

# 16-Bit, 1-MSPS, Serial Interface, microPower, Miniature, True-Differential Input, SAR Analog-to-Digital Converter

Check for Samples: [ADS8861](#)

## FEATURES

- **Sample Rate: 1 MHz**
- **No Latency Output**
- **Unipolar, True-Differential Input Range:**  
– $V_{REF}$  to  $+V_{REF}$
- **Wide Common-Mode Voltage Range:**  
0 V to  $V_{REF}$
- **SPI™-Compatible Serial Interface with Daisy-Chain Option**
- **Excellent AC and DC Performance:**
  - SNR: 96 dB
  - THD: –115 dB
  - INL:  $\pm 1.0$  LSB (max)
  - DNL:  $\pm 1.0$  LSB (max), 16-bit NMC
- **Wide Operating Range:**
  - AVDD: 2.7 V to 3.6 V
  - DVDD: 1.65 V to 3.6 V (Independent of AVDD)
  - REF: 2.5 V to 5 V (Independent of AVDD)
  - Operating Temperature: –40°C to +85°C
- **Low Power Dissipation:**
  - 5.5 mW at 1 MSPS
  - 0.55 mW at 100 kSPS
  - 55  $\mu$ W at 10 kSPS
- **Power-Down Current (AVDD): 50 nA**
- **Full-Scale Step Settling to 16-bit: 290 ns**
- **Packages: MSOP-10 and SON-10**

## APPLICATIONS

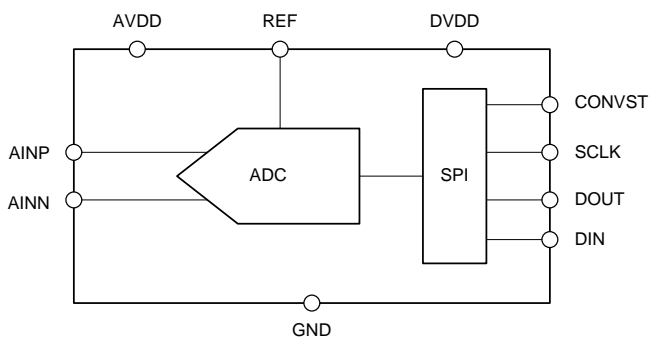
- **Automatic Test Equipment (ATE)**
- **Instrumentation and Process Controls**
- **Precision Medical Equipment**
- **Low-Power, Battery-Operated Instruments**
- **Loop-Powered Applications**
- **Optical Networking**

## DESCRIPTION

The ADS8861 is a 16-bit, 1-MSPS, true-differential input analog-to-digital converter (ADC). The device operates with a 2.5-V to 5-V external reference, offering a wide selection of signal ranges without additional input signal scaling. The reference voltage setting is independent of and can exceed the analog supply voltage (AVDD). The device includes a capacitor-based, successive-approximation register (SAR) ADC with an inherent sample-and-hold amplifier.

The device offers an SPI-compatible serial interface. The interface is designed to support daisy-chain operation for cascading of multiple devices. An optional busy-indicator bit makes it easy to synchronize with the digital host. The device supports unipolar true-differential analog input signals with a differential input swing of  $-V_{REF}$  to  $+V_{REF}$ . This true-differential analog input structure allows for a common-mode voltage of any value in the range of 0 V to  $+V_{REF}$  (while both inputs are within the operating input range of  $-0.1$  V to  $V_{REF} + 0.1$  V).

Device operation is optimized for very low power operation. Power consumption directly scales with speed. This feature makes the ADS8861 excellent for lower-speed applications. The ADS8861 is available in MSOP-10 and SON-10 packages.


**PRODUCT PREVIEW**


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**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|------------------|----------------------|--------------|-------------------------|---------|
| ADS8861IDGS      | PREVIEW       | VSSOP        | DGS                | 10   | 80             | TBD             | Call TI          | Call TI              | -40 to 85    |                         |         |
| ADS8861IDGSR     | PREVIEW       | VSSOP        | DGS                | 10   | 2500           | TBD             | Call TI          | Call TI              | -40 to 85    |                         |         |
| ADS8861IDRCR     | PREVIEW       | WSO          | DSC                | 10   | 3000           | TBD             | Call TI          | Call TI              | -40 to 85    |                         |         |
| ADS8861IDRCT     | PREVIEW       | WSO          | DSC                | 10   | 250            | TBD             | Call TI          | Call TI              | -40 to 85    |                         |         |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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DGS (S-PDSO-G10)

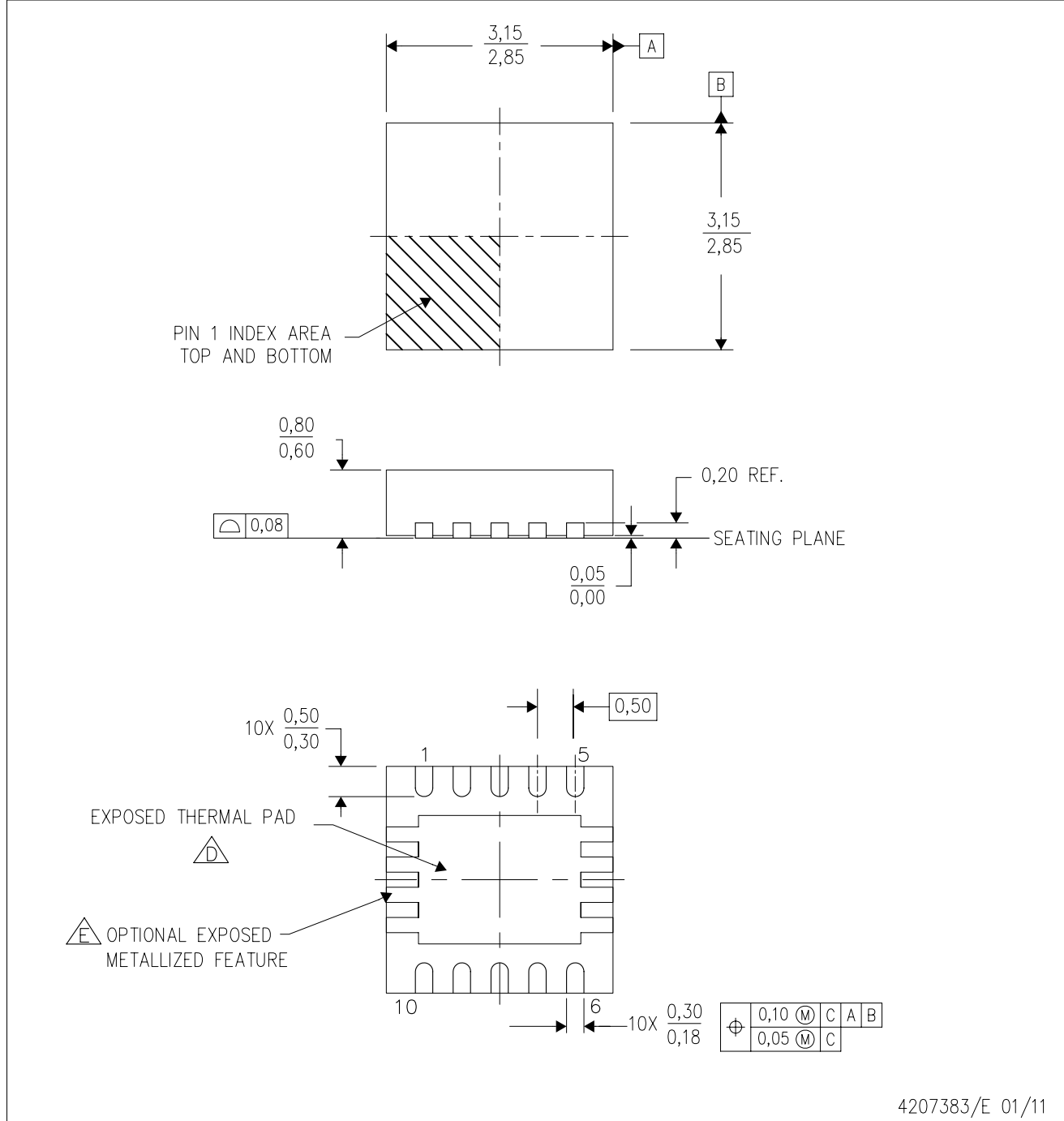
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion.
  - D. Falls within JEDEC MO-187 variation BA.

DSC (S-PWSON-N10)

PLASTIC SMALL OUTLINE NO-LEAD



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Small Outline No-Lead (SON) package configuration.
  - D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - E. See the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

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|                               |  |
|-------------------------------|--|
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