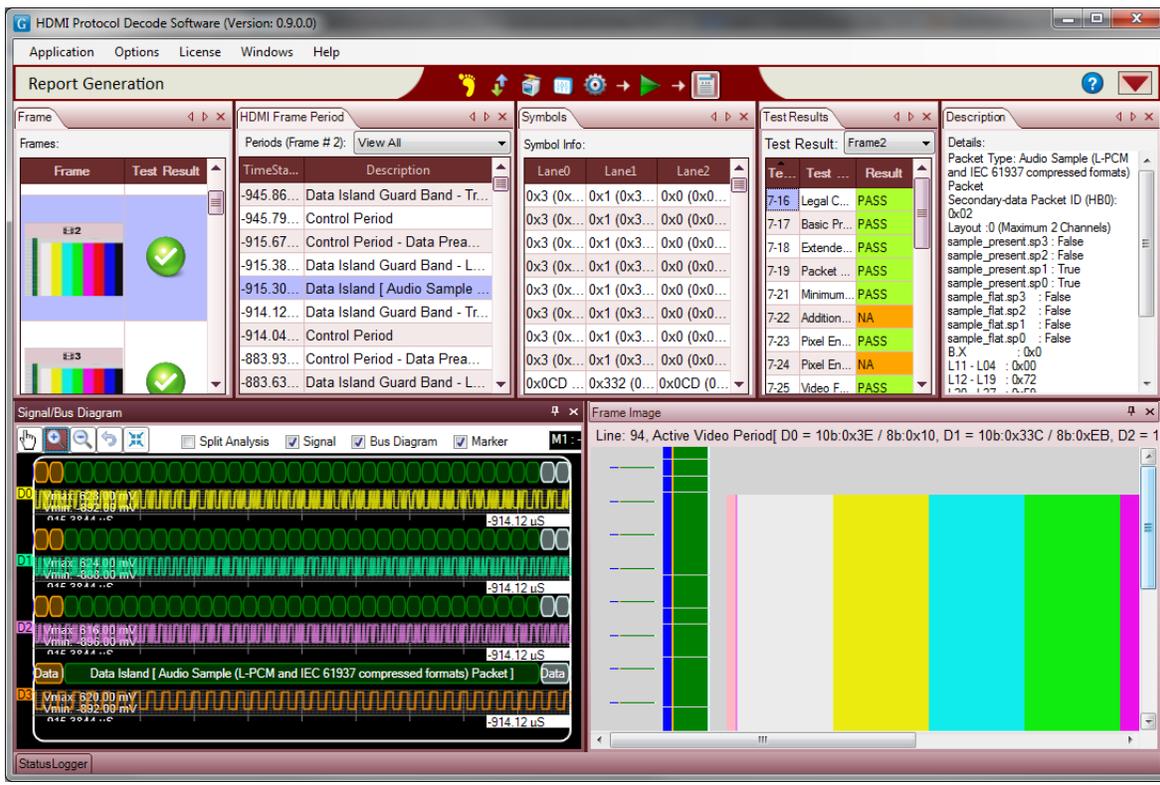


# GRL HDMI 1.4/2.0 Protocol Compliance and Decode Software GRL-HDMI-DEC

## Installation and Quick Start Guide



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## 1. Introduction

This Installation and Quick Start Guide provides procedures for installing, configuring, and verifying the operation of the GRL HDMI 1.4/2.0 Protocol Decode Software. It also will help you familiarize yourself with the basic operation of the analyzer.

## 2. Pre-requisite

Following are pre-requisites for using the software:

1. Agilent Technologies 90000 X-Series, 9000, 90000, or 90000Q Series model oscilloscope
2. Agilent IO software (Pre-installed on the Oscilloscope)
3. Microsoft .NET 4.5 (If not available, please download and install from [www.microsoft.com](http://www.microsoft.com) )
4. Differential probes and probe heads
5. Keyboard and Mouse

## 3. Installing the software

Download the latest software from [www.graniteriverlabs.com](http://www.graniteriverlabs.com). If you have received a product CD carefully open the CD and note the media serial number printed on the CD; you may require this information to obtain the activation key for this software.

Locate the installer file named “GRL Automated Test Solutions - Installer.exe”. Open the application by double clicking the installer file. The install wizard will install the software

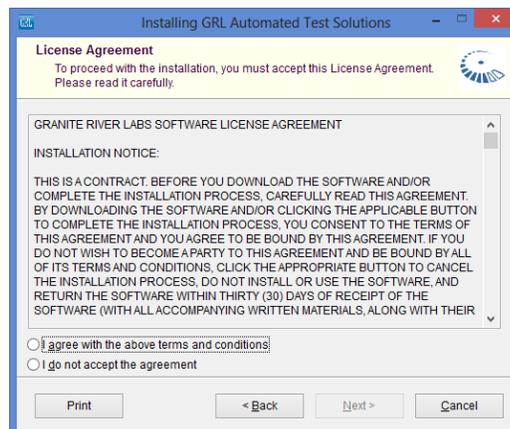
Install the software as follows

Step 1: Double click Installer.exe.

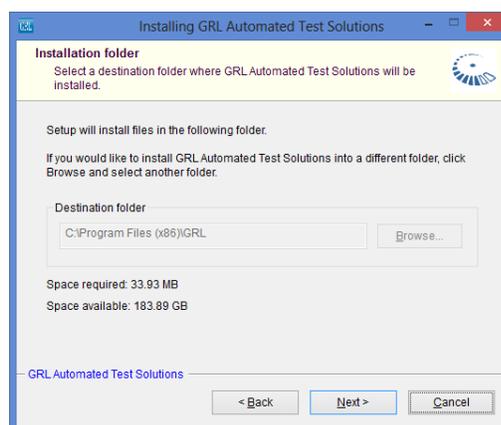
Step 2: Click “Next” in the welcome screen



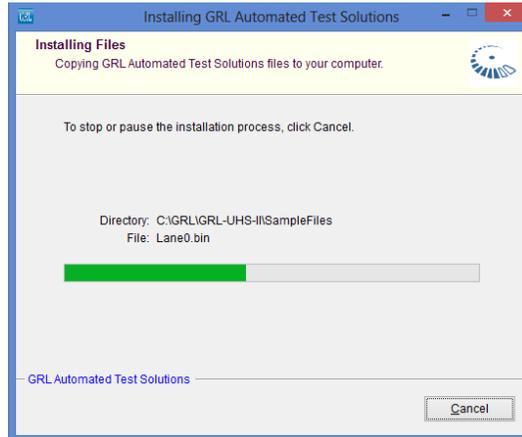
Step 3: Read and agree the license agreement and click “Next”



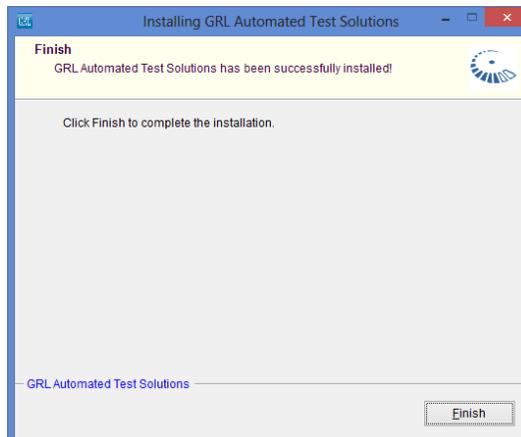
Step 4: Review the install folders and click “Next”



Step 5: Click “Install” and the Install wizard installs all required files.



Step 6: Click “Finish” to complete the installation

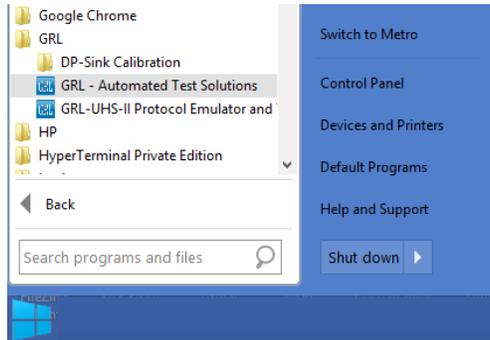


## 4. Running the Software

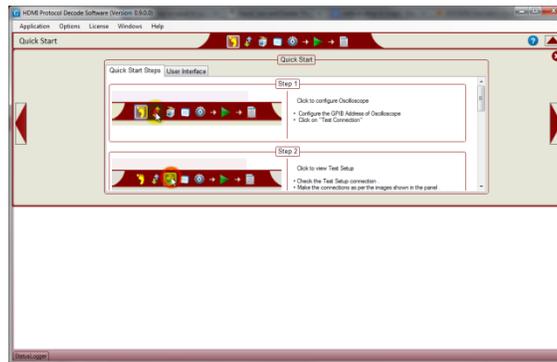
The software installer automatically creates short cuts in the Desktop and Start Menu.

To open the application follow the below procedure:

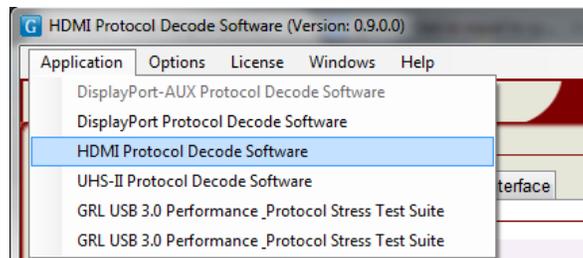
Step 1: Navigate to Start Menu > All Programs > GRL > GRL Automated Test Solutions



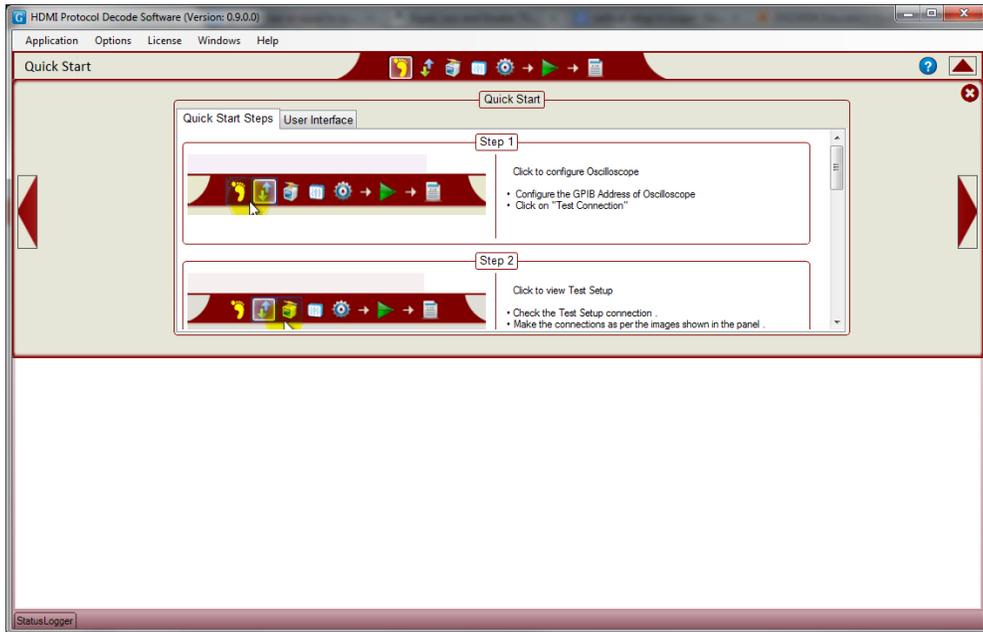
Step 2: Click “GRL- Automated Test Solutions” to open the application.



Step 3: Click the Application Menu, and open “HDMI Protocol Decode Software”

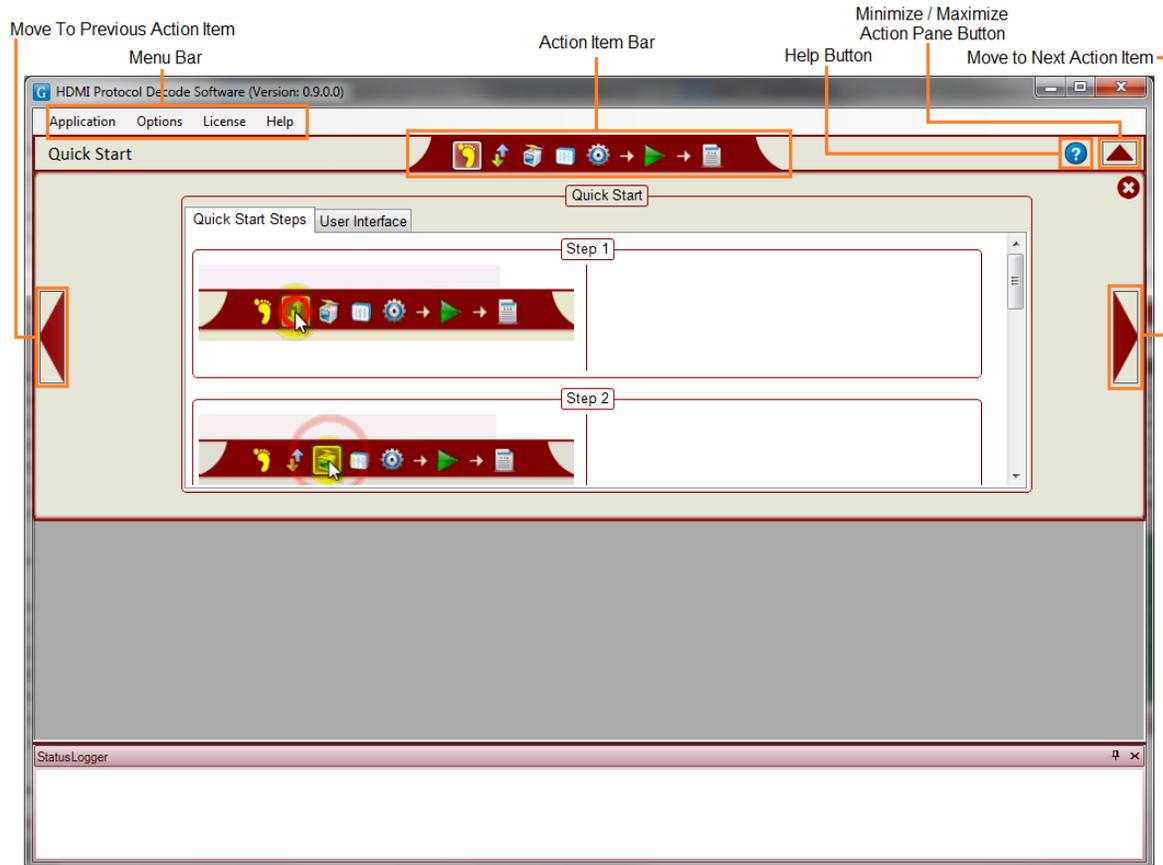


Step 4: HDMI Protocol Decode Application is ready to use.



## 5. Introduction to Software User Interface

The software user interface includes a Menu, Action Item Bar, and Action Window as shown in the below image. The Action Window changes according to the selection of Action Item Bar.



The Action Item Bar provides access to all functionalities of the software. When an action item is selected, the Action Window is loaded with the Action Item. You can navigate to various Action Items using the arrow bars located in the left and right side of the window. The Minimize/Maximize action button minimizes and maximizes the Action Window. Help button will open the instruction manual for using the software.

## 6. Activating the Application

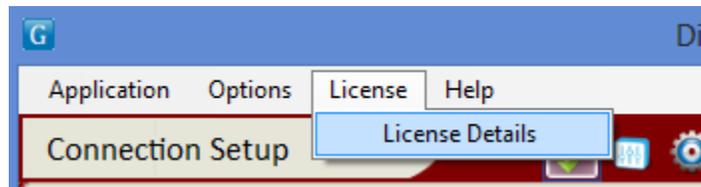
Application by default is provided with 10 days of activation. Without any activation key the application can be used for 10 days for evaluation.

After the purchase, if you received a CD of the software, you can find the Media number. You may need to use this media number for any further communications.

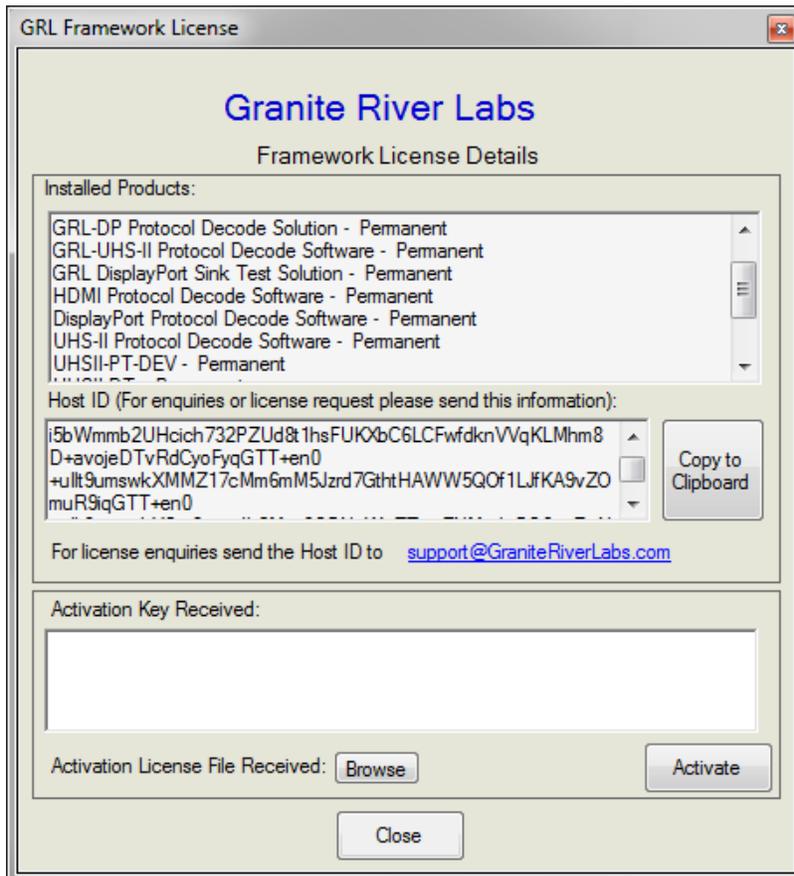
Below are the steps to activate the application license:

Step 1: Open the application (For more information, see [Running the application](#))

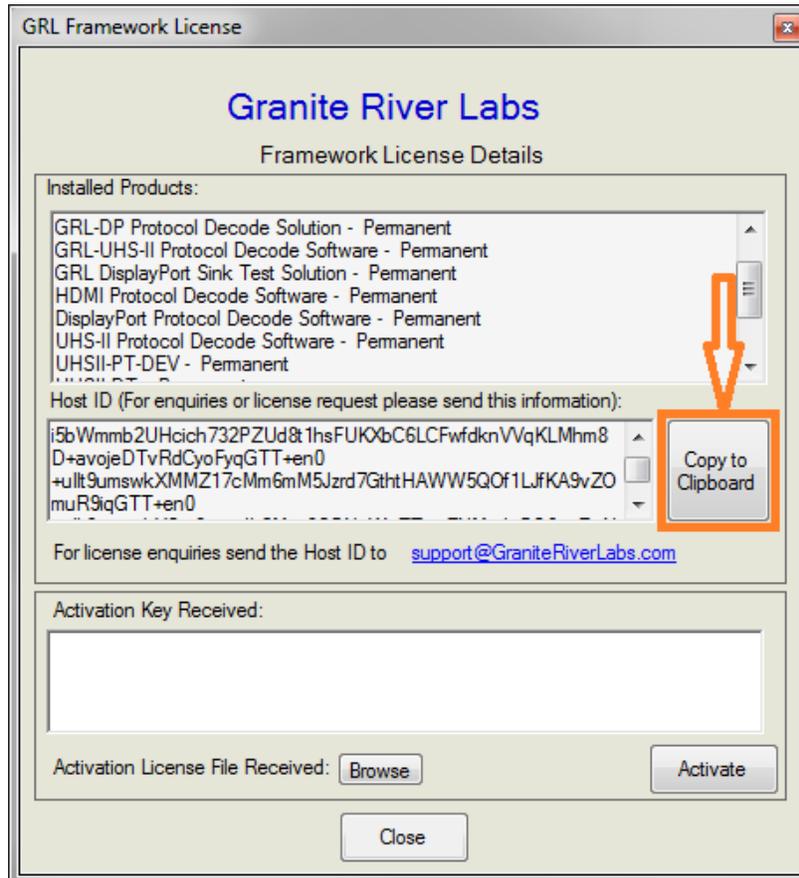
Step 2: In the application menu, Click License > License Details



Step 3: Review the installed applications



Step 4: Copy the Host ID by clicking “Copy to Clipboard”



Step 5: Send the following details to [info@graniteriverlabs.com](mailto:info@graniteriverlabs.com):

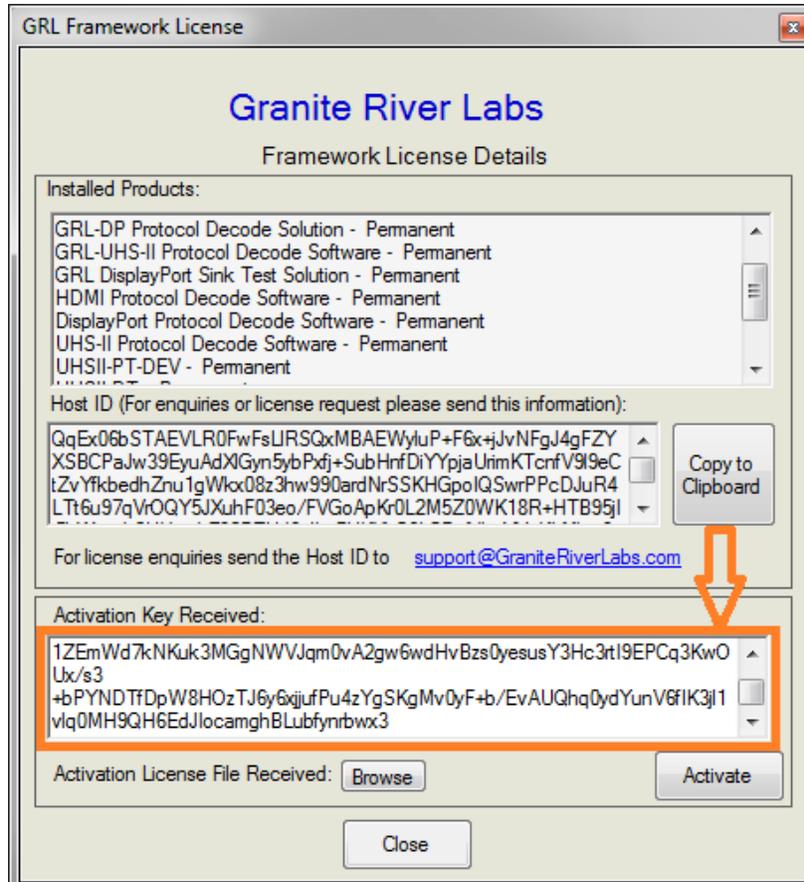
Media Number / Order Number:

Company Name:

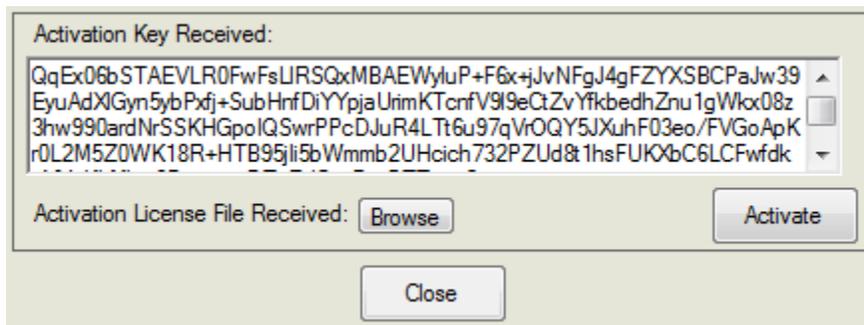
Contact person:

Note: Media number will be written on the CD case. If you would have ordered online and received an application installer, use the Order Number specified in the confirmation e-mail.

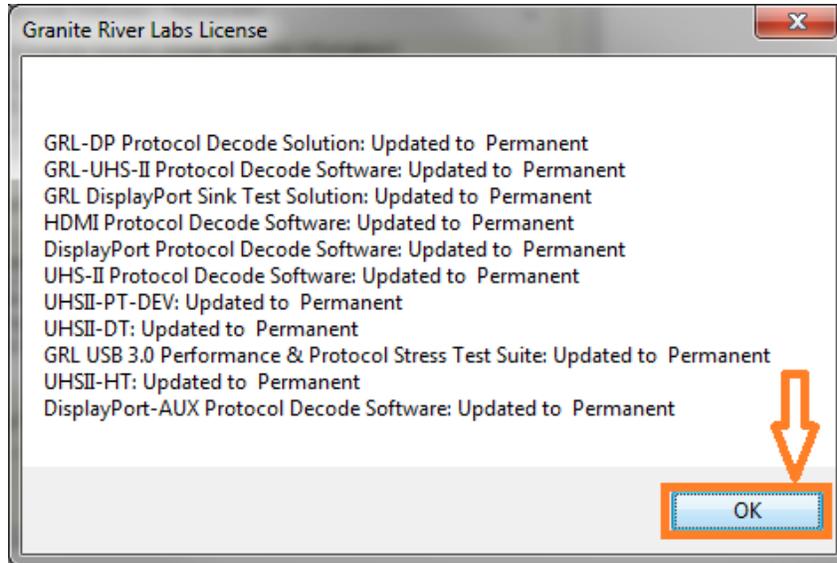
Step 6: Paste the activation key received from [info@graniteriverlabs.com](mailto:info@graniteriverlabs.com) in the Activation Key Received text box provided in the License Dialog



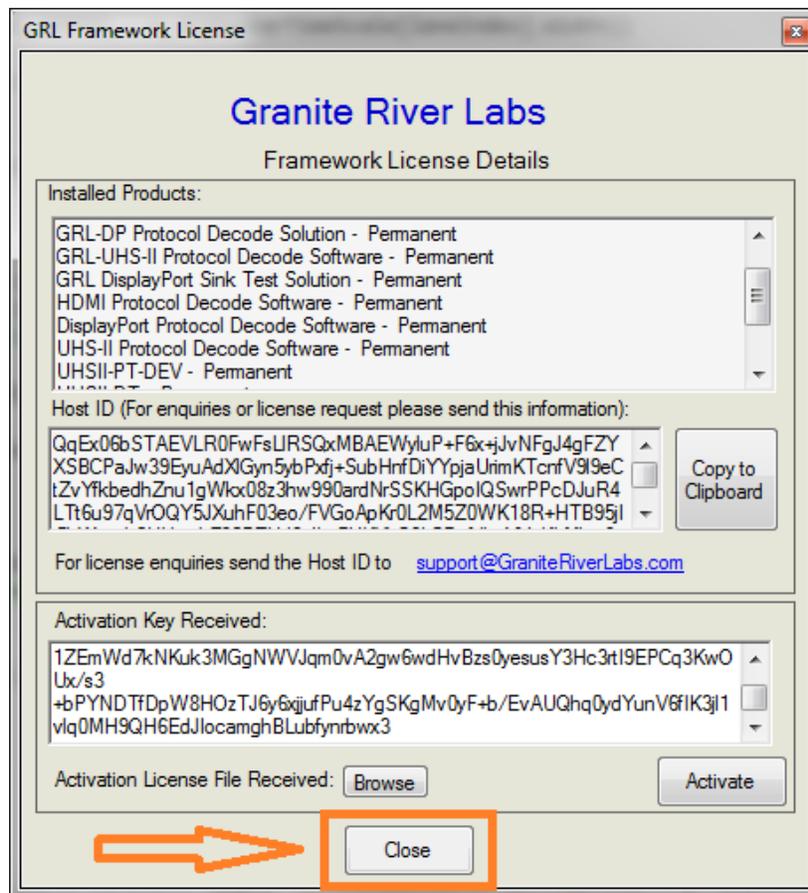
Step 7: Click on “Activate” button.



Step 8: The following Confirmation message will be shown, Click on OK button.



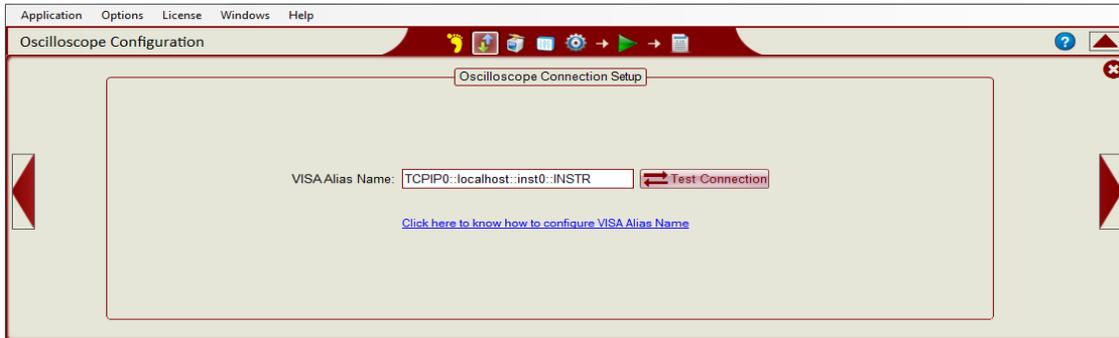
Step 9: Review the license, and click close button in the License Dialog window.



## 7. Instrument/Oscilloscope Configuration

To operate GRL Automated Test Solutions may require configuring the VISA aliasing to make the software communicate with the Oscilloscope.

Click “Oscilloscope Configuration” in the Action Bar button. The following action window appears:



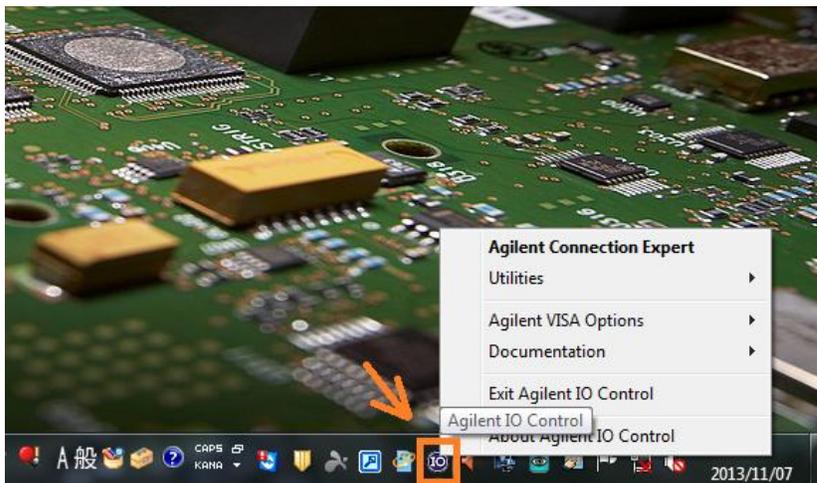
### Pre-requisite

The following are the pre-requisite for following this step by step procedure

1. Agilent Technologies 90000 X-Series, 9000, 90000, or 90000Q Series model oscilloscope
2. Key board and Mouse
3. GRL Automated Test Solutions Software

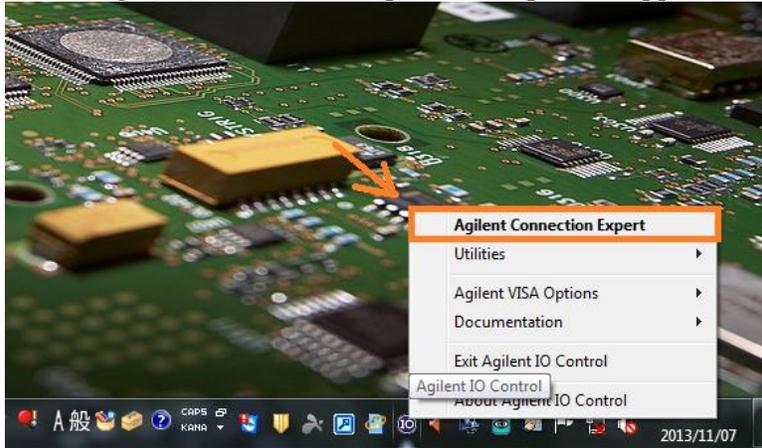
### Step 1: Open the Agilent IO Control

Find the Agilent IO icon on the system tray as shown below and **right click** the Agilent IO control.



### Step 2: Open Agilent Connection Expert

Click “Agilent Connection Expert” and open the application

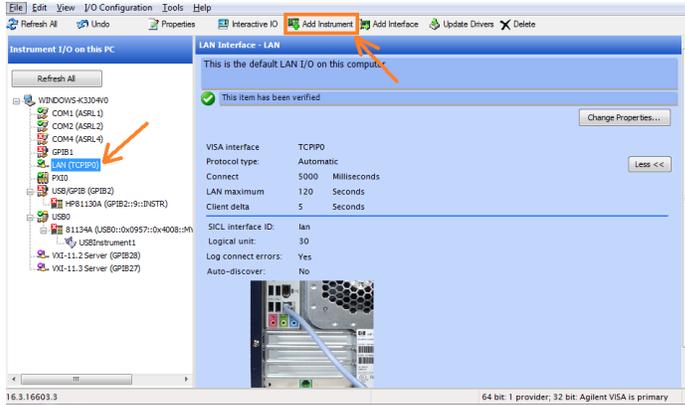


This opens the Agilent Connection Expert as shown below



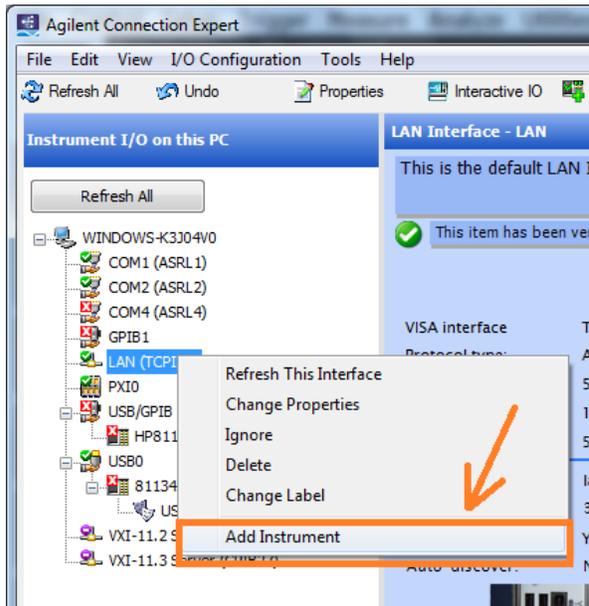
### Step 3: Select LAN instrument

In Agilent Connection Expert Select the LAN instrument



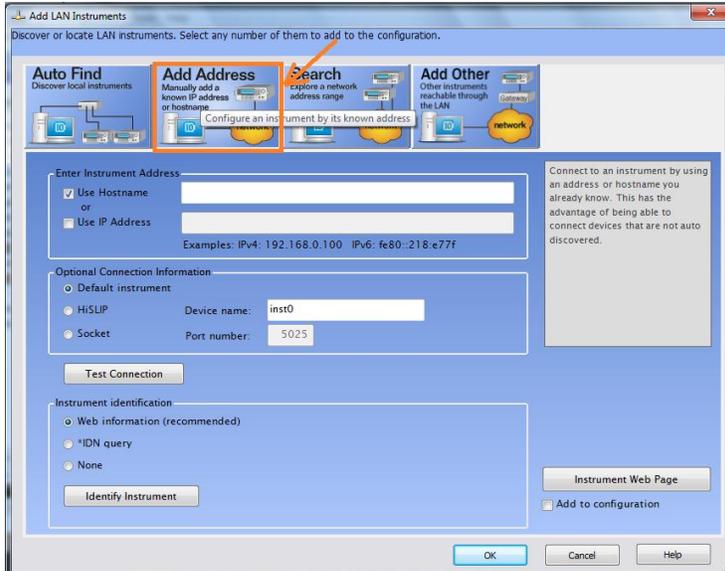
**Step 4: Add Instrument**

Right click the LAN as shown below and click “Add Instrument” or click “Add Instrument” in the ribbon bar.



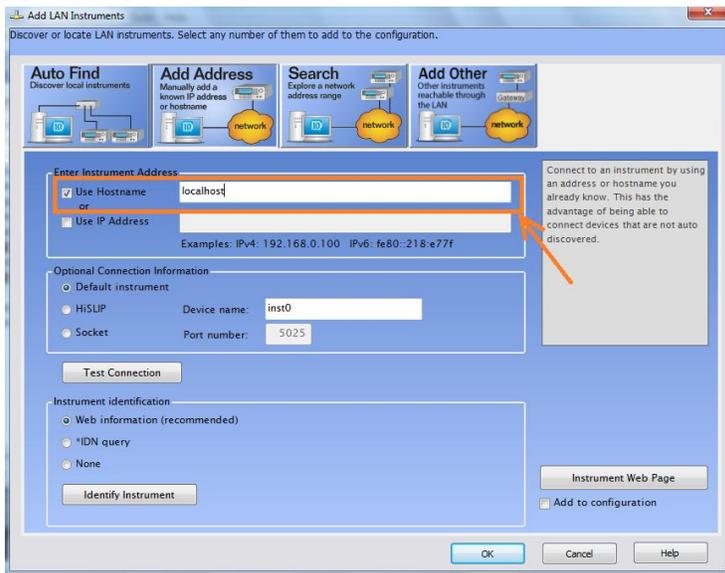
**Step 5: Configure the LAN instrument**

Click “Add Address” in the “Add LAN Instrument” dialog as shown below:



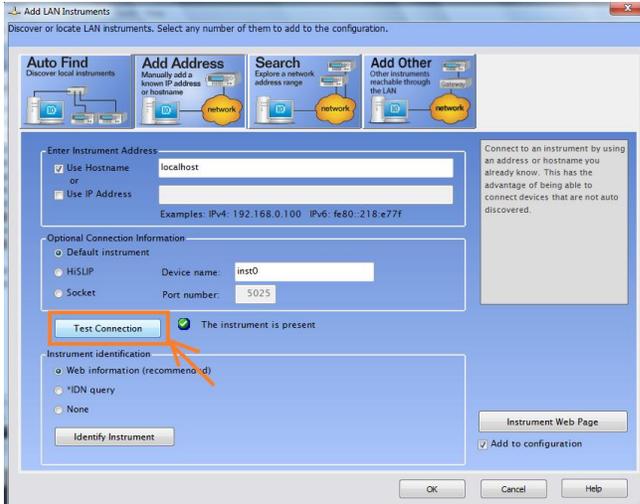
### Step 6: Configure the IP address of LAN Instrument

In Add Address page, select "Use Hostname" and type "localhost" in the text box provided for local host.



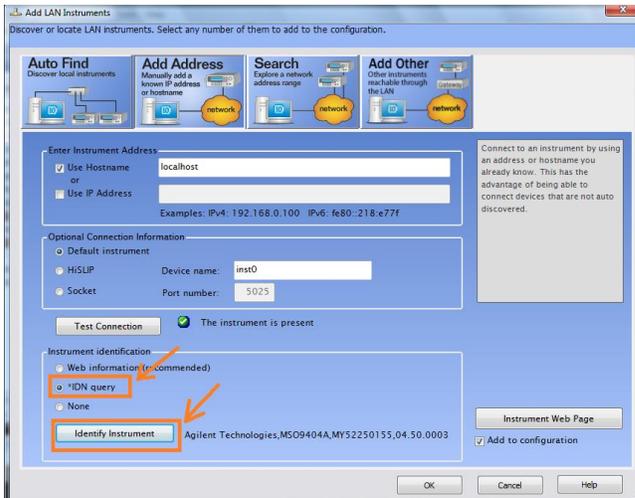
### Step 7: Test the connection

Click "Test Connection" to make sure that the Agilent IO configuration is correct. After this you should be able to see "The instrument is present"



### Step 8: Check the Instrument Identification

In the instrument identification, select “\*IDN Query” and click “Identify Instrument”. If the instrument is configured correctly you should be able to see the instrument name next to the “Identify Instrument” button as shown below:

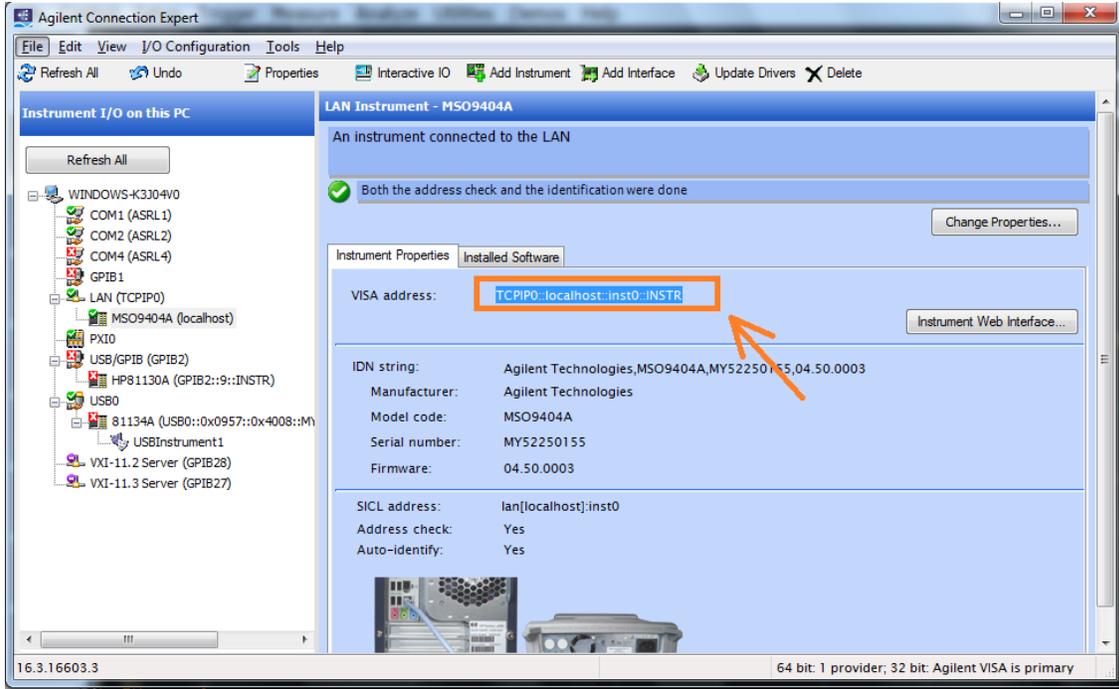


### Step 9: Complete Add LAN Instrument

Click “OK” to complete Add LAN Instrument

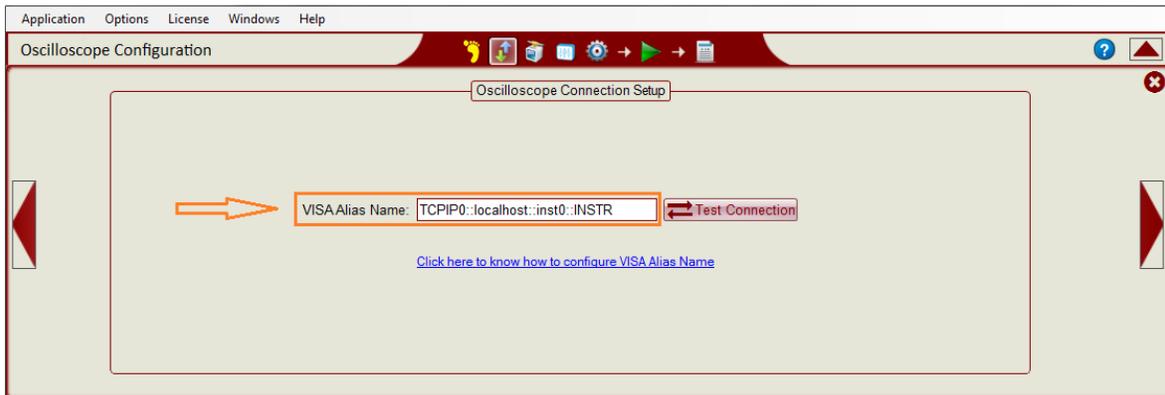
### Step 10: Copy VISA alias name

At the end of Step 9, you should be able to see your Oscilloscope in the LAN instrument. Copy or note the VISA address:



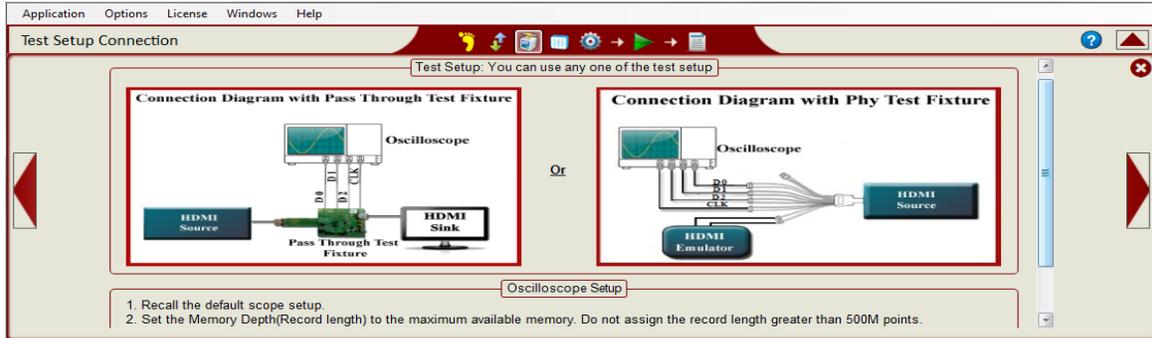
### Step 11: Configure the GRL Automated Test Solution

Copy the VISA name provided in the Step 10 and type the same in the GRL Automated Software “VISA Alias Name”:



## 8. Test Setup Connection

Click “Test Setup Connection” action bar button to view the test setup required to efficiently run the GRL HDMI Protocol Decode tool. In both recommended test setups active differential probes are required to connect Clock, Data0, Data1 and Data2 lanes to oscilloscope.

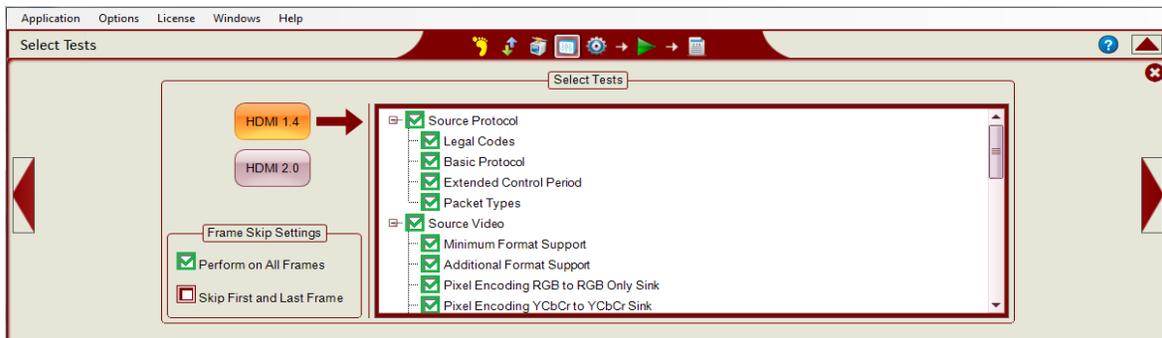


If you would like to view live traffic in the HDMI main link, you can use pass through test fixtures and probes. If you have a HDMI Controller which enables the Source device to transmit the line traffic you can use a test fixture and controller configuration.

**Note: The GRL HDMI Protocol Decode software is not designed to communicate with the HDMI EDID Controller. You may require a separate software program to control the HDMI EDID Controller.**

## 9. Test Selection

Click “Select Tests” action bar button to view the selected tests for HDMI 1.4b/2.0. If you want to run HDMI 1.4b tests then click on HDMI 1.4 button, resultant test cases will be populated in the tree view adjacent to it. Select HDMI 2.0 to select/unselect HDMI 2.0 test cases. One can select/ deselect the test cases using their respective checkboxes.



Select "Perform on ALL Frames" to run the selected tests on all the frames.  
Select "Skip First and Last Frame" to run the tests on all the frames except 1st and last frame as they are incomplete frames.

## 10. Decoder Configuration

To configure the decoder, click “Decoder Configuration” button in the Action Bar. It is essential to review this configuration before running the software.



### ***Signal Configuration:***

Depending on the HDMI Source you may be required to input the Configuration:

Select CH1 if your HDMI Source is configured for Clock  
 Select CH2 if your HDMI Source is configured for Data0  
 Select CH3 if your HDMI Source is configured for Data1  
 Select CH4 if your HDMI Source is configured for Data2

### ***Signal Source:***

If you want to analyze the signal using a live waveform captured using Oscilloscope select “Live” If you want to analyze a waveform stored already, select “Offline”.

Note: Refer to the datasheet for list of Oscilloscope and waveform formats supported.

For Live Signal Capture, connect the signals as shown in the Test Setup Connection and select the appropriate channels in the software.

To analyze previously stored waveforms, select “Offline Mode” and input the appropriate files in using the “File Browse” button.

Currently the software supports Agilent's BIN file format.

### ***Source Capabilities declaration:***

Select the appropriate Source Capabilities declaration as per your requirement.

### ***Pixel Format Selection:***

Select RGB in the pixel format if the source DUT transmits the video stream in RGB.

Select YCbCr 4:4:4 in the pixel format if the source DUT transmits the video stream in 4:4:4

Select YCbCr 4:2:2 in the pixel format if the source DUT transmits the video stream in 4:2:2

Select YCbCr 4:2:0 in the pixel format if the source DUT transmits the video stream in 4:2:0

***Bits Per Pixel Selection:***

Select 24, 30, 36, 48 bits per pixel depending on your HDMI Source DUT's transmission.

***Source\_CN Selection:***

Select Photo if the SOURCE\_CN is photo.

Select Game if the SOURCE\_CN is game.

Select Cinema if the SOURCE\_CN is cinema.

***Format Structure Selection:***

Select Default if the video format structure is not 3D not 4K\*2k

Select 3D Frame Packing/ 3D Side-By-Side/ 3D Top-Bottom for 3D Video Format

Select 4K\*2K for 4k\*2k Video formats.

***Video format Selection:***

When Format Structure is selected, its relevant video formats will be populated.

Identify the VIC Code and select the proper video format.

***Audio Frequency Selection:***

Select the appropriate audio frequency selection.

***DVI Interoperability Selection:***

Select the appropriate selection.

***Video Selections:***

Select/deselect the SOURCE video related CDF based on the requirement. Make sure you select the one which is required for the tests selected. Else the test cases may FAIL based on the selection.

***Audio Selections:***

Select/deselect the SOURCE audio related CDF based on the requirement. Make sure you select the one which is required for the tests selected. Else the test cases may FAIL based on the selection.

## 11. Run / Start the Decoder

### Before Run / Start the Decoder, ensure that:

1. The [Oscilloscope configuration](#) is appropriate if you are using live signal mode capture
2. Connect all the probes as per the recommended [Test Setup](#) if you are using live signal mode in the decoder configuration
3. Ensure that you have [selected the required tests](#) you would like to perform. (Note, this feature will be supported in a future software version)
4. Based on the HDMI Source device configuration you have [Configured the Decoder](#) software and connected the appropriate signals to the Oscilloscope if you are using Live signal source. Or you have selected the appropriate offline signal files.
5. Make horizontal and vertical oscilloscope setup by following the instructions given in Test Setup Connection window

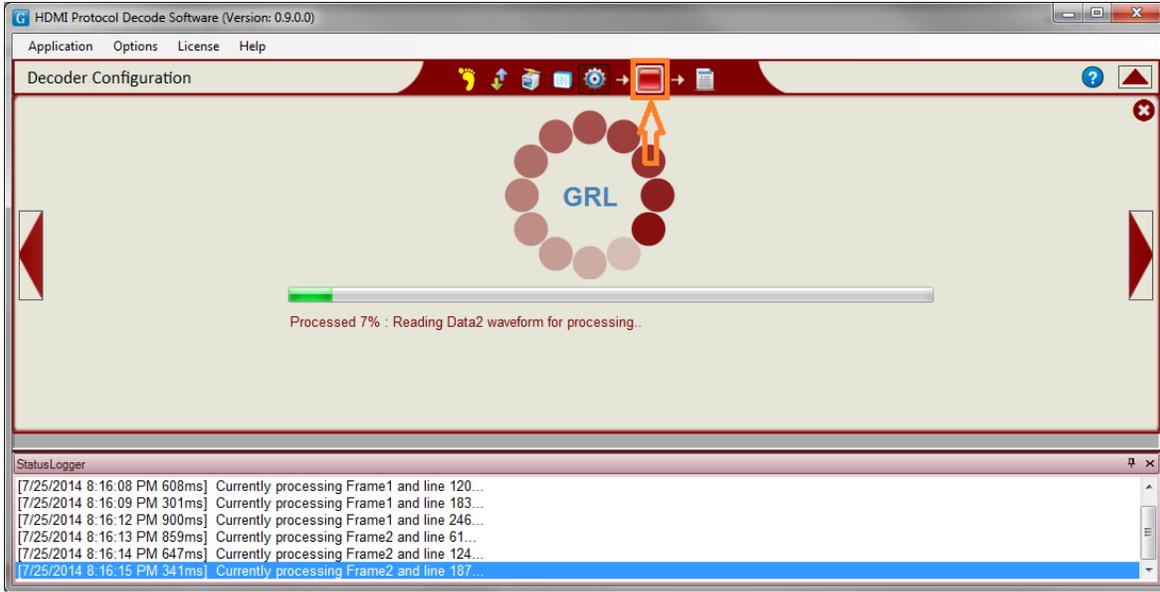
**Make sure that you have completed all the above required steps before Run/Start the decoder software. Any inappropriate inputs will lead to un-determined output of the decode application.**

Click the “Run/Start” button in the Action Bar to start the application:



Once you click Run, the decode software takes the inputs from the configuration and decodes the signal. The inbuilt de-serializer creates a stream of data and decodes all the HDMI micro packets.

The status bar displays the progress and shows the activities being carried out. To stop the Decode/Analysis operation, click the “Stop” button as shown below:



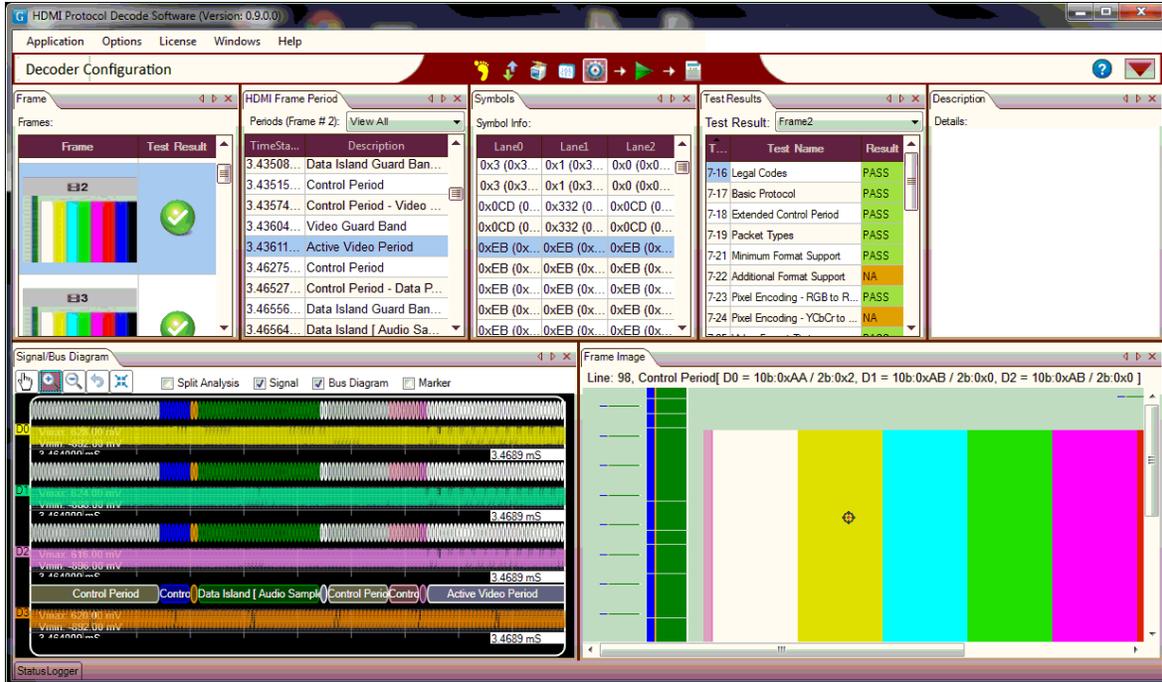
After completing the analysis, the software minimizes the action window and displays the decode results.

## 12. Analyzing the Results

After completing the decode process, the GRL HDMI Protocol Decode software displays comprehensive test results.

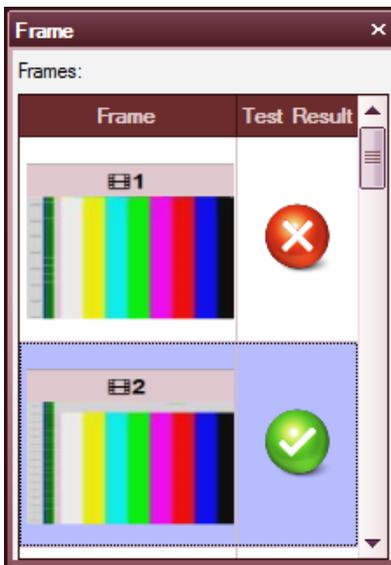
***Note: If the test results do not meet your expectations, first review the test setup, decoder configuration. Any inappropriate inputs in the decoder configuration may result in incorrect test results.***

The software provides a list of frames, frame packets, description of each Data Island packet, K codes, D codes, transmitted image with horizontal and vertical blanking periods, active video periods, secondary data packets, bus diagram, and physical layer waveforms. All these items can be cross-correlated with the physical layer waveforms.



**Frame List:**

Frame List provide the list of frames in the Oscilloscope acquisition. This gives indication of how many frames are present for the analysis.



By clicking the frame, all other windows such as frame packets, symbols, frame image and bus and signal diagrams will get updated to the selected frame's details.

### ***HDMI Frame Period***

Frame packet list provide the list of packets for the selected frames with the time stamp. By clicking the packet list the Symbol list and Packet Details, Bus Diagrams will get the corresponding Packet information.

TimeStamp	Description
-947.423509 µS	Control Period - Data Preamble
-947.126910 µS	Data Island Guard Band - Leading
-947.053088 µS	Data Island [ Audio Sample (L-PCM and IEC 61937 compressed formats) Packet ]
-945.869070 µS	Data Island Guard Band - Trailing
-945.795203 µS	Control Period
-915.677112 µS	Control Period - Data Preamble
-915.381296 µS	Data Island Guard Band - Leading
-915.307178 µS	Data Island [ Audio Sample (L-PCM and IEC 61937 compressed formats) Packet ]
-914.123195 µS	Data Island Guard Band - Trailing
-914.048803 µS	Control Period
-883.931204 µS	Control Period - Data Preamble

### ***HDMI Frame description***

Frame description provides the details of the selected Data Island Packet as per the HDMI Specification.

```

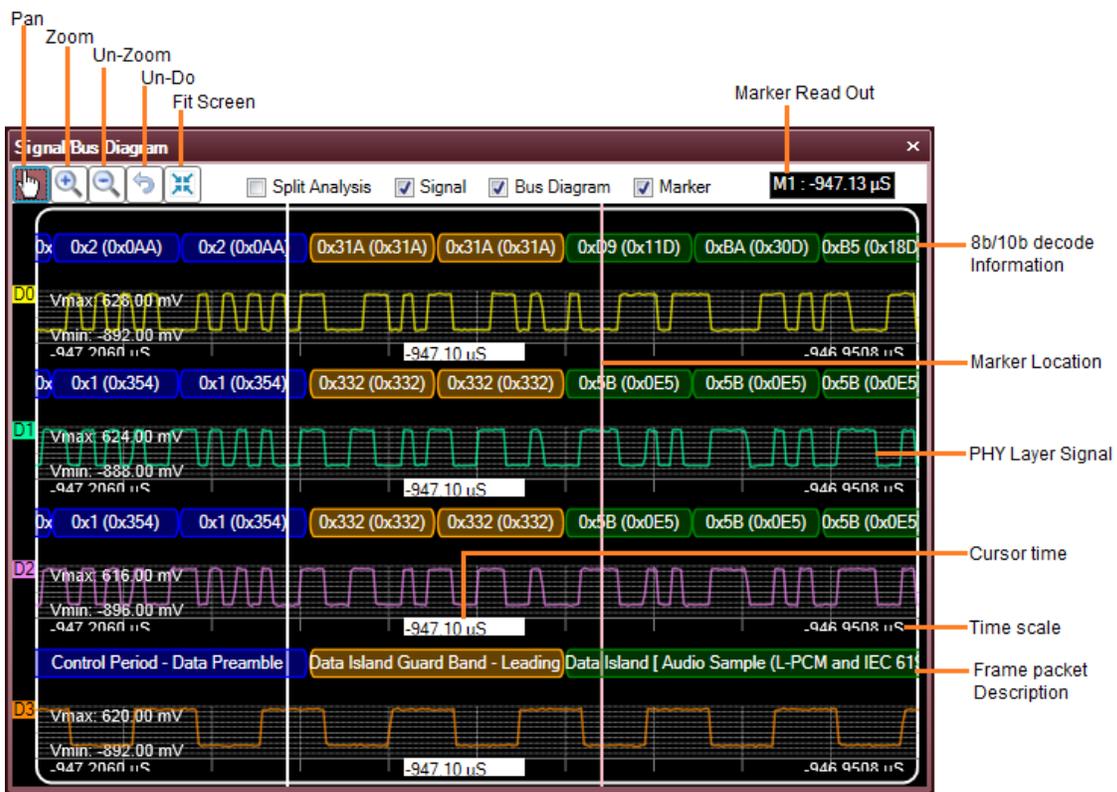
Description
Details:
Packet Type: Audio Sample (L-PCM and IEC 61937 compressed formats) Packet
Secondary-data Packet ID (HB0): 0x02
Layout :0 (Maximum 2 Channels)
sample_present.sp3 : False
sample_present.sp2 : False
sample_present.sp1 : False
sample_present.sp0 : True
sample_flat.sp3 : False
sample_flat.sp2 : False
sample_flat.sp1 : False
sample_flat.sp0 : False
B.X : 0x0
L11 - L04 : 0x00
L12 - L19 : 0x3A
L20 - L27 : 0xFA
LP.LC.LU.LV : 0x0
R11 - R04 : 0x00
R12 - R19 : 0xCF
R20 - R27 : 0x09
RP.RC.RU.RV : 0x0
    
```

### Signal Plot and Bus Diagram

Signal Plot and Bus Diagram provides details of the bus diagram and associated physical layer waveforms.

Color coded bus diagram provides information on the Control period, Video guard band, Active video period, Data Island guard band, Data Island, Control period Data preamble, Control period Video preamble, etc

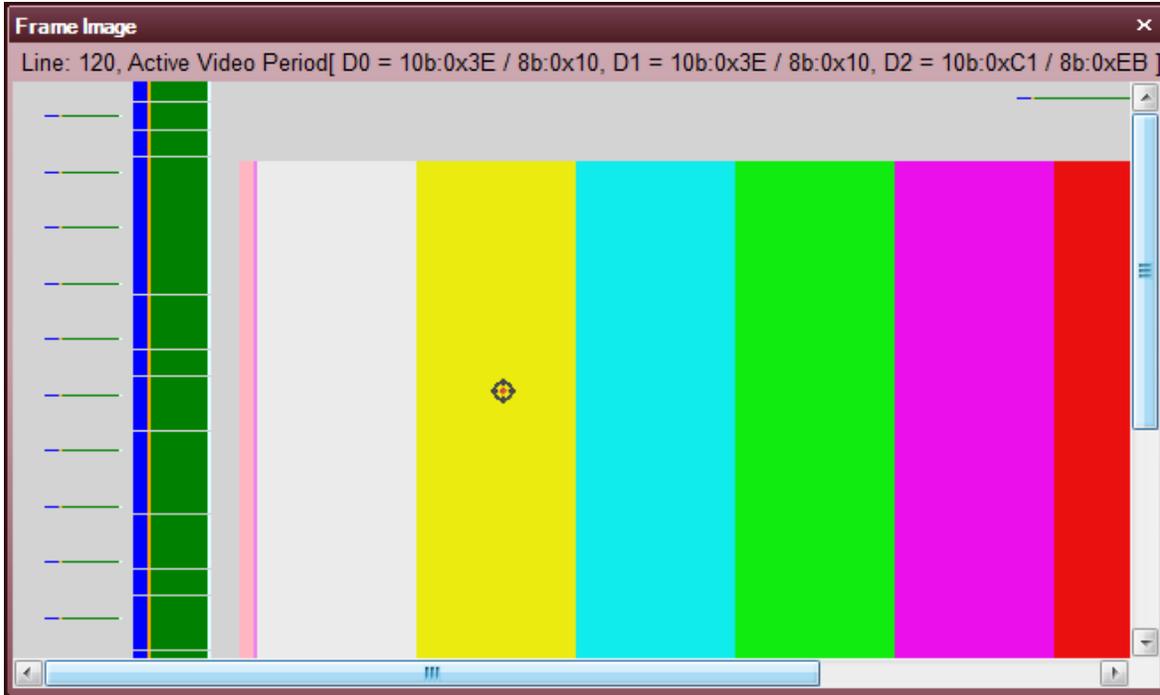
Signal plot consists of Pan, Zoom, Un-Zoom, Undo, Fit to screen options which helps to analyze the HDMI protocol data.



### Frame Image:

HDMI Protocol Decode software's Frame Image provide the complete Frame grab of the transmitted video stream. This frame image also can show the details of Horizontal and vertical blanking periods.

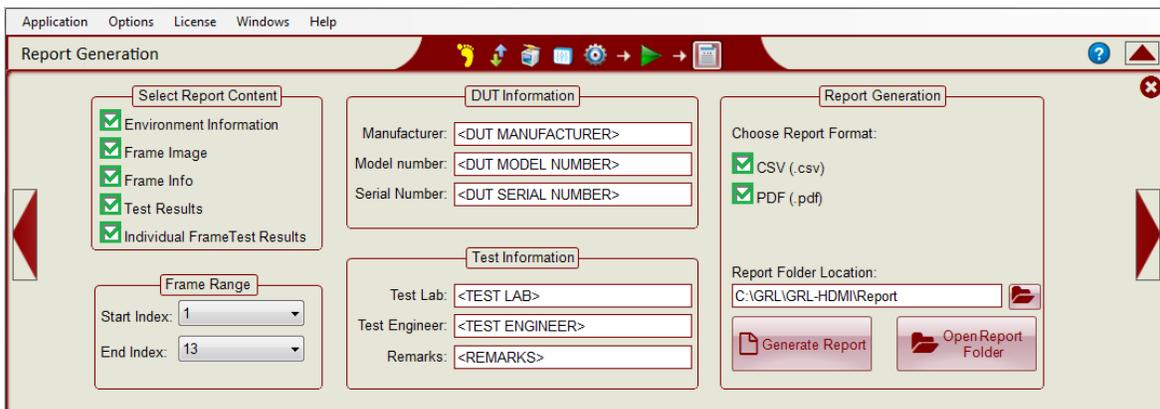
During Horizontal and vertical blanking period, Control period, Data Island guard band, Data Island, etc are color coded and displayed in the image.



You can also move the mouse over the image and find the respective information on the top of the image.

### 13. Test Report

HDMI protocol decode software's automated report generation capability provides ability to generate the report to share the test results.



You can also customize the test report with the details of the "Device Under Test Information", you can specify the Manufacturer information, model number, serial number and other test related information.

You can also choose the environment variables such as decoder configuration details, frame image and frame information in the test report.

## 14. Feedback and Suggestion

Granite River Labs values your feedback on our products. To help us serve you better, please send us your suggestions, ideas, or comments on the HDMI Protocol Decode software. Direct your feedback via e-mail to [info@graniteriverlabs.com](mailto:info@graniteriverlabs.com) and include the following information:

### ***General Information***

- Instrument model number and hardware options, if any
- Probes used
- Your name, company, mailing address, phone number, FAX number, e-mail id
- Please indicate if you would like to be contacted by Granite River Labs about your suggestions or comments

### ***Program-Specific Information***

- Software version number
- Description of the problem such that technical support can duplicate the problem
- The instrument setup files
- Configuration used in the application.
- If possible, save the waveform on which you are performing the test

Once you have gathered this information, you can contact technical support by e-mail. When you use e-mail, be sure to type in the subject line “HDMI Protocol Decode Software Problem/Feedback/Suggestion,”