3DM®-GX5-35

Attitude and Heading Reference System (AHRS) with GNSS

3DM-GX5-35 *– miniature, high-performance, industrial-grade attitude and heading reference system (AHRS) with integrated multi-constellation GNSS, high noise immunity, and exceptional performance*

The LORD Sensing 3DM-GX5 family of high-performance, industrial-grade inertial sensors provides a wide range of triaxial inertial measurements and computed attitude and navigation solutions.

In all models, the Inertial Measurement Unit (IMU) includes direct measurement of acceleration and angular rate. The computed outputs vary between models and can include pitch, roll, yaw, a complete attitude and heading reference solution (AHRS), or a complete position, velocity and attitude solution (PVA), and integrated GNSS outputs. All sensors are fully temperature-compensated and calibrated over the operating temperature. Micro-Electro-Mechanical System (MEMS) technology allows for highly accurate, small, light-weight devices.

The LORD Sensing MIP Monitor software can be used for device configuration, live data monitoring, and recording. Alternatively, the MIP Data Communications Protocol is available for development of custom interfaces and easy OEM integration.

PRODUCT HIGHLIGHTS

- High-performance integrated multi-constellation GNSS receiver and advanced MEMS sensor technology provide direct inertial measurements, and computed attitude and heading outputs in a small package
- Triaxial accelerometer, gyroscope, magnetometer, temperature sensors, and a pressure altimeter achieve the optimal combination of measurement qualities
- Economical combination of AHRS and GNSS outputs for use in customer supplied Kalman Filters

FEATURES AND BENEFITS

BEST IN CLASS PERFORMANCE

- Fully calibrated, temperature-compensated, and mathematically-aligned to an orthogonal coordinate system for highly accurate outputs
- High-performance, low-drift gyros with noise density of 0.005°/sec/√Hz and VRE of 0.001°/s/g2RMS
- Accelerometer noise as low as 25 ug/√Hz

EASE OF USE

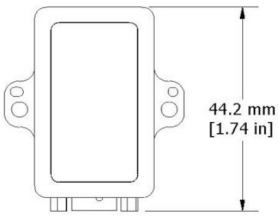
- Easy integration via comprehensive and fully backwards-compatible communication protocol

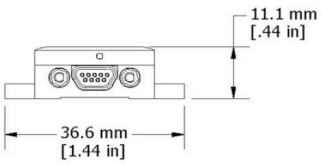
COST EFFECTIVE

- Out-of-the box solution reduces development time
- Volume discounts

APPLICATIONS

- GNSS-aided attitude and heading measurement
- Platform stabilization, artificial horizon
- Satellite dish, radar, and antenna pointing





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Specifications

General			
Integrated Sensors	Triaxial accelerometer, triaxial gyroscope, triaxial magnetometer, pressure altimeter, temperature sensors, and GNSS receiver		
Data Outputs	**Inertial Measurement Unit (IMU) outputs:** acceleration, angular rate, magnetic field, ambient pressure, Delta-theta, Delta-velocity **COMPUTED OUTPUTS** **Complementary Filter (CF):** attitude estimates (in Euler angles, quaternion, orientation matrix) stabilized, north and up vectors, GNSS correlation timestamp **Global Navigation Satellite System outputs (GNSS):** LLH position, ECEF position and velocity, NED velocity, UTC time, GNSS time, SV. GNSS protocol access mode available.		
Inertial Measurement Unit (IMU) Sensor Outputs			
	Accelerometer	**Gyroscope**	**Magnetometer**
Measurement range	±8 g (standard) ±2 g, ±4 g, ±20 g, ±40 g (optional)	300°/sec (standard) ±75, ±150, ±900 (optional)	±8 Gauss
Non-linearity	±0.02 % fs	±0.02% fs	±0.3% fs
Resolution	0.02 mg (+/- 8 g)	<0.003°/sec (300 dps)	--
Bias instability	±0.04 mg	8°/hr	--
Initial bias error	±0.002 g	±0.04°/sec	±0.003 Gauss
Scale factor stability	0.03%	±0.05%	±0.1%
Noise density	25 µg/√Hz (2 g)	0.005°/sec/√Hz (300°/sec)	400 µGauss/√Hz
Alignment error	±0.05°	±0.08°	±0.05°
Bandwidth	225 Hz	250 Hz	--
Offset error over temperature	0.06% (typ)	0.04% (typ)	--
Gain error over temperature	0.03% (typ)	0.03% (typ)	--
Vibration induced noise	--	0.072°/s RMS/g RMS	--
Vibration rectification error (VRE)	--	0.001°/s/g² RMS	--
IMU filtering	Digital sigma-delta ADC sampled at 1kHz and 4kHz. 4kHz data averaged to 1kHz nominal sampling rate. Scaled into physical units at 1kHz. User adjustable IIR filter available for 1kHz data. Coning and sculling integrals computed at 1kHz.		
Sampling rate	1 kHz	4 kHz	100 Hz
IMU data output rate	1 Hz to 1 kHz		
Pressure Sensor			
Range	260 to 1260 hPa		
Resolution	0.01 hPa		
Noise density	0.01 hPa RMS		
Sampling rate	25 Hz		

Computed Outputs	
Attitude accuracy	CF outputs: ±0.5° roll, pitch, and heading (static, typ), ±2.0° roll, pitch, and heading (dynamic, typ)
Attitude heading range	360° about all axes
Attitude resolution	< 0.01°
Attitude repeatability	0.2° (typ)
Calculation update rate	500 Hz
Computed data output rate	CF outputs: 1 Hz to 500 Hz
Global Navigation Satellite System (GNSS) Outputs	
Receiver type	72-channel GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1, SBAS L1 C/A:WAAS, EGNOS, MSAS Galileo E1B/C
GNSS data output rate	1 Hz to 4 Hz
Time-to-first-fix	Cold start: 27 second, reacquisition: 1 second hot start: <1 second
Sensitivity	Tracking: -164 dBm, cold start: -147 dBm hot start: - 156 dBm
Velocity accuracy	0.1 m/sec
Heading accuracy	0.5°
Horizontal position accuracy	GNSS: 2.5 m CEP SBAS: 2.0 m CEP
Time pulse signal accuracy	30 nsec RMS < 60 nsec 99%
Acceleration limit	≤ 4 g
Altitude limit	50,000 meters
Velocity limit	500 m /sec (972 knots)
Operating Parameters	
Communication	USB 2.0 (full speed) RS232 (9,600 bps to 921,600 bps, default 115,200)
Power source	+4 to + 36 V dc
Power consumption	700 mW (typ), 800 mW (max)
Operating temperature	-40°C to +85°C
Mechanical shock limit	500*g*/1ms survivability
MTBF	396,193 hours (Telcordia method, GM/35C)
Physical Specifications	
Dimensions	44.2 mm x 36.6 mm x 11 mm
Weight	20 grams
Enclosure material	Aluminum
Regulatory compliance	ROHS, CE
Integration	
Connectors	Data/power output: micro-DB9 GNSS antenna: MMCX type
Software	MIP Monitor, MIP Hard and Soft Iron Calibration, Windows XP/Vista/7/8/10 compatible
Compatibility	Protocol compatibility across 3DM®-GX3, GX4, RQ1, GQ4, GX5 and CV5 product families
Software development kit (SDK)	MIP data communications protocol with sample code available (OS and platform independent)

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