

## 256-Channel Analog Front-End for Flat-Panel Digital X-Ray Detector

Check for Samples: [AFE0256](#)

### FEATURES

- 256 Channels
- On-Chip, 14-Bit ADC
- High Performance:
  - Noise: 758 electronRMS (eRMS) with 28-pF Sensor Capacitor in 1.2-pC Range
  - Integral Nonlinearity:  $\pm 1.25$  LSB with Internal 14-Bit ADC
  - Minimum Scan Time:
    - Normal Mode: 37.9  $\mu$ s, Internal ADC
    - 2x Binning Mode: 26  $\mu$ s, Internal ADC
- Integration:
  - Eight Selectable, Full-Scale Ranges:
    - 0.15 pC (min) to 9.6 pC (max)
  - Built-In Correlated Double Sampler
  - 2x Binning for Faster Throughput:
    - Averages Charge of Two Adjacent Channels
  - Pipelined Integration and Read:
    - Allows Data Read During Integration
- Flexibility:
  - Electron and Hole Integration
  - Analog Output Provided for External High-Resolution ADC
- Low Power:
  - 2.9 mW per Channel with ADC
  - 2.3 mW per Channel without ADC
  - 0.1 mW per Channel in Nap Mode
  - Total Power-Down Feature
- 22-mm  $\times$  5-mm Gold-Bump Die Suitable for Tape Carrier Package (TCP) or Chip-on-Film (COF)

### APPLICATIONS

- Flat-Panel X-Ray Detectors

### DESCRIPTION

The AFE0256 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, 256:4 analog multiplexers, and four differential output drivers.

The device also features four 14-bit successive-approximation register (SAR) analog-to-digital converters (ADCs) on board. Serial data from the ADCs are available in SPI™ 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.

The AFE0256 is available as a 22-mm  $\times$  5-mm singulated format with known good gold-bump dies.



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Tray, Top Side

Single Gold-Bump Unit, Back Side

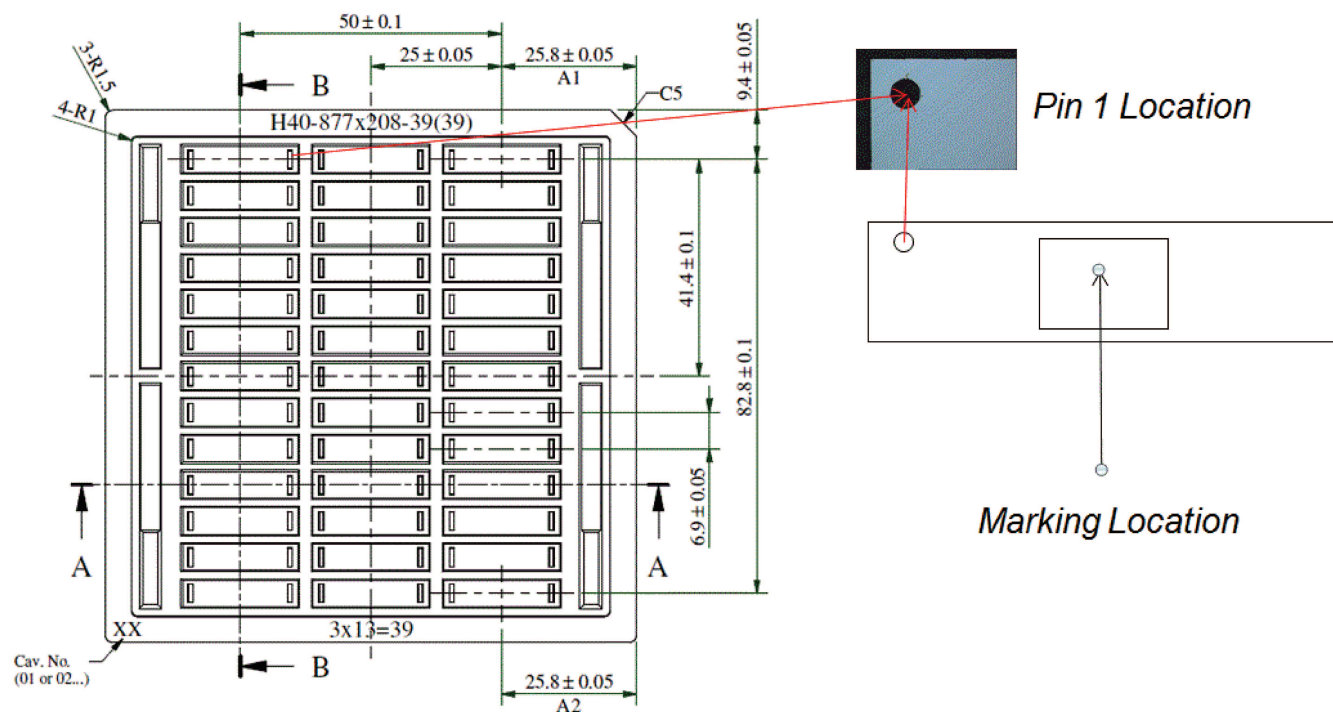


Figure 1. Tray Information

## REVISION HISTORY

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

Changes from Original (December 2012) to Revision A	Page
• Changed last Features bullet .....	<a href="#">1</a>
• Updated <a href="#">Figure 1</a> .....	<a href="#">2</a>

## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
AFE0256GBTD	Active	Production	null (null)   0	39   TUBE	Yes	AU	Level-1-260C-UNLIM	0 to 85	AFE0256
AFE0256GBTD.A	Active	Production	null (null)   0	39   TUBE	Yes	AU	Level-1-260C-UNLIM	0 to 85	AFE0256

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts 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.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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Last updated 10/2025