TEXAS INSTRUMENTS

DEM-PCM1791, DEM-DSD1791, DEM-PCM1793, DEM-DSD1793 EVM Board

User's Guide

November 2003

Audio Converter Products, Digital Audio

SLEU038

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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 55°C. The EVM is designed to operate properly with certain components above 55°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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Read This First

About This Manual

This user's guide provides information needed by a technician for the operation and maintenance of the DEM-PCM/DSD1791/1793 evaluation module (EVM). This includes descriptions of connections, controls, audio interface selection, control via software and I^2C, parts listings, board layouts, and schematic diagrams.

How to Use This Manual

This document contains the following chapters:

Chapter 1—Description

Chapter 2—Schematics and Printed-Circuit Boards

Related Documentation From Texas Instruments

DSD1791 24-Bit, 192-kHz Sampling, Advanced Segment, Audio Stereo Digital-to-Analog Converter data sheet, SLES072

DSD1793 24-Bit, 192-kHz Sampling, Advanced Segment, Audio Stereo Digital-to-Analog Converter data sheet, SLES075

PCM1791A 24-Bit, 192-kHz Sampling, Advanced Segment, Audio Stereo Digital-to-Analog Converter data sheet, SLES071

PCM1793 24-Bit, 192-kHz Sampling, Advanced Segment, Audio Stereo Digital-to-Analog Converter data sheet, SLES076

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

Contents

Figures

Tables

Chapter 1

Description

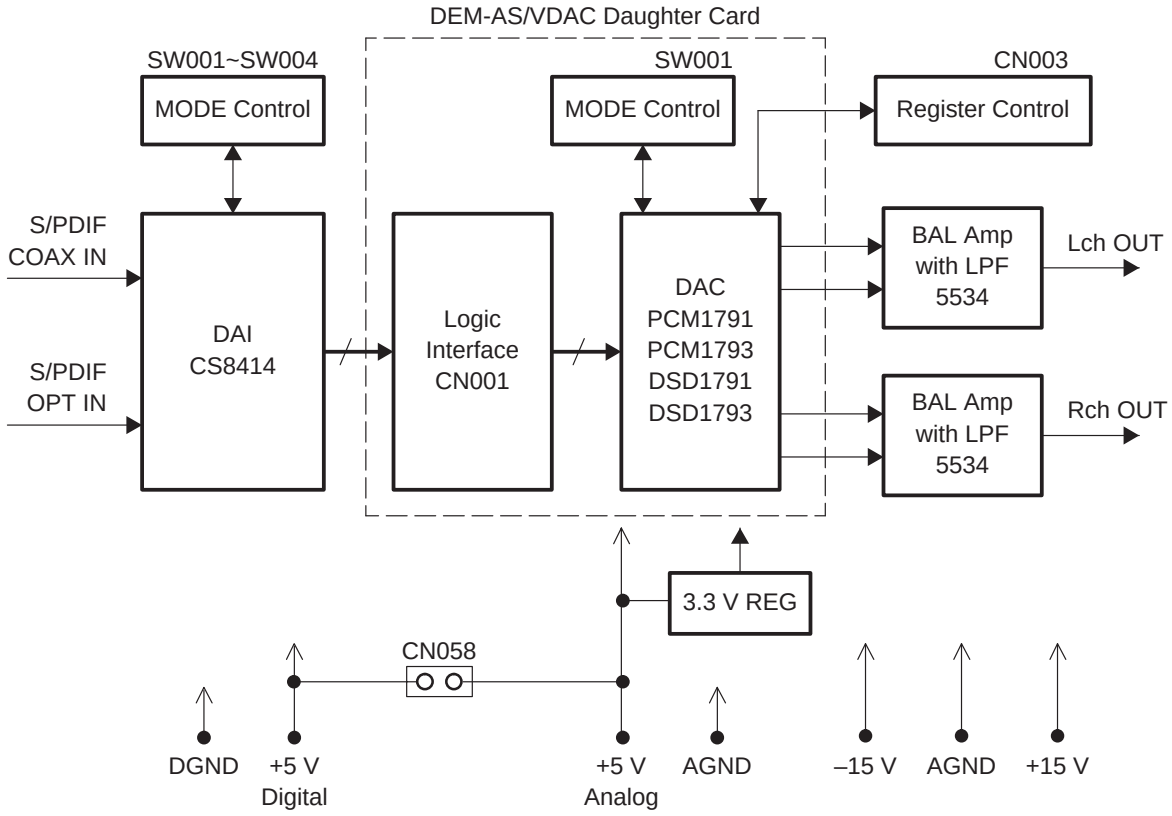
The DEM-PCM/DSD1791/1793 is an evaluation module for the 192-kHz, 24-bit stereo differential voltage output DAC PCM/DSD1791/1793 family.

- ❑ DEM-PCM1791: PCM1791A. Software control
- ❑ DEM-PCM1793: PCM1793. Hardware control
- ❑ DEM-DSD1791: DSD1791. Software control
- ❑ DEM-DSD1793: DSD1793. I^2C control

Topic **Page**

1.1 Block Diagram

Figure 1−1. DEM−PCM/DSD1791/1793 Block Diagram



1.2 Connections

The DEM-PCM/DSD1791/1793 can be operated by connecting ±15-V and 5-V power supplies and the S/PDIF interface.

- ❑ CN051 AVCC : 9 V to 15 V Icc = 20 mA, typical
- ❑ CN052 GND (analog)
- ❑ CN053 AVCC− : –9 V to –15 V Icc = 20 mA, typical
- ❑ CN054 VCC : 4.5 V to 5.5 V Icc = 80 mA, typical (CN058 shorted, default)
- ❑ CN055 GND (analog)
- ❑ CN056 VCC : 4.5 V to 5.5 V
- ❑ CN057 GND (digital)
- ❑ CN001 RCA jack : S/PDIF coax input
- ❑ U001 TORX : S/PDIF optical input

The S/PDIF interface accepts up to f_S = 96 kHz sampling rate, f_S = 192 kHz, 24-bit PCM data and 64 f_S, 1-bit DSD data can be connected directly on interface connector. A stereo audio signal can be obtained by connecting RCA audio cables to the onboard RCA stereo jacks, CN103 and CN104.

- ❑ CN103: L-channel audio out (2.1 V rms)
- ❑ CN104: R-channel audio out (2.1 V rms)

1.3 Operating Controls

1.3.1 SW001, SW002, SW003 DAI PCM Interface Format

These switches select the PCM audio interface format for the S8414 DAI receiver, and the interface formats are listed in Table 1−1. The default interface format is 16- to 24-bit I^2S.

Table 1−1. SW001/002/003: For S8414 (DAI Receiver)

SW001	SW002	SW003	Receiver Output Data Format
L	L	L	16- to 24-bit left-justified
L	H	L	16- to 24-bit I^2S
H	L	H	16-bit right-justified (or standard)
L	H	H	18-bit right-justified (or standard)

1.3.2 SW004 Reset for DAI

Switch SW004 is the reset control for the CS8414 DAI receiver.

1.3.3 SW005 DAI/External Interface Selection

Switch SW005 selects whether the S/PDIF inputs for the PCM/DSD1791/1793 are provided through the CS8414 DAI receiver or supplied as external data.

- ❑ INT: S/PDIF, DAI receiver data (default)
- ❑ EXT: External data

1.3.4 JP001 BCK Selection

Jumper JP001 selects the BCK clock format for the CS8414.

- ❑ IIS: I^2S right-justified (default)
- ❑ 24L/J: 24-bit left-justified

1.3.5 SW006 Operation Control for DAC

Switch SW006 is the register reset control for the PCM1791 and DSD1791. For normal board operation, all four switches must be set to H.

- ❑ RESET: H / normal operation (default)
- ❑ RESET: L / reset operation

1.3.6 SW001 on Daughter Card − Operation Control for PCM1793

SW001 on the daughter card is the operation control for the PCM1793 hardware model.

Table 1−2. Audio Interface Format Selection

FMT2 PIN 28	FMT1 PIN 27	FMT0 PIN 26	FORMAT
L	L	L	16-bit standard format, right-justified
L	L	H	20-bit standard format, right-justified
L	H	L	24-bit standard format, right-justified
L	H	H	24-bit MSB-first, left-justified format
H	L	L	16-bit I^2S format
H	L	H	24-bit I^2S format
H	H	L	Reserved
H	H	H	Reserved

Switches FMT0, FMT1, and FMT2 select the audio interface format for the PCM1793. The interface formats are listed in Table 1−2.

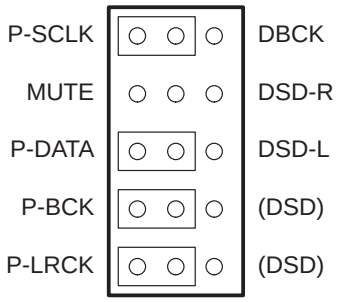
Table 1−3. De-Emphasis Control

DEMP1 PIN 25	DEMP0 PIN 24	De-Emphasis Function
L	L	Disabled
L	H	48 kHz
H	L	44.1 kHz
H	H	32 kHz

Switches DEMP0 and DEMP1 select the sampling frequency for which de-emphasis filtering is performed. The available frequencies are listed in Table 1−3.

1.4 Audio Data Interface

CN001 on the daughter card selects the data interface. Available choices are DSD by device type and PCM. The default setting is for the PCM audio data interface with S/PDIF. The DSD interface can also be connected directly to this connector.



1.4.1 PCM Audio Interface

P-SCLK:	SYSTEM CLOCK
P-DATA:	DATA clock
P-BCK:	BCK clock
P-LRCK:	LRCK clock

1.4.2 DSD Audio Interface for PCM1791/1793

P-SCLK:	DSD BCK clock
P-LRCK:	DSD DATA-R
P-DATA:	DSD DATA-L
P-BCK:	GND
MUTE:	GND

1.4.3 DSD Audio Interface for DSD1791/1793

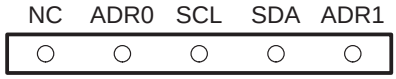
P-LRCK:	GND
P-BCK:	GND
P-DATA:	GND
DBCK:	DSD BCK clock
DSD-L:	DSD DATA-L
DSD-R:	DSD DATA-R

1.5 Demonstration Software Control

Software provided with the DEM-PCM/DSD1791 allows programming of the PCM/DSD1791 internal registers. The software operates on computers running Microsoft™ Windows™ 3.1, 95, 98 or 2000. The demonstration software requires connection of the PC printer port to CN003 of the demo board using a standard printer port cable. After installing and executing the demo software, the main window shows register bit codes and the sub-window shows register control function.

1.6 I^2C Control

The DSD1793 has an I^2C control function. The I^2C interface is provided on 5-pin connector RA001, shown in the following diagram.



1.7 Demonstration Software

Demonstration software is provided to control the PCM1791/DSD1791's internal register using a PC running Microsoft Windows. The software requires the use of a printer cable to connect between the PC and connector CN003 of the DEM-PCM/DSD1791.

The demonstration software includes a total five files in the DEM1791; these files include the following:

DEM1791.exe

DEM1791.ini

Vbrjp200.dll

Ver.dll

Inpout.dll

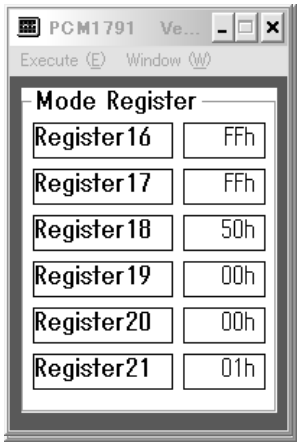
Copy these files to a convenient directory (folder) such as

C:＼DEM1791

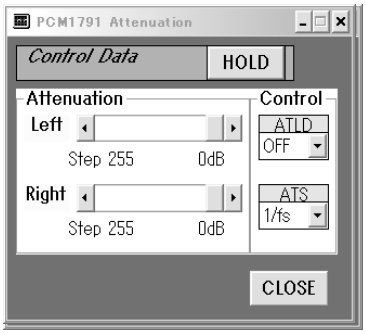
Then change the printer-port address in DEM1791.ini to:

&H378, &H278, or &H3BCO (Most PCs use &H378 as the default printer port address.)

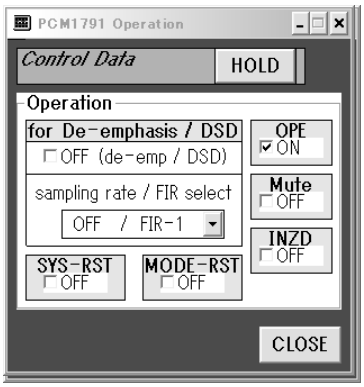
Top Menu



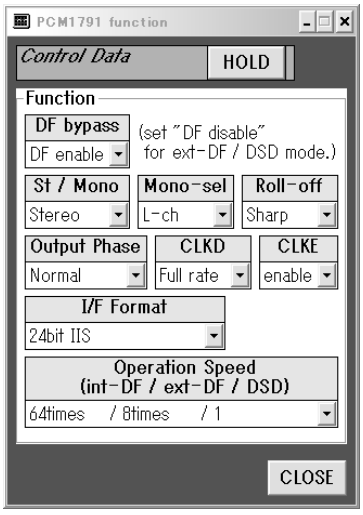
Attenuation Window



Operation Window



Function Window



1.8 DEM/DSD1791/1793 Parts List (BOM)

Reference No.	Value	Part Type	Part Number	Manufacturer
C001, C002	0.01 μF	Film capacitor	AMFF0050J103	Nissei
C004, C006, C008, (C016), C051, C058	0.1 μF	Film capacitor	AMFF0050J104	Nissei
C009	0.068 μF	Film capacitor	AMFF0050J683	Nissei
C010, C011, C013, C014, C055	0.1 μF	Ceramic capacitor	RPE132F104Z50	Murata
C003, C005, C007, C109, C110, C111, C112	10 μF/16 V	Ceramic capacitor	ROA-16V100M	ELNA
(C015), 052, 053, 054, 057	100 μF/16 V	Ceramic capacitor	ROA-16V101M	ELNA
C101, C102, (C017), (C018)	10 μF/16 V	Ceramic capacitor	R3A-16V100M	ELNA
C105, C106, C107, C108	2700pF	Film capacitor	APSF0100J272	Nissei
C012	10 μF/16 V	Ceramic capacitor	SME16VB10M	Nikkemi
C056	10 μF/16 V	Tantalum capacitor	DN1C100M1S	NEC
CN003		L connector	57LE40360-7700(D3)	Daiichi Denshi
CN002, CN058, JP002		2-pin connector	FFC-2BMEP1	Honda
CN104		RCA (Red)	LPR6520-0802	SMK
CN103		RCA (Yellow)	LPR6520-0803	SMK
CN001		RCA (Yellow)	LPR6520-0804	SMK
CN051		Banana jack (Orange)	T-45 (Yellow)	Sato Parts
CN052		Banana jack (Green)	T-45 (Green)	Sato Parts
CN053		Banana jack (Blue)	T-45 (Blue)	Sato Parts
CN054, CN056		Banana jack (Red)	T-45 (Red)	Sato Parts
CN055, CN057		Banana jack (Black)	T-45 (Black)	Sato Parts
CN101, CN102, (CN006), (CN007)		C-T connector	XB-3-7-20	MAC8
D001		Diode	1SS133	ROHM
JP001		4-pin connector	FFC-4BMEP1	Honda
R001	75 Ω	Resistor	SN14C2C-75ΩF	KOA
R003	47 kΩ	Resistor	SN14C2C-47kΩF	KOA
R002, R004	470 Ω	Resistor	SN14C2C-470ΩF	KOA
R101−104, R109−112	360 Ω	Resistor	SN14C2C-360ΩF	KOA
R105−108		Resistor		
R113, R114	100 Ω	Resistor	SN14C2C-100ΩF	KOA
RA001	47k Ω × 5	Resistor Array	M6-1-473J	BI
RA001		5-pin connector	FFC-5AMEP1	Honda
RA001	4.7 kΩ	Resistor	SN14C2C-4.7kΩF	KOA
U001		TOSLINK	TORX179P	Toshiba
U002		Digital audio I/F receiver IC	CS8414-CS	Cirrus Logic
U003		Logic IC	TC74VHC14F	Toshiba
U004		Logic IC	TC74HCT32AF	Toshiba
U005, U006		Logic IC	TC74VHC244F	Toshiba
U051		Regulator IC	REG1117-3.3	Burr-Brown

Reference No.	Value	Part Type	Part Number	Manufacturer
U101, U102		IC socket DIP 8-pin	100-008-000	3M
SW001, SW002, SW003		DIP switch	FT1D-2M	Fujisoku
SW004		Push SE	FP1D-2M	Fujisoku
SW005		DIP SW-2	FT2D-2M	Fujisoku
SW006		DIP SW-4	DSS104	Fujisoku
JP101−103				

1.9 DEM-AS/VDAC Board Section Parts List (BOM)

Reference No.	Value	Parts Type	Parts Name	Manufacturer
C001, C003, C005	10 μF/16 V	AL ELE capacitor	ROA-16V-100M	ELNA
C002	0.1 μF	Ceramic capacitor	RPE132F104Z50	Murata
C004, (C006)	0.1 μF/2125	Ceramic capacitor	GRM40F104Z25PT	Murata
(C007), (C008)	3900 pF	Film capacitor	APSF0100J392	Nissei
R001, R002, R003, R004	1 kΩ	Resistor	SN14C2C-1kΩF	KOA
R005	47 kΩ	Resistor	SN14C2C-47kΩF	KOA
RA001	47 kΩ × 5	Resistor array	M6-1-473J	Beckman
SW001		DIP SW, 5-contact	DSS105	Fujisoku
CN001	5 pins × 3	15-pin connector	FFC-15NSM1	Honda
CN002	3 pins	3-pin connector	FFC-3AMEP1	Honda
U001	28-pin SSOP		DSD1791	Burr-Brown
U001	28-pin SSOP		PCM1791	Burr-Brown
U001	28-pin SSOP		DSD1793	Burr-Brown
U001	28-pin SSOP		PCM1793	Burr-Brown

Chapter 2

Schematics and Printed-Circuit Boards

This chapter presents the DEM-DAI/ASDAC and the DEM-AS/VDAC printed-circuit boards and schematics

Topic **Page**

2.1 DEM-DAI/ASDAC Printed-Circuit Board

Figure 2−1. DEM-DAI/ASDAC Silkscreen

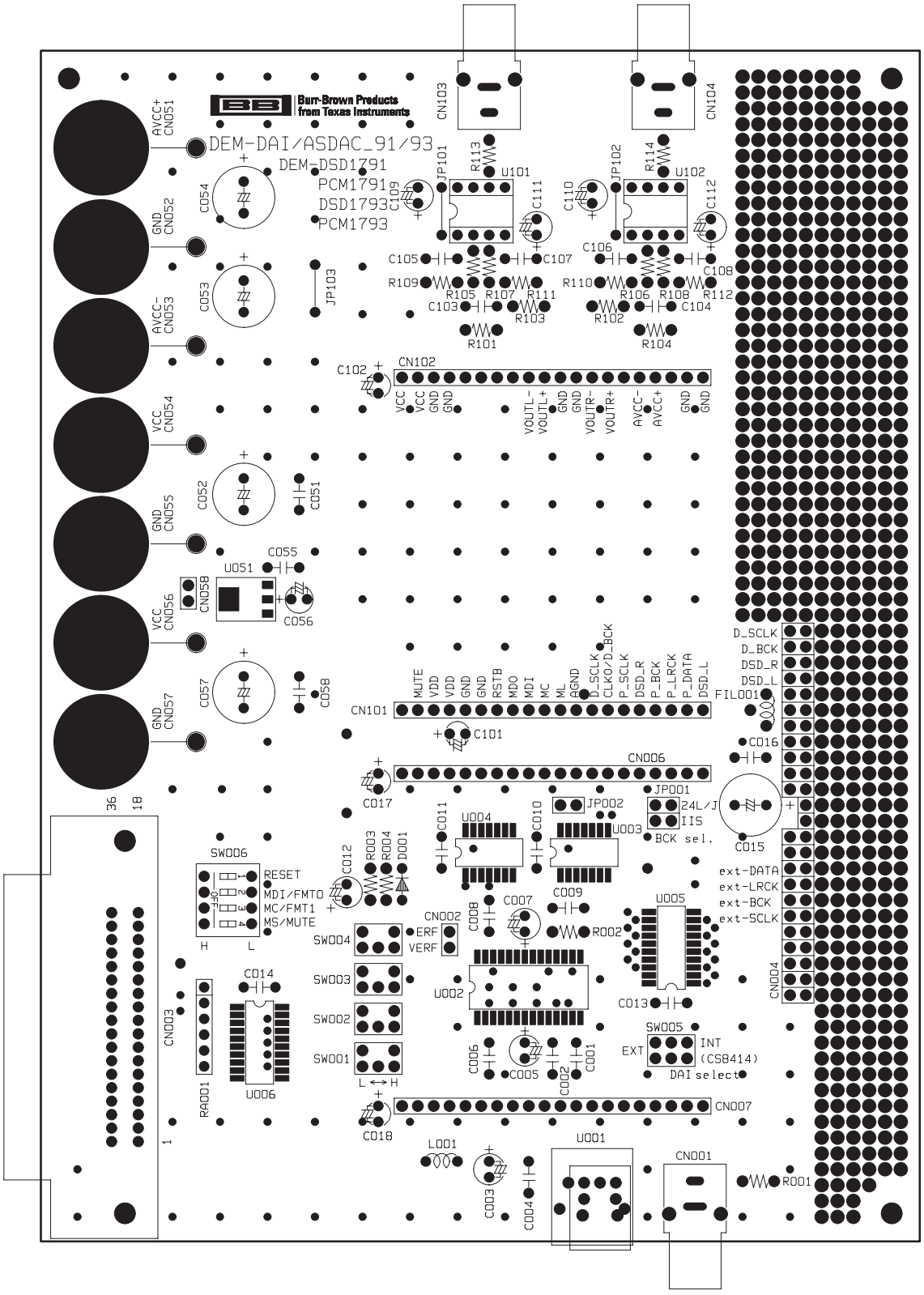


Figure 2−2. DEM-DAI/ASDAC—Top View

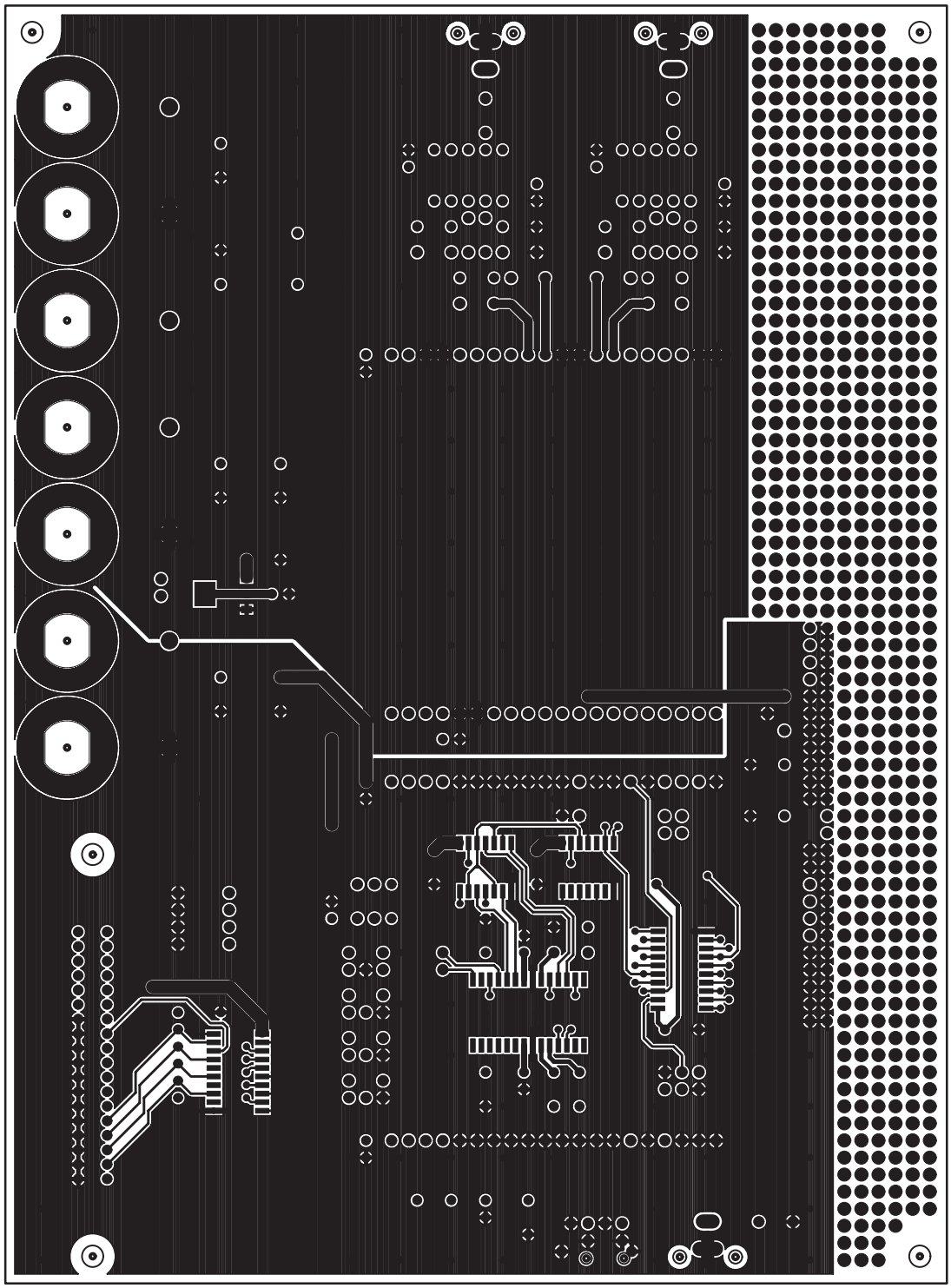
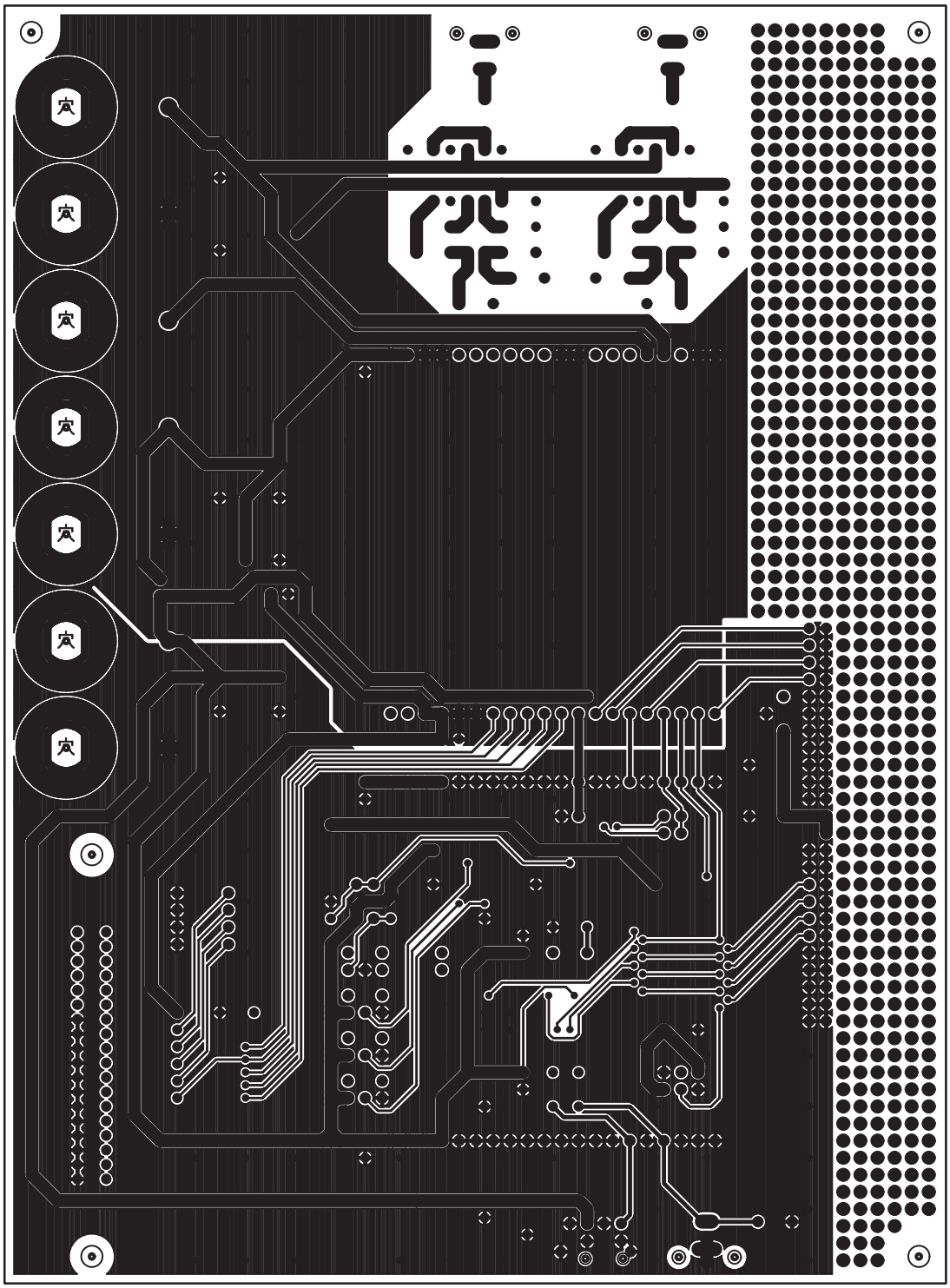


Figure 2−3. DEM-DAI/ASDAC—Bottom View



2.2 DEM-AS/VDAC Printed-Circuit Board

Figure 2−4. DEM-AS/VDAC Silkscreen

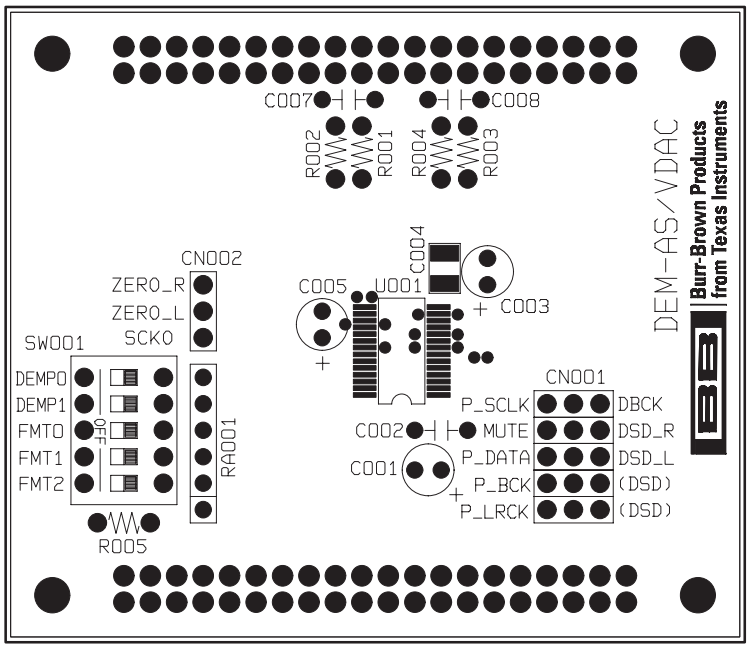


Figure 2−5. DEM-AS/VDAC—Top View

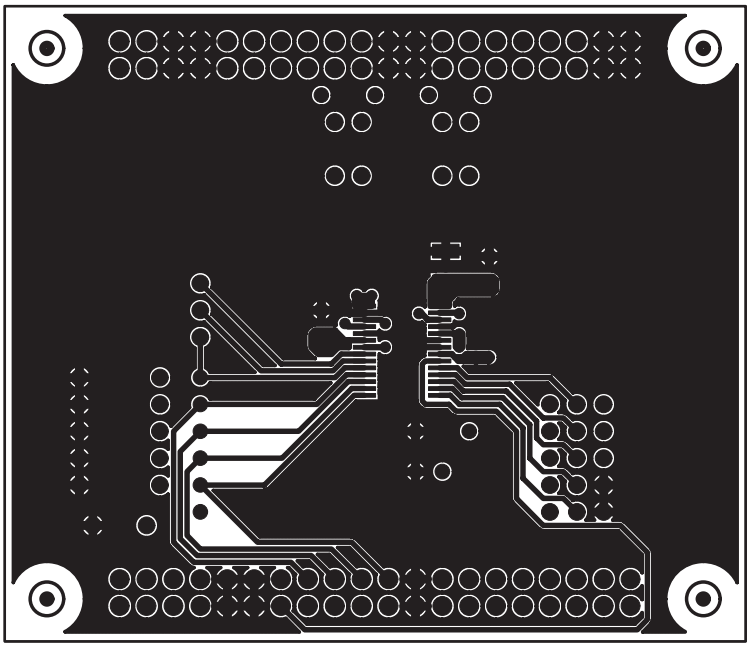
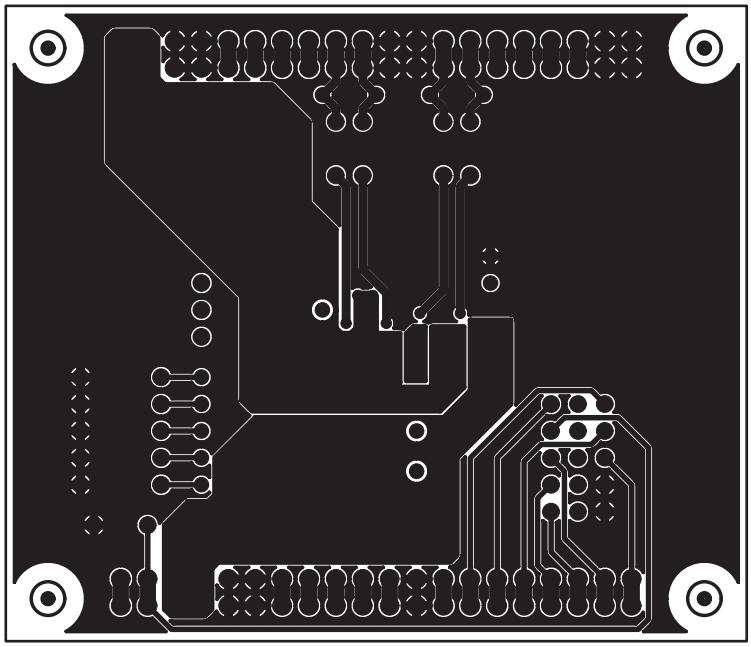


Figure 2−6. DEM-AS/VDAC—Bottom View



2.3 DEM-DAI/ASDAC Schematic

Figure 2−7. DEM-DAI/ASDAC Analog Section (Sockets for Daughter Board, Low-Pass Filter)

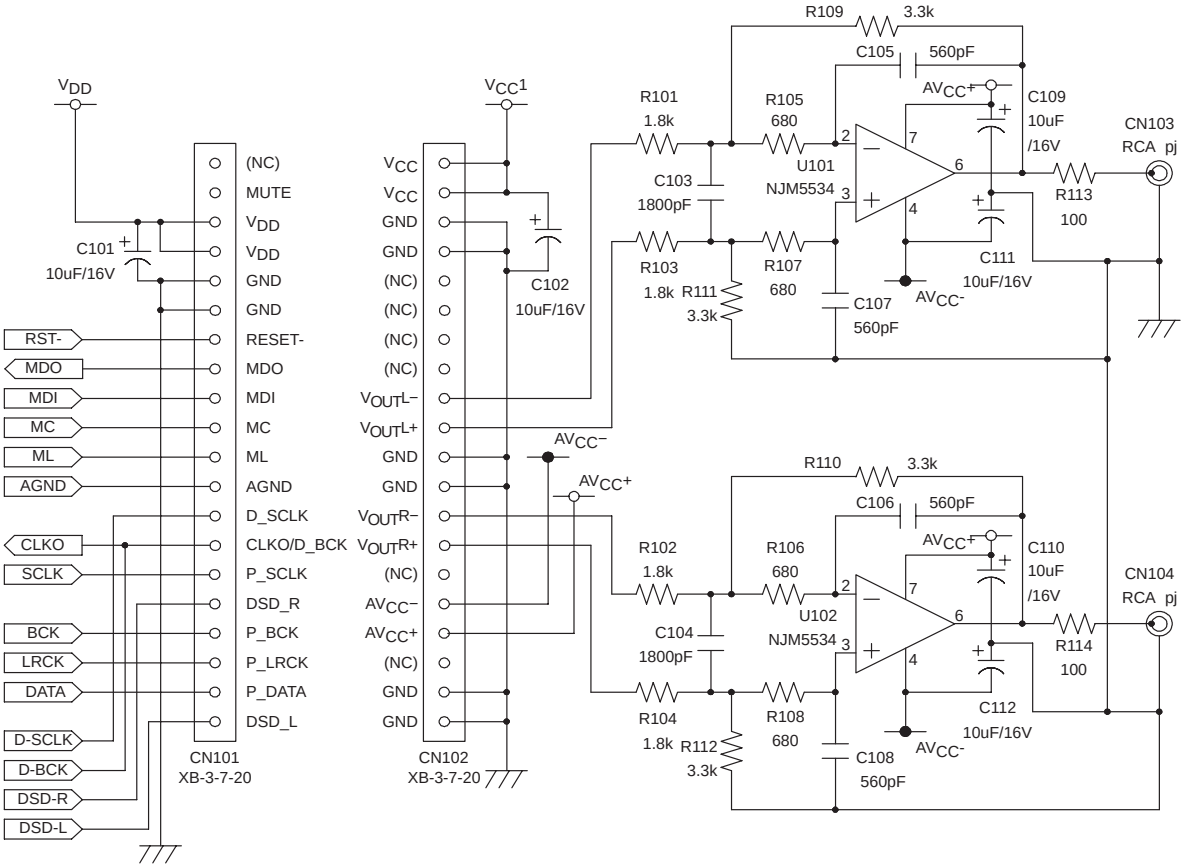


Figure 2−8. DEM-DAI/ASDAC Regulator and Connector

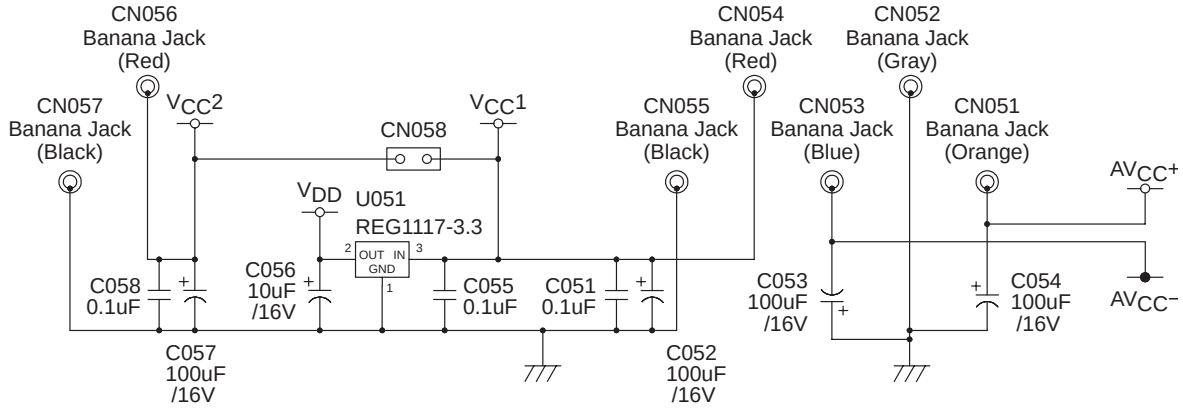


Figure 2−9. DEM-DAI/ASDAC—PCM/DSD1791, PCM1793 Digital Section (Digital Audio Interface)

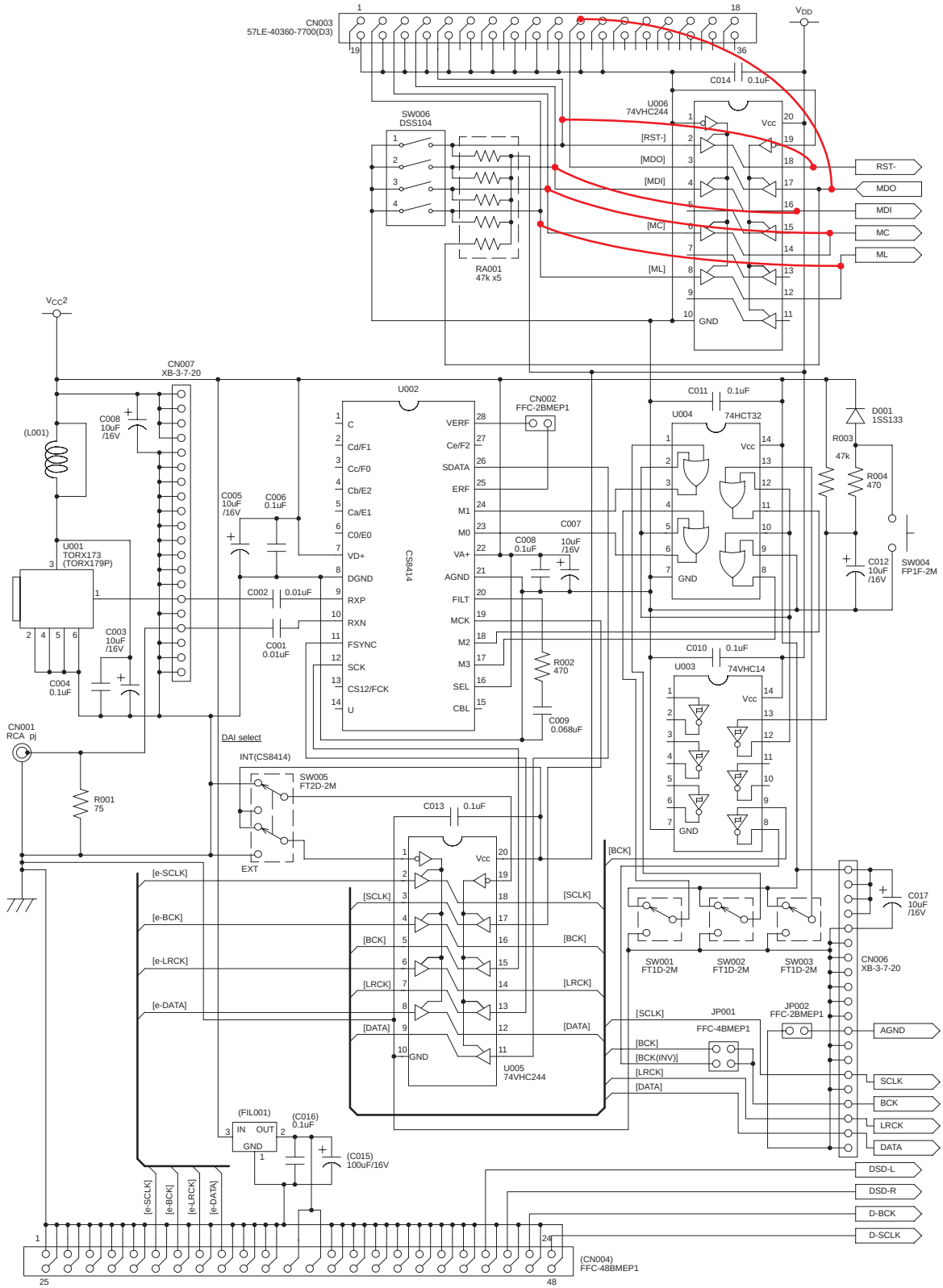
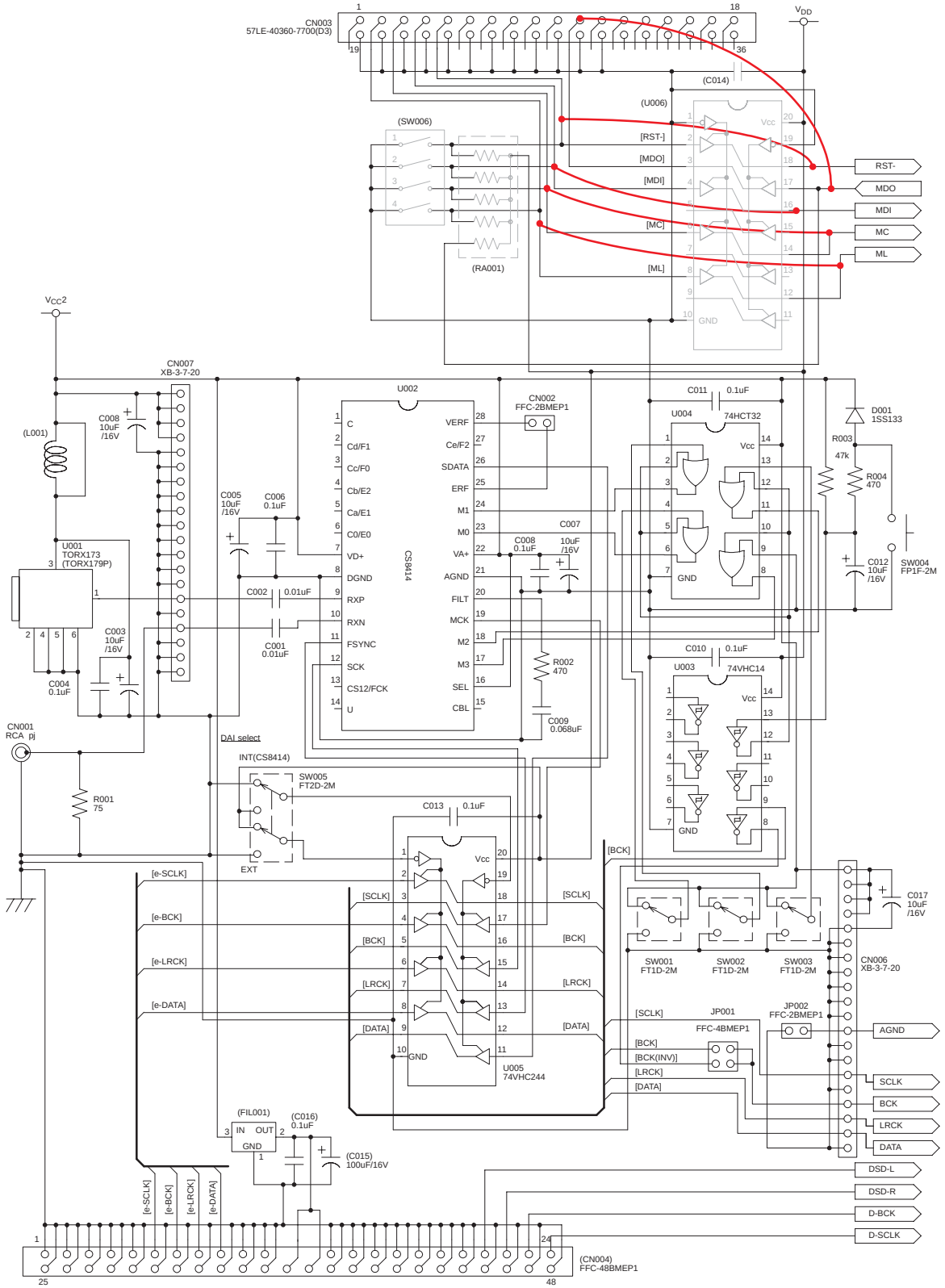


Figure 2−10. DEM-DAI/ASDAC—DSD1793 Digital Section (Digital Audio Interface)



2.4 DEM-AS/VDAC Schematic

Figure 2−11. DEM-AS/VDAC