

None, move to bin center

This choice also does not apply a window function, but it is not restricted to signals that are synchronous. **None, move to bin center** may be used with any signal which consists only of a single sine wave and any harmonically-related distortion products. For signals that are non-synchronous, this selection modifies the signal so that it becomes synchronous.

None, move to bin center shifts the fundamental frequency of the signal to the center of the nearest bin, which is the same as stretching or compressing the waveform so that an integer number of cycles fits exactly in the transform length. See Appendix C for a conceptual overview of FFTs, including basic information on synchronous FFTs.

When used with a single sine wave, this technique results in excellent selectivity, with the signal spreading to the adjacent FFT bin normally 120 dB down or more. Due to the correction, the signal in the DSP buffer will now be at an exact bin center and NOT at the original frequency.

Here's an example: assume that you want to test an ADC operating at a 48.00 kHz sample rate, using a test signal frequency of 997 Hz. This frequency is often chosen because it is non-synchronous with the sample rate and causes the converter under test to be exercised through a large number of its possible states.

With an FFT length of 16,384 samples, the two nearest synchronous frequencies are 996.09375 Hz (exactly 340 cycles in the buffer) and 999.0234375 Hz (exactly 341 cycles). The **None, move to bin center** mode of the FFT program will shift the frequency of the acquired 997 Hz signal in DSP memory down to 996.09375 Hz (the nearest synchronous frequency) and then perform a windowless FFT.

The result: the ADC under test was exercised at 997 Hz, as desired; and the frequency correction yielded an unwindowed FFT with high selectivity, as if the signal had been at the synchronous frequency of 996.09375 Hz.

The frequency correction technique has a maximum correction range of $\pm 4\%$. At the low end of the frequency range there will be frequencies that are more than 4% from a bin center. For example, with a 16,384-sample transform and 48 kHz rate, 37 Hz is approximately the lower limit above which a sine wave at any arbitrary frequency can be guaranteed to be brought to a synchronous frequency.

The technique will work at still lower frequencies if the signal frequency is within 4% of a synchronous bin center frequency. Bin center frequencies may be computed from the equation

$$Frequency = \frac{(N \times Sample\ Rate)}{Transform\ Length}$$