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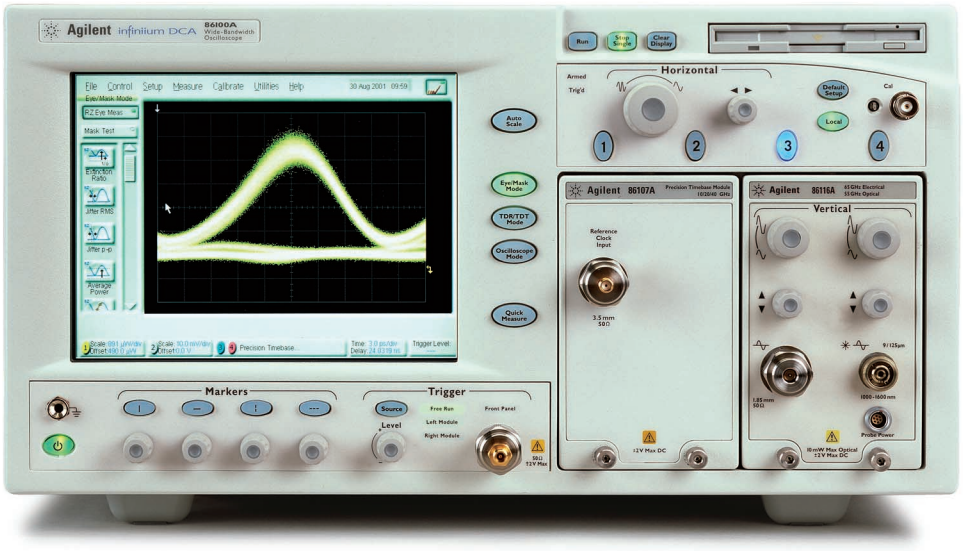
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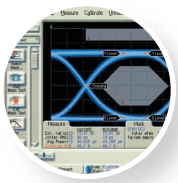
Find the *Keysight / Agilent 86105A* at our website: *Click HERE*

86100A

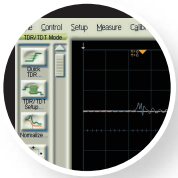
Modular platform for fast, accurate waveform testing up to 40 Gb/s

Infiniium DCA









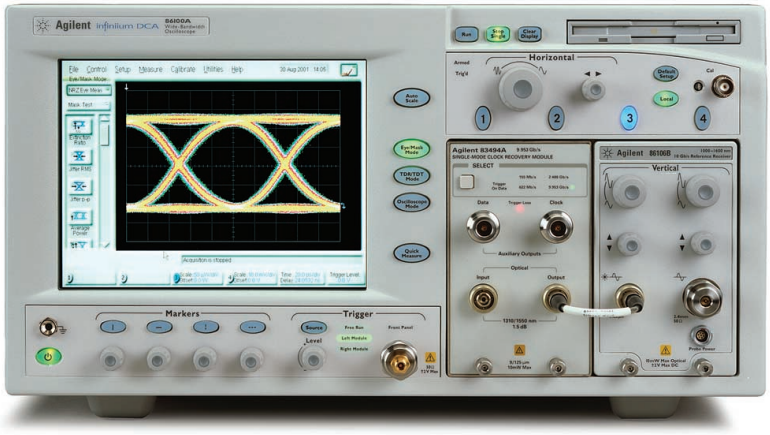
Agilent 86100A
Wide-Bandwidth Oscilloscope with Digital Communications Analysis and Time-Domain Reflectometry

Agilent Technologies

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Agilent 86100A Infiniium DCA Wide-Bandwidth Oscilloscope

Powerful combination of performance and ease of use



The 86100A Infiniium DCA is three high-performance instruments in one. It's a general purpose wide-bandwidth oscilloscope, a digital communications analyzer, and a time-domain reflectometer.

The 86100A provides comprehensive measurement capabilities and supports wide-bandwidth applications for both optical and electrical signals. Whether you're working on SONET/SDH, Gigabit Ethernet, Fibre channel, Infiniband, very short reach (VSR) optics, parallel optics, or general electrical signals, the 86100A is the ideal instrument for characterizing your waveforms.

With exceptional vertical resolution and jitter performance, a fast display update rate, and Windows®-based graphical user interface, the 86100A is a powerful measurement system for high-speed optical communications, TDR characterization and semiconductor testing of circuit boards.

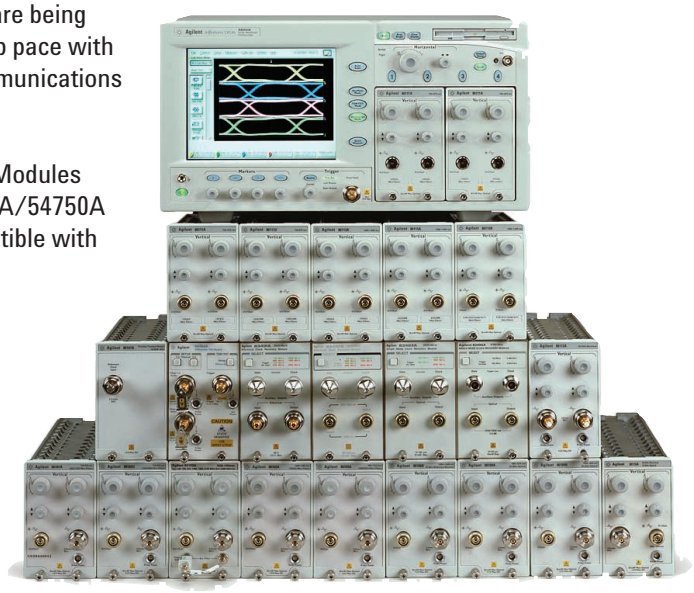
Windows is a U.S. registered trademark of Microsoft Corp.

Agilent Protects Your Investment: Easily configure from a wide selection of modules to fit your needs

What does a modular platform do for you?

The 86100A supports a large and growing family of optical and electrical plug-in modules. This modular architecture lets you configure the instrument for your application both now and in the future. New receiver plug-in modules are being developed to keep pace with the evolving communications industry.

- **Compatibility** Modules from the 83480A/54750A are fully compatible with the 86100A
- **Remote programming commands** from the 83480A/54750A are over 95% compatible with the 86100A
- **Free firmware upgrades** The measurement capabilities of the 86100A are always being expanded and improved.



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Agilent breaks through the picosecond jitter threshold allowing you to see signals as never before



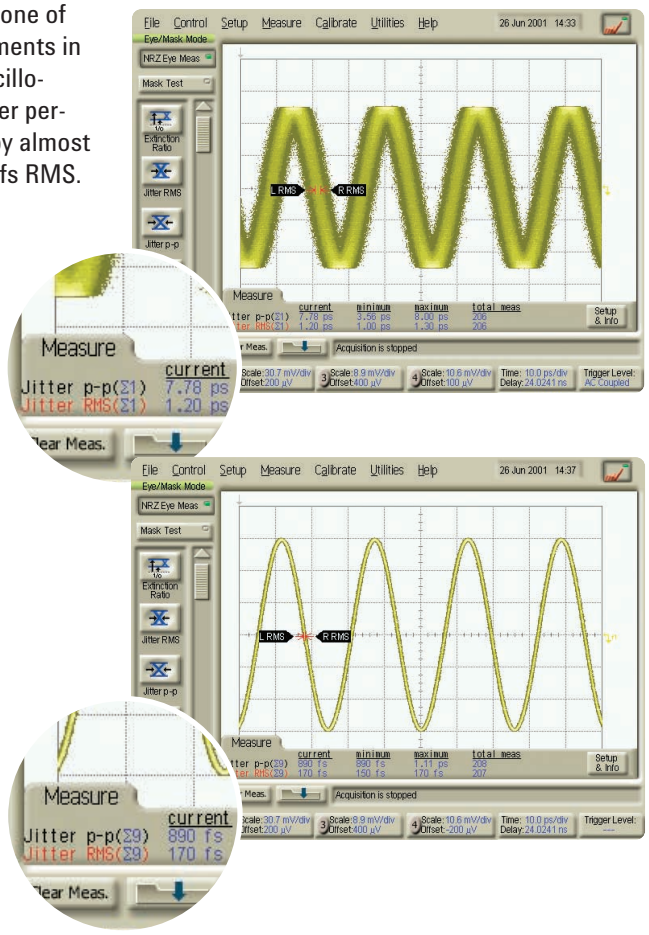
Introducing Agilent's New 86107A Precision Timebase Reference Module

Accurate views of your 40 Gb/s waveforms

When developing 40 Gb/s devices, even a small amount of inherent scope jitter can become significant since 40 Gb/s waveforms only have a bit period of 25ps. Scope jitter of 1ps RMS can result in 6 to 9 ps of peak-to-peak jitter, causing eye closure even if your signal is jitter-free. The Agilent 86100A has been improved specifically for 40 Gb/s waveform analysis.

The new 86107A precision timebase reference module represents one of the most significant improvements in wide-bandwidth sampling oscilloscopes in over a decade.[1] Jitter performance has been reduced by almost an order of magnitude to 200 fs RMS.

Oscilloscope jitter is virtually eliminated! The reduced jitter of the 86107A precision timebase module allows you to measure the true jitter of your signal. The 86107A requires a 10, 20 or 40 GHz electrical reference clock that is synchronous with the signal under test. Timebase resolution has also been improved from 10 ps/division to 2 ps/division, a 5 times improvement.



The same 40 GHz sinewave captured using current DCA (left) and now with 86107A precision timebase module (below).

[1] Methods and algorithm used in the precision timebase module are so innovative that a U.S. patent application has been filed.

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Helping you accelerate the next generation optical network

The 86100A is the ideal instrument for quickly and easily analyzing the quality of your signals.

Optical networking is critical to the future of telecommunications and 40 Gb/s transmission rates are key to the future of optical networking. The exploding growth of the Internet, as well as e-commerce, IP telephony, and other data-centric applications, is prompting a demand for increased bandwidth. The telecommunications industry needs to bring new high-capacity fiber optic systems on line fast to keep up with customer demand for more bandwidth. Agilent's test solutions enable you to quickly and accurately make the measurements needed to reduce time-to-market for new 40 Gb/s products. The 40 Gb/s optical network will provide the speed, capacity and reliability needed to enable bandwidth intensive applications and services. Optical components and equipment within this high-speed infrastructure will require characterization with unique time domain measurements due to new modulation formats.

86100A—the ideal instrument for testing devices in the 40 Gb/s network

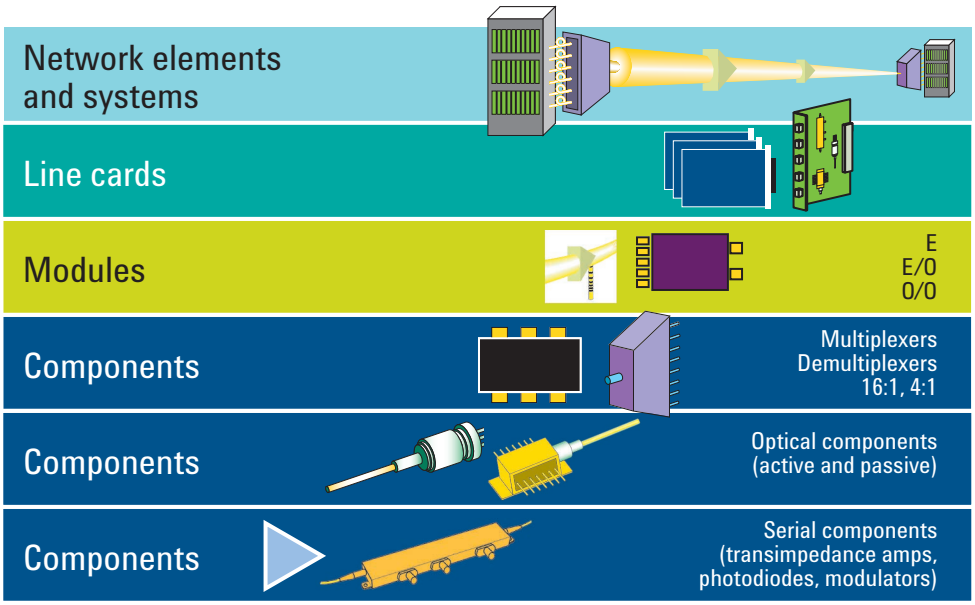
The wide-bandwidth sampling oscilloscopes (widely referred to as digital communication analyzers) are used extensively in research, development, and manufacturing of components, modules, line cards, and network systems. The 86100A is the ideal instrument for quickly and easily analyzing the quality of your signals.

Faster time to market

Getting ahead in the development, manufacturing and deployment of high-speed optical and electrical components and network elements means one thing: faster time to market.

And the best way to get there is with a partner like Agilent Technologies.

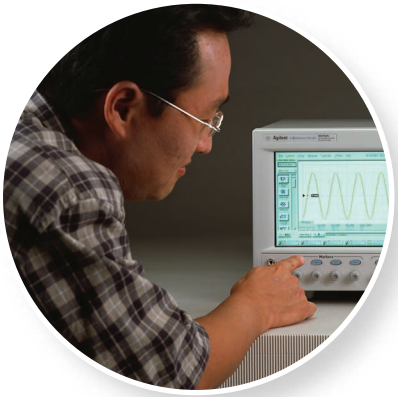
86100A—the ideal instrument for testing components to systems



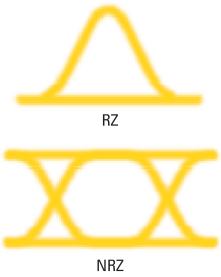
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Meeting your growing need for more bandwidth

40 Gb/s



Today's communication signals have significant frequency content well beyond an oscilloscopes 3-dB bandwidth. A high-bandwidth scope does not alone guarantee an accurate representation of your waveform. Careful design of the scope's frequency response (both amplitude and phase) minimizes distortion such as overshoot and ringing.



Performing return-to-zero (RZ) waveform measurements

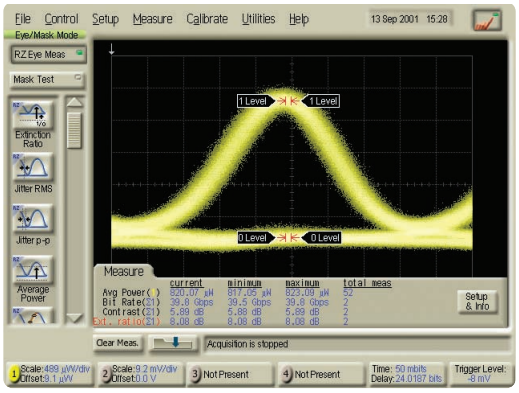
Extensive set of automatic RZ measurements are built-in for the complete characterization of return-to-zero (RZ) signals at the push of a button.



The new Agilent 86116A and 86109B plug-in module includes an integrated optical receiver designed to provide the optimum in bandwidth, sensitivity, and waveform fidelity. The 86116A extends the bandwidth of the 86100A Infiniium DCA to 65 GHz electrical and 55 GHz optical. The 86109 is an economical solution with 50 GHz electrical and 40 GHz optical bandwidth. You can build the premier solution for 40 Gb/s waveform analysis around the 86100A mainframe you already own.

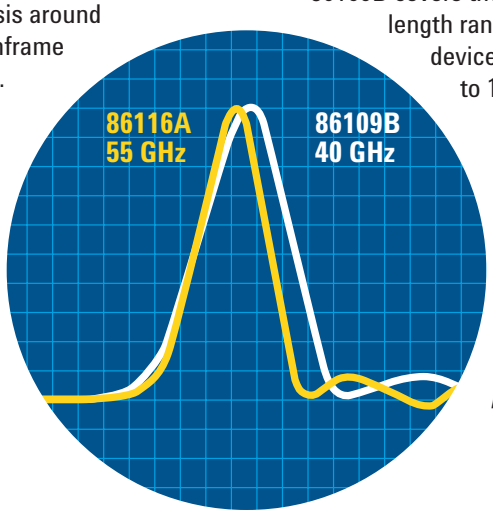
Built-in RZ Measurements

- Bit rate
- Extinction ratio
- Contrast ratio
- Rise and fall times
- Pulse width
- RMS and peak-to-peak jitter
- Eye amplitude
- Eye opening factor
- Eye height and width
- Signal-to-noise ratio and more

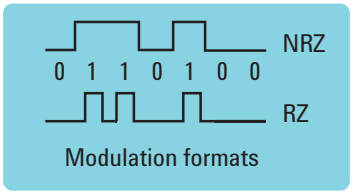


Wide wavelength range

S-, C-, and L-band. The 86116A and 86109B covers the widest wavelength range for testing devices from 1000 nm to 1600 nm.



Impulse response of Agilent's optical plug-in modules



With RZ, the light level "Returns-to-Zero" in between the transmission of two digital 1's.

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Testing Very Short Reach Optics

The 86100A provides waveform test capability for all of the emerging standards for VSR.

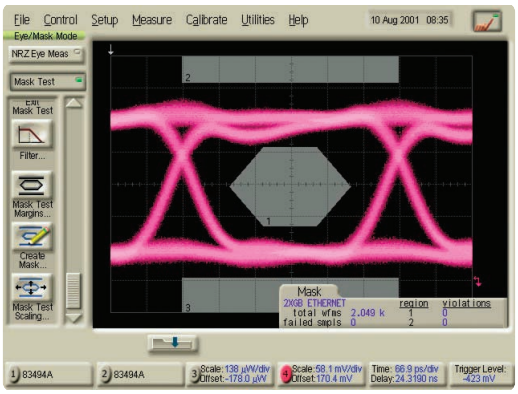
The explosion in data communications has resulted in the need to move tremendous amounts of data. Much of that data movement is over very short distances within and between equipment in central offices, points of presence, and IT equipment rooms. This short distance space has driven the development of a class of economical optical interfaces targeted at high bit rate data transfer over short distances—very short reach (VSR) optics. The Agilent 86100A provides complete waveform analysis capability for VSR.



Broad coverage of VSR standards

The 86100A provides waveform test capability for all of the emerging standards for VSR—parallel and serial implementations; 850 nm and 1310 nm implementations. We provide compliance filter options and pre-defined eye mask files for all of the physical layer variants of:

- Optical Internetworking Forum (OIF) implementation agreements for OC192 and OC768
- 10 Gigabit Ethernet
- InfiniBand
- 10 Gigabit Fibre Channel



The 86100A also supports testing for many proprietary system interconnects (PSIs) based on parallel optics. Also, you can define your own masks, or modify existing ones, to meet your specific needs.

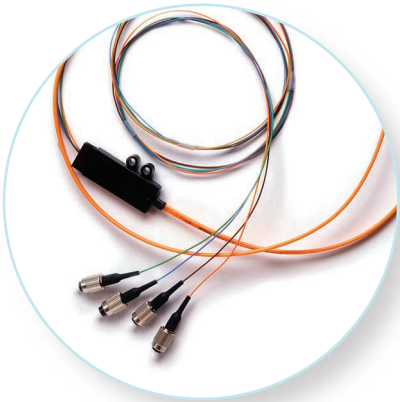
Many of the VSR standards specify physical variants for non-VSR applications—intermediate and long reach. The 86100A solution covers both VSR and non-VSR implementations of the standards.

Flexible architecture protects your investment

The 86100A mainframe supports all 861xx and 834xx DCA plug-in modules. As your VSR measurement requirements evolve, leverage your mainframe hardware and software investment to new applications. The architecture allows you to choose the plug-in modules that meet your VSR needs as they arise based on data rates, wavelength, and number of inputs required.

861xx modules support both filtered and unfiltered measurement applications from R&D through manufacturing—development, verification, and compliance.

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Best solution for testing parallel optics

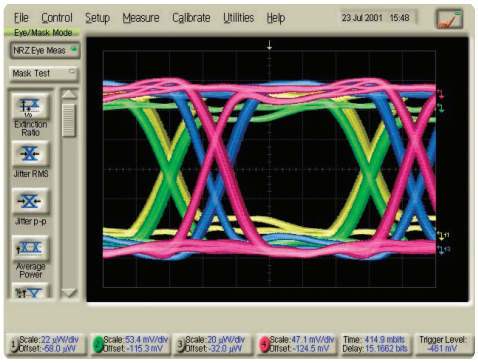
Test four channels of a parallel device simultaneously with a single mainframe.

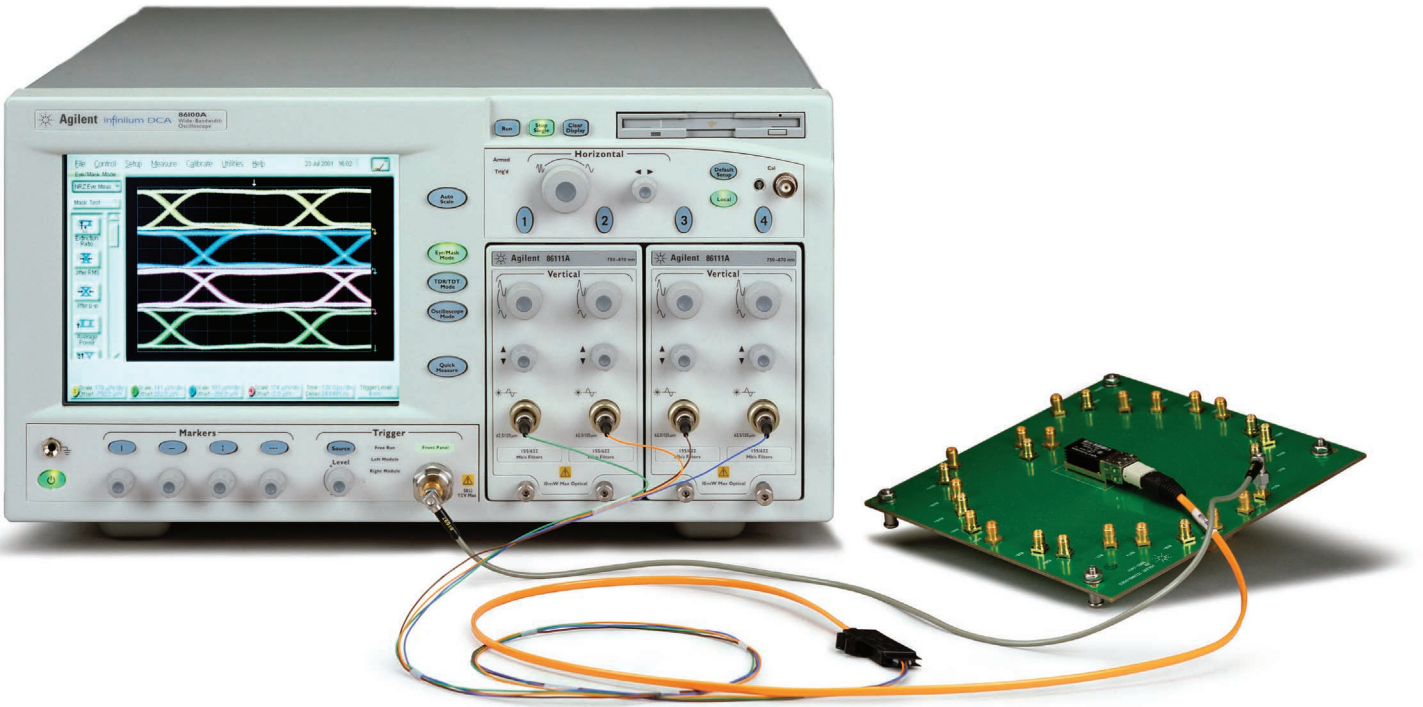
The 86100A software revision A.03.00 implements a multiple database architecture that enables simultaneous eye-mode analysis on four channels. Multiple database software along with a full suite of modules—dual optical, dual electrical, and optical/electrical—maximize efficiency of waveform analysis for parallel optics.

Configurations can be tailored for a given set of devices—transmitters, receivers or transceivers—and test priorities—maximum throughput, lowest cost, minimum space, or simplified cabling.

Maximize manufacturing throughput

Simultaneous eye-mode analysis on four channels delivers over a three times improvement in throughput compared to sequential test time per unit.





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Modular and upgradeable

Today's solution. Tomorrow's solution.

Reduced size

The 86100A is smaller and much lighter than previous generation wide-bandwidth oscilloscopes.

Multiple databases

Simultaneous eye diagram analysis on four channels

Autoscale

Improved autoscale for a quick display of waveforms including eye-diagrams

RZ/NRZ

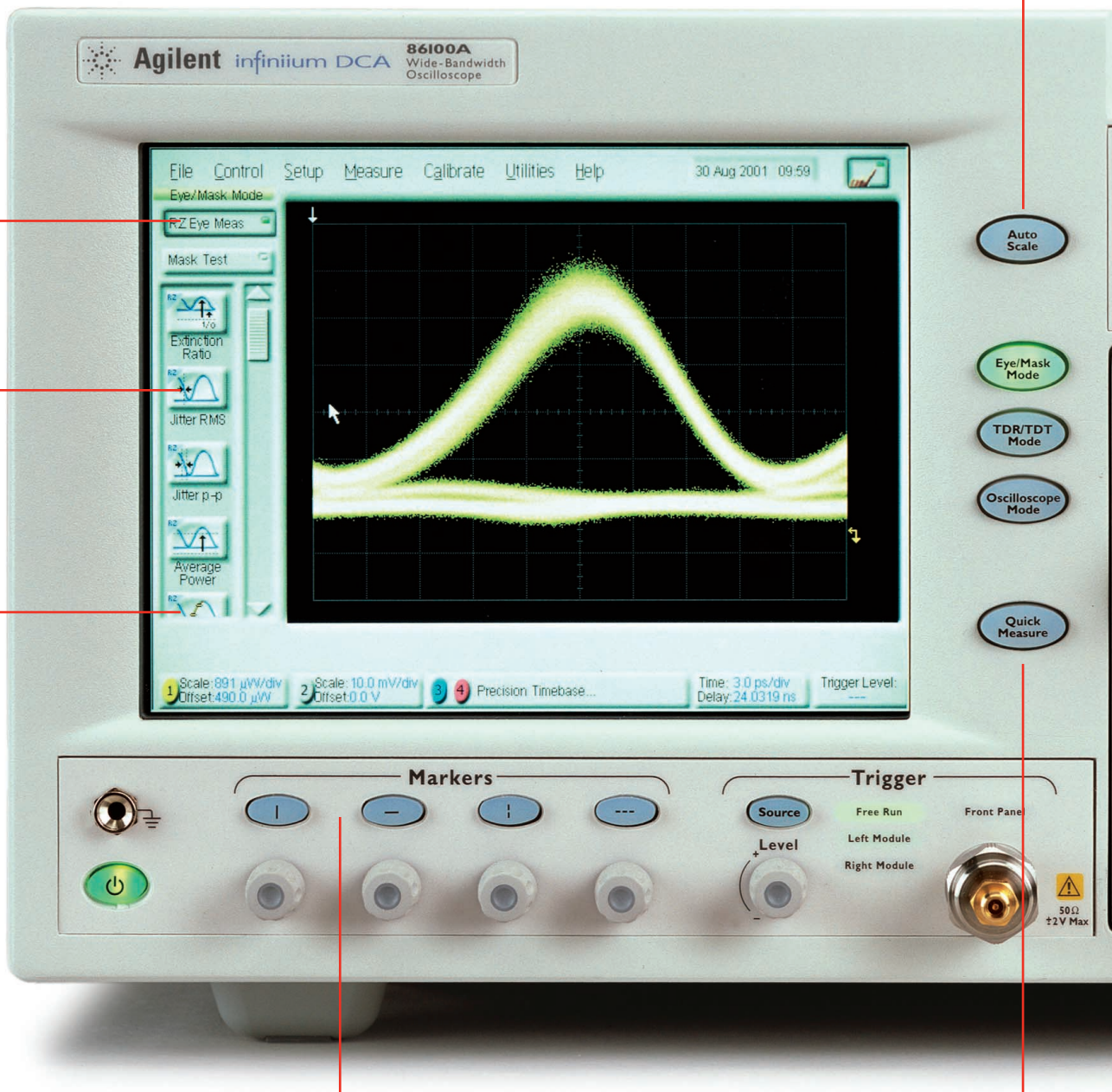
Complete set of RZ and NRZ measurements

Touchscreen

A high-performance touchscreen allows easy navigation of the instrument interface, or use a mouse.

Familiar interface

A Windows-based graphical user interface makes it easy to access advanced features. Icons provide quick access to an extensive set of common tests and measurements.



Simplified marker control

Two X-Y marker pairs with individual knob control. These knobs are also used for easy configuration of histograms

Trigger gating

Rear panel trigger gating port allows easy external control of data acquisition for circulating loop or burst-data experiments. Use TTL compatible signals to control when the instrument does and does not acquire data.

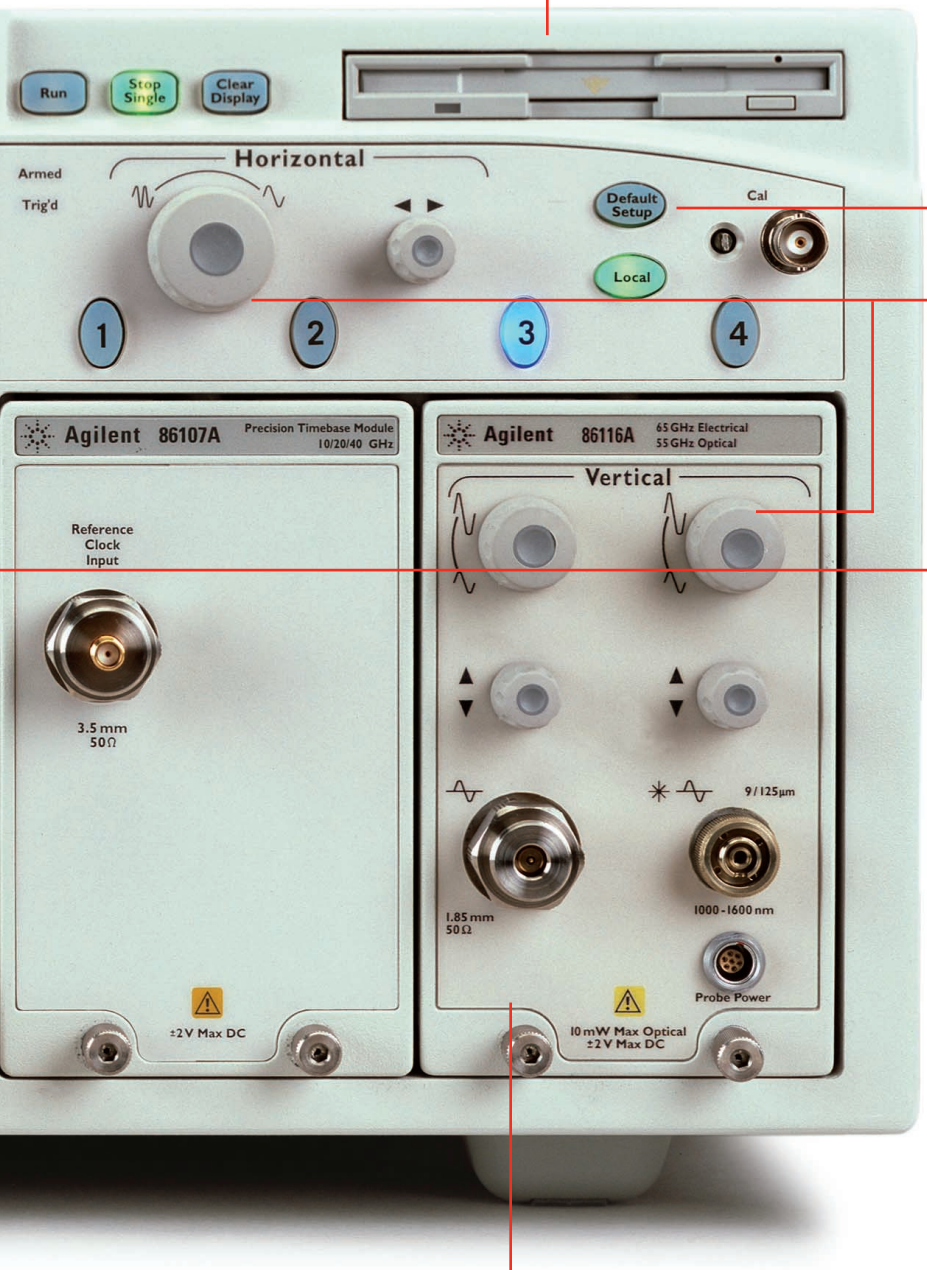
Quick measure

Use Quick Measure to do a compliance test with a single button press. Quick Measure can also be configured to automatically perform your favorite four measurements.

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High-capacity disk drives

The 120-MB SuperDisk™ floppy drive makes it easy to save/retrieve setups, image files, waveforms (and reads/writes to 3.5" disks), and makes system software updates fast and easy. 5.5 GB of hard drive space is available to the user. LAN interface is standard.



Default setup

Default setup returns the scope to a known state. A valuable feature if the scope has multiple users.

Dedicated controls for common adjustments

Analog oscilloscope type front panel provides simple controls for basic functions.

Three instruments in one

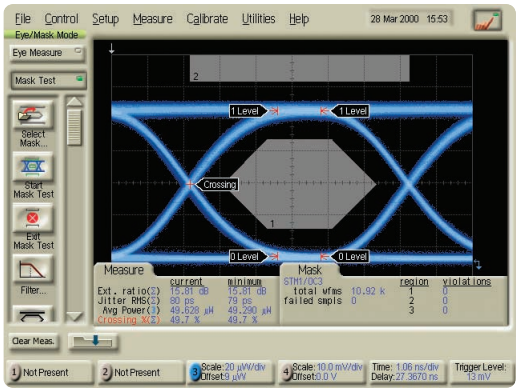
A digital communications analyzer, a full featured wide-bandwidth oscilloscope, and a time-domain reflectometer. Just select the desired operating mode to setup the instrument you want.

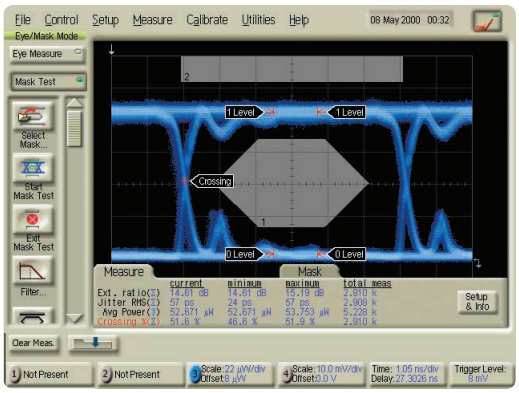
Modular

Configure the 86100A for the exact measurement capability you need with a large and growing family of plug-in modules. Modules have both optical and/or electrical input channels. Integrated optical receivers are key to accurate high-speed optical waveform measurements. Modules used in the HP 83480A/54750A are compatible with the 86100A.

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In just a few minutes, become an expert at digital communications compliance testing





With a press of a button, filters can be switched in or out for compliance testing or wide-bandwidth analysis.

Transmitters used in SONET/SDH applications must perform according to a rigorous set of industry-defined standards. A significant portion of what defines acceptable performance is based on waveform quality tested by a high-speed sampling oscilloscope. The 86100A was designed specifically to verify transmitter compliance with the highest speed and accuracy.

Key parameters include the shape of the eye and the strength of the signal. Eye shape is confirmed through an eye-mask test. Signal strength is verified through average power, extinction ratio, and optical modulation amplitude (OMA) measurements. Tests are performed automatically according to industry-recognized procedures.

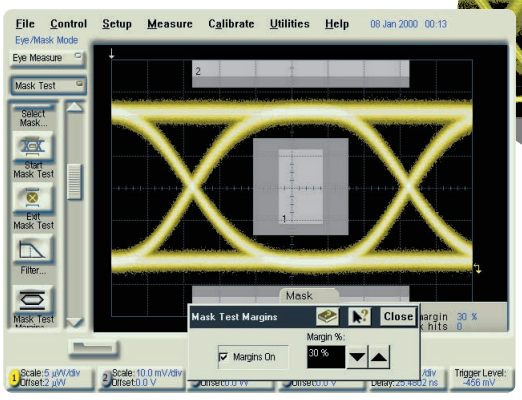
Are these tests difficult to perform?

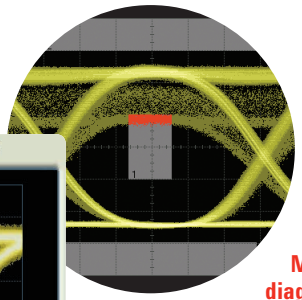
Don't waste your time trying to remember how to perform common tasks. A complete compliance test can be achieved in only two keystrokes!

Do the tests require much time?

Waveform analysis should never be the bottleneck in a high-volume production line. Scaling the waveform, acquiring the data, and completing the compliance test require only a few seconds.

Almost all compliance measurements are made with a standards-based reference receiver. The typical reference receiver consists of a high-speed photodetector followed by a fourth-order Bessel-Thomson low-pass filter. The overall response of the receiver must meet a frequency response defined by the associated test standard. For accuracy and ease-of-use, reference receivers are integrated within the 86100A. Many of the 86100A plug-in modules include multiple filters creating reference receivers for several data rates. Choose from a large family of plug-in modules and customize the 86100A to meet your exact test needs. Filters are easily switched out to allow testing with the full instrument bandwidth.



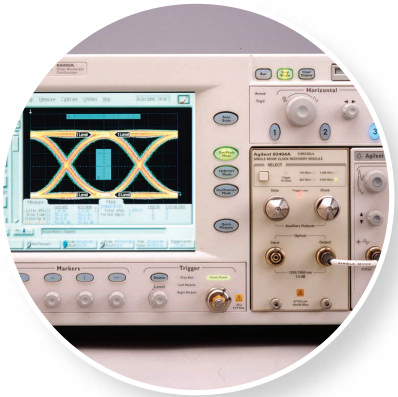


Mask test diagnostics

86100A Infiniium DCA goes beyond basic testing with margin analysis for process monitoring. Mask hits/failures are easily viewed with red pixels.

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No Trigger? No Problem.
Agilent Makes it Easy!



Agilent 8349x Clock Recovery Modules

Time domain measurements are only as accurate as the signal source that you are triggering on. What you see on the display is highly dependent upon your trigger signal. When a separate trigger source is not available, the 8349X clock recovery modules can derive a timing reference directly from the signal under test allowing you to perform reliable parametric testing even when you do not have access to a clock signal. The 8349X clock recovery modules have exceptional jitter performance to ensure an accurate jitter display of the incoming data signal. A built-in coupler/splitter reduces external hardware requirements. No more need for cables and probes just to get a trigger—simply plug in your test signal, select your data rate, and make your measurements.

SONET/SDH, Gigabit Ethernet, Fibre Channel Data Rates

The clock recovery modules cover the three most popular transmission media in use today: electrical transmission lines, multimode fiber and single-mode fiber. Standard data rates used in the SONET/SDH, Gigabit Ethernet, and Fibre Channel market are available at the push of a button

Clock Recovery Loop Bandwidth

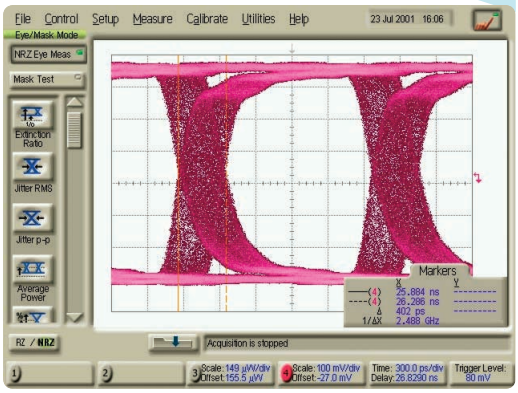
The Agilent clock recovery modules have two loop bandwidth settings. Loop bandwidth is very important in determining the accuracy when measuring the jitter of your waveform.

- Narrow loop bandwidth provides a clean system clock for accurate jitter measurements
- Wide loop bandwidth allows the recovered clock to track the data and is useful for extracting a signal that may have propagated through a complex network and have large amount of jitter. While this obviously negates any ability to quantify the jitter, it does allow other parameters of an eye to be measured.

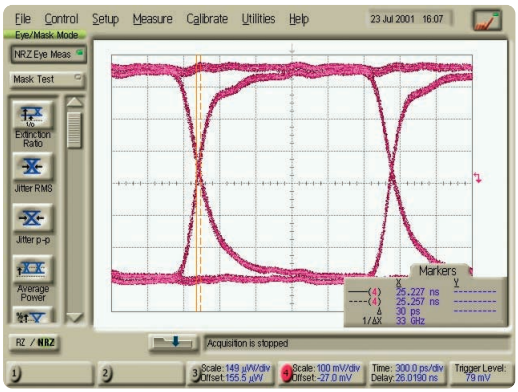
Note: When using recovered clocks for triggering, unless the scheme has a very narrow loop bandwidth, jitter measurement accuracy is suspect.

Module	Input	Wavelength Ranges	Data Rates (Mb/s)
83491A	50 Electrical	N/A	155, 622, 1063, 1250, 2125, 2488, 2500
83492A	Multimode Fiber (62.5/125 um)	750 to 860 nm & 1000 to 1600 nm	155, 622, 1063, 1250, 2125, 2488, 2500
83493A	Single-mode Fiber (9/125 um)	1000 to 1600 nm	155, 622, 1250, 2488, 2500
83494A	Single-mode Fiber (9/125 um)	1000 to 1600 nm	155, 622, 2488, 9953
83494A Option 106	Single-mode Fiber (9/125 um)	1000 to 1600 nm	155, 622, 2488, 2666, 10664

Narrow loop bandwidth



Wide loop bandwidth



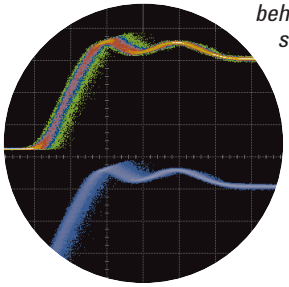
Identical 622 Mb/s (OC-12/STM-4) signal triggered with a narrow and wide loop bandwidth clock recovery circuits. The narrow loop accurately displays the jitter while the wide loop effectively removes the jitter.

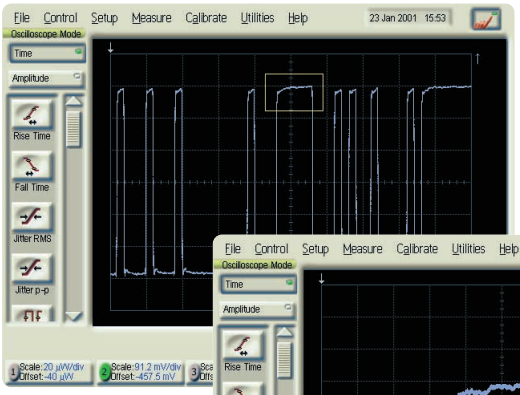
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Simple, yet powerful tools for high-speed measurement problems

Informative waveform displays

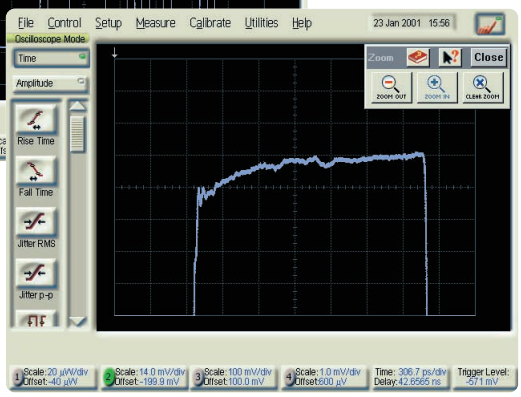
Get valuable insight into your device behavior with intensity or color shading. View pattern dependencies and differentiate rare versus common events.

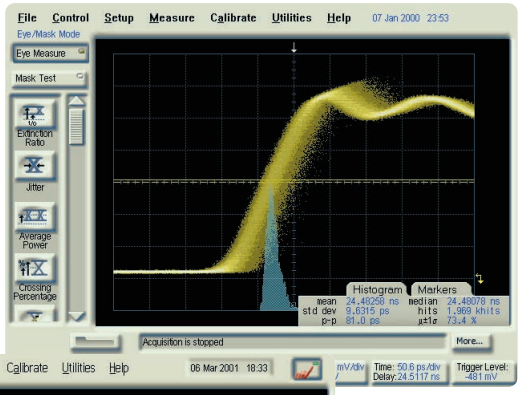


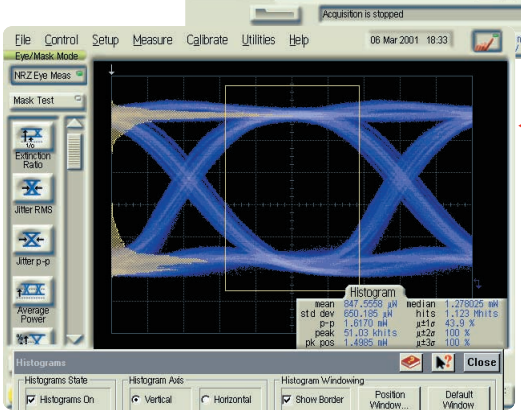


Zoom

Draw a box around the section of the waveform you want to expand, then click inside the box.

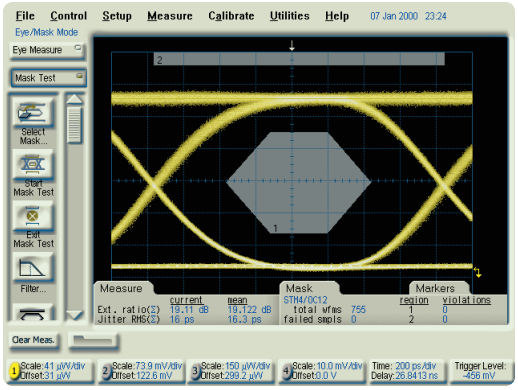






Histogram analysis

Histograms can be constructed on waveforms on either the vertical or horizontal axes to derive statistical information about the data.



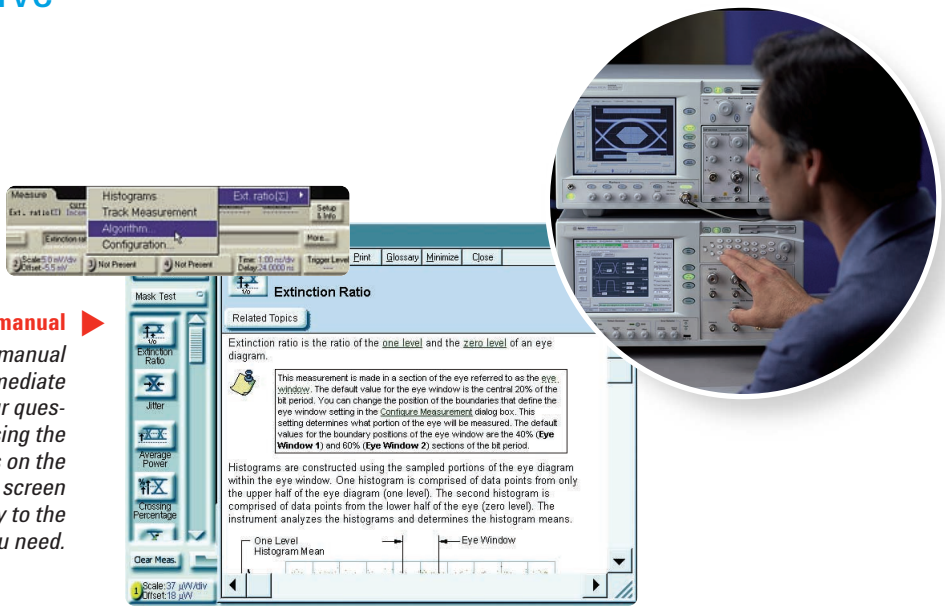
Organized test results

View measurements, histogram, marker and mask test results in individual tabular displays.

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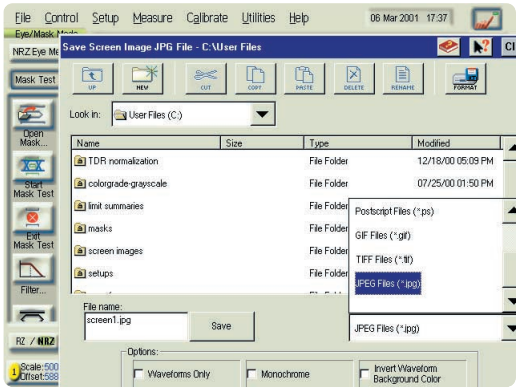
Familiar user interface with extensive online help manual

No relearning curve



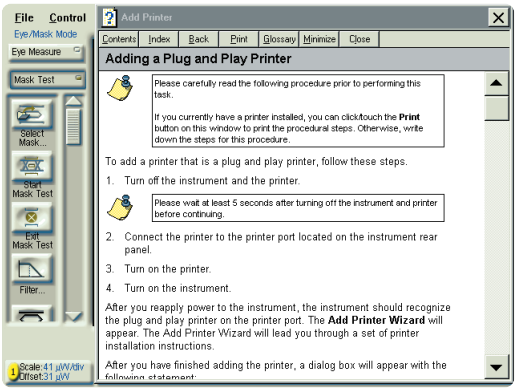
On-line help manual

The on-line manual provides immediate answers to your questions about using the instrument. Links on the measurement screen take you directly to the information you need.



Familiar file management

User interface with internal hard drive allows you to save screen images in various formats including bmp, ps, gif, tif and jpg. LAN interface is also available for network file management.

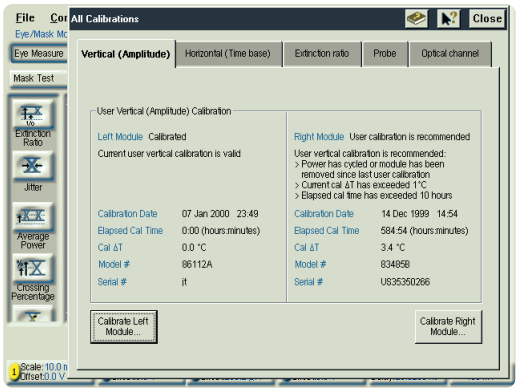


Simple printer setup and upgrading

The Windows based operating system allows easy configurations of local or networked printers, similar to your PC.

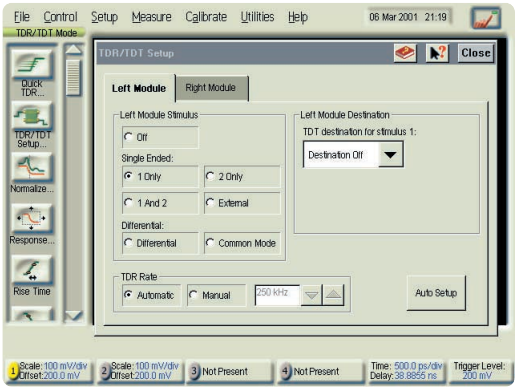
No calibration mysteries

Calibration of your instrument has been simplified by placing all the performance level indicators and calibration procedures in a single high-level location.



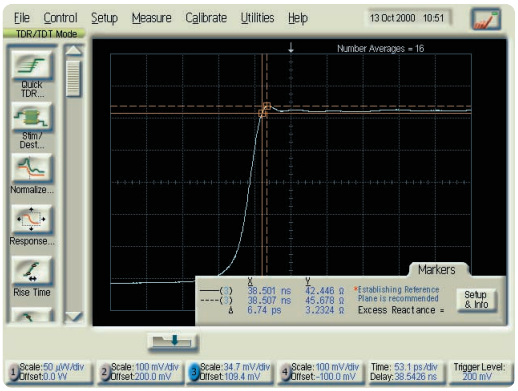
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Improve signal integrity with time domain reflectometry (TDR)



TDR/TDT setup

TDR/TDT setup allows you to select a stimulus for single ended or differential TDR measurements and a destination for TDT. Many configurations are available to help you customize your test requirements.

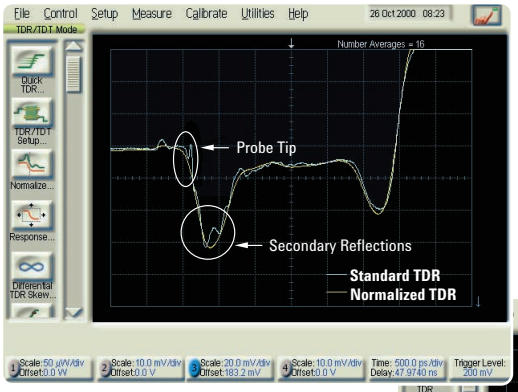


TDR step fidelity

TDR step fidelity is crucial for high accuracy impedance measurements. With less than 5% overshoot, the 86100A has the best-in-class TDR step flatness.

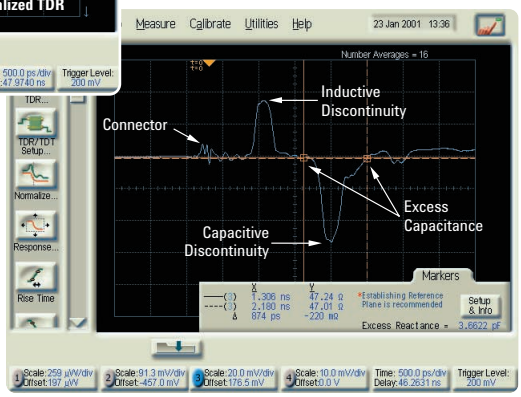
TDR normalization

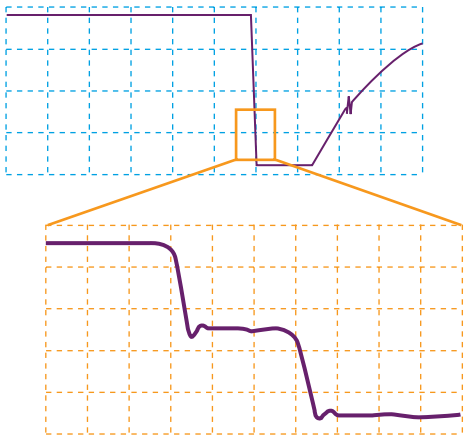
TDR normalization sets the reference plane at the probe tip. This technique is a two-point calibration using a precision 50-ohm load and a short. The processing power of the 86100A then builds a digital filter, which corrects for test fixture errors in the frequency domain.



Transmission line characteristics

TDR instantly reveals the characteristic impedance of the transmission line, and displays both the position and the nature (resistive, inductive, or capacitive) of each discontinuity.





Zoom

Allows you to quickly zoom in on a signal.

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Agilent 86100A family of modules

The following list of plug-in modules operate with the 86100A. See the Technical Data Sheet for details on specifications and ordering options. Note that modules from the HP 83480 and 54750 family are compatible with the 86100A including the 54751A, 54752A, 54753A, 54754A, 83481A, 83482A, 83483A, 83484A, 83485A, 83485B, 83486A, and 83487A.

Optical/Electrical Modules

86101A: 3 GHz optical channel; multimode, amplified (750-860 nm) 20 GHz electrical channel
86102A: 10 GHz optical channel; multimode, amplified (750-860 nm) 20 GHz electrical channel
86102U: 15 GHz optical channel; multimode, unamplified (750-860 nm) 20 GHz electrical channel
86103A: 3 GHz optical channel; multimode, amplified (1000-1600 nm) 20 GHz electrical channel
86103B: 10 GHz optical channel; multimode, amplified (750-860 nm) 20 GHz electrical channel
86105A: 20 GHz optical channel; single-mode, unamplified (1000-1600 nm) 20 GHz electrical channel
86106B: 28 GHz optical channel; single-mode, unamplified (1000-1600 nm) 40 GHz electrical channel
86109A: 30 GHz optical channel; single-mode, unamplified (1000-1600 nm) 40 GHz electrical channel
86109B: 40 GHz optical channel; single-mode, unamplified (1000-1600 nm) 50 GHz electrical channel
86116A: 55 GHz optical channel; single-mode, unamplified (1000-1600 nm) 65 GHz electrical channel

Dual Optical Channel Modules

86111A: Dual 3 GHz optical channels multimode, amplified (750-860 nm)
86111U: Dual 15 GHz optical channels multimode, unamplified (750-860 nm)
86113A: Dual 3 GHz optical channels multimode, amplified (1000-1600 nm)
86115B: Dual 28 GHz optical channels single-mode, unamplified (1000-1600 nm)

Dual Electrical Channel Modules

86112A: Dual 20 GHz electrical channels
83484A: Dual 50 GHz electrical channels

TDR/TDT Module

54754A: Dual 18 GHz TDR/electrical channels

Trigger Module

86107A: Precision timebase reference module

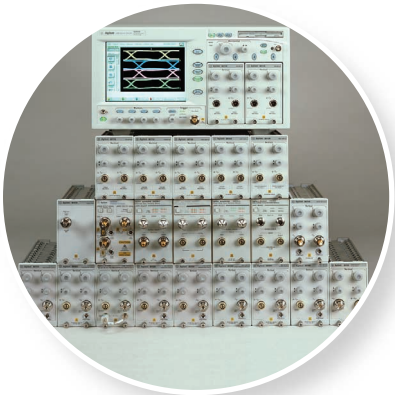
Clock Recovery Modules

The following modules provide a recovered clock from the data signal for triggering at standard telecommunications and enterprise data rates:

83491A: Electrical signals. Data rates (Mb/s) 155, 622, 1063, 1250, 2125, 2488, 2500.
83492A: Multimode optical. Data rates (Mb/s) 155, 622, 1063, 1250, 2125, 2488, 2500.
83493A: Single-mode signals. Data rates (Mb/s) 155, 622, 1250, 2488, 2500.
83494A: Single-mode signals. Data rates (Mb/s) 155, 622, 2488, 9953.
83494A: Option 106: Single-mode signals. Data Rates (Mb/s) 155, 622, 2488, 2666, 10664

Accessories

11667B: Power Splitter, DC to 26.5 GHz , APC 3.5 mm
11667C: Power Splitter, DC to 50 GHz , 2.4mm
11742A Option K01: 50 GHz DC blocking capacitor
11898A: 1.5 meter remote extender module
54006A: 6 GHz passive probe
54007A: 3.5 mm RF accessory kit
54008B: 24 ns delay line
54701A: 2.5 GHz active probe
83430A: 2.5 Gb/s Lightwave Transmitter
83433A: 10 Gb/s Lightwave Transmitter
83434A: 10 Gb/s Lightwave Receiver
83440B/C/D: Optical-to-Electrical Converters (6/20/32 GHz)
83446A: 2.5 Gb/s Lightwave Receiver
N1020A: 6 GHz TDR probe kit
N1025A: 1 GHz Active Differential Probe



Connector Options for All Optical Modules

Option 011 Diamond HMS-10 Connector
Option 012 FC/PC Connector Adapter
Option 012 DIN Connector Adapter
Option 014 ST Connector Adapter
Option 017 SC Connector Adapter

Adapters for Electrical Modules

11900B 2.4mm (f-f) Adapter
11901B 2.4mm (f) to 3.5mm (f) Adapter
11901C 2.4mm (m) to 3.5mm (f) Adapter
54124-24101 2.4mm Termination
5061-5311 3.5mm (f-f) Adapter
1250-1158 (f-f) Adapter
1810-0118 3.5mm Termination

Firmware and software

Firmware and software upgrades are available through the Web or your local sales office.
www.agilent.com/comms/dcaupgrade

Additional literature

Product Note:
40 Gb/s and Return-to-Zero Measurements Using the Agilent 86100A Infiniium DCA
5988-2039EN

Technical Specifications:
Infiniium DCA: Agilent 86100A Wide-Bandwidth Oscilloscope
5968-8546E

Application Note:
Characterizing High-Speed Optical Transmitters: Compliance Testing with the Agilent 86100A Infiniium DCA
5968-9249E

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