256-Channel, Analog Front-End for Digital X-Ray Flat-Panel Detectors

Check for Samples: AFE1256

FEATURES

- **256 Channels**
- **On-Chip, 16-Bit ADC**
- **Photodiode Short Immunity**
- **Column Short Immunity**
- **High Performance:**
  - **Noise: 758 e-RMS with 28-pF Sensor Capacitor in 1.2-pC Range**
  - **Integral Nonlinearity: ±2 LSB with Internal 16-Bit ADC**
  - **Minimum Scan Time:**
    - **37.9 µs in Normal Mode**
    - **20 µs in 2x Binning Mode**
- **Integration:**
  - **Eight Selectable Full-Scale Ranges: 0.15 pC (Min) to 9.6 pC (Max)**
  - **Built-In Correlated Double Sampler**
  - **2x Binning (Averages Charge of Two Adjacent Channels) for Faster Throughput**
  - **Pipelined Integrate and Read, Allows Data Read During Integration**
- **Flexibility:**
  - **Electron and Hole integration**
- **Low Power:**
  - **2.9 mW/Ch with ADC**
  - **2.3 mW/Ch without ADC**
  - **0.1 mW/Ch in Nap Mode**
  - **Total Power-Down Feature**
- **22-mm × 5-mm Gold-Bump Die, Suitable for TCP and COF**

APPLICATIONS

- **Flat-Panel X-Ray Detectors**

DESCRIPTION

The AFE1256 is a 256-channel, analog front-end designed to suit the requirements of flat-panel detectors (FPDs) based on 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 16-bit, successive-approximation register (SAR) analog-to-digital converters (ADCs) onboard. Serial data from the ADCs are available in SPI™ format.

Hardware-selectable integration polarity allows for the integration of positive or negative charge and provides more flexibility in system design. The Nap feature enables substantial power saving. This power savings is especially useful in battery-powered systems.

The AFE1256 is available in a 22-mm × 5-mm, singulated TCP package with known good dies and gold bumps. The device is also available in a 34.89-mm × 29.65-mm, 344-pin, chip-on-film (COF) TDQ package and a 38-mm × 28-mm, COF-314 TDS package in singulated forms.

PRODUCT PREVIEW

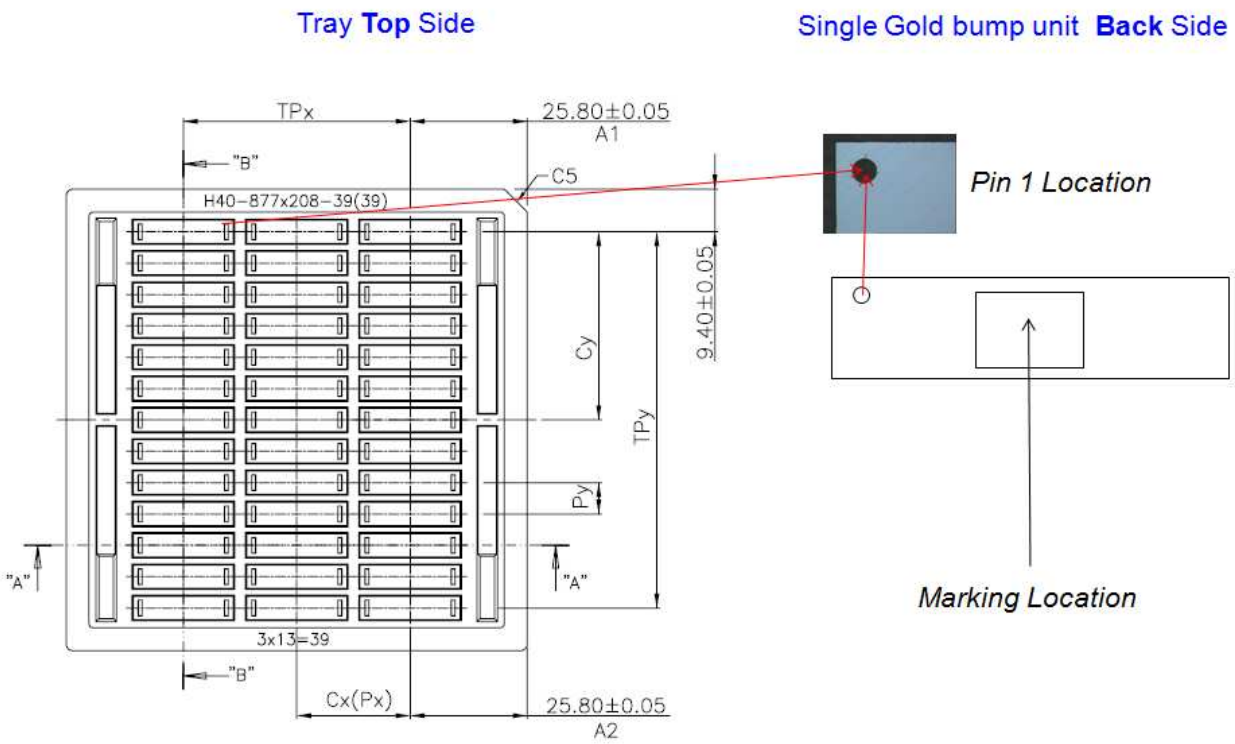

Figure 1. GBTD Tray Dimensions

PRODUCT PREVIEW

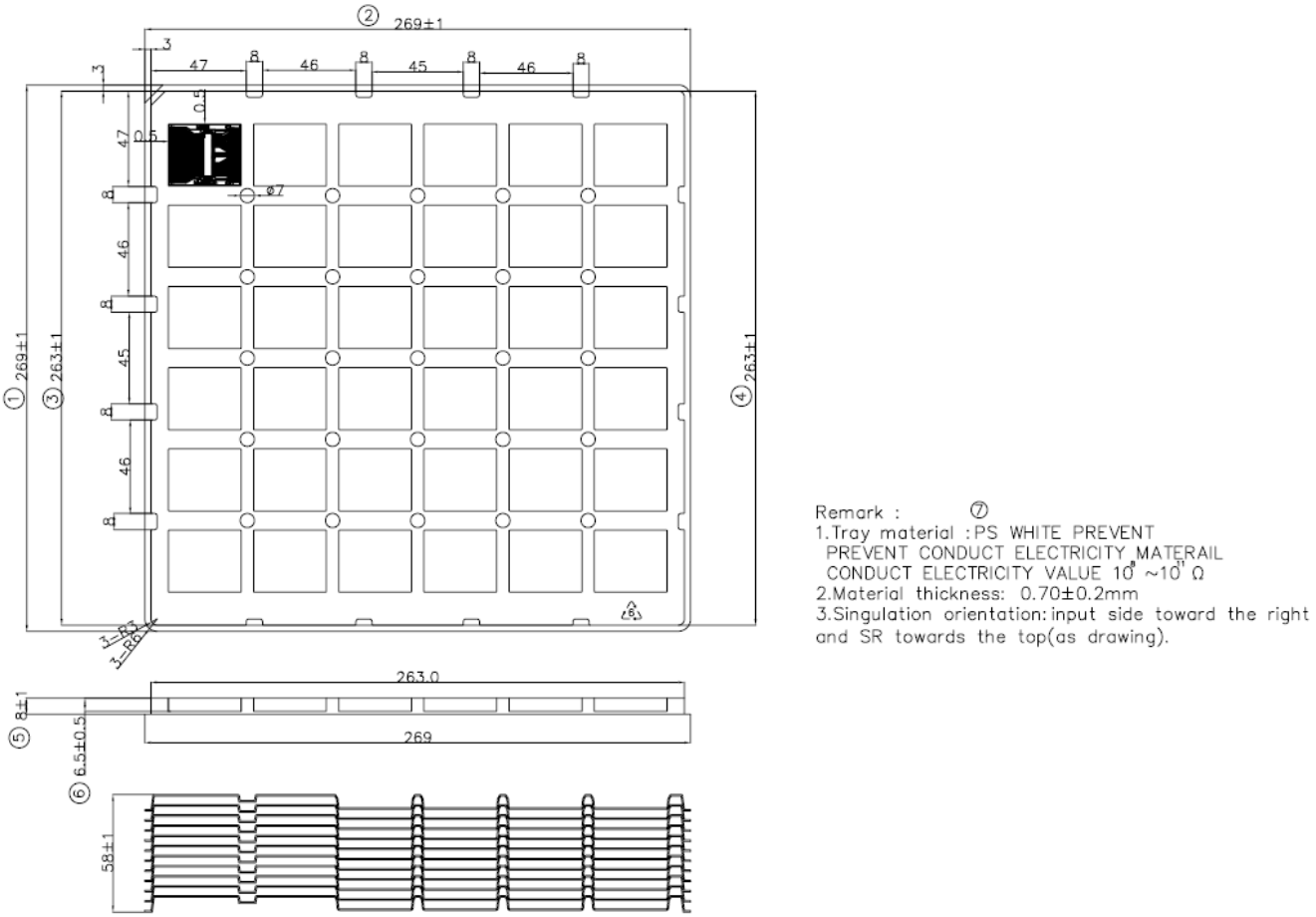

Figure 2. TDQ Tray Dimensions

PRODUCT PREVIEW

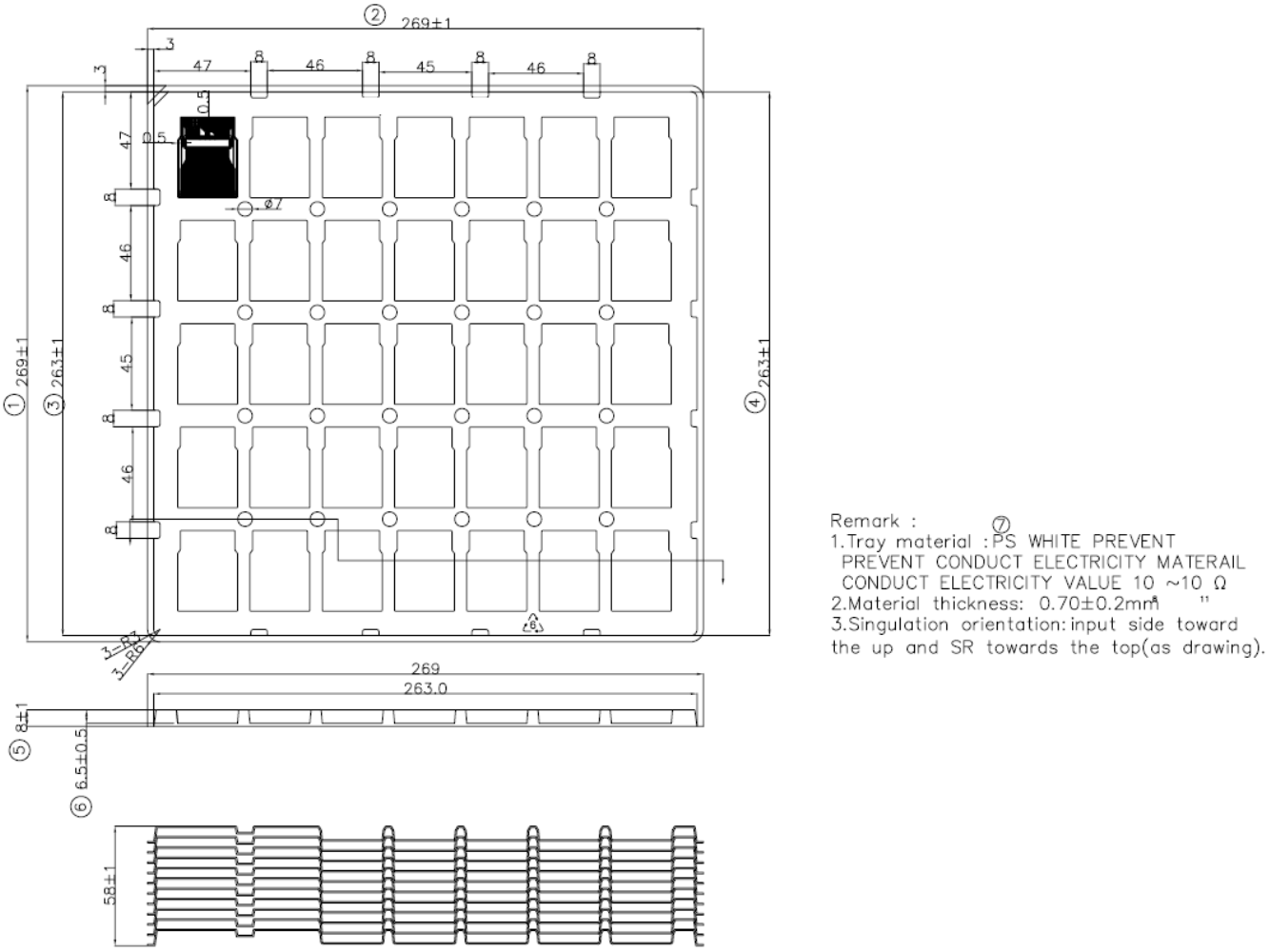

Figure 3. TDS Tray Dimensions

PRODUCT PREVIEW

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
AFE1256GBTD	PREVIEW			0	39	Green (RoHS & no Sb/Br)	AU	Level-1-260C-UNLIM	0 to 85	AFE1256	
AFE1256TDQ	PREVIEW	COF	TDQ	344	36	TBD	Call TI	Call TI	0 to 85		
AFE1256TDS	PREVIEW	COF	TDS	314	35	Green (RoHS & no Sb/Br)	AU	Level-1-260C-UNLIM	0 to 85	AFE1256TDS	

(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.

(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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