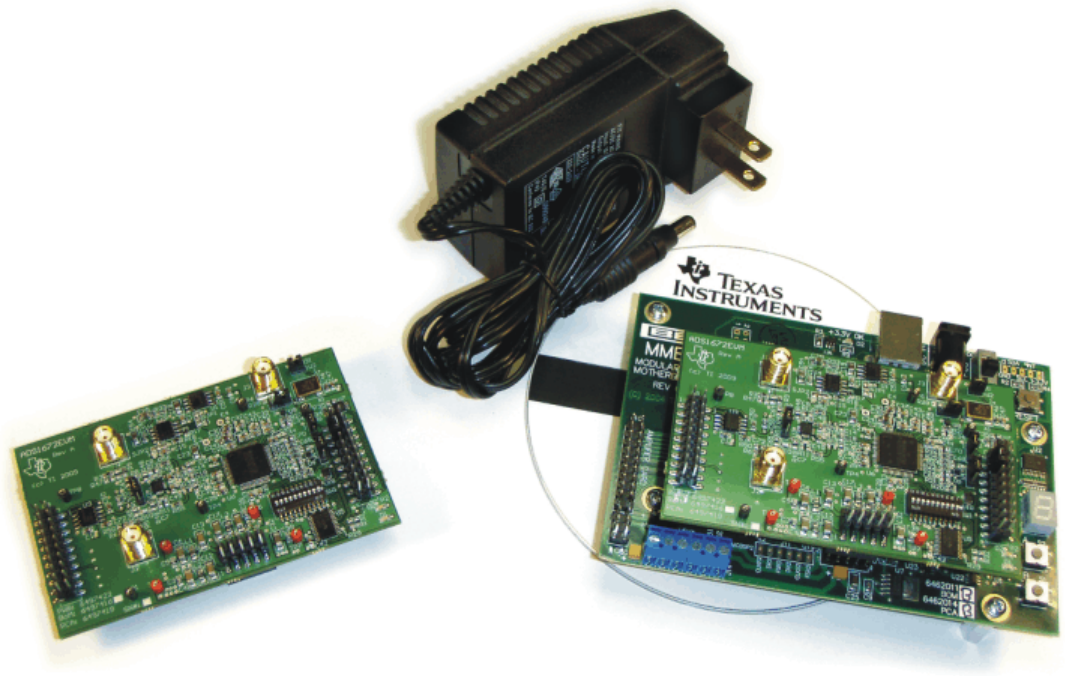
ADS1672EVM and ADS1672EVM-PDK User's Guide



ADS1672EVM (Left) and ADS1672EVM-PDK (Right)

This user's guide describes the characteristics, operation, and use of the ADS1672EVM, both by itself and as part of the ADS1672EVM-PDK. This evaluation module (EVM) is an evaluation platform for the ADS1672, a high-speed, single-channel, 24-bit, 625kHz delta-sigma analog-to-digital converter (ADC). The EVM allows evaluation of all aspects of the ADS1672 device using a standard serial CMOS interface. A complete circuit description, schematic diagram, and bill of materials are included.

The following related documents are available through the Texas Instruments web site at http://www.ti.com.

EVM-Compatible Device Data Sheets

Device	Literature Number
ADS1672	SBAS402
REF5030	SBOS410
THS4520	SLOS503
REF5025	SBOS410
OPA211	SBOS377
PCA9535	SCPS129

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1 EVM Overview

ADS1672EVM Features:

- Contains all support circuitry needed for the ADS1672
- Voltage references onboard
- Clock options: onboard 20MHz ceramic oscillator or adjustable frequency
- GPIO access
- Compatible with the TI Modular EVM System

ADS1672EVM-PDK Features:

- Easy-to-use evaluation software for Microsoft® Windows® XP
- Data collection to text files
- Built-in analysis tools including scope, FFT, and histogram displays
- Complete control of board settings
- Easily expandable with new analysis plug-in tools from Texas Instruments

As a stand-alone unit, you can use the ADS1672EVM as a prototyping or troubleshooting tool.

For use with a computer, the ADS1672EVM-PDK is available. This kit combines the ADS1672EVM board with the DSP-based MMB0 motherboard, and includes ADCPro™ software for evaluation.

You can connect the ADS1672EVM through the MMB0 motherboard and then to a computer via an available USB port. This manual shows how to use the MMB0 as part of the ADS1672EVM-PDK, but does not provide technical details about the MMB0 itself.

ADCPro is a program for collecting, recording, and analyzing data from ADC evaluation boards. ADCPro has a number of plug-in programs, so it can be expanded easily with new test and data collection plug-ins. You control the ADS1672EVM-PDK with a plug-in that runs in ADCPro. For more information about ADCPro, see the ADCPro™ Analog-to-Digital Converter Evaluation Software User's Guide (literature number SBAU128), available for download from the TI web site.

This manual covers the operation of both the ADS1672EVM and the ADS1672EVM-PDK. It does not describe the MMB0 motherboard in detail. Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the ADS1672EVM.

2 Introduction

The ADS1672EVM is an evaluation module built to the TI Modular EVM System specification. You can connect the ADS1672EVM to any Modular EVM System interface card.

The ADS1672EVM is available as a stand-alone printed circuit board (PCB) or as part of the ADS1672EVM-PDK, which includes an MMB0 motherboard and software. As a stand-alone PCB, the ADS1672EVM is useful for prototyping designs and firmware development.

Note that the ADS1672EVM cannot run software. To connect it to a computer, some type of interface is required.

3 Analog Interface

The ADS1672EVM board applies 5V of power (VCC) to the ADS1672 (U6) and THS4520 (U2). The THS4520, a wideband, fully-differential amplifier, drives the differential inputs of the ADS1672. This device was selected because of its slew rate (570V/µs), settling time (7ns to 0.1%), low noise (2nV/$\sqrt{Hz}$) and low harmonic distortion (HD3: –123dBc at 100kHz).

Analog input signals to the THS4520/ADS1672 signal chain can be applied at connectors J1 (inverting input, –IN) and J2 (noninverting input, +IN) or P3-1 (–IN) and P3-2 (+IN). The P3 connector is an SMT plug on the top side of the PCB (as Figure 1 shows). The signal at +IN and –IN should be differential and centered at 2.5V.

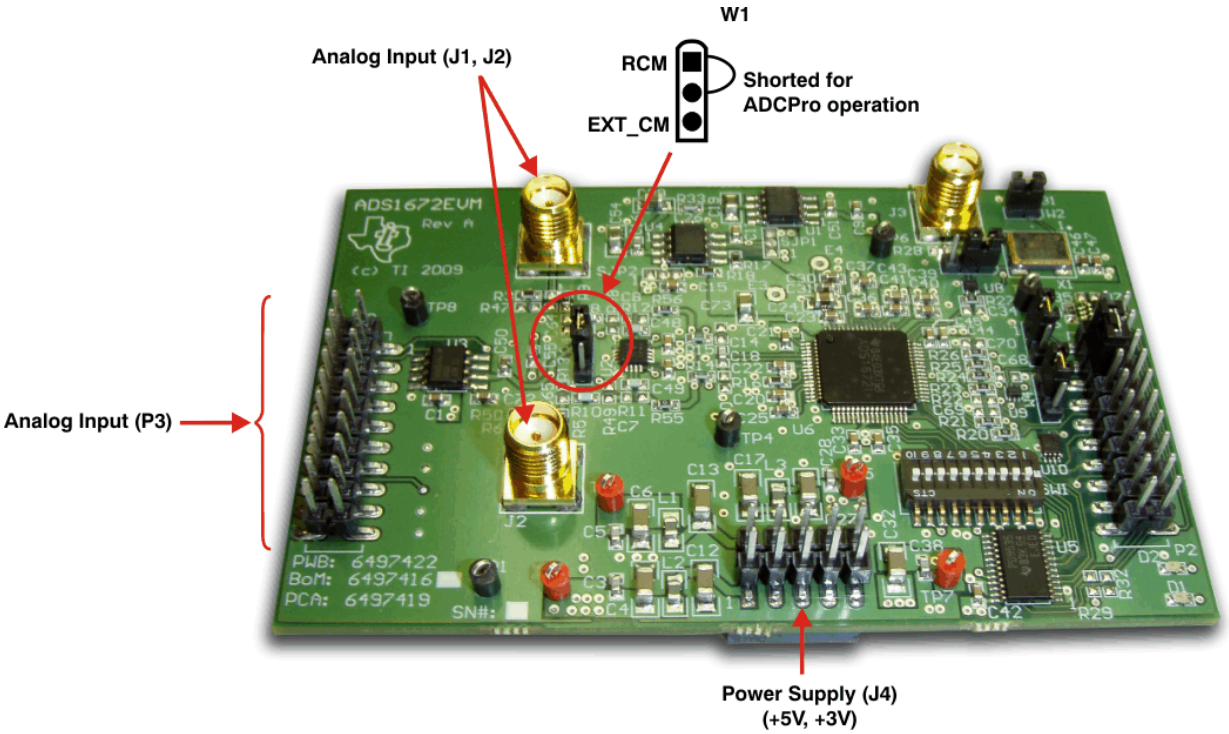


Figure 1. Location of Onboard Connectors J1, J2, W1, P1, P2, SW1, and P3

At the analog board inputs, +IN and –IN, there are termination resistors (R3, R6 = 49.9Ω) installed on the board at J1 and J2 (as Figure 2 illustrates). These resistors are followed by a capacitor between the inputs (C55 = 750pF) and resistors (R8, R10 = 383Ω) to the THS4520. Additional pads are available at the inputs of the THS4520 to allow insertion of capacitor and/or resistor networks.

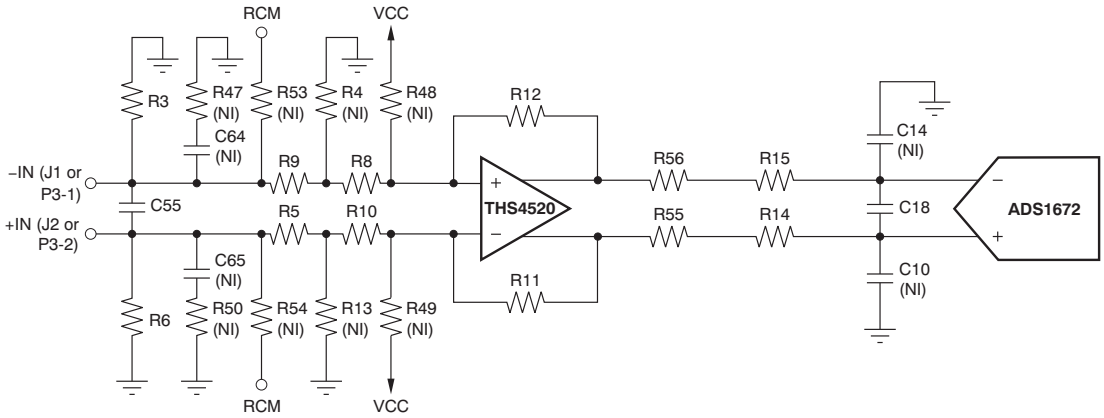


Figure 2. ADS1672EVM Input Signal Path

Note: If you are connecting the ADS1672EVM through the MMB0 board to ADCPro, there are no modifications required.

Following the THS4520, an R-C network connects directly to the ADS1672. This R-C network (R56, R15, C18, R55, and R14) acts as a first-order, anti-aliasing filter for the ADS1672. The corner frequency of the installed first-order filter is $1/[2\pi \times (10\Omega + 10\Omega) \times 750pF]$ or 10.6MHz. Pads are available to install more resistors and capacitors, as needed.

The common-mode voltage to the THS4520 is set at R_{CM} and can be connected to the analog board inputs +IN and –IN through R53 and R54 as shown in Figure 2. The output signal from the onboard REF5025 (U3) establishes this voltage at 2.5V. You can inject an external common-mode voltage into the THS4520 through P3-15 (as Table 1 shows). If this option is used, the shunt on W1 (an onboard jumper) must be moved to position 2-3 (see Figure 1). With this reconfiguration, R_{CM} in the input circuitry does not change, as shown in Figure 2. If the common-mode of the input signals center at a voltage other than VCC/2, pull-up resistors (R48 and R49) must be installed to maintain the proper input common-mode range to the THS4520 amplifier. The THS4520 performance degrades if operated beyond its specified range of 1.2V to 4.25V (when powered with 5V).

Samtec part number TSM-110-01-T-DV-P provides a convenient 20-pin, dual-row, header/socket combination at P3. As shown in Figure 1, the P3 header provides access to –IN and +IN of the ADS1672EVM board as well as the common-mode pins of the THS4520 (pins 4 and 9, CM). Consult Samtec at http://www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options. There is no filtering or protection on the P3 pins. Use appropriate caution when handling these pins. Table 1 summarizes the pin assignments for the analog interfaces on P3.

Table 1. P3: External Analog Input Connector

Pin Number	Signal	Description
P3.1	–IN	Inverting analog input
P3.2	+IN	Noninverting analog input
P3.3	NC	No connection
P3.4	NC	No connection
P3.5	NC	No connection
P3.6	NC	No connection
P3.7	NC	No connection
P3.8	NC	No connection
P3.9	NC	No connection
P3.10	NC	No connection
P3.11	GND	System ground
P3.12	NC	No connection
P3.13	GND	System ground
P3.14	NC	No connection
P3.15	EXT_COM	External common-mode voltage; connect to THS4520
P3.16	NC	No connection
P3.17	GND	System ground
P3.18	NC	No connection
P3.19	GND	System ground
P3.20	NC	No connection

4 Reference Buffer

The ADS1672 reference pins have switched capacitor inputs. At a clock rate of 20MHz (X1), a charge injection in and out of the ADS1672 reference input occurs. The external reference voltage that drives the ADS1672 reference pin must settle in less than 50ns. The REF5030 (U1) generates the 3.0V reference signal (Figure 3). The output of the REF5030 is heavily filtered to remove noise. The onboard OPA211 (U4) again filters and buffers the reference signal so that the reference signal noise to the ADS1672 is less than the noise generated by the converter itself. The OPA211 is a low-noise, unity-gain stable amplifier that provides a reliable current source for the ADS1672 reference input. The OPA211 and output decoupling capacitors work together to settle the VREFP (ADS1672) reference input voltage to within ±1/2 LSB, every 50ns. This board uses a 22µF ceramic capacitor with a 0.1µF ceramic capacitor directly across the reference inputs, VREFP and VREFN. Note that the 22µF and 0.1µF capacitors are placed as close to the ADS1672 reference pins as possible. These capacitors further reduce noise that is common to both inputs. The ADS1672 VREFN pin goes to ground.

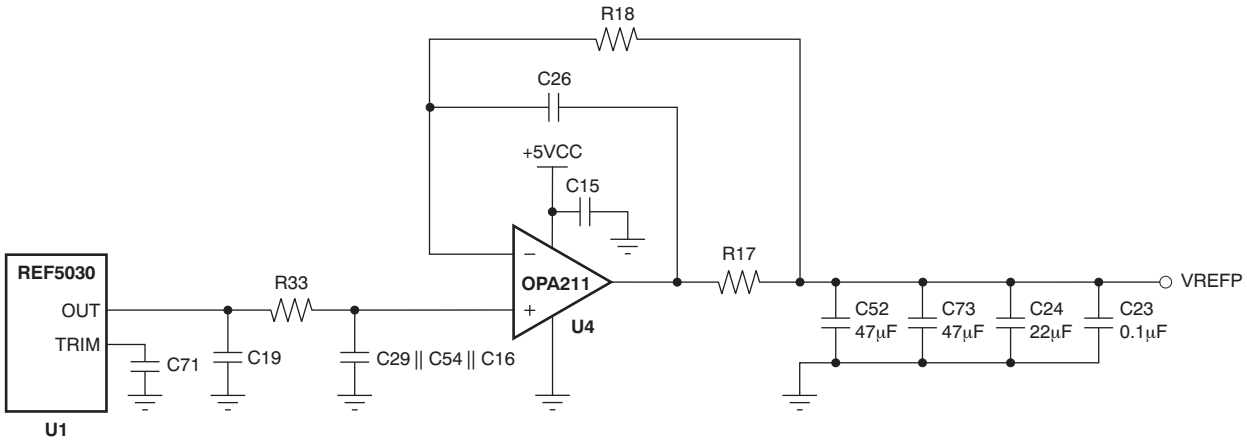


Figure 3. ADS1672 External Reference and Buffer

5 Power Supplies

J4 (see Figure 1) is the power-supply input connector. Table 2 lists the configuration details for J4.

Table 2. J4 Configuration: Power-Supply Input

Pin No.	Pin Name	Function	Required
J4.1	+VA	+VCC	Optional
J4.2	–VA	–VCC	Optional
J4.3	+5VA	+5VCC	Always
J4.4	NC	No connection	No
J4.5	NC	No connection	No
J4.6	AGND	Analog ground input	Always
J4.7	NC	No connection	No
J4.8	NC	No connection	No
J4.9	+3.3V	3.3V digital supply	Always
J4.10	NC	No connection	No

6 Digital Interface

It is easy to interface the ADS1672EVM board to multiple control platforms. The P2 connector (Figure 4, Samtec part number SSW-110-22-S-D-VS) provides a convenient digital access to the key ADS1672 I/O pins. Consult Samtec at http://www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options.

SW1, a 10-position DIP switch (Figure 4), gives users the ability to change the setting of the ADS1672 digital configuration pins when the EVM is used as a stand-alone evaluation board. Pull-up/-down resistors are provided to set the static state of the digital configuration pins. All position settings for SW1 must be off (factory default state) when the board is configured for use with ADCPro. The ADCPro software uses the PCS9535 at U5, a remote I^2C I/O expander at address 32 (20h), to control the configuration pins. In addition, the pin setting for the SW1 switches must be off when using the I^2C function for stand-alone systems. The ADS1672EVM does not support LVDS interface mode; only the standard 3.3V CMOS interface is supported.

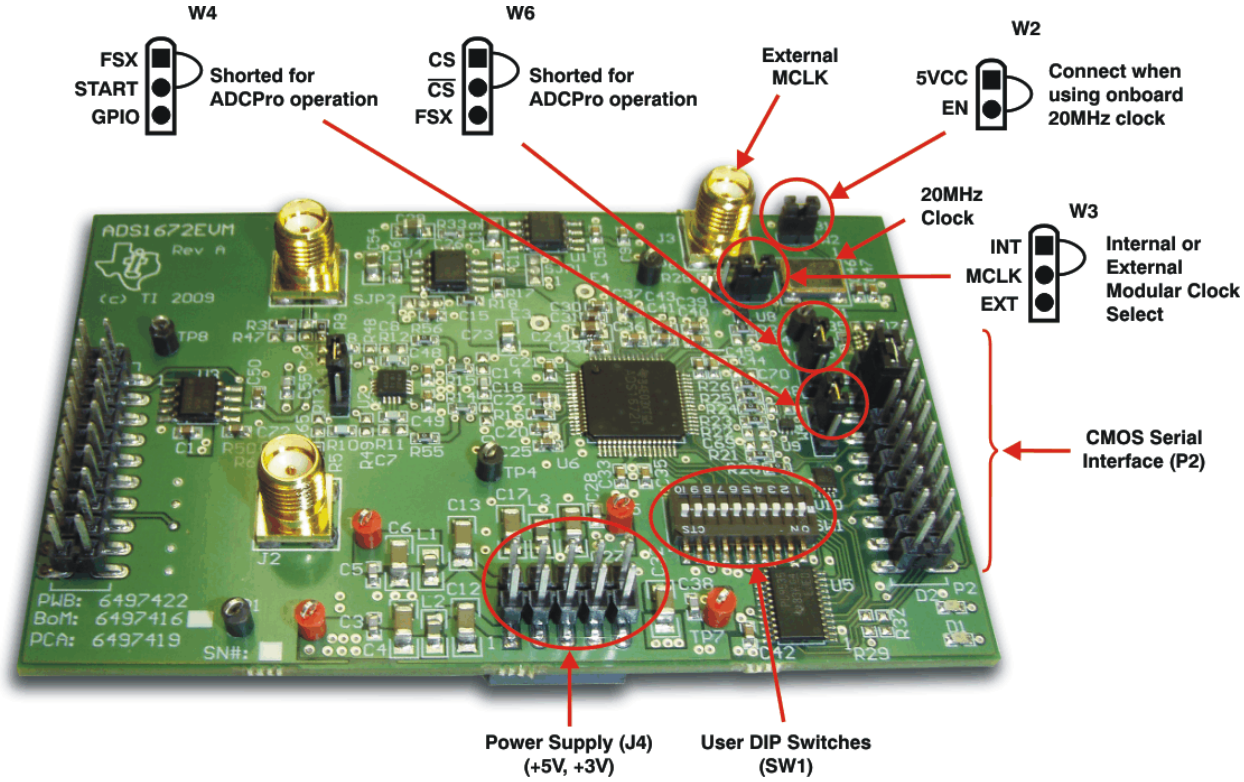


Figure 4. Digital Interface Connectors and Jumpers

6.1 Serial Data Interface, P2

The P2 connector (Table 3) is used for the digital interface to MMB0 and ADCPro. All logic levels on P2 are 3.3V CMOS.

Table 3. P2: External Digital I/O Connector

Pin Number	Signal	Description
P2.1	$\overline{CS}$	Chip select, active low
P2.2	OTRD	Digital filter out-of-range indicator. High on rising edge of $\overline{DRDY}$. If conversion is in range, OTRD returns low on next rising edge of $\overline{DRDY}$.
P2.3	CLKX	Serial transmit clock from processor. Jumper connect to P2.5 installed at factory.
P2.4	GND	System ground
P2.5	CLKR	Serial receive clock from ADS1672EVM
P2.6	NC	No connection
P2.7	FSX	Frame sync signal from processor
P2.8	NC	No connection
P2.9	FSR	Frame sync return to processor (sourced from the $\overline{DRDY}$ output of the ADS1672)
P2.10	GND	System ground
P2.11	NC	No connection
P2.12	NC	No connection
P2.13	DRR	Serial data into processor
P2.14	NC	No connection
P2.15	$\overline{DRDY}$	Interrupt source to processor (sourced from the $\overline{DRDY}$ output pin)
P2.16	SCL	I^2C serial shift clock (NOTE: For this function to work, all SW1 switches should be in the off position)
P2.17	GPIO	General-purpose pin. Can be used to toggle start.
P2.18	GND	System ground
P2.19	NC	No connection
P2.20	SDA	I^2C data signal (NOTE: For this function to work, all SW1 switches should be in the off position)

6.2 Digital Control Signal PIN Configuration, SW1

When using the I^2C function through U5 (with or without ADCPro connected), all SW1 switches should be in the OFF position (see Figure 4).

The data clock and data out communications are directed through P2. All remaining ADS1672 digital control pins are configured with SW1. Table 4 describes the settings of the digital configuration switches.

The shunt on W3 must be moved to cover pin positions 2 and 3 in order to use the external clock applied to J3. The control signal operating modes in Table 4 are further explained in the ADS1672 data sheet.

Note: All SW1 switches must be configured in the OFF position when using ADCPro software.

Table 4. SW1: Supplemental Analog Interface Pinout

Pin Number	Signal	Description
SW1.1	DRATE2	Data rate selection, bit 1 (oversampling ratio select pin)
SW1.2	DRATE1	Data rate selection, bit 0 (oversampling ratio select pin)
SW1.3	NC	No connection
SW1.4	FPATH	Digital filter path selection: If FPATH = '0', then path is wide-bandwidth; if FPATH = '1', then path is low-latency
SW1.5	LL_CONFIG	Configure low-latency digital filter: If LL_CONFIG = '0', then single-cycle settling is selected; if LL_CONFIG = '1', the fast-response is selected
SW1.6	$\overline{\text{LVDS}}$	This pin should always be in its off position or '0'. The LVDS interface is not supported on this EVM.
SW1.7	SCLK_SEL	Shift-clock source select: If SCLK_SEL = '0', then SCLK is internally generated; if SCLK_SEL - '1', then SCLK must be externally generated
SW1.8	$\overline{\text{PDWN}}$	Power-down control; active low
SW1.9	NC	No connection
SW1.10	NC	No connection

7 Clock Source

You can either select the onboard 20MHz crystal oscillator as the master clock for the ADS1672, or apply an external clock signal through J3. When the onboard 20MHz clock is used, the W2 jumper must be installed (Figure 5). W2 is an *enable* function for the onboard crystal oscillator (X1). W3 in positions 1-2 sends the onboard clock to the DUT by way of the buffer, U8. When using an external clock, move the W3 jumper (see Figure 4 and Figure 5) on pins 1-2 to cover pins 2-3, and remove the W2 jumper (see Figure 6) to disable X1. Then apply your clock source to J3. Otherwise, simply remove the jumper when an external clock is inserted at J3.

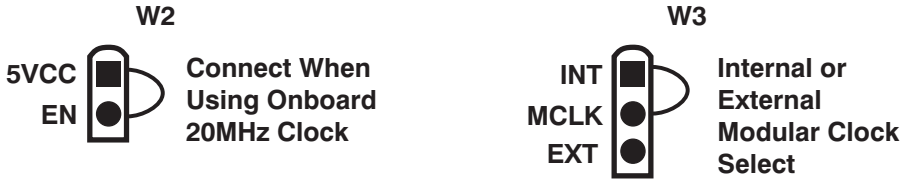


Figure 5. W2 and W3 Jumpers for Onboard Clock

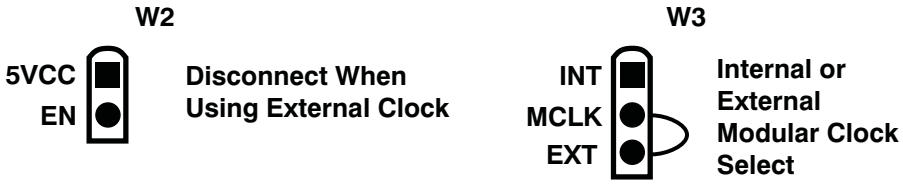


Figure 6. W2 and W3 Jumpers for External Modulator Clock

8 Use as a Stand-Alone EVM

The ADS1672EVM can be used as a stand-alone EVM, provided that the proper control signals are applied to serial input connector P2 (top or bottom side). The required power supplies (+5VA and +3.3VD) can be connected directly to J4 pins 3 and 9 or test points TP5 and TP7, respectively. Both supplies are referenced to J4 pin 6 or TP8, and should be sourced from clean, well-regulated lab supplies for best performance. The minimum control lines necessary are the active-low chip select ($\overline{CS}$) and START inputs, which are applied to P2 pins 1 and 7. If an external serial clock is desired, the signal is applied to P2 pin 5. The ADS1672 digital configuration pins can be set statically by using SW1, or can be manipulated through U5 by an I^2C controller connected to P2 pins 16 and 20 (all SW1 positions must be set to off when using U5). For additional details, please see section Section 9 of this document and review the ADS1672 datasheet.

9 EVM Operation

This section provides information on the analog input, digital control, and general operating conditions of the ADS1672EVM.

9.1 Analog Input

The differential analog input to the ADS1672EVM board is applied through J1 (–IN) and J2 (+IN) or P3.1 (–IN) and P3.2 (+IN).

9.2 Digital Control

The digital control signals can be applied directly to P2 (top or bottom side). The modular ADS1672EVM can also be connected directly to a DSP or microcontroller interface board, such as the 5-6K Interface EVM or HPA-MCU Interface boards available from Texas Instruments. For a complete list of compatible interface and/or accessory boards for the EVM or the ADS1672, see the relevant product folder on the TI web site.

Some of the digital signals to the ADS1672 are controlled using three methods: SW1 slide switches, GPIO pins through P2.17 (W4 configured to GPIO), or I^2C control using U5.

You can access a general-purpose input/output (GPIO) port through P2.17 by also connecting W4.2 (START) to W4.3 (GPIO), as shown in Figure 7. Otherwise, for proper ADCPro operation, pin 1 (FSX) is connected by a jumper to pin 2 (START).

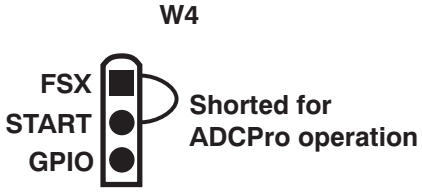


Figure 7. Connector W4 for GPIO Communication

9.3 ADS1672EVM-PDK Power Supply

The ADS1672EVM can be powered with the J4 connector or by attaching the MMB0 board. The MMB0 board provides the 5V and 3.3V power to the ADS1672EVM. Because the circuitry is provided on the ADS1672EVM, the complete system can be powered from the supplied +6V, 3A ac adapter.

9.4 Default Jumper Settings and Switch Positions

Figure 8 shows the jumpers found on the EVM and the factory default conditions for each.

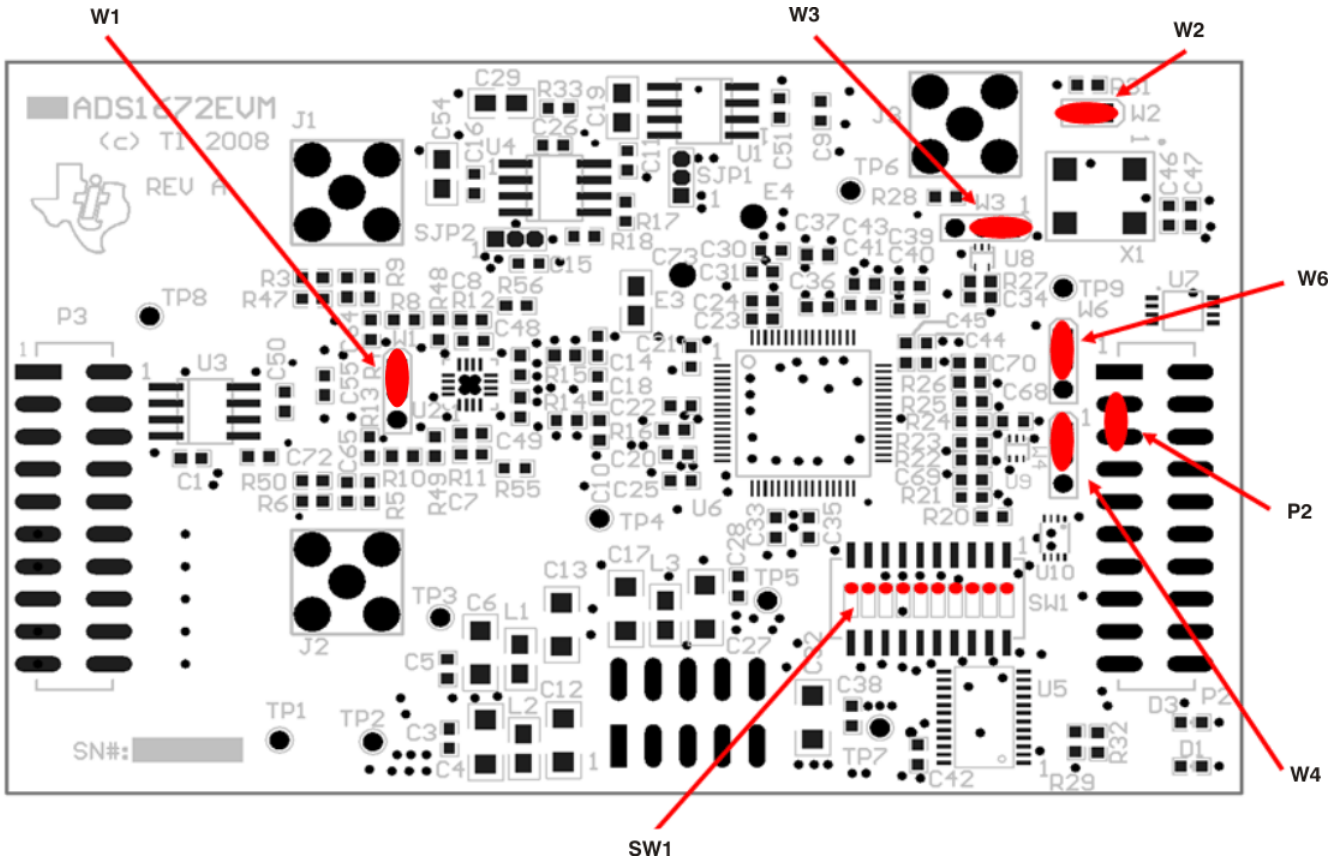


Figure 8. ADS1672EVM Default Jumper Locations

Table 5 provides a list of switches found on the EVM and the factory default conditions for each.

Table 5. List of Switches

Switch	Default Position	Switch Description
W1	Not installed	Selects U2 (THS4520) CM input source
W2	Short across pins	Onboard 20MHz Oscillator
W4	Top two pins shorted	Configures board for ADCPro operation
W6	Top two pins shorted	Configures board for ADCPro operation
SW1	All 10 switches in OFF position	Configures board for ADCPro operation
P2	Pins 3 and 5 shorted	Connects CLKX TO CLKR

10 ADS1672EVM-PDK Kit Operation

This section provides information on using the ADS1672EVM-PDK, including setup, program installation, and program usage.

CAUTION

Do not connect the ADS1672EVM-PDK before installing the ADCPro software on a suitable PC. Failure to observe this caution may cause Windows to not recognize the ADS1672EVM-PDK as a connected device.

To prepare to evaluate the ADS1672 with the ADS1672EVM-PDK, complete the following steps:

Step 1. Install the ADCPro software (if not already installed) on a PC.
Step 2. Install the ADS1672EVM-PDK EVM plug-in software.
Step 3. Set up the ADS1672EVM-PDK.
Step 4. Connect a proper power supply or use the included AC adapter.
Step 5. Run the ADCPro software.
Step 6. Complete the Microsoft Windows USB driver installation process.

Each task is described in the subsequent sections of this document.

10.1 Installing the ADCPro Software

The latest software is available from Texas Instruments' website at http://www.ti.com/. The CD-ROM shipped with the ADS1672EVM may not contain the latest software, but the ADCPro installer will check for updates when executed (if connected to the Internet), and then give you the option of downloading and installing the latest version. Refer to the http://focus.ti.com/lit/ug/sbau128/sbau128.pdf for instructions on installing and using ADCPro.

To install the ADS1672EVM-PDK plug-in, run the file: **ads1672evm-pdk-plug-in-1.0.0.exe** (*1.0.0* is the version number, and increments with software version releases; you may have a different version on your CD). Double-click the file to run it; then follow the instructions shown. After installation, you can use the ADCPro *Update Check* feature to check for newer versions of the ADS1672EVM-PDK plug-in.

The software should now be installed, but the USB drivers may not have been loaded by the PC operating system. The USB driver upload step will complete when the ADCPro software is executed (see Section 11.2, *Running the Software and Completing the Driver Installation*).

10.2 Setting Up the ADS1672EVM-PDK

The ADS1672EVM-PDK contains both the ADS1672EVM and the MMB0 motherboard; however, the devices are shipped unconnected. Follow these steps to set up the ADS1672EVM-PDK:

Step 1. Unpack the ADS1672EVM-PDK kit.

Step 2. Set the jumpers and switches on the MMB0 as shown in Figure 9.

- Set the Boot Mode switch to USB.
- Connect +5V and +5VA on jumper block J13 (if +5V is supplied from J14 +5VA).
- Leave +5V and +VA disconnected on jumper block J13.
- If the PDK will be powered from an ac adapter, connect J12. If the PDK will be powered through the terminal block, disconnect J12. See Section 9.3 for details on connecting the power supply.

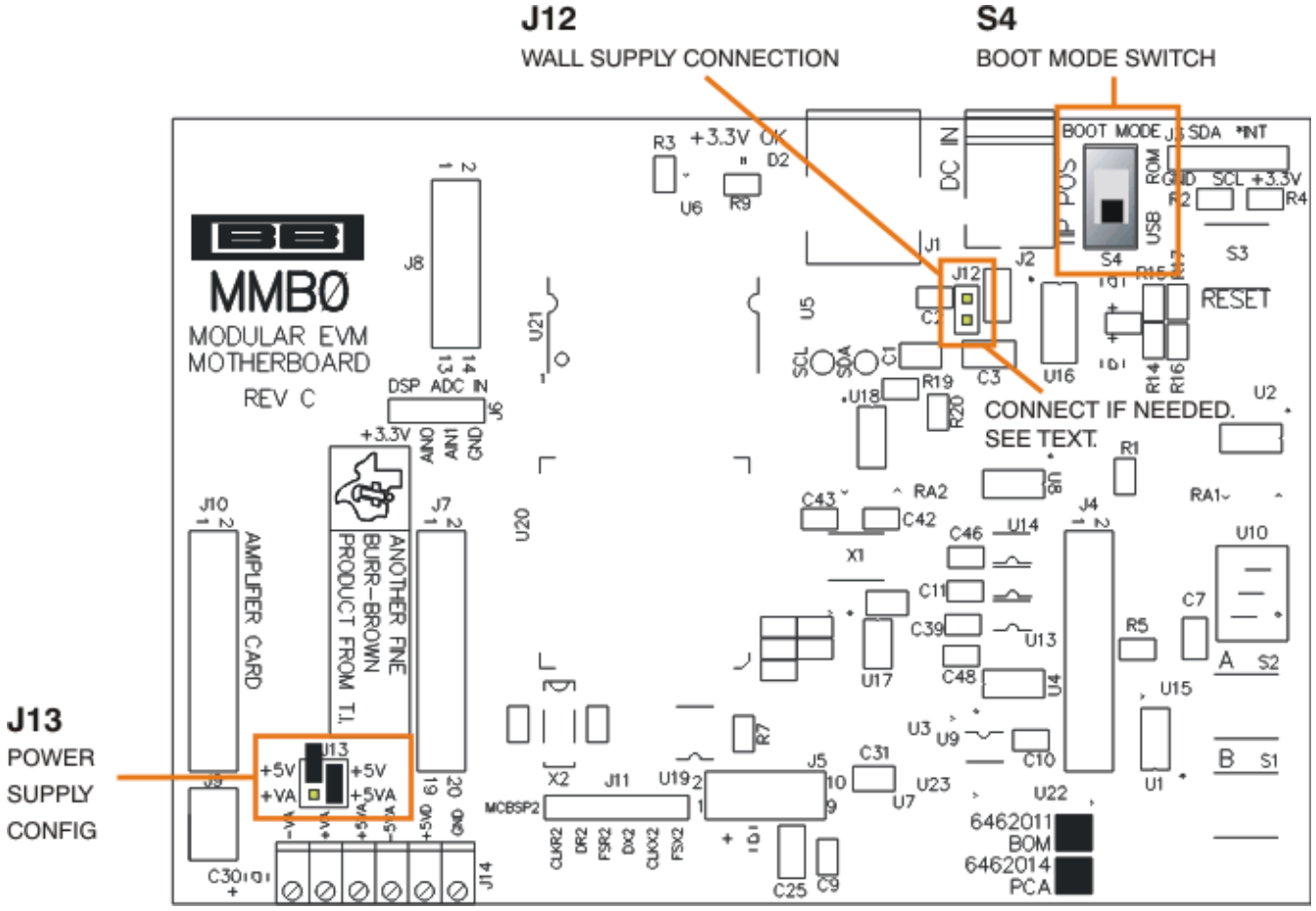


Figure 9. MMB0 Initial Setup

3. Plug the ADS1672EVM into the MMB0 as Figure 10 illustrates.

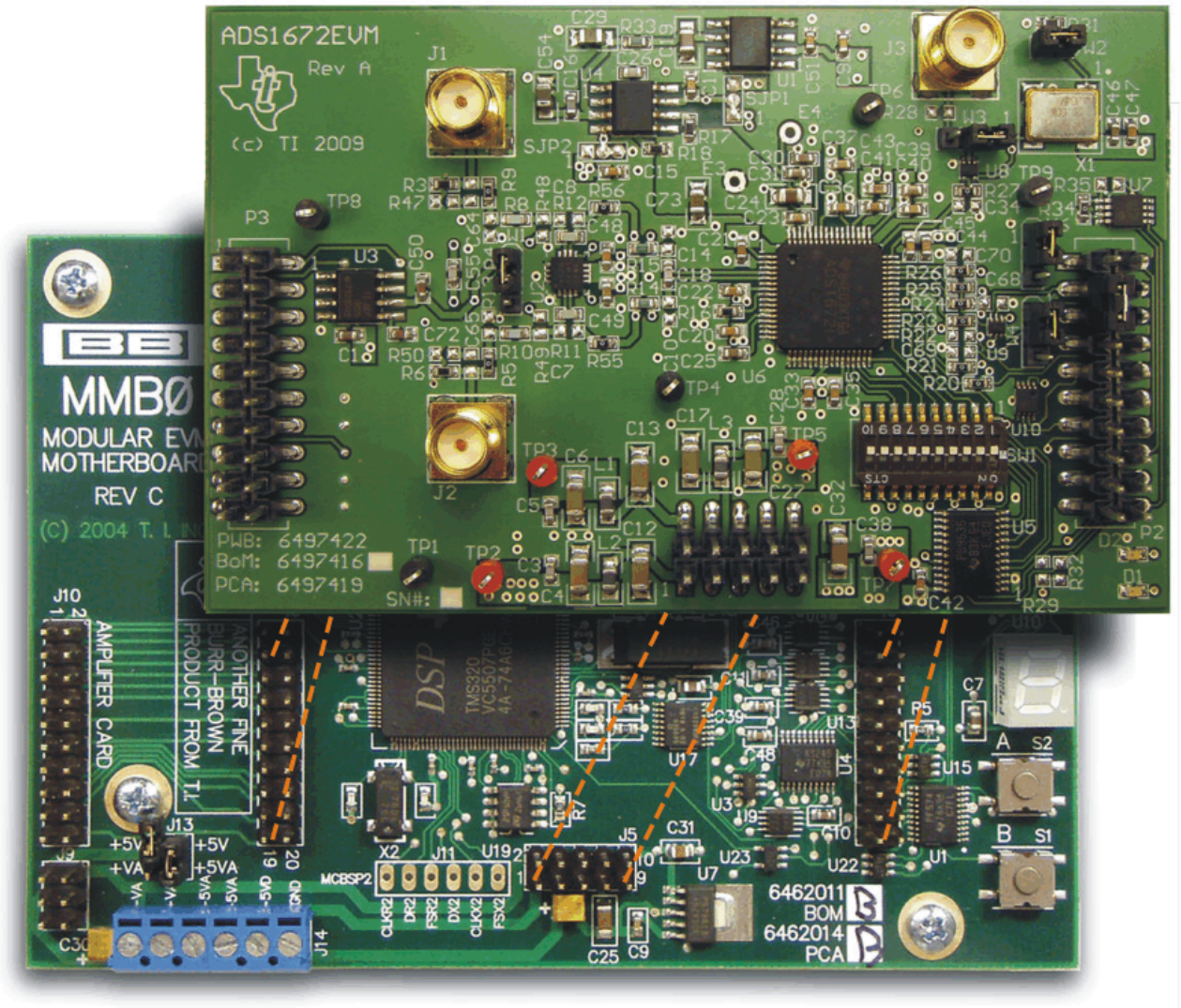


Figure 10. Connecting ADS1672EVM to MMB0

CAUTION

Do not misalign the pins when plugging the ADS1672EVM into the MMB0. Check the pin alignment carefully before applying power to the PDK.

Step 3. Set the jumpers and switches on the ADS1672EVM as shown in Figure 8 (note that these settings are the factory-configured settings for the EVM).

11 About the MMB0

The MMB0 is a Modular EVM System motherboard. It is designed around the TMS320VC5507, a DSP from Texas Instruments that has an onboard USB interface. The MMB0 also has 16MB of SDRAM installed.

The MMB0 is not sold as a DSP development board, and it is not available separately. TI cannot offer support for the MMB0 except as part of an EVM kit. For schematics or other information about the MMB0, contact Texas Instruments.

11.1 Connecting the Power Supply

The ADS1672EVM-PDK can be operated with a unipolar +5V supply.

When the MMB0 DSP is powered properly, LED D2 glows green. The green light indicates that the 3.3V supply for the MMB0 is operating properly; however, it does **not** indicate that the EVM power supplies are operating properly.

11.1.1 Connecting an AC Adapter

An ac adapter can be connected to barrel jack J2 on the MMB0. J2 is located next to the USB connector. The adapter must output 6V to 7V dc. The connector must be sleeve-negative, tip-positive and it should have a current rating of at least 2A.

Jumper J12 on the MMB0 connects a wall-mounted power supply to the board. To use the wall-mount supply, J12 must be shorted. Figure 11 illustrates how to connect an ac adapter to the MMB0.

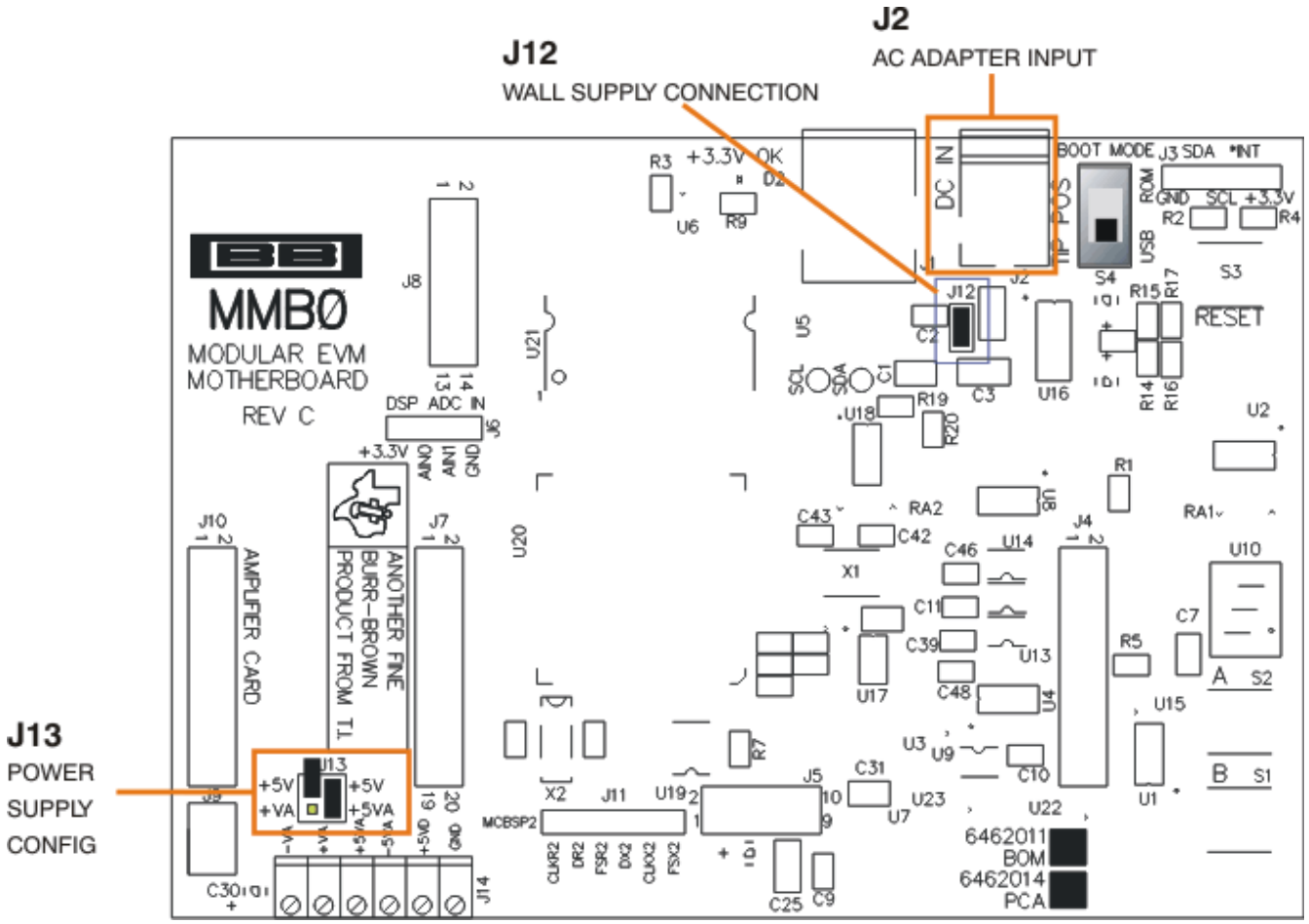


Figure 11. Connecting an AC Adapter

11.1.2 Connecting a Laboratory Power Supply

A laboratory power supply can be connected through terminal block J14 on the MMB0, as shown in Figure 12.

To use a unipolar lab power supply configuration:

- Disconnect J12 on the MMB0.
- Connect a +5V dc supply to the +5VD terminal on J14.
- Connect ground of the dc supply to the GND terminal on J14.

It is not necessary to connect a +5V dc supply voltage to the +5VA terminal on J14 if the +5V/+5VA position on J13 is shorted.

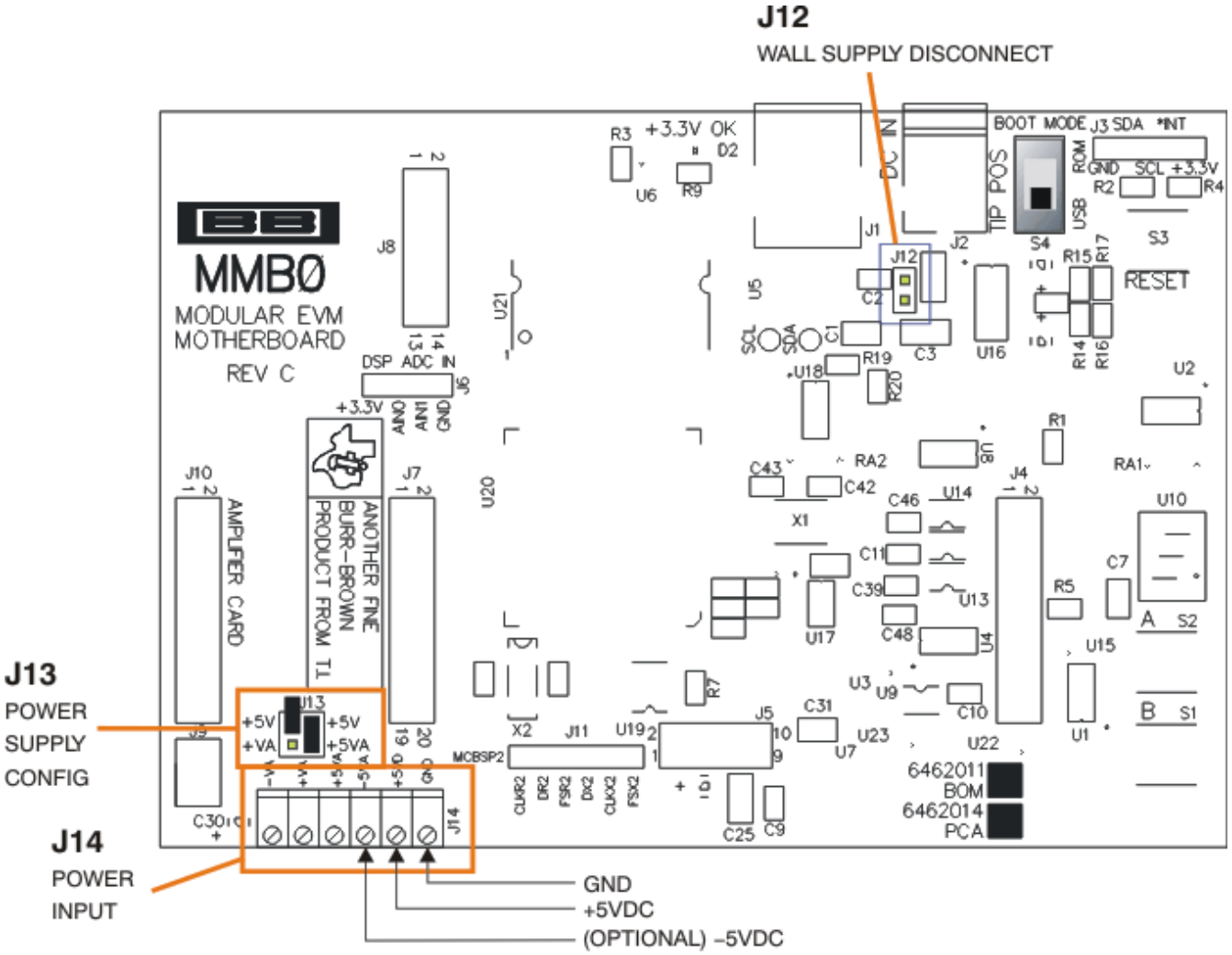


Figure 12. Laboratory Power-Supply Connection

11.2 Running the Software and Completing the Driver Installation

Note: The software is continually under development. These instructions and screen images are current at the time of this writing, but may not exactly correspond to future releases.

The program for evaluating the ADS1672EVM-PDK is called ADCPro. This program uses plug-ins to communicate with the EVM. The ADS1672EVM-PDK plug-in is included in the ADS1672EVM-PDK package.

The program currently runs only on Microsoft Windows platforms of WindowsXP.

Follow these procedures to run ADCPro and complete the necessary driver installation.

Step 1. Start the software by selecting ADCPro from the Windows Start menu. The screen in Figure 13 appears.

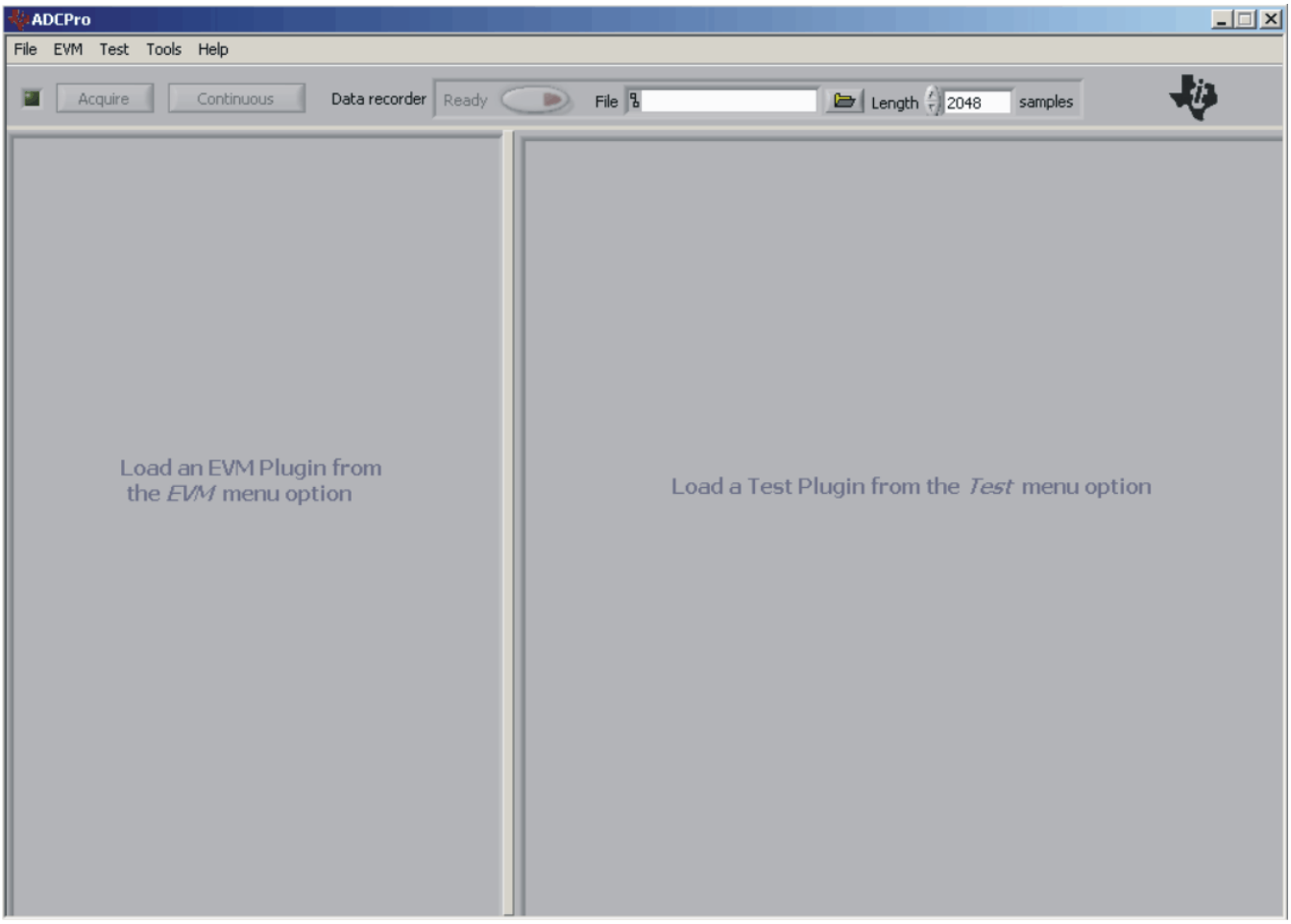


Figure 13. ADCPro Software Start-up Display Window

2. Select *ADS1672EVM* from the EVM drop-down menu. The ADS1672EVM-PDK plug-in appears in the left pane, as shown in Figure 14.

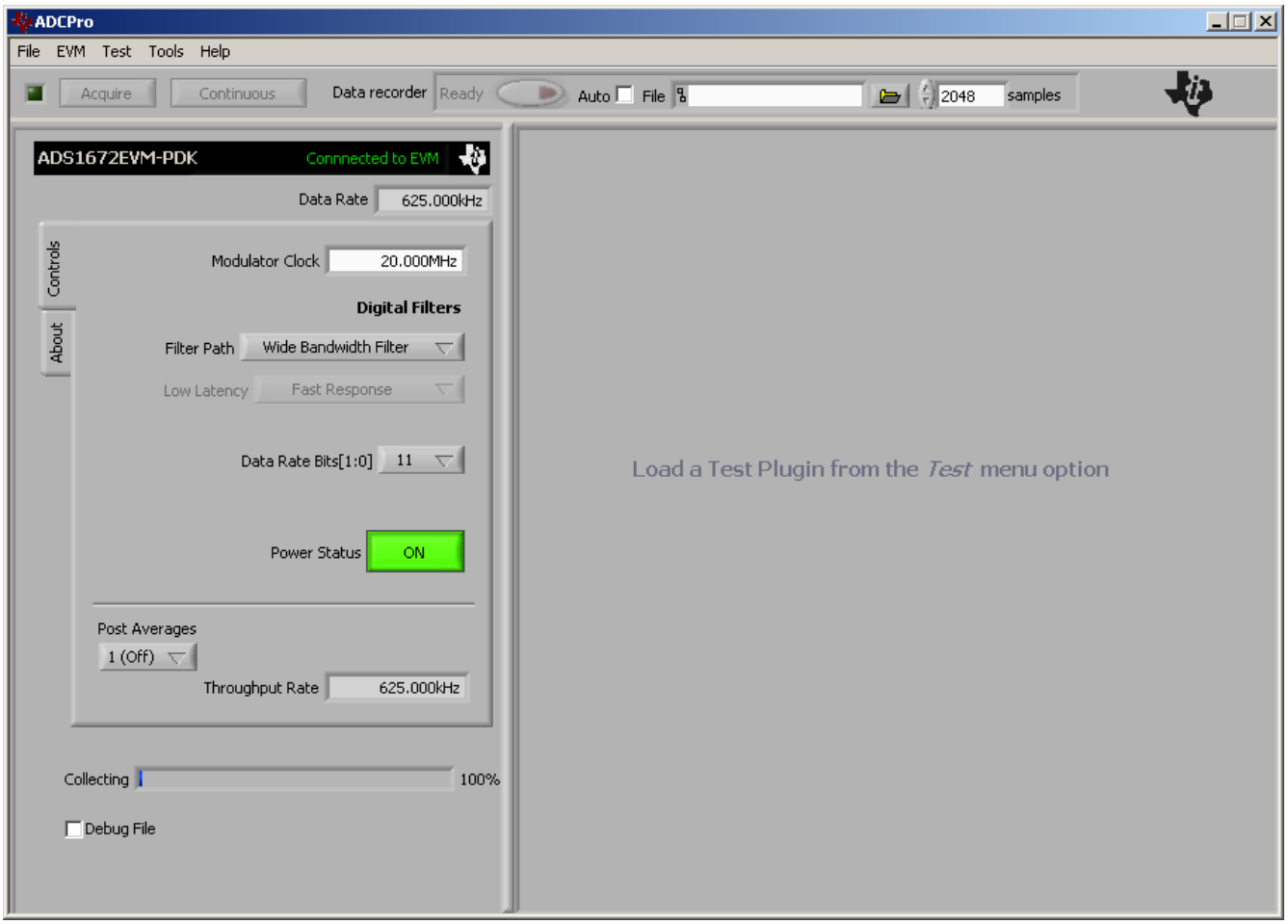


Figure 14. ADS1672EVM-PDK Plug-In Display Window

Step 2. The ADS1672EVM-PDK plug-in window has a status area at the top of the screen. When the plug-in is first loaded, the plug-in searches for the board. You will see a series of messages in the status area that indicate this action.

Step 3. Apply power to the PDK and connect the board to an available PC USB port.

Step 4. If you have not yet loaded the operating system drivers, Windows will display the Windows *Found New Driver Wizard* sequence (illustrated in Figure 15 through Figure 19). Accept the default settings.

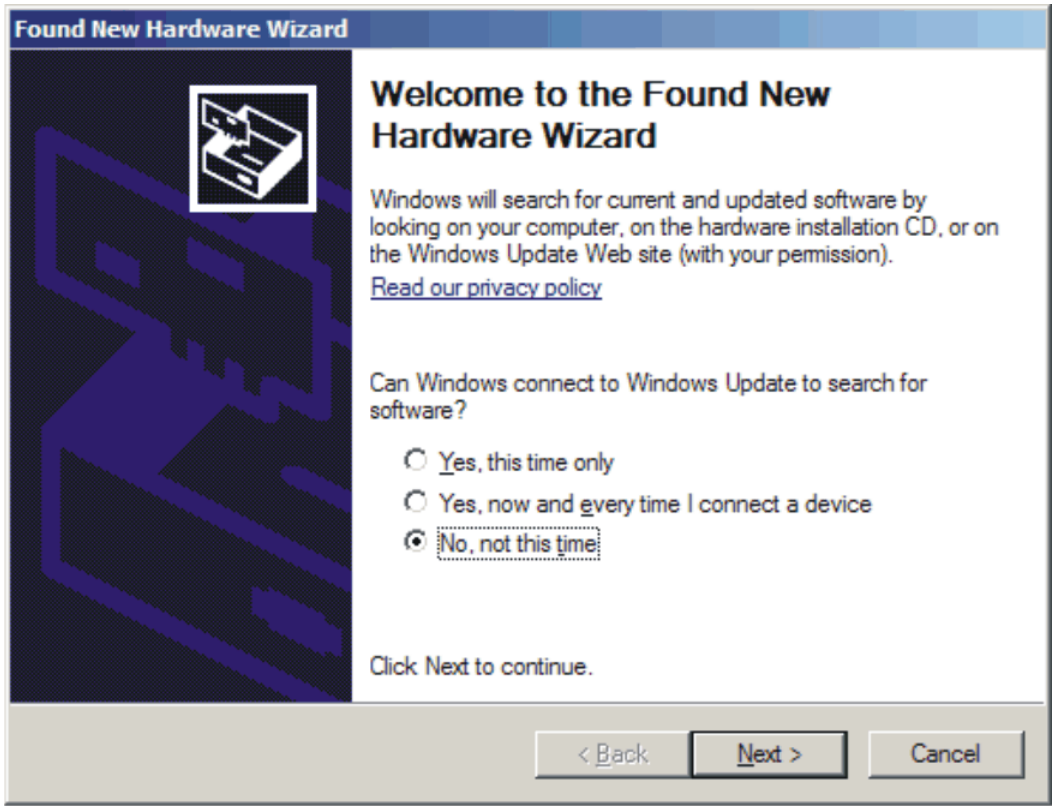


Figure 15. Found New Driver Wizard, Screen 1

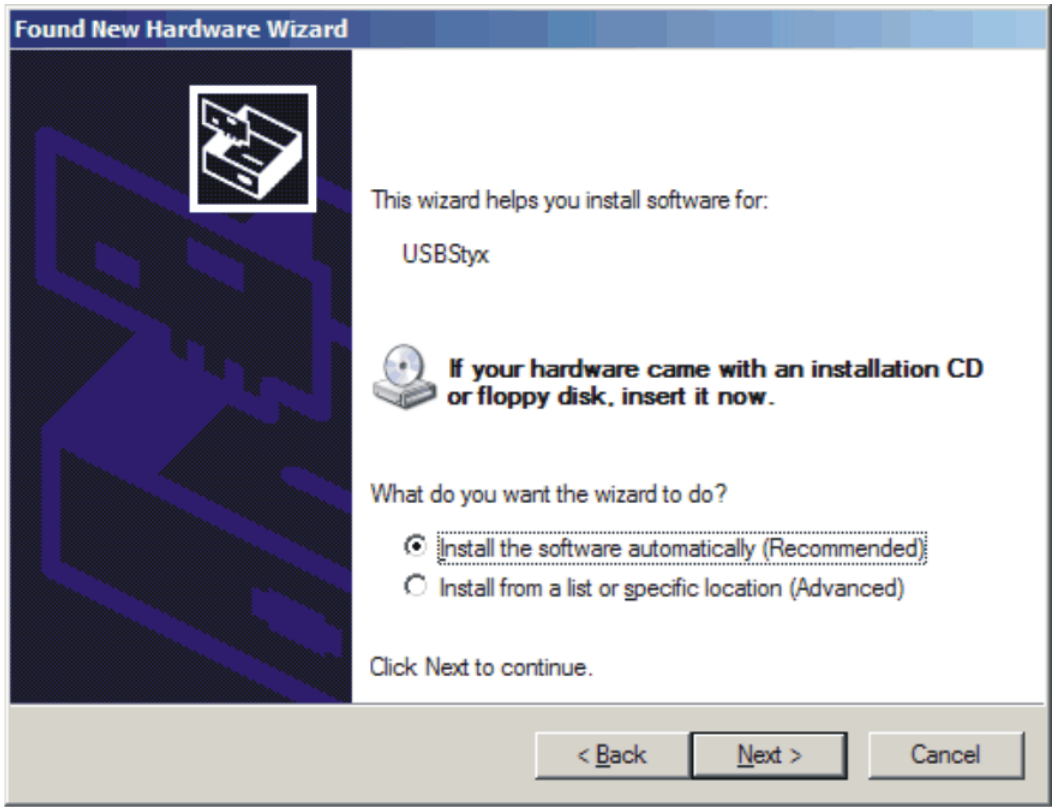


Figure 16. Found New Driver Wizard, Screen 2

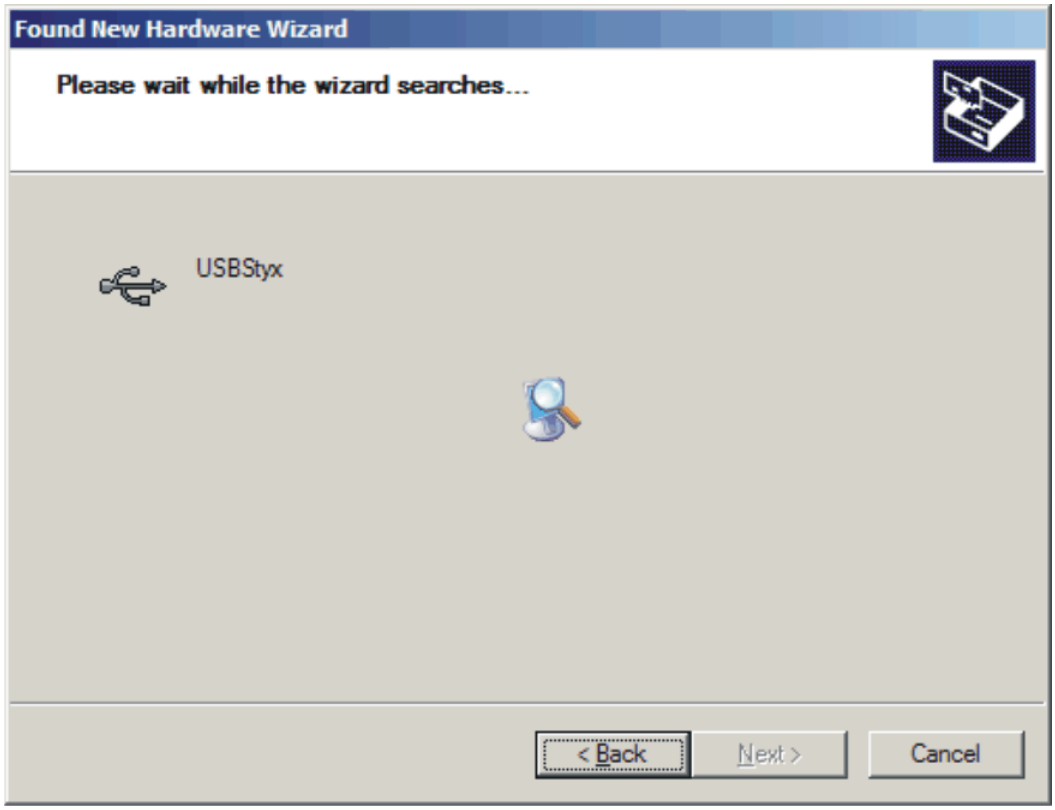


Figure 17. Found New Driver Wizard, Screen 3

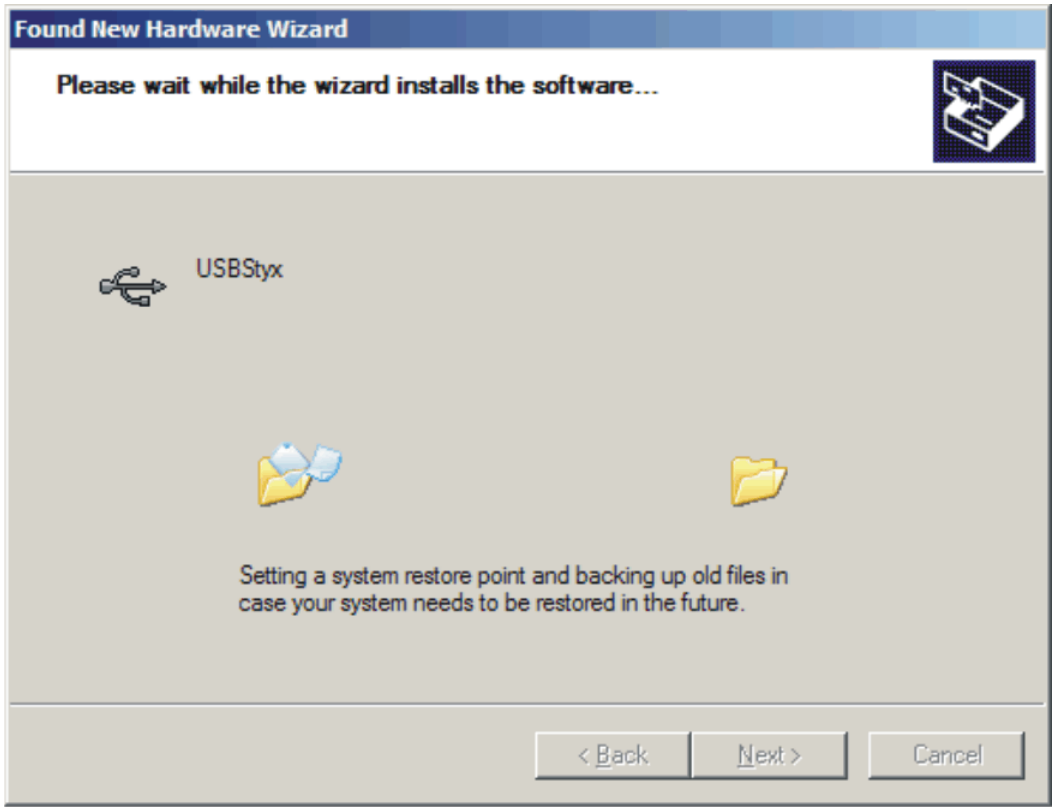


Figure 18. Found New Driver Wizard, Screen 4

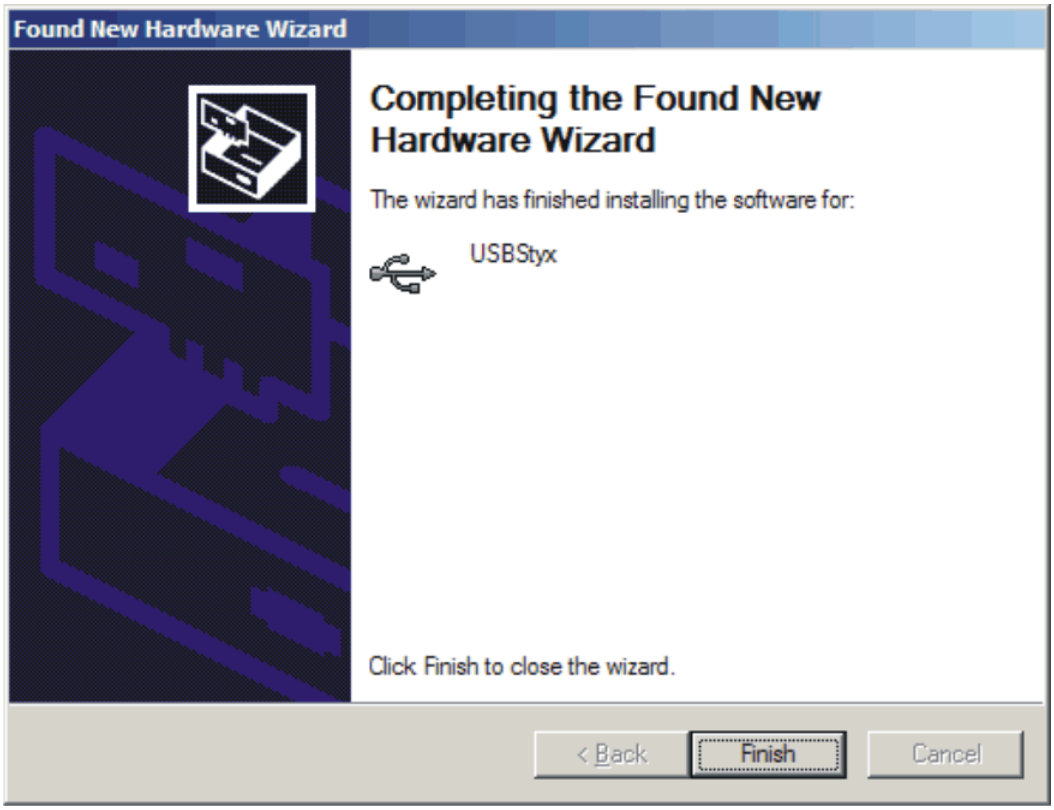


Figure 19. Found New Driver Wizard, Screen 5

Step 5. When Windows installs the software driver, the plug-in downloads the firmware to the MMB0.

Step 6. Windows will display the installation wizard a second time. Again, accept the default settings.

Step 7. The status area displays a *connected* message. The software is now ready to use.

The *Found New Driver* wizard sequence should not appear again, unless you connect the board to a different USB port.

12 Evaluating with the ADCPro Software

The evaluation software is based on ADCPro, a program that operates using a variety of plug-ins. The ADS1672EVM plug-in is installed as described in Section 11.2, *Running the Software and Completing the Driver Installation*.

To use ADCPro, load an EVM plug-in and a test plug-in. To load an EVM plug-in, select it from the *EVM* menu. To load a test plug-in, select it from the *Test* menu. To unload a plug-in, select the *Unload* option from the corresponding menu.

Only one of each type of plug-in (EVM and Test) can be loaded at a time. If you select a different plug-in, the previous plug-in is unloaded.

12.1 Using the ADS1672EVM-PDK Plugin

The ADS1672EVM-PDK plug-in for ADCPro provides complete control over all settings of the ADS1672. It consists of a tabbed interface (see Figure 14), with all of the functions available on the main tab. The controls on the main tab are described in this section.

You can adjust the ADS1672EVM settings when you are not acquiring data. During acquisition, all controls are disabled and settings may not be changed.

When you change a setting on the ADS1672EVM plug-in, the setting is immediately updated on the board.

Settings on the ADS1672EVM correspond to settings described in the ADS1672 data sheet; see the ADS1672 data sheet (available for download at the www.ti.com) for details.

Because the effective data rate of the ADS1672 depends on settings of the Modulator Clock and the operating modes of FPATH, LL_CONFIG, and the Data Rate Bits, the **Data Rate** indicator (in the upper right corner of the plug-in interface) is always visible and updated whenever a setting is changed that affects the data rate.

12.1.1 Settings Tab

The FPATH control (illustrated in Figure 20) can configure the ADS1672 digital filter as a Wide-Bandwidth Filter or Low-Latency Filter setting.

Figure 20. FPATH settings

The LL_CONFIG control can configure the ADS1672 in a Single Cycle Settling mode or Fast Response. Figure 21 shows the LL_CONFIG options.

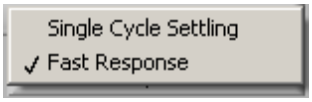


Figure 21. LL_CONFIG Settings

The Data Rate Bits can be configured as 00b, 01b, 10b, or 11b. Figure 22 shows the Data Rate Bits options.

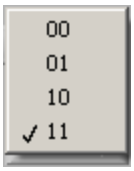


Figure 22. Data Rate Bits Setting Options

The Modulator Clock can be configured to match the onboard oscillator (20MHz) or the external clock. The setting of the Modulator clock in ADCPro will change the Data Rate indicator in the top right corner of the plug-in interface. The Post Averages option is used to average the data output results after data have been collected. Figure 23 shows the Modulator Clock and Post Averages options.

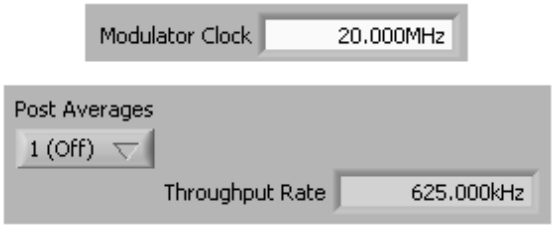


Figure 23. Modulator Clock and Post Averages Options

The Data Rate of a conversion is posted in the upper left corner of the ADC1672 plug-in screen. Under the Date Rate, a power-down switch can be implemented. This power-down affects the ADS1672 on the EVM board. Figure 24 shows the power-down option.

Figure 24. Power-Down Option

12.1.2 Collecting Data

After you have configured the ADS1672 for your test scenario, pressing the ADCPro **Acquire** button will start the collection of the number of data points specified in the test plug-in *Block Size* control. The ADS1672EVM-PDK plug-in disables all the front panel controls while acquiring data, and displays a progress bar as shown in Figure 25.

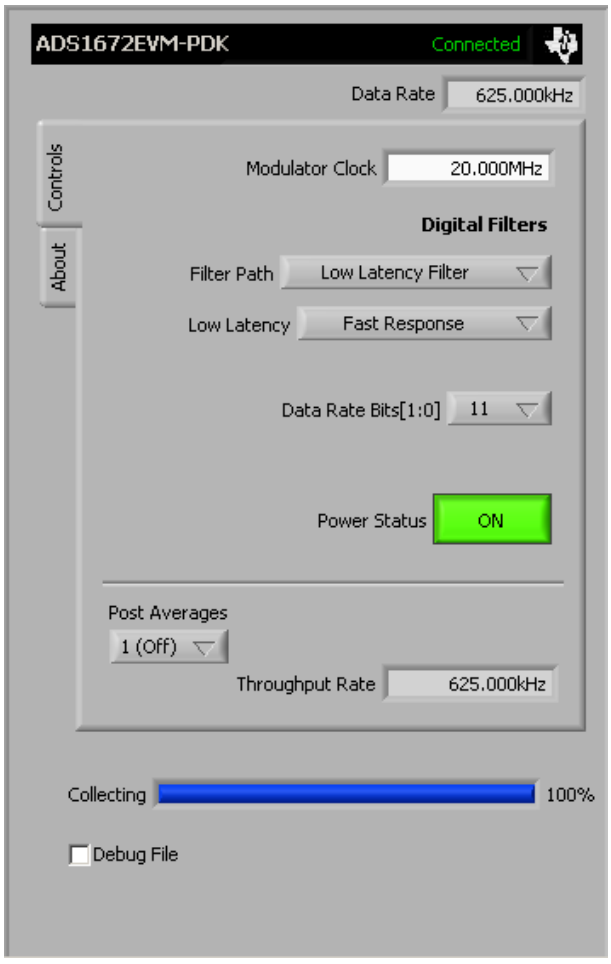


Figure 25. Progress Bar while Collecting Data

For more information on testing analog-to-digital converters in general and using ADCPro and test plug-ins, refer to the ADCPro™ Analog-to-Digital Converter Evaluation Software User's Guide.

12.2 Troubleshooting

If ADCPro stops responding while the ADS1672EVM-PDK is connected, try unplugging the power supply from the PDK, making sure to unload and reload the plug-in before reapplying power to the PDK.

13 Schematics and Layout

Schematics for the ADS1672EVM are appended to this user's guide. The bill of materials is provided in Table 6.

Note: Board layouts are not to scale. These figures are intended to show how the board is laid out; they are not intended to be used for manufacturing ADS1672EVM PCBs.

13.1 Bill of Materials

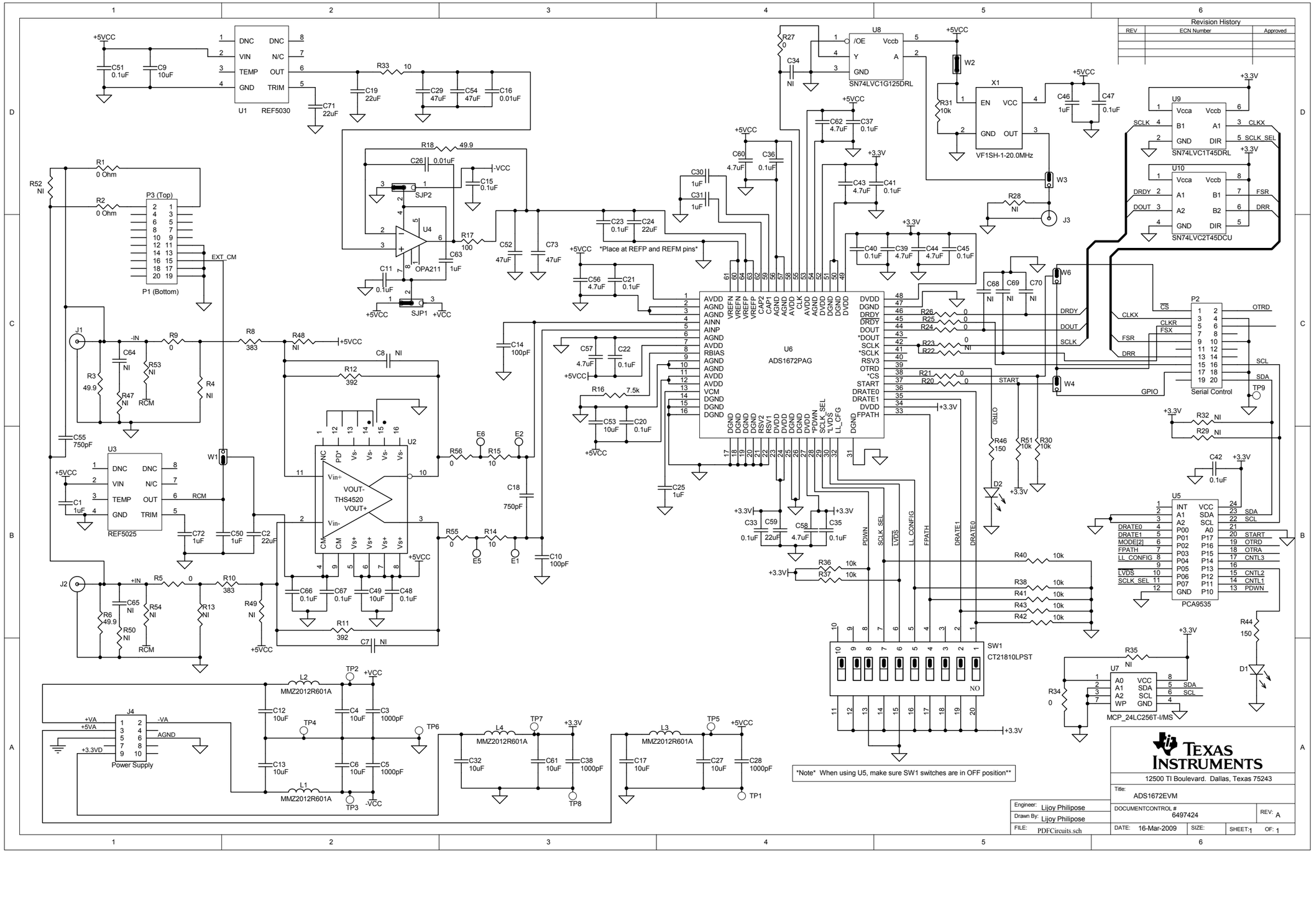
Note: All components should be compliant with the European Union Restriction on Use of Hazardous Substances (RoHS) Directive. Some part numbers may be either leaded or RoHS. Verify that purchased components are RoHS-compliant. (For more information about TI's position on RoHS compiance, see the Quality and Eco-Info information on the TI web site.)

Table 6. ADS1672EVM Bill of Materials

Item No.	Qty	Value	Reference Designators	Description	Vendor	Part Number
1	12	0	R5, R9, R20, R21 R22, R24, R25, R26, R27, R33, R55, R56	RES 0Ω 1/16W 5% 0603 SMD	Panasonic: ECG or Alternate	ERJ-3GEY0R00V
2	3	10	R14, R15, R17	RES 10.0Ω 1/10W 0.1% 0603 SMD	Vishay Dale	TNPW030610R0BT9
3	3	49.9	R3, R6, R18	RES 49.9Ω 1/10W 1% 0603 SMD	Panasonic: ECG or Alternate	ERJ-3EKF49R9V
4	3	150	R44, R45, R46	RES 150Ω 1/10W 1% 0603 SMD	Panasonic: ECG or Alternate	ERJ-3EKF1500V
5	2	383	R8 R10	RES 383Ω 1/10W 0.1% 0603 SMD	BCC	2312-201-73831
6	2	392	R11 R12	RES 392Ω 1/10W 0.1% 0603 SMD	BCC	2312-201-73921
7	1	6.04k	R16	RES 6.04kΩ 1/10W 1% 0603 SMD	Panasonic: ECG or Alternate	ERJ-3EKF6041V
8	13	10k	R7, R19, R30, R31, R35, R36, R37, R38, R40, R41, R42, R43, R51	RES 10.0lΩ 1/10W 1% 0603 SMD	Panasonic: ECG or Alternate	ERJ-3EKF1002V
9	17	—	R1, R2, R4, R13, R23, R28, R29, R32, R34, R39, R47, R48, R49, R50, R52, R53, R54		Not Installed	Not Installed
10	1	750pF	C18, C55	CAP CER 820pF 50V C0G 5% 0603	TDK Corporation	C1608C0G1H821J
11	4	1000pF	C3, C5, C28, C38	CAP CER 1000pF 50V C0G 5% 0603	TDK Corporation or Alternate	C1608C0G1H102J
12	2	0.01µF	C16, C26	CAP CER 0.01µF 25V C0G 5% 0603	TDK Corporation or Alternate	C1608C0G1E103J
13	19	0.1µF	C11, C15, C20, C21, C22, C23, C33, C35, C36, C37, C40, C41, C42, C45, C47, C48, C51, C66, C67	CAP CER 0.10µF 25V X7R 10% 0603	TDK Corporation or Alternate	C1608X7R1E104K
14	8	1µF	C1, C25, C30, C31, C46, C50, C63, C72	CAP CER 1.0µF 10V X5R 10% 0603	TDK Corporation or Alternate	C1608X5R1A105KT
15	8	4.7µF	C39, C43, C44, C56, C57, C58, C60, C62	CAP CER 4.7µF 6.3V X5R 20% 0603	TDK Corporation or Alternate	C1608X5R0J475M
16	5	10µF	C9, C24, C49, C53, C61	CAP CER 10µF 6.3V X5R 0603 ±20%	Murata Electronics North America	GRM188R60J106ME 47D
17	7	10µF	C4, C6, C12, C13, C17, C27, C32	CAP CER 10µF 16V X5R 20% 1206	TDK Corporation or Alternate	C3216X5R1C106M
18	7	47µF	C2, C19, C29, C52, C54, C59, C71, C73	CAP CER 47µF 6.3V X5R 0805	Taiyo Yuden or Alternate	JMK212BJ476MG-T

Table 6. ADS1672EVM Bill of Materials (continued)

Item No.	Qty	Value	Reference Designators	Description	Vendor	Part Number
19	11	—	C7, C8, C10, C14, C34, C64, C65, C68, C69, C70		Not Installed	Not Installed
20	3		D1, D2, D3	LED 565NM GRN DIFF 0603 SMD	Lumex	SML-LX0603GW-TR
21	4		L1, L2, L3, L4	FERRITE CHIP 600 OHM 500MA 0805	TDK Corporation	MMZ2012R601A
22	1		U1	REF5030 Low-noise, low-drift precision reference	Texas Instruments	REF5030AID
23	1		U2	Rail-to-rail output, wideband, fully differential amplifier	Texas Instruments	THS4520RGTT
24	1		U3	REF5025 low-noise, low-drift precision reference	Texas Instruments	REF5025IDG4
25	1		U4	1.1nV/$\sqrt{Hz}$ Noise, low-power, precision operational amplifier	Texas Instruments	OPA211AIDR
26	1		U5	16-BIT I^2C I/O expander	Texas Instruments	PCA9535PWR
27	1		U6	ADS1672 24-bit 625kSPS	Texas Instruments	
28	1		U7	IC SRL EE 256K 2.5V 8MSOP	Microchip Technology	24LC256T-I/
29	1		P1	0.025 SMT SOCKET: BOTTOM SIDE OF PWB	Samtec	SSW-110-22-S-D-VS
30	1		P2	0.025 SMT SOCKET: BOTTOM SIDE OF PWB	Samtec	SSW-110-22-S-D-VS
31	1			0.025 SMT PLUG: TOP SIDE of PWB	Samtec	TSM-110-01-T-DV-P
32	1		P3	0.025 SMT PLUG: TOP SIDE of PWB	Samtec	TSM-110-01-T-DV-P
33	3		J1 , J2, J3	CONN RECEPT STRAIGHT PCB .155NI	Emerson Network Power Connectivity Solutions	142-0701-206
34	1		J4	0.025 SMT SOCKET: BOTTOM SIDE OF PWB	Samtec	SSW-105-22-S-D-VS
35	1			0.025 SMT PLUG: TOP SIDE of PWB	Samtec	TSM-105-01-T-DV-P
36	1		W2	2mm low profile	Samtec	TMM-102-03-T-S
37	5		W1, W3, W4, W5, W6	2mm low profile	Samtec	TMM-103-03-T-S
38	4		TP2, TP3, TP5, TP7	TEST POINT PC MINI .040D RED	Keystone Electronics	5000K-ND
39	5		TP1, TP4, TP6, TP8, TP9	TEST POINT PC MINI .040D BLACK	Keystone Electronics	5001K-ND
40	6		E1, E2, E3, E4, E5, E6		Not Installed	Not Installed
41	2		SJP1, SJP2		Not Installed	Not Installed
42	1		SW1	DIP Switch 10-Position	CTS Corporation Resistor/Electrocomponents	CT21810LPST
43	1		X1	20MHz, Ceramic SMD 3-state Oscillator	Valpey Fisher	VF1SH-1-20.0MHz


Revision History
REV
ECN Number
Approved
U1 REF5030
U2 THS4520
U3 REF5025
U4 OPA211
U5 PCA9535
U6 ADS1672PAG
U7 MCP_24LC256T-I/MS
U8 SN74LVC1G125DRL
U9 SN74LVC1T45DRL
U10 SN74LVC2T45DCU
X1 VF1SH-1-20.0MHz
P1 (Bottom)
P2 Serial Control
P3 (Top)
J1
J2
J3
J4 Power Supply
SW1 CT21810LPST
W1
W2
W3
W4
W5
W6
SJP1
SJP2
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
D1
D2
Place at REFP and REFM pins
Note When using U5, make sure SW1 switches are in OFF position**
Texas Instruments
12500 TI Boulevard. Dallas, Texas 75243
Title: ADS1672EVM
DOCUMENTCONTROL # 6497424
REV: A
Engineer: Lijoy Philipose
Drawn By: Lijoy Philipose
FILE: PDFCircuits.sch
DATE: 16-Mar-2009
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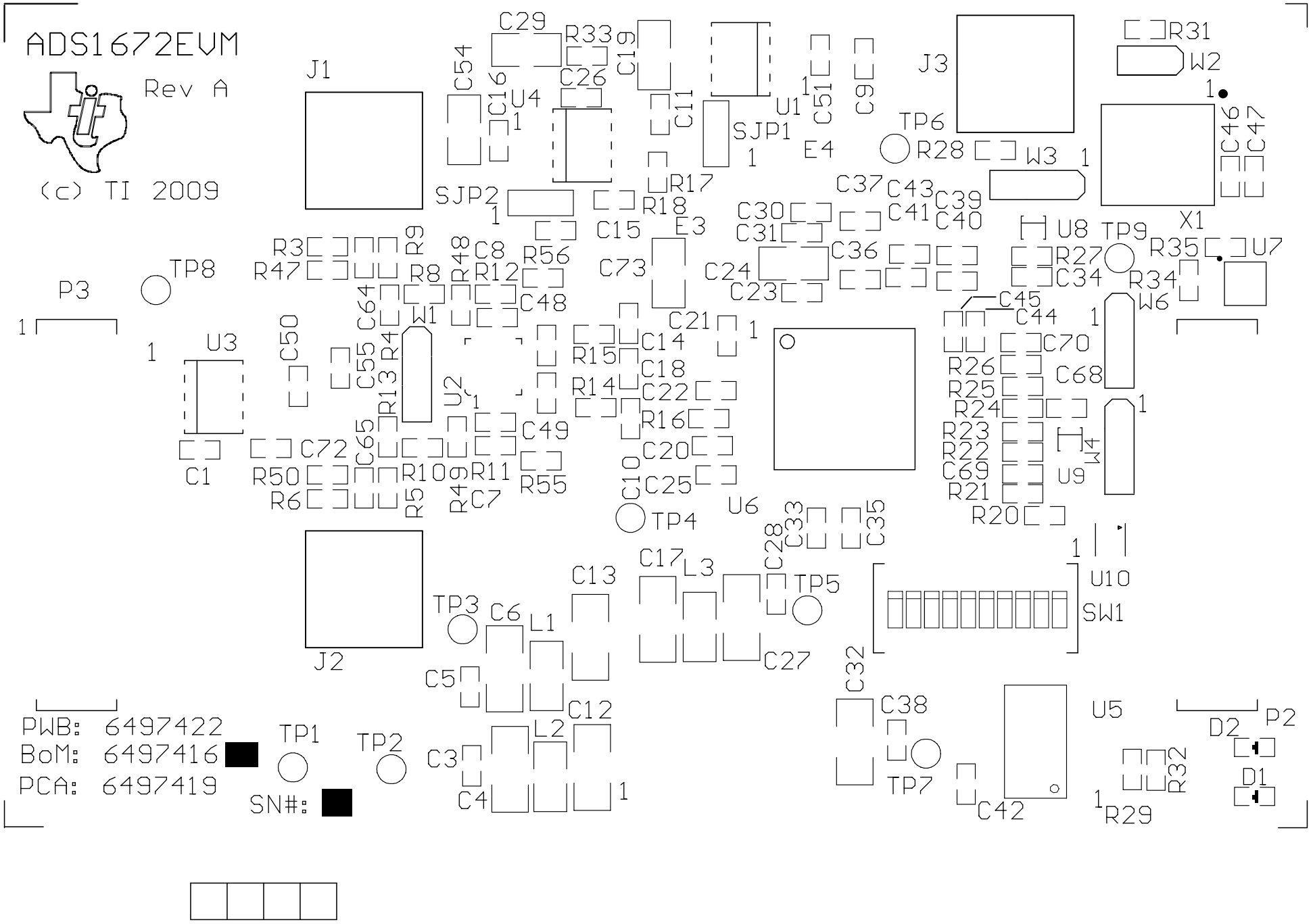
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Rev A
(c) TI 2009
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BoM: 6497416
PCA: 6497419
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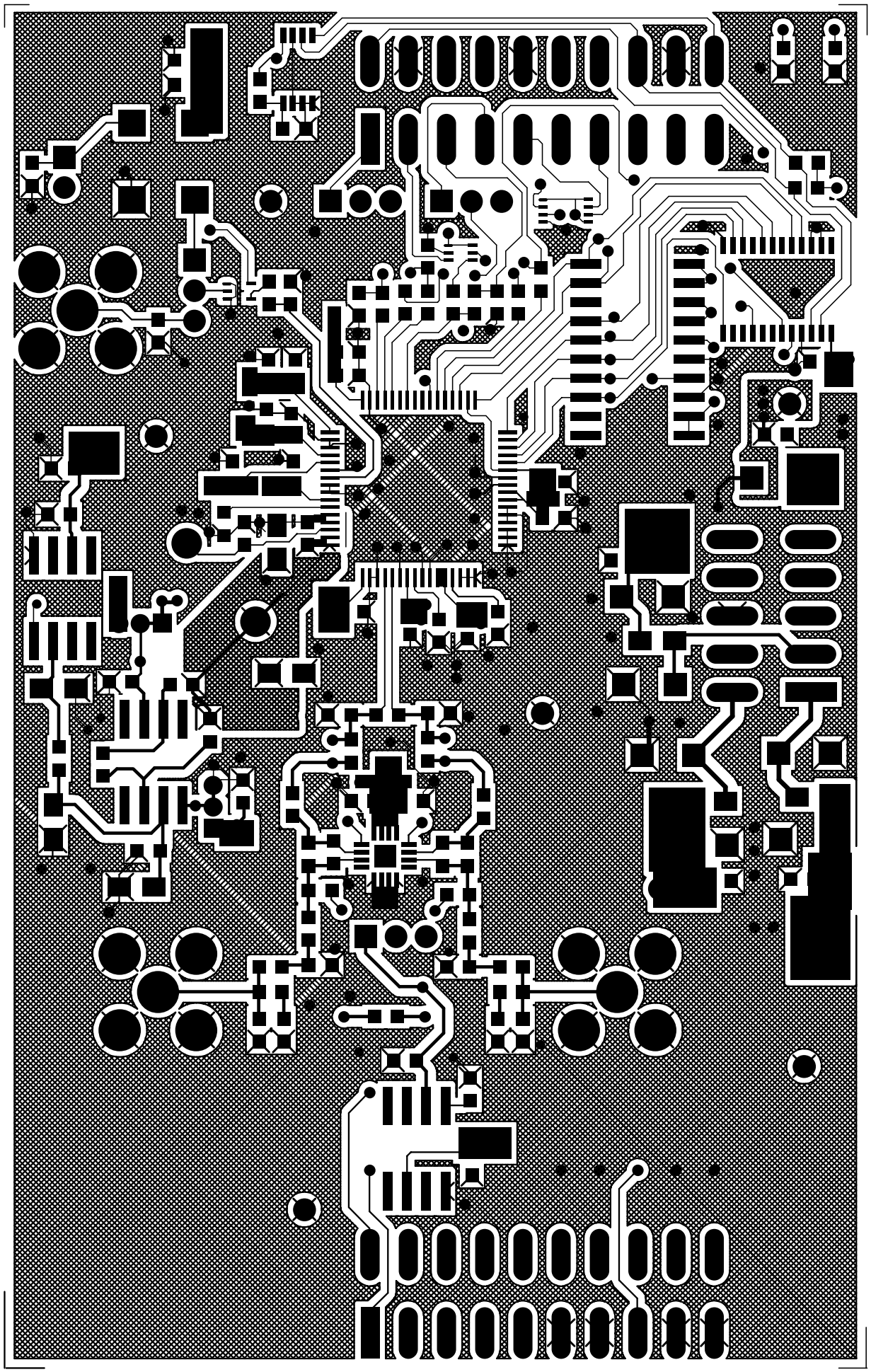

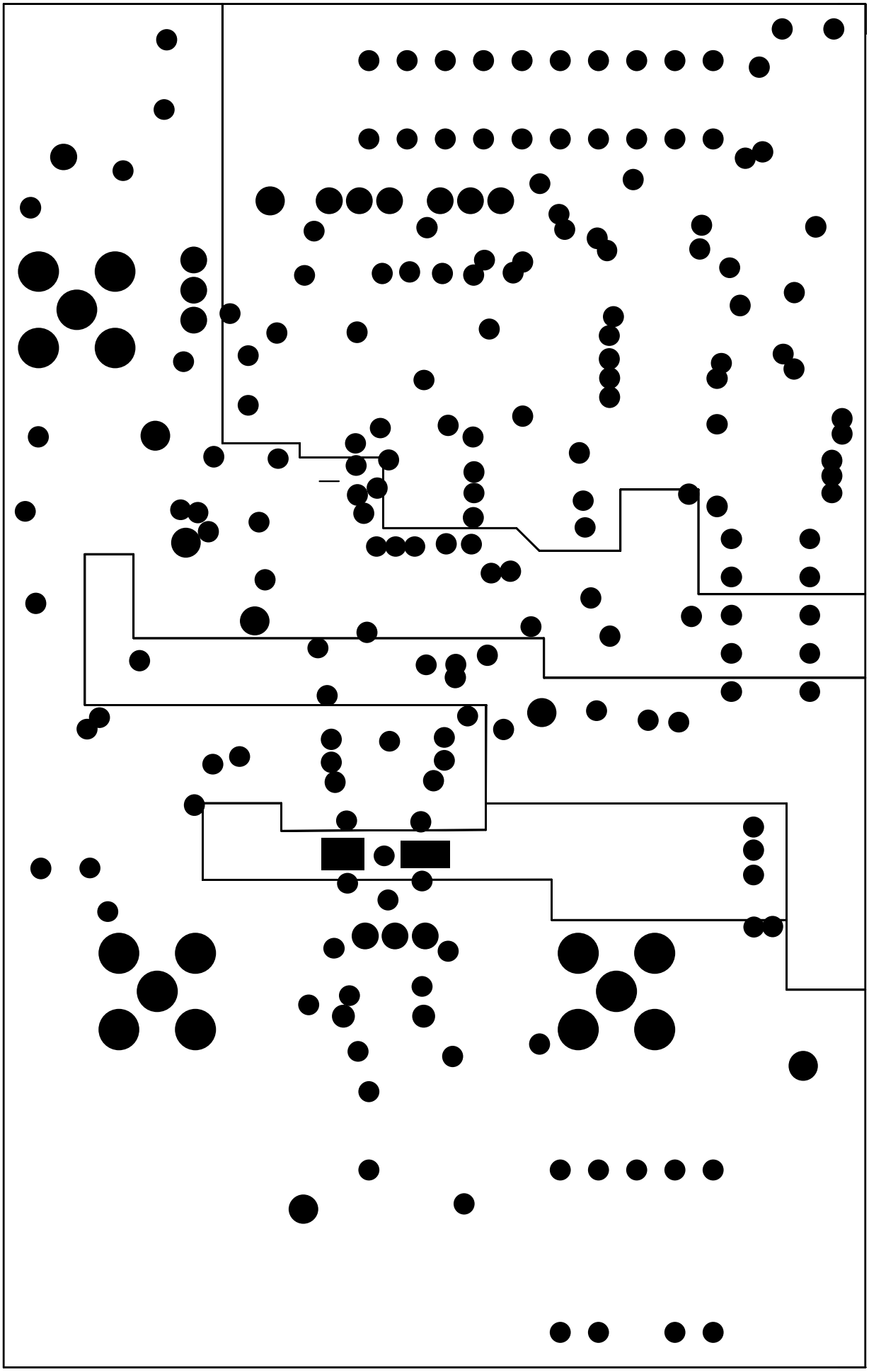

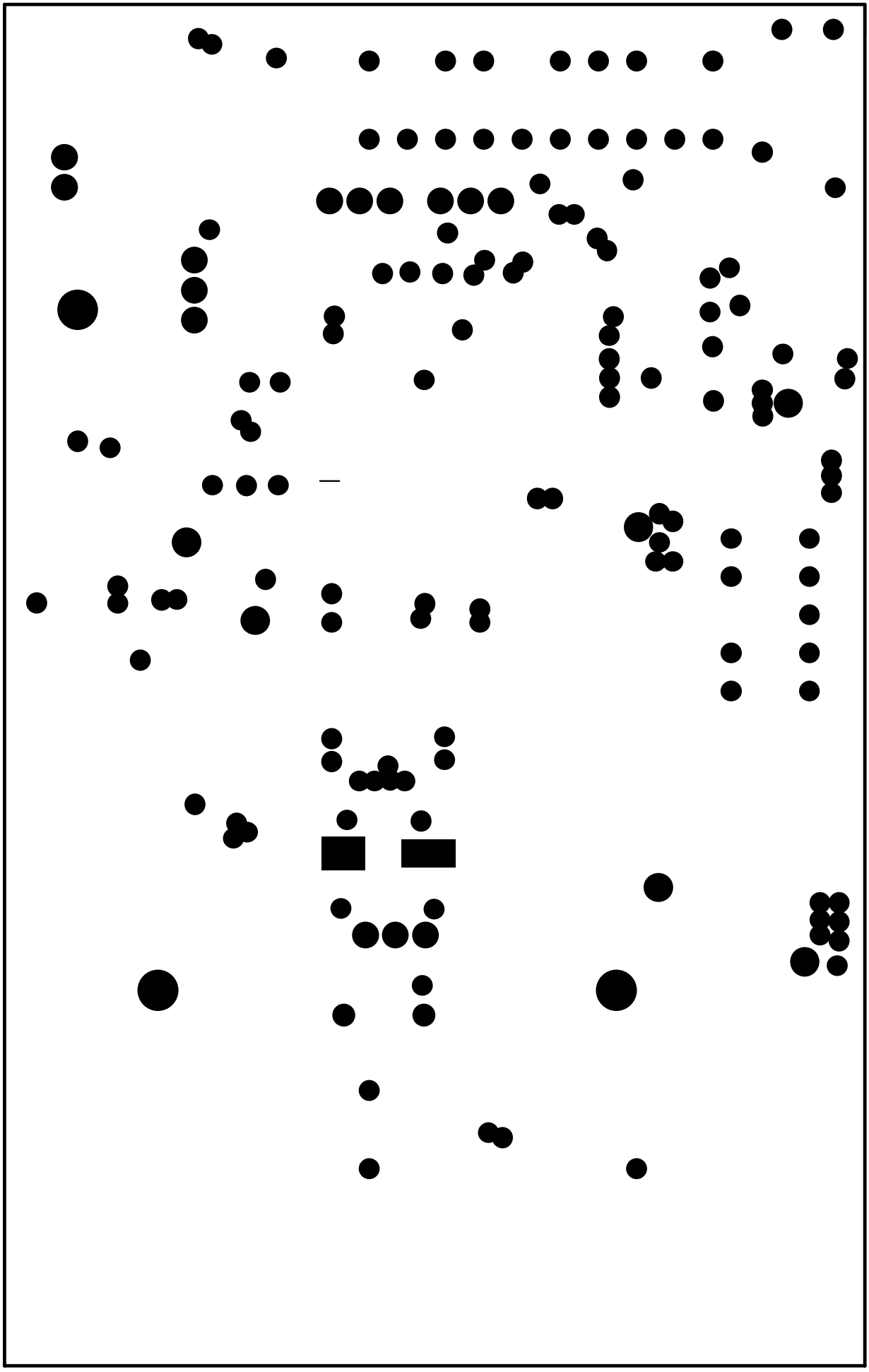

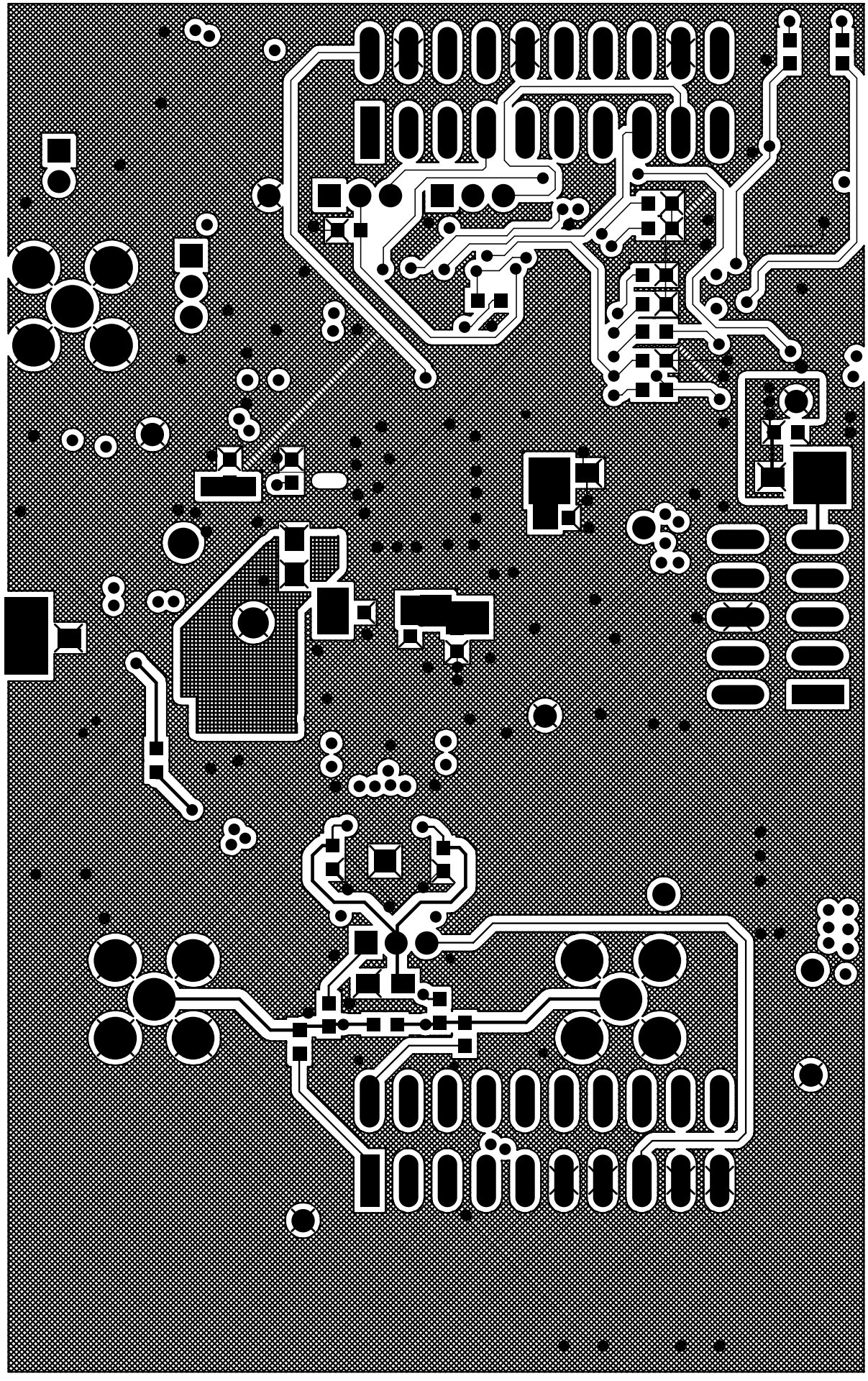

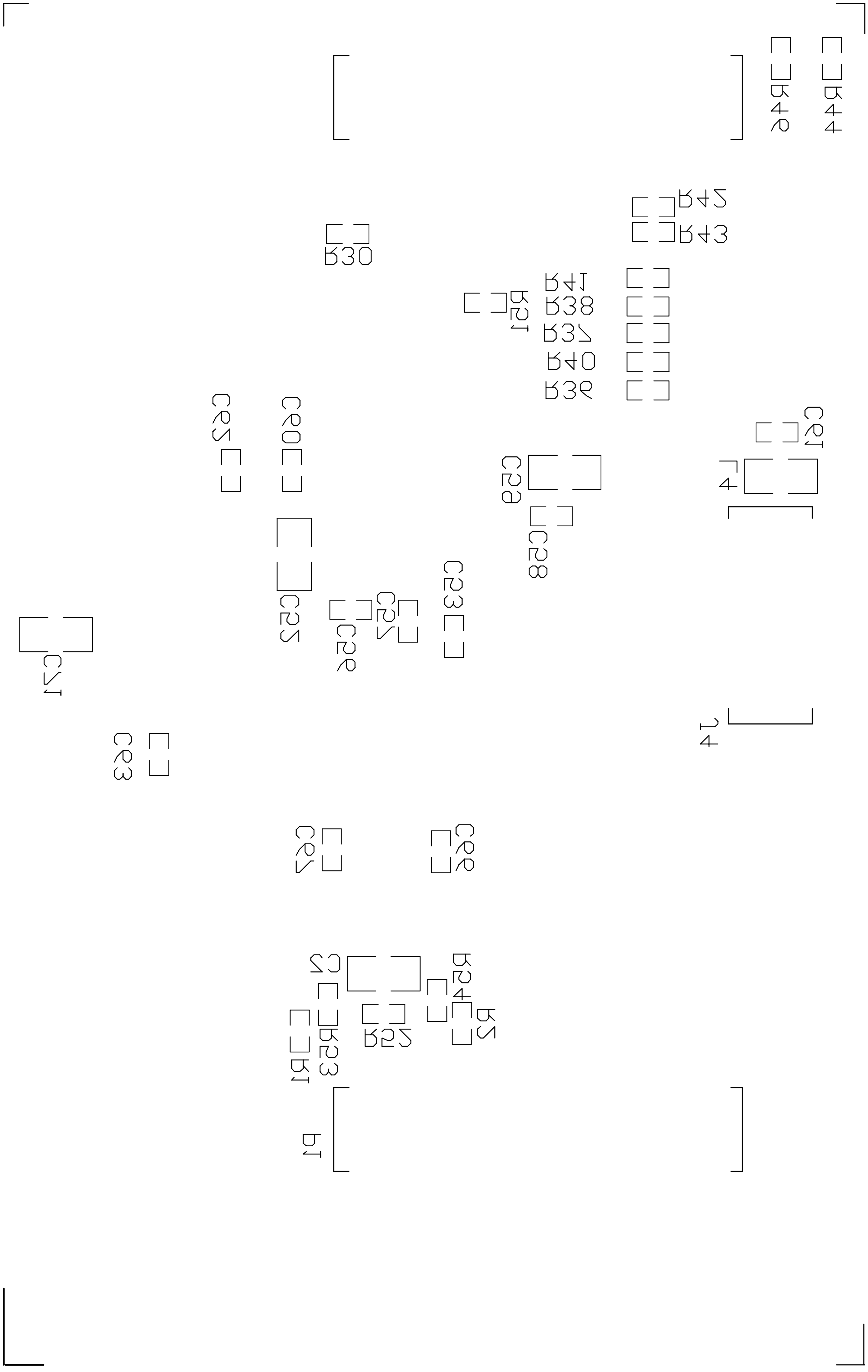
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C55
C57
C56
C71
J4
C63
C67
C66
C2
R54
R2
R52
R53
R1
P1

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 3.3V to 5V and the output voltage range of 0V to 5V.

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 +30°C. The EVM is designed to operate properly with certain components above +85°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.

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

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