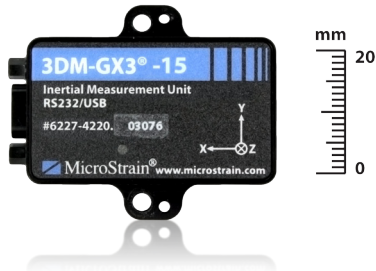


# 3DM-GX3<sup>®</sup> -15

Data Sheet

## Miniature Inertial Measurement Unit And Vertical Gyro



### Introduction

The 3DM-GX3<sup>®</sup> -15 is a high-performance, miniature Inertial Measurement Unit and Vertical Gyro, utilizing MEMS sensor technology. It combines a triaxial accelerometer, triaxial gyro, temperature sensors, and an on-board processor running a sophisticated sensor fusion algorithm to provide static and dynamic orientation, and inertial measurements.

### Features & Benefits

- smallest and lightest IMU available on the market
- fully temperature compensated over operational range
- calibrated for sensor misalignment, gyro  $g$ -sensitivity, and gyro scale factor non-linearity to third order
- improved performance under vibration, as sensors are sampled at 30 kHz and digitally filtered and scaled into physical units; coning and sculling integrals are computed at 1 kHz
- complementary filter eliminates gyro drift in IMU output
- RS-232 and USB 2.0 communication interfaces
- inertial data up to 1000 Hz
- output includes Euler angles, rotation matrix, deltaTheta, deltaVelocity, quaternion, acceleration, angular rate
- versions available from 1.7  $g$  to 50  $g$  and 50°/s to 1200°/s
- rugged aluminum enclosure with precision mounting holes
- ROHS compliant

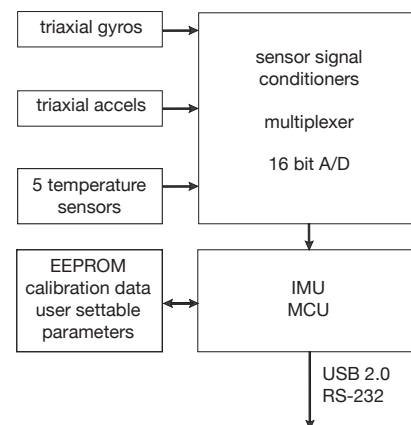
### Applications

- inertial aiding of GPS
- platform stabilization, artificial horizon
- antenna, satellite and camera pointing
- robotics
- biomechanics, biomedical animation
- automotive, marine, military
- heavy equipment, container handling
- virtual reality, computer science
- reconnaissance, surveillance and target acquisition system

### Product Overview

The 3DM-GX3<sup>®</sup> -15 offers a range of fully calibrated inertial measurements including acceleration, angular rate, deltaTheta, and deltaVelocity vectors. It can also output computed orientation estimates including Euler angles (pitch and roll), rotation matrix and quaternion. All quantities are fully temperature compensated and are mathematically aligned to an orthogonal coordinate system. The angular rate quantities are further corrected for  $g$ -sensitivity and scale factor non-linearity to third order. The 3DM-GX3<sup>®</sup> -15 architecture has been carefully designed to substantially eliminate common sources of error such as sensitivity to supply voltage variations. On-board coning and sculling compensation allows for use of lower data output rates while maintaining performance of a fast internal sampling rate.

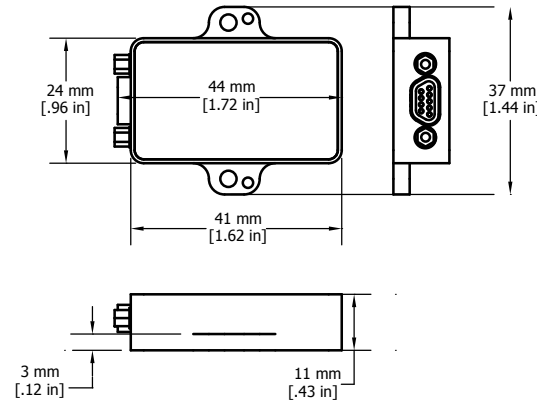
The 3DM-GX3<sup>®</sup> -15 is initially sold as a starter kit consisting of an IMU module, RS-232 or USB communication and power cable, software CD, user manual, and quick start guide.



## IMU Specifications

Attitude and Heading	
Attitude heading range	360° about all 3 axes
Accelerometer range	±5 g standard
Gyroscope range	±300°/sec standard
Static accuracy	±0.5° pitch and roll typical for static test conditions
Dynamic accuracy	±2.0° pitch and roll for dynamic (cyclic) test conditions and for arbitrary angles
Long term drift	eliminated by complementary filter architecture
Repeatability	0.2°
Resolution	<0.1°
Data output rate	up to 1000 Hz
Filtering	sensors sampled at 30 kHz, digitally filtered (user adjustable) and scaled into physical units; coning and sculling integrals computed at 1 kHz
Output modes	acceleration, angular rate, deltaTheta, deltaVelocity, Euler angles, quaternion, rotation matrix

Options	
Accelerometer range	±1.7 g, ±16 g, ±50 g
Gyroscope range	±50°/sec, ±600°/sec, ±1200°/sec



General	
A/D resolution	16 bits SAR oversampled to 17 bits
Interface options	USB 2.0 or RS232
Baud rate	115,200 bps to 921,600 bps
Power supply voltage	+3.2 to +16 volts DC
Power consumption	80 mA @ 5 volts with USB
Connector	micro-DB9
Operating temperature	-40° C to +70° C
Dimensions	44 mm x 24 mm x 11 mm - excluding mounting tabs, width across tabs 37 mm
Weight	18 grams
ROHS	compliant
Shock limit	500 g
Software utility	CD in starter kit (XP/Vista/Win7 compatible)
Software development kit (SDK)	complete data communications protocol and sample code

## Sensor Specifications

	Accels	Gyros
Measurement range	±5 g	±300°/sec
Non-linearity	±0.1 % fs	±0.03 % fs
In-run bias stability	±0.04 mg	18°/hr
Initial bias error	±0.002 g	±0.25°/sec
Scale factor stability	±0.05 %	±0.05 %
Noise density	80 µg/√Hz	0.03°/sec/√Hz
Alignment error	±0.05°	±0.05°
User adjustable bandwidth	225 Hz max	440 Hz max
Sampling rate	30 kHz	30 kHz



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Patent Pending