National Instruments delivers exceptional 1 MSPS per channel I/O with one watt power consumption

As a recognized innovator in precision software and hardware technologies, National Instruments (NI) consistently provides its customers with high precision, innovative tools for test and measurement and instrumentation. It is this dedication to ensuring reliable "specified performance" in its own products that led the design team to select multiple Analog Devices, Inc., (ADI) components for its NI 9223, a 4-channel, 1 MSPS (million samples per second) simultaneous input module for the company's C Series hardware control and data acquisition systems, the CompactDAQ and CompactRIO. ADI's analog-to-digital converters (ADCs) enabled National Instruments' design team to bring a new level of performance and multichannel capability within very restrictive size and power consumption constraints. There are over fifty C Series-compatible modules available, including support for applications that require complex analog measurement functionality, such as ballistics, impact, and wave testing.

National Instruments 9223.

The design specification targets for the NI 9223 module centered on speed, form factor, and power consumption. There was little precedent for designing a 4-channel, up to 1 MSPS per channel module that conformed to a 3" × 3" form factor with an extremely low power draw of only one watt.

Analog Devices ADC.

NI CompactDAQ System.

The ADI AD7983 16-bit, 1.33 MSPS throughput ADC with power dissipation of only 10.5 mW (typical @ 1.33 MSPS) enabled National Instruments' designers to meet all three objectives. Performance was achieved using four ADI AD7983 ADCs with no active cooling or heat sink. Leveraging the AD7983's versatile serial interface port, the NI 9223 is able to synchronize all analog input modules in a single C Series chassis to share the same start clock and/or sample clocks, further enhancing flexibility and performance when deployed.

NI CompactRIO System.

To optimize the analog signal acquisition, the NI 9223 includes the ADA4841 low power, low noise, low distortion amplifier and the AD8691 low offset, low noise amplifier with very low input bias currents. ADI rigorously applies "best practice" silicon characterization testing techniques for product qualification, ensuring the same performance from the developer's bench through production of the customers' system designs. For designers, this ensures that ADI products are comprehensively specified and consistently deliver the same performance regardless, if it's a single unit or a large quantity.

> "Reliable converter performance is the crux of this design's success. I chose ADI components because the parts are clearly and completely specified and meet these specifications both on my desk and in the field."
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> **Richard Lam, staff hardware engineer, National Instruments**