

RUG-3-IMX-5
Size: 30.5 x 25.4 x 9.9 mm
Weight: 10.5 g



IMX-5
Size: 15.6 x 12.5 x 2.9 mm
Weight: 0.8 g
INS: External GNSS Input



RUG-3-IMX-5-RTK/Dual
Size: 30.5 x 25.4 x 14.8 mm
Weight: 14 g
GNSS: Multi-Band L1/L2/E5

Features

- **Tactical Grade IMU**
 - Gyro: 1.5 °/hr Bias Instability, 0.16 °/vhr ARW
 - Accel: 19 µg Bias Instability, 0.02 m/s/vhr VRW
- **0.04° Dynamic Roll/Pitch**
- **0.13° Dynamic Heading**
- **Surface Mount Reflowable (PCB Module)**
- **Output Data Rates:**
 - 1000Hz IMU, 200Hz AHRS, 142Hz GNSS-INS
- External GNSS Support (Multi-Band)
- Attitude (Roll, Pitch, Yaw, Quaternions), Velocity, and Position UTC Time Synchronized
- Triple Redundant IMUs Calibrated for Bias, Scale Factor, Cross-axis Alignment, and G-sensitivity
- -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
- Data Logging (SDK and Application Software)
- RUG-3-IMX-5: RS232, RS485, CAN* bus

* Available in future firmware release.

Overview

The **IMX-5™** 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-5 includes Attitude Heading Reference System (**AHRS**) sensor fusion to estimate roll, pitch, and heading. Adding GNSS input to the IMX-5 enables onboard Inertial Navigation System (**INS**) sensor fusion for roll, pitch, heading, velocity, and position.

The **RUG-3-IMX-5™** series adds a rugged aluminum enclosure and RS232, RS485, and CAN bus to the IMX-5.

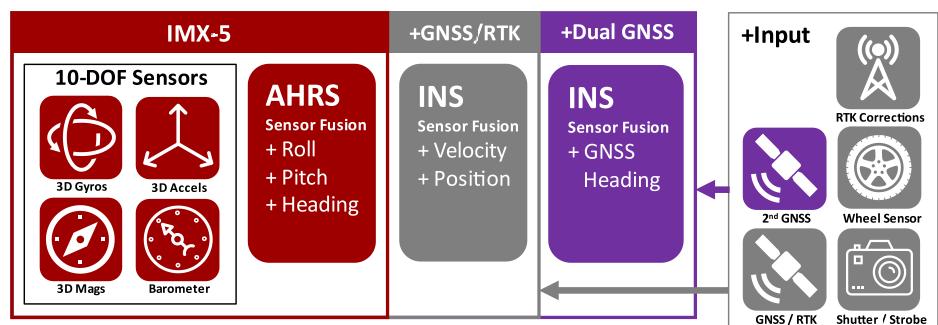
The **RUG-3-IMX-5-RTK™** includes a multi-frequency GNSS receiver with RTK precision position enabling INS sensor fusion for roll, pitch, heading, velocity, and position.

The **RUG-3-IMX-5-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, Fitness, and Sport Monitors
- Robotics and Ground Vehicles
- Maritime





Specifications

Performance (AHRS, INS, RUG-3)		Typ	Electrical (IMX-5)					
INS Dynamic Roll/Pitch** (RMS)		0.04°	Power Draw	Min	Typ	Max		
Static Roll/Pitch (RMS)		0.1°	IMU @ 1KHz	95	105	mW		
INS Dynamic Heading** (RMS)		0.13°	w/ AHRS, INS @ 250Hz	100	110	mW		
Static Heading w/Dual Compass* (RMS)		0.4°	Supply Voltage (Vcc)	3.0	3.3	3.6		
Static Heading w/magnetometer (RMS)		1.0°	I/O Pin MAX Voltage Range	-0.5	3.6	V		
*1 m baseline distance between GNSS antennas.								
**With GNSS input and periodic motion >0.8 m/s ² acceleration and >2 m/s velocity.								
Performance (INS, RUG-3)		RUG-3	+RTK	Electrical (RUG-3)				
Horizontal Position (w/ SBAS)		1.5 m CEP	1 cm + 1 PPM CEP	Supply Voltage (VIN)	Min	Typ		
Velocity (GPS and INS)		0.03 m/s		4.5	20	V		
Angular Resolution		0.05°		RUG-3-IMX-5-RTK + Antenna				
Operation Limits				Current Draw @ 5V, 250Hz*	185	mA		
Velocity (external GNSS)		500 m/s		Power Consumption @250Hz*	927	mW		
Altitude (external GNSS)		50 Km		Power Consumption @100Hz*		mW		
Altitude (Barometric)		10 Km		Power Consumption – Dual	1470	mW		
GNSS cold start time to fix		24 s	-	*Navigation filter update rate.				
Performance		Typ	Mechanical (IMX-5)					
Startup Time		0.8 s	Size	15.6 x 12.5 x 2.9				
INS/AHRS Timestamp Accuracy (RMS)		1 us	Weight	0.8				
Max Output Data Rate (IMU, AHRS, GNSS-INS)		1000, 200, 142 Hz	Mechanical (RUG-3)					
IMU signal latency		4 ms	Size	30.5 x 25.4 x 9.9	Units	mm		
Absolute Maximum Ratings		MAX	Size	30.5 x 25.4 x 14.8	RUG-3	RUG-3-RTK/Dual		
Acceleration		10,000 g	IP Rating	40	No liquid protection			
Operating Temperature		-40 to 85 °C	Mounting Tab	30.836	mm			
Storage Temperature		-40 to 125 °C	Hole Spacing					
Overpressure		600 kPa	Weight	14.0	grams			
ESD rating		± 2 kV	Connectors	Main: Harwin# G125-MV11205L1P, GPS 1/2: MMCX				
Solder Reflow Temperature Max		245 °C	Communications & I/O					
Solder Reflow Temperature Limit		217 °C liquidus: 40 – 60 s	IMX-5 Interface	USB, UART x3, SPI				
Sensors		IMU - Gyros	IMU - Accels	Mags	USB, UART x2, RS232, RS485, CAN*, SPI			
Operating Range		±4000 °/sec	±16 g	±2500 µT				
In-Run Bias		< 1.5 °/hr	< 19 µg	Max Baud Rate:				
Stability				SPI	10 Mbps			
Random Walk		0.16 °/Vhr	0.02 m/s/Vhr	UART, RS422, RS485	10 Mbps			
Non-linearity		0.02 % FSR		RS232	500 Kbps			
Noise Density		5 mdps/VHz	60 µg/VHz	Strobe Inputs / Outputs				
Bias Error over -40C to 85C		0.3 °/s RMS			4 / 1			
Max Output Rate	1 KHz	1 KHz	100 Hz		* Available in future firmware release.			
Bandwidth	250 Hz	218 Hz	50 Hz					
Alignment Error	0.03°	0.03°	0.05°					
Resonant Freq.	2.6/2.17 KHz	20 KHz						
Sampling Rate	8 KHz	4 KHz	300 Hz					
Resolution	*0.0076 °/sec	*122 µg	0.3 µT					
*1KHz resolution after oversampling								
Function		IMX™	+RTK	+Dual				
Gyro & Accelerometer (IMU)		•	•	•				
Magnetometer & Barometer		•	•	•				
Roll, Pitch, Heading (AHRS)		•	•	•				
Heading, Velocity, Position (INS)			•	•				
GNSS Heading				•				

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