SL-881 6G Handheld HDMI/MHL Audio and Video Generator/Analyzer

User Guide

Simplay-UG-02001-E

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Contents

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1. Overview

The SL-881 6G Handheld HDMI/MHL Audio Video Generator (SL-881 AVG, SL-881, or AVG) is designed for testing source, sink, or repeater devices, and is compliant to the latest High Definition Multimedia Interface (HDMI®) 2.0a and Mobile High-Definition Link (MHL®) 3.x specifications.

This User Guide provides details on how to setup and test source, sink, or repeater devices for compliance to the HDMI version 2.0a and MHL 3.x specifications.

For the latest updated software, drivers, see online at:

https://www.simplaylabs.com/Support/

For the latest updated documentation, see online at :

https://www.simplaylabs.com/Support/Documentation/

1.1. SL-881 Hardware

Figure 1.1, Figure 1.2, and Figure 1.3 show the top view, the front panel view, and the rear panel view of the SL-881 AVG chassis, respectively.

Figure 1.1. SL-881 AVG – Top View

Figure 1.2. SL-881 AVG – Front Panel

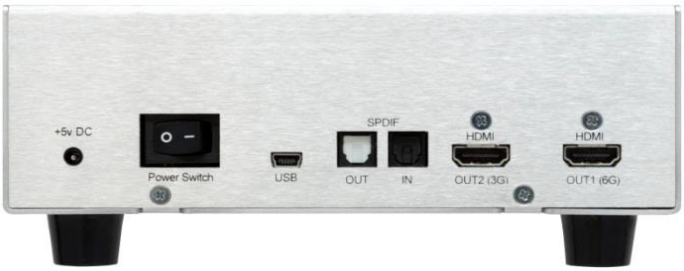


Figure 1.3. SL-881 AVG – Rear Panel

1.2. SL-881 Controls, Indicators, and Interface Connectors

Figure 1.4 shows the location of the SL-881 AVG enclosure features: input and output ports, power and reset switches, LCD touch screen display, and SD card slot.

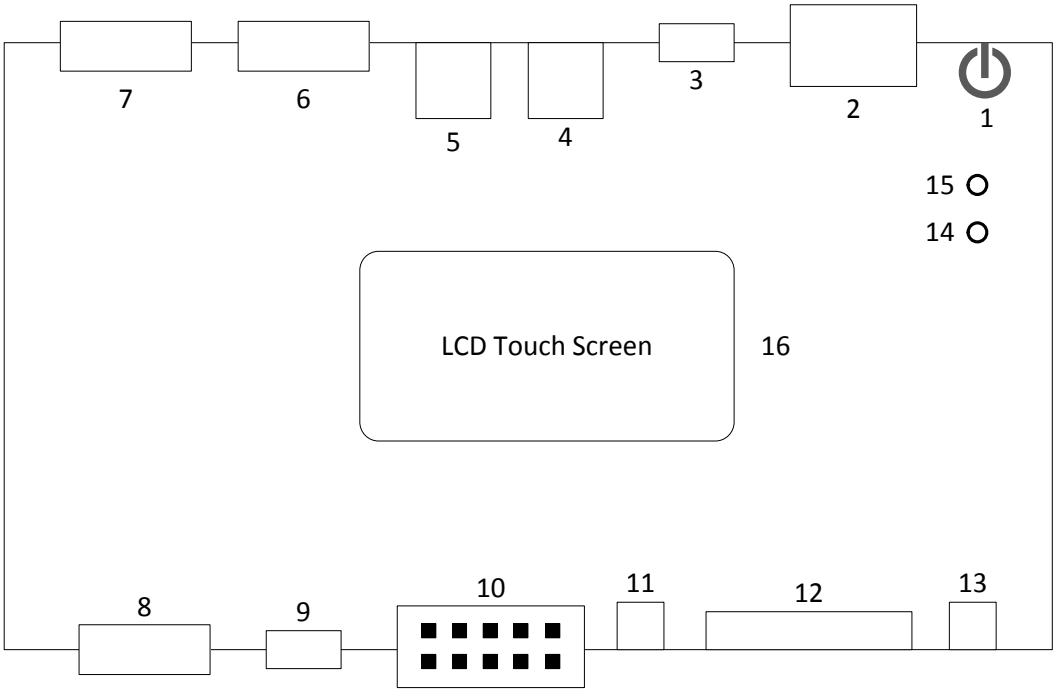


Figure 1.4. Locating SL-881 AVG Components – Top View

Item	Label	Description
1	+5 V DC	DC power receptacle, 5 V 3 A.
2	Power Switch	Powers On/Off switch.
3	USB	USB mini-B port. Connects to test computer before running SCDC CTS test.
4	SPDIF OUT	SPDIF output port.
5	SPDIF IN	SPDIF input port.
6	HDMI OUT2 (3G)	HDMI 2.0a 3G signal generator port 2.
7	HDMI OUT1 (6G)	HDMI 2.0a 6G signal generator port 1.
8	HDMI INPUT	HDMI 2.0a signal receiver port.
9	MHL OUT	MHL signal output port.
10	I2C Monitor	Test connector for SCDC CTS test and DDC monitor function.
11	UPG	Push-button switch for firmware upgrade.
12	SD Card	SD card slot, only for updating firmware, and supplying audio and EDID contents from an up to 32 GB SD card.
13	Reset	Reset button
14	LED Charger	Battery charging indicator: when green, the SL-881 battery is charging. Turns off when the battery charge is complete.
15	LED Power	DC power indicator: when red, the power adapter is connected and the SL-881 is powered on.
16	LCD Touch Screen	Enables SL-881operation in standard test mode. See Section 1.3.1.2 for a description of the touch screen icons and their functions.

1.3. SL-881 Test Modes

The SL-881 AVG is designed to offer two distinct modes of operation:

- Standard Test Mode, see Section 1.3.1.
- Enhanced Test Mode, adding to the standard mode functionality. See Section 1.3.2.

1.3.1. Standard Test Mode

In its standard test configuration, the SL-881 offers audio and video test features to enable compliance testing to HDMI 2.0a and MHL 3.x specifications.

1.3.1.1. Available Standard Tests

The SL-881 AVG is ready for use in standard test mode immediately upon delivery. These are the operations that are available in standard test mode:

1. Analyze input signal using HDMI IN port
2. Generate output signal using HDMI OUT ports
3. Perform Factory timing test using HDMI OUT ports
4. Read EDID contents from devices connecting to HDMI OUT ports
5. Load EDID data to HDMI IN port

For details of the above operations, refer to Section 2.

1.3.1.2. The SL-881 LCD Touch Screen in Standard Test Mode

Figure 1.5 shows the LCD touch screen of the SL-881 in standard test mode under default factory configuration.

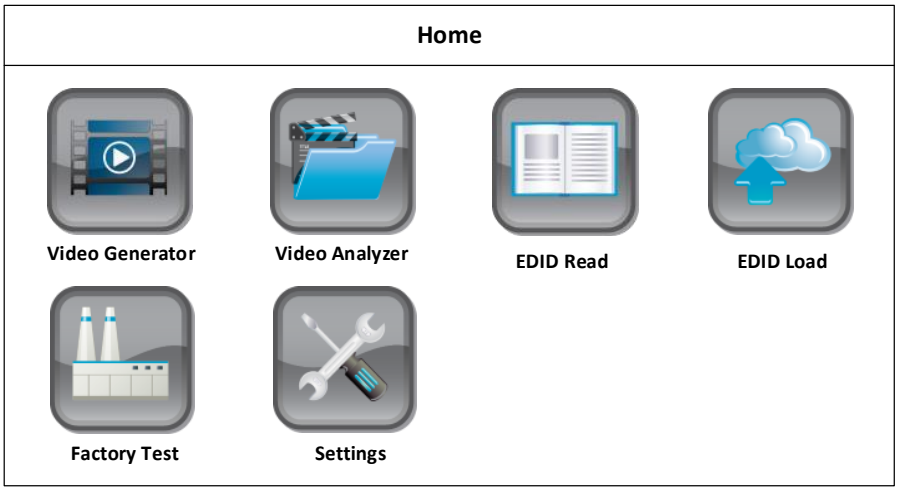


Figure 1.5. LCD Touch Screen Main Window

These are the standard operation features, accessible through the icons that are displayed on the LCD touch screen of the SL-881:

Icon	Function	Section Reference
Video Generator	Controls HDMI OUT 1 and HDMI OUT 2 ports to send HDMI signal.	Section 2.2
Video Analyzer	Analyzes HDMI input signal from HDMI IN port.	Section 2.3
EDID Read	Reads EDID contents from device connected to HDMI OUT 1 (6G) or HDMI OUT 2 (3G) port.	Section 2.4
EDID Load	Loads EDID data from SD card and program to HDMI INPUT port.	Section 2.5
Factory Test	Runs batch testing for a device connected to HDMI OUT 1 or HDMI OUT 2 ports.	Section 2.6
Settings	Displays AVG firmware-related information. LCD touch screen to list current settings and parameters.	—

1.3.2. Enhanced Test Mode

Enhanced test mode features become available only when installing optional software to your test computer. Section 3 gives details of the procedure for installing the software and registering the license that is required to run the expanded test features. Section 4 gives details on the enhanced SL-881 AVG functionality.

1.3.2.1. Enhanced Test Functions

In addition to the full set of functions of the standard configuration, enhanced test functionality becomes available upon installation and licensing of the optional software. These enhanced functions become available:

1. Perform EDDC (SCDC) compliance test.
2. Perform cable loop-back test.
3. DDC monitoring
4. EDID file editing

For details of the above operations, see Section 4.

1.3.3. Devices under Test

Standard and enhanced test operations are available for:

- Sink devices, or input port of repeater devices
- Source devices, or output port of repeater device

1.4. Inside the Box

The SL-881 AVG delivery includes the following items:

- 5 V power supply
- Prime pass HDMI cable
- USB A to USB mini-B cable
- MHL cable (HDMI to Mini-B USB)
- SD card. This card is required to transfer and program the EDID contents of the HDMI INPUT port, and also for firmware upgrading.
- Header cable, 10 pin, with daughter card. **IMPORTANT! Save this item, as it is required for operation in the enhanced** SL-881 **AVG test mode.**

2. The SL-881 in Standard Test Mode

In its standard test configuration, the SL-881 offers audio and video test features to enable compliance testing to HDMI 2.0a and MHL 3.x specifications.

For standard mode operation, no additional optional software installation is required.

These are the operations that are available in the standard test mode:

1. Generate output signal using HDMI OUT ports
2. Analyze input signal using HDMI IN port
3. Perform Factory timing test using HDMI OUT ports
4. Load EDID data to HDMI IN port
5. Read EDID contents from devices connecting to HDMI OUT ports

Notes: When in Standard test mode, testing with source device or the output port of repeater devices, you can perform actions 2 and 4 mentioned in Section 2.3 and Section 2.5.

When in Standard test mode, testing with sink device or the input port of repeater devices, you can perform actions 1, 3, and 5 mentioned in Section 2.2, Section 2.6, and Section 2.4.

2.1. Setting up Connections

Connect the SL-881 to the source device or the output port of the repeater or sink device or the input port of the repeater device before performing any test.

- When testing with HDMI Source device or the output port of repeater device, connect the SL-881 to your source device in the way shown in Figure 2.1.

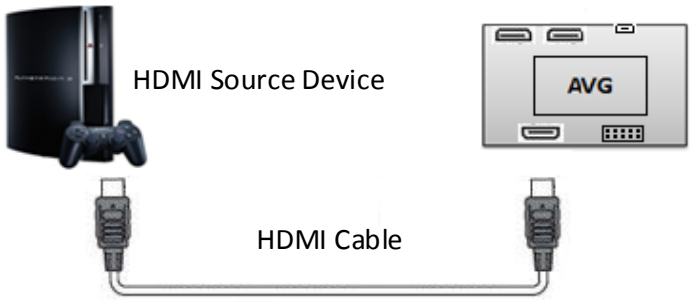


Figure 2.1. Connecting with HDMI Source Device in Stand-alone Mode

- When testing with HDMI Sink device or the input port of the repeater device, connect the SL-881 to your sink device in the way shown in Figure 2.2.

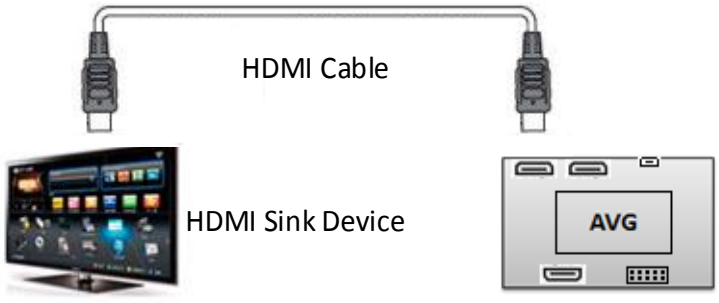


Figure 2.2. Connecting with HDMI Sink Device in Stand-alone Mode

- When testing with MHL Source device, connect the SL-881 to your MHL source device in the way shown in Figure 2.3.

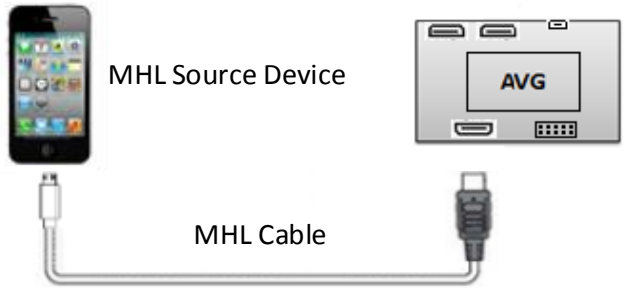


Figure 2.3. Connecting with MHL Source Device in Stand-alone Mode

- When testing with MHL Sink device, connect the SL-881 to your MHL sink device in the way shown in Figure 2.4.

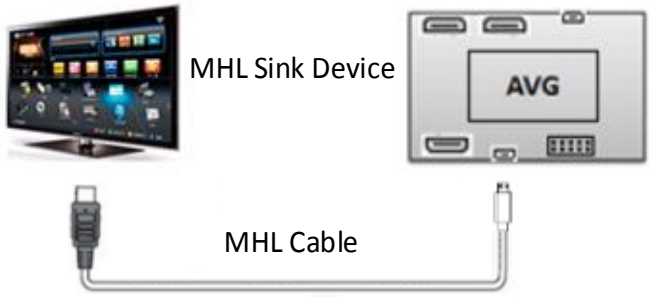


Figure 2.4. Connecting with MHL Sink Device in Stand-alone Mode

2.2. Generating Video Signals When Running with Sink Devices

The SL-881 can be used to generate multiple output signals to sink devices or the input port of repeater devices. You can modify parameters of the output signal at run time.

This procedure shows how to generate output signal when running with a sink device.

1. Use the HDMI cable to connect the HDMI sink device to the SL-881 HDMI OUT 1 port, as shown in Figure 2.2.

   Or, use the MHL cable to connect the MHL sink device to the SL-881 MHL OUT port if you test an MHL sink device, as shown in Figure 2.4.
2. Power on the SL-881.
3. On the LCD touch screen (Figure 1.5), choose Video Generator. The Video Generator window appears (Figure 2.5).

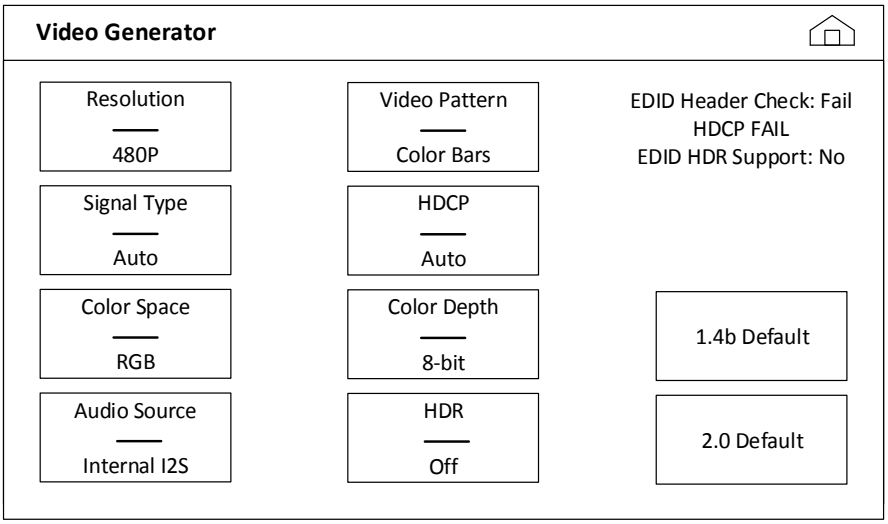


Figure 2.5. Video Generator Window

Field	Function
Resolution	Change output video timings, from 480p to 4k
Video Pattern	Change output video patterns, up to 30 video patterns are supported
Signal Type	Change output mode HDMI/DVI
HDCP	Change output HDCP revision, HDCP 2.x / 1.x / Off
Color Space	Change output color spaces, RGB/YC444/YC422/YC420
Color Depth	Change output color depth, 8/10/12 bits per pixel per channel
Audio Source	Change output audio formats
HDR	Change output HDR formats enable/disable

You can choose the parameter you want to change from the Video Generator window, such as Resolution. Change the parameter. The output signal will be changed accordingly.

2.3. Analyzing Input Signal When Running with Source Devices

The SL-881 can be used to analyze input signal from source devices or from output port of repeater devices, including video timing, video format, audio format, and HDR infoFrame information.

The following procedure shows how to analyze the video timing for input signal when running with source devices.

1. Use the HDMI cable to connect HDMI source device to the SL-881 HDMI IN port, as shown in Figure 2.1.

   Or, use the MHL cable to connect MHL source device to the SL-881 HDMI IN port when you test an MHL source device, as shown in Figure 2.3.
2. Power on the SL-881.
3. On the LCD touch screen (Figure 1.5), choose Video Analyzer. The Video Analyzer window appears (Figure 2.6).

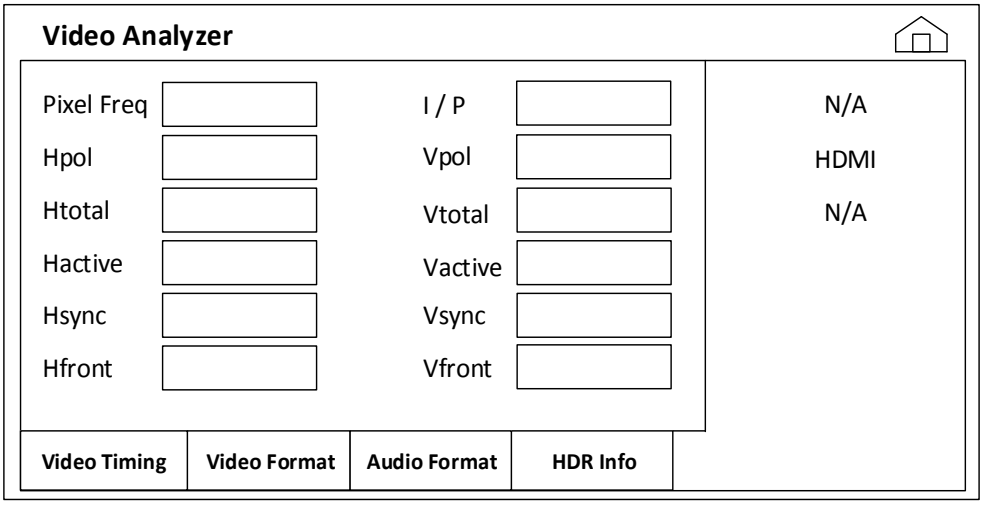


Figure 2.6. Video Analyzer Window

Field	Function
Pixel Freq	detected pixel frequency (Hz)
I/P	detected Interlaced/Progressive mode
Hpol	detected timing Hsync polarities
Vpol	detected timing Vsync polarities
Htotal	detected timing Horizontal total pixel count
Vtotal	detected timing Vertical total pixel count
Hactive	detected timing Horizontal active pixel count
Vactive	detected timing Vertical active pixel count
Hsync	detected timing Hsync width (in pixels)
Vsync	detected timing Hsync width (in lines)
Hfront	detected timing Hsync front pixels
Vfront	detected timing Vsync front lines

2.4. Reading EDID Contents from HDMI OUT Ports

The SL-881 can be used to read EDID contents from a sink device or the input port of repeater device. The 256-byte raw data, which is in Hex mode, of EDID contents from a sink device or input port of a repeater device can be read out and displayed in the LCD touch screen of the SL-881 in this test.

This procedure shows how to read EDID contents from the HDMI OUT ports.

1. Use the HDMI cable to connect the sink device to the SL-881 HDMI OUT 1 port, as shown in Figure 2.2.
2. Power on the SL-881.
3. On the LCD touch screen (Figure 1.5), choose EDID Read. The Read EDID from Sink DUT window appears (Figure 2.7).

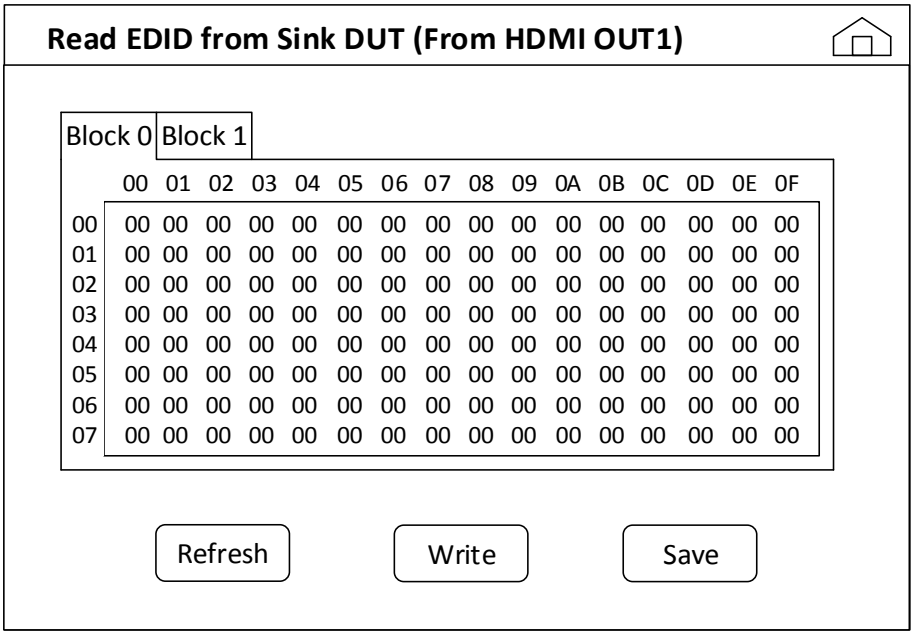


Figure 2.7. Read EDID from Sink DUT Window

You can use the Block 0 or Block 1 tab to select which part of EDID contents to display. Use the Refresh button to read EDID contents from the HDMI OUT 1 port. Use the Write button to program current EDID content to AVG HDMI IN port. Use the Save button to save current EDID content to SD card.

2.5. Loading EDID Data to the HDMI IN Port

The EDID contents of HDMI input port of the SL-881 can be updated using SD card. Use the EDID Load icon of the SL-881 LCD touch screen (Figure 1.5) to load the updated EDID file from the SD card.

Note: When you want to update the EDID content of the HDMI input of the SL-881, copy your own EDID data, 256-byte binary file in *.bin format to the SD card.

This procedure shows how to load EDID data from the SD card to the HDMI IN port of the SL-881.

1. Power on the SL-881.
2. Plug the SD card into the SD Card slot.
3. On the LCD touch screen (Figure 1.5), choose EDID Load. The Load EDID to Sink TE window appears. See Figure 2.8.

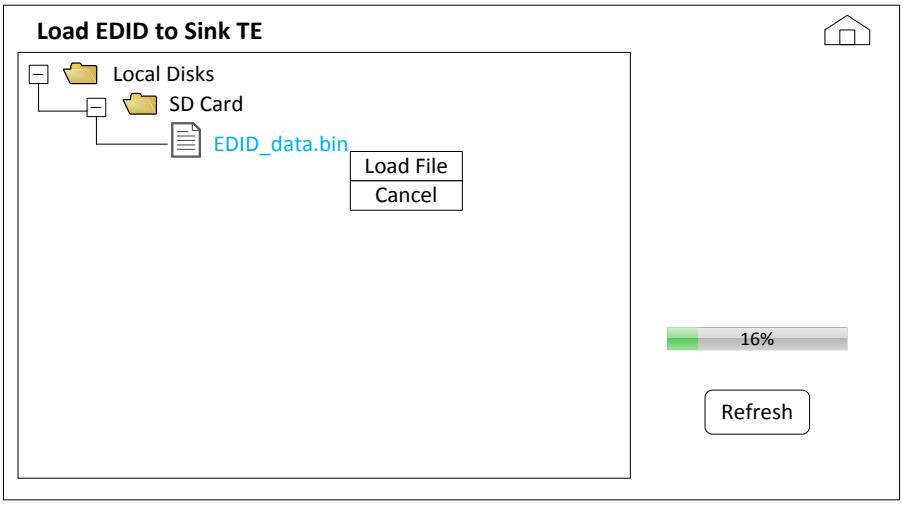


Figure 2.8. Load EDID to Sink TE Window

4. Select the EDID file (EDID_data.bin) to load.
5. Select Load File or Cancel from the pop-up menu that is not visible on screen. If you click Load File, the selected EDID file will be loaded into HDMI IN port of the SL-881. If you do not want to load the selected EDID file, click Cancel.
6. Use the HDMI cable to connect source device to the SL-881 HDMI IN port, as shown in Figure 2.1. Now the source device is tested with the new loaded EDID content.

Note: When the pop-up menu appears, you cannot go back to the main window until you click Load File or Cancel. Use the Home icon on the upper right corner to go back to the main window.

2.6. Performing Factory Test When Running with Sink Devices

The SL-881 can be used to perform video output batch testing, using the Factory Test icon of the SL-881 LCD touch screen. You can perform a quick check for input signal rendering capability of your Sink device or input port of the repeater device.

This procedure shows how to perform factory test when running with sink devices.

1. Use the HDMI cable to connect sink device to the SL-881 HDMI OUT 1 port, as shown in Figure 2.2.
2. Power on the SL-881 .
3. On the LCD touch screen (Figure 1.5), choose Factory Test. The Factory Test window appears (Figure 2.9).

Figure 2.9. Factory Test Window

Use the Up and Down arrows (green buttons in Figure 2.9) to switch among output signals to perform factory test. HDCP compliance information is displayed in the text output field.

3. Optional SL-881 AVG Software

You must have purchased the SL-881 AVG software (p/n SL-881-SWUPG) from you distributor or Simplay Labs before you can complete the installation steps outlined below and obtain the license key to activate the features (SCDC, DDC, and EDID Editor)

This section provides details on downloading and installing the optional SL-881 AVG software to your test computer.

Note: Upon installation and licensing, control of the optional features resides with the application installed on your test computer.

Overall, the optional SL-881 AVG software installation and licensing requires these procedures:

1. Download the optional software from the website to your test computer.
2. Install the software driver and the software. We recommend you installing the driver first.
3. Purchase and activate the software license. The license must be purchased.

3.1. Downloading the SL-881 AVG Software

The optional SL-881 AVG software can be downloaded from the Simplay website to your test computer. To download the software, see the Simplay Labs site, at: https://www.simplaylabs.com/Support/.

3.1.1. Contents of the Software Package

Download the firmware, software and driver (Figure 3.1):. Save*.zip to your test computer. Unzip the file.

Model Number	Software Description	Version Number	Date Posted
SL-881 PC Software	Simplay 6Gbps Audio/Video Generator/Analyzer PC Software	1.24	9/12/17
SL-881 Firmware	Simplay 6Gbps Audio/Video Generator/Analyzer Firmware	2.14015008	11/29/17
Support Tools			
Model Number	Software Description	Version Number	Date Posted
SL-881 Driver	Simplay SL-881 AVG Driver Installation	1.0	5/22/17

Figure 3.1. Inside the Software Package

- The SL881_AVG_driver_installation folder contains driver installation files. Refer to Section 3.3 below for more details.
- The SL881 AVG PC Software contains software installation files. Refer to Section 3.4 below for more details.
- The SL-881 Firmware contains the binary file. Refer to Appendix A for more details.

3.2. System Requirements

Before installing the software, you need to confirm the system environment of your test computer.

- A PC or laptop computer with Microsoft Windows 7 or Windows 8, 32 bit or 64 bit Operating System.
- Minimum 4 GB, optimum 8 GB RAM.
- 500 GB hard drive.

3.3. Installing the SL-881 AVG Driver

You will need to install two drivers: first, the VCP (Virtual COM Port) driver, and then install the dpinst driver.

Follow steps bellow to install the VCP driver and dpinst driver.

1. Plug in the mini-USB cable (item 3 in Figure 1.4) and power on the SL-881. Open the SL881_AVG_driver_installation folder from your test computer. Click VCP_V1.4.0_Setup to install VCP driver (as shown in Figure 3.2)

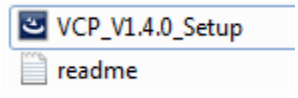


Figure 3.2. Install the VCP Driver

2. After the VCP driver installation is completed, open readme.txt (Figure 3.2). Follow the steps in the "How to use" section in readme.txt to install the dpinst driver.

   Based on your Operating System: if you have 64-bit Windows, run dpinst_amd64.exe; if you have 32-bit Windows, run dpinst_x86.exe (Figure 3.3).

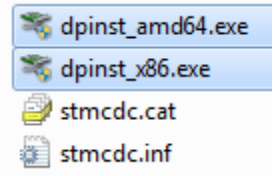


Figure 3.3. Install the Dpinst Driver

3. If the dpinst driver is installed correctly, you can see the SL-881 is recognized by the Device Manager (as shown in Figure 3.4).

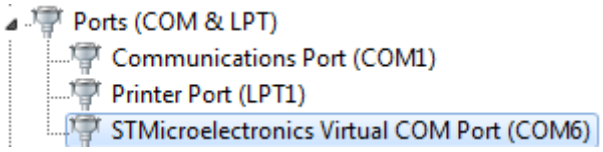


Figure 3.4. The SL-881 AVG Shown in Device Manager

3.4. Installing the SL-881 AVG Software

After installing the software driver, you need to install the software. Follow these steps to install the SL-881 AVG software.

1. Open the SL881_AVG_software_installation folder from your test computer. Click setup.exe (as shown in Figure 3.5) to install the SL-881 AVG software.

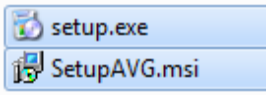


Figure 3.5. Locate and Open Setup.exe

2. The Welcome to the Simplay AVG Setup Wizard dialog opens (as shown in Figure 3.6). Click Next.

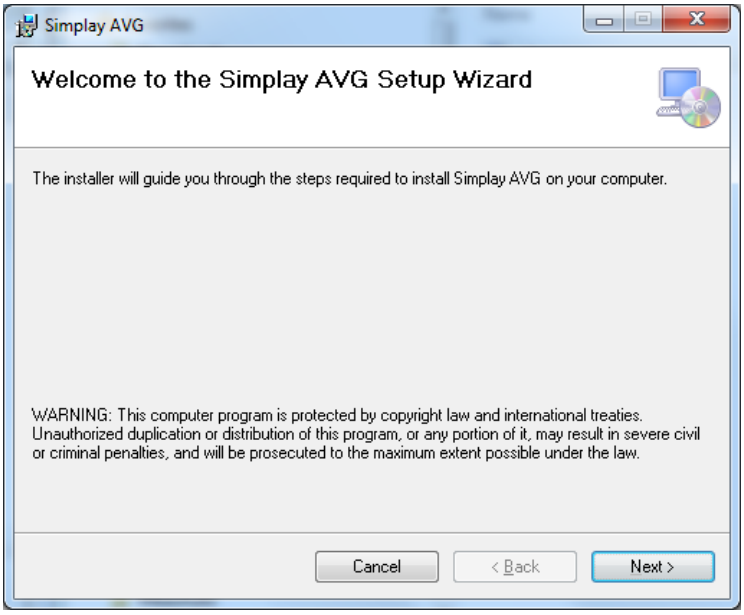


Figure 3.6. Welcome to the AVG Setup Wizard

3. When the SL-881 AVG software installation is completed, the AVG application shortcut is created on your desktop (as shown in Figure 3.7).

Figure 3.7. AVG Application Shortcut

3.5. Licensing

If you install the SL-881 AVG software for the first time, you need to set up the connection between the SL-881 and test computer, and then get an AVG software license.

If you already have the AVG software license, you can set up the connection between the SL-881 and test computer, and use the AVG software directly.

3.5.1. Getting License File

You need to get and load the license file to activate the software.

If you install the AVG software for the first time, follow these steps to get an AVG software license.

1. Make sure the SL-881 is powered on and is connected to your test computer. Open the SL-881 Application shortcut from your test computer desktop (Figure 3.7). You get the main window of the AVG software (Figure 3.8).

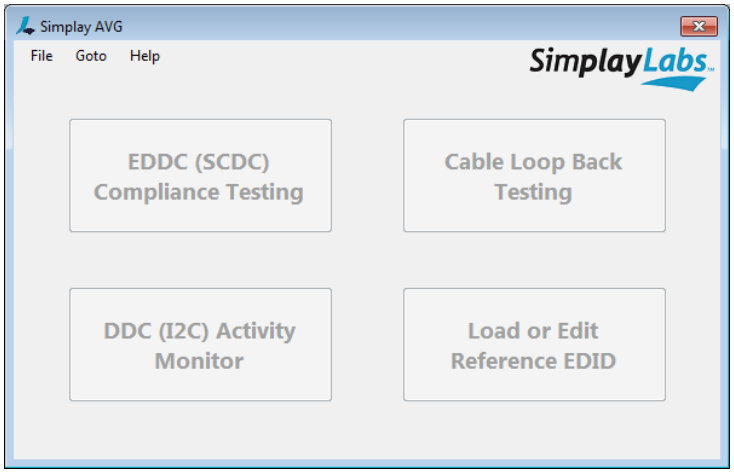


Figure 3.8. AVG Software Main Window on Test Computer

2. Select File → Open Device → Connect Device.
3. From the drop-down menu of this dialog, select the COM port shown in the Device Manager (Figure 3.9).

Figure 3.9. Connect Device Dialog

4. Click Open.
5. A dialog pops up as shown in Figure 3.10. Click OK.

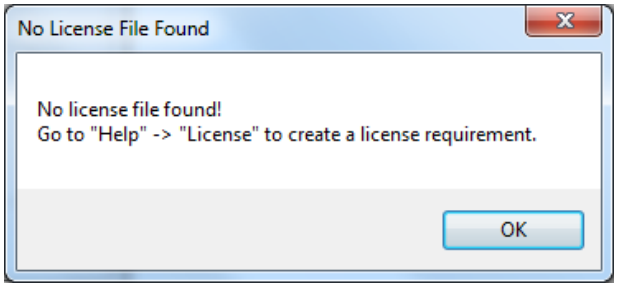


Figure 3.10. No License File Found Dialog

6. From the AVG software main window (Figure 3.8), choose Help → License. The License Manager dialog appears (Figure 3.11).

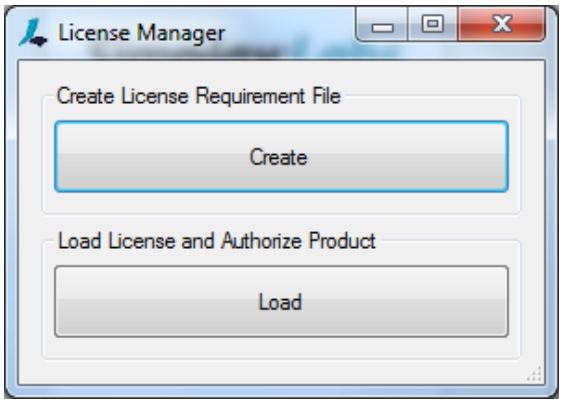


Figure 3.11. License Manager Dialog

7. Click Create to generate a license requirement file (*.avg).
8. The Windows Save as dialog pops up (Figure 3.12). Save this license requirement file to your test computer.

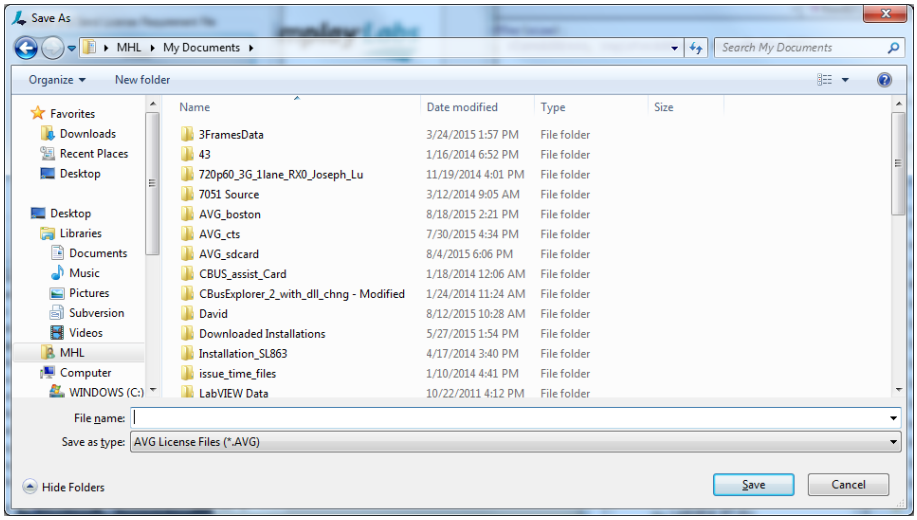


Figure 3.12. The Windows Save As Dialog

9. The Send License Requirement File dialog pops up (Figure 3.13).

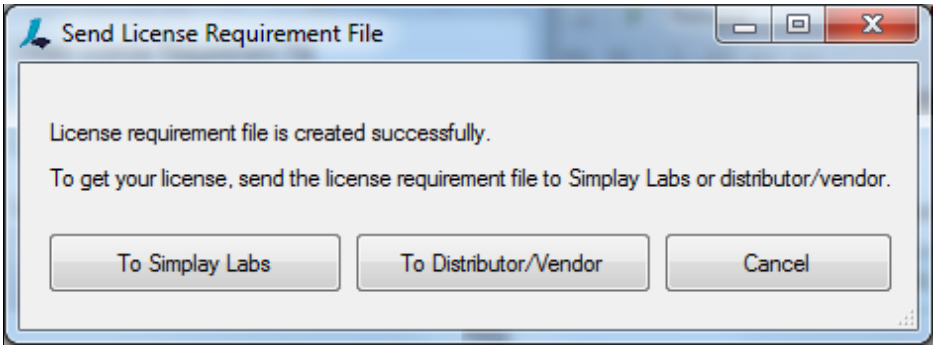


Figure 3.13. Send by Email Dialog

10. If you purchased your SL-881 directly from Simplay Labs, click To Simplay Labs. The Windows explorer pops up, pointing you to the license requirement file you previously saved. Then Microsoft Outlook window pops up. Manually attach the license requirement file (*.avg) which you previously saved to the email (Figure 3.14). Send it to tools@simplaylabs.com to request a license file (*.lic). Simplay Labs will send the license file back to you.

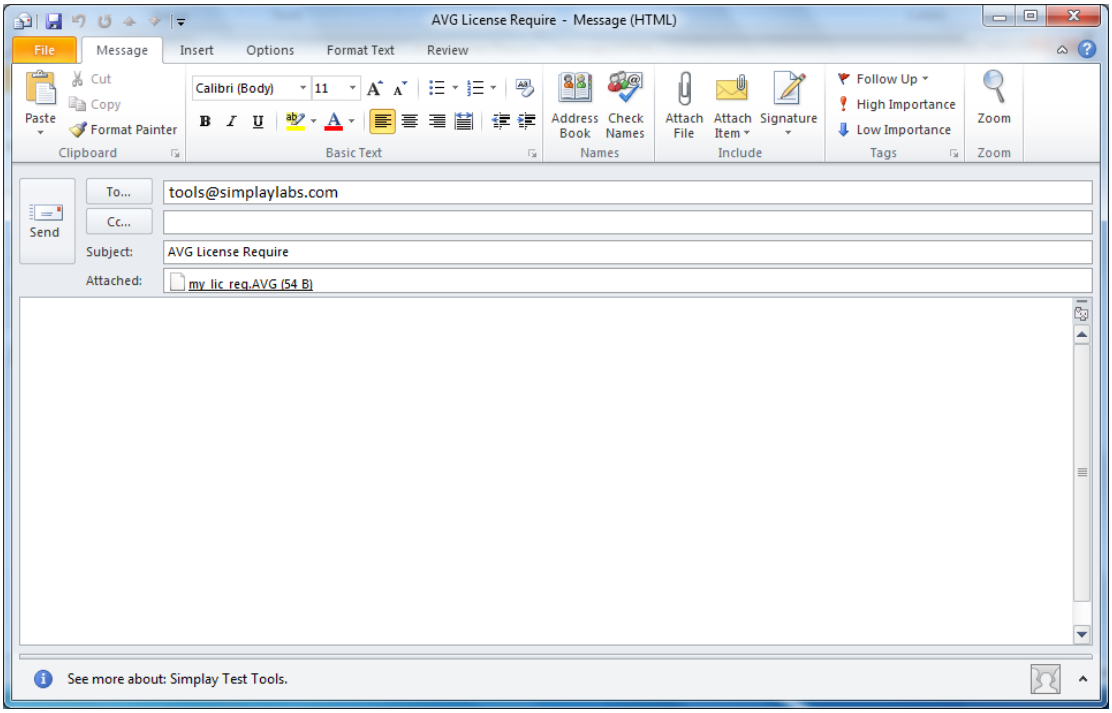


Figure 3.14. License Requirement File to Simplay Labs

If you purchased your SL-881 from a distributor/vendor, click To Distributor/Vendor. The Windows explorer pops up, pointing you to the license requirement file you previously saved. Then Microsoft Outlook window pops up. Manually attach the license requirement file (*.avg) which you previously saved to the email. Fill in your distributor/vendor's email address. Send the email to your distributor/vendor. The distributor/vendor will forward this request to Simplay Labs and purchase the license key on your behalf. The distributor/vendor will send the license file back to you.

3.5.2. Loading License File

After getting a license file (*.lic), you need to load the license file to activate the software and yet to access enhanced test functionality of the SL-881.

Follow these steps to load the license file.

1. Save the license file to your test computer.
2. Make sure your test computer is connected to the SL-881.
3. Go back to the AVG software main window (Figure 3.8). Select File → Open Device → Connect Device.
4. From the drop-down menu of this dialog (Figure 3.9), select the COM port shown in the Device Manager.
5. Click Open.

6. No License File Found dialog pops up as shown in Figure 3.10. Click OK. After that, the Help → License menu item is enabled (Figure 3.15).

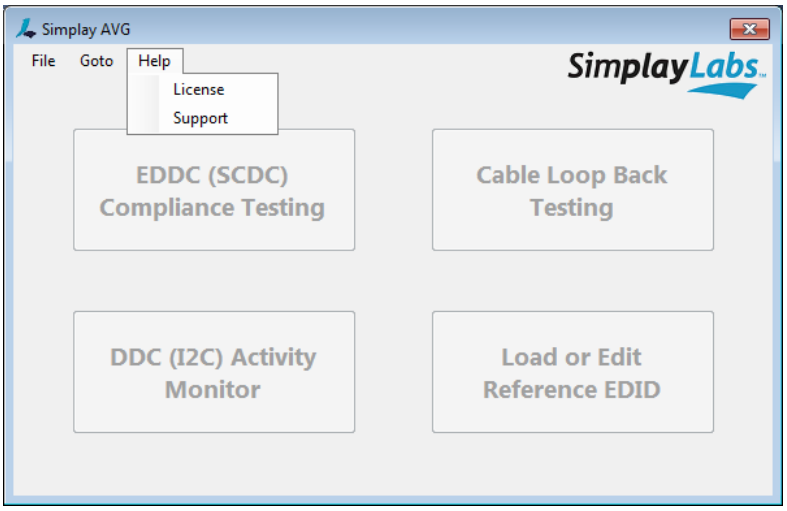


Figure 3.15. License Menu Item Enabled

7. Choose Help → License.
8. The License Manager dialog appears (Figure 3.11). Click Load to load the license file (*.lic).
9. After loading the license file, from the AVG software main window, the EDDC (SCDC) Compliance Testing, the DDC (I2C) Activity Monitor, and the Load or Edit Reference EDID options are enabled, as shown in Figure 3.16. The connection between the SL-881 and your test computer is completed. You can start using the SL-881 AVG software.

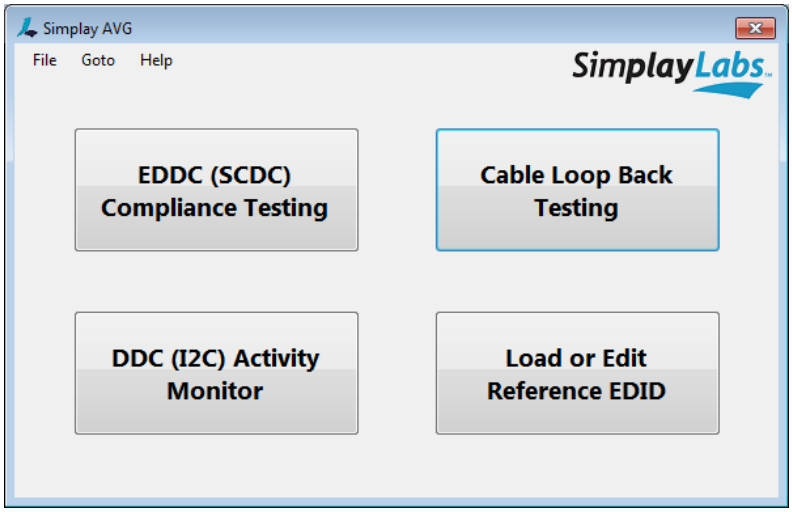


Figure 3.16. Options Enabled in AVG Software Main Window

Note: The Help → Support menu item (Figure 3.15) points you to the Simplay Labs website for technical support information.

4. Enhanced SL-881 AVG Test Mode

After you purchased SL-881 software and install the software to the test computer, you can access those enhanced functionality of the SL-881 via your test computer, including performing EDDC (SCDC) compliance test, running Cable Loop-back test, monitoring DDC, and Editing EDID files, i.e. in its enhanced test mode. In this enhanced test based mode, use the SL-881, 5 V power, mini-USB cable, and HDMI cable to run those optional features.

You can also control SL-881 with a console application of Windows to build SL-881 in your own automation test.

Note: In this enhanced test mode, the LCD touch screen of the SL-881 is not operational. Most of the operation is performed on your test computer, unless there is message pop up prompting you to check the connections between the devices and the SL-881.

4.1. Performing EDDC Compliance Test

1. From the AVG software main window of your test computer (Figure 3.16), click EDDC (SCDC) Compliance Testing. The EDDC Compliance Test window appears (Figure 4.1).
2. From the EDDC Compliance Test window, select the Source DUT or Sink DUT radio button.

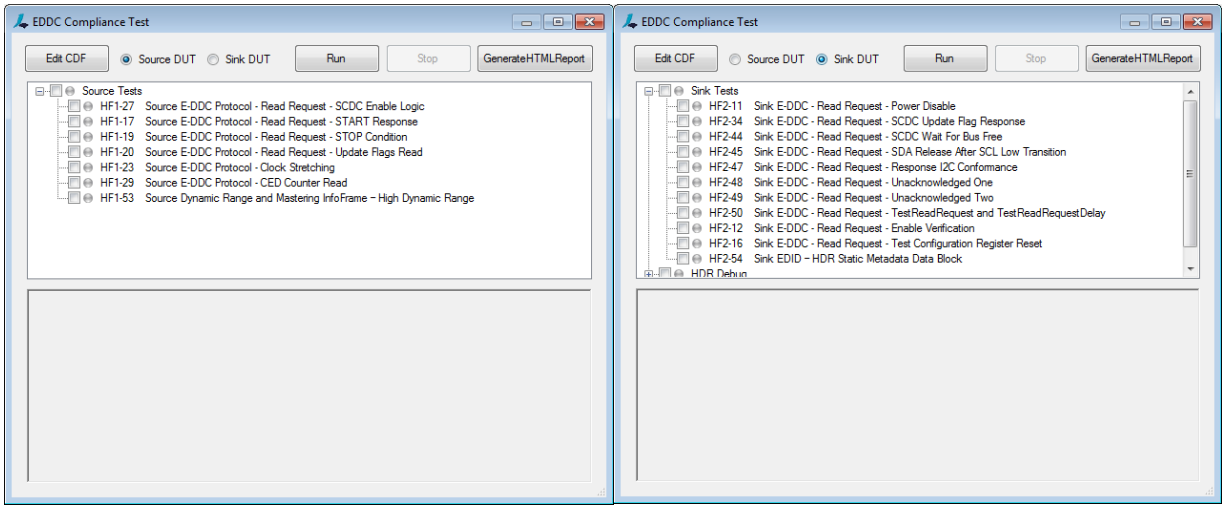


Figure 4.1. EDDC (SCDC) Compliance Test Windows

3. Click the Edit CDF button. CdfSource or CdfSink dialog pops up (Figure 4.2). You can customize the information to your need in the dialog.

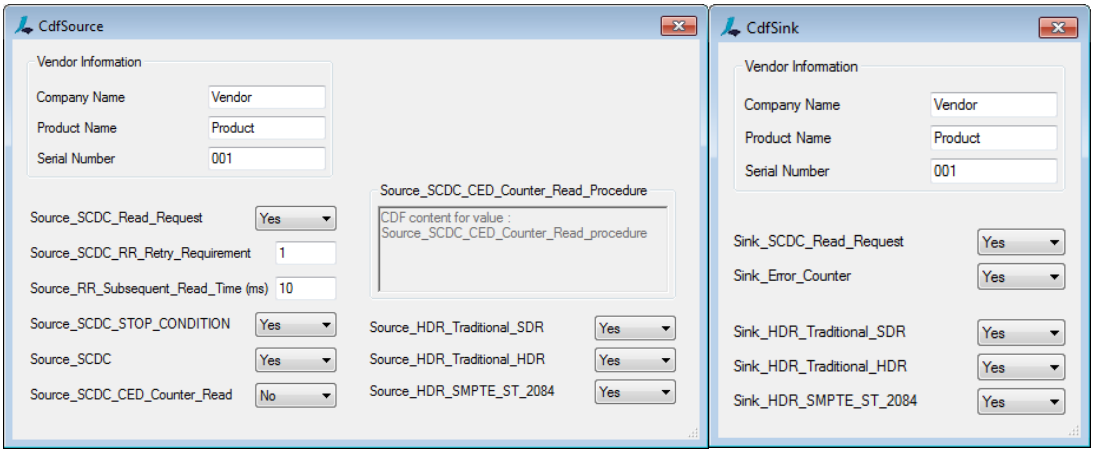


Figure 4.2. CdfSource and CdfSink Dialogs

4. After editing CDF variables, choose the items from the Source Tests area or the Sink Tests area (Figure 4.1). Click Run to run the selected items.
5. A dialog pops up (Figure 4.3) asking you to connect the source or sink device to the test computer. After the connections are set up, click OK.

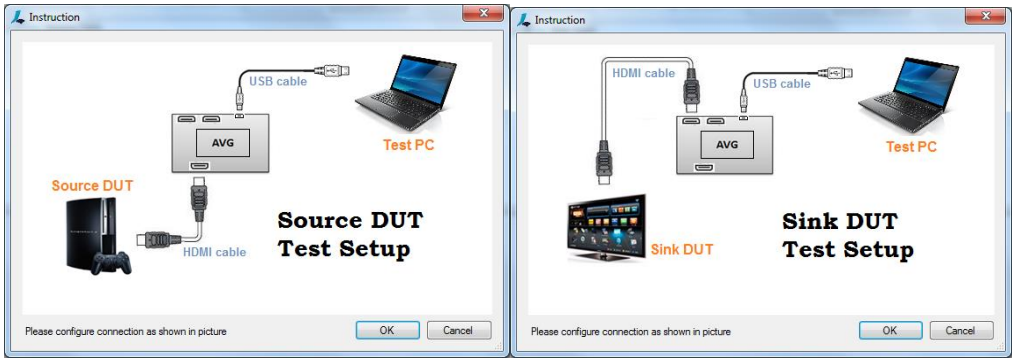


Figure 4.3. Instruction Dialogs

6. The selected tests run as shown below (Figure 4.4 and Figure 4.5).

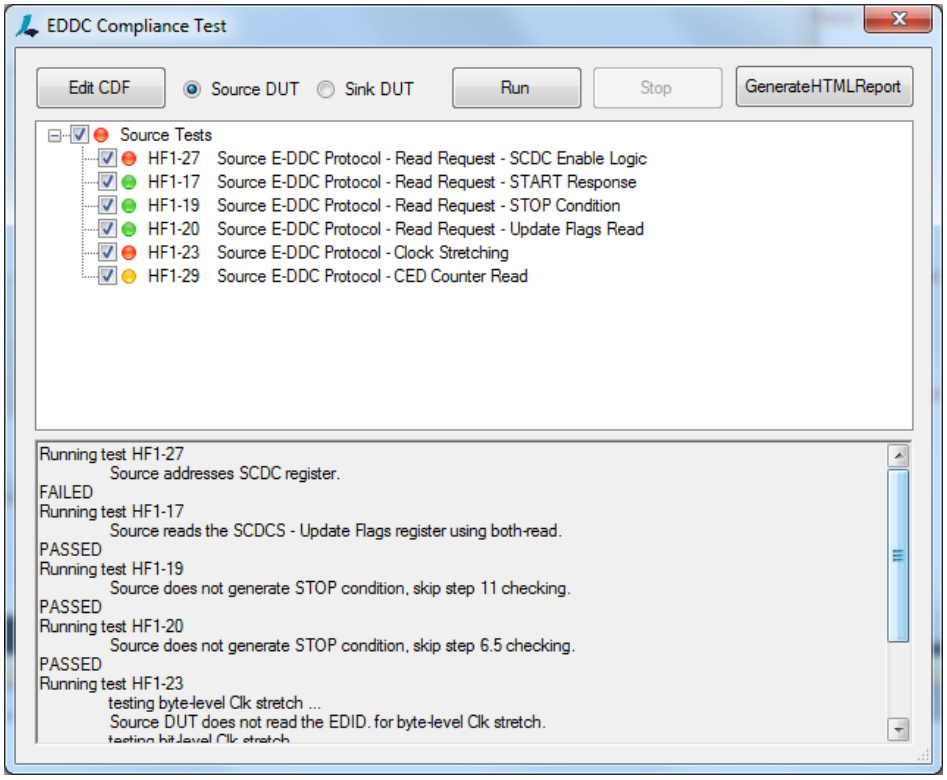


Figure 4.4. EDDC Source Test with Log File

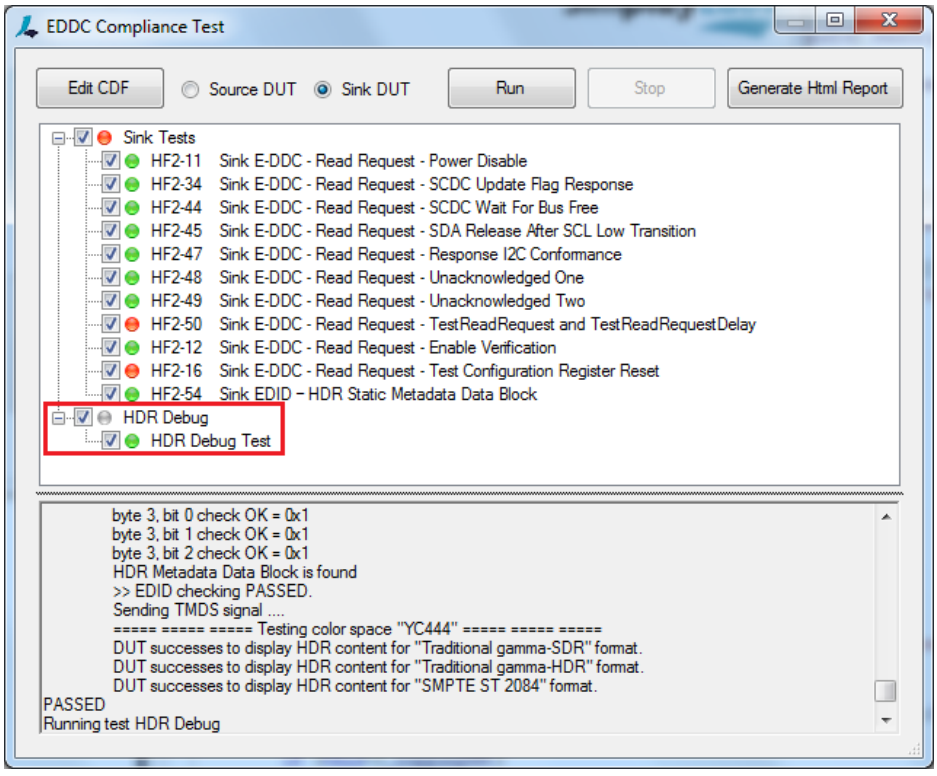


Figure 4.5. EDDC Sink Test with Log File

7. This step is Sink-Test-specific.

HDR Debug Test is one of the selected tests in the Sink Tests. When HDR Debug Test in Sink Tests is running, HDR Palette window pops up (Figure 4.6).
HDR Debug Test is available only in the Sink Tests of the EDDC Compliance Test. This HDR Debug Test feature is available since SL-881 AVG software version 1.16 and hardware version 2.10015008. To download the software, refer to Downloading the SL-881 AVG Software.

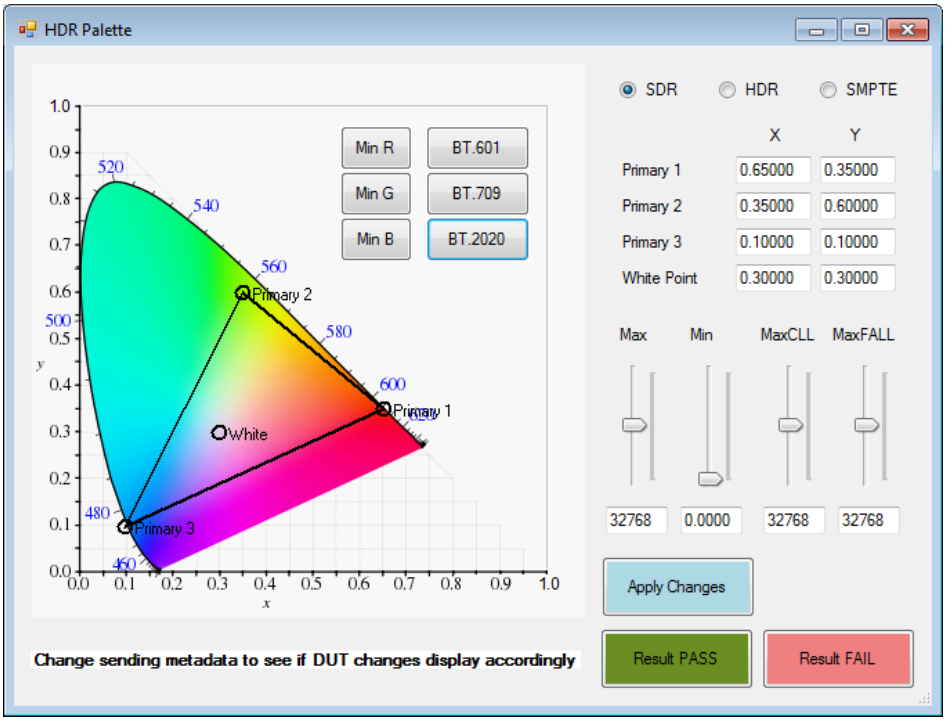


Figure 4.6. HDR Palette Window

- Use SDR, HDR, or SMPTE radio button to select HDR infoFrame type.
- Use Min R, Min G, and Min B buttons to set Primary points to reflect minimum Red, Green, and Blue coloremetry.
- Use BT.601, BT.709, and BT.2020 buttons to set Primary points to reflect BT.601, BT.709, and BT.2020 coloremetry.
- Fill in Primary 1, Primary 2, Primary 3, and White Point fields to set Primary and White points with arbitrary values. The primary range is from 0 to 1.0.
- Drag the circle points in the coordinate axis to set Primary and White points with arbitrary values.
- Use slider bar Max, Min, MaxCLL, and MaxFALL to adjust luma parameters for HDR infoFrame.
- Use Apply Changes button to control AVG platform to send new HDR infoFrame based on current selections.
- Click Press Result PASS or Result FAIL button to end the test. Select which button that depends on customers' expection of the sink device in this test.

8. After all the selected tests, for either Source Test or Sink Test in the EDDC compliance test, are completed, right click on the test case. Click “View DDC Waveform” to get a detailed DDC log (Figure 4.7).

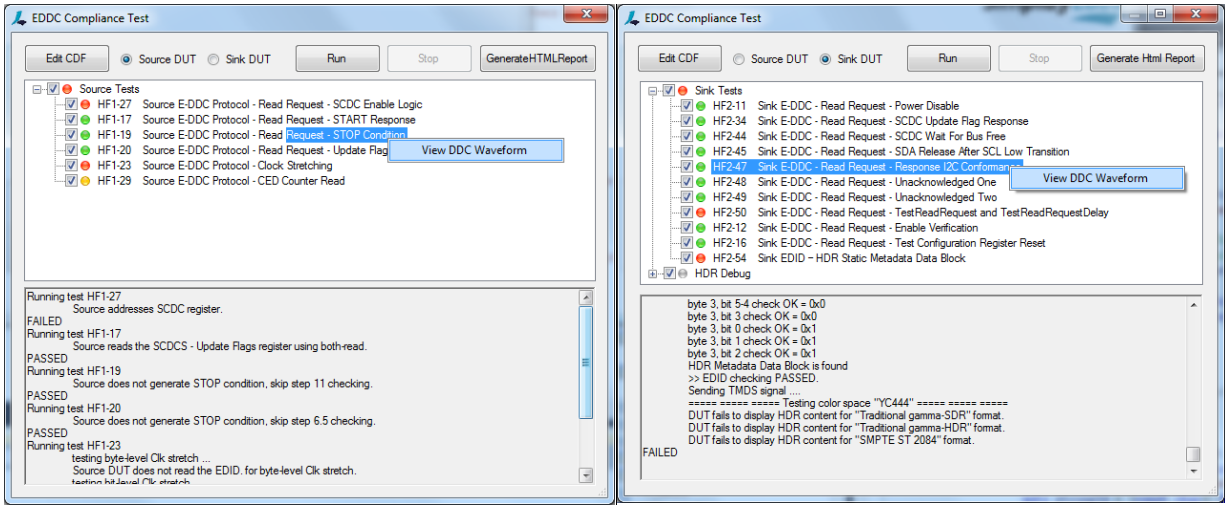


Figure 4.7. DDC Waveform Viewer

9. Following is a sample DDC Waveform (Figure 4.8).

Note: DDC Waveform viewer feature is available since SL-881 AVG software version 1.16 and hardware version 2.10015008. To download the software, refer to Downloading the SL-881 AVG Software.

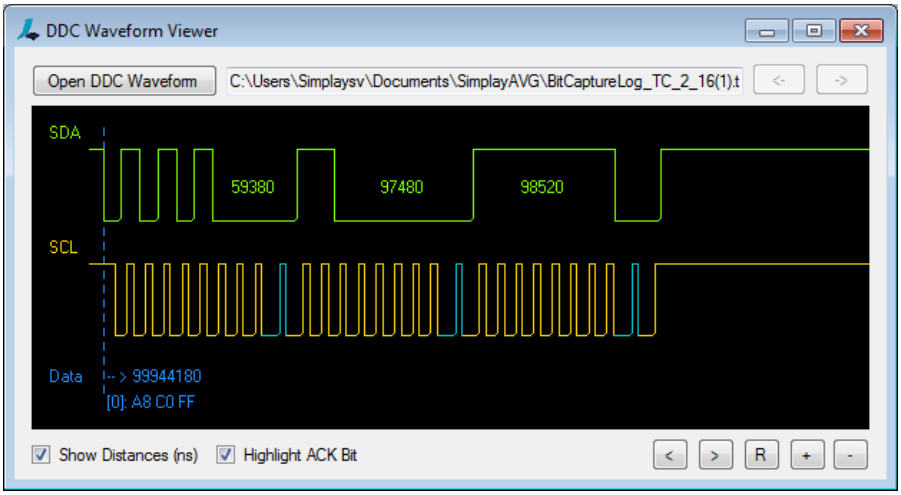


Figure 4.8. Sample DDC Waveform

- Use Open DDC Waveform button to load desired DDC waveform file.
- Use “<-” and “->” buttons to view previous and next DDC waveform file.
- Use “R” button to reset waveform displaying.
- Use “<” and “>” buttons to navigate to previous and next DDC transaction.
- Use “+” and “-“ buttons to zoom in and zoom out waveform displaying.

10. When the EDDC compliance test completes, you can get a report file in HTML format by clicking the Report button (Figure 4.1). Following is a sample report (Figure 4.9).

Simplay Labs
Simplay SL881 AVG

Test Information

Simplay AVG	SW Version : 1.16 FW Version : 2.10 HW Version : 8 (2016-6-23) CTS Version : 8

CDF Information	**Company Name = Vendor** **Product Name = Product** **Serial Number= 001**	Source_SCDC_Read_Request = Yes Source_SCDC_RR_Retry_Requirement = 1 Source_RR_Subsequent_Read_Time = 10 Source_SCDC_STOP_CONDITION = Yes Source_SCDC = Yes Source_SCDC_CED_Counter_Read = No Source_SCDC_CED_Counter_Read_Procedure = CDF content for value : Source_SCDC_CED_Counter_Read_procedure

Result Summary

Total : 6 Pass : 4 Fail : 2 Finish Time : 9/6/2016 3:52:28 PM

HF1-27 Source E-DDC Protocol - Read Request - SCDC Enable Logic	**PASSED**
HF1-17 Source E-DDC Protocol - Read Request - START Response	**PASSED**
HF1-19 Source E-DDC Protocol - Read Request - STOP Condition	**PASSED**
HF1-20 Source E-DDC Protocol - Read Request - Update Flags Read	**PASSED**
HF1-23 Source E-DDC Protocol - Clock Stretching	**FAILED**
HF1-29 Source E-DDC Protocol - CED Counter Read	**PASS_SKIP**
HF1-53 Source Dynamic Range and Mastering InfoFrame - High Dynamic Range	**FAILED**

Test Log

> ------ Start Time : 9/6/2016 3:47:28 PM ------
> Running test HF1-27
> Toggle HPD ...
> Source does not address SCDC register when RR Capable is set to 0.
> Toggle HPD 2nd time ...
> Source DUT reads the EDID out.
> Source DUT does not write RR_Enable bit.
> Toggle HPD 3rd time ...
> Source DUT reads the EDID.
> Source DUT writes RR_Enable bit.
> Source DUT does not write RR_Enable bit before reading EDID data

Figure 4.9. Sample Test Report

4.2. Running Cable Loop-back Test

From the AVG software main window of your test computer (Figure 3.16), click Cable Loop-back Testing. The Cable Loop-back Test window appears (Figure 4.10).

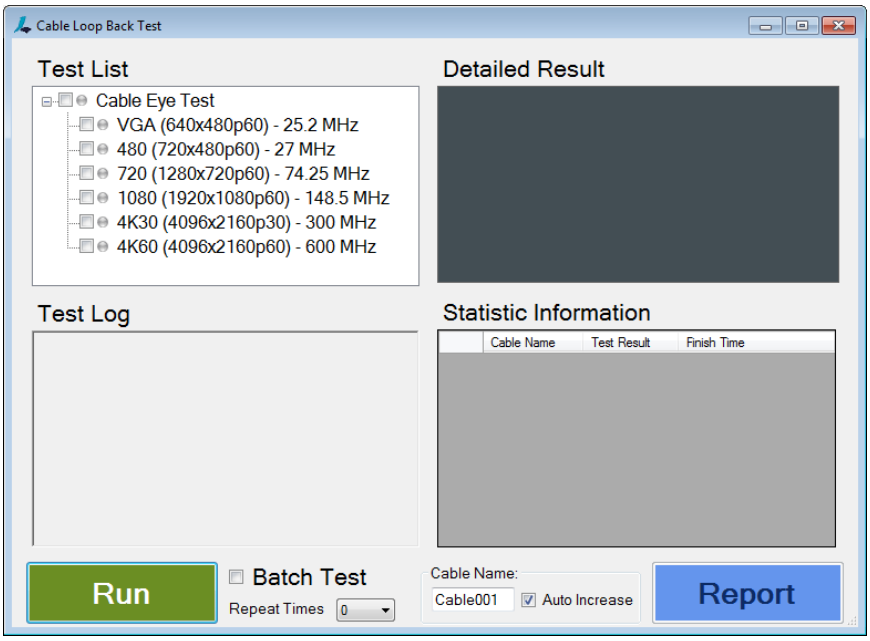


Figure 4.10. Cable Loop-back Test Windows

There are two modes of Cable Loop-back test, single mode and batch mode.

4.2.1. Single mode

If you want to run the test in single mode, be sure NOT to check the Batch Test checkbox (bottom area in Figure 4.10).

1. Select one or multiple items in the Test List area (Figure 4.11).

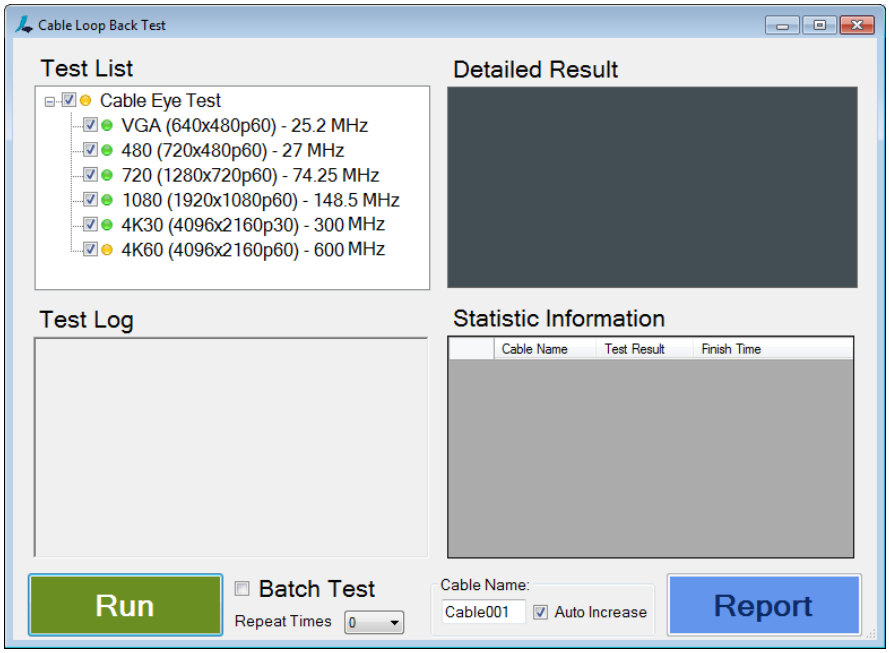


Figure 4.11. Selected Items in Test List

2. Select how many times to repeat the test from the Repeat Times area.
3. When Auto Increase checkbox is checked, Cable Name will be changed to Cable002 and increase after each complete test run.

   If the Auto Increase checkbox is not checked, Cable Name remains the same after each test.
4. Click Run to run the items selected in Step 1.
5. A dialog pops up (Figure 4.12) asking you to connect the cable device to the AVG platform. After the connections are set up, click OK.

   Note: Connect the cable to the 6G Output port which supports Cable Loop-Back test. The 3G Output port does not support Cable Loop-Back test.

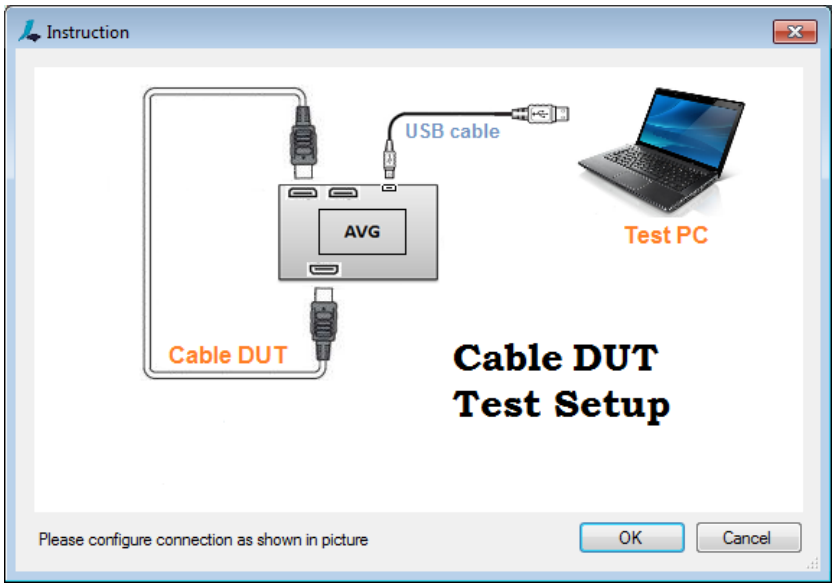


Figure 4.12. Cable DUT Test Setup

6. Start running test for the selected items, as shown in Figure 4.13.

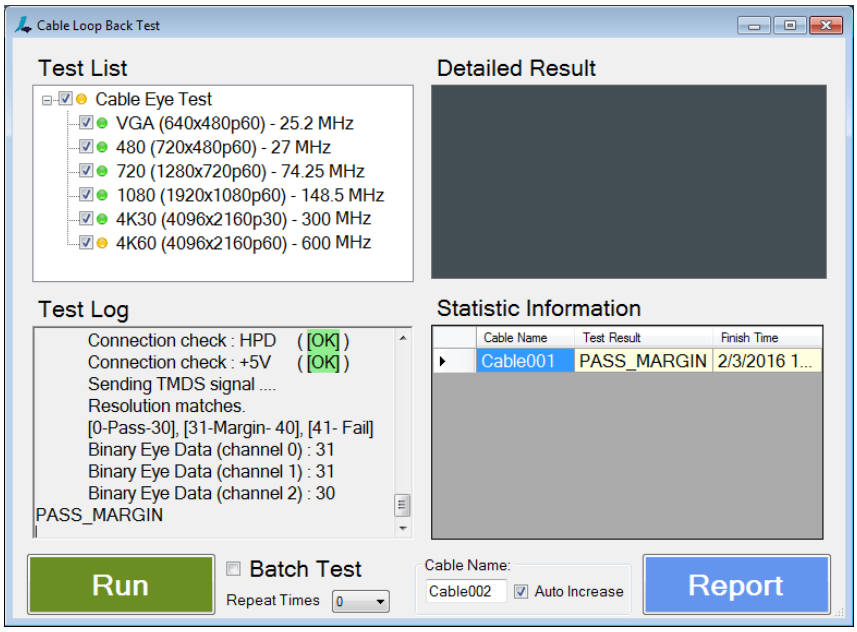
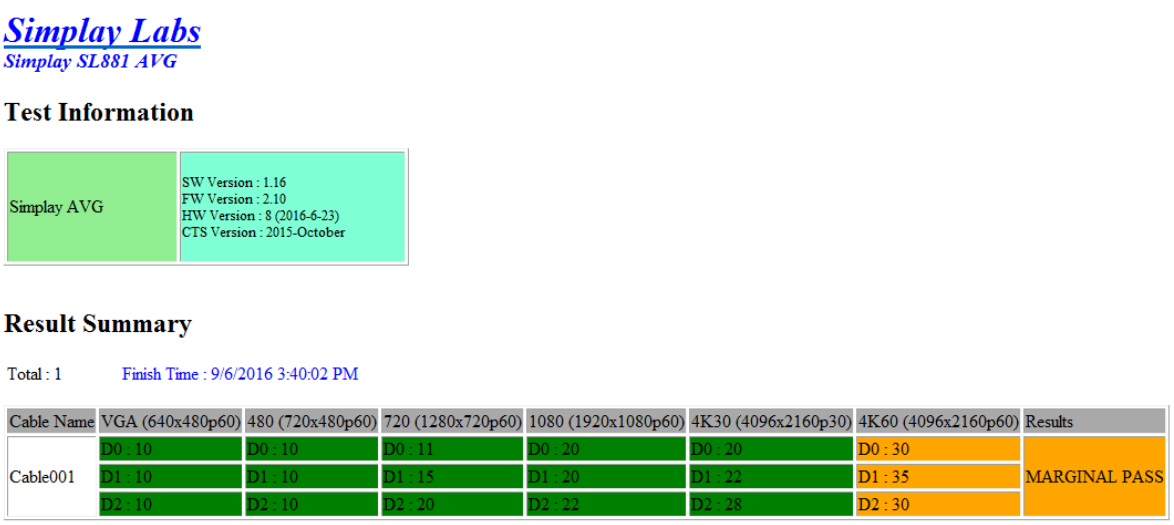


Figure 4.13. Cable Loop Test in the Single Mode

7. When the Cable Loop-back test completes, you can get a formatted report file by clicking the Report button (Figure 4.10). Following is a sample report (Figure 4.14).



Simplay Labs
Simplay SL881 AVG

Test Information

Simplay AVG	SW Version : 1.16 FW Version : 2.10 HW Version : 8 (2016-6-23) CTS Version : 2015-October

Result Summary

Total : 1 Finish Time : 9/6/2016 3:40:02 PM

Cable Name	VGA (640x480p60)	480 (720x480p60)	720 (1280x720p60)	1080 (1920x1080p60)	4K30 (4096x2160p30)	4K60 (4096x2160p60)	Results
Cable001	D0 : 10	D0 : 10	D0 : 11	D0 : 20	D0 : 20	D0 : 30	MARGINAL PASS
	D1 : 10	D1 : 10	D1 : 15	D1 : 20	D1 : 22	D1 : 35	
	D2 : 10	D2 : 10	D2 : 20	D2 : 22	D2 : 28	D2 : 30	

Figure 4.14. Sample Test Report

4.2.2. Batch mode

When running in the batch mode:

1. Check the Batch Test checkbox (Figure 4.15).
2. Select item(s) in the Test List area (Figure 4.15).
3. Use Repeat Times listbox to select how many times to repeat the test.
4. When Auto Increase checkbox is checked, Cable Name will be changed to Cable002 and increase after each complete test run.

   If the Auto Increase checkbox is not checked, Cable Name remains the same after each test.
5. Click Run (Figure 4.10).
6. Follow the instructions in the Test Log area to run the Cable Loop-back test (Figure 4.15).

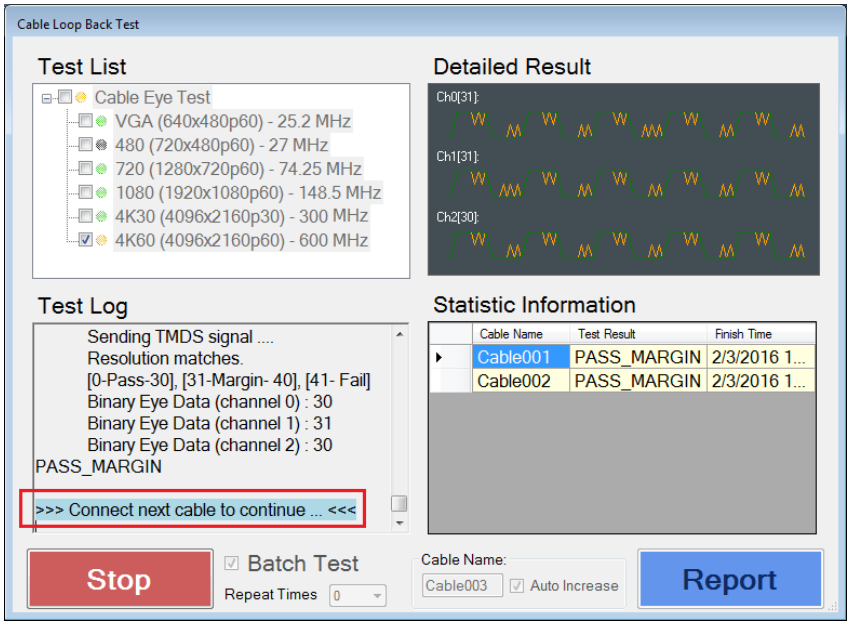


Figure 4.15. Cable Loop Test in the Batch Mode

Notes:

Except running in Batch Test mode, you need to check all resolutions under Cable Loop-back Test window to see a result in Statistic Information area.

7. After the testing is completed, click the item in the Test List area. The detailed result will be shown in the Detailed Result area (Figure 4.16). The green lines show the ideal signal waveform. The orange triangles show the noise jitter detected during the test.

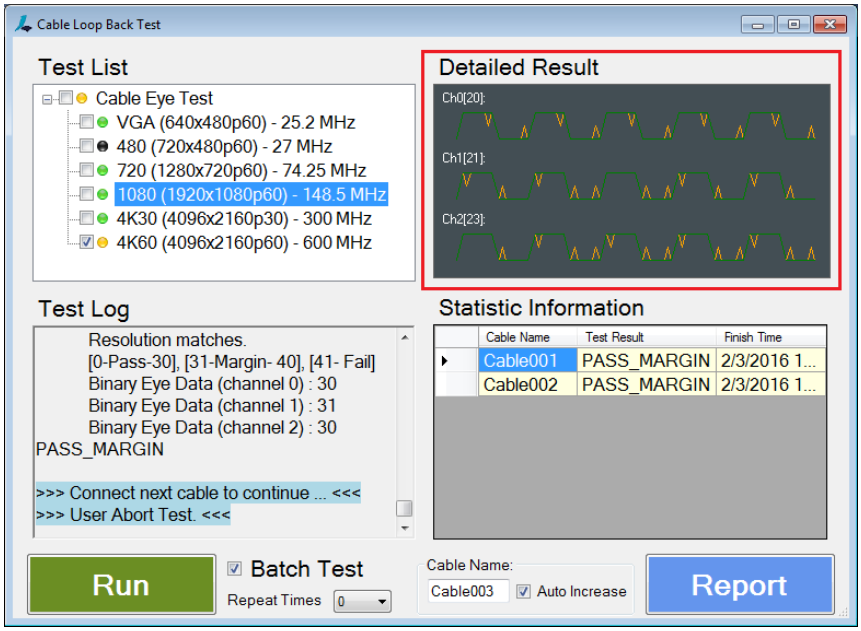


Figure 4.16. Cable Loop Test - Detailed Result Area

8. Click the Report button (Figure 4.16). The Report file in HTML format is opened, and is automatically saved under Documents\SimplayAVG folder, name of which is CableTestSummary.html.
9. Items in the Statistic Information area can be deleted (Figure 4.16) by selecting an item row and pressing the delete key (on your keyboard).

4.3. Monitoring DDC

1. From the AVG software main window of your test computer (Figure 3.16), click DDC (I2C) Activity Monitor. The DDC (I2C) Monitor window appears (Figure 4.17).
2. From the DDC Monitor window, to decide which DDC bus to monitor, select the Rx Port, Tx Port, or External radio button.

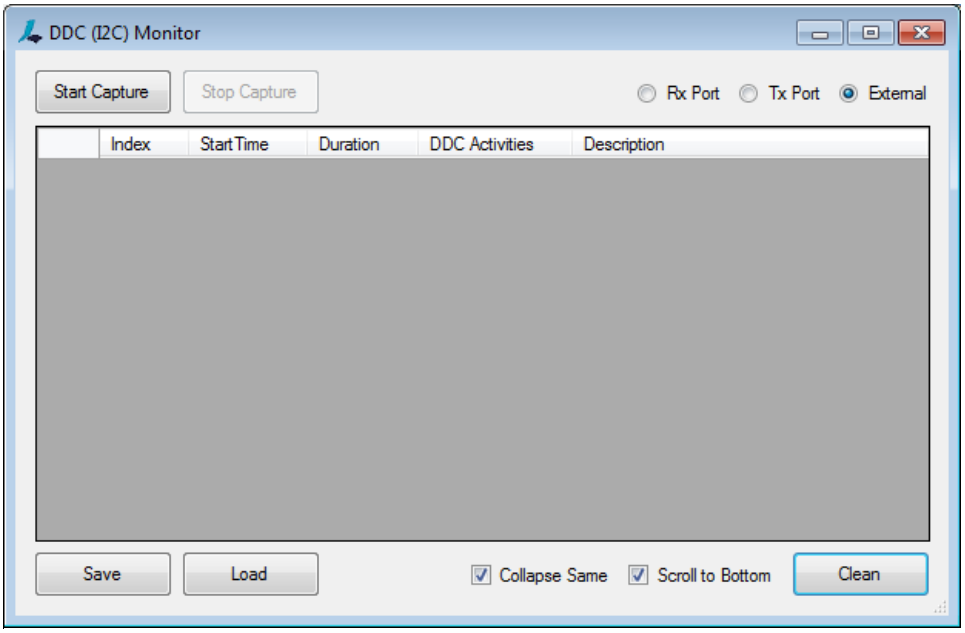


Figure 4.17. DDC Monitor Test Window

- When you select the Rx Port radio button, a dialog pops up (Figure 4.18) asking you to connect the source device to the test computer. After the connection is set up, click OK.

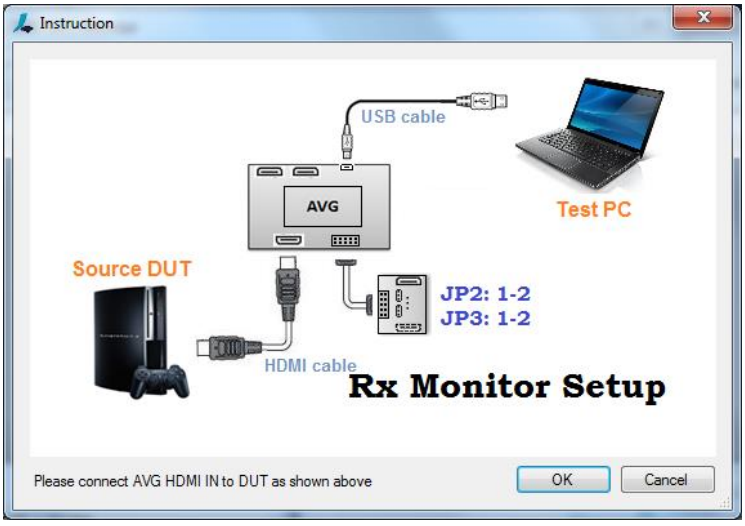


Figure 4.18. Input Port Monitor Instruction Dialog

- When you select the Tx Port radio button, a dialog pops up (Figure 4.19) asking you to connect the sink device to the test computer. After the connection is set up, click OK.

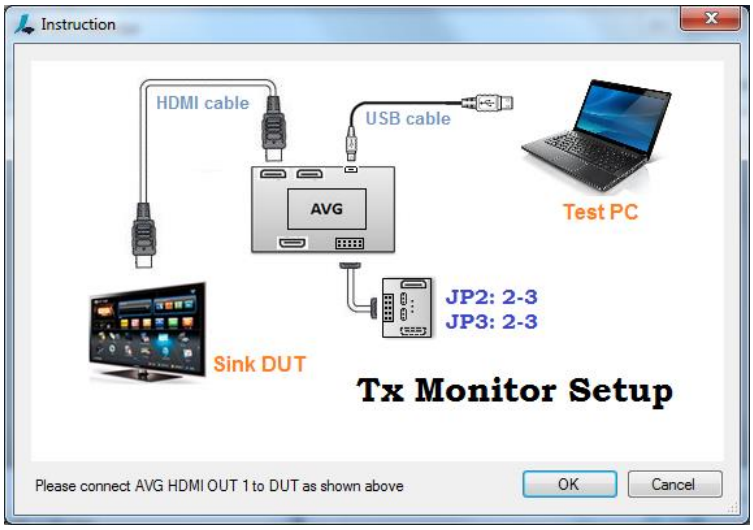


Figure 4.19. Output Port Monitor Instruction Dialog

- When you select the External radio button, a dialog pops up (Figure 4.20) asking you to connect the sink and source devices to the test computer. After the connection is set up, click OK.

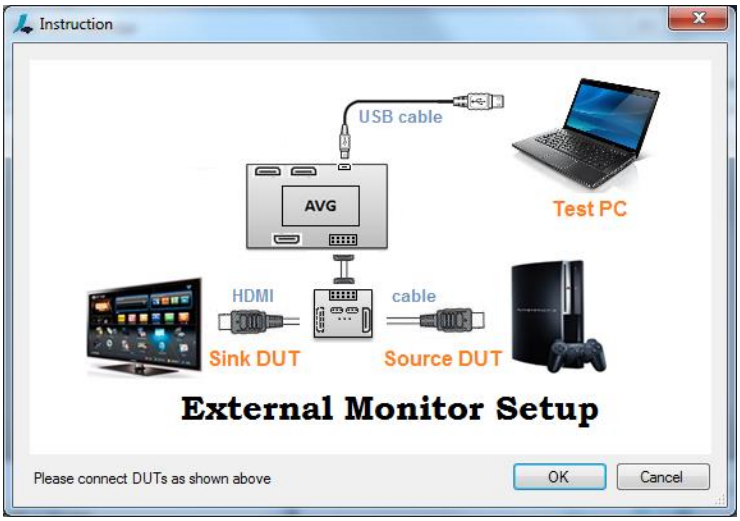


Figure 4.20. Pass Through Monitor Instruction Dialog

3. Click the Start Capture button to start the DDC monitor (Figure 4.21). DDC activities are logged and decoded.

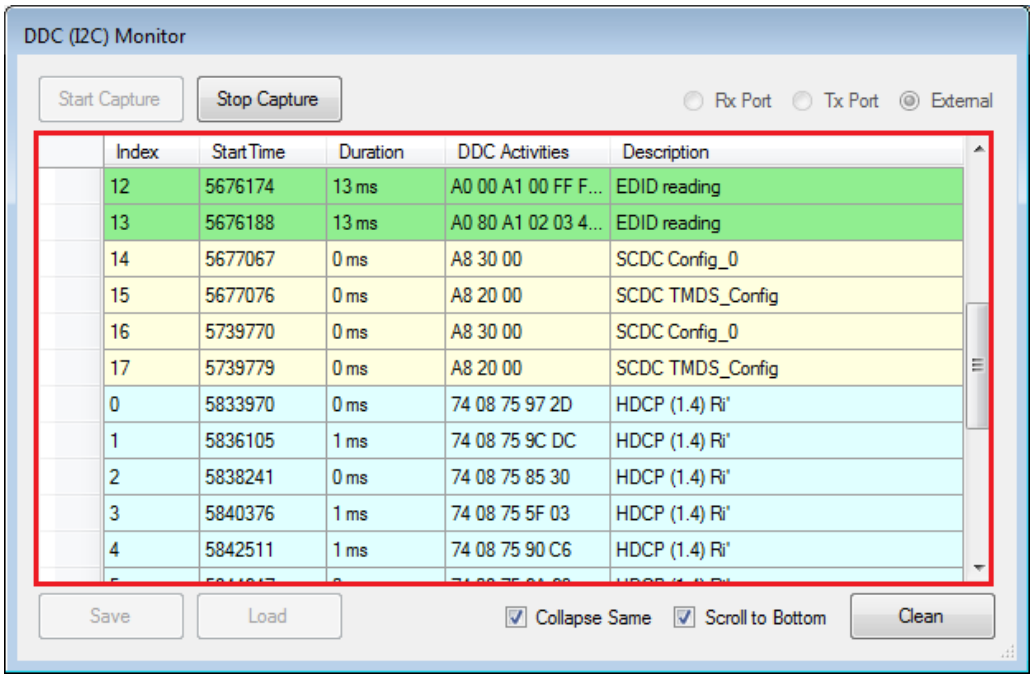


Figure 4.21. DDC Monitor Activities Window

4. Check Scroll to Bottom option (Figure 4.21) to scroll the current log to the bottom.
5. Check Collapse Same option (Figure 4.21) to collapse the same log.
6. Click the Clean button (Figure 4.21) to clean the current log and decoding data displayed in the window when necessary.
7. Click the Save button (Figure 4.21) to save the current log to local PC.
8. Click the Load button (Figure 4.21) to load back log file from PC.
9. Right click the log area, the area in red box (Figure 4.21), to show filter items.
10. Check or uncheck the filter items (Figure 4.22) to show different DDC log accordingly.

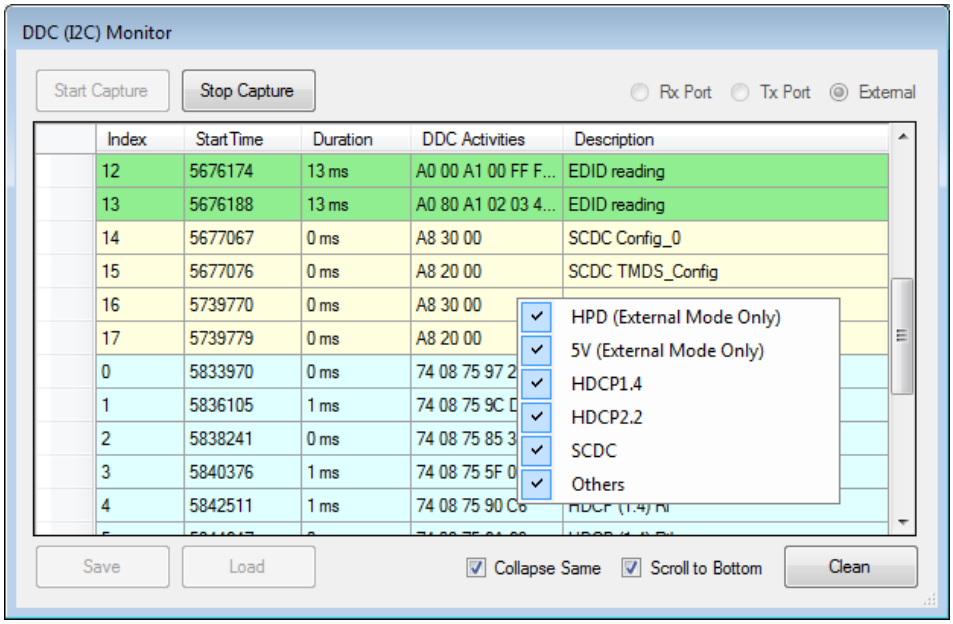


Figure 4.22. DDC Log Filter

4.4. Editing EDID

1. From the AVG software main window of your test computer (Figure 3.16), click Load or Edit Reference EDID.
2. From the EDID Editor window, select the EDID which you want to review, edit or program to the SL-881 (Figure 4.23).

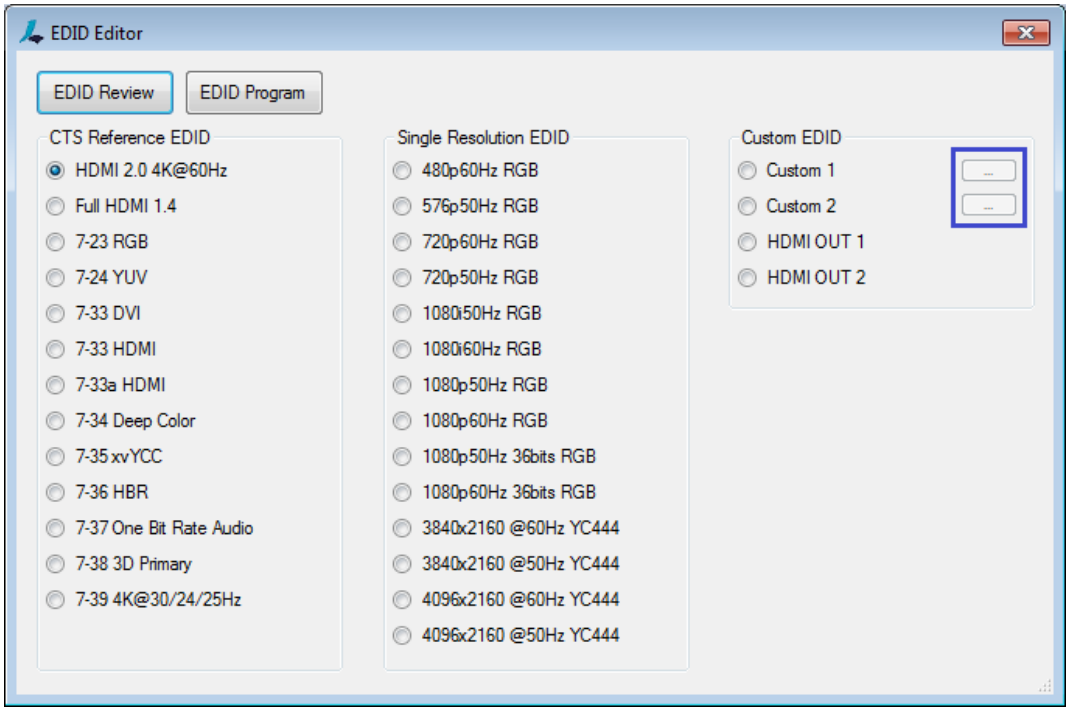


Figure 4.23. EDID Editor Test Window

- Reviewing EDID file
  To review selected EDID data, click the EDID Review button (Figure 4.23). EDID Review/Edit window appears (Figure 4.24). Contents of the EDID file are displayed.

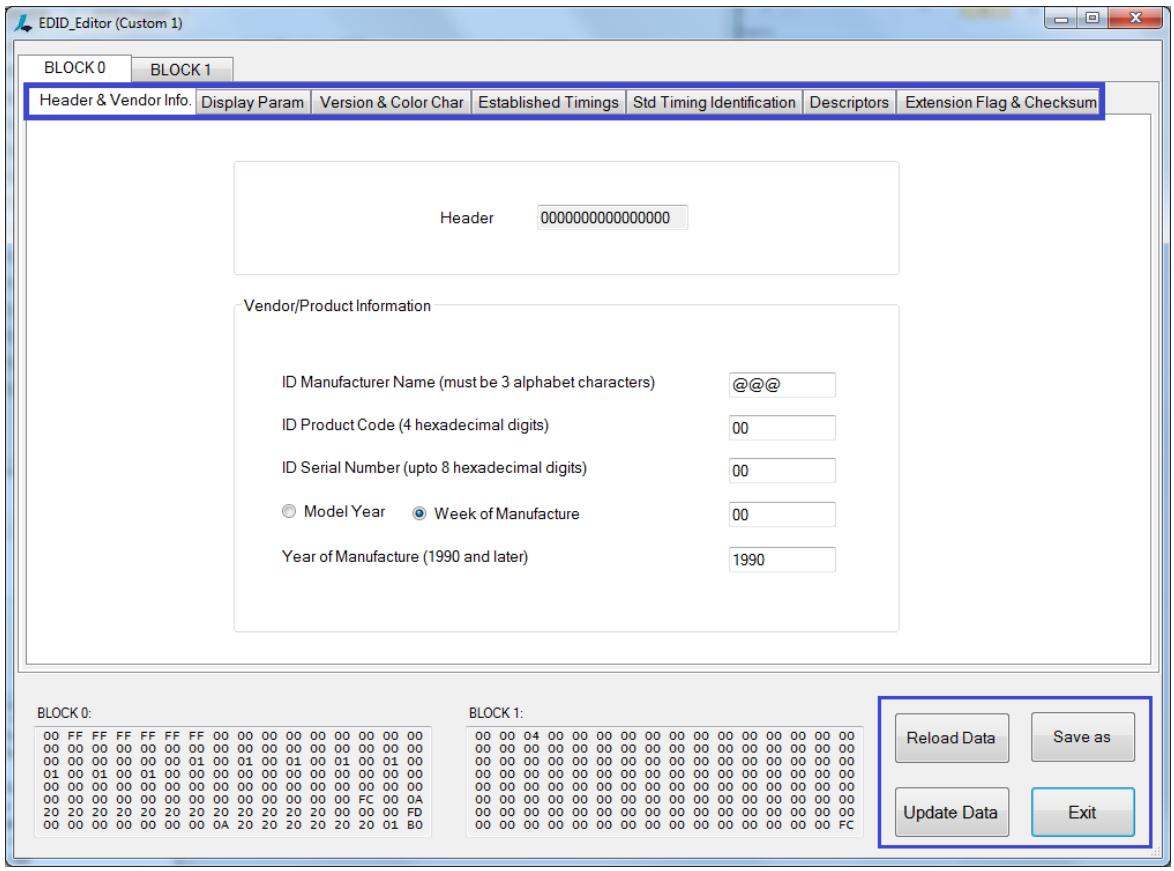


Figure 4.24. EDID Review/Edit Window

- Editing selected EDID data

  You can load your own EDID file. After that, you can edit the EDID file.

  - Loading Customer's EDID data
    - A. Choose Custom 1 from the Custom EDID area (Figure 4.23). If you need to load second EDID data, choose Custom 2. Custom 1 and Custom 2 can be chosen randomly.
    - B. Click "..." (the blue box in Figure 4.23) to load customer's EDID data, in either binary (*.bin) or text (*.txt) format. When customer's EDID data is selected to load, the EDID Review button changes to the EDID Edit button in the EDID Editor Test window.
    - C. Click the EDID Edit button. EDID contents are displayed in detail in the EDID Review/Edit window (Figure 4.24).
  - Modifying the EDID contents.
    - A. Select the tab, contents of which you want to modify (Figure 4.24).
    - B. Modify the data on that tab.
    - C. Click the Update Data button to apply the changes. If you need to go back to the original data, click the Reload Data button to reload the original EDID contents.
    - D. Click Save as to save the modified EDID contents. You can save the contents in text (*.txt) or binary (*.bin) format.

- Programming EDID file
  To program selected EDID data into EDID contents of the SL-881 HDMI IN port, click the EDID Program button (Figure 4.23). Once the programming completes successfully, a dialog pops up (Figure 4.25). Click OK.

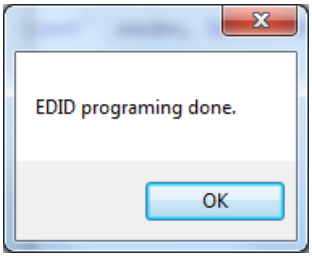


Figure 4.25. EDID Program Done Dialog

4.5. Running with Console Application of Windows

This section describes how to use a console interface to control the SL-881 AVG platform.

Note: This function is available since SL-881 AVG software version 1.16 and hardware version 2.10015008. To download the software, refer to Downloading the SL-881 AVG Software.

4.5.1. Hardware and Software Requirements

The following hardware and software are required to run the SL-881 with console control:

- Hardware requirements:
  - SL-881 AVG platform (Figure 1.1)
  - USB A to USB mini-B cable
- Software requirements:
  - Console application of Windows (cmd.exe)
  - AVG_Console.exe (Figure 4.26)

Figure 4.26. AVG_Console.exe

4.5.2. Getting Started

Follow the procedures described in this section to setup the console application.

1. Power on the SL-881.
2. Connect mini-B cable from PC to the SL-881.
3. Invoke Command Prompt window. Press “Win + R” to start “cmd.exe” (Figure 4.27).

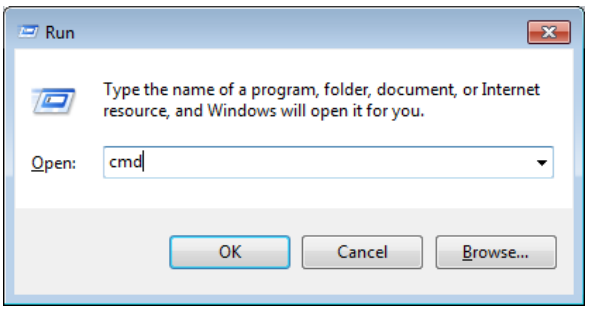


Figure 4.27. Running cmd.exe

4. From the Windows explorer, navigate to the folder where AVG_Console.exe locates.
   A typical location is “C:\Program Files (x86)\Simplay Labs\Simplay AVG”.
   Manually typing the path of AVG_Console.exe in the Command Prompt window (Figure 4.28).

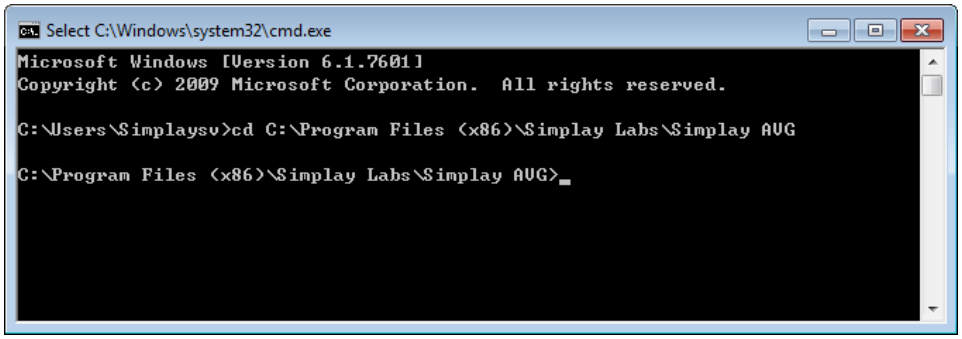


Figure 4.28. Entering AVG_Console.exe Path

5. Run “AVG_Console.exe” with parameters (Figure 4.29). Supported parameters are listed in Table 4.1.

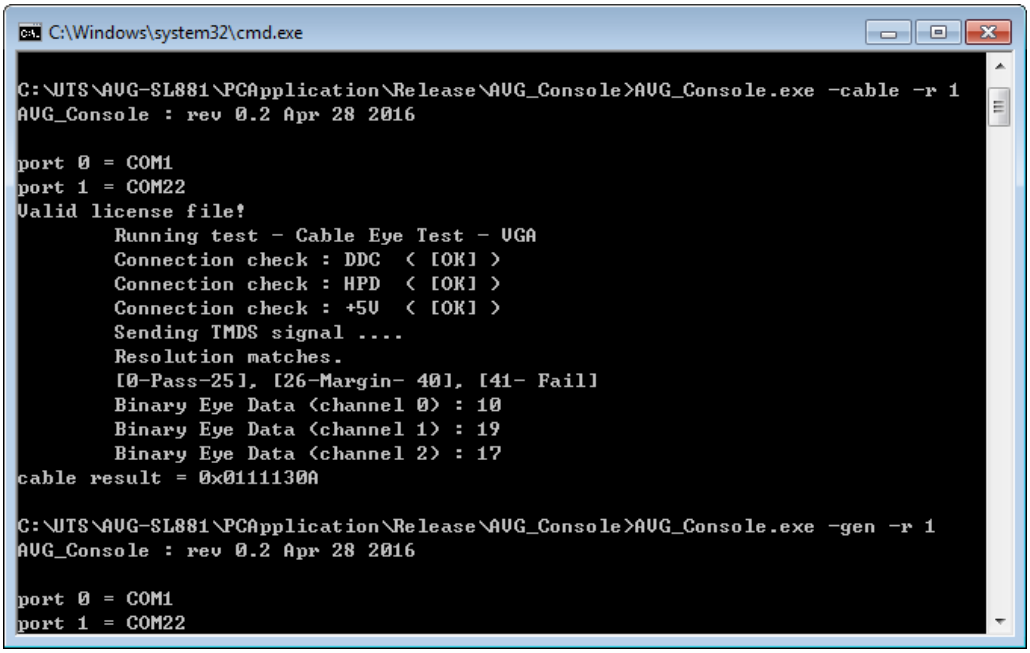


Figure 4.29. Running AV_Console.exe with Parameters

Table 4.1. Supported Parameters

Features	-Parameter	-Argument	Details	Returns
Video Transmitting	-gen	-r	1 : 640x480p60 2/3: 720x480p60 4: 1280x720p60 16: 1920x1080p60 17/18: 720x576p50 19: 1280x720p50 31: 1920x1080p50 95: 3840x2160p30 97: 3840x2160p60	0: Success -1: Failed
		-hdcp	0/1/2/3	0: Auto 1: Force 1.4 2: Force 2.2 3: Off
		-cs	0/1/2/3	0: RGB 1: YCbCr 4:2:0 2: YCbCr 4:2:2 3: YCbCr 4:4:4
		-st	0/1/2	0: Auto 1: HDMI 2: DVI
		-cd	0/1/2	0: 8 bit 1: 10 bit 2: 12 bit
		-p	0/1/.../22	0: color_bar75 1: half_red75 2: half_green75 3: half_blue75 4: half_magenta75 5: half_cyan75 6: half_yellow75 7: half_white75 8: black 9: checkerboard 10: bluescreen 11: doublepluge 12: sharpness 13: colortint 14: grayramp 15: evothvline 16: freqsweep 17: frmgeom 18: rgbgray 19: rgb3bars 20: half_clrbars75 21: diagram 22: hdrdemo
Cable Loop Test	-cable	-r	1 : 640x480p60 2/3: 720x480p60 4: 1280x720p60 16: 1920x1080p60 95: 3840x2160p30 97: 3840x2160p60	32-bit value: Bits 7-0 channel 0 result count Bits 15-8 channel 1 result count Bits 23-16 channel 2 result count Bits 24-31 flags 25,24: (0- Inconclusive; 1- Pass; 2- Fail; 3- Pass_Margin) 26: DDC connection error 27: HPD connection error 28: +5 V connection error 29: resolution mismatch
		-conn	0/1	0: Skip cable connection check 1: Run with cable connection check
		-hdcp	0/1	0: Skip HDCP check 1: Run with HDCP check

Table 4.1. Supported Parameters *(Continued)*

Features	- Parameter	-Argument	Details	Returns
Video Analyze	-ana	5v	Get input 5 V state	0: 5 V Off 1: 5 V On
		stype	Get signal type	0: None 1: DVI 2/3: HDMI 4: MHL
		hdcp	Get HDCP state	0: Off 1: HDCP 1.4 pass 2: HDCP 2.2 pass 3: Authenticating 4: Failed
		freq	Get character frequency	Return value in unit Hz
		intl	Get interlaced mode	0: Progressive 1: Interlaced
		hpol	Horizontal sync polarity	0: Negative 1: Positive
		htot	Horizontal total pixels	Return value in pixel count
		hact	Horizontal active pixels	Return value in pixel count
		hsnc	Horizontal sync pixels	Return value in pixel count
		hfrt	Horizontal front porch pixels	Return value in pixel count
		vpol	Vertical sync polarity	0: Negative 1: Positive
		vtot	Vertical total pixels	Return value in pixel count
		vact	Vertical active pixels	Return value in pixel count
		vsnc	Vertical sync pixels	Return value in pixel count
		vfrt	Vertical front porch pixels	Return value in pixel count
		vic	VIC code in AVI infoFrame	As defined in CEA861 Spec
		ar	Aspect ratio	0: None 1: 4:3 2:16:9 3: 64:27 4: Square pixel
		cs	Color space	0: RGB 1: YC444 2: YC422 3: YC420
		cd	Color depth	0: None 1: 8bits 2: 10bits 3: 12bits
		3d	3D information	0: None 1: Frame Sequential 3: TopBottom 8: SideBySide
		rpt	Pixel repetition	0/1: No repeat N: Repeat (N-1) times
		ainfo	AVI infoFrame raw data	10 bytes (as defined in HDMI Spec)
		csbits	Audio Channel Status data	10 bytes (as defined in 60958 Spec)
		hdrt	Get HDR infoFrame Type	0: None 1: Tranditional SDR 2: Tranditional HDR 3: SMPTE 2084 4: Hybird Log-Gamma
		hdrd	HDR infoFrame raw data	32 bytes (as defined in HDMI Spec)
		all	Return all above result and decode them as messages	—
Load EDID	-load	{path}	String {path} where EDID data is located, supporting ".bin/.hex/.edi/.txt" formats	0: Success other: Failed
5 V Control	-out5v	-0/1	Disable/enable HDMI output port 5 V power	0: Success other: Failed

HPD Control	-inhpd	-0/1/time	0: Disable 1: Enable time-toggling HPD for “time” ms	0: Success other: Failed

4.5.3. Resolution Parameter Description

Value	Description
1	640x480p60
2	720x480p60 (4:3)
3	720x480p60 (16:9)
4	1280x720p60
5	1920x1080i60
6	1440x480i60 (4:3)
7	1440x480i60 (16:9)
16	1920x1080p60
17	720x576p50 (4:3)
18	720x576p50 (16:9)
19	1280x720p50
20	1920x1080i50
21	1440x576i50 (4:3)
22	1440x576i50 (16:9)

Value	Description
31	1920x1080p50
32	1920x1080p24
33	1920x1080p25
34	1920x1080p30
93	3840x2160p24
94	3840x2160p25
95	3840x2160p30
96	3840x2160p50
97	3840x2160p60
98	4096x2160p24
99	4096x2160p25
101	4096x2160p50
100	4096x2160p30
102	4096x2160p60

4.5.4. Pattern Parameter Description

Value	Description
0	color_bar75
1	half_red75
2	half_green75
3	half_blue75
4	half_magenta75
5	half_cyan75
6	half_yellow75
7	half_white75
8	black
9	checkerboard
10	bluescreen
11	doublepluge

Value	Description
12	sharpness
13	colortint
14	grayramp
15	evothvline
16	freqsweep
17	frmgeom
18	rgbgray
19	rgb3bars
20	half_clrbars75
21	diagram
22	hdrdemo

4.5.5. Option to Control multi-AVG Platforms

Features	-Parameter	-Argument	Details
Multi-AVG Control	-port	COM*	When multi-AVG is connected to one PC, use this feature to indicate which AVG to control (*-COM number)

Besides parameters listed in Table 4.1, you can indicate which exactly AVG platfomr to control with this “-port” argument. For example, when you connect two AVG platforms to one PC, one is connected to COM port COM23 and the other is to COM port COM26. You can control which one you want to specify its COM port number.

4.5.6. Examples of Parameter Usages

In the Command Prompt window, you can run “AVG_Console.exe” with different parameters.

Following are the examples of parameter usage for different purposes:

Purpose	Command
To generate resolution 1920 x 1080p @ 60 Hz	>AVG_Console.exe –gen –r 16
To generate resolution 4K YCbCr 4:2:0	>AVG_Console.exe –gen –r 97 –cs 1
To run a “Cable Loop Test” for 4K @ 60 Hz resolution	>AVG_Console.exe –cable –r 97
To run a “Cable Loop Test” for 4K @ 60 Hz resolution without cable connection checking	>AVG_Console.exe –cable –r 97 –conn 0
To generate HDR pattern with 1080p @ 60 Hz, size percentage = 50%, IRE percentage = 70%, HDR infoFrame type = SMPTE	>AVG_Console.exe –gen –r 16 –p 7 –pw1 5 –pw2 7 –hdr
To get input signal timing information, e.g. horizontal active pixels’ count	>AVG_Console.exe –ana hact
To set output HDMI1 port 5 V to “off” state	>AVG_Console.exe –out5v 0
To toggle input HDMI port HPD for 300 ms	>AVG_Console.exe –inhpd 300
To load EDID data located at “C:\test\myEDID.bin”	>AVG_Console.exe –load C:\test\myEDID.bin
To control 2nd AVG platform which occupying COM port 29	>AVG_Console.exe –gen –r 16 –port COM29

Appendix A. Internal Firmware Upgrade

If you received firmware upgrade notification from Simplay Labs, or if you find issues or problems in the firmware, use the files in the firmware folder to make upgrade.

You can download the latest SL-881 AVG firmware installation package from Simplay Labs website http://www.simplaylabs.com/support/product_support.aspx. Choose "SL-881". There is only one package in the *zip downloaded (Figure A.1). The package contains firmware installation files.

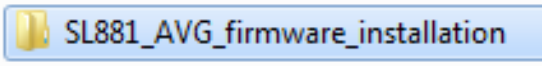


Figure A.1. SL-881 Firmware Installation Package

The SL881_AVG_firmware_installation folder contains one AVG.bin file (Figure A.2), which is to be used below.

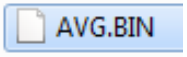


Figure A.2. SL-881 Firmware binary file

Follow the steps below to perform the SL-881 firmware update.

1. Copy the AVG.bin files you downloaded to the SD card.
2. Plug in the SD card and power on the SL-881.
3. The SL-881 LCD touch screen main window appears (as shown in Figure 1.5). From now on, all the operation is performed on the SL-881 AVG.
4. Choose Settings.
5. In the System Settings window (Figure A.3), you can see the current version information. Write down the System FW Version, Video Transceiver Version and RTL Version for a later check.

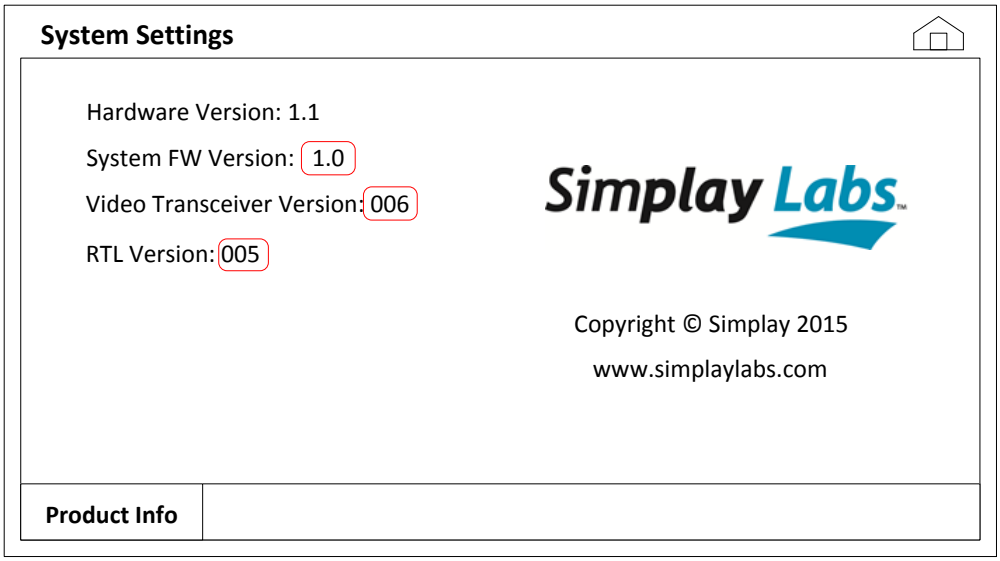


Figure A.3. System Settings Window Shown on the SL-881 LCD Touch Screen

6. Power off the SL-881.
7. Pin and hold the UPG button (item 11 in Figure 1.4) of the SL-881. Power on the SL-881.

8. Firmware update starts running automatically (Figure A.4). You can release the UPG button now.

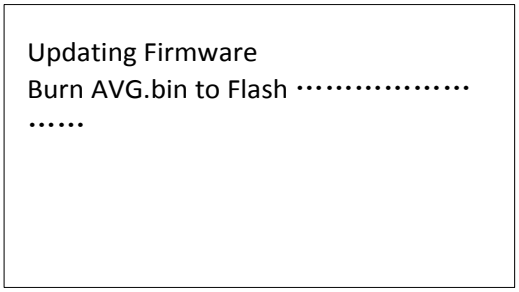


Figure A.4. Image Update Window Shown on the SL-881 LCD Touch Screen

9. After that step is done, Video Transceiver and RTL firmware will be updated automatically as shown in Figure A.5.

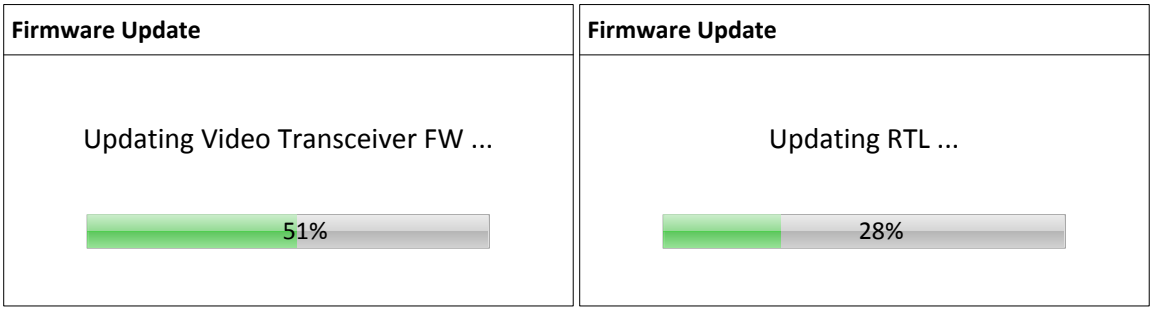


Figure A.5. Transceiver FW and RTL Updating Windows shown on the SL-881 LCD Touch Screen

10. After all firmware is updated successfully, follow the instruction to power off then power on the SL-881, as shown in Figure A.6.

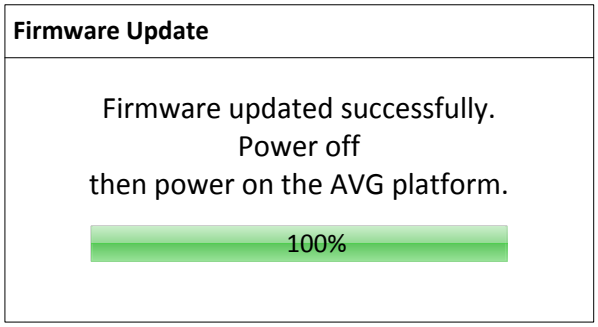


Figure A.6. Image Update Completed Window Shown on the SL-881 LCD Touch Screen

To confirm whether or not the firmware update is successful, follow the steps below:

1. After you power on the SL-881 again, go back to the LCD touch screen main window (Figure 1.5). Click Settings.
2. The System Settings window appears. Compare the System FW Version, Video Transceiver Version and RTL Version in the current window (Figure A.7) with the one (Figure A.3) you have written down. If the version number changes as expected, the firmware is updated successfully.

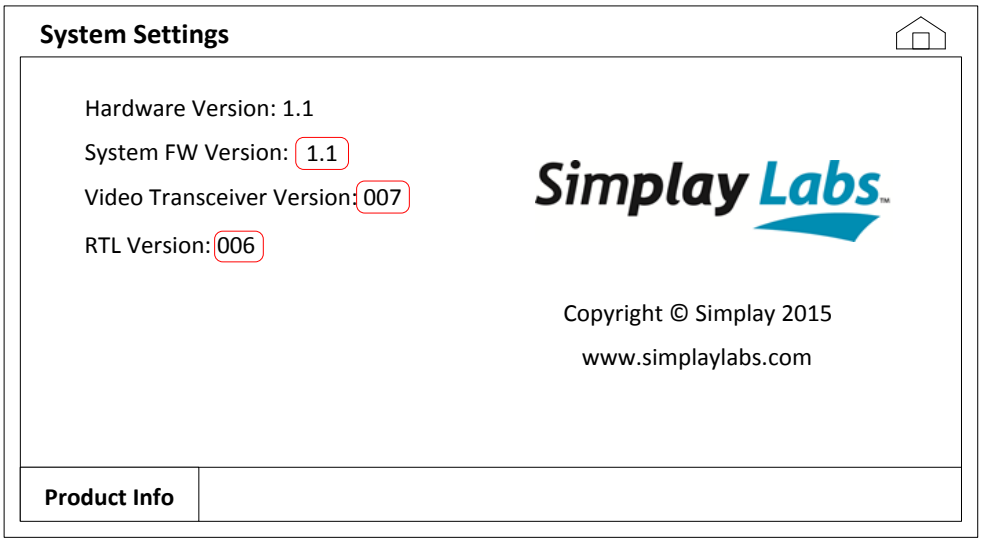


Figure A.7. System Settings Window after Successful Firmware Updating

Appendix B. LCD Touch Screen Position Calibration

The SL-881 AVG LCD touch screen has been calibrated before shipping out. In case you need to calibrate touch screen position, follow steps below. All the operation in this section is performed on the SL-881.

1. Press the UPG button (item 11 in Figure 1.4) first, and then press the Reset button (item 13 in Figure 1.4) to reset the SL-881. After the SL-881 completes resetting, the Touch Screen Calibration window appears. See Figure B.1.

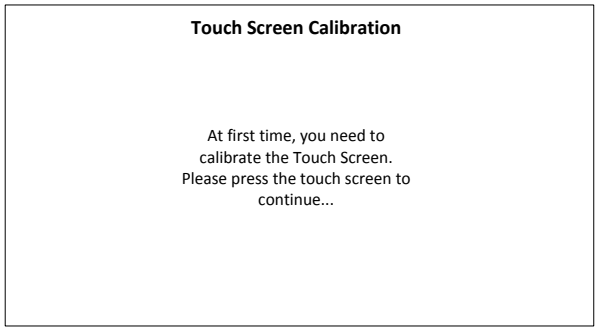


Figure B.1. Touch Screen Calibration Window Shown on the SL-881 LCD Touch Screen

2. Touch any position on the touch screen to start the calibration.
3. A message appears on the top left corner on the touch screen (Figure B.2). Follow the instruction, press the circle.

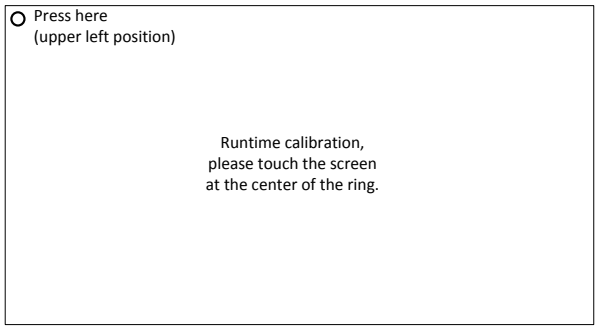


Figure B.2. Click Circle on the Top Left Corner

4. After that, another message appears on the lower right corner on the touch screen (Figure B.3). Follow the instruction, press the circle. The touch screen position calibration is finished.

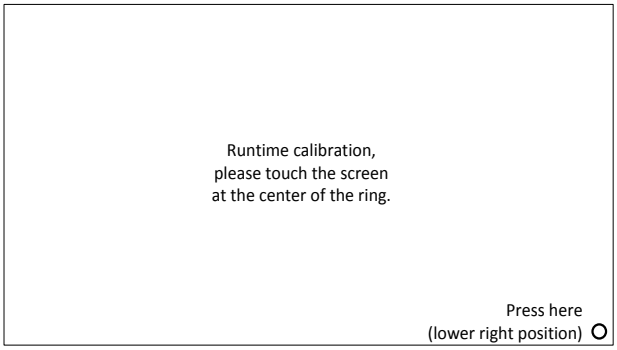


Figure B.3. Click Circle on the Lower Right Corner

5. After the position calibration is completed, the SL-881 will go back to the LCD Touch Screen main window (Figure 1.5).

References

This is a list of the standards abbreviations appearing in this document.

Abbreviation	Standards Publication, Organization, and Date
HDMI	*High Definition Multimedia Interface* Version 2.0, HDMI, LLC, September 4, 2013
HDMI CTS	*High-Definition Multimedia Interface Version 2.0 Generic Compliance Test Specification,* October 4, 2013

Revision History

Revision E, April 2020

Summary of Changes and Additions:

Updated the Simplay Labs hypertext links in the document.

Revision D, July 2017

Summary of Changes and Additions:

Updated the Running with Console Application of Windows section.

Details of the changes and additions:

- Added Figure 4.26. AVG_Console.exe and Figure 4.27. Running cmd.exe.
- Updated Table 4.1. Supported Parameters. Added Video Analyze, Load EDID, 5 V Control, and HPD Control features to this table.
- Added the Resolution Parameter Description, Pattern Parameter Description, and Option to Control multi-AVG Platforms sections.

Revision C, September 2016

Summary of Changes and Additions:

Added MHL connection and console application to the SL-881 AVG platform. Updated SL-881 AVG Software with HDR Debug test and DDC waveform viewer features.

Details of the changes and additions:

- Updated Figure 1.5. LCD Touch Screen Main Window.
- Added Figure 2.3. Connecting with MHL Source Device in Stand-alone Mode and Figure 2.4. Connecting with MHL Sink Device in Stand-alone Mode.
- Added MHL related contents to step 1 in both Generating Video Signals When Running with Sink Devices and Analyzing Input Signal When Running with Source Devices sections.
- Updated Figure 2.7. Read EDID from Sink DUT Window.
- Added step 7, step 8, and step 8 to the Performing EDDC Compliance Test section.
- Changed “Finish Time” in Figure 4.9. Sample Test Report and Figure 4.14. Sample Test Report.
- Added step 7 to the Monitoring DDC section.
- Added the Running with Console Application of Windows section.

Revision B, March 2016

Summary of Changes and Additions:

- Added HDR support in the Analyzing Input Signal When Running with Source Devices section.
- Added Cable Loop-back Testing in the Running Cable Loop-back Test section.

Revision A, August 2015

First production release.

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- Damage caused by third party peripherals (including but not limited to visible damages on motherboard or other electronic parts of the product such as burn spots after electric discharge, melting, fusing, splitting, etc.).
- Any unauthorized software or modification of built-in software not approved by Simplay Labs.
- The serial number of the product (or serial number stickers of its parts) has been modified, removed, blurred or damaged.
- Cracks and scratches on LCD and plastic material as well as other defects caused by transportation, handling or customer abuse.

Simplay Labs, LLC
www.simplaylabs.com