

W2642A DisplayPort AUX Channel Controller

Complete your DisplayPort toolset with test automation and AUX channel control capability



Introduction

The Keysight Technologies, Inc. W2642A DisplayPort AUX channel controller¹ enables fast, easy and automated testing for the physical layer as well as flexible debug capability for new DisplayPort designs. DisplayPort test and design engineers can now run physical layer tests fully unattended thus doubling their productivity. When used with the W2642A, the Keysight DisplayPort source and sink compliance test solutions which are already VESA² certified for official DisplayPort compliance testing can become fully automatic. In addition to the productivity gains, this new capability helps eliminate operator errors and offers complete device test status tracking and repeatable results.

Features

- Stand alone graphic user interface
- LAN interface
- Read/write capability for EDID (Electronic Display Identification ePROM) over AUX
- Read/write capability for DPCD (DisplayPort Configuration Data) over AUX
- Load/read DPCD or EDID data for DisplayPort sink emulation device
- Load/store DPCD or EDID data files for quick configuration of sink emulation devices.
- Hot plug event generation
- Method 1 and Method 2 EDID read/writes
- API (application program interface) used for N5990A factory automation software and infiniiium DisplayPort compliance application U7232A
- Upgrade paths for Link Layer Compliance Test, HDCP compliance testing and AUX channel protocol analysis
- The removable solid state drive (SSD) offers faster boot time and mechanical reliability
- SSD can be easily removed from the front panel and secured when not in use.

1. The W2642A AUX channel controller is based on the Quantum Data 882E product. Keysight intellectual property was developed separately and is placed in the 882E to control the DisplayPort AUX channel.
2. Video Electronics Standards Association (www.vesa.org)

Stand alone AUX channel control

A standard process to ascertain the functionality of any DisplayPort device is to see if you can communicate with it through the standard interface, the AUX channel. With a PC as the host, a graphical user interface (GUI) is used to control the W2642A through a LAN connection. Through this GUI, you can check the operation of a DisplayPort source or sink over the AUX channel.

Source testing

Figure 2 shows the setup screen configured for testing a source. Note that the W2642A is set up as a sink.

The W2642A can initiate a source read /write process by asserting a hot plug event. This event can have varying lengths. Some events can be specified as within the range to be interpreted as an interrupt, while others can be outside this range. You can use this feature to check the source driver interpretation of the event.

The W2642A can appear as any sink device by merely loading in that device's EDID file. You can acquire that file by connecting to the device, configuring the W2642A as a source and downloading the sink's EDID data. By using many different sets of valid EDIDs, you can check the default setup of a source as a function of the parameters read from the EDID, such as timing information or resolution.

Setup Screen

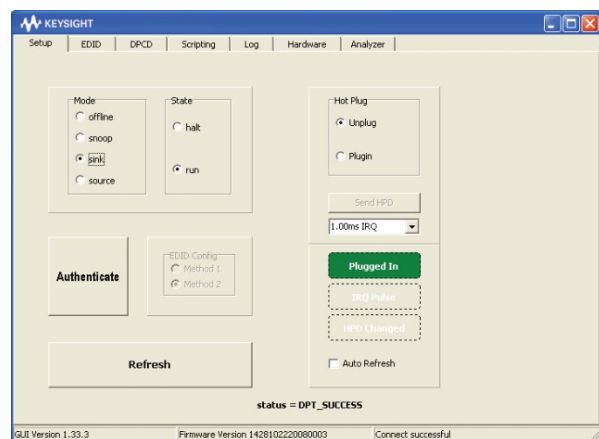


Figure 2: Setup screen for the W2642A GUI for source test.

EDID Load

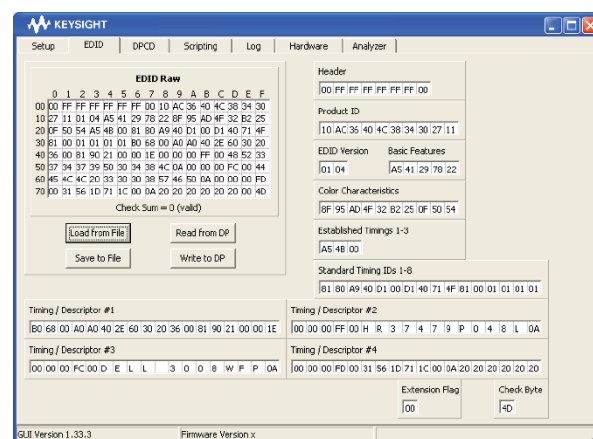


Figure 3: EDID tab screen for the W2642A GUI

Stand alone AUX channel control

The W2642A can provide any DPCD data desired by merely loading from a DPCD file that has acceptable data or by creating that data independently. Standard DPCD data can be acquired from a device by connecting to it and configuring the W2642A as a source and downloading its DPCD data, or by writing to it directly using the DPCD IO capabilities shown in Figure 4.

Sink testing

Figure 5 shows the setup screen configured for testing a sink. Note that the W2642A is set up as a source.

The W2642A configured as a source can read/write EDID or DPCD. In this mode, data that is read from the sink device can be compared with expected behavior, for example, symbol lock. This is particularly convenient for testing jitter tolerance on a sink or verifying that the sink state registers are operating as expected. When the W2642A is acting as a source, the EDID and DPCD screens are identical as in Figures 4 and 5 and represent actual data state of the sink device being tested when the “Read from DP function” is enabled.

In any verification process you must verify the EDID content and I²C over AUX communication using the source reading of EDID. You can verify whether your sink device works in either EDID communication method as stipulated in the DisplayPort standard using the Method 1 or Method 2 selection in the Setup tab.

DPCD Data Load

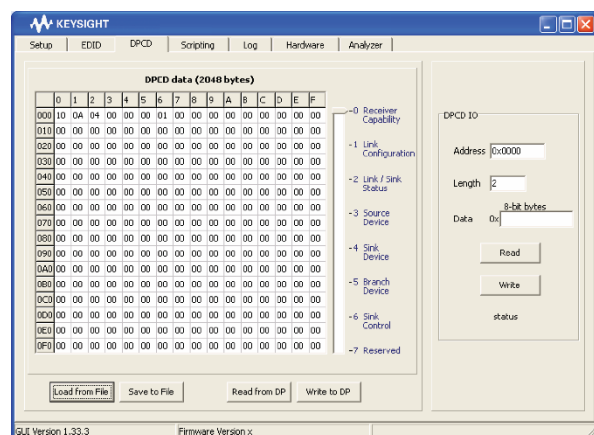


Figure 4: DPCD tab screen for the W2642A GUI

Setup Screen

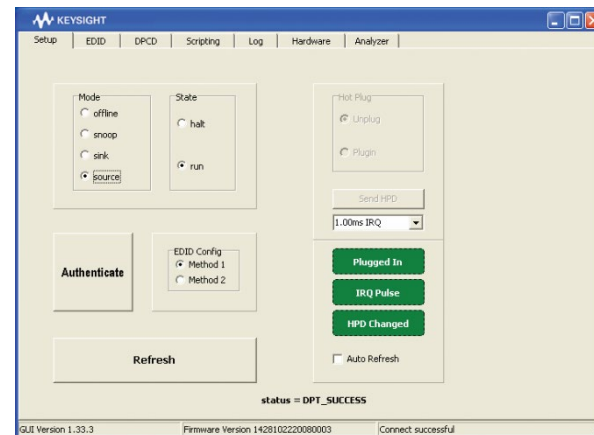


Figure 5: Setup screen on the W2642A GUI configured for sink test.

Test automation

The application program interface used by the W2642A GUI to control the W2642A is also used in test automation software provided by Keysight for source and sink physical layer testing. For source testing, this feature is provided in the U7232A DisplayPort source compliance test software, and is available on versions later than version 1.7. The U7232A software was designed specifically for test automation and will run unattended after the device capabilities are defined and the scope connection details are entered in the software. This software can run the full compliance test conditions as specified in the DisplayPort Compliance Test Specification or can run specialized user defined procedures. See Table 2 for the full equipment set for the elements of the automated DisplayPort source solution.

For sink testing, the N5990A factory automation software used with other standards such as SATA, PCI Express® and HDMI, provides the necessary control to the Keysight equipment and the device under test. N5990A Option 155 provides the control to the Device under test through the W2642A Option AUX channel controller to set the state and query the registers, for example the PRBS counter register must be able to reset to 0, count a given number of errors, be queried, reset and then count errors during the jitter tolerance test and read again. The software guides you through the connection process and controls the stress signal generator as identified in the compliance test specification. See Table 1 for full automation solution requirements.

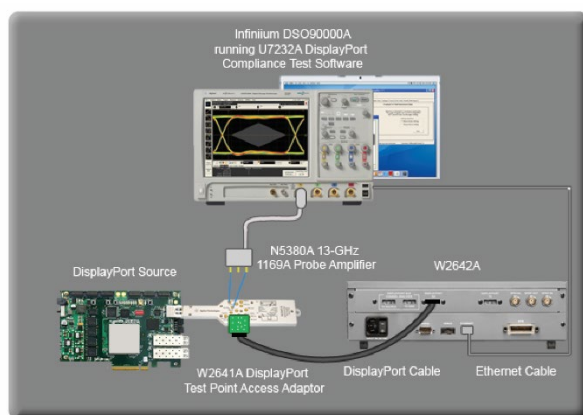


Figure 6: The W2642A AUX channel controller in A source test configuration

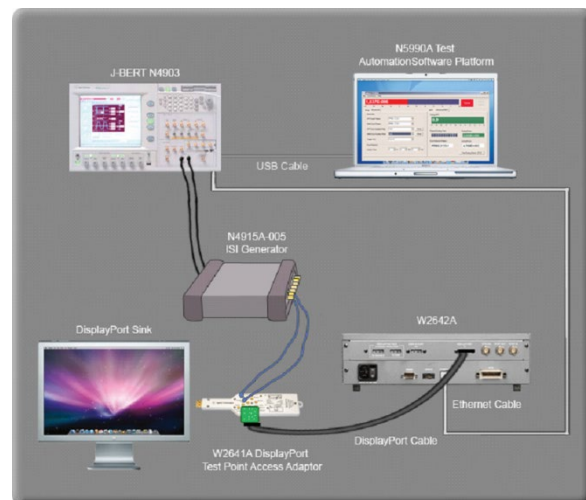


Figure 7: The W2642A AUX channel controller in a sink test configuration

Test automation

Test connectivity

A key component in source or sink test solutions is the W2641A test point access adaptor. The W2641A was designed with AUX channel access through a 14-pin digital connector. An adaptor board as illustrated in Figures 6 and 7, connects to the device under test to the W2642A through a DisplayPort cable. The adaptor board, and DisplayPort and LAN cables, are shipped with each W2642A.



Figure 8: W2641A DisplayPort test point access adaptor.

Ordering DisplayPort Solutions with the W2642A

Expanding your toolset

Because the W2642A AUX channel controller is based on the Quantum Data 882E instrument you get access to all the capabilities that Quantum Data provides with this platform. Quantum Data is the leader for DisplayPort link layer compliance testing, DisplayPort high definition content protection and also for DisplayPort AUX channel analysis. These capabilities are not shipped with the 882E but they are available as aftermarket upgrades through your Quantum Data distributor.

Sink test

When purchasing a full automated sink test solution, order the following:

Model Number	Description	Quantity
W2642A	DisplayPort AUX channel controller	1
W2641A	DisplayPort test point access adapter	1
N5460A	SMP right angle cables (recommended)	
N4903A	J-BERT	1
Option G07	150 Mb/s to 7 Gb/s	1
Option J10	Jitter injection	1
Option J11	SSC clocking	1
N4915A-006	ISI generator	1
N5990A-010,-155	Test automation software	1 ea.

For Calibration

BIT-DP-RTF-0001	Receptacle DisplayPort fixture	1
DSA90804A	Infiniium Series oscilloscope	1
DSAX90000A	Infiniium X-Series oscilloscope	1

Table 1: Sink test solution elements

Ordering DisplayPort Solutions with the W2642A (Continued)

Source test

When purchasing a full automated source test solution, order the following:

Model Number	Description	Quantity
W2642A	DisplayPort AUX channel controller	1
DSA90804A	Infiniium Series realtime oscilloscope	1
1169A	Probe amplifiers (optional)	1,2, or 4
N5380A	SMA differential probe heads (optional)	1, 2 or 4
U7232A (opt028)	DisplayPort source test compliance software	1
DSAX91604A	Infiniium Series real-time oscilloscope	1
N2800A	Probe amplifiers	1,2, or 4
N5444A	2.92 Probe head	1,2, or 4
W2641A	DisplayPort test point adapter (see W2641A accessories below)	1
N5990A-255	Interface to N5990A complementary test automation software platform, optional	1

Table 2: Source test solution elements

W2641A Test accessories

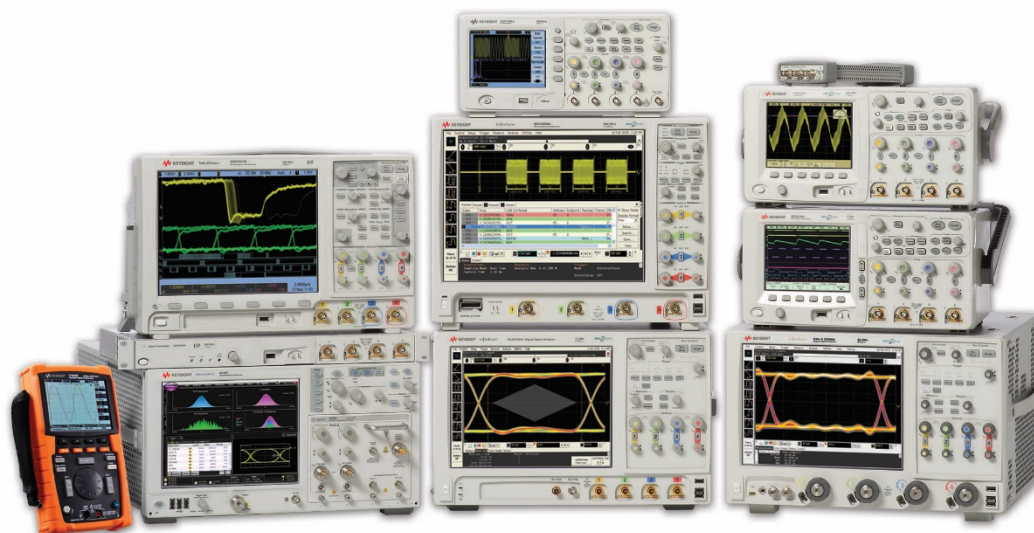
Model Number	Description	Quantity
N5460A	Phase matched pair: Right angle SMP-to-SMA male (optional, recommended)	1, 2, 4
E4809-23801	Cable plug in tool (recommended for N5460A cables)	1
E4809-23802	Cable removal tool (required for N5460A cables)	1
N4235-61602	Phased matched pair: SMP-to-SMA cables (standard replacement cables for W2641A)	1, 2, 4

Test accessories

Model Number	Description	Quantity
N9398C	Blocking capacitor	1
11636B	Power dividers	4
15442A	SMA cable kit(4 cables)	2
15435A	150-ps transition time converter	4
1250-2206	50-ohm terminations	4
BW-S4W2+	Mini Circuits 4 dB attenuator	2
BW-S54W2+	Mini Circuits 5 dB attenuator	2
BW-S10W2+	Mini Circuits 10 dB attenuator	2
1810-0118	SMA (m) 50 Ω termination	
33SMA-Q50-0-4	SMA push-on adaptors from S.M. Electronics (or equivalent)	

Related Keysight literature

Publication title	Publication type	Publication number
Infiniium 90000 Series Oscilloscopes	Data sheet	5989-7819EN
U7232A DisplayPort Compliance Test Software	Data sheet	5989-7198EN
Keysight Method of Implementation for DisplayPort Sink Compliance Test	Application note	5989-9147EN
N4903A JBERT	Data sheet	5989-2899EN
N4915A-006 DisplayPort ISI Generator	Data sheet	5989-8688EN
ParBERT TMDS Generator	Data sheet	5989-5537EN
N5990A Test Automation Software Platform	Data sheet	5989-5483EN
W2641A DisplayPort test point access adapter	Data sheet	5989-7274EN
Infiniium 90000 X-Series oscilloscopes	Data sheet	5990-5271EN



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