500 series

GUIDANCE GRADE ACCELEROMETERS

The smallest high-performance quartz accelerometer

The 500 series is an ultra miniature, high-performance and ITAR-free range of linear accelerometers designed to provide inertial acceleration measurements about one reference axis. The 500 series is ideal for small size precision Strapdown Inertial Navigation Systems used for guidance of modern Unmanned Aerial Vehicles (UAV) and Precision Guided Systems. With its miniature form factor, low power consumption, low cost, and high reliability, the 500 series offers a range of accelerometers considered as the smallest true tactical grade accelerometers ever produced in the open market.

The core technology used in the 500 series is IXSENS improved Fused Quartz Pendulous Servo Accelerometers technology, designed, engineered, and manufactured by IXSENS.

At the heart of the accelerometer is a proof mass made of a high purity fused quartz disc structure connected to a rigid outer frame by two thin hinges. A deposited gold film is used to form an electrode pattern on the surface of the pendulum for capacitive detection. The outer frame is clamped symmetrically between two magnetic structures comprising a high stability magnet and a nickel–iron alloy case. When acceleration is applied perpendicularly to the proof mass, a servo loop circuit derives an error signal from the capacitive detection and delivers a current into a coil attached to the proof mass. Laplace forces are then applied to the winding and the proof mass is maintained in a capture mode with its center in a null position. As the current running through the coil is proportional to the applied acceleration, the same current flowing through an external load resistor will then generate an output voltage proportional to acceleration.

The 500 series is available in a type-C version for applications limited to 15g, and a type-D version for applications with extended range up to 80g to meet customer's performance requirements.

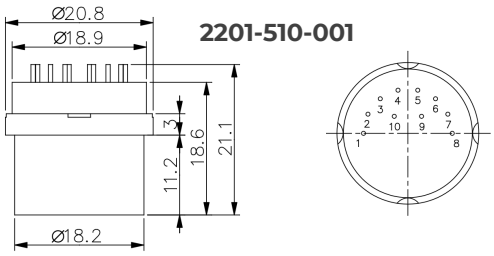
FEATURES

- 15g and 80g measurement range
- Guidance grade accuracy
- ITAR-free
- Superior reliability (MTBF ≥ 500,000 hr)
- 1-axis measurement
- Analogue output
- Internal temperature sensor for thermal compensation
- Ultra-low power electronics

DIMENSIONS – ELECTRICAL INTERFACE

Pin	Function	Characteristics
1	Signal Out	Acceleration output, current signal
2	Current Torque	Used for factory tests. Do not connect to that pin
3	Negative Power Supply	-13 V to -18 V
4	Positive Power Supply	+13 V to +18 V
5	Voltage Self-Test output	Used for factory tests. Do not connect to that pin
6	Temperature Sensor Output	Temperature output, current signal
7	Voltage Self-Test input	Used for factory tests. Do not connect to that pin
8	Signal & Power Return	Ground reference for power supplies and signals
9	Voltage self-Test input	Used for factory tests. Do not connect to that pin
10	N/A	Do not connect to that pin

2201-510-001



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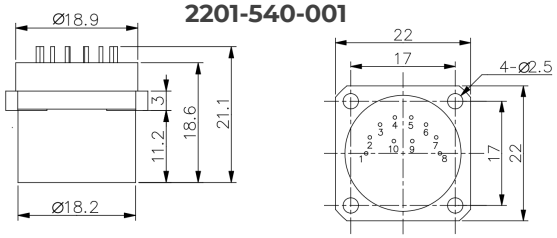

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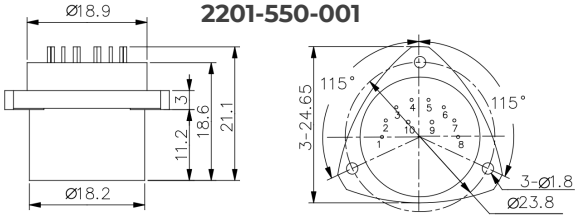

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PERFORMANCE AND KEY CHARACTERISTICS

Type D – Dual-use accelerometers

Performance	2201-510-001 No flange	2201-540-001 Square flange	2201-550-001 Triangle flange
Input Range	±80 g	±80 g	±80 g
Bias	≤4 mg	≤4 mg	≤4 mg
Bias stability (FTR, compensated)	≤400 µg	≤400 µg	≤400 µg
Bias one-year composite repeatability	≤1,000 µg	≤1,000 µg	≤1,000 µg
Bias temperature slope	≤50 µg/°C	≤50 µg/°C	≤50 µg/°C
Scale factor	0.65 to 0.85 mA/g	0.65 to 0.85 mA/g	0.65 to 0.85 mA/g
Scale factor stability (FTR, compensated)	≤300 ppm	≤300 ppm	≤300 ppm
Scale factor one-year composite repeatability	≤600 ppm	≤600 ppm	≤600 ppm
Scale factor temperature slope	≤100 ppm/°C	≤100 ppm/°C	≤100 ppm/°C
Axis misalignment	≤1,500 µrad	≤1,500 µrad	≤1,500 µrad
Axis misalignment stability (FTR, compensated)	≤50 µrad	≤50 µrad	≤50 µrad
Axis misalignment one-year composite repeatability	≤100 µrad	≤100 µrad	≤100 µrad
Axis misalignment temperature slope	≤10 µrad/°C	≤10 µrad/°C	≤10 µrad/°C
Vibration Rectification	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)
Intrinsic Noise	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)
Environment			
Operating Temperature Range	-55 to +95 °C	-55 to +95 °C	-55 to +95 °C
Shock, half-sine, 4ms	250 g	250 g	250 g
Vibration Peak Sine	35 g @ 20-2 kHz	35 g @ 20-2 kHz	35 g @ 20-2 kHz
Resolution/Threshold	≤1 µg	≤1 µg	≤1 µg
Bandwidth	≥800 Hz	≥800 Hz	≥800 Hz
Temperature sensor output			
	Yes	Yes	Yes
Electrical			
Quiescent Current per Supply	≤6 mA	≤6 mA	≤6 mA
Quiescent Power (±15 V DC)	≤180 mW	≤180 mW	≤180 mW
Input Voltage	±13 to ±18 V DC	±13 to ±18 V DC	±13 to ±18 V DC
Physical			
Weight	25 ±1 grams	25 ±1 grams	25 ±1 grams
Diameter below mounting surface	Ø18.2 mm Max	Ø18.2 mm Max	Ø18.2 mm Max
Height bottom to mounting surface	11.2 mm Max	11.2 mm Max	11.2 mm Max
Case Material	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel

FTR: Full Temperature Range

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PERFORMANCE AND KEY CHARACTERISTICS

Type C – Commercial accelerometers

Performance	2201-511-001 No flange	2201-541-001 Square flange	2201-551-001 Triangle flange
Input Range	±15 g	±15 g	±15 g
Bias	≤4 mg	≤4 mg	≤4 mg
Bias stability (FTR, compensated)	≤400 µg	≤400 µg	≤400 µg
Bias one-year composite repeatability	≤1,000 µg	≤1,000 µg	≤1,000 µg
Bias temperature slope	≤50 µg/°C	≤50 µg/°C	≤50 µg/°C
Scale factor	0.65 to 0.85 mA/g	0.65 to 0.85 mA/g	0.65 to 0.85 mA/g
Scale factor stability (FTR, compensated)	≤300 ppm	≤300 ppm	≤300 ppm
Scale factor one-year composite repeatability	≤600 ppm	≤600 ppm	≤600 ppm
Scale factor temperature slope	≤100 ppm/°C	≤100 ppm/°C	≤100 ppm/°C
Axis misalignment	≤1,500 µrad	≤1,500 µrad	≤1,500 µrad
Axis misalignment stability (FTR, compensated)	≤50 µrad	≤50 µrad	≤50 µrad
Axis misalignment one-year composite repeatability	≤100 µrad	≤100 µrad	≤100 µrad
Axis misalignment temperature slope	≤10 µrad/°C	≤10 µrad/°C	≤10 µrad/°C
Vibration Rectification	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)	≤25 µg/g²rms (50-200 Hz) ≤50 µg/g²rms (200-750 Hz) ≤100 µg/g²rms (750-2 kHz)
Intrinsic Noise	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)	≤7 µg-rms (0-10 Hz) ≤70 µg-rms (10-500 Hz) ≤1,500 µg-rms (500-10 kHz)
Environment			
Operating Temperature Range	-55 to +95 °C	-55 to +95 °C	-55 to +95 °C
Shock, half-sine, 4ms	250 g	250 g	250 g
Vibration Peak Sine	35 g @ 20-2 kHz	35 g @ 20-2 kHz	35 g @ 20-2 kHz
Resolution/Threshold	≤1 µg	≤1 µg	≤1 µg
Bandwidth	≥800 Hz	≥800 Hz	≥800 Hz
Temperature sensor output			
	Yes	Yes	Yes
Electrical			
Quiescent Current per Supply	≤6 mA	≤6 mA	≤6 mA
Quiescent Power (±15 V DC)	≤180 mW	≤180 mW	≤180 mW
Input Voltage	±13 to ±18 V DC	±13 to ±18 V DC	±13 to ±18 V DC
Physical			
Weight	25 ±1 grams	25 ±1 grams	25 ±1 grams
Diameter below mounting surface	Ø18.2 mm Max	Ø18.2 mm Max	Ø18.2 mm Max
Height bottom to mounting surface	11.2 mm Max	11.2 mm Max	11.2 mm Max
Case Material	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel

FTR: Full Temperature Range

Additional product specifications, outline drawings, block diagrams, and test data are available on request.

For More Information:
www.ixsens.com

General inquiries:
info@ixsens.com

DISCLAIMER:
Specifications are subject to change without notice. IXSENS does not assume any liability arising out of the application or use of the product.

FOR INFORMATION:
Type C series not subject to Export Control.
Type D series subject to Export Control.

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