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VIDEO TEST INSTRUMENTS

Introducing the latest video test instrument from Quantum Data, the 881E/882E. The HDMI interface supports the latest HDMI 1.3 standard, with up to 36-bit/pixel (12-bit/component) Deep Color mode x.v.Color wide gamut color and high bit audio formats. The 882E can be equipped with the analyzer functionality for testing HDMI 1.3 source devices.

KEY FEATURES + BENEFITS

HDMI 1.3 Deep Color™
Up to 36-bit/pixel (12-bit/component) Deep Color at 1080p; TMDS link up to 2.25 GB/s.

x.v.Color
Supports wide gamut color generation with test images and metadata.

High Bit Rate Audio
Generates Dolby® formats Plus & TrueHD lossless compressed audio format.

Image Control Tool (882E)
Web-based Image Control Tool for fine tuning Deep Color images.

central administration/network control
Update and configure all networked instruments from a single computer. Fully control instrument from any network location with web browser or Telnet client.

HDMI + DVI Analyzer (882E with analyzer)
Single link analyzer (up to 150 MHz) for measuring source timing & pixel errors and emulated EDIDs. Include formatted reports.

HDCP including compliance test
Production keys included with HDMI and DVI signals. Runs HDCP compliance test (optional with 882EA).

graphics SDK
Create complex patterns based on your specifications using C++ software development kit.

analog video (optional, not available with 882E with analyzer)
Up to 250 MHz.

CEC
Interactive Troubleshooting Environment (ITE) for CEC development (optional with 882E and 882EA). Test Management Environment (TME) for CEC compliance (optional with 882EA).

Auxiliary Channel Analyzer (ACA) (882E/EA only)
Monitor DDC, HDCP, CEC and EDID transactions

comprehensive timing + patterns
Includes extensive library of standard timings and patterns. Add your own custom timings and patterns.

local pattern storage
Store multiple custom images (.bmp, .jpg and .png) images in instrument.

easy to use
Access powerful features easily using intuitive user interface.

DUT-based setup
Specify device under test to automatically set up instrument.

multiple configurations
Save and restore different instrument configurations for different users or applications.

Note: 882EA shown in photo.

881E/882E HDMI

APPLICATION TESTS

HDCP Testing

HDMI and DVI	Authentication and encryption of uncompressed HDMI and DVI signals

HDCP Compliance Testing

	For testing sink devices
	For testing source devices

HDMI InfoFrames (882 only)

HDMI	Verify InfoFrames sent to display

HDMI Pixel Repetition (882 only)

HDMI	Test gaming formats with variable horizontal resolution

HDMI Active Format Descriptor (AFD) (882 only)

HDMI	Verify HDMI content mapping

HDMI Audio Tests

Rate	Vary audio sampling rate to test sink handling
Frequency	Vary audio frequency to test sink handling
Amplitude	Vary audio amplitude to test sink handling

EDID Read

HDMI, DVI, VGA	Auto-configuration of generator format list

Data channels

Physical	I2C per VESA E-DDC
Protocols	DDC2B, E-DDC & DDC/CI (reads E-EDID Ver 1.3)

EDID Testing

HDMI, DVI, VGA	Reads EDID from display and presents as displayed image

EDID Compliance Testing (882 only)

HDMI	HDMI EDID processing

DV Swing Test

HDMI, DVI	Vary TMDS digital video signal swing in 4mV increments from 150 to 1560 mVp-p (programmable)

Scrolling Image Test

All interfaces	Scroll any static image

Special Sync Tool

	Trigger scope or inspection camera anywhere in video

Formats

Format file types	XML
Standard formats	Over 580 formats for testing IT, CE, military and other display test applications
Custom formats	Graphical format editor

Patterns

Pattern file types	Custom object (.o) files, BMP, JPEG, PNG
Standard patterns	Over 320 standard static and dynamic images included for testing CRTs and FPDs
Custom patterns	Graphics SDK to create complex patterns
Internal data storage	15 MB

Test Sequences

	Create test sequences with unlimited number of steps; each step defines a video format, image, sync, gating and duration (0.1 sec to 24 hours, or frames)

SPECIFICATION

General Specifications

Size (mm)	330 W, 87 H, 284 D
Humidity	30 to 80% RH (non-condensing)
Operating temp.	0 to 40° C
AC Mains	
Frequency	47 to 63 Hz
Voltage	90-264 VAC

HDMI (included with HDMI 1.3 option)

Connector	One HDMI Type A
TMDS (single link)	225MHz clock; 2.25 Gb/s link rate
Video	
TMDS protocols	DVI 1.0 and HDMI 1.3
Encoding	RGB or YCbCr (only RGB in DVI mode)
Sampling modes	4:4:4 or 4:2:2 (only 4:4:4 in DVI mode)
Color depth (HDMI)	24/30/36-bit 4:4:4 RGB / YCbCr 16/20/24-bit 4:2:2 YCbCr
Color depth (DVI)	24-bits per pixel RGB 4:4:4
Clocks per pixel	1 or 2
Pixel repetition	1 to 10 using interactive test image
TMDS differential swing	150-1560 mVp-p (programmable)
Quantization modes	Full with optional gamma correction ITU-R BT.709-5 Part 1, Sec 6.10 SMPTE 296M Sec 7.12 under/overshoot
Colorimetry	Legacy HDTV SMPTE 260M-1999 Table 1, ITU-R BT.601-5 Sec 3.5.1 and ITU-R BT.709-5 Sec 4.2-1125 xvYCC 601 & xvYCC 709 for x.v.Color
Content fitting methods	All AFD cases (Shoot & Protect, Overscan,Under-scan, Letterbox/Pillarbox, Anamorphic Squeeze)
Aspect ratio	
Content	4:3, 14:9, 16:9
Embedded	4:3, 16:9
Format (coded)	4:3, 16:9
Format timings	All EIA/CEA-861-D formats All E-EDID sink-requested < 165 MHz
Data (island) packet generator types	General control packet, audio samples, ACR data, InfoFrames, null frame
InfoFrame types	AVI, SPD, AUD, MPG, GIF (generic)
Audio	
Streams	4
Channels	8
Bits per sample	16, 20, 24
Sampling rates	32.0, 44.1, 48, 88.2, 92, 176.4, 192 kHz
Stream type	IEC 60958-3 Consumer LPCM Dolby Digital, Dolby Digital Plus, Dolby TrueHD Other audio formats with exter,nal source
Audio content	FL, FR, LFE, FC, RL, RR, RC, FLC, FRC, RLC and RRC
Mixer mux	Sinewave or external audio
Embedded sonic data generator	
Channels	8
Waveform	Sinewave
Amplitude	-96.3 to 0.0 dBFS
Frequency Change	20 Hz to 20 kHz
Controls	Mute, amplitude, frequency
External audio interface	
Type	SPDIF input (coaxial)
Amplitude	As received
Connector	BNC with special SPDIF I/O
Cable	75 ohm coax cable

DVI

Connector	HDMI output with HDMI-to-DVI cable
Encoding	RGB (4:4:4 with 8-bits/component)
TMDS differential swing	150-1560 mVp-p (programmable)

Analog Composite (included with analog video option; not available with 882E analyzer)

Connectors	CVBS (BNC) and S-Video
Encoding	NTSC and PAL
Sample rate	24.55-29.50 MHz
Pixel rate	12.27-14.75 MHz
Pixel aspect ratio	Standard or square
Swing	1000 mVp-p fixed with programmable calibration
Calibration	self-calibration with internal reference

Analog Component (included with analog video option; not available with 882E analyzer)

Connector	VGA
Color encoding	RGB, YPbPr (unfiltered)
Video levels	
Video swing	0-1000 mV
Sync swing	0-400 mV (bi-level), 0-800 (tri-level)
Video setup	0-100 IRE
Calibration	Self-calibration with internal reference
Protection	Buffered with 75 ohm isolation
Internal data storage	15 MB

Digital Sync

Outputs	HS, VS and Special Sync
Swing	> 2V fixed into 75 ohm

Pixel Clock

Frequency range	
Analog component	5.16-250 MHz
HDMI	25-165 MHz (single-link)
DVI	25-165 MHz (single-link)
Step	Less than 0.1 Hz
Accuracy	50 ppm (electronically adjustable to <5 ppm with external frequency counter)

Horizontal Timing

Frequency range (kHz)	
Analog composite	15.734 or 15.625
HDMI / DVI	8-1000
Total pixels (max)	65,535
Active pixels (max)	4096
Blank pixels (min)	
HDMI	14 (minimum)
DVI	12 (minimum)
Step pixels	
HDMI	1
DVI	1

Vertical Timing

Frequency range	1-650 Hz
Total lines (max)	4095 progressive, 8193 interlaced and segmented
Active lines (max)	4096
Blank lines (min)	1 to Total-1
Step lines	1
Scan types	Progressive, interfaced, segmented
Composite sync types	ORed, Serrated, Serrated and Equalized, Tri-level

Video Memory

Size	16,384,000 pixels at 32-bits/pixel 32,768,000 pixels at 8-bits/pixel
Maximum width	16,384 pixels at 32 bits/pixel 16,384 pixels at 8 bits/pixel
Color depth	36 bit up to 165 MHz 32 (24-bit TrueColor) up to 250 MHz 8 bits up to 250 MHz

Administration

Physical user interface (selection keys and display)	
Control interfaces	RS-232 serial AT 10/100 BaseT Ethernet (TCP/IP, FTP, Telnet) GPIB
Browser-based virtual control panel to manage from any network location	
Create custom Microsoft Windows-based applications using Quantum Data SDK (includes API documentation, sample application & source)	
PCMCIA slot	Compact Flash card to boot generator, backup generator configuration, copy generator configuration to other generators, and store patterns

ANALYZER OPTION

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Overview

Use the DVI and HDMI analyzer option to test HDMI 1.3 deep color source products, such as set-top boxes, DVDs as well as repeaters and cables. Source product manufacturers will find this option invaluable for verifying signal quality, timing, color encoding, and E-EDID/E-DDC/HPD-related behavior.

The analyzer option adds a digital video receiver to the base instrument. This receiver emulates a sink device (display), while the generator output emulates a source (host) device. The receiver presents an on-the-fly reprogrammable E-EDID to the source, and analyzes incoming video for data errors and timing anomalies. The receiver can analyze video from the instrument itself or from an external source. Results can be displayed on the instrument's front panel or issued as formatted reports.

The HDMI and DVI analyzer option passes through the incoming digital signal to the HDMI Tx interfaces, which can be connected to a HDMI display for monitoring incoming content. The displayed image rendered identically as the source on a pixel per pixel basis. The analyzer also routes incoming audio to a SPDIF output, which can be connected to an external digital speaker or audio analyzer.

Signal quality can be measured without meticulous inspection of a display screen. The analyzer accepts standard QDI-BCM pseudo-random noise test patterns, which allow overall signal quality to be measured and expressed in simple objective terms. In cases where the analyzer is connected to a video source that does not support the rendering of pseudo-random noise data, a pixel error measurement technique can be alternately used, which counts flickering pixels in still-frame test images. Detailed pixel-by-pixel analysis is also supported for checking color encoding, scaling, and masking in test images.

Timing can be measured, independent of video content. The signal analyzer manager can be used to check several timings and obtain HTML report.

The analyzer option is also excellent for finding problems with repeaters, cables, cable extenders, and distribution systems. Everything needed to test transmission systems from end-to-end, using pseudo-random noise or test images, is now available in a single instrument.

The analyzer optionally supports CEC compliance testing with the Test Management Environment (TME). The TME application is used for testing CEC compliance in the HDMI Authorized Test Centers.

The analyzer optionally supports HDCP compliance testing enabling developers of HDMI products to perform fast, comprehensive HDCP compliance test. on sources, sinks or repeaters, in accordance with the HDCP compliance test specification.

Signal Analyzer Features

> **EEPROM Emulator** emulates an EEPROM (up to 8 blocks) with rapid on-the-fly re-programmable E-EDID for testing how source devices respond to different sink devices.

> **EDID Editor.** Supports acquisition, editing and emulation of EDIDs including CEA extension block.

> **Hot-Plug Generator** generates hot-plug events in concert with E-EDID changes.

> **Timing Analyzer** measures timing of external video signal.

  Measurements: pixel rate, fields-per-frame, H and V rate/total/active, sync delay/width/polarity/ H-to-V alignment

  Machine Unit Accuracy: zero tolerance

  Frequency Accuracy: < 0.3%

> **Pixel Data Analyzer** measures pixel values and detects flickering pixels in user-defined region of 1024 square pixels.

  Error Tallies: pixel errors (in static images)

  Tally Range: 0 to 4095

> **Packet Analyzer** displays InfoFrame, general control, audio sample, ACR, and generic data along with audio channel status and errors.

> **Pseudo-Noise Analyzer:**

  Noise type accepted: QDI-BCM

  Error Tallies: Errors by channel (0, 1, and 2), total pixel errors, floating-point pixel error rate (in errors per-billion)

  Tally Range: 0 to 4095

  PN Error Memory: One expected and one measured 24-bit value

> **HDMI TX** ports are used for monitoring incoming HDMI signal.

> **SPDIF** out port is used to extract audio embedded in incoming HDMI stream.

Signal Generator Feature Extensions

The analyzer option enables these transmitter related features:

> **HDCP** for functionally testing content protection protocol (production key is provided). Also supports HDCP Compliance Testing (option) in accordance with HDCP Compliance Test Specification.

> **CEC Testing (optional).** Integrated Troubleshooting Environment (ITE) supports debug testing during development and the Test management Environment (TME) supports CEC Compliance Testing.

> **Pseudo-Noise Generator:**

  Noise Type Generated: QDI-BCM (source code provided)

  Sequence Length: manually set from 4 to (2^31-1) pixels or automatically set to hActive*vActive

  Bit-to-Bit Correlation: none

  Noise Value Advance: manually choose between every pixel and active pixels only or automatically set to active pixels only

  Sequence Repeat: continuous or stop after n=1 to 4,294,967,295 sequences

  Seed Value: manually set form 0x00000001 to 0x7FFFFFFF or automatically set to 0x08000001

  Re-seed Logic: via "magic" pixel value

  Re-seed Period: manually set from 3 to 2,147,483,647 pixels or automatically set to hActive*vActive

> **Analyzer-related Images:** FormatRx, PacketRx, ErrorRx HDMI Hardware

> **Transmitter:** Sil9134

  Links: Single

  CEC: Consumer Electronics Control

  Audio: 8-Ch L-PCM programmable sinewave (frequency and amplitude) at 32, 44.1, 48 88.2, 96, 176.4 and 192 kHz

> **Receiver:** Sil9135

  Links: Single