Atmel®



Atmel | SMART SAM R21

ARM® Cortex®-M0+ based IEEE 802.15.4 Wireless MCUs

The Atmel® | SMART SAM R21 series of low-power microcontrollers (MCUs) combines the 32-bit ARM® Cortex®-M0+ processor and an integrated ultra-low-power 2.4GHz ISM band transceiver. These devices are available in 32- and 48-pin packages with up to 256KB Flash, and 32KB of SRAM. They deliver a maximum operating frequency of 48MHz and reach 2.14 CoreMark/MHz. SAM R21 devices are designed for simple and intuitive migration with identical peripheral modules, hex compatible code, identical linear address map, and pin compatible migration paths between all devices in the product series. All devices include intelligent and flexible peripherals, Atmel Event System for inter-peripheral signaling, and support for capacitive touch button, slider and wheel user interfaces.

Key Benefits

High performance

- 48MHz operation
- 2.14 CoreMark/MHz
- Single-cycle IO access
- 12-channel event system
- 12-channel DMA

Low power

- < 70µA/MHz
- <3.5µA RAM retention and RTC
- Internal and external oscillators
- On-the-fly clock switching and prescaling

Robust peripheral set

- Ultra-low-power 2.4GHZ transceiver
- Up to five serial communication modules (SERCOM) configurable as UART/USART, SPI or I^2C
- Up to three 16-bit Timer/Counters
- Peripheral Touch Controller that supports buttons, sliders, wheels and proximity with up to 48 channels
- Real Time Clock (RTC) and Calendar with leap year correction and 1ppm calibration
- 12-bit 300kbps ADC
- Full Speed USB device and host

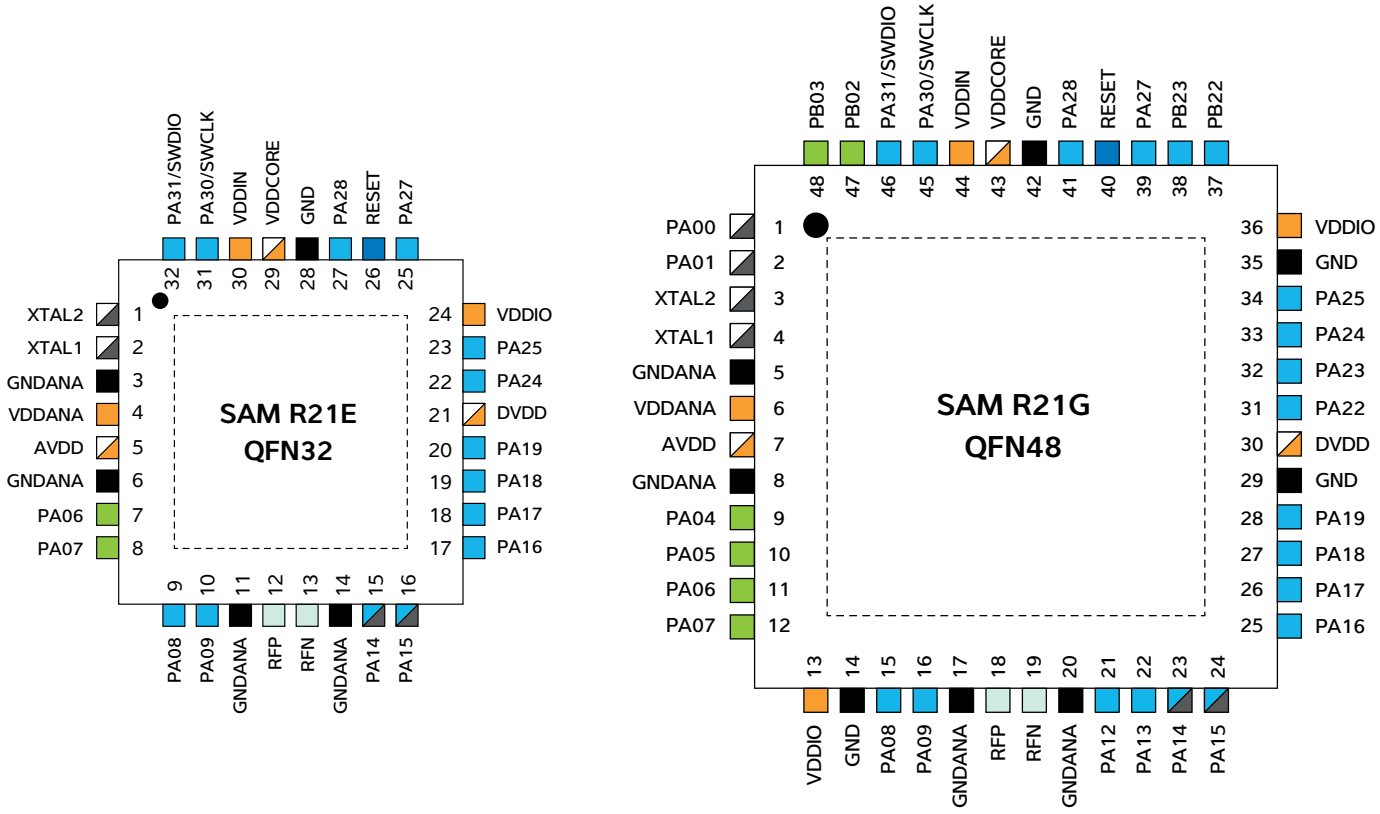
World-class tools

- SAM R21 Xplained Pro starter kits – $39
- Atmel Studio with compiler support – Free
- Atmel Software Framework – Free
- Low-level drivers and stacks – Free

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ARM® Cortex®-M0+ Processor

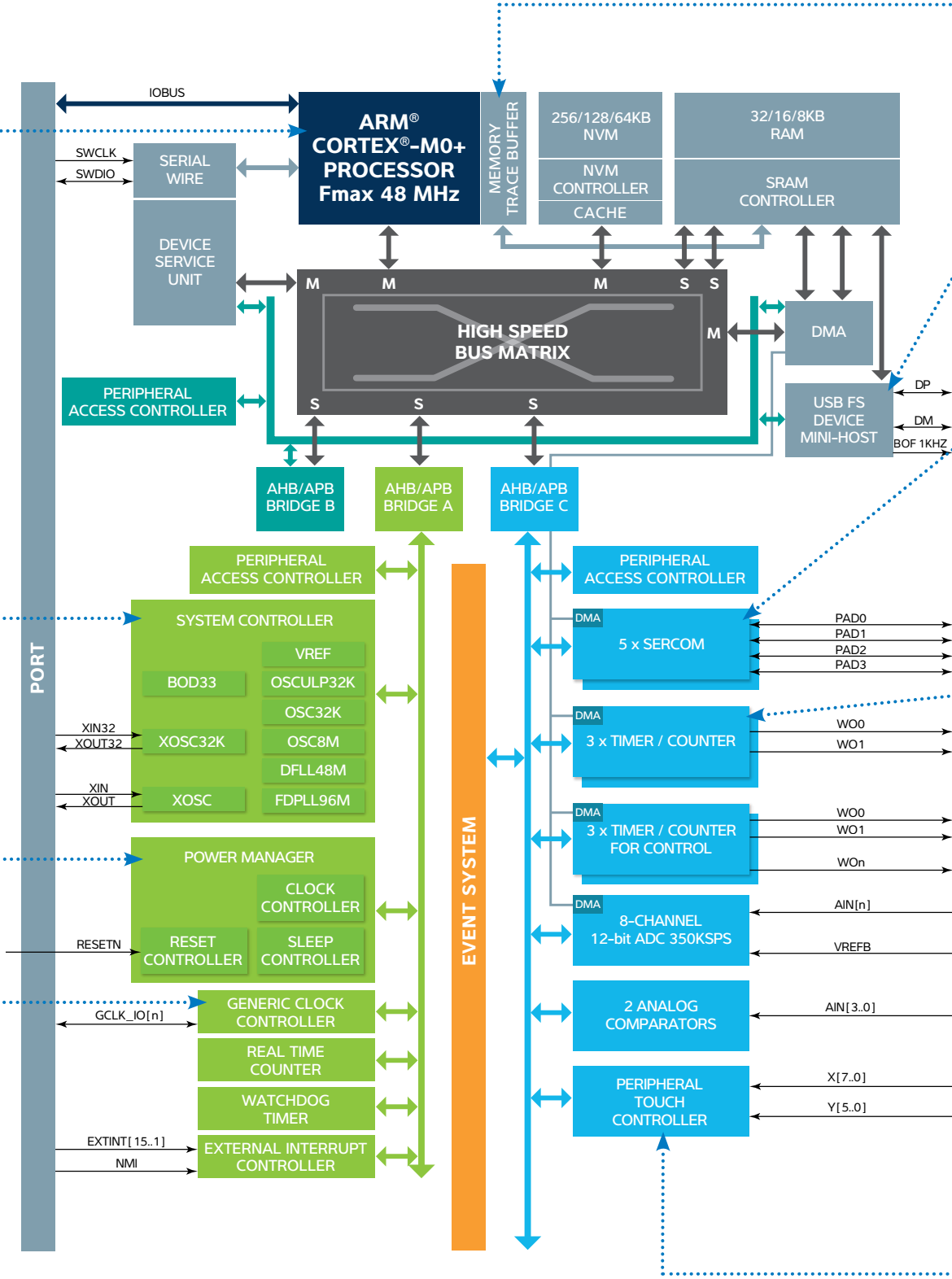
The most energy-efficient ARM processor yet, the ARM Cortex-M0+ builds on the ARM Cortex-M0 processor—retaining its full instruction set and tool compatibility—while further reducing energy consumption and increasing performance. The SAM R21 ARM Cortex-M0+ based MCUs operate at 48MHz and feature a two-stage pipeline, single-cycle I/O access, single-cycle 32x32 multiplier, event system, and a fast and flexible interrupt controller. They are also highly efficient, reaching 2.14 CoreMark/MHz – 0.93 DMIPS/MHz.



The SAM R21 series consists of two pin- and code-compatible product series and a total of 24 different microcontrollers. They all use the same processor, bus matrix, interrupt system and other core features, but they are differentiated in regards to pin counts, memories, peripheral mix and temperature grades.

Low Power

The SAM R21 MCU implements a wide range of features to drive down power consumption, including low-power oscillators, clock gating and prescaling, Atmel SleepWalking™ technology and a proprietary low-power process. All this enables 70µA/MHz in active mode and <3.5µA with full RAM retention and RTC running in Sleep mode.



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FS USB 2.0

SAM R21 products feature Full Speed USB device and embedded host. In Device mode, a device can operate from the internal RC oscillator giving you a minimum Bill of Materials (BoM) implementation of a USB device. The USB drivers are available from Atmel through the Atmel Software Framework.

SERCOM

SAM R21 devices feature multiple instances of the Serial Communication Module (SERCOM). The SERCOM is configurable to operate as I^2C, SPI or USART, giving developers extended flexibility to mix serial interfaces and greater freedom in PCB layout. Each SERCOM instance can be assigned to different I/O pins through I/O multiplexing, further increasing versatility.

Timers/Counters

SAM R21 devices include multiple instances of 16-bit Timer/Counters (TC). Each TC can be individually programmed to perform frequency and waveform generation, accurate program execution timing, and input capture with time and frequency measurement of digital signals. Each TC can be configured to operate as 2x8-bit timers, as a 16-bit timer, and two TCs can be combined to a 32-bit TC. In addition, the SAM R21 features a 32-bit RTC with full calendar and leap year support.

Timers/Counters for Control

SAM R21 devices have T/CCs, these are Timers/Counters for control applications like switch mode power supplies, lighting and motor control. The T/CCs support up to 96MHz and 24 bit resolution.

PORT

Micro Trace Buffer

The Micro Trace Buffer available in selected SAM R21 devices enables enhanced on-chip debugging with trace capabilities supported by Atmel and third-party debuggers.

Peripheral Touch Controller

An embedded peripheral touch controller (PTC) makes it easy to add capacitive touch sensing to your project with buttons, sliders, wheels and proximity. By offering superb sensitivity and noise tolerance as well as self-calibration, the PTC eliminates the need for external components and minimizes CPU overhead. The PTC supports up to 48 channels on the 48-pin devices, and 12 channels on the 32-pin devices.

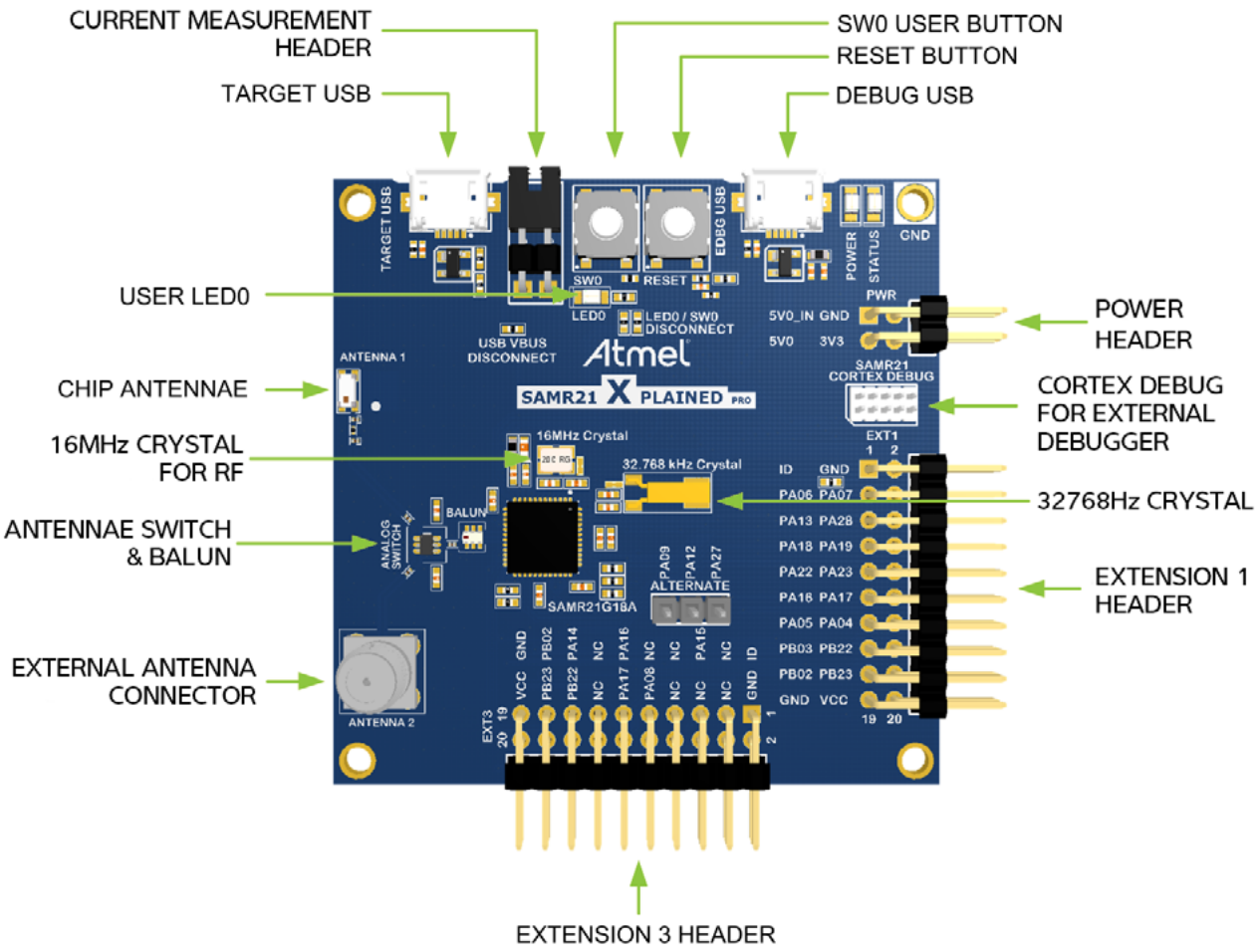
Hardware and Software Tools

Prototype your designs with the Atmel | SMART SAM R21 Xplained Pro, which incorporates an embedded programmer and debugger. If you prefer to use a standalone programmer/debugger, Atmel SAM-ICE™, JTAGICE3 and Atmel-ICE debuggers fully supports the SAM R21 series. Atmel Studio and the Atmel Software Framework also support the SAM R21 products, providing an easy-to-use and low-cost development platform to reduce your time to market.

Hardware and Software Tools

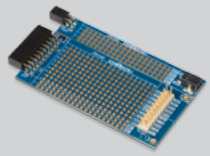
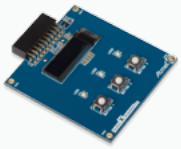
The Xplained Pro board available for the SAM R21 is perfect for rapid prototyping and development. It features an embedded programmer and debugger, and easily connects to your computer and Atmel Studio. Several expansion wings are available for Xplained Pro boards. The wings enable evaluation of different interfaces and peripherals. Wings are also available from third parties.

Xplained Pro boards are available for the SAM R21 wireless microcontrollers



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Extension Boards

	The PROTO1 extension provides a breadboarding area for general prototyping with the SAM R21 Xplained Pro boards.
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	The OLED1 wing connects a 128x32 OLED display, LEDs and buttons to the Xplained Pro.

Ordering Information: SAM R21 Series

SAM R 21 G 18 A – M U T

Product Family
SAM R = Low Power Wireless MCU

Product Series
21 = D21 + 2.4GHz TRX, USB, DMA, TCC, I²C

Pin Count
E = 32 pins
G = 48 pins

Memory Density
16 = 64kB
17 = 128kB
18 = 256kB

Marketing Revision
A = Initial Revision

Package type
M = QFN

Plating material and temp grade
U = -40 — 85˚C Matte Sn plating
F = -40 — 125˚C Matte Sn plating

Package carrier
T = Tape & Reel
No character = Tray (Default)







Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T :** (+1)(408) 441. 0311 **F :** (+1)(408) 436. 4200 | **www.atmel.com**

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