



ANELLO X3 IMU

World's Smallest and Lightest 3-Axis Optical Gyroscope IMU

The ANELLO X3 IMU is a small, compact and highly reliable, 3-Axis Optical Gyroscope Inertial Measurement Unit (IMU) for today's autonomous applications in GPS denied environments.



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The ANELLO X3 IMU leverages three state-of-the-art ANELLO SiPhOG™ (Silicon Photonics Optical Gyroscope) units as low-noise and low-drift optical smart sensors each containing its own independent 6-Axis redundant IMU sensor.

ANELLO replaces traditional discrete optical components with its patented photonic integrated circuit (PIC) technologies, making the ANELLO X3 IMU the smallest and lightest commercially available 3-Axis optical gyroscope in the world. Optical gyroscope measurements are trusted for their low-drift performance under harsh environments including shock, vibration, and thermal gradients.

Requiring only an unregulated power input, the ANELLO X3 IMU outputs data via a flexible, high-speed serial channel.

The all-digital ANELLO X3 IMU provides high-bandwidth, low-drift angular rate measurements on all axes. The integrated triple-redundant 6-Axis MEMS IMUs provide fully calibrated acceleration measurements and auxiliary rate sensor data for maximum fault detection coverage. A hardware built in test (BIT) output line signals fault detection, alongside diagnostic messages and the BIT data word.

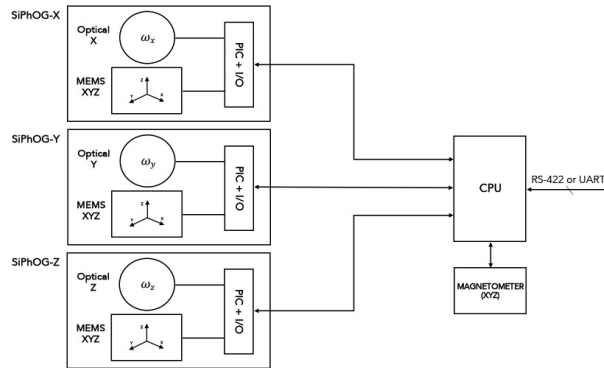
A Sync/PPS input line allows the SiPhOG and IMU measurements to be time aligned with an external clock such as a GNSS/GPS pulse per second (PPS) line.

The ANELLO X3 IMU offers seamless integration with PX4 and ArduPilot - enabling precise, low-drift inertial navigation for autonomous aerial systems.

FEATURES

3-Axis SiPhOG™	< 0.03 m/s/ $\sqrt{\text{hr}}$ Accel VRW
24 Total Sensor Channels	< 0.5°/hr Gyro Bias Instability
Safety Rated RTOS and CPU	< 0.05°/ $\sqrt{\text{hr}}$ Angular Random Walk
RS-422 and UART	Easy to Time Synchronize
< 20 μg Accel Bias Instability	Fully Calibrated Measurements
Patented Photonic Integrated Circuit Technology	Triple Redundant, 6-Axis MEMS IMUs, each with independent CPU/Power Subsystems
Integrated with PX4 & ArduPilot	$\pm 8\text{G}$ full-scale range magnetometer with 0.4mG total RMS noise

FUNCTIONAL BLOCK DIAGRAM



TECHNICAL SPECIFICATIONS (COMMERCIAL)

XYZ Optical Gyroscope Performance

Rate Range	+/- 400°/s
Bias Instability	< 0.5°/hr
Angle Random Walk	< 0.05°/√hr
Scale Factor Error	< 0.1% (0 - 200°/s)
Scale Factor Over Temp	< 0.1% typical
Bandwidth	Up to 100 Hz

MEMS IMU Performance

MEMS IMU	Accelerometer	Gyroscope
Range	16g	up to 400°/s
Bias Instability	20μg	1.5°/hr
Random Walk	0.03 m/s/√hr	0.3°/√hr

Serial Communication

UART and RS-422	Up to 921600 Baud
UART and RS-422 Sample Rate	Up to 200 Hz

Electrical

Connector	SAMTEC 14-pin Male
Sync / PPS In	TTL
Built-In-Test	TTL
Voltage Supply	4-24 VDC (regulated)
Power Consumption	4W typical

Environmental

Sealing	IP54
Temperature ¹	-10 to +50°C
Shock	20g, 20ms, 6 Shocks per Axis
Vibration	4g rms, 20-2 kHz, 30min per Axis

Physical

Size	2" (51mm) x 2" (51mm) x 1.75" (44.5mm)
Weight	< 0.4 lbs (182g)

Notes: 1. Option for -20 to +70°C extended range upgrade