

The MeshConnect™ EM357 module (ZICM357P2) is based on the *Ember EM357 system on chip (SoC)*. The module includes a high performance Renesas power amplifier that increases power out to +20 dBm, making it one of the most powerful modules on the market. With its 120 dB link budget, the module provides range up to 2.5 miles, ensuring reliable transmission even in harsh environments and reducing the number of nodes needed in the network. The increased output power also provides better interior penetration from devices installed outside the home such as smart meters that need to connect to devices inside the home. The MeshConnect EM357 module also integrates 1 MB of flash memory which enables over-the-air programming updates in the field.

The MeshConnect EM357 module is compliant with ZigBee Alliance specifications and IEEE 802.15.4, making it applicable for all ZigBee applications and profiles. The SoC consists of an RF transceiver with a baseband modem, a hardwired MAC and an embedded 32-bit ARM® Cortex™-M3 microcontroller with internal RAM (12kB) and flash (192kB) memory. The SoC provides numerous general-purpose I/O pins and peripheral functions such as timers and UARTs enabling customers to access a rich mix of on-chip functionality.

A complete development kit is available including evaluation boards, software tools, and cables which help engineering staff quickly develop their end product.

CEL's MeshConnect™ line of 802.15.4/ZigBee products delivers industry-leading range, high performance, and a rich feature set at low cost. CEL's design examples, reference designs, and engineering support help customers get their product designs to market quickly. Key applications include ZigBee Pro Smart Energy focused applications: thermostats, meters, in-home-displays, as well as LED lighting control, solar/wind power, HVAC control, and security systems. MeshConnect certified and qualified modules enable customers to reduce their design and certification costs of development as well as development risk, while reducing time to market.

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MeshConnect™ EM357 Module for 802.15.4/ZigBee™ Applications



FEATURES

- Transmit Power: +20 dBm
- 1MB integrated Flash memory for over the air program updates
- Sensitivity: - 100 dBm
- RF link budget: up to +120 dB
- Range: up to 2.5 miles (line of sight)
- Network Speed: 250Kbps
- 16 RF channels
- Inverted-F PCB antenna with Optional U.FL external Antenna
- Advanced Power Management Scheme w/ Deep Sleep Mode
- Integrated MCU functionality:
 - 32-bit ARM® Cortex™-M3*
 - Up to 23 GPIO Pins*
 - 192KB Flash; 12KB RAM*
 - SPI Master /Slave, TWI, UART*
 - Timers, Serial Wire /JTAG Interface*
 - 5-channel, 14-bit ADC*
- Software support: *EmberZNet PRO™ (ZigBee PRO)*
- Mesh, point-to-point, and point-to-multipoint networks
- Small footprint: 25.4 mm x 35.9 mm (1" x 1.41")

SPECIFICATIONS

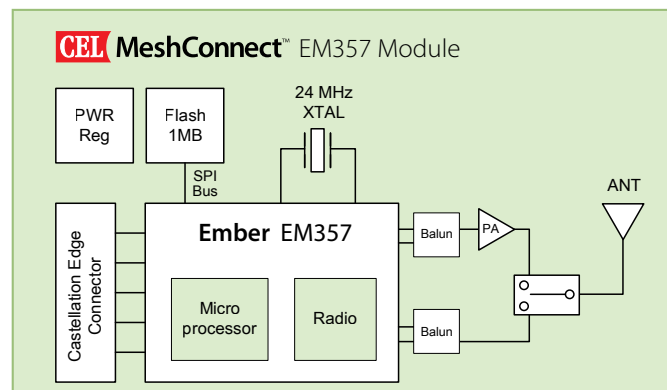
- ▶ Frequency: 2405 to 2475 MHz
- ▶ Operating Voltage: 2.7 to 3.6 V
- ▶ Output Power: +20 dBm
- ▶ Rx Sensitivity: -100 dBm
- ▶ Power Consumption:
 - Transmit Mode: 170 mA @ 20 dBm*
 - Receive Mode: 28 mA*
 - Sleep Mode: 6 µA*
- ▶ Operating Temperature:
 - 40°C to +85°C*
- ▶ AES encryption
- ▶ RoHS Compliant
- ▶ Regulatory Certification:
 - FCC /IC /CE*

APPLICATIONS

- ▶ Smart Energy / Grid Markets
 - Smart Meters*
- ▶ Building automation and control
- ▶ Home automation and control
 - Thermostats*
 - Displays*
 - Energy Management*
 - Security Devices*
 - HVAC Control*
- ▶ General ZigBee wireless sensor networking

BLOCK DIAGRAM

See Data Sheet for more information.



CEL MeshConnect™ EM357 Product Family

MeshConnect™ EM357 Mini Modules

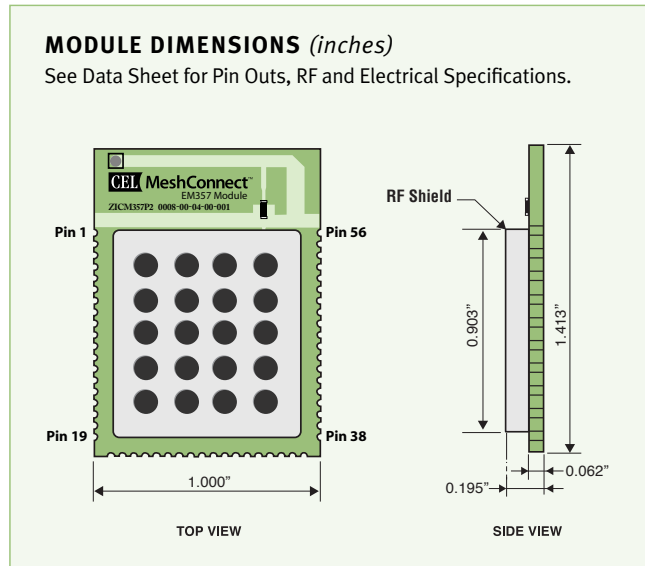
ZICM357SP0-1	+8 dBm Output Power, PCB Trace antenna
ZICM357SP0-1C	+8 dBm Output Power, with RF port castellation pin for external antenna
ZICM357SP2-1	+20 dBm Output Power, PCB Trace antenna
ZICM357SP2-1C	+20 dBm Output Power, with RF port castellation pin for external antenna
ZICM-EM35X-DEV-KIT-2	MeshConnect EM35x Ember Companion Kit for Ember EM35x Dev Kits

MeshConnect™ EM357 Module

ZICM357P2-1	+20 dBm Output power, PCB Trace antenna, 1MB additional Flash
ZICM357P2-2C	+20 dBm Output power, with U.FL Connector for external antenna, 1MB additional Flash
ZICM357P2-1-NF	+20dBm Output Power, PCB Trace Antenna (No 1 MB Flash memory)
ZICM357P2-1C-NF	+20 dBm Output power, with U.FL Connector for external antenna (No 1 MB Flash memory)
ZICM357P2-KIT1-1	+20 dBm Engineering Development Kit
ZICM-EM35X-DEV-KIT-1	MeshConnect EM35x Ember Companion Kit for Ember EM35x Dev Kits

MeshConnect™ EM357 USNAP Module

ZUSNAP357P2-1	EM357 USNAP module with integrated PCB antenna
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CEL MeshConnect / ZigBee Modules / ICs

MODULE / IC ▶	MeshConnect™	MeshConnect™ Extended Range	NEW: MeshConnect™ EM357 Mini	MeshConnect™ EM357	FreeStar Pro	MeshConnect™ IC	
RADIO	2405 to 2480 MHz / DSSS / IEEE 802.15.4	2405 to 2480 MHz / DSSS / IEEE 802.15.4	2405 to 2480 MHz / DSSS / IEEE 802.15.4	2405 to 2480 MHz / DSSS / IEEE 802.15.4	2405 to 2480 MHz / DSSS / IEEE 802.15.4	2405 to 2480 MHz / DSSS / IEEE 802.15.4	
Transceiver Chipset	MeshConnect™ ZIC2410 (SoC) 8 bit, 8051	MeshConnect™ ZIC2410 (SoC) 8 bit, 8051	Ember™ EM357 32 bit, ARM® Cortex™-M3	Ember™ EM357 32 bit, ARM® Cortex™-M3	Freescall™ MC13224 / MC13226 32 bit, ARM7	MeshConnect™ CEL ZIC2410 8 bit, 8051	
Fmax	16 MHz	16 MHz	24 MHz	24 MHz	32 MHz	16 MHz	
Memory	96 KB Flash; 8 KB RAM	96 KB Flash; 8 KB RAM	192 KB Flash; 12 KB RAM	192 KB Flash; 12 KB RAM	128 KB Flash	96KB Flash	
Inputs/Outputs	22	20	23	23	46	22 / 24	
Network	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	Mesh, Point-to-Point, Point-to-Multipoint	
Software/ ZigBee Stack	MAC, S-MAC, ZigBee® (RF4CE)	MAC, S-MAC, ZigBee® (RF4CE)	EmberZNet PRO™ (ZigBee Pro)	EmberZNet PRO™ (ZigBee Pro)	BeeStack™ ZigBee Pro - MC13226 MAC, S-MAC - MC13224	MAC, S-MAC, ZigBee® (RF4CE)	
Tx Power Output	+6dBm	+20dBm	SP0 +7 dBm	SP2 +20dBm	+20dBm	+8 dBm	
Rx Sensitivity	-97dBm	-103dBm	SP0 -100 dBm	SP2 -100 dBm	-100dBm	-98 dBm	
Range (line of sight)	2,000 ft (609 M)	16,000 ft (4,876 M)	TBD		13,000 ft (3,962 M)	4,000 ft (1,219 M)	—
Vcc	2.1 - 3.3V	2.1 - 3.3V	2.1 - 3.6V		2.7 - 3.6V	2.0 - 3.6V	1.5V - 3.3V
Rx Current	35mA	38mA	SP0 30mA	SP2 34mA	28mA	30mA	33.2mA
Tx Current @ max dBm	44mA	200mA	SP0 44mA	SP2 150mA	170mA	193mA	30.6mA
Sleep Current	<1.0µA	<1.0µA	1.0µA		6.0µA	13µA	0.3µA
Dimensions	25 x 36 mm	25 x 36 mm	23.9 x 16.6 mm		25 x 36 mm	25 x 36 mm	QFN 7 x 7 48 pin VFPGA 5 x 5 72 pin
PART NO. ▶	ZICM2410P0-1 ZICM2410P0-1C	ZICM2410P2-2 ZICM2410P2-1C	ZICM357SP0-1 ZICM357SP0-1C	ZICM357P2-2 ZICM357P2-2C	ZFSM-201-1 ZFSM-201-1C	ZICM2410QN48 ZICM2410FG72	
EVAL KIT ▶	ZICM2410P0-KIT2-1	ZICM2410P2-KIT1-1	ZICM357P2-KIT1-2 ZICM-EM35X-DEV-KIT-2	ZICM357P2-KIT1-1 ZICM-EM35X-DEV-KIT-1	ZFSM-201-2 ZFSM-201-2C	ZICM2410P0-KIT2-1	