

***DEM-DAI1608***  
***PCI1608 Evaluation Board***

*User's Guide*

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# Read This First

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### ***About This Manual***

This user's guide describes the construction and circuitry of the DEM-DAI1608 demonstration board. It also contains instructions for connecting and setting up the DEM-DAI1608 for operation, and for installation and use of the software that controls the demonstration board.

### ***How to Use This Manual***

This document contains the following chapters:

Chapter 1 – *Description*

Chapter 2 – *Demonstration Software*

Chapter 3 – *Schematics and Printed-Circuit Boards*

### ***Related Documentation From Texas Instruments***

*PCM1608 24-Bit, 192kHz Sampling, 8-Channel, Enhanced Multilevel, Delta-Sigma Digital-to-Analog Converter* – Literature No. SBAS164

### ***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 will be required to take whatever measures may be required to correct this interference.

### ***Trademarks***

Windows is a trademark of Microsoft Corporation.



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# Description

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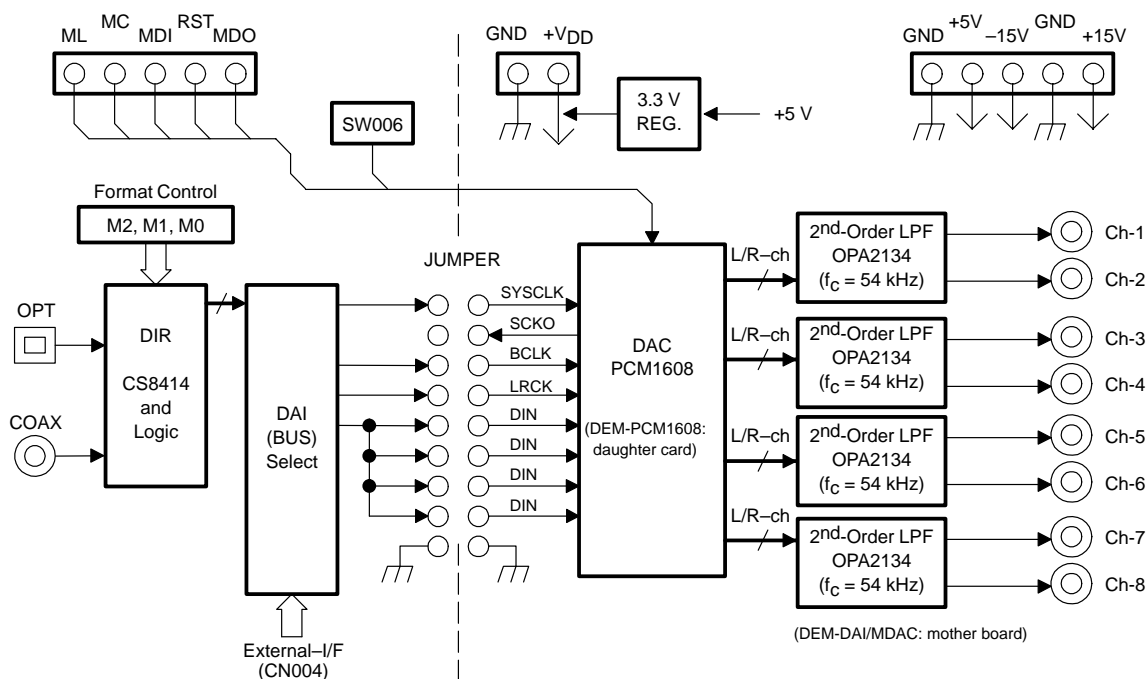
The DEM-DAI1608 is an evaluation board for the PCM1608, a 24-bit, 192-kHz, 8-channel audio DAC with digital audio receiver, mode controls switch, and 8-channel second-order post filter.

The DEM-DAI1608 operates from 5-V and  $\pm 15$ -V analog power supplies with an S/PDIF input signal.

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## 1.1 Block Diagram

Figure 1–1. DEM-DAI1608 Block Diagram



## 1.2 DEM-DAI1608 Basic Connection and Operation

- Connect the 5-V and  $\pm 15$ -V power supplies to  $V_{CC}$ ,  $AV_{CC}$ ,  $-AV_{CC}$ , and GND on connectors CN051–CN055.
- Connect the S/PDIF signal into CN001 (COAX) or U001 (OPT).
- Set jumper to provide the system clock and other digital signals from the digital audio receiver to the PCM1608.
- Set the input data format using SW001–SW003 and the demonstration software.

### 1.2.1 Configuration Controls

Table 1–1. SW006 for PCM1608: Data Format Selection

FMT1 (as MDI)	FMT0 (as RST)	Data Format Selection
L	L	24-bit I <sup>2</sup> S
L	H	TDM
H	L	16-bit standard, right-justified
H	H	24-bit left-justified, MSB-first

Table 1–2. SW006 for PCM1608: De-Emphasis Selection

FMT1 (as ML)	FMT0 (as MC)	De-Emphasis Selection
L	L	OFF
L	H	48 kHz
H	L	44.1 kHz
H	H	32 kHz

Table 1–3. SW001/002/003: For CS8414 (Digital Audio I/F Receiver)

SW001 (M0)	SW002 (M1)	SW003 (M2)	Data Format Selection
L	L	L	16-/24-bit left-justified, MSB-first
L	H	L	I <sup>2</sup> S
H	L	H	16-bit standard, right-justified
L	H	H	24-bit standard, right-justified

SW004: Manual reset

SW005: Digital audio interface selection  
 Internal – CS8414  
 External – (CN004)

JP001: BCK selection

When using left-justified MSB-first data format, move the jumper from BCK to BCK (L/J).

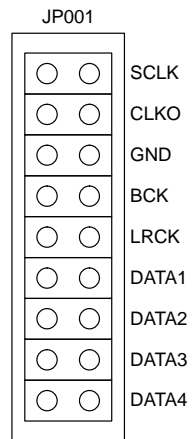
### 1.3 Jumpers

The following jumpers are onboard:

JP001            For digital signal  
 CN057           For 3.3-V power supply  
 JP101–JP106   For  $f_c$  of second-order post filter

### 1.3.1 JP001

The digital signal generated by the digital audio receiver is input to this jumper. For each shorted pin, the corresponding digital signal is input to the PCM1608.



### 1.3.2 JP101–JP106 (Six Pieces)

These jumpers determine  $f_c$  of the second-order post filter.

For JP101–JP106 shorted,  $f_c = 54$  kHz

For JP101–JP106 open,  $f_c = 108$  kHz

# Demonstration Software

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Software provided with the DEM-DAI1608 allows programming of the PCM1608 internal registers. The software operates on computers running Microsoft Windows™ 3.1, 95, or 98.

The demonstration software requires connection of the PC printer port to CN-2 of the DEM-DAI1608 using a standard printer cable.

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## 2.1 Installation

The demonstration software is distributed on a 3.5-inch floppy disk.

To install the software on your PC computer, first create a new folder on your hard drive with an appropriate name (such as *DEM1608*). Then open the *Dem1608* folder on the installation floppy disk and copy all its files to your new folder.

Open the configuration setting file named *#Dem1608* using a text editor, such as Notepad. After the file opens, search for the following line:

```
PCMIFADR = &h378
```

The `&h378` indicates the printer port address that the demonstration software uses to communicate with the DEM-DAI1608.

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.

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## 2.2 Using the Demonstration Software

Double-click on the application file named DEM1608. A window appears on your screen, as shown in Figure 2–1. There are two menu selections (Execute and Window) near the top of the window.

The Execute menu includes three selections: Initialize, Reset, and Exit. Selecting Initialize instructs the program to write all of the PCM1608 internal registers with the default values.

Reset instructs the program to rewrite the PCM1608 internal registers with the data currently elected in the application windows. Exit closes the application.

The Window menu includes four selections: Attenuation control (Figure 2–2), Operation control (Figure 2–3), Function control (Figure 2–4), and Register read. The following sections provide an explanation of each window.

*Figure 2–1. Demonstration Software Window*

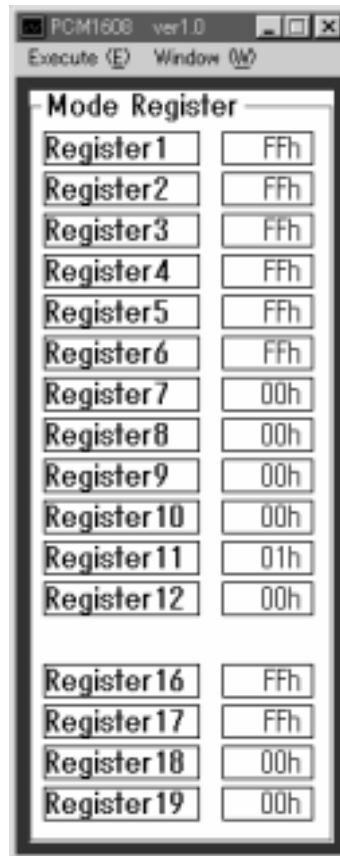


Figure 2–2. Attenuation Control

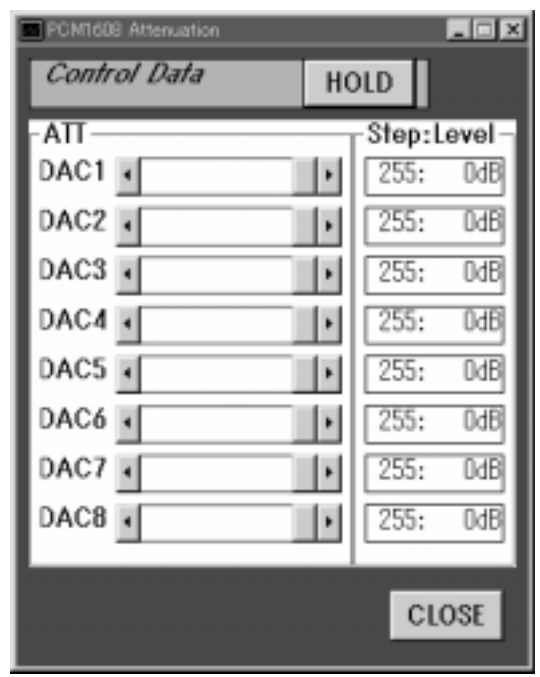


Figure 2–3. Operation Control

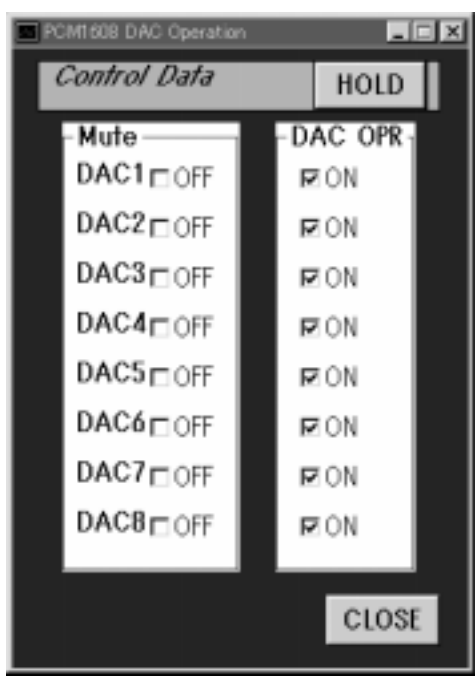
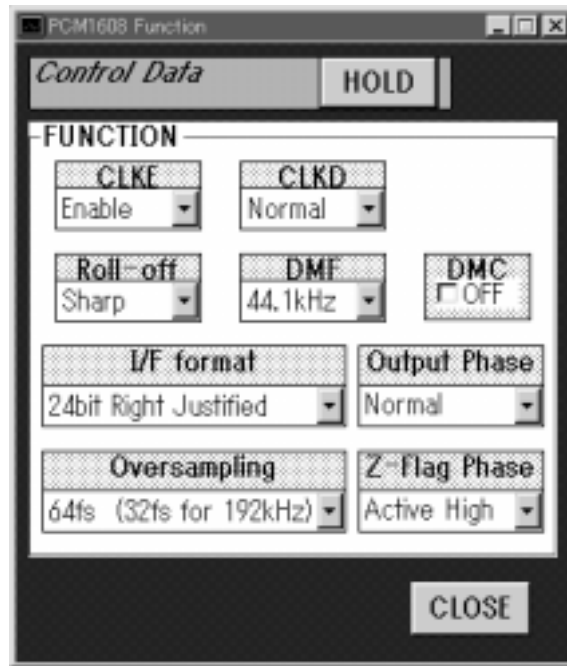




Figure 2–4. Function Control



### 2.2.1 HOLD and PASS

Each window has a button near the top which is labeled either HOLD or PASS. The current setting is toggled by clicking on this button. When set to HOLD, the settings in a window can be changed, but are not written to the register(s) until the OK button (which appears at the bottom of the window) is pressed.

When set to PASS, any setting changes made in a window are immediately written to the corresponding register(s).

## 2.2.2 Function Control

The various functions of the DEM-DAI1608 and the registers and bits that control each function are shown in Table 2–1.

Table 2–1. Function Control

FUNCTION	DEFAULT	REGISTER	BIT
Digital attenuation control, 0 dB to –63 dB in 0.5 dB steps	0 dB, No attenuation	Register 1 through 6, 16, 17	AT1[7:0] AT2[7:0] AT3[7:0] AT4[7:0] AT5[7:0] AT6[7:0] AT7[7:0] AT8[7:0]
Soft mute control	Mute disabled	Register 7, 18	MUT[8:1]
DAC 1–8 operation control	DAC 1–6 enabled	Register 8, 19	DAC[8:1]
Audio data format control	24-bit standard format	Register 9	FMT[2:0]
Digital filter rolloff control	Sharp rolloff	Register 9	FLT
SCKO frequency selection	Full rate (= $f_{SCKI}$ )	Register 9	CLKD
SCKO output enable	SCKO Enabled	Register 9	CLKE
De-emphasis all channel function control	De-emphasis all channel disabled	Register 10	DMC
De-emphasis all channel sample rate selection	44.1kHz	Register 10	DMF[1:0]
Output phase select	Normal phase	Register 10	DREV
Zero flag polarity select	High	Register 10	ZREV
Read register index control	REG[6:0] = 01H	Register 11	REG[6:0]
Read auto-increment control	Auto-increment disabled	Register 11	INC
General purpose output enable	Zero flag enabled	Register 12	GPOE
General purpose output bits (GPO1–GPO6)	Disabled	Register 12	GPO[6:1]
Oversampling rate control	64x	Register 12	OVER

# Schematics and Printed-Circuit Boards

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This chapter presents the DEM-DAI/MDAC and the DEM-PCM1608 printed-circuit boards and schematics.

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Figure 3-2. DEM-DAI/MDAC Top View

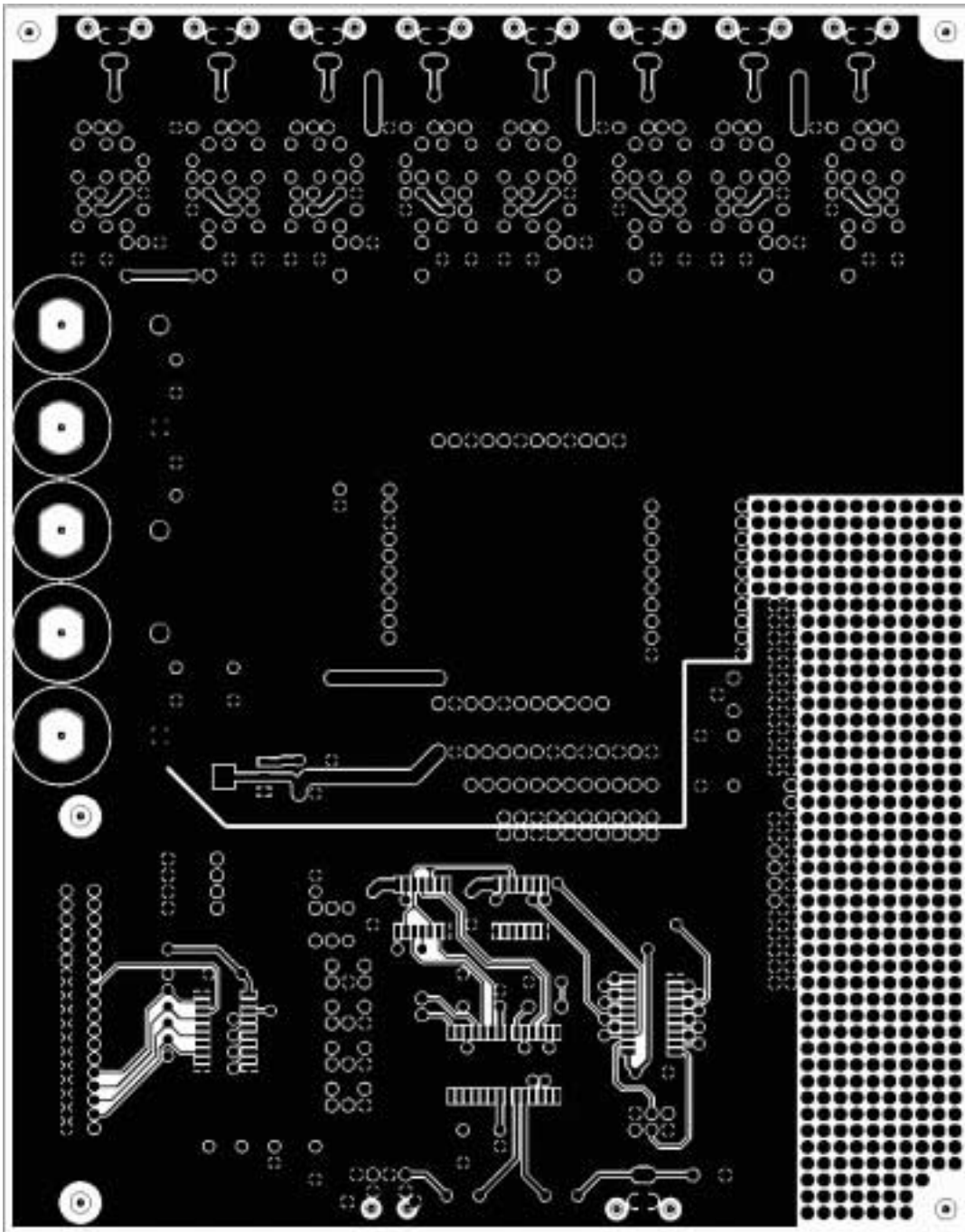
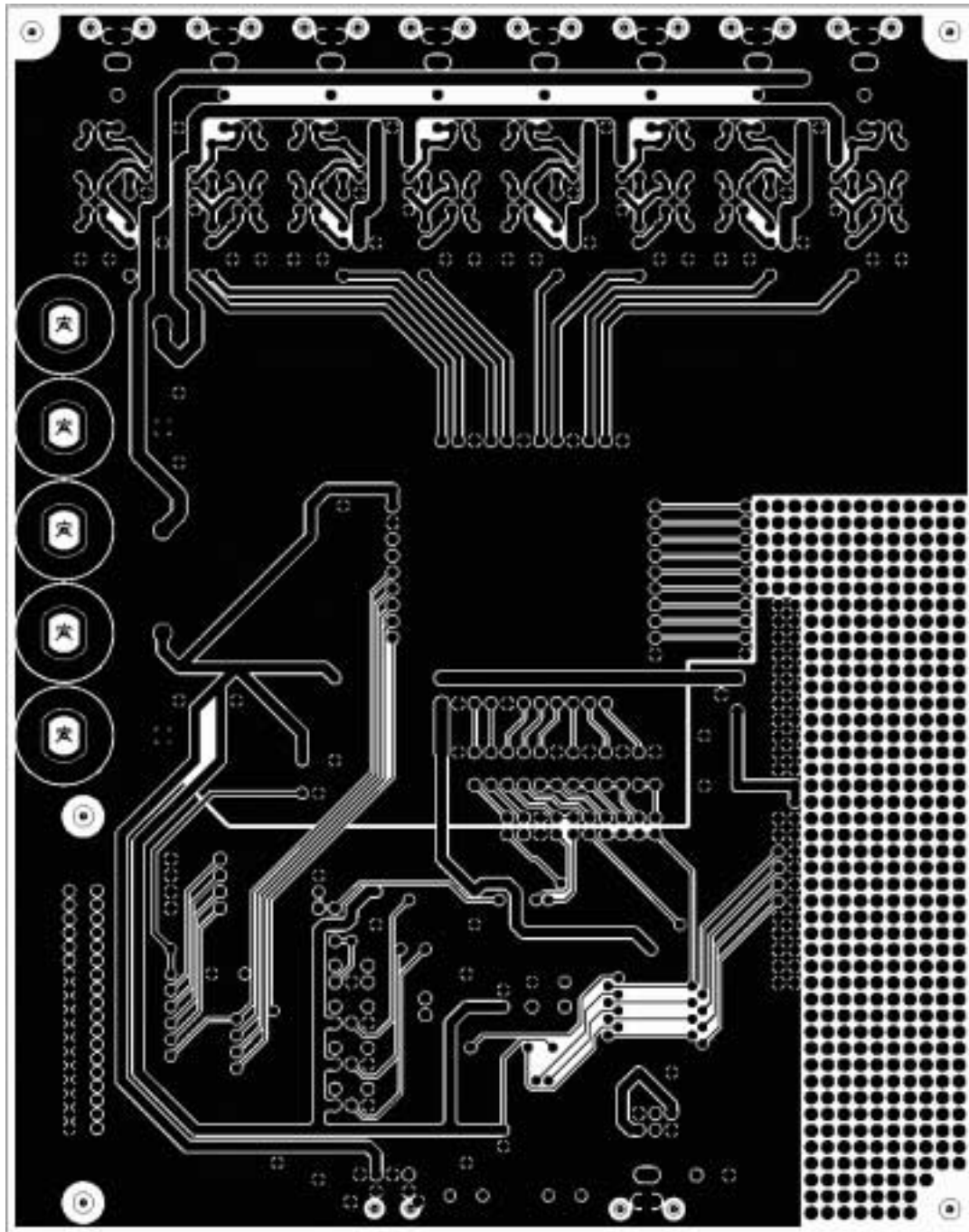


Figure 3–3. DEM-DAI/MDAC Bottom View



### 3.2 DEM-PCM1608 Printed-Circuit Board

Figure 3-4. DEM-PCM1608 Silkscreen

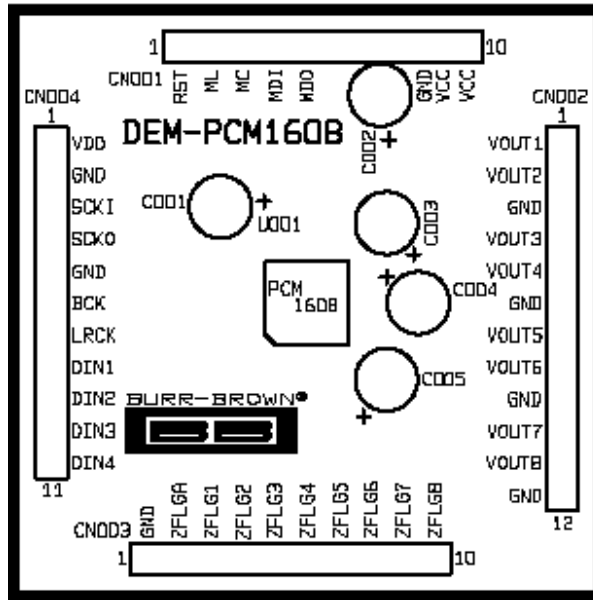


Figure 3-5. DEM-PCM1608 Top View

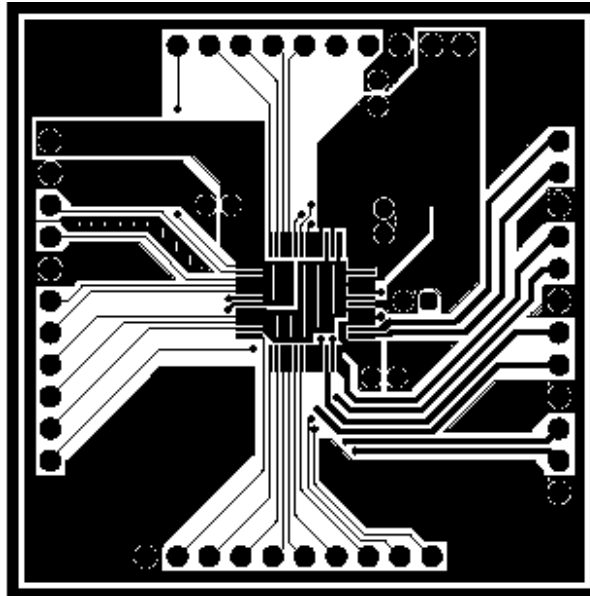
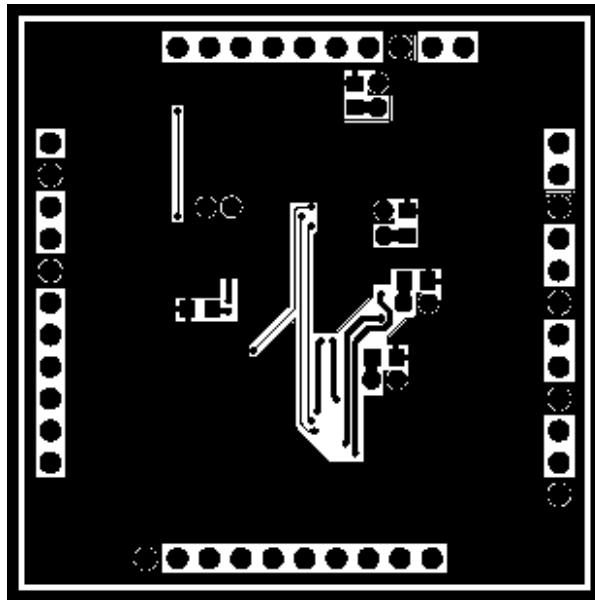


Figure 3–6. DEM-PCM1608 Bottom View





### 3.3 DEM-DAI/MDAC Schematics

Figure 3–7. DEM-DAI/MDAC Low-Pass Filter Schematic

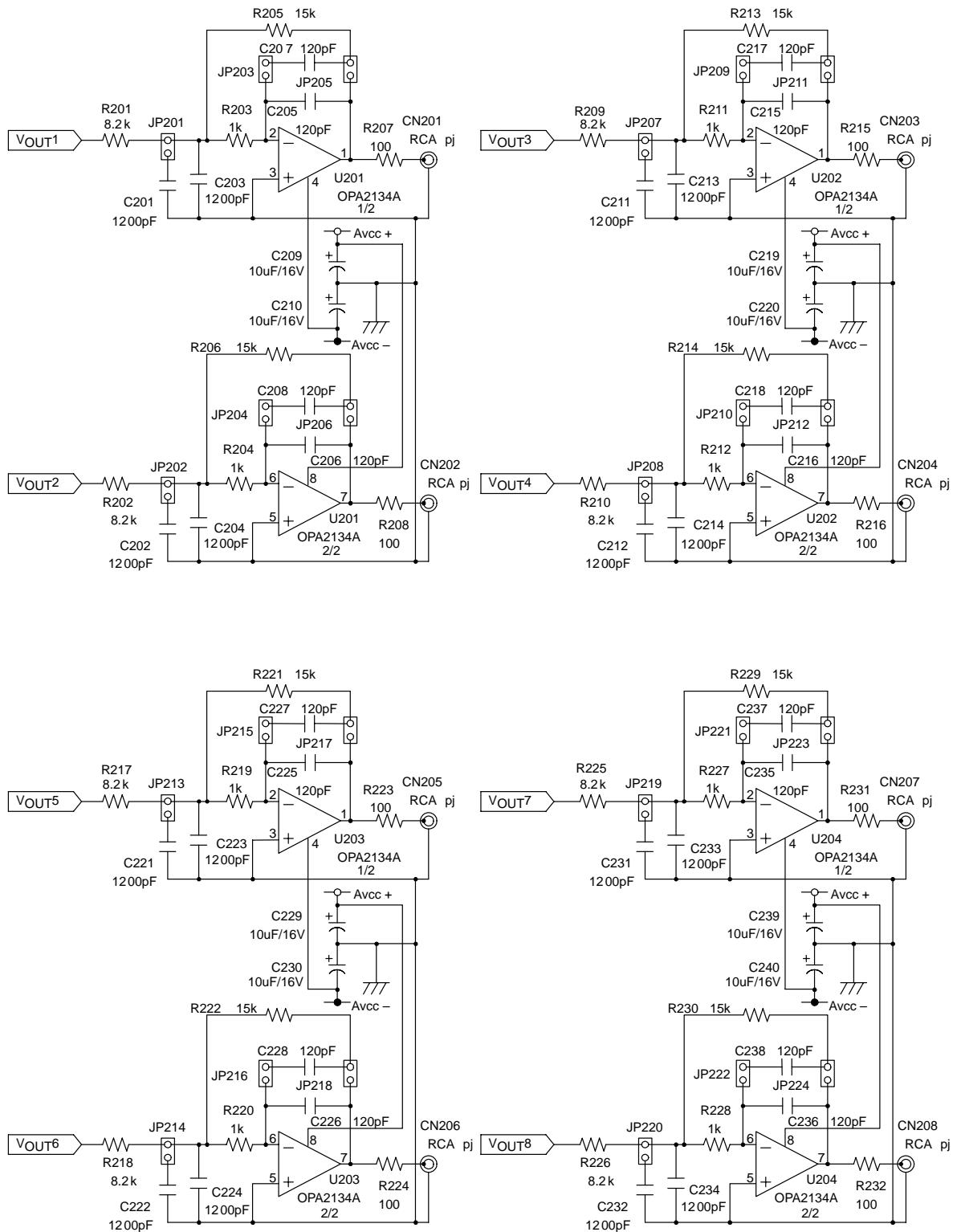


Figure 3–8. Daughter Board Sockets, Connectors, and Regulator Schematic

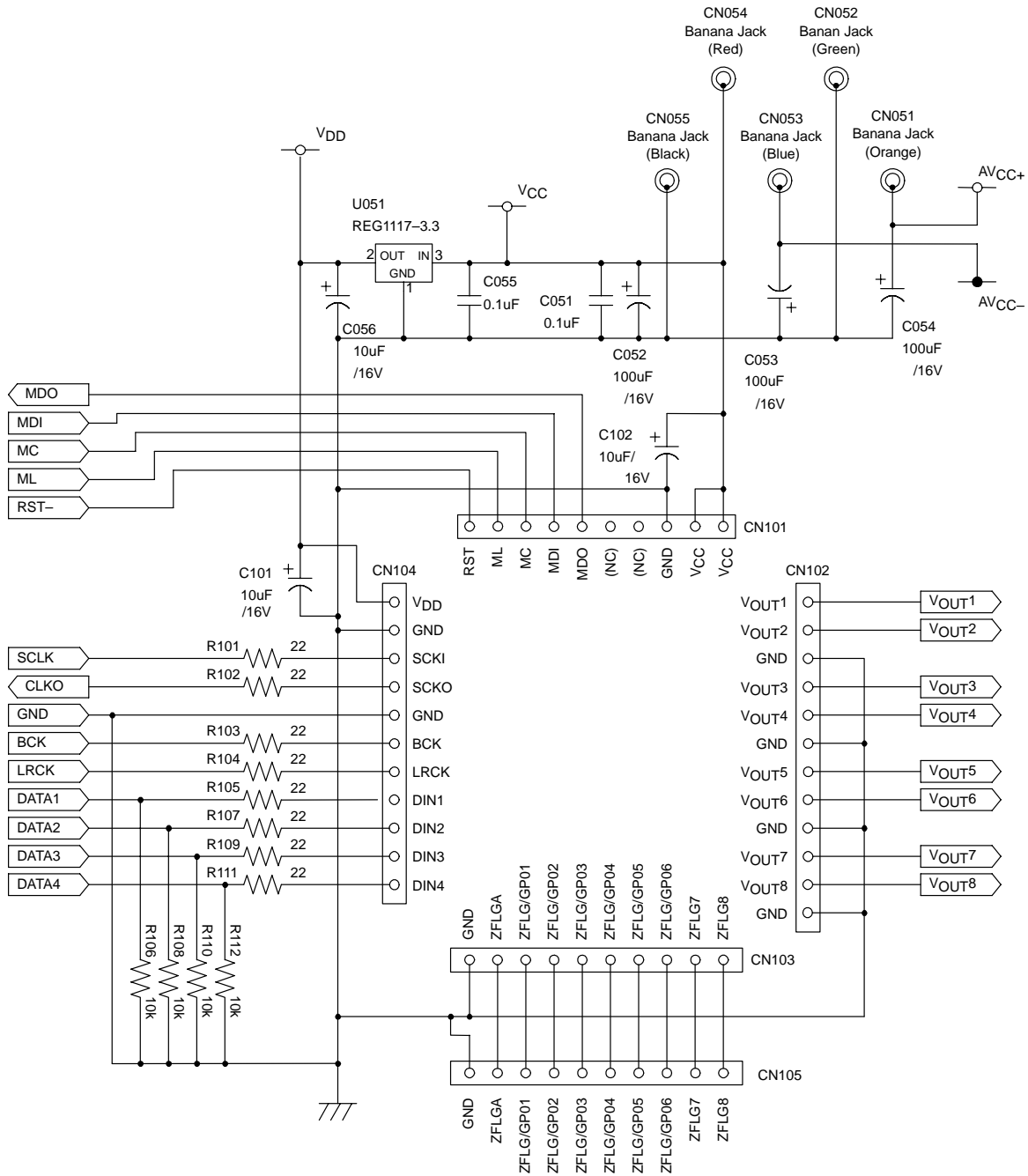
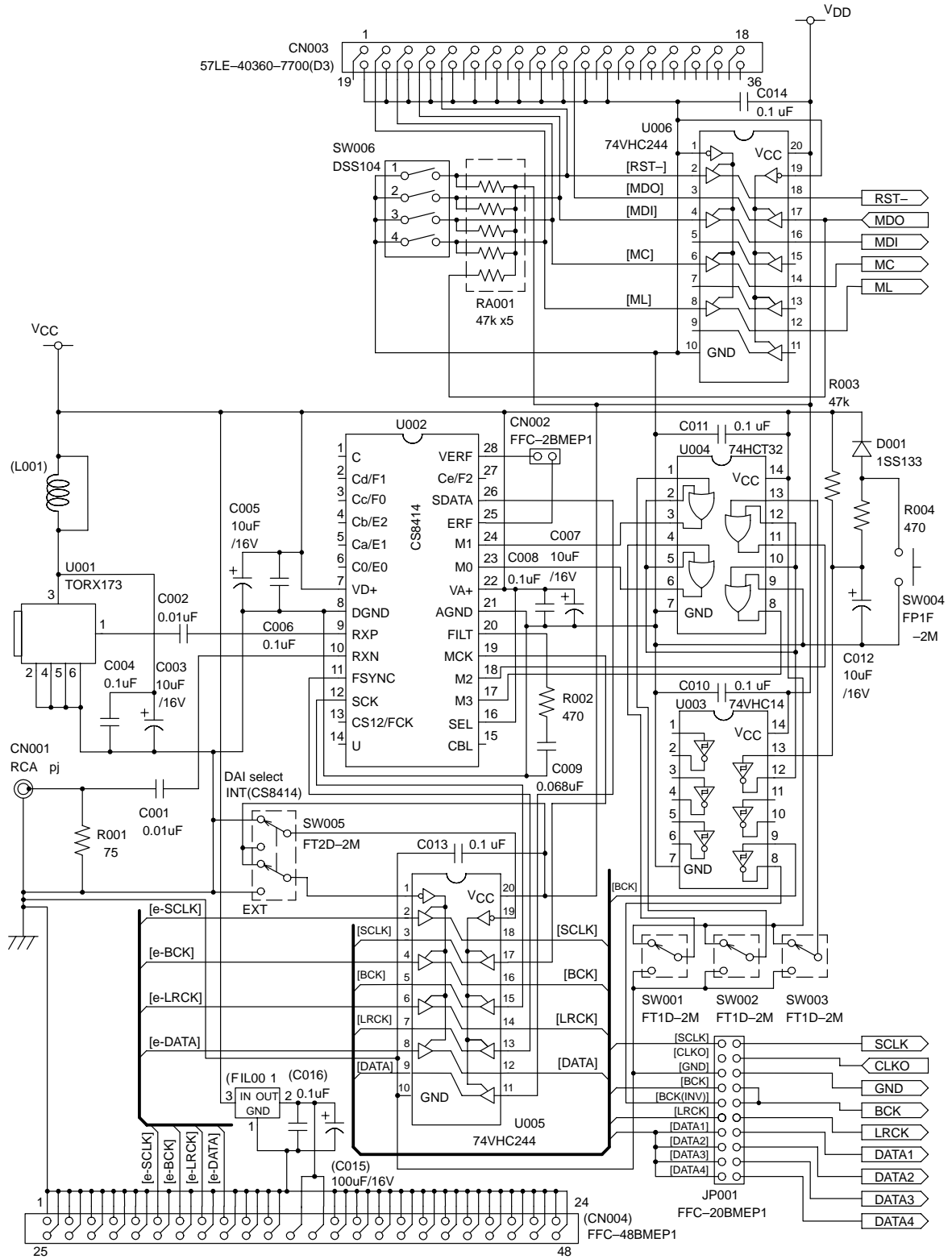


Figure 3–9. Digital Audio Interface Schematic



### 3.4 DEM-PCM1608 Schematic

Figure 3–10. PCM1608 Schematic

