



Datasheet

DS001049

AS5911

256-Channel Low Noise Current-to-Digital Converter

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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:

Figure 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

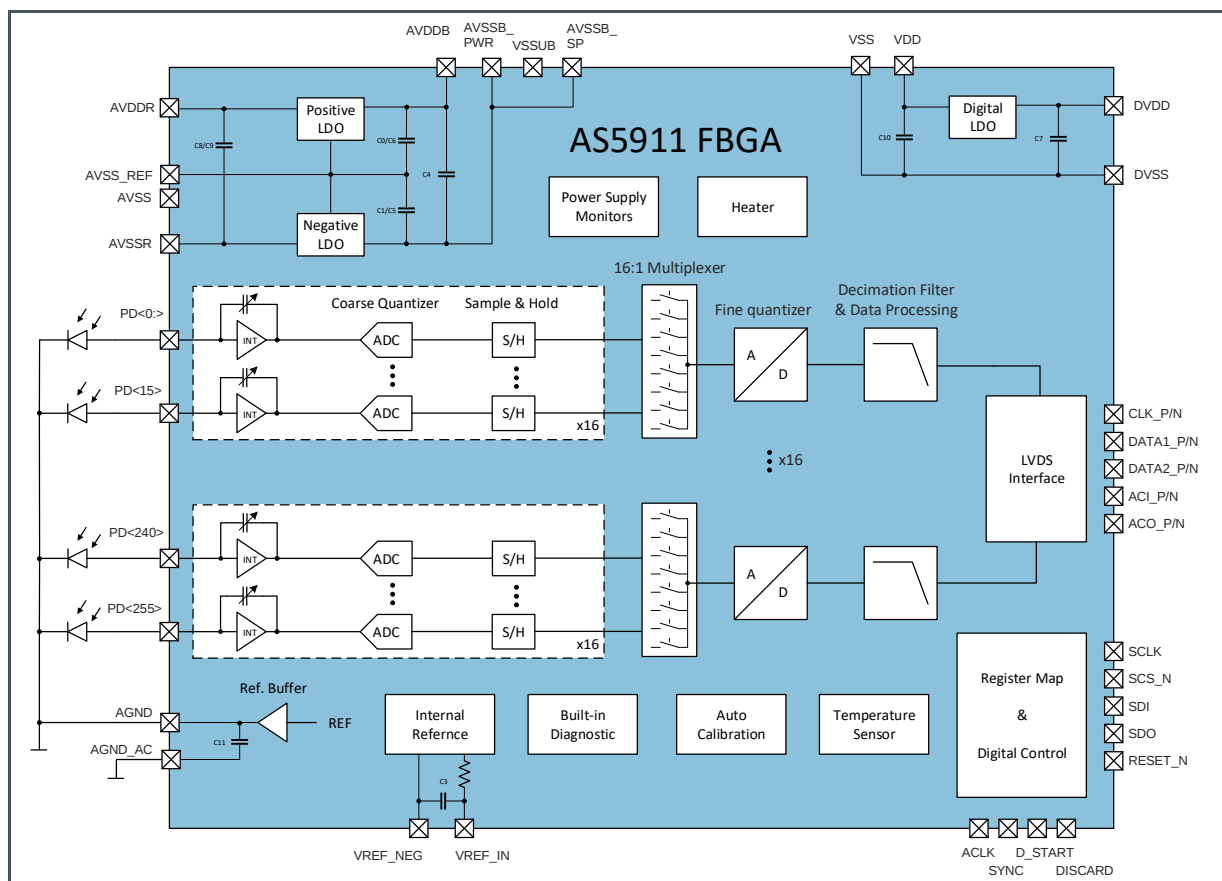
1.2 Applications

- 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 2:
Functional Blocks of AS5911 for True Ground Concept

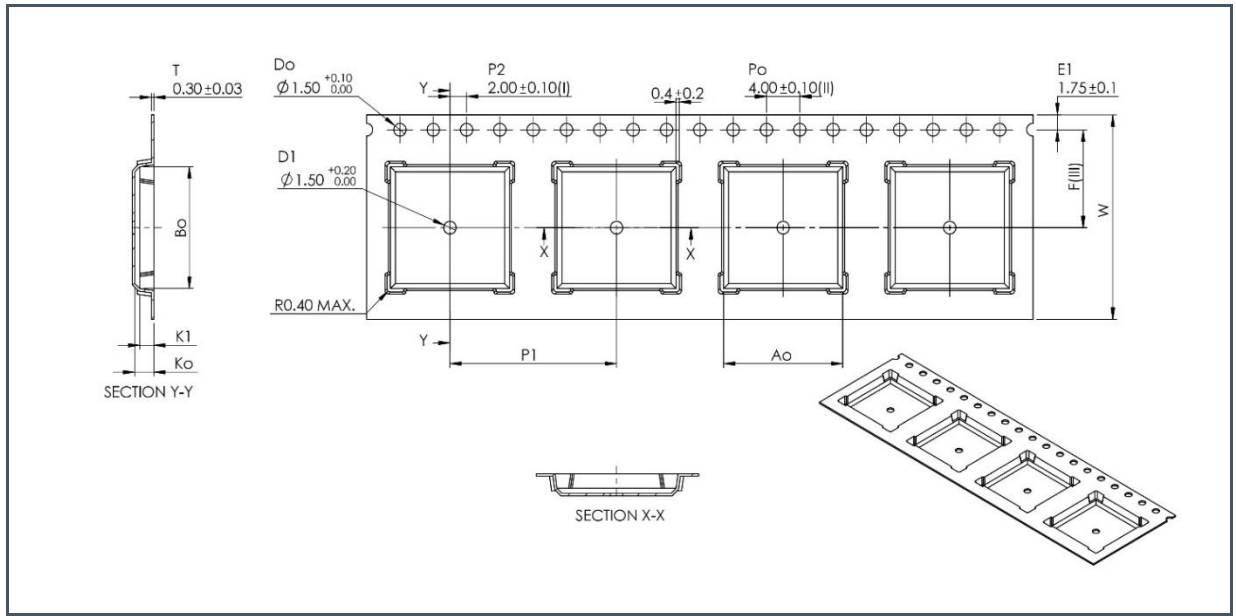


2 Ordering Information

Ordering Code	Package	Marking	Delivery Form	Delivery Quantity
AS5911-FFBT	FBGA 14 mm x 14 mm	AS5911	Tape & Reel	500 pcs/reel

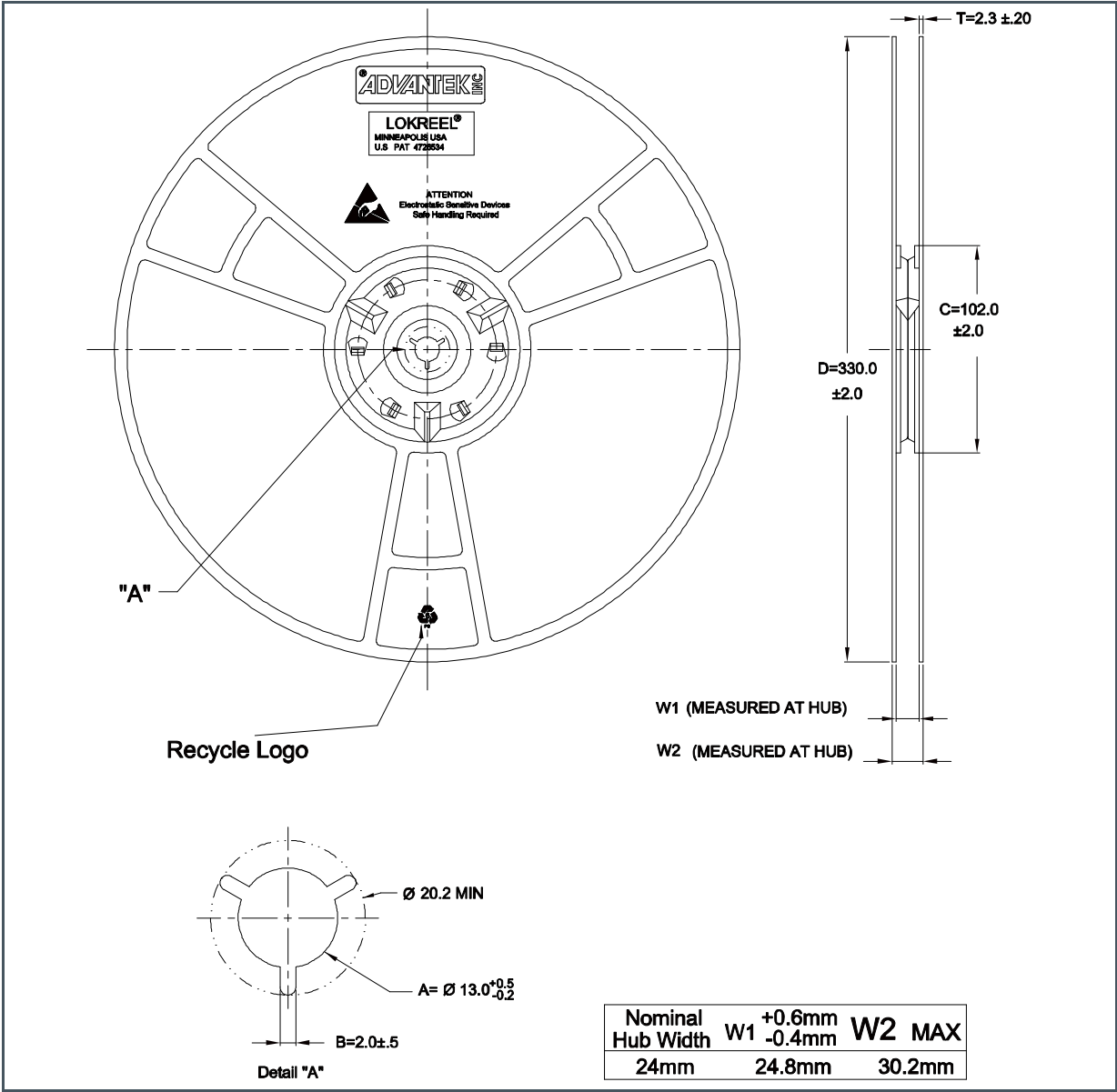
3 Tape & Reel Information

Figure 3:
Tape Dimensions⁽¹⁾



- (1) All dimensions in millimeters.
Compliance with EIA-481-E
- (2) Measured from centerline of sprocket hole to centerline of pocket.
- (3) Cumulative tolerance of 10 sprocket holes is ± 0.2 .
- (4) Other material available.

Figure 4:
Reel Dimensions⁽¹⁾



(1) All dimensions in millimeters

4 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 version to current revision v1-00	Page
This short datasheet is derived from v1-00 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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