INERTIAL SENSE
autonomous navigation solutions

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

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.

IMX-5
Size: 15.6 x 12.5 x 2.9 mm
Weight: 0.8 g

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

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

Features

- **Tactical Grade IMU**
  - **Gyro: 1.5 °/hr Bias Instability, 0.16 °/√hr ARW**
  - **Accel: 19 µg Bias Instability, 0.02 m/s/√hr VRW**
- **Surface Mount Reflowable (PCB Module)**
- Up to 1KHz IMU Output Data Rate
- 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.

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Specifications

Performance	Typ
Startup Time	0.8 s
Timestamp Accuracy (RMS)	1 us
Max Output Data Rate	1 KHz
IMU signal latency @ 1KHz ODR	4 ms

Absolute Maximum Ratings	MAX	
Acceleration	10,000 g	
Operating Temperature	-40 to 85 °C	
Storage Temperature	-40 to 125 °C	
Overpressure	600 kPa	
ESD rating	± 2 kV	Human body model
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 °/sec	±16 g	±2500 µT	30–125 kPa
In-Run Bias Stability	< 1.5 °/hr	< 19 µg		
Random Walk	0.16 °/√hr	0.02 m/s/√hr		
Non-linearity	0.02 % FSR	0.02 % FSR		
Noise Density	5 mdps/√Hz	60 µg/√Hz		Pa/√Hz
Bias Error over -40C to 85C	0.3 °/s RMS	3,7 mg RMS		
Max Output Rate	1 KHz	1 KHz	100 Hz	50 Hz
Bandwidth	539 Hz	416 Hz	50 Hz	5 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	200 Hz
Resolution	*0.0076 °/sec	*122 µg	0.3 µT	0.03 Pa
*1KHz resolution after oversampling				(2 cm)

Function	IMX™
Gyro & Accelerometer (IMU)	●
Magnetometer & Barometer	●

Electrical (IMX-5)	Min	Typ	Max	Units
Power Draw				
IMU @ 1KHz		95	105	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
Rising Slope of VIN*	2.4			V/ms

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

Electrical (RUG-3)	Min	Typ	Max	Units
Supply Voltage (VIN)	4.5		20	V

Mechanical (IMX-5)		Units
Size	15.6 x 12.5 x 2.9	mm
Weight	0.8	grams

Mechanical (RUG-3)		Units	Conditions
Size	30.5 x 25.4 x 9.9	mm	RUG-3
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-5 Interface	USB, UART x3, SPI
RUG-3 Interface	USB, UART x2, RS232, RS485, CAN*, SPI
Max Baud Rate:	
SPI	10 Mbps
UART, RS422, RS485	3 Mbps
RS232	500 Kbps
Strobe Inputs / Outputs	4 / 1

* Available in future firmware release.

Development Kits available on our website.