Evaluation Board for 8-Channel, Simultaneous Sampling, Bipolar 14/16/18-Bit ADCs

Preliminary Technical Data

EVAL-AD7606/7/8EDZ

FEATURES

Full-featured evaluation board for the AD7606/7/8
EVAL-CED1Z compatible
Standalone capability
On-board optional voltage reference
Various linking options
PC software for control and data analysis when used with EVAL-CED1Z

PART DESCRIPTION

This data sheet describes the evaluation board for the AD7606/7/8, which is an eight channel simultaneously sampled 14/16/18-bit successive approximation analog-to-digital converter (ADC). The AD7606/7/8 is capable of achieving a sampling rate of 200 ksps per channel. The input signals are sampled simultaneously thus preserving the relative phase information of the signals on the input channels. The part operates from a 5V supply and can accommodate ± 10V and ±5V true bipolar input signals. The part contains on-chip LDOs, reference and reference buffer, track and hold circuitry, supply conditioning circuitry, on-chip conversion clock, oversampling capability and high speed parallel and serial interfaces. Full details on the AD7606/7/8 are available in the AD7606, AD7607 and AD7608 data sheet available from Analog Devices, Inc., which should be consulted in conjunction with this data sheet when using the evaluation board.

GENERAL DESCRIPTION

On-board components include: the ADR421 2.5 V reference, Various link options are explained in the Evaluation Board Hardware section. Interfacing to this board is through a 96-way connector. This 96-way connector is compatible with the EVAL-CED1Z also available from Analog Devices. External sockets are provided for multiple signals.

FUNCTIONAL BLOCK DIAGRAM

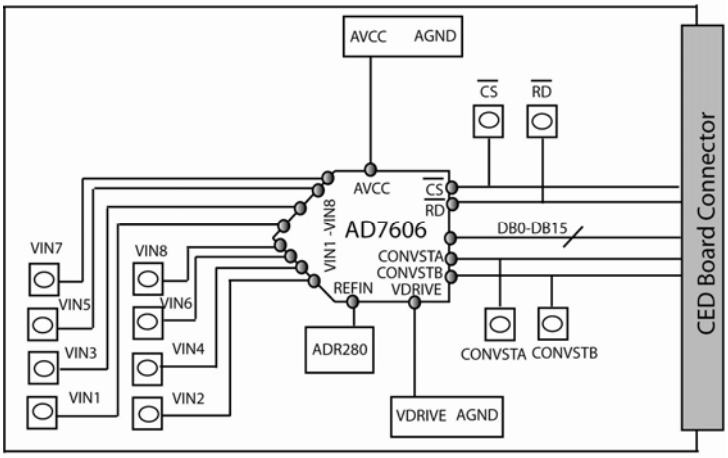

Figure 1.

Rev. PrD

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REVISION HISTORY

08/10—Revision PrD: Preliminary Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

When using this evaluation board with the EVAL-CED1Z, all supplies are provided from the EVAL-CED1Z through the 96-way connector. When using the board as a standalone unit, external supplies must be provided. This evaluation board has the following power supply inputs: AV_{CC} (+5 V), AGND, V_{DRIVE}, and DGND.

The +5V and Vdrive supplies are decoupled to the ground plane with 10 µF tantalum and 0.1 µF multilayer ceramic capacitors at the point where they enter the board. There is also an EMC filter prior to this decoupling on each supply including the Vdrive supply. The supply pins for the external reference are also decoupled to AGND with a 10 µF tantalum and a 0.1 µF ceramic capacitor.

Extensive ground planes are used on this board to minimize the effect of high frequency noise interference. A singel ground plane is used on this evaluation board.

LINK OPTIONS

There are multiple (LK), solder link options (SL), resister options (R) and 16 Zero Ω link options (K) that must be set correctly to select the appropriate operating setup before using the evaluation board. The functions of these options are outlined in Table 1.

Table 1. Link Option Functions

Link No.	Function
	Analog input Circuitry Link options
LK1, LK3, LK4, LK5, LK6, LK7, LK8,	These link options tie the AD7606/7/8 inputs V1_IN to V8_IN inputs to GND. If this link is inserted the input to the input is tied to AGND. If not inserted the input to the AD7606/7/8 Vx is tied to the SMB connector (V1, V2, V3, V4, V5, V6, V7, V8)
	Power Supply Configuration Links
SL 9	This solder link option selects the source of the 5V Analog Supply for the AD7606/7/8 evaluation board. In position A the 5V supply is taken from the CED board connector J1 pin A32, B32, C32. (operation with CED board) In position B the 5V supply is taken from the external J6 connector. – (stand alone mode)
SL10	This solder link option selects the source of the 2.5V digital V_{DRIVE} supply for the AD7606/7/8 evaluation board. In position A the V_{DRIVE} supply is taken from the CED board connector J1 pin A8, B8, C8. (operation with CED board) In position B the V_{DRIVE} supply is taken from the external J5 connector. – (stand alone mode)
	AD7606/7/8 Interface configuration links
SL2	This link option selects the source of the $\overline{CS}$ signal. In position A the $\overline{CS}$ signal comes from the external EXT_$\overline{CS}$ SMB connector (CS). In position B the $\overline{CS}$ signal comes from the J1 connector pin C10 CED board connector. In position C the $\overline{CS}$ signal comes from CED_$\overline{RD}$. (J1 A9)
SL3	This link option selects the source of the $\overline{RD}$/SCLK signal for the AD7606/7/8 interface. In position A the $\overline{RD}$/SCLK signal come from CED_$\overline{RD}$. (J1 A9) In position B the $\overline{RD}$/SCLK signal comes from the external $\overline{RD}$ (RD) SMB connector. In position C the $\overline{RD}$/SCLK signal comes from the J1 connector pin A7 (SPORT_TSCLK) In position D the $\overline{RD}$/SCLK signal comes from the external SCLK (SCLK) SMB connector.
SL4	This link option selects the source of the CONVST A signal for the AD7606/7/8. In position A the CONVST A signal comes from the CED connector J1 pin A17. In position B the CONVST B signal comes from and external SMB connector CONVST A.
SL5	This link option selects the source of the CONVST B signal for the AD7606/7/8. In position A the CONVST B signal is connected to the CONVST A signal. In position B the CONVST B signal is selected via the SL6 link option.
SL 6	This link option selects the source of position B in the SL 5 link option. In position A, option B of link SL5 will be connected to the external CONVST_BSMB socket. In position B, option B of link SL5 will be connected to the CED connector J1 pin A14.

Link No.	Function
SL7	This link option selects the destination of the serial data DB7 from the AD7606/7/8 in Serial mode In position A data from DB7 ($D_{OUT}A$) is fed to the JI CED connector pin C5. In position B data from DB7 ($D_{OUT}A$) is fed to the DOUT A SMB connector (DOUTA).
SL8	This link option selects the destination of the serial data DB8 from the AD7606/7/8 in Serial mode In position A data from DB8 ($D_{OUT}B$) is fed to the JI CED connector pin C13. In position B data from DB8 ($D_{OUT}B$) is fed to the SMB connector (DOUTB).
	Resister options
R1/R2	When R1 is inserted the AD7606/7/8 will operate in +/- 10V range mode. When R2 is inserted the AD7606/7/8 will operate in +/-5V range mode. R1 and R2 should be removed when operating the EVAL AD7606/7/8 with the CED as the range is controlled via AD7606/7/8 software.
R3/R4	When R3 is inserted the AD7606/7/8 will operate in parallel interface mode. – R3 should be inserted when using the CED board. When R4 is inserted the AD7606/7/8 will operate in serial mode.
R5/R6	When R5 is inserted the AD7606/7/8 will operate in internal Reference mode. When R6 is inserted the AD7606/7/8 will operate in external reference mode. In this condition R20 should be inserted.
R7-R12	These 6 resisters determine the voltage of the OS pins. When using the software supplied with the EVAL AD7606/7/8EDZ these 4 resisters should be removed. R11 and R12 determine the voltage applied to OS2 pin of the AD7606/7/8. R9 and R10 determine the voltage applied to OS1 pin of the AD7606/7/8. R7 and R8 determine the voltage applied to OS0 pin of the AD7606/7/8.
R20	This resister should be inserted when operating the AD7606/7/8 in external reference mode. This resister selects the ADR421 as the reference when R20 is inserted. In external reference mode R6 should be inserted
K0-K15	These zero Ohm links should be inserted to connect the digital parallel interface from the AD7606/7/8 to the CED board connector. .

SETUP 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 two different modes in which to operate the evaluation board. Either the user can operate the board with the EVAL-CED1Z or it can be used as a standalone board.

Table 2 and Table 3 shows the position in which all the links are set when the evaluation board is packaged. When the board is shipped, it is assumed that the user is operating with the EVAL-CED1Z board. The links are set so that all power supplies and control signals are supplied by the EVAL-CED1Z.

The EVAL-AD7606/7/8 is configured to use the AD7606/7/8 in external reference mode with the parallel interface.

Table 2. Link Positions on the Packaged EVAL-AD7606/7/8

Link No.	Position	Function
LK1-LK8	inserted	The AD7606/7/8 analog inputs are tied to AGND.

Table 3. Solder Link Positions on the Packaged EVAL-AD7606/7/8

Link No.	Position	Function
SL2	B	The CS signal is taken from the CED connector
SL3	A	
SL4	A	The CONVST A signal comes from the CED connector J1 pin A17.
SL5	A	The CONVST B signal is connected to the CONVST A signal.
SL6	B	SL5 will be connected to the CED connector J1 pin A14.
SL7	Not inserted	
SL8	Not inserted	
SL9	A	5V supply taken from CED board
SL10	A	2.5V taken from CED board
R1/R2	Not inserted	Range selected via AD7606/7/8 software
R3/R4	R3	Parallel mode selected
R5/R6	R6	External reference mode
R20	Inserted	External reference mode
R7-R12	Not inserted	OS pins controlled via AD7606/7/8 software
K0-K15	Inserted	These zero Ω link options are inserted to connect AD7606/7/8 parallel bus to the CED connector.

INTERFACING THE EVALUATION BOARD TO THE EVAL-CED1Z

Interfacing the EVAL-CED1Z board to the evaluation board is via a 96-way connector, J1. The pinout for the J1 connector is shown in Figure 2. Table 5 gives a description of the pins on the 96-way connector used to interface between the EVAL-CED1Z board and the EVAL-AD7606/7/8. Table 4 gives its pin designations.

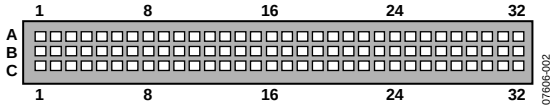

Figure 2. Pin Configuration for the 96-Way Connector, J1

Table 4. 96-Way Connector Pin Functions[1]

Pin	Row A	Row B	Row C
1	DTPRI	GPIO3	DR1PRI
2	TFS1		RFS1
3	TSCLK1		RSCLK1
4	DGND	DGND	DGND
5	DT0PRI		DR0PRI
6	TFS0		RFS0
7	TSCLK0		RSCLK0
8	V_{DRIVE} (+3.3 V)	V_{DRIVE} (+3.3 V)	V_{DRIVE} (+3.3 V)
9			
10			
11	DTOSEC		GPIO6
12	DGND	DGND	DGND
13			DROSEC
14	GPIO5		GPIO7
15	GPIO0		GPIO4
16	DGND	DGND	DGND
17			GPIO2
18			
19		GPIO1	
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	−12 V	AGND	+12 V
31	(−5 V)	(−5 V)	(−5 V)
32	AV_{DD} (+5 V)	AV_{DD} (+5 V)	AV_{DD} (+5 V)

[1] The unused pins of the 96-way connector are not shown.

Table 5. 96-Way Connector Pin Description

Signal	Description
DRPRI	Data Receive Primary. This input is connected to the D_{OUT}A pin of the AD7606/7/8.
DRSEC	Data Receive Secondary. This input is connected to the D_{OUT}B pin of the AD7606/7/8.
RSCLK	Receive Clock.
TFS	Transmit Frame Sync.
RFS	Receive Frame Sync.
AV_{DD}	Analog +5 V Supply. These lines are connected to the AV_{CC} line on the board via LK.
V_{DRIVE}	Digital +3.3 V supply. This is used to provide the V_{DRIVE} supply to the board via LK for the digital logic.
−5 V	Analog −5 V Supply. This supply is not used on the EVAL-AD7606/7/8.
DGND	Digital Ground. These lines are connected to the digital ground plane on the evaluation board.
AGND	Analog Ground. These lines are connected to the analog ground plane on the evaluation board.
GPIO 0	General-Purpose Input/Output.
GPIO1	General-Purpose Input/Output.
GPIO2	General-Purpose Input Output.
GPIO3	General-Purpose Input/Output.
GPIO4	General-Purpose Input/Output.
GPIO5	General-Purpose Input/Output.
GPIO6	General-Purpose Input/Output.
GPIO7	General-Purpose Input/Output.

SOCKETS

There are 15 SMB input sockets relevant to the operation of the AD7606/7/8 on this evaluation board. 13 of these sockets are used for applying an externally generated signal to the evaluation board while 2 are outputs. When operating the board with the EVAL-CED1Z, the only external sockets necessary are those used to supply the bipolar signal to the selected analog inputs to the ADC (that is, VIN1 to VIN8). The remaining sockets are optional and if they are not used, their signals are supplied by the EVAL-CED1Z. Most of these sockets are used when operating the board as a standalone unit, as all the signals required are supplied from external sources. The functions of these sockets are outlined in Table 6.

Table 6. Socket Functions

Socket	Function
VIN1	Subminiature BNC socket for a single ended input that is applied directly to the VIN1 pin of the AD7606/7/8.
VIN2	Subminiature BNC socket for a single ended input that is applied directly to the VIN2 pin of the AD7606/7/8.
VIN3	Subminiature BNC socket for a single ended input that is applied directly to the VIN3 pin of the AD7606/7/8.
VIN4	Subminiature BNC socket for a single ended input that is applied directly to the VIN4 pin of the AD7606/7/8.
VIN5	Subminiature BNC socket for a single ended input that is applied directly to the VIN5 pin of the AD7606/7/8.
VIN6	Subminiature BNC socket for a single ended input that is applied directly to the VIN6 pin of the AD7606/7/8.
VIN7	Subminiature BNC socket for a single ended input that is applied directly to the VIN7 pin of the AD7606/7/8.
VIN8	Subminiature BNC socket for a single ended input that is applied directly to the VIN8 pin of the AD7606/7/8.
DOUT-A	Subminiature BNC socket for $D_{OUT}A$ output.
DOUT-B	Subminiature BNC socket for $D_{OUT}B$ output.
EXT_CS	Subminiature BNC socket for an external $\overline{CS}$ input.
RD	Subminiature BNC socket for an external RD input.
SCLK	Subminiature BNC socket for an external SCLK input.
CONVST A	Subminiature BNC socket for CONVST A input.
CONVST B	Subminiature BNC socket for CONVST B input.

CONNECTORS

There are 3 connectors on the EVAL-AD7606/7/8 as outlined in Table 7.

Table 7. Connector Functions

Connector	Function
J1	96-way connector for the digital interface and power supply connections.
J5	External V_{DRIVE} and GND power connector.
J6	External AV_{CC} and GND power connector.

TEST POINTS

There are numerous test points on the EVAL-AD7606/7/8. These test points enable the user to have easy access to the signals for probing, evaluation, and debugging.

OPERATING WITH THE EVAL-CED1Z BOARD

The evaluation board can be operated in a standalone mode or operated in conjunction with the EVAL-CED1Z board. This evaluation board controller is available from Analog Devices under the order entry EVAL-CED1Z.

When interfacing the EVAL-AD7606/7/8directly to the EVAL-CED1Z board, all supplies and control signals to operate the EVAL-AD7606/7/8are provided by the EVAL-CED1Z. The AD7606/7/8 is interfaced to the EVAL-CED1Z via its parallel interface and can run at full throughput rate. The software allows the user to change the throughput rate by effectively modifying the CONVST frequency.

Software to communicate with the EVAL-CED1Z and AD7606/7/8 is provided with the EVAL-AD7606/7/8 package.

The 96-way connector on the EVAL-AD7606/7/8plugs directly into the 96-way connector on the EVAL-CED1Z.
The EVAL-CED1Z provides all the supplies for the evaluation board. It is powered from a 7 V, 15 W power supply, which accepts input voltages from 100 V to 240 V ac and contains the relevant adaptors for worldwide use. The power supply is provided with the EVAL-CED1Z.

Connection between the EVAL-CED1Z and the USB port of a PC is via a standard USB 2.0 connection cable that is provided as part of the EVAL-CED1Z package.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The EVAL-AD7606/7/8 evaluation kit includes self-installing software on CD. The software controls and evaluates the performance of the AD7606/7/8 when it is operated with the EVAL-CED1Z. The software is compatible with Windows® 2000/XP®. If the setup file does not run automatically, **setup.exe** can be run directly from the CD.

When the CD is inserted into the PC, an installation program automatically begins. This program installs the evaluation software. The user interface on the PC is a dedicated program written especially for theAD7606/7/8 when operating with the EVAL-CED1Z.

The software should be installed before the USB cable is connected between the EVAL-CED1Z and the PC. This ensures that the appropriate USB driver files have been properly installed before the EVAL-CED1Z is connected to the PC.

When the software runs for the first time with the EVAL-CED1Z board connected to the PC, the PC automatically finds the new device and identifies it. Follow the on-screen instructions that appear. This installs the drivers for the CED on the PC. If an error appears on screen when the software is first opened, then the PC is not recognizing the USB device. This error is corrected by the following steps:

1. Click **My Computer**, then select **Properties**. When the **System Properties** window opens, select the **Hardware** tab.
2. Click **Device Manager**.
3. Examine the devices listed under the **Universal Serial Bus Controller** heading. If an unknown device is listed, right click this option and select **Update Driver**.
4. Note that the New Hardware Wizard runs twice. Under **ADI Development Tools**, the hardware is listed as **ADI Converter Evaluation and Development Board (WF)**.
5. Reboot your PC.

SETTING UP THE EVAL-CED1Z

This section describes how the evaluation board, the EVAL-CED1Z board, and the software should be setup to begin using the complete system.

1. Install the AD7606/7/8 evaluation board software.
2. Connect the EVAL-CED1Z board and the evaluation board together via the 96-way connector. Apply power to the EVAL-CED1Z via +7 V, 15 W power supply provided. At this stage, the green LED labeled **Power** on the EVAL-CED1Z should be lit, which indicates that the EVAL-CED1Z is receiving power.
3. Connect the USB cable between the PC and the EVAL-CED1Z. A green LED positioned beside the USB connector on the EVAL-CED1Z board lights up indicating that the USB connection has been established.
4. The EVAL-AD7606/7/8is detected. Proceed through any dialog boxes that appear (use the recommended options) to finalize the installation.
5. Start the EVAL-AD7606/7/8 software.

The FPGA on the EVAL-CED1Z is automatically programmed when the software is opened. The two red LEDs (D14 and D15) on the EVAL-CED1Z now light up. This indicates that the EVAL-CED1Z is functional and ready to receive instructions.

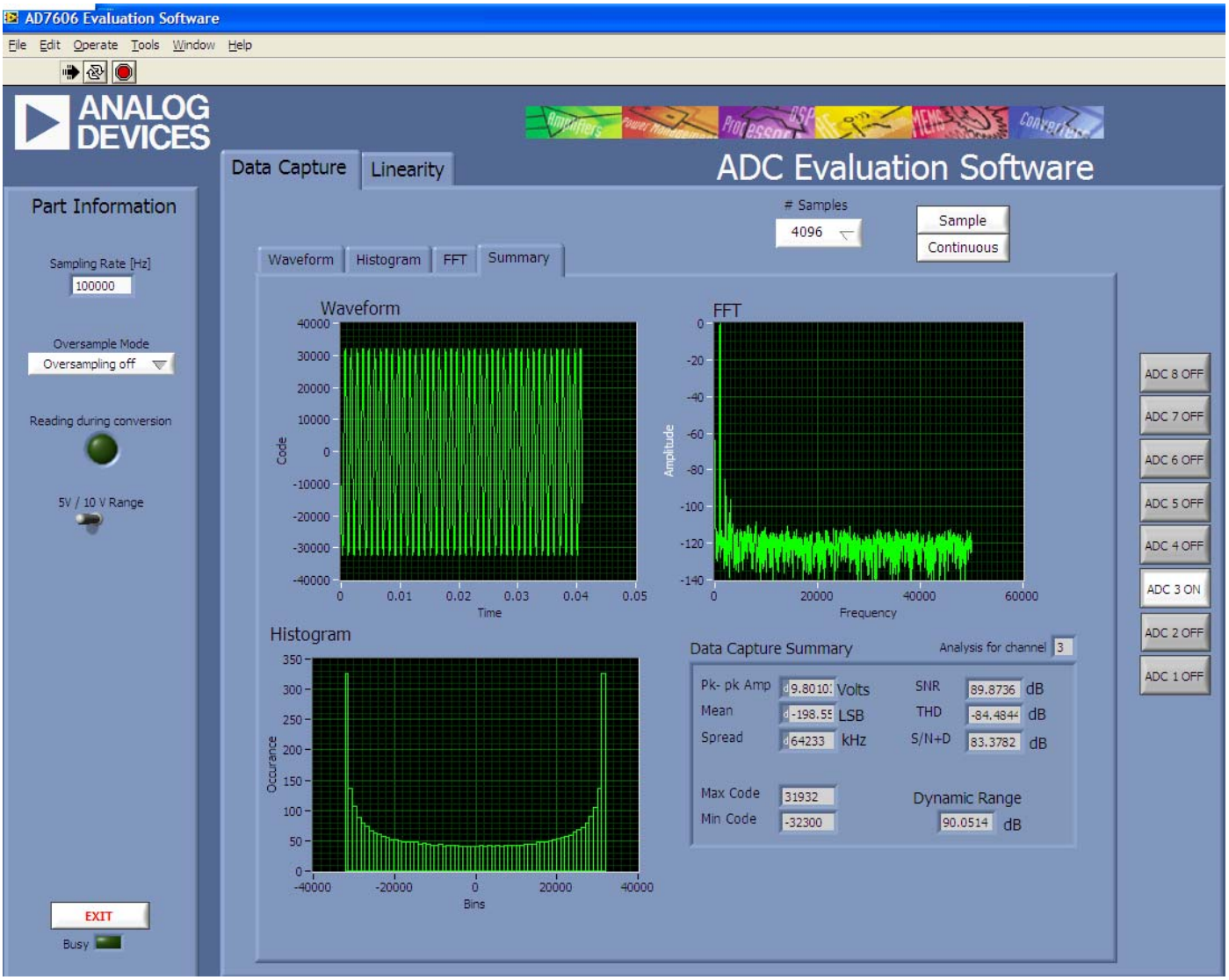

Figure 3. AD7606/7/8 Main Window

SOFTWARE OPERATION

With the hardware set up, use the software to control the EVAL-CED1Z and the EVAL-AD7606/7/8. To launch the software from the **Analog Devices** menu, use the following steps:

1. Click the **AD7606/7/8** submenu.
2. Click the **AD7606/7/8 icon.** Figure 3 displays the main window that is opened.
3. If an error message appears, click **OK** and restart the application after checking the connection between the adapter board and the USB port on the PC. Also check that the USB device is identified by the device manager as detailed in the Installing the Software section.

The software that controls the EVAL-CED1Z and, therefore, the AD7606/7/8 evaluation board, has two main windows. Figure 3 shows the window that appears when the software is run. The main function of this window is to allow you to read a predetermined number of samples from the evaluation board and display them in both the time and frequency domain. The top portion of the screen contains the menu bar and the screen can be divided into three main sections: **Part Information**, **Data Capture**, and **Linearity**. The **Data Capture** tab consists of four subtabs: **Waveform**, **Histogram**, **FFT**, and **Summary**.

The **Linearity** tab enables you to generate a linearity plot for the device. **The Linearity tab is only available for the AD7606 version.**

USING THE SOFTWARE

MENU BAR

The menu bar consists of the following items: **File**, **Edit**, **Operate**, **Tools**, **Window**, and **Help**.

PART INFORMATION SECTION

The **Part Information** section allows you to select the following configuration options:

- Part Number:AD7606/7/8.
- Sampling Frequency: The maximum sampling frequency supported by the EVAL-AD7606/7/8 is 200 kSPS.
- Reading during conversion: When clicked the green light will illuminate indicating that the read from the AD7606/7/8 is now taking place during the conversion time. When the green light is not illuminated the read takes place after the conversion.
- 5V/10V throw switch: You can select the desired input range for the AD7606/7/8 with this switch. The '5V' switch position selects the +/-5V input range while the '10V' switch position selects the +/-10V input range.
- Oversampling mode: selects the rate of oversampling.

The **Part Information** tab also includes a **Busy** status indicator, which lights when the evaluation board is busy and an **Exit** button to allow you to quit the program.

DATA CAPTURE TAB

In the **Data Capture** tab, the user can select the number of samples to be captured from the drop-down menu. The default number of samples is 4096; you are free to change this as required. The desired display option is selected by clicking any one of the **Waveform**, **Histogram**, or **FFT** tab.

Waveform Tab

The **Waveform** tab displays a digital storage oscilloscope (DSO) that allows you to display a waveform. Samples are displayed here when uploaded from the EVAL-CED1Z board. The samples are displayed as integer code values.

At the bottom left of the graph are the zoom options. These allow you to zoom in and out to get a closer look at a sample. The **Waveform Analysis** section, which is located beneath the waveform graph, contains information about the samples taken; for example, minimum/maximum position or velocity, the spread, the standard deviation, and the mean.

The waveform graph displays the information for all 8 input channels or as many channels as desired. Eight buttons located to the right hand side of the graph, labeled **ADC 1 On/ Off** to **ADC 8 On/Off** are used to select which channel's data is displayed. An indicator, located beneath the graph, shows what color graph represents each channel when the data from several channels is displayed.

Histogram Tab

The **Histogram** tab displays a histogram of the captured ADC codes. It can be used to give an indication of the performance of the ADC in response to dc inputs. The **Histogram Analysis** section contains information about the samples taken; for example, maximum and minimum codes captured.

FFT Tab

The FFT tab displays an fast Fourier transform (FFT) plot. The FFT is typically used for examining the performance of the ADC in the frequency domain. The **Spectrum Analysis** section contains information about the samples taken, such as ac specifications (see Figure 3).

You can choose whether to display the information for one, several or all eight channels in the window using the **ADC 1 On/ Off** to **ADC 8 On/Off** buttons, as explained in the Waveform Tab section.

LINEARITY TAB (AD7606 ONLY)

In the **Linearity** tab, you can select the number of hits per code to be captured for the linearity analysis. The desired display option is selected by clicking the **Histogram**, **INL**, **DNL**, or **Summary** tab. To initiate the data collection, select the **Get Linearity Data** button. The data collection and analysis takes a few seconds to complete. The greater the number of hits per code selected, the longer the analysis takes.

Histogram Tab

The **Histogram** tab displays a histogram of the captured ADC codes. It can be used to give an indication of the performance of the ADC in response to dc inputs. The **Histogram Analysis** section contains information about the samples taken, for example, maximum and minimum codes captured.

INL Tab

The **INL** tab displays an INL plot for theAD7606. This plot can be used to examine the dc performance of the ADC. The **Linearity Analysis** section contains information on the maximum and minimum INL error and the code at which this error occurred. It also shows the total number of hits per code and the number of samples taken.

DNL Tab

The **DNL** tab displays a DNL plot for theAD7606. This plot can be used to examine the dc performance of the ADC in conjunction with the INL plot. The **Linearity Analysis** section contains information on the maximum and minimum DNL error and the code at which this error occurred. It also shows the total number of hits per code and the number of samples taken.

Summary Tab

The **Summary** tab displays the INL/DNL/histogram plots and results in the same place for convenient analysis.

TAKING SAMPLES

To initiate a conversion and capture the sample data, click the **Sample** button or the **Continuous** button. Both the **Sample** and the **Continuous** buttons are located on the top right hand corner of the **Data Capture** tab. When you click the **Sample** button, the software instructs the EVAL-CED1Z board to take the required number of samples at the required frequency from the evaluation board. The EVAL-AD7606/7/8 runs with sampling speeds less than or equal to 200 kSPS. You can choose the sampling frequency up to this rate and the number of samples to be taken.

The samples taken are then uploaded and displayed. An FFT and/or histogram can be calculated and displayed. If you click the **Continuous** button, the software repeats the process indefinitely until you click **Stop.** (The **Continuous** button switches to **Stop** when clicked).

Note that no data appears on the screen if the channels are not selected. The **ADC 1 On/ Off** to **ADC 8 On/Off** buttons in the **Part Information** section should be set to **ON** to select the desired channels.

DEMONSTRATING THE AD7606/7/8 ANALOG INPUT ANTI-ALIASING FILTER

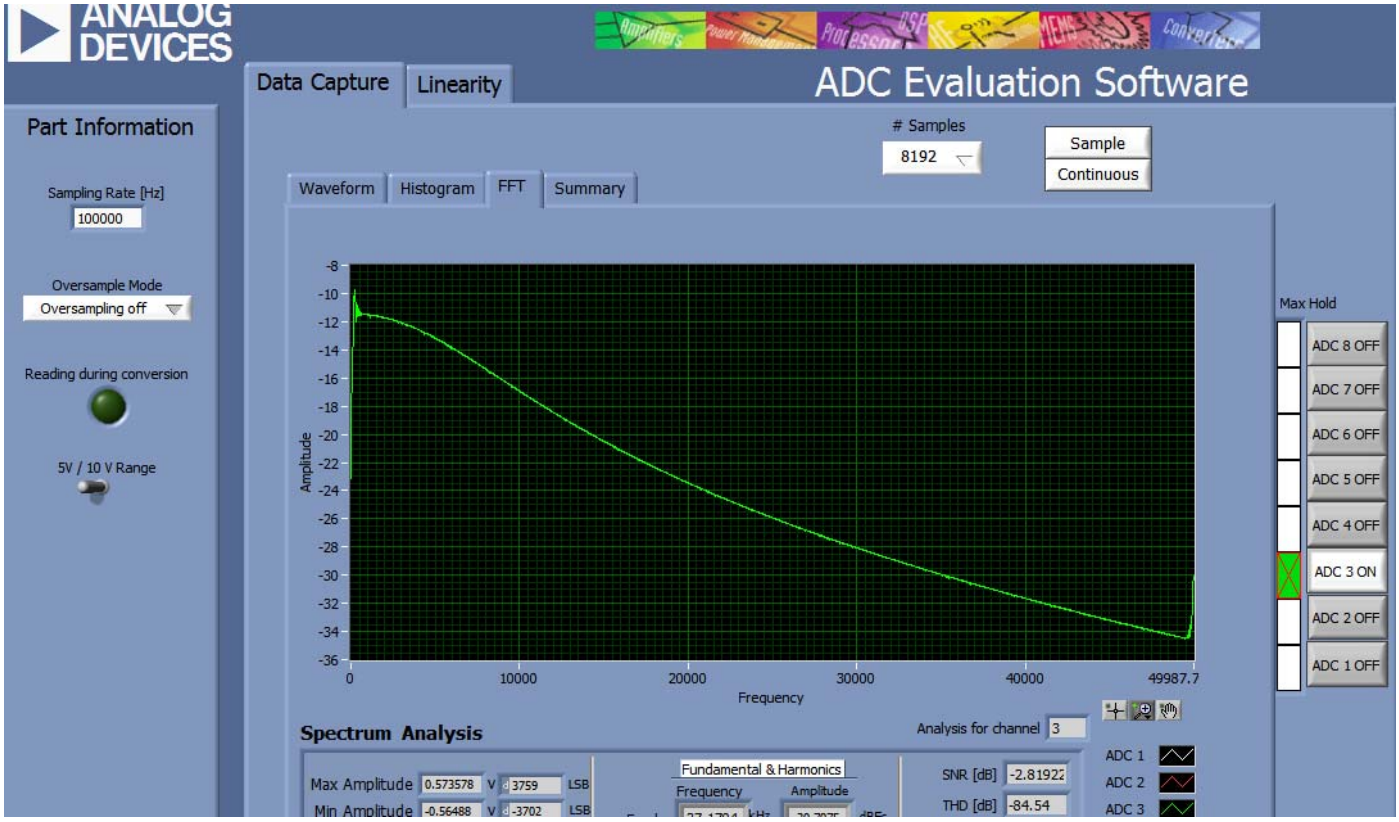

Figure 4 AD7606/7/8 Analog Input Filter Profile

The AD7606/7/8 analog input channels have an on-chip analog anti-aliasing filter. The AD7606/7/8 evaluation board can be set up to demonstrate the analog input filter profile of the AD7606/7/8 anti-aliasing filter. In Figure a full scale sweep of 100 Hz to 50 kHz is applied to an analog input channel on the AD7606/7/8 evaluation board. To see the profile of the filter the max hold button corresponding to the analog input channel chosen for the sweep is turned on. In Figure 4 this was for input channel 3. The continuous sampling mode of operation is chosen on the AD7606/7/8 software. The AD7606/7/8 will continuously convert the input sweep being applied to the AD7606/7/8 analog input and the resulting profile of the analog input filter is displayed on screen. To get a smooth profile the AD7606/7/8 should be allowed to continuously convert the input sweep sweep over a number of sweep cycles. The analog input filter is designed for 40 dB attenuation at 100 kHz.

DEMONSTRATING THE AD7606/7/8 DIGITAL FILTER

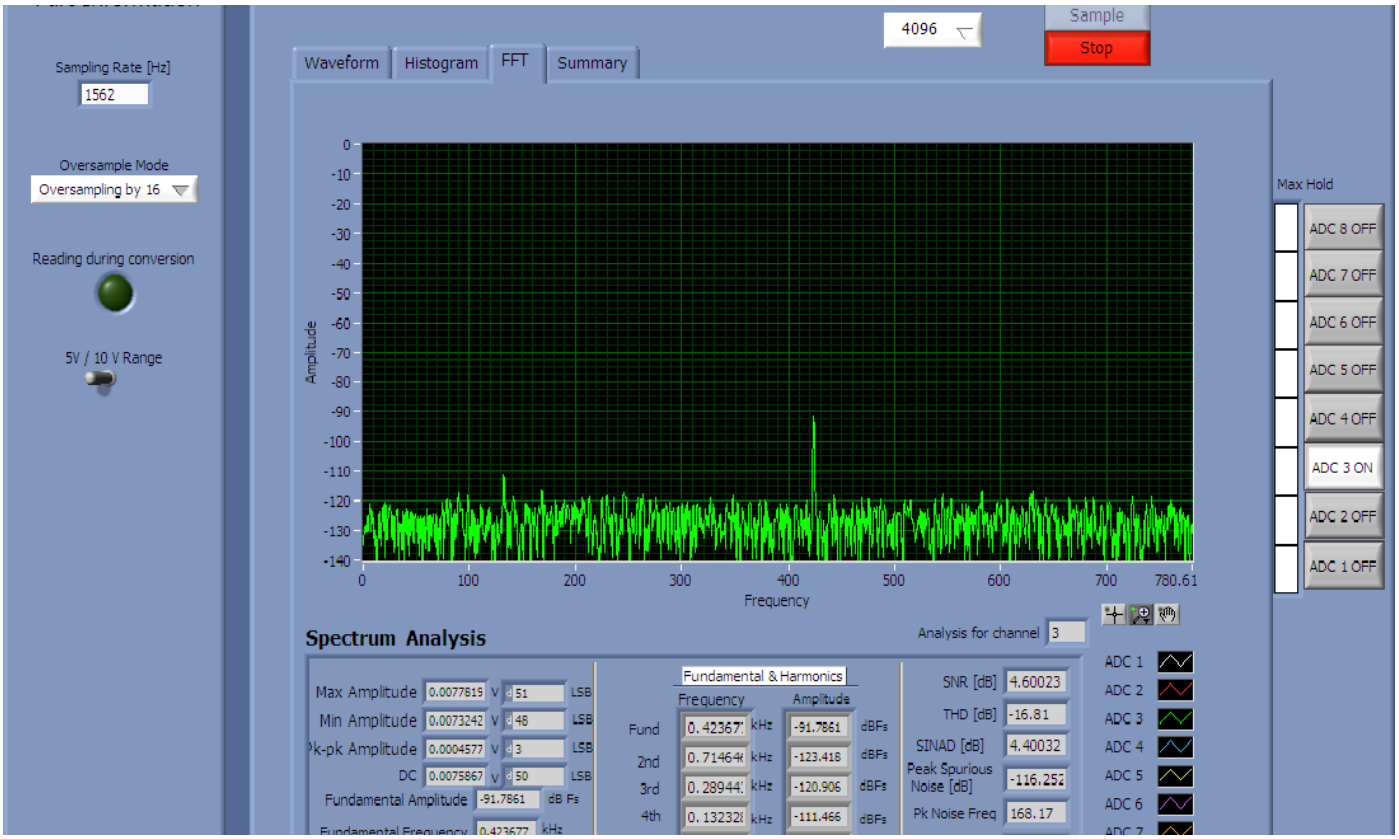

Figure 5.Digital Filter effect on alias component, alias at 425 attenuated to >-90dB

The AD7606/7/8 contains an on-chip digital filter. The digital filter is controlled via the OS X pins on the AD7606/7/8 device. The AD7606/7/8 evaluation board can be configured to show the effects of the on-chip digital filter. A 48 kHz 200 mV pk-pk input tone is applied to one of the AD7606/7/8 evaluation board inputs, in this case VIN3 (J23) is chosen. The AD7606/7/8 evaluation board software is set to continuous conversion mode with a sampling frequency of 100 kSPS. The resulting FFT shows a -50 dB fundamental at ~ 48kHz. The sampling rate is then dropped to 1562 SPS. The resulting FFT shows a -50 dB alias at ~ 425 Hz. Next select the 'Oversampling by 16' option from the Oversampling Mode control button on the left side of the screen. Keep the sampling rate at 1562 SPS. Figure 5 shows the resulting FFT, the original -50 dB 425 Hz alias signal has been attenuated to -91 dB due to the on-chip digital filter. Additional attenuation can be achieved by selecting higher Oversampling rates.

(See Over-Sampling Mode section of the AD7606/7/8 datasheet for more information)

EVALUATION BOARD SCHEMATICS AND ARTWORK

EVAL-AD7606/7/8schematics, silkscreen, and layout can be found in Figure to Figure .

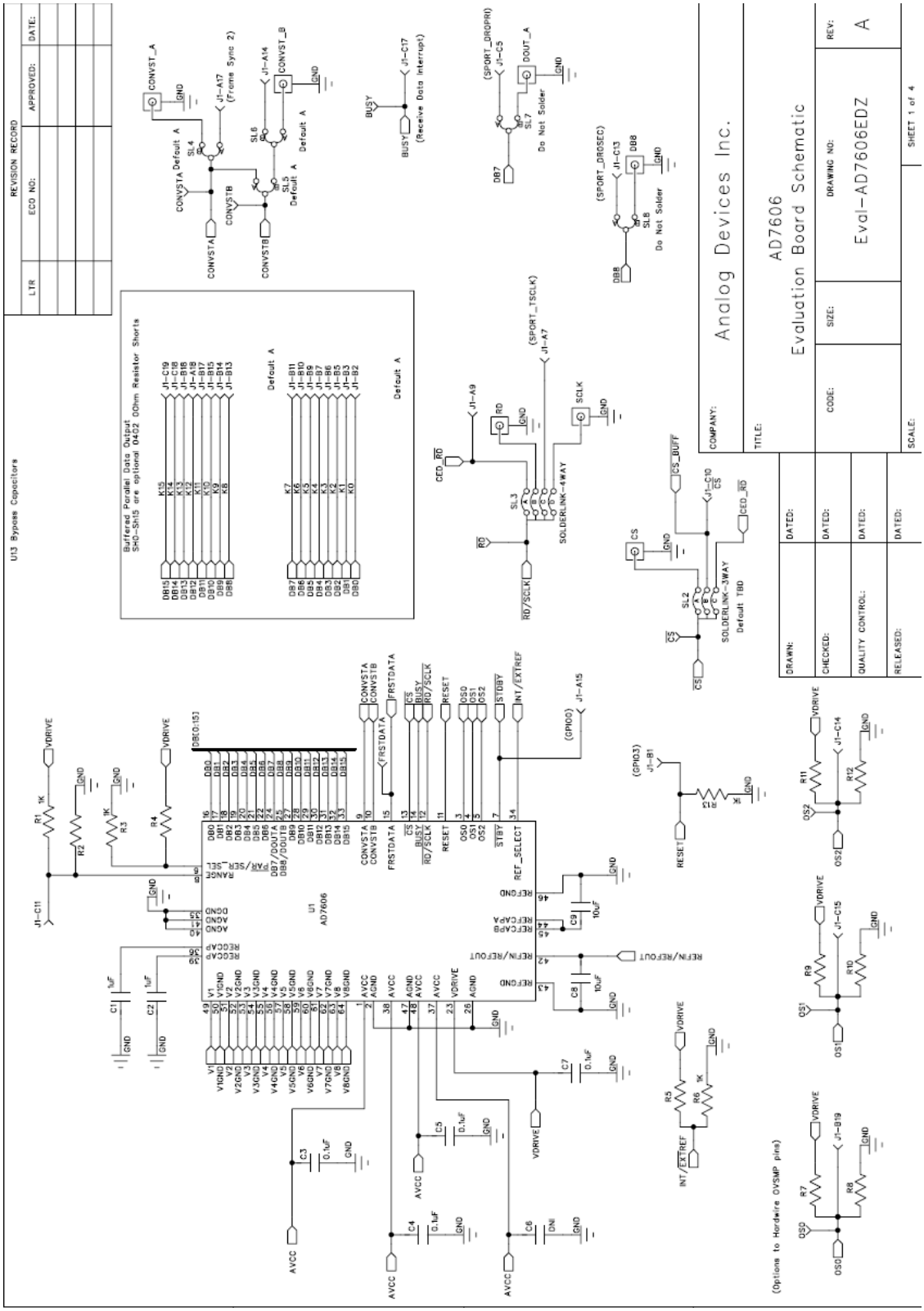

Figure 6. EVAL-AD7606/7/8Circuit Diagram 1

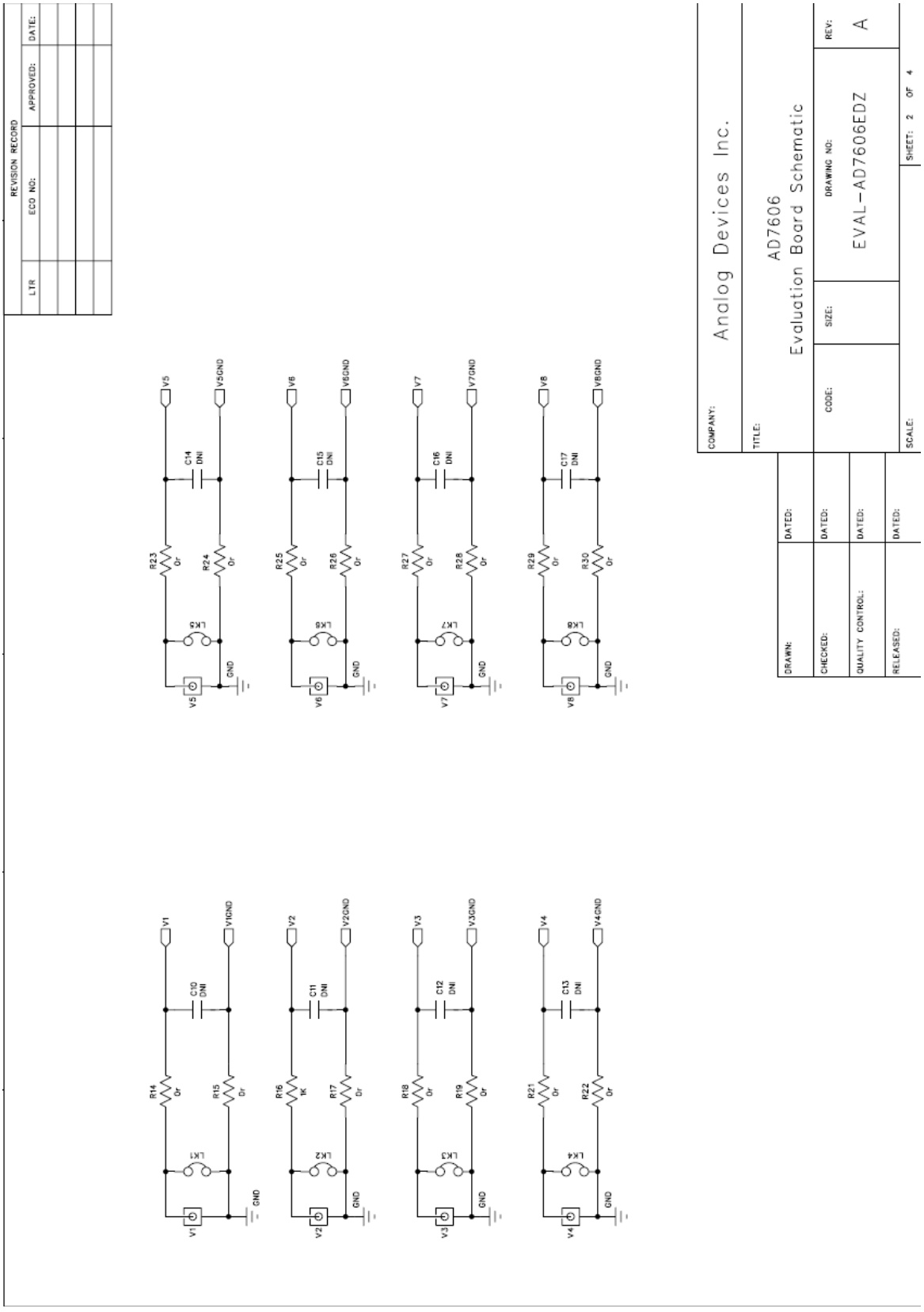

Figure 7. EVAL-AD7606/7/8Circuit Diagram 2

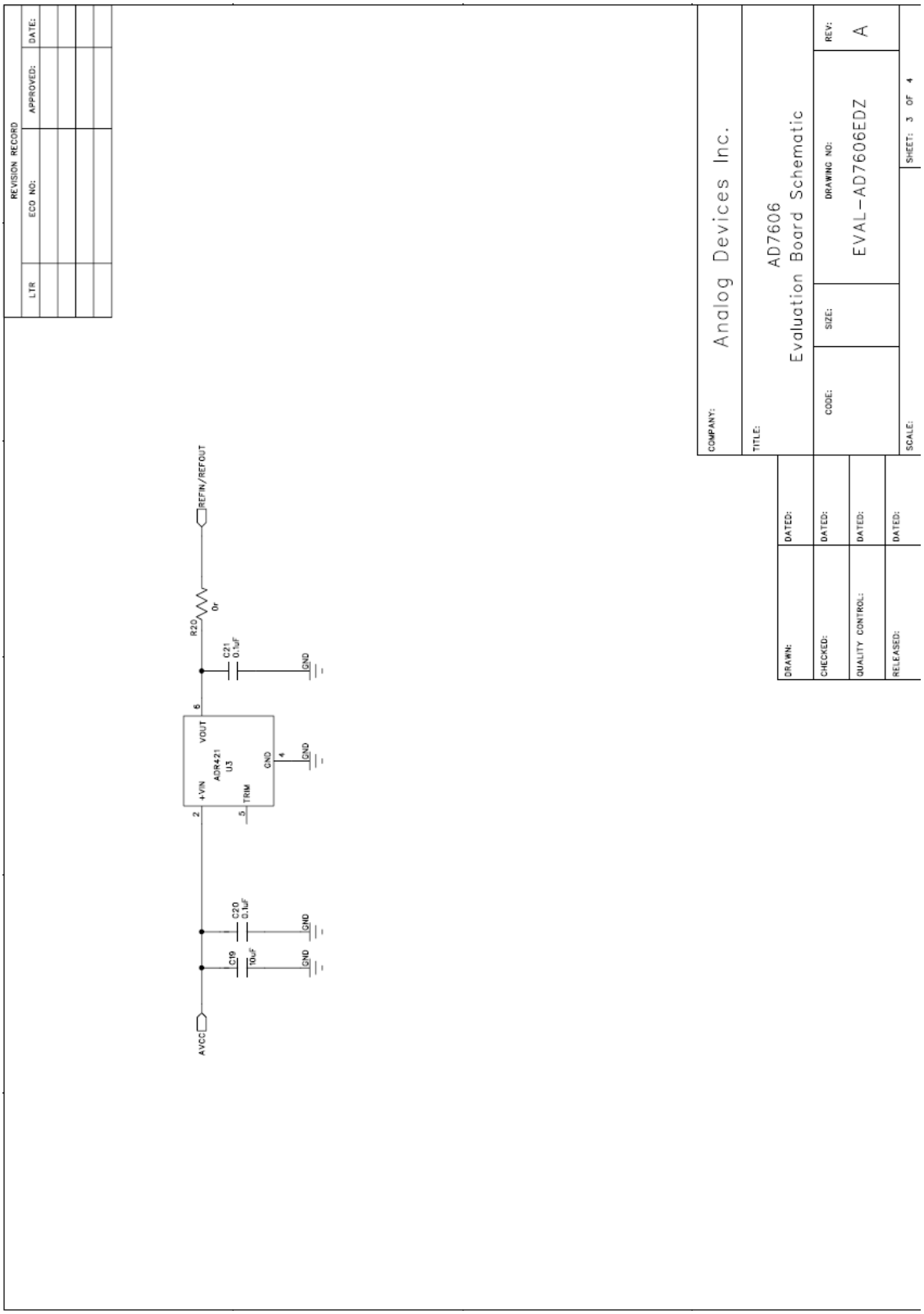

Figure 8 EVAL-AD7606/7/8Circuit Diagram 3

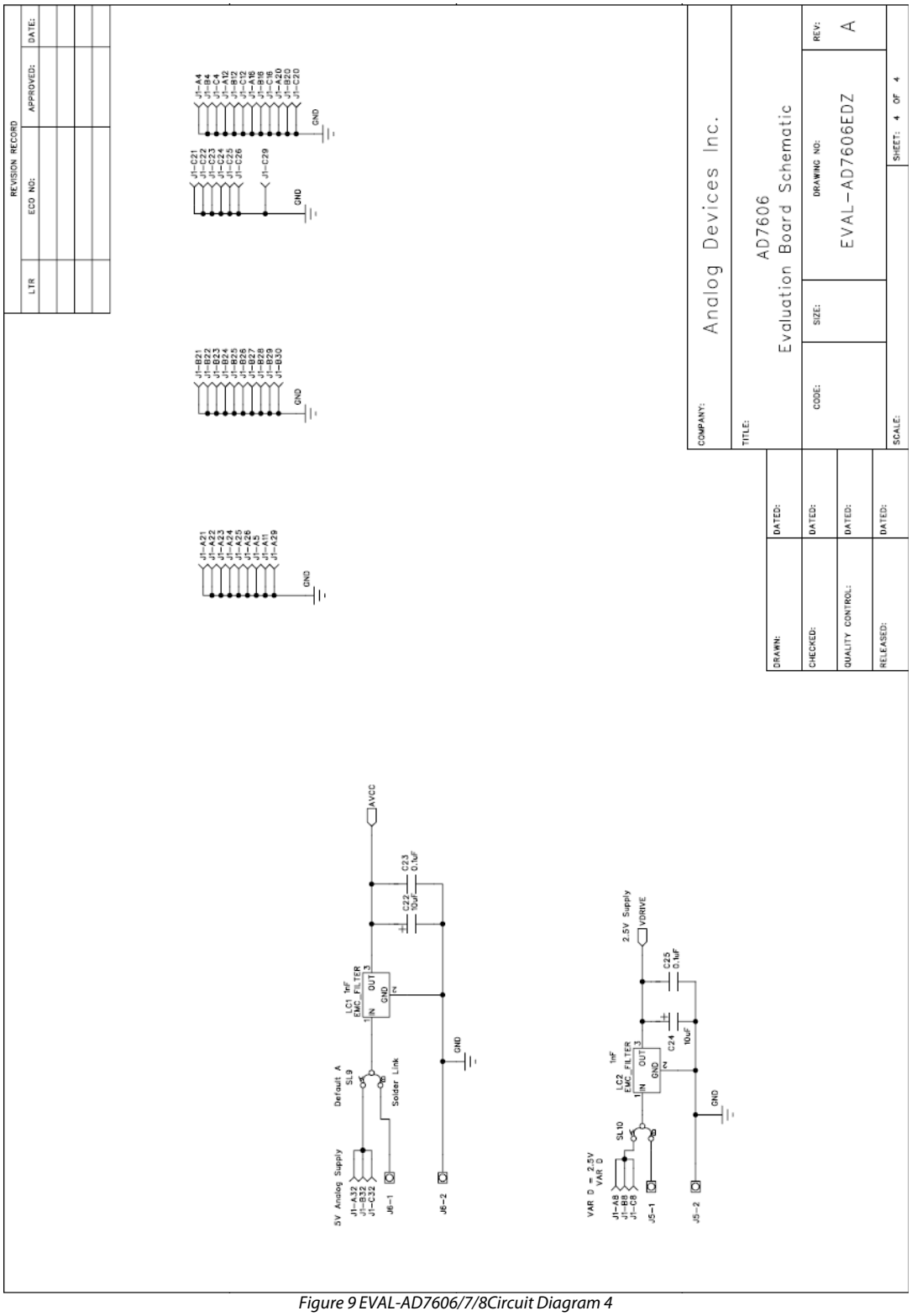

Figure 9 EVAL-AD7606/7/8Circuit Diagram 4

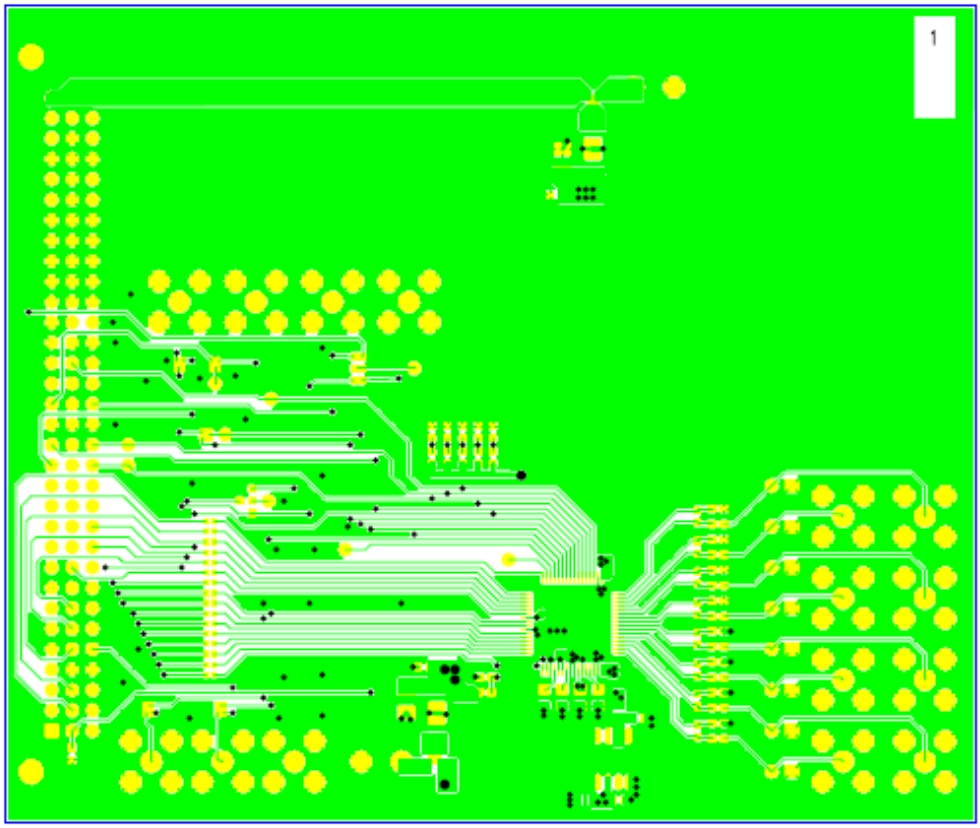

Figure 11. Component Side Artwork

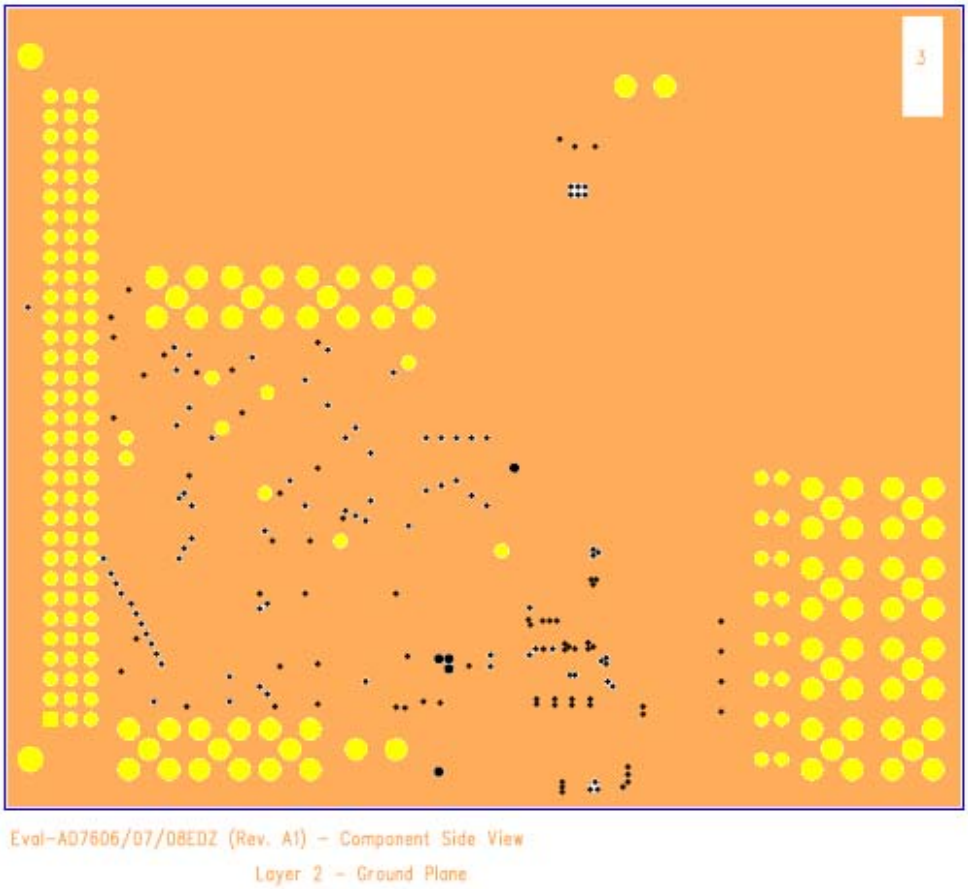

Figure 12. Layer 2 Artwork

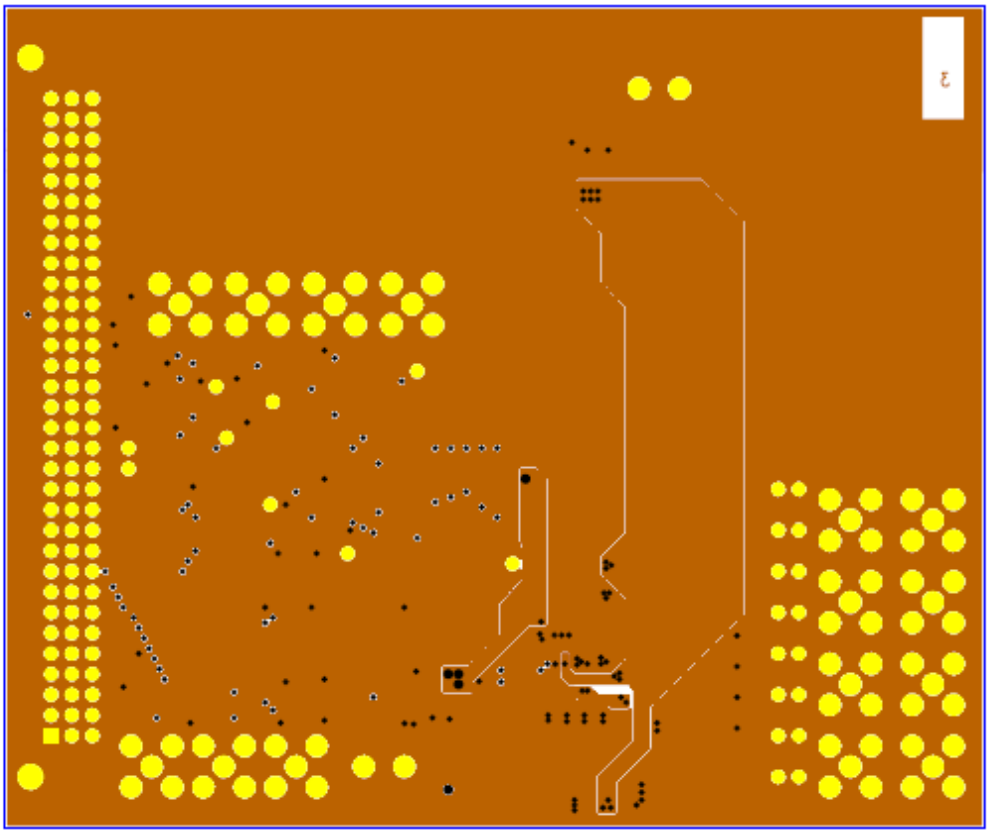

Figure 13 Layer 3 Artwork

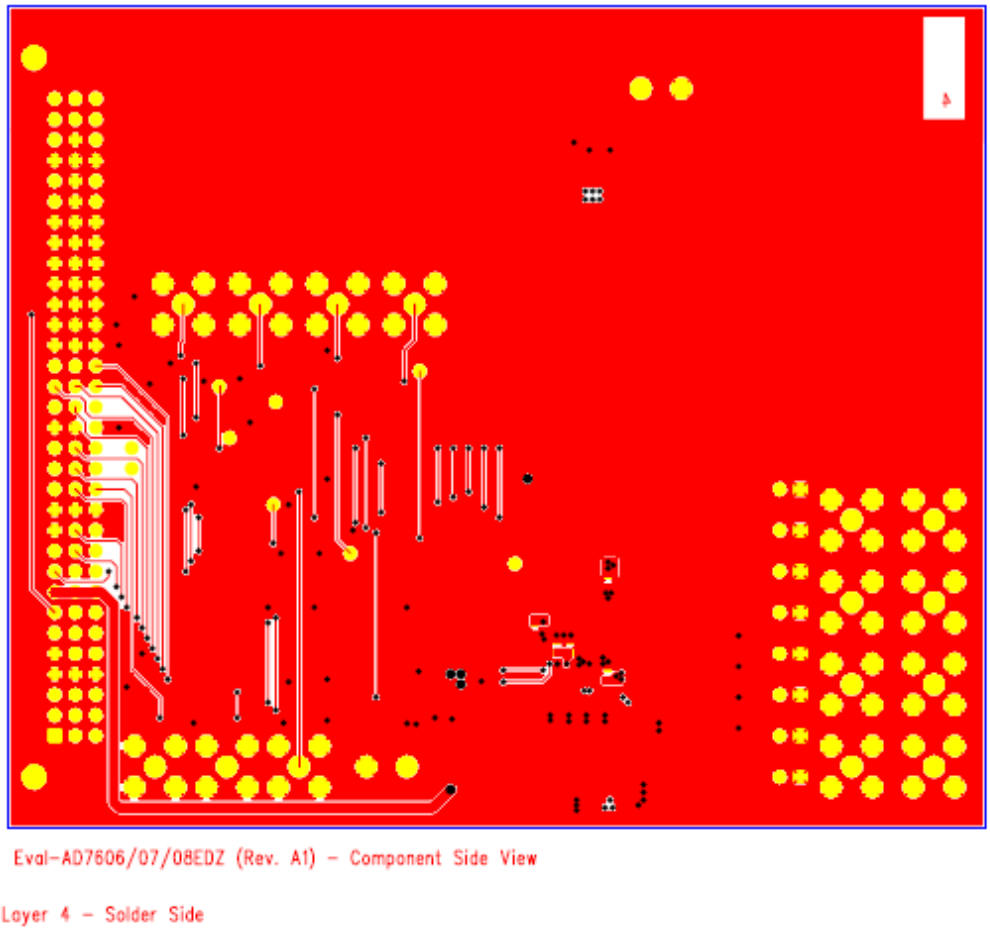

Figure 64 Solder Side Artwork

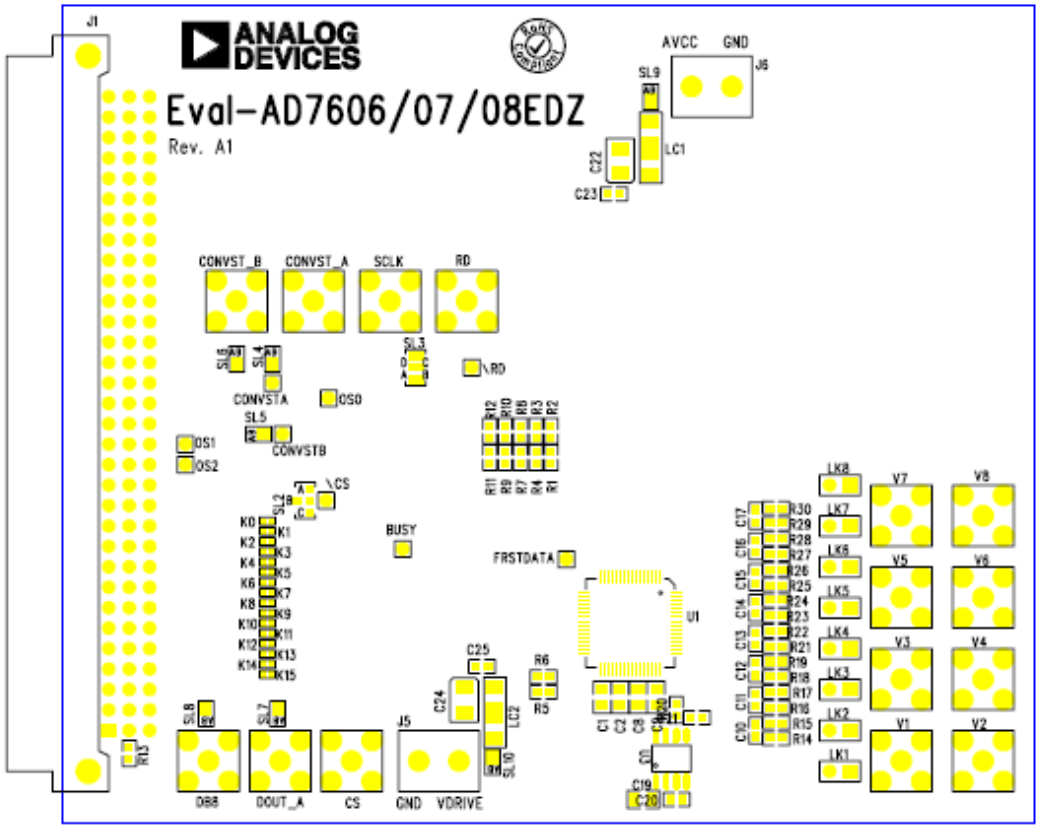

Figure 15. Component Side Silkscreen

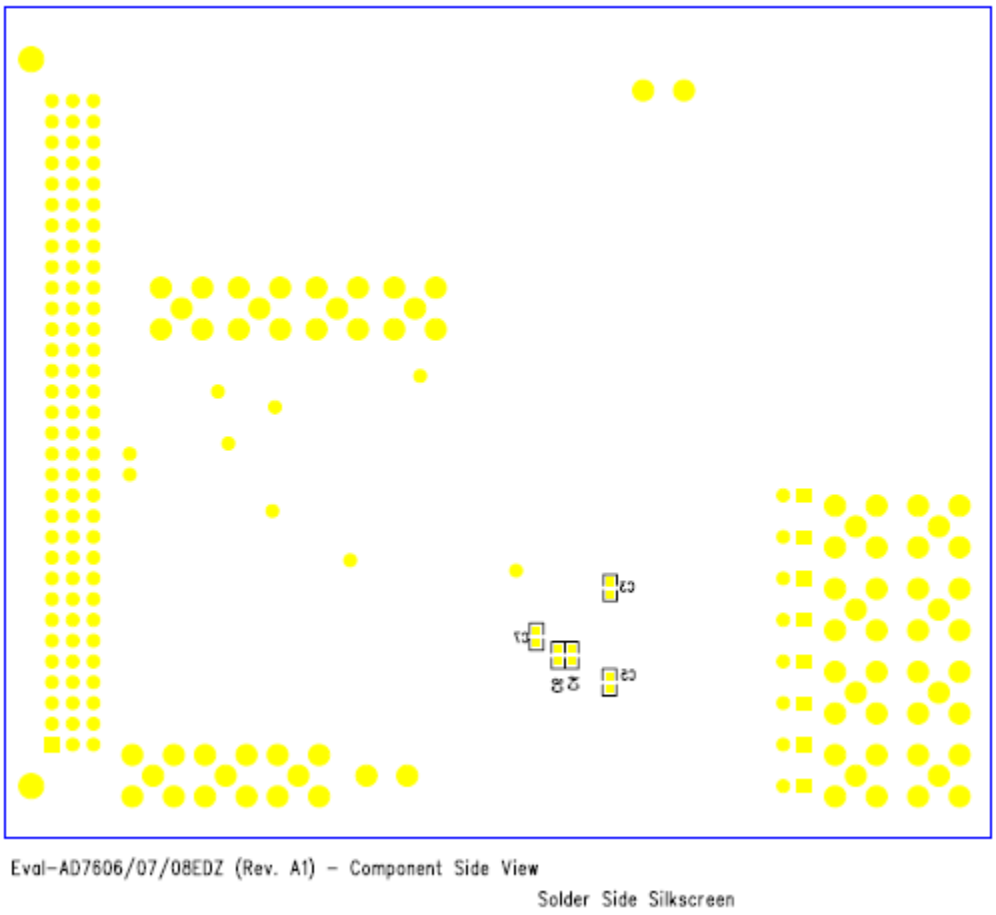

Figure 16. Bottom layer silkscreen

ORDERING INFORMATION

BILL OF MATERIALS

Table 8

Name	Part Description	Value	Tolerance	PART DESC	Part Number	STOCK CODE
BUSY	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
C1	CAP	1uF	±10%	10V X7R Ceramic Capacitor	CC0805KKX7R6BB105	FEC 3352067
C2	CAP	1uF	±10%	10V X7R Ceramic Capacitor	CC0805KKX7R6BB105	FEC 3352067
C3	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C4	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C5	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C6	CAP	DNI	n/a	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C7	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C8	CAP	10uF	±10%	10V X5R Ceramic Capacitor	2222 2401 3676	FEC 9402136
C9	CAP	10uF	±10%	10V X5R Ceramic Capacitor	2222 2401 3676	FEC 9402136
C10	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C11	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C12	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C13	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C14	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C15	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C16	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C17	CAP	DNI	TBA	0603 Ceramic Capacitor Location - Not Populated	TBA	Not Assembled
C19	CAP	10uF	±10%	10V X5R Ceramic Capacitor	2222 2401 3676	FEC 9402136
C20	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C21	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C22	CAP+	10uF	±10%	20V Tantalum Capacitor	TAJB106K020R	FEC 197427
C23	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
C24	CAP+	10uF	±10%	20V Tantalum Capacitor	TAJB106K020R	Not Assembled
C25	CAP	0.1uF	±10%	50V X7R Ceramic Capacitor	GRM188R71H104KA93D	FEC 8820023
CONVSTA	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
CONVSTB	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
CONVST_A	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
CONVST_B	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
CS	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
DB8	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
DOUT_A	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
FRSTDATA	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
J1	CON\41612\96			DIN41612 PCB Connector 96-Pin	0903 196 7921	FEC 1096832
J5	CON\POWER			2 Pin Terminal Block (5mm Pitch)	CTB5000/2	FEC 151789
J6	CON\POWER			2 Pin Terminal Block (5mm Pitch)	CTB5000/2	FEC 151789
K0	SHORT-0402			Shorting Location - Use 0402 0r	n/a	Populate with

				Resistor if short is required		0ohm 0402 resister
K1	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K2	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K3	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K4	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K5	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K6	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K7	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K8	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K9	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K10	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K11	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K12	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K13	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K14	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
K15	SHORT-0402			Shorting Location - Use 0402 0r Resistor if short is required	n/a	Populate with 0ohm 0402 resister
LC1	EMC_FILTER	1nF	(+80% / -20%)	3-Terminal Capacitor	NFM61R10T102T1	FEC 952-8202
LC2	EMC_FILTER	1nF	(+80% / -20%)	3-Terminal Capacitor	NFM61R10T102T1	FEC 952-8202
LK1	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK2	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK3	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK4	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK5	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK6	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK7	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
LK8	JUMPER			2 Pin (0.1" Pitch) Header & Shorting Shunt	M20-9990246	FEC 1022247 & 150-411
OS0	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
OS1	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
OS2	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
R1	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	Not Assembled
R2	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled
R3	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	FEC 933-0380
R4	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled
R5	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled

R6	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	FEC 933-0380
R7	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled
R8	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	Not Assembled
R9	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled
R10	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	Not Assembled
R11	RES	1K	±1%	0603 Resistor Location - Not Populated	MC 0.063W 0603 1k	Not Assembled
R12	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1k	Not Assembled
R13	RES	1K	±1%	SMD Resistor	MC 0.063W 0603 1K	Not Assembled
R14	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R15	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R16	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R17	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R18	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R19	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R20	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R21	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R22	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R23	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R24	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R25	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R26	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R27	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R28	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R29	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
R30	RES	0r	±1%	SMD Resistor	MC 0.063W 0603 0r	FEC 933-1662
RD	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
SCLK	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	Not Assembled
SL2	SOLDERLINK-3WAY			3-way Solder Link (Use 0r 0603 Resistor)	Insert in Link Position "B"	FEC 933-1662
SL3	SOLDERLINK-4WAY			4-way Solder Link (Use 0r 0603 Resistor)	Insert in Link Position "A"	FEC 933-1662
SL4	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	Insert in Link Position "A"	FEC 933-1662
SL5	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	Insert in Link Position "A"	FEC 933-1662
SL6	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	Insert in Link Position "B"	FEC 933-1662
SL7	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	n/a	Keep Pads Free of solder (Not Assembled)
SL8	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	n/a	Keep Pads Free of solder (Not Assembled)
SL9	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	Solder to Link A	Center pad and A Side to be shorted with Solder
SL10	JUMPER2\SOLDER-BRIDGE			2 Way solder Bridge	Solder to Link A	Center pad and A Side to be shorted with Solder
U1	AD7606/7/8			Analog/Digital Converter	AD7606BSTZ AD7607BSTZ AD7608BSTZ	AD7606BSTZ AD7607BSTZ AD7608BSTZ
U3	ADR421			2.5V Reference	ADR421ARZ	ADR421ARZ

V1	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V2	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V3	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V4	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V5	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V6	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V7	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
V8	SMB			Straight PCB Mount SMB Jack - 50 Ohm	1-1337482-0	FEC 1206013
\CS	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)
\RD	TESTPOINT			Red Testpoint	20-313137	FEC 8731144 (Pack)

ORDERING GUIDE

Model	Description
EVAL-AD7606EDZ[1]	Evaluation Board for AD7606
EVAL-AD7607EDZ[1]	Evaluation Board for AD7607
EVAL-AD7608EDZ[1]	Evaluation Board for AD7608
EVAL- CED1Z[1]	Controller Board

[1] Z = RoHS Compliant Part.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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