
Press Release, 30 April 2010

Sensoror Technologies present paper on a Gyroscope with North Seeking Capability at PLANS 2010 (IEEE) May 4, 2010

[Sensoror Technologies](#) is developing, SAR500, a novel high-precision, low-noise, high-stability, calibrated and compensated digital oscillatory gyroscope with SPI interface housed in a rigid custom-made ceramic package.

The SAR500 contains a Butterfly™ MEMS die and an analog ASIC, housed in a rigid custom-made ceramic package. An FPGA or a digital ASIC contains the needed control and functional algorithms to achieve the superior performance. The device is factory-calibrated and compensated for temperature effects to provide high-accuracy digital output over a broad temperature range. A perfect tuning of the excitation and detection frequencies, as well as perfect mechanical and electrical balancing of the dual masses result in very low sensitivity to shock and vibrations.

The sensing element consists of a system of two identical masses suspended by means of asymmetric springs to pedestals designed to minimize the mechanical and thermal stress. Closed feed-back loops are used to control both the excitation and detection modes. Additional pairs of electrodes are used to perfectly tune the resonance frequency of the excitation and detection modes, and to actively compensate the quadrature offset of the gyroscope. By utilizing a unique sealed cavity technology, the vibrating masses are contained within the low-pressure hermetic environment needed for low dynamic damping and high Q factors. Further on, improved stability of the gyroscope is achieved by the choice of crystalline materials in the entire structure of the sensing element and of full design symmetry about the vertical axis.

The signal processing circuits consist of a full custom analog ASIC and a digital part which can be implemented in an FPGA or structured ASIC. The analog ASIC includes precision low noise charge amplifiers and 5th order delta-sigma ADCs, as well as voltage references and low pass filters for the feedback signals. The digital ASIC provides a stable, high-resolution implementation of the loop filters and delta-sigma DACs for excitation and detection feedback. It also performs low noise synchronous demodulation, and compensates for temperature drift of bias and scale factor. The gyro is configured as an SPI slave for efficient readout of angular rate as well as other data.

The key performance elements of the device are: angular random walk = 0.004 deg/sqr(hr), in-run bias stability = 0.02 deg/hr and bias repeatability = 0.1 deg/hr.

About Sensoror Technologies AS

Sensoror is a global leader in high precision MEMS technology; designing and manufacturing advanced, integrated gyro and pressure sensors for harsh environments. Based on a continuous MEMS activity since 1965, Sensoror pioneered the introduction of MEMS accelerometers and gyros to the automotive market and also became the leading supplier of tire pressure sensors.

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