ANALOG DEVICES

EVAL-ADG2128EBZ User Guide
UG-341

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Evaluation Board—I²C, CMOS, 8 × 12 Analog Switch Array with Dual/Single Supplies

FEATURES

Full featured evaluation board for ADG2128
Various link options
Direct hookup to USB port of PC
PC software for control of switches
Can be used with or without PC

GENERAL DESCRIPTION

This user guide describes the evaluation board for the ADG2128 I²C, CMOS, 8 × 12 analog switch array with dual/single supplies. The array is bidirectional; therefore, the rows and columns can be configured as either inputs or outputs, and any number of combinations can be active at one time.

The ADG2128 has a maximum difference of 15 V between its inputs, V_{DD} and V_{SS}; take care 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 ADG2128.

Full data on the ADG2128 can be found in the data sheet, which should be consulted in conjunction with this document when using the evaluation board.

EVALUATION BOARD SETUP

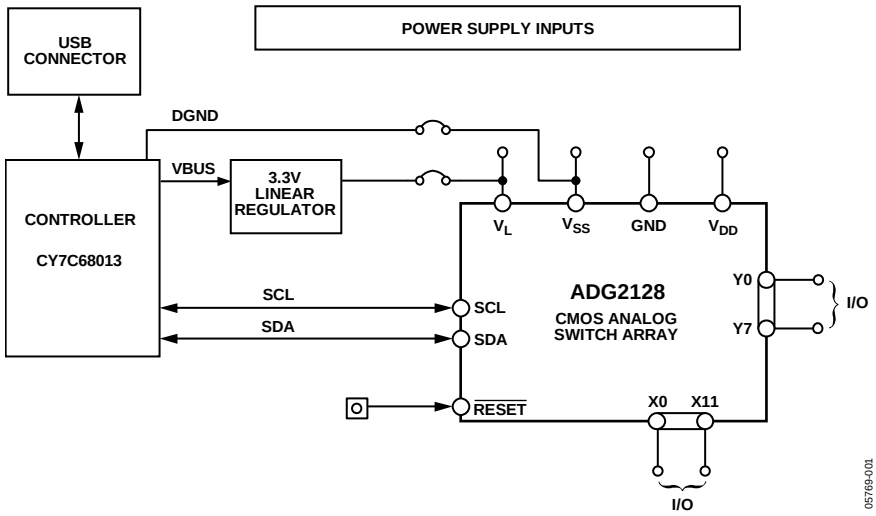

Figure 1. Evaluation Board Setup

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REVISION HISTORY

10/15—Rev. B to Rev. C

Added Evaluation Board Photograph Section and Figure 2; Renumbered Sequentially 3
Changes to Evaluation Board Software Quick Start Procedures Section, Software Installation Section, Software Operation Section, Setting the I^2C Address Section, and Figure 2 to Figure 4 5
Added Reinitialize the Software Section 5
Changes to LDSW (Load Switch) Section, Switch Status Section, Figure 5, and RESET Function Section 6
Added All On Function Section 6

11/11—Rev. A to Rev. B

Changes to Evaluation Board Schematics Section 7

8/07—Rev. 0 to Rev. A

Changes to Figure 1 1
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7/06—Revision 0: Initial Version

EVALUATION BOARD PHOTOGRAPH

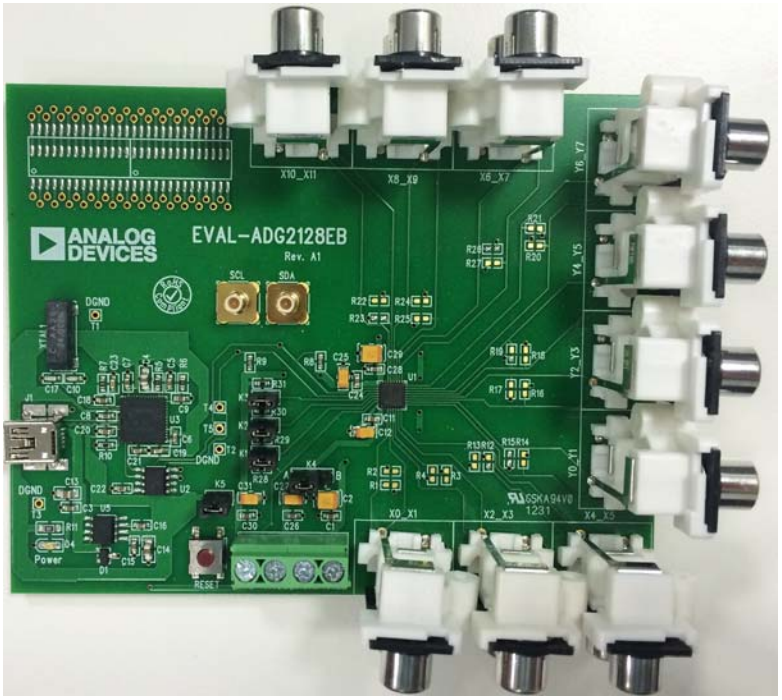

Figure 2. EVAL-ADG2128EBZ Evaluation Board

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The EVAL-ADG2128EBZ can be operated with both single and dual supplies. The device is specified to operate in single-supply mode at 12 V ± 10% and 8 V ± 10% operation. It is also specified to operate at ±5 V dual supply. The following details how these supplies are applied to the evaluation board:

- V_L provides the digital supply for the ADG2128 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 (with Link 5 inserted). In this case, the logic supply power is 3.3 V.
- Connect 8 V or 12 V between the AVDD and AGND inputs for the positive analog supply (V_{DD}) of the ADG2128. Note that the maximum single supply that the chip can handle is 15 V. In this case, AV_{SS} must equal 0 V. In the case of an 8 V or 12 V supply, negative voltage can be applied to AV_{SS} if V_{DD} to V_{SS} is a maximum of 15 V.
- Connect −5 V between the AV_{SS} and AGND inputs for the negative supply (V_{SS}) of the ADG2128.

Both AGND and DGND inputs are provided on the board. The AGND and DGND planes are connected at one location close to the ADG2128. To avoid ground loop problems, it is recommended not to 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 a 0.1 µF capacitor pair to the relevant ground plane.

LINK OPTIONS

Prior to using the board, a number of link and switch options must be set for the required operating setup. These link option functions are described in Table 1.

Table 1. Link Options

Link No.	Function
LK1	This link is for choosing the LSB bit of the address of the chip on the USB I^2C interface. Note that the I^2C address must be set before the evaluation software is launched. When this link is inserted, the address bit is set to 0. When this link is removed, the address bit is set to 1.
LK2	This link is for choosing the second LSB bit of the address of the chip on the USB I^2C interface. Note that the I^2C address must be set before the evaluation software is launched. When this link is inserted, the address bit is set to 0. When this link is removed, the address bit is set to 1.
LK3	This link is for choosing the third LSB bit of the address of the chip on the USB I^2C interface. Note that the I^2C address must be set before the evaluation software is launched. When this link is inserted, the address bit is set to 0. When this link is 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 AV_{SS}. If it is sourced from ground, it is a single-supply system. Position A: V_{SS} sourced from AV_{SS}. Position B: V_{SS} sourced from ground.
LK5	This link selects whether the logic supply power is from the USB power (when connected to a PC) or from the user-supplied V_L (when used as a standalone unit). When this link is inserted, the logic power supply is from the USB power. When this link is removed, the logic power supply is from the user-supplied V_L.

Link Setup Options for PC Control

The default setup for the EVAL-ADG2128EBZ is to be controlled 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—the LSB is 0.
LK2	Inserted—the second LSB is 0.
LK3	Inserted—the third LSB is 0.
LK4	Position A—AV_{SS} is supplying the power to V_{SS}.
LK5	Inserted—the logic power supply is from USB power.

Link Setup Options for Control Without a PC

The EVAL-ADG2128EBZ can also be used as a standalone board. This option is for PC users who do not have a USB port or for users who want to connect the board to their entire system.

Table 3 lists the link options that must be set to operate the evaluation board without a PC.

Table 3. Link Setup Options 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	User configurable—does not affect whether the board is connected to a PC or not.
LK5	Removed.

Switches are turned on and off via the I^2C bus. The read/write procedures are provided in the ADG2128 data sheet and should be consulted when using this evaluation board in its standalone mode.

EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

The ADG2128 evaluation kit includes self-installing software on the CD-ROM. The evaluation software must be installed before connecting the evaluation board to the USB port of the PC to ensure that the evaluation board is correctly recognized when connected to the PC.

SOFTWARE INSTALLATION

To install the software

1. Start Windows® and insert the CD. 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.
2. At the prompt, select a destination directory. By default, it is **C:\Program Files\Analog Devices\ADG2128**. After 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 a subgroup called **ADG2128** in the **Start** menu of the taskbar.
3. After the installation of the evaluation software is complete, a welcome window displays for the installation of the **ADI PAD Drivers**. Click **Install** to install the drivers.
4. After the installation of the drivers, power up the ADG2128 evaluation board as described in the Evaluation Board Hardware section. Then, connect it to the USB port of the PC using the supplied cable.

SOFTWARE OPERATION

To launch the software, click **Start** > **All Programs** > **Analog Devices** > **ADG2128** > **ADG2128 Evaluation Software**. The **Configuration** tab of the evaluation software then displays as shown in Figure 3.

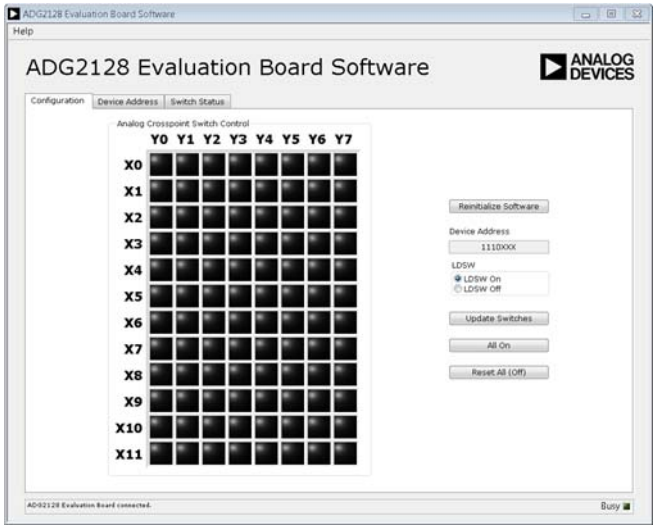

*Figure 3. **Configuration** Tab*

If the ADG2128 evaluation board is not connected to the USB port when the software is launched, a **Hardware Select** dialog box displays (shown in Figure 4). Connect the evaluation board to the USB port of the PC, wait for a few seconds, click **Rescan**, and then click **Select**. The **Configuration** tab of the evaluation software then displays as shown in Figure 3.

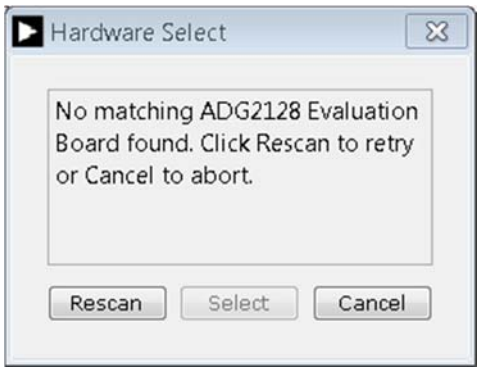

*Figure 4. **Hardware Select** Dialog Box*

Reinitialize Software

In the **Configuration** tab, click **Reinitialize Software** to reset the software to its default state. Reinitialize the software whenever the evaluation board is reconnected to the PC or a new evaluation board is to be used.

Setting the I²C Address

The device address can be set in the **Device Address** tab (shown in Figure 5).

*Figure 5. **Device Address** Tab*

Set the device address by clicking the relevant bit. Click **Set Device Address** to update the device address in the software. Note that the address set in the software must correspond to the address set with the jumpers on the evaluation board. The address must be set for the evaluation board software to work.

LDSW (Load Switch)

If the load switch function in the **Configuration** tab is on, the switches can be updated simultaneously (as an example, for the RGB colors in video switching). Otherwise, if the load switch is off, the switch condition updates upon completion of each I^2C write, that is, immediately upon clicking an LED in **Analog Crosspoint Switch Control** in the **Configuration** tab. The LED is green if the switch is on and black if the switch is off.

If the load switch is on, clicking an LED in **Analog Crosspoint Switch Control** stores the switch status temporarily until **Update Switches** is clicked. When clicked, a black LED becomes red, which indicates that the switch is to be turned on, and a green LED becomes dark green, which indicates that the switch is to be turned off. All switches are then updated simultaneously upon clicking **Update Switches**. The red LEDs then become green, and the dark green LEDs become black, indicating that the switches are now on and off, respectively.

Switch Status

To see what the status of the switch array is at any given time, click the **Switch Status** tab (shown in Figure 6). The green LED in the **Analog Crosspoint Switch Status** indicates that the switch is on, and the black LED indicates that the switch is off.

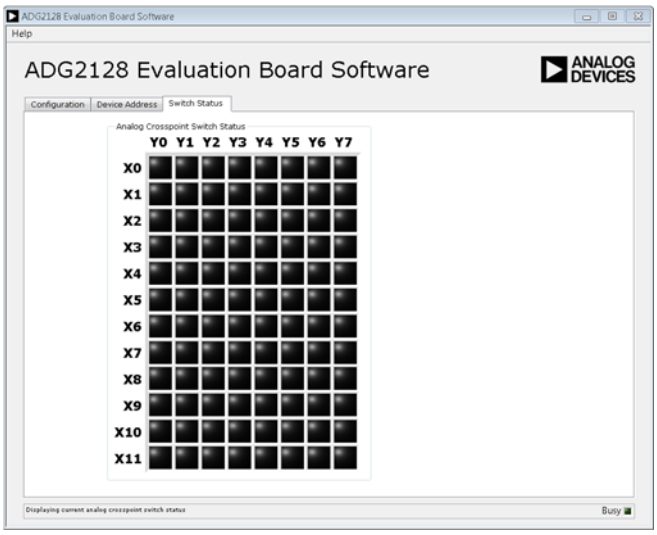

*Figure 6. **Switch Status** Tab*

RESET Function

There is a RESET button on the board (see RESET on the Figure 8 schematic) that can be used to reset the switch array. Alternatively, clicking **Reset All (Off)** in the software **Configuration** tab resets all the switches.

All On Function

Clicking **All On** in the software **Configuration** tab turns on all the switches.

EVALUATION BOARD SCHEMATICS AND ARTWORK

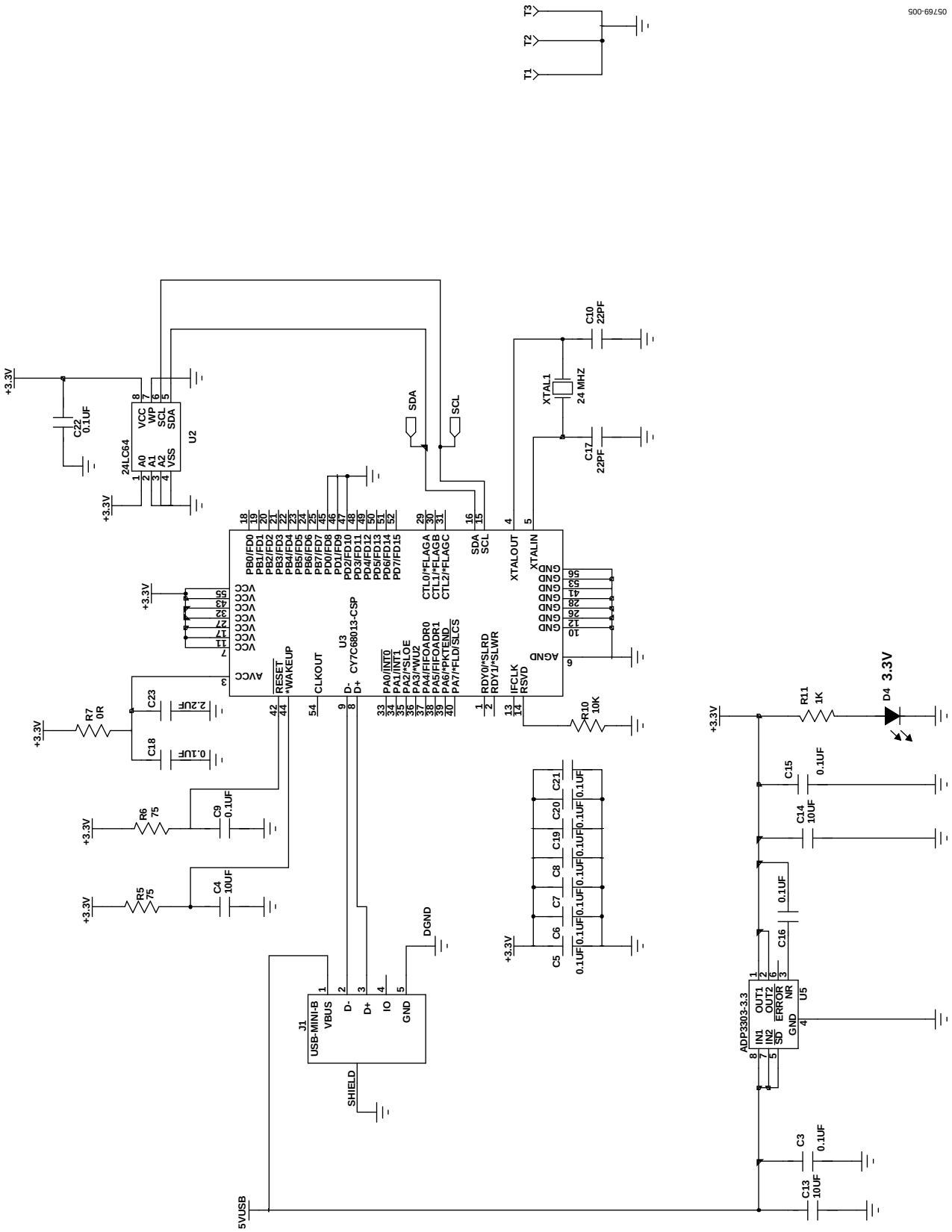

Figure 7. Schematic of USB Controller Circuitry

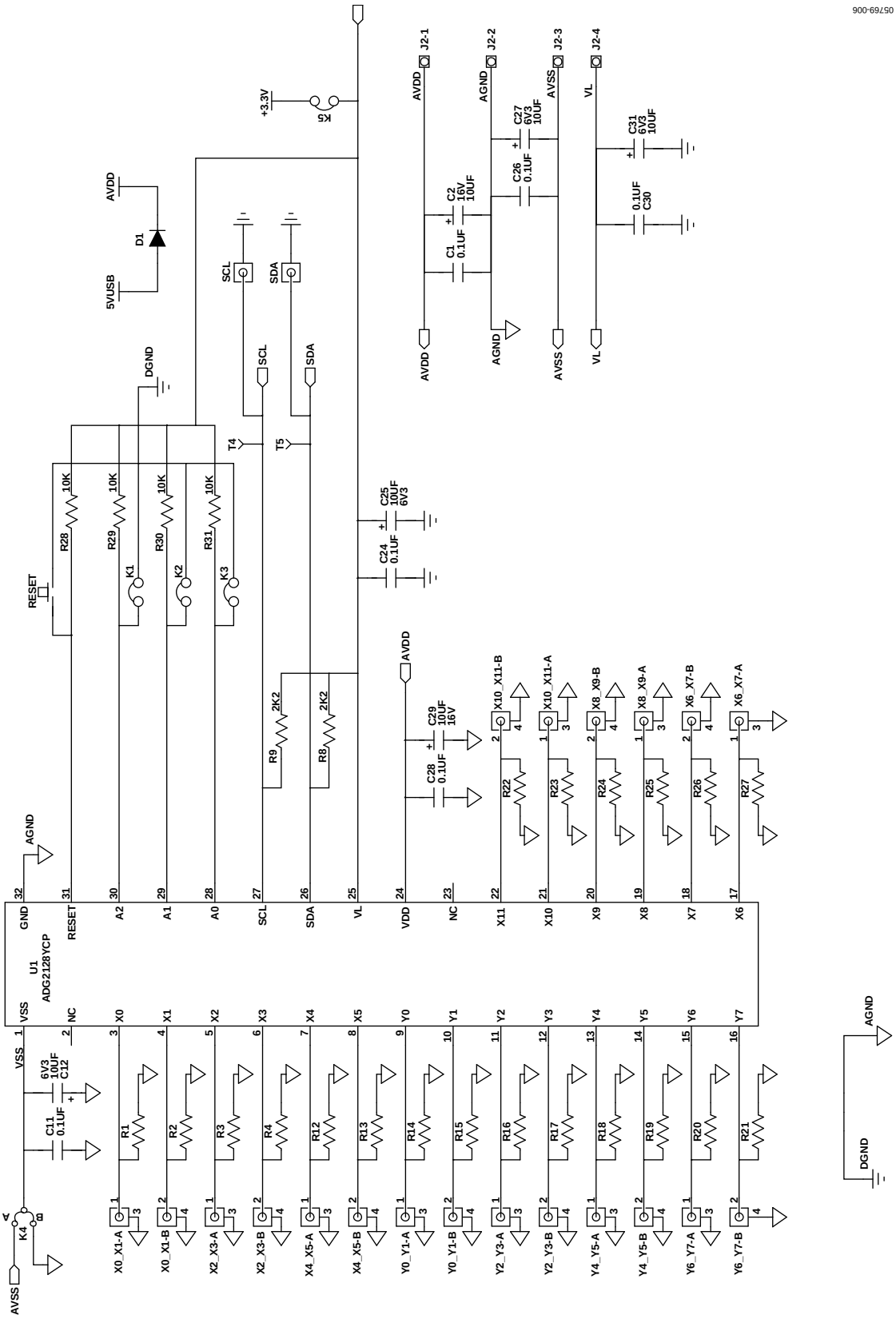

Figure 8. Schematic of ADG2128 Circuitry

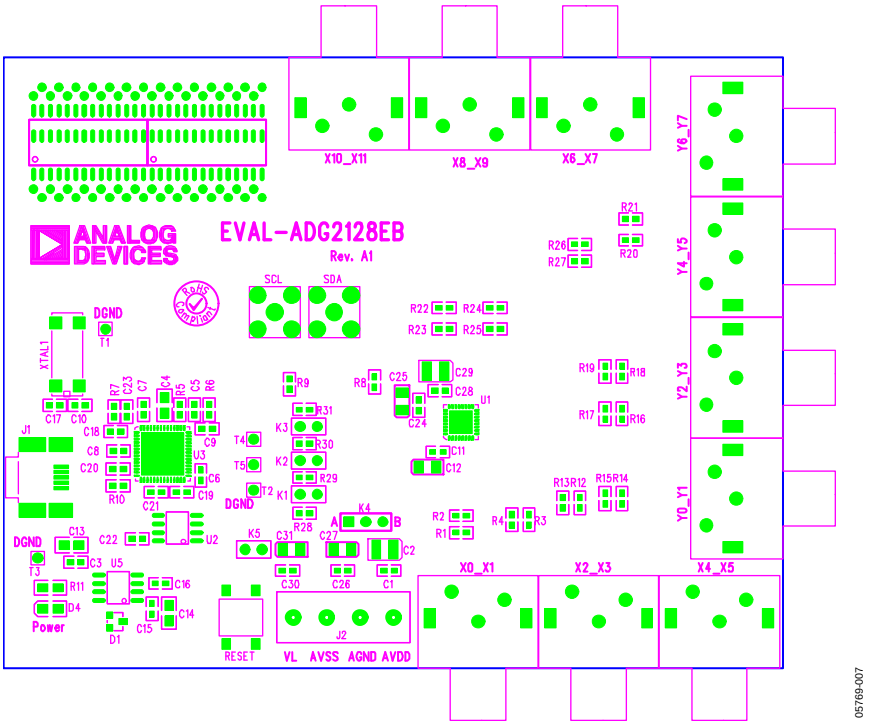

Figure 9. Component Placement Drawing

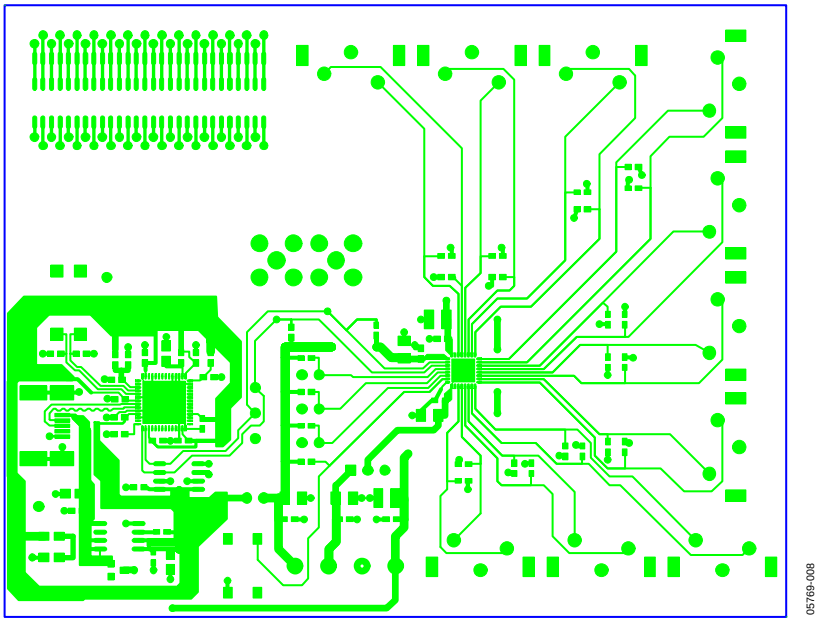

Figure 10. Component Side Printed Circuit Board (PCB) Drawing

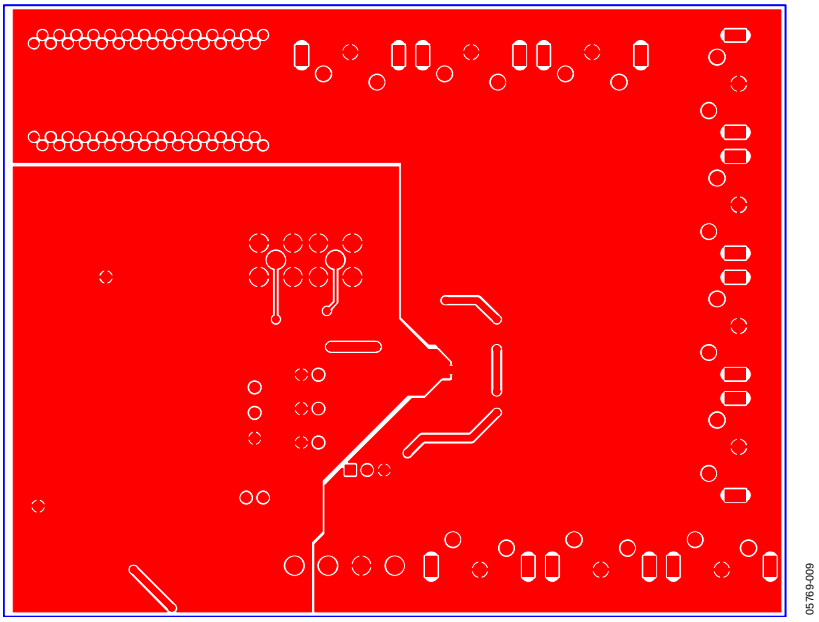

Figure 11. Solder Side PCB Drawing

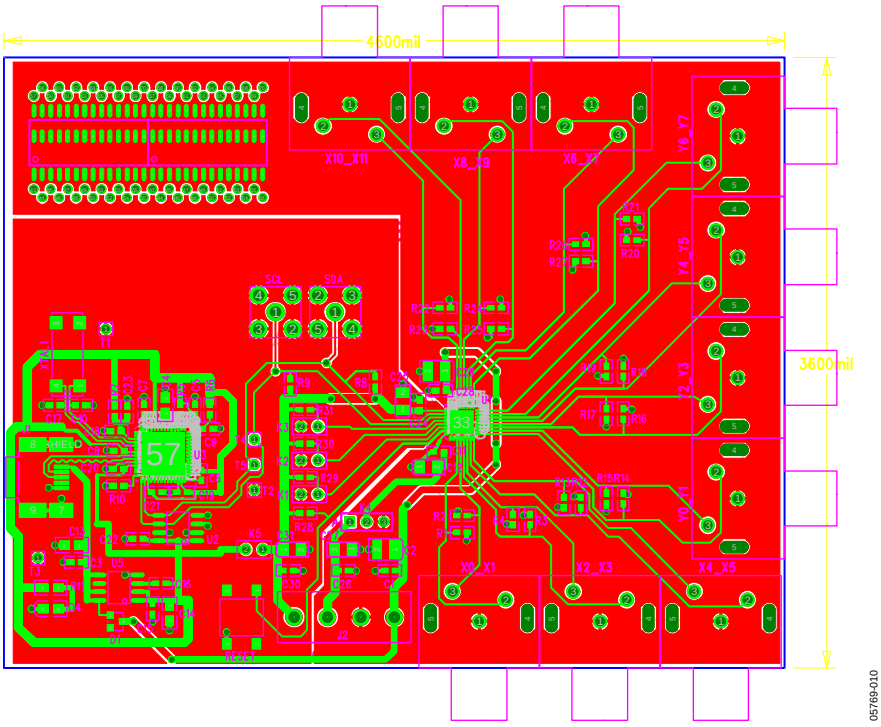

Figure 12. Composite Side PCB Drawing

ORDERING INFORMATION

BILL OF MATERIALS

Table 4.

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 4765837
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	Digi-Key 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	Digi-Key 490-1552-1-ND
1	D1	Diode, SOT-23	FEC 984-3728
1	D4	LED (0805 package)	FEC 5790852
1	J1	USB mini-B connector	FEC 9786490 (Digi-Key WM17116CT-ND)
4	J2	4-pin terminal block	FEC 151-791
5	K1 to K5	SIP-2P, 2-pin header and shorting shunt	FEC 511-705 and FEC 150-411
20	R1 to R4, R12 to R27	SMD, resistor (0603 package)	Not inserted
2	R5, R6	75 Ω, SMD, resistor (0603 package)	FEC 933-1549
1	R7	0 Ω, SMD, resistor (0603 package)	FEC 933-1662
2	R8, R9	2.2 kΩ, SMD, resistor (0603 package)	FEC 933-0810
1	R10	10 kΩ, SMD, resistor (0603 package)	FEC 933-0399
1	R11	1 kΩ, SMD, resistor (0603 Package)	FEC 933-0380
4	R28 to R31	10 kΩ, SMD, resistor (0603 package)	FEC 933-0399
1	RESET	Push-button switch (sealed 6 mm × 8 mm)	FEC 177-807
5	T1 to T5	Test point	Not inserted
1	U1	8 × 12 analog switch array	Analog Devices, Inc., ADG2128YCPZ
1	U2	64k I^2C serial EEPROM	Digi-Key 24LC64-I/SN-ND
1	U3	USB microcontroller	Digi-Key 428-1669-ND
1	U5	3.3 V regulator	Analog Devices, Inc., ADP3303ARZ-3.3
20	X0 to X11, Y0 to Y7	Socket, phono, PCB, gold, one pair	FEC 382-4834
2	SCL, SDA	50 Ω, straight, SMB jack	FEC 1111349
1	XTAL1	24 MHz, CM309S SMD crystal	FEC 950-9658

NOTES

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

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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