



## Xilinx Zynq® and Spartan® Devices Power Digilent Test and Measurement Instruments

Digilent’s ADP3450 Uses Zynq SoC for Control and Communications, and Signal Processing; AD2 Uses Spartan FPGA for Test Processing

### AT A GLANCE:

Since 2000, Digilent (a wholly owned subsidiary of National Instruments) has provided embedded engineers, researchers, scientists, and students with cost-optimized products, tools, and application information for innovative, FPGA and SoC-based hardware-software systems. The company specializes in Xilinx-based FPGA/SoC development boards/kits and portable USB test and measurement devices, all designed to be used from an engineer’s or student’s desk. The company also offers a variety of expansion modules (Pmods and Zmods) to create flexible I/O options for its other products.

**Industry:** Test & Measurement

**Location:** Pullman, Wash.

<https://www.digilent.com>



Figure 1. Digilent Analog Discovery 2 USB oscilloscope and logic analyzer

### SUMMARY:

Digilent makes development boards and kits, along with a variety of test and measurement tools that provide professional-level analytics to engineers, researchers, and students with the flexibility of a portable instrument. A long-time user of Xilinx technology, the company once again turned to Xilinx’s SoC and FPGA devices, recently, to create two new powerful test and measurement instruments that deliver higher performance, lower cost, and greater flexibility to its customers.

### CHALLENGE:

Digilent was looking to expand two of its test and measurement product families. For the Analog Discovery family of USB-based instruments, Digilent wanted to build a cost-optimized solution to process vast amounts of test data used by its WaveForms software. For the Analog Discovery Pro 3000 series of products, the company was looking for a versatile, high-performance platform that could help with instrument control and communications, as well as signal generation and processing.

The results were the Analog Discovery 2 (AD2) and Analog Discovery Pro 3000-series products which were built around Xilinx’s Spartan 6 and Zynq 7020 SoC devices, respectively.

**SOLUTION:**

Digilent’s AD2 is a portable, multifunction oscilloscope and logic analyzer that lets users visualize, generate, record, and control mixed-signal circuits. The product is small enough to fit into a pocket but provides the functionality of several pieces of professional lab equipment. For the AD2, the Xilinx Spartan 6 provides a better way to perform data processing than ASIC-based solutions. It’s more cost-effective, faster, and uses less power. It’s also powerfully flexible. It allows users allocate the instrument’s buffer to either the scope or logic analyzer and reconfigure power supply channels to waveform generator channels. The same chip can be used to support oscilloscope calculations on the hardware, while the waveform generator can use the device to generate AM and FM signals and perform system frequency adjustments.

The Analog Discovery Pro 3450 (ADP3450) serves engineers needing more advanced, home electronics test benches. The device comes with 12 instruments that can analyze mixed-signal systems through the company’s WaveForms software.

In the ADP3450, Xilinx’s Zynq 7020 SoC not only helps with signal generation and synchronization, but it also enables a Linux Mode feature that lets users run Python or other scripts on the device, add a display, deploy a test without a computer attached, or connect remotely.



Figure 2. Digilent’s Analog Discovery Pro (ADP340) portable

“We chose the Xilinx Zynq 7020 SoC for the ADP3450 because it combined the ARM processors needed for instrument control and communications with the FPGA fabric needed for signal acquisition/generation logic, processing, and synchronization. It also met our requirements for size and power, all at a cost that allowed us to deliver a high-performance and very versatile device at unmatched pricing to our customers,” said Steve Johnson, president of Digilent.

“In the Analog Discovery 2, we selected the Spartan 6 as a cost-optimized solution to process numerous testing tasks that our WaveForms software calls for on its various instruments.”

Johnson said the flexibility of Xilinx devices is important to Diligent's product design. "We utilize the flexibility and configurability of the devices to optimize the logic or SoC for different tasks or instrument configurations. This allows the customer to make trade-offs in speed, memory depth, or other system characteristics," he said. "Some of our products even expose the FPGA to customers to allow them to design custom signal processing algorithms and further optimize the instrument to their application," Johnson added.

## RESULTS:

"By standardizing on Xilinx programmable logic and SoCs, Digilent has developed a high level of expertise with the devices and tools, allowing us to rapidly and efficiently develop new products that push the performance and pricing envelope in our markets," Johnson said. "Our integration of Xilinx technology ultimately makes us a more competitive company."

Johnson added that Xilinx sales and support teams have been helpful throughout the design process. "Xilinx technical and sales reps are very attentive and definitely an integral part of the design process, from early input on device variants, information on new/upcoming parts, and even design reviews," he said.

## ADDITIONAL RESOURCES:

[Learn More About Xilinx's Cost-Optimized Portfolio](#)

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