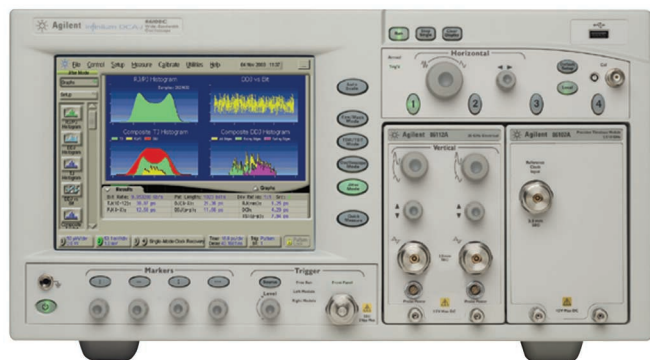


Agilent 86100C Infiniium DCA-J

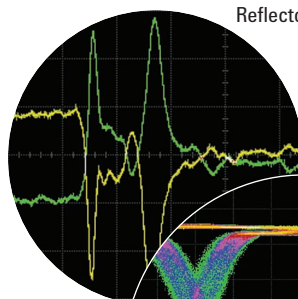
The *fastest* way to the *right* answer



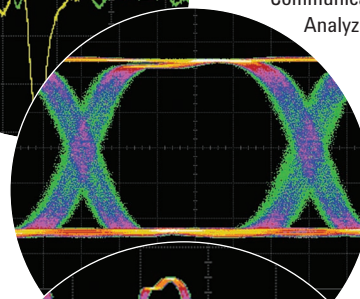
The multi-functional analysis tool



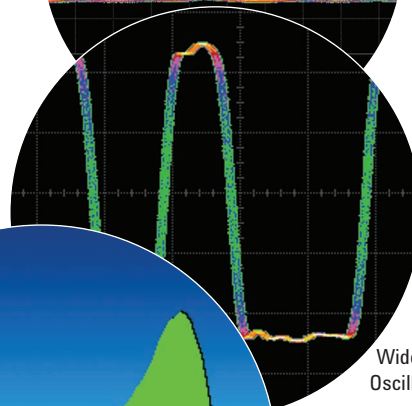
Time Domain
Reflectometer



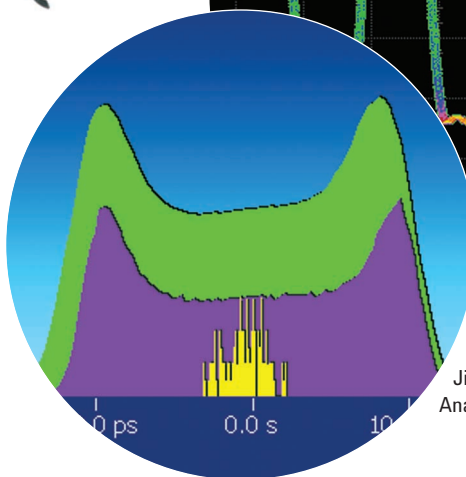
Digital
Communications
Analyzer



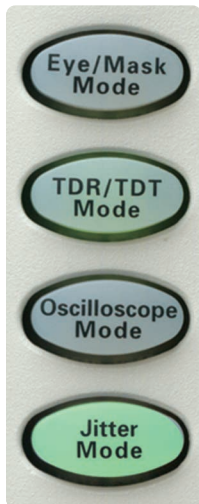
Wide Band
Oscilloscope



Jitter
Analyzer



Agilent Technologies



DCA-J: Expect more

The ultimate flexible tool—the 86100C Digital Communications Analyzer with advanced jitter analysis (DCA-J). Four instruments in one—a digital communications analyzer with automated

eye measurements; a full-function time domain reflectometer (TDR) for impedance analysis; a full function oscilloscope with bandwidth in excess of 80 GHz; an innovative and accurate jitter analyzer for electrical and optical signals.

With the ability to accept plug-in modules that you already own from the 83480A/54750A and 86100A/B, the DCA-J also protects your investment.

Essential tools for the high speed digital designer...

- Wide bandwidth oscilloscope
- Signal integrity analyzer
- Communications analyzer
- Jitter analyzer

...all in *one* instrument!

New Advantages

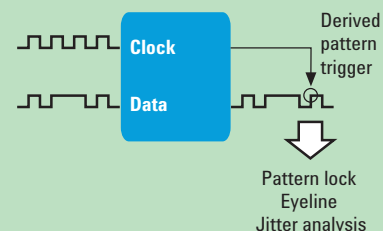
- Jitter Measurements at any rate, even beyond 40 Gb/s
- Jitter separation into subcomponents:
 - Total Jitter (TJ)
 - Random Jitter (RJ)
 - Deterministic Jitter (DJ)
 - Inter-Symbol Interference (ISI)
 - Duty Cycle Distortion (DCD)
 - Periodic Jitter (PJ)
 - Sub-Rate Jitter (SRJ)
- No need for an external pattern trigger
- Stable, accurate measurements
- One button ease
- Support for all DCA plug-ins

New Capabilities

- **Pattern lock**—internally generates pattern trigger from an ordinary clock
- **Eyeline mode**—isolates specific bit sequences, creates an averaged eye diagram
- **Jitter Mode**—one-button RJ/DJ separation; accurate, stable, in-depth jitter analysis
- **Jitter Mode with the 86107A Precision Timebase**—the easiest jitter measurements combine with the lowest jitter intrinsics of any enterprise jitter solution to measure ultra high performance components
- **Open Operating System**—Windows® XP Pro allows external applications to be installed

“Easy jitter analysis that scales to any bit rate I might need in the future—at an amazingly cost-effective price. That this comes with 3 other other instruments in the same package is amazing!”

New Hardware Enabler



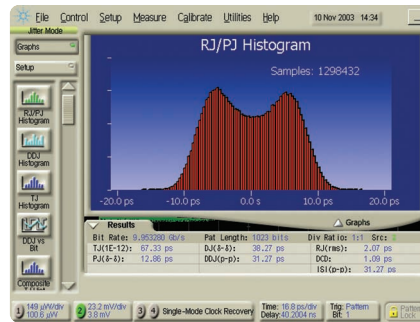
Smashing through the barriers to gigabit jitter analysis



Jitter Analyzer

Pages 4-5

- One button does it all
- Easy set up means you get right answers faster
- Separation of jitter into subcomponents for fast debugging
- Highly repeatable measurements
- High sensitivity—ideal for testing devices with low intrinsic jitter
- Negligible jitter contribution from the instrument—you're measuring your device, not your test equipment



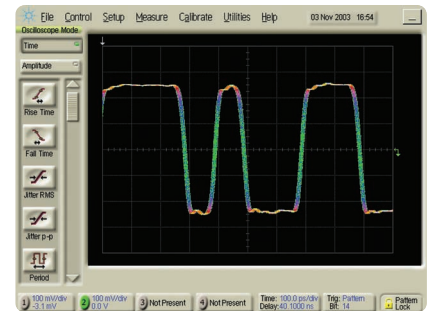
4 essential tools in 1



Wide Bandwidth Oscilloscope

Page 8

- Electrical bandwidths from 12 to over 80 GHz ensure the most accurate waveforms
- Pulse trains viewed without the need for a separate pattern or frame trigger
- Analog scope look and feel
- Trigger bandwidth to >13 GHz (option 001) or 43 GHz (with 86107A precision time base)



Signal Integrity Analyzer

Page 9

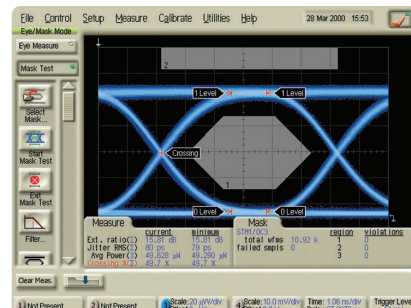
- Verify the transmission quality of components and channels with a precision time domain reflectometer
- Single ended or differential TDR for accurate impedance measurements
- Advanced calibration techniques remove cabling/fixturing/probe effects; measure just the test device
- Conversion to complete mixed-mode S-parameter data through N1930A software package



Digital Communications Analyzer

Pages 10-11

- Widely trusted for optical and electrical eye diagram analysis
- Easy transmitter compliance testing to international standards
- Optical bitrate coverage from 155 Mb/s to >40 Gb/s
- Optical module bandwidth to >65 GHz
- Fast test throughput for manufacturing
- NRZ/RZ built-in measurement ease
- Completely compatible with the 86100B
- Windows® XP Pro open environment and easy networking
- Eyeline Mode allows averaging of eye diagrams, isolation of mask violation bit sequences





Think jitter measurements are hard to make? *Think again.*

The DCA-J takes jitter analysis to a new level of simplicity and accuracy. Add to that the scalability to any data rate that is likely in the future, and you have the ultimate in investment protection.

As device performance and system requirements push jitter performance to ever higher levels, it is sometimes hard to distinguish between the behavior of your device and the jitter of your test equipment. That will never be a problem with the DCA-J. The instrument jitter in the standard main-frame is already very low. Combine that with the 86107A precision time-base, and intrinsic jitter falls away to less than 250 fs. DCA-J—see what's really going on.

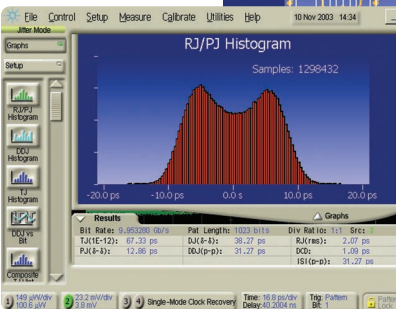
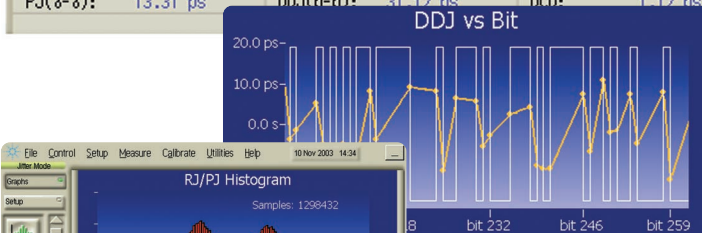
Key enablers

- Jitter Measurements at any rate, even beyond 40 Gb/s
- Jitter separation into subcomponents:
 - Total Jitter (TJ)
 - Random Jitter (RJ)
 - Deterministic Jitter (DJ)
 - Inter-Symbol Interference (ISI)
 - Duty Cycle Distortion (DCD)
 - Periodic Jitter (PJ)
 - Sub-Rate Jitter (SRJ)
- No need for a pattern trigger
- Stable, accurate measurements
- One button ease
- Wide bandwidth means lowest intrinsic ISI/DDJ
- Lowest Intrinsic Jitter floor means highest sensitivity RJ measurements
- Support for all DCA plug-ins, optical and electrical
- Limit tests provide quick pass-fail jitter results



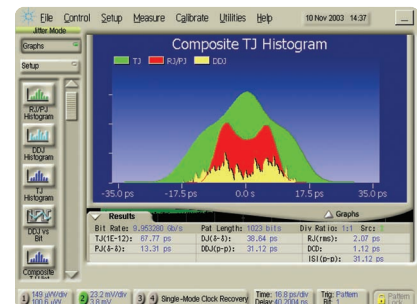
“As bit rates increase, jitter budgeting and characterization of jitter performance present an ever increasing challenge. In order to manage jitter effectively, we need tools that can decompose the jitter into the numerical and statistical forms that allow us to predict our performance effectively and provide the insight necessary to solve problems quickly. The new capability of the DCA-J provides irreplaceable visibility for the challenges of jitter characterization of our world class products. This new instrument is a major contribution to our ability to manage jitter.”

—Anthony Sanders
Principal Engineer, Infineon Technologies



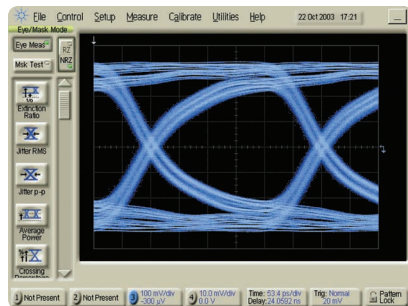
Displays that save you time

Sometimes you want to get in-depth analysis of a difficult device performance issue. Sometimes you want data views that are compatible with other instruments so you can correlate multiple answers. And then, there are times when you just want to know whether your device meets a standard.



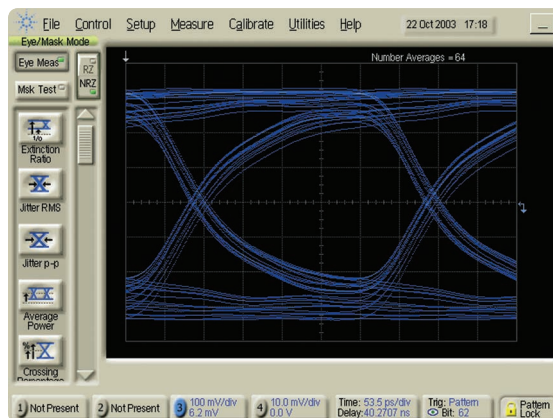
The DCA-J handles all of these situations by providing revealing histograms and intuitive graphical views, and by providing an easy and simple table of jitter sub-components. Its aim is to save you time.

The *fastest* way to the right answer



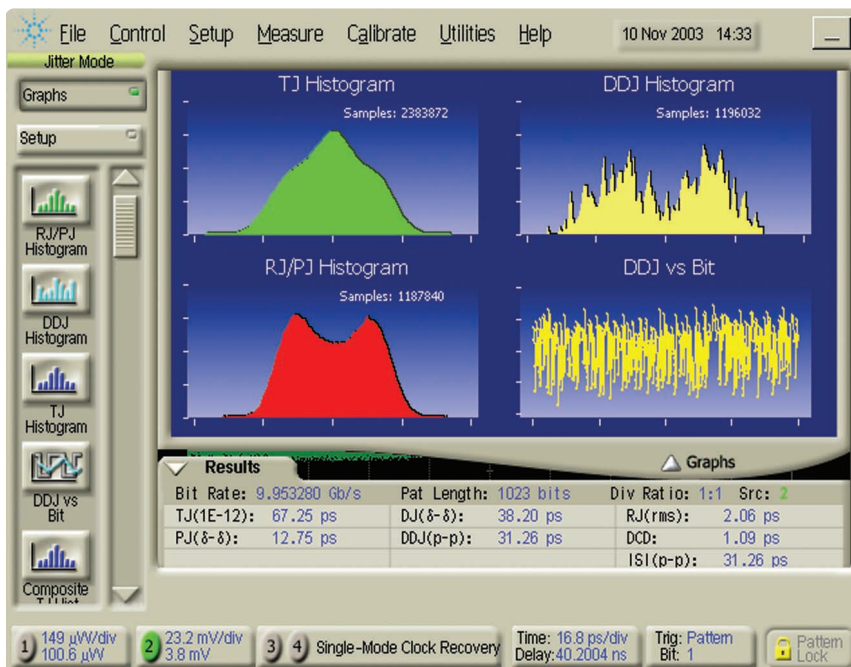
1 Easy setup, easy triggering

Many jitter measurements turn out to be inaccurate because of some small but important error in a complicated measurement setup. With the DCA-J, a simple physical setup, combined with a user interface that never lets you get lost, makes getting simple, accurate jitter measurements easy.



2 Eyeline mode—see your problem sequences

It's easy to move between eye diagrams that overlay all possible bit sequences to single valued waveforms that show individual bit sequences. Sometimes it would be useful to make the noise disappear and just see the inter-symbol effects (ISI). Averaging in Eyeline Mode enables you to do exactly that. Now you can see exactly which sequences are causing mask violations. No need for a pattern trigger either—connect your signal and in most cases the instrument detects pattern length and bit rate without being told—you have an immediate display to work from.



3 Jitter mode—one button gateway to understanding jitter

Jitter can be a complex subject, and sometimes it can seem that your test equipment is making it even more complicated. Ultimately, you just want to get a design completed and working. Finally, there is a test solution that makes things simpler.

Eye diagrams have proved useful because they are so intuitive. Building on this intuitiveness, the DCA-J shows you the behavior of your device in the jitter domain but always tracks back to the eye diagram. Measurements not making sense? Maybe something changed in your setup. It's easy to switch back to the eye and quickly see whether everything is how you left it. Results are in familiar formats—but that have never been available for 6, 10, or 40 Gb/s applications. Simplicity in setup and operation means you can be confident that you are making accurate, valuable measurements from the very beginning.

The big picture—4 instruments in 1



Compatible

The 86100C is code-compatible with the 86100A and B.

NRZ/RZ

Complete set of NRZ/RZ measurements

Touchscreen

A high performance touchscreen allows easy navigation of the instrument interface. Or, use dedicated knobs or a mouse—the choice is yours.

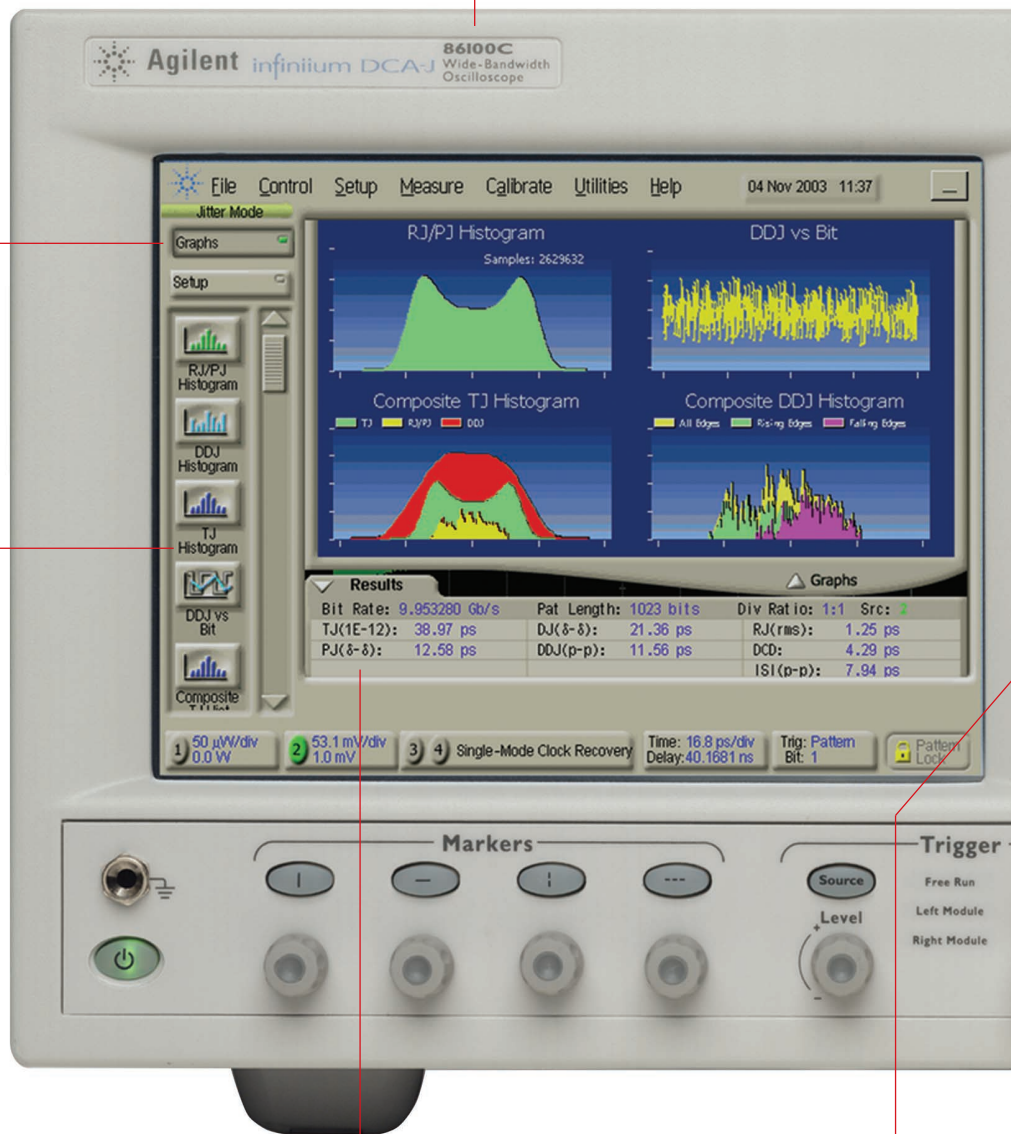
Easy user interface

A well-designed Windows®-based graphical user interface makes it easy to access advanced features.

Icons provide access to an extensive set of common tests and measurements.

Dedicated jitter analysis mode

Whether you are making electrical or optical measurements, quickly change between observing the eye to making quick, accurate, and intuitive jitter measurements with the touch of a button.





Autoscale

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

Flexible storage

Internal hard drive, front panel USB port, and supplied USB pen drive make storage and transfer of setups, image files, database files, and waveforms easy.

Dedicated controls for common adjustments

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

4 instruments in 1

A digital communications analyzer, a full featured wide-bandwidth oscilloscope, a time domain reflectometer and now a fast and accurate jitter analyzer. Just select the desired operating mode to set up the instrument you want.

Very low intrinsic jitter

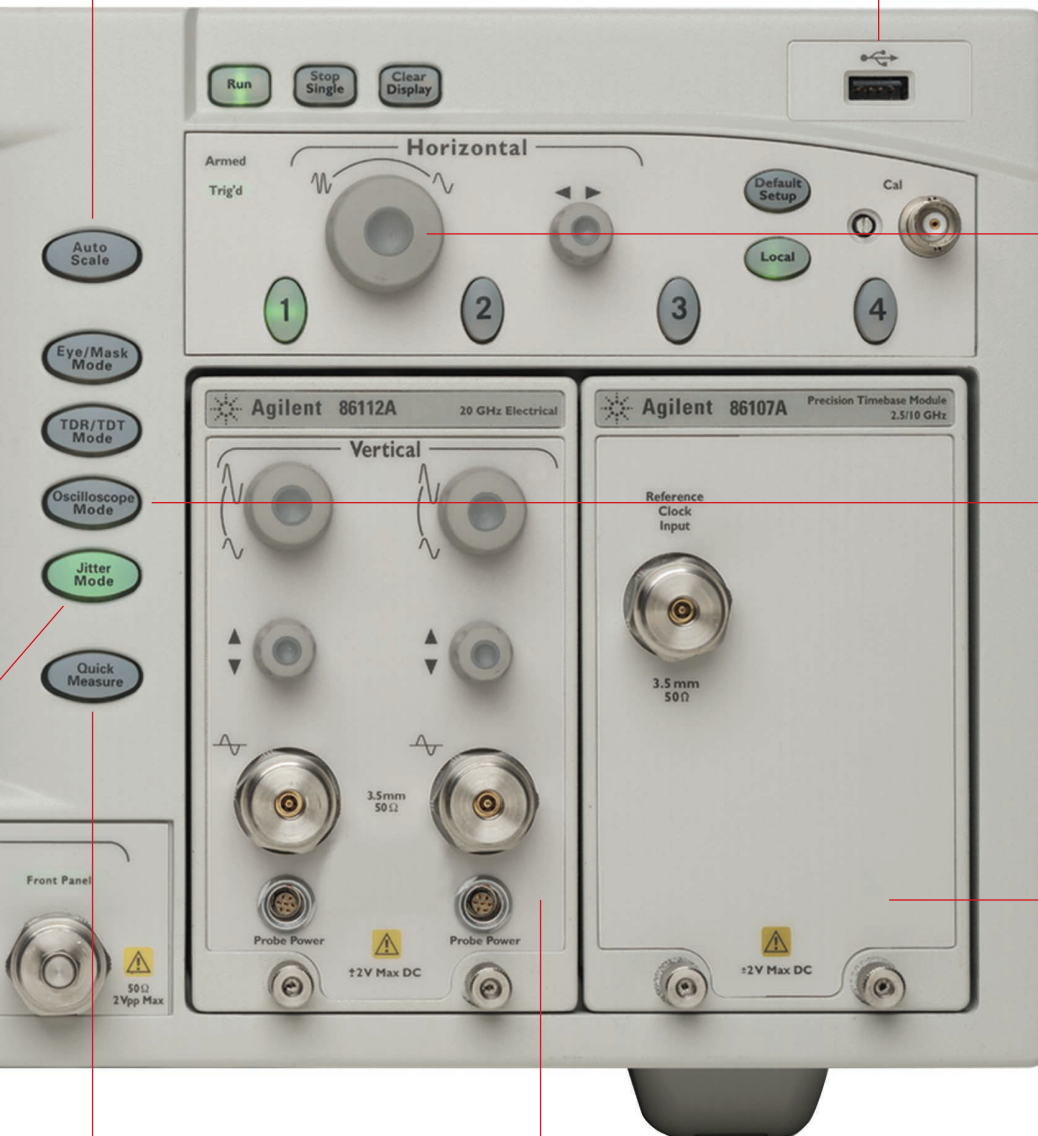
The intrinsic jitter noise floor of the instrument is extremely low, making it easy to measure high performance designs where instrument jitter might otherwise hide the real device performance. For the ultimate in performance, the 86107A can be used to reduce the intrinsic jitter to an industry leading level.

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.

Modular

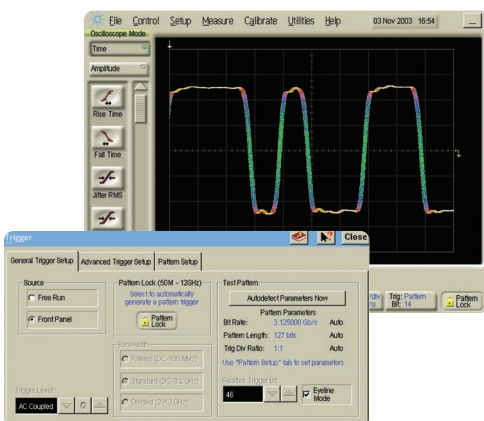
Configure the 86100C for the exact capability you need with a large family of plug-in modules to choose from. Modules for the 83480A/54750A are compatible with the 86100 family.





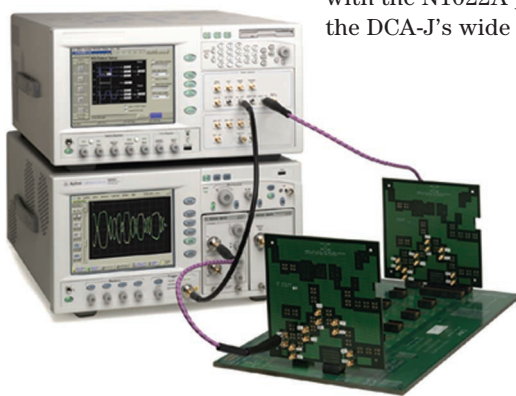
Fast time to insight

With higher bit rates being used in ever lower target cost systems, advanced techniques are being used to get a low system BER. Circuit boards constructed from FR-4 can be cheap, but they distort pulse trains passing across them. Designers are increasingly employing pre-emphasis and equalization to counteract inter-symbol interference (ISI) and open up the eye. However, it can be hard to measure the effectiveness of such systems. Designers use modeling to predict component performance, but they ultimately need to verify with real-world measurements.



Pattern Lock control

86100C
partnered
with N4901A
13.5 Gb/s
Serial BERT



"In the modern ultra high speed SERDES business, understanding jitter at the zero crossing points of a waveform is not enough. Accurate capture of very long data packets becomes a requirement to permit post-processing both for design analysis and standards compliance testing. It is also our desire to have a single signal analysis platform to handle bit rates from 1 Gb/s to 12.5 Gb/s and beyond.

The 86100C meets our requirements well. In addition to its new jitter analysis package, the combination of its flexible triggering system and precision timebase enables the capture of averaged very long data packet waveforms with unprecedented accuracy. The speed of the instrument has also been impressive with DDJ measurements that used to take hours being reduced to less than a minute."

—Steve Hubbins

Silicon Evaluations Specialist, Texas Instruments



The DCA-J can swiftly provide insight

- Pattern Lock enables single-valued waveform viewing at even the fastest bit rates when **no separate pattern trigger** is available.
- Triggering is also enhanced with the industry's first **10 Gb/s electrical clock recovery** instrument solution, the 83495A.
- With electrical channels that have bandwidths ranging from 12 GHz to in excess of 80 GHz, you can be sure of the most precise pulse fidelity.
- **Probing**—if connectorized test points are not available, use the award-winning Infiniimax probes to their maximum bandwidth advantage (in excess of 7 GHz) by pairing them with the N1022A probe adapter and the DCA-J's wide bandwidth inputs.



- Even closed eyes can be captured as pulse train data and the effectiveness of common **equalization** schemes seen from on-board algorithms.
- With many standards scaling up in bandwidth at an increasing rate, the DCA-J has you covered for now and for the foreseeable future. All at a new price/performance benchmark.

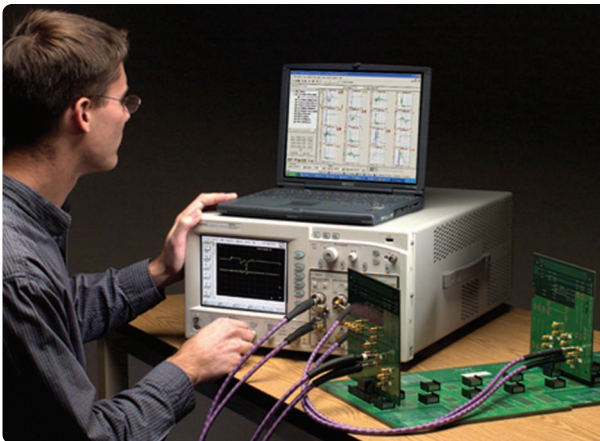
An end to bit rates
outpacing your test equipment



Superior signal integrity insight

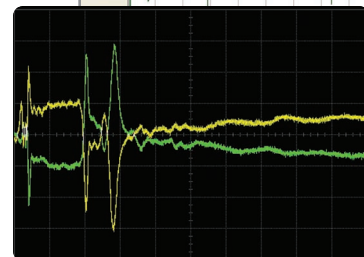
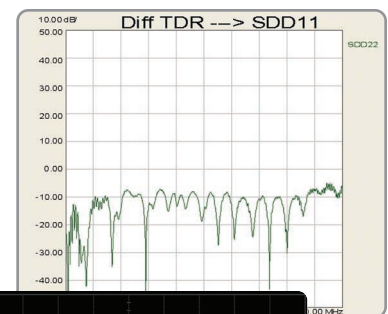
Configure the DCA as a time domain reflectometer (TDR) to quantify the transmission/impedance properties of components and channels

- Unique calibration capabilities remove systematic measurement errors from cabling, connectors, and probes so you see only the properties of the test device
- Similar to calibrations of network analyzers...just place a short circuit and load at the reference plane of the test device
- Increase the two-event resolution impedance precision of the TDR through pulse enhancement
- See sub-millimeter two-event resolution and accurately measure impedance for ultra-fast edge speeds with accessories from Picosecond Pulse Labs (www.Picosecond.com)
- Accurately characterize differential circuitry

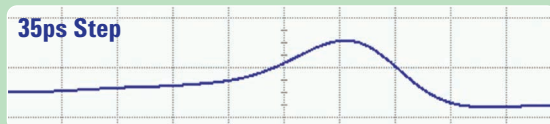
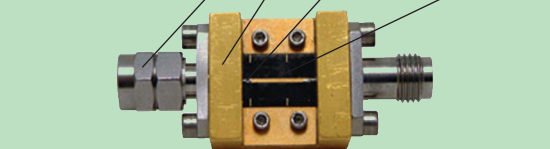
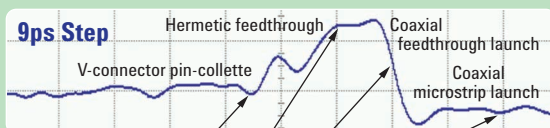


The N1930A software being used to convert precision TDR measurements into S-parameter data.

- Highest fidelity and symmetry dual-TDR outputs yield precision differential and common mode results in a single setup
- Gain insight and improved modeling through frequency domain S-parameters
- Use the N1930A Physical Layer Test System software to automatically configure and calibrate the 86100 TDR system.
- Time-domain TDR results are transformed to complete set of single-ended and mixed-mode frequency domain S-parameters

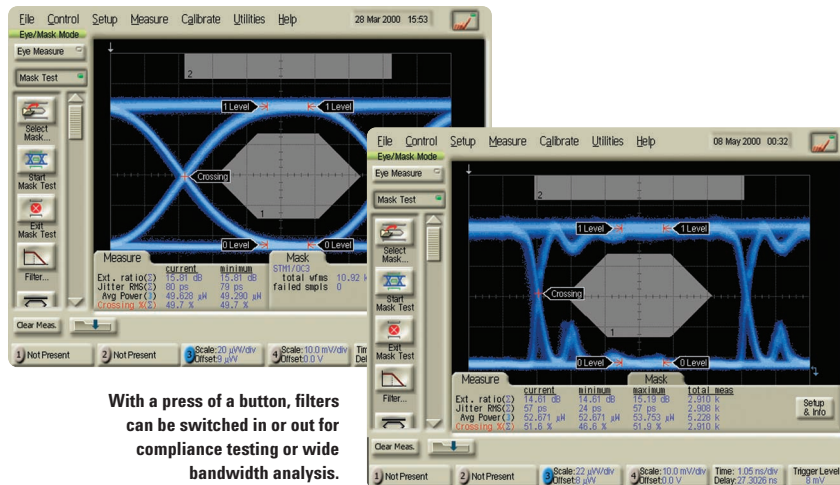


Using the Picosecond Pulse Labs 4020 to get more information about your device.





In just a few minutes, become an expert in Compliance Testing



SONET/SDH Compliance

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 with a high-speed sampling oscilloscope. The 86100C is ideally suited to verify transmitter compliance quickly and accurately. Tests are performed automatically according to industry-recognized procedures. The 86105B is an industry leader in waveform fidelity and extinction ratio accuracy for 10 Gb/s applications.

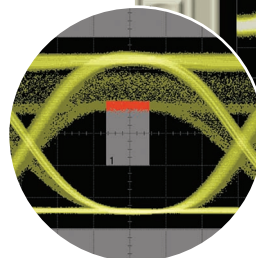
Easy. Quick. Accurate.

The 86100C makes compliance testing straightforward—only two keystrokes are needed to perform a complete compliance test. Scaling the waveform, acquiring the data, and completing the compliance test require only a few seconds. Many plug-in modules contain multiple filters so many different rates can be tested with the required standards-based reference receiver methodology. Filters are easily switched out to allow testing with the full instrument bandwidth.

Enterprise & Storage

Transmitter testing for 10 Gigabit Ethernet and 10X Fiber Channel uses similar methodologies to those used in SONET/SDH, but there are some important variations. An aspect that makes testing easier is that despite the differing bit rates (10.3125 Gb/s and 10.51875 Gb/s respectively) the compliance filter has been specified to be the same frequency as for 9.95 Gb/s SONET/SDH.

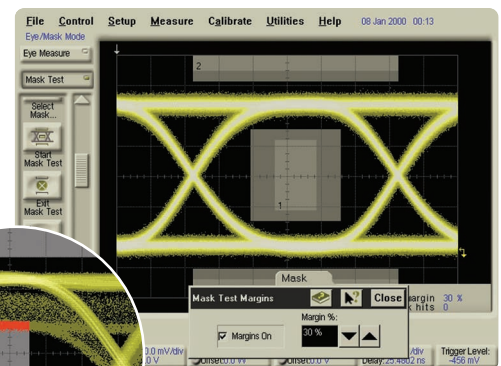
Mask Test Diagnostics— 86100C Infinium DCA-J goes beyond basic testing with margin analysis for process monitoring. Mask hits/failures are easily viewed with red pixels.



Clock recovery is a more significant difference. Transmitter test requires the use of a clock trigger that is derived from the transmitted signal itself. A critical feature of the clock recovery process is the loop bandwidth being specified at 4 MHz. This is intended to “track out” the jitter components that are less than 4 MHz, so that only elements beyond this are displayed on the eye diagram. The 83495A clock recovery module is compliant to this requirement as well as offering continuous rate coverage in the 10 Gb/s band to cover many applications.

Clock Recovery Flexibility

The 83495A is the newest member of a clock recovery family covering electrical, optical multimode, and optical single-mode transmission media. Hot-swapping and matching alongside the other 86100 plug-in modules gives you maximum flexibility in the lab and in production.



40 Gb/s RZ? No problem!

There are many demanding aspects to 40 Gb/s testing. RZ modulation is now a common format in 40 Gb/s systems, and has a unique set of measurement parameters defined to describe it. Components designed for 40 Gb/s systems also must have very low intrinsic jitter to successfully operate, with levels sometimes so low that it is difficult to tell whether measured jitter is the result of component jitter or the inherent jitter noise floor of the measuring instrument.

To counter both of these new challenges, Agilent has industry leading answers to enable your success. A broad choice of modules is led by the 86118A module with 70+ GHz dual electrical remote heads, or choose the 86116B 65 GHz optical/80 GHz electrical module. In both cases, once the signal is acquired, it is a breeze to activate the automated RZ measurements to instantly see contrast ratio, eye opening factor, and many other critical parameters.

"The most significant improvement is that we can now show a repeatable, low jitter result to customers without going into lengthy discussions about test methods. As a result, we are able to go to customers with results taken directly from the equipment—results better than anything they've seen before."

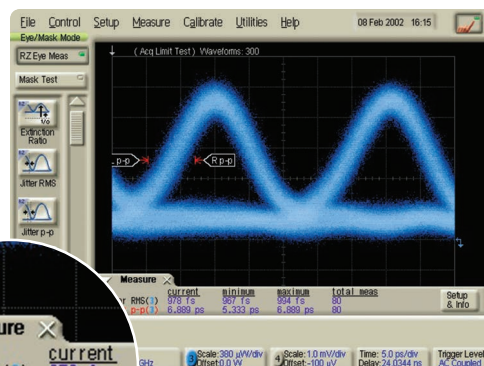
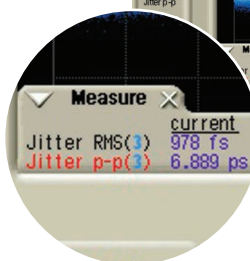
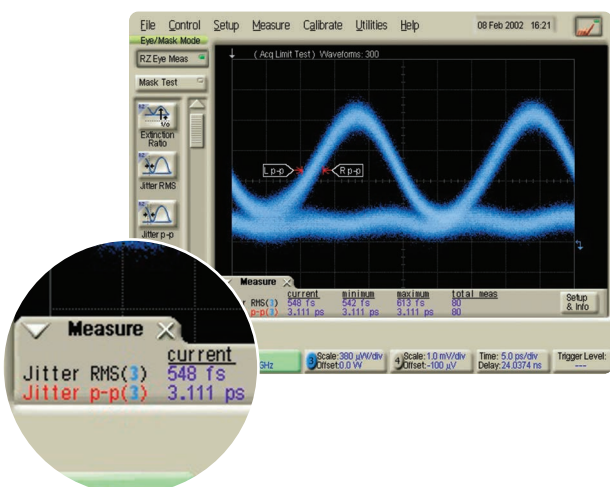
We expect additional future business directly as a result of returning to the 86100 platform, recognizing this as the premier solution in our measurement laboratory."

—Matt Isaacs
Verification Engineer, Broadcom Corporation



To lower the intrinsic jitter of the instrument for the most demanding applications, the 86107A has enabled many, many customers to see their true device performance. This module has revolutionized high performance 10 Gb/s and 40 Gb/s measurements. The 86107A plugs into any 86100 mainframe and reduces the inherent timebase jitter to about 200 fs—almost a factor of 5 reduction in system jitter.

The 86107A requires an electrical reference clock that is synchronous with the signal under test and allows timebase resolution to be improved from 2 ps/division to 500 fs/division. For 40 Gb/s applications, the 86107A is considered a must.



The same 40 GB/s RZ signal captured using current DCA (right) and now with the 86107A patented precision timebase module (left).

Product Ordering Overview

More details can be found in the Infiniium DCA
Technical Specifications, 5989-0278EN

Mainframe

86100C Digital Communications Analyzer, 3.2 GHz trigger bandwidth.

Option 001 Enhanced trigger to 13 GHz+. Pattern Lock, Eyeline Mode.

Option 100 Jitter Analysis Software Package (requires Option 001).
TJ, RJ, DJ, DDJ, PJ, DCD histograms and numerical results.
DDJ vs. Bit display.

Option 101 Advanced Waveform Analysis Software Package
(requires Option 001 & 101).^{*} Bathtub, export of large single
valued waveform segments, equalization of closed eyes,
SRJ analysis, support for 86107A precision timebase.

^{*}Available Summer '04

Vertical Channel & Clock Recovery Modules:

A wide variety of optical, optical & electrical, and electrical modules are available
with bandwidths ranging from 12 to >80 GHz electrical and 3 to >65 GHz optical.
Electrical and optical clock recovery modules are also available. See Technical
Specifications for more details.

Trigger Module

86107A Precision Timebase with <200 fs intrinsic jitter.

Time Domain Reflectometer

54754A Dual channel differential TDR module.

Windows and MS Windows are U.S. registered trademarks of Microsoft Corporation.



Agilent Email Updates

www.agilent.com/find/emailupdates

Get the latest information on the products and
applications you select.

By internet, phone, or fax, get assistance with all
your test & measurement needs

Online assistance:

www.agilent.com/comms/dca

Phone or Fax

United States:

(tel) 1 800 452 4844

Canada:

(tel) 1 877 894 4414

(fax) (905) 282 6495

China:

(tel) 800-810-0189

(fax) 1-0800-650-0121

Europe:

(tel) (31 20) 547 2323

(fax) (31 20) 547 2390

Japan:

(tel) (81) 426 56 7832

(fax) (81) 426 56 7840

Korea:

(tel) (82-2) 2004-5004

(fax) (82-2) 2004-5115

Latin America:

(tel) (305) 269 7500

(fax) (305) 269 7599

Taiwan:

(tel) 080-004-7866

(fax) (886-2) 2545-6723

Other Asia Pacific Countries:

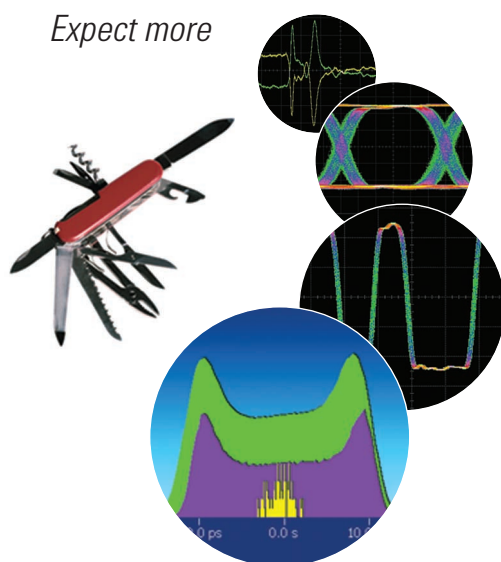
(tel) (65) 375-8100

(fax) (65) 836-0252

Email: tm_asia@agilent.com

Product specifications and descriptions in this
document subject to change without notice.

© 2003 Agilent Technologies
Printed in USA December 3, 2003
5988-5235EN



Expect more



Agilent Technologies