How to Use JitterFFT

- Display the JitterTrack to be analyzed
- Apply a JitterFFT to the JitterTrack, and zoom/position the JitterFFT is to read frequency data.

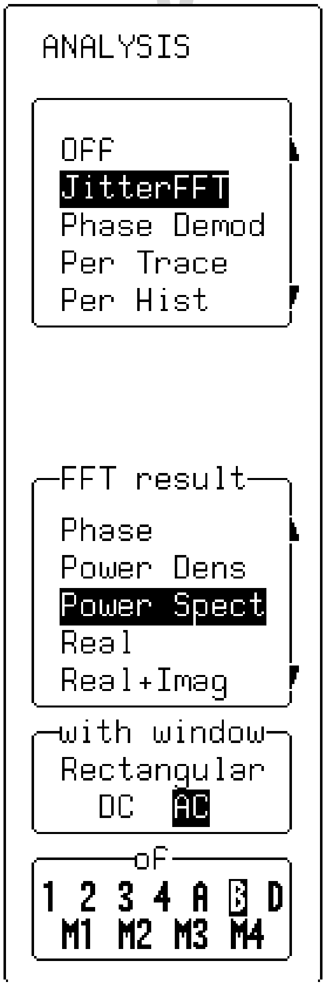
The JitterFFT analysis tool provides a special (frequency) view that consists of the timing domain JitterTrack into a frequency domain spectrum similar to that of an RF spetrum analyzer display. However, unlike a spectrum analyzer, which has controls for span and resolution bandwidth, you determine the FFT span using the scope's sampling rate. This view often reveals critical insights into sources of jitter. The display's vertical axis displays amplitude and the horizontal axis displays frequency.

There are two methods to create a JitterFFT on the Jitter and Timing Analyzer. The easiest method is to use the Jitter Views toolbar Analysis button to access the Analysis menu. When this method is used, certain defaults are set, and the JitterFFT will be displayed as Trace C. This method is explained below:

1. Acquire a clock or data signal, and display the relevant JiterTrack for that signal.
2. Press the Analysis button in the Jitter Views Toolbar and select JitterFFT from the menu.
3. Use the horizontal position and Zoom front panel knobs in the Analysis Controls section to position and expand the JitterFFT to see the detail desired.

A JitterFFT can also be set up on any math trace by following the instruction below:

1. Press Math Tools
2. Press the menu button "REDEFINE D", for example. This will place the JitterFFT on trace D.
3. Select **Yes** from "Use Math" menu to enable math functions, including FFT.
4. Choose **FFT** from the "Math Type" menu.
5. Make a selection for "FFT Result".



Power Spectrum is the signal power, or magnitude represented on a logarithmic vertical scale: 0 dBm corresponds to the voltage (0.316 V peak), which is equivalent to 1 mW into 50 ohms. Power Spectrum is suitable for characterizing spectra tha contain isolated peaks (dBm).

Phase is measured with respect to a cosine whose maximum occurs at the left-hand edge of the screen, at which point it has 0^o. Similarly, a positive-going sine wave starting at the left-hand edge of the screen has a -90^o phase. Phase is displayed in degrees.

Power Density: Signal power normalized to the bandwidth of the equivalent filter associated with the FFT calculation, suitable for characterizing broadband noise. Power Density is displayed on a logarithmic vertical axis calibrated in dBm.

Magnitude: The peak signal amplitude is represented on a linear scale, in the same units as the input signal.

Real, Real + Imaginary:, Imaginary: complex result of the FFT processing in the same units as the input signal.

6. Make a selection for “with window” and press the button to select **AC**.

   AC forces the DC component of the input signal to zero before FFT processing, and improves the amplitude resolution. This is especially useful when your input has a large DC component.

   FFT windows define the bandwidth and shape of the FFT filter. (See Chapter 10, “Use Advanced Math Tools,” in the WavePro *Operator’s Manual* for the windows filter parameters.)

   Von Hann (Hanning) windows resuce leakage and improve amplitude accuracy. But they also reduce frequency resolution.

   Rectangular windows should be used when the signal is transient (completely contained in the time-domain window) or you know it to have a fundamental frequency component that is an integer multiple of the fundamental frequency of the window. Other signal types will show varying amounts of spectral leakage and scallop loss when you use a Rectangular window. To correct this use another window type.

Hamming reduces leakage and improves amplitude accuracy, but also reduces frequency resolution.

Flat Top provides excellent amplitude accuracy with moderate leakage reduction, but also reduces frequency resolution.

Blackman-Harris windows reduce leakage to a minimum, but reduce frequency resolution.

7. Set the "of" selection to the trace that is the JitterTrack on which you want to perform the JitterFFT.

Note: During FFT computation, the FFT sign is shown below the grid. The computation can take a while on long time-domain records, but you can stop it at any time by pressing an front panel button.

Spectra will be shown with

a linear frequency axis running from zero to the Nyquist frequency. The frequency scale factors (Hz/div) are in a 1-2-5

sequence. The processing equation is displayed at the bottom of the screen, together with the three key parameters that characterize an FFT spectrum:

Transform size N (number of input points)

Nyquist frequency (= ½ sample rate)

Frequency increment, Delta f, between two successive points of the spectrum.

These parameters are related as:

Nyquist frequency = Delta f * n/2

where Delta f = 1/t and T is the duration of the input waveform record (10 * time/div). The number of output points is equal to N/2.

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