

Product Specification & User Guide

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Document Change History

REV	STATUS	DESCRIPTION	DATE
L	Obsolete	New Memsense document format	12-16-2008
Μ	Obsolete	Added 10g 1200 deg/s version to part no. table and specifications. Normalized overall formatting	12-3-2009
Ν	Obsolete	Updated graphics and colors. Added temperature range to part numbering.	4-11-2009
Ρ	Obsolete	Updated specifications and format.	6-5-2015
Р	Obsolete		1-29-2016
Q	Obsolete	Updated velocity random walk parameters.	
R	Obsolete	Updated Noise Density for the ±5g Accel Dynamic Range.	2-15-2018
S	Released	Updated soldering requirement.	10-29-2020





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1.0 OVERVIEW

The SMD is a robust inertial sensor providing analog outputs of triaxial acceleration and triaxial angular rate. The packaging employed encapsulates the gyroscopes and accelerometers making the sensor extremely robust. Configured versions of the SMD can be ordered with mixed gyro dynamic ranges enabling a perfect fit for specific applications. The SMD is provided in a surface mount package measuring 0.7 in. x 0.7 in. x 0.4 in.

2.0 SPECIFICATIONS

					NOTEC	
ACCELERATION				UNITS	NOTES	
Dynamic Range	± 2	± 5	± 10	g	Minimum	
Bias Instability	33	75	163	μg	Typical	
Zero g Output	2.5	2.5	2.5	V	Typical	
Nonlinearity	± 0.4	± 0.4	± 0.4	% of FS	Typical	
Velocity Random Walk	0.030	0.080	0.140	m/s/h ^{-1/2}	Typical	
Noise Density	81	207	363	µg/Hz ^{-1/2}	Typical	
Scale Factor	1000	400	200	mV <i>/g</i>	Typical	
Bandwidth ¹	50	50	50	Hz	-3dB point	
				-		
ANGULAR RATE				UNITS	NOTES	
ANGULAR RATE Dynamic Range	± 150	± 300	± 1200	UNITS °/s	NOTES Minimum	
ANGULAR RATE Dynamic Range Bias Instability	± 150 20	± 300 20	± 1200 20	UNITS °/s °/h	NOTES Minimum Typical	
ANGULAR RATE Dynamic Range Bias Instability Zero Rate	± 150 20 2.5	± 300 20 2.5	± 1200 20 2.5	UNITS °/s °/h V	NOTES Minimum Typical Typical	
ANGULAR RATE Dynamic Range Bias Instability Zero Rate Nonlinearity	± 150 20 2.5 ± 0.1	± 300 20 2.5 ± 0.1	± 1200 20 2.5 ± 0.1	VNITS °/s °/h V % of FS	NOTES Minimum Typical Typical Typical	
ANGULAR RATE Dynamic Range Bias Instability Zero Rate Nonlinearity Angle Random Walk	± 150 20 2.5 ± 0.1 2.0	± 300 20 2.5 ± 0.1 2.0	± 1200 20 2.5 ± 0.1 2.0	UNITS °/s °/h V % of FS °/h -1/2	NOTES Minimum Typical Typical Typical Typical	
ANGULAR RATE Dynamic Range Bias Instability Zero Rate Nonlinearity Angle Random Walk Noise Density	± 150 20 2.5 ± 0.1 2.0 0.04	± 300 20 2.5 ± 0.1 2.0 0.05	± 1200 20 2.5 ± 0.1 2.0 0.05	UNITS °/s °/h V % of FS °/h ^{-1/2} °/s /Hz ^{-1/2}	NOTES Minimum Typical Typical Typical Typical Typical	
ANGULAR RATE Dynamic Range Bias Instability Zero Rate Nonlinearity Angle Random Walk Noise Density Scale Factor	± 150 20 2.5 ± 0.1 2.0 0.04 12.5	± 300 20 2.5 ± 0.1 2.0 0.05 5.0	± 1200 20 2.5 ± 0.1 2.0 0.05 1.25	UNITS °/s °/h V % of FS °/h ^{-1/2} °/s /Hz ^{-1/2} mV/°/s	NOTES Minimum Typical Typical Typical Typical Typical Typical	

Table 1 - Specifications



TEMPERATURE		UNITS	NOTES			
Voltage at 25 °C	2.5	V				
Scale Factor	9.0	mV/°C				
PHYSICAL		UNITS	NOTES			
Dimensions	0.720 x 0.720 x 0.417	in.	(L x W x H)			
Mass	5	grams				
OPERATIONAL REQUIR	REMENTS	UNITS	NOTES			
Supply Voltage	4.75 to 5.25	VDC	Regulated			
Supply Current	21	mA				
ABSOLUTE MAXIMUM	UNITS	NOTES				
Acceleration Powered	2000	g	0.5 ms any axis			
Supply Voltage	-0.3 (min) to +6.0 (max)	VDC				
"C" Temperature Range	0 to 70	°C				
"M" Temperature Range	-40 to 85	°C				
Storage Temperature	-65 to +150	°C				

1) Other bandwidth configurations are available upon request.

2) Other configurations are available on a special order basis. Contact sales for more information.

3) Custom correction temperature profiles are available. Contact sales for more information.

4) Typical Values at 25°C, Supply Voltage = 5.0 VDC, 0 °/s, unless otherwise noted.





3.0 MECHANICAL

3.1 Dimensions

The SMD is available in a custom surface mount package measuring 0.720 in. length \times 0.720 in. width \times 0.417 in. height. Castellated pads are located on the 4 sides of the device. See the SMD installation procedure for details on mounting the device. Hand soldering attachment is required.







Figure 2 – Recommended Land Pattern



4.0 SIGNAL DESCRIPTIONS

Table 2 – SMD Signal Descriptions

Pin	Name	Description		
1	XREF	X axis analog precision reference output. ³		
2	XRATE	X axis analog rate signal output.		
3	ZREF	Z axis analog precision reference output. ³		
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 electrical connection required (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 – 1.9 V. ²		
39	TESTP	High-level activated digital input stimulating X, Y and Z rate to Ref +1.9 V. 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. ³		
44	YRATE	Y axis analog rate signal output.		

1. Physical solder connection recommended.

2. The 300°/s and 1200°/s rate sensor will produce a 417 mV and 104.25 mV output change respectively.

3. Do NOT ground 2.5V Precision Reference Outputs, Damage to the device may occur (Recommend floating, or the use of a 20k resistor or higher).



4.1 Coordinate System





5.0 OPTIONS

5.1 Part Numbers

Table 3 -	Standard	Part N	umber
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Part Number	Acceleration	Angular Rate	Bandwidth
	(g)	(°/s)	(Hz.)
SMD05-0300S050	±5	±300	50

1.) Temperature Range of 0° C to 70° C append a "C" to the Part Number

2.) Temperature Range of -40°C to 85°C append an "M" to the Part Number

3.) Custom bandwidth and mixed dynamic ranges can be ordered contact sales for more information.