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KIT34825EPEVME Evaluation Board

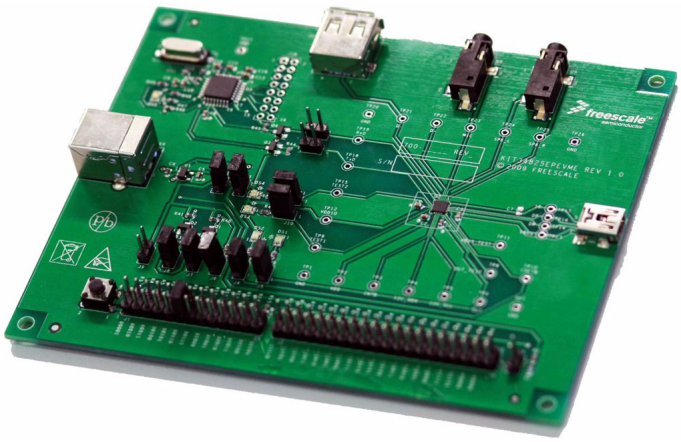

Figure 1. KIT34825EPEVME Evaluation Board

Table of Contents

1 Kit Contents / Packing List

- KIT34825EPEVME Evaluation Board (1)
- Standard USB A-to-B cable (1)
- CD34825 (1)

2 Important Notice

Freescale provides the enclosed product(s) under the following conditions:

This evaluation kit is intended for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY. It is provided as a sample IC pre-soldered to a printed circuit board to make it easier to access inputs, outputs, and supply terminals. This EVB may be used with any development system or other source of I/O signals by simply connecting it to the host MCU or computer board via off-the-shelf cables. This EVB is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application will be heavily dependent on proper printed circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.

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3 Introduction

This KIT34825EPEVME evaluation kit is for demonstrating the capability and features of the 34825 and is aimed to make it easy for users to evaluate the performance of the 34825. The KIT34825EPEVME evaluation kit contains an 34825 evaluation board, a graphic user interface (GUI) software for personal computers (PC), and connection cables.

The 34825 is designed to support the Universal Charging Solution (UCS) recommended by the OMTP (Open Mobile Terminal Platform) as well as to use the same 5-pin micro or mini-USB connector for other wired accessories. A typical application circuit is shown in **Figure 2**. The 34825 offers five pins (VBUS, ID, DP, DM, and GND) to directly interface to the mini or micro-USB connector. Accessories are connected to the evaluation kit (which simulates a cell phone system) through the mini-USB connector. The 34825 also offers pins to interface to the USB, audio, UART, the I2C bus, and the interrupt ($\overline{INT}$) signals of the baseband in the cell phone system. All these signals are simulated by the evaluation kit so users do not need to generate them.

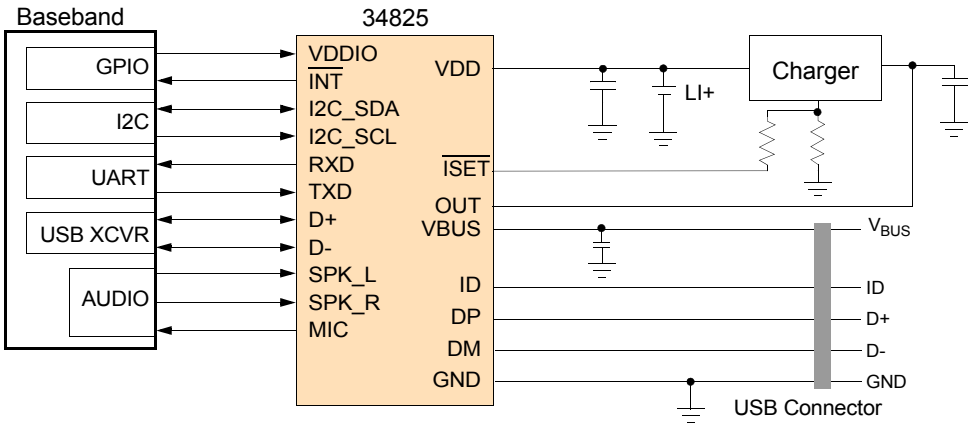

Figure 2. The Typical Application Circuit of 34825

The evaluation kit is designed to work together with a PC running Microsoft Windows for easy demonstration or evaluation. All baseband signals in **Figure 2** are generated by the evaluation kit with the help from the PC, so the user does not need to provide special equipment. The 34825 evaluation board contains an MCU block to generate the I2C signals to control the 34825 and to receive the interrupt signal from the 34825 using a GPIO pin. The MCU block is controlled by the PC with the GUI via a USB connection. The PC together with the MCU block simulates the host device of the I2C bus and the interrupt interface of the baseband circuit in a cell phone system. The evaluation kit uses the PC to obtain the audio signals and a USB flash memory device to generate the D+ and D- signals. The UART signals can be obtained from the MCU block but is not enabled in this version of the MCU firmware.

The evaluation board offers other features for the simplification of the evaluation. A remote control simulator is offered for simulation the remote control buttons. An accessory simulator allows users to simulate the attachment or detachment of accessories without connecting a real accessory to the mini-USB connector. LEDs are used to indicate two logic outputs. Jumpers are offered for configuration of the evaluation board. The evaluation board offers all test points needed for evaluation of the 34825 or directly connecting the IC to a real cell phone printed circuit board (PCB) with jumping wires.

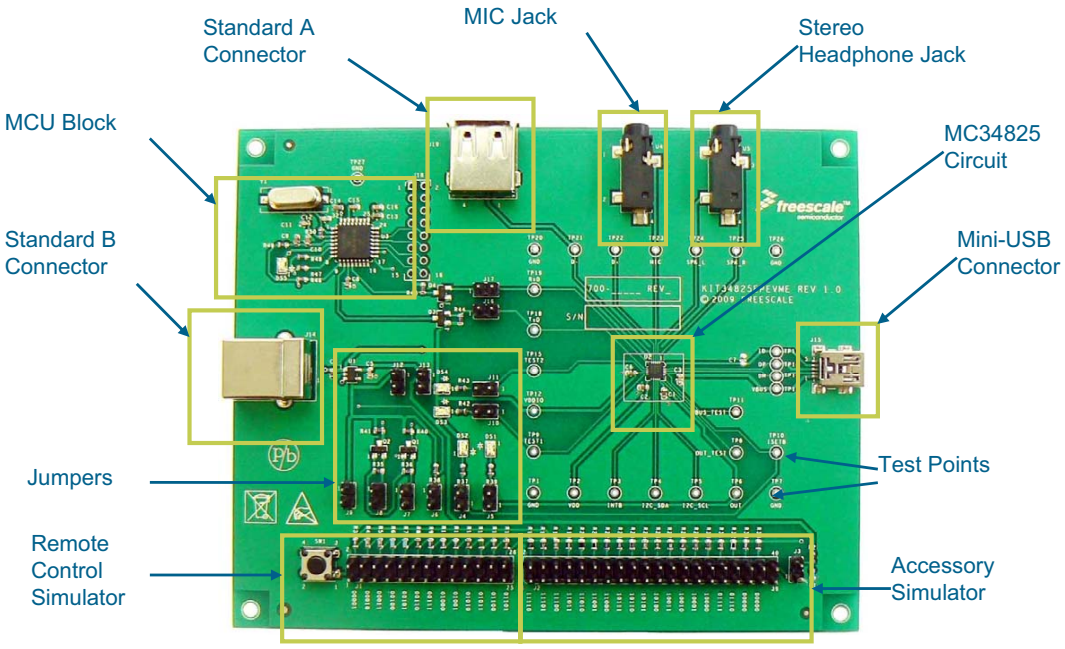

Figure 3. The 34825 Evaluation Board

3.1 EVB Features

- Input supply voltage ranges
  - VDD: from 2.7 to 5.5V
  - VBUS: from 2.8 to 28V
  - VDDIO: from 1.65 to 3.6V
- All baseband signals generated in the evaluation kit with a PC
- An on-board USB-to-I2C interface acting as an I2C host
- Powered and controlled by one USB port
- LEDs status indication of the OUT and the $\overline{\text{ISET}}$
- On-board accessory and remote control simulators
- Can be directly jump connected to a real cell phone PCB for evaluation
- 5 inch x 4 inch board size

3.2 Required Equipment

Minimum required equipment:

- USB-enabled computer with Windows 2000 or later operating system
- A standard USB A-to-B cable

4 Hardware Description

The hardware in the evaluation kit includes an 34825 evaluation board and a standard USB A-to-B cable. The evaluation board has three major blocks: the circuit related to the 34825, the remote control and accessory simulator, and the USB-to-I2C interface. This section describes the above three blocks as well as an example of an audio accessory with remote control.

4.1 34825 Circuit

The schematic related to the 34825 is shown in **Figure 4**. Jumpers are offered to configure the evaluation board for demonstration or evaluation purposes. When the evaluation board is used to be directly jump connected to a cell phone PCB, these jumpers should be disconnected to prevent interference between the signals from the evaluation board and the cell phone board.

4.1.1 I2C and Interrupt Signals

The I2C signals are the interrupt signal are connected to the MCU. The transistors Q1 and Q2 are for level shifting between the 5V I2C signal for the MCU and the VDDIO from the 34825. The jumpers J6, J7, and J8 should normally be always connected unless the evaluation board is used to directly jump these signals to a cell phone PCB, in which case the signals are jumped directly from the corresponding test points TP3, TP4 and TP5 to the cell phone PCB and the above jumpers should be disconnected.

4.1.2 Audio Signals

The audio signals include the microphone (MIC) signal and the stereo speaker (SPK_L and SPK_R) signals. These three signals are connected to the microphone and the stereo audio jacks.

4.1.3 UART Signals

The UART signals are connected to the MCU on the evaluation board via jumpers J16 and J17 as well as transistors Q3 and Q4. The two transistors are for level shifting purpose. Since the UART features are not enabled, users should keep the JP16 and JP17 open all the time. The UART feature can be evaluated with the UART signals from a different circuit by jumping the signals to test points TP18 and TP19.

4.1.4 LED Indicators

The evaluation offers two LEDs to indicate the status of the two logic signals $\overline{\text{ISET}}$ and OUT. When a power supply is attached to the mini-USB connector, depending on the type of the power supply, the $\overline{\text{ISET}}$ output will indicate either high impedance open-drain output or low impedance to ground. The red LED DS2 is used to indicate the $\overline{\text{ISET}}$ logic level. If the internal power MOSFET is turned on (refer to the datasheet for more details), the voltage at the VBUS pin is switched to the OUT pin. The red LED DS1 will indicate the voltage level at the OUT pin. Jumpers J4 and J5 should always be connected for these two signals. There are another two LEDs on the Evaluation Board DS3 and DS4. They are reserved for Freescale internal use only. Please keep the jumpers J10 and J11 open all the time.

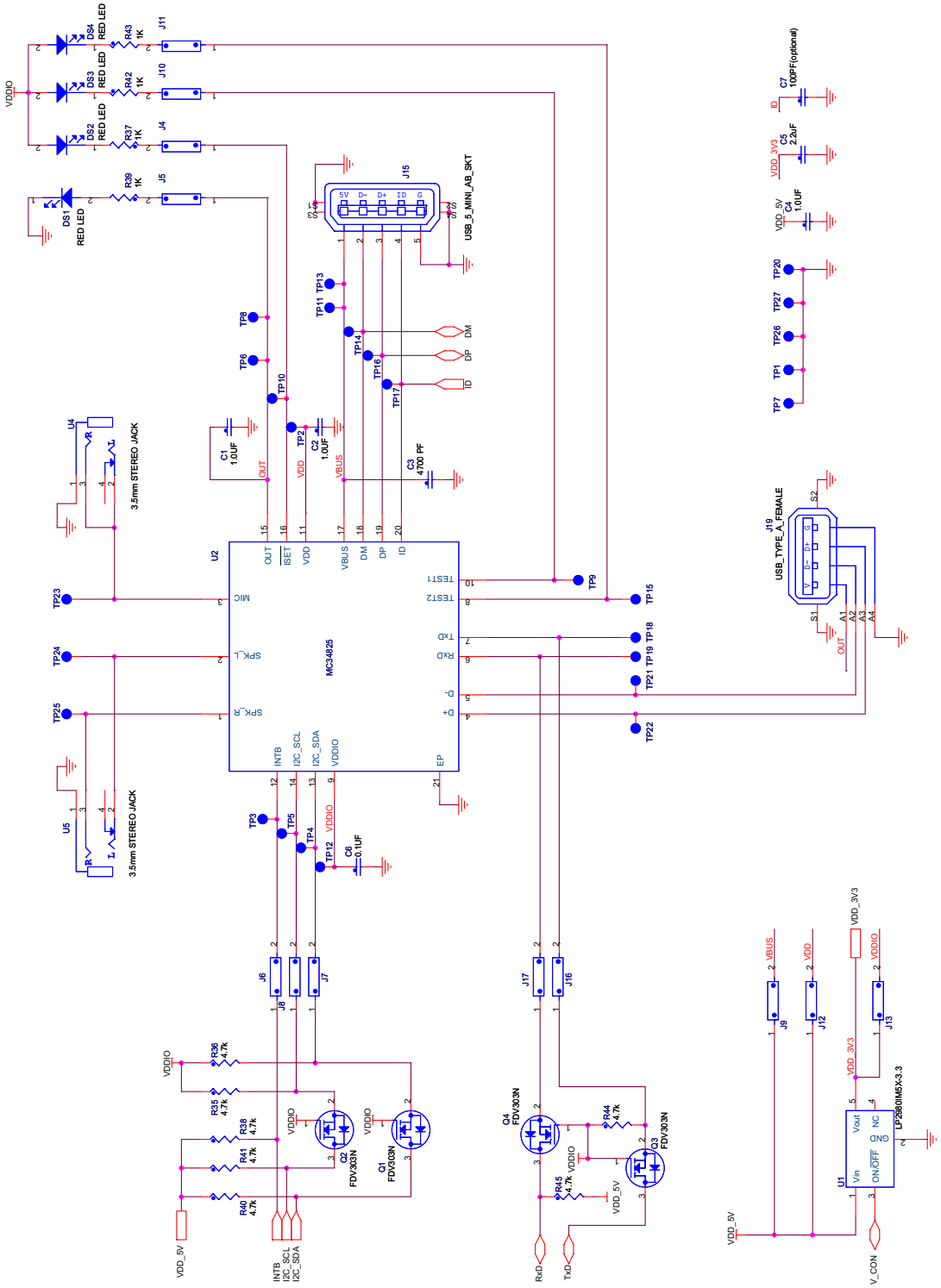

Figure 4. The 34825 Schematic of the KIT34825EPEVME Evaluation Board

4.1.5 On-Board LDO and VDD_5V

The evaluation board has a 3.3V LDO on the board. This LDO generates the VDDIO voltage as well as to generate a reference voltage (3.3V) for the USB charger simulator (see section 4.2 for more information). Unless powered by a different source, the JP13 should always be connected for the VDDIO supply.

The 3.3V LDO is powered by a 5V supply (VDD_5V) from the standard type-B USB connector. The VDD_5V supply are also used to supply the 34825 via jumper J12 to the VDD pin during the evaluation. In addition, the VDD_5V can also be used to generate the 5V supply to the VBUS pin in the mini-USB connector to simulate various power supplies, together with the D+/D- connection and the ID connection. Jumper J9 is for this purpose. More details are given in the section 4.2.

4.2 Remote Control and Accessory Simulator

The remote control simulator contains 13 resistors (R3 to R15) that are corresponding to the 13 supported keys (see datasheet for more details) and a push button (SW1) to simulate the action of the remote control. The left side of **Figure 5** shows the detailed schematic. To simulate a key press, the user needs to select one ID resistor value by shorting the corresponding jumper in J1 and then to press the push button SW1. Shorting pin1 and pin2 of the jumper header J1 represents the S0 key. Shorting pin3 and pin4 of the J1 represents S1 key, and so on.

The right side of **Figure 5** shows the schematic of the accessory simulator. Resistor R16 to R34 represent all supported ID resistors. R16 and R17 are in series with the remote control key resistors to form the correct ID resistors. Shorting one pair of the headers in J2 is equivalent to connecting one ID resistor to the ID pin.

The headers of 39 and 40 in J2 are connected to the DP and DM pins of the 34825. Shorting these two headers is equivalent to short the DP and DM pins. To simulate the attachment of a dedicated charger, the users can short the 39 and 40 headers first and then short jumper J9 to connect the VDD_5V to the VBUS pin of the mini-USB connector. Once the J9 are shorted, the 34825 sees a 5V at the VBUS pin and starts the power supply type identification. The identification result will be a dedicated charger.

Resistors R1 and R2 and jumper J3 are for simulating the USB charger. The USB charger requires the power supply to offer a 0.6V to the DM pin when the DP pin is sourced with a 0.6V. Shorting J3 first and then J9 creates and equivalent attachment of a USB charger to the mini-USB connector.

The headers in J2 should be left open unless an accessory is being simulated.

4.3 USB-to-I2C Interface

The USB-to-I2C interface consisting of the MCU block and the standard type-B connector enables users to use the PC as the host controller of the I2C bus. Users can access the I2C register map with the GUI in the PC and receive the interrupt signal from the 34825. The schematic of the USB-to-I2C interface is given in **Figure 6**. The MCU in the schematic is powered by the USB bus voltage. A standard type-B connector is given to connect the evaluation board to the PC. The USB bus voltage is the supply of the VDD_5V discussed earlier.

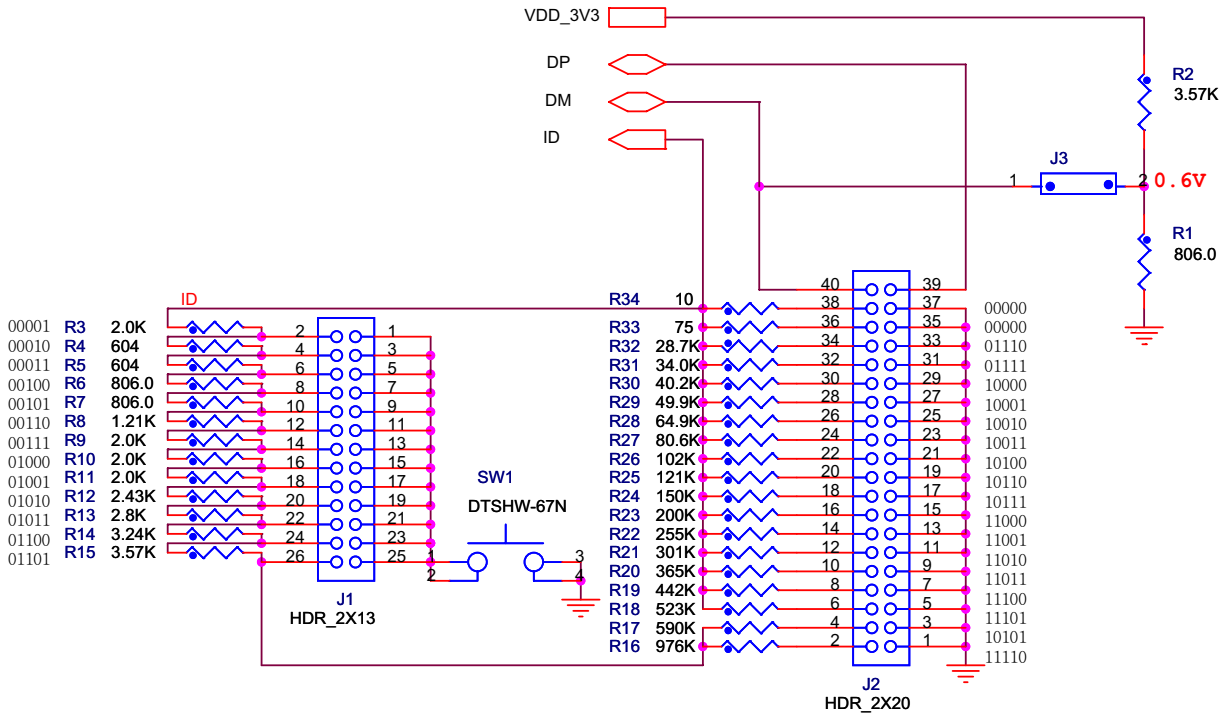

Figure 5. The Schematic for the Remote Control and the Accessory Simulator.

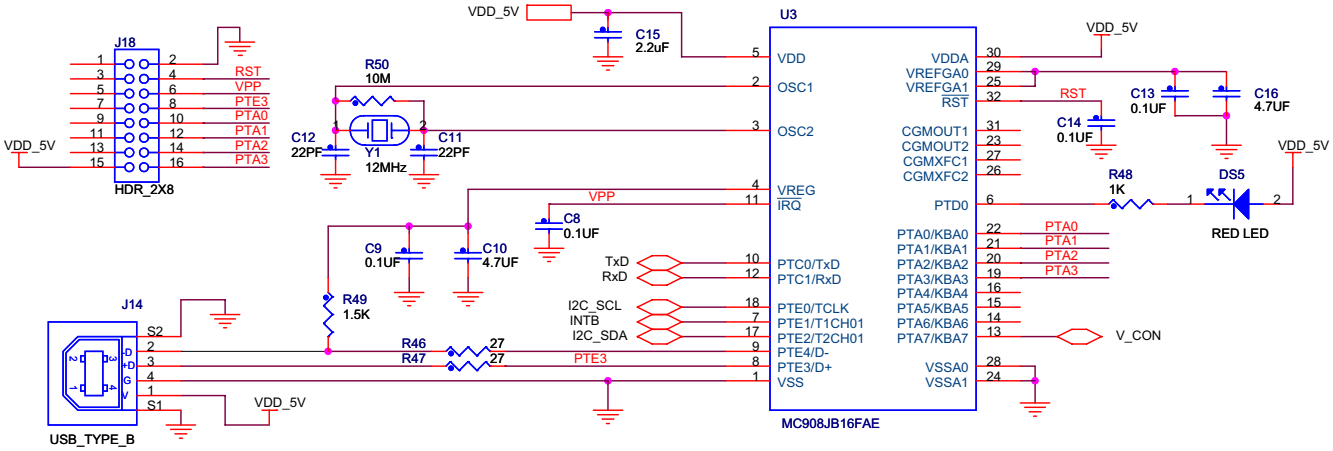

Figure 6. The MCU Block and I/O of the KIT34825EPEVME Schematic

4.4 Audio Accessory with Remote Control

The user may build an additional audio accessory with remote control to work with the evaluation kit. Here is an example of the audio accessory with remote control. The picture of the top side and the bottom side are shown in **Figure 7**. The schematic is shown in **Figure 8**.

The top side contains five buttons, representing S0 to S4 respectively. These buttons are assigned to “play/pause”, “previous”, “next”, “volume up”, and “volume down” respectively in the GUI software comes with the evaluation kit. The assignments are indicated at the lower-left corner with the silk screen, as shown in **Figure 7**.

The bottom side contains two audio jacks for a microphone and a stereo headphone, a mini-USB connector, and the ID resistors for the five buttons and the audio accessory. The audio jacks are for connecting to a regular headphone/microphone combo for computers that is not included in the evaluation kit but can be easily acquired in any computer accessory store. The mini-USB connector is for connecting to the mini-USB connector of the evaluation board with a special cable comes with the evaluation kit.

The board, together with the headphone/microphone combo and the mini-USB cable form an audio headset with a microphone and a remote control. Users can use such an accessory to evaluate the feature of the remote control and the simultaneous stereo and the microphone signals.

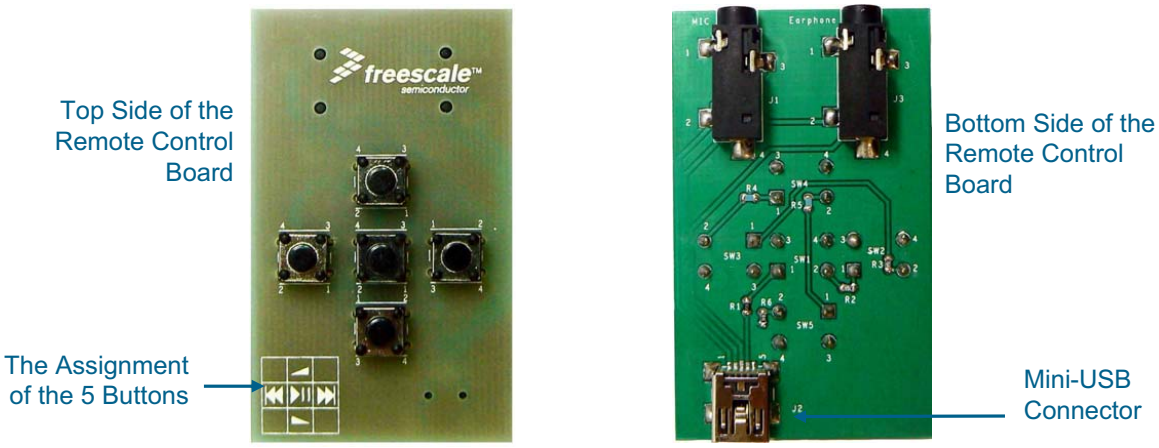

Figure 7. The Audio Accessory with Remote Control Buttons

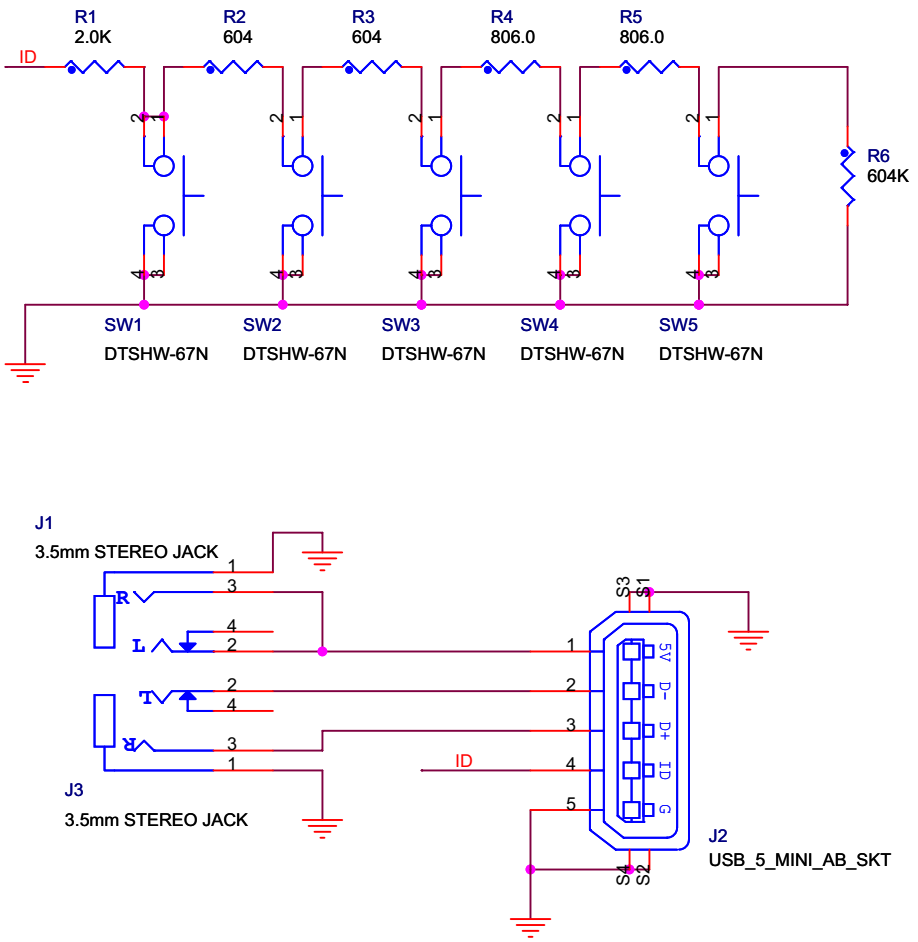

Figure 8. The Schematic for the Audio Accessory with Remote Control Buttons

5 Software Description

A GUI software comes with the evaluation kit for the convenience of demonstration and evaluation. This section introduces how to install the driver of the evaluation kit in a PC, how to start the GUI software, and how to use the software.

5.1 Installation of the Driver

The evaluation kit is designed as a USB Human Interface Device (HID), similar to a mouse. For Microsoft Windows 2000 or a later operating system (OS), the driver for the HID class is already built in. The driver will be loaded automatically when the evaluation kit is connected to a USB port for the first time. The operating system will indicate the following messages during the first-time connection to the USB port.

- The OS will automatically recognize the board and show the product name “USB Interface Board” information, as shown in **Figure 9**.
- The OS will recognize the USB device as a “USB Human Interface Device” and show the message as shown in **Figure 10**.
- The OS will install the internal driver to make it ready for users to use the evaluation kit. The message is shown in **Figure 11**.

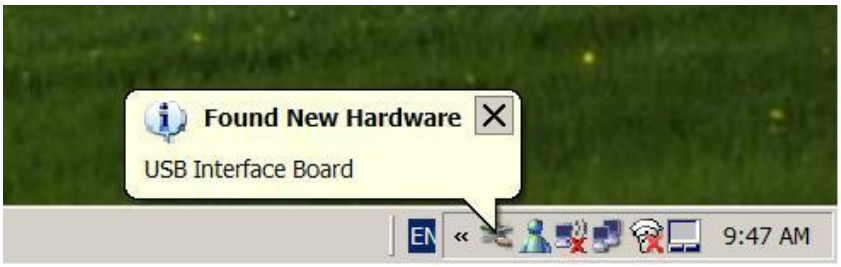

Figure 9. Windows Finds the New Hardware

Figure 10. Windows Recognizes the Evaluation Board as an HID Device

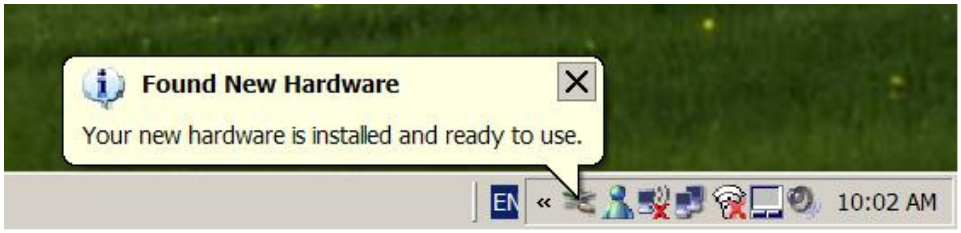

Figure 11. The Interface Board is Ready to Use

After the driver is installed, unless the user uninstalls the driver, the OS will not show any of the above information again when the evaluation kit is connected to the USB port. When the evaluation kit is connected, the user can check the board status in the Windows Device Manager. Under the “Human Interface Device” category, one can double click one USB Human Interface Device and properties. **Figure 12** will show up. Please note that the board name “USB Interface Board” is shown in Location. It should also show that the device is working properly.

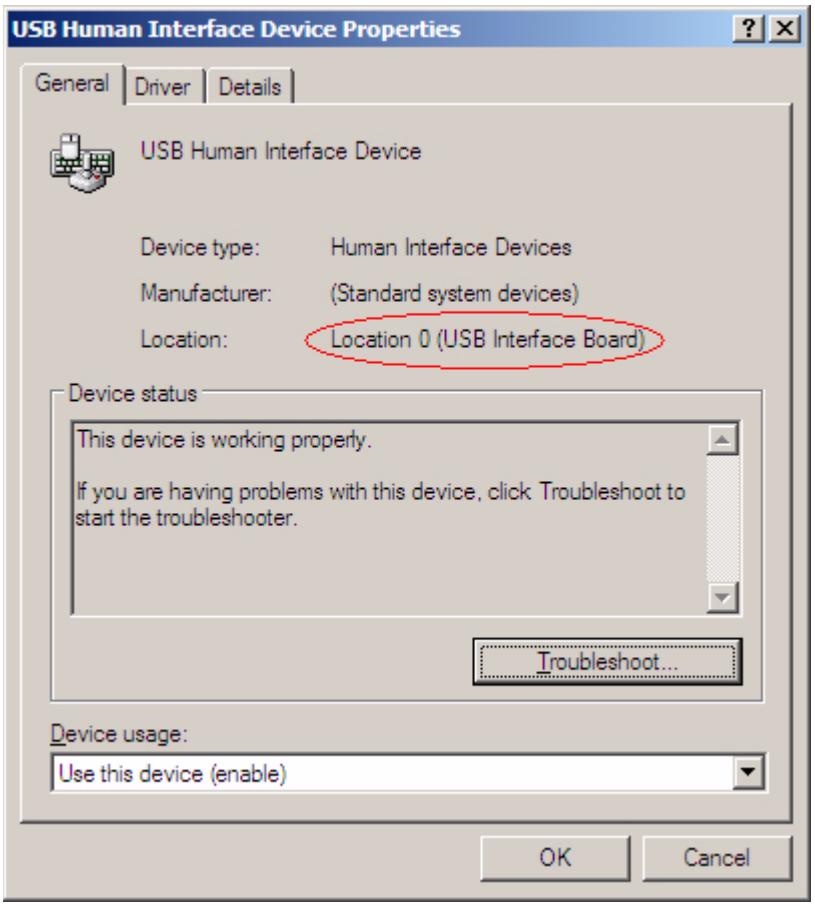

Figure 12. The Device Status in the Window Device Manager

5.2 Installation and Starting the GUI software

The GUI software is an executable file running in Windows 2000 or a later OS. The file name is ***34825Demo.exe***. The Windows Media Player is required to be installed to run the GUI software. In order to demonstrate the remote control feature of the 34825, the software needs four audio files named “Audio01.wma”, “Audio02.wma”, “Audio03.wma” and “Audio04.wma” in the same application folder. No installation is needed. The users need only to copy the four mentioned “.wma” files and the 34825Demo.exe file into the same folder, as shown in **Figure 13**. Doubling clicking the 34825Demo.exe will start the GUI software.

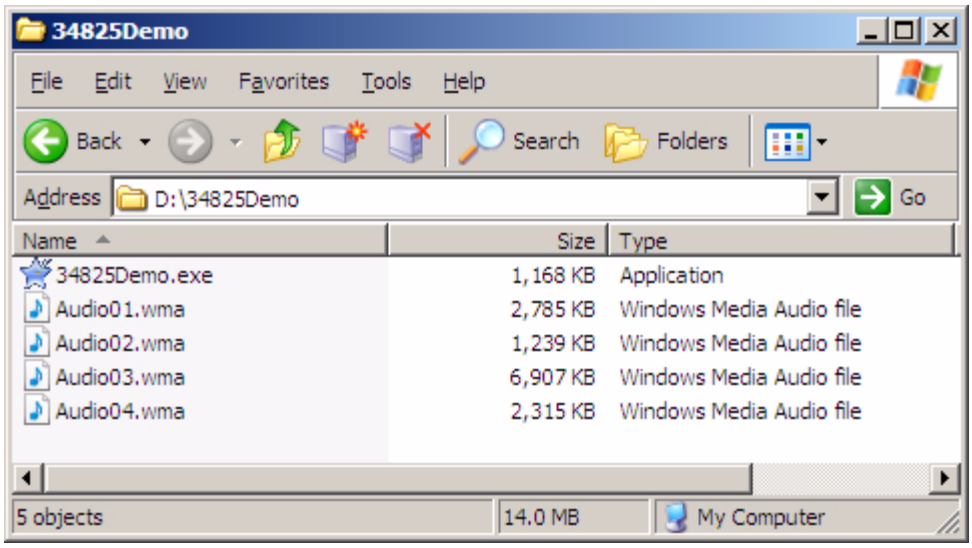

Figure 13. The Files in The GUI Software Folder

5.3 Using the GUI Software

The GUI has two windows. The window on the left side is a cell phone window and the window on the right side is an information window, as shown in **Figure 14**. When the software is started, the GUI shows the cell phone window first. The information displayed in the cell phone window is dependent on the accessory that is attached to the mini-USB connector of the evaluation board. The information window contains detailed information about 34825 and the status of the evaluation board.

This section explains each portion of the two windows in details.

5.3.1 System buttons

At the top of the cell phone window, there are two system buttons, as shown in **Figure 14**. The one on the right is the ***close*** button to exit the GUI software when clicked. The one on the left side is a ***Show/Hide*** button, when clicked, to show or hide the information window.

5.3.2 Status information

The status information is located at the bottom of the information window. This is for indicating the status of the evaluation board. If the evaluation board is connected and recognized by the OS, a message "***The 34825 Evaluation Board Is Connected!***" and the version number of the evaluation board firmware will be shown. The evaluation system is ready to work. If the evaluation board is not connected to the PC when the software is running, the message shown will be "***The 34825 Evaluation Board Is not Found. Please Check and Connect the Evaluation Board!***" Whenever the evaluation board is connected while the GUI software is running, the PC software will recognize the evaluation board automatically and display the first message.

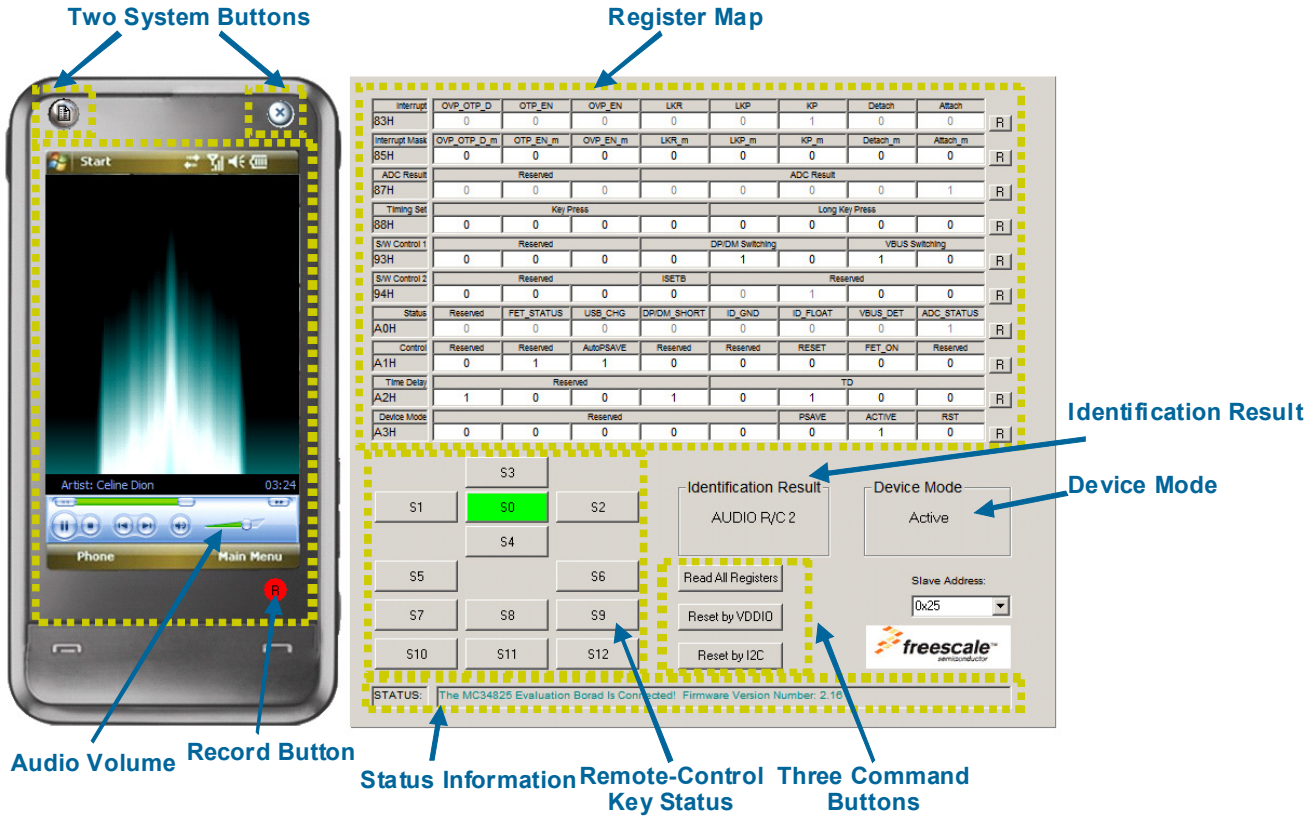

Figure 14. The 34825 Demo GUI

5.3.3 The register map

The register map is shown at the top of the information window. Refer to the 34825 datasheet for more information about the register map. The values of the registers will be automatically updated if an interrupt is received from the 34825. The user can manually update each register by clicking the “R” command button next to each register, as shown in **Figure 14**. For a read-and-write register, a hidden “W” command button will show up next to the “R” button when the register value is modified. The user can directly modify the bit value in the register map. After clicking the “W” button, the new value will be written into the 34825 and the “W” button will disappear again. When the value in the register is not changed, the “W” command button is hidden.

5.3.4 Command buttons

There are three command buttons, “Read All Registers”, “Reset by VDDIO” and “Reset by I2C”, located at the lower portion of the information window. The functions for them, when clicked, are as following:

Read All Registers: to read all internal registers and display the result in the register map.

Reset by VDDIO: to reset the 34825 by disabling the VDDIO supply to the 34825.

Reset by I2C: to reset the 34825 by pulling both I2C_SCL and I2C_SDA signals to ground. Refer to the datasheet of 34825 for more information. The status of the registers after reset will show up in the register map.

5.3.5 Identification result

The identification result is displayed right under the register map. When the 34825 identifies one accessory, the accessory name is shown in this window.

5.3.6 Device mode

The device mode is displayed next to the identification result. The 34825 has three operation modes, Standby, Power Save and Active (refer to the datasheet for more details). The operation mode of device is shown at this location.

5.3.7 Remote control key status

The 34825 supports up to 13 remote control keys (S0 to S12) when an Audio R/C 1 or an Audio R/C 2 accessory is attached to the mini-USB connector of the evaluation board. With an Audio R/C 1 or an Audio R/C 2 accessory attached, the cell phone window enters the media-player mode, as shown in **Figure 14**. In the media-player mode, the remote control key status will be displayed. When the key is released before a “short-key” timing length, the corresponding key in the GUI shows green color. When the key is still pressed when passing the “short-key” timing length, the corresponding key shows red color until the key is released.

When using the remote control simulator on the evaluation board, the key “S0”, “S1”, “S2”, “S3” and “S4” are assigned to “Play/Pause”, “Previous”, “Next”, “Volume Up” and “Volume Down” function of the Windows Media Player. Pressing S0 will start or pause the music. The S1 and S2 switch between the four songs shown in **Figure 13**. The S3 and S4 adjust the volume of the music and the volume is displayed the cell phone window of the GUI software.

5.3.8 Record button

When the Audio R/C accessory is attached, the GUI software can record the voice input from the microphone. Click the red “R” button under the Windows Media Player to start the voice recording. At the same time, the button name is changed to “P”. Click the red “P” button to stop voice recording and recorded voice will be played back through the headphone.

5.3.9 Version information

There is an “*about...*” item in the system menu of the software. After running the GUI software, clicking the right button of the mouse with the cursor pointing at the software icon in the task bar, as shown in **Figure 15**, will pop up the system menu that contains the “about...” selection. Clicking the “*about...*” selection results in a dialog window showing the version information of the software.

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Figure 15. The About... Menu Selection

6 Using the Evaluation Kit

There are two ways of using the evaluation board. The first one is to directly jump connect the signals of 34825 to the customer's system board. The evaluation board offers the test points of all pins of the IC for the convenience of such connection. The second way is to use the evaluation kit and a PC and the GUI software to evaluate or demonstrate the features and the performance of the 34825. The first way is straight forward and requires no further explanation once the user understand the 34825. This section describes the second way with a few real examples of using the evaluation kit.

6.1 Setting up the Evaluation Kit

The 34825 requires the baseband signals for the demonstration or evaluation. Those signals can be easily created with the evaluation kit.

6.1.1 I2C host signals

The I2C host signals are provided by the MCU in the USB-to-I2C interface. Connect the evaluation board to the PC that runs the GUI software using a USB A-to-B cable, as shown in **Figure 16**. The I2C host command can be sent from the GUI software via the USB-to-I2C interface. Any interrupt signal from the 34825 can be intercepted by the MCU and forwarded to the GUI software via the USB bus.

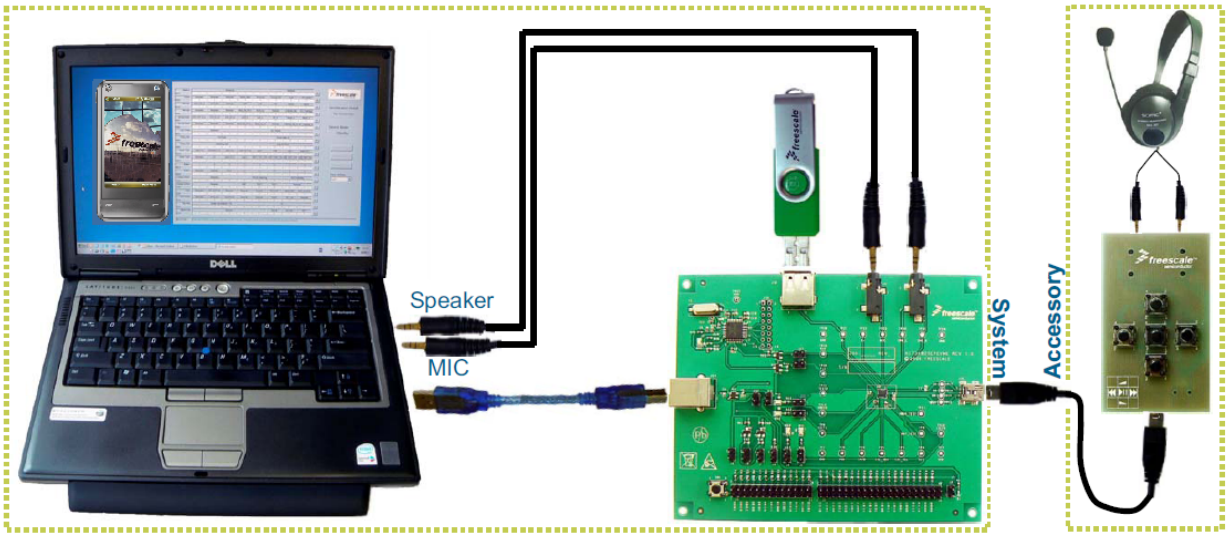

Figure 16. The Setup for the KIT34825EPEVME Kit

6.1.2 Audio signals

The audio signals, namely the microphone and the stereo audio signals, can also be obtained from the PC. Connect the microphone and stereo speaker jacks between the PC and the evaluation board, as shown in **Figure 16**. When evaluating with an audio accessory, such as the one illustrated in **Figure 16**, the PC functions as the baseband system to offer a stereo audio output to the 34825 as well as to receive the microphone signal. The signals will be passed through the 34825 to the external audio accessory.

6.1.3 USB slave device signals

A cell phone is a USB slave device. A PC is a USB host device so cannot be used to offer slave device signals. The evaluation board offers a female USB type-A connector for a USB flash memory device. The user can connect any USB2.0 compatible flash memory device to the evaluation board to test the 480Mbps data transfer speed and the performance of the analog switches in the 34825. The connection of the flash memory is illustrated in **Figure 16**.

6.1.4 Jumper configuration

The jumpers need be configured properly for the operation. The location of the jumpers are shown in **Figure 17**. These jumpers should be removed when using the test points to directly jump the 34825 signals to the customer system board.

The default configuration for the jumpers is summarized in **Table 1**. The jumper configuration should stay in the default connections if the on-board accessory simulator or the on-board remote control is not used.

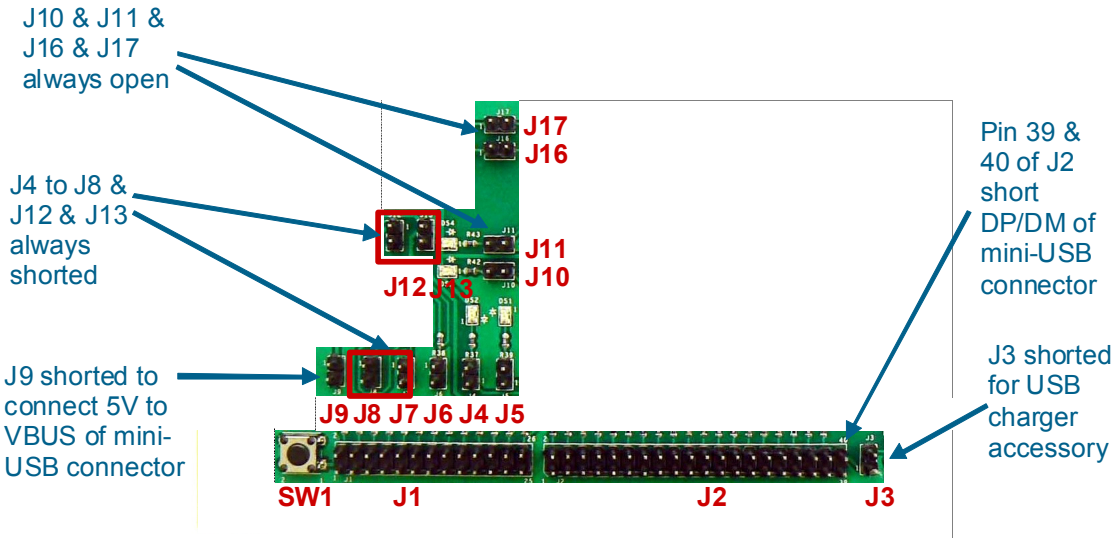

Figure 17. The Jumper Configurations.

Table 1. The Default Configuration of the Jumpers

Jumper	Default Connection	Comments
J4, J5	Shorted	LED indications for $\overline{\text{ISET}}$ and OUT signals
J6, J7, J8	Shorted	I2C and Interrupt signals
J10, J11	Open	Reserved for Freescale internal use only
J12, J13	Shorted	To provide VDD and VDDIO supplies to 34825

Table 1. The Default Configuration of the Jumpers

Jumper	Default Connection	Comments
J16, J17	Open	TxD and RxD signals. Not supported in the current board.
J1	Open or short	J1 contains 13 pairs of headers for the 13 remote control keys. They are disconnected by the SW1 switch so either short or open does not affect the operation of the evaluation. When the remote control keys in an audio accessory is simulated, one pair should be shorted and then the SW1 push button be pressed to create a key press event.
J2	Open	J2 contains 20 pairs of headers for selecting different ID resistors for their corresponding accessories. The pair of pin 39 and 40 are connected to the DP and DM pins of the mini-USB connector on the evaluation board.
J3	Open	J3 is for simulating the USB charger accessory.
J9	Open	J9 shorts the 5V bus voltage from the type-B connector to the VBUS pin of the mini-USB connector for simulating. Unless using the on-board simulator for a powered accessory, this jumper should always be open.

6.2 Evaluation Examples

Once the above connections are made, the evaluation kit is ready to be evaluated or demonstrated. One can imagine that the PC and the evaluation board form a cell phone system. The only interface of the cell phone to the external world is the mini-USB connector. External accessories, such as an audio headset, an ac-dc adapter, or a USB port can be connected to the cell phone system only through the mini-USB connector.

6.2.1 Dedicated Charger

A dedicated charger is a powered accessory that has a 5V on the VBUS pin and the D+ and the D- pins are shorted. When such an accessory is attached to the mini-USB connector of the evaluation board, the 34825 will recognize and send an interrupt to the I2C host. The internal power MOSFET is turned on automatically to switch the 5V VBUS voltage to the OUT output and the I2C host sets the $\overline{\text{ISET}}$ output to low. Both LEDs for the OUT and the $\overline{\text{ISET}}$ indications will be turned on. The dedicated charger is displayed in the Identification Result window in the GUI software.

If a dedicated charger is not available, one can simulate such an accessory with the on-board accessory simulator. The steps are as following:

1. Short pin 39 and pin 40 of J2.

2. Short J9.

Once J9 is shorted, the 5V supply is jumped to the VBUS pin of the mini-USB connector. The 34825 will see an accessory with D+ and D- shorted and a 5V on the VBUS pin, and hence recognizes it as a dedicated charger.

6.2.2 USB Port

Connect the evaluation kit to a PC using a regular USB A-to-mini-B cable. Since a USB port has a 5V on the VBUS pin, the D+ and D- not shorted, and the ID pin floating, the 34825 recognizes the accessory as a USB port. The identification result is displayed in the GUI software. The internal power MOSFET is turned on automatically to switch the 5V VBUS to the OUT pin. The I2C host leave the $\overline{\text{ISET}}$ output high impedance so only the OUT indication LED will be turned on. The PC will recognize the flash memory connected to the evaluation board and the user can read from or write to the flash memory the same way as if the flash memory is attached to a USB port of the PC directly. Try to copy a large file to see the data transfer speed.

If a second PC is not available, the user can use the same PC shown in **Figure 16** for the USB port.

6.2.3 USB Charger

A USB charger is a special charger defined in the *USB Charging Specification* Version 1.0 from the USB developer's forum. If such a charger is not available, one can use the on-board accessory simulator with the following two steps, starting with the default jumper configuration.

1. Short J3.
2. Short J9.

Once J9 is shorted, an accessory recognition flow starts in the 34825 and a USB charger is recognized. The internal power MOSFET is turned on automatically and $\overline{\text{ISET}}$ is set to low by the I2C host. Both OUT and $\overline{\text{ISET}}$ LED indications are turned on.

6.2.4 Audio Accessory

If the user has an additional audio accessory (a stereo headphone with a microphone and the 5-button remote control), as described in section 4.4. Please refer to **Figure 16** for the construction of the audio accessory.

When attached to the mini-USB connector, the audio accessory is recognized by the 34825 and the Identification Result in the GUI shows "Audio R/C", representing an audio accessory with remote control. The signal connections between the accessory and the baseband system (simulated by the PC in this case) are established. Any music out from the PC will be passed to the stereo headphone while the microphone signal from the headset will be passed to the PC. The cell phone window in the GUI shows a volume indication, the playback progress bar, and a red-dot button for recording the voice (refer to section 5.3.8 for more details).

The 5 buttons in the remote control are assigned to the play/pause, previous, next, volume up, and volume down functions in the media player. When the Play/Pause is pressed, the PC starts to play music to the headphone. One can play with all five buttons to find out the functions. Try to press quickly and press and hold the key for a few seconds to see the color difference in the key displays of the GUI software.

The voice recording function is for demonstrating that the headset has independent stereo audio and the microphone channels. When the record button is clicked, the voice is recorded into the PC through the microphone in the headset. Clicking the record button again will stop recording and immediately start playing back recorded voice, while the stereo music continues to play independently.

The user can also use the J1 to simulate all 13 keys, as described in section 4.2.

7 KIT34825EPEVME Board Layout

7.1 Overview

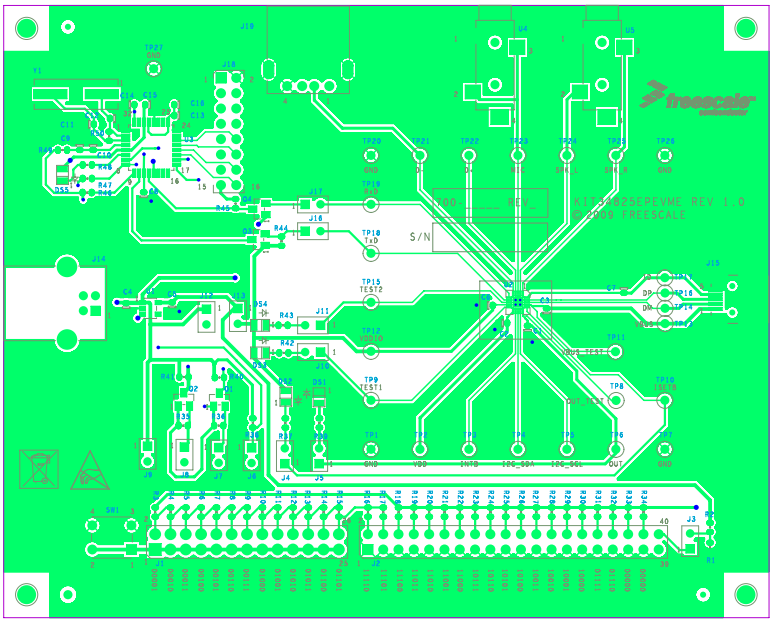

Figure 18. The Overview of the KIT34825EPEVME Evaluation Board.

7.2 Top Side Silkscreen Layer

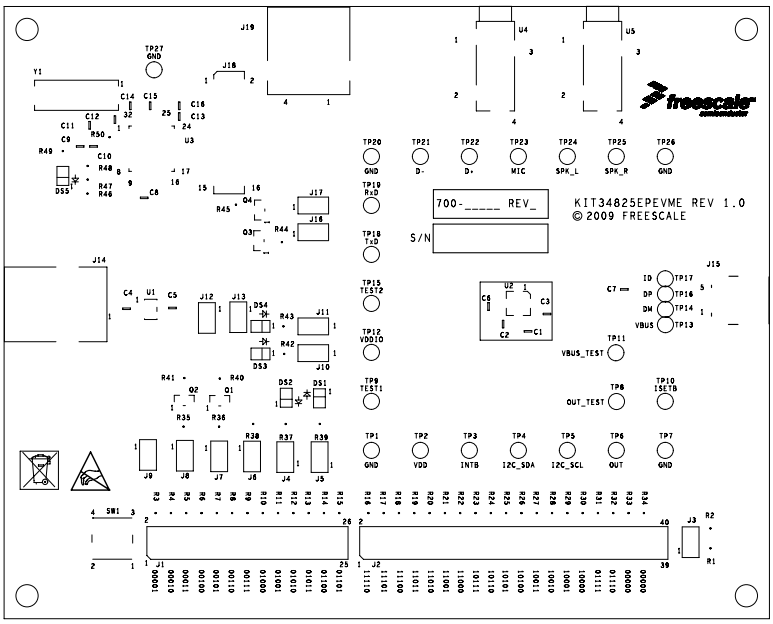

Figure 19. The Top Side Silk Screen Layer of the KIT34825EPEVME Evaluation Board.

7.3 Top Side Layer

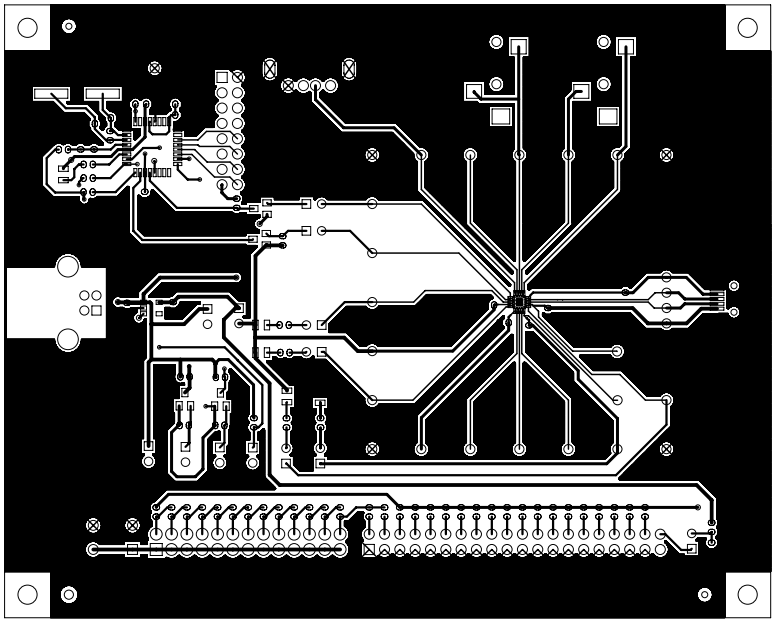

Figure 20. Top Side Layer of the KIT34825EPEVME Evaluation Board.

7.4 Bottom Side Layer

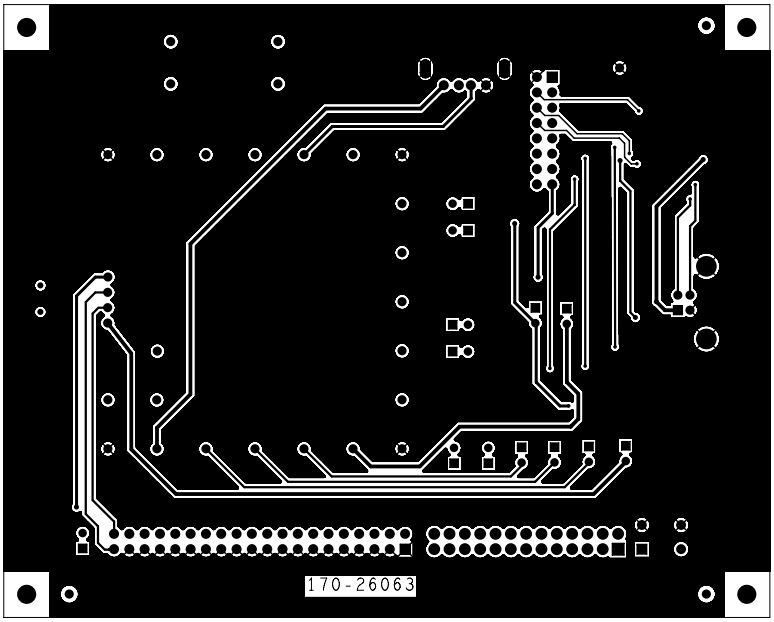

Figure 21. The Bottom Side Layer of the KIT34825EPEVME Evaluation Board.

8 KIT34825EPEVME Evaluation Board Bill of Material

Item	Qty	Schematic Label	Value	Description	Vender
Capacitors					
1	3	C1, C2, C4	1.0µF	CAP CER 1.0UF 16V 10% X5R 0603	TDK MURATA
2	1	C3	4700pF	CAP CER 4700PF 50V 5% X7R 0603	TDK MURATA
3	5	C6, C8, C9, C13, C14	0.1µF	CAP CER 0.1UF 50V 10% X7R 0603	TDK MURATA
4	1	C7 (optional)	100pF	CAP CER 100PF 50V 10% X7R 0603	TDK MURATA
5	2	C10, C16	4.7µF	CAP CER 4.7UF 6.3V 20% X5R 0603	TDK MURATA
6	2	C11, C12	22pF	CAP CER 22PF 50V 10% X7R 0603	TDK MURATA
7	2	C5, C15	2.2µF	CAP CER 2.2UF 6.3V 20% X5R 1608	TDK MURATA
Resistors					
8	1	R32	28.7k	RES MF 28.7K 1/10W 1% 0603	KOA SPEER
9	4	R3, R9-R11	2.0k	RES MF 2.0K 1/10W 1% 0603	KOA SPEER
10	2	R4, R5	604.0	RES MF 604.0 OHM 1/10W 1% 0603	KOA SPEER
11	3	R1, R6, R7	806.0	RES MF 806.0 OHM 1/10W 1% 0603	KOA SPEER
12	1	R8	1.21k	RES MF 1.21K 1/10W 1% 0603	KOA SPEER
13	1	R12	2.43k	RES MF 2.43k 1/10W 1% 0603	KOA SPEER
14	1	R13	2.8k	RES MF 2.8k 1/10W 1% 0603	KOA SPEER
15	1	R14	3.24k	RES MF 3.24k 1/10W 1% 0603	KOA SPEER
16	2	R2, R15	3.57k	RES MF 3.57k 1/10W 1% 0603	KOA SPEER
17	1	R16	976.0k	RES MF 976.0k 1/10W 1% 0603	KOA SPEER
18	1	R17	590.0k	RES MF 590.0k 1/10W 1% 0603	KOA SPEER
19	1	R18	523.0k	RES MF 523.0k 1/10W 1% 0603	KOA SPEER
20	1	R19	442.0k	RES MF 442.0k 1/10W 1% 0603	KOA SPEER
21	1	R20	365.0k	RES MF 365.0k 1/10W 1% 0603	KOA SPEER
22	1	R21	301.0k	RES MF 301.0k 1/10W 1% 0603	KOA SPEER
23	1	R22	255.0k	RES MF 255.0k 1/10W 1% 0603	KOA SPEER
24	1	R23	200.0k	RES MF 200.0k 1/10W 1% 0603	KOA SPEER
25	1	R24	150.0k	RES MF 150.0k 1/10W 1% 0603	KOA SPEER
26	1	R25	121.0k	RES MF 121.0k 1/10W 1% 0603	KOA SPEER
27	1	R26	102.0k	RES MF 102.0k 1/10W 1% 0603	KOA SPEER
28	1	R27	80.6k	RES MF 80.6k 1/10W 1% 0603	KOA SPEER
29	1	R28	64.9k	RES MF 64.9k 1/10W 1% 0603	KOA SPEER
30	1	R29	49.9k	RES MF 49.9k 1/10W 1% 0603	KOA SPEER

Item	Qty	Schematic Label	Value	Description	Vender
31	1	R30	40.2k	RES MF 40.2k 1/10W 1% 0603	KOA SPEER
32	1	R31	34.0k	RES MF 34.0k 1/10W 1% 0603	KOA SPEER
33	1	R33	75.0	RES MF 75.0 OHM 1/10W 1% 0603	KOA SPEER
34	1	R34	10.0	RES MF 10.0 OHM 1/10W 1% 0603	KOA SPEER
35	7	R35,R36, R38, R40, R41, R44, R45	4.7k	RES MF 4.7k 1/10W 5% 0603	KOA SPEER
36	5	R37, R39, R42, R43, R48	1.0k	RES MF 1.0k 1/10W 5% 0603	KOA SPEER
37	2	R46, R47	27	RES MF 27 OHM 1/10W 5% 0603	KOA SPEER
38	1	R49	1.5k	RES MF 1.5k 1/10W 5% 0603	KOA SPEER
39	1	R50	10M	RES MF 10M 1/10W 5% 0603	KOA SPEER
LEDs					
40	5	DS1-DS5	RED LED	LED RED SGL 30MA SMT 0805	LUMEX
FETS and LDOs					
41	4	Q1-Q4	FDV303N	TRAN NMOS GEN 680MA 25V SOT-23	FAIRCHILD
42	1	U1	FAN2500S33X	3.3V 100 mA CMOS LDO SOT23-5	FAIRCHILD
Push buttons, Jumpers and Connectors					
43	1	SW1	DTSHW-67N	SW SPST NO PB WSH 12VDC 50MA TH	DIPTRONICS
44	1	J1	HDR_2x13	HDR 2X13 TH 100MIL CTR 330H AU	SAMTEC
45	1	J2	HDR_2x20	HDR 2X20 TH 100MIL CTR 330H AU	SAMTEC
46	13	J3-J13, J16, J17	SHORT_100mil	CON 2 JUMPER MALE 2.54MM SP 157H AU	PRECI-DIP
47	1	J14	USB_TYPE_B	CON 2X2 USB_TYPE_B RA SKT SHLD TH -- 435H AU	CYPRESS
48	1	J15	USB_5_MINI_AB_SKT	CON 5 SKT RA USB MINI AB SMT AU	SAMTEC
49	1	J19	USB_TYPE_A_FEMALE	CON 4 SKT RA TH USB A FEMALE	SAMTEC
50	2	U4, U5	3.5mm STEREO JACK	CON 4 AUD RA SMT	KYCON
51	27	TP1-TP27	TP-105-01-00	TEST POINT PIN 0.109 x 0.087 TH YELLOW	COMPO-NENTS
Crystal					
52	1	Y1	12MHz	XTAL 12MHz FIXED PAR--SMT 11.5x4.7MM	CITIZEN
Freescale IC					
53	1	U2	MC34825EP	USB INTERFACE IC QFN20	FREESCALE
54	1	U3	MC908JB16FAE	8-bit MCU LQFP32	FREESCALE

9 References

Following are URLs where you can obtain information on other Freescale products and application solutions:

Description	URL
Data Sheet	www.freescale.com/files/analog/doc/data_sheet/MC34825.pdf
Freescale's Web Site	www.freescale.com
Freescale's Analog Web Site	www.freescale.com/analog
Freescale's Power Management Web Site	www.freescale.com/powermanagement
Freescale's Automotive Applications Web Site	www.freescale.com/automotive

10 Revision History

REVISION	DATE	DESCRIPTION OF CHANGES
1.0	8/2010	• Initial Release

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Technical Information Center
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Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
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China
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support.asia@freescale.com

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