



# AFE2256 256-Channel, Analog Front-End for Digital X-Ray, Flat-Panel Detectors

## 1 Features

- 256 Channels
- On-Chip, 16-Bit ADC
- Photodiode Short Immunity
- Column Short Immunity
- High Performance:
  - Noise: < 800 e-RMS with 50-pF Sensor Capacitance in 1.2-pC Input Range
  - Integral Nonlinearity:  $\pm 5$  LSB with Internal 16-Bit ADC
  - Scan Time:
    - 20  $\mu$ s in Non-Binning Mode
    - 15  $\mu$ s in  $2 \times 2$  Binning Mode
- Integration:
  - Six Selectable Full-Scale Input Ranges: 0.6 pC (Min) to 9.6 pC (Max)
  - Internal Timing Generator (TG)
  - Built-In Correlated Double Sampler
  - $2 \times 2$  Binning Mode (Averages Charge of Two Adjacent Channels) for Faster Throughput
  - Pipelined Integrate and Read: Allows Data Read During Integration
  - Serial LVDS Output
- Flexibility:
  - Electron and Hole Integration
- Simple Power-Supply Scheme:
  - AVDD1 = 1.85 V
  - AVDD2 = 3.3 V
- Low Power:
  - < 2 mW/Ch
  - < 0.05 mW/Ch in Nap Mode
  - Total Power-Down
- Chip-On-Film (COF) Package

## 2 Applications

- Flat-Panel, X-Ray Detectors
- Charge Detectors

## 3 Description

The AFE2256 is a 256-channel, analog front-end (AFE) designed to suit the requirements of flat-panel detector (FPD) based digital x-ray systems. The device includes 256 integrators, a programmable gain amplifier (PGA) for full-scale charge level selection, a correlated double sampler (CDS) with dual banking, and 256:4 analog multiplexers.

The device also features four 16-bit successive-approximation register (SAR) analog-to-digital converters (ADCs) onboard. Serial data from the ADCs are available in low-voltage differential signaling (LVDS) format.

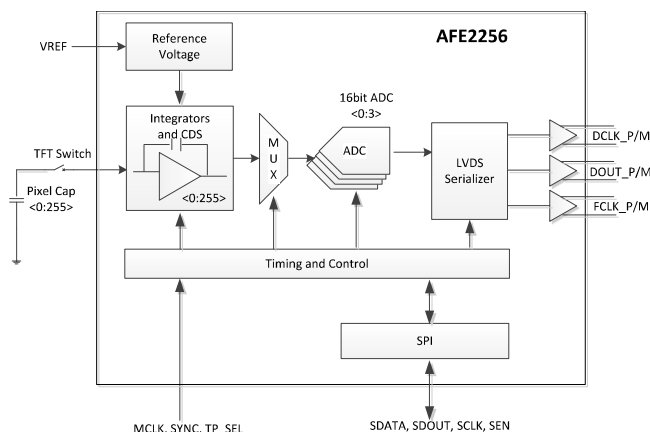
Hardware-selectable integration polarity allows positive or negative charge integration and provides more flexibility in system design. The Nap feature enables substantial power saving that is especially useful in battery-powered systems.

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

PART NUMBER	PACKAGE	BODY SIZE (NOM)
AFE2256	COF (370)	38.00 mm x 28.00 mm

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

### AFE2256 Schematic



## 4 Device and Documentation Support

### 4.1 Trademarks

All 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.



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# PACKAGE OPTION ADDENDUM

3-Mar-2015

## PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty (2)	Eco Plan	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
AFE2256TDU	PREVIEW	COF	TDU	370	TBD	TBD	Call TI	Call TI	0 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.

**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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TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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### Applications

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