CDB42518

Evaluation Board For CS42518/16

Features

- Single-Ended Analog Inputs and Outputs
- Integrated S/PDIF compatible Receiver
- CS5361 converters supply ADCIN1 and ADCIN2 for CS42518 One Line Modes
- CS8406 S/PDIF Digital Audio Transmitter
- Header for optional external configuration of CS42518 and board
- Header for external DSP serial audio I/O
- 3.3 or 5.0 Volt Logic Interface supply
- Demonstrates recommended layout and grounding arrangements
- Windows compatible software interface to configure CS42518 and inter-board connections

Description

The CDB42518 demonstration board is an excellent means for evaluating the CS42518/16 family of highly integrated multi-channel CODEC-S/PDIF receivers. Evaluation requires an analog/digital signal source and analyzer, Windows compatible computer, and power supplies.
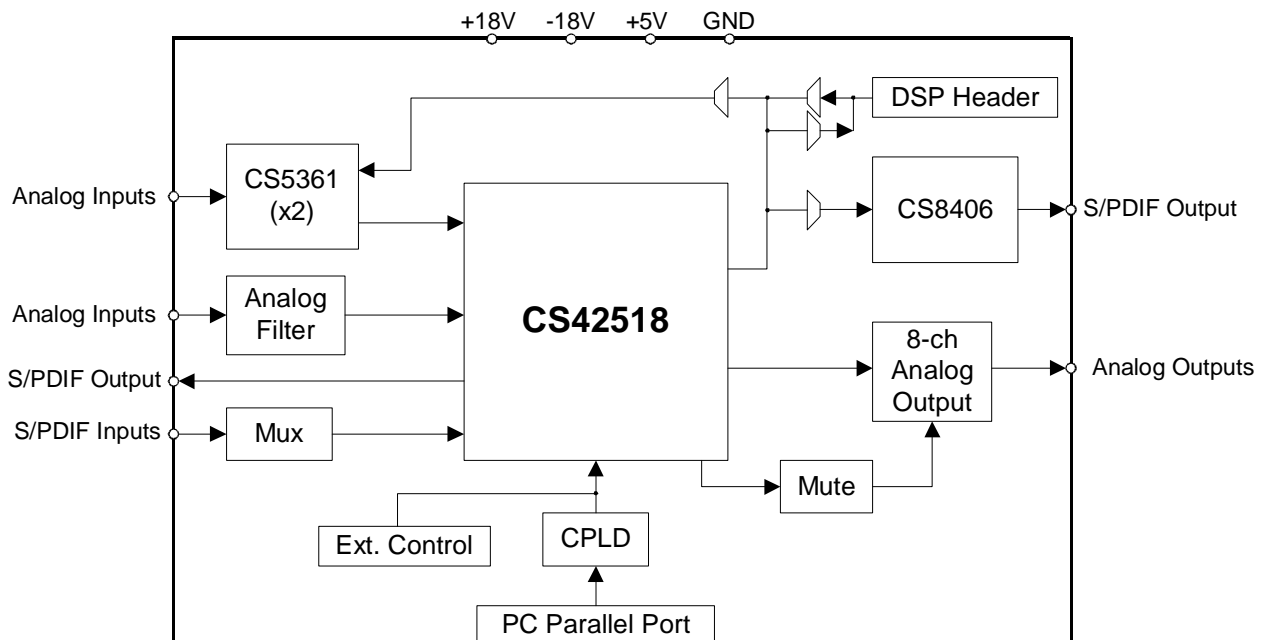
System timing can be provided by an on-board oscillator or phase-locked to an S/PDIF input. RCA phono jacks are provided for the CS5361 analog inputs and CS42518 analog inputs and outputs. Digital data I/O is available via RCA phono jacks or optical connectors to/from the CS42518 and CS8406.

The Windows software provides a GUI to make configuration of the board easy. The software communicates through the computer's parallel port, and will configure the hardware to allow all features of the CS42518 to be evaluated. The evaluation board may also be configured to accept external timing and data signals for operation in a user application during system development.

ORDERING INFORMATION

CDB42518   Evaluation Board

TABLE OF CONTENTS

Contacting Cirrus Logic Support

For all product questions and inquiries contact a Cirrus Logic Sales Representative.
To find one nearest you go to **www.cirrus.com/en/contacts/sales**

LIST OF FIGURES

LIST OF TABLES

1. SYSTEM OVERVIEW

The CDB42518 demonstration board is an excellent means for evaluating the CS42518/16 family of highly integrated CODEC-S/PDIF receivers. Analog and digital audio signal interfaces are provided, as well as a DB-25 computer parallel port interface for use with the supplied Windows configuration software.

The CDB42518 schematic set has been partitioned into 13 pages as shown in Figures 6 through 18.

1.1 CS42518

A complete description of each member of the CS42518/16 family is included in each respective product data sheet.

1.2 CS8406

The CS8406 S/PDIF transmitter on the demonstration board (see Figure 8) allows the performance of the CS42518 to be measured digitally. Either the CS42518 CODEC (CX) port or the Serial Audio Interface (SAI) port can be multiplexed to the CS8406. The CS8406 transmitter is configured to operate in slave mode only, and will receive the required clocks from the CS42518. The data format for the CS8406 is selectable and must match that of its source. The CS8406 must be configured using the supplied software.

1.3 CS5361

There are two CS5361 A/D converters on the CS42518 demonstration board (see Figures 9 and 10). These converters supply the CS42518 ADCIN signals, and must operate in left-justified, 24-bit mode only. Their serial data outputs are used when supporting the CS42518 One Line Mode of operation.

RCA analog connectors supply the inputs to each CS5361 channel through a unity gain, AC-coupled, single-to-differential circuit. Each CS5361 input circuit is biased to 1/2 VA, and a $1V_{RMS}$ signal will drive the converter to full scale. The CS5361 converters are set to operate in slave mode and will receive their clocks from the CS42518. The SCLK and LRCK signals can be provided from either the CS42518 CX or SAI port, and must be selected using the configuration software.

1.4 Crystal Oscillator

Oscillator Y1 (see Figure 7) provides the System Clock (OMCK) for the CS42518. The crystal oscillator on the board is mounted in pin sockets that allow it to be removed or replaced. The board is shipped with a 24.000 MHz crystal oscillator stuffed at Y1. Please refer to the CS42518/16 data sheet for details on OMCK operation.

The buffer on the output of the oscillator provides for signal level shifting to the proper VLS supply. This buffer can be removed if the oscillator is powered from the same VLS voltage source as the codec.

1.5 Analog Input

RCA phono connectors supply the CS42518 analog inputs through unity gain, AC-coupled single-to-differential circuits (see Figure 11). Each input circuit is biased to match the $2.7V_{DC}$ VQ, and a $1V_{RMS}$ differential signal will drive the CS42518 converter to full scale.

1.6 Analog Outputs

Each CS42518 analog output is routed through a differential to single-ended, unity-gain low pass filter, which is AC-coupled to an RCA phono jack (see Figures 12 through 15). The analog output filter on the CDB42518 has been designed to add flexibility when evaluating the CS42518 DAC outputs. The output filter was designed in a two stage format, with the first stage being an optional instrumentation amplifier, and the second stage a 2-pole butterworth low pass filter.

The 2-pole low pass filter provides an example of an inexpensive circuit with good distortion and dynamic range performance. It is designed to have the in-band impedance matched between the positive and negative legs. It also provides a balanced to single-ended conversion for standard un-balanced outputs. Evaluate this circuit by placing the FILT jumpers (three per output channel) to position 1 (selectable by J9, J10 & J11 for OUTA1, etc.).

The instrumentation amplifier is optionally inserted before the LPF by changing the FILT jumpers to position 2. The instrumentation amplifier incorporates a 5x gain (+14dB) which effectively lowers the noise contribution of the following 2-pole LPF. This improves the overall dynamic range of the system. The gain of this stage is determined from the following equation:

$$Gain = 1 + \frac{2(R)}{R_2}$$

The resistor designated by R_2 (see Figure 1) can be adjusted to change the gain of the instrumentation amp. The feedback resistors on the two sides of the instrumentation amp 'R' must be equal.
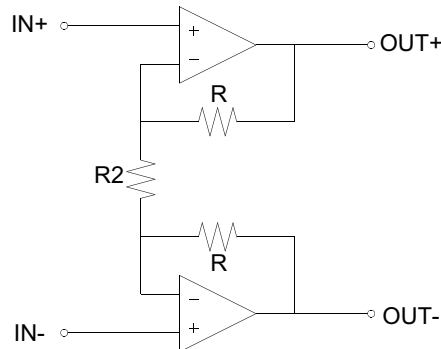
Figure 1. Instrumentation Amplifier Configuration

A resistor divider pad (R66 and R84 for OUTA1) has been placed after the low pass filter to bring the circuit back to unity gain (selectable with jumper J11 for OUTA1).

The attenuation provided by the output mute transistor (Q2 for OUTA1) is determined by the resistor-divider formed between the collector-emitter on-resistance and the output resistor of the LPF (R66 for OUTA1). The greater the output resistor, the greater the attenuation will be for a given transistor. The trade off is that a high output impedance is not usually desirable, and may affect the voltage transfer to the next stage based upon its input impedance.

The same resistor that affects the transistor mute level also affects the HPF formed with the output DC-block capacitor (C63 for OUTA1). For LPF configuration 2, the values for the DC-block capacitor and output resistor pad (R66 and R84 for OUTA1) were chosen to give uniform distortion performance across the audio bandwidth, particularly at low frequency. The HPF formed by this R-C pair must be such that the voltage across the aluminum electrolytic DC-block capacitor must be a minimum at 20Hz. This keeps the distortion due to the electrolytic's dielectric absorption properties to a minimum. For a design utilizing only LPF configuration 1, there is no post-LPF resistor-divider pad, and a much smaller value capacitor can be used.

1.7   CPLD
The CPLD controls the on-board signal routing and configuration (see Figure 17). The CPLD interfaces with the computer software through the DB-25 parallel port header, or can communicate with an external processor via the External Control header.

1.8   DB-25 Computer Parallel Port
On-board clock and data routing and configuration logic, as well as the CS42518 part are configured using a computer with the supplied Windows-based software. The software communicates via the DB-25 parallel port interface (see Figure 16) to a local CPLD that can configure all parts on the board.

1.9   External Control Header
A 26-pin dual-row header allows access to the control signals needed to configure the CS42518. The external controller has access to the CS42518 I2C/SPI signals, master mute and reset, and the CS42518 interrupt signal is available (see Figure 16). All control header signals are buffered, and are referenced to VLC levels. See Table 3 for a complete description of External Control Header signals.

1.10 DSP Header

A 32-pin dual-row header provides access to the serial audio signals required to interface with a DSP (see Figure 7). Either the CS42518 or the DSP header can be the master of the MCLK signal. The CS42518 can supply the DSP header with its recovered master clock (RMCK), or pass the local oscillator-sourced OMCK. An optional configuration supported is for the DSP header to source DSP_MCLK to the OMCK input, and the RMCK of the CS42518 is not used.

The CS42518 SAI and CX ports are individually selectable to be master or slave, and should source/receive their clocks to/from the DSP as required. All serial port timings must be synchronous to the to RMCK or the clock source suppling OMCK. See the data sheet for a complete description of serial port modes of operation. All DSP header signals are buffered, and are referenced to VLS levels. DSP interface power VLS and ground are supplied to the header. See Table 4 for a complete description of DSP Header signals.

1.11 LED Function Indicator

D1 (see Figure 16) indicates that a master reset condition has occurred on the board. D4 (see Figure 17) is sourced from the CPLD and is currently unsupported.

1.12 Power

Power can easily be supplied to the evaluation board through three binding posts, all referenced to the single black binding post ground connector (see Figure 18).

Supply +18.0 VDC to the green binding post to provide the positive analog rail. Supply -18.0 VDC to the yellow binding post to provide the negative analog rail. +18V and -18V supply power to the op-amps and can be +/-12 to +/-18 volts (must be +/-18 V when filter 2 is selected).

Supply +5.0VDC to the red binding post. This directly supplies the digital +5V, is regulated down to provide the digital +3.3V, and is filtered to supply VLC, VA and VARX.

VLS and VD must be individually set with jumpers to either +3.3V or +5V.

1.13 Grounding and Power Supply Decoupling

The CS42518 requires careful attention to power supply and grounding arrangements to optimize performance. Figures 15 and 16 detail the routing and component placement for both top and bottom layers of the demonstration board. Power supply decoupling capacitors are located as close to the CS42518 as possible. Extensive use of ground plane fill in the demonstration board yields large reductions in radiated noise.

CONNECTOR	INPUT/OUTPUT	SIGNAL PRESENT
+5V	Input	+ 5VDC power
-18V	Input	-18 to -12VDC negative supply for the op-amps
+18V	Input	+12 to +18VDC positive supply for the op-amps
GND	Input	Ground connection from power supply
SPDIF RX - J1	Input	Digital audio interface input via coax
SPDIF RX - OPT1	Input	Digital audio interface input via optical
SPDIF TX - J2	Output	CS8406 digital audio interface output via coax
SPDIF TX - OPT2	Output	CS8406 digital audio interface output via optical
CS42518 TXP - OPT3	Output	CS42518 digital audio interface output via optical
PC Port - J22	Input/Output	Parallel connection to computer for SPI / I^2C control port signals
EXTERNAL CONTROL HEADER - J17	Input/Output	I/O for SPI / I^2C control port signals - see signal descriptions below
DSP HEADER - J36	Input/Output	I/O for DSP serial port signals - see signal descriptions below
ANALOG IN LFT/RT	Input	RCA phono jacks for analog input signal to CS42518 internal ADCs
EXT A/D #1 LEFT/RIGHT	Input	RCA phono jacks for analog input signal to CS5361 ADC #1
EXT A/D #2 LEFT/RIGHT	Input	RCA phono jacks for analog input signal to CS5361 ADC #2
OUT_A1 to OUT_B4	Output	RCA phono jacks for channels A1 to B4 analog outputs

Table 1. System Connections

JUMPER / SWITCH	PURPOSE	POSITION	FUNCTION SELECTED
J37	Selects source of voltage for the VLS supplies	+3.3V *+5V	Voltage source is +3.3V regulator Voltage source is +5V binding post
J38	Selects source of voltage for the VD supply	+3.3V *+5V	Voltage source is +3.3V regulator Voltage source is +5V binding post
S2	Stand-Alone Mode Select	SAM0 SAM1	Stand-Alone Modes are for debug use and are presently unsupported
J9,J10,J11 J13,J15,J16 J18,J19,J20 J23,J25,J26 J28,J29,J30 J32,J34,J35 J39,J40,J41 J43,J45,J46	DAC Output Filter select - FILT	*1 2	Selects standard 2-pole LPF Selects instrumentation-amp/LPF/pad *Default Factory Settings

Table 2. Jumper Settings

1.14 External Control Header Signals

Header Pin #	Signal Description	Source	Schematic Signal Name	Buffer	Buffer Voltage
1	External Control Present Signal	CTRL	EXT_CONTROL_PRESENT-	-	-
2	Ground	CDB	GND	-	-
3	Address Bit 0 (I^2C) / CS- (SPI)	CTRL	AD0/CS	74VHC125	VLC
4	Ground	CDB	GND	-	-
5	Address Bit 1 (I^2C) / CDIN (SPI)	CTRL	AD1/CDIN	74VHC125	VLC
6	Ground	CDB	GND	-	-
7	SDA (I^2C) / CDOUT (SPI)	CTRL or CS42518	SDA/CDOUT	MOSFET	VLC
8	Ground	CDB	GND	-	-
9	Serial Control Port Clock	CTRL	SCL/CCLK	74VHC125	VLC
10	Ground	CDB	GND	-	-
11	Master MUTE to all Outputs	CTRL	EXT_MUTE	74VHC125	VLC
12	Ground	CDB	GND	-	-
13	Master RESET	CTRL	EXT_RESET	Diode	-
14	Ground	CDB	GND	-	-
15	CS42518 Interrupt (Programmable)	CS42518	EXT_HDR_INT	74VHC125	VLC
16	Ground	CDB	GND	-	-
17	Enable external I2C interface	CTRL	EXT_EN_SCL	74VHC125	VLS
18	Ground	CDB	GND	-	-
19	Enable external I2C interface	CTRL	EXT_EN_SDA	74VHC125	VLS
20	Ground	CDB	GND	-	-

Table 3. CS42518 External Control Header Signals

1.15 DSP Header Signals

Header Pin #	Signal Description	Source	Schematic Signal Name	Buffer	Buffer Voltage
1	Master Clock	CS42518 or DSP	DSP_MCLK	74VHC125	VLS
2	Ground	CDB	GND	-	-
3	CODEC port LRCK	CS42518 or DSP	DSP_CX_LRCK	74VHC125	VLS
4	Ground	CDB	GND	-	-
5	CODEC port SCLK	CS42518 or DSP	DSP_CX_SCLK	74VHC125	VLS
6	Ground	CDB	GND	-	-
7	CODEC port SDATA Input 1	DSP	DSP_SDAT1	74VHC125	VLS
8	Ground	CDB	GND	-	-
9	CODEC port SDATA Input 2	DSP	DSP_SDAT2	74VHC125	VLS
10	Ground	CDB	GND	-	-
11	CODEC port SDATA Input 3	DSP	DSP_SDAT3	74VHC125	VLS
12	Ground	CDB	GND	-	-
13	CODEC port SDATA Input 4	DSP	DSP_SDAT4	74VHC125	VLS
14	Ground	CDB	GND	-	-
15	no connect	-	-	-	-
16	Ground	CDB	GND	-	-
17	SAI port LRCK	CS42518 or DSP	DSP_SAI_LRCK	74VHC125	VLS
18	Ground	CDB	GND	-	-
19	SAI port SCLK	CS42518 or DSP	DSP_SAI_SCLK	74VHC125	VLS
20	Ground	CDB	GND	-	-
21	no connect	-	-	-	-
22	Ground	CDB	GND	-	-
23	CODEC port SDATA Output	CS42518	DSP_CX_SDOUT	74VHC125	VLS
24	Ground	CDB	GND	-	-
25	SAI Port SDATA Output	CS42518	DSP_SAI_SDOUT	74VHC125	VLS
26	Ground	CDB	GND	-	-
27	MCLK Direction Control	DSP	MCLK_TO_DSP-	-	-
28	Ground	CDB	GND	-	-
29	Serial Port Interface Power	CDB	VLS	-	-
30	Ground	CDB	GND	-	-
31	Serial Port Interface Power	CDB	VLS	-	-
32	Ground	CDB	GND	-	-

Table 4. CS42518 DSP Header Signals

2. INITIAL BOARD SETUP

2.1   Power Supplies

1) Verify that all power supplies are off before making connections.

2) Connect a +5.0 VDC power supply to the +5V (J47) red binding post. Select VLS and VD operating voltage by placing a jumper on J37 and J38 to select either +5V or +3.3V.

3) Connect a +12.0 to +18.0 VDC power supply to the +18V (J49) green binding post. If using the FILT position number 2 for the output filter stage, then supply +18.0V only.

4) Connect a -12.0 to -18.0 VDC power supply to the -18V (J50) yellow binding post. If using the FILT position number 2 for the output filter stage, then supply -18.0V only.

5) Connect the common ground of the power supplies to the GND (J48) binding post.

6) Attach parallel port cable between board and computer.

7) Attach all required analog and digital cables to the board jacks and connectors.

8) If using the DSP Header connection, attach the required user supplied flat ribbon cable to the header with the power supplies turned off.

9) If using the External Control Header connection, attach the required user supplied flat ribbon cable to the header with the power supplies turned off. Note that external controller must ground the EXT_CONTROL_PRESENT-signal to gain control of the I2C/SPI signals. This can be done easily by connecting External Control Header pins 1 and 2 together.

10) With all cables and connections in place, turn on the power supplies to the board. Turn on supplies in this order: +5 V, +18 V, -18 V.

11) Press and release the RESET switch S1. The LED, D1, will illuminate as long as S1 is depressed indicating a reset condition. Once S1 is released, the LED should turn off. If it remains on, an error has occurred. At this point, power off the power supplies and re-check all connections. Apply power to the board and press and release S1. Once the LED has turned off, the board should now be ready for setup and use.

2.2   Installing the Software

1) Create a directory called CDB42518 anywhere on your system.

2) Copy CDB425XX.EXE from the included CD into this directory.

3) Copy the .LVS preset script files from the CD into this directory.

4) Run port95nt.exe from the CD. This will install a utility that will allow the CDB software to access the parallel port. After running the program the system will need to be restarted.

5) If desired, create a shortcut to CDB425XX.EXE on your desktop. You should now be able to run CDB425XX.EXE. Double-click on CDB425XX.EXE or its shortcut.

6) Select the LPT port you are using to connect to the CDB42518.

7) Shut down the application, reset the board, and then restart the application.

3. CDB425XX.EXE USER'S GUIDE

3.1 Main Window

The main window of the CDB42518 control application allows the user to configure the CDB42518 inter-board routing of clocks and data, as well as setup the CS5361 and CS8406 parts. To make changes to the CS5361, CS8406, or inter-board routing, the "Configure Board" radio button must be selected.

The RESET CS425xx button will reset only the part. The MASTER RESET button will reset the CS42518, as well as reset the board into its default state.

3.2 CS425XX Window

To configure the CS42518, the "Configure CS425xx" radio button must be selected, then press the "CS425XX" button. This will bring up the complete CS42518 configuration window.

3.3 Preset Scripts

To make configuring the board and part easier, preset scripts can be saved and recalled. A preset script is a "snapshot" of all GUI board and component settings. This can done using the File pulldown menu and choosing Load or Save. Scripts are saved with the default .LVS extension, and when loaded, will create a .LOG file. There are several preset scripts included with the software. The following sections represent three common setup modes with scripts for quick evaluation of the board.

3.4 Quick Start Preset - Analog In to Analog Out

To measure analog in to analog out performance, you will need the following:

• CS42518 Demonstration Board

• +18 VDC, -18 VDC, and +5 VDC power supplies

• Analog signal source and analyzer

• Windows compatible computer with parallel port cable and CDB425xx software

Step 1 - Follow Initial Board Setup procedure as described above

Step 2 - Select Output Filter Jumpers

Set all CDB42518 analog output filter jumpers to the FILT2 settings.

Step 3 - Connect to Windows Software

Connect the computer to the board and launch the CDB425xx software.

Step 4 - Connect Signal Source

Connect the analog output from the analyzer to the Left Analog Input J7. Connect J12 analog OUTA1 RCA to the input of the analyzer. Set the analyzer output to 1.0 VRMS, 1 kHz. Set the analyzer input to measure signal level and apply a 22-22 kHz filter.

Step 5 - Configure the Board

Using the Windows software, load the preset script "Single Speed Analog In To Analog Out.LVS". This preset will configure the CS42518 to use OMCK as the master clock, CX and SAI ports will be masters, and the CX_SDOUT (ADC) data will source all CX_SDIN (DAC) inputs. The left/right analog inputs will appear at all odd/even analog outputs. The single speed sample rate will be 46.875kHz based upon the 24.000MHz OMCK. You may load the similar double speed or quad speed presets to investigate higher sample rates.

Step 6 - Measure Audio

You should now have audio appearing at the Analog A1 output.

3.5 Quick Start Preset - Analog In to Digital Out

To measure the analog to digital converter performance, you will need the following:

• CS42518 Demonstration Board

• +18 VDC, -18 VDC, and +5 VDC power supplies

- Analog signal source and analyzer
- Digital signal source and analyzer
- Windows compatible computer with parallel port cable and CDB425xx software

Step 1 - Follow Initial Board Setup procedure as described above

Step 2 - Connect to Windows Software

Connect the computer to the board and launch the CDB425xx software.

Step 3 - Connect Signal Source

Connect the analog output from the analyzer to the Left Analog Input J7. Connect the CS8406 digital output (coax J2 or optical OPT2) to the input of the analyzer. Set the analyzer output to 1.0 VRMS, 1 kHz. Set the analyzer input to measure digital signal level and apply a 22-22 kHz filter.

Step 4 - Configure the Board

Using the Windows software, load the preset script "Single Speed Analog In To Digital Out.LVS". This preset will configure the CS42518 to use OMCK as the master clock, CX and SAI ports will be masters, and the CX (ADC) clocks data will source the CS8406 inputs. The CS8406 will output the ADC digital data to both the optical and RCA jacks. The single speed sample rate will be 46.875kHz based upon the 24.000MHz OMCK. You may load the similar double speed or quad speed presets to investigate higher sample rates.

Step 5 - Measure Audio

You should now have digital audio appearing at the CX_SDOUT port and the CS8406 digital output.

3.6   Quick Start Guide - Digital In to Analog Out

To measure digital to analog performance, you will need the following:

- CS42518 Demonstration Board
- +18 VDC, -18 VDC, and +5 VDC power supplies
- Analog signal source and analyzer
- Digital signal source and analyzer
- Windows compatible computer with parallel port cable and CDB425xx software

Step 1 - Follow Initial Board Setup procedure as described above

Step 2 - Select Output Filter Jumpers

Set all CDB42518 analog output filter jumpers to the FILT2 settings.

Step 3 - Connect to Windows Software

Connect the computer to the board and launch the CDB425xx software.

Step 4 - Connect Signal Source

Connect the S/PDIF digital output from the analyzer to the optical input connector OPT1. Connect the analog OUTA1 RCA phono jack J12 to the input of the analyzer. Set the analyzer output to 0 dBFS, 1 kHz, sample rate at 48 kHz. Set the analyzer input to measure signal level and apply a 22-22 kHz filter.

Step 5 - Configure the Board

Using the Windows software, load the preset script "Single Speed Optical In to Analog Out.LVS". This preset will configure the CS42518 to use the recovered PLL clock as the master clock, the SAI port will be master, the CX port will be slaved to the SAI port, the SAI_SDOUT will source all CX_SDIN inputs. The test source left/right data will appear at all odd/even analog outputs. You may load the similar double speed or quad speed presets to investigate higher sample rates, but you must be sure to supply an appropriate speed SPDIF signal.

Step 6 - Measure Audio

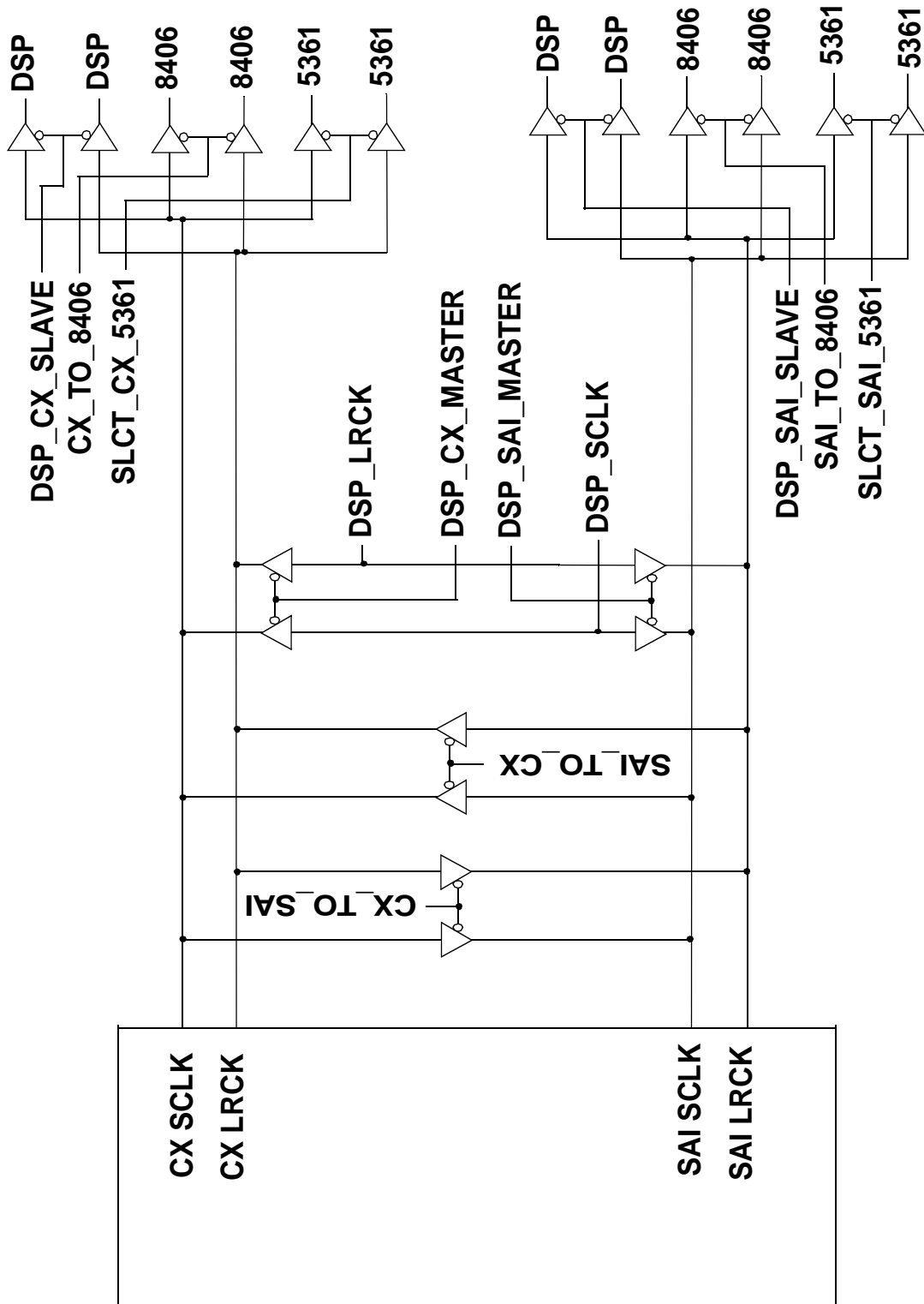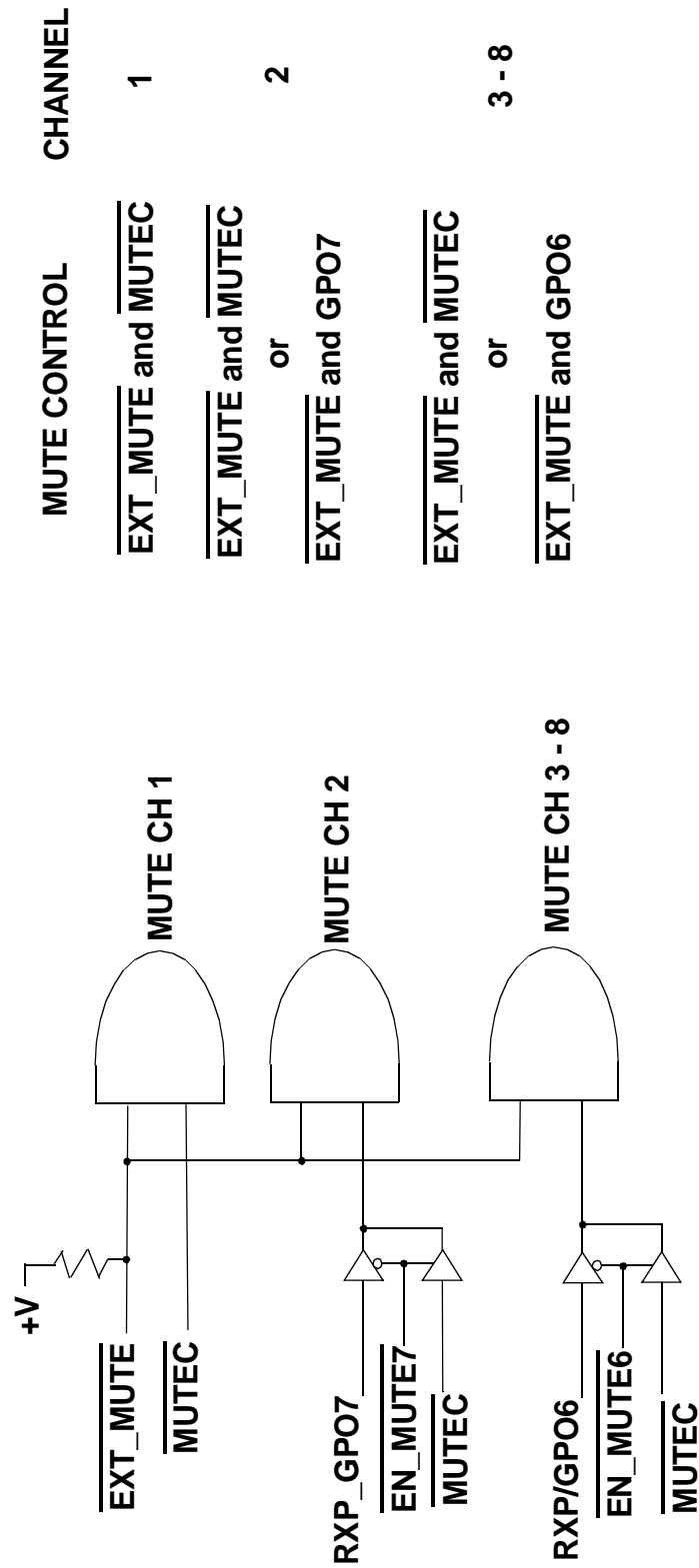You should now have audio appearing at the Analog A1 output.

4. BLOCK DIAGRAMS

Figure 2. MCLK and SDATA

Figure 3. CX and SAI LRCK/SCLK
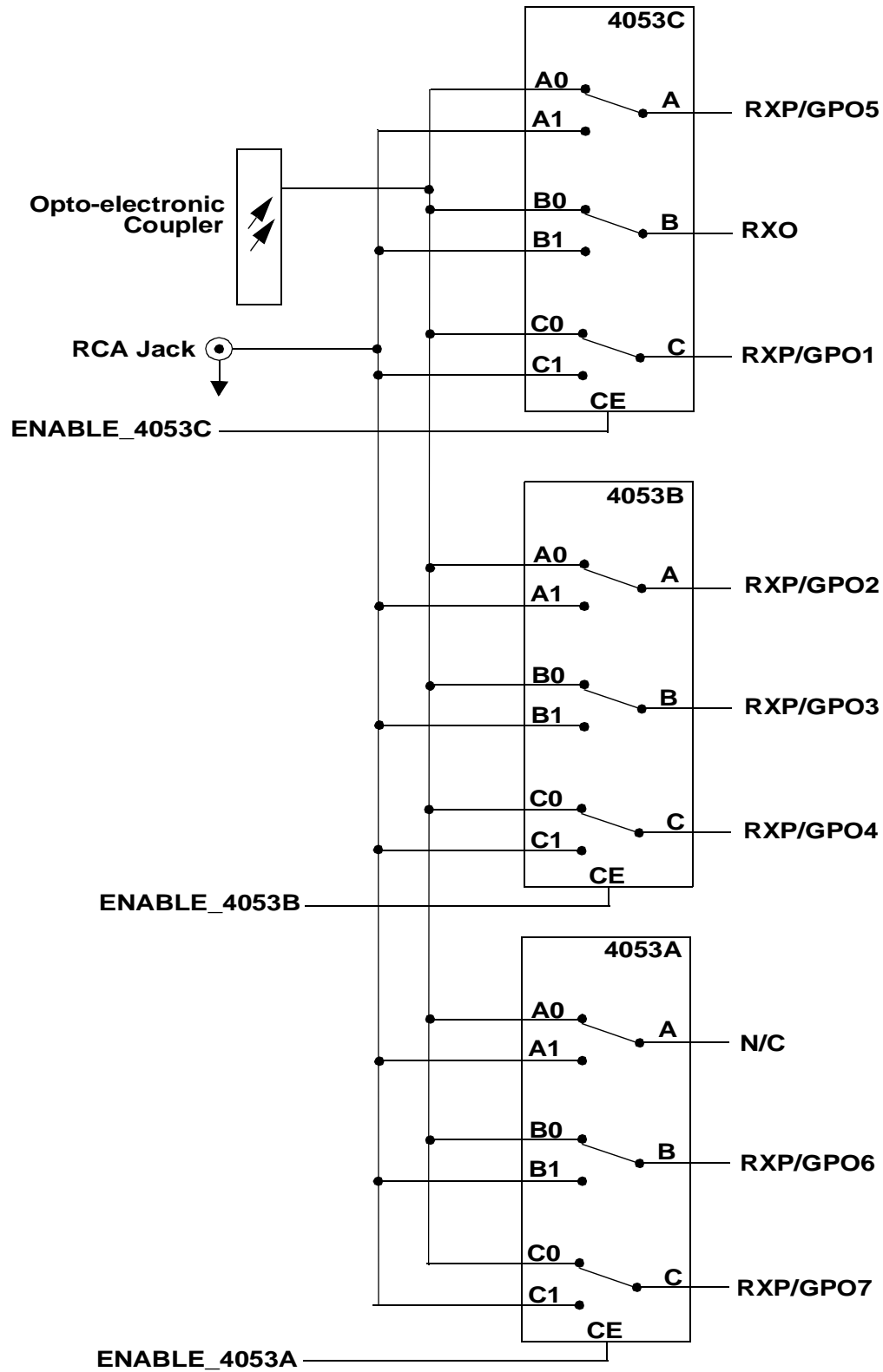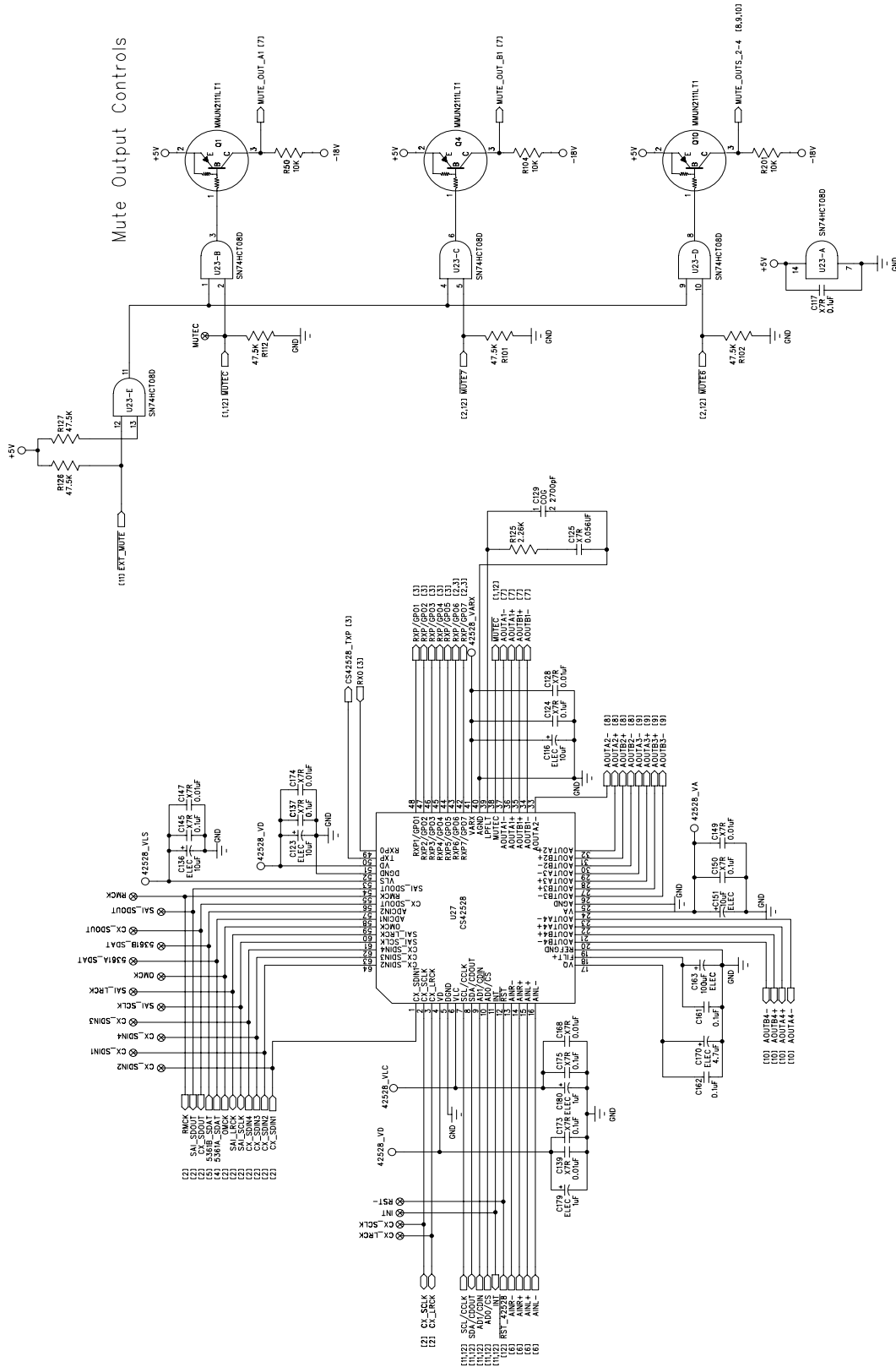
Figure 4. Output Channel Mute Select

Figure 5. SPDIF Routing

5. SCHEMATICS AND LAYOUT

Figure 6. CS42518
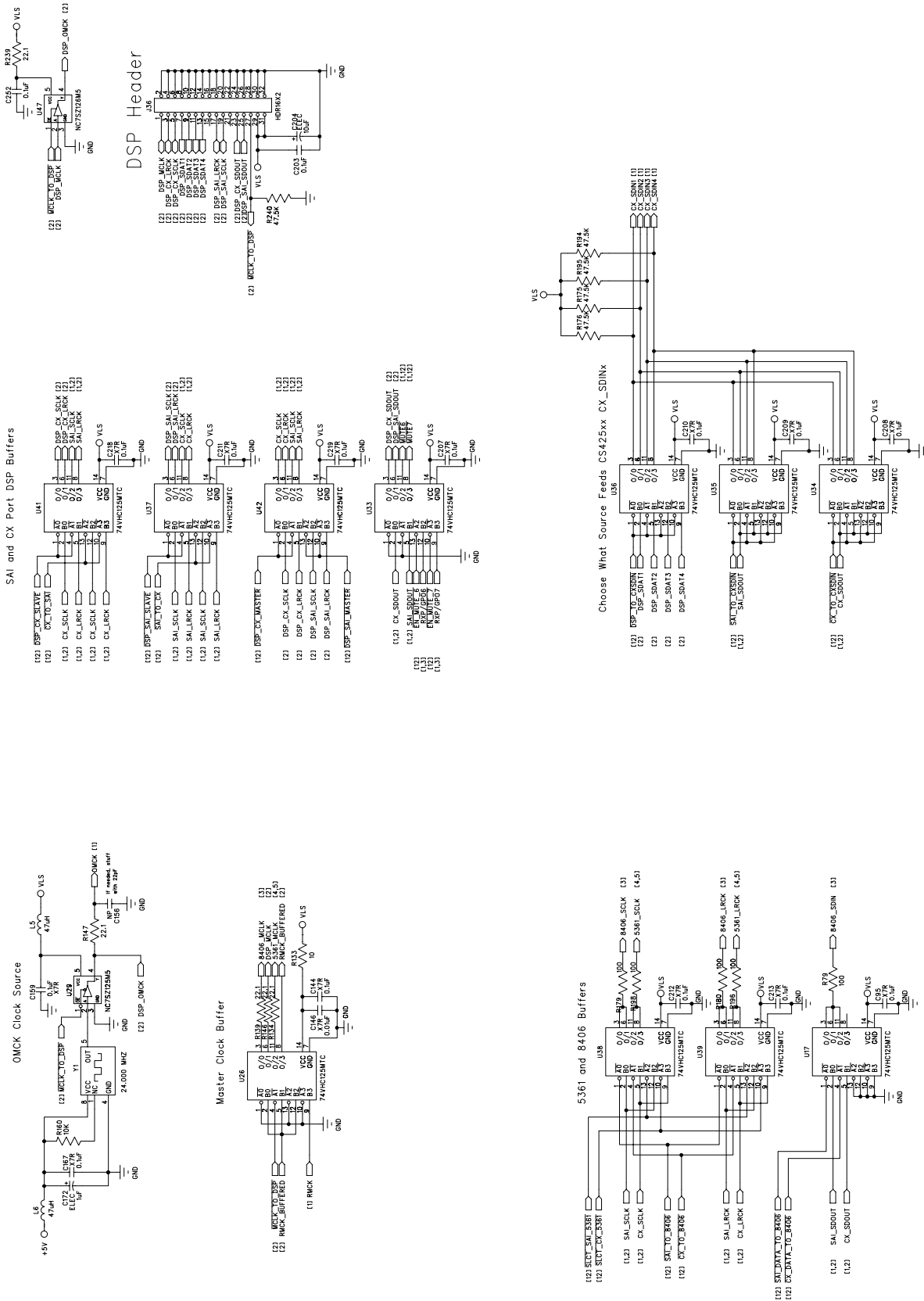
Figure 7. Clocks, Data, and DSP Header
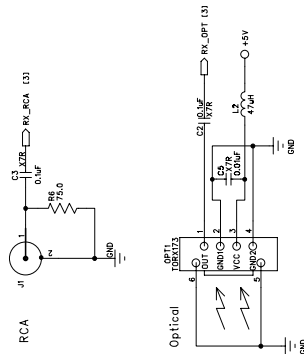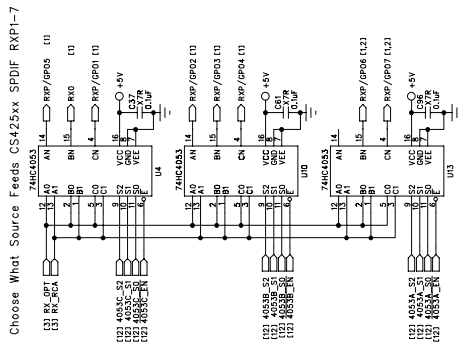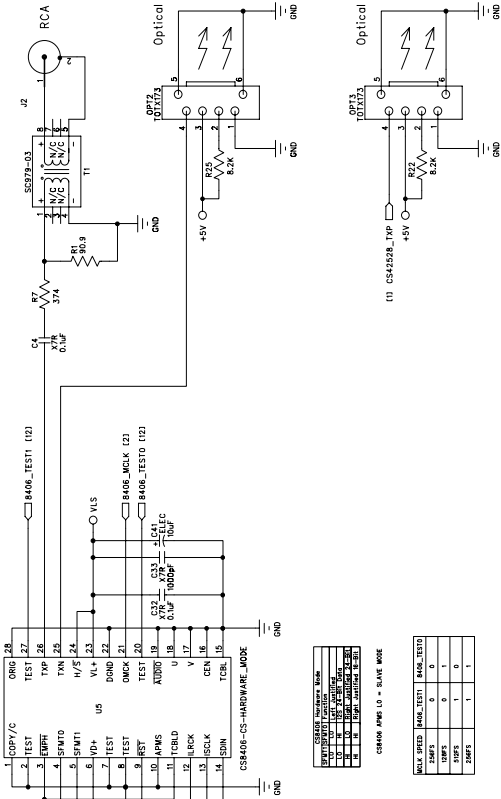
Figure 8. SPDIF
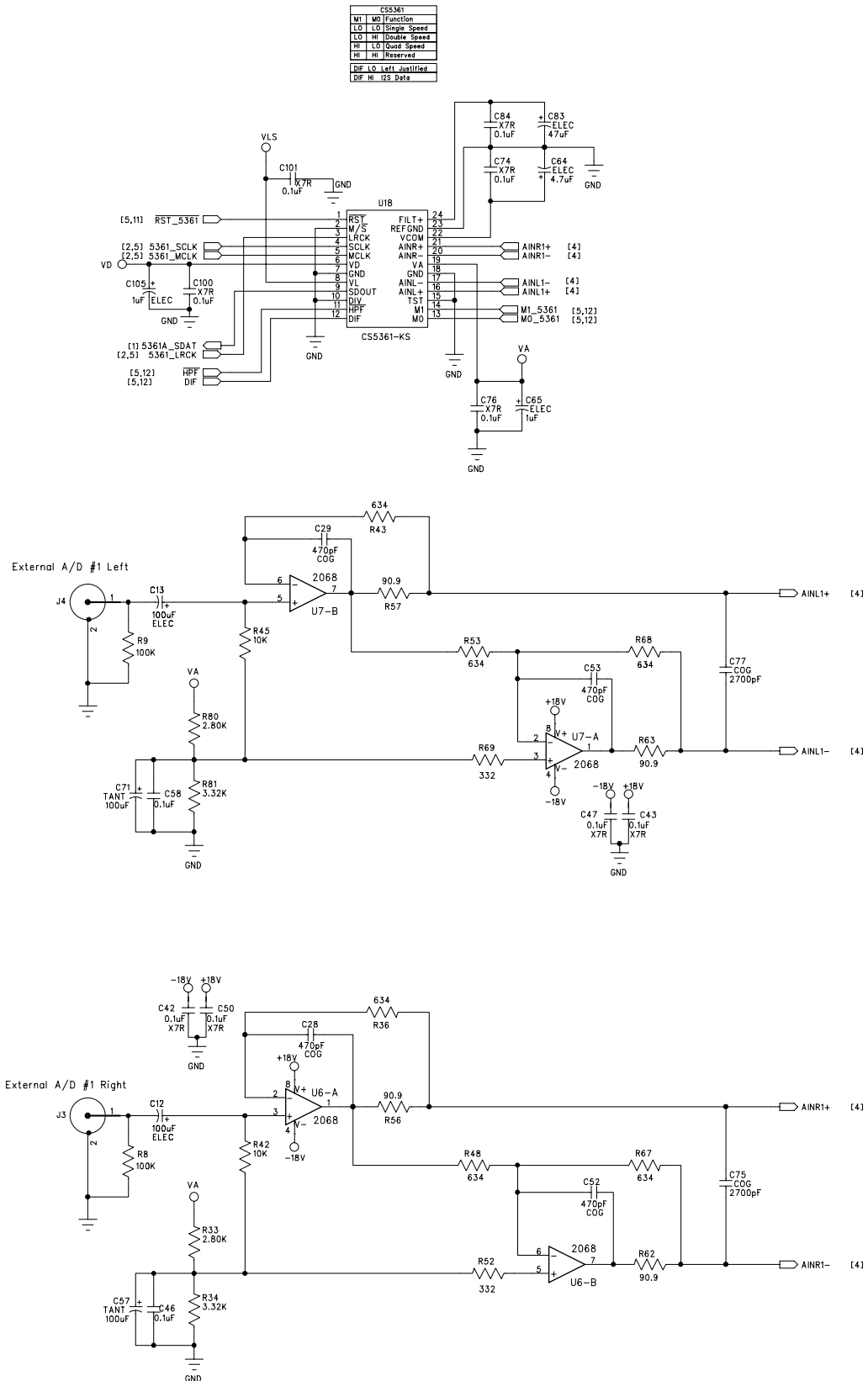
Figure 9. CS5361 External ADC #1
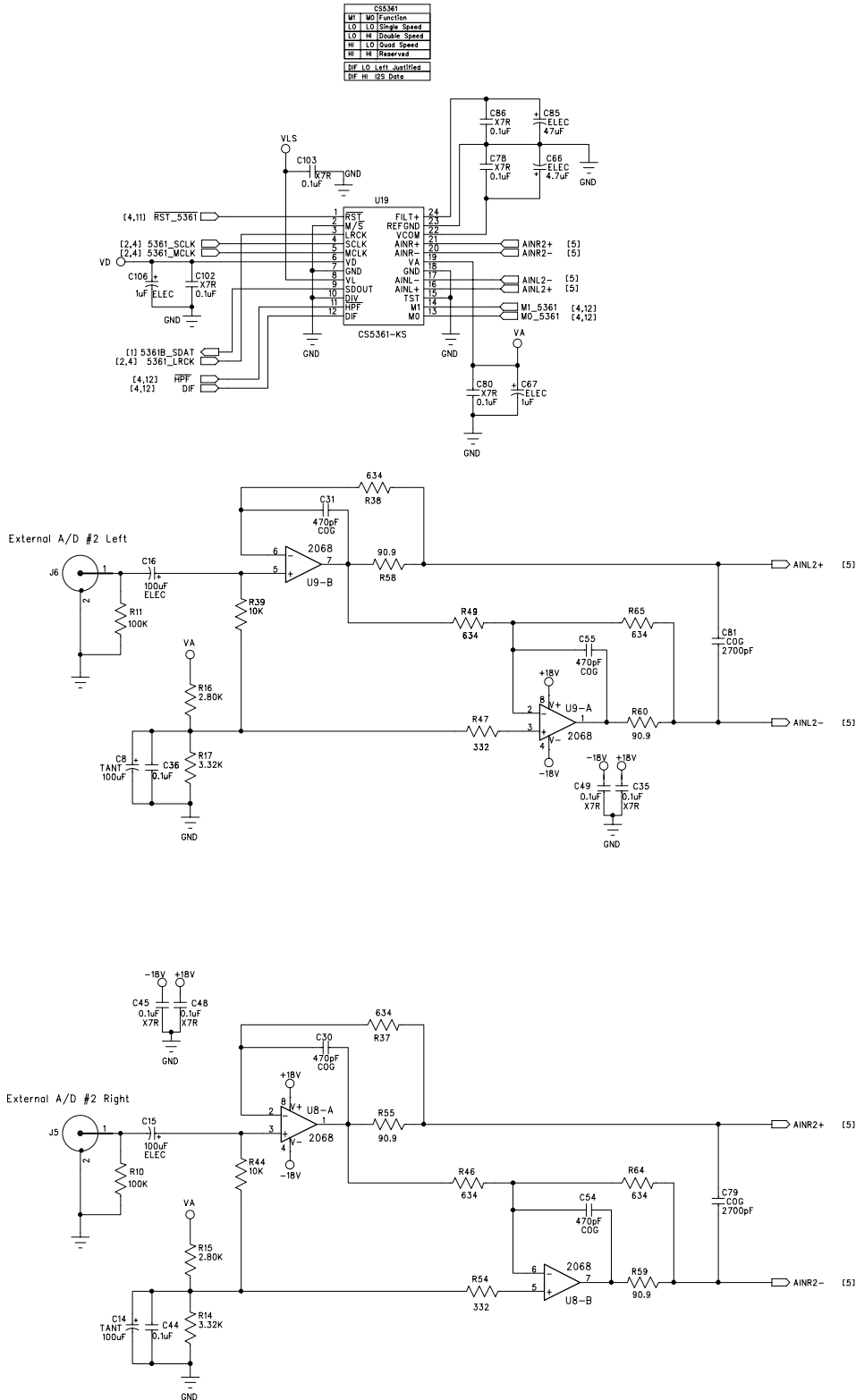
Figure 10. CS5361 External ADC #2
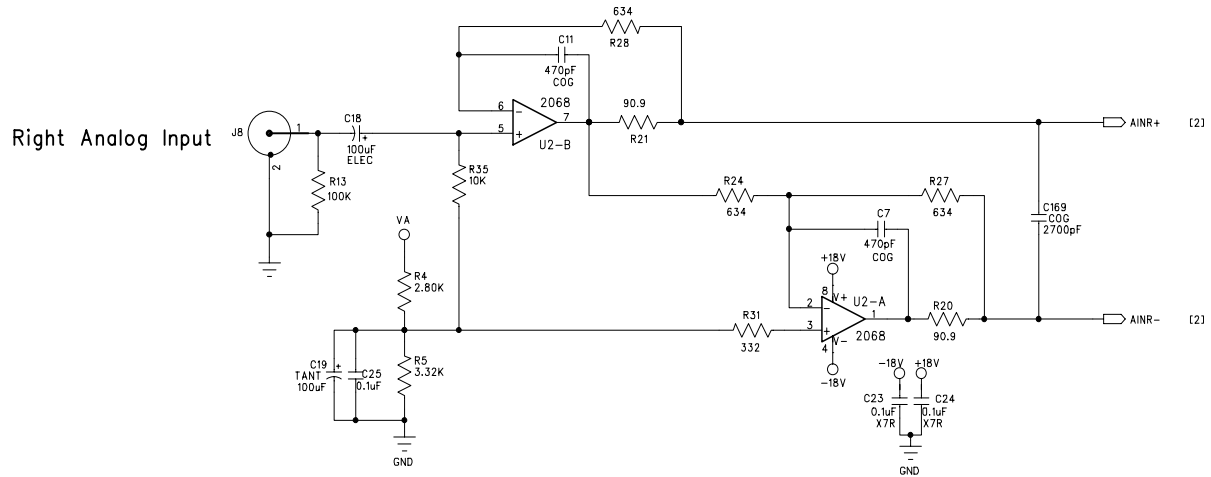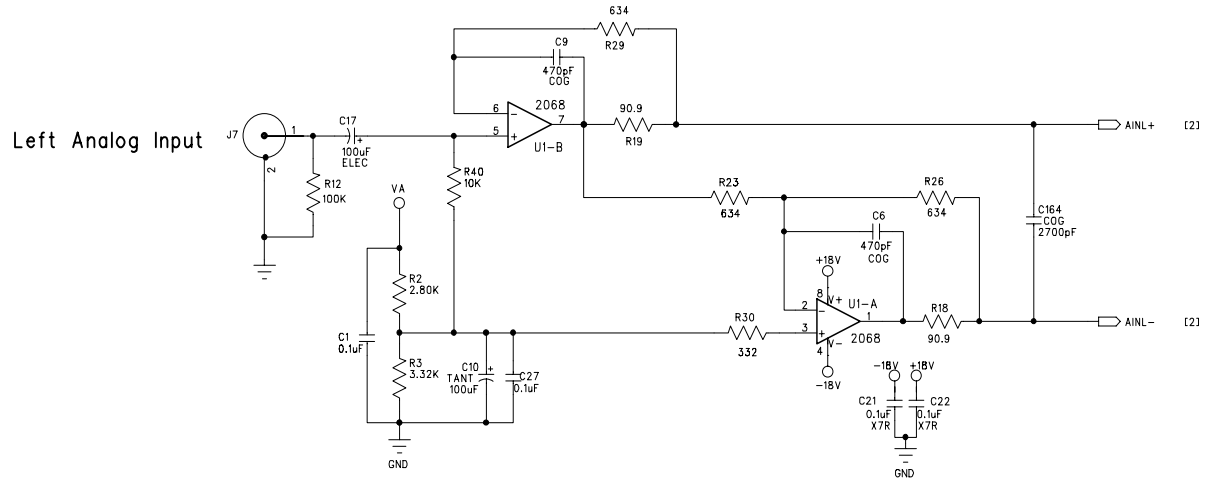
Figure 11. CS42518 Analog Inputs
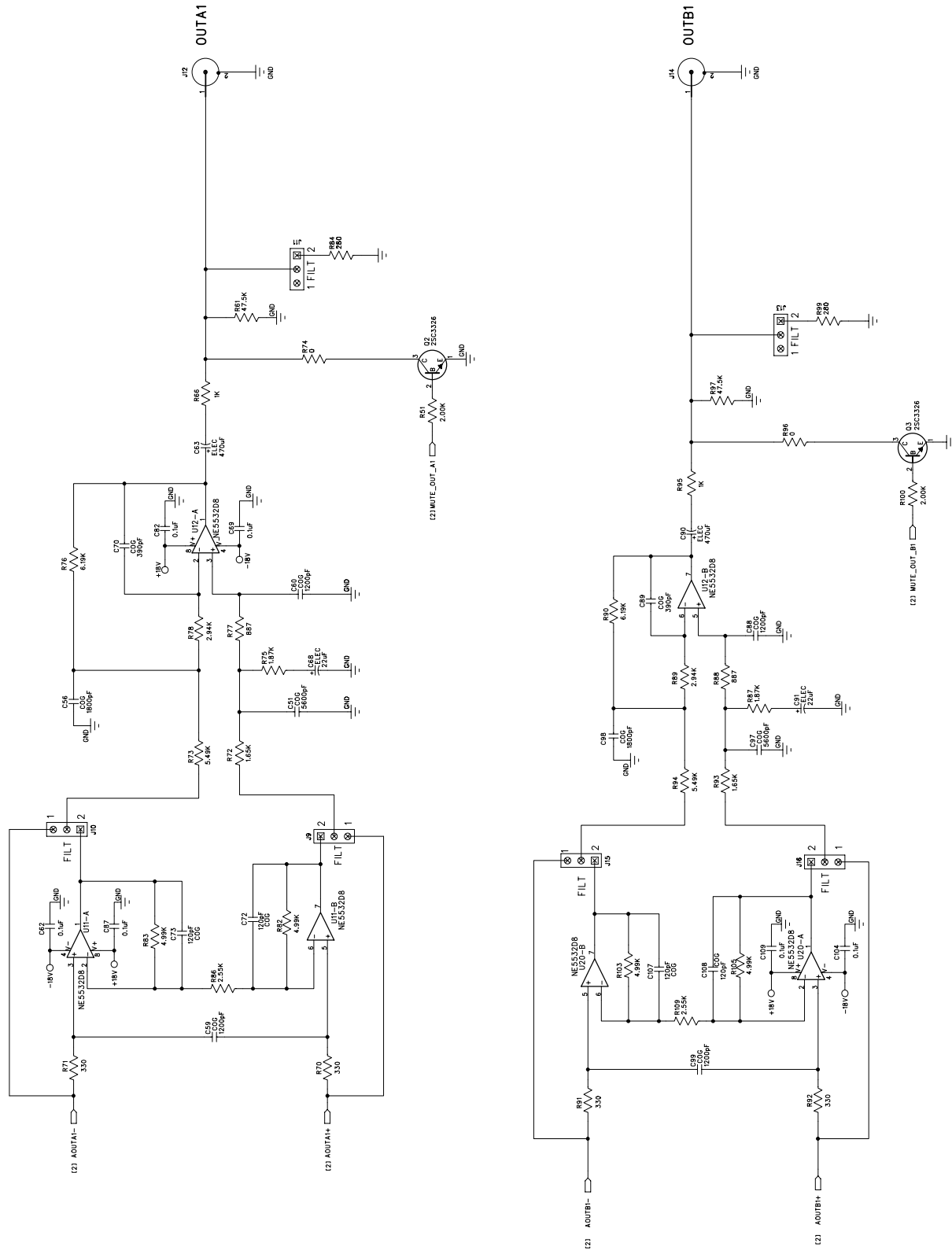
Figure 12. Analog Outputs A1 and B1
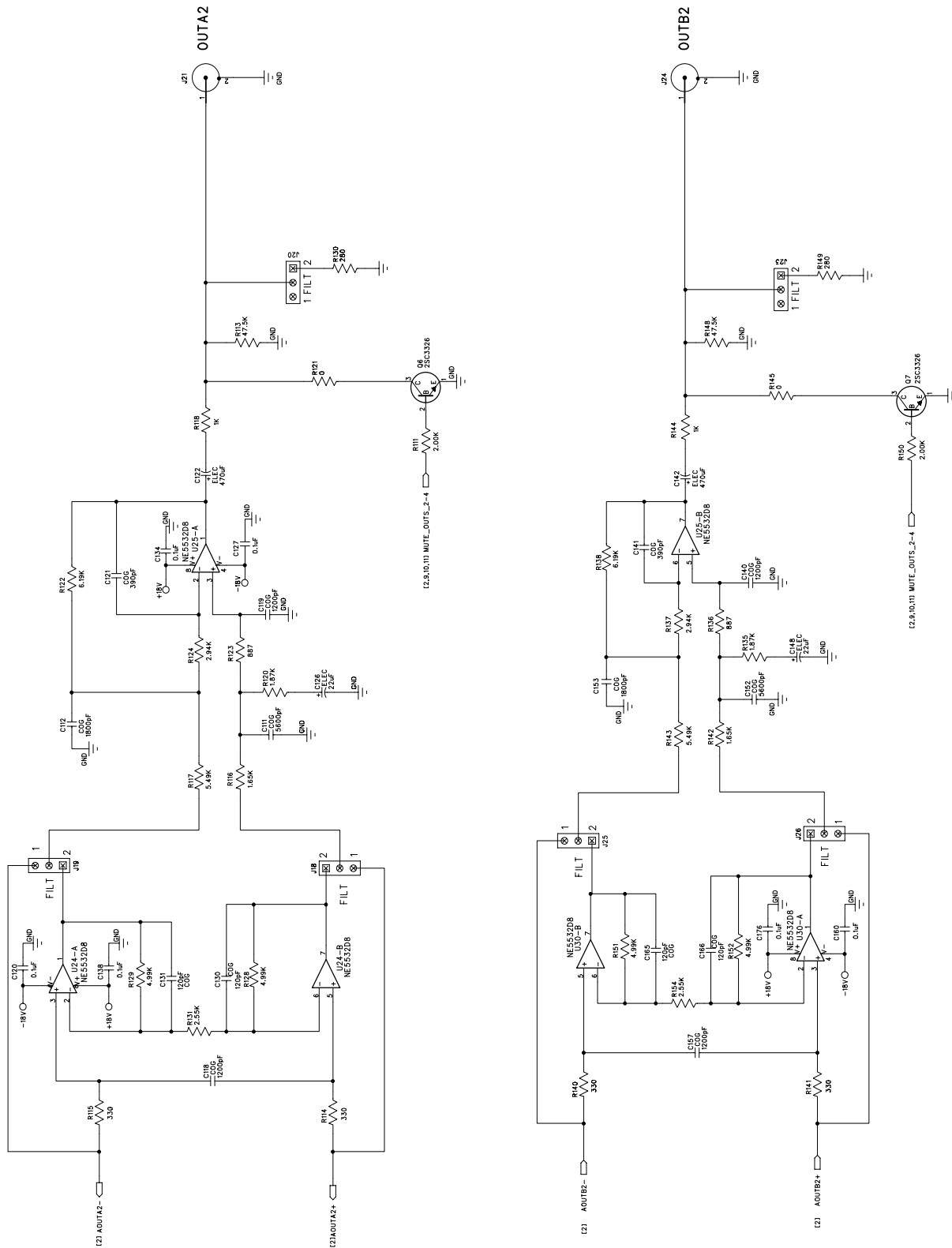
Figure 13. Analog Outputs A2 and B2
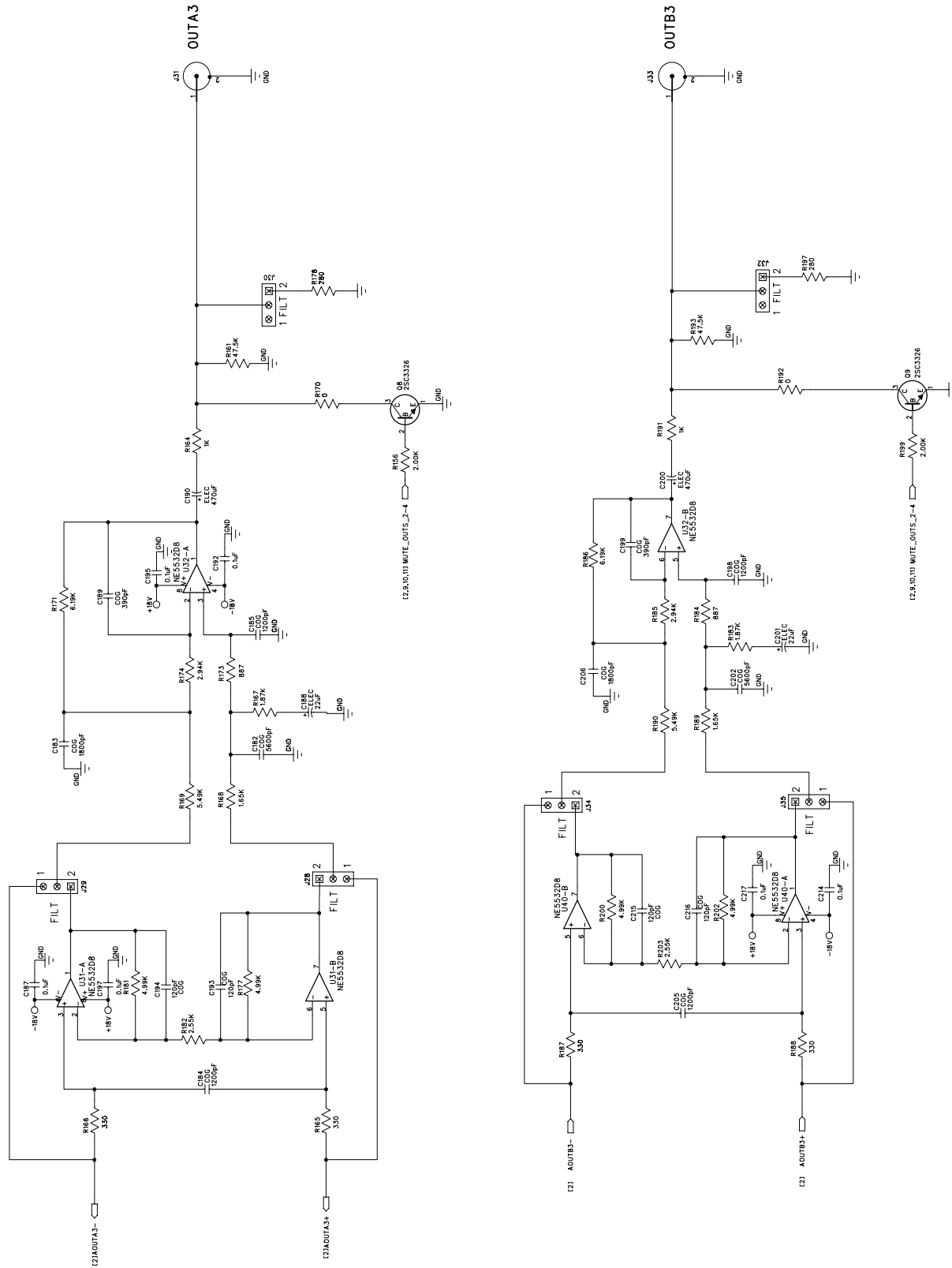
Figure 14. Analog Outputs A3 and B3

Figure 15. Analog Outputs A4 and B4

Figure 16. DB-25, Ext Ctrl Header, Reset

Figure 17. CPLD

Figure 18. Power

Figure 19. Component Placement and Reference Designators

Figure 20. Top Layer

Figure 21. Bottom Layer

6. BILL OF MATERIALS

CIRRUS LOGIC
CDB42528B.sch

BILL OF MATERIAL

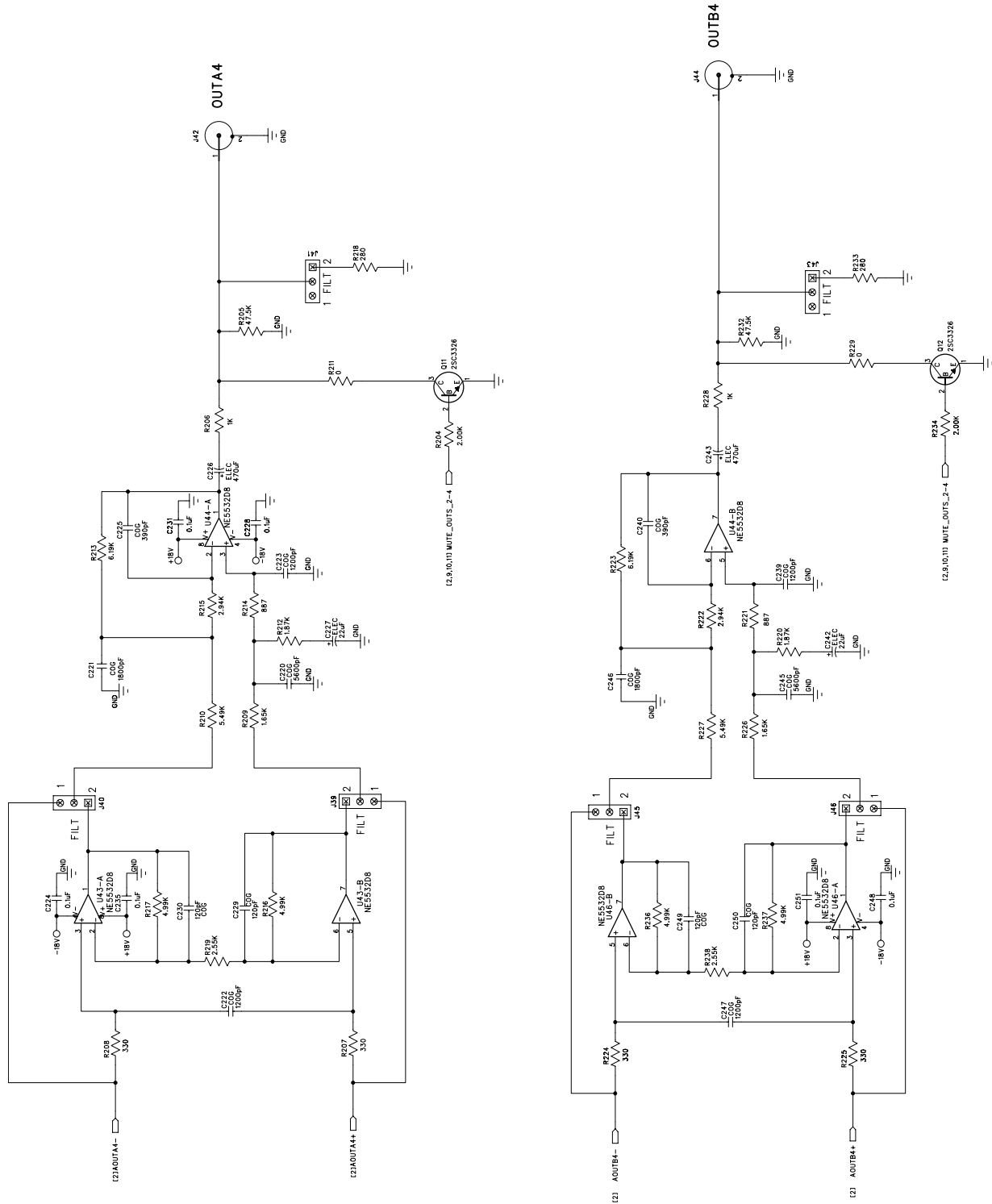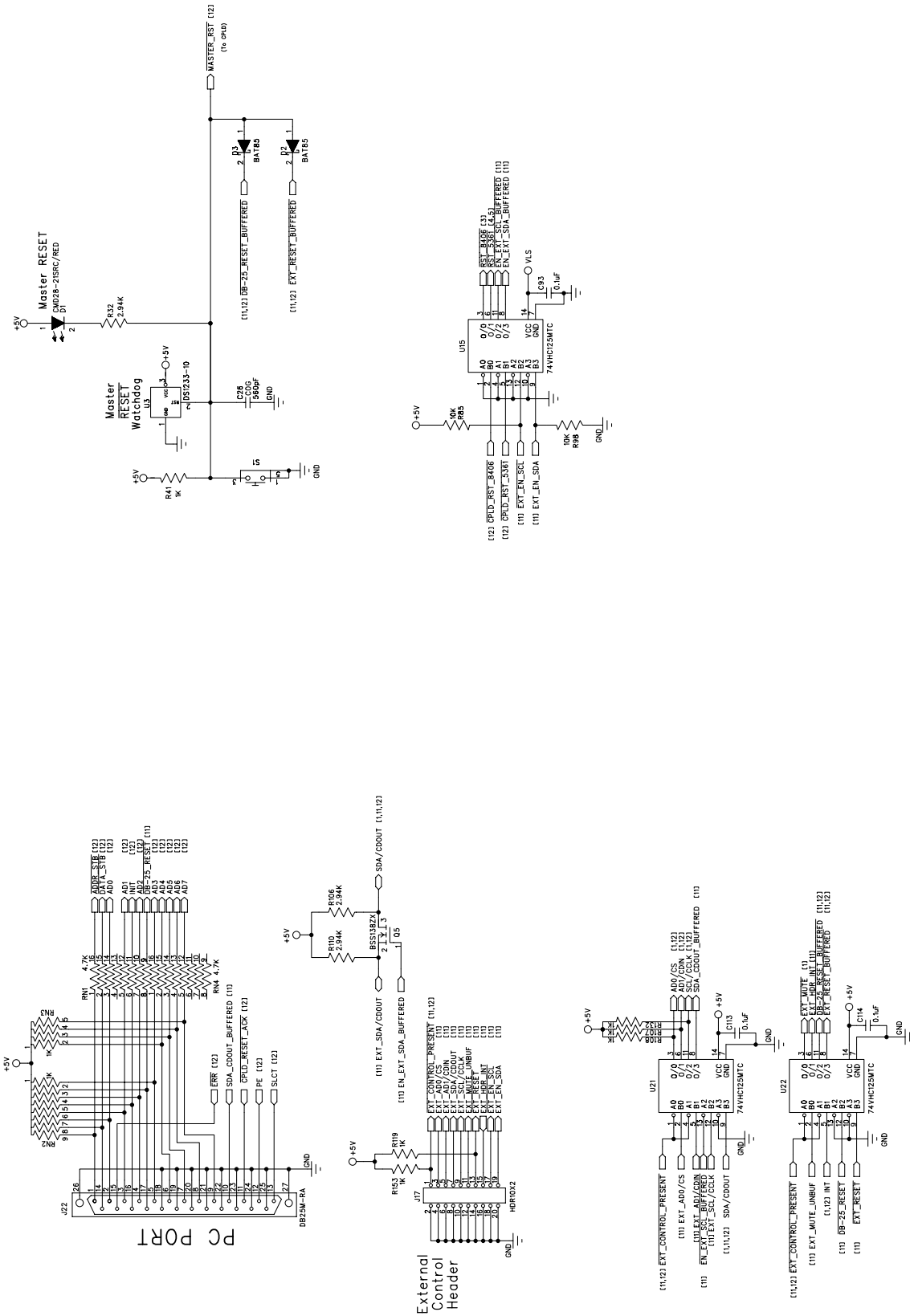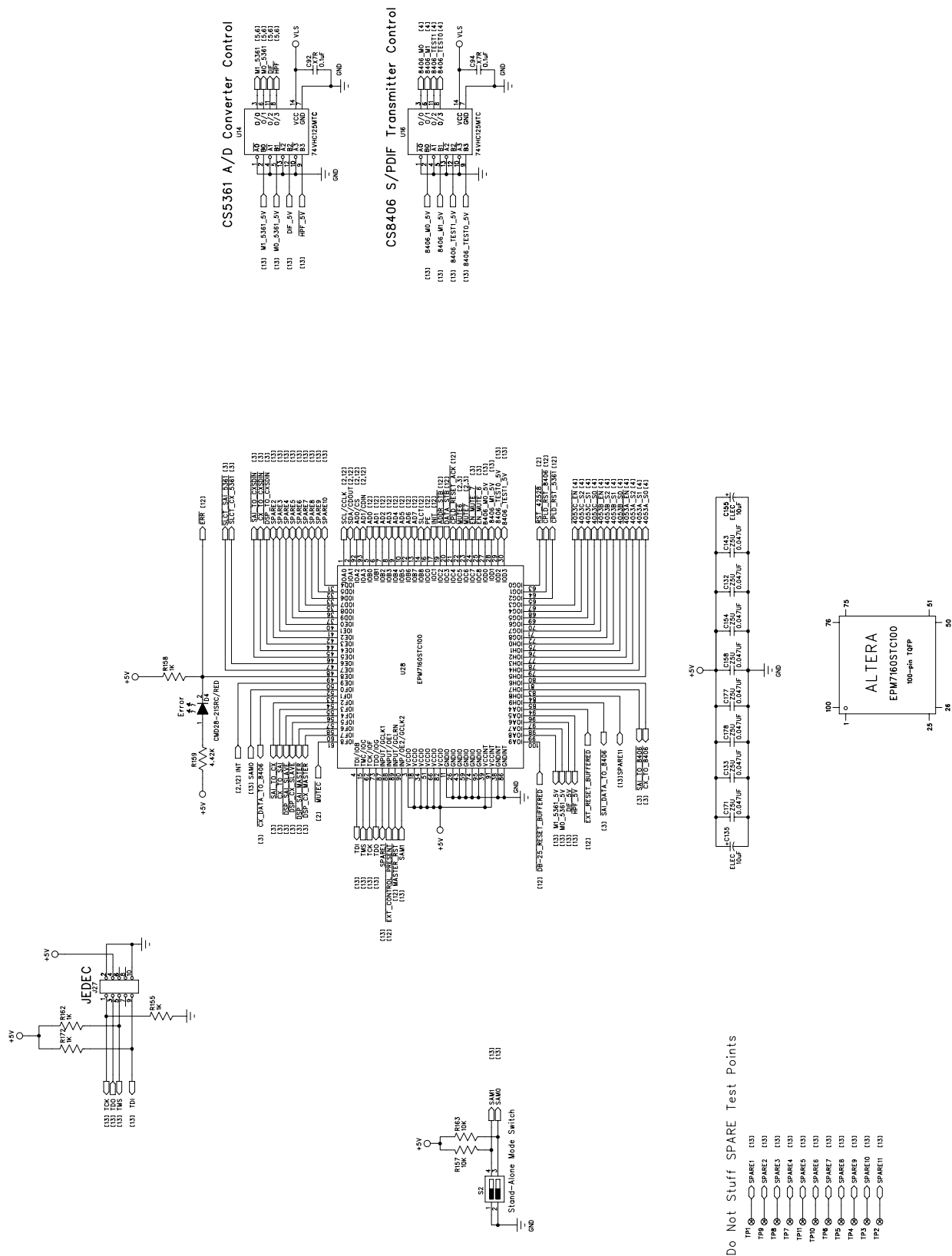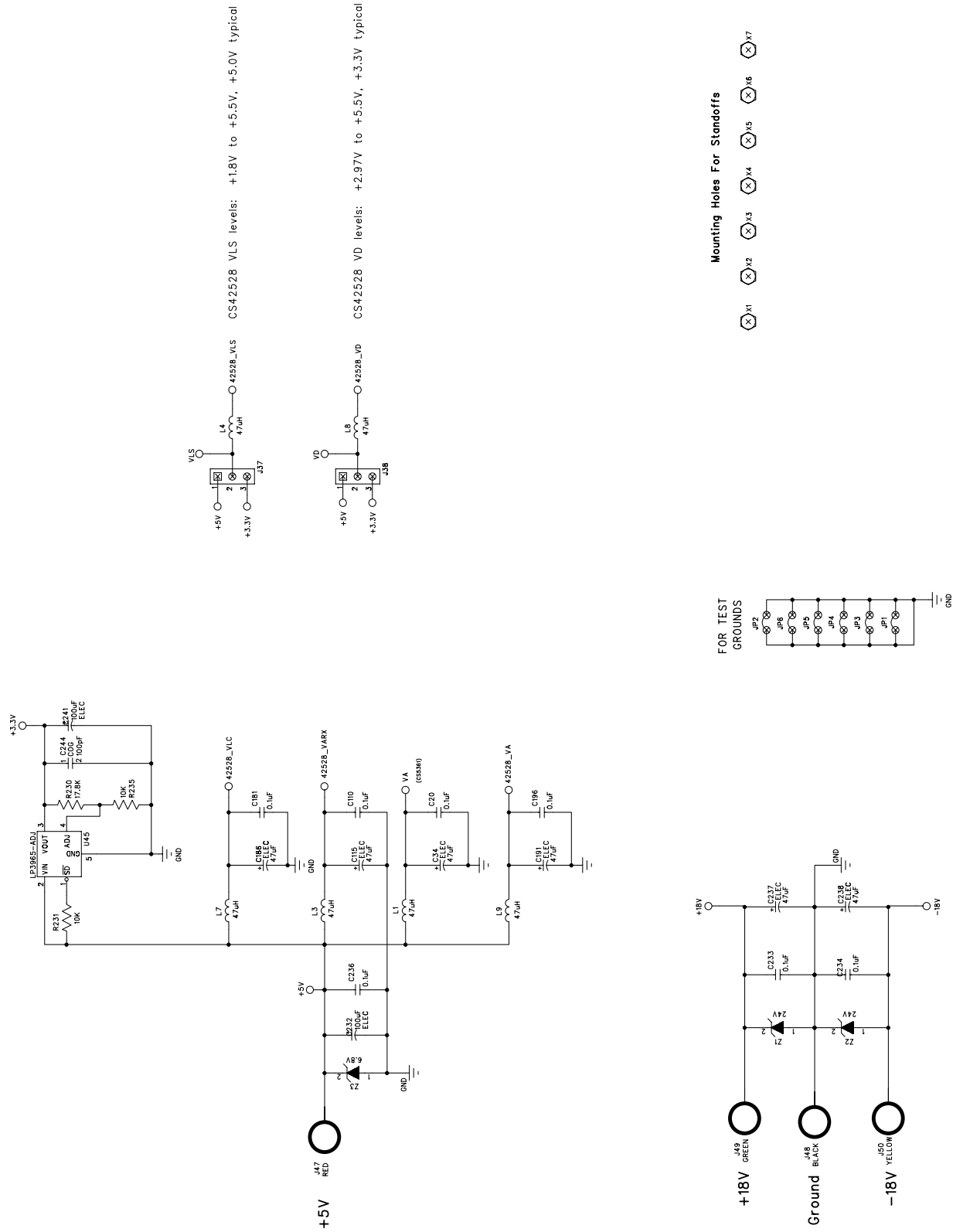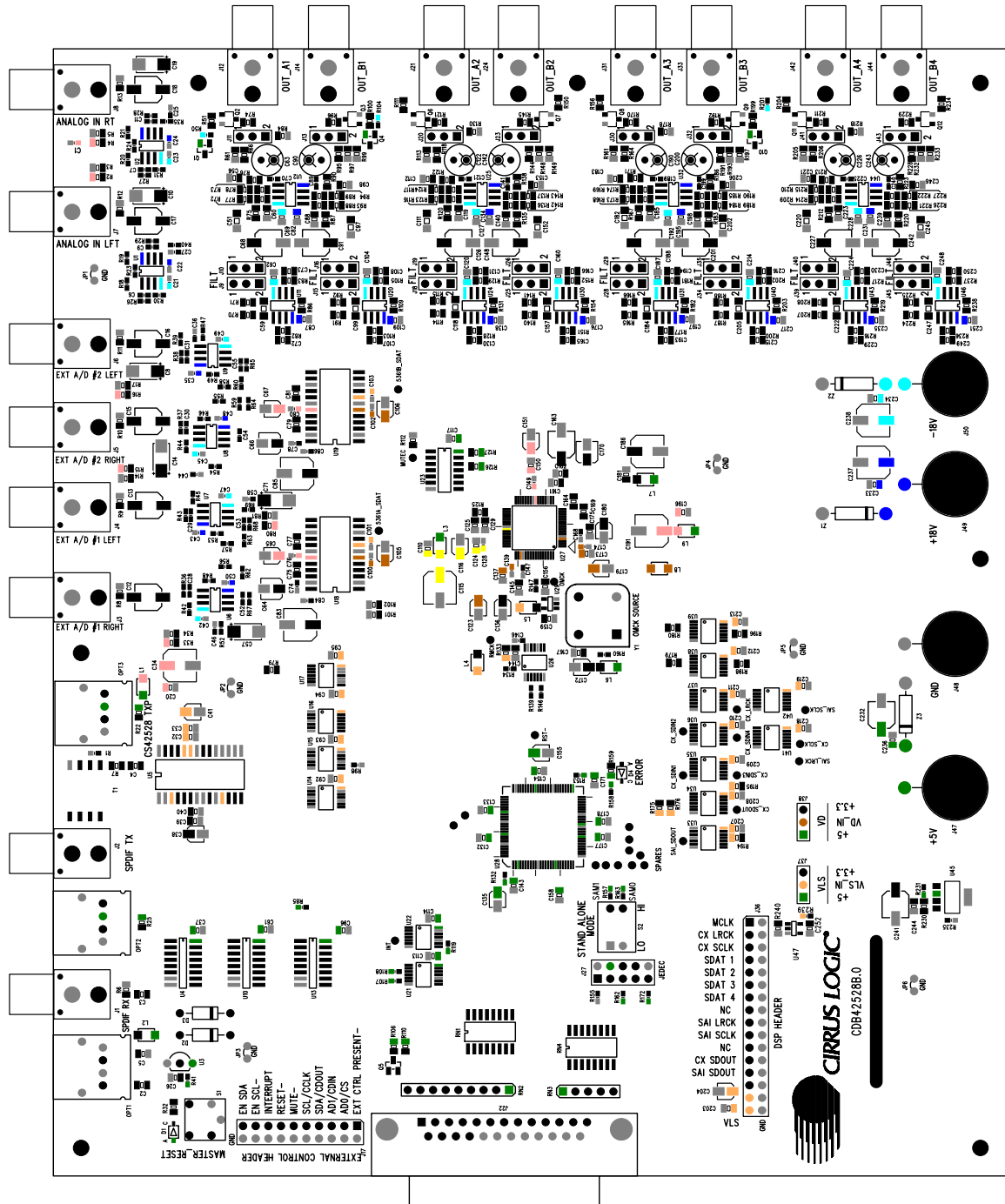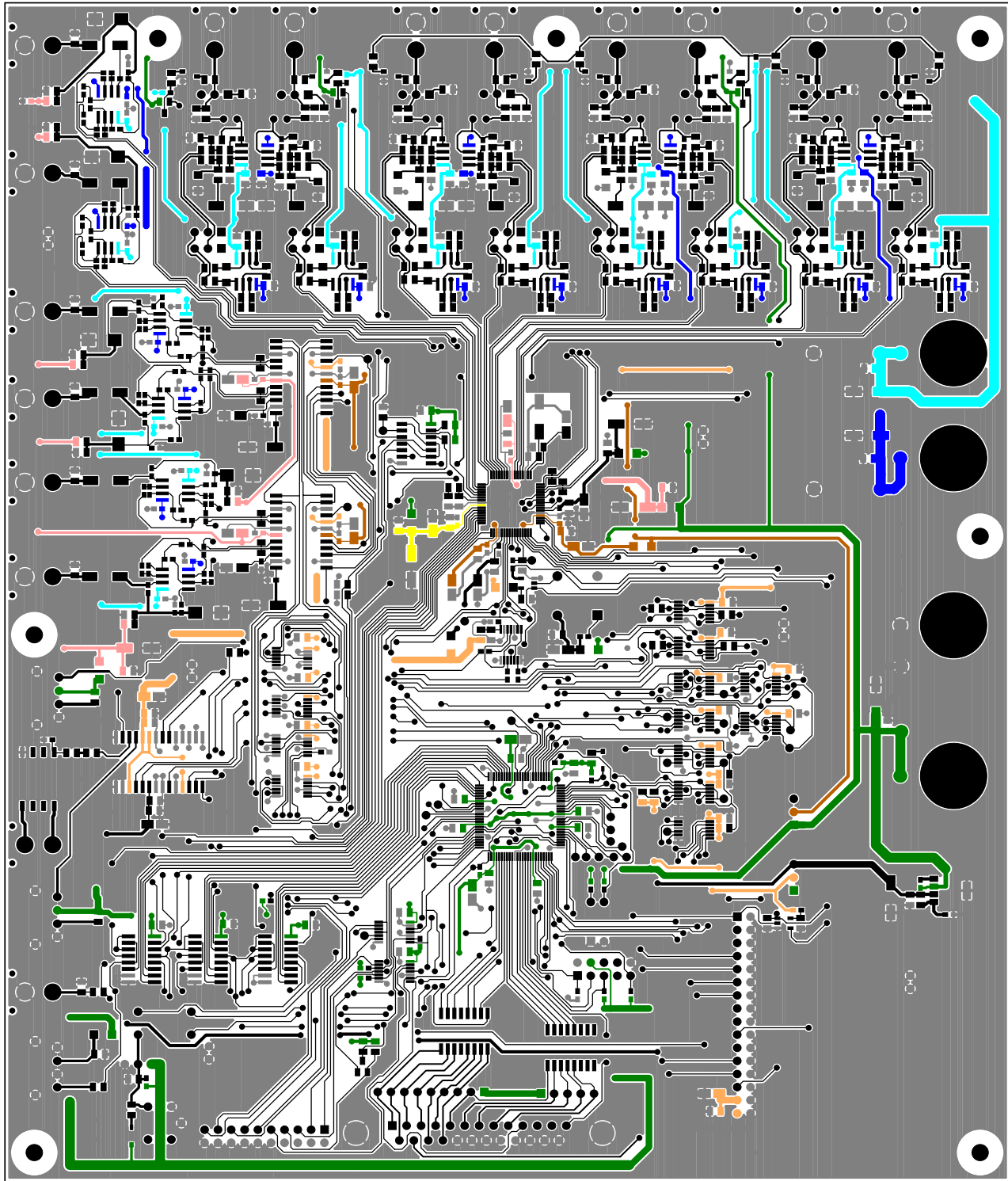| Qty	Reference	Part Number	Manufacturer	Description
1	U45	LP3965EMP-ADJ	National Semiconductor	1.5A Ultra Low Dropout Adjustable Linear Regulator, SOT223-5
2	U18 U19	CS5361-KS Rev-C	CRYSTAL SEMI	192 kHz AUDIO A/D CONVERTER, SO24-300
1	S2	76SB02	GRAYHILL	2 POSITION DIP SWITCH
6	JP1 JP2 JP3 JP4 JP5 JP6	TP-102-02	CONTROL DESIGN	2-PIN JUMPER WIRE
1	J48	111-0103-001	E.F. JOHNSON	BINDING POST, BLACK
1	J49	111-0104-001	E.F. JOHNSON	BINDING POST, GREEN
1	J47	111-0102-001	E.F. JOHNSON	BINDING POST, RED
1	J50	111-0107-001	E.F. JOHNSON	BINDING POST, YELLOW
7	C128 C139 C146 C147 C149 C168 C174	C0603C103J5RAC	KEMET	CAP, 0.01UF, X7R, 0603, 50V, 5%
1	C5	C0805C103J5RAC	KEMET	CAP, 0.01UF, X7R, 0805, 50V, 5%
8	C132 C133 C143 C154 C158 C171 C177 C178	C0805C473Z5UAC	KEMET	CAP, 0.047UF, Z5U, 0805, 50V, 80-20%
1	C125	C0805C563J5RAC	KEMET	CAP, 0.056UF, X7R, 0805, 50V, 5%
29	C1 C21 C22 C23 C24 C25 C27 C35 C36 C42 C43 C44 C45 C46 C47 C48 C49 C50 C58 C74 C76 C78 C80 C84 C86 C100 C101 C102 C103	ECJ-1VB1C104K	PANASONIC	CAP, 0.1UF, X7R, 0603, 16V, 10%
68	C2 C3 C4 C20 C32 C37 C40 C61 C62 C69 C82 C87 C92 C93 C94 C95 C96 C104 C109 C110 C113 C114 C117 C120 C124 C127 C134 C137 C138 C144 C145 C150 C159 C160 C161 C162 C167 C173 C175 C176 C181 C187 C192 C195 C196 C197 C203 C207 C208 C209 C210 C211 C212 C213 C214 C217 C218 C219 C224 C228 C231 C233 C234 C235 C236 C248 C251 C252	C0805C104J5RAC	KEMET	CAP, 0.1UF, X7R, 0805, 50V, 5%
2	C33 C39	C0805C102J5RAC	KEMET	CAP, 1000pF, X7R, 0805, 50V, 5%
1	C244	C0805C101J5GAC	KEMET	CAP, 100pF, COG, 0805, 50V, 5%
9	C12 C13 C15 C16 C17 C18 C163 C232 C241	ECE-V1AA101WR	PANASONIC	CAP, 100uF, ELEC, VS SERIES, SMT CASE-C, 10V, 20%
6	C8 C10 C14 C19 C57 C71	595D107X06R3C2T	VISHAY SPRAGUE	CAP, 100uF, TANT, 6.3V, 10%
9	C38 C41 C116 C123 C135 C136 C151 C155 C204	ECE-V1CS100SR	PANASONIC	CAP, 10uF, ELEC, VS SERIES, SMT CASE-A, 16V, 20%
8	C60 C88 C119 C140 C185 C198 C223 C239	C0805C122J5GAC	KEMET	CAP, 1200pF, COG, 0805, 50V, 5%
8	C56 C98 C112 C153 C183 C206 C221 C246	C0805C182J5GAC	KEMET	CAP, 1800PF, COG, 0805, 50V, 5%
7	C65 C67 C105 C106 C172 C179 C180	ECE-V1HS010SR	PANASONIC	CAP, 1uF, ELEC, VS SERIES, SMT CASE-A, 50V, 20%
8	C59 C99 C118 C157 C184 C205 C222 C247	C1206C222J5GAC	KEMET	CAP, 2200PF, COG, 1206, 50V, 5%
8	C68 C91 C126 C148 C188 C201 C227 C242	ECE-V1CA220P	PANASONIC	CAP, 22uF, ELEC, VA SERIES, SMT CASE-C, 16V, 20%

BILL OF MATERIAL

CIRRUS LOGIC
CDB42528B.sch

Qty	Reference	Part Number	Manufacturer	Description
7	C75 C77 C79 C81 C129 C164 C169	ECJ-2VC1H272J	PANASONIC	CAP, 2700PF, COG, 0805, 50V, 5%
8	C70 C89 C121 C141 C189 C199 C225 C240	C0603C391J5GAC	KEMET	CAP, 390PF, COG, 0603, 50V, 5%
16	C72 C73 C107 C108 C130 C131 C165 C166 C193 C194 C215 C216 C229 C230 C249 C250	C0805C391J5GAC	KEMET	CAP, 390PF, COG, 0805, 50V, 5%
3	C64 C66 C170	ECE-V1EA4R7R	PANASONIC	CAP, 4.7uF, ELEC, VA SERIES, SMT CASE-B, 25V, 20%
12	C6 C7 C9 C11 C28 C29 C30 C31 C52 C53 C54 C55	C0603C471J5GAC	KEMET	CAP, 470PF, COG, 0603, 50V, 5%
8	C63 C90 C122 C142 C190 C200 C226 C243	ECA-0JM471	PANASONIC	CAP, 470uF, ELEC, M SERIES, 6.3V, 20%
6	C34 C83 C85 C115 C186 C191	ECE-V1AA470P	PANASONIC	CAP, 47uF, ELEC, VA SERIES, SMT CASE-D, 10V, 20%
2	C237 C238	ECE-V1EA470UP	PANASONIC	CAP, 47uF, ELEC, VS SERIES, SMT CASE-D, 25V, 20%
1	C51	C1206C562K5GAC	KEMET	CAP, 5600PF, COG, 1206, 50V, 10%
7	C97 C111 C152 C182 C202 C220 C245	C1206C562J5GAC	KEMET	CAP, 5600PF, COG, 1206, 50V, 5%
1	C26	C0805C561J5GAC	KEMET	CAP, 560PF, COG, 0805, 50V, 5%
1	J22	747238-4	AMP	CONNECTOR, D-SUB, DB25, MALE, RT. ANGLE
1	U28	EMP7160STC100-6	ALTERA	CPLD
1	C156	NP-CAP-0805	N/A	DO NOT POPULATE
1	J17	TSW-110-07-G-D	SAMTEC	HEADER, 10X2, 0.1" CTR, GOLD
3	U4 U10 U13	74HC4053	Texas Instruments	HEX 2:1 Analog Switch, SOIC150-16
1	U5	CS8406-CS	CRYSTAL SEMICONDUCTOR	IC, 192kHz DIGITAL AUDIO TRANSMITTER, SO28-300
1	U3	DS1233-10	DALLAS SEMICONDUCTOR	IC, 5-VOLT ECONO RESET, TO92
6	U1 U2 U6 U7 U8 U9	NJM-2068E	NJR	IC, DUAL LOW NOISE OP-AMP, SO8-150
12	U11 U12 U20 U24 U25 U30 U31 U32 U40 U43 U44 U46	NE5532D8	PHILIPS	IC, DUAL LOW NOISE OP-AMP, SO8-150
1	U27	CS4252	CIRRUS LOGIC	IC, ELVIS, QFP64, 10X10mm, 0.5mm PITCH
16	U14 U15 U16 U17 U21 U22 U26 U33 U34 U35 U36 U37 U38 U39 U41 U42	74VHC125MTC	FAIRCHILD SEMICONDUCTOR	IC, QUAD BUFFER WITH 3-STATE OUTPUTS, TSSOP14-173
9	L1 L2 L3 L4 L5 L6 L7 L8 L9	ELJ-FA470KF	PANASONIC	INDUCTOR, 47uH, 1210, TYPE FA, 10%
2	D1 D4	CMD28-21SRC/TR8/T1	CHICAGO MINIATURE	LED, SMT, RED
1	Q5	BSS138ZX	Zetex	N-Channel Enhancement Mode FET, SOT23
1	OPT1	TORX173	TOSHIBA	OPTICAL TOSLINK RECEIVER
2	OPT2 OPT3	TOTX173	TOSHIBA	OPTICAL TOSLINK TRANSMITTER
1	Y1	ECS-2100A-240	ECS	OSCILLATOR, 24.000MHZ, HALF SIZE CASE, +/100PPM

CIRRUS LOGIC

CDB42518

CIRRUS LOGIC
CDB42528B.sch

BILL OF MATERIAL

Qty	Reference	Part Number	Manufacturer	Description
1	U23	SN74HCT08D	TEXAS INST	QUAD 2-INPUT POS-AND GATES
16	J1 J2 J3 J4 J5 J6 J7 J8 J12 J14 J21 J24 J31 J33 J42 J44	ARJ-2018-1	A/D ELECTRONICS	RCA JACK - RIGHT ANGLE, GOLD PLATED
2	RN1 RN4	4816P-001-472	BOURNS	RES NETWORK, 4.7K, 8 ISOLATED, SO16-220
8	R74 R96 R121 R145 R170 R192 R211 R229	CRCW0805000FT	DALE	RES, 0-OHM, 0805
8	R72 R93 R116 R142 R168 R189 R209 R226	CRCW08051651F	DALE	RES, 1.65K , 0805, 1/10W, 1%. 100ppm
8	R75 R87 R120 R135 R167 R183 R212 R220	CRCW08051871F	DALE	RES, 1.87K , 0805, 1/10W, 1%. 100ppm
6	R8 R9 R10 R11 R12 R13	CRCW08051003F	DALE	RES, 100K, 0805, 1/10W, 1%. 100ppm
5	R79 R179 R180 R196 R198	CRCW08051000F	DALE	RES, 100-OHM, 0805, 1/10W, 1%. 100ppm. 100ppm
16	R35 R39 R40 R42 R44 R45 R50 R85 R98 R104 R157 R160 R163 R201 R231 R235	CRCW06031002F	DALE	RES, 10K, 0603, 1/16W, 1%, 200ppm
1	R133	CRCW0805100FT	DALE	RES, 10-OHM, 0805, 1/10W, 1%. 100ppm
1	R230	CRCW08051782F	DALE	RES, 17.8K , 0805, 1/10W, 1%. 100ppm
10	R41 R107 R108 R119 R132 R153 R155 R158 R162 R172	CRCW06031001F	DALE	RES, 1K, 0603, 1/16W, 1%, 200ppm
8	R66 R95 R118 R144 R164 R191 R206 R228	CRCW08051001F	DALE	RES, 1K, 0805, 1/10W, 1%. 100ppm
8	R51 R100 R111 R150 R156 R199 R204 R234	CRCW08052001F	DALE	RES, 2.00K , 0805, 1/10W, 1%. 100ppm
1	R125	CRCW08052261F	DALE	RES, 2.26K , 0805, 1/10W, 1%. 100ppm
6	R2 R4 R15 R16 R33 R80	CRCW08052801F	DALE	RES, 2.80K , 0805, 1/10W, 1%. 100ppm
11	R32 R78 R89 R106 R110 R124 R137 R174 R185 R215 R222	CRCW08052941F	DALE	RES, 2.94K , 0805, 1/10W, 1%. 100ppm
5	R134 R139 R146 R147 R239	CRCW060322R1F	DALE	RES, 22.1 OHMS, 0603, 1/16W, 1%, 200ppm
8	R84 R99 R130 R149 R178 R197 R218 R233	CRCW08052800F	DALE	RES, 280 OHMS, 0805, 1/10W, 1%. 100ppm
6	R3 R5 R14 R17 R34 R81	CRCW08053321F	DALE	RES, 3.32K , 0805, 1/10W, 1%. 100ppm
16	R70 R71 R91 R92 R114 R115 R140 R141 R165 R166 R187 R188 R207 R208 R224 R225	CRCW08053010F	DALE	RES, 301OHMS, 0805, 1/10W, 1%. 100ppm
6	R30 R31 R47 R52 R54 R69	CRCW06033320F	DALE	RES, 332 OHMS, 0603, 1/16W, 1%, 200ppm
1	R7	CRCW08053740F	DALE	RES, 374 OHMS, 0805, 1/10W, 1%. 100ppm
1	R159	CRCW08054421F	DALE	RES, 4.42K , 0805, 1/10W, 1%. 100ppm
8	R86 R109 R131 R154 R182 R203 R219 R238	CRCW08054420F	DALE	RES, 442 OHMS, 0805, 1/10W, 1%. 100ppm
18	R61 R97 R101 R102 R112 R113 R126 R127 R148 R161 R175 R176 R193 R194 R195 R205 R232 R240	CRCW08054752F	DALE	RES, 47.5K , 0805, 1/10W, 1%. 100ppm
8	R73 R94 R117 R143 R169 R190 R210 R227	CRCW08055491F	DALE	RES, 5.49K , 0805, 1/10W, 1%. 100ppm
8	R76 R90 R122 R138 R171 R186 R213 R223	CRCW08056191F	DALE	RES, 6.19K , 0805, 1/10W, 1%. 100ppm
18	R23 R24 R26 R27 R28 R29 R36 R37 R38 R43 R46 R48 R49 R53 R64 R65 R67 R68	CRCW06036340F	DALE	RES, 634 OHMS, 0603, 1/16W, 1%, 200ppm

CIRRUS LOGIC
CDB42528B.sch

BILL OF MATERIAL

Qty	Reference	Part Number	Manufacturer	Description
1	R6	CRCW080575R0F	DALE	RES, 75.0 OHMS, 0805, 1/10W, 1%, 100ppm
2	R22 R25	CRCW0805822J	DALE	RES, 8.2K, 0805, 1/10W, 5%, 200ppm
24	R77 R82 R83 R88 R103 R105 R123 R128 R129 R136 R151 R152 R173 R177 R181 R184 R200 R202 R214 R216 R217 R221 R236 R237	CRCW08058870F	DALE	RES, 887 OHMS, 0805, 1/10W, 1%. 100ppm
13	R1 R18 R19 R20 R21 R55 R56 R57 R58 R59 R60 R62 R63	CRCW060390R9F	DALE	RES, 90.9 OHMS, 0603, 1/16W, 1%, 200ppm
1	RN2	4609X-101-102	BOURNS	RESISTOR NETWORK, 8 BUSSED, SIP9, 1K
1	RN3	4605X-101	BOURNS	RESISTOR NETWORK, 9 BUSSED, SIP5, 1K
2	D2 D3	BAT85	PHILIPS	SCHOTTKY DIODE, THRU-HOLE
1	J36	TSW-116-07-G-D	SAMTEC	STAKE HEADER, 16X2, 0.1: CTR, GOLD
26	J9 J10 J11 J13 J15 J16 J18 J19 J20 J23 J25 J26 J28 J29 J30 J32 J34 J35 J37 J38 J39 J40 J41 J43 J45 J46	TSW-103-07-G-S	SAMTEC	STAKE HEADER, 3X1, 0.1" CTR, GOLD
1	J27	TSW-105-07-G-D	SAMTEC	STAKE HEADER, 5X2, 0.1"CTR, GOLD
7	X1 X2 X3 X4 X5 X6 X7	313-6477-032	E.F.JOHNSON	STANDOFF, #4-40, .25 HEX x .875 LG
1	S1	PTS645TL50	C&K	SWITCH, MOMENTARY, PUSHBUTTON
1	U29	NC7SZ125M5	FAIRCHILD	TINYLOGIC UHS BUFFER W/ 3-STATE OUTPUT, SOT23-5
1	U47	NC7SZ126M5	FAIRCHILD	TINYLOGIC UHS BUFFER W/ 3-STATE OUTPUT, SOT23-5
1	T1	SC979-03		Transformer, SMT, AES-192kHz Compatible
2	Z1 Z2	P6KE24A	MOTOROLA	TRANSIENT SUPPRESSOR, 24V
1	Z3	P6KE6.8	MOTOROLA	TRANSIENT SUPPRESSOR, 6.8V
8	Q2 Q3 Q6 Q7 Q8 Q9 Q11 Q12	2SC3326	TOSHIBA	TRANSISTOR, NPN, EPITAXIAL TYPE, SC59
3	Q1 Q4 Q10	MMUN2111LT1	MOTOROLA	TRANSISTOR, PNP SILICON SMT WITH MONOLITHIC BIAS RES NET, SOT23
28	5361A_SDAT 5361B_SDAT CX_LRCK CX_SCLK CX_SDIN1 CX_SDIN2 CX_SDIN3 CX_SDIN4 CX_SDOUT INT MUTEC OMCK RMCK RST- SAI_LRCK SAI_SCLK SAI_SDOUT TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11			

7. ADDENDUM

There are three hardware modifications to the circuit board as follows:

1) U16 pin 10 and U16 pin 13 are unterminated in the schematic set. They should have been connected to ground. A top side modification was performed on the board by adding a wire from U16 pin 10 to U16 pin 13, then to the ground pad at C94.

2) U17 pin 11 is grounded in the schematic set. It should have been left unterminated. A top side modification was performed by lifting U17 pin 11.

3) The MCLK_TO_DSP- signal trace between U29 pin 1 and U47 pin 1 got merged to the ground fill beneath the crystal oscillator Y1. A top side modification was performed on the board by cutting the trace to disconnect it from the ground fill. A bottom side modification was performed on the board by adding a wire to reconnect the trace.

• Notes •

CIRRUS LOGIC®