

# D9010JITA/D9020JITA

EZJIT Complete Jitter and Vertical Noise Analysis and Phase Noise Analysis for Infiniium Oscilloscopes

## Introduction

The D9010JITA and D9020JITA software packages for Infiniium oscilloscopes offer advanced statistical analysis of high-speed digital interfaces in the vertical (voltage) and horizontal (time) domains, as well as phase noise analysis. The result: the industry's most complete jitter and noise analysis software for real-time oscilloscopes.



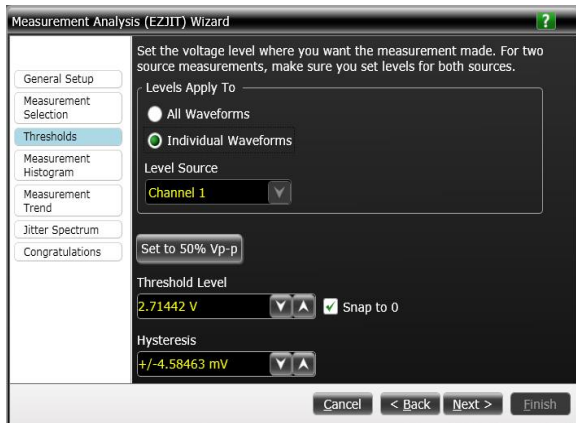
# Table of Contents

Product Overview .....	3
Automated Setup Wizards .....	3
Analysis Measurements and Charts .....	4
Available Measurements .....	9
Ordering information and related literature .....	10

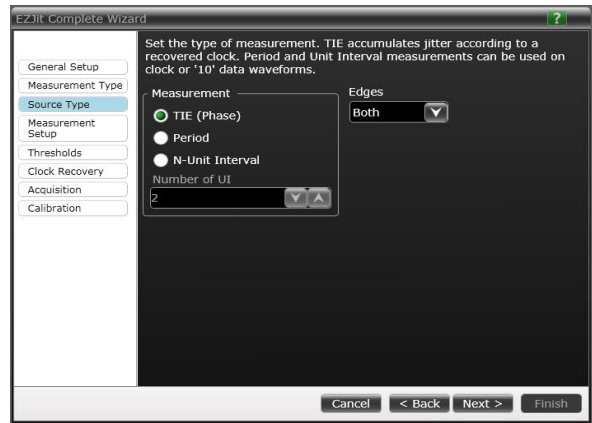
# Product Overview

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 Complete software for Infiniium oscilloscopes provides the advanced decomposition, analysis, and views of jitter necessary for fast and accurate insight into your signal. This EZJIT Complete package provides basic jitter analysis such as histograms and jitter trends, advanced level clock and data measurements such as time-interval error and UI measurements, and expert-level analysis with complete jitter separation in timing and noise in over ten categories. Finally, EZJIT Complete will allow you to make phase noise measurements on clock signals. Another large measurement benefit of EZJIT Complete is that the oscilloscope will make applicable jitter measurements on all cycles of the waveform, including those not in the display window, instead of just one cycle.

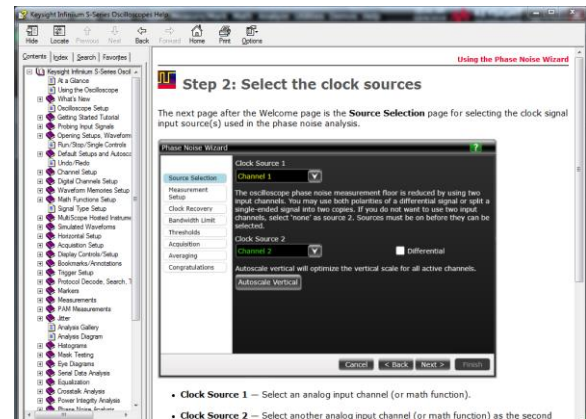
## Automated Setup Wizards



**Figure 1.** The measurement analysis wizard provides you instructions to help make the best decision of measurement options for the type of jitter



**Figure 2.** The EZJIT Complete wizard simplifies the process of configuring RJ and DJ analysis by stepping you through setup menus and choosing appropriate settings.



**Figure 4.** Infiniium built-in help guides walk you through automatic wizards, as well as manual step-by-step setup of all jitter and phase noise

# Analysis Measurements and Charts

## Jitter basics

Starting with the basics, EZJIT Complete lets you quickly and easily view jitter in the form of a TIE histogram, trend, and spectrum. This can be accomplished with just a few clicks in the wizard.



Figure 5. Results of the measurement setup wizard show the jitter histogram, trend, and spectrum.

# Timing jitter

EZJIT Complete also provides numerous charts to determine the correct settings in your jitter separation. While the wizard provides a quick way to separate jitter, there are times when parameters need to be changed to make the correct answer. The analysis charts provide detailed information needed to properly separate the jitter of your design. EZJIT Complete includes the following jitter charts to help you in your analysis:

- Composite TJ histogram
- Composite DDJ histogram
- TJ histogram
- RJ/PJ histogram
- DDJ histogram
- Jitter BER bathtub
- RJ/PJ threshold
- DDJ vs. bit
- RJ PJ spectrum



Figure 6. An adjustable grid of up to nine analysis charts gives you complete flexibility in the data you view.

## Vertical noise

In addition to providing timing jitter separation, EZJIT Complete offers a comprehensive suite of vertical noise separation charts. These include:

- Noise BER bathtub
- Composite TI histogram
- TI histogram
- DDI histogram
- RN PI histogram
- RN PI threshold
- RN PI spectrum
- ISI vs. bit



Figure 7. An adjustable grid of up to fifteen analysis charts gives you complete flexibility in the data you view.

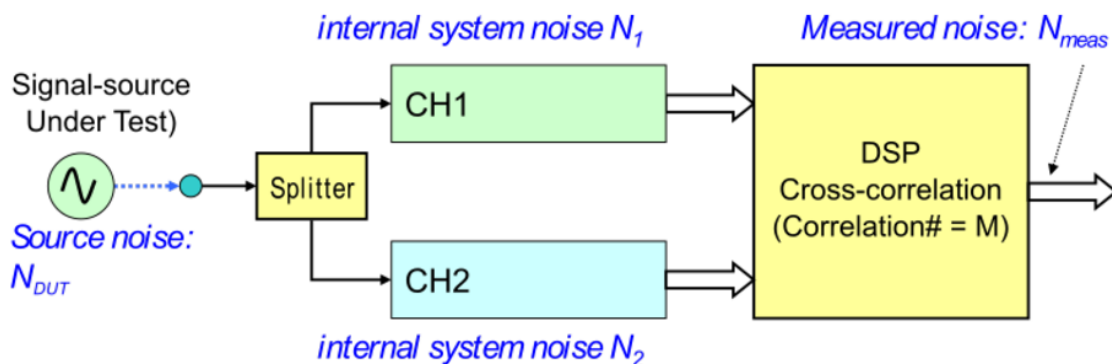
## Phase noise

Available exclusively with D90x0JITA, Keysight is the first to offer a dedicated phase noise measurement application on Infiniium oscilloscopes. Phase noise is related to clock TIE and is generally used to measure the change in an oscillator's frequency, either in the long term or short term. When you look at the spectrum of an imperfect clock or oscillator, there will be energy radiated slightly off the nominal clock frequency (or carrier), called sidebands. Phase noise is generally measured as a ratio of the spectral power in the carrier vs. the phase noise in the sidebands, normalized to 1 Hz of bandwidth.

### Phase Noise Analysis Provides

- Plotting Single Side Band (SSB) phase noise as log frequency vs dBc/Hz
- Measuring phase noise using the oscilloscope you already own
- Measuring square wave clocks
- Using 2 channels and cross-correlation to reduce broadband measurement noise.
- Measure phase noise of differential clocks with reduced broadband measurement noise.
- Measure phase noise of spread-spectrum modulated clocks (with optional SSC removal).
- Reduce broadband noise (RJ) in cross-correlated time interval error (TIE) measurements.
- Measure integrated jitter between two frequencies on phase noise plot.
- True phase/amplitude discrimination to wide offsets
- Measure phase noise in the circuit with InfiniiMax probes.

#### Two-Channel Cross-Correlation Technique:



$$N_{meas} = N_{DUT} + (N_1 + N_2) / \sqrt{M} \quad \text{Assuming } N_1 \text{ and } N_2 \text{ are uncorrelated.}$$

Figure 8. Using 2 channels and cross-correlation to reduce broadband measurement noise.

Analysis results are presented in a log frequency plot, where the amplitude units are dBc/Hz (decibels relative to the carrier power, normalized to a 1 Hz bandwidth). The x-axis is the frequency offset from the nominal signal, or “carrier” frequency. Resulting spurs can be normalized, omitted, or represented separately to better show their energy levels.



Figure 9. Using default settings, spurs in the spectrum are normalized into the plot.

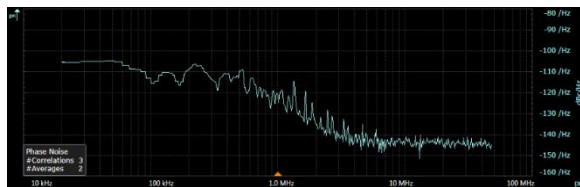


Figure 10. Spurs omitted

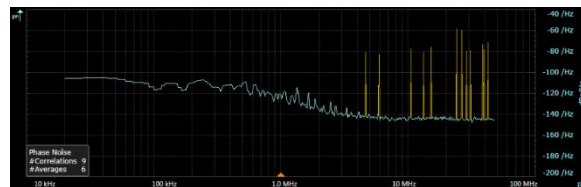


Figure 11. Spurs in power



# Available Measurements

## Base timing measurements (standard, D90x0JITA not required)

Pulse width (+/-)	Duty Cycle	Rise/Fall time	Setup/Hold time	Frequency/Period
Phase				

## EZJIT clock measurements

Clock time-interval error (TIE)	Period-period jitter	Pulse width jitter	Duty cycle jitter	
---------------------------------	----------------------	--------------------	-------------------	--

## EZJIT data measurements

Data TIE	Noise	Unit interval	N-UI	UI-UI
Data rate	Pattern length	Clock recovery rate	De-emphasis	

## Jitter separation measurements

Total jitter (TJ)	Random jitter (RJ)	Periodic jitter $\delta$ - $\delta$	Periodic jitter RMS	Deterministic jitter (DJ) delta-delta
Data-dependent jitter	Duty cycle distortion	Intersymbol interference	Scope random jitter	Data-dependent pulse width shrinkage
Even/odd jitter (F/2)				

## Vertical noise measurements

Total interference	Deterministic interference	Random noise	Scope random noise	Inter-symbol interference
Bounded uncorrelated interference	Periodic interference	Aperiodic bounded uncorrelated interference		

# Ordering information and related literature

## Required hardware

Model	Compatibility
D9010JITA	Infiniium 9000, S-Series, EXR-Series, MXR-Series
D9020JITA	Infiniium 90000, V-Series, Z-Series, UXR-Series

## Flexible software licenses and KeysightCare Software Support Subscriptions

Keysight offers a variety of flexible licensing options to fit your needs and budget. Choose your license term and license type.

### License terms

**Perpetual** – Perpetual licenses can be used indefinitely.

**Subscription** – Subscription licenses can be used through the term of the license only.

### License types

**Node-locked** – License can be used on one specified instrument/computer.

**Transportable** – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (internet connection required).

**USB Portable** – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number SW1000-D10).

**Floating (single site)** – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.

## KeysightCare Software Support Subscriptions

Perpetual licenses are sold with a 12 (default) and up to 60-month software support subscription with a user-selected start and end date. Support subscriptions can be renewed for a fee after that.

Subscription licenses include a software support subscription through the term of the license, from 3 to 36 months, with a user-selected start date.

## Selecting your license

Step 1. Choose your software product (e.g. D9020ASIA)

Step 2. Choose your license term: perpetual or subscription.

Step 3. Choose your license type: node-locked, transportable, USB portable, or floating.

Step 4: Depending on the license term, choose your support subscription duration.

## Example

If you selected:	Your quote will look like this:	
D9020ASIA Node-locked	Part Number D9020ASIA	Description Advanced Signal Integrity Software (EQ, InfiniiSimAdv, Crosstalk)
Perpetual license	SW1000-LIC-01 SW1000-SUP-01	Node-locked perpetual license Node-locked KeysightCare software support subscription with user-selected start and end dates
D9020ASIA Transportable Subscription 6-month license	Part Number D9020ASIA SW1000-SUB-01	Description Advanced Signal Integrity Software (EQ, InfiniiSimAdv, Crosstalk) 6-months, transportable subscription license

To configure your product and request a quote:

<http://www.keysight.com/find/software>

Contact your Keysight representative or authorized partner for more information or to place an order:

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



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at [www.keysight.com](http://www.keysight.com).

This information is subject to change without notice. © Keysight Technologies, 2018 – 2023, Published in USA, October 6, 2023, 5992-3376EN