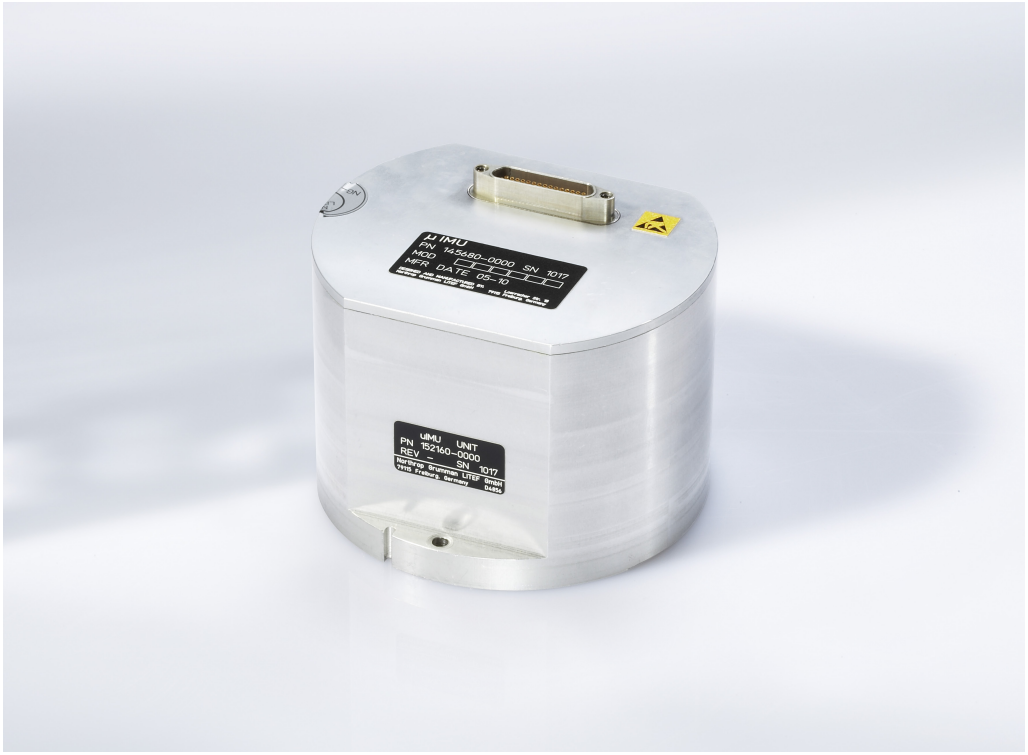
NORTHROP GRUMMAN

µIMU-I

Micro Inertial Measurement Unit

Minimizing a highly successful system with no compromises



Northrop Grumman LITEF (NG LITEF) is a world leading company with over 45 years of experience in Inertial Systems Technology. With its new generation MEMS (Micro Electro Mechanical Systems) technology sensors, NG LITEF continues to design high accuracy Inertial Measurement Units (IMUs) to meet current and future requirements.

MEMS sensor design at NG LITEF started in the early nineties with the B-290, a full silicon accelerometer. This accelerometer has been qualified in systems for attitude heading reference, stabilization and guidance. In 2001 NG LITEF launched the development of the µCORS (Micro Coriolis Rate Sensor) applying the DRIE MEMS technology.

NG LITEF's extensive experience with its IMUs, based on Fiber Optic Gyros and the MEMS Accelerometer Triad B-290, was the basis of the MEMS IMU design, resulting in the following advantages for the user:

- Integrated, sealed and self contained unit (3 MEMS rate sensors, 3 MEMS linear accelerometers, electronics, power supply and housing)
- Standard digital interfaces
- Output of fully compensated data (e.g. temperature and misalignment)
- Extensive Built-in-Test features
- Small size, low weight, low power consumption
- Low Life Cycle cost

Typical Applications:

- Attitude Heading Reference Systems
- Flight control and guidance systems, e.g. for UAVs
- Stabilization of antennas, cameras and other instruments on moving platforms
- Precision farming

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Micro Inertial Measurement Unit

TECHNICAL DATA

Rate Sensor Parameters		
• Measurement Range	±610 °/s, ±1000 °/s, ±1500 °/s	
• Bias In Run Stability (1σ)	≤ 6 °/h	
• Bias Repeatability (residual, RMS)	≤ 10 °/h	(2 °/h)*
• Bias Instability (Allan Variance)	≤ 0.1 °/h	
• Angular Random Walk	≤ 0.3 °/√h	(0.07 °/√h)*
• Scale Factor Error (RMS)	≤ 1400 ppm	(150 ppm)*
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.2 mrad)*
Linear Acceleration Parameters		
• Measurement Range	±40 g	
• Bias Repeatability (residual, RMS)	≤ 3 mg	
• Bias Instability (Allan Variance)	≤ 10 µg	
• Velocity Random Walk	≤ 0.25 mg/√Hz	(0.05 mg/√Hz)*
• Scale Factor Error (RMS)	≤ 1500 ppm	
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.3 mrad)*
System Parameters		
• Mass	0.68 kg, 1.5 lb	
• Dimensions	Ø 85 mm x H 60 mm, Ø 3.35 inch x H 2.36 inch	
• Volume	340 cm^3, 20.7 $inch^3$	
• Supply Voltage	+5 VDC	
• Power Consumption	< 8 W	
• Interface	RS 422 , HDLC	
• Data Rate	50 to 1024 Hz	
• Built in Test (BIT)	Power up BIT, Continuous BIT	
• Acoustic noise level	140 dB	
• Random vibration level [10…2000 Hz]	4.1 g_{RMS}	
• Temperature - operating - specified performance	 - 55 °C to +71 °C - 45 °C to +70 °C	 (short term +85 °C)

Accuracy parameters refer to measurement range ±1000 °/s
* typical value, measured at final production acceptance test

For more information,
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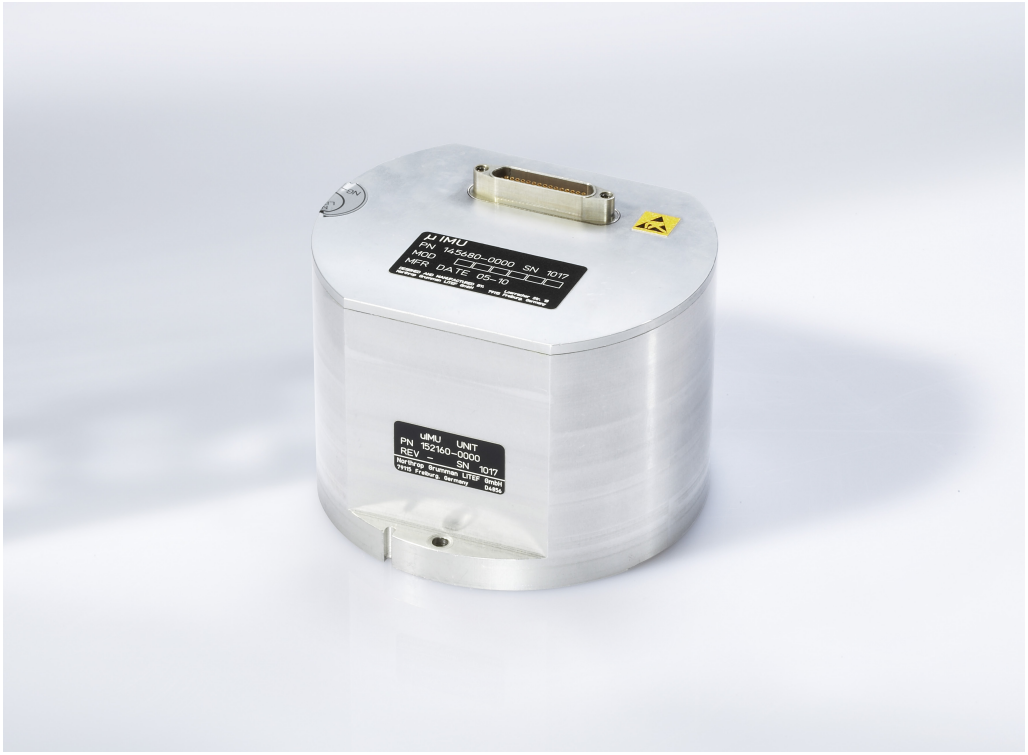

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Typical Applications:

- Attitude Heading Reference Systems
- Flight control and guidance systems
- Stabilization of antennas, cameras and other instruments on moving platforms
- Precision farming

NORTHROP GRUMMAN

µIMU-IC

Micro Inertial Measurement Unit

TECHNICAL DATA

Rate Sensor Parameters		
• Measurement Range	±499 °/s	
• Bias In Run Stability (1σ)	≤ 6 °/h	
• Bias Repeatability (residual, RMS)	≤ 10 °/h	(2 °/h)*
• Bias Instability (Allan Variance)	≤ 0.1 °/h	
• Angular Random Walk	≤ 0.3 °/√h	(0.07 °/√h)*
• Scale Factor Error (RMS)	≤ 1400 ppm	(150 ppm)*
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.2 mrad)*
Linear Acceleration Parameters		
• Measurement Range	±15 g	
• Bias Repeatability (residual, RMS)	≤ 3 mg	
• Bias Instability (Allan Variance)	≤ 10 µg	
• Velocity Random Walk	≤ 0.25 mg/√Hz	(0.05 mg/√Hz)*
• Scale Factor Error (RMS)	≤ 1500 ppm	
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.3 mrad)*
System Parameters		
• Mass	0.68 kg, 1.5 lb	
• Dimensions	Ø 85 mm x H 60 mm, Ø 3.35 inch x H 2.36 inch	
• Volume	340 cm^3, 20.7 $inch^3$	
• Supply Voltage	+5 VDC	
• Power Consumption	< 8 W	
• Interface	RS 422 , HDLC	
• Data Rate	50 to 1024 Hz	
• Built in Test (BIT)	Power up BIT, Continuous BIT	
• Acoustic noise level	140 dB	
• Random vibration level [10…2000 Hz]	4.1 g_{RMS}	
• Temperature - operating - specified performance	 - 55 °C to +71 °C - 45 °C to +70 °C	 (short term +85 °C)

* typical value, measured at final production acceptance test

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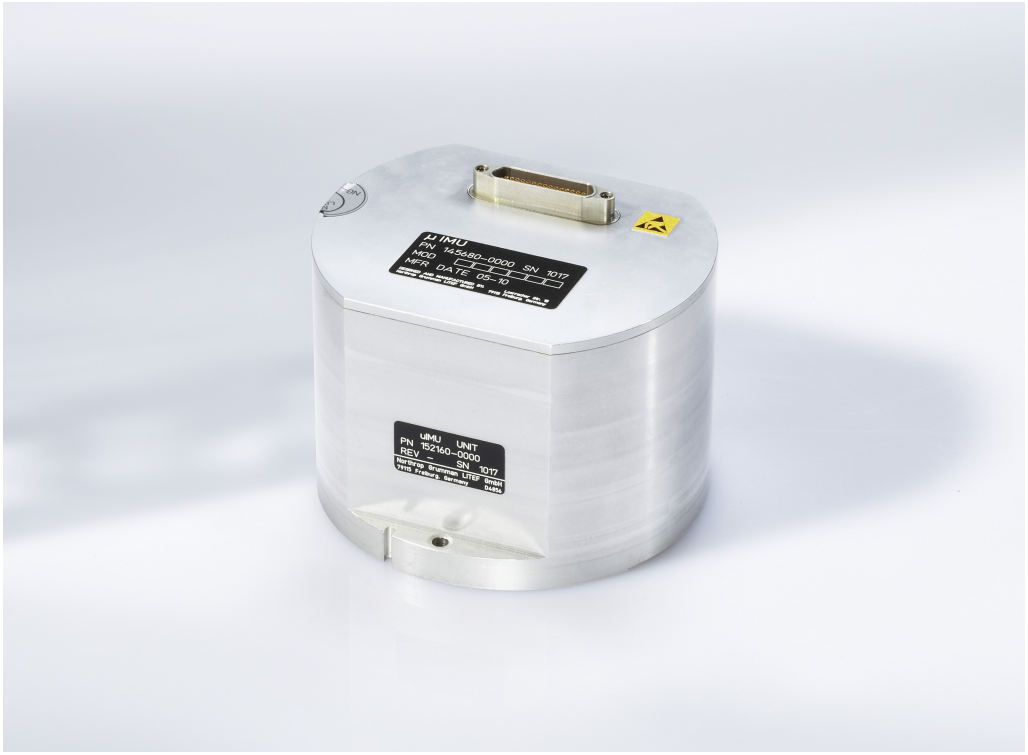
NORTHROP GRUMMAN

µIMU-M

Micro Inertial Measurement Unit

Minimizing a highly successful system with no compromises



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- Standard digital interfaces
- Output of fully compensated data (e.g. temperature and misalignment)
- Extensive Built-in-Test features
- Small size, low weight, low power consumption
- Low Life Cycle cost

Typical Applications:

- Applications where high input ranges are required, e.g. missiles, rockets
- Attitude Heading Reference Systems
- Flight control and guidance systems
- Stabilization of platforms

NORTHROP GRUMMAN

µIMU-M

Micro Inertial Measurement Unit

TECHNICAL DATA

Rate Sensor Parameters		
• Measurement Range	±1000 °/s, ±1500 °/s, ±3000 °/s	
• Bias In Run Stability (1σ)	≤ 6 °/h	
• Bias Repeatability (residual, RMS)	≤ 10 °/h	(2 °/h)*
• Bias Instability (Allan Variance)	≤ 0.1 °/h	
• Angular Random Walk	≤ 0.3 °/√h	(0.07 °/√h)*
• Scale Factor Error (RMS)	≤ 1400 ppm	(150 ppm)*
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.2 mrad)*
Linear Acceleration Parameters		
• Measurement Range	±70 g	
• Bias Repeatability (residual, RMS)	≤ 3 mg	
• Bias Instability (Allan Variance)	≤ 10 µg	
• Velocity Random Walk	≤ 0.1 mg/√Hz	(0.05 mg/√Hz)*
• Scale Factor Error (RMS)	≤ 1500 ppm	
• Axis Misalignment (RMS)	≤ 0.5 mrad	(0.3 mrad)*
System Parameters		
• Mass	0.68 kg, 1.5 lb	
• Dimensions	Ø 85 mm x H 60 mm, Ø 3.35 inch x H 2.36 inch	
• Volume	340 cm^3, 20.7 $inch^3$	
• Supply Voltage	+5 VDC	
• Power Consumption	< 8 W	
• Interface	RS 422 , HDLC	
• Data Rate	50 to 1024 Hz	
• Built in Test (BIT)	Power up BIT, Continuous BIT	
• Acoustic noise level	140 dB	
• Random vibration level [10…2000 Hz]	11 g_{RMS}	
• Temperature operating	- 55 °C to +71 °C (short term +85 °C) - 67 °F to +160 °F (short term +185 °F)	

Accuracy parameters refer to measurement range 1000 °/s

* typical value, measured at final production acceptance test

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