CDB5531/32/33/34

CDB5531/32/33/34 Evaluation Board and Software

Features

- RS-232 Serial Communication with PC
- On-board 80C51 Microcontroller
- On-board Voltage Reference
- Lab Windows®/CVI® Evaluation Software
  - Register Setup & Chip Control
  - FFT Analysis
  - Time Domain Analysis
  - Noise Histogram Analysis
- On-board Data SRAM
- Integrated RS-232 Test Modes
- Supports the CS5531, CS5532, CS5533, and CS5534 ADCs.

General Description

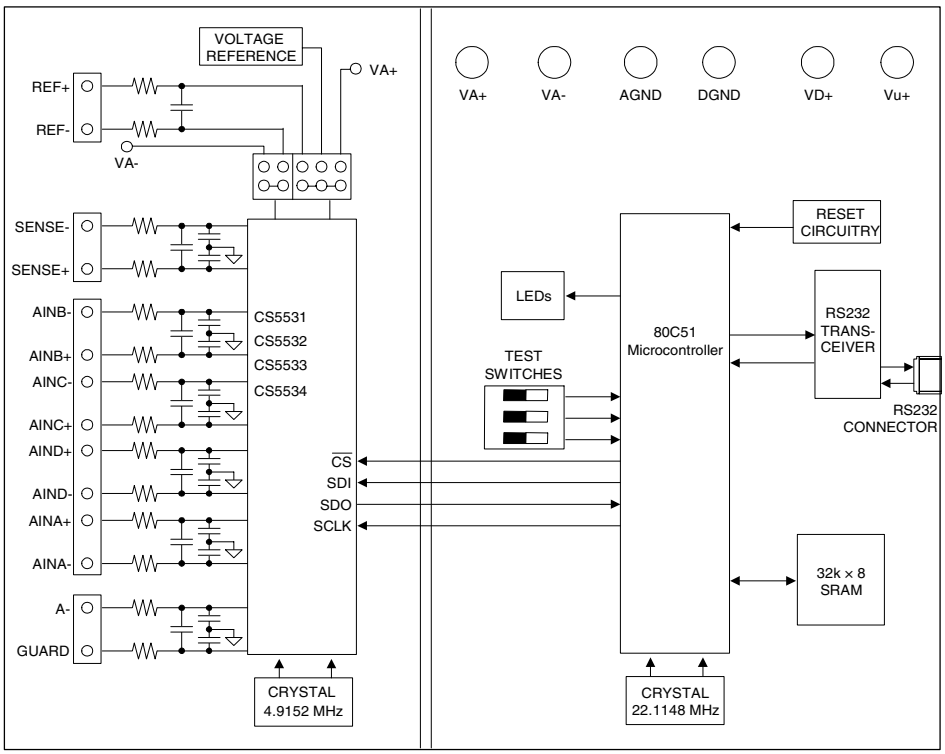
The CDB5531/32/33/34 is an inexpensive tool designed to evaluate the functionality and performance of the CS5531/32/33/34. The CS5531/32/33/34 Datasheet should be read and consulted when using the CDB5531/32/33/34 evaluation board.

The evaluation board includes a 2.5V voltage reference, an 80C51 microcontroller, an RS232 transceiver, and firmware. The 8051 controls the serial communication between the evaluation board and the PC, enabling quick and easy access to all of the CS5531/32/33/34's registers and functions.

The included PC software contains algorithms for Data Capture, Time Domain Analysis, Histogram Analysis, and Frequency Domain Analysis.

ORDERING INFORMATION

CDB5531/32/33/34 Evaluation Board



Preliminary Product Information | This document contains information for a new product. Cirrus Logic reserves the right to modify this product without notice.

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1. HARDWARE

1.1 Introduction

The CDB5531/32/33/34 evaluation board provides a quick means of evaluating the CS5531/32/33/34 Analog-to-Digital Converters (ADCs). The CS5531/32/33/34 are highly integrated ΔΣ Analog-to-Digital Converters (ADCs) which use charge-balance techniques to achieve 16-bit (CS5531/33) and 24-bit (CS5532/34) performance. The ADCs come as either two-channel (CS5531/32) or four-channel (CS5533/34) devices and include a very low noise chopper-stabilized instrumentation amplifier (6 nV/$\sqrt{\text{Hz}}$ @ 0.1 Hz) with selectable gains of 1×, 2×, 4×, 8×, 16×, 32×, and 64×. These ADCs also include a fourth order ΔΣ modulator followed by a digital filter which provides twenty selectable output word rates of 6.25 Hz, 7.5 Hz, 12.5 Hz, 15 Hz, 25 Hz, 30 Hz, 50 Hz, 60 Hz, 100 Hz, 120 Hz, 200 Hz, 240 Hz, 400Hz, 480 Hz, 800 Hz, 960 Hz, 1.6 kHz, 1.92 kHz, 3.2 kHz and 3.84 kHz (XIN = 4.9152 MHz).

The CS5531/32/33/34 are highly integrated devices. The devices' datasheets should be read thoroughly and understood before using the CDB5531/32/33/34 evaluation board.

1.2 Evaluation Board Overview

The CDB5531/32/33/34 evaluation board is partitioned into two main sections: analog and digital. The analog section consists of the CS5531/32/33/34 and a precision voltage reference. The digital section consists of the 80C51 microcontroller, 32 Kilobytes of SRAM, the hardware test switches, the reset circuitry, and the RS-232 interface. The board also has power supply connections which accommodate all of the various supply options of the CS5531/32/33/34.

The evaluation board's analog section operates from either a single +5V, dual ±2.5V, or dual ±3V power supply. The evaluation board interfaces the CS5531/32/33/34 to an IBM® compatible PC with an RS-232 interface. To accomplish this, the board comes equipped with an 80C51 microcontroller and a 9-pin RS-232 cable which physically interfaces the evaluation board to the PC. The software provides easy access to the internal registers of the CS5531/32/33/34, and provides a means to display and evaluate the performance of the ADCs in the time domain or frequency domain.

1.2.1 Analog Section

The CS5531/32/33/34 are high precision ΔΣ converters designed to accurately measure up to four fully-differential analog voltage inputs while operating from a 4.9152 MHz crystal.

The evaluation board provides two means of connecting external signals to the inputs of the ADCs. As shown in Figure 1, two BNC connectors (J7 and J9) along with HDR14, can be used to connect external input signals. Additionally, separate screw terminals can be used to connect signals to each of the four input channels. The input screw terminals are labeled as AINA through AIND, which correspond to different physical input channel numbers on the different parts. For the two-channel parts (CS5531 and CS5532), input A corresponds to channel 1, and input B corresponds to channel 2. For the four-channel parts (CS5533 and CS5534), input D corresponds to channel 1, input C corresponds to channel 2, input B corresponds to channel 3, and input A corresponds to channel 4. A simple RC network on each channel filters the sensor's output to reduce any interference picked up by the input leads. The 3 dB corner of the filter is approximately 50 kHz differential and common mode.

The evaluation board provides three voltage reference options: VA+, the on-board LT1019, and external, as shown in Figure 2. Table 1 illustrates the options available. With HDR4's jumpers in position VA+, the reference is supplied by the VA+ and

VA- analog supplies. With HDR4's jumpers in position LT1019, the LT1019 provides a 2.5 Volt reference (the LT1019 was chosen for its low drift, typically 5ppm/°C). By setting HDR4's jumpers to position EXTERNAL, the user can supply an external voltage reference to J2's REF+ and REF- inputs. Application Note 4 on the web details various voltage references.

Reference	Description	HDR4
VA+	Selects Analog Power Supplies	VA+ ●—● VREF+ LT1019 O O VREF+ REF+ O O VREF+ REF- O O VREF- VA- ●—● VREF-
LT1019	Selects on board LT1019 Reference (5ppm/°C)	VA+ O O VREF+ LT1019 ●—● VREF+ REF+ O O VREF+ REF- O O VREF- VA- ●—● VREF-
EXTERNAL	Selects external reference source	VA+ O O VREF+ LT1019 O O VREF+ REF+ ●—● VREF+ REF- ●—● VREF- VA- O O VREF-

Table 1. Voltage Reference Selection

1.2.2 Digital Section

Figures 3 and 4 illustrate the schematic of the digital section. It contains the microcontroller, test switches, a Motorola® MC145407 RS-232 interface chip, and 32K bytes of SRAM. The test switches aid in debugging communication problems between the CDB5531/32/33/34 and the PC. The microcontroller, which derives its clock from a 22.1148 MHz crystal, is initially configured to communicate via RS-232 at 9600 baud, no parity, 8-bit data, and 1 stop bit. The baud rate can be changed with the software to go as fast as 115200 baud.

1.2.3 CS5531/32/33/34 Serial Interface

The CS5531/32/33/34 serial interfaces are SPI® and MICROWIRE™ compatible. The interface control lines ($\overline{CS}$, SDI, SDO, and SCLK) are connected to the 80C51 microcontroller on port one. These control lines are also connected to HDR2 (Header 2), which allows the user to interface an external microcontroller to the evaluation board. To accomplish this, the evaluation board must be modified in one of three ways: 1) cut the interface control traces going to the microcontroller, 2) remove resistors R4, R7, R8, and R13, or 3) remove the microcontroller. Once a method is chosen, the user can develop code for an external microcontroller using the existing analog section of the evaluation board. To aid in code development for he user's system, the source code for the on-board 80C51 microcontroller is included with the evaluation software, in the *8051Code* directory that is installed as part of the setup process.

1.2.4 Power Supply Section

Figure 5 illustrates the power supply connections to the evaluation board. The VA+ post supplies the positive analog section of the evaluation board, the LT1019 and the ADC. The VA- post supplies the negative analog voltage circuitry. This terminal is connected to ground when powering the CDB5531/32/33/34 from a single +5V analog supply. The VD+ post supplies the digital section of the ADC and level shifters. The Vu+ post supplies the digital section of the evaluation board, the 80C51, the reset circuitry, and the RS-232 interface circuitry. Note, the board's digital section, supplied through the Vu+ post, must always be +5 Volts. Table 2 shows the various power connections possible with the required jumper settings on HDR3 and HDR5.

1.2.5 Headers, Jumpers, and Dip Switches

Table 3 describes the various headers, jumpers and DIP switches on the CDB5531/32/33/34 evaluation board. DIP switch S1 is used to control the 80C51 test modes. Table 4 illustrates the various settings of the DIP Switch S1. The DIP switches should be set to the OPEN position for normal operation. When testing the RS-232 link in the PC software,

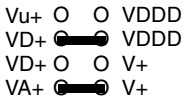
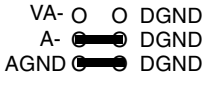
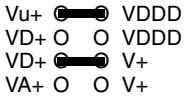
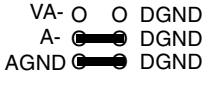
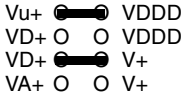
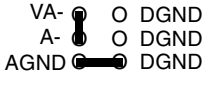
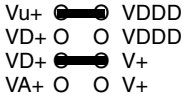
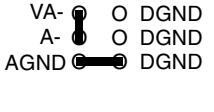
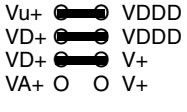
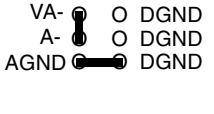
Power Supplies		Power Post Connections						Jumpers	
Analog	Digital	VA+	VA-	AGND	DGND	VD+	Vu+	HDR5	HDR3
+5V	+5V	+5	NC	GND	GND	+5	NC		
+5V	+3V	+5	NC	GND	GND	+3	+5		
±3V	+3V	+3	-3	NC	GND	+3	+5		
±2.5V	+3V	+2.5	-2.5	NC	GND	+3	+5		
±2.5V	+5V	+2.5	-2.5	NC	GND	+5	NC		

Table 2. Recommended Power Supply Connections
NC = No Connection

the DIP switches should all be in the CLOSED position.

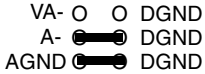
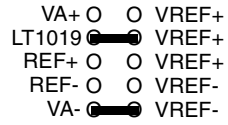
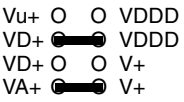
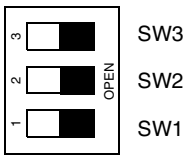
Name	Function Description	Default Setting	Default Jumpers
HDR2	Used to interface with an external micro-controller	Connected to 80C51	NC
HDR3	Used to switch VA-, A-, and AGND to DGND.Refer to Table 2	Negative Analog Power Supply Set to 0 V	
HDR4	Used to switch the voltage reference inputs from the external J2 header, to the on board LT1019 reference, or to VA+. Refer to Table 1	Set to on-board LT1019 voltage reference	
HDR5	Used to switch Vu+, VD+, and VA+ to VDDD and/or V+. Refer to Table 2	Digital Power Supply Set to +5V	
HDR6, 8, 9	Internal Use.	Not Connected	O O
HDR7	Used in conjunction with the self test modes to test the UART/RS-232 communication link between the microcontroller and a PC.	RS-232 Set to Normal Mode	
HDR10, 11, 12	Used to connect latch pins to micro-controller input.	Connected	
HDR14	Used to connect BNC AIN+ and AIN- inputs to any of the four input channels.	Not Connected	NC
S1	DIP switch to control 80C51 test modes. See Table 4 for DIP switch settings.	SW1 set to OPEN SW2 set to OPEN SW3 set to OPEN	

Table 3. Default Header and DIP Switch Descriptions

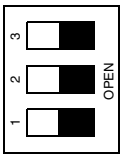
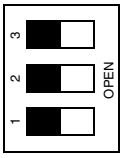
80C51 Mode	S1
Normal Operation Mode SW1 is OPEN SW2 is OPEN SW3 is OPEN	
RS-232 Test Mode SW1 is CLOSED SW2 is CLOSED SW3 is CLOSED	

Table 4. DIP Switch S1 Settings

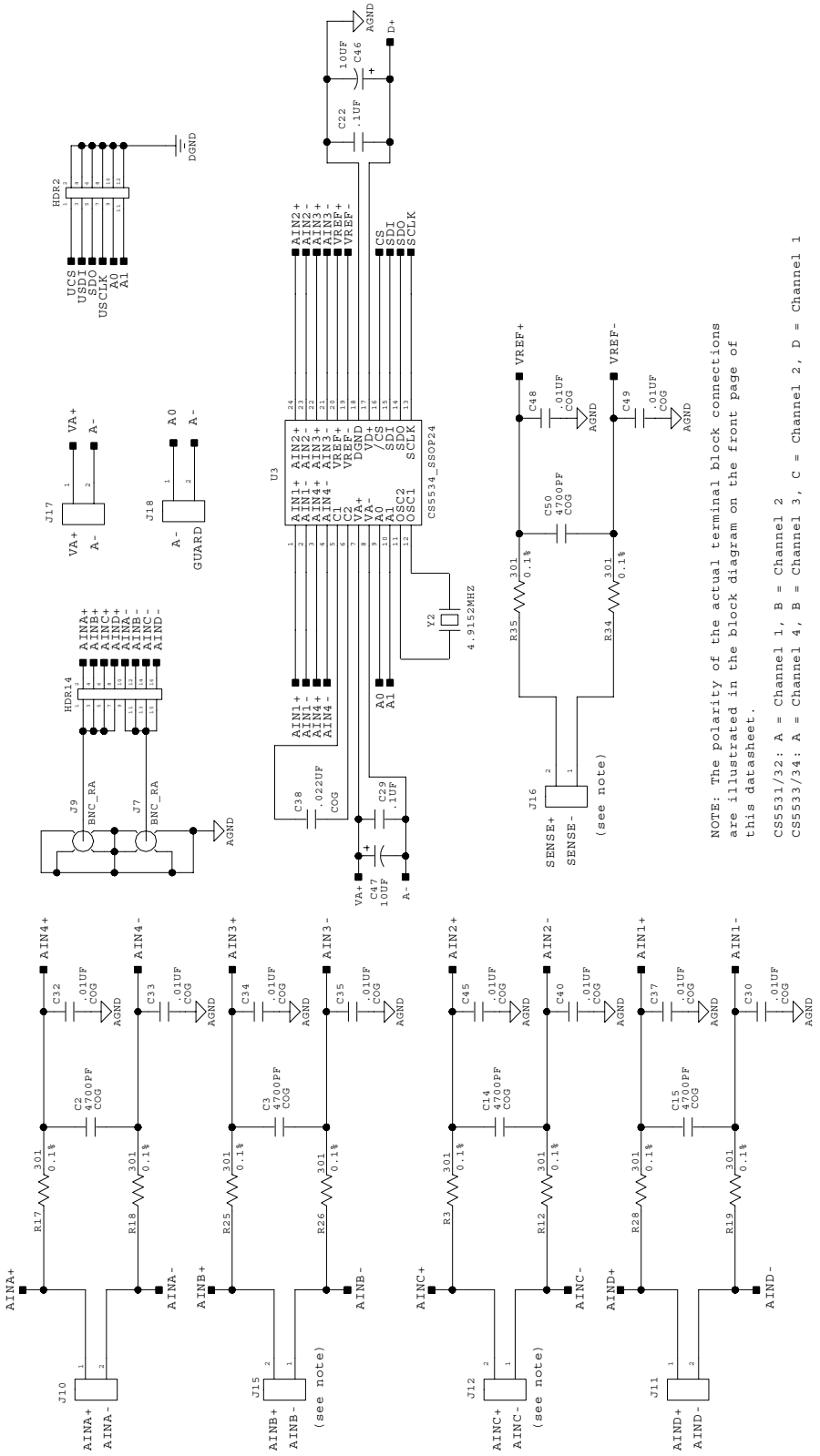


Figure 1. Analog Section Schematic - Part 1

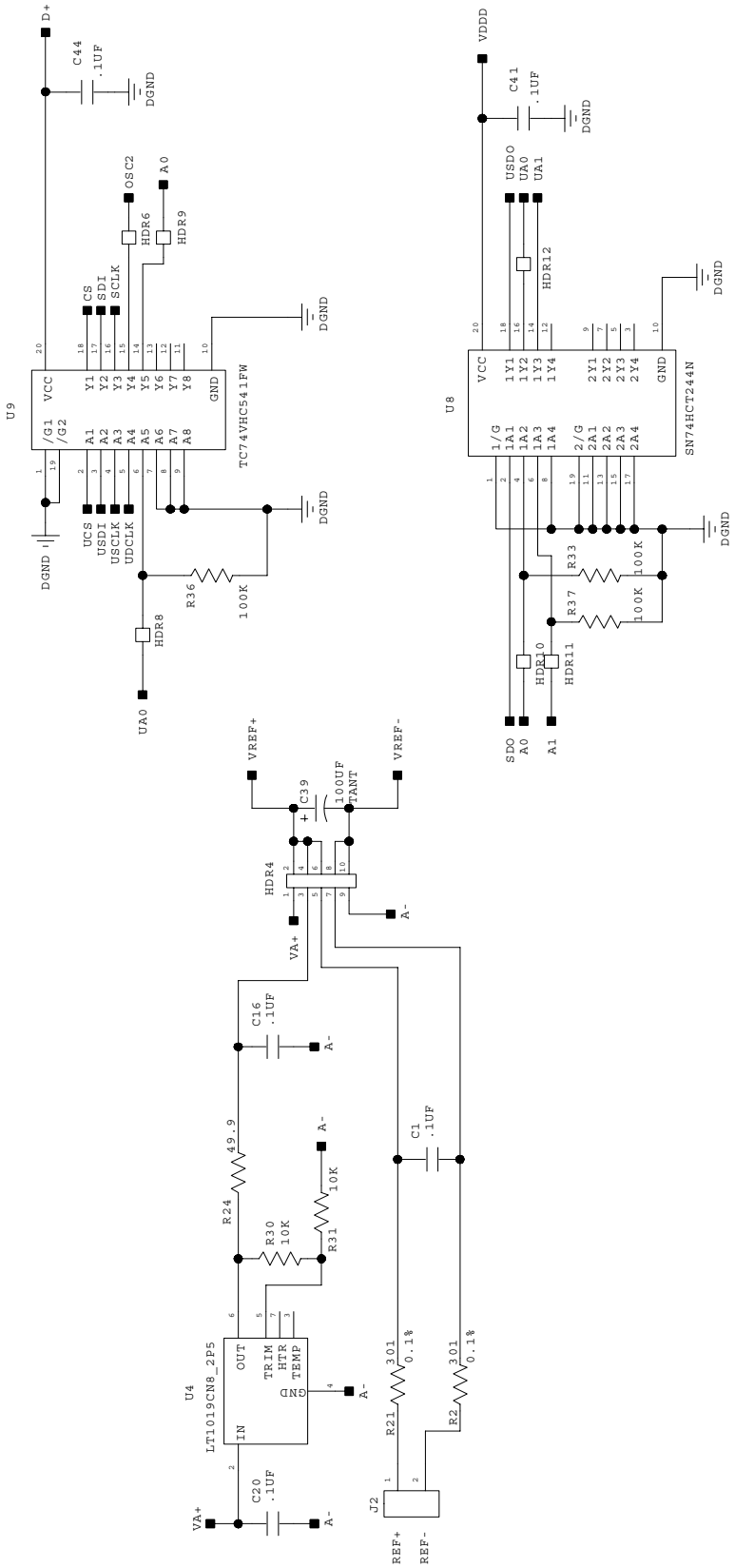


Figure 2. Analog Section Schematic - Part 2

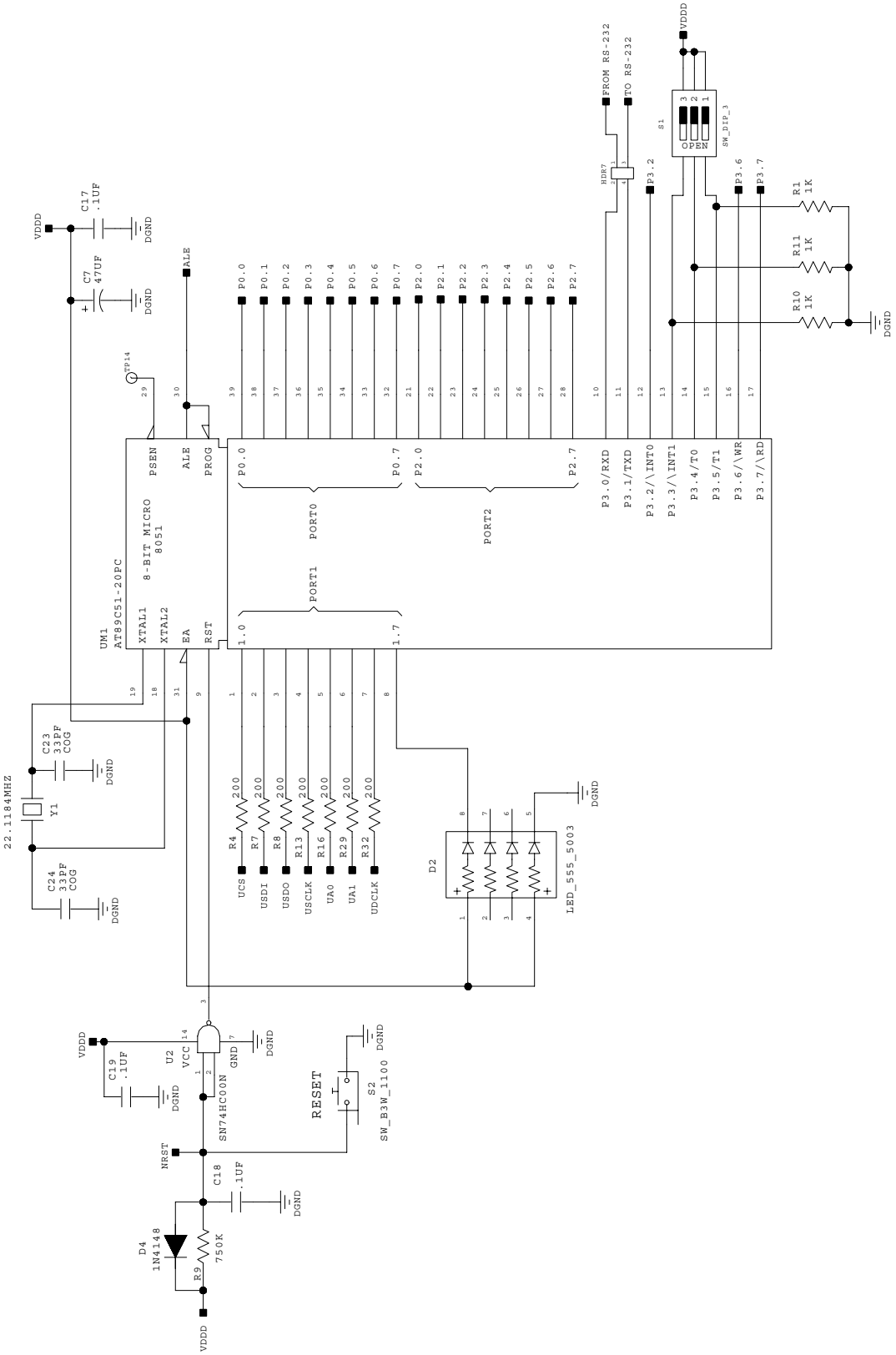


Figure 3. Digital Section Schematic - Part 1

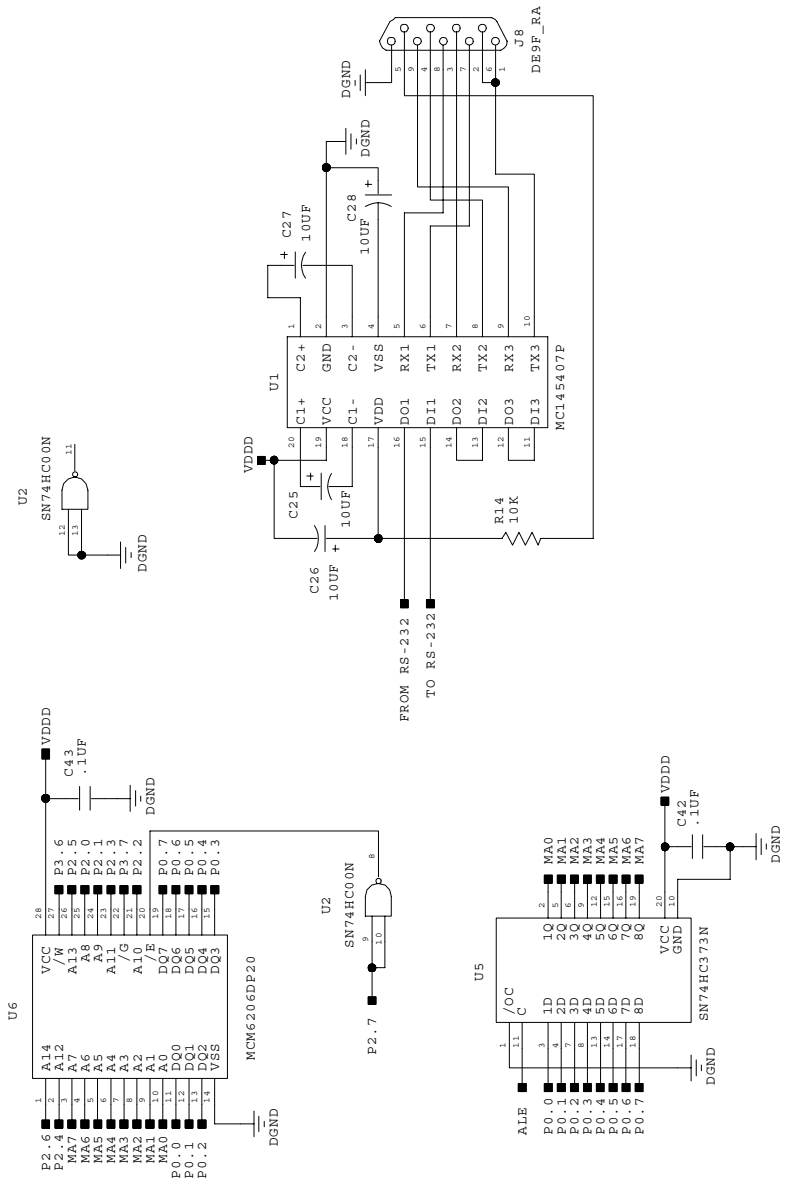


Figure 4. Digital Section Schematic - Part 2

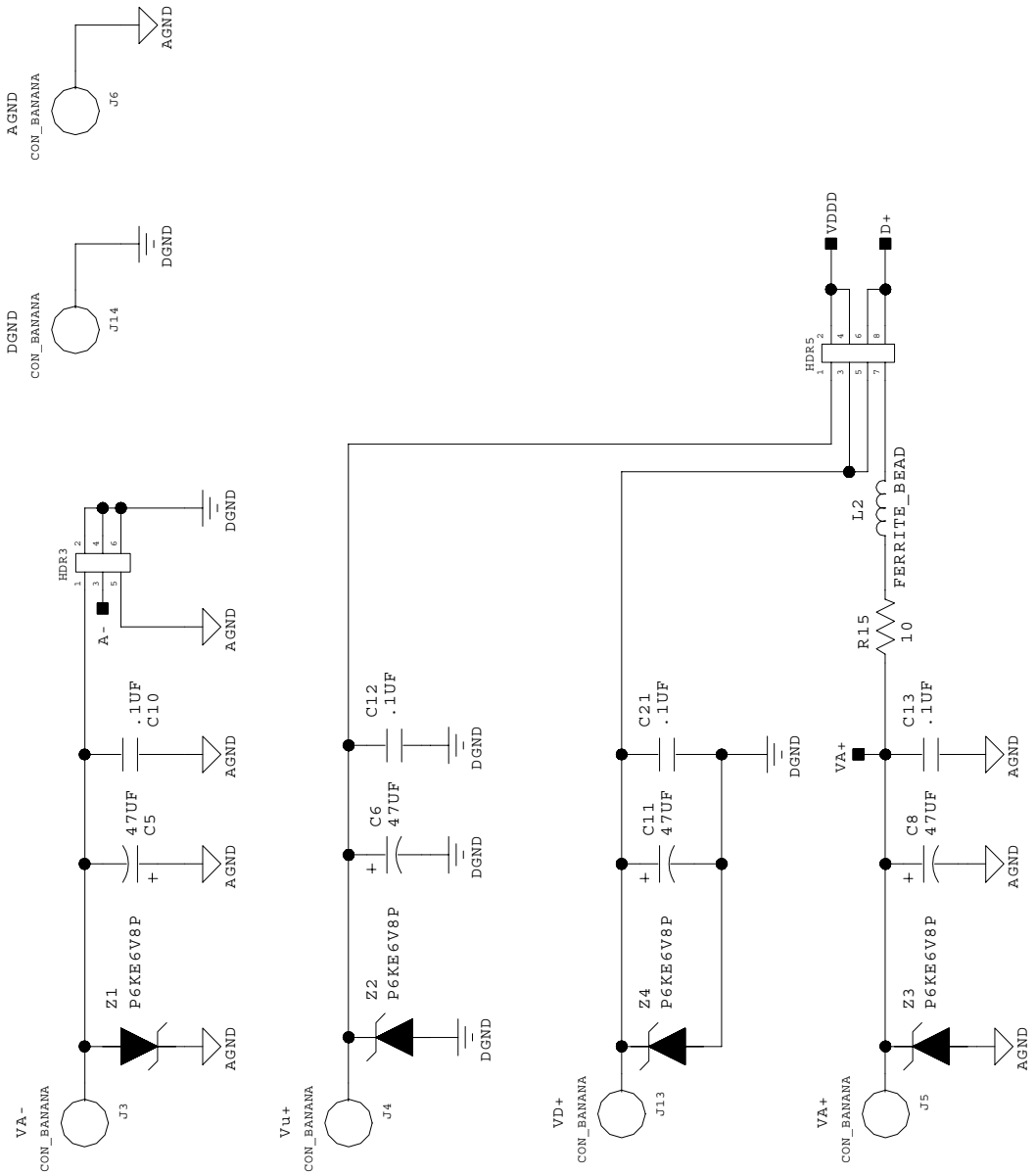


Figure 5. Power Supply Connection Schematic

2. SOFTWARE

The evaluation board comes with software and an RS-232 cable to link the evaluation board to the PC. The evaluation software was developed with Lab Windows/CVI, a software development package from National Instruments. The software was designed to run under Windows 95® or later, and requires about 3 MB of hard drive space (2 MB for the CVI Run-Time Engine, and 1 MB for the evaluation software). After installing the software, read the readme.txt file for any last minute updates or changes. More sophisticated analysis software can be developed by purchasing the development package from National Instruments (512-794-0100).

2.1 Installation Procedure

1) Turn on the PC, running Windows 95 or later.
2) Insert the Installation Diskette #1 into the PC.
3) Select the Run option from the Start menu.
4) At the prompt, type: A:\SETUP.EXE <enter>.
5) The program will begin installation.
6) If it has not already been installed on the PC, the user will be prompted to enter the directory in which to install the CVI Run-Time Engine. The Run-Time Engine manages executables created with Lab Windows/CVI. If the default directory is acceptable, select OK and the Run-Time Engine will be installed there.
7) After the Run-Time Engine is installed, the user is prompted to enter the directory in which to install the CDB5531/32/33/34 software. Select OK to accept the default directory, or choose an alternate directory.
8) Once the program is installed, it can be run by double clicking on the Eval5531/32/33/34 icon, or through the Start menu.

Note: *The software is written to run with 640 x 480 resolution; however, it will work with 1024 x 768 resolution. If the user interface seems to be a little small, the user might consider setting the display settings to 640 x 480 (640 x 480 was chosen to accommodate a variety of computers).*

2.2 Using the Software

Before launching the software, the user should set up the CDB5531/32/33/34 evaluation board by using the correct jumper and DIP switch settings as described in the Section 1: Hardware, and connect it to an open COM port on the PC using the RS-232 serial cable. Once the board is powered on, the user can start the software package.

When the software is launched, the Start-Up window appears first (Figure 6). This window contains information concerning the software's title, revision number, copyright date, etc. At the top of the screen is a menu bar which displays user options. The menu bar item *Window* is initially disabled to prevent conflicts with other serial communications devices, such as the mouse or a modem. After selecting a COM port, the *Window* menu item will become available.

2.3 Selecting and Testing a COM Port

Upon start-up, the user must select the serial communications port which will interface to the CDB5531/32/33/34 board. To select a COM port, pull down the *Options* menu, and select *Data Source*. The Data Source Window will appear on the screen, with a variety of options. Check the box labeled "Communications Port" and then select either COM1 or COM2 in the box which is initially labeled "NONE" (the "File" box is used for previously saved files, and is discussed later). Testing the COM port to verify communication between the PC and the evaluation board is not necessary, but can help to troubleshoot some problems. The procedure for testing the communication link follows.

1) Press the TEST RS-232 button in the Data Source Window.
2) When prompted, set the three DIP switches to the closed position, reset the board by pressing the reset switch, and press OK to perform the test.
3) If the test passes, set the DIP switches back to the open position, and reset the board by pressing the reset switch again. This returns the evaluation board to normal operating mode.
4) If the test fails, check the serial port connections, power connections, jumpers, and DIP switch settings on the board, and run the test again from step 1.

Note: When performing the RS-232 test, the communications speed is reset to the default 9600 baud rate.

The user can change the speed of the serial link at any time by clicking on the box that reads "9600", and selecting a new speed. Once the serial link has been established between the PC and the evaluation board, the user can press the "Done" button to return to the Start-Up Window.

2.4 Selecting a Part

To ensure proper functionality of the evaluation board and software, the user must select the part that they are using. To select a part, pull down the *Options* menu and select *Part*. From this menu, click on the part that is installed on the CDB5531/32/33/34.

2.5 Register Access in the Setup Window

The Evaluation software provides access to the CS5531/32/33/34's internal registers in the Setup Window (Figure 7). The user can enter the Setup Window by pulling down *Window* and selecting *Setup Window*, or by pressing F2 on the keyboard.

In the Setup Window, all of the ADC's registers are displayed as hexadecimal values. The Configuration Register's meaning is also decoded in this window.

Update Registers Button: The Update Registers button will read all the register values from the part and update the hexadecimal values displayed on the screen. This usually takes a couple of seconds, but it is a good idea to press the Refresh Screen button when entering the Setup Window, or after modifying any registers to reflect the current status of the part.

Configuration Register: In the Configuration Register box, the contents of the Configuration Register are displayed, and can be modified by typing a hexadecimal value in the HEX: box, or by changing any of the values below the HEX: box to the desired settings. Note: When changing the value of the reset system bit to '1' (RS, bit 29 in the Configuration Register), the part will be reset, and all registers will return to their default values. It is a good idea to press the Update Registers button after performing a reset to update the screen with the new register values.

Channel Setup Registers: In the Channel Setup Registers box, all four Channel Setup Registers are displayed in hexadecimal. These registers can be modified from the Channel Setup Register Window, which is accessed by pressing the Edit CSRs button.

Channel Setup Register Window: In the Channel Setup Register Window (Figure 8), each of the four CSRs can be decoded and modified. The blue box at the top of the window allows the user to switch between CSRs. Each 32-bit CSR contains two 16-bit "Setups" which are decoded in the two boxes below the hexadecimal value. The currently displayed CSR can be modified by either typing a value directly in the Hexadecimal: box or by changing the decoded values in the individual Setup boxes.

Offset / Gain Registers: In the Offset Registers / Gain Registers box, the offset and gain registers for all channels are displayed in hexadecimal (two

channels for the CS5531 and CS5532, four channels for the CS5533 and CS5534). These registers can all be modified in the Calibration Window, which is accessed when the user presses the Calibration Window button.

Calibration Window: The Calibration Window (Figure 9) permits the user to access the calibration registers for each channel of the CS5531/32/33/34 and also perform self and system offset or gain calibrations on of the channels. Prior to performing calibrations however, the Channel Setup Registers should be modified to configure the part for the desired operating mode (see the section on the Channel Setup Register Window for more details). Note that offset calibration should be performed before gain calibration to ensure accurate results. Refer to the CS5531/32/33/34 Data Sheet for more details.

Self Offset or Gain Calibrations:

1) Pull down the Self Offset or Self Gain box, and select the setup number you want to use to calibrate the channel.
2) The offset and gain register values will automatically update when the calibration is completed.

System Offset Calibrations:

1) Attach a grounded input to the physical channel you want to calibrate. Note that the grounded input must be within the common mode range of the particular amplifier (1X-64X) for valid calibration.
2) Pull down the System Offset box, and select the setup number you want to use to calibrate the channel.
3) The offset and gain register values will automatically update when the calibration is completed.

System Gain Calibrations:

1) Attach a full-scale input to the physical channel you want to calibrate.
2) Pull down the System Gain box, and select the setup number you want to use to calibrate the channel.
3) The offset and gain register values will automatically update when the calibration is completed.

Reset Serial Port: When this button is pressed, the software will send the synchronization sequence discussed in the CS5531/32/33/34 data sheet to the ADC. This sequence brings the CS5531/32/33/34's serial port back to the command mode. It does not reset any of the registers in the part.

Reset Part Button: When this button is pressed, a '1' is written to the RS bit in the Configuration Register to reset the part. After a reset, the registers will all return to their default values as discussed in the CS5531/32/33/34 data sheet.

Read Data Button: This button will instruct the ADC to begin performing repeated single (fully-settled) conversions on the setup channel specified by the Setup Register box. The results of the most recent conversion are displayed in the "Last Conversion" box, as well as the Channel and Overflow indicator bits for each conversion. The software will halt the data collection process when the user presses the Stop button.

Num to Avg. Box: This box will allow the user to collect multiple single conversions at once, and the software will compute mean, standard deviation, and peak values for each set of conversions. The results will be displayed in the corresponding boxes for the last three sets of data taken.

2.6 Data Collection Window Overview

The Data Collection Window (Figures 10, 11, and 12) allows the user to collect sample sets of data from the CS5531/32/33/34 and analyze them using time domain, FFT, and histogram plots. The Data Collection Window is accessible through the *Window* option, or by pressing F3.

Time Domain / FFT / Histogram Selector: This menu selects the type of data processing to perform on the collected data and display in the plot area. Refer to the section on Analyzing Data for more information.

Collect Button: This button will collect data from the part, to be analyzed in the plot area. See the section on Collecting Data Sets for more information.

Config Button: This button will bring up the configuration window, in which the user can modify the data collection specifications. See the discussion of the Config Window in this document.

Output Button: This button will bring up a window in which the user can output the data to a data file for later use, print out a plot, or print out the entire screen.

Zoom Button: This button allows the user to zoom in on the plot by selecting two points in the plot area. Press the Restore button to return to the normal data plot, or press the Zoom button again to zoom in even further.

Setup Select Box: This box determines the setup number to use when performing conversions. See the CS5531/32/33/34 data sheet for more details on the functionality of the Channel Setup Registers.

2.7 Config Window

The Config Window allows the user to set up the data collection and analysis parameters.

Number of Samples: This box allows the user to select the number of samples to collect, between 16 and 32,768. Due to the 32 KB memory size on the CDB5531/32/33/34, the maximum is 8192 samples when collecting memory-buffered sample sets. When collecting un-buffered sample sets, the only limitation is the speed of the RS-232 interface.

Average: When doing FFT processing, this box will determine the number of FFTs to average. FFTs will be collected and averaged when the Collect button is pressed.

FFT Window: This box allows the user to select the type of windowing algorithm for FFT processing. Windowing algorithms include the Blackman, Blackman-Harris, Hanning, 5-term Hodie, and 7-term Hodie. The 5-term Hodie and 7-term Hodie are windowing algorithms developed at Cirrus Logic. This selection has no effect on Time Domain or Histogram analysis.

Histogram Bin Width: This box allows for a variable "bin width" when plotting histograms of the collected data. Each vertical bar in the histogram plot will contain the number of output codes contained in this box. Increasing this number may allow the user to view histograms with larger input ranges.

Collection Process: This box will change the collection process to either buffered or un-buffered. For buffered conversions, the microcontroller will temporarily store the conversion data in the on-board 32 KB SRAM. For unbuffered conversions, the microcontroller will send the collected data directly to the PC through the RS-232 cable. Note that unbuffered conversion sets are limited by the speed of the RS-232 connection, while buffered sets are limited to 8192 samples by the size of the on-board SRAM.

Crystal Frequency: The evaluation board comes equipped with a 4.9152 MHz crystal. If the user chooses to replace this with a crystal of a different frequency, the number in this box can be modified to provide more accurate timing and FFT information.

Accept Button: When this button is pressed, the current settings will be saved, and the user will return to the Data Collection Window.

2.8 Collecting Data Sets

To collect a sample data set:

1) In the Data Collection Window, press the Config button to bring up the Configuration Window and view the current settings.

2) Select the appropriate settings from the available options (see the section on the Configuration Window) and press the Accept button.

3) The Data Collection Window should still be visible. In the Setup box, select the Setup number you want to use to perform conversions.

4) Press the Collect button to begin collecting data. A progress indicator bar will appear at the bottom of the screen during the data collection process.

5a) For buffered conversion sets, data is first collected from the CS5531/32/33/34 and stored in SRAM, and then transferred from the SRAM to the PC through the RS-232 serial cable. Depending on the value of the WR bits in the selected Setup and the number of samples being collected, this process may take a long time. The process can be terminated by pressing the Stop button, but if this is done the user should also press the Reset button on the CDB5531/32/33/34 board to bring the microcontroller out of the collection routine.

5b) For unbuffered conversion sets, data is sent directly to the PC through the RS-232 serial cable. Depending on the value of the WR bits in the selected Setup and the number of samples being collected, this process may take a long time. The process can be terminated by pressing the Stop button, but if this is done, the user should also press Reset on the CDB5531/32/33/34 board to bring the microcontroller out of the collection routines.

6) Once the data has been collected, it can be analyzed, printed, or saved to disk.

2.9 Saving and Printing Data

Once collected, data can be printed or saved to a file for later use. To save or print data, click on the Output button in the Data Collection Window. A small panel will pop up with three options:

1) Output Data File: Brings up the File Save dialog box, which allows the data to be saved to a file.

2) Print Screen: Prints the entire display, including the calculated statistics.

3) Print Graph: Prints the information in the plot area. The statistical information is not printed.

2.10 Retrieving Saved Data From a File

To load a previously saved file:

1) Pull down the Setup option and select Disk. A file menu will appear.

2) Find the data file in the list and select it. Press the Select button to return.

3) Go to the Data Collection Window, and press the Collect button.

4) The data from the file should appear on the screen. To select a different file, repeat the procedure.

2.11 Plot Options Window

The plot options window can be accessed by pulling down the *Options* menu and clicking on *Plot Options*. In this window, the user can change the background color, the plot line color, and the peak indicator color. The harmonic and peak indicators can also be turned on or off in this window.

2.12 Analyzing Data

The evaluation software provides three types of analysis tests - Time Domain, Frequency Domain, and Histogram. The Time Domain analysis processes acquired conversions to produce a plot of Conversion Sample Number versus Magnitude. The Frequency Domain analysis processes acquired conversions to produce a magnitude versus frequency plot using the Fast-Fourier transform (results up to Fs/2 are calculated and plotted). Also, statistical noise calculations are calculated and displayed. The Histogram analysis test processes acquired conversions to produce a histogram plot.

Statistical noise calculations are also calculated and displayed. For more information on Histogram or FFT analysis, refer to Application Notes 37 and 147.

2.13 Histogram Information

The following is a description of the indicators associated with Histogram Analysis. Histograms can be plotted in the Data Collection Window by setting the Time Domain / FFT / Histogram selector to Histogram (Figure 12).

BIN: Displays the x-axis value of the cursor on the Histogram.

MAGNITUDE: Displays the y-axis value of the cursor on the Histogram.

MAXIMUM: Indicator for the maximum value of the collected data set.

MEAN: Indicator for the average of the data sample set.

MINIMUM: Indicator for the minimum value of the collected data set.

STD. DEV.: Indicator for the Standard Deviation of the collected data set.

VARIANCE: Indicates the Variance for the current data set.

2.14 Frequency Domain Information

The following describe the indicators associated with FFT (Fast Fourier Transform) Analysis. FFT data can be plotted in the Data Collection Window by setting the Time Domain / FFT / Histogram selector to FFT (Figure 11).

FREQUENCY: Displays the x-axis value of the cursor on the FFT display.

MAGNITUDE: Displays the y-axis value of the cursor on the FFT display.

S/D: Indicator for the Signal-to-Distortion Ratio, 4 harmonics are used in the calculations (decibels).

S/N+D: Indicator for the Signal-to-Noise + Distortion Ratio (decibels).

SNR: Indicator for the Signal-to-Noise Ratio, first 4 harmonics are not included (decibels).

S/PN: Indicator for the Signal-to-Peak Noise Ratio (decibels).

# of AVG: Displays the number of FFT's averaged in the current display.

2.15 Time Domain Information

The following controls and indicators are associated with Time Domain Analysis. Time domain data can be plotted in the Data Collection Window by setting the Time Domain / FFT / Histogram selector to Time Domain (Figure 10).

COUNT: Displays current x-position of the cursor on the time domain display.

MAGNITUDE: Displays current y-position of the cursor on the time domain display.

MAXIMUM: Indicator for the maximum value of the collected data set.

MINIMUM: Indicator for the minimum value of the collected data set.

Figure 6. Start-Up Window

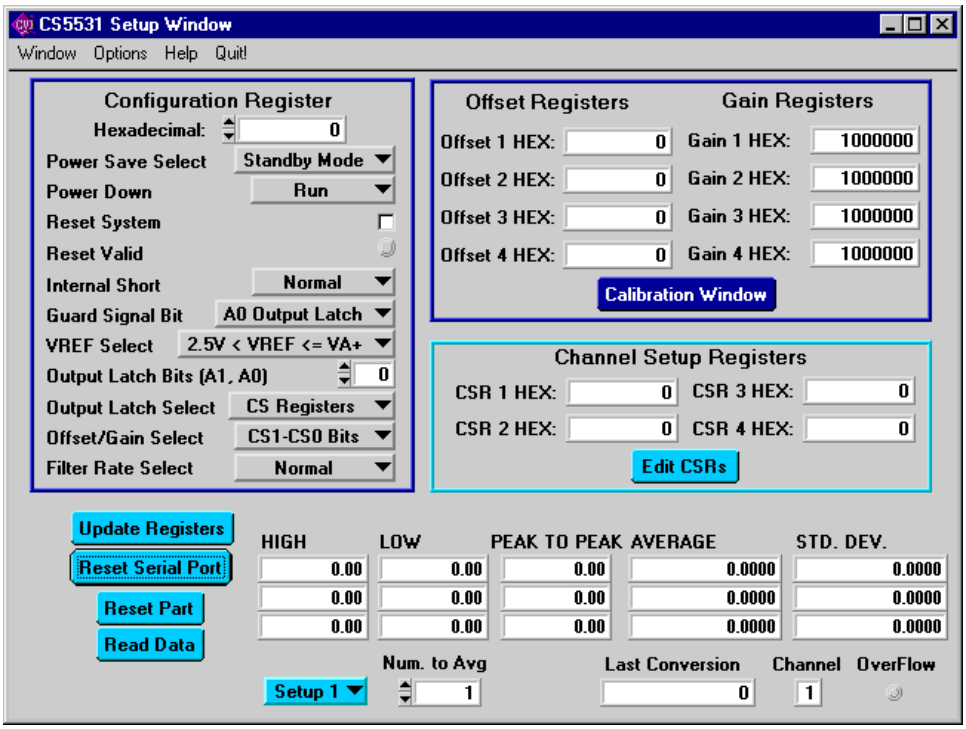


Figure 7. Setup Window

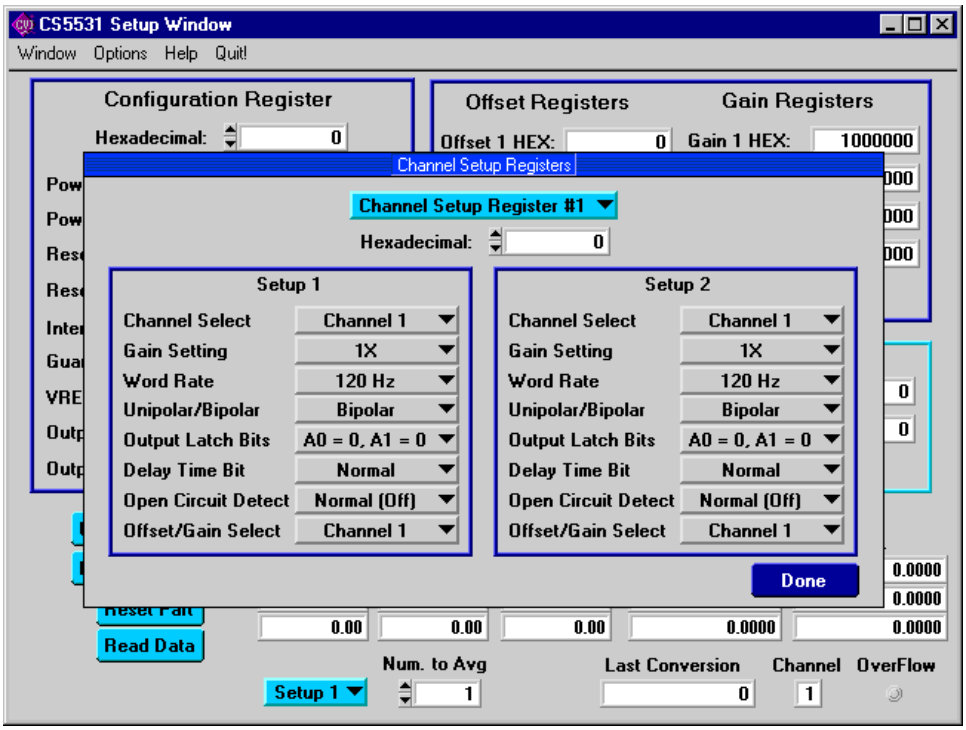


Figure 8. Channel Setup Register Window

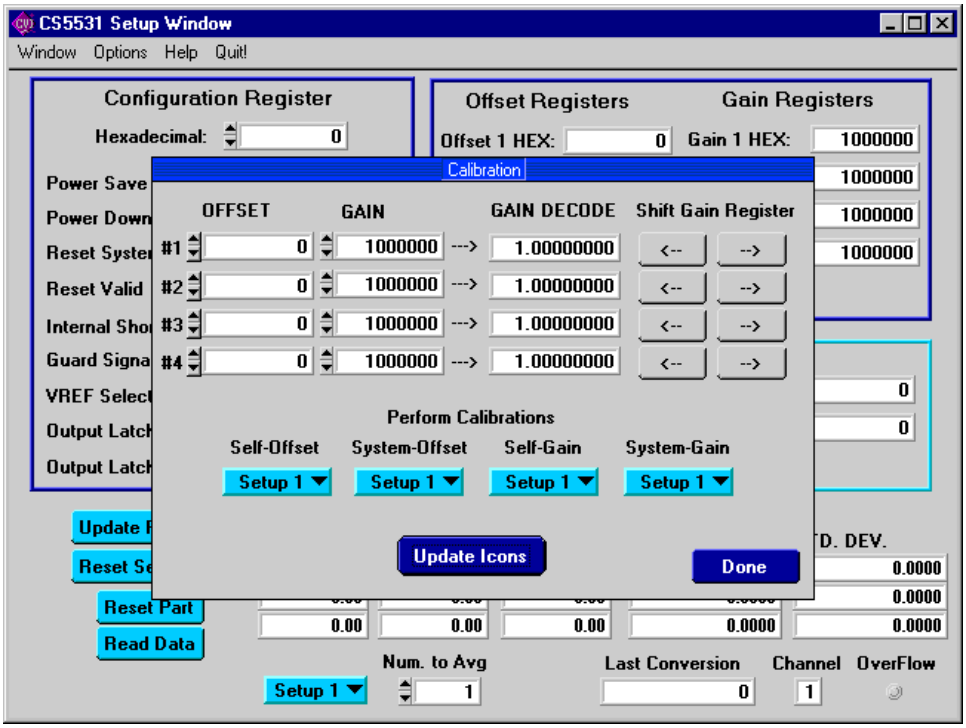


Figure 9. Calibration Window

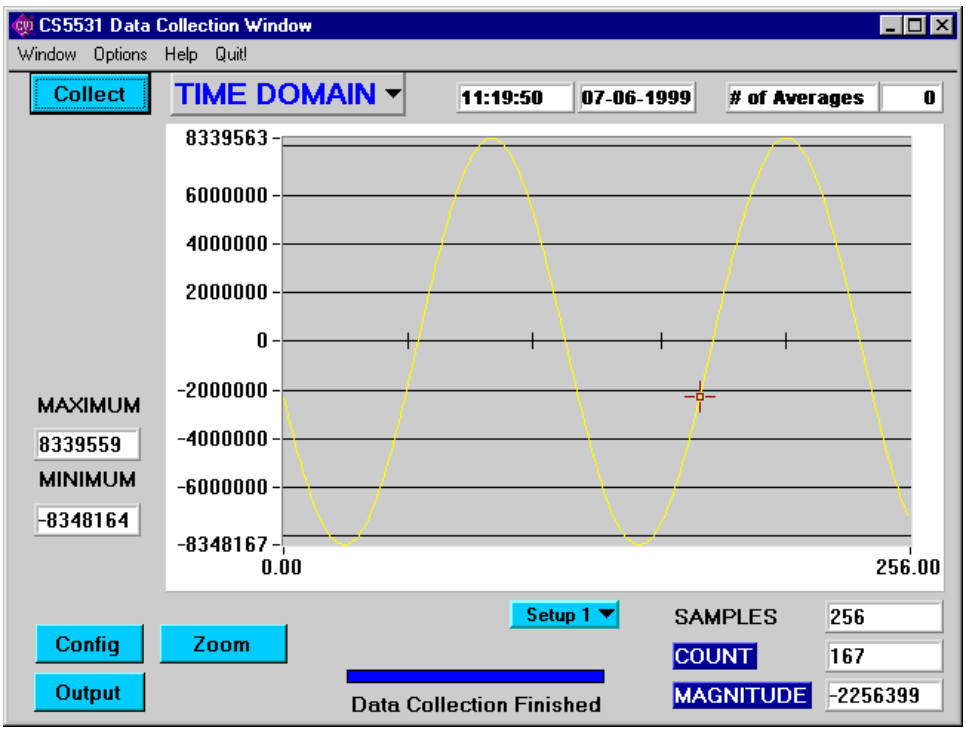


Figure 10. Data Collection Window: Time Domain Analysis

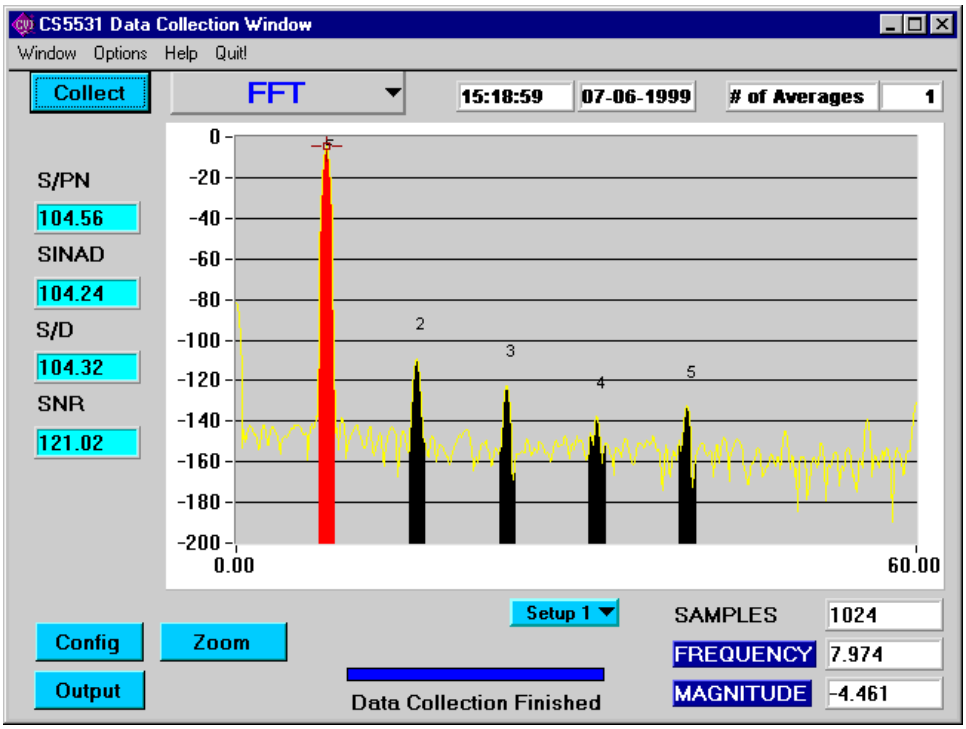


Figure 11. Data Collection Window: FFT Analysis

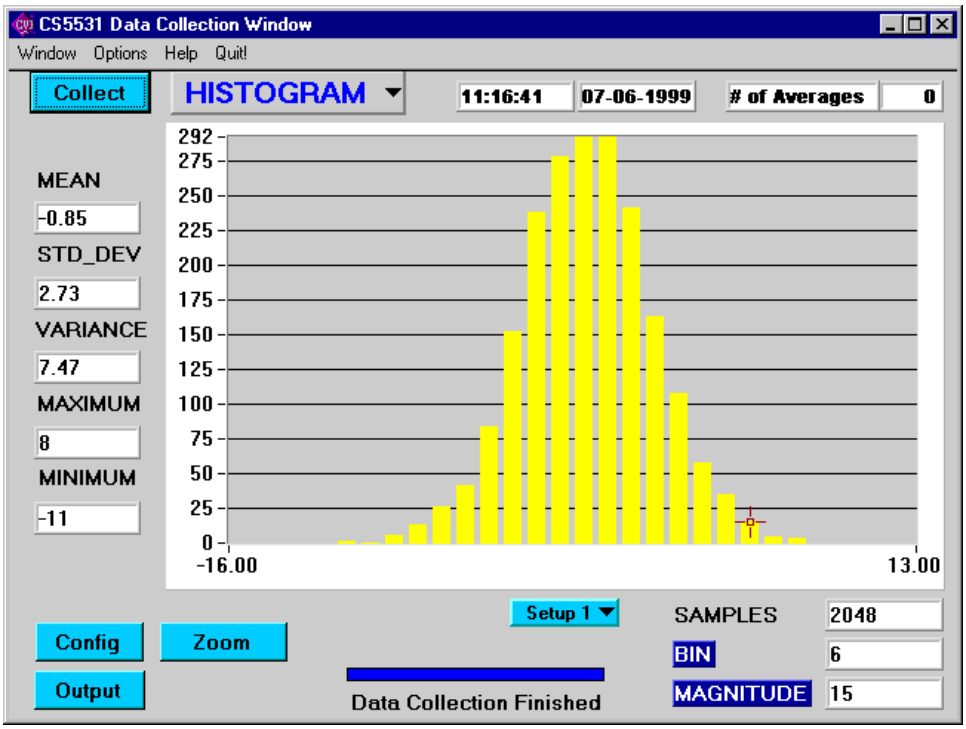


Figure 12. Data Collection Window: Histogram Analysis

3. PCB LAYOUT

The CS5531/32/33/34 should be placed entirely over an analog ground plane. Place the analog-digital plane split immediately adjacent to the digital portion of the chip. Figures 14 and 15 illustrate the layout of the CDB5531/32/33/34.

Note: See Applications Note 18 for more detailed layout guidelines. Before layout, please call for our Free Schematic Review Service.

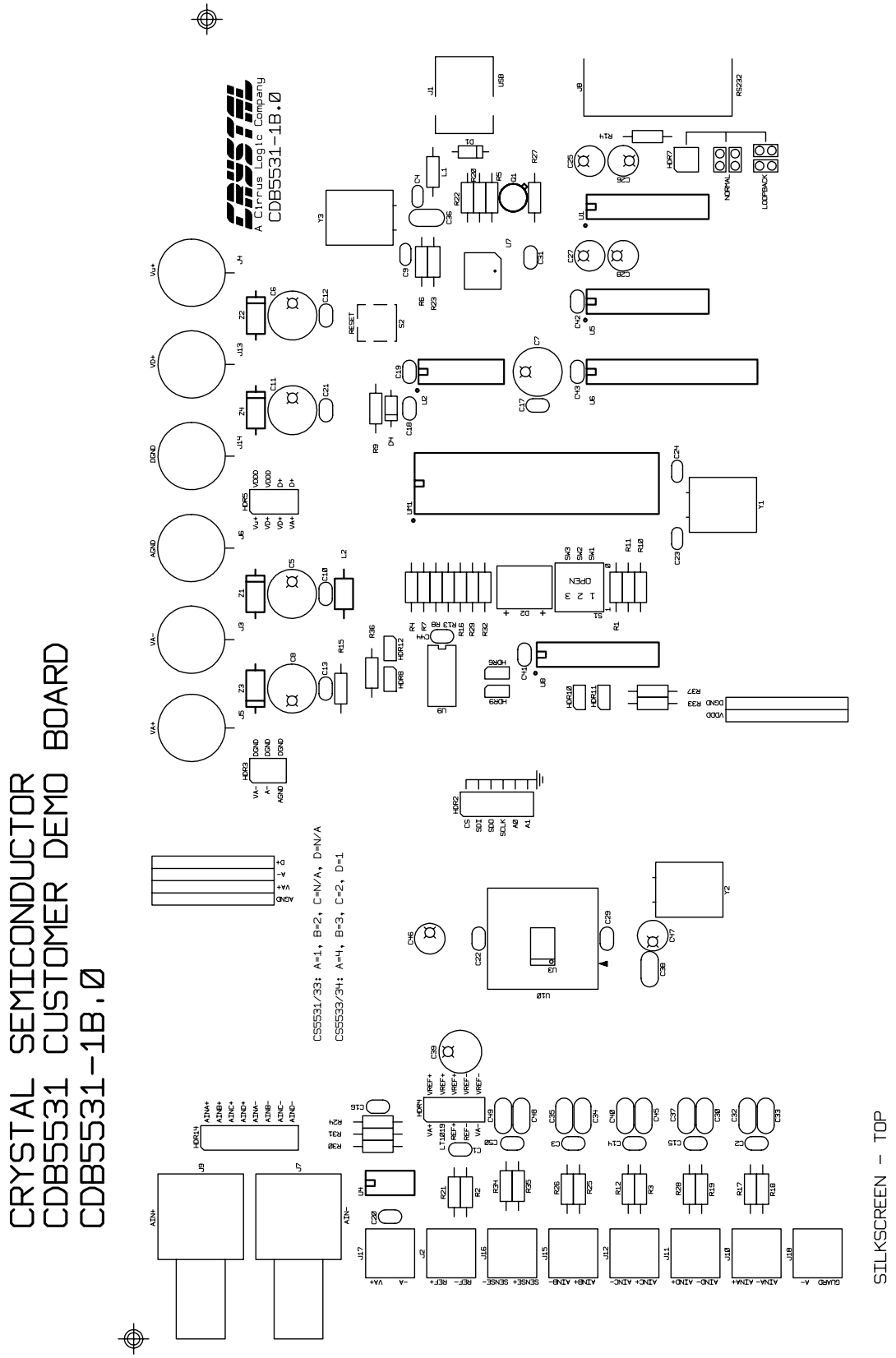


Figure 13. Top Silkscreen

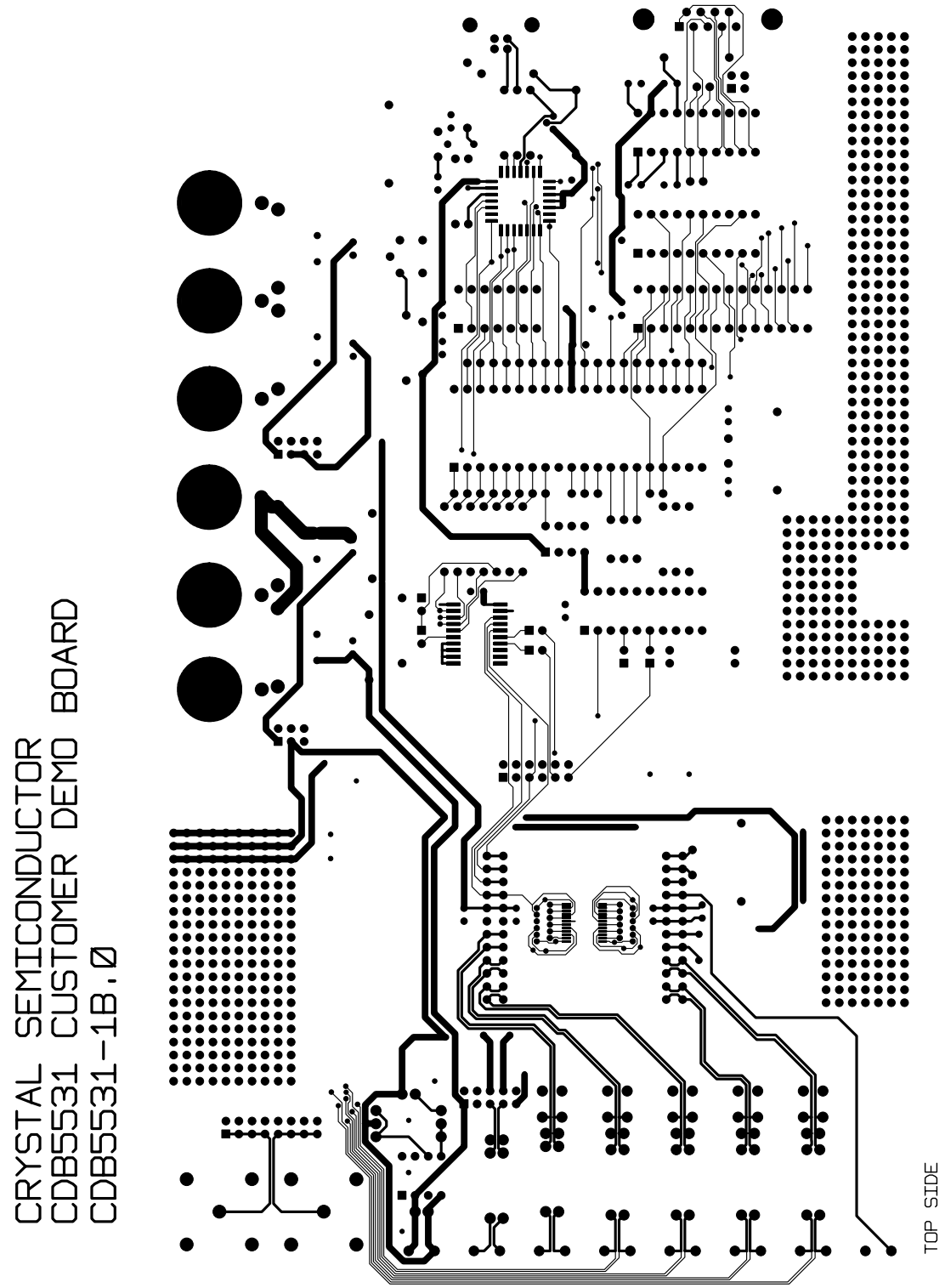


Figure 14. Top Side Layout

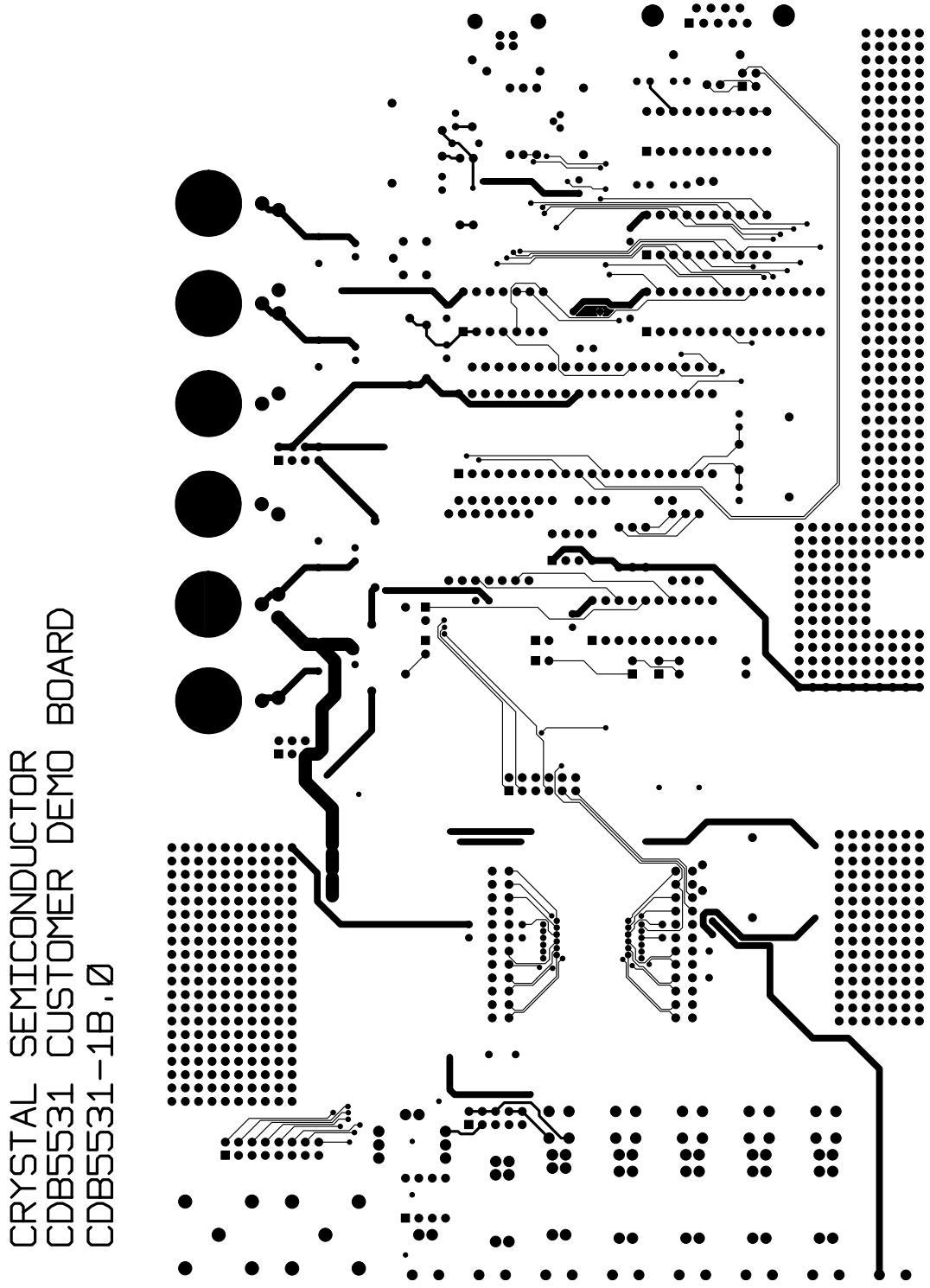


Figure 15. Bottom Side Layout

• Notes •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