- Sample Rate

If I could...

...be sure I'm seeing *all* the details of my signal...

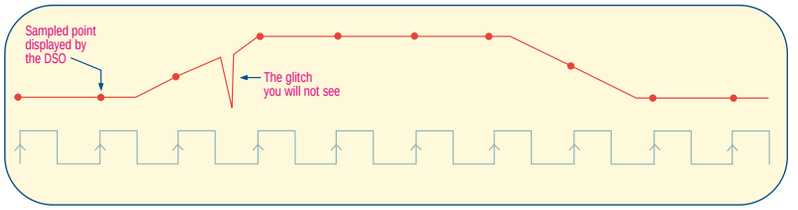
Sample Rate Equals Resolution

Sample rate – specified in Samples per second (S/s) – refers to how frequently a digital oscilloscope takes a snapshot or sample of the signal, analogous to the frames on a movie camera. The faster an oscilloscope samples (i.e., the higher the sample rate), the greater the resolution and detail of the displayed waveform and the less likely that critical information or events will be lost.

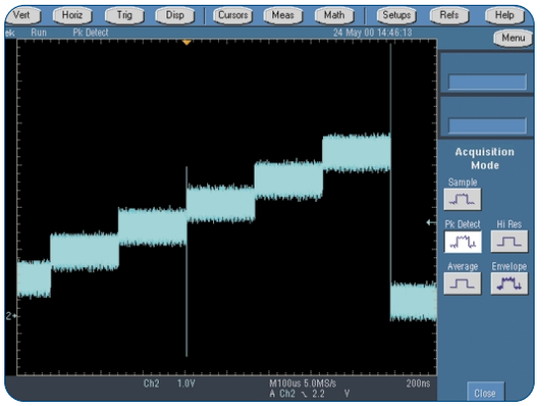
How do you calculate your sample rate requirements? The method differs based on the type of waveform you are measuring, and the method of signal reconstruction used by the oscilloscope. Most Tektronix oscilloscopes let you select either sin(x)/x interpolation for measuring sinusoidal signals, or linear interpolation for square waves, pulses and other signal types.

For accurate reconstruction using sin(x)/x interpolation, your oscilloscope should have a sample rate at least 2.5 times the highest frequency component of your signal. Using linear interpolation, sample rate should be at least 10 times the highest frequency signal component.

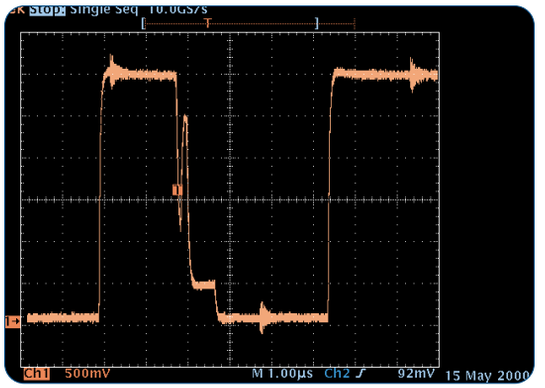
Tektronix has greatly simplified most sample rate decisions by matching the sample rate to the bandwidth of each of our oscilloscopes, ensuring a Tektronix oscilloscope for every application.



Sample rate varies with time base settings – the slower the time base setting, the slower the sample rate. Some digital oscilloscopes provide peak detect mode to capture fast transients at slow sweep speeds.



Peak detect mode enables the TDS7000 Series oscilloscope to capture transient anomalies as narrow as 100 ps.



A higher sample rate provides greater signal resolution, ensuring that you'll see narrow and intermittent events.

A clear distinction exists between sample rate and waveform capture rate.

While the sample rate indicates how frequently the oscilloscope samples the input signal within one waveform, or cycle, the waveform capture rate refers to how quickly an oscilloscope acquires waveforms. (Please refer to the "waveform capture rate" section.)