Using Memory Effectively

How to Set Up Acquisition and Math Memory Effectively

The LeCroy X-Stream™ oscilloscopes offer the longest available acquisition memories. These long memories, combined with high sampling rate, minimize the possibility of aliasing and assure accurate measurement of fast waveforms. While these are very important features, there are times when the acquisition setup needs to be changed to optimize other features such as maximizing capture time.

Figure 1 shows a measurement of a power supply during startup. The acquisition has been configured to maintain a fixed sample rate while increasing the time/division settings. This allows users to keep increasing the capture time to see the full startup event. The sampling rate is set to guarantee that the edges of the pulse waveform are sampled at least 10 times on each edge. This is determined by measuring the risetime of the pulse using one of the built-in measurement parameters. Note that the measured risetime is 97 ns. The sampling rate is set to 100 MS/s or 10 ns/sample, ensuring 10 samples per edge. At this sampling rate the WavePro 7300 with the optional -XL memory can acquire up to 240 ms of data on four channels or up to 480 ms on two channels.

Another sampling rate issue arises when doing frequency domain

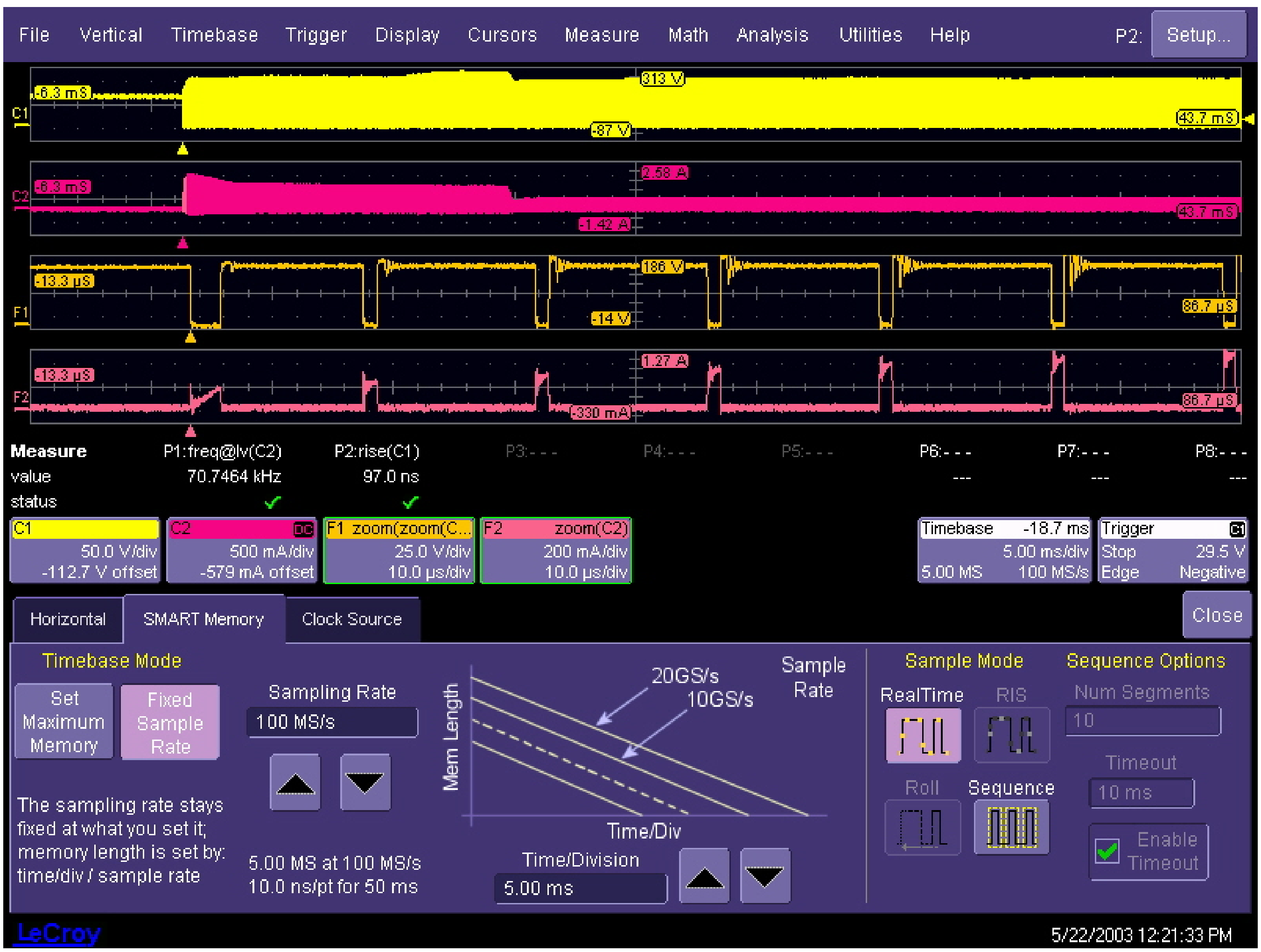

Figure 1 An Acquisition setup that doesn't require the maximum sampling rate

analysis on low frequency applications like power supplies. The FFT span is a function of the scope sampling rate. If we sample at 100 MS/s to guarantee good sampling on the time domain signal we will have a default span on the FFT of 50 MHz. In Figure 2 we have acquired 200 ms of a power supply gate drive signal that is pulse width modulated. The track of width, shown in trace F1, shows the variation of pulse width vs. time. The frequency of the pulse width modulation is shown in the frequency parameter (P4) as 125 Hz. To set up an FFT to analyze the frequency content of the modulation with a span of 2.5 kHz we need to reduce the effective sampling rate to 5 kHz. This is done by adding the sparsing function in the math setup. The math dialog box at the bottom of the figure shows the sparsing setup. The data coming out of the track function is sparsed by a factor of 20,000 to 1 reducing the effective sampling rate from100 MS/s to 5 kS/s. Because the power supply has a very limited bandwidth, this poses little or no problem with aliasing. As you can see from the FFT, the signal amplitude drops off sharply above 750 Hz. If the signal had energy above 2500 Hz it would be necessary to filter the data before using the sparsing function. Filtering operations are described in application briefs LAB 746, 747, and WM747.

Figure 2 Using the sparsing function to control the FFT span