

Application Note

Fluke 8845A / Tektronix DPO 4054

Introduction

Global market demands and corporate goals are drivers to improve product performance and attributes, increase quality, and drive down costs - all to gain even the slightest competitive edge. Every manufacturer strives to deliver products with tighter tolerances and wider ranges, which operate under varying environmental conditions. This challenge also applies to design, test and service engineers and the tools they use.

Today's digital multimeters (DMMs) and oscilloscopes are multipurpose tools that are used to measure volts, amps and ohms and view all types of waveforms in just about every application from electro-mechanical design to high-frequency communications. They are used as stand-alone tools on the service bench, or in automated test systems. These products address the most basic needs of engineers and technicians working in the fields of R&D, design, manufacturing and service engineering. These dmms span from 5.5 digits to 8.5 digits resolution, with accuracies from 0.1 % to a much more precise 0.0035 % while the oscilloscopes provide bandwidths from 100MHz. to 1GHz. and display waveforms on up to 4 channels.

The Fluke 8845A Precision Multimeter and Tektronix DPO 4054 oscilloscope not only build on the performance of today's instruments, they also offer functionality beyond that commonly found in these products. The result is a set of instruments that help engineers to design, build and test electronic products with improved performance and better quality, all at lower cost.

Building on the performance of today's digital multimeters and oscilloscopes

To improve performance while using existing technology, engineers must design analog and digital circuits that are "cutting edge" in terms of speed, sensitivity and range. The products they

use need to have the appropriate levels of measurement sensitivity and range to do the job. The Fluke 8845A and Tektronix DPO 4054 meet this need in multiple ways by:

- **Increasing the range of each major measurement function beyond what is standard in today's popular instruments.**

- **8845A**

- Volts dc ranges from 100 mV to 1000 V with a max resolution of 100 nV.
- Current dc ranges from 100 uA to 10 A with a max resolution of 100 pA.
Compared to other popular multimeters, the 8845A/8846A increase the range on both ends of the spectrum - from pico amps to amps.
- Resistance ranges from 10 Ω to 1 G Ω , with a max resolution of 10 $\mu\Omega$. Now engineers can perform a critical low ohms measurement as well as a high impedance measurement with one tool.

DPO 4054

- 500 MHz. bandwidth, 4 channels
- 5GS/s sample rate on all channels
- I2C, SPI, and CAN bus serial triggering and analysis

Why is this important? Consider, for example, an attempt to check the resistance across connectors, relay or switch contacts, or simply to validate a sensitive circuit's signal path resistance, where the measurement is less than a few milli-ohms. Using current DMMs, the maximum available resolution would be 0.0001 or 100 $\mu\Omega$ - not accurate enough for the job. With the Fluke 8845A, the resolution is increased to 10 $\mu\Omega$, allowing the engineer to make an accurate measurement and potentially eliminating the need to acquire an additional single-function low ohms meter to do the same job.

The DPO 4054's Wave Inspector function allows the efficient view of record lengths in the millions of points that represent thousands of screens worth of signal activity. This is accomplished by a dedicated two-tier front panel Zoom / Pan control.

- **Exceeding expectations for measurement accuracy.** The standard for basic volts dc accuracy in today's 6.5 digit DMMs is 0.0035 %. The Fluke 8845A meets this standard with a basic accuracy of 0.0035 %.

The DPO 4054 provides 5GS/sec. Acquisition rate on all channels

- **Providing additional measurement functions and wider measurement ranges that allow users to cover a wider test workload.** Today's passive components push the limits of range and tolerance. It is common practice to use large value capacitors in portable devices as a battery backup, or reference resistors with tight specifications. Until now, that would mean turning to alternative tools like a micro-ohms meter or LCR (Inductance, Capacitance and Resistance) bridge meter to make the measurement. The Fluke 8845A includes not only volts, amps and resistance measurement functions, but also capacitance, frequency or period and temperature.

The proliferation of embedded controllers and the use of serial busses demand a powerful method to capture and view bit packets on these busses. The DPO 4054 has three plug in modules that address embedded, automotive, and computer triggering and analysis needs. A record length of 10 million points / channel captures long bit streams.

Making the DMM and oscilloscope easy to use on the bench or in a system

Getting “into the depths” of a DMM menu system to change measurement modifiers like filter settings, reading rate or even zero out an offset should be as convenient as setting the

meter to take more routine measurements such as volts dc or ac measurement. On the Fluke 8845A meter, engineers can access less-frequently-used functions or parameters directly from the front panel display using the soft menu keys and a context sensitive menu structure. Additionally, it's not necessary to pull out the manual or a detailed map of the menu navigation system to change a parameter like the instrument's IP address; the context-sensitive menus and flexible text display are designed to guide users quickly and easily to the parameter of choice.

The DPO 4054 utilizing OpenChoice Desktop enables fast and easy transfers of settings, waveforms, measurements, and screen

images over USB or LAN. TekXL and TekW toolbars enable integration of the scope into Microsoft Office.

Conclusion

Engineers and technicians working in the fields of R&D, design, manufacturing and service engineering can improve productivity, enhance quality and control expenses by using tools designed to meet today's competitive requirements for performance and utility.