

HDMI Compliance testing using Tektronix DTG5274 and AWG710

As part of the HDMI Compliance Test Specification 1.0 there are many tests that require a TMDS signal source. Tektronix is active in providing the required equipment and setups required to make these tests. This tech brief describes the signal source setups for compliance tests in section 8 of the HDMI Compliance Test Specification 1.0 available for HDMI adopters at www.hdmi.org.

Equipment Required:

Hardware:

- 1) DTG5274 with 3 DTGM30 modules
- 1) AWG710
- 1) TDS/CSA7404
- 1) TDS/CSA8000B
- 1) 80E04 Differential TDR sampling module
- 2) Differential probes P7350 or P7330
- 1) HDMI TPA – R board (tek kit 013-A012-50)
- 1) HDMI TPA – P board (tek kit 013-A013-50)
- 3) SMA(Ma) to BNC(Fe) (tek 015-1018-00)
- 2) BNC(Ma to SMB(Ma) (tek 015-0671-00)
- 2) SMB to pin cable (tek 012-1503-00)
- 11) SMA cables (tek 074-1427-00) 20 inch
- 1) BNC cable (tek 012-0057-01)
- 2) SMA(Fe) to SMA(Fe) barrel (tek 015-1012-00)
- 2) Bias Tee (Mini-Circuits ZFBT-4R2GW .1 – 4200MHz)
- 1) HDMI cable
- 1) DC Power Supply 3.3V

Software:

AWG710 jitter modulation waveform files

PM-270M-10M.txt

(equation file: 27MHz clock with 10M jitter freq)

Marker270M.wfm (270M marker file)

PM-740M-10M500K.txt (equation file: 74.25MHz clock with 10M jitter and 500k jitter)

Marker740M.wfm (740M marker file)

DTG5274 Pattern files

1080i Pattern files (ColorBar, GrayShade, GreyStep and GreyWave)

720p Pattern files (ColorBar, GrayShade, GreyStep and GreyWave)

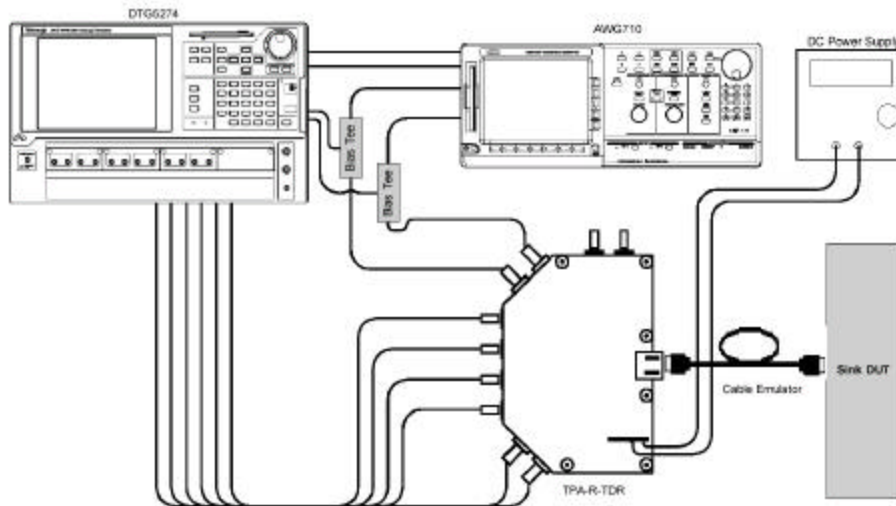
Compliance test setups(8-5, 8-6, 8-15, 8-16, 8-19, 8-20, 8-21, 8-22, 8-23, 8-24)

Software Clock Recovery (available by request from Tektronix for HDMI adopters only)

Test 8-7 Jitter Tolerance Setup:

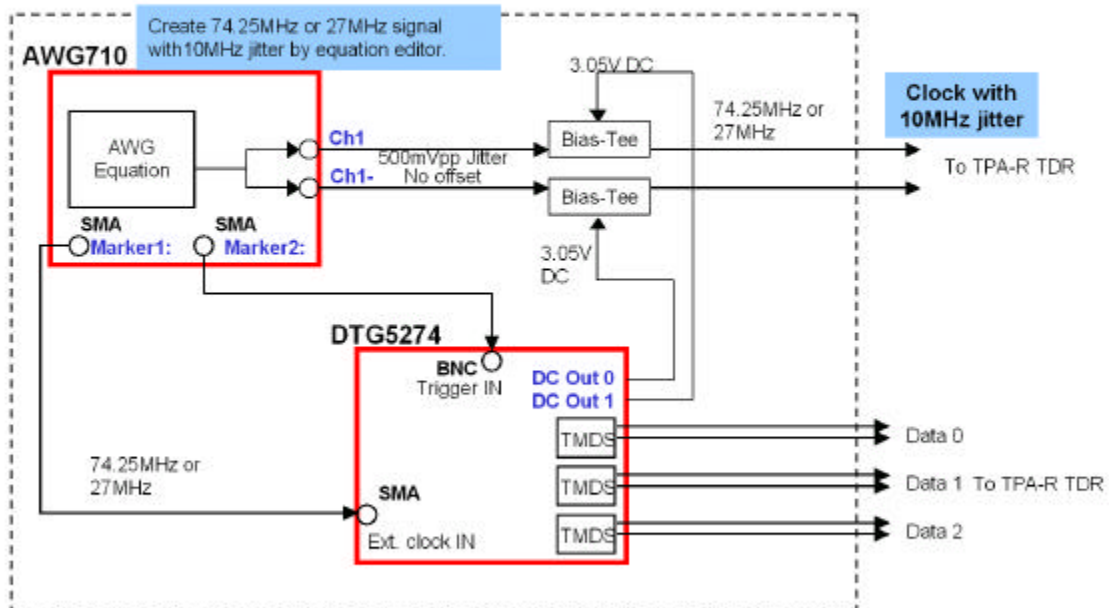
Recommended Test Method

Test ID 8-7: TMDS – Jitter Tolerance

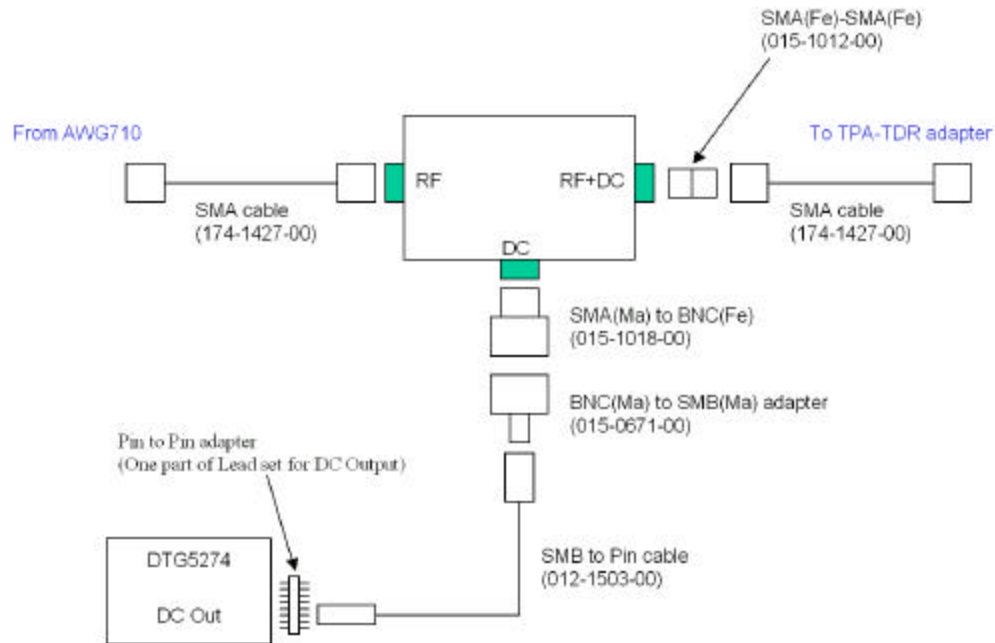


Setup 22. Test ID 8-7: TMDS – Jitter Tolerance

DTG5274 + DTGM30 x 2 + AWG710 + Bias-Tee



Connection around bias-tee



Editing jitter equation on AWG710 to generate different amplitudes of jitter.

- Copy files PM-270M-10M.txt, marker270m.wfm, PM-740M-10M500K.txt and marker740M.wfm to the AWG710 hard disk.
- From the AWG710 front panel press the EDIT menu button.
- Select the file to edit such as PM-270M-10M.txt
- Edit Jitter Amplitude here (k2) and press Compile.

```
'Phase modulation'

clock = 2.7e9      ' Sampling Clock
size = 5400       ' Waveform Length

k0 = 10e6          ' Jitter Frequency
k1 = 27e6          ' Clock Frequency
k2 = 500e-12       ' Jitter Amplitude (peak to peak)
k3 = 30           ' Vertical Scale

k = k2 * 1e12      ' Used to name file with jitter amplitude

"PM-270M-10M_":k:".wfm" = k3 * sin(2 * pi * k1 * (time + k2/2 * sin(2 * pi * k0 * time)))

"PM-270M-10M_":k:".wfm".marker1 = "marker270M.wfm".marker1
"PM-270M-10M_":k:".wfm".marker2 = "marker270M.wfm".marker2
```

To generate the patterns from the DTG copy the .set files to the DTG hard disk and select File Open and select the pattern to be used. Then select the Run Sequencer and the All OUTPUTS ON/OFF button.

HDMI TPA-R test adapter set

013-A012-50

Includes

HDMI TPA-R TDR	2ea
HDMI TPA-R DI	1ea
HDMI TPA-R SE	1ea

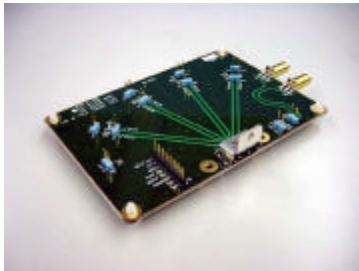
HDMI TPA-R TDR board



This adapter is used to change the output of the signal generator into HDMI or used to measure HDMI cable impedance with digital sampling oscilloscope.

J10:	HDMI receptacle connector
J20 to J27:	T.M.D.S signal input or output.
J30:	Control signal monitor
J50 to J51:	Impedance validation connector

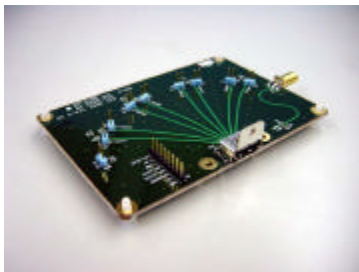
HDMI TPA-R DI board



This adapter is used to terminate HDMI signal and pick up with differential probe connected to oscilloscope.

J10:	HDMI receptacle connector
J20, J22, J24, J26:	Header pin for differential probe
J21, J23, J25, J27:	GND terminal
J30:	Control signal monitor terminal
J40:	VCC(3.3V) input terminal
J50, J51:	Impedance validation connector
J55	Test signal monitor terminal
J56	GND terminal

HDMI TPA-R SE board



This adapter is used to terminate HDMI signal and pick up with single-ended probe connected to oscilloscope.

J10:	HDMI receptacle connector
J20 to J27	Header pin for single-ended probe
J30:	Control signal monitor terminal
J40:	VCC(3.3V) input
J50:	Impedance validation connector
J51:	Test signal monitor terminal

HDMI TPA-P test adapter set:

013-A0123-50

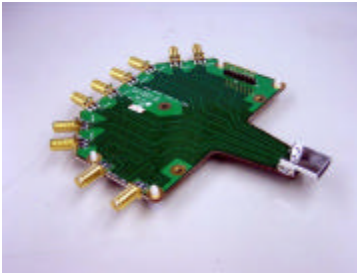
Includes:

HDMI TPA-P TDR 1ea

HDMI TPA-P DI 1ea

HDMI TPA-P SE 1ea

HDMI TPA-P TDR board



This adapter is used to change the output of the signal generator into HDMI.

Signal from Data Generator is connected to test system without HDMI cable influence.

J10:	HDMI plug connector
J20 to J27:	T.M.D.S signal input or output.
J30:	Control signal monitor
J50 to J51:	Impedance validation connector

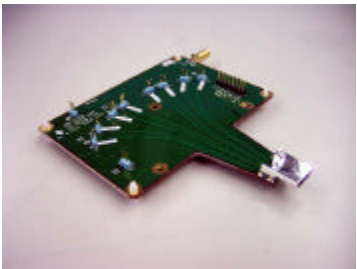
HDMI TPA-P DI board



This adapter is used to terminate HDMI signal and pick up with differential probe connected to oscilloscope.

J10:	HDMI plug connector
J20, J22, J24, J26:	Header pin for differential probe
J21, J23, J25, J27:	GND terminal
J30:	Control signal monitor terminal
J40:	VCC(3.3V) input terminal
J50, J51:	Impedance validation connector.
J55	Test signal monitor terminal
J56	GND terminal

HDMI TPA-P SE board



This adapter is used to terminate HDMI signal and pick up with single-ended probe connected to oscilloscope.

J10:	HDMI plug connector
J20 to J27	Header pin for single-ended probe
J30:	Control signal monitor terminal
J40:	VCC(3.3V) input
J50:	Impedance validation connector
J55	Test signal monitor terminal