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EVAL-AD765x-1SDZ User Guide UG-417

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Evaluating the AD7656-1/AD7657-1/AD7658-1, 250 kSPS, 6-Channel, Simultaneous Sampling, Bipolar 16-/14-/12-Bit ADCs

FEATURES

Full featured evaluation board for the AD7656-1/AD7657-1/ AD7658-1

PC control in conjunction with the system demonstration platform (EVAL-SDP-CB1Z)

PC software for control and data analysis (time and frequency domain)

Standalone capability

EVALUATION KIT CONTENTS

EVAL-AD7656-1SDZ, EVAL-AD7657-1SDZ, or EVAL-AD7658-1SDZ evaluation board Evaluation software CD for the AD7656-1/AD7657-1/ AD7658-1

9 V mains power supply adapter

ADDITIONAL EQUIPMENT NEEDED

EVAL-SDP-CB1Z system demonstration platform, includes a USB cable Precision analog signal source SMB cables PC running Windows XP SP2, Windows Vista, or Windows 7 with USB 2.0 port

ONLINE RESOURCES

Documents AD7656-1/AD7657-1/AD7658-1 data sheet EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ user guide

Required Software EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ evaluation software

GENERAL DESCRIPTION

The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ are full featured evaluation boards that can be used to easily evaluate all features of the AD7656-1/AD7657-1/AD7658-1. The AD7656-1/AD7657-1/AD7658-1 are 16-/14-/12-bit, 6-channel, 250 kSPS simultaneous sampling ADCs, respectively. Each part contains six 16-, 14-, or 12-bit, low power SAR ADCs and can operate from a single 4.75 V to 5.25 V power supply or dual \pm 12 V power supplies. The parts feature throughput rates of up to 250 kSPS.

The evaluation boards can be controlled via the system demonstration platform (SDP). The EVAL-SDP-CB1Z board allows the evaluation boards to be controlled via the USB port of a PC using the AD7656-1/AD7657-1/AD7658-1 evaluation software. The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ generates all required power supplies on board and supplies power to the EVAL-SDP-CB1Z controller board.

On-board components include the following:

AD8597: ultralow distortion, ultralow noise op amp (single) AD8031: 2.7 V, 800 μA, 80 MHz rail-to-rail I/O single amplifier ADP1613: step-up PWM dc-to-dc switching converter

ADP3303-5: high accuracy anyCAP* 200 mA low dropout linear regulator

ADP2301: 1.2 A, 20 V, 1.4 MHz nonsynchronous step-down switching regulator

ADM1185: quad voltage monitor and sequencer

ADP190: logic controlled, high-side power switch

ADG3308: low voltage, 1.15 V to 5.5 V, 8-channel bidirectional logic level translator

ADR431: ultralow noise XFET^{*} voltage reference with current sink and source capability

AD780: 2.5 V/3.0 V ultrahigh precision band gap voltage reference

A functional block diagram is shown in Figure 1, and various link options are described in the Link Configuration Options section.

For full details on the AD7656-1/AD7657-1/AD7658-1, see the AD7656-1/AD7657-1/AD7658-1 data sheet, which should be consulted in conjunction with this user guide when using these evaluation boards.

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REVISION HISTORY

6/13—Revision 0: Initial Version

EVAL-AD765x-1SDZ User Guide

FUNCTIONAL BLOCK DIAGRAM

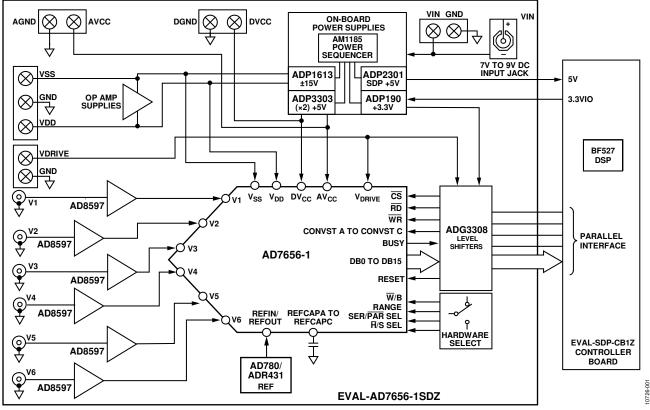


Figure 1.

GETTING STARTED

QUICK START STEPS

To begin using the evaluation board, do the following:

- With the EVAL-SDP-CB1Z board disconnected from the USB port of the PC, install the AD7656-1/AD7657-1/ AD7658-1 evaluation board software from the CD included in the evaluation board kit. The PC must be restarted after the software installation is complete. (For complete software installation instructions, see the Software Installation Procedures section.)
- Connect the EVAL-SDP-CB1Z board to the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ board as shown in Figure 2. Screw the two boards together using the nylon screw-nut set included in the

evaluation board kit to ensure that the boards are connected firmly together.

- 3. Connect the 9 V power supply adapter included in the evaluation board kit to Connector J702 on the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ board.
- 4. Connect the EVAL-SDP-CB1Z board to the PC using the supplied USB cable. (If you are using Windows* XP, you may need to search for the EVAL-SDP-CB1Z drivers. Choose to automatically search for the drivers for the EVAL-SDP-CB1Z board if prompted by the operating system.)
- 5. Launch the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ software from the **Analog Devices** subfolder in the **Programs** menu.

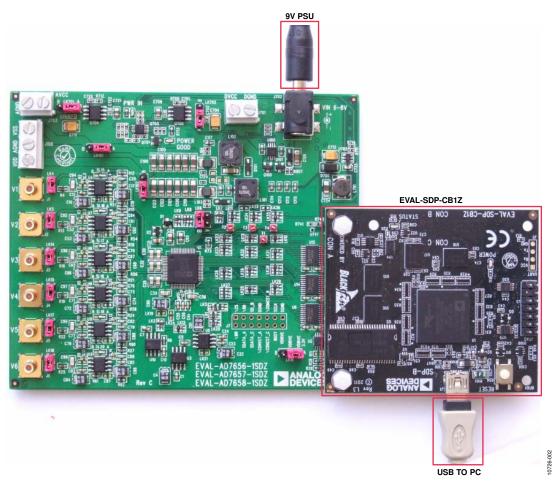


Figure 2. Hardware Configuration—Setting up the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ (EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ on Left and EVAL-SDP-CB1Z on Right)

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SOFTWARE INSTALLATION PROCEDURES

The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-

AD7658-1SDZ evaluation kit includes a CD containing software to be installed on your PC before you begin using the evaluation board.

There are two parts to the installation:

- AD7656-1/AD7657-1/AD7658-1 evaluation board software installation
- EVAL-SDP-CB1Z system demonstration platform board drivers installation

Warning

The evaluation board software and drivers must be installed before connecting the evaluation board and EVAL-SDP-CB1Z board to the USB port of the PC to ensure that the evaluation system is correctly recognized when it is connected to the PC.

Installing the AD7656-1/AD7657-1/AD7658-1 Evaluation Board Software

To install the AD7656-1/AD7657-1/AD7658-1 evaluation board software,

- With the EVAL-SDP-CB1Z board disconnected from the USB port of the PC, insert the installation CD into the CD-ROM drive.
- Double-click the setup.exe file to begin the evaluation board software installation. The software is installed to the following default location: C:\Program Files\Analog Devices\AD7656-1_57-1_58-1.
- 3. A dialog box appears asking for permission to allow the program to make changes to your computer. Click **Yes**.





4. Select the location to install the software, and then click Next.

₩ ADxxxx	
Destination Directory Select the primary installation directory.	
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory	
Directory for ADXXXX C:\Ptogram Files\Analog Devices\ Brow	
Directory for National Instruments products	
C:\Program Files\National Instruments\ Brow	se
(
<< Back Next >>>	<u>Cancel</u>

Figure 4. AD7656-1/AD7657-1/AD7658-1 Evaluation Board Software Installation: Selecting the Location for Software Installation

5. A license agreement appears. Read the agreement, and then select **I accept the License Agreement** and click **Next**.

W ADXXXX	
License Agreement You must accept the license(s) display	red below to proceed.
NATIONAL INSTRUMENT	IS SOFTWARE LICENSE AGREEMENT
ANDOR COMPLETE THE INSTALLATION P DOWNLOADING THE SOFTWARE AND/OR COMPLETE THE INSTALLATION PROCESS AOREEMENT AND YOU AGREE TO BE BOU BECOME A PARTY TO THIS AGREEMENT A CONDITIONS, CLICK THE APPROPRIATE O DO NOT INSTALL OR USE THE SOFTWARE (30) DAYS OF RECEIPT OF THE SOFTWARE	S, YOU CONSENT TO THE TERMS OF THIS JND BY THIS AGREEMENT. IF YOU DO NOT WISH TO MID BE BOUND BY ALL OF ITS TERMS AND BUTTON TO CANCEL THE INSTALLATION PROCESS, E, AND RETURN THE SOFTWARE WITHIN THIRTY IE (WITH ALL ACCOMPANYING WRITTEN MATERIALS, IE PLACE YOU OBTAINED THEM. ALL RETURNS
	accept the License Agreement O I do not accept the License Agreement
	< <pre><< Book Next >> Cancel</pre>

Figure 5. AD7656-1/AD7657-1/AD7658-1 Evaluation Board Software Installation: Accepting the License Agreement

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6. A summary of the installation is displayed. Click **Next** to continue.

ADxxxx				
Start Installation Review the following sur	nmary before continuing			
Adding or Changing •ADxxxx Files				
k the Next button to begin installa	tion. Click the Back but	ton to change the	installation settings	

Figure 6. AD7656-1/AD7657-1/AD7658-1 Evaluation Board Software Installation: Reviewing a Summary of the Installation 0726-006

7. A dialog box informs you when the installation is complete. Click **Next**.

🖷 AD>	<xxx< th=""><th></th><th></th><th></th></xxx<>			
	Installation Complete			
	The installer has finished updating your system.			
		< <u>€</u> Back	Next >>	Einish

Figure 7. AD7656-1/AD7657-1/AD7658-1 Evaluation Board Software Installation: Indicating When the Installation Is Complete

Installing the EVAL-SDP-CB1Z System Demonstration Platform Board Drivers

After the installation of the evaluation board software is complete, a welcome window is displayed for the installation of the EVAL-SDP-CB1Z system demonstration platform board drivers.

1. With the EVAL-SDP-CB1Z board still disconnected from the USB port of the PC, make sure that all other applications are closed, and then click **Next**.

ADI SDP Drivers 2.0.2.0 Setup	Welcome to the ADI SDP Drivers 2.0.2.0 Setup Wizard This wizard will guide you through the installation of ADI SDP Drivers 2.0.2.0. It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer. Click Next to continue.
	Next > Cancel

Figure 8. EVAL-SDP-CB1Z Drivers Setup: Beginning the Drivers Installation

2. Select the location to install the drivers, and then click Next.

🕞 ADI SDP Drivers 2.0.2.0 Setup	
Choose Install Location Choose the folder in which to install ADI SDP Drivers 2.0.2.0.	
Setup will install ADI SDP Drivers 2.0.2.0 in the following folder. To i folder, click Browse and select another folder. Click Install to start th	
Destination Folder C\Program Files\Analog Devices\SDP\Drivers	Browse
Space required: 12.6MB Space available: 139.6GB Nullsoft Install System v2.46	Install Cancel

Figure 9. EVAL-SDP-CB1Z Drivers Setup: Selecting the Location for Drivers Installation

3. Click **Install** to confirm that you would like to install the drivers.



Granting Permission to Install Drivers

4. To complete the drivers installation, click **Finish**, which closes the installation wizard.



Figure 11. EVAL-SDP-CB1Z Drivers Setup: Completing the Drivers Setup Wizard

5. Before using the evaluation board, you must restart your computer. A dialog box opens, giving you the following options: **Restart, Shut Down, Restart Later**. Click the appropriate button.



igure 12. EVAL-SDP-CB1Z Drivers Setup Restarting the Computer

EVALUATION BOARD SETUP PROCEDURES

The AD7656-1/AD7657-1/AD7658-1 evaluation board connects to the EVAL-SDP-CB1Z system demonstration board. The EVAL-SDP-CB1Z board is the controller board, which is the communication link between the PC and the main evaluation board. Figure 2 shows a photograph of the connections made between the AD7656-1/AD7657-1/AD7658-1 daughter board and the EVAL-SDP-CB1Z board.

After following the instructions in the Software Installation Procedures section, set up the evaluation and SDP boards as detailed in this section.

Warning

The evaluation software and drivers must be installed before connecting the evaluation board and EVAL-SDP-CB1Z board to the USB port of the PC to ensure that the evaluation system is correctly recognized when it is connected to the PC.

Configuring the Evaluation and SDP Boards

- 1. Connect the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ board to Connector A or Connector B of the EVAL-SDP-CB1Z board (see Figure 2).
 - a. Screw the two boards together using the nylon screwnut set included in the evaluation board kit to ensure that the boards are connected firmly together.
- Connect the 9 V power supply adapter included in the evaluation kit to Connector J702 of the EVAL-AD7656-1SDZ/ EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ board. (See Table 1 for more information about the connections and options for the required power supplies.)
- 3. Connect the EVAL-SDP-CB1Z board to the PC using the supplied USB cable.

EVALUATION BOARD HARDWARE AD7656-1/AD7657-1/AD7658-1 DEVICE DESCRIPTION

The AD7656-1/AD7657-1/AD7658-1 are reduced decoupling pin- and software-compatible versions of the AD7656/AD7657/ AD7658. Each AD7656-1/AD7657-1/AD7658-1 device contains six 16-/14-/12-bit, fast, low power successive approximation ADCs in a package designed on the *i*CMOS[®] process (industrial CMOS). *i*CMOS is a process combining high voltage silicon with submicron CMOS and complementary bipolar technologies. It enables the development of a wide range of high performance analog ICs capable of 33 V operation in a footprint that no previous generation of high voltage parts could achieve.

The AD7656-1/AD7657-1/AD7658-1 feature throughput rates of up to 250 kSPS. The parts contain low noise, wide bandwidth track-and-hold amplifiers that can handle input frequencies of up to 4.5 MHz.

For more information about these devices, refer to the AD7656-1/ AD7657-1/AD7658-1data sheet, which should be used in conjunction with this user guide.

POWER SUPPLIES

The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-

AD7658-1SDZ can be used in two modes: SDP controlled mode and standalone mode (see the Modes of Operation section for more information).

When the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ board is used in conjunction with the EVAL-SDP-CB1Z board (SDP controlled mode), connect the 9 V dc supply to Connector J702 on the EVAL-AD7656-1SDZ/ EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ board. The V_{DD}, V_{SS}, AV_{CC}, and DV_{CC} supplies are generated on board. When the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ board is used in standalone mode, the V_{DD}, V_{SS}, AV_{CC}, and DV_{CC} supplies must be sourced from external sources (see Table 1).

In SDP controlled mode and standalone mode, each supply is decoupled on the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/ EVAL-AD7658-1SDZ using 10 μ F and 0.1 μ F capacitors. A single ground plane is used on this board to minimize the effect of high frequency noise interference.

Table 1. External Power Supplies Required				
Power Supply	Connector	Voltage Range	Purpose	
V _{IN} ¹	J702	7 V to 9 V	Supplies all on-board power supplies, generating all required voltages to run the evaluation board	
V _{DD}	J100	+12 V to +16.5 V	Supplies the positive rail of the amplifier	
V _{ss}	J100	–12 V to –16.5 V	Supplies the negative rail of the amplifier	
AVcc	J703	4.75 V to 5.25 V	Supplies the AVcc analog supply on the ADC	
DVcc	J701	4.75 V to 5.25 V	Supplies the DV _{cc} digital supply on the ADC	

Table 1. External Power Supplies Required

¹ When V_{IN} is supplied, all other power supplies are available on board. If the V_{IN} supply is not used, all other power supplies must be sourced from an external source.

LINK CONFIGURATION OPTIONS

There are multiple jumper (LKx) and solder link (SLx) options that must be set correctly to select the appropriate operating setup before you begin using the evaluation board. The functions of these options are outlined in Table 2.

SETUP CONDITIONS

Table 2. Link Option Functions

Care should be taken before applying power and signals to the evaluation board to ensure that all link positions are as required by the operating mode. There are two modes in which to operate the evaluation board. The evaluation board can be operated in SDP controlled mode to be used with the SDP board, or the evaluation board can be used in standalone mode.

Table 3 shows the default positions in which the links are set when the evaluation board is packaged. When the board is shipped, it is assumed that you are going to operate the evaluation board with the SDP board (SDP controlled mode).

Link No.	Function
LK1	H/S SEL selection.
	Position A: the software input is selected.
	Position B: the hardware input is selected.
LK2	V _{REF} buffer signal selection.
	Position A: the VREF signal is unbuffered.
	Position B: the V_{REF} signal is buffered by the AD8031 op amp (U10).
LK3	WR/REF _{EN/DIS} signal selection.
	Position A: the WR/REF _{EN/DIS} pin is connected to EVAL-SDP-CB1Z.
	Position B: the WR/REFENTORS pin is connected to the J7-2 external socket.
	Position C: the $\overline{WR}/REF_{EN/\overline{DIS}}$ pin is connected to GND.
	Position D: the $\overline{WR}/REF_{EN/\overline{DIS}}$ pin is connected to V_{DRIVE} .
LK4	V1 input jumper.
	Inserted: the V1 input is shorted to GND.
LK5	V2 input jumper.
	Inserted: the V2 input is shorted to GND.
LK6	RANGE signal selection.
	Position A: the RANGE pin is connected to V _{DRIVE} .
	Position B: the RANGE pin is connected to GND. The input range is set to $\pm 4 \times V_{REF}$.
LK7	STBY signal selection.
	Position A: the $\overline{\text{STBY}}$ pin is connected to V_{DRIVE} . Normal operation is selected.
	Position B: the STBY pin is connected to GND.
LK8	RESET signal selection.
	Position A: the RESET pin is connected to V _{DRIVE} .
	Position B: the RESET pin is connected to GND.
1.160	Position C: the RESET pin is connected to EVAL-SDP-CB1Z.
LK9	W/B signal selection.
	Position A: the \overline{W}/B pin is connected to V_{DRIVE} .
	Position B: the \overline{W}/B pin is connected to GND. Word mode is selected.
LK10	BUSY signal selection.
	Position A: the BUSY pin is connected to EVAL-SDP-CB1Z.
	Position B: the BUSY pin is connected to the J7-12 external socket.
LK11	CONVST A signal selection.
	Position A: the CONVST A pin is connected to the J7-8 external socket.
	Position B: the CONVST A pin is connected to EVAL-SDP-CB1Z.
	Position C: the CONVST A pin is connected to GND.
LK12	CS source signal selection.
	Position A: the \overline{CS} pin is connected to EVAL-SDP-CB1Z.
	Position B: the \overline{CS} pin is connected to the J7-1 external socket.
LK13	REFIN/REFOUT source signal selection.
	Position A: the REFIN/REFOUT signal is sourced from AD780 (U5).
	Position B: the REFIN/REFOUT signal is sourced from ADR431 (U3).
LK14	V3 input jumper.
	Inserted: the V3 input is shorted to GND.

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Link No.	Function
LK15	V4 input jumper.
	Inserted: the V4 input is shorted to GND.
LK16	V _{DRIVE} source signal selection.
	Position A: the V _{DRIVE} signal is sourced from the on-board 3.3 V supply. (Requires the EVAL-SDP-CB1Z board to be connected.)
	Position B: the V _{DRIVE} pin is connected to the J7-14 external socket.
LK17	V5 input jumper.
1 1/10	Inserted: the V5 input is shorted to GND.
LK18	V6 input jumper. Inserted: the V6 input is shorted to GND.
1 1/10	REFIN/REFOUT input selection.
LK19	Inserted: the V_{REF} signal is connected to the REFIN/REFOUT pin.
LK20	SER/PAR SEL selection.
LINZO	Position A: the SER/PAR SEL pin is connected to V _{DRIVE} .
	Position B: the SER/PAR SEL pin is connected to VDRVE. Position B: the SER/PAR SEL pin is connected to GND. Parallel mode is selected.
1 1/21	
LK21	AD780 (U5) voltage output selection. Inserted: the AD780 voltage output is 3 V.
	Removed: the AD780 voltage output is 2.5 V.
LK22	CONVST A/CONVST B link selection.
LNZZ	Inserted: Connects CONVST A to CONVST B.
1.1/22	
LK23	RD source signal selection.
	Position A: the RD pin is connected to EVAL-SDP-CB1Z.
	Position B: the RD pin is connected to the J7-3 external socket.
LK24	REFCAPA source signal selection.
	Inserted: an external reference is connected to REFCAPA.
1 1/25	Removed: an external reference is disconnected from REFCAPA.
LK25	DB10/DOUT C destination selection.
	Position A: data is sent to EVAL-SDP-CB1Z. Position B: data is sent to the J7-4 external socket.
LK26	DB7/HBEN/DCEN selection.
LK20	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: the DB7/HBEN/DCEN pin is connected to V _{DRIVE} .
	Position C: the DB7/HBEN/DCEN pin is connected to GND.
LK27	DB9/DOUT B destination selection.
	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: not used.
	Position C: data is sent to the J7-5 external socket.
LK28	DB8/DOUT A destination selection.
	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: not used.
	Position C: data is sent to the J7-6 external socket.
LK29	DB14/REFBUF _{EN/DIS} selection.
	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: the DB14/REFBUF _{EN/DIS} pin is connected to V _{DRIVE} .
	Position C: the DB14/REFBUFEN/DIS pin is connected to GND.
LK30	DB6/SCLK selection.
	Position A: the DB6/SCLK pin is connected to EVAL-SDP-CB1Z.
	Position B: not used.
	Position C: the DB6/SCLK pin is connected to the J7-11 external socket.
LK31	DB2/SEL C selection.
	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: the DB2/SEL C pin is connected to V _{DRIVE} .
	Position C: the DB2/SEL C pin is connected to GND.
LK32	DB1/SEL B selection.
	Position A: data is sent to EVAL-SDP-CB1Z.
	Position B: the DB1/SEL B pin is connected to V _{DRIVE} .
	Position C: the DB1/SEL B pin is connected to GND.

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Link No.	Function				
LK33	DB0/SEL A sele	ection.			
	Position A: data is sent to EVAL-SDP-CB1Z.				
	Position B: the DB0/SEL A pin is connected to V _{DRIVE} .				
		DB0/SEL A pin is cor			
LK34	CONVST B se	•			
			onnected to the J7-9 external socket.		
		-	onnected to EVAL-SDP-CB1Z.		
		CONVST B pin is co			
		•	nnected to GND.		
LK35	CONVST C se				
		•	onnected to the J7-10 external socket.		
	Position B: the	CONVST C pin is co	onnected to EVAL-SDP-CB1Z.		
	Position C: the	CONVST C pin is co	onnected to GND.		
_K36	CONVST A/C	ONVST C link select	ion.		
	Inserted: Conn	ects CONVST A to C	CONVST C.		
_K101	V _{ss} signal sour	ce selection (op amp	o negative supply).		
	-		from the on-board supply generation circuitry (–12 V).		
		-	from the J100 external socket.		
_K102		rce selection (op amp			
	-		d from the on-board supply generation circuitry (+12 V).		
		-	from the J100 external socket.		
LK103 to LK106		-	ing the on-board supplies as follows (where POP = place both 0 Ω resistors, and NOPOP = neither		
	0Ω resistor is				
	Link	±12 V	±15 V		
	LK103	POP	NOPOP		
	LK104	NOPOP	POP		
	LK105	NOPOP	POP		
	LK106	POP	NOPOP		
.K701	AV _{CC} signal sou	urce selection.			
	3		ed from the on-board supply generation circuitry.		
		-	ed from the J703 external socket.		
_K702	DV _{CC} signal so	-			
	3		ed from the on-board supply generation circuitry.		
		-	ed from the J701 external socket.		
SL1		CAPB link selection.			
			-CAPB when soldered.		
SL2		CAPC link selection.	en binnen sonderen.		
			CAPC when soldered.		
6L3 to SL14	Not used. Leav		chi c which solucicu.		
SL15	V1 buffer selec				
		V1 input signal is bu	iffered through 114		
		V1 input signal is tal			
SL16	V2 buffer selec				
JE 10		V2 input signal is bu	iffered through 117		
		V2 input signal is tal			
SL17	V3 buffer selec		the directly non-52.		
	Position A: the V3 input signal is buffered through U8.				
SL18	Position B: the V3 input signal is taken directly from J7.				
	V4 buffer selection. Position A: the V4 input signal is buffered through U9.				
51.10		V4 input signal is tal	ken unecuy nom J4.		
SL19	V5 buffer selec				
			uffered through U11.		
		V5 input signal is tal	ken directly from J5.		
SL20	V6 buffer selec				
			uffered through U12.		
	Position B: the	V6 input signal is tal	ken directly from J6.		

Link No.	Position	Function
LK1	А	Software input is selected.
LK2	А	V _{REF} is not buffered.
LK3	А	The WR/REF _{EN/DIS} pin is connected to EVAL-SDP-CB1Z.
LK4	Inserted	The V1 input is grounded.
LK5	Inserted	The V2 input is grounded.
LK6	В	The RANGE pin is connected to GND. The input range is set to $\pm 4 \times V_{REF}$ (can be overridden by control registers in software).
LK7	А	The $\overline{\text{STBY}}$ pin is connected to V_{DRIVE} . Normal operation is selected.
LK8	с	The RESET pin is connected to EVAL-SDP-CB1Z.
LK9	В	The \overline{W}/B pin is connected to GND. Word mode is selected.
LK10	А	The BUSY pin is connected to EVAL-SDP-CB1Z.
LK11	В	The CONVST A pin is connected to EVAL-SDP-CB1Z.
LK12	А	The \overline{CS} pin is connected to EVAL-SDP-CB1Z.
LK13	А	The REFIN/REFOUT signal is sourced from AD780.
LK14	Inserted	The V3 input is grounded.
LK15	Inserted	The V4 input is grounded.
LK16	А	The V _{DRIVE} signal is sourced from the on-board 3.3 V supply. (Requires the EVAL-SDP-CB1Z board to be connected.)
LK17	Inserted	The V5 input is grounded.
LK18	Inserted	The V6 input is grounded.
LK19	Removed	An external V _{REF} is disconnected.
LK20	В	The SER/PAR SEL pin is connected to GND. Parallel mode is selected.
LK21	Removed	The AD780 voltage output is 2.5 V.
LK22	Removed	The CONVST A and CONVST B pins are not linked.
LK23	А	The RD pin is connected to EVAL-SDP-CB1Z.
LK24	Removed	An external V _{REF} is disconnected.
LK25	А	The DB10/DOUT C pin is connected to EVAL-SDP-CB1Z.
LK26	А	The DB7/HBEN/DCEN pin is connected to EVAL-SDP-CB1Z.
LK27	А	The DB9/DOUT B pin is connected to EVAL-SDP-CB1Z.
LK28	А	The DB8/DOUT A pin is connected to EVAL-SDP-CB1Z.
LK29	А	The DB14/REFBUFEN/DIS pin is connected to EVAL-SDP-CB1Z.
LK30	А	The DB6/SCLK pin is connected to EVAL-SDP-CB1Z.
LK31	А	The DB2/SEL C pin is connected to EVAL-SDP-CB1Z.
LK32	А	The DB1/SEL B pin is connected to EVAL-SDP-CB1Z.
LK33	А	The DB0/SEL A pin is connected to EVAL-SDP-CB1Z.
LK34	В	The CONVST B pin is connected to EVAL-SDP-CB1Z.
LK35	В	The CONVST C pin is connected to EVAL-SDP-CB1Z.
LK36	Removed	The CONVST A and CONVST C pins are not linked.
LK101	Α	The on-board op amp power is used.
LK102	А	The on-board op amp power is used.
LK103	NOPOP ¹	The op amp supply rails are set to ± 15 V.
LK104	POP ¹	The op amp supply rails are set to ± 15 V.
LK105	POP ¹	The op amp supply rails are set to ± 15 V.
LK106	NOPOP ¹	The op amp supply rails are set to ± 15 V.
LK701	А	The on-board AV _{CC} is used.
LK702	А	The on-board DV _{cc} is used.
SL1	Removed	The REFCAPA and REFCAPB pins are not linked.
SL2	Removed	The REFCAPB and REFCAPC pins are not linked.
SL3 to SL14	Removed	Not used.
SL15	Α	The V1 input is buffered.
SL16	А	The V2 input is buffered.
SL17	А	The V3 input is buffered.
SL18	A	The V4 input is buffered.
SL19	A	The V5 input is buffered.
SL20	A	The V6 input is buffered.

Table 3. Default Link Positions for Packaged EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ

 1 POP = place both 0 Ω resistors; NOPOP = neither 0 Ω resistor is placed.

EVALUATION BOARD CIRCUITRY

ANALOG INPUTS

The V1 to V6 inputs allow a signal to be connected to the board via SMB connectors.

The analog inputs on the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ are filtered and buffered by the AD8597 ultralow distortion, ultralow noise (single) op amps. Additional filtering is provided by an R-C filter directly before the AD7656-1/AD7657-1/AD7658-1 inputs. Alternatively, the op amps can be bypassed, and the inputs can be fed directly to the AD7656-1/AD7657-1/AD7658-1 via the R-C filter.

REFERENCE OPTIONS

The following two on-board reference supplies are available:

- ADR431: ultralow noise XFET voltage reference with current sink and source capability
- AD780: 2.5 V/3.0 V ultrahigh precision band gap voltage reference

Alternatively, the AD7656-1/AD7657-1/AD7658-1 can supply an internal reference voltage.

SOCKETS/CONNECTORS

Table 4. Socket/Connector Functions

VIN0Analog Input VIN0. Buffered to the V _{IN} 0 pin on the AD7656-1/AD7657-1/AD7658-1.VIN1Analog Input VIN1. Buffered to the V _{IN} 1 pin on the AD7656-1/AD7657-1/AD7658-1.VIN2Analog Input VIN2. Buffered to the V _{IN} 2 pin on the AD7656-1/AD7657-1/AD7658-1.VIN3Analog Input VIN3. Buffered to the V _{IN} 3 pin on the AD7656-1/AD7657-1/AD7658-1.VIN3Analog Input VIN3. Buffered to the V _{IN} 3 pin on the AD7656-1/AD7657-1/AD7658-1.J1VIN. Apply a bipolar signal to this pin. This signal is biased up on J3.J2Socket for EVAL-SDP-CB1Z evaluation controller board.J3VIN BIASED. Unipolar version of signal applied to J1.J5V _{REF} . External reference voltage.J8V _{DRIVE} . External screw connection for V _{DRIVE} .J9Analog Input VIN4 to Analog Input VIN15. Buffered to V _{IN4} to V _{IN15} pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—V _{IN4} Pin 2—AGNDPin 3—V _{IN5} Pin 4—AGNDPin 3—V _{IN6} Pin 6—AGNDPin 13—V _{IN10} Pin 14—AGNDPin 13—V _{IN11} Pin 16—AGNDPin 13—V _{IN12} Pin 18—AGNDPin 19—V _{IN13} Pin 20—AGNDPin 19—V _{IN14} Pin 22—AGNDPin 23—V _{IN15} Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DV _{Cc} screw terminal connector.J703AV _{cc} screw terminal connector.	Socket	Function		
AD7656-1/AD7657-1/AD7658-1.VIN2Analog Input VIN2. Buffered to the V_IN2 pin on the AD7656-1/AD7657-1/AD7658-1.VIN3Analog Input VIN3. Buffered to the V_IN3 pin on the AD7656-1/AD7657-1/AD7658-1.J1VIN. Apply a bipolar signal to this pin. This signal is biased up on J3.J2Socket for EVAL-SDP-CB1Z evaluation controller board.J3VIN BIASED. Unipolar version of signal applied to J1.J5VREF. External reference voltage.J8VDRIVE. External screw connection for VDRIVE.J9Analog Input VIN4 to Analog Input VIN15. Buffered to VIN4 to VIN15 pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—VIN4Pin 2—AGNDPin 3—VIN5Pin 4—AGNDPin 5—VIN6Pin 6—AGNDPin 7—VIN7Pin 8—AGNDPin 10—VIN8Pin 10—AGNDPin 11—VIN9Pin 12—AGNDPin 13—VIN10Pin 14—AGNDPin 13—VIN10Pin 14—AGNDPin 13—VIN11Pin 16—AGNDPin 19—VIN12Pin 18—AGNDPin 19—VIN13Pin 20—AGNDPin 19—VIN14Pin 22—AGNDPin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.	VIN0			
AD7656-1/AD7657-1/AD7658-1.VIN3Analog Input VIN3. Buffered to the VIN3 pin on the AD7656-1/AD7657-1/AD7658-1.J1VIN. Apply a bipolar signal to this pin. This signal is biased up on J3.J2Socket for EVAL-SDP-CB1Z evaluation controller board.J3VIN BIASED. Unipolar version of signal applied to J1.J5VREF. External reference voltage.J8VDRIVE. External screw connection for VDRIVE.J9Analog Input VIN4 to Analog Input VIN15. Buffered to VIN4 to VIN15 pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—VIN4Pin 2—AGNDPin 5—VIN5Pin 4—AGNDPin 5—VIN6Pin 6—AGNDPin 7—VIN7Pin 8—AGNDPin 10—VIN8Pin 10—AGNDPin 11—VIN9Pin 12—AGNDPin 13—VIN10Pin 14—AGNDPin 13—VIN11Pin 16—AGNDPin 15—VIN11Pin 16—AGNDPin 15—VIN11Pin 20—AGNDPin 19—VIN13Pin 20—AGNDPin 21—VIN14Pin 22—AGNDPin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.	VIN1			
AD7656-1/AD7657-1/AD7658-1.J1VIN. Apply a bipolar signal to this pin. This signal is biased up on J3.J2Socket for EVAL-SDP-CB1Z evaluation controller board.J3VIN BIASED. Unipolar version of signal applied to J1.J5VREF. External reference voltage.J8VDRIVE. External screw connection for VDRIVE.J9Analog Input VIN4 to Analog Input VIN15. Buffered to VIN4 to VIN15 pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—VIN4Pin 2—AGNDPin 3—VIN5Pin 4—AGNDPin 5—VIN6Pin 6—AGNDPin 7—VIN7Pin 8—AGNDPin 1—VIN8Pin 10—AGNDPin 13—VIN9Pin 12—AGNDPin 13—VIN10Pin 14—AGNDPin 15—VIN1Pin 16—AGNDPin 15—VIN11Pin 16—AGNDPin 15—VIN12Pin 18—AGNDPin 19—VIN13Pin 20—AGNDPin 21—VIN14Pin 22—AGNDPin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.	VIN2	5 1		
biased up on J3.J2Socket for EVAL-SDP-CB1Z evaluation controller board.J3VIN BIASED. Unipolar version of signal applied to J1.J5VREF. External reference voltage.J8VDRIVE. External screw connection for VDRIVE.J9Analog Input VIN4 to Analog Input VIN15. Buffered to VIN4 to VIN15 pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—VIN4Pin 2—AGNDPin 3—VIN5Pin 4—AGNDPin 5—VIN6Pin 6—AGNDPin 7—VIN7Pin 8—AGNDPin 11—VIN8Pin 10—AGNDPin 13—VIN10Pin 14—AGNDPin 13—VIN10Pin 14—AGNDPin 15—VIN11Pin 16—AGNDPin 15—VIN12Pin 18—AGNDPin 17—VIN13Pin 20—AGNDPin 19—VIN13Pin 20—AGNDPin 21—VIN14Pin 22—AGNDPin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.	VIN3			
J3VIN BIASED. Unipolar version of signal applied to J1.J5 V_{REF} . External reference voltage.J8 V_{DRIVE} . External screw connection for V_{DRIVE} .J9Analog Input VIN4 to Analog Input VIN15. Buffered to $V_{IN}4$ to $V_{IN}15$ pins of the AD7656-1/AD7657-1/AD7658-1. Odd PinsEven Pins Pin 1—V_IN4Pin 2—AGND Pin 3—VIN5Pin 5—VIN6Pin 6—AGND Pin 7—VIN7Pin 9—VIN8Pin 10—AGND Pin 11—VIN9Pin 13—VIN10Pin 12—AGND Pin 13—VIN10Pin 13—VIN10Pin 14—AGND Pin 13—VIN10Pin 15—VIN11Pin 16—AGND Pin 13—VIN12Pin 19—VIN13Pin 20—AGND Pin 21—VIN13Pin 21—VIN14Pin 22—AGND Pin 23—VIN15J100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.	J1			
J5 V _{REF} . External reference voltage. J8 V _{DRIVE} . External screw connection for V _{DRIVE} . J9 Analog Input VIN4 to Analog Input VIN15. Buffered to V _{IN} 4 to V _{IN} 15 pins of the AD7656-1/AD7657-1/AD7658-1. Odd Pins Even Pins Pin 1—V _{IN} 4 Pin 2—AGND Pin 3—V _{IN} 5 Pin 4—AGND Pin 5—V _{IN} 6 Pin 6—AGND Pin 7—V _{IN} 7 Pin 8—AGND Pin 11—V _{IN} 8 Pin 10—AGND Pin 13—V _{IN} 10 Pin 14—AGND Pin 13—V _{IN} 11 Pin 16—AGND Pin 13—V _{IN} 12 Pin 18—AGND Pin 15—V _{IN} 11 Pin 16—AGND Pin 12—AGND Pin 12—AGND Pin 13—V _{IN} 13 Pin 20—AGND Pin 15—V _{IN} 11 Pin 16—AGND Pin 15—V _{IN} 12 Pin 18—AGND Pin 21—V _{IN} 13 Pin 22—AGND Pin 23—V _{IN} 15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DV _{cc} screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.	J2	Socket for EVAL-SDP-CB1Z evaluation controller board.		
J8 V _{DRIVE} . External screw connection for V _{DRIVE} . J9 Analog Input VIN4 to Analog Input VIN15. Buffered to V _{IN4} to V _{IN15} pins of the AD7656-1/AD7657-1/AD7658-1. Odd Pins Even Pins Pin 1—V _{IN4} Pin 2—AGND Pin 3—V _{IN5} Pin 4—AGND Pin 5—V _{IN6} Pin 6—AGND Pin 7—V _{IN7} Pin 8—AGND Pin 10—V _{IN8} Pin 10—AGND Pin 11—V _{IN9} Pin 12—AGND Pin 13—V _{IN10} Pin 14—AGND Pin 15—V _{IN11} Pin 16—AGND Pin 15—V _{IN11} Pin 16—AGND Pin 17—V _{IN12} Pin 18—AGND Pin 19—V _{IN13} Pin 20—AGND Pin 21—V _{IN14} Pin 22—AGND Pin 23—V _{IN15} Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 J702 The 7 V to 9 V dc transformer power connector.	J3	VIN BIASED. Unipolar version of signal applied to J1.		
J9Analog Input VIN4 to Analog Input VIN15. Buffered to $V_{IN}4$ to $V_{IN}15$ pins of the AD7656-1/AD7657-1/AD7658-1.Odd PinsEven PinsPin 1—V_IN4Pin 2—AGND Pin 3—VIN5Pin 4—AGNDPin 5—VIN6Pin 7—V_IN7Pin 8—AGND Pin 9—VIN8Pin 11—V_IN8Pin 10—AGND 	J5	V _{REF} . External reference voltage.		
VIN4 to VIN15 pins of the AD7656-1/AD7657-1/AD7658-1. Odd Pins Even Pins Pin 1—VIN4 Pin 2—AGND Pin 3—VIN5 Pin 4—AGND Pin 5—VIN6 Pin 6—AGND Pin 7—VIN7 Pin 8—AGND Pin 10—AGND Pin 10—AGND Pin 11—VIN8 Pin 10—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 15—VIN12 Pin 18—AGND Pin 17—VIN12 Pin 18—AGND Pin 17—VIN13 Pin 20—AGND Pin 21—VIN14 Pin 22—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DVcc screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.	J8	V _{DRIVE} . External screw connection for V _{DRIVE} .		
Pin 1—VIN4 Pin 2—AGND Pin 3—VIN5 Pin 4—AGND Pin 5—VIN6 Pin 6—AGND Pin 7—VIN7 Pin 8—AGND Pin 9—VIN8 Pin 10—AGND Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 15—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 19—VIN14 Pin 22—AGND Pin 21—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 J702 The 7 V to 9 V dc transformer power connector.	79			
Pin 3—VIN5 Pin 4—AGND Pin 5—VIN6 Pin 6—AGND Pin 7—VIN7 Pin 8—AGND Pin 9—VIN8 Pin 10—AGND Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 17—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 21—VIN14 Pin 22—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 J702 The 7 V to 9 V dc transformer power connector.		Odd Pins	Even Pins	
Pin 5—VIN6 Pin 6—AGND Pin 7—VIN7 Pin 8—AGND Pin 9—VIN8 Pin 10—AGND Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 17—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 21—VIN14 Pin 22—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DV _{CC} screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.		Pin 1—V _{IN} 4	Pin 2—AGND	
Pin 7—VIN7 Pin 8—AGND Pin 9—VIN8 Pin 10—AGND Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 17—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 21—VIN14 Pin 22—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DVcc screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.		Pin 3—V _{IN} 5	Pin 4—AGND	
Pin 9—VIN8 Pin 10—AGND Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 17—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DV _{CC} screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.				
Pin 11—VIN9 Pin 12—AGND Pin 13—VIN10 Pin 14—AGND Pin 15—VIN11 Pin 16—AGND Pin 17—VIN12 Pin 18—AGND Pin 19—VIN13 Pin 20—AGND Pin 21—VIN14 Pin 22—AGND Pin 23—VIN15 Pin 24—AGND J100 Op amp power supply screw terminal connectors. Supply rails for op amps. J701 DV _{CC} screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.				
$ \begin{array}{llllllllllllllllllllllllllllllllllll$				
Pin 15— V_{IN} 11Pin 16—AGNDPin 17— V_{IN} 12Pin 18—AGNDPin 19— V_{IN} 13Pin 20—AGNDPin 21— V_{IN} 14Pin 22—AGNDPin 23— V_{IN} 15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DV _{cc} screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
Pin 17— V_{IN} 12Pin 18—AGNDPin 19— V_{IN} 13Pin 20—AGNDPin 21— V_{IN} 14Pin 22—AGNDPin 23— V_{IN} 15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DV_{CC} screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
Pin 19—VIN13Pin 20—AGNDPin 21—VIN14Pin 22—AGNDPin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
Pin 21—V _{IN} 14Pin 22—AGNDPin 23—V _{IN} 15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DV _{CC} screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
Pin 23—VIN15Pin 24—AGNDJ100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
J100Op amp power supply screw terminal connectors. Supply rails for op amps.J701DVcc screw terminal connector.J702The 7 V to 9 V dc transformer power connector.				
Supply rails for op amps. J701 DV _{CC} screw terminal connector. J702 The 7 V to 9 V dc transformer power connector.				
J702 The 7 V to 9 V dc transformer power connector.	J100			
•	J701	DV _{cc} screw terminal connector.		
J703 AV _{cc} screw terminal connector.	J702			
	J703	AV _{cc} screw terminal connector.		

MODES OF OPERATION

SDP CONTROLLED MODE

The AD7656-1/AD7657-1/AD7658-1 uses a high speed parallel interface that allows sampling rates of up to 250 kSPS. For more information about the operation of the parallel interface, refer to the AD7656-1/AD7657-1/AD7658-1 data sheet.

The AD7656-1/AD7657-1/AD7658-1 uses the parallel interface to transfer data to the EVAL-SDP-CB1Z.

The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ communicates with the EVAL-SDP-CB1Z board using level shifters. The EVAL-SDP-CB1Z operates at a 3.3 V logic level, which allows logic voltages that exceed 3.3 V to be used without damaging the SDP interface.

STANDALONE MODE

The EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ can also be used without the EVAL-SDP-CB1Z controller board. In this case, the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-AD7658-1SDZ is connected to the serial interface using the J7 socket. For more information about the operation of the serial interface, refer to the AD7656-1/AD7657-1/ AD7658-1 data sheet.

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HOW TO USE THE SOFTWARE FOR EVALUATING THE AD7656-1/AD7657-1/AD7658-1 SETTING UP THE SYSTEM FOR DATA CAPTURE

After completing the steps in the Software Installation Procedures and Evaluation Board Setup Procedures sections, set up the system for data capture as follows:

- Allow the Found New Hardware Wizard to run after the 1. EVAL-SDP-CB1Z board is plugged into your PC. (If you are using Windows XP, you may need to search for the EVAL-SDP-CB1Z drivers. Choose to automatically search for the drivers for the EVAL-SDP-CB1Z board if prompted by the operating system.)
- Check that the board is connected to the PC correctly 2. using the Device Manager of the PC.
 - Access the Device Manager as follows:
 - i. Right-click My Computer and then click Manage.
 - ii. A dialog box appears asking for permission to allow the program to make changes to your computer. Click Yes.
 - iii. The Computer Management box appears. From the list of System Tools, click Device Manager (see Figure 13).
 - b. Under ADI Development Tools, Analog Devices System Development Platform (32MB) should appear, indicating that the EVAL-SDP-CB1Z driver software is installed and that the board is connected to the PC correctly.



Figure 13. Device Manager: Checking that the Board Is Connected to the PC Correctly

Launching the Software

After completing the steps in the Setting Up the System for Data Capture section, launch the AD7656-1/AD7657-1/AD7658-1 software as follows:

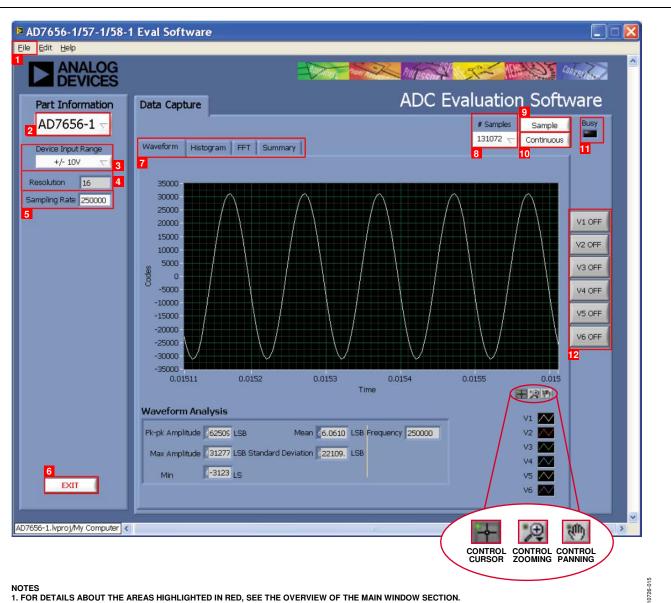
- From the Start menu, select Programs > Analog Devices 1. > AD7656-1_57-1_58-1. The main window of the software then displays.
- If the EVAL-AD7656-1SDZ/EVAL-AD7657-1SDZ/EVAL-2. AD7658-1SDZ evaluation system is not connected to the USB port via the EVAL-SDP-CB1Z when the software is launched, a connectivity error displays (see Figure 14). Connect the evaluation system to the USB port of the PC, wait a few seconds, click Rescan, and follow the on-screen instructions.

No matching s abort.	stem found. Press Rescan to re	etry or Cancel to
Previous	Next.	

Figure 14. Connectivity Error Alert

When the software starts running, it searches for hardware connected to the PC. A dialog box indicates when the evaluation board attached to the PC is detected, and then the main window appears (see Figure 15).

0726-013



NOTES

1. FOR DETAILS ABOUT THE AREAS HIGHLIGHTED IN RED, SEE THE OVERVIEW OF THE MAIN WINDOW SECTION.

Figure 15. Evaluation Software Main Window

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OVERVIEW OF THE MAIN WINDOW

The main window of the software is shown in Figure 15 and has the features described in this section.

File Menu (Section 1)

The File menu (labeled 1 in Figure 15) offers the choice to

- Load data: load previously captured data or example files in .tsv (tab separated values) format for analysis (see Figure 16). (The default location for example files is C:\Program Files\Analog Devices\AD7656-1_57-1_58-1\examples.)
- Save Data as .tsv: save captured data in .tsv format for future analysis (see Figure 17).
- **Print Front Panel Picture**: print the main window to the default printer.
- **Save Picture**: save the current screen capture.
- **Exit**: close the application.



Figure 16. Load File Dialog Box: Loading Previously Captured Data or Example Files in .tsv Format

Choose fil	e to read.				?	×
Look jn:	🚞 TEST DATA		~	000		
My Recent Documents	E data.tsv					
My Documents						
My Computer						
	File <u>n</u> ame:	data.tsv		~	ОК	
My Network	Files of type:	All Files (*.*)		~	Canc	10726-017

Figure 17. Save File Dialog Box: Saving Data as .tsv

Part Information Box (Section 2)

The **Part Information** box (labeled 2 in Figure 15) allows selecting the generic to be evaluated; choose AD7656-1, AD7657-1, or AD7658-1.

Device Input Range Box (Section 3)

The **Device Input Range** box (labeled 3 in Figure 15), in conjunction with hardware settings, is used to select the voltage range.

Resolution Box (Section 4)

The **Resolution** box (labeled 4 in Figure 15) displays the resolution of the selected part in bits.

Sampling Rate Box (Section 5)

The default sampling frequency in the **Sampling Rate** box (labeled 5 in Figure 15) matches the maximum sample rate of the ADC being evaluated. Although you can adjust the sampling frequency, there are limitations in terms of the sample frequencies that can be entered. If an unusable sample frequency is input, the software automatically adjusts the sample frequency accordingly. Units can be entered as, for example, 10k for 10,000 Hz. The software automatically adjusts the sample frequency according to the ability of the ADC being evaluated. For example, if you enter a value that is beyond the ability of the device, the software indicates this and reverts to the maximum sample frequency.

Exit Button (Section 6)

Clicking **Exit** (labeled 6 in Figure 15) closes the software. Alternatively, you can select **Exit** from the **File** menu.

Tabs Area (Section 7)

There are four tabs available in the tabs area (labeled 7 in Figure 15) of the main window: **Waveform**, **Histogram**, **FFT**, and **Summary**. These tabs display the data in different formats. Navigation tools are provided within each tab to allow you to control the cursor, zooming, and panning (see Figure 15) within the graphs displayed.

Each tab is described in more detail in the Generating a Waveform Analysis Report; Generating a Histogram of the ADC Code Distribution; Generating a Fast Fourier Transform of AC Characteristics; and Generating a Summary of the Waveform, Histogram, and Fast Fourier Transform sections.

Samples Box (Section 8)

The **# Samples** box (labeled 8 in Figure 15) allows you to select the number of samples to analyze. When **Sample** or **Continuous** is clicked, the software requests this number of samples to be taken. This is the total number of samples taken on all channels.

Sample Button (Section 9)

Clicking **Sample** (labeled 9 in Figure 15) performs a single capture, acquiring a set number of samples at the selected sampling rate.

Continuous Button (Section 10)

Clicking **Continuous** (labeled 10 in Figure 15) performs a continuous capture from the ADC. Clicking **Continuous** a second time stops sampling.

Busy LED (Section 11)

The **Busy** LED (labeled 11 in Figure 15) indicates when a read from the EVAL-SDP-CB1Z board is in progress.

Channel Display Buttons (Section 12)

Clicking the buttons in this area (labeled 12 in Figure 15) allows you to display multiple channel reads. (Note that for FFT analysis, you can select only one channel to be displayed.)

GENERATING A WAVEFORM ANALYSIS REPORT

Figure 18 illustrates the waveform capture tab for a 10 kHz sine wave input signal.

The **Waveform Analysis** area (labeled 1 in Figure 18) reports the amplitudes recorded from the captured signal and the frequency of the signal tone.

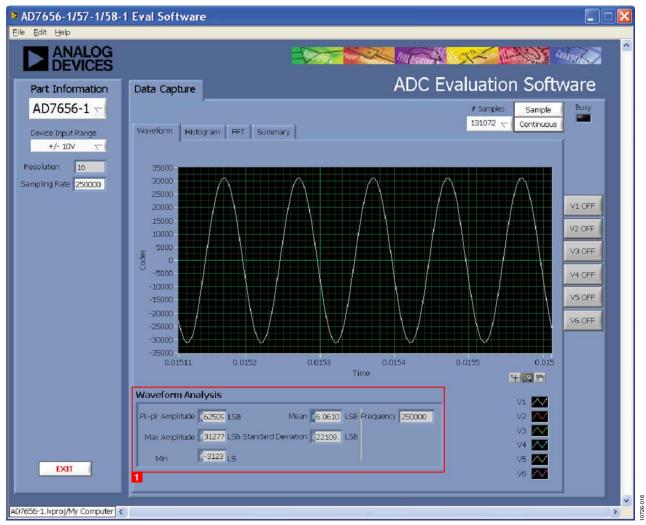


Figure 18. Waveform Tab

GENERATING A HISTOGRAM OF THE ADC CODE DISTRIBUTION

The **Histogram** tab can be used to perform ac testing or, more commonly, dc testing. This tab shows the ADC code distribution of the input and computes the mean and standard deviation, which are displayed as **Mean** and **Transition Noise**, respectively, in the **Histogram Analysis** area (labeled 1 in Figure 19).

Figure 19 shows the histogram with ac input for a 10 kHz sine wave applied to the ADC input and the resulting calculations.

AC Input

To perform a histogram test of ac input,

- 1. Apply a signal source to the selected analog input on the board.
- 2. Click the **Histogram** tab from the main window.
- 3. Click **Sample**.

Raw data is then captured and passed to the PC for statistical computations, and various measured values are displayed in the **Histogram Analysis** area.

DC Input

A histogram test of dc input can be performed with or without an external source because the evaluation board has a buffered $V_{\text{REF}}/2$ source at the ADC input.

To perform a histogram test of dc input,

- 1. If an external source is being used, apply a signal source to the selected analog input. It may be required to filter the signal to ensure that the dc source is noise-compatible with the ADC.
- 2. Click the **Histogram** tab from the main window.
- 3. Click Sample.

Raw data is then captured and passed to the PC for statistical computations, and various measured values are displayed in the **Histogram Analysis** area.

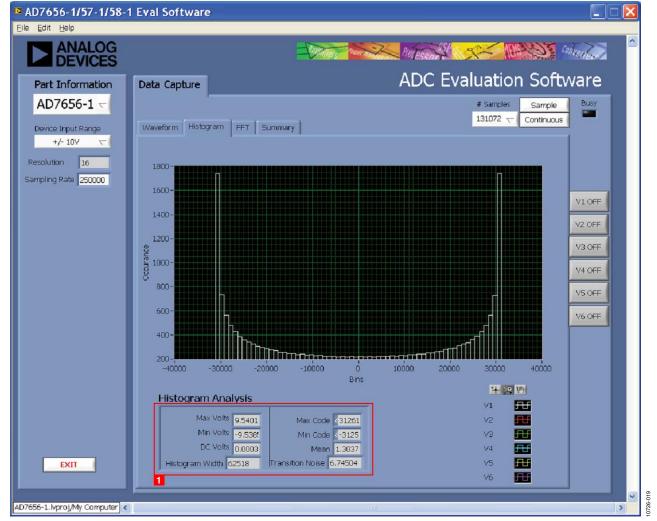


Figure 19. Histogram Tab

GENERATING A FAST FOURIER TRANSFORM OF AC CHARACTERISTICS

Figure 20 shows the **FFT** tab. This feature tests the traditional ac characteristics of the converter and displays a fast Fourier transform (FFT) of the results.

To perform an ac FFT test,

- Apply a sinusoidal signal with low distortion (better than 115 dB) to the evaluation board at the selected analog input. To attain the requisite low distortion, which is necessary to allow true evaluation of the part, one option is to
 - a. Filter the input signal from the ac source. Choose an appropriate band-pass filter based on the sinusoidal signal applied.
 - b. If a low frequency band-pass filter is used when the fullscale input range is more than a few volts peak-to-peak, use the on-board amplifiers to amplify the signal, thus preventing the filter from distorting the input signal.

- 2. Click the **FFT** tab from the main window.
- 3. Click Sample.

As in the histogram test, raw data is then captured and passed to the PC, which performs the FFT and displays the resulting SNR, THD, and SINAD.

The **Spectrum Analysis** box displays the results of the captured data.

- The area labeled 1 in Figure 20 shows the input signal information.
- The area labeled 2 in Figure 20 displays the fundamental frequency and amplitude in addition to the second to fifth harmonics.
- The area labeled 3 in Figure 20 displays the performance data, including the SNR, THD, and SINAD.

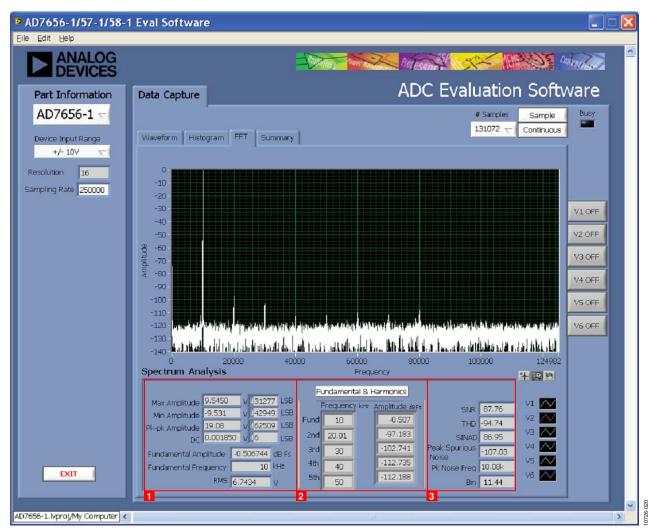


Figure 20. FFT Tab

GENERATING A SUMMARY OF THE WAVEFORM, HISTOGRAM, AND FAST FOURIER TRANSFORM

Figure 21 shows the **Summary** tab. The **Summary** tab captures all the display information and provides it in one panel with a synopsis of the information, including key performance parameters such as SNR and THD.

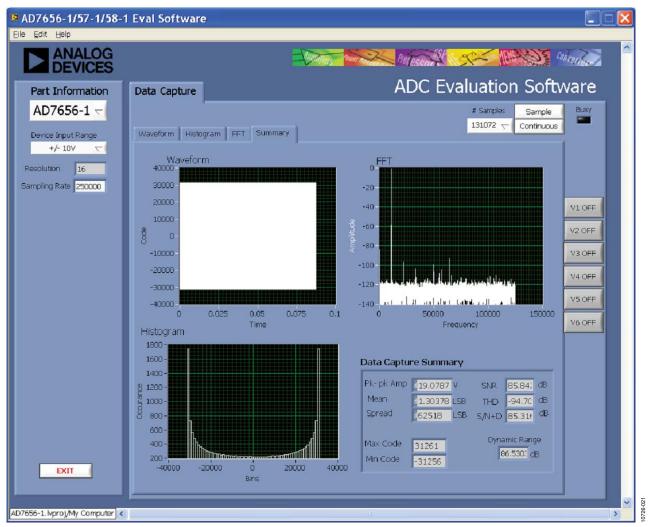


Figure 21. Summary Tab

RELATED LINKS

Resource	Description	
AD7656-1	Product Page: 250 kSPS, 6-Channel, Simultaneous Sampling, Bipolar 16-Bit ADC	
AD7657-1	Product Page: 250 kSPS, 6-Channel, Simultaneous Sampling, Bipolar 14-Bit ADC	
AD7658-1	Product Page: 250 kSPS, 6-Channel, Simultaneous Sampling, Bipolar 12-Bit ADC	
AD8597	Product Page: Ultralow Distortion, Ultralow Noise Op Amp (Single)	
AD8031	Product Page: 2.7 V, 800 μA, 80 MHz Rail-to-Rail I/O Single Amplifier	
ADP1613	Product Page: 650 kHz/1.3 MHz Step-Up PWM DC-to-DC Switching Converter with 2.0 A Current Limit	
ADP3303-5	Product Page: High Accuracy anyCAP 200 mA Low Dropout Linear Regulator	
ADP2301	Product Page: 1.2 A, 20 V, 1.4 MHz Nonsynchronous Step-Down Switching Regulator	
ADM1185	Product Page: Quad Voltage Monitor and Sequencer	
ADP190	Product Page: Logic Controlled, High-Side Power Switch	
ADG3308	Product Page: Low Voltage, 1.15 V to 5.5 V, 8-Channel Bidirectional Logic Level Translator	
ADR431	Product Page: Ultralow Noise XFET 2.5 V Voltage Reference with Current Sink and Source Capability	
AD780	Product Page: 2.5 V/3.0 V Ultrahigh Precision Band Gap Voltage Reference	
EngineerZone	Online Community: Analog Devices Online Technical Support Community	
Circuits from the Lab	Reference Circuits: Circuit Designs that Have Been Built and Tested to Ensure Function and Performance and that Address Common Analog, RF/IF, and Mixed-Signal Design Challenges by Applying Analog Devices' Vast Applications Expertise	



ESD Caution

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