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Evaluation Board for the AD5668 Octal, 16-Bit, Serial Voltage Output DAC

FEATURES

Full featured evaluation board for the AD5668
On-board reference
Various link options
PC control in conjunction with Analog Devices
System development platform (SDP)
PC software for control of DACs
On-board ADC for voltage readback

PACKAGE CONTENTS

AD5668 evaluation board
AD5668 device
CD that includes
    Self-installing software that allows users to control
    the board and exercise all functions of the device
    Electronic version of the AD5668 data sheet
    Electronic version of UG-155

GENERAL DESCRIPTION

The Analog Devices, Inc., AD5668 evaluation board (EVAL-AD5668EBRZ and AD5668EBCZ) is designed to help customers quickly prototype new AD5668 circuits and reduce design time. 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.

Consult the AD5668 data sheet, available from Analog Devices, in conjunction with this user guide when using the evaluation board.

The evaluation board interfaces to the USB port of a PC via the SDP board. Software is available with the evaluation board, which allows the user to easily program the AD5668.
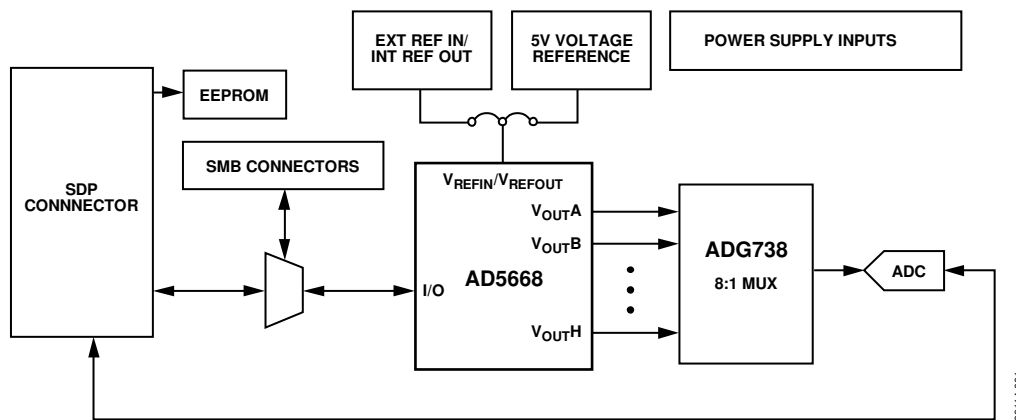

Figure 1. Universal Evaluation Board

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REVISION HISTORY

6/10—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

To power the AD5668 evaluation board, supply 5.5 V between the AVDD and AGND inputs for the analog supply, and supply 5 V between DVDD and DGND inputs for the digital supply.

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.

All supplies are decoupled to ground with 10 μF tantalum and 0.1 μF ceramic capacitors.

Table 1. Power Supply Connectors

Connector No.	Voltage
J1	Analog positive supply and ground, AVDD and AGND. For single-supply operation, supply 5.5 V.
J2	Digital positive power supply, DVDD. For single-supply operation, supply 5 V.

LINK OPTIONS

A number of link and switch options are incorporated in the evaluation board and should be set for the required operating setup before using the board. Table 2 describes the positions of the different links to control the evaluation board by the PC, via the USB port, using the AD5668 in single-supply mode. The functions of these link options are described in detail in Table 3.

Table 2. Link Options Setup for SDP Control (Default)

Link No.	Options
LK1	A
LK2 to LK3	Inserted
LK4	Inserted
LK5	B
LK6	A
LK7	A
LK8	A
LK9 to LK14	Inserted

Table 3. Link Functions

Link No.	Option
LK1	This link selects the AVDD power supply source for the analog circuitry:` Position A selects J1 as the AVDD analog circuitry power supply source. Position B selects the DVDD source as the AVDD analog circuitry power supply source (see LK6).
LK2	This link connects the $V_{OUT}G$ pin of the AD5668 to the input pin of the ADG738 demultiplexer, so that DAC output value can be monitored using the on-board AD7476 ADC.
LK3	This link connects the $V_{OUT}H$ pin of the AD5668 to the input pin of the ADG738 demultiplexer, so that DAC output value can be monitored using the on-board AD7476 ADC.
LK4	This link connects a 0.1 μF capacitor to AGND on the V_{REFIN}/V_{REFOUT} pin. It is recommended to connect this when using the internal reference.
LK5	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 5 V reference as the reference source.
LK6	This link selects the 5 V power supply source for the digital circuitry: Position A selects V_IO as the 5 V digital circuitry power supply source. Position B selects J2 as the 5 V digital circuitry power supply source.
LK7	This link selects the DAC voltage source: Position A selects the AVDD analog circuitry power supply source. Position B selects the on-board 5 V reference as the power supply source.
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 to LK14	This link connects the $V_{OUT}A$ to $V_{OUT}F$ pins of the AD5668 to the input pins of ADG738 demultiplexer, so that the DAC output value can be monitored using the on-board AD7476 ADC.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The EVAL-AD5668EBZ evaluation kit includes self-installing software on CD. The software is compatible with Windows® XP, Windows Vista (32 bits), and Windows 7 (32 bits).

To obtain drivers for 64-bit operating systems, contact Linear.Apps@analog.com.

Install the software before connecting the SDP board to the USB port of the PC. This ensures that the SDP board is recognized when it connects to the PC. Follow these steps:

1. Start the Windows operating system and insert the CD. The installation software must open automatically. If it does not, run the **setup.exe** file from the CD.
2. After installation is completed, power-up the evaluation board as described in the Power Supplies section
3. Plug the EVAL-AD5668EBZ into the SDP board, and plug the SDP board into the PC using the USB cable included in the box.
4. When the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation.

RUNNING THE SOFTWARE

To run the program, do the following:

1. Click **Start > All Programs > Analog Devices > AD5668> AD5668 Evaluation Software**.
   To uninstall the program, click **Start > Control Panel > Add or Remove Programs > AD5668 Evaluation Software**.
2. Determine if the SDP board is connected to the USB port. If the SDP board is not connected to the USB port when the software is launched, a connectivity error is displayed (see Figure 2). Simply connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.
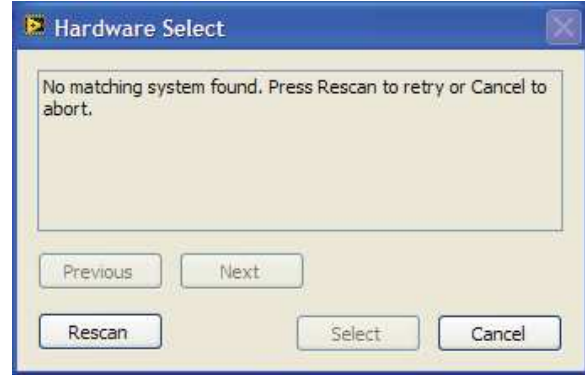
Figure 2. Pop-Up Window Error

3. Determine if the SDP board is connected to the boards. If the SDP board is not connected to the evaluation boards, a message box appears as shown in Figure 3. Check the connection between the SDP and EVAL-AD5668EBZ boards and run the program again.

Figure 3. Error Message

If the SDP board is connected, the System Development Platform connects briefly.

Figure 4. System Development Platform Wait Window

4. Notice that the main window of the AD5668 evaluation software then displays, as shown in Figure 5.

Figure 5. AD5668 Evaluation Board Main Window

SOFTWARE OPERATION

Follow the steps below to operate the software:

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

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

   The AD5668 main window opens, as shown in Figure 5. 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 button under each area.

2. To select a command to program the part, select the appropriate option from the drop-down menu under **Command Menu**. For example, to program all DAC outputs with full scale , select **Write to and Update DAC channel n** and then click **All DACs** under **Address Bits**.

3. In the **Data Bits** section, enter the data in decimal format in the **Enter Value** field. To execute, click **Write to Part**. Note that you must click **Write to Part** to execute all writes to the part.

4. 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 (in the upper right of the window).

5. To set up the power-down DAC bits, the clear code register bits, and the LDAC register bits, select the appropriate option from the drop-down menu under **Command Menu** and click **Write to Part**. You can also set the register bits for the required mode of operation. Consult the AD5668 data sheet for details.

6. To set $\overline{\text{LDAC}}$ and $\overline{\text{CLR}}$ to high or low, click the corresponding check box under **Hardware Pins**. Because this command is executed immediately, there is no need to click **Write to Part**.

EVALUATION BOARD SCHEMATICS AND ARTWORK

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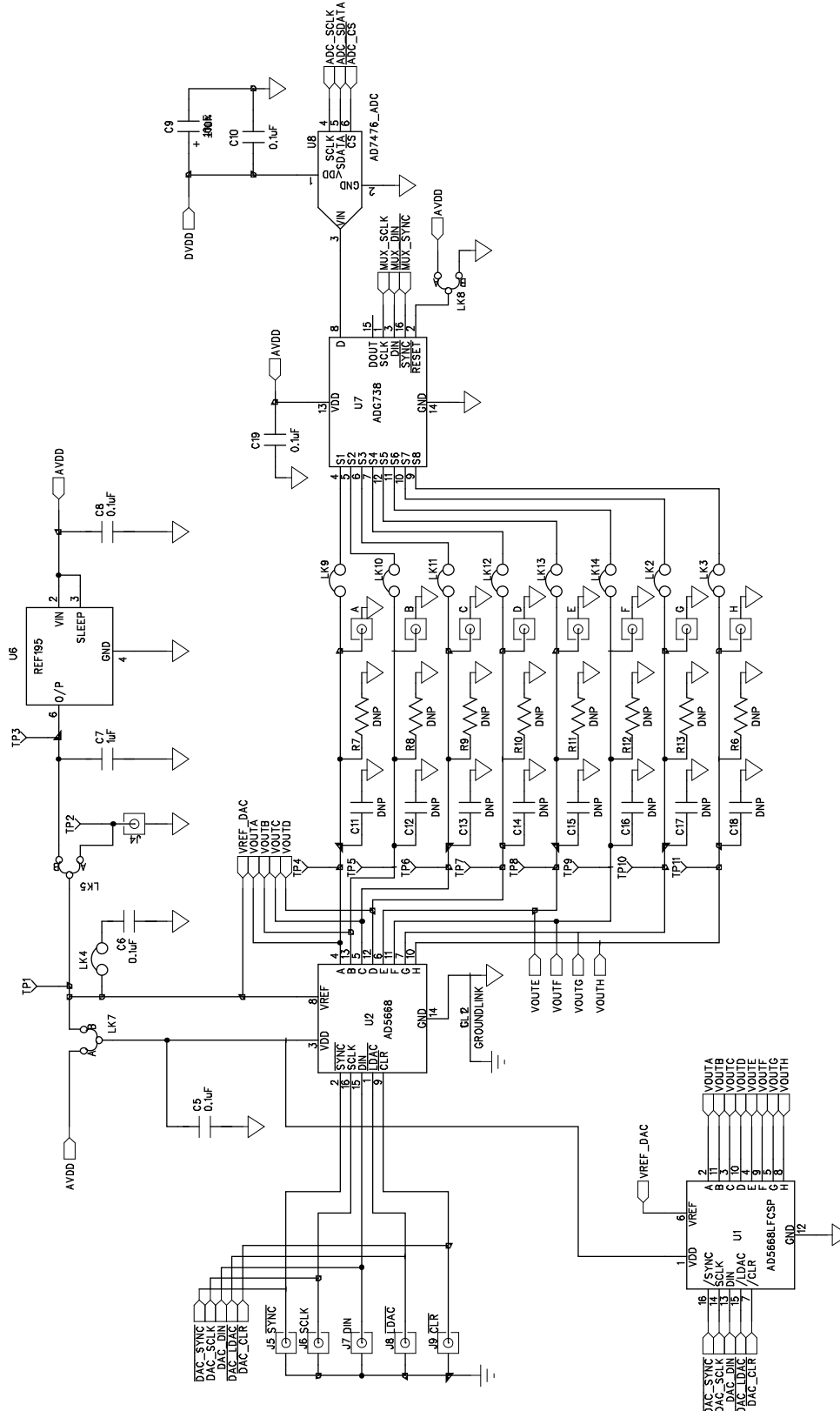
Figure 6. Schematic of AD5668 Evaluation Circuitry
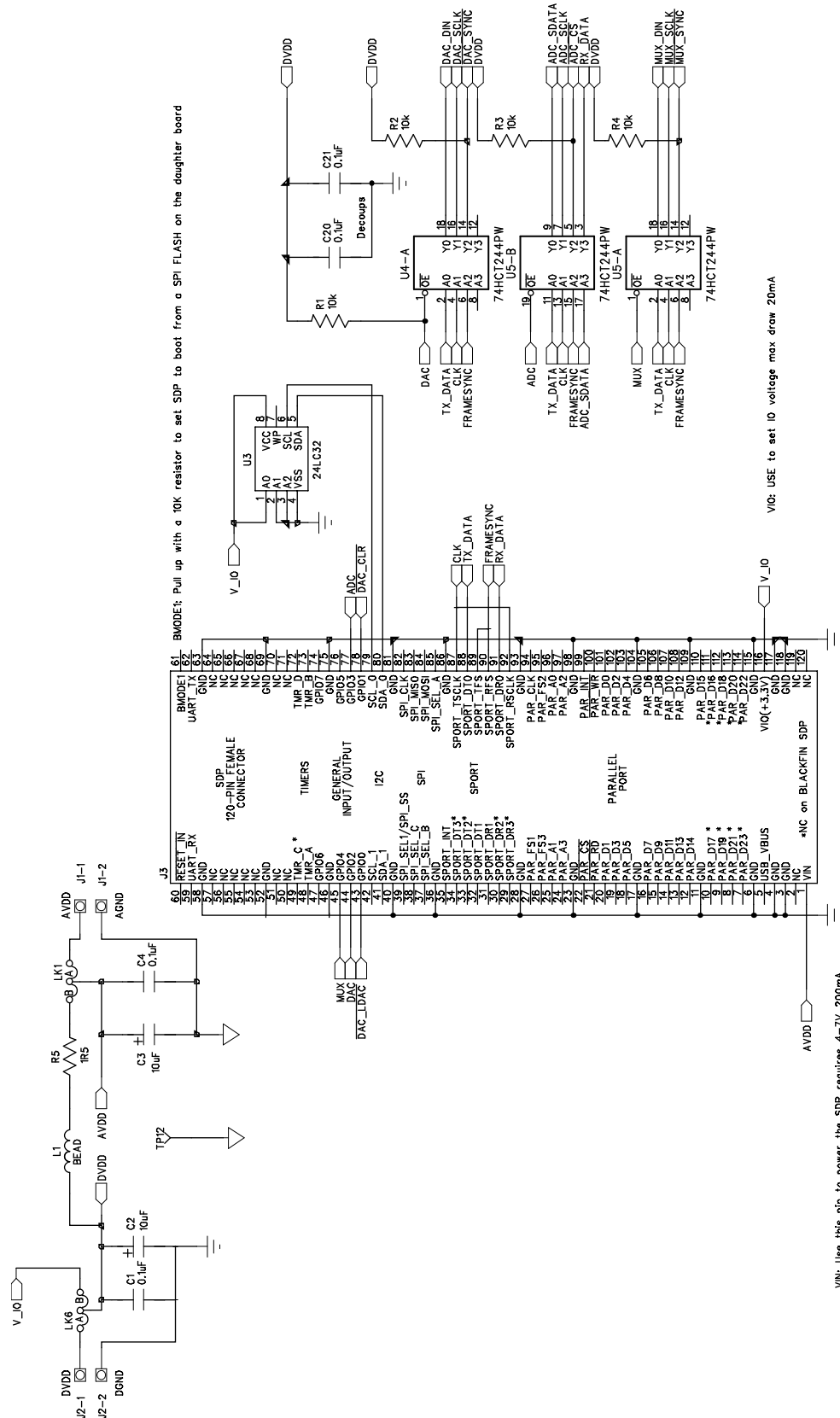
Figure 7. Schematic of SDP Connector
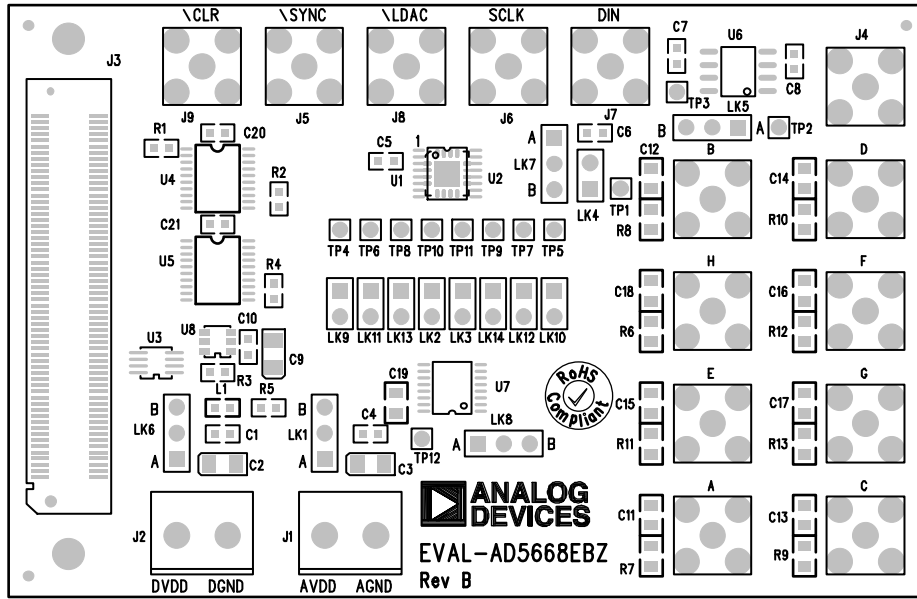
Figure 8. Component Placement Drawing
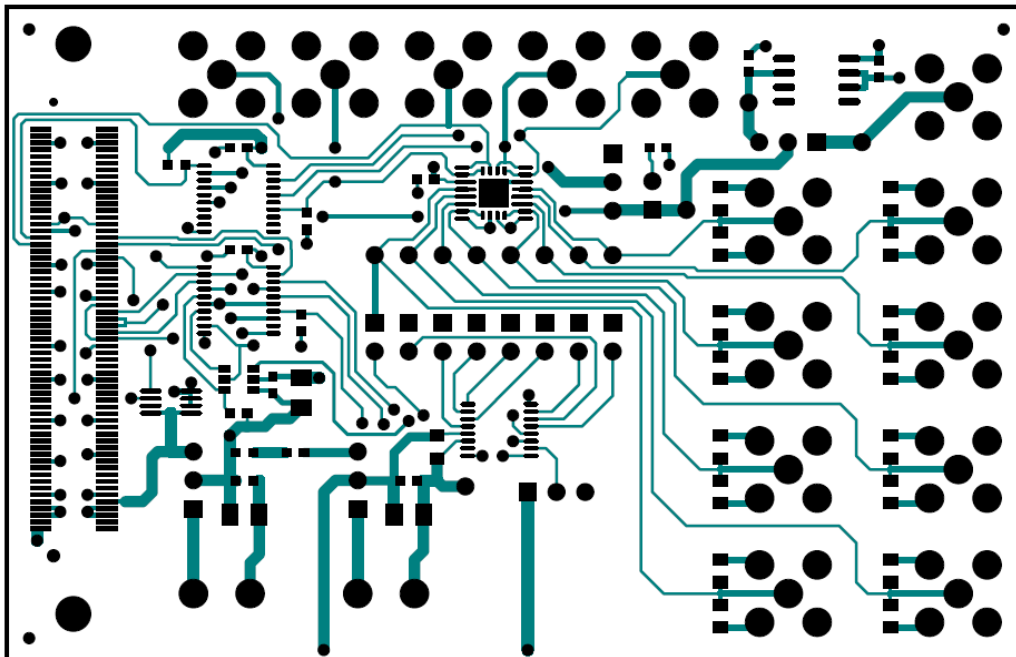
Figure 9. Component Side PCB Drawing
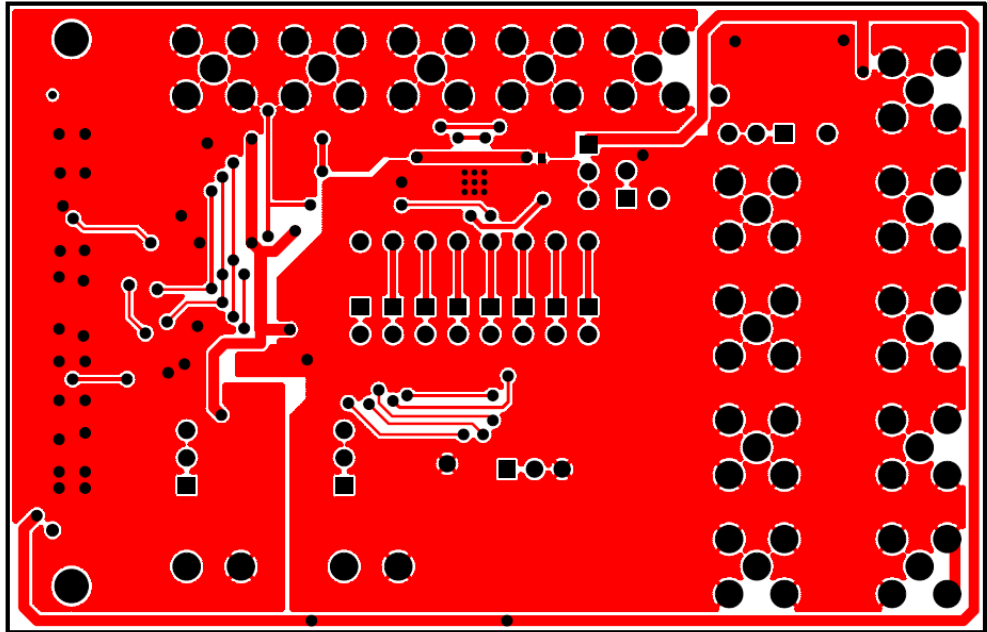
Figure 10. Solder Side PCB Drawing

BILL OF MATERIALS

Table 4.

Qty.	Reference Designator	Description	Supplier/Part Number
1	U8	12-bit ADC	Analog Devices AD7476
1	U7	Matrix switch/multiplexer	Analog Devices ADG738
1	L1	Ferrite bead	Digi-Key 490-1024-1-ND
9	LK2, LK3, LK4, LK9, LK10, LK11, LK12, LK13, LK14	Jumper block, 2-way, 2.54 mm pitch spacing	FEC 1022247 and 150-411
3	LK5, LK7, LK8	Jumper block, 3-way, 2.54 mm pitch spacing	FEC 1022248
6	J4, J5, J6, J7, J8, J9	SMB jack 50 Ω	FEC1206013
1	J3	120-way female connector	FEC 1324660
1	U3	32 kb I²C serial EEPROM	FEC 1331330
2	J1, J2	Terminal block, 2-way	FEC 151789
3	C2, C3, C9	Case A 10 µF capacitor	FEC 197-130
1	C7	0603 10 µF capacitor	FEC 318-8840
2	LK1, LK6	SIL header, 3-way	FEC 512-047 and 150-411
13	TP1 to TP12	Red test point	FEC 8731144 (pack)
9	C1, C4, C5, C6, C8, C10, C19, C20, C21	0603 100 nF capacitor	FEC 8820023
4	R1, R2, R3, R4	SMD resistor	FEC 933-0399
1	R5	0603 1.5 Ω resistor, 5%, 0.063 W	FEC 9331832
2	U4, U5	Octal buffer/line driver	FEC 9591915
1	U1	Octal 16-bit DAC with on-chip reference in LFCSP	Analog Devices AD5668(CP)
1	U2	Octal 16-bit DAC with on-chip reference in TSSOP	Analog Devices AD5668(RU)
1	U6	Low dropout voltage reference	Analog Devices REF195

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