EM260
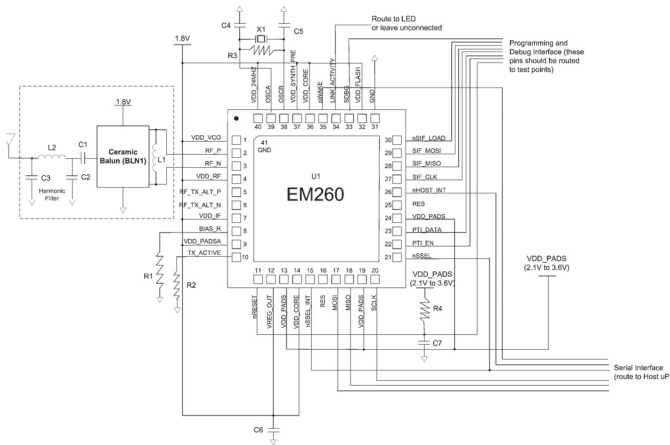
802.15.4 Transceiver and EmberZNet™ Networking

Extended Features

– Best in class RF performance

– Complete network processor plus radio containing a complete Network level ZigBee implementation

– Simple SPI-Slave or UART interface to an application microcontroller, proving the full serialized EmberZNet interface

– Flexible Antenna Interface allows easy antenna connection with or without external PA

– Excellent noise immunity to 802.11 b/g. Exceeds 802.15.4 adjacent/alternate channel rejection specification for improved co-existence

– Digital RSSI / 802.15.4 Link Quality Indication

– Hardware supported network level debugging

– Hardware Encryption Engine (AES 128) with true Random Number Generator

– Integrated sleep oscillator allows a single crystal design, reducing cost and power consumption

– Capable of being ZigBee co-ordinator, Full-Functional Device (FFD), and Reduced Functional Device (RFD)

Overview

The EM260 from Ember is the first network processor chip that has been designed for the low power, low cost, mesh networking industry standards based protocol – ZigBee. The EM260 is designed to provide customers the flexibility of choosing their own microcontroller to run their application, while interfacing to the EM260 to provide all the ZigBee functionality. The external microcontroller can be sized exactly for the application, from the smallest, most cost-effective 8-bit controller, all the way through high-end 32-bit controllers for gateway applications. This flexibility of microcontroller choice allows customers to ZigBee enable existing products very rapidly using tool-chains they are familiar with.

The EM260 integrates an IEEE 802.15.4 2.4GHz unlicensed spectrum ZigBee radio, along with the baseband, network microcontroller and onboard memory to run the protocol stack from the PHY layer to the network layer. It includes built in powerful debug modes including network wide debugging support to rapidly get customers from the design phase into production.

Designed specifically for use with EmberZNet, Ember's ZigBee compliant embedded mesh networking software, the EM260 is optimized for designs requiring long battery life, low external component count, and a reliable, proven, industry-standard networking solution.

ZigBee Network Processor

The EM260's industry proven embedded 16-bit XAP2 microcontroller was specifically chosen to run ZigBee. The microcontroller has industry leading low power modes in order to keep the over all power consumption of the ZigBee solution very low, making this solution well suited for battery operated devices that are required to run for many years without changing the batteries.

The EM260's built-in 802.15.4 RF section provides the highest level of integration, requiring only minimal external components. It provides exceptional interference immunity to other 2.4GHz interferers, and excellent receiver sensitivity for long range. For applications requiring even longer range, an easy method of connecting an external PA and/or LNA is provided.
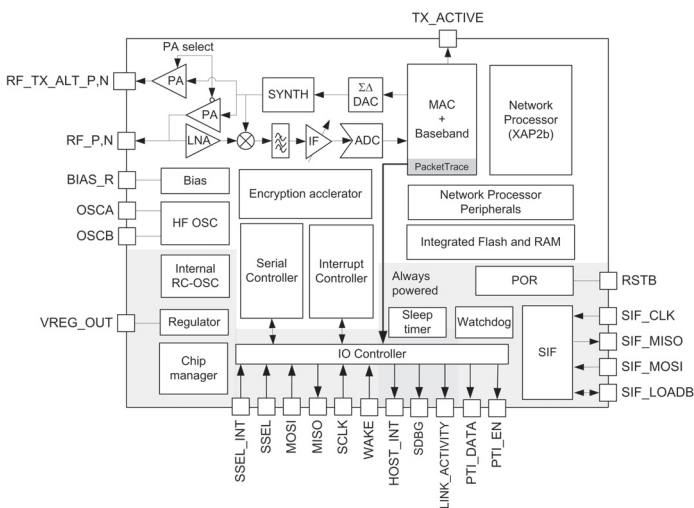
Microcontroller Interface

The EM260 provides an easy to use network interface over an SPI slave-mode connection (customer micro is SPI master). For larger micros or gateway applications, the EM260 supports a UART interface with RTS/CTS flow control. The interface exposes a serialized version of Ember's EmberZNet API. All EmberZNet network functionality is available, along

with additional functionality such as a system battery monitor and a settable wakeup timer. The EM260 handles all processing and timing intensive tasks, such as AES-128 encryption, relaying packets, and handling all aspects of the ZigBee protocol, leaving the customer's microcontroller free to implement even the most timing critical applications. The ability to run the application on the microcontroller of choice, using tools that customers are already used to enables rapid application development and obviates the need for porting of applications to other microcontrollers, thereby reducing barriers to deployment of products.

Power

Applications requiring years of battery life take advantage of the EM260's low operating and sleep currents and the integrated EmberZNet networking library to easily incorporate short activity cycles. The EM260's integrated voltage regulator supports a wide range of operating voltages that allows hardware to be optimized for use with lithium-ion or alkaline batteries, without additional circuitry.

Development

The EM260's serialized network interface is available with generic host-side source-code level drivers for SPI and UART implementations. Select microcontroller families will have hardware-specific source code drivers available. Application development can be performed in the customer's microcontroller of choice, using their tool-chain of choice. Debugging can be performed using standard ICE or JTAG type tools for the chosen microcontroller. In addition, the EM260 is supported by InSight Desktop, which provides network level debugging to quickly identify complicated bugs that can't be caught by examining a single node. InSight Desktop will also provide EM260 users with a trace of the calls made over the serial connection to help identify issues in the communication between the EM260 and the host microcontroller.

The EM260 provides a serialized interface to EmberZNet, which is Ember's widely used and well-tested fourth generation embedded mesh networking API, providing a smooth transition for existing users of Ember's previous generation software and guaranteeing a well supported and low risk introduction for first-time users.

General Characteristics

Deep Sleep Current (with sleep timer running)	1uA max
RX Current	35.5mA – Normal Mode; 37.5mA - Boost Mode
TX Current	35.5mA – Normal Mode; 41.5mA Boost Mode
Crystal Frequency	24MHz
Operating Temperature Range	-40 – +85 C
Voltage	(internal reg) 2.1 – 3.6V
Package	6 mm x 6 mm 40 pin QFN

RF Characteristics

Data Rate	250kbps
Frequency	2400 – 2485
RX Sensitivity	-97.5dBm – Normal Mode; -98.5dBm Boost Mode
Adj Channel Rejection	(15.4) >30dB
Alt Channel Rejection	(15.4) >40dB
802.11g Rejection	(+12/-13MHz) >30dB
TX Power	-32dBm – +3dBm Normal; -32dBm – +5dBm Boost

About Ember

Ember develops wireless sensor and control network technologies that help make our living and working environments safer, smarter, more comfortable and energy efficient. Ember's ZigBee-based semiconductors and software enable communication between devices embedded in a variety of building and home automation products. Ember is a lead member of the ZigBee Alliance, and its platform is the National Technical Systems' (NTS) "Golden Suite" for 802.15.4/ZigBee interoperability testing.

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