AFE2257
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: < 600 electrons
  - Low correlated noise
  - Full-channel integral nonlinearity: ±2 LSB with internal 16-Bit ADC
  - Scan time: < 20 µs to > 250 µs
- Integration:
  - Programmable full-scale input charge range: < 1 pC to > 25 pC
  - 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 or 4.75 V
- Low power consumption
- Nap and total power-down modes
- Pin compatible to AFE2256

2 Applications

- Flat-panel, X-ray detectors
- Charge detectors
- Capacitance measurement

3 Description

The AFE2257 is a 256-channel charge readout IC (ROIC) designed for flat-panel detector (FPD) based digital x-ray systems. The device includes 256 integrators, correlated double samplers (CDSs) 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 device optimizes the overall x-ray system performance using features such as multiple power modes and in-system debug options. The nap and power-down modes enable substantial power savings, and are especially useful in battery-powered systems.

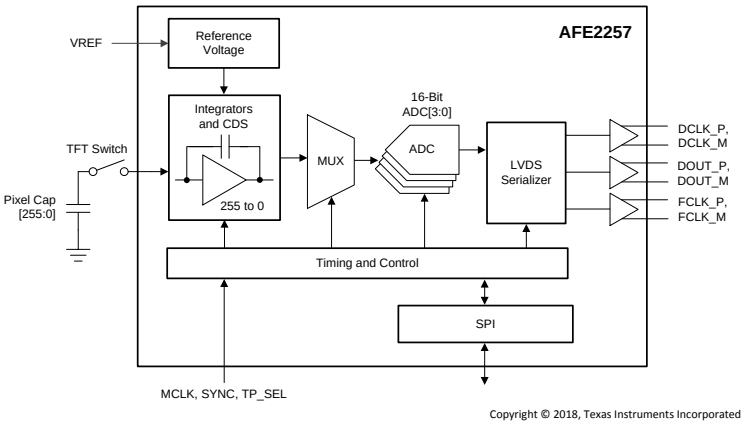
Device Information[1]

PART NUMBER	PACKAGE	BODY SIZE (NOM) [2]
AFE2257	COF (TDU) 320	38.00 mm × 28.00 mm

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

(2) L x W (mm × mm)

AFE2257 Block Diagram



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4 Revision History

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

DATE	REVISION	NOTES
March 2019	*	Initial release.

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5 Device and Documentation Support

5.1 Documentation Support

5.1.1 Related Documentation

TPS7A8300 2-µA, 6-µVRMS, RF, LDO Voltage Regulator

5.2 Trademarks

All trademarks are the property of their respective owners.

5.3 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.

5.4 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.

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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
AFE2257TDU	ACTIVE	COF	TDU	320	35	Green (RoHS & no Sb/Br)	AU	Level-1-260C-UNLIM	0 to 85	AFE2257TDU	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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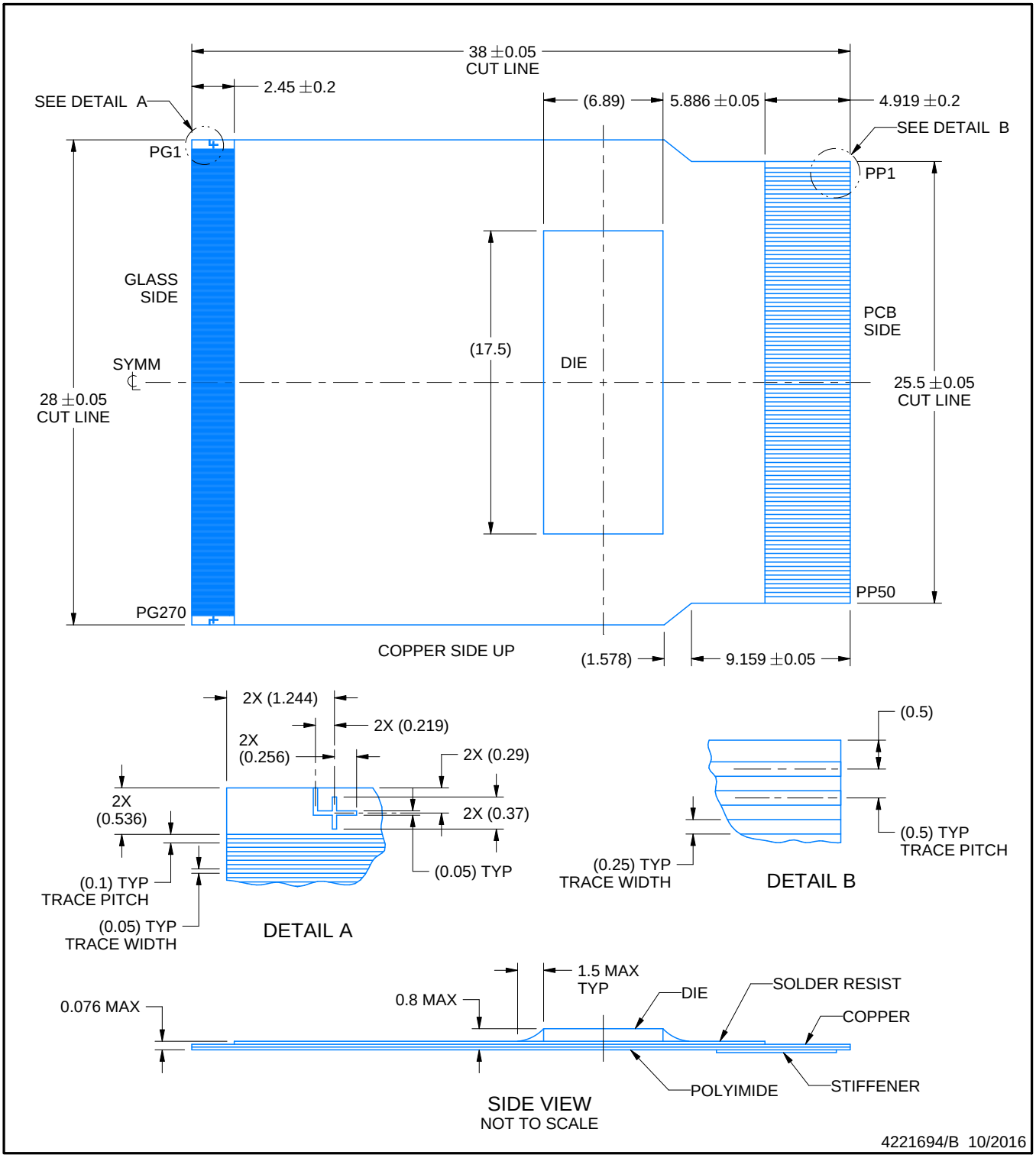
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PACKAGE OUTLINE

TDU0320A

COF - 0.8 mm max height

CHIP ON FLEX



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.
3. Flip chip application only.

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