

Electronics Solutions for Miniaturizing Lab-Grade Electrochemical Measurements



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AHEAD OF WHAT'S POSSIBLE™

Analog Devices, the Leader in Precision Measurement Electronics and Integrated Circuits

ADI brings integration, performance, and flexibility to electrochemical measurements from discrete signal chains all the way to complete embeddable system solutions.

ADI has been providing targeted integrated solutions for analytical instruments for more than 50 years and continues to push technological boundaries with recent releases that bring a full electrochemical toolbox to chip-scale measurement to enable rapid productization with software programmable functionality that gets your inventions out of the lab and into the market easily.

System Solutions

EmStat Pico

by PalmSens and Analog Devices

The EmStat Pico™ module is an embedded potentiostat that can be used in highly compact systems for electrochemical measurements. The EmStat Pico module supports most common electrochemical techniques in an ultra low power solution for long-term, remote site monitoring.



The EmStat Pico Module Supports:

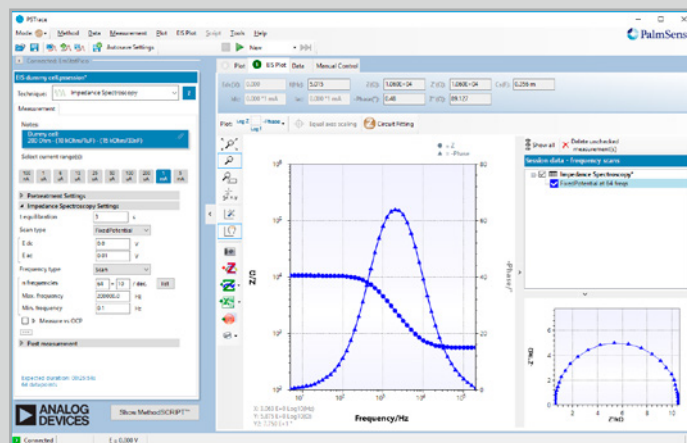
Voltammetric Techniques

(Can also be used for stripping voltammetry)

- ▶ Linear Sweep Voltammetry (LSV)
- ▶ Cyclic Voltammetry (CV)
- ▶ Square Wave Voltammetry (SWV)
- ▶ Differential Pulse Voltammetry (DPV)
- ▶ Normal Pulse Voltammetry (NPV)

Techniques as a Function of Time

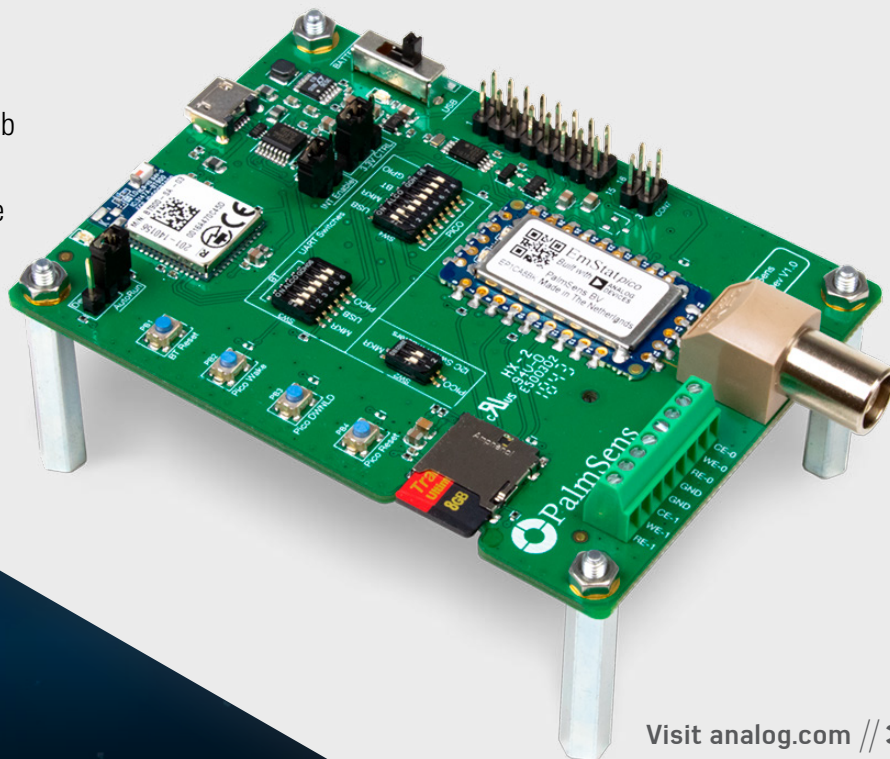
- ▶ Chronoamperometry (CA)
- ▶ Open-Circuit Potentiometry (OCP)
- ▶ Electrochemical Impedance Spectroscopy (EIS)



Full design kit available for fast, easy embedded design integration.

△ Use the PSTrace software to find the optimal settings for your experiment and extract the generated script for EmStat Pico. This script can be transferred directly into your (embedded) code for controlling EmStat Pico. EmStat Pico is Arduino MKR compatible.

- ▶ **Use this solution for:** complete lab grade electrochemical measurement system and software support package



System Reference Designs

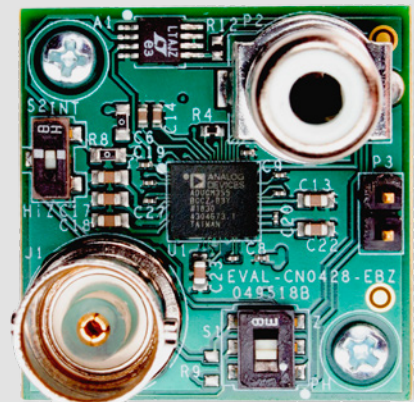
Analog Devices provides complete Circuits from the Lab[®] reference designs, using the latest integrated circuits to solve application-level design problems. Find our latest Arduino form factor reference designs for electrochemical-based liquid analysis and gas sensing that are ready for direct sensor interfacing.

Circuits from the Lab[®] Reference Designs

CN-0428: pH and Conductivity Water Quality Measurement System

This system is a modular sensing platform that allows users to design a flexible electrochemical water quality measurement solution. Its high level of integration enables an electrochemical measurement platform applicable to a variety of water quality probes including pH, oxidation reduction potential (ORP), and conductivity cells. An available full suite of electrochemical measurement functions enables firmware programmable temperature compensation, as well as calibration and diagnostic routines for enhanced sensor analytics.

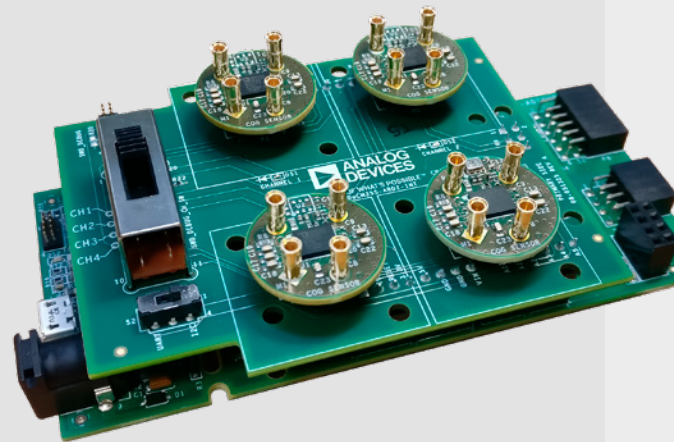
- ▶ **Use this solution for:** a complete electronics design for electrochemical liquid analysis with example firmware projects



CN-0429: Electrochemical Gas Measurement System with Sensor Diagnostics

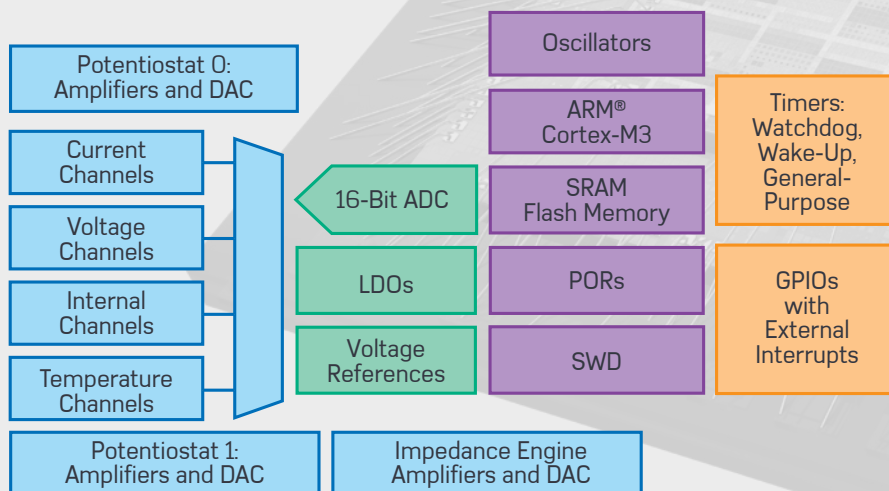
This potentiostat circuit platform is for common 2-lead, 3-lead, and 4-lead electrochemical gas sensors and it dramatically reduces cost, size, complexity, and power consumption at the sensor node. Using built-in diagnostics features (such as impedance spectroscopy or bias voltage pulsing and ramping), it is possible to inspect sensor health, compensate for accuracy drift due to aging or temperature, and estimate the remaining lifetime of the sensor right at the edge of the sensor network without user intervention.






- ▶ **Use this solution for:** a complete electronics design for electrochemical gas sensors with example firmware projects



Foundational, Highly Integrated IC Products for Electrochemistry

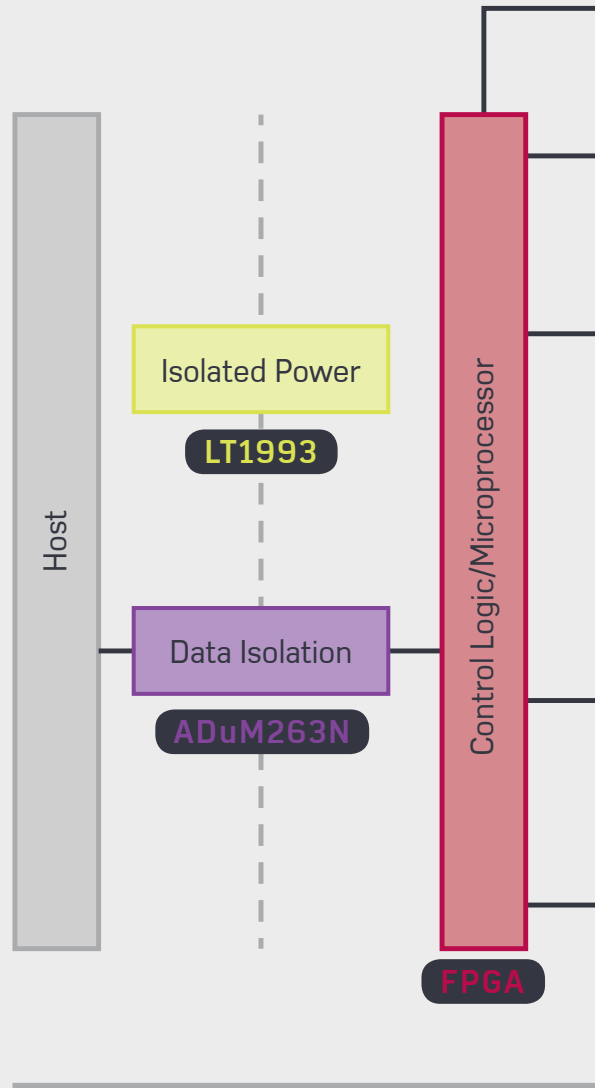
Analog Devices highly integrated measurement ICs reduce total solution size while providing added performance and flexibility. Integrated analog front ends make easily reusable designs, while integrated microcontroller products deliver full sensor-to-bits functionality.

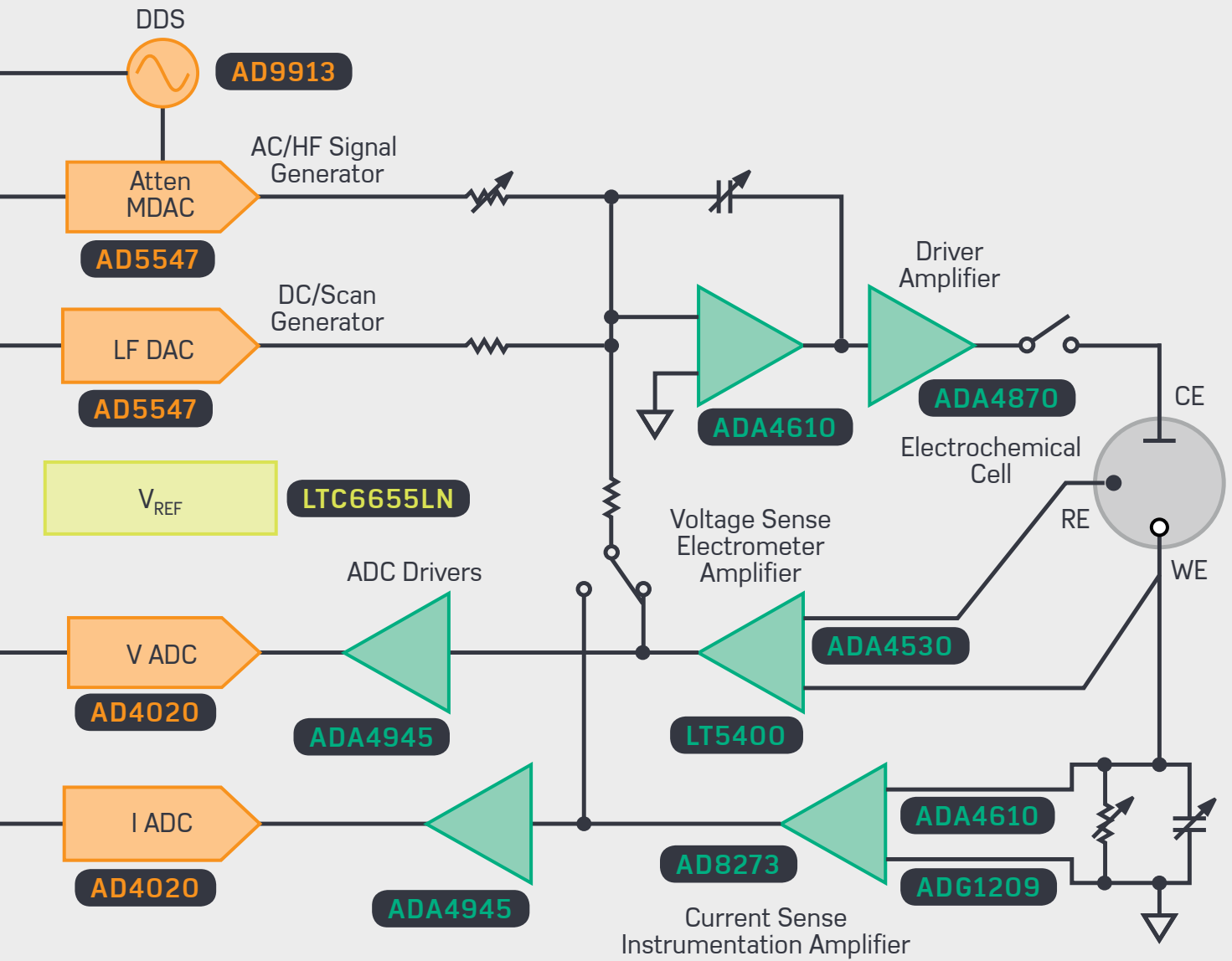


	Capability	Integrated MCU?	Use This Solution for
 ADuCM355	Dual potentiostat, full electrochemical measurement solution on chip with digital preprocessing and onboard Cortex®-M3	✓	Fulllest flexibility measurements with microcontroller where minimum solution size and lowest power are required
 AD5940	Single potentiostat analog front end for full electrochemical measurement solution on chip	✗	Fulllest flexibility integrated measurements that connect to an external microcontroller/processor
 ADuCM350	Configurable impedance converter and potentiostat with integrated microcontroller with USB PHY, display controller, and CapTouch®	✓	Integrated precision measurement solution with system integration features for portable device applications
 ADuCM360	Microcontroller with single/dual, 24-bit ADC signal chain	✓	Highest precision, general-purpose 24-bit data acquisition system with integrated microcontroller
 AD5933	1 MSPS, 12-bit impedance converter, network analyzer with 27 bits of frequency resolution	✗	Impedance calculation with highest resolution integrated direct digital synthesis (DDS)

Best-in-Class Signal Chains for Electrochemistry and Source Measurement

Analog Devices retains the marquee name in precision signal chain solutions. Our portfolio of highest performance amplifiers, ADCs, DACs, voltages references, and multiplexers provide ultimate design customizability and are routinely used in the industry's highest precision measurement instruments.



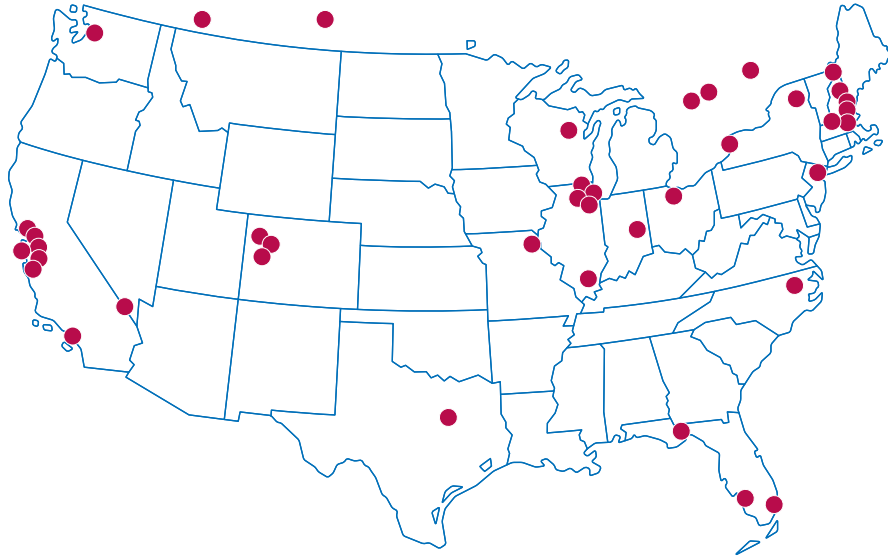


△ Example high performance potentiostat signal chain.

Interested in Professional Electronic Design Services?

Analog Devices' Design Partner Network (DPN) can help you connect to a Design Partner. The DPN is a collection of carefully selected independent design houses with engineering expertise and market experience in all Analog Devices' strategic areas of investment—from dc to light,

healthcare to communications, and consumer to industrial. The design houses ADI selects bring system-level knowledge in their areas of specialty, ensuring that they will be able to provide expert service in every aspect of product concept, development, test, and manufacturing.



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Circuits from the Lab Reference Designs

Circuits from the Lab reference designs are built and tested by ADI engineers with comprehensive documentation and factory-tested evaluation hardware.

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