This quick start guide offers an overview of the Dual-Mode Bluetooth® CC256XCQFN-EM evaluation board, including the required hardware and software tools, and describes the basic settings. For more information on using the CC256XCQFN-EM board, see the Dual-Mode Bluetooth® CC2564C Evaluation Board User Guide.

Contents
1 Introduction ................................................................................................................... 2
2 CC256XCQFN-EM Kit Contents ........................................................................................ 2
3 CC256XCQFN-EM Requirements .................................................................................... 3
4 CC256XCQFN-EM Board Overview ................................................................................ 5
5 CC256XCQFN-EM Board Settings .................................................................................. 6

List of Figures
1 CC256XCQFN-EM Board ............................................................................................. 2
2 MSP432™ LaunchPad™ Hardware Setup Example ...................................................... 4
3 STM3240G-EVAL Hardware Setup Example ................................................................ 4
4 CC256XCQFN-EM Front View....................................................................................... 5
5 CC256XCQFN-EM Back View ....................................................................................... 5

List of Tables
1 EM1 Standard Pinout .................................................................................................... 6
2 EM2 Standard Pinout .................................................................................................... 6
3 COM Connector Pinout ................................................................................................ 7
1 Introduction

The TI CC256XCQFN-EM board is used to evaluate the dual-mode Bluetooth CC2564C controller, which supports classic Bluetooth and Bluetooth low energy (LE) wireless technology. The CC256XCQFN-EM board works with the following hardware development kits:

- MSP-EXP432P401R with BOOST-CCEMADAPTER (through EM connectors)
- TMDXEVM3358 AM335x Evaluation Module (through COM connector)
- CC256XEM-STADAPT with STM32 MCU Evaluation Board (through EM connectors)

**NOTE:** Refer to the CC256XEM-STADAPT Quick Start Guide for a list of compatible STM32 MCU Evaluation Boards.

The CC256xC Bluetooth device is a complete basic rate (BR), enhanced data rate (EDR), and LE host controller interface (HCI) solution that reduces design effort and enables fast time to market. Based on TI's seventh-generation core, the module is a product-proven solution supporting Bluetooth 4.2 dual-mode protocols.

Figure 1 shows the CC256XCQFN-EM board.

---

2 CC256XCQFN-EM Kit Contents

The CC256XCQFN-EM kit contains the following contents:

- One CC256XCQFN-EM board with a TI dual-mode Bluetooth CC2564C controller
3 CC256XCQFN-EM Requirements

For a complete evaluation, the CC256XCQFN-EM board requires hardware and software tools selected from the following lists.

- **Hardware requirements:**
  - MSP432™ LaunchPad™ (sold separately), AM335x Evaluation Module (sold separately), or other MCU platforms (sold separately)
    - MSP432 LaunchPad board options:
      - MSP-EXP432P401R
      - BOOST-CCEMADAPTER
      - CC3200AUDBOOST (optional: only necessary for audio and voice applications like A3DP, HFP, and HSP)

  __NOTE:__ The BOOST-CCEMADAPTER and CC3200AUDBOOST pinout are not compatible with each other. Because of this limitation, the CC3200AUDBOOST cannot be stacked on top of the MSP-EXP432P401R and BOOST-CCEMADAPTER. Refer to the CC2564C TI Dual-Mode Bluetooth Stack on MSP432 MCUs User’s Guide for the CC3200AUDBOOST pin connections for audio and voice applications.

- AM335x Evaluation Module options:
  - TMDXEVM3358
- Other MCU options:
  - CC256XEM-STADAPT
  - STM3240G-EVAL or one of the STM32 MCU platforms mentioned in the CC256XEM-STADAPT User’s Guide.

- **Software requirements:**
  - TI dual-mode Bluetooth stack
    - On MSP432 MCUs: CC2564CMSP432BTBLESW
    - Other MCUs: CC2564CSTBTBLESW
    - On Sitara Processors (Linux): TI-BT-4-2-STACK-LINUX-ADDON
Figure 2 shows example hardware setups for the CC256XCQFN-EM board using the MSP-EXP432P401R LaunchPad and the BOOST-CCEMADAPTER boards.

![Figure 2. MSP432™ LaunchPad™ Hardware Setup Example](image1)

Figure 3 shows the example hardware setup for the CC256XCQFN-EM board using the CC256XEM-STADAPT and the STM3240G-EVAL board.

![Figure 3. STM3240G-EVAL Hardware Setup Example](image2)
4 CC256XCQFN-EM Board Overview

The CC256XCQFN-EM board supports the following connectors:

- EM (default): I/Os are at 3.3 V.
- COM: I/Os are at 1.8 V.

Figure 4 shows the connectors on the front side of the CC256XCQFN-EM board.

Figure 4. CC256XCQFN-EM Front View

Figure 5 shows the connectors on the back side of the CC256XCQFN-EM board.

Figure 5. CC256XCQFN-EM Back View
5 CC256XCQFN-EM Board Settings

This section describes the settings for the EM connector and the COM connector.

5.1 EM Connector Settings

The CC256XCQFN-EM can be mounted on TI MCU platforms such as the MSP-EXP432P401R using the BOOST-CCEMADAPTER. The CC256XCQFN-EM EM1/EM2 connectors can also be used with the CC256XEM-STADAPT to mount the CC256XCQFN-EM on other MCU platforms.

All EM I/Os are at 3.3-V levels. Pin assignments are described with respect to the front (CC2564C) side. For example, MODULE_UART_RX refers to the receiving UART RX pin on the CC256xC device that connects to the UART_TX pin on the MCU.

Table 1 describes the standard pinout for EM1.

<table>
<thead>
<tr>
<th>Pin</th>
<th>EM Adapter Assignment(1)</th>
<th>Pin</th>
<th>EM Adapter Assignment(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>2</td>
<td>NC</td>
</tr>
<tr>
<td>3</td>
<td>MODULE_UART_CTS</td>
<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>SLOW_CLK</td>
<td>6</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>MODULE_UART_RX</td>
<td>8</td>
<td>NC</td>
</tr>
<tr>
<td>9</td>
<td>MODULE_UART_TX</td>
<td>10</td>
<td>NC</td>
</tr>
<tr>
<td>11</td>
<td>NC</td>
<td>12</td>
<td>NC</td>
</tr>
<tr>
<td>13</td>
<td>NC</td>
<td>14</td>
<td>NC</td>
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<tr>
<td>15</td>
<td>NC</td>
<td>16</td>
<td>NC</td>
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<td>17</td>
<td>NC</td>
<td>18</td>
<td>NC</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>20</td>
<td>NC</td>
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(1) NC = not connected

Table 2 describes the standard pinout for EM2.

<table>
<thead>
<tr>
<th>Pin</th>
<th>EM Adapter Assignment(1)</th>
<th>Pin</th>
<th>EM Adapter Assignment(1)</th>
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<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td>6</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>3.3 V</td>
<td>8</td>
<td>MODULE_AUDIO_DATA_OUT</td>
</tr>
<tr>
<td>9</td>
<td>3.3 V</td>
<td>10</td>
<td>MODULE_AUDIO_DATA_IN</td>
</tr>
<tr>
<td>11</td>
<td>MODULE_AUDIO_FSINK</td>
<td>12</td>
<td>NC</td>
</tr>
<tr>
<td>13</td>
<td>NC</td>
<td>14</td>
<td>NC</td>
</tr>
<tr>
<td>15</td>
<td>NC</td>
<td>16</td>
<td>NC</td>
</tr>
<tr>
<td>17</td>
<td>MODULE_AUDIO_CLK</td>
<td>18</td>
<td>MODULE_UART_RTS</td>
</tr>
<tr>
<td>19</td>
<td>nSHUTD</td>
<td>20</td>
<td>NC</td>
</tr>
</tbody>
</table>

(1) NC = not connected

For complete evaluation of the audio applications with the MSP432 LaunchPad and STM32 Evaluation boards, the level shifter U4 must be properly configured to ensure proper direction of PCM signals.

- When using CC256XC as PCM master (for A3DP_SNK, HFP_AG, HFP_HF and HSP profiles):
  - R19 must be populated with a 10K resistor.
  - R18 and R11 must be unpopulated (removed).
- When using CC256XC as PCM slave (for A3DP_SRC profile):
  - R18 must be populated with a 10K resistor.
  - R19 and R11 must be unpopulated (removed).
More information on the hardware changes required for PCM signals on EM connectors is in the Dual-Mode Bluetooth CC2564C Evaluation Board User's Guide and the CC256XCQFN-EM board design files (schematics and bill of materials).

5.2 COM Connector Settings

The COM connector interfaces with TI's MPU platforms, such as the AM335x evaluation module (TMDXEVM3358).

NOTE:

• All I/Os for the COM connector are at 1.8 V.
• Some components must be removed (DNI) and R2 must be populated on the CC256XCQFN-EM to use to use the COM connector with the AM335x evaluation module.
• EM1, EM2, U2, U3, U4 must be unpopulated (removed).
• R2 (0 Ω) must be populated.
• More information on the hardware changes required for COM connector is in the Dual-Mode Bluetooth CC2564C Evaluation Board User's Guide and the CC256XCQFN-EM board design files (schematics and bill of materials).

Table 3 describes the COM connector pinout.

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

(1) Pins not listed are NC.
## Revision History

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

### Changes from Original (November 2016) to A Revision

<table>
<thead>
<tr>
<th>Change Description</th>
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<tr>
<td>• Added TMDXEVM3358 AM335x Evaluation Module to Introduction</td>
<td>2</td>
</tr>
<tr>
<td>• Added cc3200audboost to CC256XCQFN hardware requirements</td>
<td>3</td>
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<td>• Added AM335x Evaluation Module to CC256XCQFN-EM Requirements</td>
<td>3</td>
</tr>
<tr>
<td>• Added note to CC256XCQFN-EM requirements</td>
<td>3</td>
</tr>
<tr>
<td>• Added AM335x Evaluation Module option to CC256XCQFN requirements</td>
<td>3</td>
</tr>
<tr>
<td>• Added Sitara Processors (Linux) : TI-BT-4-2-STACK-LINUX-ADDON to software requirements</td>
<td>3</td>
</tr>
<tr>
<td>• Added Added text to CC256XCQFN-EM Board Settings</td>
<td>6</td>
</tr>
<tr>
<td>• Changed text in COM Conntector Settings note</td>
<td>7</td>
</tr>
</tbody>
</table>
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3. **Regulatory Notices:**

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      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.

      **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 isotrope 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/lds/it_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。http://www.tij.co.jp/lds/it_ja/general/eStore/notice_01.page

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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3.4.1 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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4.1 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:
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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.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User’s handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

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