

AccelRate3D Triaxial Accelerometer & Gyroscope Analog Inertial Sensor

Revision D

**±150, ±300 or ±1200 °/s
±2, or ±5 g**

FUNCTIONAL DESCRIPTION

The AccelRate3D is the world's smallest analog inertial measurement unit, providing analog outputs of triaxial acceleration and rate of turn (gyro) data. The AccelRate3D also provides precision references for the X, Y, and Z-axes as well as temperature outputs allowing the implementation of compensation techniques. A digital self-test input electromechanically excites each axis to test proper operation of both sensors and the signal conditioning circuits. The AccelRate3D is available in a custom SMT package measuring 0.70 x 0.70 x 0.40 inches.

FEATURES

- Triaxial Angular Rate Sensor
- Triaxial Accelerometer ± 2g or ± 5g
- Solid State MEMS Reliability
- Low Noise
- Low Power
- SMT Miniature Package
- 2000g Powered Shock Operation
- 5 V Single Supply Operation

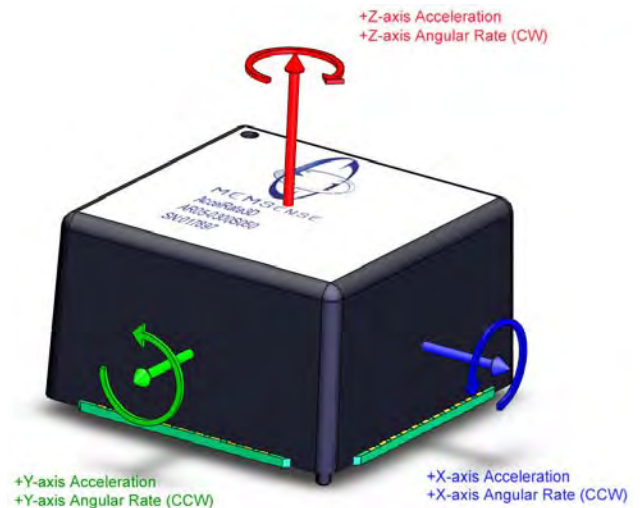
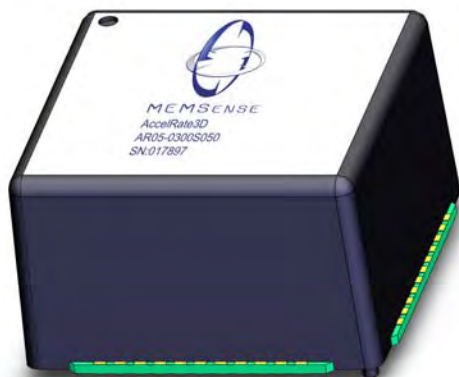
ORDERING INFORMATION

Part	Accelerometer (g)	Rate (°/s)
AR02-0150S050	± 2	± 150
AR05-0150S050	± 5	± 150
AR02-0300S050	± 2	± 300
AR05-0300S050	± 5	± 300
AR02-1200S050	± 2	± 1200
AR05-1200S050	± 5	± 1200

APPLICATIONS

- Antenna Stabilization
- Automotive Control
- Inertial Measurement Units
- Orientation Sensing
- 3D Simulators
- Industrial Automation

ORIENTATION DIAGRAM



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Table 1 – Specifications

Parameter	Specification			Units	Conditions
Sensor					
Operating Voltage Range	4.75 to 5.25			V	
Supply Current	21.0, (27)			mA	Typical, (Maximum)
Mass	5			Grams	Maximum
Commercial Temperature Range					
	0 to +70			°C	Temperature for max and min specs.
Military Temperature Range					
	-40 to +85			°C	Temperature for max and min specs.
Accelerometers					
	MAG02		MAG05		
Range	± 2		± 5		g
Sensitivity	1000		400		mV/g
Offset Vs Temp	±150		± 60		mV
Noise X and Z	35		35		µg/Hz ^½
Noise Y	65		65		µg/Hz ^½
Bandwidth ¹	50		50		Hz
Nonlinearity	± 0.4, (± 1.0)		± 0.4, (± 1.0)		% of FS
Cross Axis Sensitivity	2		2		%
Rate Output					
	0150S050	0300S050	1200S050		
Dynamic Range	±150	± 300	±1200	°/s	Full scale range over specified temperature
Sensitivity	12.5	5.0	1.25	mV/°/s	
Nonlinearity	0.1	0.1	0.1	% of FS	Best fit straight line
Zero Rate	2.50	2.50	2.50	V	
Turn On Time	35	35	35	ms	Power on to ± ½ °/s of Final
Rate Noise Density	0.05	0.1	0.1	°/s/Hz ^½	
Bandwidth ¹	50	50	50	Hz	Factory set 3dB point
Cross Axis Sensitivity	1	1	1	%	
Rate Reference Output					
Voltage Value	2.5			V	
Power Supply Rejection	60			db	4.75 Vs to 5.25 Vs
Temperature Drift	5.0			mV	Deviation from 25°C
Temperature Output					
Voltage at 25 °C	2.50			V	
Scale Factor	8.4			mV/°C	
Absolute Maximum Ratings					
Acceleration Powered	2000 max			g	Any axis 0.5ms
Vdd	-0.3, +6.0			V	Minimum, Maximum
Operating Temperature	-40 to +85			°C	
Storage Temperature	-65 to +150			°C	

Typical Values at 25 °C, Vdd = 5.0V, 0 °/s unless otherwise noted

1. Other bandwidth configurations are available upon request.

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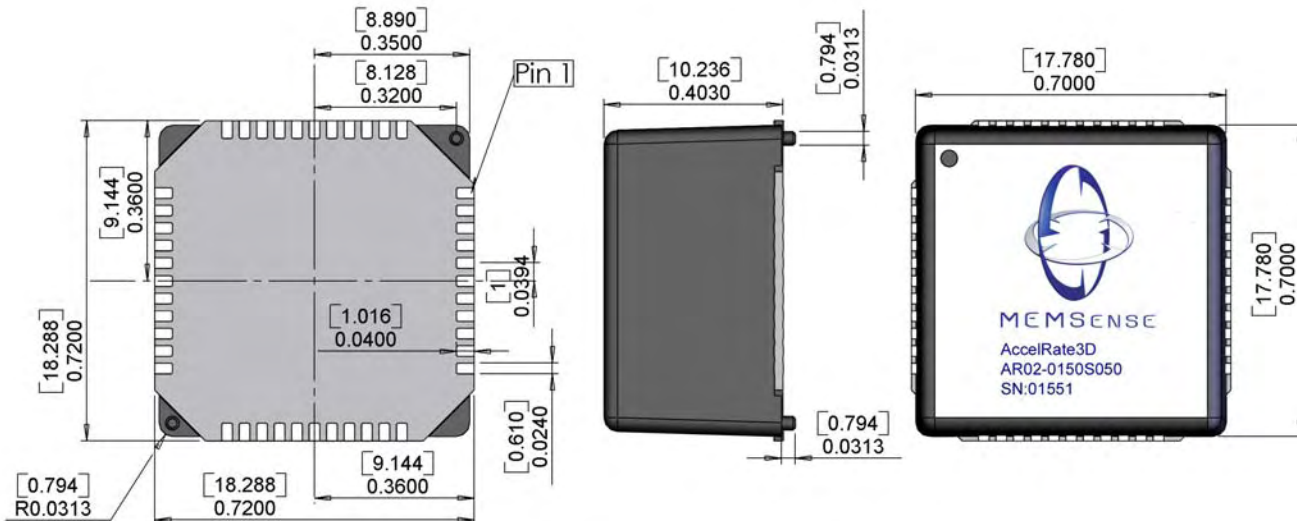
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Table 2 - Pin Function Descriptions

Pin No.	Name	Function
1	XREF	X axis analog precision reference output.
2	XRATE	X axis analog rate signal output.
3	ZREF	Z axis analog precision reference output.
4	ZRATE	Z axis analog rate signal output.
5	TEMPZ	Analog temperature voltage output, Z gyro.
6	AGND	Analog power supply return.
7	TEMPX	Analog temperature voltage output, X gyro.
8	TEMPY	Analog temperature voltage output, Y gyro.
9-35		No connect (open) ¹
36	AGND	Analog power supply return.
37	VDDA	Analog power supply.
38	TESTN	High-level activated digital input stimulating X, Y and Z rate to Ref - 660mV. ²
39	TESTP	High-level activated digital input stimulating X, Y and Z rate to Ref +660mV. ²
40	YACCEL	Y axis analog acceleration signal output.
41	ZACCEL	Z axis analog acceleration signal output.
42	XACCEL	X axis analog acceleration signal output.
43	YREF	Y axis analog precision reference output.
44	YRATE	Y axis analog rate signal output.

- Physical solder connection recommended.
- The 300°/s and 1200°/s rate sensor will produce a 270 mV and 67.5 mV output change respectively.

Figure 1 – AccelRate3D Physical Dimensions



All dimensions in [mm] inches - Hand solder attachment recommended