![TEXAS INSTRUMENTS]

ADS527xEVM

Evaluation Module

User's Guide

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the specified input and output ranges described in the EVM User's Guide.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 60°C. The EVM is designed to operate properly with certain components above 60°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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ADS527xEVM

The ADS527xEVM is designed for ease of use in evaluating the performance of the ADS527x of 10- and 12-bit analog-to-digital converters (ADCs) with low-voltage differential signal (LVDS) outputs.

1 Description

The ADS527xEVM is designed to provide ease of use in evaluating the performance of the ADS527x family of 10- and 12-bit ADCs with LVDS outputs. When combined with the ADSDeSer-50EVM, a complete evaluation of the ADS527x family can be performed. The ADS527xEVM has the following features:

❑ Easy testing of the ADS527x family of 10 and 12-bit data converters

❑ Single-ended, transformer-coupled inputs.

❑ PC interface to control internal registers.

2 Power Supplies

The ADS527x EVM requires four supplies:

❑ AVDD – 3.3V DUT analog supply

❑ DVDD– 3.3V Digital supply for the microcontroller and RS232 level shifter

❑ LVDD – 1.8V to 3.3V LVDS output driver supply

❑ AW – 3.3V Clock driver supply

All of the supplies can be connected to one 3.3V supply for ease of connectivity.

3 Signals

3.1 Input Signals

The input signals are applied to SMA connectors J1 to J8. The input signals are transformer-coupled to the inputs of the ADC. There are no coupling capacitors, only resistors in series with the converters inputs to the transformers.

3.2 Output Signals

The LVDS outputs from the ADC are sent to J10. J10 is used to connect the ADS527xEVM to the ADSDeSer–50EVM to provide a means for deserializing the data for external processing.

4 Operation

When power is applied to the board, the EVM performs an initialization sequence that sets the initial operation of the ADS527x. The Ref LED lights up to signify that the Int/$\overline{\text{Ext}}$ reference is set to internal. The RST LED is illuminated while a reset pulse is provided to the ADS527x to reset the device for proper operation. The EVM is now operational. If it is connected to the ADS-DESer−50EVM and the reset pushbutton is pressed on the deserializer board, parallel data should be available on each channel output, and a clock should be present on the clock output.

4.1 Pushbuttons and Indicator LEDs

The ADS527xEVM has three pushbuttons and four indicator LEDs, as shown in Figure 1. The pushbuttons and their corresponding LEDs are defined as follows:

❑ **SW1 – RST** – ADS527x device reset (resets only the ADS527x device).

❑ **SW2 – PD** – ADS527x device power-down (LED *on* signifies that only the ADS527x device is in complete power-down).

❑ **SW3 – Ref** – Internal/$\overline{\text{External}}$ Reference Selection (LED *on* signifies Internal reference).

When illuminated, the fourth LED (SDI) signifies that data has been received from the PC through the serial link.

Figure 1. Evaluation Board Overview
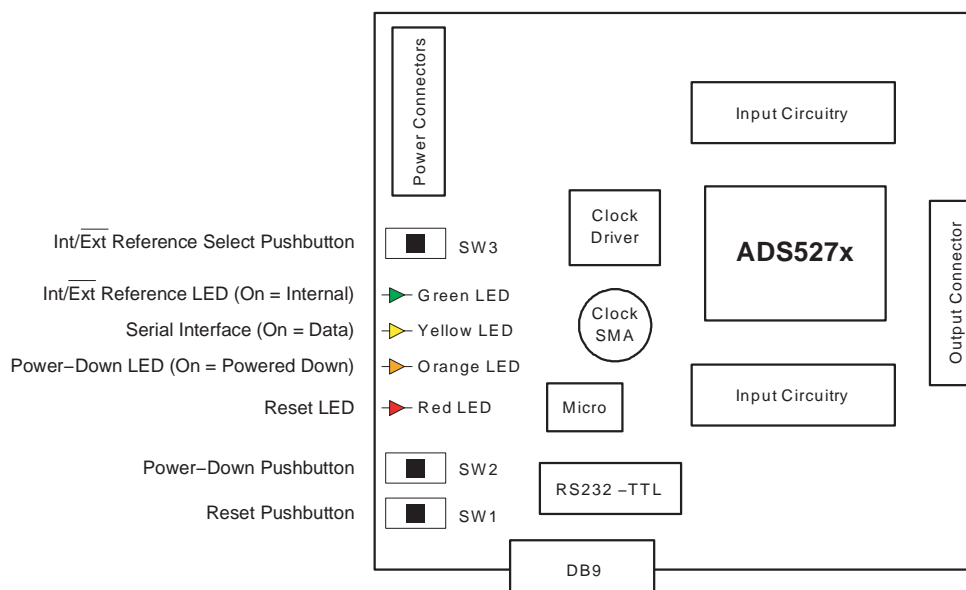
4.2 Serial Data In

The Serial Data In (DB-9) connector is used to connect the EVM to a PC for accessing the internal registers of the ADS527x device. This allows extended flexibility of the device beyond the simple power-up mode.

4.3 Accessing the Internal Registers

The ADS527x family has several internal registers that offer flexibility to the end user. In order to facilitate using these registers, the evaluation program is used. With the combination of a serial port on a PC, EVM software, a serial link cable (provided), and the ADS527xEVM, the user has the ability to access the internal registers on the ADS527x family of data converters.

4.4 Installing the Software

Software installation is straightforward. Insert the included CD and double click on the Setup.exe file. This will install the program and all necessary files to the PC.

Note:

The installation files are also available for download from the TI web site at www.ti.com.

Once the installation process is complete go to the *START > Programs > ADS527xEVM_Software > ADS527xEVM_Software* icon to start the program.

4.5 Using the Software

After clicking on the ADS527xEVM_Software icon, an initial startup screen will be displayed, as shown in Figure 2. The COM Port Selection prompt, as shown in Figure 3, will appear in front of Figure 2.
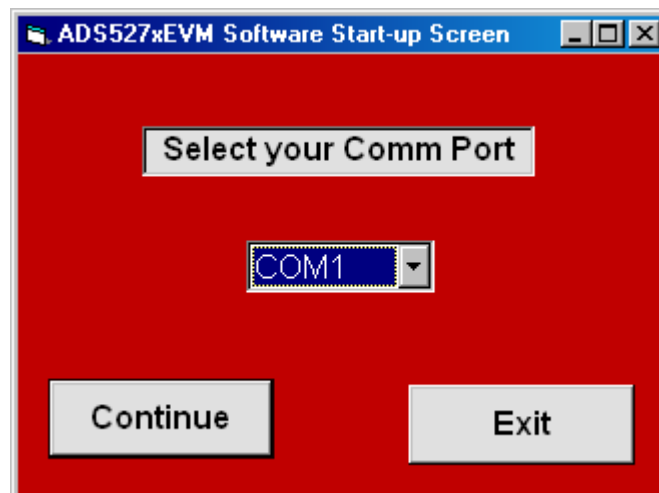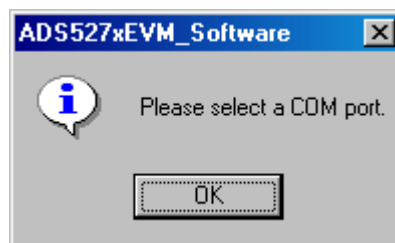
Figure 2. Initial Startup Screen

Figure 3. COM Port Selection Prompt

Click *OK* and then select the proper COM port from the drop-down list, as shown in Figure 4. The program lists all available COM ports on your system to choose from. Once a COM port is selected, the main program window will open. (This example only shows two COM ports listed. Results will vary based on your actual system configuration.)

Figure 4. COM Port Drop-Down Selection List
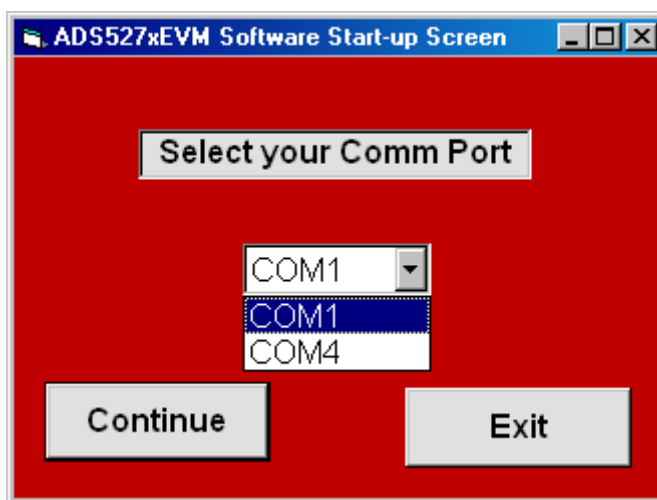
The main program window (see Figure 5) allows the user to access the registers of the ADS527x family. With this program, it is easy to change operating characteristics, send out test patterns, or power down any of the eight channels of the ADS527x converter. The software also contains the ability to reset the ADS remotely from the PC in addition to the pushbutton on the EVM board itself.

Figure 5.   Register Access Program Screen
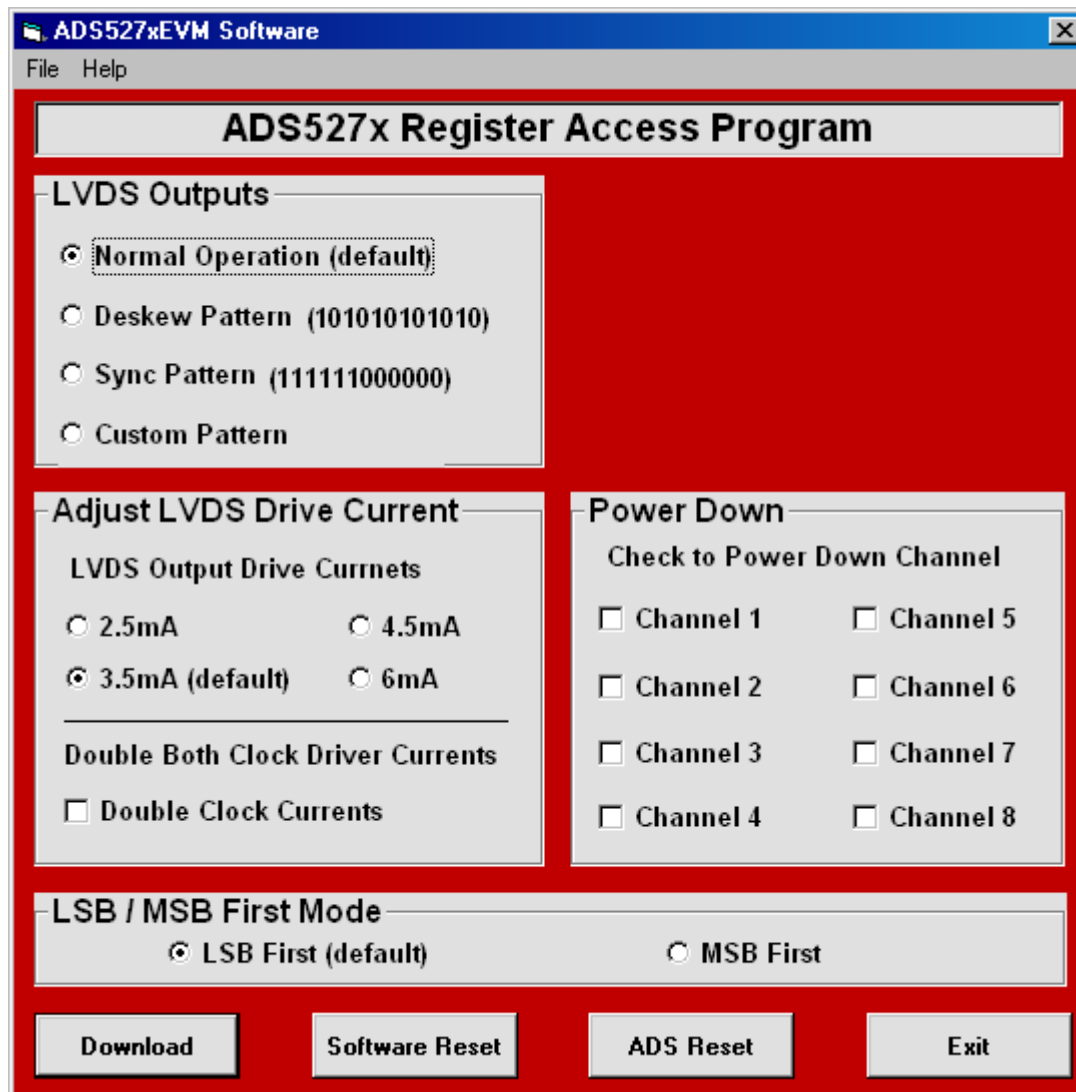
Once again, program operation is straightforward. Make your selection and press the *Download* button. The proper codes are then sent from the PC to the ADS527xEVM board. A software reset is provided to reset all choices to their default values. To exit the program, click the the *Exit* command button or go to the File menu and select *Exit*.

4.6   Custom Pattern Generation

When using the custom pattern option, as shown in Figure 6, all of the values are entered in a binary format (e.g., 101011001111).

> **Note:**
>
> Even when using a 10-bit device (ADS5275 or ADS5276), both the internally-generated patterns and the custom pattern are 12 bits in length.

Figure 6.   Register Access Program Screen – Custom Pattern Option

4.7   LSB/MSB First Mode

The default mode of data out of the ADS527x device is LSB first. This mode can be changed by selecting the *MSB First* option in the software, as shown in Figure 5 and Figure 6. This option increases the flexibility of the device.

Note:

Changing to MSB First also reverses the internally-generated test patterns and the custom pattern. This will show up on the Register Access screen as blue text.

5   Schematic and PCB

Figure 7.   ADS527xEVM Schematic—Part 1

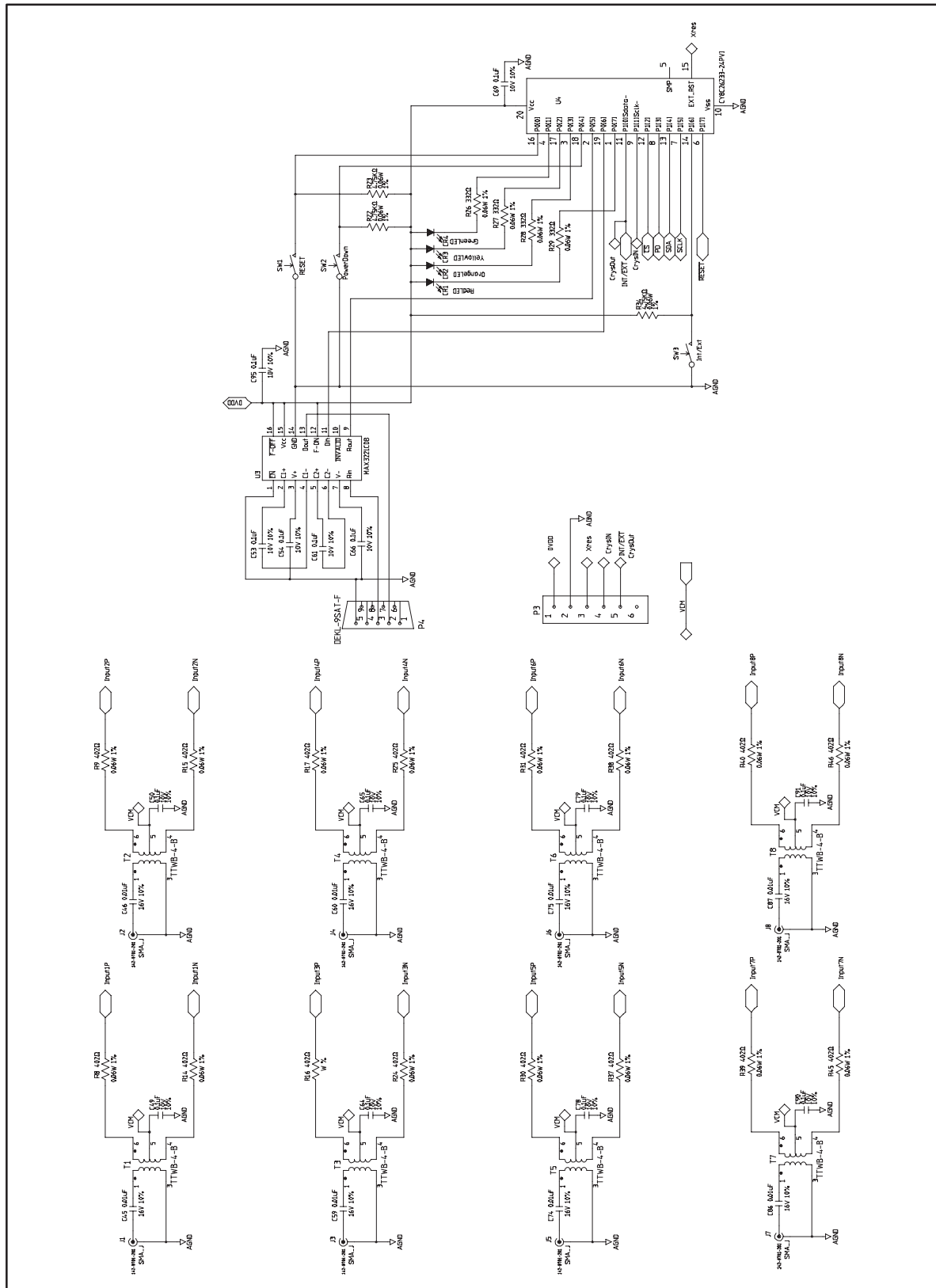Figure 8. ADS527xEVM Schematic—Part 2

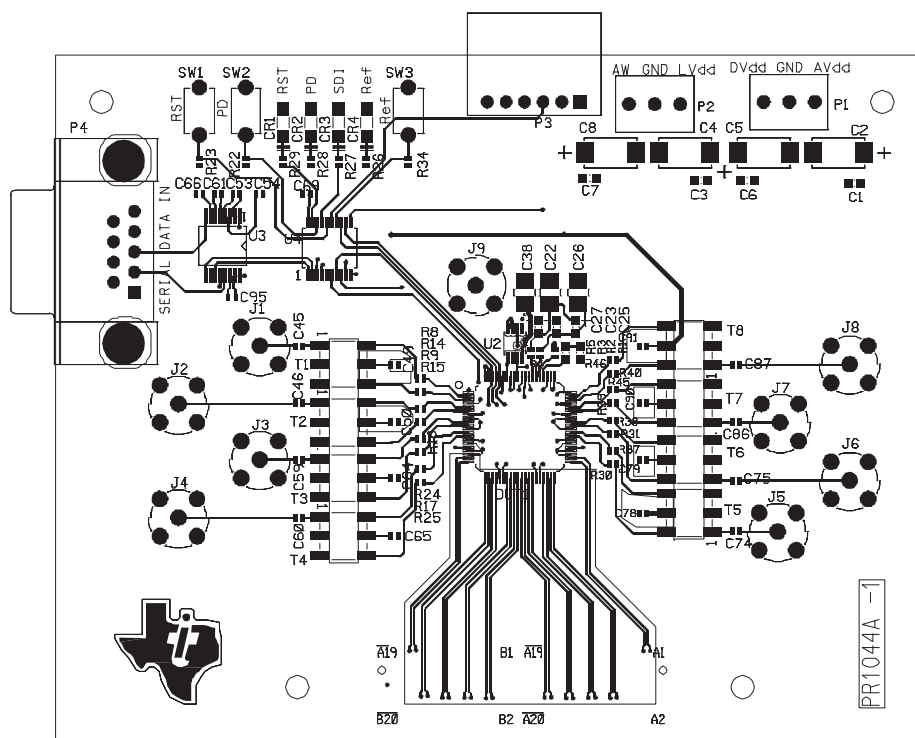*Figure 9. ADS527xEVM PCB—Top Layer*

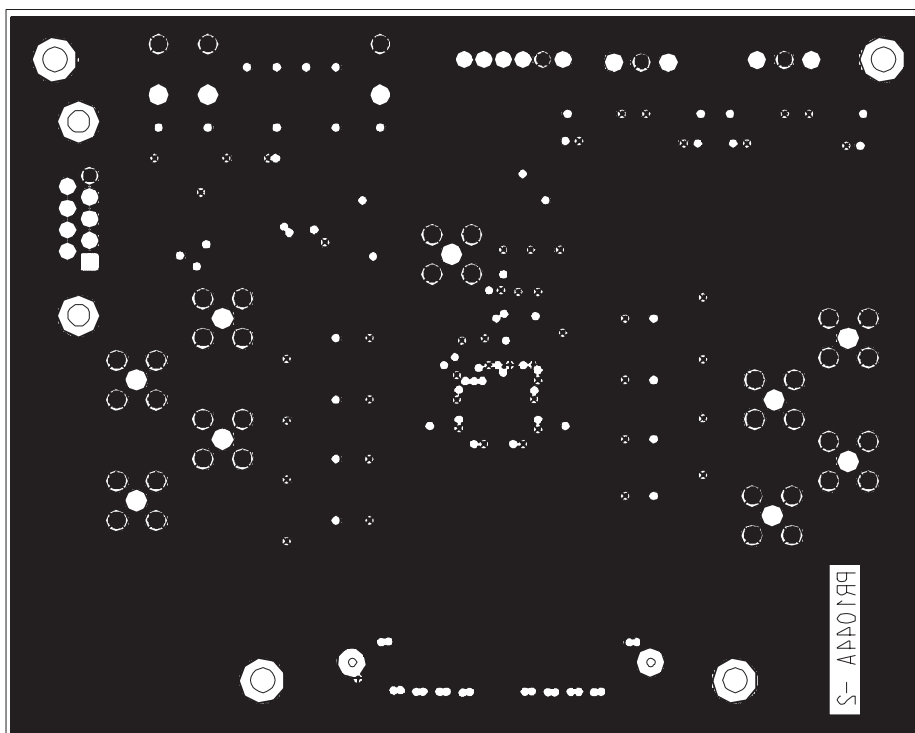*Figure 10. ADS527xEVM PCB—Ground Layer*

Figure 11. ADS527xEVM PCB—Power Layer

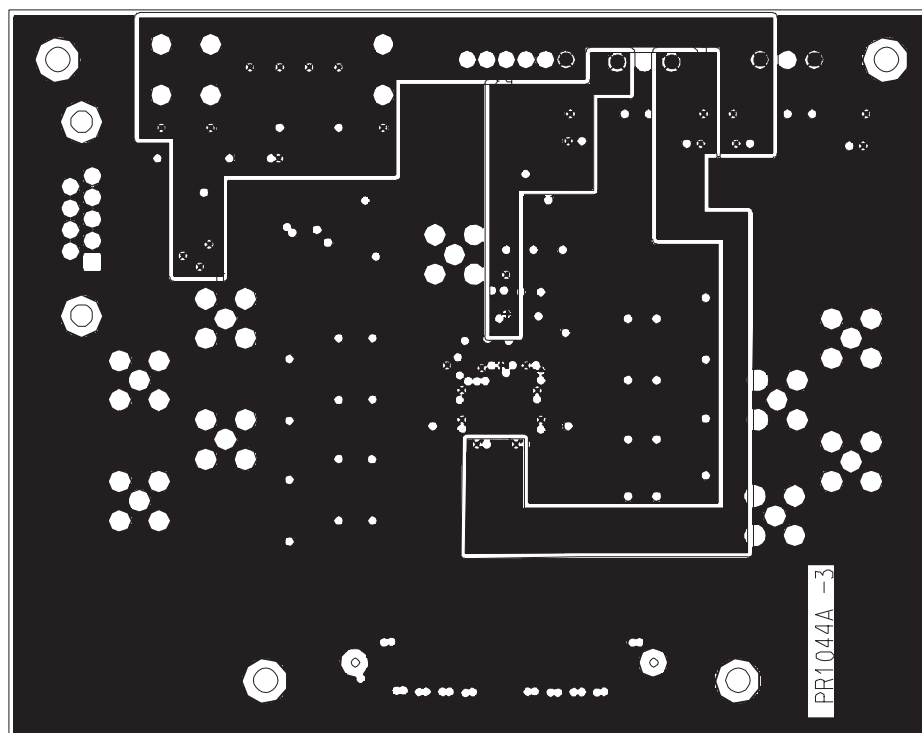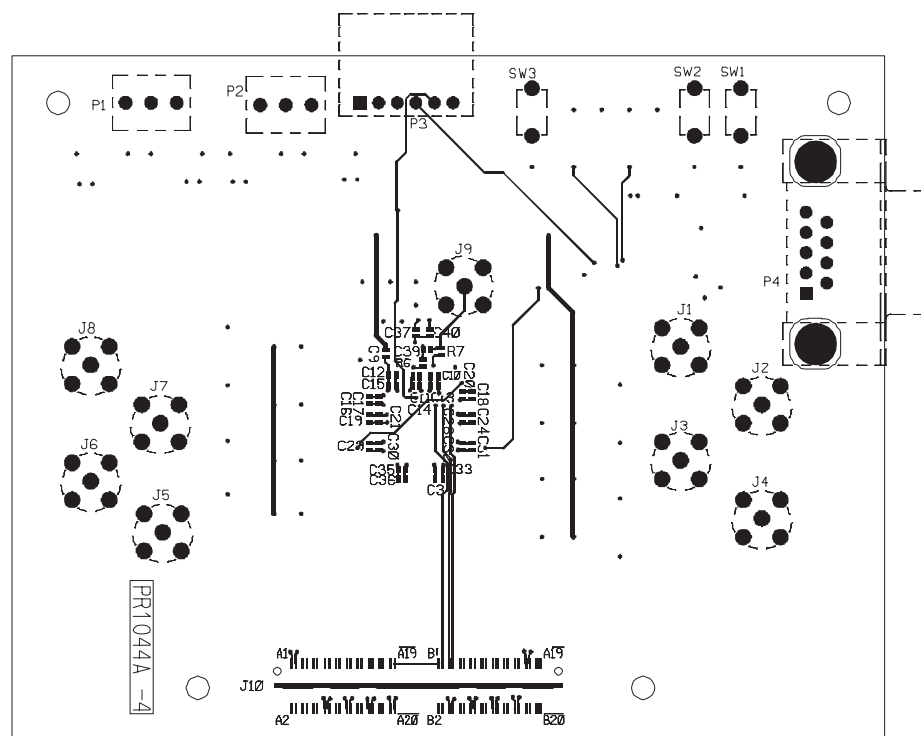*Figure 12. ADS527xEVM PCB—Bottom Layer*

6　Bill of Materials

Table 1.　Component List

DESIGNATOR	QTY	PART NUMBER	DESCRIPTION
Capacitors			
C1, C3, C6, C7, C23, C25, C27	7	ECJ1VB1C104K	CAP, 0.1μF, 16VDC, 10%, Ceramic Multilayer Chip
C2, C4, C5,C8	4	T491D475K050AS	CAP, 4.7μF, 50V, 10%, Tantalum Chip–Molded
C9–C11, C15, C16, C18, C19, C28, C29, C32, C33, C35, C37, C49, C50, C53, C54, C61, C64–C66, C69, C78, C79, C90, C91, C95	27	ECJ0EB1A104K	CAP, 0.1μF, 10VDC, 10%, Ceramic Multilayer chip
C12–C14, C17, C20, C21, C24, C30, C31, C34, C36	11	ECJ0EB1H102K	CAP, .001μF, 50V DC, 10% Ceramic Multilayer 0402
C22, C26, C38	3	T491B225K016AS	CAP, 2.2μF, 16V, 10%, Tantalum Chip–Molded
C39, C40, C45, C46, C59, C60, C74, C75, C86, C87	10	ECJ0EB1C103K	CAP, 0.01μF, 16VDC, 10%, Ceramic Multilayer Chip
Connectors			
J1–J9	9	142–0701–201	CONN, SMA Jack .2CC Lo–Cost
J10	1	QTH–040–01–L–D–DP–A	CONN, 40 Plin SMT, Samtec
P1, P2	2	ED555/3DS	CONN, 3 Pin Screw Term
P3	1	102203–3	CONN, Header, 6 Position, Right Angle, Single Row
P4	1	DEKL–9SAT–F	CONN, DB9, RTANG RECPT 0.318 w/ Screw Locks
Diodes			
CR1–CR4	4	SML–LX1206–GC–TR	LED, SMT 1206, Green
Integrated Circuits			
U2	1	MC100EPT21DT	IC, 3.3V Translator, Differential LVPECL to LVT
U3	1	MAX3221CDB	IC, TI RS232 Translator
U4	1	CY8C26233–24PVI	IC, Microcontroller, 8-Bit PSoC
Resistors			
R1	1	CRCW06034992F	RES, 49.9kΩ, 0.1W, 1%, 0603 Chip, Thick Film
R2	1	CRCW06036041F	RES, 6.04kΩ, 0.1W, 1%, 0603 Chip, Thick Film
R3–R6	4	CRCW0402000RF	RES, 0.0Ω, 0.1W, 1%, 0402 Chip, Thick Film
R7	1	CRCW040249R9F	RES, 49.9Ω, 0.1W, 1%, 0402 Chip, Thick Film
R8, R9, R14–R17, R24, R25, R30, R31, R37, R38, R39, R40, R45, R46	16	CRCW0402402RF	RES, 402Ω, 0.1W, 1%, 0402 Chip, Thick Film
R22, R23, R34	3	CRCW04024751F	RES, 4.75kΩ, 0.1W, 1%, 0402 Chip, Thick Film
R26–R29	4	CRCW0402332RF	RES, 332Ω, 0.1W, 1%, 0402 Chip, Thick Film
Switches			
SW1–SW3	3	EVQPJB04K	Switch, SPST, PCB Mount
Transistors			
T1–T8	8	TTWB–4–B	XFMR, RF, 0.1–1500MHz