



High precise inclinometers and accelerometers for inertial sensor applications

First Sensor has over 20 years' experience in the development and manufacture of unique sensor solutions offering the highest levels of precision and reliability. Our customers include well known industrial groups and research institutes across the entire globe, which attribute highest importance to quality and integrity on the basis of their strategic alignment and production requirements. We provide innovative, integrated expertise in the fields of optoelectronics and MEMS sensors, microsystems technology and hybrid electronics. Our industry expertise encompasses medical and industrial applications, the aerospace sector, mobility and security solutions. At First Sensor, tradition and innovation go hand-in-hand. The highly specialized development and production expertise of about 750 employees across the globe has allowed us to focus on the implementation of individual customer requirements with the highest levels of technical excellence, precision and reliability.

First Sensor offers a technology platform to fabricate precise inertial sensors for navigation, condition monitoring or geoengineering. The patented AIM technology (Air gap Insulated Microstructures) is used to fabricate sensors elements based on high aspect ratio silicon microstructures with open-loop capacitive working principle.

Benefits of the AIM technology

- Ultra-low cross axis sensitivity due to HARMS technology
- Thin-film free mechanical components, single crystal silicon based
- Minimizing of parasitic capacitances due to insulation of the functional components by air gap
- Complete dry processing
- Excellent thermal performance
- Large signal-to-noise ratio
- Mechanical over-damped to reduce parasitic signals
- Customer specific measurement ranges due to flexible adjustment of mass, spring and damping

Features of the sensor systems

- Dual axis measurement
- Excellent stability over temperature
- Digital interface (I²C or SPI)
- Shock survival 2000 g
- Hermetically sealed package
- Customized sensor solutions for packaging and signal processing

Applications

- Geoengineering
- Condition monitoring
- Navigation
- Security systems
- Platform control and stabilization
- Tilt sensing and leveling
- Industrial applications

Performance SensIncline

Inclinometer parameter	Conditions	SI-11.S1.C-30	SI-11.P3.C-30	Unit
Measurement range	Full scale (linear up to $\pm 30^\circ$)	± 90	± 90	$^\circ$
Resolution	@ 10 Hz	< 0.0015	< 0.0040	$^\circ$
Scale factor (repeatability)		± 35	± 50	ppm
Scale factor (temperature coefficient)	Without calibration	± 50	± 50	ppm/K
Bias (repeatability)	Turn on/off	± 0.0030	± 0.0045	$^\circ$
Bias (temperature coefficient)	Without calibration	± 0.0025	± 0.0030	$^\circ/\text{K}$
Non linearity		< 0.5	< 0.5	% of FS
Noise density		< 0.0004	< 0.0015	$^\circ/\text{v Hz}$
Measuring frequency	Maximum	400	800	Hz
Power supply		4.8 ... 5.2	2.7 ... 3.3	V
Digital interface		SPI	SPI/I ² C	
Operating temperature		-40 ... 85	-40 ... 120	$^\circ\text{C}$

Performance SensAcc

Accelerometer parameter	Conditions	SA-13.S1.C-8	SA-14.S1.C-15	Unit
Measurement range	Full scale	± 8	± 15	g
Resolution	@ 10 Hz	< 65	< 95	μg
Scale factor (repeatability)		± 35	± 35	ppm
Scale factor (temperature coefficient)	Without calibration	± 50	± 50	ppm/K
Bias (repeatability)	Turn on/off	± 260	± 470	μg
Bias (temperature coefficient)	Without calibration	± 105	± 175	$\mu\text{g}/\text{K}$
Non linearity		< 1.0	< 1.0	% of FS
Noise density		< 20	< 30	$\mu\text{g}/\text{v Hz}$
Measuring frequency	Maximum	400	400	Hz
Power supply		4.8 ... 5.2	4.8 ... 5.2	V
Digital interface		SPI	SPI	
Operating temperature		-40 ... 85	-40 ... 85	$^\circ\text{C}$

Packaging and samples

The inertial sensors are packaged in a tailored ceramic housing with 28 pins (Figure 1), that is similar to a standard LCC28 package. Please contact us for more information regarding pinout, external circuitry or configuration of your devices. In addition sensor modules for quick evaluation are available (Figure 2).



Figure 1: Packaged sensor component ready for assembling on PCBs

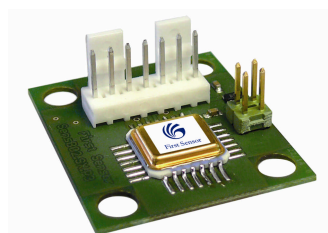


Figure 2: Example of sensor module for easy-to-use read-out of the sensor data (including control board, sensor board and software)

Customized solutions

First Sensor components, modules and sensor systems are developed and manufactured on a customer specific basis. All our products are customizable and can be adapted or developed to fit specific requirements or applications. Please contact us if you need more information regarding specification or packaging solutions.

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