AnalogMAX-DAQ3: A Programmable High-Accuracy Data Acquisition Development Platform

Based on Analog Devices ADAQ4003 18-bit, 2 MSPS, µModule® Data Acquisition Solution

AnalogMAX-DAQ3 is a low-cost, programmable, high-accuracy 18-bit data acquisition rapid prototyping platform that meets power, footprint, and reliability requirements of measurement instruments in ATE, medical equipment, precision DAQ systems, and battery-powered equipment applications.

The data acquisition system is based on the 2 MSPS, 18-bit ADAQ4003 µModule® Data Acquisition Solution that reduces the development cycle of a precision measurement system by transferring the signal chain design challenge of component selection, optimization, and layout from the designer to the device.

Using System-in-Package (SIP) technology, the ADAQ4003 reduces end system component count by combining multiple common signal processing and conditioning blocks into a single device along with the critical precision passive components. These blocks include a low noise, fully differential ADC driver, a stable reference buffer, and a high resolution 18-bit, 2 MSPS successive approximation register (SAR) ADC.

The small footprint, 7 mm × 7 mm, 0.80 mm pitch, BGA package enables compact form factor designs without sacrificing performance and simplifies end system bill of materials management. This level of system integration makes the ADAQ4003 much less sensitive to printed circuit board (PCB) layout while still providing flexibility to adapt to a wide range of signal levels.

Benefits of the AnalogMAX-DAQ3 Platform

> **High-accuracy analog front-end** – Ideal for applications requiring accurate data capture at high throughputs

> **Flexible platform –** Based on the programmable Intel® MAX® 10 FPGA, easily adjusts to a wide range of use cases and production needs

> **Rapid prototyping and product development** – Rapid development and testing with an out-of-the-box experience that includes the Jupyter notebook with Python code

> **Quick customization services** – Add new functionality, lower BOM cost, or have the complete product designed
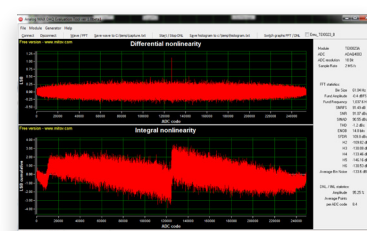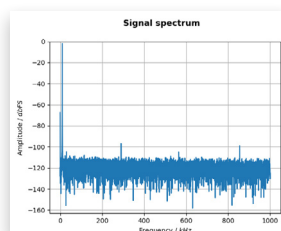
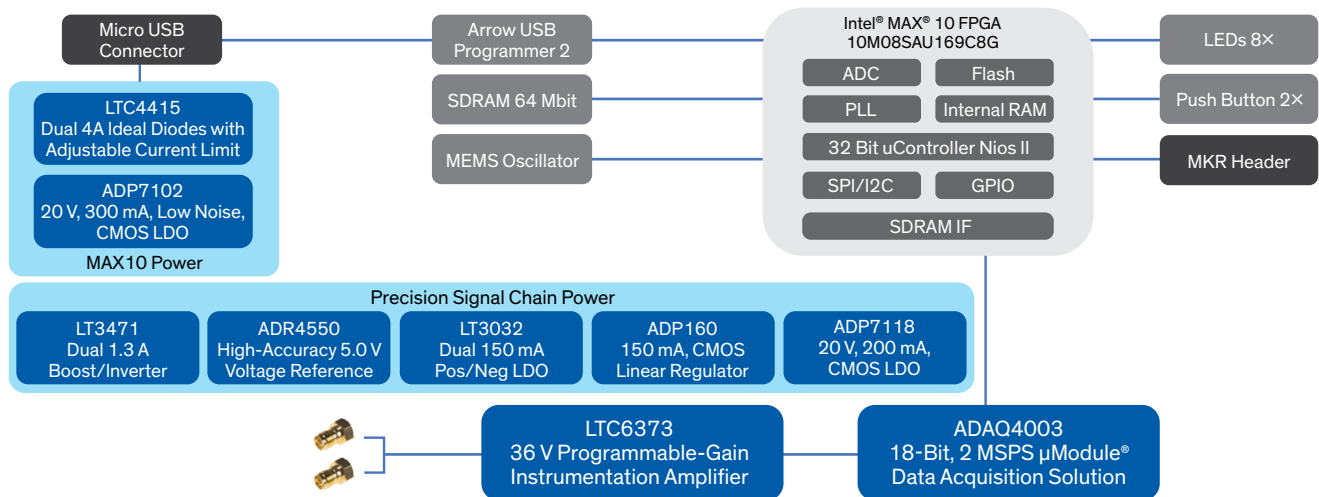## High-Accuracy Data Acquisition Platform
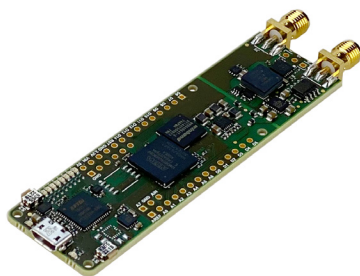
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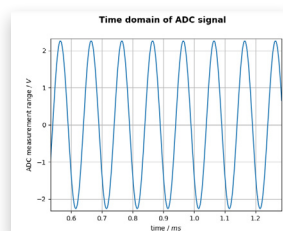
Jupyter notebook with Python code for demos that allow data collection out-of-the-box

DAQCapture Windows Application

Five Years Out

AnalogMAX-DAQ3 Block Diagram

Micro USB Connector

MAX10 Power
- LTC4415 Dual 4A Ideal Diodes with Adjustable Current Limit
- ADP7102 20 V, 300 mA, Low Noise, CMOS LDO

| Arrow USB Programmer 2 |
| SDRAM 64 Mbit |
| MEMS Oscillator |

Intel® MAX® 10 FPGA 10M08SAU169C8G
- ADC
- Flash
- PLL
- Internal RAM
- 32 Bit uController Nios II
- SPI/I2C
- GPIO
- SDRAM IF

| LEDs 8× |
| Push Button 2× |
| MKR Header |

Precision Signal Chain Power
- LT3471 Dual 1.3 A Boost/Inverter
- ADR4550 High-Accuracy 5.0 V Voltage Reference
- LT3032 Dual 150 mA Pos/Neg LDO
- ADP160 150 mA, CMOS Linear Regulator
- ADP7118 20 V, 200 mA, CMOS LDO

LTC6373 36 V Programmable-Gain Instrumentation Amplifier

ADAQ4003 18-Bit, 2 MSPS µModule® Data Acquisition Solution

Hardware Features

> High-accuracy, 18-bit, 2 MSPS µModule® (Analog Devices ADAQ4003)

> Power: Small foot-print, low-noise power design

> Memory: 64 Mb SDRAM memory and 64 Mb Secure Flash

> Dual high-speed USB to multipurpose UART/FIFO IC

> On-board Intel® MAX® 10 FPGA to combine and process data from multiple sensor inputs

Software and Demo Features

Precision data acquisition system evaluation demo

> Works out-of-the-box with the latest code and documentation all available on wiki and GitHub

> User experience includes intuitive demos featuring the Jupyter Notebook software tools or with the standalone Windows application DAQCapture. Jupyter notebook is flexible and extensible. DAQCapture is simple and easy to use. Both can be operated in a loopback mode, and do not require a source waveform

Key Components

Analog Signal Chain

> ADAQ4003: 18-bit, 2MSPS µModule® data acquisition solution

> LTC6373: 36V fully-differential programmable-gain instrumentation amplifier with 20pA input bias current

Processor

> Intel® MAX® 10 FPGA: Non-volatile low-cost FPGAs

Power

> LT3471: Dual 1.3A, 1.2 MHz boost/inverter in 3 mm × 3 mm DFN

> LT3032: Dual 150 mA positive/negative low noise low dropout linear regulator

> ADP160: Ultra-low quiescent current 150 mA, CMOS linear regulator

> ADR4550: High-accuracy 5.0 V voltage reference

> LTC4415: Dual 4A ideal diodes with adjustable current limit

Features of the ADAQ4003 18-Bit, 2 MSPS µModule® Data Acquisition Solution

> Low-power solution with guaranteed 18-bit no missing codes

> Throughput: 2 MSPS

> INL: +/-0.8 LSB typical

> SINAD: 99.5 dB typical at 1 kHz (Gain = 0.454)

> THD: −120 dB typical at 1 kHz, -100 dB at 100 kHz

Ordering Information

Part #: AnalogMAX-DAQ3

Documentation and Instructions

github.com/ArrowElectronics/AnalogMAX/wiki

Online

www.arrow.com/analogMAX

ARROW
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