### KEY FEATURES

- **Flexibility**
  - Configurable resolution: 7-10bit
  - Configurable speed: 0-to-8MS/s
- **Low supply voltage**
  - Working with supply from 1V down to 0.7V
- **Ultra Low Power**
  - Minimum power: 1.61 to 3.56uW from 7b to 10b
  - Leakage only 2nW
  - Dynamic power consumption from 0 to 8 MS/s
- **Calibration Simple**
  - Gain/Time skew mismatch immune
  - Offset calibration method simple

### APPLICATIONS

- **Wireless Sensor Nodes**

### PRODUCT SUMMARY

#### Description

This ADC can support resolutions from 7 to 10bit and sample rates from DC to 8MS/s, this design can be used for a variety of applications such as sensor interfacing and receiver frontends.

Besides, for autonomous wireless sensor nodes, the supply may be produced by local energy harvesters with limited voltage. This work can operates at supplies below 1V (0.7V) while still maintaining sufficient speed (2MS/s). The ADC is ideal for wireless sensor nodes, e.g., EEG, ECG, temperature and pressure monitoring.

#### Block Diagram

Clock boosting is used to enable operation at reduced supply with sufficient bandwidth and linearity. The differential input signal voltage is sampled on the capacitor arrays inside the DAC. The binary-scaled DAC uses unit capacitors of 0.6fF, which are switched between GND and VDD. The small value of 0.6fF minimizes the power consumption while providing sufficient kT/C noise performance for all resolutions. The 3 MSBs of the DAC (b8 to b6) can be calibrated manually with 1LSB steps to compensate for mismatch errors. The asynchronous logic control resolves the bits of the output code based on self-synchronization. Thus, this architecture requires only a sample-rate clock instead of an oversampled clock.

#### INL/DNL

8 chips are tested. The chip with the worst INL performance is selected for this datasheet. To make clarification, all the measurement presented is at 0.7V. The INL and DNL at 10bit mode are 0.68LSB and 0.50LSB.
Frequency Spectrum

The frequency spectrum for the 10bit mode is shown. An SFDR above 72dB and an ENOB of 9.3bit are achieved.

ENOB Versus input frequency

The ENOB versus signal frequency for the different resolutions is shown. It reaches up to 9.30bit with an ERBW beyond Nyquist in all cases.

For more information

Please visit [www.imec.be](http://www.imec.be) for more information about this and other products.

About Imec

Imec performs world-leading research in nano-electronics. We leverage our scientific knowledge with the innovative power of our global partnerships in ICT, healthcare and energy. Our goal: creating innovative solutions that are relevant for the industry. Imec's research is 3 to 10 years ahead of the industry. We form a bridge between the fundamental research at universities and the technology development in the industry. Imec has a unique expertise in chip processing and system design, a strong IP portfolio, an ultramodern infrastructure, and an extensive network of partners. This makes us your premier partner to develop the technology of the future. Imec is headquartered in Leuven, Belgium. We have additional R&D teams in The Netherlands (Holst Centre in Eindhoven), China, Taiwan, and India, and offices in Japan and the USA. Our staff of close to 2,000 people include more than 600 industrial residents and guest researchers. In 2011, imec's revenue (P&L) was 300 million euro.

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### SPECIFICATIONS

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<th>Resolution (bits)</th>
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<td>Supply (V)</td>
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<td>Power Consumption (mW)</td>
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### EVALUATION BOARDS

Imec provides evaluation boards (EB) on request to prospective customers and partners interested in licensing imec’s radio designs and IP.

- **LUPUS EB**: allows complete evaluation of the ADC with the assistance of external FPGA board.