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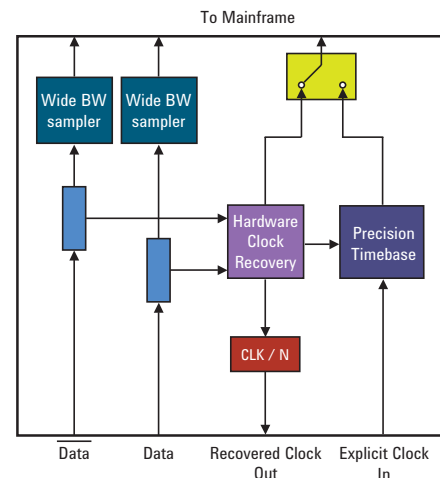
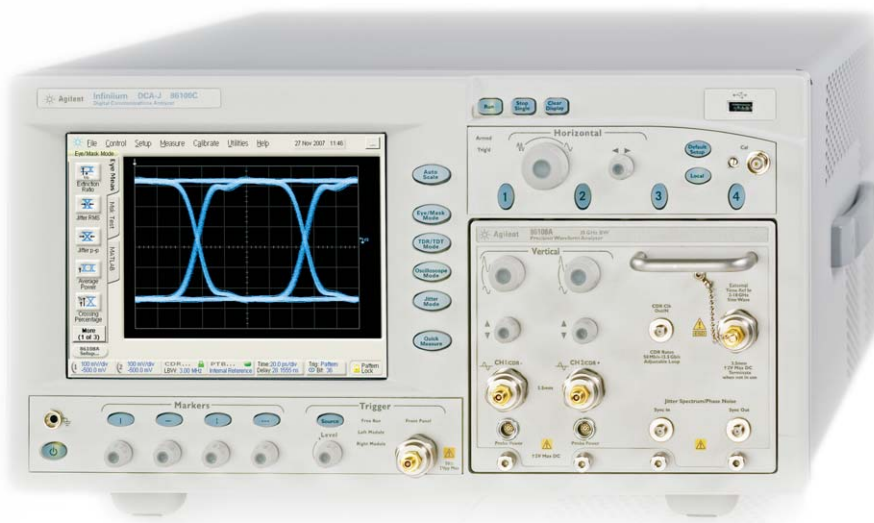
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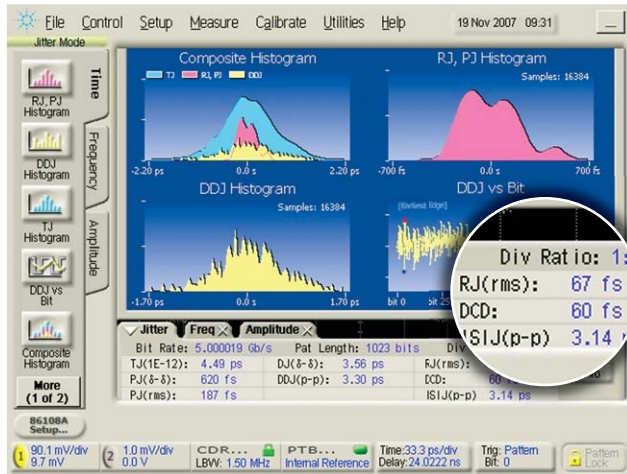
# Agilent 86108A Precision Waveform Analyzer

## Accuracy and ease-of-use for high-speed digital communications signals

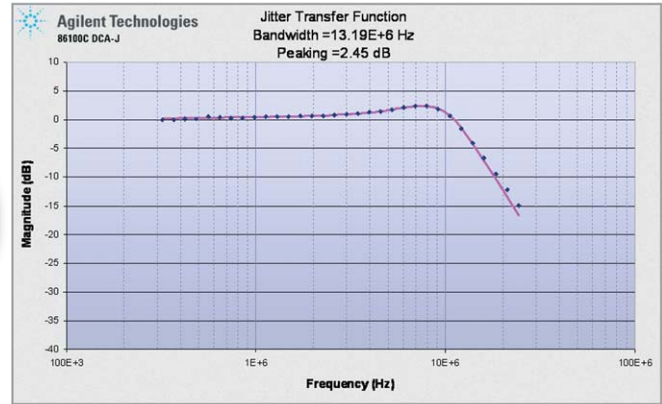
- High bandwidth, low noise, ultra-low residual jitter
- Simple one connection 'triggerless' operation
- PLL characterization including loop BW/jitter transfer
- Integrated HW clock recovery with adjustable loop BW/Peaking-exceeds industry standards for SSC tracking
- Easy setup for serial bus differential signaling (PCI-Express, SATA etc.)

Engineers are often frustrated by test equipment limitations preventing them from seeing the true performance of their designs. This can be the case with oscilloscopes used to analyze signals from high-speed electrical communications systems. As data rates increase, these problems can get even worse. The Agilent 86108A Precision Waveform Analyzer is a plug-in module used with the 86100C Infiniium DCA-J Digital Communications Analyzer that provides an ideal solution to this accuracy problem. The 86108A has a bandwidth in excess of 33 GHz, channel noise of less than 300 uV, and residual jitter at an astounding level of under 100 femtoseconds (60 fs typical)! This provides a "gold standard" for waveform accuracy and translates into confidence that the waveform displayed by the oscilloscope is a faithful representation of the true device performance for today's technology as well as future generations.





**Residual jitter of a 5 Gb/s PRBS signal showing the RJ component at 67 fs, indicating the extremely low jitter level of the oscilloscope system**



**Jitter transfer/PLL bandwidth measurement**

### Configured for accuracy, compliance, and ease-of-use

Measurement precision is achieved by integrating channels, clock recovery, and a precision timebase into a single plug-in module. While this is a key enabler for the high performance of the instrument, it also provides significant ease-of-use advantages. For analysis of embedded and distributed clock systems, simply connect either a single-ended or differential signal to the channel inputs. The internal instrumentation grade hardware clock recovery system will lock to clocks or data (including stress patterns such as CJTPAT). The system has adjustable loop BW/peaking and will synchronize the oscilloscope to any rate from 50 Mb/s to 13.5 Gb/s. Integration of the system hardware virtually eliminates the trigger-to-sample delay inherent in sampling oscilloscopes. Coupled with the high gain clock recovery, the measurement system exceeds the spread-spectrum clock (SSC) tracking requirements for compliance testing for systems such as SATA3 and SAS3. System jitter budgets can be analyzed without being obscured by large SSC components.

### PLL bandwidth and jitter transfer

The on-board phase detector of the 86108A allows for a precision measurement of phase-locked loop (PLL) bandwidth, sometimes referred to as jitter transfer. An external software application running on a PC controls the jitter source<sup>1</sup> to provide a modulated stimulus to the device under test (DUT). The application will monitor the internal phase detector of the 86108A to measure the stimulus as well as the DUT response.

By sweeping the frequency of the jitter stimulus, the ratio of the output jitter to the input jitter provides the PLL bandwidth. The measurement system is extremely flexible and can test input/outputs from 50 Mb/s to 13.5 Gb/s (data signals) and/or 25 MHz to 6.75 GHz (clock signals). Thus several classes of DUTs can be measured including clock extraction circuits, multiplier/dividers, and PLLs. For example, a PLL bandwidth test for PCI-express (shown above) requires a 100 MHz clock input and a 2.5 or 5 Gb/s data output. In addition to the loop BW measurements, the jitter spectrum/phase noise of the signals can be observed providing valuable insight into the root causes of jitter. See [www.agilent.com/find/dca](http://www.agilent.com/find/dca) for further details.

### Key specifications:

Bandwidth:	> 33 GHz (2 channels)
Noise:	< 300 uV rms
Jitter:	< 100 fs rms (< 60 fs typical)
Clock recovery range:	
Rates	50 Mb/s to 13.5 Gb/s
Loop BW	15 kHz to 10 MHz (rate dependent)

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

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1. Jitter sources for the PLL BW/jitter transfer measurement include the Agilent N4903 JBERT, N5182A MXA, or pattern generators/sources with delay line or phase modulation inputs modulated with a 33250A function generator.