

Power Line Monitoring

TECHNICAL BRIEF

Trend Function Monitors Line and Output Voltages

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Summary

The Trend function is ideal for monitoring power supply input and output voltages.

Using the Trend Function for Power Line Monitoring

The Trend function is a waveform composed of a series of parameter measurement values presented in the order they were taken. Up to 1,000,000 values can be trended. Trend is a ideal tool for monitoring long term processes such as power line monitoring. Figure 1 shows a power supply test where the input line voltage and output voltage are monitored.

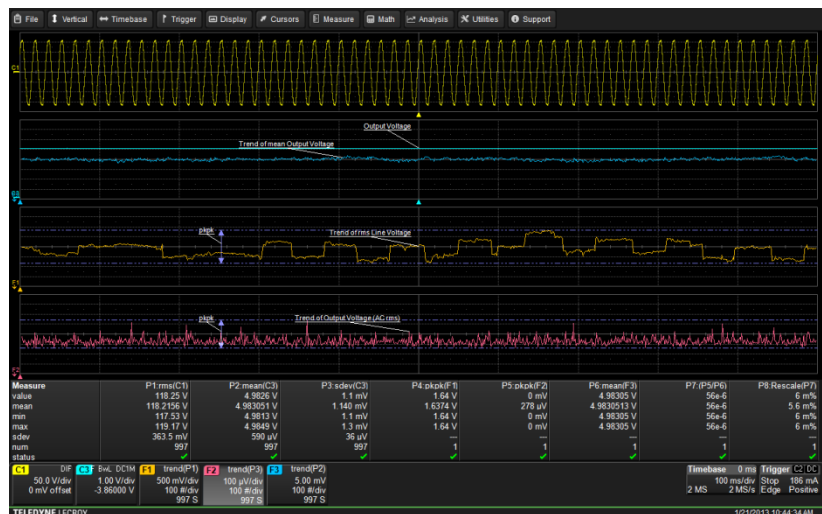


Figure 1: An example of monitoring the AC line input and DC output of a power supply using the trend function

The AC line input is acquired on channel 1 (top trace) using a differential probe. Channel 3 is the DC output of the power supply. Record length for each measurement is one second. The parameter P1 is the rms value of the power line. Parameter P2 is the mean value of the DC output voltage. Parameter P3 is the standard deviation (ACrms) value of the power supplies output. It is used to monitor small changes in the power supply output level including ripple and line related output changes.

Function trace F1 is a trend of the AC input voltage. It shows the rms line voltage over 1000 acquisitions (about 17 minutes). Similarly, the function trace F2 shows the trend of P3 (standard deviation) taken at the same time. Trace F3 is a trend of the mean output voltage taken over the same time interval. The trend of line voltage shows variations on the order of 1.6 V over the 17 minute interval as read by P4 (peak-to-peak of F1). At the same time the AC variation of the power supply output is 278 μ V. The mean power supply output (P6) is 4.98V.

Trend functions can be set up from the parameter setup dialog box from the Action for Px control group. They can also be setup from the Math setup dialog box as shown in Figure 2.

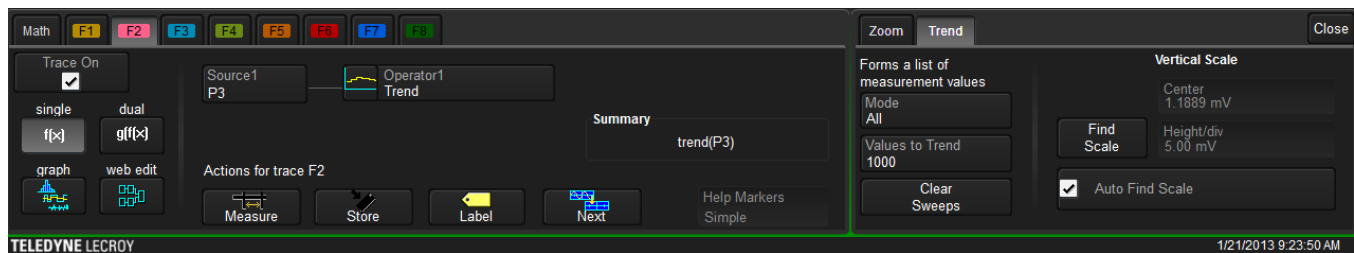


Figure 2: Setting up a trend function using the math setup dialog box for function F2

The source can be any parameter. The number of values (points) in a trend can be selected to be from 2 to 1,000,000 (model dependent). Scaling can be set automatically or manually. It is important to note that the trend function can be manipulated like any waveform, math operations and parameter measurements can be applied.

A visual assessment of the relationship of the line voltage variations with either the mean power supply output or the AC variation of the output, by comparing the trend functions, reveals no apparent relationship indicating that the power supply has good line regulation. We can compute the line variation using the measurements we've taken thus far. Parameter P7 uses parameter math to take the ratio of the peak to peak output variation divided by the mean output voltage. P8 rescales this to percent, again using parameter math, by multiplying by 100 and changing the units to percent. The resultant line regulation is 5.6m%

The Trend function is an ideal datalogging tool, for applications like this, taking place over seconds, minutes, hours, or days.