CSEM News for immediate publication

CSEM demonstrates high-precision, low power silicon resonator-based real-time clock.

Neuchâtel, 5 February 2009 – Silicon resonators offer significant advantages compared to quartz crystals for timing applications. Thinner and smaller than their quartz counterparts they are also more robust, and offer better aging performance, as well as programmability. Furthermore they can benefit from the economies of scale of CMOS wafer processing to achieve lower cost, as well as the possibility of integration into a single monolithic structure with no external components.

Silicon resonators however suffer from a strong temperature dependence; various methods are used to overcome this, however these methods tend to increase the complexity of the device or the system power consumption when relying on electronic temperature dependant fractional PLLs.

Researchers at CSEM have recently devised a generic ultra-low power thermal compensation concept which applied to a low frequency piezoelectric AlN-driven silicon resonator can be used to implement both a real time clock (RTC) and a reference for a MEMS-based frequency synthesizer architecture, eliminating the need for any other bulky reference. This RTC achieves ±5ppm frequency accuracy over 0-50°C at only 3uA, hence 3 orders of magnitude reduction compared to commercially available silicon resonator products. One application that stands to benefit from this breakthrough is wireless sensors, and this opens the way to true ultra-low power single-chip sensor nodes with no external components.

CSEM will present its results at the International Solid State Circuits Conference in San Francisco in February.

Photograph showing a chip on board assembly of a miniature silicon resonator.
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