Product Document

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Sensor Chip for 32-slice CT

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- 3-side buttable CT sensor solution with sub-millimeter pixel pitch for improved image resolution
- Monolithic integration of ADC, photodiode array and voltage reference provide best cost efficiency
- 90% less photodiode dark current and ultra-low noise ADC allow improved low dose performance
- Low power ADC reduces self-heating effects and lowers the overall cost of cooling the CT detector

Sensing is life

ams OSRAM

AS5951
Sensor Chip for 32-slice CT

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 low dose performance can be achieved because of superior dark current of max. 1 pA due to the near zero offset voltage across the photodiode. The input-related noise is very low, in high-resolution mode a typ. noise of 0.21 fC can be reached including photodiode for an input current range of 200 nA.

The max. power dissipation of 128 mW per device in high resolution mode and 67.2 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.

Features

- Monolithic integration of 128-channel ADC and photodiode array in one device
- Automatic zero offset voltage calibration across photodiode for ultra-low dark current
- Integrated reference voltage and bias current generator for low bill of material
- Two modes of operation: High resolution mode and low dose mode
- Customization of pixel dimensions on request

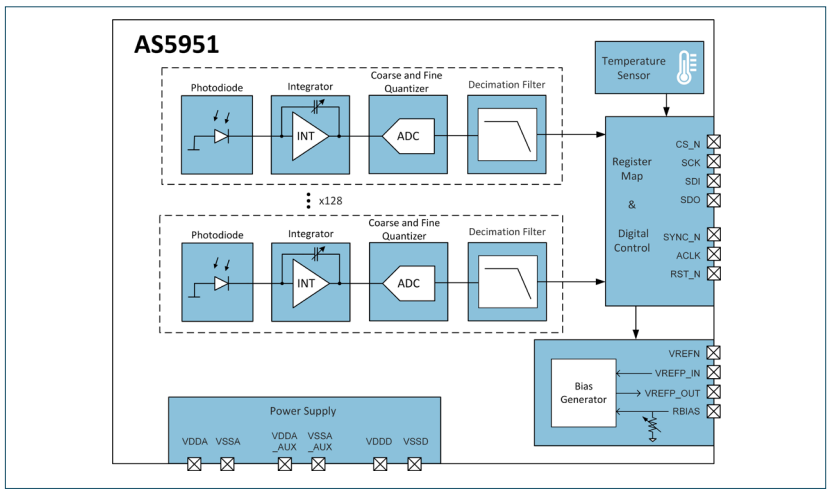
Benefits

- Ultra-low dark current of max. 1pA
- Lowest input related noise of typ. 0.21fC
- Fast integration time down to 200µs
- Low power dissipation of max. 1mW per channel in high resolution mode
- High ADC linearity of ±600ppm including photodiode

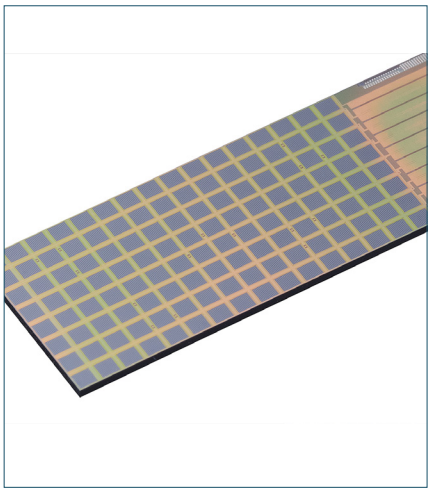
Applications

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

Block Diagram



Product Image



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ams OSRAM
Tobelbader Strasse 30
8141 Premstaetten, Austria
Phone +43 3136 500-0
ams-osram.com