GigE VISION CAMERAS

Prosilica GB

Technical Manual

V2.2.6

Prosilica GB at a glance

Read this manual carefully

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

Prosilica GB cameras have a Gigabit Ethernet (GigE) port and work with Gigabit Ethernet hardware and cable lengths up to 100 meters. Prosilica GB cameras are GigE Vision V1.2 compliant.

Scope of delivery

Your Allied Vision camera is delivered with the following components:
- Prosilica GB GigE Vision camera
- Quickstart Guide
- Camera box.

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-gb-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

Contents

Image data flow   66

Cleaning optical components   68

Firmware update   73

Index   78

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

Headquarters

Allied Vision Technologies GmbH
Taschenweg 2a
07646 Stadtroda, Germany

Tel: +49 36428 677-0
Fax: +49 36428 677-28

Geschäftsführer (Managing Directors): Andreas Gerk, Peter Tix
Registration Office: AG Jena HRB 208962

Tax ID: DE 184383113

Document history and conventions

This chapter includes:

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

Document history

Version	Date	Remarks
V2.2.6	2019-Jul-08	• Editorial changes
V2.2.5	2019-Mar-08	• Added EMC compliance statement to Installation and hardware chapter • Editorial changes • Various improvements and typographic corrections
V2.2.4	2018-Jun-19	• Updated RoHS statement to include amendment 2015/863/EU
V2.2.3	2018-Jan-16	• Removed references to the Modular Concept • Updated installation chapter
V2.2.2	2017-Dec-21	• Various minor improvements and corrections
V2.2.1	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
V2.2.0	2016-Dec-01	• Changed the technical manual layout. • Changed chapter name from Camera data path to Image data flow and updated the figure • Changed chapter name from Camera dimensions to Mechanical dimensions • Merged the Resolution and ROI frame rates chapter into Specifications chapter • Added Prosilica GB at a glance section • Added General safety notes section • Added Regulations section in Safety and regulations chapter to replace 'Legal notice' and 'Conformity' sections • Added Cleaning optical components chapter to replace Camera cleaning and updated information • Added Contact us section to replace Contacting Allied Vision section • Added Installation and Hardware chapter • Added Firmware Update chapter • Removed references to FCC, CE, and ICES and added a note for board level cameras and electromagnetic compatibility (EMC) • Added spectral response curves for select models • Updated absolute QE curves for select models • Added optical filter information to specification tables • Various other minor improvements and corrections

Table 1: Document history (sheet 1 of 2)

Version	Date	Remarks
V2.1.0	2015-Mar-20	• Updated Allied Vision logo • Replaced old links with new Allied Vision website links • Changed file name from 'GigE Camera and Driver Features' to 'GigE Features Reference' • Changed chapter name from 'Description of data path' to 'Camera data path' • Updated datapath diagram for The following diagrams illustrate Prosilica GB image data flow. The individual blocks are described in more detail in the GigE Features Reference. • Replaced the optical flange focal distance section with C-Mount flange focal distance section
V2.0.5	2013-Nov-26	• Added chapter Camera data path • Added a note on camera lens mount dimensions in the following sections: - Landscape sensor and inline connector - Landscape sensor and vertical connector - Portrait sensor and inline connector - Portrait sensor and vertical connector
V2.0.4	2013-Oct-02	• Added optical flange focal distance and maximum lens protrusion information • Updated Cleaning optical components section • Updated vertical binning value for *Prosilica GB660 series* • Updated table 13: on page 42 • Updated links to PvAPI SDK
V2.0.3	2013-Jul-05	• Added contact information for Allied Vision Technologies (Shanghai) Co. Ltd. • Added links to GigE Camera and Driver Features document
V2.0.2	2013-Apr-22	• Updated the RoHS directive • Updated the exposure control values in the Specifications chapter • Added Status LEDs section • Updated the pixel format naming according to the GenICam naming convention • Added frame rate formulas in the Resolution and ROI frame rates chapter • Added Vimba SDK link in Additional references section • Updated recommended cabling to category 6 or higher in Gigabit Ethernet port section
V2.0.1	2013-Jan-28	• Renamed Camera IO signals • Reworked cleaning optics section • Reworked the spectral plots and frame rate vs. height graphs
V2.0.0	2011-Jul-14	• New manual release status

Table 1: Document history (sheet 2 of 2)

Manual conventions

To give this manual an easily understood layout and to emphasize important information, the following typographical styles and symbols that 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. The URL itself is shown in blue.

Acronyms and abbreviations

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

Acronym or Abbreviation	Description
AIA	Automated Imaging Association
CAD	Computer aided design
Cat 6	Category 6, Ethernet cable
CCD	Charge-coupled device
DHCP	Dynamic Host Control Protocol
EMVA	European Machine Vision Association
ESD	Electrostatic discharge
FIFO	First-in first-out
GigE	Gigabit Ethernet
GND	Ground (power)
GVSP	GigE Vision Streaming Protocol
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
MSDS	Material safety data sheet
NIC	Network interface card
QE	Quantum efficiency
ROI	Region of interest
SFNC	Standard Feature Naming Convention
TTL I/O	Transistor-transistor logic input/output
XML	Extensible Markup Language

Table 3: Acronyms and abbreviations used in this document

Allied Vision

Compliance and intended use

§

This chapter includes:

- Compliance notifications for the following areas:
  - Europe
- 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 GB camera family:

- Directive 2011/65/EU, including amendment 2015/863/EU (RoHS)

Board level cameras

Board level models are designed for integration and are delivered without housing on customer's request. Because housing design is critical to the electromagnetic compatibility (EMC) of a camera, no certification tests regarding electromagnetic interference have been performed for these models. Users who design board level models into their systems should perform appropriate testing regarding EMC after the product design is completed. Compliance with requirements non EMC-related remains unaffected.

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

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

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

Copyright © 2019 Allied Vision GmbH. All rights reserved.

Installation and hardware

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

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

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.

Board level cameras

NOTICE

Board level cameras

- Board level cameras are delivered without housing. Handle the sensor board and main board with care. Do not bend the boards. Do not touch the components or contacts on a board. Hold a board by its edges.
- Sensor board and main board are sensitive to electrostatic discharge. To avoid possible damage, handle all static-sensitive boards and components in a static-safe work area. Observe the following procedures.
- ESD: Static electricity can damage the sensor board or the main board of your board level cameras. To prevent static damage, discharge static electricity from your body before you touch any of your broad level camera's electronic components, such as sensor board or main board. To do so, use a static-safe work area with static-dissipative mat and wear a static-dissipative wrist strap. Do not hold any components of your board level cameras against your clothing. Even when you are wearing a wrist strap, your body is grounded but your clothes are not.
- Do not remove the sensor board and main board from its anti-static packaging unless your body is grounded.
- ESD shielding: To protect the boards from radiation of other modules or devices use a special ESD protective housing.

NOTICE

Board level cameras: General

- Be sure that all power to your board level camera is switched off before mounting the sensor board or making connections to the camera.
- Do not connect or disconnect any cables during an electrical storm.
- Do not use your board level cameras during an electrical storm.
- To help avoid possible damage to the sensor board or main board, wait five seconds after power is switched off, before connecting or disconnecting any cable to the board level cameras.
- Keep your board level cameras away from radiators and heat sources.
- Avoid contact of board level cameras with liquids.

NOTICE

Board level cameras: Loading

- Avoid any mechanical forces to the board level cameras, the boards and its components, especially torsional, tensile and compressive forces.
- To avoid damages of the boards, provide cables with an external pull relief so that no force is applied to the connectors itself.

Allied Vision

NOTICE

Board level cameras: Dirty environments

- Always use clean boards.
- To protect the board level cameras from debris always use in a clean environment or a protective housing.

Configuring the host computer

Prosilica GB 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 Allied Vision GigE cameras. Allied Vision recommends that your camera system uses a dedicated Ethernet port not shared with Internet or local area networks. If more ports are needed, or your existing NIC is unable to operate at Gigabit Ethernet speeds, installing additional hardware may be required.

Usage on mixed-use networks (with printers, Internet, email for example) 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** once 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 interface card address to minimize the time required for a camera to be recognized by the host application. Systems that employ multiple NICs connected to multiple cameras will also be required to fix the address of the NIC.

To connect to the camera, edit the host computer's interface card 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 interface card 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

Default packet size

The default packet size of Prosilica GB 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 Allied Vision 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/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 Category 6 or higher rated Ethernet cable to connect the camera to the host interface card. Crossover cabling is not required but does work. The camera has circuitry to determine if a crossover cable is being used.

Allied Vision recommends Category 6 or higher rated Ethernet cables. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or image data coming from the camera.

Optics

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

Accessories

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

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

A list of Allied Vision recommended accessories is available on the Allied Vision website. See the Hardware Selection for Allied Vision GigE Cameras Application Note at www.alliedvision.com/en/support/technical-papers-knowledge-base.html.

Software

Prosilica GB 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

Once you have installed the **Vimba Viewer** or third-party application to your host computer, you can connect your Allied Vision GigE camera via an Ethernet cable and connect the 3M Mini D cable to power the camera.

Allied Vision recommends Category 6 or higher rated Ethernet cables. A different rating may not sustain peak interface bandwidth; leading to lost connectivity or image data coming from the camera.

Vimba Viewer documentation

Vimba Viewer documentation is included with the software download. Once 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.

Specifications

This chapter provides:

- Applied standard
- Technical specifications
- Absolute QE plots
- Spectral sensitivity plots
- ROI frame rate

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 (that is, GigE Vision, USB3 Vision, DCAM IEEE 1394, Camera Link). This approach enables proper interoperability between GenICam compliant hardware and software solutions without the need for customization.

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

Notes on specifications

Dimensions and mass

Dimensions include connectors but not the tripod and lens.

Mass does not include the tripod and lens.

Mono8

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

Frame memory

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

Number of frames

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

Resolution and ROI frame rate

Resolution and ROI frame rate is listed after the specification table. The resulting frame rate from changing sensor height from full image to a single line. Unless otherwise noted, sensors do not give an increase in readout speed with a reduction in width. However, in cases where a camera is limited by frame rate due to bandwidth restrictions, a reduction in width will give a frame rate increase. Cameras with a "burst mode" frame rate are able to output more data than the maximum available bandwidth (124 MBps), and will see a frame rate increase with a reduction in width.

Resolution and ROI measurements

- Data was generated using `StreamBytesPerSecond` = 124 MBps (full bandwidth), minimum exposure, full resolution, and an 8-bit pixel format. Frame rate may be lower if using network hardware incapable of 124 MBps.
- For maximum speed advantage on quad-tap CCD sensors, ROIs are center image, where feature `OffsetY` = (full sensor height – ROI height)/2.
- `BinningVertical` is vertical row summing of charge on CCD sensors before readout. The frame rate for an ROI at the same effective height as binning is slower because the CCD still needs to read out the "fast readout rows" in ROI mode.

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.

Wavelength

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

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.

Specifications common to all models

Feature	Specification
Shutter type	Global
Default lens mount	C-Mount (adjustable)
Default optical filter	• Monochrome models: No filter • Color models: IRC30 (IR cut filter)
Image buffer	16MB
TTL I/Os	1 input, 1 output
Opto-isolated I/Os	1 input, 1 output
RS232	1
Voltage requirements	• 5 to 16 VDC: Camera serial number: 02-22XXA • 5 to 25 VDC: Camera serial number: 02-22XXB
Operating temperature	0 to +70 °C ambient temperature (without condensation)
Storage temperature	-10 to +70 °C ambient temperature (without condensation)
Operating humidity	20 to 80% non-condensing
Dimensions	51 × 89 mm (board size: W × L)
Interface standard	• IEEE 802.3 1000BASE-T (Gigabit Ethernet), 100BASE-TX (Fast Ethernet) • GigE Vision Standard 1.2

Table 4: Specifications common to all Prosilica GB models

Prosilica GB650 series

The following table provides model series specifications. The values are valid for Prosilica GB650 and GB650C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GB650	**Prosilica GB650C**
Sensor model	Sony ICX424AL with HAD CCD™ technology	Sony ICX424AQ with Wfine HAD CCD™ technology
Resolution (H × V)	659 × 493 0.3 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/3	
Sensor size	6.0 mm diagonal	
Pixel size	7.4 µm × 7.4 µm	
Maximum frame rate at full resolution	121.6 fps	
A/D	12 bit	
Bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	(Not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(Not applicable)	RGB8Packed, BGR8Packed
RAW pixel formats	(Not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	10 µs to 78.5 s; 1 µs increments	
Gain control	0 to 30 dB; 1dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Power consumption	3 W at 12 VDC	
Sensor orientation	Landscape, portrait	
Connector orientation	Inline, vertical	
Trigger latency	1.0 µs for non-isolated I/O, 9 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O, ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O, 1.3 µs for isolated I/O	
Mass (typical)	59 g	

Table 5: Prosilica GB650 model series specifications
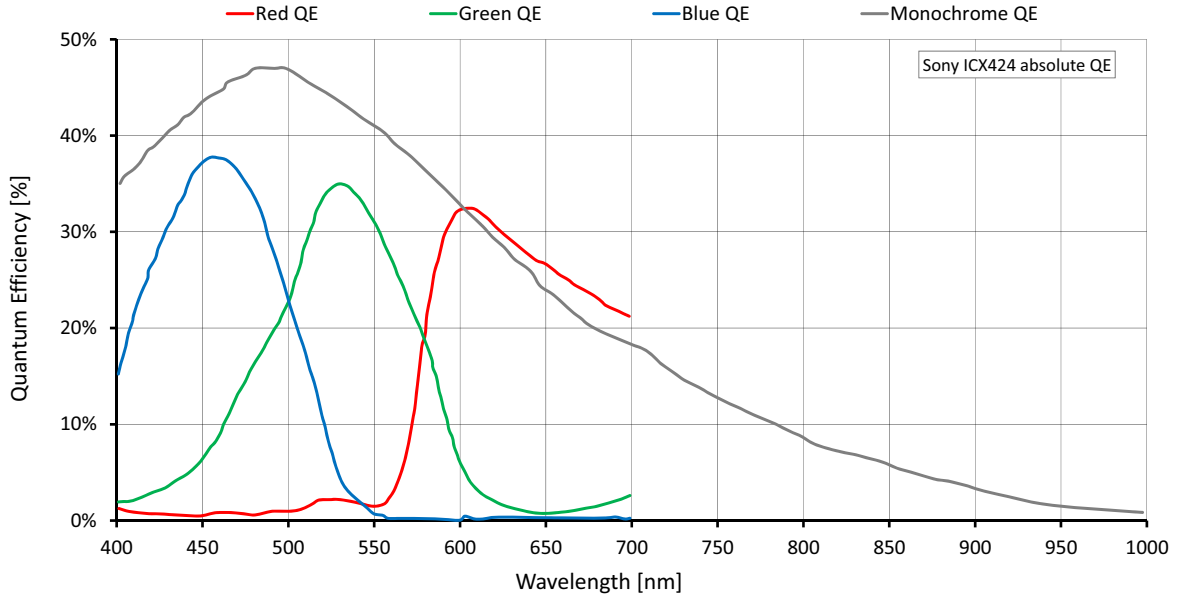
Allied Vision

Absolute QE

Figure 1: Prosilica GB650 (Sony ICX424) absolute QE
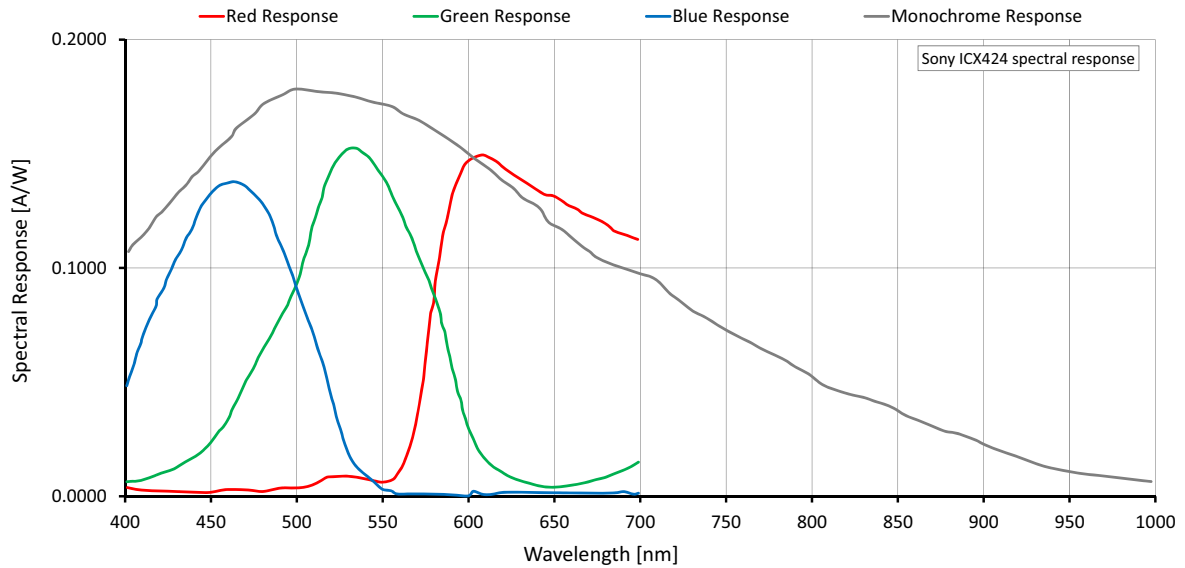
Spectral response

Figure 2: Prosilica GB650 (Sony ICX424) spectral response

ROI frame rate

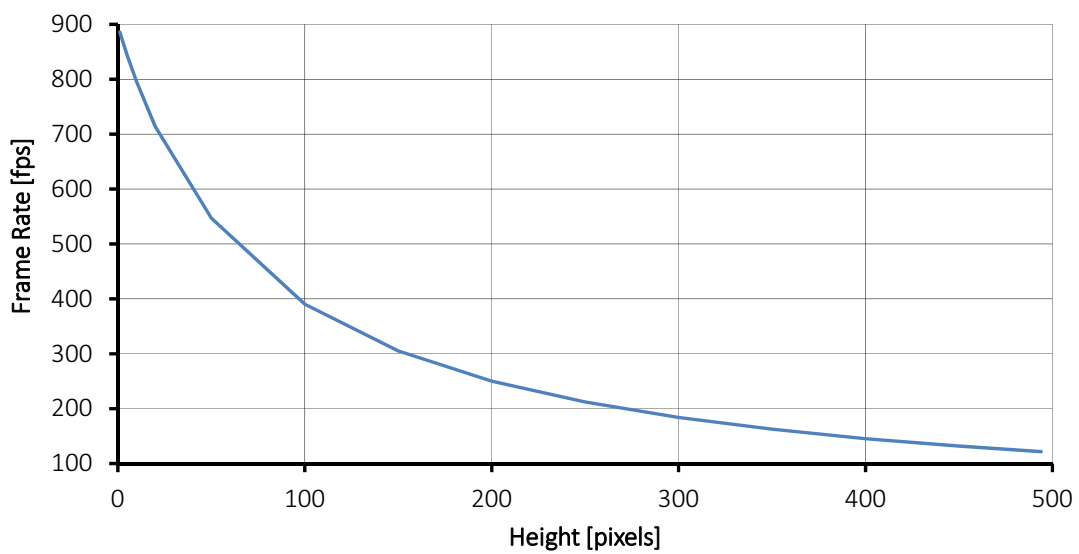$$\text{Frame rate} \; = \; \frac{1}{14.39 \; \mu s \times \text{Height} + 1114.28 \; \mu s}$$

Figure 3: Prosilica GB650 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
493	121.6	150	304.9
450	131.8	100	390.4
400	145.2	50	547.2
350	162.6	20	713.5
300	184.0	10	795.0
250	212.1	5	843.5
200	250.2	1	886.0

Table 6: Frame rate as a function of ROI height (Width=659 pixels)

Prosilica GB660 series

The following table provides model series specifications. The values are valid for Prosilica GB660 and GB660C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GB660	**Prosilica GB660C**
Sensor model	Sony ICX618AL with EXview HAD CCD™ technology	Sony ICX618AQ with EXview HAD CCD™ technology
Resolution (H × V)	659 × 493 0.3 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 1/4	
Sensor size	4.5 mm diagonal	
Pixel size	5.6 µm × 5.6 µm	
Maximum frame rate at full resolution	119.1 fps	
A/D	14-bit	
Bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	(Not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(Not applicable)	RGB8Packed, BGR8Packed
RAW pixel formats	(Not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	10 µs to 78.5 s; 1 µs increments	
Gain control	0 to 30 dB; 0.1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Power consumption	3 W at 12 VDC	
Sensor orientation	Landscape only	
Connector orientation	Inline, vertical	
Trigger latency	2 µs for non-isolated I/O, 10 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O, ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O, 1.3 µs for isolated I/O	
Mass (typical)	59 g	

Table 7: Prosilica GB660 model series specifications
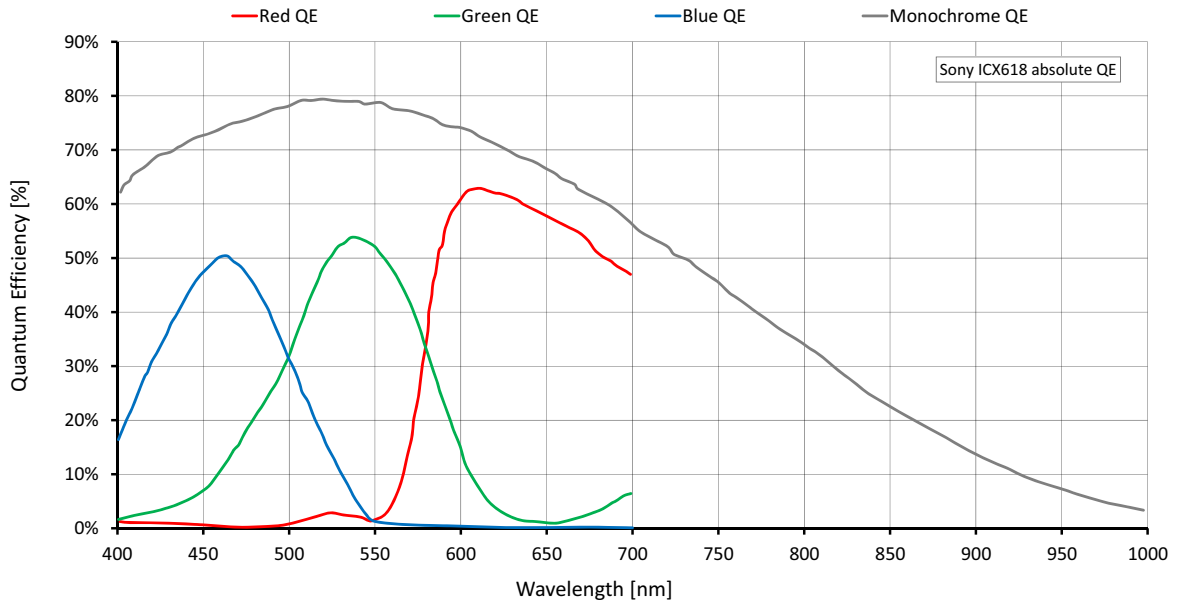
Absolute QE

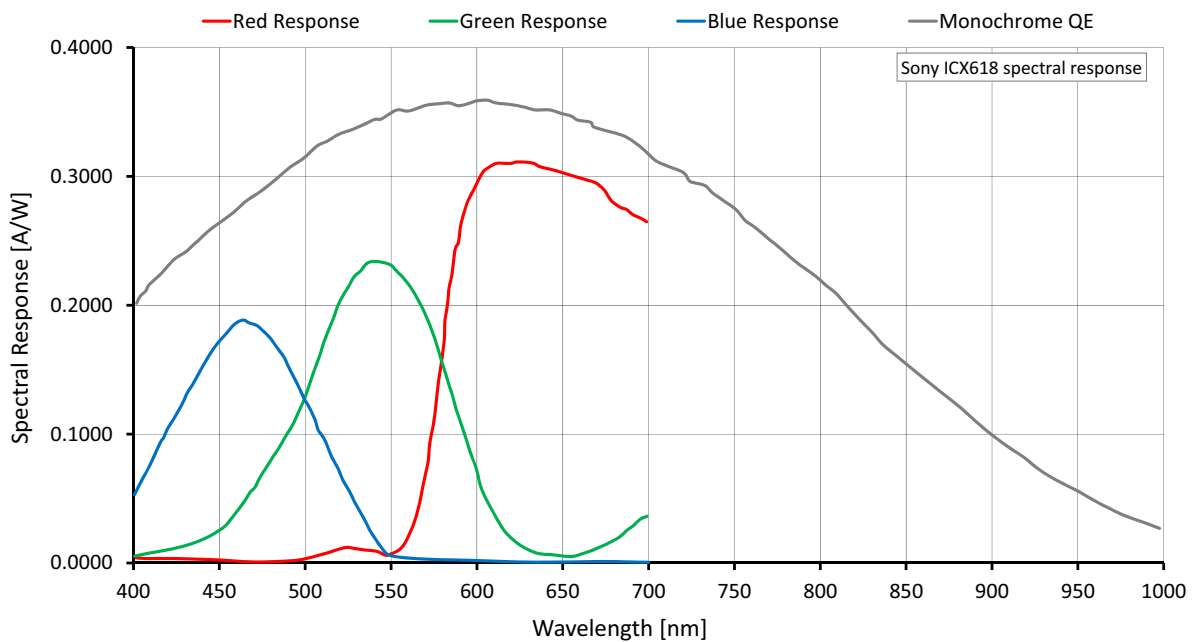*Figure 4: Prosilica GB660 (Sony ICX618) absolute QE*

Spectral response

Figure 5: Prosilica GB660 (Sony ICX618) spectral response

ROI frame rate

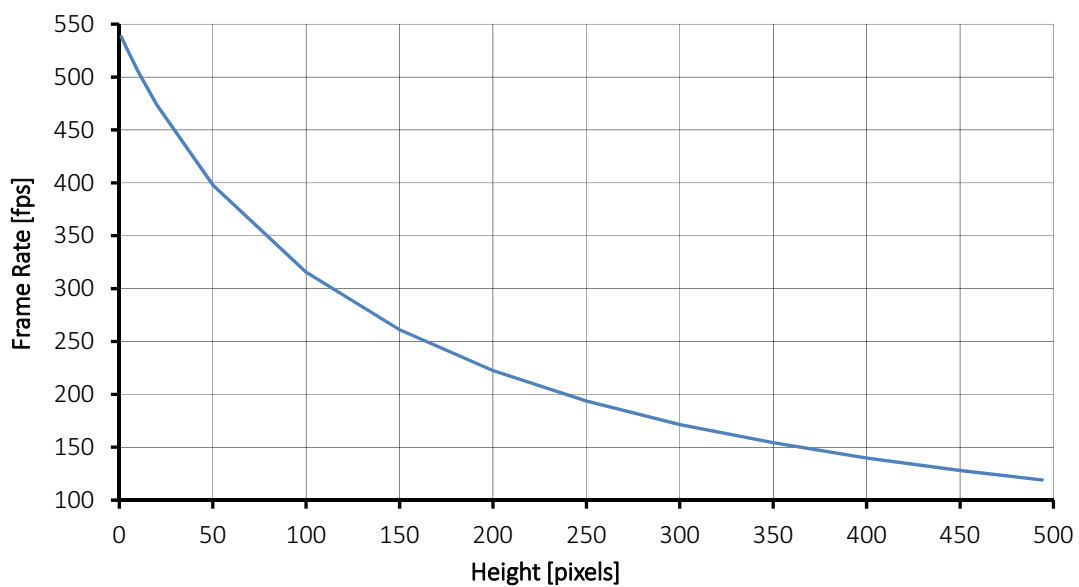$$\text{Frame rate} \ = \ \frac{1}{13.26 \ \mu s \times \text{Height} + 1844.78 \ \mu s}$$

Figure 6: Prosilica GB660 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
493	119.1	150	261.0
450	128.0	100	315.5
400	139.9	50	398.0
350	154.3	20	474.0
300	171.5	10	505.7
250	193.7	5	523.2
200	222.5	1	538.2

Table 8: Frame rate as a function of ROI height (Width=659 pixels)

Prosilica GB1380 series

The following table provides model series specifications. The values are valid for Prosilica GB1380 and GB1380C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GB1380	**Prosilica GB1380C**
Sensor model	Sony ICX285AL with EXview HAD CCD™ technology	Sony ICX285AQ with EXview HAD CCD™ technology
Resolution (H × V)	1360 × 1024 1.4 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.0 mm diagonal	
Pixel size	6.45 μm × 6.45 μm	
Maximum frame rate at full resolution	30 frames per second	
A/D	14-bit	
Bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	(Not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(Not applicable)	RGB8Packed, BGR8Packed
RAW pixel formats	(Not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	10 μs to 78.5 s; 1 μs increments	
Gain control	0 to 30 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Power consumption	3 W at 12 VDC	
Sensor orientation	Landscape, portrait	
Connector orientation	Inline, vertical	
Trigger latency	1 μs for non-isolated I/O, 9 μs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O, ±0.5 μs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O, 1.3 μs for isolated I/O	
Mass (typical)	59 g	

Table 9: Prosilica GB1380 model series specifications
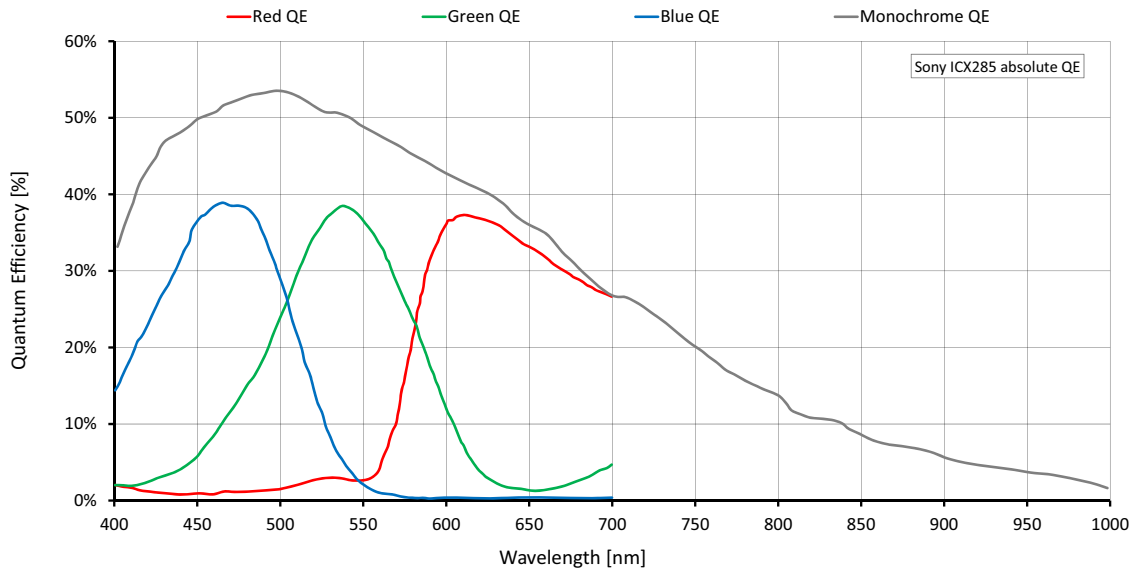
Absolute QE

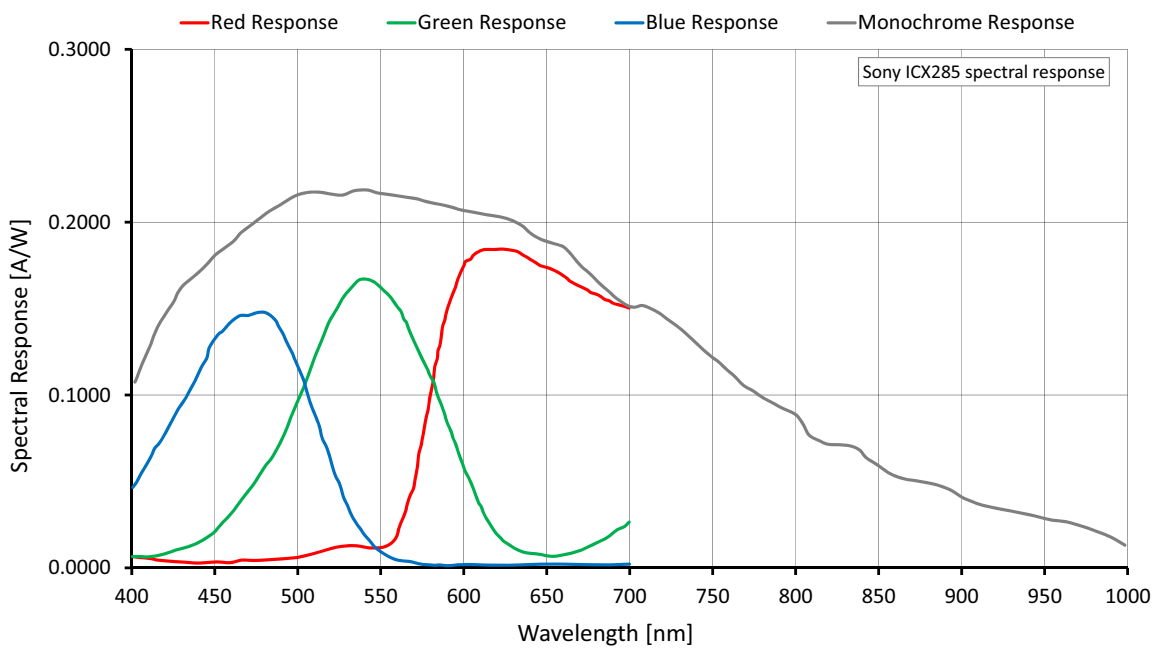*Figure 7: Prosilica GB1380 (Sony ICX285) absolute QE*

Spectral response

Figure 8: Prosilica GB1380 (Sony ICX285) spectral response

ROI frame rate

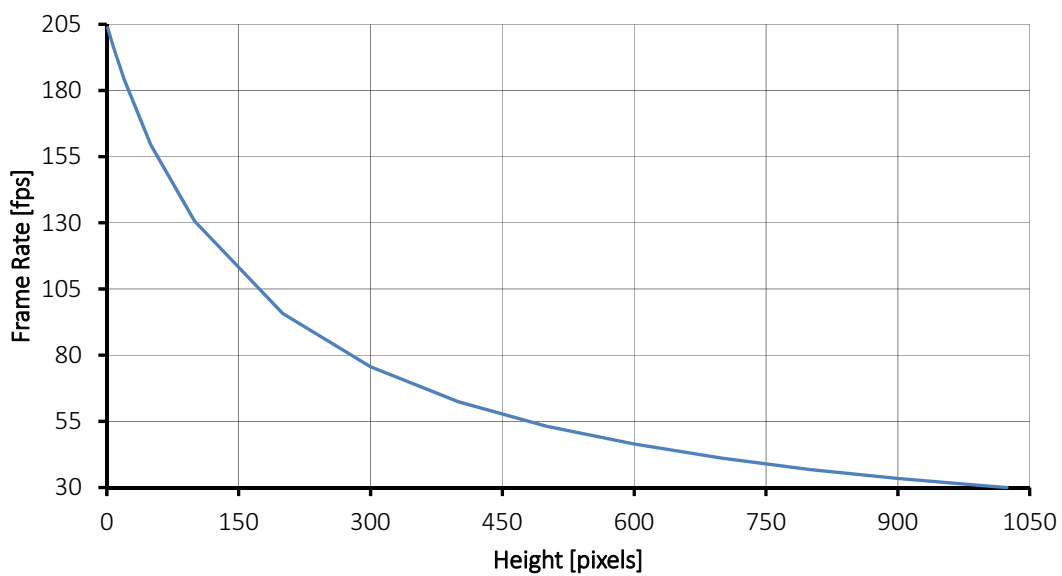$$\text{Frame rate} \;=\; \frac{1}{27.79\ \mu s \times \text{Height} + 4881.40\ \mu s}$$

Figure 9: Prosilica GB1380 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
1024	30.0	200	95.8
1000	30.6	100	130.6
900	33.4	50	159.5
800	36.8	20	183.9
700	41.1	10	193.9
600	46.4	5	199.2
500	53.2	2	202.6
400	62.4	1	203.7
300	75.6		

Table 10: Frame rate as a function of ROI height (Width=1360 pixels)

Prosilica GB2450 series

The following table provides model series specifications. The values are valid for Prosilica GB2450 and GB2450C models. For specifications common to all models, see Specifications common to all models.

Feature	Specification	
	Prosilica GB2450	**Prosilica GB2450C**
Sensor model	Sony ICX625AL with Super HAD CCD™ technology	Sony ICX625AQ with Super HAD CCD™ technology
Resolution (H × V)	2448 × 2050 5.0 MP	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	11.016 mm diagonal	
Pixel size	3.45 µm × 3.45 µm	
Optical filter	No filter	IRC30 (IR cut filter)
Maximum frame rate at full resolution	15.1 fps	
A/D	14-bit	
Bit depth	8-bit, 12-bit	
Monochrome pixel formats	Mono8, Mono12, Mono12Packed	Mono8
YUV color pixel formats	(Not applicable)	YUV411Packed, YUV422Packed, YUV444Packed
RGB color pixel formats	(Not applicable)	RGB8Packed, BGR8Packed
RAW pixel formats	(Not applicable)	BayerRG8, BayerRG12, BayerGR12Packed
Exposure time control	10 µs to 42.9 s; 1 µs increments	
Gain control	0 to 30 dB; 1 dB increments	
Binning (Sum)	Horizontal: 1 to 8 columns; Vertical: 1 to 14 rows	
Power consumption	3 W at 12 VDC	
Sensor orientation	Landscape only	
Connector orientation	Inline, vertical	
Trigger latency	2 µs for non-isolated I/O, 10 µs for isolated I/O	
Trigger jitter	±20 ns for non-isolated I/O, ±0.5 µs for isolated I/O	
Propagation delay (t_{pd})	10 ns for non-isolated I/O, 1.3 µs for isolated I/O	
Mass (typical)	54 g	

Table 11: Prosilica GB2450 model series specifications
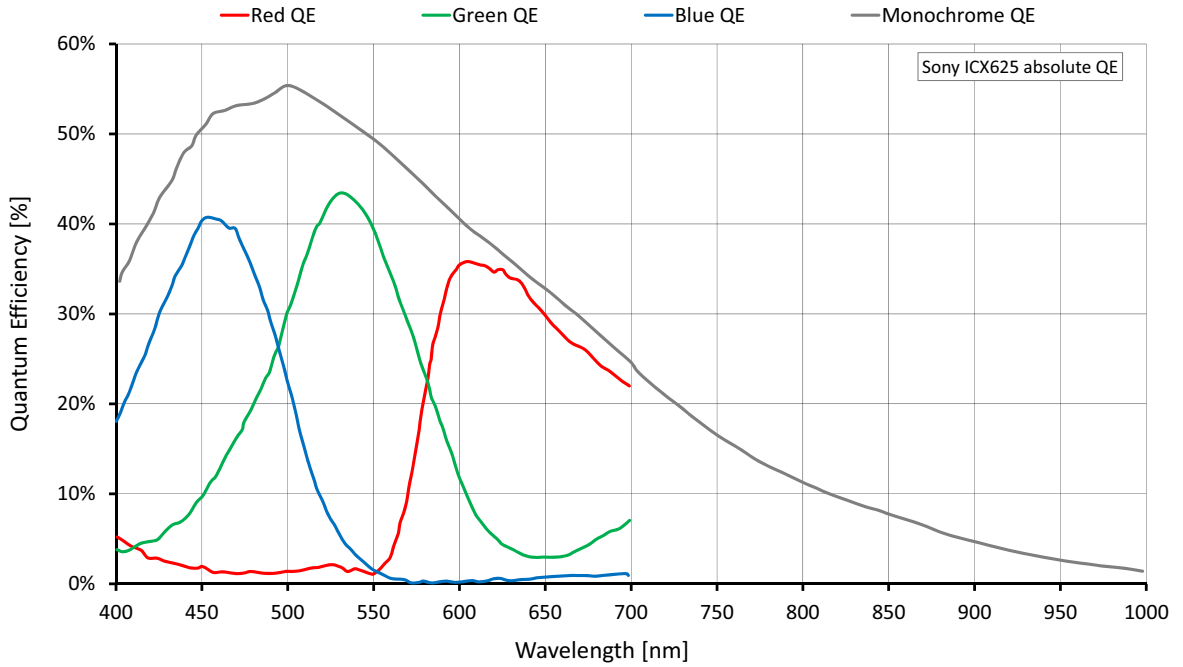
Absolute QE

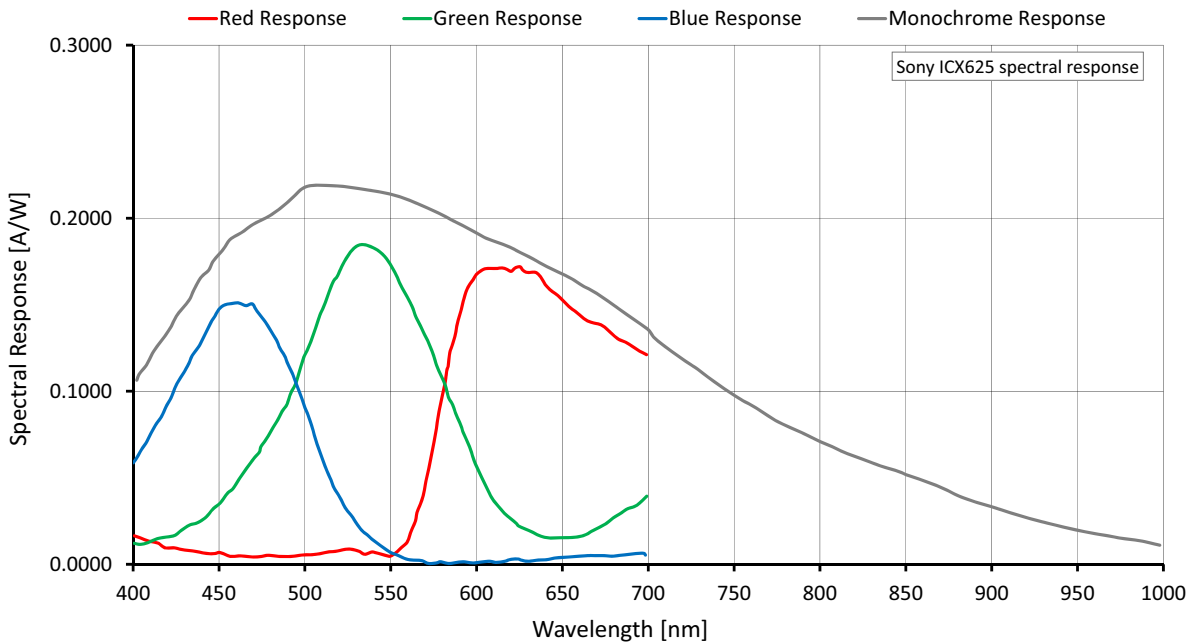*Figure 10: Prosilica GB2450 (Sony ICX625) absolute QE*

Spectral response

Figure 11: Prosilica GB2450 (Sony ICX625) spectral response

ROI frame rate

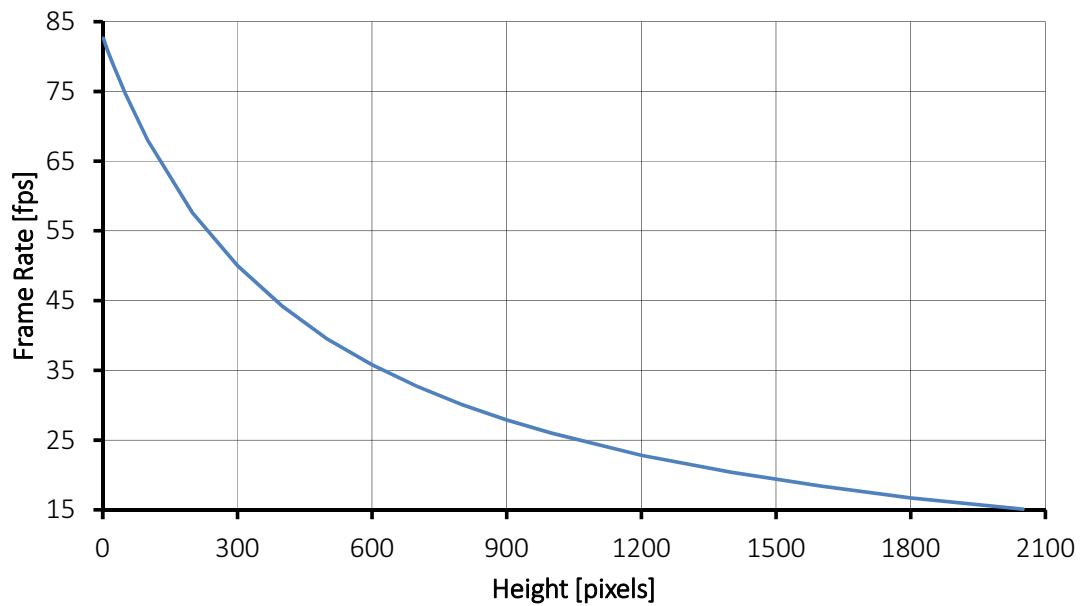$$\text{Frame rate} = \frac{1}{26.63 \text{ μs} \times \text{Height} + 12079.91 \text{ μs}}$$

Figure 12: Prosilica GB2450 frame rate as a function of ROI height

Height	Frame rate (fps)	Height	Frame rate (fps)
2050	15.1	400	44.2
1800	16.7	300	50.0
1600	18.4	200	57.6
1400	20.4	100	68.0
1200	22.8	50	74.7
1000	26.0	20	79.3
900	27.9	10	81.0
800	30.1	5	81.9
700	32.7	2	82.5
600	35.8	1	82.6
500	39.5		

Table 12: Frame rate as a function of ROI height (Width=2448 pixels)

Prosilica GB model comparison
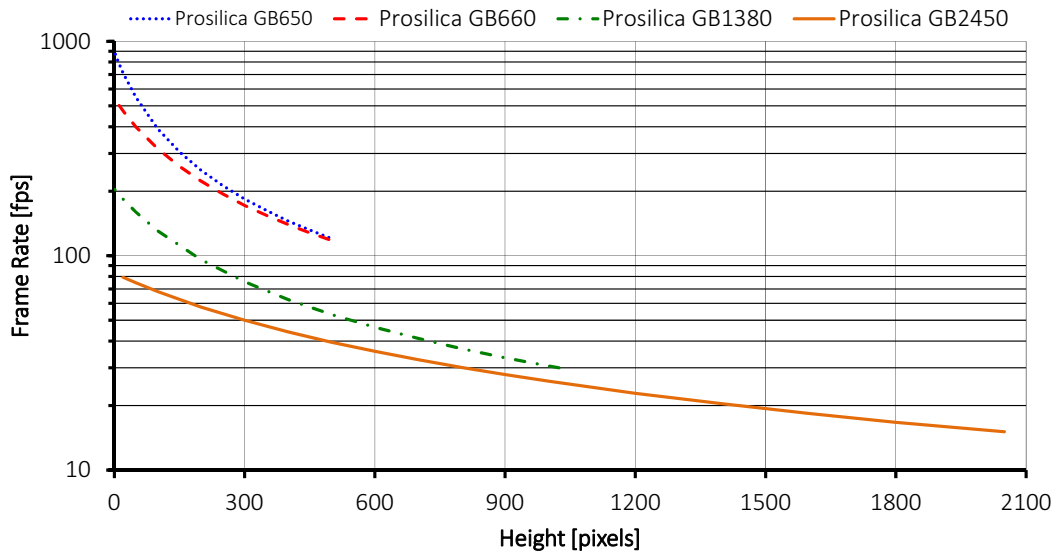
Figure 13: Maximum frame rate comparison for select models

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 GB camera family.

Control	Description
Gain control	Manual and auto
Exposure time control	Manual and auto
White balance	Red and blue channel; manual and auto control
External trigger event	Rising edge, falling edge, any edge, level high, level low
External trigger delay*	0 to 60 s; 1 µs increments
Fixed rate control	0.001 frames per second 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 broadcast to the host computer
*May vary depending on the camera model	

Table 13: Camera and driver attribute highlights

IR cut filter

All Prosilica GB color models are equipped with an infrared block 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 cameras do not employ an IR filter.

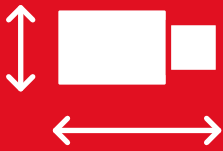The following figure shows the filter transmission response for the IRC30 filter employed in the Prosilica GB cameras.
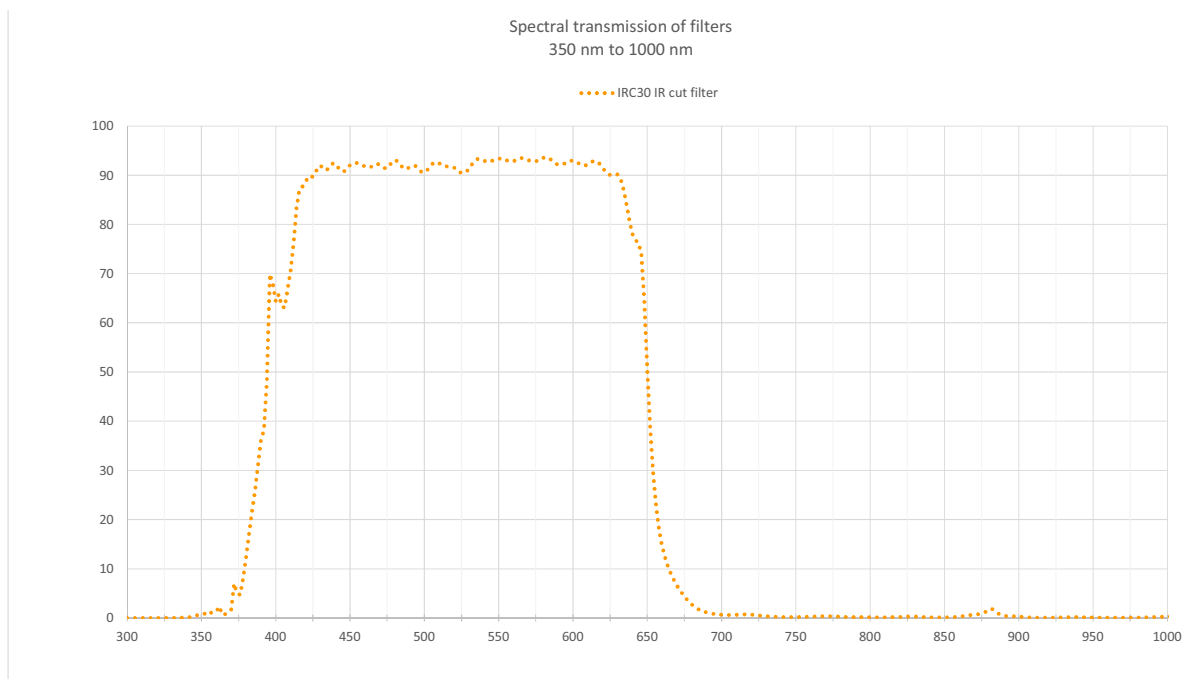
Figure 14: IRC30 filter transmission response

Mechanical dimensions

This chapter includes:

- Sensor and connector orientation
- CAD drawing and dimensions
- Sensor position accuracy
- Maximum protrusion distance and filter diameter

The Prosilica GB camera is a board level product which offers several sensor and connector orientation options. The camera variations are described in the following table and detailed dimension drawings are provided in the next section.
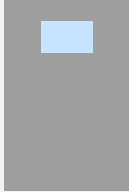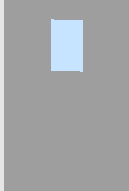
Sensor orientation	Model	Description	Example
Landscape	GB	Sensor mounted in landscape orientation	GB1380, GS1380
Portrait	GB-P	Sensor mounted in portrait orientation	GB1380-P, GS1380-P

Table 14: Sensor orientation options

Prosilica GB660, GB660C, GB2450, GB2450C do not support portrait sensor orientation.
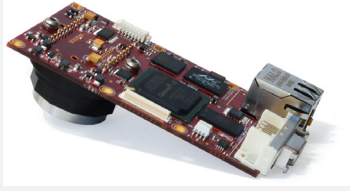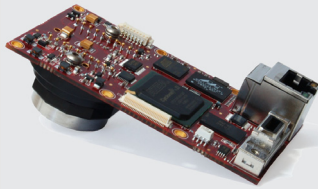
Connector orientation	Model	Description	Example
Inline	GB	Ethernet and I/O connectors are in parallel with camera board	GB1380
Vertical	GB-V	Ethernet and I/O connectors are perpendicular to camera board	GB1380-V

Table 15: Connector orientation options

Mechanical drawings

Landscape sensor and inline connector

Assembly shown is without the camera lens mount. See figure 19 for lens mount dimensions. All measurement values are in millimeters.
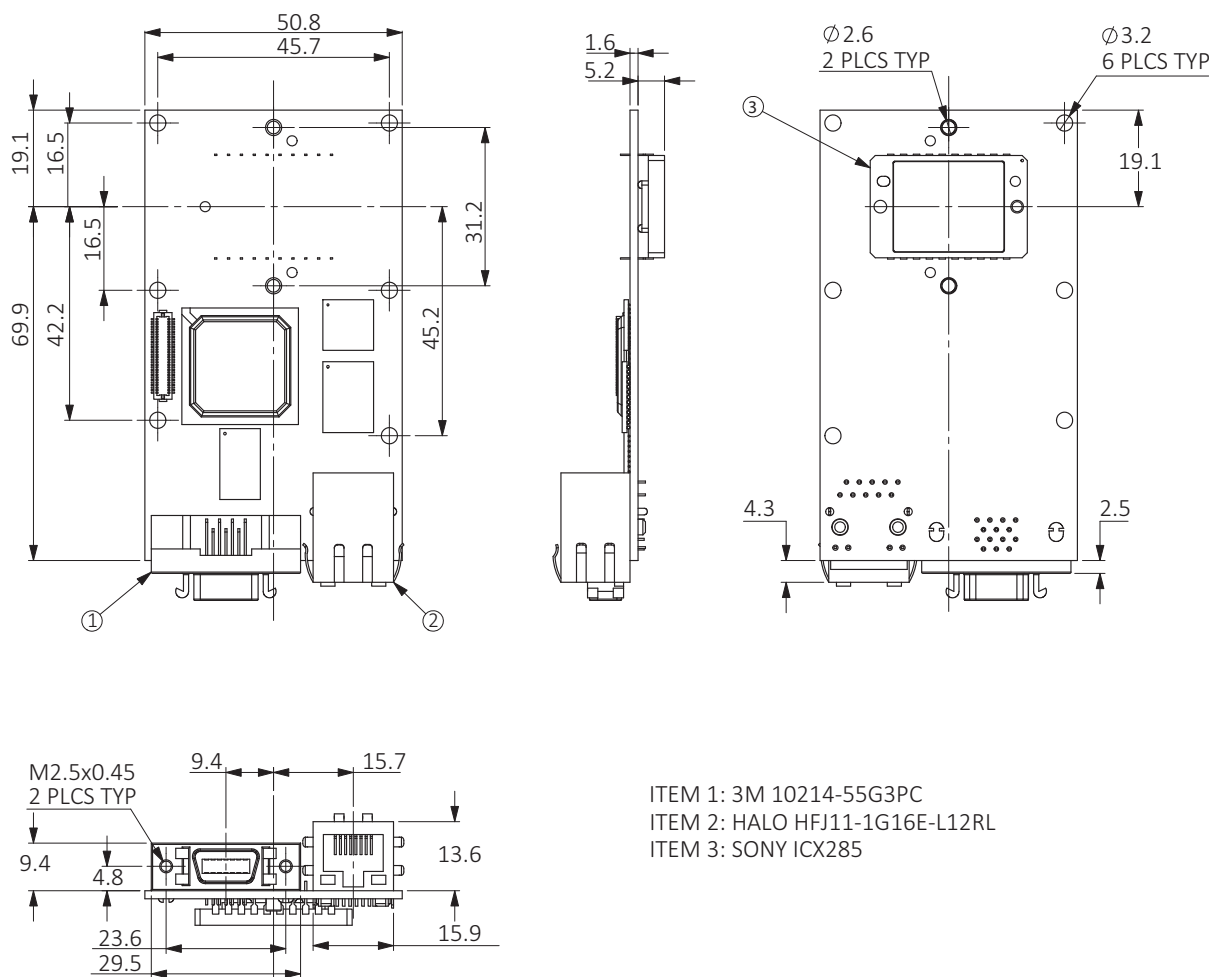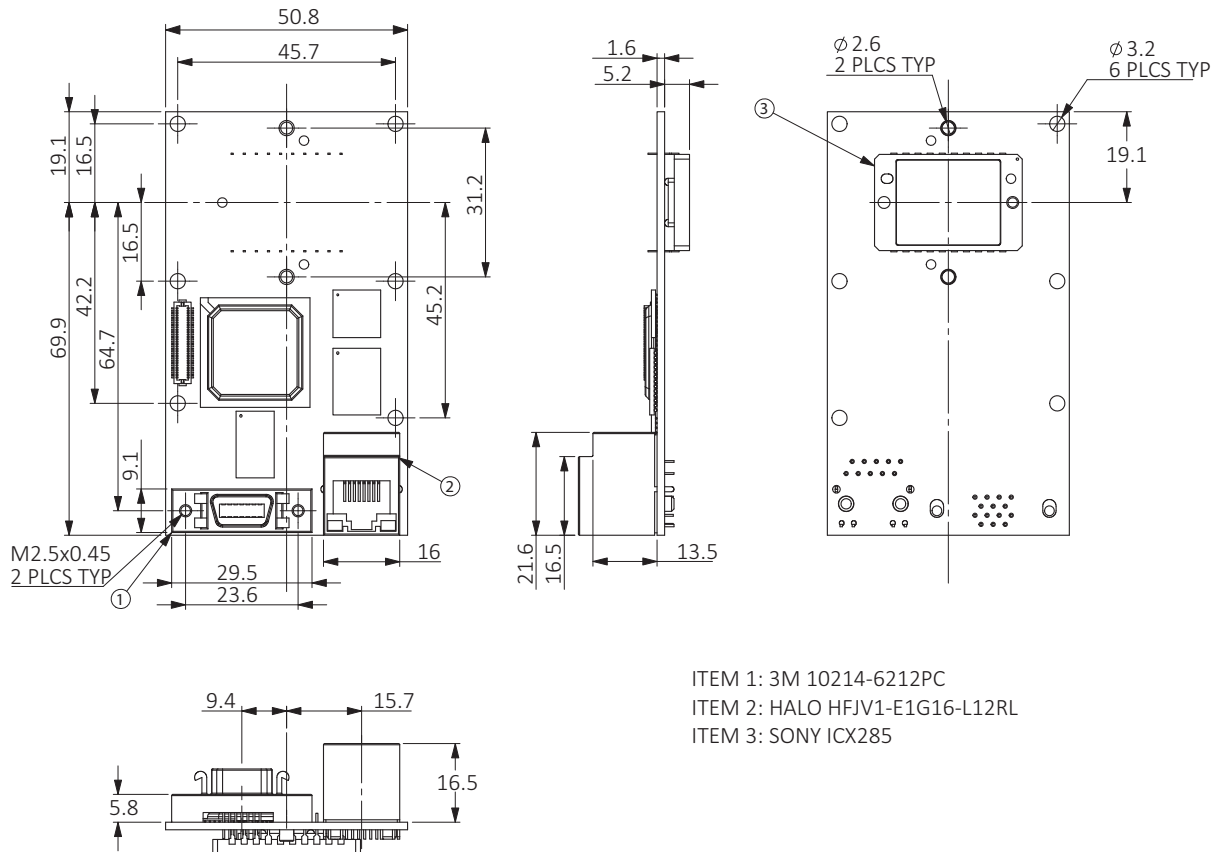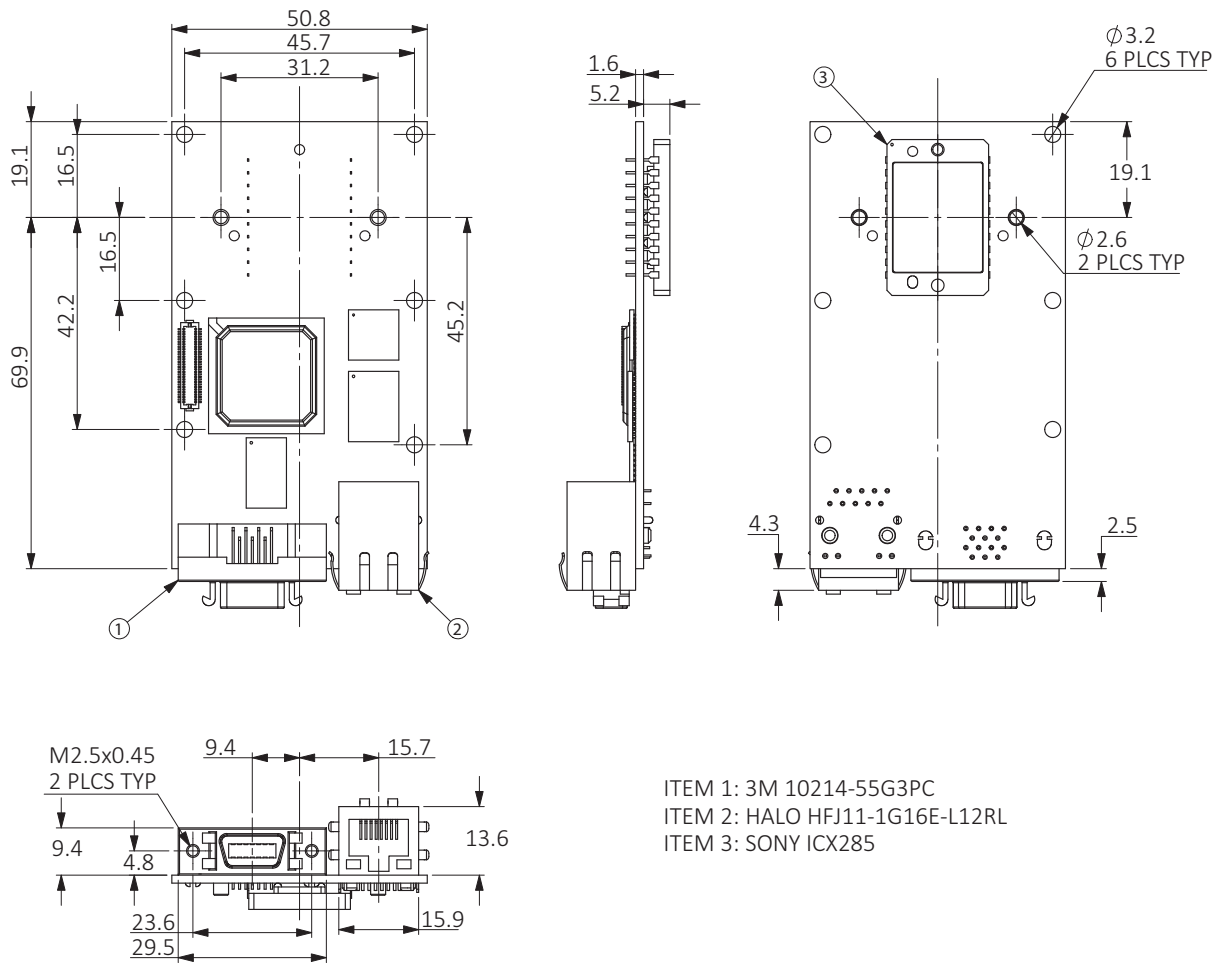

ITEM 1: 3M 10214-55G3PC
ITEM 2: HALO HFJ11-1G16E-L12RL
ITEM 3: SONY ICX285

Figure 15: Prosilica GB1380 series mechanical drawing

Landscape sensor and vertical connector

Assembly shown is without the camera lens mount. See figure 19 for lens mount dimensions. All measurement values are in millimeters.


ITEM 1: 3M 10214-6212PC
ITEM 2: HALO HFJV1-E1G16-L12RL
ITEM 3: SONY ICX285

Figure 16: Prosilica GB1380-V series mechanical drawing

Portrait sensor and inline connector

Assembly shown is without the camera lens mount. See figure 19 for lens mount dimensions. All measurement values are in millimeters.

ITEM 1: 3M 10214-55G3PC
ITEM 2: HALO HFJ11-1G16E-L12RL
ITEM 3: SONY ICX285

Figure 17: Prosilica GB1380-P series mechanical drawing

Portrait sensor and vertical connector

Assembly shown is without the camera lens mount. See figure 19 for lens mount dimensions. All measurement values are in millimeters.

ITEM 1: 3M 10214-6212PC
ITEM 2: HALO HFJV1-E1G16-L12RL
ITEM 3: SONY ICX285
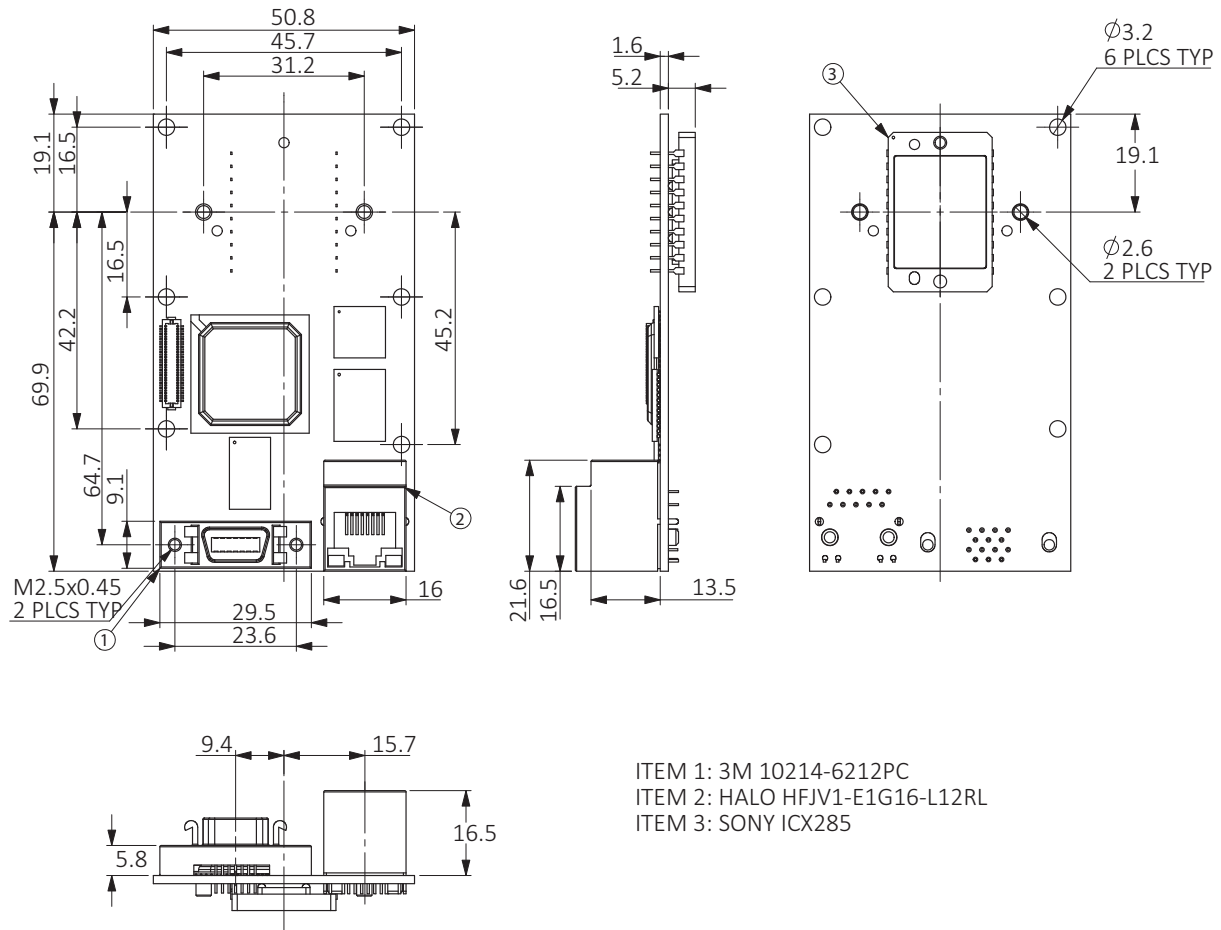
Figure 18: Prosilica GB1380-PV series mechanical drawing

Camera lens mount
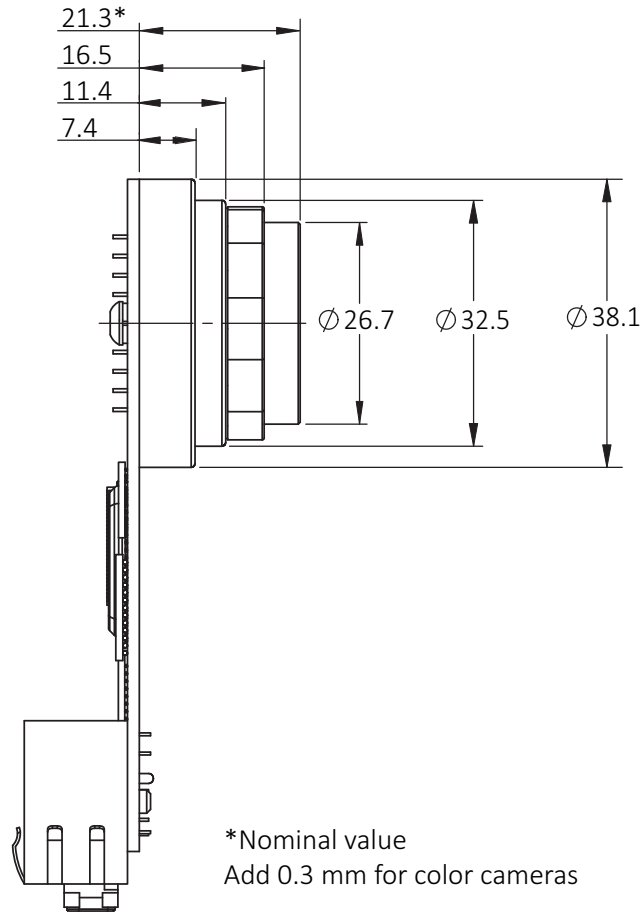
Figure 19: Prosilica GB lens mount

Allied Vision

C-Mount flange focal distance

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

Prosilica GB cameras are shipped with adjustable C-Mount.

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.
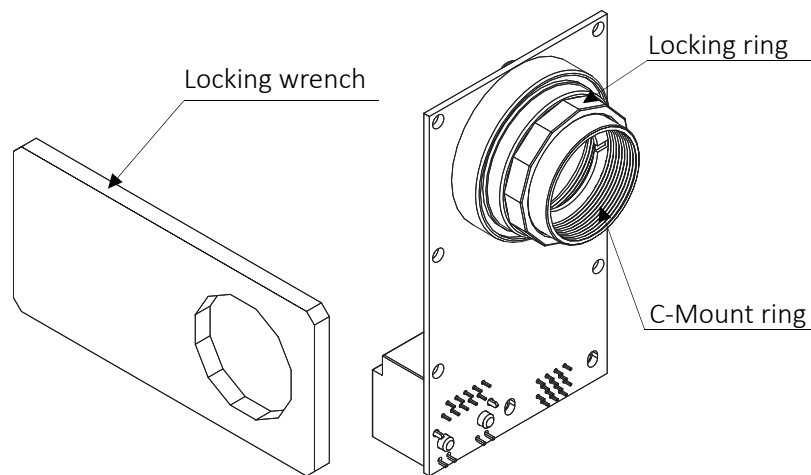
Figure 20: Prosilica GB camera front view

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 GB 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 for C-Mount cameras

Lens protrusion is the distance from outer edge of C-Mount ring to contact point of first surface internal to C-Mount ring. For color cameras this surface is the IR-filter holder, and for mono cameras this surface is the internal camera front plate (see Figure 21). Table 13 presents lens protrusion values for Prosilica GB cameras with C-Mount.

Section A-A for C-Mount monochrome cameras   Section A-A for C-Mount color cameras
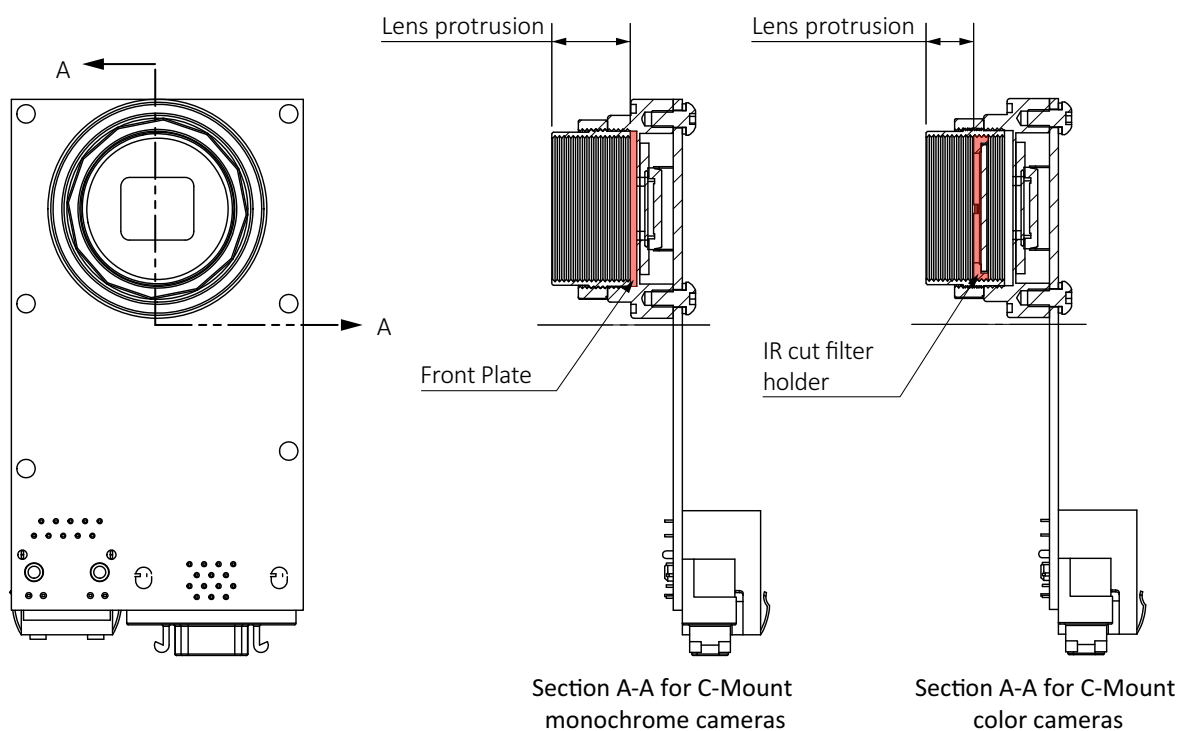
Figure 21: Cross section of typical Prosilica GB front assembly with C-Mount

Model	Sensor orientation	Lens protrusion	Model	Sensor orientation	Lens protrusion
GB650C	Landscape	8.88 mm	GB1380C	Landscape	8.88 mm
GB650C	Portrait	9.27 mm	GB1380C	Portrait	9.32 mm
GB650	Landscape	13.64 mm	GB1380	Landscape	13.64 mm
GB650	Portrait	13.64 mm	GB1380	Portrait	13.64 mm
GB660C	Landscape	8.41 mm	GB2450C	Landscape	8.29 mm
GB660	Landscape	13.64 mm	GB2450	Landscape	13.64 mm

Table 16: Lens protrusion for models with C-Mount

Camera interfaces
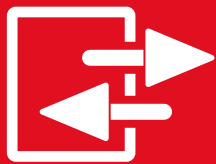
This chapter includes:

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

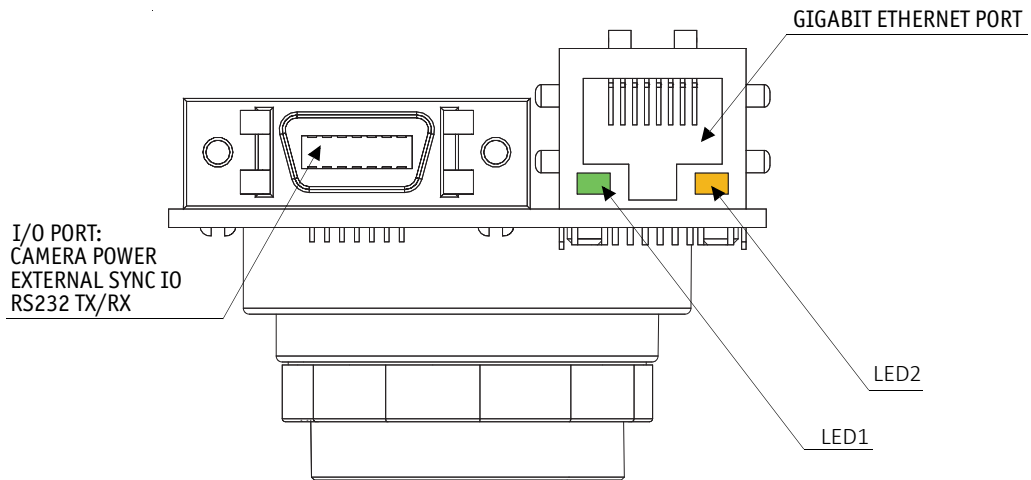This chapter provides information on Gigabit Ethernet port, I/Os, and trigger features.

Figure 22: Prosilica GB connection ports

Status LEDs

The color of the LEDs have the following meaning:

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

Table 17: Status of LEDs

Once the camera is booted, LED1 will remain solid green as long as the camera is powered, even if connection with the host is lost.

Gigabit Ethernet port

The Gigabit Ethernet port conforms to the IEEE 802.3 1000BASE-T standard for Gigabit Ethernet over copper. We recommend using Category 6 or higher compatible cabling and connectors for best performance.

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.

Cable lengths

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).

Horizontal locking screw connector

Prosilica GB cameras support cables with horizontal locking screw connector for a secured connection.

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

Camera I/O connector pin assignment

The General Purpose I/O port uses a 3M 10214-55G3PC (or 3M 10214-6212PC) connector on the camera side. The mating cable connector is 3M 10114-3000PE or a connector with shielded housing 3M 10314-3210-00X (where X indicates color preference).

Camera side 3M 10214-55G3PC/3M 10214-62121PC connector					I/O cable color code
Pin	Signal	Direction	Level	Description	
1	Camera Power	In	5 to 16* VDC	Power supply	Red
2	Camera GND	In	GND for external power	Ground for camera power supply	Black
3	In 1	In	U_{in}(high) = 5 to 24 V U_{in}(low) = 0 to 0.8 V	Input 1 opto-isolated (SyncIn1)	White
4	Isolated IO GND	In/Out	Common GND for I/O	Isolated input and output signal ground	Brown
5	Out 1	Out	Open emitter maximum 20 mA	Output 1 opto-isolated (SyncOut1)	Green
6	Video Iris	Out	---	PWM signal for iris control	Blue
7	Reserved	---	---	---	Orange
8	---	---	---	---	---
9	---	---	---	---	---
10	TxD RS232	Out	RS232	Terminal transmit data	Yellow
11	RxD RS232	In	RS232	Terminal receive data	White and Brown
12	In 2	In	LVTTL maximum 3.3 V	Input 2 non-isolated (SyncIn2)	Pink

Table 18: Camera I/O connector pin assignment and I/O cable color coding (sheet 1 of 2)

Camera side 3M 10214-55G3PC/3M 10214-62121PC connector					I/O cable color code
Pin	Signal	Direction	Level	Description	
13	Out 2	Out	LVTTL maximum 3.3 V	Output 2 non-isolated (SyncOut2)	White and Black
14	Signal GND	---	---	Ground for RS232 and non-isolated outputs	Gray

*Some models offer 5 to 25 VDC. See Camera power section for details.

Table 18: Camera I/O connector pin assignment and I/O cable color coding (sheet 2 of 2)

Cable side connector

The cable side connector is available for purchase from Allied Vision. Order code: 02-7003A.

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/accesso-ries-data-sheets.html
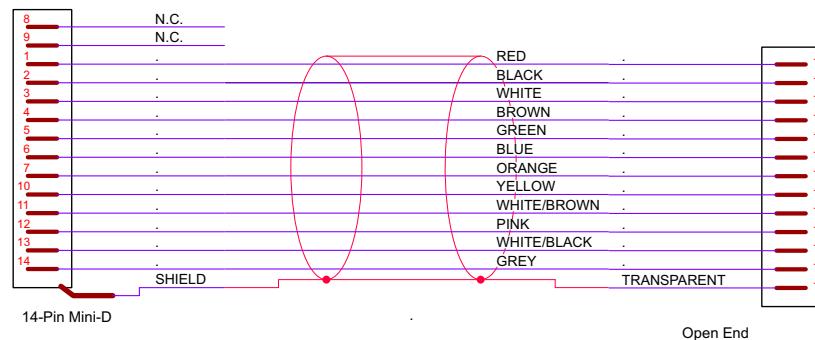
Figure 23: Prosilica GB cable color coding

I/O definition

Camera power

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

12 Volt power adapter

A 12 Volt power adapter with 3M Mini D connector is available for purchase from Allied Vision:

- Order code: 02-8007C (Power supply, North America, Plug type B)
- Order code: 02-8008C (Power supply, Europe, Plug type F)

Isolated IO ground

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

RxD RS232 and TxD RS232

These signals are RS232 compatible. These signals are not optically isolated. Tie RS232 ground to Camera GND to complete the RS232 circuit. Communication is at 11520 baud.

RS232

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

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

Input triggers

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

In 1 (Opto-isolated)

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

In 2 (Non-isolated)

In 2 is non-isolated and can be used when a faster trigger is required and when environmental noise is inconsequential. The required signal is low voltage TTL 3.3 Volts. Tie Signal GND to Camera GND to complete the trigger circuit. See *Camera I/O non-isolated user circuit example* for more wiring information.

Power caution

Exceeding 5.5 Volts on signal inputs can permanently damage the camera.

Output signals

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

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

Out 1 (Opto-isolated)

Out 1 is optically isolated and should be used in noisy environments. Out 1 requires a pull up resistor of greater than 1 KΩ to the user's 5 V logic supply. Tie Camera GND to Isolated IO GND to complete the external circuit. See *Camera I/O opto-isolated user circuit example* for more information.

Out 2 (Non-isolated)

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

Signal ground

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

Video iris

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

Reserved

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

Camera I/O opto-isolated user circuit example
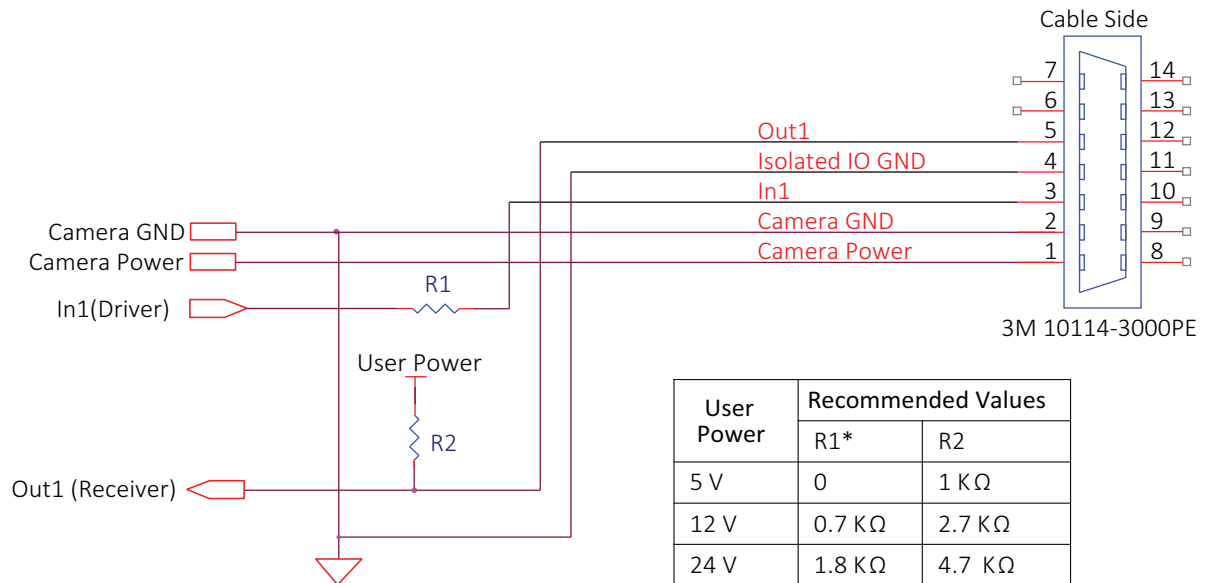
Figure 24: Prosilica GB isolated trigger user circuit

User Power	Recommended Values	
	R1*	R2
5 V	0	1 KΩ
12 V	0.7 KΩ	2.7 KΩ
24 V	1.8 KΩ	4.7 KΩ

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

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

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

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

Camera I/O non-isolated user circuit example
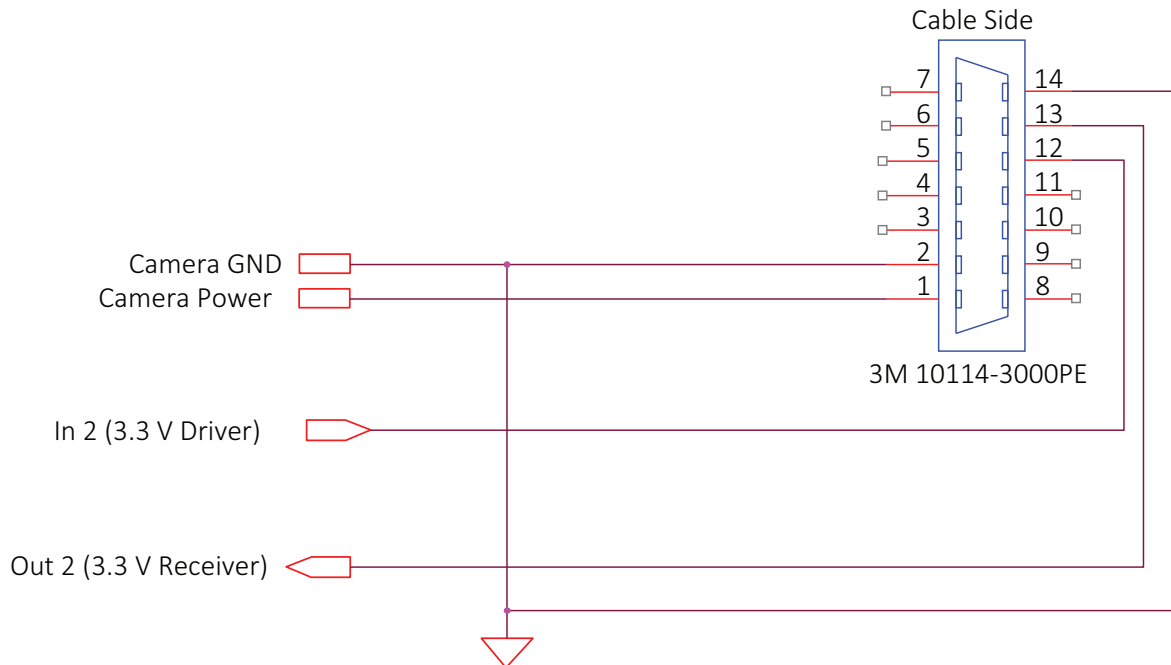
Figure 25: Prosilica GB non-isolated trigger user circuit

Input: Incoming trigger must be able to source 10 µA, at 3.3 Volts. Input trigger voltage greater than 5.5 Volts will damage the camera.

Output: The maximum sync output current is 24 mA, at 3.3 Volts.

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

Video iris user circuit example

Prosilica GB series 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.

The following schematic uses Camera Power to power the video iris lens, and assumes Camera Power = 12 Volts. Most video iris lenses operate at a 8 to 16 Volts input voltage. Therefore, this circuit is not appropriate if using a 24 Volts camera power supply. Doing so may irreparably damage your lens. Please consult your video iris lens specifications for the appropriate drive voltage.
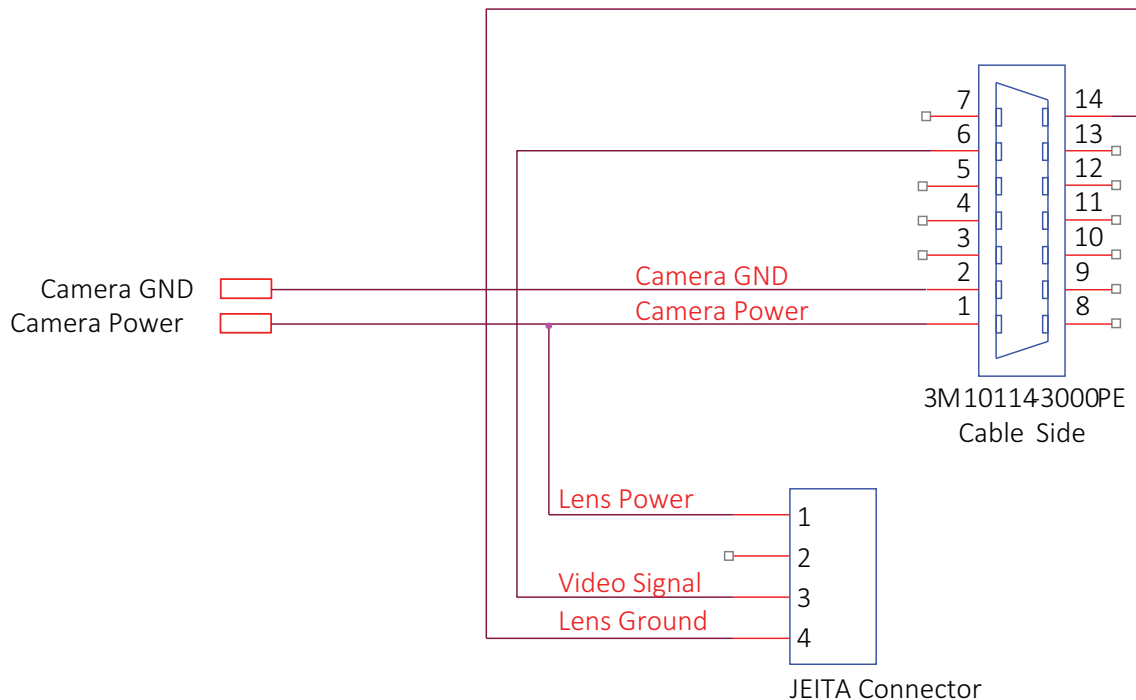
Figure 26: Prosilica GB video iris user circuit diagram

Trigger timing diagram

The following diagram explains the general trigger concept.
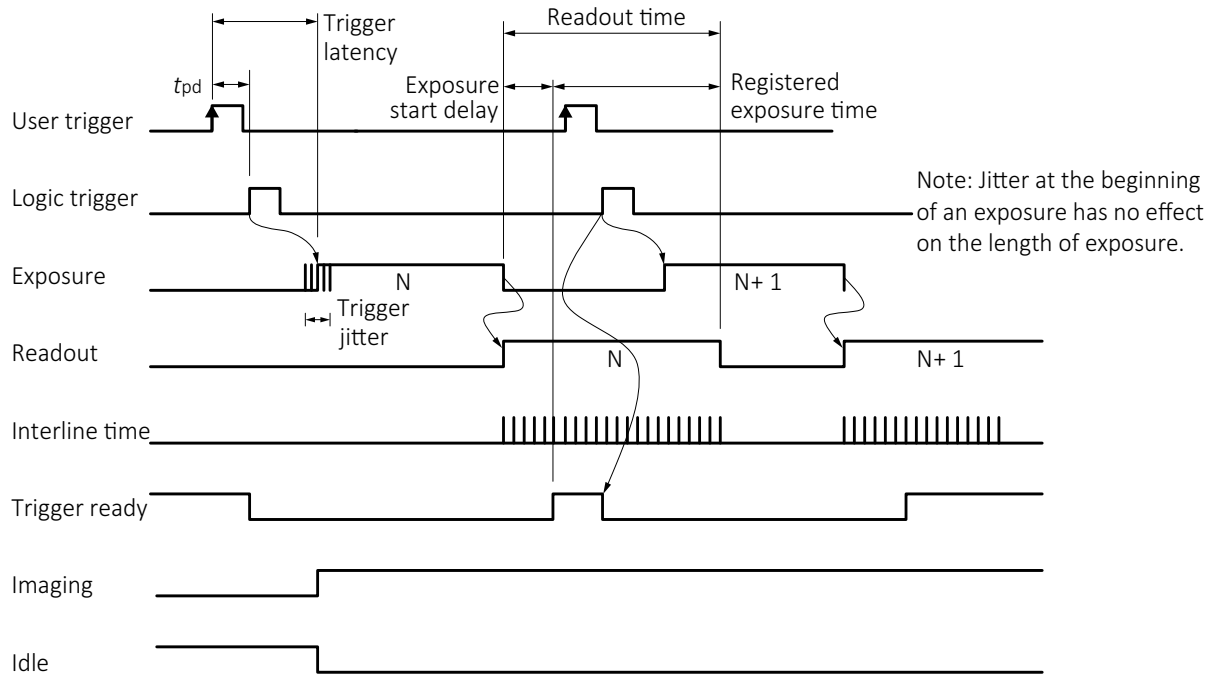
Figure 27: Prosilica GB internal signal timing waveforms

Trigger definitions

Term	Definition
User trigger	Trigger signal applied by the user (hardware trigger, software trigger).
Logic trigger	Trigger signal seen by the camera internal logic (not visible to the user).
t_{pd}	Propagation delay (t_{pd}) between the user trigger and the logic trigger.
Exposure	High when the camera image sensor is integrating light.
Readout	High when the camera image sensor is reading out data.
Trigger latency	Time delay between the user trigger and the start of exposure.
Trigger jitter	Deviation from the trigger latency time.
Trigger ready	Indicates to the user that the camera will accept the next trigger.
Registered exposure time	Exposure time value currently stored in the camera memory.

Table 19: Explanation of signals in timing diagram (sheet 1 of 2)

Term	Definition
Exposure start delay	Registered exposure time subtracted from the readout time and indicates when the next exposure cycle can begin such that the exposure will end after the current readout.
Interline time	Time between sensor row readout cycles.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Idle	High if the camera image sensor is not exposing and/or reading out data.

Table 19: Explanation of signals in timing diagram (sheet 2 of 2)

Trigger rules

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

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

Triggering during the idle state

For applications requiring the shortest possible trigger latency and the smallest possible trigger jitter the user trigger signal should be applied when imaging is false and idle is true. 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 since exposure must always begin on an Interline boundary.

Image data flow
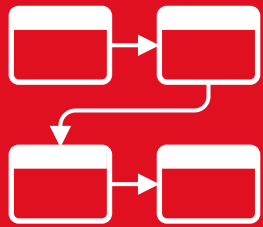
This chapter presents diagrams that illustrate data flow of the image data.

The following diagrams illustrate Prosilica GB image data flow. The individual blocks are described in more detail in the *GigE Features Reference*.
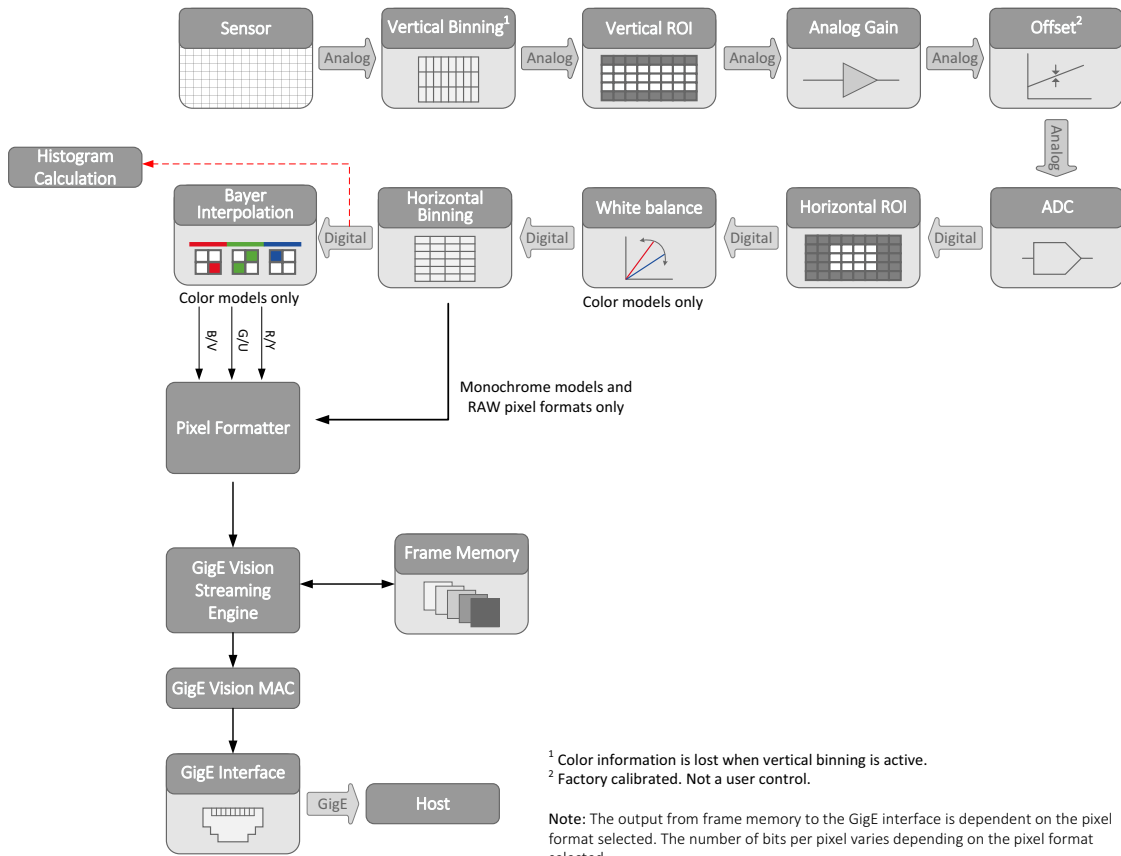

Figure 28: Prosilica GB image data flow

[1] Color information is lost when vertical binning is active.
[2] Factory calibrated. Not a user control.

Note: The output from frame memory to the GigE interface is dependent on the pixel format selected. The number of bits per pixel varies depending on the pixel format selected.

Allied Vision

Cleaning optical components

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

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

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

Keep optical components clean

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

When screwing or unscrewing the camera lens or dust cap, hold the camera with the mount opening towards the floor. This minimizes the possibility of any contaminants falling on the glass surface. Always store cameras and lenses with dust-caps on.

Identifying impurities

If you observe any image artifacts in your video preview of your Prosilica GB camera you may have impurities either on the lens, filter or protection glass, or on the sensor protection glass. Every Prosilica GB camera is cleaned prior to shipment; however, impurities may develop due to handling or unclean environments.

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.

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: 02-5003A) suitable for IR filter removal is available for purchase from Allied Vision for all Prosilica GB cameras.

Materials for cleaning optical components

Use only these cleaning materials for optical components

- Optic approved lens cotton, cloth, or tissue that is chemically pure and free from silicones and other additives.
- Optic approved low residue cleaning liquid.

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.

Cleaning Instructions

Workplace conditions

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

1. Unplug the camera from any power supply before cleaning.

2. Apply a small amount of cleaning liquid to a new lens cleaning cotton, cloth, or tissue. The cotton, cloth, or lens tissue should be moist, but not dripping.

3. Hold the camera sensor diagonally upwards. Ensure that the camera is away from your body to prevent particles like skin flakes from falling on the sensor.

4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.

5. When you have finished cleaning, examine the surface in a strong light. Take an out-of-focus picture of a flat, illuminated surface to see if any dirt or dust remains.

6. If dust spots remain, repeat this procedure using new clean lens tissue (as 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 GB 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 GB 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*.
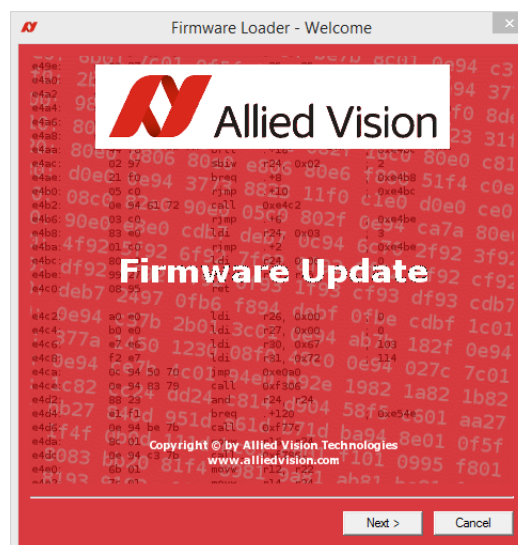
2. Click **Next**. The *Firmware Loader* displays a list of firmware included in the package.
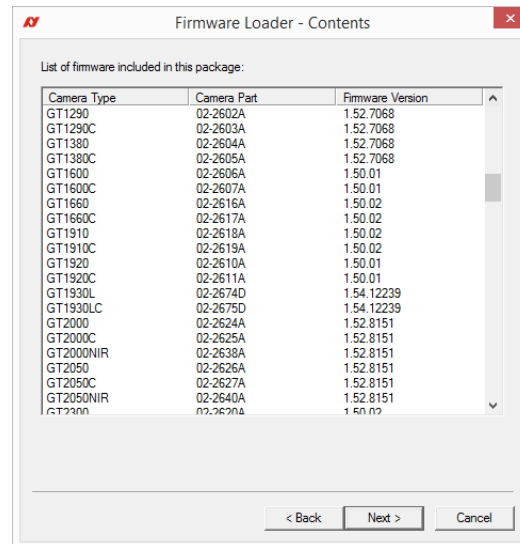
3. Click **Next**. Select your camera model on this page.
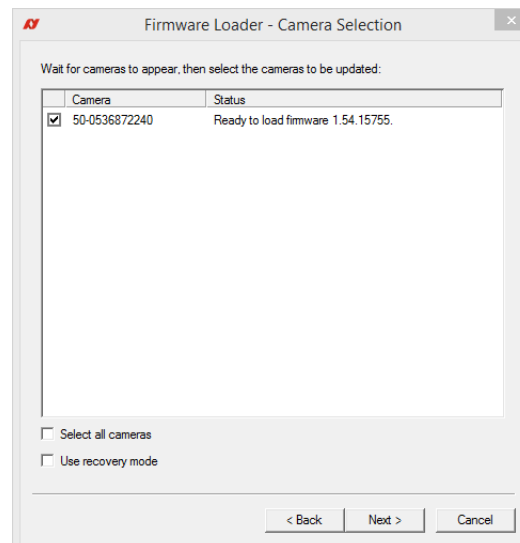
Recovery Mode

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**.
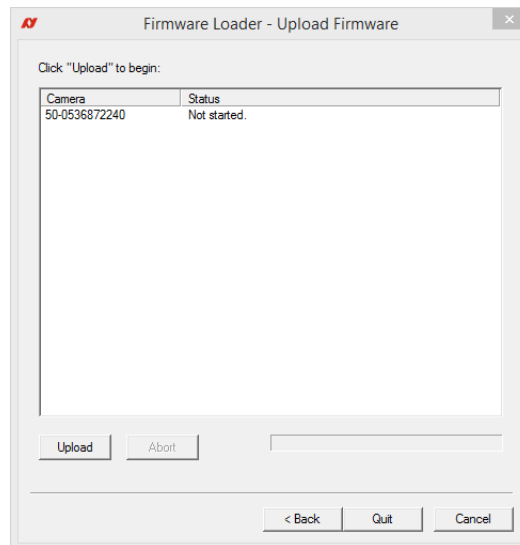
5. Click **Upload** to start the update. The existing firmware will be erased and the new firmware will be updated to the camera.
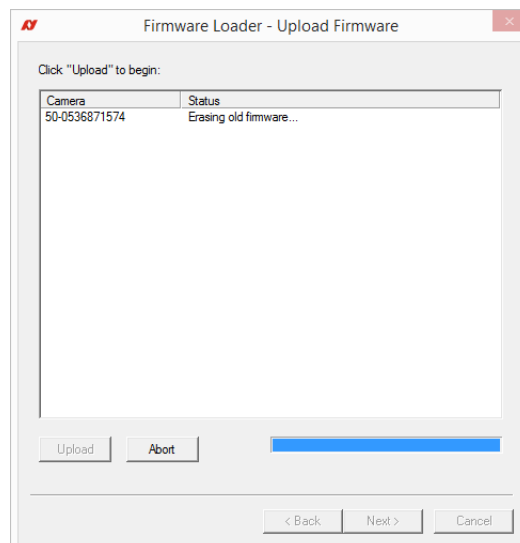
6. The *Firmware Loader* displays a success status upon completion. Click **Quit** to exit the loader.
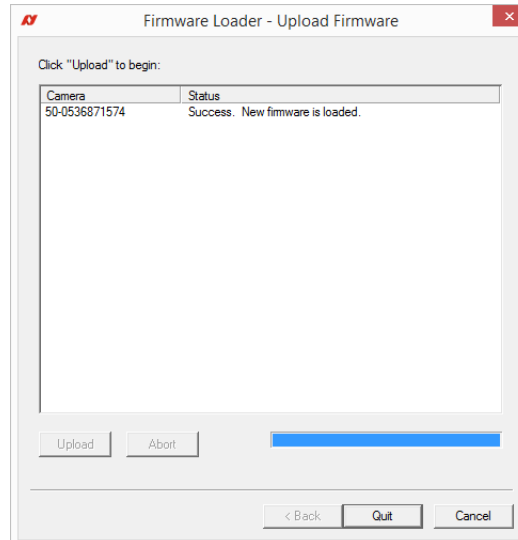
Power cycle after upgrade or downgrade

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

Index