

# Keysight Technologies

## EZJIT Jitter Analysis Software for Infiniium Series Oscilloscopes

### Data Sheet

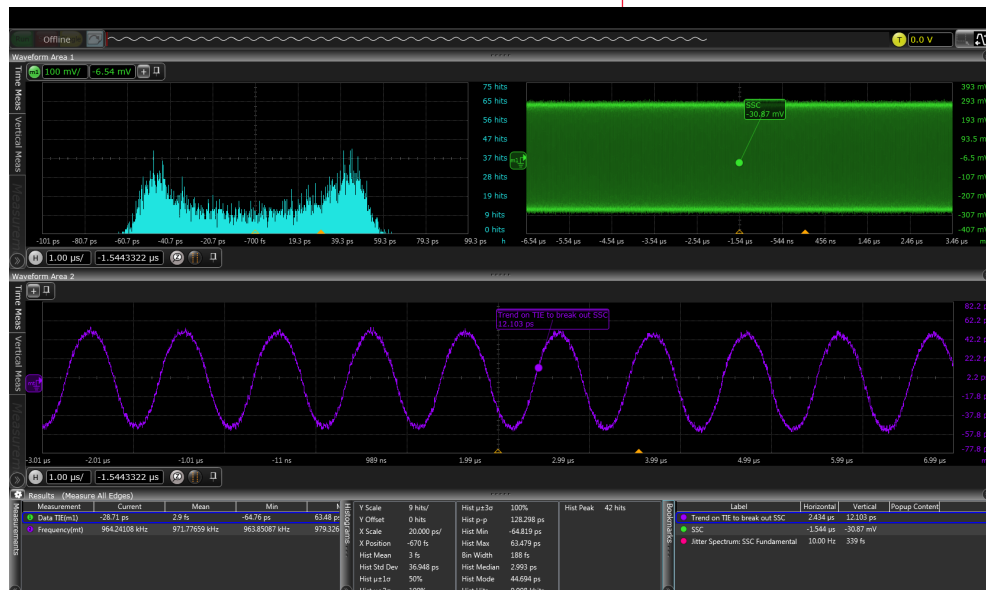


Figure 1. The software provides multiple views of jitter, including histogram, trend, and spectrum, for maximum insight

## 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.

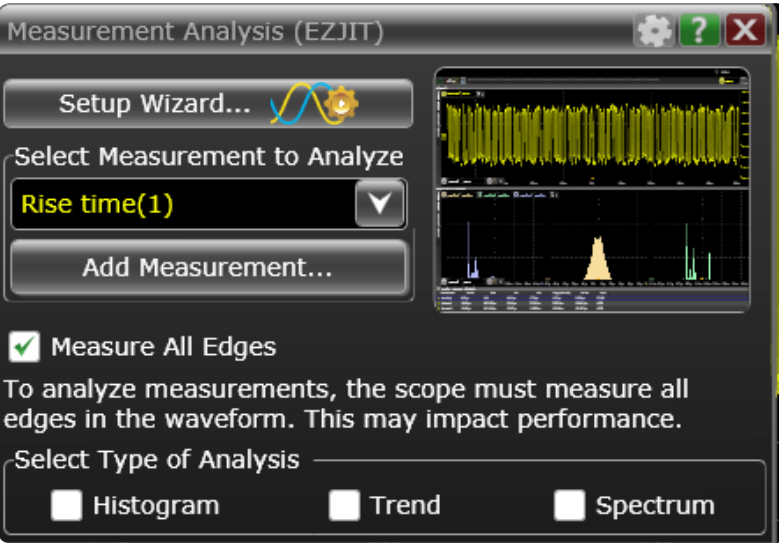
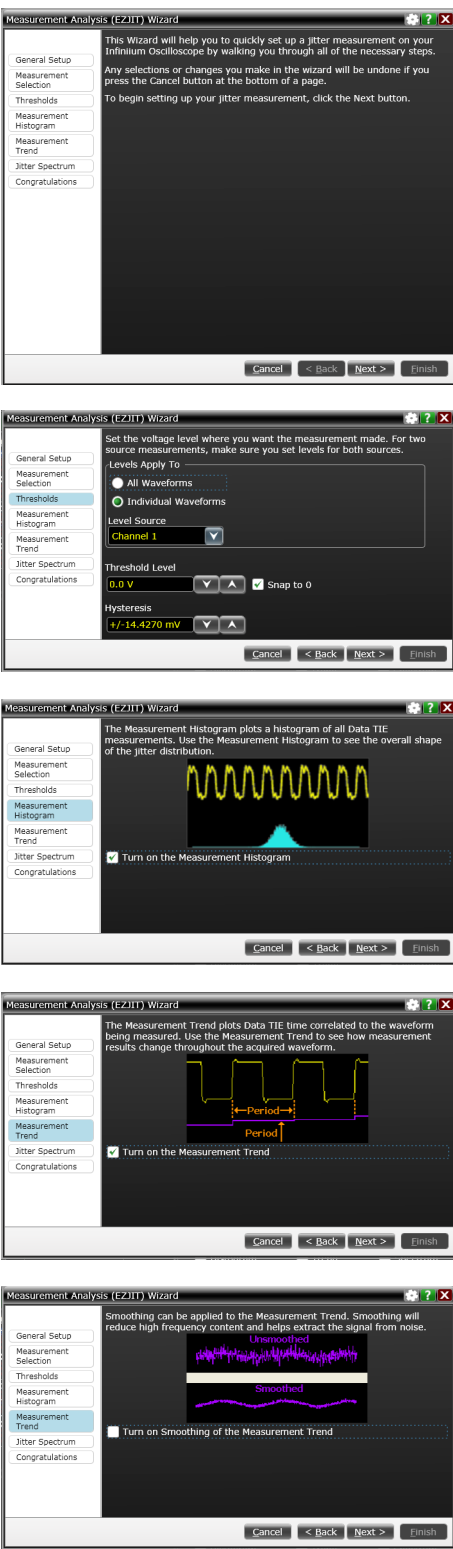


Figure 2. The setup wizard prompts you to select measurement thresholds, histogram, jitter trend, and/or spectrum displays.

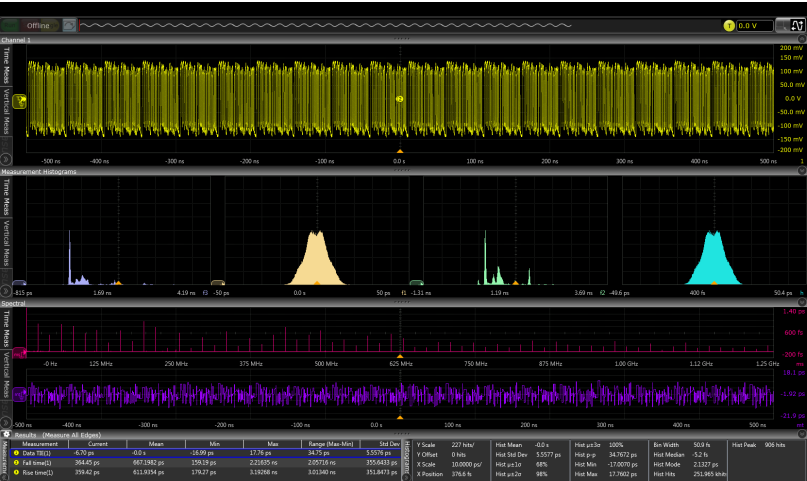


Figure 3. EZJIT provides analysis capability that is unmatched. Look at spectrum, histograms, and trends across multiple displays.

## 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.

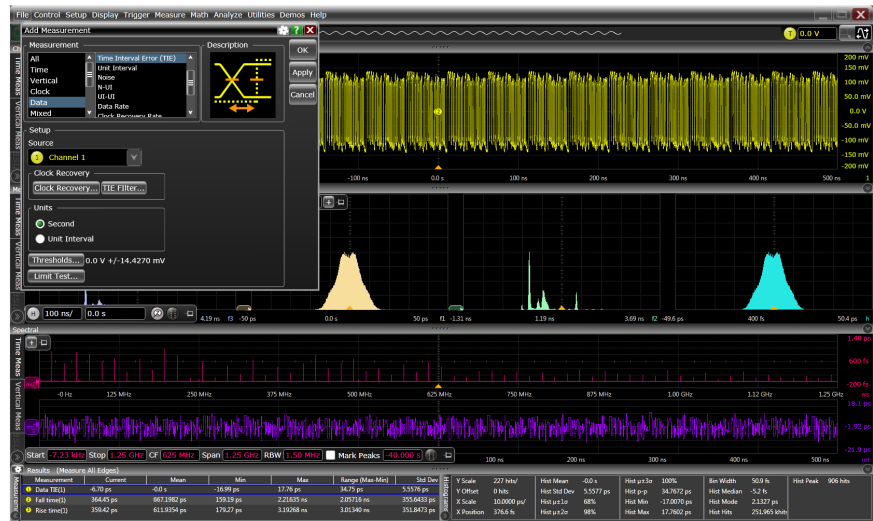


Figure 4. Extensive parametric analysis provides insight into data jitter components.

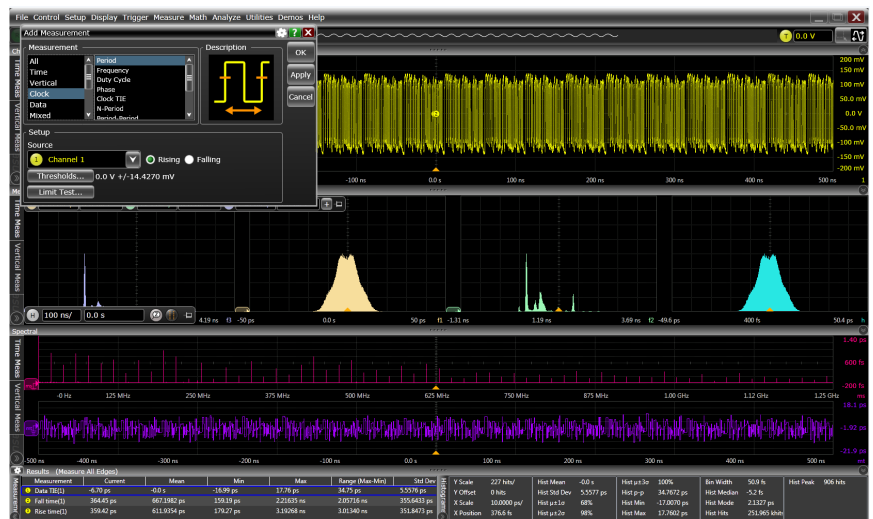


Figure 5. Clock jitter measurements provides insight into clock jitter components.

## 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).

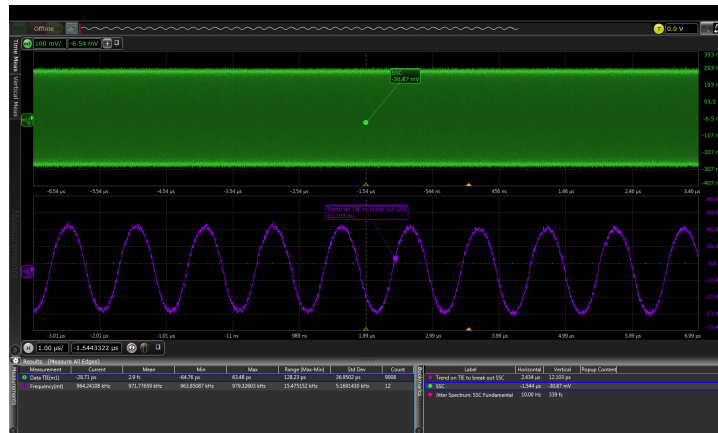


Figure 6. A trend display, showing a time plot of the measurement time-correlated with the signal waveform data, makes it easy to understand relationships between jitter and signal conditions.

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 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.

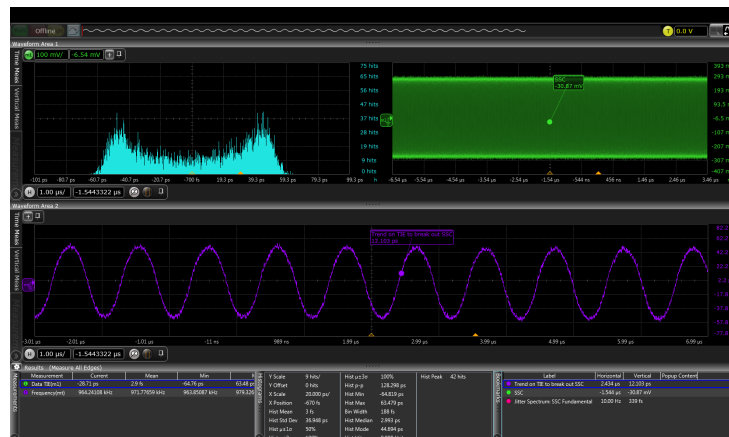


Figure 7. A histogram display plots the relative occurrence of values for the measured parameter, providing insight into the statistical nature of the jitter.

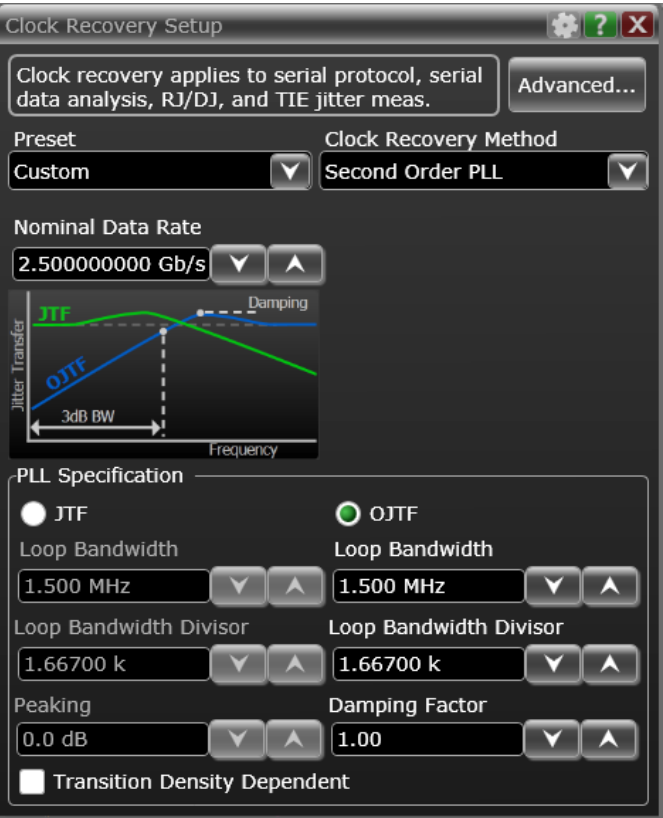
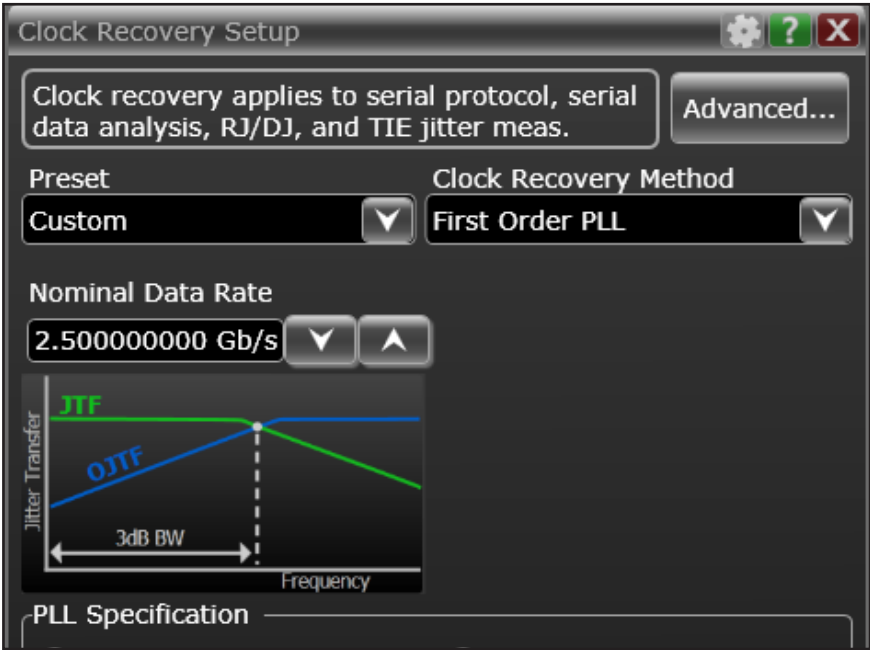


Figure 8. A spectrum display shows the spectral content of the jitter, useful for identifying sources of jitter by their frequency components.

## 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 PLL cannot 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.

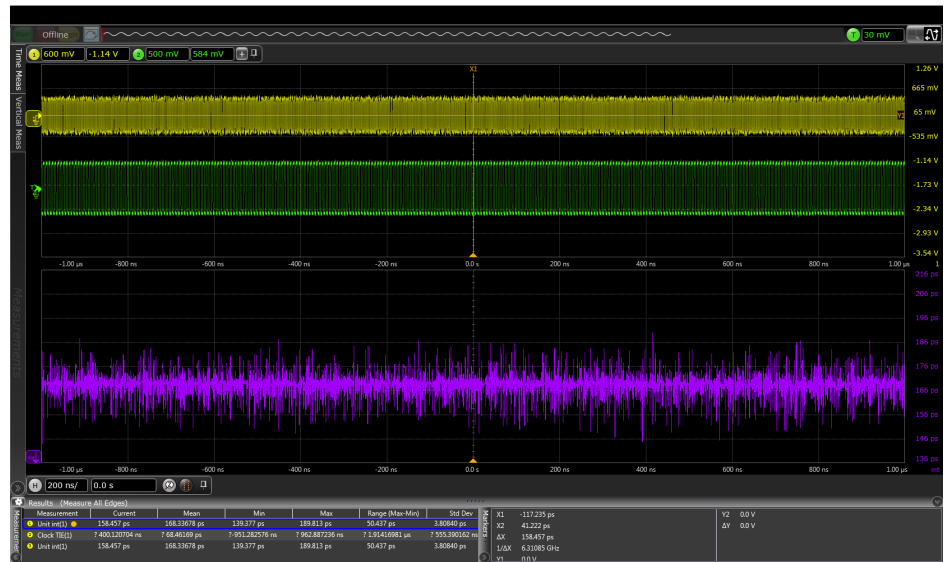


Figure 11. The clock recovery PLL in most serial data receivers can reject jitter at low frequencies. However, sometimes events occurring at low frequencies (middle green trace) can cause bursts of jitter that contain higher frequencies that the PLL cannot reject (lower purple trace).

## Further Jitter Analysis Support

For additional jitter analysis features, including Rj/Dj separation, bathtub curve generation, and ABUE 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



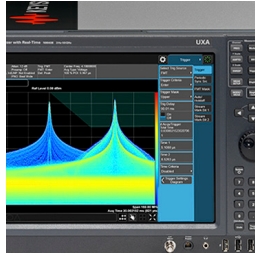
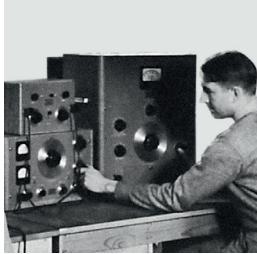
# Keysight Oscilloscopes

Multiple form factors from 20 MHz to > 90 GHz | Industry leading specs | Powerful applications

## Evolving Since 1939

Our unique combination of hardware, software, services, and people can help you reach your next breakthrough. We are unlocking the future of technology.

From Hewlett-Packard to Agilent to Keysight.



**myKeysight**

**myKeysight**

[www.keysight.com/find/mykeysight](http://www.keysight.com/find/mykeysight)

A personalized view into the information most relevant to you.

[www.keysight.com/find/emt\\_product\\_registration](http://www.keysight.com/find/emt_product_registration)

Register your products to get up-to-date product information and find warranty information.

**KEYSIGHT SERVICES**  
Accelerate Technology Adoption.  
Lower costs.

**Keysight Services**

[www.keysight.com/find/service](http://www.keysight.com/find/service)

Keysight Services can help from acquisition to renewal across your instrument's lifecycle. Our comprehensive service offerings—one-stop calibration, repair, asset management, technology refresh, consulting, training and more—helps you improve product quality and lower costs.



**Keysight Assurance Plans**

[www.keysight.com/find/AssurancePlans](http://www.keysight.com/find/AssurancePlans)

Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

**Keysight Channel Partners**

[www.keysight.com/find/channelpartners](http://www.keysight.com/find/channelpartners)

Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

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](http://www.keysight.com/find/contactus)

### Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

### Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 11 2626
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

### Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:

[www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)  
(BP-9-7-17)

**DEKRA Certified**  
ISO 9001 Quality Management System

[www.keysight.com/go/quality](http://www.keysight.com/go/quality)

Keysight Technologies, Inc.  
DEKRA Certified ISO 9001:2015  
Quality Management System



This information is subject to change without notice.  
© Keysight Technologies, 2017  
Published in USA, December 1, 2017  
5991-1315EN  
[www.keysight.com](http://www.keysight.com)