

Trendplot applications for design validation

- Power supply stability over time
- Verify circuit design specifications
- Capture intermittent events/troubleshooting random shut-downs (plot key parameters for critical test points looking for changes that correlate to fluctuations)
- Trend critical parameters per test point during climate testing temperature cycle
- Temperature controlled crystal oscillator circuit tests
- Temperature monitoring

Changes in environment can lead to unpredictable results. By taking multiple measurements over minutes, hours or days you can quantify these changes. Parameters like dc voltage, dc current, frequency, and resistance can be recorded directly. AC voltage and current can be plotted as rms measurements. Temperature, pressure and humidity can be converted into dc voltages by using the appropriate transducer.

In the simplest form of digital recording, a series of “snapshot” measurements are taken with a fixed interval in between. In this scenario the instrument takes a single measurement for each interval and stores it in memory. A very short measurement interval can catch fast changes, but unfortunately it will use memory quickly. Conversely, with more data points it takes more time to write the last data point to memory, affecting the sample interval. Even if you have a very large memory, like a hard drive or flash drive, you still face a daunting task of pouring over vast numbers of measurements. High-speed, fixed interval recording is easy to understand and can be accomplished with relatively simple hardware, but it is usually not practical for logging over minutes or hours. The user has to select a reading rate and is forced to compromise. “Do I want to record for a long time or do I want to see fast changes? Why can’t I do both?”

Min/Max recording

This technique also stores readings at the end of each preset recording interval. But instead of taking just one reading per recording interval, the instrument takes many high-speed measurements over each interval. Processors within the instrument crunch through the measurements and log a minimum (min) and a maximum (max) for each interval. The min and max indicate the worst-case, short-duration events, and can be as short as a few milliseconds. Graphs from these instruments will often plot min and max on the same graph.

Automatic time compression and TrendPlot

TrendPlot is a recording technique available in Fluke instruments, including the 884X Multimeter. It shows the same detailed data as min/max recording, but it is simple to set up and automatically gives you the best time resolution with the available memory.

TrendPlot is a form of min/max recording in which the meter automatically compresses the timescale each time the trend approaches the end of memory. As the meter starts to run out of memory, signal processors quickly go to work. They combine adjacent recording intervals into a new min and max. You still get to see the worst-case measurements and the overall trend. And because you choose

when to stop the measurement, you automatically get the best time resolution with the available memory.

To set up TrendPlot, simply set up as you would for any measurement. Select a measurement function, voltage, current, resistance, temperature or any of the other functions on the 884X. Check to make sure the reading looks right—is the resolution OK? Are the leads in the right jacks? Then press the ANALYSE button, select TrendPlot, and hit START.

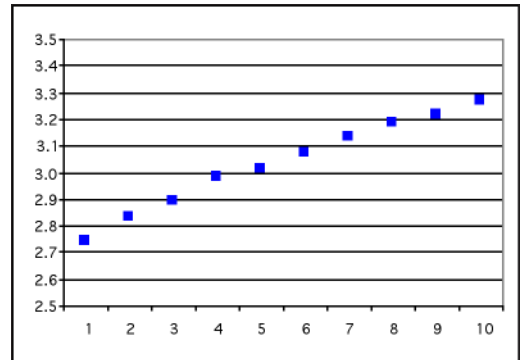


Figure 1. To illustrate how sample rate is proportionate to memory size, this plot example shows 10 samples recorded at a fixed interval 10 minutes. The shorter the time interval between each sample, the shorter the recorded time span and vice versa.

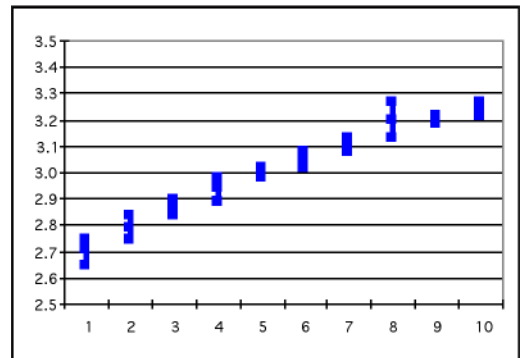


Figure 2. For each sample interval, a minimum and maximum value is plotted, calculated from a large (buffered memory) sample set captured at higher speed. This captures the major changes while still plotting the overall trend without compromises.

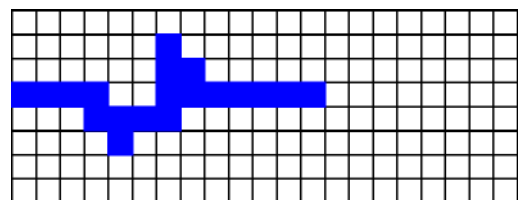


Figure 3. Shows a section of the Fluke 884XA dot matrix graphical display. A minimum and maximum data point is plotted in each column of pixels drawing a TrendPlot across the display.