

ParBERT 81250 Software and Measurement Suite - Version 5.2



Spectral Decomposition of Jitter



Agilent Technologies

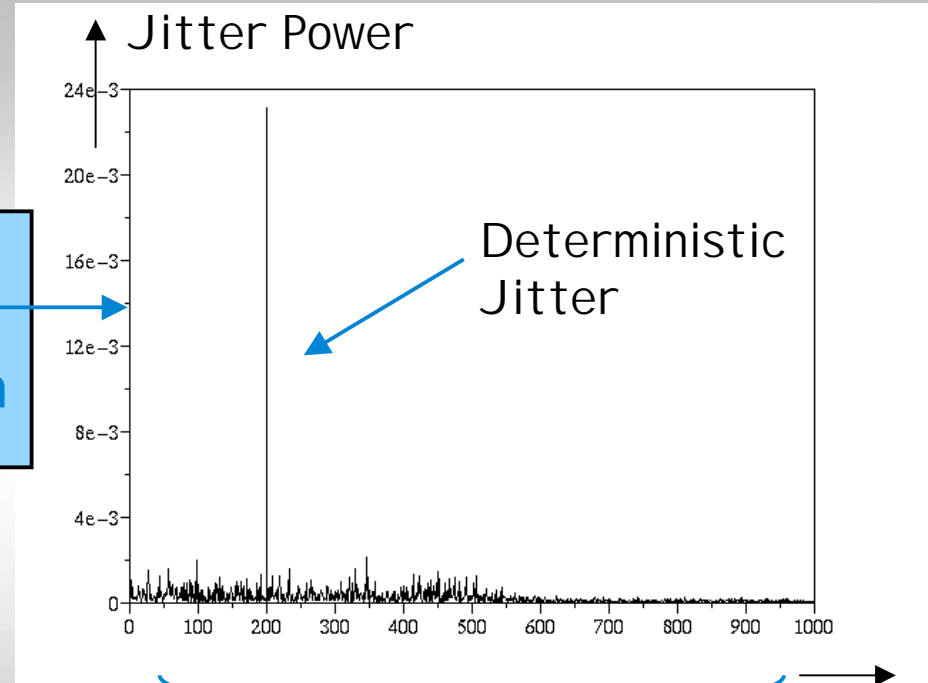
New Methodology for Deterministic Jitter Decomposition

Captured Data

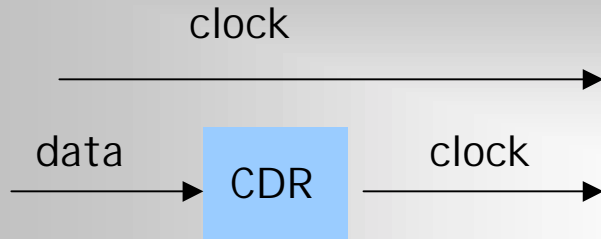
Expected Data

Error Function,
Fourier &
Power Spectrum

Post-Processing



Existing Spectral Jitter Solutions

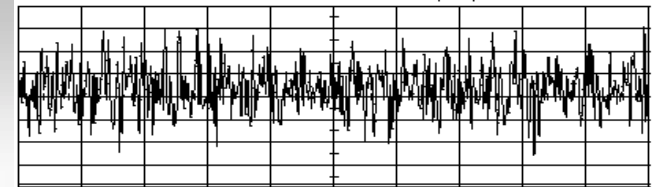


Phase Noise Measurement:

- Clock only, no Data Jitter
- CDR, Bandwidth limited



Spectrum Analyzer



JITTER GENERATION RESULTS
Cutoff Frequency = 50 KHz
35.413E-03 UI p-p
4.207E-03 UI rms

Different to ParBERT



Scope Measurement:

- Histogram
- Software CDR
- Jitter Trend/Spectrum
- Spectrum is without Bandwidth limiting/rating



Scope



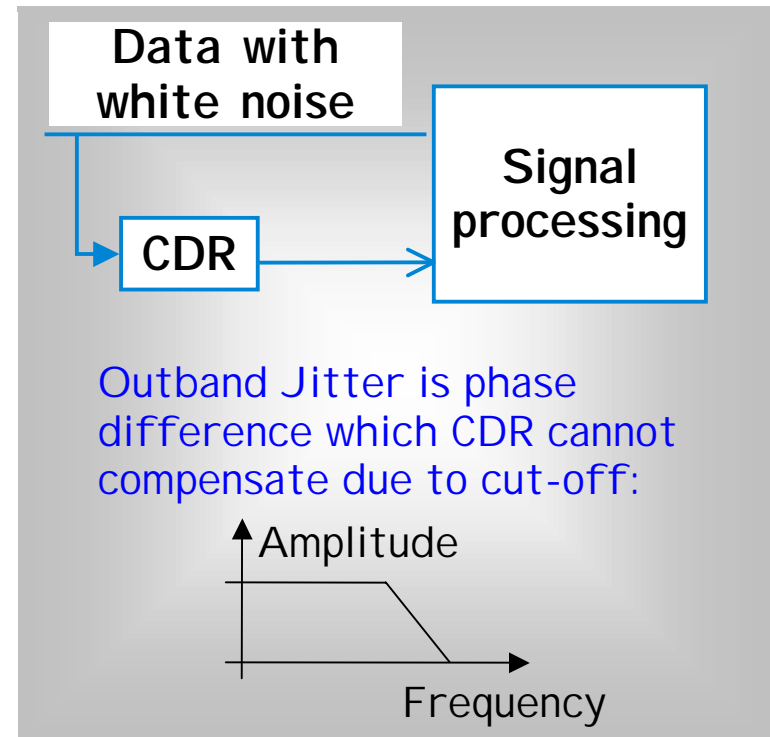
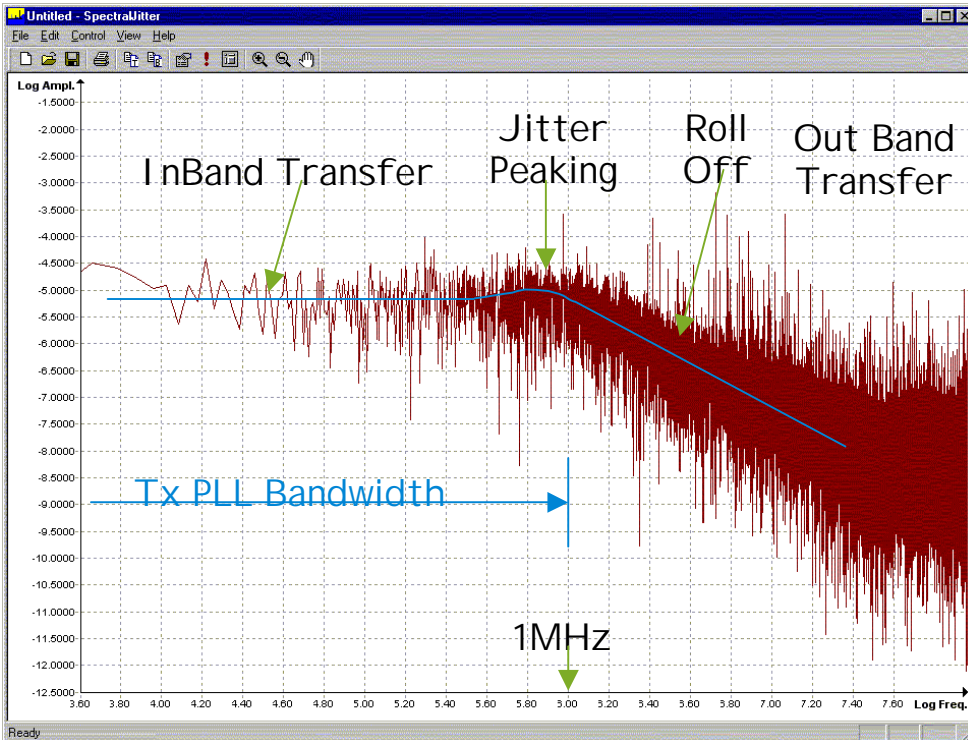
Similar to ParBERT

Spectral decomposition of jitter method can be used for...

- Device characterization
 - Allows inband and outband characterization of circuits and devices incl. PLLs and CDRs
- Design validation and debugging
 - Allows thorough exploration of the various components of deterministic jitter
 - Separates even smallest amounts of periodic jitter from the random jitter floor

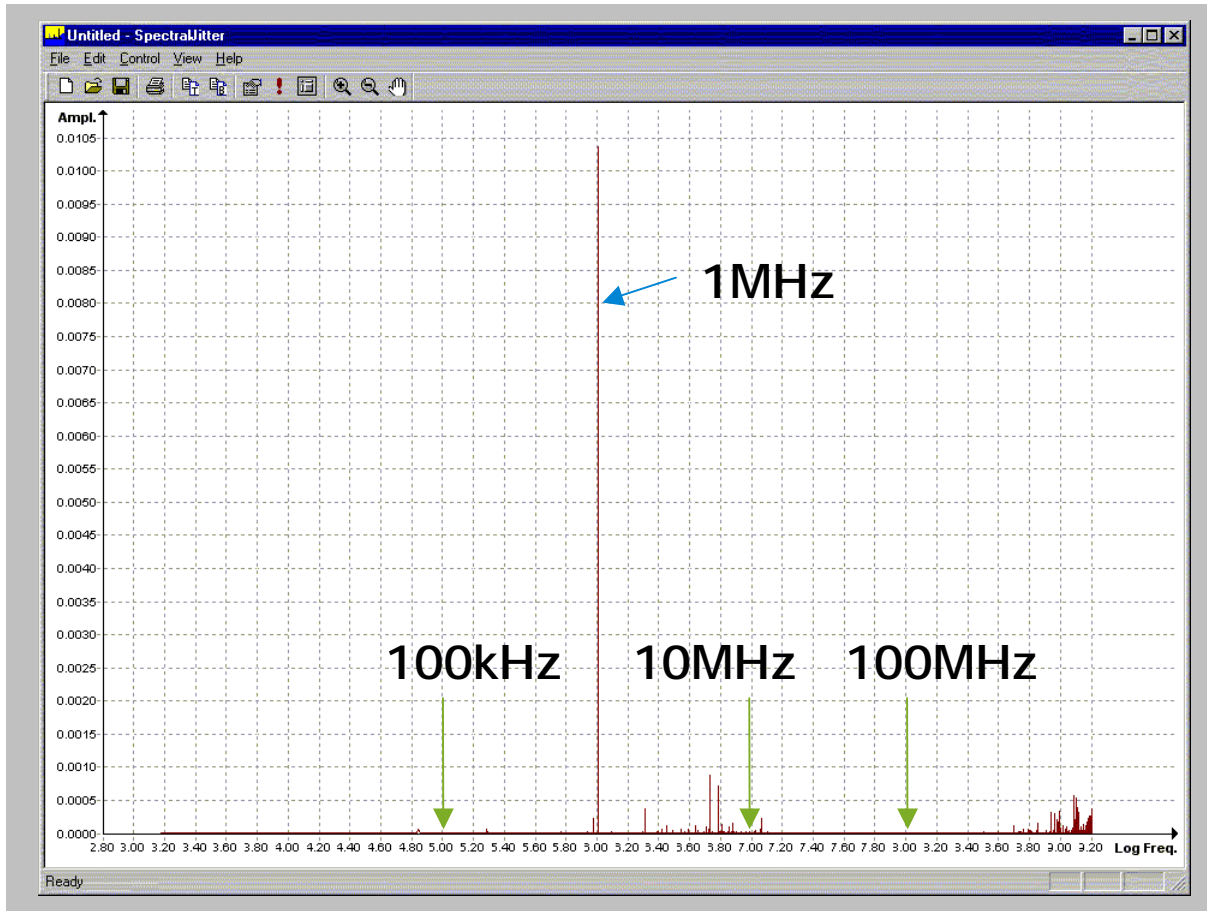
Device Characterization

- Frequency Range of Jitter components not limited by bandwidth -> Inband and Outband frequency spectrum
- CDR can be characterized for all parameters:



Design validation and debugging:

- **DEBUG:**



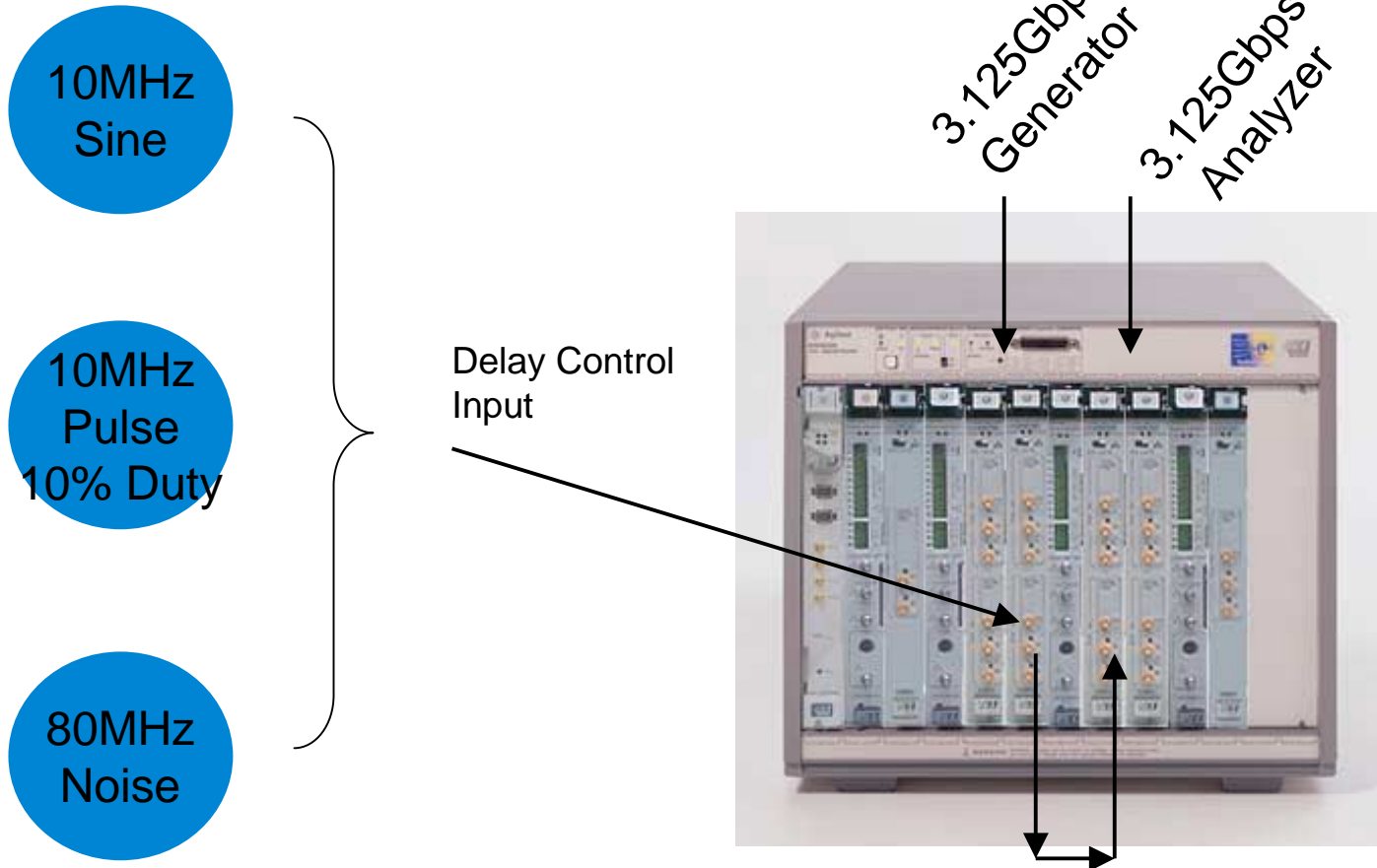
Qualitative information on frequency components within jitter budget

Example: interference of 1 MHz signal

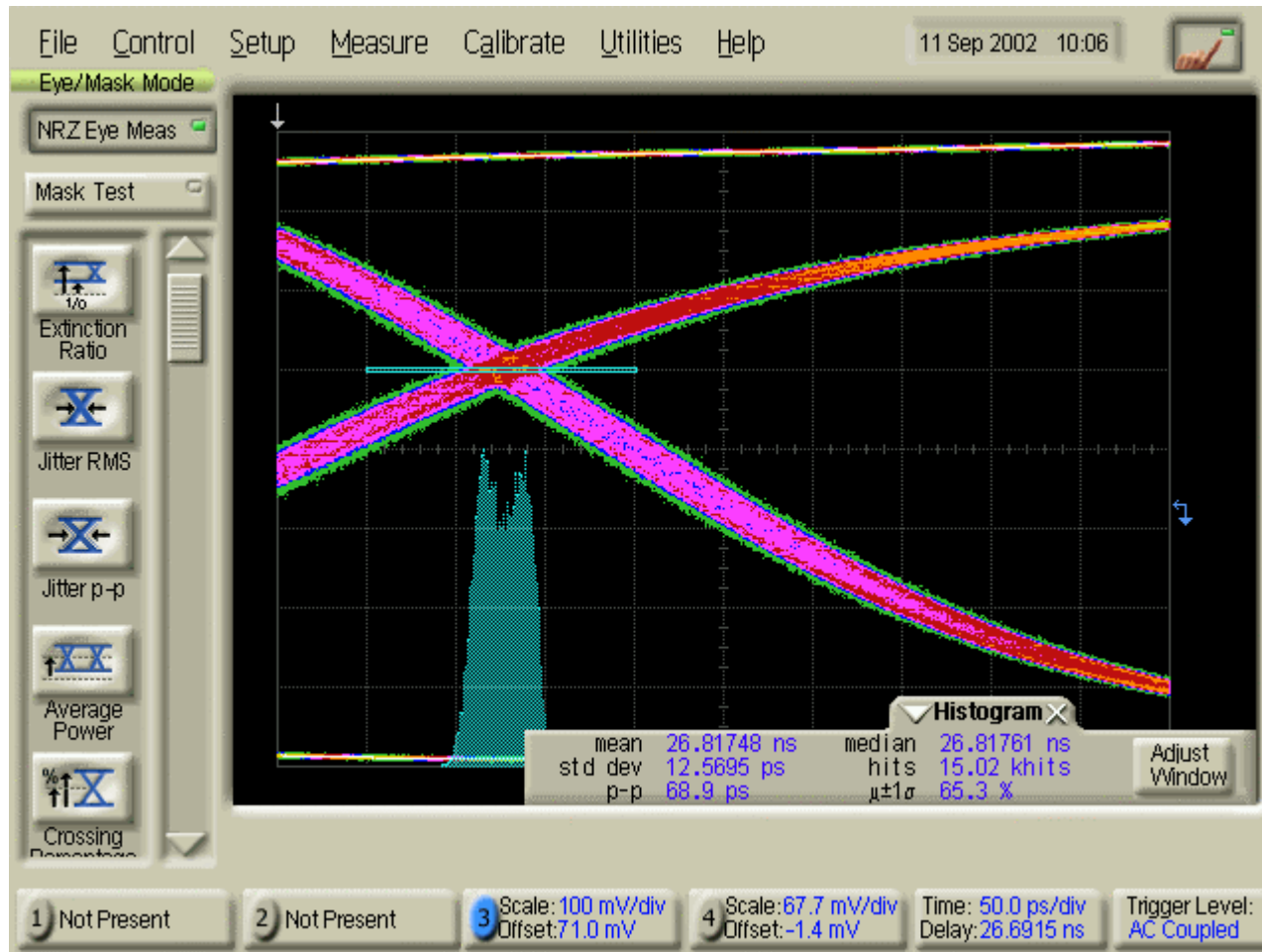


Measurement examples..

Simple Loopback Measurements with help of Generator's Delay Control

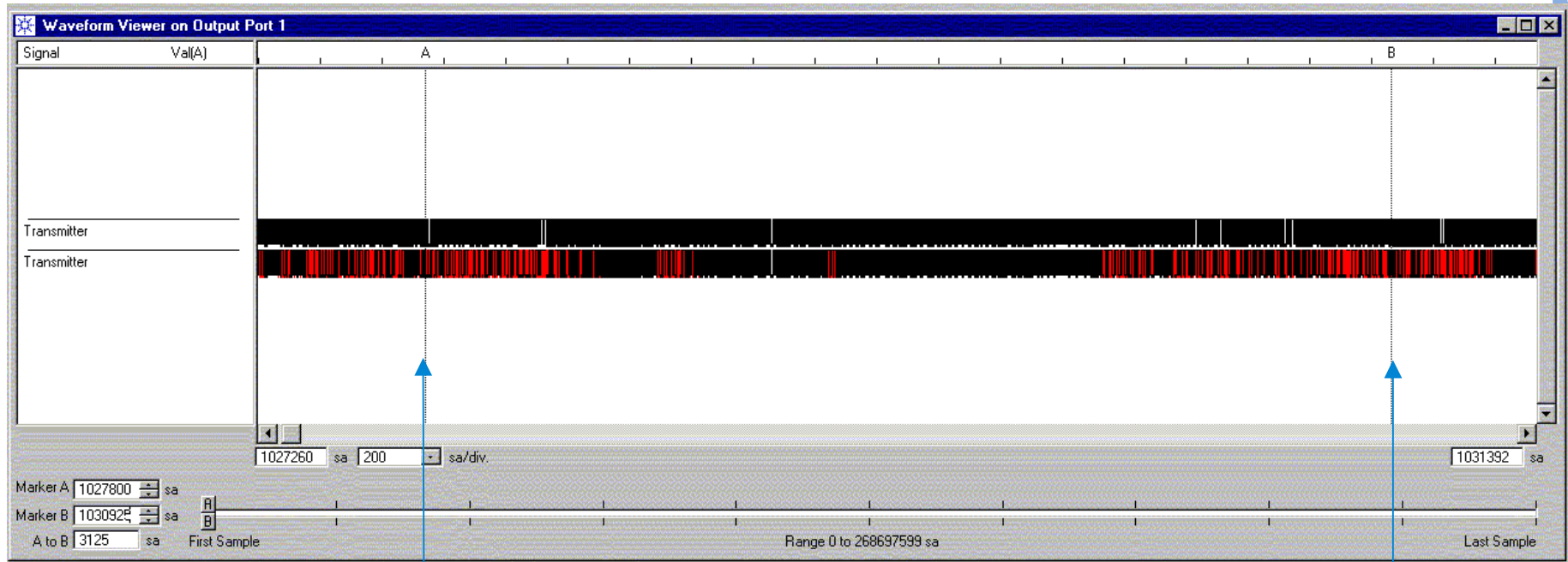


Sinusoidal Jitter 1MHz



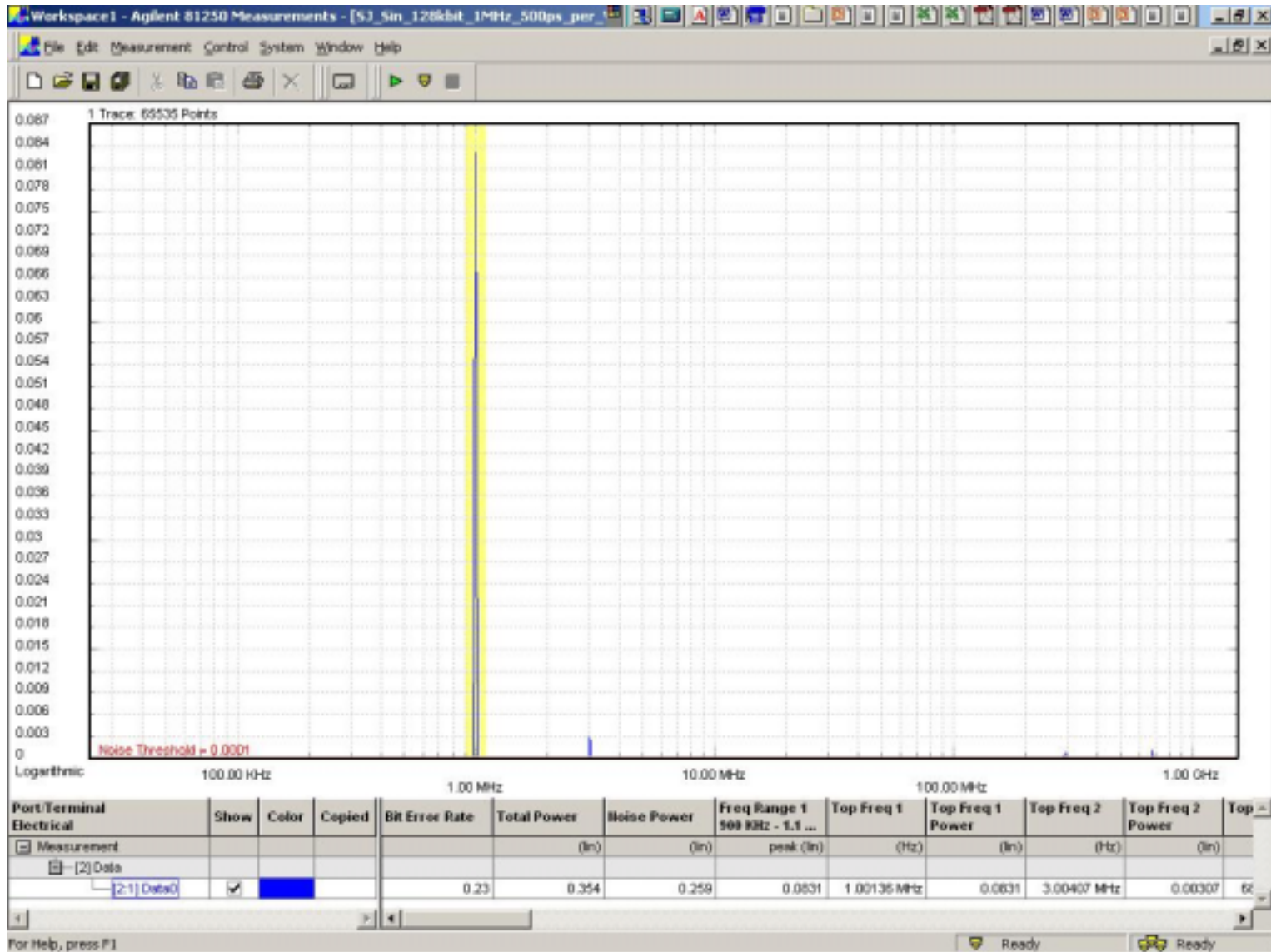
Approx. 25ps (0.08UI pp)

Error Density Modulation (1MHz Sinusoidal Jitter)

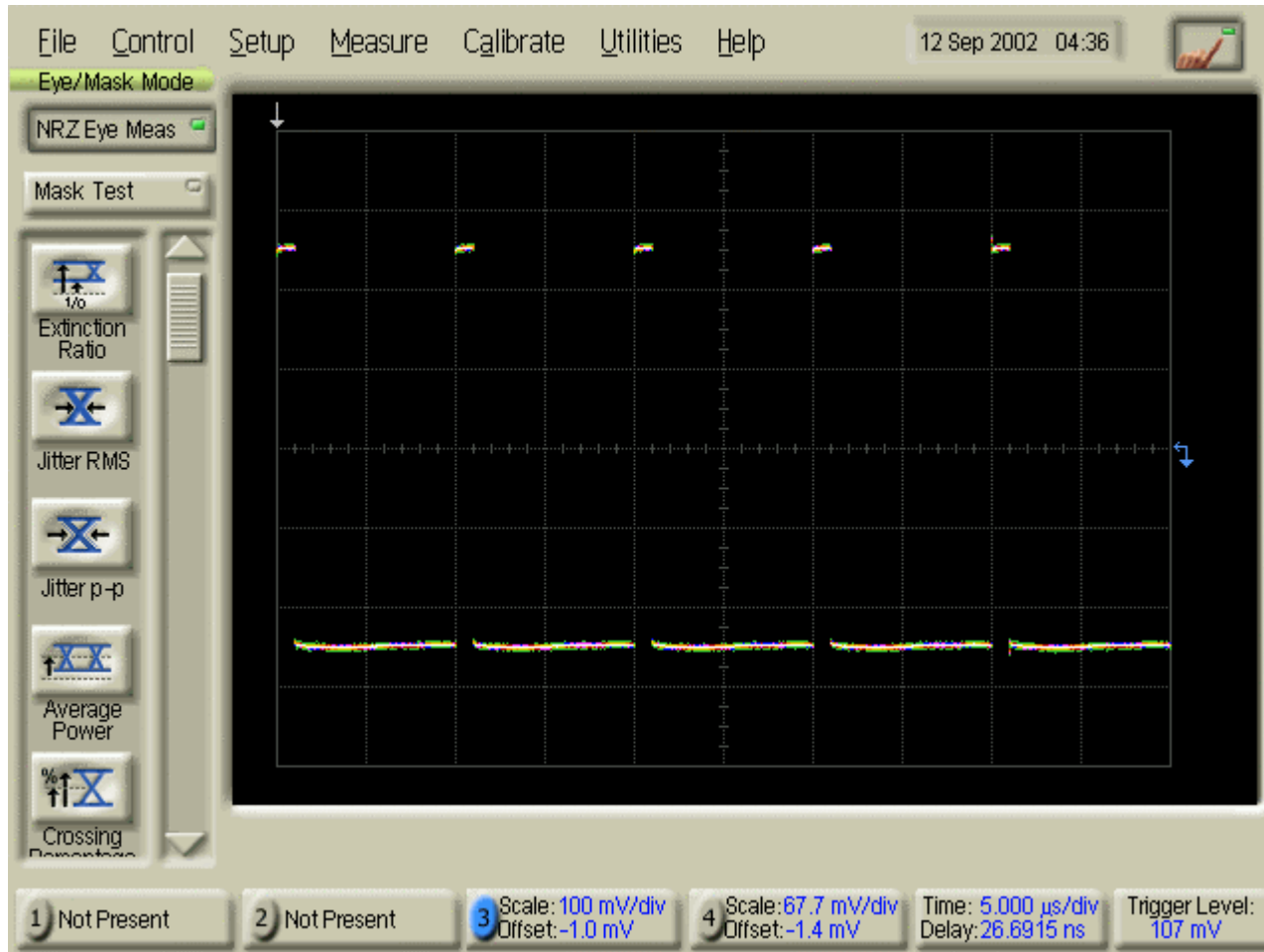


← 3125 samples = 1us (1MHz) →

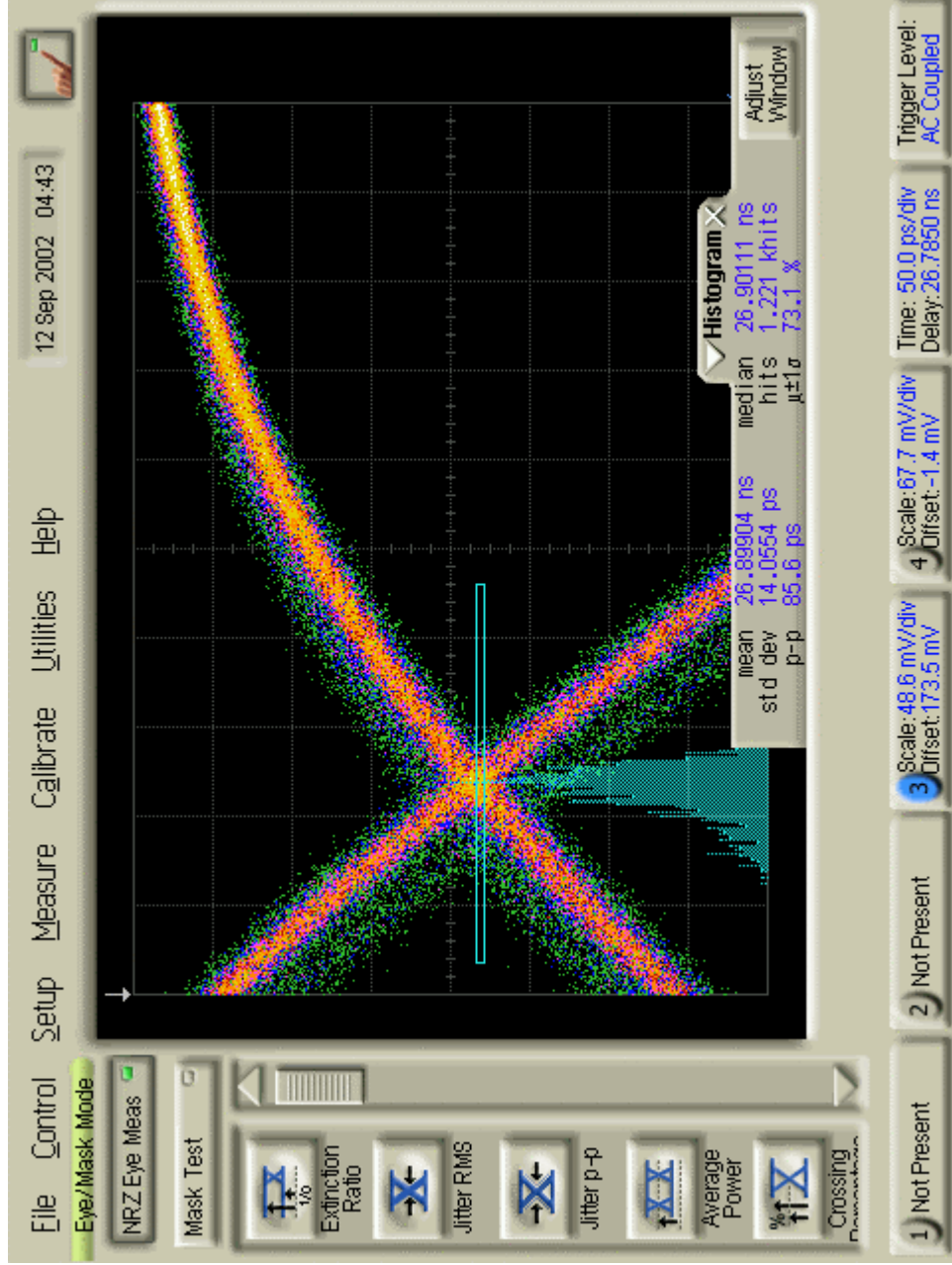
Spectrum of Sinusoidal Jitter



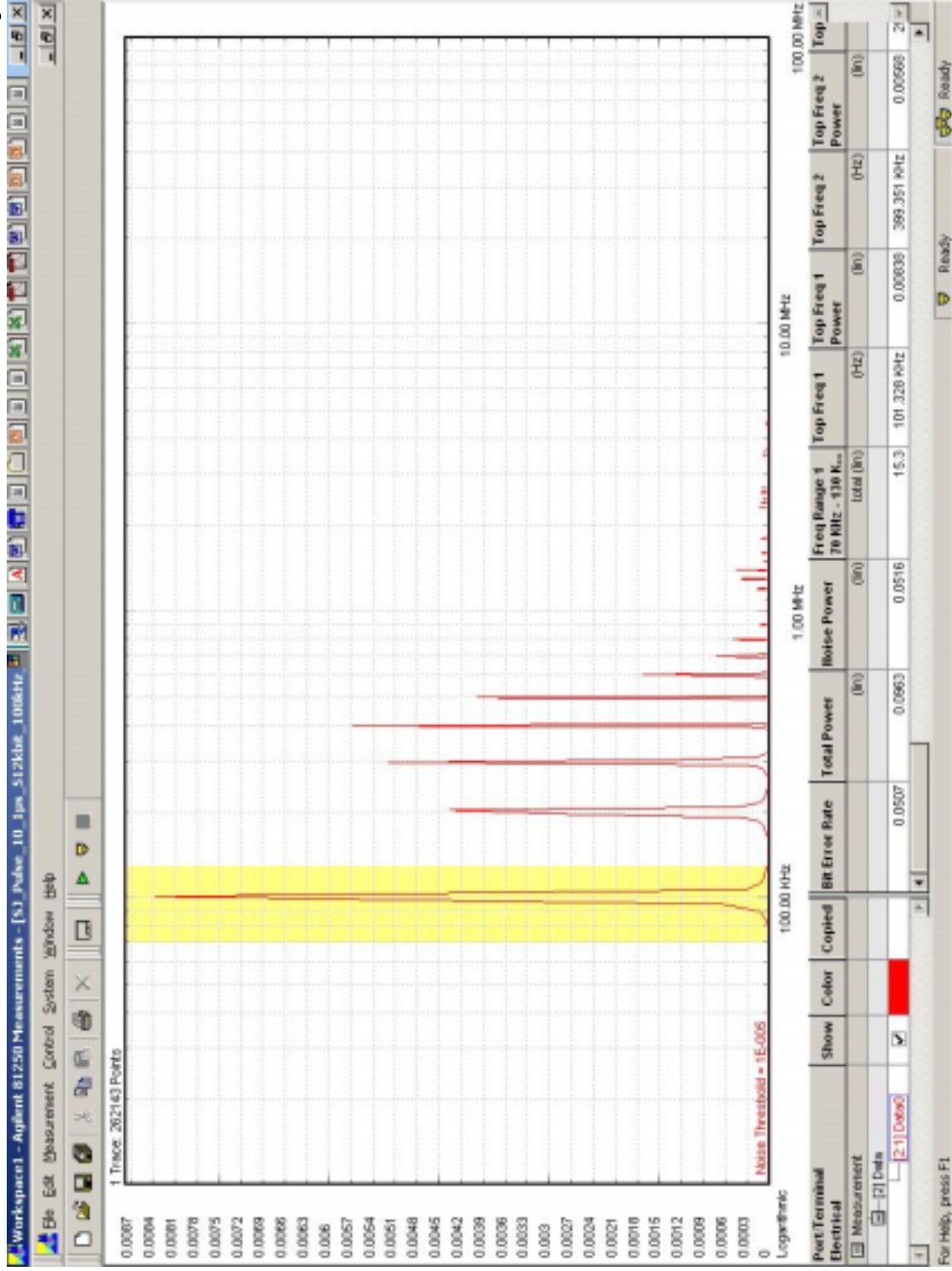
Pulse Modulation Waveform 10 μ s Period/1 μ s Width



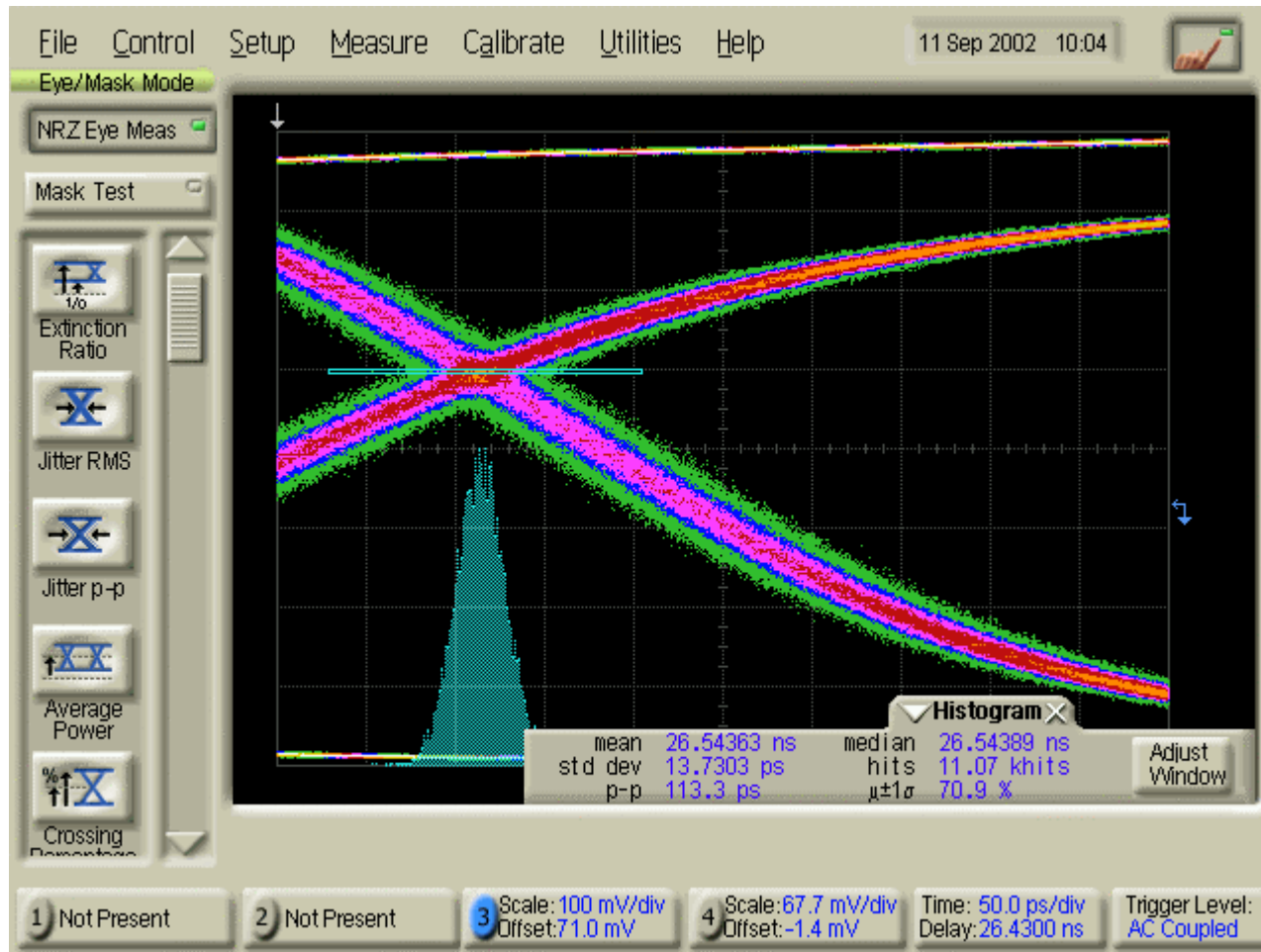
Pulse Jitter



Spectrum of Pulse Jitter

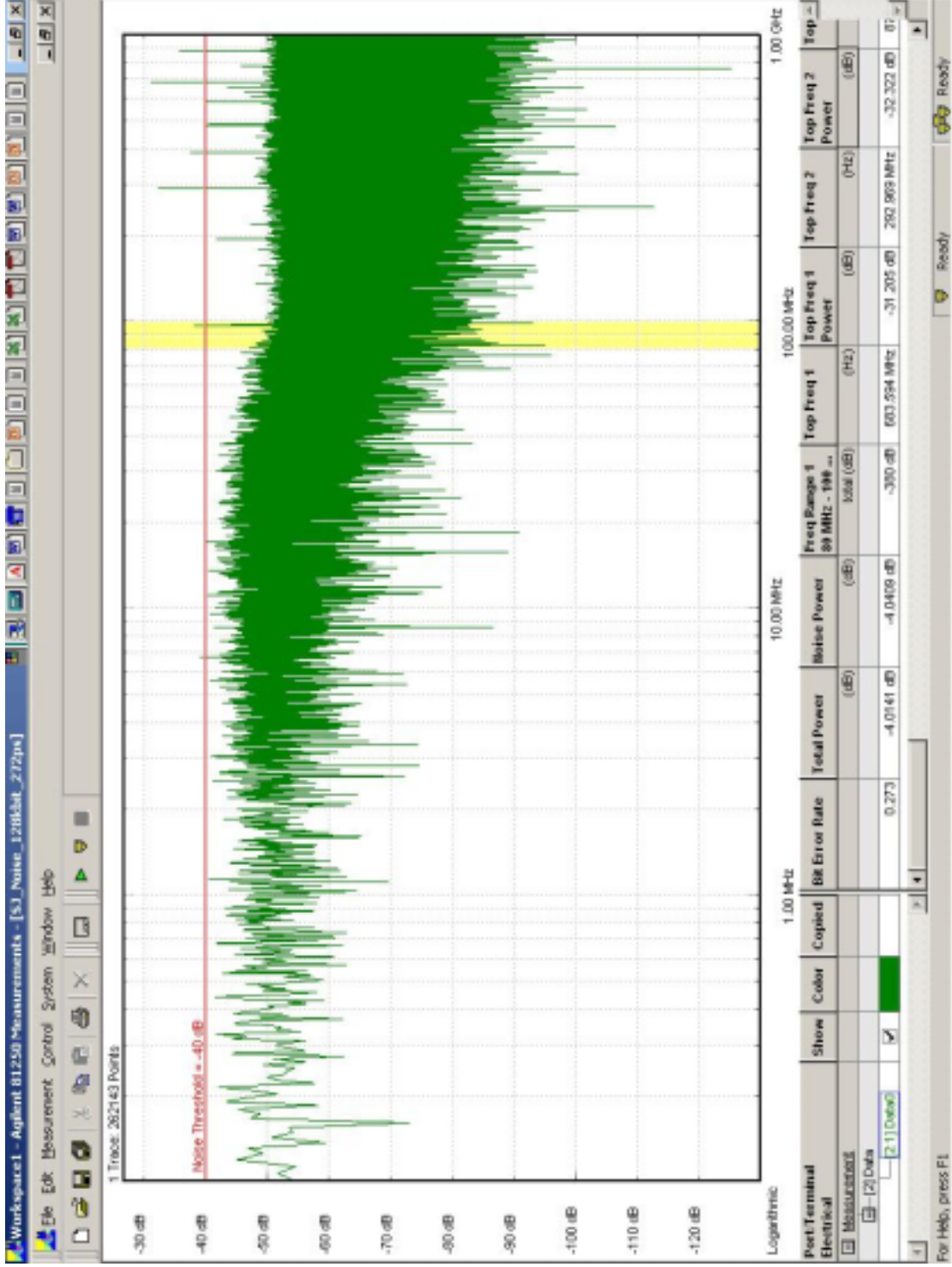


80MHz Broadband Gaussian Jitter



Total Jitter 13ps rms (0.04UI rms) --> pretty small injection intensity

Spectrum of Noise Jitter



Conclusion

- This new measurement technique hooks up on the RJ/DJ separation measurement providing an even more comprehensive approach to thoroughly explore the various components of deterministic jitter
- The decomposition technique helps debugging, design verification and characterization of devices
- Even smallest amounts of periodic jitter can be separated from the random jitter floor
- ParBERT licencees can download the latest version of the ParBERT 81250 software and measurement suite: www.agilent.com/find/ParBERT