3DM-GX3® -35

Data Sheet

Miniature Attitude Heading Reference System with GPS

Introduction

The **3DM-GX3® -35** high-performance, miniature AHRS (attitude heading reference system) with GPS, combines MEMS sensor technology and a highly sensitive embedded GPS receiver. It incorporates a triaxial accelerometer, triaxial gyro, triaxial magnetometer, temperature sensors, and a dedicated 32 bit processor running a sophisticated fusion algorithm to provide orientation, inertial, and GPS measurements. Data from the GPS receiver is time synchronized with the inertial sensors and all inertial and GPS data are available as custom user packets (either by polling or continuous stream).

Features & Benefits

- smallest, lightest, miniature AHRS with GPS available on the market
- fully temperature compensated over -40 °C to 65 °C operational range
- improved performance under vibration, as inertial sensors are sampled at 30 kHz and digitally filtered and scaled into physical units; coning and sculling integrals are computed at 1 kHz
- fully customizable data output: inertial data up to 1000 Hz and GPS data up to 4 Hz with individual data quantity control
- calibrated for sensor misalignment, gyro G-sensitivity, and gyro scale factor non-linearity to third order
- versions available from 1.7 g to 50 g and 50°/s to 1200°/s
- rugged aluminum enclosure with precision alignment holes

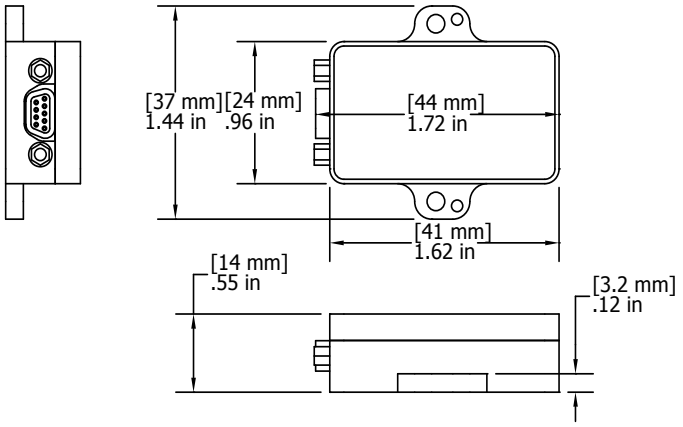
Applications

- host based inertial aided GPS Navigation
- indoor/outdoor location tracking of personnel
- unmanned vehicles, navigation, artificial horizon
- computer science
- biomedical
- platform stabilization
- antenna and camera pointing
- robotics
- ideally suited to navigation solutions using custom Kalman filters or additional sensor inputs

System Overview

The 3DM-GX3® -35 is a member of the **3DM-GX3®** family of inertial sensors. The system offers a range of output data quantities, including fully calibrated inertial measurements: acceleration, angular rate, and magnetic field; or deltaTheta & deltaVelocity vectors. It can also output computed orientation estimates: Euler angles (pitch, roll, and yaw (heading)); orientation matrix; or quaternion. GPS data quantities include LLH position, NED velocity, ECEF position and velocity, DOP data, UTC time, GPS time, clock info, GPS fix, and SVI. The flexibility of the system is made possible by the powerful new MicroStrain Inertial Packet Protocol (**MIPP™**).

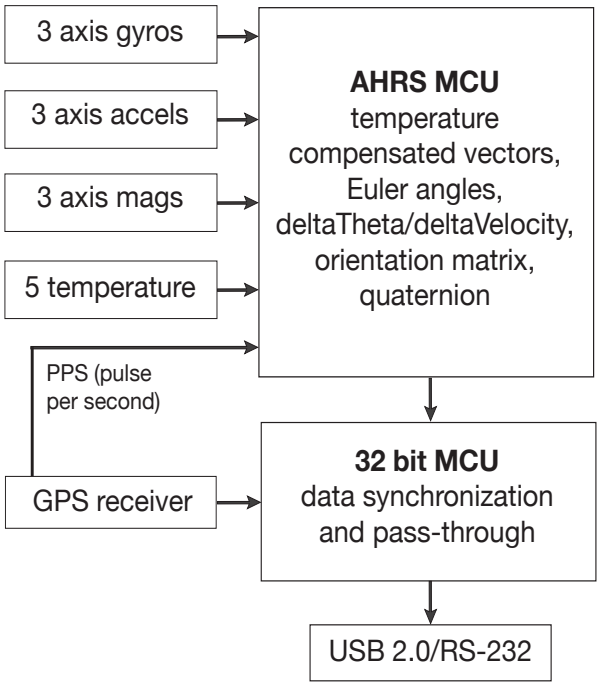
The 3DM-GX3® -35 has a dual communication interface, which supports USB and RS-232. Starter kits include choice of USB or RS-232 interface cable.



Specifications

Inertial Sensors	
Orientation range	360° about all axes
Accelerometer range	± 5 *g* standard; ± 1.7 *g*, ± 16 *g*, and ± 50 *g* also available
Accelerometer bias stability	± 0.005 *g* for ± 5 *g* range ± 0.003 *g* for ± 1.7 *g* range ± 0.010 *g* for ± 16 *g* range ± 0.050 *g* for ± 50 *g* range
Accelerometer nonlinearity	0.2 %
Gyro range	± 300°/sec standard, ± 1200°/sec, ± 600°/sec, ± 150°/sec, ± 50°/sec also available
Gyro bias stability	± 0.2°/sec for ± 300°/sec
Gyro nonlinearity	0.2 %
Magnetometer range	± 2.5 Gauss
Magnetometer nonlinearity	0.4 %
Magnetometer bias stability	0.01 Gauss
Filtering	sensors sampled at 30 kHz, digitally filtered (user adjustable) and scaled into physical units; coning and sculling integrals computed at 1 kHz.
A/D resolution	16 bits (SAR) (oversampled to 17 bits)
Orientation Accuracy	± 0.5° typical for static conditions ± 2.0° typical for dynamic (cyclic) conditions
Orientation resolution	<0.1°
Repeatability	0.2°
GPS Receiver	
GPS receiver type	50 Channels, L1 frequency, GPS C/A Code SBAS: WAAS, EGNOS, MSAS, GAGAN
GPS Navigation update rate	Up to 4Hz
Time-to-First-Fix	Cold Start (Autonomous): 36 sec Warm Start (Autonomous): 36 sec Hot Start: < 1 sec
GPS Tacking and Navigation Sensitivity	-159 dBm
GPS Reacquisition Sensitivity	-159 dBm
GPS Cold Start (Autonomous) Sensitivity	-141 dBm
GPS Velocity Accuracy	0.1 m/sec
GPS Heading Accuracy	0.5 degrees
GPS Horizontal position Accuracy	< 2.5 m Autonomous
	< 2.0 m SBAS
GPS Timepulse signal Accuracy	30 nsec RMS
	< 60 nsec 99%
GPS Acceleration Limit	≤ 4 *g*
GPS Altitude Limit	50000 m
GPS Velocity Limit	500 m/sec (972 knots)

General	
Output modes	3DM-GX3 MIPP™ records: acceleration, angular rate, magnetic field, deltaTheta, deltaVelocity, Euler angles, orientation matrix, quaternion, LLH position, NED velocity, ECEF position and velocity, DOP data, UTC time, GPS time, clock info., GPS fix, and SVI NMEA GPS protocol records and UBX GPS protocol records available in advanced mode
Interface options	standard: USB 2.0 and RS232
Data rate	AHRS: 1 Hz to 1,000 Hz, GPS: 1 Hz to 4 Hz
Serial baud rate	9,600 baud to 921,600 baud (115,200 baud default)
Supply voltage	standard: 3.2 to 16 volts
Power consumption	160 mA (typical) @ 5 volts with RS-232 and GPS lock
Connectors	micro-DB9,
Operating temp.	-40 °C to +65 °C
Dimensions	44 mm x 24 mm x 14 mm - excluding mounting tabs, width across tabs 37 mm,
Weight	23 grams
Shock limit	500 *g*



MicroStrain®
MicroStrain Inc.
459 Hurricane Lane,
Suite 102
Williston, VT 05495 USA
www.microstrain.com
ph: 800-449-3878
fax : 802-863-4093
sales@microstrain.com