

MAX30131/MAX30132/ MAX30134

1-, 2-, 4-Channel, Ultra-Low Power Electrochemical Sensor AFEs

General Description

The MAX30131/MAX30132/MAX30134 are 1-, 2-, and 4-channel (respectively) ultra-low power programmable analog front ends (AFE) for use with electrochemical sensors. The devices provide the biasing and complete measurement path, including the analog to digital converters (ADCs). The flexibility of the MAX30131/MAX30132/MAX30134 enables them to work with both two and three terminal electrochemical sensors, providing both DC current measurement and electrochemical impedance spectroscopy (EIS) measurement capability. The devices include an internal temperature sensor and programmable voltage reference to support external temperature monitoring, and an external reference source to integrate voltage monitoring of bias and supply voltages for safety and compliance.

The MAX30131/MAX30132/MAX30134 support single-, dual-, and quad- two-terminal or three-terminal electrochemical sensors, respectively. Ultra-low power allows for the continuous biasing of the sensor to maintain accuracy and fast response when a measurement is required. The MAX30131/MAX30132/MAX30134 operate over a 1.73V to 5.0V voltage range. Total current consumption can be less than 5 μ A depending on the configuration, measurement frequency, and number of sensors. Communication is through a 4-pin SPI serial interface plus a configurable interrupt pin and four configurable general purpose input/outputs (GPIOs) for direct control of internal functions.

The MAX30131/MAX30132/MAX30134 are available in a 25-bump WLP package and operate over a 0°C to +70°C temperature range.

Applications

- Electrochemical Sensors
- Continuous Glucose Monitors
- Sweat Sensors
- Wearable Devices

Benefits and Features

- Multichannel Operation
 - Up to Four Independent DC Channels
 - 1 Switchable EIS Channel
- High Accuracy and Precision
 - Up to Four 12-Bit Voltage DACs
 - Up to Four 16-Bit Current ADCs
 - Programmable 0.8pA to 30pA Resolution
 - One 16-Bit EIS ADC
 - Programmable 0.014Hz to 27kHz Sine Wave Drive
 - 12-Bit Voltage System ADC
 - 16-Bit Temperature Sensor
 - Programmable, 30ppm/°C Voltage Reference
- Autonomous Modes with 256 Word Configurable FIFO and Programmable Alarm
- Long Battery Life for 2- and 3-Terminal Sensors
 - 3.5 μ A Continuous Bias Supply Current for Single 2- or 3-Terminal Sensor
 - Add 0.25 μ A for Each Additional Sensor
- Small Size
 - 25-Bump WLP 2.93mm x 2.93mm
- Safety and Compliance
 - Monitor Sensor Bias Voltages for Compliance
 - Monitor Supply/Battery Voltage and Temperature
- Simple and Robust Digital Interface
 - 8MHz 4-Wire SPI Interface
 - Programmable Interrupt
 - Four Programmable GPIOs
- IEC61000-4-2 ESD: \pm 15kV Air, \pm 8kV Contact On Sensor Pins

Visit [Web Support](#) to complete the nondisclosure agreement (NDA) required to receive additional product information.

[Ordering Information](#) appears at end of data sheet.

19-100638; Rev 5; 2/25

© 2025 Analog Devices, Inc. All rights reserved. Trademarks and registered trademarks are the property of their respective owners.

One Analog Way, Wilmington, MA 01887 U.S.A. | Tel: 781.329.4700 | © 2025 Analog Devices, Inc. All rights reserved.

MAX30131/MAX30132/
MAX30134

1-, 2-, 4-Channel, Ultra-Low Power
Electrochemical Sensor AFEs