

# Jitter and Eye Diagram Analysis Package

## For Tektronix TDS 7000 Series Oscilloscopes

### Features and Benefits

- Guzik Hardware Accelerator Card integrated with Tektronix oscilloscope provides fast signal analysis and data processing
- Measurement accuracy down to 1 ps RMS (with TDS7404 oscilloscope), which does not depend from oscilloscope trigger jitter
- Measurement of all main timing parameters of signals: period, pulse width, rise/fall times, time interval error (TIE), skew/setup/hold times
- Representation of all measured parameters in various graphical forms (histogram, track, trend, frequency domain) and in form of accumulated statistical results
- Eye diagram form of signal representation with powerful hardware zoom feature
- Internal clock recovery based on digital PLL with programmable bandwidth
- Capability of measurements at any distance and duration from user-defined reference event
- Jitter measurement of single input signal or channel-to-channel
- All measurements can be done using one acquisition or multiple acquisitions
- Comprehensive autoset feature simplifies product configuration
- Convenient and intuitive Windows-based User Interface optimized for touch-screen applications

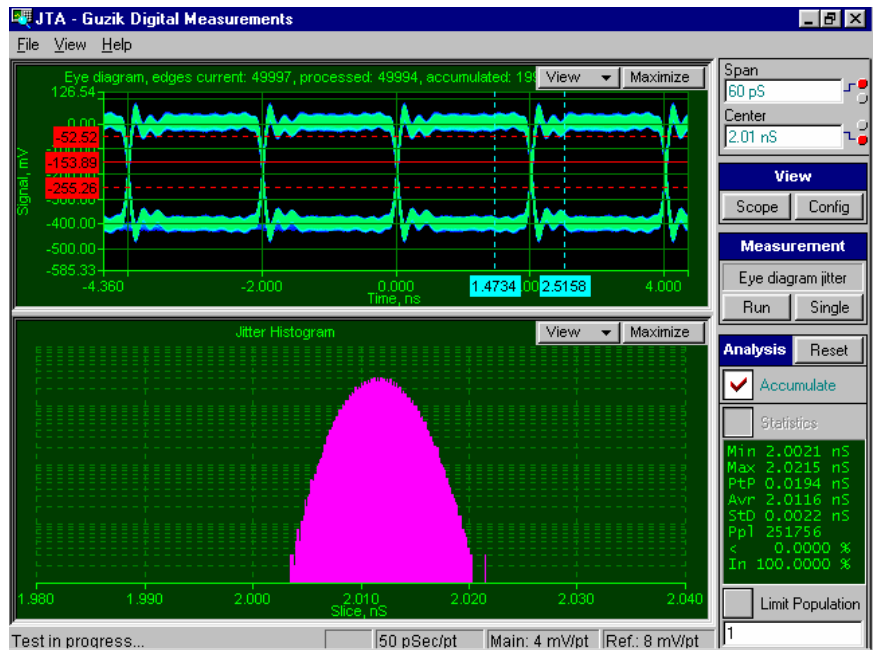


Fig. 1. Jitter Histogram of Selected Part of Eye Diagram  
(2.2ps RMS Jitter Measured)

### Applications

- **Digital circuits design:**
  - Measurement of timing margins
  - Characterization of clock distribution circuits
  - PLL-synthesized (including spread-spectrum modulated) clocks testing
  - Jitter sources investigation
- **Telecommunications:**
  - Characterization of both electrical and optical encoded data streams
  - Analysis of phase and frequency modulation (PM, FM) and keying (PSK, FSK, MSK)

### Maximum Performance

The Jitter and Eye Diagram Analysis package from Guzik Technical Enterprises delivers wide range of fast and accurate measurements of different timing parameters on digital oscilloscopes. The package includes the Guzik Hardware Accelerator card and Guzik software environment installed on the Tektronix oscilloscope. The 4 GHz analog bandwidth and 20 GS/s sampling rate of Tektronix TDS7404 oscilloscope combined with sophisticated signal processing algorithms make possible to obtain measurement accuracy down to 1 ps RMS. The unique design and strategic location of Guzik Hardware Accelerator card gives possibility to perform most computation-consuming measurements by hardware, thus delivering high speed of operation.



## Better by Design

The following principles underlie the Jitter and Eye Diagram Analysis package:

- All measurements are based on time positions of signal edges. Sophisticated and precise algorithms are used for edge detection
- All valid edges in the acquisition are included in the measurement
- Possibility to apply any representation of result to any measured parameter
- Possibility to define custom timing parameters to be measured while preserving measurement technique (user-defined measurements)
- Full choice of source signals for measurements
- Preserving accuracy of graphical representation forms when zooming

The following benefits are resulted from the implementation of these principles:

- High precision of measurements including user-defined measurements
- Independence from oscilloscope trigger jitter
- Possibility to obtain all results (including eye diagram and statistic) from one acquisition or accumulate them from multiple acquisitions
- Variety of possible representation forms for each measured parameter
- Flexibility in choosing external or internal reference signals in relative measurements (for example external clock or clock from internal clock recovery with adjustable bandwidth)
- Hardware zoom feature preserves the quality of the eye diagram at any zoom ratio

## Easy to Use

The Jitter and Eye Diagram Analysis package provides intuitive Windows-based GUI optimized for oscilloscope touch-screen. For added convenience it supports second external monitor and front-panel oscilloscope knobs. The package has comprehensive autoset feature for automatic adjustment of different measurement parameters. It significantly simplifies the product configuration and minimizes the learning time.

## Digital Oscilloscopes Supported

Oscilloscope Model	Platform	
	Guzik Hardware Accelerator	Oscilloscope Sampling Rate
Tektronix TDS7104	?	10GS/s
Tektronix TDS7154	?	20GS/s
Tektronix TDS7254	?	20GS/s
Tektronix TDS7404	?	20GS/s

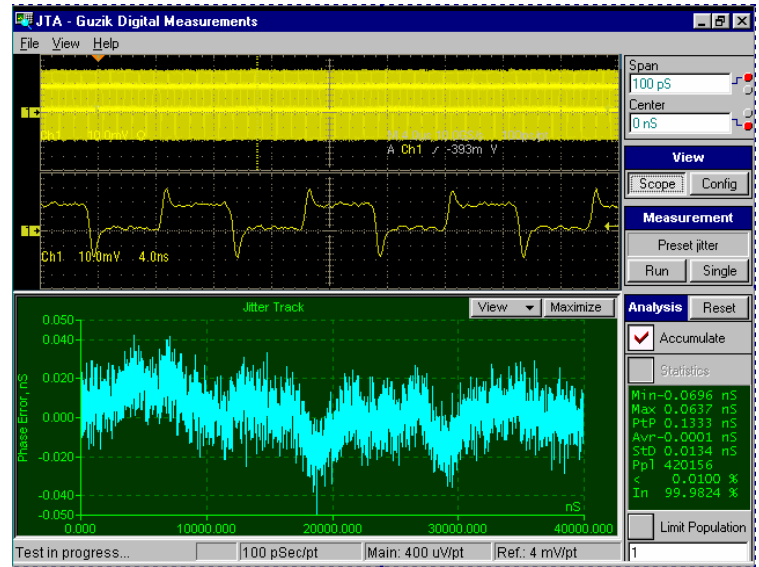


Fig. 2. Jitter Track of TIE

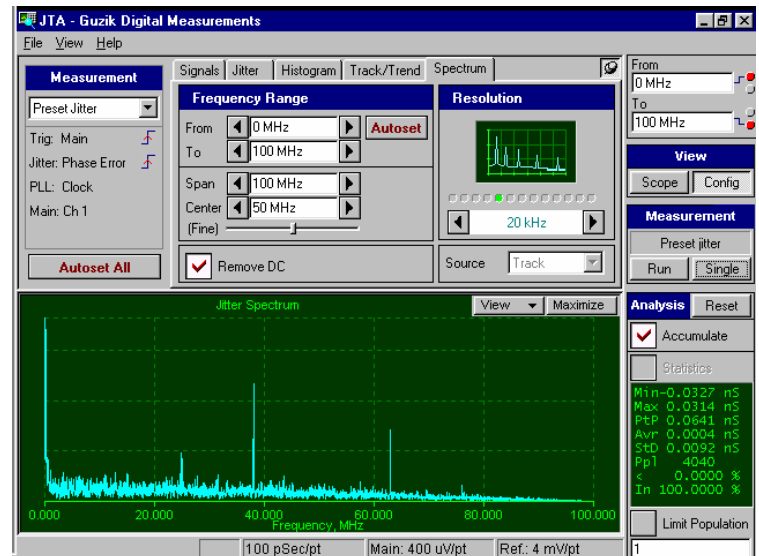


Fig. 3. Spectrum of Jitter Track of TIE



## Specifications

Measured parameters	Period, Pulse width, Rise/fall time, Phase error (Time interval error, TIE), Skew/setup/hold time, Complex user -defined relative time positions (slice mode)
Results representation forms	Eye diagram, Histogram, Track, Trend, Spectrum of Track/Trend, Statistics, Average trace
Accumulation modes	Off (one acquisition), Limited population, Unlimited population
Timing measurement accuracy (at 20 GS/s)	Down to 1 ps RMS, independent from oscilloscope trigger jitter
Interpolated resolution in timing measurements (at 20 GS/s)	500 fs min
Resolution bandwidth in spectral measurements (at 20 GS/s)	1 kHz min
Acquisition length	32M samples* max
Digital clock recovery modes (based on digital PLL)	Clock in – clock out: Synchronized by clock, outputs recovered clock Data in – clock out: Synchronized by data, outputs recovered clock Data in – data out: Synchronized by data, outputs data re-clocked on recovered clock
Digital PLL bandwidth	Programmable (including 0 Hz – ideal reference)
Number of bins in histogram	1024 max
Trigger for eye diagram	Designated edge of main or reference signal
Reference signal in relative measurements	Main or reference scope channel, PLL-recovered main or reference channel (digital clock recovery output)
Available autosets	Edge detectors levels and hysteresis, All time spans for all result representation forms, Digital clock recovery parameters
Processing Speed	Up to 33 MSamples/s (limited by oscilloscope throughput)

\* Limited only by oscilloscope's available record length and current channel configuration

## Contact Information

**Guzik Technical Enterprises**  
**2443 Wyandotte Street,**  
**Mountain View, CA, 04043**  
**Voice: 1 (650) 625-8000**  
**Fax: 1 (650) 625-9325**  
**www.guzik.com**

Copyright © 2002, Guzik Technical Enterprises. All rights reserved. Guzik products are covered by U.S. and foreign patents, issued and pending. Information in this publication superseded that in all previously published material. Specification and price change privileges reserved. Guzik is a registered trademarks of Guzik Technical Enterprises, Tektronix and Tek are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks or registered trademarks of their respective companies.

