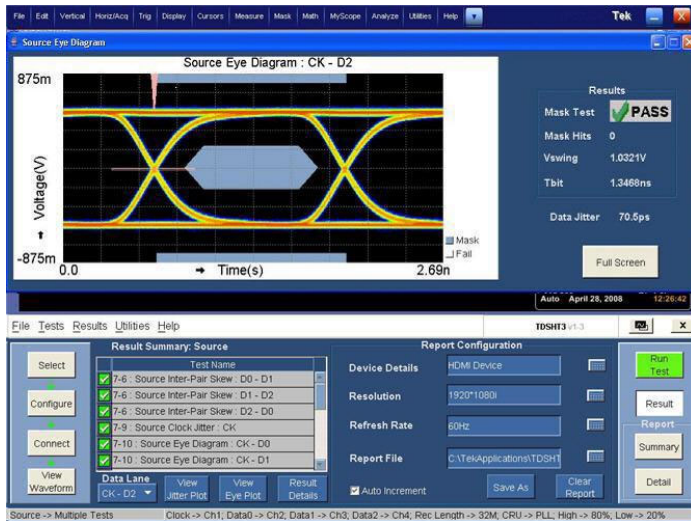


# HDMI Compliance Test Software

## TDSHT3 Data Sheet



## Features & Benefits

- Fast, Efficient Direct Synthesis Solution
- Conformance to HDMI 1.4 Standards and Compliance Test Specification 1.4 (CTS)
- Complete Validation to Standards with Wide Range of Tests for Source, Sink, and Cable Devices
- Accurate Source Tests using Precise Measurement Techniques
- Dependable Sink Tests with Closed-loop Measurements that Eliminate Nonlinearities in Test Setup
- Automation of Complex Sink and Cable Tests with Remote Control of Signal Sources and Software Emulation of Cable Effects, Eliminating the Need for Hardware Transition Time Converters (TTC) and Cable Emulators
- Quick Results with Automatic Mask-Fit, Measurements and Pass/Fail Notification, and In-depth Results with Statistical Analysis and Mask Margins
- Quick Testing with One-button Selection of Multiple Tests and CSV-format Test Summary and Reports
- Comprehensive HDMI 1.4 Solution including Test Fixtures, DPO/DSA7000B Real-Time Oscilloscopes, P7313SMA Differential Probes, AWG7000B Signal Sources, HDMI Fixtures, and DSA8200 Sampling Oscilloscopes

## Applications

- Design and Validation of HDMI 1.4 Physical Layer



Complete Sink Test Automation

## HDMI Physical Layer Compliance Testing

Engineers designing and validating the HDMI physical layer of their devices face constant pressure to improve efficiency. Designers need to perform a wide range of compliance tests quickly and reliably right on their bench.

HDMI 1.4 introduces Automotive HDMI (Type E) in addition to Mobile HDMI (Type D), HEAC, 3D HDMI, 4K x 2K patterns, and new Calorimetric patterns, all operating up to 3.4 Gb/s. TDSHT3 and HT3-DS HDMI Compliance Test Software automate a comprehensive range of tests enabling unprecedented efficiency with reliable results.

### Reliable and Dependable Results

TDSHT3 embeds the HDMI CTS 1.4 compliance test procedures, including the software clock recovery (SoftCRU), ensuring dependable results. Accurate eye rendering and precise violation testing deliver credible results. Perform accurate sink tests with closed-loop measurements that eliminate nonlinearities of the test setup. Authentic measurement techniques and automation eliminate errors to provide repeatable results.

Option HT3-DS enables the innovative Direct Synthesis Solution for sink and cable eye-diagram testing. The Direct Synthesis method ensures greater repeatability as it eliminates the requirement for hardware TTC filters and cable emulators. HT3-DS supports all cable emulator effects (Type 1, Type 2, Type 3, and Type E).

### Faster Validation Cycles

The unparalleled automation offered on the TDSHT3 and HT3-DS enables faster validation. Reduce test times for complete HDMI sink testing with TDSHT3 and HT3-DS by digitally controlling cable emulator and TTC effects allowing for a single hardware connection for all resolutions. Demonstrate efficiency by using the "Select All" feature to perform multiple tests. Quickly generate CSV-format summaries or detailed reports at a press of a button.

## Characteristics

Test	Description
<b>Source Tests</b>	
Eye Diagram*1	PLL, Raw, and Ideal clock
Clock Jitter*1	PLL, Raw, and Ideal clock
Clock Duty Cycle	
Rise Time and Fall Time	
Inter-pair Skew	Data-Data
Low Amplitude	
<b>Sink Tests</b>	
Jitter Tolerance*1	
Jitter frequencies (D/CK)	500 kHz/10 MHz or 1 MHz/7 MHz
DUT frequency (pixel clock)	25.125, 27, 74.25, 148.5, 165, 225, 297, 330 MHz
Direct Synthesis Solution provides selection of cable emulators' emulation in the software. 1st Cable Emulator or 2nd Cable Emulator or Both. Covering the various Type 1, Type 2, Type 3, and Type E cable emulators required in CTS 1.4 as per resolution selection.	
Min/Max Differential Swing Tolerance	250 mV - 70 mV, 20 mV steps. Direct Synthesis setup can also be used for this test
Intra-pair Skew	<1 ns, 0.1 T <sub>bit</sub> steps. Direct Synthesis setup can also be used for this test
Deep Color Tests	Selection under Direct Synthesis method
<b>Cable Tests</b>	
Eye Diagram*1	TP1 and TP2. Direct Synthesis setup can also be used for this test
Repeater Cable Inter-pair Skew Test	Selection under Direct Synthesis method only

\*1 Requires record length of more than 16 M on each channel.

### Tektronix Real-Time Oscilloscopes Supported

DPO/DSA70804/B, DPO/DSA71254/B, DPO/DSA71604/B, DPO/DSA72004/B Real-Time Oscilloscopes support both HT3 and HT3-DS.

TDS6K/7K/B Series of Real-Time Oscilloscopes support HT3 only and cannot support HT3-DS.

### Tektronix Generators Supported

#### Data Timing Generator Method:

Test Pattern Generation – DTG 5334 or DTG5274\*3, DTGM30 (Qty: 3), and DTGM32\*2 (for Sink Tests).

Jitter Generation (for use with DTG method) – AWG7102 with Opt. 01 and 06, AWG7122B with Opt. 01, 06, and 08, AWG710/B (for Sink Tests).

#### Direct Synthesis Method:

AWG7122B w/ Opt. 01, 06, and 08 (Qty: 2).

AFG3102 or AFG3252 – Used for synchronizing and triggering the 2 AWGs in the Direct Synthesis setup.

### Tektronix Sampling Oscilloscopes Supported

#### TDR Tests:

Oscilloscope – DSA8200 or TDS8000B with 80E03 and 80E04 modules.

\*2 The DGM32 module is needed for tests with clock rates >148.5 MHz and is required only when AWG710/B is used. It is not needed if AWG7102 is used.

\*3 DTG5274 can be used to test HDMI clock rates up to 270 MHz only.

## Ordering Information

### Test Software

**Includes:** Application CD, HDMI Direct Synthesis AWG Patterns DVDs, and electronic documentation.

Product/Feature	Description
<b>To Order Along with Oscilloscope</b>	
Opt. HT3	HDMI Compliance Test Software
Opt. HT3-DS	HDMI Direct Synthesis Software (requires Opt. HT3)
<b>To Upgrade Existing Oscilloscope</b>	
DPO/DSA70000/B	Order DPO7UP – Opt. HT3
DPO/DSA70000/B	Order DPO7UP – Opt. HT3-DS*4
TDS6000B/TDS6000C	Order TDS6BUP – Opt. HT3
TDS7000/B	Order TDS7UP/7BUP – Opt. HT3
CSA7000/B	Order CSA7UP/CSA7BUP – Opt. HT3

\*4 HT3-DS is available on DPO/DSA70000/B Series scopes with bandwidth greater than 8 GHz.

### Recommended Accessories and Options Needed

Accessory	Description
HDMI Direct Synthesis Accessory Kit (is required with Opt. HT3-DS)	Consists of: Minicircuits Bias Tees (ZX85-12G-S+) (Qty: 8) Matched SMA cables (174-4944-xx) (Qty: 10) Picosecond Pulse labs TTC filter (5915-110-120PS) (Qty: 8) BNC cables (012-0057-xx) (Qty: 4) BNC-T adapter (015-1016-xx) (Qty: 1) GPIB Cables from NI (763061-xx) 6 dB attenuator from mini circuits (BW-S6W2+) (Qty: 8)
Oscilloscope	16 M Record Length/Ch or more – Opt. 2XL on DPO70000B oscilloscopes (for eye diagram and jitter tests)
Signal Sources	DTG5334 (for DTG-based method) AWG7102 needs Option 01 and 06 AWG7122B needs Option 01, 06, and 08 (for Direct Synthesis method)
<b>Probes</b>	
Differential probes	P7350SMA (2 probes required) – for testing TMDS clock rates less than or equal to 74.25 MHz P7313 SMA (minimum 2 probes required) – for testing all resolutions (recommended for 1.4 specs testing) is also used for single-ended testing
Active probes	P7240 used with old 1.2 test fixtures (2 probes required); P7313SMA probes can also be used to test single-ended tests using 50 ohms short
Probe positioner	PPM100 Flexible Arm Probe Positioner

## Tektronix Fixtures for HDMI

### HDMI Type A Fixtures

- ET-HDMI-TPA-S Test Adapter Set (used for source, sink, and cable testing) includes the following:
  - 1 HDMI-TPA-P plug board with SMA cables
  - 1 HDMI-TPA-R receptacle board with SMA cables
  - 1 HDMI-TPA-C calibration board with SMA cables
  - 1 HDMI-TPA-E EEPROM board
  - 29 SMA-to-GPPO cables 2 inches long
- ET-HDMI-TPA-STX Test Adapter Set (used for source testing only) includes the following:
  - 1 HDMI-TPA-P plug board with SMA cables
  - 1 HDMI-TPA-E EEPROM board
  - 10 SMA-to-GPPO cables 2 inches long

### HDMI Type C Fixtures

- ET-HDMIC-TPA-S Test Adapter Set (used for source, sink, and cable testing) includes the following:
  - 1 HDMI-TPA-P plug board with SMA cables
  - 1 HDMI-TPA-R receptacle board with SMA cables
  - 1 HDMI-TPA-C calibration board with SMA cables
  - 1 HDMI-TPA-E EEPROM board
  - 29 SMA-to-GPPO cables 2 inches long
- ET-HDMIC-TPA-STX Test Adapter Set (used for source testing only) includes the following:
  - 1 HDMI-TPA-P plug board with SMA cables
  - 1 HDMI-TPA-E EEPROM board
  - 10 SMA-to-GPPO cables 2 inches long

### HDMI Type D Fixtures for Mobile HDMI

- TF-HDMID-TPA-KIT Test Adapter Kit (used for Type D and Type D HEAC source, sink, and cable testing) includes the following:
  - 1 TF-HDMID-TPA-P plug board
  - 1 TF-HDMID-TPA-R receptacle boards
- TF-HDMI-TPA-CE consisting of:
  - EDID Fixture PCBA
  - EEPROM with HDMI 1.4 Software
  - Ribbon Cable (174-5746-xx)
  - Customer Documentation

### HDMI Type E Fixtures for Automotive HDMI

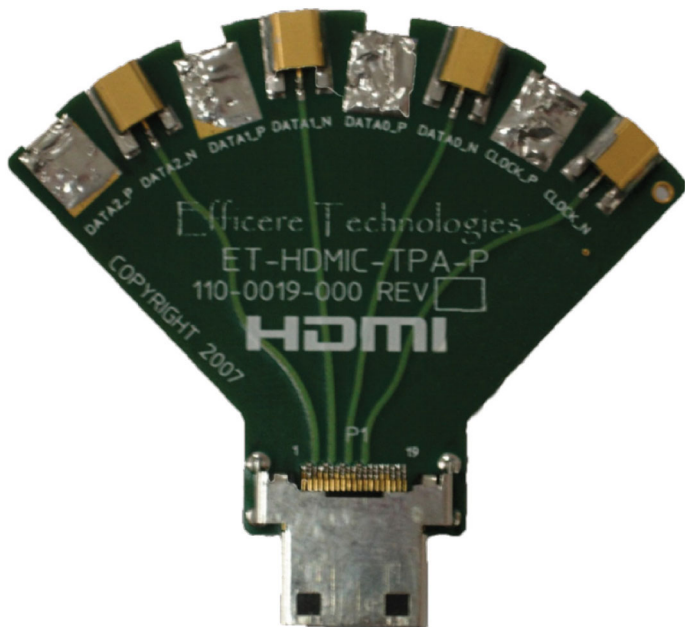
- TF-HDMIE-TPA-KIT Test Adapter Kit (used for source, sink, and cable testing) includes the following:
  - 1 TF-HDMIE-TPA-P plug board
  - 2 TF-HDMIE-TPA-R receptacle boards
- TF-HDMI-TPA-CE consisting of:
  - EDID Fixture PCBA
  - EEPROM with HDMI 1.4 Software
  - Ribbon Cable (174-5746-xx)
  - Customer Documentation



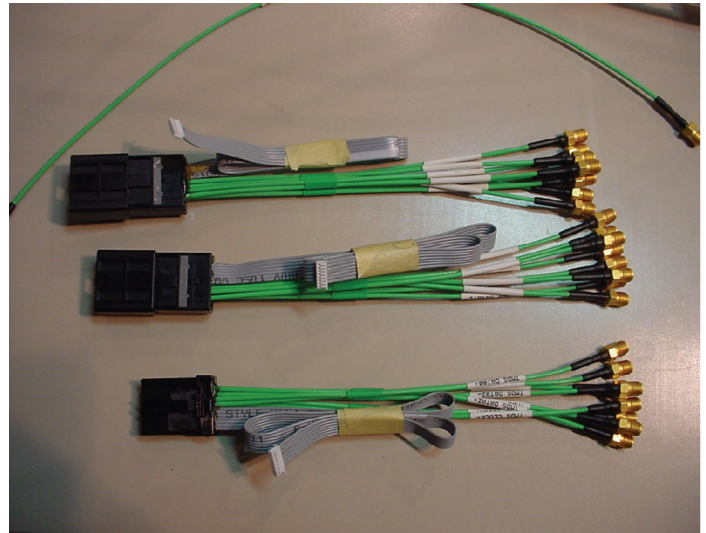
TYPE A PLUG Fixture



TYPE D Fixture set



TYPE C PLUG Fixture



TYPE E Fixture set

**Sink Test Automation**

Product	Description
NI GPIB-USB-A/B	USB-to-GPIB controller (with driver software)
NI GPIB-ENET/100	Ethernet GPIB Controller (with driver software)

For ordering, contact National Instruments (ni.com).



Product(s) are manufactured in ISO registered facilities.



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









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