Evaluation Board for Differential Input, 12-Bit ADC with Serial Interface

Preliminary Technical Data

EVAL-AD7450CB

FEATURES
Full-Featured Evaluation Board for the AD7450
Evaluation Board Controller Compatible
Stand Alone Capability
On-Board Analog Buffering and Reference
On-Board Single Ended to Differential Conversion
Various Linking Options
PC Software for Control and Data Analysis when used with Evaluation Board Controller

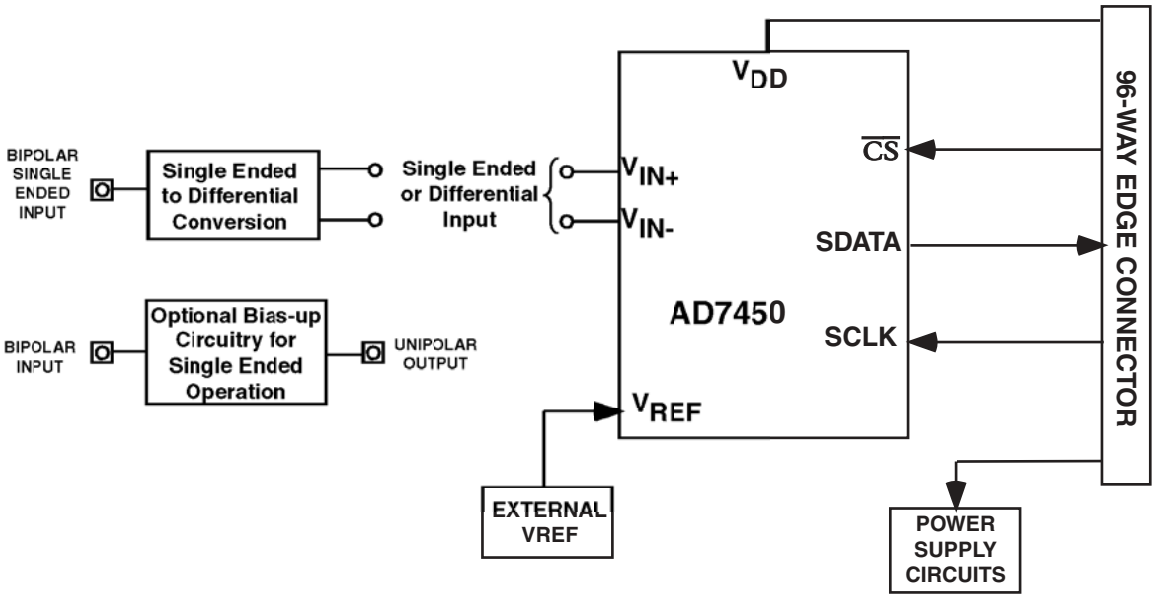
INTRODUCTION

This Technical Note describes the evaluation board for the AD7450 which is a 12-bit, high speed, low power successive-approximation ADC with a fully differential analog input. This part operates from a single +5 V or +3 V power supply. Full details on the AD7450 are available in the AD7450 data sheet which is available from Analog Devices and should be consulted in conjunction with this Technical Note when using the Evaluation Board.

On-board components include an AD780 which is a pin programmable +2.5 V or +3 V ultra high precision bandgap reference, one AD713 quad op-amp, two AD711 single opamps, one AD8138 differential amplifier and a 7S04 inverter. Various link options are explained in detail on pages 2 and 3.

Interfacing to this board is through a 96-way connector. This 96-way connector is compatible with the Eval-Control Board, which is also available from Analog Devices. External sockets are provided for a V_{REF} input; the V_{IN+} and V_{IN-} inputs; the optional, external SCLK and $\overline{CS}$ inputs; and for SDATA out.

FUNCTIONAL BLOCK DIAGRAM



REV. A 19/09/02

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OPERATING THE AD7450 EVALUATION BOARD

Power Supplies

When using this evaluation board with the Eval-Control Board all supplies are provided from the Eval-Control Board through the 96-way connector.

When using the board as a stand-alone unit, external supplies must be provided. This evaluation board has six power supply inputs: AV_{DD} (+5 V), AV_{SS} (-5V); A_{GND}, +12 V, -12 V, V_{DD} (+5V/+3V) and D_{GND}. If the evaluation board is used in stand-alone mode, +5V/+3V must be connected to the V_{DD} input to supply the AD7450 V_{DD} pin. ±5V must be connected to the ±5V inputs to supply the AD8138 and +12 V and -12 V are used to supply the AD713 quad op-amp, the AD711 single opamps and the AD780 voltage reference. The supplies are decoupled to the relevant ground plane with 10µF tantalum and 0.1µF multilayer ceramic capacitors at the point where they enter the board. The supply pins of all the op-amps and the reference are also decoupled to A_{GND} with 10µF tantalum and a 0.1µF ceramic capacitor. The AD7450 V_{DD} supply pin is decoupled to A_{GND} with 10µF tantalum and 0.1µF multilayer ceramic capacitors.

Extensive ground planes are used on this board to minimize the effect of high frequency noise inteference. There are two ground planes, A_{GND} and D_{GND}. These are connected at one location close to the AD7450.

LINK OPTIONS

There are 23 link options which must be set for the required operating setup before using the evaluation board. The functions of these options are outlined below in Table I.

Table I. Link Option Functions

Link No.	Function.
LK1	This link option selects the source of the AV_{DD} +5 V supply. In position "A", the AV_{DD} is supplied from the Evaluation Board Controller. In position "B", the AV_{DD} must be supplied from an external source via the power connector J2.
LK2	This link option selects the source of the AV_{SS} -5 V supply. In position "A", the AV_{SS} is supplied from the Evaluation Board Controller. In position "B", the AV_{SS} must be supplied from an external source via the power connector J2.
LK3	This link option selects the source of the V_{DD} for the AD7450. In position "A", V_{DD} is supplied from the Evaluation Board Controller provided LK1 is in position "A". In position "B", V_{DD} must be supplied from an external source via J3. For 3V operation, V_{DD} must be supplied from an external source via J3.
LK4	This link option selects the source of the V_{IN-} analog input. In position "A", V_{IN-} is supplied from the negative output of the AD8138 differential amplifier. In position "B", V_{REF} is applied to the V_{IN-} input of the AD7450 for single ended operation. In position "C", an external signal must be applied to V_{IN-} via P6, either for differential or single ended operation.
LK5	This link option selects the reference voltage applied to the V_{REF} pin of the AD7450. In position "A", an external signal must be supplied to the V_{REF} pin via P7. In position "B", the AD780 provides a 2.5V reference to the V_{REF} pin. This is intended for 5V operation of the AD7450. In position "C", a 1.25V reference, half the output of the AD780 output is applied to V_{REF} pin. This is intended for 3V operation of the AD7450.
LK6	This link option selects the Common Mode Voltage (V_{CM}) to be applied to the Vocm pin of the AD8138 differential amplifier. In position "A", the Common Mode Voltage applied to Vocm is V_{REF}. In position "B", an external Common Mode Voltage must be applied to Vocm via P4.
LK7	This link option is used to select the source of the V+ (+12 V) supply which is used to power the opamps and the external reference. In position "A", V+ is supplied from an external source via the power connector, J4. In position "B", V+ is supplied from the Eval-Control Board through the 96-way connector.
LK8	This link option is used to select the source of the V- (-12 V) supply which is used to power the opamps. When this link is in position "A", the V- is supplied from the Eval-Control Board through the 96-way connector. When this link is in position "B", the V- is supplied from an external source via the power connector, J4.
LK9	This link option controls the program pin of the AD780 reference voltage. When this link is "inserted" the AD780 output voltage is set to +3.0 V. When this link is "removed" the AD780 output voltage is set to +2.5 V.

Link No.	Function.
LK10	This link option adds a 50Ω termination to AGND at the Vin SE socket of the bias up circuit (P2) for the single ended input. This link should be inserted if a 50Ω termination is required on the analog input.
LK11	This link option sets the DC bias voltage that is applied to the optional bias up circuit used in single ended mode. In position "A", the bias voltage is set to V_{REF} (i.e. 2.5 V). In position "B", the bias voltage is set to AGND. In this configuration, the bias-up circuit is not used.
LK12	This link option selects the input to the AD8138 differential amplifier. In position "A", a single ended bipolar input is applied to the AD8138 input via P1. In position "B", the input to the AD8138 is set to AGND. This is when the AD8138 is not used.
LK13	This link option selects the single ended input source to the AD7450 if operating in single ended mode. In position "A", the single ended input is generated by the bias up circuit. In position "B", an external unipolar single ended signal must be applied to the V_{IN+} input via P3. In position "C", the input the the AD711 opamp used to buffer the single ended signal is tied to AGND. In this case, single ended operation is not used.
LK14	This link option selects the source of the V_{IN+} analog input. In position "A", an external signal must be applied to V_{IN+} via P5. In position "B", V_{IN+} is supplied from the positive output of the AD8138 differential amplifier In position "C", a single ended signal is applied to the V_{IN+} input.
LK15	This link option is only necessary when the bias up circuit is being used in single ended mode operation. The options choose the ratio of resistors required to perform the appropriate biasing up of the bipolar analog input in single ended mode. This link option should always be in position B as this biases the input to be centered on V_{REF}.
LK16	This link option selects the source of the SCLK input. In position "A", the SCLK input is provided via the external socket, P8. In position "B", the SCLK input is provided by the Eval-Control Board.
LK17	This link is used to control the polarity of the serial clock applied to the SCLK pin. This link must be in position "A" when LK16 is in position "B" and the SCLK is provided by the Evaluation Board Controller. This means data is valid on the falling edge of SCLK. This link may be placed in position "B" when LK16 is in position "A", to invert an SCLK from P8 if necessary. This would mean data could be read on the rising edge of SCLK but would only be possible with a slower SCLK frequency.
LK18	This link option selects where the Serial Data out (SDATA) appears. In position "A", the data may be read by the Eval-Control Board. In position "B", the data may be read via the external socket, P9.
LK19	This link option selects the source of the $\overline{CS}$ input. In position "A", the $\overline{CS}$ input is provided by the Evaluation Board Controller. In position "B", the $\overline{CS}$ input is provided via the external socket, P10.
LK20	This link option selects the source of the +5V digital supply. In position "A", +5V is supplied by the Eval-Control Board. In position "B", +5V must be supplied from an external source via J5.
L1	This link option adds a 50Ω termination to AGND at the Vin socket of the bipolar input to the AD8138 (P1) for differential operation. This link should be inserted if a 50Ω termination is required on the analog input. In this case, R11 should be increased to 523Ω. The additional 23Ω at the input is to balance the parallel impedance of the 50Ω source and the 50Ω termination thus making both inputs to the AD8138 have the same gain. If a 50Ω termination is not required then all four resistors around the AD8138 (R10, R11, R12, R13) must have the same value.
L2	This link option selects whether the output of the AD780 reference is applied directly to the AD7450 or if it is divided by two. This link should be in position "A" if a 2.5 V reference is required (usually for 5 V operation). In this case LK22 should be inserted. This link should be in position "B" if a 1.25 V reference is required (usually for 3 V operation). In this case LK22 should be removed.
LK22	This link options selects the input to the AD711, U7 opamp. This opamp is only used in 3V operation of the AD7450 as it buffers the output of the resistor divider circuit which divides the output of the AD780 in half to provide a 1.25 V reference for 3 V operation. If 3V operation is being used, then this link should be removed. If 5V operation is being used, this link should be inserted to ground the input to U7 as it is not used.

SET-UP CONDITIONS

Care should be taken before applying power and signals to the evaluation board to ensure that all link positions are as per the required operating mode. There are three different modes in which to operate the evaluation board. These are Differential Mode for both 5 V and 3 V power supplies and Single Ended mode (only 5V supply). Table II shows the position in which all the links are set when the evaluation board is shipped. This is set up for Differential mode and V_{DD} of 5 V. The link positions for Differential 3V operation and Single Ended operation are discussed below this table. The board is compatible with the Eval-Control Board when shipped.

Table II. Initial Link Positions (Differential Mode, V_{DD} = 5V)

Link No.	Position	Function.
LK1	A	AV_{DD} is supplied by the Evaluation Board Controller.
LK2	A	AV_{SS} is supplied by the Evaluation Board Controller.
LK3	A	V_{DD} for the AD7450 is 5 V and is supplied by the Evaluation Board Controller.
LK4	A	V_{IN-} is supplied by the negative output of the AD8138 differential amplifier.
LK5	B	V_{REF} is selected to be 2.5 V and is supplied by the AD780.
LK6	A	The Common Mode Voltage applied to the Vocm pin of the AD8138 is V_{REF}.
LK7	B	V+ is supplied by the Evaluation Board Controller.
LK8	A	V- is supplied by the Evaluation Board Controller.
LK9	Removed	The AD780 is set to provide a 2.5 V reference.
LK10	Removed	A 50Ω termination to AGND is not applied to the input of the bias up circuit as this is only used in single ended mode.
LK11	B	The bias up circuit is not used so the input to U2C opamp (reference buffer) is grounded.
LK12	A	A bipolar single ended input is applied to the AD8138 differential Amplifier via P1.
LK13	C	The input to U5, the opamp buffer for single ended input, is tied to ground as it is not used.
LK14	B	V_{IN+} is supplied by the output of the AD8138 differential amplifier.
LK15	Removed	This link is only used in single ended mode operation.
LK16	B	SCLK is supplied by the Evaluation Board Controller.
LK17	A	SCLK is not inverted.
LK18	A	SDATA is read by the Evaluation Board Controller.
LK19	A	$\overline{CS}$ is supplied by the Evaluation Board Controller.
LK20	A	The +5V source is the Evaluation Board Controller.
L1	Removed	A 50Ω termination to AGND is not applied to the input to the AD8138 amplifier. In this case, all four resistors (R10, R11, R12, R13) have the same value.
L2	A	The output of the AD780 reference is connected directly to LK5 to provide a 2.5 V reference to the AD7450.
LK22	Inserted	The input to the AD711, U5, opamp is tied to ground as it is not used.

The following links should be changed for 3 V Differential operation (the others remain in the same place):

Link No.	Position	Function
LK3	B	3V should be applied externally to V_{DD} of the AD7450 via J3.
LK5	C	A 1.25 V reference is applied to the AD7450 V_{REF} pin.
L2	B	The output of the AD780 reference is divided by 2 to provide a 1.25V reference to the AD7450.
LK22	Removed	AD711, U5, is used to buffer the 1.25 V reference before it is applied to the AD7450.

The following links should be changed for 5 V Single Ended Mode operation (the others remain in the same place):

Link No.	Position	Function
LK4	B	V_{IN-} is supplied by V_{REF} to setup the midscale value or Common Mode.
LK11	A	V_{REF} of 2.5 V is applied to the bias up circuit.
LK12	B	Input to AD8138 is connected to AGND as it is not used.
LK13	A	The single ended input to V_{IN+} is supplied by the bias-up circuit
LK14	C	The V_{IN+} input is supplied by the output of U5, i.e. the buffered single ended input.
LK15	B	Bipolar input signal biased to V_{REF}.

INTERFACING TO THE EVALUATION BOARD

Interfacing to the evaluation board is via a 96-way connector, J1. J1 is used to connect the evaluation board to the EVAL-Control Board or other system. The pinout for the J1 connector is shown in Figure 1. Table III gives a description of the pins on the 96-way connector used to interface between the Eval-Control Board and the EVAL-AD7450CB, and Table IV gives its pin designations.

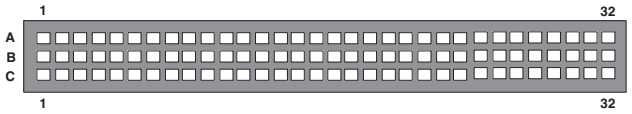

Figure 1. Pin Configuration for the 96-Way Connector, J1

Table III. 96-Way Connector Pin Description

Pin	Description
DR0	Data Receive Zero. This input is connected to the SDATA pin of the AD7450 via LK18. 16 bits of data are provided on this input from the AD7450 output with four leading zeros followed by 12 bits of conversion data which is provided MSB first.
SCLK0	Serial Clock Zero. This continuous clock output is connected to the SCLK pin of the AD7450 via LK16.
TFS0	Transmit Frame Sync Zero. This output is connected to the $\overline{CS}$ pin of the AD7450 via LK19 to initiate conversions and to frame the serial data transfer.
RFS0	Receive Frame Sync Zero. This input is connected to the TFS0 pin of the ADSP-2189 to frame the serial data read.
DGND	Digital Ground. These lines are connected to the digital ground plane on the evaluation board. It allows the user to provide the digital supply via the connector along with the other digital signals.
AGND	Analog Ground. These lines are connected to the analog ground plane on the evaluation board.
AV_{DD}	Analog +5V Supply. These lines are connected to the AV_{DD} supply line on the board via LK1 to provide +5V to the AD8138 differential amplifier. They are also connected to the V_{DD} supply of the AD7450 via LK3.
AVSS	Analog -5V Supply. These lines are connected to the AV_{SS} supply line on the board via LK2 to supply -5V to the AD8138 differential amplifier.
+12V	+12 V Supply. This line is connected to the +12V supply line on the board via LK7 to supply +12V to the AD713, the AD711's and the AD780.
-12V	-12V Supply. This line is connected to the -12V supply line on the board via LK8 to supply -12V to the AD713 and the AD711's.

Table IV. 96-Way Connector Pin Functions.

	ROW A	ROWB	ROWC
1			
2			
3			
4	DGND	DGND	DGND
5			DR0
6	TFS0		RFS0
7	SCLK0		SCLK0
8	+5V	+5V	+5V
9			
10			
11			
12	DGND	DGND	DGND
13			
14			
15			
16	DGND	DGND	DGND
17			
18			
19			
20	DGND	DGND	DGND
21	AGND	AGND	AGND
22	AGND	AGND	AGND
23	AGND	AGND	AGND
24	AGND	AGND	AGND
25	AGND	AGND	AGND
26	AGND	AGND	AGND
27		AGND	
28		AGND	
29	AGND	AGND	AGND
30	-12V	AGND	+12V
31	AVSS	AVSS	AVSS
32	AVDD	AVDD	AVDD

Note : The unused pins of the 96-way connector are not shown.

SOCKETS

There are ten input sockets relevant to the operation of the AD7450 on this evaluation board. All of these sockets are used for applying an externally generated signal to the evaluation board. When operating the board with the Eval-Control Board the only necessary external socket used is P1. All of the other sockets are optional and if they are not used their signals are supplied by the Eval-Control Board. Most of these sockets are used when operating the board as a stand alone unit, as all the signals required are supplied from external sources. The functions of these sockets are outlined in Table V.

Table V. Socket Functions

Socket	Function
P1	Sub-Miniature BNC socket for the bipolar analog input to the AD8138 which is used when operating in Differential Mode.
P2	Sub-Miniature BNC socket for the bipolar analog input to the bias up circuit which is an option when operating in Single Ended Mode.
P3	Sub-Miniature BNC socket for the unipolar analog input to V_{IN+} which is an option when operating in Single Ended Mode.
P4	Sub-Miniature BNC socket for the dc analog input to Vocm pin on the AD8138 differential amplifier.
P5	Sub-Miniature BNC socket for a signal to be applied directly to V_{IN+}.
P6	Sub-Miniature BNC socket for a signal to be supplied directly to V_{IN-}.
P7	Sub-Miniature BNC socket for an external V_{REF} input.
P8	Sub-Miniature BNC socket for an external SCLK input.
P9	Sub-Miniature BNC socket for the SDATA output.
P10	Sub-Miniature BNC socket an external $\overline{CS}$ input.

CONNECTORS

There are five connectors on the AD7450 evaluation board as outlined in Table VI.

Table VI. Connector Functions

Connector	Function
J1	96-Way Connector for Serial Interface & Power Supply connections.
J2	External AV_{DD}, AV_{SS} & A_{GND} power connector.
J3	External V_{DD} power connector.
J4	External +12 V, -12 V & A_{GND} power connector.
J5	External +5V power connector.

OPERATING WITH THE EVAL-CONTROL BOARD

The evaluation board can be operated as a stand-alone unit or operated in conjunction with the Eval-Control Board. The Eval-Control Board is available from Analog Devices under the order entry "EVAL-CONTROL BRD2".

When interfacing the EVAL-AD7450CB directly to the Eval-Control Board, all supplies and control signals to operate the AD7450 are provided by the Eval-Control Board. However, due to the nature of the DSP interface on the Eval-Control Board, AD7450 sampling rates greater than 580kHz are not supported when interfacing this evaluation board directly to the Eval-Control Board. This is because the clock frequencies on the ADSP-2189 on the EBC are limited by the equation:

CLKOUT/(2 x (SCLKDIV+1)

where CLKOUT = 40MHz

and SCLKDIV is the the number that the user can choose to determine their required clock frequency. It can be seen from this equation that the CLKOUT frequency can only be divided by factors of two because the value of SCLKDIV can only be an integer.

Therefore in the case of the AD7450 where the maximum clock frequencies at 5V and 3V are 18MHz and 15MHz respectively, the nearest clock frequency to these that can be generated by the DSP is 10MHz (i.e. SCLKDIV = 1) which results in a maximum sampling frequency of 580kHz.

Software to communicate with the Eval-Control Board and AD7450 is provided with the AD7450 evaluation board package. This Eval-Control Board will also operate with all Analog Devices evaluation boards which end with the letters CB in their title.

The 96-way connector on the EVAL-AD7450CB plugs directly into the 96-way connector on the Eval-Control Board. The Eval-Control Board provides all the supplies for the evaluation board. It is powered from a 12V AC transformer. Suitable transformers are available from Analog Devices as an accessory under the following part numbers:

EVAL-110VAC-US: For use in the U.S. or Japan

EVAL-220VAC-UK: For use in the U.K.

EVAL-220VAC-EU: For use in Europe

These transformers are also available from other suppliers including Digikey (U.S.) and Campbell Collins (U.K.).

Connection between the Eval-Control Board and the serial port of a PC is via a standard Centronics printer port cable which is provided as part of the Eval-Control Board package. Please refer to the manual which accompanies the Eval-Control Board for more details on the Eval-Control Board package.

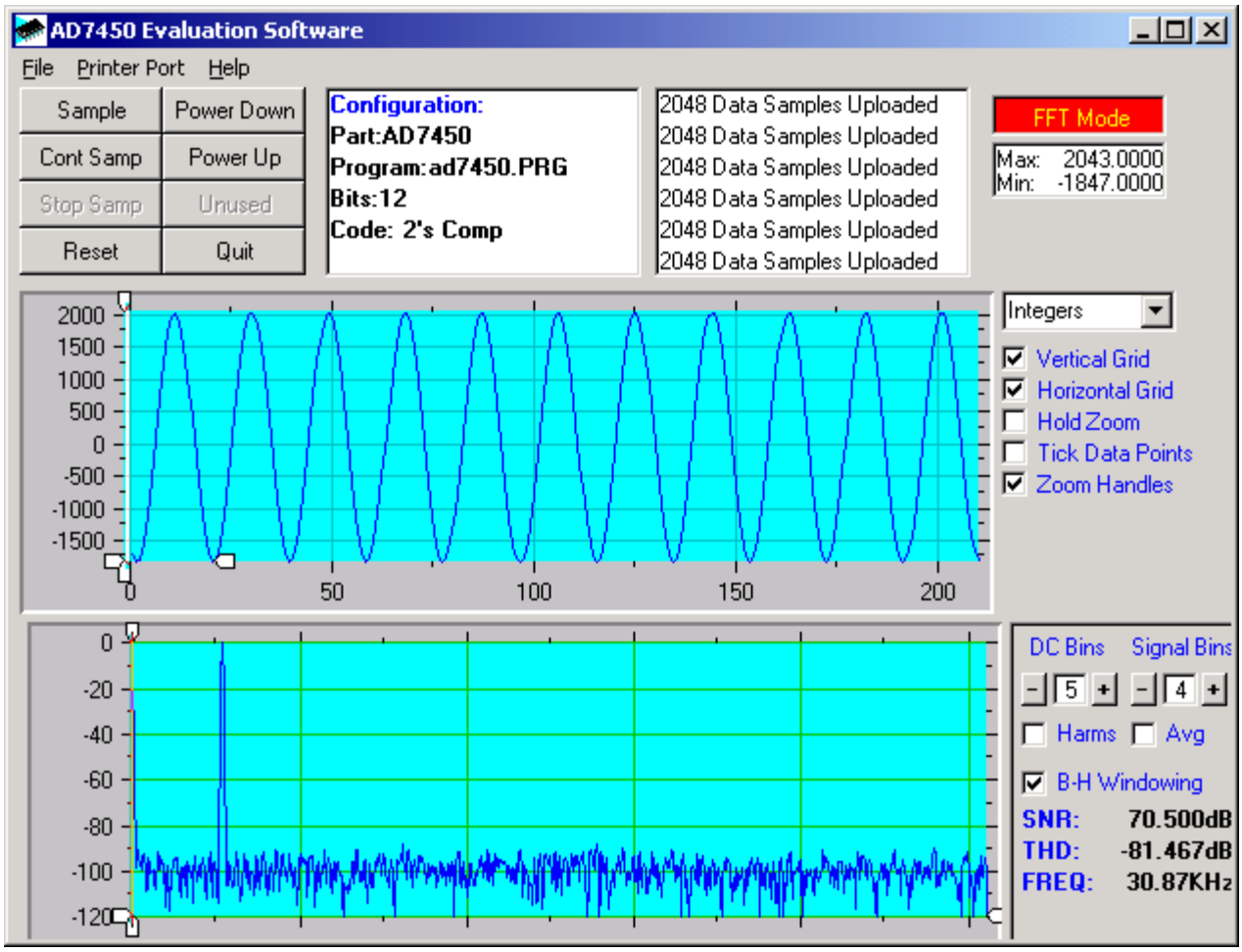

Figure 2. AD7450 Main Screen - FFT Mode

SOFTWARE DESCRIPTION

The software that controls the Eval-Control Board and hence the evaluation board has three main screens. The screen shown in Figure 2 is the screen which appears when the software is run. The main function of this screen is to allow the user to read a pre-determined number of samples from the evaluation board and display them in both the time and frequency domain. The screen can be divided into three sections. The upper third of the screen contains the control buttons, the menu bar and various status windows. The control buttons allow the user to take samples, reset the part and quit the program. There are also power-down/up options in the control buttons. These buttons allow the user to place the part into power-down, and power the part up again.

To enter power-down, the "PowerDown" button should be clicked. To exit power-down the power-up button should be clicked (see "Modes of Operation" section in the AD7450 datasheet).

The menu bar allows the user to enter the setup menu, select which printer port is to be used to control the Eval-Control Board, load and save data and get information about the software.

The status windows indicate the setup of the evaluation board/device, number of samples taken and any information or error messages that are generated.

The middle third of the screen is a Digital Storage Oscilloscope (DSO). When samples are uploaded from the Eval-Control Board they are displayed here. The samples can be displayed either as integer values or as voltages. Once samples have been displayed clicking at any point on the graph will display the sample number and value of the point directly beneath the cursor. Along the axis of the graph are the "zoom handles". These allow the user to zoom in and out to get a closer look at a particular sample, if required. When another set of samples is taken the graph will attempt to display all values collected unless the **Hold Zoom** check box is ticked. In this case the graph will keep the same axis settings as for the previous set of data samples. Additional check boxes are provided to give the user control over the vertical and horizontal grids and data points.

The lower third of the screen will show either a Fast Fourier Transform (FFT) of the data or a Histogram which shows the number of occurrances of each particular code read back.

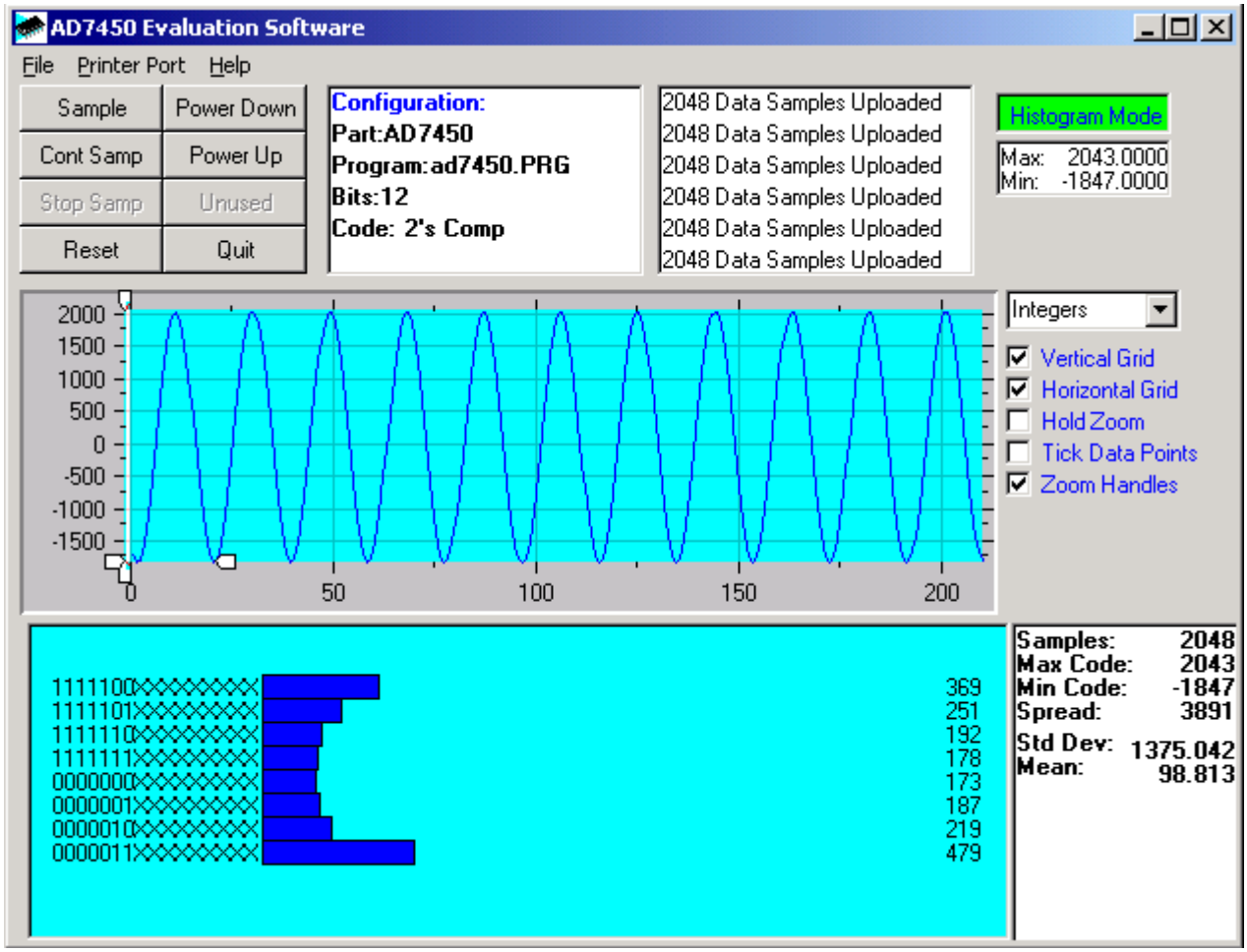

Figure 3. AD7450 Main Screen - Histogram Mode

The FFT (the default option) is typically used when the user is concerned with examining the ADC's performance in the frequency domain while the Histogram will give an indication of the ADC's performance to DC signals. The option displayed can be toggled by clicking on the FFT Mode/ Histogram Mode button in the top right of the screen. Figure 3 shows the main screen when the Histogram Mode Option is selected.

Setup Screen

The Setup Screen is responsible for allowing the user to load the required configuration file for the evaluation board. The configuration file gives the software detailed information about the AD7450 Evaluation Board and the part connected to the Evaluation Board Controller such as number of bits, maximum sampling rate, output coding, maximum analog input, power supply requirements etc. For 5V Differential Operation and Single Ended Operation, load **AD7450-5V.cfg** and for 3V Differential Operation, load **AD7450-3V.cfg**.

As explained in the 'Operating with the Eval-Control Board' section, the maximum clock frequency that can be used is limited by the ADSP-2189 on the Eval-Control Board. In this case, the maximum clock that can be used is 10MHz giving a maximum sampling frequency of 580kHz.

The configuration file also tells the software the name of the DSP program file which it should download to the Evaluation Board Controller. Figure 4 shows the Setup Screen.

SETTING UP THE EVAL-CONTROL BOARD

This section describes how the evaluation board, the Eval-Control Board and software should be set up for the user to begin using the complete system.

The Eval-Control Board and evaluation board should be connected together (via the 96-way connector). The power should be applied to the EBC via a 12V AC transformer. At this stage the red LED should be flashing which indicates that the Eval-Control Board is functional and ready to receive instructions. The software, which should have been installed should be loaded before the printer port cable is connected between the Eval-Control Board and the PC. This will ensure that the printer port has been initialized properly. The printer port cable can then be connected between the PC and the Eval-Control Board.

Running the Software

With the hardware set up the user is now in a position to use the software to control the Eval-Control Board and the AD7450 evaluation board.

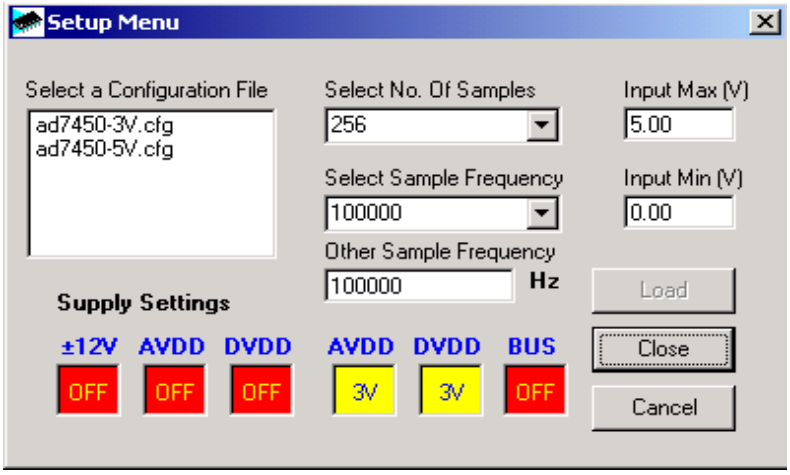

Figure 4. The Setup Screen

In the software the user should select the **File** menu and click on **Setup**. This will display the setup form (as shown in figure 4). A window on the left of the setup form lists the available configuration files. The configuration files are text based files which contain information about the particular evaluation board to be tested. The information covers the part name, number of samples to be taken, default and maximum sampling frequency, power supply settings etc. The configuration file also contains the name of the DSP program file which is to be downloaded to the Eval-Control Board.

The user should select the relevant configuration file and click **Load**. The Eval-Control Board will be reset and the DSP program will be downloaded. When the download has been completed the power supply settings indicated in the configuration file are set and the user may hear some of the relays clicking.

The pull-down menu items such as 'number of samples' and 'sampling frequency' will have been set to the default values specified by the configuration file. The user is free to change these at will. Once all the settings have been decided, the user can click **Close** to return to the main form.

Taking Samples

When the user clicks **Sample,** the software will instruct the Eval-Control Board to take the required number of samples at the required frequency from the evaluation board. The AD7450 evaluation board will run up to 580 kSPS so the user can choose the sampling frequency up to this rate and may also choose the number of samples to be taken. The maximum sampling frequencies as described in the AD7450 datasheet can only be achieved when operating the evaluation board as a stand alone unit. This is a clock frequency limitation of the DSP on the EBC (explained previously).

These samples are then uploaded and displayed. An FFT and Histogram are also calculated and displayed. If the user clicks **Cont Samp** the software will repeat the process indefinitely until the user clicks the button again. While the software is continuously sampling data the other control buttons are disabled.

Other Buttons

The **Reset** button will cause the Eval-Control Board to perform a reset function. When this happens the power supplies are turned off and the program in DSP memory is lost. The user should repeat the setup instructions to download another program if required.

The **Quit** button will exit the software, the program running on the Eval-Control Board is not terminated.

MENU BAR ITEMS

The main screen of the Eval-Control Board contains a number of options available as pull-down menu items. The functions of these are listed below.

File Menu

Setup Menu: Selecting this option displays the Setup Screen as shown in Figure 4.

Load Raw Data: Selecting this option allows the user to load data which had been saved by the software during a previous session.

Save Raw Data: Selecting this option allows the user to save the current set of sample data points. The data can be reloaded to the Eval-Control Board software at a later date or can be used by other programs for further analysis.

Save Binary Data: Selecting this option allows the user to save the current set of sample data points. The data is saved in binary format as a text file. This method can be useful for examining code flicker, looking for stuck bits etc.

Save FFT Data: Selecting this option allows the user to save the current set of FFT data points. FFT data cannot be reloaded into the EBC software but can be loaded into other software packages for further analysis.

Exit: Quits the program.

Printer Port

This menu item allows the user to select which printer port should be used for communication with the EBC.

LPT1: This option selects 0x378 as the printer port address. This is the default option.

LPT2: This option selects 0x278 as the printer port address.

PRN: This option selects 0x3BC as the printer port address.

Help
This menu item gives information about the current revision of software for the particular evaluation board being used.

SOFTWARE CONFIGURATION FILES
Software Configuration Files give the Evaluation Board Controller software information on how the software and hardware should perform. They contain information such as the name of the DSP program to download, the default and maximum sample frequencies, the number of samples to take and the power supply settings to use. A typical Software Configuration File (*.cfg) is shown in Listing 1.

```
[EVAL-CONTROL BOARD]
partname:AD7450
programname:ad7450.PRG

samplefrequency:100000
maxsamplefrequency:580000
samples:2048


+/-15V:on
dvdd:5:on
avdd:5:on
bus:on
;options 2scomp, binary
dataformat:2scomp
numberofbits:12
inputVmax:5
inputVmin:0
[endofconfig]
```

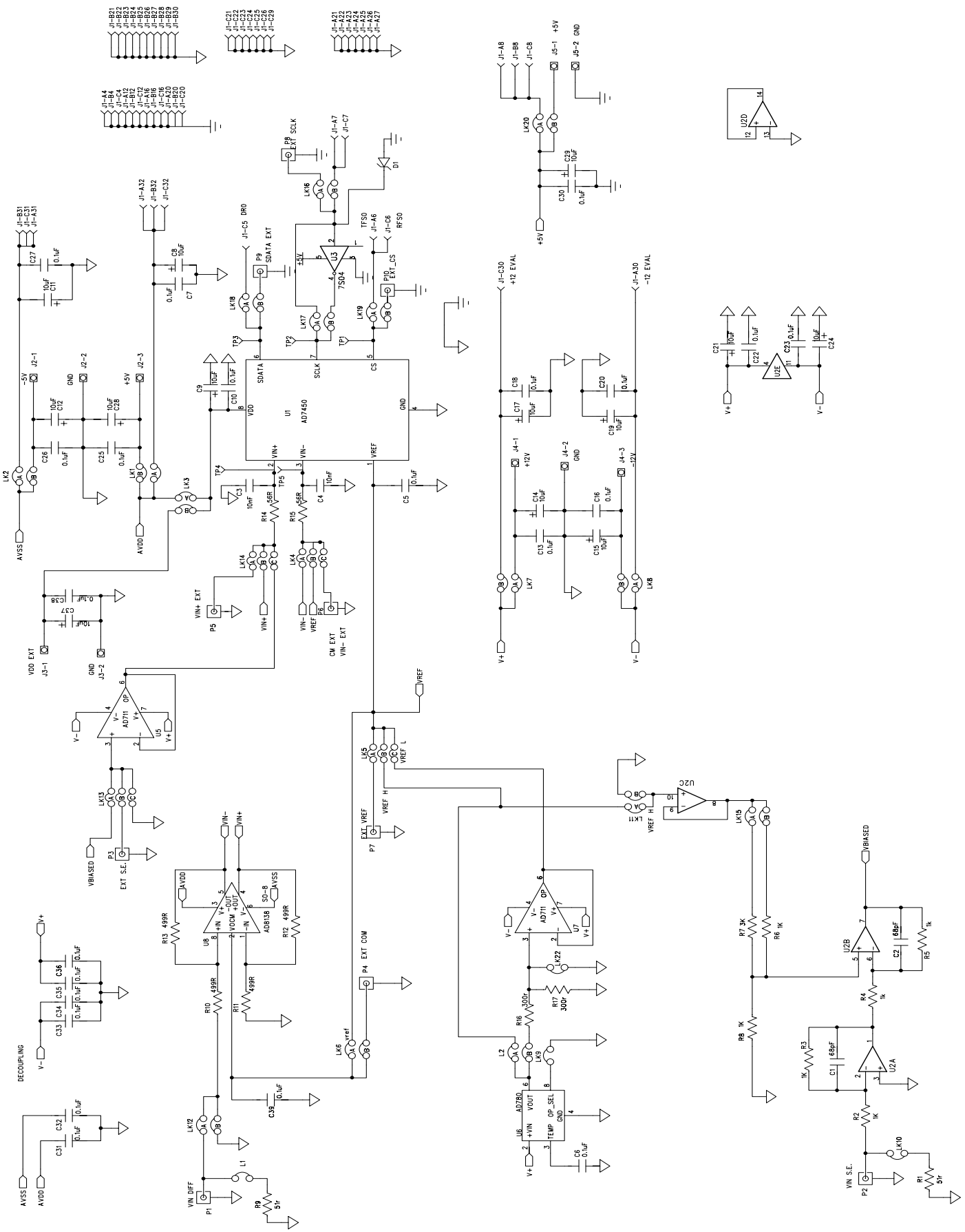

Figure 5. AD7450 Evaluation Board Circuit Diagram

Table VI. AD7450 Evaluation Board Bill Of Materials

Qty	Part Type	Reference Designator	Manuf/Disti	Order Number
1	AD7450BR	U1	ADI	AD7450AR
1	AD713JN	U2	ADI	AD713JN
1	NC7S04M5	U3	Fairchild	FEC 685-914
2	AD711KN	U5 & U7	ADI	AD711KN
1	AD780AR	U6	ADI	AD780AR
1	AD8138AR	U8	ADI	AD8138AR
10	0.1µF Ceramic Capacitor, SMD 0805	C5, C6 ,C10, C18, C20, C22, C23, C31, C32, C39	AVX	FEC 499-687
2	68pF Ceramic Capacitor, SMD 0805	C1, C2	BC Components	FEC 722-066
2	1nF Ceramic Capacitor, SMD 0805	C3, C4	AVX	FEC 499-201
3	499 Ω 0.1W, 0.1% Resistor, SMD 0805	R10, R11, R12, R13	Meggit E.C.	FEC 553-712
1	SD103C Schottky Diode	D1		SD103C
8	1kΩ, 0.1W, 0.1% Resistor, SMD 0805	R2, R3, R4, R5, R6, R8, R16, R17	Multicomp	FEC 911-859
1	3kΩ, 0.1W, 0.1% Resistor SMD 0805	R7	Multicomp	FEC 711-399
2	51Ω, 0.1W, 0.1% Resistor SMD 0805	R1, R9	Multicomp	FEC 771-181
2	10Ω, 0.1W, 0.1% Resistor SMD 0805	R14, R15	Multicomp	FEC 911-616
12	0.1µF Ceramic Capacitor	C7, C13, C16, C25, C26, C27, C30, C33, C34, C35, C36, C28		FEC 146-227
13	10µF Tantalum Capacitor	C8, C9, C11, C12, C14, C15, C17, C19, C21, C24, C28, C29, C37		FEC 664-881
1	CON\41612\96 Connector	J1	Siemens	FEC 269-931
2	2 Pin Terminal Block	J3 & J5	Lumberg	FEC 151-785
2	3 Pin Terminal Block	J2 & J4	Lumberg	FEC 151-786
4	1-way Jumper (2 x 1)	L1, LK9, LK10, LK22	Harwin	FEC 511-705
15	2-way Jumper (2 x 2)	LK1, LK2, LK3, LK6, LK7, LK8, LK11, LK12, LK15, LK16, LK17 LK18, LK19, LK20, L2	Harwin	FEC 511-791
4	3-way Jumper (2 x 3)	LK4, LK5, LK13, LK14	Harwin	FEC 511-780
23	Shorting Link	LK1 to LK20, LK22, L1, L2	Berg	FEC 528-456
16	Ultra Low Profile Sockets	U5 & U7	Harwin	FEC 519-959
4	Stick-on Feet	Each Corner	3M	FEC 148-922
1	14-pin DIL Socket	U2		FEC 738-529
5	Test point	TP1, TP2, TP3, TP4, TP5	W Hughes	FEC 240-333
10	Gold 50Ω SMB Jack	P1-P10	M/ACOM	FEC 310-682

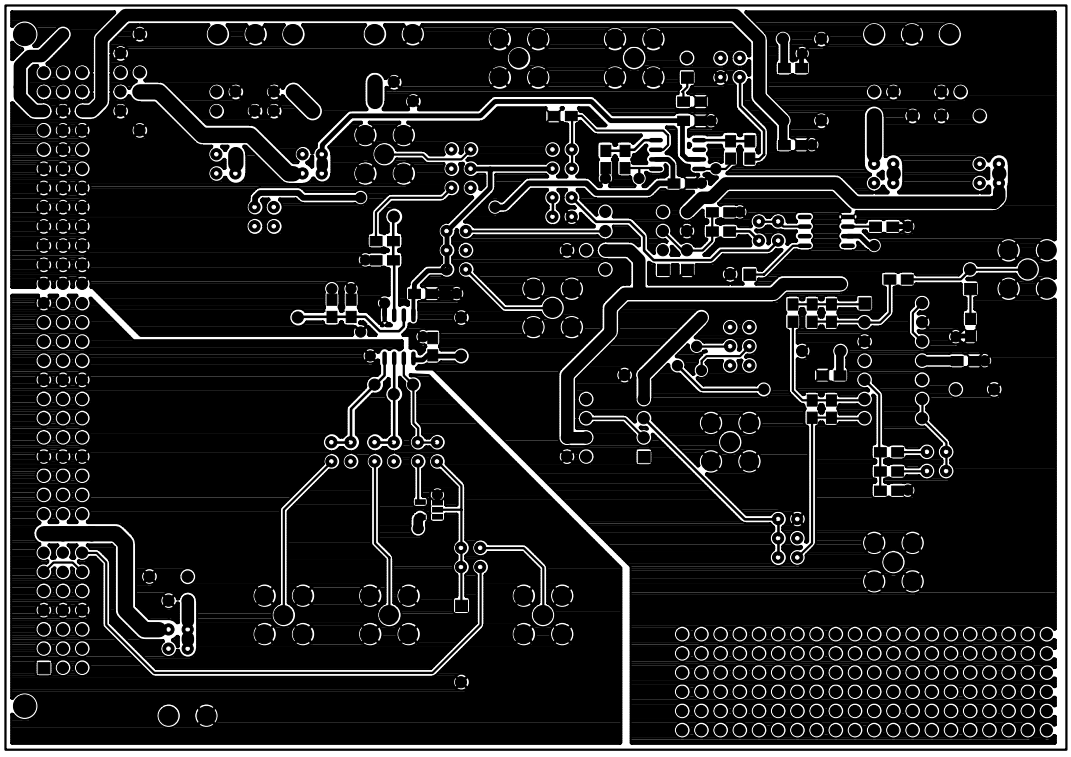

Figure 6. Component Side Artwork

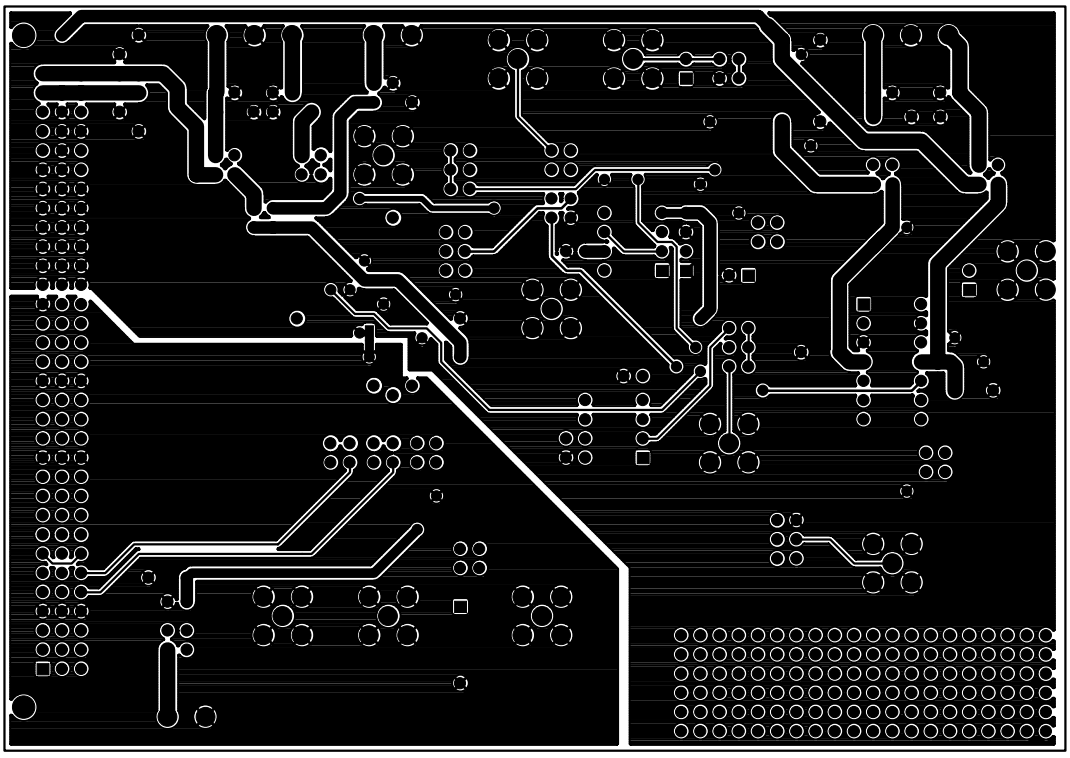

Figure 7. Solder Side Artwork

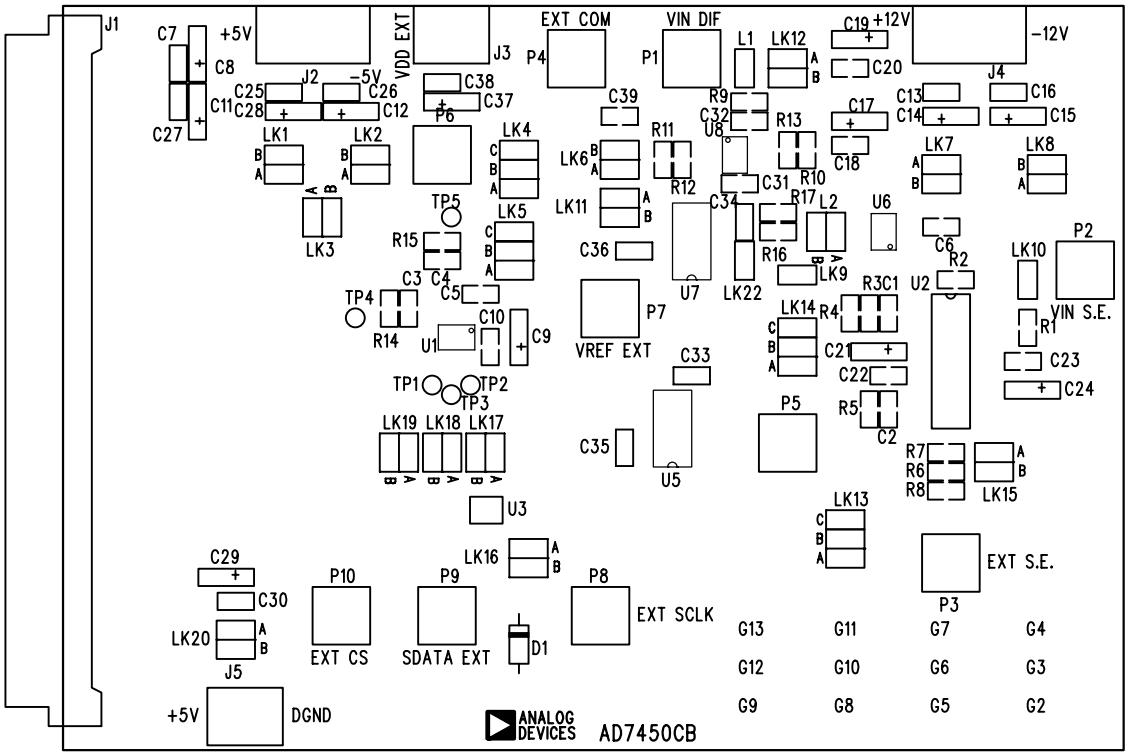

Figure 8. AD7450 Evaluation Board Component Placement Drawing.