

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

FEATURES

Full featured evaluation board for the AD5064
 On-board reference
 On-board ADC for voltage readback
 Various link options
 Direct hookup to USB port of PC
 PC software for control of DACs

EQUIPMENT NEEDED

IBM-compatible PC
 Cable (supplied in kit)

SOFTWARE NEEDED

AD5064 evaluation software (supplied in kit)

DOCUMENTS NEEDED

[AD5064](#)
[AD7476](#)
[ADG738](#)
[ADG774](#)
[REF195](#)

GENERAL DESCRIPTION

This user guide describes the evaluation board for the AD5064 quad 16-bit digital-to-analog convertor (DAC). The AD5064 operates from a single 4.5 V to 5.5 V supply. There is an external reference, which is the REF195 on this evaluation board.

Complete specifications for the AD5064 are found in the data sheet available from Analog Devices, Inc., and should be consulted in conjunction with this user guide when using the evaluation board.

The evaluation board interfaces to the USB port of an IBM®-compatible PC. Software is available with the evaluation board allowing the user to easily program the AD5064.

EVALUATION BOARD CONNECTION DIAGRAM

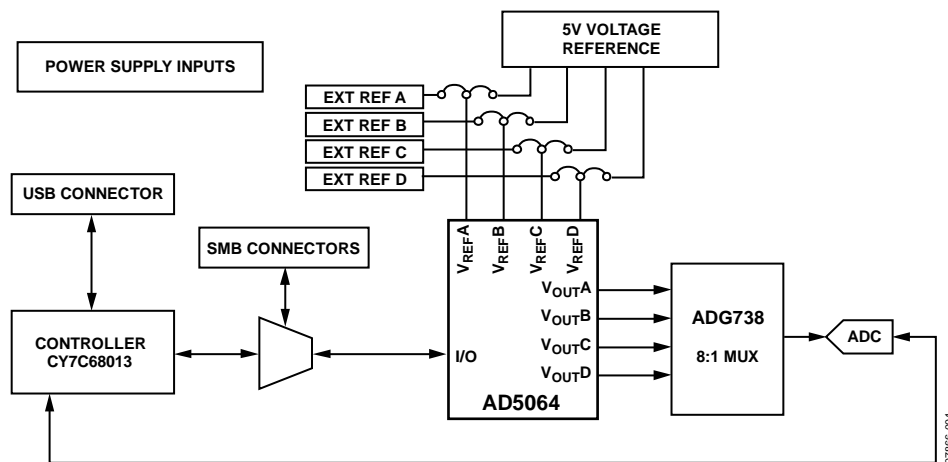


Figure 1.

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REVISION HISTORY

6/10—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

To power the EVAL-AD5064EBZ, supply 5.5 V between the AVDD and AGND inputs for the analog supply of the AD5064. Alternatively, placing Link 6 in Position B 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 AD5064. To avoid ground loop problems, do not connect AGND and DGND elsewhere in the system.

Each supply is decoupled to the relevant ground plane with 10 μ F and 0.1 μ F capacitors. Each device supply pin is also decoupled with a 10 μ F and 0.1 μ 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. 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	A
LK11	A
LK12	A
LK13 to LK16	B

Table 2. Link Functions

Link No.	Function
LK1 to LK4	These links connect the V_{OUTA} to V_{OUTD} pins of the AD5064 to the input/output pins of the ADG738 demultiplexer to monitor the DAC output value 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 A selects J7 as the 5 V digital circuitry power supply source. Position B selects the USB port as the 5 V digital circuitry power supply.
LK7	This link selects whether the AD5064 evaluation board is controlled by the PC via the USB port or by an external source via the SMB connectors (J1 to 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 J5).
LK8	This link sets the 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 selects the DAC power supply source. Position A selects the AVDD as the DAC power supply source. Position B selects an external source via SMB Connector EXT_VDD as the power supply source.
LK11	This link selects the DAC voltage source. Position A selects the DAC power supply source as the DAC voltage source (see LK10). Position B selects the on-board REF195 5 V reference as the DAC voltage source.
LK12	This link selects whether the part power-on resets to zero or midscale. Position A ensures that the POR of the part resets to midscale. Position B ensures that the POR of the part resets to zero scale.
LK13 to LK16	These links select the reference sources for V_{REFA} to V_{REFD} . Position A selects an external reference via the SMB connectors (EXT_REF_A, EXT_REF_B, EXT_REF_C, and EXT_REF_D). Position B selects the on-board REF195 5 V reference as the reference source.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The AD5064 evaluation kit includes self-installing software on CD. The software is compatible with Microsoft® Windows® 2000 and Windows XP.

To ensure that the board is correctly recognized when connected to the PC, install the software before connecting the evaluation board to the USB port of the PC.

1. Start the Windows operating system and insert the CD.
2. The installation software should launch automatically. If it does not, run the **setup.exe** file directly from the CD.
3. After installation from the CD is complete, power up the AD5064 evaluation board as described in the Power Supplies section. Connect the evaluation board to the USB port of the PC using the cable that is supplied.
4. When the software detects the evaluation board, proceed through any dialog boxes that appear until the installation is completed.

SOFTWARE OPERATION

1. From the **Analog Devices** menu, click **Start > All Programs > Analog Devices > AD5064 > AD5064 Evaluation Software**.

For older PCs, click **Start > Programs > Analog Devices > AD5064 > AD5064 Evaluation Software**.

The main window of the AD5064 evaluation software 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 clicking the appropriate option button under each section.

Command Bits

1. To select a command to program the part, click the drop-down menu button under the **Select Control Function** section and select the appropriate option from the menu. For example, to program all DAC outputs with full scale, click **Write to and Update DAC Channel n**.
2. Click **All DACs** in the **Address Bits** section.
3. In the **Data** section, enter the data in hexadecimal value.
4. To execute, click **Write to Part**. You must click **Write to Part** to execute all writes to the part.

Other commands that the AD5064 evaluation software allows you to program include the power-down DAC bits, the clear code register bits, and the register bits by clicking the corresponding option button under the **Select Control Function** section and then clicking **Write to Part**. You can also set the register bits for the required mode of operation. Consult the AD5064 data sheet for details.

Hardware Pins

To set $\overline{\text{LDAC}}$ and $\overline{\text{CLR}}$ high or low, click the corresponding checkbox, $\overline{\text{LDAC}}$ or $\overline{\text{CLR}}$, located on the right portion of the screen dedicated to the hardware pins. This command executes immediately; therefore, there is no need to click **Write to Part**.

ADC

The voltage output on each DAC channel is monitored using the on-board ADC. To read the output voltage, click the **OK** button under the **Sample ADC** section and select which channel to read (**A**, **B**, **C**, or **D**) under the **ADC** section.

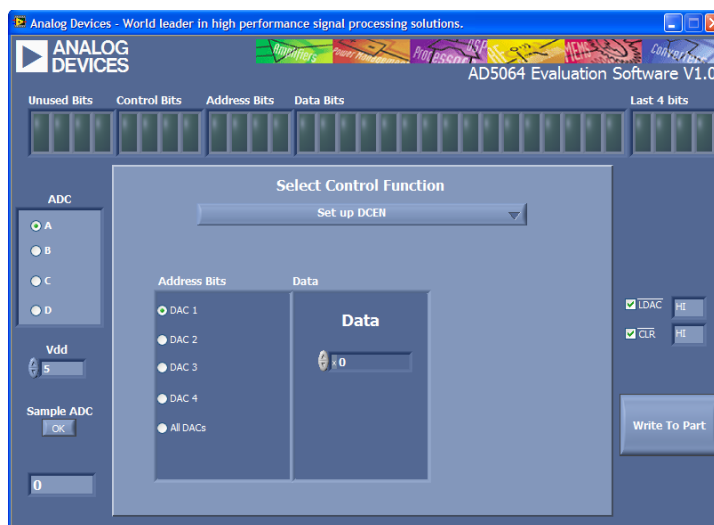


Figure 2. AD5064 Evaluation Software Main Window

EVALUATION BOARD SCHEMATICS AND ARTWORK

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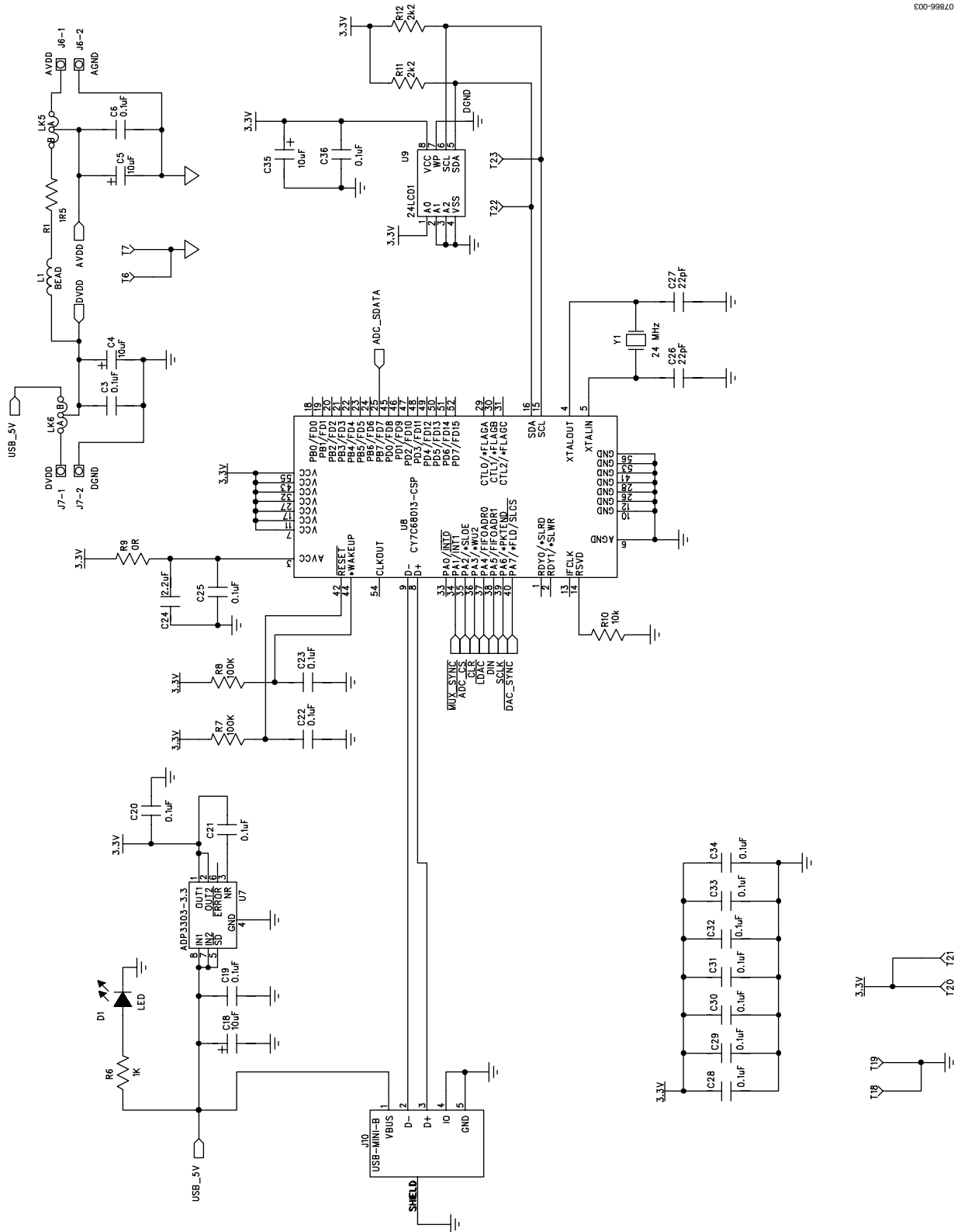


Figure 3. Schematic of Controller Circuitry

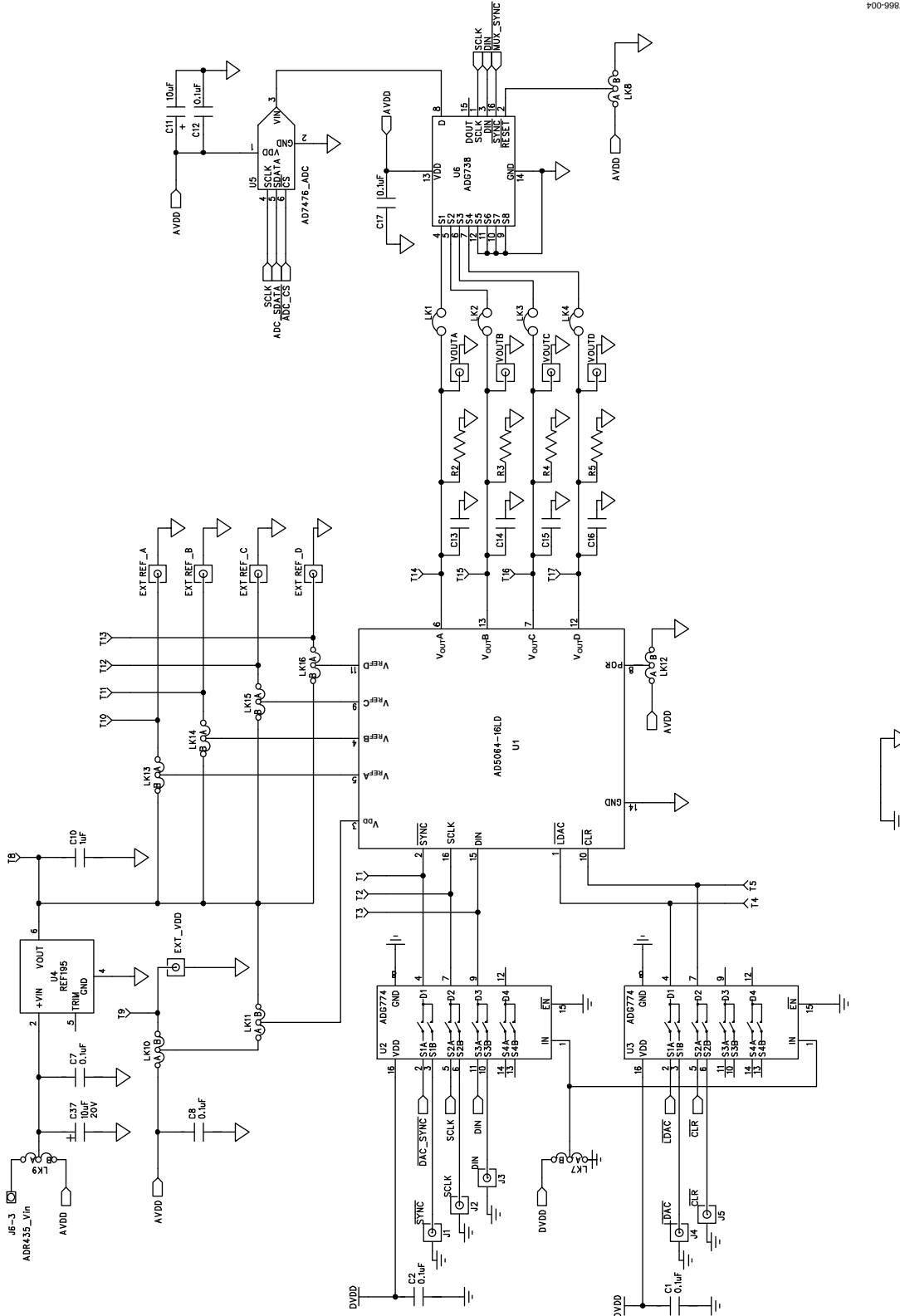


Figure 4. Schematic of AD5064 Circuitry

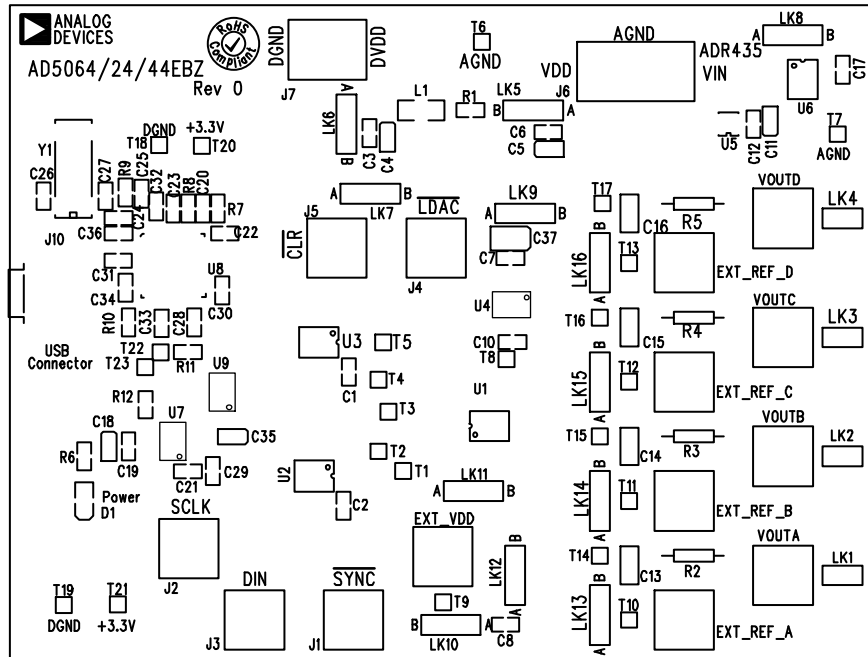


Figure 5. Component Placement Drawing

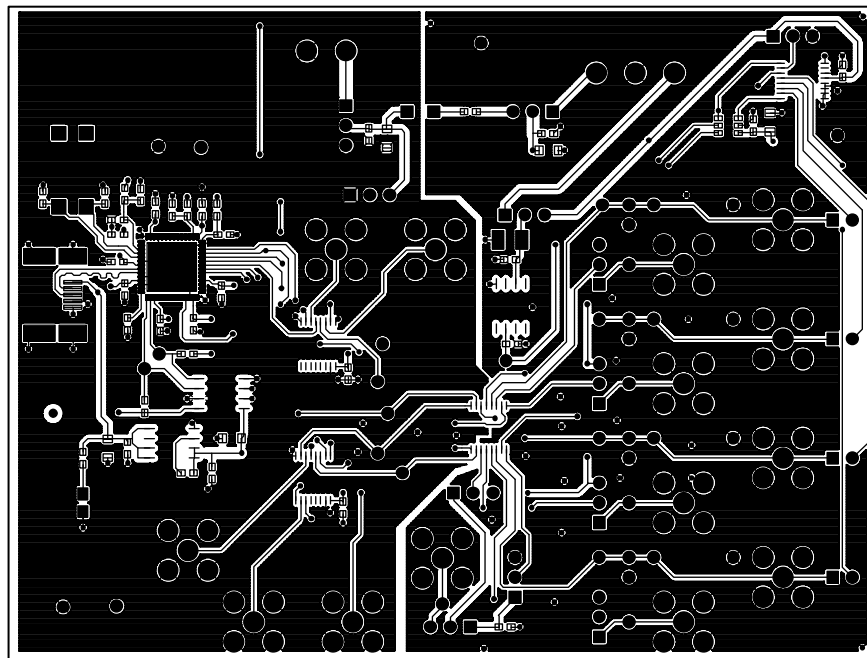


Figure 6. Component Side PCB Drawing

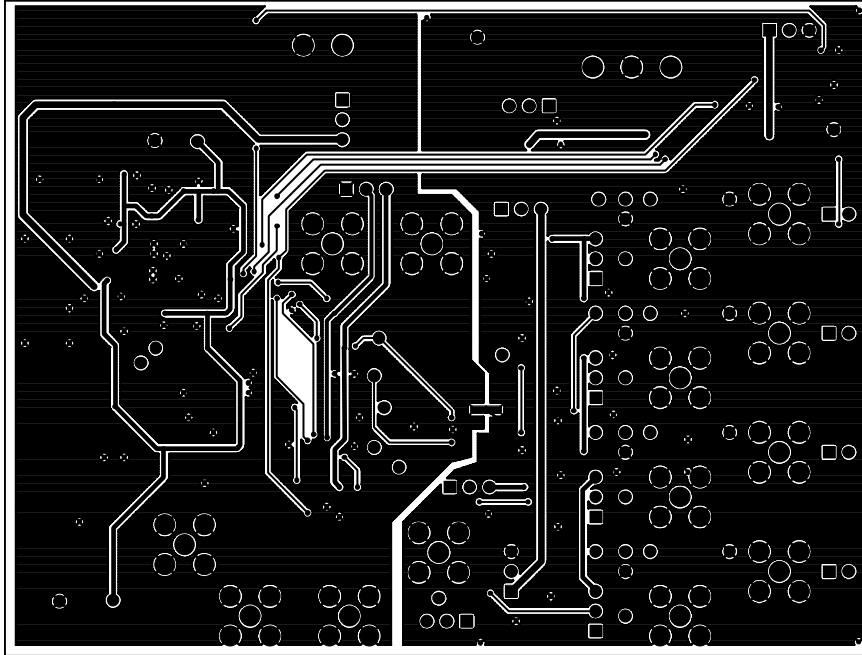


Figure 7. Solder Side PCB Drawing

ORDERING INFORMATION

BILL OF MATERIALS

Table 3.

Quantity	Reference Designator	Description	Supplier/Number
1	U7	ADP3303AR-3	Analog Devices
1	U1	AD5064BRUZ-2 (3)	Analog Devices
1	U9	24LC01	FEC 9758070
2	U2, U3	ADG774BRQ	Analog Devices
1	U5	AD7476ART	Analog Devices
1	U6	ADG738BRU	Analog Devices
1	U4	REF195ES	Analog Devices
1	U8	CY7C68013-CSP	Embassy CY7C68013-56LFC
1	Y1	24 MHz crystal	FEC 569-872
9	VOUTA to VOUTD; J1 to J5	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 μ F 10 V tantalum capacitor (TAJ-B package)	FEC 197-130
2	C26, C27	22 pF (0603 package)	FEC 722-005
22	C1 to C3, C6 to C8, C12, C17, C19 to C23, C25, C28 to C34, C36	0.1 μ F (0603 package)	FEC 882-0023
1	C24	2.2 μ F (0603 package)	Digikey 490-1552-1-ND
1	C10	1 μ F (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 k Ω (0603 package)	FEC 911-239
2	R7, R8	100 k Ω (0603 package)	FEC 911 471
2	R11, R12	2.2 k Ω (0603 package)	FEC 911-276
1	R10	10 k Ω (0603 package)	FEC 911-355
1	R9	0 Ω (0603 package)	FEC 772-227
5	LK1 to LK4, LK10	Header (2 \times 1 pin)	FEC 511-705
8	LK5 to LK9, LK11 to LK13	Header (3 \times 1 pin)	FEC 511-717
21	T1 to T21	Testpoint	FEC 873-1144

RELATED LINKS

Resource	Description
AD5064	Product page, AD5064 <i>Fully Accurate 16-Bit VOUT nanoDAC™ Quad, SPI Interface, 4.5 V to 5.5 V in TSSOP</i>
AD7476	Product page, AD7476 <i>1 MSPS, 12-Bit ADC in 6-Lead SOT-23</i>
ADG738	Product page, ADG738 <i>CMOS, Low Voltage, Single 8-to-1 Multiplexer, Serially Controlled Matrix Switch</i>
ADG774	Product page, ADG774 <i>2.2 Ω, Wide Bandwidth, Low Voltage Quad SPDT Switch</i>
ADP3303	Product page, ADP3303 <i>High Accuracy anyCAP® 200 mA Low Dropout Linear Regulator</i>
REF195	Product page, REF195 <i>Precision Micropower, Low Dropout, Low Voltage Reference</i>

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**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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