

ADS7861/8361 EVM

User's Guide

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EVM WARNINGS AND RESTRICTIONS

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

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.

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Preface

Read This First

About This Manual

This users guide describes the characteristics, operation, and use of the ADS7861/8361 EVM – 12-/16-bit dual, 500-KSPS, 2+2 channel, serial analog-to-digital converter evaluation module. A complete circuit description as well as a schematic diagram and bill of materials are included.

How to Use This Manual

This document contains the following chapters:

- ☐ Chapter 1 – EVM Overview
- ☐ Chapter 2 – Analog Interface
- ☐ Chapter 3 – Digital Interface
- ☐ Chapter 4 – Power Supplies
- ☐ Chapter 5 – EVM Operation
- ☐ Chapter 6 – Bill of Materials and EVM Schematic

Related Documentation From Texas Instruments

To obtain a copy of any of the following TI documents, call the Texas Instruments Literature Response Center at (800) 477-8924 or the Product Information Center (PIC) at (972) 644-5580. When ordering, please identify this booklet by its title and literature number. Updated documents can also be obtained through our website at www.ti.com.

Data Sheets:

ADS7861
ADS8361
Op Amps for Everyone

Literature Number:

SBAS110
SBAS230
SLOD006

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.

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EVM Overview

The ADS7861 and ADS8361 are high-speed, low-power, 12-bit and 16-bit A/D converters that operate from independent 5-V AV_{DD} and 5-V DV_{DD} (2.7-V to 3.6-V DV_{DD} for ADS8361) supplies.

The four fully differential analog inputs are divided into two pairs (A and B). The ADS7861 and ADS8361 accept an analog input voltage in the range of $-V_{REF}$ to $+V_{REF}$ ($5 V_{p-p}$), centered on the internal 2.5-V reference. The part also accepts bipolar input ranges when a level shift circuit is used in the analog front-end circuitry. Refer to Section 12 of *Op Amps for Everyone* (literature number SLOD006) for information on various circuit applications.

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1.1 Features	1-2

1.1 Features

- ☐ Full-featured evaluation board for the ADS7861 and ADS8361, dual, 500-kSPS, 12-bit/16-bit, serial output, 2+2 analog input, simultaneous sampling analog-to-digital converter
- ☐ Analog inputs can be configured as single-ended or differential
- ☐ Built-in reference
- ☐ High-speed serial interface

Analog Interface

For maximum flexibility, the ADS7861/8361 EVM is designed for easy interfacing to multiple analog sources. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient ten-pin dual row header/socket combination at J1. This header/socket provides access to the analog input pins of the ADC. Consult Samtec at www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options.

Table 2–1. Header/Socket J1 Description

Pin Number	Signal	Description
J1.2	B1+	Noninverting input – channel B1
J1.4	B1–	Inverting input – channel B1
J1.6	B0+	Noninverting input – channel B0
J1.8	B0–	Inverting input – channel B0
J1.10	A1+	Noninverting input – channel A1
J1.12	A1–	Inverting input – channel A1
J1.14	A0+	Noninverting input – channel A0
J1.16	A0–	Inverting input – channel A0
J1.18	Unused	Pins are unused and should be left open for use with future amplifier and sensor input modules.
J1.20	REFIN	External reference source input (2.5 V nom, 2.525 V max)
J1.1– J1.19 (odd)	AGND	Analog ground connections

Digital Interface

The ADS7861/8361 EVM is designed for easy interfacing to multiple control platforms. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient ten-pin dual row header/socket combination at J2. This header/socket provides access to the digital control and serial data pins of the ADS7861/8361. Consult Samtec at www.samtec.com or 1-800-SAMTEC-9 for a variety of mating connector options.

Table 3–1. Header/Socket J2 Description

Pin Number	Signal	Description
J2.1	CS	Chip select—Active low signal, enables data transfer and device configuration
J2.3	SCLK	Serial clock
J2.5	SCLK(R)	Serial clock return for DSP host
J2.7	FS	Frame sync
J2.9	FS(R)	Frame sync return for DSP host
J2.11	SDI	Serial data input
J2.13	SDO	Serial data output
J2.15	INT	Interrupt output—provides an interrupt source to the host processor
J2.17	CSTART	Conversion start—provides an alternate method of conversion initialization
J2.19	SPARE	

Topic	Page
3.1 Additional Control Options	3-2

3.1 Additional Control Options

The following table shows the pin-out of header J5. This dual row, four-position header provides additional control functionality to the ADS7861/8361 EVM. Signals A0, M0, and M1 are configured with pull-up resistors by default. The jumper shunts supplied with the EVM can be used to set these signals to logic low. These signals can also be connected to control signals in the users system.

Table 3–2. Header J5 Description

Pin Number	Signal	Description
J5.1	M0	Selects two-channel or four-channel mode
J5.3	M1	Selects between serial outputs A and B
J5.5	A0	Operates in conjunction with M0. See data sheet for details.
J5.7	OUT B	B channel secondary output
J5.2 – J5.8 (even)	DGND	Digital ground connections

Power Supplies

The ADS7861 EVM board requires 5 V dc for both the analog and digital sections of the ADC. While filters are provided for all power supply inputs, optimal performance of the EVM requires a clean, well-regulated power source. Positive 5-V dc power is applied to J3 and J4 (pin1 referenced to pin 2). The ADS8361 requires 5 V dc for the analog supply located on J3, and 2.7 V to 5.5 V dc for the digital supply located on J4.

An alternate power source can be applied via J6 located on the bottom side of the printed-circuit board. If a variable digital supply voltage is desired, completely remove the shunt jumper from W3. Apply a 100-mA current limited dc voltage of not more than 5.5 V to J4.

Note:

The shunt jumper at location W3 should be placed across pin 2 and pin 3 for proper operation of the ADS7861. This is the factory default condition for both the ADS7861 and ADS8361 EVMs.

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4.1 Reference Voltage	4-2

4.1 Reference Voltage

The ADS7861/8361 can be configured to use its internal reference, or external reference source through jumper W1 (see schematic for details). If an external reference is desired, the shunt jumper on W1 should cover pins 2 and 3. The external reference is supplied through header/socket J1 pin 20 (J1.20).

EVM Operation

Apply a current limited (150 mA max) 5-V dc source to J3 and J4 prior to connecting the analog input signals and digital control signals.

The analog input source can be applied directly to header/socket J1 (top or bottom side) or through optional amplifier and signal conditioning modules. The analog input level should not exceed $5 V_{p-p}$. The analog input range is from $-V_{REF}$ to V_{REF} (0 V to 5 Vdc) centered at 2.5 V.

The digital control signals can be applied directly to header/socket J2 (top or bottom side). The ADS7861/8361 EVM can also be connected directly to a DSP interface board. Consult the ADS7861 and ADS8361 product folders for a complete list of DSP interface cards and optional analog interface modules.

Jumper W2 is provided to allow separation of the convert start (CONVST) and read (RD) signals. The factory default condition for the EVM is to place a shunt jumper between pin 1 and pin 2 of W2. This combines signals RD and CONVST, which are applied to the ADC via pin J2.7. When W2 is moved to pin 2 and pin 3, the RD signal is applied via pin J2.7 while CONVST is applied to pin J2.17.

Header J5 is a means to access the M0, M1, and A1 control lines as well as the OUTB serial data. Shunt jumpers are placed on pins 1 and 2, 3 and 4, and 5 and 6 of J5, which defaults M0, M1, and A0 to logic low levels. Removing the jumpers allows these lines to go to logic high levels through the associated pullup resistors R12, R13, and R14. In the factory default conditions, the ADC is converting the A0 and B0 inputs, placing AOUT serial data on pin J2.13, and BOUT serial data on pin J5.7.

Bill of Materials and EVM Schematic

The following table contains a complete bill of materials for the ADS7861/8361 EVM. The schematic diagram is also provided for reference.

Table 6–1. Bill of Materials

Designators	Description	Manufacturer	Mfg. Part Number
C1 C2 C3 C4 C5 C6 C7 C8	100-pF, 0805, Ceramic capacitor, NPO, 50-V, 5%	PhyComp	0805CG101J9B200
C13 C14 C15 C16 C21	0.1-μF, 0805, Ceramic capacitor, X7R, 50-V, 10%	Panasonic	ECJ-2YB1H104K
C17 C18	10-μF, 16-V, Aluminum capacitor, Size C	Cornell Dubilier	AVS106M16B12T
FB1 FB2	SMT, EMI beads, Z = 47 Ω at 100 MHz	Fair-Rite	2743019447
J1 J2 (top side)	10 Pin, dual row, SMT header (20 Position)	Samtec	TSM-110-01-T-DV-P
J1B J2B (bottom side)	10 Pin, dual row, SMT socket (20 Position)	Samtec	SSW-110-22-F-D-VS-K
J3 J4	2 Terminal screw connector	OST	ED1514
J5	4 Pin, dual row, TH header (8 Position)	Samtec	TSW-104-07-L-D
J6 (bottom side)	4 Pin, dual row, TH header (8 Position)	Samtec	SSW-105-22-F-D-VS-K
R1 R2 R3 R4 R5 R6 R7 R8	49.9-Ω, 0805, 1%, 0.1-W resistor	Yageo America	9C08052A49R9FKHFT
R9 R10 R11	33-Ω, 0805, 5%, 0.1-W resistor	Yageo America	9C08052A33R0JLHFT
R12 R13 R14	10-kΩ, 0805, 0.1-W resistor	Yageo America	9C08052A1002JLHFT
R15	0-Ω, 0805, 0.1-W resistor	Yageo America	9C08052A0R00JLHFT
TP1 TP2 TP3	Red test point loop	Keystone	5000
U1	ADS7861 or ADS8361 ADC	Texas Instruments	ADS7861E or ADS8361I
W1	3 Pin, 2-mm header	Samtec	TMM-103-01-G-S
W2, W3	3 Pin header	Samtec	TSW-103-07-L-S

