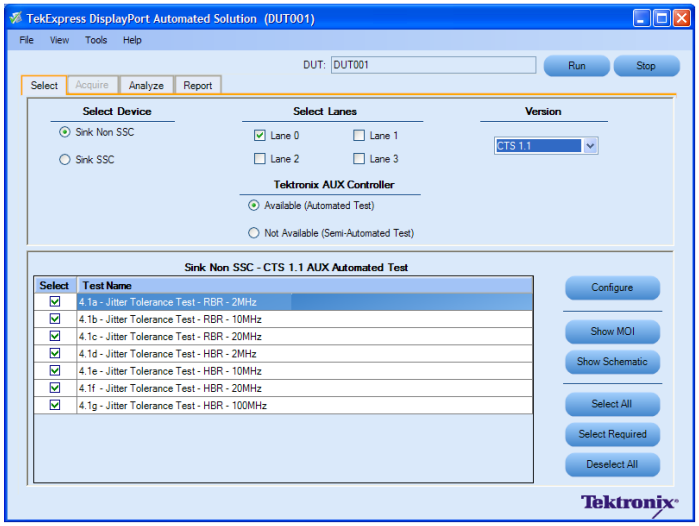
TekExpress DisplayPort Sink Compliance Software

TEKEXP DP-SINK • TEKEXPUP DP-SINK Data Sheet



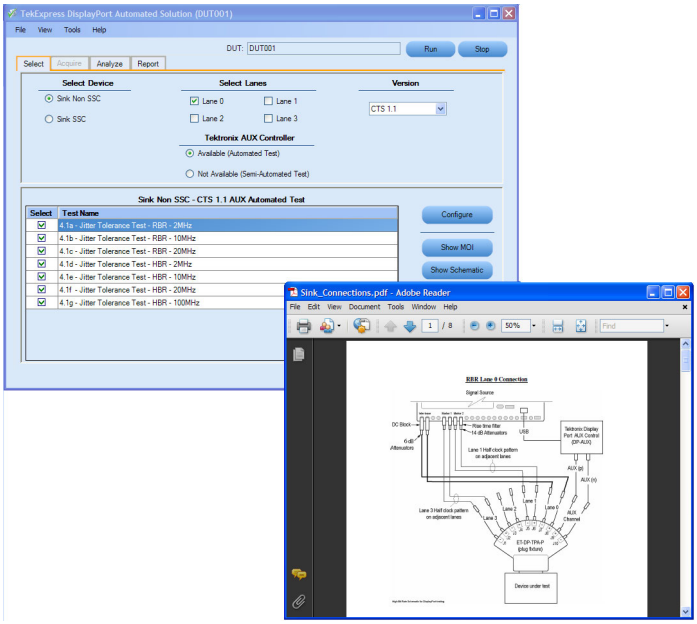
Features & Benefits

- Automates DisplayPort Sink Compliance Testing
- Speeds Up Test Time – Link Training and Error Count automatically validated with DisplayPort AUX Channel Controller (DP-AUX)
- No User Interaction is Required to Configure Test Equipment or Validate Link Training and Error Count
- View Real-time Device State including Link Training or Error Count Details during Test Execution
- Fully Integrated with DP-AUX
- No Need to Reconfigure Test Setups for ISI or SSC. All Signal Impairments are Generated by the AWG7000 Series
- Semi-automated Mode enables the Use of Vendor-specific Tools to Validate Device Error Count and Link Training Details

Applications

- DisplayPort Sink Compliance Testing for:
  - Silicon Validation
  - Computer System Validation and Integration
  - Manufacturing Test

Tektronix®



Show Schematic.

Complete Automation for DisplayPort Testing

Tektronix TekExpress (TEKEXP) Automated Compliance Test Software is a Windows-based application that runs on any Windows XP*[1] computer operating system including Tektronix Windows-based instruments. TekExpress software ordered with Option DP-SINK provides an automated, simple, and efficient way to test DisplayPort sink devices per the requirements of the DisplayPort Physical Layer Compliance Test Specification (CTS) 1.1.

100% DisplayPort Sink Test Coverage

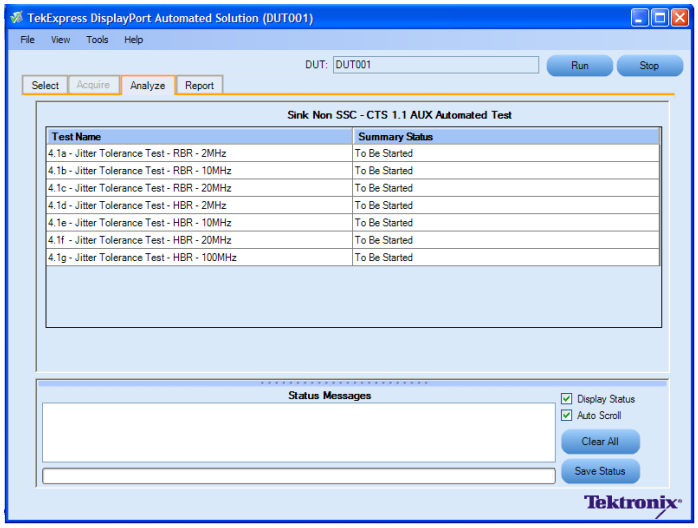
Compliance requirements for DisplayPort Sink devices consist of a Jitter Tolerance Test. The TekExpress Option DP-SINK software is an easy-to-use software package that automates the DisplayPort Sink Compliance Tests. The Tektronix DisplayPort sink test bench includes a high-performance signal generator (AWG7000 Series), a real-time oscilloscope (DPO/DSA/MSO70000 Series), and an Auxiliary Channel Controller (DP-AUX).

The Tektronix DisplayPort test bench is used at DisplayPort VESA-sponsored PlugTests and DisplayPort Authorized Test Centers. Required test procedures (MOI) can be found at http://www.tek.com/Measurement/applications/serial_data/displayport.html.

Automated Testing – Save Time and Resources

There is no longer a need to be an expert on testing procedures. Remembering the exact steps to take is time consuming and often requires going back to the DisplayPort Physical Layer Compliance Test Specification. DP-SINK takes the guesswork out of conducting Sink Testing. Additionally, DP-SINK is fully automated with the DP-AUX Auxiliary Controller. DP-AUX eliminates the need for user interaction during testing to validate link training and the device error count. The combination of DP-SINK and DP-AUX allows engineers to simply select the desired tests to run and work on other tasks while the tests are being executed.

*[1] See host system requirements in Ordering Information section.



Test Status.

Simple Setup, Test Execution, and Reporting

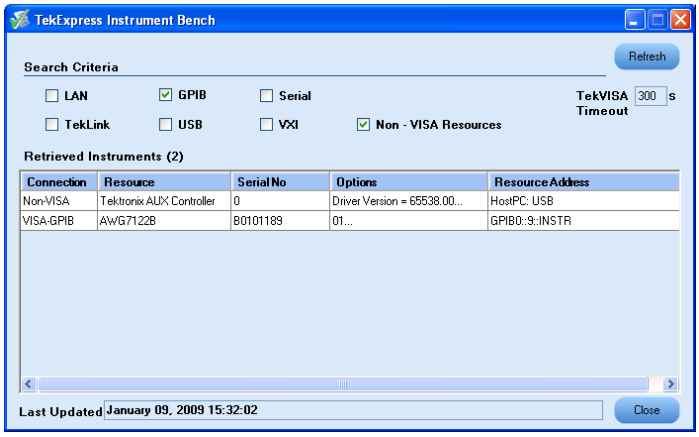
Setup and test execution is simple with the TekExpress software. The signal generator and auxiliary controller are all controlled through the TekExpress automation framework. The TekExpress software provides a Graphical User Interface (GUI) and provides an intuitive workflow through setup and testing. Upon completion of test execution, a report is generated displaying the test results.

Setting up the Bench

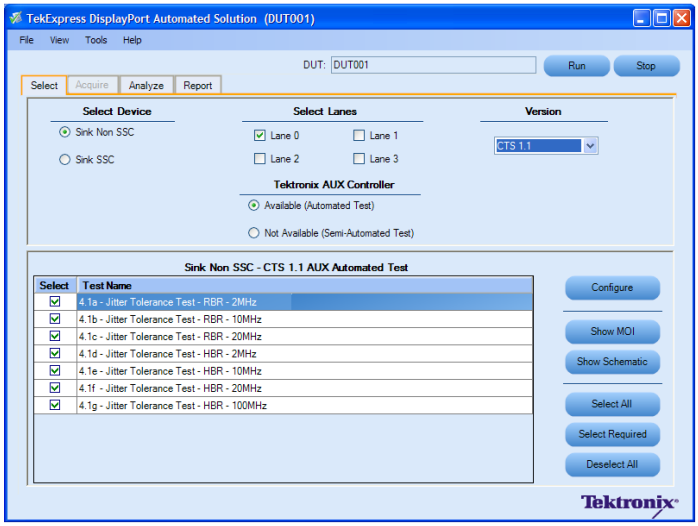
When setting up a test, nothing can be simpler than hooking up the test system by looking at a schematic. View the schematic of the selected test with a push of a button.

Instrument Bench Discovery

TekExpress™ software automatically (or on demand) scans and detects supported instruments connected in your test bench (both Visa supported and non-Visa supported instruments), whether they are connected through LAN, GPIB, or USB. A quick check of the Instrument Bench menu confirms all instruments are networked correctly.



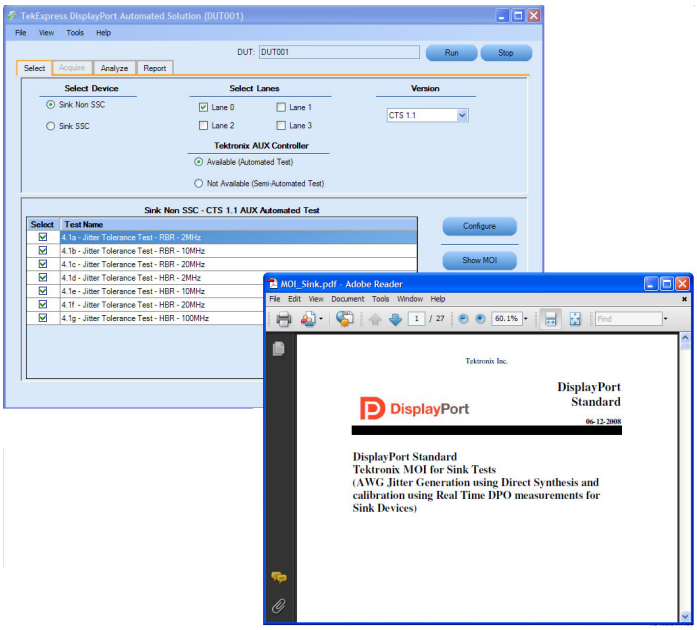
Instrument Bench Discovery.



Basic Operation.

One-button Testing

Once the test bench is setup and the DUT is properly connected, simply press the **Run** button to perform the selected test suite.



Show MOI.

Online Help and Show MOI

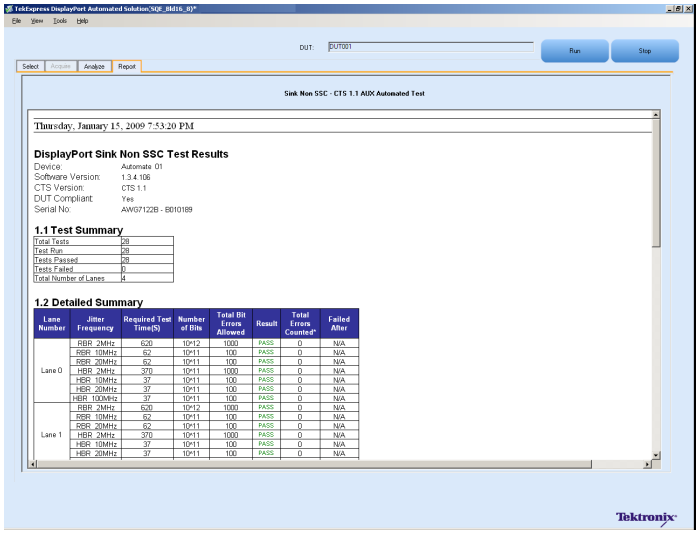
Online Help is available through the Help menu and direct access to the approved DisplayPort MOI (Method of Implementation) through the Show MOI button. The approved MOI documents step-by-step how the test is being performed by the TekExpress™ software. This allows users to understand the theory behind the measurements and better understand test results.

Pass/Fail Report

The Report tab provides an HTML view of test results along with Pass/Fail status.

Powered by NI TestStand™

The TekExpress automated compliance software uses NI (National Instruments) TestStand to manage and execute its test sequences. A Windows user interface is provided in the TekExpress software for simple and complete operation of compliance measurements. However, if your validation and debug needs go beyond the features offered by the TekExpress software, a full version of NI TestStand can be used to develop higher-level automation sequences to control the TekExpress software.



View Report.

NI TestStand is the de facto industry standard test management environment for automating test and validation systems. NI TestStand is used to develop, manage, and execute test sequences, to integrate test modules written in any test programming language through an open and flexible architecture. Customers who own NI TestStand and purchase the TekExpress software will be able to write scripts using NI TestStand that call the TekExpress software with a limited command set. The limited command set allows the NI TestStand user to recall and save TekExpress software setups, start execution, query current execution status, and receive measurement results.

For device validation, it's often desirable to make multiple runs of a single device using different operating conditions such as temperature and power supply voltages. This is sometimes referred to as 'four-corners testing' (testing to low-high temperature and low-high supply voltages). For four-corners testing, NI TestStand supports drivers for a wide range of temperature chambers and power supplies. NI TestStand can be used to control the temperature chamber and then call the TekExpress software for a compliance test using the limited command set. For adjusting power supply voltages, the power supply control sequence file within the TekExpress software can be modified using a standard NI TestStand sequence file. Thus, if your company already uses NI TestStand for automation, your test engineers can incorporate commands to run the TekExpress compliance software directly into their test sequences.

Characteristics

DisplayPort Sink Compliance Testing with TekExpress Software

TekExpress Software (with Opt. DP-SINK) provides automation of the VESA-approved Tektronix DisplayPort Sink Test MOI. A supported configuration includes a DPO/DSA/MSO70000 Series Oscilloscope equipped with DPOJET (Jitter and Eye Diagram Analysis Tools), an AWG7000 Series Arbitrary Waveform Generator, and the DP-AUX DisplayPort Auxiliary Controller.

DisplayPort Sink Compliance Testing includes a single Jitter Tolerance Test. Before the Jitter Tolerance Test can be executed, the device must be checked to enable that link training can be done successfully. Furthermore, the DisplayPort Specification requires that sink devices have an internal error counter. This error counter must also be validated before the Jitter Tolerance Test can be executed.

The TekExpress DisplayPort software first validates the device is able to train correctly. This is done by using DP-AUX to set up the device to receive the Frequency Lock Pattern. The AWG is then used to issue the Frequency Lock Pattern and the device is validated to have frequency lock by using DP-AUX. After frequency lock has been achieved, DP-AUX is used to set up the device to receive the Symbol Lock Pattern and then the AWG is used to issue the Symbol Lock Pattern. DP-AUX is used to validate that symbol lock has been achieved. Upon completion of the link training, DP-AUX is used to ensure that the error counter of the device is working properly. This is done by using DP-AUX to enable the error counter while a clean signal is generated from the AWG. After the error count is enabled, a random number of errors between one and ten injected by the AWG and DP-AUX is used to validate that the number of errors sent matches the number of errors in the device.

After link training and the error counter have been validated, the Jitter Tolerance Test can be performed.

The Jitter Tolerance Test must be executed at all supported data rates of the device 2.7 Gb/s for High Bit Rate and/or 1.62 Gb/s for Reduced Bit Rate. Additionally, if the device supports SSC (Spread Spectrum Clocking) the Jitter Tolerance Test must be ran with and without SSC. The specific frequencies, jitter values, and test time are outlined in the Tektronix DisplayPort Sink MOI.

The Jitter Tolerance Test requires multiple impairments to be added to the test signal in order to fully stress the sink device. Specifically, the signal must be impaired with Jitter components (Random Jitter, Sinusoidal Jitter, and Inter Symbol Interference) and include Spread Spectrum Clocking. The AWG7000 Series are uniquely positioned to support DisplayPort Sink Testing as all sources of signal impairment can be generated with the AWG, thus allowing for simplification of the testing environment. SSC generators or external boards to generate ISI are not required with the AWG.

DP-SINK automatically steps through each frequency during the Jitter Tolerance Test using DP-AUX to validate the error count at the completion of each test.

Required Equipment for Sink Testing

Equipment	Description	Quantity
High-speed Signal Source	AWG7122C Arbitrary Waveform Generator with Options 1, 6, 8 or AWG7082C with Options 1, 6	1
Oscilloscope*2	Real-time DPO/DSA/MSO70000 Series (8 GHz or higher) and Opt. 5XL*3	1
Software	SerialXpress® (SDX100) Advanced Jitter Generation Tool with Options ISI and SSC	1 each
	DPOJET Jitter and Eye Diagram Analysis Tool with Option DJA	1 each
	TekExpress Sink Compliance Tool with Option TEKEXP DP-SINK	1 each
Test Fixtures	TF-DP-TPA-R	1 each
Controller	DisplayPort Auxilary Channel Controller (DP-AUX)	1 each
Attenuators*4	14 dB P/N: 015-1002-01	4
	6 dB P/N: 015-1001-01	6
Accessories	Picosecond Pulse Lab Filter P/N: 5915-110-100ps*5	4 each
	Picosecond Pulse Lab DC Block P/N: 5501A*6	2 each
	Phase Matched SMA Cable Set P/N: 174-5771-00	2 each
	SMA Cables P/N: 174-1341-00	4 each
	Terminators P/N: 015-1022-01	20 each

*2 RT oscilloscope is used for jitter calibration and eye diagrams in receiver (Sink) tests.

*3 Opt. 5XL required for Tests 3-11 Non-ISI Jitter and 3-12 Total Jitter Measurements if also used for source testing.

*4 If testing tethered devices, two 20 dB attenuators (011-0059-03) are required in addition to attenuators listed above.

*5 Rise-time filters required to provide typical operating edge rates for adjacent lanes.

*6 DisplayPort requires source AC coupling.

Ordering Information

TEKEXP

TekExpress™ Automated Compliance Test Software. For a new system, order one or more of the options listed below. The software installs on the controller PC. A USB key dongle with software key enables the selected option set.

Includes: Latest TekExpress product software DVD kit (P/N 020-2913-xx), USB key dongle (P/N 119- 6963-xx), online documentation and printable manual in PDF format are supplied.

TEKEXPUP

TekExpress Automated Compliance Test Software Upgrade. To upgrade an existing system, order one or more of the options listed below. The above USB key dongle is upgraded with upgraded option set through a software key.

Includes: Latest TekExpress product software DVD kit (P/N 020-2913-xx) and upgrade SW key. Online documentation and printable manual in PDF format are supplied.

Prerequisite Host System Software Requirements

- Microsoft XP OS with SP2 or later
- Microsoft Excel 2002 or above
- Microsoft Explorer 6.0 SP1 or later
- Microsoft Photo Editor 3.0 or equivalent for viewing image files
- Adobe Reader 6.0 or equivalent software for viewing portable document format (PDF) files

Options

Note: At least one option required when ordering TEKEXP or TEKEXPUP.

Option	Description
TEKEXP Opt. DP-SINK	DisplayPort Sink Compliance Tests
TEKEXPUP Opt. DP-SINK	DisplayPort Sink Compliance Tests

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

GPIB IEEE-488

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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