Dual-Mode Bluetooth® CC2564 Module With Integrated Antenna BoosterPack™ Plug-in Module

The BOOST-CC2564MODA BoosterPack™ Plug-in Module is intended for evaluation and design purposes of the dual-mode *Bluetooth*® CC2564 module with integrated antenna (CC2564MODA). The CC2564MODA module is based on TI's dual-mode Bluetooth CC2564B controller, which reduces design effort and enables fast time to market. The CC2564MODA module provides one of the best RF performance with a transmit power and receive sensitivity that provides range of about 2× compared to other Bluetooth low energy only solutions.

For a complete evaluation solution, the BOOST-CC2564MODA board plugs directly into a TI LaunchPad™ Development Kit and BoosterPack Plug-in Module, such as the following:

- MSP-EXP432P401R
- CC3200AUDBOOST
- CC31XXEMUBOOST

A certified and royalty-free TI Bluetooth stack (TIBLUETOOTHSTACK-SDK) is available for the MSP432™ MCU.

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1 Features

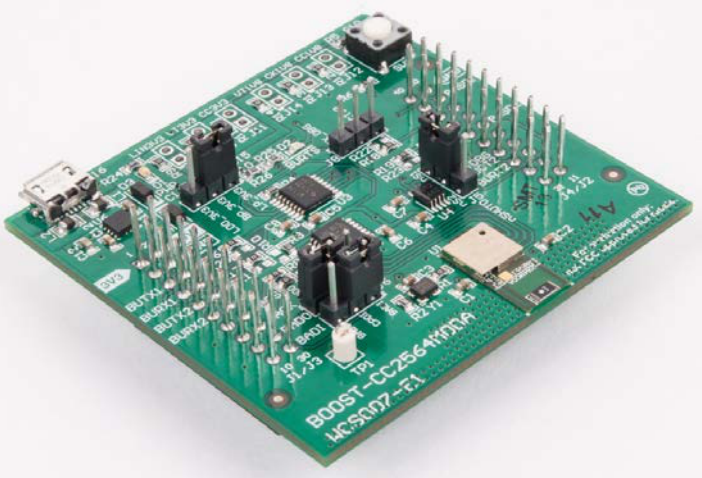
The BOOST-CC2564MODA BoosterPack Plug-in Module has the following features:

- Supports dual-mode (Bluetooth and Bluetooth low energy) Bluetooth Specification v4.1
- Offers an integrated antenna on the CC2564MODA module for ready-to-use application
- FCC, IC, and CE certified with a certified and royalty-free TI Bluetooth stack, getting started guide, demonstrations, UART, and PCM-I2S interface
- Offers class 1.5 transmit power (10 dBm) and high sensitivity (–93 dBm typical)
- Offers BoosterPack connectors compatible with TI LaunchPad Development Kits and BoosterPack Plug-in Modules such as the following:
  - MSP-EXP432P401R
  - CC3200AUDBOOST
  - CC31XXEMUBOOST

2 Introduction to BOOST-CC2564 BoosterPack™ Plug-in Module

TI intends this user's guide to help you integrate TI's Bluetooth development platform, the BOOST-CC2564 BoosterPack Plug-in Module, with TI's evaluation platforms and software development kits (SDKs). This guide describes the components and configurations of the board for various Bluetooth applications, and it includes specific information about the BoosterPack Plug-in Module to help apply the board specifics to an application. Including pin descriptions and available software and tools, BoosterPack Plug-in Module information and capabilities are provided to enhance the out-of-box experience for the user. Figure 1 shows the BOOST-CC2564MODA board.

Figure 1. BOOST-CC2564MODA Board



3 Kit Contents

The kit contains the BOOST-CC2564MODA board with a TI dual-mode Bluetooth CC2564 module with integrated antenna.

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4 Requirements

The following hardware and software tools are required in combination with the BOOST-CC2564MODA board for a complete evaluation.

Hardware

- One MSP432 LaunchPad Development Kit—sold separately
  - MSP-EXP432P401R LaunchPad
- One SimpleLink™ Wi-Fi® CC3200 Audio BoosterPack (optional)—for audio and voice sample applications
  - CC3200AUDBOOST BoosterPack
- One Advanced Emulation BoosterPack for SimpleLink Wi-Fi CC3100 BoosterPack (optional)—for debugging purposes
  - CC31XXEMUBOOST BoosterPack

Software

- TI dual-mode Bluetooth stack
  - On MSP432 MCUs: CC2564CMSP432BTBLESW

Figure 2 shows MSP43x hardware setup examples. Figure 3 shows MSP43x and CC3200AUDBOOST hardware setup examples.

Figure 2. MSP43x Hardware Setup Examples

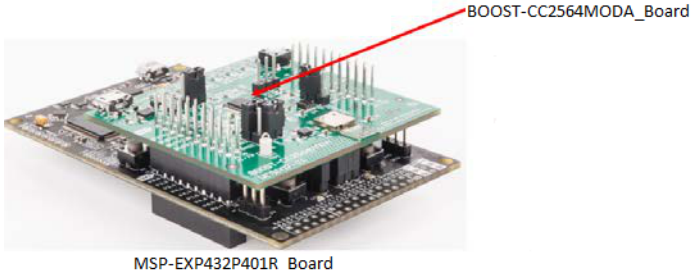
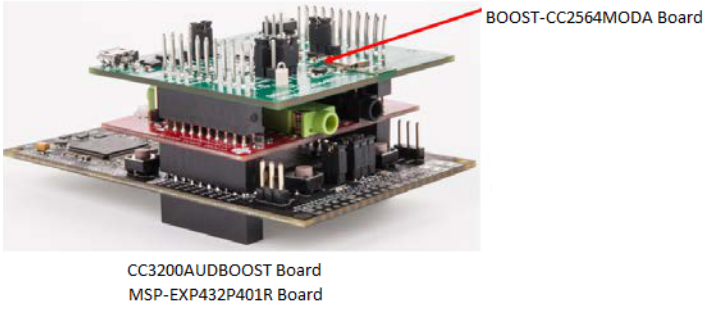


Figure 3. MSP43x and CC3200AUDBOOST Hardware Setup Examples



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5 Hardware Description

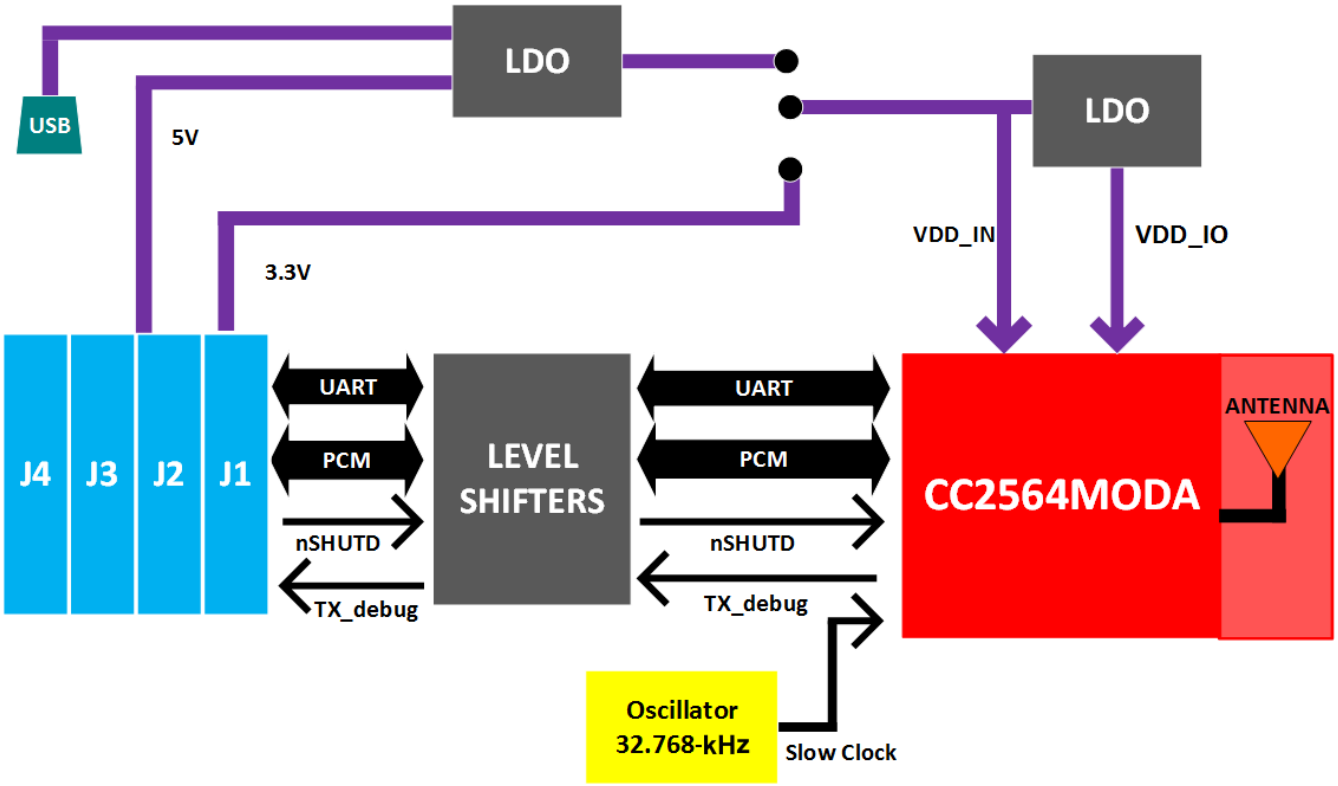
5.1 Overview

The BOOST-CC2564MODA board has four BoosterPack connectors (J1 through J4). The board also has six jumper connectors (J5 through J10). BoosterPack connectors are at 3.3 V. Figure 4 is a high-level block diagram of the BoosterPack Plug-in Module. The onboard oscillator is the slow clock with a frequency accuracy of 32.768 kHz + –250 ppm. The signals from the dual-mode Bluetooth CC2564MODA module include:

- UART
- PCM
- nSHUTD
- TX_debug

BoosterPack connectors (J1 through J4) provide the default power to the CC2564MODA. The USB port can be configured to power the BoosterPack Plug-in Module. Figure 5 is an overview of the front of the BOOST-CC2564MODA and shows the default settings for the I/O connectors. Figure 6 shows the back connectors of the board for the BOOST-CC2564MODA.

Figure 4. BOOST-CC2564MODA Block Diagram



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Figure 5. BOOST-CC2564MODA Board Front Overview

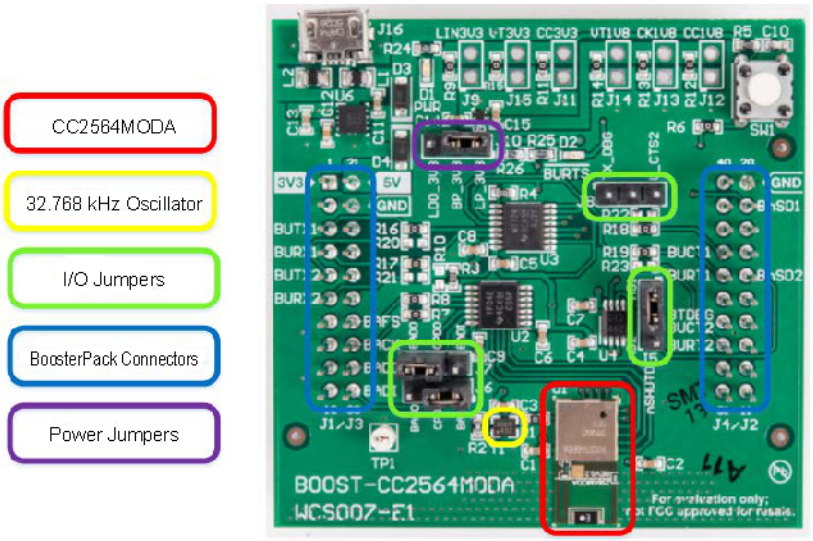
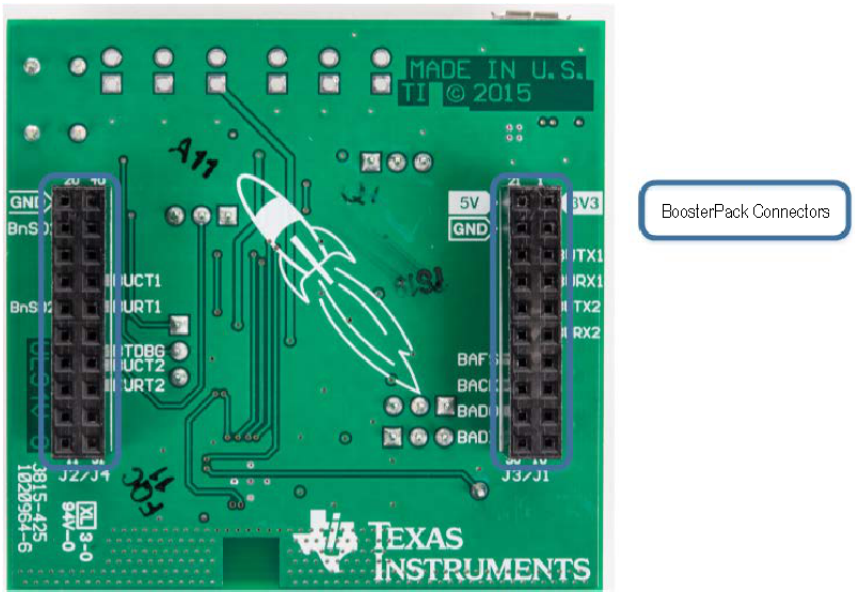


Figure 6. BOOST-CC2564MODA Board Back Overview

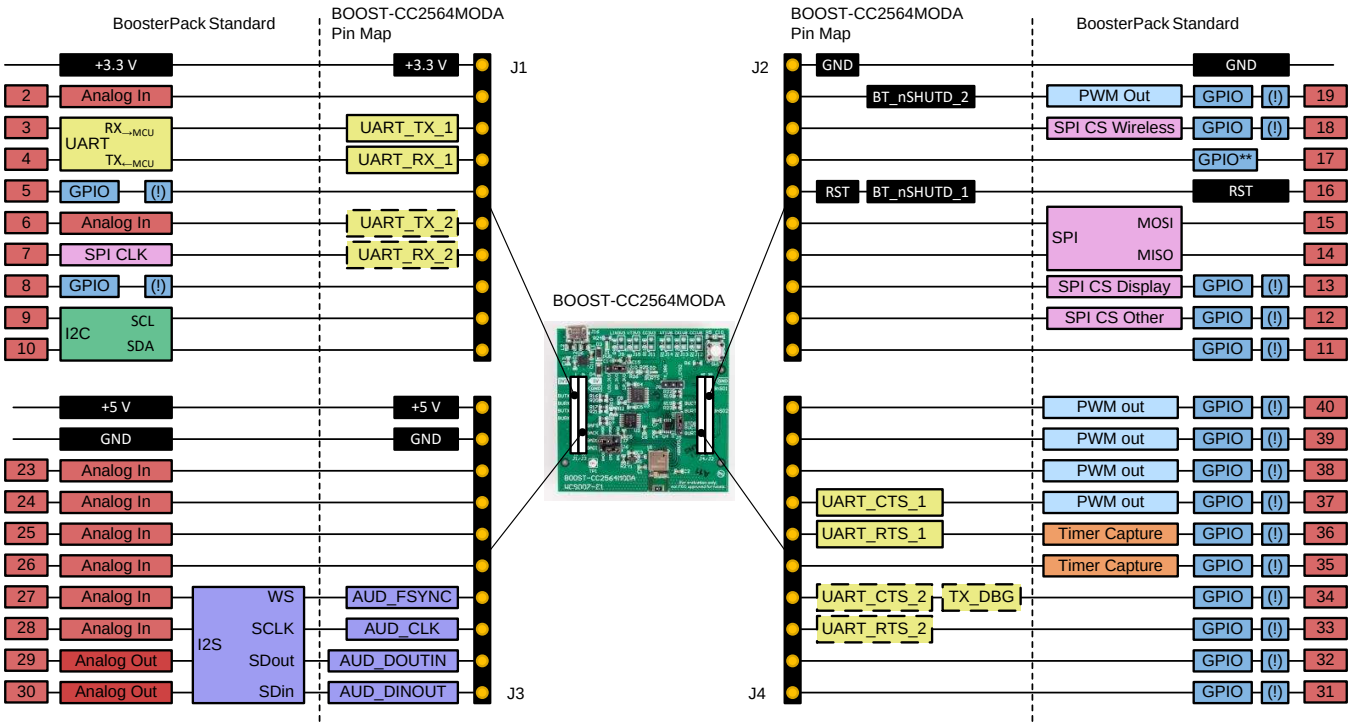


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5.2 BoosterPack™ Connectors

The BoosterPack connectors comply with the 40-pin BoosterPack standard and can be used to mount on a variety of LaunchPad Development Kits. Figure 7 shows the pin assignments for the BOOST-CC2564MODA.

Figure 7. BOOST-CC2564MODA BoosterPack™ Connectors



NOTE: The dashed outline on the pins indicates that those pins are not connected or enabled by default.

5.3 Board Configuration

5.3.1 Power Supplies Configuration

The CC2564MODA module can be configured to be powered by one of the following sources:

- LaunchPad 3.3 V (J1.1) (default)
- Onboard 3.3-V LDO, which has the following two input options:
  - An onboard USB connector
  - LaunchPad 5 V (J3.21)

The LaunchPad 3.3 V (J1.1) is the default setup on the J10 jumper short-pins 1 and 2. The onboard 3.3-V LDO (which has two input options) must be configured. The LDO can regulate the power source from the LaunchPad 5.5 V (J3.21) or the onboard USB connector from a connected USB. To configure the power from the LDO regulator, the J10 jumper must be moved to pins 2 and 3 (LDO_3V3) where the LDO takes the higher-input voltage. The red LED, D1, indicates power to the board.

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5.3.2 nSHUTD Configuration

The BOOST-CC2564MODA default nSHUTD comes from an internal switch (SW1). To disable the SW1, do not populate (DNP) resistor R6. To configure the BoosterPack Plug-in Module to nSHUTD_1 or nSHUTD_2, 1, add a jumper to J5 (nSHUTD) on pins 1 and 2 (nS1) for BoosterPack BT_nSHUTD_1 or on pins 2 and 3 (nS2) for BT_nSHUTD_2.

NOTE: During initialization, the green LED (D2) indicates that the CC2564MODA has been successfully powered up after a reset.

5.3.3 UART Configuration

The BOOST-CC2564MODA has two UART connections. The default is set to UART_TX_1, UART_RX_1, UART_CTS_1, and UART_RTS_1.

To configure the BoosterPack Plug-in Module to use UART_2, do:

1. Populate resistor R20.
2. DNP R16 to UART_TX_1 (J1.3).
3. Populate resistor R21.
4. DNP R17 to UART_RX_1 (J1.4).
5. Populate resistor R22.
6. DNP R18 to UART_CTS_1 (J4.37).
7. Add a jumper to J8 on pins 2 and 3 (UART_CTS_2).
8. Populate resistor R23.
9. DNP R19 to UART_RTS_1 (J4.36).

5.3.4 PCM Configuration

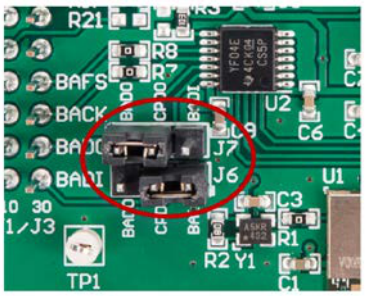
For voice and assisted-audio features, the BOOST-CC2564MODA uses an auto-sensing voltage translator so the CC2564MODA PCM interface can be master or slave without hardware configuration. The CC2564MODA module can provide the PCM clock (BCLK) and fsync (WCLK) clock signals to the codec. The PCM configuration is required for the following profiles:

- HFP
- HSP
- A3DP

To change the direction of the audio data pins, perform the following steps to configure the hardware:

1. Move jumper J6 from pins 1 and 2 (AUD_DINOUT J3.30) to pins 2 and 3 (AUD_DOUTIN J3.29).
2. Move jumper J7 from pins 1 and 2 (AUD_DOUTIN J3.29) to pins 2 and 3 (AUD_DINOUT J3.30) (see Figure 8).

Figure 8. BOOST-CC2564MODA Default PCM Jumper Settings



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If audio is unused, the pins can be disabled from the connector to provide extra analog pins. Perform the following steps to disable the audio pins:

1. Disable resistors R7 and R8 to disable pins J3.27 (AUD_FSYNC) and J3.28 (AUD_CLK) from the connector.
2. Remove the jumpers on J6 and J7 to disable pins J3.29 (AUD_DOUTIN) and J3.30 (AUD_DINOUT).

5.3.5 TX_Debug Configuration

The CC31XXEMUBOOST emulation BoosterPack can be used along with the BOOST-CC2564MODA to collect internal CC2564MODA logging information for debugging purposes. Also, the CC31XXEMUBOOST emulation BoosterPack can allow direct HCI communication to the CC2564MODA. To connect the CC31XXEMUBOOST BoosterPack board and the BOOST-CC2564MODA BoosterPack board, do:

On the BOOST-CC2564MODA:

1. Move jumper J5 and nSHUTD to pins 2 and 3 (nS2).
2. Add a jumper to pins 1 and 2 (TX_DBG) on J8.

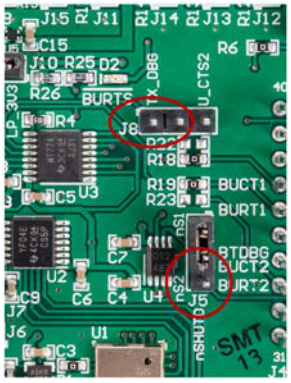
On the CC31XXEMUBOOST:

1. Populate J22, J2, and J4.
2. Do not install (DNI) J1.
3. Connect PC to J6 (USB connector).

NOTE: The third and fourth virtual COM ports correspond to CC2564 UART and Bluetooth logger UART, respectively.

You can communicate to the CC2564MODA UART directly from the PC and collect the Bluetooth logger logs. See Figure 9 for more information.

Figure 9. BOOST-CC2564MODA Jumper Placement



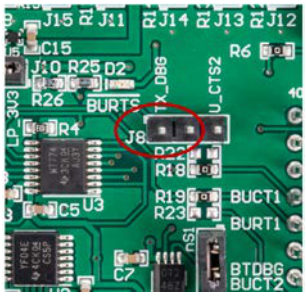
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To connect the CC31XXEMUBOOST BoosterPack board and the BOOST-CC2564MODA BoosterPack board and any LaunchPad, do:

1. Add a jumper to pins 1 and 2 (TX_DBG) on J8 of the BOOST-CC2564MODA.
2. DNI J22 and J4 on the CC31XXEMUBOOST.
3. Populate J1 and J2 on the CC31XXEMUBOOST.

NOTE: You can collect the Bluetooth logger logs but cannot communicate to the CC2564MODA UART directly from the PC because the LaunchPad is communicating to the CC2564MODA over the UART. See Figure 10.

Figure 10. BOOST-CC2564MODA Jumper Placement



6 Software Tools

6.1 TI Dual-Mode Bluetooth Stack

TI's dual-mode Bluetooth stack enables Bluetooth and 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 MSP43X MCU with flash equal to or greater than 128KB and RAM equal to or greater than 8KB (CC256XMSPBTBLESW)
- Any TM4C MCU with flash equal to or greater than 128KB (CC256XM4BTBLESW)

For detailed documentation, see the Bluetooth Demo APPS page.

6.2 TI Dual-Mode Bluetooth Service Packs for the CC256x Device

The CC256x Bluetooth service packs (SPs) 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 host controller interface (HCI) commands and HCI events.

6.3 Bluetooth Hardware Evaluation Tool

The CC256x Bluetooth hardware evaluation tool can be downloaded as a complete package from TI. The tool is an intuitive user-friendly tool used to test TI's Bluetooth chips, including this CC256xQFNEM board. The tool tests RF performance and modifies the service packs of TI's Bluetooth chips

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Revision History

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

Changes from Original (March 2016) to A Revision **Page**

- Deleted MSP-EXP430F5529LP 1
- Deleted MSP430 1
- Deleted MSP-EXP430F5529LP 2
- Deleted MSP-EXP430F5529LP LaunchPad..... 3
- Changed *MSP43x Hardware Setup Examples* figure 3
- Changed *MSP43x and CC3200AUDBOOST Hardware Setup Examples* figure 3
- Changed *BOOST-CC2564MODA BoosterPack™ Connectors* figure..... 6

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