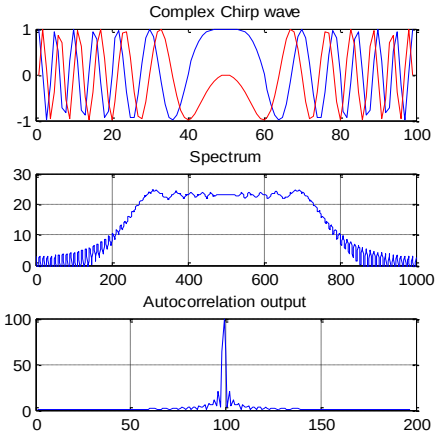
Overlap and Save Pulse Compression Design Example

1.0 **Design Example Datasheet**

Description

Pulse compression is a signal processing technique to increase the signal and noise ratio, detection range and range resolution. It is done so by sending a long wideband signal at transmit, then correlates the receive signal with the transmit signal. When the two signals match in time, a sharp peak is produced.

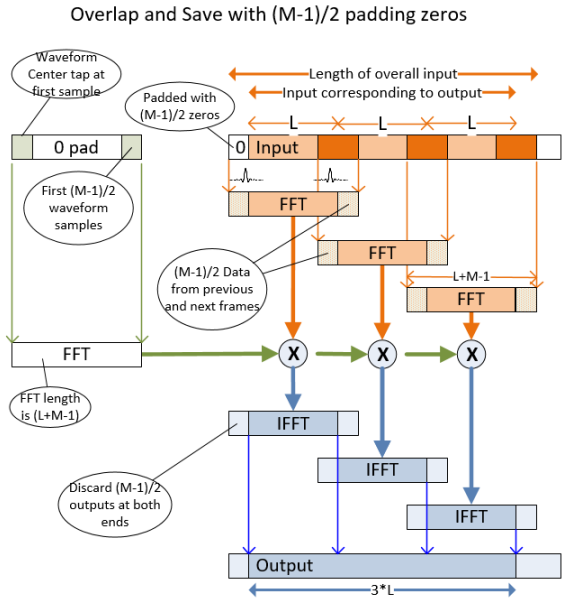


The cross correlation can be performed by time-domain convolution, or FFT-based fast convolution which has lower complexity of order log(N) instead of N, where N is the length of the waveform. Following table shows the multipliers count of both methods.

Linear Conv, N	Log_2N	Real mult. per FFT	Total OLS real mult.
16	4	4	20
64	6	8	36
256	8	12	52
1024	10	16	68
4096	12	20	84

However, FFT is block based processing but the radar receive is a streaming one, a technique known as Overlap-and-Save (OLS), also known as Overlap-and-Discard is used here to partition the input signal and regroup the blocked output to resemble streaming output. OLS is preferred over Overlap-and-Add as adders is not required.

A text book implementation of OLS would retain the front portion of the convolution results. An enhanced version is implemented that retains the more useful middle section of convolution result.



Features

- Custom overlap and save technique to retain the more useful middle portion of the convolution results
- Dynamically configurable FFT size, and waveform size.

Applications

- Generic streaming convolutions
- Pulsed radar, automobile radar

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