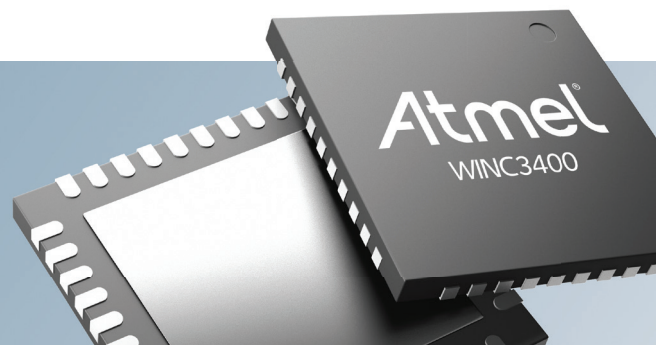# SmartConnect WINC3400
Wireless Network Controller

The Atmel® SmartConnect ATWINC3400 is a single-chip IEEE 802.11 b/g/n RF/Baseband/MAC network controller and Bluetooth® 4.0 Low Energy (BLE) compliant module optimized for low-power mobile applications. It supports single stream 1x1 802.11n mode, providing up to 72 Mbps throughput. The ATWINC3400 device features a fully integrated power amplifier, LNA, switch and power management, as well as an on-chip microcontroller (MCU) and integrated Flash memory for system software. Implemented in 65nm CMOS technology, it offers very low power consumption while simultaneously providing high performance and a minimal bill of materials.

The ATWINC3400 wireless network controller utilizes highly optimized coexistence protocols. It provides multiple peripheral interfaces, including UART, SPI, I2C, and SDIO. For simplicity, both Wi-Fi and BLE can run on a single peripheral interface (SPI).

The only external clock sources required is a high-speed crystal or oscillator with a wide range of reference clock frequencies supported (14-40 MHz) and a 32.768 kHz clock for sleep operation. The device is available in QFN packaging.

Key Features

IEEE 802.11

- IEEE 802.11 b/g/n RF/PHY/MAC SoC
- IEEE 802.11 b/g/n (1x1) for up to 72 Mbps
- Single spatial stream in 2.4GHz ISM band
- Integrated PA and T/R switch
- Superior sensitivity & range via advanced PHY signal processing
- Advanced equalization and channel estimation
- Advanced carrier and timing synchronization
- Wi-Fi Direct and Soft-AP support
- Supports IEEE 802.11 WEP, WPA, WPA2 security
- Superior MAC throughput via hardware accelerated two-level A-MSDU/A-MPDU frame aggregation and block acknowledgement
- On-chip memory management engine to reduce host load
- SPI, SDIO, I2C, and UART host interfaces
- Operating temperature range of -30°C to +85°C
- Fast boot options:
  - On-chip boot ROM (firmware instant boot)
  - SPI flash boot (firmware patches and state variables)
  - Low-leakage on-chip memory for state variables
  - Fast AP re-association (150ms)
- On-chip network stack to offload MCU:
  - Integrated Nnetwork IP stack to minimize host CPU requirements
  - Network features: TCP, UDP, DHCP, ARP, HTTP, SSL, and DNS

Bluetooth Low Energy

- Bluetooth 4.0 low energy (BLE) technology
- Class 1 & 2 transmission
- Adaptive frequency hopping
- HCI (Host Control Interface) via SPI (or UART)
- Integrated PA and T/R switch
- Superior sensitivity and range

Target Applications

- IoT applications
- Smart appliances
- Healthcare
- Home automation
- Consumer electronics
- Industrial automation
- Mobile applications
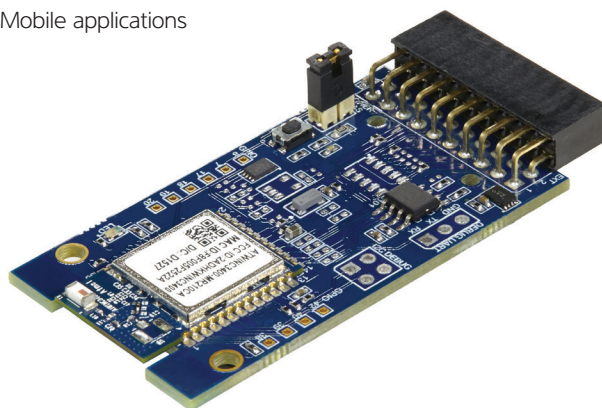
Power Architecture and Consumption

The ATWINC3400 has multiple device states, depending on the state of the 802.11 and Bluetooth subsystems. It is possible for both subsystems to be active at the same time. To simplify the device power consumption breakdown, the following basic states—for which only one subsystem can be active at a time—are defined as follows:

- WiFi_ON_Transmit: Device is actively transmitting an 802.11 signal
- WiFi_ON_Receive: Device is actively receiving an 802.11 signal
- BT_ON_Transmit: Device is actively transmitting a Bluetooth signal
- BT_ON_Receive: Device is actively receiving a Bluetooth signal
- Doze: Device is neither transmitting nor receiving (device state is retained)
- Power_Down: Device is powered down with CHIP_EN low and supplies connected

Accelerating RF Design

To help designers accelerate development, the ATWINC3400A-MU is offered as a single chip, module, or evaluation kit for fast integration.
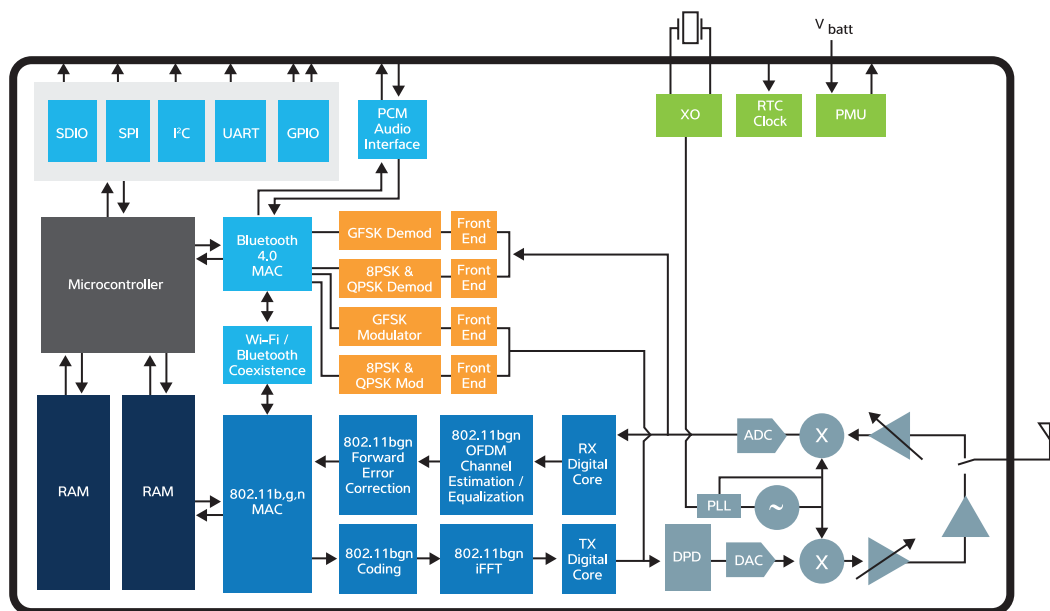
Ordering Codes	Description
ATWINC3400A-MU	Single-chip IEEE 802.11 b/g/n RF/Baseband/MAC network controller and BLE 4.0
ATWINC3400-MR210CA	Fully certified WINC3400 with chip antenna
ATWINC3400-WING	Evaluation kit, fully certified WINC3400 with chip antenna
ATWINC3400-XSTK	Evaluation kit, including Atmel® │ SMART SAMD21 MPU and WINC3400 network controller