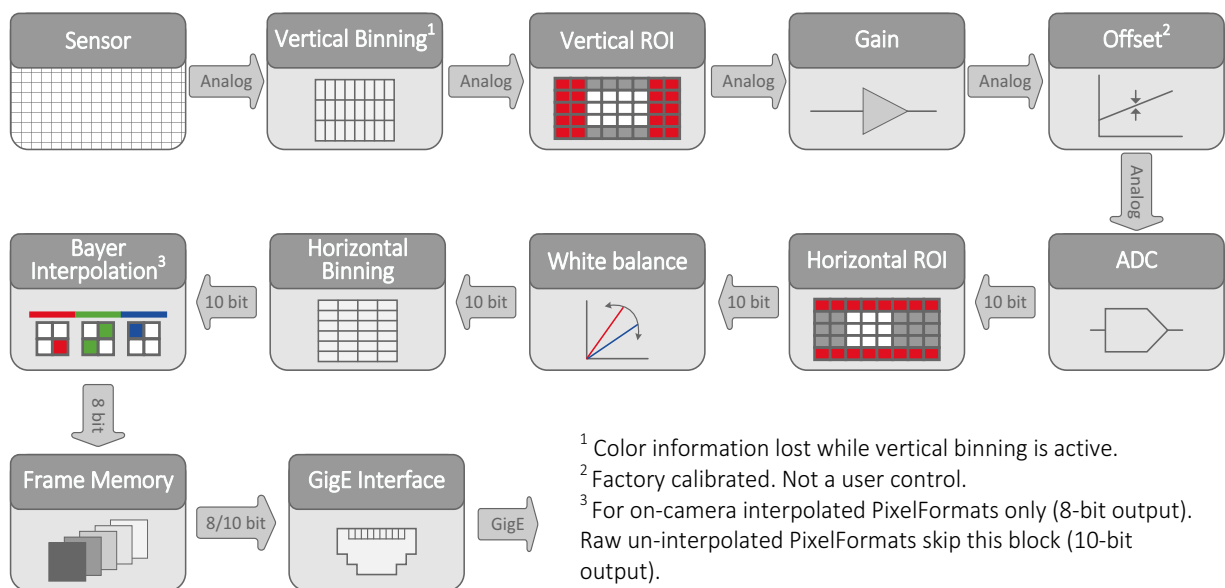
Figure 62: Image data flow diagram for Prosilica GC750C

Mechanical dimensions

The Prosilica GC family offers both CCD and CMOS sensor models. CCD cameras utilize additional circuitry required for A/D conversion. As a result, CMOS models offer a shorter mechanical package than CCD models.

Prosilica GC CCD model housing (C-Mount)

Models: Prosilica GC650, GC655, GC780, GC1020, GC1350, GC1380, GC1600

*Nominal value. Add 0.3 mm for color cameras.

STEP files are available on the Allied Vision Technical Documentation website.
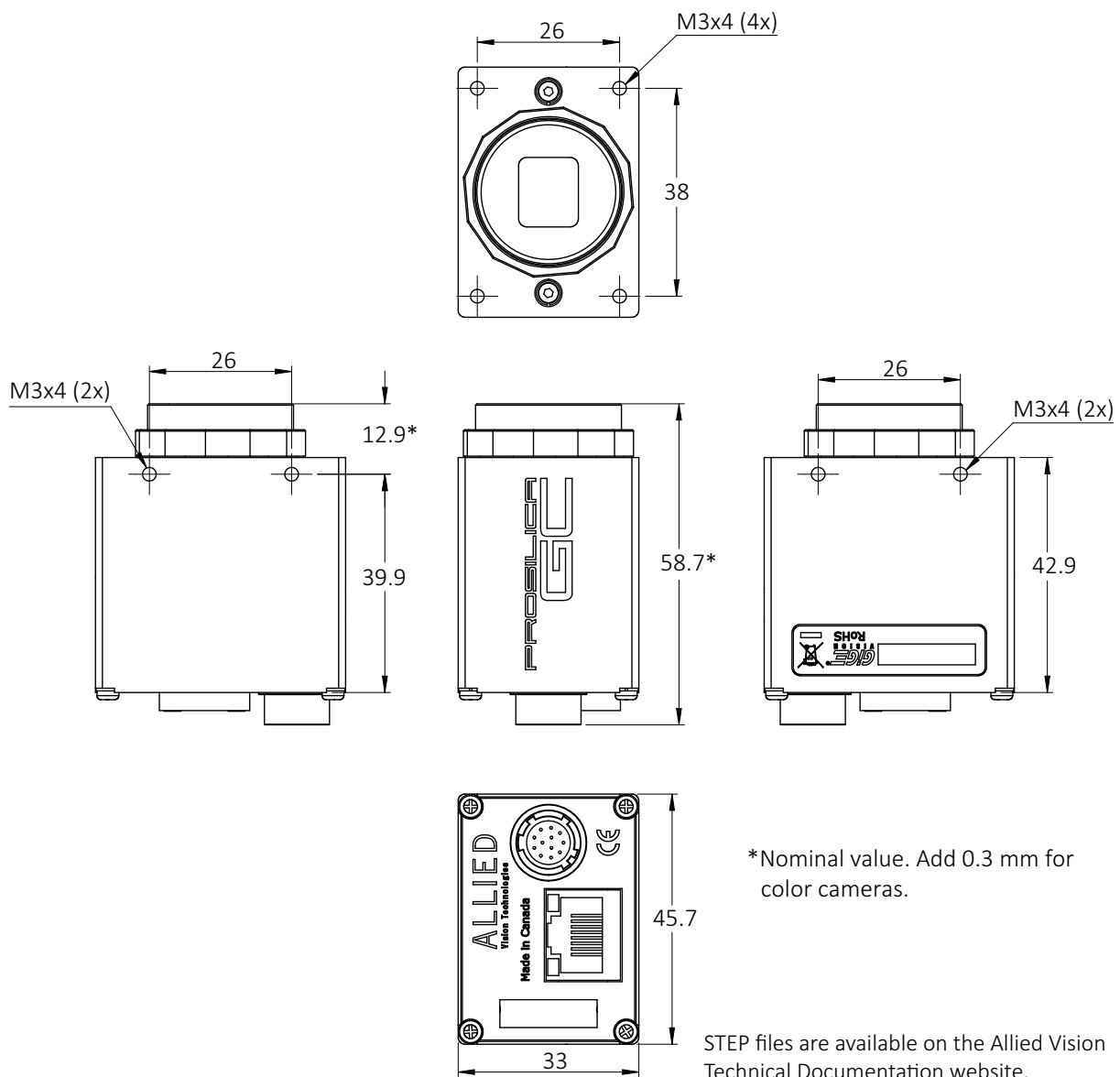
Figure 63: Prosilica GC CCD model housing dimensions

Prosilica GC CMOS model housing (C-Mount)

Model: Prosilica GC750

*Nominal value. Add 0.3 mm for color cameras.

STEP files are available on the Allied Vision Technical Documentation website.
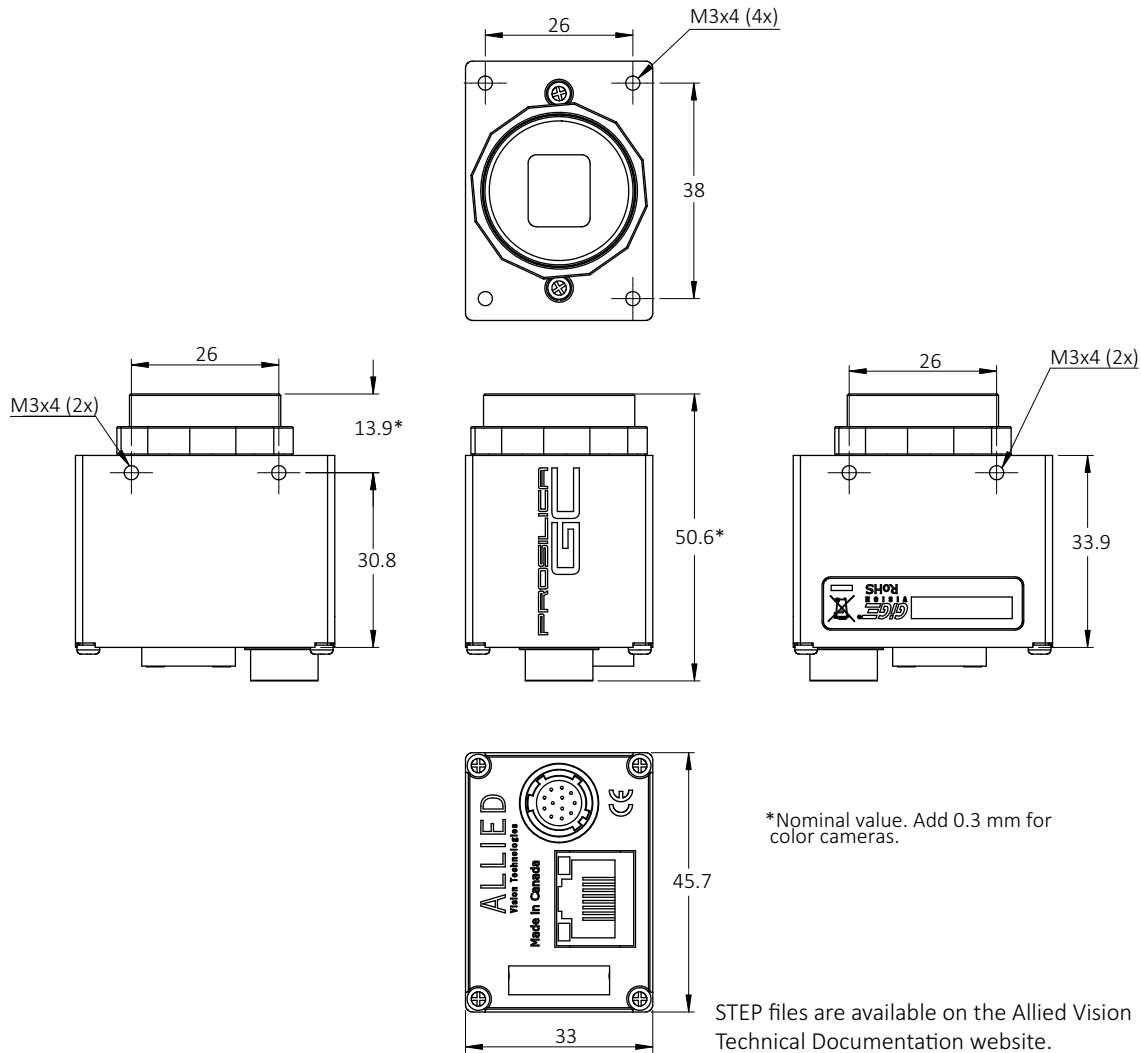
Figure 64: Prosilica GC CMOS model housing dimensions

Lens protrusion for C-Mount cameras

Lens protrusion is the distance from outer edge of C-Mount ring to contact point of first surface internal to C-Mount ring. For color models this surface is the IR-filter holder, and for monochrome models this surface is the internal camera front plate (see figure 65). Table 46 presents lens protrusion values for Prosilica GC models with C-Mount.

Section A-A for C-Mount monochrome cameras

Section A-A for C-Mount color cameras
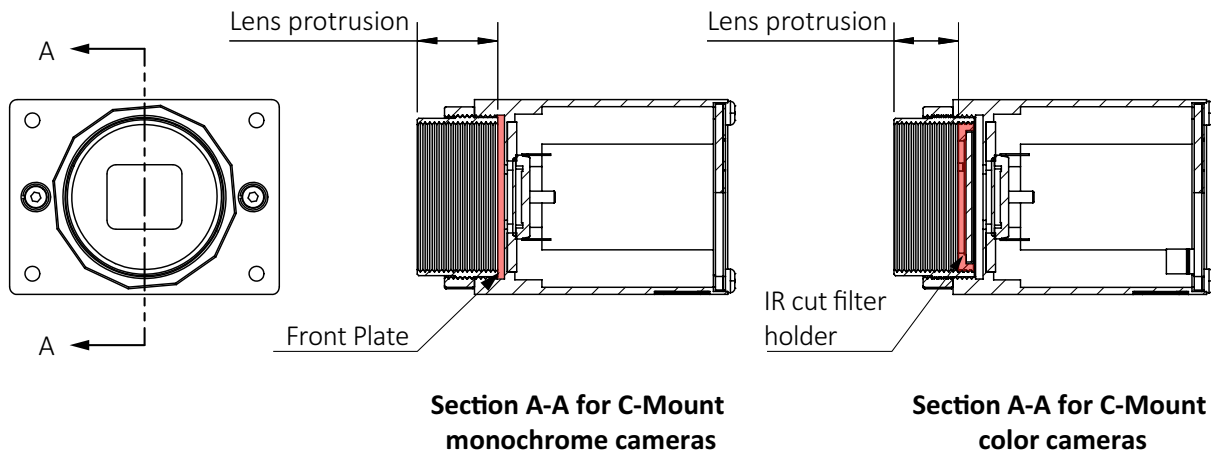
Figure 65: Cross section of typical Prosilica GC assembly with C-Mount

Model	Lens protrusion [mm]
GC650	13.64
GC650C	9.01
GC655	13.64
GC655C	8.29
GC750	9.12
GC750C	3.84
GC780	13.64
GC780	8.29

Model	Lens protrusion [mm]
GC1020	13.64
GC1020C	9.01
GC1350	13.64
GC1350C	8.90
GC1380	13.65
GC1380C	8.95
GC1600	13.64
GC1600C	8.93

Table 46: Lens protrusion for Prosilica GC models with C-Mount

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