

**ADS1244EVM  
ADS1245EVM**

***Evaluation Module***

*User's Guide*

## 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.

### Mailing Address:

Texas Instruments  
Post Office Box 655303  
Dallas, Texas 75265

## EVM IMPORTANT NOTICE

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation kit being sold by TI is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not considered by TI to be fit for commercial use. As such, the goods being provided may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety measures typically found in the end product incorporating the goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may not meet the technical requirements of the directive.

Should this evaluation kit not meet the specifications indicated in the EVM User's Guide, the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Please be aware that the products received may not be regulatory compliant or agency certified (FCC, UL, CE, etc.). Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

**EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive**.

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein**.

Please read the EVM User's Guide and, specifically, the EVM Warnings and Restrictions notice in the EVM User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact the TI application engineer.

Persons handling the product must have electronics training and observe good laboratory practice standards.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

Mailing Address:

Texas Instruments  
Post Office Box 655303  
Dallas, Texas 75265

## **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.

### Mailing Address:

Texas Instruments  
Post Office Box 655303  
Dallas, Texas 75265

# Read This First

---

---

---

---

### ***About This Manual***

This manual describes the ADS1224EVM and ADS1245EVM evaluation fixtures and how to use them.

### ***Notational Conventions***

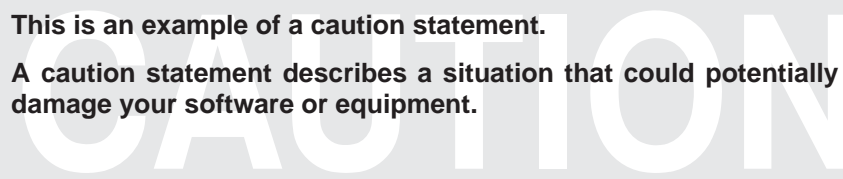
The ADS1244EVM and ADS1245EVM boards are identical except for the evaluation device installed on them. This manual covers both boards, and refers to them in the singular, when necessary, as “ADS1244/45EVM.”

When a statement applies to both the ADS1244 and ADS1245 devices, they may be referred to in the singular, when necessary, as “ADS1244/45.”

### ***Information About Cautions***

This book contains cautions.

**This is an example of a caution statement.  
A caution statement describes a situation that could potentially damage your software or equipment.**



The information in a caution statement is provided for your protection. Please read each caution carefully.

### **Related Documentation From Texas Instruments**

To obtain a copy of any of the following TI documents, visit our web site at <http://www.ti.com/> or call the Texas Instruments Literature Response Center at (800) 477-8924 or the Product Information Center at (972) 644-5580. When ordering, identify the booklet(s) by both title and literature number.

<b>Data sheets</b>	<b>Literature number</b>
ADS1244	SBAS273
ADS1245	See <a href="http://www.ti.com/">http://www.ti.com/</a>
REF1004	SBVS002
SN74LVC1G80	SCES221

### **FCC Warning**

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

### **Trademarks**

I<sup>2</sup>C is a registered trademark of Royal Philips Electronics B.V., The Netherlands.

All other trademarks are the property of their respective owners.

# Contents

---

---

---

<b>1</b>	<b>Introduction</b>	<b>1-1</b>
1.1	Introduction	1-2
1.2	Built-in Accessories	1-2
1.3	Connectors	1-2
1.4	Controls	1-3
1.5	Setting Up	1-4
<b>2</b>	<b>Circuit Description</b>	<b>2-1</b>
2.1	I/O Connectors and Testpoints	2-2
2.1.1	J1: Analog Connector	2-3
2.1.2	J5: Serial Connector	2-4
2.1.3	J6: Power Connector	2-5
2.1.4	Testpoints	2-6
2.2	Jumpers	2-7
2.2.1	J2: Analog–Digital Ground Shorting Jumper	2-7
2.2.2	J3: ADS1244/45 Analog Supply Current Measurement Jumper	2-7
2.3	Switches	2-8
2.3.1	S1: System Clock Select	2-8
2.3.2	S2: Input Select	2-8
2.3.3	S3: Reference Input Select	2-9
2.3.4	S5: Digital Power Supply Level	2-10
<b>3</b>	<b>Usage</b>	<b>3-1</b>
3.1	The Input Filtering Capacitors	3-2
3.2	The Serial Interface	3-3
3.3	The Serial EEPROM	3-3
<b>4</b>	<b>Schematic and Layout</b>	<b>4-1</b>
4.1	Schematic	4-2
4.2	Component Layout	4-3
4.3	Bill of Materials	4-4

# Figures

---

---

---

2-1.	Connectors and Jumpers .....	2-2
2-2.	Analog Connector Pinout .....	2-3
2-3.	Serial Connector Pinout .....	2-4
2-4.	Power Connector Pinout .....	2-5
2-5.	Jumpers .....	2-7
2-6.	Switches .....	2-8
4-1.	Schematic Diagram .....	4-2
4-2.	Top Side Layout .....	4-3
4-3.	Bottom Side Layout .....	4-3

# Tables

---

---

---

2-1.	Analog Connector Pin Descriptions .....	2-3
2-2.	Serial Connector Pin Descriptions .....	2-4
2-3.	Power Connector Pin Descriptions .....	2-5
2-4.	Testpoints .....	2-6
2-5.	System Clock Select Switch .....	2-8
2-6.	Input Select Switch .....	2-8
2-7.	Reference Input Select Switch .....	2-9
2-8.	Digital Power Supply Level Select Switch .....	2-10
4-1.	Bill of Materials .....	4-4



# Introduction

---

---

---

---

The ADS1244EVM and ADS1245EVM are evaluation fixtures for the ADS1244 and ADS1245 24-bit delta-sigma analog-to-digital converters. Designed for prototyping and evaluation, they include a reference circuit and an oscillator circuit with two selectable frequencies.

<b>Topic</b>	<b>Page</b>
<b>1.1 Introduction</b> .....	<b>1-2</b>
<b>1.2 Built-in Accessories</b> .....	<b>1-2</b>
<b>1.3 Connectors</b> .....	<b>1-2</b>
<b>1.4 Controls</b> .....	<b>1-3</b>
<b>1.5 Setting Up</b> .....	<b>1-4</b>

## 1.1 Introduction

Many data converter evaluation fixtures contain a computer interface or a microcontroller, but the ADS1244/45EVM contains only the ADS1244 or ADS1245 device and a few support components. All ADS1244/45 pins are accessible through various pins on the ADS1244/45EVM's analog and digital connectors.

The ADS1244/45EVM is designed using a simple card format developed by TI. This simple, consistent design makes it very easy to connect the ADS1244/45EVM to your own prototype system. You can even think of the ADS1244/45EVM as an alternate package for the ADS1244/45 – one much larger than the device itself, but also much easier to wire up by hand on your test bench.

The ADS1244/45EVM can be plugged directly into suitable motherboards such as the HPA449 MSP430 microcontroller development system from Soft-Baugh, Inc. (<http://www.softbaugh.com/>). See TI's web site for sample code using the ADS1244/45EVM with the HPA449.

The ADS1244/45EVM, together with the HPA449 and the appropriate software, also forms a complete evaluation system for verifying the performance of the ADS1244/45. See TI's web site for more information and software.

## 1.2 Built-in Accessories

The ADS1244/45EVM includes a system clock generator and a low-noise voltage reference. Both features are optional; you can select an external system clock and an external reference using the slide switches.

The +2.5V reference circuit is based on a REF1004–2.5. Its noise performance is sufficient to allow the ADS1244/45 to perform at its lowest noise level.

The system clock is based on a 4.9152MHz CMOS crystal clock generator module. A flip-flop divides the clock generator by two in order to provide an additional 2.4576MHz clock source. The two clocks can be selected using the clock source select switch.

## 1.3 Connectors

The ADS1244/45 device on the ADS1244/45EVM is connected through three headers: the analog connector, the serial connector, and the power connector. Pinouts and locations for the connectors are given in the following chapter.

The **analog connector** (J1) carries analog I/O. The ADS1244/45 has a single differential input channel connected to pins 1 and 2. An optional external differential reference can be connected to pins 18 and 20.

The **serial connector** (J5) carries the ADS1244/45 serial digital interface, an optional external system clock signal, and an I<sup>2</sup>C connection to the on-board serial EEPROM.

The **power connector** (J6) carries the power supplies. The ADS1244/45EVM requires a +5V analog supply and either a +5V or +3.3V digital supply. The board is designed using a single ground net connected to DGND. An AGND pin is also provided, and it can be connected to DGND using jumper J2.

The ADS1244/45 uses separate supplies for its analog and digital sections. A jumper is inserted in each supply line. These jumpers allow the current of each supply to be measured independently.

Four loop-style testpoints provide easy access to the ADS1244/45 clock and the power supplies on the board. Other signals can be probed using the I/O connector pins.

## 1.4 Controls

The ADS1244/45EVM is configured using four slide switches and a jumper.

Switch S1 selects the system clock source for the ADS1244. You can select from the 4.9152MHz clock source, the 2.4576MHz clock source, or an externally provided clock. When the external clock is selected, the onboard oscillator is disabled to save power and prevent interference.

Switch S2 selects the input signal provided to the ADS1244/45. Normally you will use the external input, but you can also use the switch to short the inputs together and to connect the reference voltage to the inputs. The latter two positions are useful for conducting noise tests.

Switch S3 selects the reference input. One position selects the external reference input pins on the analog connector (J1). The other two positions connect the onboard +2.5V reference in one of two ways: between ground and the reference, or between the reference and the analog supply.

Switch S5 is used to select one of two digital power supply pins provided on the power connector. One pin is used for +3.3V, and the other is used for +5V; some motherboards, such as the HPA449, provide both voltages. This switch determines the logic levels that the ADS1244/45 will use to communicate, so it is important to set it correctly.

## 1.5 Setting Up

The way you configure the ADS1244/45EVM depends on how you will use it. There is therefore no single correct procedure to follow to configure the ADS1244/45EVM.

Nevertheless, it is useful to remember the following things when you are setting up the board:

- Make certain that S5, the digital power supply select switch, is in the right position for your system, and that you have a power supply connected to the proper pins on the power connector.
- If you are not measuring the ADS1244/45's supply current, remember to place shorting blocks on jumpers J3 and J4. Without these blocks, the ADS1244/45 will not be powered on, and will not work properly, if at all.
- Unless you are using two entirely separate power supplies for analog and digital, place a shorting block on jumper J2. This connects the analog and digital grounds together, which is the usual way to operate the ADS1244/45.
- Check the system clock switch. If it is set to "EXT," and you have not connected a clock signal to the external clock input pin on J5, the ADS1244/45 will not operate.



# **Circuit Description**

---

---

---

---

This chapter describes the ADS1244/45EVM connectors, controls, and circuit design in detail.

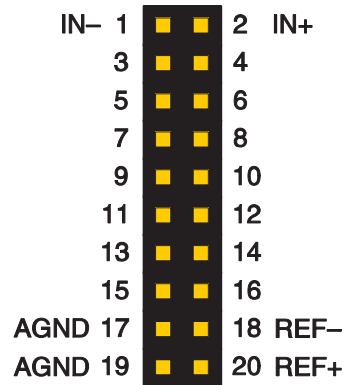
<b>Topic</b>	<b>Page</b>
<b>2.1 I/O Connectors and Testpoints</b> .....	<b>2-2</b>
<b>2.2 Jumpers</b> .....	<b>2-7</b>
<b>2.3 Switches</b> .....	<b>2-8</b>



## 2.1.1 J1: Analog Connector

The analog connector pinout is shown in Figure 2–2. and described in Table 2–1.

Figure 2–2. Analog Connector Pinout



**Caution:** Although certain pins are described as “negative,” *never* apply voltages less than  $-0.3\text{V}$  to these pins. The ADS1244 is not a bipolar-input device, and it cannot accept negative voltages below  $-0.3\text{V}$  without damage. The negative input pins are so named because the voltage on such a pin is subtracted from a positive pin during a reading.

Table 2–1. Analog Connector Pin Descriptions

Pin No.	Pin Name	Standard Name	Direction	Function
1	SYSINN	AN0–	Input	Negative analog input
2	SYSINP	AN0+	Input	Positive analog input
18	SYSREFN	REF–	Input	Negative external reference input
20	SYSREFP	REF+	Input	Positive external reference input
17, 19	GND	AGND	Power	Signal ground

Note that the input pins are not used unless the input select switches are set to the appropriate positions. See Table 2–3 for details.



## 2.1.2 J5: Serial Connector

The serial connector's pinout is shown in Figure 2–3 and described in Table 2–2.

Figure 2–3. Serial Connector Pinout

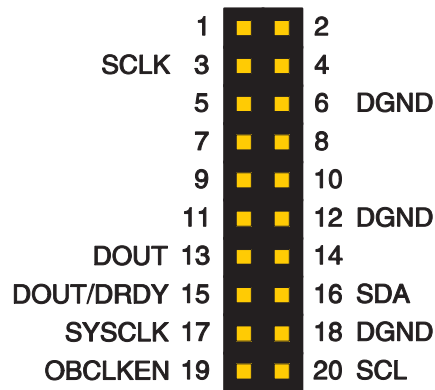


Table 2–2. Serial Connector Pin Descriptions

Pin No.	Pin Name	Standard Name	Direction	Function
3	SCLK	CLKX	Input	Serial clock input
13	DOUT	DR	Output	Serial data output / data ready
15	DOUT	INT	Output	Serial data output / data ready
16	SCL	SCL	I/O	I <sup>2</sup> C clock line
17	SYSCLK	TOUT	Input	External system clock input
19	OBCLKEN	GPIO5	Output	Clock mode indicator
20	SDA	SDA	I/O	I <sup>2</sup> C data line
6, 12, 18	GND	DGND	Power	Signal ground

The ADS1244/45 serial interface is connected through pins 3, 13, and 15.

SCL and SDA are used to communicate with the I<sup>2</sup>C serial EEPROM.

OBCLKEN is logic high when either of the onboard clock sources are selected, and low when the external clock source is selected. It can be used by external systems to determine whether to generate a clock signal for the ADS1244/45EVM.

### 2.1.3 J6: Power Connector

The power connector pinout pattern is shown in Figure 2–4 and described in Table 2–3.

Figure 2–4. Power Connector Pinout

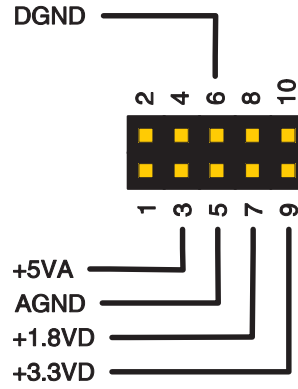


Table 2–3. Power Connector Pin Descriptions

Pin No.	Pin Name	Function	Usage on ADS1244/45EVM
1	+VA	Positive analog supply, +5V to +18V	Not used
2	–VA	Negative analog supply, –5V to –18V	Not used
3	+5VA	Positive analog supply, +5VA	Analog supply
4	–5VA	Negative analog supply, –5VA	Not used
5	AGND	Analog ground	Optionally connected to DGND through J2
6	DGND	Digital ground	Ground
7	+1.8VD	Positive digital supply, +1.8V	Possible digital supply, selected using S5
8	VD1	Positive digital supply	Not used
9	+3.3VD	Positive digital supply, +3.3V	Possible digital supply, selected using S5
10	+5VD	Positive digital supply, +5V	Not used

The ADS1244/45EVM always uses DGND for its single ground domain. The AGND pin may optionally be connected to DGND through jumper J2.

The ADS1244/45 uses an analog supply of +5V and a digital supply of +1.8V to +3.3V. Both +1.8V and +3.3V are available as standard supply voltages over the power connector, so the ADS1244/45EVM allows you to switch between them using S5.

---

## 2.1.4 Testpoints

The testpoints are marked on the board with the net to which they are attached, instead of with their schematic reference designators. Table 2–4 lists the testpoints.

*Table 2–4. Testpoints*

<b>Board Marking</b>	<b>Reference Designator</b>	<b>Signal</b>
CLK	TP4	System clock
AVDD	TP3	Analog supply
DVDD	TP1	Digital supply
GND	TP2	Ground

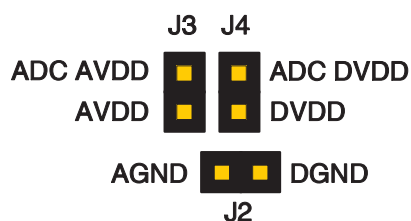
The CLK testpoint is attached to the CLK pin on the ADS1244/45. It reflects the actual CLK signal controlling the ADS1244/45. When the onboard oscillator is in use, its waveform can be observed from the CLK testpoint.

The supply testpoints are provided for convenience. The GND testpoint is slightly larger than the others to accommodate multiple probe clips.

## 2.2 Jumpers

The jumpers are shown in Figure 2–5. Jumper positions and functions are shown in Figure 2–1.

Figure 2–5. Jumpers



### 2.2.1 J2: Analog–Digital Ground Shorting Jumper

This jumper is used to connect the analog and digital grounds together.

If you are using a single power supply, you should usually place a shorting block across this jumper. If you are using two different supplies, each with its own ground, you should usually leave this jumper unconnected.

### 2.2.2 J3: ADS1244/45 Analog Supply Current Measurement Jumper

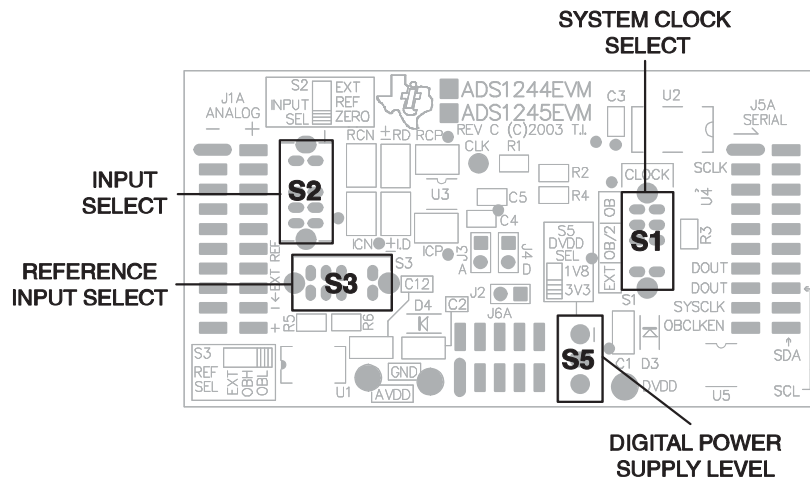
This jumper can be used to measure the current drawn by the ADS1244/45 analog supply line.

For normal operation, when not measuring current, place a shorting block across this jumper.

## 2.3 Switches

The positions and functions of the switches are shown in Figure 2–6.

Figure 2–6. Switches



### 2.3.1 S1: System Clock Select

This switch selects which of the three available clock sources on the ADS1244/45EVM will be provided to the CLK pin on the device. The switch positions are described in Table 2–5.

Table 2–5. System Clock Select Switch

Board Marking	Switch Position	System Clock Source	OBCLKEN State
OB	Top	Onboard 4.9152MHz	High
OB/2	Middle	Onboard 2.4576MHz	High
EXT	Bottom	External (J5, pin 17)	Low

This switch also controls the state of OBCLKEN. This signal enables the oscillator (U2), and is also brought to pin 19 of J5. External systems can read this signal to determine whether to generate a clock.

### 2.3.2 S2: Input Select

This switch controls which lines are routed to the ADS1244/45 input pins. The switch positions are described in Table 2–6.

Table 2–6. Input Select Switch

Board Marking	Switch Position	Input Source	ADS1244/45 VIN+	ADS1244/45 VIN–
EXT	Top	External (J1, pins 1 and 2)	J1 pin 2	J1 pin 1
REF	Middle	Reference voltage	+2.5V	Ground
ZERO	Bottom	Zero (shorted to reference)	+2.5V	+2.5V

In the EXT position, J1 pins 1 and 2 are connected to the ADS1244/45 inputs.

In the REF position, the reference is connected across the ADS1244/45 inputs. This normally gives a full-scale reading.

In the ZERO position, both of the ADS1244/45 input pins are connected to the reference. This gives a zero-scale reading.

The REF and ZERO positions are useful for certain noise tests.

### 2.3.3 S3: Reference Input Select

This switch controls which signals are connected to the ADS1244/45 differential reference input. The switch positions are described in Table 2–7.

Table 2–7. Reference Input Select Switch

Board Marking	Switch Position	Reference Source	ADS1244/45 REF+	ADS1244/45 REF–
EXT	Left	External (J1, pins 18 and 20)	J1 pin 20	J1 pin 18
OBH	Middle	On-board, high common-mode	+AVDD	+2.5V
OBL	Right	Zero (shorted to reference)	+2.5V	AGND

In the EXT position, J1 pins 18 and 20 are connected to the ADS1244/45 reference input.

In the OBH position, the analog power supply is connected to the positive reference input, and the negative reference input is connected to the output of the onboard reference.

In the OBL position, the onboard reference output is connected to the ADS1244/45 positive reference input pin, and the negative reference input pin is grounded.

Both OBH and OBL provide a +2.5V reference to the ADS1244/45. The OBL position corresponds to the usual way to connect a reference to the ADS1244/45, and should be used for most measurements. The OBH position is useful for testing the reference input common-mode sensitivity, which can be important for ratiometric connections.

### 2.3.4 S5: Digital Power Supply Level

This switch selects from one of the two digital power supply pins on J6 that can be used to power the digital side of the ADS1244/45 device. The positions of the switch are described in Table 2–8.

*Table 2–8. Digital Power Supply Level Select Switch*

<b>Board Marking</b>	<b>Switch Position</b>	<b>Digital Power Supply Source</b>
1V8	Top	+1.8V typ. (J6 pin 7)
3V3	Bottom	+3.3V typ. (J6 pin 9)

This switch determines the logic level at which the ADS1244/45 will communicate. Make certain it is set correctly before you power the board on.

# Usage

---

---

---

---

This chapter provides guidelines on using the ADS1244/45EVM and connecting other systems to it.

<b>Topic</b>	<b>Page</b>
<b>3.1 The Input Filtering Capacitors</b> .....	<b>3-2</b>
<b>3.2 The Serial Interface</b> .....	<b>3-3</b>
<b>3.3 The Serial EEPROM</b> .....	<b>3-3</b>



### 3.1 The Input Filtering Capacitors

The ADS1244/45EVM is designed to accept input filtering capacitors on both the reference and signal inputs. Each input has two common-mode capacitors and one differential capacitor.

The common-mode capacitors are connected from each differential line to ground. They are intended to filter the common-mode portion of the signal. The differential capacitors are connected between the differential pins. These capacitors filter the signal itself.

The ADS1244/45EVM is shipped with a differential capacitor and common-mode capacitors on the analog inputs, and a positive common-mode capacitor on the reference. The other two reference filter capacitors are not populated, since they would be redundant with REF- connected to ground, as is usually the case.

The performance of the ADS1244 is often improved by these capacitors. On the input, the capacitors attenuate frequencies beyond the ADS1244/45 sampling frequency. On the reference, the capacitors eliminate high noise frequencies that can couple into the device and disrupt the measurement. (Lower noise frequencies can be dealt with at the reference circuit itself.)

Although the supplied 100nF capacitors do not have particularly high values, they are in relatively large 1210-size packages, in contrast to most of the other passives on the board. They were made large so that you can easily remove them or replace them with other values. By exercising appropriate care, you can even solder leaded devices to these large pads.

A typical layout will not use packages as large as this, unless very large capacitors are also used.

## 3.2 The Serial Interface

The ADS1244/45 serial interface is connected directly to the ADS1244/45EVM serial connector. Therefore, the way you connect the ADS1244/45EVM in a prototype situation can be the same as the way you connect it in your final product. This discussion assumes that you will be connecting the ADS1244/45EVM to a microcontroller, but for FPGA and PC-based systems, similar principles apply.

There are two primary ways to connect the ADS1244/45. If you are using GPIO (“bit-banging”) to communicate with the device, you can use only the serial data / data ready line (J5 pin 13) and the serial clock line (J5 pin 3). By polling the data line, you can determine when the ADS1244/45 has a new code ready. You might also let the data line interrupt the processor, if your processor supports this.

If the microcontroller has an SPI peripheral, you can also use this, together with an interrupt input, to read from the ADS1244/45. This is done by connecting the serial data line to both SDI / MOSI on the microcontroller and also to the interrupt input.

The ADS1244/45EVM is pre-wired for this method. The standard serial connector has an interrupt output pin (J5 pin 15). The data line is wired to both this pin and the serial data pin.

Of course, you can still use the bit-bang method to communicate with the ADS1244/45. Simply ignore the interrupt output pin and use GPIO instead of a dedicated SPI peripheral.

## 3.3 The Serial EEPROM

The serial EEPROM is a Microchip 24LC256 32KB type. You can use it in any way you need to; the chip is not programmed during manufacturing. Possible uses include calibration data or board ID information.

Information on communicating with the EEPROM is available from Microchip Technology, Inc.

# Schematic and Layout

---

---

---

This appendix contains the complete bill of materials, schematic diagram, and PCB layout for the ADS1244/45EVM.

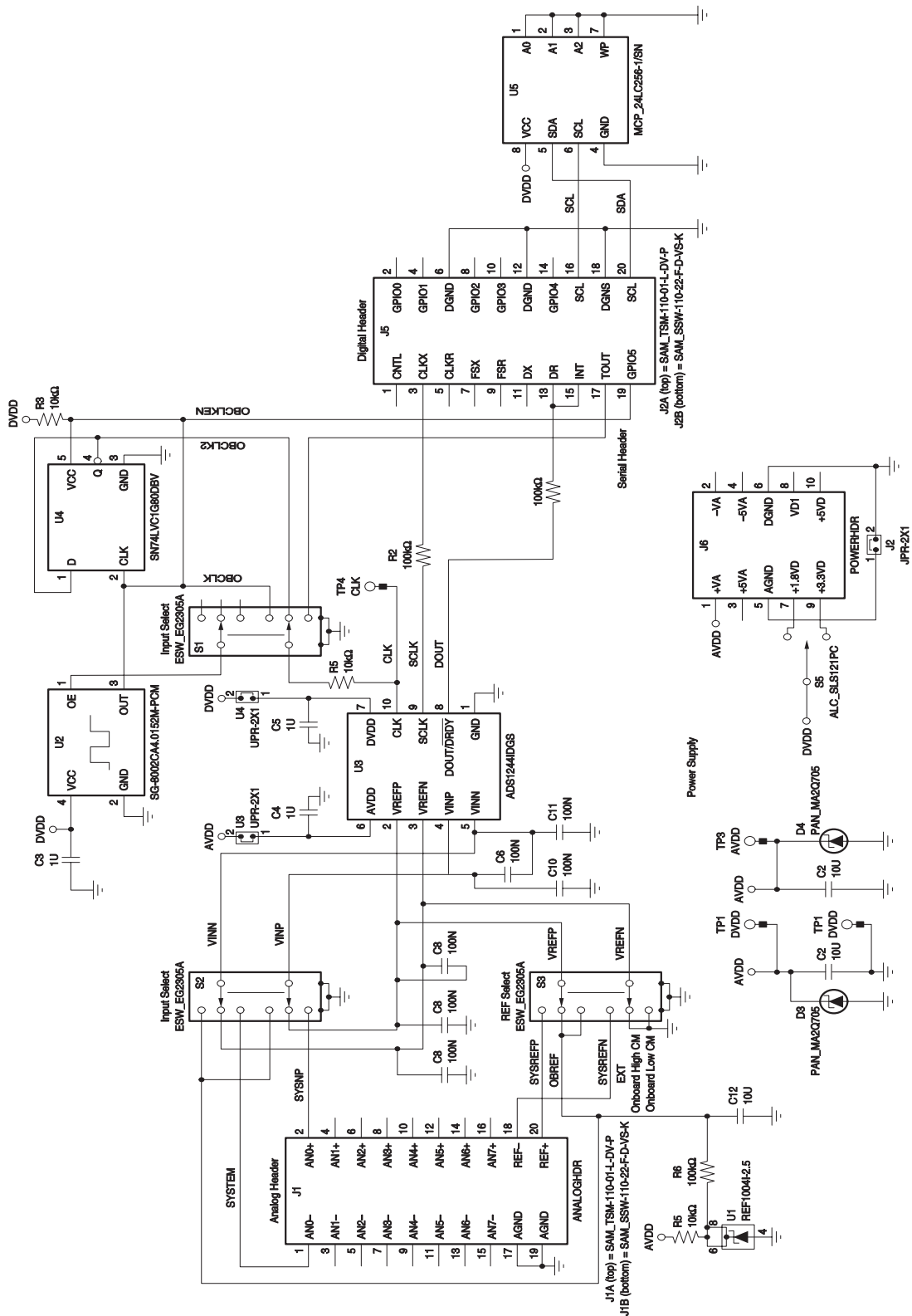
The schematic diagram is shown in Section 4.1 on page 4-2. The top (component) side layout is shown in Figure 4–2 on page 4-3. The bottom (solder) side layout is shown in Figure 4–3 on page 4-3. The bill of materials is shown in Section 4.3 on page 4-4.

Both the schematic and the bill of materials apply for the ADS1244EVM and the ADS1245EVM. The only difference between them is the part at U3. On the ADS1244EVM, U3 is ADS1244IDBG; on the ADS1245EVM, U3 is ADS1245IDBG.

<b>Topic</b>	<b>Page</b>
<b>4.1 Schematic</b> .....	<b>4-2</b>
<b>4.2 Board Layout</b> .....	<b>4-3</b>
<b>4.3 Bill of Materials</b> .....	<b>4-4</b>

### 4.1 Schematic

Figure 4–1. Schematic Diagram



## 4.2 Board Layout

Figure 4-2. Top Side Layout

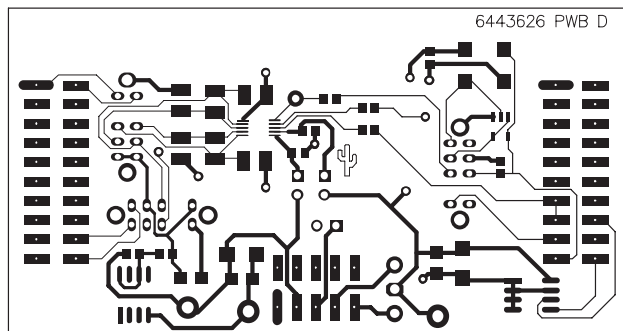
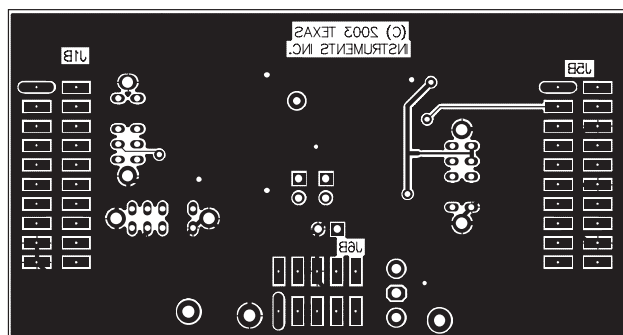


Figure 4-3. Bottom Side Layout



### 4.3 Bill of Materials

Table 4–1. Bill of Materials

Ref Des	Description	Vendor	Part Number
R4, R1, R6, R2	1/16W 1% 100–R Chip Resistor	Panasonic	ERJ–3GEYJ101V
R3, R5	1/16W 1% 10k Chip Resistor	Panasonic	ERJ–3GEYJ103V
C3, C4, C5	50V 1uF Ceramic Capacitor, +/- 0.5pF, NPO	Panasonic	ECJ–1VB1C105K
C1, C2, C12	16V 10 uF Ceramic Capacitor, +80% –20%, F	Panasonic	ECJ–3YF1C106Z
C8, C6, C10, C11	50V 0.1uF Ceramic Capacitor, +/- 10%, X7R	Kemet	C1210C104K5RACTU
C7, C9	Not installed		
U3	Analog–to–digital converter	Texas Instruments	ADS1244IDGS / ADS1245IDGS
U2	Oscillator	Epson	SG–8002CA4.9152M–PCM
U5	Serial EEPROM	Microchip	24LC256–I/SN
U1	Voltage reference	Texas Instruments	REF1004I–2.5
U4	Positive edge–triggered D–type flip–flop	Texas Instruments	SN74LVC1G80DBVR
D3, D4	Schottky diode	Panasonic	MA2Q705
N/A	ADS1244 EVM PWB	Texas Instruments	6443626
TP4	Test point, miniature, white	Keystone Electronics	5002
TP3	Test point, multipurpose, red	Keystone Electronics	5010
TP1	Test point, multipurpose, orange	Keystone Electronics	5013
TP2	Test point, multipurpose, black	Keystone Electronics	5011
J1A, J5A	Header, SMT, 20 pin	Samtec	TSM–110–01–T–DV–P
J1B, J5B	Socket, SMT, 20 pin	Samtec	SSW–110–22–F–D–VS–K
J6A	Header, SMT, 10 pin	Samtec	TSM–105–01–T–DV–P
J6B	Socket, SMT, 10 pin	Samtec	SSW–105–22–F–D–VS–K
J2, J3, J4	2 Position Jumper , 0.1” spacing	Samtec	TSW–102–07–L–S
S5	SPDT slide switch	Alcoswitch	SLS121PC
S1, S2, S3	DP3T slide switch	E–Switch	EG2305A