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.

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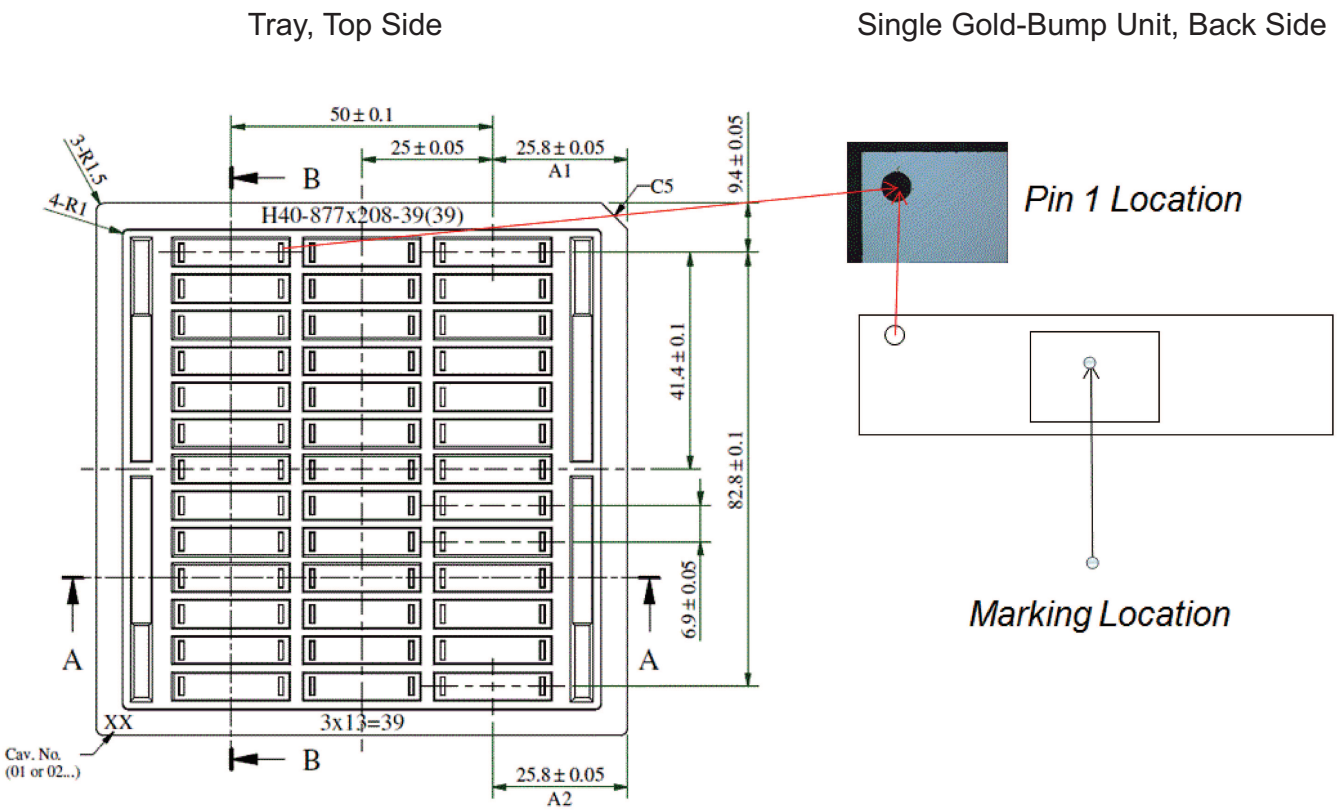

Figure 1. Tray Information

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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	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) 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.

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