Keysight Technologies

EZJIT Jitter Analysis Software for Infiniium Series Oscilloscopes

Data Sheet

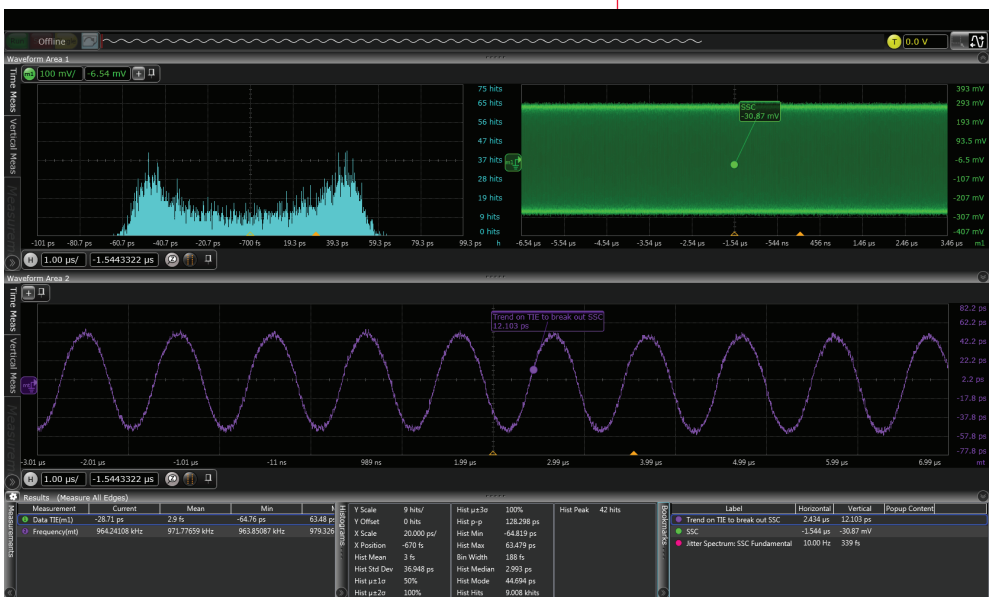


Figure 1. The software provides multiple views of jitter, including histogram, trend, and spectrum, for maximum insight

KEYSIGHT TECHNOLOGIES

Features of the EZJIT Software that Optimize Jitter Analysis Include:

- Easy-to-use jitter wizard
- Access up to 16 real-time measurement trends and histograms
- Fully functional with other Infiniium software such as Equalization and InfiniiSim
- Jitter spectrum display

With the faster edge speeds and shrinking data valid windows in today's high-speed digital designs, insight into the causes of signal jitter is critical for ensuring the reliability of your design. EZJIT jitter analysis software from Keysight Technologies, Inc. combined with Infiniium Series oscilloscopes. provide insight necessary to evaluate signals and improve your designs. Jitter histograms, trends, and spectra time correlated to the real-time signal make it easy to trace jitter sources. Deep memory, extensive parametric analysis and advanced clock recovery ensure you can make the required measurements on the desired signals, with confidence.

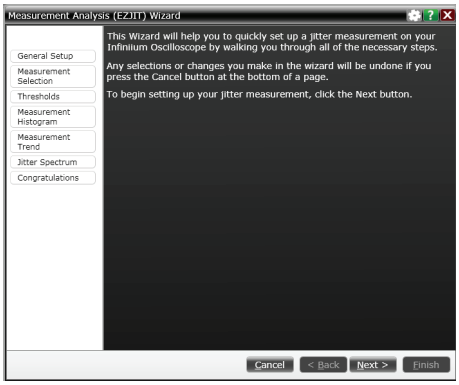
Choosing Your Jitter Analysis Software for Infiniium Oscilloscopes

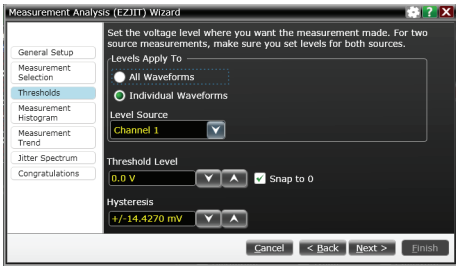
	EZJIT	EZJIT Plus	EZJIT Complete
Model Number **Option Number**	**E2681A** **002**	**N5400A** **004**	**N8823A** **070**
Advanced Clock Recovery	Requires Serial Data Analysis, option -003	Requires Serial Data Analysis, option -003	Requires Serial Data Analysis, option -003
Basic Jitter Views			
Jitter trend	■	■	■
Jitter histogram	■	■	■
Jitter spectrum	■	■	■
Multi-acquisition	■	■	■
Jitter Clock Measurements			
Period	■	■	■
Pulse width (+, –, both)	■	■	■
Frequency	■	■	■
Duty cycle (+, –)	■	■	■
Time-interval error	■	■	■
Cycle-cycle jitter	■	■	■
N-cycle jitter	■	■	■
Cycle-cycle +/– width	■	■	■
Cycle-cycle duty cycle	■	■	■
Jitter Data Measurements			
Time-interval error	■	■	■
Data rate	■	■	■
Unit interval	■	■	■
Delay/Edge Measurements			
Setup/hold	■	■	■
Phase	■	■	■
Rise/fall time	■	■	■
Jitter Separation			
Random jitter (RJ)		■	■
Deterministic jitter (DJ)		■	■
Data dependent jitter (DDJ)		■	■
Inter-symbol interference (ISI)		■	■
Duty cycle distortion (DCD)		■	■
Bounded uncorrelated jitter (BUJ)		■	■
Periodic jitter (PJ)		■	■
Aperiodic bounded uncorrelated jitter (ABUJ)		■	■
Total jitter (TJ) estimation		■	■
BER range		■	■
Max pattern length periodic mode		■	■
Max pattern length arbitrary mode		■	■

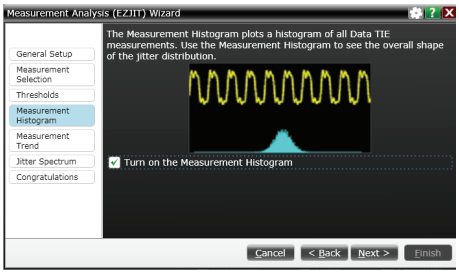
Choosing Your Jitter Analysis Software for Infiniium Oscilloscopes (continued)

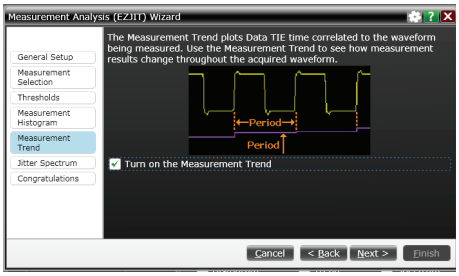
	EZJIT	EZJIT Plus	EZJIT Complete
Model Number **Option Number**	**E2681A** **002**	**N5400A** **004**	**N8823A** **070**
Advanced Jitter Views			
Real-time Eye	Requires Serial Data Analysis, option -003	Requires Serial Data Analysis, option -003	Requires Serial Data Analysis, option -003
BER bathtub		■	■
DDJ vs bit		■	■
Composite histograms		■	■
TJ histogram		■	■
DDJ histogram		■	■
RJ/PJ histogram		■	■
RJ/PJ spectrum		■	■
Vertical Noise Analysis			
Vertical noise decomposition			■
Total interference estimation			■
Separate analysis of one and zero levels			■
Advanced noise views			■

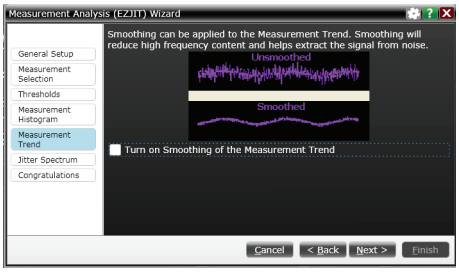
Jitter Analysis Made Easy











A wizard in the EZJIT jitter analysis software helps you quickly set up the Infiniium oscilloscopes and begin taking measurements. With time-correlated jitter trend and signal waveform displays, the relationships between jitter and signal conditions are more clearly visible. Intuitive displays and clear labeling of information make it easy to comprehend measurement results.

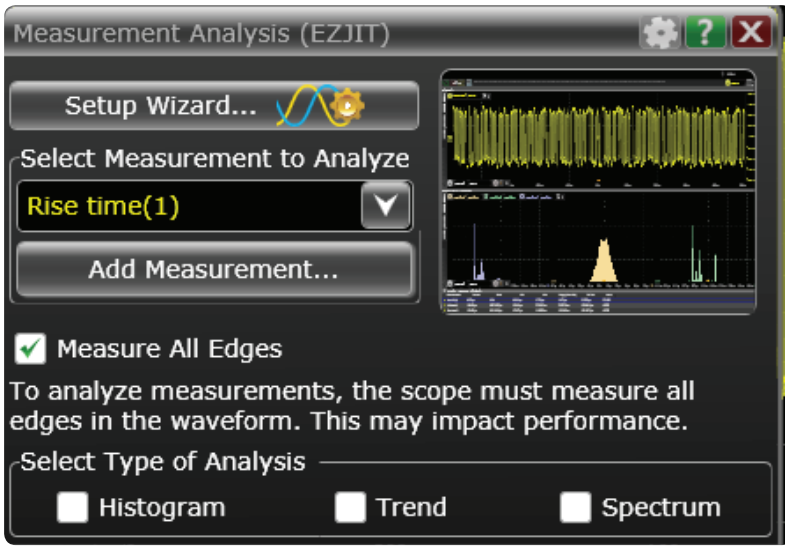


Figure 2. The setup wizard prompts you to select measurement thresholds, histogram, jitter trend, and/or spectrum displays.

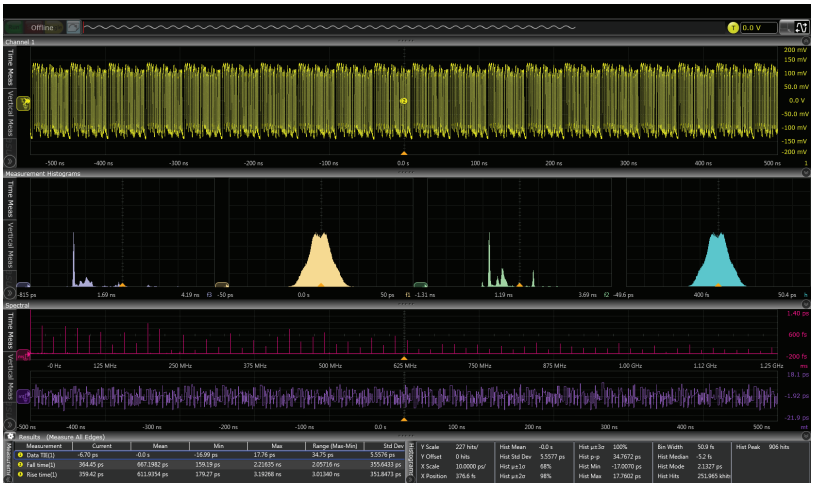


Figure 3. EZJIT provides analysis capability that is unmatched. Look at spectrum, histograms, and trends across multiple displays.

Extensive Parametric Analysis

EZJIT jitter analysis software can analyze the time variability of any of the following fundamental parametric measurements:

Single-source

- Period
- Frequency
- Positive pulse width
- Negative pulse width
- Duty cycle
- Rise time
- Fall time

Dual-source

- Setup time
- Hold time
- Phase

Clock

- Time-interval error (TIE)
- N - Period Jitter
- Period to Period Jitter
- Pos width to Pos width jitter
- Neg width to Neg width jitter
- Cycle-to-cycle duty cycle

Data

- Time interval error (TIE)
- Data rate
- Unit interval
- n - UI jitter
- UI - UI jitter
- Clock Recovery Rate

Each measurement can then be broken down further by looking at its trend or histogram.

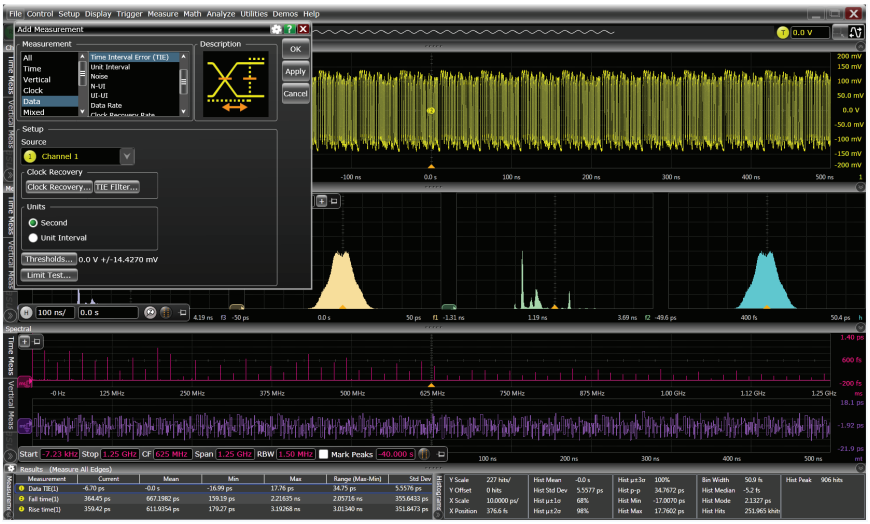


Figure 4. Extensive parametric analysis provides insight into data jitter components.

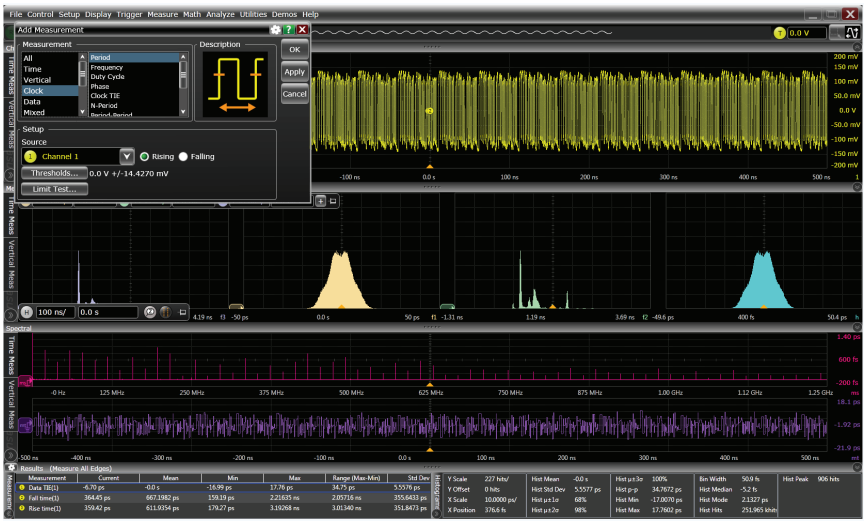


Figure 5. Clock jitter measurements provides insight into clock jitter components.

Real-Time Trend, Histogram, and Spectrum Displays

Measurement data can be viewed as a trend display (Figure 6), showing a time plot of the measurement time-correlated with the signal waveform data. This makes it easy to understand relationships between jitter and signal conditions, such as intersymbol interference (ISI).

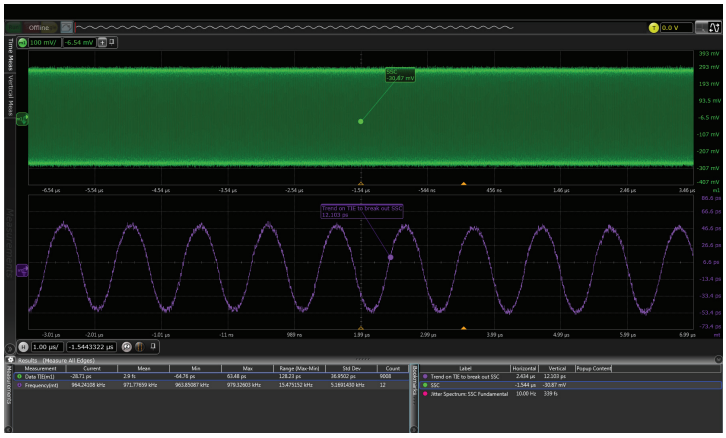


Figure 6. A trend display, showing a time plot of the measurement time-correlated with the signal waveform data, makes it easy to understand relationships between jitter and signal conditions.

The histogram display (Figure 7) plots the relative occurrence of values for the measured parameter. The histogram provides insight into the statistical nature of the jitter.

For example, the histogram shown in Figure 7 appears as two gaussian distributions. The peak-to-peak jitter between the gaussians indicates significant deterministic jitter in the signal, while the gaussians show the spread of random jitter.

The spectrum display (Figure 8) shows the spectral content of the jitter. The spectrum display can be useful for identifying sources of jitter by their frequency components. For example, if you suspect a switching power supply with a switching frequency of 33-KHz is injecting jitter, you can test your theory by examining the jitter spectrum for a peak at 33-KHz.

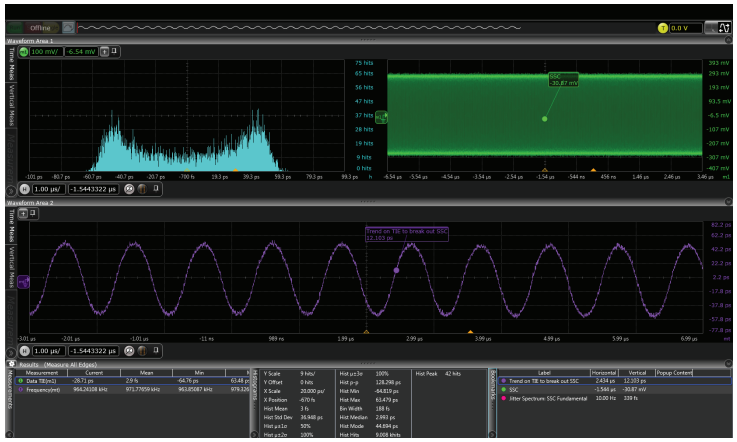


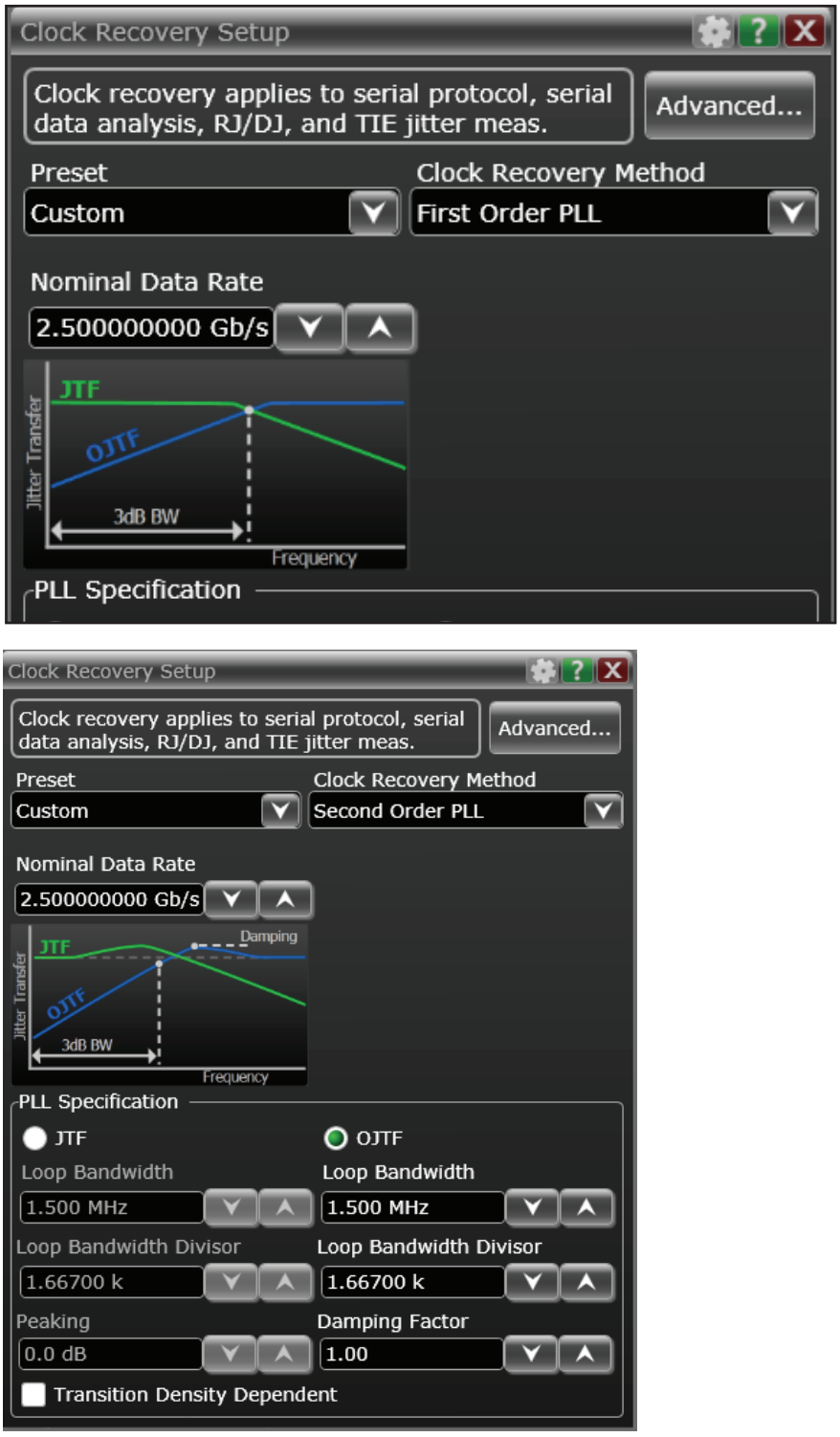
Figure 7. A histogram display plots the relative occurrence of values for the measured parameter, providing insight into the statistical nature of the jitter.

Figure 8. A spectrum display shows the spectral content of the jitter, useful for identifying sources of jitter by their frequency components.

Flexible Clock Recovery

You can choose constant-frequency or phase-locked loop (PLL) clock recovery as well as use an explicit clock on another input channel to time the data transition. With PLL clock recovery, the data rate and loop bandwidth are adjustable.

Many standards allow the use of spread-spectrum clocking to avoid concentrating EMI and RFI at specific frequencies. Spread-spectrum clocking is simply FM modulation of the clock frequency, usually at some frequency well below the clock frequency. The bandwidth of the PLL in the receiver hardware allows it to track the slow change in the clock frequency while allowing faster changes to be measured.



Figures 9-10. You can choose constant-frequency or phase-locked loop (PLL) clock recovery. With PLL clock recovery, the data rate, loop bandwidth and damping factor are adjustable.

Deep Memory Captures Low-Frequency Jitter

Deep memory is especially valuable for jitter analysis. The optional 2 Gpts memory on the Keysight 90000 X-Series and Z-Series is helpful in measuring low frequency jitter. At a sample rate of 80 GSa/s and incoming data rate of 2.5 Gb/s, 2 Gpts allows you to capture jitter frequency components down to 40Hz. Comparably in the 90000A, 9000 and S-Series, the 20 GSa/s sample rate and optional 1 Gpts memory allows you to capture jitter frequency components as low as 40 Hz. In some cases, measuring low- frequency jitter is not required; for example, the clock recovery PLL in most serial data receivers can reject jitter very effectively at moderately low frequencies. But sometimes an event occurring at a low repetition rate can cause bursts of jitter or noise with higher frequencies that the PLLcannot reject.

An example is shown in Figure 11. The upper yellow trace is a serial data signal. The middle green trace shows an uncorrelated aggressor signal that is causing short-term bursts of jitter in the data signal. The lower purple trace, showing a jitter trend signal derived from the serial data signal, plots the timing of each edge in the data stream compared to the “ideal” recovered clock. You can see a burst of timing errors that coincides with each transition in the middle green signal.

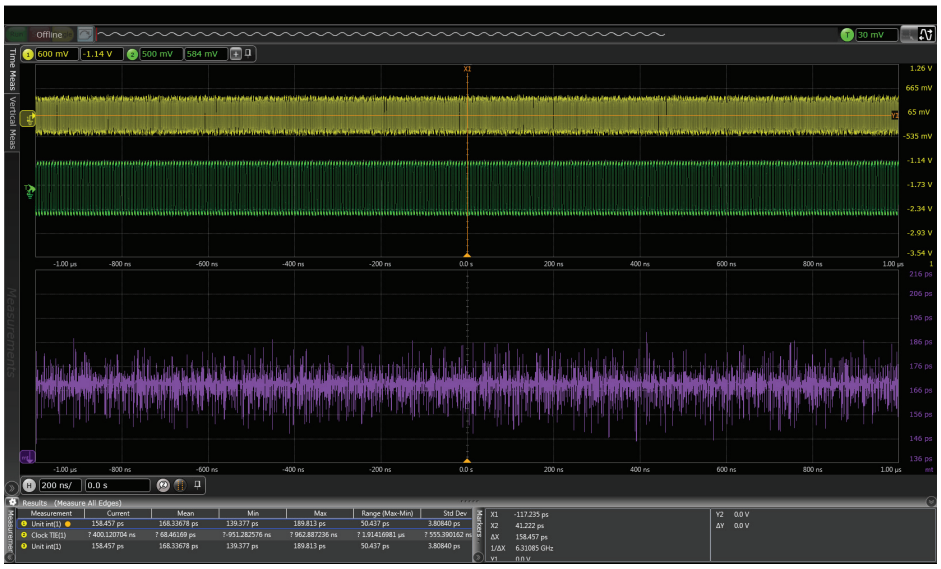


Figure 11. The clock recovery PLL in most serial data receivers can reject jitter at low frequencies. However, sometimes events occurring at low frequencies (middle green trace) can cause bursts of jitter that contain higher frequencies that the PLL cannot reject (lower purple trace).

Further Jitter Analysis Support

For additional jitter analysis features, including Rj/Dj separation, bathtub curve generation, and ABUJ extraction, Keysight offers the N5400A EZJIT Plus jitter analysis software.

For even deeper insight, apply the same deep analysis and component separation to the vertical noise affecting your signal using Keysight's EZJIT Complete software.

Ordering Information

License type		Infiniium Z-Series	Infiniium S-Series	Infiniium 90000A and X-Series	Infiniium 9000 Series
Fixed	Factory-installed	E2681A-1FP	E2681B-1FP	Option 002	
	User-installed			E2681A-1NL	
Floating	Transportable	E2681A-1TP			
	Server-based	N5435A-002			
Infiniium Offline	DSA package	Part of the N8900A-002 DSA package			

To order the EZJIT jitter analysis software for an existing oscilloscope, please order the following:

Model number	Description
E2681A	After-purchase EZJIT jitter analysis software for Infiniium oscilloscopes
N5400A	After-purchase EZJIT Plus jitter analysis software for Infiniium oscilloscopes
N5401A	After-purchase EZJIT Plus upgrade from existing EZJIT installation for oscilloscopes
N8823A	After-purchase EZJIT Complete jitter analysis software for Infiniium oscilloscopes
N8813A	After-purchase EZJIT Complete upgrade from existing EZJIT Plus installation for oscilloscopes

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