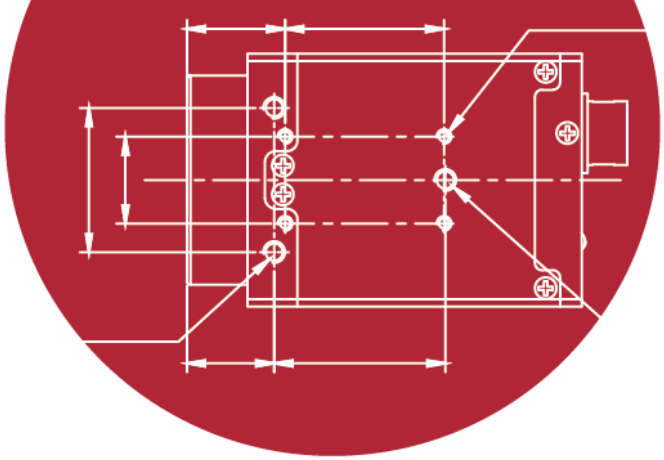


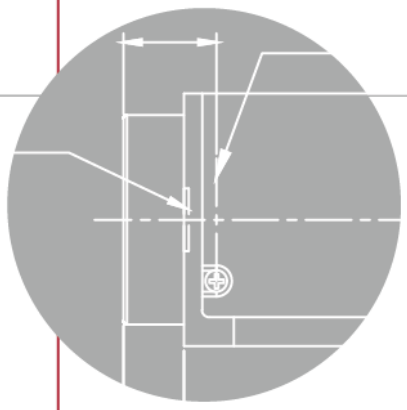
VQ series

User Manual

English

VQ-400G2
VQ-1600G2
VQ-2MG2
VQ-3MG2
VQ-5MG2
VQ-12MG2
VQ-20MG2

GiGE VISION



vieworks
Imaging Expert

Revision History

Version	Date	Description
1.0	2019-09-06	Initial release
1.1	2022-03-11	Added power information on the “Power” section in the “Configuring the Camera and Host System” chapter

Contents

Welcome!

The VQ GigE series is a micro compact camera, making it the world's smallest GigE PoE camera. The VQ GigE series camera is equipped with low noise, high dynamic range image sensing technology suitable for a wide range of applications such as factory automation, medical, scientific and logistics.

VQ GigE series is targeting machine vision system developers who are looking for:

- Great image quality
- Reliable camera connection
- Compact size
- Availability for standard features

Contact Us

Vieworks Co., Ltd.

Contact Sales

vision@vieworks.com

Contact Support

support@vieworks.com

Using this Documentation

Some warning, safety, and/or tips icons

	The help icon indicates important instructions and steps to follow.
	The light bulb icon indicates useful hints for understanding the operation of the camera
	The computer icon represents useful resources found outside of this documentation.

Installing the Camera Hardware

Mounting

The camera is equipped with M3 mounting. One pair of M3 holes are present on opposite sides of the lens mount surface.

GigE Cable

- For the best performance, a shielded Ethernet Cat5e or higher grade should be used. STP shielding is recommended for minimal electromagnetic interference in environments with harsh EMI conditions.
- An unshielded or lower grade/quality Ethernet cable may result in loss of camera connection and/or lost and inconsistent image data.
- The maximum cable length from camera to host with no switch or repeater in between is 100 meters.

GPIO Cable

The VQ GigE series camera is equipped with an 8-pin General Purpose Input/Output (GPIO) connector at the back.

- The GPIO cable should be shielded for best performance.
- Poor quality unshielded GPIO cable may result in false triggers or missing triggers.
- The GPIO connector part number is BM08B-NSHSS-TBT. The mating connector is NSHR-08V-S.
- Recommended wire thickness is AWG26 or AWG28.

	Consult the GPIO Characteristics section for a GPIO pinout diagram.

Lens

C mount lens

C mount lenses can be used on a C mount camera. According to standard, the C mount flange back distance is 17.53 mm.

	Note about using a heavy lens with the camera.

Mounting a heavy and long lens may cause damage to the camera board. If the lens is considerably heavier than the camera, the lens' weight may exert significant force on the lens mount attached to the camera's board causing unexpected damage to the board and soldered components. If a heavy lens is necessary for the production environment, it is recommended to use the lens as a mounting point rather than the camera to avoid damage to the camera.

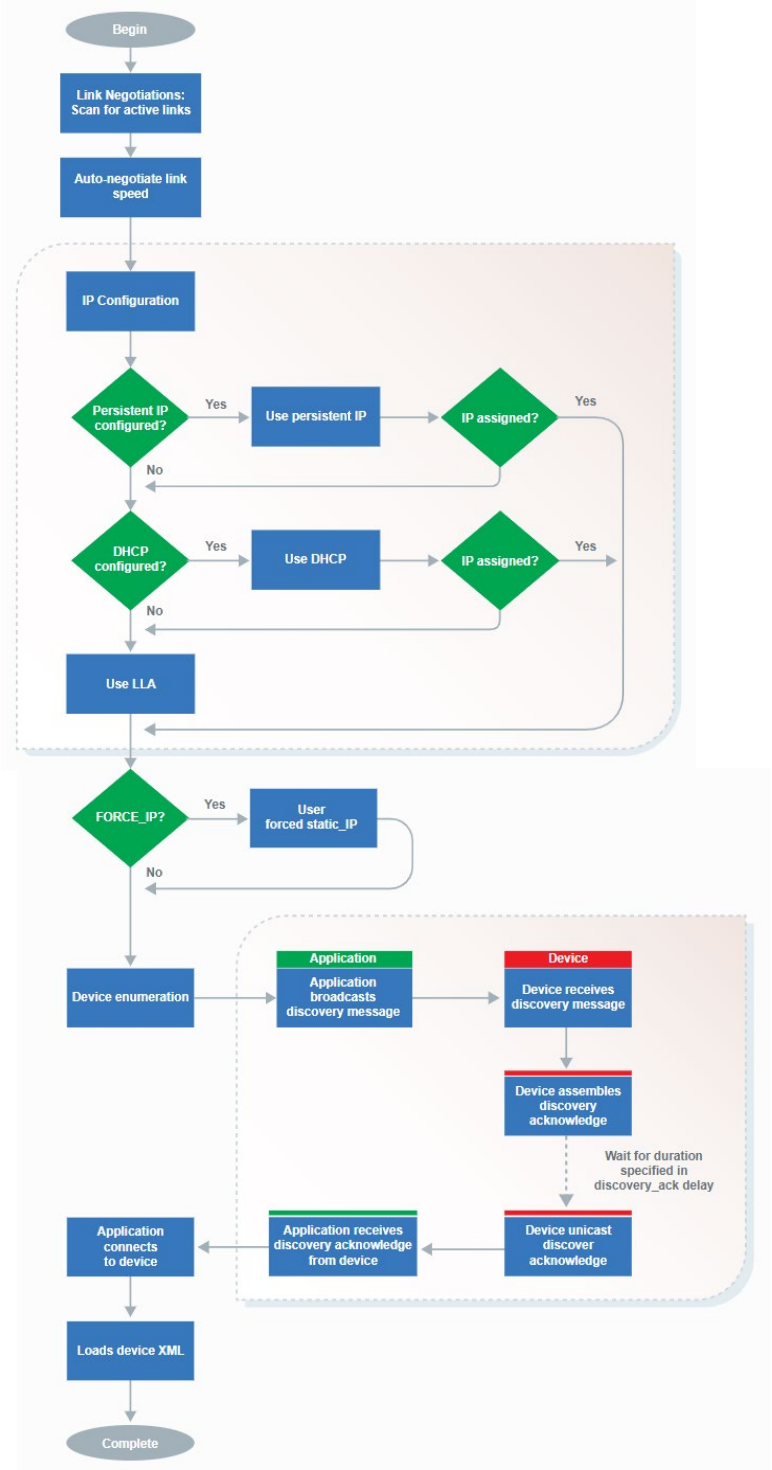
Configuring the Camera and Host System

Installing the Ethernet Driver

Vieworks recommends updating to the latest version of your Ethernet adapter's driver before connecting your camera.

Device Discovery and Enumeration

Vieworks cameras are discovered and enumerated with the following process:



IP Configuration

There are three methods used by the VQ GigE series to obtain an IP address:

- Persistent - The camera uses a fixed IP address
- Dynamic Host Configuration Protocol (DHCP) - The camera is assigned an address from a DHCP server
- Link-Local Address (LLA) - The camera obtains an address in the Link-Local address range from 169.254.1.0 to 169.254.254.255

Persistent IP and DHCP configurations can be disabled on the camera. Out of the box, persistent IP is disabled and DHCP is enabled. LLA is always enabled.

The camera must be on the same subnet as the Ethernet adapter and have a valid IP address before use.

Bandwidth Management

Jumbo Frames

Vieworks recommends enabling jumbo frames on your Ethernet adapter. A jumbo frame is an Ethernet frame that is larger than 1500 bytes. Most Ethernet adapters support jumbo frames, however it is usually turned off by default.

Enabling jumbo frames on the Ethernet adapter allows a packet size of up to 9000 bytes to be set on the VQ GigE series. The larger packet size will enable optimal performance on high-bandwidth cameras, and it usually reduces CPU load on the host system. Please note in order to set a 9000 byte packet size on the camera, the Ethernet adapter must support a jumbo frame size of 9000 bytes or higher.

The following table are some of the Ethernet adapters that Vieworks has tested:

Product Name	Maximum Jumbo Frame Size
ADLINK PCIe-GIE64+	9000
Neousys PCIe-PoE354at	9500
Intel EXPI9301CT (non-POE)	9000

If you still experience issues such as lost packets or dropped frames, you can also try:

- Updating the Ethernet adapter driver (you may need to enable jumbo frames again after updating).
- Increasing the receive buffer size in your Ethernet adapter properties.
- Reducing the DeviceLinkThroughputLimit value (this may reduce maximum frame rate).

Receive Buffers

A receive buffer is the size of system memory that can be used by the Ethernet adapter to receive packets. Some Ethernet adapter drivers or the operating system itself may set the receive buffer value to a low value by default, which may result in decreased performance. Increasing the receive buffer size, however, will also result in increased system memory usage.

DeviceLinkThroughputLimit

The DeviceLinkThroughputLimit is the maximum available bandwidth for transmission of data represented in bytes per second. This can be used to control the amount of bandwidth used by the camera. The maximum available frame rate may decrease when this value is lowered since less bandwidth is available for transmission.

User Sets, Streamables, and File Access

User Sets

The VQ GigE series features two customizable user sets to load or save user-defined settings on the camera. Accessing the user set named Default will allow loading or saving of factory default settings. The VQ GigE series will load the user set selected in UserSetDefault when powering up or when reset.

	If the camera is acquiring images, AcquisitionStop must be called before loading or saving a user set.

Streamables

A camera feature marked as Streamable allows the feature's current value to be stored to and loaded from a file.

File Access

The VQ GigE series features persistent storage for generic file access on the camera. This feature allows users to save and load a custom file up to 16 megabytes with UserFile. Users can also save and load User Set contents to and from a file.

	Loading new firmware onto the camera may overwrite existing UserFile contents.

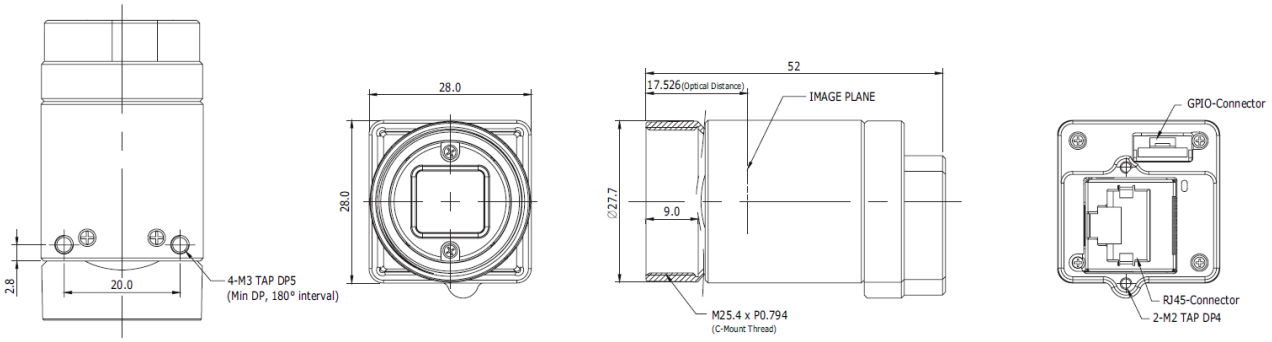
	User Sets, Streamables, and File Access functions do not load or save camera IP configuration settings.

Camera Specifications

Model	Resolution	Frame Rate	Interface	Optical Format	Sensor	Pixel Size
VQ-400G2-M/C 291 H	728 × 544	291 fps	GigE	1/2.9"	Sony IMX287	6.90 μm × 6.90 μm
VQ-1600G2-M/C 77 H	1440 × 1080	77 fps	GigE	1/2.9"	Sony IMX273	3.45 μm × 3.45 μm
VQ-2MG2-M/C 52 H	1920 × 1200	52 fps	GigE	1/2.3"	Sony IMX392	3.45 μm × 3.45 μm
VQ-3MG2-M/C 38 H	2048 × 1536	38 fps	GigE	1/1.8"	Sony IMX265	3.45 μm × 3.45 μm
VQ-5MG2-M/C 24 H	2448 × 2048	24 fps	GigE	2/3"	Sony IMX264	3.45 μm × 3.45 μm
VQ-12MG2-M/C 10 H	4096 × 3000	9.9 fps	GigE	1.1"	Sony IMX304	3.45 μm × 3.45 μm
VQ-20MG2-M/C 6 H	5472 × 3648	6 fps	GigE	1"	Sony IMX183	2.40 μm × 2.40 μm

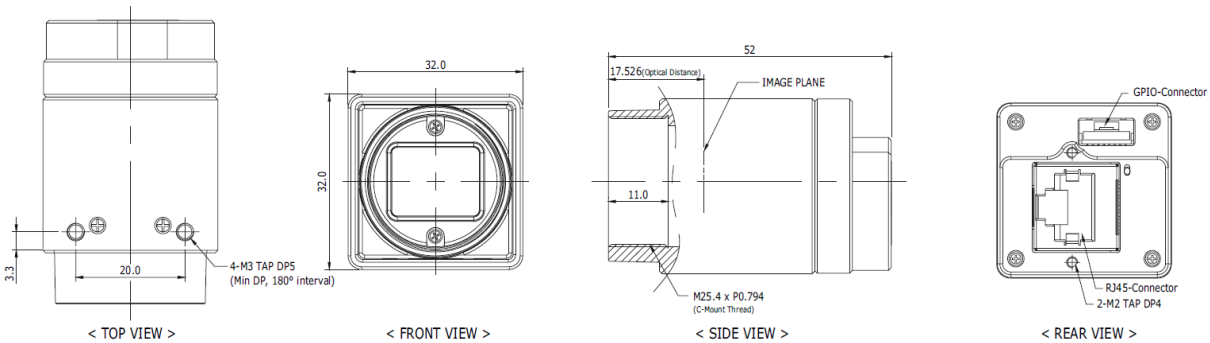
Mechanical Dimensions

VQ-400G2 / VQ-1600G2 / VQ-2MG2 / VQ-3MG2 / VQ-5MG2



< TOP VIEW > < FRONT VIEW > < SIDE VIEW > < REAR VIEW >

VQ-12MG2 / VQ-20MG2



< TOP VIEW > < FRONT VIEW > < SIDE VIEW > < REAR VIEW >

Power

The VQ GigE series can be powered via the Ethernet cable using Power over Ethernet (PoE) or the GPIO using the pins described in the GPIO Characteristics section.

When using PoE, the power supply must comply with the IEEE 802.3af standard.

Model	PoE	External
VQ-400G2-M/C 291 H	IEEE 802.3af, 3.1 W	12 -24 V DC, 2.5 W
VQ-1600G2-M/C 77 H	IEEE 802.3af, 3.1 W	12 -24 V DC, 2.5 W
VQ-2MG2-M/C 52 H	IEEE 802.3af, 3.1 W	12 -24 V DC, 2.5 W
VQ-3MG2-M/C 38 H	IEEE 802.3af, 3.1 W	12 -24 V DC, 2.5 W
VQ-5MG2-M/C 24 H	IEEE 802.3af, 3.1 W	12 -24 V DC, 2.5 W
VQ-12MG2-M/C 10 H	IEEE 802.3af, 3.5 W	12 -24 V DC, 3.0 W
VQ-20MG2-M/C 6 H	IEEE 802.3af, 3.5 W	12 -24 V DC, 3.0 W

Temperature

The VQ GigE series should be kept in the following storage, operating, and humidity conditions.

Storage Temperature	-30 to 60°C
Operating Temperature	-10 to 55°C
Humidity	Operating: 20% ~ 80%, relative, non-condensing

Placing the camera outside of these conditions may result in damage to the device.

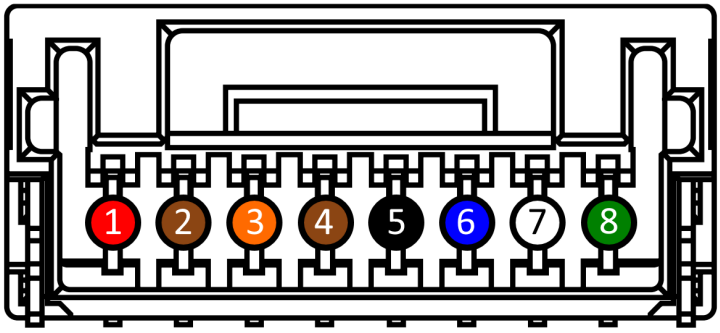
The VQ GigE series is equipped with a built in temperature sensor that can be read by reading the DeviceTemperature property.

	The camera can get hot to touch if it has been streaming images for an extended period of time.

	DeviceTemperature can show values outside of the operating temperature range. This is generally acceptable as long as the camera is kept within the stated operating temperature range.

GPIO Characteristics

GPIO Pinout Diagram



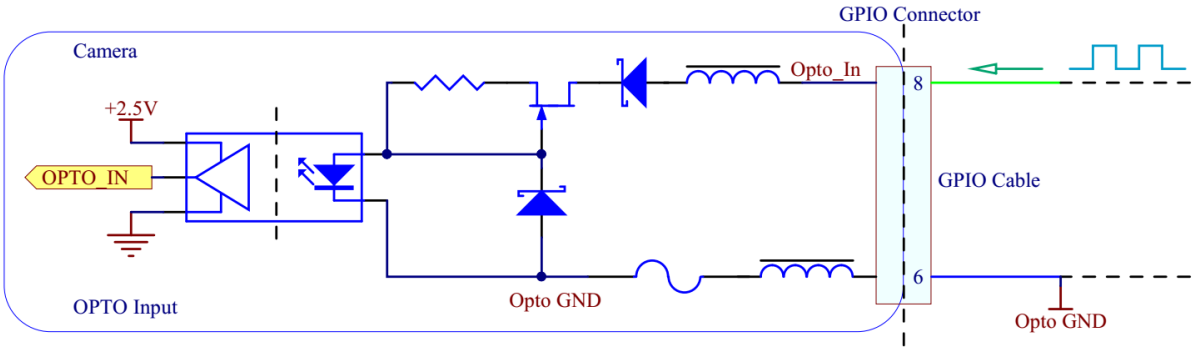
GPIO connector as seen from rear VQ GigE series view. Pin colors correspond to GPIO-8P20 cable from Vieworks.

Pin Number	Pin Description
1 (Red)	V_{AUX} (12-24V DC Power Input)
2 (Brown)	Non-isolated bi-directional GPIO channel (Line 2)
3 (Orange)	V_{DD} GPIO (2.5V Power Output) (Line 4)
4 (Brown)	Non-isolated bi-directional GPIO channel (Line 3)
5 (Black)	GND (Camera GND)
6 (Blue)	OPTO GND (Opto-isolated Reference)
7 (White)	OPTO OUT (Opto-isolated Output) (Line 1)
8 (Green)	OPTO IN (Opto-isolated Input) (Line 0)

Consult the Turning on GPIO Voltage Output section for enabling V_{DD}.

GPIO Schematics

Opto-isolated Input – GPIO Line 0

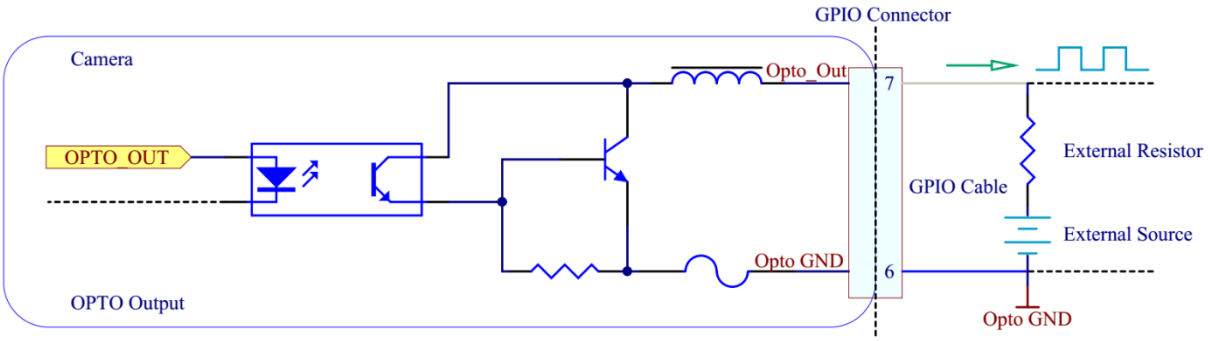


Opto-isolated Input Measurements:

Voltage (V)	Max Rise Delay (us)	Max Fall Delay (us)	Max Rise Time (us)	Max Fall Time (us)	Min Pulse Input (us)	Min Input High (V)	Min Input Low (V)
2.5	1	1	1	1	2	2.1	1.6
5	1	1	1	1	2	2.1	1.6

Sample values measured at room temperature. Results may vary over temperature and setup.

Opto-isolated Output – GPIO Line 1

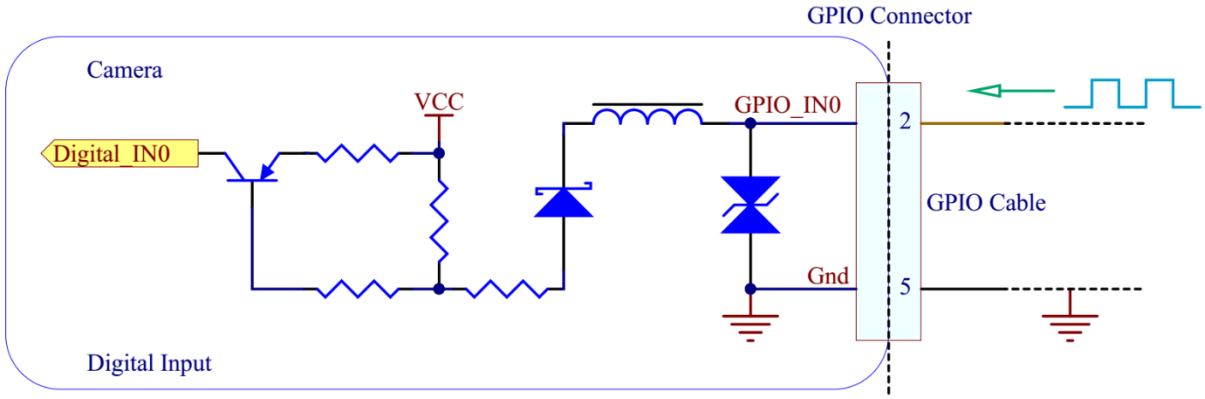


Opto-isolated Output Measurements:

Voltage (V)	External Resistor (Ω)	Max Rise Delay (us)	Max Fall Delay (us)	Max Rise Time (us)	Max Fall Time (us)	Current (mA)	Low Level (V)
2.5	150	50	5	40	5	5.7	0.9
2.5	330	50	5	40	5	2.9	0.8
2.5	560	50	5	40	5	1.9	0.5
2.5	1k	50	5	40	5	1.2	0.3
5	330	50	5	50	5	6.6	0.9
5	560	50	5	50	5	4	0.7
5	1k	50	5	50	5	2.4	0.5
5	1.8k	50	5	50	5	1.4	0.4
12	1k	50	5	60	5	6	0.9
12	1.8k	50	5	60	5	3.4	0.9
12	2.7k	50	5	60	5	2.4	0.7
12	4.7k	50	5	60	5	1.5	0.5
24	1.8k	60	5	60	5	7.1	0.9
24	2.7k	60	5	60	5	4.7	0.9
24	4.7k	60	5	60	5	2.8	0.7
24	6.8k	60	5	60	5	2.1	0.6

Sample values measured at room temperature. Results may vary over temperature and setup.

Non-isolated Input – GPIO Line 2

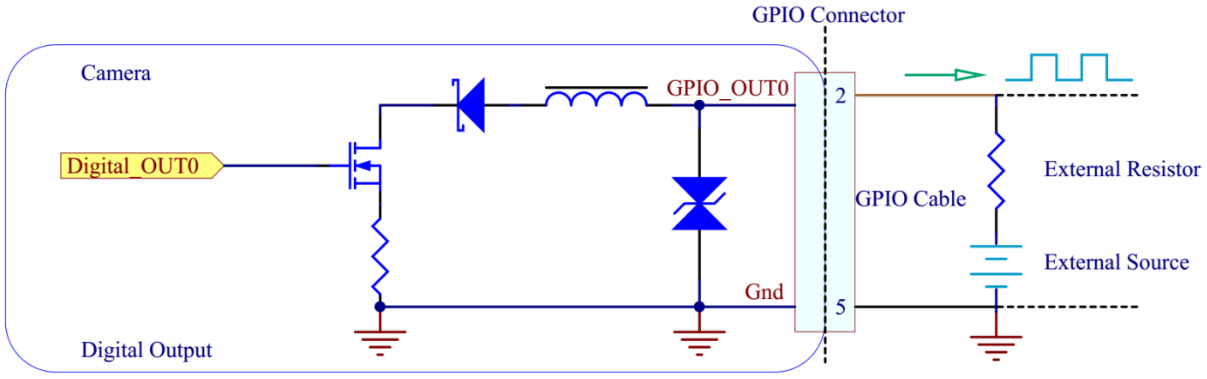


Non-isolated Input Measurements:

Voltage (V)	Max Rise Delay (us)	Max Fall Delay (us)	Max Rise Time (us)	Max Fall Time (us)	Min Pulse Input (us)	Min Input High (V)	Min Input Low (V)
2.5	1	1	1	1	2	1	0.8
5	1	1	1	1	2	1	0.8

Typical values measured at room temperature. Results may vary over temperature.

Non-isolated Output – GPIO Line 2



Non-isolated Output Measurements:

Voltage (V)	External Resistor (Ω)	Max Rise Delay (us)	Max Fall Delay (us)	Max Rise Time (us)	Max Fall Time (us)	Current (mA)	Low Level (V)
2.5	150	0.5	0.5	1	0.5	4.3	1.3
2.5	330	0.5	0.5	1	0.5	2.6	1
2.5	560	0.5	0.5	1	0.5	1.8	0.8
2.5	1k	0.5	0.5	1	0.5	1.1	0.6
5	330	0.5	0.5	1	0.5	5.6	1.4
5	560	0.5	0.5	1	0.5	3.7	1.1
5	1k	0.5	0.5	1	0.5	2.3	0.9
5	1.8k	0.5	0.5	1	0.5	1.4	0.7
12	1k	0.5	0.5	1	0.5	5.5	1.4
12	1.8k	0.5	0.5	1	0.5	3.2	0.9
12	2.7k	0.5	0.5	1	0.5	2.3	0.9
12	4.7k	0.5	0.5	1	0.5	1.5	0.7
24	1.8k	0.5	0.5	2	0.5	6.5	1.6
24	2.7k	0.5	0.5	2	0.5	4.5	1.3
24	4.7k	0.5	0.5	2	0.5	2.6	0.9
24	6.8k	0.5	0.5	2	0.5	1.8	0.8

Typical values measured at room temperature. Results may vary over temperature.

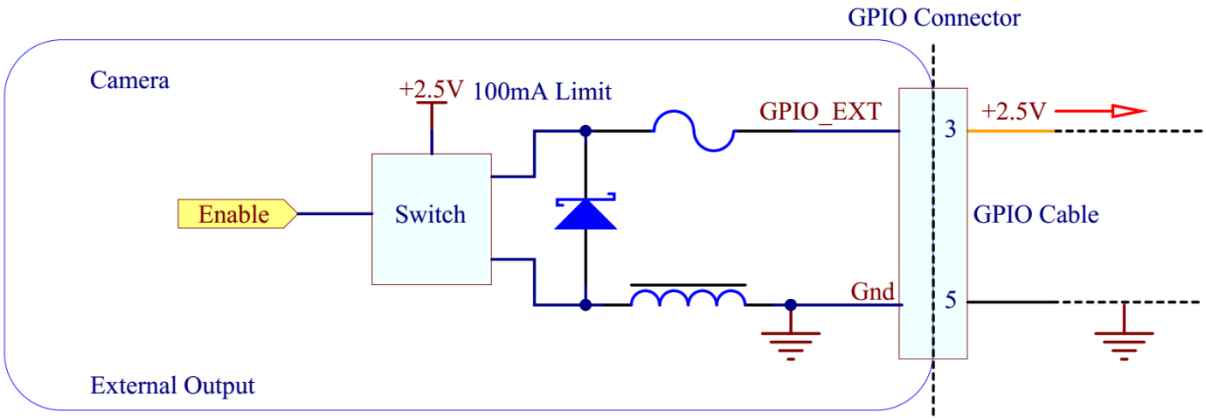
Non-isolated Input - GPIO Line 3

Same as Non-isolated Input – GPIO Line 2 (GPIO_IN is Pin 4, GND is Pin 5)

Non-isolated Output - GPIO Line 3

Same as Non-isolated Output – GPIO Line 2 (GPIO_OUT is Pin 4, GND is Pin 5)

2.5V Output



LED Status

The VQ GigE series camera is equipped with an LED that identifies the current state of the camera.

LED Status	Status Information
Flashing red	Camera powered, but no Ethernet link established.
Flashing green	Camera powered, Ethernet link established, but no network traffic.
Solid green	Camera powered, Ethernet link established, and there is network traffic.
Flashing red/green	Firmware update in progress.
Solid red	Error. Firmware update failed.

The following LED sequence occurs when the camera is powered up and connected to a network:

1 LED off, plug in the Ethernet cable.

2 LED on, flashing red.

3 After link is established, LED becomes flashing green.

4 Launch application and start capturing images, LED becomes solid green.

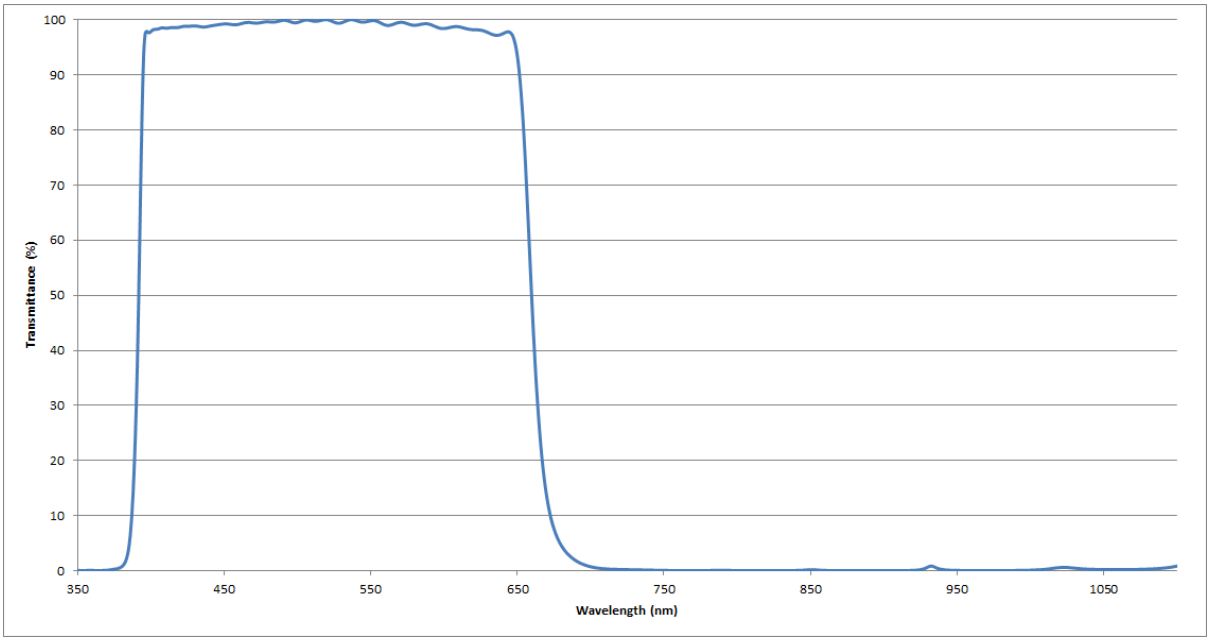
The status LED can also be controlled using the DeviceIndicatorMode property. Possible values are:

- Inactive: LED is off.
- Active: LED indicates camera status according to the above table.

IR Filter

Color cameras from Vieworks are equipped with an IR filter that is installed under the gasket of the mount. Mono cameras are equipped with a transparent glass window instead of an IR filter. The dimensions of the IR filter / transparent glass window are as follows:

Model	Size	Thickness
28 x 28mm VQ GigE series C-Mount	14 x 14mm	1mm
32 x 32mm VQ GigE series C-Mount	18 x 14.5mm	1mm



The IR filter and transparent glass window have anti-reflective coating on one side.

Specification Tests

FCC

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

Users are advised that any changes or modifications not approved by Vieworks will void the FCC compliance. The product is intended to be used as a component of a larger system, hence users are advised that cable and other peripherals may affect overall system FCC compliance.

RoHS, REACH, and WEEE

Vieworks declares the VQ GigE series camera is in conformity of the following directives:

- RoHS 2011/65/EC
- REACH 1907/2006/EC
- WEEE 2012/19/EC

CE

Vieworks declares the VQ GigE series meets requirements necessary for CE marking. The product complies with the requirements of the listed directives below:

- EMC Directive 2014/30/EU
- EN 55032:2015 Class A, EN55024:2010 +A12015
- EN 61000-3-2:2014
- EN 61000-3-3:2013

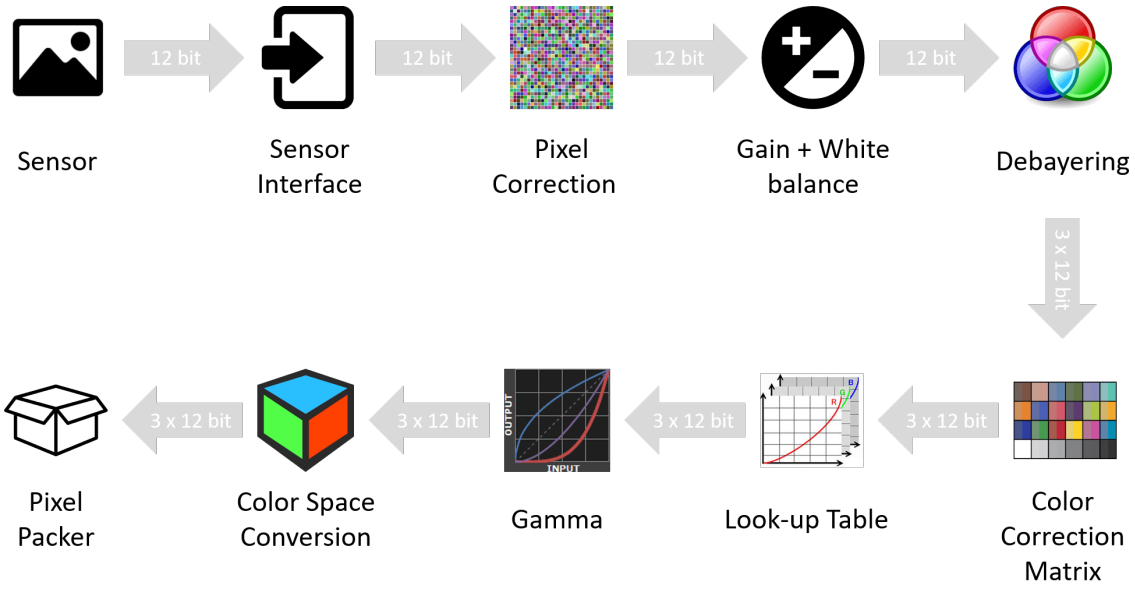
KC (Class A)

This device obtained EMC registration for office use and may be used in places other than home. Sellers and/or users need to take note of this.

Camera Features

Image Processing Controls

The VQ GigE series camera is equipped with the following image processing control flow.



The details of each of the image processing controls are described below.

Pixel Correction

The VQ GigE series supports a list of pixel coordinates to be corrected via firmware. For the list of pixel coordinates, their actual pixel values are replaced by interpolation of their neighboring pixel values. The camera has a preloaded pixel correction list and these pixels are loaded during the camera manufacturing process. It is natural that sensors come with defective pixels and they are inevitable in the semi-conductor manufacturing process. As the camera operates longer in heat or is exposed to radiation, more defective pixels may appear. Users can update the pixel correction list any time.

Gain

Gain refers to a multiplication factor applied to a signal to increase the strength of that signal. On Vieworks cameras, gain can be either manually adjusted or automatically controlled.

Some cameras feature gain that is purely digital while others allow for analog gain control up to a certain value, beyond which the gain becomes digital. Depending on the camera family and sensor model, the specific gain control can vary.

Analog Gain

Analog Gain refers to amplification of the sensor signal prior to A/D conversion.

Digital Gain

Digital Gain refers to amplification of the signal after digitization.

Model	Analog	Digital
VQ-400G2	0-24dB	24-48dB
VQ-1600G2	0-24dB	24-48dB
VQ-2MG2	0-24dB	24-48dB
VQ-3MG2	0-24dB	24-48dB
VQ-5MG2	0-24dB	24-48dB
VQ-12MG2	0-24dB	24-48dB
VQ-20MG2	0-27dB	NA

Color Processing

The VQ GigE series camera is equipped with a debayering core within the image processing pipeline. The color processing core enables the camera to output a color processed image format in addition to the unprocessed Bayer-tiled image. Currently the camera supports the RGB8 pixel format which outputs 8-bits of data per color channel for a total of 24-bits per pixel. Due to the amount of bits per pixel, the total image size for RGB8 would be 3 times larger when compared to an 8-bit image. This increase in image data size per frame would result in a reduction of average frame rate for the camera.

White Balance

The white balance module aims to change the balance between the Red, Green and Blue channels such that a white object appears white in the acquired images. Vieworks cameras allow for manual white balance adjustment by the user, or automatic white balance adjustment based on statistics of previously acquired frames. Different external illuminations and different sensors may render acquired images with color shift. The White Balance module allows the user to correct for the color shift by adjusting gain value of each color channel.

Vieworks offers two types of white balance algorithm as described below. Both methods below allow for user controlled anchor points or reference points, from which multipliers are computed for each channel. The different anchor points are summarized below.

Anchors	Information
Min	The lowest luminance channel is used as reference while other channels are adjusted to match it. There is no chance of overflowing the pixels, however the image is darkened.
Max	The highest luminance channel is used as reference while other channels are adjusted to match it. There is a chance of overflowing the pixels.
Mean	The mean value of all channels is used as reference while all channels are adjusted to match the mean. There is a smaller chance of overflowing.
Green	Green channel is used as the reference while the Red and Blue are adjusted.

Grey World

A grey world assumes that the average of all colors in an image is a neutral grey.

White Patch

White patch has the same idea as Grey World, but only considering a section of the image (i.e. the section being the white patches). A simple way to determine such section(s) of the image is to indicate a pixel as white when R+G+B is greater than the threshold pixel value. Determining the threshold can be done using a 90% percentile of previous image. There is also a need for an additional threshold to exclude saturated pixels for better white balance adjustment.

Look-Up Table (LUT)

Look-Up Table is used for mapping pixel values from raw sensor response to user-specified values. LUT supports a 12-bit (4096 values) to 12-bit mapping with interpolation. The number of effective input levels is 2049 (11 bits plus one). The supported LUT indices (input to LUTIndex) are 0, 2, 4, ..., 4092, 4094 and 4095, and users may specify their mapped values in the corresponding LUTValue field. If an input pixel value falls in the gap (e.g., 1091), its mapped value will be interpolated by the neighboring mappings (e.g., the mapped values of LUTIndex 1090 and 1092).

Gamma

The gamma control allows the optimization of brightness for display. The camera applies a gamma correction value to the intensity of each pixel. In general, gamma values can be summarized as follows:

- Gamma = 1: brightness is unchanged.
- Gamma > 1: brightness decreases.
- Gamma < 1: brightness increases.

Image Format Controls

The VQ GigE series camera is equipped with the following image format control capabilities.

Region of Interest (ROI)

The region of interest feature allows you to specify which region of the sensor is used for image acquisition. This feature allows a custom width and height for image size and a custom X and Y offset for image position. The width and height must be a multiple of the minimum width and height values allowed by the camera.

	If the camera is acquiring images, AcquisitionStop must be called before changing region of interest settings.

Binning (*Not applicable to VQ-20MG2)

The VQ GigE series camera supports binning in which columns and/or rows of pixels are combined to achieve a reduced overall image size without changing the image's field of view. This feature may result in an increase of camera's frame rate.

The binning factor indicates how many pixels in the horizontal and vertical axis are combined. For example, when applying 2x2 binning, which is 2 pixels in the horizontal axis and 2 pixels in the vertical axis, 4 pixels combine to form 1 pixel. The resultant pixel values can be summed or averaged.

When binning is used, the settings of the image width and height will be affected. For example, if you are using a camera with sensor resolution of 2448 x 2048 and apply 2x2 binning, the effective resolution of the resultant image is reduced to 1224 x 1024. This can be verified by checking the Width and Height nodes.

	When horizontal binning is used, horizontal decimation is not available. When vertical binning is used, vertical decimation is not available.

	If the camera is acquiring images, AcquisitionStop must be called before adjusting binning settings.

Decimation (*Not applicable to VQ-20MG2)

The VQ GigE series camera supports decimation in which columns and/or rows of pixel are skipped to achieve reduced overall image size without changing the image's field of view. This feature is also known as "subsampling" due to the smaller sample size of pixels the camera transmits. This feature may result in an increase of camera's frame rate.

When decimation is used, the settings of the image width and height will be effected. For example, if you are using a camera with sensor resolution of 2448 x 2048. When horizontal and vertical decimation are both set to 2,

the effective resolution of the resultant image is reduced to 1224 x 1024. This can be verified by checking the Width and Height nodes.

	When horizontal decimation is used, horizontal binning is not available. When vertical decimation is used, vertical binning is not available.

	If the camera is acquiring images, AcquisitionStop must be called before adjusting decimation settings.

Horizontal and Vertical Flip (*VQ-20MG2 supports only Vertical Flip)

This feature allows the camera to flip the image horizontally and vertically. The flip action occurs on the camera before transmitting the image to the host.

	If the camera is acquiring images, AcquisitionStop must be called before changing horizontal or vertical flip.

Test Pattern

The camera outputs a FPGA-generated pattern when test pattern is enabled.

Digital IO

The VQ GigE series's Digital IO controls input and output lines that can be utilized with external circuitry for synchronization with other devices. An example use of an input line is to allow the camera to take an image upon receipt of an internal software signal or an external pulse (rising or falling edge). An example use of an output line is to fire a pulse when the camera starts integration for the duration of the current ExposureTime value.

The Digital IO lines correspond to the VQ GigE series's GPIO pins. Please consult the GPIO Cable section for more information on the required cable for the GPIO connector and the GPIO Characteristics section for a GPIO pinout diagram.

Configuring an Input Line

When a Digital IO line is set to Input, the line can accept external pulses. To trigger the camera upon receipt of an external pulse, the camera must also have trigger mode enabled.

It is also possible to set software as the input source. This will enable the camera to trigger upon a software signal. Note this mechanism may not be as accurate as using an external trigger source.

TriggerOverlap

By default, the VQ GigE series will reject input pulses until the last triggered image has completed the readout step on the sensor. This may limit the maximum achievable trigger frequency on some cameras when compared to maximum non-triggered FrameRate.

To address this situation, the VQ GigE series also supports TriggerOverlap functionality. When TriggerOverlap is enabled, this allows the camera to accept an input pulse before the readout step is complete. This allows the camera to be triggered at frequencies closer to the maximum non-triggered FrameRate.

	Some Digital IO lines may be Input only (e.x. an opto-isolated input). Consult the GPIO Characteristics section for a GPIO pinout diagram.

Configuring an Output Line

When a Digital IO line is set to Output, the line can fire pulses.

	Opto-isolated outputs will require external circuitry to be properly signaled. Some Digital IO lines may be Output only (e.x. an opto-isolated output). Consult the GPIO Characteristics section for a GPIO pinout diagram.

Turning on GPIO Voltage Output

The VQ GigE series is capable of supplying external circuits with power through the V_{DD} line. By default this line is turned off.

	Consult the GPIO Characteristics section for a GPIO pinout diagram.

Rolling Versus Global Reset Shutter Mode (*Applicable to VQ-20MG2)

The sensor is capable of supporting both rolling shutter and global reset mode when the camera is configured to operate under trigger mode. The shutter mode refers to the way in which image data is captured, processed and readout.

The SensorShutterMode node indicates the current shutter configuration.

Rolling Shutter Mode

Unlike global shutter sensor where exposure for each line starts simultaneously, rolling shutter exposure performs exposure per line of pixel in a staggered fashion. The amount of stagger (calling it *t_s*) between each line is dependent on the sensor. When the current frame exposure starts, the lines are exposed in succession and in some cases the exposure for each line is overlapped with multiple other lines.

The pixel values for each line are read out after that line completes exposure. The exposure time as well as read out time is consistent for all rows. Hence the overall delay between the start of first row's exposure to the start of the last row's exposure is (n is the number of lines):

*Total Delay = t_s * (n - 1)*

The total readout time for the current frame is calculated as below since readout time for each line is the same as *t_s*.

*Total Readout Time = t_s * n*

As shown by the calculations above, both values are dependent on the number of lines determined by the image ROI.

Total image acquisition time = Total readout time + Exposure Time

Rolling Reset Mode

The Global Reset shutter mode behaves similarly to global shutter when exposure starts, where all lines start their exposure simultaneously. However, the end of exposure for each line is staggered similar to Rolling Shutter mode. The stagger for the end of exposure is *t_s* as determined by the line time which is sensor dependent.

When operating in global reset mode, an external flash should be used and synchronized to the exposure. Otherwise, the resultant image will have a gradient from dark to bright going from top to bottom.

Device Nodes

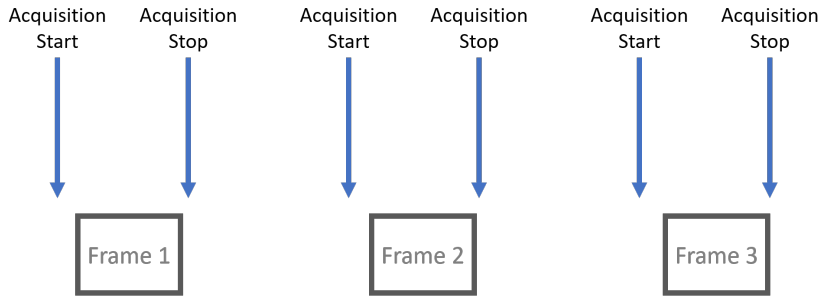
Acquisition Control

Acquisition Control contains features related to image acquisition. Triggering and exposure control functionalities are included in this section.

Acquisition Modes

There are 3 main types of acquisition modes - SingleFrame acquisition, MultiFrame acquisition, and Continuous acquisition.

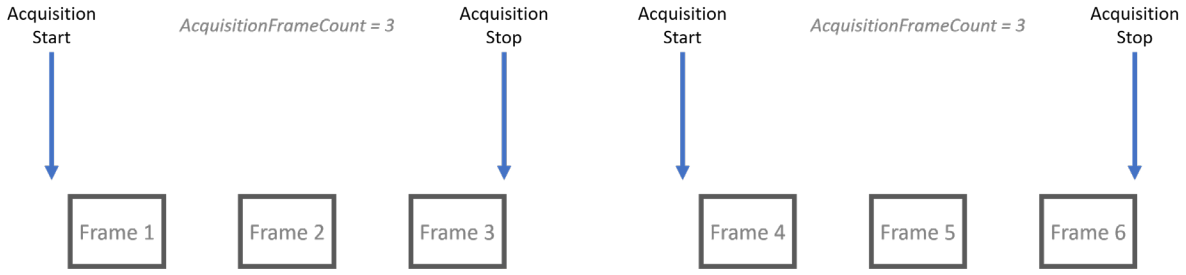
SingleFrame Acquisition



Under SingleFrame acquisition mode, one frame is acquired after AcquisitionStart is called. AcquisitionStop is an optional call as the acquisition process automatically stops after the single frame is acquired. During the acquisition process, all Transport Layer parameters are locked and cannot be modified.

	Note that if “Acquisition Stop” is executed after “Acquisition Start” but prior to a frame is available, it is possible that no frame is acquired.

MultiFrame Acquisition

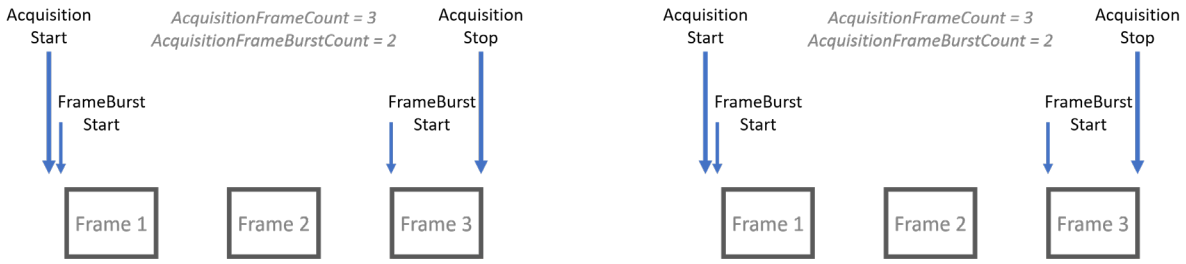


Under MultiFrame acquisition mode, frames are acquired once AcquisitionStart is called. The number of frames acquired is dictated by the parameter AcquisitionFrameCount. During the acquisition process, all Transport Layer parameters are locked and cannot be modified.

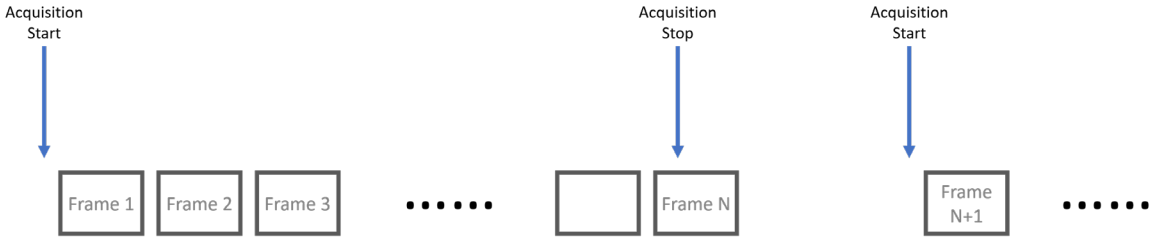
	Note that AcquisitionStop is optional under this acquisition mode.

MultiFrame with FrameBurstStart

A burst of frames is defined as a capture of a group of one or many frames within an acquisition. This can be achieved with MultiFrame acquisition mode as demonstrated in the diagram below. Note in the diagram, the second FrameBurstStart in each acquisition sequence only results in 1 frame acquired since AcquisitionFrameCount is set to a value of 3.



Continuous Acquisition

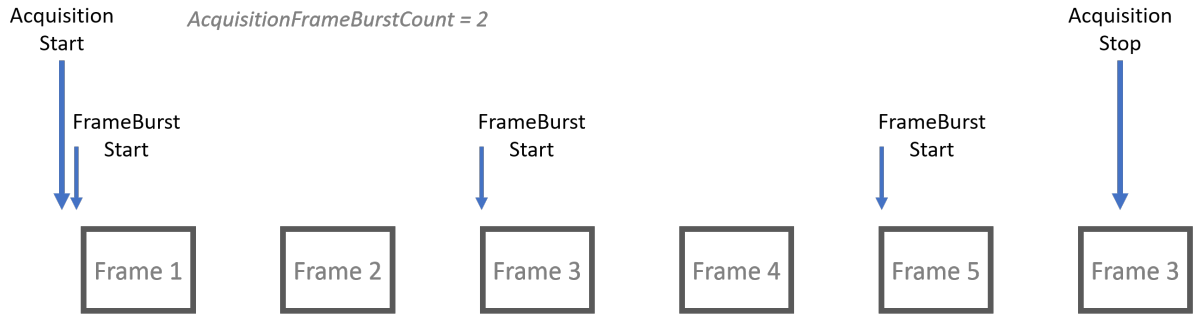


Under Continuous acquisition mode, frames are acquired once AcquisitionStart is called. Frames are acquired until AcquisitionStop is called. During the acquisition process, all Transport Layer parameters are locked and cannot be modified.

	Note that if AcquisitionStop is called during the last frame then the acquisition sequence will stop after the current frame finishes.

Continuous Acquisition with FrameBurstStart

A burst of frames is defined as a capture of a group of one or many frames within an acquisition. This can be achieved with Continuous acquisition mode as below. Note that when AcquisitionStop is called, the current frame will need to be finished.



Node Name	Description
AcquisitionMode	Specifies the acquisition mode of the current device. It helps determine the number of frames to acquire during each acquisition sequence.
AcquisitionStart	Start the acquisition sequence for the current device.
AcquisitionStop	Stop the acquisition sequence for the current device.
AcquisitionFrameCount	This node specifies the number of frames to be acquired under MultiFrame AcquisitionMode.
AcquisitionBurstFrameCount	This parameter is ignored if AcquisitionMode is set to SingleFrame. This feature is also constrained by AcquisitionFrameCount if AcquisitionMode is MultiFrame.
AcquisitionFrameRate	Specifies the frequency in which frames are acquired. Note that TriggerMode must be off for this parameter to take effect.
AcquisitionFrameRateEnable	Controls if the AcquisitionFrameRate feature is writable and used to control the acquisition rate.
AcquisitionLineRate	Controls the rate (in Hertz) at which the Lines in a Frame are captured.
TriggerSelector	This node selects the specific trigger type to configure.
TriggerMode	Controls the On/Off status of the current trigger.
TriggerSoftware	Executing this will generate a software trigger signal. Note that current TriggerSource must be set to Software.
TriggerSource	This node specifies the source of the trigger. It can be a software internal signal of a physical input hardware signal.
TriggerActivation	This node specifies the state in which trigger is activated.
TriggerOverlap	Specifies the type of trigger overlap permitted with the previous frame or line. This defines when a valid trigger will be accepted (or latched) for a new frame or a new line.
TriggerDelay	Specifies the delay in microseconds (us) to apply after the trigger reception before activating it.
TriggerArmed	Specifies whether the trigger is armed. If the trigger is not armed, triggers will be ignored.
ExposureTime	Controls the device exposure time in microseconds (us).
ExposureTimeRaw	Reports the device raw exposure time value.
ShortExposureEnable *Applicable to VQ-5MG2	Sets to Short Exposure Mode.
ExposureAuto	Sets the automatic exposure mode.
TargetBrightness	Sets the target brightness in 8-bit.
ExposureAutoAlgorithm	Controls the auto exposure algorithm.

ExposureAutoDamping	Controls the auto exposure damping factor in percent. Bigger values converge faster but have higher chance of oscillating.
ExposureAutoDampingRaw	Controls the auto exposure damping factor raw value. Bigger values converge faster but have higher chance of oscillating.
CalculatedMedian	Reports the current image exposure median value.
CalculatedMean	Reports the current image exposure average value.
AutoExposureAOI	Category for auto exposure AOI features.

Auto Exposure AOI

Node Name	Description
AutoExposureAOIEnable	Controls auto exposure AOI enable (1) or disable (0).
AutoExposureAOIWidth	Controls auto exposure AOI width relative to user AOI.
AutoExposureAOIHeight	Controls auto exposure AOI height relative to user AOI.
AutoExposureAOIOffsetX	Controls auto exposure AOI offset X relative to user AOI.
AutoExposureAOIOffsetY	Controls auto exposure AOI offset Y relative to user AOI.

Action Control

Node Name	Description
ActionUnconditionalMode	Enables the unconditional action command mode where action commands are processed even when the primary control channel is closed.
ActionQueueSize	Indicates the size of the scheduled action commands queue.
ActionDeviceKey	Provides the device key that allows the device to check the validity of action commands.
ActionSelector	Selects to which Action Signal further Action settings apply.
ActionGroupKey	Provides the key that the device will use to validate the action on reception of the action protocol message.
ActionGroupMask	Provides the mask that the device will use to validate the action on reception of the action protocol message.

Analog Control

Analog Control contains features that describe how to influence the analog features of an image, such as gain, black level, and gamma. Features related to white balance are not available on monochrome cameras.

Node Name	Description
GainSelector	Selects which Gain is controlled by the various Gain features.
Gain	Controls the selected Gain as an absolute physical value.
GainRaw	Reports the gain raw value.
GainAuto	Sets the automatic gain control mode.
BlackLevelSelector	Selects which BlackLevel is controlled by the various Black Level features.
BlackLevel	Controls the BlackLevel as an absolute physical value.
BlackLevelRaw	Controls the raw BlackLevel value.
BalanceRatioSelector	Selects which BalanceRatio is controlled by the various Balance Ratio features.
BalanceRatio	Controls the selected BalanceRatio as an absolute physical value. This is an amplification factor applied to the video signal.
BalanceWhiteAuto	Controls the mode for automatic white balancing between the color channels. The white balancing ratios are automatically adjusted.
BalanceWhiteEnable	Actives balance white features.
BalanceWhiteAutoAnchorSelector	Controls which type of statistics are used for BalanceWhiteAuto.
AwbWhitePatchEnable	Controls if the white patch algorithm is used for BalanceWhiteAuto.
AwbStatsFrameCount	Controls how many frames are used for collecting statistics for BalanceWhiteAuto.
GammaEnable	Controls the selected balance ratio as an absolute physical value. This is an amplification factor applied to the video signal.
Gamma	Controls the gamma correction of pixel intensity.

Color Transformation Control

Color Transformation Control contains features that describe how to color transformation features of an image, such as RGB to YUV conversion. This feature is not available on monochrome cameras.

Node Name	Description
ColorTransformationEnable	Controls if the selected color transformation module is activated.
ColorTransformationSelector	Selects which Color Transformation module is controlled by the various Color Transformation features.
ColorTransformationValueSelector	Selects the Gain factor or Offset of the Transformation matrix to access in the selected Color Transformation module.
ColorTransformationValue	Represents the value of the selected Gain factor or Offset inside the Transformation matrix.

Device Control

Device Control contains features that provide information of the capabilities of the device. There are also features that describe the particular device in detail. These features can be used in applications to query the capabilities of the device and report them to the end user if needed.

Below is a list of the available features that are contained in the specific category.

Node Name	Description
DeviceType	Returns the device type.
DeviceScanType	Scan type of the sensor of the device.
DeviceVendorName	Name of the manufacturer of the device.
DeviceModelName	Model of the device.
DeviceFamilyName	Identifier of the product family of the device.
DeviceManufacturerInfo	Provides additional information from the vendor about the device.
DeviceVersion	Version of the device.
DeviceFirmwareVersion	Version of the firmware in the device.
DeviceSerialNumber	Device's unique serial number.
DeviceUserID	A device ID string that is user-programmable.
DeviceSFNCVersionMajor	Major version of the Standard Features Naming Convention (SFNC) that was used to create the device's GenICam XML.
DeviceSFNCVersionMinor	Minor version of the Standard Features Naming Convention (SFNC) that was used to create the device's GenICam XML.
DeviceSFNCVersionSubMinor	Sub minor version of the Standard Features Naming Convention (SFNC) that was used to create the device's GenICam XML.
DeviceManifestEntrySelector	Manifest entry selector.
DeviceManifestXMLMajorVersion	Indicates the major version number of the GenICam XML file of the selected manifest entry.
DeviceManifestXMLMinorVersion	Indicates the minor version number of the GenICam XML file of the selected manifest entry.
DeviceManifestXMLSubMinorVersion	Indicates the sub minor version number of the GenICam XML file of the selected manifest entry.
DeviceManifestSchemaMajorVersion	Indicates the major version number of the schema file of the selected manifest entry.
DeviceManifestSchemaMinorVersion	Indicates the minor version number of the schema file of the selected manifest entry.
DeviceManifestPrimaryURL	Indicates the first URL to the GenICam XML device description file of the selected manifest entry.
DeviceManifestSecondaryURL	Indicates the second URL to the GenICam XML device description file

	of the selected manifest entry.
DeviceTLType	Transport Layer type of the device.
DeviceTLVersionMajor	Major version of the Transport Layer of the device.
DeviceTLVersionMinor	Minor version of the Transport Layer of the device.
DeviceTLVersionSubMinor	Sub minor version of the Transport Layer of the device.
DeviceMaxThroughput	Maximum bandwidth of the data that can be streamed out of the device.
DeviceLinkSelector	Selects which Link of the device to control. In general, the device only has one link.
DeviceLinkSpeed	Indicates the speed of transmission negotiated on the specified Link selected by DeviceLinkSelector.
DeviceLinkThroughputLimitMode	Controls if the DeviceLinkThroughputLimit is active.
DeviceLinkThroughputLimit	Limits the maximum bandwidth of the data that will be streamed out by the device on the selected Link.
DeviceLinkThroughputReserve	Allocates the maximum percentage of bandwidth reserved for re-transmissions.
DeviceLinkHeartbeatMode	Activate or deactivate the selected Link's heartbeat.
DeviceLinkHeartbeatTimeout	Controls the current heartbeat timeout of the specific Link in microseconds.
DeviceLinkCommandTimeout	Indicates the command timeout of the specified Link in microseconds.
DeviceStreamChannelCount	Indicates the number of stream channels supported by the device.
DeviceStreamChannelSelector	Selects the stream channel to control.
DeviceStreamChannelType	Reports the type of the stream channel.
DeviceStreamChannelEndianness	Endianness of multi-byte pixel data for this stream.
DeviceStreamChannelPacketSize	Specifies the stream packet size, in bytes, to send on the selected channel for the device.
DeviceEventChannelCount	Indicates the number of event channels supported by the device.
DeviceCharacterSet	Character set used by all the strings of the device.
DeviceReset	Resets the device to its power up state.
DeviceFactoryReset	Resets device to factory defaults.
DeviceIndicatorMode	Controls the behavior of the indicator LED showing the status of the Device.
DeviceTemperatureSelector	Selects the temperature sensor to read from.
DeviceTemperature	Device temperature in degrees Celsius.
DevicePressure	The internal device pressure in kilopascals.
DevicePower	Device power in Watts.
DeviceClockSelector	Selects the clock frequency to access from the device.

DeviceClockFrequency	Returns the frequency of the selected Clock.
Timestamp	Reports the current value of the device timestamp counter.
TimestampReset	Resets the current value of the device timestamp counter. Executing this command causes the timestamp counter to restart automatically.
TimestampLatch	Latches the current timestamp counter into TimestampLatchValue.
TimestampLatchValue	Returns the latched value of the timestamp counter.
DeviceUpTime	Time the device has been powered in seconds.
LinkUpTime	Time the device link has been established in seconds.

Digital IO Control

Node Name	Description
LineSelector	Selects the physical line (or pin) of the external device connector to configure.
LineMode	Controls if the physical Line is used to Input or Output a signal.
LineInverter	Controls the inversion of the signal of the selected input or output Line.
LineStatus	Returns the current status of the selected input or output Line.
LineStatusAll	Returns the current status of all available Line signals at time of polling.
LineSource	Selects which internal acquisition or I/O source signal to output on the selected Line. LineMode must be set to Output.
LineFormat	Controls the current electrical format of the selected physical input or output Line.
VoltageExternalEnable	Controls if the external voltage is enabled.
UserOutputSelector	Selects which bit of the User Output register will be set by UserOutputValue.
UserOutputValue	Sets the value of the bit selected by UserOutputSelector.
UserOutputValueAll	Sets the value of all the bits of the User Output register. It is subject to the UserOutputValueAllMask.
UserOutputValueAllMask	Sets the write mask to apply to the value specified by UserOutputValueAll before writing it in the User Output register. If the UserOutputValueAllMask feature is present, setting the user Output register using UserOutputValueAll will only change the bits that have a corresponding bit in the mask set to one.

Event Control

Event Control has the device inform the host application that an event has occurred. Below is a list of the available features that are contained in the specific category.

Node Name	Description
EventDestinationAddress	Controls the destination IP address for events.
EventTestData	Category that contains all the data features related to the EventTest generated using the TestEventGenerate command.

Event Test Data

Node Name	Description
EventTest	Returns the unique identifier of the EventTest type of event generated using the TestEventGenerate command.
EventTestTimestamp	Returns the Timestamp of the EventTest event. It can be used to determine when the event occurred.

File Access Control

Node Name	Description
FileSelector	Selects the target file in the device.
FileOperationSelector	Selects the target operation for the selected file in the device. This operation is executed when the FileOperationExecute feature is called.
FileOperationExecute	Executes the operation selected by FileOperationSelector on the selected file.
FileOpenMode	Selects the access mode in which a file is opened in the device.
FileAccessBuffer	Defines the intermediate access buffer that allows the exchange of data between the device file storage and the application.
FileAccessOffset	Controls the offset of the mapping between the device file storage and the FileAccessBuffer.
FileAccessLength	Controls the length of the mapping between the device file storage and the FileAccessBuffer.
FileOperationStatus	Represents the FileOperationExecute status.
FileOperationResult	Represents the file operation result. For Read or Write operations, the number of successfully read/written bytes is returned.
FileSize	Represents the size of the selected file in bytes.
FileStorageSize	Represents the total size of the file storage selected by FileSelector in bytes.
FileStorageUsedSize	Represents the used size of the file storage selected by FileSelector in bytes.
FileStorageFreeSize	Represents the free size of the file storage selected by FileSelector in bytes.

Image Format Control

Node Name	Description
PixelFormat	Format of the pixels provided by the device.
PixelColorFilter	Type of color filter that is applied to the image.
IspBayerPattern	Reports the image Bayer pattern in the ISP.
SensorWidth	Effective width of the sensor in pixels.
SensorHeight	Effective height of the sensor in pixels.
SensorShutterMode	Specifies the shutter mode.
WidthMax	Maximum width of the image in pixels.
HeightMax	Maximum height of the image in pixels.
PhysicalPixelSize	Reports the physical size of an individual pixel on the sensor.
ADCBitDepth	Reports the bit depth of the sensor's ADC.
ImagerWidth	Width of the sensor image after binning and decimation.
ImagerHeight	Height of the sensor image after binning and decimation.
ImagerOffsetX	Horizontal offset from the origin of the sensor region.
ImagerOffsetY	Vertical offset from the origin of the sensor region.
Width	Width of the image provided by the device in pixels.
Height	Height of the image provided by the device in pixels.
OffsetX	Horizontal offset from the origin to the region of interest in pixels.
OffsetY	Vertical offset from the origin to the region of interest in pixels.
PixelSize	Total size in bits of a pixel of the image.
ReverseX	Flip horizontally the image sent by the device.
ReverseY	Flip vertically the image sent by the device.
PixelDynamicRangeMin	Minimum value that can be returned during the digitization process.
PixelDynamicRangeMax	Maximum value that can be returned during the digitization process.
BinningSelector *Not applicable to VQ-20MG2	Selects which binning engine is controlled by the BinningHorizontal and BinningVertical features.
BinningHorizontalMode *Not applicable to VQ-20MG2	Selects how to combine the horizontal pixels together.
BinningVerticalMode *Not applicable to VQ-20MG2	Selects how to combine the vertical pixels together.
BinningHorizontal *Not applicable to VQ-20MG2	Number of horizontal pixels to combine together. This reduces the horizontal resolution (width) of the image. A value of 1 indicates that no horizontal binning is performed by the camera.
BinningVertical *Not applicable to VQ-20MG2	Number of vertical pixels to combine together. This reduces the vertical resolution (height) of the image. A value of 1 indicates that no vertical binning is performed by the camera.

DecimationSelector *Not applicable to VQ-20MG2	Selects which decimation engine is controlled by the DecimationHorizontal and DecimationVertical features.
DecimationHorizontalMode *Not applicable to VQ-20MG2	Selects how to decimate the horizontal pixels.
DecimationVerticalMode *Not applicable to VQ-20MG2	Selects how to decimate the vertical pixels.
DecimationHorizontal *Not applicable to VQ-20MG2	Number of horizontal pixels to decimate. This reduces the horizontal resolution (width) of the image. A value of 1 indicates that no horizontal decimation is performed by the camera.
DecimationVertical *Not applicable to VQ-20MG2	Number of vertical pixels to decimate. This reduces the vertical resolution (height) of the image. A value of 1 indicates that no vertical decimation is performed by the camera.
TestPattern	Selects the type of test pattern that is generated by the device as image source.

LUT Control

Node Name	Description
LUTEnable	Actives the saved LUT.
LUTSelector	Selects which LUT to control.
LUTIndex	Control the index (offset) of the coefficient to access in the selected LUT.
LUTValue	Access the value at entry LUT Index of the LUT selected by LUT Selector.
LUTValueAll	Accesses all the LUT coefficients in a single access without using individual LUT Index.
LUTSave	Save the values set through LUT Values or LUT Value All.
LUTReset	Reset the LUT Values to be linear mapping.

Pixel Correction Control

Node Name	Description
PixelCorrectionEnable	Actives the saved table of defective pixels.
PixelCorrectionCount	Shows the number of defective pixels.
PixelCorrectionIndex	Controls the index of defective pixels to access.
PixelCorrectionPositionX	Accesses the column index of the defective pixel selected by Defective Pixel Index.
PixelCorrectionPositionY	Accesses the row index of the defective pixel selected by Defective Pixel Index.
PixelCorrectionDelete	Deletes the defective pixel selected by Defective Pixel Index.
PixelCorrectionAdd	Adds the selected defective pixel.
PixelCorrectionSave	Saves the defective pixels set through Pixel Correction Positions X and Y.
PixelCorrectionSetToDefault	Reset the pixel correction table to factory default.

Test Control

Node Name	Description
TestPendingAck	Tests the device’s pending acknowledge feature.
TestEventGenerate	Generates a Test Event.
TestMode	None

Transport Layer Control

Transport Layer Control includes a list of features related to the GigE Vision bootstrap registers and GigE Vision transport medium.

Node Name	Description
PayloadSize	Provides the number of bytes transferred for each image or chunk on the stream channel.
GigEVision	Category that contains the features pertaining to the GigE Vision transport layer of the device.
PtpControl	Category that contains the features related to the Precision Time Protocol (PTP) of the device.
ReceivedPacketResendCount	Returns the number of received packet resend commands.
ValidPacketResendCount	Returns the number of valid packet resends handled by the device.
UnavailablePacketResendCount	Returns the number of unavailable packet resends handled by the device.

GigE Vision

Node Name	Description
GevPhysicalLinkConfiguration	Controls the principal physical link configuration to use on next restart/power-up of the device.
GevCurrentPhysicalLinkConfiguration	Indicates the current physical link configuration of the device.
GevSupportedOptionSelector	Selects the GEV option to interrogate for existing support.
GevSupportedOption	Returns if the selected GEV option is supported.
GevInterfaceSelector	Selects which logical link to control.
GevMACAddress	MAC address of the logical link.
GevPAUSEFrameReception	Controls whether incoming PAUSE Frames are handled on the given logical link.
GevPAUSEFrameTransmission	Controls whether PAUSE Frames can be generated on the given logical link.
GevCurrentIPConfigurationLLA	Controls whether the Link Local Address IP configuration scheme is activated on the given logical link.
GevCurrentIPConfigurationDHCP	Controls whether the DHCP IP configuration scheme is activated on the given logical link.
GevCurrentIPConfigurationPersistentIP	Controls whether the Persistent IP configuration scheme is activated on the given logical link.
GevCurrentIPAddress	Reports the IP address for the given logical link.
GevCurrentSubnetMask	Reports the subnet mask of the given logical link.
GevCurrentDefaultGateway	Reports the default gateway IP address to be used on the given logical link.

GevIPConfigurationStatus	Reports the current IP configuration status.
GevPersistentIPAddress	Controls the Persistent IP address for this logical link.
GevPersistentSubnetMask	Controls the persistent subnet mask associated with the Persistent IP address on this logical link.
GevPersistentDefaultGateway	Controls the persistent default gateway for this logical link.
GevDiscoveryAckDelay	Indicates the maximum randomized delay the device will wait to acknowledge a discovery command.
GevGVCPExtendedStatusCodesSelector	Selects the GigE Vision version to control extended status codes for.
GevGVCPExtendedStatusCodes	Enables the generation of extended status codes.
GevGVCPPendingAck	Enables the generation of PENDING_ACK.
GevPrimaryApplicationSwitchoverKey	Controls the key to use to authenticate primary application switchover requests.
GevGVSPExtendedIDMode	Enables the extended IDs mode.
GevCCP	Controls the device access privilege of an application.
GevPrimaryApplicationSocket	Returns the UDP source port of the primary application.
GevPrimaryApplicationIPAddress	Returns the address of the primary application.
GevMCPHostPort	Controls the port to which the device must send messages.
GevMCDA	Controls the destination IP address for the message channel.
GevMCTT	Provides the transmission timeout value.
GevMCRC	Controls the number of retransmissions allowed when a message channel message times out.
GevMCSP	This features indicates the source port for the message channel.
GevStreamChannelSelector	Selects the stream channel to control.
GevSCPInterfaceIndex	Index of the logical link to use.
GevSCPHostPort	Controls the port of the selected channel to which a GVSP transmitter must send data stream or the port from which a GVSP receiver may receive data stream.
GevSCPSFireTestPacket	Sends a test packet. When this feature is set, the device will fire one test packet.
GevSCPSDoNotFragment	The state of this feature is copied into the ‘do not fragment’ bit of IP header of each stream packet.
GevSCPSPacketSize	It specifies the stream packet size, in bytes, to send on the selected channel for a GVSP transmitter or specifies the maximum packet size supported by a GVSP receiver.
GevSCPD	Controls the delay (in GEV timestamp counter unit) to insert between each packet for this stream channel.

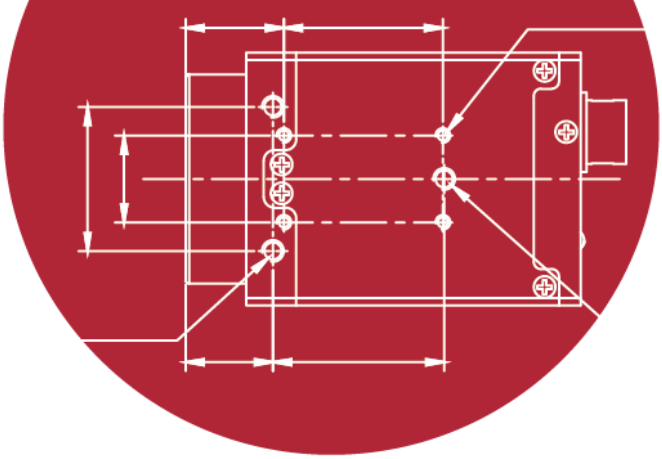
GevSCDA	Controls the destination IP address of the selected stream channel to which a GVSP transmitter must send data stream or the destination IP address from which a GVSP receiver may receive data stream.
GevSCSP	Indicates the source port of the stream channel.

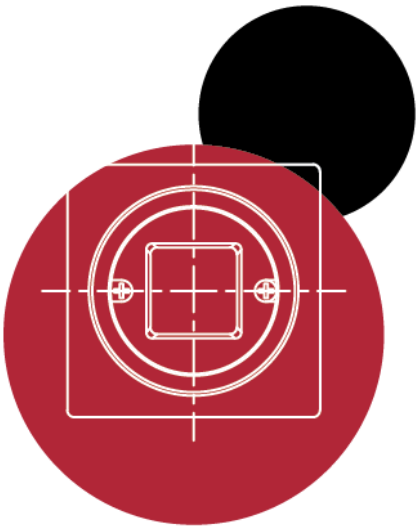
PTP Control

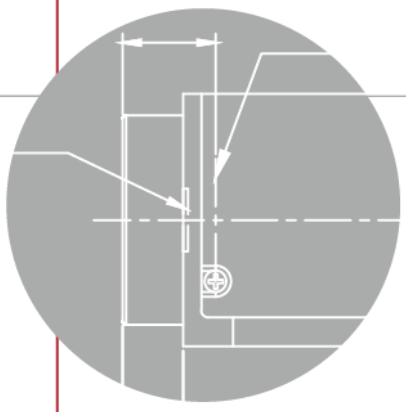
Node Name	Description
PtpEnable	Enables the Precision Time Protocol (PTP).
PtpStatus	Returns the latched state of the PTP clock.
PtpSlaveOnly	Enables slave only operation of the PTP.
PtpClockAccuracy	Indicates the expected accuracy of the device PTP clock when it is the grandmaster, or in the event it becomes the grandmaster.
PtpServoStatus	Returns the latched state of the clock servo.
PtpDataSet	Reports the current value of the PTP's timestamp.
PtpDataSetLatch	Latches the current values from the device's PTP clock data set.
PtpDataSetLatchValue	Returns the latched value of the PTP clock.
PtpOffsetFromMaster	Returns the latched offset from the PTP master clock in nanoseconds. If PtpOffsetFromMaster returns -1 then the synchronization has not started.
PtpClockID	Returns the latched clock ID of the PTP device.
PtpParentClockID	Returns the latched parent clock ID of the PTP device.
PtpGrandmasterClockID	Returns the latched grandmaster clock ID of the PTP device.

User Set Control

Node Name	Description
UserSetSelector	Selects the feature User Set to load, save, or configure.
UserSetLoad	Loads the User Set specified by UserSetSelector to the device and makes it active.
UserSetSave	Save the User Set specified by UserSetSelector to the non-volatile memory of the device.
UserSetDefault	Selects the feature User Set to load and make active by default when the device is reset.
UserSetFeatureSelector	Selects which individual User Set feature to control.
UserSetFeatureEnable	Enables the selected feature and make it active in all the User Sets.







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