

## **Integrated Magnetic and Optical Sensors for Reliable High Volume Manufacturing**

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Integrated circuit technology is best suited to manufacture sensor arrays with excellent precision of the relative positioning of the individual sensor elements. Moreover sensor signals can be directly processed on chip eliminating problems caused by additional external connections. Very little real estate on the chip is needed for the sensor devices, thus making the integration of them very cost-effective.

Both magnetic and optical sensor arrays will be discussed. Key parameters for a magnetic sensor include the resistance, the magnetic sensitivity, the offset remaining after the current spinning technique and the integrated excitation coil. Specific examples in state of the art 0,35 $\mu$  CMOS technology will be presented.

We also present modelling of integrated sensor devices based on characterisation and process monitoring data. Furthermore, life-time effects and design for production test solutions will be reviewed. Modelling of integrated sensors in the same way as other devices is of critical importance in the practical design of industrial products in a CMOS process.

As an example a 10 bit resolution absolute angle sensor is presented. It offers a full self-calibrating system including digital signal processing for the calculation of the measured angle. It is qualified for the automotive temperature range from -40 to 125 C and offers usage of either 5V or 3,3V supply voltage