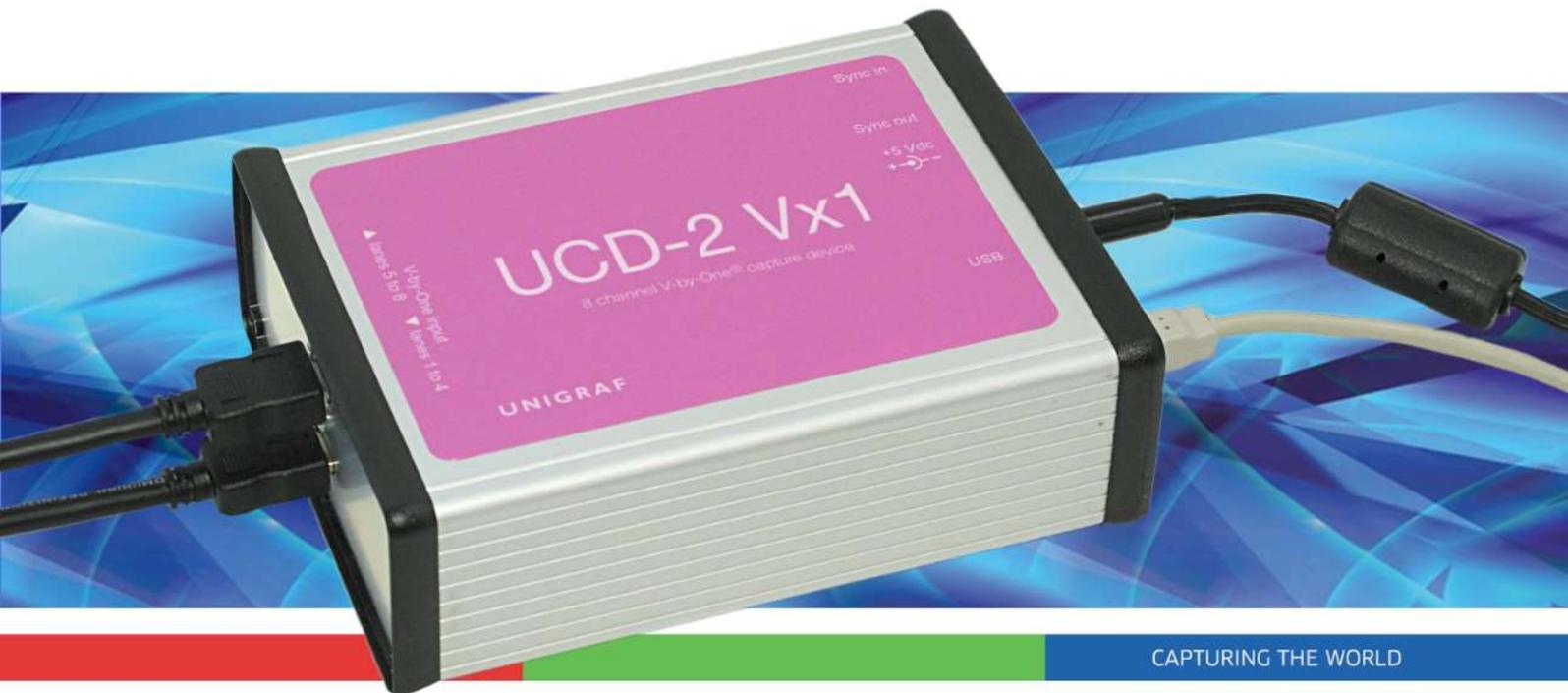


UCD VIEWER for UCD-2 Vx1



USER MANUAL

UNIGRAF

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Edition

UCD Viewer for UCD-2 Vx1 User Manual, Version 1

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UCD-1 and UCD-2 products 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.

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1. ABOUT THIS MANUAL

Purpose

This guide is the User Manual of UCD-2 Vx1, USB-connected video capture units for use in a PC with Windows® 10, Windows® 8, Windows® 7 or Windows® XP operating system.

The purpose of this guide is to

- Provide an overview of the product and its features.
- Provide instruction for the user on how to install the software and the drivers.
- Introduce the HW features of the units.
- Provide instructions for the user how use the UCD Viewer software.

Product and Driver Version

This manual explains features found in UCD-1/-2 Setup Software Package **1.6**. Please consult Unigraf for differences or upgrades of previous versions.

Please consult the Release Notes document in the installation package for details of the SW versions and changes to previous releases.

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
------	--------------------------------

2. HARDWARE

First, hardware properties for UCD-2 Vx1 device are described and later the device specific features are presented.



Figure 1 UCD-2 device back panel

Connectors

USB



USB 2.0 Hi-Speed standard type-B connector. There is no power draw from this connector.

Power

Switchcraft S761K external power connector.



Pin	Description
1. Tip	+5VDC
2. Sleeve	Ground

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Sync Out, Sync In



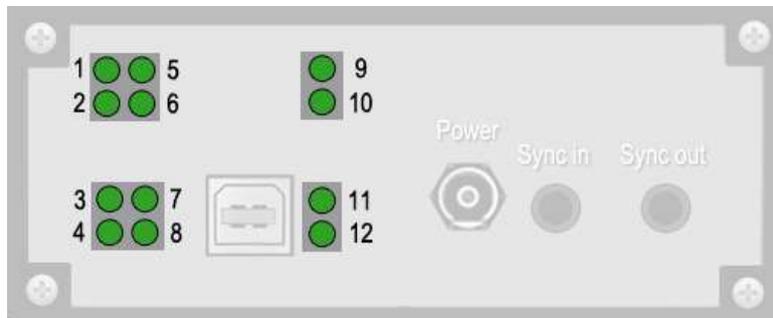
Synchronization output and synchronization input for master slave configuration of capturing multiple parallel channels.

Pin	Description
1. Tip	Signal 1
2. Ring	Signal 2
3. Sleeve	Ground

Status LEDs

LED operations of UCD devices are firmware dependent and subject to change excluding *power good* which is always available. Functions for each LED are described in the figure below.

UCD-2 Vx1



LED	Description
1, 3, 9, 11	On = V-by-One symbol lock
2, 4, 10, 12	Flashing = FW running
6, 8	On = Power good
7	For chained devices: On = Master, Off = Slave
5	Unused

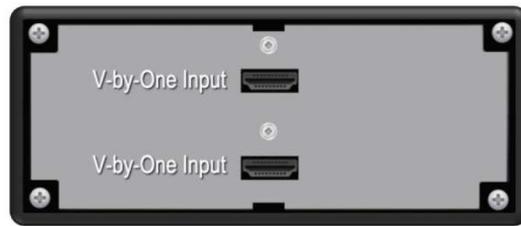
The table below shows the pin-out of one connector. Please refer to chapter [Connecting Source Devices](#) later in this document on allocating data to the two connectors.

Channel A is for the data of ODD and Channel B of EVEN pixels. N/C = No Connection

			50	GND	Signal Ground
			51	N/C	N/C / Not in use

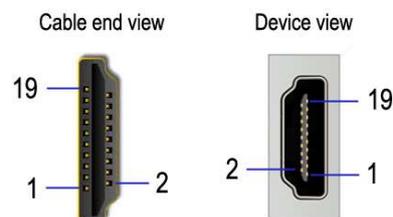
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UCD-2 VX1



V-by-One Inputs

V-by-One inputs use 19 pin HDMI connectors. Connectors are described in detail in the figure below.



The following table describes function of each pin for each connector.

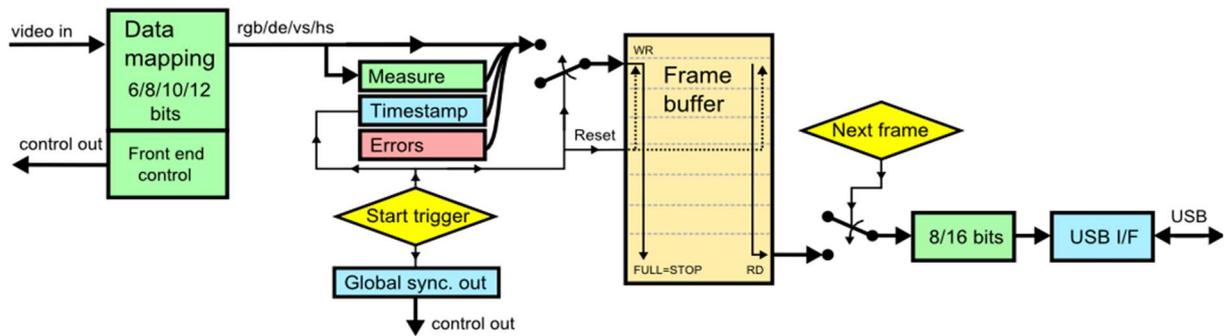
Pin number	Connector 5	Connector 6
1	Lane 8 +	Lane 4 +
2	Lane 8 shield / Ground	Lane 4 shield / Ground
3	Lane 8 -	Lane 4 -
4	Lane 7 +	Lane 3 +
5	Lane 7 shield / Ground	Lane 3 shield / Ground
6	Lane 7 -	Lane 3 -
7	Lane 6 +	Lane 2 +
8	Lane 6 shield / Ground	Lane 2 shield / Ground
9	Lane 6 -	Lane 2 -
10	Lane 5 +	Lane 1 +
11	Lane 5 shield / Ground	Lane 1 shield / Ground
12	Lane 5 -	Lane 1 -
13	Unconnected	Unconnected
14	Unconnected	Unconnected
15	Unconnected	LOCKn
16	Unconnected	HTPDn
17	Ground	Ground
18	Unconnected	Unconnected
19	Unconnected	Unconnected

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Capture Process

UCD hardware blocks are described in the figure below. Simplified version of the capture process is described as follows:

1. Set V-by-One color depth (6/8/10/12 bits /V-by-One byte mode)
2. Choose the desired number of V-by-One lanes to be captured.
3. Set color depth (8/16 bits) that is transferred over USB to PC. This setting affects data amount i.e. preview frame rate. It does not need to be the same as V-by-One color depth chosen in step 1.
4. Trigger capture start.
5. Video frames are saved to memory until memory is full.
6. Frames are readable one by one from the memory until memory is empty.
7. To continue, go back to step 4.



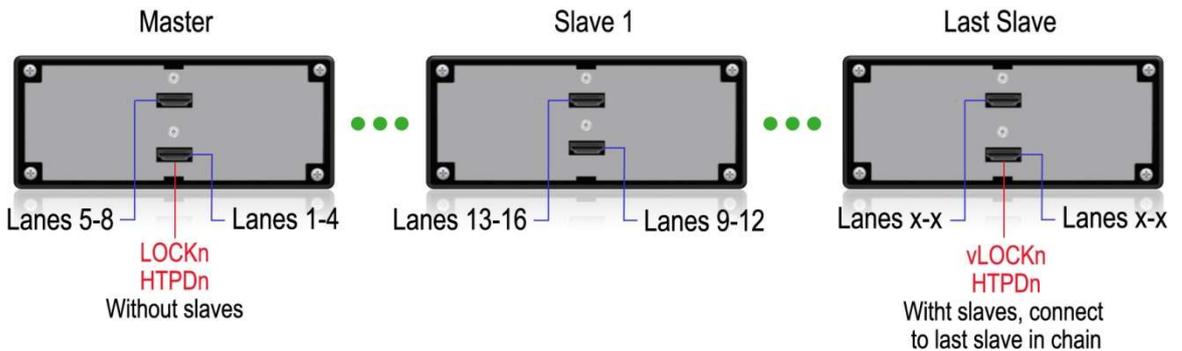
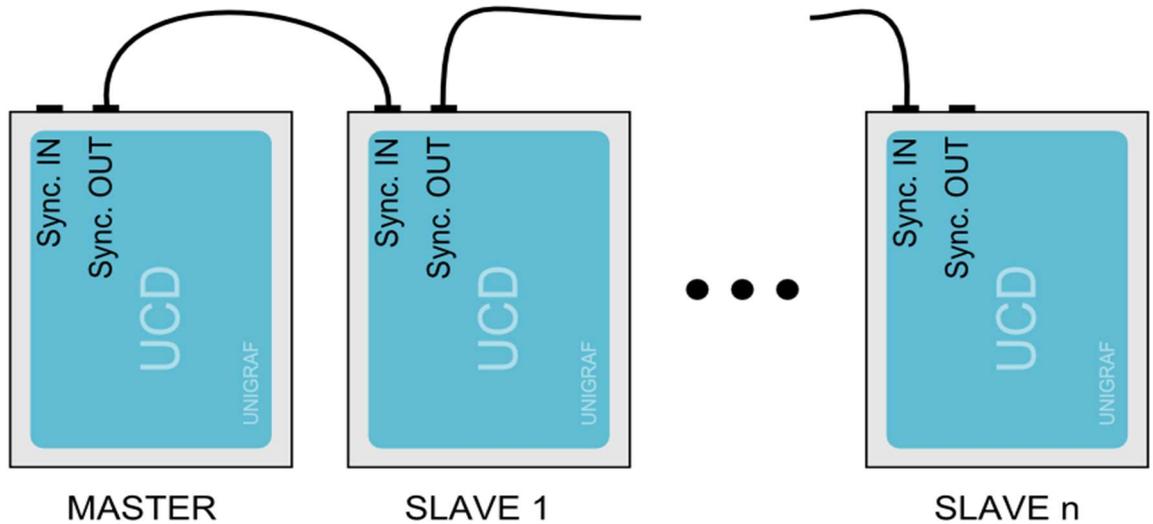
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Device chaining

Two or more UCD-2s can be chained together for capturing more than 8 lanes. The connection is done with a synchronizing cable as shown in the figure below. Figure in the following page shows the intended V-by-One connections in a chained configuration.

When chaining devices, please pay attention to the following:

- Device chain must not form a ring.
- Both ends of the cables should always be connected to a device.
- All devices must be connected to the same computer via USB cables.
- LOCKn and HTPDn must be connected to correct devices for reliable operation.
- Please note that connecting the lanes incorrectly does not prevent capturing but will only affect visible video.



External Trigger

An external trigger can be used to start video capture precisely at the right time. Connect the external trigger to the Sync IN input (See Fig. 9). The trigger should provide a 3.3V logical levels. Video capture can be started by either rising or falling edge.

The input is internally pulled up (10k Ω resistor) to 3.3V. It enables triggering the video capture manually with a push button that simply grounds the input.

External trigger mode needs to be enabled by setting the option value `UUCD_OPTION_EXT_TRIGGER` to either `EXT_TRIGGER_FALLING` or `EXT_TRIGGER_RISING`. Setting the option to `EXT_TRIGGER_NONE` disables external trigger mode.

Exactly like in free-run mode, the application should invoke `UUCD_StartCapture()` and then it can read frames by calling `UUCD_GetFrame()` until all the buffered frames are transferred to a PC. In external trigger mode, the first `UUCD_GetFrame()` call may take long time as it will be waiting for an external trigger to start video capture. Consider setting long enough timeout by calling `SetOption()` with `UUCD_OPTION_FRAMEINFO_TIMEOUT` parameter.

If UCD-2 devices are chained, the master device propagates the trigger to all slave devices. All chained devices start video capture synchronously.

3. UCD VIEWER

Unigraf UCD Viewer software is the configuration and capture GUI for UCD-2 devices.

System requirements

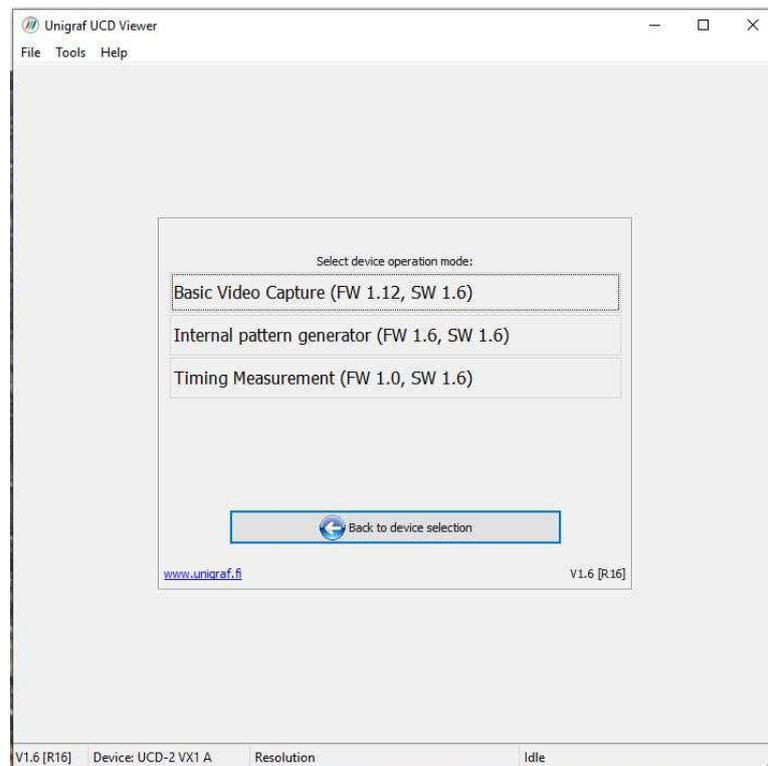
The UCD Viewer application can be used in 32-bit and 64-bit editions of Windows XP, Windows Vista, Windows 7, Windows 8 and Windows 10.

Installation

UCD Viewer can be installed by running **UCD Setup.exe**. The installer will allow you to select the components used and configure the install locations.

Device and Mode Selection

When *UCD Viewer* is launched, you can first select the connected UCD device.

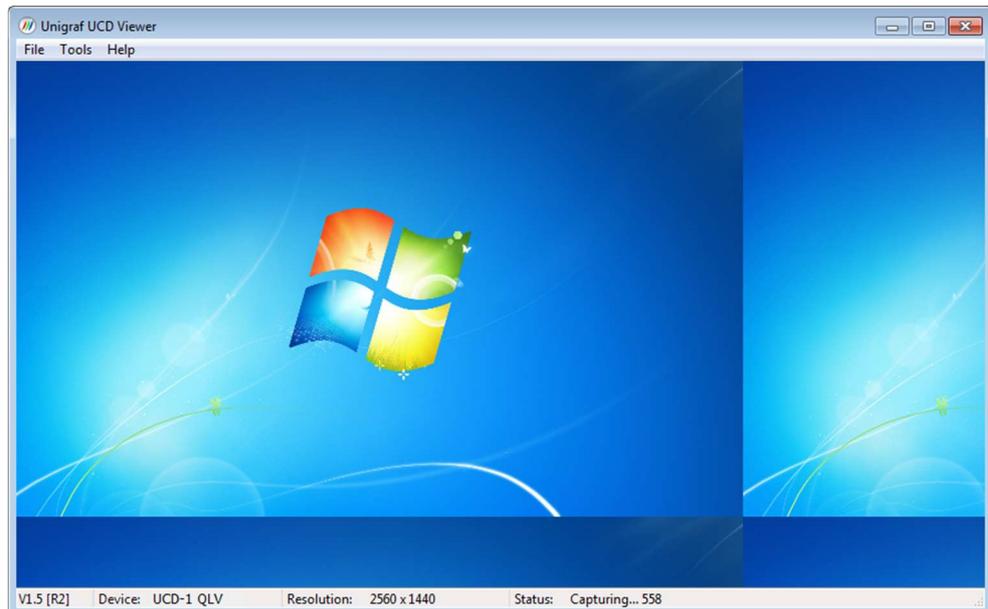


In the following dialog you can select the signal mode that you want to use.

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Preview Window

When you click **Start capture** a window will open and show a preview of your captured content.



You can align the size of the preview window to the content by right clicking on top of the window and selecting one of the **fixed zoom factors** 25% [Alt+1], 50% [Alt+2] or 100% [Alt+3].

You can display the captured content in a borderless window by selecting **Borderless Mode**. You can also maximize the window on your desktop by selecting **Maximize**.

Controls

You can end the current session by selecting **File > Stop Capture**.

You can select another capture device by selecting **File > Close Device**. From the dialog click the new capture device that you need to use.

Saving

- ▶ By selecting **File > Save snapshot (Ctrl+S)** you can capture and save individual frames. By selecting **File > Save video sequence** you can save a sequence of captured frames.

Capture Format

- ▶ You can select the capture image format from **Tools > Options**. The available formats are PPM (up to 16 bpc), BMP and JPG (8 bpc).

In the same dialog you can also select the folder where the image files are stored.

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UCD-2 Vx1

Vx1 Basic Video Capture Configuration

In the following window you can select the preferred Vx1 Capture Configuration settings. Vx1 Capture Configuration settings are described in the figure below.

Vx1 Capture Configuration

Lane count

1 Lane 4 Lanes
 2 Lanes 8 Lanes

Capture Colordepth

6 bits per pixel 10 bits per pixel
 8 bits per pixel 12 bits per pixel

Section Count

1 Section 4 Sections
 2 Sections 8 Sections

Color mapping

VESA Standard (JEIDA)

Measurement Mode

DE-only H-sync. and V-sync.

Vx1 Lane mapping

1 = 0 2 = 0 3 = 0 4 = 0 5 = 0 6 = 0
7 = 0 8 = 0 9 = 0 10 = 0 11 = 0 12 = 0
13 = 0 14 = 0 15 = 0 16 = 0

Lock options

0 HTPDN 42000 LOCKN delay, us
0 LOCKN 42000 Video valid delay, us

External Trigger

Disabled Falling Edge Rising Edge

Capture Mode

Real time Buffered

Start Capture

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Setting	Descripton								
Lane count	Number of lanes to capture. For cascaded devices, it shows the total number of lanes for all devices.								
Capture color depth	Selects input color-depth and capture color-depth. The preview display is always 24 bit true-color, while saved file will have the requested color-depth.								
Section count	Number of sections the frame is divided into.								
Color mapping	Selects color-mapping mode. (Vx1 should always use JEIDA).								
Measurement Mode	DE-only or Hsync-VSync based measurement								
Vx1 Lane mapping	All zero means that default mapping is used (= No change of lane order). This feature can be used to correct a situation where the Vx1 lanes are mixed up for some reason. For example, if lanes 1 and 2 are reversed on the physical connector, enter 2 to the first edit box, and 1 to the second.								
External trigger	Controls using external trigger mode, see 2.7								
Capture mode	In real time mode, the internal UCD-2 device buffer memory is not used, it only stores one frame. the screen is updated with minimal delay but some frames might be lost due to limited USB2 band width. In the buffered mode, a sequence of frames is stored in the internal buffer memory and then transferred to the PC. There are no frame gaps in this sequence. There may be gaps between sequences.								
Lock Options	Adjust the needed delay period based on product specifications. For the configuration rules, follow the table below.								
	<table border="1"> <thead> <tr> <th>HTPDN:</th> <th>LOCKN</th> <th>LOCKN delay, us:</th> <th>Video valid delay, us:</th> </tr> </thead> <tbody> <tr> <td>0 = Normal operation (Default) 1 = HTPDn signal is forced low 2 = HTPDn signal is forced high</td> <td>0 = Normal operation (Default) 1 = LOCKn signal is forced low 2 = LOCKn signal is forced high 3= LOCKn signal is forced low, and stays low, after "LOCKN delay" time has elapsed. Timer starts after HTPDn goes low internally in normal operation. Setting of "HTPDN" value does not affect this timer.</td> <td>Timer value in micro seconds to "LOCKN" option 3. Default is 42000 us.</td> <td>Timer value in micro seconds after which valid video is received from source after LOCKn signal goes low. Setting "LOCKN" option 1 or 2 does not prevent timer operation. Default is 42000 us.</td> </tr> </tbody> </table>	HTPDN:	LOCKN	LOCKN delay, us:	Video valid delay, us:	0 = Normal operation (Default) 1 = HTPDn signal is forced low 2 = HTPDn signal is forced high	0 = Normal operation (Default) 1 = LOCKn signal is forced low 2 = LOCKn signal is forced high 3= LOCKn signal is forced low, and stays low, after "LOCKN delay" time has elapsed. Timer starts after HTPDn goes low internally in normal operation. Setting of "HTPDN" value does not affect this timer.	Timer value in micro seconds to "LOCKN" option 3. Default is 42000 us.	Timer value in micro seconds after which valid video is received from source after LOCKn signal goes low. Setting "LOCKN" option 1 or 2 does not prevent timer operation. Default is 42000 us.
HTPDN:	LOCKN	LOCKN delay, us:	Video valid delay, us:						
0 = Normal operation (Default) 1 = HTPDn signal is forced low 2 = HTPDn signal is forced high	0 = Normal operation (Default) 1 = LOCKn signal is forced low 2 = LOCKn signal is forced high 3= LOCKn signal is forced low, and stays low, after "LOCKN delay" time has elapsed. Timer starts after HTPDn goes low internally in normal operation. Setting of "HTPDN" value does not affect this timer.	Timer value in micro seconds to "LOCKN" option 3. Default is 42000 us.	Timer value in micro seconds after which valid video is received from source after LOCKn signal goes low. Setting "LOCKN" option 1 or 2 does not prevent timer operation. Default is 42000 us.						

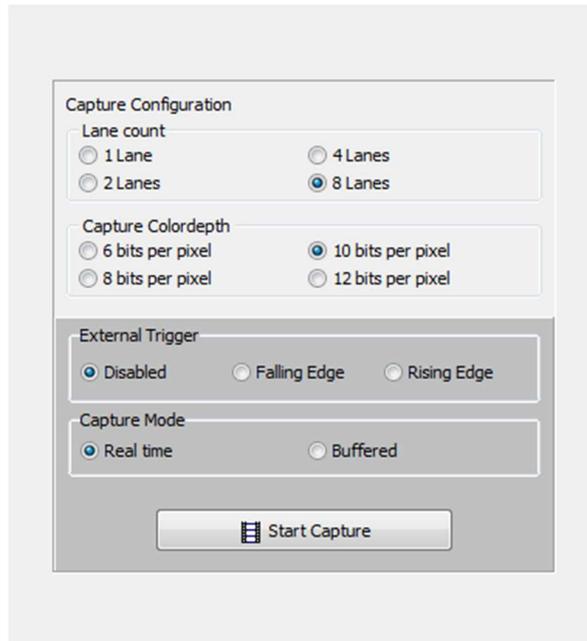
After selecting the settings you can start the acquisition by pressing ‘**Start Capture**’ button. You can return to the configuration window by selecting “**Stop Capture**” from the “**File**” option in the main menu. To return to the device selection window, select “**Close device**” from the “**File**” option in the main menu.

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When capture is in progress, single frame capture and frame-sequence capture features are available through the “**File**” option in the main menu. Captured frames are stored in files according to the settings in “**Tools**” → “**Options**” dialog described in chapter 3.5.

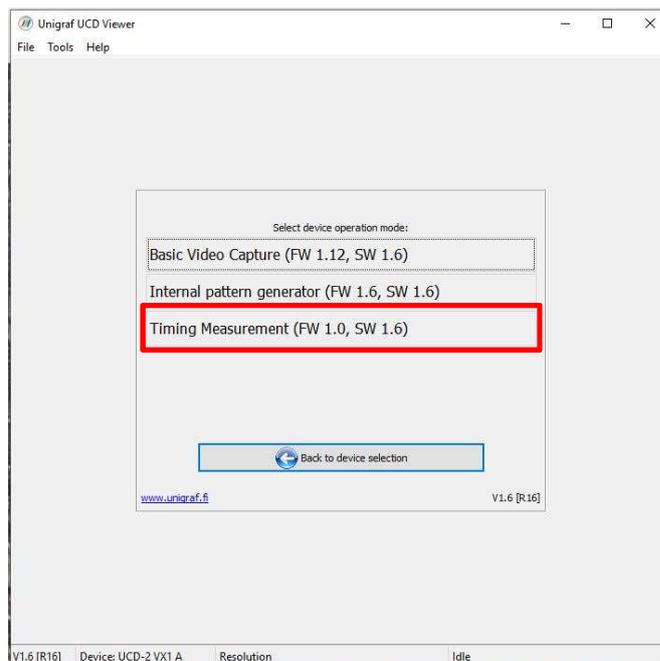
Internal pattern generator

Settings are similar to those described in Vx1 Basic Video Capture Configuration.



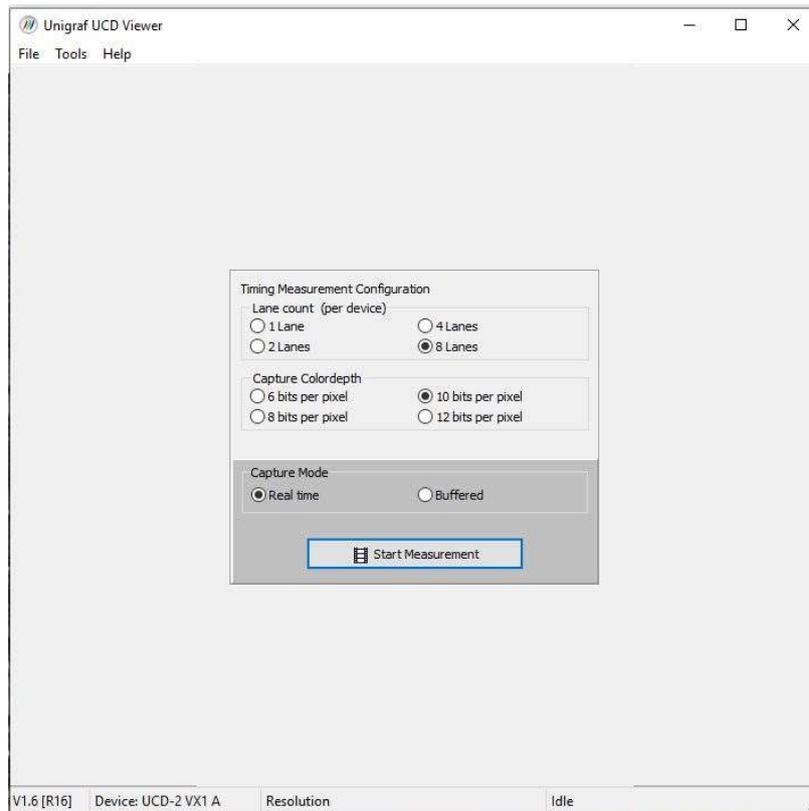
Timing Measurement

In device operation mode, select *Timing Measurement*.



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Settings are similar to those described in Vx1 Basic Video Capture Configuration.



UCD Viewer tabs

In *Time Measurement* mode UCD Viewer shows five tabs: Raw, Content, Frame, Clock, Time Stamp and General.

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Raw

Unigraf UCD Viewer

File Tools Help

Timing Measurement

General	Time Stamp	Clock	Frame	Content	Raw				
Tag	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	
0) TSTAMP	3691012	3691012	3691013	3691013	3690305	3690305	3690305	3690305	
1) FRAME_RATE	60,0039482597955	60,0039482597955	60,003912255079	60,0039482597955	60,004020269358	60,0040562742041	60,004020269358	60,004020269358	
2) FRAME_RATE_MIN	60,0039482597955	60,0039482597955	60,0039482597955	60,0039482597955	60,0040562742041	60,0040562742041	60,0040562742041	60,0040562742041	
3) FRAME_RATE_MAX	60,003912255079	60,003912255079	60,003912255079	60,003912255079	60,004020269358	60,004020269358	60,004020269358	60,004020269358	
4) VIDCLK_MINMAX	16,3; 16,2	16,3; 16,2	16,3; 16,2	16,3; 16,2	16,3; 16,2	16,3; 16,2	16,3; 16,2	16,3; 16,2	
5) VS_HIGH	2016	2016	2016	2016	2016	2016	2016	2016	
6) VS_HIGH_MIN	2016	2016	2016	2016	2016	2016	2016	2016	
7) VS_HIGH_MAX	2016	2016	2016	2016	2016	2016	2016	2016	
8) VS_LOW	268800	268800	268800	268800	268800	268800	268800	268800	
9) VS_LOW_MIN	268800	268800	268800	268800	268800	268800	268800	268800	
10) VS_LOW_MAX	268800	268800	268800	268800	268800	268800	268800	268800	
11) HS_HIGH	34	34	34	34	34	34	34	34	
12) HS_HIGH_MIN	34	34	34	34	34	34	34	34	
13) HS_HIGH_MAX	34	34	34	34	34	34	34	34	
14) HS_LOW	302	302	302	302	302	302	302	302	
15) HS_LOW_MIN	302	302	302	302	302	302	302	302	
16) HS_LOW_MAX	302	302	302	302	302	302	302	302	
17) DE_HIGH	256	256	256	256	256	256	256	256	
18) DE_HIGH_MIN	256	256	256	256	256	256	256	256	
19) DE_HIGH_MAX	256	256	256	256	256	256	256	256	
20) DE_LOW_HBLANK	80	80	80	80	80	80	80	80	
21) DE_LOW_HBLANK_MIN	80	80	80	80	80	80	80	80	
22) DE_LOW_HBLANK_MAX	80	80	80	80	80	80	80	80	
23) DE_LOW_VBLANK	12848	12848	12848	12848	12848	12848	12848	12848	
24) DE_LOW_VBLANK_MIN	12848	12848	12848	12848	12848	12848	12848	12848	
25) DE_LOW_VBLANK_MAX	12848	12848	12848	12848	12848	12848	12848	12848	
26) HTOTAL	336	336	336	336	336	336	336	336	
27) HTOTAL_MIN	336	336	336	336	336	336	336	336	
28) HTOTAL_MAX	336	336	336	336	336	336	336	336	
29) FRAME_TOTAL	270816	270816	270816	270816	270816	270816	270816	270816	
30) FRAME_TOTAL_MIN	270816	270816	270816	270816	270816	270816	270816	270816	
31) FRAME_TOTAL_MAX	270816	270816	270816	270816	270816	270816	270816	270816	
32) HBPORCH	40	40	40	40	40	40	40	40	
33) HBPORCH_MINMAX	40; 40	40; 40	40; 40	40; 40	40; 40	40; 40	40; 40	40; 40	

Pause

V1.6 [R16] Device: UCD-2 VX1 A N/A OK

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Content

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File Tools Help

Timing Measurement

General Time Stamp Clock Frame Content Raw

	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8
Red min, max	0, 0	0, 0	0, 0	0, 0	0, 4092	0, 4092	0, 4092	0, 4092
Green min, max	4092, 4092	4092, 4092	4092, 4092	4092, 4092	4, 4092	8, 4092	0, 4092	4, 4092
Blue min, max	0, 0	0, 0	0, 0	0, 0	0, 4092	0, 4092	0, 4092	0, 4092
CRC Red	0x24713772							
CRC Green	0x24713772							
CRC Blue	0x24713772							
CRC Count Red	0	0	0	0	0	0	0	0
CRC Count Green	0	0	0	0	0	0	0	0
CRC Count Blue	0	0	0	0	0	0	0	0
CRC Count Total	0	0	0	0	0	0	0	0
CRC Count Frames	20921	20921	20921	20921	20920	20920	20920	20920
Bit Activity RGB	0xFFC, 0x000 0x000	0xFFC, 0x000 0x000	0xFFC, 0x000 0x000	0xFFC, 0x000 0x000	0xFFC, 0xFFC 0xFFC	0xFFC, 0xFFC 0xFFC	0xFFC, 0xFFC 0xFFC	0xFFC, 0xFFC 0xFFC
Grabbed RGB	60 0 0	60 0 0	60 0 0	60 0 0	36 52 44	8 12 56	56 52 52	52 52 52

Pause

V1.6 [R16] Device: UCD-2 VX1 A N/A OK

Frame

Unigraf UCD Viewer

File Tools Help

Timing Measurement

General Time Stamp Clock Frame Content Raw

	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8
VS High (min, max)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)	2016 (2016, 2016)
VS Low (min, max)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)	268800 (268800, 268800)
HS High (min, max)	34 (34, 34)	34 (34, 34)	34 (34, 34)	34 (34, 34)	34 (34, 34)	34 (34, 34)	34 (34, 34)	34 (34, 34)
HS Low (min, max)	302 (302, 302)	302 (302, 302)	302 (302, 302)	302 (302, 302)	302 (302, 302)	302 (302, 302)	302 (302, 302)	302 (302, 302)
DE High (min, max)	256 (256, 256)	256 (256, 256)	256 (256, 256)	256 (256, 256)	256 (256, 256)	256 (256, 256)	256 (256, 256)	256 (256, 256)
DE Low HBlank (min, max)	80 (80, 80)	80 (80, 80)	80 (80, 80)	80 (80, 80)	80 (80, 80)	80 (80, 80)	80 (80, 80)	80 (80, 80)
DE Low VBlank (min, max)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)	12848 (12848, 12848)
HTotal (Calculated)	2688	2688	2688	2688	2688	2688	2688	2688
HActive (Calculated)	2048	2048	2048	2048	2048	2048	2048	2048
HBlank (Calculated)	640	640	640	640	640	640	640	640
VTotat (Calculated)	806	806	806	806	806	806	806	806
VBlank (Calculated)	38	38	38	38	38	38	38	38
VActive (Calculated)	768	768	768	768	768	768	768	768

Pause

V1.6 [R7012] Device: UCD-2 VX1 A N/A OK

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Clock

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File Tools Help

Timing Measurement

General Time Stamp **Clock** Frame Content Raw

	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8
HTOTAL_SYCLK	1666558 (1666557, 1666558)	1666558 (1666557, 1666558)	1666557 (1666557, 1666557)	1666557 (1666557, 1666557)	1666554 (1666554, 1666554)	1666555 (1666554, 1666555)	1666554 (1666554, 1666554)	1666555 (1666554, 1666555)

Pause

V1.6 [R16] Device: UCD-2 VX1 A N/A OK

Time Stamp

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File Tools Help

Timing Measurement

General Time Stamp **Clock** Frame Content Raw

	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8
CLK Error	False							
Input Error	False							
3D video	False							
3D left	False							
Packet timestamp	2151973	2153639	2153640	2153640	2154491	2152824	2152824	2152824

Pause

V1.6 [R16] Device: UCD-2 VX1 A N/A OK

General

Unigraf UCD Viewer

File Tools Help

Timing Measurement

General **Time Stamp** Clock Frame Content Raw

OK

Pause

V1.6 [R16] Device: UCD-2 VX1 A N/A OK

APPENDIX A. PRODUCT SPECIFICATION

UCD-2 Vx1

Power Requirement	
Supply voltage	+5VDC ±15%
Supply current	< 3A
Performance	
25MB/s	USB transfer, typical (root dependent)
8	Lanes
3.75Gb/s	V-by-One data rate / Lane
20MHz – 75MHz	Pixel clock / Lane @ 5 byte mode
20MHz – 85MHz	Pixel clock / Lane @ 4 byte mode
20MHz – 100MHz	Pixel clock / Lane @ 3 byte mode
Operating Environment	
Operation temperature	+10°C – +40°C
Storage temperature	+0°C – +60°C

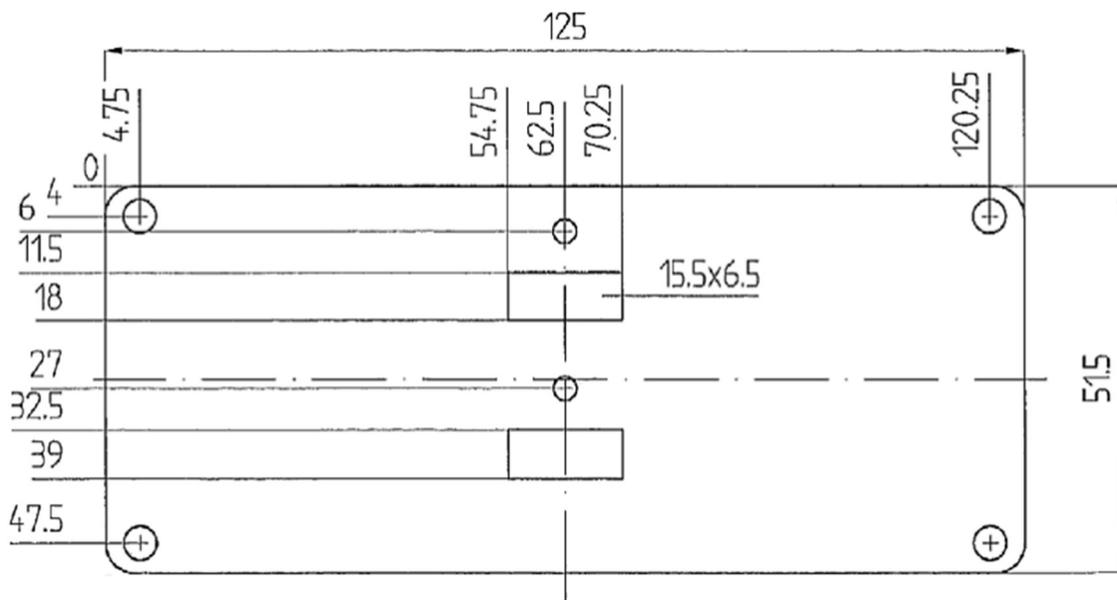
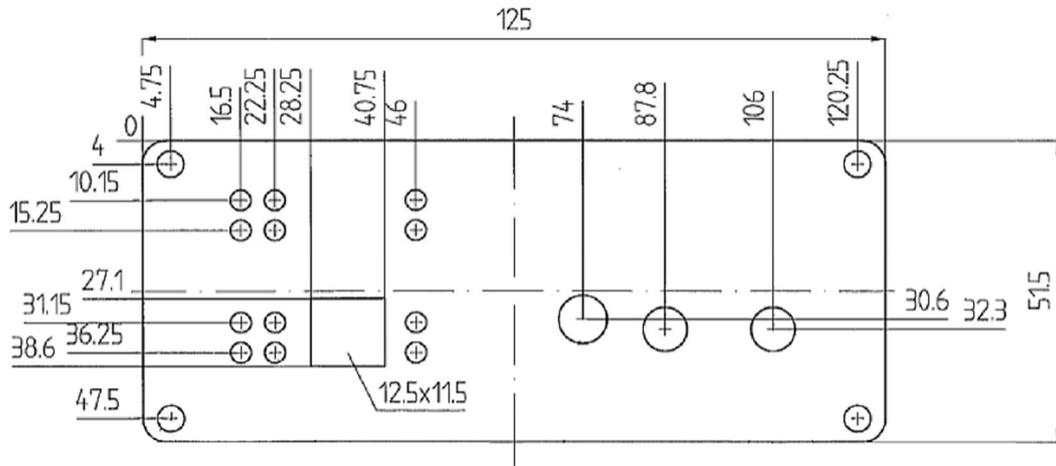
Frame Buffering		
256 Frames	16.77 MPixels	Memory / Lane
Buffering Examples		
Video Mode	Lanes	Buffered Frames
1920×1080 @ 60Hz	2	16
1920×1080 @ 60Hz	4	32
1920×1080 @ 240Hz	8	64
4096×2160 @ 60Hz	8	15
4096×2160 @ 120Hz	16 (chained)	30

All specifications are subject to change without notice.

APPENDIX C: PHYSICAL DIMENSIONS

All UCD devices have lightweight aluminum casing with plastic rims. All lengths are given in mm.

UCD-2 Vx1



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