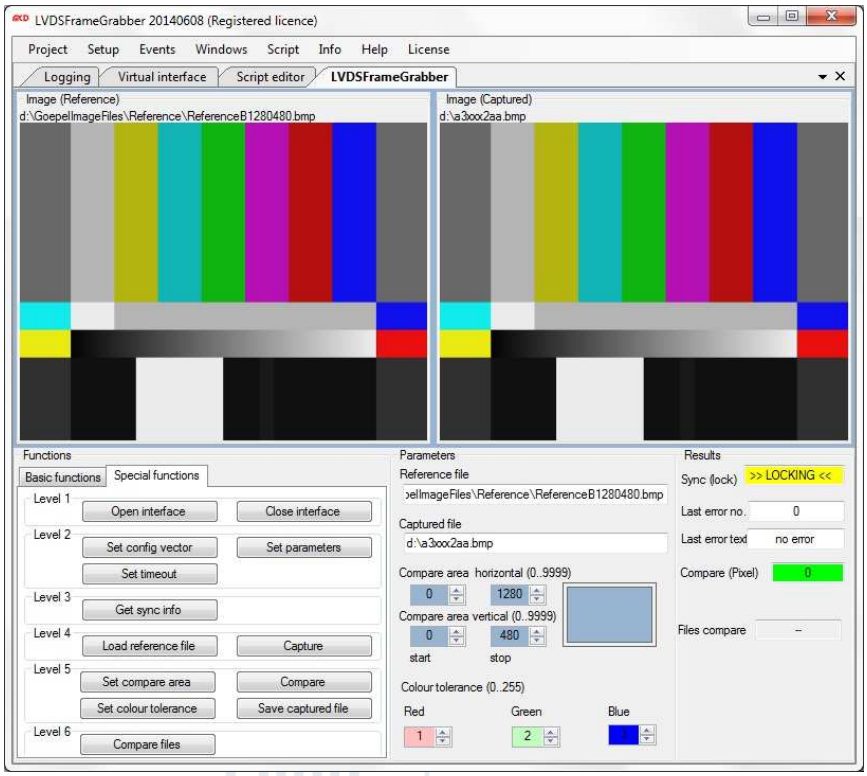
MCD ELEKTRONIK GMBH

Operating Instructions

LVDS Frame Grabber



Softline

Modline

Conline

Boardline

Avidline

Pixline

Application

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Messtechnologie bis ins Detail

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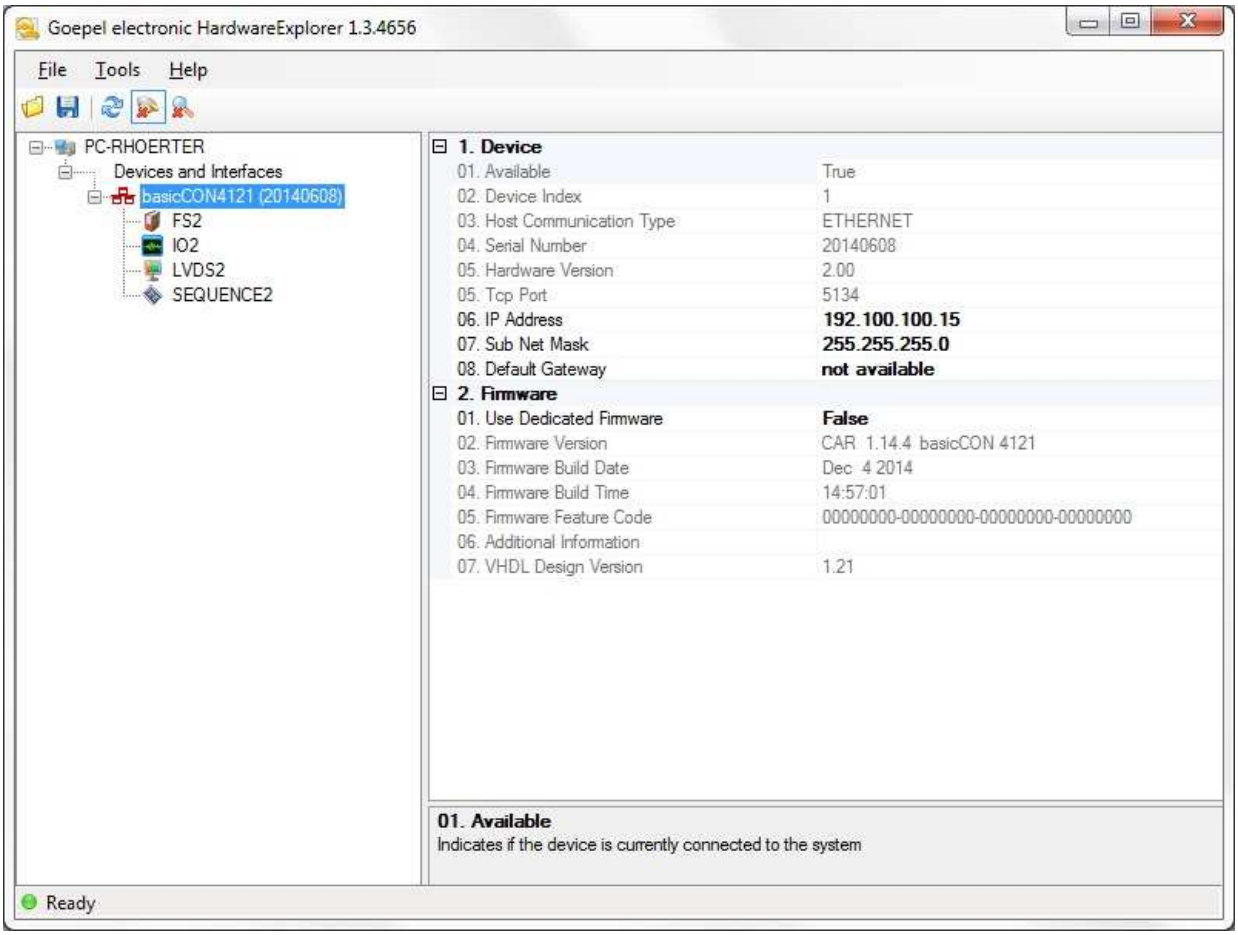
1. General Information

1.1. Frame Grabber

LVDS-Frame Grabber basicCON 4121 is a standalone device made by GÖPEL. The Grabber features an USB or Ethernet interface to connection to a PC. A supply voltage (8-25 Volt DC) via a power supply is required in addition. The grabber also offers an HDMI port for direct display of the stored frame.

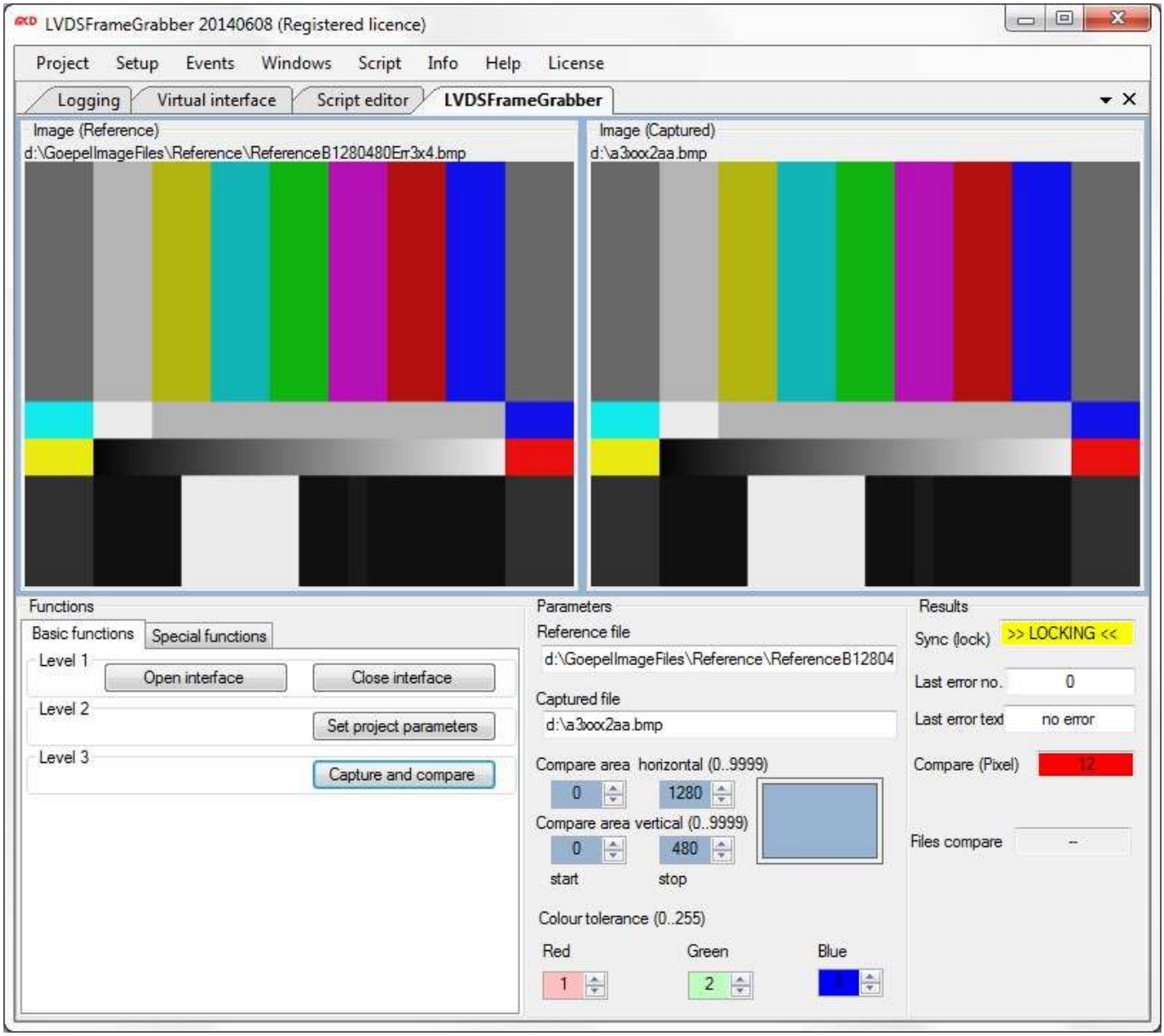
1.2. Features

- Driver installation (USB) and Hardware Explorer available from Göpel
- LEDs for indication the current operation conditions.
- Image data transmission to the display via LVDS standard.
- Metal housing


Goepel electronic HardwareExplorer 1.3.4656
File
Tools
Help
PC-RHOERTER
Devices and Interfaces
basicCON4121 (20140608)
FS2
IO2
LVDS2
SEQUENCE2
1. Device
01. Available True
02. Device Index 1
03. Host Communication Type ETHERNET
04. Serial Number 20140608
05. Hardware Version 2.00
05. Tcp Port 5134
06. IP Address 192.100.100.15
07. Sub Net Mask 255.255.255.0
08. Default Gateway not available
2. Firmware
01. Use Dedicated Firmware False
02. Firmware Version CAR 1.14.4 basicCON 4121
03. Firmware Build Date Dec 4 2014
04. Firmware Build Time 14:57:01
05. Firmware Feature Code 00000000-00000000-00000000-00000000
06. Additional Information
07. VHDL Design Version 1.21
01. Available
Indicates if the device is currently connected to the system
Ready

1.3. LVDSFrameGrabber

The MCD LVDSFrameGrabber monitor is used as user interface for MCD LVDS Frame Grabber.



MCD LVDS Frame Grabber

2. Software and Driver Installation

2.1. Requirements

Requirement:

- Windows (Windows XP – Windows 8.1, 32 or 64 bit)
- .Net – Framework 3.0

Copy the LVDSFrameGrabber.exe into a user-defined directory on the targets system to install the MCD LVDS Frame Grabber tool monitor.

2.2. License

To protect the software against unauthorized use, the tool monitor must be licensed after the installation.

For **demonstration and test purposes,** the tool monitor can be operated for **30 minutes** each without license. Some program functions are deactivated.

For **bridging the waiting time** until activation (e.g., on the weekend), a **temporary 24-h license** can be activated as well.

To activate the tool monitor, open the **License Administration** dialog via the **License -> Register** menu item.

Accessing the Registration dialog

1. The status of your current license is displayed in the **Current Licensing** dialog:

Accessing the license status

2. To request a **permanent license** for your software, proceed as follows:

- Select the Request **License** tab.
- Enter the **number** of required licenses (for your PC) into the **Number of Licenses** field.
- Click on the **Create Request File** button.
- Now, an additional window opens, asking you to **save the MCD Licenser Request file (*.mlr)**.
- Please save this file and **e-mail it to the following address:** info@mcd-elektronik.de
  Please add an order or project number to help us in finding you.
- Next, you will receive an e-mail from MCD Elektronik with your **license file (MCD License Key *.mlk)** attached.
- To complete licensing, **save** this file either under **C:\Windows**or in the directory, where your software executable (*.exe) was saved.
- After you **restart** your software, the **full scope of function** will be available to you.

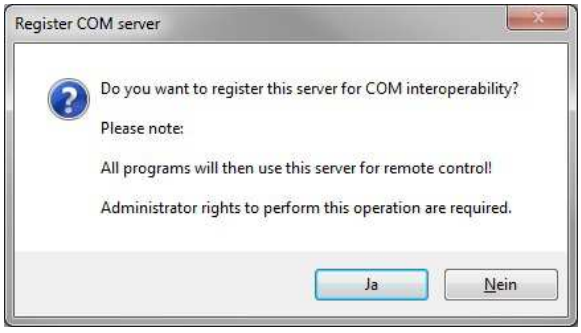
Requesting a permanent license

3. To activate a **temporary 24-h license**, select the **Temporary License** tab. Next, enter the **series of numbers from the left window into the right window**. If you cannot read the numbers, click on the **New Number** button to receive a new number. Once you enter the number correctly, you can activate the temporary license via the **Activate License** button. Please be advised that the temporary license expires as soon as you exit the software. However, you can **activate the temporary license as many times as you want.**

Requesting temporary license

2.3. Register COM-Server

Using this command, the tool manager can be registered as COM server. This is required, when the tool manager should be remote-controlled by a different program, such as the MCD TestManager.



Register COM-Server

3. Introduction into Operation

3.1. Brief Introduction

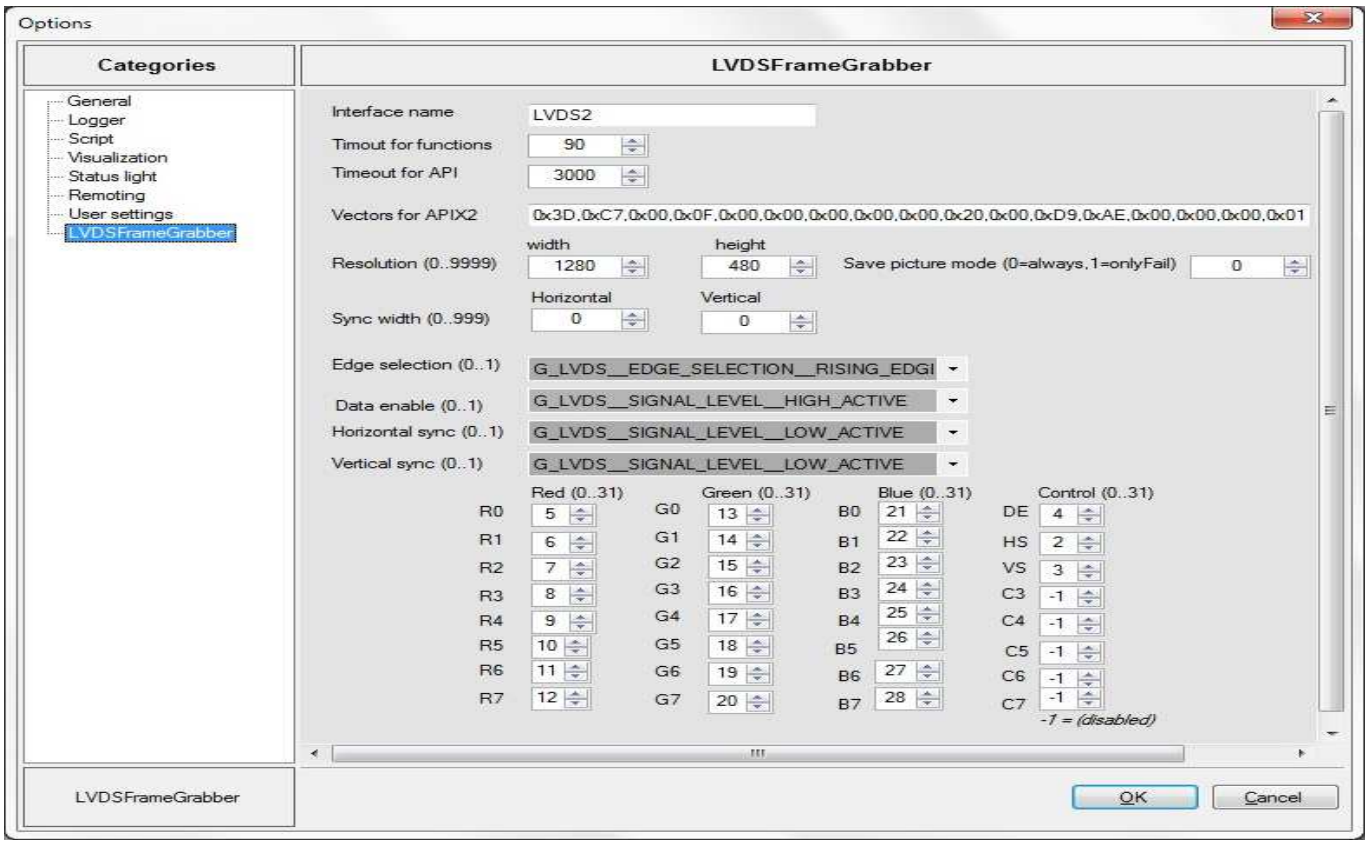
- **Adjustment of the Required Grabber Parameters**

The LVDS Frame Grabber basicCON 4121 and the corresponding software (driver) must be installed according to the installation instructions (CD) for the following brief introduction.

After successful installation, the required driver files can be found in the “Göpel” program directory and used in any Windows program.

The Grabber identifier can be configured using the Hardware Explorer by Göpel. A unique name must be assigned to the device.

The MCD software requires this name for defined access to the desired Göpel device. The respective name can be entered via the Options setup menu.

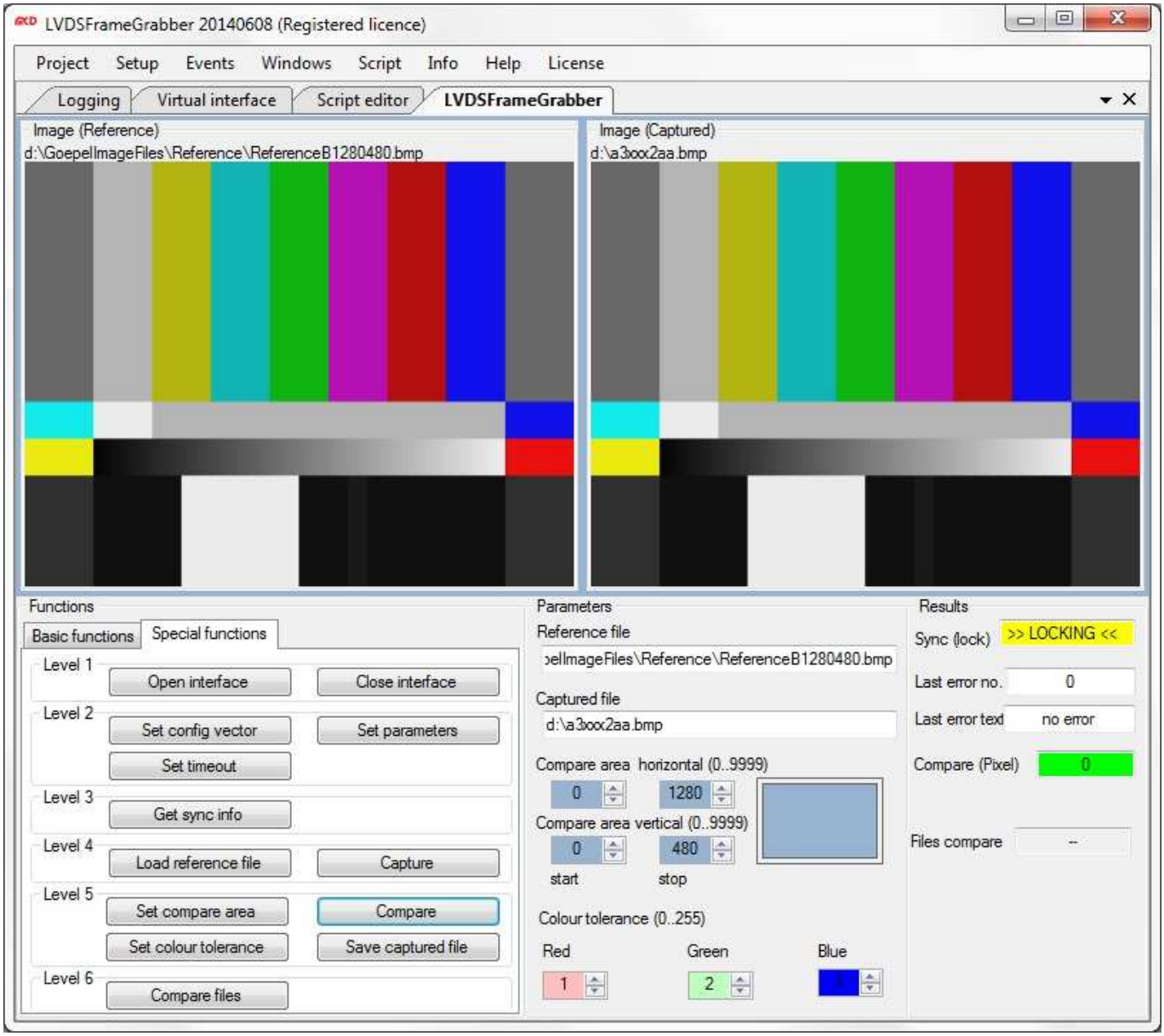


- **Preparation of the LVDS Frame Grabber Software**

- Interface name = Grabber device name. The names are set in the Hardware Explorer
- Timeout functions = Timeout time for internal function calls (script) Range: 0..1000 msec
- Timeout for API = Timeout time for calls in API of LVDS = Range: 0..10000 msec
- Vector for APIX2 = Initialization of the APIX vector Range: 35 parameters
- Resolution = Image size Range: 0..1920 pixels

- Save Picture Mode = Saving the image during CaptureAndCompare Range: 0=always 1=in the event of an error
- Sync Width = Synchronization (horizontal/vertical) Range: 0..1920
- Edge Selection = Synchronization (edge) Range: 0..1 (low/high)
- Data Enable = Synchronization Range: 0..1 (low/high)
- Horizontal Sync = Horizontal synchronization Range: 0..1 (low/high)
- Vertical Sync = Vertical synchronization Range: 0..1 (low/high)
- Signal Routing
- R (0..7) = Signal routing red Range: 1..31
- G (0..7) = Signal routing green Range: 1..31
- B (0..7) = Signal routing blue Range: 1..31 (-1=disabled)

Operating the LVDS Frame Grabber



Open Interface = Initialization of the USB/Ethernet connection with LVDS Grabber

Close Interface = Closing the USB/Ethernet connection with LVDS Grabber

Load File = Loading the file with the given name (Filename) and index (Filenumber)

Set Config Vector = Loading the current APIX-vector (Setup) for Grabber

Set Timeout = Setting the timeout for communication with LVDS Grabber [ms]

Set Parameters = Setting all routing parameters (Setup) in Grabber

Get Sync Info = Determination of the current LVDS signal status

Load reference file = Loading the file from parameter (Reference file) into Grabber

Capture = Saving the current image into the internal memory of Grabber

Compare = Comparing the reference file with the current image in the Grabber memory

Save Captured file = Saving the current image from the memory into a file (Captured filename)

Set Compare area = Setting the comparison area in the image

Set colour tolerance = Setting the color tolerance for the image comparison

Compare files = Additional comparison of the reference file with the captured file at the file level (RGB)

Basic functions

Set project parameters = Set timeout, vector, and signal routing parameters

Capture and Compare =Set commands and save image in the event of an error

Color tolerance for compare

0=No tolerance of the RGB color value. A deviation of 0 color levels is permitted

255=Maximum tolerance of the RGB color value. A deviation of 255 color levels is permitted

Select area for the compare mask in the saved image

Horizontal Start: Horizontal start value for the compare window Range: 0..1920

Horizontal End: Horizontal end value for the compare window Range: 0..1920

Vertical Start: Vertical start value for the compare window Range: 0..1920

Vertical End: Vertical end value for the compare window Range: 0..1920

Reference file

File with the desired reference image for the later comparison.

Captured file

File name and path for saving the image available from the Capture Buffer.

Sync

Signal status on the LVDS line.

No Lock = No locking present

LOCKED = Locking present

Last Error No

Last error that occurred. (0= No error)

Compare

Pixel differences between reference file and currently available image from the Capture command.

Files compare (optional)

Pixel differences between reference file and currently available file from Dave Captured File.

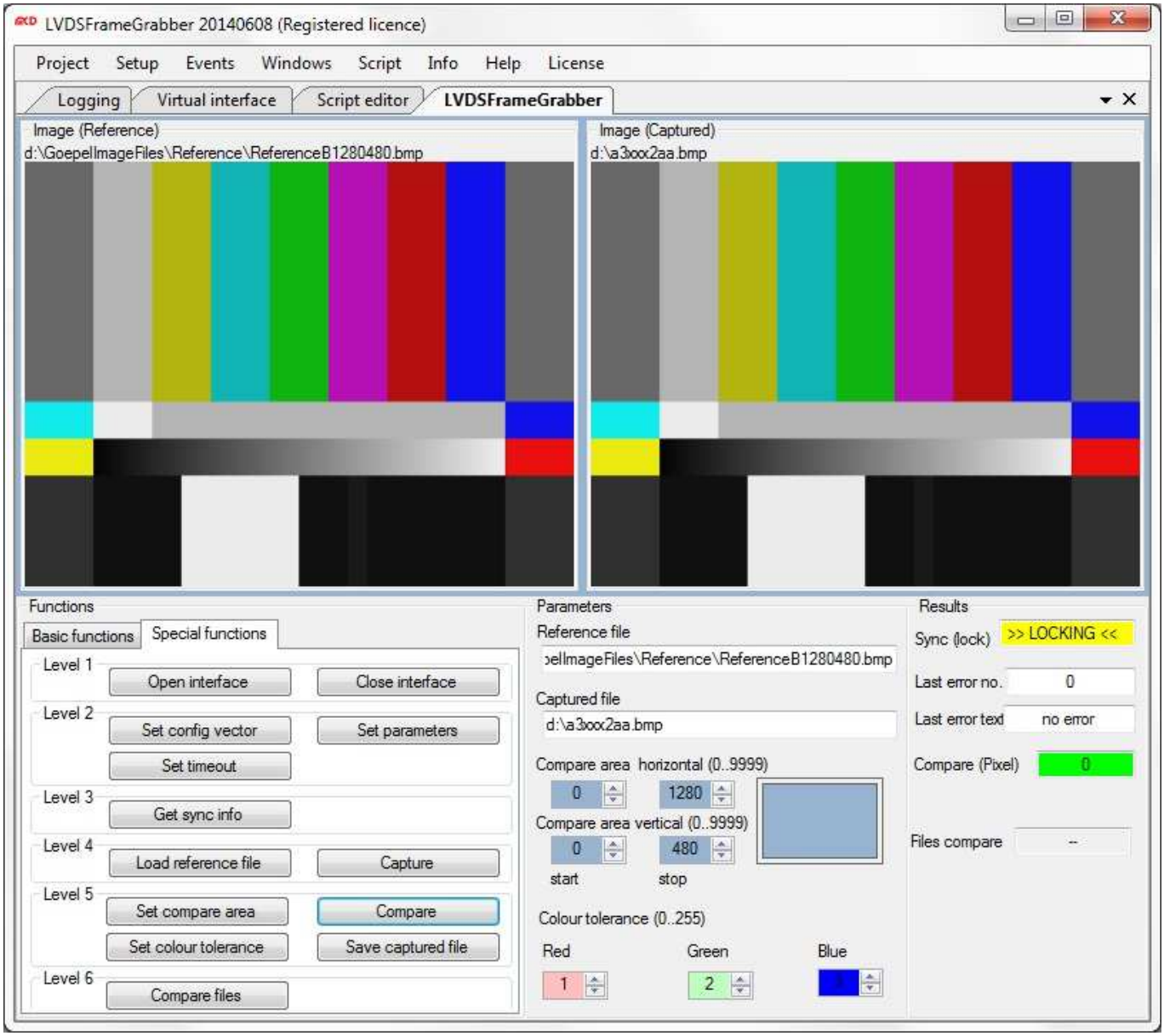
4. Software Manual

4.1. General Information

The main areas of this documentation are “Functions” and “Programming”. The descriptions of the individual software modules are available under “Functions”. The interfaces for the software user are listed in tabular form under “Programming”. The functions for tool monitor access are documented in the interface. The applicable handover parameters for these functions are provided in the respective modules.

4.2. LVDS Frame Grabber

The connected LVDSGrabber(4121) can be controlled using "LVDSGrabber". Depending on the name assigned in the setup, the designations can deviate from “LVDS1”. They can be replaced with user-defined designations. The designation can be changed using the Hardware Explorer (Göpel) software tool. The visualization of the connected LVDS frame can be called up via Windows. One LVDS-Frame-Grabber only can be operated at system at the same time.



- Open Interface = Initialization of the USB/Ethernet connection with LVDS Grabber
- Close Interface = Closing the USB/Ethernet connection with LVDS Grabber
- Load File = Loading the file with the given name (Filename) and index (Filenumber)
- Set Config Vector = Loading the current APIX-vector (Setup) for Grabber
- Set Timeout = Setting the timeout for communication with LVDS Grabber [ms]

- Set Parameters = Setting all routing parameters (Setup) in Grabber
- Get Sync Info = Determination of the current LVDS signal status
- Load reference file = Loading the file from parameter (Reference file) into Grabber
- Capture = Saving the current image into the internal memory of Grabber
- Compare = Comparing the reference file with the current image in the Grabber memory
- Save Captured file = Saving the current image from the memory into a file (Captured filename)
- Set Compare area = Setting the comparison area in the image
- Set colour tolerance = Setting the color tolerance for the image comparison
- Compare files = Additional comparison of the reference file with the captured file at the file level (RGB)

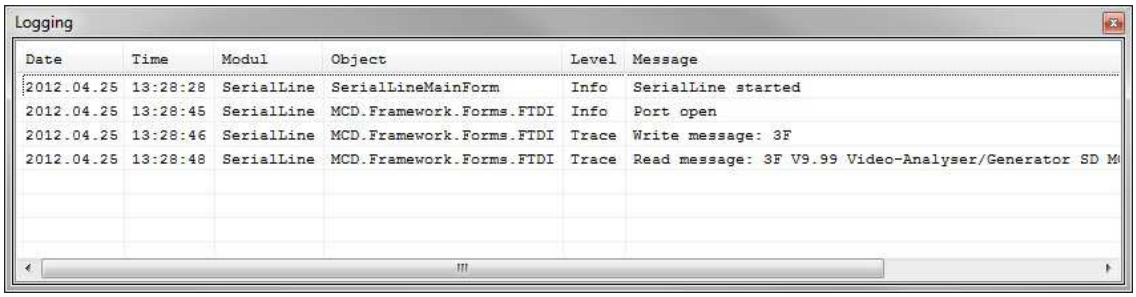
4.3. Events

Here, the views for the log and trace messages can be accessed.

Events menu

Logging

Using this menu, the log messages view for general events, warnings, errors, etc. is called up.



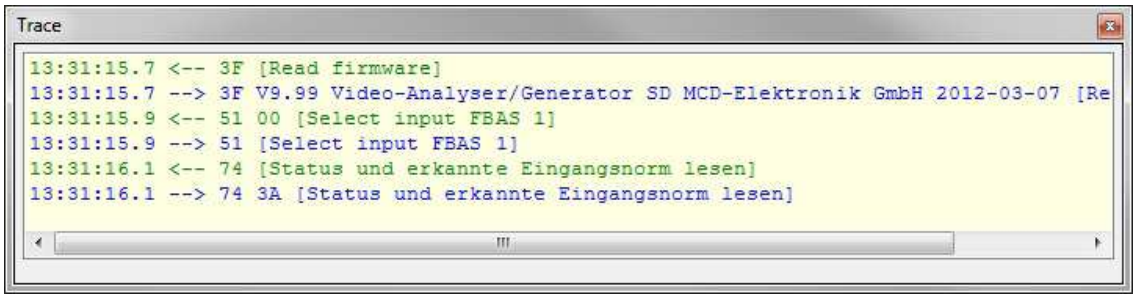
Logging

Date	Time	Modul	Object	Level	Message
2012.04.25	13:28:28	SerialLine	SerialLineMainForm	Info	SerialLine started
2012.04.25	13:28:45	SerialLine	MCD.Framework.Forms.FTDI	Info	Port open
2012.04.25	13:28:46	SerialLine	MCD.Framework.Forms.FTDI	Trace	Write message: 3F
2012.04.25	13:28:48	SerialLine	MCD.Framework.Forms.FTDI	Trace	Read message: 3F V9.99 Video-Analyser/Generator SD M

Log Monitor

Trace

Using this menu, the trace messages view (sent and received messages) is called up.



Trace

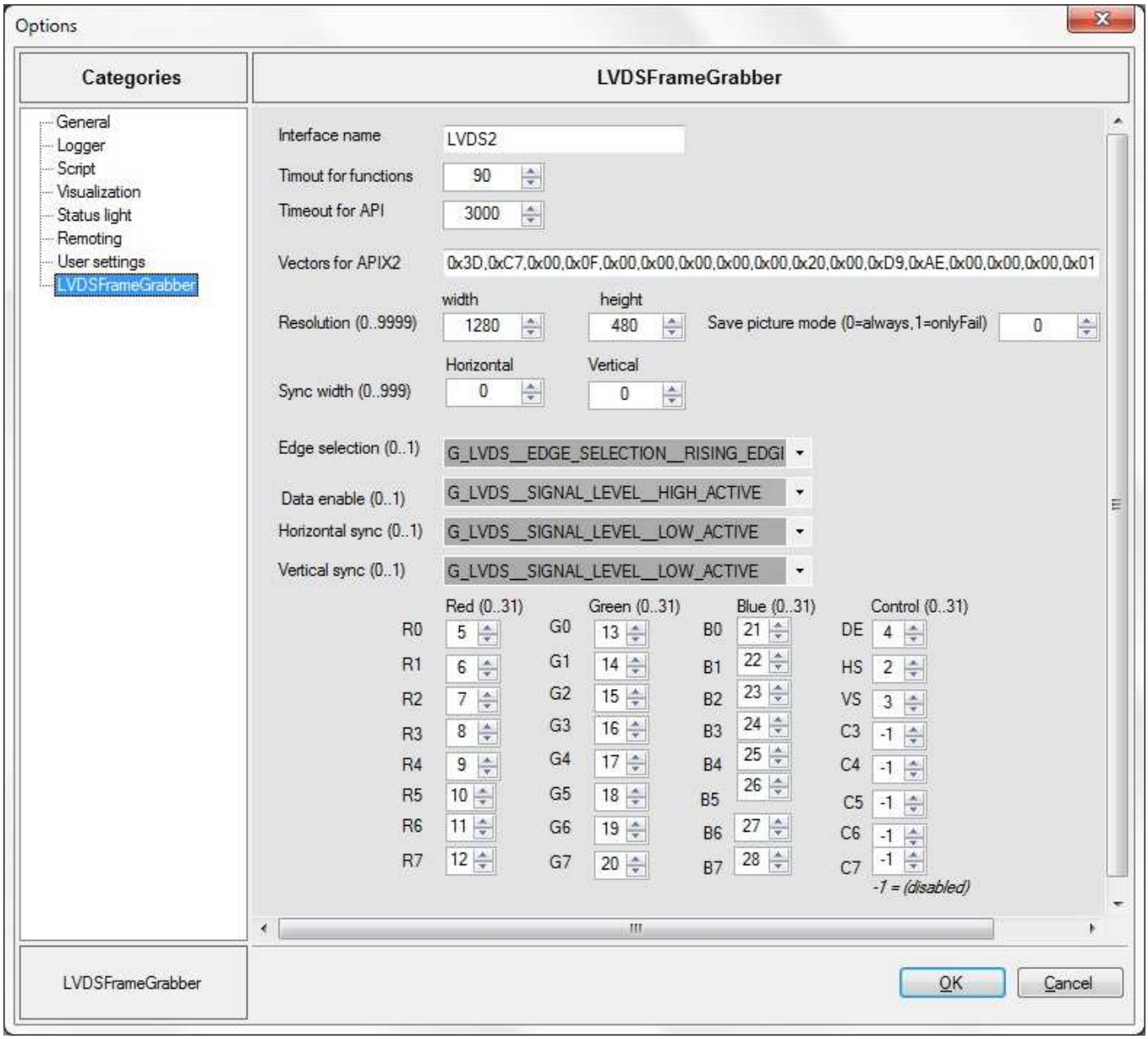
```
13:31:15.7 <-- 3F [Read firmware]
13:31:15.7 --> 3F V9.99 Video-Analyser/Generator SD MCD-Elektronik GmbH 2012-03-07 [Re
13:31:15.9 <-- 51 00 [Select input FBAS 1]
13:31:15.9 --> 51 [Select input FBAS 1]
13:31:16.1 <-- 74 [Status und erkannte Eingangsnorm lesen]
13:31:16.1 --> 74 3A [Status und erkannte Eingangsnorm lesen]
```

Trace

4.4. Setup

A name can be assigned for every LVDS generator here. This name is also used in visualization and when controlling via the virtual interface.

The values adjusted in the setup can only be applied after the tool monitor was started.



LVDSGrabber Options

Options

- Interface name = Grabber device name. The names are set in Hardware Explorer
- Timeout functions = Timeout time for internal function calls (script) Range: 0..1000 ms
- Timeout for API = Timeout time for calls in API of LVDS = Range: 0..10000 ms

- Vector for APIX2 = Initialization of the APIX vector Range: 35 parameters
- Resolution = Image size Range: 0..1920 pixels
- Save Picture Mode = Saving the image during CaptureAndCompare Range: 0=always 1=in the event of an error
- Sync Width = Synchronization (horizontal/vertical) Range: 0..1920
- Edge Selection = Synchronization (edge) Range: 0..1 (low/high)
- Data Enable = Synchronization Range: 0..1 (low/high)
- Horizontal Sync = Horizontal synchronization Range: 0..1 (low/high)
- Vertical Sync = Vertical synchronization Range: 0..1 (low/high)
- Signal Routing
- R (0..7) = Signal routing red Range: 1..31
- G (0..7) = Signal routing green Range: 1..31
- B (0..7) = Signal routing blue Range: 1..31 (-1=disabled)

4.5. Programming

4.5.1. Control Events

Event names for interface reset and deletion of all loaded files.

Reset = Using this Event name, the interface is newly initialized.

Example:

```
SetEvent("OpenInterface");
SetEvent("CloseInterface");
```

Enumerated values:

Capture	Capture of the LVDS Interface.
OpenInterface	Opening the LVDS Interface.
CloseInterface	Closing the LVDS Interface.

4.5.2. LVDS Frame Grabber Properties

Names for setting the Grabber parameters.

The LVDS Grabber parameters can be set using these names.
For this purpose, the desired name of the Enum entry is handed over with the identifier to the SetValue() Grabber function as string.

Example:

```
 //Event for opening and closing the interface
 SetEvent("LVDSFrameGrabber.OpenInterface", "");
 SetEvent("LVDSFrameGrabber.CloseInterface", "");

 //Event for Start Capturing
 SetEvent("LVDSFrameGrabber.Capture", "");

 //Parameters for Timeout time API
 SetValue("LVDSFrameGrabber.ResponseTimeout", "1200");          // 0..10000

 //Parameters for APIX2 vector initialization (maximum 35 hex numbers)
 SetValue("LVDSFrameGrabber.ConfigureDeserializerVector", "0x0F,0x3F,0x01,0x00");

 //Parameters for signal routing   (-1=inactive in the menu, 255=inactive in the
script)
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR0", "5");   // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR1", "6");   // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR2", "7");   // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR3", "8");   // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR4", "9");   // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR5", "10");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR6", "11");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursR7", "12");  // 0..31,255

 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG0", "13");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG1", "14");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG2", "15");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG3", "16");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG4", "17");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG5", "18");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG6", "19");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursG7", "20");  // 0..31,255

 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB0", "21");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB1", "22");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB2", "23");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB3", "24");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB4", "25");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB5", "26");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB6", "27");  // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingColoursB7", "28");  // 0..31,255

 SetValue("LVDSFrameGrabber.ParametersRoutingControlDE",     "4"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlHSync", "2"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlVSync", "3"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlC3",  "255"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlC4",  "255"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlC5",  "255"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlC6",  "255"); // 0..31,255
 SetValue("LVDSFrameGrabber.ParametersRoutingControlC7",  "255"); // 0..31,255

 //Parameters for Sync
 SetValue("LVDSFrameGrabber.ParametersResolutionWidth",    "1280");// 0..1920
 SetValue("LVDSFrameGrabber.ParametersResolutionHeight",   "480"); // 0..1920
```

```
 SetValue("LVDSFrameGrabber.ParametersSyncWidthVertical",  "0");   // 0..1920
 SetValue("LVDSFrameGrabber.ParametersSyncWidthHorizontal","0");   // 0..1920

 SetValue("LVDSFrameGrabber.ParametersEdgeSelectionClock", "1");   // 0..1
 SetValue("LVDSFrameGrabber.ParametersSignalLevelsDE",     "1");   // 0..1
 SetValue("LVDSFrameGrabber.ParametersSignalLevelsHSync",  "0");   // 0..1
 SetValue("LVDSFrameGrabber.ParametersSignalLevelsVSync",  "0");   // 0..1

 //Loading the reference as bitmap file
 SetValue("LVDSFrameGrabber.ReferenceFromFile", "d:\\Reference.bmp");

 //Determining Grabber locking (1=Locking, 0=NO Locking)
 GetValue("LVDSFrameGrabber.SyncInfo");                            // 0..1

 //Setting the area for the Compare mask
 SetValue("LVDSFrameGrabber.CompareAreaHorizontalStart",   "0");     // 0..1920
 SetValue("LVDSFrameGrabber.CompareAreaHorizontalEnd",   "1280");    // 0..1920
 SetValue("LVDSFrameGrabber.CompareAreaVerticalStart",     "0");     // 0..1920
 SetValue("LVDSFrameGrabber.CompareAreaVerticalEnd",     "480");     // 0..1920

 //Setting the color tolerance for Compare (0=No tolerance, 255=Maximum)
 SetValue("LVDSFrameGrabber.ColourToleranceRed",           "0");     // 0..255
 SetValue("LVDSFrameGrabber.ColourToleranceGreen",         "0");     // 0..255
 SetValue("LVDSFrameGrabber.ColourToleranceBlue",          "0");     // 0..255


 //Comparing the images from Capture and reference
 GetValue("LVDSFrameGrabber.Compare");                             // 0=OK,>0=Pixel

 //Saving the images from Capture as file
 SetValue("LVDSFrameGrabber.CapturedFrameToFile","d:\\File001.bmp"); // 0=OK

 //Comparing the images from file and reference file
 GetValue("LVDSFrameGrabber.CompareFiles");                        // 0=OK,>0=Pixel

 //Setting the timeout, vector, and signal routing parameters
 GetValue("LVDSFrameGrabber.SetProjectParameters");                //
0=OK,!=0:Error

 //Setting the Capture and Compare command and saving the image (fail)
 GetValue("LVDSFrameGrabber.CaptureAndCompare");                   //
0:OK,>0:Pixel,
```

Enumerated values:

ParametersRoutingColoursR0	Routing Colors R0 Range: 0..31,255.
ParametersRoutingColoursR1	Routing Colors R1 Range: 0..31,255.
ParametersRoutingColoursR2	Routing Colors R2 Range: 0..31,255.
ParametersRoutingColoursR3	Routing Colors R3 Range: 0..31,255.
ParametersRoutingColoursR4	Routing Colors R4 Range: 0..31,255.
ParametersRoutingColoursR5	Routing Colors R5 Range: 0..31,255.
ParametersRoutingColoursR6	Routing Colors R6 Range: 0..31,255.
ParametersRoutingColoursR7	Routing Colors R7 Range: 0..31,255.

ParametersRoutingColoursG0	Routing Colors G0 Range: 0..31,255.
ParametersRoutingColoursG1	Routing Colors G1 Range: 0..31,255.
ParametersRoutingColoursG2	Routing Colors G2 Range: 0..31,255.
ParametersRoutingColoursG3	Routing Colors G3 Range: 0..31,255.
ParametersRoutingColoursG4	Routing Colors G4 Range: 0..31,255.
ParametersRoutingColoursG5	Routing Colors G5 Range: 0..31,255.
ParametersRoutingColoursG6	Routing Colors G6 Range: 0..31,255.
ParametersRoutingColoursG7	Routing Colors G7 Range: 0..31,255.
ParametersRoutingColoursB0	Routing Colors B0 Range: 0..31,255.
ParametersRoutingColoursB1	Routing Colors B1 Range: 0..31,255.
ParametersRoutingColoursB2	Routing Colors B2 Range: 0..31,255.
ParametersRoutingColoursB3	Routing Colors B3 Range: 0..31,255.
ParametersRoutingColoursB4	Routing Colors B4 Range: 0..31,255.
ParametersRoutingColoursB5	Routing Colors B5 Range: 0..31,255.
ParametersRoutingColoursB6	Routing Colors B6 Range: 0..31,255.
ParametersRoutingColoursB7	Routing Colors B7 Range: 0..31,255.
ParametersRoutingControlDE	Routing Control DataEnable Range: 0..31,255.
ParametersRoutingControlHSync	Routing Control H-Sync Range: 0..31,255.
ParametersRoutingControlVSync	Routing Control V-Sync Range: 0..31,255.
ParametersRoutingControlC3	Routing Control Control C3 Range: 0..31,255.
ParametersRoutingControlC4	Routing Control Control C4 Range: 0..31,255.
ParametersRoutingControlC5	Routing Control Control C5 Range: 0..31,255.
ParametersRoutingControlC6	Routing Control Control C6 Range: 0..31,255.
ParametersRoutingControlC7	Routing Control Control C7 Range: 0..31,255.
ParametersResolutionWidth	Resolution Width Range: 0..1920.
ParametersResolutionHeight	Resolution Height Range: 0..1920.
ParametersSyncWidthVertical	Syncwidth Vertical Range: 0..1920.

ParametersSyncWidthHorizontal	Syncwidth Horizontal Range: 0..1920.
ParametersEdgeSelectionClock	EdgeSelection Clock Range: 0..1.
ParametersSignalLevelsDE	SignalLevels DataEnable Range: 0..1.
ParametersSignalLevelsHSync	SignalLevels Horizontal Sync Range: 0..1.
ParametersSignalLevelsVSync	SignalLevels Vertical Sync Range: 0..1.
ConfigureDeserializerVector	Configure Deserializer Vector Range: 0..0.
ReferenceFromFile	File name for the reference file Range: ".bmp".
ResponseTimeout	Timeout for communication (ms) Range: 0..n.
LastResult	Error status Range: 0..n.
SyncInfo	Sync available? Range: 0..1.
Compare	Call Compare and result Range: 0..n.
CompareFiles	Call Compare files, result Range: 0..n.
CapturedFrameToFile	CapturedFrame as file Range: ".bmp".
CompareAreaHorizontalStart	CompareArea Horizontal Startpos.Range: 0..1920.
CompareAreaHorizontalEnd	CompareArea Horizontal Endpos Range: 0..1920.
CompareAreaVerticalStart	CompareArea Vertical Startpos. Range: 0..1920.
CompareAreaVerticalEnd	CompareArea Vertical Endpos. Range: 0..1920.
ColourToleranceRed	Color Tolerance Red Range: 0..255.
ColourToleranceGreen	Color Tolerance Green Range: 0..255.
ColourToleranceBlue	Color Tolerance Blue Range: 0..255.
SetProjectParameters	SetProjectParameters Range: -n..0..n.
CaptureAndCompare	CaptureAndCompare Range: -n..0..n.