TEXAS INSTRUMENTS

AFE2256
SBAS693C – MARCH 2015 – REVISED DECEMBER 2023

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
- High Performance:
  - Noise: 750 Electrons RMS (1.2-pC Input Charge Range)
  - Low Correlated Noise
  - Integral Nonlinearity: ±2 LSB with Internal 16-Bit ADC
  - Scan Time: < 20 µs to 204.8 µs
- Integration:
  - Six Selectable, Full-Scale Input Ranges: 0.6 pC (Minimum) to 9.6 pC (Maximum)
  - Internal Timing Generator (TG)
  - Built-In Correlated Double Sampler
  - Pipelined Integrate-and-Read for Improved Throughput—Data-Read During Integration
  - Serial LVDS Output
- Simple Power-Supply Scheme:
  - AVDD1 = 1.85 V
  - AVDD2 = 3.3 V
- Low Power Consumption
- Nap and Total Power-Down Modes
- Custom Chip-On-Film (COF) Packages

2 Applications

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

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 with dual banking, and 256:4 analog multiplexers.

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

The nap and power-down modes enable substantial power savings, and are especially useful in battery-powered systems.
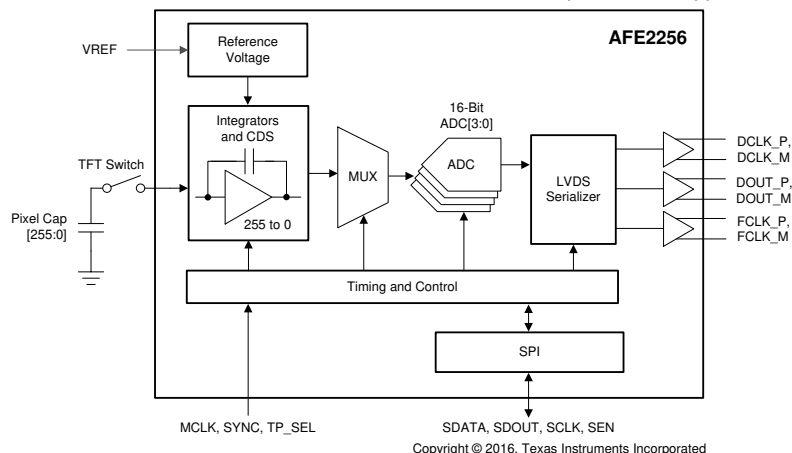
To request a full datasheet or other design resources: request AFE2256

Package Information

PART NUMBER	PACKAGE[1]	PACKAGE SIZE[2]
AFE2256	TDU (COF, 320)	38.00 mm × 28.00 mm
	TDR (COF, 325)	48.35 mm × 21.5 mm
	TBN (COF, 325)	48.35 mm × 21.5 mm

(1) For all available packages, see Section 6.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.

AFE2256 Block Diagram

Table of Contents

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Product Folder Links: *AFE2256*

4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation, see the following:

Texas Instruments, *TPS7A8300 2-µA, 6-µVRMS, RF, LDO Voltage Regulator* data sheet

4.2 Trademarks

All 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

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

5 Revision History

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

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.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
AFE2256TBN	ACTIVE	COF	TBN	325	32	Non-RoHS & Non-Green	AU	N / A for Pkg Type	0 to 70	AFE2256TBN	Samples
AFE2256TDR	ACTIVE	COF	TDR	325	32	RoHS & Green	AU	Level-1-260C-UNLIM	0 to 85	AFE2256TDR	Samples
AFE2256TDU	ACTIVE	COF	TDU	320	35	RoHS & Green	AU	Level-1-260C-UNLIM	0 to 85	AFE2256TDU	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 finish/Ball material - Orderable Devices 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.

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