AS5966

Datasheet

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AS5966 4-side buttable CT sensor

1 General description

The AS5966 is a sensor chip for CT detectors that combines the photodiodes and the readout circuit on a single CMOS chip by using through silicon vias (TSV). This sensor solution, which integrates an array of 10 x 8 photodiodes and an 80-channel ADC on top of each other, allowing the assembly of the pixel array on four adjacent edges of the device.

Featuring on-chip photodiodes, the AS5966 offers high performance for CT detectors across all segments. The TSV technology allows for very low parasitic capacitance between back-side illuminated photodiode and the ADC front-end. This leads to superior image performance that can be achieved because of the very low input-related noise of 0.38 fC at a maximum input current range of 335 nA. The ultra-low power consumption of 0.94 mW/pixel reduces self-heating effects and lowers the overall cost of cooling the system.

The digital data readout can be accessed via a 15 MHz CMOS level interface. An appropriate separate interface is used for device configuration as well as data output operation. An integrated temperature sensor enables monitoring of the junction temperature.

Its 4-side buttability allows to place AS5966 on all four adjacent edges of the IC that enables a wide range of CT detector designs from 20 mm to 160 mm of Z-coverage in ISO center. The AS5966 is directly assembled on a substrate using a soldering and underfill process for manufacturing of the CT tile.

The assembly of 2x4 ICs on a substrate allows sensor dimension in Z-direction of 35.108 mm, therefore equivalent to a Z-coverage of 20 mm in ISO center. AS5966 has a pixel dimension of 1.1 x 1.02 mm², pixel dimensions can be customized on request.

1.1 Key benefits & features

The benefits and features of AS5966, 4-side buttable CT sensor, are listed below:

Table 1: Added value of using AS5966

Benefits of AS5966	
Integration of 80-channel ADC and photodiode array in one ASIC using TSV technology	4-Side Buttable ASIC to achieve Z-coverage of 2 cm to 16 cm in ISO center
Lowest input related noise of 0.38 fC at 335 nA input range	Pixel size 1.1 x 1.02 mm². Customization of pixel dimensions on request
Low power dissipation of 0.94 mW/pixel at 195.5 µs	No need of X-ray shield for ADC protection
Integration time of min. 195.5 µs	
15 MHz CMOS level interface for data streaming and device configuration	

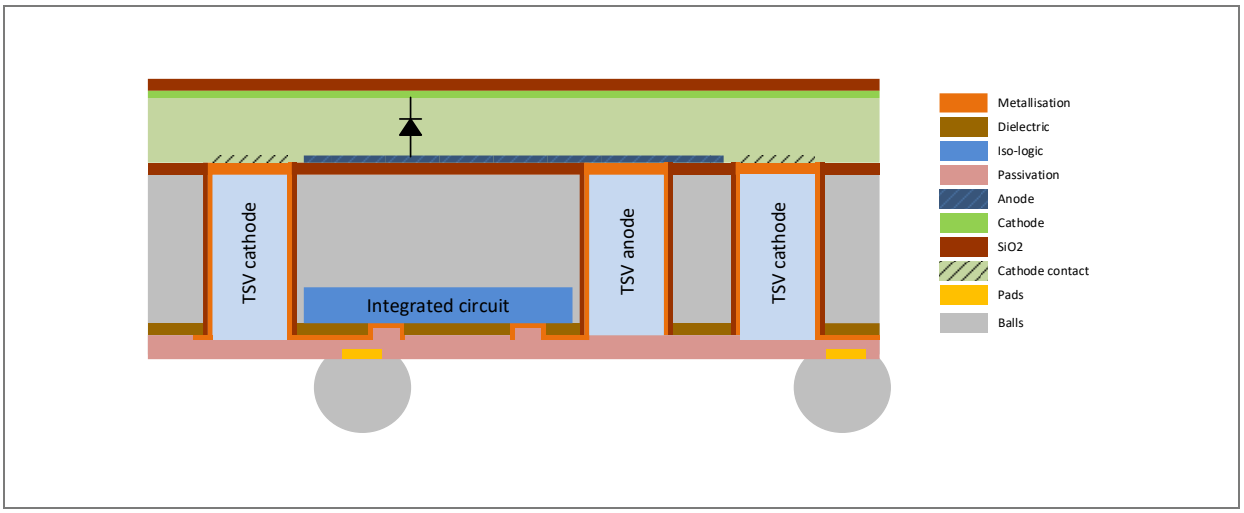
1.2 Applications

- Medical, industrial and security CT detector modules
- CT detectors across all segments

1.3 Cross section

The AS5966 integrates photodiodes and an 80-channel ADC in one single device using through silicon vias (TSV). The cross section of this CT detector device is shown below.

Figure 1: Cross section of AS5966



2 Ordering information

Product type	Ordering code	Package	Delivery form
AS5966	Q65115A2923	WLCSP	Wafer / Die on Foil

3 Abbreviations

Table 2: Abbreviations

Term	Description
PD	Photodiode
TSV	Through Silicon Via
ADC	Analog-to-Digital Converter
CCO	Coarse Quantizer
QP	Charge Pump
D-IF	Data Interface
P-IF	Programming Interface / Configuration Interface
IP	Integration Period
RH	Relative Humidity

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
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- 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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