APP019.TXT TestPoint Application Note
APP019A.TST Associated Source File: FFT's of simulated and real waveforms
APP019B.TST Associated Source File: Filtering example

FFT’s Doing It Right

TestPoint can acquire waveform data, graph the data, calculate an FFT, and graph the FFT in just four Action Lines. As easy as it is, there are some common problems that will produce incorrect results:

Sampling rate - sample at ten times the maximum displayed frequency. The Nyquist criteria (sampling at two times the maximum frequency) is okay for textbooks but it doesn’t work that well in the real world. Especially if the expected higher frequency components aren’t showing up in your FFT, check the sampling rate.

Graph settings - generally the desired display for the FFT is magnitude vs frequency. This requires a line mode X vs. Y graph. Check the graph settings to insure that they are line mode, X vs. Y.

A/D settings – When analyzing sampled data from a plug in board, the A/D driver information may not be available to TestPoint. Verify that TestPoint is properly interfacing with your hardware.

Wrong phase - phase is returned in radians. If you want degrees convert radians to degrees.

APP019A.TST file associated with this application note has two action lists that are almost identical. The first shows how to create a simulated wave, graph it, take the FFT and graph the FFT. The simulated waveform begins life mathematically perfect and is useful for determining the effect of various sampling rates on the displayed wave and FFT. The second action list replaces the simulated data with real data acquired with a Keithley data acquisition board. The ability to compare the real waveform with the simulated waveform is often helpful in troubleshooting an application.

APP019B.TST file associated with this application demonstrates the use of FFT's for analyzing filtered waveforms. All data in this application is simulated. The generated waveform can be of type Cosine, Triangle, Ramp or Square. It can have a frequency of 8Hz, 32 Hz or both of these. Use the high and low cutoff sliders to apply digital filtering to the data before the FFT is computed. Digital filtering can be of benefit in cases where hardware filtering (anti–aliasing filters) has not been used to eliminate frequency components that are not of interest to the experiment.