

amun AS5911

Datasheet

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Tobelbader Strasse 30, 8141 Premstaetten, Austria

Phone +43 3136 500-0

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AS5911 256-channel low noise current-to-digital converter

1 General description

The AS5911 is an ultra-low noise, 256-channel low power current to digital converter that enables the readout of photodiodes of a CT detector with highest sensitivity. The output currents of 256 photodiodes are converted simultaneously into digital without any dead time resulting in no charge loss on the inputs. The AS5911 combines current-to-voltage integration and A/D conversion for 256-channels in one device. The ADC architecture with its low-noise integrators, coarse quantizer, sample-and-hold and fine quantizer guarantee lowest input related noise of maximum 0.29 fC (low noise mode) at an input current range of 0.5 μ A. The input current range of the ADC is selectable between 0.5 μ A and 1 μ A.

The AS5911 supports two supply concepts: a single analog and true ground supply, in both modes the photodiodes are zero biased for ultra-low dark current of the photodiode. In true ground mode, the AS5911 operates at ± 1.5 V dual analog supply while in single supply mode only a single analog supply of +3.0 V is needed. The device detects automatically the chosen supply concept. No external components are required for supply decoupling. To reduce PCB area and simplify the assembly process, decoupling capacitors for supply and reference voltages are integrated in the 14 x 14 mm² FBGA package. The on-chip LDOs, reference voltages and a temperature sensor minimize the external component requirements and reduces the bill of material.

Full-scale range, integration time and power mode are configurable over a SPI-compatible serial interface as well as the digital output modes of the LVDS interface. In low power mode, the power dissipation can be minimized down to 1.25 mW per channel for reduced self-heating of the CT detector. The adjustable integration time down to 51 μ s allow very high frame rates. The operating range of AS5911 is specified from 0 °C to 85 °C.

1.1 Key benefits & features

The benefits and features of AS5911, 256-channel low noise current-to-digital converter are listed below:

Table 1: Added value of using AS5911

Benefits	Features
256-channel in 14 x 14 mm ² FBGA package.	No external components required. Integrated capacitors for supply and reference decoupling
Ultra-low noise of 0.29 fC at 0.5 μ A input current in low noise mode.	No charge loss. Continuous charge integration due to zero dead time of ADC architecture.
Lowest power dissipation of 1.25 mW per channel in low power mode	Selectable full-scale range of 0.5 μ A in low range and 1 μ A in high range.
Adjustable integration time down to 51 μ s (20 kSPS) at 20-bit resolution. Up to 26-bit at integration times of 1 ms.	Adjustable full-scale range, integration time and power consumption via SPI interface as well as adjustable output modes via LVDS.
Zero biased photodiodes (true ground concept) for ultra-low dark currents.	Selectable power supply concept between dual ± 1.5 V analog supply (true ground concept) or single +3.0 V analog supply.
Integral Linearity of $\pm 0.080\%$ of reading and ± 0.2 ppm of full-scale range (all channels active).	On-chip LDOs, voltage references and temperature sensor.
Automatic zero offset calibration, input charge calibration and linearity calibration.	Built-in diagnostic modes for testing full detector signal chain.

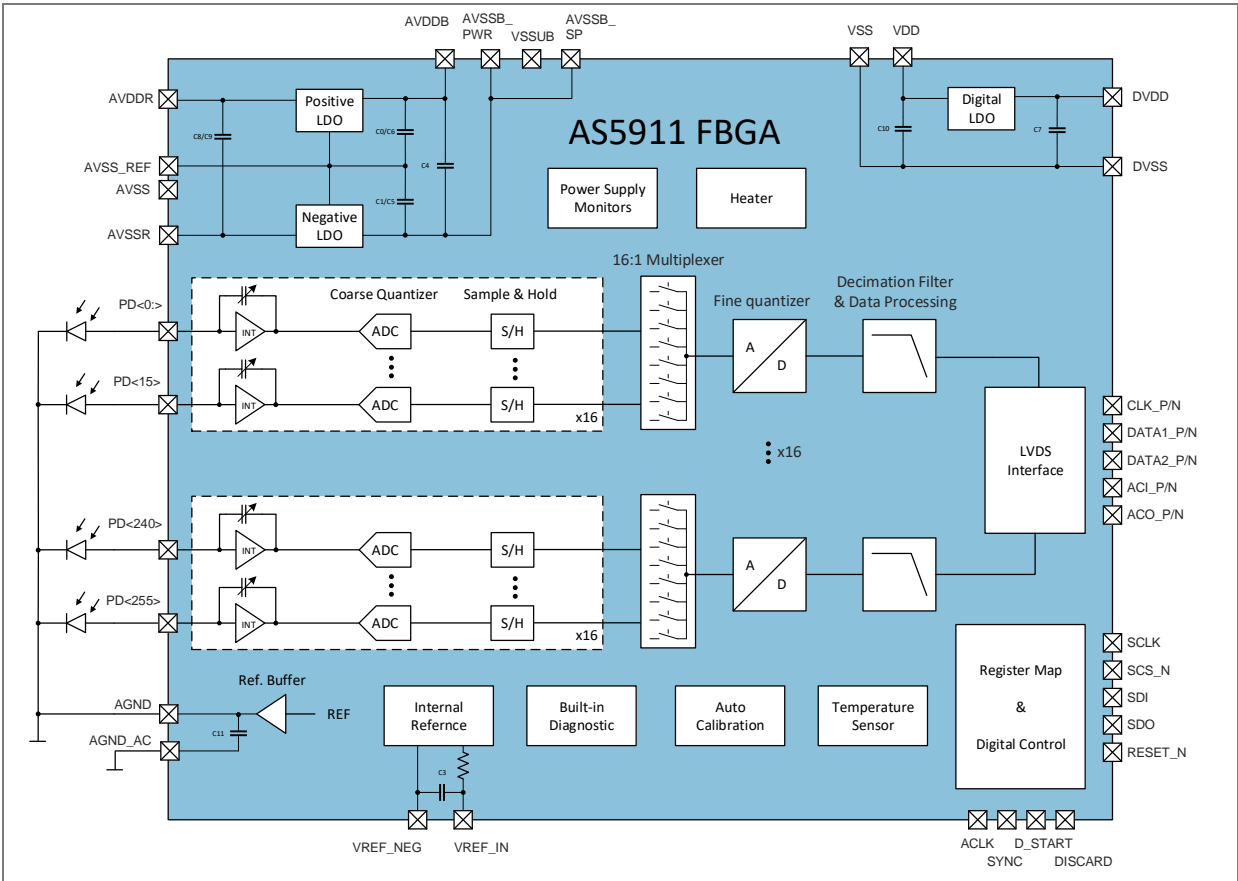
1.2 Applications

- Medical, industrial and security CT scanner data acquisition.
- Photodiode sensors.
- Multi-channel sensors with current output.
- DAS (Data Acquisition System) for current input.

1.3 Block diagram

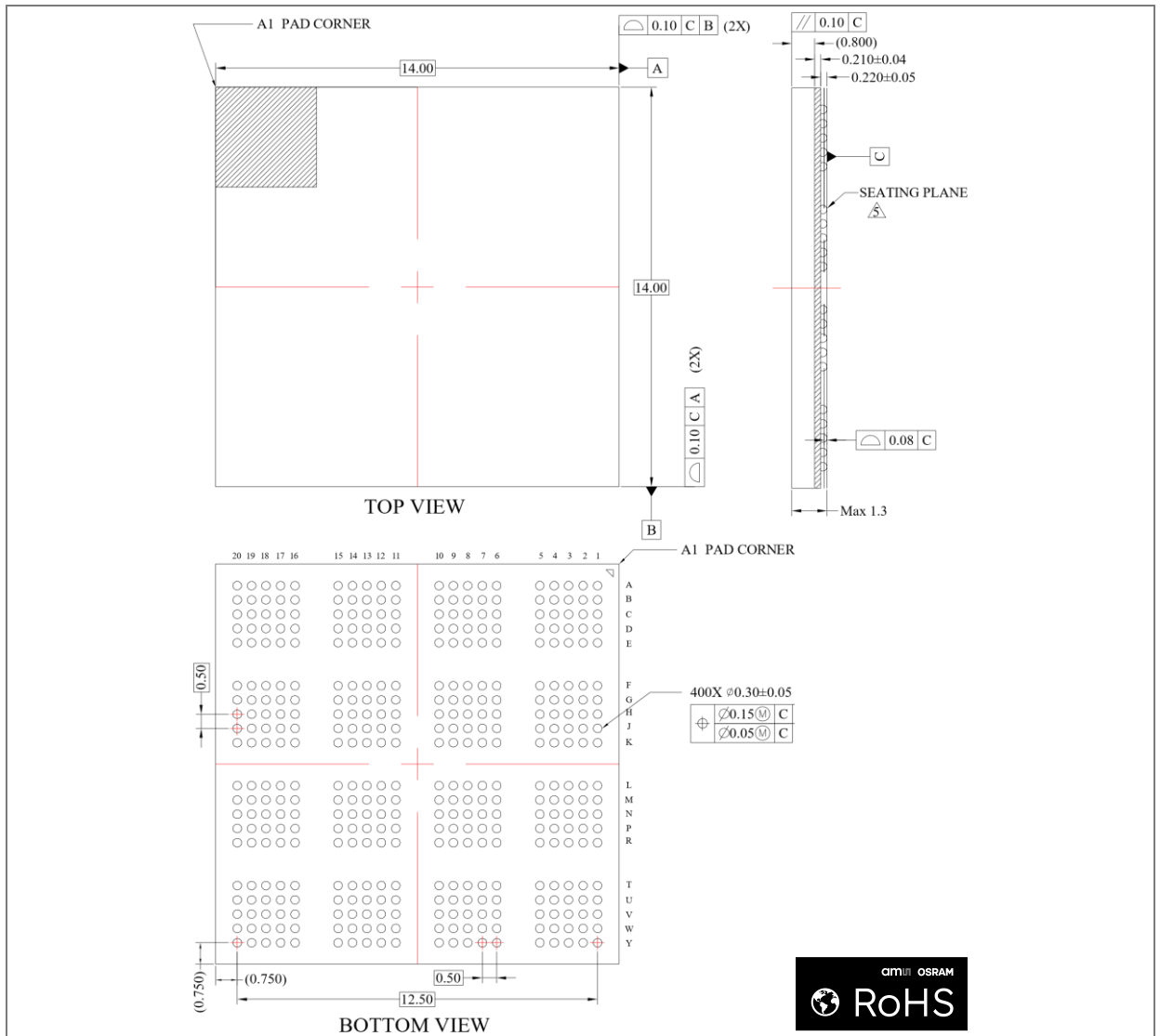
The functional blocks of this device are shown below:

Figure 1: Functional blocks of AS5911 for true ground concept



2 Package drawings & markings

Figure 2: FBGA400 package outline drawing of AS5911



- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Dimensioning and tolerancing conform to ASME Y14.5M-1994.
- (3) Maximum solder ball diameter measured parallel to datum C. Post reflow diameter.
- (4) Datum C and seating plane are defined by the spherical crowns of the solder balls.
- (5) This package contains no lead (Pb).
- (6) This drawing is subject to change without notice.

Figure 3: FBGA400 package marking/code of AS5911



3 Revision information

Document status	Product status	Definition
Product Preview	Pre-development	Information in this datasheet is based on product ideas in the planning phase of development. All specifications are design goals without any warranty and are subject to change without notice
Preliminary Datasheet	Pre-production	Information in this datasheet is based on products in the design, validation or qualification phase of development. The performance and parameters shown in this document are preliminary without any warranty and are subject to change without notice
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Changes from previous released version to current revision v2-00

Page

This short datasheet is derived from v2-00 of full datasheet.

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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Headquarters

ams-OSRAM AG
Tobelbader Strasse 30
8141 Premstaetten
Austria, Europe
Tel: +43 (0) 3136 500 0

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