www.epiphan.com

DVI2PCIe Duo™ User Guide

Epiphan Technical Documentation

February 2017

Thank you for choosing Epiphan!

At Epiphan Systems Inc. (“Epiphan”), product function and quality are our top priority. We make every effort to make sure that our products exceed our customers’ expectations.

Product Feedback

We regularly contact our customers to ensure product performance and reliability. We strive to continually enhance our products to accommodate your needs. We welcome your feedback and suggestions for product improvements. You can email your comments to info@epiphan.com.

Specifications

Go to the Products page of the Epiphan website for more information about DVI2PCIe Duo.

Warranty

All Epiphan Systems products are provided with a 100% return to depot warranty for one year from the date of purchase.

Technical Support

Epiphan is staffed by a professional support team. If, after checking the FAQs for your product on the Epiphan website and re-installing the Epiphan driver software (where applicable), you continue to have outstanding issues, email a problem report to support@epiphan.com. To help us solve the problem efficiently, include the following info:

- Your DVI2PCIe Duo serial number.
- Technical description of the signal source including resolution, refresh rate, synchronization, type of hardware.
- Complete description of the problem you are experiencing.

Terms and Conditions

This document, the Epiphan web site, and the information contained therein, including but not limited to the text and images as well as Epiphan Systems Inc's trademarks, trade names and logos are the property of Epiphan and its affiliates and licensors, and are protected from unauthorized copying and dissemination by Canadian copyright law, United States copyright law, trademark law, international conventions and other intellectual property laws.

Epiphan, Epiphan Systems, Epiphan Systems Inc., and Epiphan logos are trademarks or registered trademarks of Epiphan Systems Inc., in certain countries. All Epiphan product names and logos are trademarks or registered trademarks of Epiphan. All other company and product names and logos may be trademarks or registered trademarks of their respective owners in certain countries.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET OR PRODUCT INSTALLATION SOFTWARE PACKAGE THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR EPIPHAN REPRESENTATIVE FOR A COPY.

PRODUCT DESCRIPTIONS AND SPECIFICATIONS REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. EPIPHAN PERIODICALLY ADDS OR UPDATES THE INFORMATION AND DOCUMENTS ON ITS WEB SITE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION AND RECOMMENDATIONS ARE BELIEVED TO BE ACCURATE AT TIME OF WRITING BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

LIMITATION OF LIABILITY
UNDER NO CIRCUMSTANCES SHALL EPIPHAN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, CONSEQUENTIAL, EXEMPLARY OR OTHER INDIRECT DAMAGES THAT RESULT FROM THE USE OF, OR THE INABILITY TO USE, THIS PRODUCT OR THE INFORMATION CONTAINED ON THIS DOCUMENT OR PROVIDED ON EPIPHAN'S WEB SITE, EVEN IF EPIPHAN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL EPIPHAN'S TOTAL LIABILITY TO YOU FOR ALL DAMAGES, LOSSES, AND CAUSES OF ACTION RESULTING FROM YOUR USE OF THIS PRODUCT, WHETHER IN CONTRACT, TORT (INCLUDING, BUT NOT

LIMITED TO, NEGLIGENCE) OR OTHERWISE, EXCEED THE AMOUNTS YOU PAID TO EPIPHAN DURING THE MOST RECENT THREE-MONTH PERIOD IN CONNECTION WITH AMOUNTS WHICH YOU PAID FOR USING THIS PRODUCT.

INFORMATION AND DOCUMENTS, INCLUDING PRODUCT SPECIFICATIONS, PROVIDED IN THIS DOCUMENT OR THE EPIPHAN WEB SITE ARE PROVIDED "AS IS." SPECIFICALLY, BUT WITHOUT LIMITATION, EPIPHAN DOES NOT WARRANT THAT: (i) THE INFORMATION IS CORRECT, ACCURATE, RELIABLE OR COMPLETE; (ii) THE FUNCTIONS CONTAINED ON THE EPIPHAN WEB SITE WILL BE UNINTERRUPTED OR ERROR-FREE; (iii) DEFECTS WILL BE CORRECTED, OR (iv) THIS WEB SITE OR THE SERVER(S) THAT MAKES IT AVAILABLE ARE FREE OF VIRUSES OR OTHER HARMFUL COMPNENTS. EPIPHAN SPECIFICALLY DISCLAIMS ALL REPRESENTATIONS, WARRANTIES AND CONDITIONS, EITHER EXPRESS, IMPLIED, STATUTORY, BY USAGE OF TRADE OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, TITLE, SATISFACTORY QUALITY OR FITNESS FOR A PARTICULAR PURPOSE.

For additional terms and conditions, please refer to additional sections in this document.

1 Table of Contents

1. DVI2PCIe Duo Introduction

DVI2PCIe Duo™ is Epiphan's newest internal frame grabber with a DVI-I dual link and an SDI input . It is installed in a video capture workstation's PCI Express (PCIe) slot and transmits captured data to the video capture workstation over the PCIe bus.

DVI2PCIe Duo captures video from any dual or single link DVI, unencrypted HDMI, VGA, or 3G-SDI, HD-SDI and SD-SDI source. An optional A/V kit can be installed to capture S-Video/composite, analog audio and balanced or unbalanced TRS audio. DVI2PCIe Duo captures full HD at 60 frames per second and captures and streams audio and HD video sources with resolutions up to 2048×2048 when connected to a DVI-I dual link connector. The DVI2PCIe Duo capture card driver is fully compatible with DirectShow in Windows and Video4Linux in Linux, and can be used with third party software.

In addition to capturing video from SDI, DVI/HDMI/VGA and S-Video/composite video sources, DVI2PCIe Duo supports DisplayPort, Mini DisplayPort, and Thunderbolt sources using a converter cable, sold separately.

DVI2PCIe Duo is part of Epiphan's complete line of video signal capture products. For more information about all of Epiphan's video signal capture products, please see the Products page on the Epiphan website.

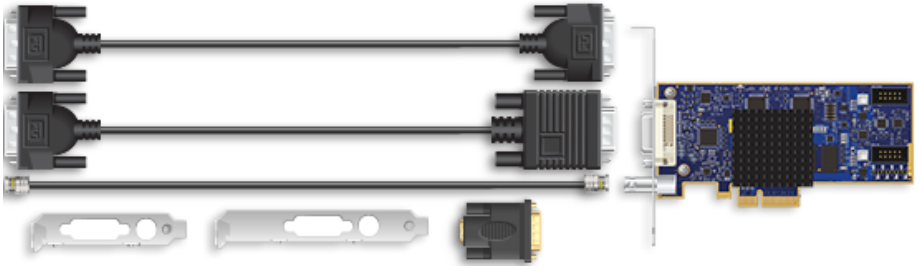
1.1 What's in the box

The DVI2PCIe Duo frame grabber package includes the following:

1. DVI2PCIe Duo board (with full height PCIe bracket attached)
2. One DVI cable
3. One SDI cable (3G compliant)
4. One DVI-VGA cable

5. One HDMI to DVI adapter
6. One Low-profile bracket

Figure 1: What's in the box?



2 Physical Attributes

2.1 System Hardware Features

The Epiphan DVI2PCIe Duo frame grabber is a PCIe x4 card that includes a DVI-I type connector, SDI connector and three activity LEDs. The DVI2PCIe card can be installed in a 4x, 8x or 16x PCIe slot on the motherboard of the video capture workstation.

Note: To maintain high performance levels, the DVI2PCIe Duo card requires a minimum of PCIe x4. Consult your motherboard manufacturer's support to ensure your motherboard supports PCIe x4.

Note: PCIe card performance is determined by the length of the card and slot, (x1, x4, x8 or x16) and the generation of the PCIe card and the motherboard slot. The DVI2PCIe Duo card is a generation 2 card and is fully backward compatible with first generation slots; the card will perform at first generation speed. DVI2PCIe Duo card is compatible with generation 3 slots; the card will perform at generation 2 speed.

Figure 2: DVI2PCIe Duo connectors and LEDs

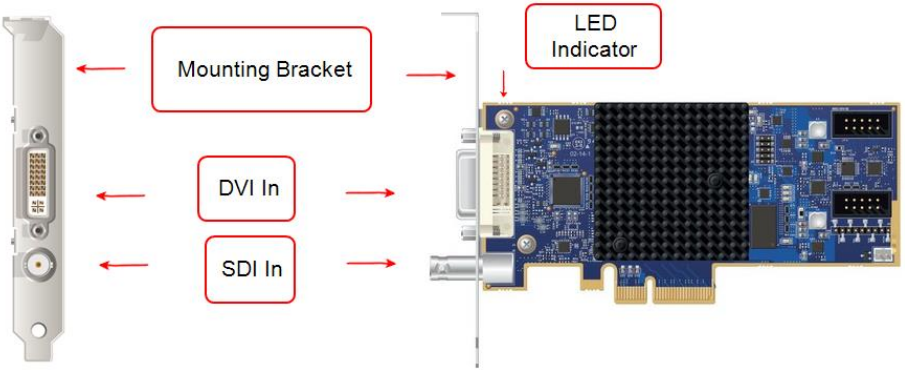
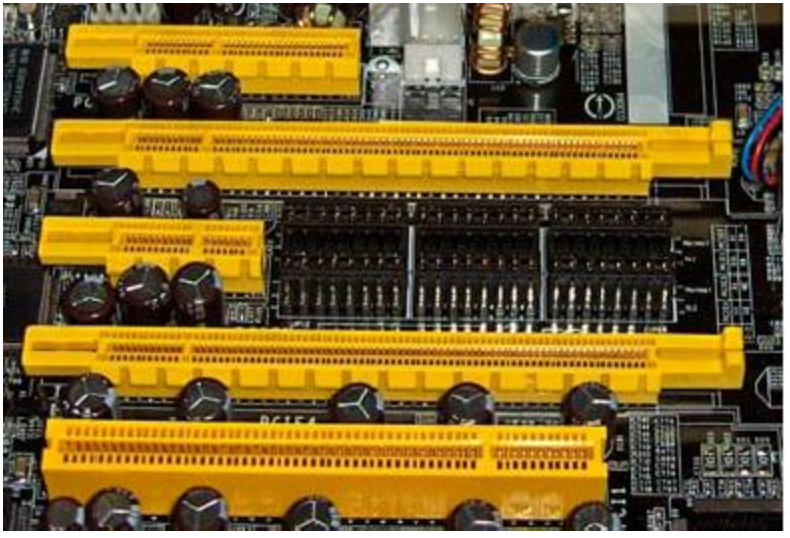


Figure 4 shows an example of different PCIe slots on a single PC motherboard. DVI2PCIe can be installed on any of the following PCIe slots.

Figure 3: PCIe slots (from top to bottom: 4x, 16x, 1x and 16x), compared to a traditional 32-bit PCI slot (bottom)



When installed, the DVI2PCIe Duo card adds a DVI IN and an SDI IN port and an LED indicator. You can connect a DVI-I (single link/dual link) source directly to the DVI IN port using a standard DVI cable. You can connect an SDI source (3G-SDI, HD-SDI and SD-SDI) directly to the SDI IN port using an SDI cable with a BNC connector. To connect a VGA source, use a VGA to DVI cable. To connect an HDMI source, use an HDMI to DVI adapter.

Table 1 LED Descriptions

Interface	Description
LEDs	**Red LED:** During operation the red LED blinks each time the DVI2PCIe Duo captures an image. You can use the red LED as an indicator that the DVI2PCIe Duo is capturing images. **Green and blue LEDs**: When the PC starts up the DVI2PCIe Duo blue LED lights up. A few seconds later the green LED

	lights up. After about another 20 seconds the blue LED turns off, leaving the green LED on indicating that the device has started up and can start capturing images. During operation the blue LED blinks during the signal test operation and when the system tunes the parameters.
DVI In	Connect a DVI, VGA, or HDMI source to the DVI2PCIe Duo card. See the DVI2PCIe Duo Specifications on the Epiphan web site for information about the video inputs supported by the DVI2PCIe Duo card.

2.2 Cables, Connectors and Adapters

The DVI2PCIe Duo can be connected to a number of different types of equipment using a variety of cables, and adapters. This section describes a subset of connectors, cables and adapters that are known to be compatible with the DVI2PCIe Duo.

2.2.1 VGA to DVI Cable

Connects a VGA source to the DVI2PCIe Duo DVI port. This cable is included with the DVI2PCIe Duo.

Figure 4: VGA to DVI Cable

2.2.2 *DVI to DVI Cable*

Connects a DVI source to the DVI2PCIe Duo DVI port. This cable is included with the DVI2PCIe Duo.

Figure 5: DVI to DVI Cable

2.2.3 *SDI to SDI Cable*

Connects an SDI (3G, HD or SD) source to the DVI2PCIe Duo SDI port. This cable is included with the DVI2PCIe Duo.

Figure 6: SDI to SDI Cable

2.2.4 *HDMI to DVI Adapter*

Connects an HDMI source to the DVI2PCIe Duo DVI port. This adapter is included with the DVI2PCIe Duo.

Figure 7: HDMI to DVI Adapter

2.2.5 *DisplayPort Cable*

Connects a source's DisplayPort to the DVI2PCIe Duo DVI port (cable sold separately).

Figure 8: DisplayPort Cable

2.2.6 *Mini DisplayPort Cable*

Connects a source's Mini DisplayPort to the DVI2PCIe Duo DVI port (cable sold separately).

Figure 9: Mini DisplayPort Cable

2.2.7 *Thunderbolt Port Cable*

Connects a source's Thunderbolt port to the DVI2PCIe Duo DVI port (cable sold separately).

Figure 10: Thunderbolt Port Cable

3 System Requirements

Epiphan's DVI2PCIe Duo internal frame grabber has the following hardware and software requirements:

Video source	any VESA-compatible VGA, DVI, or HDMI source
Video capture workstation	4x PCIe slot (4x, 8x or 16x are supported)
Processor frequency	2 GHz or faster 32-bit (x86) or 64-bit (x64) processor

RAM memory	2 GB RAM (32-bit and 64-bit)
Available hard disk space	16 GB available hard disk space (32-bit) or 20 GB (64-bit)
Video capture workstation OS	Windows 7, 8, 10 (i386, x64); Linux (x86, x86_64); A list of precompiled drivers is available on the Software Download page.

To download the latest versions of the DVI2PCIe Duo drivers and Epiphan Capture Tool, browse to http://www.epiphan.com/products/dvi2pcie-duo/downloads/.

4 Installing DVI2PCIe Duo

This section describes how to install the DVI2PCIe Duo and to connect a DVI/VGA/HDMI or 3G-SDI/HD-SDI/SD-SDI source to it.

Note: It is recommended that you download and install the latest drivers for the video capture workstation motherboard from the motherboard manufacturer's website after installing the DVI2PCIe Duo internal frame grabber into the video capture workstation.

To connect the DVI2PCIe Duo card, in addition to the frame grabber itself you need:

- A video capture workstation with an available 4x, 8x or 16x PCIe slot.
- A DVI/VGA/HDMI or a 3G-SDI/HD-SDI/SD-SDI video source.
- For VGA and HDMI video sources, the appropriate cable or adapter to connect the video source input to the DVI IN port.
- An antistatic wrist strap to protect sensitive electronic components.

4.1.1 To install a DVI2PCIe Duo Frame Grabber:

This procedure describes how to install the DVI2PCIe Duo in a video capture workstation.

1. Shut down and power off the video capture workstation.
2. Disconnect all cables from the video capture workstation.
3. Open the system unit to expose the PCIe slots (usually located at the back of the PC).
4. Attach the antistatic wrist strap to the metal casing of the PC power supply and to your wrist according to the instructions supplied with the wrist strap.
5. Select a PCIe slot and remove the corresponding filler panel from the PC slot opening.
6. Holding the DVI2PCIe Duo card by the edges, align the card edge connector with the PCIe slot.
7. Slide the card mounting bracket into the small slot at the end of the PCIe opening.
8. Applying even pressure at both corners of the card, push the card down until it is firmly seated in the slot.

Caution: Do not use excessive force when installing the card into the PCIe slot. You may damage the card's PCIe connector. If the card does not seat properly when you apply even pressure, remove the card and carefully reinstall it.

9. Secure the card mounting bracket to the system unit using a screw at the top of the mounting bracket.
10. Detach the wrist strap and close the system unit.
11. Power on the video capture workstation.
12. Install the DVI2PCIe duo drivers and Epiphan Capture Tool as described below.

5 Installation Steps for the Windows Video Capture Workstation

Follow the step-by step procedures provided in this section when you use a Windows PC as the video capture workstation to view and record images captured by a DVI2PCIe duo frame grabber.

Note: Install the drivers and Epiphan Capture Tool **after** installing the DVI2PCIe duo in a PCIe slot on the Windows video capture workstation.

5.1 Install the Windows Drivers and Epiphan Capture Tool

The drivers and application software includes the Epiphan device drivers and the Epiphan Capture Tool.

1. Find the latest Windows drivers and Epiphan Capture software. Browse to http://www.epiphan.com/products/dvi2pcie-duo/downloads/.
2. Scroll to the Windows section of the download page.
3. Download the latest version of the drivers and capture tool that will run on the video capture workstation.
   Make sure you note the download destination folder.
4. Unzip the downloaded file.
5. Right-click on the .zip file and choose **Extract All**.
6. Select the Setup Utility (setup.exe) from the list of extracted files; the Setup Wizard window opens.

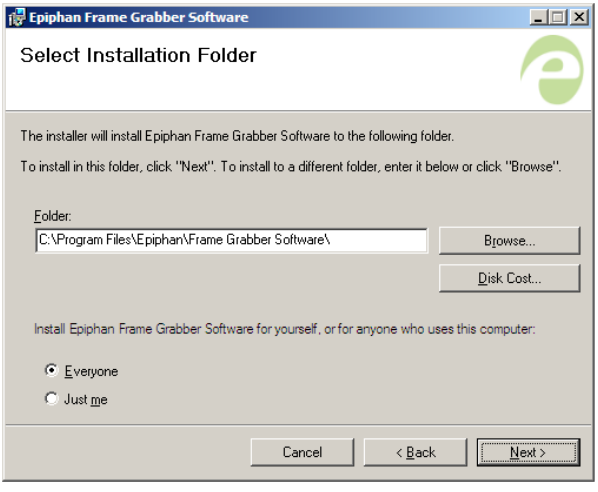
Figure 11: Setup Wizard

7. Click Next. The License Agreement window opens.

Figure 12: License Agreement window

8. Select I Agree.
9. Click Next; the Select Installation Folder window opens.

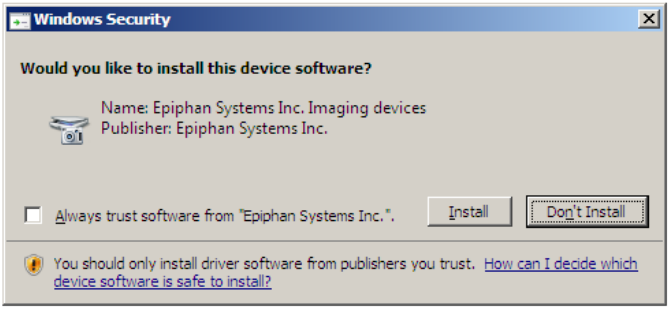
Figure 13: Select Installation Folder



10. Enter a path or file name, or browse to a location to save the frame grabber software.

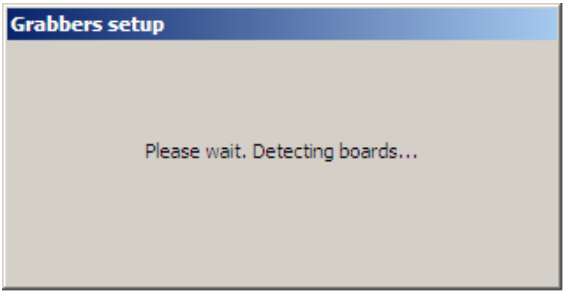
11. Click Next; a Confirm Installation window opens.
12. Click Next; a progress bar appears. When the installation is complete, the progress bar closes and a Windows Security window opens.

Figure 14: Windows Security window



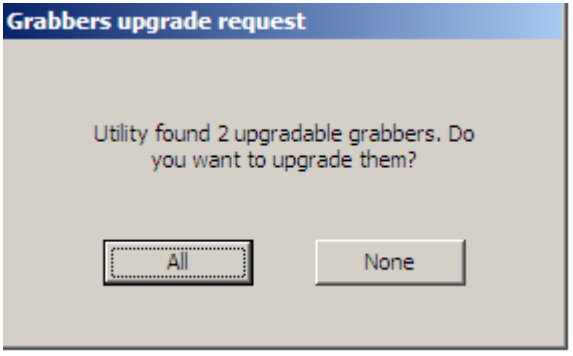
13. Click Install. A Grabbers setup window opens. Indicating board detection is in progress.

Figure 15: Grabbers setup window



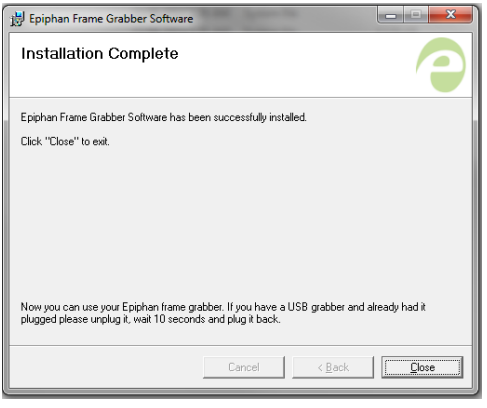
13. Perform one of the following:
    a. If the setup operation detects a mismatch between the driver software and the FPGA image; go to Firmware Upgrade.

Figure 16: Grabbers upgrade request window



b. If the installation is successful and no mismatches are detected, the Installation Complete window opens.

Figure 17: Installation Complete window



14. Click Close. The Windows drivers and capture tool are now installed. If you installed the drivers and capture tool software, the video capture workstation after powering up should automatically recognize the frame grabber and install drivers for it.

5.2 Upgrading to the Latest Windows Software Version

From time to time Epiphan makes new versions of all Epiphan Frame Grabber software available from the Epiphan web site. To confirm that you have the latest Epiphan Capture Tool software, select the Check for Updates command from the Help menu.

Note: Check for Updates will only recommend an update if Epiphan recommends that you install a new version. This will happen if the latest version contains significant bug fixes or enhancements. If a new Epiphan Capture Tool software version only contains minor changes, Check for Updates may not recommend that you install a new version.

In most cases you can upgrade the Epiphan software on your Windows video capture workstation by following normal procedures for your operating system to download the latest version and install it without uninstalling the previous version. If you have problems upgrading Windows software, see the detailed driver update instructions and install/uninstall instructions available from the Windows section of the Download page.

5.2.1 Finding Software Updates

To find the latest versions of all Epiphan software for Windows, go to http://www.epiphan.com/downloads. You can also browse to the download page for your DVI2PCIe Duo product. To do so, browse to http://www.epiphan.com and select **Products > DVI Frame Grabbers > DVI2PCIe Duo**. On these pages you will find the most recent versions of:

• Epiphan DVI2PCIe Duo User Guide.
• Epiphan USB device driver and video capture tool for Windows 2000, Windows XP, and Windows Vista.

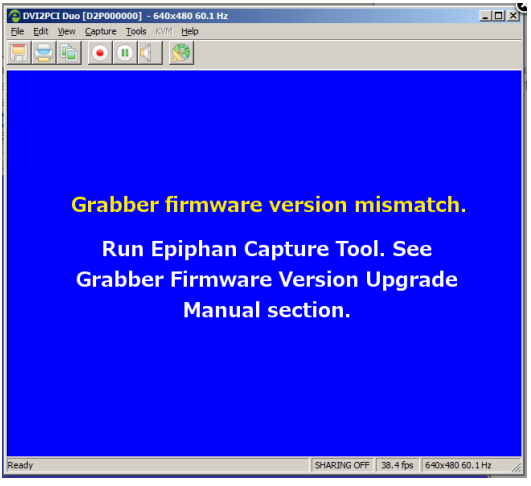
5.2.2 Firmware Upgrade

When you upgrade your driver, you may be prompted to upgrade your FPGA image. Follow the steps below when DVI2PCIe Duo detects a mismatch between the driver software and the FPGA image.

To update firmware:

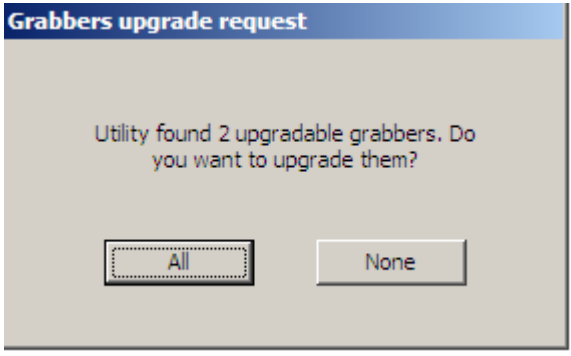
1. Open the Epiphan Capture Tool from the video capture workstation; the following window opens indicating a mismatch was detected.

Figure 18: Firmware version mismatch detected



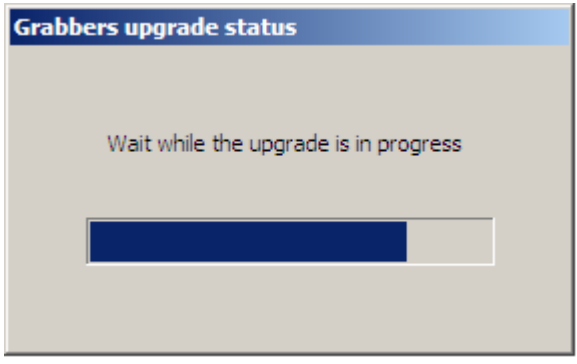
2. Click on the Tools menu option; a dropdown menu opens.
3. Select Upgrade Grabber Firmware; the firmware upgrade request window opens indicating the number of grabbers that require an upgrade. If there is no available upgrade, the menu option is greyed out.

Figure 19: Grabbers upgrade request



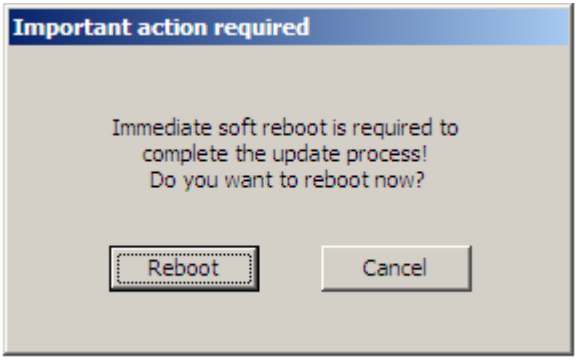
4. Perform one of the following:
   a. Click None when you do not want to upgrade the firmware for any of the frame grabbers detected on the network. The window closes; minimal firmware saved from on-board storage is applied.
   b. Click All to upgrade the firmware for all frame grabbers detected on the network; go to the next step.
5. A Grabbers upgrade status window opens and provides a progress of the upgrade.

Figure 21: Grabbers upgrade status



6. When the upgrade is complete, a dialog box appears requesting a soft reboot.

Figure 22: Important action required



7. Perform one of the following:
   a. Click Reboot; the reboot cycle begins. The Frame Grabber software is updated.
   b. Click Cancel; the video capture workstation loads minimal firmware saved from on-board storage.

5.3 Troubleshooting a Windows Installation

If you experience any difficulty viewing captured images with the Windows capture tool, review the following items prior to contacting technical support.

Confirm that the DVI2PCIe Duo is properly installed in its PCIe slot and confirm that the Windows Device Manager displays the DVI2PCIe Duo status under **System Devices > PCIe Bus**. Finally, observe the behavior of the frame grabber LED indicators.

If, after following the installation steps, you are still having problems, close all applications and restart the video capture workstation. When the video capture workstation has started up, open the Windows Device Manager to confirm that the frame grabber is detected.

6 Linux Video Capture Workstation Software

Epiphan provides the Epiphan USB device driver and the Epiphan capture API for Linux. Epiphan does not provide a video capture tool for Linux. However, the USB device driver is compatible with Video4Linux so you can use Video4Linux compatible applications to receive and process captured images. You can also use the Epiphan Linux SDK to write your own custom video capture application that receives captured images from the Epiphan capture API. The following software components operate on a video capture workstation running Linux:

- The Epiphan USB device driver
- Video4Linux
- The Epiphan capture API
- V4L custom video capture applications

6.1 The Epiphan USB Device Driver

The Linux Epiphan USB device driver receives images from an Epiphan DVI2PCIe Duo and delivers the images to the Epiphan capture API and to Video4Linux. Before delivering the images the Epiphan USB device driver also performs image adjustment to improve the quality of the image. Image adjustments include setting the sampling phase, PLL adjustments, and horizontal shift. The USB device driver can also change the color depth of the captured image before sending the image to the video API. For example, if the DVI2PCIe Duo is capturing the frames at a color depth that is different than that required by the video capture application, the USB device driver converts the images to the required color depth.

The Epiphan USB device driver may not be available for your version of Linux. Epiphan does not provide source code for the Epiphan USB device driver. But you can

contact Epiphan if you need an Epiphan USB device driver compiled for a specific Linux kernel version or kernel setting. Using the Epiphan software development kit (SDK) you can also create custom USB device drivers that incorporate the functions you need.

6.2 Video4Linux

Video4Linux (V4L) is a Linux video capture API. The Epiphan USB device driver can send captured images directly to Video4Linux. This means that any Video4Linux-compatible application can receive captured images. You can use a Video4Linux-compatible application to record a series of captured images as a video in the video format supported by the Video4Linux application. You can also create your own custom Video4Linux-compatible video capture application to record captured images from Video4Linux.

6.3 The Epiphan Capture API

The Epiphan Capture API receives captured images from the Epiphan USB device driver. It is optimized for processing Epiphan DVI2PCIe Duo captured images. The Epiphan Capture API analyzes individual images, performs on-device cropping, and handles video mode changes. It is an alternative to using Video4Linux to capture images on Linux video capture workstations. You can use the Epiphan software development kit (SDK) to create your own custom video capture application to record captured images from the Epiphan Capture API.

6.4 V4L Custom Video Capture Applications

Epiphan does not provide a video capture application for Linux. However, you can use Video4Linux-compatible applications to perform many video capture operations such as recording images or video, copying, printing and saving images, or broadcasting images across the Internet. You can also use the Epiphan Linux SDK to create your own custom video capture application. The SDK along with some example

applications is available from the downloads page of the Epiphan Web Site. To download the latest version, browse to http://www.epiphan.com/products and locate the downloads page for your product.

7 Connecting DVI2PCIe Duo to a Video Source

This section describes how to connect a DVI/VGA/HDMI or SDI (3G, HD or SD) source to the DVI2PCIe Duo. Complete the following before making the connections:

- Install the frame grabber and Epiphan Capture Tool on the video capture workstation; and
- Power up the video capture workstation.

1. Connect the DVI2PCIe Duo to the video source using the provided cables. If necessary, you can use a high-quality VGA, DVI or SDI splitter to split the VGA, DVI and SDI signal between an external monitor and the frame grabber in order to monitor the output signal quality.
2. Connect one of the following to the frame grabber's DVI In port:
    a. connect a DVI source using a standard DVI cable.
    b. connect a VGA source using a VGA to DVI cable.
    c. connect an HDMI source using an HDMI to DVI adapter.
3. Connect an SDI source directly to the SDI In port.

8 Windows Video Capture Application

This section describes common functions and features of the Epiphan Capture Tool and assumes you followed installation and connection instructions. Before starting the Epiphan Capture Tool, complete the following:

- install the DVI2PCIe card on the video capture workstation running Windows (Windows 2000, XP, Vista and Windows 7);
- install DVI2PCIe Duo drivers and capture tool on the video capture workstation; and
- connect a video signal source to the DVI2PCIe Duo card.

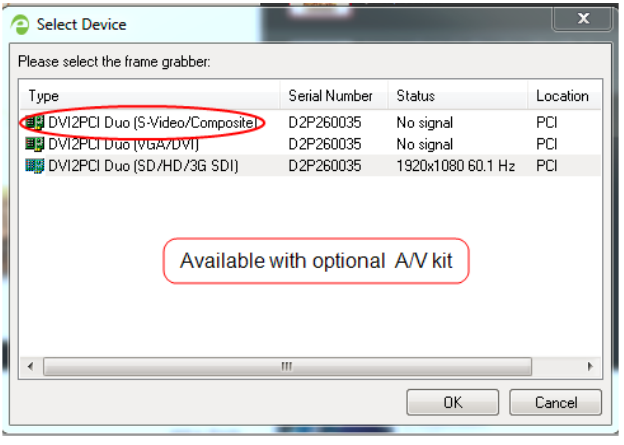
8.1 Start the Windows Video Capture Application

1. From the video capture workstation, click **Start > Epiphan Capture Tool;** a User Account Control dialog box opens.
2. Click **Yes**. The application starts up and searches for the DVI2PCIe Duo frame grabber connected to your PC. If the application successfully connects to and synchronizes with the DVI2PCIe Duo device, it begins displaying captured images

Note: When 2 sources are connected to the DVI2PCIe Duo, images from the first signal detected are displayed.

3. When two input sources are connected to the DVI In and SDI In ports, perform one of the following the view the images:
    a. To simultaneously view both sources, start up another capture tool, **Start > Epiphan Capture Tool.**
    b. To view the second source from the same capture tool window, select, **Capture > Select Device**; click the frame grabber to display The following figure displays the available options when an optional A/V kit is installed.

Figure 23: Select Device window with an optional A/V kit is installed



4. When a video signal source is not connected, or the DVI2PCIe Duo device is not capturing images, the application displays **No signal detected**.

As the Epiphan Capture Tool starts, the following messages may appear:

- **Capture device not found** - as the application attempts to connect with DVI2PCIe Duo device.
- **Detecting video mode** - as the application connects to a device and then determines the video mode of the device.
- **Tuning capture parameters** - as the application synchronizes and tunes capture settings and image adjustments.
- **No signal detected** - if the application connects to the DVI2PCIe Duo that is not connected to an active video source.

8.2 Pausing, Copying, Saving, and Printing Images

Once the application displays images captured by the frame grabber, you can pause, copy, save, and print the current image.

8.2.1 To pause and resume image capture:

1. Select **Pause Capture** from the **Capture** menu or from the toolbar click  .
2. While image capture is paused, the application stops receiving new images from the device. Pause also pauses video recording and image recording. While paused, you can save, print, and copy the captured image.
3. To resume image capture select **Resume Capture** from the **Capture** menu or from the toolbar click  again. You can use the following procedure to copy the image currently displayed to the video capture workstation clipboard.

8.2.2 *To copy a snapshot of the current image:*

1. Select **Copy** from the **Edit** menu or select  from the toolbar. You can also use the key combination **CTRL+C**. The current image is copied to the clipboard.
2. Paste the image into a document or other application as a bitmap image. The image is pasted as an independent bitmap image.

8.2.3 *To save a snapshot of the current image as an image file:*

Use the following procedure to save the current image as a .bmp, .png, or .jpg file on the video capture workstation. You can optionally pause the image capture before saving an image.

1. Select **Save** from the **File** menu or from the toolbar select  or use the key combination **CTRL+S**.
   The status bar displays the location and name of the saved file.
   The first time you save an image, the **Save As** dialog appears and you can specify the file name, file type, and location of the saved image file.
2. When you select **Save** again, the application saves the new image with the same file name and location, overwriting the previously saved file. Select **Save As** to save the image with a different file name, file type, or location or use the key combination **CTRL+Shift+S**.
3. You can open the saved image file with most bitmap image editing applications.

8.2.4 *To print a snapshot of the current image:*

Use the following procedure to print the current image on any printer connected to the video capture workstation. You can optionally pause the image capture before printing an image.

1. Select **Print** from the **File** menu, or select  from the toolbar or use the key combination **CTRL+P**. The current image is sent to the default printer set in your computer.
2. Select **Print Setup** from the file menu or use the key combination **CTRL+Shift+P** to select a different printer and set printer options.

8.2.5 To invert or reverse the colors of the image:

Use the following procedure to invert colors for printing. By reversing or inverting the colors of an image, the colors are complementary of the original value. After performing color inversion, black becomes white, yellow becomes blue, and red becomes aqua.

1. Select **Options** from the **Tools** menu.
2. Select the Display tab.
3. Enable the **Invert colors for printing** checkbox.
4. Click OK.

8.3 Recording Captured Images

Record captured images as a video file or as a series of image files.

8.3.1 To record captured images as a series of image files

Before recording captured images as a series of image files, you must configure the recording options by selecting **Options** from the **Tools** menu, then selecting the **Recording** tab, and finally selecting **Record** as **Images**. You should also select the image file format and other image file settings. Refer to **Configuring Recording Options**.

1. Select **Start Recording** from the **Capture** menu, from the toolbar select  or use the key combination **CTRL+R**. As images are captured by the frame grabber, they are recorded as a series of image files according to the image file settings on

the **Recording** tab (**Tools** – **Options)**. The Status bar displays the name and location of the last saved file. Pause recording by using the key combination **CTRL+U,** by selecting **Pause** from the **Capture** menu or  from the toolbar.

2. Stop recording by selecting **Stop Recording** from the **Capture** menu or  from the toolbar. When you stop recording images, the status bar displays the number of image files saved.

8.3.2 To record captured images as a video file:

Before recording captured images as a video file, you must configure the recording options by selecting **Options** from the **Tools** menu, then selecting the **Recording** tab, and select **Record** as **Video**. Refer to **Configuring Recording Options**.

1. Select **Start Recording** from the **Capture** menu or from the toolbar select  .

2. In the **Save as** dialog box enter the file name, select the location for saving the video file, and click **Save**. Record video in AVI format only.

As images are captured by the frame grabber, they are recorded to the video file. The status bar displays the name and location of the video file. The status bar also displays the elapsed time the video has been recording and the number of frames (or images) recorded.

When the size of the video file reaches the AVI file size limit that was set in the **Configuring Recording Options section**, the following occurs based on the settings you selected:

- stops recording;
- starts a new video file and continues recording (**Configuring Recording Options** section describes how to specify the file name); or

- overwrites the original video file and continues recording.

Pause a recording by selecting **Pause Capture** from the **Capture** menu or  from the toolbar.

Stop recording by selecting **Stop Recording** from the **Capture** menu or  from the toolbar.

When you stop recording, the Status bar displays the name and location of the saved video file, the elapsed time the video file was recording, and the number of frames or images that were recorded. For example: **Wrote c:\temp\example.avi (85 sec, 464 frames)**.

8.4 Menus

This section describes the commands available from the Windows-based DVI2PCIe Duo user interface menus.

Note: The frame grabber and input source type determine the settings that are displayed in each menu option. This user guide describes all of the possible objects, some of which may not be available or applicable to your application, and may even seem quite foreign. You can just disregard these.

8.4.1 File Menu

Use the File menu commands to save and print the current image displayed by the DVI2PCIe Duo user interface and to exit the DVI2PCIe Duo user interface.

Save	Save a snapshot of the current image to a file on the video capture workstation. Select a location for the file and select a file format. Save the snapshot as a bitmap (*.bmp), portable network graphics (*.png), or JPEG (*.jpg) file. The first time you select **Save** after starting the DVI2PCIe Duo user interface, you are prompted for a file name; you can change the file

	location and format. After saving the first file, every time you select **Save**, the video capture software saves a snapshot using the same file name in the same location replacing the previously saved file. When you select **Save**, the status bar shows the location and name of the saved file.
Save As	Save a snapshot of the current image to a file on the video capture workstation. Using **Save As** you can enter a file name and select a file location and format. **Save As** resets the file name, location, and file format used by the **Save** command and the **Save snapshot** toolbar button. When you select **Save As** the status bar displays the location and name of the saved file.
Print Setup	Configure printer settings used when you select the **Print** command or the **Print snapshot** toolbar button. You can also configure the DVI2PCIe Duo user interface to invert colors for printing. By reversing or inverting the colors of an image, the colors are made complementary of the original value. After performing picture color inversion, black becomes white, yellow becomes blue, red becomes aqua. From the **Tools** menu select **Options**, then select the **Display** tab and select **Invert colors for printing**.
Print	Print a snapshot of the current image using the configured printer.
Exit	Close the DVI2PCIe Duo user interface.

*8.4.2 **Edit Menu***

From the Edit menu, copy a snapshot of the current image, or use the key combination **CTRL+C.**

Copy	Copy a snapshot of the current image to the video capture workstation clipboard and paste the image into a document or other application as a bitmap image.

8.4.3 *View Menu*

Use the options on the **View** menu to control the layout of the DVI2PCIe Duo user interface window.

Toolbar	Change the size of the toolbar icons or hide the toolbar. You can select small, large, or huge icons and hide the toolbar. When the toolbar is hidden, select an icon size to display the toolbar.
Status Bar	Hide or unhide the status bar.
Full Screen	Enable full screen mode, **Ctrl+F**. Click the Esc button to go back to normal screen mode.
Image Only	Change the DVI2PCIe Duo user interface to operate in the **Image Only** mode. In **Image Only** mode the DVI2PCIe Duo user interface displays the captured image only. The window borders, toolbar, status bar and menu bar are not displayed. Scroll bars are displayed if required. The **Image only** mode can be useful for applications such as integrating the DVI2PCIe Duo user interface into a custom system. You can still use all of the shortcut keys to save and print images, start and stop recordings, and to exit from the **Image only** mode. Click the Esc button to go back to normal screen mode. Press **Alt+F4** to exit from the DVI2PCIe Duo user interface. You can also use the **--borderless** command line option to start the DVI2PCIe Duo user interface in image only mode. Refer to **Windows command line options**.

8.4.4 *Capture Menu*

Use the commands on the Capture menu to start, stop or pause capturing and recording images. From the Capture menu you can select from which device the DVI2PCIe Duo user interface receives captured images when you have more than one source connected to your DVI2PCIe Duo or other Epiphan frame grabbers

connected to the network. You can also view image adjustment settings and VGA mode settings for the selected device.

The record option on the Capture menu allows you to record the current image as a video or as a series of consecutive image files. Select **Options** from the **Tools** menu and use the settings on the **Recording** tab to configure what the DVI2PCIe Duo user interface records.

Start recording	Start recording the current image to a video file or a series of image files.
Pause capture	Pause or resume image capturing. If you select pause, the DVI2PCIe Duo user interface stops displaying newly captured images and the image captured when you selected Pause is displayed. Pause also pauses the recording of video and the saving of image files. Select pause again to resume displaying captured images and to resume recording.
Select device	Choose **Select Device** or use the key combination **Ctrl+D** to choose from which device or input the DVI2PCIe Duo user interface receives captured images. The command searches and lists available frame grabber devices and inputs. The list displays the serial number, device type, or input type, captured image resolution and frequency or status and location of each device. You can also use this command to select which device to configure with the **Configure Device** command.
Connect network device	Connect a device recognized on the network.
Disconnect network device	Disconnect current device.
Recent network devices	Displays a list of recently viewed devices.

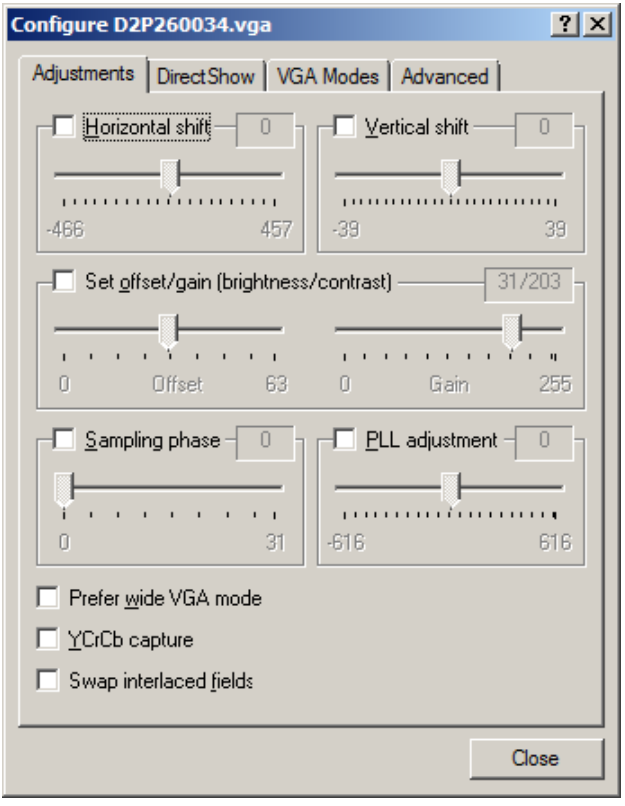
Enable/Disable audio capture	When enabled, captured audio is played on the video capture workstation and can be recorded. The toolbar icon  indicates enabled. When disabled, captured audio is not played on the video capture workstation and is not recorded. The toolbar icon  indicates disabled.
Audio input device	From the dropdown menu select the audio source device. For example when you capture audio from a built-in microphone, choose microphone. When you capture video and embedded audio from an SDI source, select SDI In or Default Windows device, if you set SDI In as the Windows default. When you capture video and embedded audio from an HDMI source, select HDMI In or Default Windows device, if you set HDMI In as the Windows default.
Play captured audio	When enabled, captured audio is played on the video capture workstation and is recorded. When disabled, audio is not played on the video capture workstation, however it is recorded. Use this setting to choose whether or not to play the audio while capturing. Enable audio capture must be enabled for the Play captured audio settings to take effect.
Configure device	You can view image adjustments for the selected device. You can configure image adjustments from the Web Admin Interface or from the Network Discovery Utility. You can also select and configure VGA modes for the selected device. See the **Configure Device** section for more information regarding this function.

*8.4.5 **Configure Device***

This window allows you to perform various image adjustments and select a required VGA mode. The following section illustrates and describes what can be configured using each tab.

Adjustments tab:

Figure 24: Adjustments tab



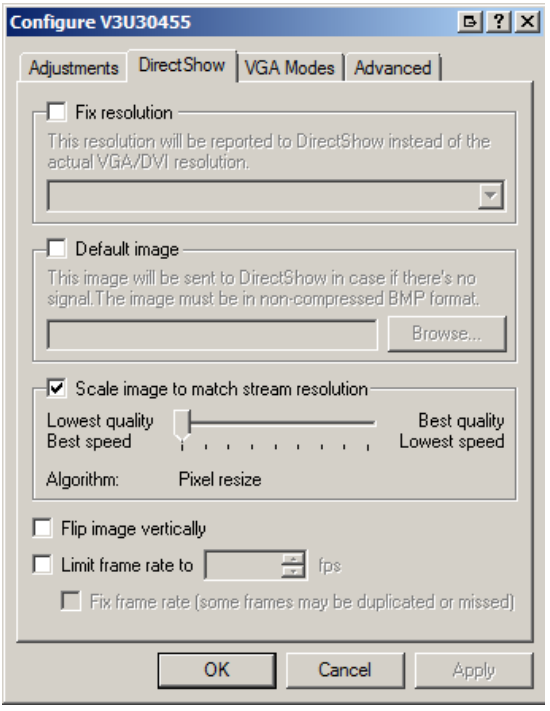
Horizontal shift	Configure horizontal shift to offset the captured image position. For example, a captured image shifted

	slightly to the right (horizontally) can be corrected with minor adjustments to the horizontal shift settings. Increasing or decreasing the value entered in the Horizontal Shift field shifts the image to the right or left.
Vertical shift	Configure vertical shift to offset the captured image position. For example, a captured image shifted slightly downward (vertically) can be corrected with minor adjustments to the vertical shift settings. Increasing or decreasing the value entered in the Vertical Shift field shifts the image up or down.
Set offset/gain (brightness/contrast)	The offset and gain settings control the image brightness and contrast respectively. Increasing the offset control causes the image to become darker. Increasing the Gain control gives the image more contrast. This option is available when a VGA source is connected to the input port.
Sampling phase	This setting adjusts the vertical synchronization properties of the image. You may need to change it when there is a repetitive distortion or blurriness on the horizontal axis of the image. Adjust the setting in small steps until a sharper image is displayed. This option is available when a VGA source is connected to the input port.
PLL adjustment	This setting is used to squeeze or stretch the image horizontally.

	This option is available when a VGA source is connected to the input port.
Prefer wide VGA mode	This checkbox, when enabled, allows Wide Aspect Ratio VGA modes to be displayed by the capture tool window. The Epiphan USB device driver may not be able to determine whether the video source is sending a wide video mode signal. Select this option when your video source uses a wide video mode to ensure the Epiphan USB device driver selects a wide video mode. This option is available when a VGA source is connected to the input port.
YCrCb capture	Select this checkbox when you need to capture analog component video with YCrCb encoding.
Swap interlaced fields	Select this checkbox to swap odd and even fields of the video frame. Use this feature when fields are reversed from the state in which they were originally captured.

DirectShow tab:

Figure 25: DirectShow tab

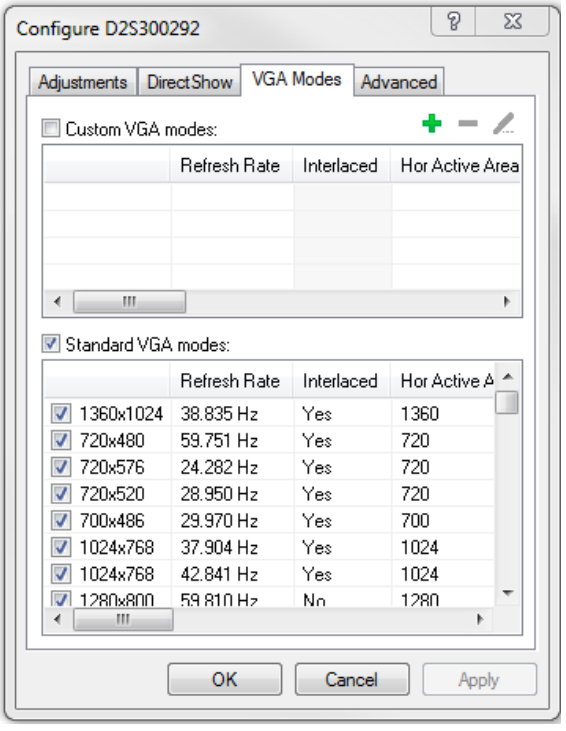


Fix resolution	Resolution that is sent to DirectShow
Default image	Image sent to DirectShow if there is no signal. Click the checkbox to browse to a .bmp image saved on the video capture workstation.
Scale image to match stream resolution	Use the slider to scale the image
Flip image vertically	Select the checkbox to flip the image
Limit frame rate to	Specify the frame rate limit
Fix frame rate	Select the checkbox to fix frame rate

VGA Modes tab

VGA Modes tab is applicable when a source is connected to the DVI input port.

Figure 26: VGA Modes tab



To add a standard VGA mode

1. Click on the **Capture** menu option from the toolbar; a dropdown menu opens.
2. Select **Configure Device** from the dropdown menu.
3. Click on the **VGA Modes tab.**
4. Select the standard VGA modes that are used during image capture. The Standard VGA modes checkbox allows you to select all standard modes. To

apply several modes select the checkboxes near the mode resolution value.

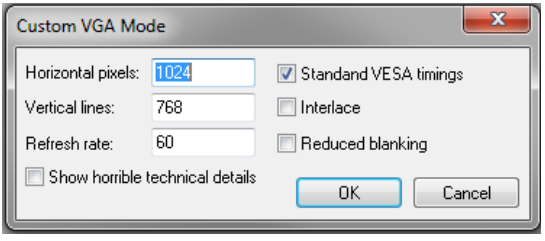
The following parameters are displayed for each mode:

- Refresh Rate
- Interlaced
- Horizontal active area
- Horizontal front porch
- Horizontal sync time (the time the beams needs to get from the far right edge back to the far left)
- Horizontal back porch (left border)
- Hsync polarity
- Vertical active area
- Vertical front porch (bottom border)
- Vertical sync time (the time the beam needs to get from the far bottom edge back to the top)
- Vertical back porch (top border)
- Vsync polarity

To add a custom VGA mode

1. Click on the **green plus sign** in the upper right corner of the tab; a Custom VGA Mode window opens.

Figure 27: Custom VGA Modes



2. Enter number of horizontal pixels
3. Enter number of vertical lines.
4. Enter refresh rate.
5. Select the **Standard VESA timings** checkbox to use these timings.
6. Select the **Interlace** checkbox to apply the interlacing technique.
7. Select the **Reduced blanking** checkbox if necessary. Reducing the DVI pixel clock makes it much easier to transmit the digital image through the cable.
8. Select the **Show horrible technical details** checkbox to see more details about the custom mode.

To edit a custom VGA mode

1. Select a mode from the Custom VGA modes list.
2. Click on the **blue pencil icon** in the upper right corner of the tab. The Custom VGA Mode window opens.
3. Edit the mode.
4. Click OK; the Custom VGA Mode window closes.

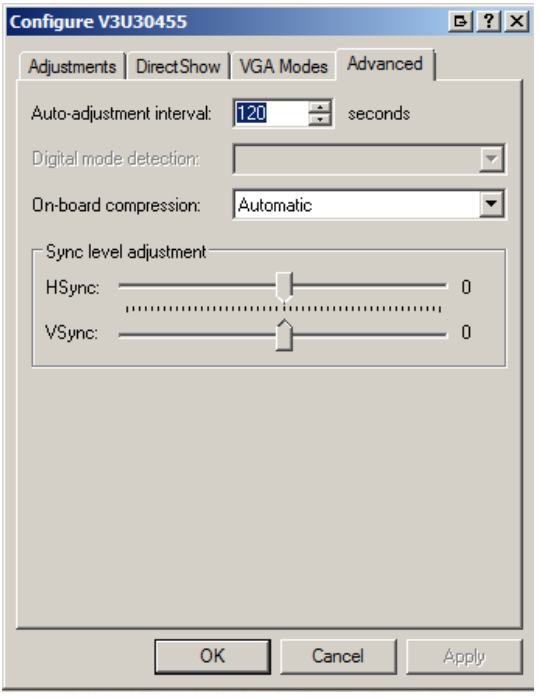
To delete a custom VGA mode

1. Select a mode from the Custom VGA modes list.
2. Click on the **red minus sign** in the upper right corner of the tab. The selected mode is removed from the list.

Click OK; the Configure VGA Mode window closes.

Advanced tab:

Figure 28: Advanced tab



Auto-adjustment interval	Specify the interval value
Digital mode detection	• Automatic • Single Link • Dual Link Note: This menu option is not displayed when an SDI input is chosen from the Select Device menu.
On-board compression	Select his checkbox to enable on-board compression of the incoming signal Note: This menu option is not displayed when an SDI input is chosen from the Select Device menu.

Sync level adjustment	Adjust sync level (HSync and VSync) Note: This menu option is not displayed when an SDI input is chosen from the Select Device menu.

*8.4.6 **Tools Menu***

Use the Tools menu to customize basic DVI2PCIe Duo user interface operating settings.

Web Broadcasting	Use this command to broadcast the captured signal, refer to Chapter 5, **Web Broadcasting**, for more details.
Upload EDID to device	Use this command to upload an extended display identification data (EDID) file to your device. Refer to the section **EDID**. Extended display identification data (EDID) is a data structure provided by a digital display to describe its capabilities to a video source. It is what enables a modern personal computer to know what type of monitors are connected to it. EDID is defined by a standard published by the Video Electronics Standards Association (VESA). Note: This menu option is not available when an SDI input is chosen from the Select Device menu.
Read EDID from device	Use this command to read an extended display identification data (EDID) file from the device. Note: This menu option is not available when an SDI input is chosen from the Select Device menu.
Measure VGA Mode	When requested by Epiphan technical support, use this command to display low-level information about the

	VGA mode you are capturing with your frame grabber. Copy this information into an email to send to Epiphan technical support.
Upgrade EDIDs for all Devices	Select the option to upgrade the EDID for all frame grabber devices Note: This menu option is not available when an SDI input is chosen from the Select Device menu.
Upgrade Grabber Firmware	Select this option to download the latest firmware version. When DVI2PCIe Duo detects that a firmware upgrade is required, a message appears on the capture screen notifying the user to upgrade their firmware. Select Upgrade Grabber Firmware; the firmware upgrade request window opens indicating the number of grabbers that require an upgrade. If there is no available upgrade, the menu option is greyed out.
Options	Configure video recording and display settings. See the section **Capture, Recording, and Display Options** for more information.

*8.4.7 **Help Menu***

Use the Help menu to check for updates and to display information about the version of the DVI2PCIe Duo user interface that you are running.

Note: **Check for Updates** function will only recommend an update if Epiphan recommends that you install a new version. This will happen if the latest version contains significant bug fixes or enhancements. If a new DVI2PCIe Duo user interface version only contains minor changes or if you are running the current version, **Check for Updates** may not recommend that you install a new version and will not display any information.

8.5 Toolbar

The toolbar can be used to save, print, or copy the current captured image; to start, pause, and stop the recording of the currently captured image. Use the **Toolbar** command on the **View** menu to change the size of the toolbar icons or to hide the toolbar. You can select small, large, or huge icons. If the toolbar is hidden, you can select an icon size to unhide the toolbar.

	Save a snapshot of the current image captured by the DVI2PCIe Duo user interface to a file on the video capture workstation. Select a location for the file and select a file format. Save the snapshot as a Windows bitmap (*.bmp), portable network graphics (*.png), or JPEG (*.jpg) file.
	Print a snapshot of the current image to the configured printer.
	Copy a snapshot of the current image to the video capture workstation's clipboard. Paste this image into a document or another application as a bitmap image.
	Start or stop recording the images that are captured by the DVI2PCIe Duo user interface. When you start recording, the status bar displays RECORDING and also displays information about the image or video file being recorded. When you stop recording, the status bar displays information about the saved image files or video file.
	Pause or resume image capturing. If you select pause, the DVI2PCIe Duo user interface stops displaying captured images. Pause also pauses video recording and saving images to files. Select pause again to resume playing captured images and to resume video recording.
	When enabled, captured audio is played on the video capture workstation and can be recorded. The toolbar icon  indicates enabled. When disabled, captured audio is not played on the video capture workstation and is not recorded. The toolbar icon  indicates disabled.

	Enable web broadcasting of the captured signal. Refer to Chapter 5, Web Broadcasting, for details.

8.6 Status Bar

The status bar displays information about the DVI2PCIe Duo user interface. You can choose which information is displayed on the status bar.

To choose which information is displayed on the status bar:

1. From the Capture tool menu, choose **Tools;** a drop down menu opens.
2. Select **Options** from the dropdown menu.
3. Click the Display tab.
4. From the Optional status bar indicators panel, check which options to display in the status bar. Refer to the options listed below:

- The location and file name for the image or video files saved during recording.
- Recording status. “RECORDING” indicates the DVI2PCIe Duo is recording captured images.
- The data rate is the rate (in MB/s, KB/s, Mbps, and Kbps) of data transfer to the DVI2PCIe Duo user interface when it is capturing images.
- The frame rate at which the DVI2PCIe Duo is operating.
- The number of frames or images that the DVI2PCIe Duo has displayed since the DVI2PCIe Duo was last started. The number of frames is only visible if you select **Number of captured frames**. The number of frames stops incrementing and starts flashing if you have paused the image capture. Use the **Reset counter button** to reset the number of frames.
- The VGA mode and refresh rate of the video source.

5. Click OK.

8.7 Capture, Recording, and Display Options

This section introduces the options available from the **Tools** menu when you select the **Options** command. These options control how the DVI2PCIe Duo user interface records and displays images.

Note: The functionalities located on the **KVM** tab do not apply to DVI2PCIe Duo.

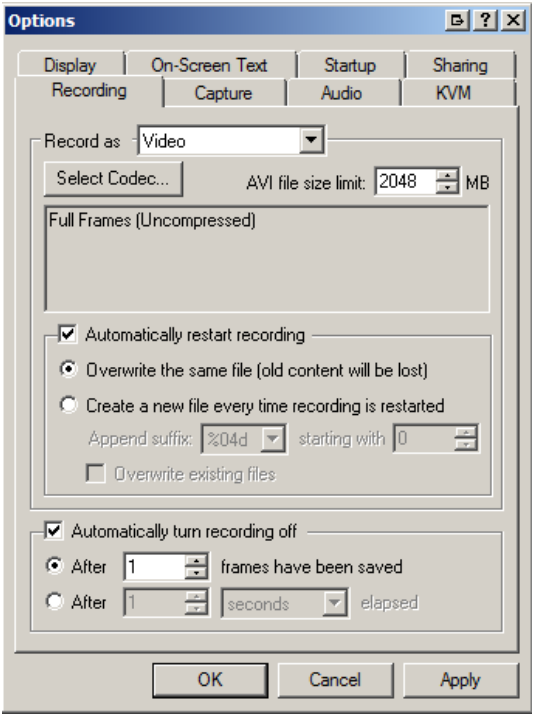
8.7.1 Configuring Recording Options

To control how the DVI2PCIe Duo user interface records captured images, select **Options** from the **Tools** menu and then select the **Recording** tab. You can record captured images as a series of consecutively saved graphic files or as a video file. How the DVI2PCIe Duo user interface records images when you start recording from the Toolbar or the capture menu depends on how you set the recording options.

From this tab select the codec used to encode the captured video stream. Codecs are not included in the software package provided by Epiphan. You must download them before using the frame grabber. For example, you can download an x264 codec pack - a free library for encoding H.264/MPEG-4 AVC video streams.

If your computer is running under the 32-bit OS, download 32-bit codecs. For the 64-bit OS, download 64-bit codecs.

Figure 29: Recording tab with Video selected



Select the following options:

Record as	Specify whether video or images are recorded.
Select Codec	Select the codec that is applied for compressing the signal. This option is available when Video is selected for the Record as value.
Format	Specify the file format for the image. The options are: • BMP • PNG • JPEG

	This option is available when Image is selected for the Record as value.
AVI file size limit	Specify the size limit of the .AVI file to where data is recorded. This option is available when Video is selected for the Record as value.
Automatically restart recording	Select the checkbox to restart recording automatically. This checkbox enables the five fields below. This option is available when Video is selected for the Record as value
Overwrite the same file (old content will be lost)	After the video file size limit is reached, delete the original file and start recording a new video file with the same name. If you select this option the original saved video data is lost. This option is available when Video is selected for the Record as value.
Create a new file every time recording is restarted	After the video file size limit is reached, start a new video file. Use the append suffix setting to create a unique name for the new file or files. This option is available when Video is selected for the Record as value.
Folder	Enter the file name or click the browse button to locate a file to save the image. This option is available when Image is selected for the Record as value.
Prefix	Specify a prefix to identify the file. This option is available when Image is selected for the Record as value.
Append suffix…	When you start a video recording session you are prompted to enter a file name. If the file exceeds the AVI file size limit, the DVI2PCIe

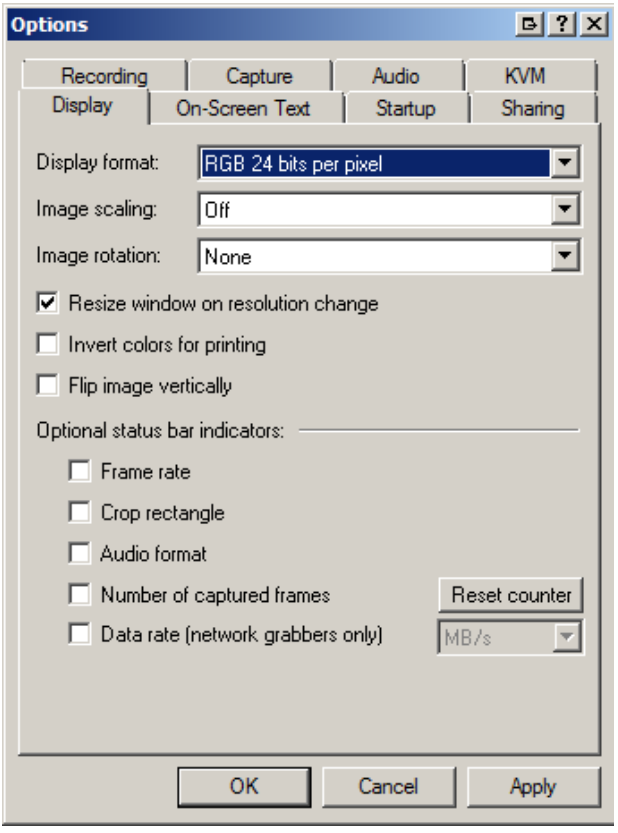
	Duo user interface starts another file with the original file name appended with a sequential numeric suffix. Use the append suffix options to specify the format of this suffix. Each suffix starts with a % sign and can include the following characters: 02, 04, 06, or 08 indicates the number of digits to use in numbering the suffix. You can specify 2, 4, 6, or 8 digits. “d” means decimal numbers are used in the suffix. “X” means hexadecimal numbers are used in the suffix. The suffix %02d means the saved file names end with two-digit decimal numbers, for example: 01, 02, 03, ..., 10, 11 and so on. The suffix %04X means the saved file names end with 4-digit hexadecimal numbers, for example: 0001, 0002, 0003, ..., 000A, 000B and so on.
Starting with	Enter the starting number used in the file name suffixes in decimal format. If the suffixes include hexadecimal numbering this decimal number is automatically converted to hexadecimal. For example, if you name the video file VID, set the suffix to %02d and starting with to 1, the video file names would be VID.avi, VID01.avi, VID02.avi, etc.
Overwrite existing files	If you select overwrite existing files, files are saved according to the video file recording

	options. Existing files are replaced with the new files. If you do not select overwrite existing files, the file number in the suffix of the file name is incremented until a file can be saved without overwriting an already saved file.
Ignore write failures	This option is available when you select Image for the Record as value. Select this feature to ignore failures. This option is available when Image is selected for the Record as value.
Save all frames	Click on the radio button to save each frame as an image. This option is available when Image is selected for the Record as value.
Skip	Specify a number of frames to skip between saves.
Wait	Specify a length of time to skip between saved
Automatically turn recording off	Specify under which conditions recording turns off automatically.
After … frames have been saved	Specify the number of saved frames before recording is automatically turned off.
After … elapsed	Specify an elapsed length of time before recording is automatically turned off.

8.7.2 Configuring Display Options

To change display options from the **Tools** menu, select **Options** and then select the **Display** tab.

Figure 30: Display tab



The following display options are available:

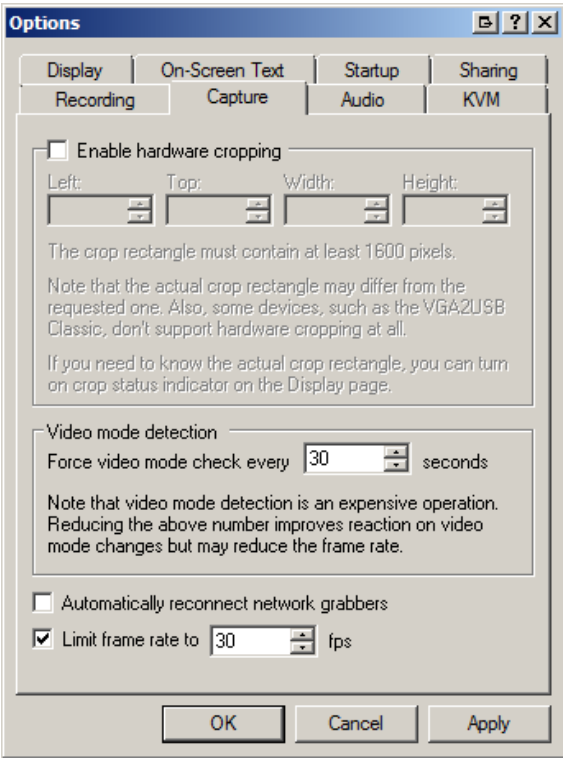
Display format	Specify in which format video or image are displayed
Image scaling	Specify whether the image should be scaled and how
Image rotation	Specify whether the image should be rotated and how
Resize window on resolution change	Select the checkbox to resize window when the image resolution is changed

Invert colors for printing	Select the checkbox to change dark colors to light colors and light colors to dark colors
Flip image vertically	Flip the image at its vertical axis
Select the check boxes below to add optional indicators to the status bar…	
Frame rate	Displays frame rate
Crop rectangle	Displays crop status
Audio format	Displays audio format..
Number of captured frames	Displays number of captured frames
Data rate (network grabbers only)	The data rate is the rate (in MB/s, KB/s, Mbps, and Kbps) that the DVI2PCIe Duo user interface receives data from the device capturing images.

8.7.3 *Configuring Capture Options*

Use this tab to encode the stream.

Figure 31: Capture tab



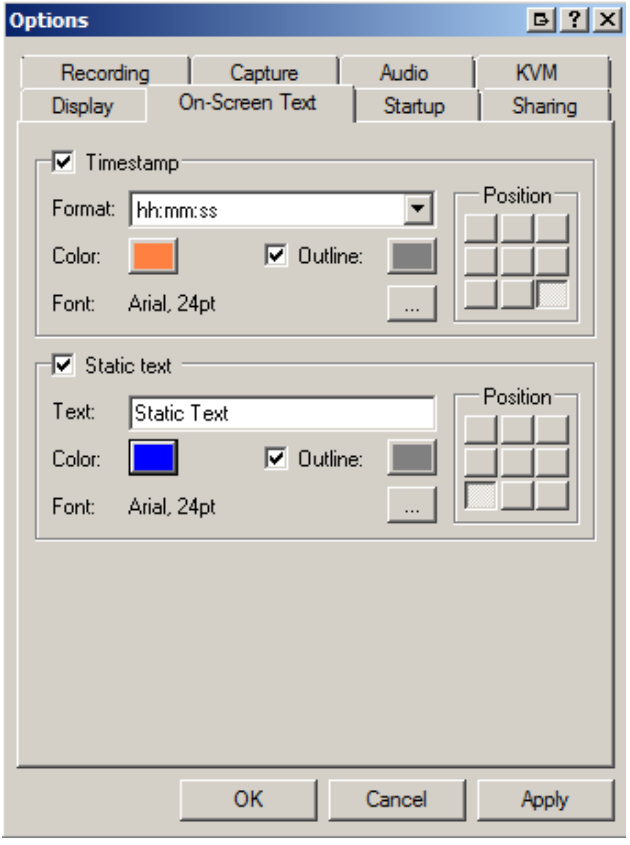
Enable hardware cropping	Select this checkbox to enable cropping functionality
Left, Top, Width, Height	Enter values to crop the image
Force video mode check every … seconds	Specify how often the application indicates the type of the video signal that is received. Note that although frequent video mode detection decreases reaction

	time when changing video mode, it may also reduce the frame rate.
Automatically reconnect network grabbers	Select this checkbox to restore connection with the remote frame grabbers in case the connection has been lost. Otherwise the system connects to the local frame grabber, if one exists or displays a warning “No frame grabbers found”. In this case you need to restore connection manually.
Limit frame rate to … fps	Set the maximum frame rate for the video signal

8.7.4 *Setting On-Screen Text Parameters*

Use this tab to timestamp the captured video and add static text.

Figure 32: On-Screen Text tab



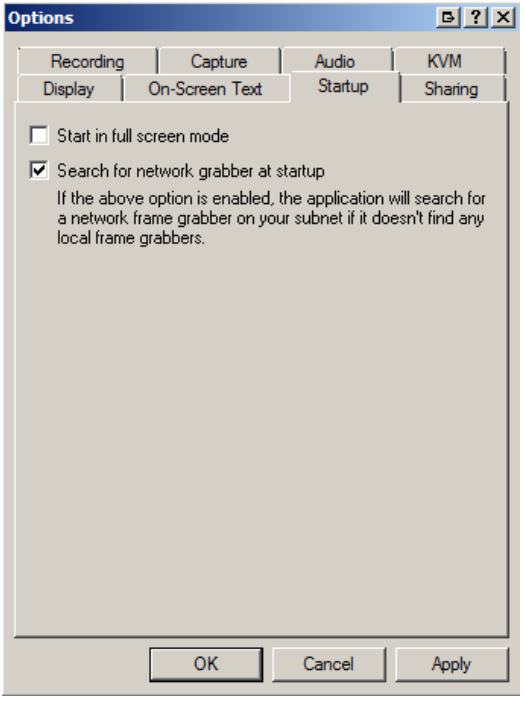
Timestamp	Select this checkbox to set timestamp parameters
Format	Specify the timestamp format
Color	Set the color for the timestamp
Outline	Add an outline to the timestamp. Use an outline to highlight the timestamp when the text color is similar to the display background color
Font	Click the …button to set the font and the font size

Position	Set the location on the screen where the timestamp is displayed
Static text	Select this checkbox to set static text parameters
Format	Specify the static text format
Color	Set the color for the static text
Outline	Add an outline to the static text. Use an outline to highlight the text when the text color is similar to the display background color
Font	Click the …button to set the font and the font size
Position	Set the location on the screen where the static text is displayed

8.7.5 Configure Startup

Use this tab to specify actions the application should perform during startup.

Figure 33: Startup tab

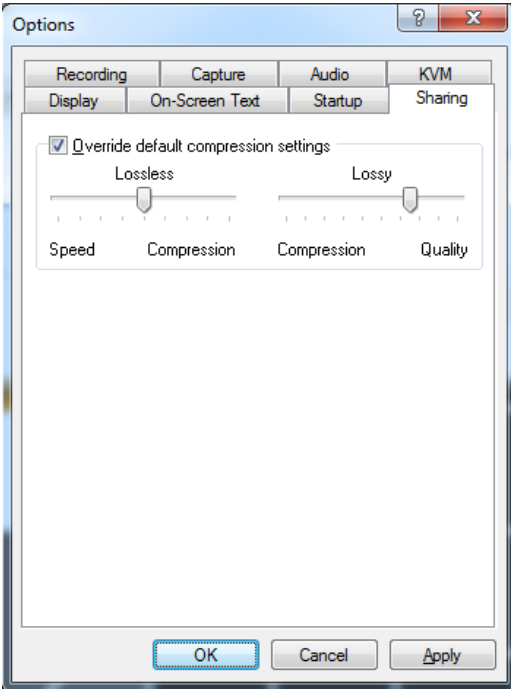


Start in full screen mode	When the application starts, it resizes to the current resolution of the screen
Search for network grabber at startup	When enabled the application will search for a network frame grabber on your subnet if it doesn't find local frame gabbers.

*8.7.6 **Sharing***

Use this tab to change web broadcasting compression. Select **Override default compression settings** and adjust the **Lossless** and **Lossy** settings.

Figure 34: Sharing tab



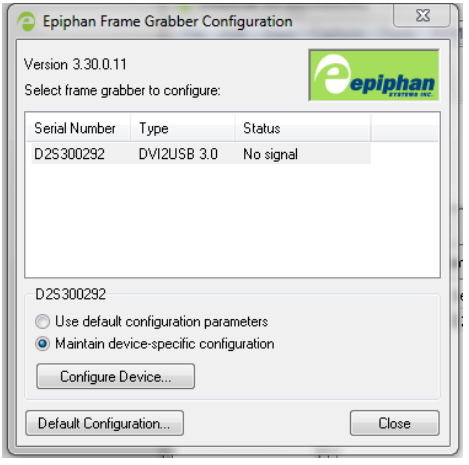
Lossless compression	Lossless compression compresses the streamed video or images without reducing image quality. Increasing lossless compression takes some processing power, so it's always best to keep this value low.
Lossy compression	Lossy compression compresses the streamed video or images by reducing image quality. Lossy compression is not as CPU intensive as lossless compression.

9 Configuring DVI2PCIe Duo from the Windows Control Panel

Your DVI2PCIe Duo can be configured from the Windows Control Panel using the **Epiphan Frame Grabbers** icon - 

. Here you can verify the device's serial number, type and status as well as setup configuration parameters.

Figure 35: Frame Grabber Configuration Window



To edit the default configuration of the device:

1. Select the frame grabber you want to configure.

2. Click the **Default Configuration** button.
   It is similar to the Tools > Options > Configure command in the Epiphan Capture Tool.
3. Edit parameters.
4. After editing click OK and select the **Use default configuration parameter** radio button to activate settings. Then click **Close**.

To maintain device-specific configuration:

1. Select the **Maintain device-specific configuration** radio button.
2. Click the **Configure Device…** button. It is similar to the Tools > Options > Configure command in the Epiphan Capture Tool.
3. Edit parameters.
4. After editing click OK and select the **Maintain device-specific configuration** radio button to activate settings. Then click **Close**.

10 Web Broadcasting

Use the information in this chapter to share or stream the images captured by your DVI2PCIe Duo over the Internet. Note that web streaming is available on video capture workstations running Windows.

To stream captured images over the Internet, the Epiphan capture tool sends captured images to an Epiphan web streaming portal. Each web streaming session is labelled with the serial number of the DVI2PCIe Duo that is capturing the images. The card's serial number appears on the video capture application title bar.

Web streaming sends the currently captured image only. You cannot broadcast saved recordings and the DVI2PCIe Duo web streaming feature does not include sound.

Note: Web streaming using Epiphan Capture Tool is intended as a demonstration only and has a 10-hour time limit.

It is important to note that images streamed over the Internet are not secure. Potentially anyone can view the stream if they know the URL. Web streaming supported by the Epiphan Capture Tool is a relatively limited feature. Epiphan's streaming products provide a richer web streaming feature set.

10.1 To set the display format for web streaming

1. Open the capture tool on a video capture workstation running Windows.
2. From the **Tools** menu select **Options**.
3. Select the **Display** tab.
4. Set **Display Format** to **RGB 24 bits per pixel**.
5. Optionally limit the frame rate to reduce the number of images sent over the Internet reducing bandwidth. Depending on your requirements you may not have to change any other display settings. Refer to section, **Configuring Display Options** for all available display settings.
6. Select OK to save your changes.

10.2 To start a web streaming session

No special setup is required for web streaming except the video capture workstation must be able to connect to the Internet. The video capture workstation can be connected directly to the Internet or to a LAN that is connected to the Internet.

Before streaming captured images over the Internet you need to set the display format to 24 bits per pixel. Please refer to the previous section **To set the display format for web streaming.**

To start a web broadcast:

1. Connect the Epiphan Frame Grabber to the video source that you want to stream and to the video capture workstation.
2. Start the Epiphan Capture Tool.

3. Select **Web Broadcasting** from the **Tools** menu or from the toolbar select  .

   The **Start web broadcasting** dialog box appears.

Figure 38: Start Web Broadcasting Dialog

10.3 Viewing a web broadcasting session

View a web broadcasting session from a web browser running Windows 2000, XP, Vista and 7 versions. The following browsers are supported:

- Internet Explorer
- Firefox
- Opera
- Chrome
- Safari

Mobile browsers are also supported if the mobile device is compatible with Java SE. The video capture workstation and web browser should be running the most recent version of the Java plug-in. Download the plug-in's latest version from http://www.java.com.

To view a web broadcast:

1. Open a web browser and browse to the required URL, for example: http://www.vga2web.com/D2P00000. This URL is supplied by the vga2web application as shown on the Figure 38: Start Web Broadcasting Dialog and can be advertised to potential viewers of the stream.

   A second web browser window appears displaying the message **Applet is loading. Please wait…** The streamed image should appear within 10 to 20 seconds.

   The first web browser window in which the web stream URL address was entered, displays a message indicating that the web presentation has been opened in a new window. Use the first window to refresh the stream or re-open the stream window if it is accidentally closed.

10.4 Changing web streaming compression and performance

Normally you should not need to change the default web streaming compression settings. The default settings reduce the amount of Internet bandwidth used for web streaming by applying a combination of lossless and lossy compression to the images being broadcasted.

To change the web streaming compression, from the **Tools** menu of the DVI2PCIe Duo capture tool select **Options** and then select **Sharing**. Select **Override default compression** settings and adjust the **Lossless** and **Lossy** settings.

10.5 Troubleshooting web streaming performance

The following are three typical reasons for adjusting web streaming compression:

- If you have a slow Internet connection or when viewers of the web stream notice delays, you can increase lossless or lossy compression to reduce Internet bandwidth usage.
- If viewers of the web stream notice poor image quality you can reduce the amount of lossy compression.
- If the video capture workstation CPU usage is too high during web streaming or if viewers of the web stream notice delays and you have determined that the delays are not caused by low Internet bandwidth. The delays could be caused by high CPU usage on the video capture workstation resulting in the video capture workstation not being able to process all image data. Lossless compression increases CPU usage, so you can reduce CPU usage during web streaming by reducing lossless compression.

Note: You cannot change web streaming compression during a web broadcast. You must stop the stream, adjust the settings and then start the stream again.

Changes made to default web stream compression settings are only visible to viewers of the web stream. Changing these settings does not change how the video capture application displays, records, or prints captured images.

11 Advanced Topics

11.1 EDID

Extended display identification data (EDID) is data provided by a video display device (usually a monitor) to describe its capabilities to a video source. The video source uses the EDID to determine the capabilities of the monitor and, therefore, to determine the resolution, color depth and other settings that the monitor will accept.

11.1.1 About EDID

EDID is defined by a standard published by the Video Electronics Standards Association (VESA). The EDID includes manufacturer name, product type, phosphor

or filter type, timings supported by the display device, display size, luminance data and (for digital displays only) pixel mapping data. EDID is crucial for DVI sources but mostly ignored by VGA sources.

When you connect a DVI2PCIe Duo to a video source, the video source sees the DVI2PCIe Duo as a monitor. Just like a monitor, the DVI2PCIe Duo contains EDID that is used by the video source to determine the video signal to send to the DVI2PCIe Duo.

Usually you would operate a DVI2PCIe Duo using the factory installed default EDID. However, in some cases when you connect a DVI2PCIe Duo to a video source, the video source may operate using video settings at which you do not want to operate. For instance, you can control the video source output settings by uploading a custom EDID file to the DVI2PCIe Duo. The EDID information in the file restricts the video signal that can be accepted by the DVI2PCIe Duo. For example, you can upload a custom EDID file to your DVI2PCIe Duo that limits the DVI2PCIe Duo to operate at 1040x768. When the video source reads the EDID from the DVI2PCIe Duo, the video source will reset to operate at 1024x768 as set in the EDID.

You can obtain custom EDID files from Epiphan Support. You can also download custom EDID files for DVI2PCIe Duo frame grabber from the frame grabber product page of the Epiphan web site. This page contains custom EDIDs for single video resolutions (for example, 640x480 only, 800x600 only, and 1024x768 only) for each DVI2PCIe Duo. This page also contains default EDIDs for each DVI2PCIe Duo. You can use the custom EDIDs to restrict the video resolution of the video source connected to the DVI2PCIe Duo. You can use the default EDIDs to return your DVI2PCIe Duo to normal operation.

11.1.2 Changing the EDID on your Frame Grabber

Use the following steps to upload a new EDID to your DVI2PCIe Duo. The uploaded EDID is permanently installed in the DVI2PCIe Duo and the DVI2PCIe Duo will always share this EDID with the video source.

1. Download an EDID file from the Epiphan web site or obtain an EDID file from Epiphan Support.
2. Disconnect any input cables from the DVI2PCIe Duo. Keep the DVI2PCIe Duo connected to the video capture workstation USB port.
3. From the video capture application Tools menu, select Upload EDID and select the EDID file.
4. Wait for the EDID update to complete. This can take several minutes.
5. Reconnect input cables to the DVI2PCIe Duo.
6. Set the required resolution on the video source. You may need to disable/re-enable or reset the DVI or SDI input port.

11.1.3 An EDID example

In this example, a user was viewing the video output from a system using a flat panel monitor. The monitor displayed video images at a screen resolution of 640x480. When the user replaced the flat panel monitor with a DVI2PCIe Duo, the system changed to produce video images at a screen resolution of 720x400.

It turned out that the video source preferred to output 720x400, but because the original monitor did not support 720x400, the video source was forced to operate at 640x480. The DVI2PCIe Duo supported 720x400 so the system changed to this resolution when the DVI2PCIe Duo was connected to it.

The user wanted to return the video source to operating at 640x480 but could not manually adjust the screen resolution. To solve the problem, Epiphan created a custom EDID for the DVI2PCIe Duo that excluded support for 720x400. When the user uploaded the custom EDID to the DVI2PCIe Duo, the video source returned to operating at 640x480.

11.2 Windows command line options

Use the following command line options to control how the Windows video capture application starts up. You can add as many command line options as you want in any order. All command line options must start with two dashes. Separate command line options with spaces.

--borderless	Start the video capture application in image only mode. Press Esc to exit from image only mode.
--sn <sn>	To specify which Frame Grabber to use if more than one Frame Grabber is connected to the PC. Similar to the Capture menu Select Device command. <sn> is the serial number of the Frame Grabber.
--hs <#>	Set the horizontal shift*. The range is -100 to 100.
--vs <#>	Set the vertical shift*. The range is -80 to 80.
--phase <#>	Set the sampling Phase*. The range is 0 to 31.
--pll <#>	Set the PLL adjustment*. The range is -50 to 50.
--offset <#>	Set the offset (brightness)*. The range is 0 to 63.
--gain <#>	Set the gain (contrast)*. The range is 0 to 255.
--noesc	Enter this parameter so that you can disable exiting image only mode by Pressing the Esc key. Press Alt+F4 to exit from the video capture application.
--topmost	To keep the video capture application window on top.
"*" – Refer to the **Configure device** section for more details.	

11.2.1 Creating a Windows Shortcut that Uses Command Line Options

Use video capture application command line options by creating a Windows shortcut to the video capture application executable file and editing the shortcut to add command line options. In the following procedure, the video capture application executable file v2ugui2.exe has been installed in the folder C:\Program Files\DVI2USB30:

1. Open Windows Explorer and navigate the following path:
   C:\Program Files\Epiphan
2. Right click on the file v2ugui2.exe and select Create Shortcut. Windows creates a shortcut file that, depending on your Windows settings, may be named “Shortcut to v2ugui2.exe.lnk”. The “.lnk” may not appear if Windows does not display file extensions. Change the name of this file and copy it to another location if required. Don’t change the file extension.
3. Right click on the shortcut file and select Properties.
4. Edit the Target field and add command line options after the closing quote. For example, to add the --topmost command line option:
   "C:\Program Files\Epiphan\v2ugui2.exe" –topmost
   For example, to add --topmost and --borderless, set the horizontal shift to -67, and the vertical shift to 10:
   "C:\Program Files\Epiphan\v2ugui2.exe" –topmost --borderless --hs -67 --vs 10
5. Select OK to save your changes to the shortcut.
6. Double-click on the shortcut to start the video capture application with the command line options.

12 Table of Figures

13 Software and Documentation License

ATTENTION: THE SOFTWARE AND DOCUMENTATION PROVIDED UNDER THIS AGREEMENT ARE BEING LICENSED TO YOU BY EPIPHAN SYSTEMS INC. ("LICENSOR") AND ARE NOT BEING SOLD. THIS AGREEMENT CONTAINS LIMITATIONS ON REPRESENTATIONS, WARRANTIES, CONDITIONS, REMEDIES, AND LIABILITIES THAT ARE APPLICABLE TO THE SOFTWARE AND DOCUMENTATION.

Epiphan
Software License

IMPORTANT: BEFORE DOWNLOADING, INSTALLING, OR USING THE SOFTWARE AND DOCUMENTATION, PLEASE CAREFULLY READ THIS AGREEMENT WHICH CONTAINS THE TERMS AND CONDITIONS UNDER WHICH YOU ARE ACQUIRING A LICENSE TO USE THE SOFTWARE AND DOCUMENTATION. IF YOU DO NOT ACCEPT THE TERMS AND CONDITIONS OF THIS AGREEMENT PLEASE DO NOT DOWNLOAD, INSTALL, OR USE THE SOFTWARE AND DOCUMENTATION AND PROMPTLY RETURN OR DESTROY THE SOFTWARE AND DOCUMENTATION. IF YOU DOWNLOAD, INSTALL, OR USE THE SOFTWARE AND/OR DOCUMENTATION, YOU WILL HAVE ACCEPTED AND AGREED TO THESE TERMS AND CONDITIONS. THE SOFTWARE AND DOCUMENTATION ARE ALSO PROTECTED BY COPYRIGHT LAWS AND INTERNATIONAL COPYRIGHT TREATIES, AS WELL AS OTHER INTELLECTUAL PROPERTY LAWS. IF YOU ARE AN AGENT OR EMPLOYEE OF AN ENTITY, YOU REPRESENT AND WARRANT THAT (I) THE INDIVIDUAL ACCEPTING THIS AGREEMENT IS DULY AUTHORIZED TO ACCEPT THIS AGREEMENT ON SUCH ENTITY'S BEHALF AND TO BIND SUCH ENTITY, AND (II) SUCH ENTITY HAS FULL POWER, CORPORATE OR OTHERWISE, TO ENTER INTO THIS AGREEMENT AND PERFORM ITS OBLIGATIONS UNDER THIS AGREEMENT.

1. Definitions: In this Agreement:

"Agreement" means this Epiphan Software License;

"Documentation" means the technical publications delivered to You with the Software relating to the installation and operation of the Software, such as reference, user, installation and technical guides and release notes;

"Software" means the Licensor binary and/or bytecode software programs that (i) are made available to You for download after acceptance of this Agreement, (ii) are packaged with this Agreement, or (iii) embed this Agreement in their installer(s) and which are installed after acceptance of this Agreement, and which binary and/or bytecode software programs include any Documentation; and

"You" or "Your" means the individual acquiring the Software license or any entity on whose behalf such individual is acting. In the case of an entity, "You" includes any entity that by majority voting interest controls, is controlled by, or is under common control with You.

2. Grant of Software License: Subject to the terms and conditions of this Agreement, Licensor grants You a non-exclusive, non-transferable, non-sublicensable, internal license to use a reasonable number of copies of the Software. All copies of the Software made by You shall include all trademarks, copyright notices, restricted rights legends, proprietary markings and the like exactly as they appear on the copy of the Software originally provided to You. No other rights in the Software or Documentation are granted to You.

3. Open Source Software: Binary, bytecode and source code versions of certain open source software packages may be embedded in or distributed with the Software ("Open Source Software"). If a separate license agreement for an item of open source software is: delivered to You with the Software; included in the download package for the Software; referenced in any material (including the Documentation) that is included in the download or distribution package for the Software; or listed at www.epiphan.com/opensource, then such open source software shall be Open Source Software and such separate license agreement shall govern Your use of that item or version of such open source software. The Open Source Software may include free software (i.e. software licensed under the GNU Lesser General Public License or other free software licenses) for which the applicable free software license may also require that the source code for such free software be made available to those receiving only executable versions of such free software. If the source code for any free software distributed with the Software is not provided with the Software, then upon request, within a three (3) year period from the original receipt of such Open Source Software from Licensor, for a fee that shall not exceed Licensor's costs associated with the shipping of the source code for such free software, Licensor will provide a copy of the source code for such free software to You.

4. Restrictions: The terms set forth in this Section 4 shall constitute conditions to the licenses granted in Section 2. You shall not reverse engineer, disassemble, reverse translate, decompile or in any other manner decode the Software except to the extent the Software is distributed with any Open Source Software that prohibits the imposition of such a restriction or to the extent the foregoing restriction is expressly prohibited by applicable law notwithstanding a contractual obligation to the contrary. You acknowledge and agree that no rights in respect to the source code of the Software are granted to You. You shall not distribute, lease, rent, grant a security interest in, assign, or otherwise transfer the Software except as expressly provided in this Agreement. You shall not modify or create any derivatives works of the Software or merge all or any part of the Software with another program. You shall not use the Software or make the Software available to any third parties as part of any service bureau, time sharing service, application service provider offering, software-as-a-service offering or any other managed service offering. You shall not disclose any performance, benchmarking, or feature-related information about the Software. You further agree not to disclose, transfer or otherwise provide to any third party any portion of the Software, except as expressly permitted herein.

5. Disclaimer of Warranties: Licensor does not make any representations or provide any warranties or conditions in respect to the Software. **EXCEPT FOR ANY WARRANTIES THAT MAY BE PROVIDED IN ANY COMMERCIAL AGREEMENT BETWEEN YOU AND LICENSOR, THE SOFTWARE AND DOCUMENTATION ARE PROVIDED "AS IS", WITHOUT ANY REPRESENTATIONS, CONDITIONS, OR WARRANTIES OF ANY KIND. WITHOUT LIMITATION, LICENSOR AND ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND DISTRIBUTORS DISCLAIM ANY EXPRESS OR IMPLIED REPRESENTATIONS, CONDITIONS, AND/OR WARRANTIES OF MERCHANTABILITY, MERCHANTABLE QUALITY, NON-INFRINGEMENT, DURABILITY, TITLE, SATISFACTORY QUALITY, OR FITNESS FOR A PARTICULAR PURPOSE WHETHER ARISING BY STATUTE, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN ANY COMMERCIAL AGREEMENT, THE ENTIRE RISK OF THE USE OF THE SOFTWARE AND DOCUMENTATION SHALL BE BORNE BY YOU. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN ANY**

COMMERCIAL AGREEMENT, NEITHER LICENSOR NOR ANY OF ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND/OR DISTRIBUTORS MAKE ANY REPRESENTATIONS OR PROVIDE ANY CONDITIONS AND/OR WARRANTIES ABOUT THE SUITABILITY OF THE SOFTWARE AND/OR DOCUMENTATION OR ABOUT ANY INFORMATION AND/OR DATA THAT MAY BE PROCESSED BY OR MADE AVAILABLE USING THE SOFTWARE.

6. LIMITATION OF LIABILITY: NEITHER LICENSOR NOR ANY OF ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND/OR DISTRIBUTORS SHALL HAVE ANY LIABILITY TO YOU OR ANY OTHER PERSON OR ENTITY FOR ANY DAMAGES ARISING FROM THIS AGREEMENT, RELATING TO THE SOFTWARE OR DOCUMENTATION, OR RELATING TO ANY SERVICES PROVIDED TO YOU BY LICENSOR (INCLUDING ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND/OR DISTRIBUTORS) IN RELATION TO THE SOFTWARE AND/OR DOCUMENTATION FOR ANY INDIRECT, RELIANCE, INCIDENTAL, SPECIAL, PUNITIVE, EXEMPLARY OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF REVENUE OR PROFIT, LOSS OF OR DAMAGE TO DATA, BUSINESS INTERUPTION, LOSS OF DATA, REPLACEMENT OR RECOVERY COSTS, OR OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER ARISING FROM CONTRACT, EQUITY, TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR ANY OTHER THEORY OF LIABILITY, EVEN IF LICENSOR (INCLUDING ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND DISTRIBUTORS) HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR THEY ARE FORESEEABLE. THE LIMITATIONS IN THIS SECTION SHALL APPLY WHETHER OR NOT THE ALLEGED BREACH OR DEFAULT IS A BREACH OF A FUNDAMENTAL CONDITION OR TERM OR FUNDAMENTAL BREACH. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THESE LIMITATIONS MAY NOT APPLY TO YOU. IN NO EVENT SHALL THE TOTAL CUMULATIVE LIABILITY OF LICENSOR (INCLUDING ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND DISTRIBUTORS) TO YOU OR ANY OTHER PERSON OR ENTITY FOR ANY DAMAGES ARISING FROM THIS AGREEMENT, RELATING TO THE SOFTWARE, DOCUMENTATION AND/OR RELATING TO ANY SERVICES PROVIDED TO YOU BY LICENSOR (INCLUDING ITS LICENSORS, SUPPLIERS, SUBCONTRACTORS AND DISTRIBUTORS) IN RELATION TO THE SOFTWARE AND/OR DOCUMENTATION, EXCEED THE LICENSE FEES PAID BY YOU FOR THE SOFTWARE.

THE DISCLAIMER OF REPRESENTATIONS, WARRANTIES AND CONDITIONS AND LIMITATION OF LIABILITY CONSTITUTE AN ESSENTIAL PART OF THIS AGREEMENT. YOU ACKNOWLEDGE THAT BUT FOR THE DISCLAIMER OF REPRESENTATIONS, WARRANTIES AND CONDITIONS AND LIMITATION OF LIABILITY, NEITHER LICENSOR NOR ANY OF ITS LICENSORS OR SUPPLIERS WOULD GRANT THE RIGHTS GRANTED IN THIS AGREEMENT.

7. Term and Termination: This Agreement shall continue for as long as You use the Software, however, it may be terminated sooner as provided in this Section 7. You may terminate this Agreement by destroying all copies of the Software and Documentation under Your control and providing certification of such destruction to Licensor or by returning the Software to Licensor. Licensor may terminate this Agreement immediately by providing You with written notice if: (a) You are in material breach of any provision of this Agreement, which breach, if capable of being cured, is not cured within thirty (30) days after Licensor gives You written notice thereof; or (b) You have committed a non-curable material breach of this Agreement. Upon termination You shall destroy all copies of the Software. In addition to this Section, the Sections entitled Definitions, Disclaimer of Warranties, Limitation of Liability, Title, High-Risk Activities, Intellectual Property, and General shall continue in force even after any termination of this Agreement. No termination of this Agreement will entitle You to a refund of any amounts paid by You to Licensor or affect any obligations You may have to pay any outstanding amounts owing to Licensor. Upon any termination by Licensor, You shall destroy all copies of the Software and Documentation under Your control and certify such destruction to Licensor.

8. Support and Updates: This Agreement does not grant You the right to any updates or enhancements of the Software or the right to receive any technical support for the Software. Such updates and other technical support services, if available, may be purchased separately from Licensor. Use of any updates or

enhancements to the Software provided pursuant to any technical support You may procure from Licensor shall be governed by the terms and conditions of this Agreement. Licensor reserves the right at any time not to release or to discontinue the release of any Software and to alter prices, features, specifications, capabilities, functions, licensing terms, release dates, general availability or other characteristics of the Software.

9. Title: All right, title, and interest (including all intellectual property rights) in, to, and under the Software (including all copies thereof) shall remain with Licensor and its licensors.

10. High-Risk Activities: The Software is not fault-tolerant and is not designed, manufactured or intended for use in or in conjunction with on-line control equipment in hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation systems, air traffic control, or direct life support machines. Licensor, its licensors, suppliers, subcontractors and distributors specifically disclaim any express or implied representations, warranties and/or conditions for such uses.

11. U.S. Government End-Users: The Software and Documentation are each a "commercial item" as that term is defined at FAR 2.101, consisting of "commercial computer software" and "commercial computer software documentation" as such terms are defined in FAR 12.212, and are provided to the U.S. Government only as commercial end items. Government end users acquire the rights set out in this Agreement for the Software and Documentation consistent with: (i) for acquisition by or on behalf of civilian agencies, the terms set forth in FAR12.212; or (ii) for acquisition by or on behalf of units of the Department of Defense, the terms set forth in DFARS 227.7202. Use of the Software and Documentation is further restricted by the terms and conditions of this Agreement. For the purposes of any applicable government use, the Software and Documentation were developed exclusively at private expense, and are trade secrets of Epiphan Systems Inc. for the purpose of any Freedom of Information legislation or any other disclosure statute, regulation or provision.

12. Export Restrictions: The Software, Documentation and related information are subject to export and import restrictions. By downloading, installing, or using the Software, Documentation and/or related information, You are representing and warranting that You are not located in, are not under the control of, and are not a national or resident of any country to which the export of the Software, Documentation and/or related information would be prohibited by the laws and/or regulations of Canada or the United States. You are also representing and warranting that You are not an individual to whom the export of the Software, Documentation or related information would be prohibited by the laws and/or regulations of Canada or the United States. You shall comply with the export laws and regulations of Canada and the United States that are applicable to the Software, Documentation and related information and You shall also comply with any local laws and/or regulations in Your jurisdiction that may impact Your right to export, import, or use the Software, Documentation or related information, and You represent and warrant that You have complied with any such applicable laws and/or regulations. The Software, Documentation and related information shall not be used for any purposes prohibited by export laws and/or regulations, including, without limitation, nuclear, chemical, or biological weapons proliferation. You shall be responsible for procuring all required permissions for any subsequent export, import, or use of the Software, Documentation or related information.

13. Intellectual Property: Epiphan is a trademark or a registered trademark of Epiphan Systems Inc. in certain countries. All Licensor product names and logos are trademarks or registered trademarks of Epiphan Systems Inc. in certain countries. All other company and product names and logos are trademarks or registered trademarks of their respective owners in certain countries. You shall not disclose, transfer or otherwise provide to any third party any portion of the Software, except as expressly permitted in this Agreement.

14. General: This Agreement is the entire agreement between You and Licensor in respect to the Software, superseding any other agreements or discussions, oral or written. The terms and conditions of this Agreement shall prevail over any pre-printed terms on any quotes, orders, purchase orders, or purchase order acknowledgements, and shall prevail over any other communications between the parties in relation to the Software. You may not assign this Agreement whether voluntarily, by operation of law, or otherwise without Licensor's prior written consent. Licensor may assign this Agreement at any time without notice. The failure of a party to claim a breach of any term of this Agreement shall not constitute a waiver of such breach or the right of such party to enforce any subsequent breach of such term. If any provision of this Agreement is held to be unenforceable or illegal, such decision shall not affect the validity or enforceability of such provisions under other circumstances or the remaining provisions of this Agreement and such remaining provisions shall be reformed only to the extent necessary to make them enforceable under such circumstances. This Agreement shall be governed by the laws of the Province of Ontario and the laws of Canada applicable therein. No choice or conflict of laws rules of any jurisdiction shall apply to this Agreement. You shall only be entitled to bring any action or proceeding arising out of or relating to this Agreement, the Software, Documentation or any services provided in respect to the Software and/or Documentation in a court in Ottawa, Ontario, Canada, and You consent to the jurisdiction of such courts for any such action or proceeding. You waive all rights that You may have or that may hereafter arise to contest the jurisdiction of such courts for any action or proceeding brought by You. You hereby waive any right You may have to request a jury trial with respect to any action brought by You in connection with this Agreement, the Software or any services provided in respect to the Software. The application of the United Nations Convention on Contracts for the International Sale of Goods to this Agreement is expressly excluded.

February 2017

Environmental Information

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.
In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.
The crossed-out wheeled bin symbol invites you to use those systems. If you need more information about collection, reuse and recycling systems, please contact your local or regional waste administration. You can contact us for more information on the environmental performance of our products.

FCC & CE Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation.

Marking by the symbol CE indicates compliance of this device with EMC directive of the European Community and meets or exceeds the following technical standard.

EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

Other Jurisdictional Issues

Epiphan makes no representation that its products or information in this document or its web site is appropriate or available for use in your jurisdiction. Those who choose to access the Epiphan web site or use Epiphan products do so on their own initiative and are responsible for compliance with local laws, if and to the extent local laws are applicable.

Submissions to Epiphan and Affiliated Servers

Any information, including but not limited to remarks, suggestions, ideas, graphics, or other submissions, communicated to Epiphan through their Epiphan web site is the exclusive property of Epiphan. Epiphan is entitled to use any information submitted for any purpose, without restriction (except as stated in Epiphan's Privacy Statement) or compensation to the person sending the submission. The user acknowledges the originality of any submission communicated to Epiphan and accepts responsibility for its accuracy, appropriateness, and legality.

Third Parties and Links to Third-Party Web Sites

Mention of non-Epiphan Systems Inc. products or services on their website, or this document site is for informational purposes and does not constitute an endorsement or recommendation.

This document may contain links to non-Epiphan web sites. These links are provided to you as a convenience, and Epiphan is not responsible for the content of any linked web site. Any outside web site accessed from the Epiphan web site is independent from Epiphan, and Epiphan has no control over the content of that web site. In addition, a link to any non-Epiphan web site does not imply that Epiphan endorses or accepts any responsibility for the content or use of such a web site.
In no event shall any reference to any third party or third party product or service be construed as an approval or endorsement by Epiphan of that third party or of any

product or service provided by a third party.

Miscellaneous

It is the user's responsibility to ascertain whether any information downloaded from the Epiphan web site or other websites is free of viruses, worms, trojan horses, or other items of a potentially destructive nature.

Enforcement of Terms and Conditions

These Terms and Conditions for use of this document and the associated Epiphan Product are governed and interpreted pursuant to the laws of the province of Ontario, Canada, notwithstanding any principles of conflicts of law.

All disputes arising out of or relating to these Terms and Conditions shall be finally resolved by arbitration conducted in the English language in Ottawa, Ontario, Canada under the commercial arbitration rules of the Canada. The parties shall appoint as sole arbitrator a retired judge who presided in the province of Ontario. The parties shall bear equally the cost of the arbitration (except that the prevailing party shall be entitled to an award of reasonable attorneys' fees incurred in connection with the arbitration in such an amount as may be determined by the arbitrator). All decisions of the arbitrator shall be final and binding on both parties and enforceable in any court of competent jurisdiction. Notwithstanding this, application may be made to any court for a judicial acceptance of the award or order of enforcement. Notwithstanding the foregoing, Epiphan shall be entitled to seek injunctive relief, security, or other equitable remedies from any court of competent jurisdiction.
If any part of these terms is unlawful, void, or unenforceable, that part will be deemed severable and will not affect the validity and enforceability of the remaining provisions. Epiphan may, at its sole discretion and without notice, revise these terms at any time by updating this posting.

UG101-01