GigE Vision Cameras

Prosilica GX

Technical Manual

V2.3.7

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

2019-Jul-08

Prosilica GX at a glance

Read this manual carefully

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

Prosilica GX cameras have dual GigE ports and work with GigE hardware and cable lengths up to 100 meters. Prosilica GX cameras are GigE Vision V1.2 and GenICam V1.0 compliant.

Scope of delivery

Your Allied Vision camera is delivered with the following components:

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

What else do you need?

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

Table 1: Additional resources

Contact us

Connect with Allied Vision by function

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

Find an Allied Vision office or distributor

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

General inquiries

info@alliedvision.com

Technical support

support@alliedvision.com

Sales offices

Europe, Middle East, and Africa: +49 36428 677-0
North, Central, and South America: +1 (877) USA-1394
Asia-Pacific: +65 6634-9027
China: +86 (21) 64861133

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Contents

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
V2.3.7	2019-Jul-08	• Editorial changes
V2.3.6	2019-Mar-08	• Added Supplier Declaration of Conformity to Compliance and intended use chapter • Added EMC compliance statement to Installation and hardware chapter • Editorial changes • Various improvements and typographic corrections
V2.3.5	2018-Jun-19	• Corrected lens tool- adjustment wrench part number on page 87 • Updated RoHS statement to include amendment 2015/863/EU
V2.3.4	2018-Apr-02	• Corrected power requirement value to 10 to 24 VDC • Various improvements and typographic corrections
V2.3.3	2018-Jan-16	• Deleted references to the Modular Concept
V2.3.2	2017-Dec-20	• Various improvements and typographic corrections
V2.3.1	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
V2.3.0	2017-Mar-20	• Changed the technical manual layout • Updated contact information • Changed chapter name from *Camera dimensions* to *Mechanical dimensions* • Moved *Sensor position accuracy* section from *Appendix* to *Mechanical dimensions* chapter • Deleted *Appendix* • Added *Cleaning optical components* chapter to replace *Cleaning optics* section • Added Contact us section to replace 'Contacting Allied Vision' section • Added *Installation and hardware* chapter • Added *Firmware update* chapter • Updated ON Semi absolute QE plots to reflect the curves for the Gen 2 CFA material change • Changed all instances of `RegionY` to `OffsetY` • Changed all instances of `BinningY` to `BinningVertical` • Corrected YUV color pixel formats for Prosilica GX1050, GX1910, GX1920, GX2750, GX6600 • Various other improvements and typographic corrections

Table 1: Document history (sheet 1 of 3)

Version	Date	Remarks
V2.2.0	2015-Mar-20	• 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'
V2.1.0	2015-Mar-10	• Updated Allied Vision logo • Changed AVT and Allied Vision Technologies references to Allied Vision • Updated Prosilica GX3300 series specifications, absolute QE plots, and ROI height vs frame rate information • Replaced the optical flange focal distance section with the following sections: - Flange focal distance • Updated exposure control values in Specifications chapter • Updated orientation of the connector diagram • Renamed Truesense references to ON Semi • Updated datapath diagram for Prosilica GX color cameras
V2.0.8	2013-Nov-26	• Added Prosilica GX model comparison for single and dual GigE port (16-bit) • Updated *Index* • Updated absolute QE plots in Specifications chapter.
V2.0.7	2013-Oct-02	• Added a note on locking screw cables • Added optical flange focal distance and maximum lens protrusion information • Updated the Introduction section • Added frame rate tables in Resolution and ROI frame rates • Updated links to PvAPI SDK
V2.0.6	2013-Jul-05	• Updated absolute QE plots for Prosilica GX1910 • Added links to *GigE Camera and Driver Features* document
V2.0.5	2013-Jun-06	• Updated the RoHS directive • Added Status LEDs section • Updated bit depth and exposure control values in the Specifications chapter • Updated the pixel format naming according to the GenICam standard • Added frame rate versus height graphs for 2 byte pixel format and bandwidth limiting information in Resolution and ROI frame rates section • Added Vimba SDK link in Additional references section • Updated recommended cabling to CAT-6 or higher in the *Installation and hardware* chapter

Table 1: Document history (sheet 2 of 3)

Version	Date	Remarks
V2.0.4	2013-Jan-30	• Renamed Camera IO signals • Reworked cleaning optics section • Reworked the camera spectral plots and framerate versus height graphs • Deleted the camera internal circuit diagram • Deleted the camera external circuit example diagram
V2.0.3	2012-Feb-27	• Added Prosilica GX6600 frame rate charts
V2.0.2	2011-Dec-22	• Added Prosilica GX6600 model information - Specifications - Dimensions - ROI frame rates
V2.0.1	2011-Dec-06	• Added Prosilica GX2750 model information - Specifications - Dimensions - ROI frame rates
V2.0.0	2011-Jul-14	• New manual release status

Table 1: Document history (sheet 3 of 3)

Manual conventions

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

Styles

Style	Function	Example
Bold	Program names, UI elements, highlighting important things	**bold**
Italics	Publication names, UI non-interactive elements	*Italics*
Courier New	Code listings, feature names	`Input`
Courier New Italics	Feature options	*`Mode`*
Blue	Cross references, web page links, email links	Link

Table 2: Styles used in this technical manual

Symbols and notes

NOTICE

Property damage message

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

NOTICE

Material damage by electrostatic discharge (ESD)

Precautions as described.

CAUTION

Safety message

Note to prevent physical injury.

Instructions to avoid malfunctions

This symbol indicates important or specific instructions or procedures that are related to product safety. You have to follow these instructions to avoid malfunctions.

Practical hint

This symbol highlights a practical hint that helps to better understand the camera's features and functions, and to make better use of it.

Further information available online

This symbol highlights URLs for further information.

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 3: 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
EMVA	European Machine Vision Association
ESD	Electrostatic discharge
GigE	Gigabit Ethernet
GND	Ground (power)
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
MP	Megapixel
MSDS	Material safety data sheet
NIC	Network interface card
QE	Quantum efficiency
ROI	Region of interest
SDK	Software Development Kit
SFNC	Standard Feature Naming Convention
TTL I/O	Transistor-transistor logic input/output
XML	Extensible Markup Language

Table 4: Acronyms and terms used in this document

Compliance and intended use

§

This chapter includes:

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

Compliance notifications

For customers in Europe

Allied Vision has demonstrated the fulfillment of the requirements relating to the Prosilica GX camera family:

- Directive 2014/30/EU (Electromagnetic compatibility)
- Directive 2011/65/EU, including amendment 2015/863/EU (RoHS)

For customers in the US

Supplier Declaration of Conformity

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

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

Responsible Party – US Contact Information

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

T// +1 (978) 225-2030

Class 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.

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-003 (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-003 (A)/NMB-3(A)

Avoid electromagnetic interferences

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

Camera applications and intended use

General use

- The user is responsible for operating the camera within the specifications that are defined in this document, and within appropriate environmental conditions and technical prerequisites, to ensure trouble-free camera operation.
- The camera is compliant with current data communication standards; however, those standards do not allow for self-monitoring. Thus, the camera cannot be used as a standalone device for security-related monitoring operations.
- The camera is a hardware product. Only when used with appropriate accompanying software, the camera will produce the desired results. The realization of intelligent solutions requires additional software that is suitable to run with the camera.
- The camera is a component, it is neither a complete product, nor is it a ready-made technical solution.
- The camera-supporting software can be obtained and installed separately from the camera. Usage of the software is solely the responsibility of the user.
- The camera must not be opened. For all repair tasks, contact Allied Vision or one of Allied Vision's authorized representatives.
- Observe the intended use. The camera must only be used for purposes that are in conformity with the stated intended use.
- Additionally, refer to the warranty information on the Allied Vision website.
- For usage in product with specific safety requirements a Quality Assurance Agreement with Allied Vision is required.
- The camera is intended for use in a commercial, industrial, or business environment. The test phase and programming should be carried out by advanced users.

Use in medical devices

The camera provides basic adequacy to be used in medical devices as well, however, is not specially designated for operation in medical devices. When used as part of a medical device, a review of the specific application is necessary. For usage in medical product, a Quality Assurance Agreement with Allied Vision is required. Users who integrate the camera into an application must comply with the rules and regulations concerning medical devices.

Copyright and trademarks

Installation and hardware

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

Precautions

Electrical connections

NOTICE

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

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

NOTICE

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

NOTICE

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

NOTICE

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

Observe the following:

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

Optical components

NOTICE

Image sensors are sensitive to excessive radiation: focused sunlight, lasers, and X-rays can damage the sensor.

Monochrome models are not fitted with filter or protection glass. Consider, when removing the lens or dust cap on these cameras, the sensor is not protected against dirt or scratches.

NOTICE

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

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

NOTICE

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

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

To keep dirt out of the lens mount, hold the camera with the lens mount facing the ground. Keep filter and camera back lens clean, because dirt becomes more visible the closer it gets to the sensor.

NOTICE

Many of the lens mount styles available are not designed for high vibration environments with a heavy lens load. We recommend supporting the lens externally in these environments.

NOTICE

As monochrome models do not 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.

Configuring the host computer

Prosilica GX 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 GX camera. We recommend that your camera system uses a dedicated Ethernet port not shared with Internet or local area networks. If more ports are required, or your existing NIC is unable to operate at Gigabit Ethernet speeds, installing additional hardware may be required.

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

Installing the NIC driver

Install the network card driver from your network card manufacturer. If no installation application is provided, update the driver manually.

To update the driver manually

1. Click the **Start** icon and select **Control Panel** in the menu.
2. Click **View by Large Icons** and select **Device Manager** in the list.
3. Under **Network Adapters**, locate the Ethernet NIC, right-click the entry, and select **Update Driver Software** in the menu.
4. Select the **Search automatically for updated driver software or Browse my computer for driver software**.
5. Click **Close** after the driver has been installed.

Optional: Modifying NIC IP address

After initial NIC hardware installation, connect the NIC directly to the camera. The default configuration assigns an IP address automatically using the Link-Local Address range of 169.254.xxx.xxx or an address defined by the DHCP server, if present.

Users can fix the NIC address to minimize the time required for a camera to be recognized by the host application. When systems employ multiple NICs connected to multiple cameras the address of the NICs should be set.

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

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

NIC driver settings

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 NIC manufacturer and model.

Property	**Value**
Packet size or maximum transmission unit	8228 bytes or larger
Interrupt moderation	Enable
Interrupt moderation rate	Extreme
Receive buffers	Maximum value configurable
Transmit buffers	256 bytes

Table 5: NIC driver settings

Default packet size

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

NICs

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

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

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

Enabling jumbo packets

The properties listed for the NIC may include either **Jumbo Packet** or **Jumbo Frames** depending on the manufacturer. If neither is listed under properties, your network card may not support this feature. You must use a NIC that supports Jumbo Frames or Jumbo Packets.

To enable jumbo packets

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

Connecting your camera

Use a CAT6 or higher rated Ethernet cable to connect the camera to the NIC. 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. A cable with a lower rating may not sustain peak interface bandwidth; leading to lost connectivity or dropped frames coming from the camera.

Optics

Prosilica GX cameras offer various lens mounts for installing a lens. Lenses can be purchased directly from Allied Vision or from an Allied Vision distribution partner. Users need to select the desired focal length of the lens and appropriate optical format for the target camera model.

Accessories

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

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

Software

Prosilica GX cameras work with the following software options:

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

Powering up the camera

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

NOTICE

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

NOTICE

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

Connecting to host application

After you have installed **Vimba Viewer** or a third-party application to your host computer, connect your Prosilica GX camera via an Ethernet cable and connect the Hirose cable to power the camera.

Allied Vision software

All software packages provided by Allied Vision are free of charge and contain the following components:

- Drivers
- SDK for camera control and image acquisition
- Examples based on the provided APIs of the SDK
- Documentation and release notes
- Viewer application to operate and configure the cameras

Vimba Viewer documentation

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

Allied Vision’s Vimba SDK is based on the GenICam standard. GenICam-based third-party software automatically connects with Vimba's transport layers. Additionally, Vimba includes the Cognex Adapter for VisionPro.

Implementing Link aggregation

This chapter covers link aggregation and multicasting with Prosilica GX dual Ethernet interface cameras.

Link aggregation and link aggregation group

The Prosilica GX series cameras offer two Gigabit Ethernet port for image data transfer and control. Users can connect one or both ports on the Prosilica GX to Ethernet adapter interfaces on a host computer. The dual port approach requires the host computer to configure a Link Aggregation Group (LAG). A LAG configuration combines multiple Ethernet interfaces into a single data channel.

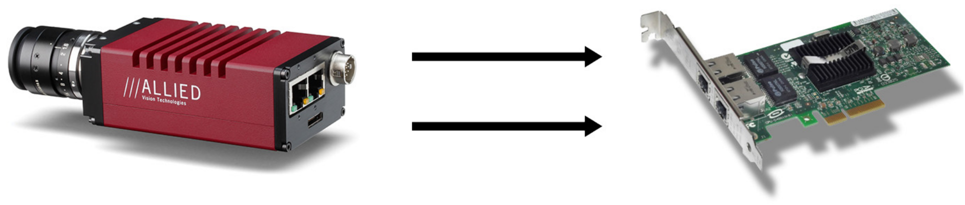


Figure 1: Prosilica GX network configuration using multiple Ethernet interfaces

When is LAG needed?

Connecting both interfaces increases the available bandwidth to 240 MBps. This is beneficial for the following cases.

- Need to use high (> 8 bits) bit depth pixel formats.
- Highest frame rate is needed.

The following examples show how to determine bandwidth consumption. If the value is greater than 125 MB, LAG is required.

Example 1

Prosilica GX1050 camera using Mono8 pixel format and outputting 100 fps

Bandwidth usage = Resolution × Pixel format × Frame rate
= 1024 × 1024 × 1 (1 byte for Mono8) × 100
~ 105 MBps

Percentage of single port GigE bandwidth ~ 84 percent, LAG is not required to operate the Prosilica GX1050 camera at 100 fps in Mono8.

Example 2

Prosilica GX1050C using YUV422 pixel format and outputting 100 fps

Bandwidth usage = 1024 × 1024 × 2 (2 byte for YUV422) × 100

~ 210 MBps

Percentage of single interface GigE bandwidth ~ 168 percent, LAG is required to operate the Prosilica GX1050C at 100 fps using YUV422.

Configuring link aggregation

The Prosilica GX camera connected to host using LAG requires two host Ethernet adapter interfaces. Configure and optimize each Ethernet adapter interface using steps outlined in *Configuring Ethernet adapter*. The following steps describe the setup of a LAG.

With LAG, you may need to increase `GVSPMaxLookBack` (Vimba) or `GvspLookbackWindow` (PvAPI) to minimize dropped packets.

Microsoft Windows 7, Intel PT

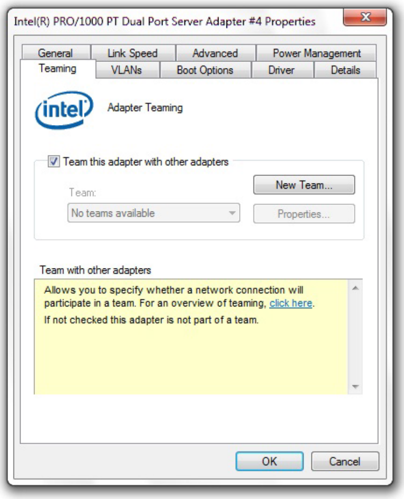


Figure 2: Intel adapter properties teaming tab

- **Start**, **Control Panel**
- **Hardware and Sound**
- **Device Manager**
- **Network Adapter**
- Right-click **Adapter** device name
- **Properties**
- Click the **Teaming** tab
- Select **Team the adapter with other adapters**
- Click **New Team**
- The **New Team Wizard** window opens, choose a team name and click **Next**

- Select the desired adapters corresponding to the interfaces to be used by the Prosilica GX camera, click **Next**

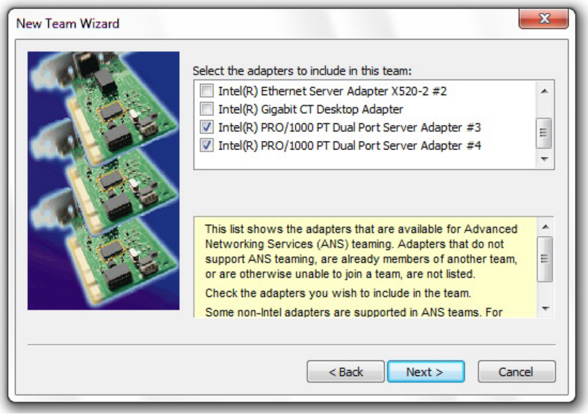


Figure 3: Team wizard adapter selection

- Select team type: **Static Link Aggregation**
  click **Next**

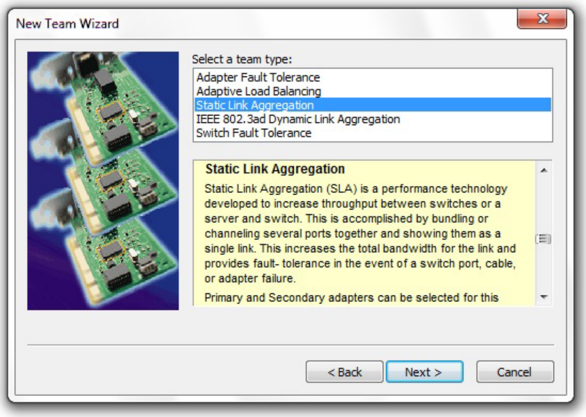


Figure 4: Team wizard team type selection

This configures the team and a new adapter appears in the Network Connections window.

The newly formed team adapter can be managed using automatic IP configuration or fixed IP using instructions provided in *Modifying Ethernet adapter IP address*.

Linux

Link Aggregation is referred to as bonding in Linux. The following instructions are for Ubuntu Linux 10.04 or newer.

For full installation instructions on Ubuntu, see:

help.ubuntu.com/community/UbuntuBonding
help.ubuntu.com/community/LinkAggregation

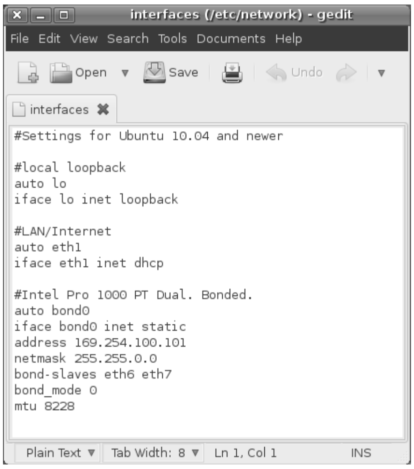


Figure 5: Interfaces file for bonding

- Download **ifenslave** moduleTerminal: sudo apt-get install ifenslave
- Terminal: ifconfig
- Note eth#'s of NICs to be bonded
- Terminal:
  sudo gedit /etc/network/interfaces
- Add/edit:
  ```
  auto bond0
  iface bond0 inet static
  address 169.254.100.101
  netmask 255.255.0.0
  bond-slaves eth6 eth7
  bond_mode 0
  mtu 8228
  ```
  where, `eth6` and `eth7` are the NICs to be bonded.

Mac OS (PvAPI only)

For full installation instructions on Mac OS, see:

docs.info.apple.com/article.html?path=ServerAdmin/10.6/en/asa7873dc0.html

These instructions are for Mac OS server, but apply to Mac OS also.

- **System Preferences**
- **Network**
- Select **Ethernet**, click gear icon, **Manage Virtual Interfaces**
- Click the **Add** (+) button, and select **New Link Aggregate**
- Select the interfaces to bond from the list, click **Create**, **Done**.

Figure 6: Manage Virtual Interfaces

Specifications

This chapter provides:

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

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 IEEE1394, 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.

Notes on specifications

Read first

For some Prosilica GX cameras, for example, Prosilica GX1910, Prosilica GX2300, bandwidth limiting occurs even in 8-bit pixel formats, although not as severely as with a 16-bit pixel format.

Dimensions and mass

Dimensions include connectors but not the tripod and lens.

Mass does not include the tripod and lens.

Mono8

Prosilica GX color models include the Mono8 monochrome pixel format in addition to color and RAW pixel formats.

ON Semi sensor change

Prosilica GX color models with ON Semi sensors now use sensors with the new Gen 2 CFA materials. For more information, see the Product Change Notification on the Allied Vision website.

Absolute QE plots

Important notice before reading the QE plots

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

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

Absolute QE plots for Sony CCD 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 adjusted using 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.

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

For additional wavelength information, contact the sensor manufacturer.

Spectral response plots

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

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

Resolution and ROI frame rates

This section provides performance information about the impact of reducing the ROI on the camera’s maximum frame rate. In addition, because the Prosilica GX camera offers dual GigE LAG, the impact of using a single Ethernet connection versus dual Ethernet connections with the host is compared.

Single port GigE connection with the Prosilica GX

When a Prosilica GX camera is connected to the host computer using a single Ethernet connection, it behaves like a single port GigE Vision camera. The total bandwidth available for the camera is 125 MB or 1 Gb. A dual GigE LAG connection supported by the Prosilica GX camera offers up to 250 MB or 2 Gb of bandwidth.

Bandwidth limiting of frame rate

There are several factors that limit the frame rate of a camera, for example, input trigger speed and mode, exposure time, sensor readout time, and available bandwidth. For the following discussion and charts we assume input trigger settings and exposure time are set so as not to limit the frame of the camera. This leaves sensor readout time, the time to physically output the charge off a camera sensor, and available bandwidth. In most cases, the sensor readout time dictates the true frame rate of a camera, unless the amount of transmitted data exceeds what is available on the GigE port.

In the following example chart, the frame rate for a 16-bit pixel format is given on a Prosilica GX1050 camera. The upper line shows the frame rate in dual GigE mode, where no bandwidth limitation occurs. The lower line shows the frame rate in single GigE mode, where bandwidth limitation occurs after a data threshold of 124 Mbps. This is the shaded region, occurring at an image height greater than 200 pixels.

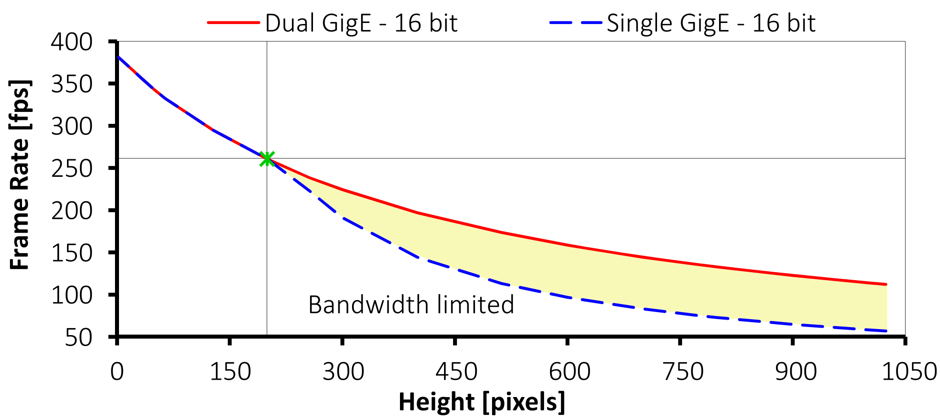


Figure 7: Illustration of bandwidth limiting: frame rate versus height for Prosilica GX1050 in single port GigE configuration using a 16-bit pixel format

The Prosilica GX camera can be operated near peak sensor frame rates even when using a single port connection. The frame rate versus height graphs included in this section provide frame rate performance results for both single GigE port and dual GigE LAG configurations at 8-bit or 16-bit output formats.

Resolution and ROI measurements

- Frame rate data was generated using `StreamBytesPerSecond` = 124 MBps and 8-bit or 16-bit pixel format
  - 8-bit pixel formats: Mono8, BayerRG8, or BayerGR8
  - 16-bit pixel formats: Mono12, BayerRG12, or BayerGR12

  Frame rates may be lower if using network hardware incapable of 124 MBps.
- ROIs are center image, where attribute `OffsetY` = (full sensor height – ROI height)/2, for maximum speed advantage on a quad-tap CCD sensor.
- The camera frame rate can be increased by reducing the camera's height attribute, resulting in a decreased ROI or “window”.
- The camera frame rate can also be increased by increasing the camera's `BinningVertical` attribute, resulting in a vertically scaled image (less overall height with same field of view).
- There is no frame rate increase with reduced width.

Specifications common to all models

Feature	Specification
Shutter type	Global
Optical filter	• Monochrome models: No optical filter • Color models: IRC30 IR cut filter
Opto-isolated I/Os	2 inputs, 4 outputs
RS232	1
Voltage requirements	10 to 24 VDC
Operating temperature	0 to +50 °C ambient temperature (without condensation)
Storage temperature	-10 to +70 °C ambient temperature (without condensation)
Operating humidity	20% to 80% non-condensing
Interface standard	• IEEE 802.3 1000BASE-T (Gigabit Ethernet) • GigE Vision Standard V1.2

Table 6: Specifications common to all Prosilica GX models

Prosilica GX1050 series

The following table provides model series specifications. The values are valid for Prosilica GX1050 and GX1050C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX1050	**Prosilica GX1050C**
Sensor model	ON Semi KAI-01050 TRUESENSE Gen 2	
Resolution (H × V)	1024 × 1024 1 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/2	
Sensor size	7.96 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	109 fps (single GigE mode) 112 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	5.4 W (single GigE mode); 6.7 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	107.2 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 7: Prosilica GX1050 model series specifications

Absolute QE

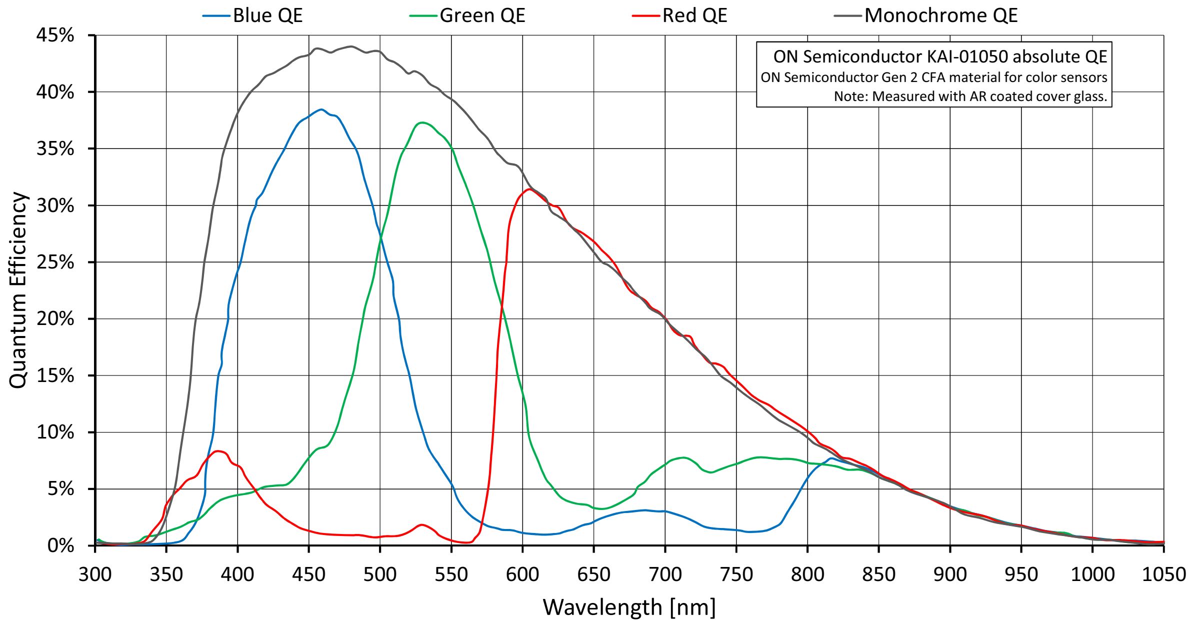


Figure 8: Prosilica GX1050 (ON Semi KAI-01050 Gen2) absolute QE

ROI frame rate

8-bit output format

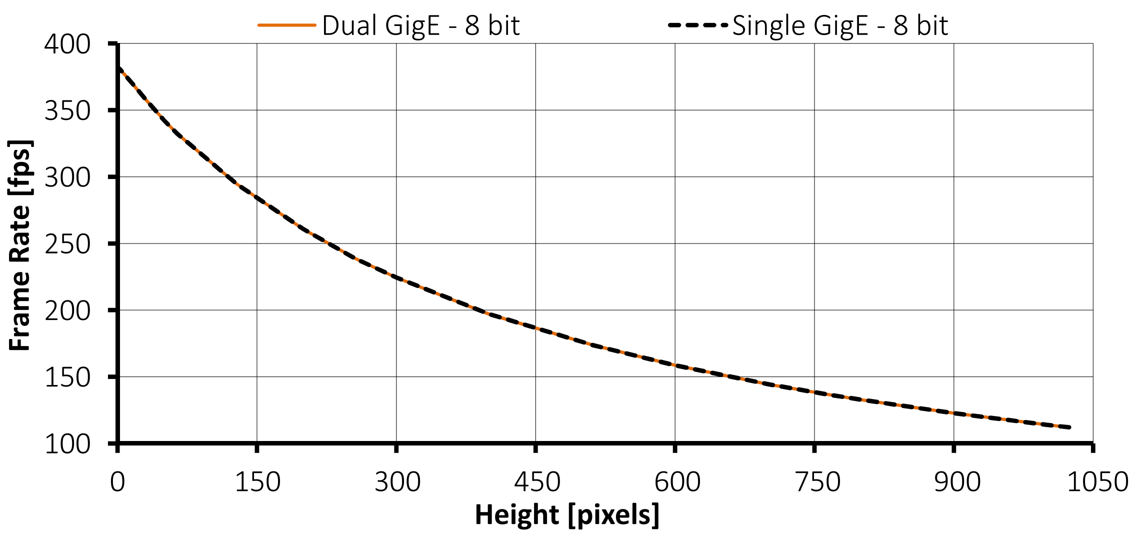


Figure 9: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1024	1024	0	112.1	112.1
1000	1024	12	114.0	114.0
900	1024	62	122.7	122.7
800	1024	112	132.8	132.8
768	1024	128	136.3	136.3
700	1024	162	144.4	144.4
600	1024	212	158.6	158.6
512	1024	256	173.7	173.7
400	1024	312	197.0	196.9
300	1024	362	224.4	224.4
256	1024	384	238.6	238.6
200	1024	412	260.7	260.7
128	1024	448	294.7	294.7
64	1024	480	332.4	332.4
50	1024	487	342.4	342.4
32	1024	496	356.6	356.6
20	1024	502	366.5	366.5
10	1024	507	374.7	374.7
2	1024	511	381.0	381.0

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 8: Frame rate as a function of ROI height (8-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	512	1024	196.6	197.0
3	340	1024	262.2	263.6
4	256	1024	313.3	315.4
5	204	1024	354.5	358.4
6	170	1024	385.7	392.9
7	146	1024	418.6	421.2
8	128	1024	442.1	444.6

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 9: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

16-bit output format

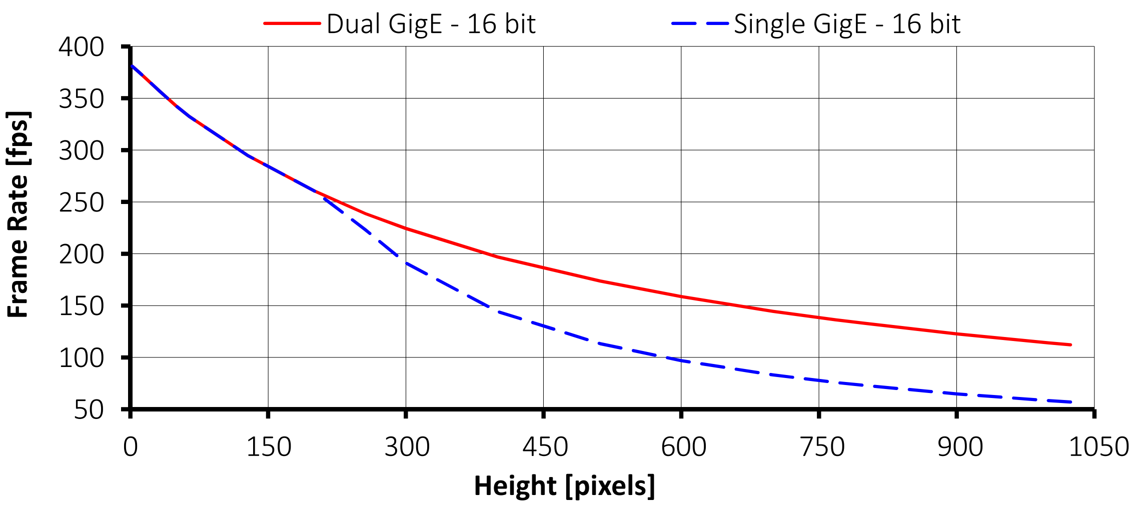


Figure 10: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1024	1024	0	57.1	112.1
1000	1024	12	58.4	114.0
900	1024	62	64.8	122.7
800	1024	112	72.9	132.8
768	1024	128	75.9	136.3
700	1024	162	83.2	144.4
600	1024	212	96.8	158.6
512	1024	256	113.2	173.7
400	1024	312	144.3	197.0
300	1024	362	191.2	224.4
256	1024	384	223.1	238.6
200	1024	412	260.7	260.7
128	1024	448	294.7	294.7
64	1024	480	332.4	332.4
50	1024	487	342.4	342.4
32	1024	496	356.6	356.6
20	1024	502	366.5	366.5
10	1024	507	374.7	374.7

Table 10: Frame rate as a function of ROI height (16-bit pixel format) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2	1024	511	381.0	381.0

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 10: Frame rate as a function of ROI height (16-bit pixel format) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	512	1024	113.1	197.0
3	340	1024	168.4	263.6
4	256	1024	221.1	315.4
5	204	1024	274.4	358.4
6	170	1024	329.3	392.9
7	146	1024	379.9	421.2
8	128	1024	423.4	444.6

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 11: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX1660 series

The following table provides model series specifications. The values are valid for Prosilica GX1660 and GX1660C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX1660	**Prosilica GX1660C**
Sensor model	ON Semi KAI-02050 TRUESENSE Gen 2	
Resolution (H × V)	1600 × 1200 1.9 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.0 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	60 fps (single GigE mode) 66 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	5.6 W (single GigE mode); 6.7 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	107.2 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 12: Prosilica GX1660 model series specifications

Absolute QE

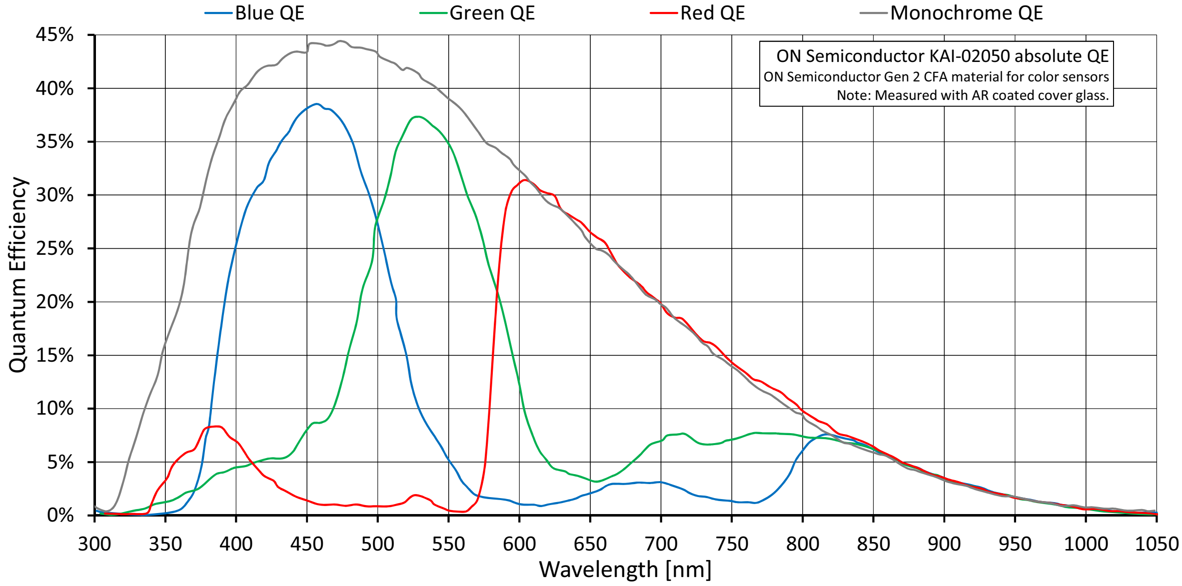


Figure 11: Prosilica GX1660 (ON Semi KAI-02050 Gen 2) absolute QE

ROI frame rate

8-bit output format

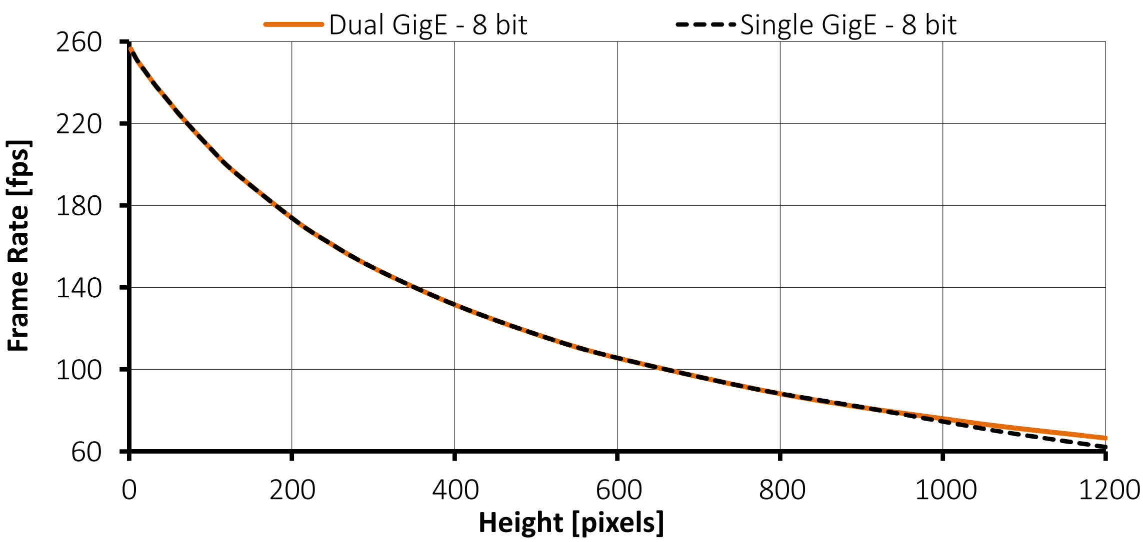


Figure 12: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1200	1600	0	62.1	66.5
1080	1600	60	69.1	71.8
1024	1600	88	72.9	74.7
900	1600	150	81.6	81.5
768	1600	216	90.6	90.6
600	1600	300	105.6	105.6
512	1600	344	115.6	115.6
400	1600	400	131.6	131.6
300	1600	450	149.6	149.6
240	1600	480	163.2	163.2
200	1600	500	173.9	173.9
128	1600	536	196.8	196.8
100	1600	550	207.8	207.8
64	1600	568	223.3	223.3
50	1600	575	230.1	230.1
32	1600	584	238.7	238.7
20	1600	590	245.2	245.2
10	1600	595	250.7	250.7
2	1600	599	256.4	256.4

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 13: Frame rate as a function of ROI height (8-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	600	1600	118.7	121.0
3	400	1600	165.4	165.4
4	300	1600	202.7	202.7
5	240	1600	234.1	234.1
6	200	1600	260.8	260.8
7	170	1600	283.9	283.9
8	150	1600	303.1	303.1

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 14: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

16-bit output format

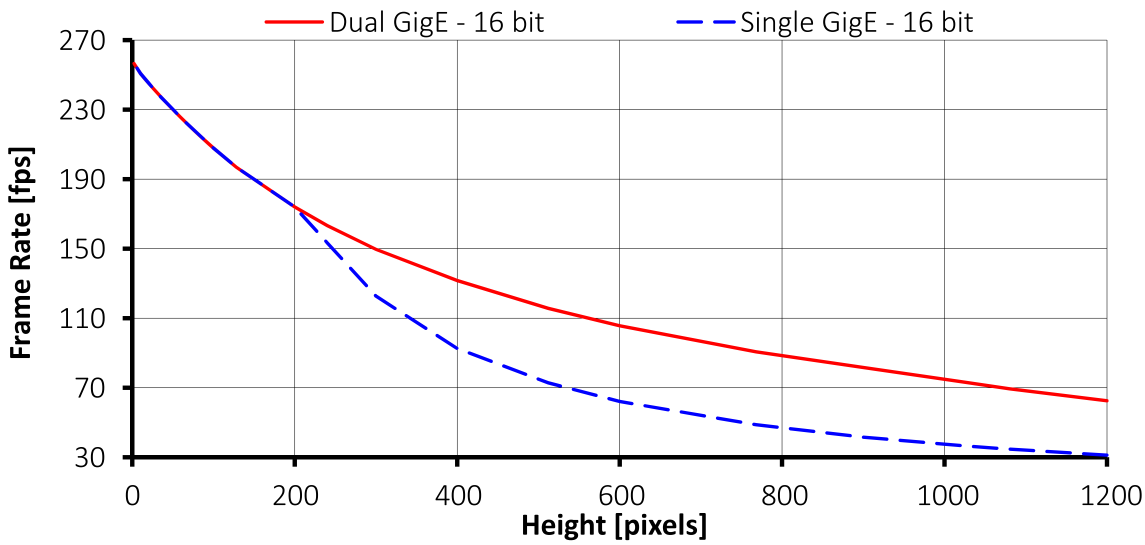


Figure 13: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1200	1600	0	31.3	62.5
1080	1600	60	34.7	69.4
1024	1600	88	36.6	73.2
900	1600	150	41.6	81.6
768	1600	216	48.7	90.7
600	1600	300	62.1	105.6
512	1600	344	72.9	115.7
400	1600	400	92.6	131.6
300	1600	450	122.7	149.6
240	1600	480	153.4	163.2
200	1600	500	174.0	174.0
128	1600	536	196.9	196.9
100	1600	550	207.8	207.8
64	1600	568	223.3	223.3
50	1600	575	230.2	230.2
32	1600	584	238.7	238.8
20	1600	590	245.3	245.3

Table 15: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
10	1600	595	250.8	250.8
2	1600	599	256.5	256.5

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 15: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	600	1600	62.3	120.7
3	400	1600	92.6	165.4
4	300	1600	123.5	202.8
5	240	1600	152.8	234.2
6	200	1600	182.9	260.8
7	170	1600	214.7	284.0
8	150	1600	242.9	303.1

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 16: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX1910 series

The following table provides model series specifications. The values are valid for Prosilica GX1910 and GX1910C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX1910	**Prosilica GX1910C**
Sensor model	ON Semi KAI-02150 TRUESENSE Gen 2	
Resolution (H × V)	1920 × 1080 2.1 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	12.1 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	55 fps (single GigE mode) 63 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	5.6 W (single GigE mode); 6.7 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	107.2 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 17: Prosilica GX1910 model series specifications

Absolute QE

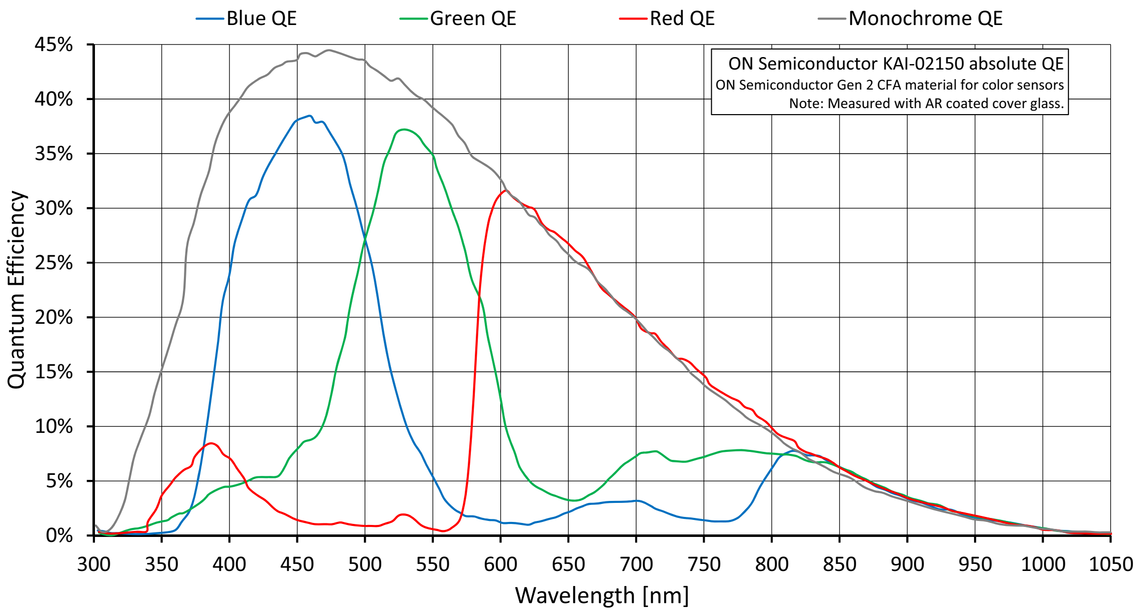


Figure 14: Prosilica GX1910 (ON Semi KAI-02150 Gen 2) absolute QE

ROI frame rate

8-bit output format

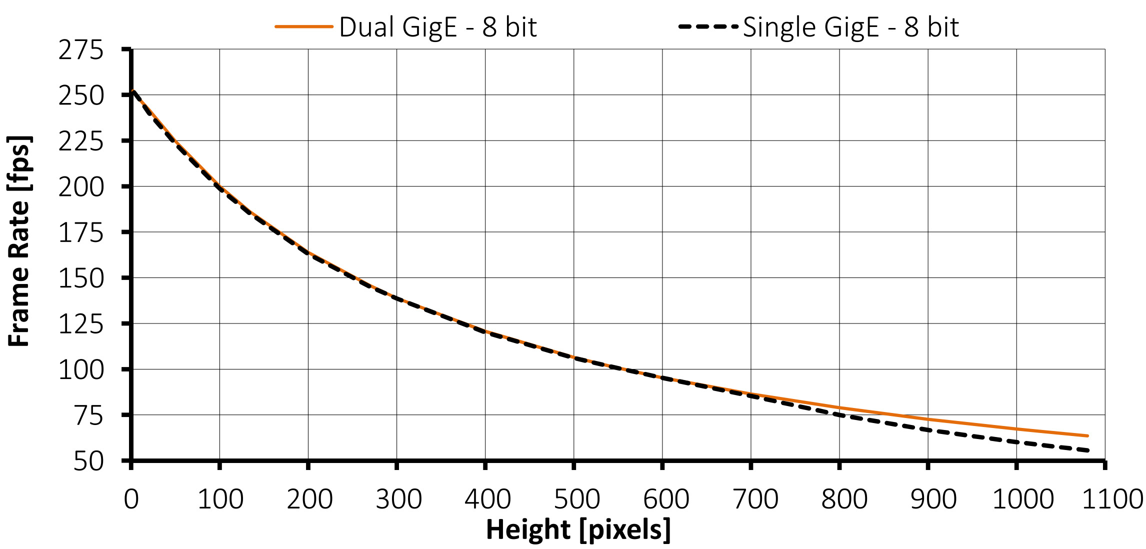


Figure 15: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1080	1920	0	55.6	63.5
1024	1920	28	58.8	66.1
1000	1920	40	60.1	67.3
900	1920	90	66.8	72.6
800	1920	140	74.9	78.9
700	1920	190	85.3	86.4
600	1920	240	95.2	95.3
540	1920	270	101.6	101.7
500	1920	290	106.1	106.5
400	1920	340	120.2	120.7
300	1920	390	138.7	138.8
270	1920	405	145.0	145.6
200	1920	440	163.0	163.8
134	1920	473	185.2	186.2
100	1920	490	198.7	199.9
50	1920	515	223.2	224.7
20	1920	530	240.1	241.9
10	1920	535	247.2	247.2
2	1920	539	252.2	252.2

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 18: Frame rate as a function of ROI height (8-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	540	1920	116.3	116.4
3	360	1920	160.8	160.8
4	270	1920	198.5	198.5
5	216	1920	230.6	230.6
6	180	1920	258.2	258.2
7	154	1920	282.3	282.4
8	134	1920	302.3	302.3

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 19: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

16-bit output format

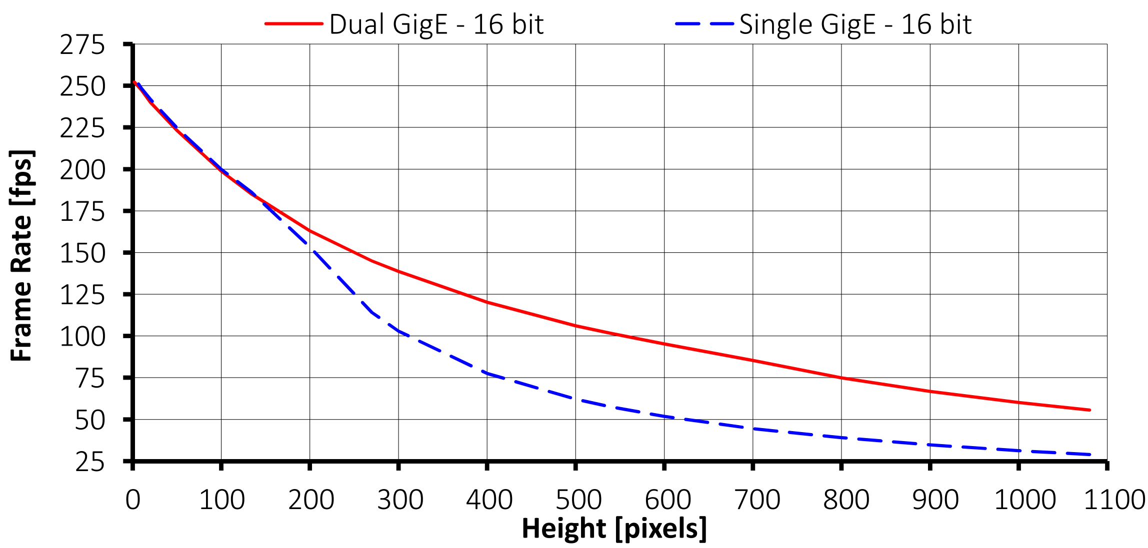


Figure 16: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1080	1920	0	28.9	55.6
1024	1920	28	30.5	58.8
1000	1920	40	31.3	60.1
900	1920	90	34.7	66.8
800	1920	140	39.0	74.9
700	1920	190	44.5	85.3
600	1920	240	51.8	95.2
540	1920	270	57.5	101.6
500	1920	290	62.1	106.1
400	1920	340	77.5	120.2
300	1920	390	102.9	138.7
270	1920	405	114.1	145.0
200	1920	440	153.4	163.0
134	1920	473	186.2	185.2
100	1920	490	199.9	198.7
50	1920	515	224.7	223.2
20	1920	530	241.9	240.1
10	1920	535	248.3	247.2

Table 20: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2	1920	539	254.8	252.2

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 20: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	540	1920	57.5	115.0
3	360	1920	86.1	160.8
4	270	1920	114.1	198.5
5	216	1920	141.5	230.7
6	180	1920	169.2	258.3
7	154	1920	196.3	282.4
8	134	1920	226.5	302.4

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 21: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX1920 series

The following table provides model series specifications. The values are valid for Prosilica GX1920 and GX1920C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX1920	**Prosilica GX1920C**
Sensor model	Sony ICX674ALG with EXview HAD II™ microlens technology	Sony ICX674AQG with EXview HAD II™ microlens technology
Resolution (H × V)	1936 × 1456 2.8 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	10.972 mm diagonal	
Pixel size	4.54 µm × 4.54 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	40 fps (single GigE and dual GigE modes)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	(not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 24 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	5.3 W (single GigE mode); 6.2 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	108.1 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 22: Prosilica GX1920 model series specifications

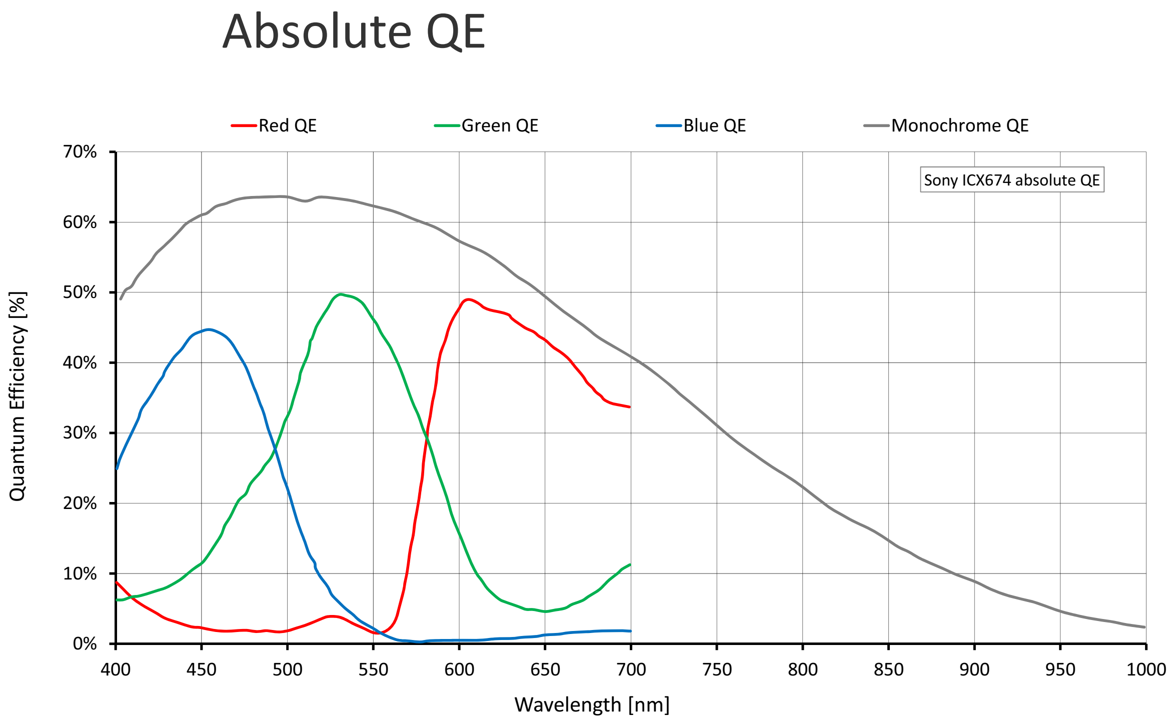


Figure 17: Prosilica GX1920 (Sony ICX674) absolute QE

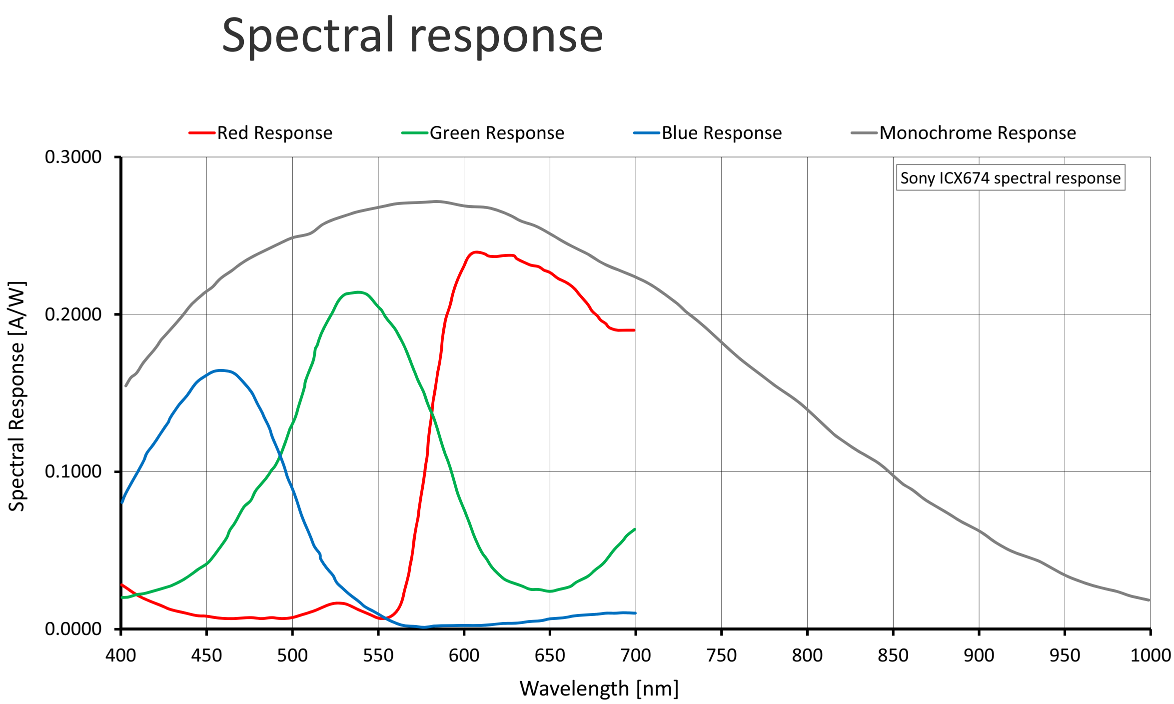


Figure 18: Prosilica GX1920 (Sony ICX674) spectral response

ROI frame rate

8-bit output format

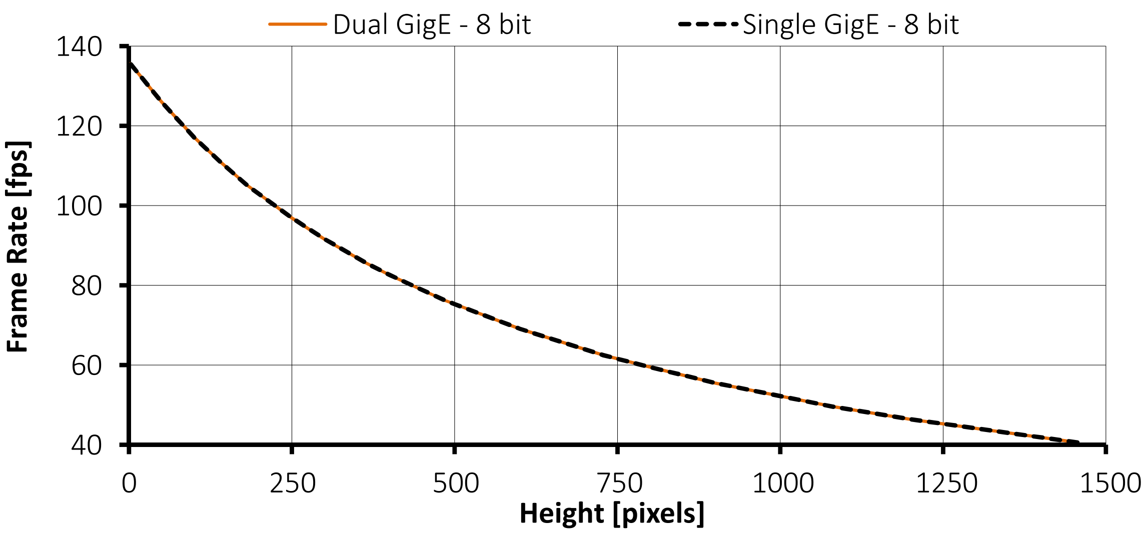


Figure 19: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1456	1936	0	40.6	40.6
1200	1936	128	46.4	46.4
1080	1936	188	49.6	49.6
900	1936	278	55.5	55.5
800	1936	328	59.5	59.5
728	1936	364	62.5	62.5
600	1936	428	69.1	69.1
500	1936	478	75.3	75.3
484	1936	486	76.3	76.3
400	1936	528	82.6	82.6
364	1936	546	85.6	85.6
300	1936	578	91.6	91.6
250	1936	603	96.9	96.9
182	1936	637	105.0	105.0
140	1936	658	111.0	111.0
100	1936	678	117.1	117.1

Table 23: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
50	1936	703	126.0	126.0
2	1936	727	135.6	135.6

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 23: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	728	1936	70.2	70.2
3	484	1936	92.8	92.8
4	364	1936	109.5	109.5
5	290	1936	123.5	123.5
6	242	1936	134.5	134.5
7	208	1936	143.5	143.5
8	182	1936	151.1	151.1

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 24: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

16-bit output format

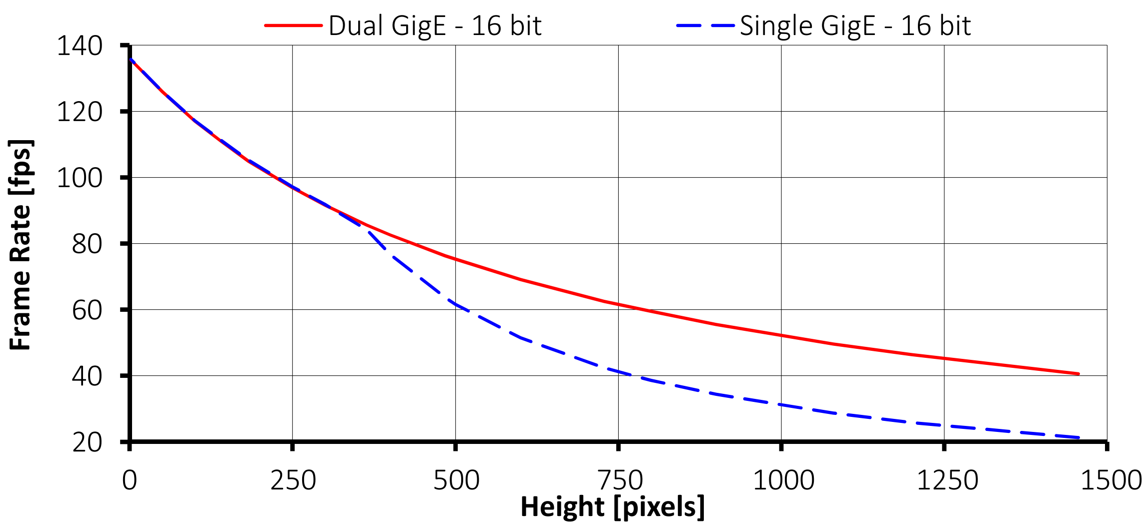


Figure 20: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1456	1936	0	21.3	40.6
1200	1936	128	25.8	46.4
1080	1936	188	28.7	49.6
900	1936	278	34.4	55.5
800	1936	328	38.6	59.5
728	1936	364	42.4	62.5
600	1936	428	51.5	69.1
500	1936	478	61.6	75.3
484	1936	486	63.7	76.3
400	1936	528	76.7	82.6
364	1936	546	84.1	85.6
300	1936	578	91.8	91.6
250	1936	603	97.2	96.9
182	1936	637	105.3	105.0
140	1936	658	111.3	111.0
100	1936	678	117.2	117.1
50	1936	703	126.0	126.0
2	1936	727	135.7	135.6

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 25: Frame rate as a function of ROI height (16-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	728	1936	42.5	70.3
3	484	1936	63.6	92.8
4	364	1936	84.2	110.0
5	290	1936	105.8	124.1
6	242	1936	125.6	135.1
7	208	1936	144.1	144.1
8	182	1936	151.7	151.7

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 26: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX2300 series

The following table provides model series specifications. The values are valid for Prosilica GX2300 and GX2300C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX2300	**Prosilica GX2300C**
Sensor model	ON Semi KAI-04050 TRUESENSE Gen 2	
Resolution (H × V)	2336 × 1752 4.1 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1	
Sensor size	16.06 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	28 fps (single GigE mode) 32 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	5.8 W (single GigE mode); 6.9 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	107.2 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 27: Prosilica GX2300 model series specifications

Absolute QE

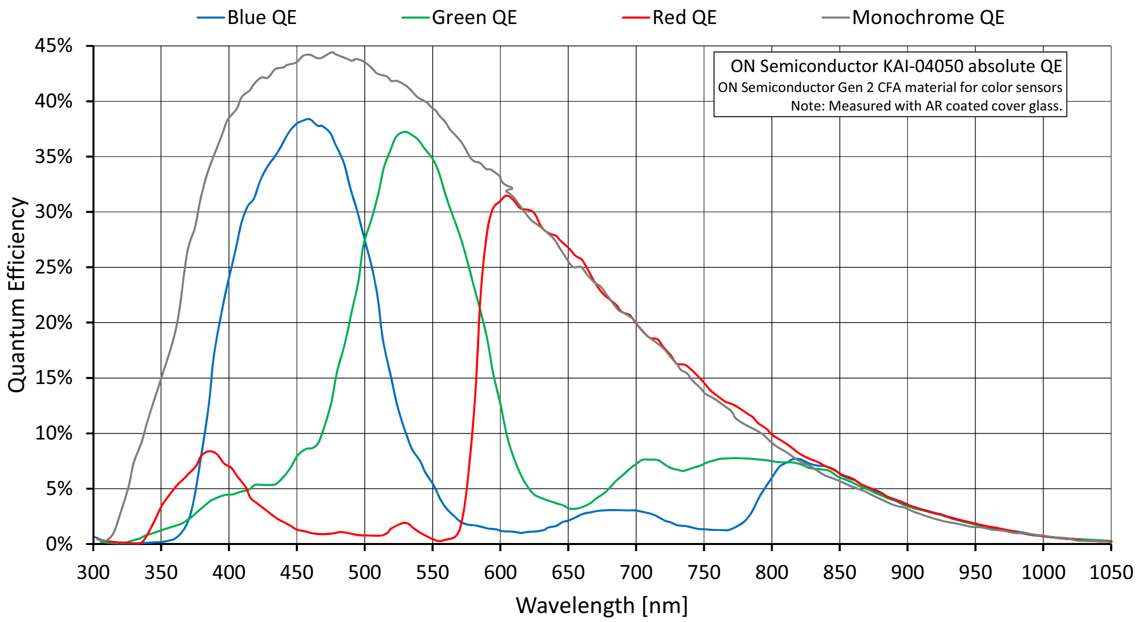


Figure 21: Prosilica GX2300, GX2300C (ON Semi KAI-04050 Gen 2) absolute QE

ROI frame rate

8-bit output format

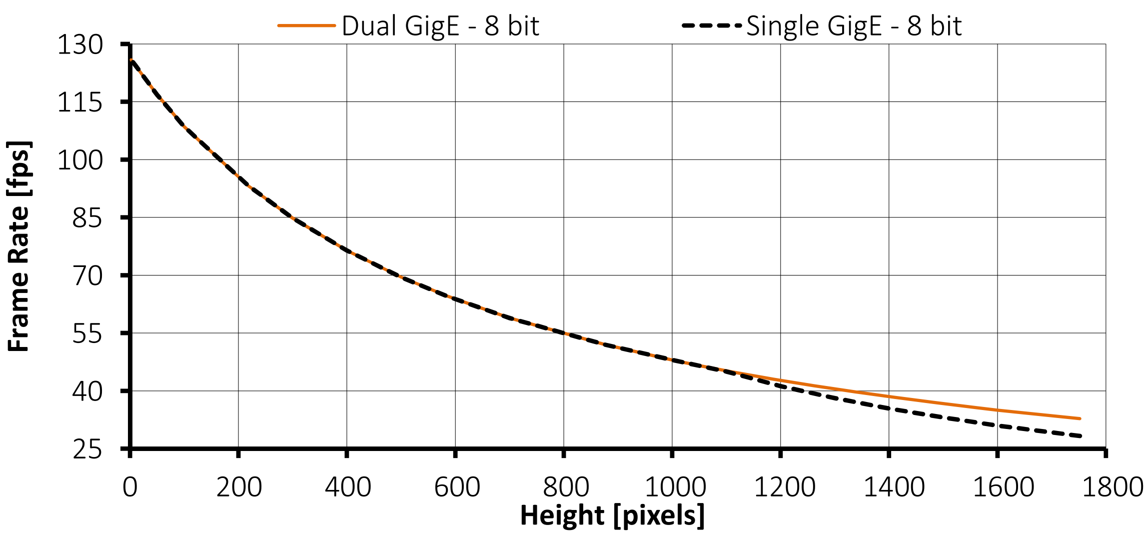


Figure 22: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1752	2336	0	28.3	32.8
1600	2336	76	31.0	35.0
1500	2336	126	33.1	36.7
1400	2336	176	35.4	38.5
1300	2336	226	38.1	40.5
1200	2336	276	41.2	42.7
1100	2336	326	45.0	45.2
1000	2336	376	48.0	48.0
876	2336	438	52.0	52.0
700	2336	526	58.9	58.9
584	2336	584	64.6	64.6
500	2336	626	69.5	69.5
400	2336	676	76.4	76.4
300	2336	726	84.8	84.8
218	2336	767	93.2	93.2
100	2336	826	108.5	108.5
50	2336	851	116.8	116.8
10	2336	871	124.4	124.4
2	2336	875	125.9	125.9

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 28: Frame rate as a function of ROI height (8-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	876	2336	56.5	59.3
3	584	2336	81.2	81.2
4	438	2336	99.5	99.5
5	350	2336	115.0	115.0
6	292	2336	128.0	128.0
7	250	2336	139.4	139.4
8	218	2336	148.2	148.2

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 29: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

16-bit output format

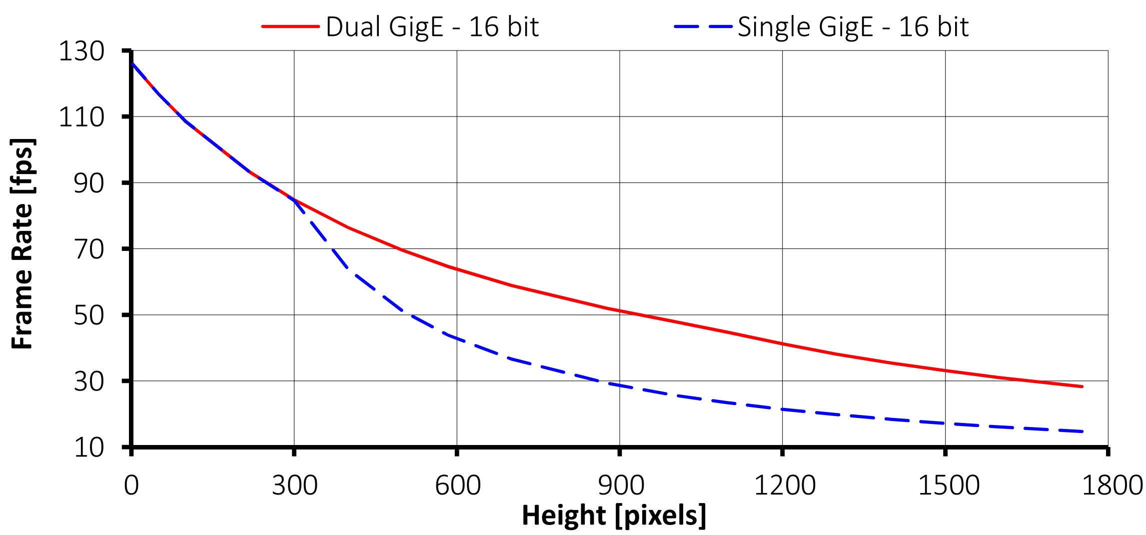


Figure 23: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
1752	2336	0	14.7	28.3
1600	2336	76	16.1	31.0
1500	2336	126	17.2	33.1
1400	2336	176	18.4	35.4
1300	2336	226	19.8	38.1
1200	2336	276	21.4	41.2
1100	2336	326	23.4	44.7
1000	2336	376	25.7	48.0
876	2336	438	29.3	52.0
700	2336	526	36.6	58.9
584	2336	584	43.8	64.6
500	2336	626	51.1	69.5
400	2336	676	63.7	76.4
300	2336	726	84.6	84.8
218	2336	767	93.2	93.2
100	2336	826	108.6	108.5
50	2336	851	116.8	116.8
10	2336	871	124.5	124.4

Table 30: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2	2336	875	125.9	125.9

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 30: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	876	2336	29.3	58.6
3	584	2336	43.8	81.2
4	438	2336	58.3	99.5
5	350	2336	73.0	115.0
6	292	2336	87.2	128.1
7	250	2336	101.5	139.5
8	218	2336	115.8	148.3

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 31: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX2750 series

The following table provides model series specifications. The values are valid for Prosilica GX2750 and GX2750C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX2750	Prosilica GX2750C
Sensor model	Sony ICX694ALG with EXview HAD CCD II™ technology	Sony ICX694AQG with EXview HAD CCD II™ technology
Resolution (H × V)	2750 × 2200 6.1 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1	
Sensor size	15.989 mm diagonal	
Pixel size	4.54 µm × 4.54 µm	
Lens mount	C-Mount	
Maximum frame rate at full resolution	19 fps (single GigE mode) 20 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed
RAW pixel formats	(not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure control	10 µs to 60 s; 1 µs increments	
Gain control	0 to 33 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	6.1 W (single GigE mode); 7.1 W (dual GigE mode)	
Mass (typical)	269 g	
Body dimensions (L × W × H)	108.1 × 53.3 × 33 mm	
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 32: Prosilica GX2750 model series specifications

Absolute QE

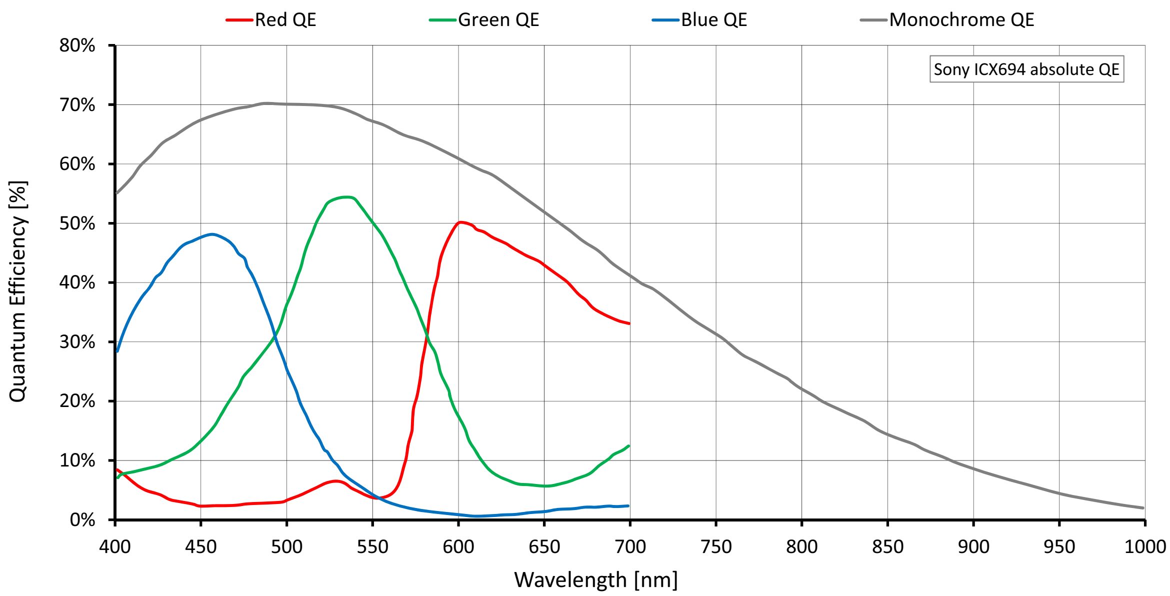


Figure 24: Prosilica GX2750 (Sony ICX694) absolute QE

Spectral response

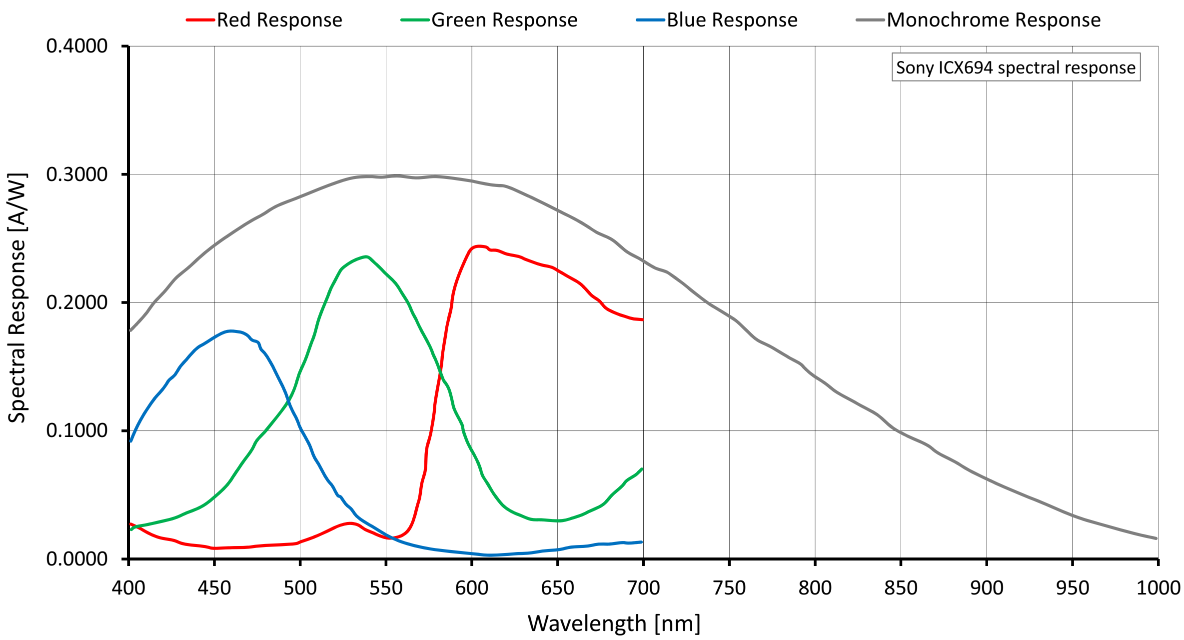


Figure 25: Prosilica GX2750 (Sony ICX694) spectral response

ROI frame rate

8-bit output format

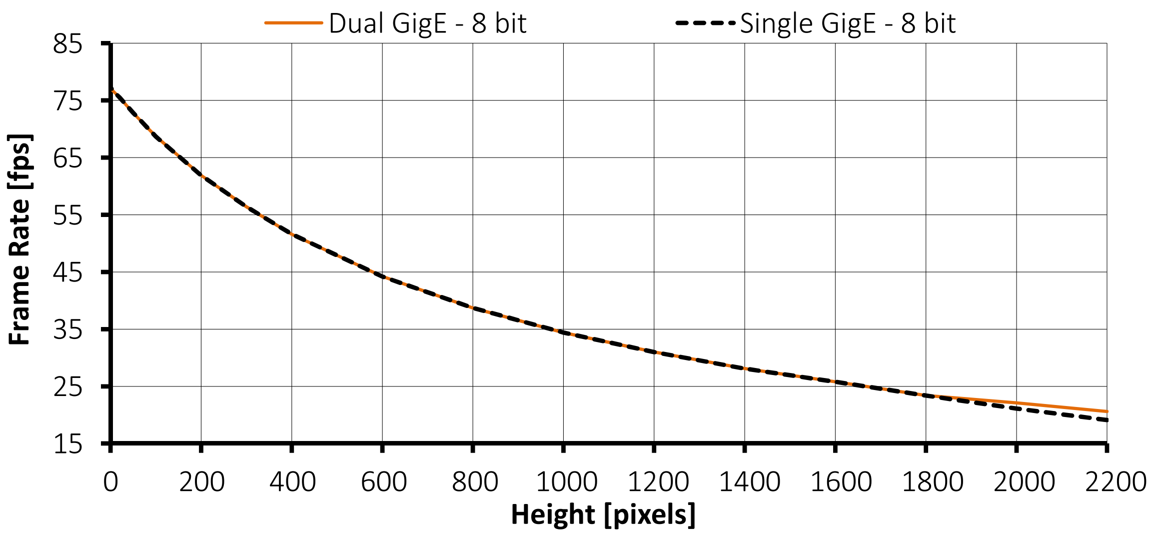


Figure 26: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2200	2752	0	19.1	20.6
2000	2752	100	21.1	22.1
1800	2752	200	23.4	23.4
1600	2752	300	25.8	25.8
1400	2752	400	28.1	28.1
1200	2752	500	31.0	31.0
1000	2752	600	34.4	34.4
800	2752	700	38.7	38.7
600	2752	800	44.2	44.2
400	2752	900	51.6	51.6
300	2752	950	56.4	56.4
200	2752	1000	61.9	61.9
100	2752	1050	68.7	68.7
50	2752	1075	72.8	72.8
20	2752	1090	75.5	75.5
10	2752	1095	76.3	76.3

Table 33: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
5	2752	1097.5	76.7	76.7
2	2752	1099	77.1	77.1

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 33: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	1100	2752	36.9	36.9
3	732	2752	50.1	50.1
4	550	2752	60.8	60.8
5	440	2752	69.6	69.6
6	366	2752	77.2	77.2
7	314	2752	83.5	83.5
8	274	2752	88.4	88.4

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 34: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

16-bit output format

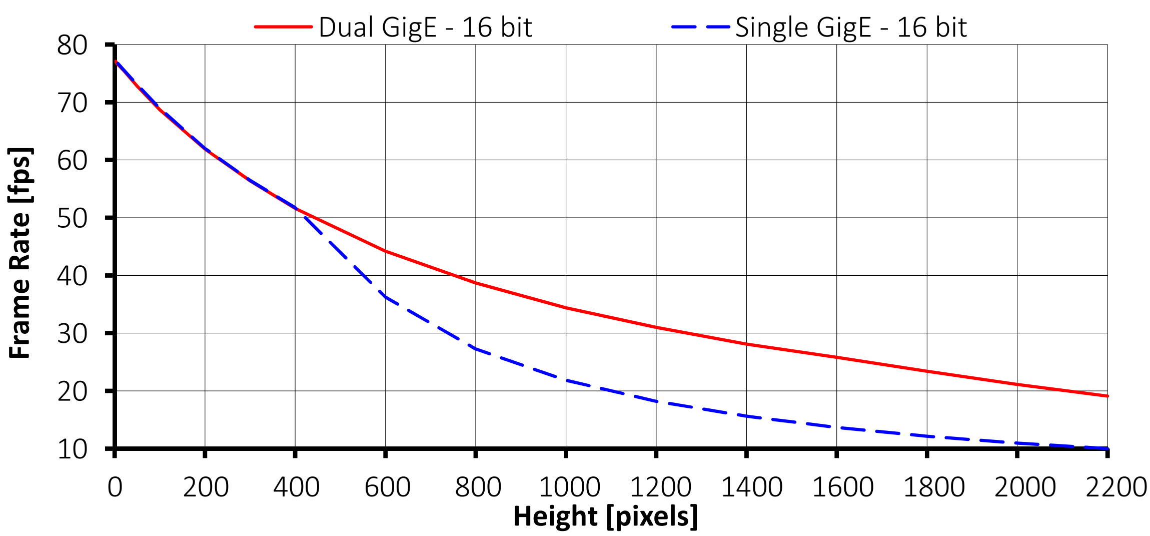


Figure 27: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2200	2752	0	10.0	19.1
2000	2752	100	10.9	21.1
1800	2752	200	12.1	23.4
1600	2752	300	13.7	25.8
1400	2752	400	15.6	28.1
1200	2752	500	18.2	31.0
1000	2752	600	21.8	34.4
800	2752	700	27.3	38.7
600	2752	800	36.3	44.2
400	2752	900	51.7	51.6
300	2752	950	56.5	56.4
200	2752	1000	62.0	61.9
100	2752	1050	68.9	68.7
50	2752	1075	73.0	72.8
20	2752	1090	75.6	75.5
10	2752	1095	76.5	76.3
5	2752	1097.5	76.9	76.7
2	2752	1099	77.3	77.1

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 35: Frame rate as a function of ROI height (16-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	1100	2752	19.9	37.0
3	732	2752	29.8	50.2
4	550	2752	39.6	60.9
5	440	2752	49.4	69.8
6	366	2752	59.3	77.4
7	314	2752	68.9	83.8
8	274	2752	78.8	88.9

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 36: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX3300 series

The following table provides model series specifications. The values are valid for Prosilica GX3300 and GX3300C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX3300	Prosilica GX3300C
Sensor model	ON Semi KAI-08050 TRUESENSE Gen 2	
Resolution (H × V)	3296 × 2472 8.1 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 4/3	
Sensor size	22.66 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	Default: F-Mount Optional: C-Mount	
Maximum frame rate at full resolution	14.7 fps (single GigE mode) 17.1 fps (dual GigE mode)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	10 µs to 60s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	6.1 W (single GigE mode); 7.2 W (dual GigE mode)	
Mass (typical)	365 g	
Body dimensions (L × W × H)	136.7 × 59.7 × 59.7 mm	

Table 37: Prosilica GX3300 model series specifications (sheet 1 of 2)

Feature	Specification	
	Prosilica GX3300	Prosilica GX3300C
Trigger latency	1.5 µs	
Trigger jitter	±0.5 µs	

Table 37: Prosilica GX3300 model series specifications (sheet 2 of 2)

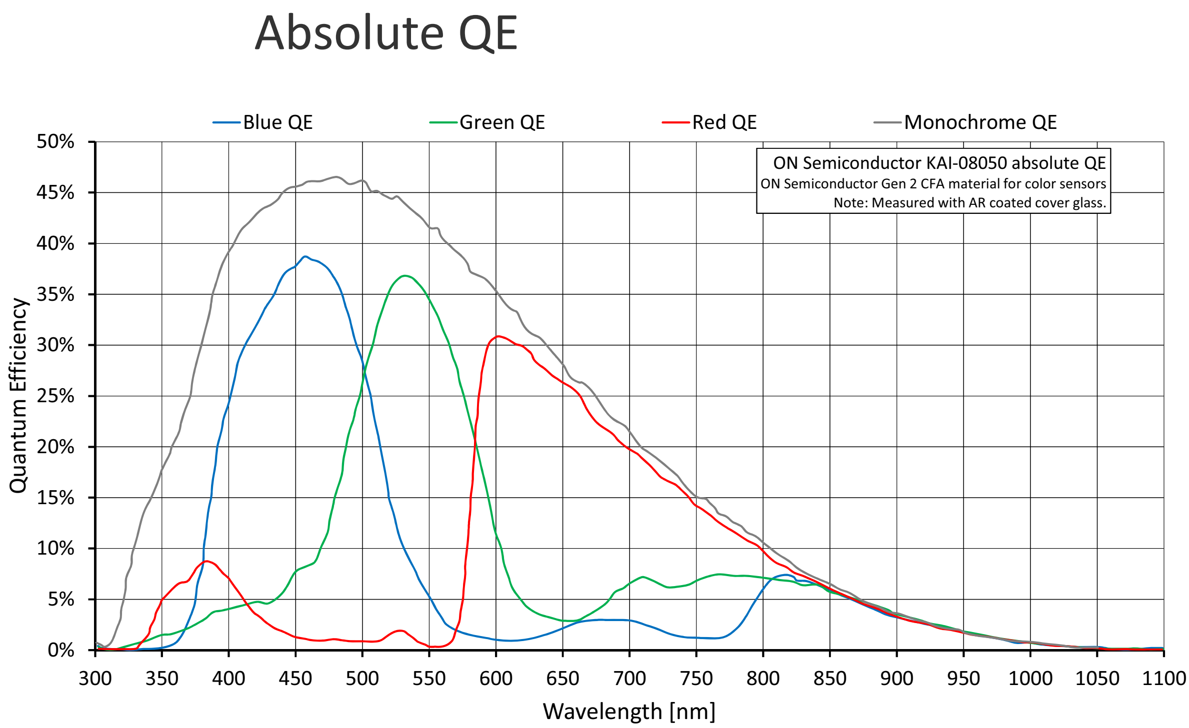


Figure 28: Prosilica GX3300 (ON Semi KAI-08050 Gen 2) absolute QE

ROI frame rate

8-bit output format

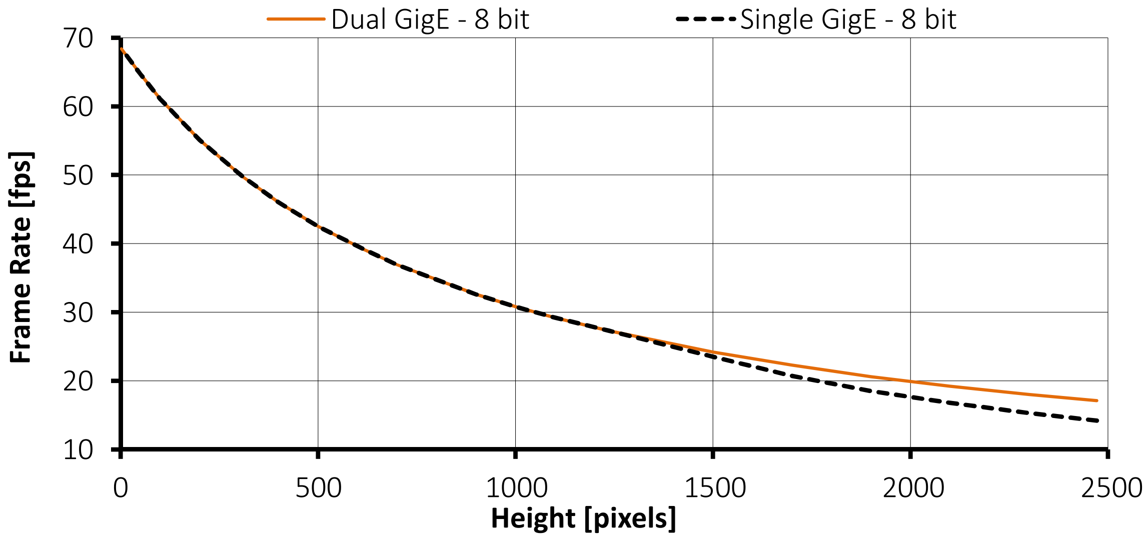


Figure 29: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2472	3296	0	14.7	17.1
2300	3296	86	15.8	18.0
2100	3296	186	17.4	19.2
1900	3296	286	19.2	20.6
1700	3296	386	21.5	22.3
1500	3296	486	24.2	24.2
1236	3296	618	27.3	27.3
1100	3296	686	29.2	29.2
1000	3296	736	30.8	30.8
900	3296	786	32.6	32.6
700	3296	886	36.9	36.9
618	3296	927	39.1	39.1
500	3296	986	42.5	42.5
400	3296	1036	46.0	46.0
308	3296	1082	49.8	49.8
200	3296	1136	55.1	55.1

Table 38: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
100	3296	1186	61.1	61.1
50	3296	1211	64.7	64.7
2	3296	1235	68.4	68.4

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 38: Frame rate as a function of ROI height (8-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	1236	3296	29.4	31.2
3	824	3296	43.1	43.1
4	618	3296	53.1	53.1
5	494	3296	61.8	61.8
6	412	3296	69.5	69.5
7	352	3296	75.8	75.8
8	308	3296	81.4	81.4

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 39: Frame rate as a function of ROI height (8-bit pixel formats)

16-bit output format

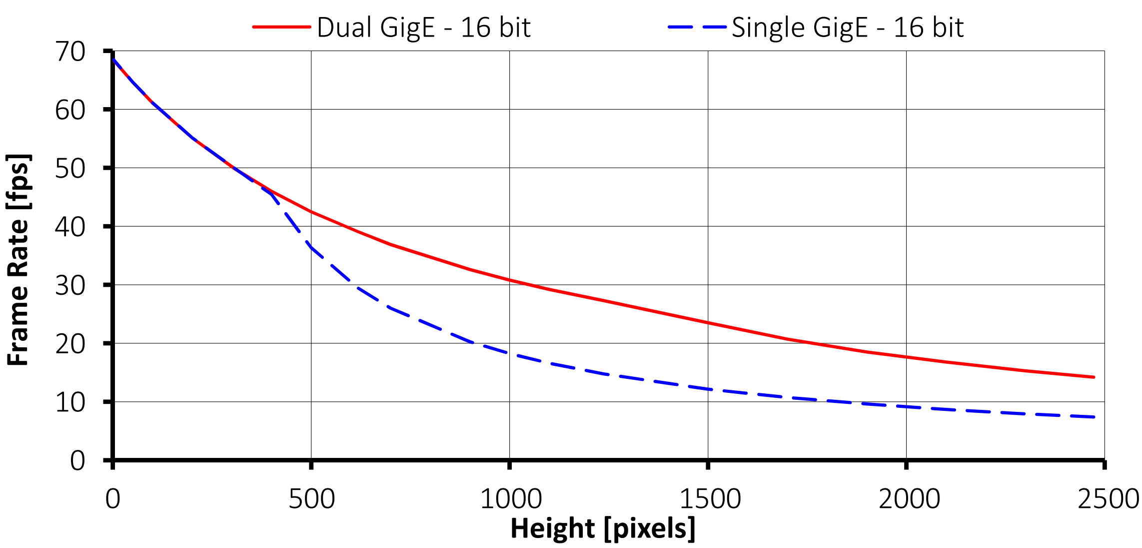


Figure 30: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2472	3296	0	7.4	14.2
2300	3296	86	7.9	15.3
2100	3296	186	8.7	16.8
1900	3296	286	9.6	18.5
1700	3296	386	10.7	20.7
1500	3296	486	12.2	23.5
1236	3296	618	14.8	27.3
1100	3296	686	16.6	29.2
1000	3296	736	18.2	30.8
900	3296	786	20.2	32.6
700	3296	886	26.0	36.9
618	3296	927	29.4	39.1
500	3296	986	36.3	42.5
400	3296	1036	45.4	46.0
308	3296	1082	49.9	49.8
200	3296	1136	55.2	55.1
100	3296	1186	61.2	61.1
50	3296	1211	64.7	64.7
2	3296	1235	68.5	68.4

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 40: Frame rate as a function of ROI height (16-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	1236	3296	14.8	29.5
3	824	3296	22.1	43.1
4	618	3296	29.5	53.2
5	494	3296	36.8	62.0
6	412	3296	44.1	69.5
7	352	3296	51.4	75.8
8	308	3296	58.8	81.4

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 41: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX6600 series

The following table provides model series specifications. The values are valid for Prosilica GX6600 and GX6600C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GX6600	**Prosilica GX6600C**
Sensor model	ON Semi KAI-29050 TRUESENSE Gen 2	
Resolution (H × V)	6576 × 4384 28.8 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 35mm	
Sensor size	43.47 mm diagonal	
Pixel size	5.5 µm × 5.5 µm	
Lens mount	F-Mount	
Maximum frame rate at full resolution	4 fps (single GigE and dual GigE modes)	
A/D	14-bit	
Image buffer	128 MB	
Bit depth	14-bit	12-bit
Monochrome pixel formats	Mono8, Mono12, Mono12Packed, Mono14	Mono8
YUV color pixel formats	(not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(not applicable)	RGB8Packed, BGR8Packed, RGBA8Packed, BGRA8Packed, RGB12Packed
RAW pixel formats	(not applicable)	BayerGR8, BayerGR12, BayerGR12Packed
Exposure control	30 µs to 60 s; 1 µs increments	
Gain control	0 to 34 dB	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 8 rows	
Power consumption	6.7 W (single GigE mode); 7.6 W (dual GigE mode)	
Mass (typical)	510 g	
Body dimensions (L × W × H)	136.6 × 59.7 × 59.7 mm	
Trigger latency	2.5 µs	
Trigger jitter	±0.5 µs	

Table 42: Prosilica GX6600 model series specifications

Absolute QE

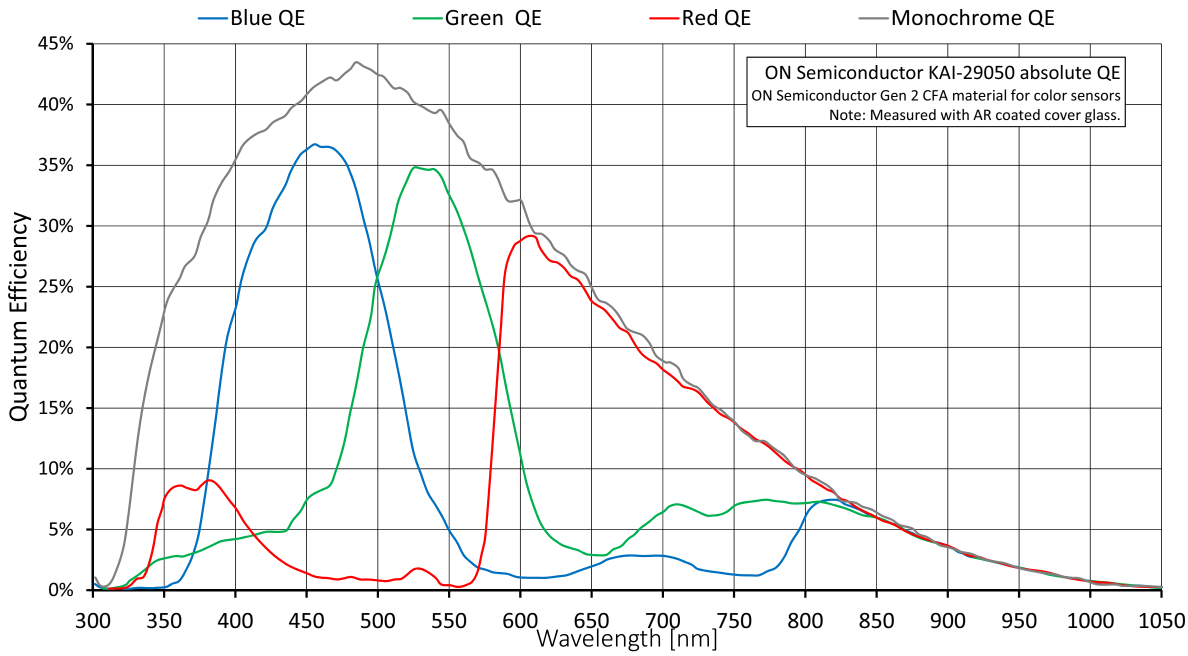


Figure 31: Prosilica GX6600 (ON Semi KAI-29050 Gen 2) absolute QE

ROI frame rate

8-bit output format

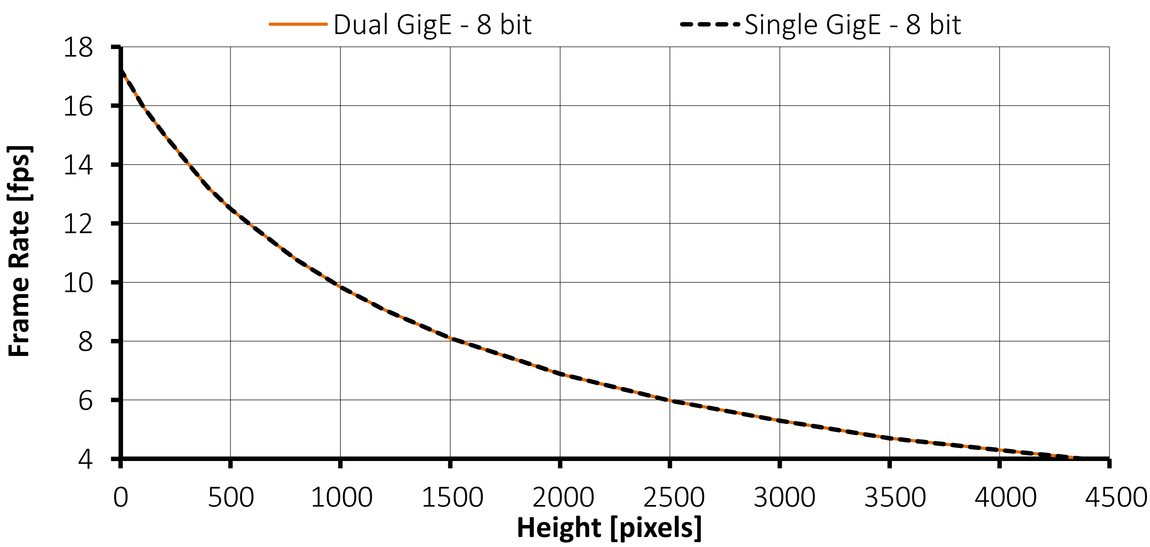


Figure 32: Frame rate as a function of ROI height (8-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
4384	6576	0	4.0	4.0
4000	6576	192	4.3	4.3
3500	6576	442	4.7	4.7
3000	6576	692	5.3	5.3
2500	6576	942	6.0	6.0
2000	6576	1192	6.9	6.9
1500	6576	1442	8.1	8.1
1200	6576	1592	9.1	9.1
1000	6576	1692	9.8	9.8
800	6576	1792	10.8	10.8
600	6576	1892	11.9	11.9
500	6576	1942	12.5	12.5
400	6576	1992	13.2	13.2
300	6576	2042	14.1	14.1
200	6576	2092	15.0	15.0
100	6576	2142	16.0	16.0
50	6576	2167	16.6	16.6
10	6576	2187	17.1	17.1
2	6576	2191	17.2	17.2
1	6576	2191	17.2	17.2

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 43: Frame rate as a function of ROI height (8-bit pixel formats)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	2192	6576	7.4	7.4
3	1460	6576	10.4	10.4
4	1096	6576	13	13
5	876	6576	15.3	15.3
6	730	6576	17.4	17.4
7	626	6576	19.1	19.1
8	548	6576	20.7	20.7

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 44: Frame rate as a function of ROI height (8-bit pixel formats) with vertical binning enabled

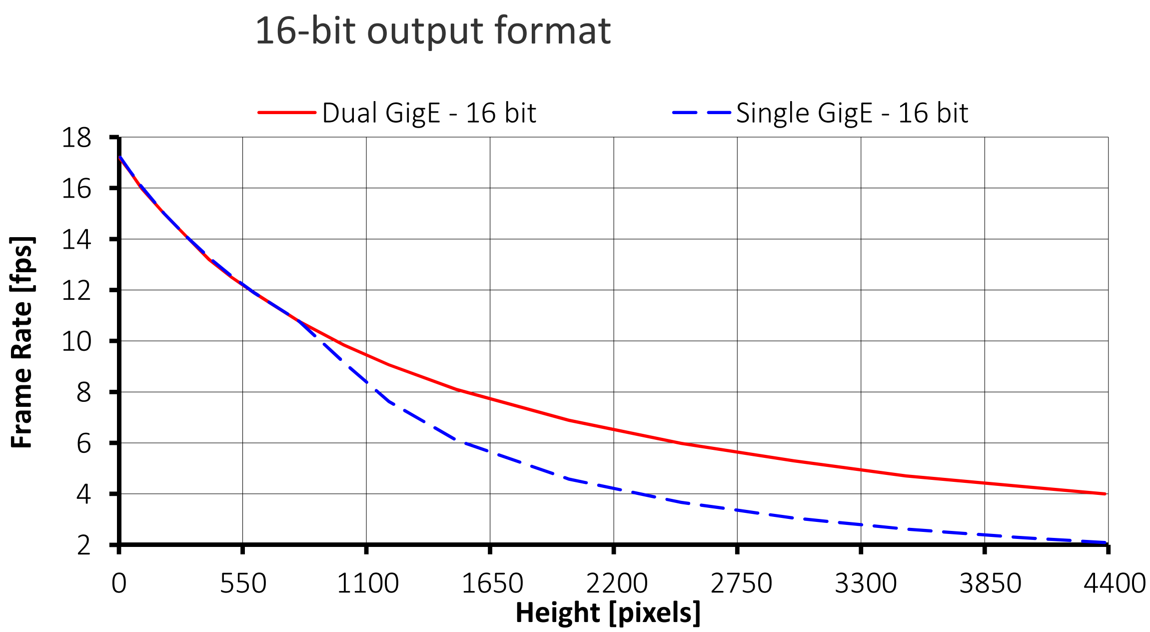


Figure 33: Frame rate as a function of ROI height (16-bit pixel formats)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
4384	6576	0	2.1	4.0
4000	6576	192	2.3	4.3
3500	6576	442	2.6	4.7
3000	6576	692	3.1	5.3
2500	6576	942	3.7	6.0
2000	6576	1192	4.6	6.9
1500	6576	1442	6.1	8.1
1200	6576	1592	7.6	9.1
1000	6576	1692	9.2	9.8
800	6576	1792	10.8	10.8
600	6576	1892	11.9	11.9
500	6576	1942	12.5	12.5
400	6576	1992	13.3	13.2
300	6576	2042	14.1	14.1
200	6576	2092	15.0	15.0
100	6576	2142	16.1	16.0
50	6576	2167	16.7	16.6
10	6576	2187	17.2	17.1

Table 45: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 1 of 2)

Height	Width	OffsetY[1]	Single GigE mode frame rate	Dual GigE mode frame rate
2	6576	2191	17.3	17.2
1	6576	2191	17.3	17.2

[1] For maximum speed advantage ROIs are taken as center image, where attribute `OffsetY` = (full sensor height – ROI height)/2.

Table 45: Frame rate as a function of ROI height (16-bit pixel formats) (sheet 2 of 2)

BinningVertical[1]	Height	Width	Single GigE mode frame rate	Dual GigE mode frame rate
2	2192	6576	4.2	7.5
3	1460	6576	6.3	10.4
4	1096	6576	8.4	13.0
5	876	6576	10.4	15.3
6	730	6576	12.5	17.4
7	626	6576	14.6	19.2
8	548	6576	16.7	20.8

[1] `BinningVertical` is horizontal row summing on CCD before readout.

Table 46: Frame rate as a function of ROI height (16-bit pixel formats) with vertical binning enabled

Prosilica GX model comparison

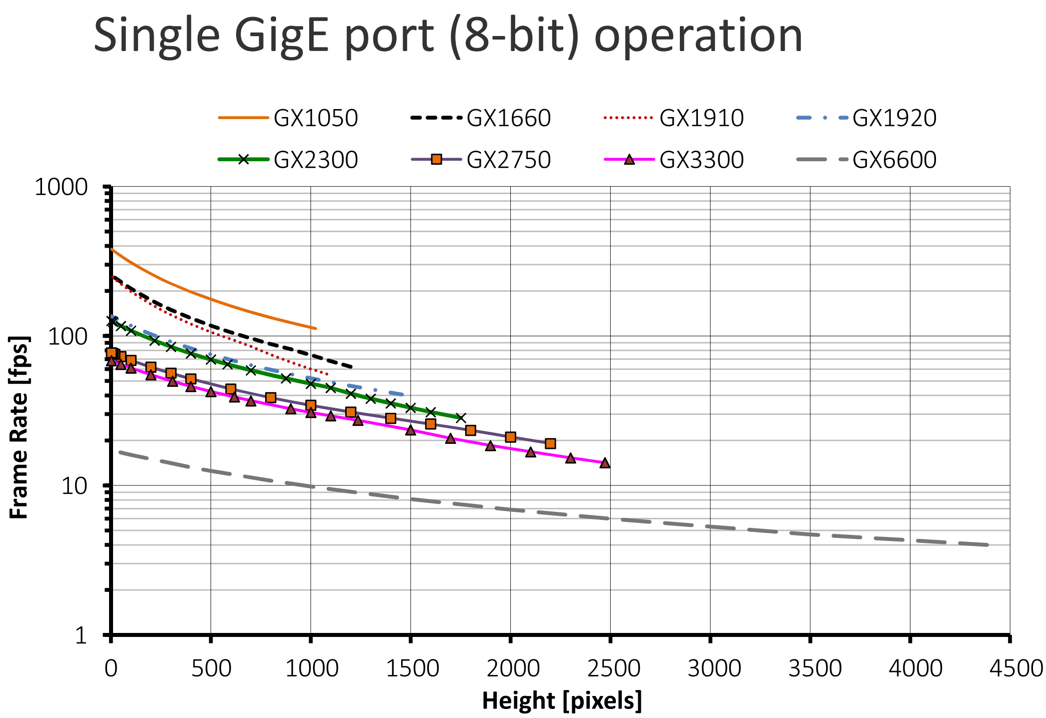


Figure 34: Maximum frame rate versus height for all Prosilica GX cameras using a single Ethernet port (8-bit pixel formats)

Dual GigE LAG (8-bit) operation

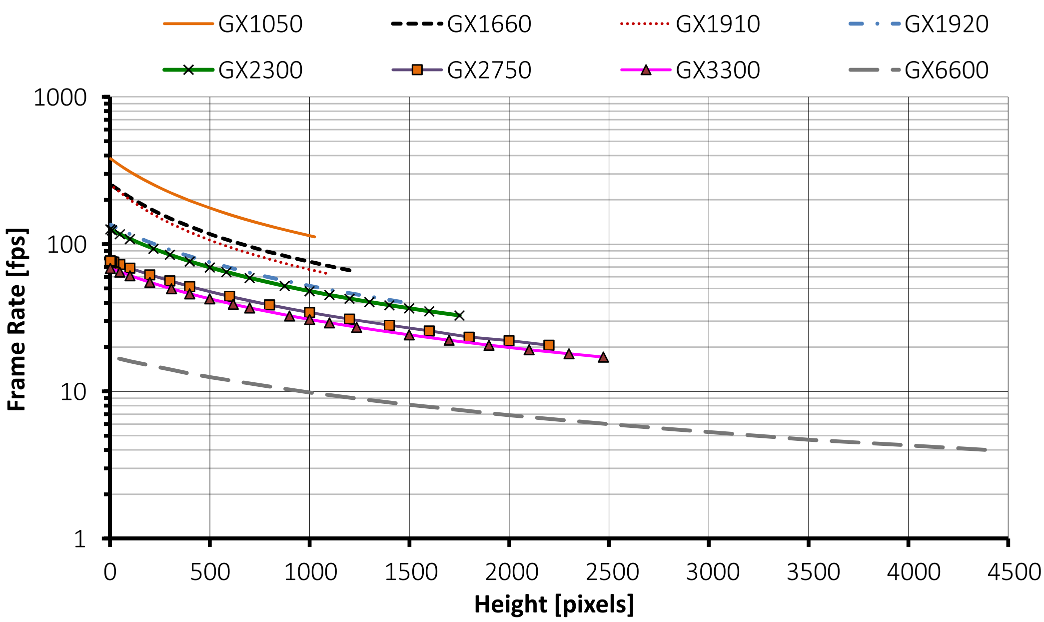


Figure 35: Maximum frame rate versus height for all Prosilica GX cameras using two Ethernet interfaces (8-bit pixel formats)

Single GigE port (16-bit) operation

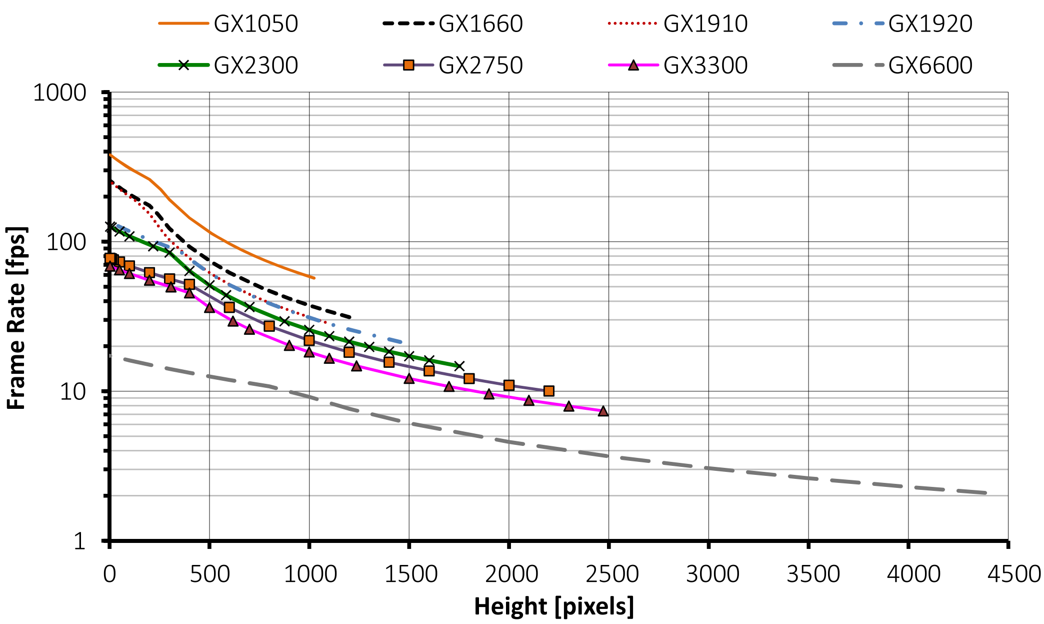


Figure 36: Maximum frame rate versus height for all Prosilica GX cameras using a single Ethernet port (16-bit pixel formats)

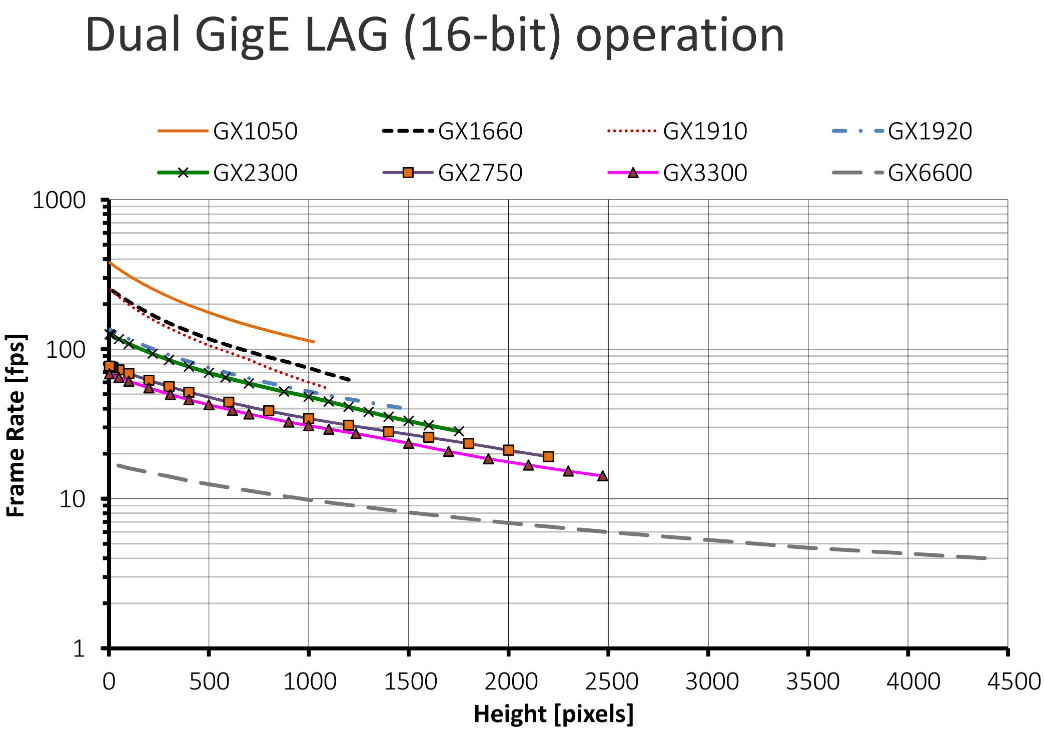


Figure 37: Maximum frame rate as a function of height for all Prosilica GX cameras using two Ethernet interfaces (16-bit pixel formats)

Mechanical dimensions

This chapter includes:

- Mechanical drawings and dimensions of standard, extended, and large format housing models, and tripod adapters
- Sensor position accuracy
- Maximum protrusion distance and filter diameter for C-Mount and F-Mount

The Prosilica GX family supports a range of sensor configurations. The mechanical drawings in this section reflect the following configurations:

- Prosilica GX standard format
- Prosilica GX extended format
- Prosilica GX large format

Prosilica GX standard format housing

Models: Prosilica GX1050, GX1660, GX1910, GX2300
Mount: C-Mount (default)

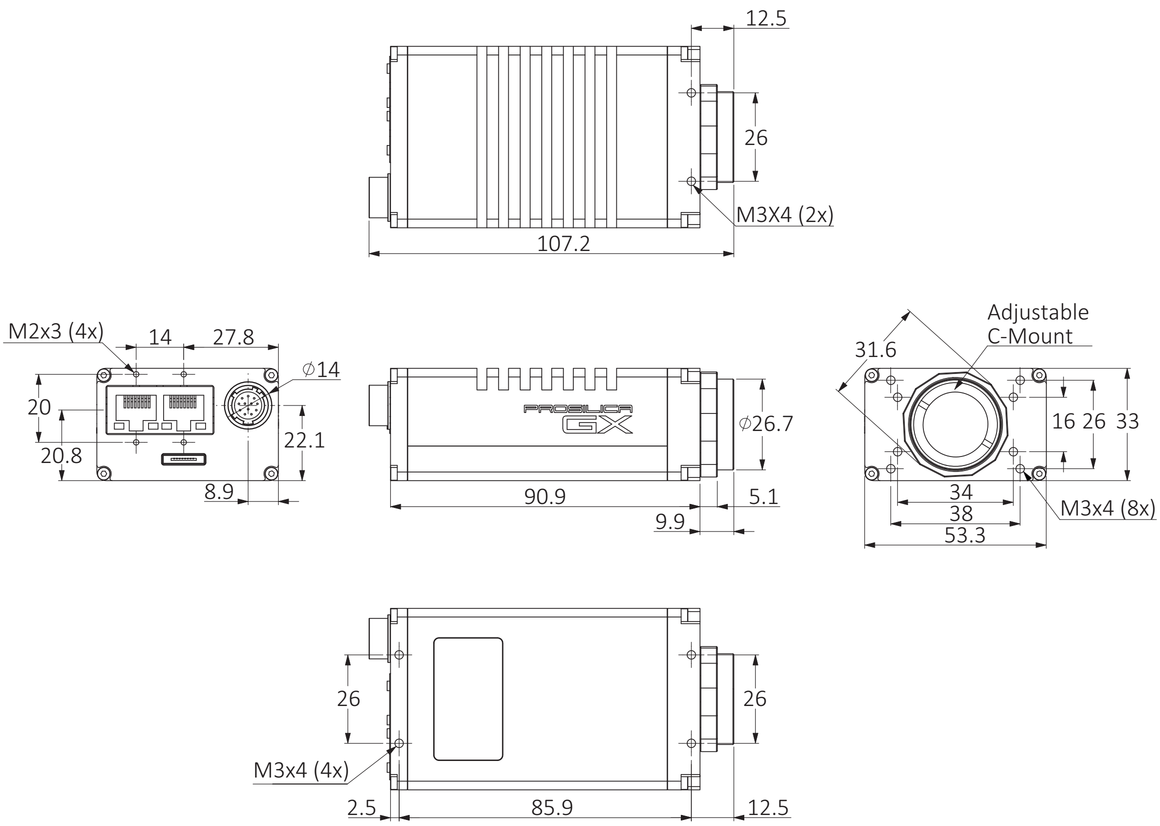


Figure 38: C-Mount standard format housing dimensions

Models: Prosilica GX2300, GX3300
Mount: F-Mount (default for Prosilica GX3300)

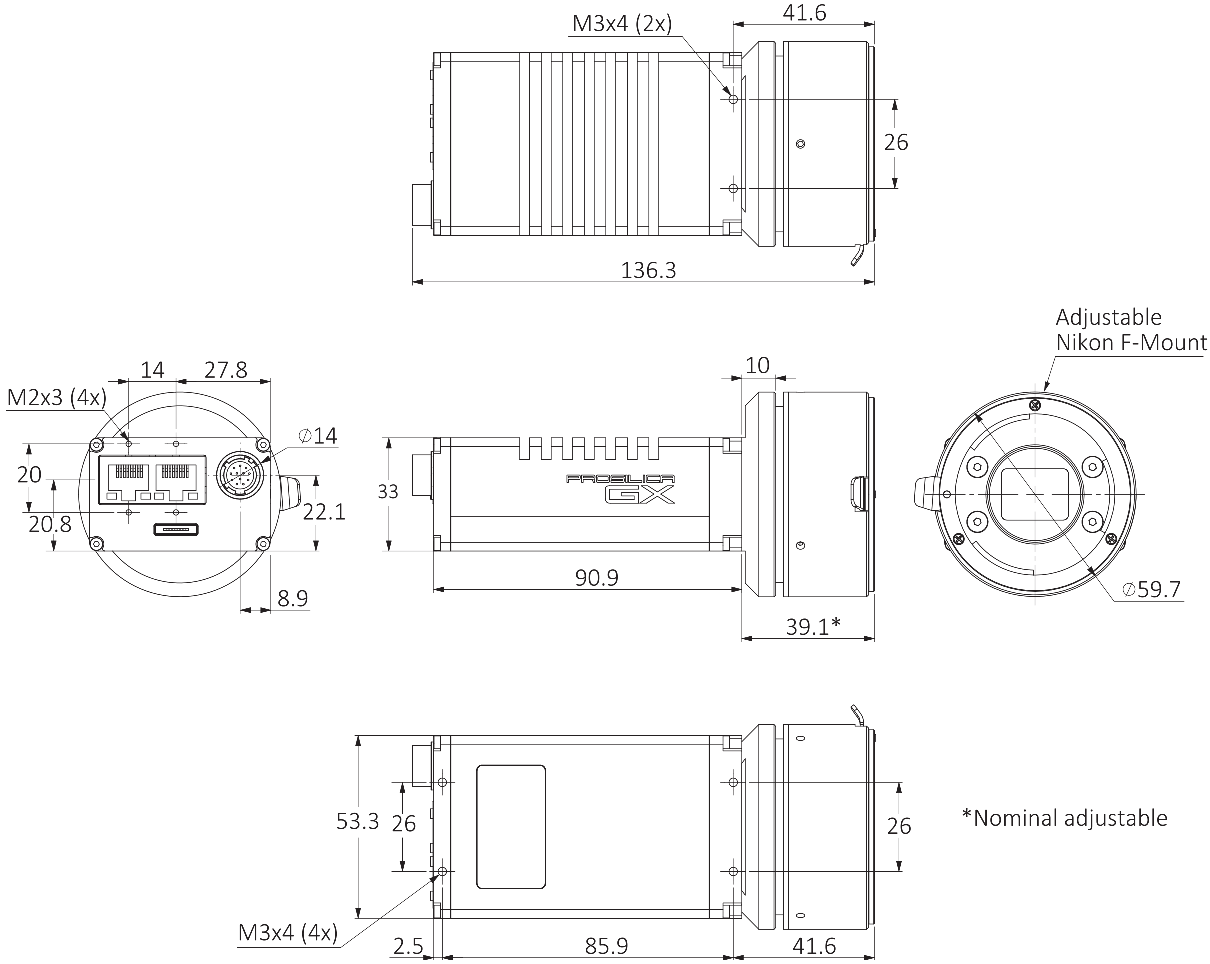


Figure 39: F-Mount standard housing dimensions

Lens mount options

Prosilica GX cameras are shipped with an adjustable C-Mount or F-Mount. Prosilica GX3300 cameras can be built with an F-Mount or C-Mount upon request.

Prosilica GX extended format housing

Models: Prosilica GX1920, GX2750
Mount: C-Mount (default)

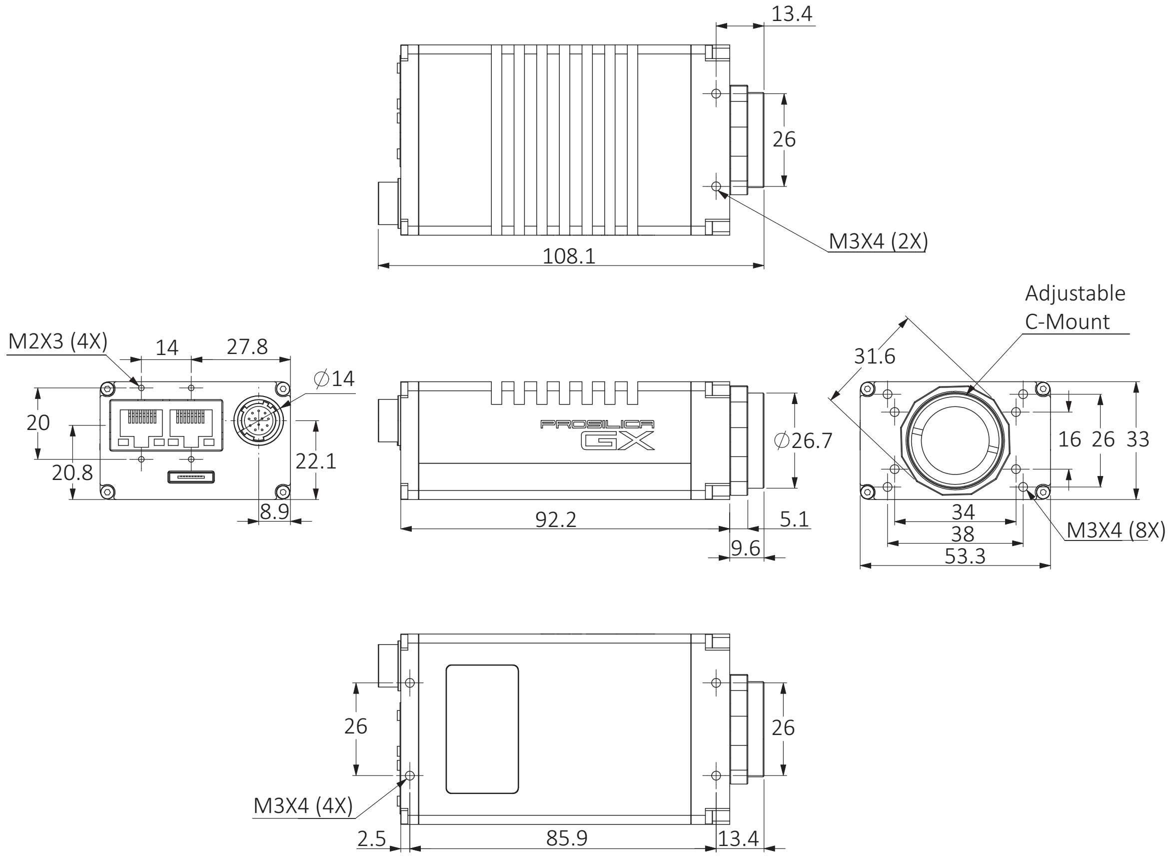


Figure 40: C-Mount extended format housing dimensions

Prosilica GX1920 and GX2750

Prosilica GX1920 and GX2750 are 1.3 mm longer than the remaining Prosilica GX C-Mount models. The same tripod adapter can be used with all Prosilica GX cameras.

Prosilica GX large format housing

Model: Prosilica GX6600
Mount: F-Mount (default)

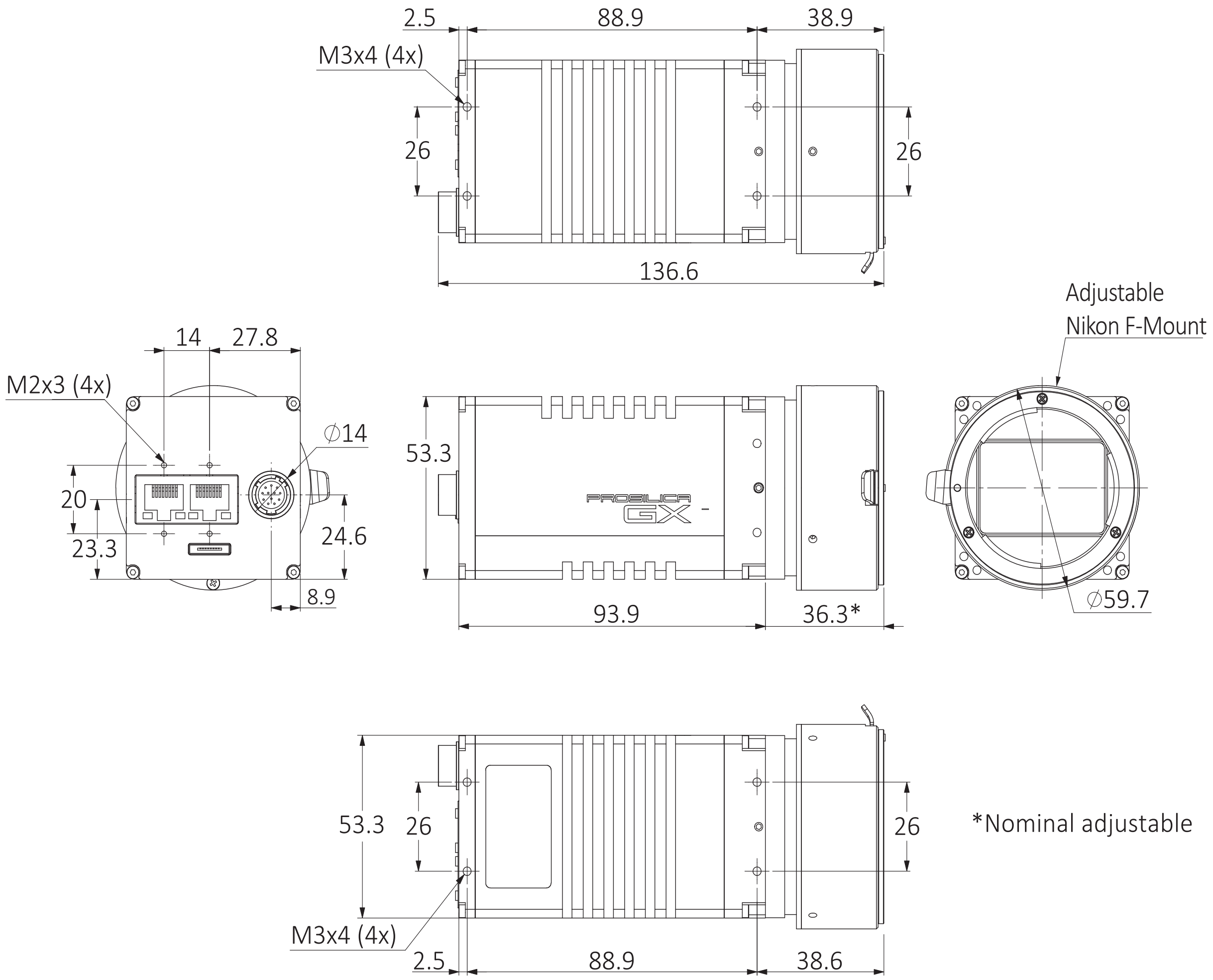


Figure 41: F-Mount large format housing dimensions

Prosilica GX6600

Prosilica GX6600 is taller than the other Prosilica GX models.

Tripod adapter

A Prosilica GX camera can be mounted on a camera tripod by using the Prosilica GX tripod adapter.

Models: Prosilica GX1050, GX1660, GX1910, GX1920, GX2300, GX3300

Prosilica GX tripod adapter

Contact the Allied Vision Sales team to purchase the Prosilica GX tripod adapter (order code 02-5030A).

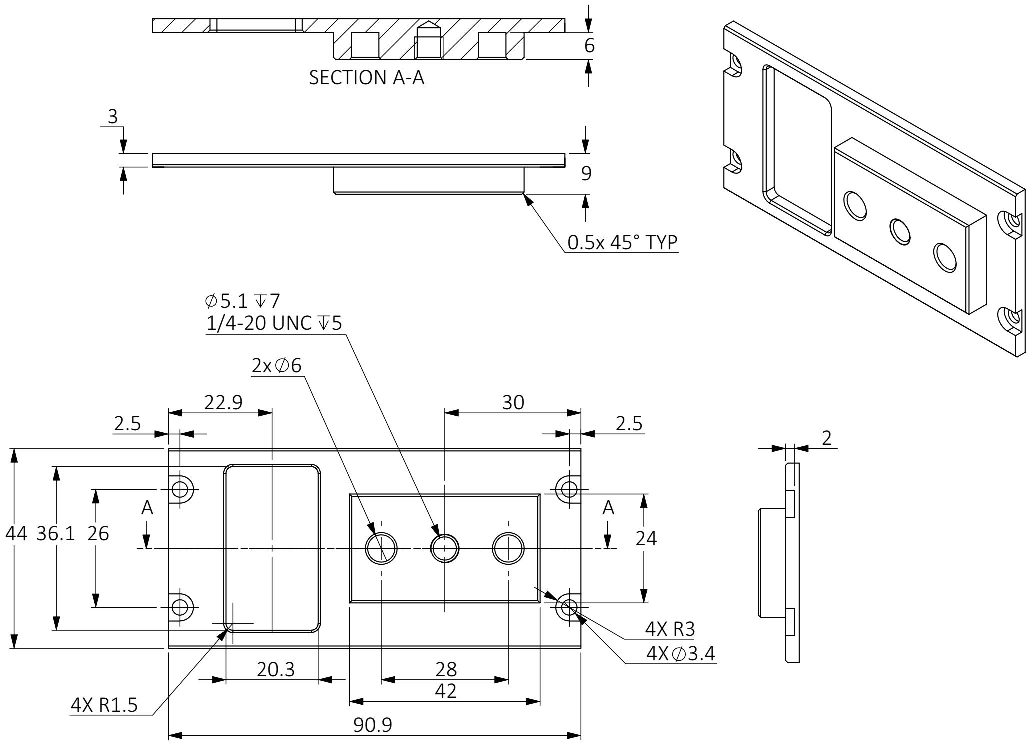


Figure 42: Prosilica GX tripod adapter mechanical drawing

Model: Prosilica GX6600

A Prosilica GX camera can be mounted on a camera tripod by using the Prosilica GX6600 tripod adapter.

Prosilica GX6600 tripod adapter

Contact the Allied Vision Sales team to purchase the Prosilica GX6600 tripod adapter (order code 02-5034A).

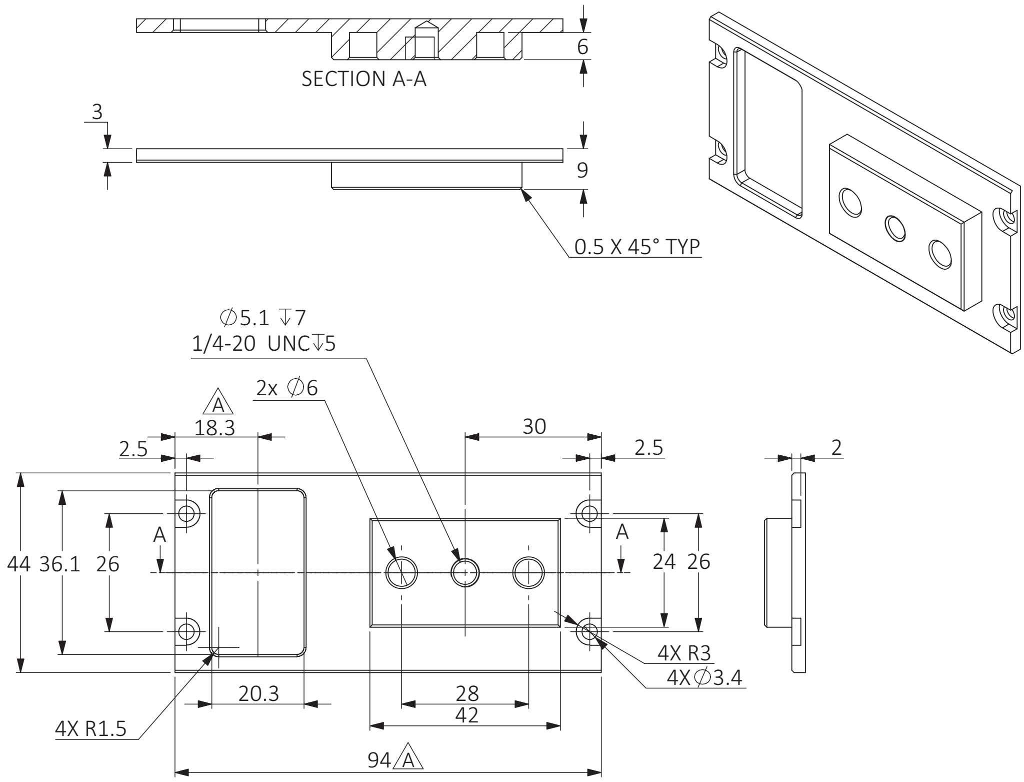


Figure 43: Prosilica GX6600 tripod adapter mechanical drawing

Sensor position accuracy

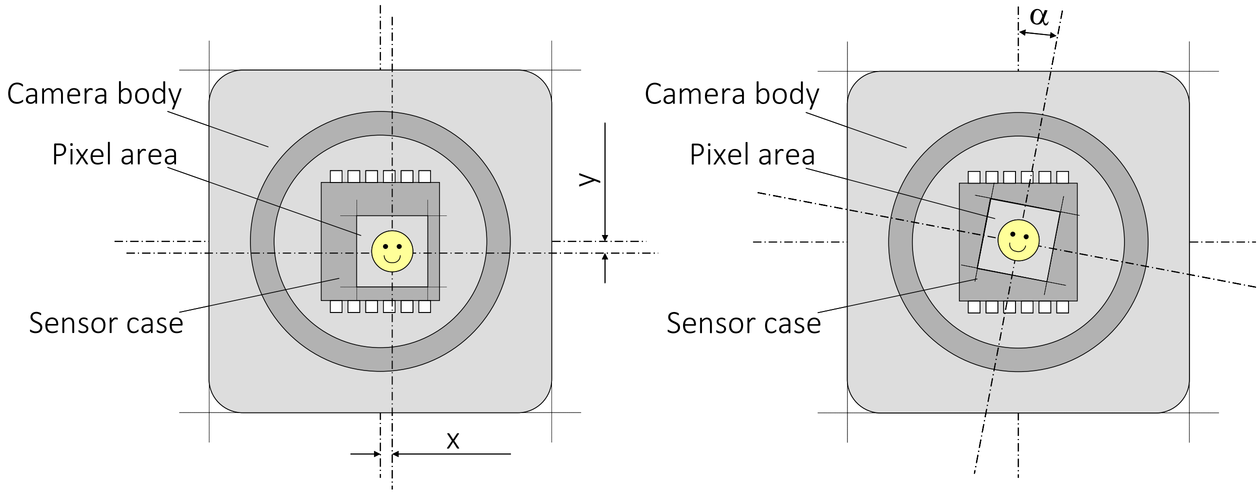


Figure 44: Allied Vision sensor position accuracy

The following table defines the manufacturing accuracy of fitting sensors into Prosilica GX 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	±250 µm (sensor shift)
	z	±10 µm (optical back focal length)
	α	< 1° (sensor rotation)
Alignment method		Optical alignment of photo sensitive sensor area into camera front module (lens mount front flange).

Table 47: Sensor position accuracy criteria

Flange focal distance

C-Mount

Flange focal distance is the optical distance from the mounting flange to image sensor. Prosilica GX C-Mount cameras are optically calibrated to a standard 17.526 mm optical flange focal distance, with 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.

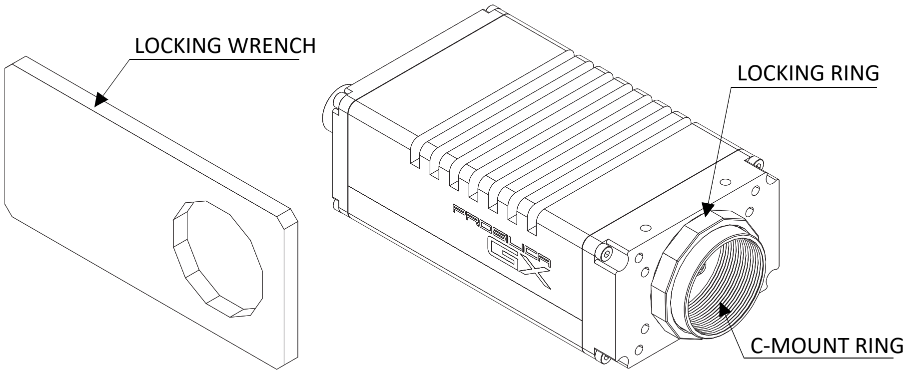


Figure 45: Prosilica GX camera and locking wrench

Loosen 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 to purchase the hexagonal lens adjustment wrench for Prosilica GX cameras with C-Mount locking ring (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

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 46:). Table 48: presents lens protrusion values for Prosilica GX cameras with C-Mount.

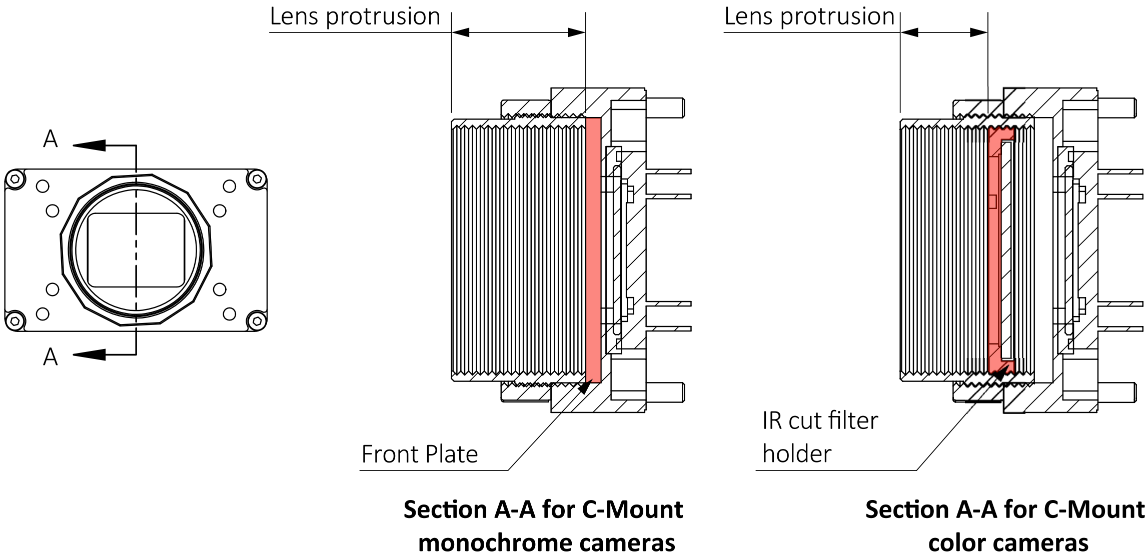


Figure 46: Cross section of typical Prosilica GX front assembly with C-Mount

NOTICE

Avoid damage from unsuitable lenses

To protect camera and lens, use lenses only up to the allowed maximum protrusion, as listed in the following tables.

Model	Lens protrusion [mm]
Prosilica GX1050	13.64
Prosilica GX1050C	8.49
Prosilica GX1660	13.64
Prosilica GX1660C	8.49
Prosilica GX1910	13.64
Prosilica GX1910C	8.49
Prosilica GX1920	13.64

Model	Lens protrusion [mm]
Prosilica GX2300	13.64
Prosilica GX2300C	9.01
Prosilica GX2750	13.64
Prosilica GX2750C	3.84
Prosilica GX3300	13.64
Prosilica GX3300C	9.01

Table 48: Lens protrusion for Prosilica GX cameras with C-Mount

F-Mount

Flange focal distance is the optical distance from the mounting flange to image sensor. Prosilica GX F-Mount cameras are optically calibrated to a standard 46.5 mm optical flange focal distance.

Adjustment of F-Mount

The F-Mount is adjusted at the factory and should not require adjusting. If for some reason, the lens mount requires adjustment, use the following method.

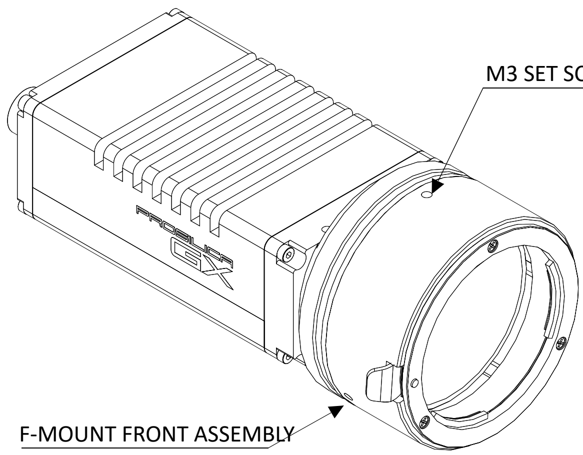


Figure 47: Prosilica GX F-Mount isometric view

Attach F-Mount compatible lens

Use an F-Mount compatible lens that allows an infinity focus. Attach the lens to the camera using a counter-clockwise rotation of about a quarter turn. The lens should snap in to place and the lens flange and camera flange should mate over the full circumference.

Loosen F-Mount front assembly

Use a 1.5 mm hex wrench to loosen the three set screws that hold the F-Mount front assembly to the camera body.

Adjusting the lens to infinity

Precondition: Use a F-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 F-Mount ring.
2. Rotate the lens and F-Mount ring until the image is focused.
3. Carefully tighten the locking ring and recheck focus.

Camera attributes and filter

This chapter includes information on:

- Camera attributes
- IR cut filters

Camera attribute highlights

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

Control	Description
Gain control	Manual and auto
Exposure 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 x and y control with 1 pixel resolution
Multicast	Streaming to multiple computers
Event channel	In-camera events including exposure start and trigger are asynchronously broadcasted to the host computer
Chunk data	Captured images are bundled with attribute information such as exposure and gain value
*May vary depending on the camera model	

Table 49: Prosilica GX camera and driver attribute highlights

IR cut filter

All Prosilica GX color models are equipped with an infrared cut filter (IR filter). This filter is employed to prevent infrared wavelength photons from passing to the sensor. In the absence of IR filter, images are dominated by red and incapable of being properly color balanced. Monochrome models do not employ an IR filter.

The following plot shows the filter transmission response for the IRC30 cut filter employed in color Prosilica GX cameras.

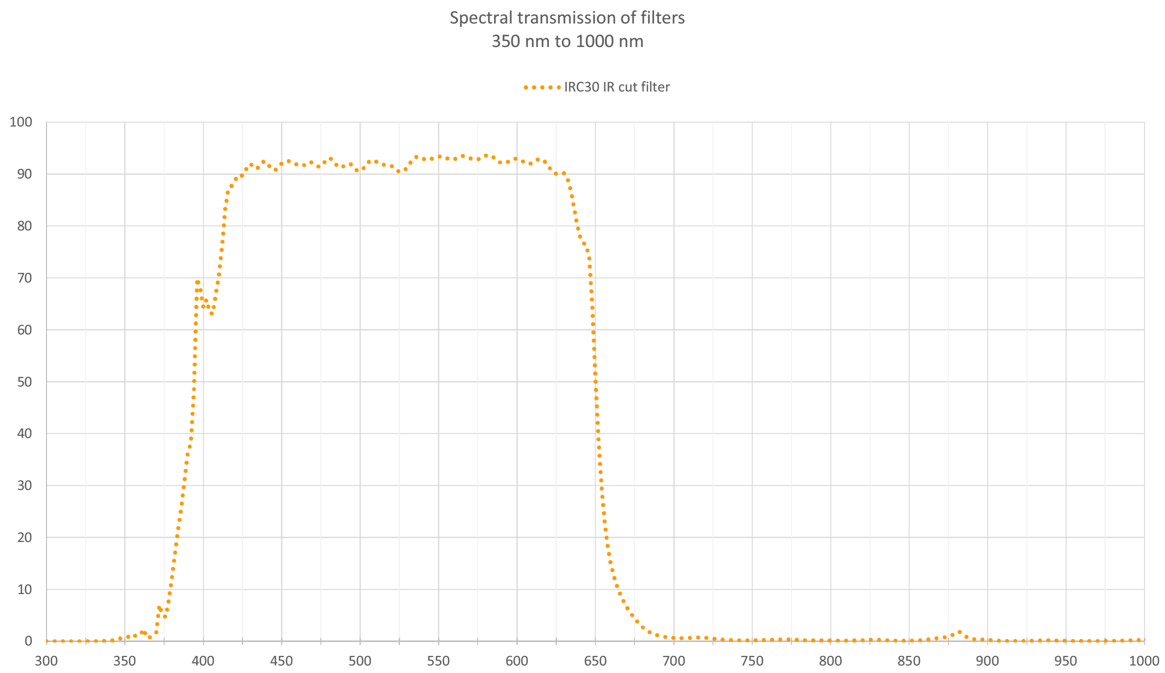


Figure 48: IRC30 filter transmission response

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 chapter provides information on Gigabit Ethernet ports, inputs and outputs, and trigger features.

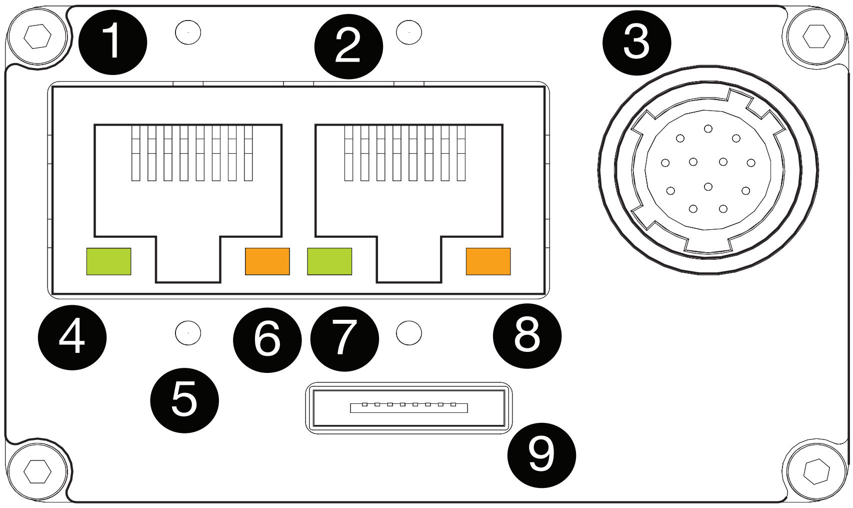


Figure 49: Ports and LEDs

1	Gigabit Ethernet port 1
2	Gigabit Ethernet port 2
3	Hirose I/O port (camera power, external sync IO, RS232 TX/RX)
4	LED 1
5	Gigabit Ethernet cable mounting holes
6	LED 2
7	LED 3
8	LED 4
9	Lens control port for direct drive lenses

Status LEDs

The following table describes the LED color and status.

LED	LED Color	Status
LED 1	Flashing green	Camera is powered
	Solid green	Camera is started and a link with the host is established
LED 2	Flashing or solid orange	Ethernet activity
LED 3	Flashing green	Camera is powered
	Solid green	Camera is started and a link with the host is established
LED 4	Flashing or solid orange	Ethernet activity

Table 50: Status of LEDs

LEDs

After the camera is started, LED1 or LED3 will remain solid green while the camera is powered, even if connection with the host is lost.

All four LEDs are engaged only when camera is operated in Link Aggregation Group (LAG) mode.

Gigabit Ethernet ports

The Gigabit Ethernet ports conform to the IEEE 802.3 1000BASE-T standard for Gigabit Ethernet. We recommend using CAT-6 higher compatible cabling and connectors for best performance.

The Prosilica GX offers two Gigabit Ethernet ports. This port is enabled using Link aggregation. A link aggregation group (LAG) is automatically configured on the camera when both ports are connected. The host computer requires a dual port, LAG capable Ethernet adapter. The LAG group needs to be configured by the user.

Ethernet cables

Cable lengths up to 100 meters are supported.

The 8-pin RJ-45 jack has the pin assignment according to the Ethernet standard (IEEE 802.3 1000BASE-T).

We recommend using locking-screw cables from Components Express Inc. for a perfect fit. Visit the CEI product configurator to customize the cable according to your requirements.

Hardware Selection

See Hardware Selection for Allied Vision GigE Cameras application note for a list of recommended GigE host controller cards:

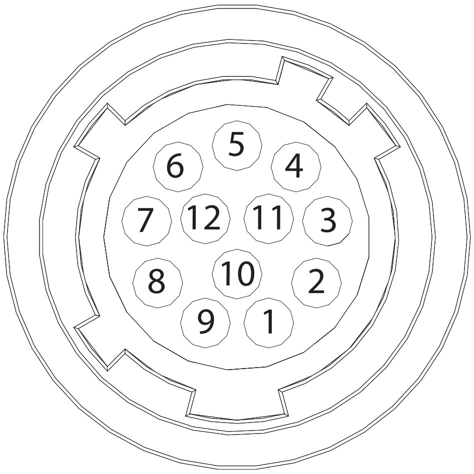
www.alliedvision.com/en/support/technical-papers-knowledge-base.html

GigE host controllers

A standard PCI GigE host controller card is available for purchase from Allied Vision. Order code: 02-3002A (Intel Pro 1000/GT, PCI, 1 port).

Contact the Allied Vision Sales team for additional GigE host controllers.

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	GND for RS232 and ext. power	Ground for RS232 and camera power supply	Blue
2	Camera power	In	10 to 24 VDC	Camera power supply	Red
3	Out 4	Out	Open emitter max. 20 mA	Output 4 isolated (SyncOut4)	Pink
4	In 1	In	U_{in}(high) = 5 to 24 V U_{in}(low) = 0 to 0.8 V	Input 1 isolated (SyncIn1)	Gray

Table 51: Camera I/O connector pin assignment and I/O cable color coding (sheet 1 of 2)

Camera side Hirose HR10A-10R-12PB connector					I/O cable color code
Pin	**Signal**	**Direction**	**Level**	**Description**	
5	Out 3	Out	Open emitter max. 20 mA	Output 3 isolated (SyncOut3)	Yellow
6	Out 1	Out	Open emitter max. 20 mA	Output 1 isolated (SyncOut1)	Green
7	Isolated IO GND	In/Out	Common GND for I/O	Isolated I/O signal ground	Brown
8	RxD RS232	In	RS232	Terminal receive data	White
9	TxD RS232	Out	RS232	Terminal transmit data	Black
10	Isolated out power	In	Common VCC for outputs 5 to 24 V DC	Power input for digital outputs	Orange
11	In 2	In	U_{in}(high) = 5 to 24 V U_{in}(low) = 0 to 0.8 V	Input 2 isolated (SyncIn2)	White/Black
12	Out 2	Out	Open emitter max. 20 mA	Output 2 isolated (SyncOut2)	White/Brown

Table 51: Camera I/O connector pin assignment and I/O cable color coding (sheet 2 of 2)

Cable color and pin out

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

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

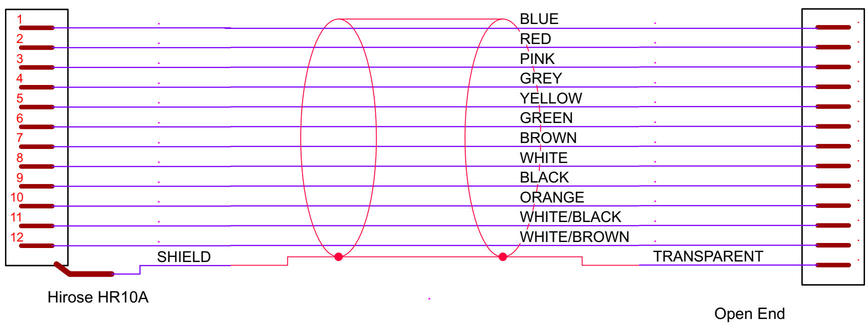


Figure 50: Prosilica GX cable color coding

The general purpose I/O port uses a Hirose HR10A-10R-12PB connector on the camera side. The mating cable connector is Hirose HR10A-10P-12S.

Hirose connector

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

I/O definition

Camera power

The Prosilica GX camera family supports a wide input power voltage range. The camera will not power in reverse polarity. Exceeding the voltage range specified will damage the camera.

Exceeding the voltage range will damage the camera

10 to 24 V DC (12 V nominal)

12 V power adapter

A 12 V power adapter with Hirose connector is available for purchase from Allied Vision:

- Order code: 02-8003D (Power supply, North America/Plug type B)
- Order code: 02-8004D (Power supply, Europe/Plug type F)

Isolated I/O GND

This connection provides the user ground reference and return path for the In 2, Out 3, and Out 4. It is also recommended that the ground wiring be physically close to the used I/O to prevent parasitic coupling. For example, a good cable design would connect the required signal on one conductor of a twisted pair and the Isolated IO GND on the second conductor of the same twisted pair.

RxD RS232 and TxD RS232

These signals are RS232 compatible. These signals allow communication from the host system via the Ethernet port to a peripheral device connected to the camera. Connect RS232 ground to Camera GND to complete the RS232 circuit.

RS232

For complete RS232 description and usage, see the *RS232 Port* application note at www.alliedvision.com/en/support/technical-papers-knowledge-base.html

Isolated out power

The isolated out power connection provides power for isolated signals Out 3 and Out 4. The voltage requirement is 5 to 24 V DC. The current requirement for this supply is a function of the optical isolator collector current and the number of outputs used in the system. Isolated Out Power wiring should be physically close to Out 3 / Out 4 wiring to prevent parasitic coupling.

Input triggers

In 1 and In 2

In 1 and In 2 allow the camera to be synchronized to some external event. These signals are optically isolated and require the signal common (Isolated I/O GND). The camera can be programmed to trigger on the rising or falling edge of these signals. The camera can also be programmed to capture an image at some programmable delay time after the trigger event. These signals can be driven from 5 V to 24 V with a minimum current source of 5 mA.

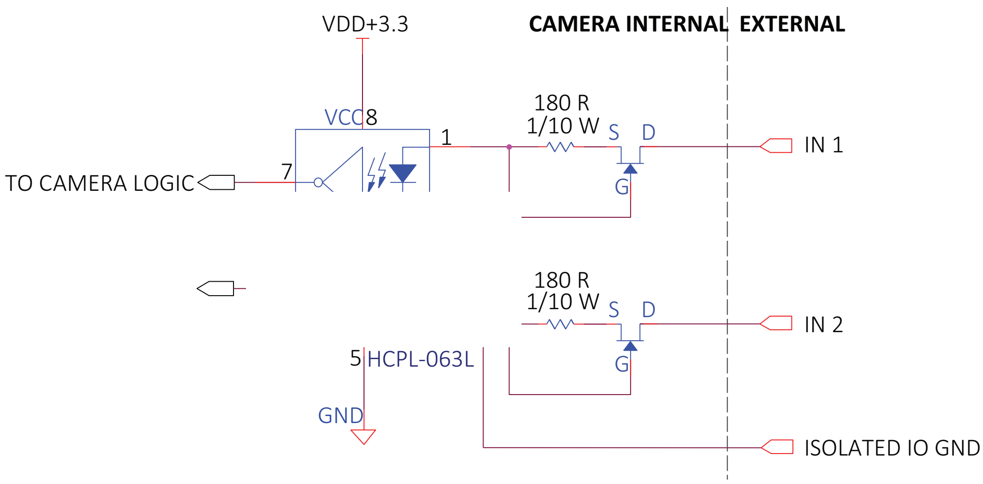


Figure 51: Input trigger, camera internal circuit

Avago HCLP-063L

Avago HCPL-063L are optically coupled gates that combine a GaAsP light emitting diode and an integrated high gain photo detector. These are used for the opto-isolated camera inputs.

Output signals

Output signals 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 will 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 to 4)

These signals are optically isolated and require the user to provide a high voltage level (Isolated out power) and signal common (Isolated IO GND). Isolated out power can be from 5 V to 24 V. An example of the functional circuit is indicated in the following diagram.

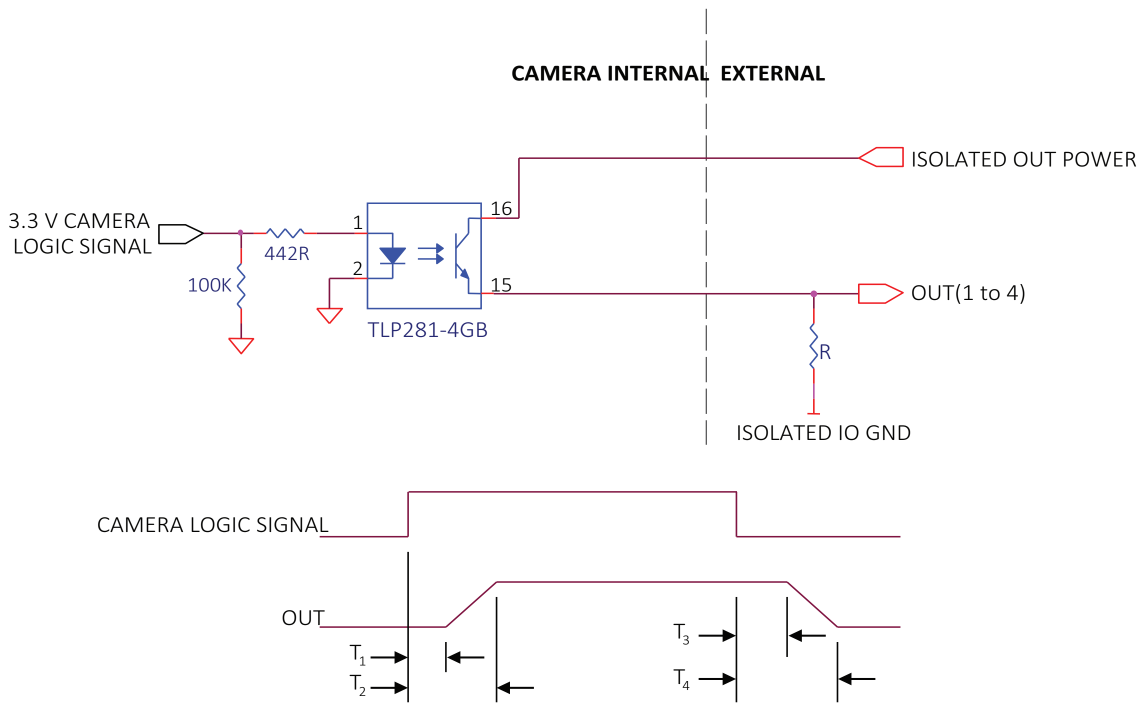


Figure 52: Output trigger circuit

Toshiba TLP281-4GB

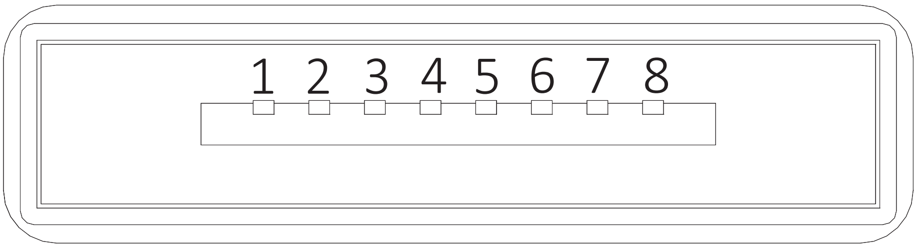
Toshiba TLP281-4GB consist of photo transistor, optically coupled to a GaAsP light emitting diode and an integrated high gain photo detector. These are used for the opto-isolated camera outputs.

Various isolated out power values and load values for the output circuit are indicated in the following table. Trigger current, OUT ICC, is a function of Isolated Out Power voltage and load resistor R.

Isolated Out Power	OUT ICC	R Load	V Load	R Power Dissipation	T_1	T_2	T_3	T_4
5 V	8 mA	500 Ω	4.1 V	32 mW	1.5 µs	6.5 µs	2 µs	14 µs
5 V	4.8 mA	1 KΩ	4.8 V	23 mW	1.5 µs	5 µs	17 µs	40 µs
12 V	9.2 mA	1.2 KΩ	11.2 V	101 mW	1.5 µs	11.2 µs	2 µs	20 µs
12 V	4.9 mA	2.4 KΩ	11.8 V	58 mW	1.5 µs	8.5 µs	17 µs	55 µs
24 V	9.5 mA	2.4 KΩ	23.2 V	217 mW	1.5 µs	22 µs	2 µs	37 µs
24 V	5 mA	4.8 KΩ	23.8 V	120 mW	1.5 µs	12 µs	17 µs	105 µs

Table 52: Trigger circuit values

Lens control port



Pin	Signal	Direction	Description
1	Iris +	Out	Open Iris
2	Iris-	Out	Close iris
3	Focus +	Out	Focus far
4	Focus-	Out	Focus close
5	Zoom +	Out	Zoom out
6	Zoom-	Out	Zoom in
7	Auto iris, video type	Out	PWM Signal for Iris Control
8	External GND	---	External Ground for all lens control signals

Table 53: Lens connector definitions

The lens control connector is a Hirose 3260-8S3. This connector provides the signals necessary to control the iris, focus, and zoom of most commercially available TV Zoom and Video-type auto-iris lenses. The cable side connector is Hirose 3240-8P. The camera can be configured to operate lenses with unipolar voltage requirements of 6 to 12 V or lenses that operate with bipolar voltages from ±6 V up to ±12 V. This voltage level can be controlled through software. The default voltage is set to 6 V. The current capacity for each axis is 50 mA.

Voltage specification

Do not exceed the lens manufacturers voltage specification.

Hirose connector

This cable side Hirose connector is available to purchase from Allied Vision. Order code 02-7004A.

Auto iris video-type connection

Prosilica GX 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, Schneider and others.

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.

Voltage specification

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

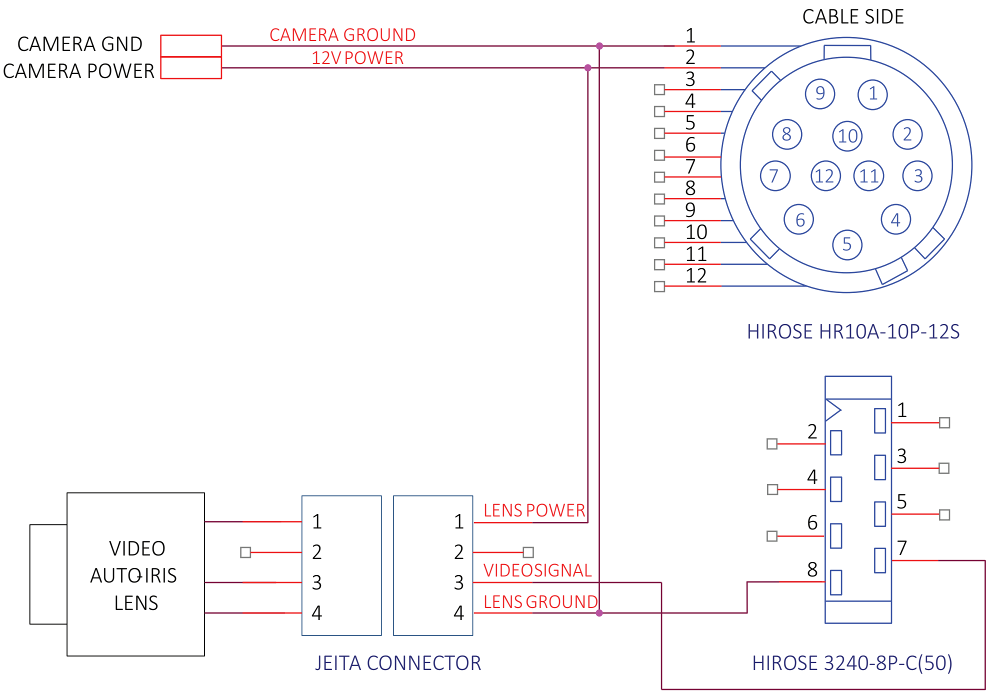


Figure 53: Video iris schematic

Motorized lens connection

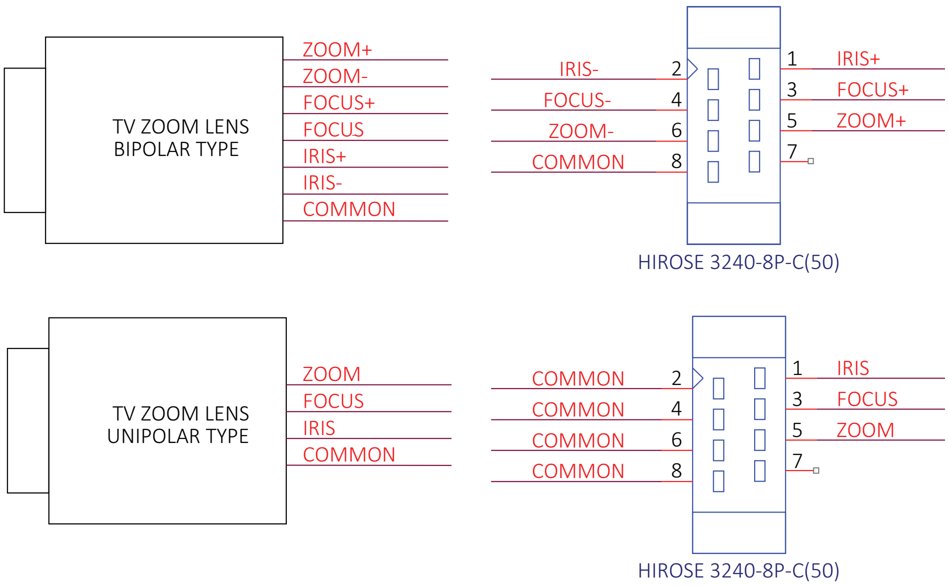


Figure 54: Motorized lens connection diagram

NOTICE

Lens voltage setting

Verify lens voltage setting on camera does not exceed lens voltage specification. Camera lens voltage is controlled by software. This is set to 6 V after power up and cannot be saved to user configuration files. Current capacity per axis = 50 mA.

Trigger timing diagram

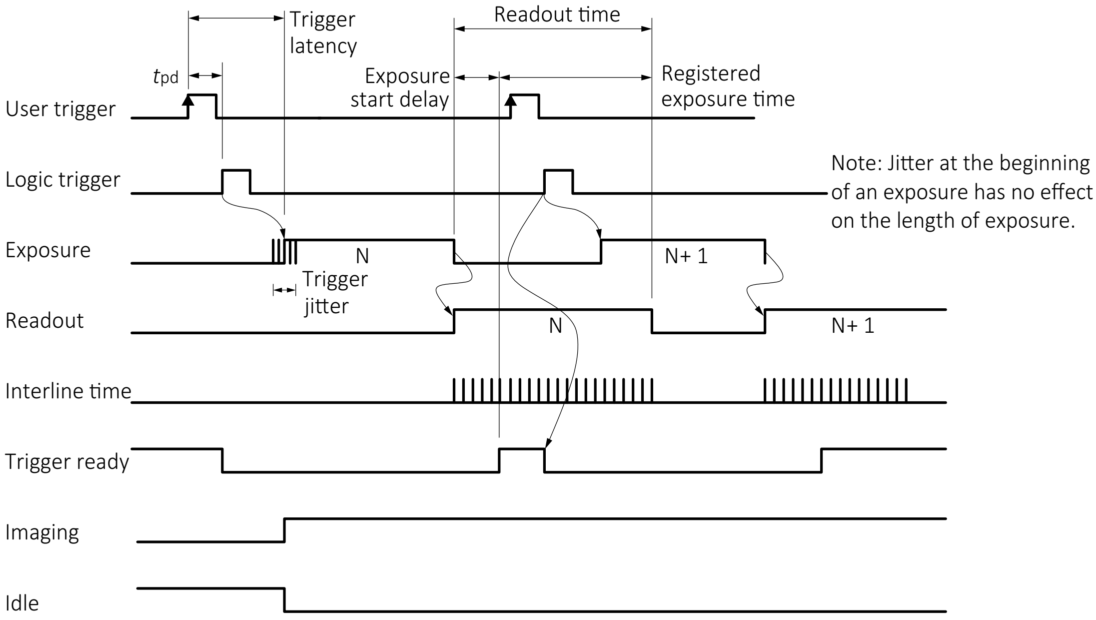


Figure 55: Internal signal timing waveforms

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

Table 54: Explanation of signals in timing diagram

Trigger rules

User trigger pulse

The user trigger pulse width should be at least three times the width of the trigger latency.

- 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 when readout is true.
- Exposure start delay equals the readout time minus the registered exposure time.

Triggering during the Idle State

For applications requiring the shortest possible *Trigger Latency* and the smallest possible *Trigger Jitter* the *User Trigger* signal 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.

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 1 row time because *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/technical-papers-knowledge-base.html

Image data flow

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

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

Prosilica GX monochrome cameras

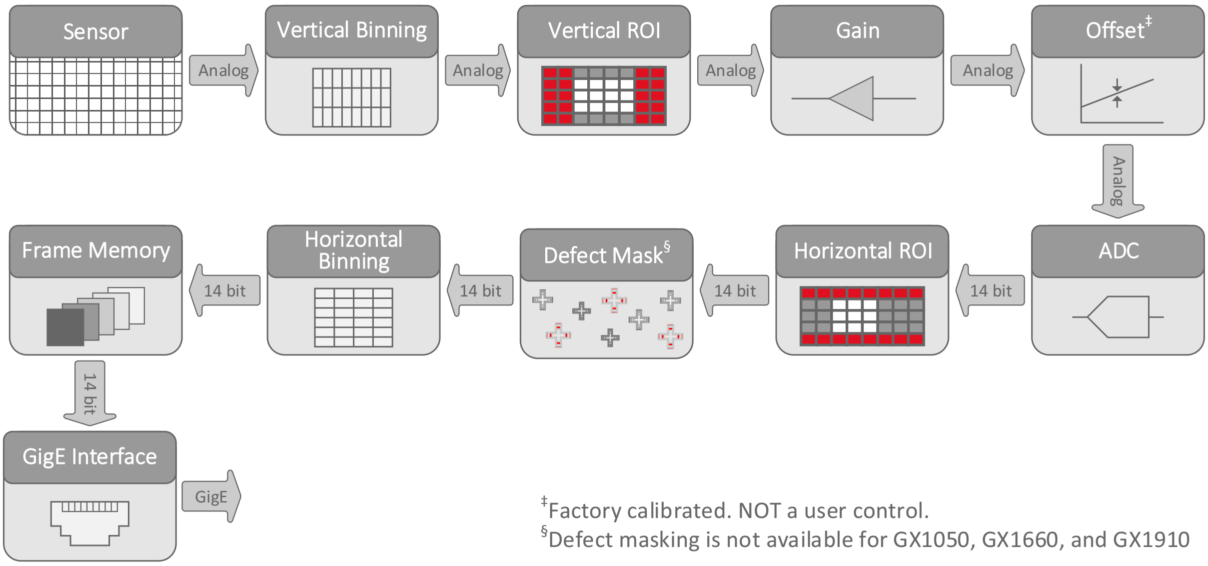
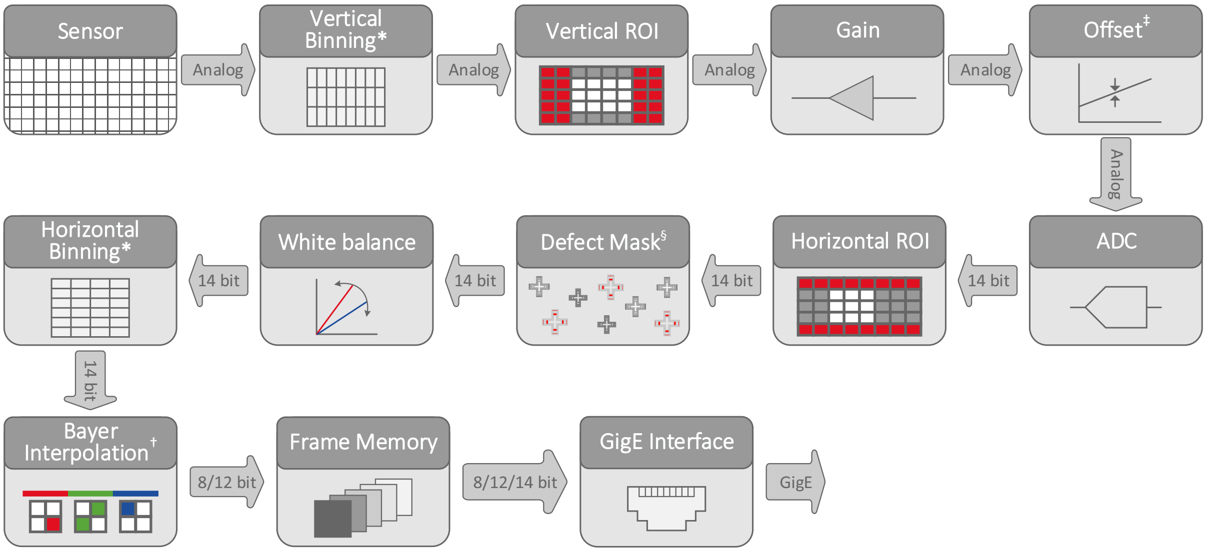


Figure 56: Image flow of monochrome Prosilica GX cameras

Prosilica GX color cameras



*Color information lost while binning is active.
‡Factory calibrated. NOT a user control.
§Defect masking is not available for GX1050C, GX1660C, and GX1910C
†For on-camera interpolated *PixelFormats* only (8-bit output). On-camera interpolated *PixelFormat*, RGB12Packed (12-bit output). Raw un-interpolated *PixelFormats* skip this block (8/12 bit output) depending upon the bit depth of *PixelFormat* used.

Figure 57: Image flow diagram of color Prosilica GX cameras

Cleaning optical components

This chapter describes safety instructions and cautions for cleaning lenses, optical filters, 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 GX camera you may have impurities either on the lens, filter or protection glass, or on the sensor protection glass. Every Prosilica GX 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.

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

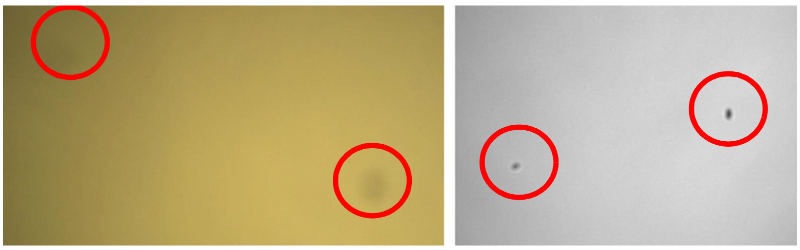


Figure 58: Image with tiny dust on the filter (left) and dust on the sensor (right)

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

Removing IR cut filter

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

Do not attempt to remove the camera IR filter for Prosilica GX large format cameras. Contact support@alliedvision.com for assistance.

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.

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.

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.

NOTICE

Property damage message

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

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. Typically, several spiral wipes are required. 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 previously described).

Cleaning issues

If you notice that the camera lens or sensor is not clean after attempting to clean twice, or if you have any questions regarding cleaning your camera, contact your Allied Vision distribution partner.

Cleaning with compressed air

Allied Vision does not recommend cleaning Prosilica GX 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 GX camera.

Saved camera user sets

When 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.

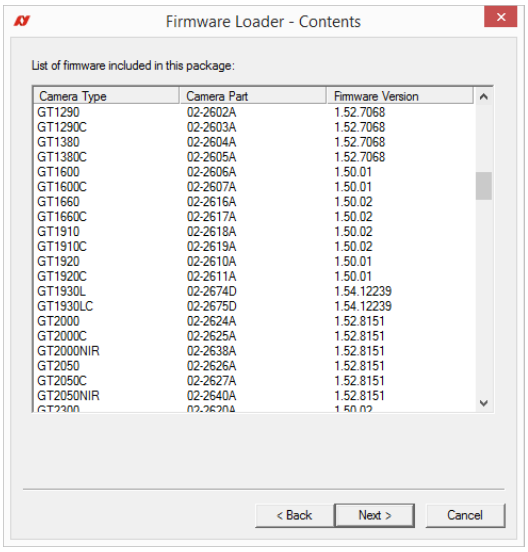
NOTICE

Do not unplug the GigE cable or camera power supply during the update procedure.

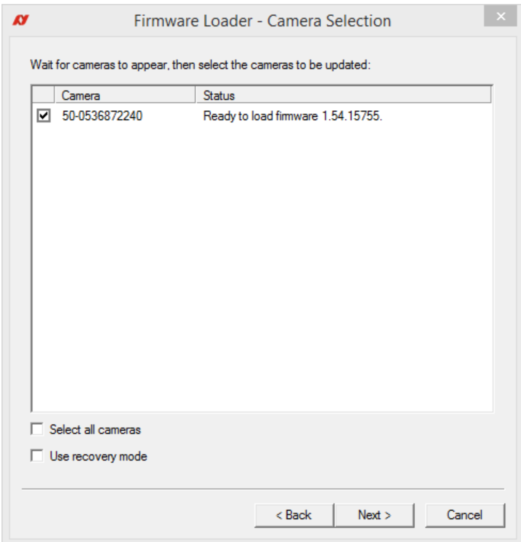
To update the firmware on your Allied Vision GigE camera

1. Launch the *Allied Vision Firmware Loader*.

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



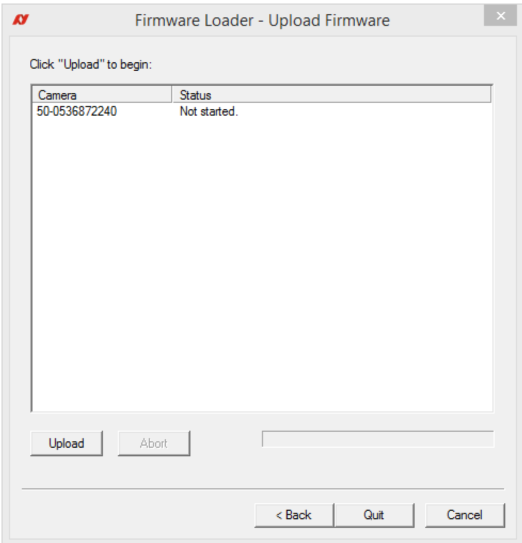
3. Click **Next**. Select your camera model on this page.



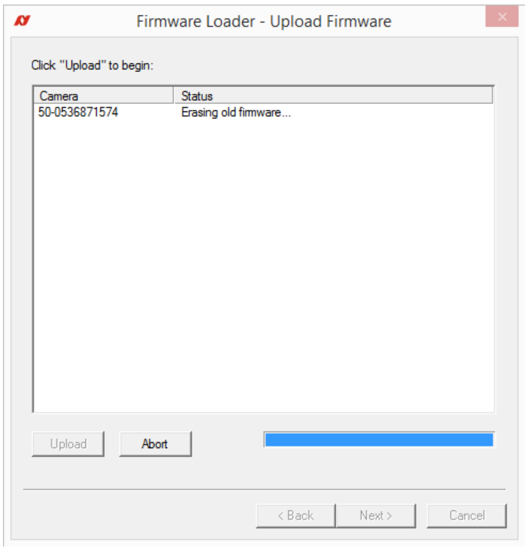
Recovery Mode

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.

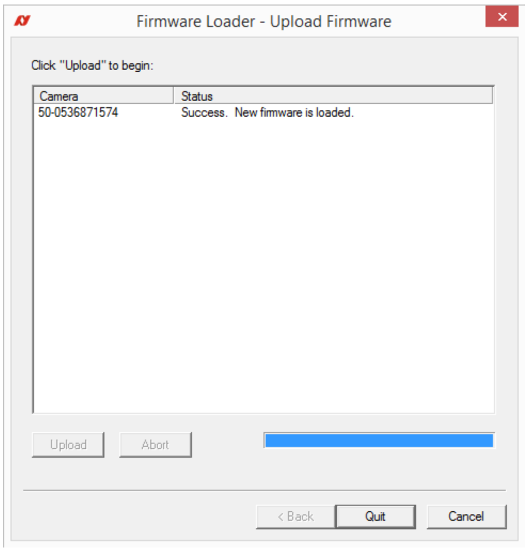
4. Click **Next**.



5. Click **Upload** to start the update. The existing firmware will be erased and the new firmware will be updated to the camera.



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



Power cycle after upgrade or downgrade

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

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