

TAC-450-360 IMU

emcore®

Photonic Inertial Measurement Unit



Key Features

- Non-ITAR and compliant with EU import regulations
- Exclusive EMCORE PIC technology
- Available with 10g, 16g, 30g and 100g inertial MEMS accelerometers
- Three tactical-grade photonic gyros
- High scale factor accuracy
- Increased efficiency with modern processing electronics
- Backward compatible with existing EMCORE IMUs/FOG equipment
- Extremely high bandwidth (≥ 1000 Hz)
- User-programmable update rates from 1 to 5000 Hz
- User-configurable baud rate from 9.6 Kbps to 4.1 Mbps
- Three-axes magnetometer for magnetic field compensation of gyro bias

Applications

- Extremely demanding autonomous platforms
- Pipeline inspection maintenance
- Drilling and mining
- High-speed gimbal stabilization
- Stabilization systems for LiDAR, EO/FLIR
- GNSS-aiding inertial navigation
- Manned and unmanned platform stabilization and navigation
- Augmented reality and mobile mapping
- Guidance and control
- Precision pointing and positioning

Precise Photonic FOG-based Non-ITAR IMU Provides the Performance Needed for Demanding Environments and Applications

The new TAC-450-360 IMU is the one of premier inertial measurement units offered by EMCORE. Designed to deliver the highest level of performance in EMCORE's TAC-450 IMU product line, the non-ITAR TAC-450-360 IMU includes EMCORE's exclusive photonic integrated chip (PIC) technology. PIC technology provides more efficient fiber optic gyros (FOGs) over traditional open-loop FOG technology by replacing previously high-touch optical components with a single precision-manufactured silicon chip. The TAC-450-360 IMU is fully configurable by the end-user and is available with a wide range of high-performance MEMS inertial-grade accelerometers.

The high-end inertial-grade accelerometers in the TAC-450-360 reduce lateral drift in dead reckoning applications and improve the stability of orientation and attitude measurements in applications requiring challenging stabilization and precision pointing needs. The TAC-450-360 IMU with 30g accelerometers is ideal for highly dynamic applications or in high acceleration, vibration, or shock applications.

The TAC-450-360 IMU leverages EMCORE's tactical-grade photonic FOG technology to offer excellent shock and vibration tolerance over competing technologies. These tactical-grade FOGs are integrated with three low noise, high-performance inertial-grade MEMS accelerometers, and a three-axis magnetometer for automatic gyro bias compensation even in environments with strong local magnetic fields. The premium performance TAC-450-360 IMU is designed for systems and applications where low Angle Random Walk (ARW), bias instability, high scale factor accuracy, very high bandwidth, and low latency are critical parameters for success.

PIC Technology for Excellent Performance

EMCORE's exclusive PIC technology uses an integrated planar optic chip, resulting in a sensor that delivers robust performance and survivability in demanding environments. With three integrated tactical-grade photonic FOGs at its core, the TAC-450-360 IMU provides the critical precision navigational support that autonomous navigation and other applications demand.

Improved SWaP for Ease of Integration

The high-performance EMCORE TAC-450-360 offers great SWaP in a sturdy, compact package. Designed for drop-in replacement for many available IMUs, the TAC-450-360 IMU's programmable message outputs simplify the integration of the TAC-450 system. This inertial sensor offers ease of integration for designers of higher-level inertial navigation, guidance, and stabilization systems by providing user-selectable features, including an adjustable baud rate to adjust communication latency to receive accurate, timely data.

Ideal applications for the TAC-450-360 IMU include challenging environments such as autonomous ground vehicles, unmanned aircraft, autonomous material movers, autonomous robots, pipeline inspection guides, mobile mapping systems, and stabilization systems for LiDAR and radar and high-speed gimbals.

EMCORE TAC-450-360 IMU

Performance Specifications – Gyros

Input Rate	±490°/sec (max)
Bias Instability (25°C)	≤0.05°/hr, 1σ (typical) ≤0.1°/hr, 1σ (max)
Scale Factor Non-linearity (full rate, 25°C)	≤50 ppm, 1σ (typical)
Angle Random Walk (ARW) (25°C)	≤0.012°/√hr (≤0.7°/hr/√Hz)

Performance Specifications – Accelerometers

	10g	16g	30g	100g
Input Range	±10g (max)	±16g (max)	±30g (max)	±100g (max)
Bias Instability (25°C)	15 µg, 1σ	24 µg, 1σ	45 µg, 1σ	150 µg, 1σ
Velocity Random Walk (25°C)	34 µg/√Hz	54 µg/√Hz	102 µg/√Hz	340 µg/√Hz
Bandwidth (-3 dB)	≥200 Hz	≥200 Hz	≥200 Hz	≥200 Hz

Performance Specifications – Magnetometers

	10g	16g	30g	100g
Input Range	±10 Gauss (max)	±10 Gauss (max)	±10 Gauss (max)	±10 Gauss (max)
Bias	<0.2 Gauss	<0.2 Gauss	<0.2 Gauss	<0.2 Gauss
Bias Noise (rms)	<2 mGauss	<2 mGauss	<2 mGauss	<2 mGauss

Environment

	10g	16g	30g	100g
Temperature (operating)	-40°C to +75°C (-40°F to +167°F)	-40°C to +75°C (-40°F to +167°F)	-40°C to +75°C (-40°F to +167°F)	-40°C to +75°C (-40°F to +167°F)
Shock (operating)	9g (11 ms, sawtooth)	15g (11 ms, sawtooth)	28g (11 ms, sawtooth)	28g (11 ms, sawtooth)
Vibration (operating)	8g rms (20-2000 Hz, random)	10g rms (20-2000 Hz, random)	12g rms (20-2000 Hz, random)	12g rms (20-2000 Hz, random)

Electrical/Mechanical

Data Interface	RS-422 Full Differential, Asynchronous or Synchronous
Dimensions	88.9 mm Dia x 63.5 mm H (3.5" x 2.5")
Weight	0.7 kg (1.54 lbs)
Power Consumption	5 W (typical), 8 W (max)

For technical manuals, expanded specifications, and additional information,
please visit: emcore.com/nav/support



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