ANALOG DEVICES

Evaluation Board for Quad, 16-Bit, Serial Input, Voltage Output DAC

EVAL-AD5664REB

FEATURES

Full featured evaluation board for the AD5664R
Allows evaluation of the AD5664 part
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 AD5664R quad, 16-bit DAC. The AD5664R 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-chip reference to give an output voltage span of 2.5 V or 5 V, respectively.
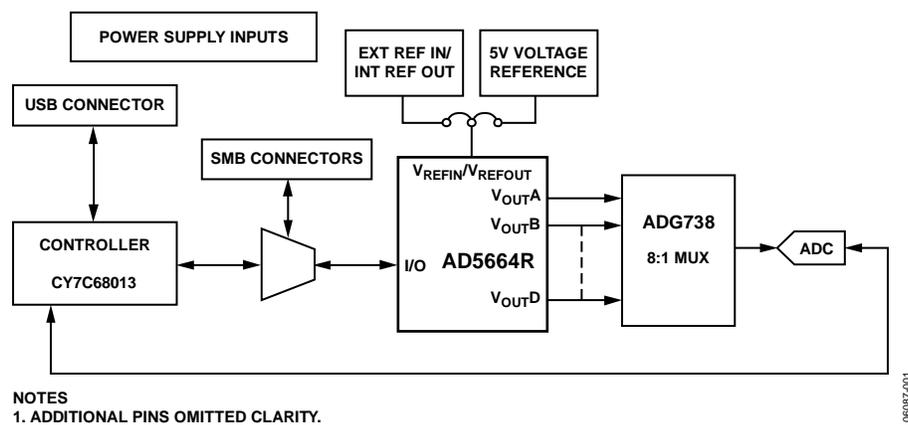
The on-chip reference is off at power-up allowing for the use of an external reference. The REF195 is used on this evaluation board. The part must be written to after power-up to turn on the internal reference.

Refer to the AD5664R data sheet available for full data on the part. Consult the AD5664R data sheet in conjunction with this data sheet when using the evaluation board.

This board can also be used to evaluate the AD5664 part. Refer to the AD5664 data sheet for complete data on the part.

The evaluation board interfaces to the USB port of an IBM®-compatible PC. Software is available with the evaluation board that allows the user to easily program the AD5664R.

FUNCTIONAL BLOCK DIAGRAM

NOTES
1. ADDITIONAL PINS OMITTED CLARITY.

Figure 1.

EVAL-AD5664REB

TABLE OF CONTENTS

REVISION HISTORY

9/06—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

To power the AD5664R evaluation board, supply 5.5 V between the AVDD and AGND inputs for the analog supply of the AD5664R (J6). Alternatively place Link 6 in Position B, powering 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 AD5664R. To avoid ground loop problems, it is recommended that the user does not connect AGND and DGND elsewhere in the system.

Each supply is decoupled to the relevant ground plane with 10 µF and 0.1 µF capacitors. Each device supply pin is also decoupled with a 10 µF and 0.1 µF 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. 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. The default link options are listed in Table 1.

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

Link No.	Option
LK1 to LK4	Inserted
LK5	B
LK6	B
LK7	A
LK8	A
LK9	B
LK10	Removed
LK11	B
LK12	Not applicable
LK13	A

Table 2. Link Options

Link No.	Function
LK1 to LK4	This link connects the V$_{OUT}$A pin to the V$_{OUT}$D pin of the AD5664R to the input pins of the ADG738 demultiplexer so that the DAC output value can be monitored using the on-board AD7476 ADC.
LK5	This link selects the AVDD power supply source for the analog circuitry. • Position A selects J6 as the AVDD analog circuitry power supply source. • Position B selects the 5 V power supply source as the AVDD analog circuitry power supply source (see LK6).
LK6	This link selects the 5 V power supply source for the digital circuitry. • Position B selects the USB port as the 5 V digital circuitry power supply source. • Position A selects J7 as the 5 V digital circuitry power supply source.
LK7	This link selects whether the AD5664R evaluation board is controlled by the PC via the USB port or by an external source via the SMB connectors J1to J5. • Position A selects control by the PC via the USB port. • Position B selects control by an external source via the SMB connectors J1 to J3.
LK8	This link sets the $\overline{RESET}$ pin on the ADG738. • Position A allows normal operation of the switch. • Position B resets the switch.
LK9	This link selects the AVDD power supply source for the REF195. • Position A selects J6 as the REF195 power supply source. • Position B selects the AVDD as the REF195 power supply source (see LK5).
LK10	This link connects a 0.1 µF capacitor to AGND on the V$_{REFOUT}$ pin. It is recommended to connect this when using the internal reference.
LK11	This link selects the reference source. • Position A selects the internal reference as the reference source. The part must be written to via software to turn on the internal reference. • Position B selects the on-board REF195 5 V reference as the reference source.
LK12	Not applicable.
LK13	This link selects the DAC voltage source. • Position A selects the AVDD analog circuitry power supply source. • Position B selects the on-board REF195 5 V reference as the power supply source.

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION AND STARTUP

The AD5664R evaluation board kit includes self-installing software CD. 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-ROM drive.

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

After the installation has completed power up the AD5664R evaluation board as described in the Power Supplies section. Then, connect it to the PC's USB port using the supplied cable.

Once the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation.

SOFTWARE OPERATION

From the **Analog Devices** menu, click **Start** > **All Programs** > **Analog Devices** >**AD5664R** >**AD5664R Evaluation Software**.

For older PCs, click **Start** > **Programs** > **Analog Devices** >**AD5664R** >**AD5664R Evaluation Software**.

The AD5664R Evaluation Software dialog box opens, as shown in Figure 2. The data programmed into the 24-bit input shift register is displayed. You can select the command bits, the address bits, and the data bits by clicking the appropriate button under each area.

To select a command with which to program the part, click the appropriate button under Command Bits. For example, to program all DAC outputs with full scale:

1. Under **Command Bits**, click **Write to and Update DAC channel n**.

2. Under **Address Bits**, click **All DACs**.

3. Under **Data Bits**, either type the data in hex format or in voltage.

4. Click **Write to Part** to execute all writes to the part.

The voltage output on each DAC channel is monitored using the on-board ADC. To read the output voltage click **Sample** under the **ADC** section in the upper right of the window.

The AD5664R evaluation board lets you program the power down DAC bits, the clear code register bits, and the LDAC register bits by clicking on the corresponding button under the Command Bits sections and clicking Write to Part. You can also program the register bits for the required mode of operation. Refer to the AD5664R data sheet for further information.

REFERENCE SETUP

The AD5664R internal reference is off at power-up by default, allowing the use of an external reference. To turn on (or off) the internal reference click **REF Setup Register** under **Command Bits**. This allows the user to program the bit in the reference setup register for the required mode of operation. as shown in Figure 3. Then click **Write to Part**.
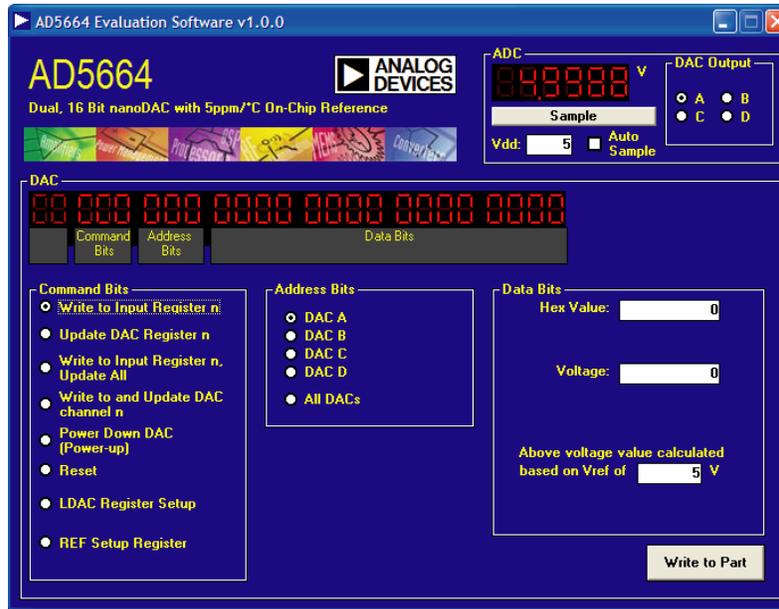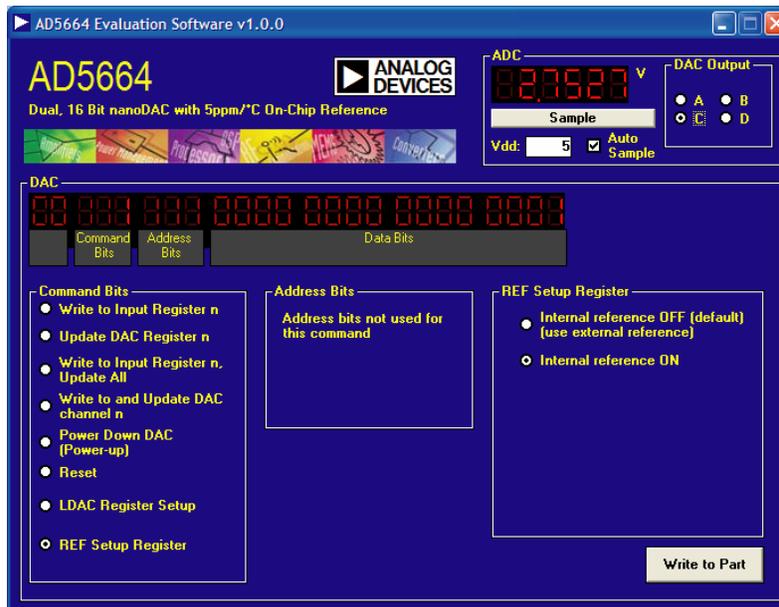
Figure 2. AD5664R Dialog Box

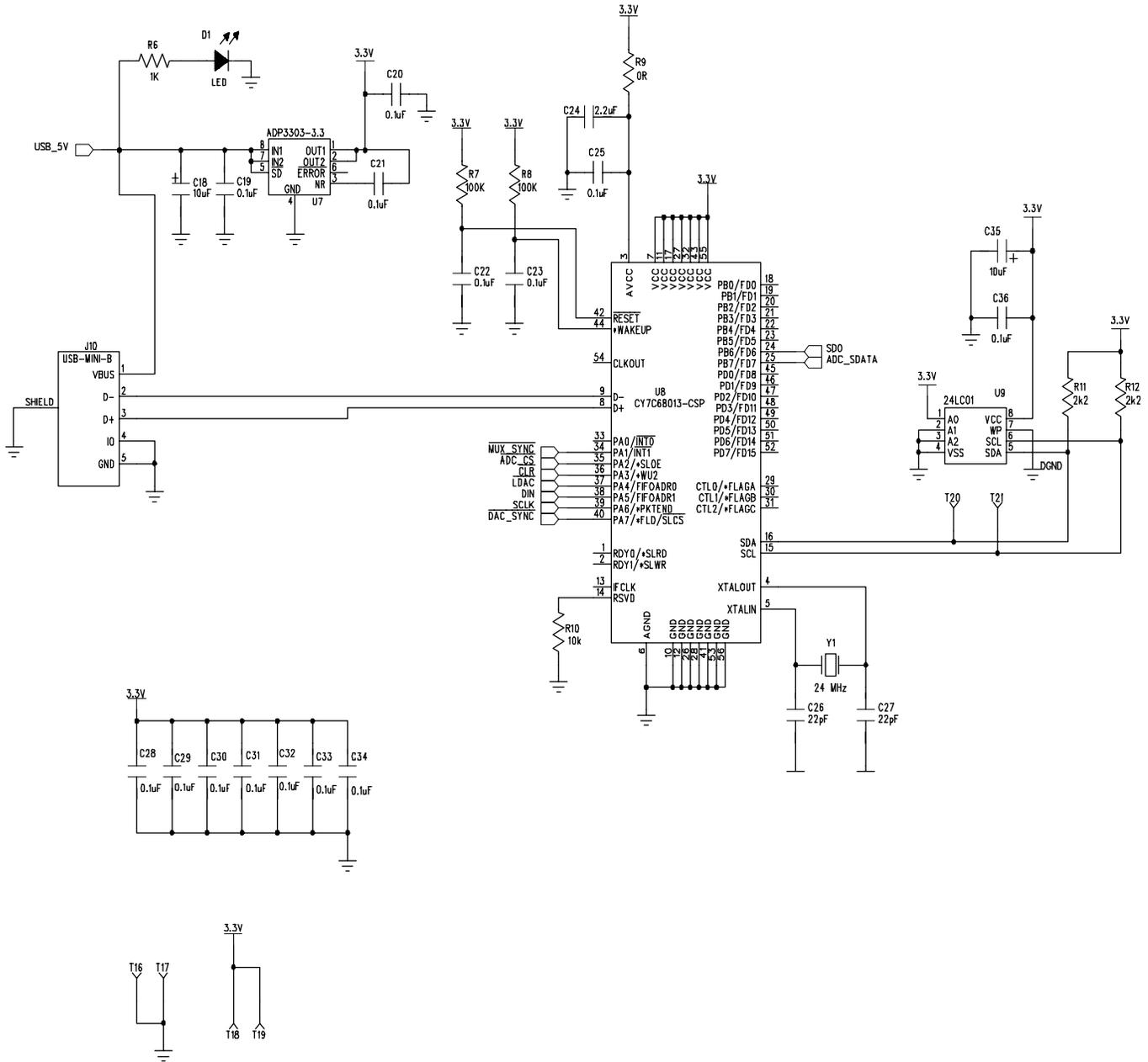Figure 3. AD5664R Dialog Box, Reference Setup

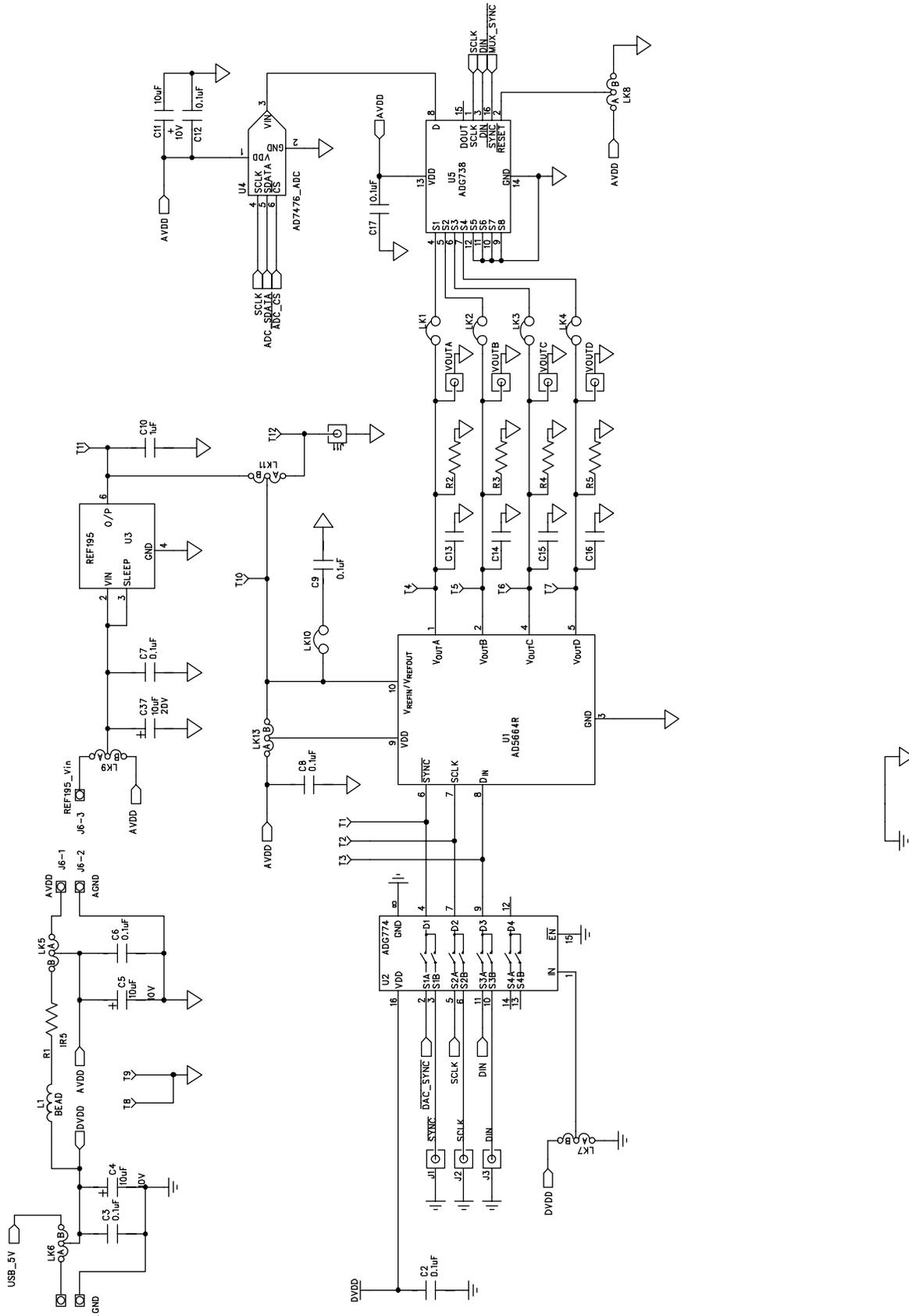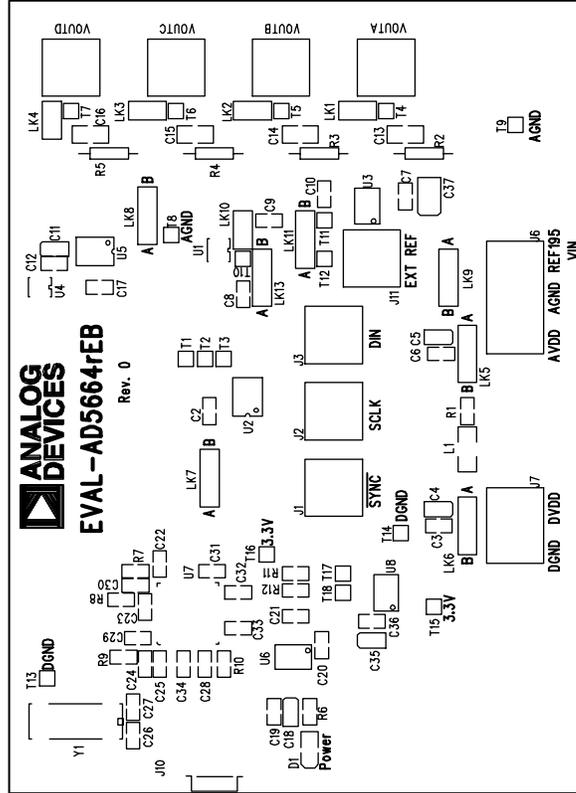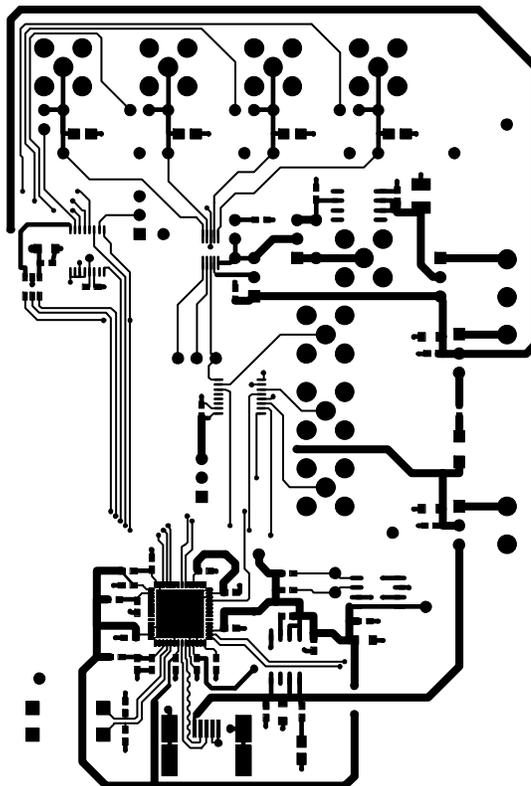## SCHEMATICS

Figure 4. Schematic of Controller Circuitry

Figure 5. Schematic of AD5664R Circuitry

06087-005

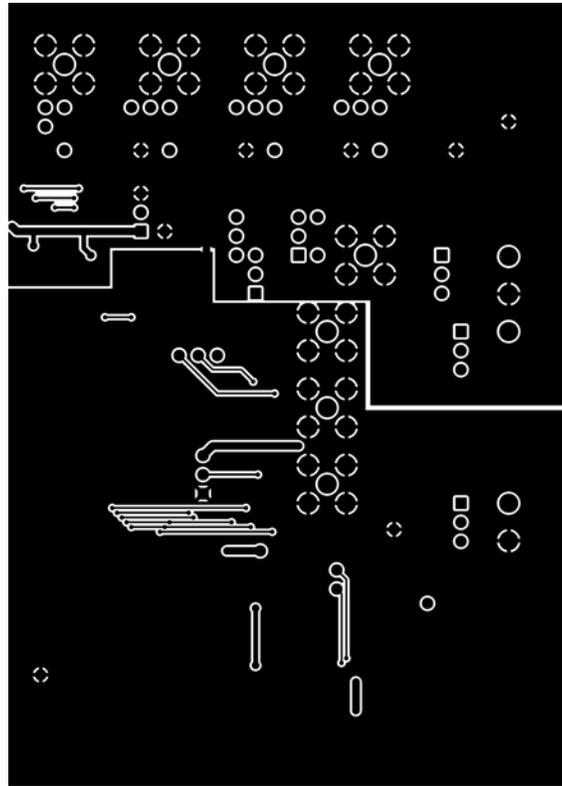Figure 6. Component Placement Drawing

Figure 7. Component Side PCB Drawing

Figure 8. Solder Side PCB Drawing

ORDERING INFORMATION

COMPONENT LISTING

Table 3.

Qty	Reference Designator	Description	Supplier/Number
1	U1	AD5664RBRMZ-5	Analog Devices
1	U2	ADG774BRQZ	Analog Devices
1	U3	REF195ESZ	Analog Devices
1	U4	AD7476ARTZ (ADC)	Analog Devices
1	U5	ADG738BRUZ	Analog Devices
1	U6	ADP3303ARZ-3.3	Analog Devices
1	U7	CY7C68013-CSP	Embassy CY7C68013-56LFC
1	U8	24LC01	FEC 975-8070
1	Y1	24 MHz crystal	FEC 569-872
8	V$_{OUT}$A to V$_{OUT}$D; J1 to J3, J11	Gold 50 Ω SMB jack	FEC 365 1228
1	J10	USB mini B	FEC 476-8309
1	J6	Power connectors	FEC 151-786
1	J7	Power connectors	FEC 151-785
1	D1	LED	FEC 359-9681
5	C4, C5, C11, C18, C35	10 µF 10 V tantalum cap (TAJ-B package)	FEC 197-130
1	C37	10 µF 20 V tantalum cap (TAJ-B package)	FEC 197-427
2	C26, C27	22 pF (0603 package)	FEC 722-005
22	C2, C3, C6 to C9, C12, C17, C19 to C23, C25, C28 to C34, C36	0.1 µF (0603 package)	FEC 882-0023
1	C24	2.2 µF (0603 package)	Digikey 490-1552-1-ND
1	C10	1 µF (0603 package)	FEC 318-8840
4	C13 to C16	0805 package (not inserted)	
1	R1	1.5 Ω	FEC 758-267
4	R2 to R5	Wire-wrap pin (not inserted)	
1	R6	1 kΩ (0603 package)	FEC 911-239
2	R7, R8	100 kΩ (0603 package)	FEC 911 471
2	R11, R12	2.2 kΩ (0603 package)	FEC 911-276
1	R10	10 kΩ (0603 package)	FEC 911-355
1	R9	0 (0603 package)	FEC 772-227
5	LK1 to LK4, LK10	Header (2 × 1 pin)	FEC 511-705
7	LK5 to LK9, LK11, LK13	Header (3 × 1 pin)	FEC 511-717
18	TP1 to TP18	Test point	FEC 873-1144

ORDERING GUIDE

Model	Package Description
EVAL-AD5664REB	AD5664R Evaluation Board Kit

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.

NOTES

NOTES

ANALOG
DEVICES

www.analog.com