MeshConnect™ EM357 Mini Modules

ZICM357SP0-1, ZICM357SP2-1
Ember™ EM357 Transceiver Based Modules

Integrated Transceiver Modules for ZigBee / IEEE 802.15.4
Development Kits available: ZICM-EM35X-DEV-KIT-2

DESCRIPTION

CEL's MeshConnect™ EM357 Mini Modules combine high performance RF solutions with the market's premier Zig-Bee® stack. Available in low and high output power options (+8dBm and +20dBm), these modules can accommodate variable range and performance requirements. The tiny module footprint makes them suitable for a wide range of ZigBee applications. The MeshConnect EM357 Mini Modules are certified and qualified, enabling customers to accelerate time to market by greatly reducing the design and certification phases of development.

CEL's MeshConnect EM357 Mini Modules (ZICM357SP0, ZICM357SP2) are based on the Ember EM357 Zigbee compliant SOC radio IC. The IC is a single-chip solution, compliant with ZigBee specifications and IEEE 802.15.4, a complete wireless solution for all ZigBee applications. The IC consists of an RF transceiver with the baseband modem, a hardwired MAC and an embedded 32-bit ARM® Cortex™-M3 microcontroller with internal RAM (12kB) and Flash (192kB) memory. The device provides numerous general-purpose I/O pins and peripheral functions such as timers and UARTs.

CEL MeshConnect EM357 Mini Modules

- **192 kB FLASH**
- **12 kB SRAM**
- **32-bit ARM® Cortex™-M3**
- **Up to 23 GPIO Pins**
- **SPI (Master/Slave), TWI, UART**
- **Timers, Serial Wire/JTAG Interface**
- **5-channel 14-bit ADC**

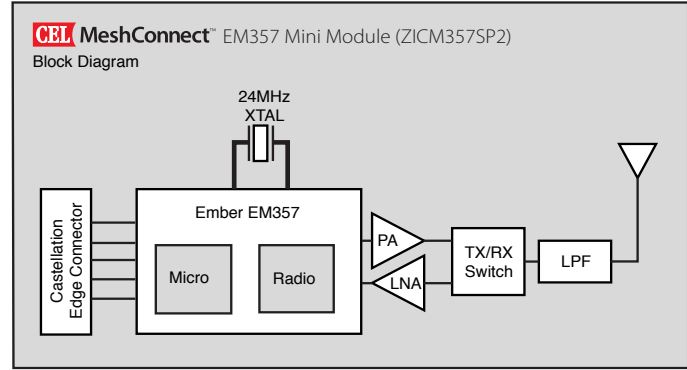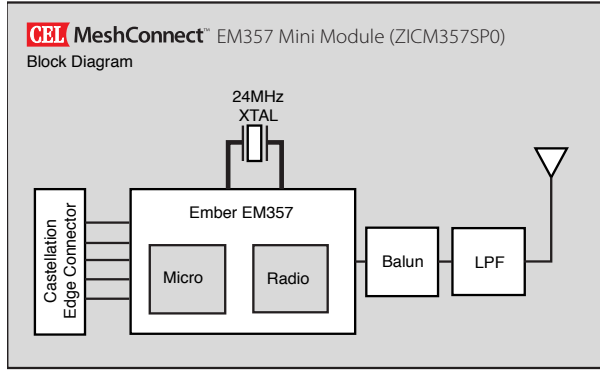|	ZICM357SP0	ZICM357SP2
Tx:	+8dBm	+20dBm
Rx:	-100dBm	-103dBm
Link Budget:	+108dB	+123dB

FEATURES

- **High RF performance:**
  Up to 123 dB RF Link Budget
  RX Sensitivity:
  -100 dBm (ZICM357SP0)
  -103 dBm (ZICM357SP2)
- **Data Rate: 250 kbps**
- **Advanced Cortex-M3 processor**
- **Advanced Power Management**
- **16 RF Channels**
- **Industry's premier ZigBee Pro stack: EmberZNet PRO™**

- **Mini footprint: (23.9mm x 16.6mm)**
  0.940" x 0.655"
- **Antenna Options:**
  1) Integrated PCB trace antenna
  or
  2) RF port for external antenna
- **Supports Mesh networks**
- **AES encryption**
- **FCC, CE and IC certifications**
- **ROHS compliant**

APPLICATIONS

- **Smart Energy / Grid Markets**
  Thermostats
  In-Home-Displays
  Smart Plugs
- **Building automation and control**
- **Lighting: fixture and control**

- **Solar inverter and control**
- **Home automation and control**
  Energy Management
  Security Devices
  HVAC Control
- **General ZigBee wireless sensor networking**

ORDERING INFORMATION

Part Number	Order Number	Description	Min./Multiple
MeshConnect™ EM357 Mini Modules	**ZICM357SP0-1**	+8 dBm Output Power, PCB Trace antenna	330 / 330
	ZICM357SP0-1C	+8 dBm Output Power, with Castellation pin for external antenna	330 / 330
	ZICM357SP2-1	+20 dBm Output Power, PCB Trace antenna	330 / 330
	ZICM357SP2-1C	+20 dBm Output Power, with Castellation pin for external antenna	330 / 330
MeshConnect™ EM357 Development Kits	**ZICM-EM35X-DEV-KIT-2**	MeshConnect EM35x Ember Companion Kit for Ember EM35x Development Kits	1 / 1

MODULE BLOCK DIAGRAMS

CEL MeshConnect™ EM357 Mini Module (ZICM357SP0)
Block Diagram

24MHz
XTAL

Castellation Edge Connector

Ember EM357

Micro   Radio

Balun   LPF

CEL MeshConnect™ EM357 Mini Module (ZICM357SP2)
Block Diagram

24MHz
XTAL

Castellation Edge Connector

Ember EM357

Micro   Radio

PA

LNA

TX/RX Switch

LPF

DEVELOPMENT KITS

CEL's Development Kits assist users in both evaluation and development.

Ember Companion Kit:

CEL's MeshConnect EM35x Ember Companion Kit is designed to work with the Ember development kits [EM35X-DEV and EM35X-DEV-IAR]. Each module in this CEL kit is soldered on a carrier board making it pin-for-pin compatible with the Ember development board.

For more information regarding MeshConnect Development Kits, refer to the respective development kit user guides documents. (Available at CEL's website **www.cel.com/MeshConnect**)

CEL MeshConnect™

EM35x Ember Companion Kit

Kit Contents:
· **ZICM357SP2-1 modules (2)**
· **ZICM357SP2-1C module (1)**
· **ZICM357SP0-1 modules (2)**
· **ZICM357SP0-1C module (1)**
· **Online Documentation**

DEVELOPMENT KITS ORDERING INFORMATION

Part Number	Order Number	Description
MeshConnect™ EM35x Ember Companion Kit	**ZICM-EM35X-DEV-KIT-2**	MeshConnect EM35x Ember Companion Kit for Ember EM35x Dev Kits

TABLE OF CONTENTS

TRANSCEIVER IC

CEL's MeshConnect EM357 Mini Modules use the Ember EM357 transceiver IC. This IC incorporates the RF transceiver with the baseband modem, a hardwired MAC, and an embedded ARM® Cortex™-M3 microcontroller, offering an excellent low cost high performance solution for all IEEE 802.15.4 / ZigBee applications.

For more information about the Ember EM357 IC, visit http://www.ember.com

ANTENNA

CEL's MeshConnect EM357 Mini Modules include an integrated Printed Circuit Board (PCB) trace antenna. An optional configuration with a Castellation pin is available for a connection to a 50-ohm external antenna of the user's choice. However use of an external antenna is not covered by the module's certification. See Ordering Information on page 1.
The PCB antenna employs a topology that is compact and highly efficient. To maximize range, an adequate ground plane must be provided on the host PCB. Correctly positioned, the ground plane on the host PCB will contribute significantly to the antenna performance (it should not be directly under the module PCB Antenna). The position of the module on the host board and overall design of the product enclosure contribute to antenna performance. Poor design affects radiation patterns and can result in reflection, diffraction, and/or scattering of the transmitted signal.

For optimum antenna performance, the MeshConnect modules should be mounted with the PCB trace antenna overhanging the edge of the host board. To further improve performance, a ground plane may be placed on the host board under the module, up to the antenna (a minimum of 1.5" x 1.5" is recommended). The installation of an uninterrupted ground plane on a layer directly beneath the module will also allow you to run traces under this layer. CEL can provide assistance with your PCB layout.

Here are some design guidelines to help ensure antenna performance:
• Never place the ground plane or route copper traces directly underneath the antenna portion of the module.
• Never place the antenna close to metallic objects.
• In the overall design, ensure that wiring and other components are not placed near the antenna.
• Do not place the antenna in a metallic or metalized plastic enclosure.
• Keep plastic enclosures 1cm or more from the antenna in any direction.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

POWER AMPLIFIER

CEL's MeshConnect EM357 High Power Module (ZICM357SP2) includes a Power Amplifier (PA). This PA delivers high efficiency, high gain, and high output power (Pout = +20.0 dBm TYP) to provide an extended range and reliable transmission for fewer nodes in a network.

SOFTWARE/FIRMWARE

CEL's MeshConnect EM357 Mini Modules are ideal platforms for the EmberZNet PRO™, the industry's most deployed and field proven ZigBee compliant stack supporting the ZigBee PRO feature Set. EmberZNET PRO is a complete ZigBee protocol software package containing all the elements required for mesh networking applications. For more information regarding the software development for this IC, visit http://www.ember.com

CEL provides reference software that runs multiple functions and executes various commands. The firmware allows the execution of IEEE 802.15.4 communication, validation and manufacturing tests. For example, users can setup a simple ZigBee Point-to-Point network to perform Range and Packet Error Rate (PER) tests. The software can also place the module in various operating modes, which allows for setting and/or testing various parameters.

The ZICM357SP0 uses the transceiver's Primary RF ports for transmitting and should use power mode 1.
The ZICM357SP2 uses the transceiver's Alternate RF ports for transmitting and should use power mode 2.

ABSOLUTE MAXIMUM RATINGS

Description		MeshConnect™ ZICM357SPx Module		Unit
		Min	**Max**	
Power Supply Voltage (V$_{DD}$)		-0.3	3.6	VDC
Voltage on any I/O Line		-0.3	V$_{DD}$ + 0.3	VDC
RF Input Power	ZICM357SP0	–	+15	dBm
	ZICM357SP2	–	+5	
Storage Temperature Range		-40	125	°C
Reflow Soldering Temperature		–	260	°C

Note: Exceeding the maximum ratings may cause permanent damage to the module or devices.

RECOMMENDED (OPERATING CONDITIONS)

Description	MeshConnect™ ZICM357SPx Module			Unit
	Min	**Typ**	**Max**	
Power Supply Voltage (V$_{DD}$)	2.1	3.3	3.6	VDC
Input Frequency	2405	–	2480	MHz
Ambient Temperature Range	-40	25	85	°C

DC CHARACTERISTICS *(@ 25⁰ C, VDD = 3.3V, ZICM357SP0 TX power mode 1, ZICM357SP2 TX power mode 2)*

Description		MeshConnect™ ZICM357SPx Module			Unit
		Min	**Typ**	**Max**	
Transmit Mode Current @ 8dBm	ZICM357SP0	–	44	–	mA
Transmit Mode Current @ 0dBm		–	31	–	mA
Receive Mode Current		–	30	–	mA
Transmit Mode Current @ 20dBm	ZICM357SP2	–	150	–	mA
Transmit Mode Current @ 0dBm		–	58	–	mA
Receive Mode Current		–	34	–	mA
Sleep Mode Current		–	1	–	µA

RF CHARACTERISTICS *(@ 25⁰ C, VDD = 3.3V, ZICM357SP0 TX power mode 1, ZICM357SP2 TX power mode 2)*

Description		MeshConnect™ ZICM357SPx Module			Unit
		Min	**Typ**	**Max**	
General Characteristics					
RF Frequency Range		2405	–	2480	MHz
RF Channels		11	–	26	–
Frequency Error Tolerance		-96.2	–	96.2	kHz
Transmitter					
Maximum Output Power	ZICM357SP0	–	8	–	dBm
Minimum Output Power		–	-40	–	dBm
Offset Error Vector Magnitude		–	5	35	%
Maximum Output Power	ZICM357SP2	–	20	21	dBm
Minimum Output Power		–	-40	–	dBm
Offset Error Vector Magnitude		–	5	35	%
Receiver					
Sensitivity (1% PER, boost mode)	ZICM357SP0	–	-100	-94	dBm
Saturation (maximum input level)		0	–	–	dBm
Sensitivity (1% PER, normal mode)	ZICM357SP2	–	-103	-97	dBm
Saturation (maximum input level)		-10	–	–	dBm

California Eastern Laboratories

PIN SIGNALS I/O PORT CONFIGURATION

CEL's MeshConnect module has 33 edge I/O interfaces for connection to the user's host board. The MeshConnect Module Dimensions shows the layout of the 33 edge castellations.

MeshConnect I/O PIN ASSIGNMENTS

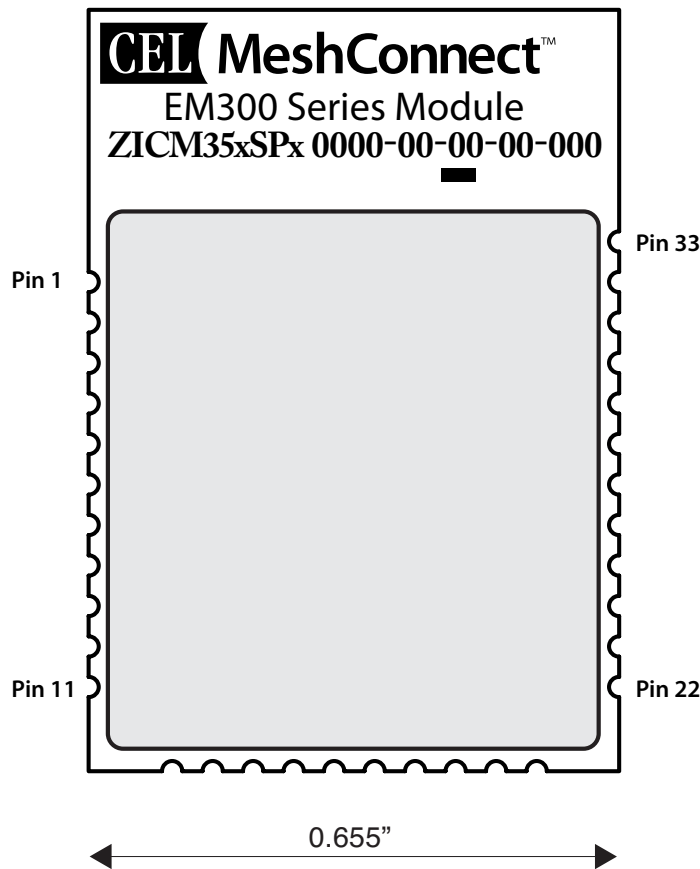| CEL MeshConnect ZICM357SPx Module Pin Number	Ember EM357 IC Pin Number	Name	Notes
1, 2, 12, 31, 33	49	GROUND	
3	11	PC5	Digital I/O TX_ACTIVE - Logic-level control for PA. The EM35x baseband controls TX_ACTIVE and drives it high when in TX mode. *Applies only to the ZICM357SP0. PC5 is a NC on the ZICM357SP2*
4	12	RESET	Active Low chip reset (Input)
5	13	PC6	Digital I/O OSC32B - 32.768 kHz crystal oscillator nTX_ACTIVE - Inverted TX_ACTIVE signal
6	14	PC7	Digital I/O OSC32A - 32.768 kHz crystal oscillator OSC32_EXT - Digital 32.768 kHz clock input source
7	18	PA7	Digital I/O TIM1C4 - Timer 1 Channel 4 input/output REG_EN - External regulator open drain output
8	19	PB3	Digital I/O TIM2C3 - Timer 2 Channel 3 input/output SC1nCTS - UART CTS handshake of Serial Controller 1 SC1SCLK - SPI master/slave clock of Serial Controller 1
9	20	PB4	Digital I/O TIM2C4 - Timer 2 Channel 4 input/output SC1nRTS - UART RTS handshake of Serial Controller 1 SC1nSSEL - SPI slave select of Serial Controller 1
10	21	PA0	Digital I/O TIM2C1 - Timer 2 Channel 1 input/output SC2MOSI - SPI master data out/slave data in of Serial Controller 2
11	22	PA1	Digital I/O TIM2C3 - Timer 2 Channel 3 input/output SC2SDA - TWI data of Serial Controller 2 SC2MISO - SPI master data in/slave data out of Serial Controller 2
13	16, 23, 28, 37	VCC	
14	24	PA2	Digital I/O TIM2C4 - Timer 2 Channel 4 input/output SC2SCL - TWI clock of Serial Controller 2 SC2SCLK - SPI master/slave clock of Serial Controller 2
15	25	PA3	Digital I/O TIM2C2 - Timer 2 channel 2 input/output SC2nSSEL - SPI slave select of Serial Controller 2 TRACECLK - Synchronous CPU trace clock
16	26	PA4	Digital I/O ADC4 - ADC Input 4 PTI_EN - Frame signal of Packet Trace Interface (PTI) TRACEDATA2 - Synchronous CPU trace data bit 2
17	27	PA5	Digital I/O ADC5 - ADC Input 5 PTI_DATA - Data signal of Packet Trace Interface (PTI) nBOOTMODE - Embedded serial bootloader activation out of reset TRACEDATA3 - Synchronous CPU trace data bit 3
18	29	PA6	Digital I/O TIM1C3 - Timer 1 channel 3 input/output

MeshConnect I/O PIN ASSIGNMENTS (Continued)

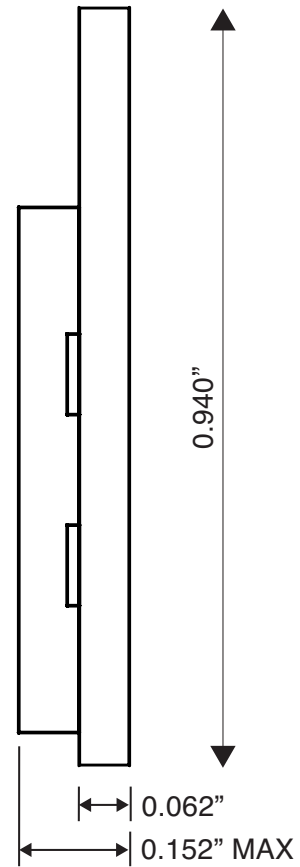| CEL MeshConnect ZICM357SPx Module PIN Number	Ember EM357 IC Pin Number	Name	Notes
19	30	PB1	Digital I/O SC1MISO - SPI slave data out of Serial Controller 1 SC1MOSI - SPI master data out of Serial Controller 1 SC1SDA - TWI data of Serial Controller 1 SC1TXD - UART transmit data of Serial Controller 1 TIM2C1 - Timer 2 channel 1 input/output
20	31	PB2	Digital I/O SC1MISO - SPI master data in of Serial Controller 1 SC1MOSI - SPI slave data in of Serial Controller 1 SC1SCL - TWI clock of Serial Controller 1 SC1RXD - UART receive data of Serial Controller 1 TIM2C2 - Timer 2 channel 2 input/output
21	32	JTCK	JTAG clock input from debugger SWCLK - Serial Wire clock input/output with debugger
22	33	PC2	Digital I/O JTD0 - JTAG data out to debugger SWO - Serial Wire Output asynchronous trace output to debugger
23	34	PC3	Digital I/O JTDI - JTAG data in from debugger
24	35	PC4	Digital I/O JTMS - JTAG mode select from debugger SWDIO - Serial Wire bidirectional data to/from debugger
25	36	PB0	Digital I/O VREF - ADC reference input/output IRQA - External interrupt source A TRACECLK - Synchronous CPU trace clock TIM1CLK - Timer 1 external clock input TIM2MSK - Timer 2 external clock mask input
26	38	PC1	Digital I/O ADC3 - ADC Input 3 SWO - Serial Wire Output asynchronous trace output to debugger TRACEDATA0 - Synchronous CPU trace data bit 0
27	40	PC0	Digital I/O JRST - JTAG reset input from debugger IRQD - Default external interrupt source D TRACEDATA1 - Synchronous CPU trace data bit 1
28	41	PB7	Digital I/O ADC2 - ADC Input 2 IRQC - Default external interrupt source C TIM1C2 - Timer 1 channel 2 input/output
29	42	PB6	Digital I/O ADC1 - ADC Input 1 IRQB - External interrupt source B TIM1C1 - Timer 1 channel 1 input/output
30	43	PB5	Digital I/O ADC0 - ADC Input 0 TIM2CLK - Timer 2 external clock input TIM1MSK - Timer 1 external clock mask input
	NC	RF Out	Castellation Pin for external Antenna

Note: PC5 Applies only to the ZICM357SP0. PC5 is a NC on the ZICM357SP2

MODULE DIMENSIONS

MeshConnect™ EM357 Mini Modules

CEL MeshConnect™
EM300 Series Module
ZICM35xSPx 0000-00-00-00-000

Pin 1

Pin 33

Pin 11

Pin 22

0.655"

0.940"

0.062"

0.152" MAX

TOP VIEW
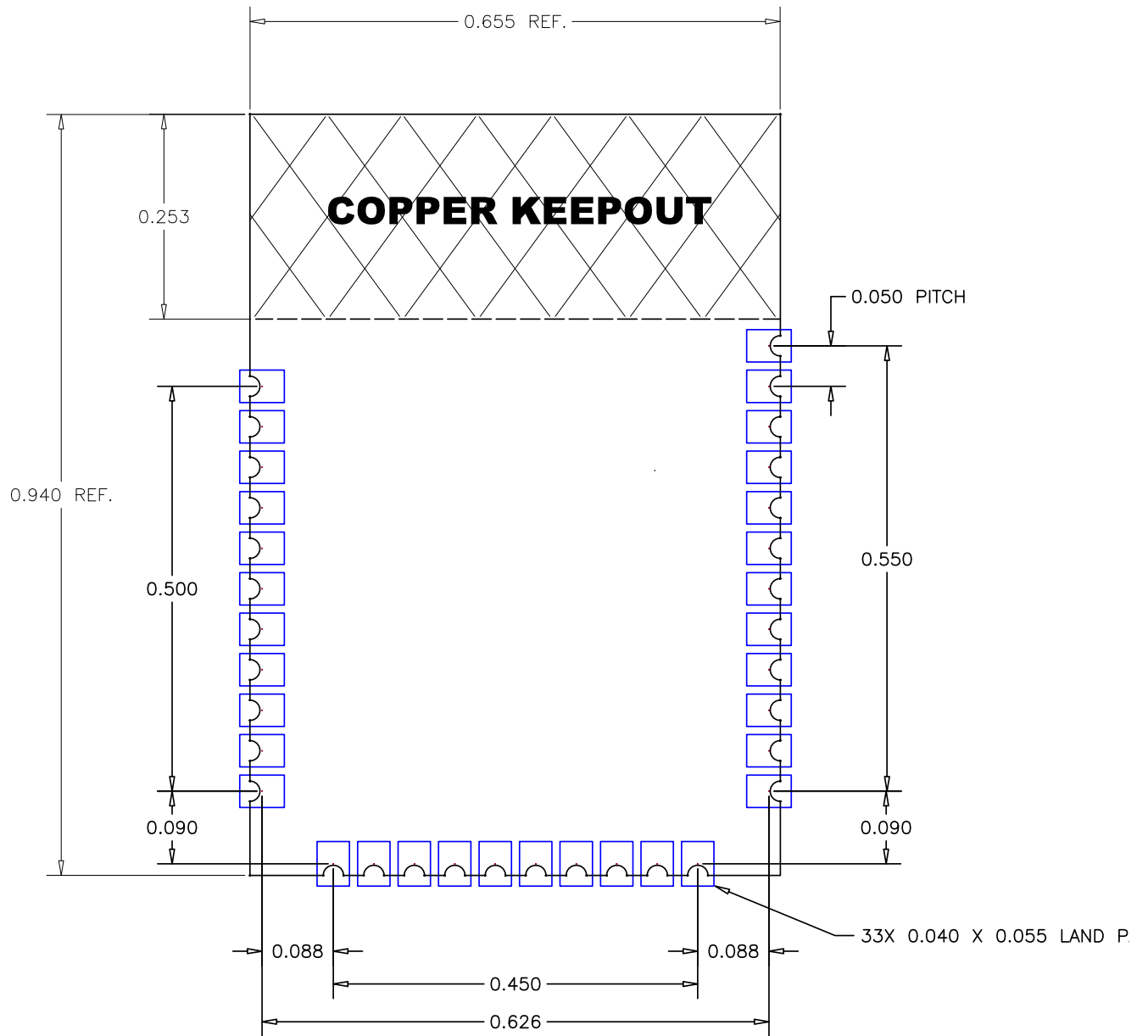
SIDE VIEW

Note: All dimensions are +/- 0.005" unless otherwise specified.

MODULE LAND FOOTPRINT

Note: Dimensions are in Inches.

Note: For layout recommendation for optimum antenna performance, refer to the Antenna section in this document.

PROCESSING

Recommended Reflow Profile

Parameters Values	
Ramp up rate (from Tsoakmax to Tpeak)	3º/sec max
Minimum Soak Temperature	150ºC
Maximum Soak Temperature	200ºC
Soak Time	60-120 sec
TLiquidus	217ºC
Time above TL	60-150 sec
Tpeak	250ºC
Time within 5º of Tpeak	20-30 sec
Time from 25º to Tpeak	8 min max
Ramp down rate	6ºC/sec max

Pb-Free Solder Paste
Use of "No Clean" soldering paste is strongly recommended, as it does not require cleaning after the soldering process.

Note: The quality of solder joints on the castellations ('half vias') where they contact the host board should meet the appropriate IPC Specification. See the latest **IPC-A-610** Acceptability of Electronic Assemblies, Castellated Terminations section.

Cleaning
In general, cleaning the populated modules is strongly discouraged. Residuals under the module cannot be easily removed with any cleaning process.

- Cleaning with water can lead to capillary effects where water is absorbed into the gap between the host board and the module. The combination of soldering flux residuals and encapsulated water could lead to short circuits between neighboring pads. Water could also damage any stickers or labels.
- Cleaning with alcohol or a similar organic solvent will likely flood soldering flux residuals into the two housings, which is not accessible for post-washing inspection. The solvent could also damage any stickers or labels.
- Ultrasonic cleaning could damage the module permanently.

The best approach is to consider using a "no clean" solder paste and eliminate the post-soldering cleaning step.

Optical Inspection
After soldering the Module to the host board, consider optical inspection to check the following:

- Proper alignment and centering of the module over the pads.
- Proper solder joints on all pads.
- Excessive solder or contacts to neighboring pads, or vias.

Repeating Reflow Soldering
Only a single reflow soldering process is encouraged for host boards.

Wave Soldering
If a wave soldering process is required on the host boards due to the presence of leaded components, only a single wave soldering process is encouraged.

Hand Soldering
Hand soldering is possible. When using a soldering iron, follow IPC recommendations (reference document IPC-7711)

PROCESSING *(Continued)*

Rework

The MeshConnect Module can be unsoldered from the host board. Use of a hot air rework tool should be programmable and the solder joint and module should not exceed the maximum peak reflow temperature of 250 ºC.

Caution

If temperature ramps exceed the reflow temperature profile, module and component damage may occur due to thermal shock. Avoid overheating.

Warning

Never attempt a rework on the module itself, e.g. replacing individual components. Such actions will terminate warranty coverage.

Additional Grounding

Attempts to improve module or system grounding by soldering braids, wires, or cables onto the module RF shield cover is done at the customer's own risk. The ground pins at the module perimeter should be sufficient for optimum immunity to external RF interference.

AGENCY CERTIFICATIONS (PCB ANTENNA ONLY)

The following Certifications are in progress:
ZICM357SP0-1: FCC, IC, CE
ZICM357SP2-1: FCC, IC

FCC Compliance Statement (Part 15.19) Section 7.15 of RSS-GEN

This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS Standards.
Operation is subject to the following two conditions:

> 1. This device may not cause harmful interference.
> 2. This device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

> 1. l'appareil ne doit pas produire de brouillage, et
> 2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Warning (Part 15.21)

Changes or modifications not expressly approved by CEL could void the user's authority to operate the equipment.

20 cm Separation Distance

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

OEM Responsibility to the FCC and IC Rules and Regulations

The MeshConnect Module has been certified per FCC Part 15 rules and to Industry Canada license-exempt RSS Standards for integration into products without further testing or certification. To fulfill the FCC and IC certification requirements, the OEM of the MeshConnect Module must ensure that the information provided on the MeshConnect Label is placed on the outside of the final product. The MeshConnect Module is labeled with its own FCC ID Number and IC ID Number. IF the FCC ID and the IC ID are not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

> "Contains Transmitter Module FCC ID: W7Z-ZICM357SP0" or "Contains FCC ID: W7Z-ZICM357SP0"
> "Contains Transmitter Module IC:8254A-ZICM357SP0" or "Contains IC: 8254A-ZICM357SP0"

or

> "Contains Transmitter Module FCC ID: W7Z-ZICM357SP2" or "Contains FCC ID: W7Z-ZICM357SP2"
> "Contains Transmitter Module IC: 8254A-ZICM357SP2" or "Contains IC: 8254A-ZICM357SP2"

AGENCY CERTIFICATIONS *(Continued)*

The OEM of the MeshConnect Module may only use the approved antenna, (PCB Trace Antenna) that has been certified with this module. The OEM of the MeshConnect Module must test their final product configuration to comply with Unintentional Radiator Limits before declaring FCC compliance per Part 15 of the FCC rules.

IC Certification — Industry Canada Statement
The term "IC" before the certification / registration number only signifies that the Industry Canada technical specifications were met.

Certification IC - Déclaration d'Industrie Canada
Le terme "IC" devant le numéro de certification / d'enregistrement signifie seulement que les spécifications techniques Industrie Canada ont été respectées.

Section 14 of RSS-210
The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population. Consult Safety Code 6, obtainable from Health Canada's website: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/99ehd-dhm237/index-eng.php

L'article 14 du CNR-210
Le programme d'installation de cet équipement radio doit s'assurer que l'antenne est située ou orientée de telle sorte qu'il ne pas émettre de champ RF au-delà des limites de Santé Canada pour la population générale. Consulter le Code de sécurité 6, disponible sur le site Web de Santé Canada: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/99ehd-dhm237/index-eng.php

CE Certification — Europe
The MeshConnect ZICM357SP0 module has been tested and certified for use in the European Union.

OEM Responsibility to the European Union Compliance Rules
If the MeshConnect module is to be incorporated into a product, the OEM must verify compliance of the final product to the European Harmonized EMC and Low-Voltage / Safety Standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive.

The manufacturer must maintain the user's guide and adhere to the settings described in the manual for maintaining European Union Compliance. If any of the specifications are exceeded in the final product, the OEM is required to make a submission to the notified body for compliance testing.

OEM Labeling Requirements
The CE mark must be placed on the OEM product in a visible location.
The CE mark shall consist of the initials "CE" with the following form:

· If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be adhered to.
· The CE mark must be a minimum of 5mm in height
· If the use of the module is subject to restrictions in the end application, the CE marking on the OEM product should also include the alert sign as shown in the picture to the right.

AGENCY CERTIFICATIONS *(Continued)*

Software Compliance

The ZICM357SP2 requires software restrictions to meet agency certification requirements. These restrictions have been implemented in the sample application included with the software development kit.

If a customer is not starting with CEL's software development kit, they must implement these output power restrictions to use the ZICM357SP2 FCC or IC certification:

Certification		RF Channel	Valid TX Power Steps	Typical Max Output Power
ZICM357SP0	FCC/IC	11 - 25	8	8 dBm
		26	0	1 dBm
	ETSI	11 - 26	8	8 dBm
ZICM357SP2	FCC/IC	11 - 24	-2	20 dBm
		25	-6	17 dBm
		26	-26	-3 dBm

SHIPMENT, HANDLING AND STORAGE

Shipment
The MeshConnect Modules are delivered in trays of 66 units (per tray).

Handling
The MeshConnect Modules are designed and packaged to be processed in an automated assembly line.

Warning
The MeshConnect Modules contain highly sensitive electronic circuitry. Handling without proper ESD protection may destroy or damage the module permanently.

Warning
The MeshConnect Modules are moisture-sensitive devices. Appropriate handling instructions and precautions are summarized in J-STD-033. Read carefully to prevent permanent damage due to moisture intake.

Moisture Sensitivity Level (MSL)
MSL 3, per J-STD-033

Storage
Storage/shelf life in sealed bags is 12 months at <40°C and <90% relative humidity.

QUALITY

CEL modules offer the highest quality at competitive prices. Our modules are manufactured in compliance with the IPC-A-610 specification, Class II. Our modules go through JESD22 qualification processes which includes high temperature operating life tests, mechanical shock, temperature cycling, humidity and reflow testing. CEL conducts RF and DC factory testing on 100% of all production parts.

CEL builds the quality into our products, giving our customers confidence when integrating our products into their systems.

REFERENCES & REVISION HISTORY

Previous Versions	Changes to Current Version	Page(s)
0011-00-07-00-000 March 29, 2012	Initial preliminary datasheet.	N/A
0011-00-07-00-000 (Issue A) April 11, 2012	Added FCC certification and shipping information; edited "Features" section	1, 13
0011-00-07-00-000 (Issue B) May 4, 2012	Updated Min./Multiple values	1, 13
0011-00-07-00-000 (Issue C) May 25, 2012	Updated Software Compliance table	13

Disclaimer