NOTICE

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

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

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

NOTICE

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

Prosilica GT cameras offer various lens mounts for installing a lens including C-Mount, CS-Mount, F-Mount, F-Mount PA, M42-Mount, M42-Mount PA, M58-Mount PA, M58-Mount PA, and Canon EF-Mount PA depending on the model. Lenses can be purchased directly from Allied Vision or from an Allied Vision distribution partner. Users need to select the desired focal length of the lens and appropriate optical format for the target camera model.

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

Configuring the host computer

Prosilica GT 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 GT 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, and email) is possible but may impact camera performance (for example, frame rate). Check with your network administrator if required for network configuration.

Installing the NIC driver

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

To update the driver manually

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

Optional: Modifying NIC IP address

After the 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.

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

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

When systems employ multiple NICs connected to multiple cameras the address of the NICs should be set. Each NIC or NIC card port requires a unique IP address.

For example:

NIC 1:

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

NIC 2:

- IP Address: 169.254.100.2
- Subnet mask: 255.255.0.0
- Default gateway: blank

In general, we recommend to use high performance Gigabit Ethernet network equipment to achieve best results and maximum performance for the communication and acquisition of images with GigE Vision cameras.

For best performance when operating Allied Vision Gigabit Ethernet cameras on a Windows-based system, we recommend installing the GigE Vision Filter Driver on the corresponding network interface.

Additional to the performance increase by using the GigE Vision Filter Driver which will result in a limitation of the interrupt rate, we recommend to optimize the following settings on the system.

Optimize system performance

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

Edit the NIC driver properties according to the values in the following table. The names and availability of the properties listed may vary depending on 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	512 bytes

Table 6: Network interface card driver settings

Default packet size

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

NIC settings

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

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

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.

Powering up the camera

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

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

- Order code: 13869 (Desktop power supply without connection cable)
- Order code: 13866 (AC power cable, 1.8 m, US to C13)
- Order code: 13865 (AC power cable, 1.8 m, EU to C13)

NOTICE

- Use only DC power supplies with insulated cases.
- For all power connections, use only shielded cables to avoid electromagnetic interference.
- Prosilica GT cameras can source power from:
  - IEEE 802.3at Type 1 (100 Mbps and 1000 Mbps)
  - IEEE 802.3at Type 1 compliant PoE power sourcing equipment devices such as switches, injectors, or NICs.

NOTICE

The maximum power supplied via PoE is 13 watts. EF-Mount lens power requirements varies from lens to lens; however, typical ratings are in the 3 to 4 watt range. Should your lens and camera power requirements exceed 13 watts, it is necessary to power the camera via the Hirose I/O port.

NOTICE

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

NOTICE

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

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

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

Powering the camera via Hirose I/O port

Cameras powered by both the Hirose I/O port and the Gigabit Ethernet port use the power provided by Hirose I/O port only.

Powering the camera via PoE

Note the following when using PoE accessories with PoE-capable GigE cameras:

- Prosilica GT cameras conform to the IEEE 802.3at Type 1 standard.
- Ensure that your PSE provides data over all four pairs.
- If the PSE uses only two out of four pairs for data, operation is limited to 10/100 Mbps. This translates to lower frame rates.
- If the PSE uses all four pairs for data, operation is in Gigabit (1000 Mbps) mode. Thus, allowing you to achieve the maximum possible frame rate.

Connecting to host application

After you have installed **Vimba Viewer** or a third-party application to your host computer, connect your Prosilica GT camera via an Ethernet cable. If your camera is not PoE powered, connect the Hirose cable to power the camera.

Prosilica GT cameras work with the following software options:

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

Allied Vision software

Software packages provided by Allied Vision are free of charge and contain such as:

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

Vimba is Allied Vision's GenICam-based SDK with transport layers for all Allied Vision cameras with GigE Vision, USB3 Vision, IEEE 1394, and Camera Link

interface. Vimba runs on Windows, Linux, and Linux for ARM. You can port your source code from Windows to Linux or cross-compile from a Linux PC to an embedded system.

Vimba provides APIs for C, C++, and .NET. Users who quickly want to develop a straightforward application love the simplicity of the C API or the .NET API.

Advanced users with high demands appreciate the C++ API, which is designed as a highly efficient and sophisticated API for advanced object-oriented programming including the STL (standard template library), shared pointers, and interface classes.

Vimba includes programming examples in C, C++, and C# and an extensive user documentation.

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

Third-party software

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

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

Configuring your camera

After the host PC is configured, it is necessary to configure the parameters in the camera to establish the connection with best performance. It is necessary to note the value for the feature `GevSCPSPacketSize` which defines the size of the network packets and also the size of the feature `StreamBytesPerSecond` which controls the available bandwidth of the network interface.

If just one camera is connected, the maximum value can be used and therefore set to 124,000,000. When using multiple cameras simultaneously on one network adapter through a switch, we recommend to divide the available amount of `StreamBytesPerSecond` by the number of connected cameras. When two cameras with the same parameter share the available bandwidth, the usable maximum value for each camera is 62,000,000.

Accessories

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

- GigE accessories such as standard GigE components and PoE capable 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.

To find accessories for your Prosilica GT camera, see www.alliedvision.com/en/products/accessories.

Applied standards

GigE Vision

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

GenICam

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

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

Shock and vibration

Prosilica GT standard, extended, and Large Format cameras were successfully tested according to the following standards:

- IEC 60068-2-6, Sinusoidal vibration testing
- IEC 60068-2-27, Non-repetitive shock testing
- IEC 60068-2-27, Repetitive shock testing
- IEC 60068-2-64, Random vibration testing

If you need more details, please visit
www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Notes on specifications

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

Dimensions and mass

Dimensions include lens mount and connectors but not the tripod and lens.

Mass does not include the tripod and lens.

Both dimensions and mass values in the specification tables are for the default configuration of the camera (default housing and lens mount).

Mono8 pixel format

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

Modular options

Prosilica GT and Prosilica GT Large Format cameras can be ordered with several modular options including lens mount, optical filter, and sensor options. For more information, see the Modular Concept.

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 GT 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, 8-bit pixel format (***Mono8*** or ***Bayer8***), and a `GevSCPSPacketSize` = *8192* bytes per packet.

Resolution

and ROI frame rates

Resolution and ROI frame rates are 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 provides 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 have 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 sensor sensors before readout. The frame rate for an ROI at the same effective height as binning is slower because the sensor still needs to read out the “fast readout rows” in ROI mode.

Frame rate and readout

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

Sensor tap mode (CCD models only)

With quad-tap sensor mode you can achieve a higher frame rate than with single-tap mode. With single-tap sensor mode, you can achieve an image certain to be free of any tap-boundary artifacts. You can also use single-tap mode if you experience tap imbalance issues with your camera. You can change the sensor digitization tap mode in **Vimba Viewer 2.0** or later. Sensor tap more is applicable to quad-tap cameras only.

Image acquisition must be stopped before changing sensor tap mode.

Affected features

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

Feature	Quad-tap mode	Single-tap mode
`ReverseX`	Available	Not available
`ReverseY`	Available	Not available
`DecimationHorizontal`	Available	Not available
`DecimationVertical`	Available	Not available

Table 7: Features affected when switching sensor tap mode

Tap modes

Model	Sensor tap mode
Prosilica GT1290	Single-tap
Prosilica GT1380	Single-tap
Prosilica GT1600	Single-tap
Prosilica GT1920	Quad-tap, Single-tap switchable in Vimba 2.0 or later
Prosilica GT2450	Dual-tap
Prosilica GT2750	Quad-tap, Single-tap switchable in Vimba 2.0 or later
Prosilica GT3400	Quad-tap, Single-tap switchable in Vimba 2.0 or later

Table 8: Sensor tap modes for CCD models

Absolute QE plots

All measurements were done without protection glass (ASG) or IR cut filter. With protection glass (ASG) 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.

Sony CCD and CMOS sensors

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

ON Semi CMOS sensors

The curve in the absolute QE plots shown in this chapter is taken from the sensor manufacturer data sheet. The information was correct at the time of publishing.

Wavelength

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

Spectral response plots

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

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

Specifications common to all models

The following table provides specifications common to all Prosilica GT models.

Feature	Specification
Default optical filter	• Monochrome and NIR models: No optical filter • Color models: Type IRC30 IR cut filter
Image buffer	128 MB
TTL (non-isolated) I/O	1 input, 2 outputs
Opto-isolated I/O	1 input, 2 outputs
RS232	1 TxD, 1 RxD
Power requirements	7 to 25 VDC AUX
Power requirements (PoE)	IEEE 802.3at Type 1
Operating humidity	20 to 80% non-condensing
Interface standards	• IEEE 802.3 1000BASE-T (GigE) and IEEE 802.3at Type 1 (PoE) • GigE Vision Standard V1.2
Camera control standard	GenICam SFNC V1.2.1

Table 9: Specifications common to all Prosilica GT models

Hardware options

Depending on the camera model, additional mount, such as EF-Mount, F-Mount, M42-Mount, M58-Mount, and TFL Mount are available. The Planarity adjusted (PA) option adds increased alignment for the sensor Z-axis.

The Modular Concept informs about options for lens mounts, optical filters, and protection glass (ASG).

Modular Concept

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

Prosilica GT1920 series

The following table provides model specifications. The values are valid for Prosilica GT1920 and GT1920C models. For specifications common to all models, see Specifications common to all models

Feature	Specification	
	Prosilica GT1920	**Prosilica GT1920**
Sensor model	Sony ICX674ALG	Sony ICX674AQG
Resolution	1936 (H) × 1456 (V); 2.8 MP	
Shutter type	Global shutter	
Sensor type	Interline CCD, Progressive Scan	
Sensor format	Type 2/3	
Sensor size	10.972 mm diagonal	
Pixel size	4.54 µm × 4.54 µm	
Housing	Extended format housing	
Default lens mount	C-Mount	
Max. frame rate at full resolution	Quad-tap mode: 40.7 fps Single-tap mode: 11.6 fps	
Max. image bit depth	12/14 bit	
StreamHoldCapacity	Up to 47 frames at full resolution	
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	BayerGR8, BayerGR12, BayerRG12Packed
Exposure time control	10 µs to 26.8 s, 1 µs increments	
Gain control	0 to 33 dB; 1 dB increments	
Binning	Horizontal: 1 to 8 columns Vertical: 1 to 8 rows	
Decimation X/Y	Horizontal and vertical: 1, 2, 4, 8 factor	
Sensor taps	Quad-tap Single-tap switchable in Vimba Viewer 2.0 or later	
Power consumption	External power: 4.9 W at 12 VDC Power over Ethernet: 6.0 W	

Table 19: Prosilica GT1920 model specifications (sheet 1 of 2)

Feature	Specification	
	Prosilica GT1920	**Prosilica GT1920**
Trigger latency	2 µs	
Trigger jitter	±20 ns	
Time between exposures	**Pixel format**	**Value**
	Mono8, BayerRG8, Mono12Packed, BayerRG12Packed, YUV411Packed	52 µs
Propagation delay (t_{pd})	30 ns for non-isolated I/O; 70 ns for isolated I/O	
Operating temperature	-20 °C to +60 °C ambient temperature (without condensation)	
Storage temperature	-20 °C to +70 °C ambient temperature (without condensation)	
Camera dimensions (L × W × H)	92 × 53.3 × 33 mm	
Mass (typical)	224 g	
Temperature monitoring	Available for main board and sensor board. Resolution: 0.031; Accuracy: ±1 °C	

Table 19: Prosilica GT1920 model specifications (sheet 2 of 2)

Absolute QE

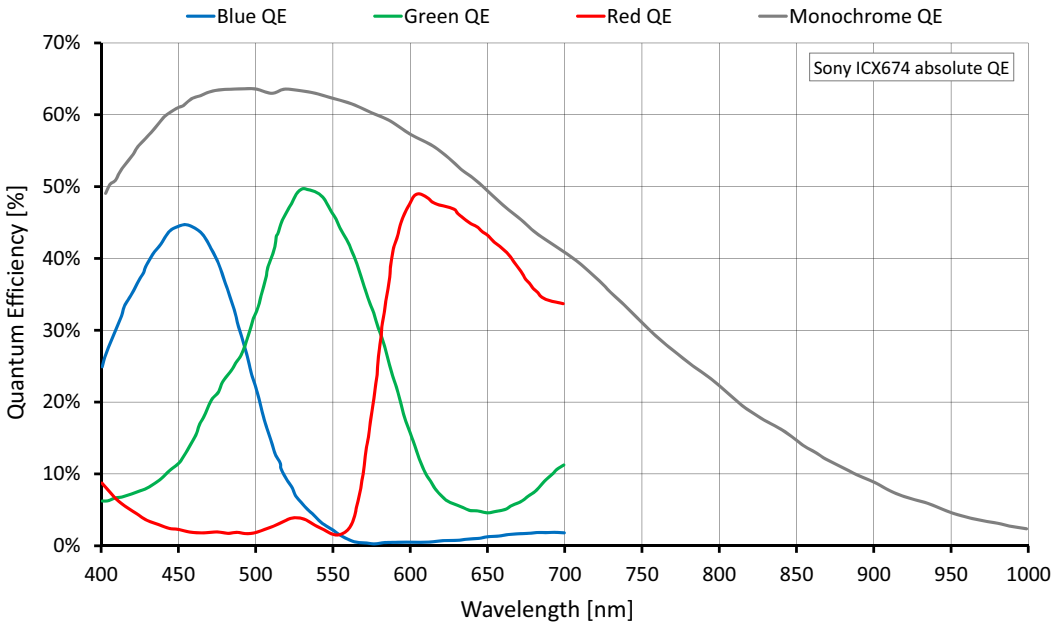

Figure 13: Prosilica GT1920 (Sony ICX674) absolute QE

Spectral response

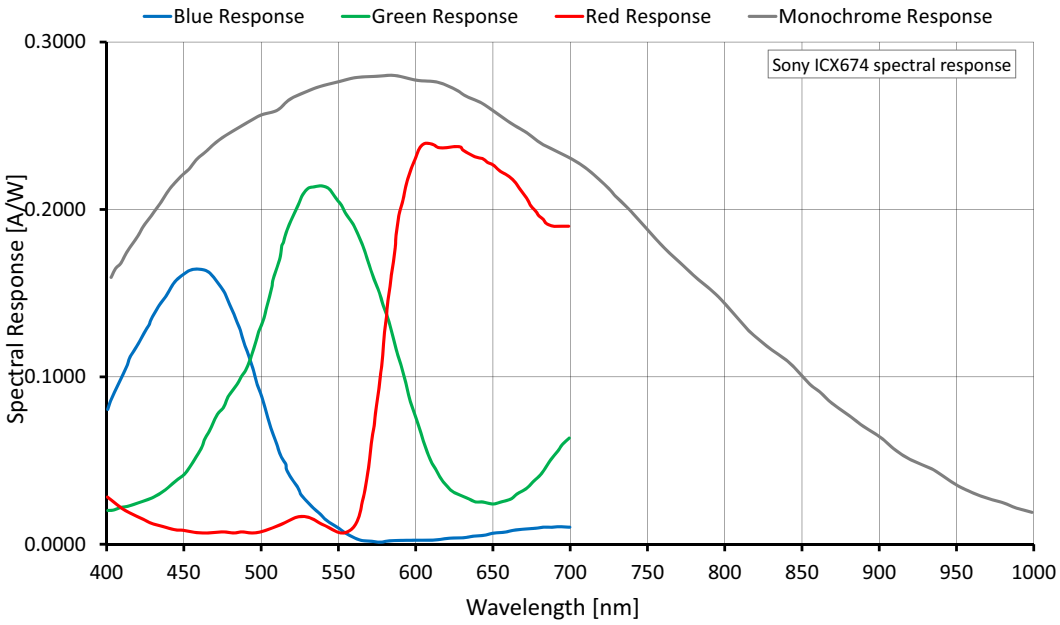

Figure 14: Prosilica GT1920 (Sony ICX674) spectral response

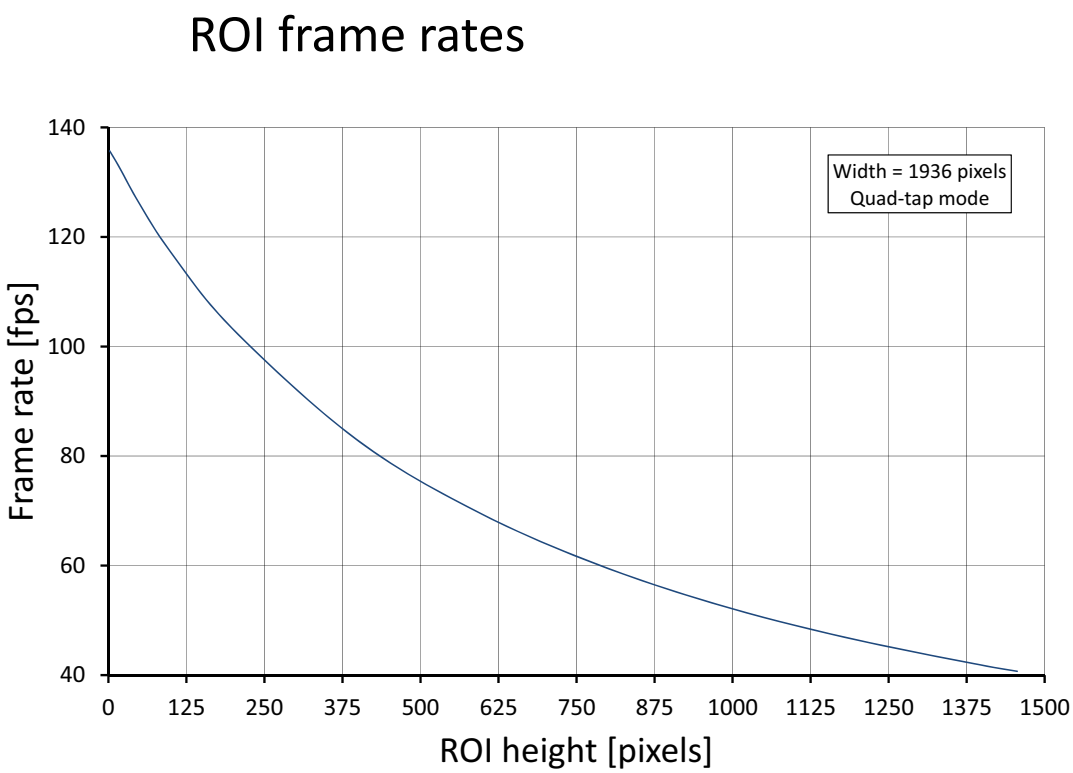

Figure 15: Prosilica GT1920 frame rate as function of ROI height

Height	Frame rate
1456	40.7
1400	41.8
1200	46.4
1000	52.1
800	59.5

Height	Frame rate
600	69.3
400	82.8
200	103.1
100	117.2
50	126.0

Height	Frame rate
20	132.2
10	134.2
2	135.7

Table 20: Frame rate as a function of ROI height (Width=1936 pixels)

The following table shows how binning affects ROI frame rates.

BinningVertical	Height	Frame rate
2	728	70.3
3	484	92.8
4	364	110.0
5	290	124.1

BinningVertical	Height	Frame rate
6	242	135.1
7	208	144.1
8	182	151.7

Table 21: Frame rate as a function of ROI height with vertical binning enabled (Width=1936 pixels)