



Datasheet

DS001042

AS5951

Sensor Chip for 32-Slice CT Detector

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1 General Description

The AS5951 is a sensor chip for 32-slice CT detectors that combines the photodiodes and the readout circuit on a single CMOS chip. This sensor solution, which includes an array of photodiodes with ultra-low dark current and a 128-channel ADC side-by-side, allows the assembly of the pixel array on three adjacent edges of the device. Two AS5951 ICs can be placed in Z-direction enabling the design of 32-slice detectors for cost optimized CT machines.

The AS5951 has a sensor dimension in Z-direction of 15.615 mm with a pixel dimension of 0.98x0.98 mm² in high resolution mode. In low dose mode two pixels are connected together to a 0.98x1.96 mm², this mode reduces the power consumption, as only half of the ADC channels are active. Pixel dimensions can be customized on request. The sensor can be directly assembled on a substrate using a wire bonding process for manufacturing of a CT module.

Improved image quality can be achieved because of superior dark current of max. 1 pA due to the zero offset voltage across the photodiode. The input-related noise is very low, in high-resolution mode a max. noise of 0.30 fC can be reached including photodiode for an input current range of 200 nA.

The max. power dissipation of 143 mW per device in high resolution mode and 65 mW in low power mode reduces self-heating effects and lowers the overall cost of cooling the system. An internal reference voltage and bias generator reduces the bill of material. Featuring on-chip photodiodes, the AS5951 offers a cost-optimized solution for 32-slice CT detectors.

The digital data readout can be accessed via SPI interface. It is also used to configure parameters such as mode of operation, input current range, selection of reference voltage and enabling the calibration mode. An integrated temperature sensor enables monitoring of the junction temperature. The AS5951 is delivered as die on foil on frame.

1.1 Key Benefits & Features

The benefits and features of AS5951, Sensor Chip for 32-Slice CT Detector, are listed below:

Figure 1:
Added Value of Using AS5951

Benefits	Features
Ultra-low dark current of down to 1 pA	Automatic zero offset voltage calibration across photodiode for ultra-low dark current
Lowest input related noise down to 0.30 fC	High sensitive photodiodes and 128-channel ADC in one integrated sensor
Fast integration time down to 200 μs	Integrated reference voltage and bias current generator for low bill of material

Benefits	Features
Low power dissipation of max. 1 mW per channel in high resolution mode	Two Modes of Operation: High resolution mode and low dose mode
High ADC linearity of ± 250 ppm of reading and ± 600 ppm including the photodiode	Calibration mode for external linearity calibration
	Customization of pixel dimensions on request

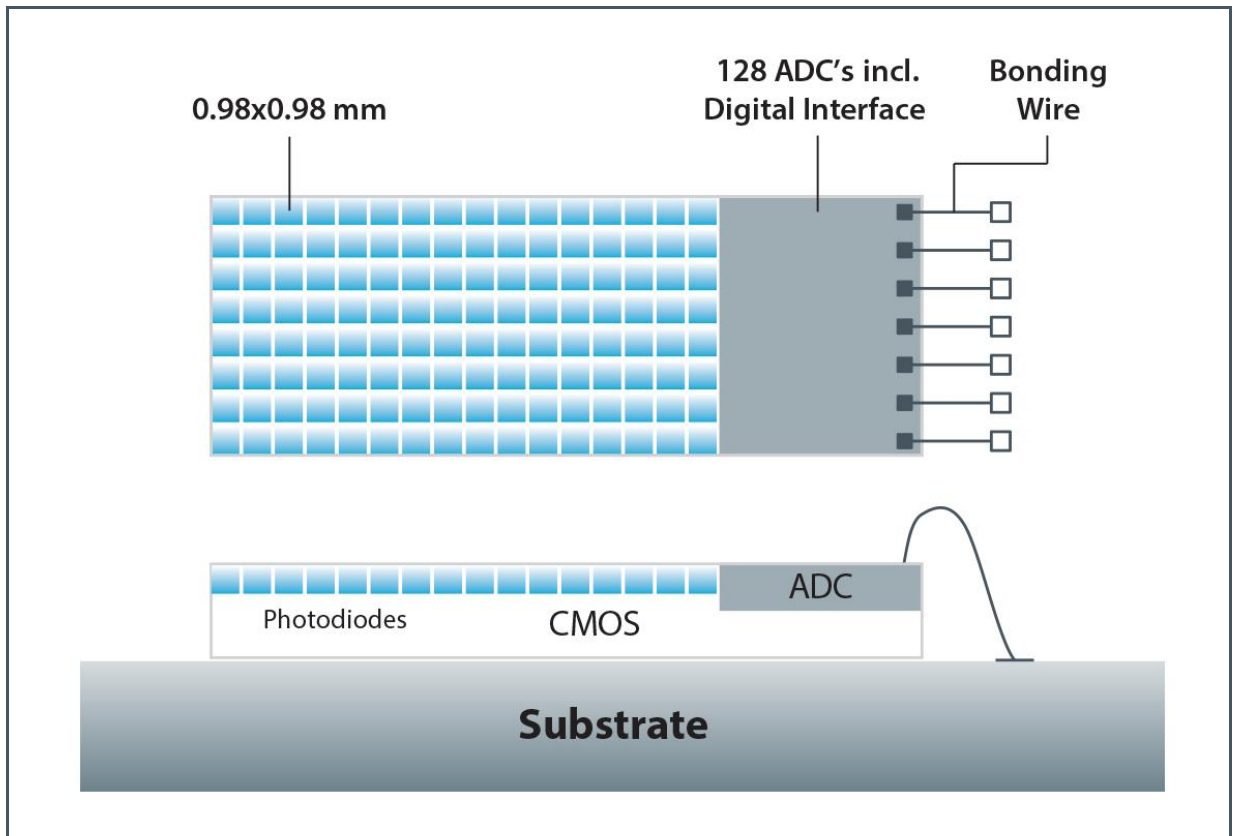
1.2 Applications

- Medical, industrial and security CT detector modules
- 16-slice and 32-slice CT detectors

1.3 Cross Section

The AS5951 integrates photodiodes and a 128-channel ADC in one single CMOS device. The cross section of this CT detector device is shown below. Figure 2 shows the assembly on a substrate through bonding wires for a CT module.

Figure 2:
Cross Section of AS5951



2 Ordering Information

Ordering Code ⁽¹⁾	Package	Delivery Form	Delivery Quantity
AS5951A-CSDF-0.98x0.98	Bare Die	Wafer / Die on Foil	130 pcs / wafer

(1) Pixel dimensions can be customized on request. Please contact **ams** for more information.

3 Revision Information

Changes from previous version to current revision v1-00	Page
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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.

4 Legal Information

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