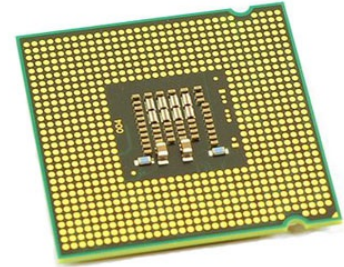


MCU 32-bit ARM Cortex M3 RISC 128KB Flash 3.3V 72-Pin LGA Tray

Manufacturers	Analog Devices, Inc
Package/Case	72-VFLGA
Product Type	Embedded Processors & Controllers
RoHS	Pb-free Halide free
Lifecycle	



Images are for reference only

Please submit RFQ for ADUCM355BCCZ or [Email to us: sales@ovaga.com](mailto:sales@ovaga.com) We will contact you in 12 hours.

[RFQ](#)

General Description

The ADuCM355 is an on-chip system that controls and measures electrochemical sensors and biosensors. The ADuCM355 is an ultralow power, mixed-signal microcontroller based on the Arm® Cortex™-M3 processor. The device features current, voltage, and impedance measurement capability.

The ADuCM355 features a 16-bit, 400 kSPS, multichannel successive approximation register (SAR) analog-to-digital converter (ADC) with input buffers, built-in antialias filter (AAF), and programmable gain amplifier (PGA). The current inputs include three transimpedance amplifiers (TIA) with programmable gain and load resistors for measuring different sensor types. The analog front end (AFE) also contains two low power amplifiers designed specifically for potentiostat capability to maintain a constant bias voltage to an external electrochemical sensor. The noninverting inputs of these two amplifiers are controlled by on-chip, dual output digital-to-analog converters (DACs). The analog outputs include a high speed DAC and output amplifier designed to generate an ac signal.

The ADC operates at conversion rates up to 400 kSPS with an input range of -0.9 V to $+0.9\text{ V}$. An input mux before the ADC allows the user to select an input channel for measurement. These input channels include three external current inputs, multiple external voltage inputs, and internal channels. The internal channels allow diagnostic measurements of the internal supply voltages, die temperature, and reference voltages.

Two of the three voltage DACs are dual output, 12-bit string DACs. One output per DAC controls the noninverting input of a potentiostat amplifier, and the other controls the noninverting input of the TIA.

The third DAC (sometimes referred to as the high speed DAC) is designed for the high power TIA for impedance measurements. The output frequency range of this DAC is up to 200 kHz.

A precision 1.82 V and 2.5 V on-chip reference source is available. The internal ADC and voltage DAC circuits use this on-chip reference source to ensure low drift performance for all peripherals.

The ADuCM355 integrates a 26 MHz Arm Cortex-M3 processor, which is a 32-bit reduced instruction set computer (RISC) machine. The Arm Cortex-M3 processor also has a flexible multichannel direct memory access controller (DMA) supporting two independent serial peripheral interface (SPI) ports, universal asynchronous receiver/transmitter (UART), and I2C communication peripherals. The ADuCM355 has 128 kB of nonvolatile flash/EE memory and 64 kB of single random access memory (SRAM) integrated on-chip.

The digital processor subsystem is clocked from a 26 MHz on-chip oscillator. The oscillator is the source of the main digital die system clock. Optionally, a 26 MHz phase-locked loop (PLL) can be used as the digital system clock. This clock can be internally subdivided so that the

processor operates at a lower frequency and saves power. A low power, internal 32 kHz oscillator is available and can clock the timers. The ADuCM355 includes three general-purpose timers, a wake-up timer (which can be used as a general-purpose timer), and a system watchdog timer.

The analog subsystem has a separate 16 MHz oscillator used to clock the ADC, DACs, and other digital logic on the analog die. The analog die also contains a separate 32 kHz, low power oscillator to clock a watchdog timer on the analog die. Both the 32 kHz oscillator and this watchdog are independent from the digital die oscillators and system watchdog timer.

A range of communication peripherals can be configured as required in a specific application. These peripherals include UART, I2C, two SPI ports, and general-purpose input/output (GPIO) ports. The GPIOs, combined with the general-purpose timers, can be combined to generate a pulse-width modulation (PWM) type output.

Nonintrusive emulation and program download are supported via the serial wire debug port (SW-DP) interface.

The ADuCM355 operates from a 2.8 V to 3.6 V supply and is specified over a temperature range of -40°C to $+85^{\circ}\text{C}$. The chip is packaged in a 72-lead, 6 mm \times 5 mm land grid array (LGA) package.

Note that, throughout this data sheet, multifunction pins, such as P0.0/SPIO_CLK, are referred to either by the entire pin name or by a single function of the pin, for example, P0.0, when only that function is relevant.

Features

16-bit, 400 kSPS ADC

Voltage, current, and impedance measurement capability

Internal and external current and voltage channels

Ultralow leakage switch matrix and input mux

Input buffers, PGA

Voltage DACs

Two dual output voltage DACs

Output range: 0.2 V to 2.4 V (± 2.2 V voltage potential to sensor) for 12-bit outputs

Two bias potentiostat and TIA amplifiers

Ultra low power, 1 μA per amplifier

One high speed 12-bit voltage DAC

Output range to sensor: -607 mV to $+607$ mV

High speed TIA for impedance measurements

Programmable gain amplifier on output

Amplifiers, accelerators, and references

Two low power, low noise amplifiers

Suitable for potentiostat bias in electrochemical sensing

Two low power, low noise TIAs

Application

Gas detection

Food quality

Environmental sensing (air, water, and soil)

Blood glucose meters

Life sciences and biosensing analysis

Bioimpedance measurements

General amperometry, voltammetry, and impedance spectroscopy functions

Suitable for measuring sensor current output in the $\pm 0.00005 \mu\text{A}$ to $\pm 3000 \mu\text{A}$ range

Programmable load and gain resistors

Analog hardware accelerators

Digital waveform generator (refer to the ADuCM355 Hardware Reference Manual)

DFT and digital filters

2.5 V and 1.82 V on-chip, precision voltage references

Internal temperature sensor, $\pm 2^\circ\text{C}$ accurate

Impedance measurement range of $< 1 \Omega$ to $10 \text{ M}\Omega$, 0.016 Hz to 200,000 Hz

Voltammetry scan rate up to 2000 steps per second

Microcontroller

26 MHz Arm Cortex-M3 processor

Serial wire port supports code download and debugging

128 kB flash/64 kB of SRAM

Security and safety

Hardware cyclic redundancy check (CRC) with programmable polynomial generator (refer to the ADuCM355 Hardware Reference Manual)

Read and write protection of user flash

On-chip peripherals

UART, I2C, and SPI serial input/output

Up to 17 GPIO pins

External interrupt option

General-purpose, wake-up, and watchdog timers

Power

2.8 V to 3.6 V supply and active measurement range

Power supply monitor

Active current consumption: $30 \mu\text{A}/\text{MHz}$ for digital section

Hibernate with bias to external sensor: $8.5 \mu\text{A}$

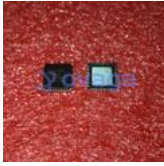
Shutdown mode with no SRAM retention: $2 \mu\text{A}$

Package and temperature range

6 mm × 5 mm, 72-lead LGA package

Fully specified for -40°C to +85°C ambient operation

Related Products



[ADUC7022BCPZ62](#)

Analog Devices, Inc
LFCSP-40



[ADUC7020BCPZ62](#)

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[ADUC841BSZ62-5](#)

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QFP-52



[ADUC841BSZ62-3](#)

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QFP-52



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[ADSP-BF527BBCZ-5A](#)

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BGA-208



[ADSP-21369BBPZ-2A](#)

Analog Devices, Inc
SBGA-256



[ADSP-BF561SBBCZ-5A](#)

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CSPBGA-256