

Overview

The **IMX-6™** is a 10-DOF sensor module consisting of a tactical-grade Inertial Measurement Unit (IMU), magnetometer, and barometer. Output includes angular rate, linear acceleration, magnetic vector, and barometric pressure and altitude. IMU calibration consists of bias, scale factor, cross-axis alignment, and temperature compensation. The IMX-6 includes Attitude Heading Reference System (**AHRS**) sensor fusion to estimate roll, pitch, and heading. Adding GNSS input to the IMX-6 enables onboard Inertial Navigation System (**INS**) sensor fusion for roll, pitch, heading, velocity, and position.

The **RUG-4-IMX-6™** series adds a rugged aluminum enclosure and RS232, RS485, and CAN bus to the IMX-6.

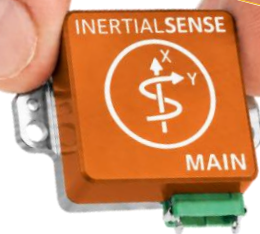
The **RUG-4-IMX-6-RTK™** includes a multi-frequency GNSS receiver with RTK precision position enabling INS sensor fusion for roll, pitch, heading, velocity, and position.

The **RUG-4-IMX-6-Dual™** includes two multi-frequency GNSS receivers with RTK precision position and dual GNSS heading/compass.

The **Inertial Sense SDK** is an open-source software development kit for quick integration to configure and communicate with Inertial Sense products. The SDK includes data logger, math libraries, and interface for Linux, Windows, and embedded platforms.

Applications

- Drone Navigation
- Unmanned Vehicle Payloads
- Ground and Aerial Survey
- Automotive Navigation
- Stabilized Platforms
- Antenna and Camera Pointing
- First Responder and Trackers
- Health and Fitness Monitoring
- Robotics and Ground Vehicles
- Maritime



RUG-4-IMX-6
 Size: 30.5 x 25.4 x 9.9 mm
 Weight: 10.6 g



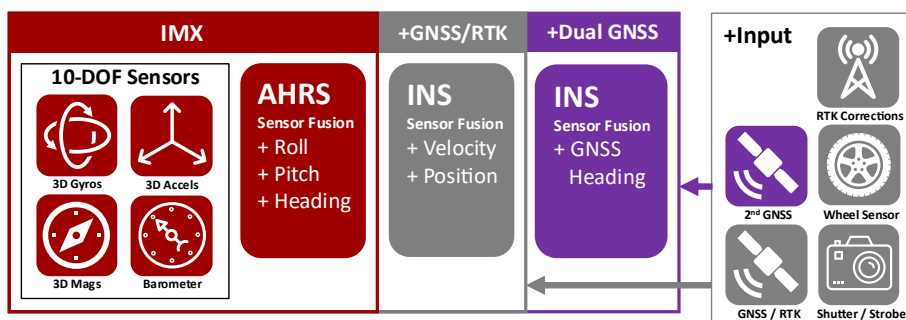
IMX-6
 Size: 15.6 x 12.5 x 2.9 mm
 Weight: 0.9 g
 INS: External GNSS Input



RUG-4-IMX-6-RTK/Dual
 Size: 30.5 x 25.4 x 14.8 mm
 Weight: 14 g
 GNSS: All-Band L1/L2/L5/L6

Features

- **Tactical-Grade IMU**
 - Gyro: 1.5 °/hr Bias Instability, 0.10 °/vhr ARW
 - Accel: 2.8 µg Bias Instability, 0.013 m/s/vhr VRW
- **0.03° Dynamic Roll/Pitch**
- **0.09° Dynamic Heading**
- **IMU Sensing Range: ±4000 °/s, ±16/80/320 g**
- **Reflow-Compatible PCB Module**
- **Output Data Rates: 1000 Hz IMU, 500 Hz INS**
- **30% More Accurate Navigation Than IMX-5**
- Pin-compatible with IMX-5
- External GNSS Input Support (Multi-Band)
- Attitude (Roll, Pitch, Yaw, Quaternions), Velocity, and Position Synchronized to UTC
- 5 Redundant IMUs Calibrated for Bias, Scale Factor, Cross-axis Alignment, and G-Sensitivity
- IMU Shock and Fault Rejection
- -40°C to 85°C Sensor Temperature Calibration
- Binary and NMEA ASCII Protocol
- Barometric Pressure and Humidity
- Strobe In/Out Data Sync (Camera Shutter Event)
- Fast Integration with SDK and Example Software
- RUG-4-IMX-6: RS232, RS485, CAN bus



Specifications

Performance (AHRS, INS, RUG-4)	Typ	
INS Dynamic Roll/Pitch** (RMS)	0.03°	(GNSS-aided with motion excitation)
Static Roll/Pitch (RMS)	0.09°	
INS Dynamic Heading** (RMS)	0.09°	(GNSS velocity-derived)
Static Heading w/Dual Compass* (RMS)	0.4°	
Static Heading w/magnetometer (RMS)	1.0°	

*1 m baseline distance between GNSS antennas.

**With GNSS input and periodic motion >0.8 m/s² acceleration and >2 m/s velocity.

Performance (INS, RUG-4)	RUG-4	+RTK
Horizontal Position (w/ SBAS)	1.5 m CEP	1 cm + 1 PPM CEP
Velocity (GPS and INS)	0.02 m/s	
Angular Resolution	0.05°	
Operation Limits		
Velocity (external GNSS)	500 m/s	
Altitude (external GNSS)	50 Km	
Altitude (Barometric)	10 Km	
GNSS cold-start time to first fix	24 s	-

Performance	Typ
Startup Time	0.8 s
INS/AHRS Timestamp Accuracy (RMS)	1 us
Max Output Data Rate (IMU, AHRS/GNSS-INS)	1000, 500 Hz
IMU signal latency @ 1 KHz ODR	4 ms

Absolute Maximum Ratings	MAX
Acceleration	10,000 g
Ambient Operating Temperature	-40 to 85 °C
Junction Temperature	-40 to 105 °C
Storage Temperature	-40 to 125 °C
Overpressure	600 kPa
ESD rating (Human body model)	± 2 kV
Solder Reflow Temperature Max	245 °C
Solder Reflow Temperature Limit	217 °C liquidus: 40 – 60 s

Sensors	IMU - Gyros	IMU - Accels	Mags	Pressure
Operating Range	±4000 °/s	±16/80/320* g	±2500 μT	30–125 kPa
In-Run Bias Stability**	< 1.5 °/hr	< 2.8 μg		
Random Walk: ARW, VRW	0.10 °/√hr	0.013 m/s/√hr		
Non-linearity	0.015 % FSR	0.015 % FSR		
Noise Density	3.8 mdps/√Hz	46 μg/√Hz	20 nT/√Hz	0.18 Pa/√Hz
Bias Error over -40C to 85C	0.3 °/s RMS	3.7 mg RMS		
Max Output Rate	1 KHz	1 KHz	50 Hz	50 Hz
Bandwidth	539 Hz	416 Hz	50 Hz	5 Hz
Alignment Error	0.03°	0.03°	0.05°	
Resonant Frequencies	19-29 KHz	4,11,15-24 KHz		
Sampling Rate	8 KHz	4 KHz	300 Hz	200 Hz
Resolution	***0.0076 °/s	***122 μg	0.3 μT	0.03 Pa

*Contact sales for extended sensing range

**Performance specifications per IEEE-STD-952-1997

***1 KHz resolution after oversampling

Function	IMX™	+RTK	+Dual
Gyro & Accelerometer (IMU)	•	•	•
Magnetometer & Barometer	•	•	•
Roll, Pitch, Heading (AHRS)	•	•	•
Heading, Velocity, Position (INS)		•	•
GNSS Heading			•

Electrical (IMX-6)	Min	Typ	Max	Units
Power Draw				
IMU @ 1 KHz		105	115	mW
w/ AHRS, INS @ 250 Hz		110	120	mW
Supply Voltage (Vcc)	3.0	3.3	3.6	V
I/O Pin MAX Voltage Range	-0.5		3.6	V
Total Output Current, All Pins			100	mA
I/O Pin Output Current			20	mA
I/O Pin Input low-level	0.99			V
I/O Pin Input high-level	2.31	3.3	3.6	V
I/O Pin Output high-level		3.3		V
STROBE input frequency			1	KHz
STROBE output jitter		10		us
Rising Slope of VIN*	2.4			V/ms

*The supply rising slope must be higher than minimum rating for proper function.

Electrical (RUG-4)	Min	Typ	Max	Units
Supply Voltage (VIN)	3.1		23	V
With R1 SMT Jumper Loaded			42	V
RUG-4-IMX-6-RTK + Antenna				
Current Draw @ 5V, 250Hz*		195		mA
Power Consumption @250Hz*		937		mW
Power Consumption @100Hz*				mW
Power Consumption – Dual		1480		mW

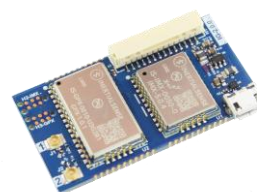
*Navigation filter update rate.

Mechanical (IMX-6)	Typ	Units
Size	15.6 x 12.5 x 2.9	mm
Weight	0.9	grams
Effective Thermal Resistance (Θ _{eff})	15	°C/W
Thermal Resistance (Θ _{JA} , Θ _{JB} , Θ _{JC})	42.3, 27.5, 1.6	°C/W

Mechanical (RUG-4)	Units	Conditions
Size	30.5 x 25.4 x 9.9 30.5 x 25.4 x 14.8	mm RUG-4 RUG-4-RTK/Dual
IP Rating	40	No liquid protection
Mounting Tab		
Hole Spacing	30.836	mm
Weight	14.0	grams
Connectors	Main: Harwin# G125-MV11205L1P, GPS 1/2: MMCX	

Communications & I/O	
IMX-6 Interface	USB, UART x3, SPI
RUG-4 Interface	USB, UART x2, RS232, RS485, CAN*, SPI
Max Baud Rate:	
SPI	10 Mbps
UART, RS422, RS485	10 Mbps
RS232	500 Kbps
Strobe Inputs / Outputs	4 / 1

* Available in future firmware release.



**Development kits
available on our
website.**