



BM62 Evaluation Board (EVB)

User's Guide

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Object of Declaration: BM62 Evaluation Board

EU Declaration of Conformity

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA.

Derek Carlson

Derek Carlson

VP Development Tools

11-NOV-16

Date

Automotive Networking Development Board User's Guide

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXXXA”, where “XXXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® X IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the BM62 Evaluation Board (EVB). Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Web Site](#)
- [Development Systems Customer Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the BM62 EVB, as a development tool to emulate and debug firmware on a target board. This user's guide is composed of the following chapters:

- [Chapter 1. “Introduction”](#) provides an overview of the BM62 EVB and its features.
- [Chapter 2. “Hardware”](#) provides hardware details of the BM62 EVB.
- [Chapter 3. “Getting Started”](#) provides information about how to establish the Bluetooth® connection using the BM62 EVB.
- [Appendix A. “Schematics”](#) provides the BM62 EVB reference schematics.

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CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Italic characters	Referenced books	<i>MPLAB IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u>File</u> > Save
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
Constants		0xFF, 'A'
<i>Italic Courier New</i>	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }
Notes	A Note presents information that we want to re-emphasize, either to help you avoid a common pitfall or to make you aware of operating differences between some device family members. A Note can be in a box, or when used in a table or figure, it is located at the bottom of the table or figure.	<p>Note: This is a standard note box.</p> <p>CAUTION</p> <p>This is a caution note.</p> <p>Note 1: This is a note used in a table.</p>

RECOMMENDED READING

This user's guide describes how to use the BM62 EVB. The following Microchip document is available and recommended as supplemental reference resources.

BM62/64 Data Sheet (DS60001403)

Refer to this document for detailed information on BM62 stereo audio module.

Reference information found in this data sheet includes:

- BM62 stereo audio module features and pin configurations
- Electrical Specifications
- Reference Circuits

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listings
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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools
- **Emulators** – The latest information on the Microchip in-circuit emulator, MPLAB REAL ICE™
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 3
- **MPLAB X IDE** – The latest information on Microchip MPLAB X IDE, the Windows® Integrated Development Environment for development systems tools
- **Programmers** – The latest information on Microchip programmers including the PICkit™ 3 development programmer

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://support.microchip.com>.

DOCUMENT REVISION HISTORY

Revision A (May 2016)

This is the initial released version of this document.

Revision B (January 2017)

This revision includes the following updates:

- Updated [3.2 “Getting Started with the BM62 EVB”](#)
- Updated [3.4 “Configuring BM62 Stereo Audio Module”](#)
- Updated [3.7 “BLE Demonstration”](#)
- Added [3.8 “NFC Demonstration”](#)

Minor updates to text and formatting were incorporated throughout the document.

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Chapter 1. Introduction

Thank you for purchasing the BM62 Evaluation Board (EVB). This document provides detailed information about the Microchip BM62 EVB.

The BM62 EVB enables the user to evaluate and demonstrate the functionality of the BM62 stereo audio module. The BM62 EVB includes an integrated configuration and programming interface for plug-and-play capability, and also has status LEDs which enable rapid prototyping and faster time to market.

Along with the BM62 EVB, software tools and applications are provided to demonstrate the Bluetooth connections to the on-board BM62 stereo audio module and to optionally configure or program it.

This chapter includes the following topics:

- 1.1 “Kit Contents”**
- 1.2 “BM62 EVB Features”**

1.1 KIT CONTENTS

The BM62 EVB kit contains the following items, as illustrated in [Figure 1-1](#):

- One BM62 EVB, which contains the BM62SPKS1MC2 module
- One micro-USB cable
- Two speaker cables
- One 5V DC power adapter

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FIGURE 1-1: BM62 EVB KIT CONTENTS



Note: If you are missing any part of the BM62 EVB kit, contact a Microchip sales office for assistance. A list of Microchip offices for sales and service is provided on the back page of this document.

1.2 BM62 EVB FEATURES

The following are key features of the BM62 EVB:

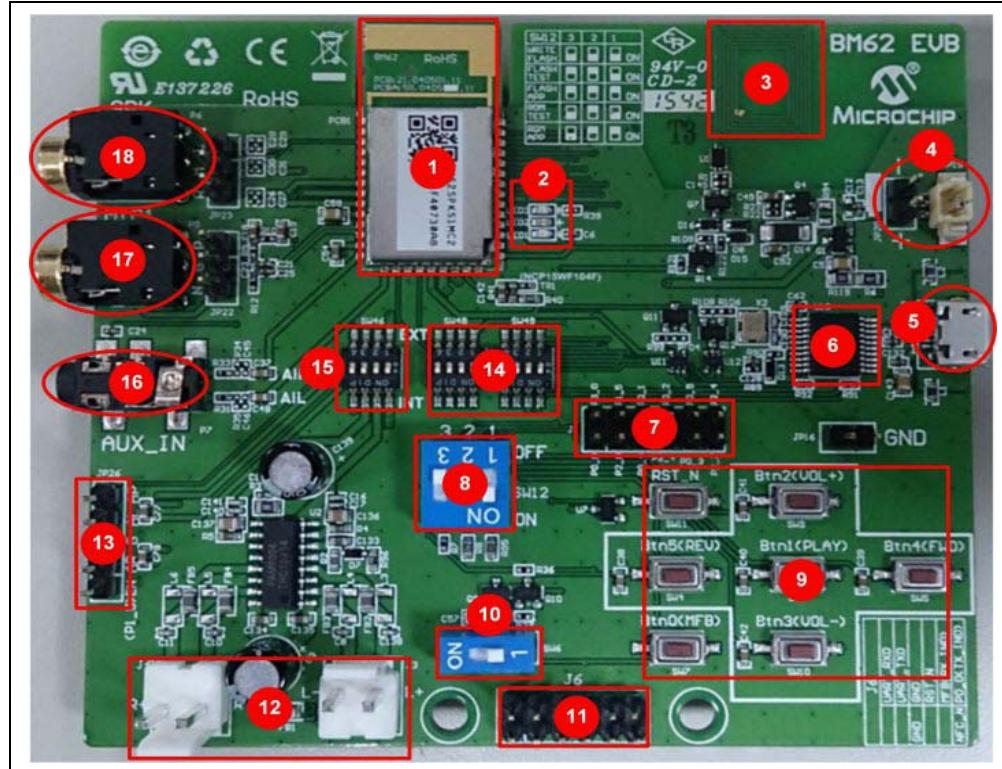
- The BM62 EVB includes a BM62 stereo audio module, qualified for Bluetooth 4.2 specifications
- The BM62 EVB can be powered by a PC host using the micro-USB cable or by connecting a Li-Ion battery
- Built-in 3W Class-D stereo audio amplifier
- Built-in Near Field Communication (NFC)
- Stereo audio output for high-quality audio
- Easy access to I/O pins
- RoHS compliant

[Figure 1-2](#) illustrates the top view of the BM62 EVB with the following components:

1. BM62SPKS1MC2 module
2. Three status LEDs
3. NFC tag
4. Li-Ion battery connector (JP19/JP20)
5. USB connector (P1)
6. USB to UART converter (MCP2200)
7. GPIO header (J1)
8. Mode switch (SW12)
9. Audio control buttons, Multi-Function Button (MFB) and Reset button
10. Slide switch (SW6)
11. External MCU header (J6)
12. 3W Class-D amplifier output connector (J3 and J4)
13. External audio amplifier connector (JP26)
14. Internal/External audio amplifier switch (SW46)
15. External MCU selection switch (SW48 and SW49)
16. Auxiliary input 3.5 mm jack (P7)
17. Microphone input 3.5 mm jack (P5)
18. Stereo output 3.5 mm jack (P6)

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FIGURE 1-2: BM62 EVB (TOP VIEW)

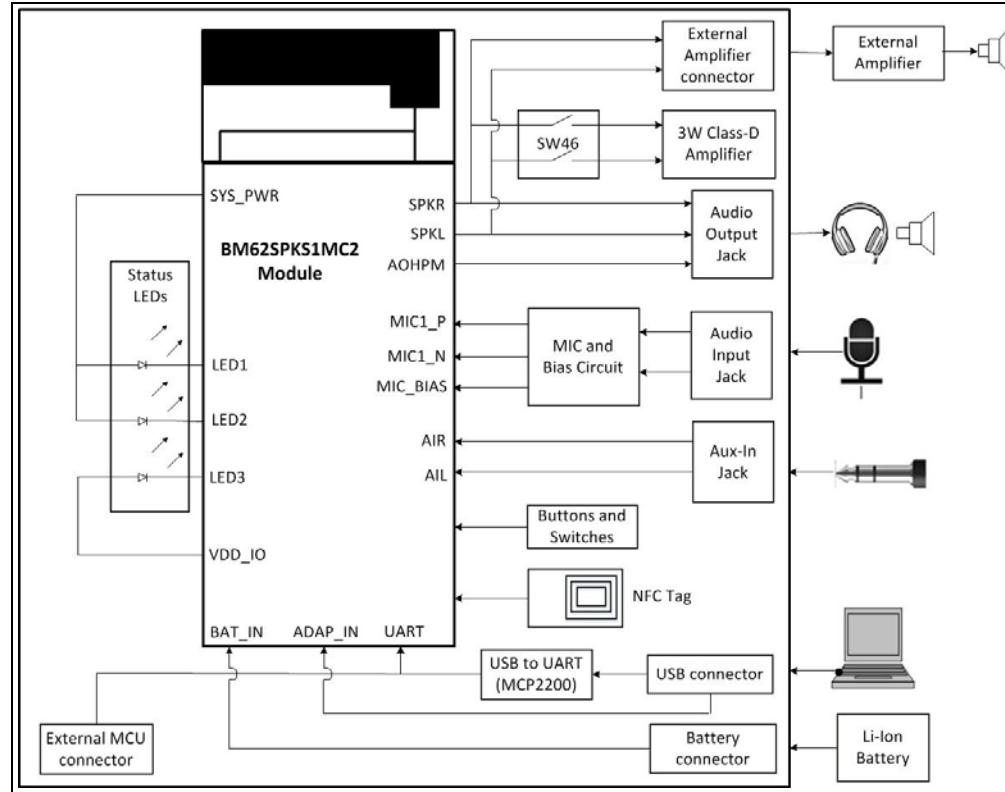




Chapter 2. Hardware

This chapter describes hardware features of the BM62 EVB. The BM62 EVB includes a range of peripheral components, refer to [Figure 2-1](#).

FIGURE 2-1: BM62 EVB BLOCK DIAGRAM



2.1 HARDWARE FEATURES

The following list provides the details of each component in the BM62 EVB. For detailed information about the location of these components, refer to [Figure 1-2](#).

2.1.1 Power Supply

Users can supply power to the BM62 EVB using either of the following options:

- Li-Ion battery
- USB (PC host over USB)

Note: While using the BM62 EVB for codec testing and application, it is recommended to use Li-Ion battery due to limitations of the power drawn from the USB port of the PC.

2.1.2 USB connectivity

The BM62 EVB connects to the PC host using a USB cable. The USB signals are converted to/from UART by the MCP2200.

2.1.3 Switches and Push buttons

The functions of the switches and push buttons on the BM62 EVB are:

- MFB – Push to turn on/off the BM62 stereo audio module
- SW4 – Skip the audio track backward
- SW5 – Skip the audio track forward
- SW9 – Increase volume
- SW10 – Decrease volume
- SW11 – Reset button
- SW12 – Mode switch
- SW46 – Button for 3W Class-D stereo amplifier signal connection
- SW48 and SW49 – Buttons for external MCU connection

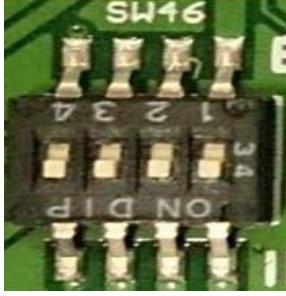
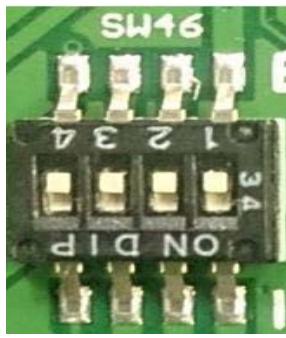
Table 2-1 provides the settings of the Mode switch SW12 to configure the BM62 EVB in various operating modes.

TABLE 2-1: SWITCH SW12 DETAILS

Mode	Switch SW12	Switch 12 PIN Definition
Write Flash		<ol style="list-style-type: none">1. ON (P2_0: LOW)2. ON (P2_4: LOW)3. ON (EAN: HIGH)
Test Mode (Write EEPROM)		<ol style="list-style-type: none">1. ON (P2_0: LOW)2. OFF (P2_4: HIGH)3. OFF (EAN: LOW)
Application Mode		<ol style="list-style-type: none">1. OFF (P2_0: HIGH)2. OFF (P2_4: HIGH)3. OFF (EAN: LOW)

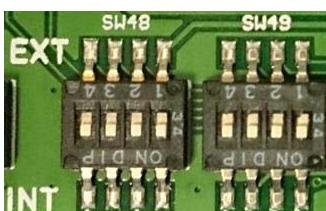
[Table 2-2](#) provides the switch SW46 details for 3W Class-D stereo amplifier signal connection.

TABLE 2-2: SWITCH SW46 DETAILS

Mode	Switch SW46	Switch 46 PIN Definition
On-board 3W Class-D stereo amplifier signal connection (default on-board stereo amplifier)		<ol style="list-style-type: none">1. ON (Amplifier power)2. ON (L-CH signal)3. ON (R-CH signal)4. ON (Amplifier enable)
External stereo amplifier connection		<ol style="list-style-type: none">1. OFF (Amplifier power)2. OFF (L-CH signal)3. OFF (R-CH signal)4. OFF (Amplifier enable)

[Table 2-3](#) provides switch SW48/SW49 details of the signals and buttons connections to the BM62 module and the external MCU.

TABLE 2-3: SWITCH SW48/SW49 DETAILS

Mode	Switch SW48/SW49	SW48/SW49 PIN Definition
Connect buttons and signals to module (default)		<p>SW48</p> <ol style="list-style-type: none">1. ON (MFB)2. ON (Volume down)3. ON (Play/Pause)4. ON (Volume up) <p>SW49</p> <ol style="list-style-type: none">1. ON (Previous Track)2. ON (Next Track)3. ON (NFC trigger)4. ON (NC)

Mode	Switch SW48/SW49	SW48/SW49 PIN Definition
Disconnect Buttons and signals to module (for external MCU usage)		<p>SW48</p> <ol style="list-style-type: none">1. OFF (MFB)2. OFF (Volume down)3. OFF (Play/Pause)4. OFF (Volume up) <p>SW49</p> <ol style="list-style-type: none">1. OFF (Previous Track)2. OFF (Next Track)3. OFF (NFC trigger)4. OFF (NC)

2.1.4 LED

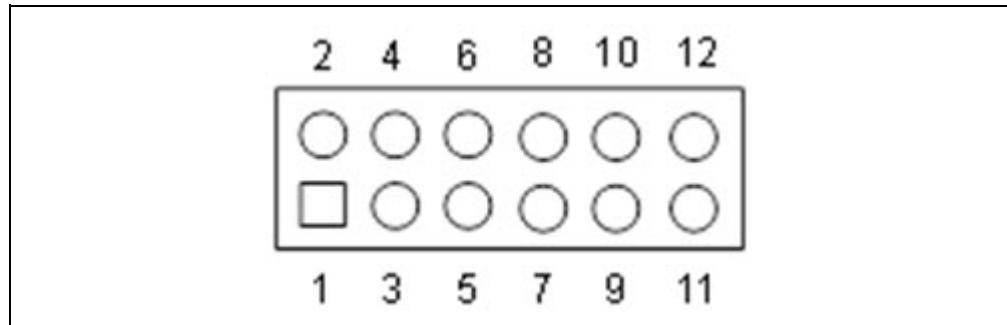
The functions of the three LEDs on BM62 EVB are listed as follows:

- LED1 – Indicates the Bluetooth connection status (UI configuration dependent)
- LED2 – Indicates the Bluetooth connection status (UI configuration dependent)
- LED3 – User defined (UI configuration dependent)

2.1.5 Jumpers and Headers

The following are jumpers and headers (J1, J6, JP19, JP20, JP22, JP23, JP26) available on the BM62 EVB.

[Figure 2-2](#) illustrates the GPIO header J1 and [Table 2-4](#) provides the pin details and descriptions.

FIGURE 2-2: GPIO HEADER J1**TABLE 2-4: GPIO HEADER J1**

Part Number	Pin	Description
J1	1	P0_0
	2	P3_0
	3	P2_0
	4	P1_5
	5	P0_4
	6	P0_1
	7	P2_4
	8	P0_2
	9	P0_3
	10	P0_5
	11	P2_7
	12	P2_4

The header J6 provides the interface to connect an external MCU to the BM62 EVB over UART. [Figure 2-3](#) illustrates the external MCU header J6 and [Table 2-5](#) provides the pin details and descriptions.

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FIGURE 2-3: EXTERNAL MCU HEADER J6

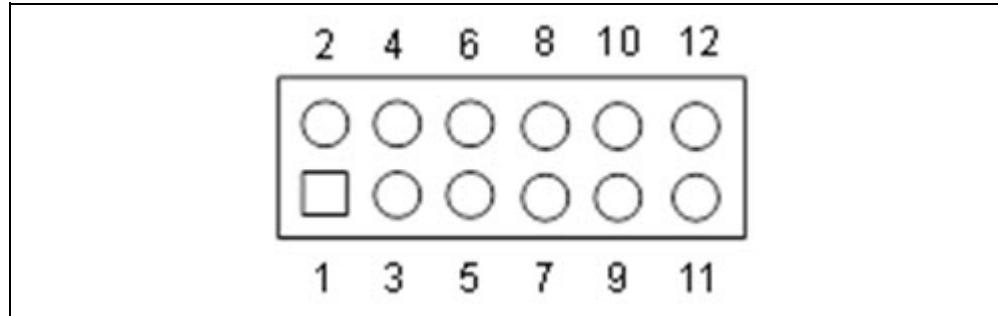


TABLE 2-5: EXTERNAL MCU HEADER J6

Part Number	Pin	Description
JP2	1	NC
	2	HCI_RXD
	3	NC
	4	HCI_TXD
	5	GND
	6	GND
	7	NC
	8	RST_N
	9	NC
	10	MFB (for RX_IND)
	11	NFC
	12	P0_0 (for TX_IND)

Figure 2-4 illustrates the battery connector JP20 and JP19, and Table 2-6 provides the pin details and descriptions.

Note: The Li-Ion battery can be connected to JP20 or JP19 of the BM62 EVB.

FIGURE 2-4: BATTERY CONNECTOR JP20 AND JP19

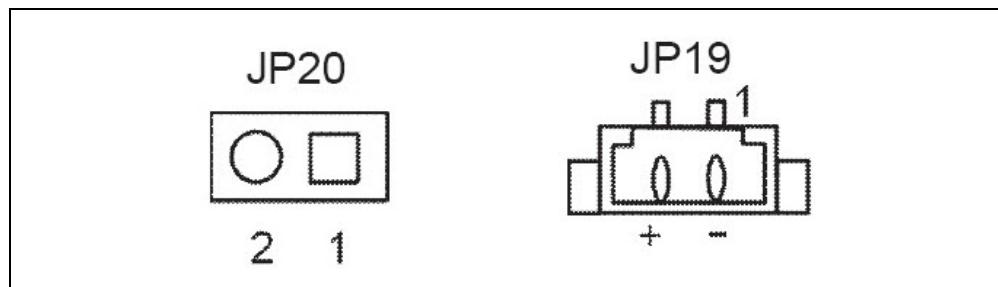


TABLE 2-6: BATTERY CONNECTOR JP20 AND JP19

Part Number	Pin	Description
JP20	1	BAT_IN
	2	GND
JP19	1	GND
	2	BAT_IN

The header JP22 is used for connecting a microphone to the BM62 EVB. [Figure 2-5](#) and [Table 2-7](#) provides the JP22 pin details and descriptions.

FIGURE 2-5: MIC JP22

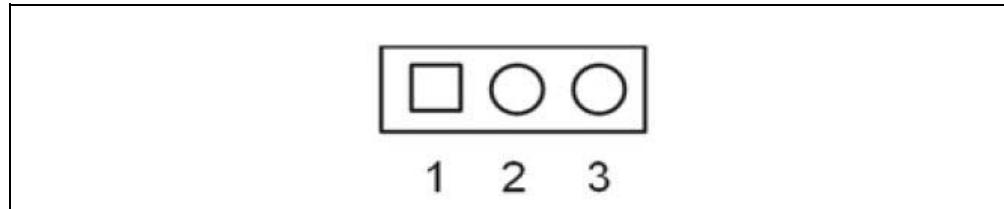


TABLE 2-7: MIC JP22

Part Number	Pin	Description
JP22	1	MIC_P1
	2	GND
	3	MIC_N1

[Figure 2-6](#) illustrates the audio output header JP23 and [Table 2-8](#) provides the pin details and descriptions.

FIGURE 2-6: AUDIO OUTPUT HEADER JP23

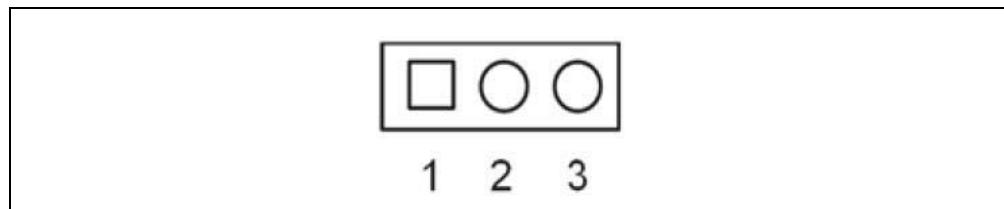


TABLE 2-8: AUDIO OUTPUT HEADER JP23

Part Number	Pin	Description
JP23	1	AOHPL
	2	AOHPM
	3	AOHPR

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Figure 2-7 illustrates the external amplifier header JP26 and Table 2-9 provides the pin details and descriptions.

FIGURE 2-7: EXTERNAL AMPLIFIER HEADER JP26

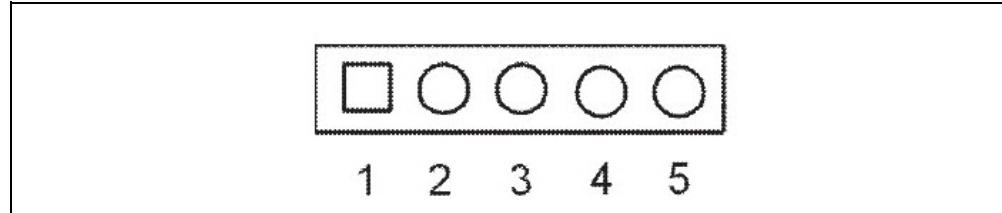


TABLE 2-9: EXTERNAL AMPLIFIER HEADER JP26

Part Number	Pin	Description
JP26	1	EXT_AMP_EN
	2	SPKR
	3	AGND
	4	SPKL
	5	AMP_POW



Chapter 3. Getting Started

This chapter describes how to establish a Bluetooth connection between the BM62 EVB and a host device. It also demonstrates the process of updating the parameters using various tools.

This chapter includes the following topics:

- 3.1 “Requirements”**
- 3.2 “Getting Started with the BM62 EVB”**
- 3.3 “Application Demonstration”**
- 3.4 “Configuring BM62 Stereo Audio Module”**
- 3.5 “Updating EEPROM Parameters”**
- 3.6 “Updating Flash Code”**
- 3.7 “BLE Demonstration”**

3.1 REQUIREMENTS

The following hardware and software components are required for getting started with the BM62 EVB.

3.1.1 Hardware Requirements

- BM62 EVB
- Bluetooth enabled smartphone:
 - Android™ device with Android 4.3 or later version
 - iOS: iPhone® 4S or later version (with BLE support)
- Windows® host PC with USB port
- Speaker, microphone or headset
- Micro-USB cable

3.1.2 Software Requirements

Download the latest firmware and corresponding tools from the Microchip web site at: www.microchip.com/BM62.

- User Interface tool
- DSP tool
- Mass Production EEPROM Tool (MPET)
- Flash update tool
- Flash code
- EEPROM tool
- UART command set tool
- mBIoT Utility app, available at Apple Store for iPhone® and at Google Play™ Store for Android™

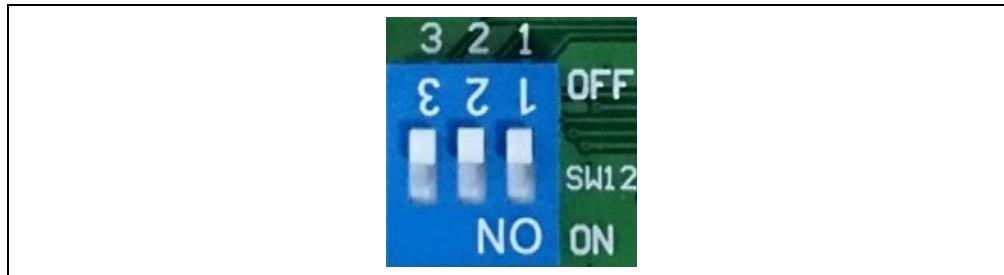
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3.2 GETTING STARTED WITH THE BM62 EVB

To establish a Bluetooth connection between the BM62 EVB and a host device, perform the following actions:

1. Set switch SW12 to Application mode, as illustrated in [Figure 3-1](#).

FIGURE 3-1: SW12 IN APPLICATION MODE



2. Connect a speaker to the audio output connector (J3 and J4) of the BM62 EVB.
3. Connect the BM62 EVB to a PC through a micro-USB cable for the power supply. LED2 (red) will turn on.

Note: The user can also power the board by connecting a Li-Ion battery to JP19 or JP20 on the BM62 EVB.

4. On the BM62 EVB, long press the **MFB** button to turn on the Bluetooth. Both LED1 (blue) and LED2 (red) will blink together. Then, continue to press the **MFB** button (approximately 5 seconds) until both the LEDs blink alternately. This LED behavior indicates that the BM62 EVB is in discoverable mode.
5. Turn on the Bluetooth on a host device (PC or smartphone), and it will display a list of discoverable Bluetooth devices. The BM62 EVB is displayed as "Dual_SPK" or "LE_Dual_SPK". Select the device to establish the connection.

Note: "Dual_SPK" is used for Bluetooth classic and "LE_Dual_SPK" is used for BLE devices.

6. LED1 (blue) will blink faster, and it indicates that the BM62 EVB is paired with the host device.
7. Once the connection is established, LED1 (blue) will blink twice at regular intervals. It will display as "connected" in the Bluetooth settings of the smartphone. With the default settings, the BM62 Stereo Audio module enables Advanced Audio Distribution Profile (A2DP) for audio playback and Audio Video Remote Control Profile (AVRCP) for player control.

3.3 APPLICATION DEMONSTRATION

3.3.1 Speaker Audio Demonstration

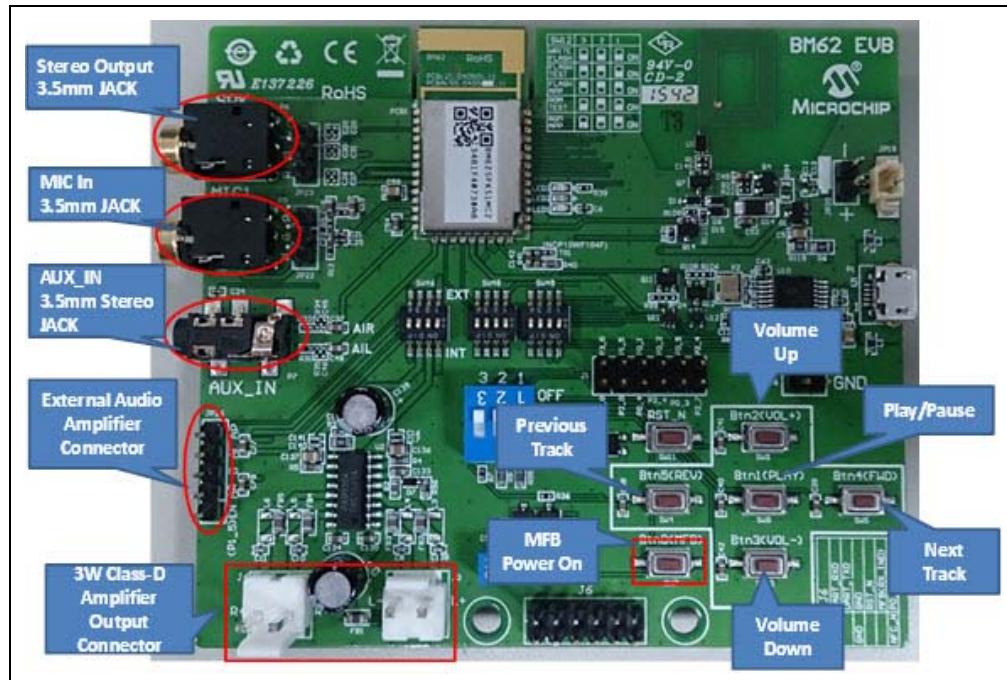
In this demonstration, the user can stream audio on the BM62 EVB using a host device (PC or smartphone). Perform the following actions for the audio demonstration. Refer to [Figure 3-2](#).

1. Establish the connection between the BM62 EVB and a host device, using the procedure listed in [3.2 "Getting Started with the BM62 EVB"](#).
2. Once the connection between the BM62 EVB and the host device is established, open the audio source on the host device. Microchip recommends using a media player (for example, Windows® Media Player, iTunes®, or Android™).
3. Start the audio stream on the media player. Both LED1 (blue) and LED2 (red) will blink once at regular intervals during the audio playback.

The audio control buttons are used to:

- Control the volume of audio output (long press **VOL+** or **VOL-** button)
- Go to the previous track (short press **REV** button)
- Go to the next track (short press **FWD** button)
- Start/stop playing the current track (short press **PLAY** button)

FIGURE 3-2: BM62 EVB AUDIO CONTROL BUTTONS



3.3.2 HSP/HFP Demonstration

In this demonstration, the user can explore the Headset Profile (HSP) or Hands-Free Profile (HFP) setting to receive an incoming voice call from a paired smartphone. Perform the following actions for demonstration. Refer to [Figure 3-2](#).

1. Establish a connection between the BM62 EVB and a host device using the procedure listed in [3.2 “Getting Started with the BM62 EVB”](#).
2. Connect the PC headset/microphone (with two-plugs) to the BM62 EVB's audio output connector (P6) and audio input connector (P5), respectively.
3. Initiate a call from another phone to the smartphone that is paired with the BM62 EVB. The A2DP stream pauses and the ringtone is played on the headset. LED1 (blue) blinks three times at regular intervals.
4. Press the **MFB** button on the BM62 EVB to accept the incoming call. LED1 (blue) and LED2 (red) will blink three times at regular intervals.

3.4 CONFIGURING BM62 STEREO AUDIO MODULE

The BM62 EVB can be configured and various parameters can be customized using the UI tool and DSP tool, and then the parameters are saved in a file. Using the MPET tool, the saved files are merged into *.ipf and then this merged file is programmed into the EEPROM. After EEPROM is programmed, power cycle the BM62 EVB to see the effect of the customized parameters.

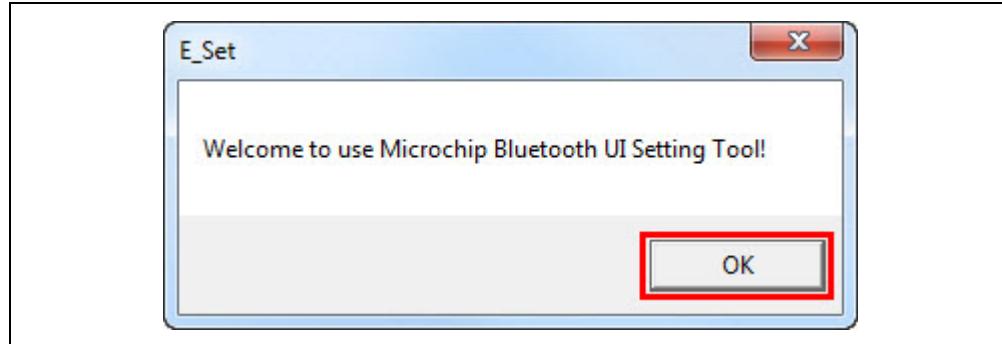
3.4.1 UI Tool Configuration

The User Interface (UI) tool is a configuration tool which enables the user to change the parameters of the BM62 stereo audio module. To configure the UI parameters, perform the following actions:

1. Open the UI configuration tool and click **OK** to configure the UI parameters (Figure 3-3).

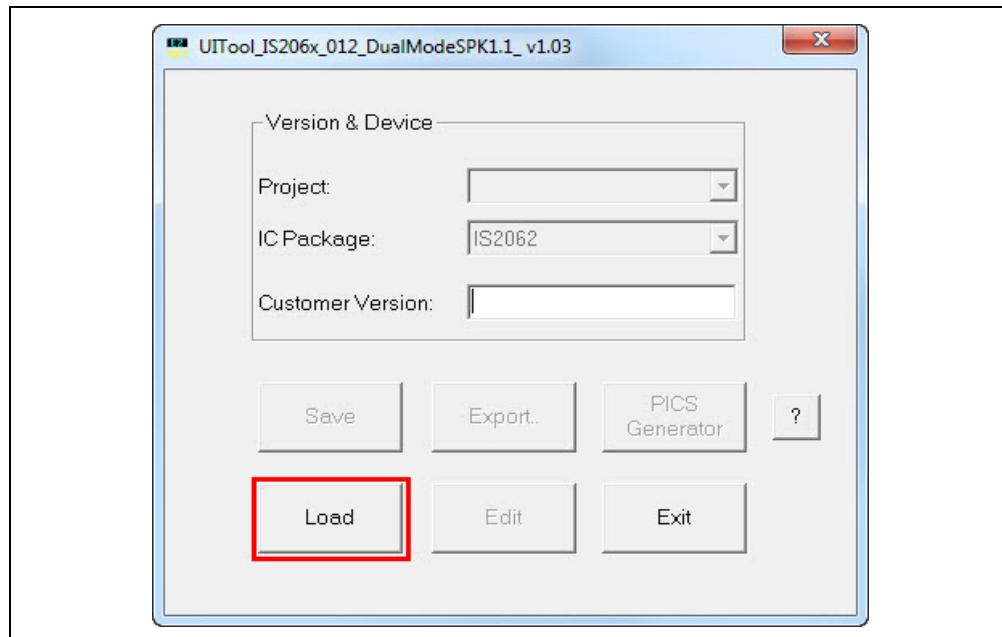
Note: Download and install the UI tool, which is available on the Microchip web site: www.microchip.com/BM62. For this demonstration UITool_IS206x_012_DualModeSPK1.1_v1.03 is used.

FIGURE 3-3: UI TOOL



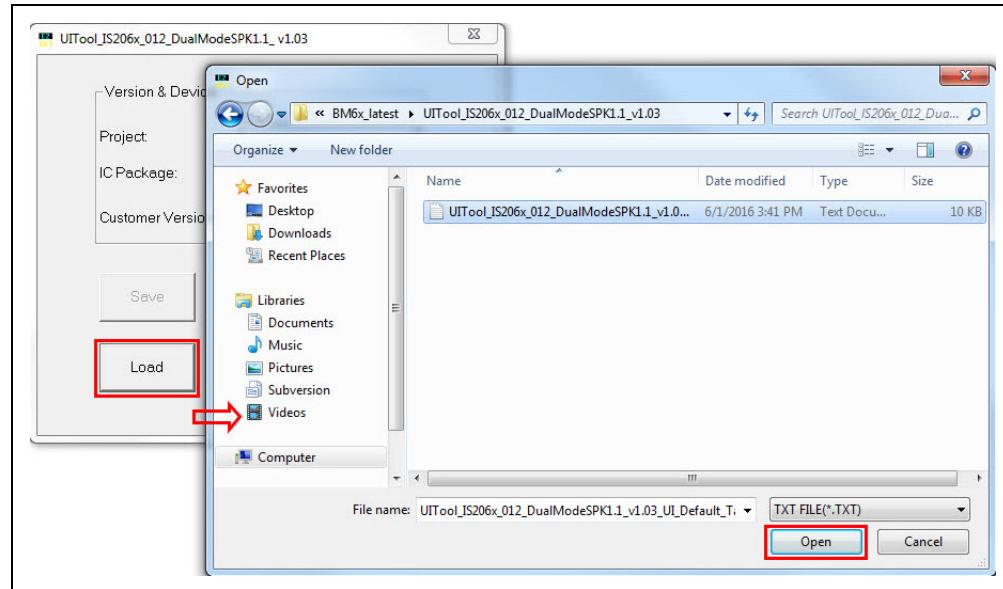
2. In the UI configuration tool, click **Load** (Figure 3-4).

FIGURE 3-4: UI CONFIGURATION TOOL



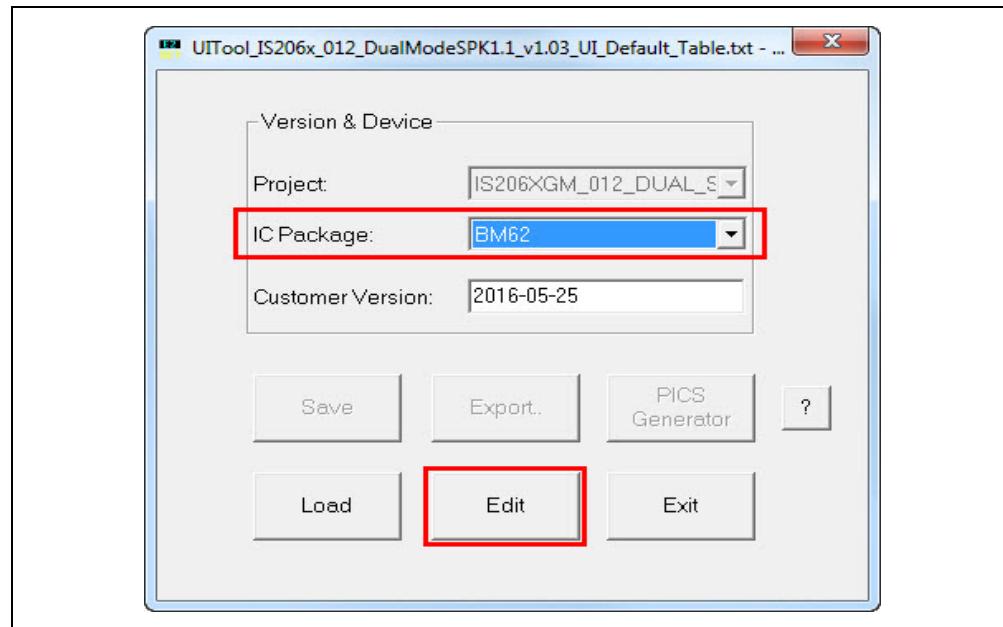
3. From the Open window, select the default UI parameter text file (provided with the UI tool) for the BM62 stereo audio module, and then click **Open** (Figure 3-5).

FIGURE 3-5: LOADING DEFAULT UI PARAMETERS



4. After selecting the UI parameters, select "BM62" from the **IC Package** drop-down list and then click **Edit** (Figure 3-6).

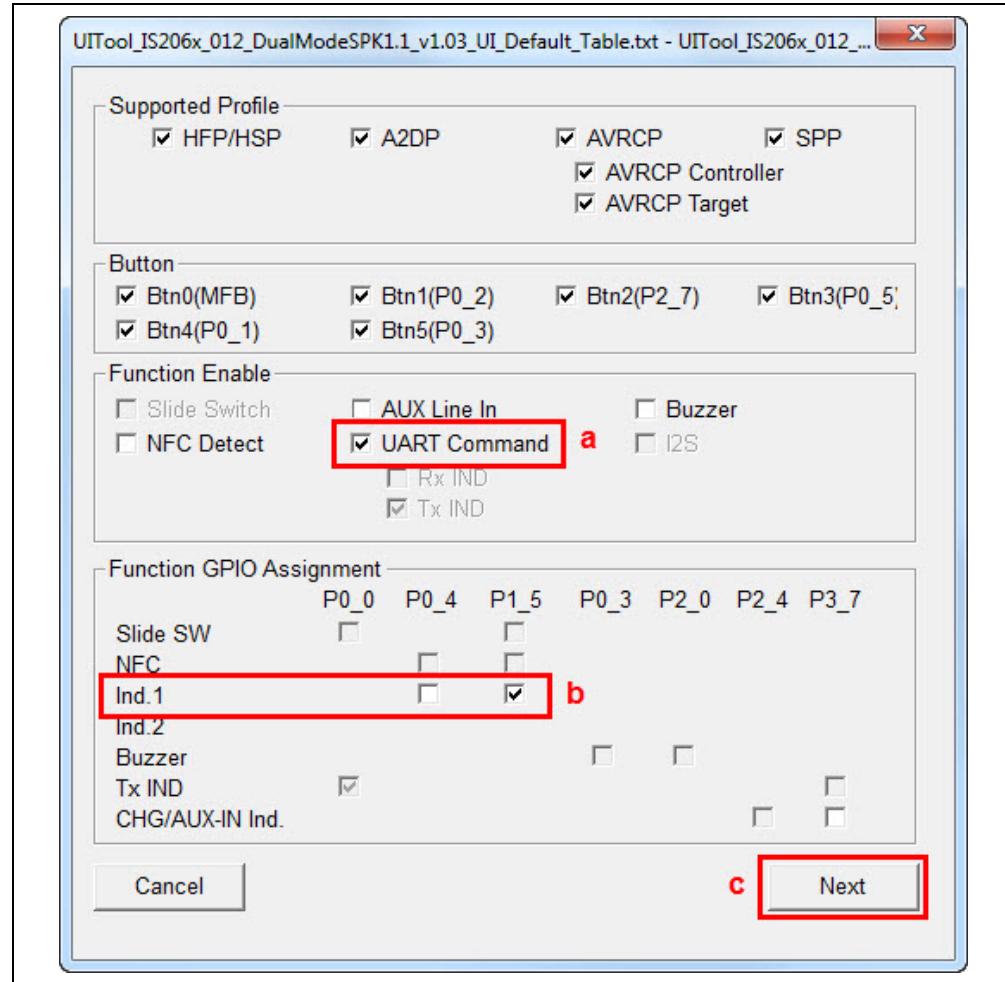
FIGURE 3-6: EDIT UI PARAMETERS



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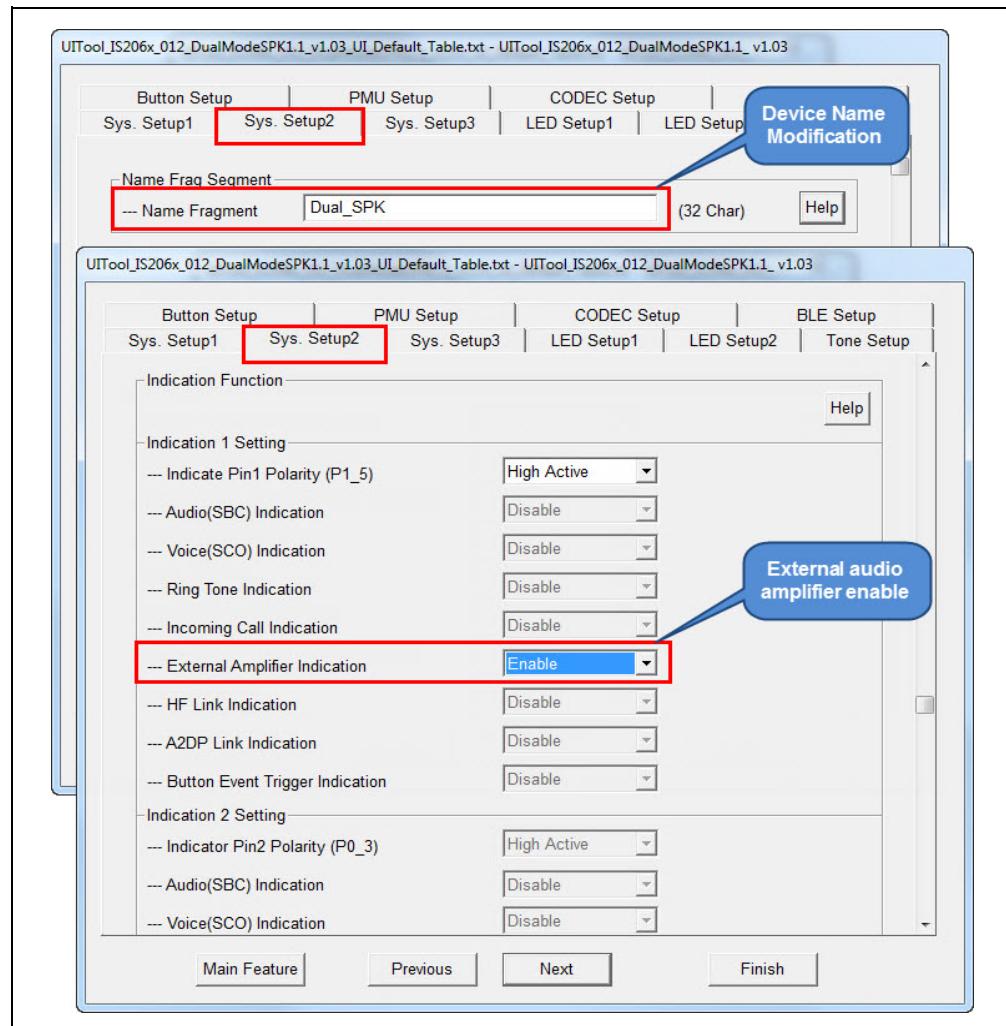
5. In the Main Feature dialog, the user can enable or disable the **Supported Profile** and audio line-in function **Button** and set the following parameters, as illustrated in [Figure 3-7](#).
 - a) Select the “UART Command” check box which allows the module to be controlled by the MCU through the UART interface.
 - b) Select the “Ind.1” check box to enable the external audio amplifier.
 - c) Click **Next**.

FIGURE 3-7: MAIN FEATURE SETTINGS



6. The System and Functional Settings dialog with various options (tabs) is displayed to configure the parameters. In the **Sys. Setup2** tab, in the Indication 1 Setting section, enable **External Amplifier Indication**, as illustrated in [Figure 3-8](#). Click **Help** to get more detailed information.

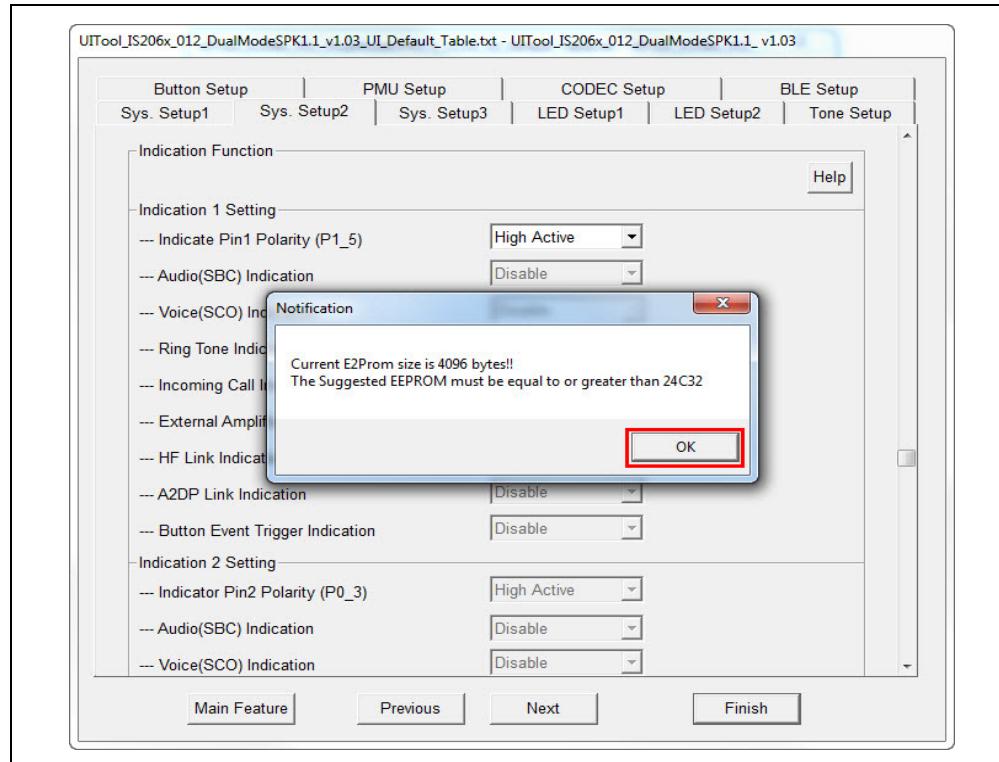
FIGURE 3-8: ENABLE EXTERNAL AMPLIFIER INDICATION



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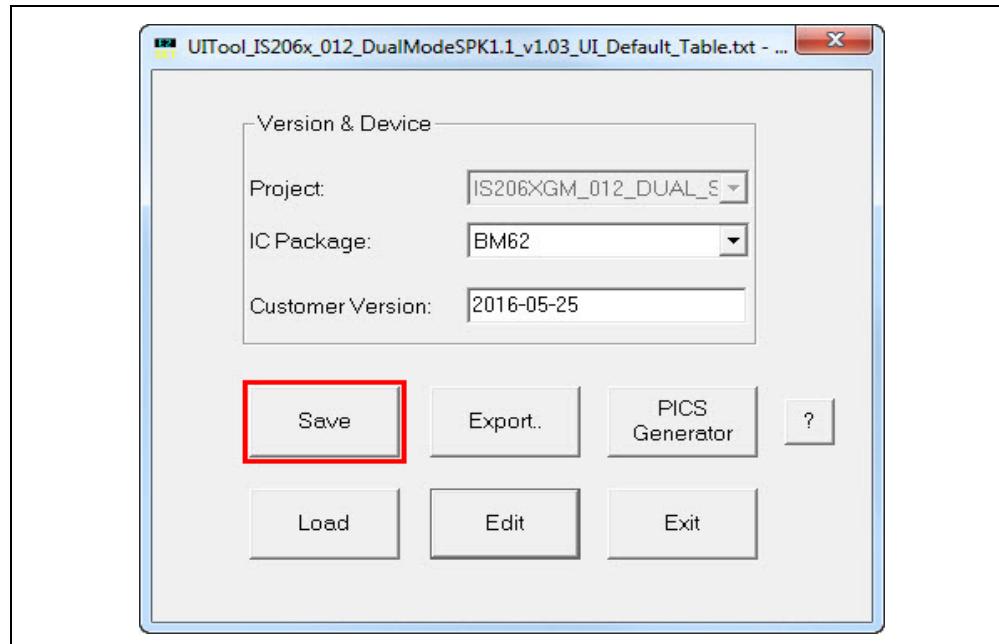
- After setting up the parameters, click **Finish**. A notification is displayed to check the EEPROM size on the system. Click **OK** (Figure 3-9).

FIGURE 3-9: EEPROM NOTIFICATION



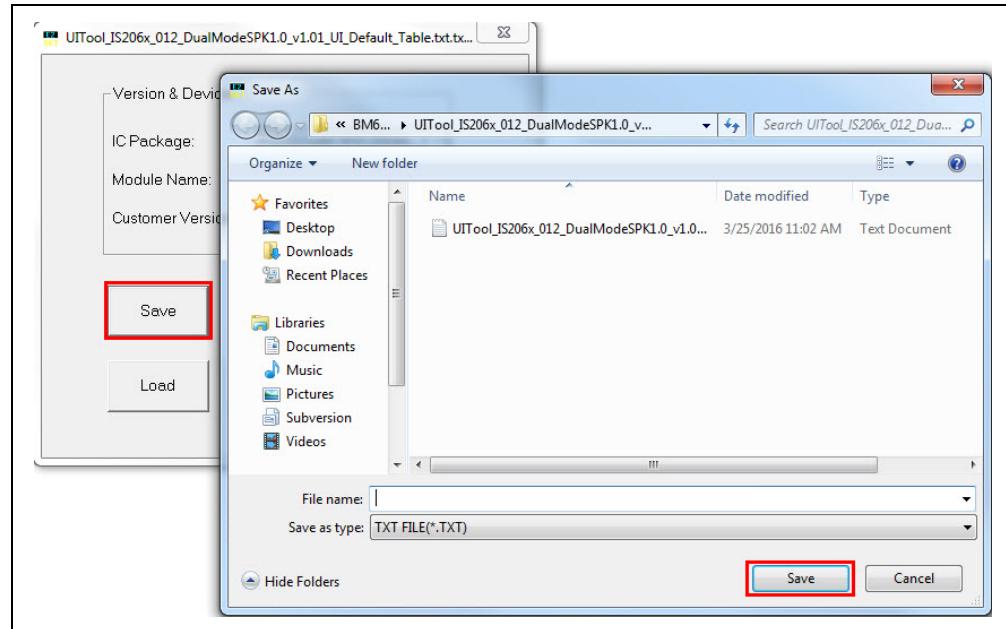
- Click **Save** to save these UI parameters as a .txt file (Figure 3-10).

FIGURE 3-10: SAVING UI PARAMETERS



- From the Save As window, select the file location and then click **Save** (Figure 3-11).

FIGURE 3-11: SAVE AS WINDOW



- After saving the UI parameters, click **Exit**.

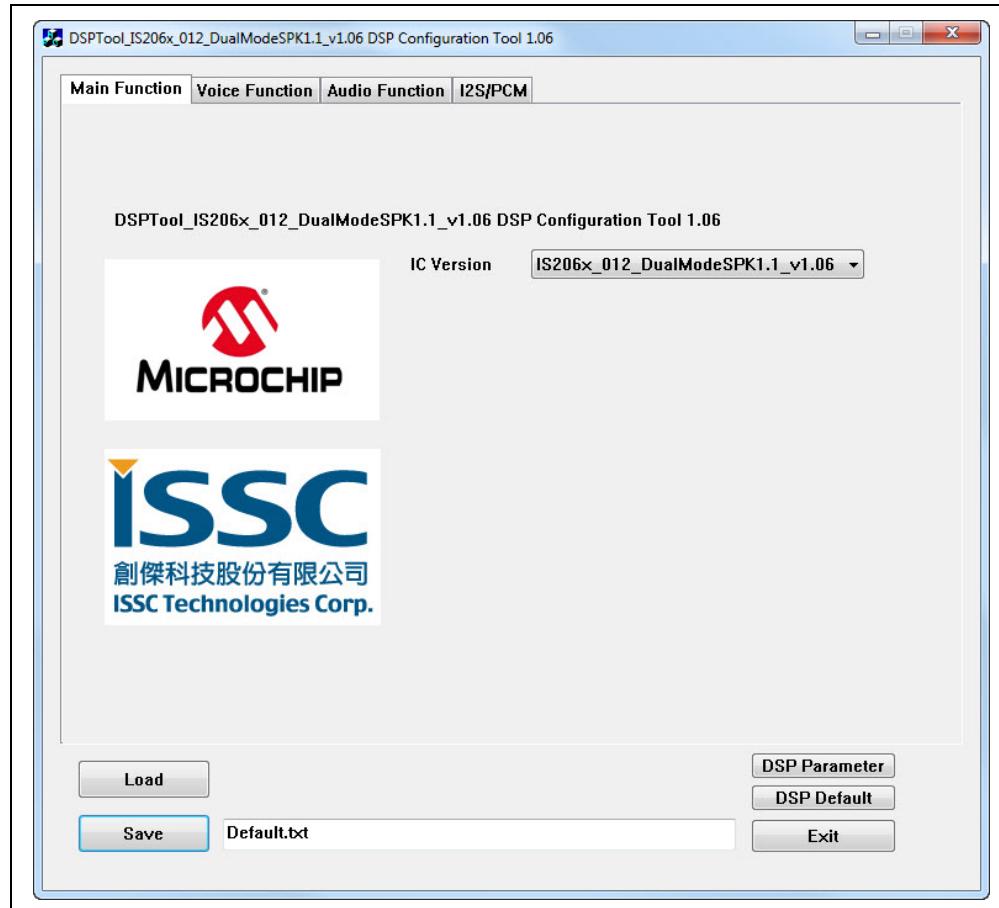
3.4.2 DSP Tool Configuration

The DSP configuration tool provides the visual interface to configure the DSP-related parameters for the voice and audio signal processing functions. To configure the DSP parameters, perform the following actions:

1. Open the DSP tool. A dialog displays various options (tabs) to configure the parameters, as illustrated in [Figure 3-12](#).

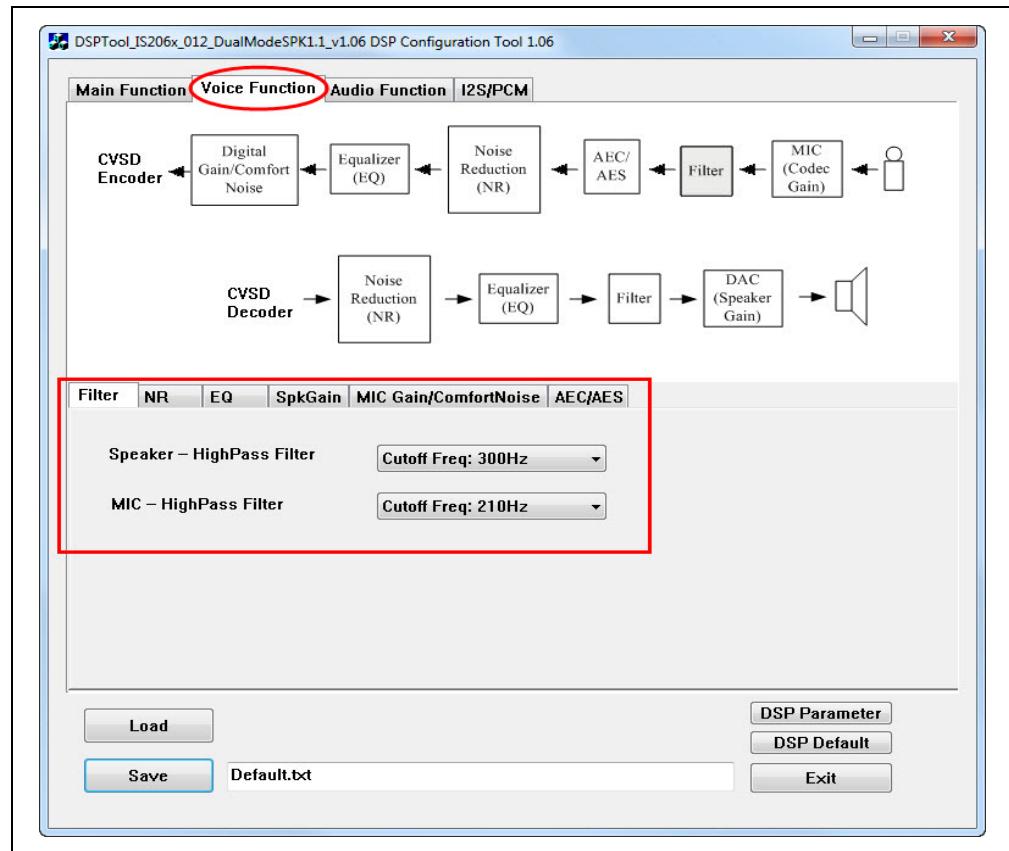
Note: Download and install the DSP tool, which is available on the Microchip web site: www.microchip.com/BM62. For this demonstration DSPTool_IS206x_012_DualModeSPK1.1_v1.06 is used.

FIGURE 3-12: DSP TOOL SETTINGS



2. From the **Voice Function** tab, set the parameters as illustrated in [Figure 3-13](#).

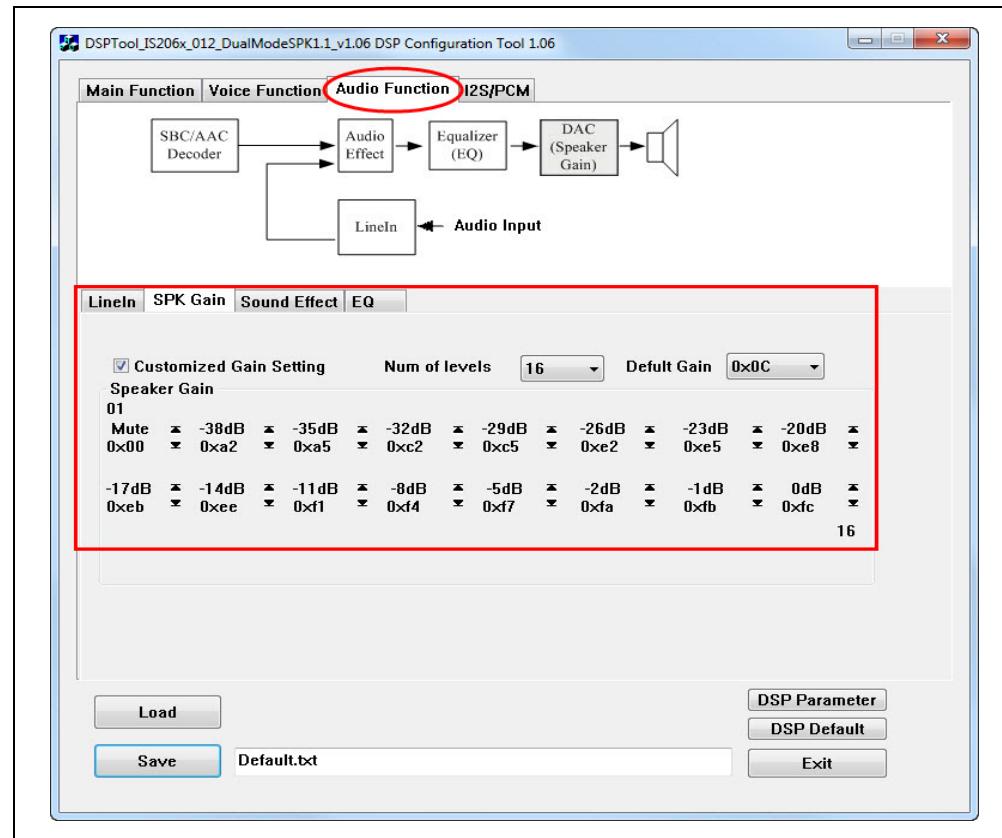
FIGURE 3-13: DSP VOICE FUNCTION SETTING



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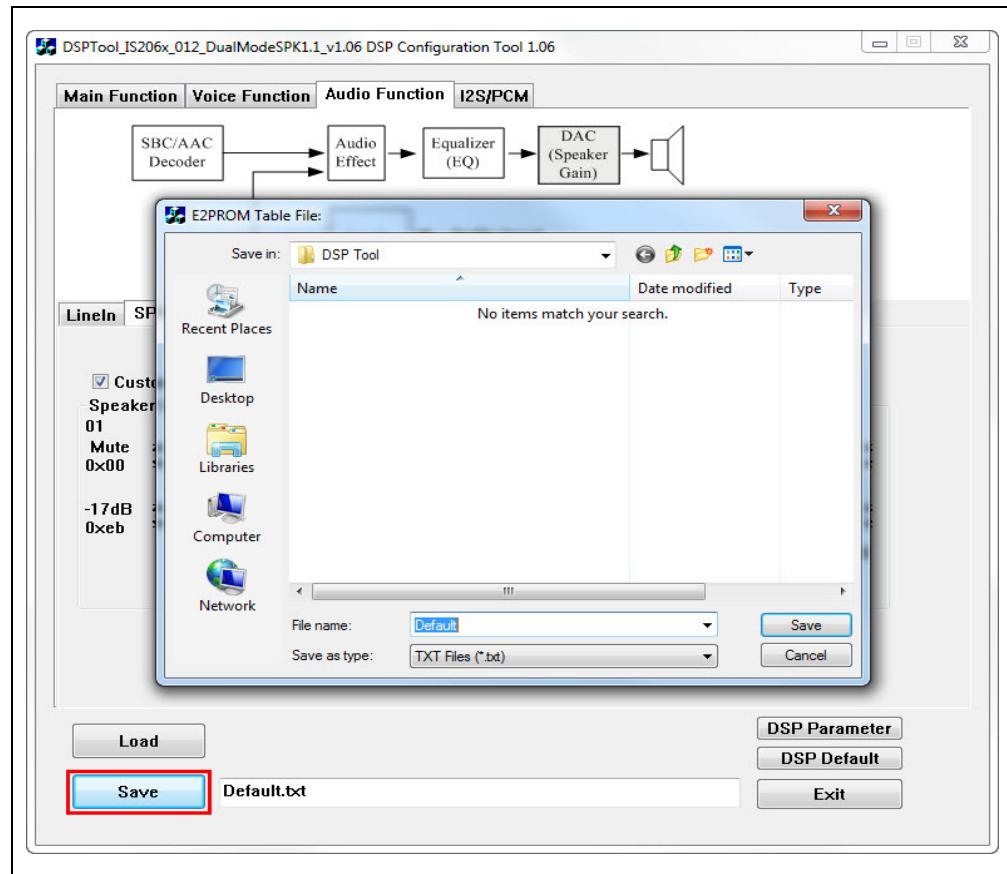
3. From the **Audio Function** tab, set the parameters as illustrated in [Figure 3-14](#).

FIGURE 3-14: DSP AUDIO FUNCTION SETTING



4. Click **Save** to save these DSP parameters as .txt file (Figure 3-15).

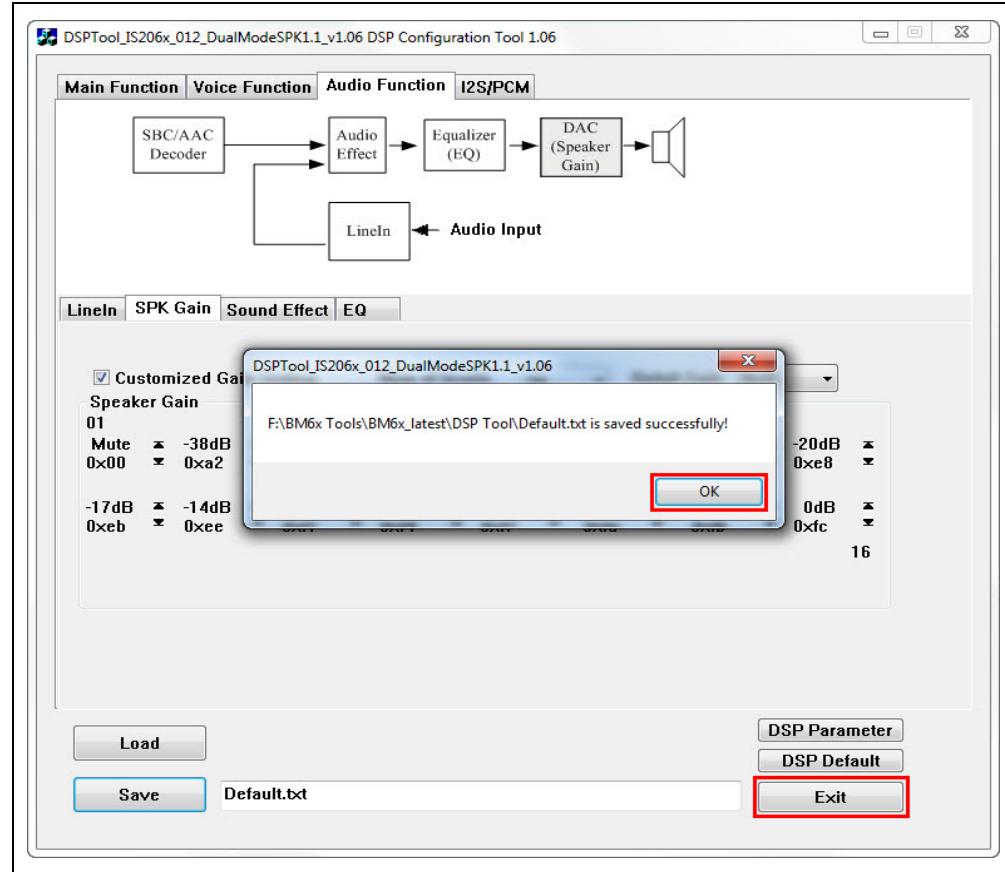
FIGURE 3-15: SAVING DSP PARAMETERS



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- After saving the DSP parameters, from the notification pop up click **OK** (Figure 3-16). Click **Exit** to exit the DSP tool settings.

FIGURE 3-16: SAVE NOTIFICATION



3.4.3 MPET Tool Configuration

The MPET tool is used to merge the UI and the DSP parameters and generate a patch file (.ipf) or binary file (.bin). To configure the MPET tool, perform the following actions:

1. Open the MPET tool and then click **Next** to continue with the configuration settings (Figure 3-17).

Note: Download and install the MPET tool, which is available on the Microchip web site: www.microchip.com/BM62. For this demonstration MPET_V2.1.29.4804 is used.

FIGURE 3-17: MPET TOOL SETTING

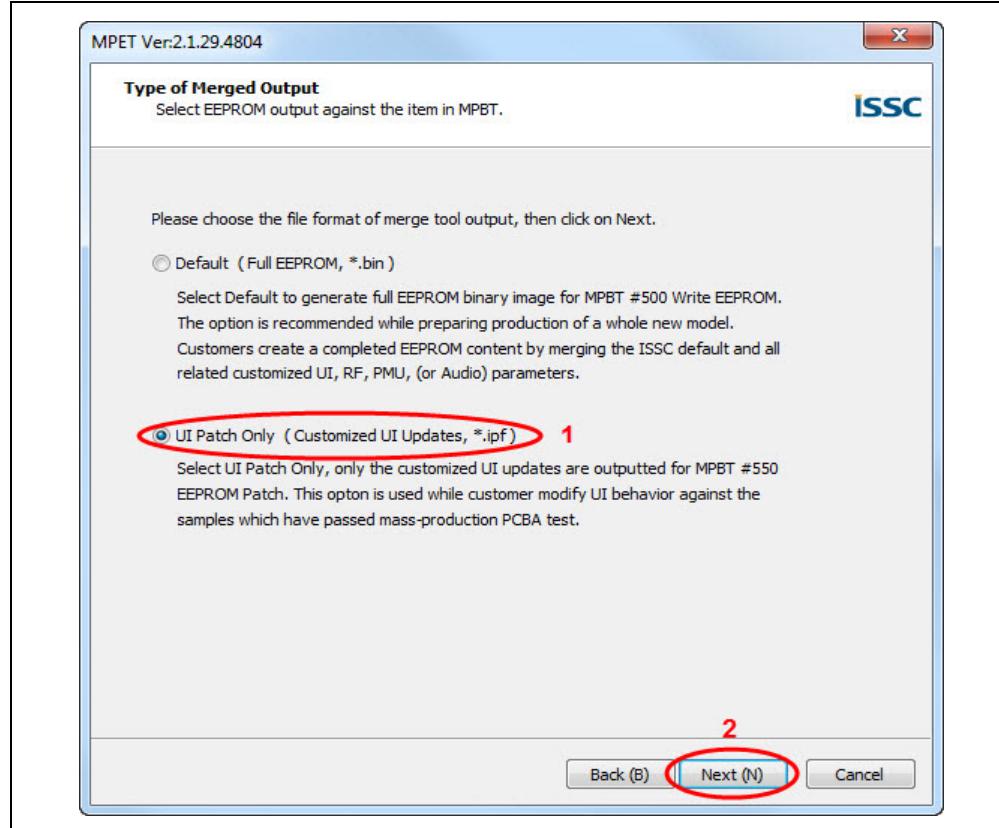


2. Select **UI Patch Only** to merge the UI and the DSP parameters and then click **Next** as illustrated in Figure 3-18.

Note: For the UI parameter settings, refer to 3.4.1 “UI Tool Configuration”, and for the DSP parameter settings, refer to 3.4.2 “DSP Tool Configuration”.

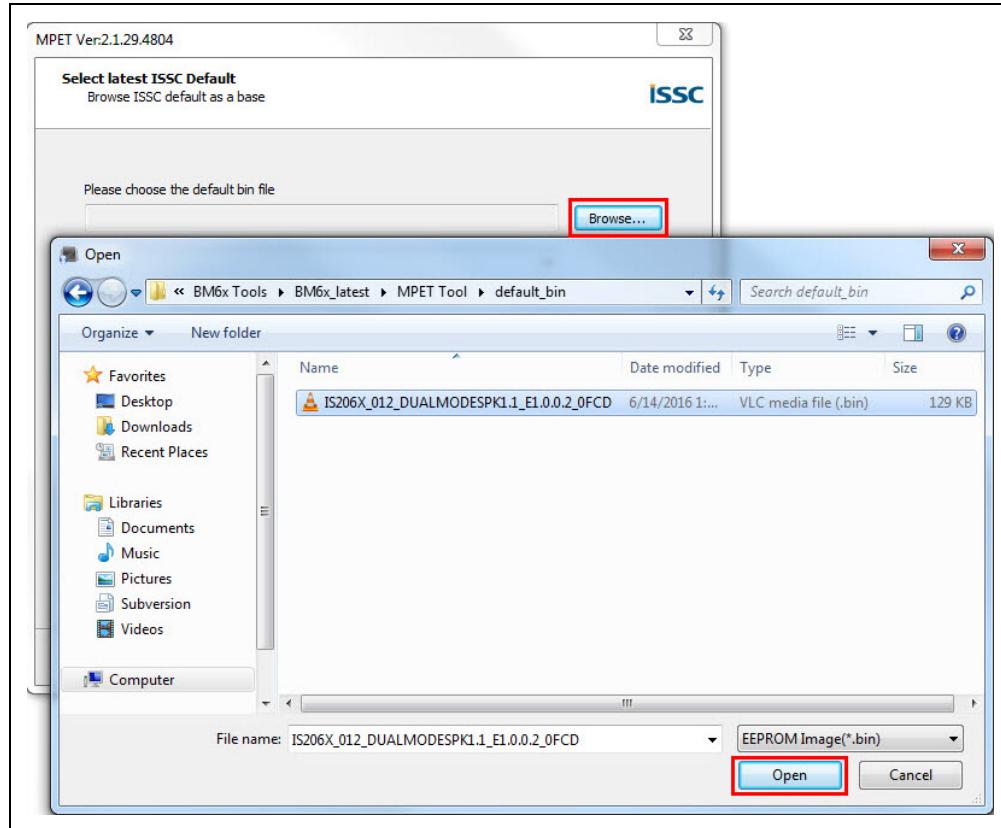
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FIGURE 3-18: MERGE UI AND DSP PARAMETERS



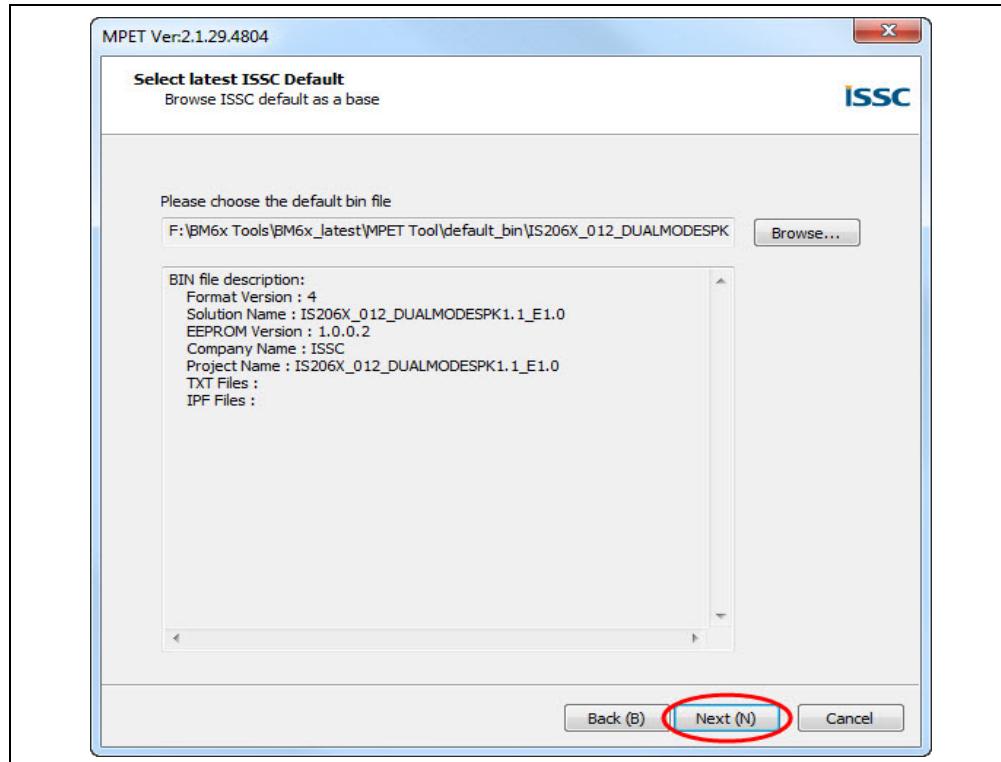
3. Click **Browse** to load the default .bin file (provided with the MPET tool). From the Open window, select the default .bin file and then click **Open** (Figure 3-19).

FIGURE 3-19: LOADING DEFAULT BIN FILE



4. The bin file description displays. Click **Next** (Figure 3-20).

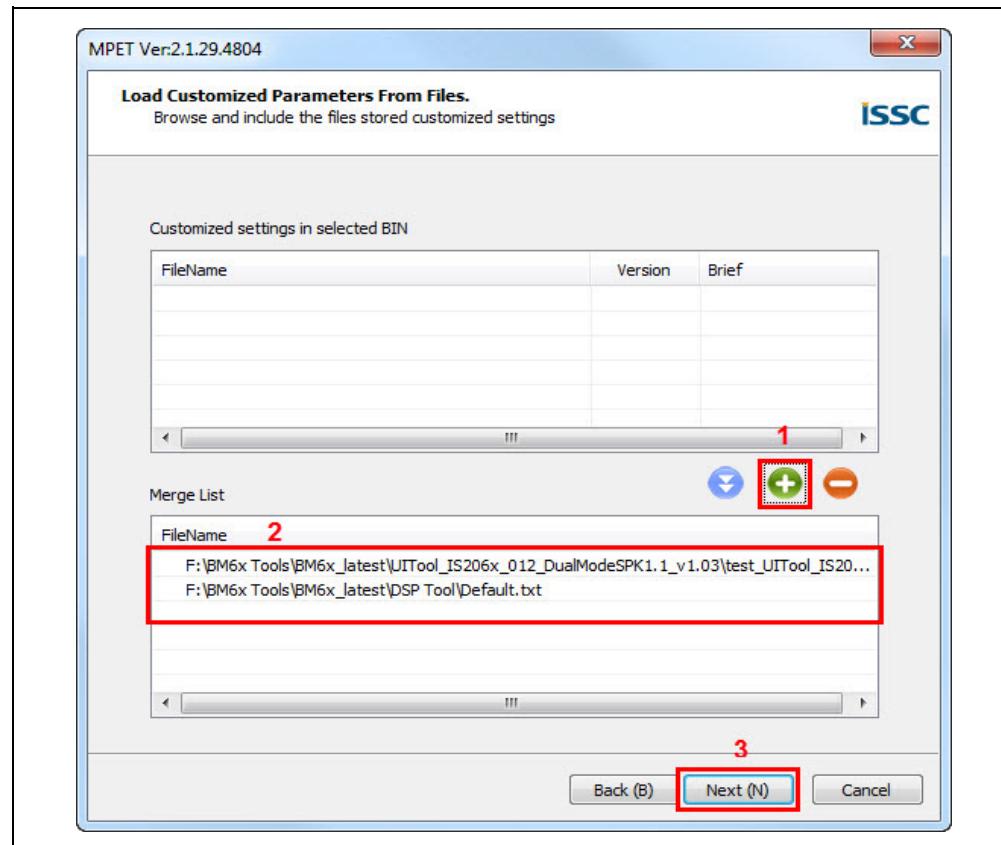
FIGURE 3-20: DEFAULT BIN FILE SETTING



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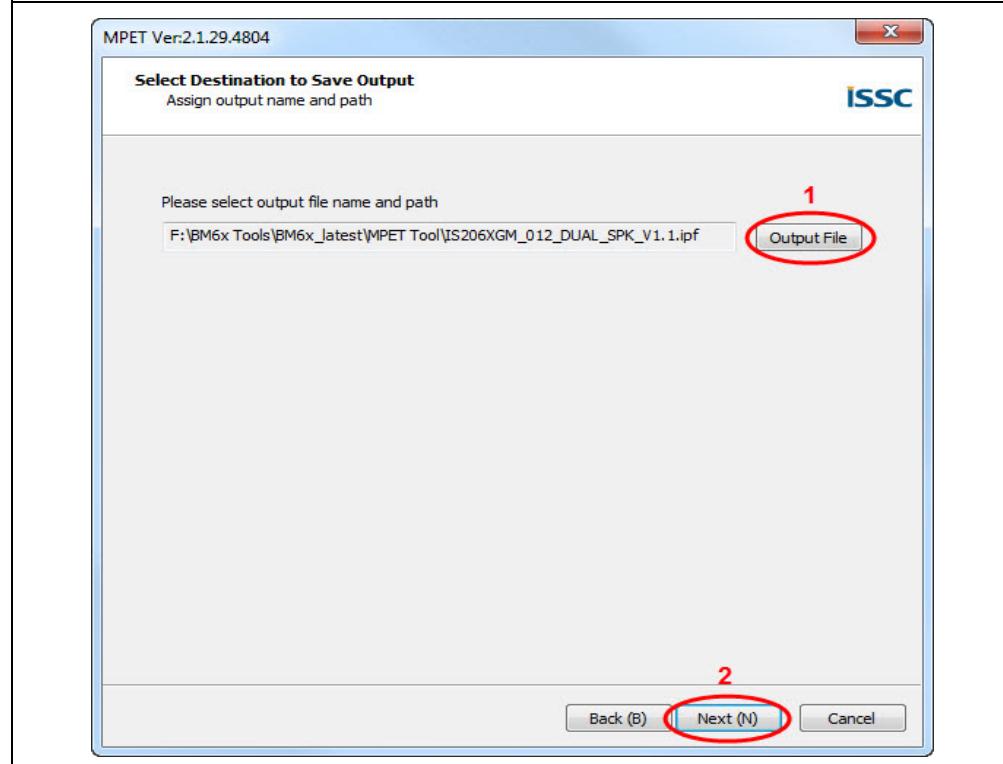
5. Click the “+” button to load the UI and the DSP parameters (.txt file) into the MPET tool to merge with the EEPROM table and then click **Next**, as illustrated in [Figure 3-21](#).

FIGURE 3-21: CUSTOMIZED SETTINGS TO MERGE



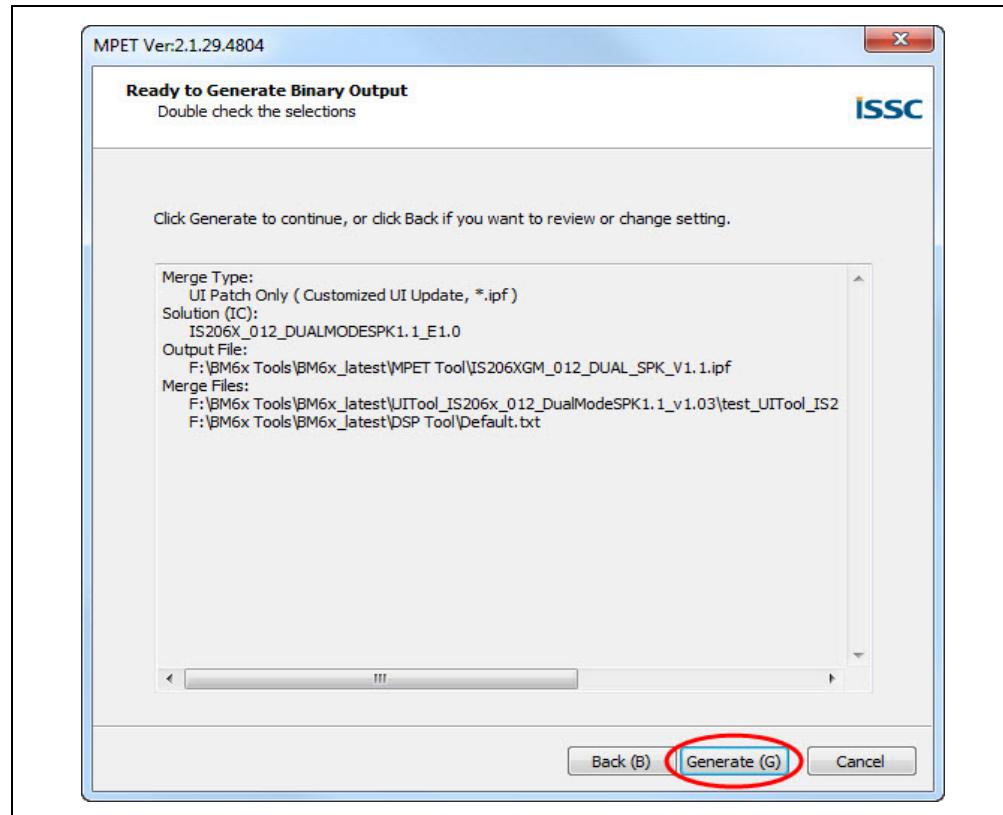
6. Select an Output File path to create the merged EEPROM table (.ipf file), and then click **Next** ([Figure 3-22](#)).

FIGURE 3-22: SELECTING OUTPUT FILE NAME AND PATH



7. Click **Generate** to generate the EEPROM table (.ipf file) (Figure 3-23).

FIGURE 3-23: GENERATE EEPROM TABLE

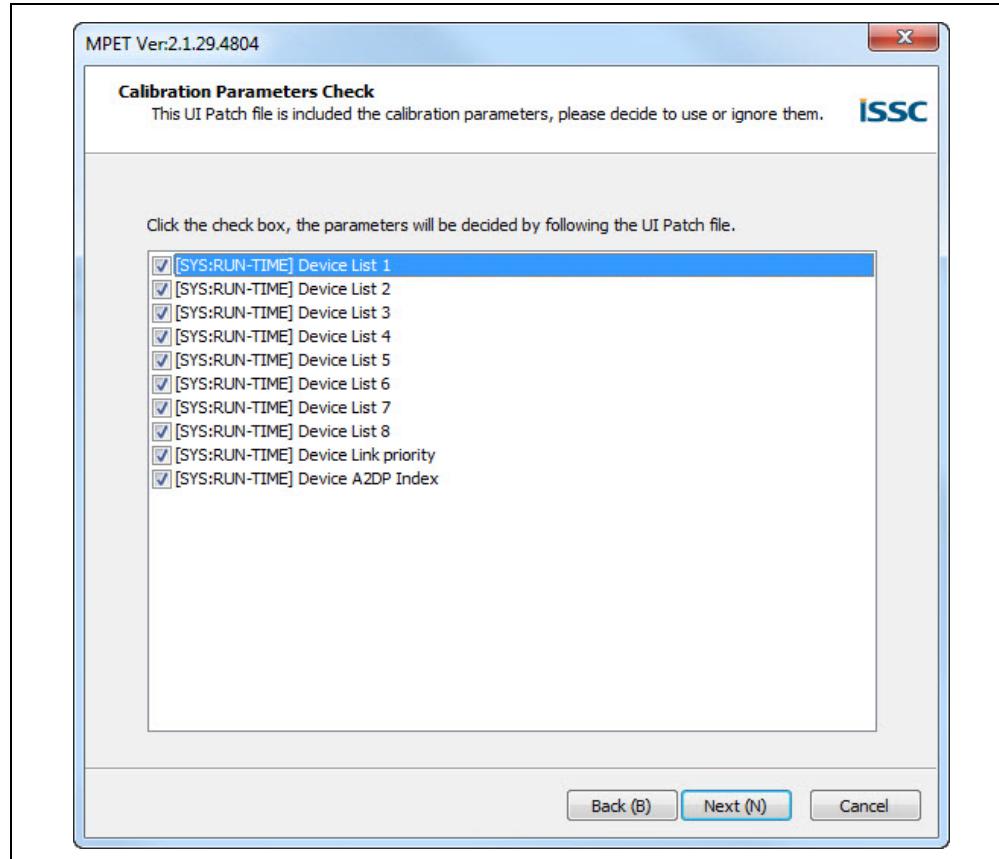


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8. The calibration parameters included in the UI patch file can be selected or ignored. Click **Next** (Figure 3-24).

Note: When the items are selected, the calibration parameters of the .ipf file will overwrite the default parameters in the device.

FIGURE 3-24: CALIBRATION PARAMETER CHECK



9. After generating the merged EEPROM table (.ipf file), click **Finish** to exit the wizard (Figure 3-25).

FIGURE 3-25: GENERATED OUTPUT FILE

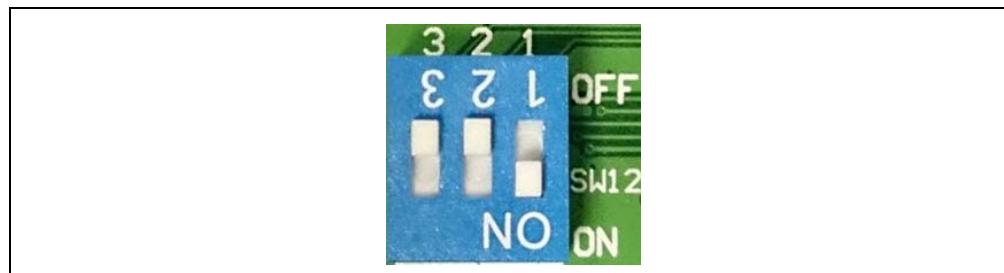


3.5 UPDATING EEPROM PARAMETERS

Perform the following actions to update the EEPROM parameters.

1. Set switch SW12 to Test Mode ([Figure 3-26](#)).

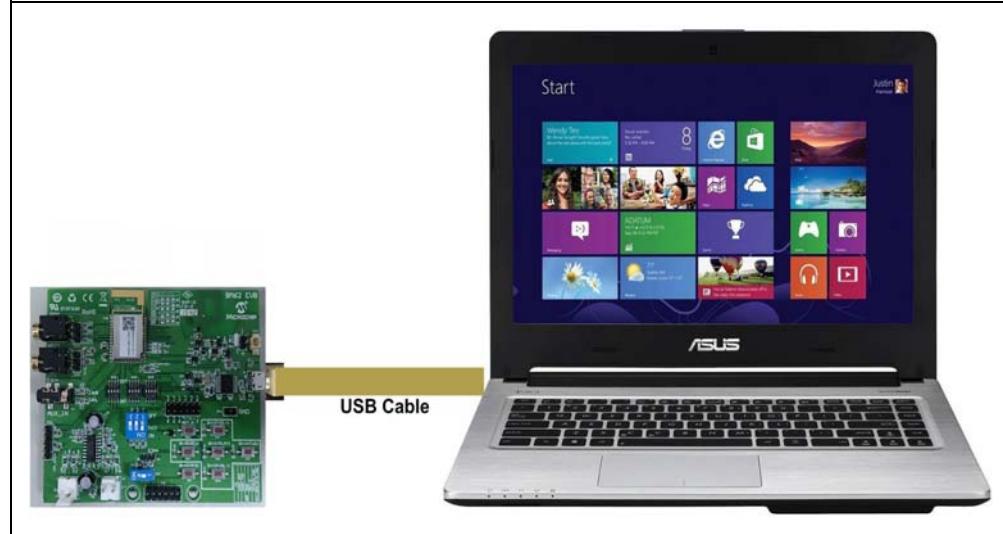
FIGURE 3-26: SWITCH SW12 IN TEST MODE



2. Connect the BM62 EVB to a PC using a micro-USB cable as illustrated in [Figure 3-27](#). The default LED behavior in Test mode is: LED1 and LED2 (blue and red) will be ON.

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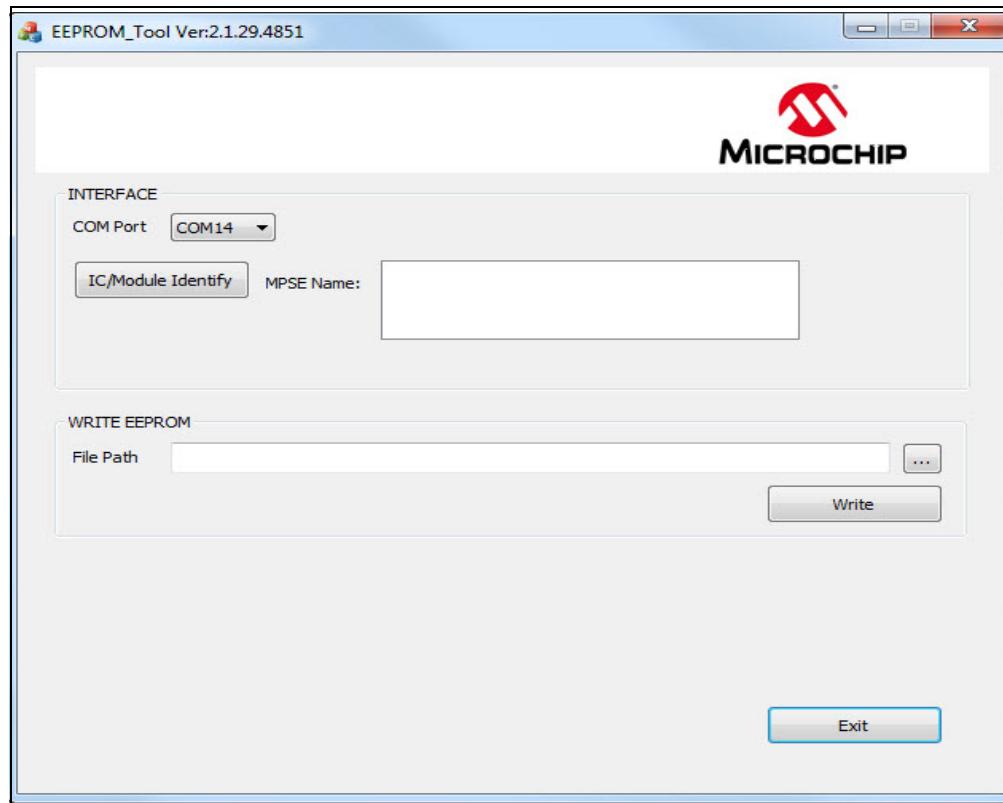
FIGURE 3-27: EEPROM PARAMETER SETUP



Note: Download and install the EEPROM tool, which is available on the Microchip web site: www.microchip.com/BM62. For this demonstration EEPROM_Tool_V2.1.29.4851 is used.

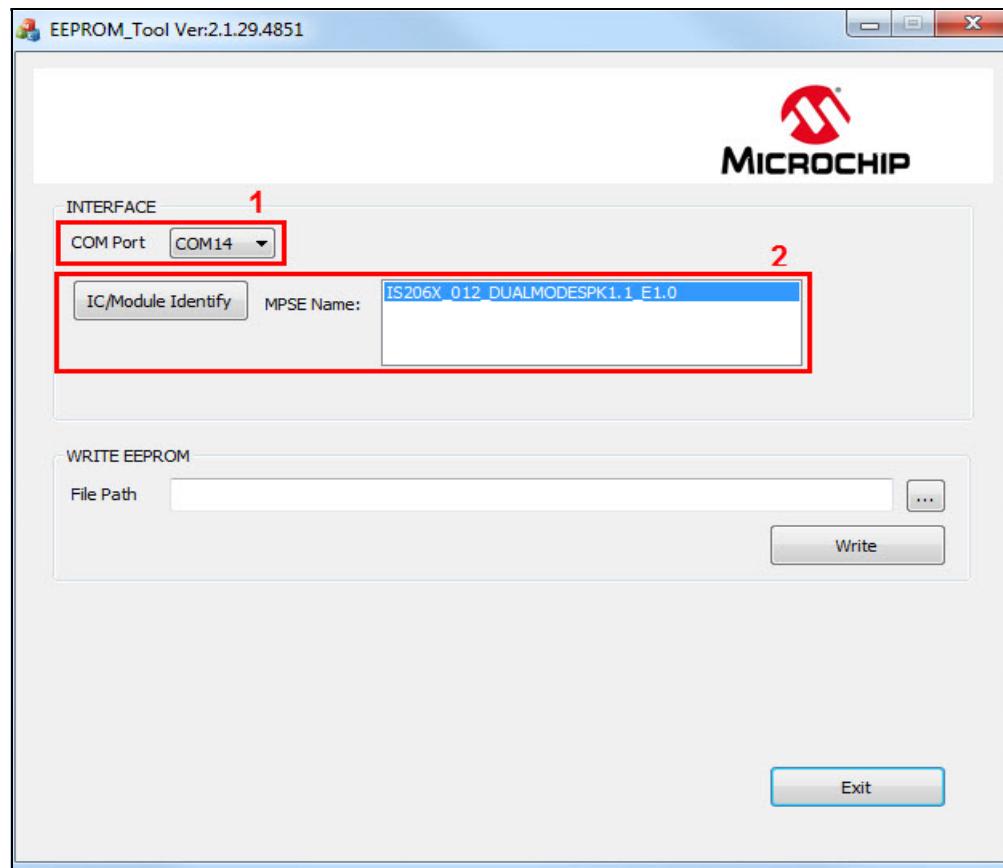
3. Open the EEPROM tool and the tool window will display, see [Figure 3-28](#).

FIGURE 3-28: EEPROM TOOL



4. Specify the **COM** Port and click **IC/Module Identify** as illustrated in [Figure 3-29](#)

FIGURE 3-29: EEPROM TOOL SETTINGS

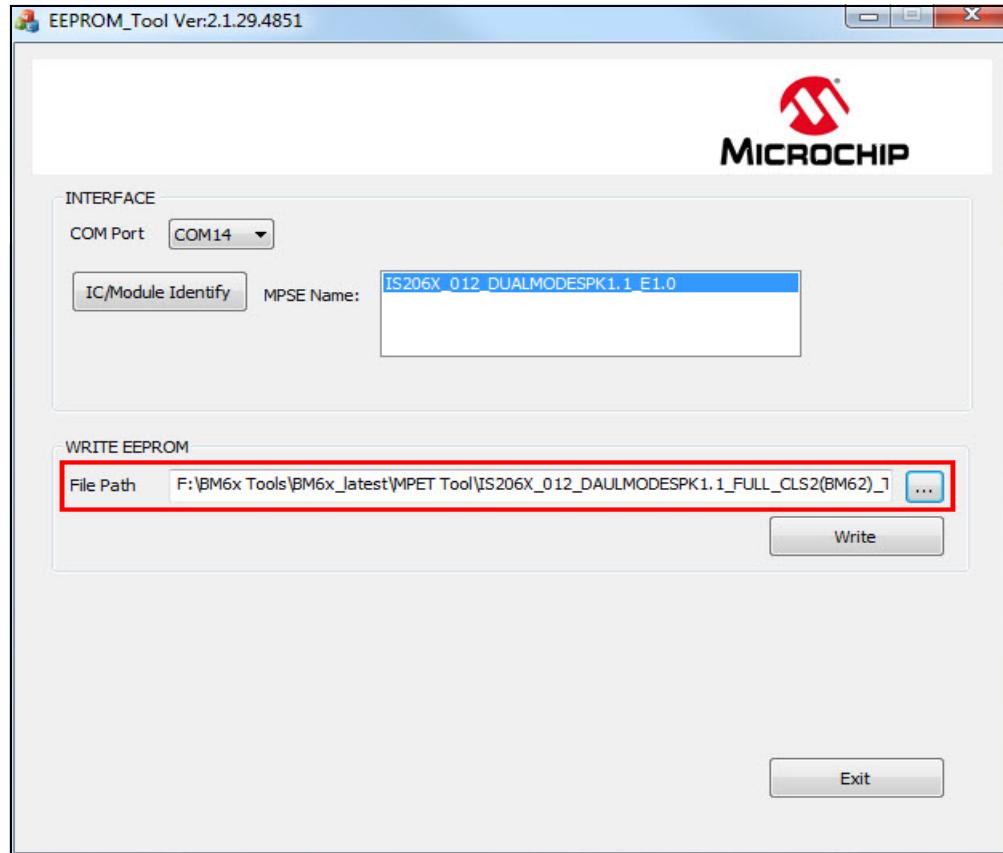


5. Click **Browse** and load the generated patch file (.ipf) to write the EEPROM parameter table on the BM62 EVB ([Figure 3-30](#)).

Note: The patch file (.ipf) is generated using the MPET tool. For information on generating the patch file, refer to [3.4.3 “MPET Tool Configuration”](#).

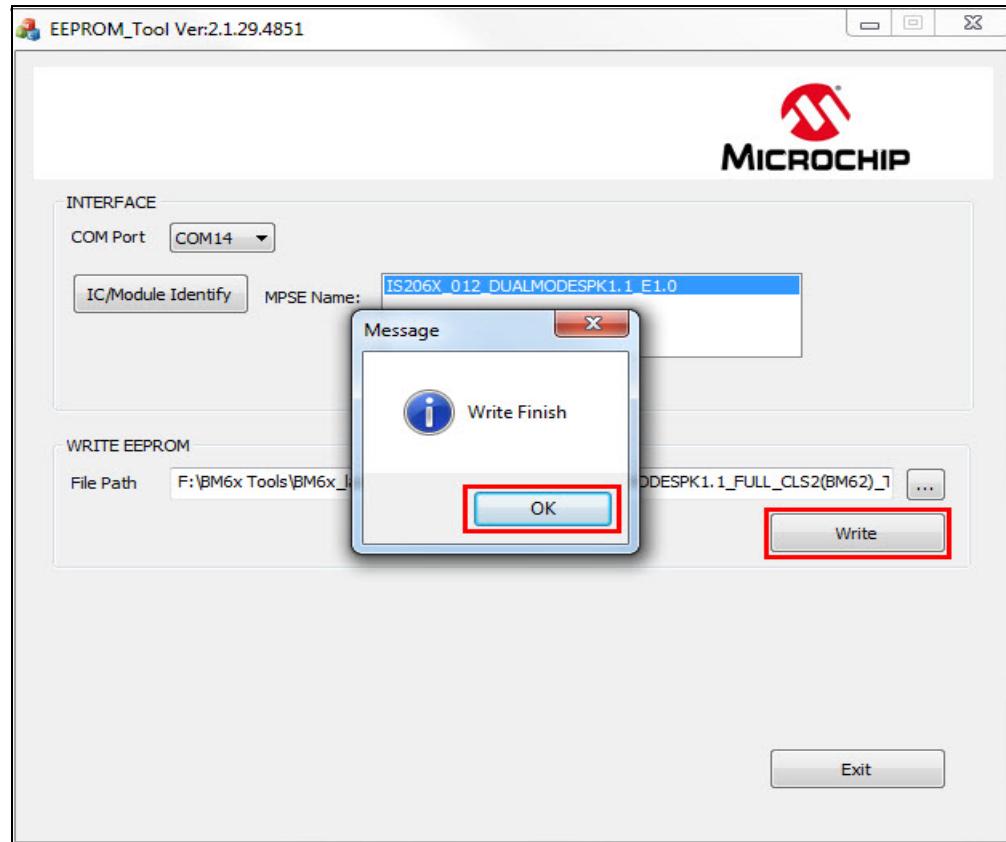
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FIGURE 3-30: LOADING GENERATED PATCH FILE



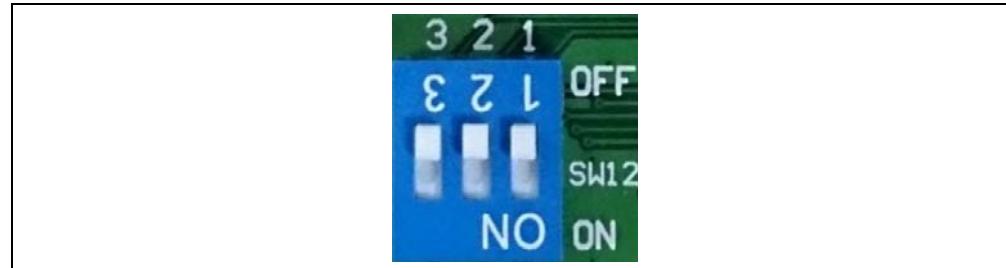
6. Click **Write** to program the EEPROM parameters on the BM62 EVB. After programming the EEPROM parameters, a message is displayed. Click **OK** as illustrated in [Figure 3-31](#).

FIGURE 3-31: WRITE EEPROM



7. Click **Exit** and remove the micro-USB cable. Next set SW12 to Application mode ([Figure 3-32](#)) and reboot.

FIGURE 3-32: SWITCH SW12 IN FLASH APPLICATION MODE



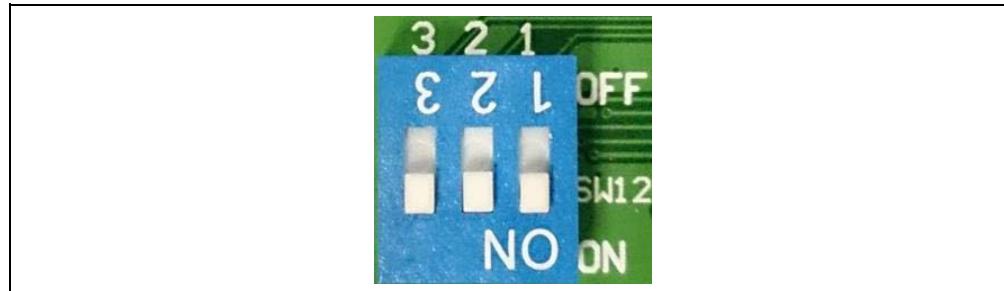
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3.6 UPDATING FLASH CODE

The new or specific version of flash code can be programmed using the Flash Programming tool. To program the flash code, perform the following actions:

1. Set switch SW12 to Write Flash mode ([Figure 3-33](#)).

FIGURE 3-33: SWITCH SW12 IN WRITE FLASH MODE



2. Connect the BM62 EVB to a PC using a micro-USB cable, as illustrated in [Figure 3-34](#). The default LED behavior in Write Flash mode is that LED1 and LED2 (blue and red) will blink. LED3 (green) is on and this is an I/O control LED.

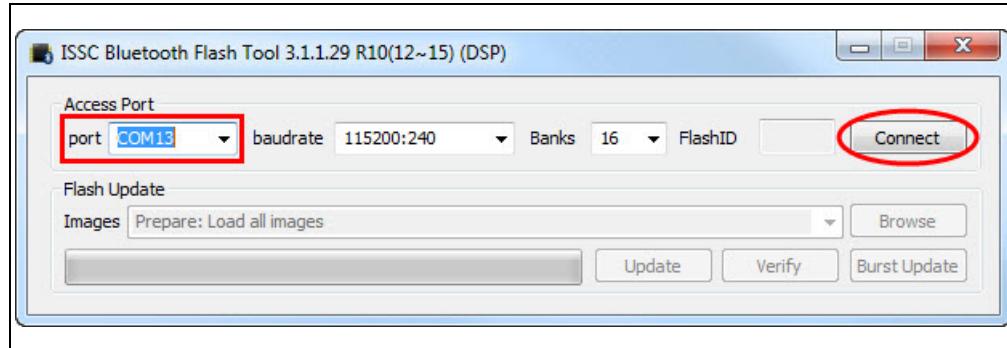
FIGURE 3-34: FLASH CODE SETUP



Note: Download and install the `isbtflash.exe` firmware tool, which is available on the Microchip web site: www.microchip.com/BM62. For this demonstration `DUAL_SPK_FIRMWARE_V1.1` is used.

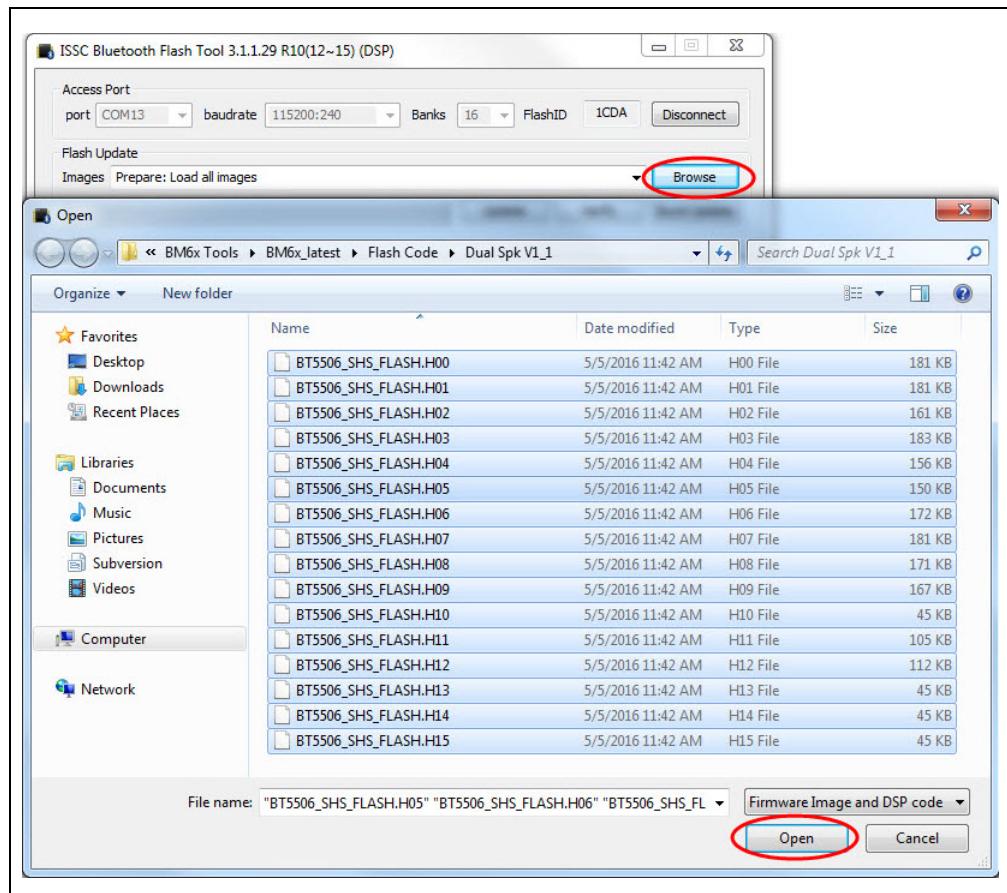
3. Open the `isbtflash.exe` firmware update tool on the PC. Specify the **COM** Port and then click **Connect**, as illustrated in [Figure 3-35](#).

FIGURE 3-35: ISBTFLASH TOOL



- Click **Browse** to select the flash code files (.hex files) downloaded from the Microchip web site (Figure 3-36).

FIGURE 3-36: LOADING FLASH CODE FILES

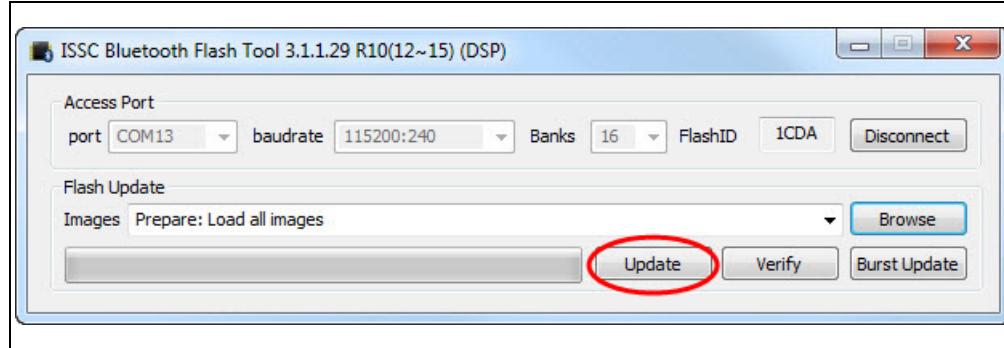


- Click **Update** to write the flash code on the BM62 EVB (Figure 3-37).

Note: Alternately, the user can also click **Burst Update** to write the flash code, which is faster than **Update**.

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FIGURE 3-37: UPDATING FLASH CODE



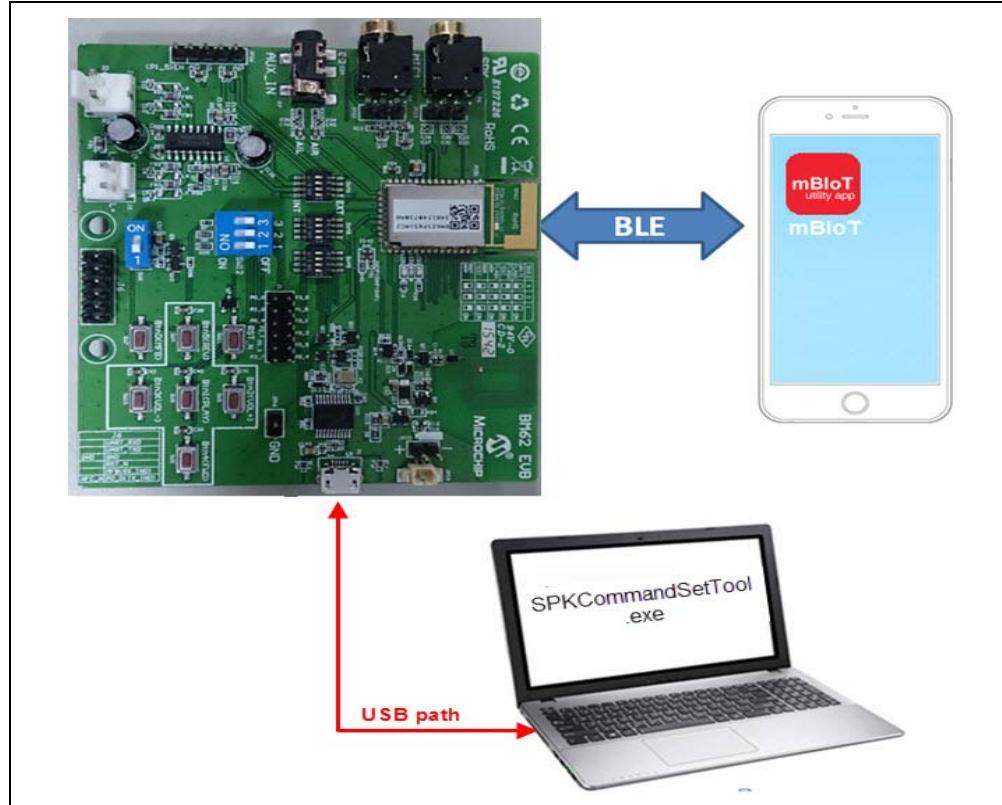
- After the flash code update, click **Disconnect** and remove the micro-USB cable. Then set SW12 to Application mode (Figure 3-32) and reboot.

3.7 BLE DEMONSTRATION

In this demonstration, the user can perform a data transmission between the BM62 EVB and a smartphone. Perform the following steps for demonstration:

- Set switch SW12 to Application mode, see Figure 3-32.
- Connect the BM62 EVB to a PC using micro-USB cable, as illustrated in Figure 3-38.

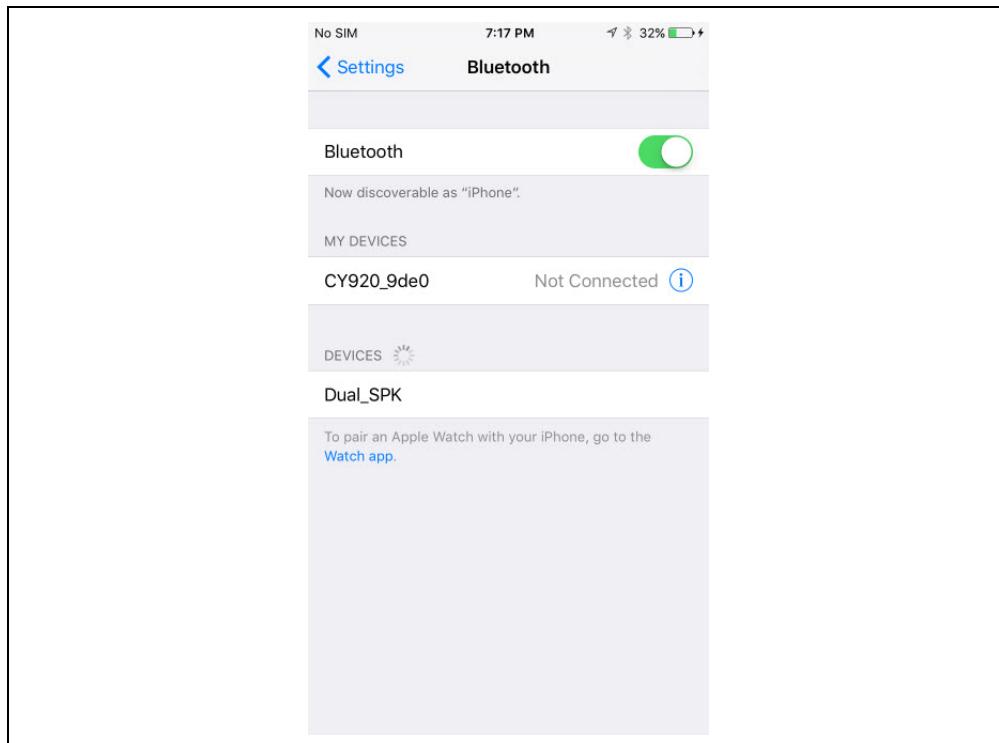
FIGURE 3-38: BLE DEMONSTRATION



- On the BM62 EVB, long press the **MFB** button to turn on the Bluetooth. Both LED1 (blue) and LED2 (red) will blink together. Then, continue to press the **MFB** button (approximately 5 seconds) until both the LEDs blink alternately. This LED behavior indicates that the BM62 EVB is in discoverable mode.

4. Connect the BM62 EVB to a smartphone that supports the BLE Bluetooth profiles.
5. Download and install the mBIoT Utility app available at the Apple Store for iPhone® or at the Google Play Store for Android™. For this demonstration iPhone is used. Users need to enable the Bluetooth settings on the iPhone (Figure 3-39).

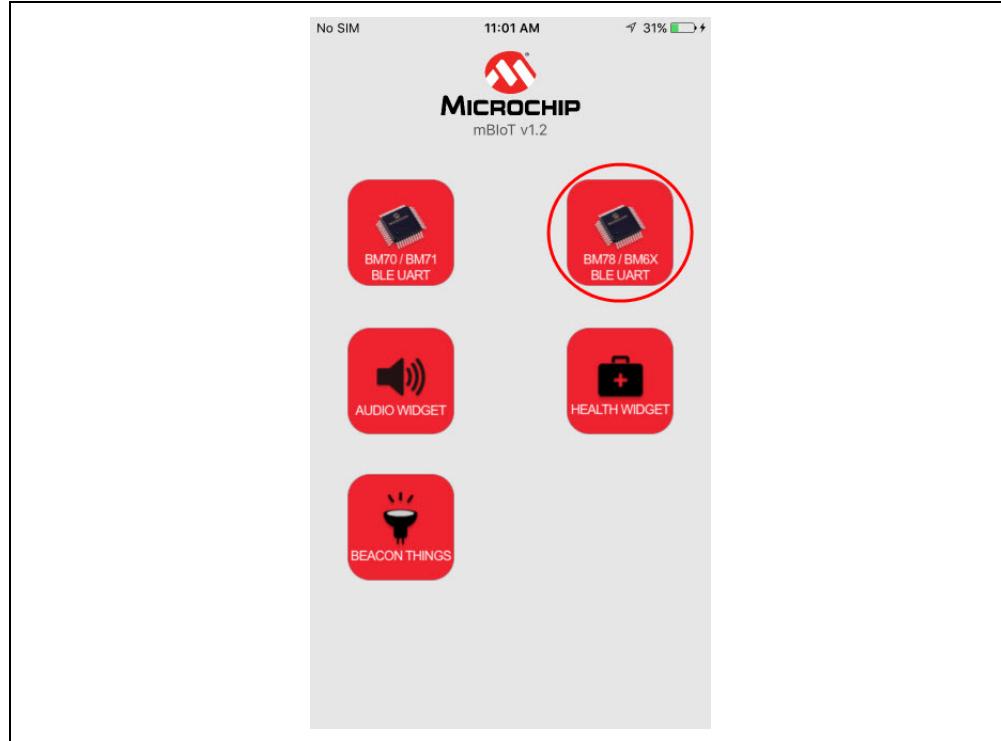
FIGURE 3-39: ENABLE BLUETOOTH ON SMARTPHONE



6. Open the mBIoT app on the smartphone and select **BM78/BM6X BLE UART** (Figure 3-40).

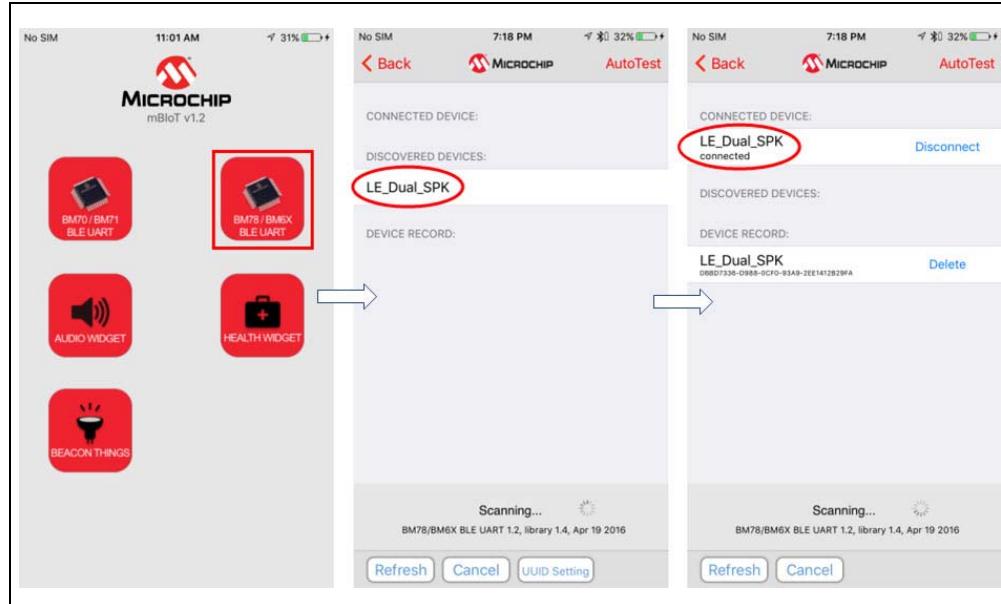
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FIGURE 3-40: SELECT BM78/BM6X BLE UART



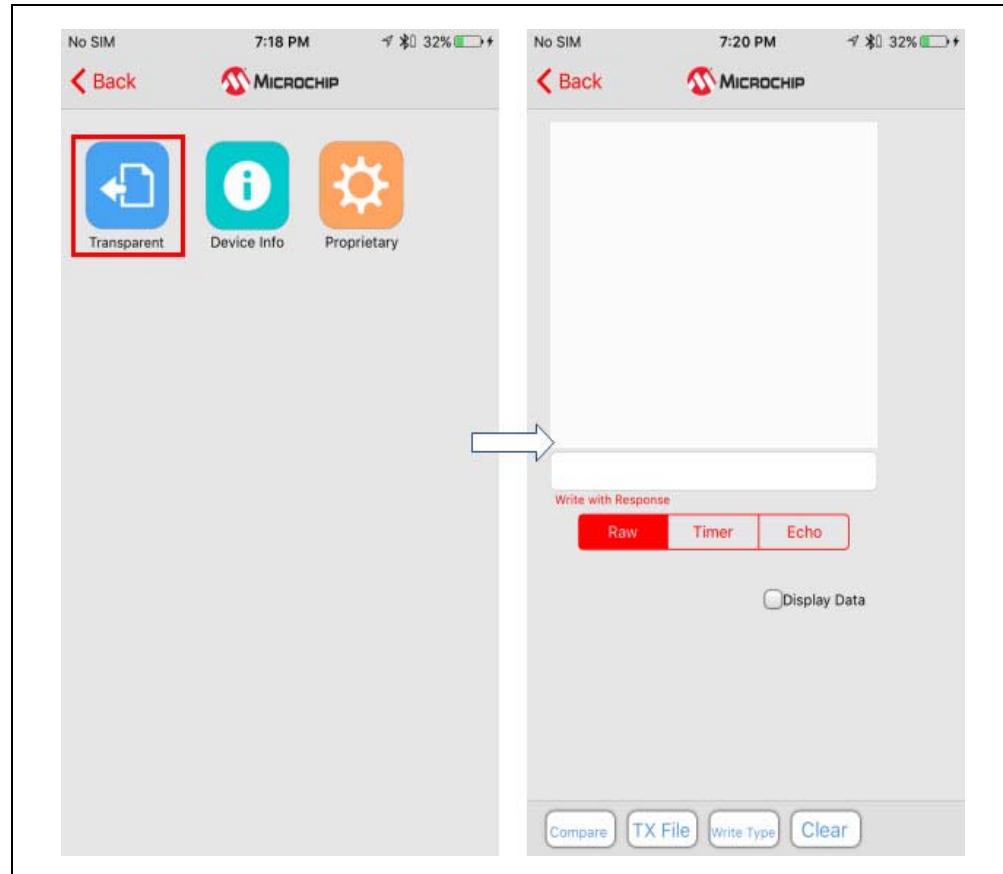
7. The smartphone will display a list of discoverable BLE devices. Click **LE_Dual_SPK** to connect. Under the **Connected Device** tab, click **LE_Dual_SPK connected** (Figure 3-41).

FIGURE 3-41: CONNECT BM78/BM6X BLE UART



8. Click **Transparent** and then select “Display Data” to enter message for transmission, see [Figure 3-42](#).

FIGURE 3-42: TRANSPARENT PAGE

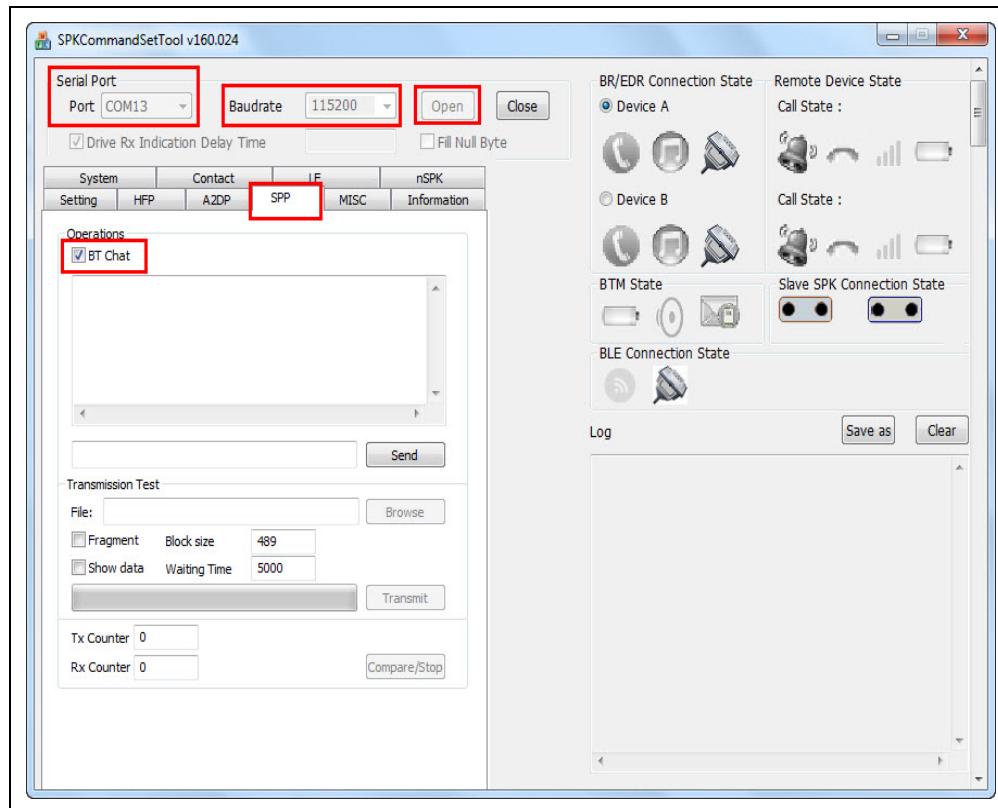


Note: Download and install the SPKCommandSetTool.exe file, which is available on the Microchip web site: www.microchip.com/BM62.

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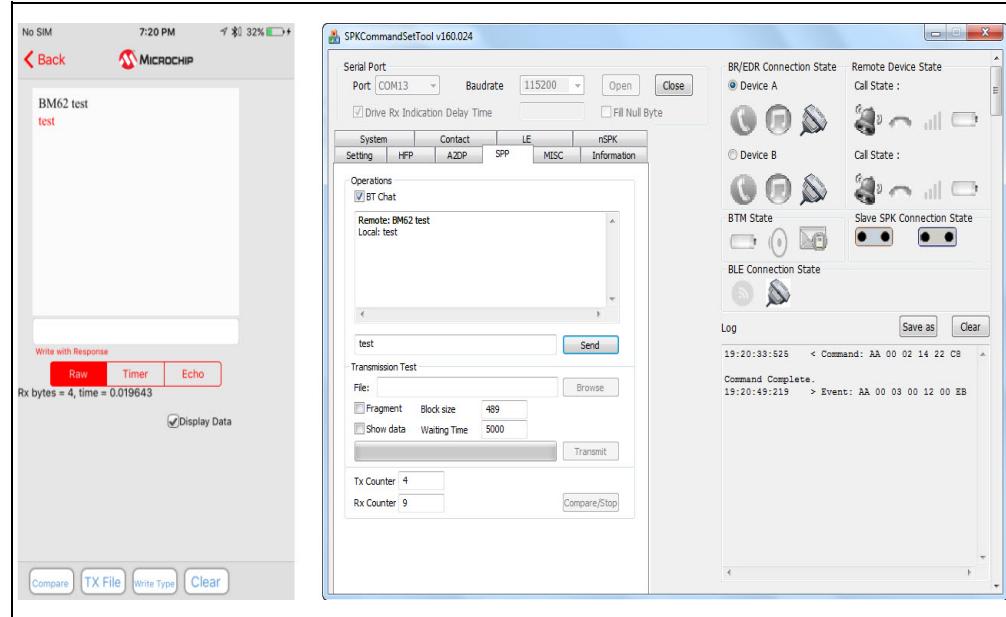
9. Open the SPKCommandSetTool.exe program on a PC to emulate the MCU and a window is displayed ([Figure 3-43](#)).
10. Specify the **COM Port**, and then click **Open**.
11. Click the **SPP** tab.
12. Select “BT Chat” check box to send or receive messages.

FIGURE 3-43: SPKCOMMANDSET TOOL



13. Figure 3-44 illustrates the data transmission between the mBIoT app and the SPKCommandSetTool.

FIGURE 3-44: DATA TRANSMISSION



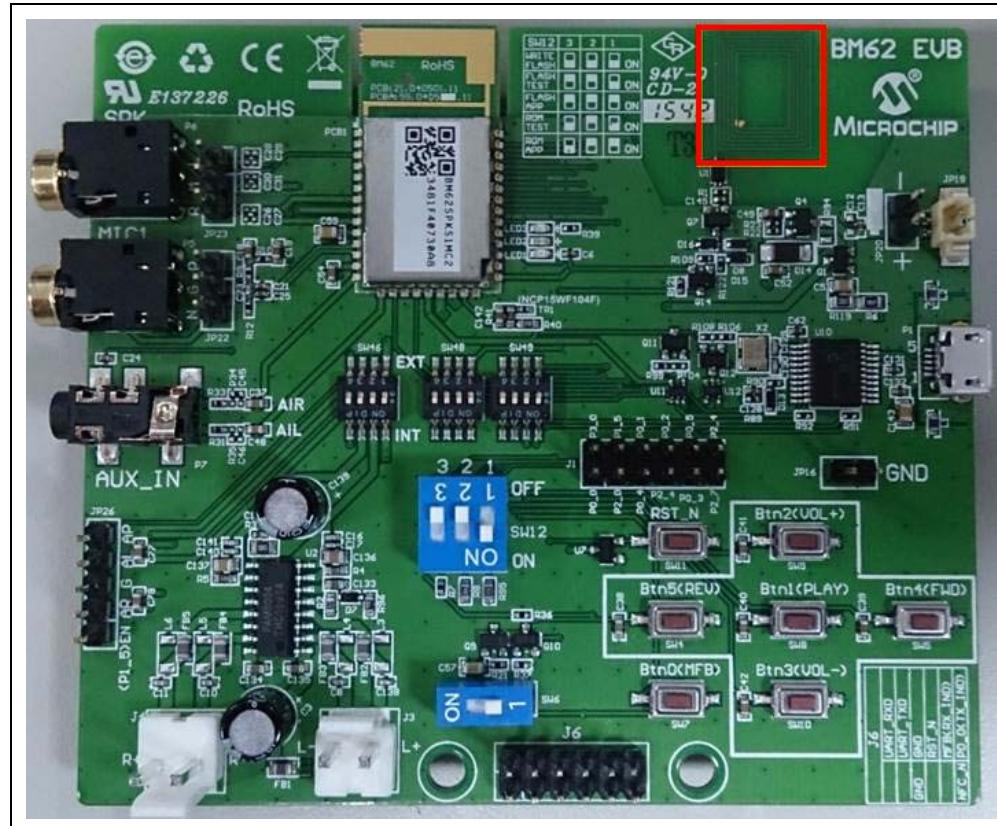
Note: It is not necessary to use same device for A2DP streaming and BLE connection.

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3.8 NFC DEMONSTRATION

In BM62 EVB, the NFC trigger circuit is connected to the BM62 module. A smartphone with built-in NFC is used to trigger the NFC function of the BM62 EVB. [Figure 3-45](#) illustrates the NFC antenna on the BM62 EVB.

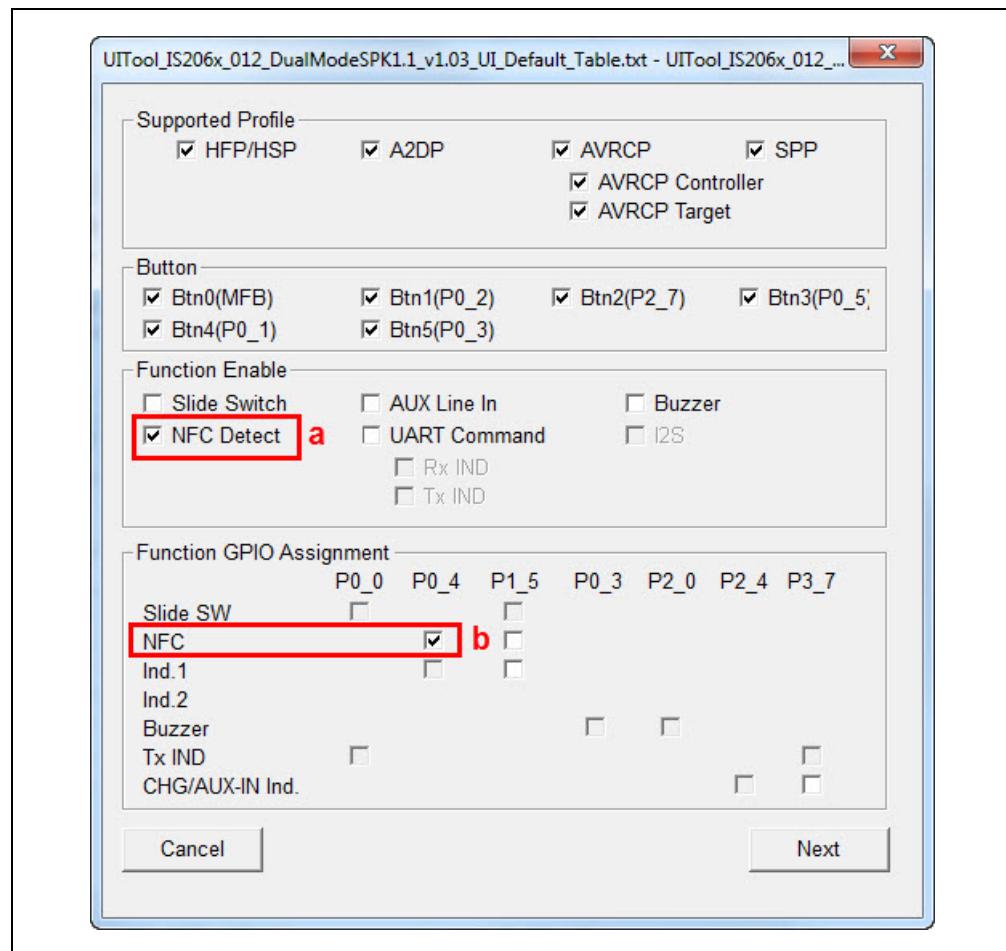
FIGURE 3-45: NFC DEMONSTRATION



The user must configure the UI tool and provide power supply to the BAT_IN pin for the NFC to function. Perform the following actions to configure the UI tool:

1. In the UI tool, set the following parameters, as illustrated in [Figure 3-46](#).
 - a) Select the “NFC Detect” check box, which allows the module to enable the NFC antenna on the BM62 EVB.
 - b) Select the “NFC” check box to assign the GPIO pin to the module.

FIGURE 3-46: ENABLE NFC



Note: For more details on the UI tool parameter settings, refer to [3.4.1 “UI Tool Configuration”](#).

2. The smartphone which has the built-in NFC must be brought closer to the antenna to trigger NFC function on the BM62 EVB.

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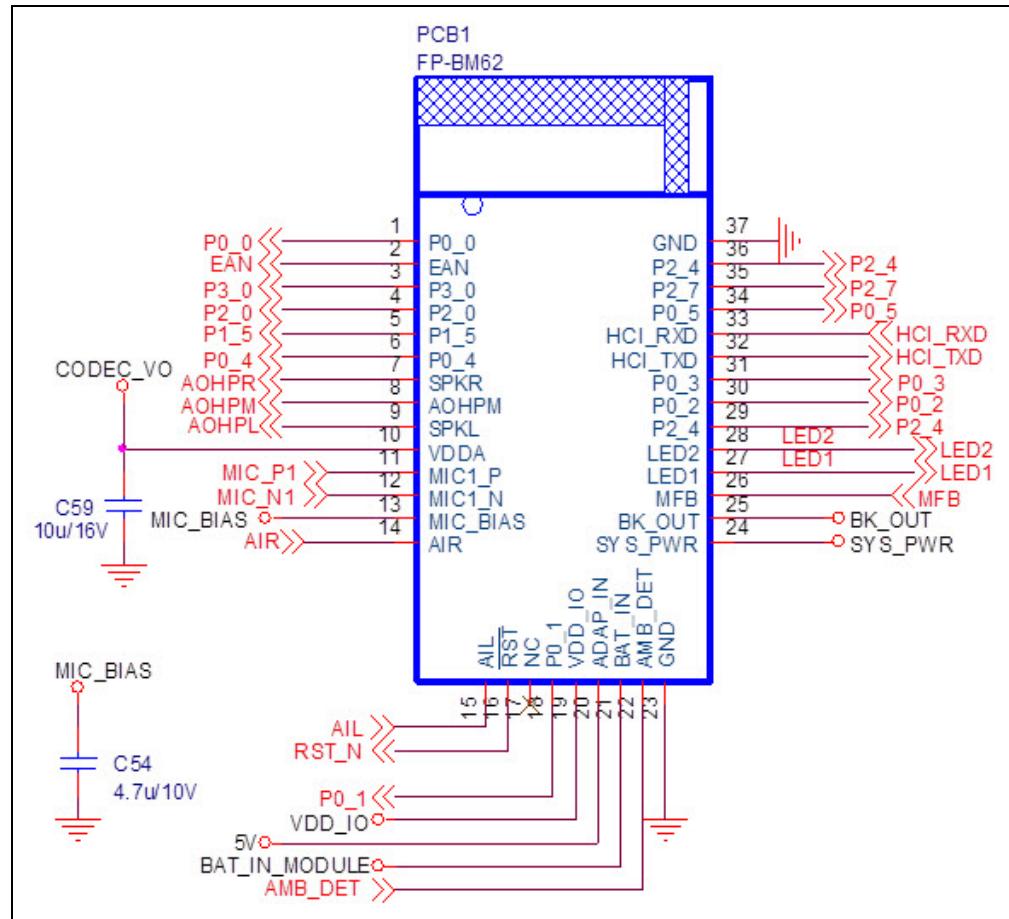
NOTES:



Appendix A. Schematics

A.1 REFERENCE SCHEMATICS

FIGURE A-1: BM62 EVB SCHEMATICS



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FIGURE A-2: INPUT/OUTPUT TEST

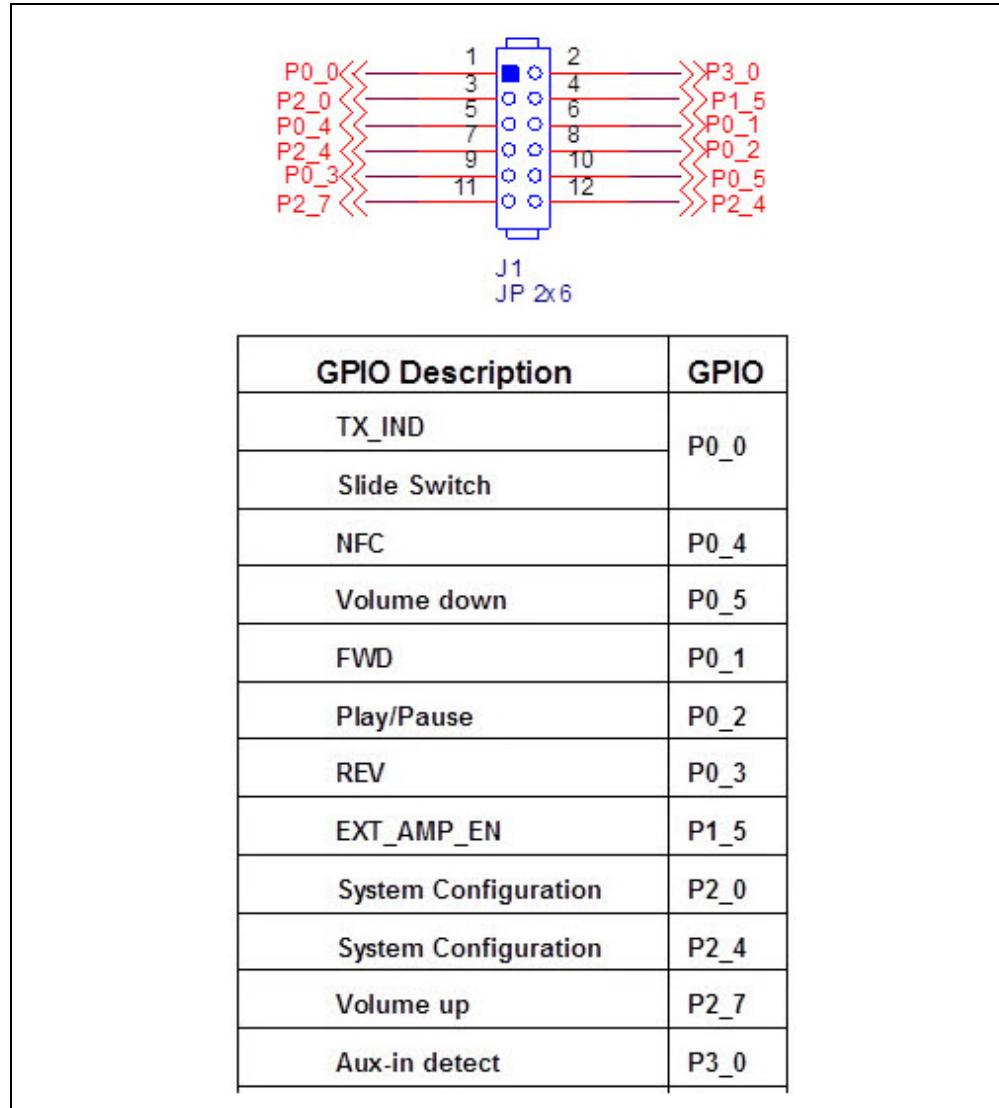


FIGURE A-3: STATUS LEDS

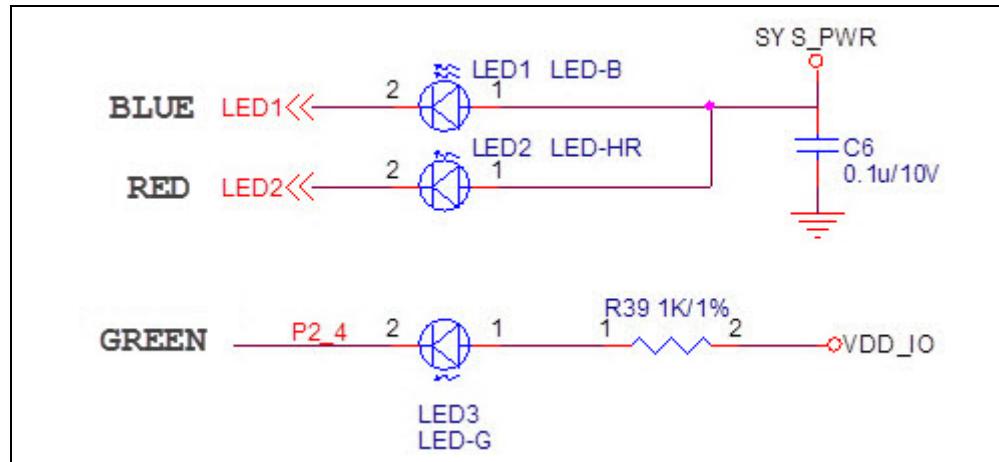
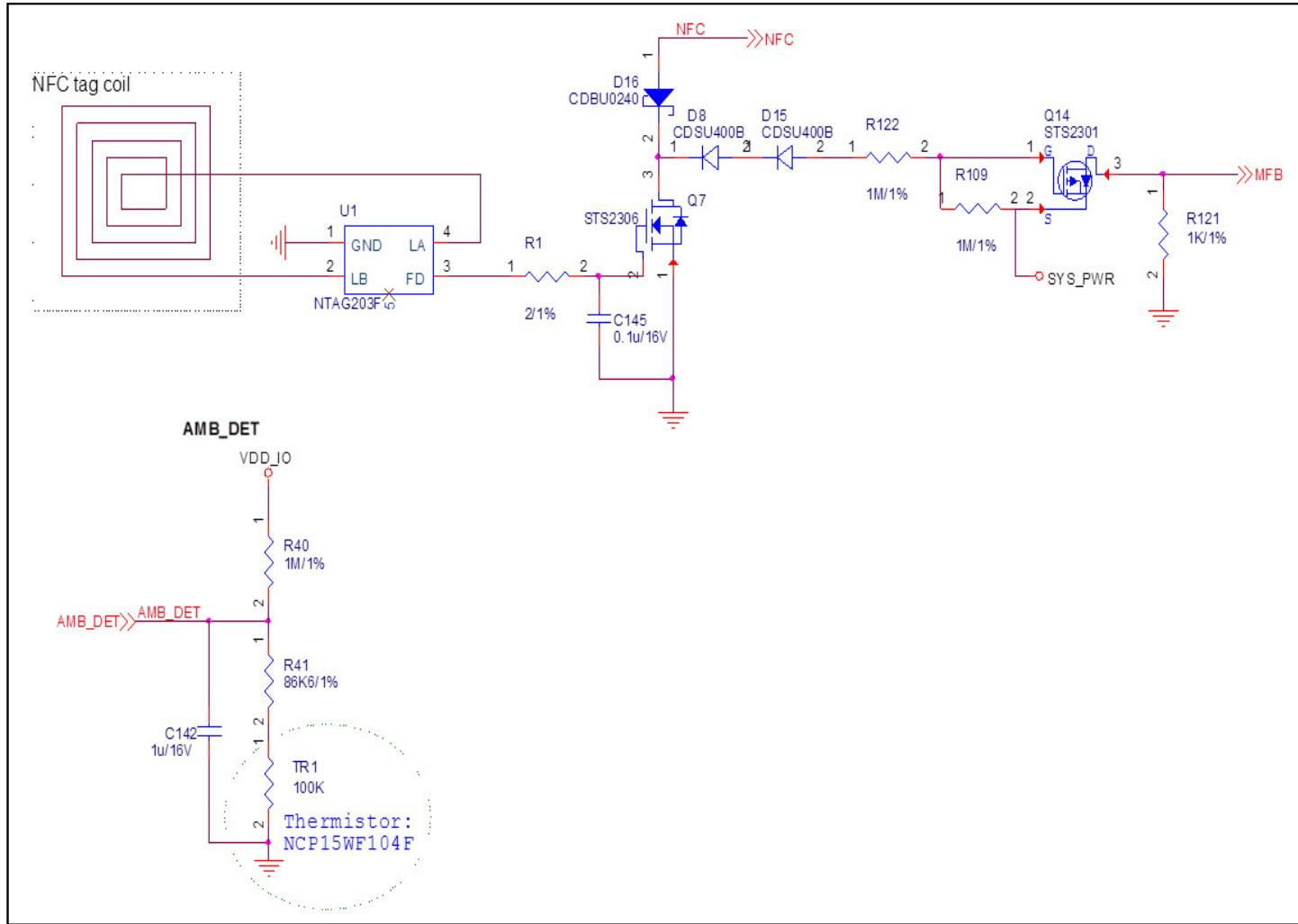


FIGURE A-4: NFC TAG CIRCUIT



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FIGURE A-5: POWER SUPPLY

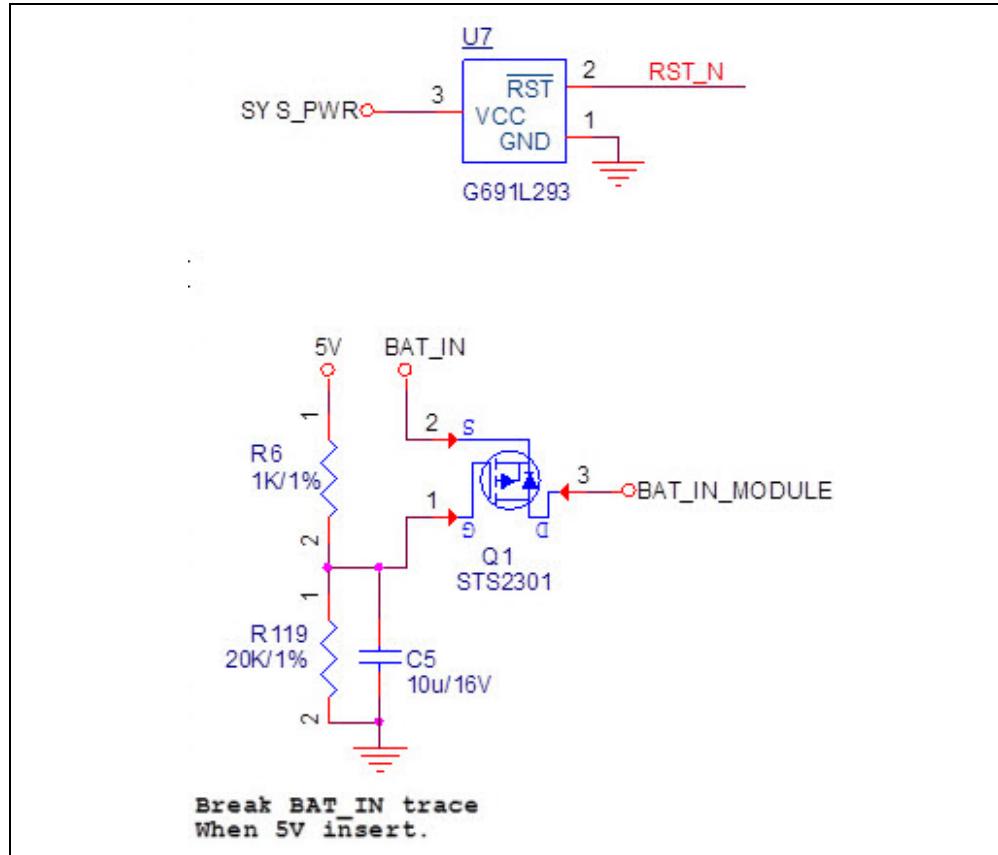


FIGURE A-6: EXTERNAL MCU INTERFACE

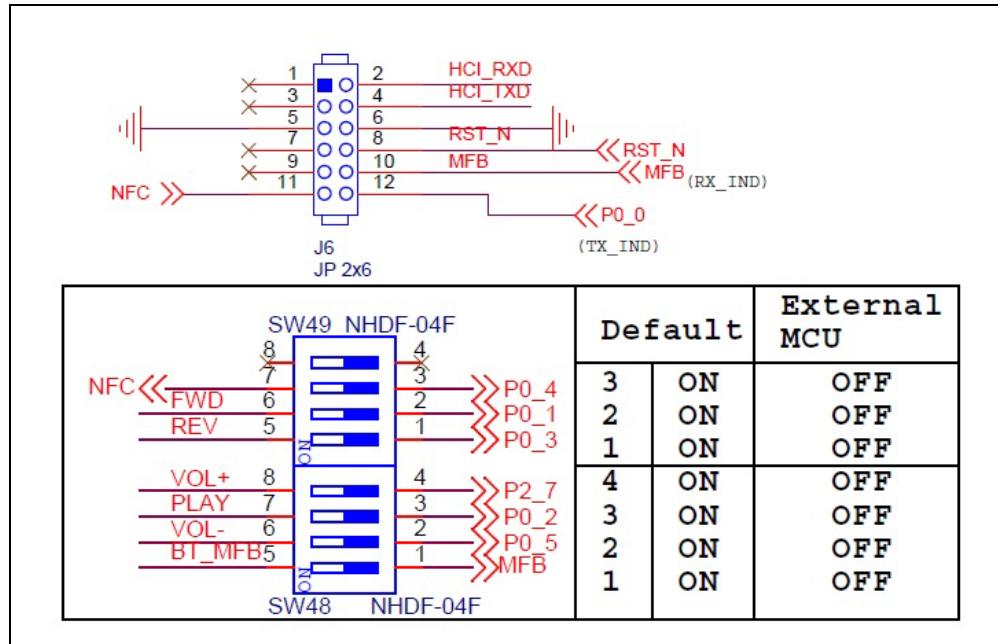
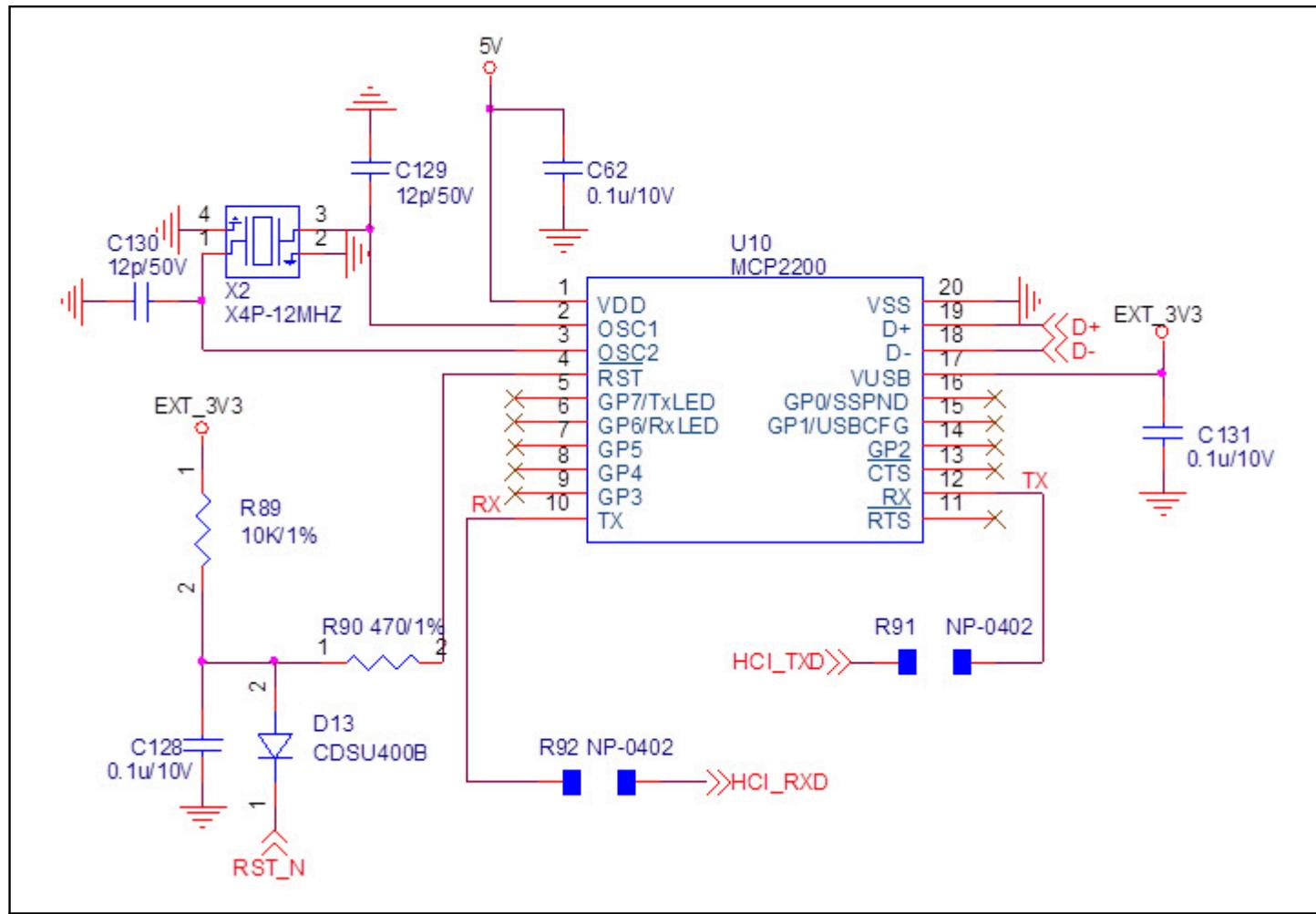


FIGURE A-7: USB TO UART INTERFACE

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FIGURE A-8: UART INTERFACE

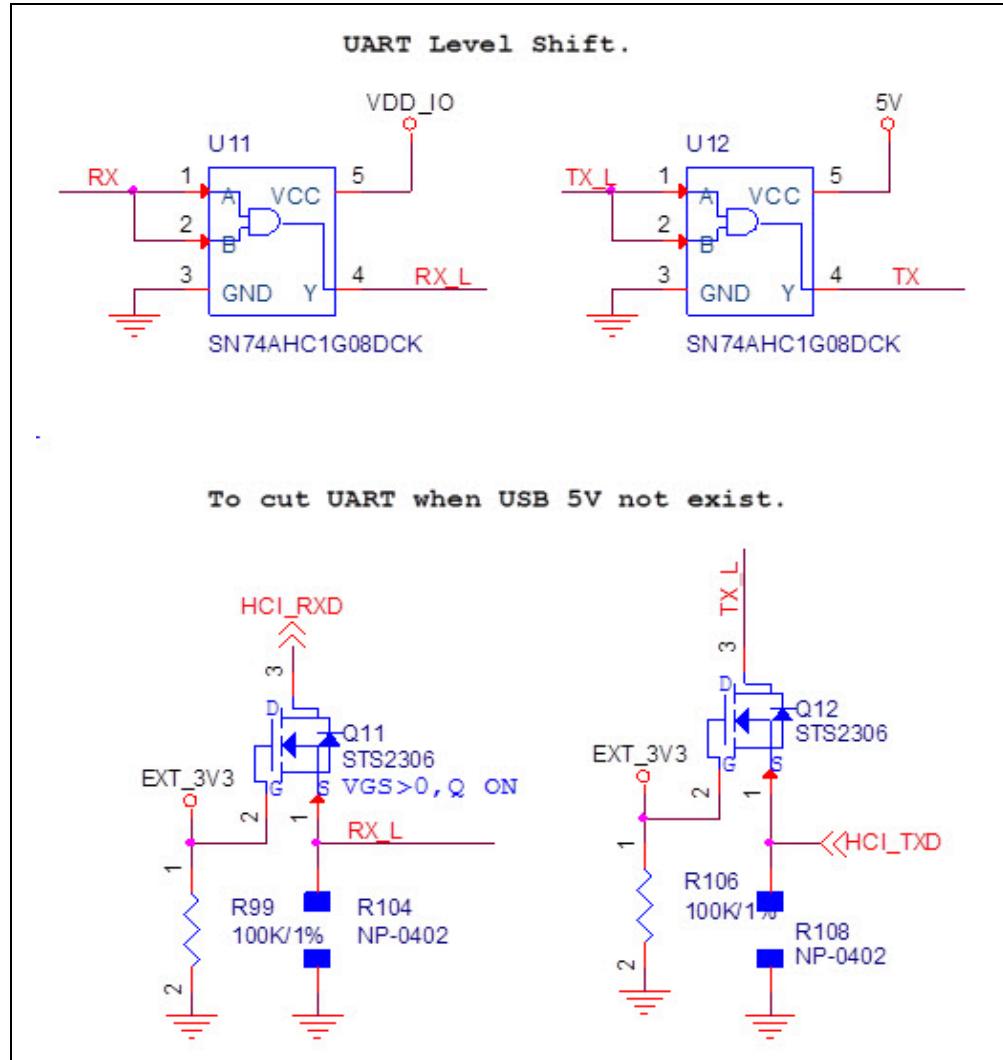


FIGURE A-9: SWITCH SW12 CONFIGURATION

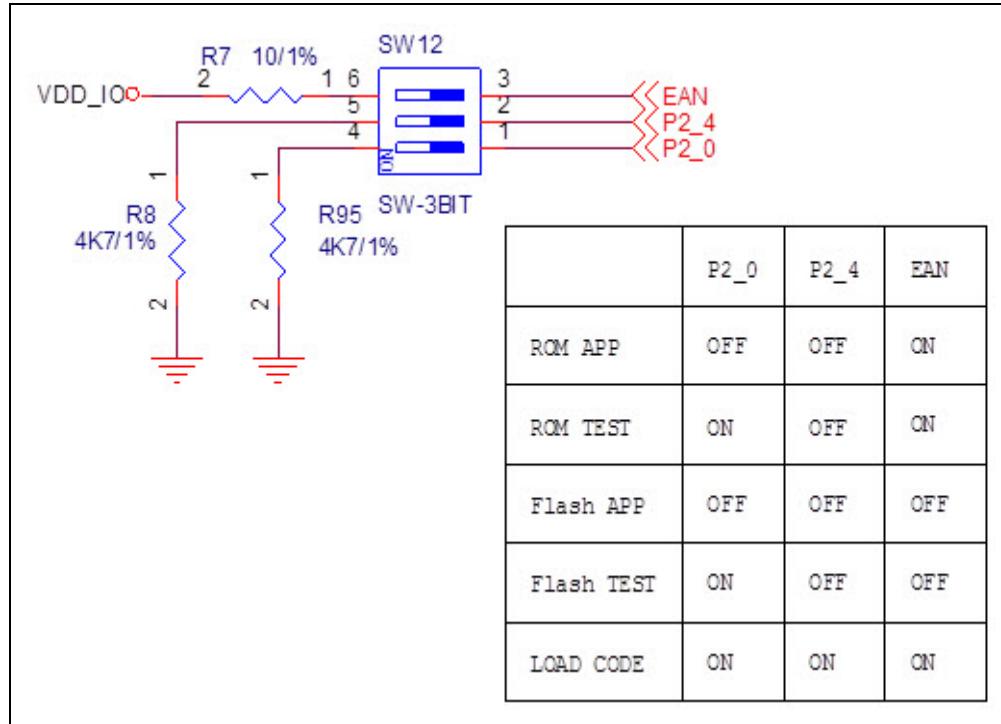


FIGURE A-10: POWER SOURCE

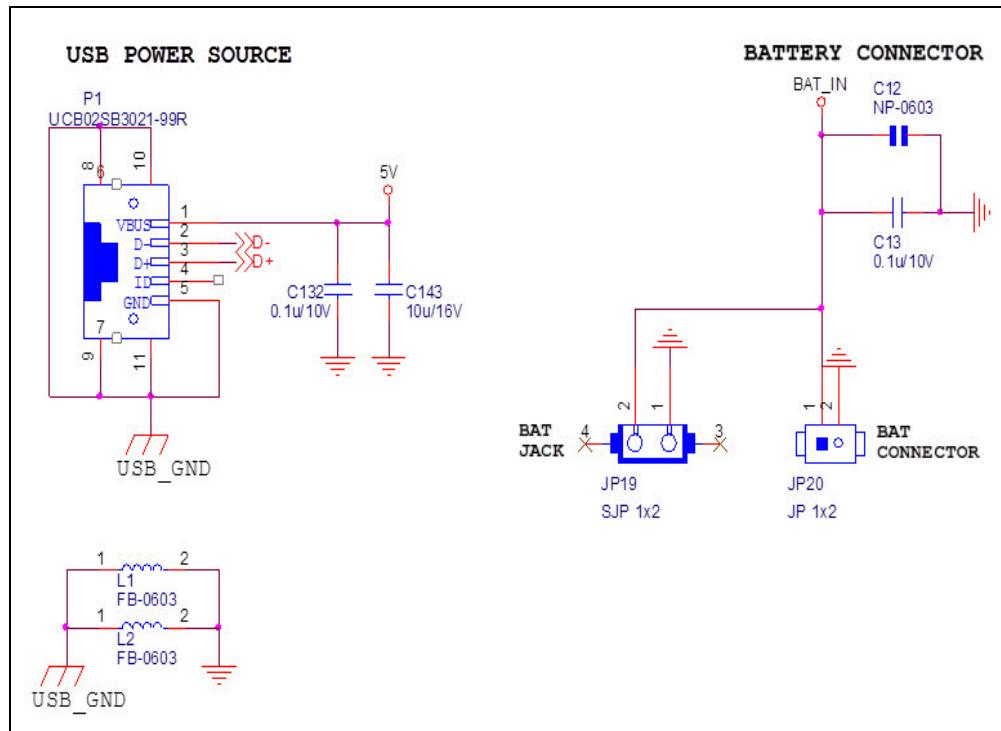


FIGURE A-11: AUDIO TEST INTERFACE

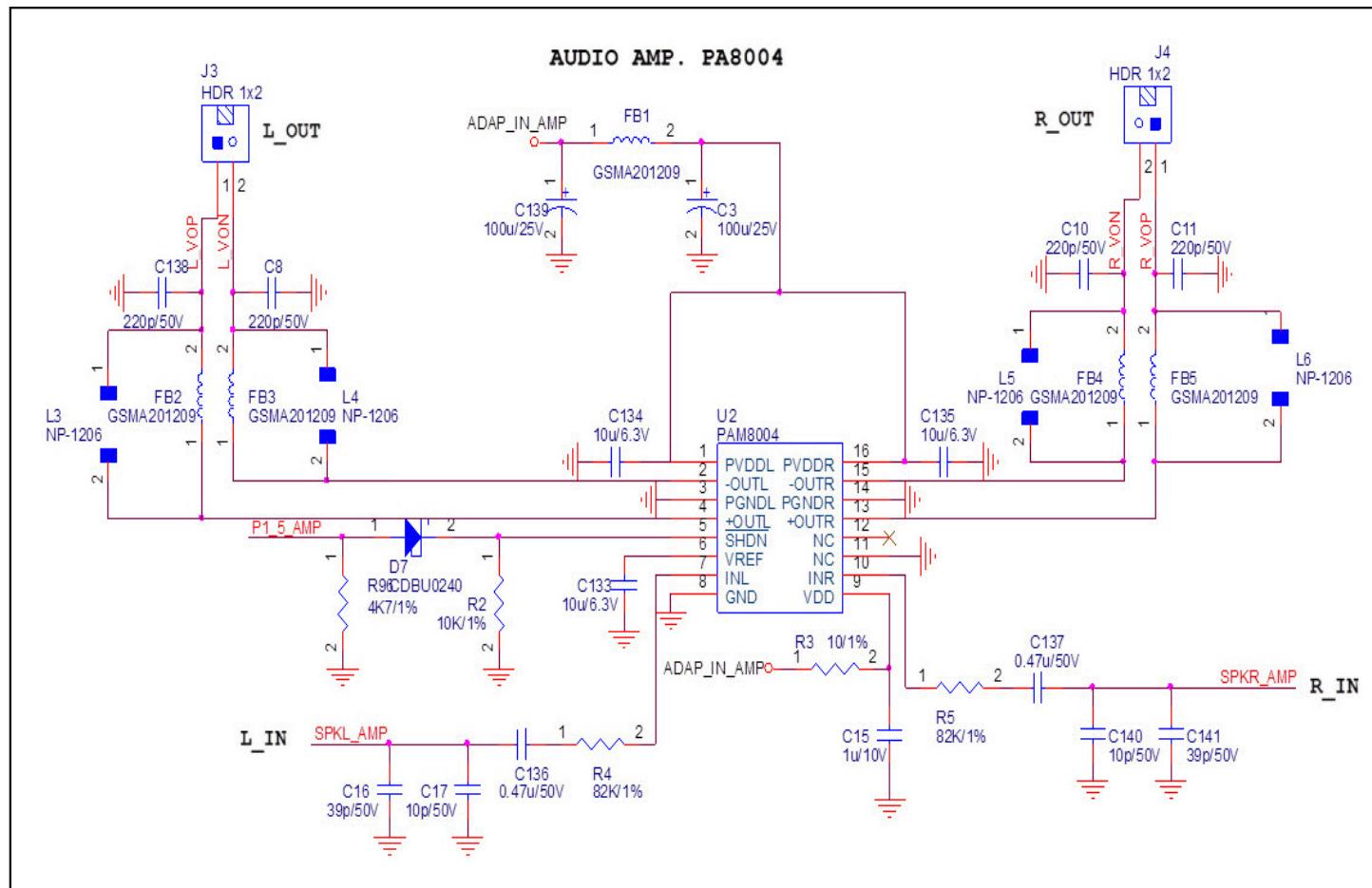
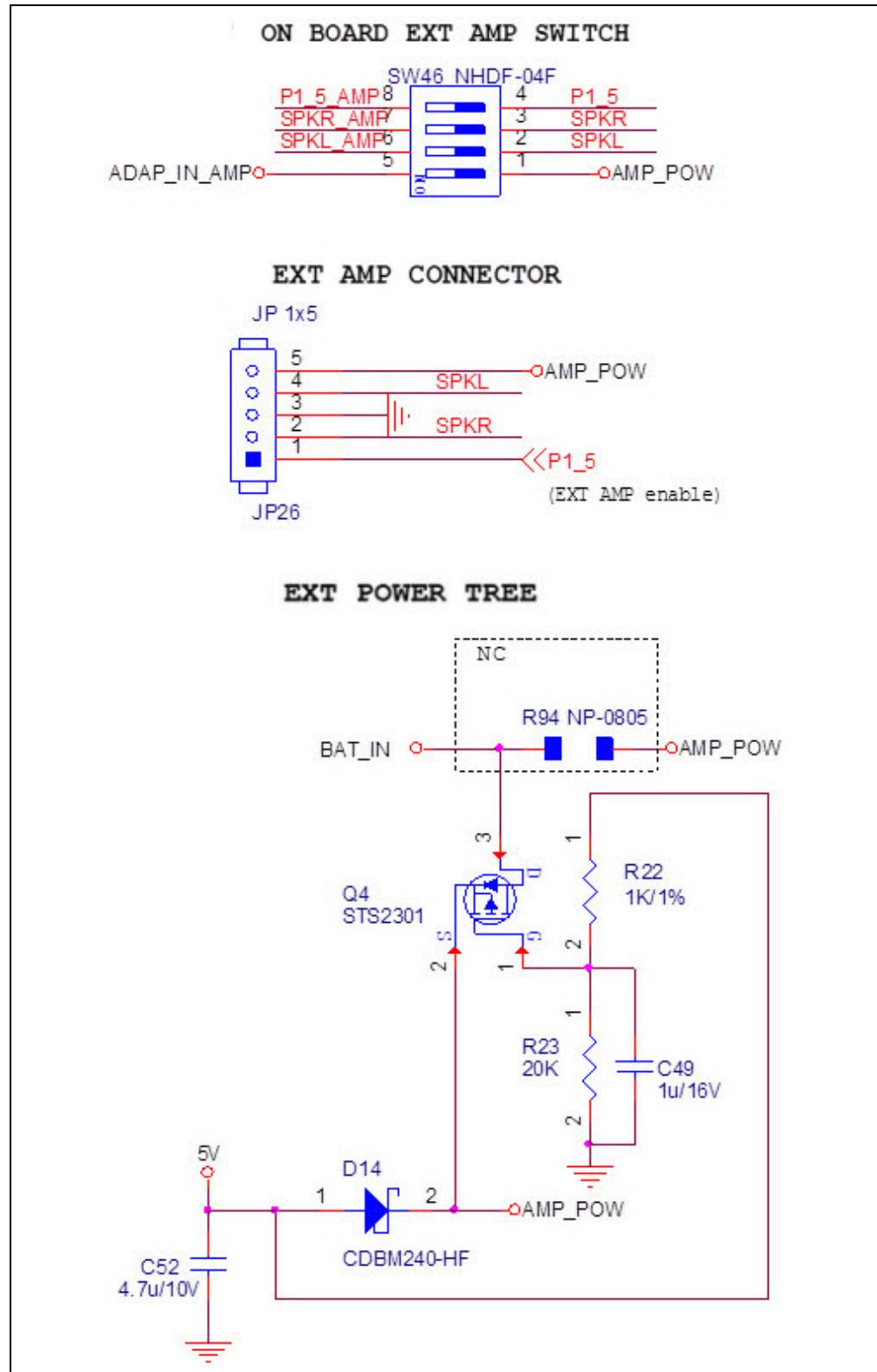


FIGURE A-12: EXTERNAL AMPLIFIER SWITCH AND CONNECTOR



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FIGURE A-13: SPEAKER

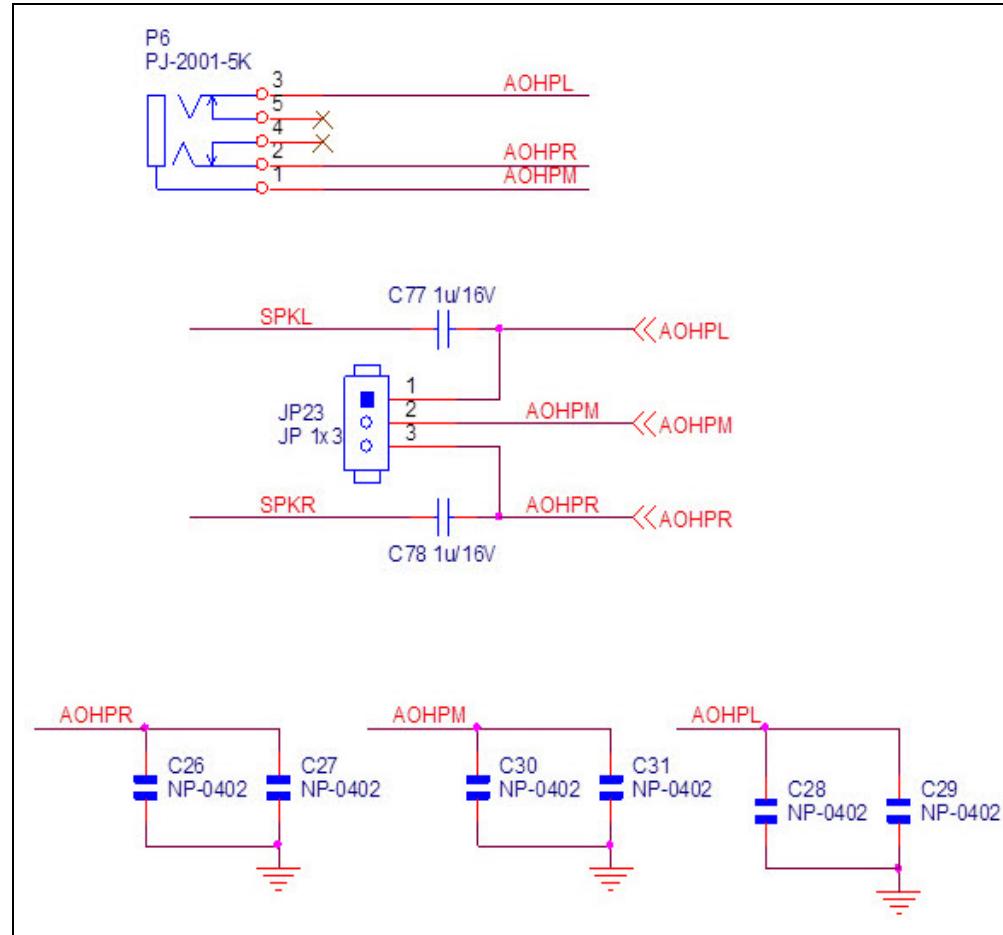


FIGURE A-14: MICROPHONE

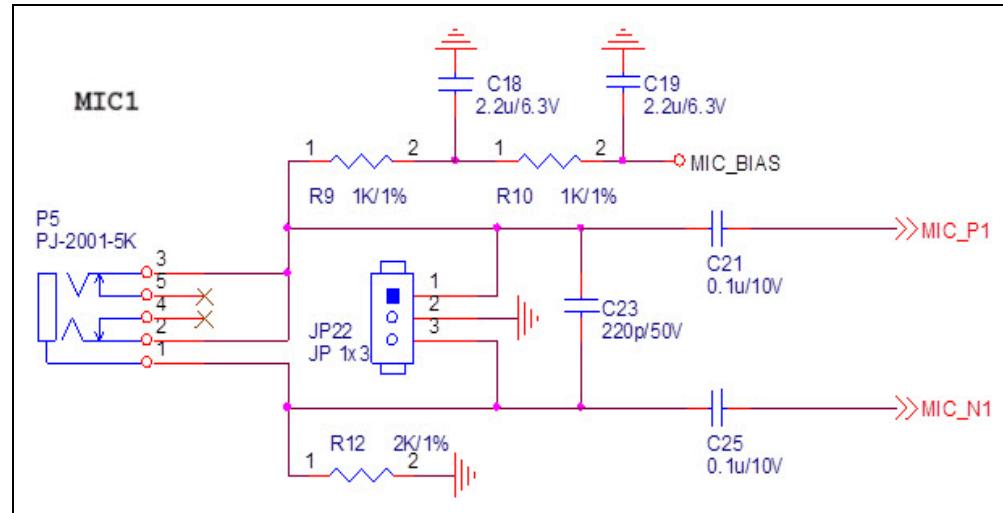


FIGURE A-15: AUXILIARY INPUT

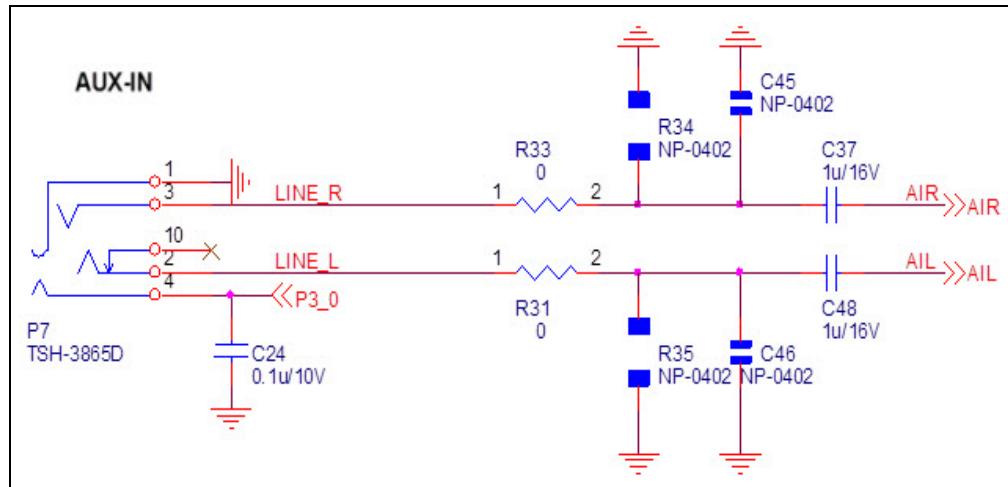
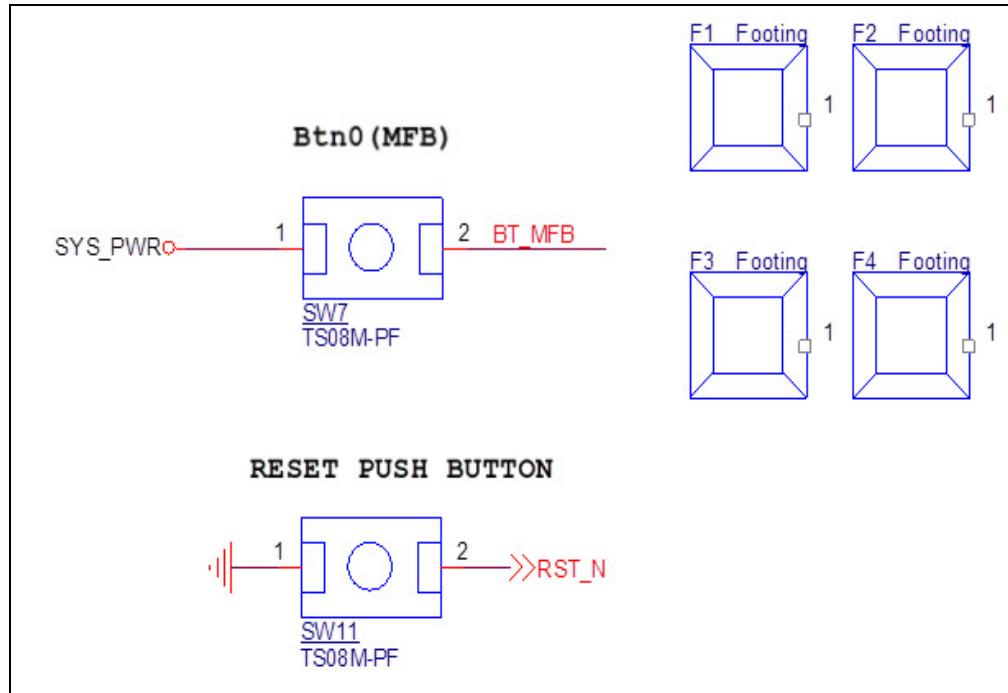


FIGURE A-16: MFB AND RESET PUSH BUTTON



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FIGURE A-17: MUSIC CONTROL PUSH BUTTONS

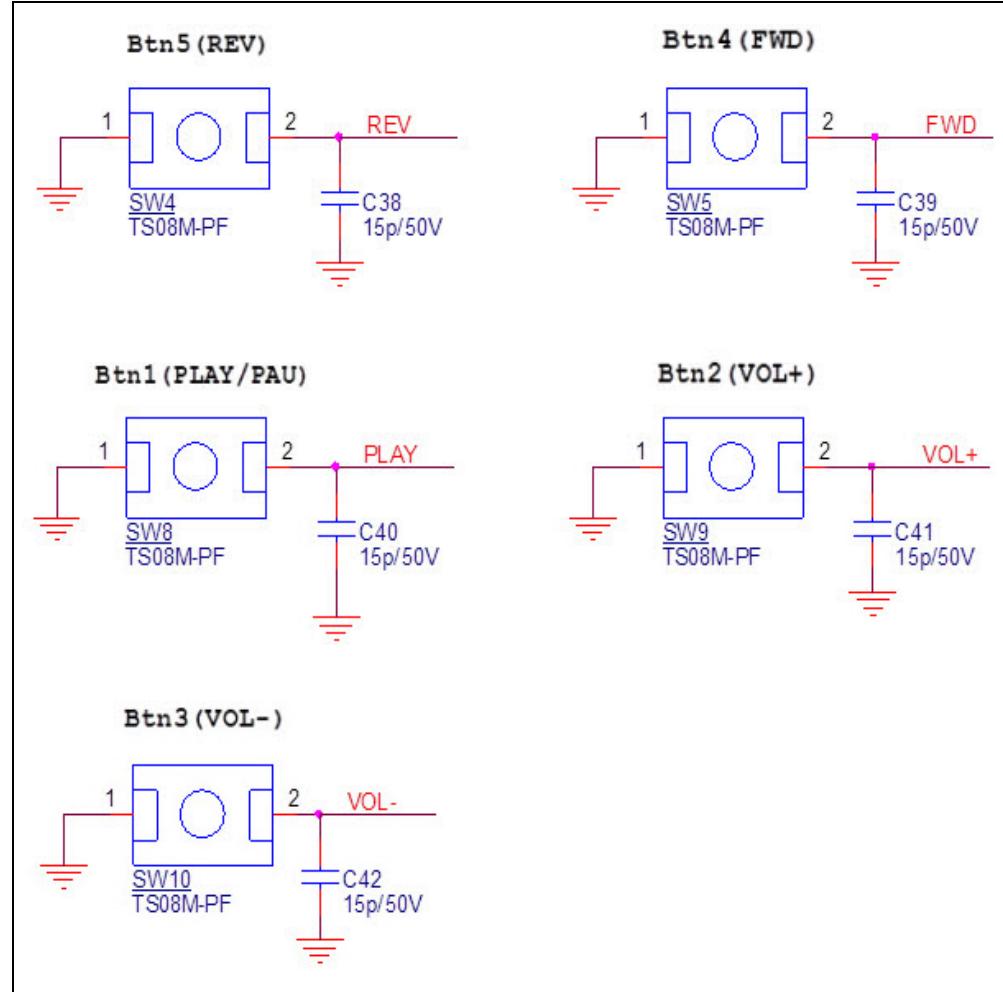
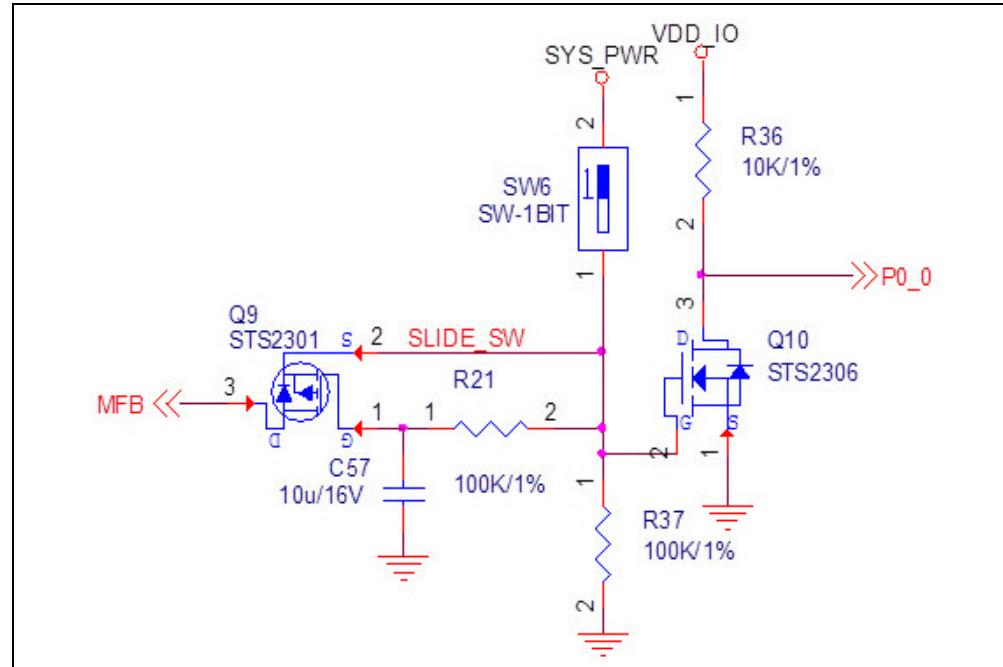


FIGURE A-18: SLIDE SWITCH



NOTES:



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