ANALOG DEVICES

Evaluation Board for Single-Ended Input, Simultaneous Sampling, 12-/14-Bit ADC

EVAL-AD7366/AD7367

FEAURES

Full-featured evaluation board for the AD7366/AD7367
EVAL-CONTROL-BRD2 compatible
Standalone capability
On-board analog buffering and voltage reference
Various linking options
PC software for control and data analysis when used with EVAL-CONTROL-BRD2

GENERAL DESCRIPTION

This data sheet describes the evaluation board for the AD7366/AD7367, which are true bipolar, dual, 12-/14-bit, 2-channel, simultaneous sampling successive-approximation ADCs. These parts operate from a dual ±11.5 to ±16.5 power supply, and a single 4.75 V to 5.25 V power supply and feature throughput rates of up to 1.0 MSPS. Full details on the AD7366/AD7367 are available in the AD7366/AD7367 data sheet, which is available from Analog Devices, Inc., and should be consulted in conjunction with this data sheet when using the evaluation board.

On-board components include:

- An AD780, a pin programmable +2.5 V or +3 V ultrahigh precision band gap reference
- Seven AD8021 op amps
- A 7S04 digital buffer

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-CONTROL-BRD2, which is available from Analog Devices. External sockets are provided for a number of signals.
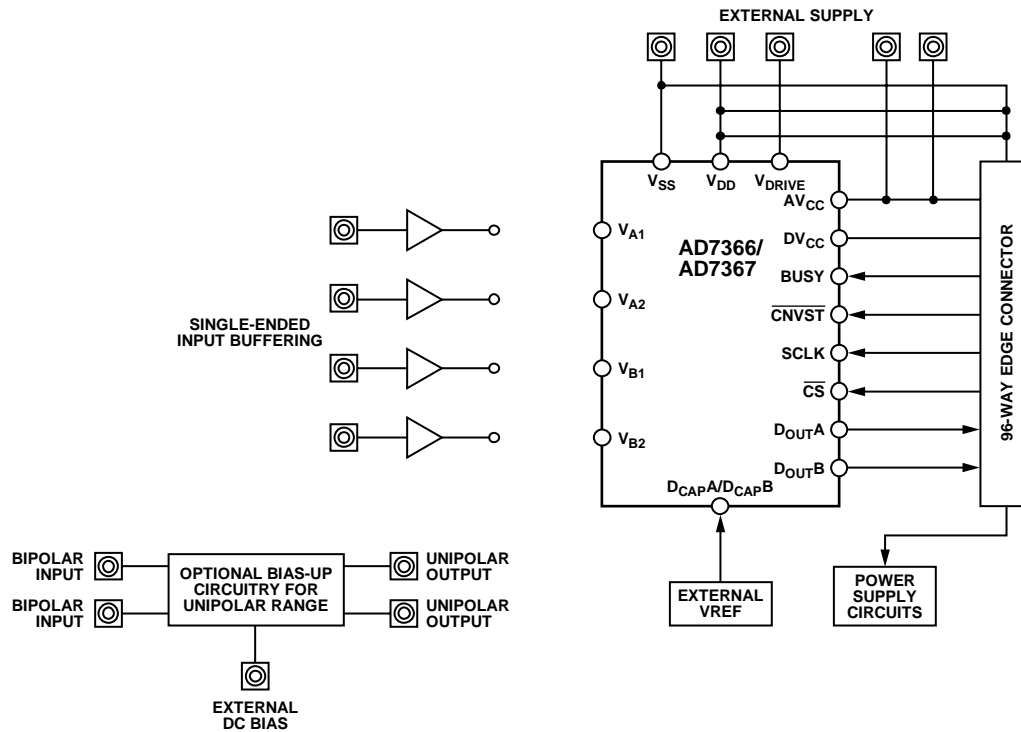
FUNCTIONAL BLOCK DIAGRAM

Figure 1.

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REVISION HISTORY

6/07—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

When using this evaluation board with the EVAL-CONTROL-BRD2, all supplies are provided from the EVAL-CONTROL-BRD2 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: V_{DD} (+12 V), V_{SS} (−12 V), AV_{CC} (+5 V), DV_{CC} (+5 V), AGND, V_{DRIVE}, and DGND. The V_{DD} (+12 V) and V_{SS} (−12 V) supplies must be connected to supply the ADC, the AD8021 op amps, and the AD780 voltage reference. V_{DRIVE} can be derived from DV_{CC}.

The supplies are decoupled to the relevant ground plane with 10 µF tantalum and 0.1 µF multilayer ceramic capacitors at the point where they enter the board. The supply pins of all the op amps and the reference pins are also decoupled to AGND with a 10 µF tantalum and a 0.1 µF ceramic capacitor. The AD7366/AD7367 AV_{CC} and DV_{CC} supply pins are decoupled to AGND with 10 µF tantalum and 0.1 µF multilayer ceramic capacitors.

Extensive ground planes are used on this board to minimize the effect of high frequency noise interference. There are two ground planes, AGND and DGND. These are connected at one location close to the AD7366/AD7367.

LINK OPTIONS

There are 25 link options that must be set for the required operating setup before using the evaluation board. The functions of the options are outlined in Table 1.

SELECTING THE ANALOG INPUT RANGE FOR THE AD7366/AD7367 WHEN USING THE EVAL-CONTROL-BRD2

The EVAL-AD7366/AD7367 is initially configured to operate with a ±10 V. To select an alternative input ranges, that is, ±5 V or 0 V to 10 V, Link 18 and Link 19 must be configured as outlined in Table 2. The chosen input range must also be selected in the software. For details on how to select the appropriate range in the software, see Figure 3 and the Using the Software section.

Table 1. Link Option Functions

Link No.	Function
LK1 to LK4	This link option connects inputs V_{A1}, V_{A2}, V_{B1}, and V_{B2}, respectively, to AGND.
LK5	This link option controls the program pin of the AD780 voltage reference.

LK6, LK7	This link selects the source of the reference input voltage applied to the $D_{CAP}A$ and $D_{CAP}B$ pins of the AD7366/AD7367, respectively.
	    In Position A, the reference input must be supplied through the DCAP_A SMB connector.
	    In Position B, the internal reference from the AD7366/AD7367 is supplied to the bias-up circuit where it is buffered.
	    In Position C, the AD780 supplies a +2.5 V reference to the AD7366/AD7367.

LK8	This link option selects the source of the V_{DRIVE} supply for the AD7366/AD7367 digital interface.
	    In Position A, V_{DRIVE} is tied to DV_{CC}.
	    In Position B, V_{DRIVE} must be supplied from an external source via the VDRIVE SMB.

LK9	This link selects where the BUSY output from the ADC appears.
	    In Position A, the BUSY output may be read by the EVAL-CONTROL-BRD2.
	    In Position B, the BUSY may be read by an external source via the BSY SMB.

LK10	This link selects the source of the $\overline{CNVST}$ input to the ADC.
	    In Position A, $\overline{CNVST}$ is supplied by the EVAL-CONTROL-BRD2.
	    In Position B, $\overline{CNVST}$ must be supplied from an external source via the CONVST SMB.

LK11	This link selects if the SCLK signal is fed through the 7S04 inverter, which inverts the SCLK signal.
	    In Position A, the SCLK bypasses the 7S04.
	    In Position B, the SCLK signal supplied to the AD7366/AD7367 comes from the 7S04 inverter.

LK12	This link selects the source of the SCLK signal for the AD7366/AD7367.
	    In Position A, the SCLK signal must be supplied from an external source via the SCK SMB.
	    In Position B, the SCLK signal is taken directly from the EVAL-CONTROL-BRD2 through the 96-way connector.

LK13	This link selects the source of the $\overline{CS}$ input to the ADC.
	    In Position A, $\overline{CS}$ is supplied by the EVAL-CONTROL-BRD2.
	    In Position B, $\overline{CS}$ must be supplied from an external source via the CS SMB.

LK14, LK15	This link option selects the destination of the $D_{OUT}A$ and $D_{OUT}B$ signals from the AD7366/AD7367, respectively.
	    In Position A, $D_{OUT}A$ and $D_{OUT}B$ go to the 96-way connector on the EVAL-CONTROL-BRD2.
	    In Position B, the $D_{OUT}B$ and $D_{OUT}A$ signals go to the DOUT-A and DOUT-B SMB sockets, respectively.

Link No.	Function
LK16	This link selects whether the AD7366/AD7367 uses the internal or external reference by setting the logic state of the REFSEL pin.
	In Position A, the on-chip +2.5 V internal reference is used as the reference source for both ADC A and ADC B. In this case, LK6 and LK7 can be in Position A, Position B, or left unconnected.
	In Position B, an external reference can be supplied to the AD7366/AD7367 through the $D_{CAP}A$ and/or $D_{CAP}B$ pins. In this case, LK6 and LK7 must be in Position A or Position C.
LK17	This link option selects the source of the logic input to the ADDR pin, thus selecting the pair of channels to be simultaneously converted.
	In Position A, the ADDR pin is connected to a logic high state. Thus, Channel 1 of both ADC A and ADC B are selected for simultaneous conversion.
	In Position B, the ADDR pin is connected to a logic low state. Thus, Channel 2 of both ADC A and ADC B are selected for simultaneous conversion.
LK18	This link option selects the source of the logic input to the RANGE0 pin (see Table 2).
	In Position A, the RANGE0 pin is connected to logic high.
	In Position B, the RANGE0 pin is connected to logic low.
LK19	This link option selects the source of the logic input to the RANGE1 pin (see Table 2).
	In Position A, the RANGE1 pin is connected to logic high.
	In Position B, the RANGE1 pin is connected to logic low.
LK20	This link selects the source of the bias, which is applied to the buffer that generates the biased input for the AD7366/AD7367.
	In Position A, the buffered internal reference for the AD7366/AD7367 ($D_{CAP}A$ or $D_{CAP}B$) is used as the bias input for U10.
	In Position B, the bias input for U10 is grounded.
	In Position C, the bias input for U10 is provided by an external source through the EXT_REFA/B SMB.
LK21	This link option is used to select the source of the V_{DD} (+12 V) supply, which is used to power the op amps and the external reference.
	In Position A, V_{DD} is supplied from the EVAL-CONTROL-BRD2 through the 96-way connector.
	In Position B, V_{DD} is supplied from an external source via the power connector, J17.
LK22	This link option is used to select the source of the V_{SS} (−12 V) supply, which is used to power the op amps.
	In Position A, V_{SS} is supplied from the EVAL-CONTROL-BRD2 through the 96-way connector.
	In Position B, V_{SS} is supplied from an external source via the power connector, J17.
LK23	This link option selects the source of the AV_{CC} supply for the AD7366/AD7367.
	In Position A, AV_{CC} is supplied from the EVAL-CONTROL-BRD2.
	In Position B, AV_{CC} must be supplied from an external source via the AVCC SMB connector.
LK24	This link option selects the source of the DV_{CC} supply for the AD7366/AD7367.
	In Position A, DV_{CC} is supplied from the EVAL-CONTROL-BRD2.
	In Position B, DV_{CC} is tied to the AV_{CC} supply.
	In Position C, DV_{CC} must be supplied from an external source via the DVCC SMB connector.
LK25	This link is used to connect either $D_{CAP}A$ or $D_{CAP}B$ (the AD7366/AD7367 internals reference) to a buffer and the bias-up circuit.
	In Position A, the output from $D_{CAP}A$ is connected to the buffer and the bias-up circuit for use on the 0 V to +10 V range.
	In Position B, the output form $D_{CAP}B$ is connected to the buffer and the bias-up circuit for use on the 0 V to +10 V range.

Table 2. Link Options for Selecting the Various Input Ranges

LK18	LK19	Input Mode Selected
B (Logic state low)	B (Logic state low)	±10 V
A (Logic state high)	B (Logic state low)	±5 V
B (Logic state low)	A (Logic state high)	0 V to 10 V
A (Logic state high)	A (Logic state high)	Not an option

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 a few different modes in which to operate the evaluation board. The user can either operate the board with the EVAL-CONTROL-BRD2 or it can be used as a standalone board. The board can accept analog input voltages within the following ranges: ±10 V, ±5 V, or 0 V to +10 V.

Table 3 shows the position in which all the links are set when the evaluation board is packaged. When the board is shipped, the assumption is that the user will be operating with the EVAL-CONTROL-BRD2. The links are set so that all power supplies and control signals are supplied by the EVAL-CONTROL-BRD2. Initially, all analog input buffers are tied to ground to

ensure that on power-up, they are not floating. The user must change these link positions depending on which analog inputs are used.

The EVAL-AD7366/AD7367 is set up to use the external reference, with the ±10 V input voltage range. Channel V_{A1} and Channel V_{B1} are selected. The AD8021 op amps have approximately a gain of 2.

BOARD SETUP FOR UNIPOLAR 0 V TO 10 V INPUT RANGE

The bias-up circuit can be used to bias up bipolar signals to the appropriate unipolar voltage to make them comply with the input requirements of the ADCs when the 0 V to +10 V analog input range is selected. The user must supply an external dc voltage of 1.25 V to the EXT_REFA/B SMB. See Table 4 for links changes required for unipolar mode of operation. All links other than those detailed in Table 4 remain as in Table 3.

Table 3. Link Positions on the Packaged EVAL-AD7366/AD7367

Link No.	Position	Function
LK1	In	The input to the analog input buffer (U3) is grounded.
LK2	In	The input to the analog input buffer (U4) is grounded.
LK3	In	The input to the analog input buffer (U5) is grounded.
LK4	In	The input to the analog input buffer (U6) is grounded.
LK5	In	AD780 supplies a 2.5 V reference to the AD7366/AD7366.
LK6	C	AD780 supplies an external reference to the AD7366/AD7367 through $D_{CAP}A$.
LK7	C	AD780 supplies an external reference to the AD7366/AD7367 through $D_{CAP}B$.
LK8	A	V_{DRIVE} supply is tied to the DV_{CC} supply.
LK9	A	The BUSY signal is sent to the EVAL-CONTROL-BRD2.
LK10	A	The $\overline{CNVST}$ signal is supplied by the EVAL-CONTROL-BRD2.
LK11	A	The SCLK signal is not inverted by the NC7504.
LK12	B	The SCLK signal is supplied by the EVAL-CONTROL-BRD2.
LK13	A	The $\overline{CS}$ signal is supplied by the EVAL-CONTROL-BRD2.
LK14	A	The $D_{OUT}A$ signal is sent to the EVAL-CONTROL-BRD2.
LK15	A	The $D_{OUT}B$ signal is sent to the EVAL-CONTROL-BRD2.
LK16	B	REFSEL is tied to ground (low logic state). Thus, an external reference is selected.
LK17	B	ADDR is tied to ground (low logic state). Thus, Channel V_{A1} and Channel V_{B1} are selected.
LK18	B	RANGE0 is tied to ground (low logic state). In conjunction with LK19 (RANGE1) in Position B, the ±10 V analog input range is selected.
LK19	B	RANGE0 is tied to ground (low logic state). In conjunction with LK18 (RANGE0) in Position B, the ±10 V analog input range is selected.
LK20	B	Bias input to U10 is grounded because this circuit is only used for the 0 V to +10 V analog input range.
LK21	A	+12 V is supplied from the EVAL-CONTROL-BRD2.
LK22	A	−12 V is supplied from the EVAL-CONTROL-BRD2.
LK23	A	The AV_{CC} supply for the ADC is supplied by the EVAL-CONTROL-BRD2.
LK24	A	The DV_{CC} supply for the ADC is supplied by the EVAL-CONTROL-BRD2.
LK25	Out	The reference is not connected to the AD8021 buffer in the bias-up circuit.

Table 4. Using the Bias Up Circuit for Unipolar Input Mode

Link No.	Position	Function
LK18	B	RANGE0 is tied to ground (low logic state). In conjunction with LK19 (RANGE1) in Position A, the 0 V to +10 V analog input range is selected.
LK19	A	RANGE1 is tied to V_{DRIVE}, (high logic state). In conjunction with LK18 (RANGE0) in Position B, the 0 V to +10 V analog input range is selected.
LK25	Out	The internal reference from the AD7366/AD7367 is not used as the bias voltage.
LK20	C	Connects the external 1.25 V dc supply to the biasing up op amp (U10).

INTERFACING THE EVALUATION BOARD TO THE EVAL-CONTROL-BRD2

Interfacing the EVAL-CONTROL-BRD2 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 that are used to interface between the EVAL-CONTROL-BRD2 and the EVAL-AD7366/AD7367. Table 6 gives its pin designations.
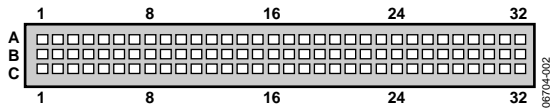
Figure 2. Pin Configuration for the 96-Way Connector, J1

Table 5. 96-Way Connector Pin Description

Signal	Description
DR0	Data Receive Zero. This input is connected to the $D_{OUT}A$ pin of the AD7366/AD7367 via LK14.
DR1	Data Receive One. This input is connected to the $D_{OUT}B$ pin of the AD7366/AD7367 via LK15.
SCLK0	Serial Clock Zero. This continuous clock is connected to the SCLK pin of the AD7366/AD7367 via LK12.
SCLK1	Serial Clock One. This is also connected to the SCLK pin of the AD7366/AD7367 via LK12 and acts as an output.
TRS0	Transmit Frame Sync Zero. This output is connected to the $\overline{CS}$ pin of the AD7366/AD7367 via LK13 to frame the serial data transfer.
RFS0/RFS1	Receive Frame Sync Zero/One. This input is connected to the TFS0 pin of the ADSP-2189 on the EVAL-CONTROL-BRD2 to frame the serial data read.
AV_{CC}	Analog +5 V Supply. These lines are connected to the AV_{CC} line on the board via LK23.
DV_{CC}, V_{DRIVE}	Digital +5 V supply. This is used to provide a digital supply to the board via LK24 for the digital logic.
FL0	Flag Zero. This logic input is connected to the $\overline{CNVST}$ input of the AD7366/AD7367 via LK10.
$\overline{IRQ2}$	Interrupt Request 2. This is a logic output and is connected to the BUSY output of the AD7366/AD7367.
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.
+12 V	+12 V Supply (V_{DD}). This line is connected to the +12 V supply line on the board via LK21.
−12 V	−12 V Supply (V_{SS}). This line is connected to the −12 V supply line on the board via LK22.

Table 6. 96-Way Connector Pin Functions[1]

Pin	Row A	Row B	Row C
1			DR1
2			RFS1
3	SCLK1		SCLK1
4	DGND	DGND	DGND
5			DR0
6	TFS0		RFS0
7	SCLK0		SCLK0
8	DV_{CC}	DV_{CC}	DV_{CC}
9			
10			
11			
12	DGND	DGND	DGND
13			
14			
15			
16	DGND	DGND	DGND
17	FL0		$\overline{IRQ2}$
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	−12 V	AGND	+12 V
31			
32	AV_{CC}	AV_{CC}	AV_{CC}

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

SOCKETS

There are 20 SMB input sockets relevant to the operation of the AD7366/AD7367 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-BRD2, the only external sockets necessary are those used to supply the analog inputs to the ADC (that is, VA1, VA2, VB1, and VB2). If the on-board bias-up circuit is used to generate a unipolar signal from a bipolar signal, then an external 1.25 V dc signal must be supplied to the EXT_REFA/B SMB. All of the other sockets are optional and if they are not used, their signals are supplied by the EVAL-CONTROL-BRD2. 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 7.

Table 7. Socket Functions

Socket	Function
VA1	Subminiature BNC socket for a single-ended bipolar or unipolar analog input that is applied to the AD8021 for buffering prior to the V_{A1} input of the ADC.
VA2	Subminiature BNC socket for a single-ended bipolar or unipolar analog input that is applied to the AD8021 for buffering prior to the V_{A2} input of the ADC.
VB1	Subminiature BNC socket for a single-ended bipolar or unipolar analog input that is applied to the AD8021 for buffering prior to the V_{B1} input of the ADC.
VB2	Subminiature BNC socket for a single-ended bipolar or unipolar analog input that is applied to the AD8021 for buffering prior to the V_{B2} input of the ADC.
DCAP-A	Subminiature BNC socket for an external reference voltage to be applied to $D_{CAP}A$ or to access the internal reference from the AD7366/AD7367.
DCAP-B	Subminiature BNC socket for an external reference voltage to be applied to $D_{CAP}B$ or to access the internal reference from the AD7366/AD7367.
DOUT-A	Subminiature BNC socket for $D_{OUT}A$ output.
DOUT-B	Subminiature BNC socket for $D_{OUT}B$ output.
CS	Subminiature BNC socket for an external $\overline{CS}$ input.
SCK	Subminiature BNC socket for an external SCLK input.
CONVST	Subminiature BNC socket for an external $\overline{CONVST}$ input.
BSY	Subminiature BNC socket for the BUSY signal.
VDRIVE	Subminiature BNC socket for an external V_{DRIVE} input.
AVCC	Subminiature BNC socket for an external AV_{CC} input.
DVCC	Subminiature BNC socket for an external DV_{CC} input.
EXT_REFA/B	Subminiature BNC socket for an external bias input, which is applied to U10.
VIN	Subminiature BNC socket for an external bipolar analog input, which is buffered and applied to U10 for biasing up.
Biased_VIN1	Subminiature BNC socket for the output of the bias-up circuit.
Biased_VIN2	Subminiature BNC socket for the output of the bias-up circuit.

CONNECTORS

There are two connectors on the AD7366/AD7367 evaluation board as outlined in Table 8.

Table 8. Connector Functions

Connector	Function
J1	96-way connector for the digital interface and power supply connections.
J17	External +12 V, −12 V, and AGND power connector.

TEST POINTS

There are nine test points on the AD7366/AD7367 evaluation board. These enable the user to have easy access to these signals for probing, evaluation, and debugging.

OPERATING WITH THE EVAL-CONTROL-BRD2

The evaluation board can be operated in a standalone mode or operated in conjunction with the EVAL-CONTROL-BRD2. This Evaluation Board Controller is available from Analog Devices under the order entry EVAL-CONTROL BRD2.

When interfacing the EVAL-AD7366/AD7367 directly to the EVAL-CONTROL-BRD2, all supplies and control signals to operate the AD7366/AD7367 board are provided by the EVAL-CONTROL BOARD. Due to the nature of the DSP interface on the EVAL-CONTROL-BRD2, AD7366/AD7367 sampling rates greater than 700 kSPS are not supported when interfacing this evaluation board directly to the EVAL-CONTROL-BRD2.

Software to communicate with the EVAL-CONTROL-BRD2 and AD7366/AD7367 is provided with the AD7366/AD7367 evaluation board package. This EVAL-CONTROL-BRD2 also operates with all Analog Devices evaluation boards that end with the letters CB.

The 96-way connector on the EVAL-AD7366/AD7367 plugs directly into the 96-way connector on the EVAL-CONTROL-BRD2. The EVAL-CONTROL-BRD2 provides all the supplies for the evaluation board. It is powered from a 12 V 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 Digi-Key Corporation (U.S.) and Campbell Collins, Ltd. (U.K.).

Connection between the EVAL-CONTROL-BRD2 and the serial port of a PC is via a standard Centronics printer port cable that is provided as part of the EVAL-CONTROL-BRD2 package. Refer to the manual that accompanies the EVAL-CONTROL-BRD2 for more details on this package.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The EVAL-AD7366/AD7367 evaluation kit includes a CD-ROM that contains software for controlling and evaluating the performance of the AD7366/AD7367 when it is operated with the EVAL-CONTROL-BRD2.

When the CD is inserted into the PC, an installation program automatically begins. This program installs the evaluation software, the data sheet for the evaluation board, the data sheet for the AD7366/AD7367, as well as the data sheet for the EVAL-CONTROL-BRD2. All literature on the CD is in Adobe's portable documentation format (PDF) and requires Acrobat® Reader to be viewed or printed. The user interface on the PC is a dedicated program written especially for the AD7366/AD7367 when operating with the EVAL-CONTROL-BRD2.

The software should be installed before the printer port cable is connected between the EVAL-CONTROL-BRD2 and the PC. This ensures that the printer port is initialized properly.

SETTING UP THE EVAL-CONTROL-BRD2

This section describes how the evaluation board, the EVAL-CONTROL-BRD2 and the software should be set up to begin using the complete system.

1. Install the AD7366/AD7367 evaluation board software.
2. Connect the EVAL-CONTROL-BRD2 and the evaluation board together via the 96-way connector.

3. Apply power to the EVAL-CONTROL-BRD2 via a 12 V ac transformer. At this stage, the red LED on the EVAL-CONTROL-BRD2 should be flashing, which indicates that the EVAL-CONTROL-BRD2 is functional and ready to receive instructions.
4. The printer port can then be connected between the PC and the EVAL-CONTROL-BRD2.

CONFIGURING THE EVALUATION BOARD

The **Load Configuration** dialog box allows you to load the required configuration file for the evaluation board. A screenshot is shown in Figure 3. The configuration file gives the software detailed information about the AD7366 or the AD7367 evaluation board and the part connected to the EVAL-CONTROL-BRD2, such as the number of bits, analog input range, the maximum sampling rate, output coding, maximum sampling rate, and power supply requirements. The **Load Configuration** window is also used to set the analog input range corresponding to the range selected using LK18 and LK19 on the AD7366/AD7367.

The configuration file tells the software the names of the DSP program file that it should download to the EVAL-CONTROL-BRD2. The **Load Configuration** window also allows you to choose the sampling frequency and the number of samples to take.

Figure 3. AD7266 Load Configuration Window

To load the required configuration files, follow these steps:

1. When the software is run, click the **Device Select** control button. This displays the **Load Configuration** window (as shown in Figure 3).

2. The **Select a Configuration File** list box at the top left of the window lists the available configuration files. Select the relevant configuration file (**AD7366.cfg** for AD7366, or **AD7367.cfg** for AD7367.) The configuration files are text based files that contain information about the particular evaluation board being used. The information covers the part name, number of samples to be taken, default and maximum sampling frequency, and power supply settings.

3. Set the desired analog input range in the **Input V Max** and **Input V Min** boxes, then click **OK**. The default analog input range selected with all the configuration files is ±10 V. If the analog input range selected using LK18 and LK19 on the AD7366/AD7367 does not correspond to the analog input range set in the **Load Configuration** window, the data that is subsequently displayed may be incorrect.

4. When **OK** is clicked, the EVAL-CONTROL-BRD2 resets and the DSP program is downloaded. When the download is complete, the power supply settings indicated in the configuration file are set and you may hear some of the relays clicking.

The selection options (for example, **Num Samples** and **Sample Frequency**) are set to the default values specified by the configuration file. You are free to change these at will.

Software Configuration Files

The following is a typical software configuration File (*.cfg).

```
[EVAL-CONTROL BOARD]
partname:AD7366

programname:ad7366.PRG
samplefrequency:100000
maxsamplefrequency:700000
samples:2048


+/-15V:on
dvdd:5:on
avdd:5:on
bus:on
;options 2scomp,
dataformat:2scomp
numberofbits:12
inputVmax:10
inputVmin:-10
```

USING THE SOFTWARE

With the hardware set up, you can now use the software to control the EVAL-CONTROL-BRD2 and the AD7366 or AD7367 evaluation board.

The software that controls the EVAL-CONTROL-BRD2 and, therefore, the AD7366/AD7367 evaluation board, has two main windows. Figure 4 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 screen can be divided into three main sections.

The top portion of the screen contains the control buttons, the menu bar, the busy status, and selection options. The control buttons allow you to take samples, reset the board, and to exit the program.

Control Buttons

Clicking the **Reset** button causes the EVAL-CONTROL-BRD2 to perform a reset function. The power supplies are turned off and the program enters DSP memory.

The **Exit** button quits the program.

To load a configuration file, click the **Device Select** button, which opens the **Load Configuration** window.

Menu Bar

The menu bar consists of **File**, **Config**, **Channel,** and **About**.

File Menu

The **File** menu offers the following:

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

Save Raw Data. Selecting this option allows you to save the current set of sample data points. The data can be reloaded to the EVAL-CONTROL-BRD2 software at a later date or can be used by other programs for further analysis.

Save Binary Data. Selecting this option allows you 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, and looking for stuck bits.

Exit. Quits the program.

About Menu

The **About** drop-down menu gives you information about the version of the software.

The **Busy** status indicates when the evaluation board is busy.

The **Frequency** spin box and **Num Samples** drop-down list box allow you to change the sampling frequency and the number of samples to upload. The **Frequency** spin box also displays the speed at which the part is running, which you can change.

The **Codes/Volts** button determines whether the data is displayed in volts or codes.

Digital Storage Oscilloscope

The middle section of the screen is a digital storage oscilloscope (DSO) that allows you to display a waveform, a histogram or an FFT. When samples are uploaded from the EVAL-CONTROL-BRD2, they are displayed here. The samples can be displayed either as integer values or as voltages.

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, if required. The right-hand side of the middle section contains information about the samples taken, for example, minimum/maximum position or velocity, the spread, the standard deviation, and the mean.

Fast Fourier Transform or Histogram

The lower section of the window is also a digital storage oscilloscope (DSO) that allows you to display a waveform, a histogram, or an FFT. The FFT (the default option) is typically used for examining the ADC's performance in the frequency domain while the histogram gives an indication of the ADC's performance in response to dc inputs. The option displayed can be changed by clicking on the **Waveform**, **Histogram**, and **FFT** buttons. The right-hand side of the lower section contains information about the samples taken, for example, ac specifications. Figure 4 shows a screen shot of the main window.

You can choose whether to display the information for ADC A, or ADC B, or both in the window using the **SHOW** drop-down list box**.** When the software is in **Both** display mode, the results from both ADCs for the channel selected are displayed. They can be distinguished in color by white (ADC A) or red (ADC B).

Information about both ADCs in histogram mode cannot be shown, only either the codes for the ADC A or the ADC B are shown.

TAKING SAMPLES

When you click the **Sample** button, the software instructs the EVAL-CONTROL-BRD2 to take the required number of samples at the required frequency from the evaluation board. The AD7366/AD7367 evaluation board runs up to 700 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, as shown in Figure 4). While the software is continuously sampling data, the other control buttons are disabled except the **Reset** and **Stop** buttons. You can also switch between displaying data from ADC A, ADC B, or both while the software is running continuously.
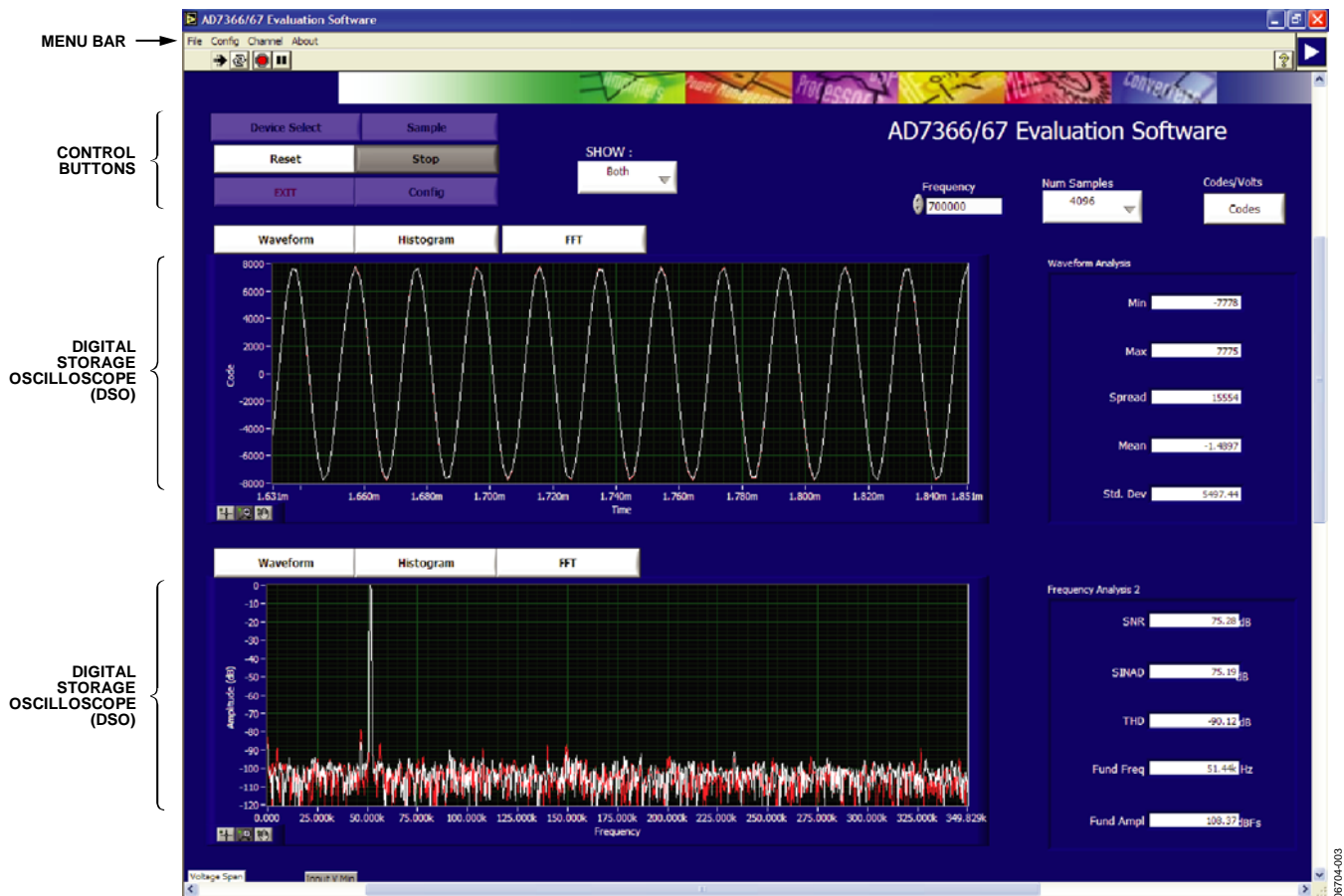

Figure 4. AD7266 Main Window

EVALUATION BOARD SCHEMATICS AND ARTWORK

EVAL-AD7366/AD7367 schematics, silkscreen, and layout can be found in Figure 5 to Figure 9.
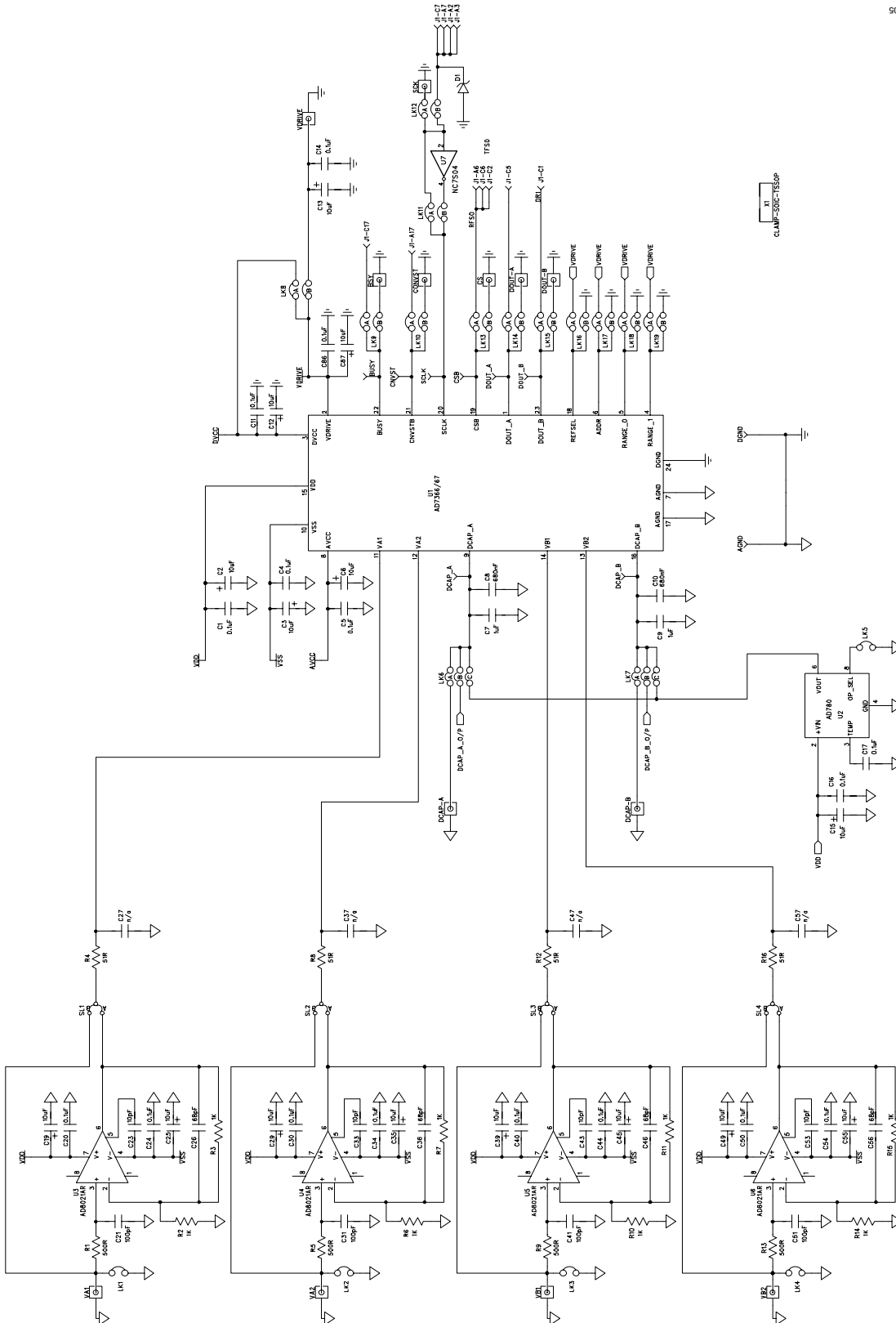

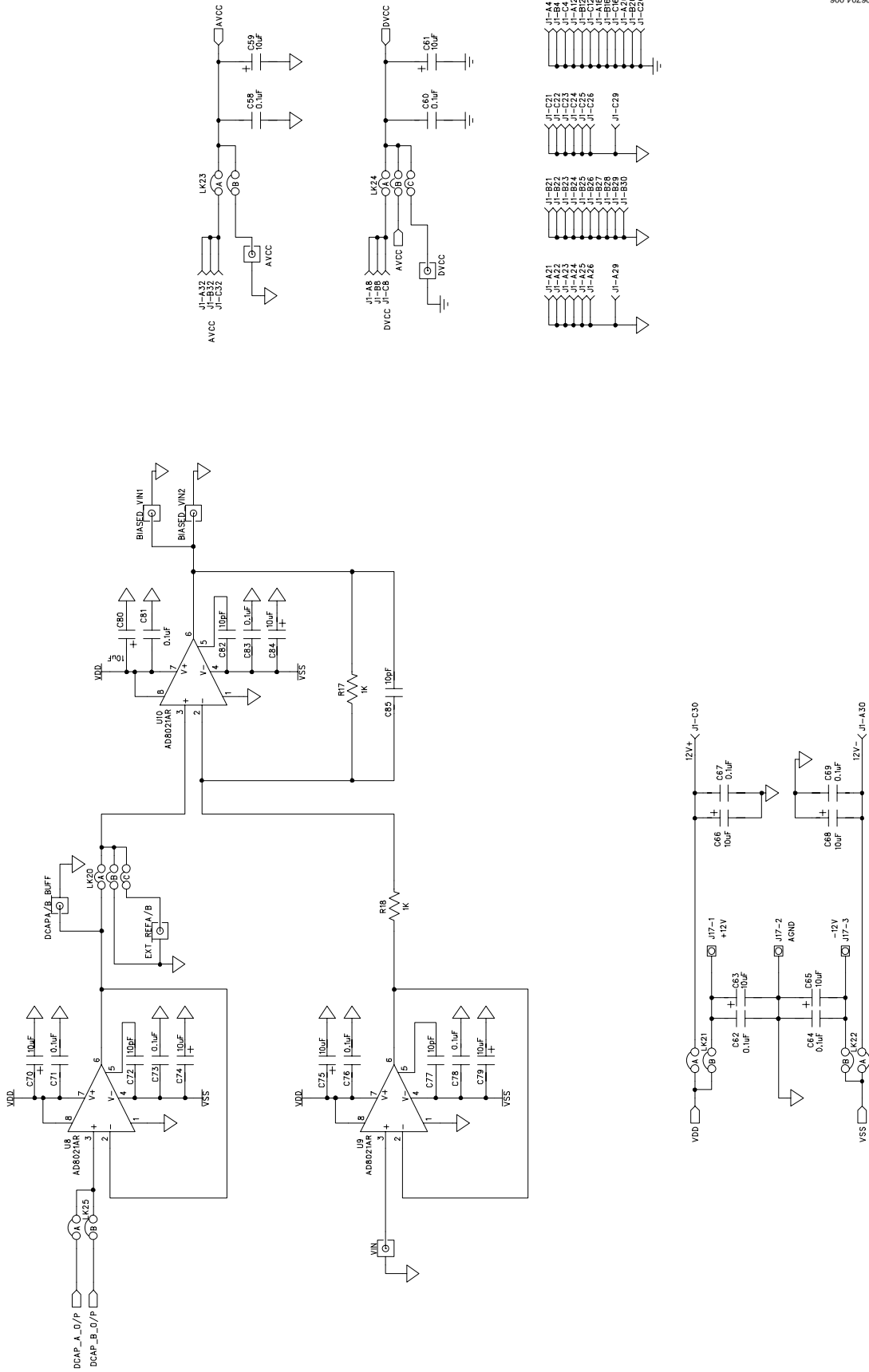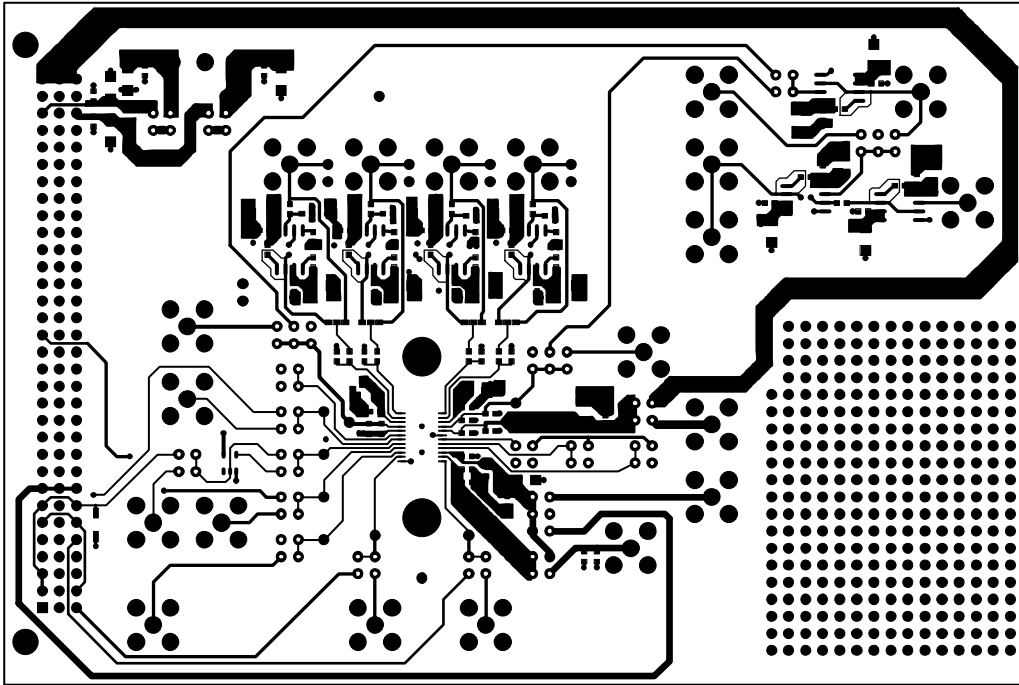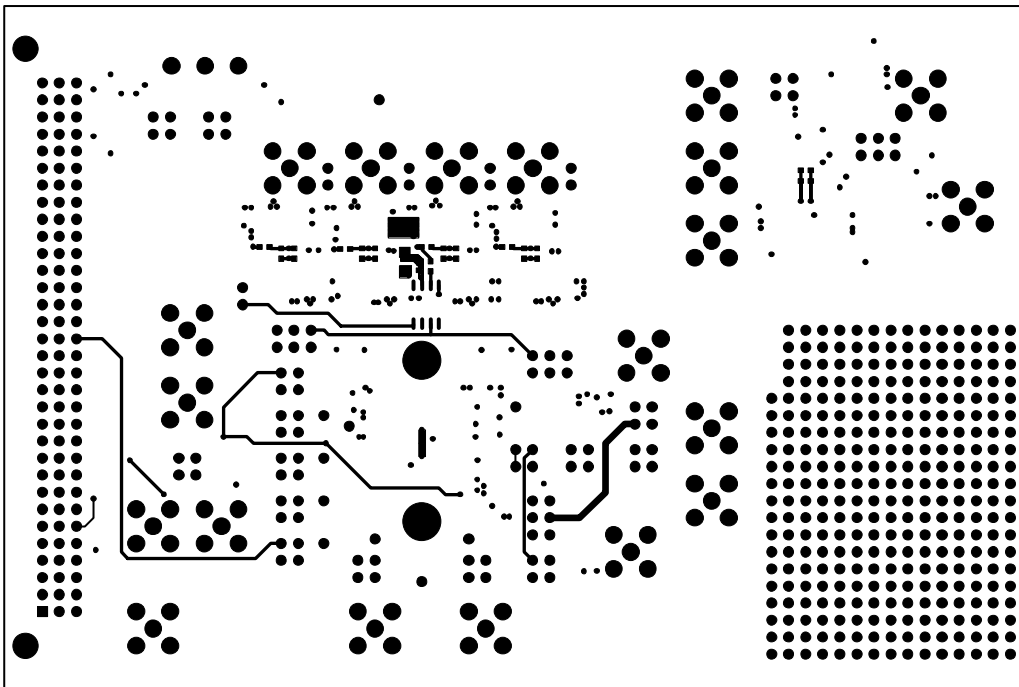*Figure 5. AD7366/AD7367 Evaluation Board Circuit Diagram 1*

Figure 6. AD7366/AD7367 Evaluation Board Circuit Diagram 2

Figure 7. Component Side Artwork

Figure 8. Solder Side Artwork

Figure 9. Silkscreen
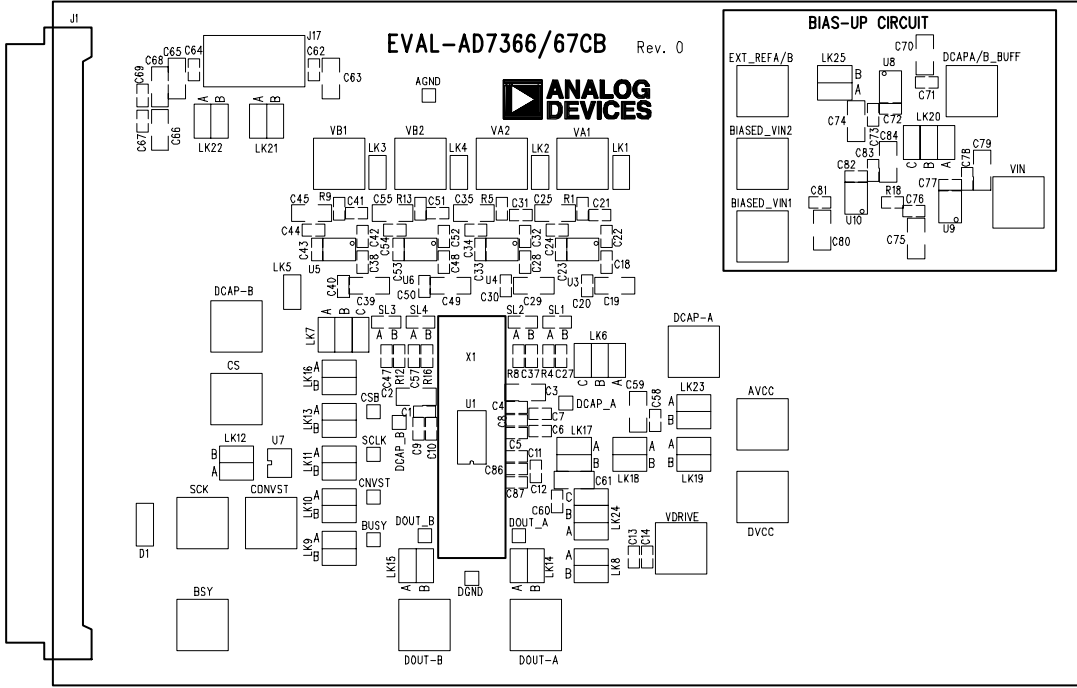
ORDERING INFORMATION

BILL OF MATERIALS

Table 9.

Qty	Reference Designator	Description	Supplier/Number
23	C2, C3, C15, C19, C25, C29, C35, C39, C45, C49, C55, C59, C61, C63, C65, C66, C68, C70, C74, C75, C79, C80, C84	10 µF capacitor	Digi-Key PCC2417CT-ND
28	C1, C4, C5, C11, C14, C16, C17, C20, C24, C30, C34, C40, C44, C50, C54, C58, C60, C62, C64, C67, C69, C71, C73, C76, C78, C81, C83, C86	0.1 µF capacitor	FEC[1] 9406140
4	C6, C12, C13, C87	10 µF capacitor	Digi-Key PCC2395CT-ND
2	C7, C9	1 µF capacitor	FEC[1] 9527699
2	C8, C10	680 nF capacitor	Digi-Key 490-1542-1-ND
4	C21, C31, C41, C51	100 pF capacitor	FEC[1] 499122
8	C23, C33, C43, C53, C72, C77, C82, C85	10 pF capacitor	FEC[1] 499110
4	C26, C36, C46, C56	68 pF capacitor	FEC[1] 722066
1	D1	Schottky diode, SD103C-SMD	Digi-Key SD103-CWDICT-ND
1	J1	Plug, CON\41612\96	FEC[1] 1096832
1	J17	Terminal block, CON\POWER3	FEC[1] 151-790
4	R1, R5, R9, R13	500 Ω resistor	FEC[1] 1170758
10	R2, R3, R6, R7, R10, R11, R14, R15, R17, R18	1 kΩ resistor	FEC[1] 9330380
4	R4, R8, R12, R16	51 Ω resistor	FEC[1] 9331336
1	U1	ADC, AD7366/67BRUZ	Analog Devices AD7366/67
1	U2	2.5 V/3 V Reference, AD780ARZ	Analog Devices AD780
7	U3, U4, U5, U6, U8, U9, U10	Op amp, AD8021ARZ	Analog Devices AD8021AR
1	U7	Inverter, NC7S04M5	Analog Devices NC7S04

[1] FEC = Farnell Electronics.

ORDERING GUIDE

Model	Description
EVAL-AD7366CBZ[1]	Evaluation Board
EVAL-AD7367CBZ[1]	Evaluation Board
EVAL-CONTROL BRD2	Control 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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