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IMU90 High Precision 6DoF Mini (<https://www.skymems.com/products/imu90-high-precision-6dof-mini-imu/>)



IMU90 High Precision 6DoF Mini IMU

- High Precision 6 DoF Mini IMU with Full Calibration
- Range (Typical) : Gyro $\pm 500^{\circ}/s$, Accel $\pm 16g$
- Bias Instability (Allan) : Gyro $1.5^{\circ}/h$, Accel: $35\mu g$
- Data Output Rate: UART 1000Hz, SPI up to 1000Hz
- Power Supply: 3.3 VDC
- Compact and Light weight $23.3 \times 22.4 \times 7.5mm$, $< 15g$
- Wide Working Temperature: $-40^{\circ}C \sim +85^{\circ}C$



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Product Categories





Brief Introduction

IMU90 High Performance Inertial Measurement Unit is a rugged industrial inertial navigation system providing precise yaw, pitch, roll as well as 6-axis outputs of angular rate and acceleration at 1000Hz. IMU90 adopts MEMS-based inertial sensors and extended Kalman filter algorithm, which provides super cost-effective solution for customers.

IMU90 Inertial Measurement Unit enjoys small size and light weight, and it is housed in an ultra-durable and compact aluminum housing, it enjoys high reliability in harsh environment, it has been widely applied in dynamic control systems and attitude systems including Unmanned Aircraft and ROVs, Smart Agriculture, Machine Control, Platform Stabilization, AGV, robotics, etc.

Technical Specifications

Parameter	Test Condition	Min.	Typical	Max.	Unit
Gyroscopes					

Range ^①			±500		°/s
Sensitivity	16-bit data format		0.02		°/s/LSB
	32-bit data format		3.0518×10 ⁻⁷		°/s/LSB
Bias Instability	Allan variance	1	1.5	2	°/h
Initial Bias Error		0.01	0.03	0.1	°/s
Random Walk		0.1	0.12	0.15	°/√h
Scale Factor Accuracy			0.1		%
Non-linearity	Full scale (FS)		0.01		%FS
Resolution			0.005		°/s
Bandwidth			150		Hz
Accelerometers					
Range ^①			±16		g
Sensitivity	16-bit data format		0.0005		g/LSB
	32-bit data format		7.6294×10 ⁻⁹		g/LSB
Bias Instability	Allan variance	25	35	45	ug
Initial Bias Error		3	4	5	mg
Random Walk		0.01	0.025	0.04	m/s/√h
Scale Factor Accuracy			0.1		%
Non-linearity	Full scale (FS)		0.01		%FS

Resolution			0.05		mg
Bandwidth			150		Hz
Interface ^②					
UART ^③					
Baud Rate			115200		bps
Output Rate			200		Hz
SPI					
Serial Clock Frequency				10	MHz
Output Rate			1000		Hz
Electrical Features					
Supply Voltage	3.3 V				
Power Consumption	< 0.15 W				
Environment Conditions					
Operating Temperature	-40°C ~ 85°C				
Storage Temperature	-55°C ~ 100°C				
Housing Material	aluminum				
Physical Parameter					
Size	23.3 × 22.4 × 7.5 mm				
Weight	< 15 grams				
Connector	7×2 pins				

Note:

$g = 9.80665 \text{ m/s}^2$;

①: The range of Gyroscopes and Accelerometers can be configured in our factory.

②: SPI or CAN communication can be selected in our factory.

③: ODR = 500Hz (Baud Rate=230400bps) or ODR = 1000Hz (Baud Rate=460800bps) can be configured via UART command

Typical Application

IMU90 Inertial Measurement Unit is a high performance 6 DoF MEMS-based inertial sensors, which has been widely used in the following fields:

- Unmanned Aircraft and ROVs
- Smart Agriculture
- Robotics Control
- AGV

IMU90 Inertial Measurement Unit widely used in Unmanned Aircraft

UAV is unmanned aerial vehicle, commonly known as a drone, is an aircraft without a human pilot aboard. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator or autonomously by onboard computers.

SkyMEMS IMU90 Inertial Measurement Unit is an industrial level IMU module, it can provide continuous acceleration and gyro angle for the UAV, which has been widely used in small UAV flight control.

IMU90 Inertial Measurement Unit widely used in smart agriculture

Smart agriculture has changed the way farmers work their land. Real-time location information also allows farmers to maximize field utilization by avoiding missed or overlapping planting and harvesting efforts while minimizing time and fuel usage through optimized travel. Such systems can also provide semi-autonomous piloting of farm machinery to reduce driver fatigue and allow efficient operation even in low visibility conditions such as dust, fog, rain, and darkness. Currently more than 50% of farmland, great and small in extent, now utilizes smart agriculture methods with adoption continually increasing.

Because they can accurately measure the movement of objects in three dimensions, IMU modules are essential to modern society. They are utilized in many more applications than just the automatic control and autonomous driving on tractors and other agricultural machinery used for precision agriculture. Examples include orientation measurement during autonomous driving, drone orientation control, camera and antenna vibration detection and control, and controlling the angle and attitude of blades and arms on construction and mining equipment. The high-precision detection of tiny changes in movement, which are too small for the human eye to detect, makes IMUs vital to high-precision data measurement and control of machinery.

SkyMEMS's IMU modules use high-performance MEMS sensors that features excellent stability, low power consumption and low noise characteristics.. And their linearity characteristics enable high-precision measurement of various kinds of movement over a wide range from slow to fast. This allows them to be used in a broad array of smart agriculture applications.

IMU90 Inertial Measurement Unit widely used in robotics control system

IMU90 Inertial Measurement Unit can work in dynamic environment, and provide accurate angle and acceleration information, which is widely used in robotics control system.

Product Advantages

Why Selecting IMU90 Inertial Measurement Unit?

IMU90 Inertial Measurement Unit is designed and produced by SkyMEMS, it enjoys high performance and accuracy, and high reliability with competitive price. It is a popular inertial measurement unit sensor in the market, which has the main following advantages:

1. High Accuracy, High Performance and Powerful Functions

IMU90 Inertial Measurement Unit is a precision 6 DoF MEMS inertial measurement unit, which enjoys excellent technical advantages:

- Precision 6 DoF Mini MEMS IMU with Full Calibration
- Range (Typical): Gyro $\pm 500^\circ/\text{s}$, Acc $\pm 16\text{g}$
- Bias Instability (Allan): Gyro $1.5^\circ/\text{h}$, Accel $35\mu\text{g}$
- Data Output Rate: UART, 1000Hz; SPI, 1000Hz
- Power Supply: 3.3 VDC
- Compact and Light weight, $23.3 \times 22.4 \times 7.5 \text{ mm}$, $< 15 \text{ grams}$
- Wide Working Temperature: $-40^\circ\text{C} \sim +85^\circ\text{C}$

IMU90 Inertial Measurement Unit adopts big brand components, high-class glue encapsulation, advanced production craft, and fully calibrated, which assured that our products have real actual precise and perfect performance.

2. Aerospace Level Reliability, 12-step Strictest Quality Control

We have advanced product test team and measurement equipment, and we cherish the quality as the life of the company, all our products must pass the strictest quality control procedures, our unique 12-step quality control assures our products enjoy top level quality.

3. Competitive Price, ODM supported

With strict cost control and massive production, we can provide the most competitive cost-effective prices, and we have abundant ODM service experience for customers around the world, that is why we can build up long term win-win cooperation with our customers.

4. Successful Applications in Tens of Fields, 1000+ Customers are Using

We are continuously focusing on MEMS measurement & control technologies, and have developed the most advanced inertial measurement unit IMU90. and IMU90 has been widely used in UAS navigation & control, smart agriculture, platform stabilization, movement control system, robotics control, antenna pointing, etc. and now more than 1000 customers are using our IMU around the world.

5. World-class Production Line, Fast Delivery

We have the world class production line to assure that the production procedures are scientific, precise, and normative, which also can assure our products to be fast delivered.

6. Service with Heart, Professional Technical Support

We have the professional technical support engineer team, which can provide 24-hour technical support and excellent after-sale service.

Serving customers with heart is the principle of SkyMEMS, Customer demand is the fundamental driving force of our development.

We treat our customers with heart, customers' satisfaction is the direction and target of SkyMEMS. Through continuously technology innovation and service upgrading, we will realize win-win cooperation with customers.

FAQ

Q: What is the Working Principle of IMU sensor?

A: IMUs operate by use of reference data, bias values from an initial starting point, and calculate changes to these values using its integrated sensors. A central processing unit calculates directional information; position, speed, orientation, and direction of movement, at a given time in space using the IMU. The sensors suffer from orientation drift as they calculate these variables using a process known as dead-reckoning and are subject to accumulative errors.

Q: What is an IMU sensor?

A: An inertial measurement unit (IMU) is an electronic device that measures and reports a body's specific force, angular rate, and sometimes the magnetic field surrounding the body, using a combination of accelerometers and gyroscopes, sometimes also magnetometers.

Q: What is the Degrees of freedom of IMU sensor?

A: IMUs measure six degrees of freedom. This includes the measurement of linear motion over three perpendicular axes (surge, heave, and sway), as well as rotational movement about three perpendicular axes (roll, pitch, and yaw). This yields six independent measurements that together define the movement of an object or vehicle.

Q: What does inertial measurement unit measure?

A: Inertial Measurement Units (IMUs) is a self-contained system that measures linear and angular motion usually with a triad of gyroscopes and triad of accelerometers. An IMU can either be gimballed or strapdown, outputting the integrating quantities of angular velocity and acceleration in the sensor/body frame.

Q: What are the Sensor types that IMU sensor is composed of?

A: The IMU is comprised of at least two dedicated sensors, one or more linear accelerometers and one or more gyroscopes or angular accelerometers. An optional magnetometer may be integrated into the unit to calibrate against orientation drift.

Accelerometers detect the direction and magnitude of change in velocity. Simple accelerometers measure linear motion while biaxial and triaxial accelerometers detect a change in velocity over a plane or three-dimensional space, respectively. The IMU possesses a triaxial (sometimes referred to as a triad) accelerometer, or otherwise uses multiple accelerometers that are aligned across perpendicular axes.

Gyroscopes detect the angular rate or orientation about a given directional vector. The angular rate is relative to a reference surface. The IMU uses multi-axis gyros to provide measurements in three orthogonal directions. These angular movements must be aligned with those of the accelerometer.

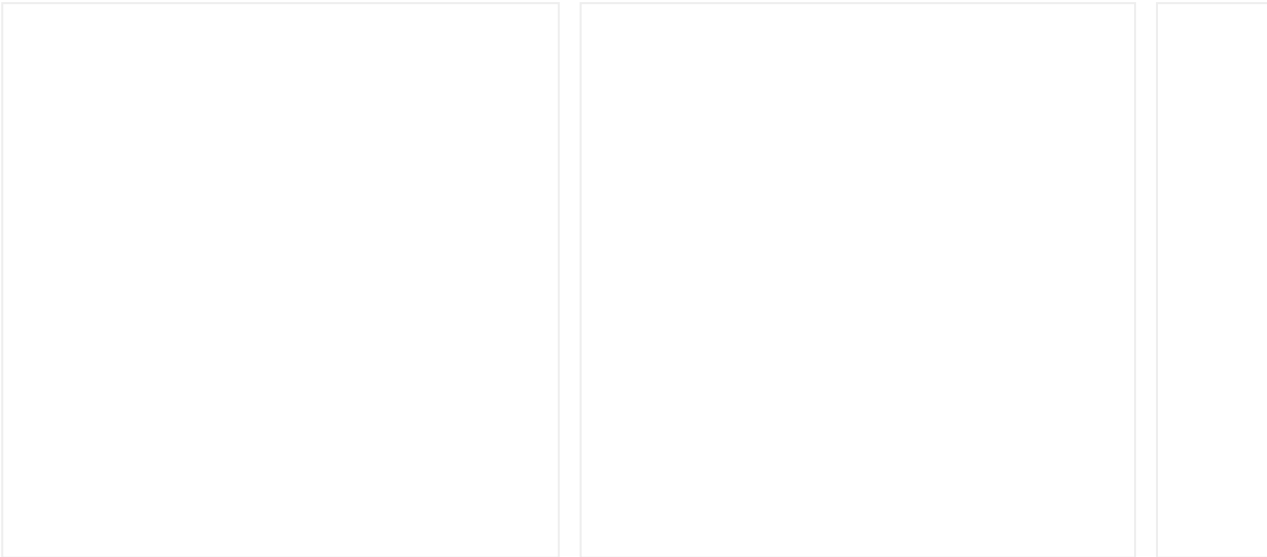
Q: How about the delivery time?

A: for our standard model, if we have them in stock, only need 2~3days to re-test before shipping, if it is out of stock, then need around 2 weeks to arrange the production and tests. For the ODM electronic product, if needing to modify the structure, it will need around 3~4 weeks to arrange the production and tests.

Q: How to arrange the payment?

A: about the payment, please pay to our company account, the beneficiary's name: NANJING SKY MEMS TECHNOLOGY CO., LTD. And our email is only @skymems.com to contact with u formally. To notice this to avoid the loss.

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