*i*Sensor Motion Sensor Products

By embedding motion sensing in your application, valuable improvements can be realized in precision, response time, reliability, safety, and security. Analog Devices' highly integrated, calibrated, and simple-to-implement *i*Sensor® products make realizing those improvements easier and more cost-effective than ever before.

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ANALOG DEVICES

Introduction

Typical *i*Sensor integration allows system insertion with only a power supply and a serial port interface. Precision factory calibration means no additional in-system motion test or calibration is required, which saves substantial equipment costs and production test time. Basic sensor tuning is accomplished after system insertion via simple SPI commands. With solutions ranging from simple digital output inertial sensors to full six-degrees-of-freedom IMUs, *i*Sensor products make motion sensing accessible to everyone at 10× to 100× size savings and 5× to 10× cost savings.

iSensor Applications Quick Reference

Part Number	Acceleration	Rotation	Tilt	Shock	IMU/6-DoF
ADIS16003	•				
ADIS16006	•				
ADIS16060		•			
ADIS16080		•			
ADIS16100		•			
ADIS16120		•			
ADIS16130		•			
ADIS16201	•		•		
ADIS16203			•		
ADIS16204				•	
ADIS16209	•		•		
ADIS16250		•			
ADIS16251		•			
ADIS16255		•			
ADIS16350					•
ADIS16354					•
ADIS16355					•

ADIS16003/ADIS16006/ADIS16060/ADIS16080/ADIS16100

Digital Output Accelerometers and Gyroscopes

For lowest cost and power, as well as smallest form factor, the following *i*Sensor products provide simple interfacing to combined inertial plus temperature sensors over the industry-standard SPI interface:

- ADIS16003: ±1.7 *g* acceleration sensing, dual axis
- ADIS16006: ±5 *g* acceleration sensing, dual axis
- ADIS16060: 80°/sec (1 kHz BW) angular rate sensing, single axis
- ADIS16080: 80°/sec angular rate sensing, single axis
- ADIS16100: 300°/sec angular rate sensing, single axis

ADIS16120/ADIS16130

Low Noise Angular Rate Sensors

The ADIS1620 and ADIS16130 gyros provide angular rate detection to the highest performance applications. They employ unique internal architectures to minimize noise and reduce sensitivity to vibration, supply, and temperature variations. The ADIS16120 has an analog interface while the ADIS16130 is digital (SPI). With a dynamic range of 300°/sec, 320 Hz bandwidth response, and fast turn-on time of 35 ms, they are ideally suited for standby navigation systems and precision instrumentation applications.

ADIS16350/ADIS16354/ADIS16355

Tri-Axis Inertial Sensors

The ADIS16350 *i*Sensor product provides complete tri-axis inertial sensing (both angular and linear motion) in a compact module fully ready for system integration. With Analog Devices' *i*MEMS® sensor technology at its core, the ADIS16350 includes embedded processing for sensor calibration and tuning. An SPI interface allows for a simple system interface and programming. The SPI port provides access to the following embedded sensors: x-, y-, and z-axis angular rate; x-, y-, and z-axis linear acceleration; internal temperature; power supply; and an auxiliary analog input. The internal sensors are calibrated, cross compensated, and precision aligned to correct for all significant electrical, positional, and motion influences. The gyroscopes operate across ±300°/sec range, and the accelerometers provide a ±10 *g* response. The ADIS16354 and ADIS16355 extend the calibration across temperature, and offer alternate accelerometer ranges. The ultracompact module measures 22.7 mm × 23.2 mm × 22.9 mm, plus mounting extensions. This six degrees of freedom module brings breakthrough price/performance to applications ranging from motion analysis in prosthetics and sports equipment to sophisticated guidance systems in industrial vehicles, avionics, and robotics.

ADIS16204

Programmable Dual-Axis Digital High-*g* Accelerometer and Impact Sensor

With an internal high-*g* MEMS sensor (±70 *g* x-axis, ±37 *g* y-axis), the ADIS16204 is ideally suited for applications in impact detection, condition monitoring, safety/shut-off sensing, shock recording, and security systems. The only required interfaces are a power supply and an SPI interface. The device includes an embedded programmable event recorder, which captures peak events, RSS values, and a user-selectable 250 ms window of data around the desired event. The SPI port also provides access to temperature and power supply readings. Design complexity and implementation time are further reduced with single-supply operation, auxiliary I/O ports, configurable trigger levels and power modes, and a digital self test feature. It is available in a 9.2 mm × 9.2 mm × 3.9 mm laminate-based land grid array package, and operates from –40°C to +105°C.

ADIS16201/ADIS16203/ADIS16209

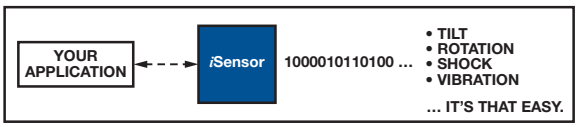
Programmable Dual-Axis Accelerometers and Inclinometers

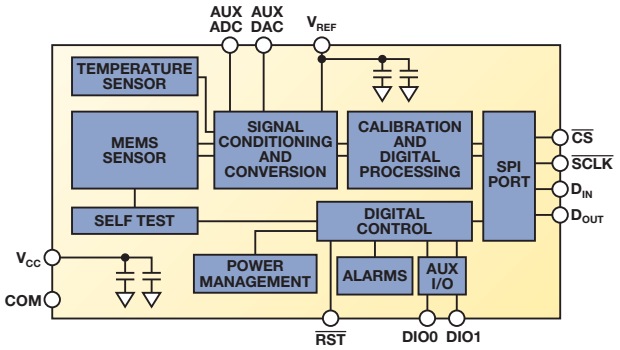
The ADIS16201, ADIS16203, and ADIS16209 products provide calibrated inclination and acceleration outputs over a simple programmable SPI interface. Industry-leading accuracy of 0.1° tilt is available with the ADIS16209. Options are available for operation in either horizontal mounting (dual axis) or vertical mounting (single axis), or both. Highly accurate acceleration outputs and temperature sensors are available in addition to the angle readings. Factory calibration provides a highly stable bias and sensitivity, which can also be in-system tuned with a simple auto-zero command, which aligns the sensor's zero-degree reference with the end-system axis. All critical parameters are programmable over the SPI port, allowing in-system tuning of digital filtering, rate/threshold alarms, sample rate, and power modes. These components are available in a 9.2 mm × 9.2 mm × 3.9 mm laminate-based land grid array package, and operate from –40°C to +125°C.

ADIS16250/ADIS16251/ADIS16255

Programmable Low Power Angular Rate Sensors

The ADIS16250, ADIS16251, and ADIS16255 gyroscopes provide angular rate and temperature sensing via a simple programmable SPI interface. The core gyroscope sensor is factory calibrated, delivering an in-run bias stability of 0.016°/sec. The ADIS16255 includes temperature calibration, improving in-system stability to as tight as 0.005°/sec/°C. These are the industry's first devices to provide digital range scaling with options covering ±20°/sec to ±320°/sec, allowing selection of the best device sensitivity for the target application. All critical parameters are programmable over the SPI port, allowing in-system tuning of digital filtering, rate/threshold alarms, sample rate, and power modes. Design complexity and implementation time are further reduced with single-supply operation, auxiliary I/O ports, and a digital self test feature. These components are available in 11 mm × 11 mm × 5.5 mm laminate-based land grid array packages.



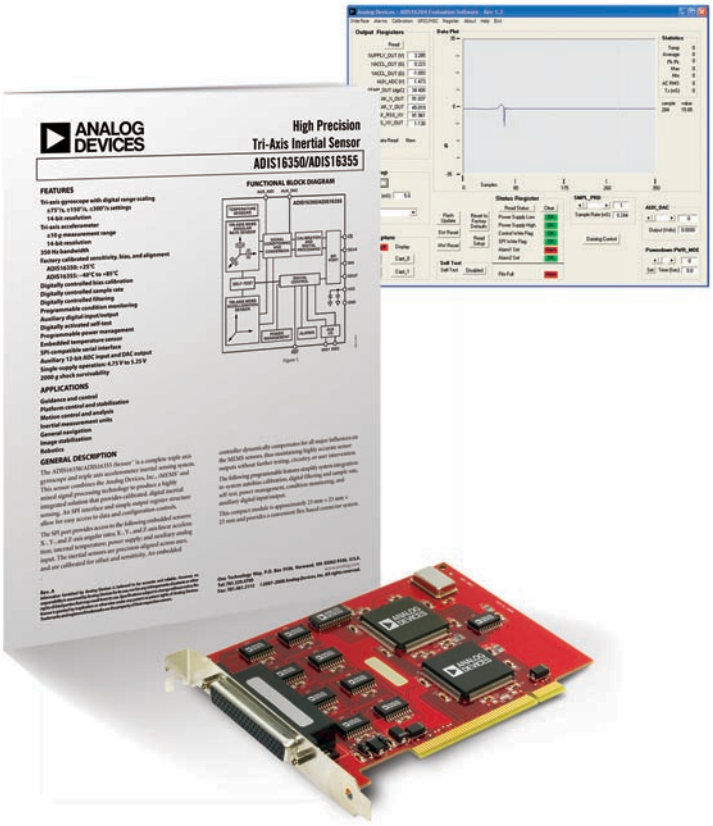


*i*Sensor Products

Part Number	Description	Features	Applications	Sensor Type	Bandwidth (Hz)	Output	Supply Voltage (V)	Package
ADIS16003	Digital accelerometer	±1.7 *g* response, dual-axis, fully integrated	Motion detection, platform stabilization	Accelerometer and temperature	2250	SPI	3 to 5.25	7.2 mm × 7.2 mm, 12-lead LGA
ADIS16006	Digital accelerometer	±5 *g* response, dual-axis, fully integrated	Motion detection, platform stabilization, crash sensors	Accelerometer and temperature	2250	SPI	3 to 5.25	7.2 mm × 7.2 mm, 12-lead LGA
ADIS16060	Digital angular rate sensor	±80°/sec yaw rate response, fully integrated	Navigation, image/platform stabilization, robotics	Gyroscope and temperature	1000	SPI	4.75 to 5.25	8.2 mm × 8.2 mm, 16-lead LGA
ADIS16080	Digital angular rate sensor	±80°/sec yaw rate response, fully integrated	Navigation, image/platform stabilization, robotics	Gyroscope and temperature	40	SPI	4.75 to 5.25	8.2 mm × 8.2 mm, 16-lead LGA
ADIS16100	Digital angular rate sensor	±300°/sec yaw rate response, fully integrated	Navigation, image/platform stabilization, robotics	Gyroscope and temperature	40	SPI	4.75 to 5.25	8.2 mm × 8.2 mm, 16-lead LGA
ADIS16120	Low noise angular rate sensor	300°/sec range, factory calibrated, improved vibration rejection	Guidance and control, avionics instrumentation, IMUs, stabilization	Gyroscope and temperature	320	Analog	4.75 to 5.25	35 mm × 42 mm, 24-lead
ADIS16130	Digital low noise angular rate sensor	250°/sec range, <6°/hr bias drift, excellent vibration rejection, digital output	Guidance and control, avionics, precision instrumentation, IMUs, stabilization	Gyroscope and temperature	300	SPI	4.75 to 5.25	36 mm × 44 mm, 24-lead
ADIS16201	Programmable inclinometer and accelerometer	±90° (±1.7 *g*) response, dual-axis, factory calibrated, fully tunable over SPI port, alarms	Tilt sensing, platform stabilization, process controls, motion monitoring, robotics	Accelerometer and temperature	2250	SPI	3 to 3.6	9.2 mm × 9.2 mm, 16-lead LGA
ADIS16203	Programmable inclinometer	360° response, single-axis, factory calibrated, fully tunable over SPI port, alarms	Tilt sensing, platform stabilization, process controls, motion monitoring, robotics	Accelerometer and temperature	2250	SPI	3 to 3.6	9.2 mm × 9.2 mm, 16-lead LGA
ADIS16204	Programmable high-*g* impact sensor	±70 *g*/35 *g* response, dual-axis, peak sample and hold, RSS, fully tunable, event recorder	Impact detection, condition monitoring, safety systems, shock sensors	Accelerometer and temperature	400	SPI	3 to 3.6	9.2 mm × 9.2 mm, 16-lead LGA
ADIS16209	Programmable inclinometer and accelerometer	Dual mode, horizontal or vertical mount, 0.1° accuracy; factory calibration; fully tunable over SPI port, alarms	Tilt sensing, platform stabilization, process controls, motion monitoring, robotics	Accelerometer and temperature	50	SPI	3 to 3.6	9.2 mm × 9.2 mm, 16-lead LGA
ADIS16250	Programmable angular rate sensor	Digital range scaling (80 to 320), factory calibrated, fully tunable over SPI port, alarms	Instrumentation control, platform stabilization, navigation, robotics	Gyroscope and temperature	50	SPI	4.75 to 5.25	11 mm × 11 mm, 20-lead LGA
ADIS16251	Programmable angular rate sensor	Digital range scaling (20 to 80), factory calibrated, fully tunable over SPI port, alarms	Instrumentation control, platform stabilization, navigation, robotics	Gyroscope and temperature	50	SPI	4.75 to 5.25	11 mm × 11 mm, 20-lead LGA
ADIS16255	Precision programmable	Angular rate sensor digital range scaling (80 to 320), factory calibrated over temperature, fully tunable over SPI port, alarms	Instrumentation control, platform stabilization, navigation, robotics	Gyroscope and temperature	50	SPI	4.75 to 5.25	11 mm × 11 mm, 20-lead LGA
ADIS16350	Tri-axis inertial sensor	Six degrees of freedom measurements, factory calibrated, alignment compensation, fully tunable over SPI port, programmable condition monitoring	IMUs, general navigation, robotics, platform stabilization, guidance and control, motion analysis	Gyroscope (3), accelerometer (3), and temperature	350	SPI	4.75 to 5.25	23 mm × 23 mm, 24-lead
ADIS16354	High precision tri-axis inertial sensor	Six degrees of freedom measurements, factory calibrated over –20°C to +70°C, alignment compensation, fully tunable over SPI port, programmable condition monitoring	IMUs, general navigation, robotics, platform stabilization, guidance and control, motion analysis	Gyroscope (3), accelerometer (3), and temperature	350	SPI	4.75 to 5.25	23 mm × 23 mm, 24-lead
ADIS16355	High precision tri-axis inertial sensor	Six degrees of freedom measurements, factory calibrated over –40°C to +85°C, alignment compensation, fully tunable over SPI port, programmable condition monitoring	IMUs, general navigation, robotics, platform stabilization, guidance and control, motion analysis	Gyroscope (3), accelerometer (3), and temperature	350	SPI	4.75 to 5.25	23 mm × 23 mm, 24-lead

iSensor Products Eliminate Implementation Barriers:

- Factory calibration eliminates need for costly motion tests
- Simple in-system auto-zero
- Standard serial peripheral interface (SPI) access to multiple sensors and functions
- Programmable filtering sample rate, alarms, and power management
- Fully integrated
- Digital self test
- Single-supply operation



Technical Support

Evaluation Boards

All *i*Sensor products are supported by complete development kits, including evaluation software. Most *i*Sensor development boards interface to a single common PC-based evaluation system, ADISEVAL, making evaluation and selection of the most appropriate product simple. A complete listing of all available evaluation tools, as well as software downloads, can be found at the Evaluation Tools section of *www.analog.com/iSensor*.

Technical Documentation and Information

For complete information and tools, in addition to the latest product updates, please visit *www.analog.com/iSensor*.

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