

# ZYNQ®



## GW Instek and Xilinx

### GDS-2000E line of digital storage oscilloscopes (6 scopes)

Thanks to an innovative platform design leveraging Xilinx's Zynq-7000 All Programmable SoC, engineers at GW Instek (Good Will Instrument Company) were able to quickly bring to market six digital storage oscilloscopes forming its critically acclaimed GDS-2000E line of digital storage oscilloscopes. With performance and features orders of magnitude superior to those of its previous product line and competitors, the GDS-2000E brings great value to customers, while dramatically reducing GW Instek's BoM, development and maintenance costs – increasing the company's profitability.

## Executive Summary

### Challenges

- Create differentiated oscilloscope line
- Provide users with superior waveform signal analysis
- High performance CPU capable of computing large amounts of FFT
- Bypass bottleneck of DSP + FPGA interconnect architecture
- Improve TTM, BOM, cost, profitability

### Xilinx Solutions

- CPU to FPGA interconnect allowing high-speed ADC data direct into memory
- CPU + logic enables exponential performance over 2-chip alternative
- ARM enables easy Linux OS porting and early HW/SW co-development
- Zynq SoC board replaces two-boards & lowers BoM

### Results

- Waveform update rate increased 12X and FFT measurements improved 288x
- The GDS-2000E line of oscilloscopes offers best-in-class performance
- Zynq platform strategy dramatically lowers TTM by 40% and cost of BoM and maintenance for derivative products

**“One of the most significant attractions of using the Zynq SoC was that it allowed our FPGA and software teams to work simultaneously and synchronously to quickly create an initial design and the five other platform derivatives. Allowing the company to get a full product line to market quickly.”**

Hong Chen, Vice President

## Challenges

With decades of building high-end test equipment, GW Instek is always looking for ways to improve their products and bring greater value to customers. The company is particularly interested in growing market share in the mid-range to value segment of the digital oscilloscope market - targeting individual engineers and entire engineering teams.

The company wanted the new product line to consist of six models, each achieving a 1GSa/s, 10Mpt memory storage and a user-friendly interface with a modern WVGA display. The product line would cover 200/100/70MHz bandwidths and depending on the configuration various models would range from two to four input channels and would be much more advanced and higher-value than GW Instek's previous offering as well as those offered by competitors.



GDS-2000E Series

## Xilinx Solutions

The engineers at GW Instek chose to implement the entire product line using a platform strategy with Xilinx's Zynq-7000 All Programmable SoC, integrating ARM dual-Cortex® A9 processors and programmable logic connected with over 3000 I/Os on one chip. This allowed the engineering team to easily create a scope that could offer exponentially higher performance than 10k waveforms per second waveform performance and 2048 pts of FFT offered by the two-chip architecture. The integration of the Zynq SoC's processing system and programmable logic and on board memory would enable GW Instek engineers to ensure the system would deposit ADC sampling data directly into system memory, eliminating the need for additional and much slower software to carry out operations on the data. This significantly improved signal processing performance and the fluidity of the system. Using one Zynq SoC vs two chips also drastically reduce BoM cost. "One of the most significant attractions of using the Zynq SoC was that it allowed our FPGA and software teams to work simultaneously and synchronously to quickly create an initial design and the five other platform derivatives. Allowing the company to get a full product line to market quickly."

## Results

GW Instek was able to leverage the Zynq-7000 SoC in a scalable platform strategy and create a full line of segment-leading products, which it brought to market in 2014. Frank said simply by leveraging the Zynq SoC's on chip, integrated processing and programmable logic, the engineering team was able to improve the bandwidth range to 10 to 30 Msps, compared to the previous line's range of 2 to 10 Msps. With the Zynq SoC, the team was able to boost the GDS-2000E's update rate to 120,000 wfm/s - a 12X performance improvement over its previous product line of 10,000 wfm/s. FFT measurements of the new line is 1M pts - a 288x improvement compared to the previous product's 2048 pts of FFT. The GDS-2000E line boasts a phenomenal minimum 1mV/div vertical range. "That's by far the best performance in the industry for a scope at that cost point," said Frank.

Frank said that not only did the Zynq SoC allow the engineering team to vastly improve the performance of the system, Zynq's dual-core ARM Cortex-A9 enabled the team to develop new features, including integrated logic analyzer and signal generator functionality and a Linux based browser viewable on the unit's 8 inch WVGA display that enables a browser interface with training materials, tutorials, and videos for using the system.

"The GDS-2000E product line's System/UI response is much improved and is far more fluid than our previous products," said Frank. "The new line offers a much better user experience. The GDS-2000E is the highest customer-value product in the mid-level DSO market today."

## More about GW Instek:

Founded in 1975, Good Will Instrument Co., Ltd was the first professional manufacturer in Taiwan specializing in electrical test & measurement instruments. GW Instek began as a manufacturer of power supplies and quickly expanded into the development of high precision electronic test and measurement instruments. With headquarters located in Taipei, Taiwan, GW Instek has subsidiaries in mainland China, America, Japan, Korea and Malaysia; its products are sold to more than 80 countries worldwide.

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