A DIVISION OF CIRRUS LOGIC

CDB5460

CDB5460 Evaluation Board and Software

Features

- Direct Shunt Sensor and Current Transformer Interface
- 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 Mode

General Description

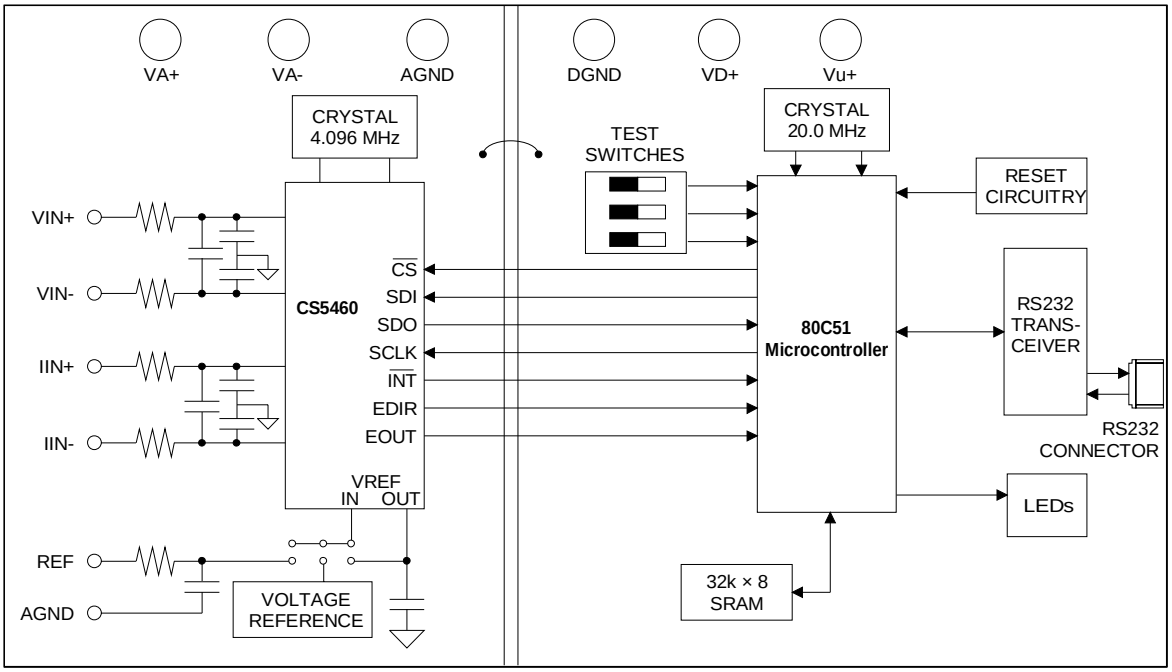
The CDB5460 is an inexpensive tool designed to evaluate the functionality and performance of the CS5460. The CS5460 Data Sheet is required in conjunction with the CDB5460 evaluation board.

The evaluation board includes an LT1019 voltage reference, an 80C51 microcontroller, an RS232 transceiver, and firmware. The 8051 controls the serial communication between the evaluation board and the PC via the firmware, enabling quick and easy access to all of the CS5460's registers and functions.

The CDB5460 includes software for Data Capture, Time Domain Analysis, Histogram Analysis, and Frequency Domain Analysis.

ORDERING INFORMATION

CDB5460 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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http://www.cirrus.com/corporate/contacts/

PART I: HARDWARE

Introduction

The CDB5460 evaluation board provides a quick means of evaluating the CS5460 Analog-to-Digital Converters (ADCs) and Computational Unit. The CDB5460 evaluation board's analog section operates from either a single +5 V or dual ±2.5 V power supply. The evaluation board interfaces the CS5460 to an IBM™ compatible PC via 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. Additionally, analysis software provides easy access to the internal registers of the CS5460, and provides a means to display the performance in the time domain or frequency domain.

Evaluation Board Overview

The board is partitioned into two main sections: analog and digital. The analog section consists of the CS5460 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 a user friendly power supply connection.

Analog Section

The CS5460 is designed to accurately measure and calculate: Energy, Instantaneous Power, I_{RMS}, and V_{RMS} while operating from a 4.096 MHz crystal. As shown in Figure 1 there are four BNC connectors (J9, J10, J11, J12) provided for converter input connections. A Shunt Sensor or Current Transformer can be connected to the converter's current inputs via J10 (IIN+) and J9 (IIN-). A voltage divider can be connected to the converter's voltage input via J12 (VIN+) and (J11) (VIN-). Note, a simple RC network filters the sensor's output to reduce any interference picked up by the input leads. The 3 dB corner of the filter is approximately 50K Hz differential and common mode.

The evaluation board provides three voltage reference options, on-chip, on-board and external, as shown in Figure 2. Table 1 illustrates the options available. With HDR4's jumpers in position REFOUT, the on-chip reference provides 2.5 volts. With HDR4's jumpers in position LT1019, the LT1019 provides 2.5 volts (the LT1019 was chosen for its low drift, typically 5ppm/°C). By setting HDR4's jumpers to position REF+, the user can supply an external voltage reference to J2's REF+ and VA- inputs. Application Note 4 on the web (http://www.cirrus.com/products//pubs.html) details various voltage references.

Reference	Description	HDR4
LT1019	Selects on board LT1019 Reference (5ppm/°C)	● ● LT1019 O O REF+ O O REFOUT
REF+	Selects external reference	O O LT1019 ● ● REF+ O O REFOUT
REFOUT	Selects the reference supplied by CS5460	O O LT1019 O O REF+ ● ● REFOUT

Table 1. Reference Selection

The CS5460 serial interfaces are *SPI™* and *Microwire™* compatible. The interface control lines ($\overline{CS}$, SDI, SDO, and SCLK) are connected to the 80C51 microcontroller via port one. To interface an external microcontroller, these control lines are also connected to HDR6 (Header 6). However 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.

Digital Section

Figures 3 and 4 illustrate the schematic of the digital section. It contains the microcontroller, test

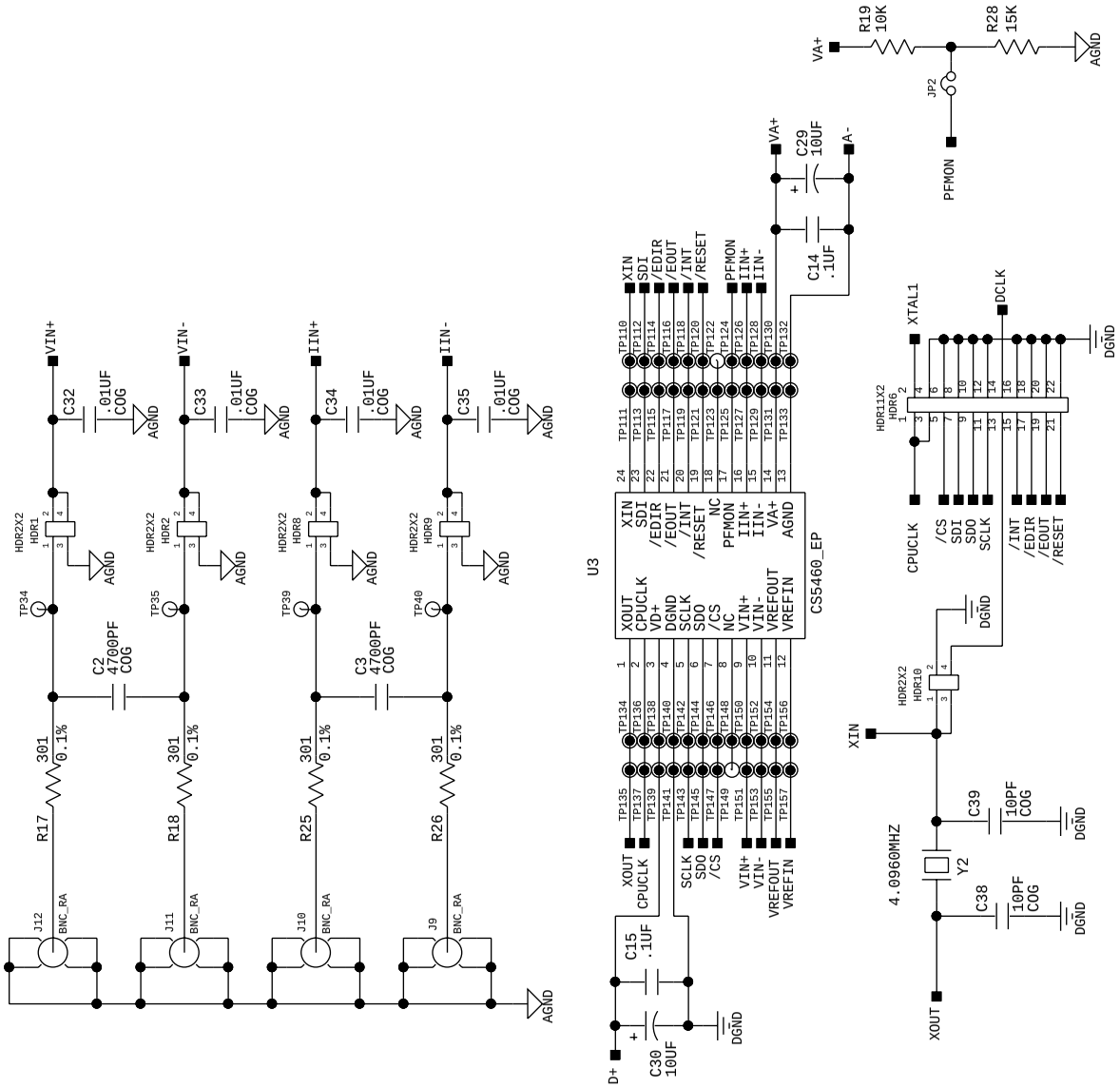


Figure 1. Analog Schematic Part 1

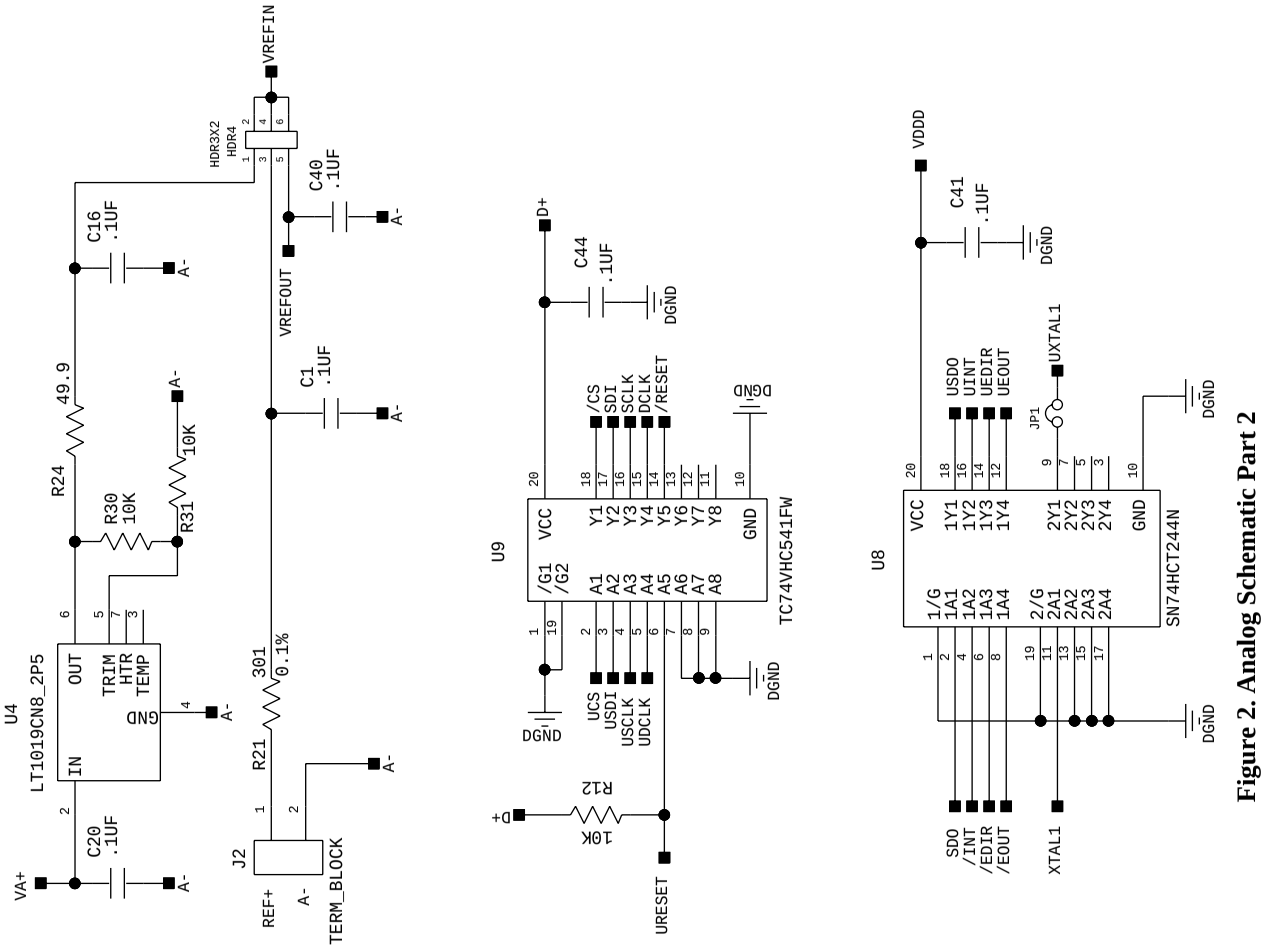


Figure 2. Analog Schematic Part 2

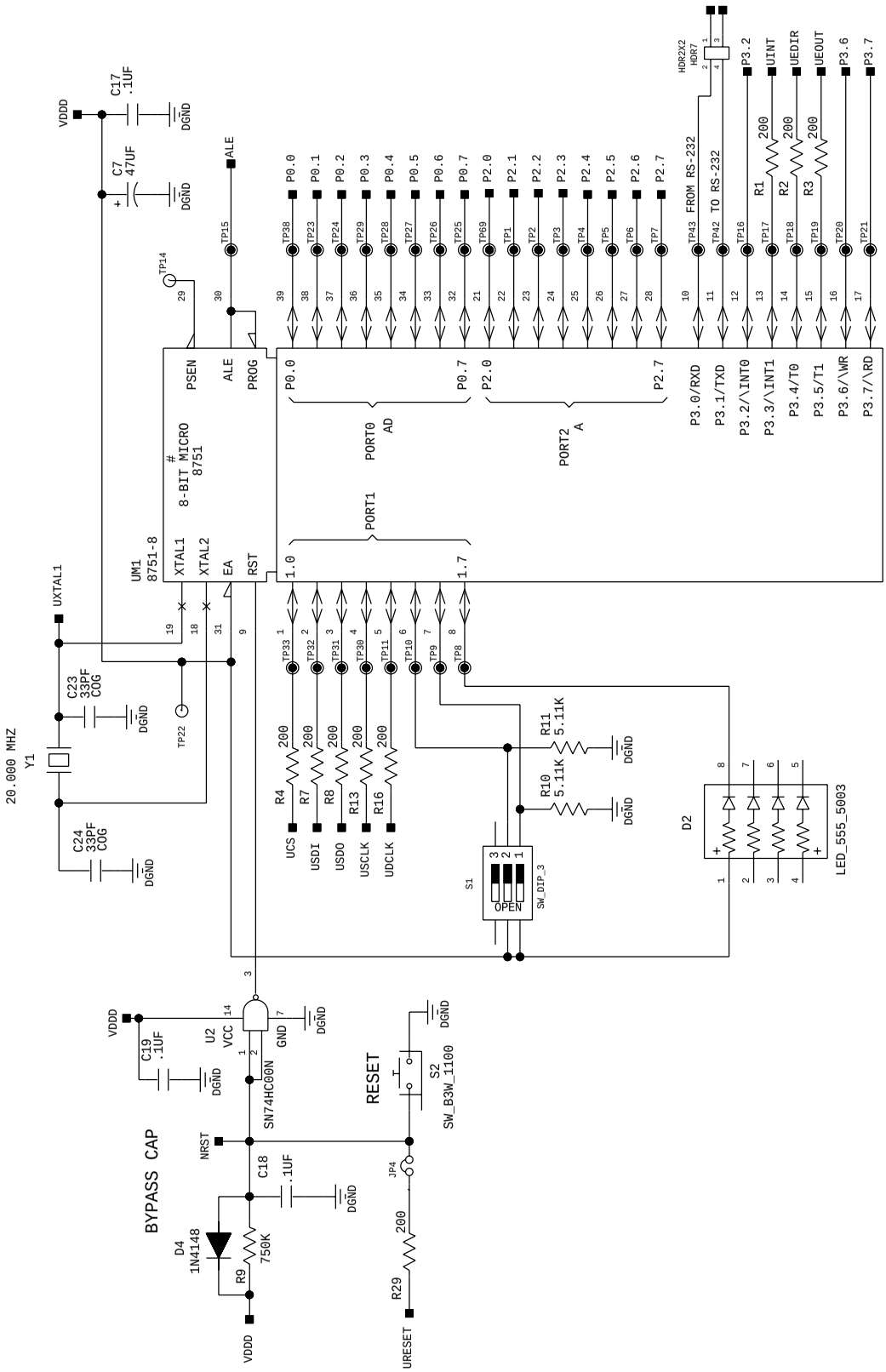


Figure 3. Digital Schematic Part 1

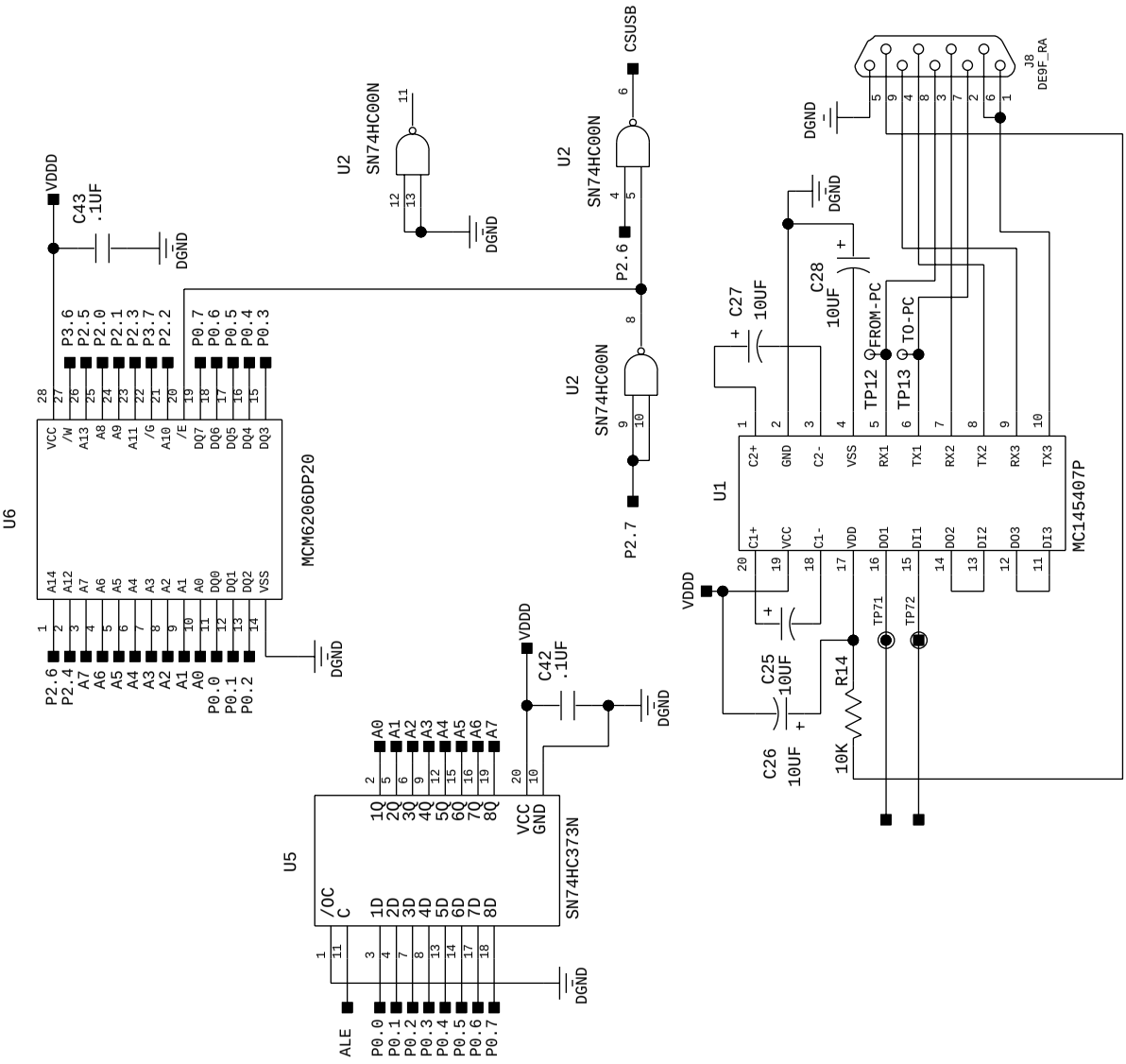


Figure 4. Digital Schematic Part 2

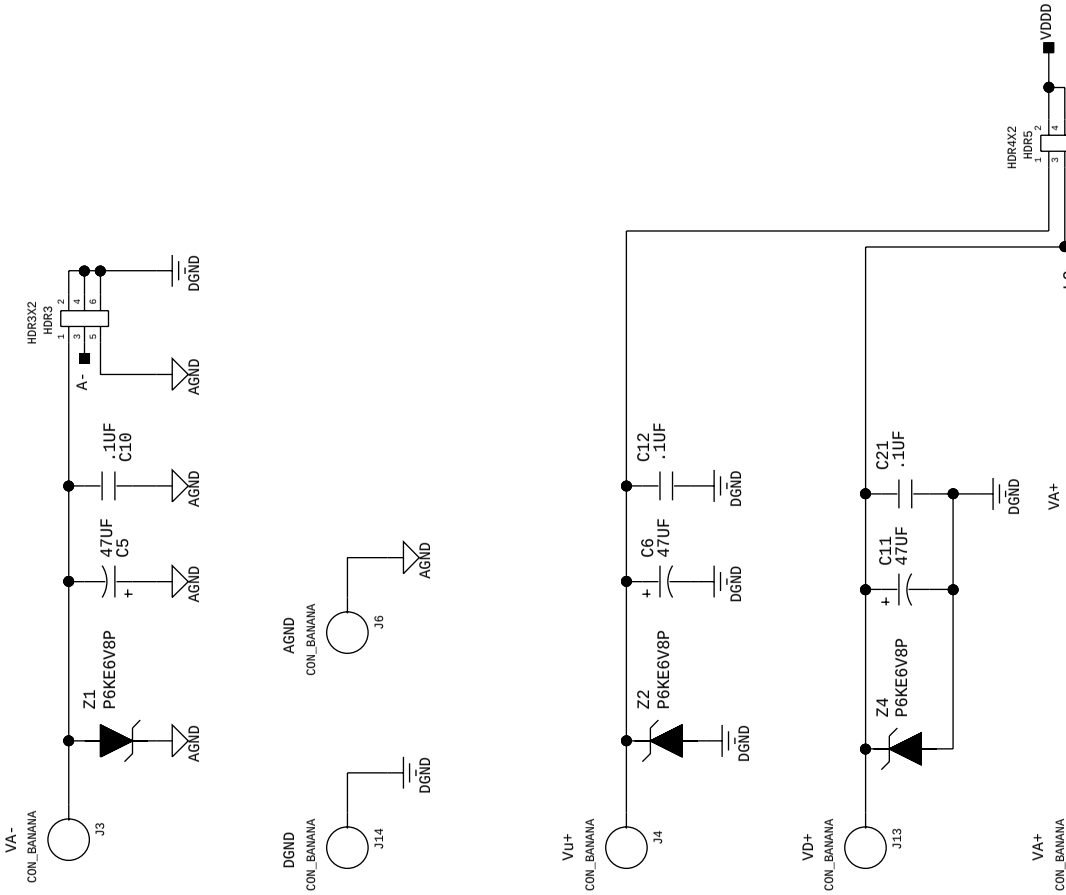


Figure 5. Power Supply Schematic

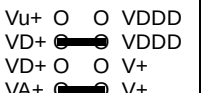
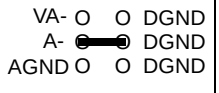
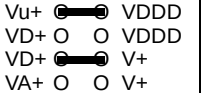
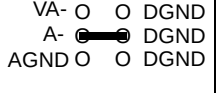
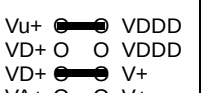
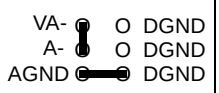
Power Supplies		Power Post Connections						Jumpers	
Analog	Digital	VA+	VA-	AGND	DGND	VD+	Vu+	HDR5	HDR3
+5V	+5V	+5	NC	GND	GND	+5	NC		
+5V	+3V	+5	NC	GND	GND	+3	+5		
±2.5V	+3V	+2.5	-2.5	NC	GND	+3	+5		

Table 2. Power Supply Connections

switches, a Motorola MC145407 interface chip, and 32K bytes of SRAM. The test switches aid in debugging communication problems between the CDB5460 and the PC. The microcontroller derives its clock from an 20.0 MHz crystal. From this, the controller is configured to communicate via RS-232 at 9600 baud, no parity, 8-bit data, and 1 stop bit.

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. Note, this terminal is grounded when powering the CDB5460 from a single +5 Volt analog supply. The VD+ post supplies the digital section of the ADC and level shifter. 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 via Vu+ post, must be +5Volts only. Table 2 shows the varies power connections with the required jumper setting on HDR3 and HDR5.

Using the Evaluation Board

The CS5460 is a highly integrated device, containing dual ADCs with a computational unit. The CS5460 and CDB5460 data sheets should be read thoroughly and understood before using the CDB5460 evaluation board. The CS5460 contains a programmable gain amplifier (PGA), two ΔΣ modulators, two high rate filters, an on-chip reference, and power calculation engine to compute Energy, V_{RMS}, I_{RMS}, and Instantaneous Power. The PGA sets the input levels of the current channel at either 30 mV_{RMS} or 150 mV_{RMS} (for VREFIN = 2.5 V). The on-chip reference can provide the necessary 2.5 V reference. This output (VREFOUT), along with a 10 μF capacitor, is used to supply the VREFIN pin with 2.5 V. The ΔΣ modulators and high rate digital filter allows the user to measure instantaneous voltage, current, and power at a output word rate of 4000 Hz when a 4.096 MHz clock source is used. Table 3 describes the varies headers, jumpers and DIP switches on the CDB5460 evaluation board. DIP switch S1 is used to control the 80C51. Table 4 illustrates the varies setting of the DIP Switch S1. Note, S1-3 is a no connect and not used. The S1-1 switch should be set to the OPEN position for normal operation. When testing the RS-232 link in the PC software, close S1-1. The

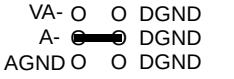
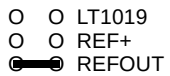
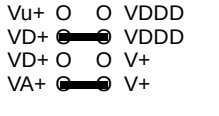
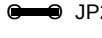
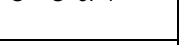
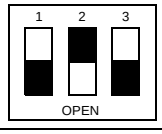
Name	Function Description	Default Setting	Default Jumpers
HDR1	Used to switch VIN+ on the CS5460 between J12 and AGND.	VIN+ Set to BNC J12	
HDR2	Used to switch VIN- on the CS5460 between J11 and AGND.	VIN- Set to BNC J11	
HDR3	Used to switch VA-, A-, and AGND to DGND.Refer to Table 2	Negative Analog Power Supply Set to 0 V	
HDR4	Used to switch the VREFIN from external J2 header, to the on board LT1019 reference, or to the on-chip reference VREFOUT. Refer to Table 1	VREFIN Set to on-chip reference VREFOUT	
HDR5	Used to switch VU+, VD+, and VA+ to VDDD and/or V+. Refer to Table 2	Digital Power Supply Set to +5V	
HDR6	Used to connect an external micro-controller.	Connected to 80C51	NC
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	
HDR8	Used to switch IIN+ on the CS5460 between J10 and AGND.	IIN+ Set to BNC J10	
HDR9	Used to switch IIN- on the CS5460 between J9 and AGND.	IIN- Set to BNC J11	
HDR10	Used to switch XIN on the CS5460 to HDR6 when an extrenal micro-controller is used.	XIN Set for on-board 4.096 MHz XTAL	
JP2	Used to connect PFMON pin on the CS5460 to monitor Power Supply VA+	PFMON Set Monitor VA+	
JP4	Used to connect the RESET Button to the CS5460	RESET Set not connected to CS5460	
S1	DIP switch to control 80C51 S1-1 is used to select RS-232 test mode S1-2 is used to select crystal to 80C51	S1-1 Set Normal S1-2 Set 20 MHz	

Table 3. Header, Jumper, DIP Switch Descriptions

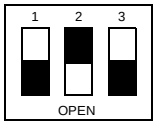
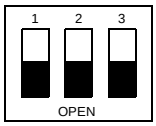
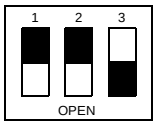
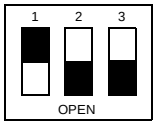
80C51 Mode	S1
80C51 is in Normal Operating Mode S1-1 OPEN S1-2 CLOSED 20 MHz Crystal	
80C51 is in Normal Operation Mode S1-1 OPEN S1-2 OPEN 11.059 MHz Crystal	
80C51 is in Test Mode S1-1 CLOSED S1-2 CLOSED 20 MHz Crystal	
80C51 is in Test Mode S1-1 CLOSED S1-2 OPEN 11.059 MHz Crystal	

Table 4. DIP Switch S1 Setting

S1-2 switch selects the crystal source for the 80C51. There are two crystal options available, 11.059 MHz and 20 MHz. If S1-2 is OPEN the 11.059 MHz crystal is selected, and when S1-2 is CLOSED the 20 MHz crystal is selected.

PART II: 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 3MB of hard drive space (2MB for the CVI Run-Time Engine™, and 1MB 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).

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 CDB5460 software. Select OK to accept the default directory.
8) Once the program is installed, it can be run by double clicking on the Eval5460 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. (640x480 was chosen to accommodate a variety of computers).*

Using the Software

Before launching the software, the user should set up the CDB5460 evaluation board by using the correct jumper and DIP switch settings as described in Part I, 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, revi-

sion number, copyright date, etc. At the top of the screen is a menu bar which displays user options. The menu bar item Menu is initially disabled to prevent conflicts with other serial communications devices, such as the mouse or a modem. After selecting a COM port, the Menu item will become available.

Selecting and Testing a COM Port

Upon start-up, the user is prompted to select the serial communications port which will interface to the CDB5460 board. To select the COM port, pull down the Setup menu option, and select either COM1 or COM2 (the DISK option 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) Pull down the Setup menu option again, and select TEST RS-232.
2) When prompted, set DIP switch 1 (the leftmost DIP switch) to the closed position, reset the board, and press OK to perform the test.
3) If the test passes, set DIP switch 1 to the open position, and reset the board to return 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.

Once the serial link is established between the PC and the evaluation board, the user is ready to access the internal registers of the CS5460, collect data, and perform analysis on the collected data.

Register Access in the Setup Window

The Evaluation software provides access to the CS5460's internal registers in the Setup Window (Figure 7). The user can enter the Setup Window by pulling down Menu and selecting Setup Window, or by pressing F2 on the keyboard.

In the Setup Window, all of the CS5460's registers are displayed in hexadecimal value, and also decoded to provide easier access. Refer to the CS5460 data sheet for information on register functionality and meanings.

Refresh Screen Button: The Refresh Screen button will update the contents of the screen by reading all the register values from the part. 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.

CS5460 Crystal Frequency: The CS5460 accepts a wide range of crystal input frequencies, and can therefore run at many different sample rates. The crystal frequency being used on the CS5460 should be entered in this box to provide accurate frequency calculations in the FFT window. This will also help the software decide which functions can be performed reliably with the evaluation system.

Configuration Register: In the Configuration Register box, the contents of the Configuration Register 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 bit to '1' (RS, bit 7 in the Configuration Register), the part will be reset, and all registers will return to their default values. Press the Refresh Screen button after performing a reset to update the screen with the new register values.

Note: Although the CDB5460 software allows the user to modify any of the bits in the Configuration Register, changing certain bits may cause the software and board to behave erratically. For the evaluation system to function properly, the Interrupt Output function should be set to the default Active Low, and the Eout / Edir Function should be set to the default Normal. This applies only to the

CDB5460 evaluation system, and not to the CS5460 chip itself.

Mask Register / Status Register: The Mask and Status Registers are displayed in hexadecimal and decoded in this box to show what each of the bits means. The Mask Register can be modified by typing a value in the HEX: box, or by checking the appropriate check boxes for the bits that are to be masked. The Status Register cannot be directly modified. It can only be reset by pressing the Clear Status Register Button. The HEX: box for this register, and the LEDs are display only. A LED that is on means that the corresponding bit in the Status Register is set (except the Invalid Command bit, which is inverted).

Note: The value present in the Mask register may be changed by the software during certain operations to provide correct functionality of the CDB5460 board.

Cycle Count / Pulse Rate / Time Base Registers: These three boxes display the values of the Cycle Count, Pulse Rate, and Time Base Registers in both hexadecimal and decimal format. All three registers can be modified by typing a value in the corresponding Value: or HEX: box.

Offset / Gain Registers: In the Offset and Gain Register boxes, the offset and gain registers for both channels are displayed in hexadecimal and decimal. These registers can all be modified directly by typing the desired value in the hexadecimal display boxes.

Performing Calibrations: Offset and gain calibrations can be performed on both the voltage and current channels of the CS5460. Offset calibration should be performed before gain calibration to ensure accurate results.

Offset Calibrations:

1) Ground the channel(s) you want to calibrate directly at the channel header(s). HDR1 and HDR2 for the voltage channel, and HDR8 and HDR9 for the current channel. The channel(s) could also be grounded directly at the BNC connectors.
2) Press the corresponding Calibrate button (Cal V, Cal I, or Cal Both) in the Offset Register box.
3) The calibration value(s) will automatically update when the calibration is completed.

Gain Calibrations:

1) Attach a full-scale calibration signal to the BNC connector(s), and make sure the corresponding channel headers (HDR1, HDR2, HDR8, and HDR9) are set to the input position.
2) Press the corresponding Calibrate button (Cal V, Cal I, or Cal Both) in the Gain Register box.
3) The calibration value(s) will automatically update when the calibration is completed.

Conversion Window

The Conversion Window (Figure 8) allows the user to see the results of single and continuous conversions on all six data registers, perform data averaging, utilize the power-saving modes of the CS5460, and reset the CS5460's serial port. The Conversion Window can be accessed by pulling down the Menu option, and selecting Conversion Window, or by pressing F3.

Single Conversion Button: On pressing this button, single conversions will be performed repeatedly until the user presses the Stop button. After each conversion is complete, the Result data column will update with the values present in each data register. The Mean and Standard Deviation columns will update every N cycles, where N is the number in the Samples to Average box. Note: It can take many collection cycles after pressing the Stop button before the data actually sops being collected.

Continuous Conversions Button: This button functions similarly to the Single Conversion button, except that continuous conversions are performed instead. The data on the screen is updated in the same fashion, and the Stop button terminates this action. There are some speed limitations when performing this function, and if any of these limitations are exceeded, the user will be prompted to change some settings before proceeding.

Re-Initialize Serial Port Button: When this button is pressed, the software will send the synchronization sequence discussed in the CS5460 data sheet to the part. This sequence brings the CS5460's serial port back to a known state. It does not reset any of the registers in the part.

Standby / Sleep Mode Buttons: When these buttons are pressed, the part will enter either Standby or Sleep power saving modes. To return to normal mode, use the Power Up button.

Power Up Button: This button is used to send the Power Up/Halt command to the CS5460. The part will return to normal operating mode and halt any conversions that are being done at this time.

Viewing Pulse Rate Output Data

The CS5460 features a pulse-rate energy output. The CDB5460 has the capability to demonstrate the functionality of this output in the Pulse Rate Output Window (Figure 9). The Pulse Rate Output Window can be accessed by pressing the F4 key, or by pulling down the Menu option, and selecting Pulse Rate Window.

Integration Period Box: This box allows the user to select the length of time which pulses will be collected over.

Periods To Average Box: This box allows the user to average a number of integration periods together.

Start Button: When the Start button is pressed, the CDB5460 will capture pulse rate data according to the values in the Integration Period and Periods to Average boxes. After each integration period, the Pulse Count and Frequency columns will be updated. The Average Freq. and Standard Deviation columns will only be updated after all of the integrations have been collected. The software stops collecting data when the user presses the Stop button, or when the data collection is finished. Due to some speed limitations of the on-board microcontroller, some higher pulse rates cannot be accurately collected. If the pulse rate is too high, a warning message will appear.

Data Collection Window Overview

The Data Collection Window (Figures 10, 11, and 12) allows the user to collect sample sets of data from the CS5460 and analyze them using time domain, FFT, and histogram plots. The Data Collection Window is accessible through the Menu option, or by pressing F5.

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.

Note: When saving data, only the data channel being displayed on the plot will be saved to a file.

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.

Channel Select Buttons: Depending on the number of channels of information that has been collected, between 1 and 3 channel select buttons will appear below the graph, allowing the user to choose the appropriate channel for display. In the Time Domain mode, an additional button labeled "Overlay" will be present, to allow the user to display all of the channels on the same plot.

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 8192. Due to memory size on the CDB5460, the maximum is 4096 samples when collecting two channels, and 2048 samples when collecting three channels.

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 Crystal Semiconductor.

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.

Pages to Collect: This box determines the number of data "pages" that the microcontroller will collect before sending data to the PC. Each page consists of the number of samples collected, and only the last page will be returned to the PC for processing. This function is useful at higher sampling frequencies to minimize board-level noise at the beginning of the conversion set.

Data to Collect: These six check boxes allow the user to select the data channels that will be collected and returned to the PC for processing. Up to three channels can be selected at once. There are some restrictions on the speed and number of samples to collect when selecting more than one channel. A warning message will appear on pressing the Collect button in the Data Collection Window if any speed limits appear to be exceeded, but the data collection will still take place.

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

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. 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.
4) Data is first collected from the CS5460 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 Cycle Count Register 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 CDB5460 board.

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

Retrieving Saved Data From a File

The CDB5460 software allows the user to save data to a file, and retrieve it later when needed. 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.

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.

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 mean 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.

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.

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.

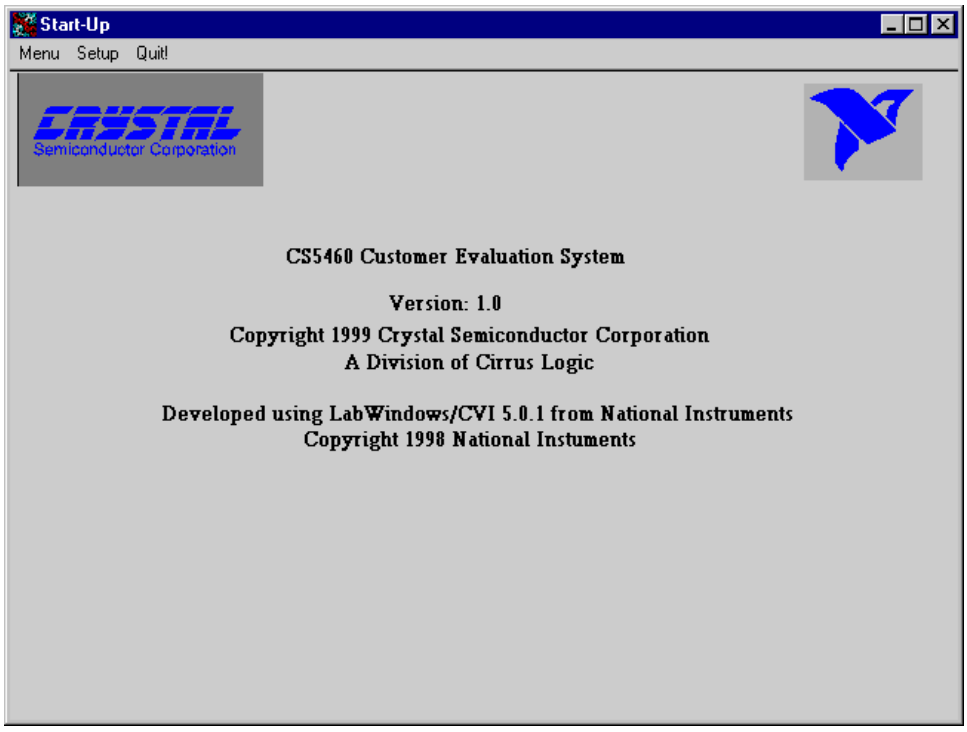


Figure 6. Start-Up Window

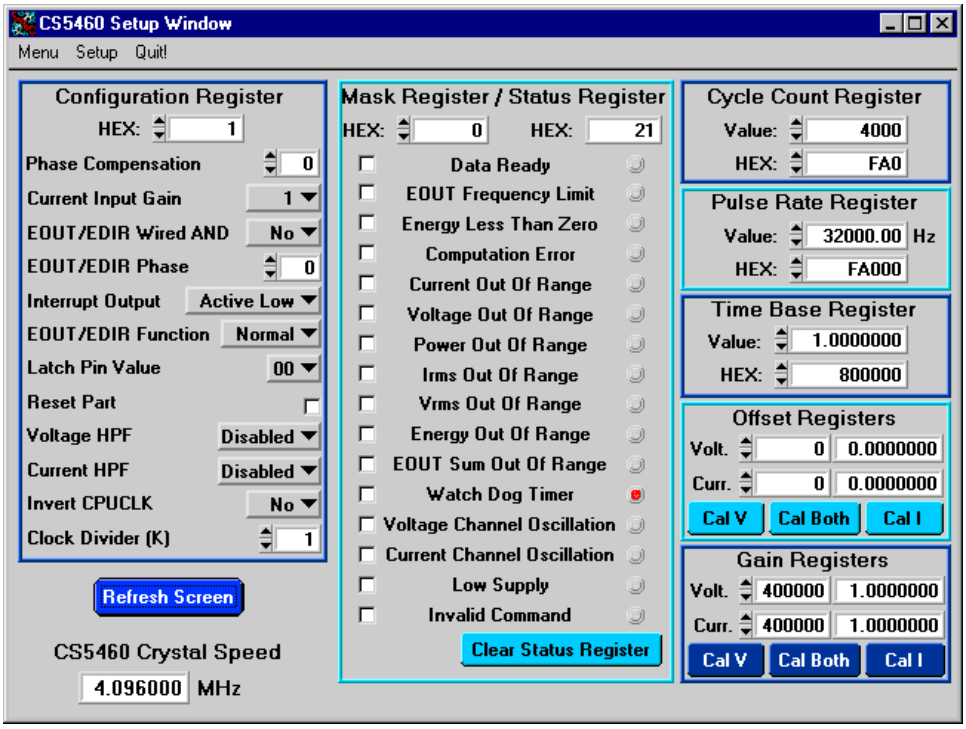


Figure 7. Setup Window

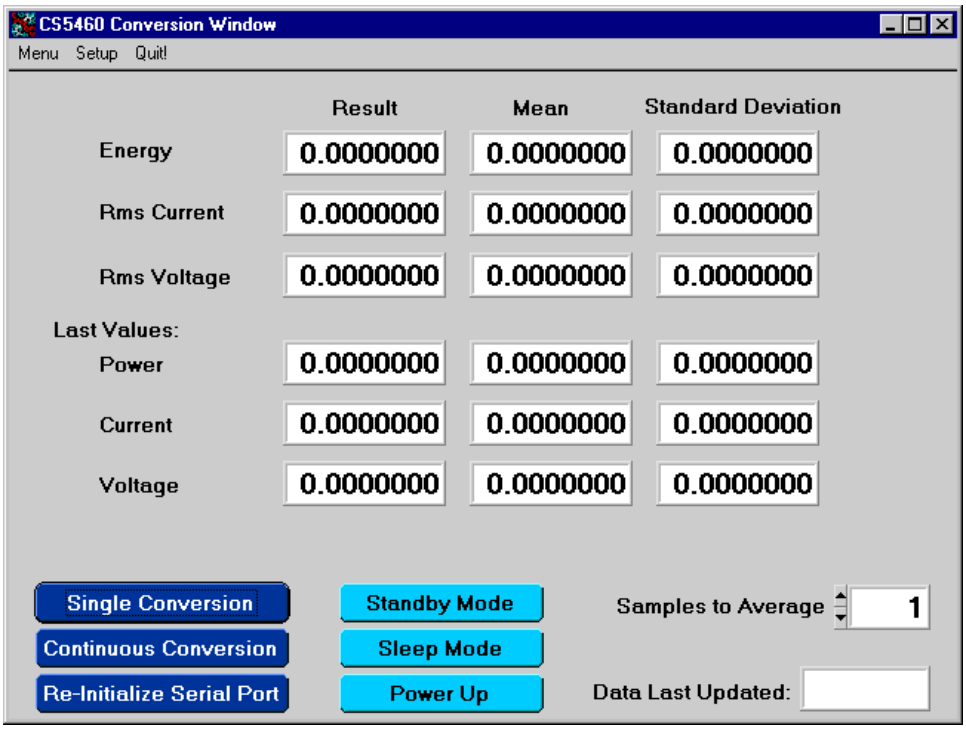


Figure 8. Conversion Window

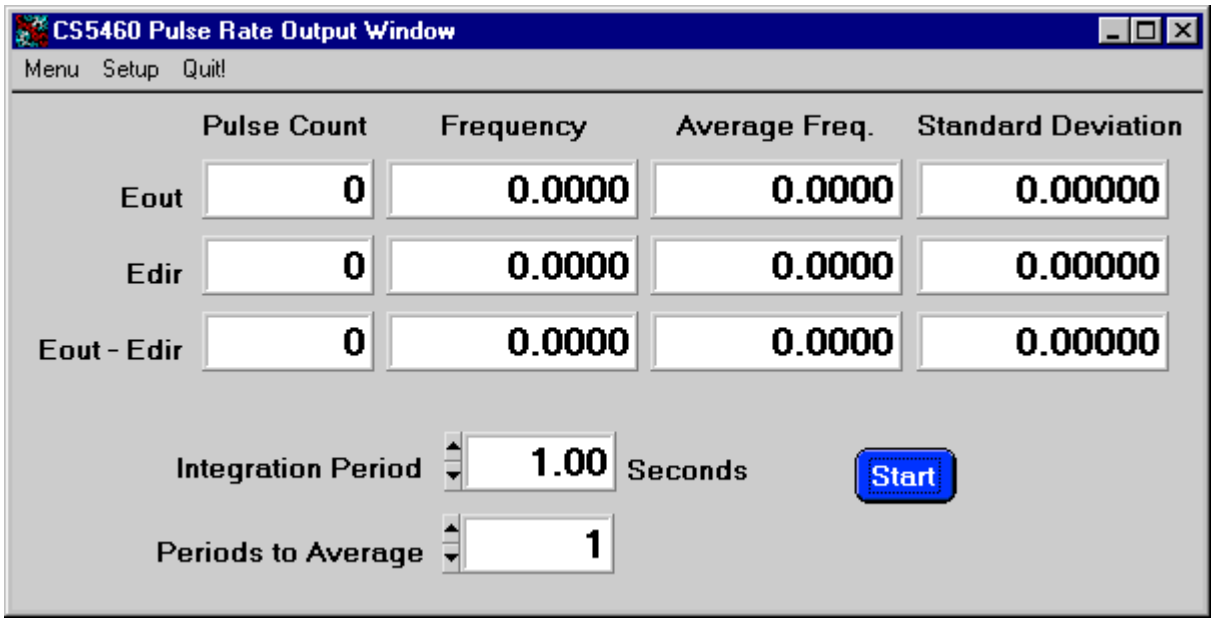


Figure 9. Pulse Rate Output Window

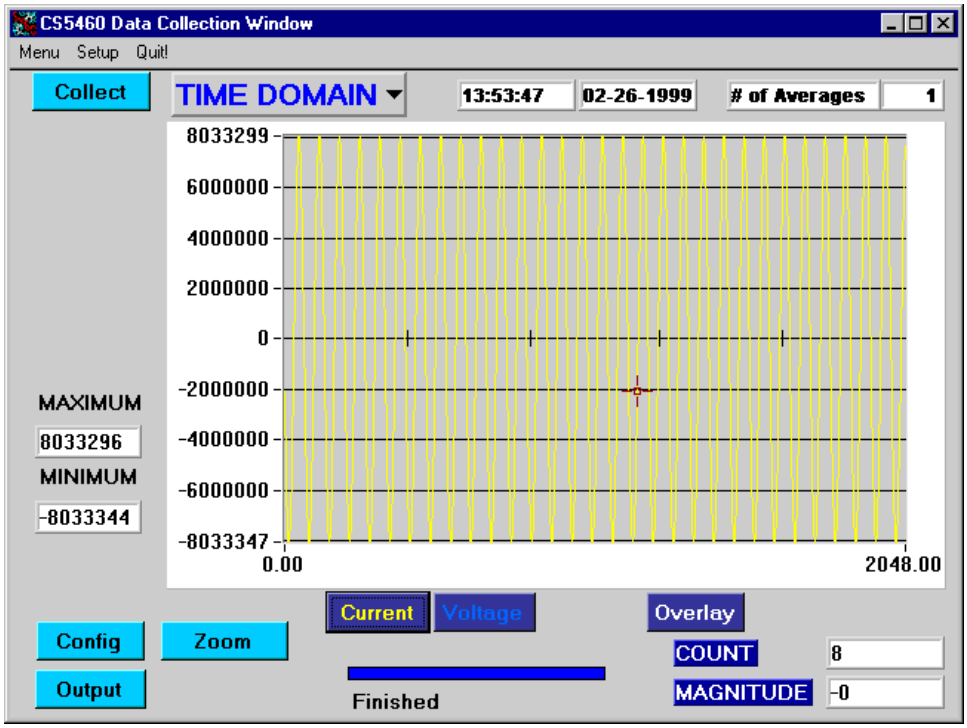


Figure 10. Time Domain Analysis

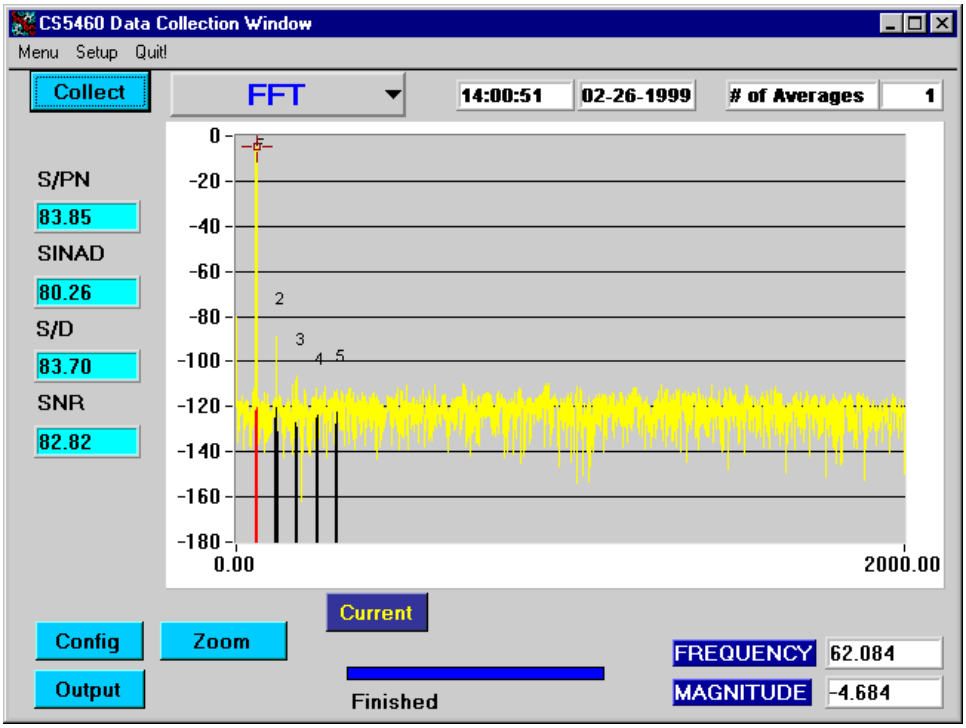


Figure 11. FFT Analysis

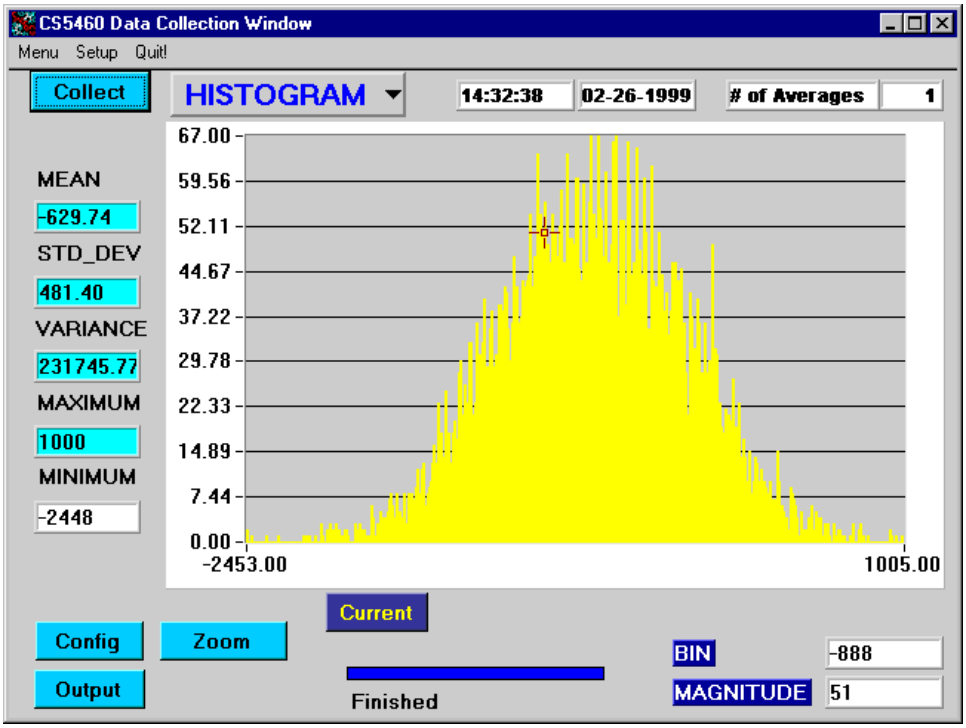


Figure 12. Histogram Analysis

PCB LAYOUT

The CS5460 should be placed entirely over an analog ground plane with both the VA- and DGND pins of the device connected to the analog plane. Place the analog-digital plane split immediately adjacent to the digital portion of the chip. Figures 14 and 15 show the layout of the CDB5460.

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

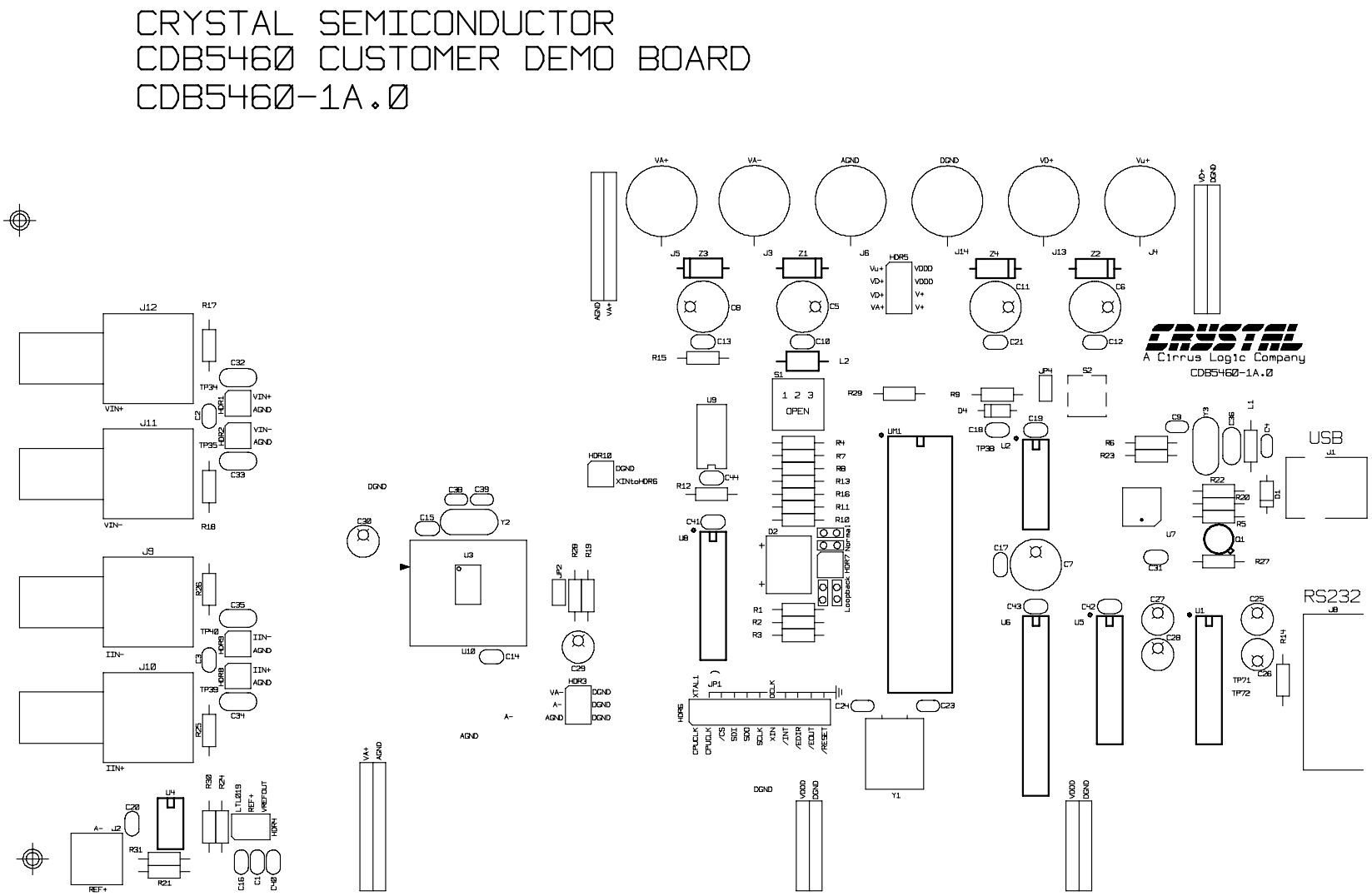


Figure 13. Silkscreen

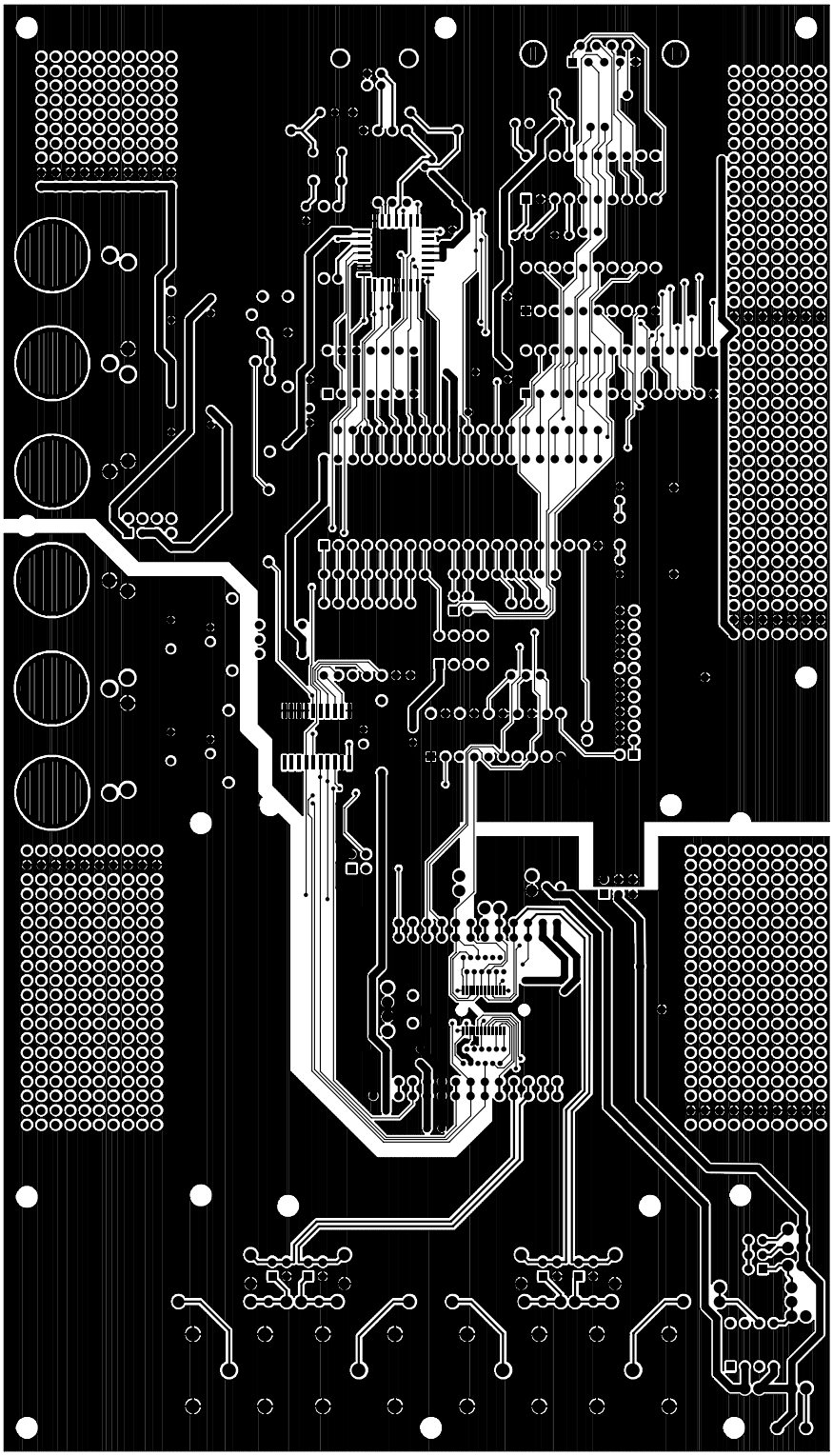


Figure 14. Circuit Side

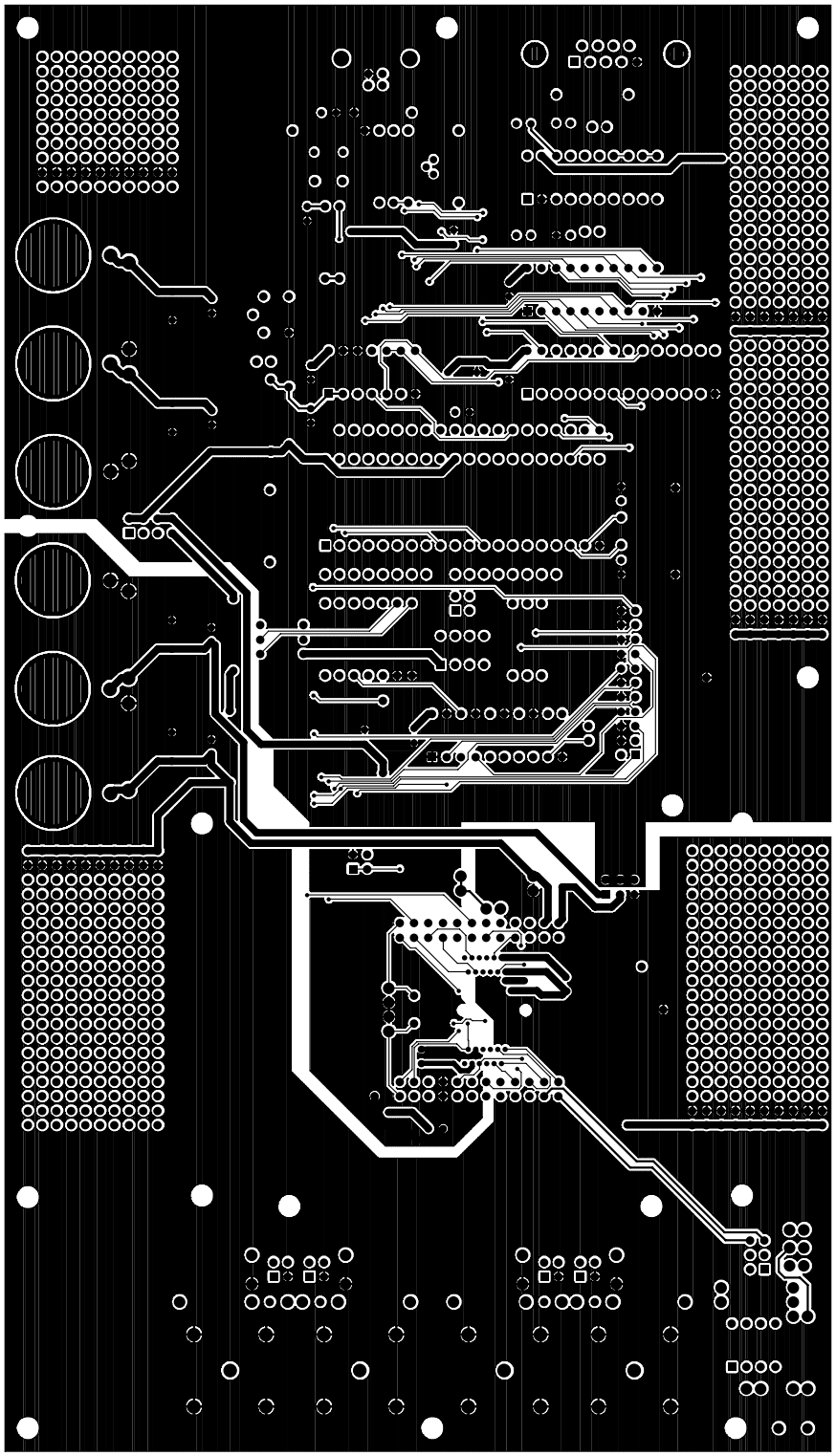


Figure 15. Solder Side

• Notes •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