

# ADS1287D Dual, Simultaneous-Sampling, Low-Power, 1000-SPS, Analog-to-Digital Converter With a Programmable Gain Amplifier

## 1 Features

- SNR: 114 dB (50 Hz–200 Hz, Gain = 1)
- Power: 2.2 mW (Per ADC)
- THD: –115 dB
- CMRR: 110 dB
- High-Impedance CMOS PGA:
  - Gains 1, 2, 4, 8, and 16
- Data Rates: 62.5 SPS to 1000 SPS
- Flexible Digital Filter:
  - Sinc + FIR + IIR (Selectable)
  - Linear and Minimum Phase Response
  - Programmable High-Pass Filter
- Sensor-Test Current Sources
- Offset and Gain Calibration
- Synchronization Control
- SPI™-Compatible Interface
- Analog Power Supply: 5 V or  $\pm 2.5$  V
- Digital Power Supply: 2.5 V to 3.3 V

## 2 Applications

- Energy Exploration
- Passive Seismic Monitoring
- Portable Instrumentation

## 3 Description

The ADS1287D device is a dual, simultaneous-sampling, analog-to-digital converter (ADC), with an integrated programmable gain amplifier (PGA) and finite-impulse-response (FIR) digital filter. The ADC is suitable for the demanding needs of low-power, seismic data acquisition.

The ADC features a programmable-gain, high-impedance amplifier suitable for direct connection of geophone and hydrophone sensors to the ADC over a wide range of input signals ( $\pm 2.5$  V to  $\pm 0.156$  V). Dual 100-nA current sources are integrated into the ADC inputs for field testing of sensors.

The ADC incorporates a fourth-order, inherently stable, delta-sigma ( $\Delta\Sigma$ ) modulator. The modulator digital output is filtered and decimated by the internal FIR digital filter to yield the ADC conversion result.

The FIR digital filter provides data rates up to 1000 samples per second (SPS). The high-pass filter (HPF) removes DC and low-frequency components from the conversion result. On-chip gain and offset scaling registers support system calibration.

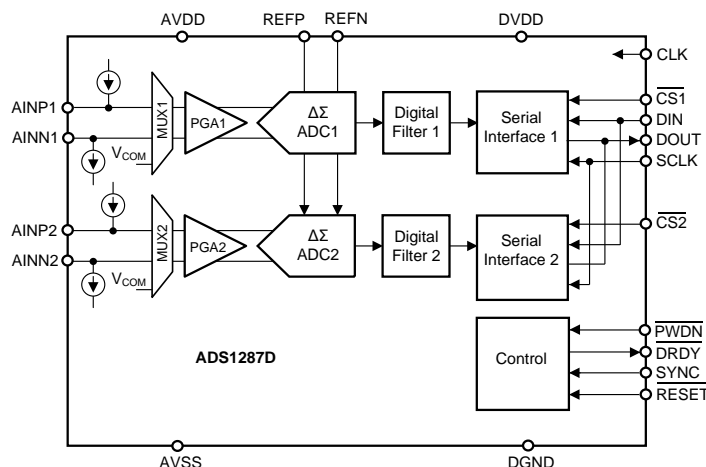
Total device power consumption is 4.4 mW. The ADC is packaged in a compact 5-mm  $\times$  5-mm VQFN package and is fully specified over the  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  temperature range.

### Device Information<sup>(1)</sup>

| PART NUMBER | PACKAGE   | BODY SIZE (NOM)          |
|-------------|-----------|--------------------------|
| ADS1287D    | VQFN (32) | 5.00 mm $\times$ 5.00 mm |

(1) For all available packages, see the package option addendum at the end of the data sheet.

### Functional Block Diagram



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## 4 Device and Documentation Support

### 4.1 Trademarks

SPI is a trademark of Motorola Mobility LLC.  
All other trademarks are the property of their respective owners.

### 4.2 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 4.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

## 5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

**PACKAGING INFORMATION**

| Orderable part number | Status<br>(1) | Material type<br>(2) | Package   Pins  | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)  |
|-----------------------|---------------|----------------------|-----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| ADS1287DIRHBR         | Active        | Production           | VQFN (RHB)   32 | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 85    | ADS<br>1287D         |
| ADS1287DIRHBT         | Active        | Production           | VQFN (RHB)   32 | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 85    | (ADS, XADS)<br>1287D |

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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