EM35x

IEEE 802.15.4 and ZigBee Compliant SoC Family

Overview—EM35x Series ZigBee SoCs

The EM351 and EM357 ZigBee chips from Silicon Labs are the industry's first ARM Cortex-M3 based family of SoCs delivering unmatched performance, power consumption and code density in a compact package.

The EM351 and EM357 combine a 2.4 GHz IEEE 802.15.4 radio transceiver with a 32-bit microprocessor, flash memory and RAM with powerful hardware-supported network-level debugging features. Combined with the powerful ecosystem of ARM tools, these devices and tools enable OEMs to simplify development and accelerate time to market.

The EM35x family is tightly integrated with EmberZNet PRO, Silicon Labs' ZigBee-compliant mesh networking software, which is the most deployed ZigBee platform in the market.

- EM351—integrates a programmable ARM Cortex-M3 processor, IEEE 802.15.4 RF radio transceiver, 128 kB flash and 12 kB RAM and EmberZNet PRO network protocol stack supporting the ZigBee PRO Feature Set.
- EM357—optimized for applications that require more memory, it has 192 kB flash but incorporates all the other characteristics and features of the EM351.

The EM35x series SoCs can also be used as a network co-processor, using the Ember EZSP protocol, supported by EmberZNet PRO 4.3.0 and later version software.

Low-Power, High Total Budget, Robust Coexistence

The EM35x family delivers outstanding, industry leading performance with a configurable total link budget up to 110 dB, while maintaining the highest level of integration requiring minimal external components. The high transmit power virtually eliminates the need for an external PA (power amplifier) in most applications, especially in Europe and Asia. Where a PA is required, the product is designed to allow an external PA or front end module (FEM) to be easily connected.

The EM35x family offers the lowest sleep current of any ZigBee system in the market. Developers can take advantage of the integrated EmberZNet PRO networking library to incorporate short wake cycles. Also, integrated clocks provide optimized wake-sleep cycles to conserve power.

The integrated voltage regulator supports a wide range of operating voltages allowing hardware designs to be optimized for lithium-ion or alkaline batteries without additional circuitry. The EM351 and EM357 ZigBee SoCs are extremely robust providing exceptional immunity and reliable co-existence with other 2.4 GHz devices in the environment.

ARM Cortex-M3 Processor

The integrated 32-bit ARM Corex-M3 processor provides a very high code density, allowing larger applications while delivering exceptional performance in a small, power-efficient RISC core. Well recognized for its outstanding computational performance and exceptional system response to interrupts, the ARM processor enables a small core footprint and best-in-class code density.

The performance of the Cortex-M3 processor coupled with the performance of the EmberZNet PRO stack helps deliver network throughput and lower latencies that are unmatched in the industry.

ZigBee-Compliant Stack and Development Environment

The EM35x series comes tightly integrated with Silicon Labs' EmberZNet PRO software protocol, the industry's most deployed and field proven ZigBee compliant stack supporting the ZigBee PRO Feature Set and enhanced with unique Silicon Labs innovations. Enabling larger, denser, sleepier, more mobile, secure and resilient ZigBee Networks, EmberZNet PRO stack is a complete ZigBee protocol software package containing all the elements required for sophisticated mesh networking applications on Silicon Labs' silicon platforms.

The Ember development environment is supported by a variety of industry leading IDE's to provide best-in-class tools to build and debug embedded ZigBee applications. The Ember Desktop Network Analyzer tool is designed for developing, compiling, loading and debugging software onto multiple nodes in a networked environment. The availability of standard ARM tools and the ARM serial wire and JTAG debug capabilities provides complete instruction level and register level debugging capabilities. The EM351 and EM357 devices support special hardware-based network debugging capabilities to help identify complex network level interactions that cannot be caught by examining a single node.

Key Features

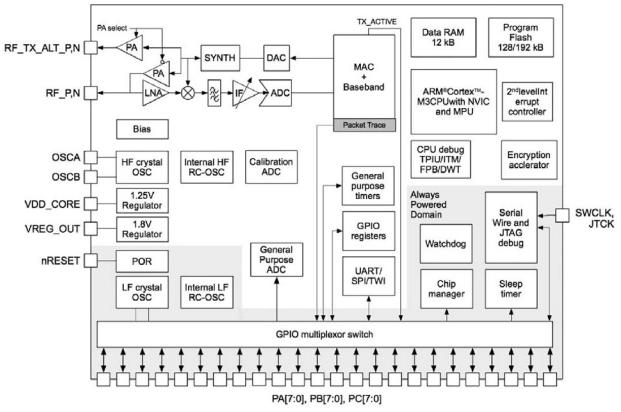
- Industry's first ARM Cortex-M3 based family of ZigBee systems
- Add-on kit enables use as a network co-processor
- Exceptional, industry-leading RF performance
- 128 kB (EM351) and 192 kB (EM357) flash variants available
- 12 kB RAM
- High code density to accommodate the most sophisticated applications
- Lowest deep sleep current and multiple sleep modes
- Excellent immunity to other 2.4 GHz devices for reliable co-existence
- Built in memory protection
- Flexible antenna interface allows easy antenna connection with or without PA
- Flash guaranteed for 20,000 write cycles, enhances token storage capability via SIM-EEPROM
- AES 128 hardware encryption engine with true random number generator
- Hardware supported network level debugging with Packet Trace Port
- Capable of being ZigBee Coordinator (ZC), full function device (FFD) and reduced function device (RFD)

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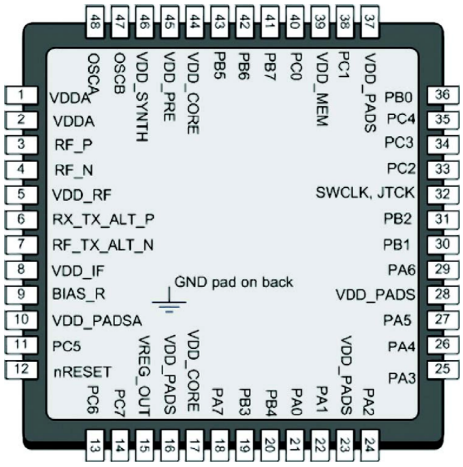
Selected Electrical Specifications

Parameter	Value
General Characteristics	
Deep Sleep Current	0.7 µA max (with timer)
RX Current	25 mA
TX Current	31 mA at +3 dBm
Crystal Frequency	24 MHz
Operating Temperature Range	–40 to 85 °C
Voltage	2.1 to 3.6 V
Package	7 mm x 7 mm, 48-Pin QFN
RF Characteristics	
Data Rate	250 kbps
Frequency	2400 to 2500 16 total 5 MHz Channels
RX Sensitivity	–100 dBm (Normal mode) –102 dBm (Boost mode)
Adjacent Channel Rejection	35 dB
Alternate Channel Rejection	43 dB
802.11g Rejection	35 dB
TX Power	–32 dBm to +5 dBm (Normal Mode) –32 dBm to +8 dBm (Boost Mode)
Total Link Budget	Up to 110 dB
Micro Characteristics	
Flash EM351 EM357	 128 kB 192 kB
RAM	12 kB

Functional Block Diagram

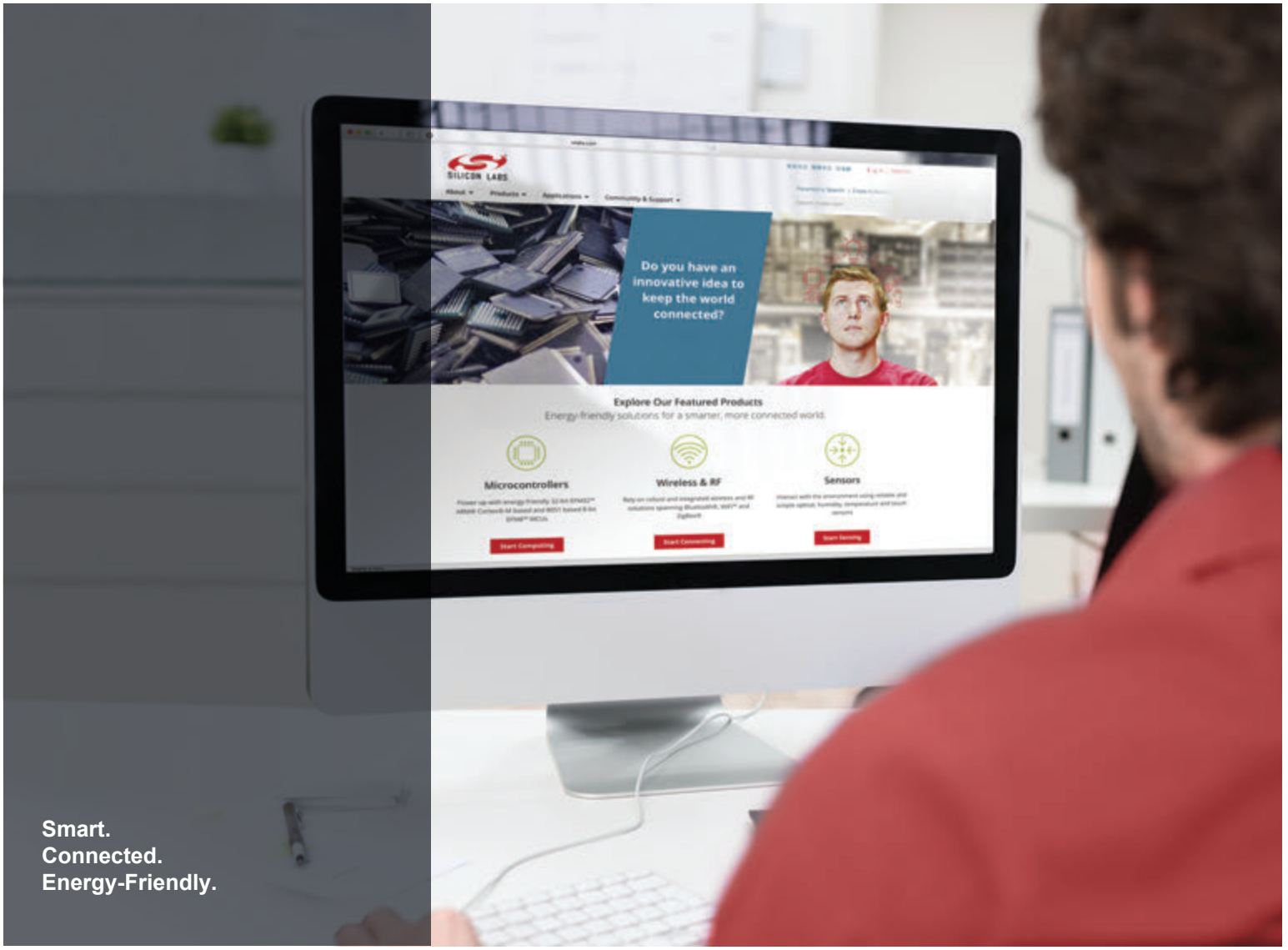


EM35x Series



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