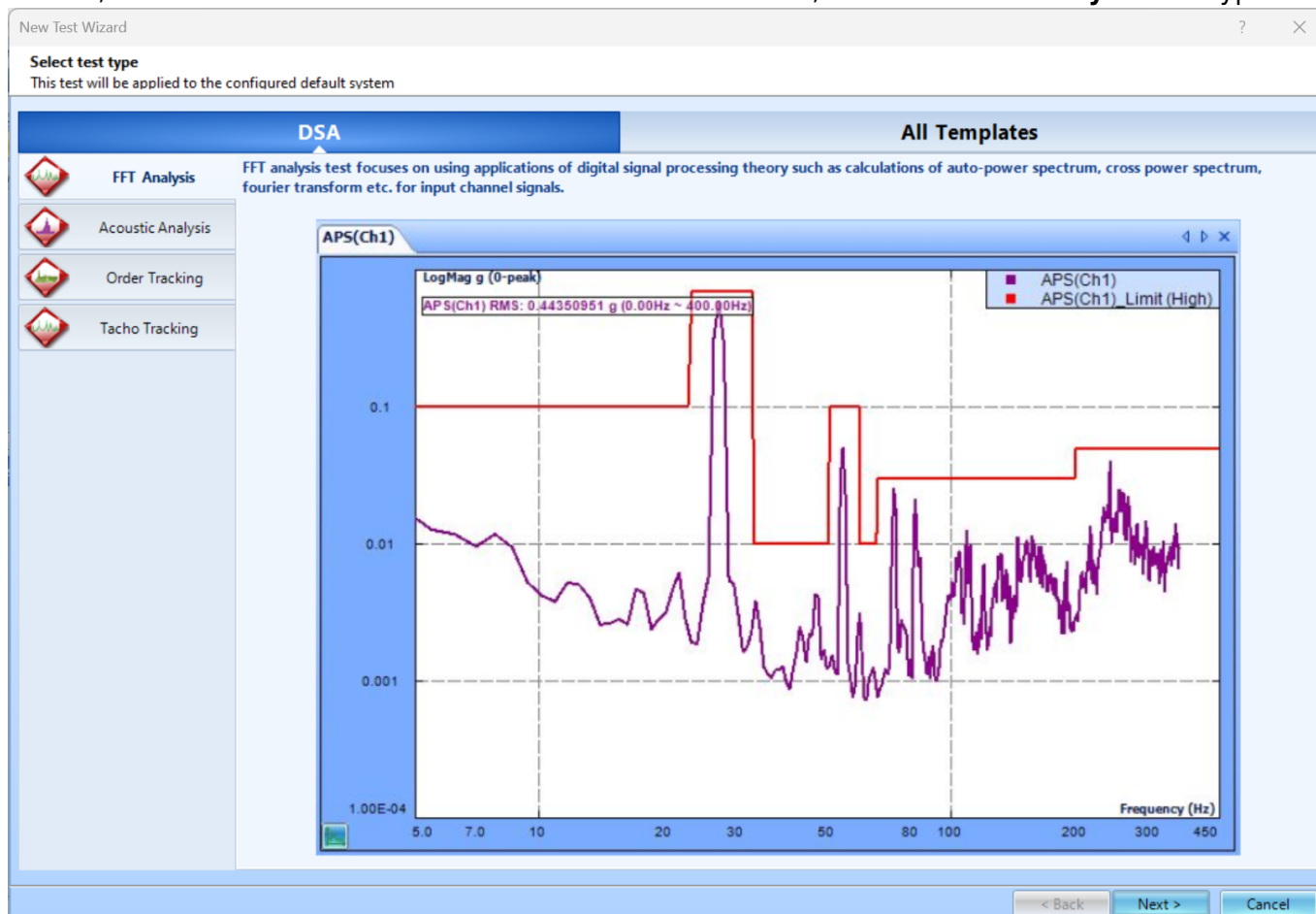


# DSA FFT Analysis

Follow the guided steps below on how to set-up a FFT Analysis in EDM to use with Spider hardware.

## Create Test

In EDM, select to create a new test. From the New Test Wizard, select the **FFT Analysis** test type.



Next, give the test a name and description.

?

×

New Test Wizard

Fill in the basic information for this test

Note: you will be able to search for this test by "Test name" or "Test description".

Create a new FFT Analysis test: **FFT Analysis**

Test name:

☐ Append the sequence number

Test description:

☒ Use the default libraries of the previous test of the same type. If default libraries were not applied before the manufacturing settings will be used.

☐ Create test by using a template.

Select	Template Name	Description

Spider system:

Test directory:

☒ Create new run folder for each run

< Back

Next >

Cancel

Finally, select the signal types that are wanted. You can select more than one signal type. Additionally, there Time History Stats can be selected to be calculated as well. You are **unable** to add more signal types to be computed once the test is created. Press **Finish** to create the test.

New Test Wizard

**Please check the signal types to be computed in real time.**  
 Note: Go to Measured Signals setting to select the signals to be viewed or saved.

☐ Enable a special analysis technology of multi-resolution spectrum  
 This function applies the FFT with variable resolution in frequency domain to achieve higher accuracy in low frequency band. To see the difference, click on [comparison](#).

☒ Time Streams and Time Block signals are always available

☒ APS: Auto Power Spectra using FFT

☐ FRF: Frequency Response Functions

☐ CPS: Cross Power Spectral Signals

☐ FFT: Linear spectra signals with averaging in complex domain. This signal type is rarely used

☐ SRS: Shock Response Spectra

☐ COR: Compute the correlation of time data(Autocorrelation and Cross-correlation)

☐ Cepstrum: Compute the Inverse Fourier transform (IFT) of spectrum signal

☐ Demodulation Spectra: Demodulation Analysis for Machinery

☐ TACHO: Tachometer

☐ FLT: Real time digital filters applied to all input channels

Measure Time Stats:

☐ RMS ☐ Peak ☐ PkPk ☐ Avg ☐ StDev ☐ PPV

Select all

< Back Finish Cancel

## Test Configuration

Before testing, the **Analysis Parameters** must be configured to ensure all the data is properly measured.

*Frequency Range (Sampling Rate)*- determines the resolution and the span of all time and frequency data blocks. Increasing the sample rate increases time resolution (makes dT smaller) and decreases the time span (Block T) captured. Increasing the sample rate also increases the maximum frequency (Fa) in a spectral block and decreases its resolution (increases dF).

*Block size/Line*- are the number of samples in each time blocks and the number of (un-aliased) spectral lines in each resulting spectrum. Increasing the block size increases the resolution of the frequency transform and allows lower frequencies to be detected, but it also increases the calculation time and slows down response. The ratio between Lines and Block Size is determined by the characteristics of the A/D converter and its anti-aliasing filter. In general, this ratio is about 0.46, meaning that 1024 samples in the waveform will produce about  $0.46 * 1024 = 471$  lines in the spectrum.

*Window*- lets the user choose the window to be applied during FFT operation. Windowing functions can help reduce leakage and increase the precision of the frequency measurement. In general, select Uniform for triggered transients, Hanning for general continuous signals and Flat Top when studying tonal data (such as a rotating machine) and needing extreme accuracy of spectral peaks.

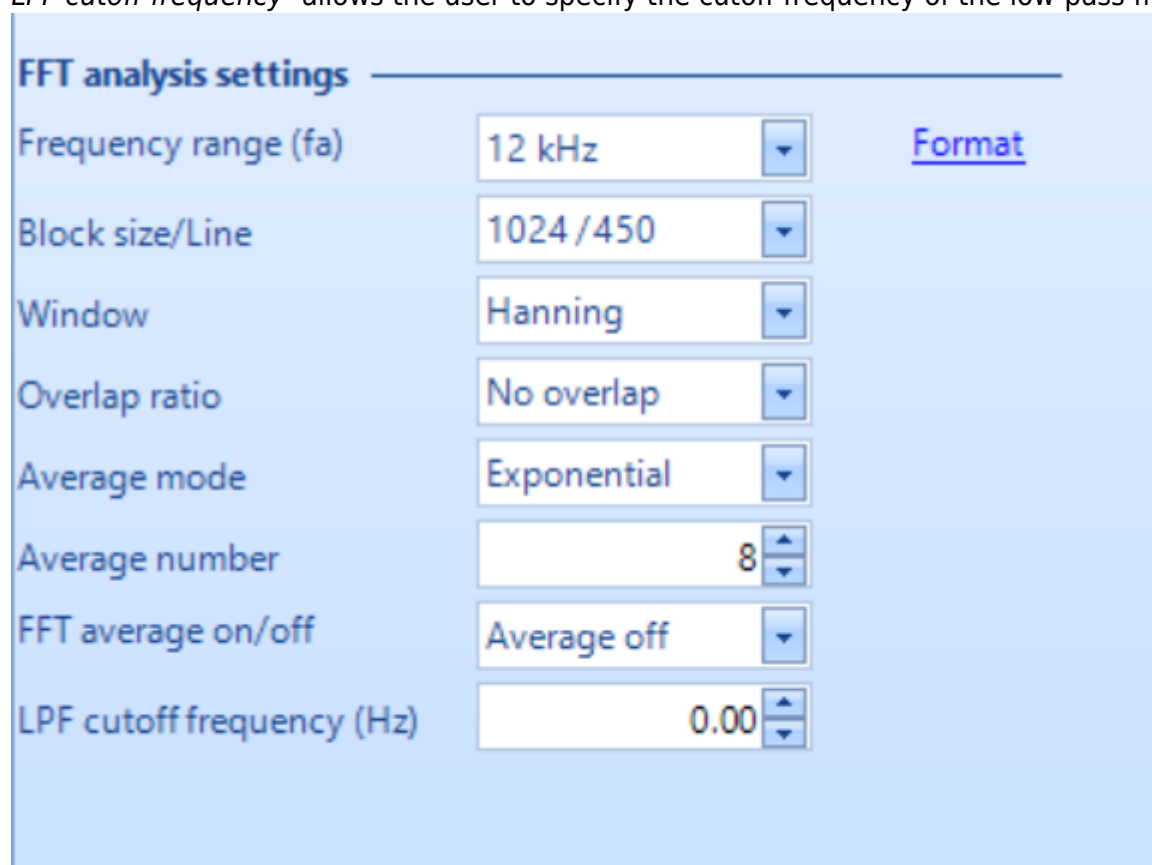
*Overlap ratio*- sets the proportion of the samples in a time block that are overlapped (redundant with samples in a prior block) when calculating the FFT of (un-triggered) continuous signals. Higher overlap

ratios result in faster variance reduction per unit time producing smoother data, but they increase the processing requirements. The Overlap Ratio options are no overlap, 25%, 50%, 75%, 87.5%, 95% and As High As Possible. For most applications employing a symmetrically tapered window function (such as Hanning), an overlap of 50% proves optimal.

*Average mode*- options include Linear, Exponential, and Peak Hold. Linear averaging treats every block equally. The blocks are simply added together (at each frequency), and the result divided by the Average Number. Exponential averaging is a moving or evolving average that favors the most recently measured block. Old data slowly loses its importance (time exponentially), so that the average is dominated by the current instantaneous spectrum.

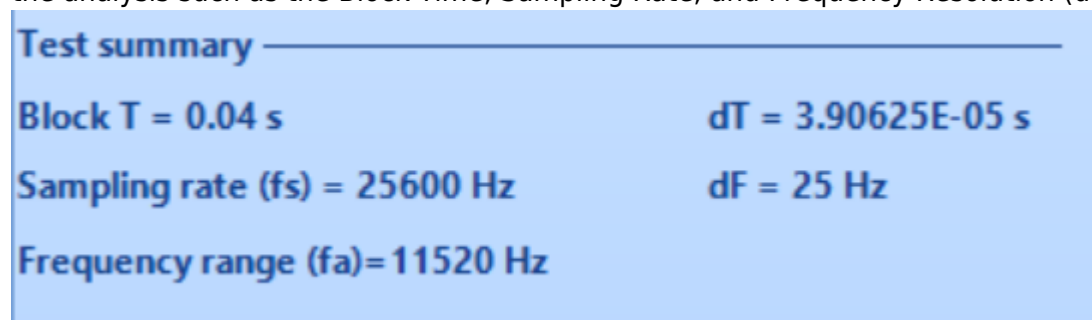
*Average number*- Determines the number of blocks measured for Linear and Peak Hold averages.

*LPF cutoff frequency*- allows the user to specify the cutoff frequency of the low-pass filter.



FFT analysis settings	
Frequency range (fa)	12 kHz
Block size/Line	1024 / 450
Window	Hanning
Overlap ratio	No overlap
Average mode	Exponential
Average number	8
FFT average on/off	Average off
LPF cutoff frequency (Hz)	0.00

At the bottom of the window, the *\*Test Summary\** can be found. This displays important stats about the analysis such as the Block Time, Sampling Rate, and Frequency Resolution (dF).



Test summary	
Block T = 0.04 s	dT = 3.90625E-05 s
Sampling rate (fs) = 25600 Hz	dF = 25 Hz
Frequency range (fa) = 11520 Hz	

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