

**ABSTRACT**

The CC2564MODNEM is a low-cost evaluation board for TI's CC2564MODN device. The evaluation board is designed to plug-in to additional TI hardware development kits, such as MSP430 or TM4C microcontroller development platforms, to create a complete evaluation platform. This guide is designed to help users quickly get started with the CC2564MODNEM board and integrate it with multiple platforms for prototyping Bluetooth applications.

The CC2564MODN device is a complete Bluetooth BR/EDR/LE HCI solution based on TI's CC2564B dual-mode Bluetooth single-chip device, which reduces design effort and enables fast time to market. The CC2564MODN device includes TI's seventh-generation Bluetooth core and provides a product-proven solution that is Bluetooth 4.1 compliant. The CC2564MODN device provides best-in-class RF performance with a transmit power and receive sensitivity that provides range of about 2 times compared to other Bluetooth Low Energy only solutions.

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**Trademarks**

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## 1 Introduction

The CC2564MODNEM evaluation board contains the CC2564MODN device. TI intends the board for evaluation and design purposes. For a complete evaluation solution, the CC2564MODNEM board plugs directly into the following TI hardware development kits:

- MSP-EXP430F5529
- MSP-EXP430F5438
- DK-TM4C123G
- DK-TM4C129X
- Other MCU

A certified and royalty-free TI *Bluetooth* stack (TIBLUETOOTHSTACK-SDK) is available for the MSP430™ and TM4C12x MCUs. The CC2564MODNEM hardware design files (schematics, layout, and bill of materials [BOM]) are provided as a reference to aid in the implementation of the CC2564MODN device.

## 2 Features

- Features a CC2564MODN device (MOE package)
- Supports *Bluetooth* Specification v4.1
- Supports dual-mode – *Bluetooth* + *Bluetooth* low energy
- Offers class 1.5-transmit power (+10 dBm)
- Offers high sensitivity (–93 dBm typical)
- Offers a 32.768-kHz oscillator
- Offers a UART interface – control and data
- Offers a PCM/I2S interface – voice and audio
- Offers 4-layer PCB design
- Offers 1.8 LDO (LP2985-18)
- Offers three voltage level translators (SN74AVC4T774)
- Offers a chip antenna (LTA-5320-2G4S3-A1)
- Offers a RF connector (U.FL-R-SMT-1)
- Offers EM connectors that plug directly into the following TI hardware development kits:
  - MSP-EXP430F5529
  - MSP-EXP430F5438
  - DK-TM4C123G
  - DK-TM4C129X
  - Other MCU
- Offers COM connectors that plug directly into the TI hardware development kits
- Features Certified and royalty-free TI dual-mode *Bluetooth* stack (TIBLUETOOTHSTACK-SDK):
  - MSP430™ (CC256XMSPTBLESW)
  - TM4C (CC256XM4BTBLESW)
  - Other MCU (CC256XSTBTBLESW)

### 3 CC2564MODNEM Board Applications

Example embedded wireless applications include the following:

- Cable replacement
- Printer adapters
- Personal digital assistants (PDAs)
- Printers and scanners
- Computers and peripherals
- Wireless sensors
- Industrial control applications
- Low-power medical

### 4 Introduction to CC2564MODNEM Board

TI intends this user's guide for use with TI's *Bluetooth* development platform, the CC2564MODNEM board. This guide will help you quickly get started with this board and integrate it with TI's evaluation platforms and software SDKs. This user's guide describes the components and configurations of this board to quickly get started with using this board for various *Bluetooth* applications. This guide provides information about the module so you can apply the board specifics to your application. Module information and capabilities, including pin descriptions, available software, and tools, enhance your out-of-box experience.



**Figure 4-1. CC2564MODNEM Board**

## 5 Kit Contents

- One CC2564MODNEM board with TI dual-mode *Bluetooth* CC2564 module
- One block jumper for MSP-EXP430F5438 board
- Four jumpers for MSP-EXP430F5529 board

## 6 Requirements

The following hardware and software tools are required for a complete evaluation:

### Hardware

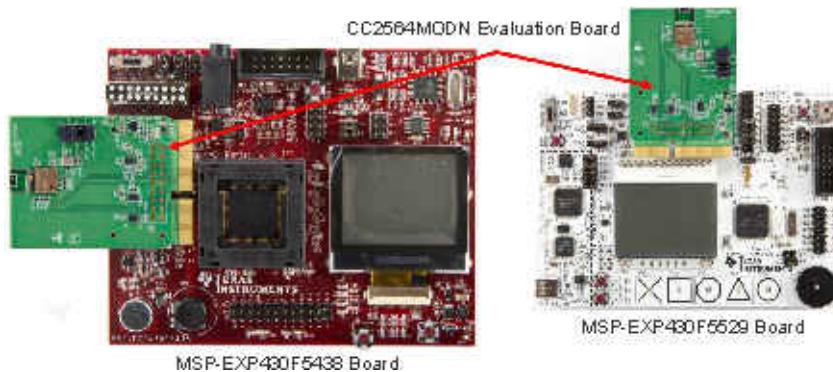
- One MSP430 experimenter board – sold separately
  - [MSP-EXP430F5529 board](#)
  - [MSP-EXP430F5438 board](#)
- One TM4C Development Kit – sold separately
  - [DK-TM4C123G Development Kit](#)
  - [DK-TM4C129X Development Kit](#)

### Software

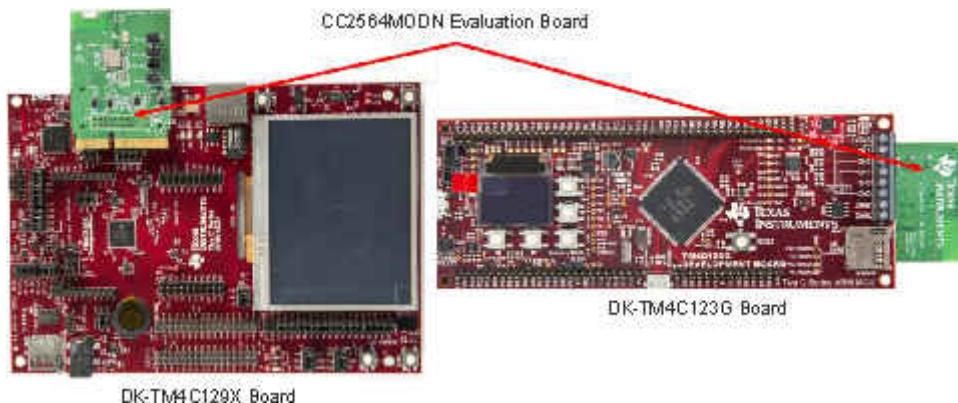
- TI dual-mode *Bluetooth* stack
  - On MSP430 MCUs: [CC256XMSPTBLESW](#)
  - On TM4C MCUs: [CC256XM4BTBLESW](#)
- Other MCU
  - On STM32F4 MCUs: [CC256XSTBTBLESW](#)

### Tools

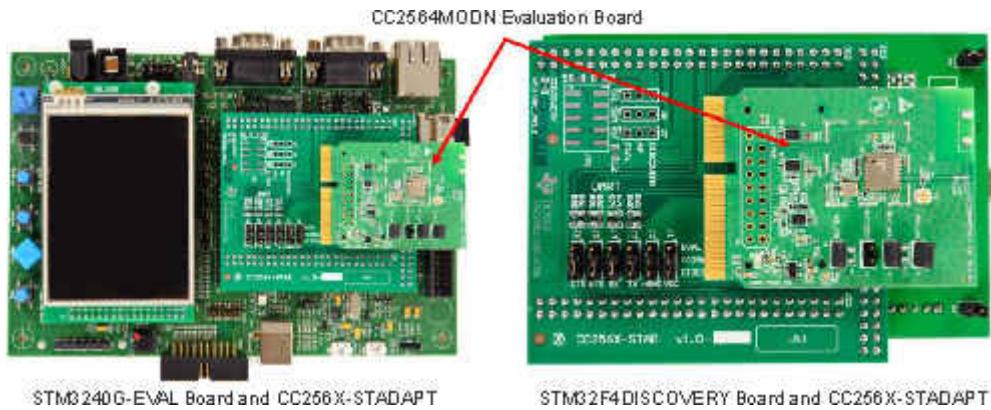
- TI dual-mode *Bluetooth* Service Pack for CC256x (optional)
- CC256x *Bluetooth* Hardware Evaluation Tool (optional)
- IDE Versions – Platform Dependent
  - [Code Composer Studio \(CCS\)](#)
  - [IAR 7.2/7.3 for ARM](#)
  - [Keil µVision 4.70.0.0](#)



**Figure 6-1. MSP430 Hardware Setup Examples**



**Figure 6-2. TM4C Hardware Setup Examples**



**Figure 6-3. Other MCU Hardware Setup Examples**

## 7 Overview

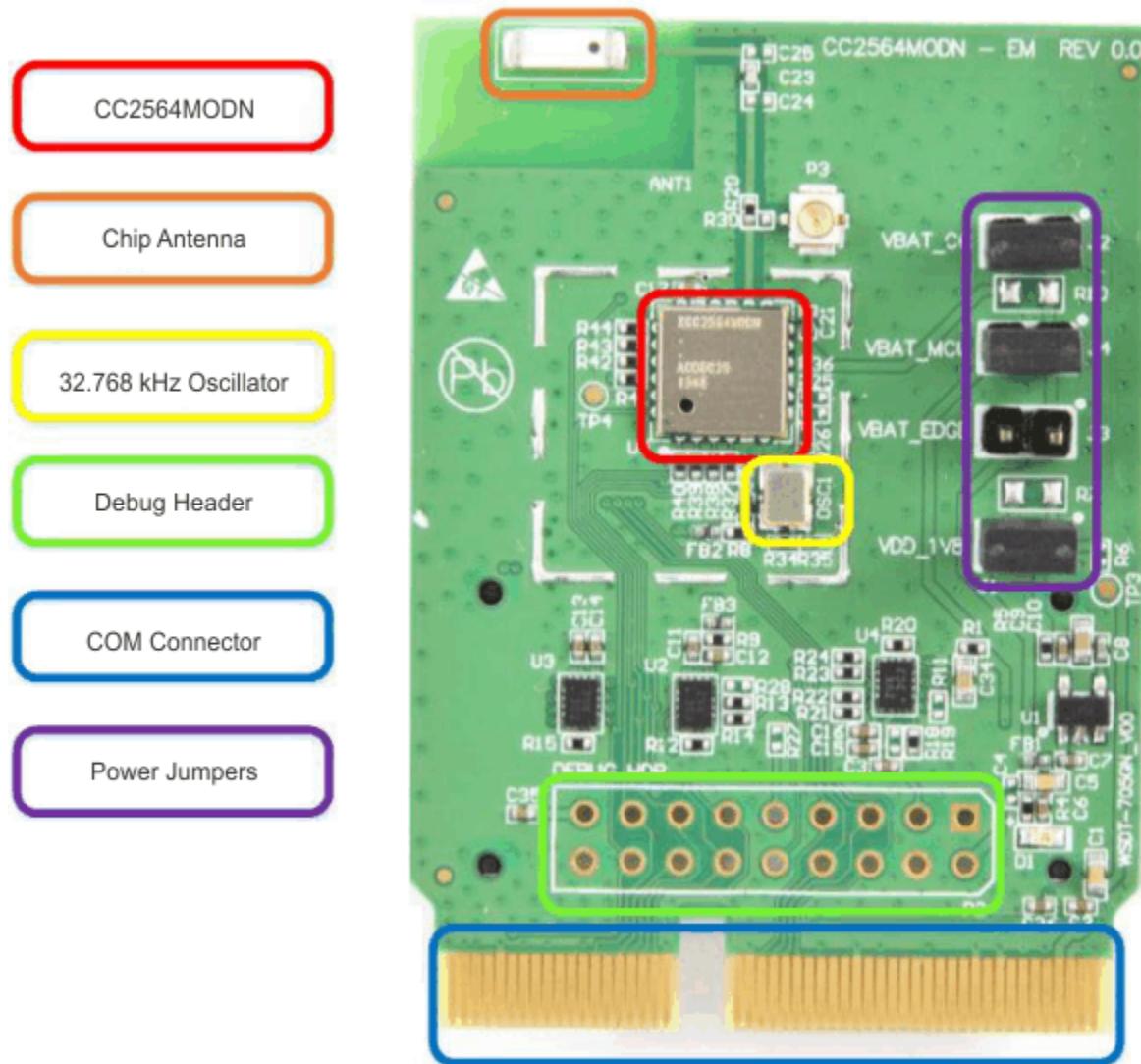
The CC2564MODNEM board is the development environment for the CC2564MODN module and plugs directly into TI's MSP430 and TM4C experimenter boards with EM connectors that simplify prototype wiring and field trials.

This module is based upon TI's CC2564B device and uses a host controller interface (HCI); this module is a cost-effective and flexible way to implement a *Bluetooth* network. The HCI reduces the cost of the BOM by giving designers the flexibility to choose a controller and eliminating redundant processing capacity while the *Bluetooth* stack resides and executes on the host processor of the application.

The CC2564MODNEM board has two connectors: EM and COM. The I/Os for the EM are at 3.3 V, which is the default assembly configuration. The I/Os for the COM are at 1.8 V and require hardware modification.

TI intends the CC2564MODNEM board for evaluation purposes and to work with TI's Hardware Development Kit. Refer to [Section 9](#) for further details.

To implement this reference design, schematic and layout files are available on the [CC2564MODN product page](#).



**Figure 7-1. CC2564MODNEM Board Front Overview**

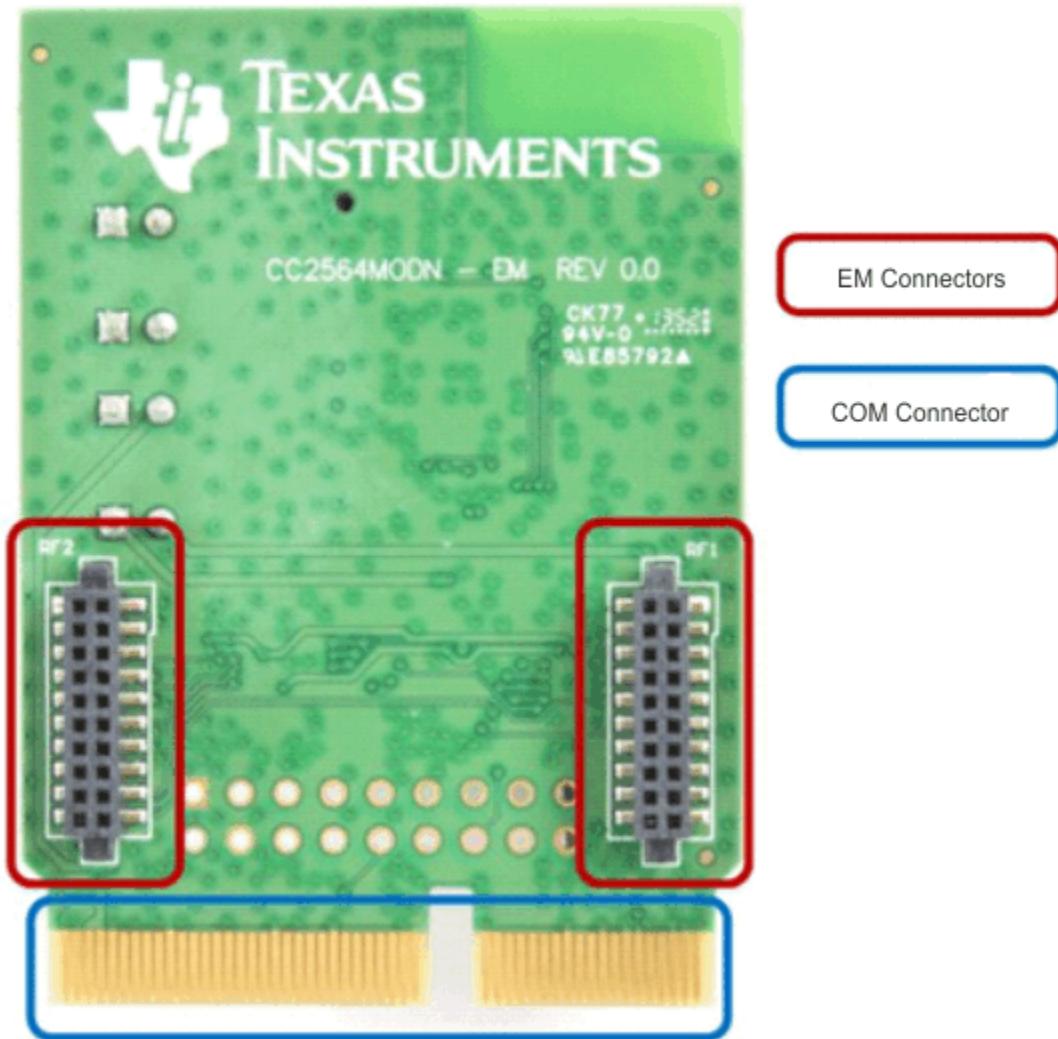


Figure 7-2. CC2564MODNEM Board Back Connectors

## 8 Hardware Description

### 8.1 Overview

Figure 8-1 is the high-level block diagram of the CC2564MODNEM board. The oscillator is the default clock with a frequency accuracy of 32.768 kHz  $\pm$  250 ppm. The signals from the dual-mode *Bluetooth* CC2564 module include UART, PCM, nSHUTD, and slow clock. The CC2564MODNEM board has the following connectors:

- EM (default)
- COM

The connectors can supply power to the CC2564MODN through either VBAT\_EDGE or VBAT MCU. For the EM connector, the signals are controlled through level shifters. The hardware can be configured and modified to use the slow clock from the connectors. The third connector, the debug header, can be used for testing. The I/Os of the EM connector are at 3.3 V. The I/Os of the COM connector are at 1.8 V and require hardware modification. The I/Os for the debug header connector are at 1.8 V and require hardware modification.

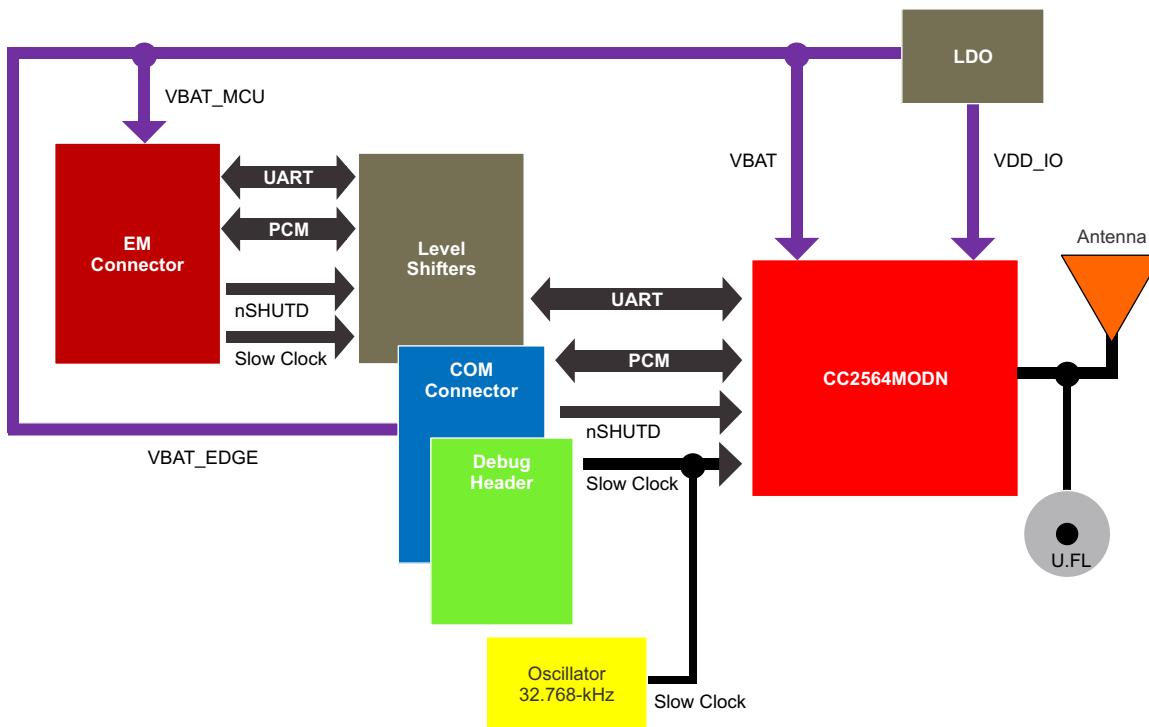


Figure 8-1. CC2564MODNEM Block Diagram

### 8.2 Connectors

#### 8.2.1 The EM Connector

The EM connectors can mount a variety of TI MCU platforms such as the MSP430 (MSP-EXP430F5529 and MSP-EXP430F5438) and TM4C (DK-TM4C123G and DK-TM4C129X). The EM I/Os are at 3.3 V. The pin assignments are for the CC2564MODN side. For example, MODULE\_UART\_RX refers to the receiving UART RX pin on the CC2564MODN that connects to the UART TX pin on the MCU. Figure 7-2 shows the EM connector on the board. Table 8-1 shows the standard pinout.

Table 8-1. EM1 Connector Standard Pinout

Pin Number	EM Adaptor Assignment	Pin Number	EM Adaptor Assignment
1	GND	2	N/C
3	MODULE_UART_CTS	4	N/C
5	SLOW_CLK	6	N/C
7	MODULE_UART_RX	8	N/C
9	MODULE_UART_TX	10	N/C

**Table 8-1. EM1 Connector Standard Pinout (continued)**

Pin Number	EM Adaptor Assignment	Pin Number	EM Adaptor Assignment
11	N/C	12	N/C
13	N/C	14	N/C
15	N/C	16	N/C
17	N/C	18	N/C
19	GND	20	N/C

**Table 8-2. EM2 Connector Standard Pinout**

Pin Number	EM Adaptor Assignment	Pin Number	EM Adaptor Assignment
1	N/C	2	GND
3	N/C	4	N/C
5	N/C	6	N/C
7	3.3V	8	MODULE_AUDIO_DATA_OUT
9	3.3V	10	MODULE_AUDIO_DATA_IN
11	MODULE_AUDIO_FSINK	12	N/C
13	N/C	14	N/C
15	N/C	16	N/C
17	MODULE_AUDIO_CLK	18	MODULE_UART_RTS
19	nSHUTD	20	N/C

### 8.2.2 The COM Connector

The COM connector interfaces with TI's MPU platforms such as AM335x evaluation module (TMDXEV3358). I/Os of the COM connector are at 1.8 V. Some components must not be installed (DNI) to use the COM connector. See [Section 8.3](#) for further details. [Table 8-3](#) shows the pinout for the COM connector.

**Table 8-3. COM Connector Pinout <sup>(1)</sup>**

Pin Number	Relevant COM Connector Pin Assignment
1	SLOW_CLK_EDGE
8	1V8_IN
52	AUD_CLK_1V8
54	AUD_FSYNC_1V8
56	AUD_IN_1V8
58	AUD_OUT_1V8
66	HCI_TX_1V8
68	HCI_RX_1V8
70	HCI_CTS_1V8
72	HCI_RTS_1V8
76	TX_DEBUG_1V8
89	nSHUTDOWN_1V8
3, 9, 19, 37, 47, 63, 77, 83, 87, 95, 97	GND
2, 6, 18, 22, 42, 60, 64, 92	GND

(1) All other pins are N/C.

### 8.2.3 Debug Header

The debug header enables important signals in the design such as power, ground, debug, UART, and audio signals for testing and debugging. The I/Os are at 1.8 V. [Table 8-4](#) lists the physical location of the pin numbers.

**Table 8-4. Debug Header Pinout**

Pin Number	EM Adapter Pin Assignment	Pin Number	EM Adapter Pin Assignment
1	GND	2	VBAT
3	VIO_HOST	4	GND
5	AUD_FSYNC_1V8	6	AUD_CLK_1V8
7	AUD_OUT_1V8	8	AUD_IN_1V8
9	CLK_REQ_OUT_1V8	10	SLOW_CLK_EDGE
11	HCI_TX_1V8	12	HCI_RX_1V8
13	HCI_CTS_1V8	14	HCI_RTS_1V8
15	TX_DEBUG_1V8	16	nSHUTDOWN_1V8
17	VDD_1V8	18	GND

## 8.3 Board Configurations

### 8.3.1 Power Supplies Configuration

The CC2564MODN device requires the following power sources:

- VDD\_IN: the main power supply for the module
- VDD\_IO: the power source for the 1.8-V I/O ring

The HCI module includes several on-chip voltage regulators for increased noise immunity and can be connected directly to the battery.

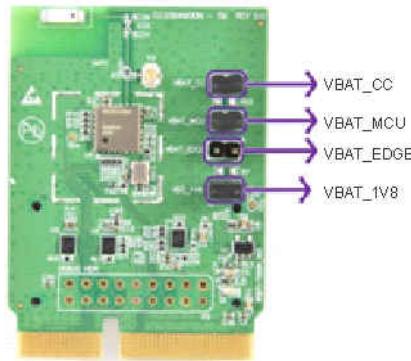
#### 8.3.1.1 Jumper Configuration

The CC2564MODNEM board has four jumpers that can be configured to control power on the board. The power supply can be enabled through either the COM or EM connector through the VBAT\_MCU or VBAT\_EDGE jumper. VBAT\_EDGE and VBAT\_MCU are the power supply to the entire board. VDD\_1V8 is the power supply jumper to the pins going in and out of the module, while the VBAT\_CC jumper is the main default power supply to the CC2564. Ensure to place jumpers to connect power to the device.

**Table 8-5. Jumper Configurations**

Jumper	Description
VDD_1V8 (J1)	Supplies power to CC2564 I/Os
VBAT_CC (J2)	Main power supply for CC2564
VBAT_EDGE (J3)	Enable power supply through the COM connector
VBAT_MCU (J4)	Enable power supply through EM connectors

Figure 8-2 shows the default settings for the jumpers on the CC2564MODNEM board. The configuration for the board can be found in Table 8-5.



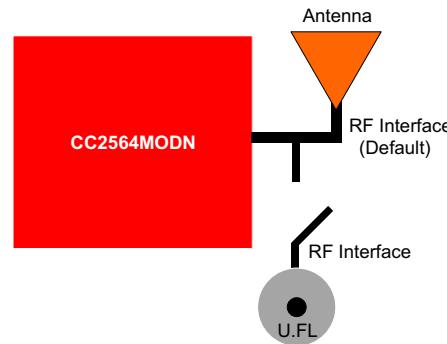
**Figure 8-2. Jumper Configuration**

#### 8.3.1.2 Measuring Current Consumption

These jumpers can measure the current consumption by placing current sense resistors on R10 for VBAT\_CC and R7 for VDD\_1V8. Both of these resistors are  $0.10\ \Omega$ ,  $1/4\ W$ . The VBAT\_CC jumper (J2) can measure the power consumed by the CC2564 including the RF TX and RF RX while the VDD\_1V8 jumper (J1) can measure power consumed by the digital VDD\_IO.

### 8.3.2 RF Interface

The board can be configured to route the radio frequency (RF) output from the CC2564MODN to the on-board chip antenna or the on-board U.FL connector. This configuration is done by placing the resistor in either R29 or R30 position which has negligible resistance of  $0\ \Omega$ . R30 connects the RF output to the U.FL while R29 connects to the chip antenna. The U.FL connector is for testing. The [Bluetooth Hardware Evaluation Tool \(BHET\)](#) can be used to test the basic RF functionality of this board.

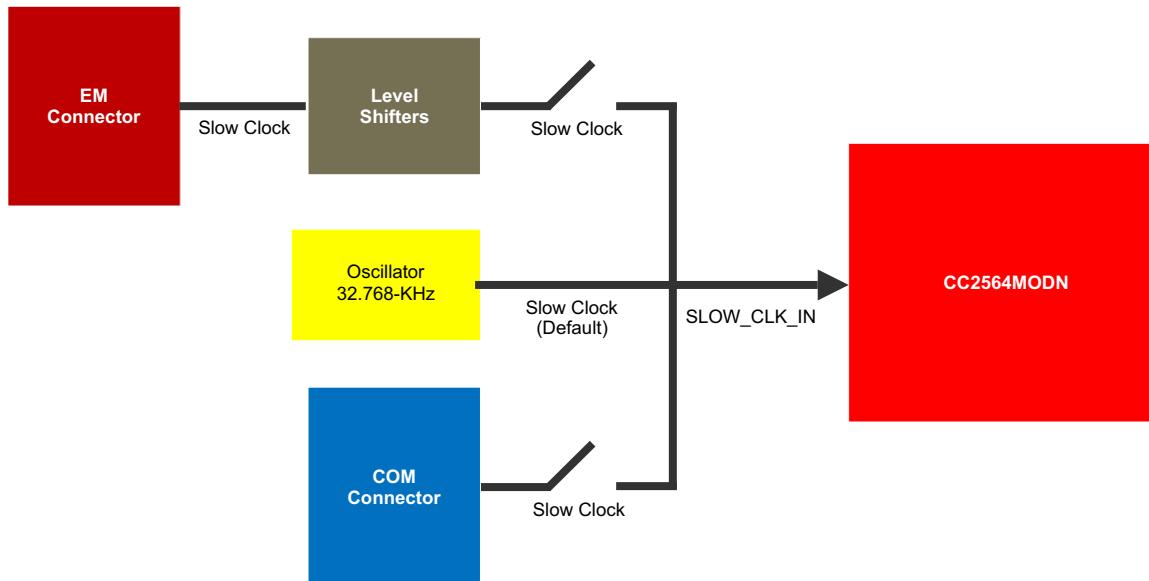


**Figure 8-3. Jumper Configuration**

### 8.3.3 Slow Clock

#### 8.3.3.1 Clock Inputs

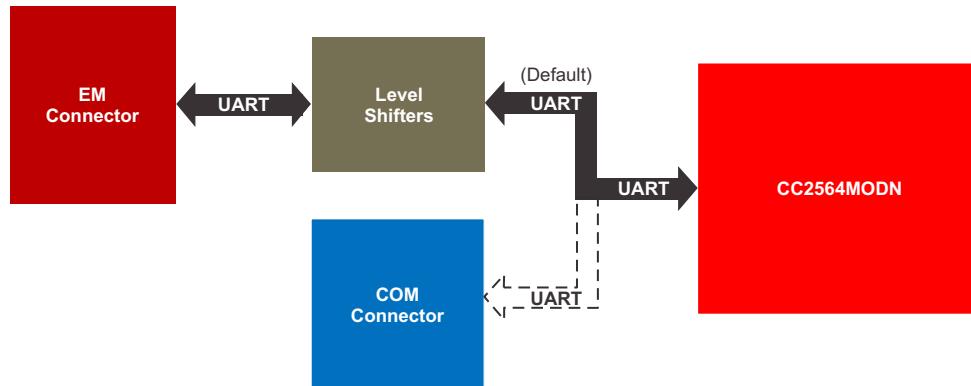
The slow clock can come from an internal or external source. The CC2564MODNEM lets you place the slow clock on the board (the default setting) or source it from an external source. The CC2564MODN connects to the SLOW\_CLK\_IN and can be a digital signal in the range of 0 V to 1.8 V. The frequency accuracy of the slow clock must be  $32.768 \text{ kHz} \pm 250 \text{ ppm}$  for *Bluetooth* use (according to the *Bluetooth* specification).



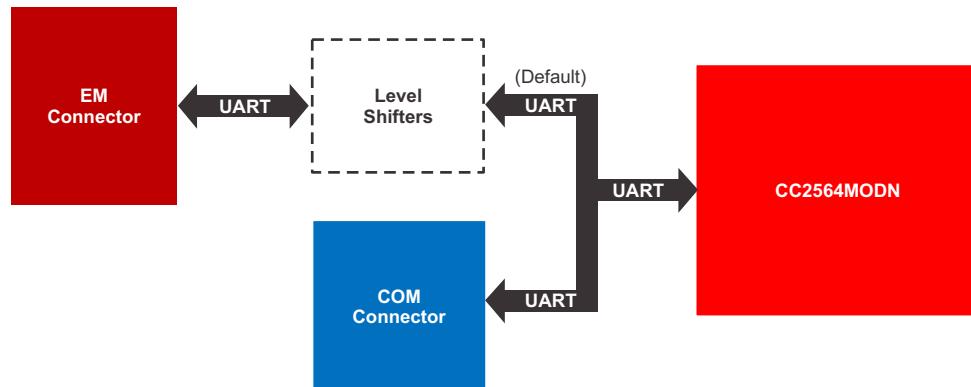
**Figure 8-4. Clock Input**

### 8.3.4 UART Configuration

The UART for the CC2564MODNEM board can be routed to the EM or COM connector. The signals are also available to the debug header to probe the signals. [Figure 8-5](#) shows the EM connector as the default UART configuration, where the dotted line shows that the COM connector is not connected. To configure the COM connector for UART, remove or unpopulate the U3 level shifter as shown in [Figure 8-6](#), where the level shifter is dotted to represent the unpopulated level shifter.



**Figure 8-5. UART Default Configuration**



**Figure 8-6. UART COM Connector Configuration**

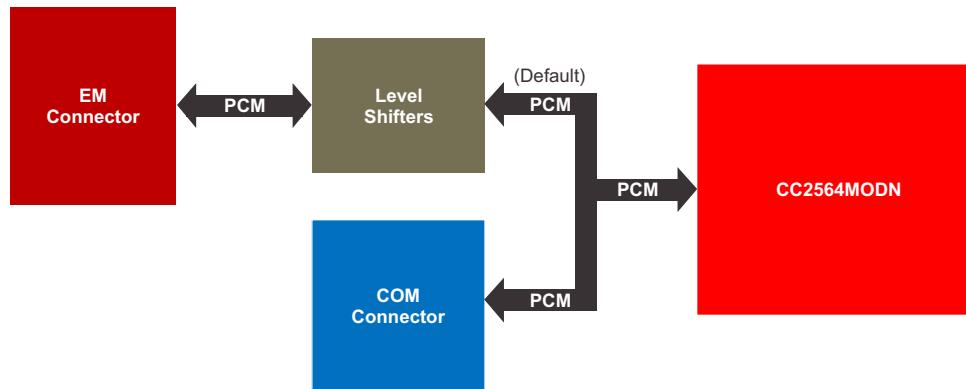
### 8.3.5 PCM Configuration

For voice and assisted audio features, the PCM signals from CC2564MODN (master) must be connected to an external audio host (slave). This relationship signifies that the CC2564MODN board provides the FSYNC and slow clock signals to the codec.

The PCM configuration is required for the following profiles:

- HFP
- HSP
- A3DP

Two configurations are available for the two connectors: EM and COM. [Figure 8-7](#) demonstrates the default configuration and the following sections show how to set up each connector.



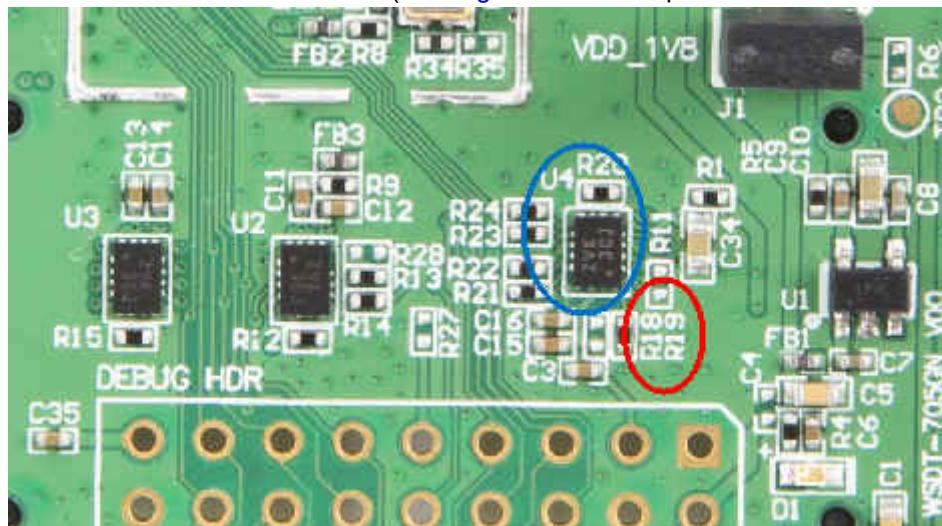
**Figure 8-7. PCM Connector Configuration**

### 8.3.5.1 EM Configuration

The EM connector allows configuration of the CC2564MODN as either the master or slave. The default configuration is a master role for the module through the EM connectors.

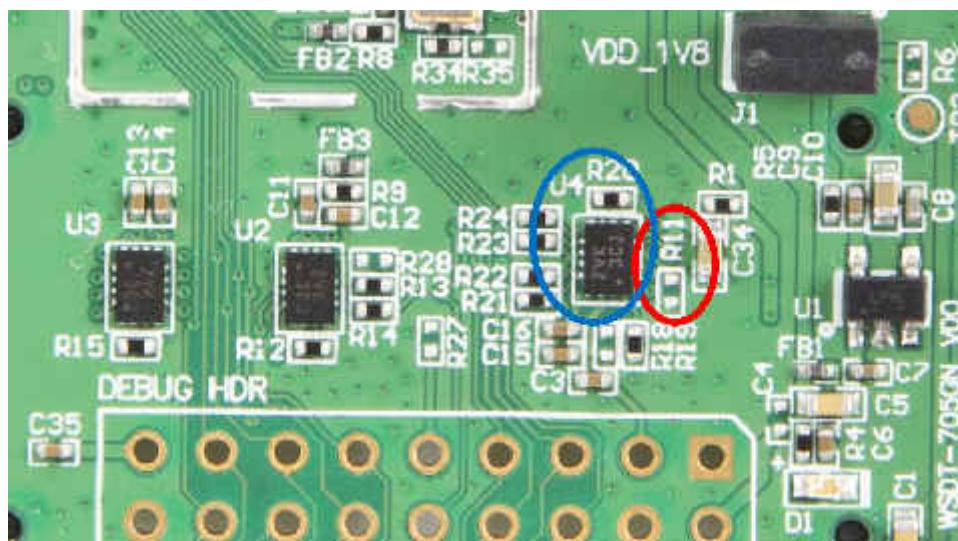
To change the direction of the PCM so the module is configured as the slave, do the following:

1. Connect resistor R18.
2. Remove resistor R19 on the U4 level shifter. (See [Figure 8-8](#) for the positions of the resistors.)



**Figure 8-8. Resistors to Change the Direction of PCM**

The board can also be set up to use audio features. To use audio features, the R11 resistor must be disconnected (DNI) on the U4 level shifter. (See [Figure 8-9](#) for the positions of the resistors.)



**Figure 8-9. R11 DNI to Enable Audio Features**

### 8.3.5.2 COM Configuration

To configure the COM connector, pull the resistors connected to U4 high to switch the direction on the level shifter. The signal in the COM connector can be configured to run in either direction without any changes to the board components.

## 9 Software Tools

### 9.1 TI Dual-Mode *Bluetooth* Stack

TI's dual-mode *Bluetooth* stack enables *Bluetooth* + *Bluetooth* low energy and is comprised of single-mode and dual-mode offerings implementing the *Bluetooth* 4.0 specification. The *Bluetooth* stack provides simple command line sample applications to speed development.

The stack works with the following:

- Any MSP430 MCU with flash equal to or greater to 128KB and RAM equal or greater than 8KB (CC256XMSPTBLESW)
- Any TM4C MCU with flash equal to or greater than 128KB (CC256XM4BTBLESW)
- Other MCUs (CC256XSTBTBLESW)

For detailed documentation, see the [Bluetooth Demo APPS page](#).

### 9.2 TI Dual-Mode *Bluetooth* Service Pack for CC256x

The [CC256x Bluetooth Service Packs](#) (SP) are mandatory initialization scripts that contain bug fixes and platform specific configurations. The scripts must be loaded into the corresponding CC256x device after every power cycle. The CC256x SPs are delivered as a *Bluetooth* Script (BTS) file. A BTS file is a scripted binary file that contains the embedded HCI commands and HCI events.

### 9.3 *Bluetooth* Hardware Evaluation Tool

The [CC256x Bluetooth Hardware Evaluation Tool](#) is a program that can be downloaded as a complete package from TI. The program is an intuitive, user-friendly tool to test TI's *Bluetooth* chips including this CC256xQFNEM board. This tool tests RF performance and modifies the service packs of our *Bluetooth* chips.

## 10 Manual Information to the End User

The OEM integrator must be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product. The end user manual must include all required regulatory information and warnings as shown in this manual.

### 10.1 RF Function

The CC2564MODN is a dual-mode Bluetooth HCI module.

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**Note**

The maximum RF power transmitted in each band is 10 dBm.

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### 10.2 FCC or IC Certification and Statement

This device is intended for OEM integrators under the following conditions:

- The antenna must be installed such that 20 cm is maintained between the antenna and users.
- The transmitter module may not be co-located with any other transmitter or antenna.
- To comply with FCC or IC regulation limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain (including cable loss in mobile exposure conditions) must not exceed -1.69 dBi.

In the event that these conditions cannot be met (for example, certain laptop configurations or co-location with another transmitter), the FCC or IC authorization is no longer considered valid. The FCC or IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC or IC authorization.

#### 10.2.1 FCC

The TI CC2564MODA module is certified for FCC as a single-modular transmitter. The module is a FCC-certified radio module that carries a modular grant.

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**Note**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC rules.

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Operation is subject to the following conditions:

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

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**CAUTION****FCC RF Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one the receiver is connected to.
- Consult the dealer or an experienced radio or TV technician for help.

The antenna listed in the *Antenna Specifications* section were verified in the compliance testing. Use only antennas on this list. A separate approval is required for all other operating configurations, including different antenna configurations.

### 10.2.2 CAN ICES-3(B) and NMB-3(B) Certification and Statement

The TI CC2564MODA module is certified for IC as a single-modular transmitter. The TI CC2564MODA module meets IC modular approval and labeling requirements. The IC follows the same testing and rules as the FCC regarding certified modules in authorized equipment.

#### Note

This device complies with Industry Canada license-exempt RSS standards.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

Operation is subject to the following conditions:

- The device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation.

L'exploitation est autorisée aux conditions suivantes:

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

#### CAUTION

##### IC RF Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with a minimum of 20 cm between the radiator and your body.

##### Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This radio transmitter (451I-2564N) has been approved by Industry Canada to operate with the antenna types listed in the *Antenna Specifications* section with maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum indicated for that type, are strictly prohibited for use with this device.

The antenna listed in the *Antenna Specifications* section were verified in the compliance testing. Use only the antennas on this list. A separate approval is required for all other operating configurations, including different antenna configurations.

### 10.2.3 Anatel Certification Label

Figure 10-1 shows the full Anatel certification label for the CC2564MODN.



Figure 10-1. Anatel Certification Label

#### 10.2.4 End Product Labeling

This module is designed to comply with the FCC statement, FCC ID: Z64-2564N. The host system using this module must display a visible label indicating the following text:

- Contains FCC ID: Z64-2564N

This module is designed to comply with the IC statement, IC: 451I-2564N. The host system using this module must display a visible label indicating the following text:

- Contains IC: 451I-2564N

#### 10.2.5 Device Classifications

Since host devices vary widely with design features and configurations, module integrators shall follow the guidelines below regarding device classification and simultaneous transmission. Module integrators will also seek guidance from their preferred regulatory test lab to determine how regulatory guidelines will impact the device compliance. Proactive management of the regulatory process will minimize unexpected schedule delays and costs due to unplanned testing activities.

The module integrator must determine the minimum distance required between their host device and the user's body. The FCC provides device classification definitions to assist in making the correct determination.

##### **Note**

These classifications are only guidelines; Strict adherence to a device classification may not satisfy the regulatory requirement, as near-body device design details may vary widely. Your preferred test lab will be able to assist in determining the appropriate device category for your host product and if a KDB or PBA must be submitted.

##### **Note**

The module you are using has been granted modular approval for mobile applications. Portable applications may require further RF exposures (SAR) evaluations. It is also likely that the host and module combination will need to undergo testing for FCC Part 15 regardless of the device classification. Your preferred test lab will be able to assist in determining the exact tests which are required on the host and module combination.

#### 10.2.6 FCC Definitions

**Portable: (§2.1093)** – A portable device is defined as a transmitting device designs to be used so that the radiating structure(s) of the device is / are within 20 cm of the body of the user.

**Mobile: (§2.1091) (b)** – A mobile device is defined as a transmitting device design to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Per §2.1091d (d)(4) in some cases (for example, modular or desktop transmitters), the potential conditions of use of a device may not allow easy classifications of that device as either Mobile or Portable. In these cases, applicants are responsible for determining minimum distances for compliance for the intended use and installation of the device based on evaluation of either specific absorption rate (SAR), field strength, or power density, which is most appropriate.

#### 10.2.7 Simultaneous Transmission Evaluation

This module has not been evaluated or approved for simultaneous transmission as it is impossible to determine the exact multi-transmission scenario that a host manufacturer may choose. Any simultaneous transmission condition established through module integration into a host product must be evaluated per the requirements in KDB447498D01(8) and KDB616217D01,D03 (for laptop, notebook, netbook, and tablet applications).

These requirements include, but are not limited to:

- Transmitters and modules certified for mobile or portable exposure conditions can be incorporated in mobile host devices without further testing or certifications when:
  - The closest separation among all simultaneous transmitting antennas is greater than 20 cm.

- Or, the antenna separation distance and MPE compliance requirements for all simultaneous transmitting antennas have been specified in the application filing of at least one of the certified transmitters within the host device. In addition, when transmitters certified for portable use are incorporated in a mobile host device, the antennas must be greater than 5 cm from all other simultaneous transmitting antennas.
- All antennas in the final product must be at least 20 cm from the users and nearby persons.

## 10.3 EU Certification and Statement

### 10.3.1 RF Exposure Information (MPE)

This device has been tested and meets applicable limits for Radio Frequency (RF) exposure. To comply with the RF exposure requirements, this module must be installed in a host platform that is intended to be operated in a minimum of 20-cm separation distance to the user.

### 10.3.2 Simplified DoC Statement

#### 10.3.2.1 CC2564MODN Module

Hereby, Texas Instruments declares that the radio equipment type CC2564MODN is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available [here](#).

#### 10.3.2.2 CC2564MODNEM

Hereby, Texas Instruments declares that the radio equipment type CC2564MODNEM is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available [here](#).

### 10.3.3 Waste Electrical and Electronic Equipment (WEEE)



#### Waste Electrical and Electronic Equipment (WEEE)

This symbol means that according to local laws and regulations your product or battery shall be disposed of separately from household waste. When this product reaches the end of life, take it to a collection point designated by local authorities. Proper recycling of your product will protect human health and the environment.

### 10.3.4 OEM and Host Manufacturer Responsibilities

OEM and Host manufacturers are ultimately responsible for compliance of the host and module. The final product must be reassessed against all the essential requirements of the RED before it can be placed on the EU market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the RED. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

### 10.3.5 Antenna Specifications

In all cases, assessment of the final product must be met against the essential requirements of the RE Directive Article 3.1(a) and (b), safety and EMC respectively. As well as any relevant Article 3.3 requirements.

- The LTA-5320-2G4S3-A1 (-1.31 dBi) was verified in the conformity testing, and for compliance the antenna shall not be modified. A separate approval is required for all other operating configurations, including different antenna configurations.
- If any other simultaneous transmission radio is installed in the host platform together with this module, or above restrictions cannot be kept, a separate RF exposure assessment and CE equipment certification is required.

## 11 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

### Changes from August 20, 2014 to August 31, 2021 (from Revision \* (Aug 2014) to Revision A (Aug 2021))

	Page
• Updated formatting and organization to match current TI standards.....	0
• Added <a href="#">Section 10</a> through <a href="#">Section 10.3.5</a> .....	18

## STANDARD TERMS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an "EVM" or "EVMs") to the User ("User") in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.
  - 1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM ("Software") shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software
  - 1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.
- 2 *Limited Warranty and Related Remedies/Disclaimers:*
  - 2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.
  - 2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.
  - 2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

### **WARNING**

**Evaluation Kits are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.**

**User shall operate the Evaluation Kit within TI's recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI's recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI's instructions for electrical ratings of interface circuits such as input, output and electrical loads.**

**NOTE:**

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGRADATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

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### 3 Regulatory Notices:

#### 3.1 United States

##### 3.1.1 Notice applicable to EVMs not FCC-Approved:

**FCC NOTICE:** This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

##### 3.1.2 For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:

#### CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### FCC Interference Statement for Class A EVM devices

*NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

#### FCC Interference Statement for Class B EVM devices

*NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### 3.2 Canada

##### 3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

#### Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

#### Concernant les EVMs avec appareils radio:

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.

#### Concerning EVMs Including Detachable Antennas:

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. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

#### Concernant les EVMs avec antennes détachables

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 isotope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

#### 3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see [http://www.tij.co.jp/lsts/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lsts/ti_ja/general/eStore/notice_01.page) 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

<https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html>

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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#### 3.4 European Union

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive):*

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

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