

Quick Start Guide - BDE-BDM209A

1. Introduction

This document is a quick start guide for how to develop BDE-BDM209A module with BDE-EVB07 evaluation board. It provides an instruction of how to modify the Demo source code to run the Demos on BDE-BDM209A modules.

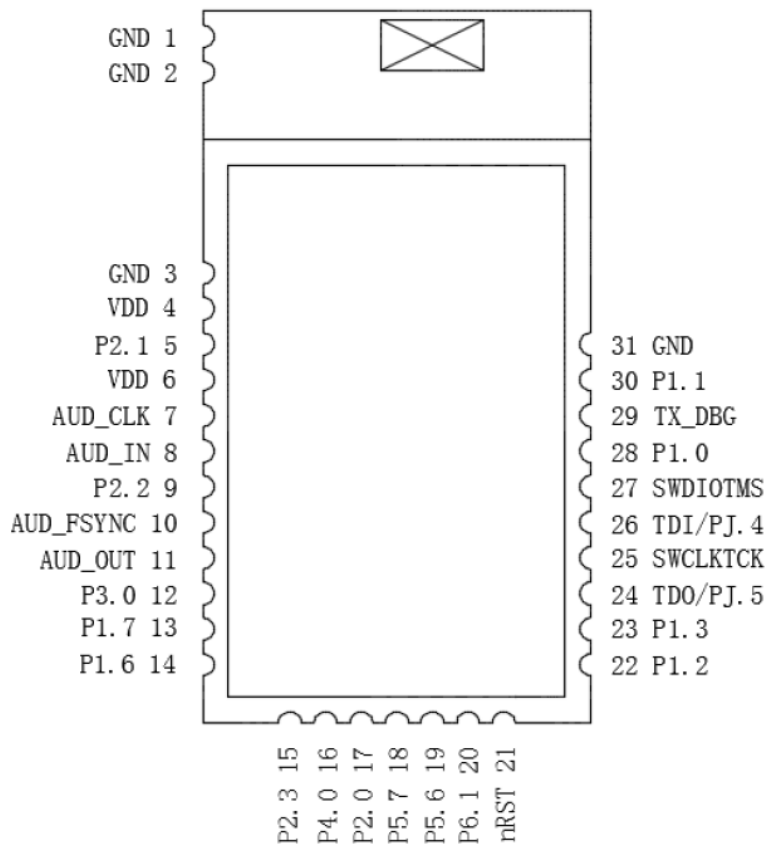


Figure 1-1: BDE-BDM209A Pinout Diagram Top View

2. BDE-EVB07

BDE-EVB07 is an evaluation board designed for various BDE modules. It is basically the same as TI launch pad which is used to evaluation TI chips. BDE-EVB07 is made to evaluate BDE modules.

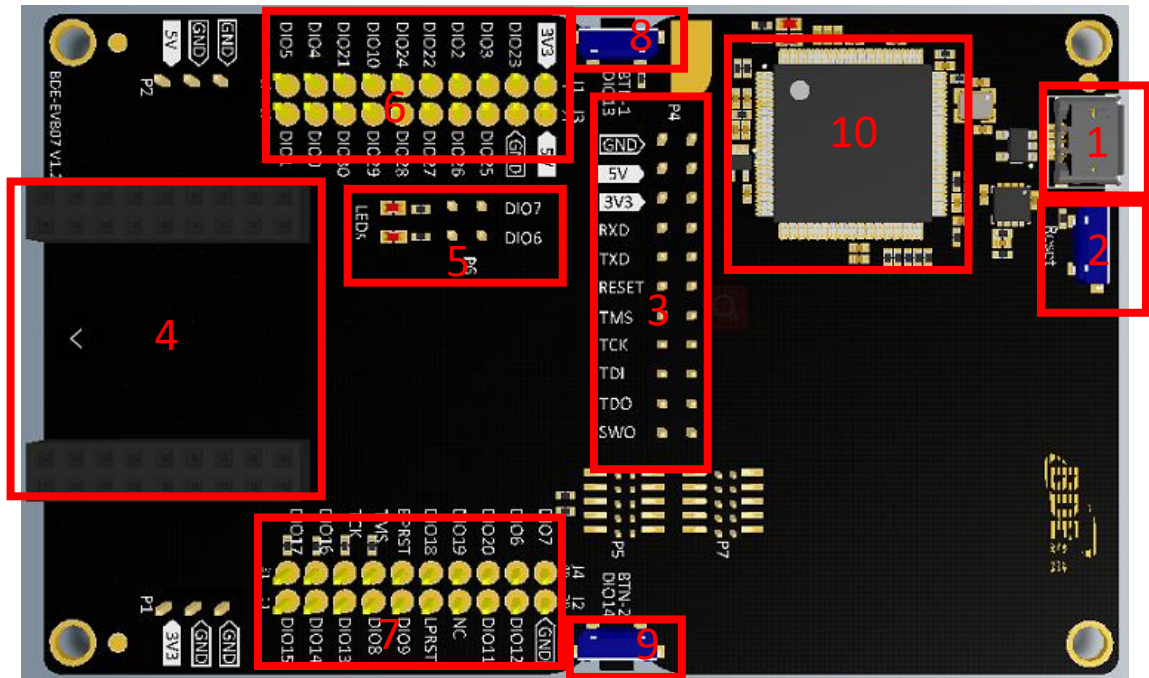


Figure 2-1: BDE-EVB07 Top View

- ① Micro USB connector
- ② Reset button
- ③ P4, Jumpers, to connect or disconnect the module from debug port or UART
- ④ Connect with module
- ⑤ Two LEDs, connect with DIO6 and DIO7
- ⑥ J1, J3, 2.54 mm pins, module pins out
- ⑦ J2, J4, 2.54 mm pins, module pins out
- ⑧ Button 1, connect with DIO13
- ⑨ Button 2, connect with DIO14
- ⑩ XDS110 chip, for programming and debug, also providing USB to UART Converter

3. BDE-ADP-209

BDE-ADP-209 is an adaptor board which connect BDE-BDM209A to the BDE-EVB07.

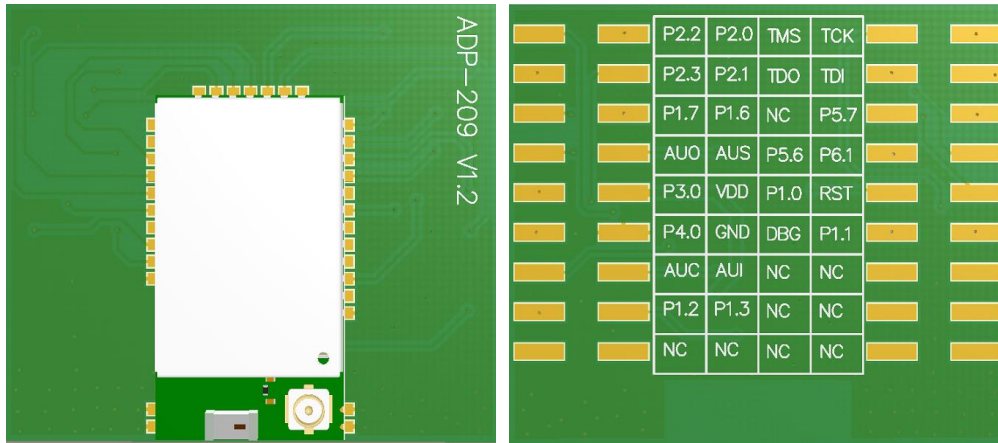


Figure 3-1: BDE-ADP-209 Top View and Bottom View

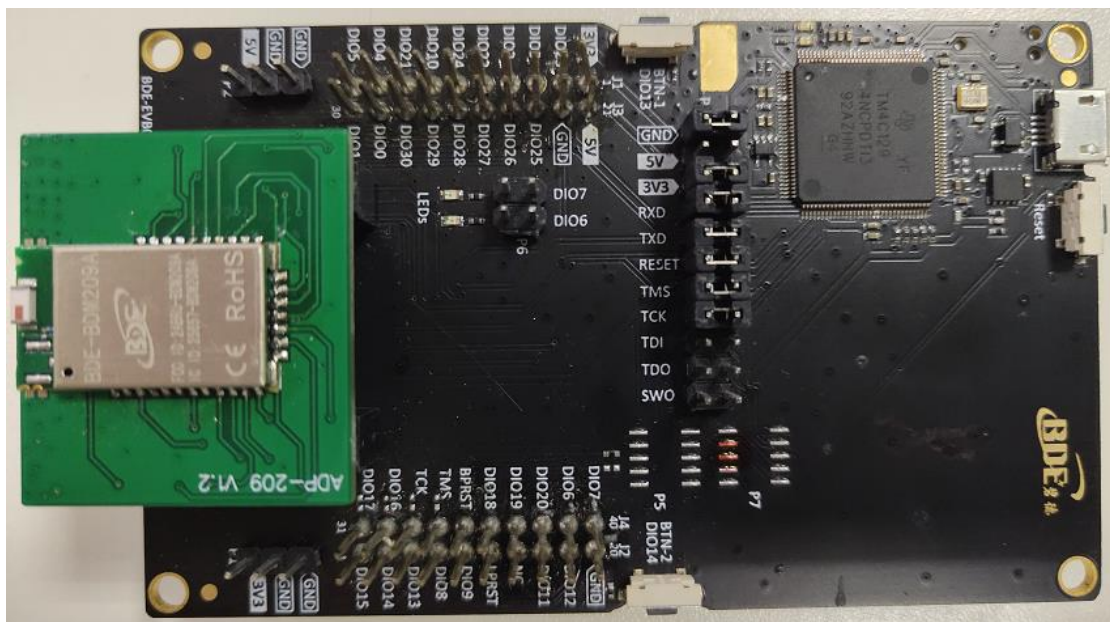


Figure 3-2: Plug BDE-ADP-209 in BDE-EVB07

IO mapping between BDE-BDM209A and BDE-EVB07:

BDE-BDM209A	BDE-EVB07
TMS	TMS
TCK	TCK
TDO/PJ.5	TDO
TDI/PJ.4	TDI
RST	RST
P1.0	DIO22
P1.1	DIO24
P1.2	RXD, DIO02
P1.3	TXD, DIO03
P1.6	DIO11
P1.7	DIO10

P2.0	DIO15
P2.1	DIO13, Button 1
P2.2	DIO14, Button 2
P2.3	DIO12
P3.0	DIO7, Green LED
P4.0	DIO6, Red LED
P5.6	DIO20
P5.7	DIO19
P6.1	DIO21
AUD_CLK	DIO4
AUD_FSYNC	DIO9
AUD_IN	DIO5
AUD_OUT	DIO8

4. BDE-EVM-209A

BDE-EVM-209A is a breakout board for connecting BDE-BDM209A and BDE-EVB07. Different from BDE-ADP-209, BDE-EVM-209A integrate stereo audio function which is the same as TI CC3200AUDBOOST boards.

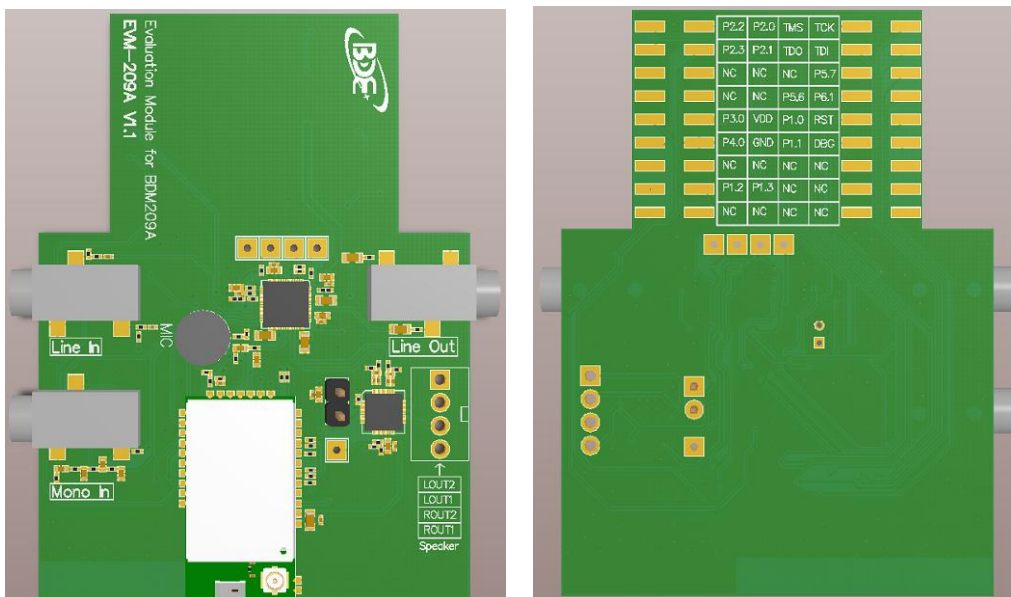


Figure 4-1: BDE-EVM-209A Top View and Bottom View



Figure 4-2: Plug BDE-EVM-209A in BDE-EVB07

IO mapping between BDE-BDM209A and BDE-EVB07:

BDE-BDM209A	BDE-EVB07
TMS	TMS
TCK	TCK
TDO/PJ.5	TDO
TDI/PJ.4	TDI
RST	RST
P1.0	DIO22
P1.1	DIO24
P1.2	RXD, DIO02
P1.3	TXD, DIO03
P2.0	DIO15
P2.1	DIO13, Button 1
P2.2	DIO14, Button 2
P2.3	DIO12
P3.0	DIO7, Green LED
P4.0	DIO6, Red LED
P5.6	DIO20
P5.7	DIO19
P6.1	DIO21

IO use for stereo audio function:

BDE-BDM209A	TLV320AIC3254
AUD_CLK	MCLK, BCLK
AUD_FSYNC	WCLK
AUD_IN	DOUT
AUD_OUT	DIN
P1.6/SDA	SDA
P1.7/SCL	SCL

5. SDK for BDE-BDM209A

CC2564CMSP432BTBLESW is CC2564C TI Dual-mode Bluetooth Stack on MSP432 MCUs. Stack download link is:

<https://www.ti.com/tool/CC2564CMSP432BTBLESW>

Also, developers can find the stack user guide on this page.

CC2564CMSP432BTBLESW

Overview | Downloads | **Technical documentation** | Support & training

Technical documentation

Type	Title
All	Filter title by keyword
More literature	Dual-Mode Bluetooth® CC256xCQFNEM Evaluation Board (Rev. B)
User guide	CC2564C TI Dual-mode Bluetooth Stack on MSP432 MCUs (Rev. A)
User guide	CC2564B to CC2564C Migration Guide (Rev. A)
User guide	EM Adapter BoosterPack User's Guide (Rev. A)

Sample applications in the SDK are available for CCS, IAR, and Keil. Developers can follow the steps in chapter 6.2 of TI stack user guide to set up the sample applications.

CCS link is:

<https://www.ti.com/tool/CCSTUDIO-MSP?keyMatch=&tisearch=search-everything&usecase=partmatches>

6. Run the Demos in the CC2564CMSP432BTBLESW SDK on BDE-BDM209A

To run the sample Demo codes in the CC2564CMSP432BTBLESW SDK on BDE-BDM209A, please take the following step.

1. Find HRDWCFG.h file, change the I2C pins to P1.6 and P1.7

```
#define HRDWCFG_I2C_MODULE           EUSCI_B0_BASE

#define HRDWCFG_I2C_SDA_PORT_NUM     GPIO_PORT_P1
#define HRDWCFG_I2C_SDA_PIN_NUM     GPIO_PIN6

#define HRDWCFG_I2C_SCL_PORT_NUM     GPIO_PORT_P1
```


7. CC2564x Demo Applications User's Guide

Developers can get more information about each demo in the SDK from the “CC2564x Demo Applications User's Guide” document provided by TI.

The document link is below:

<https://www.ti.com/product/CC2564C?keyMatch=CC2564C&tisearch=search-everything&usecase=GPN#tech-docs>

CC2564C ✔ ACTIVE

Product details	Technical documentation	Design & development	Ordering & quality	Support & training
User guide	Bluetooth Stack Build Guide for Linux			
User guide	CC2564x Demo Applications User's Guide			
Application note	Bluetooth Low Energy – Invalid Connection Request (SweynTooth) (Rev. A)			
Selection guide	CC256x Getting Started Guide (Rev. B)			
Application note	Bluetooth Basic Rate/Enhanced Data Rate – Bluetooth Impersonation Attacks (BIAS)			
Application note	Bluetooth Low Energy, Basic Rate/Enhanced Data Rate – Method Confusion Pairing V			

8. Run Bluetooth Stereo Audio Streaming Demo on BDE-BDM209A

8.1 With CC3200AUDBOOST board

If you are using the TI CC3200AUDBOOST board, you need to connect BDE-BDM209A and CC3200AUDBOOST board first.

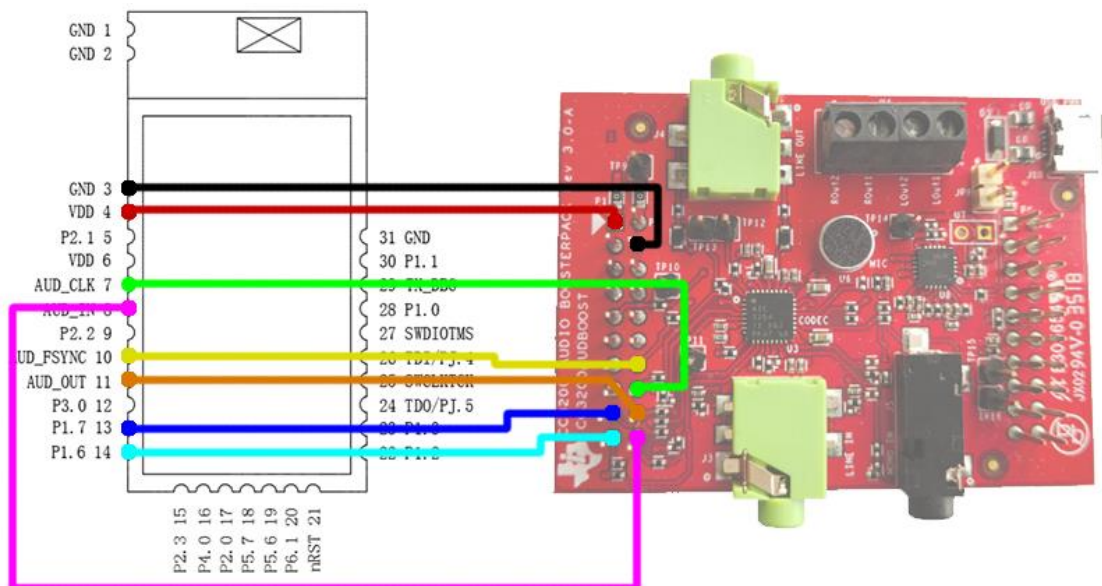


Figure 8-1: Connection between BDE-BDM209A and CC3200AUDBOOST

Connection Designator	BDM209A Pin	CC3200AUDBOOST Pin
Ground	GND	J1-4
3V3 Power	VDD	J1-1
AUD_CLK	AUD_CLK	J1-16
AUD_IN	AUD_IN	J1-20
AUD_FSYNC	AUD_FSYNC	J1-14
AUD_OUT	AUD_OUT	J1-18
I2C_SCL	P1.7	J1-17
I2C_SDA	P1.6	J1-19

8.2 With BDE-EVM-209A board

If you are using BDE-EVM-209A, you just need to plug the BDE-EVB-209A in the BDE-EVB07 board.

Before building and burn the audio demo, developers must finish modifying the code refer to [section 6](#).

Connect the BDE-EVB07 board to a PC using a microUSB cable. It will show up as XDS110 Class Application/User UART (COM x) for MSP432, under Ports (COM & LPT) in the Device manager.

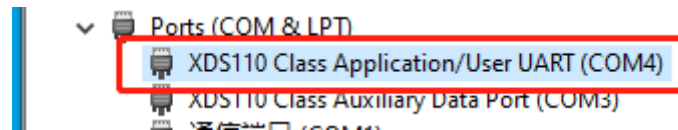


Figure 8-2: Application UART COM Port

Attach a Terminal program like PuTTY to the serial port x for the board. The serial parameters to use are 115200 Baud, 8, n, 1.

PuTTY download link:

<https://www.chiark.greenend.org.uk/~sgtatham/putty/>

Open the PuTTY software, and open a serial terminal as below:

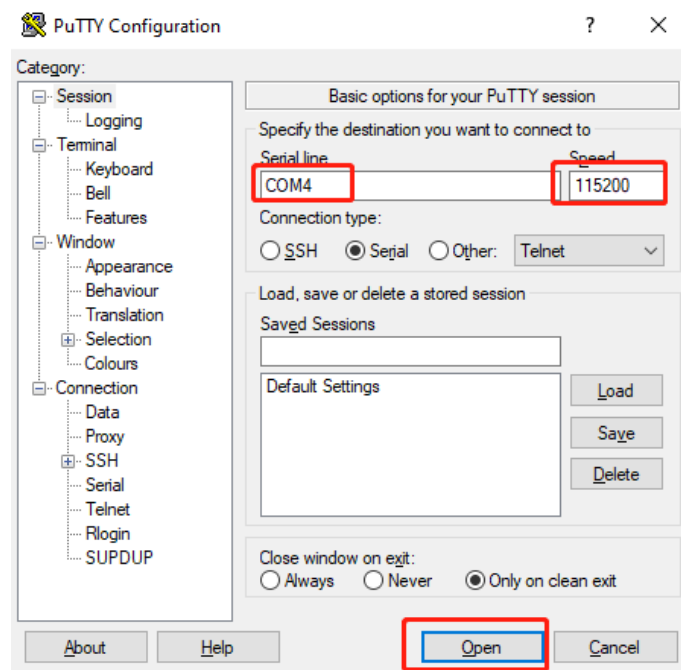


Figure 8-3: PuTTY

A3DP Sink Demo Guide

The Assisted Advanced Audio Distribution Profile (A3DP) Sink allows a device to act as an Audio sink and can control and stream audio on an Audio source.

Demo project path is:

C:\TI\Connectivity\CC256X BT\CC256x MSP432 Bluetopia SDK\v4.2.1.1\Samples\A3DPDemo_SNK

Connect the BDE-EVB07 to the PC, and use PuTTY to open the UART Port. After the firmware is flashed into the BDE-BDM209A, reset the module using Reset button and you should see the stack getting initialized on the PuTTY terminal and the help screen will be displayed, which shows all of the commands.

```
COM4 - PuTTY
OpenStack().
Bluetooth Stack ID: 1
Device Chipset: 4.2
BTPS Version : 4.2.1.0
Project Type : 6
FW Version : 12.16
App Name : A3DPDemo_SNK
App Version : 0.1
BD ADDR: 0xC464E3181136
A3DP endpoint opened successfully.
Class of Device: 0x040424.
Supported formats:
  Frequency: 44100, Channels: 2, Flags: 0
  Frequency: 48000, Channels: 2, Flags: 0
  Frequency: 48000, Channels: 1, Flags: 0
  Frequency: 44100, Channels: 1, Flags: 0

*****
* Command Options: Inquiry, DisplayInquiryList, Pair, *
* EndPairing, PINCodeResponse, PassKeyResponse, *
* UserConfirmationResponse, *
* SetDiscoverabilityMode, SetConnectabilityMode, *
* SetPairabilityMode, SetBaudRate *
* ChangeSimplePairingParameters, *
* GetLocalAddress, GetLocalName, SetLocalName, *
* GetClassOfDevice, SetClassOfDevice, *
* GetRemoteName, OpenSink, CloseSink, *
* RemotePlay, RemotePause, RemoteNext, *
* RemotePrev, Help *
*****

A3DP+SNK>
```

Figure 8-4: PuTTY Terminal

Plug your earphone into the Line Out Jack on the BDE-EVM-209A board. A3DP sink demo will advertise automatic after reset. Use your smartphone to connect and pair with the module in the Bluetooth settings menu. After the link is established, you should hear the sound via earphone if the smartphone is playing music.



By default, A3DP sink demo select CODEC_LINE_OUT as output device, as below:

```

569
570  /* This function enables the audio-specific pins. The possible a
571  /* flags are defined above.
572 void HAL_EnableAudioCodec(unsigned int BluetoothStackID, HAL_Audio_L
573 {
574     unsigned char InputLine;
575     unsigned char OutputLine;
576
577     const eUSCI_I2C_MasterConfig I2CConfig =
578     {
579         EUSCI_B_I2C_CLOCKSOURCE_SMCLK,    /* SMCLK Clock Source
580         SMCLK_FREQUENCY,                  /* SMCLK Frequency
581         EUSCI_B_I2C_SET_DATA_RATE_400KBPS, /* I2C Clock Rate
582         0,                                /* No byte counter threshol
583         EUSCI_B_I2C_NO_AUTO_STOP          /* No Autostop
584     };
585
586     /* Configure the I2C SDA and SCL pins.
587     GPIO_setAsPeripheralModuleFunctionInputPin(HRDWCFG_I2C_SDA_PORT_M
588     GPIO_setAsPeripheralModuleFunctionInputPin(HRDWCFG_I2C_SCL_PORT_M
589
590     /* Initialize I2C as the master.
591     I2C_initMaster(HRDWCFG_I2C_MODULE, &I2CConfig);
592     I2C_setSlaveAddress(HRDWCFG_I2C_MODULE, SLAVE_ADDRESS);
593     I2C_setMode(HRDWCFG_I2C_MODULE, EUSCI_B_I2C_TRANSMIT_MODE);
594     I2C_enableModule(HRDWCFG_I2C_MODULE);
595
596     switch(AudioUseCase)
597     {
598         case aucA3DPSink:
599             InputLine = NO_INPUT;
600             OutputLine = CODEC_LINE_OUT;
601             break;
602         case aucA3DPSource:
603             InputLine = CODEC_LINE_IN;
604             OutputLine = NO_OUTPUT;
605             break;

```

If developers want to use the speaker as the output device. Change the 'OutputLine' value, as below:

```

        case aucA3DPSink:
            InputLine = NO_INPUT;
            OutputLine = CODEC_SPEAKER;

```

But the stack doesn't implement the speaker initialization code. So, developers should add the below code in line 391 of CC3200AUDBOOST.c.

```

case CODEC_SPEAKER:
    // Select Page 1
    CodecPageSelect(1);
    // P1, R14, b3.      Left_DAC -> LOL (1)
    CodecRegWrite(CODEC_REG_LOL_SEL, 0x08);
    // P1, R15, b3.      Right_DAC -> LOR (1)
    CodecRegWrite(CODEC_REG_LOR_SEL, 0x08);

```



```
// P1, R18, b6.      LOL Driver = Not Muted (0)
// P1, R18, b5-0.    LOL Driver Gain = 0dB
CodecRegWrite(CODEC_REG_LOL_DRV_GAIN, 0x00);
// P1, R19, b6.      LOR Driver = Not Muted (0)
// P1, R19, b5-0.    LOR Driver Gain = 0dB
CodecRegWrite(CODEC_REG_LOR_DRV_GAIN, 0x00);
// P1, R9, b3.       LOL Driver = Power Up (1)
// P1, R9, b2.       LOR Driver = Power Up (1)
CodecRegWrite(CODEC_REG_OUT_DRV_CTRL, 0x0C);

// Select Page 0
CodecPageSelect(0);
// P0, R65, b7-0.    Left_DAC Volume = 0dB
CodecRegWrite(CODEC_REG_LDAC_VOL, 0x00);
// P0, R66, b7-0.    Right_DAC Volume = 0dB
CodecRegWrite(CODEC_REG_RDAC_VOL, 0x00);
// P0, R63, b7.      Right_DAC = Power Up (1)
// P0, R63, b6.      Right_DAC = Power Up (1)
// P0, R63, b5-4.    Left_DAC = Left Channel (01)
// P0, R63, b3-2.    Right_DAC = Right Channel (01)
// P0, R63, b1-0.    Soft-Stepping = Disabled (10)
CodecRegWrite(CODEC_REG_DAC_CTRL_1, 0xD6);
// P0, R64, b7.      Right_DAC_Off = Zero_Data (0)
// P0, R64, b6-4.    DAC_Auto_Mute = Disabled (000)
// P0, R64, b3.      Left_DAC = Not muted (0)
// P0, R64, b2.      Right_DAC = Not muted (0)
// P0, R64, b1-0.    DAC_Master_Vol = Independent L/R (00)
CodecRegWrite(CODEC_REG_DAC_CTRL_2, 0x00);
break;
```

And then , add below code in line 132 of CC3200AUDBOOST.h:

```
#define CODEC_REG_LOL_SEL      0x0E
#define CODEC_REG_LOR_SEL      0x0F
#define CODEC_REG_LOL_DRV_GAIN 0x12
#define CODEC_REG_LOR_DRV_GAIN 0x13
```



Developers can select the high gain mode by putting the jumper on as shown in above picture.



More Questions:

Please search existing answers on [TI E2E support forums](#)

Contact your local TI sales representative.

Or

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