# Keysight Technologies
86100C Option 201
86100D Option 201
Advanced Waveform Analysis Software

Accelerate Your Design Cycles with Deeper Insights in Less Time

Waveform analysis features:

– Accurately capture long waveforms (up to 223 bits) with or without averaging
– Samples/waveform limited only by size of hard disk or memory stick
– Oscilloscope measurements on equalized waveforms with built-in Linear Feedforward Equalization (LFE) tool
– MATLAB® interface allows instant processing of oscilloscope data:
    – Observe and characterize the output waveforms of any LFE, Decision Feedback Equalizer (DFE) or other algorithm
    – Calculate and display figures of merit or penalty using published or proprietary scripts
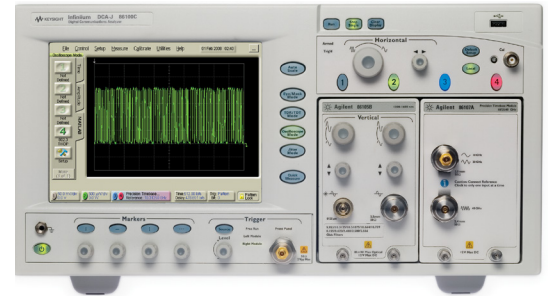
Option 201 offers advanced waveform analysis for breakthrough insights and faster standard compliance measurements such as Transmitter Waveform Dispersion Penalty (TWDP)[1]

High bit-rate systems, combined with increasing use of pre-emphasis and equalization techniques, make it more important than ever to accurately and completely characterize the quality of your transmission signals.

Option 201 offers unique analysis capabilities as well as industry-leading performance to accurately characterize high-speed signals.

Understand the effects of equalization on closed eyes

At today's high bit rates, advanced techniques must be used to maintain very low bit error ratio (BER) performance. Pre-emphasis on the transmission side and equalization on the receive side are common ways to counteract the impairments of inter-symbol interference (ISI) on circuit boards.

Want to know what type of equalization works best for your design?

The new on-board equalization tool allows you to evaluate the effectiveness of different equalizer schemes. Traditional eye measurements such as eye amplitude and rise-time can be measured on both the input signal and the equalized signal.
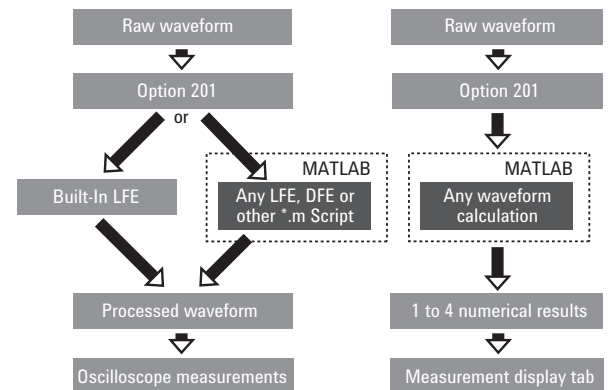
Option 201 for the 86100C DCA-J and 86100D DCA-X sends oscilloscope data to either a built-in LFE or MATLAB for processing. The output can be a waveform2 (left) or a numerical value[3] (right) such as TWDP.

1. Transmitter Dispersion Waveform Penalty (TWDP) is a compliance measurement methodology adopted by several standards that quantifi es transmitter performance for systems using dispersive channels and equalizing receivers. TWDP and related methodologies may contain intellectual property by one or more third parties. Keysight Technologies, Inc., does not license, sell or distribute TWDP scripts. Any intellectual property rights necessary to run TWDP scripts in conjunction with the Keysight 86100 DCA are not granted by Keysight.
2. Requires 86100C fi rmware revision 6.0 or later.
3. Requires 86100C fi rmware revision 8.0 or later.

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Analyze complete waveforms

The advanced waveform analysis software allows you to capture and analyze a complete single-valued record of a transmitted pattern waveform—up to 2^{23} bits long. Pattern waveforms provide key measurement data for design modeling and for optimizing equalizer design.

Use MATLAB[1] to process your signal as it is received by the DCA

While you can still transfer saved pattern waveforms via a LAN or a memory stick and analyze the data with your favorite software package, Option 201 can save you significant time while adding convenience to the task.

The 86100C and 86100D are now able to interface with MATLAB (the industry standard mathematical scripting tool) so that you can apply almost any filtering or signal processing algorithm you wish and see the results on the scope in real-time. Try different finite impulse response filters, signal-to-noise optimization schemes, image reconstruction techniques or whatever approach you come up with to compensate for signal degradation. You'll see the results on the DCA as you transmit the signal.

You can also run MATLAB scripts that write yourself or that are recommended by standards such as IEEE 802.3, FC-PI-4 and others[2]. This allows you to see live Waveform Dispersion Penalty (WDP), non-compensatable data-dependent jitter (ncDDJ) and other results right on your oscilloscope screen. Verifying interoperability and standard compliance just got faster and easier!

Example applications (*.m scripts) that are included in firmware revision 8.0

– Transmitter Compliance Transfer Functions (TCTF) emulate ISI on high-speed digital signals. Save time and money—you don't have to design and fabricate a load board that matches each TCTF function

– Separate transition and non-transition bits in a waveform to allow separate mask tests to be performed

– Pre-emphasis as defined by FC-PI-4

– Maximum, Minimum and Average measurements (different script for each) within a window specified by the vertical markers

– Transmitter Waveform Dispersion Penality (TWDP) wrapper script to work with the IEEE 802.3aq MATLAB script. The wrapper is an interface between the DCA firmware and the TWDP script.[3]

1. MATLAB Software is available from The MathWorks, Inc. (www.mathworks.com). MATLAB is sold separately and must be installed on the DCA mainframe by the user. 86100C requires MATLAB Version 2008a or earlier.
2. Requires 86100C firmware revision 8.0 or later. Firmware upgrades available—for details see www.keysight/com/find/dcaj.
3. TWDP and related methodologies may contain intellectual property by one or more third parties. Keysight Technologies, Inc., does not license, sell or distribute TWDP scripts. Any intellectual property rights necessary to run TWDP scripts in conjunction with the Keysight 86100DCA are not granted by Keysight.
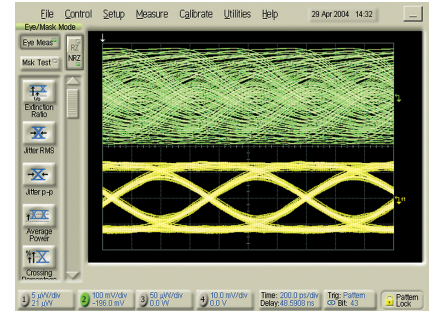
Open up a closed eye with the on-board equalization tool (top: raw waveform, bottom: equalized waveform).
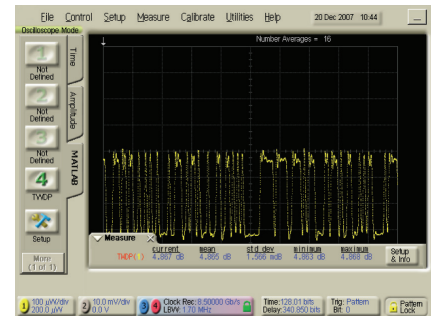
Every time the oscilloscope updates a raw waveform MATLAB scripts (*.m files) can calculate up to four numerical parameters. The 86100C/D then displays the current value as well as automatically creates statistics.
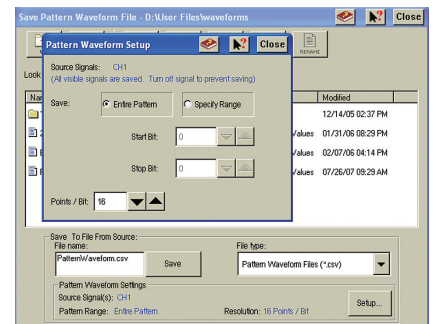
Capture partial or entire pattern waveforms for use in design modeling. A precision timebase such as the 86107A or 86108A) helps maximize measurement accuracy.

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

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