

### FEATURES

Full featured evaluation board for the AD5668

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 AD5668 octal, 16-bit DAC. The AD5668 operates from a single 2.7 V to 5.5 V supply. The part incorporates an internal 1.25 V or 2.5 V on-board reference to give an output voltage span of 2.5 V or 5 V, respectively. The on-board reference is off at power-up allowing for the use of an external reference—the REF195 is used on this evaluation board. The part must be written to after power-up to turn on the internal reference.

When using the evaluation board, refer to this data sheet along with the data sheet for the AD5668 from Analog Devices, Inc.

The evaluation board interfaces to the USB port of an IBM-compatible PC. Software is available with the evaluation board, which allows the user to easily program the AD5668.

### FUNCTIONAL BLOCK DIAGRAM

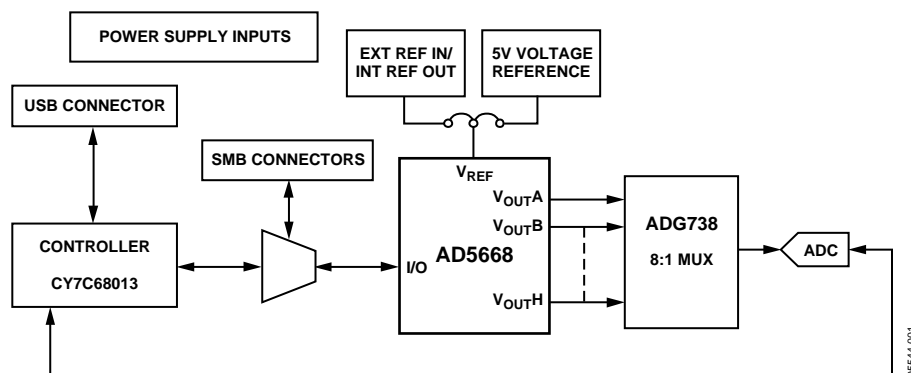


Figure 1.

### Rev. 0

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## REVISION HISTORY

7/06—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE

### POWER SUPPLIES

To power the AD5668 evaluation board, supply 5.5 V between the AV<sub>DD</sub> and AGND inputs (J3) for the analog supply of the AD5668.

Alternatively place Link 2 in Position B, which powers the analog circuitry from the USB port (default setting).

Both AGND and DGND inputs are provided on the board. The AGND and DGND planes are connected at one location close to the AD5668. It is recommended not to connect AGND 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 must be set before using the board. The default setup is for control by the PC via the USB port. The default link options are listed in Table 1. The functions of these link options are described in detail in Table 2.

**Table 1. Link Options Setup for PC Control (Default)**

Link No.	Option
LK1	A
LK2	B
LK3	INSERTED
LK4	REMOVED
LK5	B
LK6	A
LK7	A
LK8	A
LK9 to LK16	INSERTED

**Table 2. Link Options**

Link No.	Function
LK1	This link selects the 5 V power supply source for the digital circuitry: <ul style="list-style-type: none"> <li>Position A selects the USB port as the 5 V digital circuitry power supply source.</li> <li>Position B selects J2 as the 5 V digital circuitry power supply source.</li> </ul>
LK2	This link selects the AV <sub>DD</sub> power supply source for the analog circuitry: <ul style="list-style-type: none"> <li>Position A selects J3 as the AV<sub>DD</sub> analog circuitry power supply source.</li> <li>Position B selects the 5 V power supply source as the AV<sub>DD</sub> analog circuitry power supply source (see LK1).</li> </ul>
LK3	This link connects in the LED.
LK4	This link connects a 0.1 $\mu$ F capacitor to AGND on the V <sub>REF</sub> pin. It is recommended to connect this when using the internal reference.
LK5	This link selects the reference source: <ul style="list-style-type: none"> <li>Position A selects the internal reference as the reference source. The part must be written to via software to turn on the internal reference.</li> <li>Position B selects the on-board 5 V reference as the reference source.</li> </ul>
LK6	This link selects whether the AD5668 evaluation board is controlled by the PC via the USB port or by an external source via the SMB connectors J5 to J9: <ul style="list-style-type: none"> <li>Position A selects control by the PC via the USB port.</li> <li>Position B selects control by an external source via the SMB connectors J5 to J9.</li> </ul>
LK7	This link selects the DAC voltage source: <ul style="list-style-type: none"> <li>Position A selects the AV<sub>DD</sub> analog circuitry power supply source.</li> <li>Position B selects the on-board 5 V reference as the power supply source.</li> </ul>
LK8	This link sets the RESET pin on the ADG738: <ul style="list-style-type: none"> <li>Position A allows normal operation of the switch.</li> <li>Position B resets the switch.</li> </ul>
LK9 to LK16	This link connects the V <sub>OUTA</sub> to V <sub>OUTH</sub> pins of the AD5668 to the input/output pins of ADG738 demultiplexer so that the DAC output value can be monitored using the on-board AD7476 ADC.

## EVALUATION BOARD SOFTWARE

### SOFTWARE INSTALLATION AND STARTUP

The AD5668 evaluation kit includes self-installing software on CD-ROM. The software is compatible with Windows® 2000 and Windows®XP.

1. If the setup file does not run automatically when you insert the CD, run the **setup.exe** file directly from the CD.
2. 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.
3. After installation from the CD-ROM has finished, power up the AD5668 evaluation board as described in the Power Supplies section and connect it to the USB port using the supplied cable .
4. The software detects the evaluation board. Follow the instructions on the dialog boxes that appear to complete the installation.

## SOFTWARE OPERATION

The AD5668 evaluation board lets you set up the power down DAC bits, the clear code register bits and the LDAC register bits, by selecting options in the **Command Bits** section and clicking **Write to Part**.

1. From the **Analog Devices** menu, select **Start > All Programs > Analog Devices > AD5668 > AD5668 Evaluation Software**.

For older PCs, select **Start > Programs > Analog Devices > AD5668 > AD5668 Evaluation Software**.

The AD5668 main window opens, as shown in Figure 2. The data programmed into the 32-bit input shift register is displayed. You can select the command bits, the address bits, and the data bits by selecting the options in each section.

2. In the **Command Bits** section, select a command to program the part. (See the AD5668 data sheet for more information about modes of operation.)

3. In the **Address Bits** section, select the DAC channel to update.
4. To program a DAC code, in the **Data Bits** section, type a value in the **Hex Value** field or in the **Voltage** field.
5. To execute, click **Write to Part**. (Note that you must click **Write to Part** to execute all writes to the part.)
6. The voltage output on each DAC channel is monitored using the on-board ADC. To read the output voltage, click **Sample** in the **ADC** section.
7. To set LDAC and CLR to high or low, select them in the **Hardware Pins** section. The software indicates if it is HI or LOW. This command is executed immediately so there is no need to click **Write to Part**.



Figure 2. AD5668 Evaluation Software Main Window

# EVAL-AD5668EB

## REFERENCE SETUP

By default, the AD5668 internal reference is turned off at power-up, allowing for the use of an external reference. To switch the internal reference on or off, select **REF Setup Register** in the **Command Bits** section. This allows you to set the bit in the REF setup register for the required mode of operation. Click **Write to Part** to execute. See Figure 3.



Figure 3. AD5668 Evaluation Software Main Window, Reference Setup

**SCHEMATICS**

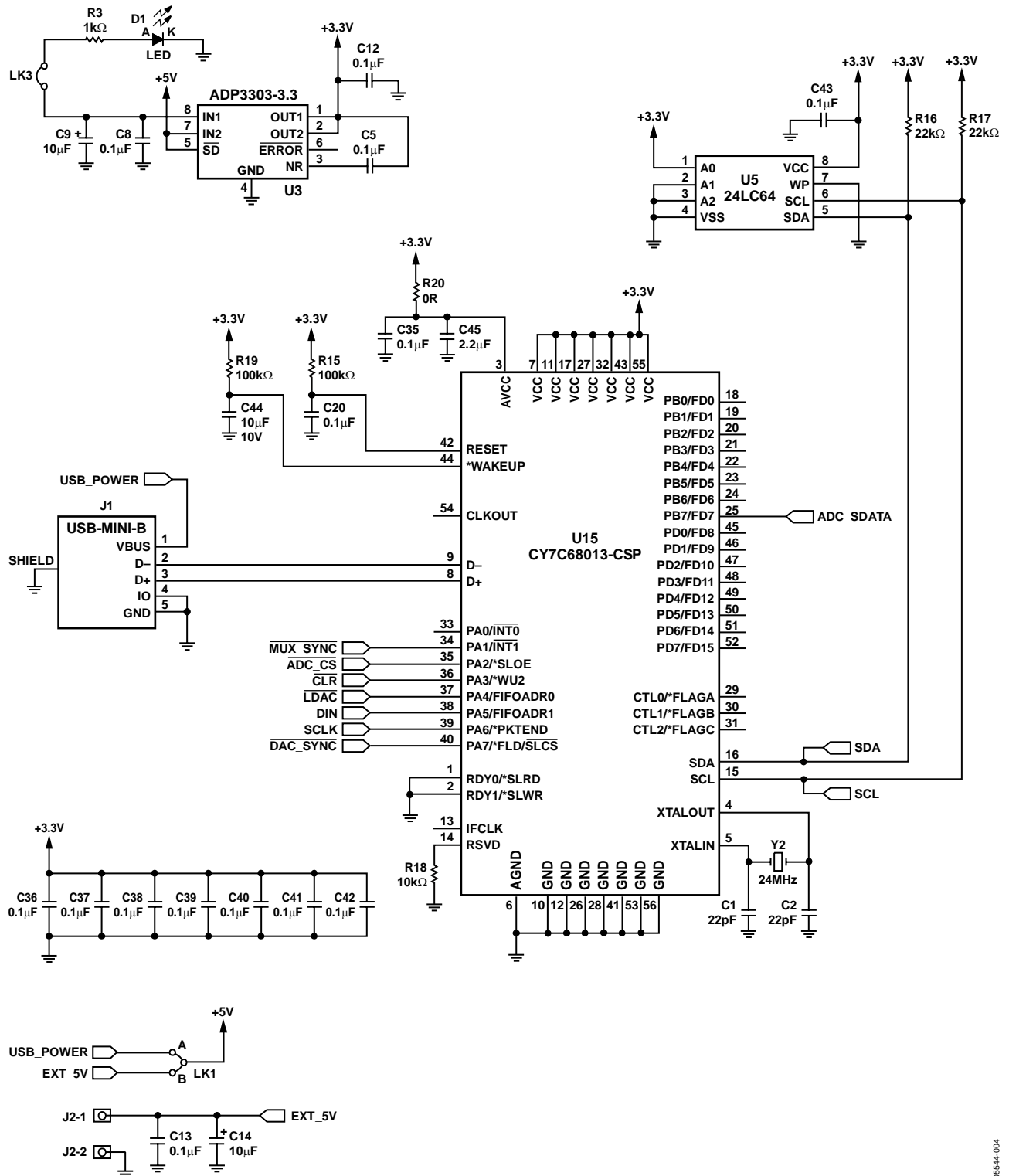


Figure 4. Schematic of Controller Circuitry

# EVAL-AD5668EB

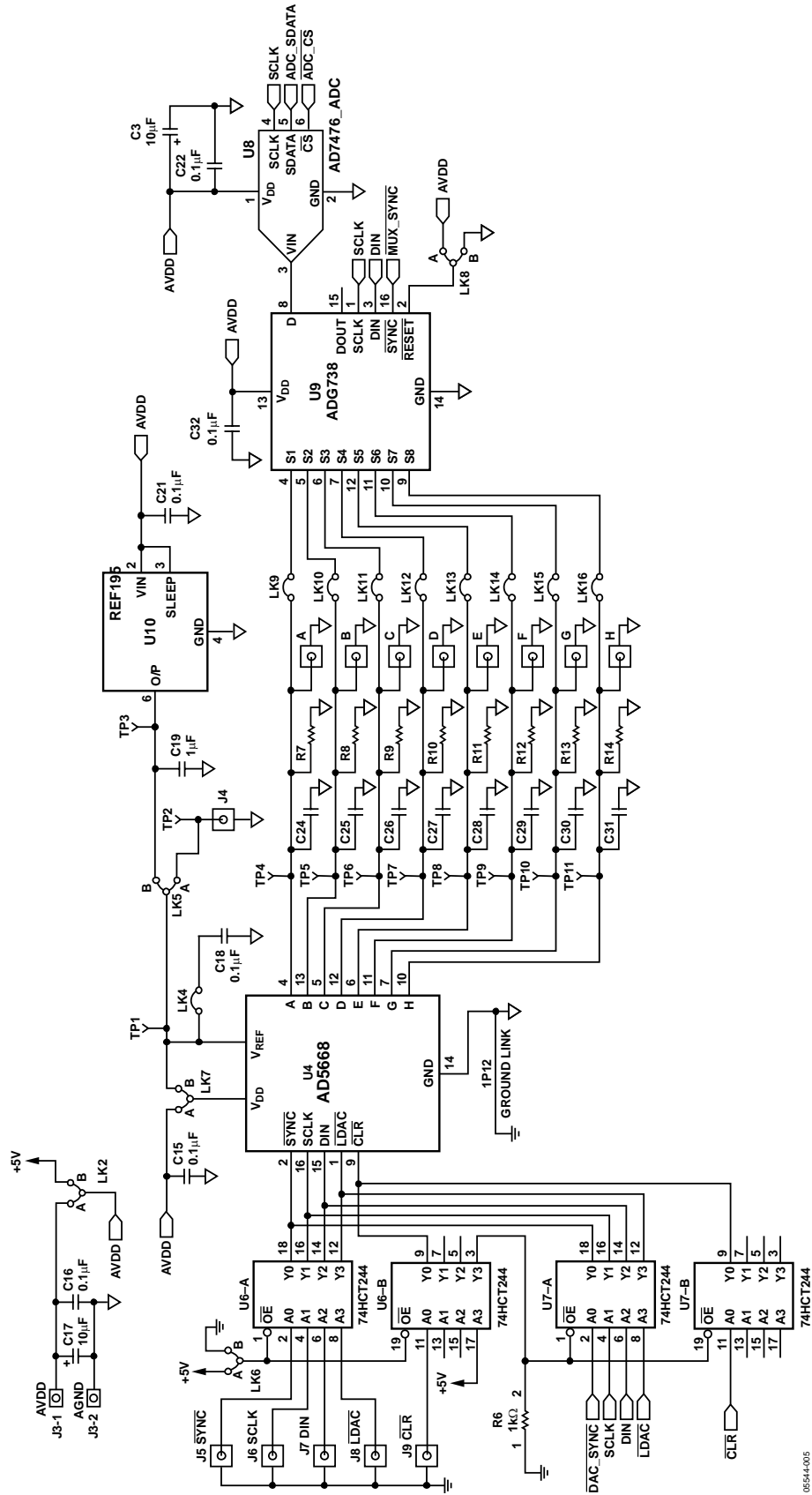


Figure 5. Schematic of AD5668 Circuitry

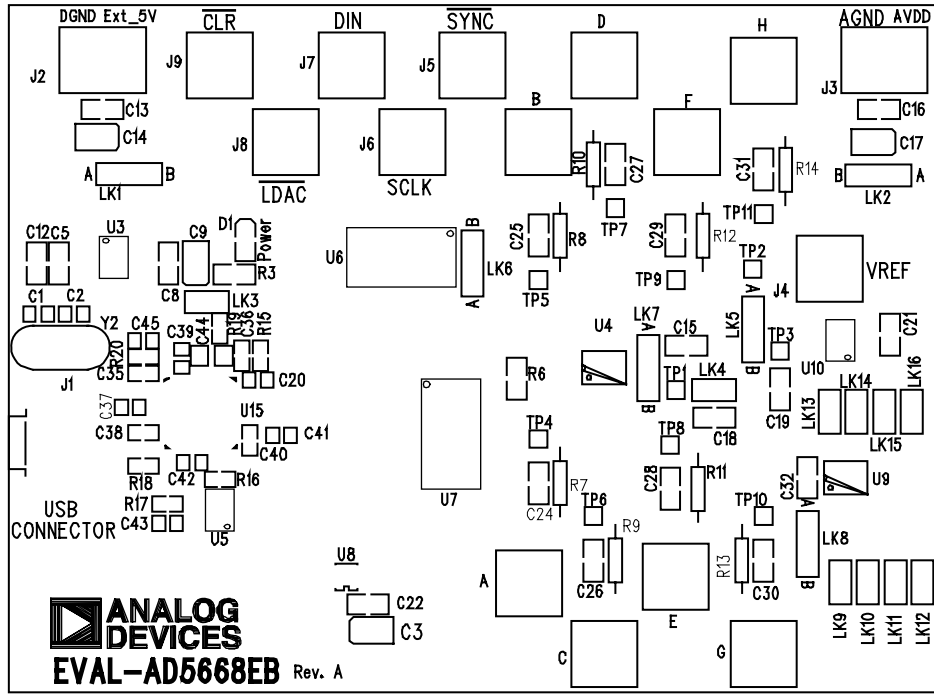


Figure 6. Component Placement Drawing

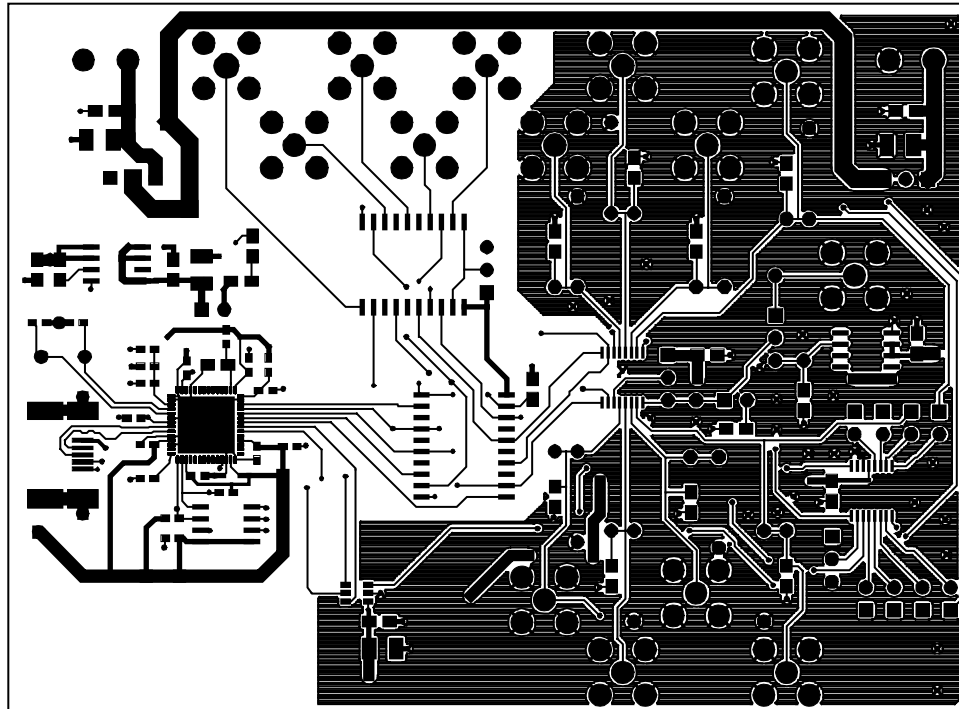
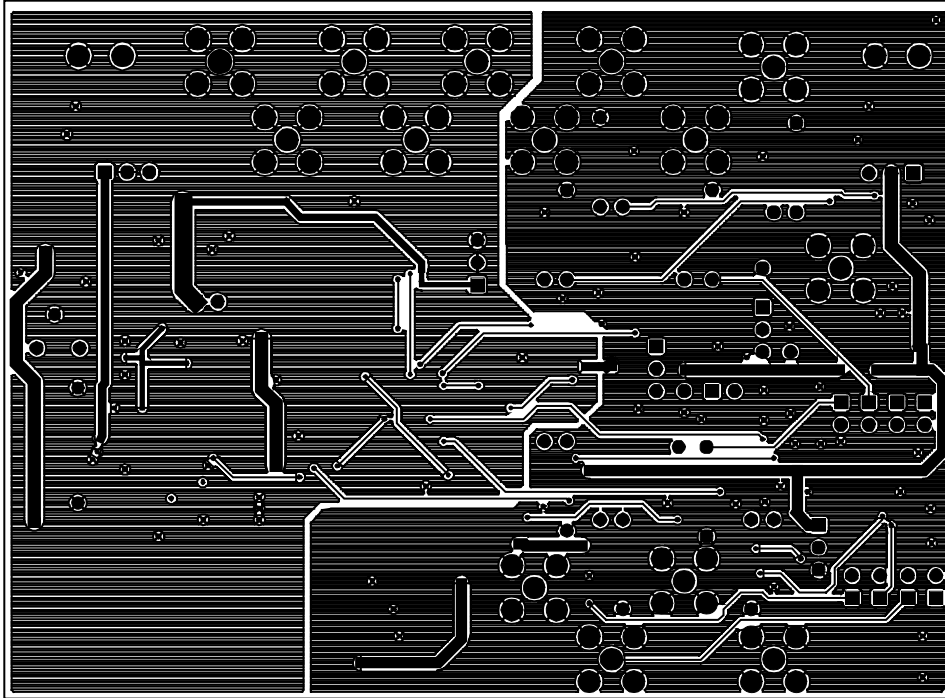


Figure 7. Component-Side PCB Drawing



05544-008

Figure 8. Solder-Side PCB Drawing

## ORDERING INFORMATION

### COMPONENT LISTING

Table 3.

Qty	Reference Designator	Description	Supplier/Number
1	U3	ADP3303AR-3.3	Analog Devices
1	U4	AD5668ARUZ-2 (3)	Analog Devices
1	U5	24LC64	Digikey 24LC64-I/SN-ND
2	U6, U7	74HCT244	FEC 383-028
1	U8	AD7476ART	Analog Devices
1	U9	ADG738BRU	Analog Devices
1	U10	REF195GS	Analog Devices
1	U15	CY7C68013-CSP	CY7C68013-56LFC
1	Y2	24 MHz crystal	FEC 569-860
14	A to H; J4 to J9	Gold 50 $\Omega$ SMB jack	FEC 310-682
1	J1	USB Mini-B	FEC 476-8309
2	J2, J3	Power connectors	FEC 151-785
1	D1	LED	FEC 359-9681
4	C3, C9, C14, C17	10 $\mu$ F tantalum cap (TAJ-B package)	FEC 197-427
2	C1, C2	22 pF (0603 package)	FEC 722-005
8	C5, C8, C12, C15, C16, C18, C21, C22	0.1 $\mu$ F (0805 package)	FEC 317-287
1	C19	1 $\mu$ F (0805 package)	FEC 318-8899
11	C20, C32, C35 to C43	0.1 $\mu$ F (0603 package)	FEC 499-675
1	C44	10 $\mu$ F (0805 package)	Digikey 490-1709-1-ND
1	C45	2.2 $\mu$ F (0603 package)	Digikey 490-1552-1-ND
8	C24 to C31	0805 package (not inserted)	
8	R7 to R14	R1/8W (not inserted)	
2	R3, R6	1 k $\Omega$ (0805 package)	FEC 613-095
2	R15, R19	100 k $\Omega$ (0603 package)	FEC 612-728
2	R16, R17	22 k $\Omega$ (0603 package)	FEC 911-276
1	R18	10 k $\Omega$ (0603 package)	FEC 911-355
1	R20	0 $\Omega$ (0603 package)	FEC 772-227
10	LK3, LK4, LK9 to LK16	Header (2 $\times$ 1 pin)	FEC 511-705
6	LK1, LK2, LK5 to LK8	Header (3 $\times$ 1 pin)	FEC 329-1698
11	TP1 to TP11	Testpoint	FEC 240-333

### ORDERING GUIDE

Model	Package Description
EVAL-AD5668EB	AD5668 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.



**NOTES**