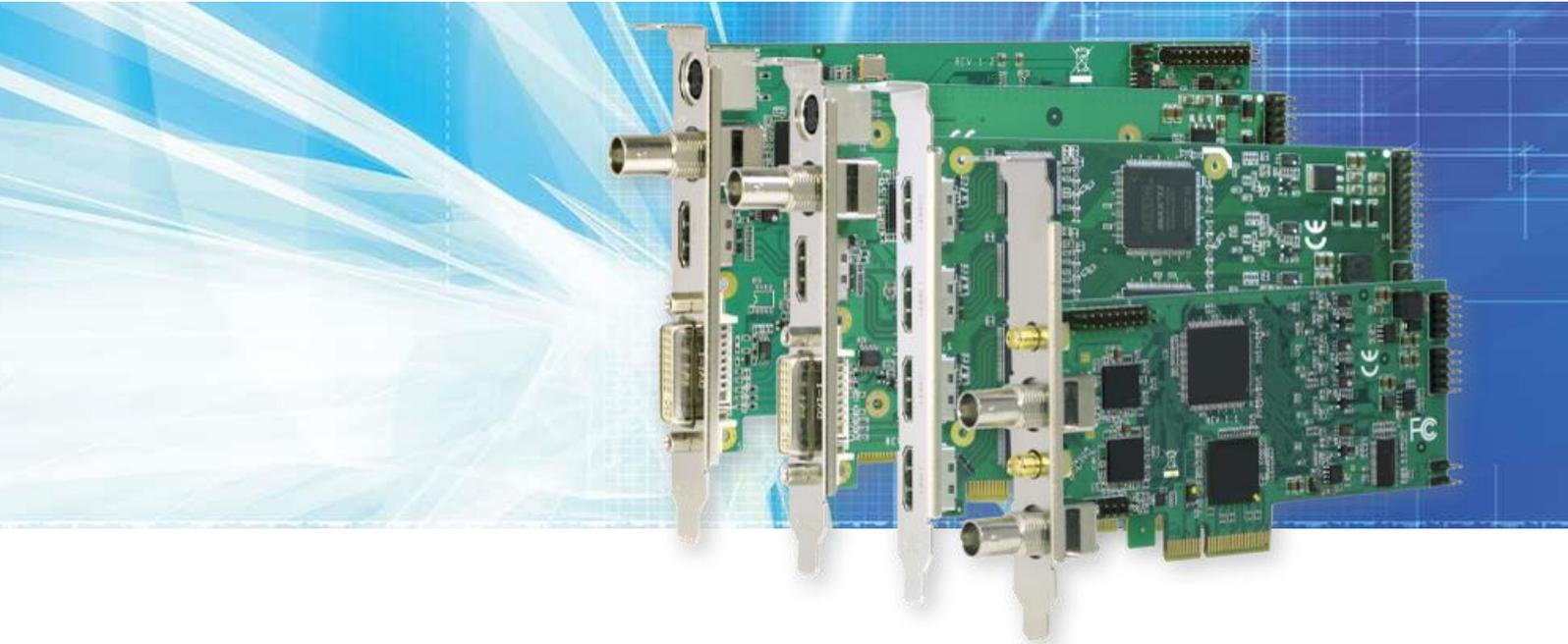


UFG-12 Family

Frame Grabbers



USER MANUAL

Windows® 10

Windows® 8

Windows® 7

 **UNIGRAF**

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The UFG-12 Family frame grabbers meet the essential health and safety requirements, is in conformity with and the CE marking has been applied according to the relevant EU Directives using the relevant section of the corresponding standards and other normative documents. Please find a Declaration of Conformity attached to this document.

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1. ABOUT THIS MANUAL

Purpose

This guide is the User Manual of UFG-12 Family of Frame Grabbers for use in a PC with Windows® 10, 8 or Windows® 7 operating system. UFG-12 Family is fully featured grabber boards for replacement of UFG-12 Family.

The purpose of this guide is to

- Give an overview of the product and its features.
- Give instruction for the user on how to install the card and the related software drivers.
- Assist the user in configuring the capturing process with the user interface.
- Give instructions for the user how to capture video and audio.

Product and Driver Version

This manual explains features found in product versions UFG-12 4H, UFG-12 2S, UFG-12 M, UFG-12 MC

Installation Package version 1.1; Codec version 175.0 Driver version 175.0. Please consult Unigraf for differences or upgrades of previous versions.

Notes

On certain sections of the manual, when important information or notification is given, text is formatted as follows. Please read these notes carefully.

Note	This text is an important note
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2. INTRODUCTION

Product Description

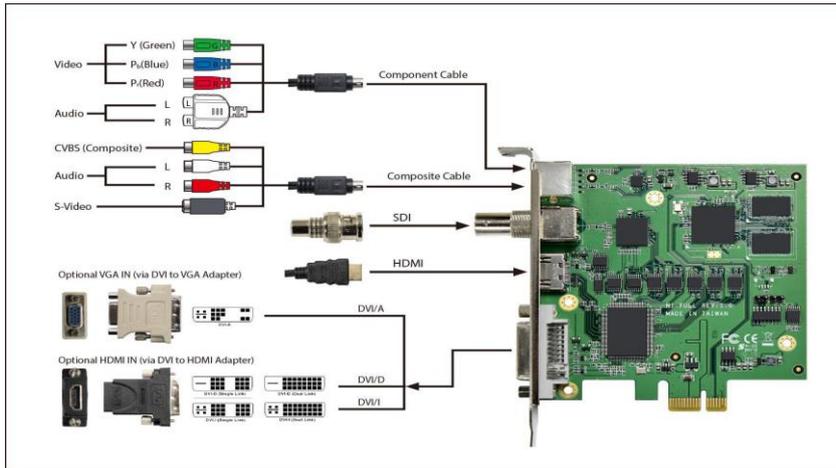
UFG-12 is a PCI Express (Gen 2) Frame Grabber family capable to capture digital HDMI, SDI and DVI, analog RGB and Component Video and also embedded or line-in audio. S-video and composite video also supported by UFG-12 M/MC.

- UFG-12 4H; Four (4) simultaneous HDMI inputs, PCIe x4
- UFG-12 2S; Two (2) simultaneous 3G/HD/SDI channels, PCIe x2
- UFG-12 M; HDMI, SDI, VGA, YPbPr, L/R audio inputs, PCIe x1
- UFG-12 MC; HDMI, SDI, VGA, YPbPr, L/R audio inputs, PCIe x1, hardware compression

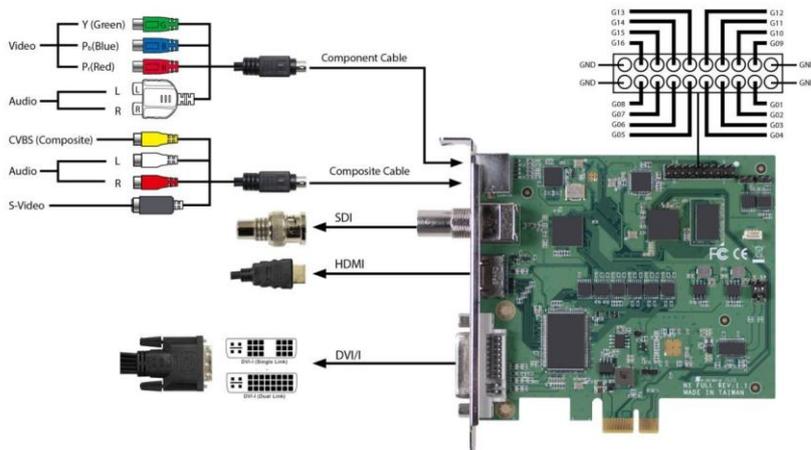
Product Features

- Captures video formats from 720 x 576 to 1920 x 1080.
- Automatically detect supported video modes.
- Capture HDMI and SDI embedded audio and line-in audio
- High capture frame rates achieved with high speed bus interfaces (pls. refer to product specification for details).
- In UFG-12 4H four (4), and UFG-12 2S two (2) fully independent capturing channels.
- In UFG-12 MC H.264 Main Profile hardware compression
- SDK for Windows.

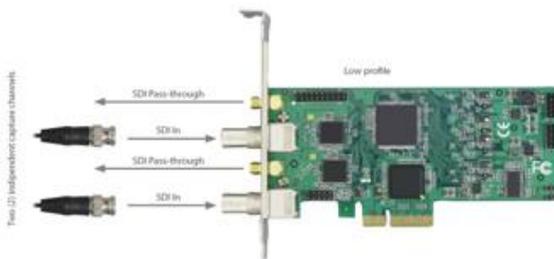
Identifying Connectors



UFG-12 MC



UFG-12 M



UFG-12 2S
(UFG-10 2SA)



UFG-12 4H

3. INSTALLATION

Unpacking

The UFG-12 family frame grabber product shipment contains

- The UFG-12 card in an anti-static bag
- The Utilities CD containing drivers for Windows operating system along with ready to use sample Windows applications. An electronic copy of this User Manual is included.
- UFG-12 installation packages are also available for download at Unigraf website at www.unigraf.fi/support-downloads/software-downloads
- Please contact Unigraf for details of the installation package for Linux

Note The UFG-12 boards are highly dedicated electronic devices that contain ESD sensitive components. Before opening the anti-static bag and always before touching the card, please be sure to ground yourself. You can do the grounding by wearing a special grounding strap or simply touching a grounded metal surface.

Driver Installation

Note: Please use the install routine in the install package for pre-installation before the hardware installation.
Please use a PCI Express Gen 2 slot.

Note: System administrator's privileges are required for performing the installation.

For UFG-12 boards there are two separate installation packages: one for the user who use Directshow application directly, no need self programming. For this user group, they can download SW package which contains UFG-12 device driver and Directshow sample application.

For the user who need to do programming based on provided API, they can download Programming User package, which include driver, codec, sample code and Easy programming guide.

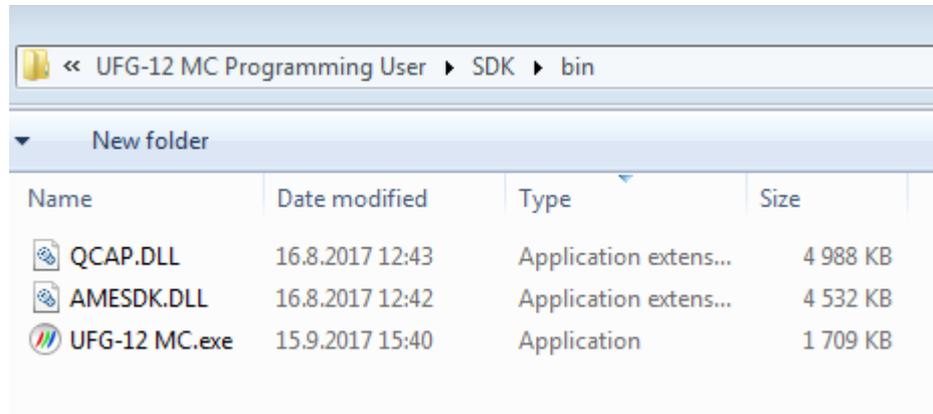
All the users can use Directshow sample application to make general functional checking for UFG-12 serial cards.

Directshow User need UFG-12 X Device Driver and Directshow sample Application e.g. Graphic Studio.

- ◆ Run driver setup application, when it was done, reboot PC.
- ◆ Start Directshow application to verify streaming functionality. Detailed instruction for Directshow application can be found chapter 4.

Programming Users need UFG-12 x Device Driver, CODEC installation and sample code. Easy programming guide will be included also. For further coding questions, please contact with Unigraf technical support info@unigraf.fi.

- ◆ Run driver setup application, when it was done, reboot PC.
- ◆ Run CODEC setup application.
- ◆ Start built up Sample code binary file to check the card working condition. Please remember Sample code application need to be put in the same folder with QCAP.DLL and AMESDK.DLL together when try to run it.
- ◆ Please check whether QCAP.DLL and AMESDK.DLL has same version as installed CODEC version.



Hardware Installation

- ▶ Power down your PC
- ▶ Insert the UFG-12 board in a vacant PCIe slot

Note	Please note that for achieving the full bandwidth of the PCIe interface of the UFG-12 board you should use a PCIe slot where four (4) PCIe lanes are enabled (UFG-12 4H, UFG-12 2S and UFG-12 M)
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- ▶ Power up your PC. Windows will detect and automatically install the UFG-12 board. Your UFG-12 board is now ready for use.

4. DIRECTSHOW CONFIGURATION

DirectShow Capture

In Windows WDM architecture, Microsoft supplies a set of hardware-independent drivers, called class drivers, and the hardware vendor provides hardware-specific minidrivers. A minidriver implements any functions that are specific to the device; for most functions, the minidriver calls the Microsoft class driver.

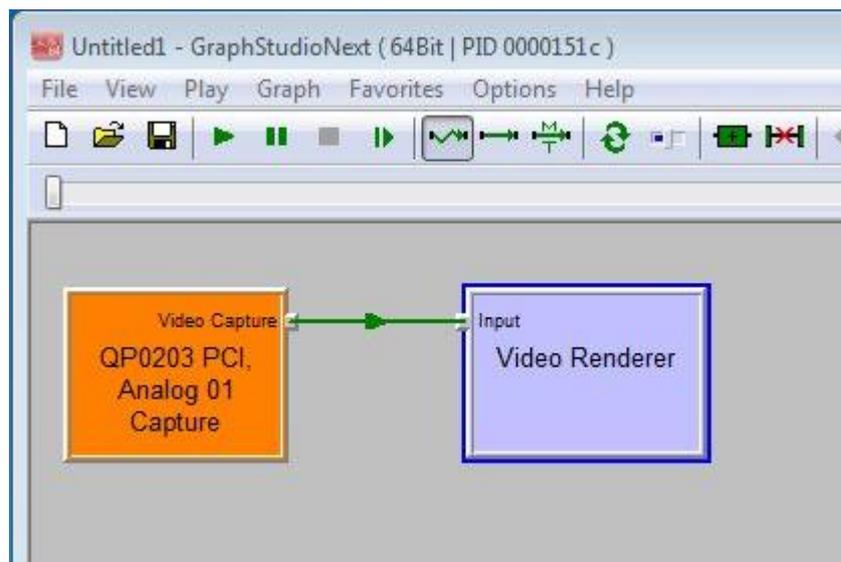
In a DirectShow filter graph, any WDM capture device appears as the WDM Video Capture filter. The WDM Video Capture filter configures itself based on the characteristics of the driver. It appears under a name provided by the driver — in case of Unigraf UFG-12 they are called QP0203 PCI, Analog Capture (#01) or MZ0380 PCI, Analog Capture (#01) for video and QP0203 PCI, Analog WaveIn (#01) or MZ0380 PCI, Analog WaveIn (#01) for audio.

In e.g. GraphEdit UFG-12 capture filters are listed e.g. under *Video Capture Sources*.

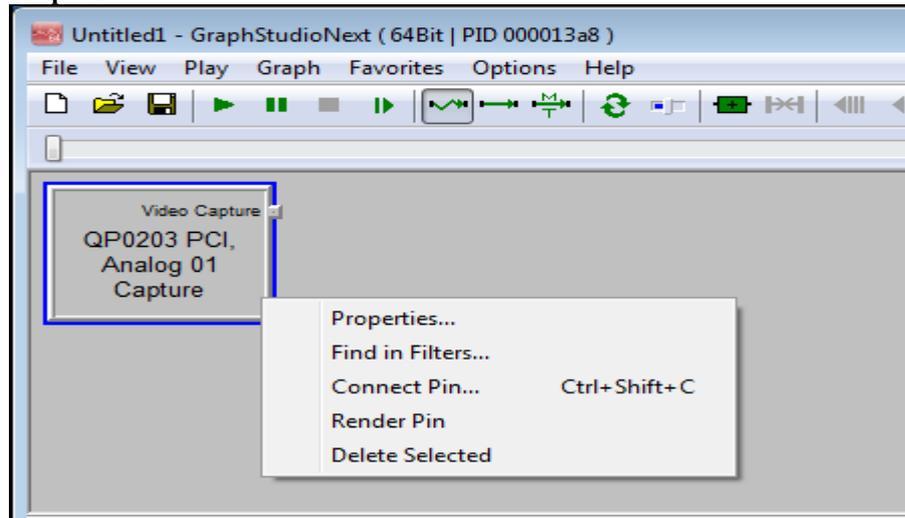
Configuration Dialogs

The capture properties for UFG-12 can be configured through the *Filter Properties* and *Video Capture Pin Properties* dialogs.

You can open the *Filter Properties* dialog by e.g. right clicking on the *QP0203 PCI Analog Capture (#0X)* in GraphEdit and selecting **Filter Properties....**



Video Capture Pin dialog can be accessed by e.g. right clicking the **Capture Pin** symbol of *QP0203 PCI Analog Capture (#0X)* in GraphEdit and selecting **Pin Properties....**

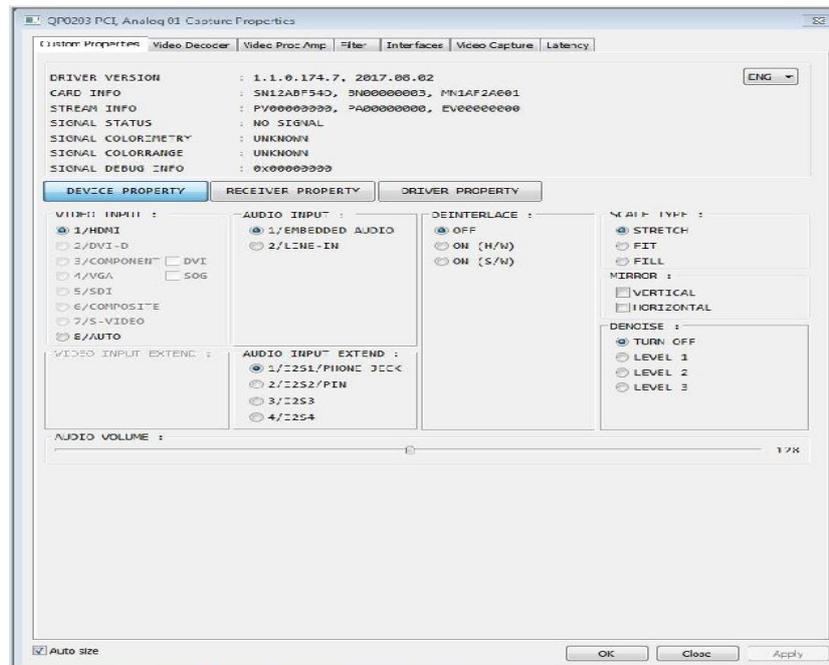


The two dialogs can be found typically in the pull-down menus of other DirectShow compatible applications.

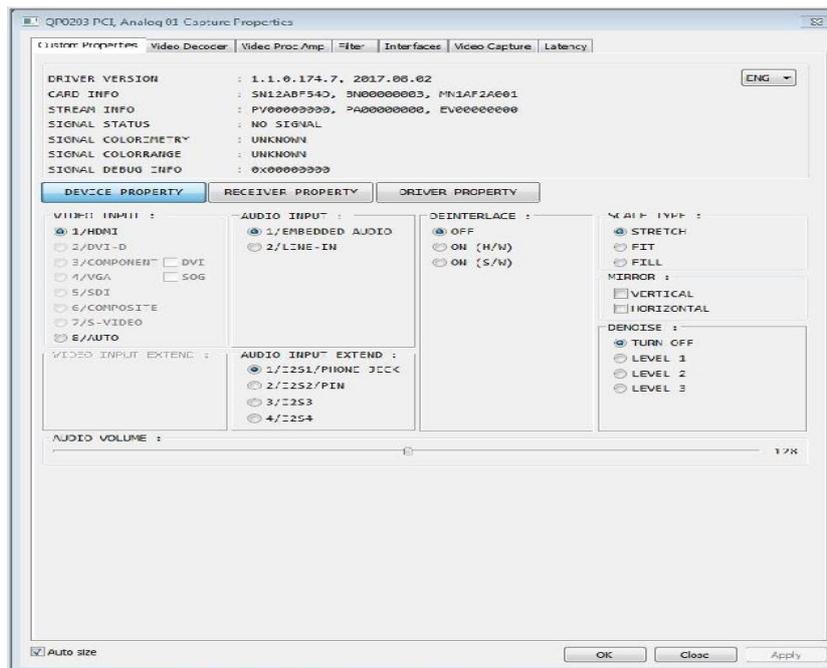
Configuring Source Input

The controls available for selecting the video input can be found in the *CUSTOM PROPERTIES* tab of the *Filter Properties dialog*. The dialog is divided into sections. The function of each section is described below. The dialog is different in UFG-12 MC.

UFG-12 4H, UFG-12 2S and UFG-12 M

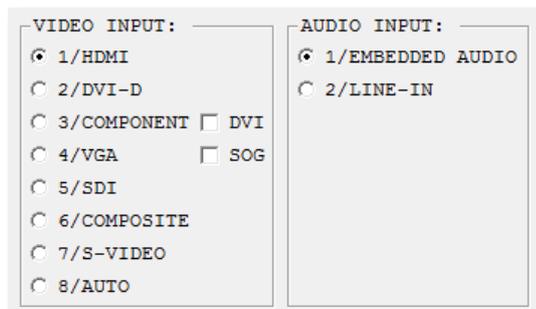


UFG-12 MC



Video and Audio Input

The video and audio source is selected from the corresponding sections of the dialog.



In **VIDEO INPUT** select the type of video that you need to capture. The software will evaluate the signal present at the input and start the capture. If you select **AUTO** the driver will detect the input that has a valid signal. If multiple signals are available, it will detect the one that was previously selected.

In **AUDIO INPUT** choose if you will be using **Embedded Audio** in HDMI, DVI-D or SDI inputs or the **Line-in audio** with the attached special cable.

With UFG-12 4H and UFG-12 2S boards video input type selection is not used.

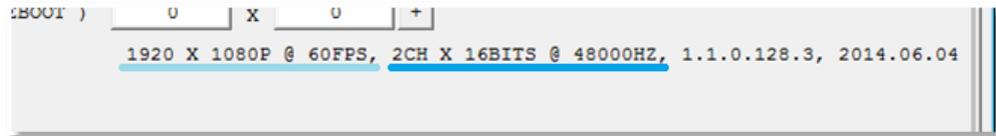
With UFG-12 M or UFG-12 MC board, you can use two alternative connectors to input Component (YPbPr) video. The default method is to use the three RCA connectors in the included special cable. You can alternatively use the analog pins in the DVI-I connector (select: **COMPONENT + DVI**)

VGA is input using the DVI-I connector. When using Sync-on-Green signal in VGA, select **SOG**.

UFG-12 M and UFG-12 MC board can support S-VIDEO and Composite (CVBS) video. Please use provided Yellow RCA to 7-pin Din connector for Composite video, while use 4-pin Din for S-video input.

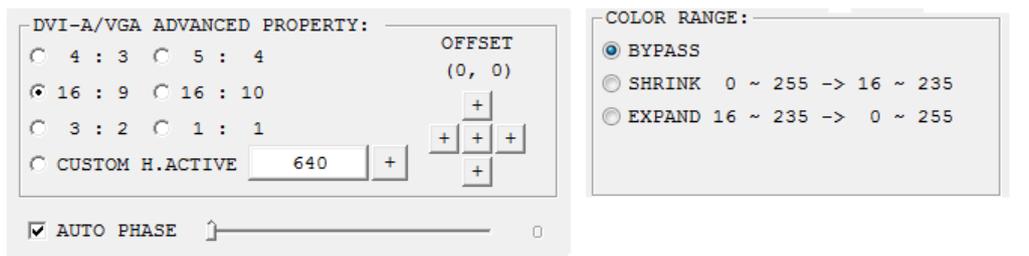
Detected Video and Audio Mode

The details of the selected video and audio is indicated in the lower part of the dialog.



VGA Input

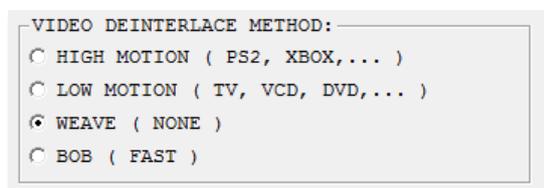
For the VGA input you can fine tune the capture active area and the color range.



- You can define the captured screen size either by selecting one of the predefined aspect ratios or define the number of *Horizontal Active Pixels* with **CUSTOM H.ACTIVE**. Please click “+” to assign the value. Vertical active pixels will be detected based on the input video.
- You can fine-tune the position of the active area with the cross shaped “+” controls in **OFFSET**
- By checking the **AUTO PHASE** the driver determines the best pixel sampling phase automatically. You can fine tune the phase with the slider.
- You can alter the color range from the one used by input video.
 - To use the color range of the input signal select **BYPASS**
 - If the input video color range is *Full Range* you can compress it to *Limited Range* by selecting **SHRINK**.
 - If the input video color range is *Limited Range* you can expand it to *Full Range* by selecting **EXPAND**.

De-interlacing

When interlaced video is captured, you can define the way the de-interlacing is performed. For non-interlaced video (e.g. for 1920×1080p60) please select **Weave (None)**



Additional Controls

SPECIAL CAMERA SUPPORT (for SDI input) lets you to select between *Standard camera* and *ISMART CAHC*.

SINGLE RESOLUTION OUTPUT forces the captured resolution (saved resolution) to be the same as the detected video mode.

FRAME RATE ADJUSTMENT not used in UFG-12 boards.

AUTO RESOLUTION SCALING & RGB24/32 OUTPUT If the check-box is selected, the video is scaled in the hardware to the resolution indicated in the fields **Customized Resolution Output** on the line below. Please click “+” to assign the values.

If the check-box is not selected the board provides the image with input resolution. In this case, if scaling is needed, it is done in the software.

Note You will need to restart the PC for a change in hardware scaling to take effect

MAXIMAL RESOLUTION SUPPORT Possibility to change the default maximum usable resolution. Please contact Unigraf for details.

VBI LINES Please contact Unigraf for details.

HDMI/DVI Input Equalization

You can compensate the length of the input cable with this control. Please select the setting closest to the cable length that you are using.

Driver Version

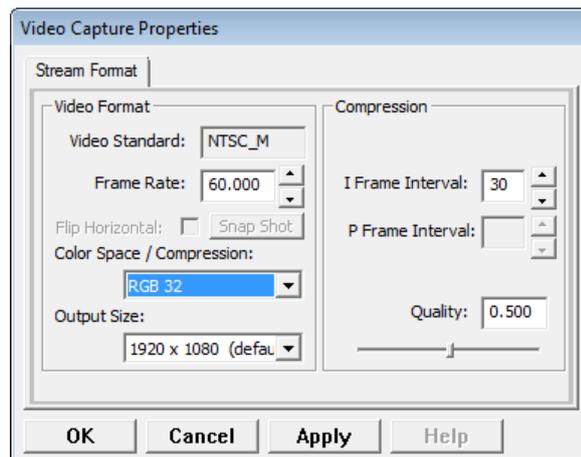
The version of the installed driver is indicated in the lower part of the dialog.

Configuring Capture Format

You can define the format of the video data that the capture filter provides to your application by using the *Video Capture Properties* dialog of the *Capture Filter Output Pin*.

Video Capture Pin dialog can be accessed by e.g. right clicking the **Capture Pin** symbol of *SA7160 PC Analog Capture (#0X)* in GraphEdit and selecting **Pin Properties....**

The dialog can be found in the pull-down menus of other DirectShow compatible applications as well.



With **Frame Rate** you can set the frames per second rate that the capture filter provides video for your application. If your system cannot consume the full input frame rate, the smoothest visual result can be achieved with 1/2, 1/3, 1/4 of the original frame rate.

With **Color Space / Compression** you can select the color format with which the captured frames are provided for your application. The options are YUY2, YV12, NV12, RGB 24 and RGB 32 for non-compressing models. When using UFG-12 MC the options are YV12, H264 and X264.

With **Output Size** you can define the size of the stored frame. Resizing will be done in the PC software.

With **I Frame Interval** you can define with UFG-12 MC the frequency of the *I Frames* in the compressed stream. *I Frames* are frames that contain the complete frame data. Between I Frames only the frame to frame difference will be stored.

With **Quality** you can vary the *Compression Quality* of UFG-12 MC. The Compression Quality effects the amount of detail in the stored stream.

5. USAGE

Applications

UFG-12 Installation package contains some practical applications for the user to start utilizing the UFG-12 capture board out of the box. QCAP Viewer utilizes UFG-12 native QCAP API while other application use AVStream driver and Direct Show capture filters for presenting and recording the video and audio content.

The following chapters explain the basic use of the included applications.

QCAP Viewer

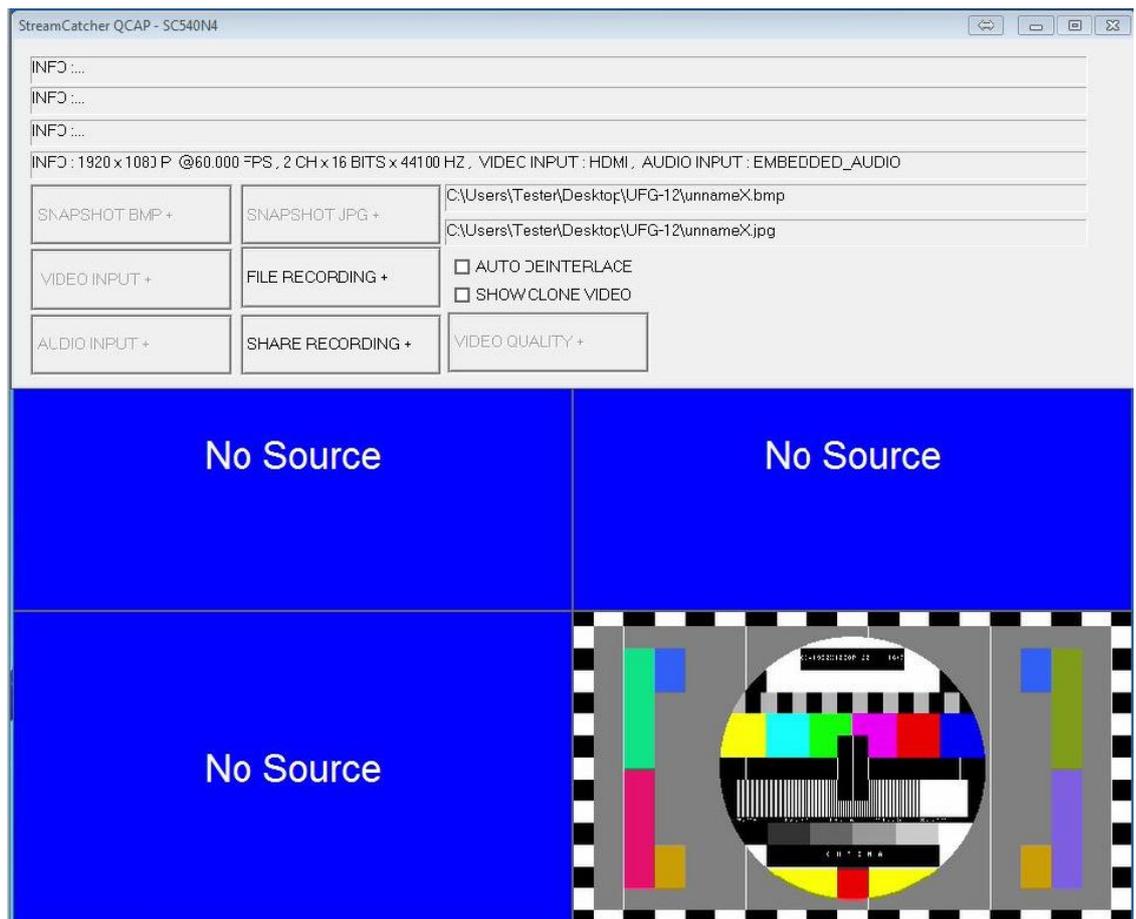
The UFG-12 SDK contains preview applications utilizing the native UFG-12 QCAP API. The applications have been created for individual UFG-12 models. The applications and their compatibility is the following:

Model	Application
UFG-12 4H	UFG-12 4H Viewer.exe
UFG-12 2S	UFG-12 2S Viewer.exe
UFG-12 M	UFG-12 M Viewer.exe
UFG-12 MC	UFG-12 MC Viewer.exe

Note Please make sure that QCAP.DLL and AMESDK.DLL are included in the same directory with the application (*.exe).

The basic functions of the QCAP Viewer are similar between the different boards. The following chapters describe the board-specific features of the provided applications. For more details of the features, please contact Unigraf.

UFG-12 4H Viewer and UFG-12 2S Viewer



QCAP Viewer for the multi-channel boards contains a preview window with four screens and a control dialog.

The features of the dialog:

- Snapshot a video frame (BMP, JPG) from the channel you need, double clicking the video preview window channel area, a separate image preview window will be come out, then the corresponding channel's snapshot operation is available.
The saved file name and location can be edited in the provided field
- FILE RECORDING: Record a video sequence (AVI or MP4 format) from each input channels individually. The saved file name and location can be edited in the provided field
- SHARE RECORDING: Record a video sequence (AVI or MP4 format) by mixing one of the input channels at a time.

UFG-12 M Viewer and UFG-12 MC Viewer



QCAP Viewer UFG-12 M and MC contains a preview window and a control dialog.

The features of the dialog:

- Select the video source used (depends on the board model)
- Select the audio source used (embedded, external)
- Set the video quality details for analog inputs (brightness, contrast, hue, saturation, sharpness)
- Snapshot a video frame (BMP, JPG)
The saved file name and location can be edited in the provided field
- Record a video sequence (AVI or MP4 format)
The saved file name and location can be edited in the provided field
- Record 1-1 saves full resolution video and audio (main channel in UFG-12 MC)
- Record 1-2 saves video with half of the original size (Sub-channel in UFG-12 MC)
- Record 1-3 saves video with one fourth of the original size (Preview of raw data in UFG-12 MC).

GraphEdit

In GraphEdit insert the filter of the device (QP0203 PCI, Analog Capture (#01) or MZ0380 PCI, Analog Capture (#01) for video and QP0203 PCI, Analog WaveIn (#01) or MZ0380 PCI, Analog WaveIn (#01) for audio) to the graph. Right click on the output pin and select **Render**. Start the graph with the play button.

With GraphEdit SW packet you will receive several rendering filters. Please experiment the performance of various filters in your set-up. *Video Mixing Renderer 9* found in *DirectShow filters* group is a good alternative.

In some cases you may need using a *Color Space Converter* filter. In this case insert *Color Space Converter* filter (please find it *DirectShow Filters* group and re-build the graph. (Click on **Video Capture** pin of the capture filter and drag the end of arrow to point to **Input** pin of *Color Space Converter*. Right-click on **XForm Out** pin and choose **Render Pin** or attach it to the input pin of the selected renderer.

If the picture appears upside down follow the previous steps and include e.g. a *Color Space Converter* in the graph.

AmCap

AmCap is a sample capture application of Windows

You will find the *Video Capture Filter* and *Audio Capture Filter* dialogs in the **Settings** pull down menu.

VirtualDUB

VirtualDUB is a freeware video capture software application originally written to capture Video for Windows (VfW) sources. The recent versions are already compatible with DirectShow. The tested version is 1.9.11.

VirtualDUB normally cannot accept top-down RGB images. To correct this open the menu **Video > Set Custom Format** and set the Use Custom Size fields for example 640x480 instead of the default values.

APPENDIX A. PRODUCT SPECIFICATION

Inputs

UFG-12 4E	4 × HDMI (A) connectors
UFG-12 2S	2 x SDI on BNC connector
UFG-12 M and UFG-12 MC	DVI and RGB on DVI-I connector HDMI on HDMI (A) connector SDI on BNC connector YPbPr and Line In Audio with supplied extension cable (RCA connectors)
Input Resolution	720×576i50 to 1920×1080p60 automatically detected (please see Appendix B for details)
Color Coding	YUY2 / YV12 / NV12 / RGB24 / RGB32
Audio	Embedded audio: LPCM, 2 channels, 16 bits, 32 to 48 kHz Line In: L / R inputs (RCA connector)

HW Features

Bus interface	PCI Express 2.0 UFG-10 M PCIe x 1 (Gen2) UFG-12 4H PCIe x4 (Gen2) UFG-12 MC PCIe x1 (Gen 2)
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Driver Properties

Operating Systems	Windows® 10, 8, 7, Vista or XP (64/32) and Linux
SW Interface	64 / 32 bit drivers. Windows Direct Show and Linux V4L2 compatible SDK / API for VC++, .NET, VB

General

Module Size	UFG-12 4H: 167 x 93 mm UFG-12 2S: 120 x 64 mm UFG-12 M: 107 x 101 mm UFG-12 MC: 93 x 101 mm
Power Consumption	TBD

APPENDIX B. SUPPORTED VIDEO MODES

Timings supported by UFG-12 models

Video Mode	Supported mode / Achieved frame rate			
	UFG-12 4H	UFG-12 2S	UFG-12 M	UFG-12 MC
1920×1080p@60 Hz	60 fps	60 fps	60 fps	60 fps
1920×1080p@50 Hz	50 fps	50 fps	50 fps	60 fps
1920×1080p@30 Hz	30 fps	30 fps	30 fps	30 fps
1920×1080p@25 Hz	25 fps	25 fps	25 fps	25 fps
1920×1080p@24 Hz	24 fps	24 fps	24 fps	24 fps
1920×1080i@60 Hz	60 fps	60 fps	60 fps	60 fps
1920×1080i@50 Hz	50 fps	50 fps	50 fps	50 fps
1280×720P@60 Hz	60 fps	60 fps	60 fps	60 fps
1280×720P@50 Hz	50 fps	50 fps	50 fps	50 fps
1280×720P@30 Hz	30 fps	30 fps	30 fps	30 fps
1280×720P@25 Hz	25 fps	25 fps	25 fps	25 fps
1280×720P@24 Hz	24 fps	24 fps	24 fps	24 fps
720×480P@60 Hz	60 fps	60 fps	60 fps *1	60 fps *1
720×576P@50 Hz	50 fps		50 fps	50 fps
720×480i@60 Hz	60 fps	60 fps	60 fps	60 fps
720×576i@50 Hz	50 fps	50 fps	50 fps*1	50 fps *1
720×240P@60 Hz				60 fps
720×288P@50 Hz				50 fps
1440×900p@60 Hz	60 fps		60 fps *1	60 fps *1
1280×1024p@60 Hz	60 fps		60 fps *1	60 fps *1
1280×960p@60 Hz	60 fps		60 fps *1	60 fps *1
1280×800p@60 Hz				60 fps
1280×768p@60 Hz				60 fps
1024×768p@60 Hz	60 fps		60 fps *1	60 fps *1
800×600p@60 Hz	60 fps		60 fps *1	60 fps *1
640×480p@60 Hz	60 fps		60 fps *1	60 fps *1
640×400p@60 Hz				
640×384p@60 Hz				

*1 Supported by HDMI, DVI, VGA and YPbPr inputs