Marvell 88MZ300

802.15.4/ZigBee Wireless Microcontroller

PRODUCT OVERVIEW

The Marvell® 88MZ300 wireless microcontroller system-on-chip (SoC) solution is the next generation of 802.15.4/ZigBee® chip that delivers unparalleled performance at ultra-low power and lowest system cost, carrying over the legacy of 88MZ100's successes in connected lighting, smart appliances, home / building automation, retailer Electronic Shelf Label (ESL), remote controllers and industrial controls. By using the most advanced process technology, the 88MZ300 significantly improves RF performance, reduces power consumption, shrinks the die size for cost reduction. It also adds execution in place (XIP), an innovative technology that allows code execution directly from flash memory providing increased memory support for larger code applications without increasing chip cost.

With a 120+dB link budget (+13dBm TX and -107dBm RX), the 88MZ300 sets a new record for RF performance in the industry and enables the devices to reach the farthest distance, penetrate obstacles and withstand interference even in the harshest environments. By employing Marvell's proven RF, DSP, and software expertise in wireless connectivity, the 88MZ300 provides best-in-class coexistence performance in the 2.4GHz ISM band (where Wi-Fi and Bluetooth devices reside) thereby achieving 56dBc Wi-Fi ACI, giving users the best experience and avoiding communication problems common to wireless applications.

The 88MZ300 has the industry's lowest power consumption in transmission and receiving current with very low standby current (1uA) and wide range of power supply from 1.8V to 3.6V. This ultra-low power design ensures battery powered devices can run for years with small form factor batteries.

With the highest level of integration, the 88MZ300 achieves the lowest Bill of Materials (BOM) cost among similar products in the industry. It only requires a crystal and a few passive components since the PA and balun are already built in. It also contains a 512KB on-chip flash, providing ample room for Over The Air (OTA) software upgrades.

Marvell also offers robust, mature network stacks for the MZ300 that are based on open standards including ZigBee and Thread.
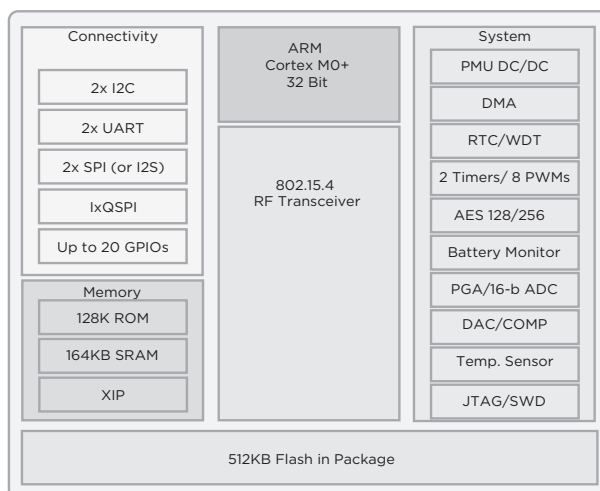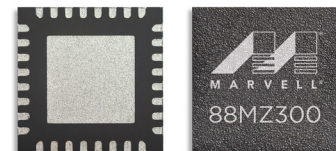
BLOCK DIAGRAM

Connectivity	ARM Cortex M0+ 32 Bit	System
2x I2C		PMU DC/DC
2x UART		DMA
2x SPI (or I2S)	802.15.4 RF Transceiver	RTC/WDT
1xQSPI		2 Timers/ 8 PWMs
Up to 20 GPIOs		AES 128/256
Memory		Battery Monitor
128K ROM		PGA/16-b ADC
164KB SRAM		DAC/COMP
XIP		Temp. Sensor
		JTAG/SWD
512KB Flash in Package		

Fig 1. Marvell 88MZ300 Block Diagram

Fig 2. 88MZ300 IC Photo

KEY FEATURES

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• Fully integrated IEEE 802.15.4 transceiver – Industry-leading 2.4GHz IEEE 802.15.4 compliant RF transceiver, supporting full features of 802.15.4-2003 and 802.15.4-2006 – Best-in-class RF performance, with 120dB link budget – Adustable output power up to +13dBm at antenna (more than 20dBm dynamic range) – Best-in-class coexistence performance with Wi-Fi and Bluetooth, ACI, Bluetooth, achieving 56DBc Wi-Fi ACI and 0dBc Bluetooth CCI	– Single-ended design with on-chip PA, TRSW, and LNA, eliminating requirement of external PA and balun – Support external PA with one extra RF pin and one GPIO pin – Hardware-aided MAC enginge, greatly lowering CPU MIPs requirement for MAC funcion – 128 bit hardware AES encryption and decryption engine – 16/32-bit hardware CRC – -107dBm RX sensitivity
• Full-featured SoC integrated with rich array of peripherals and cost-effective, human-machine interfaces to support various microcontroller applications – 32-bit ARM Cortex-M0+ high performance processor, software programmable clock rate from 1 MHz to 64 MHz – 512KB in-package QSPI serial flash with AES encryption – 128KB ROM and 160KB configurable code/data RAM – 32 MHz crystal with on-chip clock generation – Innovative XIP technology enables code execution directly from flash memory for large code applications while reducing system cost – On-chip DC-DC converter providing 50% more power efficiency compared to LDO-based power solutions – Embedded battery monitoring – Ultra-low power consumption with 8.5mA RX current and 1uA standby current, with wide range power supply from 1.8 to 3.6V	– Five levels of power mode supported by intelligent power management scheme to minimize standby power and wakeup time – Serial communication port: 2 UART, 1 SPI (or I2S?/PCM), 1 I2C , 1 QSPI – Two general purpose 32-bit timer modules with support for eight PWM channels – RTC / WDT supported – Flexible clock gating for all the peripheral modules – DMA with 4 configurable channels for peripheral data transfer – Up to 16-bit Analog to Digital Converter with configurable throughput up to 250ksps and conversion range from 0 to 3.6V; 8 single channels or 4 differential channels – 10-bit 500ksps Digital to Analog Converter, 2 single channels or 1 differential channel – 2 Analog Comparator with programmable speed/current – On-chip temperature sensor – Hardware 16/32 bit CRC and 128-bit AES engine shared with 128/192/256 key – 32 pin QFN package, 20 GPIOs

TARGET APPLICATIONS

• Connected Lighting and Appliances

• Home/Building Automation

• Remote Control

• Retailer Electronic Shelf Label (ESL)

• Smart Energy

• Industrial Controls

• Wirelesss Sensor Network Applications

Fig 3. 88MZ300 ZigBee Evaluation Kit

THE MARVELL ADVANTAGE: Marvell chipsets come with complete reference designs which include board layout designs, software, manufacturing diagnostic tools, documentation, and other items to assist customers with product evaluation and production. Marvell's worldwide field application engineers collaborate closely with end customers to develop and deliver new leading-edge products for quick time-to-market. Marvell utilizes world-leading semiconductor foundry and packaging services to reliably deliver high-volume and low-cost total solutions.

ABOUT MARVELL: Marvell (NASDAQ: MRVL) is a global leader in providing complete silicon solutions enabling the digital connected lifestyle. From mobile communications to storage, cloud infrastructure, Internet of Things (IoT), digital entertainment and in-home content delivery, Marvell's diverse product portfolio aligns complete platform designs with industry-leading performance, security, reliability and efficiency. At the core of the world's most powerful consumer, network and enterprise systems, Marvell empowers partners and their customers to always stand at the forefront of innovation, performance and mass appeal. By providing people around the world with mobility and ease of access to services adding value to their social, private and work lives, Marvell is committed to enhancing the human experience. As used herein, the term "Marvell" refers to Marvell Technology Group Ltd. and its subsidiaries.

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