

## **ADS527xEVM Evaluation Module**

---



---

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.

### **Contents**

1	Description.....	1
2	Power Supplies .....	1
3	Signals .....	2
4	Operation .....	2
5	Bill of Materials.....	6
6	Schematic and PCB.....	8

### **List of Figures**

1	Evaluation Board Overview .....	3
2	Initial Startup Screen .....	4
3	COM Port Selection Prompt.....	4
4	COM Port Drop-Down Selection List.....	4
5	Register Access Program Screen .....	5
6	Register Access Program Screen – Custom Pattern Option .....	6
7	ADS527xEVM PCB – Top Layer .....	8
8	ADS527xEVM PCB – Ground Layer.....	9
9	ADS527xEVM PCB – Power Layer.....	10
10	ADS527xEVM PCB – Bottom Layer.....	11

### **List of Tables**

1	Component List .....	7
---	----------------------	---

## **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 ADSDerSer-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 External Reference

By default, the ADS527x EVM defaults to an internally generated referenc. However, by asserting SW3, the ADS527x will use the REFT and REFB supplied on P1 as its references.

### 3.2 Inputs Signals

The input signals are applied to SMA connectors J1, J3, J5, J7, J9, J11, J13 AND J15. 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.

### 3.3 Output Signals

The LVDS outputs from the ADC are sent to P6. P6 is used to connect the ADS527xEVM to the ADSDSer-50EVM to provide a means for deserializing the data for external processing.

### 3.4 Clock Signal

Enter a clean, low jitter, 3Vpp clock on J17. The maximum clock frequency should be set with the aid of the device data sheet. Either a sinusoidal or square-wave clock input can be expected.

## 4 Operation

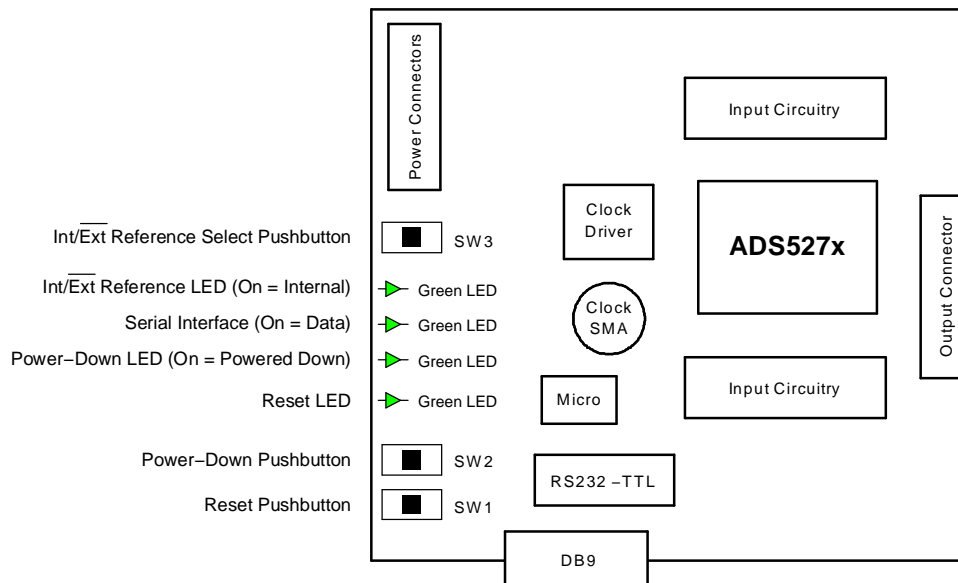
When power is applied to the board, the EVM performs an initialization sequence that sets the initial operation of the ADS527x. The Ref LED lights up to signify that the Int/Ext reference is set to internal. The RST LED is illuminated while a reset pulse is provided to the ADS527x to reset the device for proper operation. The EVM is now operational. If it is connected to the ADSDESer-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](http://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.)

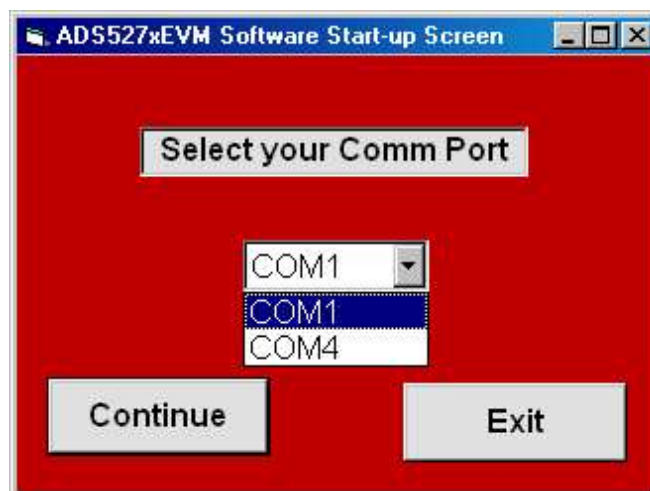


Figure 4. COM Port Drop-Down Selection List

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.

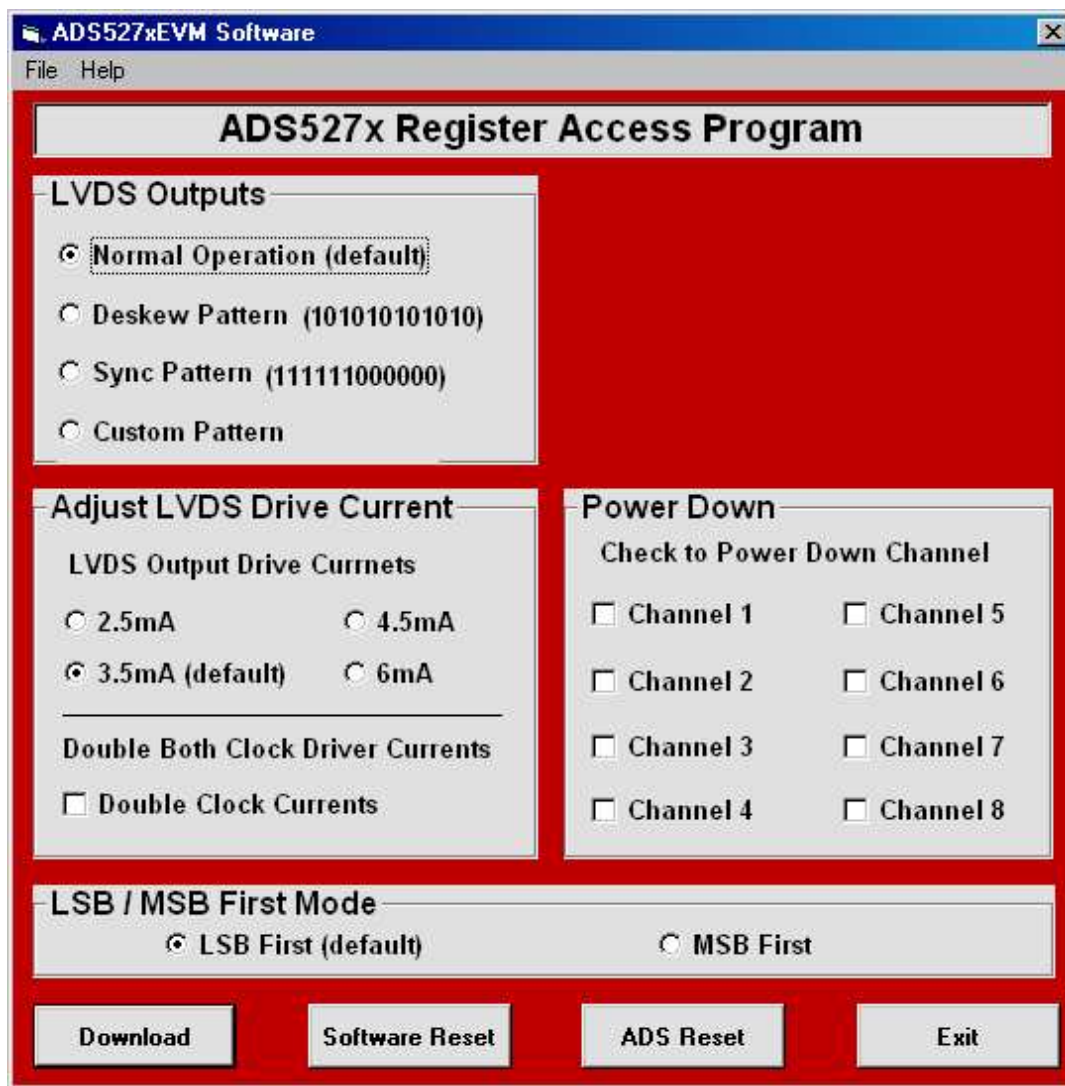


Figure 5. Register Access Program Screen

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 (ADS5277), both the internally-generated patterns and the custom pattern are 12 bits in length.

---

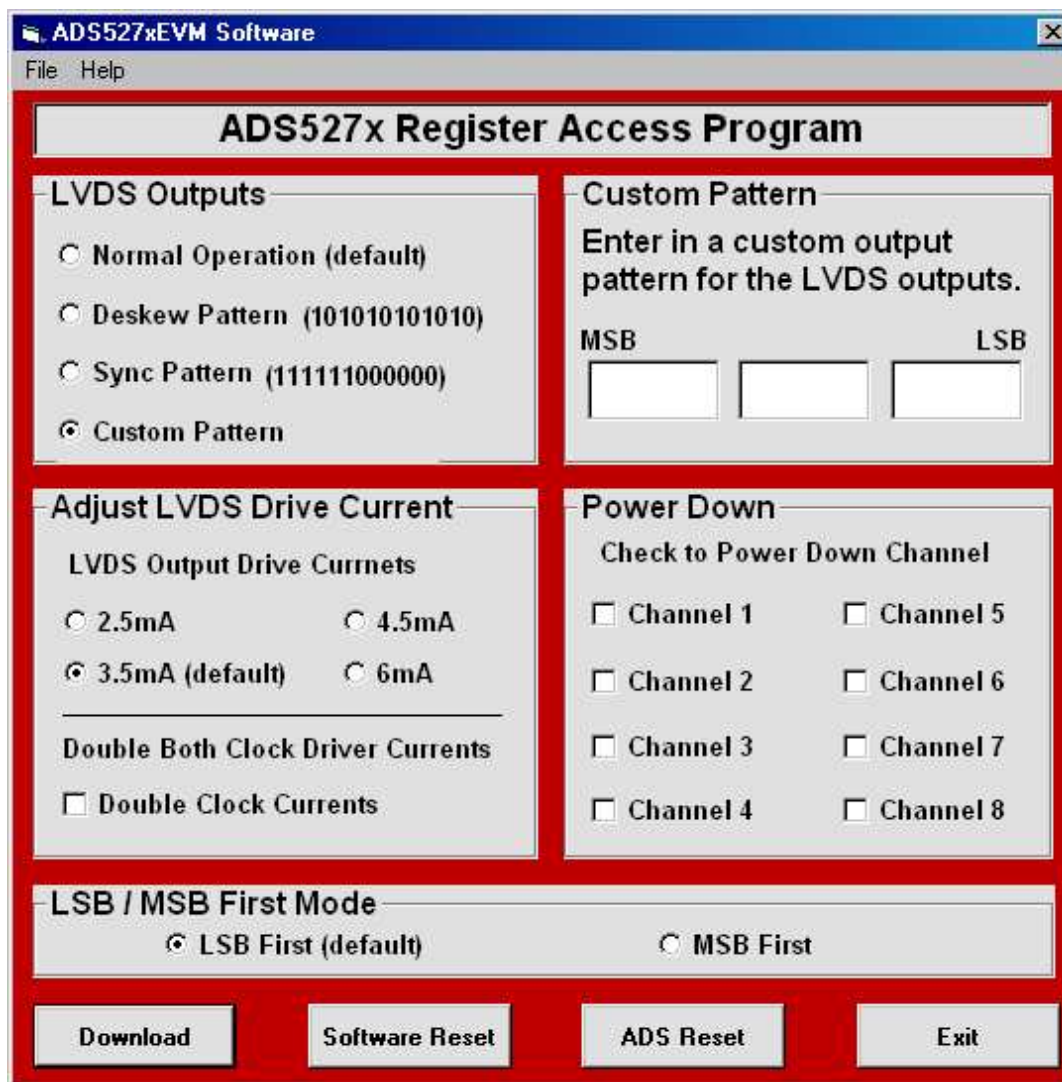


Figure 6. Register Access Program Screen – Custom Pattern Option

#### 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.

---

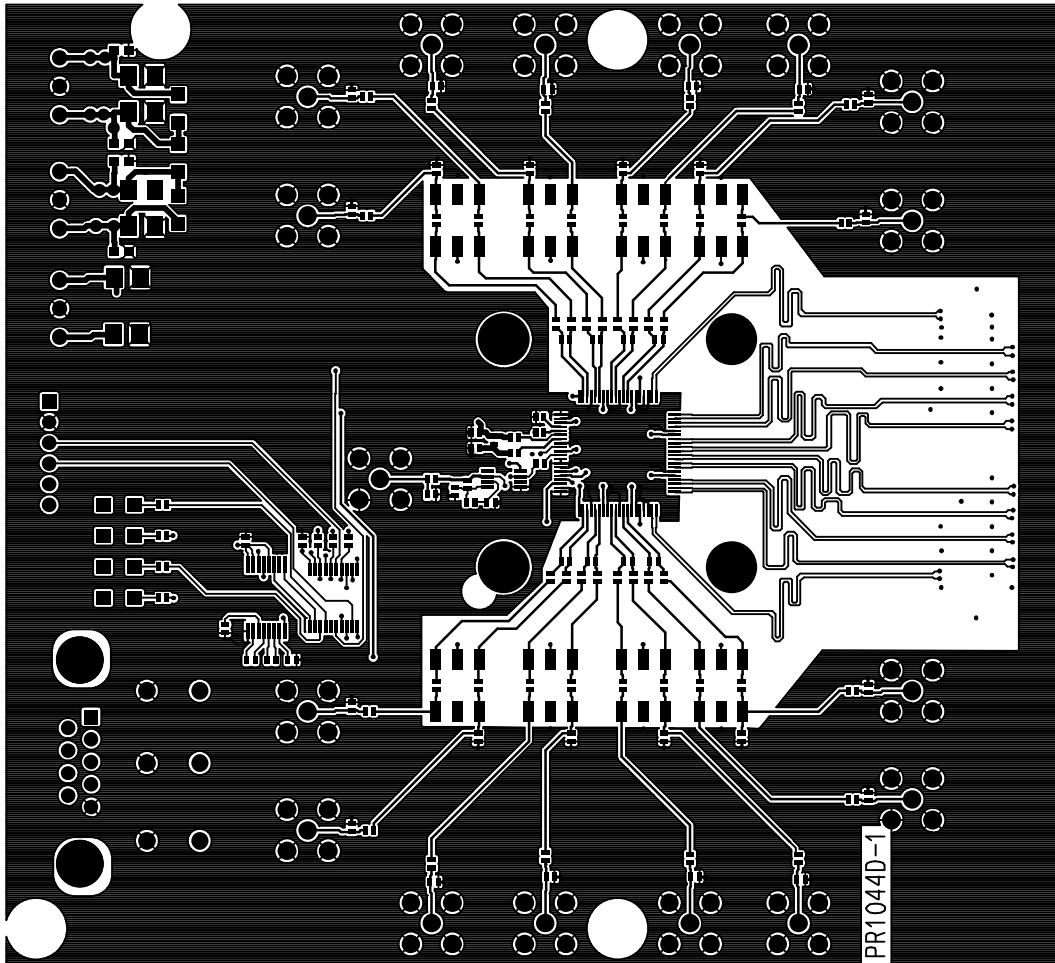
## 5 Bill of Materials

**Table 1. Component List**

MFG PART #	INSTALLED REF DES	DESCRIPTION	MFG	DO NOT INSTALL	COMMENTS
ADS527xPFC	U1	IC, 10/12-BIT, 40-70MSPS, LVDS, 8-CHANNEL A.D.C.			<b>See Note 1 (NOT IN SOURCE)</b>
CRCW040210R0F	R1, R2	RES, 10 $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE		
CRCW040249R9F	R6, R8, R9, R13, R14, R18, R19, R23, R24, R28, R29, R33, R34, R38, R39, R43, R44, R54, R55, R56–R69, R83	RES, 49.9 $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE		
CRCW0402000RF	R4, R7, R10–R12, R15–R17, R20–R22M R25–RR27, R30–R32, R35–R37, R40–R42, R45, R46	RES, 0.0 $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE	R5, R7, R11, R12, R16, R17, R21, R22, R26, R27, R31, R32, R36, R37, R41, R42, R46	
CRCW0402332RF	R49–R52	RES, 332 $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE		
CRCW1206000	R70–R72	RES, 0.0 $\Omega$ , 0.125W, 0%, CHIP-JUMPER	DALE		
CRCW04024751F	R47, R48, R53	RES, 4.75 k $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE		
CRCW04025622F	R3	RES, 56.2 k $\Omega$ , 0.1W, 1%, 0402 CHIP, THICK FILM	VISHAY/DALE		
ERJ-2RKF4990X	R80–R82	RES, 499 $\Omega$ , 0.1W, 1%, 0402, CHIP	Panasonic		
CY8C27243-24PVXI	U4	IC, MICROCONTROLLER, 8-bit PSoC			<b>See Note 2 (NOT IN SOURCE)</b>
DEKL-9SAT-F	P5	CONN, DB9, RTANG RECPT 0.318 W/ SCRW. LCKS.	CINCH		
ECJ0EB1A104K	C2, C3, C5, C14, C18, C21, C23, C24–C26, C30, C31, C33, C35, C37, C39, C41, C43–C45, C47–C49, C51–C53, C55–C57, C59–C61, C63–C65, C67–C69, C71–C78	CAP, 0.1 $\mu$ F, 10VDC, 10%, CERAMIC MULTILAYER CHIP	Panasonic		
ECJ0EB1C103K	C16, C17, C80	CAP, 0.01 $\mu$ F, 16VDC, 10%, CERAMIC MULTILAYER CHIP	Panasonic		
ECJ0EB1H102K	C19, C20, C22, C27–C29, C32, C34, C36, C38, C40	CAP, 0.001 $\mu$ F, 50V DC, 10% CERAMIC MULTILAYER 0402	Panasonic		
ECJ0EC1H100K	C42, C46, C50, C54, C58, C62, C66, C70	CAP, 10 pF, 50V DC, 10% CERAMIC MULTILAYER 0402	Panasonic		
ECJ1VB1C104K	C6, C9, C10, C12	CAP, 0.1 $\mu$ F, 16VDC, 10%, CERAMIC MULTILAYER CHIP	Panasonic		
EVQPJB04K	SW1–SW3	SWITCH, SPST, PCB MOUNT			
MAX3221CDB	U3	No PDB description available			
MC100EPT21DT	U2	IC, 3.3V TRANSLATOR, DIFFERENTIAL LVPECL to LVTTTL	On Semiconductor		
PTR AK550 3	P1–P3	TERM. BLK, 3 POS POWER CONNECTOR			
QTH-040-01-F-D-DP-A	P6	CONN, 80 PIN SMT, HI SPEED TERMINAL STRIP	SAMTEC		
SML-LX1206-GC-TR	CR1–CR4	LED, SMT 1206, GREEN			
TTWB-4-B	T1–T8	XFMR, RF, 0.1–1500 MHz	COILCRAFT		
T491B225K016AS	C1, C4	CAP, 2.2 $\mu$ F, 16V, 10%, TANTALUM CHIP-MOLDED	KEMET		
T491B475K016AS	C7, C8, C11, C13	CAP, 4.7 $\mu$ F, 16V, 10%, TANTALUM CHIP-MOLDED	KEMET		

**Table 1. Component List (continued)**

MFG PART #	INSTALLED REF DES	DESCRIPTION	MFG	DO NOT INSTALL	COMMENTS
142-0701-201	J1, J3, J5, J7, J9, J11, J13, 15, J17	CONN, SMA JACK 0.2CC LO-COST		J2, J4, J6, J8, J10, J12, J14, J16	
102203-3	P4	CONN, HEADER, 6 POSITION, RIGHT ANGLE, SINGLE ROW			
SRS4-8-01	1/2" Stand offs		Richo Inc.		

**6 Schematic and PCB**

**Figure 7. ADS527xEVM PCB – Top Layer**



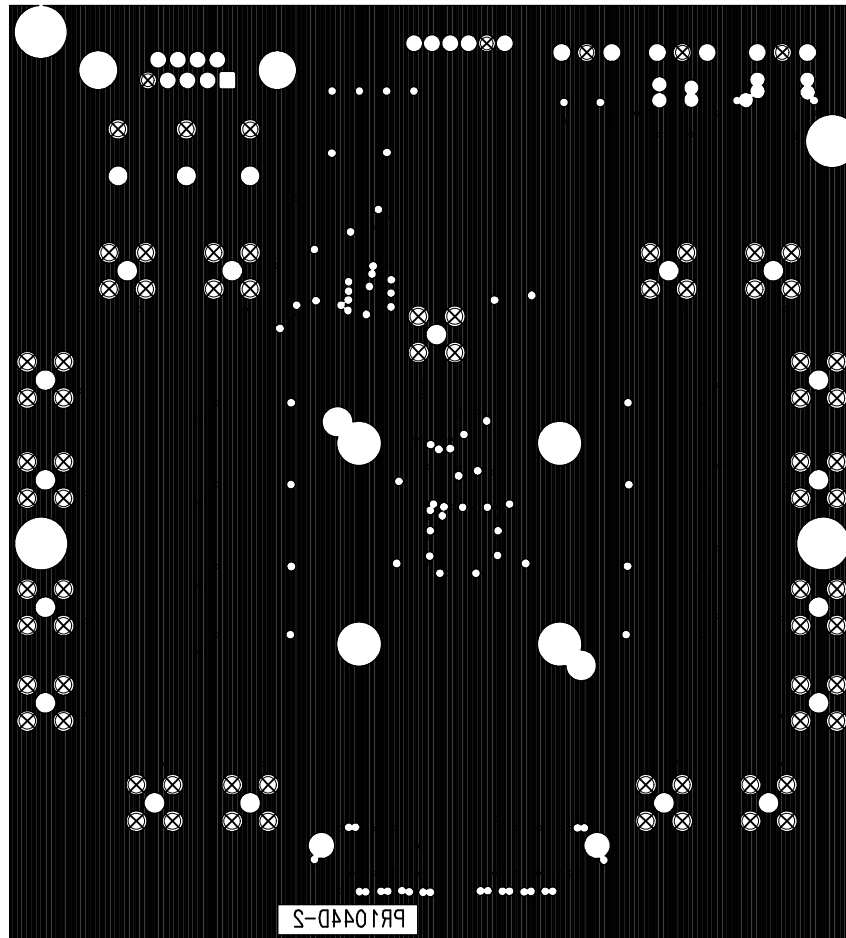


Figure 8. ADS527xEVM PCB – Ground Layer

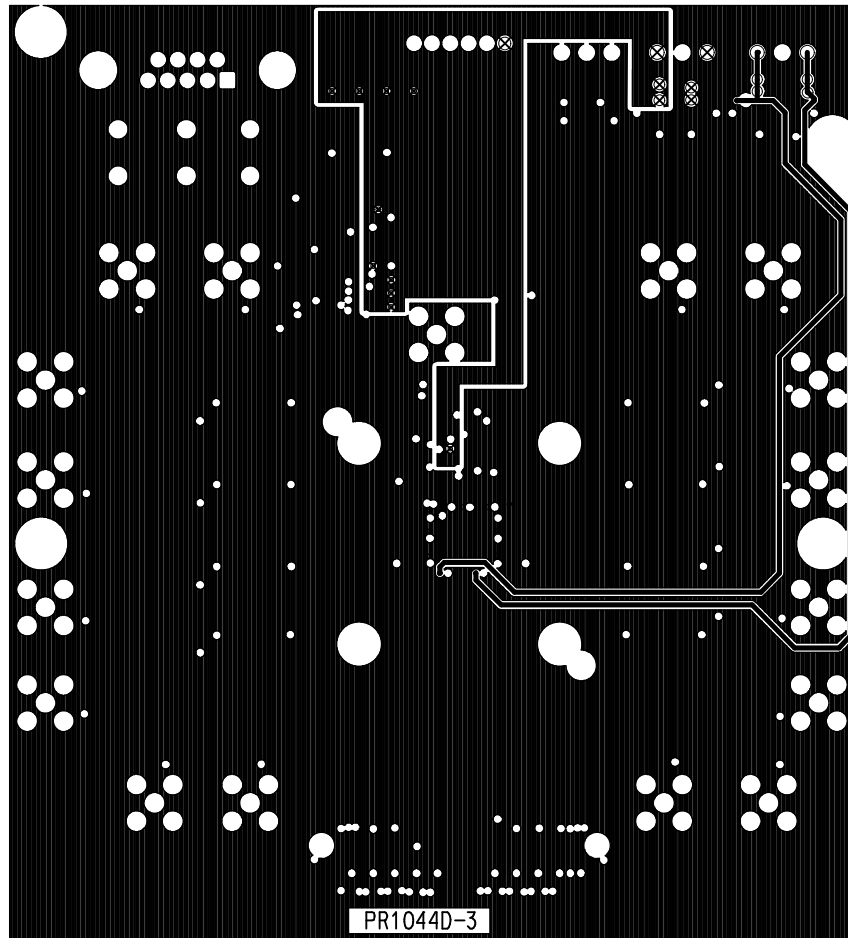


Figure 9. ADS527xEVM PCB – Power Layer

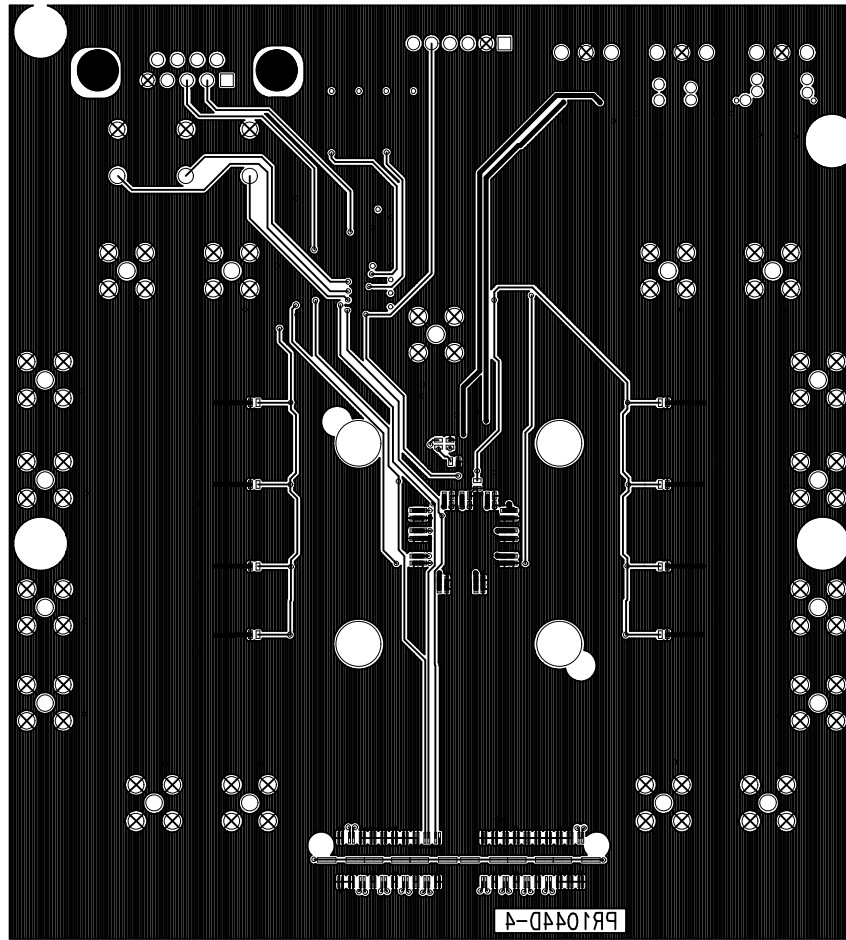
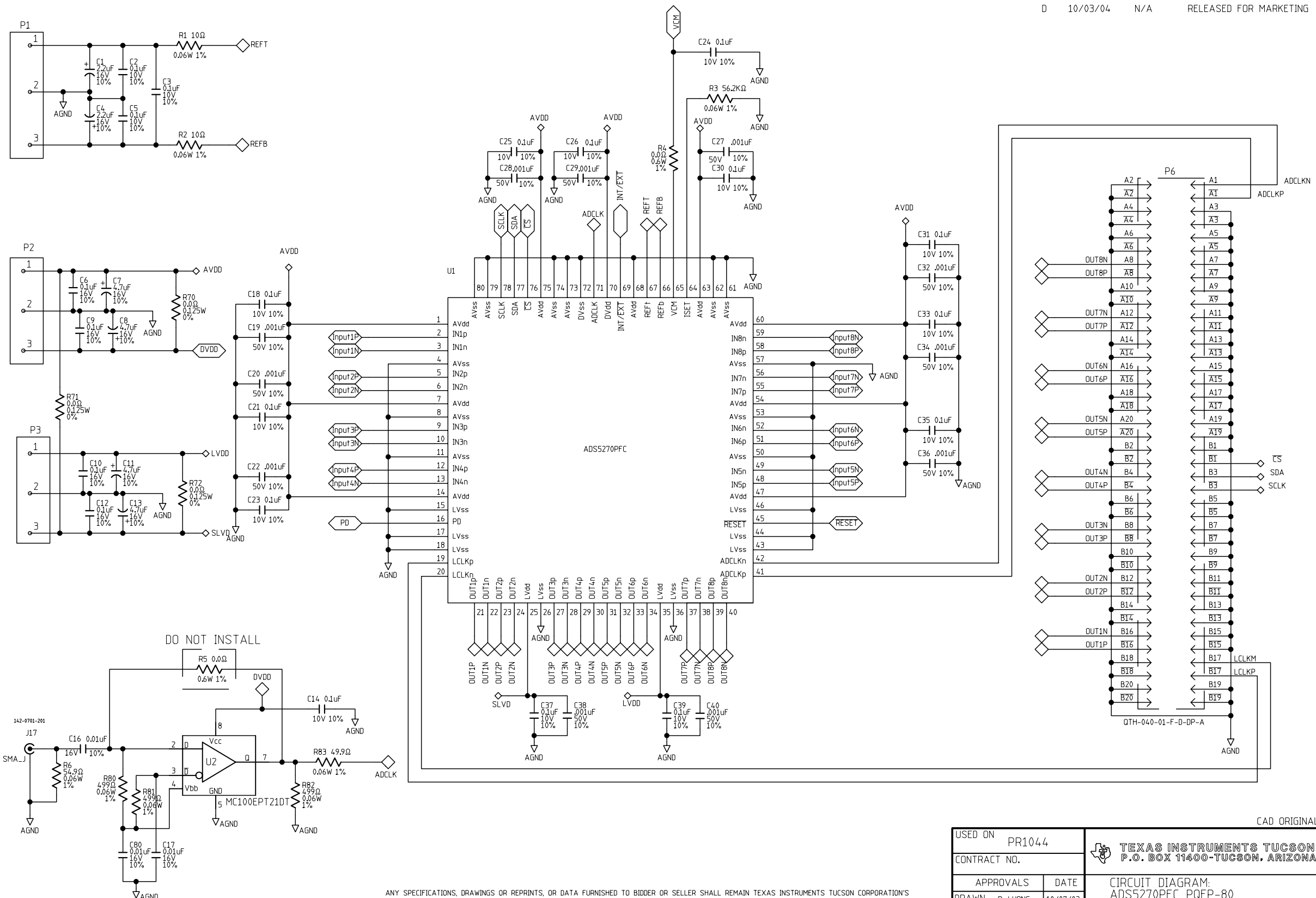


Figure 10. ADS527xEVM PCB – Bottom Layer

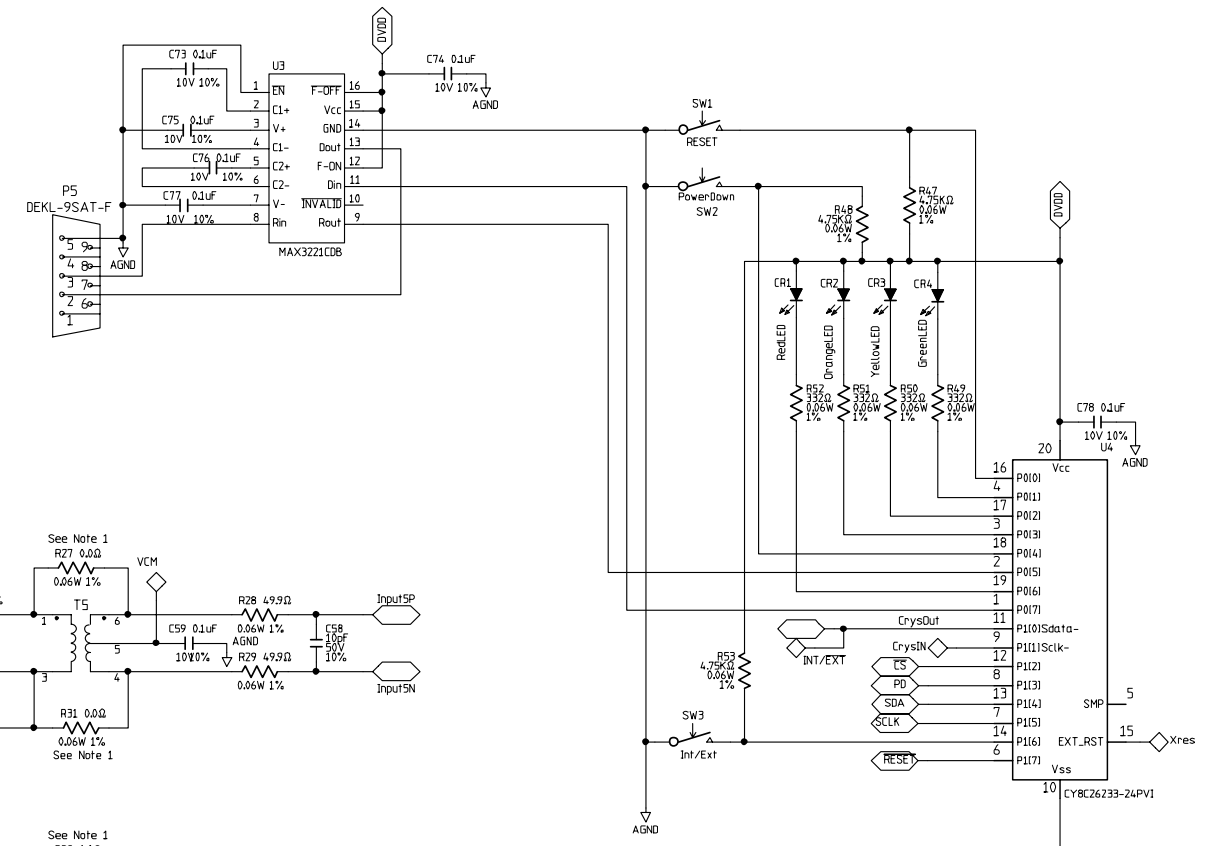
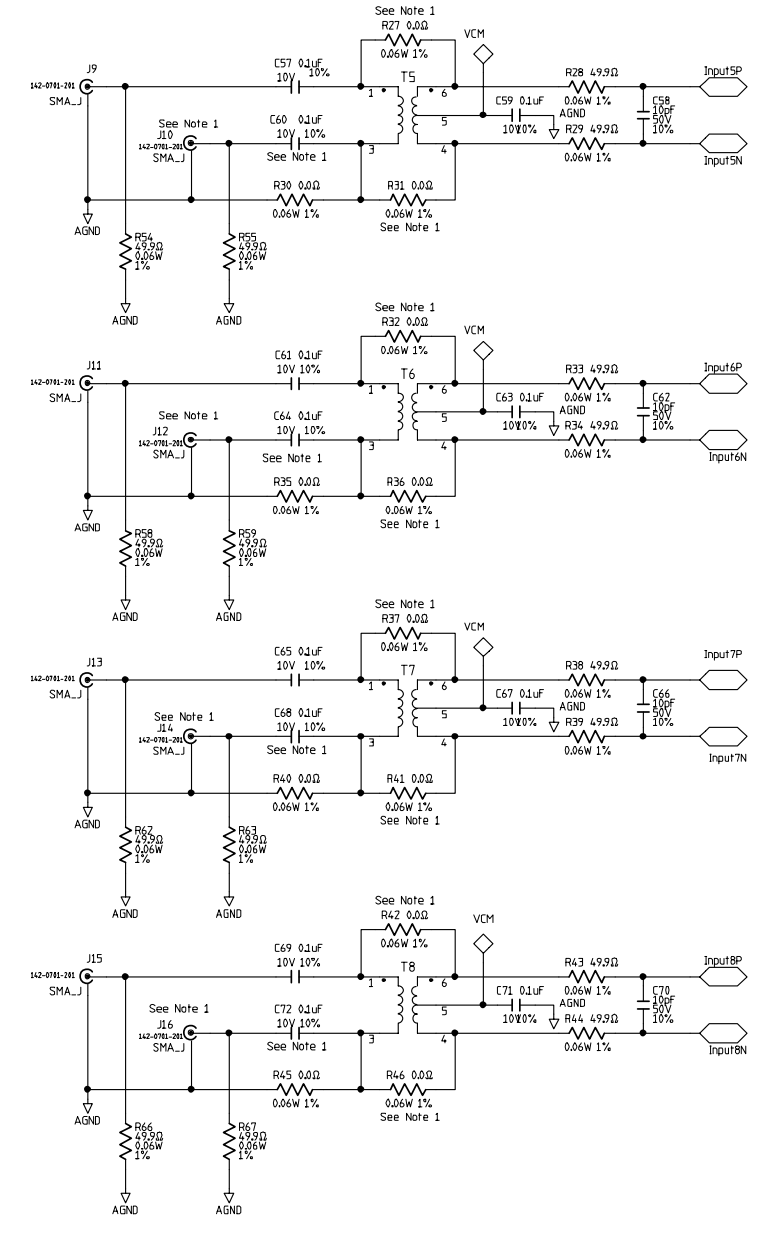
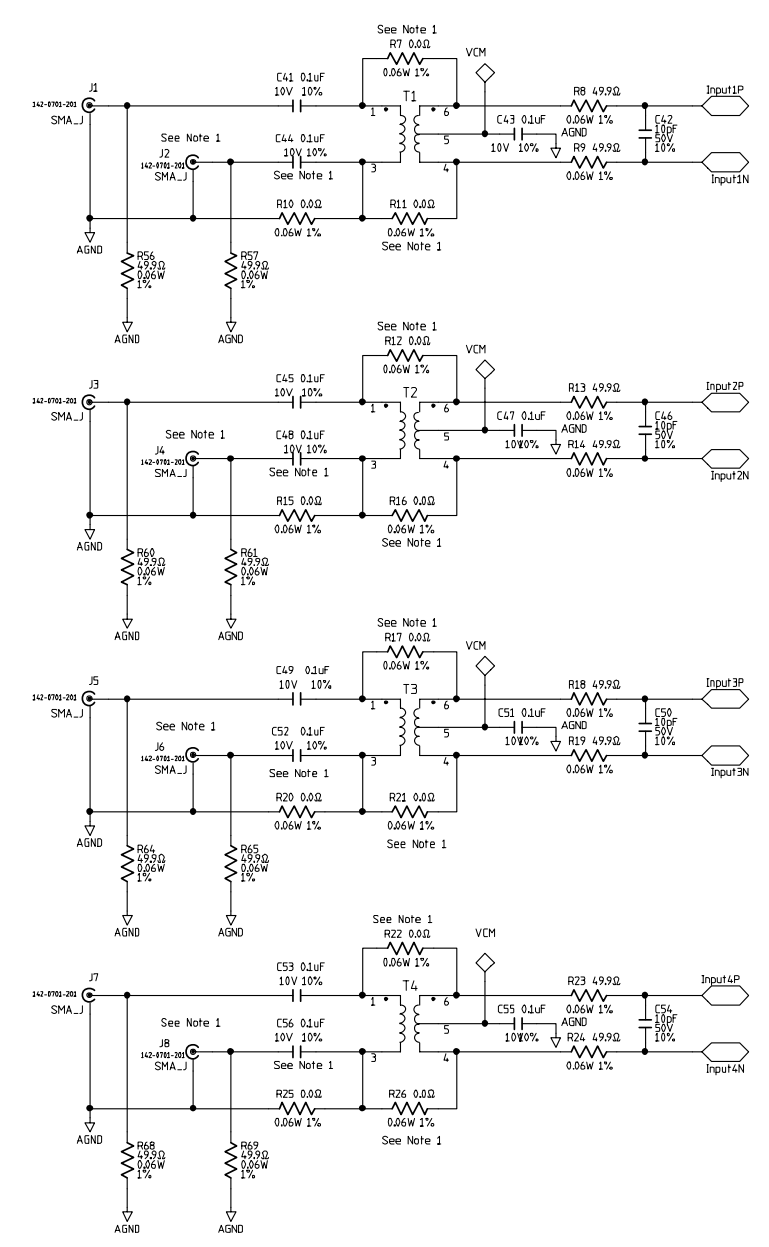
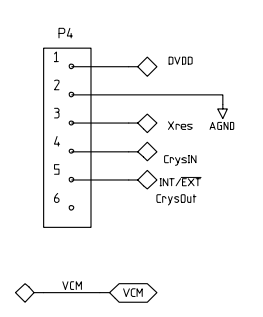
REVISIONS			
REV	DATE	DCR #	DESCRIPTION
A	10/07/03	N/A	NOT DOCUMENTED
B	12/22/03	N/A	NOT DOCUMENTED
C	08/16/04	N/A	NOT DOCUMENTED
D	10/03/04	N/A	RELEASED FOR MARKETING



ANY SPECIFICATIONS, DRAWINGS OR REPRINTS, OR DATA FURNISHED TO BIDDER OR SELLER SHALL REMAIN TEXAS INSTRUMENTS TUCSON CORPORATION'S PROPERTY, SHALL BE KEPT CONFIDENTIAL SHALL BE USED ONLY FOR THE PURPOSE OF COMPLYING WITH TEXAS INSTRUMENTS TUCSON CORPORATION QUOTATION OR WITH TEXAS INSTRUMENTS TUCSON CORPORATION PURCHASER ORDERS, SHALL NOT BE DISCLOSED TO THIRD PARTIES, AND SHALL BE RETURNED AT TEXAS INSTRUMENTS TUCSON CORPORATION'S REQUEST. PATENT RIGHTS EMBODIED IN DESIGN, TOOLS, PATTERNS, DRAWINGS, DEVICES, INFORMATION AND EQUIPMENT SUPPLIED BY TEXAS INSTRUMENTS TUCSON CORPORATION PURSUANT TO THIS REQUEST FOR QUOTATION OR PURCHASE ORDER AND EXCLUSIVE RIGHTS FOR THE USE IN REPRODUCTION THEREOF ARE RESERVED BY TEXAS INSTRUMENTS TUCSON CORPORATION.

USED ON PR1044		TEXAS INSTRUMENTS TUCSON CORP. P.O. BOX 11400-TUCSON, ARIZONA 85734	
CONTRACT NO.		CIRCUIT DIAGRAM: ADS5270PFC PQFP-80 EVM BOARD	
APPROVALS	DATE	SIZE	CAGE CODE
DRAWN P. LUONG	10/07/03	C	13919
CHECKED D. NORRIGARD	10/09/03	DWG. NO.	PR1044
ISSUED		REV	D
PR1044 -D	SCALE:	SHEET	1 of 2

CAD ORIGINAL ON VBDC



NOTE: DO NOT INSTALL  
 J2, J4, J6, J8, J10, J12, J14, J16,  
 C15, C44, C48, C52, C56, C60, C64, C68, C72,  
 R7, R11, R12, R16, R17, R21, R22, R26,  
 R27, R31, R32, R36, R37, R41, R42, R46.

ANY SPECIFICATIONS, DRAWINGS OR REPRINTS, OR DATA FURNISHED TO BIDDER OR SELLER SHALL REMAIN TEXAS INSTRUMENTS TUCSON CORPORATION'S PROPERTY. SHALL BE KEPT CONFIDENTIAL. SHALL BE USED ONLY FOR THE PURPOSE OF COMPLYING WITH TEXAS INSTRUMENTS TUCSON CORPORATION QUOTATION OR WITH TEXAS INSTRUMENTS TUCSON CORPORATION PURCHASER ORDERS. SHALL NOT BE DISCLOSED TO THIRD PARTIES, AND SHALL BE RETURNED AT TEXAS INSTRUMENTS TUCSON CORPORATION'S REQUEST. PATENT RIGHTS EMBODIED IN DESIGN, TOOLS, PATTERNS, DRAWINGS, DEVICES, INFORMATION AND EQUIPMENT SUPPLIED BY TEXAS INSTRUMENTS TUCSON CORPORATION PURSUANT TO THIS REQUEST FOR QUOTATION OR PURCHASE ORDER AND EXCLUSIVE RIGHTS FOR THE USE IN REPRODUCTION THEREOF ARE RESERVED BY TEXAS INSTRUMENTS TUCSON CORPORATION.

CAD ORIGINAL ON VBDC			
SIZE D	CAGE CODE 13919	DWG. NO. PR1044	REV D
SCALE:		SHEET 2 of 2	

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
		Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
		Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265