



# Single-Channel, 12-/14-/16-Bit, Serial Input, Voltage Output DAC Evaluation Board

EVAL-AD5620EB/EVAL-AD5640EB/EVAL-AD5660EB/EVAL-AD5662EB

## FEATURES

Full featured evaluation board for

[AD5662](#)

[AD5660](#)

[AD5640](#)

[AD5620](#)

On-board reference

On-board ADC for voltage readback

Various link options

Direct hook up to USB port of PC

PC software for control of DACs

## GENERAL DESCRIPTION

This data sheet describes the evaluation board for the 12-bit [AD5620](#), 14-bit [AD5640](#), 16-bit [AD5660](#), and 16-bit [AD5662](#) single-channel DACs.

The [AD5620](#)/[AD5640](#)/[AD5660](#) have a maximum output voltage span of 5 V derived from an internal on-chip reference voltage of 2.5 V.

The [AD5662](#) has a maximum output voltage span of 5 V derived from an external reference voltage of 5 V. The reference voltage for this evaluation board is derived from the [AD780](#) which has an output voltage of 2.5 V or 3 V. Therefore, for purpose of this evaluation, 3 V is the maximum output voltage span of the [AD5662](#) using the [AD780](#) reference.

When using the evaluation board, refer to this data sheet along with the data sheets for the [AD56xx](#) family of parts available from Analog Devices, Inc.

The evaluation board interfaces to the USB port of an IBM-compatible PC. The software available with the evaluation board allows the user to easily program the [AD56xx](#).

## Rev. 0

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## **REVISION HISTORY**

**6/06—Revision 0: Initial Version**

## OPERATING THE AD56xx EVALUATION BOARD

### POWER SUPPLIES

The AD56xx evaluation board can be powered from the USB port. This is the default setup. It can also be powered by an external supply using the J6 and J7 power connectors.

Both analog GND and DGND inputs are provided on the board. The analog GND and DGND planes are connected at one location close to the AD56xx. It is recommended not to connect analog GND and DGND elsewhere in the system to avoid ground loop problems.

Each supply is decoupled to the relevant ground plane with 10  $\mu$ F and 0.1  $\mu$ F capacitors. Each device supply pin is also decoupled with a 10  $\mu$ F and 0.1  $\mu$ F capacitor pair to the relevant ground plane.

### LINK OPTIONS

A number of link and switch options on the evaluation board should be set for the required operating setup before using the board. Table 1 lists the default link options. The functions of these link options are described in detail in Table 2. The default setup is for control by the PC via the USB port.

**Table 1. Link Options Setup for PC Controls**

Link No.	Option (Default)
LK1	INSERTED
LK2	A
LK3	REMOVED
LK4	A (AD5620/AD5640/AD5660) B (AD5662 only)
LK5	B
LK6	B
LK7	INSERTED (AD5620/AD5640/AD5660) REMOVED (AD5662 only)
LK8	INSERTED
LK9	INSERTED

**Table 2. Link Options**

Link No.	Function
LK1	This link connects the VFB pin to the V <sub>OUT</sub> pin of the AD56xx.
LK2	This link selects whether the AD56xx evaluation board is controlled by the PC via the USB port or by an external source via the J1, J3, and J4 SMB connectors. <ul style="list-style-type: none"> <li>• Position A: The evaluation board is controlled by the PC via the USB port.</li> <li>• Position B: The evaluation board is controlled by an external source via the J1, J3, and J4 SMB connectors.</li> </ul>
LK3	This link connects external resistors and capacitor loads to the V <sub>OUT</sub> pin of the AD56xx.
LK4	This link selects the reference source. <ul style="list-style-type: none"> <li>• Position A: The internal reference is the reference source (AD5660/AD5640/AD5620).</li> <li>• Position B: The on-board 2.5 V/3 V AD780 reference is the reference source (AD5662 only).</li> </ul>
LK5	This link selects the AVDD power supply source for the analog circuitry. <ul style="list-style-type: none"> <li>• Position A: J6 is the AVDD analog circuitry power supply source.</li> <li>• Position B: The USB 5 V power supply is the AVDD analog circuitry power supply source.</li> </ul>
LK6	This link selects the DVDD power supply source for the digital circuitry. <ul style="list-style-type: none"> <li>• Position A: J7 is the DVDD digital circuitry power supply source.</li> <li>• Position B: The USB 5 V power supply source is the digital circuitry power supply source.</li> </ul>
LK7	This link connects a 0.1 $\mu$ F capacitor to GND on the VREF output pin of the device (AD5620/AD5640/AD5660).
LK8	This link connects the OP_SEL pin of the AD780 reference to ground, selecting a 3 V output. Leaving no connect gives a 2.5 V output.
LK9	This link connects the V <sub>OUT</sub> pin of the AD56xx to the V <sub>IN</sub> pin of the AD7476 ADC so that the DAC output value can be monitored using the on-board ADC.

## EVALUATION BOARD SOFTWARE

### SOFTWARE INSTALLATION

The AD56xxEB evaluation kit includes self-installing software on CD-ROM. The software is compatible with Windows® 2000 and Windows® XP.

If the setup file does not run automatically when you insert the CD, run the **setup.exe** file directly from the CD.

Install the software before connecting the evaluation board to the USB port to ensure that the evaluation board is correctly recognized when connected to the PC.

1. After the installation from the CD-ROM has completed, connect the AD56xx evaluation board to the USB port using the cable supplied.
2. The software detects the evaluation board. Follow the instructions on the dialog boxes that appear to complete the installation.

### SOFTWARE OPERATION

1. From the **Analog Devices** menu, select **Start > All Programs > Analog Devices > AD5620-40-60-62 > AD56xx Evaluation Software**.

For older PCs, click **Start > Programs > Analog Devices > AD5620-40-60-62 > AD56xx Evaluation Software**.

The **Device Selection** dialog box opens, as shown in Figure 1.

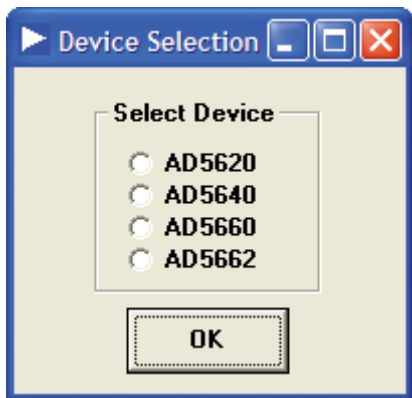


Figure 1. Device Selection Dialog Box

2. Select a part number and click **OK**. The main window opens, as shown in Figure 2.

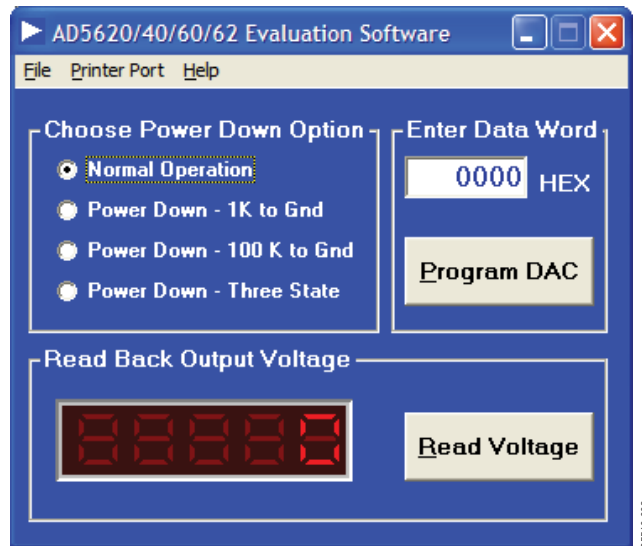


Figure 2. Main Window

3. To program the DAC, type the data word in the **HEX** field of the **Enter Data Word** section. Then click **Program DAC**.
4. To read back the output voltage using the on-board ADC, click **Read Voltage**.

The DAC output voltage for the [AD5662](#) is given by

$$V_{OUT} = VREF \times \left( \frac{D}{65536} \right)$$

For the [AD5620](#)/[AD5640](#)/[AD5660](#) parts, the DAC output voltage is calculated as

$$V_{OUT} = 2 \times VREF \times \left( \frac{D}{2^N} \right)$$

where  $N = 12$  for the [AD5620](#),  $14$  for the [AD5640](#), and  $16$  for the [AD5660](#).

5. From the **Choose Power Down Option**, select one of the following:
  - 1K to Gnd
  - 100 K to Gnd
  - Three State

After selecting an option, the AD56xx powers down and the output goes to zero. To resume operation, select **Normal Operation**.

**SCHEMATICS**

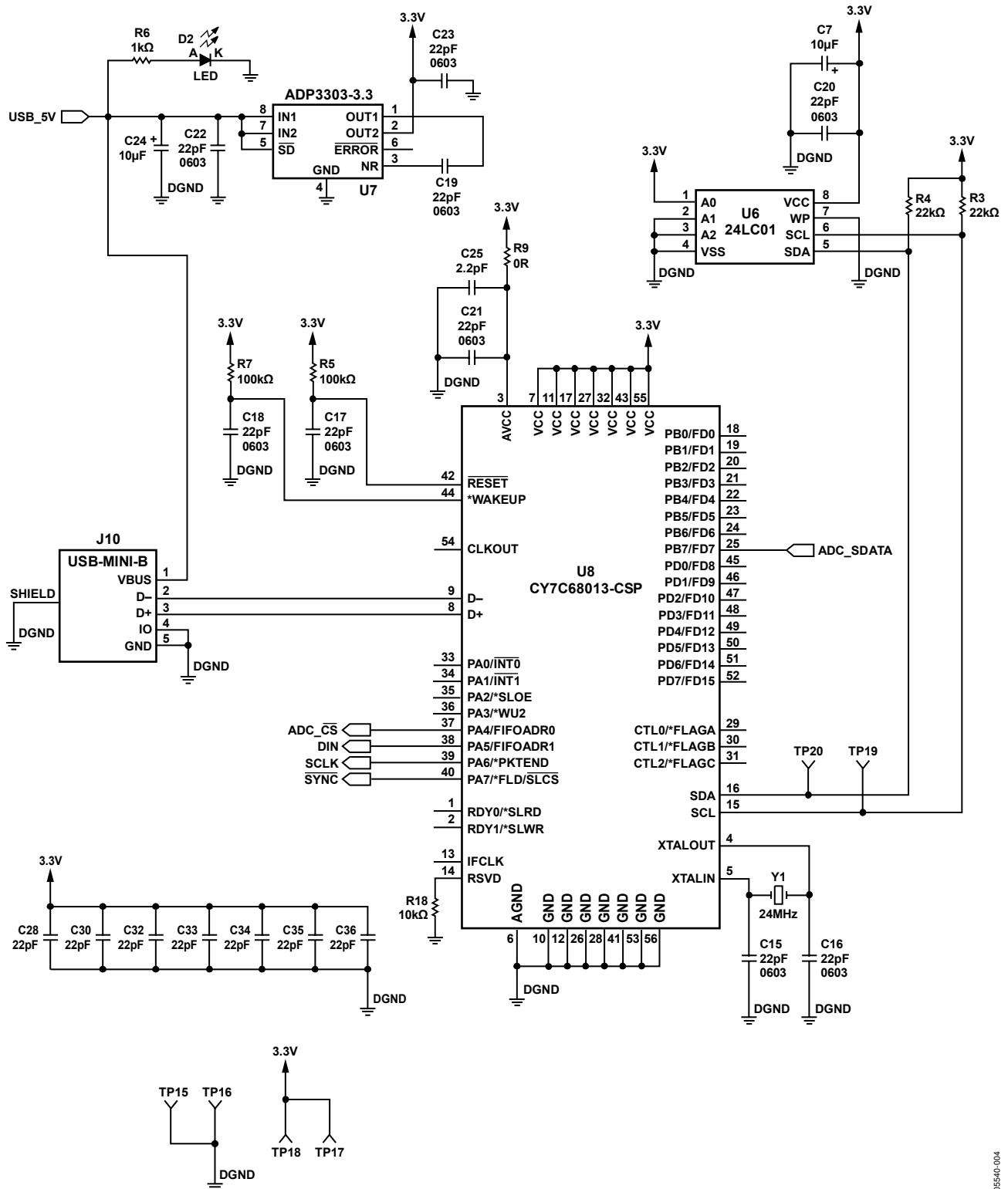


Figure 3. Schematic of Controller Circuitry

# EVAL-AD5620EB/EVAL-AD5640EB/EVAL-AD5660EB/EVAL-AD5662EB

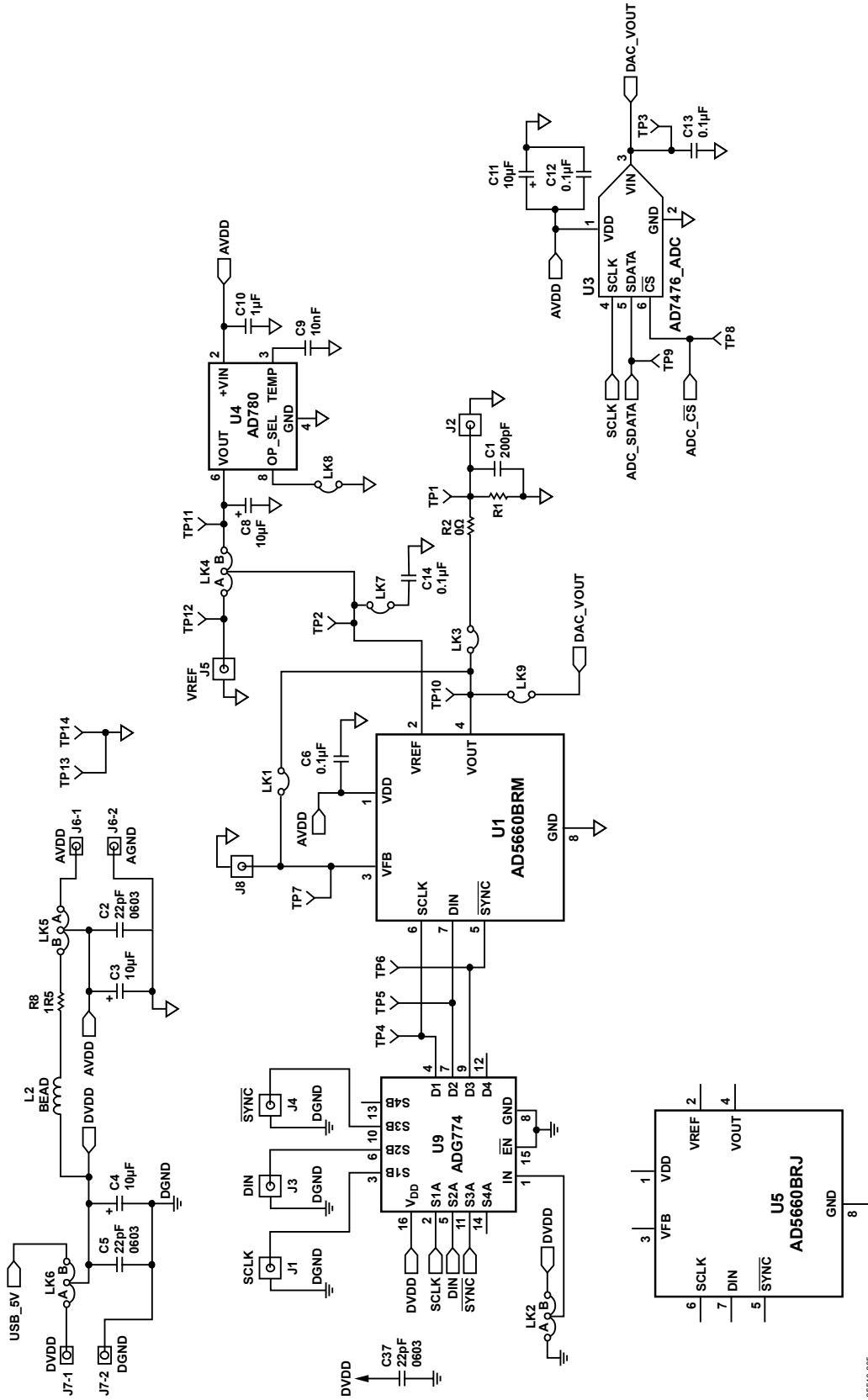


Figure 4. Schematic of AD56xx Circuitry

# EVAL-AD5620EB/EVAL-AD5640EB/EVAL-AD5660EB/EVAL-AD5662EB

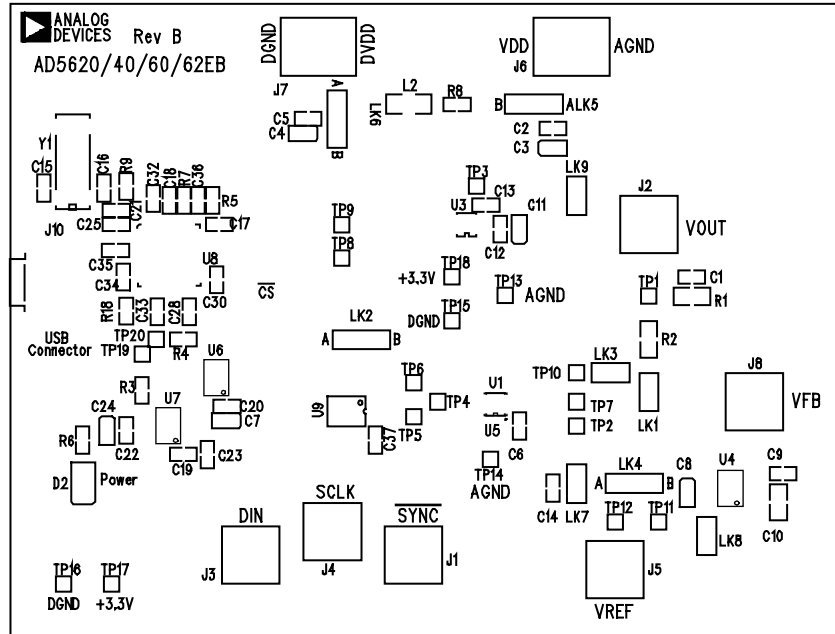


Figure 5. Component Placement Drawing

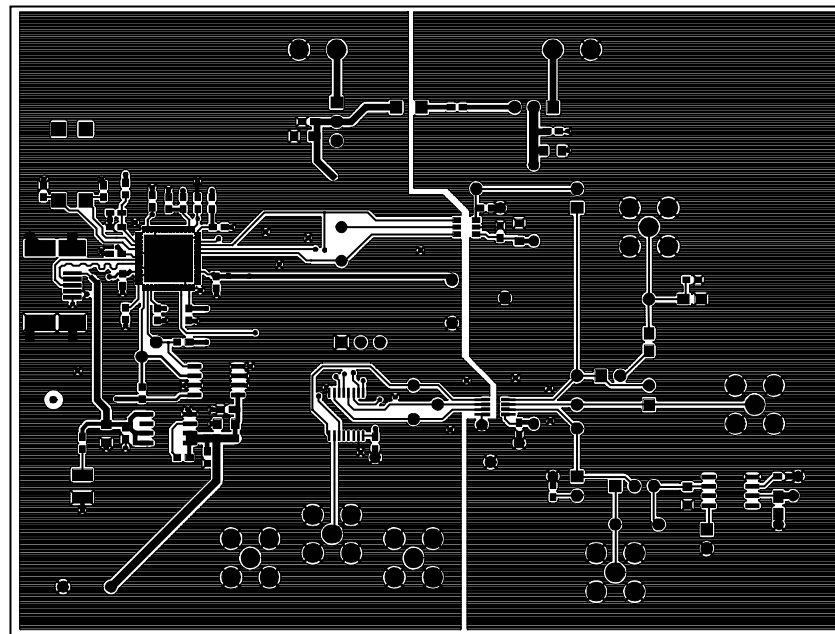
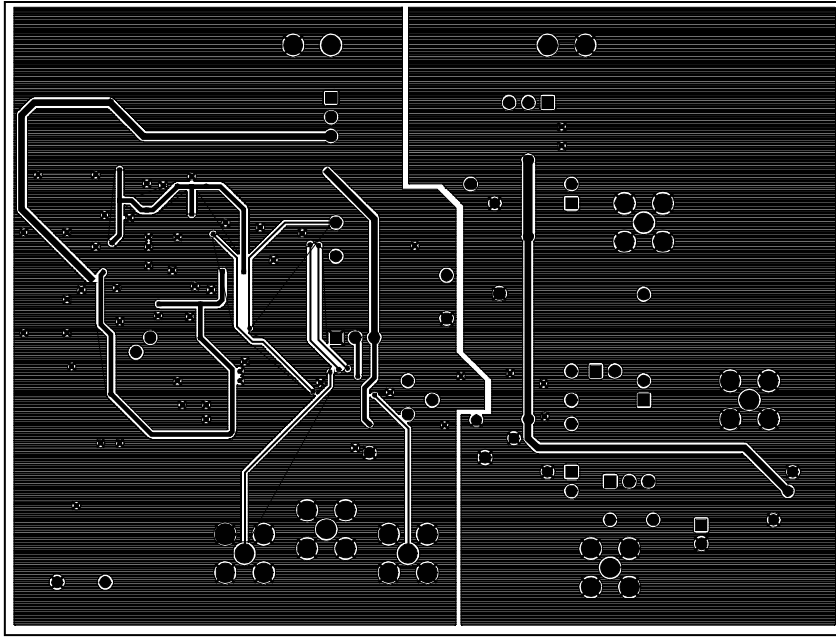


Figure 6. Component Side PCB Drawing



05540-008

Figure 7. Solder Side PCB Drawing



# EVAL-AD5620EB/EVAL-AD5640EB/EVAL-AD5660EB/EVAL-AD5662EB

## ORDERING INFORMATION

### COMPONENT LISTING

Table 3.

Qty	Reference Designator	Description	Supplier/Number
1	U1	AD56xxBRM—MSOP-8	Analog Devices, Inc.
1	U5	AD56xxBRJ—SOT-23-8	Analog Devices, Inc.
1	U3	<a href="#">AD7476ART</a> (ADC)	Analog Devices, Inc.
1	U4	<a href="#">AD780</a>	Analog Devices, Inc.
1	U6	24LC01	Digikey 24LC64-I/SN-ND
1	U7	<a href="#">ADP3303AR-3.3</a>	Analog Devices, Inc.
1	U8	CY7C68013-CSP	CY7C68013-56LFC
1	U9	<a href="#">ADG774BRQ</a>	Analog Devices, Inc.
1	Y1	24 MHz crystal	FEC 569-872
1	C1	200 pF (0603 package)	FEC 422-6811
6	C3, C4, C7, C8, C11, C24	10 $\mu$ F tantalum cap (TAJ-A package)	FEC 197-130
4	C6, C12, C13, C14	0.1 $\mu$ F multilayer ceramic cap	FEC 422-6859
1	C9	10 nF (0603 package)	FEC 422-6938
1	C10	1 $\mu$ F (0805 package)	FEC 318-8899
19	C2, C5, C15 to C23, C28, C30, C32 to C37	22 pF (0603 package)	FEC 722-005
1	C25	2.2 $\mu$ F (0603 package)	Digikey 490-1552-1-ND
1	D2	LED	FEC 359-9681
1	J10	USB Mini B	FEC 476-8309
6	J1 to J5, J8	Gold 50 $\Omega$ SMB jack	FEC 310-682
1	L2	Bead	FEC 581-094
2	J6, J7	Power connectors	FEC 151-785
5	LK1, LK3, LK7 to LK9	Header (2 $\times$ 1 pin)	FEC 511-705
4	LK2, LK4 to LK6	Header (3 $\times$ 1 pin)	FEC 512-047
1	R1	R1 (not inserted)	
2	R2	0 $\Omega$ (0805 package)	FEC 772-239
	R9	0 $\Omega$ (0603 package)	FEC 772-227
2	R3, R4	22 k $\Omega$ (0603 package)	FEC 911-276
2	R5, R7	100 k $\Omega$ (0603 package)	FEC 911-471
1	R18	10 k $\Omega$ (0603 package)	FEC 911-975
1	R6	1 k $\Omega$ (0603 package)	FEC 911-239
1	R8	1.5 $\Omega$	FEC 758-267
19	TP1 to TP20	Testpoint	FEC 240-333

### ORDERING GUIDE

Model	Description
EVAL-AD5620EB	Evaluation Board Kit
EVAL-AD5640EB	Evaluation Board Kit
EVAL-AD5660EB	Evaluation Board Kit
EVAL-AD5662EB	Evaluation Board Kit

### ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



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