

CEL's MeshConnect™ Sub-G wireless modules deliver superior range and performance. Their low operating current dramatically increases battery life, enabling battery powered nodes within the network. CEL's Sub-G varied software stacks and examples, reference designs, and engineering support help customers get their product to market quickly and efficiently. The increased range, especially in non-line of sight applications, make the Sub-G modules ideal for applications including: Lighting Control, Irrigation, Serial wire replacement, Industrial Sensor Networks, Wireless M-Bus Metering, Home Automation and Smart Plugs, Security and more. 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.

CEL's MeshConnect™ Sub-G modules are based on the Silicon Labs Si1000 and Si1002 SoC ICs. These ICs are fully integrated mixed signal System-on-Chip MCUs. Each IC consists of an RF transceiver with a baseband modem, a hardwired MAC and an embedded microcontroller.

The MeshConnect™ Sub-G modules provide high output powers (+13dBm and +20dBm) for long range wireless applications. They are especially useful for open outdoor applications where the nodes are physically far apart. The Modules' outstanding link budgets ensure high quality connections even in harsh environments.

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054
408.919.2500
www.cel.com

MeshConnect™ Sub-G Modules



FEATURES

- **Frequency range:**
902-928 MHz
868 MHz
- **Link Budget up to -140 dB (for +20 dBm module)**
*Sensitivity up to -121 dBm
+20 dBm and +13 dBm available output power*
- **Max Output power:**
+13 dBm @ 3.6 VDC (ZICM0868P0)
+20 dBm @ 3.6 VDC (ZICM0900P2)
- **Data Rate: 0.123 to 150 kbps**
- **General purpose I/O: 21**
- **High Speed 8051 MCU:**
25 MHz
4kB RAM / 64 kB Flash
- **10-Bit ADC:**
300 ksp, 18-ch inputs
- **Multiple Serial Ports:**
UART
SPI (Master/Slave)
SMBus
PCA
- **Modulation:**
FSK, GFSK, and OOK modulation
- **RF Power Consumption:**
24 mA Receive
18 mA @ + 1 dBm transmit
42 mA @ + 13 dBm transmit
97 mA @ + 19 dBm transmit
- **Sleep Current 1.2 µA TYP**
- **Up to 6 miles of range (line of sight)**
- **Operating Temperature Range: -40 to +85°C**
- **FCC, CE and IC certifications in Progress**
*Multiple antenna options
FSK Modulation Only*
- **ROHS compliant**

APPLICATIONS

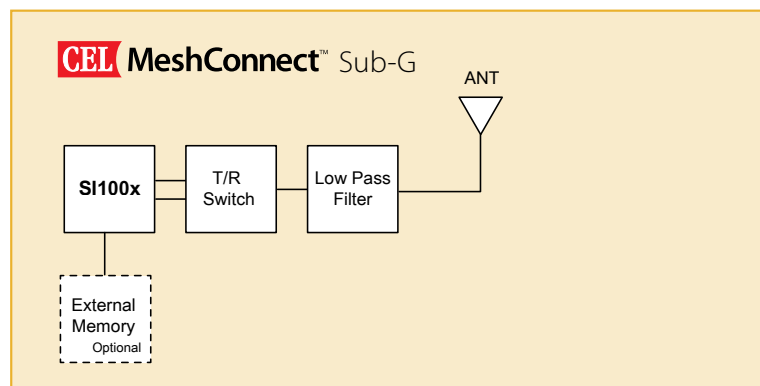
- ▶ Lighting Control
- ▶ Irrigation
- ▶ Serial wire replacement
- ▶ Industrial Sensor Networks
- ▶ Wireless M-Bus Metering
- ▶ Home Automation & Smart Plugs
- ▶ Security
- ▶ And more...

SOFTWARE SUPPORT

- ▶ Synapse SNAP Embedded Firmware
- ▶ Wireless M-Bus (868 MHz only)
- ▶ CEL Application Programming Interface (API)
- ▶ Silicon Labs EZMac

BLOCK DIAGRAM

See Data Sheet for more information.



CEL MeshConnect™ Product Family

MeshConnect™ Sub-G Module

| | |
|-------------------|---|
| ZICM0868P0 | 868MHz Modules. See data sheet for more available options |
| ZICM0900P2 | 900MHz Modules. See data sheet for more available options |

MeshConnect™ EM357 Module

| | |
|---------------------|--|
| ZICM357P2-1 | EM357 Module with integrated PCB antenna & ZigBee Pro Software |
| ZICM357P2-1C | EM357 Module with connector for external antenna option |

MeshConnect™ Module

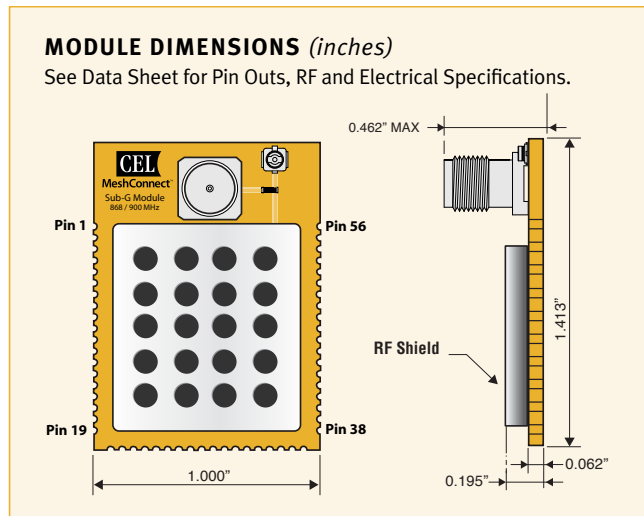
| | |
|-------------------------|---|
| ZICM2410P0-1 | Module with integrated PCB antenna |
| ZICM2410P0-1-SN | Module with integrated PCB antenna & SNAP software |
| ZICM2410P0-1C | Module with connector for external antenna option |
| ZICM2410P0-1C-SN | Module with external antenna option & SNAP software |

MeshConnect™ Extended Range Module

| | |
|-------------------------|--|
| ZICM2410P2-1 | Extended Range Module with integrated PCB antenna |
| ZICM2410P2-1-SN | Extended Range Module with integrated PCB antenna & SNAP software |
| ZICM2410P2-1C | Extended Range Module w/connector for external antenna option |
| ZICM2410P2-1C-SN | Extended Range Module with external antenna option & SNAP software |

MeshConnect™ System on Chip ICs

| | |
|--------------------|----------------------|
| ZIC2410QN48 | 48 pin QFN package |
| ZIC2410FG72 | 72 pin VFPGA package |



MeshConnect™ Development Kits

| | |
|--------------------------|---|
| ZICM357P2-KIT1-1 | Evaluation & Development Kit for EM357 Module |
| ZICM2410P0-KIT2-1 | Evaluation & Development Kit for both Transceiver ICs & MeshConnect Module |
| ZICM2410P2-KIT1-1 | Evaluation & Development Kit for both Transceiver ICs & Extended Range Module |
| ZICM0868P0-KIT1-1 | Evaluation & Development Kit for Sub-G SoC Module (868 MHz) |
| ZICM0900P2-KIT1-1 | Evaluation & Development Kit for Sub-G SoC Module (900 MHz) |

CEL MESHCONNECT / ZIGBEE MODULES

| | MeshConnect™ Sub-G | MeshConnect™ | MeshConnect™ Extended Range | MeshConnect™ EM357 | Apex | Apex LT | FreeStar Pro | FreeStar | |
|--------------------|--|---|---|-----------------------------|---|---|--|--|-------------------------------------|
| MODULE | RADIO | 2405 to 2480 MHz / DSSS / IEEE 802.15.4 | | | | | | | |
| MCU | Transceiver Chipset | Silicon Labs™ Si1000 / Si1002 8 bit, 8051 MCU | MeshConnect™ ZIC2410 (SoC) 8 bit, 8051 | | Ember™ EM357 32 bit, ARM® Cortex™-M3 | Ember™ EM250 16 bit, XAP2b | Ember™ EM260 Network processor | Freescaler™ MC13224 / MC13226 32 bit, ARM7 | Freescaler™ MC13192 8 bit, HCS08 |
| | Fmax | 25 MHz | 16 MHz | | 24 MHz | 12 MHz | n/a | 32 MHz | 40 MHz |
| | Inputs/Outputs | 21 | 22 | 20 | 23 | 17 | n/a | 46 | 8 |
| NETWORK | 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 | Point-to-Point, Point-to-Multipoint |
| | Software/ ZigBee Stack | SNAP®, Wireless M-Bus, CEL API, EZMac, | SNAP®, MAC, S-MAC, ZigBee® | | EmberZNet PRO™ (ZigBee Pro) | EmberZNet PRO™ (ZigBee Pro) | | BeeStack™ ZigBee Pro - MC13226 MAC, SMAC - MC13224 | LSR STAR Protocol BeeStack |
| PERFORMANCE | Tx Power Output | +13dBm & +20dBm | +6dBm | +20dBm | +20dBm | +20dBm | | +20dBm | |
| | Rx Sensitivity | -99dBm to -121dBm | -97dBm | -103dBm | -100dBm | -97dBm | | -94dBm | -92dBm |
| | Range (line of sight) | 31,600 ft (9,656 M) | 2,000 ft (609 M) | 16,000 ft (4,876 M) | 13,000 ft (3,962 M) | 4,000 ft (1,219 M) | | 4,000 ft (1,219 M) | 4,000ft |
| | Vcc | 1.8 – 3.6V | 2.1 – 3.3V | | 2.7 – 3.6V | 2.1 – 3.6V | | 2.0 – 3.6V | 2.4 – 3.6V |
| | Rx Current | 24mA | 35mA | 38mA | 28mA | 37mA | | 30mA | 42mA |
| | Tx Current | 18mA to 97mA | 44mA | 200mA | 170mA | 170mA | | 193mA | 150mA |
| | Sleep Current | 1.2µA | <1.0µA | | 6.0µA | 5µA | | 13µA | <5µA |
| Dimensions | 25 x 36 mm | 25 x 36 mm | | 25 x 36 mm | 25 x 33mm | | 25 x 36 mm | | |
| PART NO. | See Data Sheet | ZICM2410P0-1 ZICM2410P0-1C | ZICM2410P2-2 ZICM2410P2-1C | ZICM357P2-1 ZICM357P2-1C | ZAXM-201-1 ZAXM-201-1C | ZALM-301-1 ZALM-301-1C | (MC13224) ZFSM-201-1 ZFSM-201-1C | ZFSM-101-1 | |
| EVAL KIT | ZICM0868P0-KIT1-1 ZICM0900P2-KIT1-1 | ZICM2410P0-KIT2-1 | ZICM2410P2-KIT1-1 | ZICM357P2-KIT1-1 | ZAXM-201-KIT-1 | ZAXM-201-KIT-1 | ZFSM-201-KIT-1 | ZFSM-101-KIT-1 | |