# AVT Prosilica GC


# Technical Manual

## AVT GigE Vision Cameras

V2.0.1
70-0064

7 September 2011

Allied Vision Technologies Canada Inc.
101-3750 North Fraser Way
V5J 5E9, Burnaby, BC / Canada

ALLIED Vision Technologies

## Legal notice

For customers in the U.S.A.
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However there is no guarantee that interferences will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Use a different line outlet for the receiver.
- Consult a radio or TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment. The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart A of Part 15 of FCC Rules.

For customers in Canada
This apparatus complies with the Class A limits for radio noise emissions set out in the Radio Interference Regulations.

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

Life support applications
These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Allied Vision Technologies customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Allied for any damages resulting from such improper use or sale.

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**Allied Vision Technologies Canada Inc. 7/2011**


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# Introduction

This **AVT Prosilica GC Technical Manual** describes in depth the technical specifications of this camera family including dimensions, feature overview, I/O definition, trigger timing waveforms, frame rate performance, etc.

For information on software installation read the **AVT GigE Installation Manual**.

For detailed information on camera features and controls refer to the **AVT Prosilica GigE Camera and Driver Attributes** document.

**www**

AVT Prosilica GC literature:

http://www.alliedvisiontec.com/us/support/downloads/product-literature/prosilica-gc.html

**Info**

Please read through this manual carefully.

# Document history

| Version | Date | Remarks |
|---|---|---|
| V2.0.1 | 7.10.11 | Added note to Figure 34. |
| V2.0.0 | 22.07.11 | New Manual – RELEASE Status |

Table 1: Document History

# Symbols used in this manual

**Note**

This symbol highlights important information

**Caution**

This symbol highlights important instructions. You have to follow these instructions to avoid malfunctions.

**www**

This symbol highlights URLs for further information. The URL itself is shown in blue.

Example:

http://www.alliedvisiontec.com

# Warranty

**Info**

Allied Vision Technologies Canada provides a 2 year warranty which covers the replacement and repair of all AVT parts which are found to be defective in the normal use of this product. AVT will not warranty parts which have been damaged through the obvious misuse of this product.

# Precautions

Caution

**DO NOT OPEN THE CAMERA. WARRANTY IS VOID IF CAMERA IS OPENED.**

This camera contains sensitive components which can be damaged if handled incorrectly.

Caution

**KEEP SHIPPING MATERIAL.**

Poor packaging of this product can cause damage during shipping.

Caution

**VERIFY ALL EXTERNAL CONNECTIONS.**

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

Caution

**CLEANING.**

This product can be damaged by some volatile cleaning agents. Avoid cleaning the image sensor unless absolutely necessary. Please see instructions on sensor cleaning in this document.

Caution

**DO NOT EXCEED ENVIRONMENTAL SPECIFICATIONS.**

See environmental specifications limits in the Specifications section of this document. Special care is required to maintain a reasonable operating temperature. If the camera is to be operated in a warm environment, it is suggested that the camera be mounted on a heat sink such as a metal bracket and that there is sufficient air flow.

# Cleaning the sensor

**Caution**

**DO NOT CONTACT CLEAN SENSOR UNLESS ABSOLUTELY NECESSARY**

### Identifying Debris

Debris on the image sensor or optical components will appear as a darkened area or smudge on the image that does not move as the camera is moved. Do not confuse this with a pixel defect which will appear as a distinct point.

### Locating Debris

Before attempting to clean the image sensor, it is important to first determine that the problem is due to debris on the sensor window. To do this you should be viewing a uniform image, such as a piece of paper, with the camera. Debris will appear as a dark spot or dark region that does not move as the camera is moved. To determine that the debris is not on the camera lens, rotate the lens independent of the camera. If the spot moves as the lens moves, then the object is on the lens -not on the image sensor- and therefore cleaning is not required. If the camera has an IR filter, then rotate the IR filter. If the object moves then the particle is on the IR filter not the sensor. If this is the case remove the IR filter carefully using a small flat head screw driver. Clean both sides of the IR filter using the same techniques as explained below for the sensor window.

**Caution**

**DO NOT TOUCH ANY OPTICS WITH FINGERS. OIL FROM FINGERS CAN DAMAGE FRAGILE OPTICAL COATINGS.**

### Cleaning with Air

If it is determined that debris is on the sensor window, then remove the camera lens, and blow the sensor window directly with clean compressed air. If canned air is used, do not shake or tilt the can prior to blowing the sensor. View a live image with the camera after blowing. If the debris is still there, repeat this process. Repeat the process a number of times with increased intensity until it is determined that the particulate cannot be dislodged. If this is the case then proceed to the contact cleaning technique.

### Contact Cleaning

Only use this method as a last resort. Use 99% laboratory quality isopropyl alcohol and clean cotton swabs. Dampen the swab in the alcohol and gently wipe the sensor in a single stroke. Do not reuse the same swab. Do not wipe the sensor if the sensor and swab are both dry. You must wipe the sensor quickly after immersion in the alcohol, or glue from the swab will contaminate the sensor window. Repeat this process until the debris is gone. If this process fails to remove the debris, then contact AVT.

# Conformity

Allied Vision Technologies declares under its sole responsibility that all standard cameras of the **AVT Prosilica GC** family to which this declaration relates are in conformity with the following standard(s) or other normative document(s):

- CE, following the provisions of 2004/108/EG directive
- FCC Part 15 Class A
- RoHS (2002/95/EC)

We declare, under our sole responsibility, that the previously described **AVT Prosilica GC** cameras conform to the directives of the CE.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

# Specifications

| Prosilica GC | 650/650C |
|---|---|
| Resolution | 659 x 493 |
| Sensor | Sony ICX424AL, ICX424AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 1/3 |
| Cell size | 7.4 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 90 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC650: Mono8, Mono12, Mono16<br>GC650C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 19 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.3 W @ 12 VDC |
| Trigger latency | 1.0us for non-isolated I/O, 2.8us for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5us for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 104 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 2: Prosilica GC650 camera specification

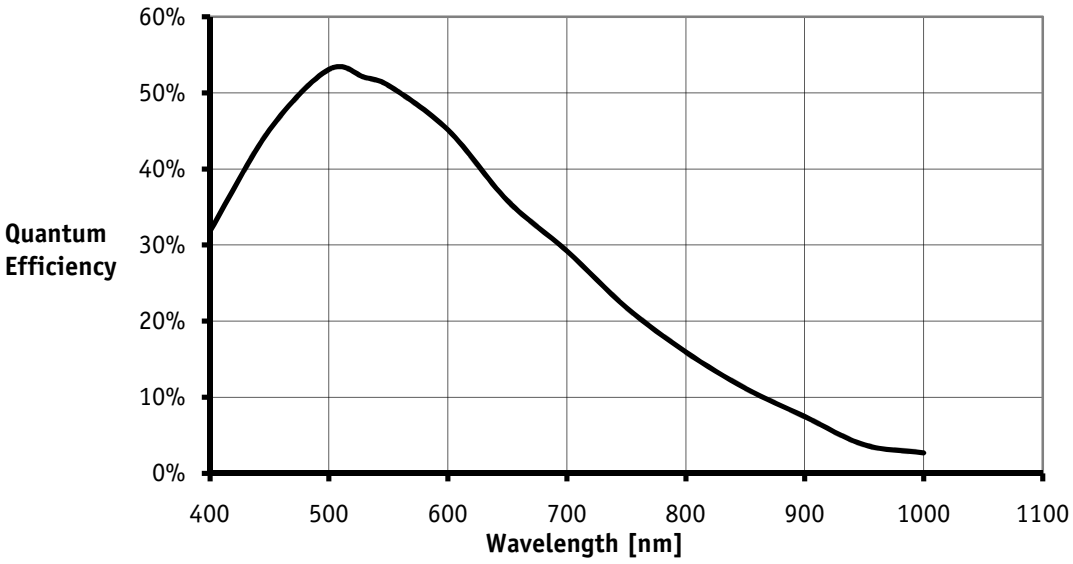



Figure 1 – Prosilica GC650 monochrome spectral response

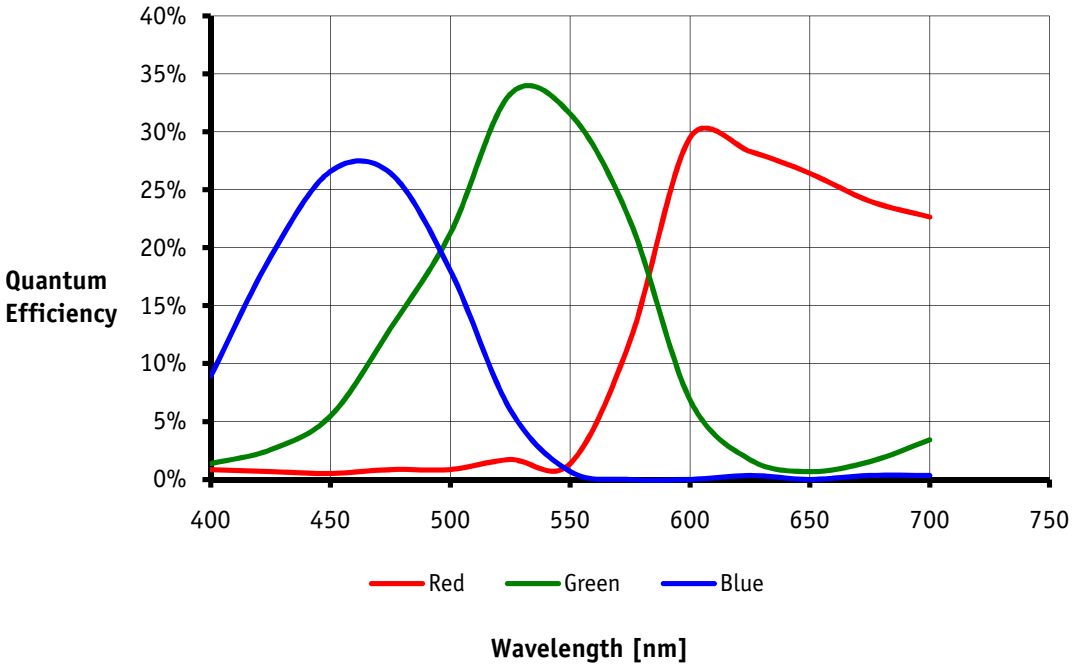



Figure 2 – Prosilica GC650C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 655/655C |
|---|---|
| Resolution | 659 x 493 |
| Sensor | Sony ICX414AL, ICX414AQ for color |
| Type | CCD Progressive |
| Sensor size | Type ½ |
| Cell size | 9.9 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 119 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC655: Mono8, Mono12, Mono16<br>GC655C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 22 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to Full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.0 W @ 12 VDC |
| Trigger latency | 1.0µs for non-isolated I/O, 2.8µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 105 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 3: Prosilica GC655 camera specification

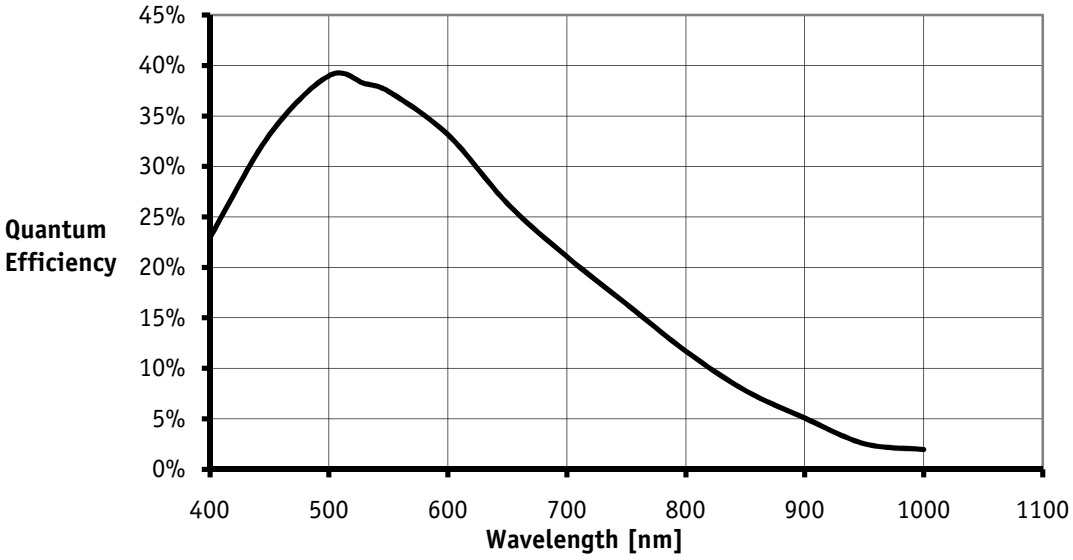



Figure 3 – Prosilica GC655 monochrome spectral response

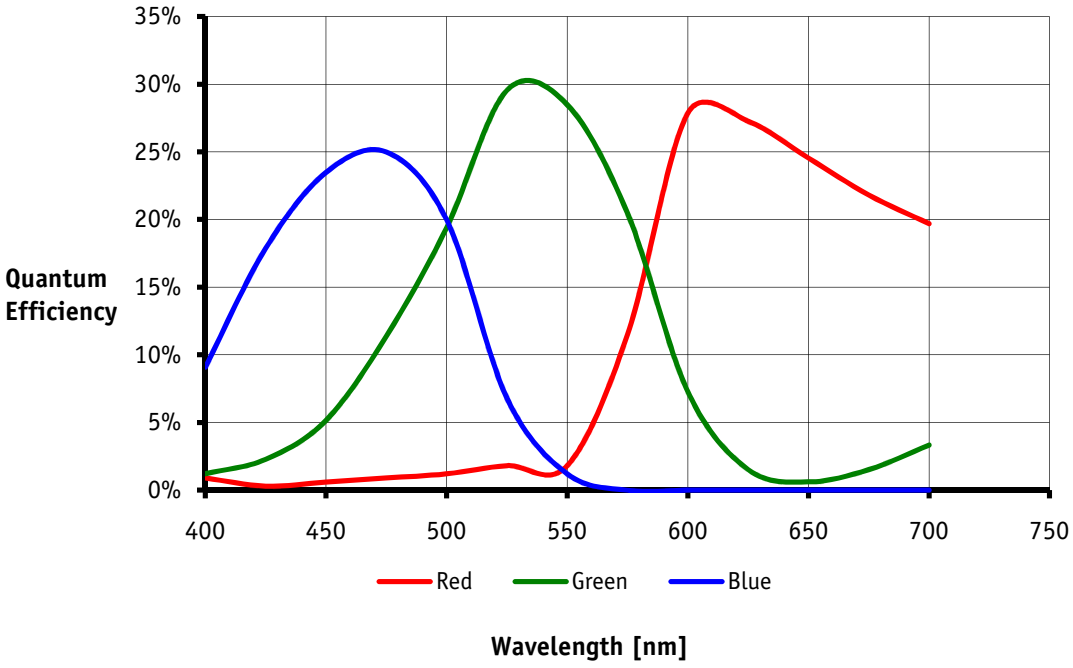



Figure 4 – Prosilica GC655C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 660/660C |
|---|---|
| Resolution | 659 x 493 |
| Sensor | Sony ICX618ALA, ICX414AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 1/4 |
| Cell size | 5.6 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 119 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC660: Mono8, Mono12, Mono16<br>GC660C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 34 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to 16 rows |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.0 W @ 12 VDC |
| Trigger latency | 1.0µs for non-isolated I/O, 2.8µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 105 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 4: Prosilica GC660 camera specification

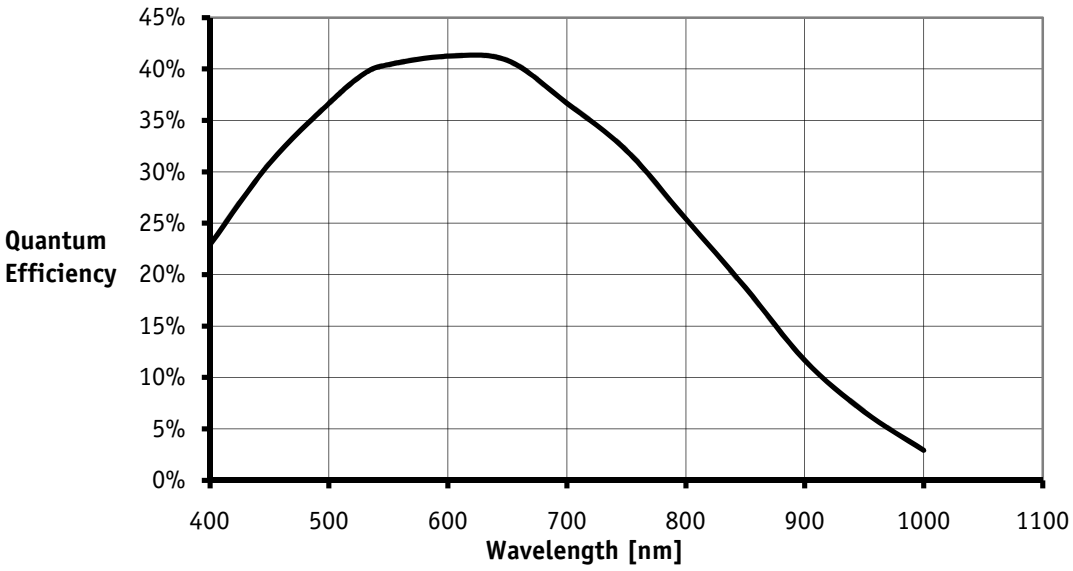



Figure 5 – Prosilica GC660 monochrome spectral response

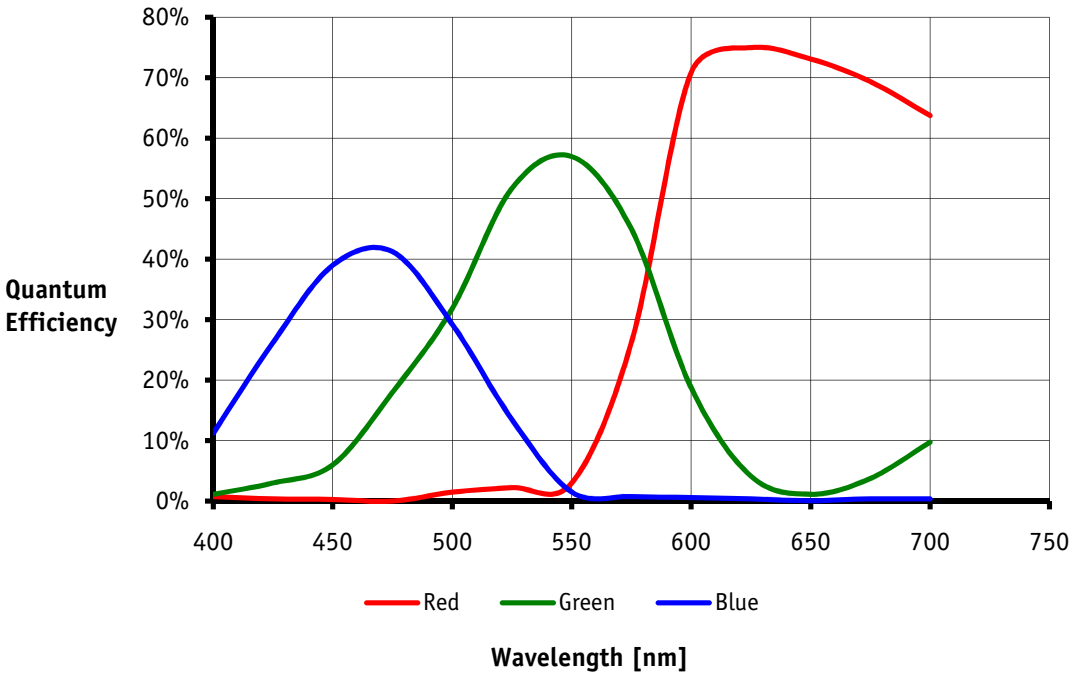



Figure 6 – Prosilica GC660C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 750/750C |
|---|---|
| Resolution | 752 x 480 |
| Sensor | Micron MT9V022 |
| Type | CMOS Progressive |
| Sensor size | Type 1/3 |
| Cell size | 6 µm |
| Lens mount | CS |
| Max frame rate at full resolution | 60 fps |
| A/D | 10 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/10 |
| Mono formats | Mono8 |
| Color formats | Bayer8, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 30 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 48 dB |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 2.2 W @ 12 VDC |
| Trigger latency | 31µs for non-isolated I/O, 43µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5us for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 45x46x33 including connectors, w/o tripod and lens |
| Mass | 85 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 5: Prosilica GC750 camera specification

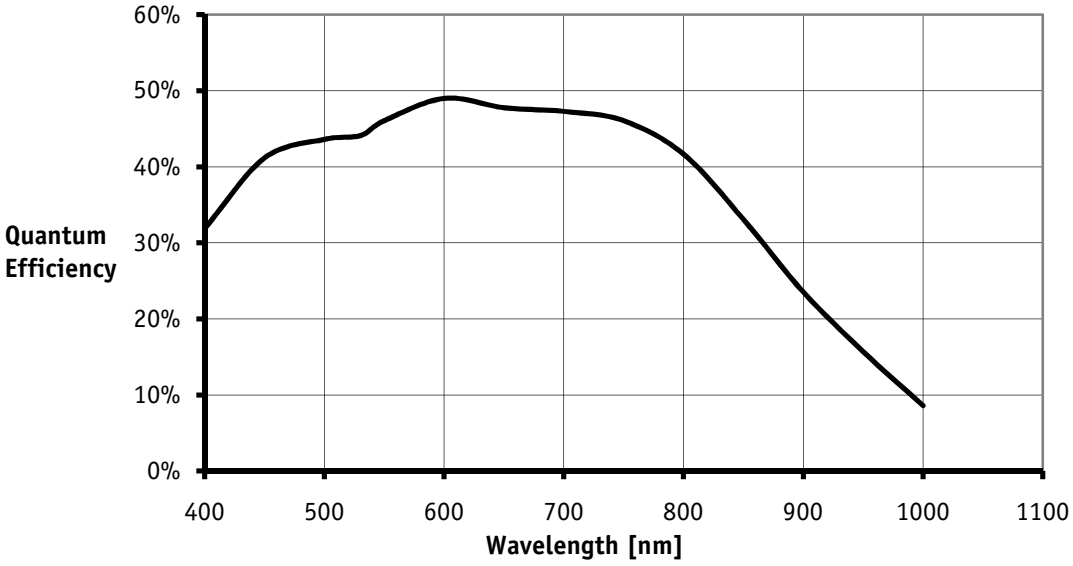



Figure 7 – Prosilica GC750 monochrome spectral response

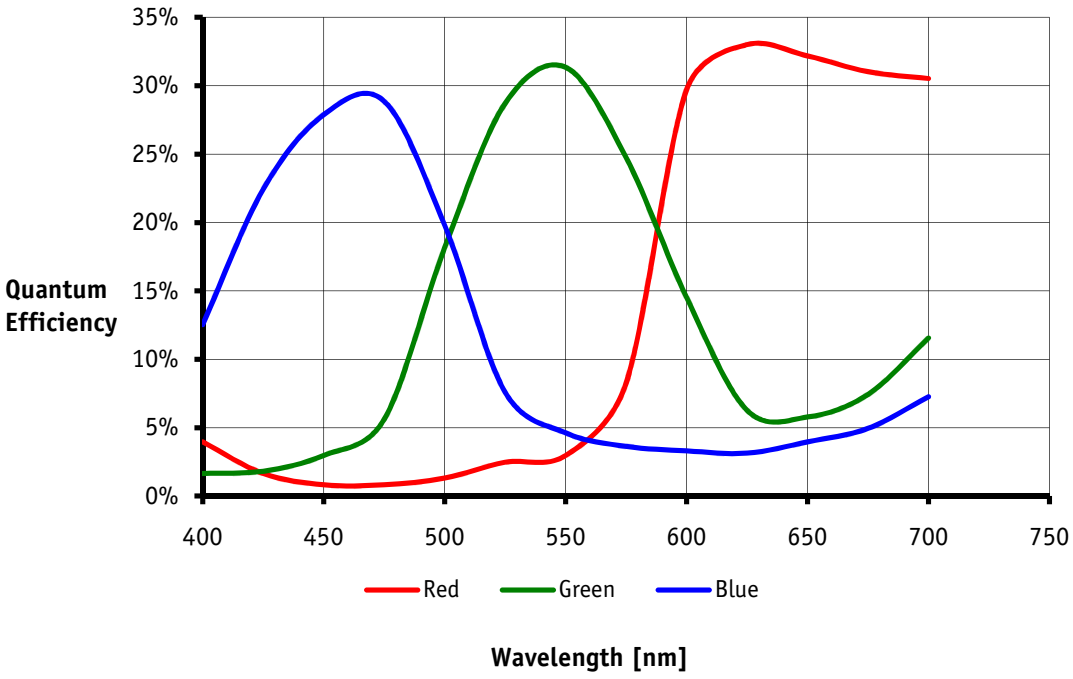



Figure 8 – Prosilica GC750C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 780/780C |
|---|---|
| Resolution | 782 x 582 |
| Sensor | Sony ICX415AL, ICX415AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 1/2 |
| Cell size | 8.3 µm |
| Lens mount | C |
| Max frame rate at full resolution | 64 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC780: Mono8, Mono12, Mono16<br>GC780C: Mono8 |
| Color formats | Bayer8, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 8 µs to 60 seconds; 1 µs increments |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| Gain control | GC780: 0 to 26 dB<br>GC780C: 0 to 23 dB |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 2.8 W @ 12 VDC |
| Trigger latency | 1µs for non-isolated I/O, 2.8µs for isolated I/O |
| Trigger Jitter | ±20ns for non-isolated I/O, ±0.5us for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating Temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage Temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating Humidity | 20 to 80% non-condensing |
| Body Dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 100 g |
| Hardware Interface Standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software Interface Standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 6: Prosilica GC780 camera specification

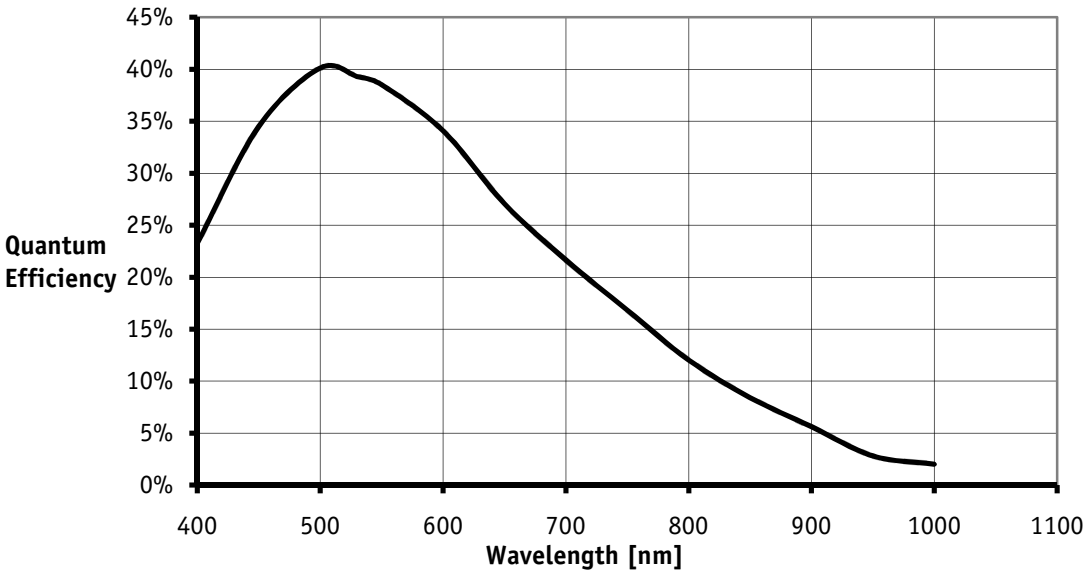



Figure 9 – Prosilica GC780 monochrome spectral response

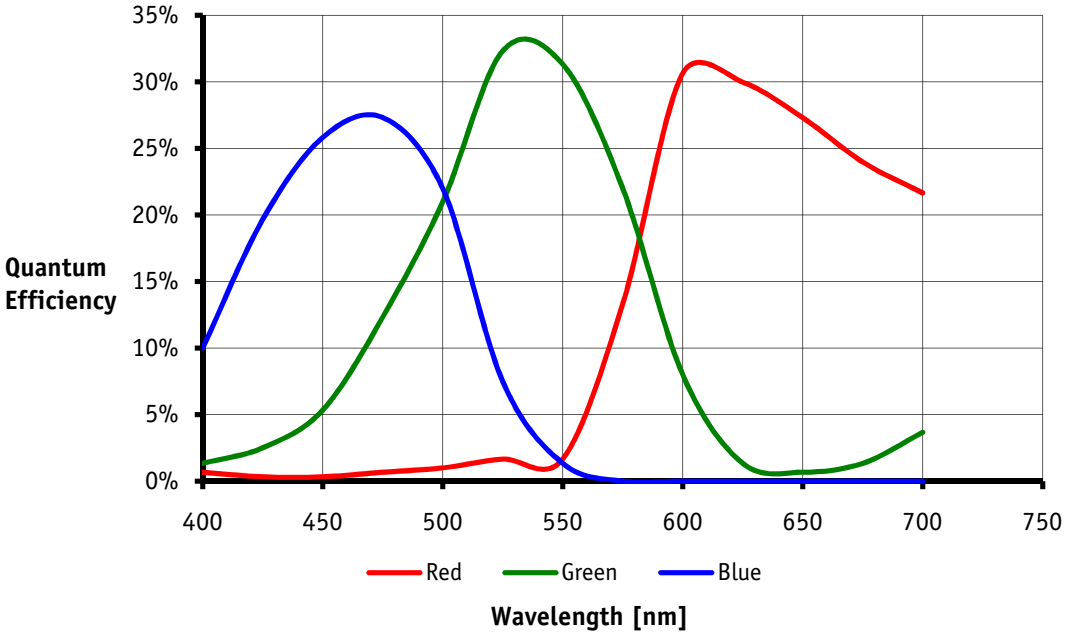



Figure 10 – Prosilica GC780C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 1020/1020C |
|---|---|
| Resolution | 1024 x 768 |
| Sensor | Sony ICX204AL, ICX204AK for color |
| Type | CCD Progressive |
| Sensor size | Type 1/3 |
| Cell size | 4.65 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 33 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1020: Mono8, Mono12, Mono16<br>GC1020C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 22 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 2.9 W @ 12 VDC |
| Trigger latency | 2.8µs for non-isolated I/O, 4.5µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 99 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 7: Prosilica GC1020 camera specification

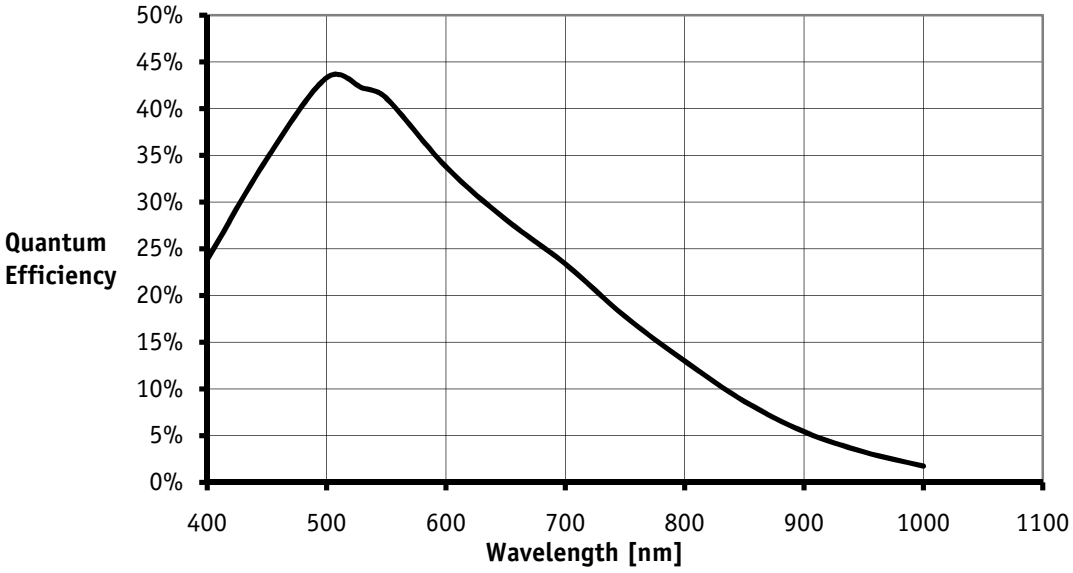



Figure 11 – Prosilica GC1020 monochrome spectral response

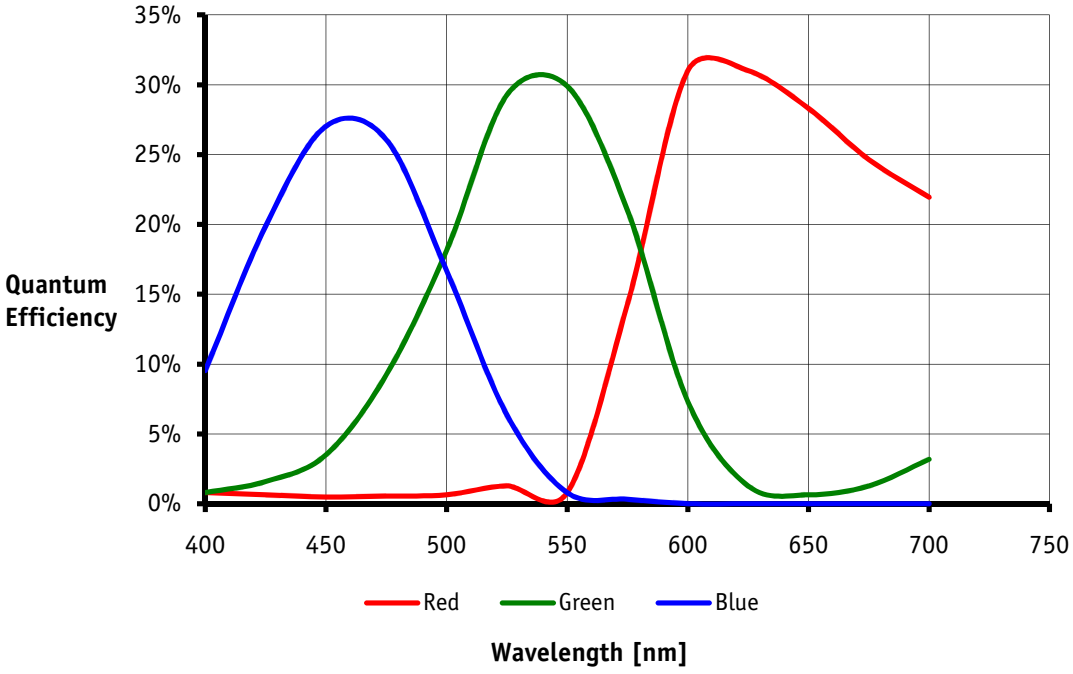



Figure 12 – Prosilica GC1020C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 1280 |
|---|---|
| Resolution | 1280 x 1024 |
| Sensor | Cypress IBIS5B |
| Type | CMOS Progressive |
| Sensor size | Type 2/3 |
| Cell size | 6.7 µm |
| Lens mount | C |
| Max frame rate at full resolution | 27 fps |
| A/D | 10 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/10 |
| Mono formats | Mono8 |
| Exposure control | 10 µs to 1 second; 1 µs increments |
| Gain control | 0 to 15 dB |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 2.9 W @ 12 VDC |
| Trigger latency | 2.8µs for non-isolated I/O, 4.5µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 99 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 8: Prosilica GC1280 camera specification

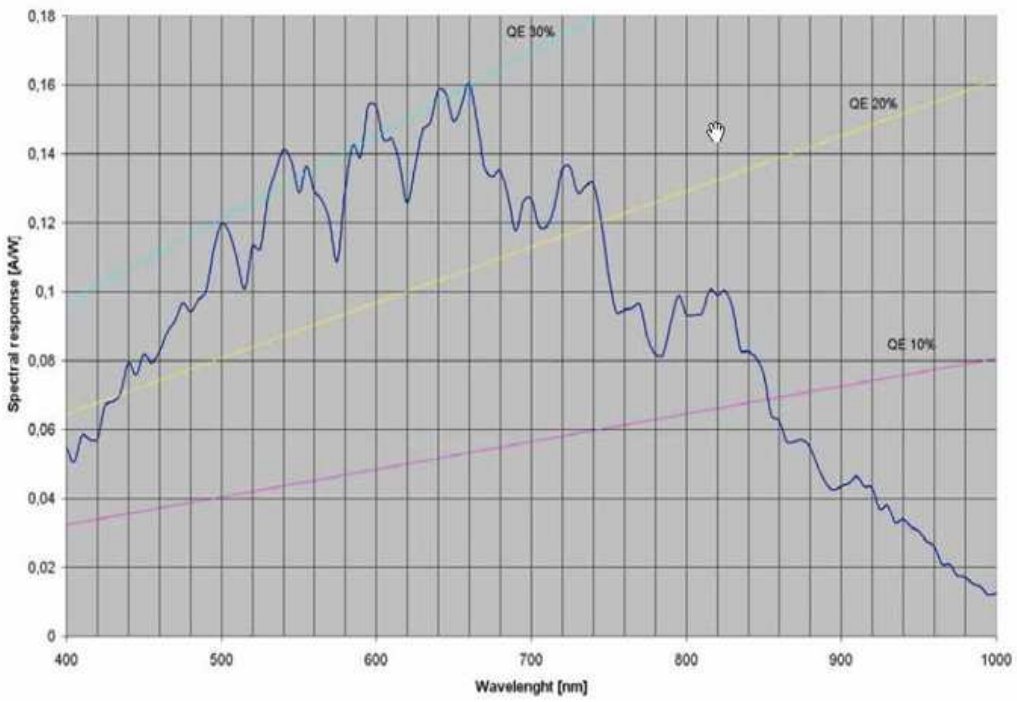



Figure 13 – Prosilica GC1280 monochrome spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 1290/1290C |
|---|---|
| Resolution | 1280 x 960 |
| Sensor | Sony ICX445ALA, ICX445AQA for color |
| Type | CCD Progressive |
| Sensor size | Type 1/3 |
| Cell size | 3.75 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 32 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1290: Mono8, Mono12, Mono16<br>GC1290C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 12 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 24 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to 16 rows |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3 W @ 12 VDC |
| Trigger latency | 2µs for non-isolated I/O, 10µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 106 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 9: Prosilica GC1290 camera specification

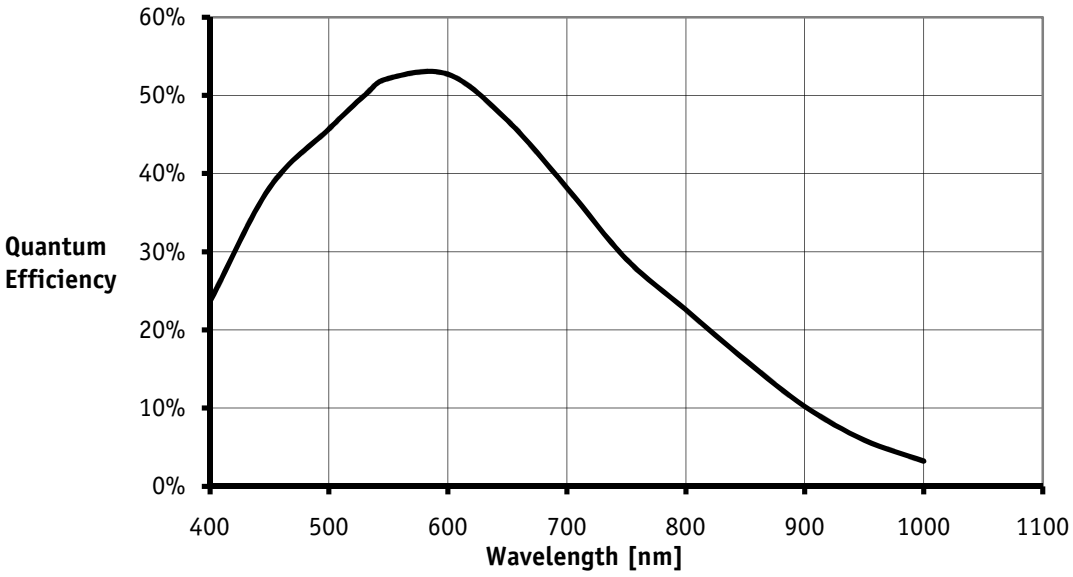



Figure 14 – Prosilica GC1290 monochrome spectral response

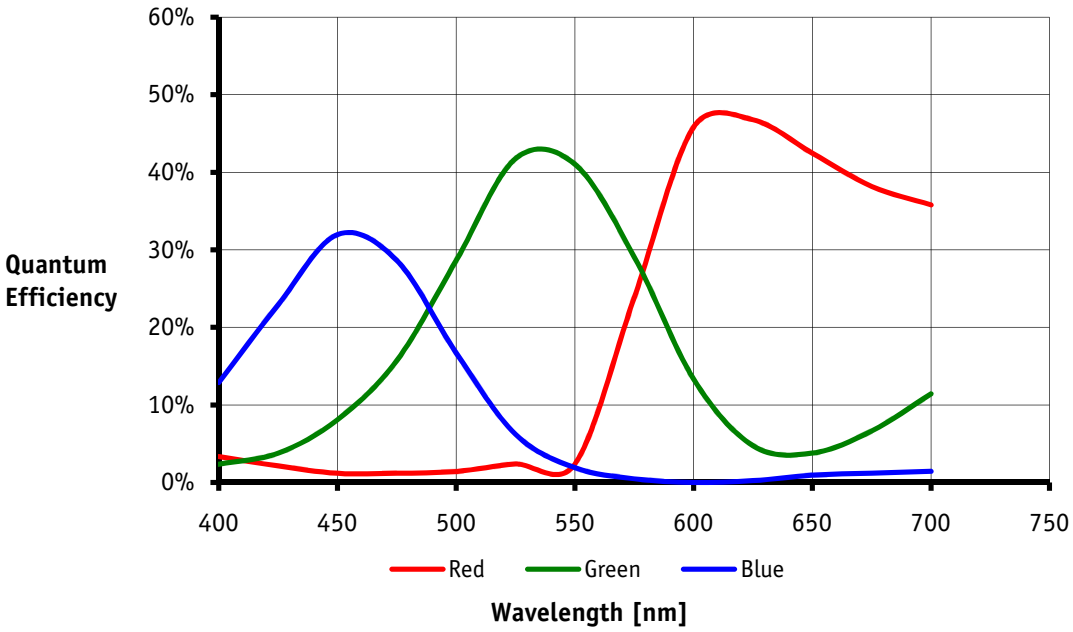



Figure 15 – Prosilica GC1290C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 1350/1350C |
|---|---|
| Resolution | 1360 x 1024 |
| Sensor | Sony ICX205AL, Sony ICX205AK for color |
| Type | CCD Progressive |
| Sensor size | Type 1/2 |
| Cell size | 4.65 µm |
| Lens mount | C/CS |
| Max frame rate at full resolution | 20 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1350: Mono8, Mono12, Mono16<br>GC1350C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 12 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 25 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to 16 rows |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3 W @ 12 VDC |
| Trigger latency | 3.5µs for non-isolated I/O, 5µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 100 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 10: Prosilica GC1350 camera specification

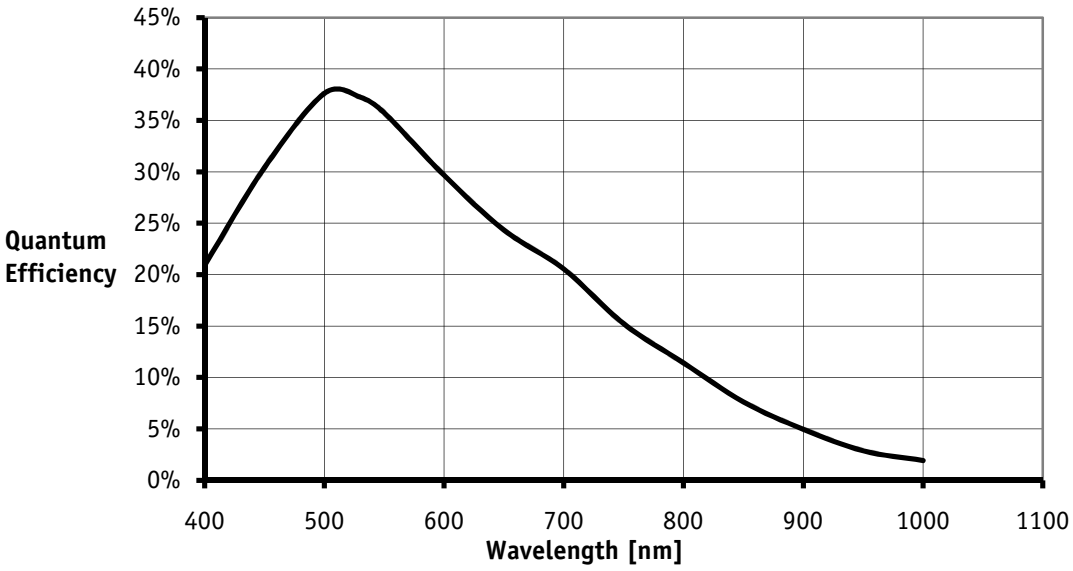



Figure 16 – Prosilica GC1350 monochrome spectral response

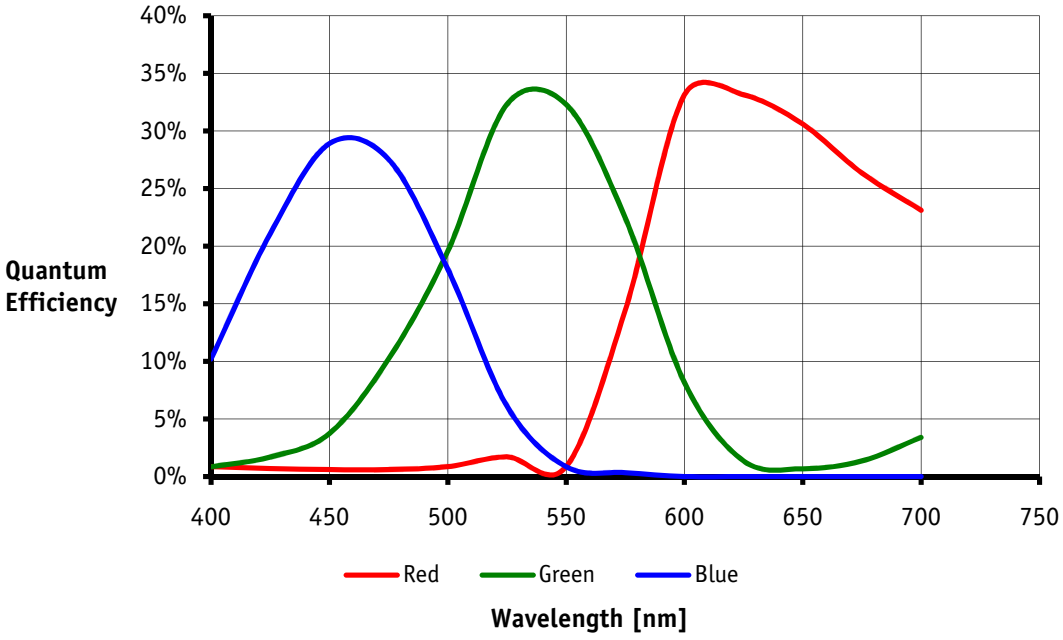



Figure 17 – Prosilica GC1350C color spectral response

**Note**

The design and specifications for the product described above may change without notice.

# Specifications

| Prosilica GC | 1380/1380C |
|---|---|
| Resolution | 1360 x 1024 pixels |
| Sensor | Sony ICX285AL, ICX285AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 2/3 |
| Cell size | 6.45µm |
| Lens mount | C |
| Max frame rate at full resolution | 20.2 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1380: Mono8, Mono12, Mono16<br>GC1380C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 27 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.3 W @ 12 VDC |
| Trigger latency | 3.7µs for non-isolated I/O, 5µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 104 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 11: Prosilica GC1380 camera specification

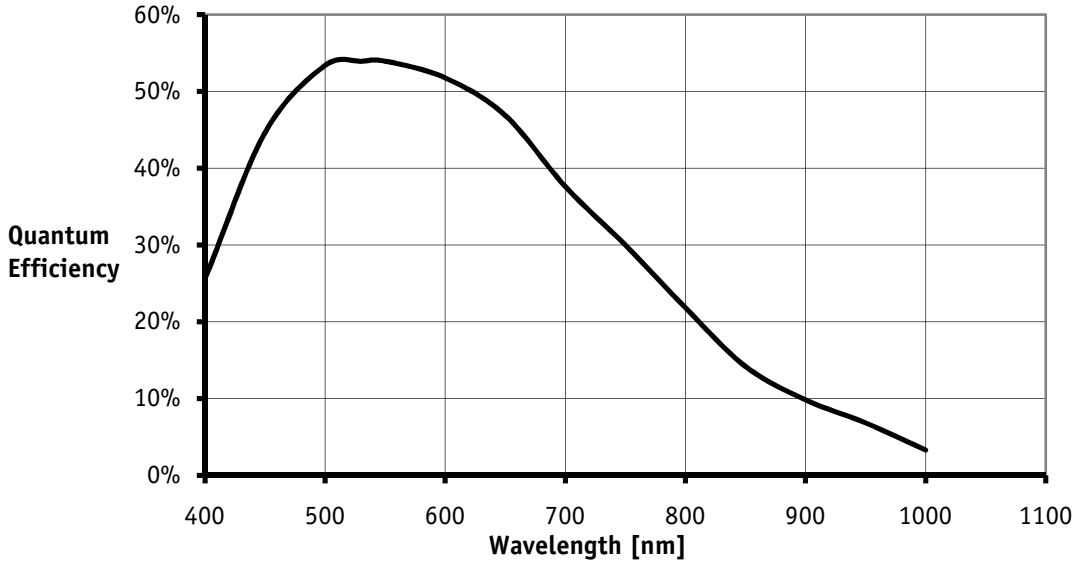



Figure 18 – Prosilica GC1380 monochrome spectral response

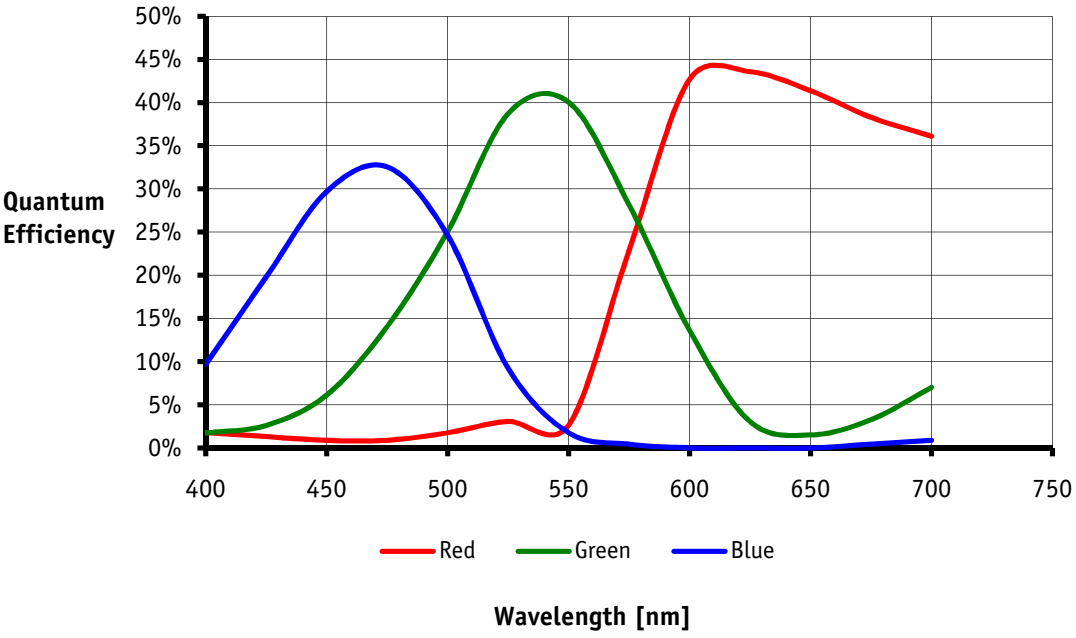



Figure 19 – Prosilica GC1380C color spectral response

**Note**

The design and specifications for the products described above may change without notice.

# Specifications

| Prosilica GC | 1380H/1380CH |
|---|---|
| Resolution | 1360 x 1024 |
| Sensor | Sony ICX285AL, ICX285AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 2/3 |
| Cell size | 6.45µm |
| Lens mount | C |
| Max frame rate at full resolution | 30 fps |
| A/D | 14 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1380H: Mono8, Mono12, Mono16<br>GC1380CH: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 33 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to 14 rows |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.3 W @ 12 VDC |
| Trigger latency | 2µs for non-isolated I/O, 10µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 111g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 12: Prosilica GC1380H camera specification

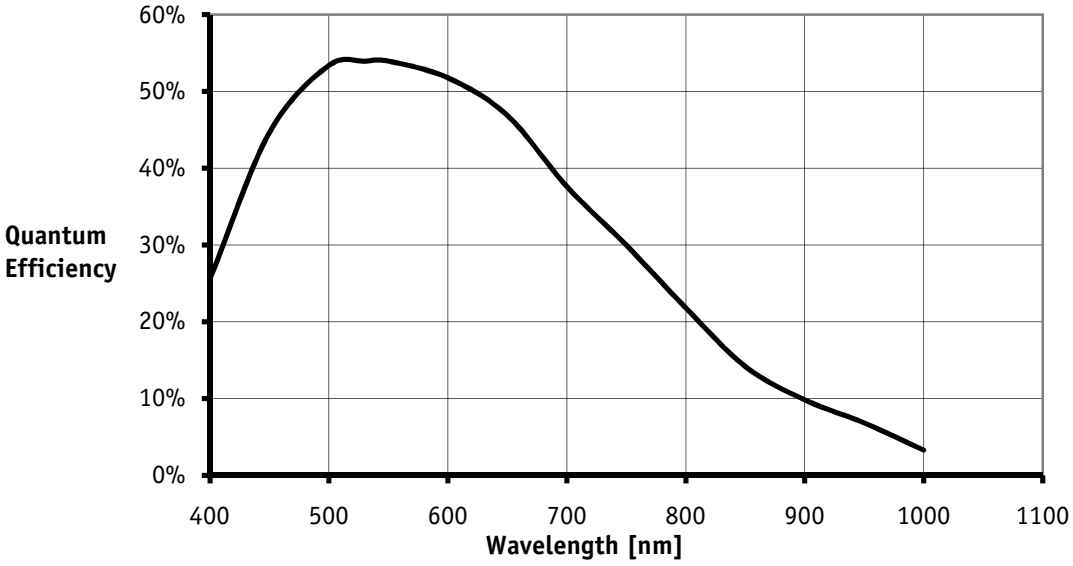



Figure 20 – Prosilica GC1380H monochrome spectral response

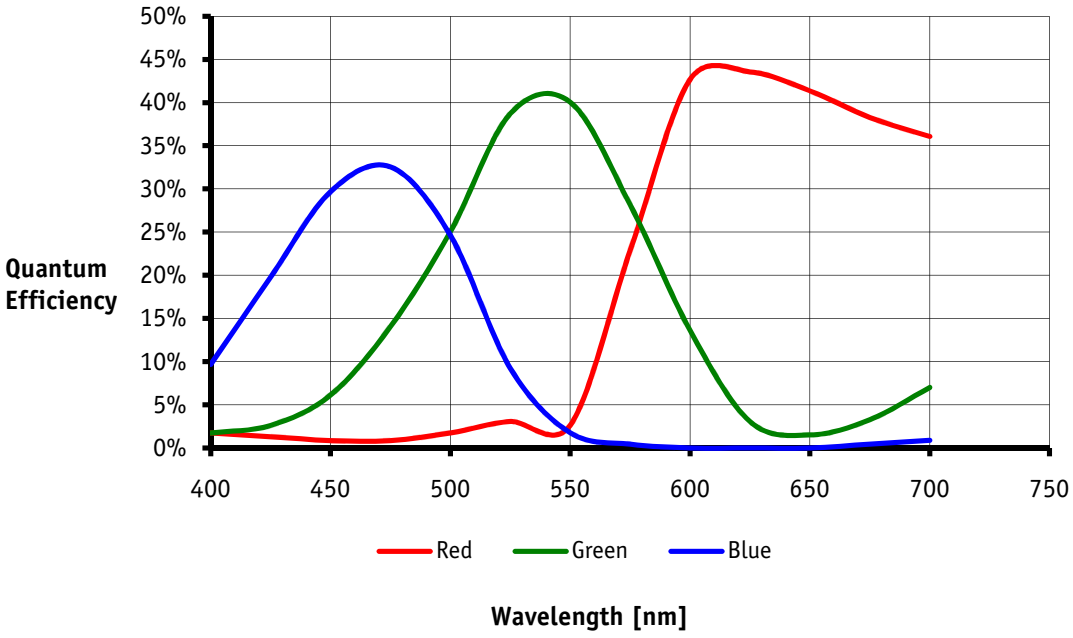



Figure 21 – Prosilica GC1380CH color spectral response

**Note**

The design and specifications for the products described above may change without notice.

# Specifications

| Prosilica GC | 1600/1600C |
|---|---|
| Resolution | 1620 x 1220 |
| Sensor | Sony ICX274AL, ICX274AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 1/1.8 |
| Cell size | 4.4 µm |
| Lens mount | C |
| Max frame rate at full resolution | 15 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1600: Mono8, Mono12, Mono16<br>GC1600C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 21 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.3 W @ 12 VDC |
| Trigger latency | 2.3µs for non-isolated I/O, 4µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 10ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 97g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 13: Prosilica GC1600 camera specification

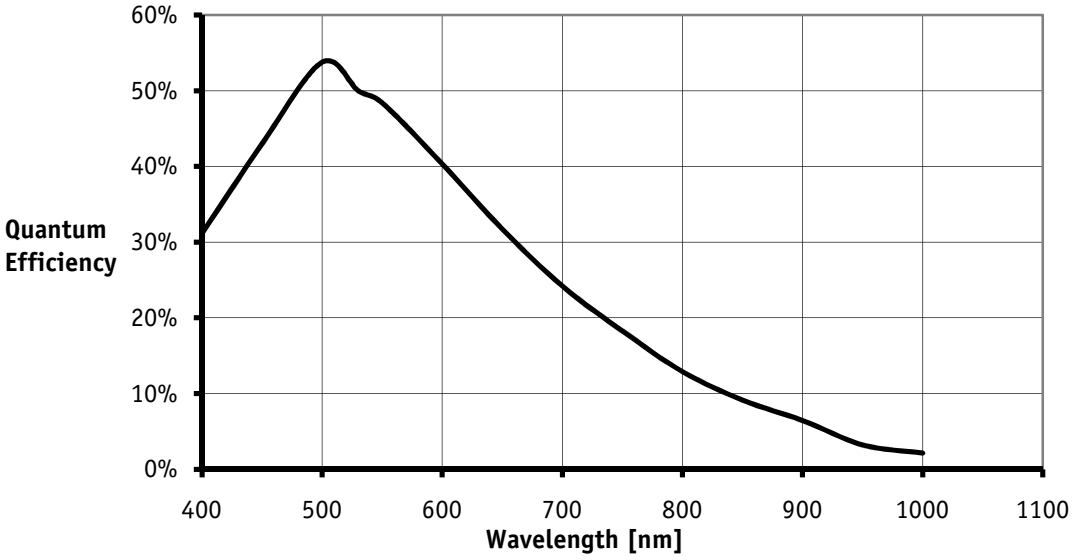



Figure 22 – Prosilica GC1600 monochrome spectral response

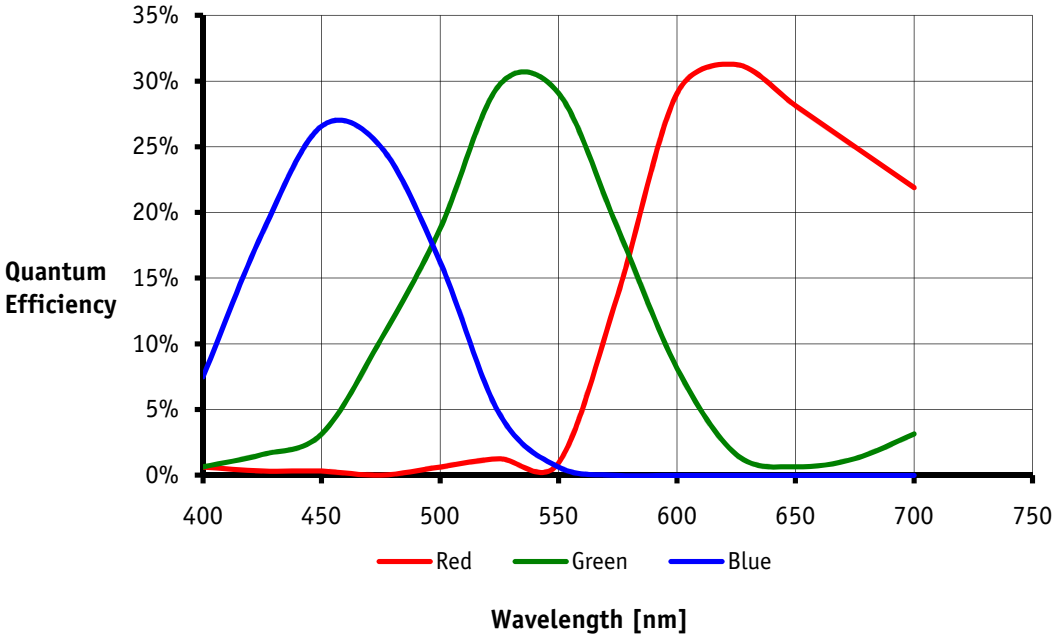



Figure 23 – Prosilica GC1600C color spectral response

**Note**

The design and specifications for the products described above may change without notice.

# Specifications

| Prosilica GC | 1600H/1600CH |
|---|---|
| Resolution | 1620 x 1220 |
| Sensor | Sony ICX274AL, ICX274AQ for color |
| Type | CCD Progressive |
| Sensor size | Type 1/1.8 |
| Cell size | 4.4 µm |
| Lens mount | C |
| Max frame rate at full resolution | 25 fps |
| A/D | 14 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC1600H: Mono8, Mono12, Mono16<br>GC1600CH: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 32 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.3 W @ 12 VDC |
| Trigger latency | 2µs for non-isolated I/O, 10µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 20ns for non-isolated I/O, 0.5µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +50 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 105 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 14: Prosilica GC1600H camera specification

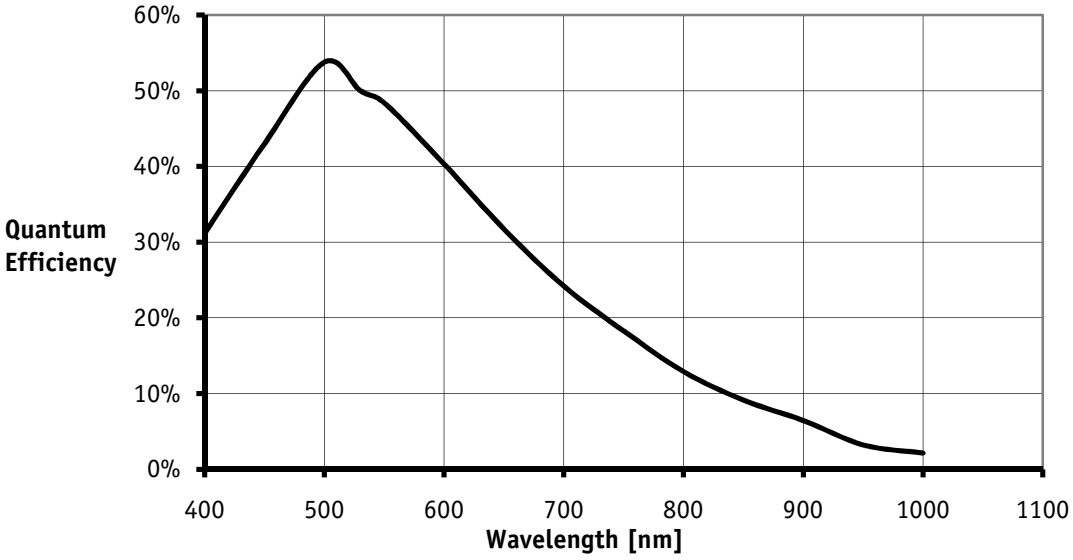



Figure 24 – Prosilica GC1600H monochrome spectral response

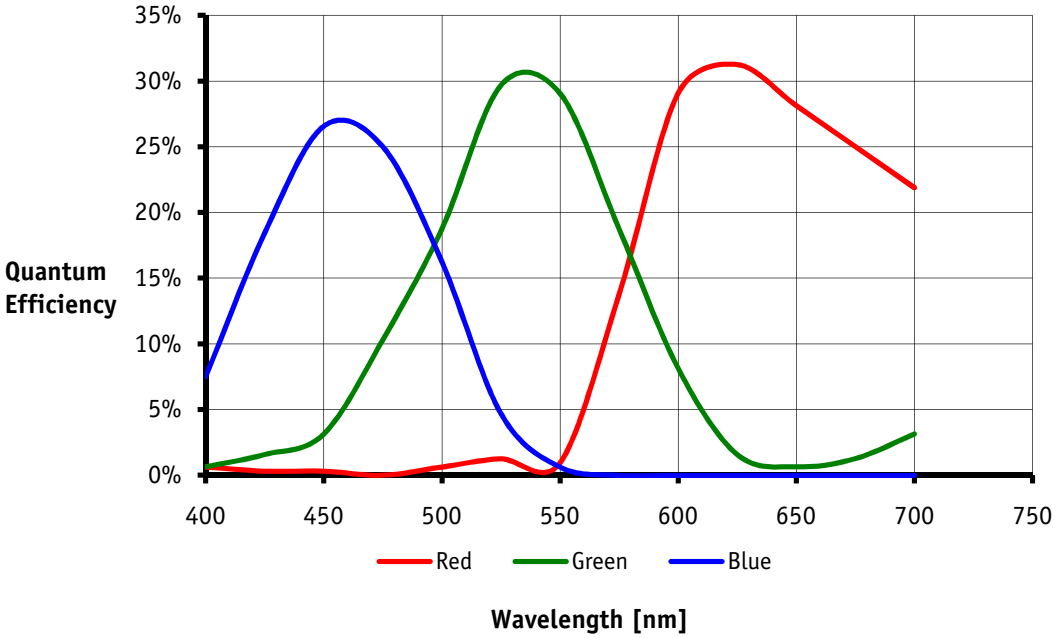



Figure 25 – Prosilica GC1600CH color spectral response

**Note**

The design and specifications for the products described above may change without notice.

# Specifications

| Prosilica GC | 2450/2450C |
|---|---|
| Resolution | 2448 x 2050 |
| Sensor | Sony ICX625ALA. Sony ICX625AQA for color |
| Type | CCD Progressive |
| Sensor size | Type 2/3 |
| Cell size | 3.45 µm |
| Lens mount | C |
| Max frame rate at full resolution | 15 fps |
| A/D | 12 bit |
| On-board FIFO | 16 MB |
| Bit depth | 8/12 |
| Mono formats | GC2450: Mono8, Mono12, Mono16<br>GC2450C: Mono8 |
| Color formats | Bayer8, Bayer16, YUV411, YUV422, YUV444, RGB24, BGR24, RGBA24, BGRA24 |
| Exposure control | 10 µs to 60 seconds; 1 µs increments |
| Gain control | 0 to 32 dB |
| Horizontal binning | 1 to 8 pixels |
| Vertical binning | 1 to full resolution |
| TTL I/Os | 1 input, 1 output |
| Opto-coupled I/Os | 1 input, 1 output |
| RS-232 | 1 |
| Power requirements | 5-16 VDC → Cameras SN: 02-XXXXX-**0**XXXX<br>5-25 VDC → Cameras SN: 02-XXXXX-**1**XXXX |
| Power consumption | 3.8 W @ 12 VDC |
| Trigger latency | 2µs for non-isolated I/O, 10µs for isolated I/O |
| Trigger jitter | ±20ns for non-isolated I/O, ±0.5µs for isolated I/O |
| Tpd | 20ns for non-isolated I/O, 1.3µs for isolated I/O |
| Operating temperature | 0 $^{0}$C ... +40 $^{0}$C ambient temperature (without condensation) |
| Storage temperature | -10 $^{0}$C ... +70 $^{0}$C ambient temperature (without condensation) |
| Operating humidity | 20 to 80% non-condensing |
| Body dimensions (L x W x H in mm) | 59x46x33 including connectors, w/o tripod and lens |
| Mass | 106 g |
| Hardware interface standard | IEEE 802.3 1000BASE-T, 100BASE-TX |
| Software interface standard | GigE Vision Standard 1.0 |
| Regulatory | CE, FCC Class A, RoHS (2002/95/EC) |

Table 15: Prosilica GC2450 camera specification

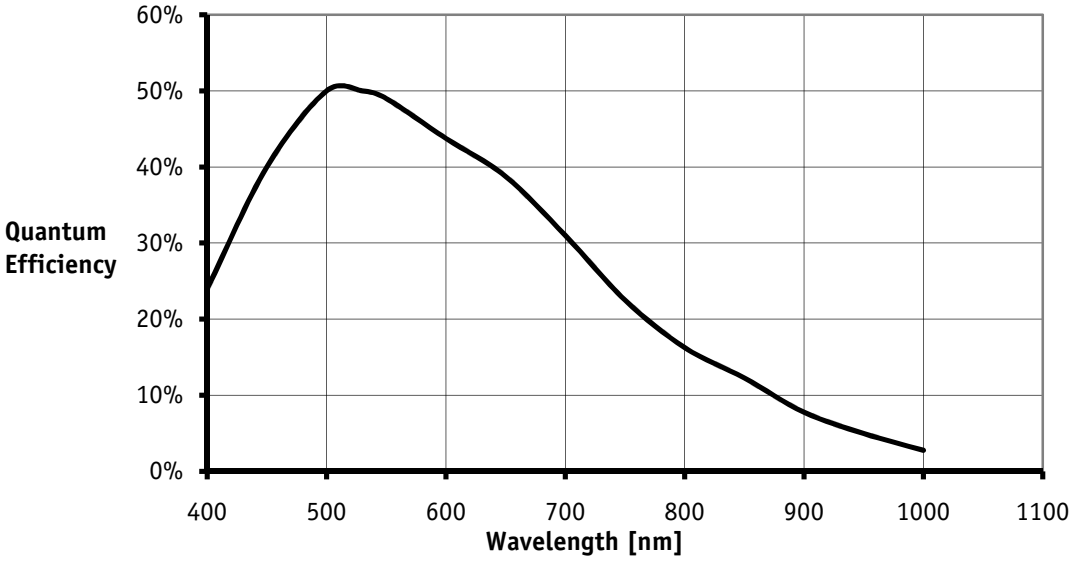



Figure 26 – Prosilica GC2450 monochrome spectral response

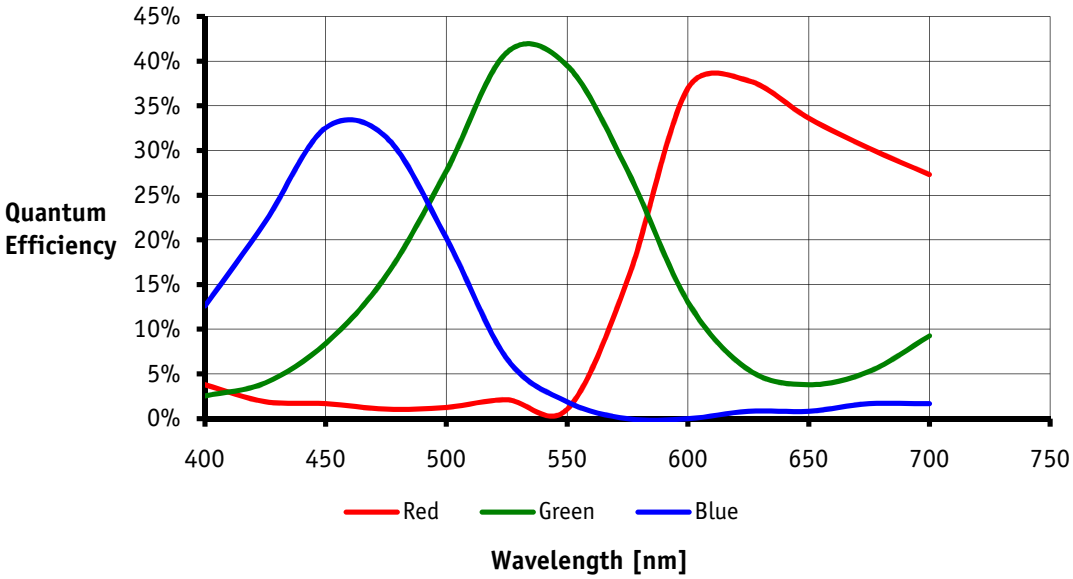



Figure 27 – Prosilica GC2450C color spectral response

**Note**

The design and specifications for the products described above may change without notice.

# Camera attribute highlights

AVT GigE cameras support a number of standard and extended features. The table below identifies the most interesting capabilities of this camera family. A complete listing of GigE camera controls, including control definitions can be found in the **AVT Prosilica GigE Camera and Driver Attributes** document:


AVT Prosilica GigE Camera and Driver Attributes document online:

http://www.alliedvisiontec.com/fileadmin/content/PDF/Software/Prosilica_software/Prosilica_firmware/AVT_Camera_and_Driver_Attributes.pdf

| Control | Specification |
|---|---|
| Gain control | Manual and auto |
| Exposure control | Manual and auto |
| Whitebalance | 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 seconds; 1 us increments |
| Fixed rate control | 0.001 fps to maximum frame rate |
| Imaging modes | Free-running, external trigger, fixed rate, software trigger |
| Sync Out modes | Trigger ready, trigger input, exposing, readout, imaging, strobe, GPO |
| Region of Interest (ROI) | independent x and y control with 1 pixel resolution |
| Multicast | Streaming to multiple PC |
| Event Channel | In-camera events including exposure start and trigger are asynchronously broadcasted to the host PC |
| Chunk Data | Captured images are bundled with attribute information such as exposure and gain value |

Table 16: Prosilica GC camera and driver attribute highlights

# IR cut filter: spectral transmission

**Note**

All Prosilica GC color models are equipped with an infrared block filter (IR filter). This filter is employed to stop infrared wavelength photons from passing to the imaging device. If the filter is removed, images will be dominated by red and cannot be properly color balanced.

Monochrome Prosilica GC cameras do not employ an IR filter.

The figure below shows the filter transmission response for the IRC filter family from Sunex. The cameras utilize the IRC30 filter.

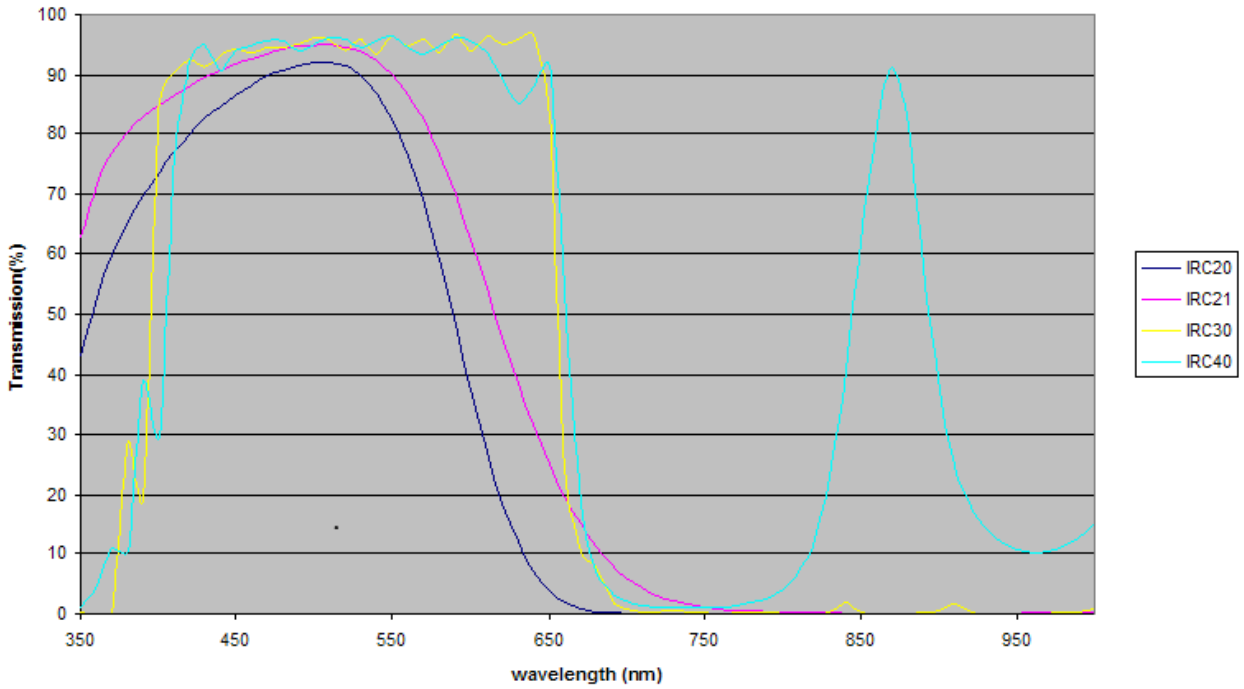



Figure 28: Sunex IRC filter transmission values

# Camera dimensions

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

## Prosilica GC CMOS models

GC750/750C, GC1280

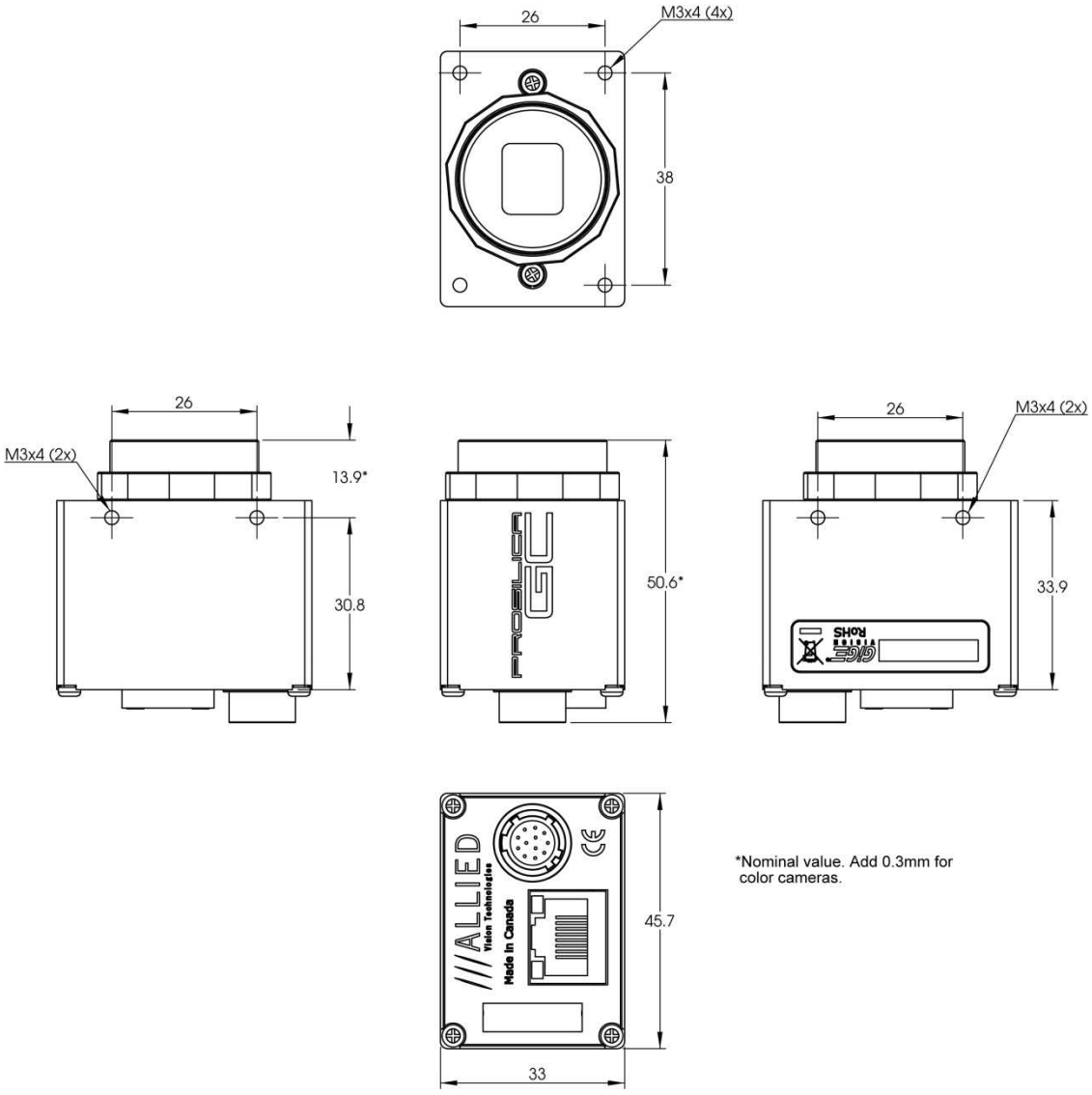



Figure 29: Prosilica GC CMOS models mechanical dimensions

# Prosilica GC CCD models

GC650/C, GC655/C, GC660/C, GC780C, GC1020/C, GC1290/C, GC1350/C, GC1380/C, GC1380H/C, GC1600/C, GC1600H/C, GC2450/C

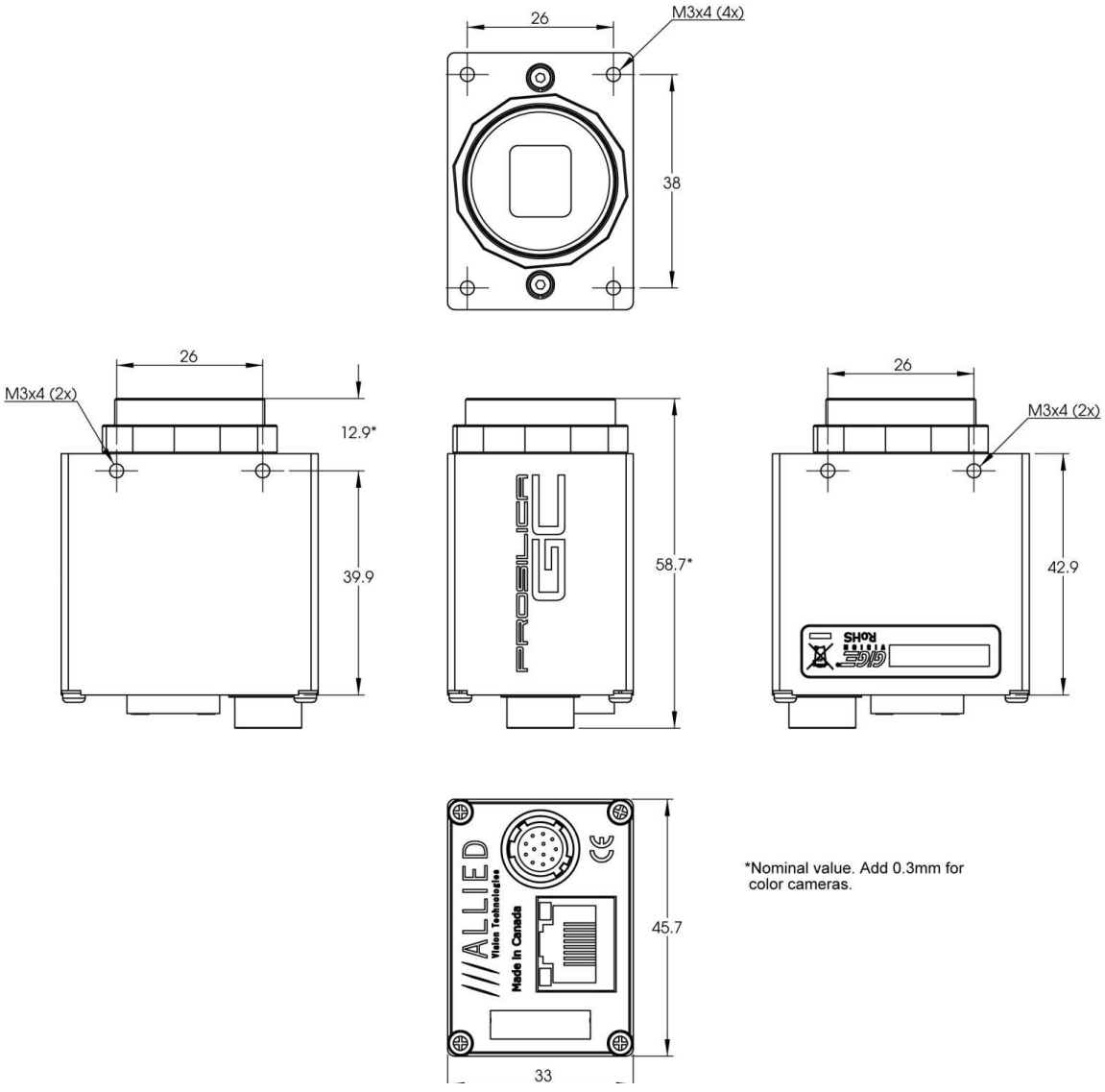



Figure 30: Prosilica GC CCD models mechanical dimensions

# Tripod adapter

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

**Note**

The Prosilica GC tripod mount can be provided by AVT
P/N: 02-5002A

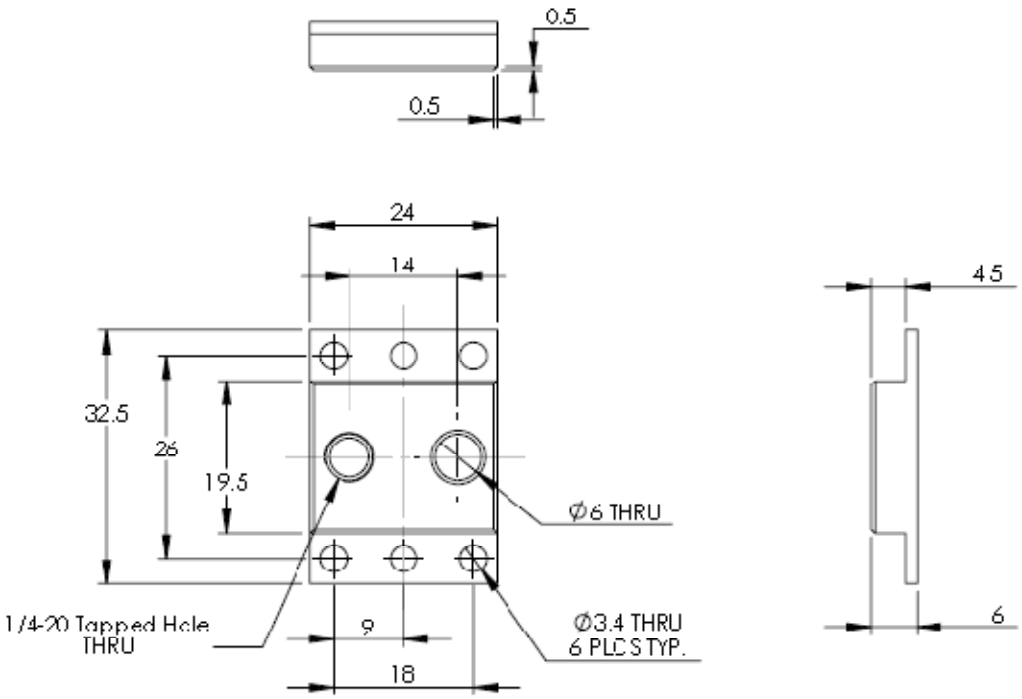



Figure 31: Prosilica GC tripod mount mechanical drawing

# Adjustment of lens mount

**Caution**

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

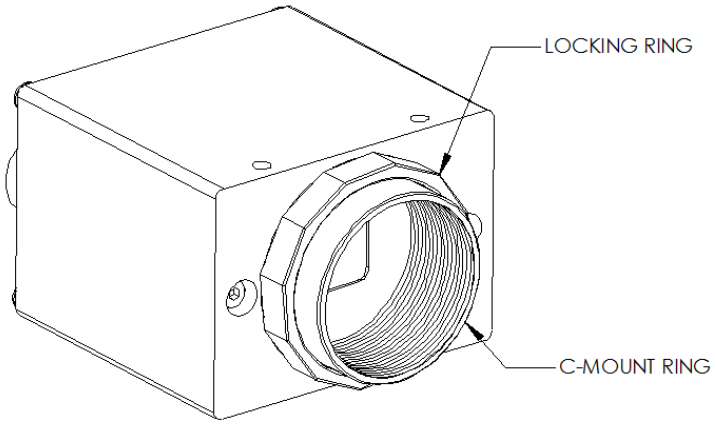



Figure 32: Prosilica GC camera front view

## Loosen Locking Ring

Use an adjustable wrench to loosen 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.

**Note**

A wrench suitable for this procedure can be provided by AVT
P/N: 02-5003A

Prosilica GC cameras can be equipped with a C-mount or a CS-mount depending on sensor size and camera order code

## Image to Infinity

Use a c-mount compatible lens that allows an infinity focus. Set the lens to infinity and image a distant object. The distance required will depend on the lens used but typically 30 to 50 feet should suffice. Make sure the lens is firmly threaded onto the c-mount ring. Rotate the lens and c-mount ring until the image is focused. Carefully tighten locking ring. Recheck focus.

# Camera interfaces

This chapter gives you information on Gigabit Ethernet port, inputs and outputs and trigger features.

www

For accessories like cables see:
http://www.alliedvisiontec.com/emea/products/accessories/gige-accessories.html

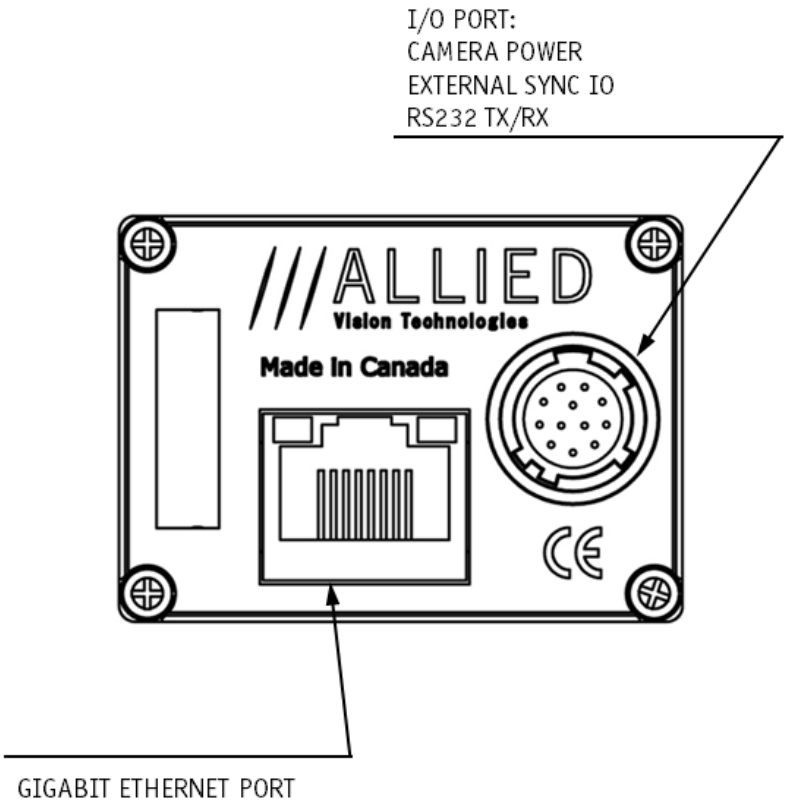
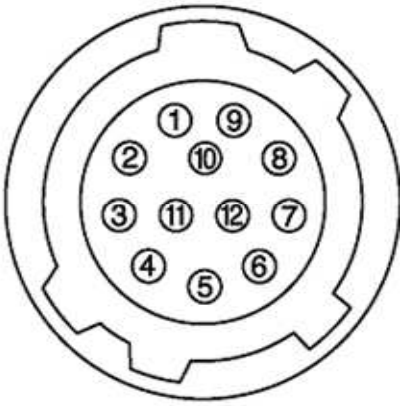



Figure 33: Prosilica GC connection diagram

# Camera I/O connector pin assignment




| Pin | Signal | Direction | Level | Description |
|---|---|---|---|---|
| 1 | External GND | --- | GND for RS232 and ext. power | External Ground for external power |
| 2 | External Power | --- | +5 V...+12 V DC (see note) | Power Supply |
| 3 | Camera In 1 | In | $U_{in}$(high) = 5 V...24 V<br>$U_{in}$(low) = 0 V...0.8 V | Camera Input 1 opto-isolated (GPIn1) |
| 4 | Camera Out1 | Out | Open emitter max. 20mA | Camera Output 1 opto-isolated (GPOut1) |
| 5 | Isolated GND | --- | --- | Ground for isolated outputs |
| 6 | Video Iris | Out | --- | PWM Signal for Iris Control |
| 7 | Reserved | --- | --- | --- |
| 8 | TxD RS232 | Out | RS232 | Terminal Transmit Data |
| 9 | RxD RS232 | In | RS232 | Terminal Receive Data |
| 10 | Signal GND | --- | --- | Ground for RS232 and non-isolated outputs |
| 11 | Camera In 2 | In | LVTTL max. 3.3 V | Camera Input 2 non-isolated (GPIn2) |
| 12 | Camera Out 2 | Out | LVTTL max. 3.3 V | Camera Output 2 non-isolated (GPOut2) |

Table 17: Prosilica GC I/O connector definition

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

**Note**

This cable side Hirose connector can be purchased from AVT.
P/N: K7600040 or 02-7002A

## External Power

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

**Caution**

SN: 02-XXXXX-**0**XXXX, 5V - 16V. 12V Nominal.
SN: 02-XXXXX-**1**XXXX, 5V - 25V. 12V Nominal.

**www**

To find more information about the power voltage range update for the Prosilica GC family, follow this link:

http://www.alliedvisiontec.com/fileadmin/content/PDF/Support/Application_Notes/Technical_Note_-_Prosilica_GC_power_voltage_specification_update.pdf

**Note**

A 12V power adaptor with Hirose connector can be ordered from AVT:

P/N 02-8003A North America Supply
P/N 02-8004A Universal Supply

## Camera In 1 and Camera In 2

Input signals 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 this signal. The camera can also be programmed to capture an image at some programmable delay time after the trigger event.

Camera In 1 is isolated and should be used in noisy environments to prevent false triggering due to ground loop noise. Camera In 2 is non-isolated and can be used when a faster trigger is required and when environmental noise is not a problem.

**Caution**

**DO NOT EXCEED 5.5V ON SIGNAL INPUTS UNLESS OTHERWISE INDICATED**

See Chapter **Camera I/O non-isolated user circuit example** on page 53 for wiring information.

## Camera Out 1 and Camera Out 2

These signals only function as outputs and can be configured as follows:

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

Any of the above signals can be set for active high or active low.

Camera Out 1 is isolated and should be used in noisy environments. Camera Out 2 is non-isolated and can be used when environmental noise is not a problem and when faster response is required.

Camera Out 1 will require a pull up resistor of greater than 1Kohm to the user’s 5V logic supply.

See Trigger Schematics in Addendum for wiring information.

## RS-232 RXD and RS-232 TXD

These signals are RS-232 compatible. These signals allow communication from the host system via the Ethernet port to a peripheral device connected to the camera. Note that these signals are not isolated and therefore careful attention should be used when designing cabling in noisy environments.

## Isolated Ground

Isolated Ground must be connected to the user’s external circuit ground if Sync Input 1 or Sync Output 1 is to be used.

## Signal Ground

Signal Ground must be connected to the user’s external circuit ground if Camera Input 2 or Camera Output 2 is to be used or if the RS-232 port is to be used. Note that Signal Ground is common with Power Ground however it is good practice to provide a separate ground connection for power and signaling when designing the cabling.

## Video Iris

This signal can be used to drive the video input of a video iris lens. See Addendum.

### Reserved

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

# 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 5e or Category 6 compatible cabling and connectors for best performance.

**Note**

- Cable lengths up to 100 m are supported.
- The 8-pin RJ-45 jack has the pin assignment according to the Ethernet standard (IEEE 802.3 1000BASE-T).
- Cables with screw-lock connectors are available from AVT: http://www.alliedvisiontec.com/emea/products/accessories/gige-accessories.html

# Camera I/O internal circuit diagram

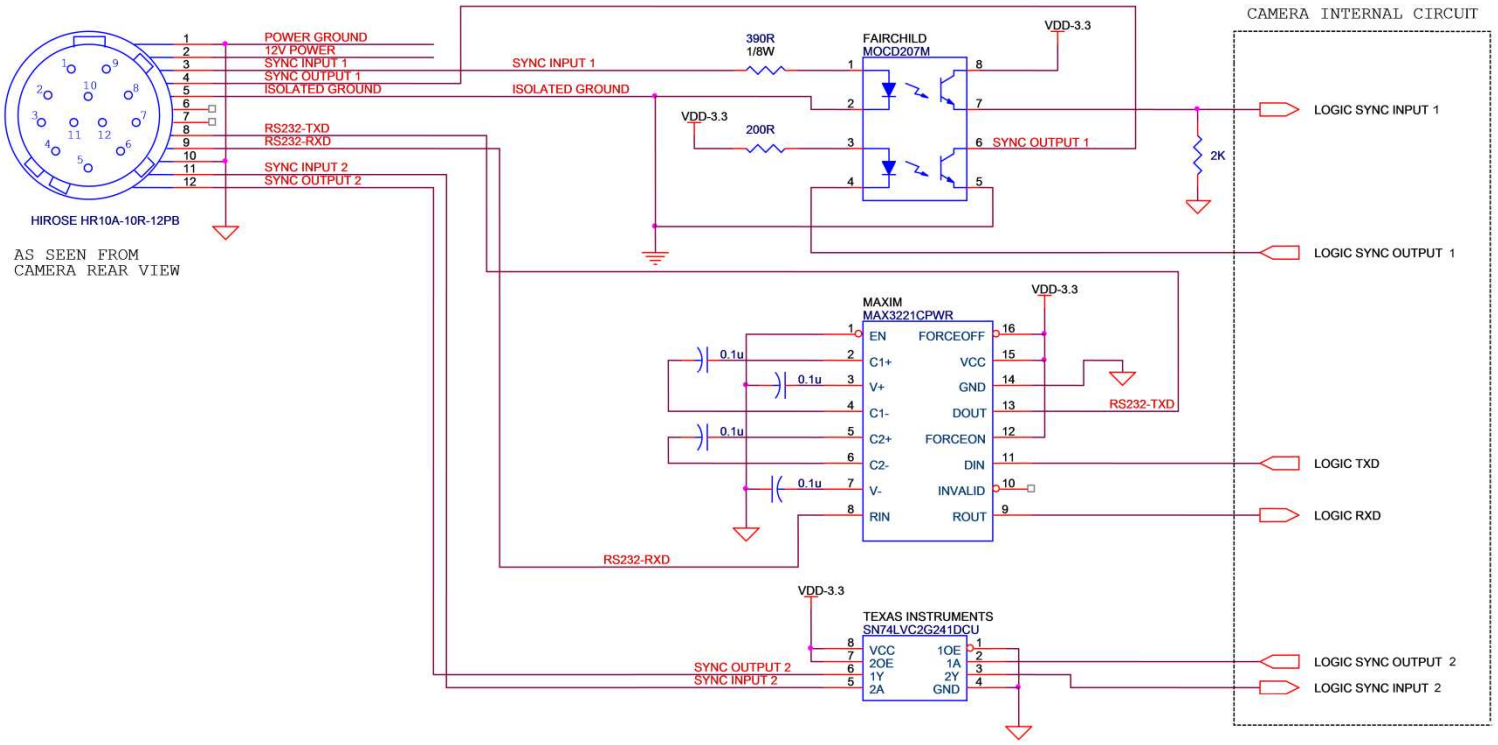



Figure 34: Prosilica GC internal circuit diagram. Cameras with SN: 02-XXXXX-**0**XXXX.

**Note**

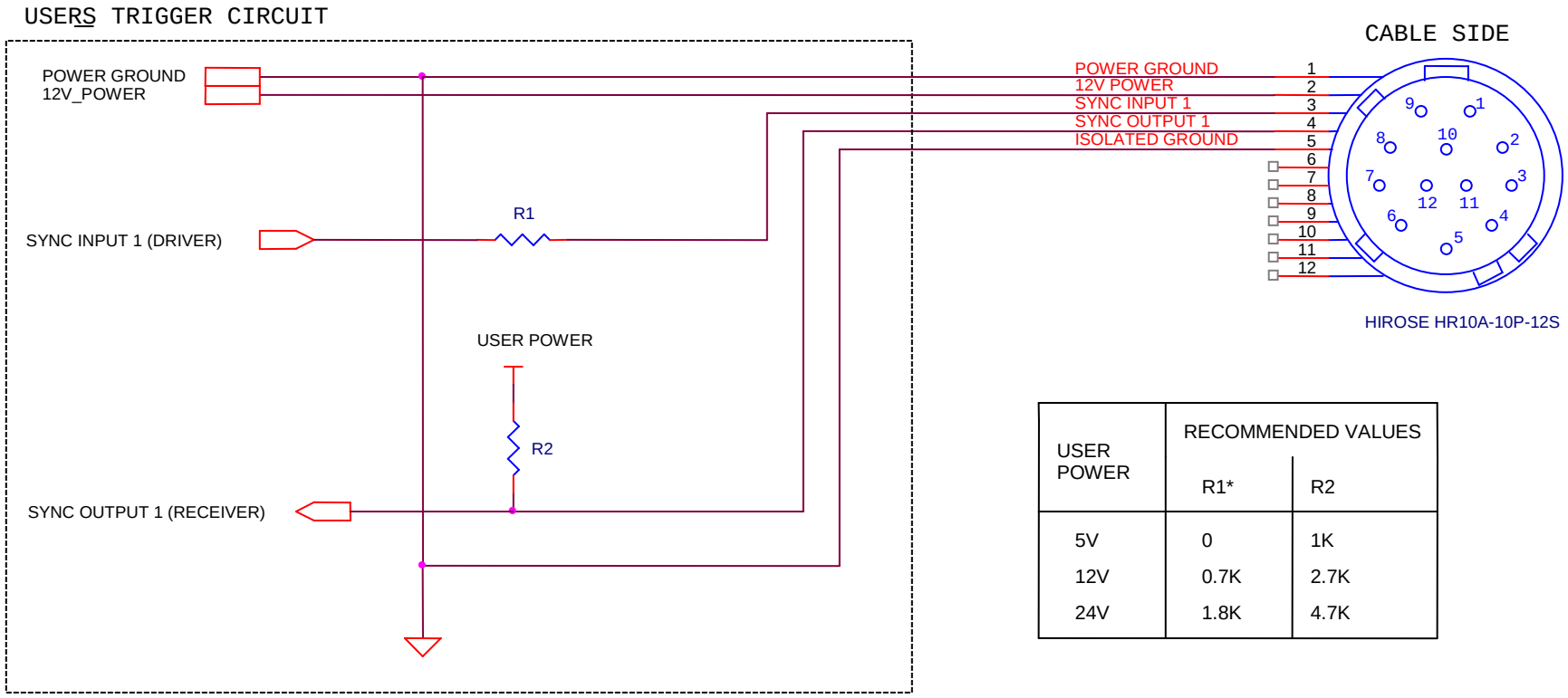
Cameras with SN: 02-XXXXX-**1**XXXX, differ from the above drawing with SYNC INPUT 1. [Diagram to be released shortly.] The 390R resistor is replaced by a fixed current source, allowing users to input a 5-24V input trigger without damaging the camera. More on this in **Camera I/O opto-isolated user circuit example** below.

Maxim **MAX3221CPWR**
Used to drive the RS232 signal logic via the external connector

Texas Instruments **SN74LVC2G241DCE**
Used to drive the non-isolated trigger signals from the camera.

Fairchild **MOCD207**
Consist of two silicon phototransistors optically coupled to two GaAs infrared LEDs. This is the input and output of the opto isolated camera trigger

# Camera I/O opto-isolated user circuit example




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

Figure 35: Prosilica GC opto-isolated user circuit

**Caution**

**Input**: Incoming trigger must be able to source 10mA. *Cameras with SN: 02-XXXXX-**0**XXXX, R1 necessary for > 5V input, see table above. Cameras with SN: 02-XXXXX-**1**XXXX, no R1 necessary, 5-24V.

**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

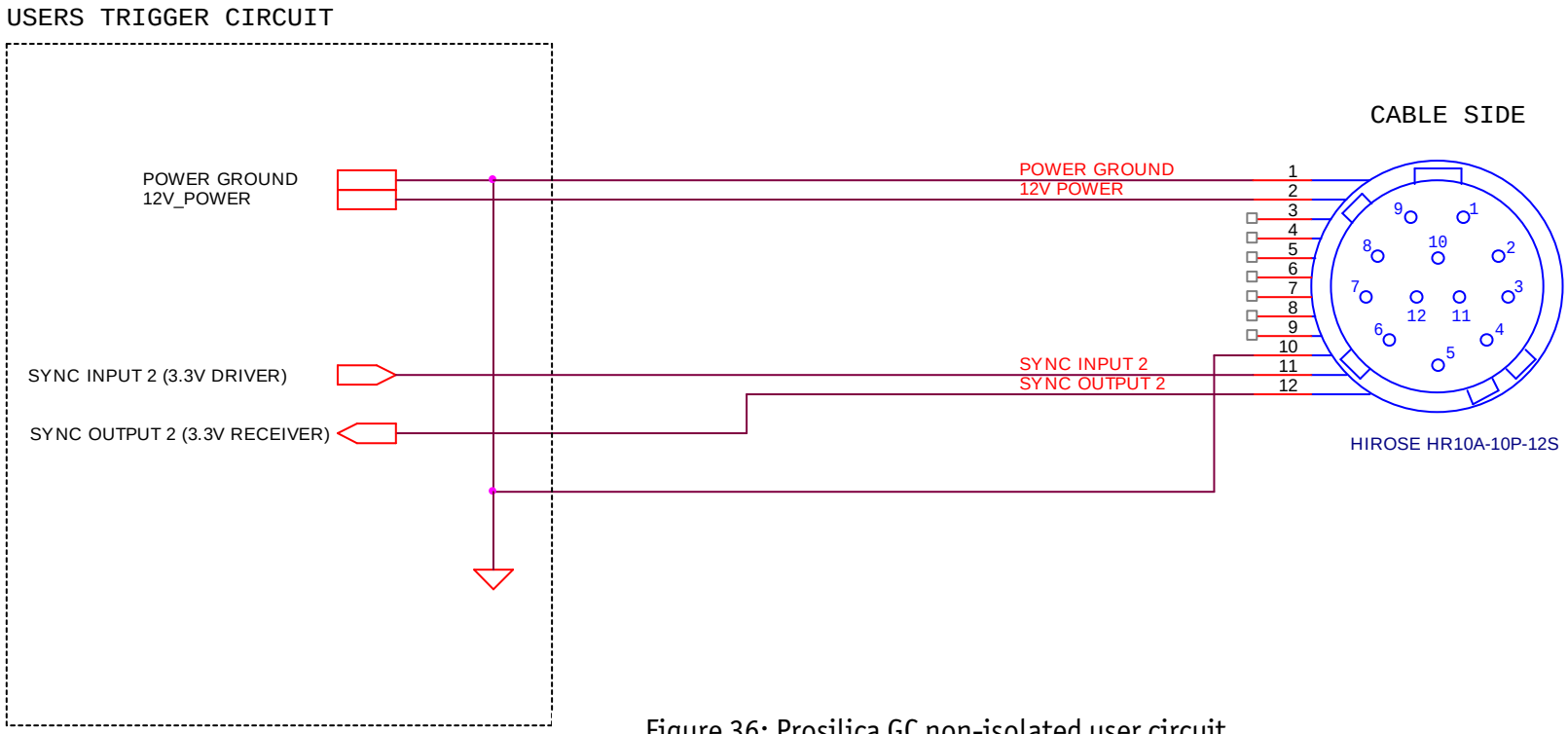



Figure 36: Prosilica GC non-isolated user circuit

**Caution**

Input: Incoming trigger must be able to source 10µA, at 3.3V. Input trigger voltage of > 5.5V will damage the camera.

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

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

# Video iris output description

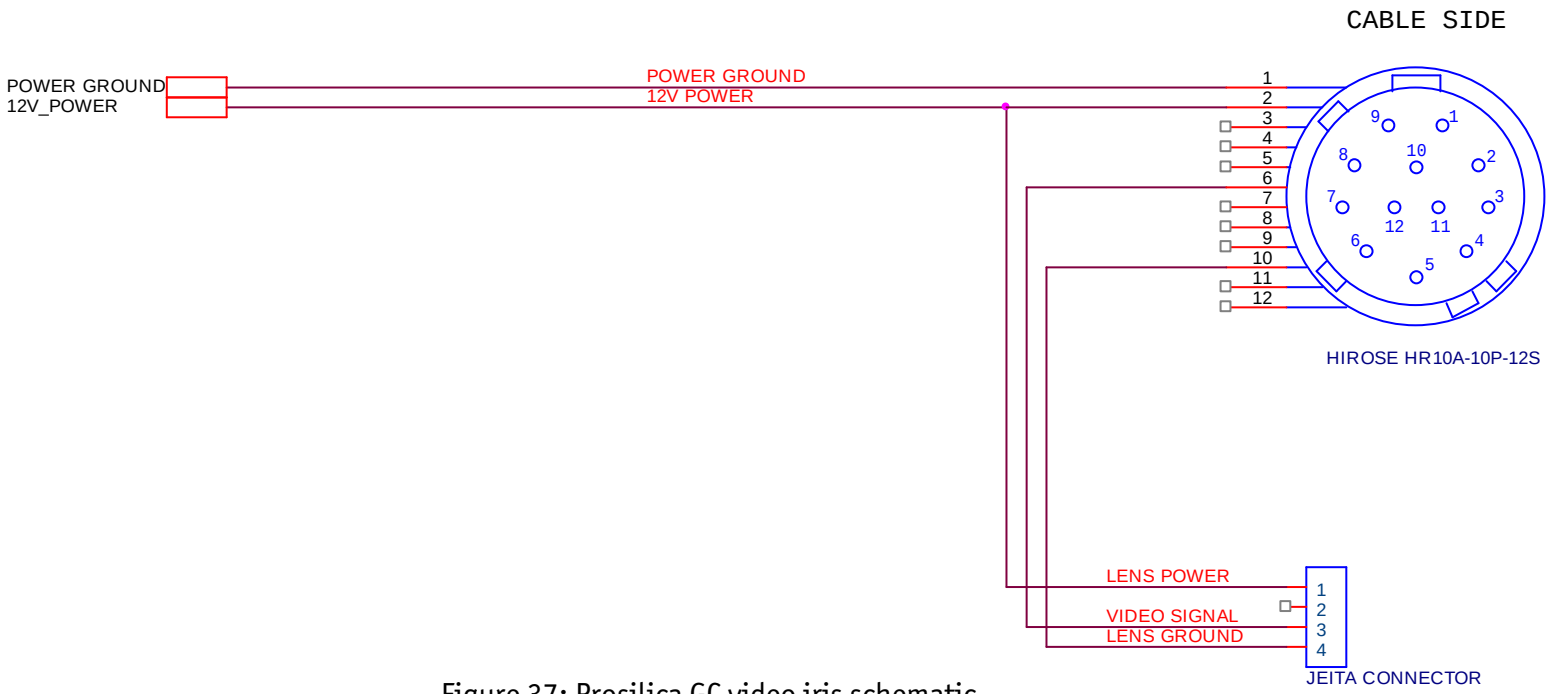



Figure 37: Prosilica GC video iris schematic

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

**Note**

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.

# Notes on triggering

## Timing diagram

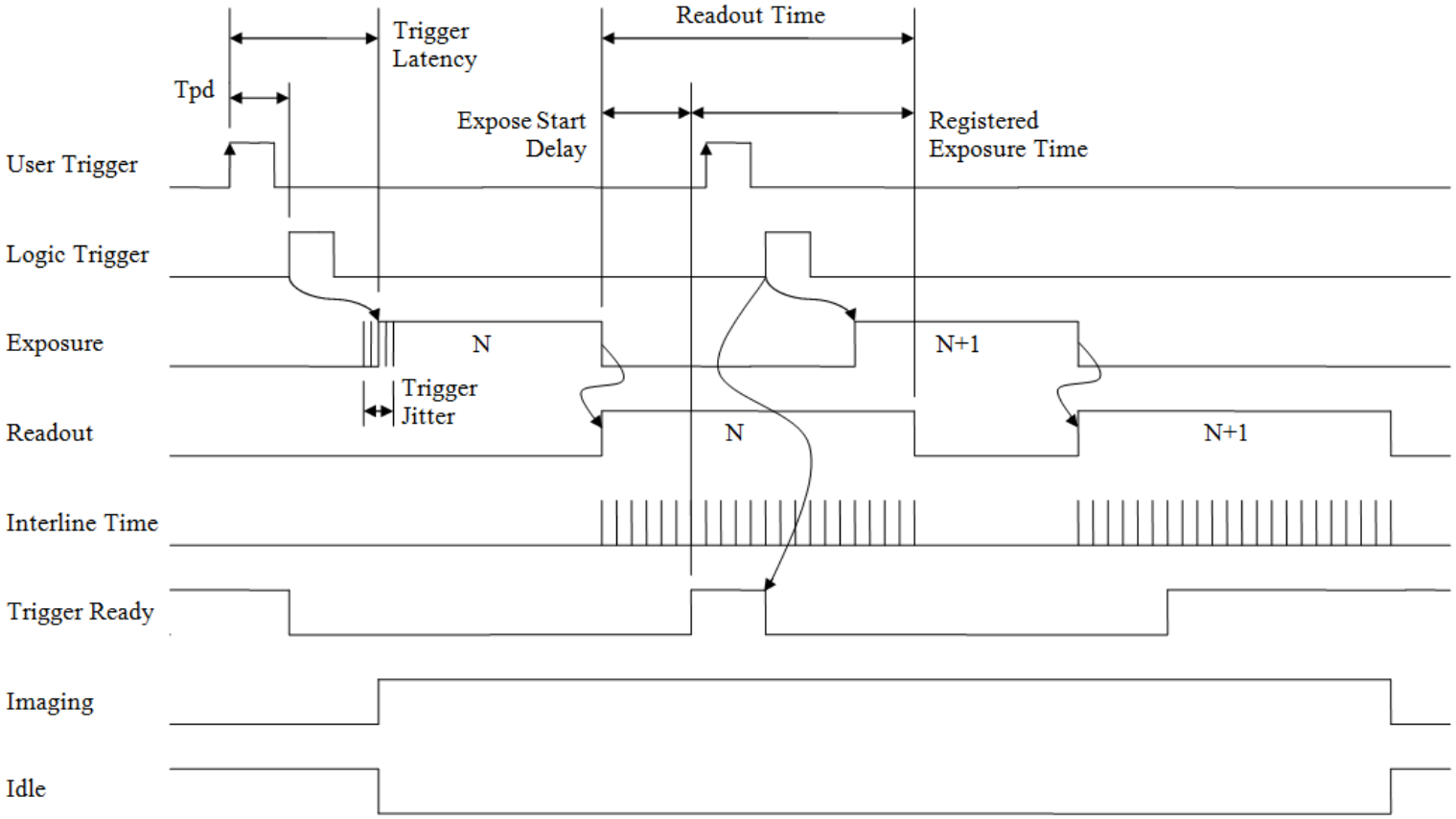



Figure 38: Prosilica GC internal signal timing waveforms

# Signal 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) |
| Tpd | Propagation delay between the User Trigger and the Logic Trigger |
| Exposure | High when the camera image sensor is integrating light. |
| Readout | High when the camera image sensor is reading out data. |
| Trigger Latency | Time delay between the User Trigger and the start of Exposure |
| Trigger Jitter | Error in the Trigger Latency Time |
| Trigger Ready | Indicates to the user that the camera will accept the next trigger. |
| Registered Exposure Time | Exposure Time value currently stored in the camera memory. |
| Exposure Start Delay | Registered Exposure Time subtracted from the Readout time and indicates when the next Exposure cycle can begin such that the Exposure will end after the current Readout. |
| Interline Time | Time between sensor row readout cycles. |
| Imaging | High when the camera image sensor is either exposing and/or reading out data. |
| Idle | High if the camera image sensor is not exposing and/or reading out data. |

Table 18: Explanation of signals in timing diagram

# Trigger rules

**Note**

The **User Trigger pulse width** should be at least three times the width of the Trigger Latency as indicated in Chapter **Specifications** on page 12.

- 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.
- **Expose 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 Specifications section.

## Triggering during the Readout State

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, then the User Trigger signal should be applied as soon as a valid Trigger Ready is detected.

In this case, Trigger Latency and Trigger Jitter can be up to 1 line time since Exposure must always begin on an Interline boundary.

# Firmware update

Firmware updates are carried out via the Ethernet connection. AVT provides an application for all AVT GigE cameras which loads firmware to the camera using a simple interface.

New feature introductions and product improvements motivate new firmware releases. All users are encouraged to use the newest firmware available and complete the firmware update if necessary.

**www**

Download the latest GigE firmware loader from the AVT website:
http://www.alliedvisiontec.com/us/support/downloads/firmware.html

**Note**

To determine the current firmware version loaded onto the camera, read the camera's Device Firmware attribute using the **GigE Sample Viewer** or third party applications such as NI Vision Acquisition Software.

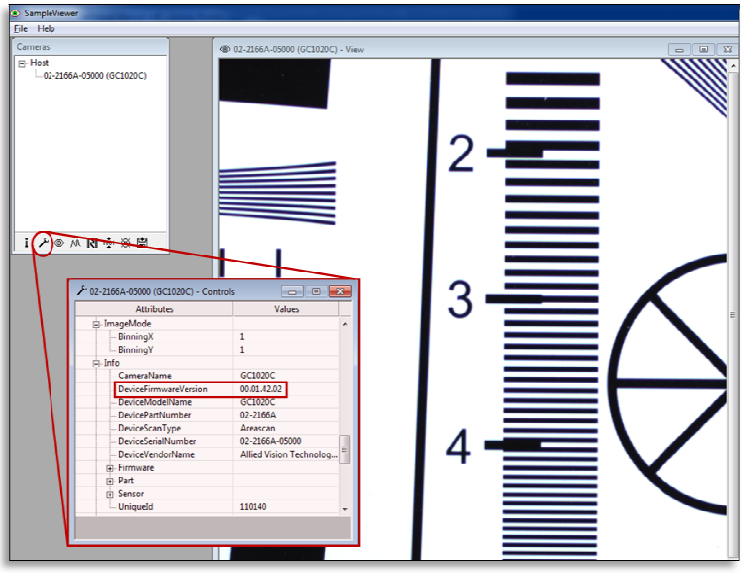



Figure 39: Screenshot of AVT GigE Sample Viewer controls window

# Resolution and ROI frame rates

This section aims to provide users with performance information which identifies the impact of reducing the region of interest on the camera's maximum frame rate.

**Note**

- The camera frame rate can be increased by reducing the camera's Height attribute, resulting in a decreased region of interest (ROI) or "window".
- The camera frame rate can also be increased by increasing the camera's BinningY attribute, resulting in a vertically scaled image (less overall height with same field of view).
- There is no frame rate increase with reduced width
- Frame rate data was generated using StreamBytesPerSecond equals 120 MB and an 8 bit pixel format such as Mono8 or Bayer8

## CAMERA: Prosilica GC650

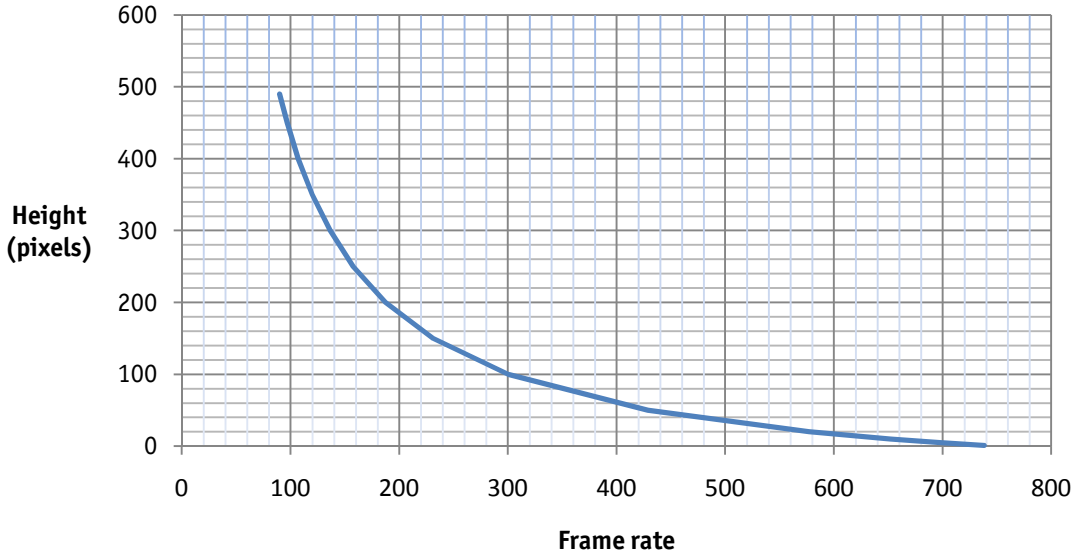



Figure 40: Maximum frame rate versus region height for GC650

# CAMERA: Prosilica GC655

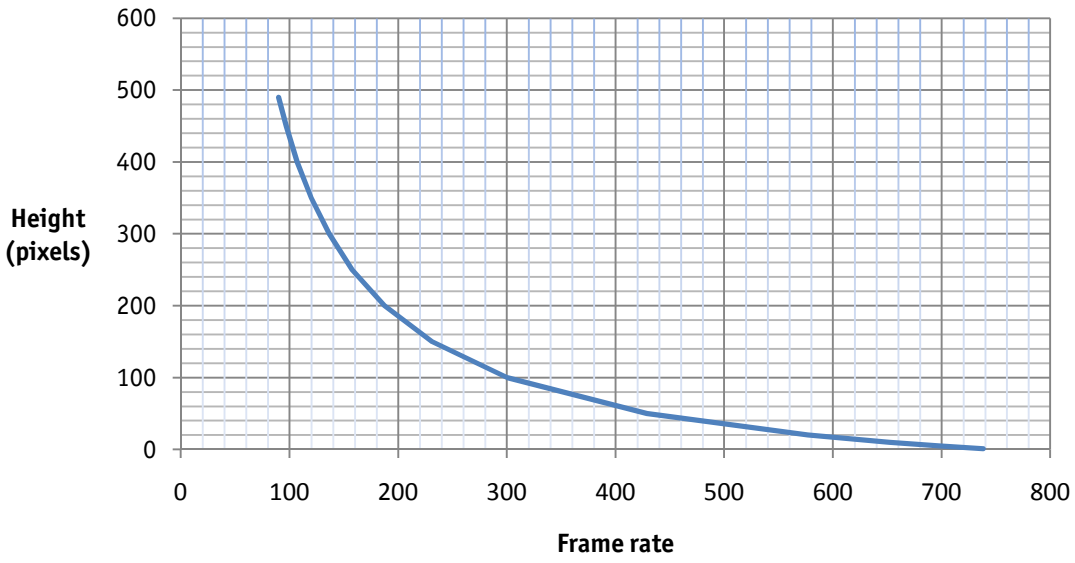



Figure 41: Maximum frame rate versus region height for GC655

# CAMERA: Prosilica GC660

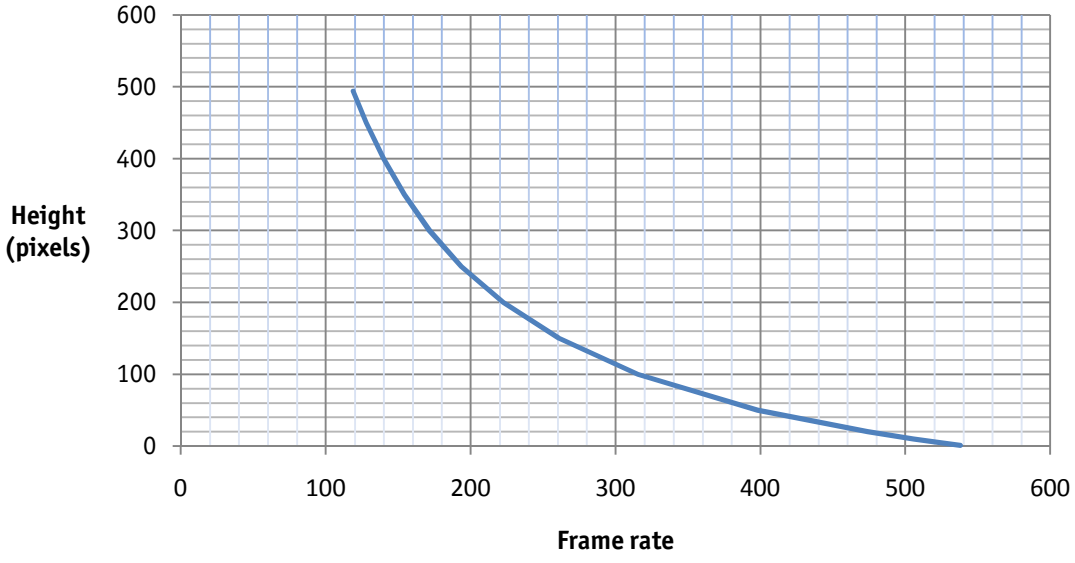



Figure 42: Maximum frame rate versus region height for GC660

# CAMERA: Prosilica GC750

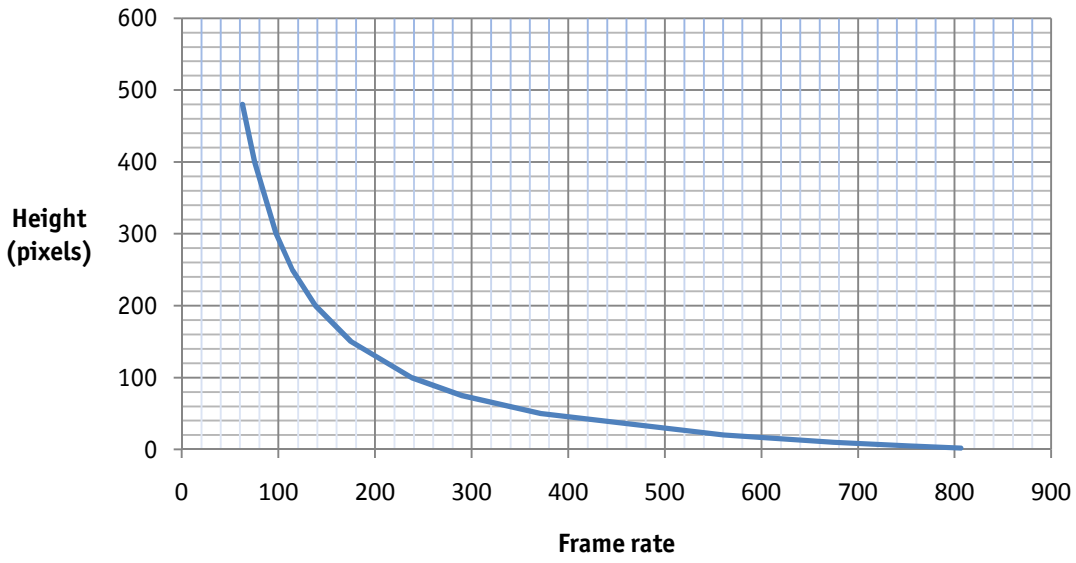



Figure 43: Maximum frame rate versus region height for GC750

# CAMERA: Prosilica GC780

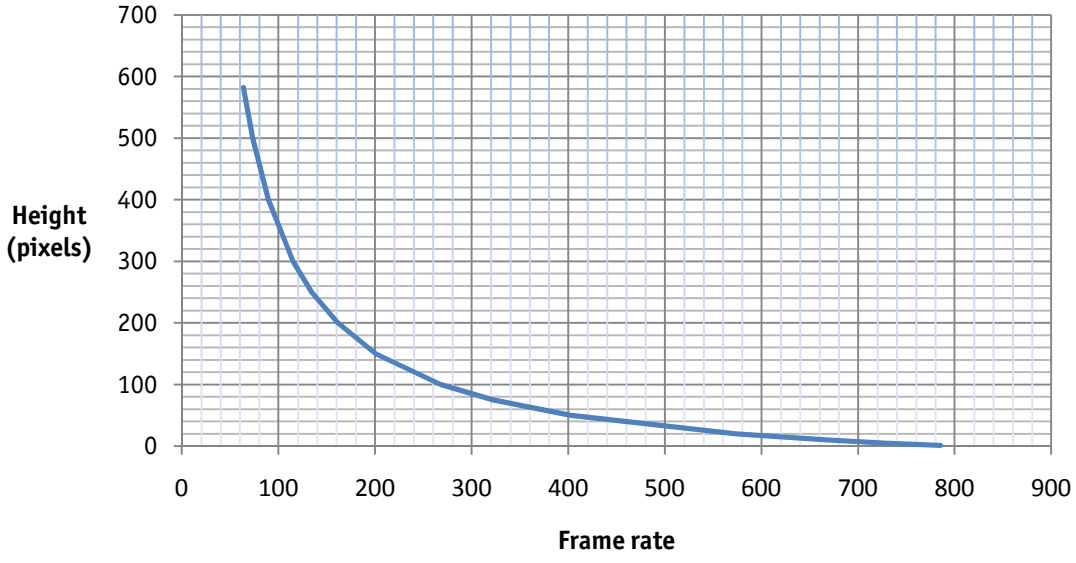



Figure 44: Maximum frame rate versus region height for GC780

# CAMERA: Prosilica GC1020

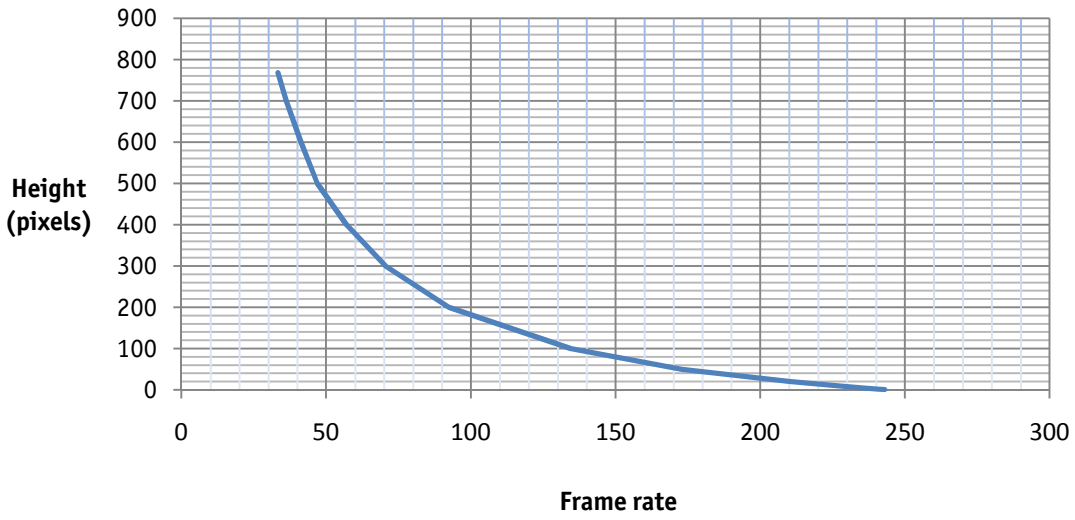



Figure 45: Maximum frame rate versus region height for GC1020

# CAMERA: Prosilica GC1280

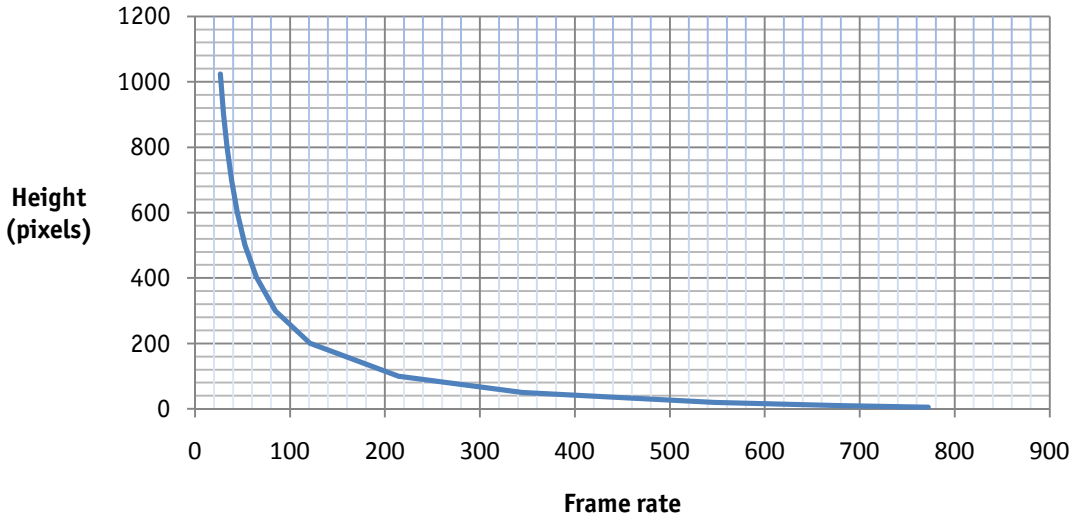



Figure 46: Maximum frame rate versus region height for GC1280

**Note**

GC1280 ROI framer rate can be increased further by reducing ROI width. This is a capability of the CMOS sensor used in this device.

# CAMERA: Prosilica GC1290

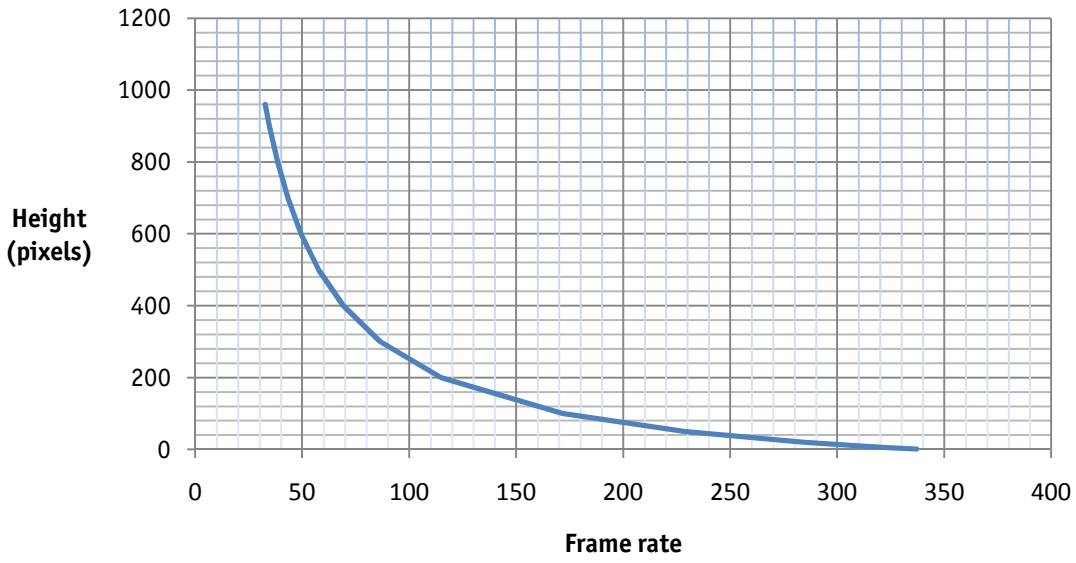



Figure 47: Maximum frame rate versus region height for GC1290

# CAMERA: Prosilica GC1350

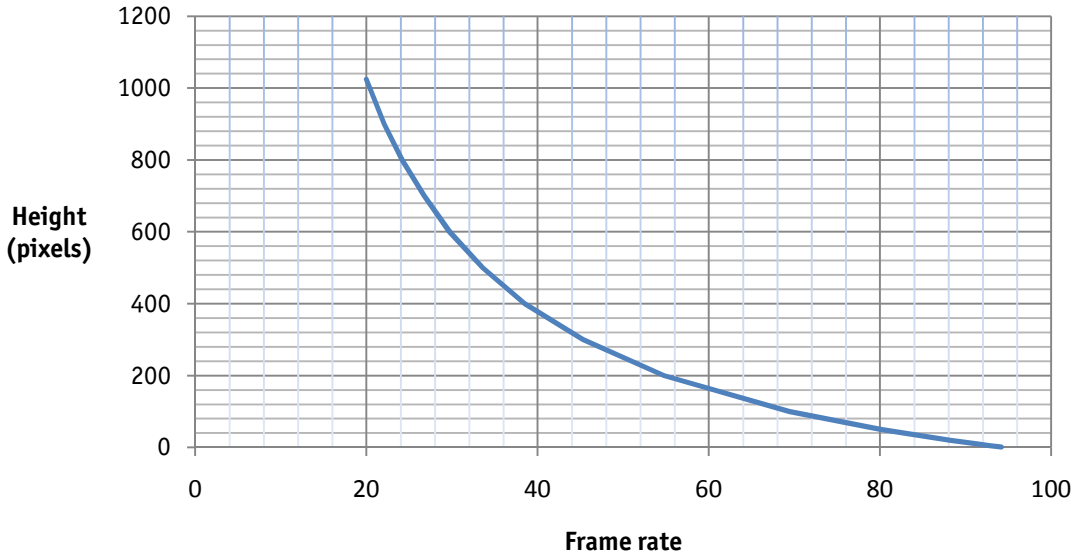



Figure 48: Maximum frame rate versus region height for GC1350

# CAMERA: Prosilica GC1380

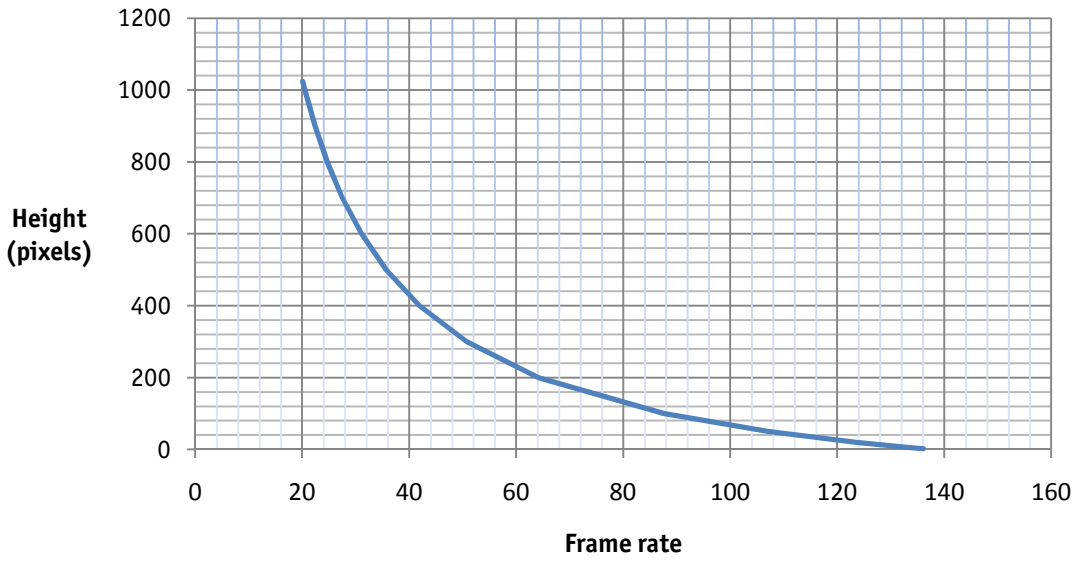



Figure 49: Maximum frame rate versus region height for GC1380

# CAMERA: Prosilica GC1380H

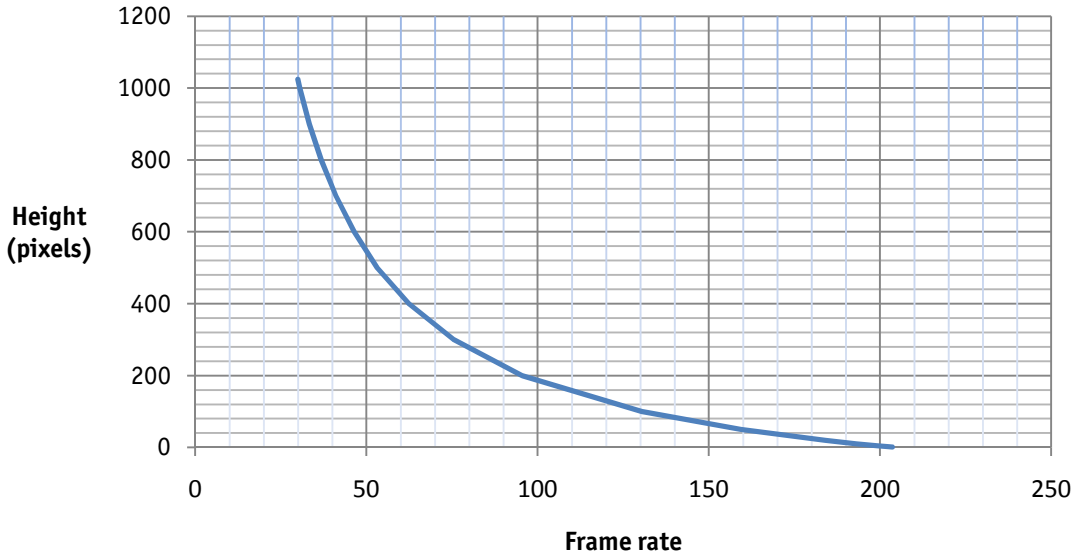



Figure 50: Maximum frame rate versus region height for GC1380H

# CAMERA: Prosilica GC1600

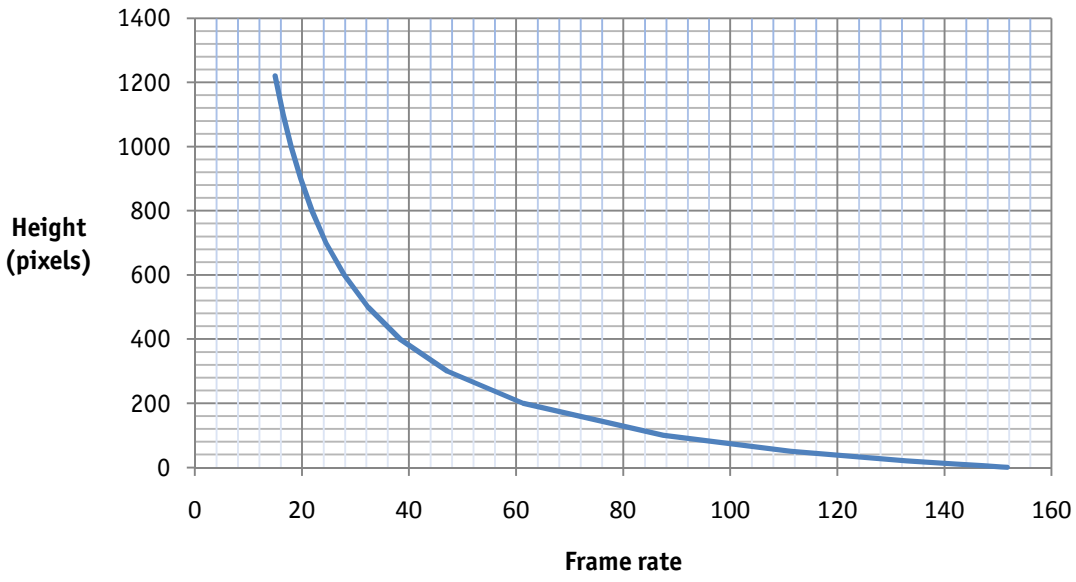



Figure 51: Maximum frame rate versus region height for GC1600

# CAMERA: Prosilica GC1600H

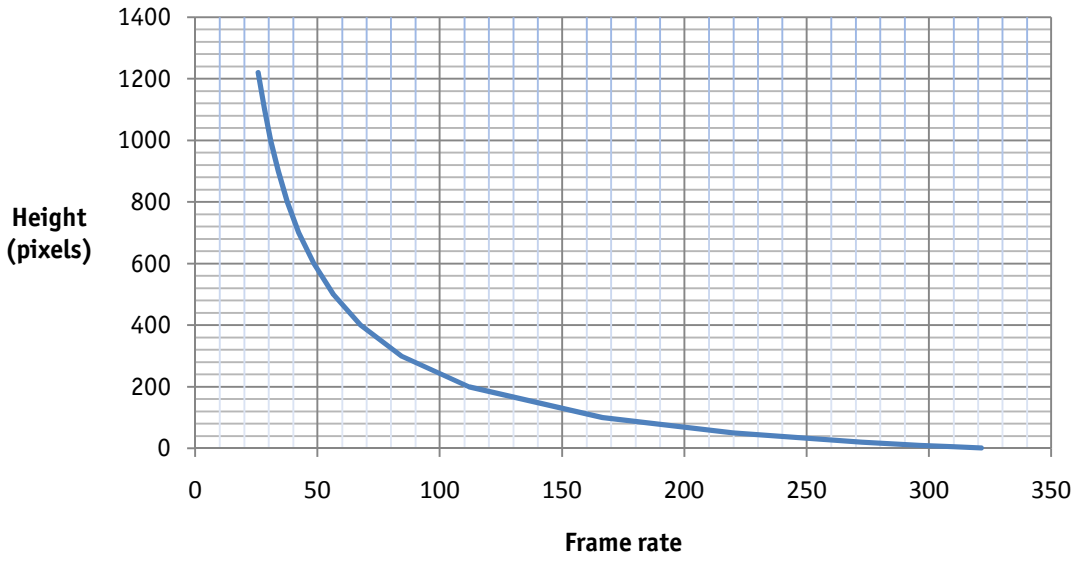



Figure 52: Maximum frame rate versus region height for GC1600H

# CAMERA: Prosilica GC2450

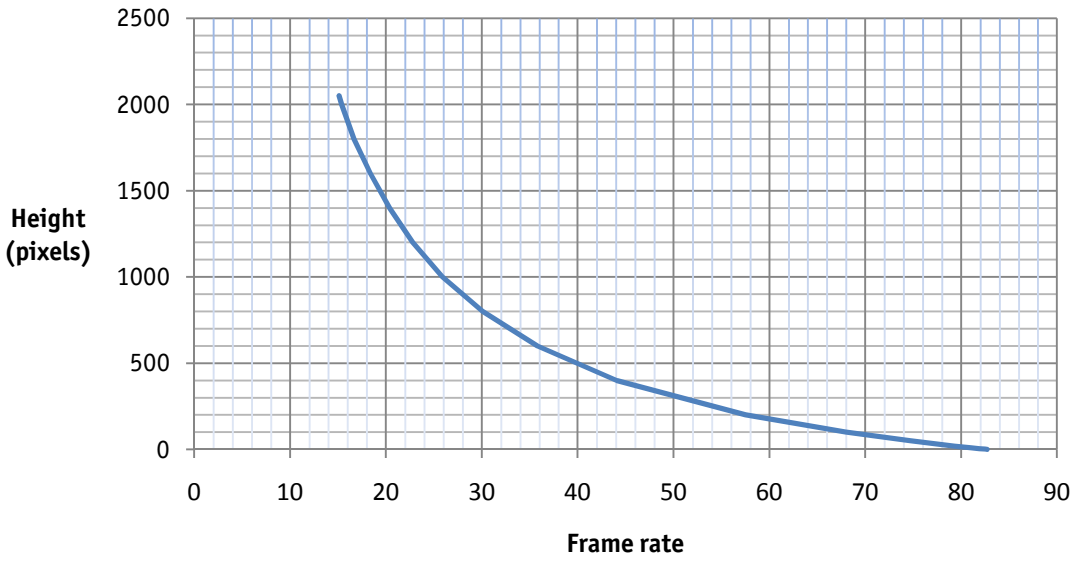



Figure 53: Maximum frame rate versus region height for GC2450

# Prosilica GC frame rate performance comparison

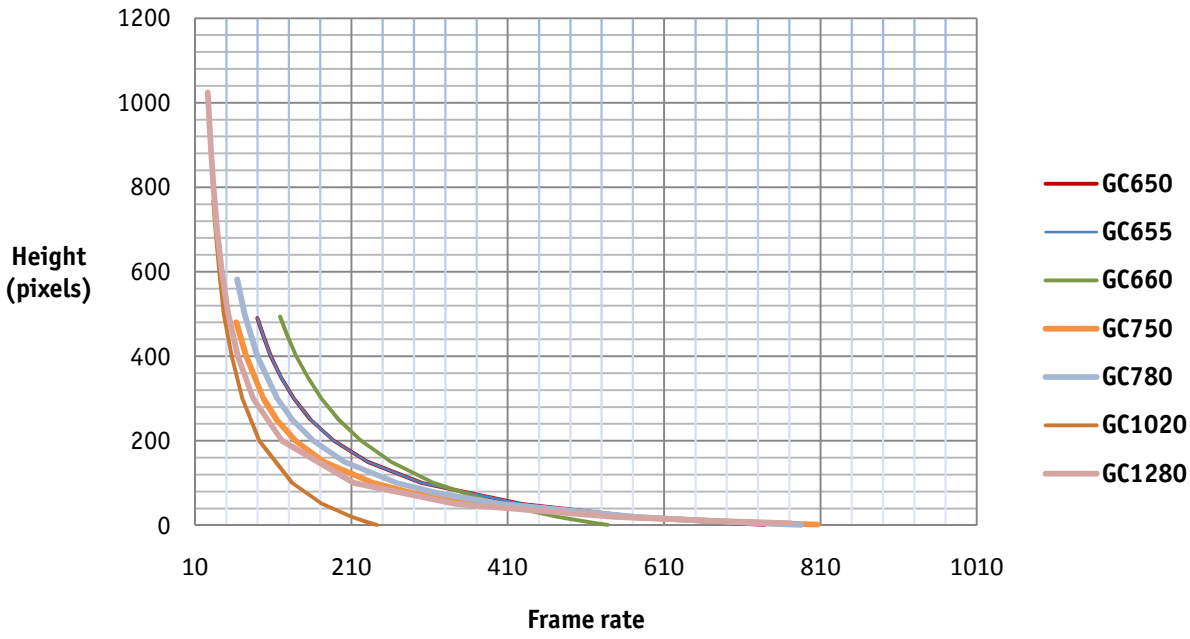



Figure 54: Maximum frame rate comparison for select models

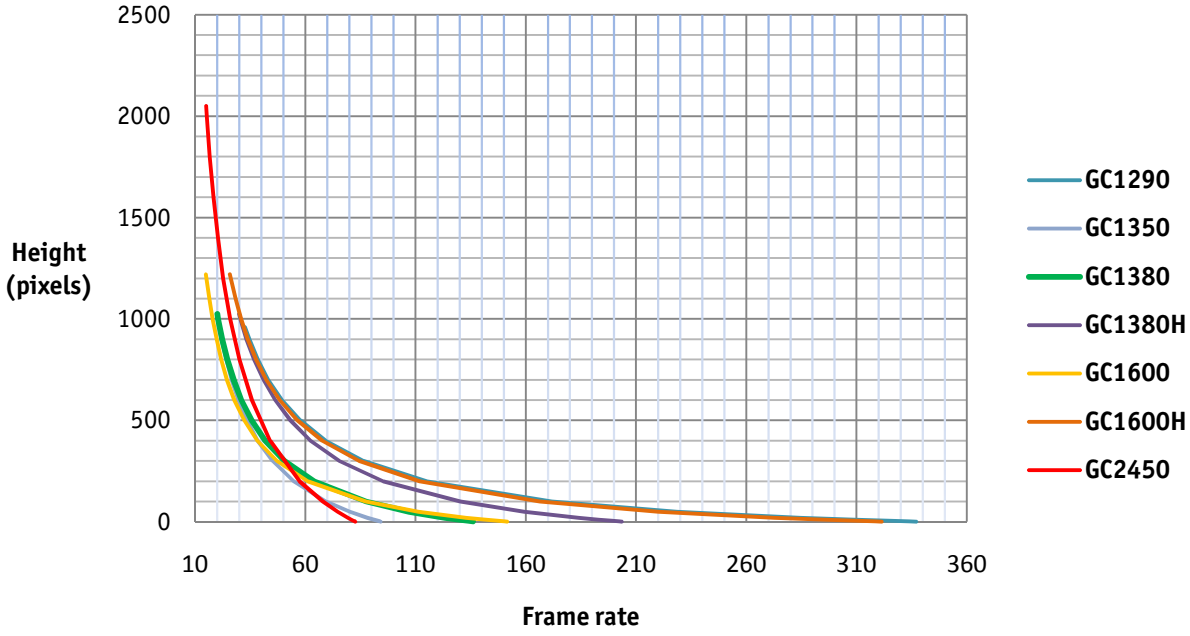
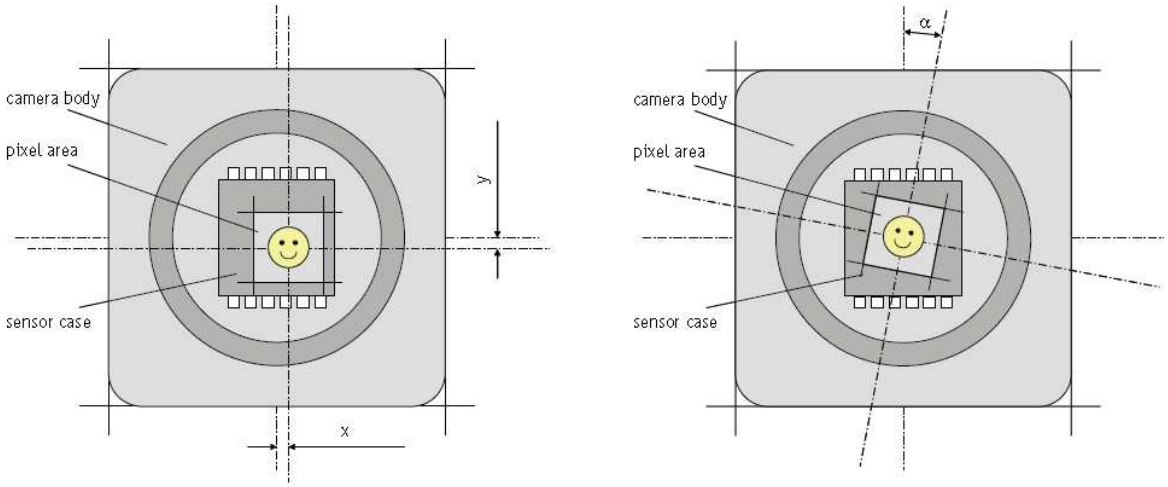



Figure 55: Maximum frame rate comparison for select models

# Sensor position of Prosilica GC cameras




| | | | |
|---|---|---|---|
| Method of Positioning: | Video alignment of photo sensitive sensor area into camera front module.<br>(lens mount front flange) | | |
| Reference points: | Sensor: Center of pixel area (photo sensitive cells).<br>Camera: Center of camera front flange (outer case edges). | | |
| Accuracy: | x/y | ±400 µm | (Sensor shift) |
| | α | ± 1 $^{0}$ | (Sensor rotation) |

# Additional references

**Prosilica GC webpage**

http://www.alliedvisiontec.com/us/products/cameras/gigabit-ethernet/prosilica-gc.html

**Prosilica GE Documentation**

http://www.alliedvisiontec.com/us/support/downloads/product-literature/prosilica-gc.html

**AVT GigE PvAPI SDK**

http://www.alliedvisiontec.com/us/products/software/avt-pvapi-sdk.html

**AVT Knowledge Base**

http://www.alliedvisiontec.com/us/support/knowledge-base.html

**AVT Case Studies**

http://www.alliedvisiontec.com/us/products/applications.html

**Prosilica GC Firmware**

http://www.alliedvisiontec.com/us/support/downloads/firmware.html