Evaluation Board for I²C® CMOS 8 × 10 Analog Switch Array with Dual/Single Supplies

EVAL-ADG2108EB

FEATURES

Full-featured evaluation board for the ADG2108
Various link options
Direct hook up to the USB port of a PC
PC software for control of switches
Functions with or without a PC

GENERAL DESCRIPTION

This data sheet describes the evaluation board for the ADG2108 I²C CMOS 8 × 10 analog switch array with dual/single supplies. The array is bidirectional, and, as a result, its rows and columns can be configured as either inputs or outputs. Any number of combinations can be active at one time.

The ADG2108 has a maximum difference of 15 V between its inputs, V_{DD} and V_{SS}. Therefore, care must be taken not to exceed this parameter when connecting the power supplies.

The evaluation board interfaces to the USB port of a PC. Software is available with the evaluation board that allows the user to easily program the ADG2108. The EVAL-ADG2108EB can also be used as a standalone board.

Complete specifications for the ADG2108 are available in the ADG2108 data sheet available from Analog Devices, Inc., and should be consulted in conjunction with this data sheet when using the evaluation board.
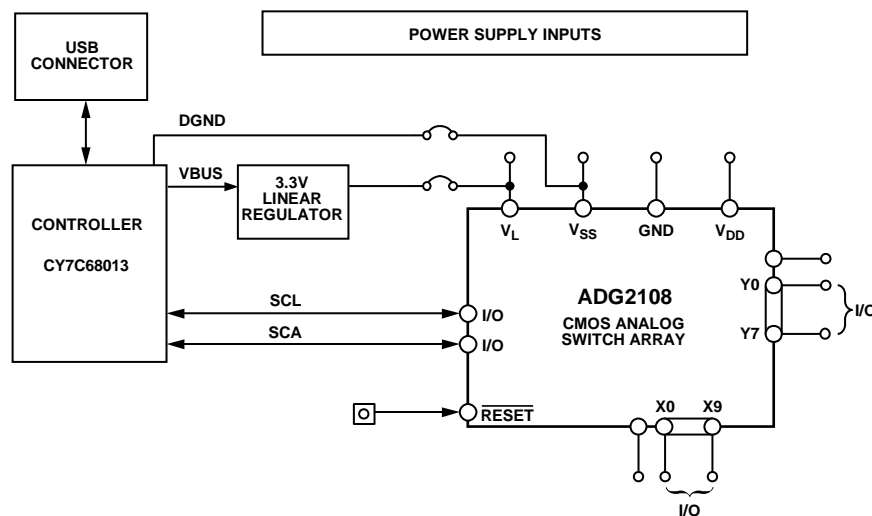
EVALUATION BOARD BLOCK DIAGRAM

Figure 1.

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REVISION HISTORY

5/06—Revision 0: Initial Version

HARDWARE DESCRIPTION

POWER SUPPLIES

The EVAL-ADG2108EB can be operated with both single and dual supplies. The device is specified to operate in single-supply mode at 12 V ± 10% and at 8 V ± 10% operation. It is also specified to operate at ±5 V dual supply. To apply these supplies to the evaluation board, the following guidelines apply:

- V_L provides the digital supply for the ADG2108 and all digital circuitry on the board. This supply can be applied externally or the USB port can be used to power the digital circuitry (Link 5 inserted). Note that in this case, the logic supply power is 3.3 V.

- The positive supply voltage (for example, 8 V/12 V) is applied between the AVDD and AGND inputs of the ADG2108 evaluation board. Note that the maximum single supply the chip can handle is 15 V. In this case, AVSS must equal 0 V.

- The negative supply (for example, −5 V) is applied between AVSS and AGND inputs for the negative supply (V_{SS}) of the ADG2108. Note that the maximum voltage between AVDD and AVSS is 15 V.

Both analog GND and digital GND inputs are provided on the board. The AGND and DGND planes are connected at one location close to the ADG2108. 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 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

There are a number of links and switch options on the evaluation board that should be set for the required operating setup before using the board. The functions of these link options are described in Table 1.

Table 1. Link Functions

Link No.	Function
LK1	This link chooses the LSB bit of the chip address on the USB I²C interface. Note that the I²C address should be set before the evaluation board software is launched. • When inserted, the address bit is set to 0. • When removed, the address bit is set to 1.
LK2	This link chooses the second LSB bit of the chip address on the USB I²C interface. Note that the I²C address should be set before the evaluation board software is launched. • When inserted, the address bit is set to 0. • When removed, the address bit is set to 1.
LK3	This link chooses the third LSB bit of the chip address on the USB I²C interface. Note that the I²C address should be set before the evaluation board software is launched. • When inserted, the address bit is set to 0. • When removed, the address bit is set to 1.
LK4	This link selects whether the supply at V_{SS} is sourced from ground or from the input AVSS. If sourced from ground, it is a single supply system. • Position A: V_{SS} sourced from AVSS. • Position B: V_{SS} is connected to ground. This implies single supply operation of the ADG2108.
LK5	This link selects whether the logic supply power comes from the USB power (if connected to a PC) or from the user supplied V_L (if used as a standalone unit). • When inserted, logic power supply comes from USB power, that is, 3.3 V. • When removed, logic power supply comes from user supplied V_L.

Setup for PC Control

The default setup for the EVAL-ADG2108EB is for control by the PC via the USB port. The default link options are listed in Table 2.

Table 2. Default Link Options

Link No.	Option
LK1	Inserted; therefore, the LSB is 0.
LK2	Inserted; therefore, the second LSB is 0.
LK3	Inserted; therefore, the third LSB is 0.
LK4	Position A; therefore, AVSS is supplying the power to V_{SS}.
LK5	Inserted; therefore, logic power supply comes from USB power.

Setup for Control Without a PC

The EVAL-ADG2108EB can also be used as a standalone board. This option is designed for users with a PC without a USB port or for users wishing to hook the board up to their entire system. Table 3 lists the link options that must be set to operate the evaluation board in this way.

Table 3. Link Options Setup for Control Without a PC

Link No.	Option
LK1	User configurable. Does not affect whether the board is connected to a PC or not.
LK2	User configurable. Does not affect whether the board is connected to a PC or not.
LK3	User configurable. Does not affect whether the board is connected to a PC or not.
LK4	Position A.
LK5	Removed.

SMB connectors are provided for the SDA and SCL inputs. Switches are turned on and off via this I²C bus. The read/write procedures are also provided in the ADG2108 data sheet and should be consulted when using this evaluation board in its standalone mode.

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The ADG2108 evaluation kit includes self-installing software on CD-ROM. The software is compatible with Microsoft® Windows® 2000 and Windows® XP.

The evaluation software should be installed before connecting the evaluation board to the PC's USB port. This ensures that the evaluation board is correctly recognized when connected to the PC.

1. Start the Windows operating system and insert the CD-ROM.

2. The installation software should launch automatically. If it does not, use Windows Explorer to locate the file **setup.exe** on the CD. Double-click this file to start the installation procedure.

3. At the prompt, select a destination directory. By default, this is **C:\Program Files\Analog Devices\ADG2108**.

4. Once the directory is selected, the installation procedure copies the files into the relevant directories on the hard drive. The installation program creates a program group called **Analog Devices** with subgroup **ADG2108** in the **Start** menu of the taskbar.

5. Once the installation procedure is complete, power up the ADG2108 evaluation board as described in the Power Supplies section. Then, connect it to the USB port of the PC using the supplied cable.

6. When the evaluation board is detected, proceed through any dialog boxes that appear. This completes the installation.

SOFTWARE OPERATION

1. To launch the software, click **Analog Devices > ADG2108 > ADG2108 Evaluation Software**.

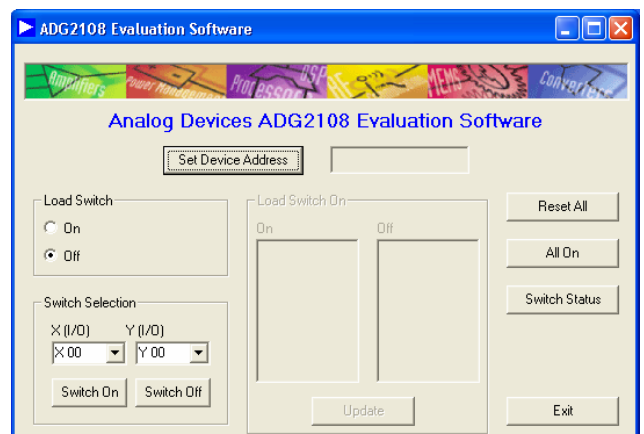2. Next, the main window is opened (see Figure 2).

Figure 2. Main Screen

Setting the I²C Address

1. From the main screen shown in Figure 2, click the **Set Device Address** button.

2. This brings up the **Device Address** dialog box (see Figure 3).

Figure 3. I²C Address Selection

3. Set the device address by double-clicking the relevant bit. Note that the address set must correspond to that set with the jumpers on the evaluation board. It must also be set before the evaluation board software can work.

Load Switch (LDSW)

The **Load Switch** option button from the main window (shown in Figure 2) allows you to enable or disable the load switch function.

1. Selecting the **On** button allows all the switches to be updated simultaneously (for example, the RGB colors in video switching). In addition, clicking the **Switch On/Switch Off** buttons (when the **Load Switch** button is **On**) stores the switch status temporarily until **Update** is clicked. The switches in temporary storage are shown in the list boxes **X (I/0)** and **Y (I/O)** in Figure 2. Next, all the switches in the **Load Switch** area are updated simultaneously upon clicking the **Update** button.

2. Clicking the **Off** button of **Load Switch** updates the switch condition upon completion of each I²C write (that is, immediately upon hitting the **Switch On/Switch Off** buttons).

3. To see what the status of the switch array is at any given time, click the **Switch Status** button.

4. The **Switch Status** dialog box then appears (see Figure 4). This indicates if a switch is on (LED lit) or off (LED not lit).

Figure 4. LED Display Showing Condition of All Switches

RESET Function

To reset the switch array:

1. Use the reset button on the board itself (see $\overline{\text{RESET}}$ in Figure 5).

2. Alternatively, click the **Reset All** button on the main screen of the software (shown in Figure 2) to reset all switches.

3. Note that if the **Switch Status** dialog box (see Figure 4) is showing when the $\overline{\text{RESET}}$ button on the board is pushed, the **Close** button needs to be clicked. Then, click the **Switch Status** button to re-open the dialog box for the LED display to accurately reflect the switch states.
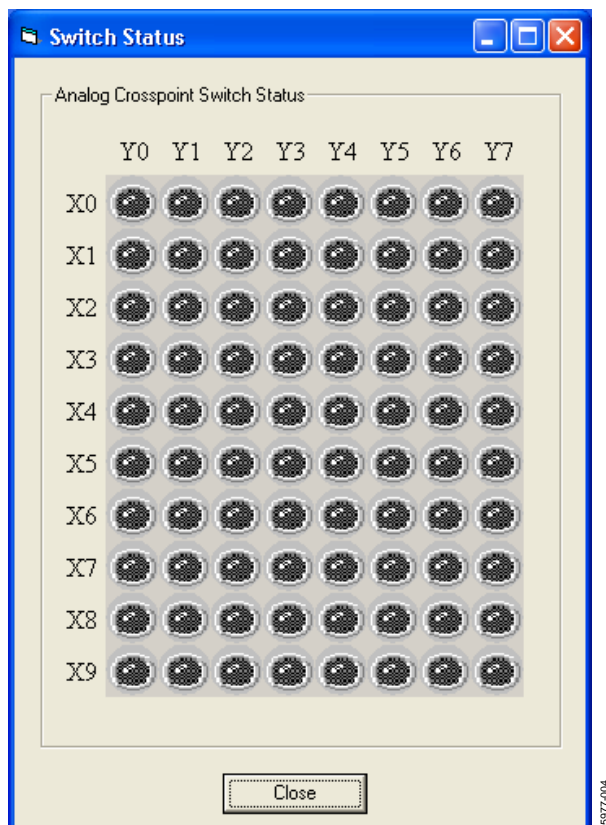
EVALUATION BOARD SCHEMATIC AND ARTWORK
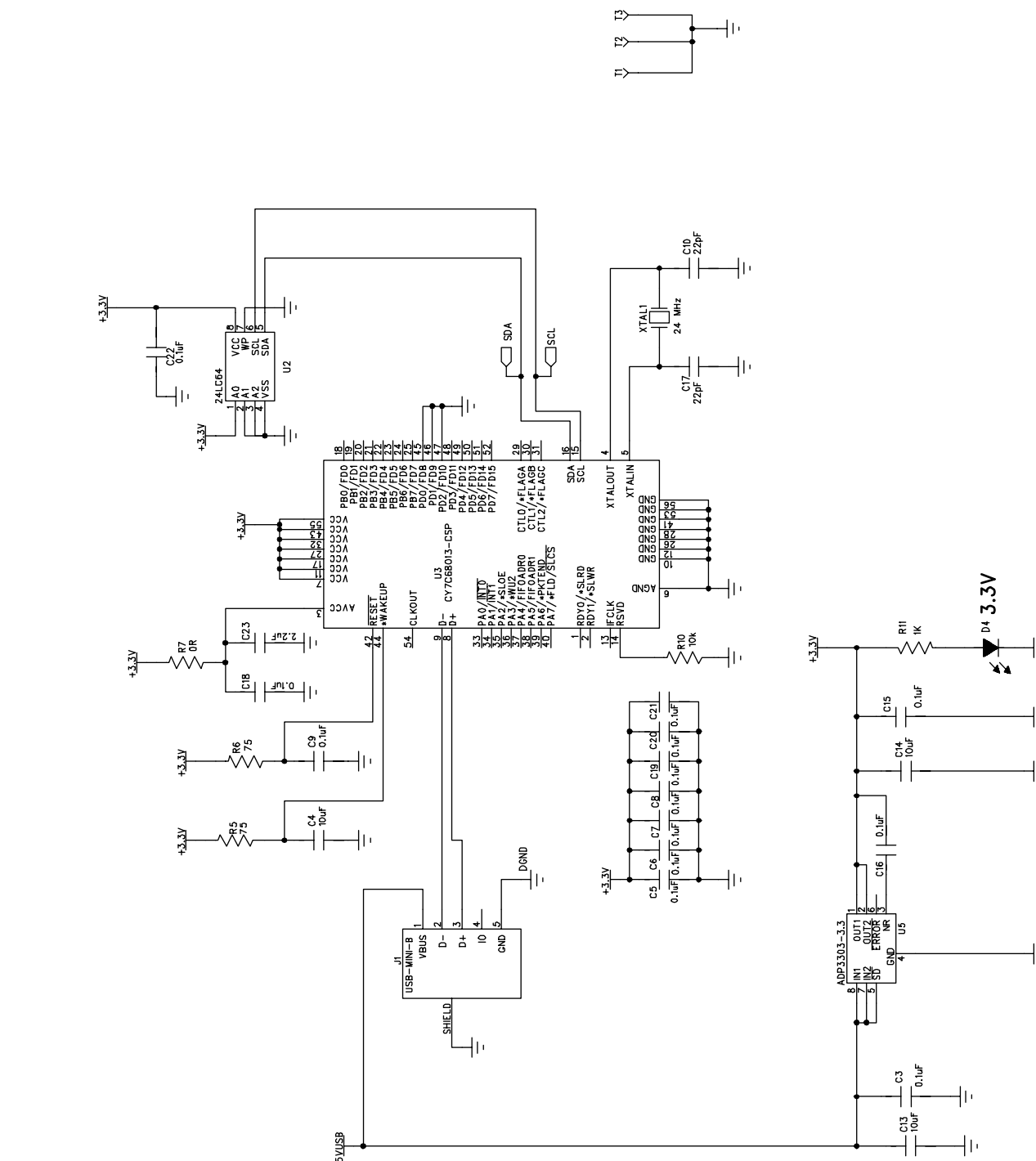

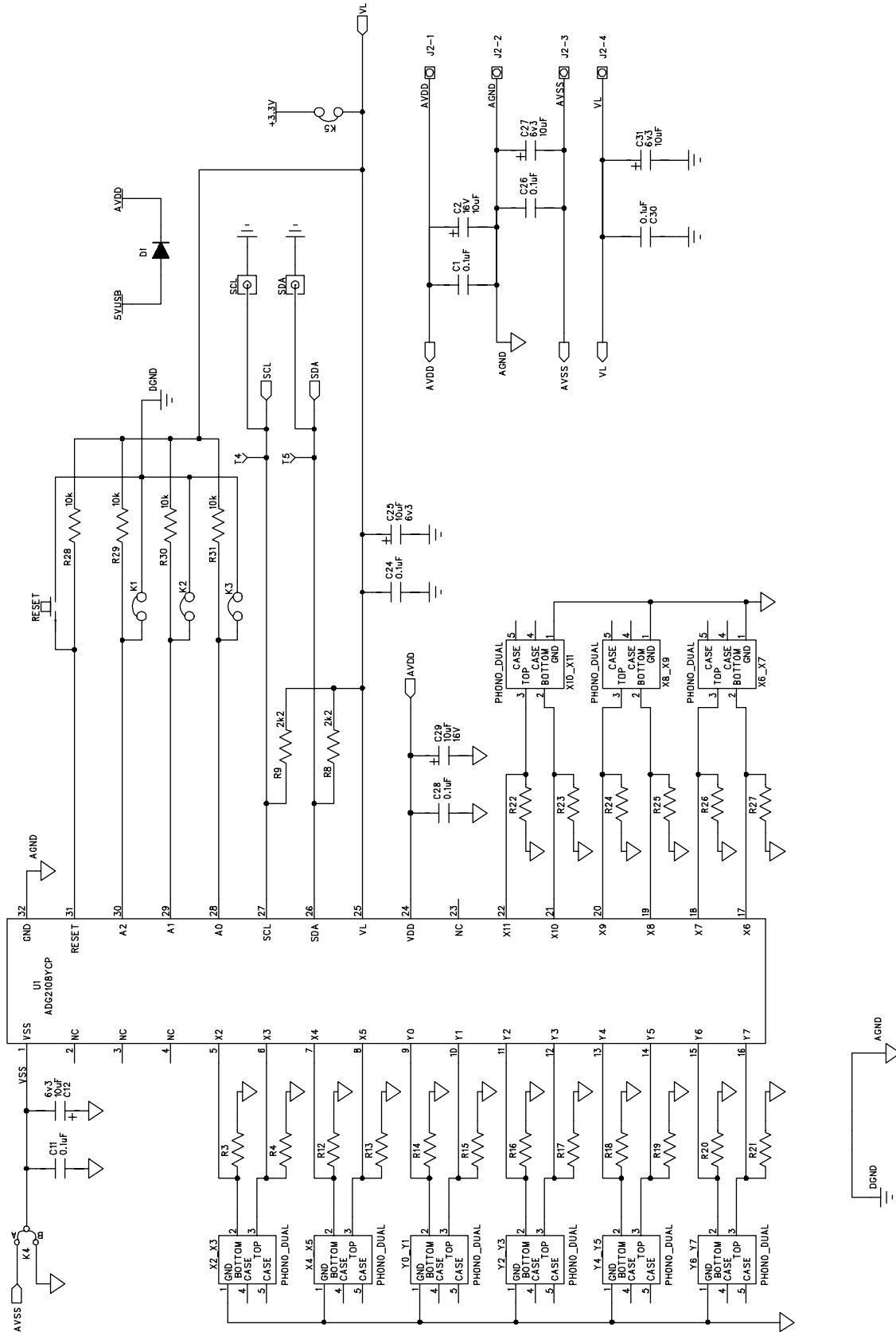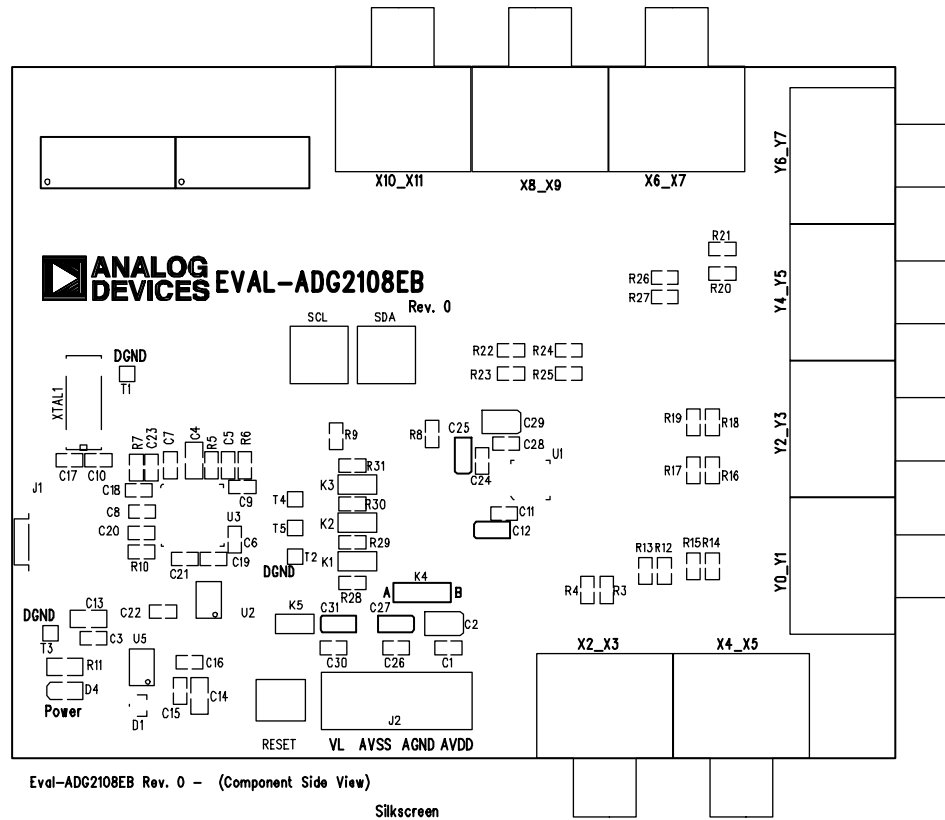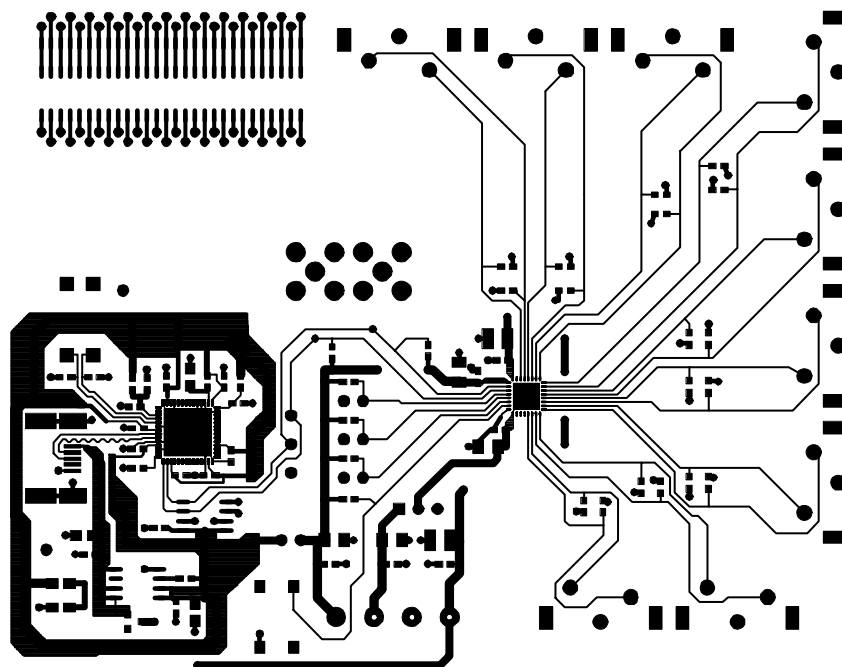Figure 5. Schematic of USB Controller Circuitry

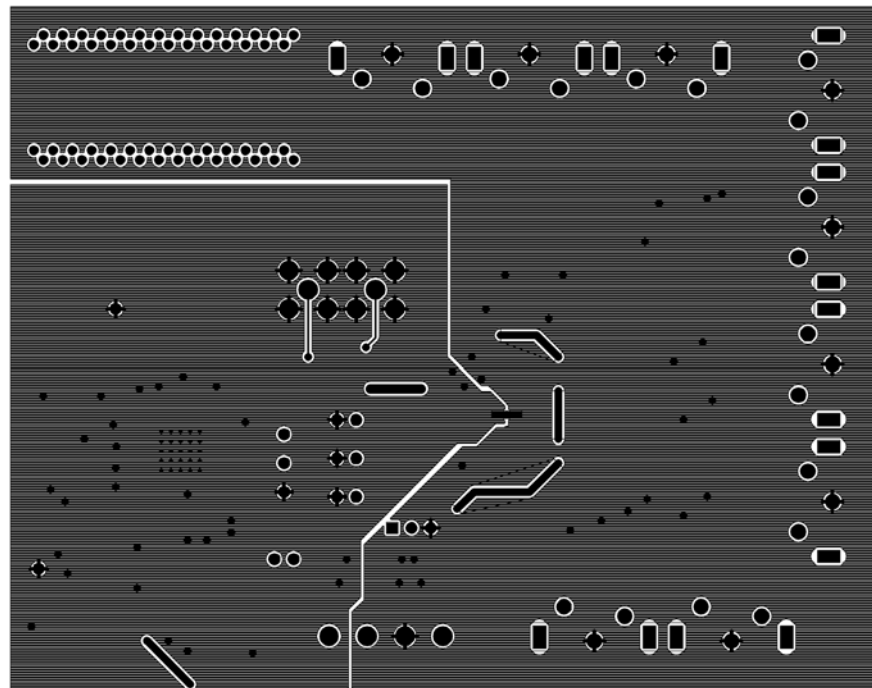*Figure 6. Schematic of ADG2108 Circuitry*

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Figure 7. Component Placement Drawing

Eval-ADG2108EB Rev. 0 — (Component Side View) Component Side

05977-008

Figure 8. Component Side PCB Drawing

Eval-ADG2108EB Rev. 0 - (Component Side View)
Solder Side

Figure 9. Solder Side PCB Drawing

ORDERING INFORMATION

BILL OF MATERIALS

Table 4. Component Listing

Qty	Reference Designator	Description	Supplier/Number
19	C1, C3, C5 to C9, C11, C15, C16, C18 to C22, C24, C26, C28, C30	0.1 µF (0603 package) 50 V X7R SMD ceramic capacitor	FEC 499-675
2	C2, C29	10 µF TAJ_B 16 V SMD tantalum capacitor	FEC 498-737
3	C4, C13, C14	10 µF (0805 package) X5R ceramic capacitor	Digikey 490-1709-1-ND
4	C12, C25, C27, C31	10 µF TAJ_A 6.3 V SMD tantalum capacitor	FEC 197-130
2	C10, C17	22 pF (0603 package) 50 V X7R SMD ceramic capacitor	FEC 722-005
1	C23	2.2 µF (0603 package) 6.3 V X5R SMD ceramic capacitor	Digikey 490-1552-1-ND
1	D1	Diode SOT23	FEC 304-9395
1	D4	LED (0805 package)	FEC 359-9681
1	J1	USB Mini-B connector	FEC 476-8309, Digikey WM2499CT-ND
4	J2	4-pin terminal block	FEC 151-787
5	K1 to K5	SIP-2P two pin header & shorting shunt	FEC 511-705, FEC 150-411
20	R3, R4, R12 to R27	SMD resistor (0603 package)	Not Inserted
2	R5, R6	75 Ω SMD resistor (0603 package)	FEC 357-1269
1	R7	0 Ω SMD resistor (0603 package)	FEC 772-227
2	R8, R9	2.2 kΩ SMD resistor (0603 package)	FEC 911-276
1	R10	10 kΩ SMD resistor (0603 package)	FEC 911-355
1	R11	1 kΩ SMD resistor (0603 package)	FEC 911-239
4	R28 to R31	10 kΩ SMD resistor (0603 package)	FEC 911-355
1	$\overline{RESET}$	Push button switch (sealed 6 mm x 8 mm)	FEC177-807
5	T1 to T5	Testpoint	Not Inserted
1	U1	8 × 10 analog switch array	Analog Devices ADG2108YCP
1	U2	24LC64	Digikey 24LC64-I/SN-ND
1	U3	USB microcontroller	Cyprus CY7C68013-56LFC
1	U5	3.3 V regulator	Analog Devices ADP3303AR-3.3
2	SCL, SDA	50 Ω straight SMB jack	FEC 365-1228
9	X2_X3, X4_X5, X6_X7, X8_X9, X10_X11, Y0_Y1, Y2_Y3, Y4_Y5, Y6_Y7	Socket, phono PCB gold 1 pair	FEC 382-4834
1	XTAL1	24 MHz CM309S SMD crystal	FEC 569-872

ORDERING GUIDE

Model	Description
EVAL-ADG2108EB	Evaluation Board

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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