Marvell. Moving Forward Faster

PRODUCT OVERVIEW

The Marvell® 88MW300/302 is a highly integrated, low-power WLAN Microcontroller System-on-Chip (SoC) solution designed for a broad array of smart devices for Internet of Things (IoT), wearables, accessories, Machine-to-Machine (M2M), home automation, and Smart Energy applications.

A high degree of integration enables very low system costs requiring only a single 3.3V power input, a 38.4 MHz crystal, and SPI Flash. The RF path needs only a lowpass filter for antenna connection.

The SoC includes a full-featured W LAN subsystem powered by proven and mature IEEE 802.11n/g/b Marvell technology. The WLAN subsystem integrates a WLAN MAC, baseband, and direct-conversion RF radio with integrated PA, LNA, and transmit/receive switch. It also integrates a CPU subsystem with integrated memory to run Marvell WLAN firmware to handle real time WLAN protocol processing to off-load many WLAN functions from the main application CPU.

The 88MW300/302 application subsystem is powered by an ARM Cortex-M4F CPU that operates up to 200 MHz. 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.
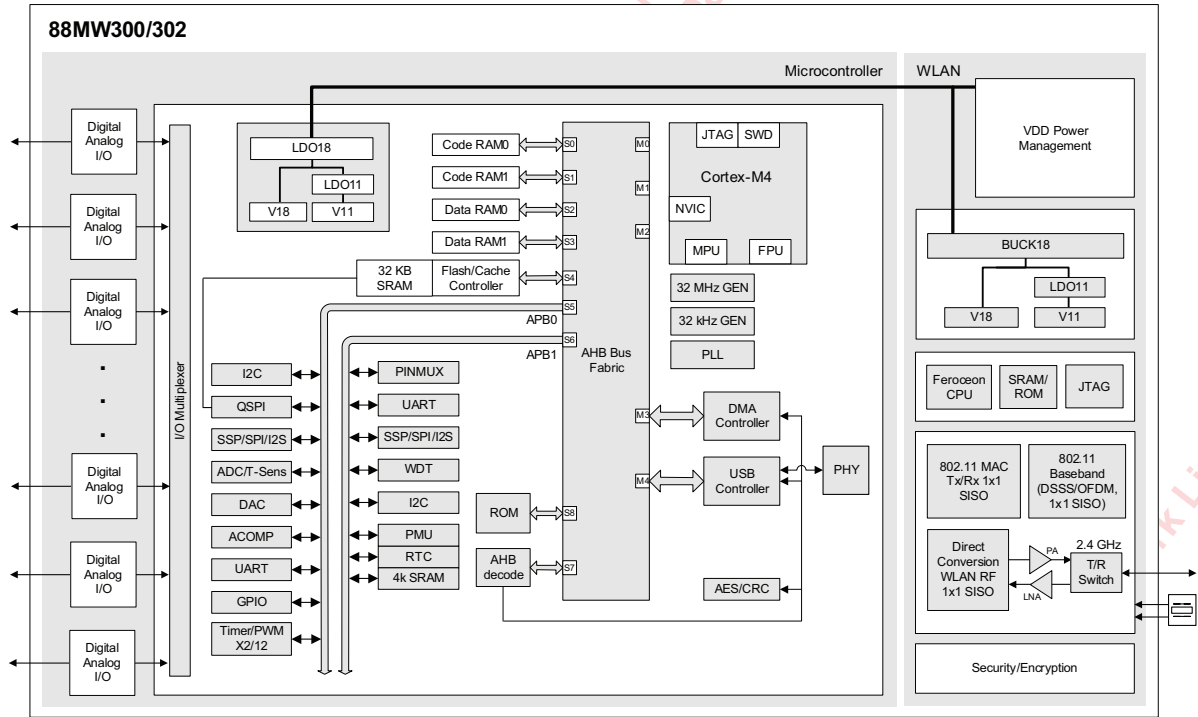
The SoC is designed for low-power operation and includes several low-power states and fast wake-up times. Multiple power domains and clocks can be individually shut down to save power. The SoC also has a high-efficiency internal PA that can be operated in low-power mode to save power. The microcontroller 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 1.8V rail for the WLAN subsystem.

The SoC provides a full array of peripheral interfaces including SSP/SPI/I^{2}S (3x), UART (3x), I^{2}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 88MW302 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 enable direct interfacing for I/O avoiding the need for external chips. The application CPU can be used to support custom application development avoiding the need for another microcontroller or processor.

Figure 1 shows an overall block diagram of the device.

Copyright © 2016 Marvell
May 12, 2016, 2.00

CONFIDENTIAL
Document Classification: Proprietary

Doc. No. MV-S109938-00 Rev. C
Page 1

MARVELL®

88MW300/302
Technical Product Brief

Figure 1:   Block Diagram

Applications

- White goods/appliances—refrigerator, washer, dryer, oven range, microwave, dishwasher, water heater, air conditioner

- Gateways—Connecting IR, sub-Gig or Legacy RF, Bluetooth Smart, ZigBee, ZWave 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

Doc. No. MV-S109938-00 Rev. C
Page 2

CONFIDENTIAL
Document Classification: Proprietary

Copyright © 2016 Marvell
May 12, 2016, 2.00

Chip Package

- 88MW300—68-pin QFN, 8x8 mm
  - USB OTG not supported
  - 35 GPIOs
  - 2 GPTs
- 88MW302—88-pin QFN, 10x10 mm
  - USB OTG supported
  - 50 GPIOs
  - 4 GPTs

Table 1: Package Feature Differences[1]

Feature	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

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

Temperature

- Extended: -30 to 85°C
- Industrial: -40 to 85°C
- Storage: -55 to 125°C

Wireless

- IEEE 802.11n/g/b, 1x1 SISO 2.4 GHz and HT20
- Integrated CPU, memory, MAC, DSSS/OFDM baseband, direct conversion RF radio, encryption
- Antenna diversity
- CMOS and low-swing sine wave input clock
- Low-power with deep sleep and standby modes
- Pre-regulated supplies
- Integrated T/R switch, PA, and LNA
- Optional 802.11n features
- One Time Programmable (OTP) memory to eliminate need for external EEPROM

WLAN Rx Path

- Direct conversion architecture eliminates need for external SAW filter
- On-chip gain selectable LNA with optimized noise figure and power consumption
- High dynamic range AGC function in receive mode

WLAN Tx Path

- Integrated PA with power control
- Optimized Tx gain distribution for linearity and noise performance

WLAN Local Oscillator

- Fractional-N for multiple reference clock support
- Fine channel step

WLAN Encryption

- WEP 64- and 128-bit encryption with hardware TKIP processing (WPA)
- AES-CCMP hardware implementation as part of 802.11i security standard (WPA2)
- Enhanced AES engine performance
- AES-Cipher-Based Message Authentication Code (CMAC) as part of the 802.11w security standard
- WLAN Authentication and Privacy Infrastructure (WAPI)

IEEE 802.11 Standards

- 802.11 data rates of 1 and 2 Mbps
- 802.11b data rates of 5.5 and 11 Mbps
- 802.11g data rates 6, 9, 12, 18, 24, 36, 48, and 54 Mbps for multimedia content transmission
- 802.11g/b performance enhancements
- 802.11n compliant with maximum data rates up to 72.2 Mbps (20 MHz channel)

Copyright © 2016 Marvell
May 12, 2016, 2.00

CONFIDENTIAL
Document Classification: Proprietary

Doc. No. MV-S109938-00 Rev. C
Page 3

88MW300/302
Technical Product Brief

Microprocessor

Processor

- ARM Cortex-M4F, 32-bit
- 200 MHz main bus clock

Memory

- 128 KB ROM
- 512 KB RAM

Flash Controller

- Supports QSPI Flash devices
- Memory-mapped access to QSPI Flash devices
- 32 KB SRAM cache

Digital Interfaces

- 3x I^{2}S stereo
- 3x SPI master/slave
- 2x I^{2}C master/slave
- 3x UART
- 1x USB OTG 2.0, high-speed
- 1x QSPI
- Up to 50 GPIOs
- 2x wake-up pins

Analog

- 2-step ADC with integrated PGA and configurable resolution/speed
  - 12-bit/2 MHz sample(s) for fast conversion
  - 16-bit/16 kHz sample/s with voice quality
  - 8 single channels or 4 differential channels
- 2-Channel or 1 differential channel DAC, 10-bit/500 ksps
- 2 Analog Comparators with programmable speed/current
- On-die/off-chip temperature sensing and battery monitor

Counters/Timers/PWM

- General Purpose Timers (GPT) with LED PWM support
- Real Time Clock (RTC)
- CM4 system tick
- Watchdog Timer

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AFC3WIFI300SMT01 or Contains FCC ID: 2AFC3WIFI300SMT01"

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product