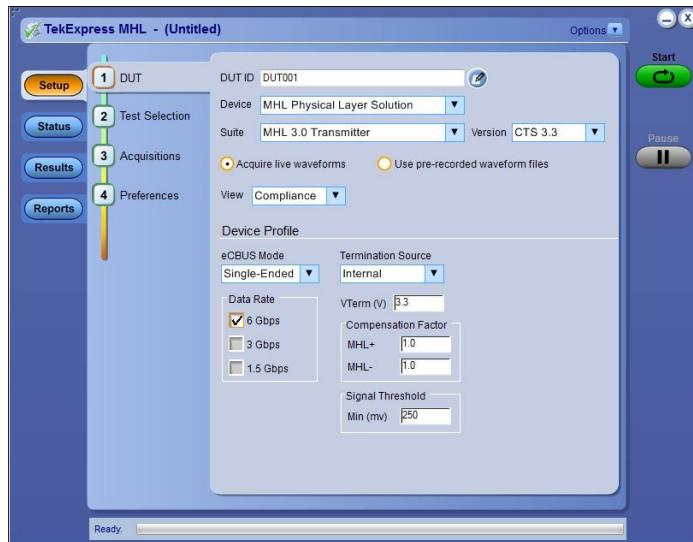


MHL Advanced Analysis and Compliance Test Software

Option MHD and Option MHD3



The TekExpress MHL Advanced Analysis and Compliance software gives you the tools to easily run Mobile High-definition Link (MHL) tests in accordance with MHL compliance test specifications 1.X, 2.0, 1.3 / 2.1 and 3.3. It provides a complete and reliable solution for quick testing.

Key features

- Ensures Conformance to latest MHL 3.3 Compliance Test Specification
- Conformance to MHL 3.3 Compliance Test Specification (CTS) ensures reliable results for Source, Sink, Dongle Output/Input group of tests introduced in MHL 3.3
- Conformance to MHL 1.1/1.2/2.0 and 1.3/2.1 Compliance Test Specification (CTS) ensures reliable results including support for direct attach device testing, cable electrical testing
- Complete validation to standards with a wide range of tests for transmitter and receiver (Sink / Dongle) devices and both physical layer and link layer testing
- Single-box physical and link layer enables seamless testing and analysis from physical layer to link layer and back
- Accurate tests using precise measurement techniques
- Automated receiver/dongle tests - simple setup with all impairments added to the MHL signals using the direct synthesis based capability of the AWG

- Path-breaking direct synthesis method for receiver testing
 - Removes the dependency on hardware elements such as ISI Boards
 - True MHL signal generation without depending on external combiners
- Get quick results with automatic mask-fit, measurements, and Pass/Fail notification
- Simple test setup ensures faster test times and greater repeatability
- Ensure faster testing with one-button selection of multiple MHL Tests
- Save time with one-button MHT/.PDF format summary and reports
- Single compliance solution to meet the MHL 1.1, 1.2, 2.0, 1.3, 2.1, and 3.3 Compliance Test Specification (CTS) using real time oscilloscopes, probes, signal sources, a complete test fixture set, and sampling scopes with innovative IConnect® software

Applications

- Design and validation of MHL physical layer and protocol layer
- MHL3.3 DUT automation support for Source and Sink Input/Output groups using SL403 and RELT board from Silicon Image
- Autocal support for MHL3.3 Transmitter Input group measurements

Mobile high-definition link (MHL) compliance

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

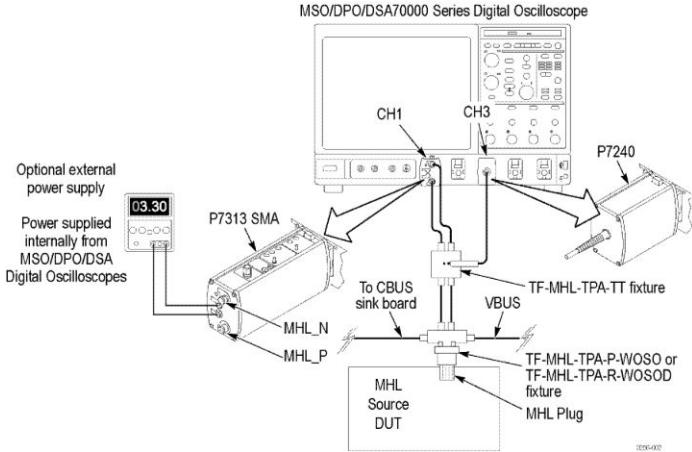
The MHL 1.1/1.2/1.3/2.0/2.1/3.3 specifications support MHL, which enables mobile devices to transmit uncompressed audio/video to an HDTV or receiver with HD capability. Option MHD and MHD3 Advanced Analysis and Compliance Test Software meets the MHL 1.1/1.2/1.3/2.0/2.1/3.3 CTS specification and automates a comprehensive range of tests, enabling unprecedented efficiency with reliable results. TEK-PGY-MHL-PA-SW MHL Protocol Analyzer Software supports up to 1.1/1.2/2.0 and 1.3/2.1 CTS specification.

Reliable and dependable results

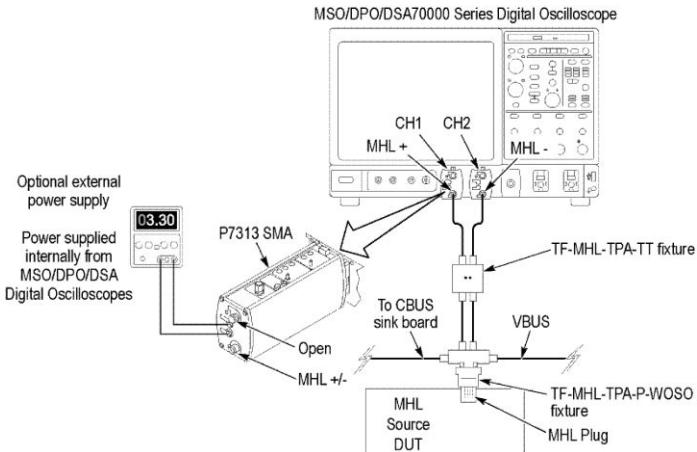
Option MHD and MHD3 software embeds the MHL CTS 1.1/1.2/2.0 and CTS 1.3/2.1/3.3 compliance test procedures, ensuring dependable results. Accurate jitter testing and precise violation testing delivers higher credibility. Perform transmitter tests with simple setups that eliminate nonlinearity. Authentic measurement techniques and automation eliminate errors to provide faster test times.

Option MHD and MHD3 leverages the TekExpress capability to provide smooth multi-equipment interactions, providing an automated solution for transmitter, sink, and dongle testing. The direct synthesis method ensures greater repeatability:

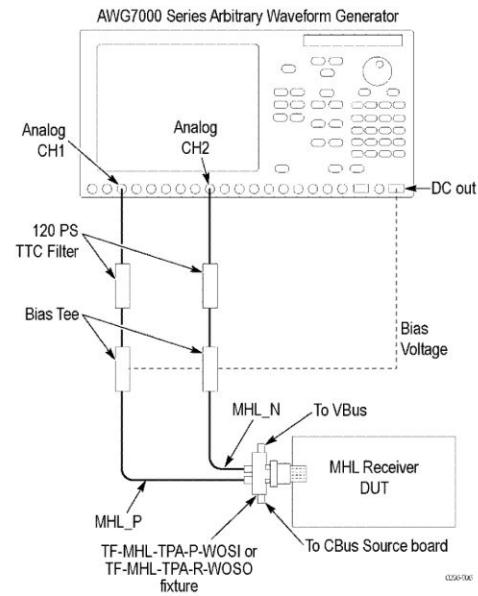
- Eliminates the dependency on hardware PCB traces to insert jitter components
- Eliminates the need to combine common mode clock and differential data signals using hardware combiners



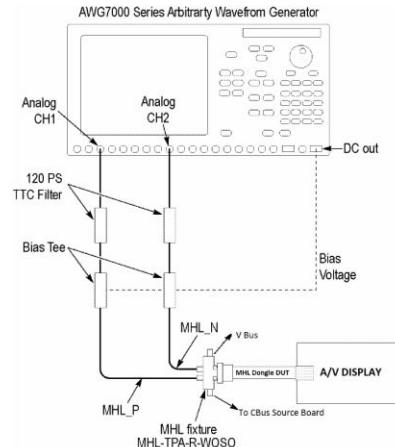
MHL 1.3/2.1 transmitter test setup for all other differential, common mode, and single ended tests



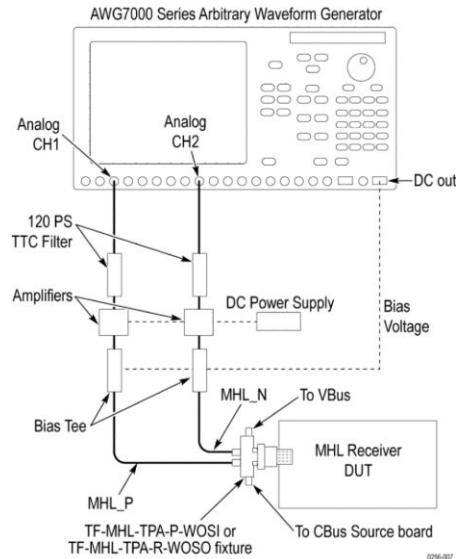
MHL 1.3/2.1 Clock Jitter and Data Eye Diagram test setup



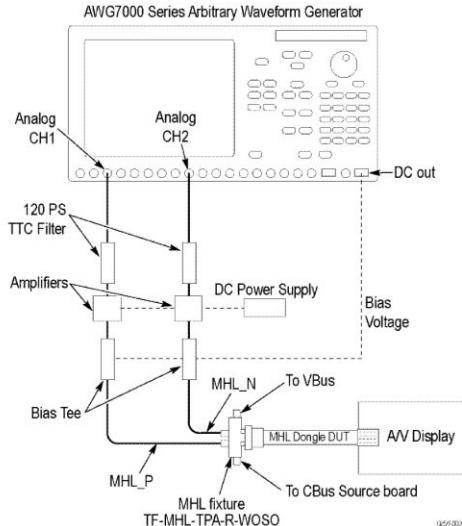
MHL 1.3/2.1 Sink setup



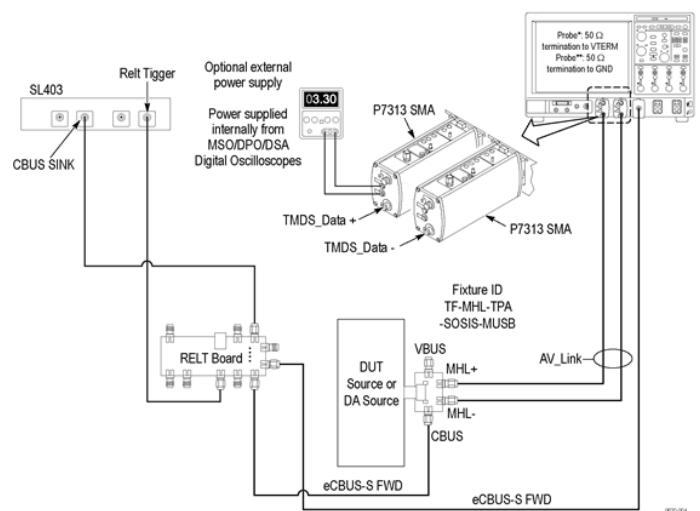
MHL 1.3/2.1 Dongle setup



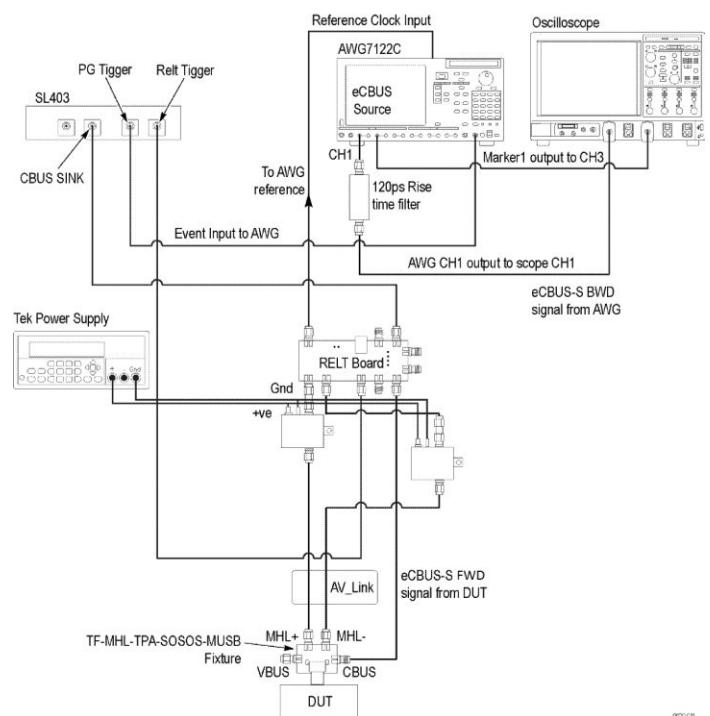
MHL 1.3/2.1 Sink Min/Max setup



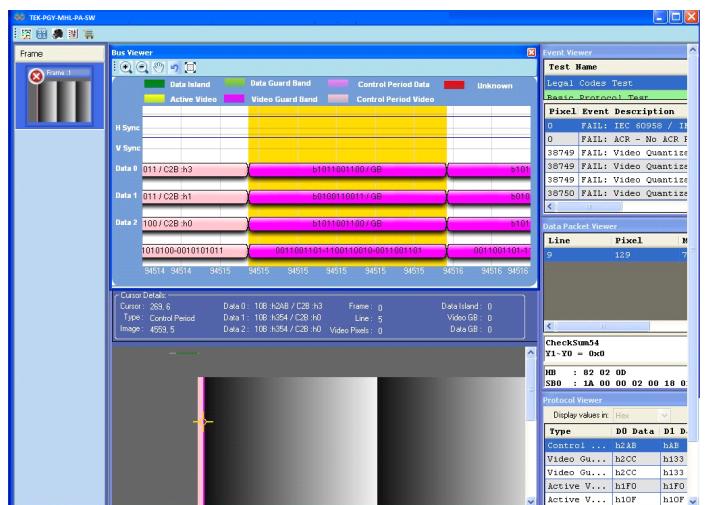
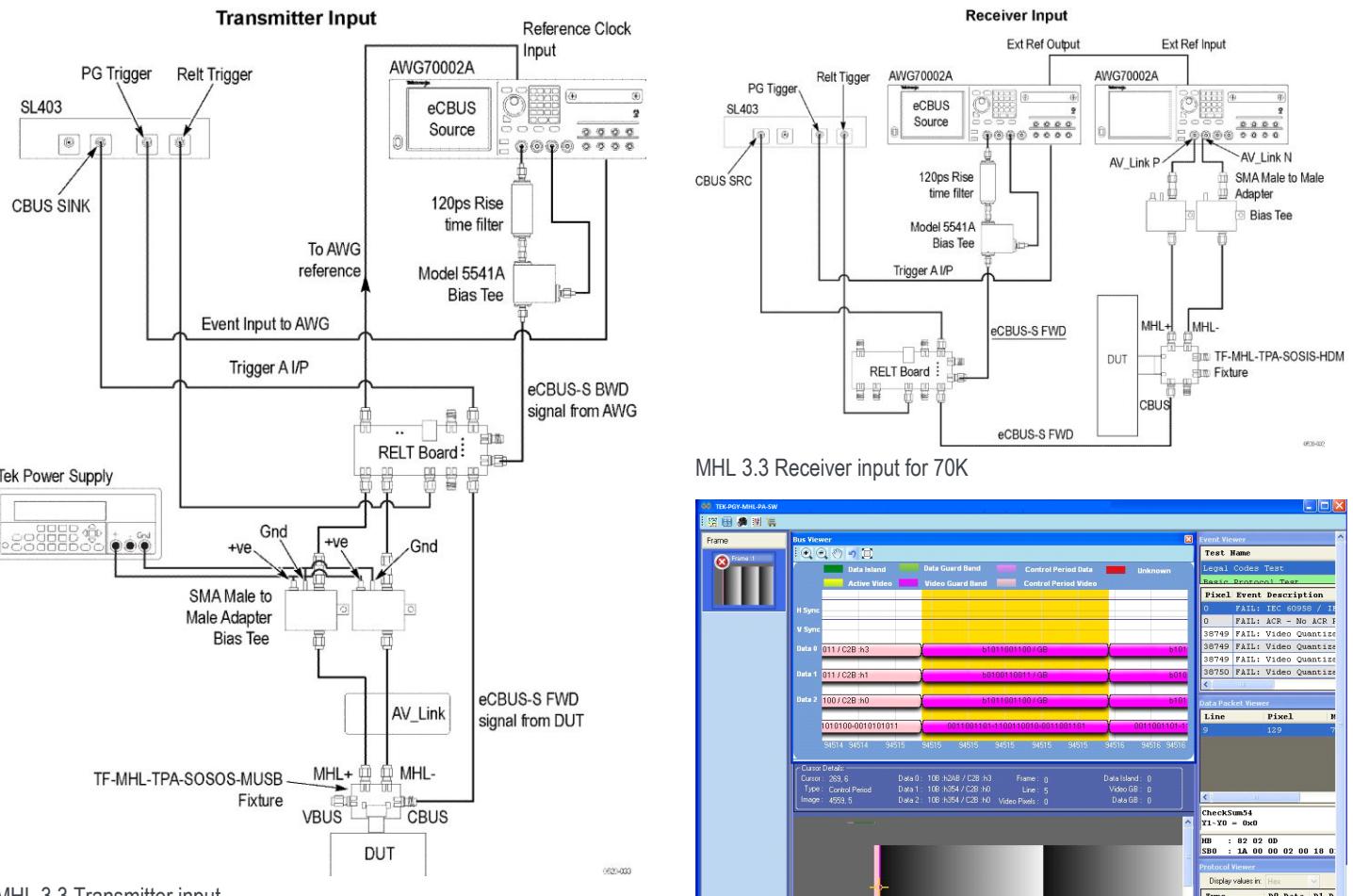
MHL 1.3/2.1 Dongle Min/Max setup



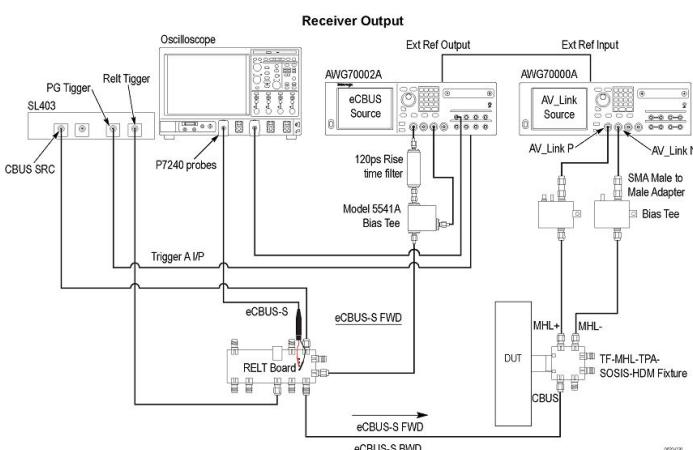
MHL 3.3 Transmitter output



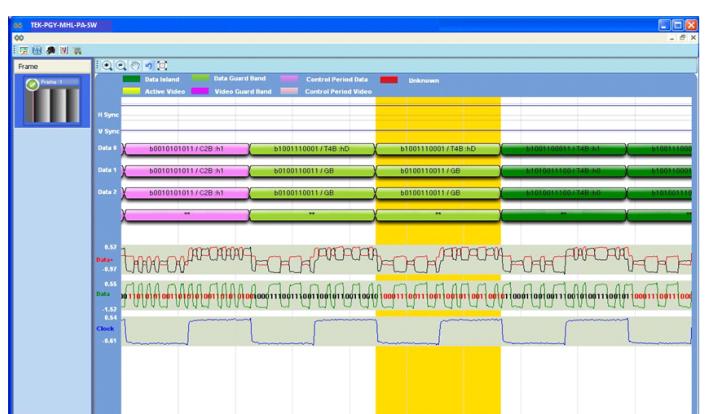
MHL3.3 Transmitter input calibration



MHL protocol multi view display.



MHL 3.3 Receiver output AWG70K-AWG70K



MHL physical and protocol layer seamless link capability

TEK-PGY-MHL-PA-SW

Third-party MHL Protocol Analyzer Software running on a Tektronix Real Time Oscilloscope embeds link-layer test procedures defined in MHL CTS 1.1/1.2/2.0 and CTS 1.3/2.1 and provides a unique one-box solution to MHL design, testing, and validation engineers to seamlessly migrate from physical layer to link layer.

Faster validation cycles

The unparalleled automation provided by Option MHD/MHD3 and Direct Synthesis capability of the Arbitrary Waveform Generators enables faster validation and shrinks test times for MHL testing. Demonstrate efficiency by using the "Select All" feature to perform multiple MHL transmitter tests. Instantly generate .CSV-format summaries or detailed reports at the press of a button.

Option MHD/MHD3 enables faster test times with automatic setting of the oscilloscope parameters and V termination voltage needs for MHL testing. This removes the inaccuracy and rigidity of MHL testing. Leveraging the Direct Synthesis capability of our industry-leading AWGs, in accordance with CTS 1.1, 1.2, 1.3, 2.0, 2.1, and 3.3.

Complete solution for validation

Option MHD and TEK-PGY-MHL-PA-SW offer a wide range of tests enabling thorough verification to standards. Tests offered include automated transmitter, AWG setup file based receiver/dongle, and MHL protocol tests. Perform convincing validation using a complete solution that includes oscilloscopes, probes, arbitrary waveform generators, test fixtures, and TDR.

Characteristics

Physical layer tests

MHL 1.3/2.1 Transmitter tests (supports Direct Attach Device testing)

3.1.1.1, 3.1.1.2, 3.1.1.3, 3.1.1.4, 3.1.1.5, 3.1.1.6, 3.1.1.7, 3.1.1.8, 3.1.1.10, 3.1.1.11, 3.1.1.12, 3.1.1.14, 3.1.1.15, 3.1.1.16, 3.1.1.17, 3.1.1.18, 3.1.1.19, and 3.1.1.20.

MHL 1.3/2.1 Receiver tests (supports Direct Attach Device testing)

4.1.1.1, 4.1.1.2, 4.1.1.3, 4.1.1.4 and 4.1.1.8.

MHL 1.3/2.1 Dongle tests

5.1.1.1, 5.1.1.2, 5.1.1.3, 5.1.1.4, and 4.1.1.9.

MHL 1.3/2.1 Cable Electrical tests

7.2.1.16 and 7.2.1.17.

MHL 1.3/2.1 Cable Assembly tests (MOI based)

7.2.1.2, 7.2.1.3, 7.2.1.4, 7.2.1.5, 7.2.1.6, 7.2.1.7, 7.2.1.8, 7.2.1.9, 7.2.1.10, 7.2.1.11, 7.2.1.12, 7.2.1.13, 7.2.1.14, and 7.2.1.15.

MHL 3.3 Transmitter Output tests

TMDS Data tests

3.7.2.1, 3.7.2.2, 3.7.2.5, S3.7.2.13, 3.7.2.17, and 3.7.2.27.

MHL Clock

3.7.2.7, 3.7.2.8, 3.7.2.9, 3.7.2.20, 3.7.2.21, 3.7.2.22, 3.7.2.23, and 3.7.2.26.

MHL eCBUS

3.7.2.7, 3.7.2.8, 3.7.2.9, 3.7.2.24, 3.7.2.25, and 3.7.2.29.

MHL 3.3 Transmitter Input tests

MHL eCBUS

3.7.2.32, 3.7.2.36, 3.7.2.40, and auto calibration of 3.7.2.36.

MHL 3.3 Receiver Output tests

MHL Sink eCBUS-S BWD

4.7.2.14, 4.7.2.15, 4.7.2.16, 4.7.2.20, 4.7.2.21, 4.7.2.22, and 4.7.2.24.

MHL Dongle eCBUS S BWD

5.7.2.16, 5.7.2.17, and 5.7.2.19.

MHL 3.3 Receiver Input tests

MHL Sink

4.7.2.1, 4.7.2.3, 4.7.2.5, 4.7.2.7, 4.7.2.10, and 4.7.2.28.

MHL Dongle

5.7.2.1, 5.7.2.2, 5.7.2.5, 5.7.2.7, 5.7.2.8, 5.7.2.10, 5.7.2.13, and 5.7.2.23.

MHL 2.1 Sink and Dongle system tests supported by AWG

TMDS Coding tests

4.2.1.1 and 5.2.1.1, 4.2.1.2 and 5.2.1.2, 4.2.1.3 and 5.2.1.3, and 4.2.1.4 and 5.2.1.4.

Video tests

4.2.2.1 and 5.2.2.1, 4.2.2.2 and 5.2.2.2, 4.2.2.3 and 5.2.2.3, 4.2.2.4 and 5.2.2.4, and 4.2.2.5 and 5.2.2.5.

Audio tests

4.2.3.1 and 5.2.3.1 IEC60958/IEC61937 and 4.2.3.2 and 5.2.3.2 Audio Clock regeneration.

3D Video tests

4.2.8.2 and 5.2.8.2 3D Video Format in Normal mode and 4.2.8.3 and 5.2.8.3 3D Video Format in Packed Pixel mode.

Protocol tests for CTS 1.1, 1.2, 2.0 and CTS 1.3, 2.1

Source Protocol tests in both normal mode and PackedPixel mode

- Legal codes
- Basic protocol
- Packet types

Source Video tests in both Normal mode and PackedPixel mode

- Video formats test
- Pixel encoding test
- Video quantization ranges
- AVI info frame

Ordering information

MHL 2.1 Compliance Test Software

MHL options to order with an oscilloscope (MHL requires a minimum 8 GHz oscilloscope for electrical testing)

Option	Description
Opt. MHD	Advanced Analysis and Compliance Test Software for MHL Requires options DJA and 2XL
Opt. DPOFL-MHD	Floating License Advanced Analysis and Compliance Test Software for MHL Requires options DJA and 2XL
Opt. DPOFT-MHD	Floating License - Trial Version
Stand-alone software for protocol analysis	
TEK-PGY-MHL-PA-SW	MHL Compliance Software for MHL 2.1 Requires option 20XL (available in 16 GHz and above real-time oscilloscopes.)

MHL upgrades with an existing oscilloscope (MHL requires a minimum 8 GHz oscilloscope for electrical testing)

Options	Description
Opt. DPO-UP MHD	Advanced Analysis and Compliance Test Software for MHL Requires options DJA and 2XL
Stand-alone software for protocol analysis	
TEK-PGY-MHL-PA-SW	MHL Compliance Software for MHL 2.1 Requires option 20XL (available in 6 GHz and above real-time oscilloscopes)

Note: If you will be doing both electrical and protocol testing, a real-time oscilloscope of at least 12.5 GHz is recommended.

MHL 3.3 options to order with an oscilloscope (MHL requires a minimum 16 GHz oscilloscope for electrical testing)

Option	Description
Opt. MHD3	MHL 3.0 Advanced Analysis and Compliance Software for Tx, Rx, Dongle and Cable tests Requires Option MHD
Opt. DPOFL-MHD3	Floating License MHL 3.0 Advanced Analysis and Compliance Software for Tx, Rx, Dongle and Cable tests Requires Option MHD
Opt. DPOFT-MHD3	Floating License - Trial Version

MHL 3.3 upgrades with an existing oscilloscope (MHL requires a minimum 16 GHz oscilloscope for electrical testing)

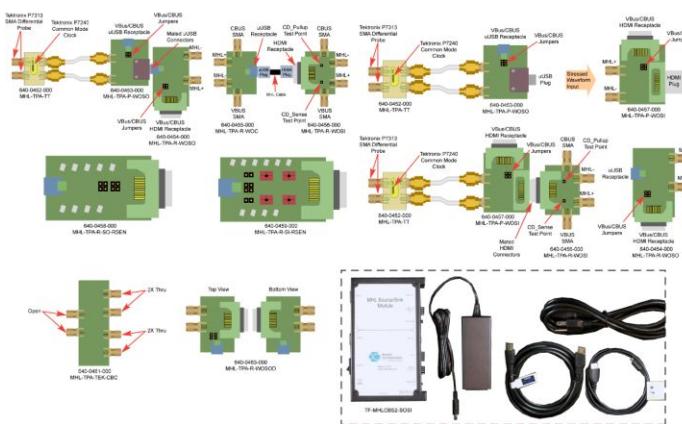
Options	Description
Opt. DPO-UP MHD3	MHL 3.0 Advanced Analysis and Compliance Software for Tx, Rx, Dongle and Cable tests
Opt. DPO-UP MHD	MHL Advanced Analysis and Compliance Software Requires Option DJA and Option 2XL

Recommended equipment

DPO/MSO 71604C	16 GHz Digital Oscilloscopes with Option DJA (12.5G Scope supported, with 10% variation in results)
DPO/MSO72004C	20 GHz Digital Oscilloscopes with Option DJA
DPO/MSO72304DX	23 GHz Digital Oscilloscopes with Option DJA
DPO/MSO72504DX	25 GHz Digital Oscilloscopes with Option DJA
DPO72504D	25 GHz Digital Oscilloscopes with Option DJA
DPO/MSO73304DX	33 GHz Digital Oscilloscopes with Option DJA
DPO73304D	33 GHz Digital Oscilloscopes with Option DJA
P7313SMA	SMA Probe for Single-ended AVLINK data measurements (Quantity 2)
P7240	Probe for acquiring Clock / eCBUS waveform (Quantity 1)
AWG7122C	Arbitrary Waveform Generator with Options 01, 02/06 and 08 (Quantity 1 for MHL 2.1 Rx and MHL 3.3 Tx; Quantity 2 for MHL 3.3 Rx)
AWG70002A	Arbitrary Waveform Generator with Options 01, 03, and 225 (Quantity 1 to be used with AWG 7122C for MHL 3.3 Rx) OR AWG70002A Arbitrary Waveform Generator with Options 01, 03, and 225 (Quantity 2 for MHL 3.3 Rx)

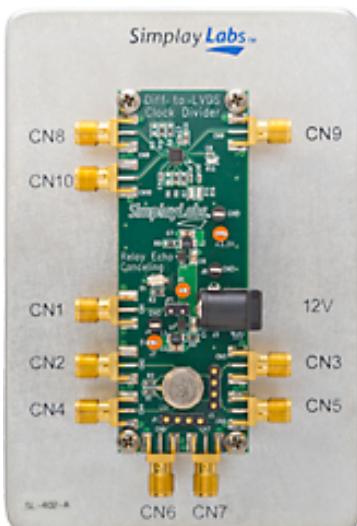
Recommended accessories for MHL 2.1

012-0649-00	SMA cables. Quantity 4 (2 pairs)
TF-MHL-DS-AccKit	MHL Direct Synthesis Accessory Kit, contains the following:
• 119-7601-00: 120 ps rise time filters. Quantity 2	
• 131-8489-00: Bias-tees. Quantity 2	
• 119-8176-00: 5866 amplifiers. Quantity 2	
• 015-1011-00: SMA-SMA barrel connectors. Quantity 2	
• PSPL5541A Bias Tee Quantity 1 (when AWG 70k is used as eCBUS source for MHL 3.3 receiver testing)	



Additional accessories for MHL 3.3

012-0649-00	SMA Cables. Quantity 4 (2 pairs)
TF-MHL-TPA-SOS-MUSB ¹	MHL Test Point Adapter uUSB Plug
TF-MHL-TPA-SOSIS-HDM	MHL Test Point Adapter HDMI-A Plug
TF-MHL3-TPA-KIT	MHL µUSB Plug and HDMI-A Plug fixture.
SL 403	Source/Sink board from Simplay Labs.
SL402	Relay board for switching signals from Simplay Labs.



¹ Two numbers are required for 3.7.2.6 Auto Calibration test measurement.

Tektronix MHL fixtures

MHL Fixtures are available from Tektronix. Details are given below. MHL fixtures are also available from Wilder Technologies (<http://www.wilder-tech.com>).

Kits

Wilder part number	Wilder model number	Tektronix nomenclature	Description
640-0476-000	MHL-TPA-TEK-SO (Source Fixture Only Kit)	TF-MHL-TPA-TEK-SO (Source Fixture Only Kit)	MHL Source Test Kit includes 640-00452 and 640-0453-000
640-0477-000	MHL-TPA-TEK-SI (Sink Fixture Kit)	TF-MHL-TPA-TEK-SI (Sink Fixture Kit)	MHL Sink Test Kit includes 640-0452-000, 640-0456-000, 640-0457-000
640-0478-000	MHL-TPA-TEK-DG (Dongle Fixture Kit)	TF-MHL-TPA-TEK-DG (Dongle Fixture Kit)	MHL Dongle Test Kit includes 640-0452-000, 640-0453-000, 640-0454-000
640-0479-000	MHL-TPA-TEK-CB (Cable Fixture Kit)	TF-MHL-TPA-TEK-CB (Cable Fixture Kit)	MHL Cable Test Kit includes 640-0455-000, 640-0456-000
640-0480-000	MHL-TPA-TEK-RSEN (RSEN Kit)	TF-MHL-TPA-TEK-RSEN (RSEN Kit)	MHL RxSense Kit includes 640-0458-000 and 640-0459-000
640-0488-000	MHL-TPA-KT	TF-MHL3-TPA-KIT	MHL 3.0 HDMI/μUSB test adapter kit

Individual fixtures

Wilder part number	Wilder model number	Tektronix nomenclature	Description
640-0452-000	MHL-TPA-TT	TF-MHL-TPA-TT	MHL Termination Board
640-0453-000	MHL-TPA-P-WOSO	TF-MHL-TPA-P-WOSO	MHL Source Test Board Plug without Termination
640-0454-000	MHL-TPA-R-WOSO	TF-MHL-TPA-R-WOSO	MHL Dongle Test Board Receptacle without Termination
640-0455-000	MHL-TPA-R-WOC	TF-MHL-TPA-R-WOC	MHL Cable Test Board Receptacle without Termination
640-0456-000	MHL-TPA-R-WOSI	TF-MHL-TPA-R-WOSI	MHL Sink Calibration Test Board Receptacle without Termination
640-0457-000	MHL-TPA-P-WOSI	TF-MHL-TPA-P-WOSI	MHL Sink Test Board Plug without Termination
640-0458-000	MHL-TPA-R-SO-RSEN	TF-MHL-TPA-R-SO-RSEN	MHL Source RxSense Test Board Receptacle
640-0459-000	MHL-TPA-R-SI-RSEN	TF-MHL-TPA-R-SI-RSEN	MHL Sink and Dongle RxSense Test Board Receptacle
640-0481-000	MHL-TPA-TEK-CBC	TF-MHL-TPA-CBC	MHL Cable Calibration Adapter Unit
640-0463-000	MHL-TPA-R-WOSOD	TF-MHL-TPA-R-WOSOD	Direct Attach Fixture
640-0486-000	MHL3-TPA-P-SOS	TF-MHL3-TPA-P-SOS	MHL 3.0 μUSB test adapter
640-0487-000	MHL3-TPA-P-SOSIS	TF-MHL3-TPA-P-SOSIS	MHL 3.0 HDMI test adapter

Recommended equipment in MHL CTS 1.1, 1.2, 1.3, 2.0, 2.1, and 3.3 to perform other tests manually

DSA8200/8300 with 80E03, 80E04, and IConnect® Software	Sampling scope with necessary modules and IConnect® Software for MHL Rx impedance tests and cable tests
DPO2024, MSO2024, MSO4054	Low-bandwidth Scopes. Used for CTS Test IDs 3.1.1.13.5; 4.1.1.7; 5.1.1.7; 5.1.1.8
P2221, TPP0500B	Passive Probes. Used for CTS Test IDs 3.1.1.13; 4.1.1.7; 5.1.1.7; 5.1.1.8
Keithley 2400	Source Meter. Used for CTS Test IDs 7.2.1.13; 7.2.1.14
PWS2185, PWS4205, 2220-30-1, 2220J-30-1	Power Supplies. Used for all tests where an external power supply is needed
DMM4020, DMM4040, DMM4050	Digital Multimeter. Used for CTS Test IDs 3.1.1.1; 7.2.1.15

Datasheet

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* European toll-free number. If not accessible, call: +41 52 675 3777

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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