# Artasie Real-Time Clock - AM1815

Product Brief

The Ambiq® Artasie Real-Time Clock AM1815 with Power Management provides a groundbreaking combination of ultra-low power coupled with a highly sophisticated feature set. With power requirements significantly lower than any other industry RTC (as low as 14 nA), these are the first semiconductors based on Ambiq's innovative SPOT® (Subthreshold Power Optimized Technology) CMOS platform.
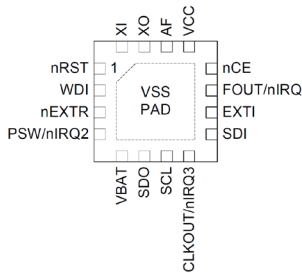
Pin Configuration Diagram for Ambiq Artasie RTC - AM1815

The AM1815 includes on-chip oscillators to provide minimum power consumption, full RTC functions including battery backup and programmable counters and alarms for timer and watchdog functions, and a SPI serial interface for communication with a host controller. An integrated power switch and a sophisticated system sleep manager with counter, timer, alarm, and interrupt capabilities allows the AM1815 to be used as a supervisory component in a host microcontroller based system.
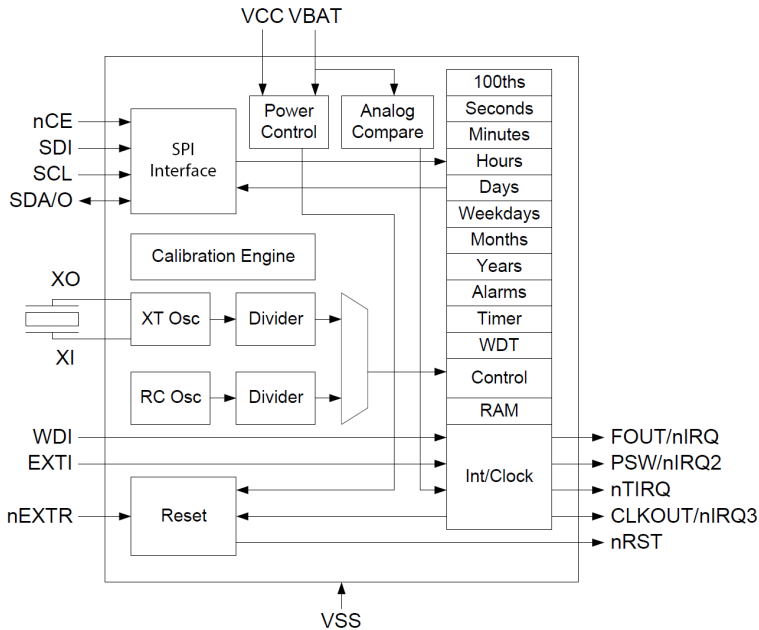
Detailed Functional Block Diagram for Ambiq Artasie RTC - AM1815
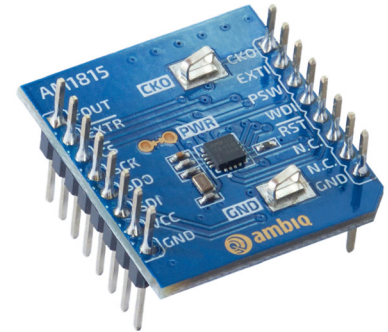
Ambiq Artasie RTC - AM1815 EVB

Feature Highlights:

- Serves as a companion part for host processors including microcontrollers, radios, and digital signal processors.

- Includes three distinct feature groups: 1) baseline timekeeping, 2) advanced timekeeping, and 3) power management.

- Baseline timekeeping feature group supports the standard 32.786 kHz crystal (XT) oscillation mode for maximum frequency accuracy with an ultra-low current draw of 55 nA.

- Advanced timekeeping feature group supports two additional oscillation modes: 1) RC oscillator mode, and 2) Autocalibration mode.

- A proprietary calibration algorithm allows the AM1815 to digitally tune the RC oscillator frequency and the XT oscillator frequency with accuracy as low as 2 ppm at a given temperature.

- Includes a finite state machine that can control a host processor as it transitions between sleep/reset states and active states.

- Integrates a power switch with ~1 Ω impedance that can be used to cut-off ground current on the host microcontroller and reduce sleep current to <1 nA.

Features and Specifications

Ultra-Low Supply Current

- 14 nA with RC oscillator
- 22 nA with RC oscillator and Autocalibration
- 55 nA with crystal oscillator

Baseline Timekeeping

- 3x GPIO Outputs
- 32.768 kHz crystal oscillator with integrated load capacitor/resistor
- Counters for hundredths, seconds, minutes, hours, date, month, year, century, and weekday
- Alarm capability on all counters
- Programmable output clock generation (32.768 kHz to 1 year)
- Countdown timer with repeat function
- Automatic leap year calculation

Advanced Timekeeping

- Integrated power optimized RC oscillator
- Advanced crystal calibration to $\pm$ 2 ppm
- Advanced RC calibration to $\pm$ 16 ppm
- Automatic calibration of RC oscillator to crystal oscillator
- Watchdog timer with hardware reset
- 256 bytes of general purpose RAM

Power Management

- Integrated ~1Ω power switch for off-chip components such as a host MCU
- System sleep manager for managing host processor wake/sleep states
- External reset signal monitor
- Reset output generator
- Supercapacitor trickle charger with programmable charging current
- Automatic switchover to Voltage of the Battery (VBAT)
- External interrupt monitor
- Programmable low battery detection threshold
- Programmable analog voltage comparator

Ultra-low Power Flexible Serial Peripherals

- 3-wire or 4-wire SPI (up to 2 MHz) serial interface

Wide Operating Range

- Operating Voltage: 1.5-3.6 V,
- Clock and RAM Retention Voltage: 1.5-3.6 V
- Operating Temperature: -40°C to 85°C
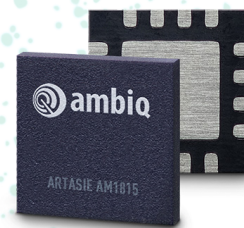- All inputs include Schmitt Triggers

Applications

- Smart Cards
- Wireless Sensors and Tags
- Medical Electronics
- Utility Meters
- Data Loggers
- Appliances
- Handsets
- Consumer Electronics
- Consumer Equipment

Package Option

- 3 mm x 3 mm 16-pin QFN package (also available in wafer form)

Ordering Information

- AM1815AQ
- AM1815SPIEVB (EVB)

Artasie RTC AM1815AQ

Product images shown are for illustration purposes only and may not be an exact representation of the products.