



## DDC2256A 256-Channel, Current-Input Analog-To-Digital Converter

### 1 Features

- Single-Chip Solution to Directly Measure 256 Low-Level Currents Simultaneously
- User Adjustable Full-Scale Range
- Adjustable Speed with Integration Times as Low as 58.8  $\mu$ s (17 KSPS per channel) with 24 bit Resolution
- Power Dissipation as Low as 1.7mW/channel
- Integral Linearity:  $\pm 0.025\%$  of Reading  $\pm 1$  ppm of Full Scale Reading (all channels active)
- Low Noise
- 24 bit ADC
- No Charge Loss and Simultaneous Sampling
- On-board Temperature Sensor
- In-Package Bypass Capacitors and Reference Buffer to Reduce PCB Area and Design Complexity
- Serial LVDS and CMOS Output Interface Option

### 2 Applications

- CT Scanner Data Acquisition System
- Photodiode Sensors
- X-ray Detection Systems
- Optical Fiber Power Monitoring
- Multichannel Current/Voltage Instrumentation

### 3 Description

The DDC2256A is a 24-bit, 256-channel, current-input analog-to-digital (A/D) converter. It combines both current-to-voltage integration and A/D conversion so that 256 individual low-level current output devices, such as photodiodes, can be directly connected to its inputs and digitized in parallel (simultaneously).

For each of the inputs, the DDC2256A has one low noise/low power integrator designed to capture all the charge from the sensor. The integration time is adjustable from 58.8 $\mu$ s to 100 ms, allowing currents from fA to  $\mu$ A to be continuously measured with outstanding precision. The outputs of the integrators are digitized by sixteen 24-bit low power ADCs and all the resulting data is output over a single LVDS serial interface pair designed to minimize noise coupling in environments with high channel count.

The DDC2256A operates from  $\pm 2.5$ -V analog supply, 1.8-V analog supply (AVDD\_18) and 1.8-V digital supply (DVDD). The device is specified from 0°C to 70°C operating temperature and available in a 14 x 16 mm<sup>2</sup> 323-ball 0.8 mm-pitch BGA. Finally, the on board reference buffer and bypass capacitors help minimize the external component requirements and further reduce board space.

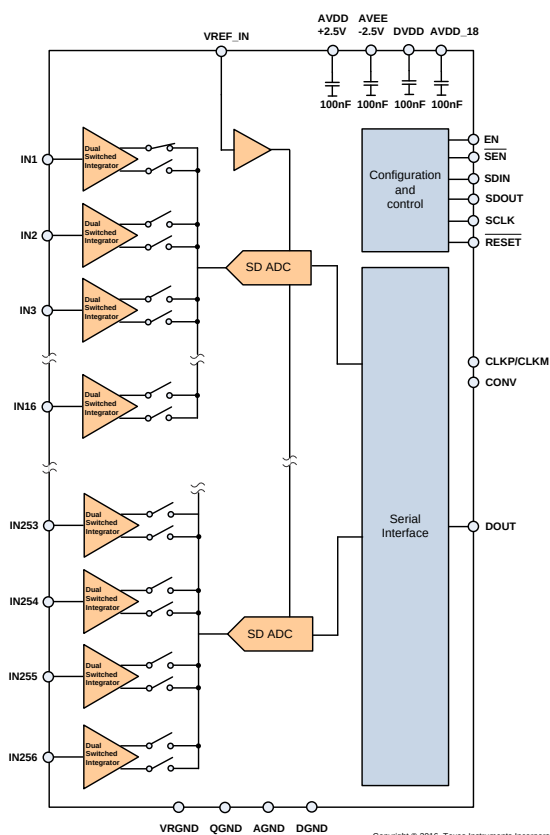
To request a full data sheet or other design resources: [request DDC2256A](#)

#### Device Information (1)

| PART NUMBER | PACKAGE     | BODY SIZE (NOM)   |
|-------------|-------------|-------------------|
| DDC2256A    | NFBGA (323) | 16.0 mm x 14.0 mm |

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

#### Block Diagram



## 4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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| Changes from Revision A (April 2016) to Revision B | Page |
|----------------------------------------------------|------|
|----------------------------------------------------|------|

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- |                                               |                   |
|-----------------------------------------------|-------------------|
| • Added link to request full data sheet ..... | <a href="#">1</a> |
|-----------------------------------------------|-------------------|
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| Changes from Original (March 2016) to Revision A | Page |
|--------------------------------------------------|------|
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- |                                                      |                   |
|------------------------------------------------------|-------------------|
| • Changed From: Product Preview To: Production ..... | <a href="#">1</a> |
|------------------------------------------------------|-------------------|
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## 5 Device and Documentation Support

### 5.1 Documentation Support

1-A, *Ultralow-Noise Negative Voltage Regulator*, [SBVS169](#)

### 5.2 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

**TI E2E™ Online Community** *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At [e2e.ti.com](#), you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

**Design Support** *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

### 5.3 Trademarks

E2E is a trademark of Texas Instruments.

### 5.4 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 5.5 Glossary

[SLYZ022](#) — *TI Glossary*.

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

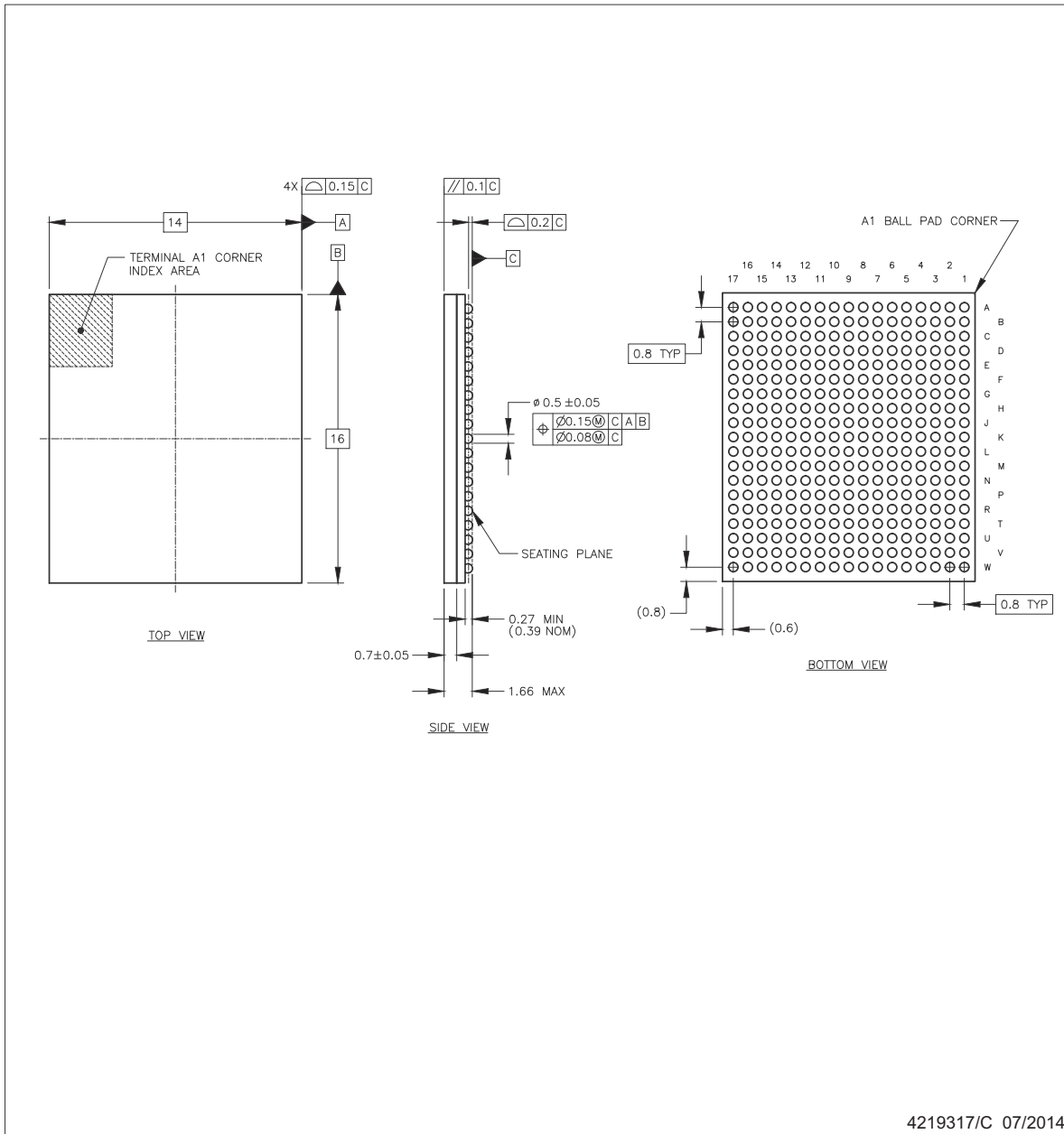
## 6 Mechanical, Packaging, and Orderable Information

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.

## ZZF0323A

## PACKAGE OUTLINE NFBGA - 1.66 mm max height

BGA



### NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| DDC2256AZZF      | ACTIVE        | NFBGA        | ZZF                | 323  | 84             | Green (RoHS<br>& no Sb/Br) | SNAGCU                  | Level-3-260C-168 HR  | 0 to 70      | DDC2256A                | <a href="#">Samples</a> |

(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.

(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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### Products

|                              |                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------|
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| Amplifiers                   | <a href="http://amplifier.ti.com">amplifier.ti.com</a>                               |
| Data Converters              | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>                       |
| DLP® Products                | <a href="http://www.dlp.com">www.dlp.com</a>                                         |
| DSP                          | <a href="http://dsp.ti.com">dsp.ti.com</a>                                           |
| Clocks and Timers            | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>                             |
| Interface                    | <a href="http://interface.ti.com">interface.ti.com</a>                               |
| Logic                        | <a href="http://logic.ti.com">logic.ti.com</a>                                       |
| Power Mgmt                   | <a href="http://power.ti.com">power.ti.com</a>                                       |
| Microcontrollers             | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a>                   |
| RFID                         | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>                                 |
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| Wireless Connectivity        | <a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a> |

### Applications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
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| Communications and Telecom    | <a href="http://www.ti.com/communications">www.ti.com/communications</a>                 |
| Computers and Peripherals     | <a href="http://www.ti.com/computers">www.ti.com/computers</a>                           |
| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
| Energy and Lighting           | <a href="http://www.ti.com/energy">www.ti.com/energy</a>                                 |
| Industrial                    | <a href="http://www.ti.com/industrial">www.ti.com/industrial</a>                         |
| Medical                       | <a href="http://www.ti.com/medical">www.ti.com/medical</a>                               |
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