

ADS7042 Ultra-Low Power, Ultra-Small Size, 12-Bit, 1-MSPS, SAR ADC

1 Features

- Industry's First SAR ADC with Nanowatt Power Consumption:
 - 234 μ W at 1 MSPS with 1.8-V AVDD
 - 690 μ W at 1 MSPS with 3-V AVDD
 - 69 μ W at 100 kSPS with 3-V AVDD
 - Less than 1 μ W at 1 kSPS with 3-V AVDD
- Industry's Smallest SAR ADC:
 - X2QFN-8 Package with 2.25-mm² Footprint
- 1-MSPS Throughput with Zero Data Latency
- Wide Operating Range:
 - AVDD: 1.8 V to 3.6 V
 - DVDD: 1.65 V to 3.6 V (Independent of AVDD)
 - Temperature Range: –40°C to 125°C
- Excellent Performance:
 - 12-Bit Resolution with NMC
 - ± 1 -LSB (Max) DNL and INL
 - 70-dB SNR with 3-V AVDD
 - 80-dB THD with 3-V AVDD
- Unipolar Input Range: 0 V to AVDD
- Integrated Offset Calibration
- SPI™-Compatible Serial Interface: 16 MHz
- JESD8-7A Compliant Digital I/O

2 Applications

- Low-Power Data Acquisition
- Battery-Powered Handheld Equipment
- Level Sensors
- Ultrasonic Flow Meters
- Motor Control
- Wearable Fitness
- Portable Medical Equipment
- Hard Drives
- Glucose Meters

3 Description

The ADS7042 is a 12-bit, 1-MSPS, analog-to-digital converter (ADC). The device supports a wide analog input voltage range (1.8 V to 3.6 V) and includes a capacitor-based, successive-approximation register (SAR) ADC with an inherent sample-and-hold circuit. The SPI-compatible serial interface is controlled by the \overline{CS} and \overline{SCLK} signals. The input signal is sampled with the \overline{CS} falling edge and \overline{SCLK} is used for conversion and serial data output. The device supports a wide digital supply range (1.65 V to 3.6 V), enabling direct interface to a variety of host controllers. The device complies with the JESD8-7A standard for normal DVDD range (1.65 V to 1.95 V).

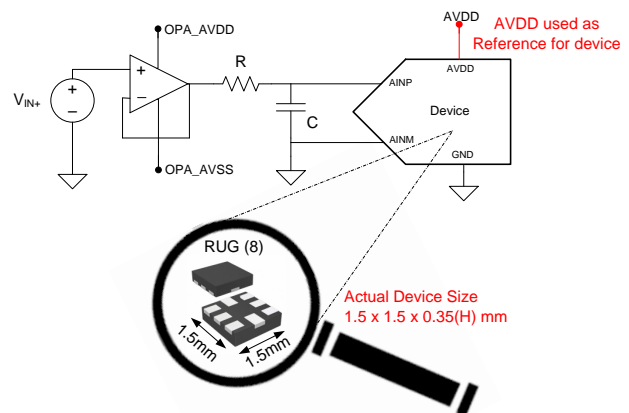
The device is available in 8-pin, miniature, leaded, and X2QFN packages and is specified for operation from –40°C to 125°C. Miniature form-factor and extremely low-power consumption make this device suitable for space-constrained, battery-powered applications.

Device Information⁽¹⁾

PART NAME	PACKAGE	BODY SIZE (NOM)
ADS7042	X2QFN (8)	1.50 mm x 1.50 mm
	VSSOP (8)	2.30 mm x 2.00 mm

(1) For all available packages, see the orderable addendum at the end of the datasheet.

Typical Application



NOTE: The device is smaller than a 0805 (2012 metric) SMD component.



4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following:

- OPA314 Data Sheet, [SBOS563](#)
- OPA835 Data Sheet, [SLOS713](#)
- TPS79101 Data Sheet, [SLVS325](#)

4.2 Trademarks

SPI is a trademark of Motorola.

All other trademarks are the property of their respective owners.

4.3 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.

4.4 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
ADS7042IDCUR	PREVIEW	US8	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	7042	
ADS7042IDCUT	PREVIEW	US8	DCU	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	7042	
ADS7042IRUGR	PREVIEW	X2QFN	RUG	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	FV	

(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) 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.

(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.

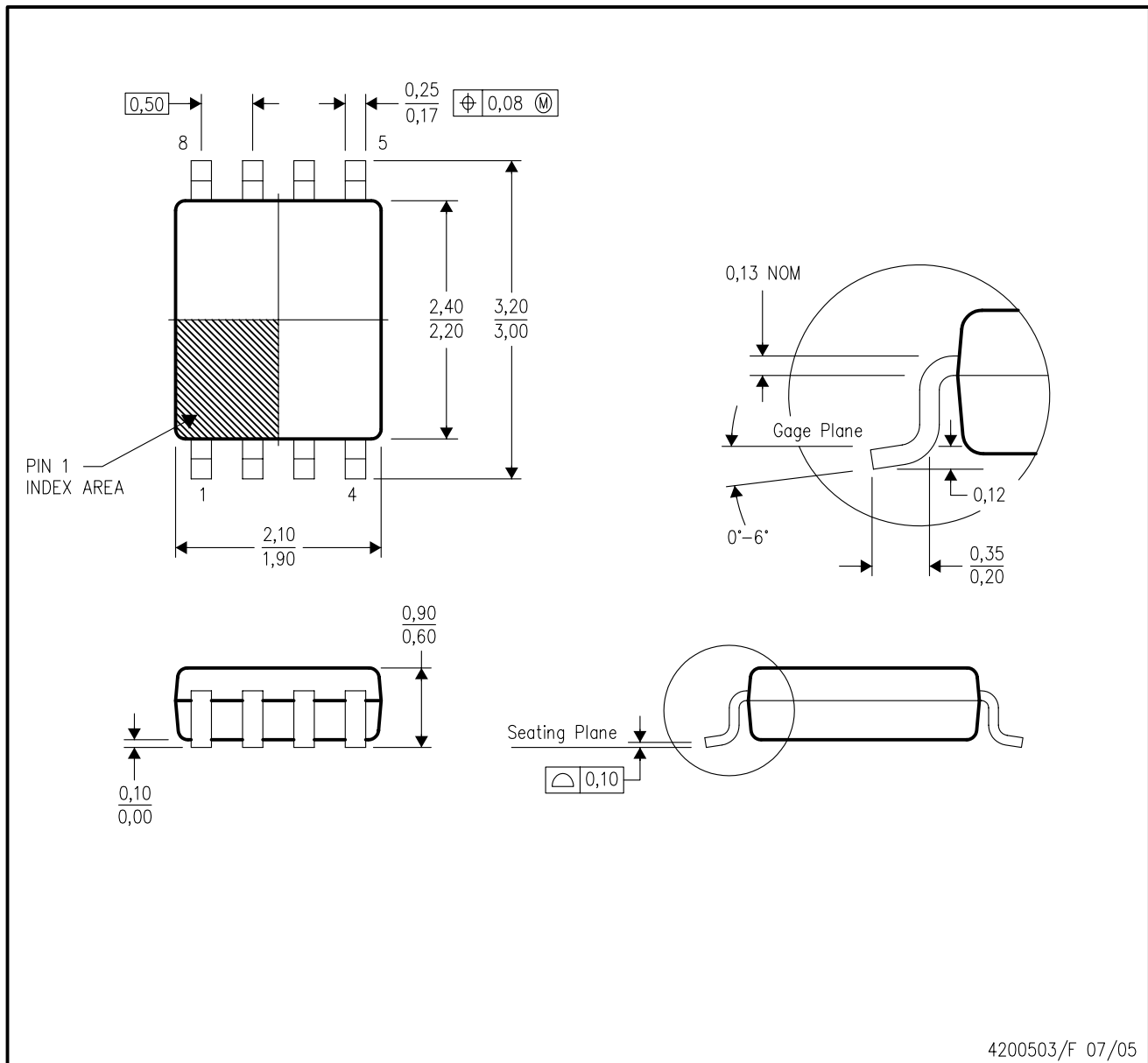
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DCU (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
 - Falls within JEDEC MO-187 variation CA.

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