Texas Instruments

DEM-PCM2912 EVM

User's Guide

March 2008

AIP Consumer Audio—TI Japan

SBAU132

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About This Manual

This document provides the information needed to set up and operate the DEM-PCM2912 EVM evaluation module, a test platform for the 16-bit, mono microphone input and stereo headphone output, single-chip PCM2912 stereo audio coder/decoder (codec) with a universal serial bus (USB) interface. For a more detailed description of the PCM2912 product line, refer to the product data sheet available from the Texas Instruments web site at http://www.ti.com. Support documents are listed in the section of this guide entitled ***Related Documentation from Texas Instruments***.

How to Use This Manual

Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the DEM-PCM2912 EVM.

Chapter 1 gives an overview of the PCM2912 USB interface codec. The EVM block diagram and primary features are also discussed.

Chapter 2 provides general information regarding EVM handling and unpacking, absolute operating conditions, and the default switch and jumper configuration.

Chapter 3 is the hardware and software setup guide for the EVM, providing all of the necessary information needed to configure the EVM under various PC operating systems for product evaluation.

Chapter 4 discusses how to configure the DEM-PCM2912 EVM motherboard for performance evaluation using an audio analyzer.

Chapter 5 includes the EVM electrical schematic, printed circuit board (PCB) layout, and the bill of materials.

Information About Cautions and Warnings

This document contains caution statements.

CAUTION

This is an example of a caution statement. A caution statement describes a situation that could potentially damage your software or equipment.

The information in a caution or a warning is provided for your protection. Please read each caution and warning carefully.

Related Documentation From Texas Instruments

The following documents provide information regarding Texas Instruments integrated circuits used in the assembly of the DEM-PCM2912 EVM. These documents are available from the TI web site. The last character of the literature number corresponds to the document revision that is current at the time of the writing of this User's Guide. Newer revisions may be available from the TI web site at http://www.ti.com/ or call the Texas Instruments Literature Response Center at (800) 477–8924 or the Product Information Center at (972) 644–5580. When ordering, identify the document(s) by both title and literature number.

Data Sheet	Literature Number
PCM2912 Product data sheet	SLES216

If You Need Assistance

If you have questions regarding either the use of this evaluation module or the information contained in the accompanying documentation, please contact the Texas Instruments Product Information Center at (972) 644–5580 or visit the TI web site at www.ti.com.

FCC Warning

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense is required to take whatever measures may be required to correct this interference.

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Chapter 1
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Description

The DEM-PCM2912 EVM is a complete evaluation platform for the 16-bit, mono microphone input and stereo headphone output PCM2912 bus-powered audio codec with a USB interface. All necessary connectors and circuitry are provided for interfacing to audio test systems and commercial audio equipment.

A USB connector is mounted on the DEM-PCM2912 EVM. Stereo audio output and mono audio input are available on two stereo mini-jacks.

1.1 Introduction—PCM2912

The PCM2912 is an audio codec with a USB interface for a USB headset, USB headphones, and a USB audio interface box that integrates mono input, stereo headphone output, an analog loopback line, a programmable gain amplifier (PGA), and microphone bias.

It is available in a 32-pin TQFP package.

1.1.1 Key Features

Major features of the PCM2912 include:

- Analog Front End:
  - Microphone amplifier (+20 dB gain)
  - Mono input
- Analog Back End:
  - Stereo/Mono headphone amplifier or line output with volume
- Analog Performance:
  - Dynamic range: 90 dB (DAC)
  - Dynamic range: 90 dB (ADC)
  - 25-mW headphone output at $R_L = 16\ \Omega$
- Power-Supply Voltage
  - Single power supply of 5.0 V (V_{BUS})
- Low Power Dissipation:
  - 425 mW at analog-to-digital converter (ADC) and digital-to-analog converter (DAC) operation, 44.1 kHz
  - 0.8 mW in Suspend mode
- Sampling Frequency: 8 kHz, 11.025 kHz, 16 kHz, 22.05 kHz, 32 kHz, 44.1 kHz, 48 kHz for ADC and DAC
- Programmable Function:
  - –76-dB to 0-dB gain for analog outputs
  - –12-dB to +30-dB gain for analog inputs
  - –76-dB to 0-dB gain for sidetone
  - 0-dB/20-dB gain for microphone amplifier
  - High-pass filter: 0.078 $\times f_S$ cutoff frequency
- Package: 32-pin TQFP
- Operating Temperature Range: –25°C to +85°C

1.2 Pin Assignments and Terminal Functions

Figure 1-1 shows the pin assignments for the PCM2912. Table 1-1 lists the terminal functions.

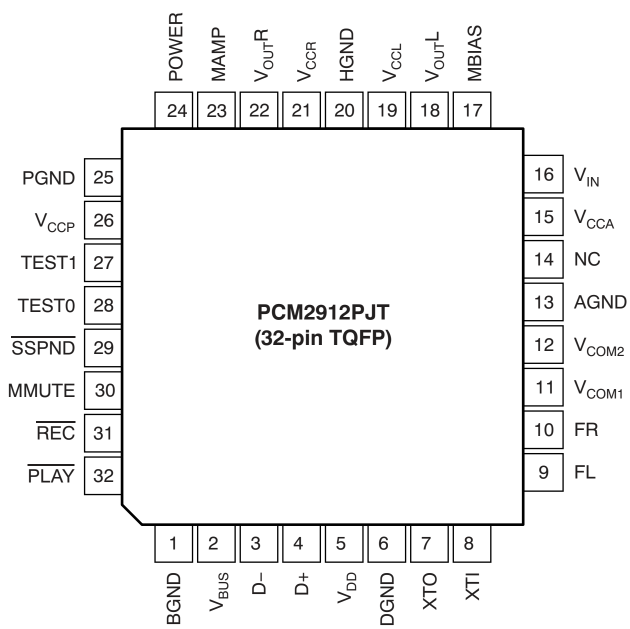


Figure 1-1. PCM2912 Pin Assignments

Table 1-1. PCM2912 Terminal Functions

Name	TQFP-36 Terminal	I/O	Description
BGND	1	–	Reference for internal regulator
V_{BUS}	2	–	Connect to USB power (V_{BUS})
D–	3	I/O	USB differential input/output minus
D+	4	I/O	USB differential input/output plus
V_{DD}	5	–	Digital power supply
DGND	6		Digital ground
XTO	7	O	Crystal oscillator output
XTI	8	I	Crystal oscillator input
FL	9	–	External filter pin of left channel (optional)
FR	10	–	External filter pin of right channel (optional)
V_{COM1}	11	–	Common voltage for ADC, DAC and analog front-end (V_{CCA}/2). Decoupling capacitor should be connected to AGND.
V_{COM2}	12	–	Common voltage for headphone (V_{CCA}/2). Decoupling capacitor should be connected to AGND.
AGND	13	–	Analog ground
NC	14	–	Not connected
V_{CCA}	15	–	Analog power supply
V_{IN}	16	I	ADC microphone input
MBIAS	17	O	Microphone bias output (0.75 V_{CCA})
$V_{OUT}L$	18	O	Headphone output for L-channel
V_{CCL}	19	–	Analog power supply for headphone amplifier of L-channel
HGND	20	–	Analog ground for headphone amplifier

Table 1-1. PCM2912 Terminal Functions (continued)

Name	TQFP-36 Terminal	I/O	Description
V_{CCR}	21	––	Analog power supply for headphone amplifier of R-channel
V_{OUT}R	22	O	Headphone output for R-channel
MAMP	23	I	Microphone preamplifier gain control (LOW: Preamplifier off; HIGH: Preamplifier on = +20 dB)
POWER	24	I	Power consumption declaration select pin (LOW: 100 mA; HIGH: 500 mA)
PGND	25	–	Analog ground for microphone bias, microphone amplifier, and PGA
V_{CCP}	26	–	Analog power supply for PLL
TEST1	27	I	Test pin. Must be set to high.
TEST0	28	I	Test pin. Must be set to low.
$\overline{\text{SSPND}}$	29	O	Suspend flag (LOW: Suspend; HIGH: Operational state)
MMUTE	30	I	Microphone mute control, active high (LOW: Mute off; HIGH: Mute on)
$\overline{\text{REC}}$	31	O	Status output for record (LOW: Record; FLASH: Mute on record; HIGH: Stop)
$\overline{\text{PLAY}}$	32	O	Status output for playback (LOW: Playback; FLASH: Mute on playback; HIGH: Stop)

1.3 Functional Block Diagram

Figure 1-2 illustrates the functional block diagram of the DEM-PCM2912 EVM.

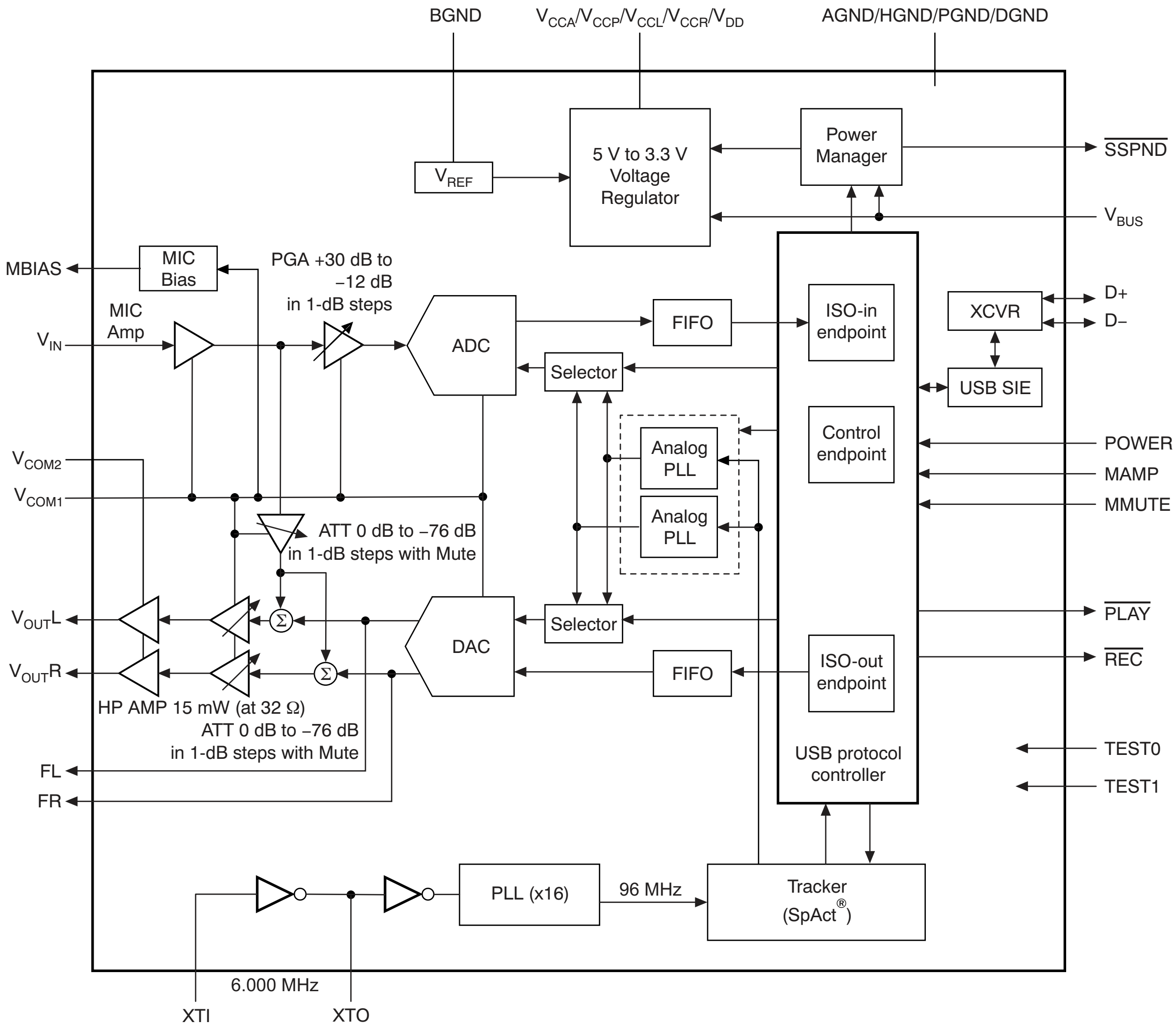


Figure 1-2. DEM-PCM2912 EVM Functional Block Diagram

Getting Started

This chapter provides information regarding handling and unpacking the DEM-PCM2912 EVM, as well as the EVM absolute operating conditions and a description of the factory default switch and jumper configurations.

2.1 Electrostatic Discharge Warning

Many of the components on the DEM-PCM2912 EVM are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

CAUTION

Failure to observe ESD handling procedures may result in damage to EVM components.

2.2 Block Diagram

Figure 2-1 illustrates the DEM-PCM2912 EVM block diagram and the default external equipment connection configuration.

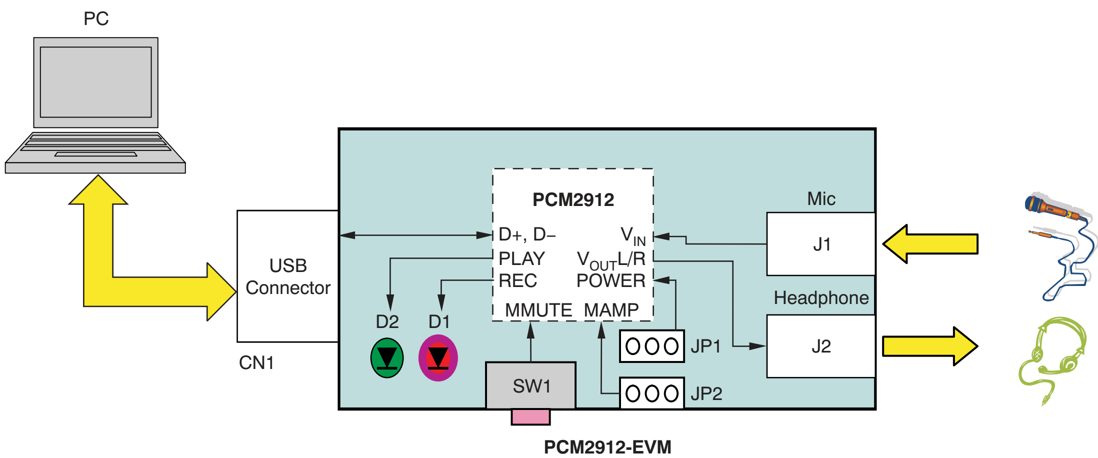


Figure 2-1. DEM-PCM2912 EVM Block Diagram

2.3 Interface and Connections

Table 2-1 lists the connector references for the DEM-PCM2912 EVM.

Table 2-1. DEM-PCM2912 EVM Connectors

Connectors	Part/Description
CN1	USB connector, type A
J1	Mono microphone input
J2	Headphone output terminal
D1	LED (red); record indicator (flash while muting)
D2	LED (green); playback indicator (flash while muting)
SW1	Microphone mute switch[(1)]
JP1	Power select (L: 100 mA, H: 500 mA)
JP2	Microphone amplifier gain control (Gain = 0 dB/+20 dB)

(1) The status of SW1 (microphone mute switch) is not reflected in the Mic Mute status of the *Wave In* display on a Windows-based PC; the operating system does not support an HID function.

Set-Up Guide

This chapter discusses how to set up the DEM-PCM2912 EVM on personal computers (PCs) equipped with any of a variety of major operating systems, including Microsoft Windows Vista®, Windows XP®, and Macintosh® OS X and later.

3.1 Basic Operating Set-Up—Windows Vista

This section reviews how to set up the DEM-PCM2912 EVM for use with a PC equipped with the Microsoft Vista Basic (or higher) operating system.

When the installation is complete, the EVM software is ready to use.

3.1.1 Basic Setup Before Evaluation

Follow these steps to set up the DEM-PCM2912 EVM for use with Windows Vista.

Step 1. Connect the USB connector of the DEM-PCM2912 EVM to an available USB connector (or hub) port on the lab PC. The DEM-PCM2912 EVM can be connected directly to the PC without an additional USB cable.
After the EVM is connected to the PC, the standard Windows Vista driver installs automatically to the PC. A custom driver for the DEM-PCM2912 is unnecessary.

Step 2. Open the *Control Panel* from the Start menu (*Start→Control Panel*. Open the *Sound* group from the Control Panel.

Step 3. Select the playback tab and confirm the USB audio codec appearance as the default playback device, as shown in Figure 3-1.

Step 4. Select the recording tab and confirm the USB audio codec appearance as the default recording device, as shown in Figure 3-2.

Figure 3-1. Sound—Playback Tab (Windows Vista)

Figure 3-2. Sound—Recording Tab (Windows Vista)

3.1.2 Volume and Mute Settings

Follow these steps to configure the volume settings for headphones, microphone, and the recording options.

To set the headphone volume:

Step 1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)

Step 2. Open the speaker properties of the USB audio codec from the Sound options and select the *Levels* tab, as Figure 3-3 illustrates.

Step 3. Set the output volume, mute, and the balance for headphones from –76 dB to 0 dB.

To set the microphone sidetone:

Step 1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)

Step 2. Open the speaker properties of the USB audio codec from the Sound options and select the *Levels* tab, as Figure 3-3 illustrates.

Step 3. Set the volume and the mute levels for the microphone sidetone from –76 dB to 0 dB.

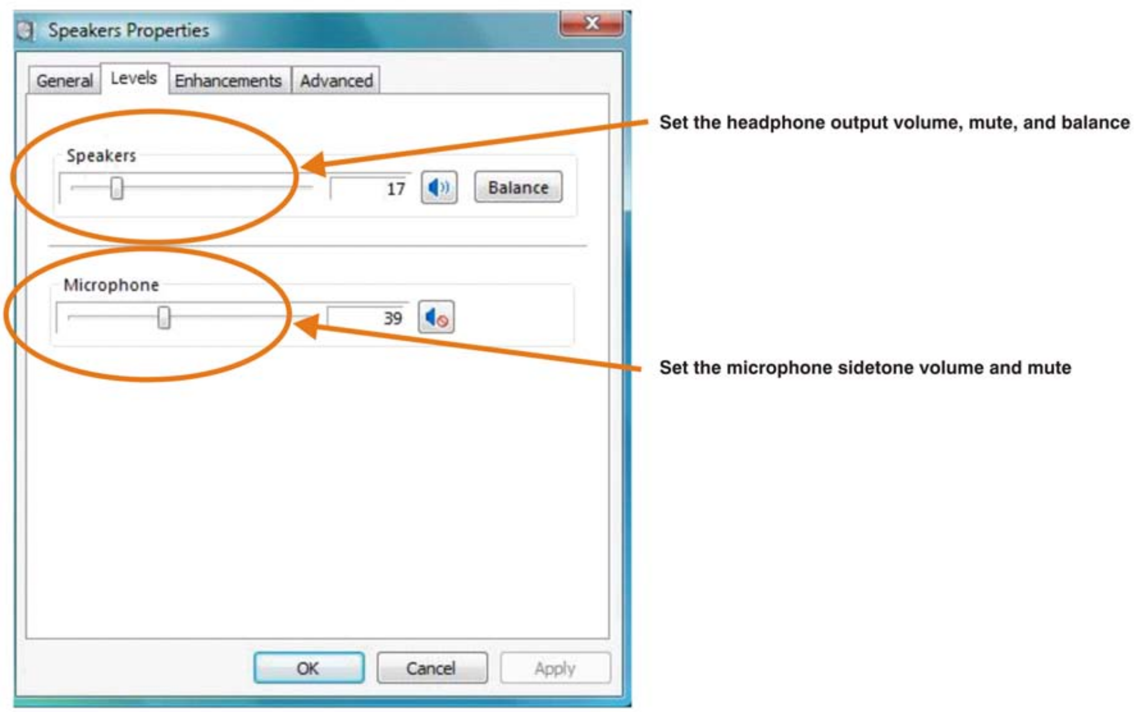


Figure 3-3. Speakers Properties—Levels Tab (Windows Vista)

To set the record volume:

Step 1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)

Step 2. Open the microphone properties of the USB audio codec from the Sound options and select the *Levels* tab, as Figure 3-4 illustrates.

Step 3. Set the microphone volume and the recording mute level from –12 dB to +30 dB.

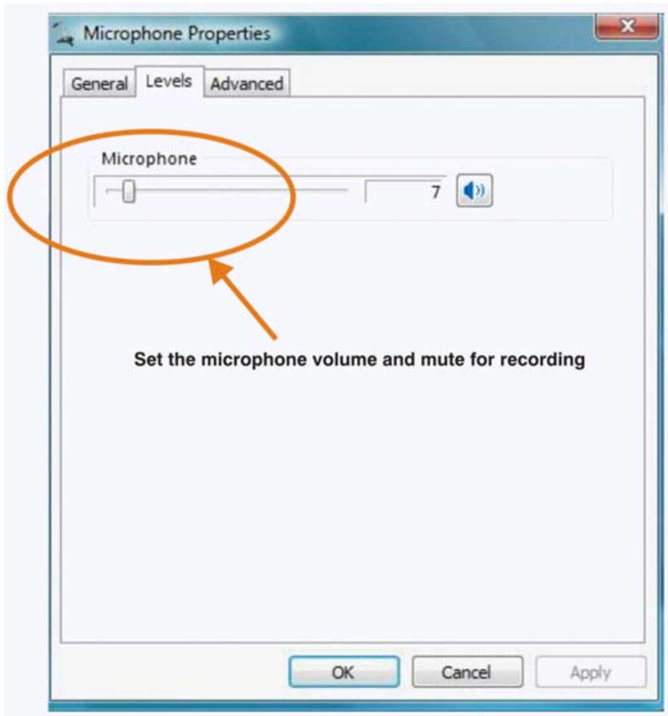


Figure 3-4. Microphone Properties—Levels Tab (Windows Vista)

After this process is complete, the system volume setting for each component is maintained even if EVM is plugged in/out.

3.1.3 Sampling Frequency

Under the Windows Vista operating system, it is necessary to select a specific sampling frequency because the sampling frequency cannot be changed on nearly all application software.

To set the DAC sampling frequency:

1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)
2. Open the speaker properties of the USB audio codec from the Sound options and select the *Advanced* tab, as Figure 3-5 illustrates.
3. Select the desired DAC sampling frequency from seven options: 8 kHz, 11.025 kHz,16 kHz, 22.5 kHz, 32 kHz, 44.1 kHz, and 48 kHz.

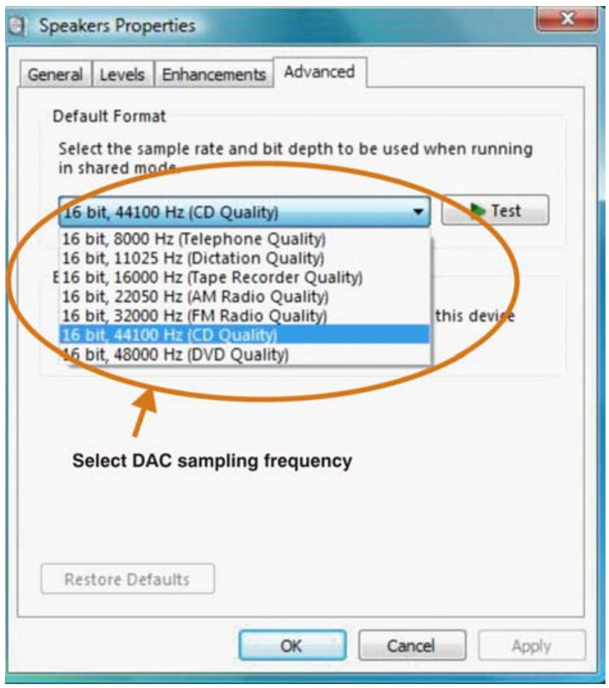


Figure 3-5. Speakers Properties—Advanced Tab (Windows Vista)

To set the ADC sampling frequency:

1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)
2. Open the microphone properties of the USB audio codec from the Sound options and select the *Advanced* tab, as Figure 3-6 illustrates.
3. Select the desired ADC sampling frequency from seven options: 8 kHz, 11.025 kHz,16 kHz, 22.5 kHz, 32 kHz, 44.1 kHz, and 48 kHz.

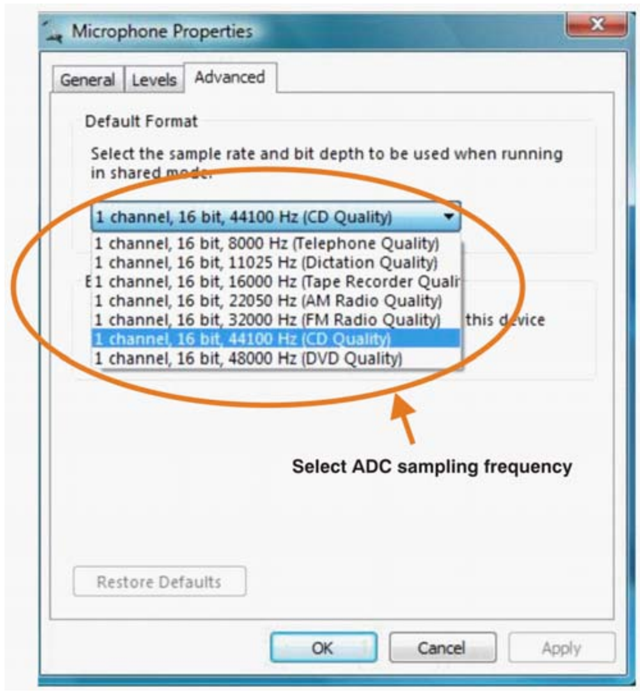


Figure 3-6. Microphone Properties—Advanced Tab (Windows Vista)

3.2 Basic Operating Set-Up—Windows XP

This section reviews how to set up the DEM-PCM2912 EVM for use with a PC equipped with the Microsoft XP (including Service Pack 2 updates) operating system.

When the installation is complete, the EVM software is ready to use.

3.2.1 Basic Setup Before Evaluation

Follow these steps to set up the DEM-PCM2912 EVM for use with Windows XP.

Step 1. Connect the USB connector of the DEM-PCM2912 EVM to an available USB connector (or hub) port on the lab PC. The DEM-PCM2912 EVM can be connected directly to the PC without an additional USB cable.
After the EVM is connected to the PC, the standard Windows XP driver installs automatically to the PC. A custom driver for the DEM-PCM2912 is unnecessary.

Step 2. Open the *Control Panel* from the Start menu (*Start→Control Panel*. Open the *Sound and Audio Devices* group from the Control Panel.

Step 3. Select the *Audio* tab and confirm the USB audio codec appearance as the default playback and recording device, as shown in Figure 3-7.

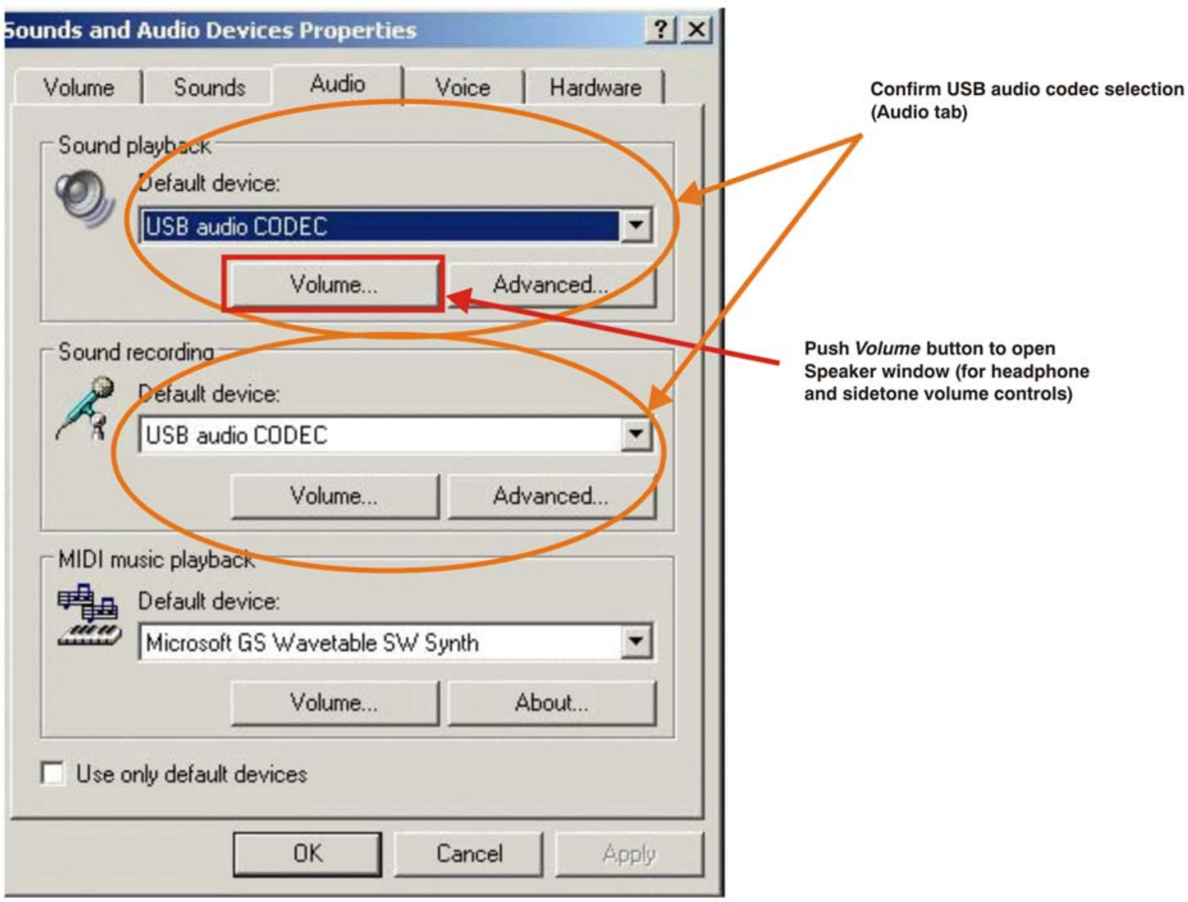


Figure 3-7. Sound and Audio Devices Properties—Audio Tab (Windows XP)

This process confirms the proper recognition of the DEM-PCM2912 EVM by Windows XP.

3.2.2 Volume Settings

Follow these steps to configure the volume settings for headphones, microphone, and the recording options.

To set the headphone volume:

Step 1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)

Step 2. Open the *Sound and Audio Devices Properties* dialog box and select the *Volume* tab, as Figure 3-8 illustrates. Alternatively, open the *Speakers* window from the *Volume* selection box (on the Audio tab) or the *Advanced* selection box (on the Volume tab); see Figure 3-7.

Step 3. Set the output volume and the mute levels for headphones from –76 dB to 0 dB. The initial volume setting upon installation is approximately –15 dB.

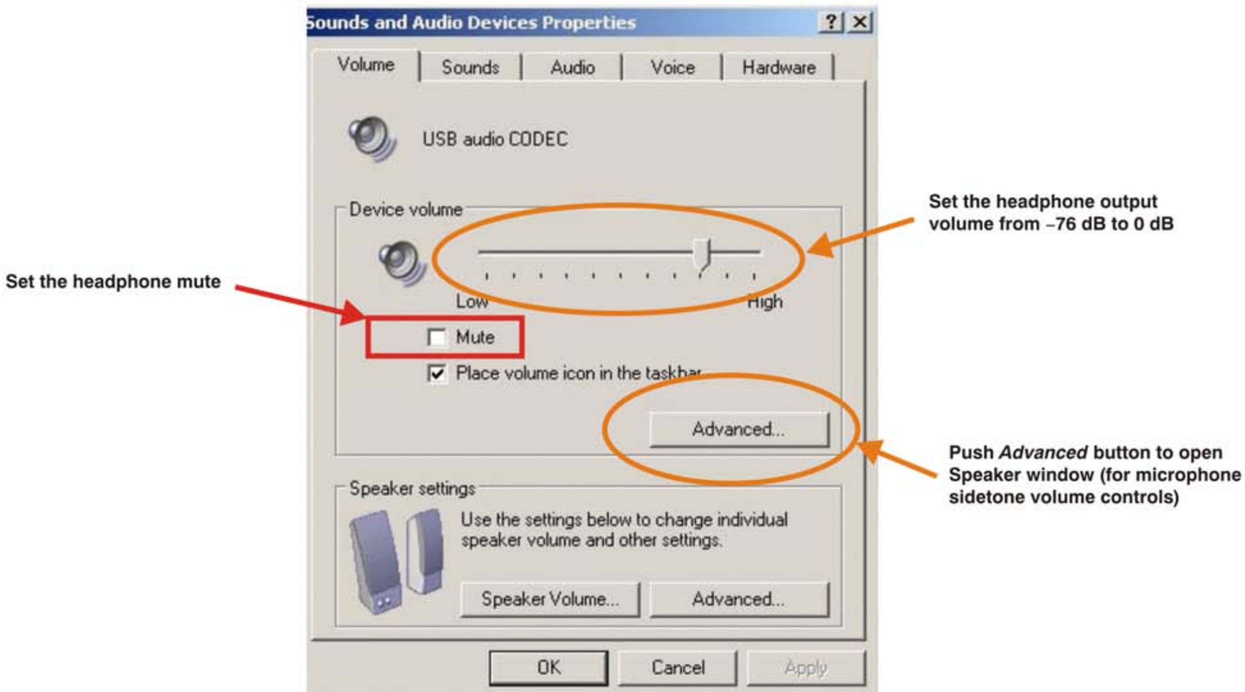


Figure 3-8. Sound and Audio Devices Properties—Volume Tab (Windows XP)

To set the microphone sidetone:

1. Open the *Speakers* options from the *Volume* selection box (on the Audio tab) or the *Advanced* selection box (on the Volume tab); see Figure 3-8. Alternatively, double-click the speaker icon (if displayed) in the lower right-hand area of the Windows taskbar (at the bottom of the screen); see Figure 3-7.
2. Set the volume and the mute levels for the microphone sidetone from –76 dB to 0 dB, as shown in Figure 3-9. The initial volume setting upon installation is approximately –8 dB.

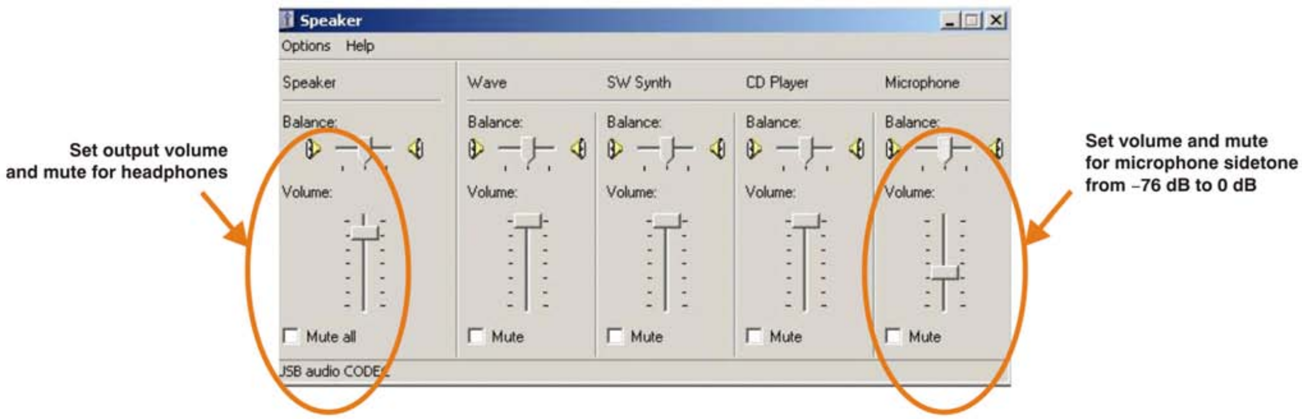


Figure 3-9. Speaker Window for Volume Setting (Windows XP)

To set the record volume:

1. Open the *Sound* options from the Control Panel. (*Start→Control Panel→Sound*)
2. Open the *Sound and Audio Devices Properties* dialog box and select the *Microphone* tab, as Figure 3-10 illustrates.

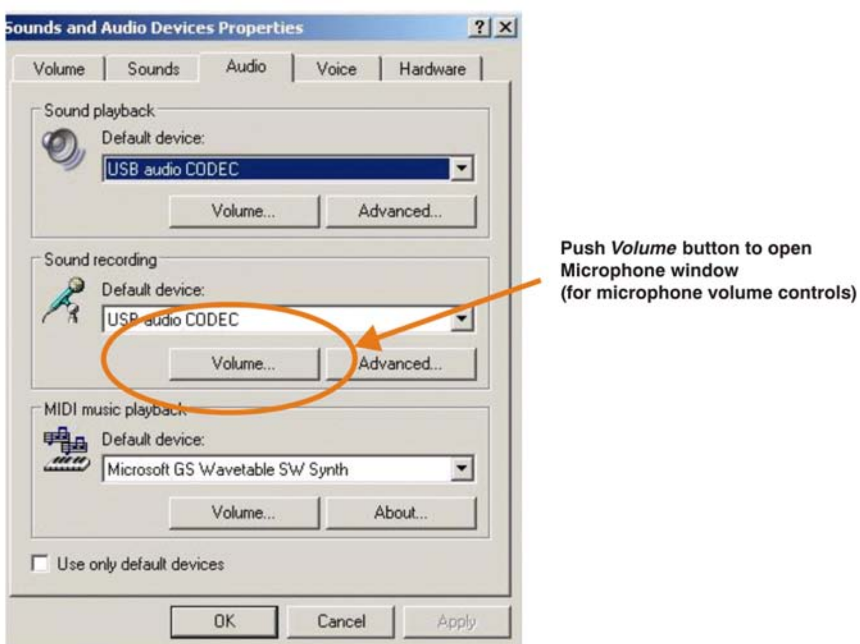


Figure 3-10. Sound and Audio Devices Properties—Audio Tab (Windows XP)

3. Set the microphone volume and the recording mute level from –12 dB to +30 dB, as shown in Figure 3-11. The initial volume setting upon installation is approximately +8 dB.

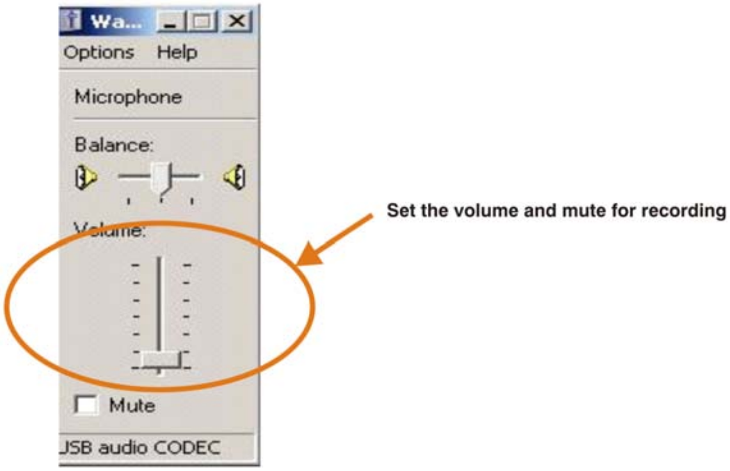


Figure 3-11. Microphone Volume Windows for Record Volume Setting (Windows XP)

After this process is complete, the system volume setting for each component is maintained even if EVM is plugged in/out.

3.3 Basic Operating Set-Up—Mac OS

This section reviews how to set up the DEM-PCM2912 EVM for use with a Macintosh computer equipped with the Mac OS X (or later) operating system.

When the installation is complete, the EVM software is ready to use.

3.3.1 Basic Setup Before Evaluation

Follow these steps to set up the DEM-PCM2912 EVM for use with a Macintosh computer.

Step 1. Connect the USB connector of the DEM-PCM2912 EVM to an available USB connector (or hub) port on the lab computer. The DEM-PCM2912 EVM can be connected directly to the PC without an additional USB cable.
After the EVM is connected to the PC, the standard Mac OS driver installs automatically to the computer system. A custom driver for the DEM-PCM2912 is unnecessary.

Step 2. Open the *System Environment Settings* from the Start menu. Open the *Sound* options from the System Environment settings.

Step 3. Select the *Input* tab and confirm the USB audio codec appearance as the default recording device, as shown in Figure 3-12.

Figure 3-12. Sound—Input Tab (Mac OS)

Step 4. Select the *Output* tab and confirm the USB audio codec appearance as the default playback device, as shown in Figure 3-13.

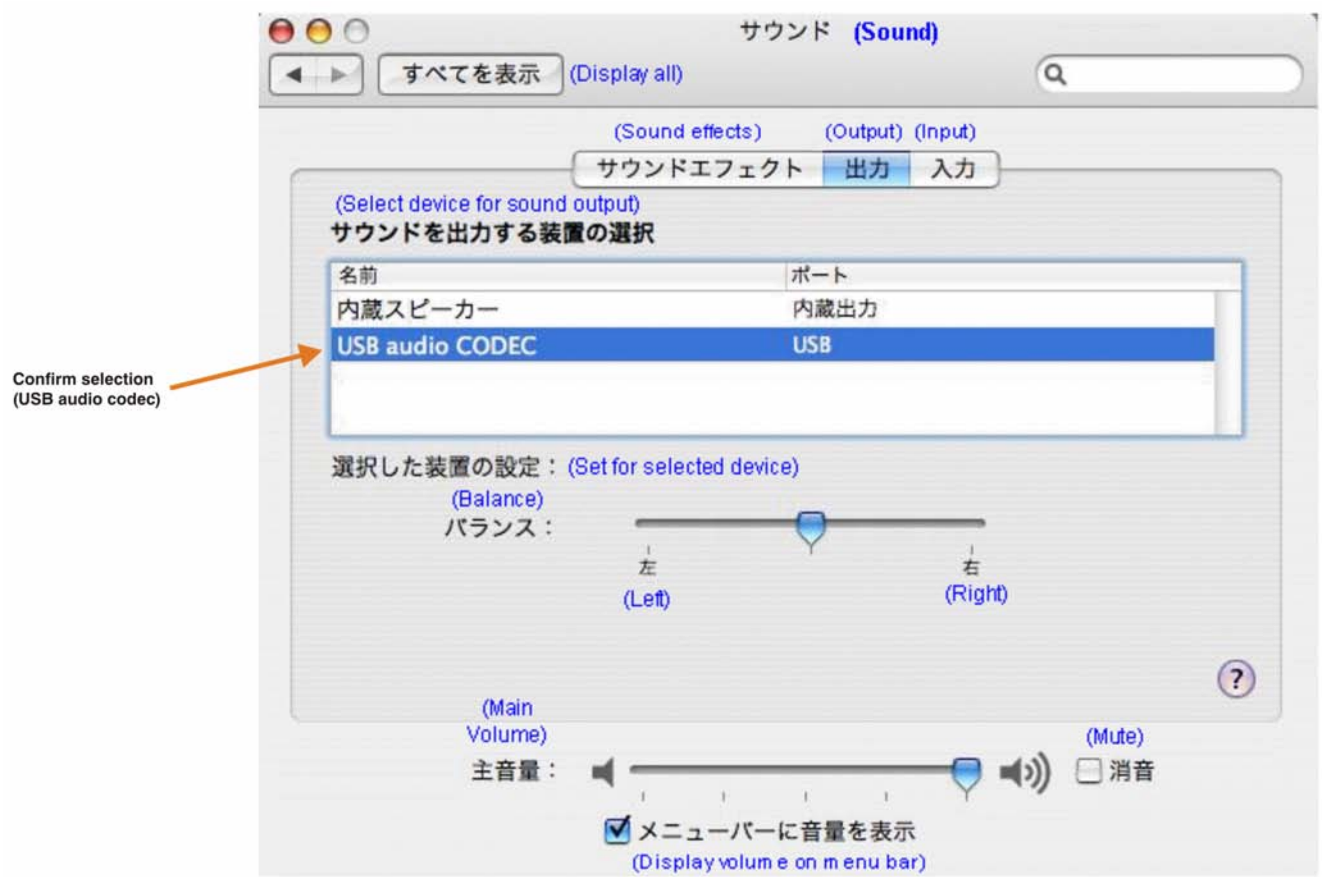


Figure 3-13. Sound—Output Tab (Mac OS)

This process confirms the proper recognition of the DEM-PCM2912 EVM by Mac OS X.

3.3.2 Volume Settings

Follow these steps to configure the volume settings for headphones, microphone, and the recording options.

To set the headphone volume:

Step 1. Open the *Audio MIDI Settings* options (*Application→Utility→Set Audio MIDI*), as illustrated in Figure 3-14. Alternatively, open the *Output* tab of the *Sound* options, as illustrated in Figure 3-13.

Step 2. Set the headphone volume and the audio output levels from –76 dB to 0 dB, and set the desired mute.

To set the record volume:

1. Open the *Audio MIDI Settings* options (*Application→Utility→Set Audio MIDI*), as illustrated in Figure 3-14. Alternatively, open the *Input* tab of the *Sound* options, as illustrated in Figure 3-12.
2. Set the recording level from –12 dB to +30 dB, and set the desired mute.

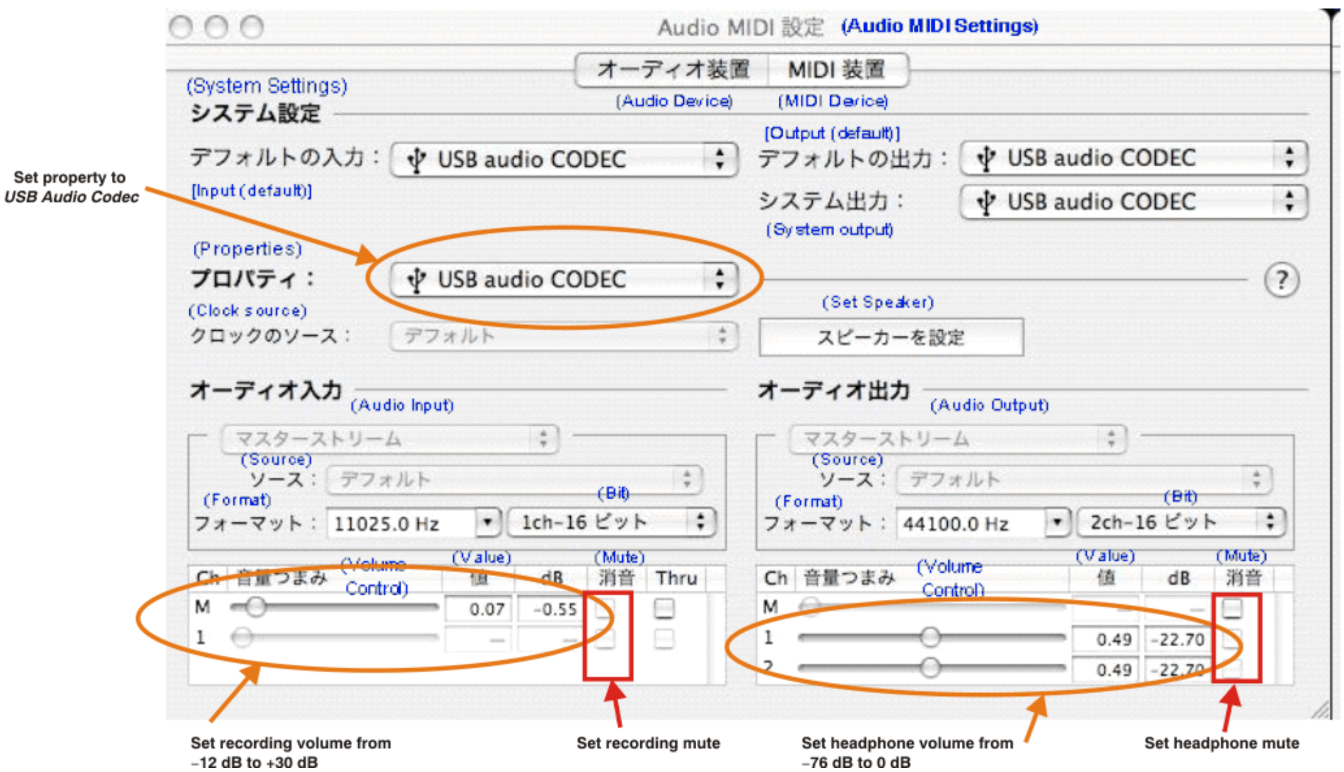


Figure 3-14. Audio Midi Setting Window (Mac OS)

To set the microphone sidetone:

The volume setting of the microphone sidetone is controlled by the individual application software on the Mac. For example, *Audio Recording* using QuickTime® (as shown in Figure 3-15) sets the microphone volume for sidetone from –76dB to 0dB.

Figure 3-15. QuickTime Audio Recording Controls

After this process is complete, the system volume setting for each component is maintained even if EVM is plugged in/out.

3.3.3 Sampling Frequency

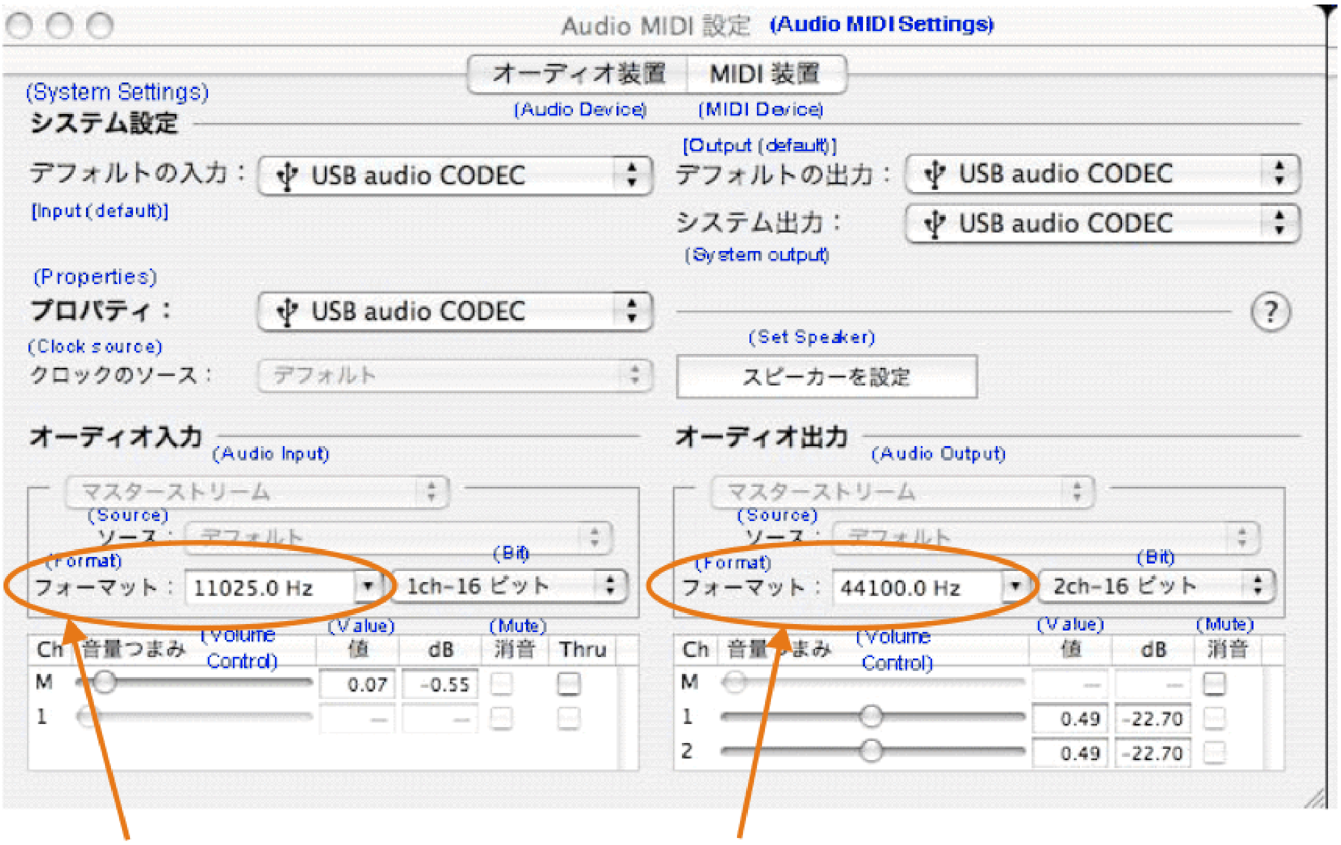
Under the Mac OS X operating system, it is necessary to select a specific sampling frequency because the sampling frequency cannot be changed on nearly all application software.

To set the DAC sampling frequency:

1. Open the *Audio MIDI Settings* options (*Application→Utility→Set Audio MIDI*), as illustrated in Figure 3-16.
2. Select the *Audio Input* tab in the *Set Audio MIDI* options group, as Figure 3-16 shows.
3. Select the desired DAC sampling frequency from seven options: 8 kHz, 11.025 kHz,16 kHz, 22.5 kHz, 32 kHz, 44.1 kHz, and 48 kHz.

To set the ADC sampling frequency:

1. Open the *Audio MIDI Settings* options (*Application→Utility→Set Audio MIDI*), as illustrated in Figure 3-16.
2. Select the *Audio Output* tab in the *Set Audio MIDI* options group, as shown in Figure 3-16.
3. Select the desired ADC sampling frequency from seven options: 8 kHz, 11.025 kHz,16 kHz, 22.5 kHz, 32 kHz, 44.1 kHz, and 48 kHz.



Select sampling frequency for ADC **Select sampling frequency for DAC**

Figure 3-16. Audio Midi Setting Window (Mac OS)

Chapter 4
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Evaluation and Measurements

This chapter discusses how to set up the DEM-PCM2912 EVM for performance evaluation using the Audio Precision SYS-2722® audio analyzer. The process of measuring dynamic characteristics is then presented, along with example characteristic data.

Topic **Page**

4.1 Measurements for Dynamic Characteristics

Typical dynamic performance graphs for playback and recording devices generally represent three performance characteristics (in addition to other specifications): total harmonic distortion and noise (THD+N); signal-to-noise ratio (SNR); and dynamic range (DR). For playback devices, channel separation is also a performance characteristic. These graphs also specify the test environment and measurement conditions required in order to meet typical performance values defined in the product data sheet.

For the DEM-PCM2912 EVM, the evaluation environment specifications are:

- Equipment used: Audio Precision, System Two Cascade Plus
- Power supply: V_{BUS} = 5.0 V (Bus power setting)
- Temperature: Room/ambient

4.2 Playback Performance

The DEM-PCM2912 EVM performance presented in this section was obtained under the following conditions:

- f_S = 44.1 kHz
- Output PGA (Speaker output volume): 0 dB
- Sidetone from microphone PGA: –76 dB (mute)
- R_L = 10 kΩ / 32 Ω / 16 Ω are inserted into headphone jack J2 for headphone output
- Jumper setting: set JP1 to 100 mA and JP2 to 0 dB
- Application software for playback: Sound Recorder, Media Player and ITunes for Windows Vista/XP; QuickTime and ITunes for Mac OS X.
- Equipment: AP2 Analog Analyzer (SYS-2722)

Configure the equipment as shown in Figure 4-1.

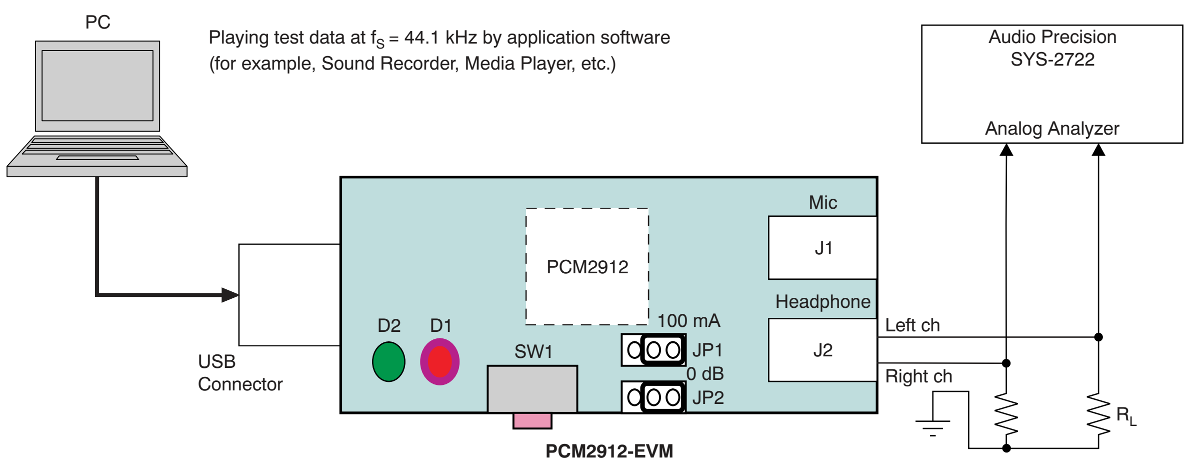

Figure 4-1. DEM-PCM2912 EVM Configuration for Playback Performance Measurement

Table 4-1. Line Output Playback Performance

Power Supply	Performance	Filter Setting	R_L	$V_{OUT}L$	$V_{OUT}R$
5.0 V	THD+N (0 dBFS at 1 kHz)	400 Hz to 20 kHz Pre-Anlr	10 kΩ	0.0086%	0.0085%
	SNR (BPZ input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	10 kΩ	92.1 dB	92.1 dB
	DR (–60 dBFS input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	10 kΩ	90.3 dB	90.5 dB
	Channel Separation (BPZ input for target channel)	400 Hz to 20 kHz Pre-Anlr	10 kΩ	89.3 dB	89.3 dB

Table 4-2. 32-Ω Headphone Output Playback Performance

Power Supply	Performance	Filter Setting	R_L	$V_{OUT}L$	$V_{OUT}R$
5.0 V	THD+N (0 dBFS at 1 kHz)	400 Hz to 20 kHz Pre-Anlr	32 Ω	0.026%	0.025%
	SNR (BPZ input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	32 Ω	92.1 dB	92.1 dB
	DR (–60 dBFS input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	32 Ω	89.4 dB	89.4 dB

Table 4-3. 16-Ω Headphone Output Playback Performance

Power Supply	Performance	Filter Setting	R_L	$V_{OUT}L$	$V_{OUT}R$
5.0 V	THD+N (0 dBFS at 1 kHz)	400 Hz to 20 kHz Pre-Anlr	16 Ω	0.044%	0.042%
	SNR (BPZ input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	16 Ω	92.1 dB	92.1 dB
	DR (–60 dBFS input)	400 Hz to 20 kHz Pre-Anlr + A-weighting	16 Ω	89.4 dB	89.3 dB

4.3 Recording Performance

The DEM-PCM2912 EVM playback performance presented in this section was obtained under the following conditions:

- f_S = 44.1 kHz
- Input PGA (Microphone input volume): 0 dB
- Jumper setting: set JP1 to 100 mA and JP2 to 0 dB
- Application software for playback: Sound Recorder, Media Player and ITunes for Windows Vista/XP; QuickTime and ITunes for Mac OS X.
- Use analog input data provided by the AP2 analog generator (SYS-2722) with unbalanced floating ground setting.

Configure the equipment as shown in Figure 4-2.

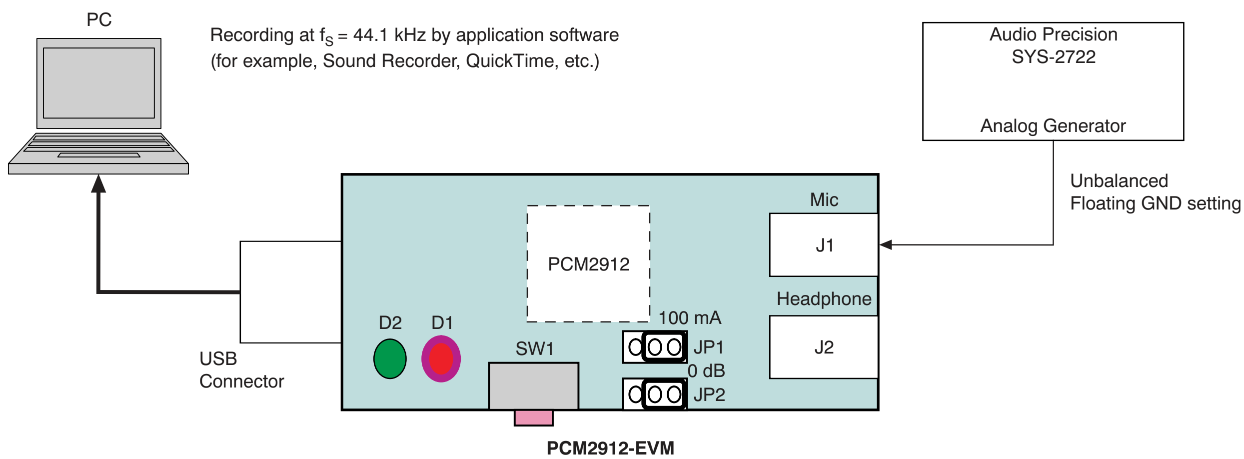

Figure 4-2. DEM-PCM2912 EVM Configuration for Recording Performance Measurement when Recording Data

To measure recording performance with the recording data, use S/PDIF digital interface output data. Connect the EVM to the AP2 digital analyzer (SYS-2722); for example, as the DEM-PCM2704 EVM shown in Figure 4-3.

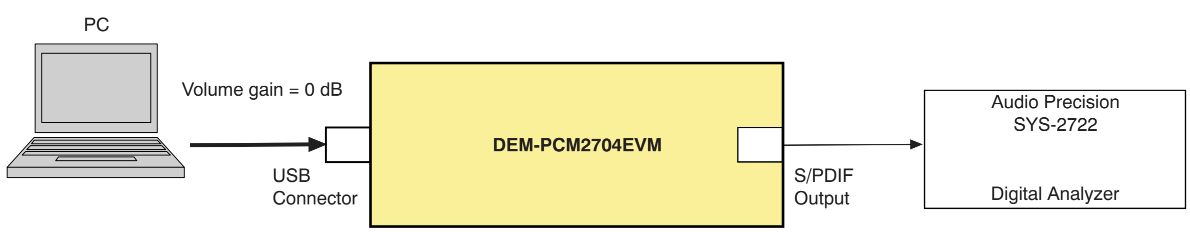

Figure 4-3. DEM-PCM2912 EVM Configuration for Recording Performance Measurement with Recorded Data

Table 4-4. Line Input Recording Performance

Power Supply	Performance	Filter Setting	DOUT
5.0 V	THD+N (–1 dB at 1 kHz)	400 Hz to 20 kHz LP	0.008%
	SNR (BPZ input)	400 Hz to 20 kHz LP + A-weighting	92.5 dB
	DR (–60 dB input)	400 Hz to 20 kHz LP + A-weighting	90.5 dB

Schematic, PCB Layout, and Bill of Materials

This chapter provides the electrical and physical layout information for the DEM-PCM2912 EVM. The bill of materials is included for component and manufacturer reference.

Note: Board layouts are not to scale. These are intended to show how the board is laid out; they are not intended to be used for manufacturing DEM-PCM2912 EVM PCBs.

Topic **Page**

5.1 Schematics

The schematic for the DEM-PCM2912 EVM is shown in Figure 5-1.

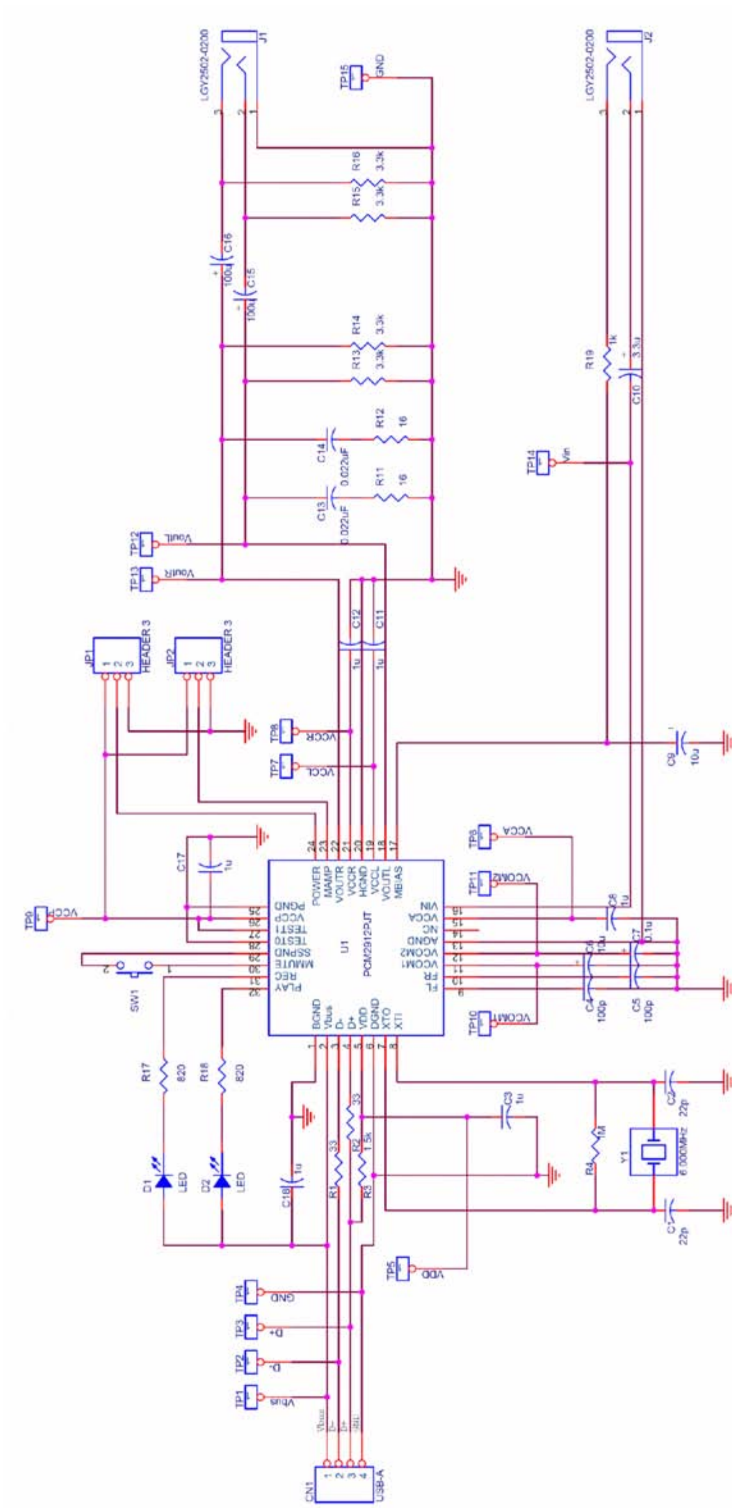

Figure 5-1. DEM-PCM2912 EVM Schematic

5.2 Printed Circuit Board Layout

Figure 5-2 through Figure 5-4 illustrate the printed circuit board (PCB) layout for the DEM-PCM2912 EVM.

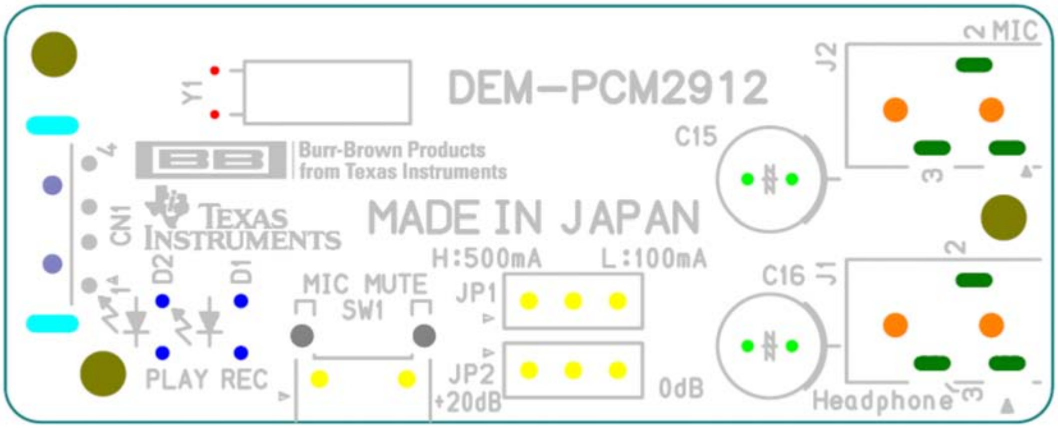

Figure 5-2. DEM-PCM2912 EVM Board Layout—Silkscreen

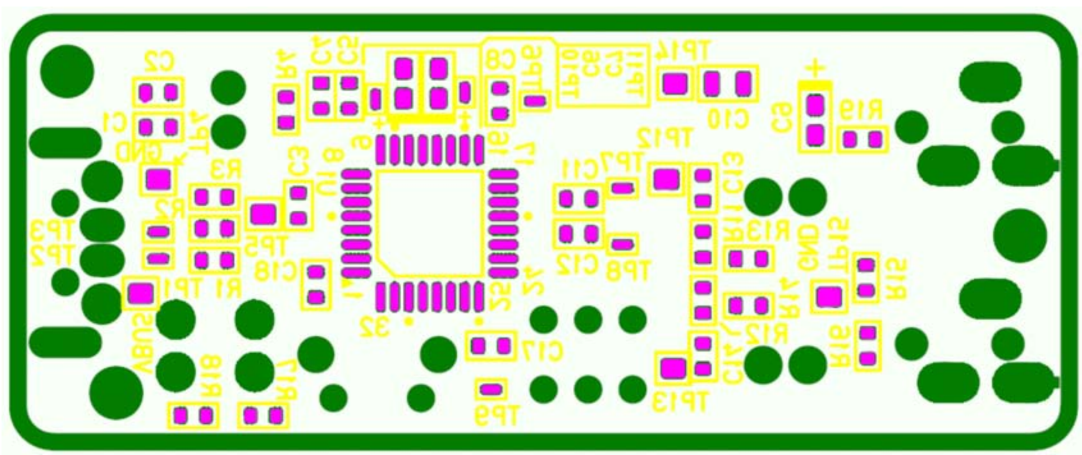

Figure 5-3. DEM-PCM2912 EVM Board Layout—Component Side

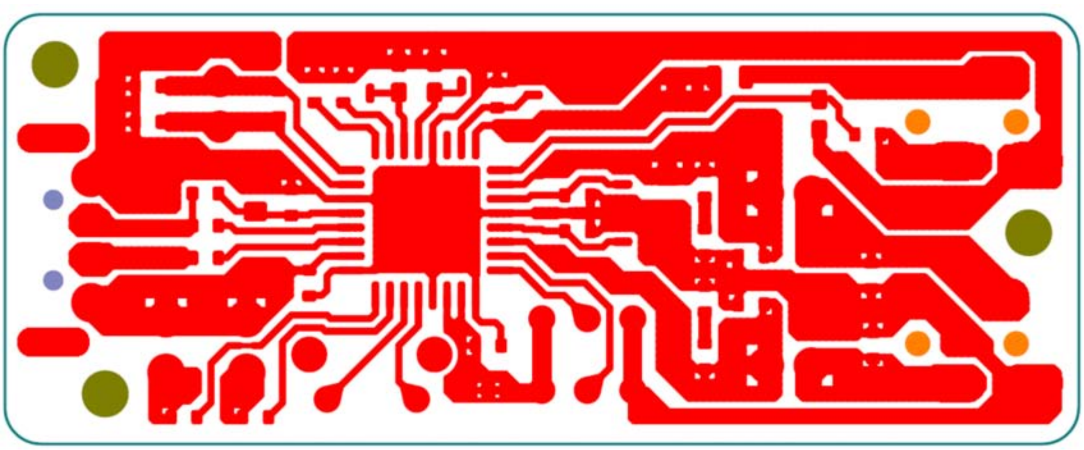

Figure 5-4. DEM-PCM2912 EVM Board Layout—Inner View

5.3 Component List

Table 5-1 lists the bill of materials for the DEM-PCM2912 EVM.

Table 5-1. Bill of Materials

Reference Designator	Value	Value2	Manufacturer	Mfr Part No	Remarks
C1	22 pF	50 V, 5%	Taiyoyuden	UMK107CH220JZ	
C2	22 pF	50 V, 5%	Taiyoyuden	UMK107CH220JZ	
C4	100 pF	50 V, 5%	Taiyoyuden	UMK107CH101JZ	
C5	100 pF	50 V, 5%	Taiyoyuden	UMK107CH101JZ	
C13	0.022 µF	25 V, 10%	Taiyoyuden	TMK107BJ223KA	
C14	0.022 µF	25 V, 10%	Taiyoyuden	TMK107BJ223KA	
C7	0.1 µF	25 V, 10%	Taiyoyuden	TMK105BJ104KV	
C11	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C12	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C17	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C18	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C3	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C8	1 µF	16 V, 10%	Matsushita	ECJ-1VB1C105K	
C10	3.3 µF	10 V, 10%	Murata SS	GRM40B335K10PT	
C6	10 µF	6.3 V, 20%	Rohm	TCP0J106M8R	
C9	10 µF	6.3 V, 20%	Rohm	TCP0J106M8R	
C15	100 µF	4 V, 20%	Matsushita	ECE-A0GKS101	
C16	100 µF	4 V, 20%	Matsushita	ECE-A0GKS101	
CN1	USB 'A'		ACON	UAR10-4W5100	Host Interface
D1	LED		Rohm	SLR342-VR	Recording Indicator
D2	LED		Rohm	SLR342-MG	playback Indicator
J1	Stereo mini Jack		SMK	LGY2502-0200	Stereo Headphone
J2	Stereo mini Jack		SMK	LGY2502-0200	Mic Input and Bias
R11	16	5%	KOA	RK73K1J-160J	
R12	16	5%	KOA	RK73K1J-160J	
R1	33	5%	KOA	RK73K1J-330J	Should be adjusted to meet USB spec.
R2	33	5%	KOA	RK73K1J-330J	
R17	820	5%	KOA	RK73K1J-821J	
R18	820	5%	KOA	RK73K1J-821J	
R19	1k	5%	KOA	RK73K1J-102J	
R3	1.5k	5%	KOA	RK73K1J-152J	
R13	3.3k	5%	KOA	RK73K1J-332J	
R14	3.3k	5%	KOA	RK73K1J-332J	
R15	3.3k	5%	KOA	RK73K1J-332J	
R16	3.3k	5%	KOA	RK73K1J-332J	
R4	1M	5%	KOA	RK73K1J-105J	
SW1	Tact SW		ALPS	SKQTLBE010	Mic Mute
U1	PCM2912PJT		TI		
Y1	Crystal	6 MHz, ±30 ppm	Epson	CA301 6.000M-C	
JP2	Jumper SW		Hiroshe denshi	A2-3PA2.54DSA(71)	
JP3	Jumper SW		Hiroshe denshi	A2-3PA2.54DSA(71)	

Table 5-1. Bill of Materials (continued)

Reference Designator	Value	Value2	Manufacturer	Mfr Part No	Remarks
TP1, TP4–TP5, TP12–TP15	Check pin		Mac8	HK-4-S	
TP2–TP3, TP6–TP11	Check pin		Mac8	HK-6-S	

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of –2.0 V to +4.0 V and the output voltage range of –2.0 V to +4.0 V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +60°C. The EVM is designed to operate properly with certain components above +60°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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