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: ±1.25 LSB with Internal 14-Bit ADC**
  - **Minimum Scan Time:**
    - **Normal Mode: 37.9 µs, Internal ADC**
    - **2x Binning Mode: 26 µs, 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 × 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 × 5-mm singulated format with known good gold-bump dies.

Tray, Top Side

Single Gold-Bump Unit, Back Side

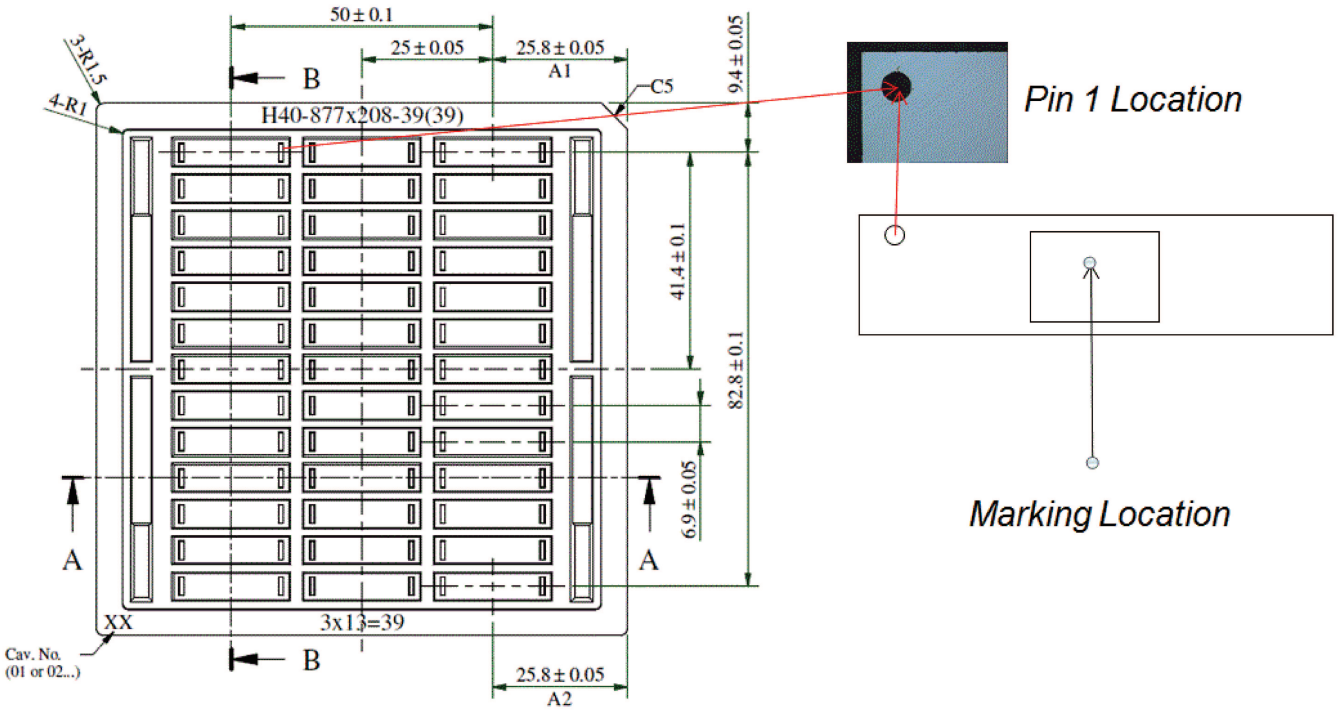

Figure 1. Tray Information

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	1
• Updated Figure 1	2

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
AFE0256GBTD	ACTIVE			0	39	Green (RoHS & no Sb/Br)	AU	Level-1-260C-UNLIM	0 to 85	AFE0256	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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