Xtium2-XGV™

User's Manual

Edition 1.0

sensors | cameras | **frame grabbers** | processors | software | vision solutions

P/N: OC-A0GM-PXF00
Revision: 05
www.teledynevisionsolutions.com

TELEDYNE | Vision Solutions

NOTICE

Revision 05 released August 4, 2025

Document Number: OC-A0GM-PXF00

About Teledyne DALSA
Teledyne DALSA is an international high performance semiconductor and electronics company that designs, develops, manufactures, and markets digital imaging products and solutions, in addition to providing wafer foundry services.

Teledyne DALSA Digital Imaging offers the widest range of machine vision components in the world. From industry-leading image sensors through powerful and sophisticated cameras, frame grabbers, vision processors and software to easy-to-use vision appliances and custom vision modules.

Contents

Figures

Overview

Series Key Features

- Compliant with GigE Vision 1.x and 2.x
  (visit www.automate.org/a3-content/vision-standards-gige-vision for details on industry standards)
- Driver installation includes installation of the high-performance Teledyne GigE Vision Interface
- Xtium2-XGV is detected by the system as a NIC card with 2 or 4 network adapters.
- Acquisition of up to 32 independent cameras spread over the network adapters.
- Support GigE cameras with bit rates of 1G, 2.5G, 5G and 10G.
- Uses a PCIe x8 Gen3 slot to maximize transfers to host computer buffers
- SFP+ Fiber module support
- Acquire from Monochrome, Bayer and RGB cameras, both area scan and line scan
- Vertical Flip supported on-board
- General Inputs/Outputs. Inputs can be used to trigger action commands.
- Supports Multi-board Sync for trigger sharing across multiple XGV frame grabbers.
- Multi-camera synchronization in real-time:
  - Action command generation and relaying incoming Action commands across adapters
  - Support for relaying PTP messages from one network adapter to other adapters.
- Supports a number of acquisition events in compliance with "Teledyne DALSA's Trigger to Image Reliability"

Product Part Numbers

Xtium2-XGV Board

Item	Product Number
Xtium2-XGV Quad	OR-A8G0-PXF40
Xtium2-XGV Dual	OR-A8G0-PXF20
SFP+ to RJ15 Transceiver Module	OR-AG0A-DASFP+45
For OEM clients, this manual in printed form, is available on request	OC-A0G0-PXF00

Optional Xtium2-XGV Cables & Accessories

Item	Product Number
VGA-15 cable assembly to blunt end: 3 meters cable I/O 15 pin VGA connector to blunt end. This cable assembly connects to J8.	OR-YXCC-DB153
External Signals bracket provides a simple way to bring out the signals from the External Signals Connector J1 to a bracket mounted DB25.	OR-YXCC-DB25F
Cable assembly to connect to J2 (Board Sync) Connecting 2 boards Connection 3 or 4 boards	 OR-YXCC-BSYNC20 OR-YXCC-BSYNC40

Xtium2-XGV Board Specifications

Frame Grabber	Xtium2-XGV Quad	Xtium2-XGV Dual
Board Input Interface	GigE Vision	
Part Numbers	OR-AG0-PXF40	OR-AG0-PXF20
Input Camera Ports	4 ports	2 ports
Maximum number of Cameras	up to 32 cameras total	
Transmission Rate	10Gbps 1, 2.5, 5 Gbps connections speed also supported.	
Input Camera Bandwidth	Up to 5.0GB/s in frame grabber memory	
On-Board Memory	4 Gigabyte Memory shared with image buffers and processing functions	2 Gigabyte Memory shared with image buffers and processing functions
Advanced Hardware Functionality	Packet-offload engine Real-time inter-port re-distribution of PTP sync (IEEE1588) Real-time inter-port re-distribution of Action Command messages Hardware-based Action Command Generator Supports multi-board synchronization of 2 to 4 frame grabbers	
PCI Bus related		
Host Bus	PCIe Gen3 x 8 slot	
PCIe Payload	Up to 1024 bytes	
Bandwidth to Host System (in a PCIe Gen3 x8 slot)	PCIe bus Output: up to 7.0GB/sec sustained (PCIe Payload @ 512 bytes) PCIe bus Output: up to 6.8GB/sec sustained (PCIe Payload @ 256 bytes) Maximum obtained is dependent on firmware loaded and PC characteristics.	
Features		
Action Command Generation	Generating camera Action Command message from External Trigger source and Board Sync. See Generating an Action Command Using the Xtium XGV.	
Action Command Forwarding	Supports real-time forwarding of ActionCmd Msg from one network adapter port to other ports.	
PTP Forwarding	Supports PTP (Precise Time Protocol - IEEE 1588-2008) Protocol UDP using ports 319 (Event Message) and 320 (General Message). Supports real-time forwarding of PTP Msg from one network adapter port to other ports. See PTP Relay Feature.	
Image Processing	Data conversion (Unpacking Packed Pixel Format) Color Conversion (Bayer & BiColor format to RGB image format) Vertical Flip	
Events	Compliant with Teledyne DALSA Trigger-to-Image Reliability framework. Comprehensive event notifications.	
Mechanical Interface		
Data Input Connectors	4x Sockets for SFP+ cage	2x Sockets for SFP+ cage
RJ-45 SFP+ modules officially supported	**10Gtek :** ASF-10G-T (https://www.10gtek.com/) **IPOLEX**: ASF-10G-T (http://ipolex.com/) **XZSNET** : XZS-SFP10G-T (https://xzsnet.com/) **FiberStore:** #66612 (https://www.fs.com/)	
I/O connectors	VGA-15P connector (Front Bracket) 26-pin TST-113-01-G-D connector (Internal) Supports multi-board synchronization of 2 to 4 boards	

Electrical Interface		
PCI Power Requirement (with RJ45 transceiver modules)	7.48 Watts on +3.3V 23.46 Watts on +12V	5.5 Watts on +3.3V 12 Watts on +12V
Inputs Voltage	RS-422 / TTL /12V / 24V	
Inputs/Outputs	4 Opto-coupled inputs 8 LVTTL general Outputs	2 Opto-coupled inputs 8 LVTTL general Outputs
	Trigger maximum input frequency of 100 kHz External trigger latency less than 100 nsec	
Environmental condition		
Ambient Temperature:	10° to 50°C (operation) -40° to 75°C (storage)	
Relative Humidity:	5% to 90% non-condensing (operating) 0% to 95% (storage)	
MTBF @40°C	79 years	

NOTE

Ensure adequate airflow for proper functioning of the board across the entire temperature range of 10 – 50°C . Airflow measuring 80 LFM (linear feet per minute) across the surface of the board is recommended.

Supported camera specification	
GigE Vision Standard	Version 1.1 and 2.x compliant
Camera Scan Type	Area scan, Line scan & Teledyne 3D profiler
Supported Input Pixel Format	8, 10, 12, 14 and 16-bit mono, 8, 10 and 12-bit RGB, Bayer and Bi-Color
Horizontal Resolution	Minimum: 32 Pixels Maximum: 131 072 Pixels in 8-bit or 65 536 Pixels for 10/12/14/16-bit
Vertical Resolution	Minimum: 1 line Maximum: 65536 lines
Pixel Format	See table below
Supported Packet Size	Maximum 16KB. The actual MTU for each connected camera is dependent on the network hardware (for example, switches) of the data path to the frame grabber
Multiple Links Configuration	Single Stream support only; MultiStream will be supported in a future release.
Chunk Data (metadata)	Currently not supported; will be supported in a future release.
TurboDrive	Currently not supported; will be supported in a future release.
Software	
Operating System Support	Windows 11
Software compatibility	Teledyne Sapera LT SDK v9.0 or greater
	Contact Teledyne DALSA sales for GenTL compatibility

Supported Input Pixel Formats

Input pixel formats use the GenICam Pixel Format Naving Convention (PFNC); if the format belongs to the GVSP (GigE Vision Streaming Protocol it is indicated. Available input pixel formats include:

Monochrome	Mono8 Mono10 Mono12 Mono14 Mono16	Mono10p Mono12p Mono14p Mono10packed (GVSP) Mono12packed (GVSP)	**3D Format**	Coord3D _C16 Coord3D_AC16 Coord3D_ACRW16
Bayer	BayerGR8 BayerRG8 BayerGB8 BayerBG8 BayerGR10 BayerRG10 BayerGB10 BayerBG10 BayerGR12 BayerRG12 BayerGB12 BayerBG12	BayerGR10p BayerRG10p BayerGB10p BayerBG10p BayerGR10packed (GVSP) BayerRG10packed (GVSP) BayerGB10packed (GVSP) BayerBG10packed (GVSP) BayerGR12p BayerRG12p BayerGB12p BayerBG12p BayerGR12packed (GVSP) BayerRG12packed (GVSP) BayerGB12packed (GVSP) BayerBG12packed (GVSP)	**BiColor**	BiColorRGBG8 BiColorBGRG8 BiColorRGBG10 BiColorBGRG10 BiColorRGBG12 BiColorBGRG12 BiColorRGBG10p BiColorBGRG10p BiColorRGBG10packed (GVSP) BiColorBGRG10packed (GVSP) BiColorRGBG12p BiColorBGRG12p
BGR	BGR8 BGR10 BGR12 BGRa8 BGRa10 BGRa12 BGR10p BGRa10p BGR12p BGRa12p		**RGB**	RGB8 RGB10 RGB12 RGBa8 RGBa10 RGBa12 RGB10p RGB12p RGBa10p RGBa12p RGB10p32

For each connected camera, the Output Pixel Format feature, available in the camera's GigE Vision Host Control category, sets the output format. Refer to the GigE Vision Host Controls section.

NOTE

The Xtium2-XGV does not currently support Chunk Data payload type (metadata); cameras with Chunk Data enabled are unable to connect to the Xtium XGV and an error message is generated. If necessary, use another adapter to connect to cameras to disable Chunk Data before connected to the Xtium XGV.

Technical Specifications

For technical specifications such as mechanical drawings, IO pinouts and electrical specifications, see the Technical Specifications section.

About GigE Vision

GiGE VISION	Xtium2-XGV series frame grabbers are 100% compliant with the GigE Vision 1.2 and 2.0 specification which defines the communication interface protocol used by any GigE Vision device. For more information see https://www.automate.org/vision/vision-standards/vision-standards-gige-vision.
GENICAM	Xtium2-XGV series frame grabbers implement a superset of the GenICam™ specification which defines device capabilities. This description takes the form of an XML device description file respecting the syntax defined by the GenApi module of the GenICam™ specification. For resources such as I/O controls, they are provided by the frame grabber's non-streamable XML device. For more information see www.emva.org/standards-technology/genicam.

The Teledyne GigE Vision Interface provides a license-free development platform for Teledyne GigE hardware or Sapera vision applications. Also supported are Sapera GigE Vision applications for third-party hardware with the purchase of a GigE Vision Module license, or the Sapera processing SDK with a valid license.

Xtium2-XGV Flow Diagram

The following diagram represents the image processing sequence through the Xtium2-XGV.

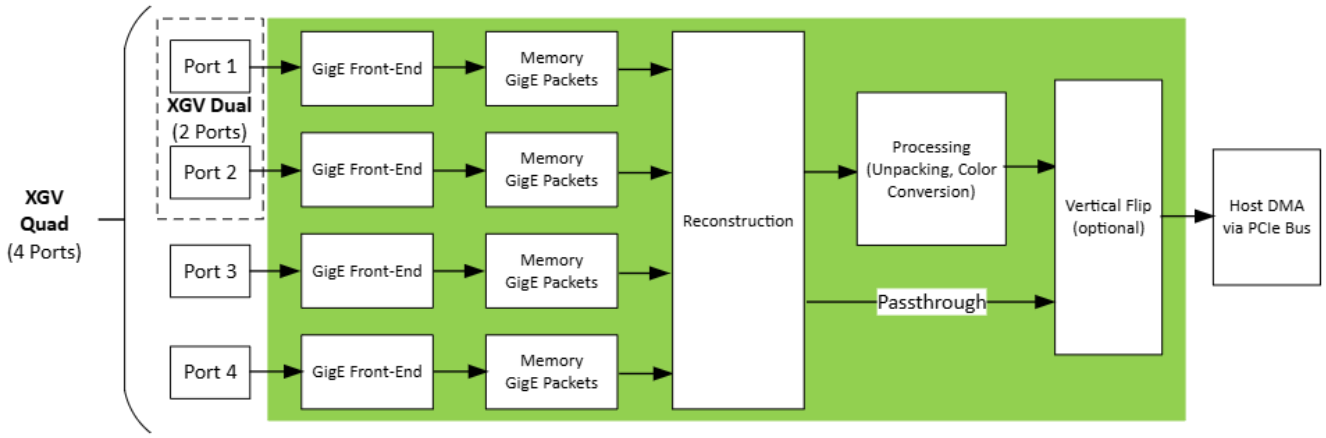
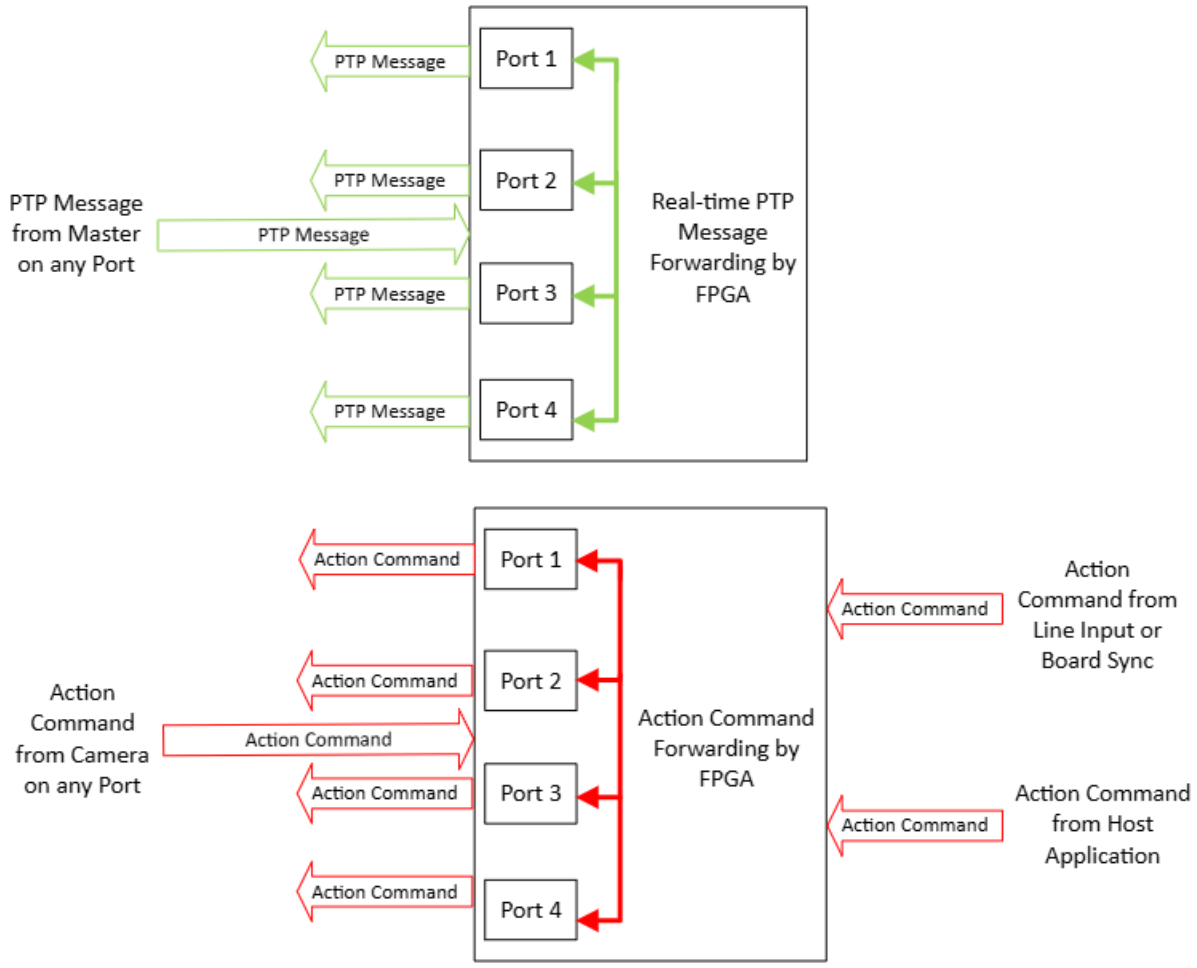


Figure 1: Xtium2-XGV Flow Diagram

- **GigE Front-End:** Extracts the video data packets from the Network Adapter.
- **Memory GigE Packets:** Stores the GigE video packets.
- **Reconstruction:** Decodes the GigE video packets and constructs the data/images.
- **Processing:** Bayer Decoding, Vertical Flip
- **Host DMA:** Transfers the data from frame grabber into the host buffer memory. This module will also perform the vertical flip if enabled.

The Xtium2 XGV supports multi-camera synchronization of all connected cameras by forwarding Action Commands or PTP messages synchronously on all ports in real-time by the FPGA. This mechanism does not use any CPU resources for optimum performance and is not available on standard multiport NICs. Standard multiport NICs use multiple CPU threads (one for each adapter) which add overhead and delay such that each of its adapters transmits messages at different times making multiple camera synchronization impossible.



Host System Requirements

General System Requirements for the Xtium2-XGV

- PCI Express Gen3 x8 slot compatible;
  (will work in Gen1 or Gen2 x8 slot with reduced bandwidth to host)
- On some computers the Xtium2-XGV may function installed in a x16 slot. If the computer only has a PCI Express x16 slot, test directly (use the supplied diagnostic tool) or review the computer documentation to verify if the Xtium2-XGV is supported. Computer motherboards may only support x16 graphic video board products in x16 slots. .
- Xtium2-XGV operates correctly when installed in a multi-processor system (including Hyper-Threading multi-core processors).

Operating System Support

Windows 11

Network Hardware Considerations

Network devices connected to Xtium2-XGV frame grabber must support 1, 2.5, 5 or 10 Gbps connections.To utilize the full 10 Gbps bandwidth output of 10G cameras, all network hardware and cables between the camera and the Xtium2-XGV must be capable of handling a 10 Gbps bandwidth.

IMPORTANT

Ethernet cable category, manufacturer, quality, and length can also affect performance; for high-speed GigE applications always use high quality shielded CAT6 (or better) Ethernet cables to avoid transmission errors. Standard twisted pair copper cables of CAT6, CAT6e, CAT6A and CAT7 support 10GigE connections. CAT6 and Cat6e can support a cable length up to 55m whereas CAT6A and CAT7 can support cable lengths up to 100m.

It is recommended to test network device performance since certain devices may not achieve acceptable results in actual operation (depending on the device manufacturer's implementation). In general, it is always recommended to use the latest device drivers provided by the manufacturer.

For any switch verify:

- Memory allocated to internal buffers
- Flow Control (PAUSE frame) support
- Jumbo Packet setting

NOTE

It is recommended that the packet size be adjusted accordingly for optimal performance given the network topology (with or without a switch), especially when using packet sizes within 1500 to 3000 bytes and 4000 to 8000 bytes ranges. For example, certain switches might perform better using a packet size of 4096 bytes instead of 9000 bytes.

Some Ethernet Switches may produce more Pause Frame requests than expected when Jumbo Frames is enabled. Changing the Ethernet Packet Size may minimize Pause Requests from such a switch and improve overall transfer bandwidth.

For additional information, refer to the Teledyne GigE Vision Interface User Manual and Optimization Guide, which is included with the Xtium2-XGV installation.

Development Software Overview

Sapera++ LT Library

Sapera++ LT is a powerful development library for image acquisition and control. Sapera++ LT provides a single API across all current and future Teledyne DALSA hardware. Sapera++ LT delivers a comprehensive feature set including program portability, versatile camera controls, flexible display functionality and management, plus easy to use application development wizards. Applications are developed using either C++ or .NET frameworks.

Sapera++ LT comes bundled with CamExpert, an easy to use camera configuration utility to create new, or modify existing camera configuration files.

NOTE

Installation of Sapera LT is currently required to support the Xtium2-XGV GigE Vision implementation: support for the Spinnaker SDK is pending. For more information, refer to the Installing Xtium2-XGV and Using Xtium2-XGV with Sapera LT SDK sections.

Sapera Processing Library

Sapera Processing is a comprehensive set of C++ classes or .NET classes for image processing and analysis. Sapera Processing offers highly optimized tools for image processing, blob analysis, search (pattern recognition), OCR and barcode decoding.

Installation Procedure

For information on how to install the Xtium-XGV see the Installing Xtium2-XGV section.

Xtium2-XGV Advantages

Trigger-to-Image Reliability

All Teledyne image acquisition devices implement what is referred to as Trigger-to-Image Reliability (T2IR) using a variety of techniques, from user-defined trigger parameters to buffer management and image metadata, to ensure that images are acquired, transferred and processed with robustness and traceability.

Trigger-to-Image reliability manages:

- High bandwidth acquisition
- High frequency acquisition
- High lines or images rate per second
- High number of cameras
- Image buffer memory
- Packet resend buffer memory
- Statistics
- In-camera event status flags

Teledyne's T2IR framework includes powerful GUI based tools for continuous monitoring and rapid pinpoint of errors that are hard to trace back. This continuous system monitoring and deep debugging tools help reduce downtime. This is done with the help of the following tools:

- Sapera Monitor (available with installation of Sapera LT)
- External LEDs
- Teledyne LogViewer
- PCI Diagnostic Tool
- Network Configuration Tool
- Sapera Configuration (available with installation of Sapera LT)
- Xtium2 Diagnostic Tool

Refer to the Xtium2-XGV Utilities section for more information on these tools.

In particular, with the GigE Vision Interface this is done with the help of the following:

- Network Configuration Tool
- GigE Vision Device Status
- GigE Vision Host Controls, including Stream Statistics Features

For more information, including a T2IR primer, visit the Teledyne website:

https://www.teledynevisionsolutions.com/learn/learning-center/machine-vision/trigger-to-image-reliability-t2ir/

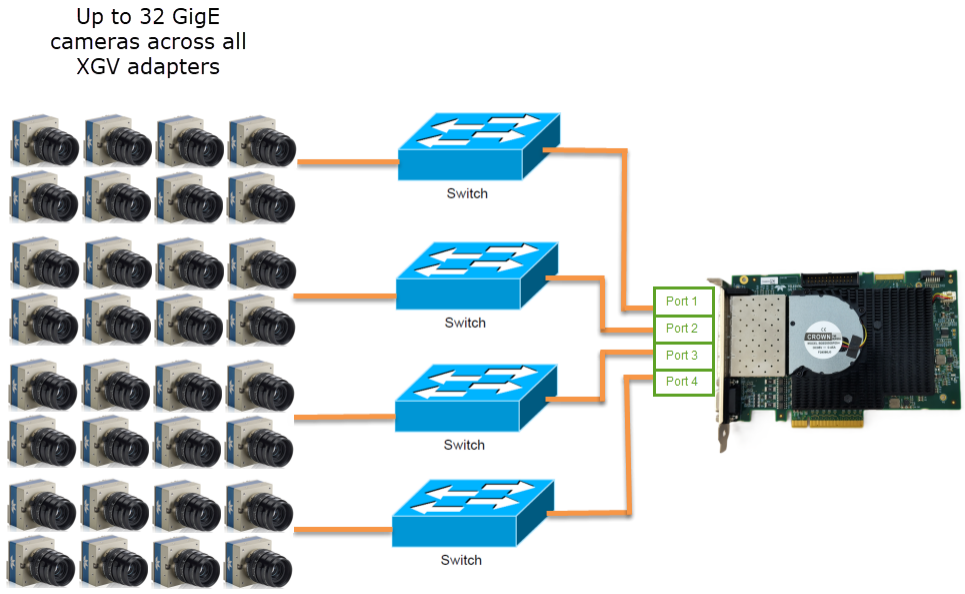
In addition, refer to the GigE Vision Interface Optimization Guide, available with the installation of the GigE Vision Interface. Also, refer to the documentation of any Teledyne GigE cameras.

User Programmable Configurations

Use the Xtium2-XGV firmware loader function in the Teledyne DALSA Device manager utility to select firmware for one of the supported modes. Firmware selection is made either during driver installation or manually later on (see Firmware Update: Manual Mode). Currently there is only one firmware version available:

- **32 GigE cameras** (*installation default*):
  Support for up to 32 GigE cameras spread across the network adapters.

The Xtium2-XGV supports connecting up to 32 independent GigE cameras across its adapters (2 or 4, depending on the model). The number of cameras per adapter is only limited by the maximum of 32 cameras. For example, with a 2 adapter model, all 32 cameras could be connected to adapter 1 and none on adapter 2. However, it is important to consider that each adapter's bandwidth is limited to 10G when considering the sysem configuration.



Action Command Generation

The Xtium XGV can generate action commands independently on each of its adapters. The action command can be generated using input lines, from cameras, board sync signals or by software.

Forwarding Action Command Across Adapters with Different Subnets

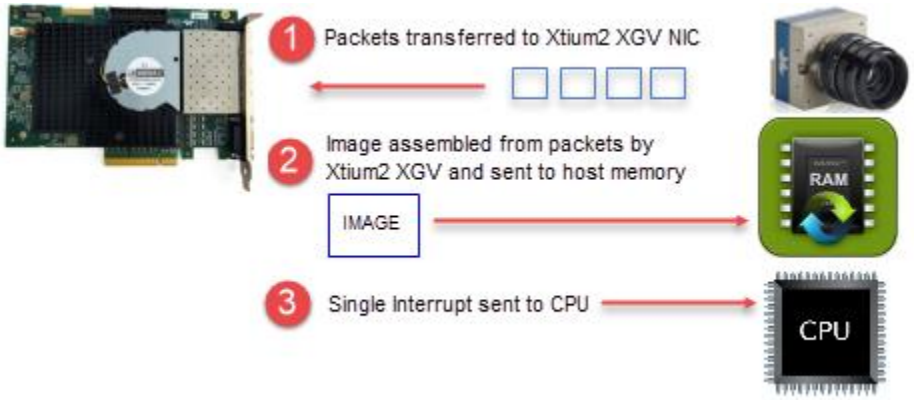
The Xtium XGV supports forwarding of Action Commands received on any of its adapters using an internal bridging mechanism unavailable in tradiional multiport adapters. This allows cameras to receive Action Commands across subnets and can enable cameras to have synchronized acquisition.

NOTE
This capability is unique to the Xtium XGV frame grabber and not possible when using a multi-port NIC card.

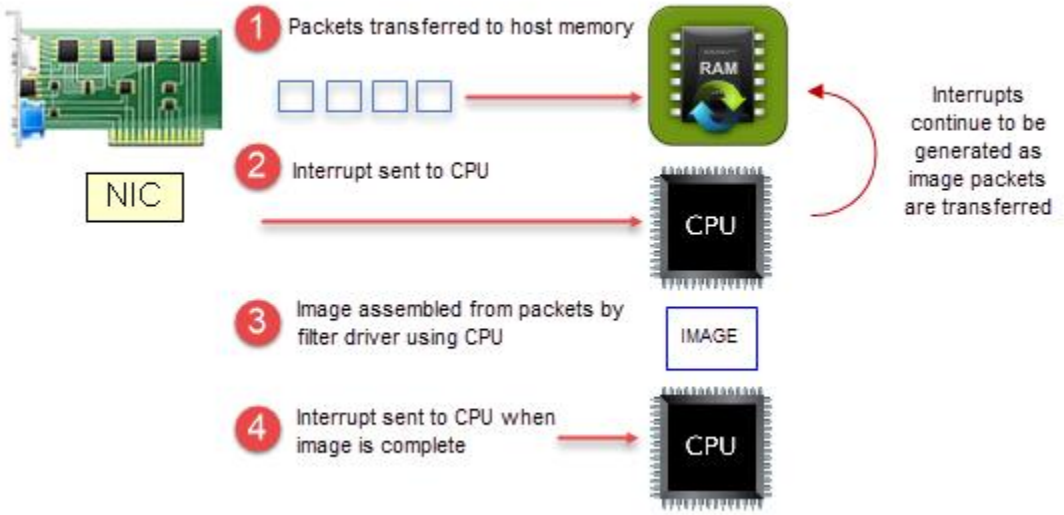
For more information on action command features see the Action Control Category.

Direct Image Transfer to Host Memory Without CPU Overhead

The Xtium XGV processes incoming packets to extract the image data on-board the frame grabber, performing the work of the Teledyne Filter driver locally. Once an image is complete, the frame grabber uses direct DMA access to transfer the image to host computer RAM memory, only sending one interrupt to the CPU to alert it that a new image buffer is available.



In contrast, a traditional NIC sends indiviual packets using DMA to the host computer, sending significantly more interrupts to the CPUs (depending on the NICs' Interrupt Moderation rate). The Teledyne Filter driver then extracts the image data from these packets and assembles the image, using CPU resources. By performing this work on the Xtium2-XGV frame grabber, it significantly reduces the CPU load.



PTP Synchronization Across Adapters with Different Subnets

Normally, achieving PTP (IEEE1588) synchronization between multiple devices requires that all devices be on the same network or subnet. This restriction is due to the current inability of standard network cards to forward PTP sync multicast packets between ports within the two microseconds requirement. However, even with multiport NICs that meet this restriction, bridging between ports in Windows requires separate threads for each port, which increases CPU overhead.

The Xtium XGV supports forwarding of PTP packets across its adapters using an internal bridging mechanism unavailable in tradiional multiport NICs. allowing camera synchronization across subnets without using CPU threads, reducing overhead.

PTP synchronization across multiple Xtium2-XGV boards is also possible by interconnecting ports from one board to another.

NOTE

This capability is unique to the Xtium XGV frame grabber and not possible when using a multi-port NIC card.

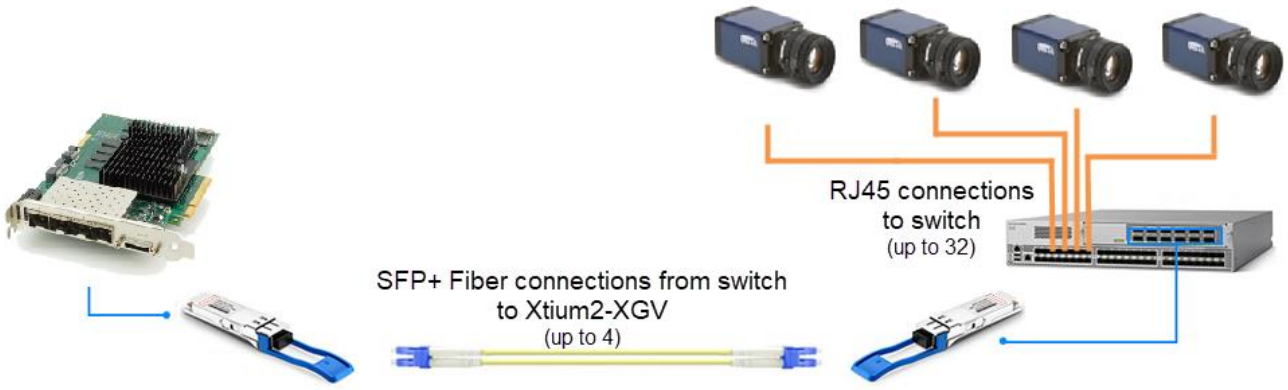
For more information on PTP features see the PTP Control Category.

On-Board Vertical Flip

The Xtium2-XGV supports performing a vertical flip of the image during the transfer to host memory; for information on how to do this using the Sapera LT API see the Enabling On-Board Vertical Flip section.

SFP+ Fiber Module Support for Extreme Distances

The Xtium2-XGV supports using SFP+ Fiber modules to connect to a 10G Ethernet switch which provides these outputs. GigE cameras (up to 32) are connected to the switch; the switch is then connected to the frame grabber using SFP+ fiber modules (up to 4). This can allow for greater cabling distances and reduced costs.



In general, an SFP+ compliant cable assembly is primarily intended as a point-to-point interface of up to 100 meters.

A suitable manufactured SFP+ cable uses the SFF-8431 Specifications for Enhanced Small Form Factor Pluggable Module SFP+ Revision 4.1, rated for 10 Gbps.

For additional information on cables and their specifications, visit the following web sites:

Components Express	http://www.componentsexpress.com/
FiberStore	https://www.fs.com

WARNING

SFP connectors and cables are considered a Class 1 laser product. Because invisible laser radiation can be emitted from the aperture of the port when no fiber is connected, avoid exposure to laser radiation and do not stare into open apertures. Laser radiation is present when the system is open and interlocks bypassed. Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Xtium2-XGV Supported Features

For GenICam applications, the Xtium2-XGV display name is Xtium2-XGV_x, with multiple devices in the same system enumerated by the appended number. For example, Xtium2-XGV_1

NOTE

The information here is subject to change. The application needs to verify capabilities. New board driver releases may change product specifications.

Frame Grabber Feature Categories

The following sections describe the available categories and their features in detail.

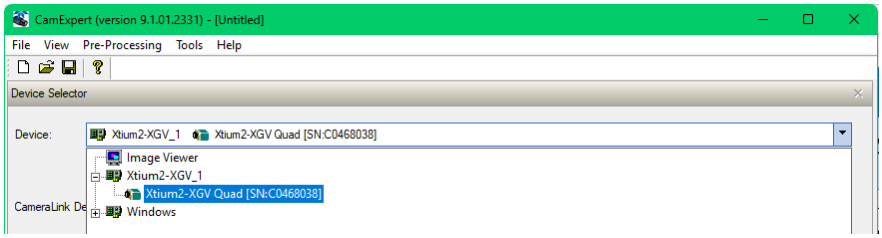
Many of the features may be changed directly in CamExpert (or other GigE Vision-compliant application) or programmatically via an imaging application. Their availability may depend on other feature settings, and while some features are read only, others may be changed even during acquisition.

The description tables in this chapter list and describe features, with their possible values and view attribute.

Features listed in the description table that are tagged as *Invisible* are usually for Teledyne DALSA or third-party software usage—not typically needed by end user applications.

Frame Grabber Features (Non-Streamable Device)

Specific features of the frame grabber can be accessed by a non-streamable SapAcqDevice. For example in CamExpert, the Xtium2-XGV is available under the Device drop-down list.

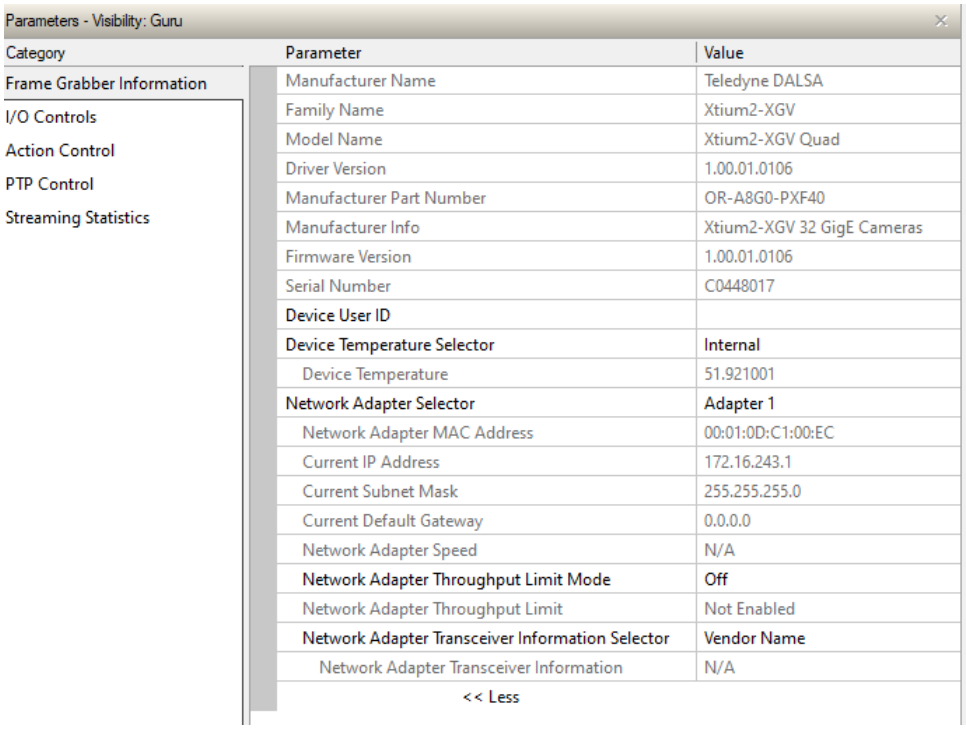


These features are divided into 5 categories:

- Frame Grabber Information
- I/O Controls
- Action Control
- PTP Contol
- Streaming Statistics

Frame Grabber Information Category

Frame Grabber Information features iclude frame grabber model, firmware version, etc. GigE Vision applications retrieve this information to identify the frame grabber along with its characteristics. These features are typically read-only. A notable exception is the Device User ID, which can be set by the user.



Frame Grabber Information Feature Descriptions

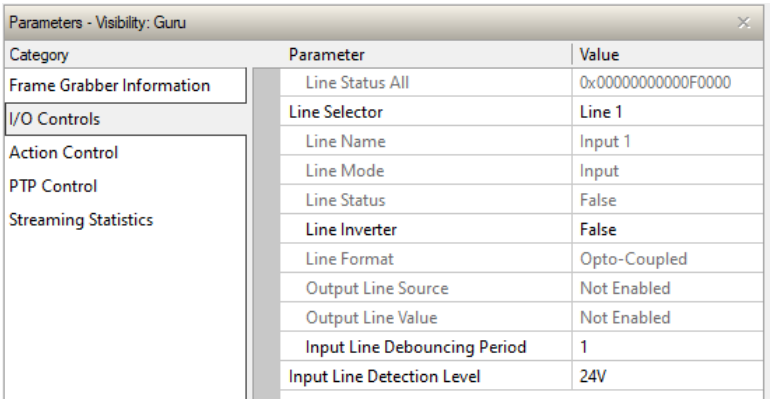
Display Name	Feature & Values	Description	View
Manufacturer Name	DeviceVendorName	Displays the device vendor name: *Teledyne DALSA*	Beginner
Family Name	DeviceFamilyName	Displays the device family name: *Xtium2-XGV*	Beginner
Model Name	DeviceModelName	Displays the device model name. Current models include: *Xtium2-XGV 4CH* *Xtium2-XGV 2CH*	Beginner
Driver Version	DeviceVersion	Displays the device software driver version running on the system. For example, xx.yy.zz.wwww	Beginner
Manufacturer Part Number	deviceManufacturerPartNumber	Displays the device manufacturer part number. Current model numbers include: *OR-A8G0-PXF40* *OR-A8G0-PXF20*	Beginner
Manufacturer Info	DeviceManufacturerInfo	Displays the device configuration firmware design that is currently loaded. Currently available firmware includes: 32 GigE Cameras	Beginner

Display Name	Feature & Values	Description	View
Firmware Version	DeviceFirmwareVersion	Displays the device currently loaded firmware version number. Format is: xx.yy.zz.wwww	Beginner
Serial Number	DeviceSerialNumber	Displays the device serial number.	Beginner
Device User ID	DeviceUserID	Stores a user-programmable identifier of up 64 characters. The default factory setting is an empty string.	Beginner
Device Temperature Selector	DeviceTemperatureSelector	Select the source of the temperature to read.	Beginner
Internal	*Internal*	*Value of the FPGA temperature.* Maximum FPGA temperature should not exceed +100°C for reliable operation.	
Transceiver 1	*Transceiver1*	*Value of selected transceiver.* Maximum temperature should not exceed +80°C for reliable operation	
Transceiver 2	*Transceiver2*		
Transceiver 3	*Transceiver3*		
Transceiver 4	*Transceiver4*		
Device Temperature	DeviceTemperature	The temperature of the selected source in degrees Celsius.	Beginner
Network Adapter Selector	DeviceLinkSelector	Selects the Network Adapter to control.	Beginner
Adapter 1	*Adapter1*		
Adapter 2	*Adapter2*		
Adapter 3	*Adapter3*		
Adapter 4	*Adapter4*		
Network Adapter MAC Address	deviceMacAddress	MAC address (AA:BB:CC;DD:EE:FF) of the selected Network Adapter	Beginner
Current IP Address	GevCurrentIPAddress	Reports the current IP address for the selected network adapter.	Beginner
Current Subnet Mask	GevCurrentSubnetMask	Reports the current subnet mask for the selected network adapter.	Beginner
Current Default Gateway	GevCurrentDefaultGateway	Reports the current default gateway for the selected network adapter.	Beginner
Network Adapter Speed	DeviceLinkSpeed	Indicates the speed of transmission negotiated on the Network Adapter.	Beginner
1 Gbps	*1000000*		
2.5 Gbps	*2500000*		
5 Gbps	*5000000*		
10 Gbps	*10000000*		
Network Adapter Throughput Limit Mode	DeviceLinkThroughputLimitMode	Controls if the DeviceLinkThroughputLimit is active.	Guru
On	*On*		
Off	*Off*		
Network Adaper Throughput Limit	DeviceLinkThroughputLimit	Limits the maximum bandwidth of the data that will be streamed out by the device on the selected Network Adapter.	Guru
1 Gbps	*1000000*		
2.5 Gbps	*2500000*		
5 Gbps	*5000000*		
10 Gbps	*10000000*		

Display Name	Feature & Values	Description	View
Network Adapter Transceiver Information Selector	deviceTransceiverInfoSelector	Select the Information to read from the transceiver.	Beginner
Vendor Name	*VendorName*	*Transceiver Vendor Name*	
Part Number	*PartNumber*	*Transceiver Vendor Part Number*	
Revision	*Revision*	*Transceiver Part Number Revision*	
Serial Number	*SerialNumber*	*Transceiver Serial Number*	
Manufacturing Date	*ManufacturingDate*	*Transceiver Manufacturing Date*	
Temperature	*Temperature*	*Transceiver Temperature*	
Network Adapter Transceiver Information	deviceTransceiverInfo	Displays the selected device transceiver information.	Beginner
Device TL Type	DeviceTLType	Transport Layer type of the device.	Invisible
GigEVision	*GigEVision*	*GigE Vision*	
Device TL Version Major	DeviceTLVersionMajor	Major version of the device's Transport Layer.	Invisible
Device TL Version Minor	DeviceTLVersionMinor	Minor version of the device's Transport Layer.	Invisible
DFNC Major Rev	deviceDFNCVersionMajor	Major revision of Dalsa Feature Naming Convention which was used to create the device's XML.	Invisible
DFNC Minor Rev	deviceDFNCVersionMinor	Minor revision of Dalsa Feature Naming Convention which was used to create the device's XML.	Invisible
SFNC Version Major	DeviceSFNCVersionMajor	Major Version of the Genicam Standard Features Naming Convention which was used to create the device's XML.	Invisible
SFNC Version Minor	DeviceSFNCVersionMinor	Minor Version of the Genicam Standard Features Naming Convention which was used to create the device's XML.	Invisible
SFNC Version SubMinor	DeviceSFNCVersionSubMinor	SubMinor Version of the Genicam Standard Features Naming Convention which was used to create the device's XML.	Invisible

I/O Controls Category

I/O Control features permit control of the general inputs, outputs and board sync of the Xtium2-XGV.



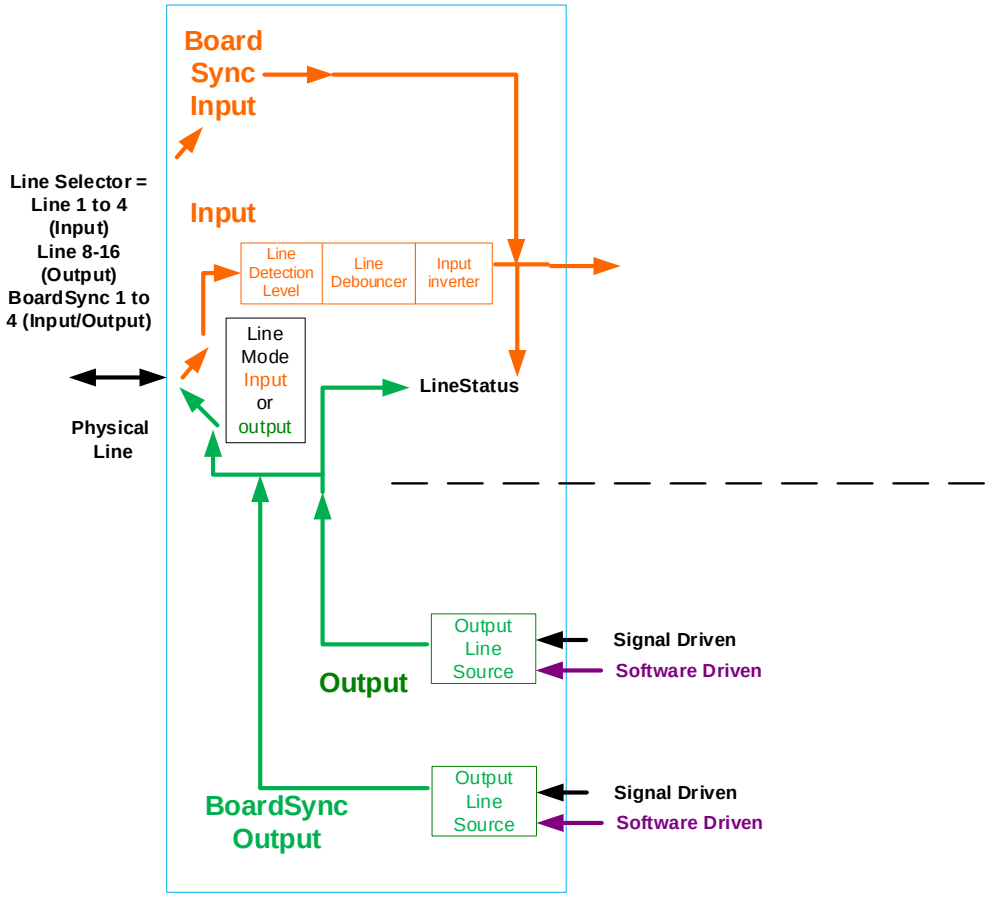
I/O Controls Feature Descriptions

Display Name	Feature & Values	Description	View
Line Status All	*LineStatusAll*	Returns the current status of all available Line signals at time of polling in a single bitfield. The order is Line1, Line2, ... For example: *0x0000000000000000*	Expert
Line Selector	LineSelector	Selects the physical line (or pin) of the external device connector and associated I/O control block to configure.	Beginner
Line 1	*Line1*	*Line 1 corresponds to General Input 1 on the I/O connectors J1 & J8.*	
Line 2	*Line2*	*Line 2 corresponds to General Input 2 on the I/O connectors J1 & J8.*	
Line 3	*Line3*	*Line 3 corresponds to General Input 3 on the I/O connectors J1 & J8.*	
Line 4	*Line4*	*Line 4 corresponds to General Input 4 on the I/O connectors J1 & J8.*	
Line 5	*Line5*	*Line 9 corresponds to General Output 1 on the I/O connectors J1 & J8.*	
Line 6	*Line6*	*Line 6 corresponds to General Output 2 on the I/O connectors J1 & J8.*	
Line 7	*Line7*	*Line 7 corresponds to General Output 3 on the I/O connectors J1 & J8.*	
Line 8	*Line8*	*Line 8 corresponds to General Output 4 on the I/O connectors J1 & J8.*	
Line 9	*Line9*	*Line 9 corresponds to General Output 5 on the I/O connector J1.*	
Line 10	*Line10*	*Line 10 corresponds to General Output 6 on the I/O connector J1.*	
Line 11	*Line11*	*Line 11 corresponds to General Output 7 on the I/O connector J1.*	
Line 12	*Line12*	*Line 12 corresponds to General Output 8 on the I/O connector J1.*	
BoardSync 1	*BoardSync1*	*Board Sync 1 corresponds to General I/O 1 on the I/O connector J2.*	
BoardSync 2	*BoardSync2*	*Board Sync 2 corresponds to General I/O 2 on the I/O connector J2.*	
BoardSync 3	*BoardSync3*	*Board Sync 3 corresponds to General I/O 3 on the I/O connector J2.*	
BoardSync 4	*BoardSync4*	*Board Sync 4 corresponds to General I/O 4 on the I/O connector J2.*	

Display Name	Feature & Values	Description	View
LineName	lineName	Description of the physical Pin associated with the logical line.	Beginner
Input 1	*Input1*	*Associated with the logical line Input 1.*	
Input 2	*Input2*	*Associated with the logical line Input 2.*	
Input 3	*Input3*	*Associated with the logical line Input 3.*	
Input 4	*Input4*	*Associated with the logical line Input 4.*	
Output 1	*Output1*	*Associated with the logical line Output 1.*	
Output 2	*Output2*	*Associated with the logical line Output 2.*	
Output 3	*Output3*	*Associated with the logical line Output 3.*	
Output 4	*Output4*	*Associated with the logical line Output 4*	
Output 5	*Output5*	*Associated with the logical line Output 5.*	
Output 6	*Output6*	*Associated with the logical line Output 6.*	
Output 7	*Output7*	*Associated with the logical line Output 7.*	
Output 8	*Output8*	*Associated with the logical line Output 8.*	
BoardSync 1	*BoardSync1*	*Associated with the logical line BoardSync 1*	
BoardSync 2	*BoardSync2*	*Associated with the logical line BoardSync 2*	
BoardSync 3	*BoardSync3*	*Associated with the logical line BoardSync 3*	
BoardSync 4	*BoardSync4*	*Associated with the logical line BoardSync 4*	
Line Format	LineFormat	Specify the current electrical format of the selected physical input or output. (RO)	Beginner
Opto-Coupled	*OptoCoupled*	*The line is opto-coupled.*	
LVTTL	*LVTTL*	*The line is LVTTL.*	
Line Mode	LineMode	Reports if the physical Line is an Input or Output signal. RO for General Inputs and Outputs signals. RW for BoardSync signals. See General Inputs Specifications. See General Outputs Specifications	Beginner
Input	*Input*	*The line is an input line.*	
Output	*Output*	*The line is an output line.*	
Line Status	LineStatus	Returns the current status of the selected input or output line.	Beginner
False	*False*	*False = line is low*	
True	*True*	*True = line is high*	
Line Inverter	LineInverter	Control to invert the polarity of the selected input or output line signal.	Beginner
False	*False*	The selected Line Inverter is inactive,	
True	*True*	The selected Line Inverter is active,	
Input Line Detection Level	lineDetectionLevel	Specifies the voltage threshold required to recognize a signal transition on an input line. See General Inputs Specifications for more info.	Beginner
TTL	*Threshold_for_TTL*	*The Input Line Detection Level is TTL.*	
RS422	*Threshold_for_RS422*	*The Input Line Detection Level is RS422.*	
12V	*Threshold_for_12V*	*The Input Line Detection Level is 12V.*	
24V	*Threshold_for_24V*	*The Input Line Detection Level is 24V.*	
Input Line Debouncing Period	lineDebouncingPeriod	Specifies the minimum delay in usec before an input line voltage transition is recognized as a signal transition. Range: 1..255.	Beginner
Output Line Source	outputLineSource	Selects which internal signal or event driven pulse or software control state to output on the selected line. Note, the LineMode feature must be set to Output. The List of supported output line sources is product-specific.	Beginner
Off	*Off*	*Line output is disabled (tri-state).*	
Software Controlled	*SoftwareControlled*	*The outputLineValue feature changes the state of the output.*	
Output Line Value	outputLineValue	Sets the output state of the selected Line	Beginner
High	*High*	*Sets the Output signal high.*	
Low	*Low*	*Sets the Output signa low.*	

Display Name	Feature & Values	Description	View
Line Pinout	linePinAssociation	Enumeration of the physical line (or pin) on the device I/O connector. (RO)	Invisible
J1 Pin1=Signal+ Pin7=Signal- J8 Pin9=Signal+– Pin8=Signal-	*J1_Pin1Signal+_Pin7Signal-_ J8_Pin9Signal+_Pin8Signal-*	*Pin 1 is the Input1 Signal+ and Pin 7 is the Input1 Signal- on connector J1. Pin 9 is the Input1 Signal+ and Pin 8 is the Input1 Signal- on connector J8.*	
J1 Pin9=Signal+ Pin20=Signal- J8 Pin7=Signal+– Pin5=Signal-	*J1_Pin9Signal+_Pin20Signal_ J8_Pin7Signal+_Pin5Signal-*	*Pin 9 is the Input2 Signal+ and Pin 20 is the Input2 Signal- on connector J1. Pin 7 is the Input2 Signal+ and Pin 5 is the Input2 Signal- on connector J8.*	
J1 Pin15=Signal+ Pin18=Signal- J8 Pin6=Signal+– Pin3=Signal-	*J1_Pin15Signal+_Pin18Signal- _J8_Pin6Signal+_Pin3Signal-*	*Pin 15 is the Input3 Signal+ and Pin 18 is the Input3 Signal- on connector J1. Pin 6 is the Input3 Signal+ and Pin 3 is the Input3 Signal- on connector J8.*	
J1 Pin16=Signal+ Pin17=Signal- J8 Pin1=Signal+– Pin2=Signal-	*J1_Pin16Signal+_Pin17Signal- _J8_Pin1Signal+_Pin2Signal-*	*Pin 16 is the Input4 Signal+ and Pin 17 is the Input4 Signal- on connector J1. Pin 1 is the Input4 Signal+ and Pin 2 is the Input4 Signal- on connector J8.*	
J1 Pin11=Signal Pin10=Ground J8 Pin14=Signal Pin10=Ground	*J1_Pin11Signal_Pin10Gnd_J8 _Pin14Signal_Pin10Gnd*	*Pin 11 is the Output1 Signal and Pin 10 is the common ground on connector J1. Pin 14 is the Output1 Signal and Pin 10 is the common ground on connector J8.*	
J1 Pin12=Signal Pin10=Ground J8 Pin13=Signal Pin10=Ground	*J1_Pin12Signal_Pin10Gnd_J8 _Pin13Signal_Pin10Gnd*	*Pin 12 is the Output2 Signal and Pin 10 is the common ground on connector J1. Pin 13 is the Output2 Signal and Pin 10 is the common ground on connector J8.*	
J1 Pin21=Signal Pin10=Ground J8 Pin12=Signal Pin10=Ground	*J1_Pin21Signal_Pin10Gnd_J8 _Pin12Signal_Pin10Gnd*	*Pin 21 is the Output3 Signal and Pin 10 is the common ground on connector J1. Pin 12 is the Output3 Signal and Pin 10 is the common ground on connector J8.*	
J1 Pin22=Signal Pin10=Ground J8 Pin11=Signal Pin10=Ground	*J1_Pin22Signal_Pin10Gnd_J8 _Pin11Signal_Pin10Gnd*	*Pin 22 is the Output4 Signal and Pin 10 is the common ground on connector J1. Pin 11 is the Output4 Signal and Pin 10 is the common ground on connector J8.*	
J1 Pin23=Signal Pin10=Ground	*J1_Pin23Signal_Pin10Gnd*	*Pin 23 is the Output5 Signal and Pin 10 is the common ground on connector J1.*	
J1 Pin24=Signal Pin10=Ground	*J1_Pin24Signal_Pin10Gnd*	*Pin 24 is the Output6 Signal and Pin 10 is the common ground on connector J1.*	
J1 Pin25=Signal Pin10=Ground	*J1_Pin25Signal_Pin10Gnd*	*Pin 25 is the Output7 Signal and Pin 10 is the common ground on connector J1.*	
J1 Pin26=Signal Pin10=Ground	*J1_Pin26Signal_Pin10Gnd*	*Pin 26 is the Output8 Signal and Pin 10 is the common ground on connector J1.*	
J2 Pin1=Signal Pin4=Ground-	*J2_Pin1Signal_Pin4Gnd-*	*Pin 1 is the BoardSync1 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin3=Signal Pin4=Ground-	*J2_Pin3Signal_Pin4Gnd-*	*Pin 3 is the BoardSync2 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin5=Signal Pin4=Ground-	*J2_Pin5Signal_Pin4Gnd-*	*Pin 5 is the BoardSync3 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin7=Signal Pin4=Ground-	*J2_Pin7Signal_Pin4Gnd-*	*Pin 7 is the BoardSync4 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin9=Signal Pin4=Ground-	*J2_Pin9Signal_Pin4Gnd-*	*Pin 9 is the BoardSync5 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin11=Signal Pin4=Ground-	*J2_Pin11Signal_Pin4Gnd-*	*Pin 11 is the BoardSync6 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin13=Signal Pin4=Ground-	*J2_Pin13Signal_Pin4Gnd-*	*Pin 13 is the BoardSync7 Signal and Pin 4 is the common ground on connector J2.*	
J2 Pin15=Signal Pin4=Ground-	*J2_Pin15Signal_Pin4Gnd-*	*Pin 15 is the BoardSync8 Signal and Pin 4 is the common ground on connector J2.*	

I/O Module Block Diagram



Input Line Details

The general purpose input line signals are controlled by Line Selector 1 to 4, which have the following features for control or status indication.

- **Feature set:** LineSelector (RW), LineName (RO), linePinAssociation (RO), LineFormat (RO), LineMode (RO), LineStatus (RO), LineInverter (RW), lineDetectionLevel (RW), lineDebouncingPeriod (RW).
- **Connector:** See J1 and J8 for connector pinout and electrical information. The cable shell and shield should electrically connect to computer chassis for maximum EMI protection.
- **Line Transition Validation:** Each input incorporates a signal debounce circuit (following the opto-coupler) to eliminate short noise transitions that could be wrongly interpreted as a valid pulse. The duration is user-programmable from 0 to 255 µs.
- **Line Signal Propagation & Timing:** Maximum delay values are defined in General Inputs Specifications.

Output Line Details

The general purpose output line signals are connected to Line Selector 5 to 12, which have the following features for control or status indication.

- **Feature set:** outputLineSource (RW), outputLineValue (RW), LineSelector (RW), LineName (RO), linePinAssociation (RO), LineFormat (RO), LineMode (RO), LineStatus (RO), See General Outputs Specifications for more information.

Board Sync Details

The general purpose board sync line signals are controlled by Line Selector Board Sync 1 to 4, which have the following features for control or status indication.

Configured as Inputs

- **Feature set:** LineSelector (RW), LineName (RO), linePinAssociation (RO), LineFormat (RO), LineMode (RW), LineStatus (RO)
- **Connector:** See J1: Internal I/O Signals Connector (26-pin TST-113-01-G-D) for connector pinout and electrical information.

Configured as Outputs

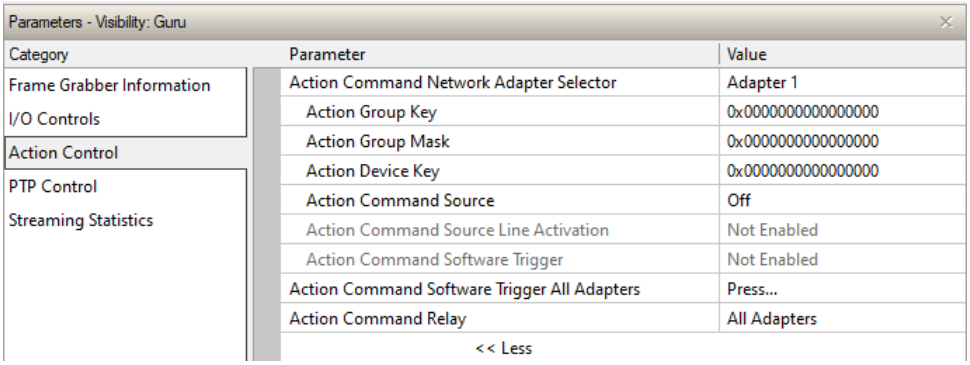
The general purpose board sync line signals are controlled by Line Selector Board Sync 1 to 4, which have the following features for control or status indication.

- **Feature set:** outputLineSource (RW), outputLineValue (RW), LineSelector (RW), LineName (RO), linePinAssociation (RO), LineFormat (RO), LineMode (RW), LineStatus (RO). See General Outputs Specifications for more information.

Action Control Category

An Action Command is a single Broadcast packet sent from the Frame Grabber and/or Host Software application to all cameras connected on the same network. How cameras act on an Action Command depends on its designed feature support. Cameras receiving the Action Command broadcast may have one or multiple functions acting on that received command.

Please refer to the GigE Vision® Specification — version 2.0 RC6, for configuration and usage details. An application note on using Action Commands (including demo code for cameras) is available for download from the Teledyne DALSA website (Action Command Demo for GigE Vision Devices | Teledyne DALSA)



Action Command Feature Descriptions

Display Name	Feature & Values	Description	View
Action Command Network Adapter Selector	actionCMDDeviceLinkSelector	Selects the Network Adapter to control.	Beginner
Adapter 1	*Adapter1*		
Adapter 2	*Adapter2*		
Adapter 3	*Adapter3*		
Adapter 4	*Adapter4*		
Action Group Key	ActionGroupKey	Provides the key that a device uses to validate that the action command message is part of the requested group.	Beginner
Action Group Mask	ActionGroupMask	Provides the mask used to filter particular action command messages for the selected action.	
Action Device Key	ActionDeviceKey	Provides the device key that allows a device to check the validity of action commands.	Beginner
Action Command Source	actionCMDSource	Select the event that will generate an action command on the network adapter.	Beginner
Off	*Off*	*Action command is disabled.*	
Input 1	*Input1*	*An Input signal 1 event will generate an action command.*	
Input 2	*Input2*	*An Input signal 2 event will generate an action command.*	
Input 3	*Input3*	*An Input signal 3 event will generate an action command.*	
Input 4	*Input4*	*An Input signal 4 event will generate an action command.*	
BoardSync 1	*BoardSync1*	*A BoardSync 1 event will generate an action command.*	
BoardSync 2	*BoardSync2*	*A BoardSync 2 event will generate an action command.*	
BoardSync 3	*BoardSync3*	*A BoardSync 3 event will generate an action command.*	
BoardSync 4	*BoardSync4*	*A BoardSync 4 event will generate an action command.*	
Software	*Software*	*A Software Trigger event will generate an action command.*	

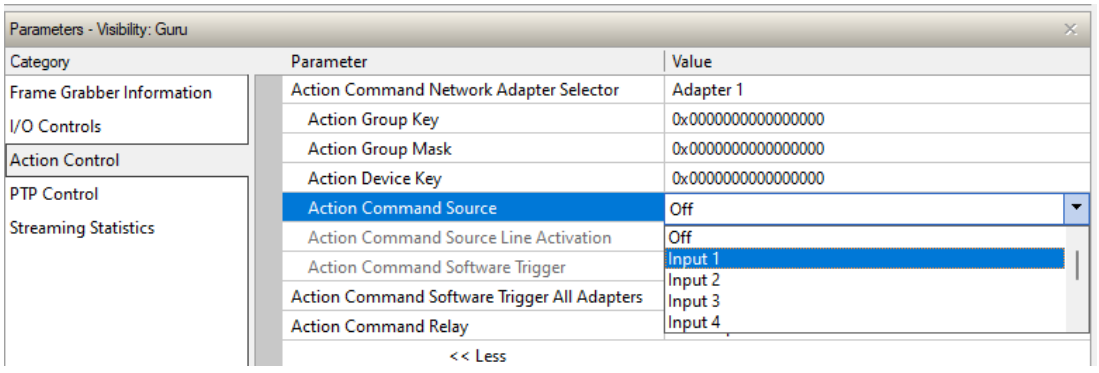
Display Name	Feature & Values	Description	View
Action Command Source Line Activation	actionCMDActivation	Specifies the activation mode to trigger an action command from the selected line of the *actionCMDSource* feature.	Beginner
Falling Edge	*FallingEdge*	*Use the falling edge of the source signal.*	
Rising Edge	*RisingEdge*	*Use the rising edge of the source signal.*	
Action Command Software Trigger	actionCMDTriggerSoftware	Generates an Action Command immediately on the adapter specified with the Action Command Network Adapter Selector.	
Action Command Software Trigger All Adapters	actionCMDTriggerSoftwareAllAdapters	Generates an Action Command immediately on all adapters.	
Action Command Relay	actionCommandRelay	Selects if received Action Commands on a Network Adapter must be relayed to the other Network Adapters.	Beginner
Off	*Off*	*Do not Broadcast any Action Commands.*	
Adapter 1	*Adapter1*	*Broadcast Action Commands received from Network Adapter 1 to all other Network Adapters.*	
Adapter 2	*Adapter2*	*Broadcast Action Commands received from Network Adapter 2 to all other Network Adapters.*	
Adapter 3	*Adapter3*	*Broadcast Action Commands received from Network Adapter 3 to all other Network Adapters.*	
Adapter 4	*Adapter4*	*Broadcast Action Commands received from Network Adapter 4 to all other Network Adapters.*	
All Adapters	*On*	*Broadcast Action Commands received from any Network Adapters to all the other Network Adapters.*	

Generating an Action Command Using the Xtium XGV

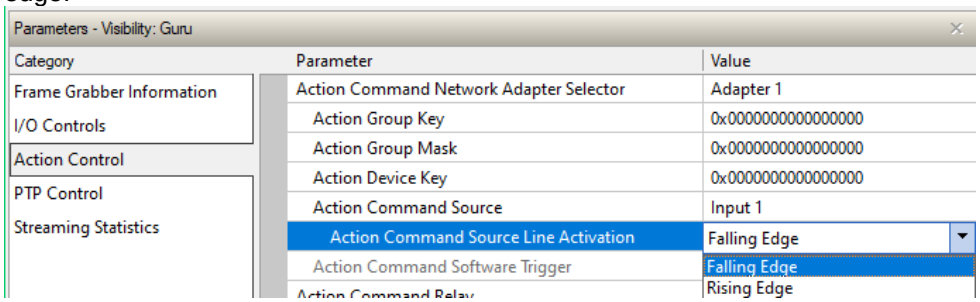
The Xtium XGV can generate action commands on each of its adapters; cameras connected to the adapter will receive the action command and respond if it is part of the target group.

Action commands generated by the frame grabber are configured on each adapter separately by using the Action Command Network Adapter Selector feature.

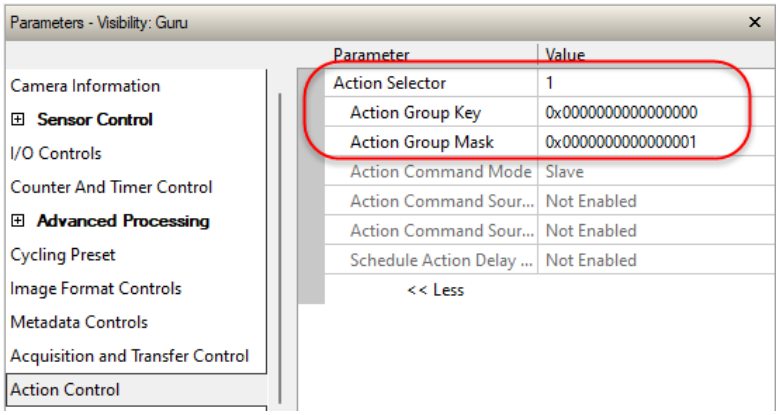
The Xtium XGV can generate action commands independently on each of its adapters. Use the Action Command Source to specify the action command trigger source for the selected adapter; the source can be an input line, board sync signal or software.



The Action Command Source Line Activation feature sets whether the action command sent on a rising or falling edge:



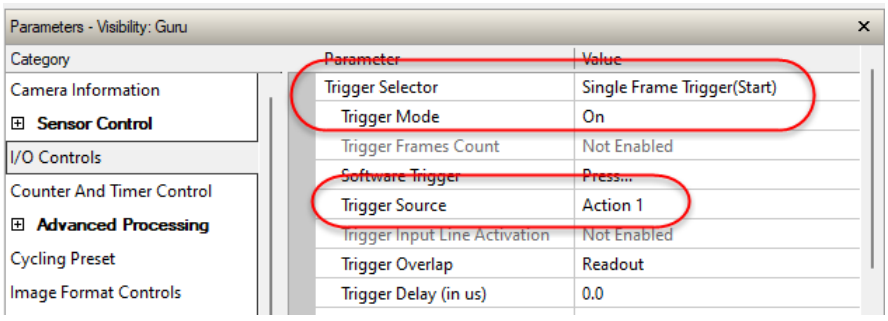
Verify that the cameras targeted for the action command have the specified Action Group Key, Action Group Mask.



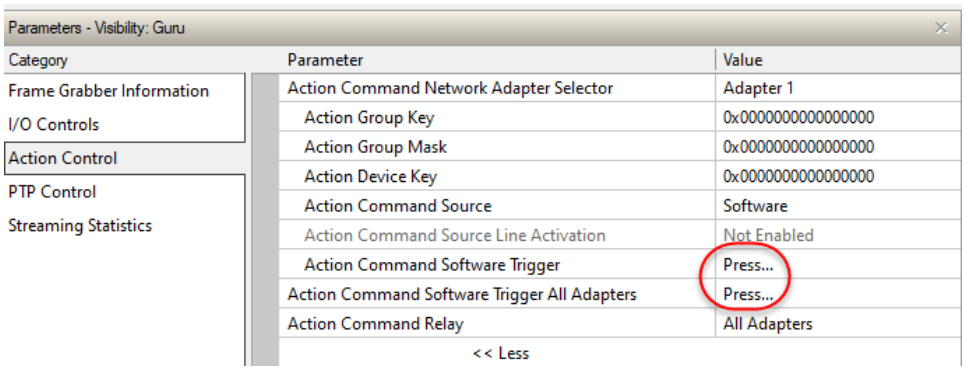
NOTE

For Teledyne cameras, the Action Device Key is a Write Only feature that provides a method to uniquely target Action Commands to specific cameras.Using an application supplied by Teledyne, the user writes an ID value to the camera which cannot be read, but allows specific Teledyne cameras to act on commands. Contact Sales for additional information.

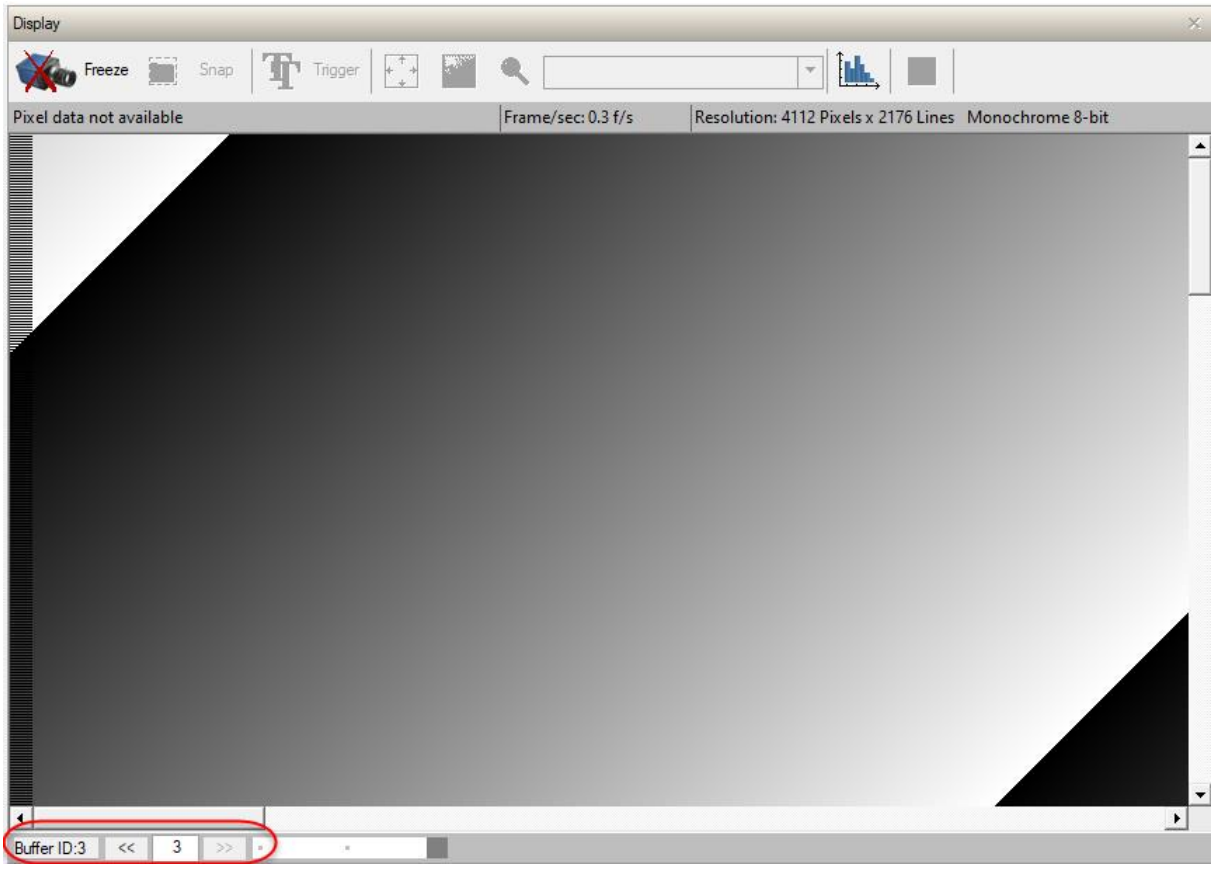
To use the action command to trigger an acquisition on targeted cameras, choose the desired trigger, set the Trigger Mode to On and the Trigger Source to Action 1:



To easily verify that the action command is successfully received by the camera, set the frame grabber Action Command Source feature to Software and click the Action Command Software Trigger (for the sending on the selected adapter) or the Action Command Software Trigger All Adapters field.



If properly configured, the camera should acquire frame(s) (depending in the trigger type selected; single or mulitframe) with each Action Command. For example, with the target camera connected in CamExpert, the Buffer ID field will increment with each action command receved.



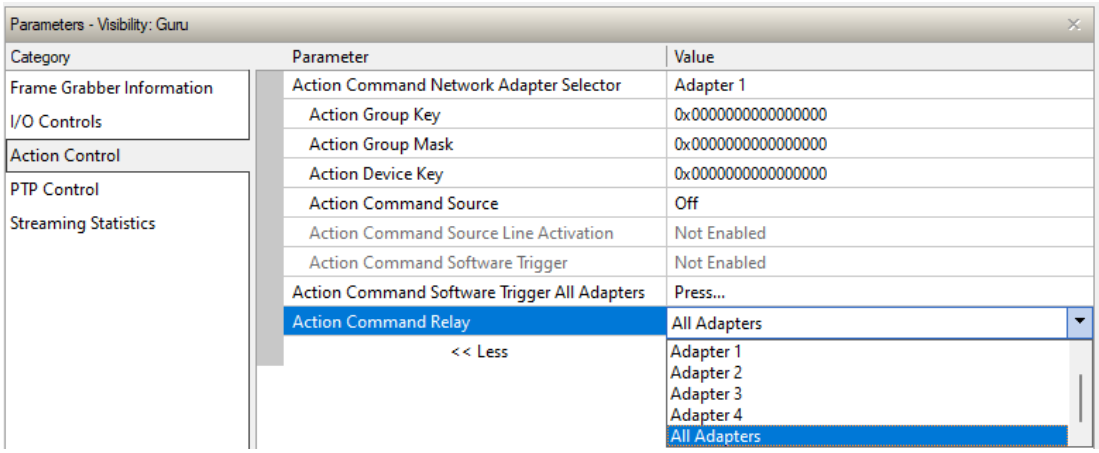
NOTE

The Xtium XGV does not currently support scheduled action commands.

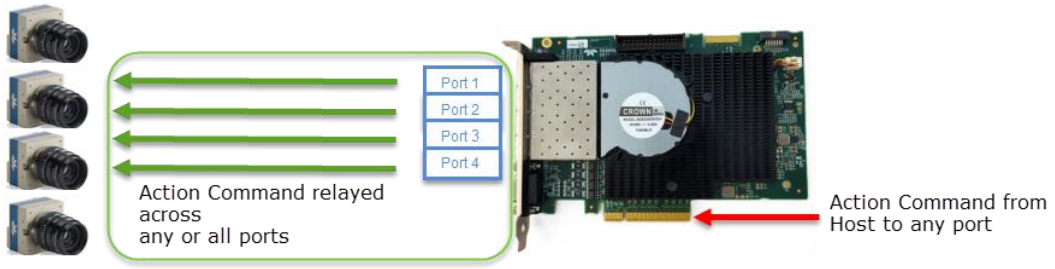
Forwarding Action Commands Across Adapters with Different Subnets

The Xtium XGV supports real-time relaying (forwarding) of Action Commands received on any of its adapters; this mechanism is unavailable in traditional multiport NICs. This allows cameras to receive Action Commands across subnets.

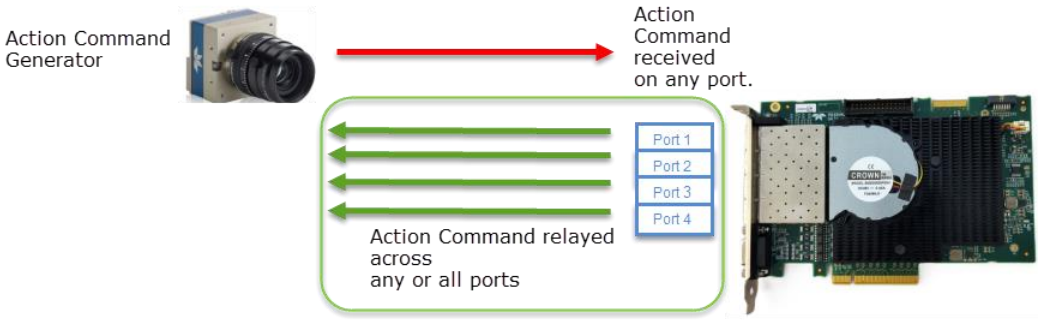
The Action Command Relay feature applies to all Action Commands received on all adapters.



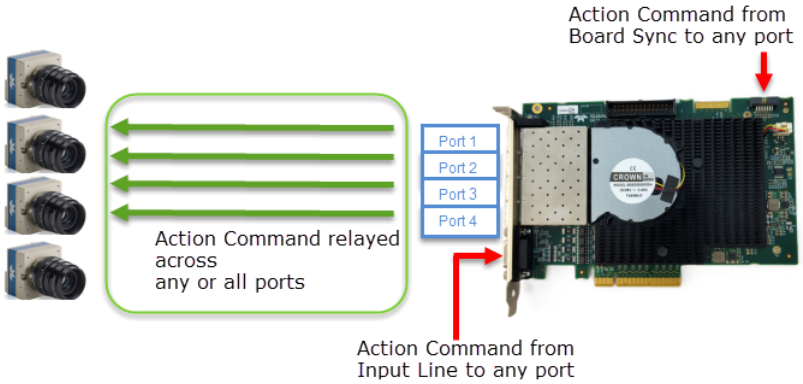
Scenario #1: Forwarding Action Command from Host Application



Scenario #2: Forwarding Action Command from a Connected Camera



Scenario #3: Forwarding Action Command from an Input Line or Board Sync



ACK Messages

A device that issues an action command can choose to request an aknowledgement from the target device. In this case, when a camera or device receives an action command it sends an acknowledgment (“ACK” message) to the device or application that issued the action command that the command was received.

However, when using an application on the host PC to generate action commands on an Xtium2-XGV adapter, if action commands are relayed to other ports the ACK messages sent by devices that receive these commands are not forwarded to the originating port, therefore the application will not receive these ACK messages on the original port and the application on the host must listen on the other port for the ACK messages.

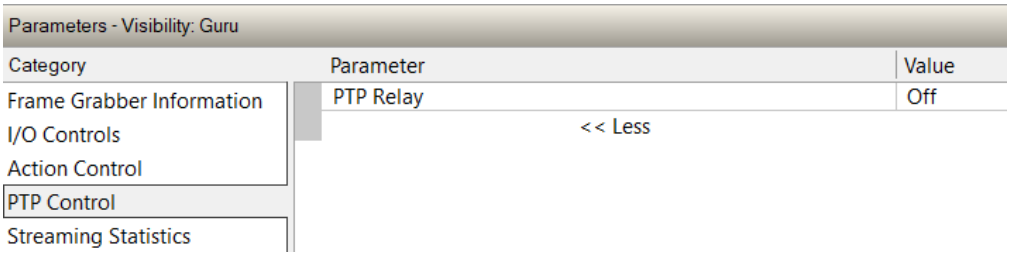
With multiple cameras scenario, it strongly recommended to use the “NO ACK” option. The demand for an acknowledge packet is indicated by a bit in the command packet; refer to the GenCP standard for more information on the command packet layout.

IMPORTANT

When forwarding action commands from a camera, the “NO ACK” option must be used; the frame grabber will not reforward the Acknowledge message back to the source.

PTP Control Category

The Xtium2-XGV PTP Control PTP category includes the PTP Relay feature, which controls how PTP packets are broadcast.

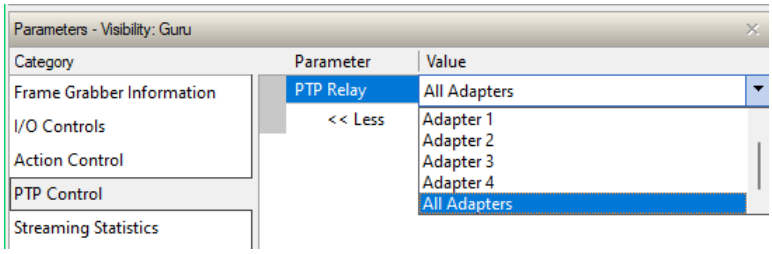


PTP Control Feature Descriptions

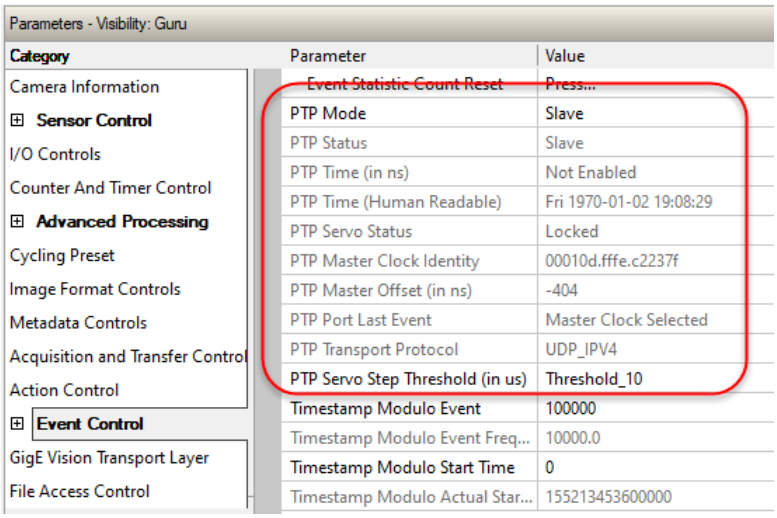
Display Name	Feature & Values	Description	View
PTP Relay	ptpRelay	Selects if received PTP packets on a Network Adapter must be Broadcast to other Network Adapters.	Beginner
Off	*Off*	*Do not broadcast any PTP packets.*	
Adapter 1	*Link1*	*Broadcast PTP packets received from Network Adapter 1 to all other Network Adapters.*	
Adapter 2	*Link2*	*Broadcast PTP packets received from Network Adapter 2 to all other Network Adapters.*	
Adapter 3	*Link3*	*Broadcast PTP packets received from Network Adapter 3 to all other Network Adapters.*	
Adapter 4	*Link4*	*Broadcast PTP packets received from Network Adapter 4 to all other Network Adapters.*	
All Adapters	*On*	*Broadcast PTP packets received from any Network Adapters to all the other Network Adapters.*	

PTP Relay Feature

PTP packets received can be forwarded to specific adapters or to all adapters on the Xtium XGV using the PTP Relay feature.



When a slave camera successfully synchronizes with a Master clock, the camera's PTP Servo Status feature is shown as Locked, as shown by the following screenshot of the camera CamExpert instance (not the Xtium2-XGV):



For more information on configuring cameras to use PTP, refer to the camera documentation.

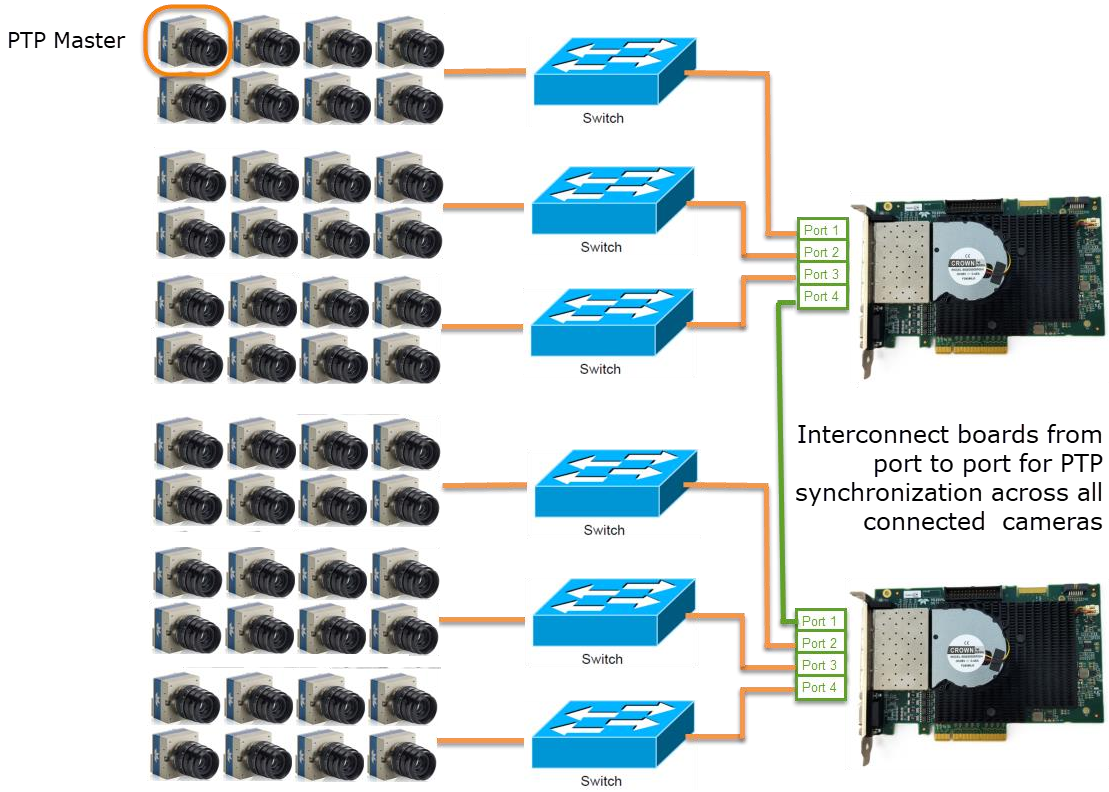
IEEE 1588 Reference Resources

For additional information: http://standards.ieee.org

PTP Standard Reference: IEEE Std 1588-2008 — IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems

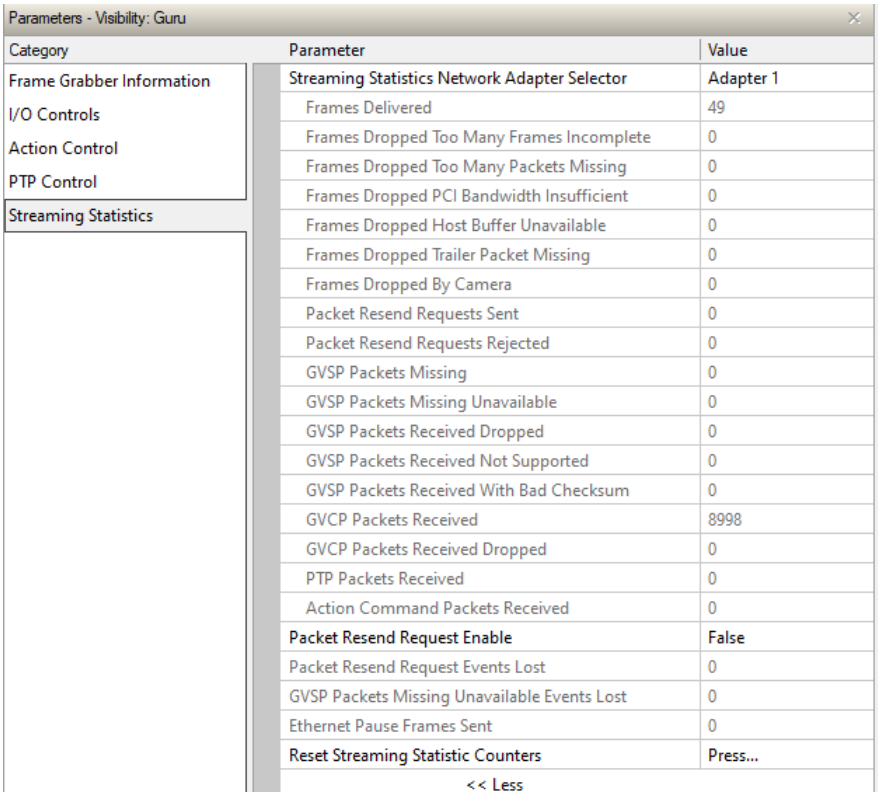
PTP Synchronization Across Multiple Xtium2-XGV Boards

PTP synchronization across multiple Xtium2-XGV boards is also possible by interconnecting ports from one board to another.



Streaming Statistics Category

The Xtium2-XGV Streaming Statistics features provide network statistics for the frame grabber network adapters, as well as the ability to disable packet resend requests. These features are part of Teledyne's Trigger-To-Image Reliability (T2IR) framework.



Streaming Statistics Feature Descriptions

Display Name	Feature & Values	Description	View
Streaming Statistics Network Adapter Selector	siDeviceLinkSelector	Selects the Network Adapter to control.	Beginner
Adapter 1	Adapter1		
Adapter 2	Adapter2		
Adapter 3	Adapter3		
Adapter 4	Adapter4		

Display Name	Feature & Values	Description	View
Frames Delivered	siFramesDelivered	Number of frames dropped due to too many frames concurrently incomplete on the network port.	Beginner
Frames Dropped Too Many Frames Incomplete	siFramesDroppedTooManyFramesIncomplete	Number of frames dropped due to too many frames concurrently incomplete on the network port.	Beginner
Frame Dropped PCI Bandwidth Insufficient	siFramesDroppedPciBandwidthInsufficient	Number of frames dropped due to insufficient PCI bandwidth on the network port.	Beginner
Frames Dropped Host Buffer Unavailable	siFramesDroppedHostBufferUnavailable	Number of frames dropped due to host buffer unavailability.	Beginner
Frames Dropped Trailer Packet Missing	siFramesDroppedTrailerPacketMissing	Number of frames dropped due to trailer packet missing on the network port.	Beginner
Frames Dropped By Camera	siFramesDroppedByCamera	Number of frames dropped by the camera due to insufficient ethernet link bandwidth on the network port.	Beginner
Packet Resend Requests Sent	siPacketResendRequestsSent	Number of packet resend requests sent on the network port.	Beginner
Packet Resend Requests Rejected	siPacketResendRequestsRejected	Number of packet resend requests rejected by the resend packets engine on the network port.	Beginner
GVSP Packets Missing	siGVSP_PacketsMissing	Number of GVSP packets missing on the network port.	Beginner
GVSP Packets Missing Unavailable	siGVSP_PacketsMissingUnavailable	Number of GVSP packets missing unavailable reported by the camera on the network port.	Beginner
GVSP Packets Received Dropped	siGVSP_PacketsReceivedDropped	Number of GVSP packets received dropped due to insufficient bandwidth to local memory.	Beginner
GVSP Packets Received Not Supported	siGVSP_PacketsReceivedUnsupported	Number of unsupported GVSP packets received on the network port.	Beginner
GVSP Packets Received with Bad Checksum	siGVSP_PacketsReceivedBadChecksum	Number of bad checksum GVSP packets received on the network port.	Beginner
GVCP Packets Received	siGVCP_PacketsReceived	Number of GVCP packets received on the network port	Beginner
GVCP Packets Received Dropped	siGVCP_PacketsReceivedDropped	Number of GVCP packets received dropped due to insufficient bandwidth to local memory.	Beginner
PTP Packets Received	siPTP_PacketsReceived	Number of PTP packets received on the network port.	Beginner
Action Command Packets Received	siActionCmdPacketsReceived	Number of Action Command packets received on the network port.	Beginner
Packet Resend Request Enable	siPacketResendRequestEnable	Sets the enable state of the packet resend request mechanism on all network ports.	Beginner
Packet Resend Request Events Lost	siPacketResendRequestEventsLost	Number of packet resend request events lost due to fifo overflow on all network ports.	Beginner
GVSP Packets Missing Unavailable Events Lost	siGVSP_PacketsMissingUnavailableEventsLost	Number of GVSP packets missing unavailable events lost due to fifo overflow on all network ports.	Beginner
Ethernet Pause Frames Sent	siEthernetPauseFramesSent	Number of ethernet pause frames sent on all network ports.	Beginner
Reset Streaming Statistic Counters	siResetCounters	Resets the streaming statistic counters on all network ports.	Beginner

GigE Vision Host Controls

For connected cameras the GigE Vision Host controls, as shown by CamExpert, groups parameters used to configure the host computer system GigE Vision features, which are used for connected camera networking management. None of these features are stored in the connected camera – they remain as settings to the host system control software.

These features allow optimizing the network configuration for maximum camera bandwidth. Settings for these parameters are highly dependent on the number of cameras connected to an adapter, the data rate of each camera and the trigger modes used.

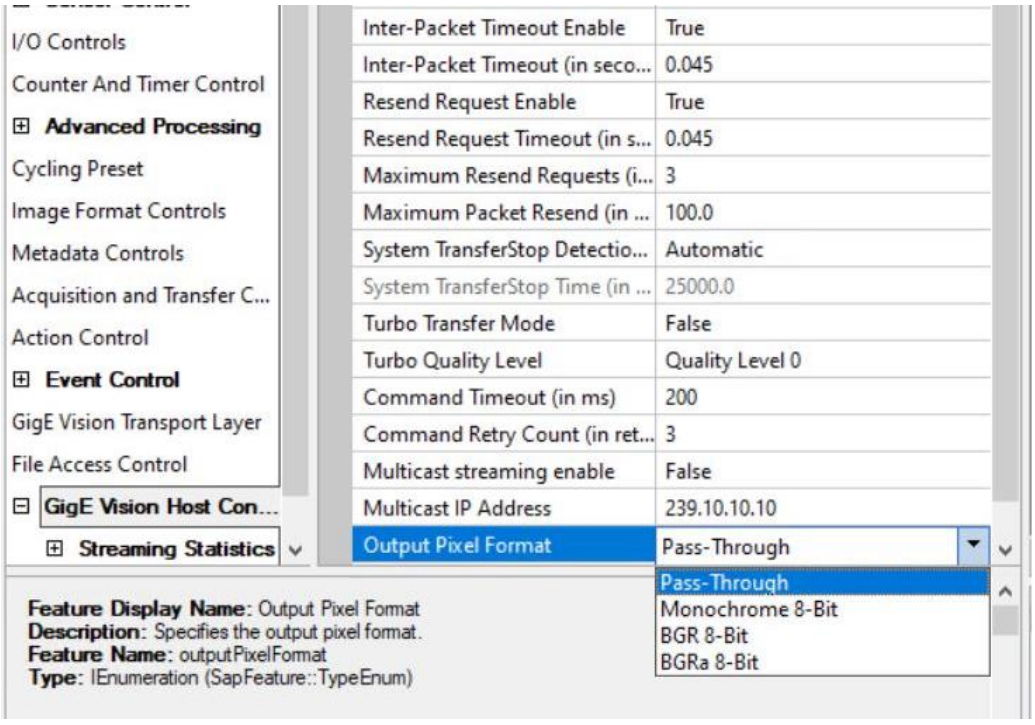
Feature values may be changed in CamExpert or via an imaging application according to their availability. The availability of a feature may depend on other feature values; several features are always read-only.

NOTE

The GigE Vision Host Control features are available for connected cameras; they are not shown for the Xtium2-XGV board.

Output Pixel Format Feature

The Teledyne GigE Vision Interface supports a number of different output pixel formats. Supported formats are device-dependent and is set using the camera's Output Pixel Format feature, which specifies the output format used by the Xtium-XGV.



For complete information on all formats supported by the Xtium2-XGV see the Xtium2-XGV Supported GigE Pixel Formats section.

Xtium2-XGV Supported GigE Pixel Formats

The Xtium2-XGV supports natively many GenICam pixel formats, meaning that it can (if needed) convert the incoming images into a different pixel format.

Available output pixel formats include:

Monochrome	Mono8: Monochrome 8-Bit Mono10: Monochrome 10-Bit Mono12: Monochrome 12-Bit Mono14: Monochrome 14-Bit Mono16: Monochrome 16-Bit	**RGB**	RGB 8-Bit RGBa 8-Bit
Bayer	BayerGR 10-Bit BayerRG 10-Bit BayerGB 10-Bit BayerBG 10-Bit BayerGR 12-Bit BayerRG 12-Bit BayerGB 12-Bit BayerBG 12-Bit	**BiColor**	BiColorRGBG10 10-Bit BiColorBGRG10 10-Bit BiColorRGBG12 12-Bit BiColorBGRG12 12-Bit BiColorRGBG8 8-Bit BiColorBGRG8 8-Bit
BGR	BGR 8-Bit BGRa 8-Bit BGR 10-Bit BGRA 10-Bit BGR 12-Bit BGRa 12-Bit BGR 16-Bit BGRa 16-Bit	**Pass-Through**	Output pixel format is the same as the pixel format provided by the device.

GenICam pixel formats not supported natively will only have Pass-Through as a possible output pixel format and this will use a monochrome 64-bit host buffer.

Unpacking Packed Formats

Packed formats cannot be displayed and must be unpacked. For packed color formats, output formats are available that perform a color conversion. Each packed pixel is unpacked into a separate buffers according to the following conversion table:

Input (packed)	**Output** (unpacked)
Mono10p Mono10packed Mono12p Mono12packed Mono14p	Mono16
BayerGR10p BayerRG10p BayerGB10p BayerBG10 BayerGR10packed (GVSP) BayerRG10packed (GVSP) BayerGB10packed (GVSP) BayerBG10packed (GVSP)	Mono16 BGR10 BGRa16
BayerGR12p BayerRG12p BayerGB12p BayerBG12p BayerGR12packed (GVSP) BayerRG12packed (GVSP) BayerGB12packed (GVSP) BayerBG12packed (GVSP)	Mono16 BGR12 BGRa16
BiColorRGBG10p BiColorBGRG10p BiColorRGBG10packed (GVSP) BiColorBGRG10packed (GVSP)	BGR10 BGR16 BGRa16
BiColorRGBG12p BiColorBGRG12p	BGR16 BGRa16
RGB10p RGBa10p BGR10p BGRa10p RGB10p32	BGR10 BGR16 BGRa16
RGB12p BGR12p	BGR16
RGBa12p BGRa12p	BGRa16

Color Conversions

The Xtium2-XGV can perform on-board color conversions of the following color input formats (for color packed formats see Unpacking Packed Formats):

Input	Output
RGB8	BGR8 BGRa8
BGR8	RGB8 BGRa8
RGBa8	BGRa8
BGRa8	RGBa8
RGB10 BGR10	BGR10 BGR16 BGRa16
RGBa10 BGRa10	BGRa16
RGB12 BGR12	BGR16 BGRa16
RGBa12 BGRa12	BGRa16
BayerGR8 BayerRG8 BayerGB8 BayerBG8	BGR8 BGRa8
BayerGR10 BayerRG10 BayerGB10 BayerBG10	BGR10 BGR16 BGRa16
BayerGR12 BayerRG12 BayerGB12 BayerBG12	BGR12 BGRa12 BGR16 BGRa16
BiColorRGBG8 BiColorBGRG8	BGR8 BGRa8
BiColorRGBG10 BiColorBGRG10	BGR10 BGR16 BGRa16
BiColorRGBG12 BiColorBGRG12	BGR16 BGRa16

Passthrough Conversions

In general, when the Output Pixel format is set to Passthrough, the Xtium2-XGV simply transfers the input data as is. However, with certain formats a conversion is performed. The following table lists input formats with passthrough conversions.

Input	Output
Mono10 Mono12 Mono14	Mono16
BGRa10	BGRa16
BGRa12	BGRa16
BayerGR8 BayerRG8 BayerGB8 BayerBG8	Mono8
BayerGR10 BayerRG10 BayerGB10 BayerBG10	Mono16
BayerGR12 BayerRG12 BayerGB12 BayerBG12	Mono16
BiColorRGBG8 BiColorBGRG8	BGR8 BGRa8
BiColorRGBG10 BiColorBGRG10	BGR10 BGR16 BGRa16
BiColorRGBG12 BiColorBGRG12	BGR16 BGRa16

3D Formats

Input	Output
Coord3D_C16	Coord3D_C16
Coord3D_AC16	Coord3D_AC16
Coord3D_ACRW16	Coord3D_ACRW16

Technical Specifications

Xtium2-XGV Reference

Block Diagram

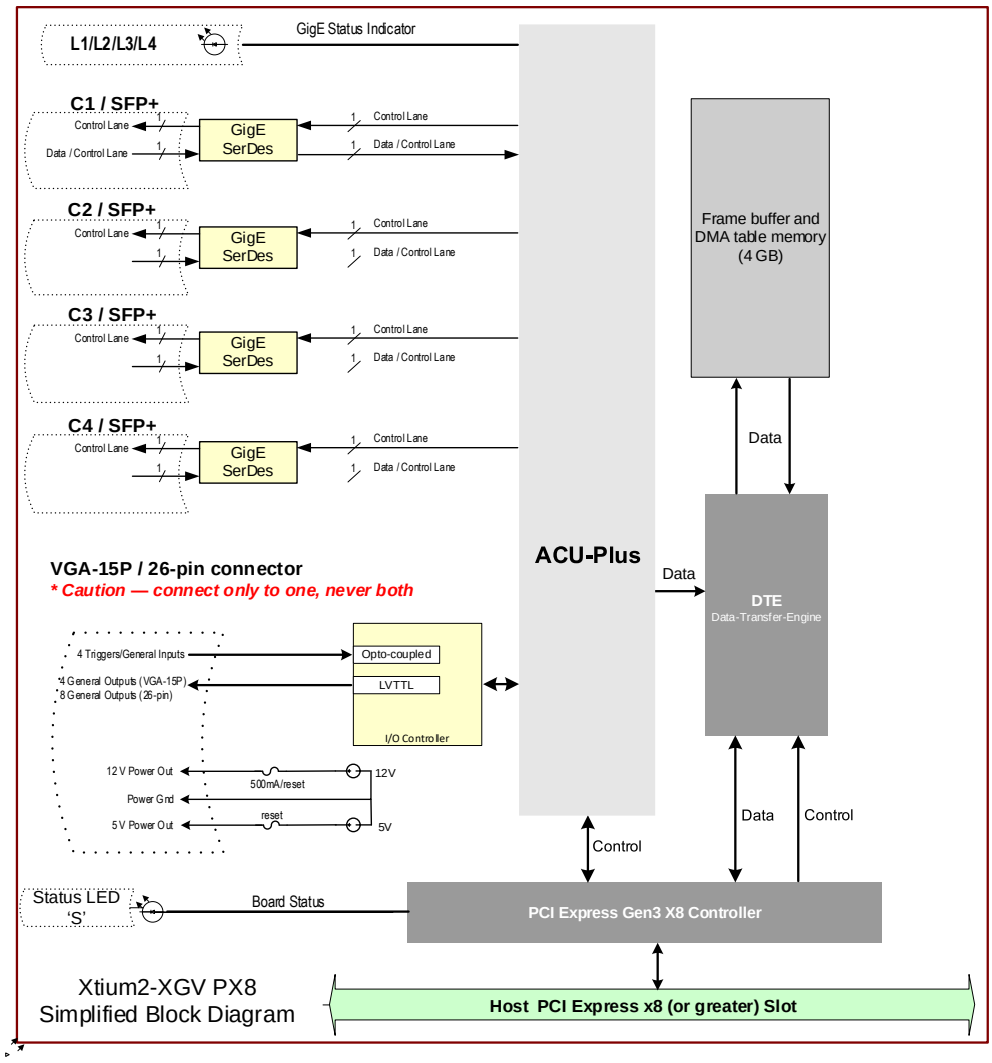


Figure 2: Xtium2-XGV Quad Block Diagram

Note: For Xtium2-XGV Dual:

- 2 network ports only with corresponding LED (P1/P2 and L1/L2)
- 2 Triggers/General Inputs
- 2 GB of frame buffer and DMA table memory

Connector and Switch Locations

Xtium2-XGV Board Layout Drawing

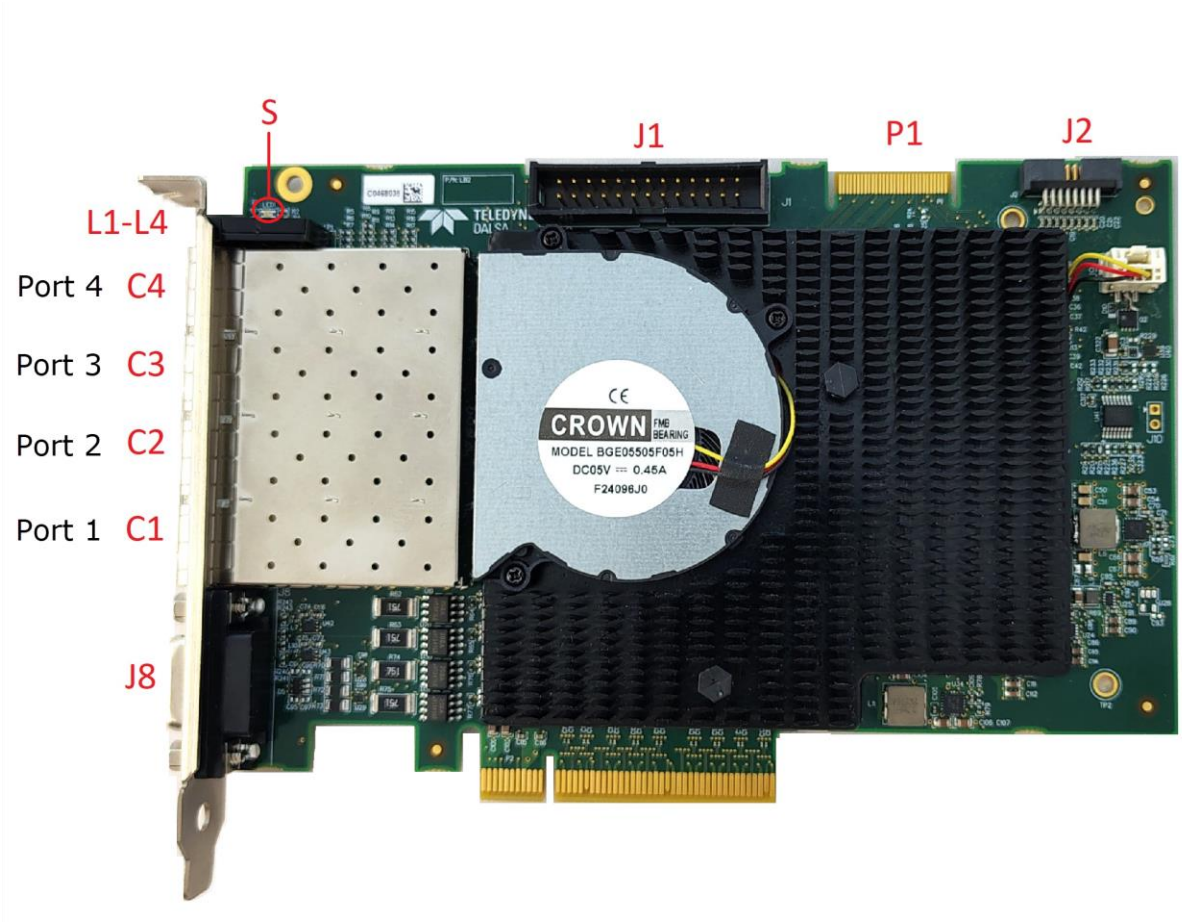


Figure 3: Board Layout

Connector / LED Description List

The following table lists components on the Xtium2-XGV board. Detailed information concerning the connectors/LEDs follows this summary table.

Location	Description	Location	Description
J8	External I/O Signals connector (VGA-15P)	J1	Internal I/O Signals connector (26-pin SHF-113-01-L-D-RA)
S	Boot-up/PCIe Status LED (refer to text)	J2	Multi Board Sync
C1, C2, C3, C4	Connectors for Network Port 1, 2, 3 & 4	P2	PCIe x8 computer bus connector (Gen3 compliant slot preferred)
L1, L2, L3, L4	GigE camera status LEDs. The end bracket label LEDs “1” indicates data status for Network Port Connector 1, followed by 2, 3 and 4. LEDs are ordered 1 to 4 vertically.	P1	Reserved

Connector and Switch Specifications

Xtium2-XGV End Bracket Detail

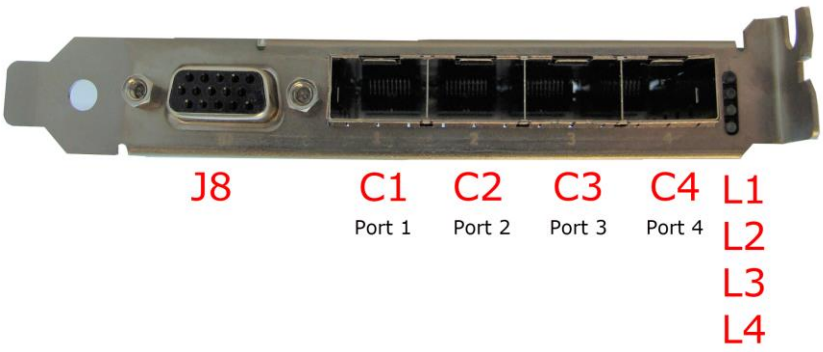


Figure 4: End Bracket Details

The hardware installation process completes with the connection of a supported camera to the Xtium2-XGV board using an ethernet cable along with an RJ45 transceiver or a SFP+ cable along with an SFP+ transceiver.

The Xtium2-XGV board supports up to 32 GigE cameras, spread over the 4 network ports. To connect multiple cameras on a single network port, cameras must be connected to an external switch, which is then connected to the Xtium2-XGV board.

Status LEDs Functional Descriptions

Xtium2 series frame grabbers use status LEDs to indicate crucial information during boot-up to indicate the board's detection status, PCIe version, lane configuration, and, during operation, presence of camera and acquisition status.

One (1) LED status, mounted on the board PCB, and four (4) LED indicators, mounted on the board bracket, provide information on board and connection status as per the tables below.

S: Boot-up/PCIe Status LED — Provides general board status information.

Color	State	Description
Red	Solid	FPGA firmware not loaded
Green	Solid	Normal FPGA firmware loaded, Gen3 speed, link width x8
Green	Flashing	Normal FPGA firmware loaded, Gen1/Gen2 speed, link width x8
Yellow	Solid	Normal FPGA firmware loaded, Gen3 speed, link width not x8
Yellow	Flashing	Normal FPGA firmware loaded, Gen1/Gen2 speed, link width not x8
Blue	Solid	Safe FPGA firmware loaded, Gen3 speed
Blue	Flashing	Safe FPGA firmware loaded, Gen1/Gen2 speed
Red	Flashing	PCIe Training Issue – Board will not be detected by computer

L1, L2, L3 and L4: Network Port status LED — Indicates the network port status for connectors 1, 2, 3 and 4 (C1, C2, C3, and C4 respectively). This set of LEDs are labeled '1' on the bracket.

Network Port Status LEDs

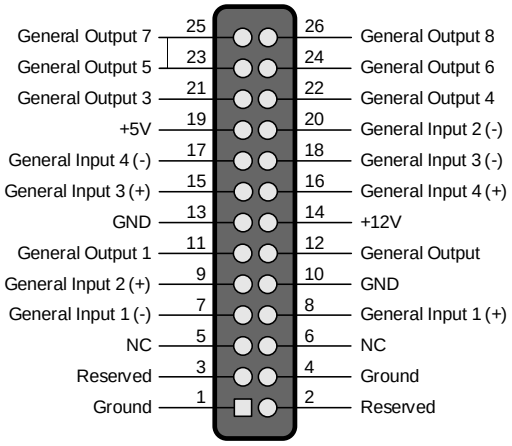
This LED status table reflects the camera activity on the ports.

LED State	Description
Red Solid	No camera detected on the port.
Constant Green	At least one camera has been detected on the port.
Flashing Green Slow ~1Hz	At least one camera has been detected on the port and data transfer may take place.
Flashing Green Fast ~4Hz	Acquisition from at least one camera is in progress on the port.

C1, C2, C3, C4: Adapter Port Connectors

Connectors C1 to C4 (Port 1 to Port 4) are used to connect GigE cameras to the Xtium2-XGV by means of an RJ45 transceiver or SFP+ transceiver.

J1: Internal I/O Signals Connector (26-pin TST-113-01-G-D)



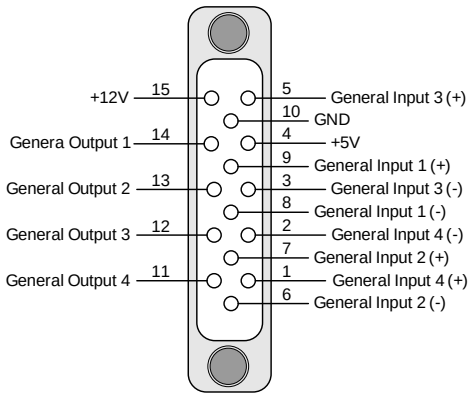
User Interface Extension Connector
26 Positions
(TST-113-01-G-D)

Description	Pin #	Pin #	Description
Ground	1	2	Reserved
Reserved	3	4	Ground
NC	5	6	NC
General Input 1 (-)	7	8	General Input 1 (+) (*See General Inputs Specifications*)
General Input 2 (+)	9	10	Ground
General Output 1 (*See General Outputs Specifications*)	11	12	General Output 2
Ground	13	14	Power Output 12 Volts, 350mA max
General Input 3 (+)	15	16	General Input 4 (+)
General Input 4 (-)	17	18	General Input 3 (-)
Power Output 5 Volts, 100mA max	19	20	General Input 2 (-)
General Output 3	21	22	General Output 4
General Output 5	23	24	General Output 6
General Output 7	25	26	General Output 8

J8: External I/O Signals Connector (Female VGA-15P)

WARNING

J1 and J8 have the same signal assignment. Signals are routed to both connectors directly from their internal circuitry. Therefore never connect both J1 and J8 to external devices at the same time.



User Interface Connector
15 Positions
(HD15-SN-24)

Description	Pin #
General Input 4 (+)	1
General Input 4 (-)	2
General Input 3 (-)	3
Power Output 5 Volts, 100mA max	4
General Input 2 (-)	5
General Input 3 (+)	6
General Input 2 (+)	7
General Input 1 (-)	8
General Input 1 (+) (*See General Inputs Specifications*)	9
Ground	10
General Output 4	11
General Output 3	12
General Output 2	13
General Output 1 (*See General Outputs Specifications*)	14
Power Output 12 Volts, 350mA max	15

General Inputs Specifications

Each of the four General Inputs are opto-coupled and able to connect to differential or single ended source signals. These inputs generate individual interrupts and are read by the Sapera application. The following figure is typical for each Genera Input.

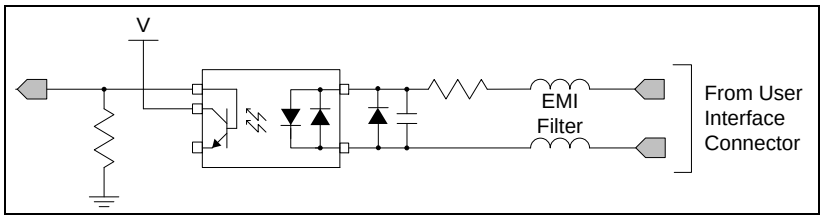


Figure 5: General Inputs Electrical Diagram

Input Details:

- Maximum input voltage is 26V.
- Maximum input signal frequency is 100 KHz.
- Each input has a 649-ohm series resistor on the opto-coupler input.
- The 0.01uF capacitor provide high frequency noise filtering.
- Minimum current is dependent on input voltage applied: Ioptoin(min) = (Voptoin - 0.5)/649Ω
- The switch point is software programmable to support differential RS-422 or single ended TTL, 12V or 24V input signals.

Control:

See I/O Controls Category section.

Trigger Signal Total Delay

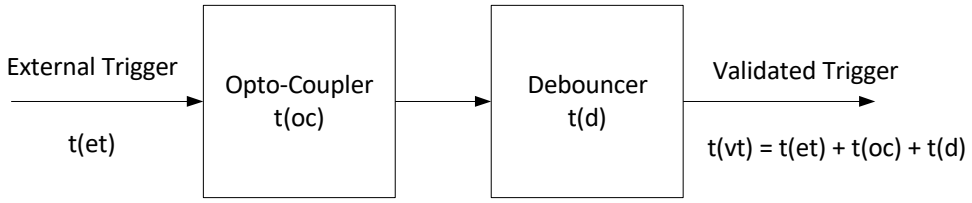


Figure 6: External Trigger Input Validation & Delay

Let	t(et) = time of external trigger in µs t(oc) = time opto-coupler takes to change state (time varies dependent on input voltage) t(d) = user set debounce duration from 1 to 255µs t(vt) = time of validated trigger in µs

NOTE

Without an install.ini, configuration information is not preserved and is always set to factory default.

If the duration of the external trigger is > t(oc) + t(d), then a valid trigger is detected.

Trigger Level	Switch Point	Propagation Delay t(oc) (*rising edge signal* ↑)	Propagation Delay t(oc) (*falling edge signal* ↓)
RS-422	1.6V	1.75 µs	5.5 µs
TTL	1.6V	1.75 µs	5.5 µs
12V	6V	2.6 µs	2.6 µs
24V	12V	1.9 µs	3.1 µs

Block Diagram: Connecting External Drivers to General Inputs on J1

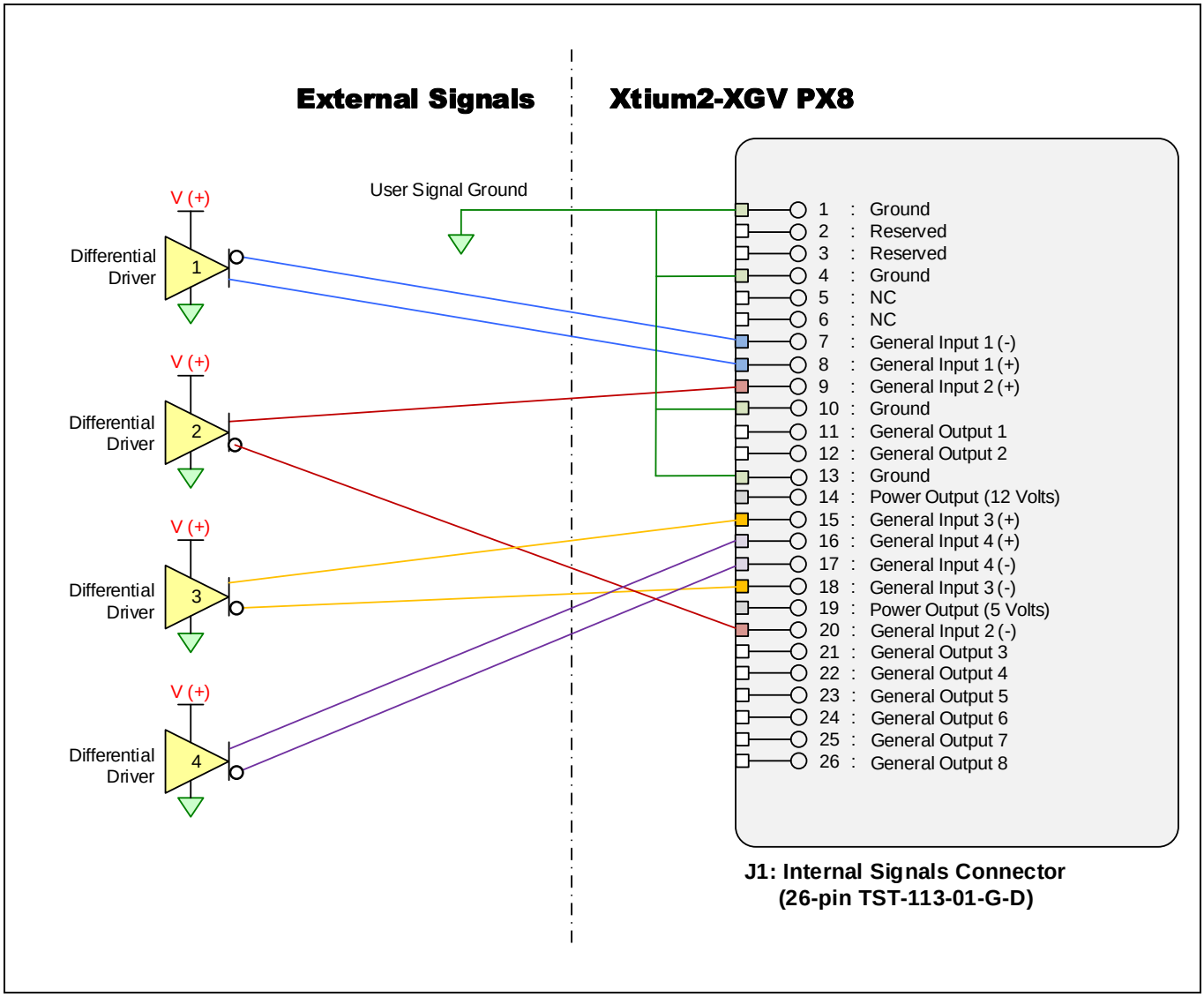


Figure 7:External Signals Connection Diagram

External Driver Electrical Requirements

The Xtium2-XGV allows user selected (software programmable) input switching points to support differential (RS-422) input signals and single ended (TTL, 12V or 24V) input signals. The following table defines the external signal voltage requirements from the driver circuits connected to the Xtium2 external inputs.

Input Level	Description	MIN	MAX
RS-422	Output Voltage High (V_{OH})	2.4 V	13.0 V
	Output Voltage Low (V_{OL})	-2.4 V	-13.0 V
TTL	Output Voltage High (V_{OH})	2.4 V	5.5 V
	Output Voltage Low (V_{OL})	0 V	0.8 V
12V	Output Voltage High (V_{OH})	9 V	13.2 V
	Output Voltage Low (V_{OL})	0 V	3 V
24V	Output Voltage High (V_{OH})	18 V	26.4 V
	Output Voltage Low (V_{OL})	0 V	6 V

General Outputs Specifications

Each of the four General Outputs are TTL (3.3V) compatible. The following figure is typical for each General Output.

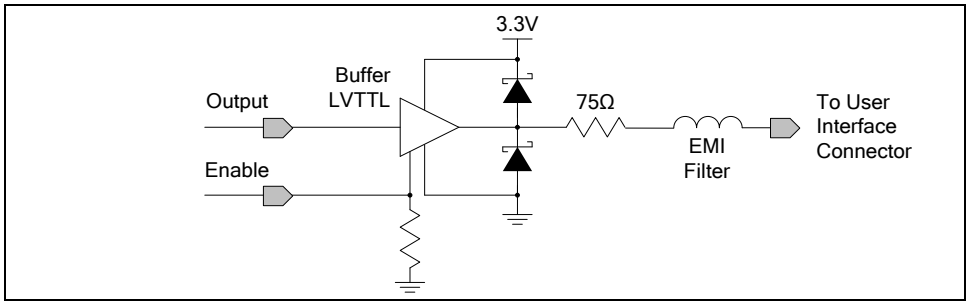


Figure 8: General Outputs Electrical Diagram

Output Details:

- Each output has a 75-ohm series resistor
- The 2 diodes protects the LVTTL buffer against overvoltage
- Each output is a tri-state driver, enabled by software
- Minimum guaranteed output current is +/- 24mA @ 3.3V
- Maximum output current is 50mA
- Maximum short circuit output current is 44mA
- Minimum voltage for output level high is 2.4V, while maximum voltage for output low is 0.55V

Control:

See I/O Controls Category section.

Block Diagram: Connecting External Receivers to the General Outputs

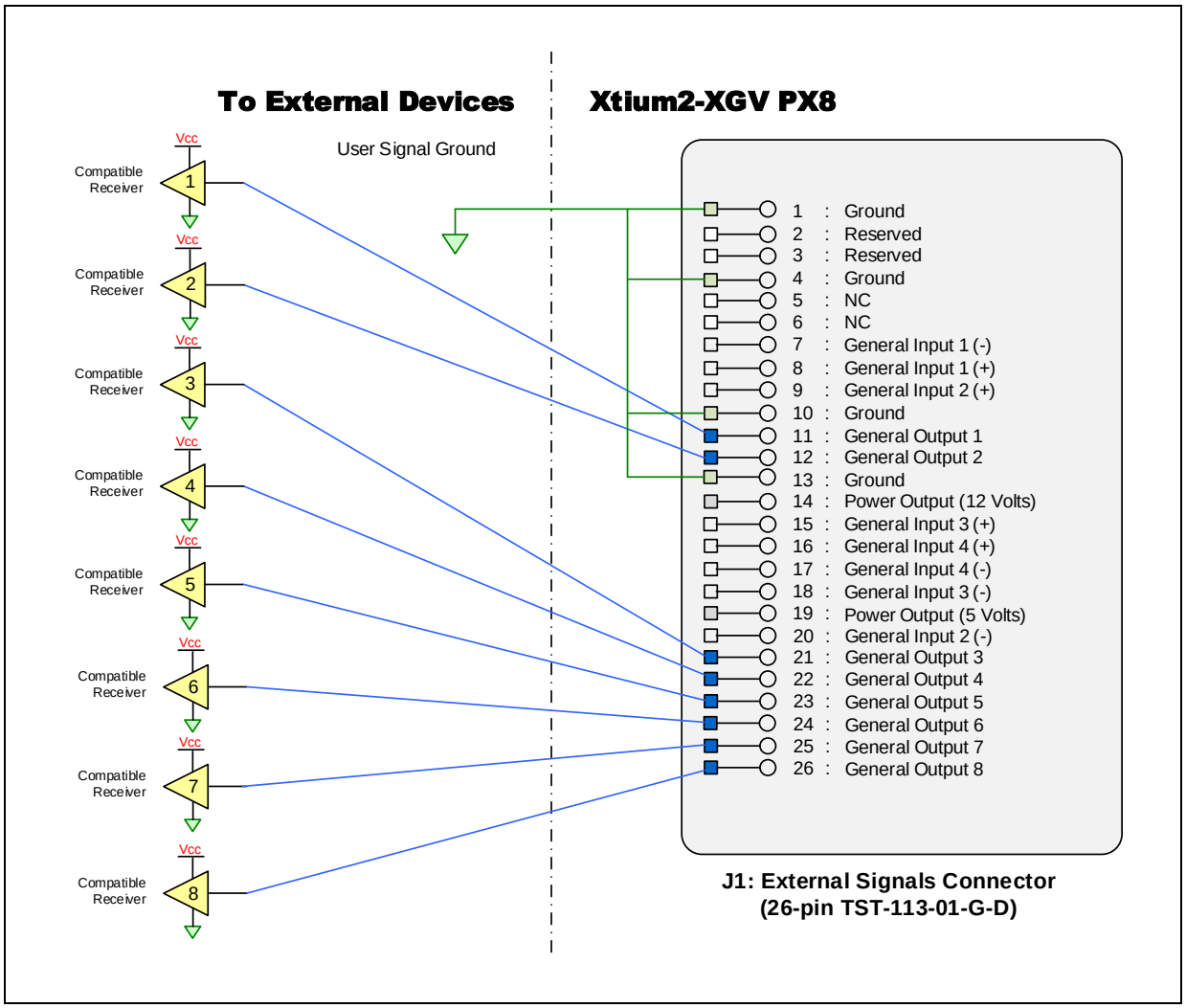


Figure 9:Output Signals Connection Diagram

External Receiver Electrical Requirements

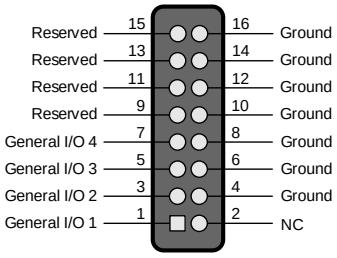
- Xtium2 General Outputs are standard TTL logic levels.
- External receiver circuits must be compatible to TTL signals.

Xtium2-XGV Output Level	Description	MIN	MAX
TTL	Output Voltage High (V_H)	2.0 V	–
	Output Voltage Low (V_L)	–	0.8 V

J2: Multi-Board Sync / Bi-directional General I/Os

There are 4 bi-directional General I/Os that can be interconnected between multiple boards. These bi-directional I/Os can be read/written by Sapera application. Bi-directional General I/Os can also act as multi-board sync I/Os.

The multi-board sync feature permits interconnecting multiple Xtium2 boards to synchronize external triggers. The trigger source origin can be either an external signal or a software control signal. The board sending the trigger(s) is the “Sync Master” board, while the one or more boards receiving the control signal(s) are “Sync Slaves”.



Open Interface Connector
16 Positions
(SHF-108-01-L-D-RA)

Description	Pin #
General I/O 1	1
NC	2
General I/O 2	3
Ground	4
General I/O 3	5
Ground	6
General I/O 4	7
Ground	8
Reserved	9
Ground	10
Reserved	11
Ground	12
Reserved	13
Ground	14
Reserved	15

Hardware Preparation

Interconnect two, three, or four Xtium2 boards via their J2 connector using the OR-YXCC-BSYNC20 cable (for 2 boards) or the OR-YXCC-BSYNC40 cable (see Cable assemblies for I/O connector J8 for 3 or 4 boards).

WARNING

Multi-Board Sync / Bi-directional General I/Os are only for use with Teledyne DALSA frame grabbers within the same PC, otherwise electrical damage to boards can occur.

Configuration via Sapera Application Programming

- See I/O Controls Category.

Cables & Accessories

The following cables and accessories are available for purchase via third party vendors or Teledyne DALSA. Contact sales for information.

GigE Cables and SFP+ Modules Overview and Resources

In general, an SFP+ to RJ45 copper module rated for 10G along with a compliant Ethernet cable of category 6A or higher is acceptable for use between the GigE camera and the Xtium2-XGV.

For additional information on cables and their specifications, visit the following web site:

FiberStore	https://www.fs.com

WARNING

SFP+ connectors and cables are considered a Class 1 laser product. Because invisible laser radiation can be emitted from the aperture of the port when no fiber is connected, avoid exposure to laser radiation and do not stare into open apertures. Laser radiation is present when the system is open and interlocks bypassed. Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Part number: OR-YXCC-DB153 - Cable to Blunt End

Sold Separately

Cable assembly consists of a 3m (~9 ft.) blunt end cable to mate to Xtium2 external connector**J8**.

NOTE

The applicable wiring color code table is included with the printed Product Notice shipped with the cable package — no other wiring table should be used.

Figure 10:VGA-15P Cable to Blunt End (OR-YXCC-DB153)

Pin No.	Wire Color Codes		Description
	Base Color	Stripe Color	
1	COAX Red	-	General Input 4 (+)
2	COAX Green	-	General Input 4 (-)
3	COAX Blue	-	General Input 3 (-)
4	Brown	-	Power Output 5 Volts, 100mA max
5	Red	-	General Input 3 (+)
6	Drain Red COAX	-	General Input 2 (-)
7	Drain Green COAX	-	General Input 2 (+)
8	Drain Blue COAX	-	General Input 1 (-)
9	Yellow	-	General Input 1 (+)
10	Orange	-	Ground
11	Black	-	General Output 4
12	Red	White	General Output 3
13	Orange	White	General Output 2
14	Brown	White	General Output 1
15	Black	White	Power Output 12 Volts, 350mA max

Part number: OR-YXCC-DB25F - Cable assemblies for I/O connector J1

Sold separately.

Flat ribbon cables for connecting J1 to a DB25 bracket can be purchased from Teledyne or from third party suppliers.

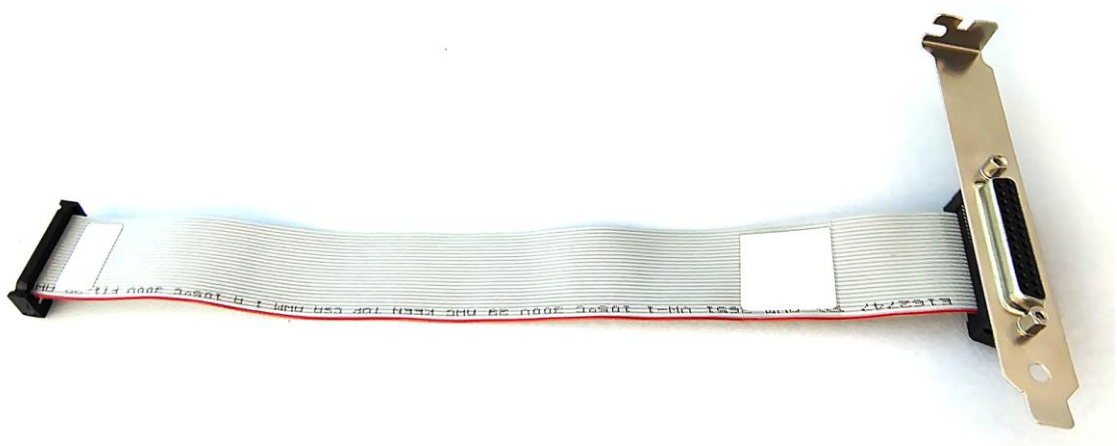


Figure 11: DB25 Output Cable

External Signals Connector Bracket Assembly

The External Signals bracket (OR-YXCC-DB25F) provides a simple way to bring out the signals from the External Signals Connector **J1 to a bracket mounted DB25**. Install the bracket assembly into an adjacent PC expansion slot and connect the free cable end to the board's J1 header. When connecting the cable make sure that the cable pin 1 goes to J1 pin 1.

External Signals Connector Bracket Drawing

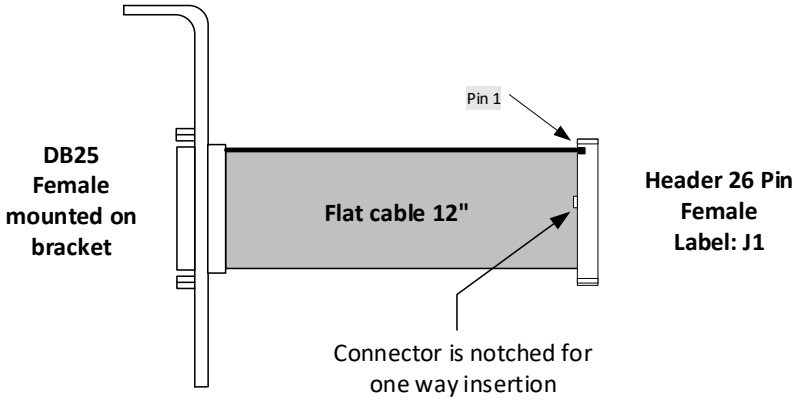


Figure 12: DB25 Output Cable - Details

External Signals Connector Bracket Pinout

The following table defines the signal pinout on the DB25 connector when connected to J1 of the Xtium2-XGV board. \

DB25 Pin Number	Signal	J8 Connector Pin Number
1	Ground	1
14	Reserved	2
2	Reserved	3
15	Ground	4
3	NC	5
16	NC	6
4	General Input 1 (-)	7
17	General Input 1 (+)	8
5	General Input 2 (+)	9
18	Ground	10
6	General Output 1	11
19	General Output 2	12
7	Ground	13
20	Power Output 12 Volts, 350mA max	14
8	General Input 3 (+)	15
21	General Input 4 (+)	16
9	General Input 4 (-)	17
22	General Input 3 (-)	18
10	Power Output 5 Volts, 100mA max	19
23	General Input 2 (-)	20
11	General Output 3	21
24	General Output 4	22
12	General Output 5	23
25	General Output 6	24
13	General Output 7	25

Part Number:OR-YXCC-BSYNC40 - Board Sync Cable Assembly

Sold separately.

This cable connects 3 to 4 Xtium2 boards for the board sync function as described in section J2: Multi-Board Sync / Bi-directional General I/Os. For a shorter 2 board cable, order cable assembly OR-YXCC-BSYNC20.

For a third part source of cables, see https://suddendocs.samtec.com/prints/ffsd-xx-x-xx.xx-01-x-x-xxx-mkt.pdf.

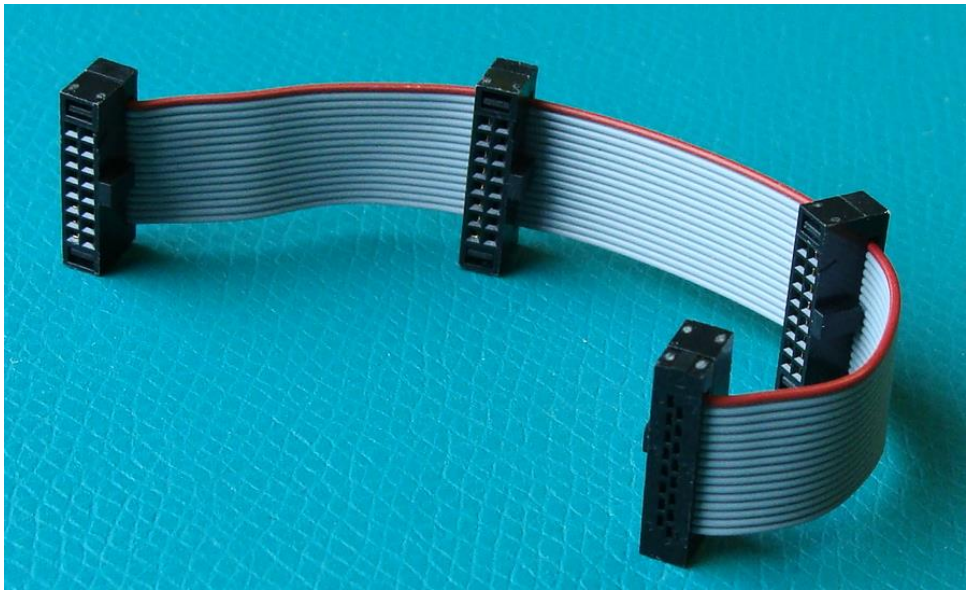


Figure 13: Photo of cable OR-YXCC-BSYNC40

EMC Declarations of Conformity

Copies of the Declarations of Conformity documents are available on the product page on the Teledyne DALSA website or by request.

FCC Statement of Conformance

This equipment complies with Part 15 of the FCC rules. Operation is subject to the following conditions:

1. The product may not cause harmful interference; and
2. The product must accept any interference received, including interference that may cause undesired operation.

FCC Class A Product

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

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment is intended to be a component of a larger industrial system.

EU and UKCA Declaration of Conformity

Teledyne Dalsa declares that this product complies with applicable standards and regulations.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This product is intended to be a component of a larger system and must be installed as per instructions to ensure compliance.

Installing Xtium2-XGV

Warning! (Grounding Instructions)

Static electricity can damage electronic components. Please discharge any static electrical charge by touching a grounded surface, such as the metal computer chassis, before performing any hardware installation. If you do not feel comfortable performing the installation, please consult a qualified computer technician.

WARNING

Never remove or install any hardware component with the computer power on. Disconnect the power cord from the computer to disable the power standby mode. This prevents the case where some computers unexpectedly power up when a board is installed.

Installation

The installation sequence is as follows:

- Install the board hardware into an available PCI Express x8 Gen3 slot.
- Turn on the computer.
- Install the Sapera LT Development Library or only its 'runtime library'.
- Install the Xtium2-XGV Sapera board driver.
- Update the board firmware if required.
- Reboot the computer.
- Connect a GenICam GigE Vision camera and test.

NOTE

The Xtium2-XGV does not currently support Chunk Data (metadata); cameras with Chunk Data enabled are unable to connect to the Xtium XGV and an error message is generated. If necessary, use another adapter to connect to cameras to disable Chunk Data before connected to the Xtium XGV.

See the Quick Start Setup & Installation section for a step-by-step guide to this procedure.

Additional Installation Types:

Other installation types include:

- Upgrading Sapera or Board Driver
- Preserving Board Parameters during Board Replacement
- Silent Installation

Refer to the Appendix: Additional Installation Types for more information on these installations.

Hardware Installation

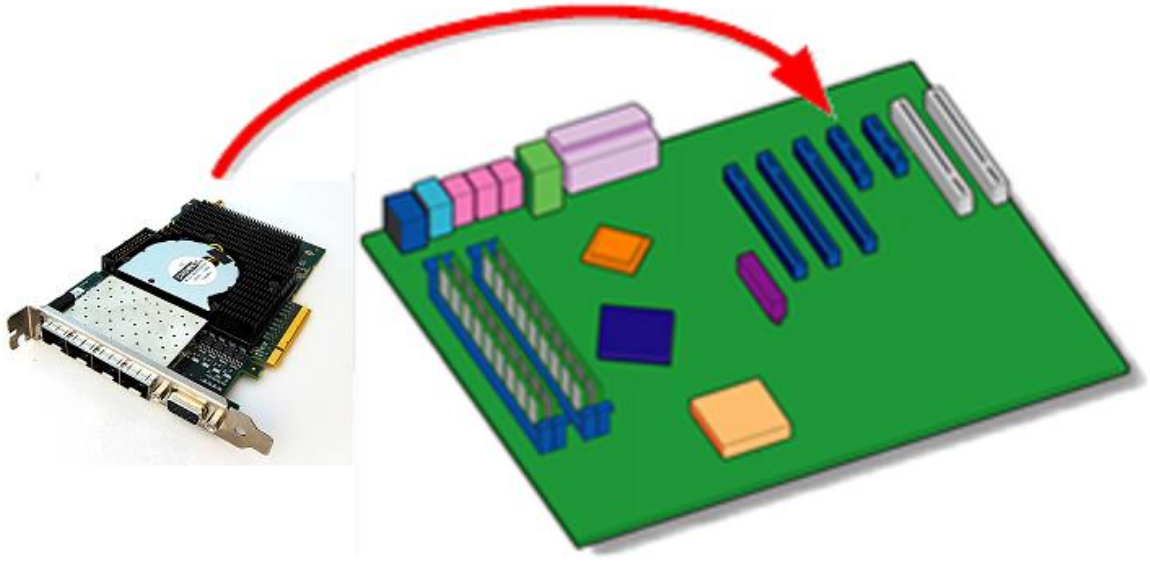
- Turn the computer off, disconnect the power cord (disables power standby mode), and open the computer chassis to allow access to the expansion slot area.
- Install the Xtium2-XGV into a free PCI Express x8 Gen3 expansion slot. Note that some computer's x16 slot may support boards such as the Xtium2-XGV, not just display adapters.
- Close the computer chassis and turn the computer on.
- Logon to the computer as administrator or with an account that has administrator privileges.
- Connect a camera to network port P1, or the output of a switch for multiple cameras, and optionally to network ports P2, P3 and P4, after installing Sapera as described below. Test with CamExpert.

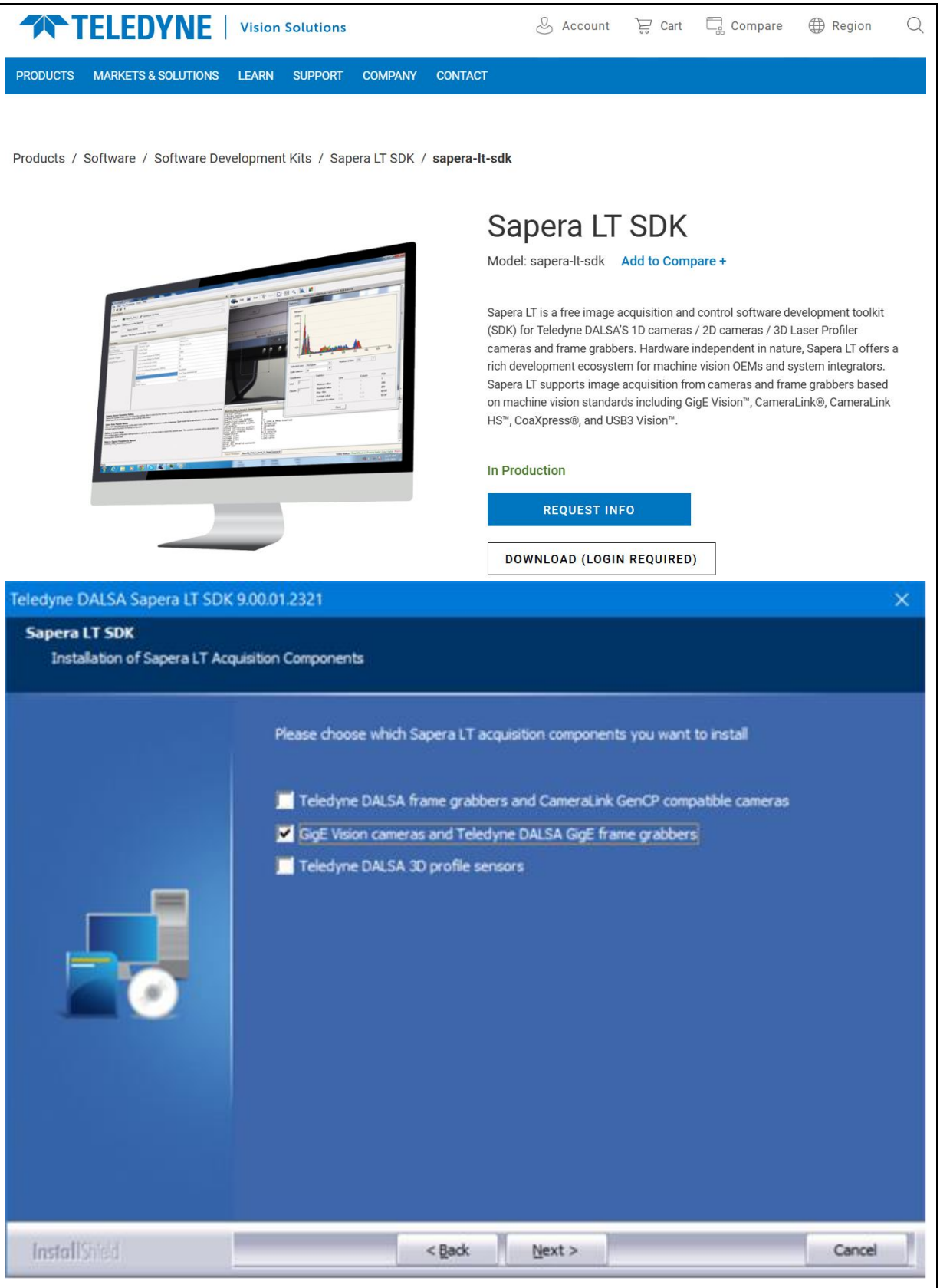
Multi-board Sync & I/O Setup

- For multi-board sync applications, see J2: Multi-Board Sync / Bi-directional General I/Os for information on using two to four Xtium2-XGV boards in one computer.

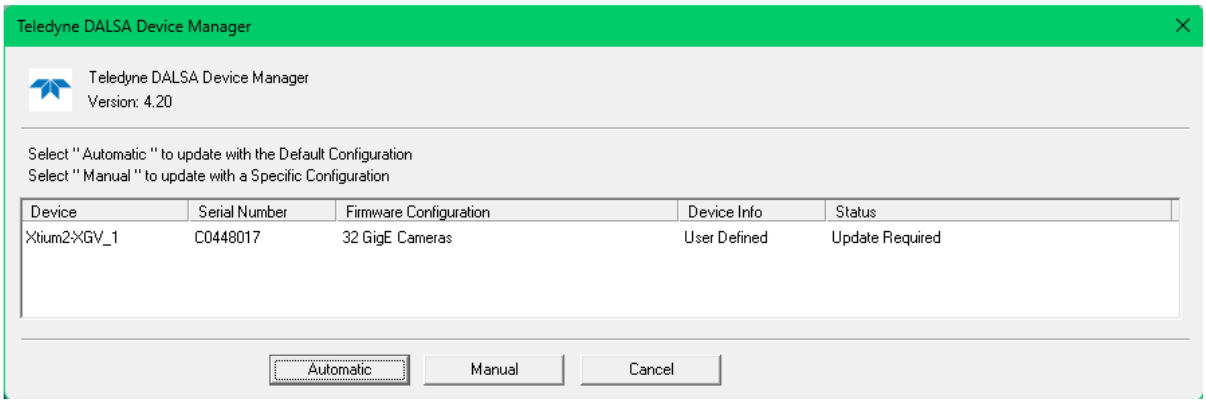
Quick Start Setup & Installation

The following procedure outlines the basic steps required to install the Teledyne DALSA Xtium2-XGV. For complete installation details and information, see Installing Xtium2-XGV.

1	Install the Xtium2-XGV in an available PCIe x8 slot on the host computer. 
2	Download and install the Sapera LT SDK software from the Teledyne Vision Solutions website.

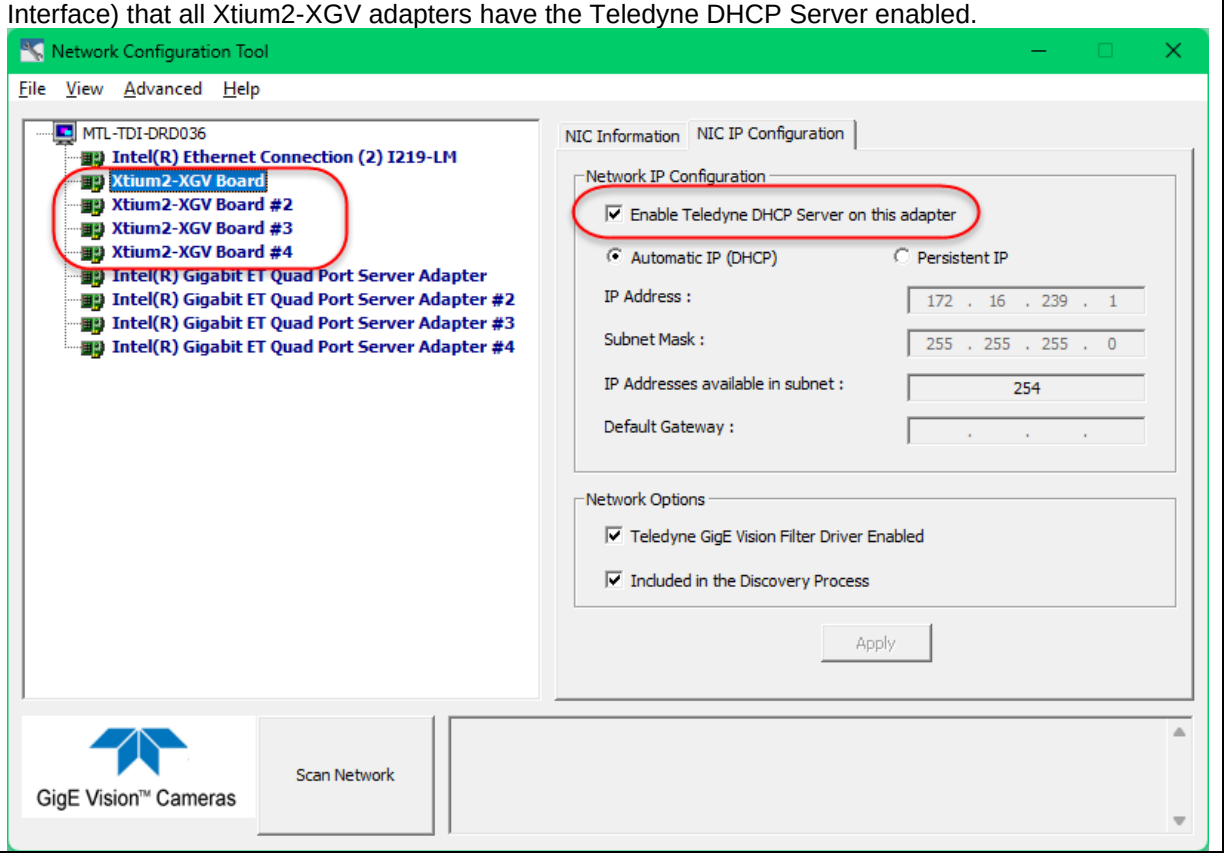


Make sure to select the 'GigE Vision cameras and Teledyne DALSA GigE frame grabbers' component.

3	Download and install the Xtium2-XGV device driver from the Teledyne Vision Solutions website. 
4	To complete the installation, update the Xtium2-XGV firmware when prompted; select Automatic to update the firmware (to default configuration) or select Manual to choose an alternate configuration).  Reboot when all software and board drivers are installed.

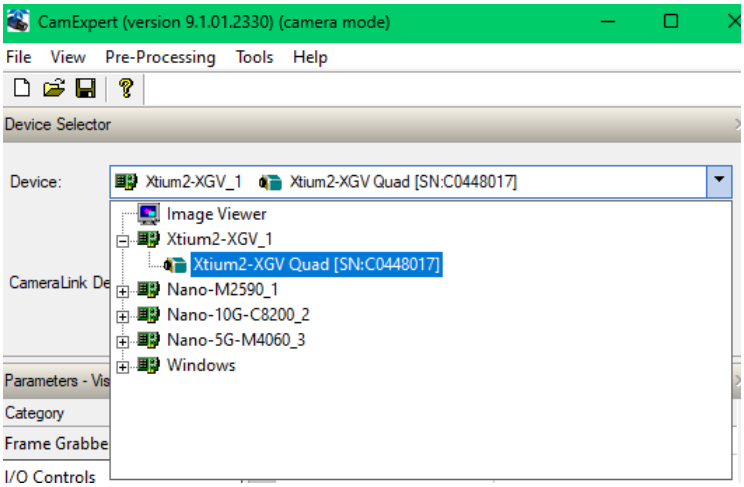
5

Verify in the Network Configuration Tool (available from the Start menu under Teledyne GigE Vision Interface) that all Xtium2-XGV adapters have the Teledyne DHCP Server enabled.



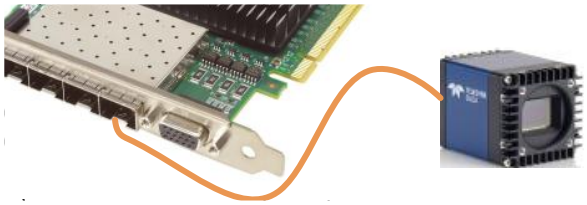
6

Launch Sapera LT CamExpert to verify the installation; the board should be present in the list of available devices.



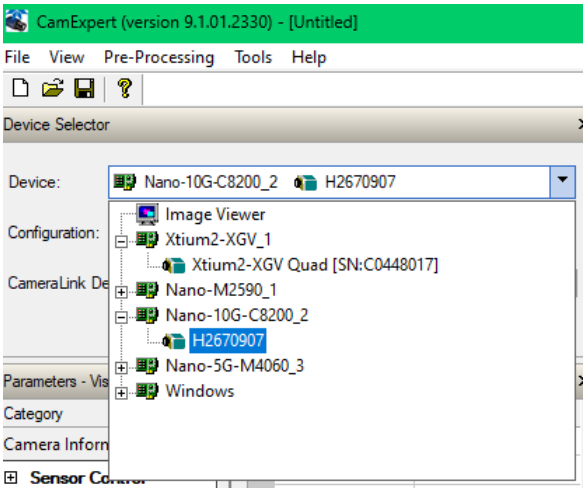
7

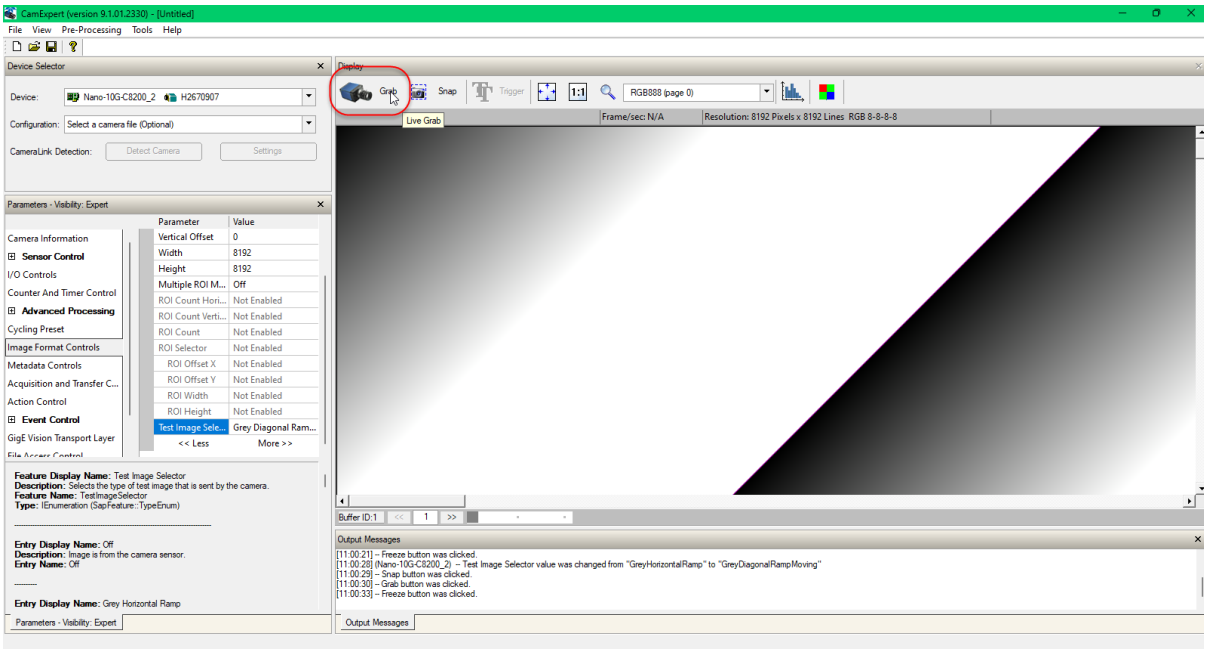
Connect a camera to one of the board's camera connector. Ensure camera is properly powered. Camera can be connected using standard Ethernet (CAT5 or CAT6) RJ-45 cables.



8

When CamExpert detects a camera, the camera server will appear in the list of devices.



9	Click Grab to acquire a test image to validate the setup. 
10	Finally, verify the PCIe performance using the Diagnostic tool; see the Optimizing PCI Express x8 Gen3 Interface section for information on how to do so..

Xtium2-XGV Firmware Loader

The Device Manager Firmware Loader program automatically executes at the end of the driver installation and on every subsequent reboot of the computer. It will determine if the Xtium2-XGV requires a firmware update. If firmware is required, a dialog displays. This dialog also allows the user to load alternative firmware if available for the Xtium2-XGV.

IMPORTANT
In the rare case of firmware loader errors please see Recovering from a Firmware Update Error.

Firmware Update: Automatic Mode

Click **Automatic** to update the Xtium2-XGV firmware. The **Xtium2-XGV** currently supports one firmware configuration.

See User Programmable Configurations for details on all supported modes, selected via a manual update of alternative firmware.

With multiple Xtium2-XGV boards in the system, all boards update with new firmware. If any installed Xtium2-XGV board installed in a system already has the correct firmware version, an update is not required. In the following screen shot, a single Xtium2-XGV board is installed and ready for a firmware upgrade.

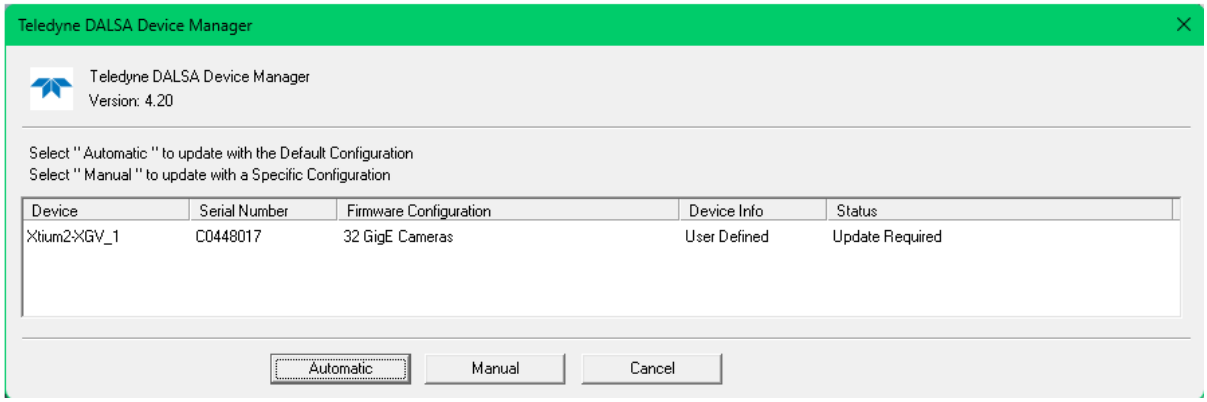


Figure 14: Automatic Firmware Update

See the following sections for more information on firmware updates, system upgrades and silent installation :

- Firmware Update: Manual Mode
- Upgrading Sapera or Board Driver
- Preserving Board Parameters during Board Replacement or System Cloning
- Displaying Xtium2-XGV Board Information
- Requirements for a Silent Install

Optimization of Bandwidth on PCIe

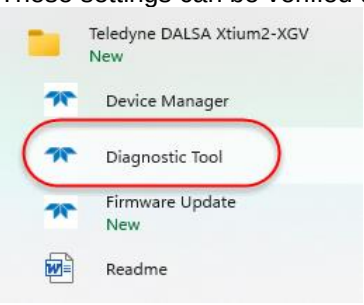
The Xtium2-XGV is a universal PCI Express x8 Gen3 board, compliant with the PCI Express 3.0 specification. The Xtium2-XGV board achieves transfer rates up to 7.0Gbytes/sec to host memory.

- PCIe bus Output: up to 7.0GB/sec sustained (PCIe Payload @ 512 bytes)
- PCIe bus Output: up to 6.8GB/sec sustained (PCIe Payload @ 256 bytes)

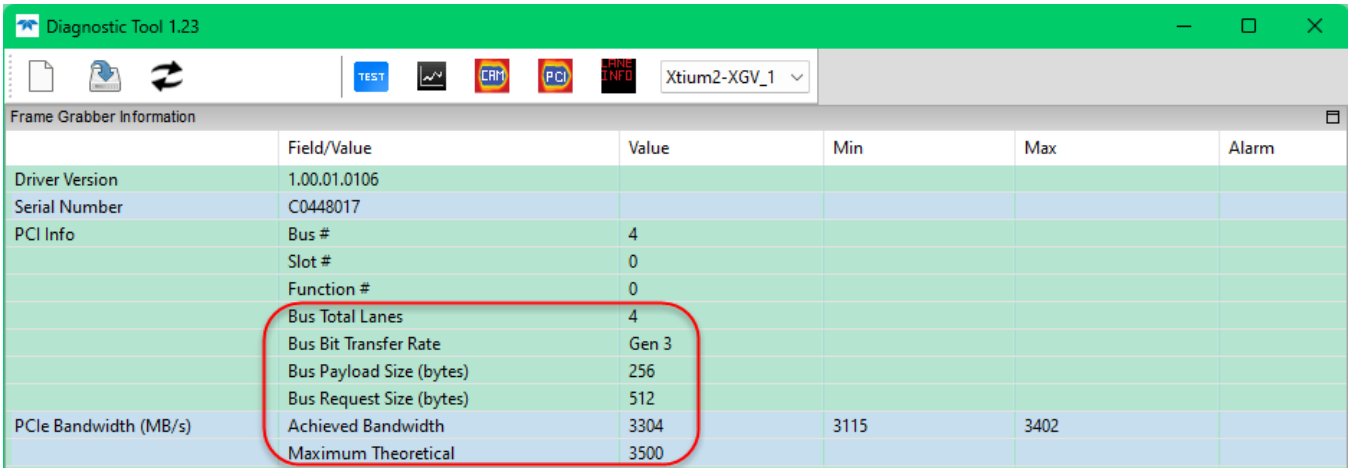
Important:

- To obtain the maximum transfer rate to host memory, make sure the Xtium2-XGV is in a computer with a Gen3 x8 slot. The board will work in a Gen1 or Gen2 slot, but only with a quarter or half the possible transfer performance respectively.
- The system motherboard BIOS should allow setting the PCIe maximum payload size to 256 or higher. Systems with fixed settings of 128 will limit performance for transfers to host memory. By default, this should be maximized.

These settings can be verified using the Diagnostic tool (available from the Windows Start menu):



For example, here the Diagnostic Tool shows that the Xtium2-XGV is installed in an Gen3 x4 slot, resulting in reduced PCIe bandwidth and lower performance:



	Field/Value	Value	Min	Max	Alarm
Driver Version	1.00.01.0106				
Serial Number	C0448017				
PCI Info	Bus #	4			
	Slot #	0			
	Function #	0			
	Bus Total Lanes	4			
	Bus Bit Transfer Rate	Gen 3			
	Bus Payload Size (bytes)	256			
	Bus Request Size (bytes)	512			
PCIe Bandwidth (MB/s)	Achieved Bandwidth	3304	3115	3402	
	Maximum Theoretical	3500			

The maximum bus payload size for the motherboard in this particular slot should also be verified; refer to the motherboard documentation and check the BIOS settings if necessary to ensure that the maximum possible value is enabled (the Xtium2-XGV supports PCIe bus payloads up to 1024 bytes).

This information is also available from the Teledyne PCI Diagnostic tool available with installation of Sapera LT (available under the Windows Start menu under Teledyne DALSA Sapera LT).

On-Board Image Buffer Memory Allocation

The Xtium2-XGV has 4GB of on-board memory for image buffer allocation (this memory is shared with processing functions. By default, each camera is allocated 128MB. The Xtium2-XGV allocates at least 3 image buffers for each camera, dynamically increasing the memory as required per camera if the size required for 3 buffers exceeds the default. This default can be changed if required (for example, to maximize memory usage if the number of cameras is limited) with the Device Manager utility by modifying the *InternalLocalMemSize* parameter.

The following equation calculates the memory required for a given size image and MTU for a camera:

blockSize = ((*MaxPacketSize(MTU)* + 42 + 64) + 1023)/1024

Camera Image Size = (*width in pixels* * *height in lines* * *bits per pixels*) / 8

nb_block = (camera Image Size / (*MaxPacketSize(MTU)* - 132)) + 4

nb_Images_In_FG = 128MB(default) / (*blockSize* * *nb_block*)

*Image Size in Frame Grabber = blockSize * nb_block * nb_Images_In_FG*

For example, if each image requires 20MB, with the default memory of 128MB, 6 image buffers are allocated (8MB remain unused). If each image requires 100MB, then the frame grabber dynamically increases the amount of memory allocated to 300MB to allocate 3 image buffers.

NOTE

If with less than 32 cameras all 4GB of on-board memory are allocated (or not enough memory is available to allocate 3 image buffers), no additional cameras will be able to connect and an error message is generated.

Using Xtium2-XGV with Sapera LT SDK

Sapera LT Library & Xtium2-XGV Driver Installation

Download and install the Sapera LT SDK software from the Teledyne DALSA website. Make sure to select the Frame Grabber and GigE Camera support.

http://teledynedalsa.com/imaging/support/downloads/sdks/

To install the full Sapera LT SDK, run *SaperaLTSDKSetup.exe*.

- Make sure Sapera LT is installed before Teledyne DALSA board drivers.
- The installation program may prompt to reboot the computer. It is not necessary to reboot the computer between the installation of Sapera LT and the board driver. Simply reboot once all the software and board drivers are installed.
- During the late stages of the installation, the Xtium2-XGV firmware loader application starts. This is described in detail in the following section.
- If Windows displays any unexpected message concerning the board, power off the system and verify the Xtium2-XGV is installed in the slot properly. You should also note the board's status LED color and compare it to the defined LED states as described in S: Boot-up/PCIe Status LED.

Refer to *Sapera LT User's Manual* for additional details about Sapera LT.

Refer to the Sapera Configuration section for information on how to use this utility to increase contiguous memory allocation, if necessary.

Sapera Servers and Resources

A Sapera Server is an abstract representation of a physical device like a frame-grabber or camera. When using the SapAcqDevice constructors, the location parameter specifies the server to use to create the object. Use the Sapera Configuration utility to find the names and indices of all Sapera servers in your system.

In Sapera LT, the Xtium2-XGV frame grabber feature are accessibly using the SapAcqDevice class.

The following table describes the Xtium2-XGV board:

Servers	**Resources**			
Name	**Type**	**Name**	**Index**	**Description**
Xtium2-XGV_1	Acquisition Device	*<DeviceModelName>* [SN:<Serial Number>]	0	Frame Grabber Non-Streamable Device

Sapera LT Supported GigE Pixel Formats

The easiest method to allocate the appropriate Sapera buffer format for the GenICam format output by the Xtium2-XGV is to use the Specialized Transfer Classes, such as the SapAcqToBuf class. These Specialized Transfer Classes automatically determine the corresponding Sapera buffer format (provided to Sapera by the Teledyne GigE Vision driver), which can then be read using the SapBuffer::GetFormat function.

Alternatively, you can retrieve the buffer information using the functions available in the SapXferNode and SapXferParams classes.

For more information on Sapera Buffer format equivalents for GenICam formats, refer to the Sapera LT C++ or .NET Programmer's Manuals.

Enabling On-Board Vertical Flip

To enable the on-board vertical flip use the Sapera LT SapXferPair::SetFlipMode function with SapXferPair::FlipVertical before calling the SapTransfer::Create or SapTransfer::Connect methods.

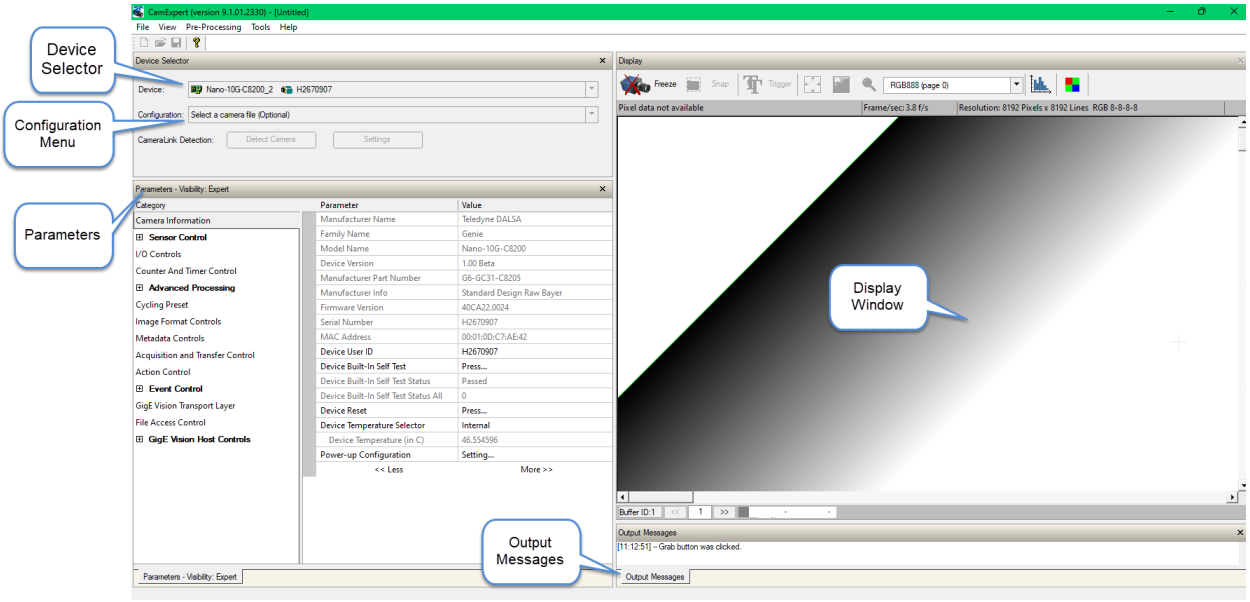
Using CamExpert with Xtium2-XGV

The Sapera CamExpert tool is the interfacing tool for Xtium2-XGV frame grabbers and connected cameras; it is supported by the Sapera library and hardware. CamExpert allows a user to test frame grabber and camera functions.

The CamExpert tool uses various panels to simplify choosing and configuring camera files or acquisition parameters for the installed devices. CamExpert:

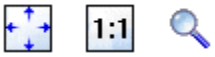
- Supports all Teledyne DALSA hardware currently supported by Sapera LT.
- Creates and modifies camera configuration (.ccf files).
- Supports Teledyne DALSA GigE Vision cameras, such as the Genie Nano series, by presenting the camera features as defined by the camera's XML file.
- Groups acquisition parameters into related categories for easier access to any specific parameter.
- Enables intelligent editing of video timings through a locking mechanism that allows explicit modification of some values and automatic recalculation of the remaining ones.
- Provides live acquisition display window that allows immediate verification of timing or control parameters without the need to run a separate acquisition program.

For connected streamable devices, the interface includes a display window to view the acquired images.



The CamExpert window is divided into panels.

- **Device Selector**: The Device menu allows you to view and select from any installed Sapera acquisition device. After a device is selected, CamExpert only presents acquisition parameters applicable to that device.
  The Configuration menu allows selecting any camera file that is included with the Sapera installation. Only camera files supported by the selected acquisition device are displayed. When there is more than one acquisition server, such as monochrome and RGB, selecting an inappropriate camera file will produce a message prompting you to select the correct acquisition server.
  The Detection command buttons allow you to detect cameras that comply with the GenICam GenCP protocol or Teledyne DALSA cameras that use the three-letter protocol. Clicking the Settings button allows you to set the camera detection communication settings.
- **Parameters**: Allows viewing or changing all acquisition parameters supported by the acquisition device. CamExpert displays parameters only if those parameters are supported by the installed device. This avoids confusion by eliminating parameter choices when they do not apply to the hardware in use.
- **Display**: Provides a live or single frame acquisition display. Frame buffer parameters are shown in an information bar above the image window. The Display pane includes CamExpert control buttons.

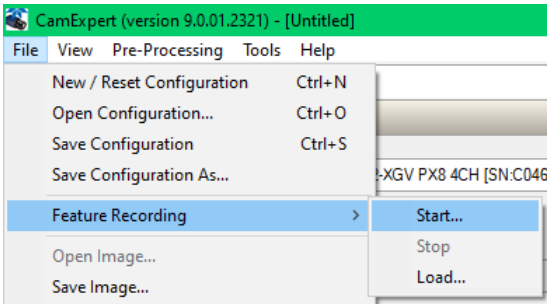
	**Acquisition control button:** Click once to start live grab, click again to stop.
	**Single frame grab:** Click to acquire one frame from device.
	**Software trigger button:** With the I/O control parameters set to Trigger Enabled / Software Trigger type, click to send a single software trigger command.
	**CamExpert display controls:** (these do not modify the frame buffer data) Stretch image to fit, set image display to original size, or zoom the image to any size and ratio.
	**Histogram / Profile tool:** Select to view a histogram or line/column profile during live acquisition.

- **Output Messages**: Displays messages from CamExpert or the device driver.
- **Camera Serial Link Command tab**: Use this to send ASCII commands from CamExpert to Teledyne DALSA CameraLink cameras.
- **Video Signal Status bar**: Located on the lower right of the CamExpert window, displays color coded camera signal status information. These are in green for valid signals detected, and in red for missing or incorrect signals. Video status items may differ with different devices.

Feature Recording

Sapera LT supports feature recording which allows you to record feature setting changes to a .txt file that can then be loaded to another device of the same model. This is supported by the Xtium2-XGV and allows you to load the same feature setting configuration to other frame grabbers, which can be useful when setting up multiple systems.

In CamExpert, to start feature recording, from the File menu, use the **Feature Recording > Start...** command.



You will be prompted to provide a location to save the feature recording .txt file which will automatically be updated when the feature recording is stopped using the **Feature Recording > Stop** command.

Use the **Feature Recording > Load...** command to upload the feature settings to an Xtium2-XGV device.

Xtium2-XGV Utilities

The Xtium2-XGV driver installation includes the following utility programs:

- Device Manager
- Firmware Loader
- Teledyne LogViewer
- Network Configuration Tool (included with the Teledyne Gig Vision Interface)
- Xtium2 Diagnostic Tool
- PCI Diagnostic Tool

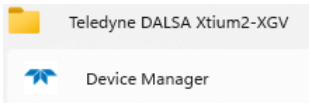
The Sapera LT installation includes these additional utility programs:

- Sapera Monitor
- Sapera Configuration

Device Manager

The Device Manager utility allows users to perform firmware updates, reset the board, and configure various board settings, such as GPIOs. The Device Manager program also displays information about the Xtium2-XGV boards installed in the system.

It is available from the Windows Start menu under **Teledyne DALSA Xtium2-XGV • Device Manager**.



Device Manager – Board Viewer

The following screen image shows the Device Manager program with the Information/Firmware tab active. The left window displays all Teledyne DALSA boards in the system and their individual device components. The right window displays the information stored in the selected board device.

Generate the Xtium2-XGV device manager report file (BoardInfo.txt) by clicking **File • Save Device Info**. Teledyne DALSA Technical Support may request this report to aid in troubleshooting installation or operational problems.

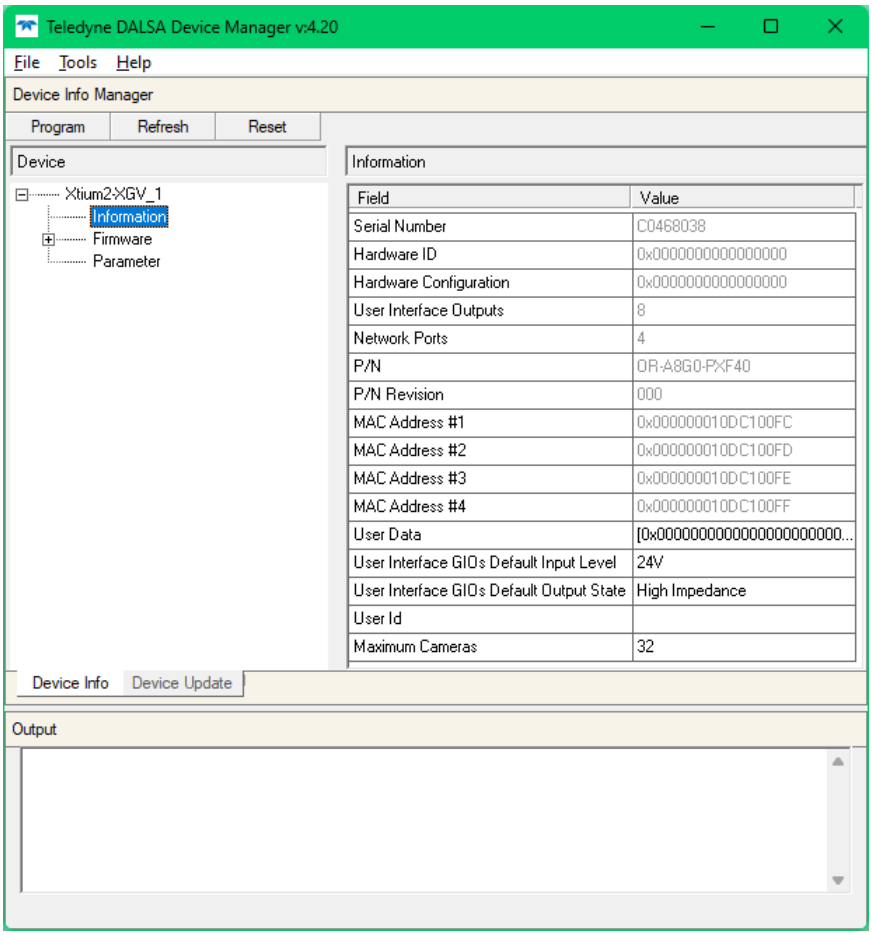
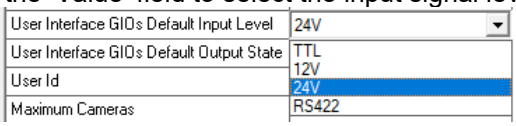
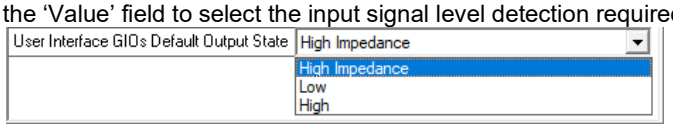


Figure 15: Board Information via Device Manager

Information Field Descriptions

Field	Description
Serial Number	[Read-Only]: Serial Number of the board.
Hardware ID	[Read-Only]: Identifies hardware changes that affect the operation of the board.
Hardware Configuration	[Read-Only]: States the presence or absence of optional components. Possible values are: • **0x0000000000000000**
User Interface Outputs	[Read-Only]: Number of available user interface outputs on the board. For this board, the value is 8.
Network Ports	[Read-Only]: Indicates the number of network ports the board has. Possible values are: • 2: Dual board • 4: Quad board
P/N	[Read-Only]: Indicates the part number of the board.
P/N Revision	[Read-Only]: Indicates the revision of the part number.
MAC Address #1	MAC Address of the 1st network port on the board.
MAC Address #2	MAC Address of the 2ndt network port on the board.
MAC Address #3	MAC Address of the 3rd network port on the board.
MAC Address #4	MAC Address of the 4th network port on the board.
User Data	[Read/Write]: This is a 64-byte general purpose user storage area. For information on how to read/write this field at the application level, contact Teledyne DALSA Technical Support.
User Interface GIOs Default Input Level	[Read/Write]: Use this field to select the default input level of the User Interface GIOs. Click on the 'Value' field to select the input signal level detection required.  By default, boards are shipped with User Interface General Inputs set to 24V. Note that the input level can also be modified at the application level.
User Interface GIOs Default Output State	[Read/Write]: Use this field to select the default Output State of the User Interface GIOs. Click on the 'Value' field to select the input signal level detection required.  By default, boards are shipped with User Interface General Outputs set to High Impedance. Note that the output state can also be modified at the application level.
Maximum Cameras	Displays the maximum number of cameras, across all adapters, supported by the current firmware configuration.

Firmware Information

The Firmware Information panel displays details about the currently installed firmware, such as the Version number and its creation date. The Modified field indicates when the firmware was installed on the host machine.

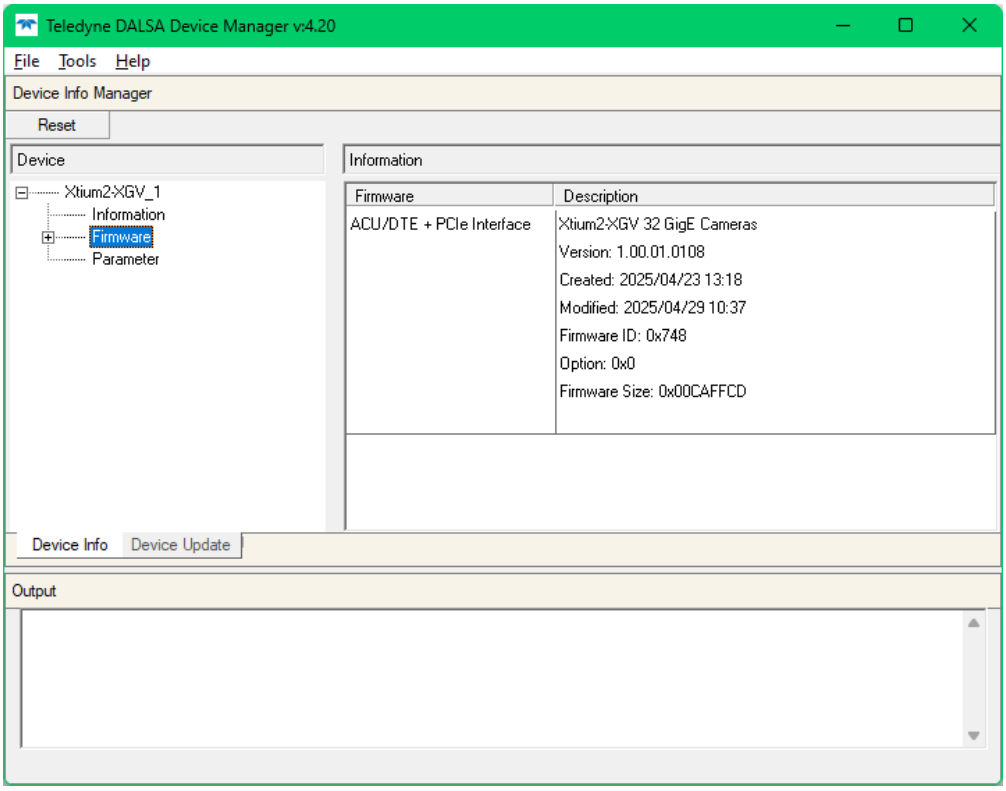


Figure 16: Firmware Information via Device Manager

The firmware itself is composed of what is referred to as the ACU (Acquisition Control Unit), DTE (Data Transfer Engine) and PCIe Interface.

Clicking on the ACU/DTE + PCIe Interface node allows you to manually load a firmware file (.cbf).

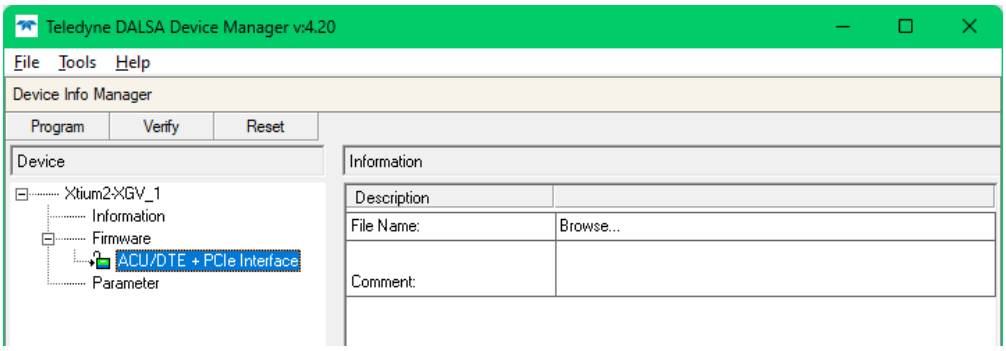


Figure 17: Manually Loading Firmware via Device Manager

Parameter Information

The Parameter panel displays the current value of various settings. In general, these parameters are for trouble shooting and it is not recommended that these be modified.

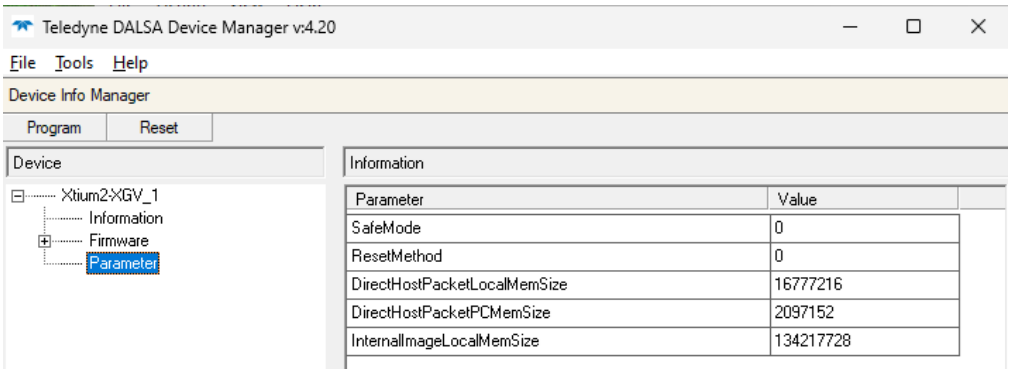


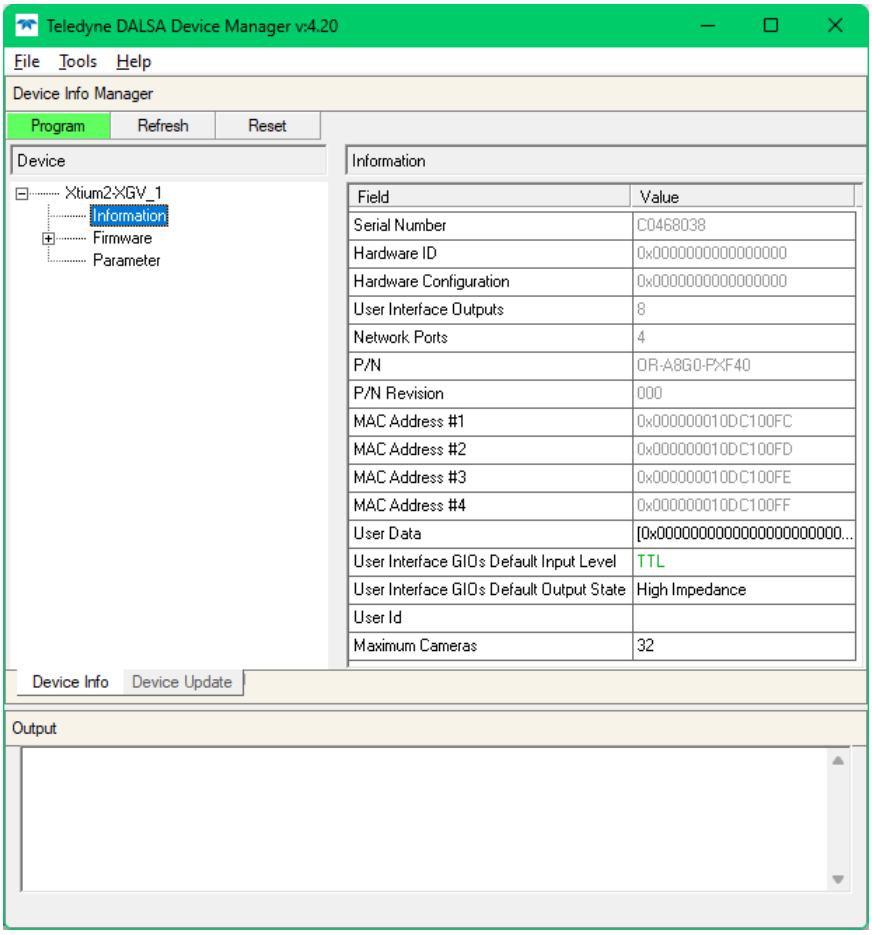
Figure 18: Device Manager Parameter Panel

Parameter	Description
SafeMode	If not zero, the board will not use the normal FPGA and stay in the backup FPGA; only needed if the normal FPGA is corrupted or needs to be upgraded manually. If the board is in SafeMode, the status LED will be blue and cannot be used for grabbing images.
ResetMethod	If zero, the board will be reset by the PCIe bridge, else it will be reset by FPGA command. Needed only on some PCs that cannot use the bridge to reset the board.
DirectHostPacketLocalMemSize	Amount of memory reserved for ethernet packets other than GVSP packets in the FG DDR memory.
DirectHostPacketPCIMemSize	Amount of memory reserved for ethernet packets other than GVSP packets in PC memory.
InternalImageLocalMemSize	Minimum amount of memory reserved per camera for grabbing images in the FG DDR memory.

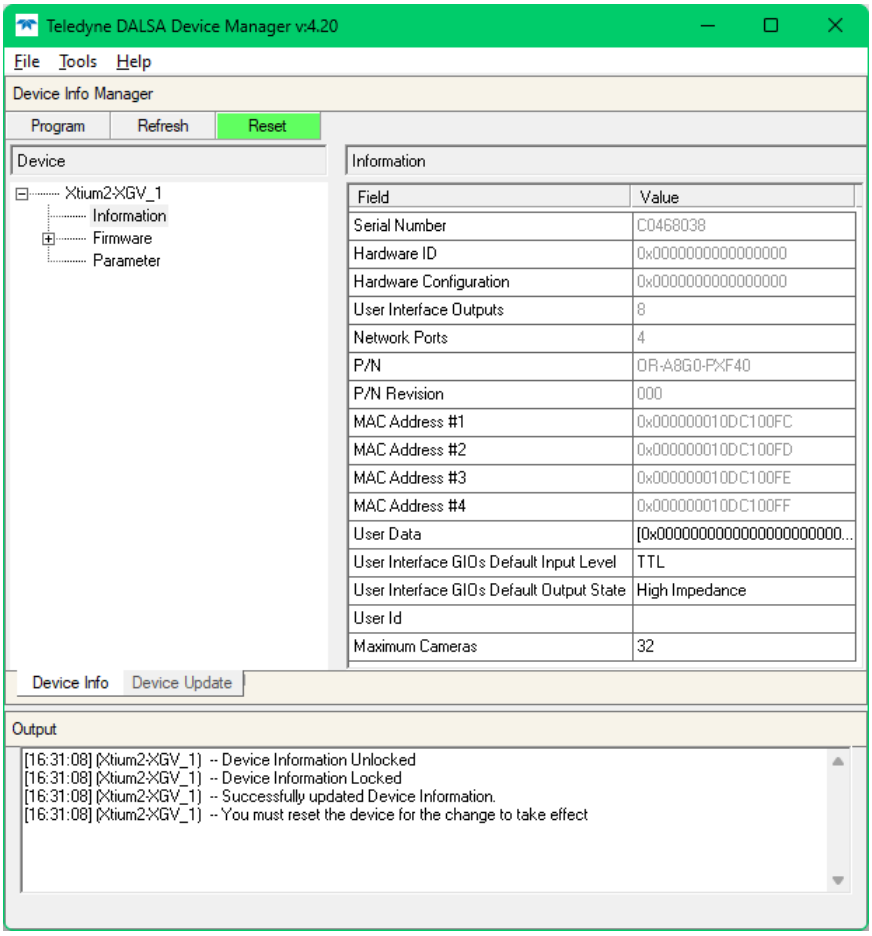
Changing Device Settings

When device settings are changed, the board must be programmed and reset to effect the changes.

If board programming is required, the Program button is displayed in green; click the button to start programming.



When programming is complete, the Reset button is displayed in green, click the button to reset the board.



Device Information Report

Teledyne DALSA Technical Support may request device information report to aid in troubleshooting installation or operational problems. Generate the Xtium2-XGV device manager report file (BoardInfo.txt) by clicking **File • Save Device Info**.

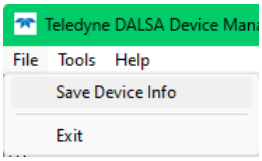


Figure 19: Device Manager File Menu Save Device Info Command

Firmware Update: Manual Mode

Select **Manual** mode to load firmware other then the default version or when, in the case of multiple Xtium2-XGV boards in the same system, if each requires different firmware.

The following figure shows the Device Manager manual firmware screen. Displayed is information on all installed Xtium2-XGV boards, their serial numbers, and their firmware components.

To perform a manual firmware update:

- Select the Xtium2-XGV to update via the board selection box (if there are multiple boards in the system).
- From the Configuration field drop menu select the firmware version required (typical required or offered to support different configurations).
- Click on the Start Update button.
- Observe the firmware update progress in the message output window.
- Close the Device manager program when the device reset complete message shows.

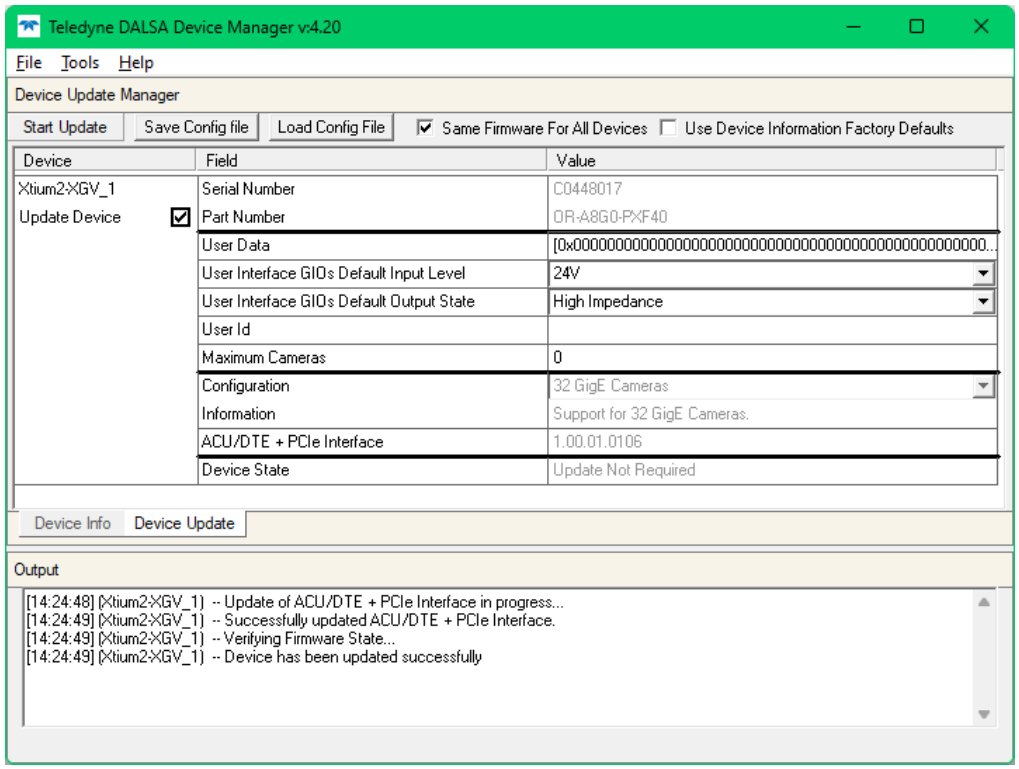
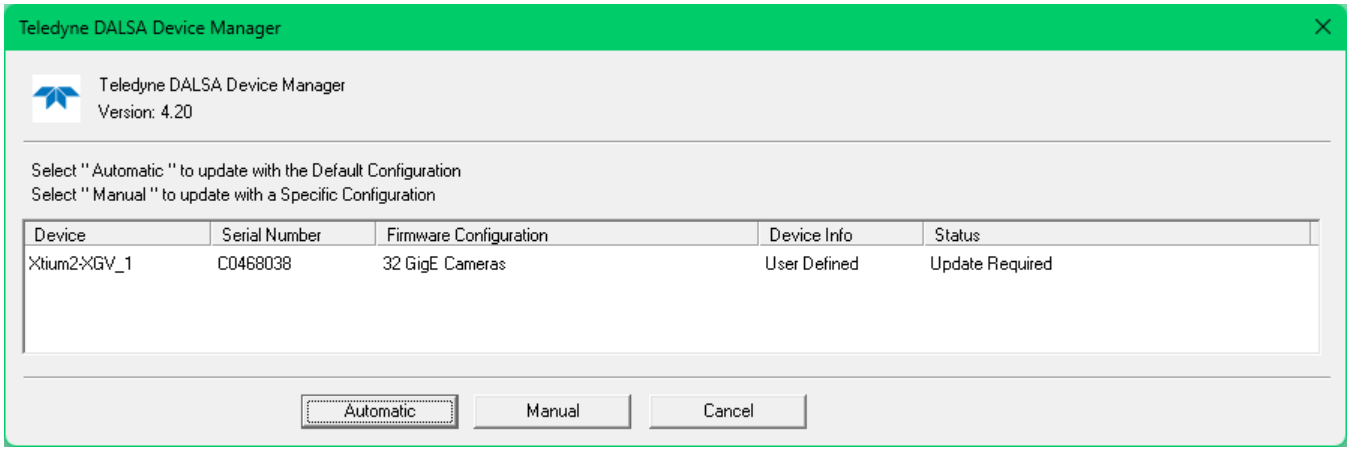


Figure 20: Manual Firmware Update

Firmware Loader

The Firmware Loader utility provides a simple method to launch the Device Manager to perform a firmware update, in automatic or manual mode. It automatically launches after a driver installation; the Status field indicates if a firmware update is required.



Executing the Firmware Loader from the Start Menu

If required, the Xtium2-XGV Firmware Loader program is executed via the Windows Start Menu shortcut **Start • Programs • Teledyne DALSA • Xtium2-XGV Driver • Firmware Update**.

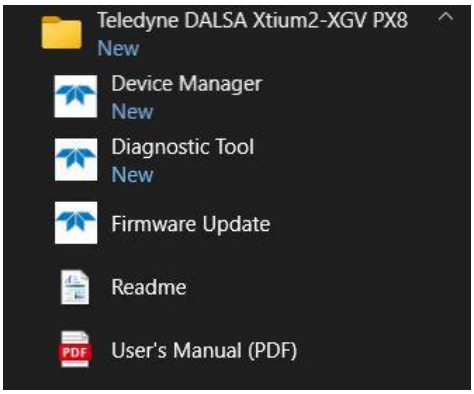


Figure 21: Start Menu Firmware Update Shortcut

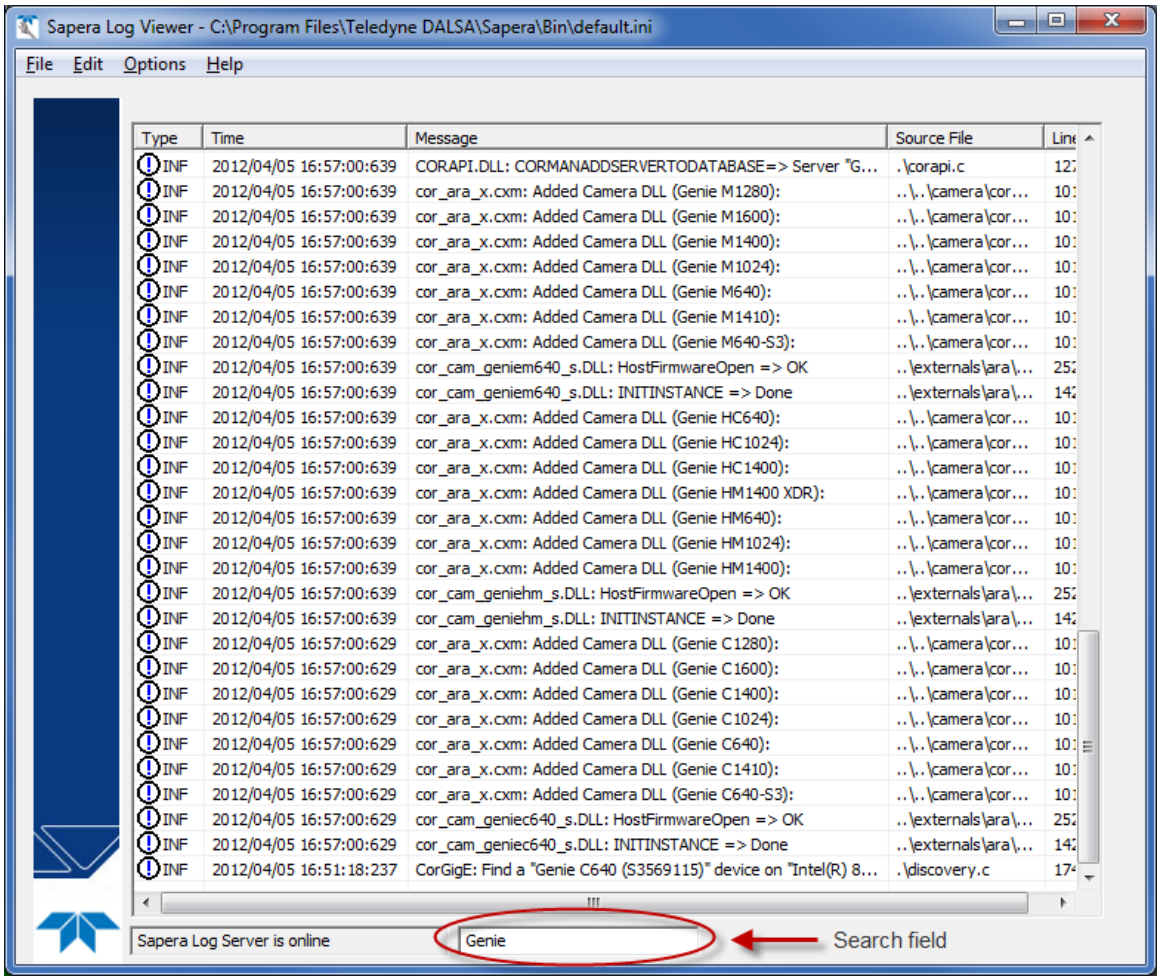
A firmware change after installation would be required to select a different configuration mode. See User Programmable Configurations.

Teledyne Log Viewer

The Teledyne Log Viewer utility program included with the Xtium2-XGV installation provides an easy way to view errors and other types of messages generated by Sapera LT applications and Teledyne DALSA hardware, such as camera and frame grabbers. The Log Viewer provides critical insight into interactions between the host application and Sapera modules. Its detailed message listing offers crucial system-wide information, thus making it an indispensable tool to pinpoint hard to isolate, infrequent errors.

Teledyne Log Viewer runs transparently in the background without impacting the application performance, and stores entire message communications and results. This allows analysis of the log even after the error has occurred. Configuration options allow users to set the type of results to log, such as ignoring info messages and logging only warning or error messages. Messages in the viewer can be dynamically filtered and/or searched for key terms.

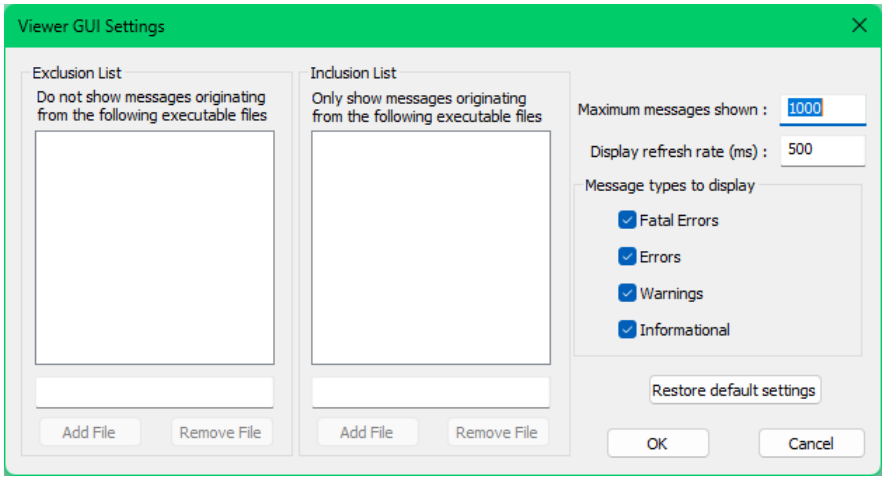
Refer to the utility's online help for more information on using the Log Viewer.



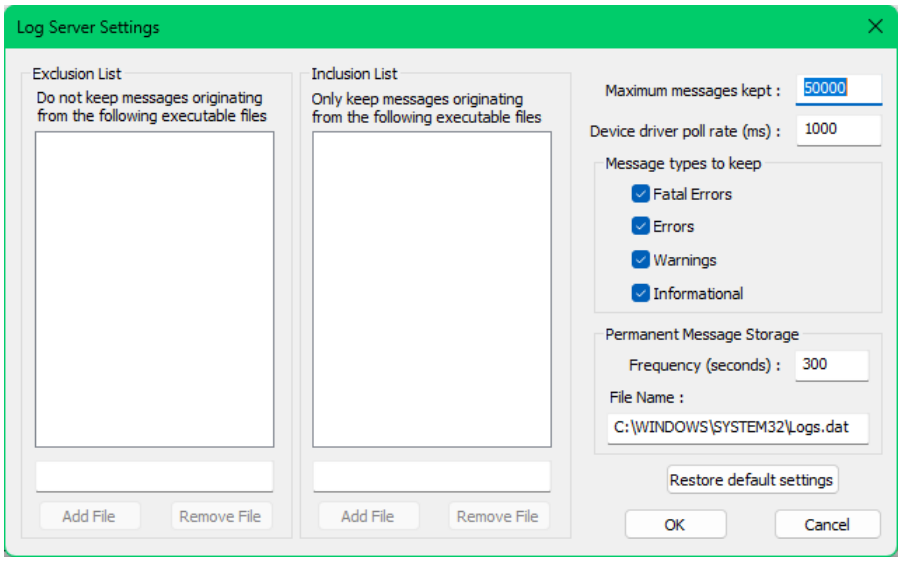
Furthermore, it is possible to run and customize multiple instances of the Log Viewer at the same time; therefore users, when dealing with multiple Teledyne acquisition devices, only view the messages of interest in each instance.

Log Viewer Options

Viewer GUI Options



Log Server Settings



Show Source File Information

The Show Source File Information option enables/disables the display of the Source File column in the Log Viewer window.

Xtium2 Frame Grabber Diagnostic Tool

The Xtium2 Board Diagnostic Tool provides a quick method to see board status and health of Xtium2 family frame grabbers. It also provides live monitoring of FPGA temperature and voltages, which may help in identifying problems.

Diagnostic Tool Main Window

The main window provides a comprehensive view of the installed Xtium board. Toolbar buttons execute the board self-test function and open a FPGA live status window.

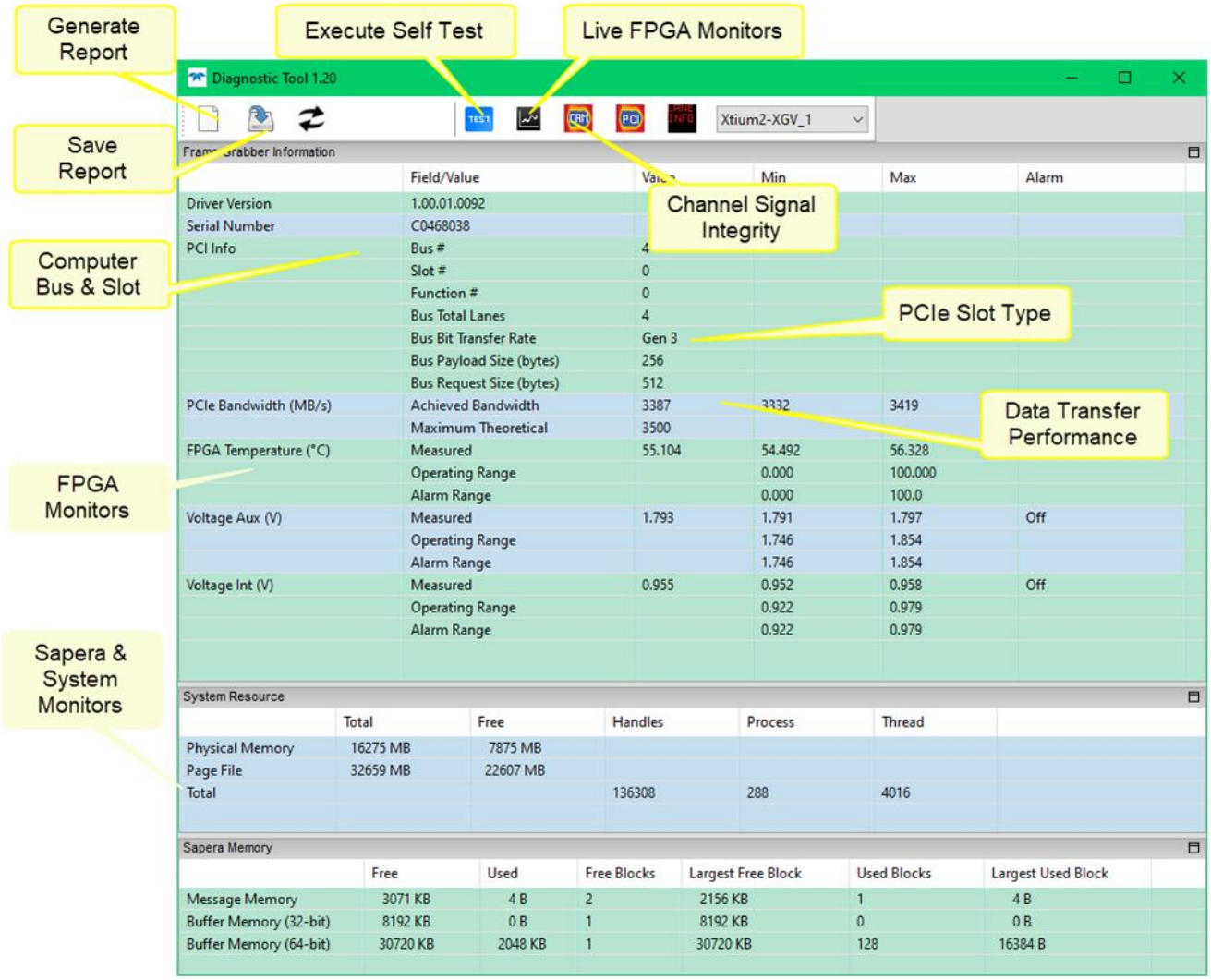


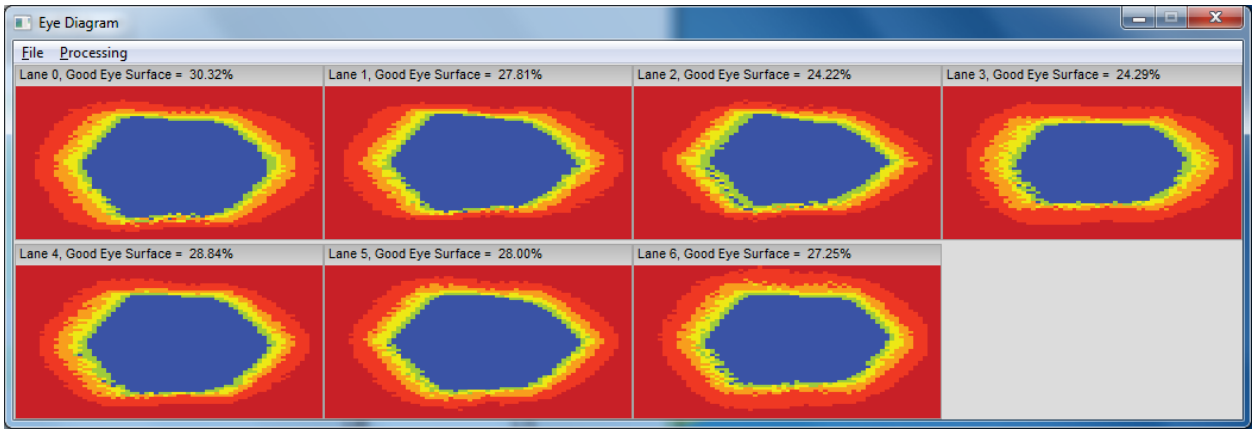
Figure 22: Diagnostic Tool User Interface

One important parameter is the PCI Express bus bit transfer rate supported by the host computer, which defines the maximum data rate possible in the computer.

Another important parameter is the internal Xtium FPGA temperature, which, if excessive, may explain erratic acquisitions due to poor computer ventilation.

Camera Input Eye Diagram Monitor

An Eye diagram is a graphical representation of signal between camera and frame grabber data lanes. This tool can be used to determine if the cable performance starts to degrade over a long period of use. The screen capture below shows a camera with 7 data lanes, where each digital signal is repetitively sampled and overlaid over itself, showing relative low-high transitions of the differential signal. Interpreting the results is easy, the bigger the blue area (eye surface) the better the signal integrity. When all the blue areas are similar in size and shape, it indicates that each wire pair has similar performance.



The closure (collapse or horizontal shortening) of the eye surface would indicate problems such as poor signal to noise, high cable capacitance, multipath interference, among many possible digital transmission faults.

Diagnostic Tool

The Xtium2-XGV Board Diagnostic Tool provides a quick method to see board status and health. It additionally provides live monitoring of FPGA temperature and voltages, which may help in identifying problems. A shortcut to this tool is in the Windows Start menu within the “Teledyne DALSA/Xtium2-XGV” folder. Do not have any other application running that connects to the Xtium2 such as CamExpert, else the diagnostic window will indicate an error for the PCIe Bandwidth, as shown in the screen capture below.

	Bus Bit Transfer Rate	Gen 3		
	Bus Payload Size (bytes)	256		
	Bus Request Size (bytes)	512		
PCIe Bandwidth (MB/s)	Achieved Bandwidth	Resource in use	Resource in use	Resource in use
	Maximum Theoretical	Resource in use		
FPGA Temperature (°C)	Measured	70.256	70.256	70.256

Figure 23: Diagnostic Tool “Resource in use”

The following section describes the information available from the Xtium2 board via the diagnostic program.

Diagnostic Tool Self-Test Window

Click the Start button to initiate the board memory self-test sequence. A healthy board will pass all memory test patterns.

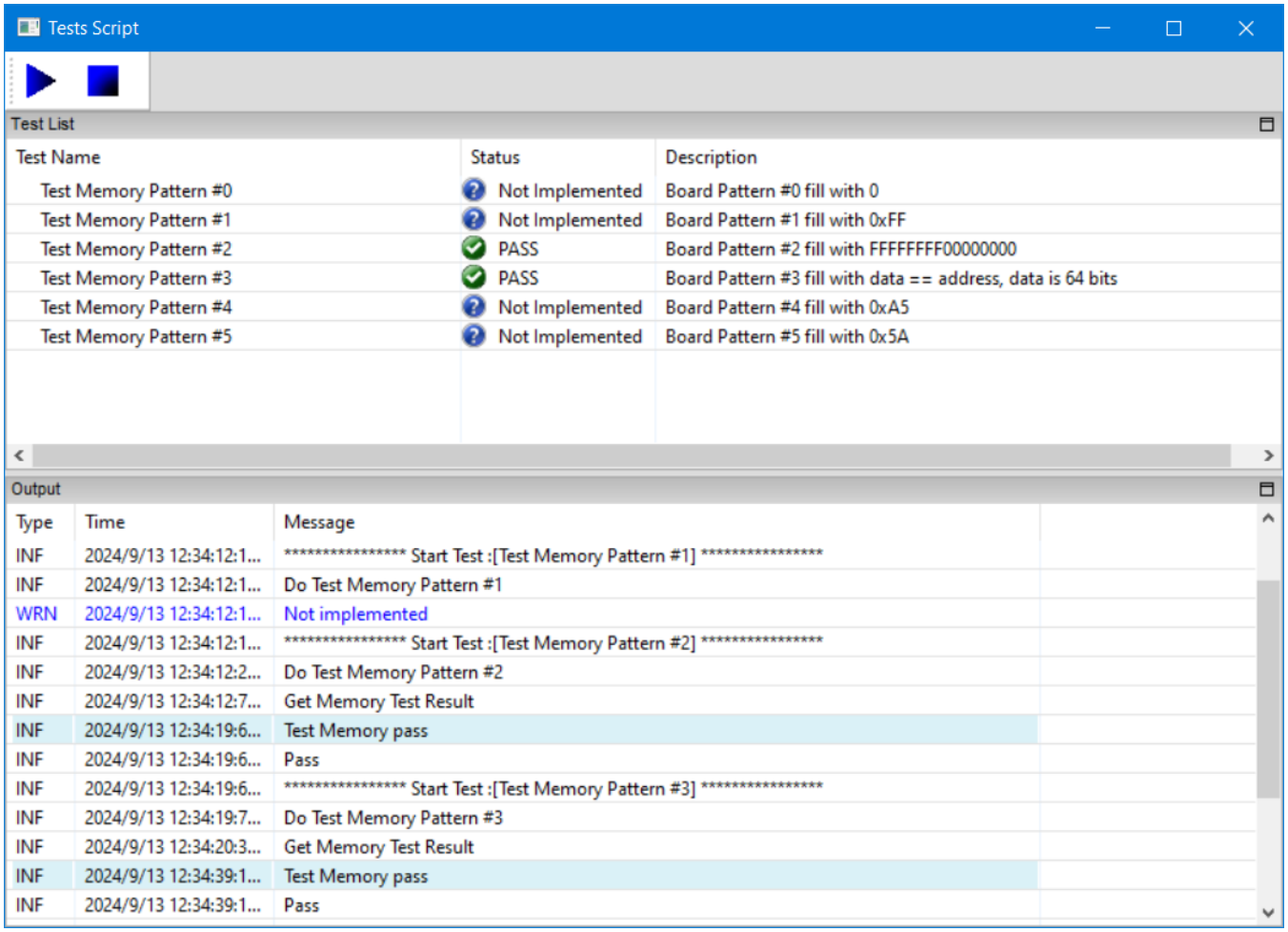


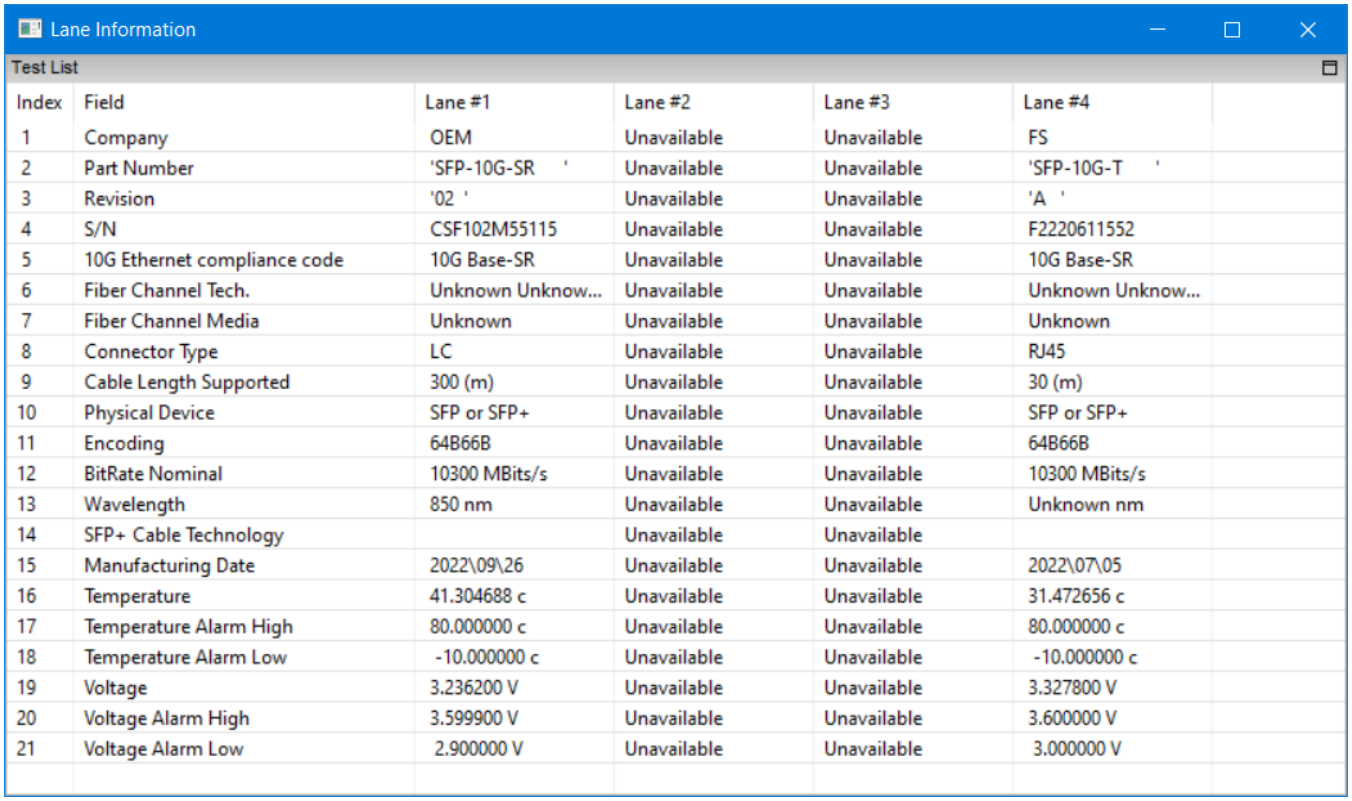
Figure 24: Diagnostic Tool Self-Test Window

Diagnostic Tool Live Monitoring Window

The three FPGA parameters can be monitored in real time. Choosing a parameter puts that graph at the top where the user can select the time unit and time range. Clicking the Output button will open a window displaying any error messages associated with that parameter.

Diagnostic Tool Lane Information

The Lane Information dialog box retrieves the SFP+ transceiver modules information if present. It displays information such current temperature and voltages of the module.

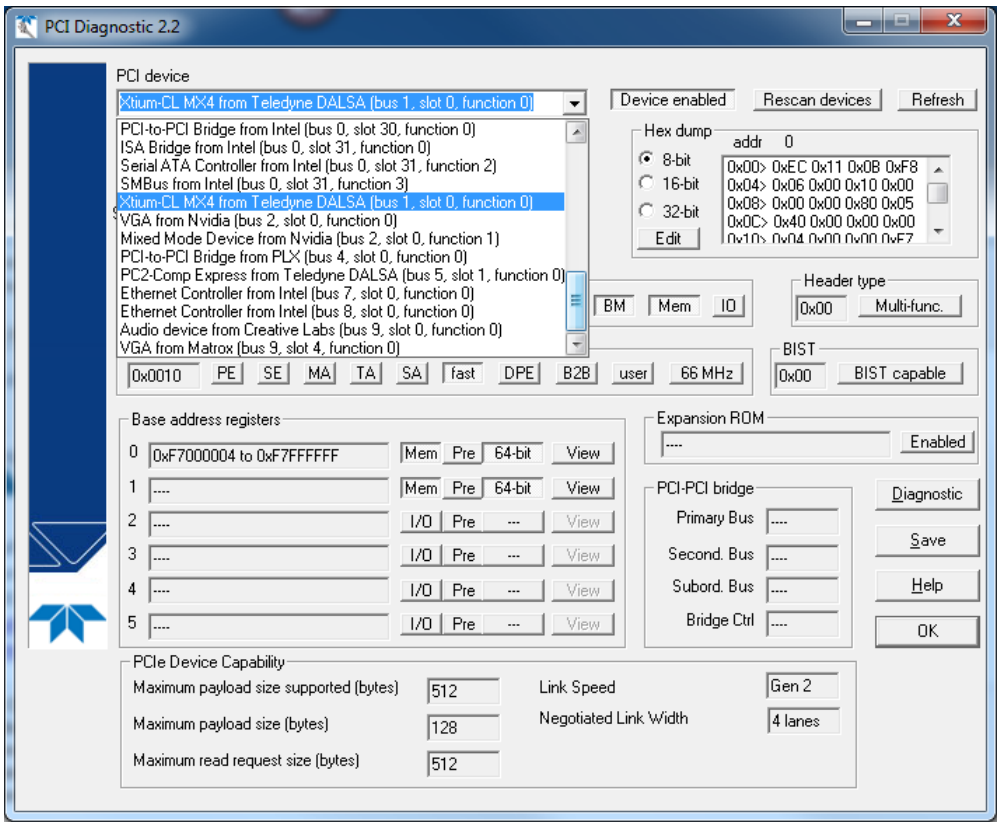


Index	Field	Lane #1	Lane #2	Lane #3	Lane #4
1	Company	OEM	Unavailable	Unavailable	FS
2	Part Number	'SFP-10G-SR '	Unavailable	Unavailable	'SFP-10G-T '
3	Revision	'02 '	Unavailable	Unavailable	'A '
4	S/N	CSF102M55115	Unavailable	Unavailable	F2220611552
5	10G Ethernet compliance code	10G Base-SR	Unavailable	Unavailable	10G Base-SR
6	Fiber Channel Tech.	Unknown Unknow...	Unavailable	Unavailable	Unknown Unknow...
7	Fiber Channel Media	Unknown	Unavailable	Unavailable	Unknown
8	Connector Type	LC	Unavailable	Unavailable	RJ45
9	Cable Length Supported	300 (m)	Unavailable	Unavailable	30 (m)
10	Physical Device	SFP or SFP+	Unavailable	Unavailable	SFP or SFP+
11	Encoding	64B66B	Unavailable	Unavailable	64B66B
12	BitRate Nominal	10300 MBits/s	Unavailable	Unavailable	10300 MBits/s
13	Wavelength	850 nm	Unavailable	Unavailable	Unknown nm
14	SFP+ Cable Technology		Unavailable	Unavailable	
15	Manufacturing Date	2022\09\26	Unavailable	Unavailable	2022\07\05
16	Temperature	41.304688 c	Unavailable	Unavailable	31.472656 c
17	Temperature Alarm High	80.000000 c	Unavailable	Unavailable	80.000000 c
18	Temperature Alarm Low	-10.000000 c	Unavailable	Unavailable	-10.000000 c
19	Voltage	3.236200 V	Unavailable	Unavailable	3.327800 V
20	Voltage Alarm High	3.599900 V	Unavailable	Unavailable	3.600000 V
21	Voltage Alarm Low	2.900000 V	Unavailable	Unavailable	3.000000 V

.

PCI Diagnostic Tool

The PCI Diagnostic tool is used for debugging frame grabber hardware issues. PCI Diagnostic reads the content of the PCI configuration space and detects memory and I/O conflicts between PCI devices. Use it to verify the integrity of your system before and after installing a new PCI device. Refer to the utility's online help for more information.



Network Configuration Tool

The Network Configuration tool provides information on all network adapters installed in the system and any connected GigE Vision devices.

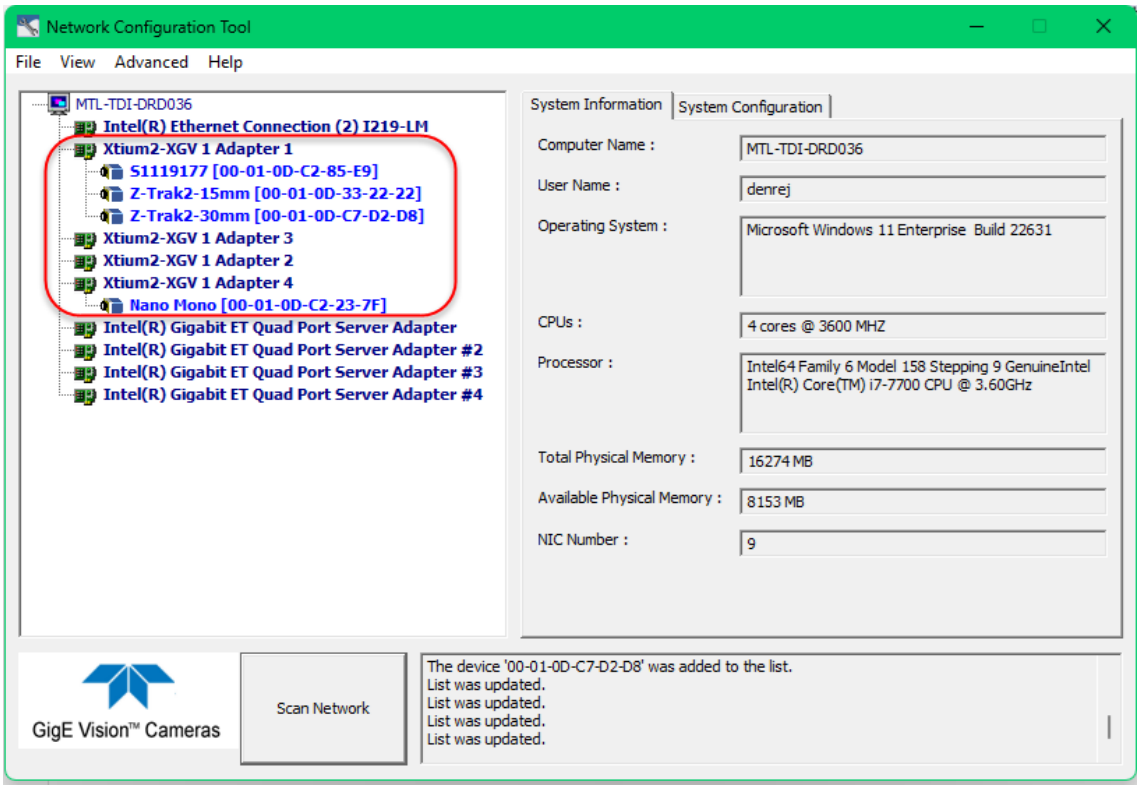
To open Network Configuration Tool

- From the **Start** menu, select **Teledyne GigE Vision Interface** > **Network Configuration Tool**.

The left pane will show the host computer with all installed network adapters and any connected GigE Vision cameras. The right pane displays, in different tabs, information and settings pertaining to the selected item.

The **Scan Network** button is used to search for all devices (conflicted and non-conflicted).

The Xtium2-XGV's 4 network adapters are shown, displaying any connected devices.



When using a GigE Vision camera, the tool provides a simple way to assign a user-defined name and to set a persistent IP address instead of the default DHCP/LLA assigned IP address. Using this tool, GigE Vision network configurations can be easily made without having to use any Windows Control Panel application.

This tool allows you to:

- Activate the Teledyne DALSA Sapera GigE Vision Filter Driver on any NIC used for image acquisition.
- Disable the Teledyne DALSA Sapera GigE Vision Filter Driver on any NIC not used with a GigE Vision camera.
- Enable or Disable the Auto Discovery process on any NIC.
- Change the Auto Discovery Interval from the default 15 seconds.
- Add the Sapera GigE server to the Windows firewall exception list.
- Configure NIC and camera IP settings.
- Assign a user-defined name to a connected camera.
- Assign a persistent IP address to a camera instead of the default DHCP/LLA assigned address.
- Recover a device with an invalid IP address.
- Configure the NIC as a Sapera DHCP server for connected GigE Vision cameras.

For more information on using the Network Configuration Tool for system and device configuration, refer to the Teledyne GigE Vision Interface User Manual and Optimization Guide and the camera documentation.

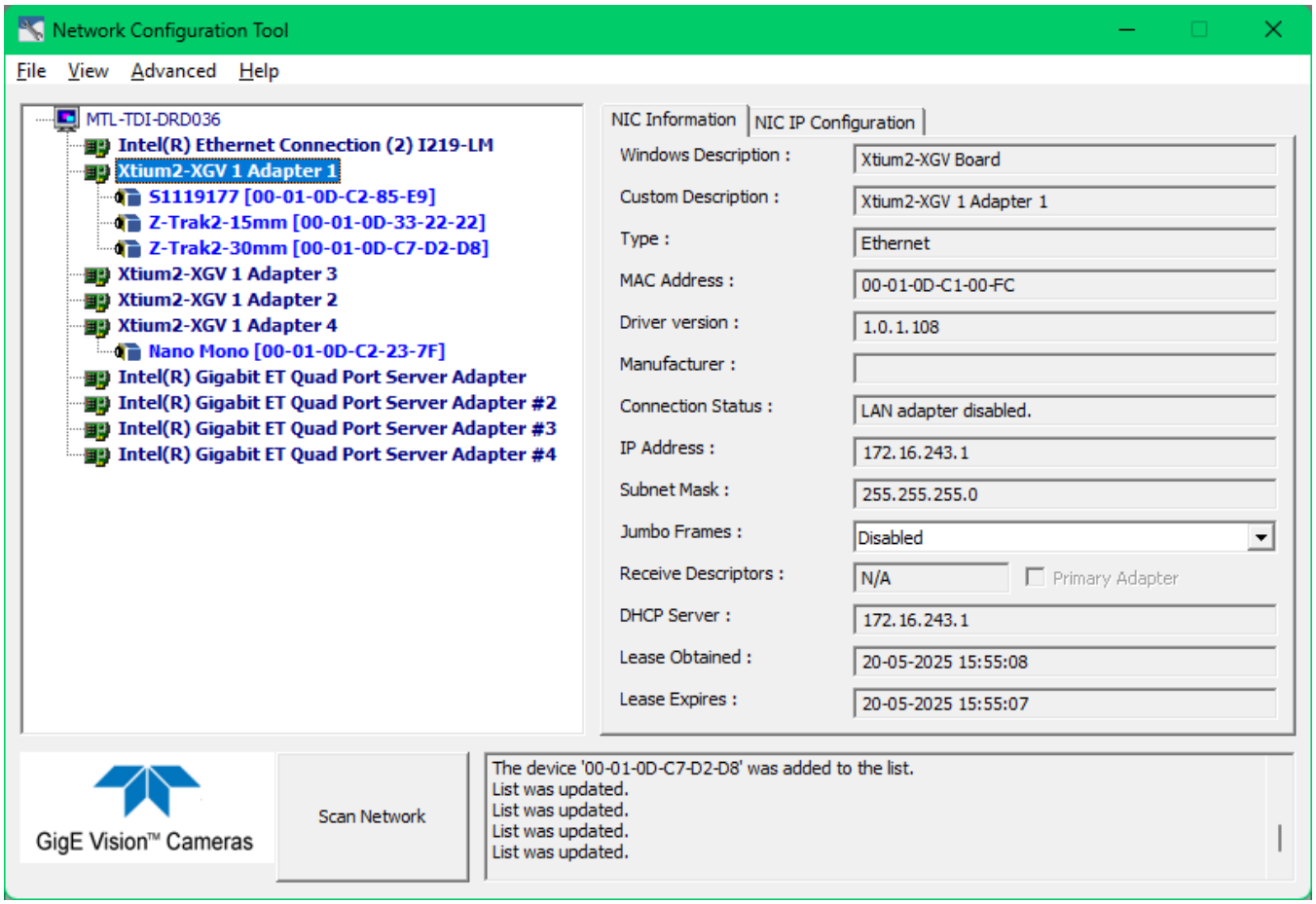
NIC Configuration

Select a network adapter (NIC) in the left pane to preview information about the NIC or to change its configuration parameters.

The Network Configuration tool ensures that no two NICs installed on the computer are on the same subnet, since that would create a conflict. A warning message is displayed in such a case, indicating that a setting change is required for one of the NICs.

NIC information

The **NIC Information** tab displays information about the NIC. Refer to the Teledyne GigE Vision Interface User Manual and Optimization Guide for more information.



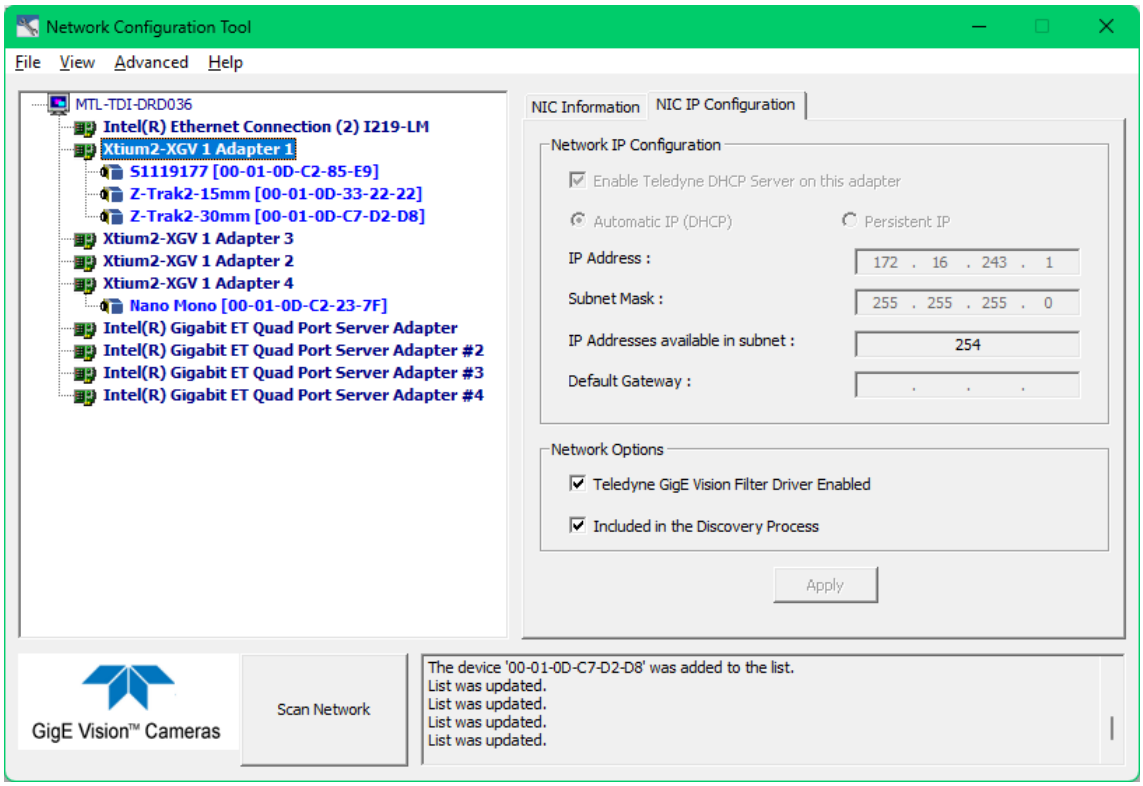
NIC IP Configuration

For each NIC used for a GigE Vision network, select the **NIC IP Configuration** tab and choose the appropriate settings.

- **Enable Sapera DHCP server on this adapter**. This option is always recommended to avoid IP address conflicts, especially when there are multiple NICs with multiple GigE Vision cameras attached. See Sapera DHCP Server for configuration.
- Select a Network IP Configuration mode (see IP configuration mode details for more info):
  - **Automatic IP (DHCP)**. Default mode.
  - **Persistent IP**. In this case, the **IP Address**, **Subnet Mask** and **Default Gateway** fields must be entered (with or without the Sapera DHCP server enabled).

WARNING

Changing the IP address of a NIC might put it on a different subnet, causing an attached GigE Vision device to become inaccessible. The proper sequence is to first change the device IP configuration, then change the NIC IP address, else you will need to perform a camera recovery procedure.



The **Network Options** are selected by default for all system NICs after installation. You may clear them for NICs that are not used with GigE Vision devices.

- **Teledyne DALSA Teledyne GigE Vision Filter Driver Enabled**. The Teledyne GigE Vision Filter Driver is used to stream image data efficiently to image buffers and is required only on NICs used to capture images with GigE Vision devices.
- **Included in the Discovery Process**. Clear this option for any system NIC that does not connect to GigE cameras, or that should be ignored during the camera discovery process (to eliminate unnecessary use of system resources for network connections).

Sapera Monitor

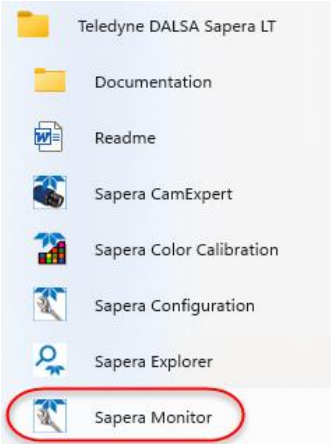
As part of the Trigger-to-Image-Reliability (T2IR) framework, the Sapera Monitor Tool allows users to view the acquisition and transfer events generated by an acquisition device in real time. Sapera Monitor is a standalone application that runs concurrently with CamExpert or with a user application, and can therefore be useful for debugging applications and identifying problems without having to code event handlers.

NOTE

The Xtium2-XGV, as a non-streamable device, is not available in Sapera Monitor; only supported Teledyne GigE Vision cameras are able to be monitored.

To open Sapera Monitor

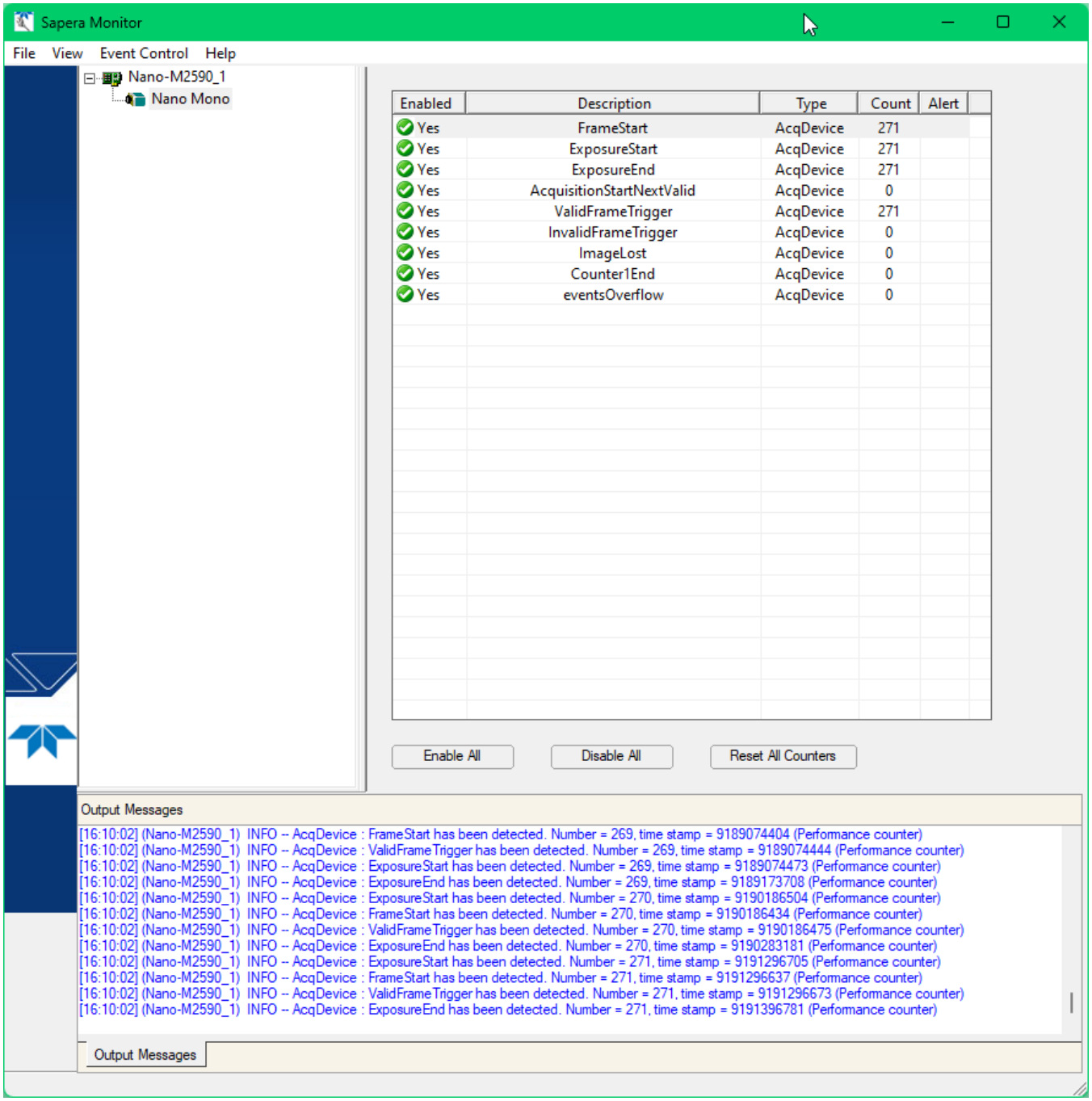
- From the **Start** menu, select **Teledyne DALSA Sapera LT** > **Sapera Monitor**.



Sapera Monitor Window

The Sapera Monitor Window is divided into three panes:

- **Device directory tree**: displays the available acquisition devices to monitor.
- **Event table**: displays the available events to monitor for the selected device.
- **Output Messages**: displays the messages generated by the selected monitored events.

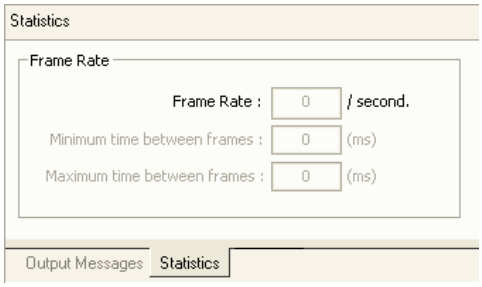


Statistics Tab

Clicking on the **Statistics** tab displays various real-time acquisition statistics, such as the Frame Rate.

NOTE

Different devices can support different statistics and not all devices support all statistics. In addition, these real-time acquisition statistics are not included in generated reports. Thus, **depending on the selected device, the Statistics tab may not be available**.



Sapera Monitor Menu Commands

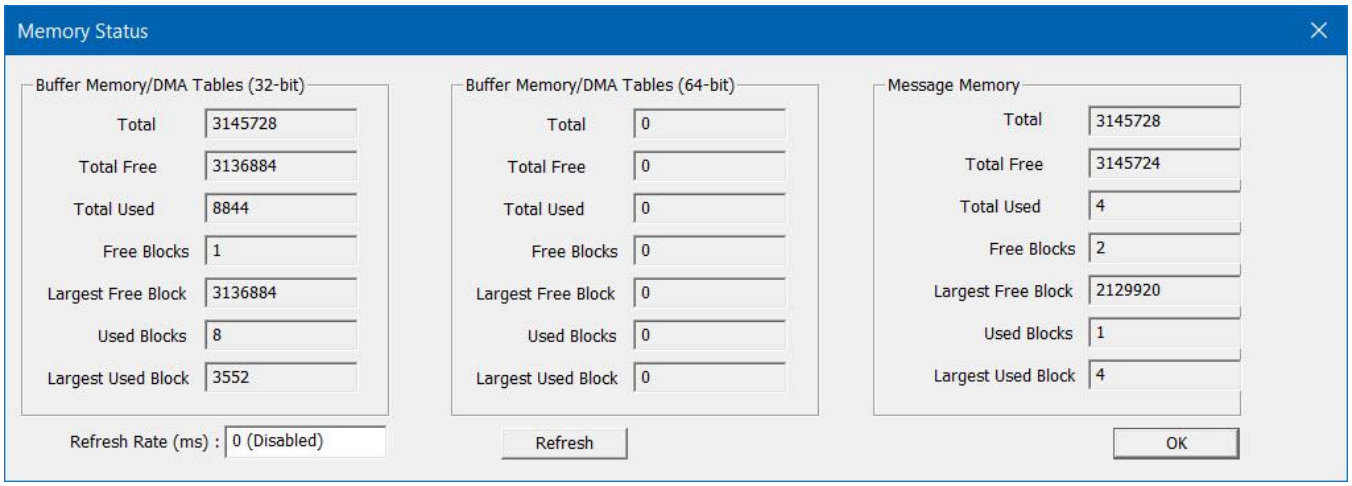
The Sapera Monitor menu provides access to **File**, **View**, and **Event Control** commands.

File Menu Commands

- **Generate Report.** Generates a text file report that includes all event settings and messages included in the current **Output Messages** pane.
- **Clear Log Information.** Clears the current **Output Messages** pane.

View Menu Commands

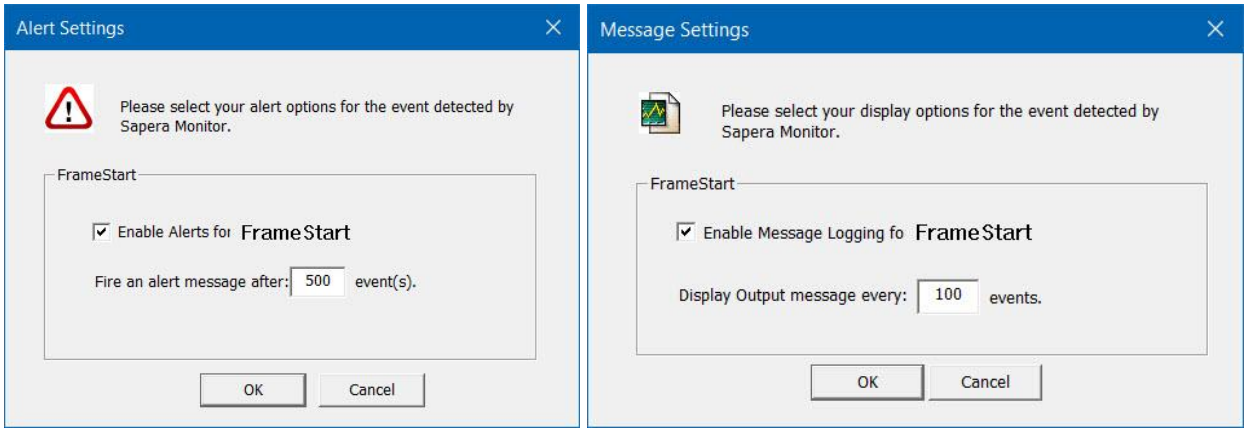
- **Always on Top.** Displays the Sapera Monitor on top of any other windows that may be visible on the desktop.
- **Select Events.** Opens the Sapera Monitor Events Display Settings dialog, which allows you to specify the events to display in the Event table.
- **View Memory Status**. Opens a Memory Status dialog with memory usage information.



Event Control Menu Commands

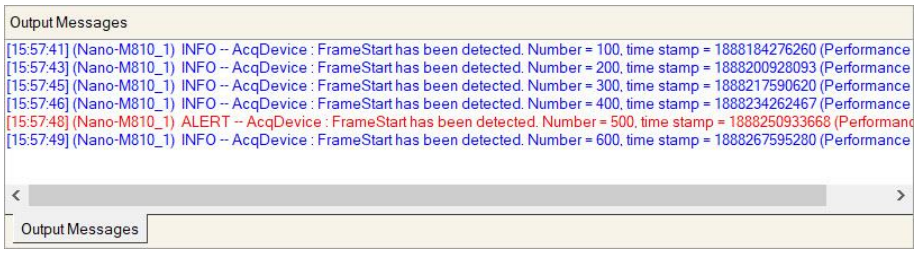
Note that the commands are also available by right-clicking on an event.

- **Enable** and **Disable.** Starts or stops the currently selected events.
- **Reset event counter.** Returns the event counter to zero for the currently selected.
- **Alert Settings.** Opens the Alert Settings dialog, where you can enable or disable alerts for the selected event and set the number of events required to generate an alert.
- **Message Settings.** Opens the Message Settings dialog, where you can enable message logging and set the number of events required to generate a log message. The log messages appear in the **Output Messages** pane.



When an alert is generated, the Alert icon appears in the Alert column of the event.

In the **Output Messages** pane, messages appear in blue, while alert messages appear in red.



Using Sapera Monitor

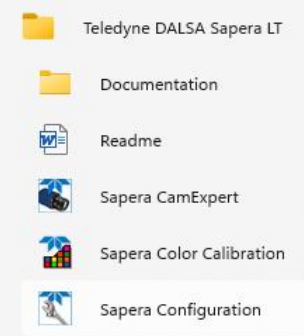
To use the Sapera Monitor tool to monitor a device

- Open a Sapera application, such as CamExpert, that uses the device.
- Open the Sapera Monitor application.
- In the Sapera Monitor Device directory tree, select a device to monitor.
- In Event table, select the events to monitor.
  - Double-click on an event to toggle between the *Enabled* and *Disabled* state. Alternatively, you can use the **Enable All** and **Disable All** buttons to quickly enable or disable all events at once. Note that these commands do not change the alert and message settings of the events.
  - Use the **Event Control** menu or shortcut menu to modify the settings for an event.
- Start acquisition with the device.

Sapera Configuration

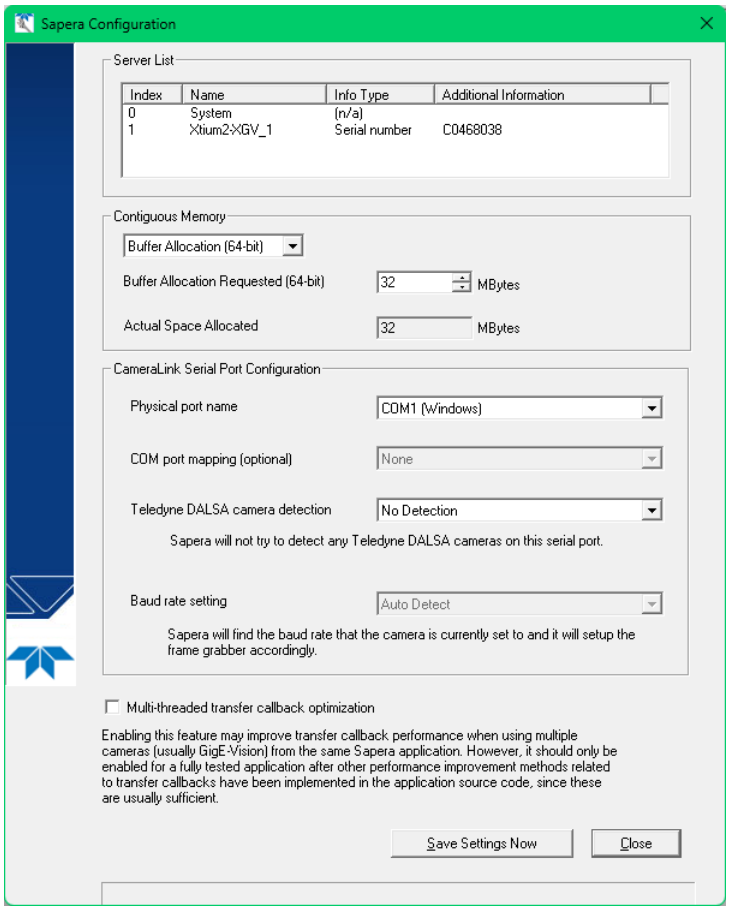
The Sapera Configuration utility allows you to configure Sapera LT resource such as contiguous memory.

It is available from the Windows Start menu under **Teledyne DALSA • Sapera LT • Sapera Configuration**:



Viewing Installed Sapera Servers

The Sapera configuration program allows the user to see all available Sapera servers for the installed Sapera-compatible boards. The **System** entry represents the system server. It corresponds to the host machine (your computer) and is the only server that should always be present.



Increasing Contiguous Memory for Sapera Resources

The **Contiguous Memory** section lets the user specify the total amount of contiguous memory (a block of physical memory, occupying consecutive addresses) reserved for the resources needed for **Sapera buffers** allocation and **Sapera messaging**. For both items, the **Buffer Allocation Requested** value shows the driver default memory setting while the **Actual Space Allocated** value displays the amount of contiguous memory allocated successfully. A minimum of 32MB is required.

The **Sapera buffers** value determines the total amount of contiguous memory reserved at boot time for the allocation of dynamic resources used for frame buffer management such as scatter-gather list, DMA descriptor tables plus other kernel needs. Adjust this value higher if your application generates any out-of-memory error while allocating host frame buffers or when connecting the buffers via a transfer object.

You can approximate the worst-case scenario amount of contiguous memory required as follows:

- Calculate the total amount of host memory used for one frame buffer

  `[number of pixels per line * number of lines * (2 if buffer is 10/12/14 or 16 bits)]`

- Provide 200 bytes per frame buffer for Sapera buffer resources.
- Provide 64 bytes per frame buffer for metadata. Memory for this data is reserved in chunks of 64kB blocks.
- Provide 48 bytes per frame buffer for buffer management. Memory for this data is reserved in chunks of 64kB blocks.
- For each frame buffer DMA table, allocate 24 bytes + 8 bytes for each 4kB of buffer. For example, for a 120x50x8 image:

  ```
  120  * 50 = 6000 = 1.46 4kB blocks -> roundup to 2 4kB blocks
  ```

  Therefore 24 bytes + (2 * 8 bytes) = 40 bytes for DMA tables per frame buffer.
  Memory for this data is reserved in chunks of 64kB blocks.
  If vertical flipping is enabled, one must add 16 bytes per line per buffer. For example, for an image 4080x3072 image:

  ```
  16 bytes * 3072 = 49152 bytes
  ```

NOTE

Sapera LT reserves the 1st 5MB for its own resources, which includes the 200 bytes per frame buffer mentioned above.

Test for any memory error when allocating host buffers.

The following calculation is an example of the amount of contiguous memory to reserve beyond 5MB with 80,000 buffers of 2048x1024x8:
a) (80000 * 64 bytes)
b) (80000 * 48 bytes)
c) (80000 * (24 + (((2048*1024)/4kB) * 8))) = 323MB
d) Total = a (rounded up to nearest 64kB) + b (rounded up to nearest 64kB) + c (rounded up to nearest 64kB).

Host Computer Frame Buffer Memory Limitations

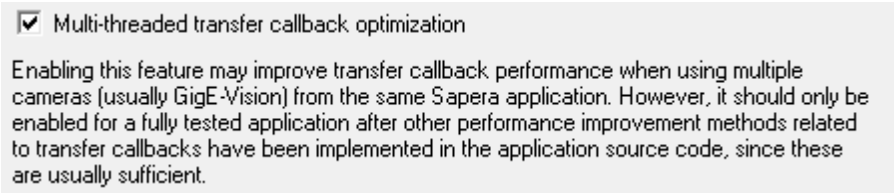
When planning a Sapera application and its host frame buffers used, plus other Sapera memory resources, do not forget the Windows operating system memory needs.

A Sapera application using the preferred *scatter gather buffers* could consume most of the remaining system memory, with a large allocation of frame buffers. If using frame buffers allocated as a *single contiguous memory block*, Windows will limit the allocation dependent on the installed system memory. Use the Buffer menu of the Sapera Grab demo program to allocate host buffer memory until an error message signals the limit allowed by the operating system used.

Contiguous Memory for Sapera Messaging

The current value for **Sapera messaging** determines the total amount of contiguous memory reserved at boot time for messages allocation. This memory space stores arguments when calling a Sapera function. Increase this value if you are using functions with large arguments, such as arrays and experience any memory errors.

Multi-Threaded Transfer Callback Optimization



Usage Notes When Writing Sapera Applications

- Always disable the **Multi-threaded transfer callback optimization** option (the default) while developing and thoroughly testing the application, especially making sure that appropriate robustness standards are met.
- If the application does not meet performance requirements, all the known performance improvements that can be implemented in application code must be tried (for example, limiting operations as much as possible in the transfer callback function).
- If performance requirements are still not met, and there is only one camera per running instance of the application, then still leave disabled since it provides no performance benefit.
- Only consider enabling if performance requirements are not met with multiple cameras in the same running instance of the application.
- If enabling does not improve performance, then disable it.
- If enabling improves performance, the application must be once again thoroughly tested to prove that it still meets the same robustness requirements as before.

Troubleshooting Problems

Overview

The Xtium2-XGV (and the Xtium2 family of products) is tested by Teledyne DALSA in a variety of computers. Although unlikely, installation problems may occur due to the constant changing nature of computer equipment and operating systems. This section describes what the user can verify to determine the problem or the checks to make before contacting Teledyne DALSA Technical Support.

If you require help and need to contact Teledyne DALSA Technical Support, make detailed notes on your installation and/or test results for our technical support to review. See Technical support for contact information.

Problem Type Summary

Xtium2-XGV problems are either installation types where the board hardware is not recognized on the PCIe bus (i.e. trained), or function errors due to camera connections or bandwidth issues. The following links jump to various topics in this troubleshooting section.

First Step: Check the Status LED

Status LED ‘S’ should be **BLUE** or flashing **BLUE** just after power up. If it remains flashing **RED**, the board firmware did not load correctly. Once the Windows driver is started, status LED should be **GREEN** or flashing **GREEN**. If status LED S remains **BLUE** or flashing **BLUE**, the board is still running from the safe mode load. This could indicate that the normal load in the flash is corrupted or not present.

The complete status LED descriptions are available in the technical reference section,
(see Status LEDs Functional Descriptions).

Possible Installation Problems

- **Hardware PCI bus conflict:** When a new installation produces PCI bus error messages or the board driver does not install, it is important to verify that there are no conflicts with other PCI or system devices already installed. Use the Teledyne DALSA PCI Diagnostic tool as described in Checking for PCI Bus Conflicts. Also verify the installation via the Windows Device Manager.
- **BSOD (blue screen) following a board reset:** After programming the board with different firmware, the computer displays the BSOD when the board is reset; ensure that you are using Sapera LT 9.0 or later.
- **Verify Sapera and Board drivers:** If there are errors when running applications, confirm that all Sapera and board drivers are running. See Sapera and Hardware Windows Drivers for details. In addition, Teledyne DALSA technical support will ask for the log file of messages by Teledyne DALSA drivers. Follow the instructions describe in Teledyne Log Viewer.

- **Firmware update error:** There was an error during the Xtium2-XGV firmware update procedure. The user can usually easily correct this. Follow the instructions Recovering from a Firmware Update Error.
- Installation went well but the board doesn't work or stopped working. Review these steps described in Symptoms: CamExpert Detects no Boards.
- **Using Windows 11 Fast Startup option:** When adding, removing, or moving boards while the PC is shutdown with the Windows Fast Boot option activated, it is possible that the boards don’t get mapped properly on the next reboot of the computer. The driver will detect such a situation and the Device Manager launched at startup will display a message indicating that a reboot is required.

Possible Functional Problems

- **Driver Information:** Use the Teledyne DALSA device manager program to view information about the installed Xtium2-XGV board and driver. See Driver Information via the Device Manager Program.
- **On-Board Image Memory Requirements:** The Xtium2-XGV on-board memory can provide two frame buffers large enough for most imaging situations. See On-board Image Memory Requirements for Acquisitions for details on the on board memory and possible limitations.

Sometimes the problem symptoms are not the result of an installation issue but due to other system issues. Review the sections described below for solutions to various Xtium2-XGV functional problems.

- Symptoms: Xtium2-XGV Does Not Grab
- Symptoms: Card Grabs Black
- Symptoms: Card acquisition bandwidth is less than expected

Troubleshooting Procedures

The following sections provide information and solutions to possible Xtium2-XGV installation and functional problems. The previous section of this manual summarizes these topics.

Checking for PCI Bus Conflicts

One of the first items to check when there is a problem with any PCI board is to examine the system PCI configuration and ensure that there are no conflicts with other PCI or system devices. The *PCI Diagnostic* program (**cpcidiag.exe**) allows examination of the PCI configuration registers and can save this information to a text file. Run the program via the Windows Start Menu shortcut **Start • Programs • Teledyne DALSA • Sapera LT • Tools • PCI Diagnostics**.

As shown in the following screen image, use the first drop menu to select the PCI device to examine. Select the device from Teledyne DALSA. Note the bus and slot number of the installed board (this will be unique for each system unless systems are setup identically). Click on the **Diagnostic** button to view an analysis of the system PCI configuration space.

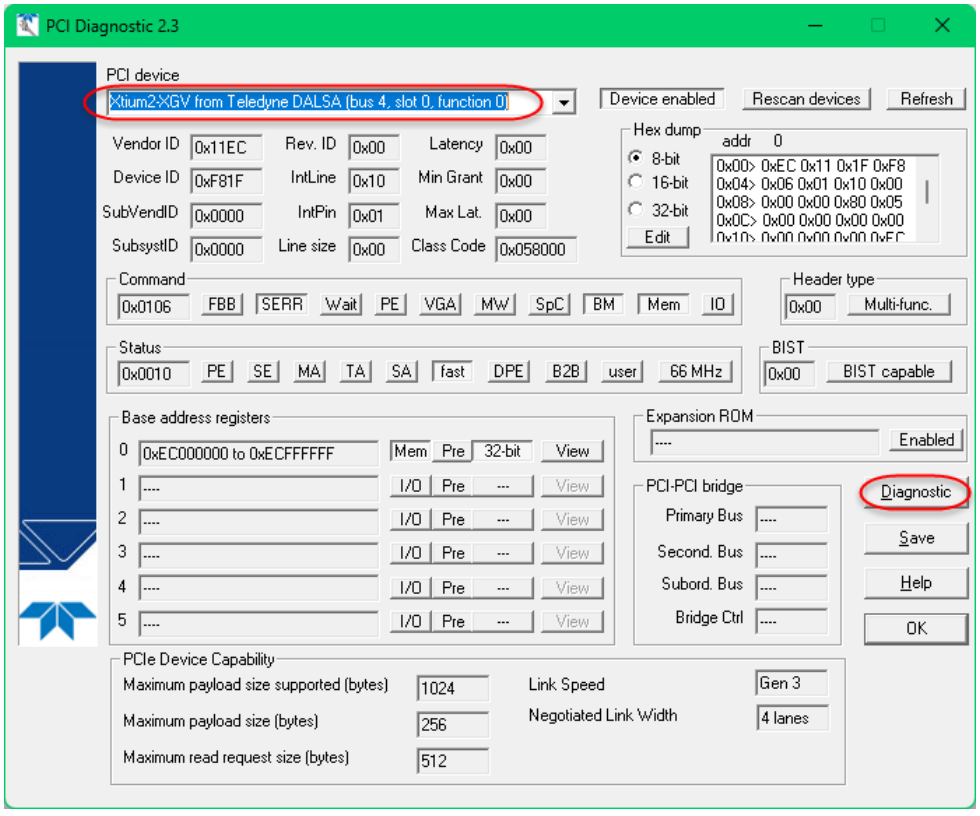


Figure 25: PCI Diagnostic Program

Clicking on the **Diagnostic** button opens a new window with the diagnostic report. From the PCI Bus Number drop menu, select the bus number that the Xtium2-XGV is installed in—in this example the slot is bus 2.

The window now shows the I/O and memory ranges used by each device on the selected PCI bus. The information display box will detail any PCI conflicts. If there is a problem, click on the **Save** button. A file named '**pcidiag.txt'** is created (in the Sapera\bin directory) with a dump of the PCI configuration registers. Email this file when requested by the Teledyne DALSA Technical Support group along with a full description of your computer.

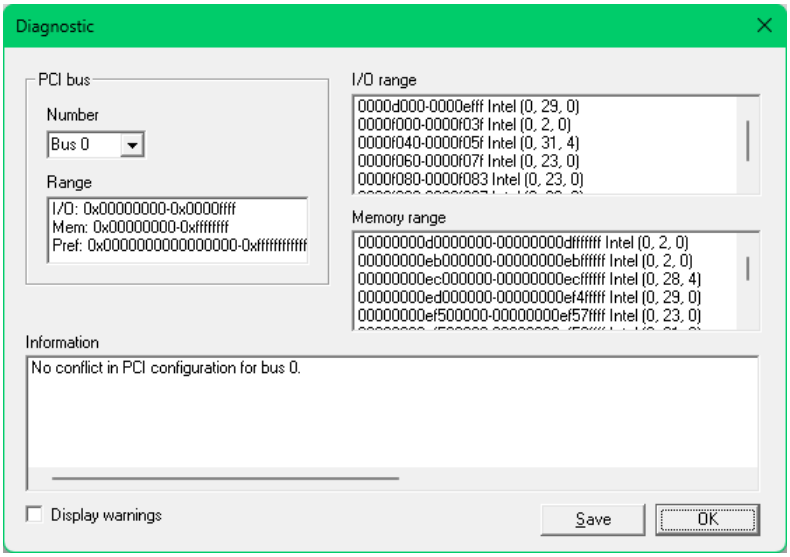


Figure 26: PCI Diagnostic Program – PCI bus info

Windows Device Manager

An alternative method to confirm the installation of the Xtium2-XGV board and driver is to use the Windows Device manager tool. Use the Start Menu shortcut **Start • Control Panel • System • Device Manager**. As shown in the following screen images, look for *Xtium2-XGV* board under “Network adapters”. Double-click and look at the device status. You should see “This device is working properly.” Go to “Resources” tab and make certain that the device has an interrupt assigned to it, without conflicts.

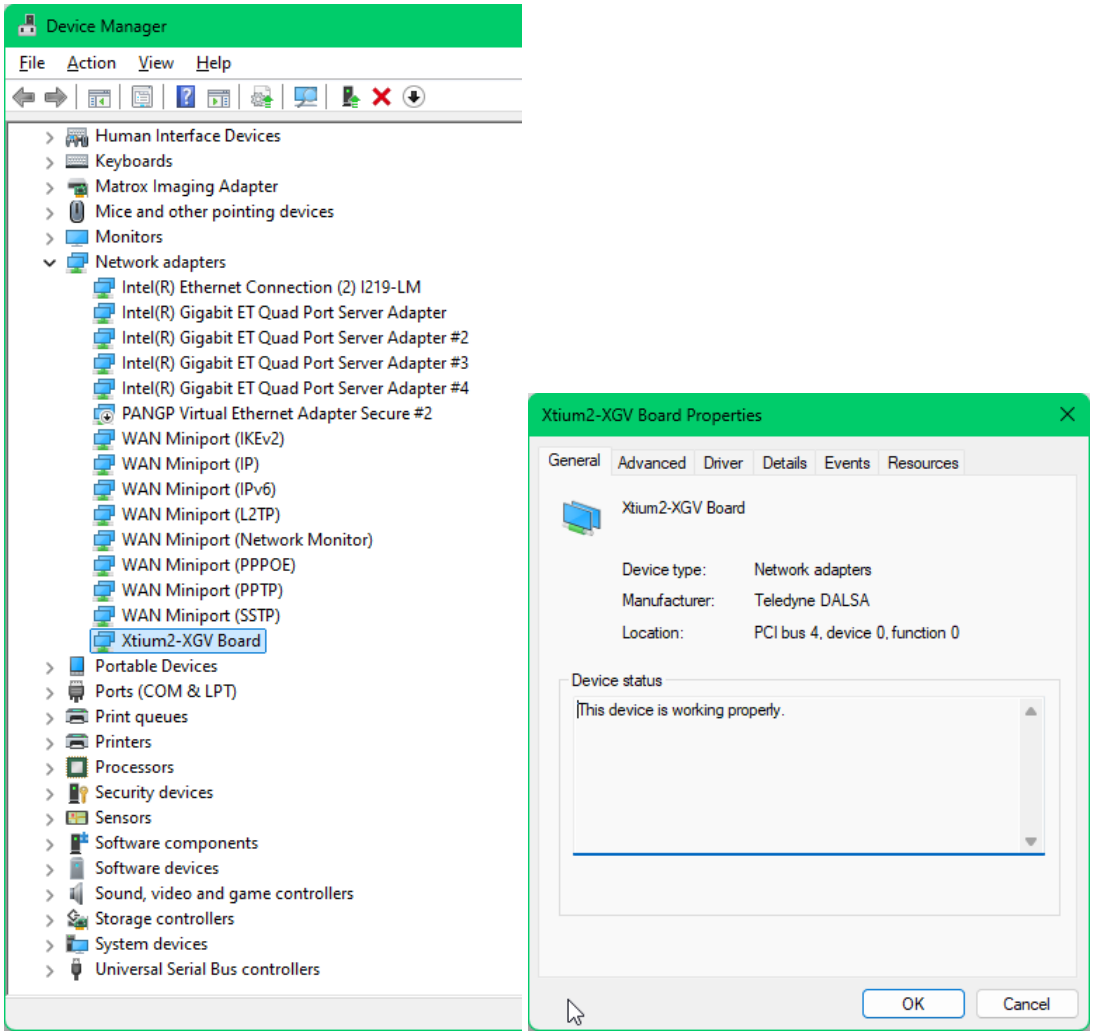


Figure 27: Using Windows Device Manager

Sapera and Hardware Windows Drivers

Any problem seen after installation, such as an error message running CamExpert, first make certain the appropriate Teledyne DALSA drivers have started successfully during the boot sequence. Example, click on the **Start • Programs • Accessories • System Tools • System Information • Software Environment** and click on **System Drivers**. Make certain the following drivers have started for the **Xtium2-XGV**.

Device	Description	Type	Started
CorXtium2XGV	Xtium2-XGV messaging	Kernel Driver	Yes
CorLog	Sapera Log viewer	Kernel Driver	Yes
CorMem	Sapera Memory manager	Kernel Driver	Yes
CorPci	Sapera PCI configuration	Kernel Driver	Yes

Teledyne DALSA Technical Support may request that you check the status of these drivers as part of the troubleshooting process.

Recovering from a Firmware Update Error

This procedure is required if any failure occurred while updating the Xtium2-XGV firmware on installation or during a manual firmware upgrade. If on the case the board has corrupted firmware, any Sapera application such as CamExpert or the grab demo program will not find an installed board to control.

Possible reasons for firmware loading errors or corruption are:

- Computer system mains power failure or deep brown-out
- PCI bus or checksum errors
- PCI bus timeout conditions due to other devices
- User forcing a partial firmware upload using an invalid firmware source file

When the Xtium2-XGV firmware is corrupted, the board will automatically run from the Safe load after a PC reset.

***Solution*:** Update the board using the standard method described in section Firmware Update: Automatic Mode.

Driver Information via the Device Manager Program

The Device Manager program provides a convenient method of collecting information about the installed Xtium2-XGV. System information such as operating system, computer CPU, system memory, PCI configuration space, plus Xtium2-XGV firmware information is displayed or written to a text file (default file name – BoardInfo.txt).

Execute the program via the Windows Start Menu shortcut
Start • Programs • Teledyne DALSA • Xtium2-XGV Device Driver • Device Manager.

If the Device Manager Program does not run, it will exit with a board was not found message. Possible reasons for an error are:

- Board is not in the computer
- Board driver did not start or was terminated
- PCI conflict after some other device was installed

Information Window

The following figure shows the Device Manager Information screen. Click to highlight one of the board components and its information shows in the right hand window, as described below.

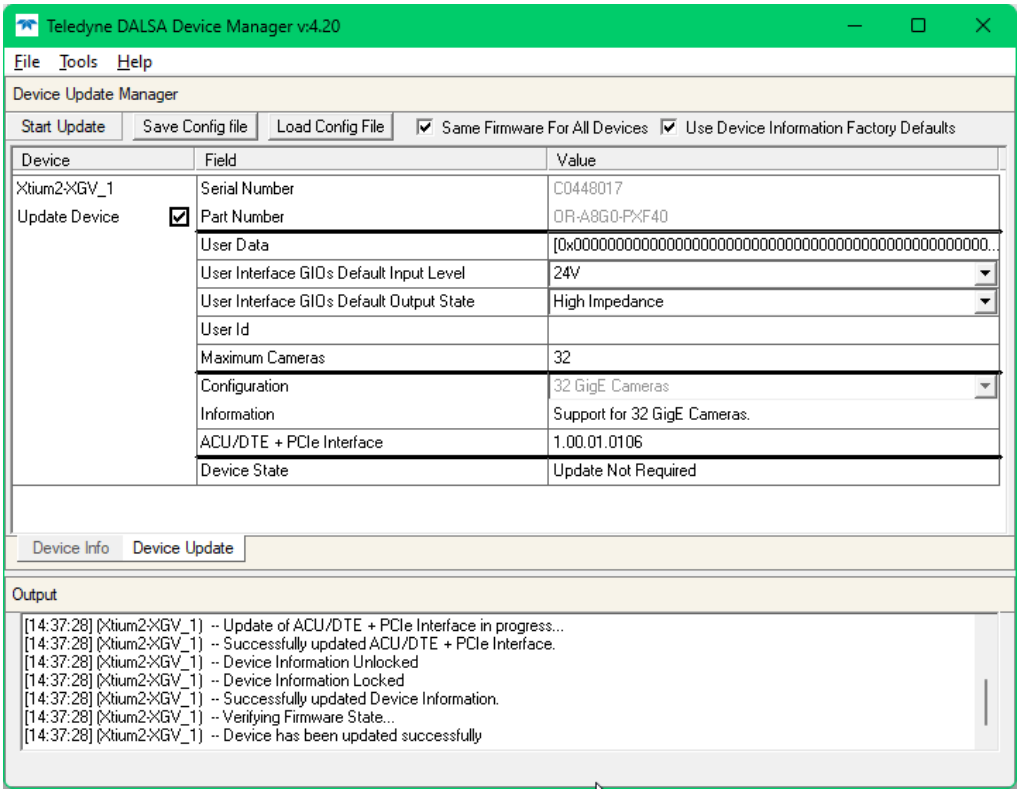


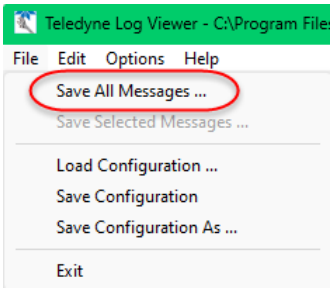
Figure 28: Board Firmware Version

- Select **Information** to display identification and information stored in the Xtium2-XGV firmware.
- Select **Firmware** to display version information for the firmware components.
- Select one of the firmware components to load *custom* firmware when supplied by Teledyne DALSA engineering for a future feature.
- Click on **File • Save Device Info** to save all information to a text file. Email this file when requested by Technical Support.

Teledyne Log Viewer

The third step in the verification process is to save in a text file the information collected by the Log Viewer program. Run the program via the Windows Start Menu shortcut
Start • Programs • Teledyne DALSA • Sapera LT • Tools • Log Viewer.

The Log Viewer lists information about the installed Teledyne DALSA drivers. Click on **File > Save All Messages** and you will be prompted for a text file name to save the Log Viewer contents.



Email this text file to Teledyne DALSA Technical Support when requested or as part of your initial contact email.

On-board Image Memory Requirements for Acquisitions

The Xtium2-XGV needs to allocate enough on-board memory to store the GigE packets of 2 entire frames. By default, the driver divides the on-board memory into 32 blocks of memory to support of up to 32 cameras. Taking into account that the driver needs 16MB to store direct host packets (ie. non video packets), each block is (4GB – 16MB)/32 = 127.5 MB. When connecting a camera, the width, height and pixel format is used to determine the size of the GigE packets of a single frame. If 2 frames cannot fit in the pre-allocated blocks, the driver will dynamically use more blocks in order to have enough memory to store GigE packets of 2 entire frames.

Symptoms: CamExpert Detects no Boards

- When starting CamExpert, with no Teledyne DALSA board detected, CamExpert will start in offline mode. There is no error message and CamExpert is functional for creating or modifying a camera configuration file. If CamExpert should have detected an installed board frame grabber, troubleshoot the installation problem as described below.

Troubleshooting Procedure

When CamExpert detects no installed Teledyne DALSA board, there could be a hardware problem, a system bus problem, a kernel driver problem, or a software installation problem.

- Make certain that the card is seated in PCIe slot.
- Perform all installation checks described in this section before contacting Technical Support.
- Try the board in a different PCIe slot if available.

Symptoms: Xtium2-XGV Does Not Grab

Sapera CamExpert does start but you do not see an image and the frame rate displayed is 0.

- Verify the camera has power.
- Verify the Camera GigE cable is connected to the camera.
- Verify the camera and timing parameters with the camera in free run mode.
- Verify you can grab with the camera in free run mode.
- Try to snap one frame instead of continuous grab.
- Perform all installation checks described in this section before contacting Technical Support.

Symptoms: Card Grabs Black

You are able to use Sapera CamExpert, the displayed frame rate is as expected, but the display is always black.

- Set your camera to manual exposure mode and set the exposure to a longer period, plus open the lens iris.
- Try to snap one frame instead of continuous grab.
- A PCIe transfer issue sometimes causes this problem. No PCIe transfer takes place, so the frame rate is above 0 but nevertheless no image is displayed in CamExpert.
- Make certain that BUS MASTER bit in the PCIe configuration space is activated. Look in PCI Diagnostics for **BM** button under “Command” group. Make certain that the **BM** button is activated.

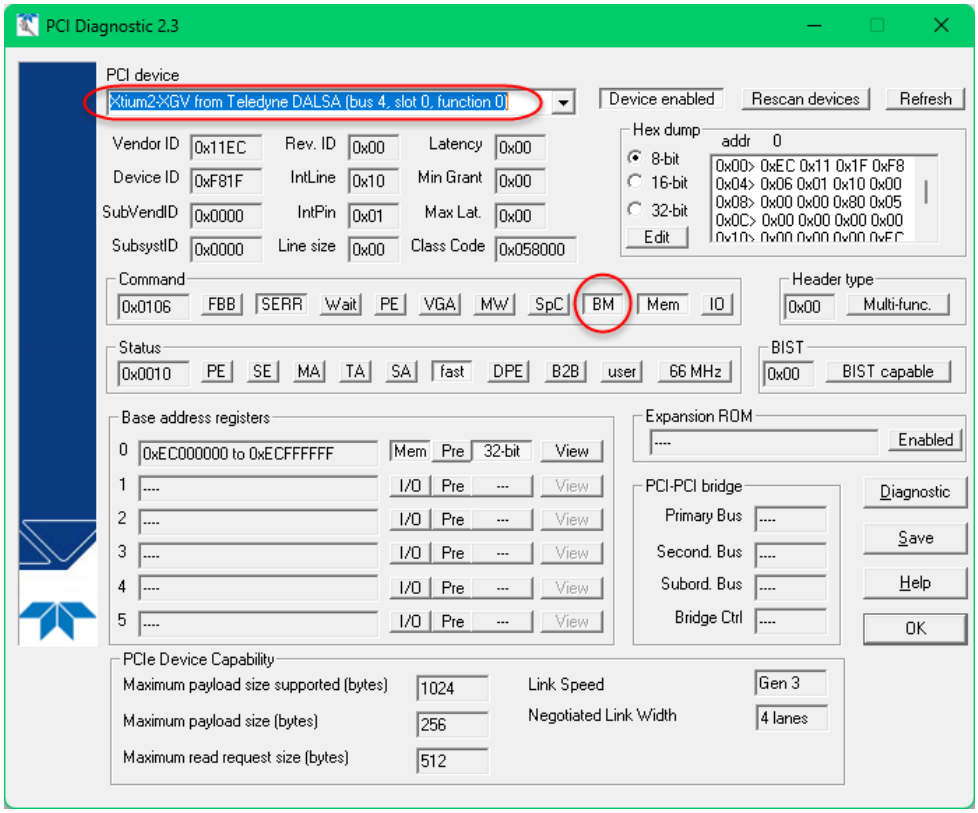


Figure 29: PCI Diagnostic Tool BM Button

- Perform all installation checks described in this section before contacting Technical Support.

Symptoms: Card acquisition bandwidth is less than expected

The Xtium2-XGV acquisition bandwidth is less than expected.

- Review the system for problems or conflicts with other expansion boards or drivers.
- Remove other PCI Express boards and check acquisition bandwidth again. Engineering has seen this case where other PCI boards in some systems cause limitations in transfers. Each system, with its combination of system motherboard and PCI boards, will be unique and must be tested for bandwidth limitations affecting the imaging application.
- Is the Xtium2-XGV installed in a PCI Express x16 slot?
  Note that some computer's x16 slot may only support non x16 boards at x1 or not at all. Check the computer documentation or test an Xtium2-XGV installation. The speed at which the board is running can be viewed using the Diagnostic Tool provided with the driver.
- Is the Xtium2-XGV installed in a PCI Express Gen1 or Gen2 slot?
  Some older computers only have PCIe Gen1 or Gen2 slots. The Generation at which the board is running is viewed using the Diagnostic Tool provided with the driver.
- Is the PCI maximum payload size smaller than 256 bytes?
  On some computers, this parameter can be changed in the PC’s BIOS.

Appendix: Additional Installation Types

Upgrading Sapera or Board Driver

When installing a new version of Sapera or a Teledyne DALSA acquisition board driver in a computer with a previous installation, the current version **must** be un-installed first. Described below are two upgrade situations. Note that if the board is installed in a different slot, the new hardware wizard opens. Answer as instructed in the section Installation.

Board Driver Upgrade Only

Minor upgrades to acquisition board drivers are distributed as ZIP files available in the Teledyne DALSA web site www.teledynedalsa.com/mv/support.

Often minor board driver upgrades do not require a new revision of Sapera. To confirm that the current Sapera version will work with the new board driver:

- Check the new board driver ReadMe file before installing, for information on the minimum Sapera version required.
- If the ReadMe file does not specify the Sapera version required, contact Teledyne DALSA Technical Support (see Technical support).

To upgrade the board driver only:

- Logon the computer as an administrator or with an account that has administrator privileges.
- In **Windows 11**, just type Control Panel while in the start screen, or click the arrow in the lower left side to bring up the all applications window. Select Programs and Features, then double-click the Teledyne DALSA Xtium2 board driver and click **Remove**.
- Install the new board driver. Run the driver **.exe** file from a downloaded driver file (for example,.Xtium2-XGV_1.00.01.xxxx.exe).

IMPORTANT
You cannot install a Teledyne DALSA board driver without Sapera LT installed on the computer.

Upgrading both Sapera and Board Driver

When upgrading both Sapera and the acquisition board driver, follow the procedure described below.

- Logon the computer as an administrator or with an account that has administrator privileges.
- In **Windows 11**, just type Control Panel while in the start screen, or click the arrow in the lower left side to bring up the all applications window. Select Programs and Features, then double-click the Teledyne DALSA Xtium2 board driver and click **Remove**. Follow by also removing the older version of Sapera LT.
- Reboot the computer and logon the computer as an administrator again.
- Install the new versions of Sapera and the board driver as if this was a first time installation. See Sapera LT Library & Xtium2-XGV Driver Installation for installation procedures.

Preserving Board Parameters during Driver Upgrade

User defined parameter settings for previously installed boards can be preserved when upgrading a device driver by using an *install.ini* file as described in the Custom Driver Installation using install.ini section. Clicking **Automatic** on the Device Manager Start-up dialog will apply the settings specified in the *install.ini* file.

To verify the settings specified in the *install.ini* file, click **Manual**; differences between the current device settings are shown in **green** in both the Device Info and Device Update tabs.

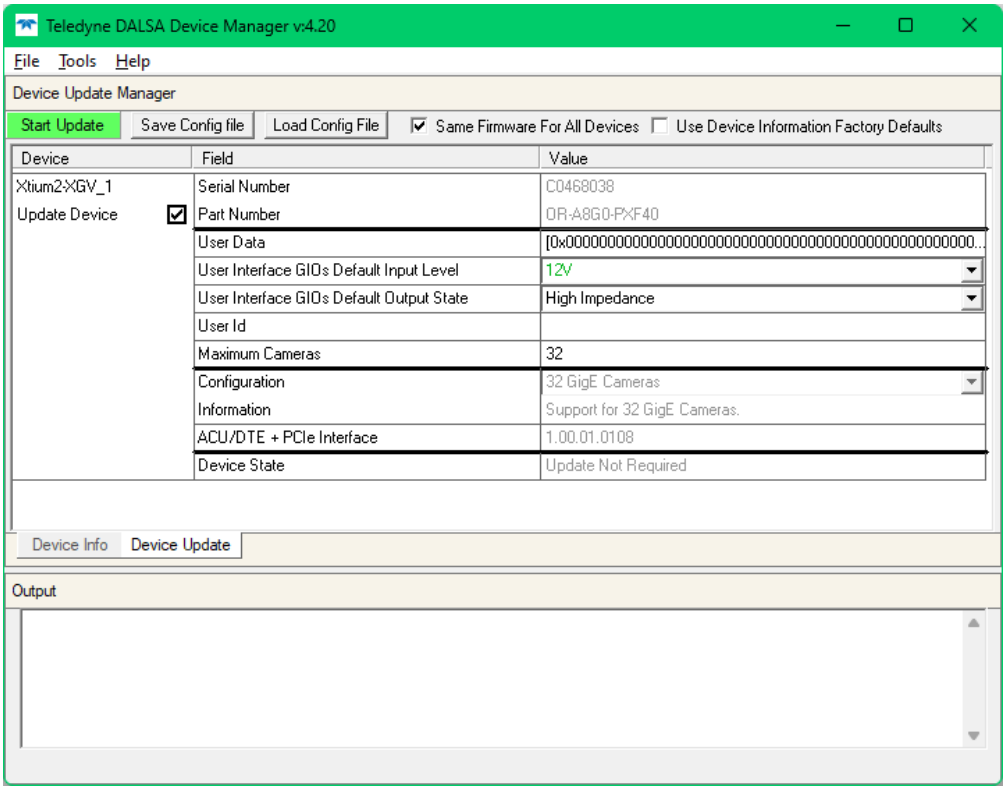


Figure 30: Device Manager Parameter Setting Differences

Upgrading without an *install.ini* file requires selecting **Manual** update on the Device Manager Start-up dialog and setting the required parameters manually.

NOTE

Without an *install.ini*, configuration information is not preserved and is always set to factory default.

Preserving Board Parameters during Board Replacement or System Cloning

When replacing a board in a system or cloning a system configuration using a hard drive image, if the previous device parameter settings differ from the factory default driver settings it is indicated as “User Defined” or “Manual Configuration” in the Teledyne DALSA Device Manager start-up dialog under the Device Info column. User-defined settings are specific to the PCI Express slot on the system.

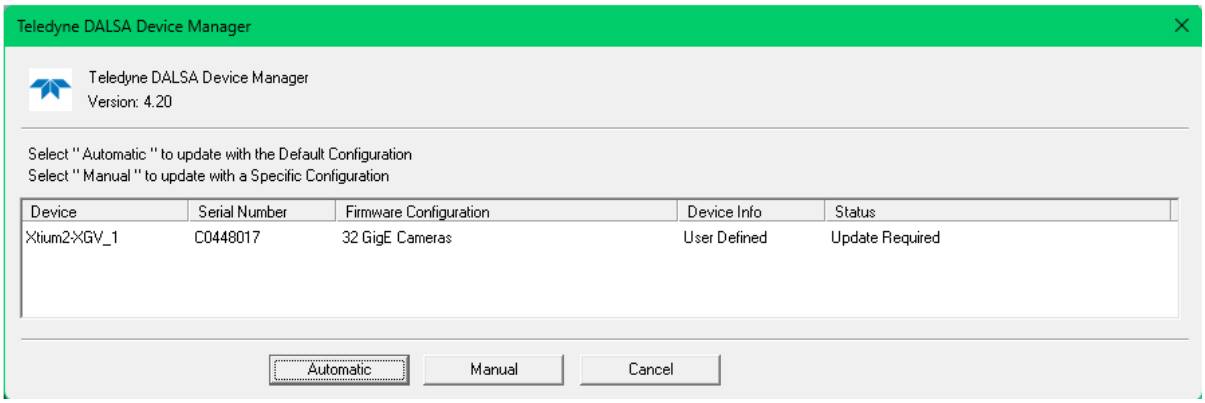


Figure 31: Firmware Update Status

To preserve the user defined parameter settings, select “Manual” and proceed with the update; differences between the current settings are shown in green in both the Device Info and Device Update tabs.

For systems with mulitple boards, if boards use different firmware configurations, disable the **Same Firmware For All Devices** option (otherwise the configuration specified for the first board according to slot position is applied to all boards in the system).

Figure 32: Same Firmware For All Devices Checkbox

Requirements for a Silent Install

Both Sapera LT and the Xtium2-XGV driver installations share the same installer technology. When the installations of Teledyne DALSA products are embedded within a third party's product installation, the mode can either have user interaction or be completely silent. The following installation mode descriptions apply to both Sapera and the hardware driver.

NOTE

You must reboot after the installation of Sapera LT. However, to streamline the installation process, Sapera LT can be installed without rebooting before installing the board hardware device drivers. The installations then complete with a single final system reboot.

Perform Teledyne DALSA embedded installations in either of these two ways:

- **Normal Mode**
  The default mode is interactive. This is identical to running the setup.exe program manually from Windows (either run from Windows Explorer or the Windows command line).
- **Silent Mode**
  This mode requires no user interaction. A preconfigured "response" file provides the user input. The installer displays nothing.

Silent Mode Installation

A Silent Mode installation is recommended when integrating Teledyne DALSA products into your software installation. The silent installation mode allows the device driver installation to proceed without the need for mouse clicks or other input from a user.

Preparing a Silent Mode Installation requires two steps:

- Prepare the response file, which emulates a user.
- Invoke the device driver installer with command options to use the prepared response file.

Creating a Response File

Create the installer response file by performing a device driver installation with a command line switch "-r". The response file is automatically named **`setup.iss`** and is saved in the \windows folder. If a specific directory is desired, the switch –f1 is used.

As an example, to save a response file in the same directory as the installation executable of the Xtium2-XGV, the command line would be:

```
Xtium2-XGV_1.00.00.0000 –r –f1".\setup.iss"
```

Running a Silent Mode Installation

A device driver silent installation, whether done alone or within a larger software installation requires the device driver executable and the generated response file **`setup.iss`**.

Execute the device driver installer with the following command line:

```
Xtium2-XGV_1.00.00.0000 -s -f1".\setup.iss"
```

Where the **–s** switch specifies the silent mode and the **–f1** switch specifies the location of the response file. In this example, the switch –f1".\setup.iss" specifies that the **`setup.iss`** file be in the same folder as the device driver installer.

NOTE

On 11, the Windows Security dialog box will appear unless one has already notified Windows to 'Always trust software from "Teledyne DALSA Inc." during a previous installation of a driver.

Silent Mode Uninstall

Similar to a silent installation, a response file must be prepared first as follows.

Creating a Response File

The installer response file is created by performing a device driver un-installation with a command line switch "-r". The response file is automatically named **`setup_uninstall.iss`** which is saved in the \windows folder. If a specific directory is desired, the switch "–f1" is used.

As an example, to save a response file in the same directory as the installation executable of the Xtium2-XGV, the command line would be:

```
Xtium2-XGV_1.00.00.0000 –r –f1".\setup_uninstall.iss"
```

Running a Silent Mode Uninstall

Similar to the device driver silent mode installation, the un-installation requires the device driver executable and the generated response file **`setup.iss`**.

Execute the device driver installer with the following command line:

```
Xtium2-XGV_1.00.00.0000 -s -f1".\setup_uninstall.iss"
```

Where the **–s** switch specifies the silent mode and the **–f1** switch specifies the location of the response file. In this example, the switch –f1".\setup_uninstall.iss" specifies that the **`setup_uninstall.iss`** file be in the same folder as the device driver installer.

Silent Mode Installation Return Code

A silent mode installation creates a file “corinstall.ini” in the Windows directory. A section called [SetupResult] contains the ‘status’ of the installation. A value of **1** indicates that the installation has started and a value of **2** indicates that the installation has terminated.

A silent mode installation also creates a log file “setup.log” which by default is created in the same directory and with the same name (except for the extension) as the response file. The /f2 option enables you to specify an alternative log file location and file name, as in Setup.exe /s /f2"C:\Setup.log".

The “setup.log” file contains three sections. The first section, [InstallShield Silent], identifies the version of InstallShield used in the silent installation. It also identifies the file as a log file. The second section, [Application], identifies the installed application name, version, and the company name. The third section, [ResponseResult], contains the ‘ResultCode’ indicating whether the silent installation succeeded. A value of **0** means the installation was successful.

Installation Setup with CorAppLauncher.exe

The installation setup can be run with the CorAppLauncher.exe tool provided with the driver.

- Install the board driver and get CorAppLauncher.exe from the \bin directory of the installation.
- When running the installation, CorAppLauncher.exe will return only when the installation is finished.
- When run from within a batch file, obtain the installation exit code from the ERRORLEVEL value.
- The arguments to CorAppLauncher.exe are
  -l: Launch application
  -f: Application to launch. Specify a fully qualified path.

As an example:

- CorAppLauncher –l –f”c:\driver_install\Xtium2-XGV_1.00.00.0000.exe”
- IF %ERRORLEVEL% NEQ 0 goto launch error

Note: There is a 32-bit and 64-bit version of CorAppLauncher.exe. When installing the driver, only the version related to the OS is installed. However, the 32-bit version is usable on either 32-bit or 64-bit Windows.

Custom Driver Installation using install.ini

Customize the driver installation by parameters defined in the file “install.ini”.
By using this file, the user can:

- Select the user default configuration.
- Select different configurations for systems with multiple boards.

Creating the install.ini File

- Install the driver in the target computer. All Xtium2-XGV boards required in the system must be installed.
- Configure each board’s acquisition firmware using the Teledyne DALSA Device Manager tool (see Device Manager – Board Viewer).
- When each board setup is complete, using the Teledyne DALSA Device Manager tool, click on the **Save Config File** button. This will create the “install.ini” file.

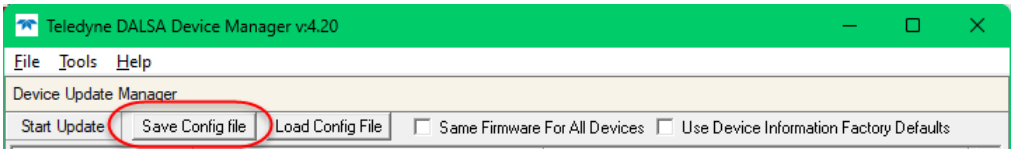


Figure 33: Create an install.ini File

Run the Installation using install.ini

Copy the install.ini file into the same directory as the setup installation file. Run the setup installation as normal. The installation will automatically check for an *install.ini* file and if found, use the configuration defined in it.

Contact Information

Sales Information

Visit our web site:	https://www.teledynevisionsolutions.com/
Email:	info@teledynevisionsolutions.com

Canadian Sales	**Canadian Sales**
Teledyne DALSA — Head office 605 McMurray Road Waterloo, Ontario N2V 2E9 Canada Tel: +1 519-886-6000 Fax: +1 519-886-8023	Teledyne DALSA — Montreal office 880 Rue McCaffrey Saint-Laurent, Quebec H4T 2C7 Canada Tel: +1 514-333-1301 Fax: +1 514-333-1388
USA Sales	**European Sales**
Teledyne DALSA — Billerica office 700 Technology Park Drive Billerica, MA 01821 USA Tel: +1 978-670-2000 Fax: +1 978-670-2010 sales.americas@teledynedalsa.com	Teledyne DALSA GMBH Lise-Meitner-Str. 7 82152 Krailling (Munich) Germany Tel: +49 89-89545730 Fax: +49 89-895457346 sales.europe@teledynedalsa.com
Asia Pacific Sales	**Asia Pacific Sales**
Teledyne DALSA Asia Pacific Ikebukuro East 6F 3-4-3 Higashi Ikebukuro, Toshima-ku Tokyo, 170-0013 Japan Tel: +81 3-5960-6353 Fax: +81 3-5960-6354 sales.asia@teledynedalsa.com	Teledyne DALSA Asia Pacific Room 904, Block C, Poly West Bund Center 275 Rui Ping Road Shanghai 200032 China Tel: +86 21-60131571 sales.asia@teledynedalsa.com

Technical support

Submit any support question or request via our web site.

Technical support form via our web page: **Support requests for imaging product installations,** **Support requests for imaging applications**	https://www.teledynevisionsolutions.com/support/support-center/
Camera/sensor support information	
Product literature and driver updates	