

ADS1287 Low-Power, 1000-SPS, Wide-Bandwidth, Analog-to-Digital Converter With Programmable Gain Amplifier

1 Features

- Selectable Operating Modes
- High-Resolution Mode:
 - SNR: 113 dB (1000 SPS, Gain = 1)
 - Power: 4.5 mW
- Low-Power Mode:
 - SNR: 110 dB (1000 SPS, Gain = 1)
 - Power: 2.4 mW
- THD: –115 dB
- CMRR: 115 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
- Offset and Gain Calibration
- Synchronization Control
- SPI-Compatible Interface
- Analog Power Supply: 5 V or ± 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 ADS1287 device is a low-power, 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 seismic equipment requiring precision digitizing with low power consumption.

The ADC features a programmable-gain, high-impedance complementary metal oxide semiconductor (CMOS) amplifier, suitable for direct connection of geophone and hydrophone sensors to the ADC over a wide range of input signals (± 2.5 V to ± 0.156 V).

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.

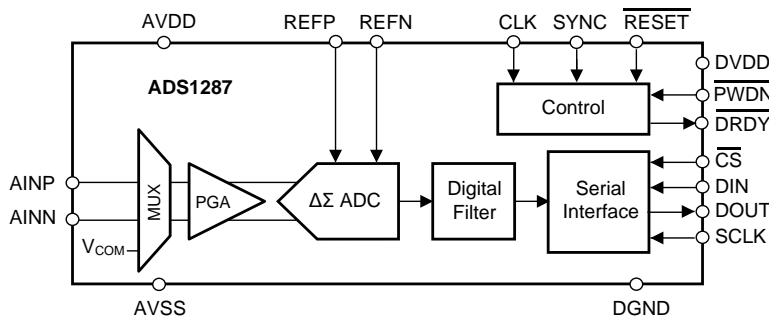
Together, the amplifier, modulator, and digital filter dissipate 4.5 mW in high-resolution mode (2.4 mW in low-power mode). The ADC is packaged in a compact 5-mm \times 4-mm VQFN package. The ADC is fully specified over the -40°C to $+85^{\circ}\text{C}$ temperature range.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
ADS1287	VQFN (24)	5.00 mm \times 4.00 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

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 Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
ADS1287IRHFR	ACTIVE	VQFN	RHF	24	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	ADS1287	Samples
ADS1287IRHFT	ACTIVE	VQFN	RHF	24	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	ADS1287	Samples

(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.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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.

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

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