

# NXP® 88MW32X 802.11N WI-FI® MICROCONTROLLER SOC

High integration and low-power operation in the 88MW320/322 WLAN microcontroller system-on-chip (SoC), making it an ideal solution for low-cost, high efficiency smart device, appliance, and energy applications.

## PRODUCT OVERVIEW

Several features of the NXP 88MW320/322 SoC enable low system costs and high WLAN protocol processing. For example, the high degree of integration in the SoC requires only one 3.3 V power input, a 38.4 MHz crystal and SPI flash, while the RF path needs only a low-pass filter for antenna connection.

Proven and mature IEEE 802.11n/g/b NXP technology powers a full-featured WLAN subsystem in the SoC. This WLAN subsystem integrates a WLAN MAC, baseband, and direct-conversion RF radio with integrated PA, LINA and transmit/receive switch. It also integrates a CPU subsystem with integrated memory to run NXP WLAN firmware to handle real-time WLAN protocol processing to offload many WLAN functions from the main application CPU.

An Arm® Cortex®-M4F CPU that operates up to 200 MHz powers the 88MW320/322 application subsystem. The device supports an integrated 512 KB SRAM, 128 KB mask ROM and a QSPI interface to external flash. An integrated flash controller with a 32 KB SRAM cache enables execute in place (XIP) support for firmware from flash.

The SoC is designed for low-power operation and includes several low-power states and fast wake-up times. Multiple power domains and clocks can be individually shut down to save power. The SoC also has a high-efficiency internal PA that can be operated in low-power mode to save power. The microcontroller and WLAN subsystems can be placed into low-power states, independently, supporting a variety of application use cases. An internal DC-DC regulator provides the 1.8 V rail for the WLAN subsystem.

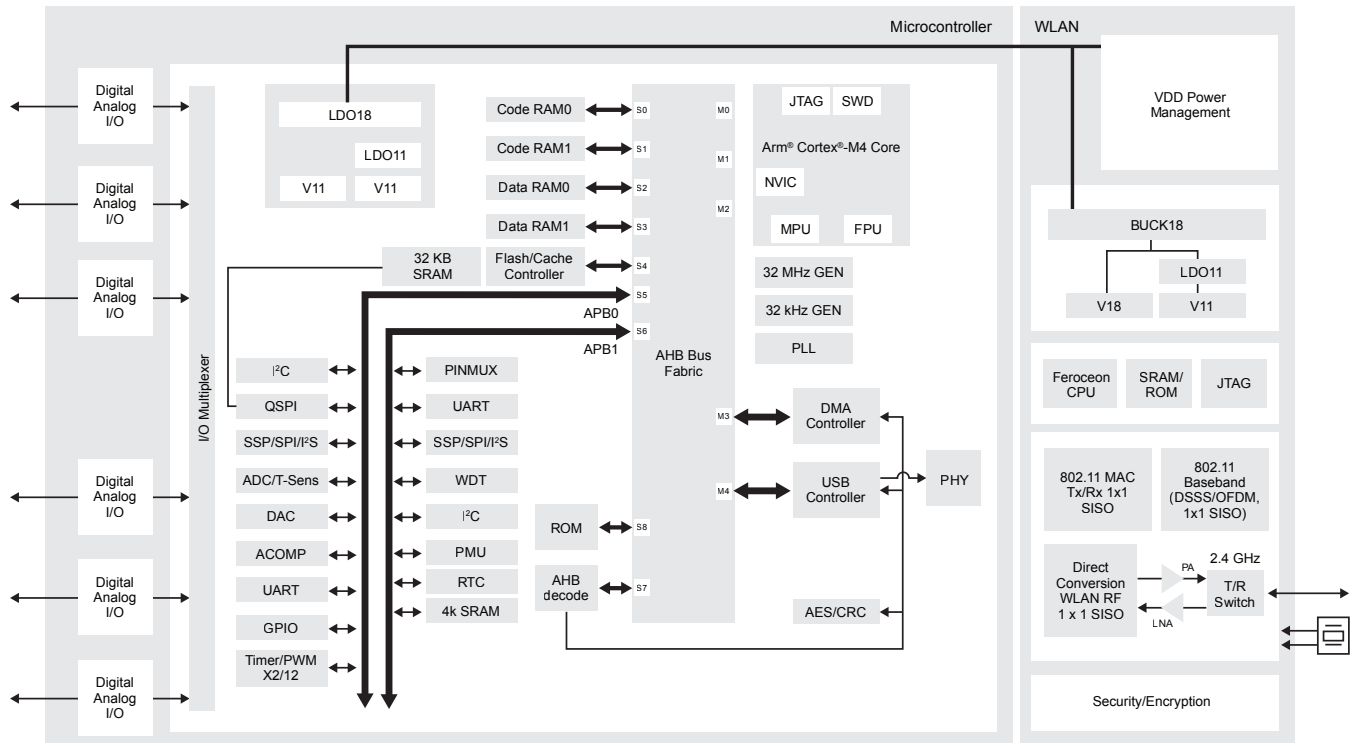


The SoC provides a full array of peripheral interfaces including SSP/SPI/I<sup>2</sup>S (3x), UART (3x), I<sup>2</sup>C (2x), general-purpose timers and PWM, ADC, DAC, analog comparator, and GPIOs. It also includes a hardware cryptographic engine, RTC, and watchdog timer.

The 88MW322 SoC includes a high-speed USB On-The-Go (OTG) interface to enable USB audio, video and other applications.

A complete set of digital and analog interfaces enables direct interfacing for I/O and avoids the need for external chips. The application CPU can be used to support custom application development and avoids the need for another microcontroller or processor.

**88MW32X BLOCK DIAGRAM**



**APPLICATIONS**

- Smart Home—smart outlet, light switch, security camera, thermostat, sprinkler controller, sensor, door lock, door bell, garage door, security system
- Industrial—building automation, smart lighting, Wi-Fi to other radio bridge, point of sale (POS) terminals
- Smart Devices—coffee pot, rice cooker, vacuum cleaner, air purifier, pet monitor, weighing scale, glucometer, blood pressure monitor, fitness equipment
- Smart Appliances—refrigerator, washer, dryer, oven range, microwave, dishwasher, water heater, air conditioner
- Smart Accessories—smart speakers, headset, alarm clock, gaming accessory, remote control
- Gateways—Bluetooth Smart Mesh and other radios to Wi-Fi/IP network

**KEY FEATURES**

- Highly integrated SoC requiring very few external components for a full system operation

- Multiple low-power modes and fast wake-up times
- Full-featured, single stream 802.11n/g/b WLAN
- High-efficiency PA with a low-power (10 dB) mode
- Cortex-M4F application CPU for applications with integrated 512 KB SRAM and 128 KB mask ROM
- Flash controller with embedded 32 KB SRAM cache to support XIP from external SPI flash
- Secure boot
- Full set of digital and analog I/O interfaces

**POWER MANAGEMENT**

- Power modes—active, idle, standby, sleep, shutoff, power-down
- Integrated high-efficiency buck DC-DC converter
- Independent power domains
- Brown-out detection
- Integrated POR
- Wake-up through dedicated GPIO, IRQ, and RTC

**CHIP PACKAGE**

- 88MW320—68-pin QFN, 8 x 8 mm
  - USB OTG not supported
  - 35 GPIOs
  - 2 GPTs
- 88MW322—88-pin QFN, 10 x 10 mm
  - USB OTG supported
  - 50 GPIOs
  - 4 GPTs

**TEMPERATURE**

- Commercial: 0° to 70° C
- Extended: -30° to 85° C
- Industrial: -40° to 105° C
- Storage: -55° to 125° C

**PACKAGE FEATURE DIFFERENCES<sup>1</sup>**

Features	68-Pin	88-Pin
GPIO	35 total GPIO_0 to GPIO_10 GPIO_16 GPIO_22 to GPIO_33 GPIO_39 to GPIO_49	50 total GPIO_0 to GPIO_49
USB 2.0 OTG	—	1
GPT	2	4

<sup>1</sup>All I/O features are muxed on GPIOs, except WLAN RF TX/RX, USB, reference clock, and reset functionality.