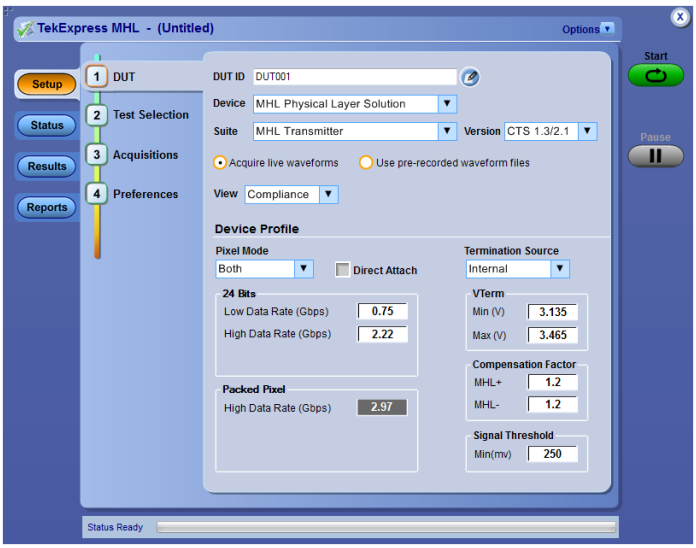
MHL Advanced Analysis and Compliance Test Software

Option MHD Datasheet



Features & Benefits

- 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, new Source Eye Diagram and Clock Jitter tests introduced in MHL 2.1
- Complete Validation to Standards with a Wide Range of Tests for Transmitter and Receiver/Dongle Devices and both Physical Layer and Link Layer Testing
- Single-box Physical and Link Layer enable 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 Format Summary and Reports
- Complete Compliance Solution to meet the MHL 1.1/1.2/2.0 and 1.3/2.1 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

Mobile High-definition Link (MHL) Compliance Testing

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

Reliable and Dependable Results

Option MHD software embeds the MHL CTS 1.1/1.2/2.0 and CTS 1.3/2.1 compliance test procedures, ensuring dependable results. Accurate jitter testing and precise violation testing deliver 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 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 as the dependency on hardware PCB traces to insert jitter components and the need to combine common mode clock and differential data signals using hardware combiners is eliminated.

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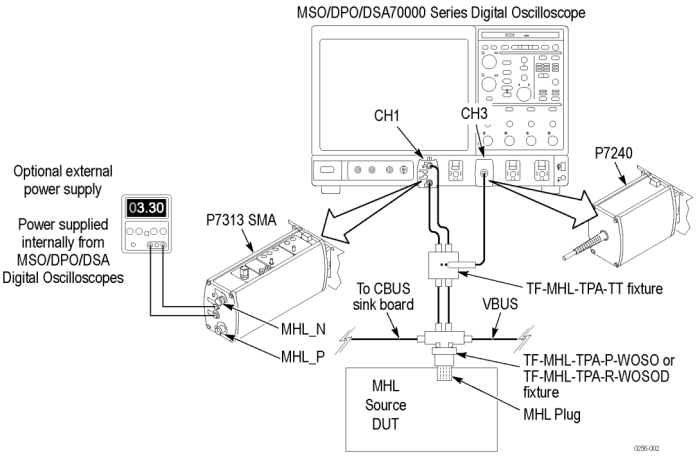
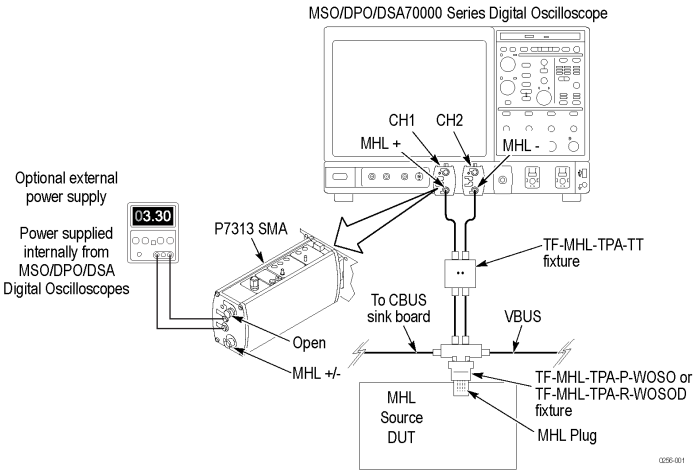
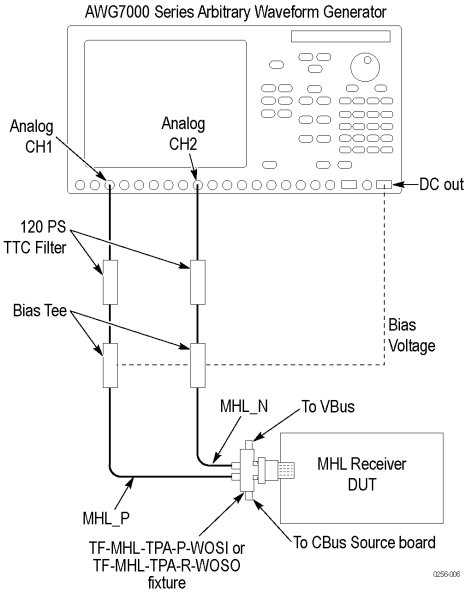


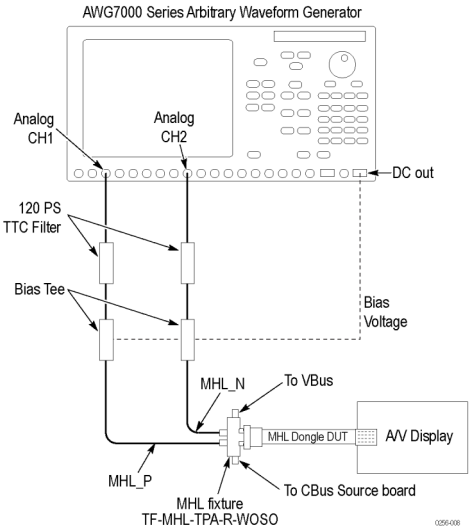
MHL Transmitter test setup for all other Differential, Common Mode, and Single Ended tests.



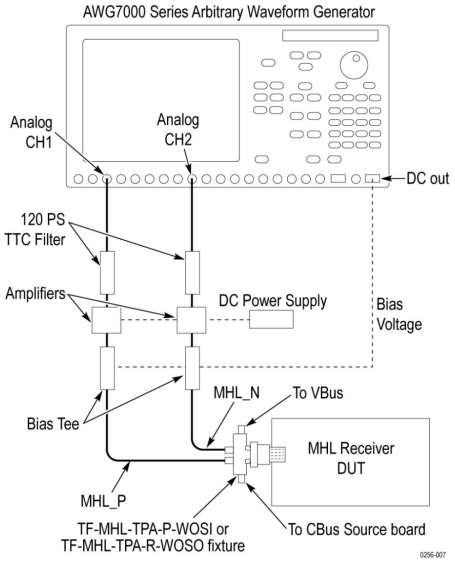
CTS 1.3/2.1 Clock Jitter and Data Eye Diagram test setup.



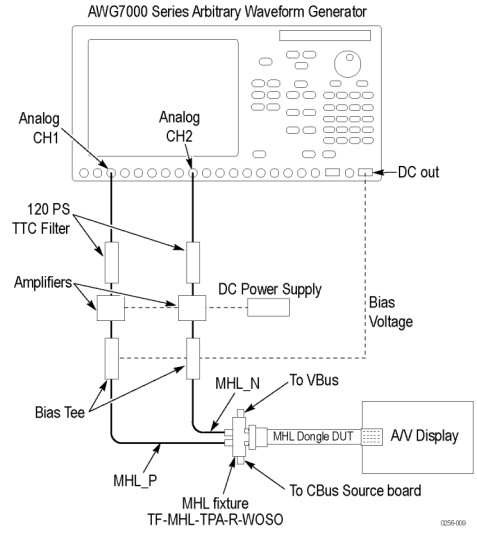
MHL Receiver setup.



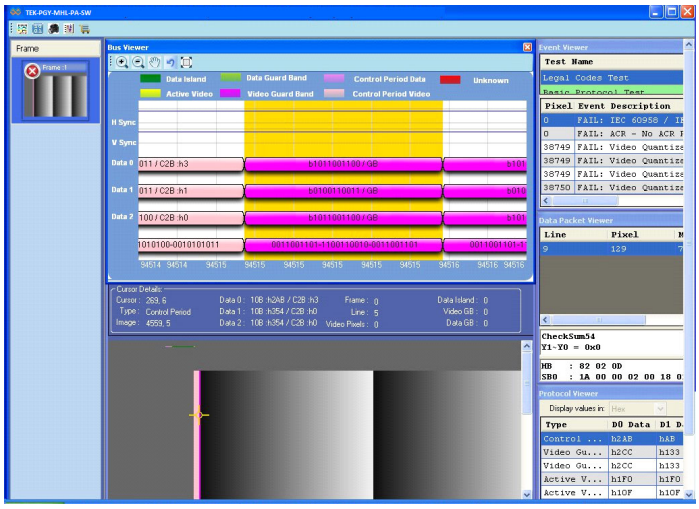
MHL Dongle setup.



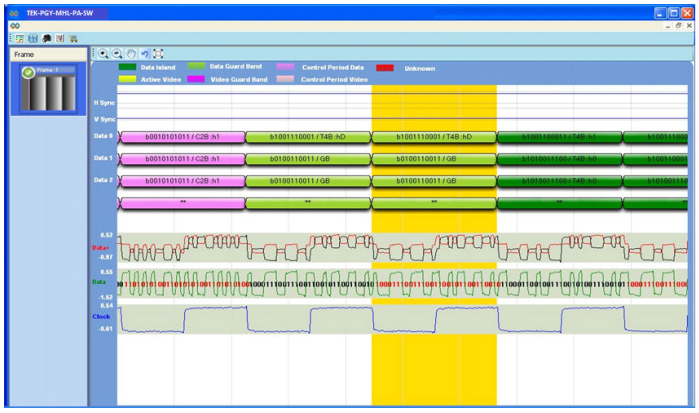
MHL Receiver Min/Max setup.



MHL Dongle Min/Max setup.



MHL Protocol Multi View Display.



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 as per 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 offered on the Option MHD 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 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 1.1/1.2/2.0 and CTS 1.3/2.1.

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 Transmitter Tests (supports Direct Attach Device testing)

- 3.1.1.1 Standby Output Voltage V_{OFF}
- 3.1.1.2 Single-ended High-level Voltage V_{SE_HIGH}
- 3.1.1.3 Single-ended Low-level Voltage V_{SE_LOW}
- 3.1.1.4 Differential Output Swing Voltage $V_{DFSWING}$
- 3.1.1.5 Common Mode Output Swing Voltage $V_{CMSWING}$
- 3.1.1.6 Differential Rise and Fall Times T_{R_DF}, T_{F_DF}
- 3.1.1.7 Common Mode Rise and Fall Times T_{R_CM}, T_{F_CM}
- 3.1.1.8 Differential Intra Pair Skew T_{SKEW_DF}
- 3.1.1.10 MHL Clock Duty Cycle in Normal mode (not needed for CTS 2.1)
- 3.1.1.11 MHL Clock Jitter in Normal mode (replaced by 3.1.1.17)
- 3.1.1.12 MHL Data Eye Diagram in Normal mode (replaced by 3.1.1.18)
- 3.1.1.14 MHL Clock Duty Cycle in PackedPixel mode
- 3.1.1.15 MHL Clock Jitter in PackedPixel mode (replaced by 3.1.1.19)
- 3.1.1.16 MHL Data Eye diagram in Packed Pixel mode (replaced by 3.1.1.20)
- 3.1.1.17 TP2 Clock Jitter in Normal mode (new test for CTS 1.3/2.1)
- 3.1.1.18 Data Eye Diagram in Normal mode (new test for CTS 1.3/2.1)
- 3.1.1.19 TP2 Clock Jitter in Packed Pixel mode (new test for CTS 1.3/2.1)
- 3.1.1.20 Data Eye Diagram in Packed Pixel mode (new test for CTS 1.3/2.1)

MHL Receiver Tests (supports Direct Attach Device testing)

- 4.1.1.1 Input Signal DC Voltage Level Tolerance
- 4.1.1.2 Input Signal Minimum and Maximum Swing Voltage Level Tolerance
- 4.1.1.3 Intra Pair Skew Tolerance
- 4.1.1.4 Jitter Tolerance in Normal mode
- 4.1.1.8 Jitter Tolerance in PackedPixel mode

MHL Dongle Tests

- 5.1.1.1 Input Signal Single-ended Voltage Level Tolerance
- 5.1.1.2 Input Signal Minimum and Maximum Swing Voltage Level Tolerance
- 5.1.1.3 Intra Pair Skew Tolerance
- 5.1.1.4 Jitter Tolerance in Normal mode
- 4.1.1.9 Jitter Tolerance in PackedPixel mode

MHL Cable Electrical Tests (CTS 1.3/2.1)

7.2.1.16 Minimum CLK Swing

7.2.1.17 Data Eye Diagram

MHL Cable Assembly Tests (MOI Based)

- 7.2.1.2 Differential Intra Pair Skew
- 7.2.1.3 Common Mode Intra Pair Skew
- 7.2.1.4 Differential Characteristic Impedance
- 7.2.1.5 Common Mode Characteristic Impedance
- 7.2.1.6 CBUS Line Capacitance
- 7.2.1.7 CBUS Cable Delay
- 7.2.1.8 Differential Insertion Loss
- 7.2.1.9 Common Mode Insertion Loss
- 7.2.1.10 Differential and Common Mode Conversion
- 7.2.1.11 CBUS Insertion Loss
- 7.2.1.12 Far End Cross talk
- 7.2.1.13 VBUS Drop (uses Keithley source meter)
- 7.2.1.14 Ground Resistance and Ground Shift (uses Keithley source meter)
- 7.2.1.15 MHL Cable Detect (MHL Cable with HDMI Type A Plug – uses Fluke DMM)

Sink and Dongle System tests supported by AWG

TMDS Coding Tests

4.2.1.1 and 5.2.1.1 Character Synchronization in Normal mode

4.2.1.2 and 5.2.1.2 Packet Types in Normal mode

4.2.1.3 and 5.2.1.3 Character Synchronization in PackedPixel mode

4.2.1.4 and 5.2.1.4 Packet Types in PackedPixel mode

Video Tests

4.2.2.1 and 5.2.2.1 Video Formats in Normal mode

4.2.2.2 and 5.2.2.2 Pixel encoding in Normal mode

4.2.2.3 and 5.2.2.3 Video Quantization Range

4.2.2.4 and 5.2.2.4 Video Formats in PackedPixel mode

4.2.2.5 and 5.2.2.5 Pixel encoding in PackedPixel mode

Audio Tests

4.2.3.1 and 5.2.3.1 IEC60958/IEC61937

4.2.3.2 and 5.2.3.2 Audio Clock regeneration

3D Video Test

4.2.8.2 and 5.2.8.2 3D Video Format in Normal mode

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 (See http://prodigytechno.com for more details)

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 Compliance Test Software

To Order along with Oscilloscope (MHL requires a minimum 8 GHz real-time scope 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 MHL Protocol Analysis	
TEK-PGY-MHL-PA-SW	MHL Compliance Software. Requires Option 20XL (Option 20XL is available in 12.5 GHz and above real-time scopes)

To Upgrade Existing Oscilloscope (MHL requires a minimum 8 GHz real-time scope for electrical testing)

Option	Description
Opt. DPO-UP MHD	Advanced Analysis and Compliance Test Software for MHL. Requires Options DJA and 2XL
Stand-alone Software for MHL Protocol Analysis	
TEK-PGY-MHL-PA-SW	MHL Compliance Software. Requires Option 20XL (Option 20XL is available in 12.5 GHz and above real-time scopes)

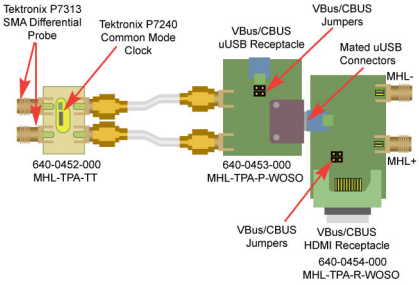
Note: For customers who want both electrical and protocol testing, a ≥12.5 GHz real-time scope is recommended.

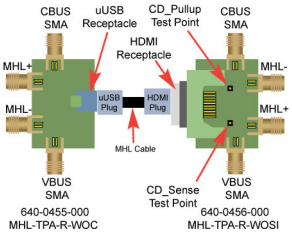
Recommended Equipment

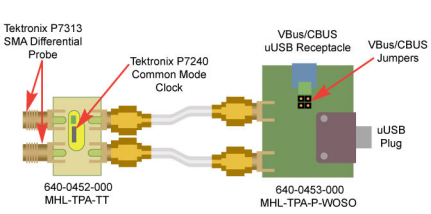
Product	Description
DPO/DSA/MSO 70804/B/C	8 GHz Digital Oscilloscopes with Option DJA (electrical testing only)
DPO/DSA/MSO 71254/B/C	12.5 GHz Digital Oscilloscopes with Option DJA
DPO/DSA/MSO 71604/B/C	16 GHz Digital Oscilloscopes with Option DJA
DPO/DSA/MSO 72004/B/C	20 GHz Digital Oscilloscopes with Option DJA
DPO/DSA 72504D	25 GHz Digital Oscilloscopes with Option DJA (Supports MHL 1.2 / 2.0)
DPO/DSA 73304D	33 GHz Digital Oscilloscopes with Option DJA (Supports MHL 1.2 / 2.0)
P7313SMA	SMA Probe for Differential and Single-ended Measurements. Qty. 2
P7240	Probe for Common Mode Measurement. Qty. 1
AWG7122B/C	Arbitrary Waveform Generator with Options 01 and 02 or Options 06 and 08

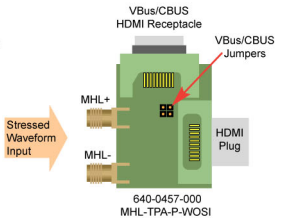
Recommended Accessories

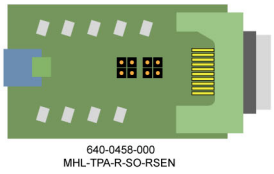
Accessory	Description
012-0649-00	SMA Cables. Qty. 4 (2 pairs)
TF-MHL-DS-AccKit contains the following:	MHL Direct Synthesis Accessory Kit
119-7601-00	120 ps rise time filters. Qty. 2
131-8489-00	Bias-tees. Qty. 2
119-8176-00	5866 amplifiers. Qty. 2
015-1011-00	SMA-SMA barrel connectors. Qty. 2

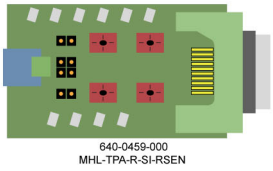


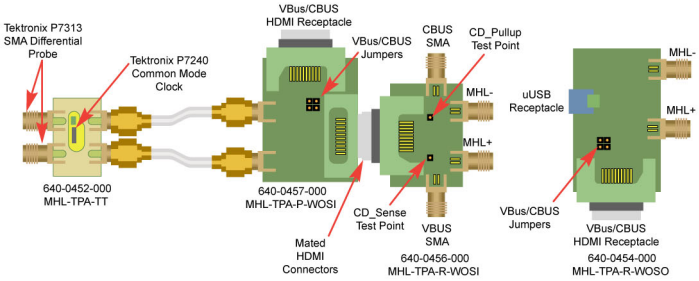


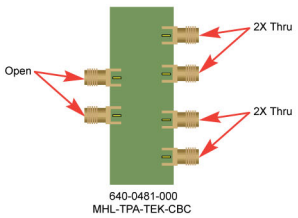


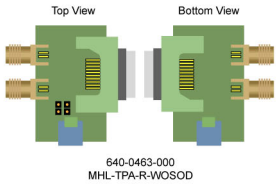












Tektronix MHL Fixtures

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

Wilder P/N	Wilder Model Number	Tektronix Nomenclature	Description
Kits			
640-0475-000	MHL-TPA-TEK (Complete MHL Fixture Kit with Cbus board)	TF-MHL-TPA-TEK (Complete MHL Fixture Kit with Cbus board)	MHL Test Kit includes 640-0452-000 through 640-0459-000, 640-0485-1x0 (x stands for power cord options)
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
Individual Fixtures			
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
640-0485-1xx	MHL-CTB-SOSI	TF-MHLCBS2-SOSI	MHL CTS 2.0 C Bus Source and Sink Board with Tektronix power supply (part number 119-7753-00) and appropriate power cord (A0, A1, A2, A5, A6, A10, A11, A12)
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

Recommended Equipment in MHL CTS 1.1/1.2/2.0 and CTS 1.3/2.1 to Perform Other Tests Manually

Product	Description
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 TPP0500	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

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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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