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DEM-DAI1742
EVALUATION FIXTURE

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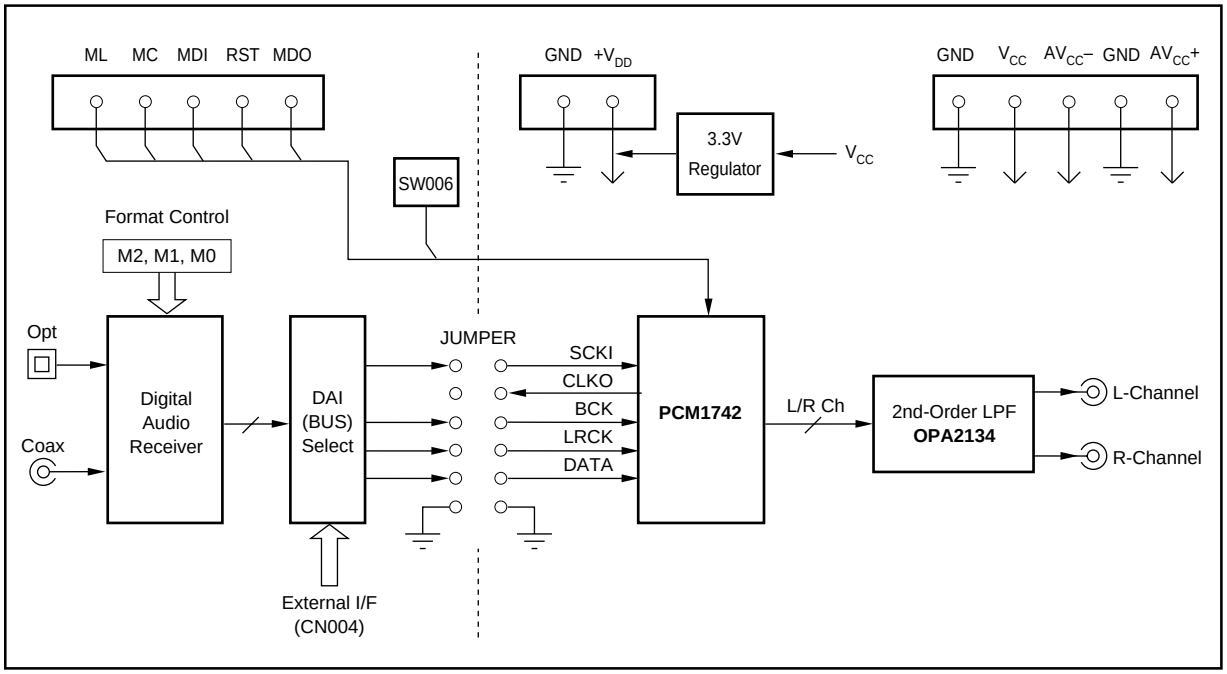

FEATURES

- **COMPLETE EVALUATION PLATFORM FOR THE PCM1742 STEREO AUDIO DAC**
- **ONBOARD LOW-PASS FILTERS FOR THE LEFT AND RIGHT CHANNELS**
- **EASY CONFIGURATION USING ONBOARD SWITCHES AND JUMPERS**
- **96kHz DIGITAL AUDIO RECEIVER ACCEPTS S/PDIF AND OPTICAL INPUTS**
- **DEMONSTRATION SOFTWARE FOR PROGRAMMING THE PCM1742'S INTERNAL REGISTERS (REQUIRES A PC RUNNING MICROSOFT WINDOWS® 3.1, 95, 98)**
- **CENTRONICS CONNECTOR FOR INTERFACING TO A PC PARALLEL PORT (REQUIRED FOR THE DEMONSTRATION SOFTWARE)**
- **POWER-SUPPLY REQUIREMENTS: +5V, +15V, AND –15V**
- **CONNECTOR FOR OPTIONAL EXTERNAL +3.3V POWER SUPPLY**

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DESCRIPTION

The DEM-DAI1742 is a complete evaluation platform for the PCM1742 24-bit, 192kHz stereo audio Digital-to-Analog Converter (DAC). All necessary connectors and circuitry are provided for interfacing to audio test systems and commercial audio equipment.

TEXAS INSTRUMENTS

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HARDWARE DESCRIPTION

POWER SUPPLIES

The DEM-DAI1742 evaluation fixture requires three power supplies for operating the PCM1742, the digital support circuitry, and the low-pass filter op amp. Standard banana jacks are provided for all power-supply connections.

Connector CN054 provides the +5V supply required for V_{CC}. It is used to power the analog sections of the PCM1742, as well as the digital audio receiver (U002) and associated logic (U003 and U004).

Connectors CN051 (AV_{CC}+) and CN053 (AV_{CC}–) are used to power the OPA2134 dual op amp (U101) that performs the DAC output low-pass filter function. AV_{CC}+ may be set from +5V to +18V, while AV_{CC}– may be set from –5V to –18V.

Ground connections are made at connectors CN052 and CN055. Both are connected to the ground plane of the DEM-DAI1742 board.

In addition to the three required external power supplies, a +3.3V supply is required for the PCM1742. The +3.3V supply is typically derived from V_{CC} using an onboard linear regulator, the REG1117-3.3 (U051). A jumper must be installed at CN057 to connect the regulator output to the PCM1742.

A connector (CN056) is provided for connection to an optional external +3.3V power supply. When using CN056, the jumper at CN057 must be removed in order to disable the regulator output.

ANALOG OUTPUTS

The left and right audio outputs are available at RCA jacks CN104 and CN105 respectively. The outputs are taken from the low-pass filter, which has a gain of 2. The low-pass filter may be configured for one of two cutoff frequencies: 54kHz or 108kHz. Typically, the 54kHz cutoff frequency is used for all measurements.

For f_{-3dB} = 54kHz, jumpers JP101 through JP106 must all be installed.

For f_{-3dB} = 108kHz, jumpers JP101 through JP106 must all be removed.

ZERO-FLAG OUTPUTS

The zero flags for the left and right channels are brought out at connector CN103. ZFGL is the zero flag for the left channel, while ZFGR is the zero flag for the right channel. Refer to the PCM1742 data sheet for detailed information regarding the zero-flag outputs.

DIGITAL AUDIO INTERFACE

A digital audio receiver (U002) is provided for easy connection to S/PDIF and optical signal sources, including audio test systems (Audio Precision, Rhode & Schwarz) and commercial audio equipment (CD and DVD players). The receiver can operate at rates up to a 96kHz with 24-bit audio data. Switches SW001 through SW003 are used to set the receiver output data format, as shown in Table I. Table II shows the jumper configuration for JP001 for normal operation.

SW001	SW002	SW003	RECEIVER OUTPUT DATA FORMAT
L	L	L	16- to 24-Bit Left-Justified
L	H	L	16- to 24-Bit I²S
H	L	H	16-Bit Right-Justified (or Standard)
L	H	H	18-Bit Right-Justified (or Standard)

TABLE I. Digital Audio Receiver Configuration.

JP001 JUMPER	16-BIT RIGHT JUSTIFIED FORMAT	18-BIT RIGHT JUSTIFIED FORMAT	16- TO 24-BIT I²S FORMAT	16- TO 24-BIT LEFT JUSTIFIED FORMAT
CLKO	X	X	X	X
SCLK	O	O	O	O
GND	O	O	O	O
BCK	O	O	O	NC
BCK (L.Just.)	NC	NC	NC	O
LRCK	O	O	O	O
DATA	O	O	O	O
NOTE: O = Install Jumper; NC = Remove Jumper; X = Don't Care,				

TABLE II. JP001 Jumper Configuration.

Switch SW004 is a normally open, momentary-contact push-button switch used to reset the digital audio receiver when necessary.

The demonstration board also supports direct interfacing to audio decoders and signal processors via connector CN004 (unpopulated). SCLK, BCK, LRCK, and DATA are available and buffered by U005. In addition, +5V (V_{CC}) and Ground are available at CN004. Switch SW005 is used to select between the digital audio receiver and connector CN004 as the source of the audio interface. Table III shows the available switch settings.

SW005 SETTING	SOURCE SELECTION
INT	Digital Audio Receiver (U002)
EXT	Connector CN004 via Buffer U005

TABLE III. Digital Audio Source Selection.

DIP-SWITCH CONFIGURATION

Switch SW006 is not utilized for the PCM1742. It is included for future products that may be compatible with this demonstration board. All switch elements must be set to the OFF position for the PCM1742.

PC PARALLEL PORT/HOST CONNECTOR

The evaluation fixture includes a Centronics connector, CN003, thatis used to connect to a PC parallel port or an alternative host controller. This connector is utilized to access the serial control port of the PCM1742. The serial control port is used to program the PCM1742's internal registers. A standard printer cable is used to connect CN003 of the evaluation fixture to a PC parallel port. The port signals are buffered using U006.

SCHEMATICS

Figures 1 through 4 provide schematics for the DEM-DAI1742.

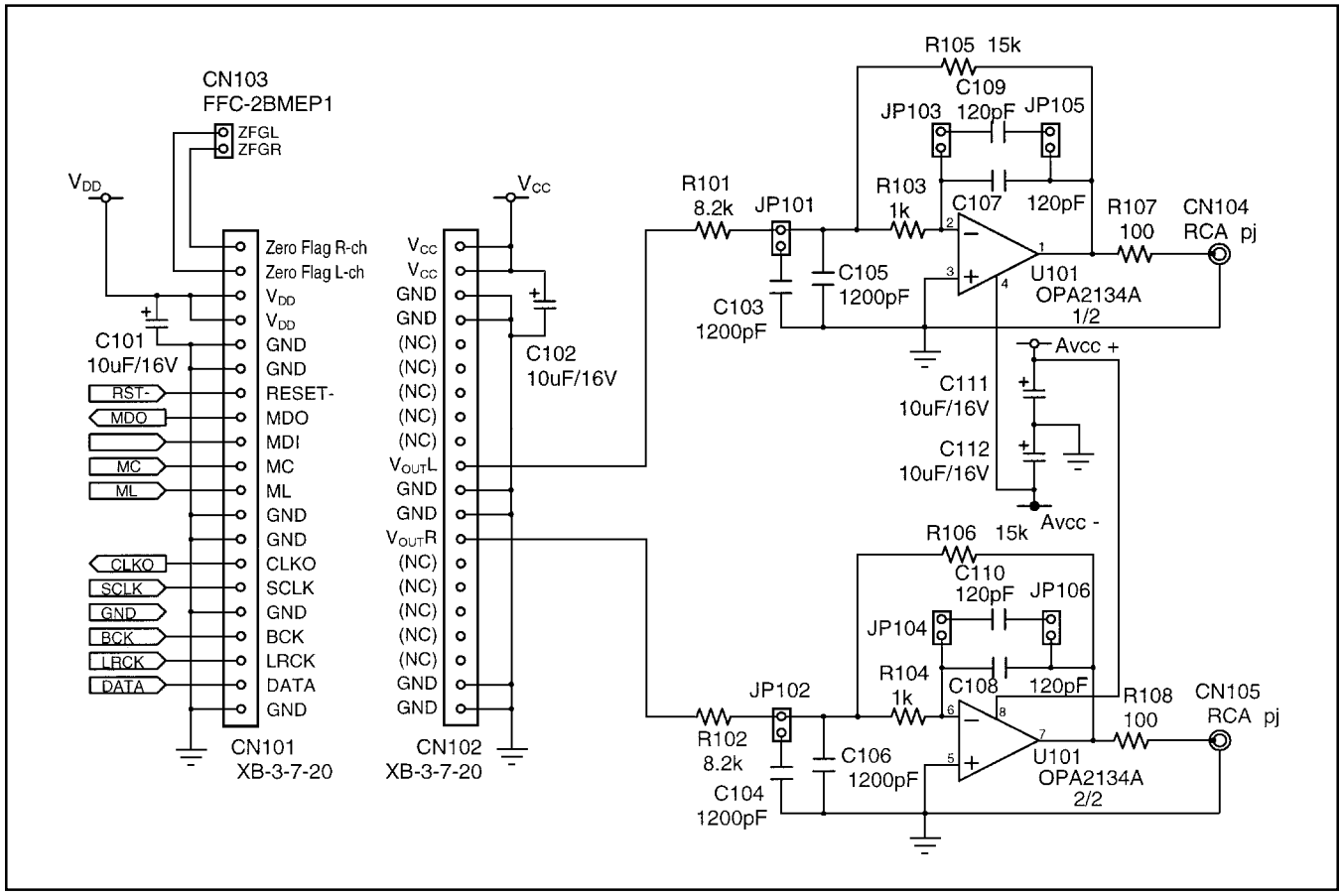

FIGURE 1. DAC Low-Pass Filters.

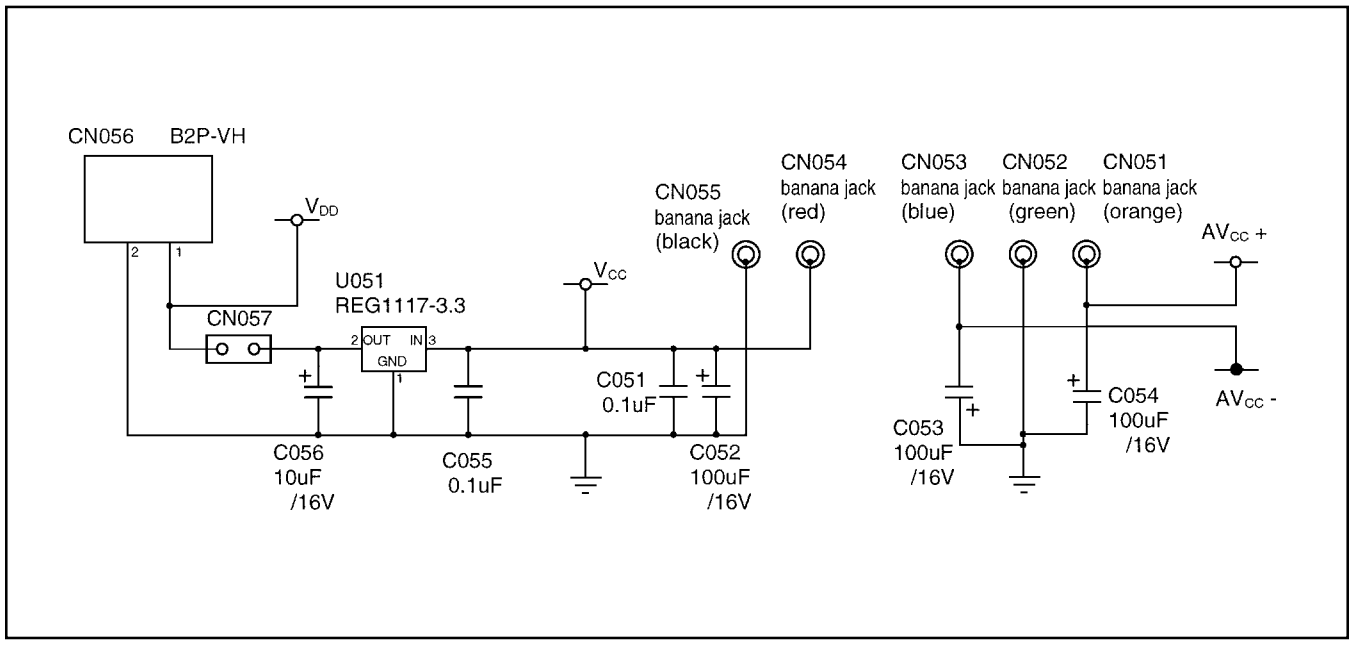

FIGURE 2. Power-Supply Connections.

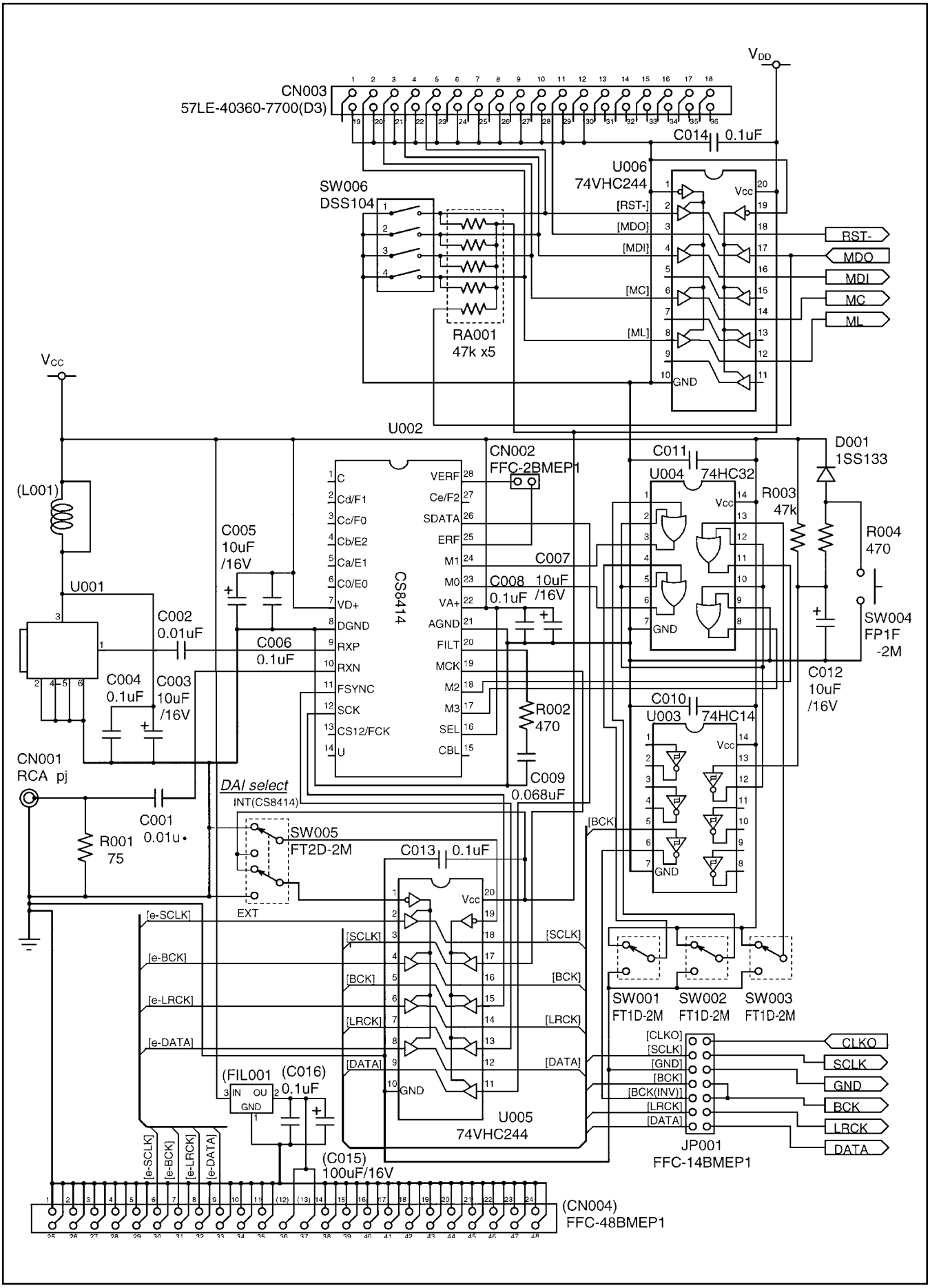

FIGURE 3. DAC, Digital Audio Interface, and I/O Connections.

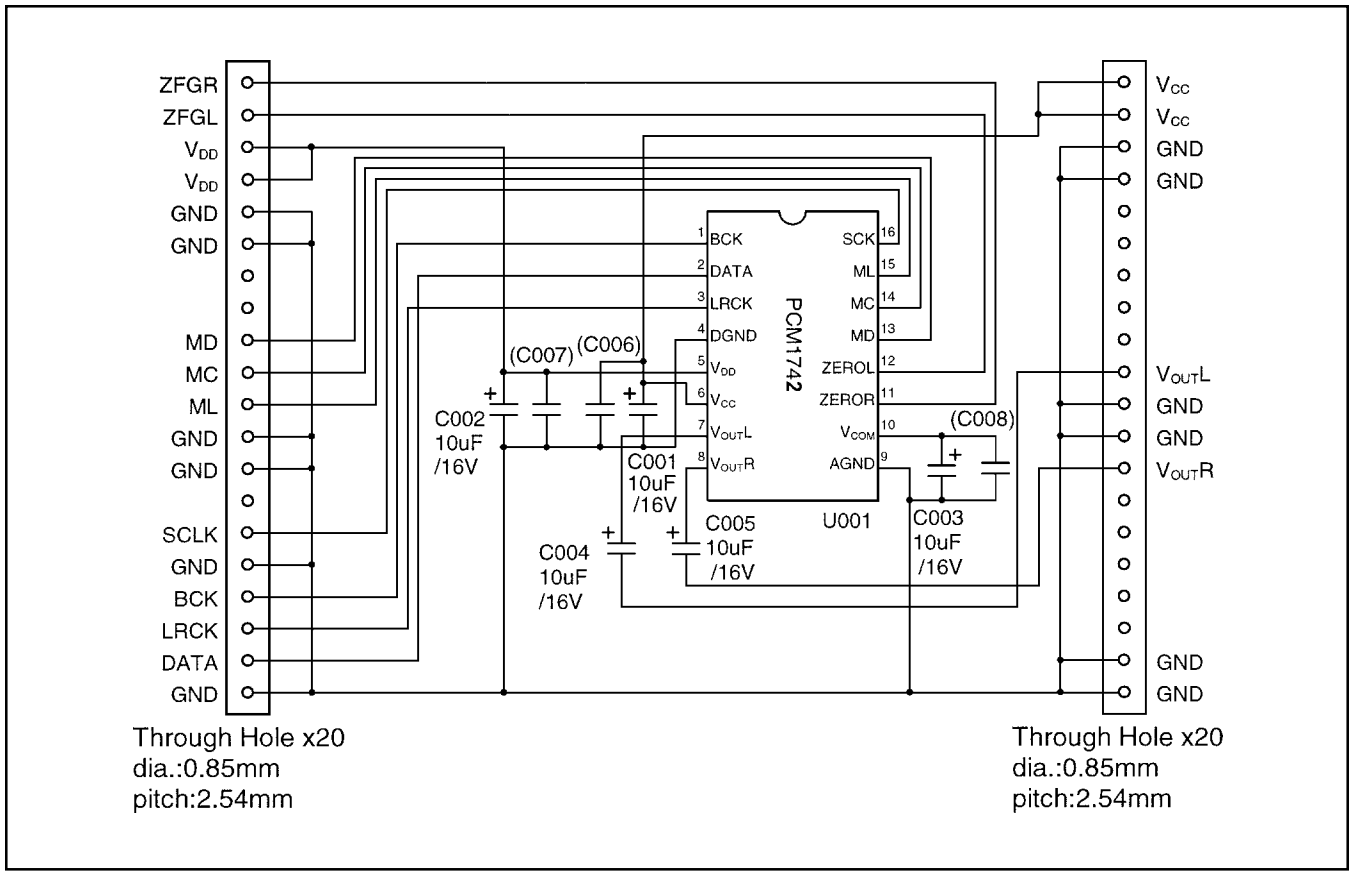

FIGURE 4. PCM1742 Daughter Card Schematic.

PCB LAYOUT

Figures 5 through 10 provide PCB plots for the DEM-DAI1742.

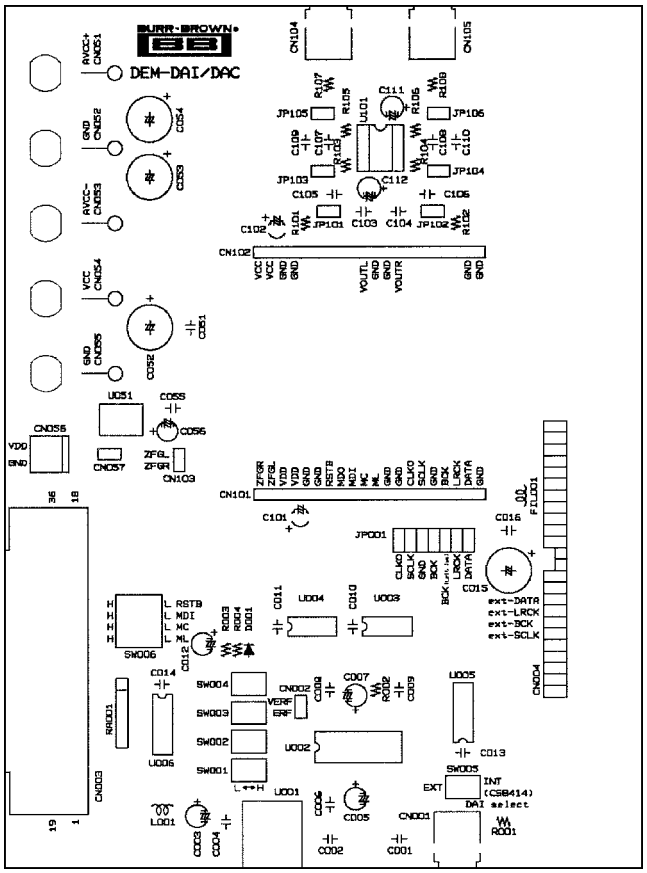

FIGURE 5. DEM-DAI/DAC Silk Screen (Top Side).

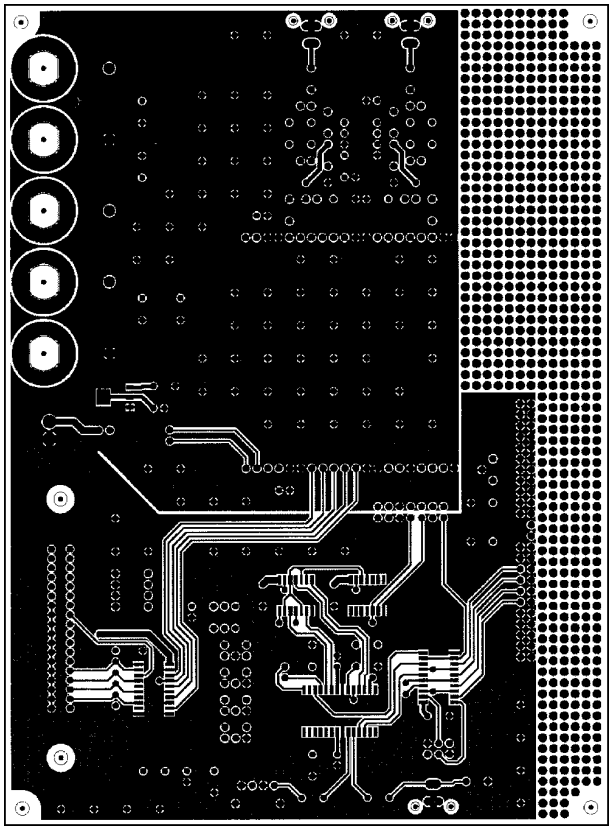

FIGURE 6. DEM-DAI/DAC Top-Side Layer.

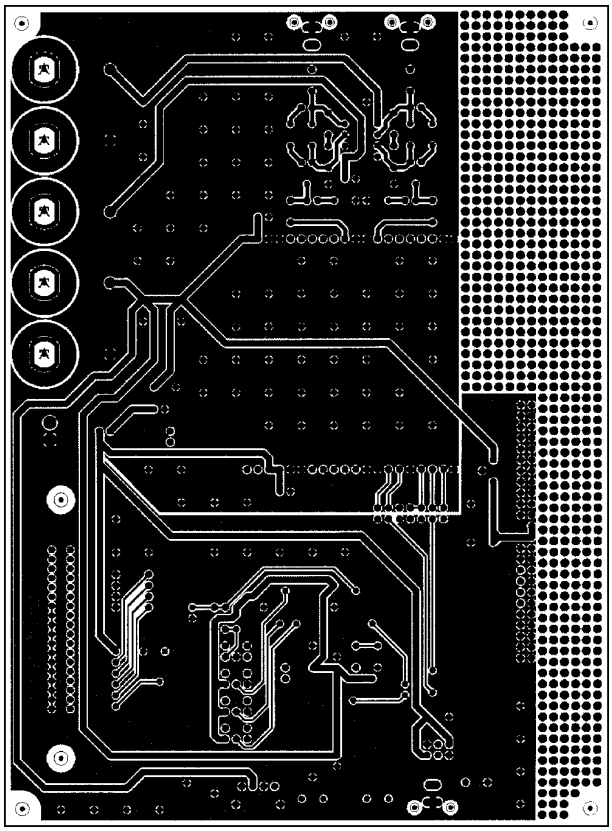

FIGURE 7. DEM-DAI/DAC Bottom-Side Layer.

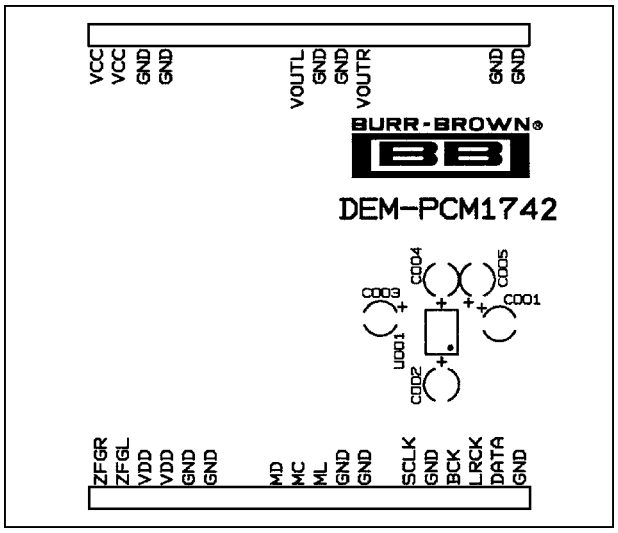

FIGURE 8. PCM1742 Daughter Card Silk Screen (Top Side).

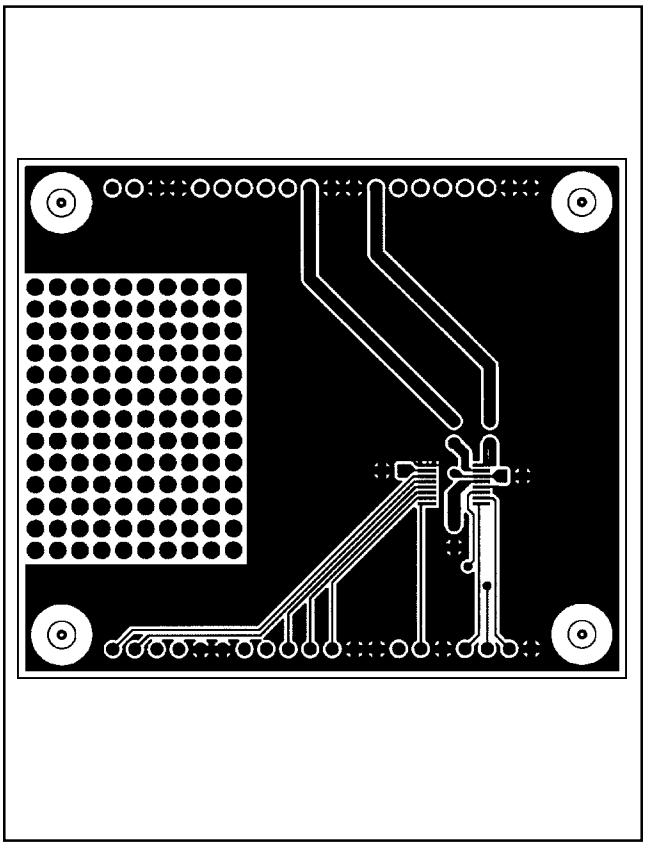

FIGURE 9. PCM1742 Daughter Card Top-Side Layer.

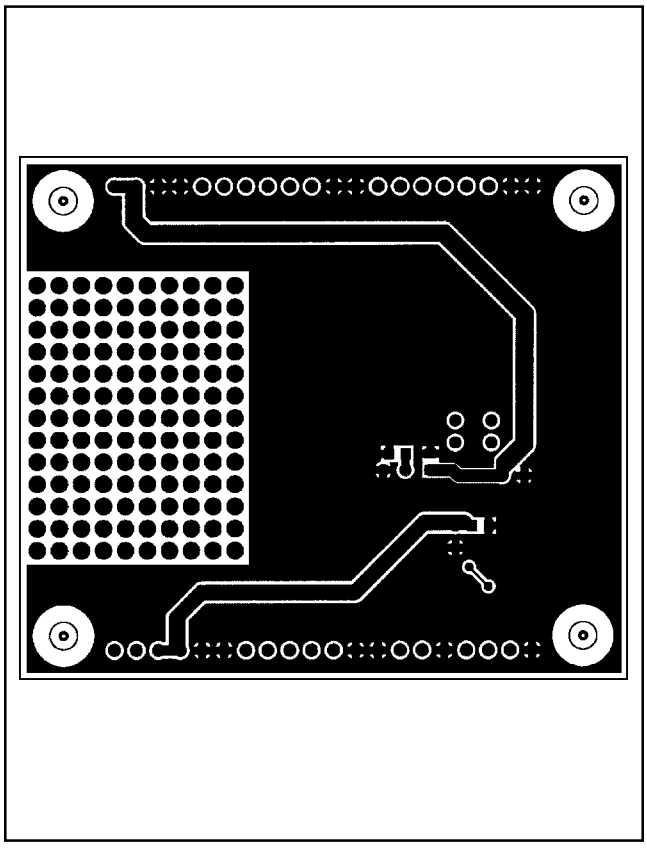

FIGURE 10. PCM1742 Daughter Card Bottom-Side Layer.

DEMONSTRATION SOFTWARE FOR THE PCM1742

Software is provided with the DEM-DAI1742 to allow programming of the PCM1742's internal registers. The software will operate on computers running Microsoft Windows 3.1/95/98. The demo software requires that the PC printer port be connected to CN003 of the DEM-DAI1742 using a standard printer cable.

INSTALLATION

The demo software is distributed on a 3.5-inch floppy disk. There is a single folder on the disk, named "Dem1742". This folder contains the application and all support files.

To install the software on your computer, first create a new folder on your hard drive with an appropriate name (e.g. Dem1742, Pcm1742, etc). Then open the "Dem1742" folder on the installation floppy and copy all of the files in it to the new folder that you created on your hard disk.

Open the configuration settings file named "Dem1742" with a text editor, such as Notepad or WordPad. When the file is opened, find the following line:

PCMIFADR = &h378

The &h378 indicates the printer port address that the demo software will use to communicate with the DEM-DAI1742. This address must be set to &h378, &h278, or &h3BC. Most PCs use &H378 as the default printer port address. If your printer port is not located at &h378, edit the address to match your computer's port address.

USING THE DEMO SOFTWARE

Double click on the application file named "Dem1742". A window will appear on your screen, as shown in Figure 11. There are two menus near the top of the window, named Execute and Window.

The Execute menu includes three selections: Initialize, Reset, and Exit. Selecting Initialize will instruct the program to write all of the PCM1742's internal registers with the default values. Selecting Reset will instruct the program to rewrite the PCM1742's internal registers with the data currently selected in the application windows. Selecting Exit will close the application.

The Window menu includes three selections: Attenuation, Operational Control, and Function Control. The following sections provide an explanation of each window.

HOLD and PASS

Each window has a button near the top. It's labeled either HOLD or PASS. The setting is toggled by clicking on this button. When set to HOLD, the user can change the settings in a window but they will not be written to the register(s) until the OK button (which appears at the bottom left corner of the window) is pressed. When set to PASS, changes made within a window are immediately written to the corresponding register(s).

The Attenuation Window

The Attenuation window is used to set the digital attenuation registers internal to the PCM1742 and is shown in Figure 12. There is an attenuator for both the left and right output channels, and each attenuator has its own independent reg-

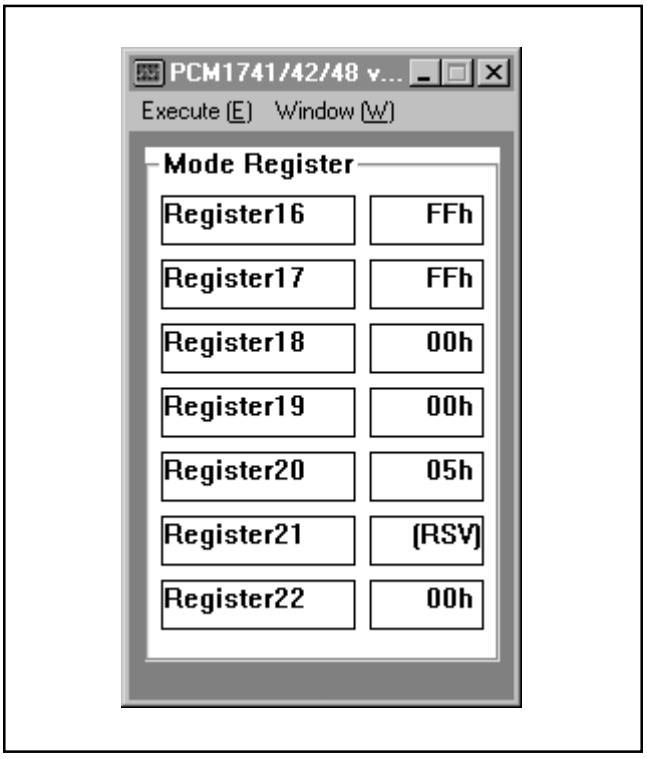

FIGURE 11. Startup Window.

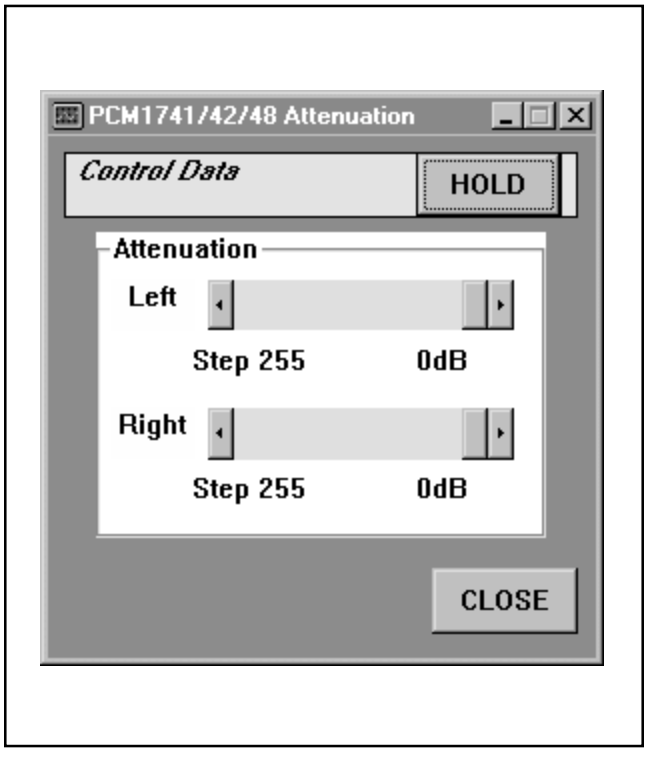

FIGURE 12. Attenuation Window.

ister to control its level. In the Attenuation window, there is a slider for each attenuator register. Use the slider handle or the arrows at each end of the slider to adjust the attenuation level. The left and right arrow keys on the keyboard can also be used to adjust the level. Just below each slider is a status display showing the current register setting (in decimals) and the corresponding attenuation level in decibels (dB).

The Operational Control Window

The Operational Control window is shown in Figure 13. This window is used to set the following functions:

- Soft Mute (Mute Lch, Mute Rch): ON or OFF
- DAC operation (DAC Lch, DAC Rch): ON or OFF
- Digital De-Emphasis (DEM): OFF, 32kHz, 44.1kHz, or 48kHz

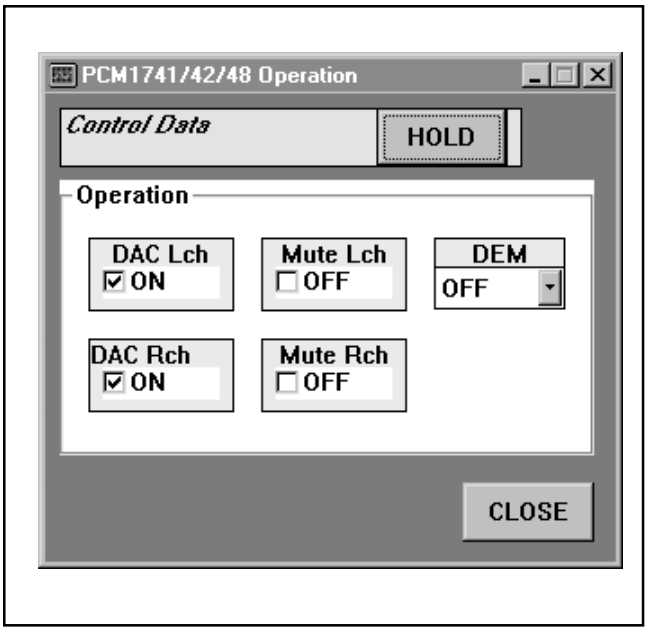

FIGURE 13. Operational Control Window.

For more information regarding these functions, refer to the PCM1742 data sheet.

The Function Control Window

The Function Control window is shown in Figure 14. This window is used to set the following functions:

- Audio Data Format (Format)
- Digital Filter Low-Pass Response (Roll-Off): Sharp or Slow
- Zero Flag Output: Active HIGH or Active LOW
- Output Phase: Normal or Inverted
- L/R Zero Flag: Independent or Common
- Oversampling Rate: $64/32f_S$ or $128/64f_S$

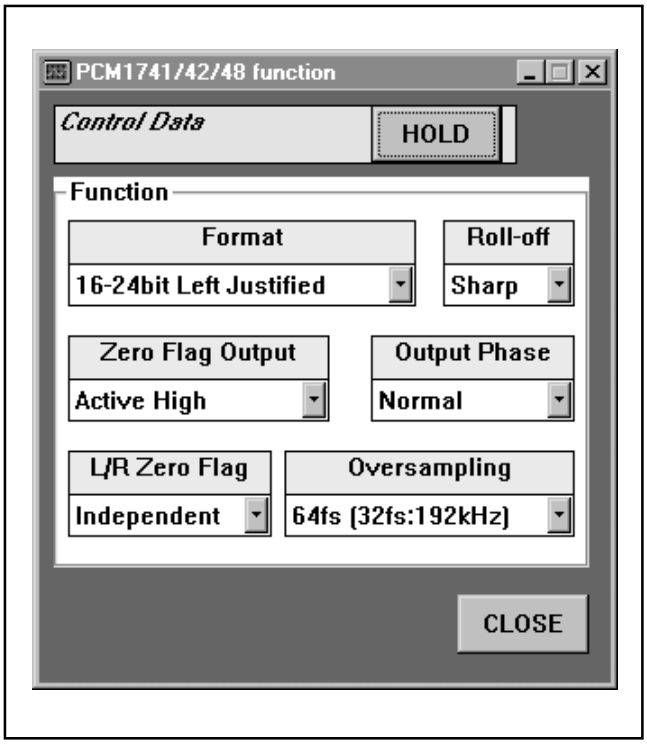

FIGURE 14. Function Control Window.

For more information regarding these functions, refer to the PCM1742 data sheet.