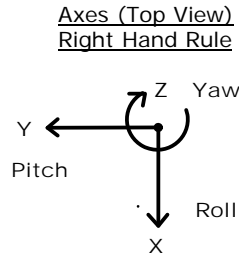
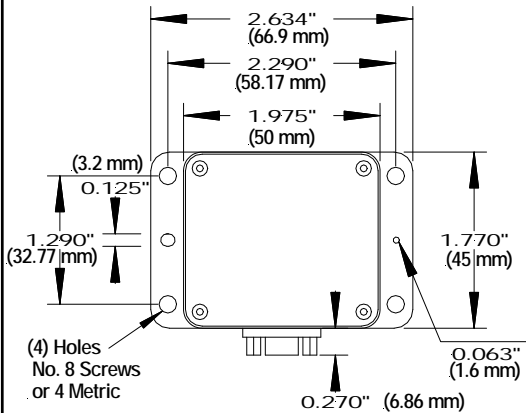


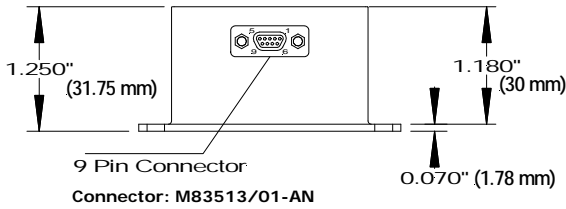
# LandMark™ 10 Vertical Gyro (VG)



## LandMark™ 10 VG

LMRK10VG-075-02-100 or -10  
LMRK10VG-150-02-100 or -10  
LMRK10VG-300-02-100 or -10

## Specification



Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	<b>+3.1V to +5.5V Max Input Power</b>
6	External Sync Input (1kHz or 1pps)
7	+5V Regulator Out
8	Signal Ground
9	Self Test

Note: Any unused inputs (Pins 4, 6, 9) must be connected to signal ground (Pin 8).

Outputs	Serial Sequence at 100Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accelerometers: (X), (Y), (Z)
7	IMU Temperature
8, 9, 10	No Magnetometers: (X), (Y), (Z)
11	No Pressure
12, 13, 14	Angles: Roll, Pitch, Zero Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	No Altitude, Temp, Forward Velocity (As Input)

User to provide either analog or external velocity for velocity functions to be enabled (pin 4).

PARAMETER	RATE AXES			ACCEL AXES	
Range	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Bias (Over Temp.)	<0.1°/sec 1σ			<3mg 1σ	<5mg 1σ
Bias (In Run Stability)	25°/hour 1σ			0.1mg 1σ	0.25mg 1σ
Scale Factor Error %	≤0.2% (over temperature) 1σ				
Sensor Resolution	0.007°/sec			0.035mg	0.25mg
Angle Random Walk	0.012° /sec/√Hz 1σ			0.07mg /√Hz 1σ	0.15mg /√Hz 1σ
Pitch & Roll	± 0.25° stationary				
Alignment	1 mrad 1σ				
G-Sensitivity	<0.03°/sec/g 1σ				
Self Test On	Δ 50 ± 25°/sec			Δ1.5g ±0.5g	Δ0.6g ±0.4g
Temp Range	Logic 1 = 3V to 5V at Pin 9				
	Operating:		-40° C to +85° C		
	Non-Operating:		-55° C to +85° C		
Update Rate	100 Hz (VG Full Mode)				
Temp Sensors	3 Internal Temperature Sensors				
Start-up Time	< 0.65 sec VG 100 Hz				
Input Power	<b>+3.1V to 5.5V Max. Input (single sided)</b>				
Power Consumption	440 mW at 3.3V Typical 500 mW at 3.3V Maximum				
Size	U.S.:	1.97 x 1.77 x 1.25 = 4.4 in <sup>3</sup>			
	Metric:	5 x 4.5 x 3.2 = 72 cm <sup>3</sup>			
Weight	≤ 105 grams				
Mounting	4ea No.8 or M4 Screws				
Shock	500g's ½ sine 30 msec powered				
Vibration	6gRMS (20Hz to 2kHz ~ 10g accelerometers)				
MTBF	55,279 hrs (per MIL-STD-217F, Notice 2 based on AIC environment with ambient temperature at 40°C)				

Specification subject to change without notice

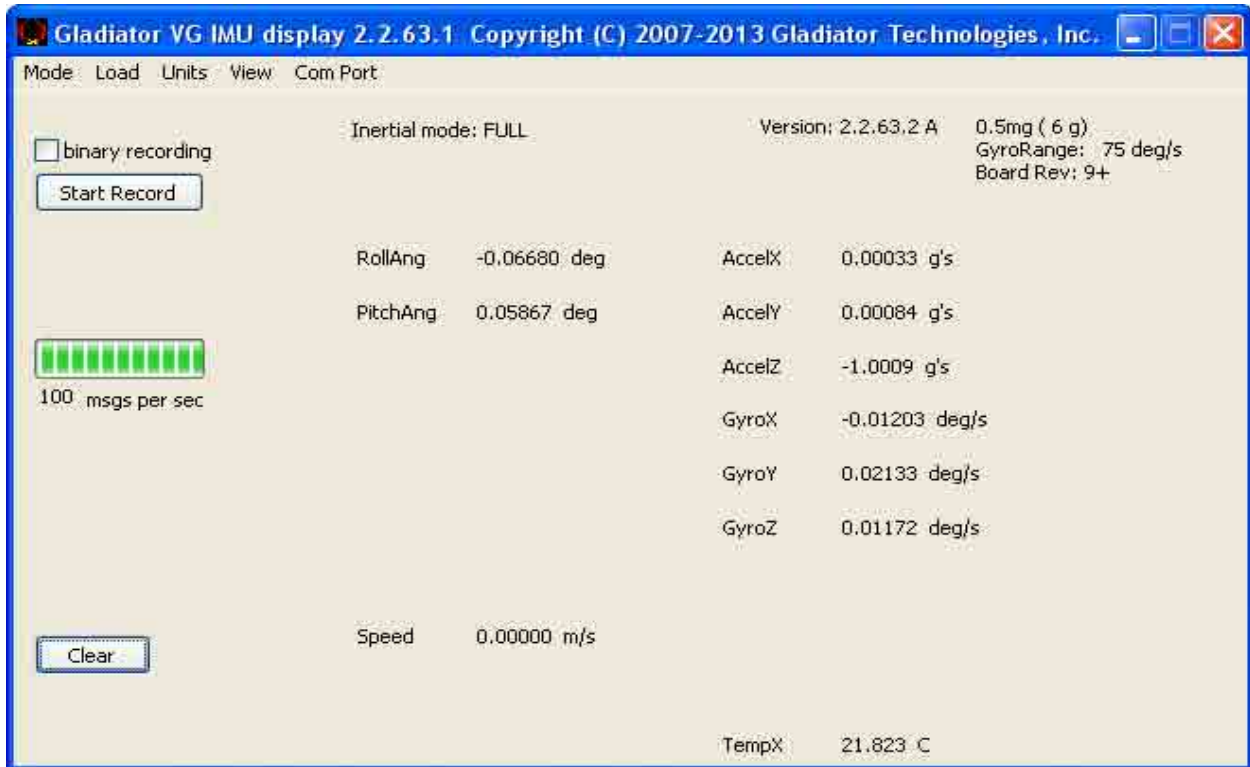


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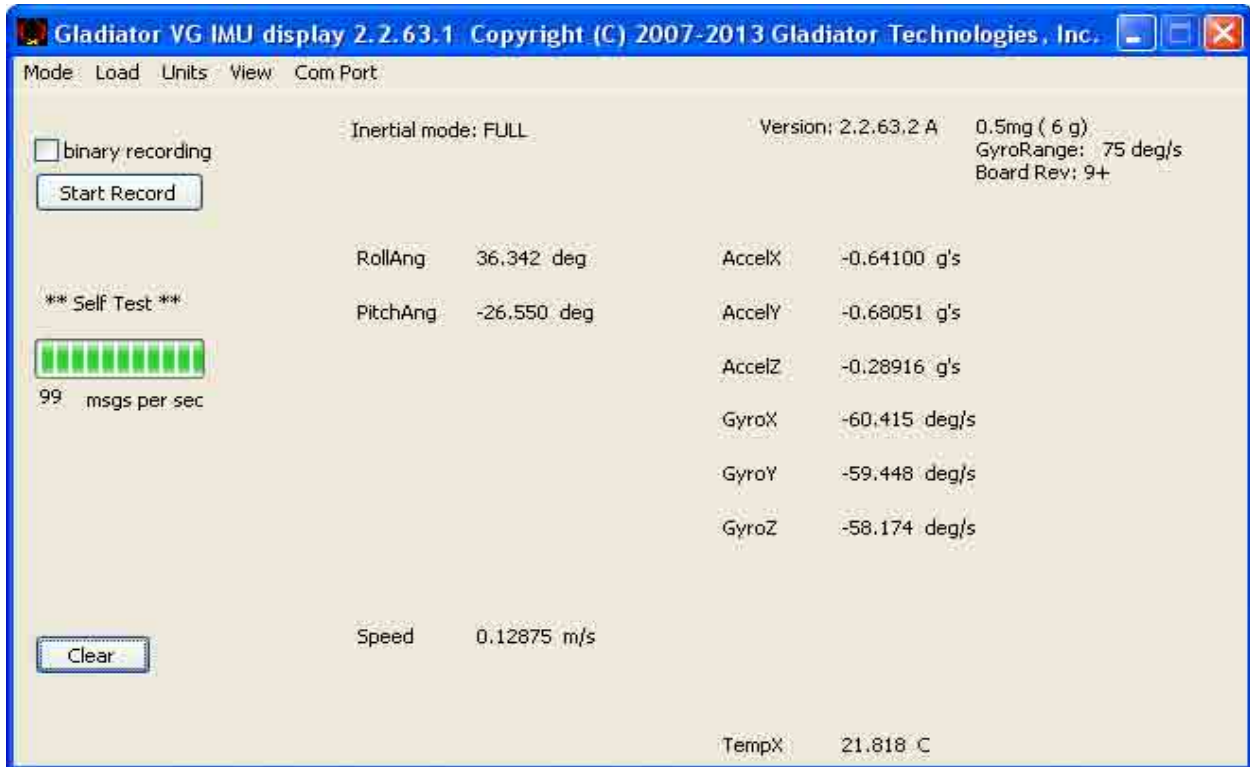
High Performance Inertial MEMS

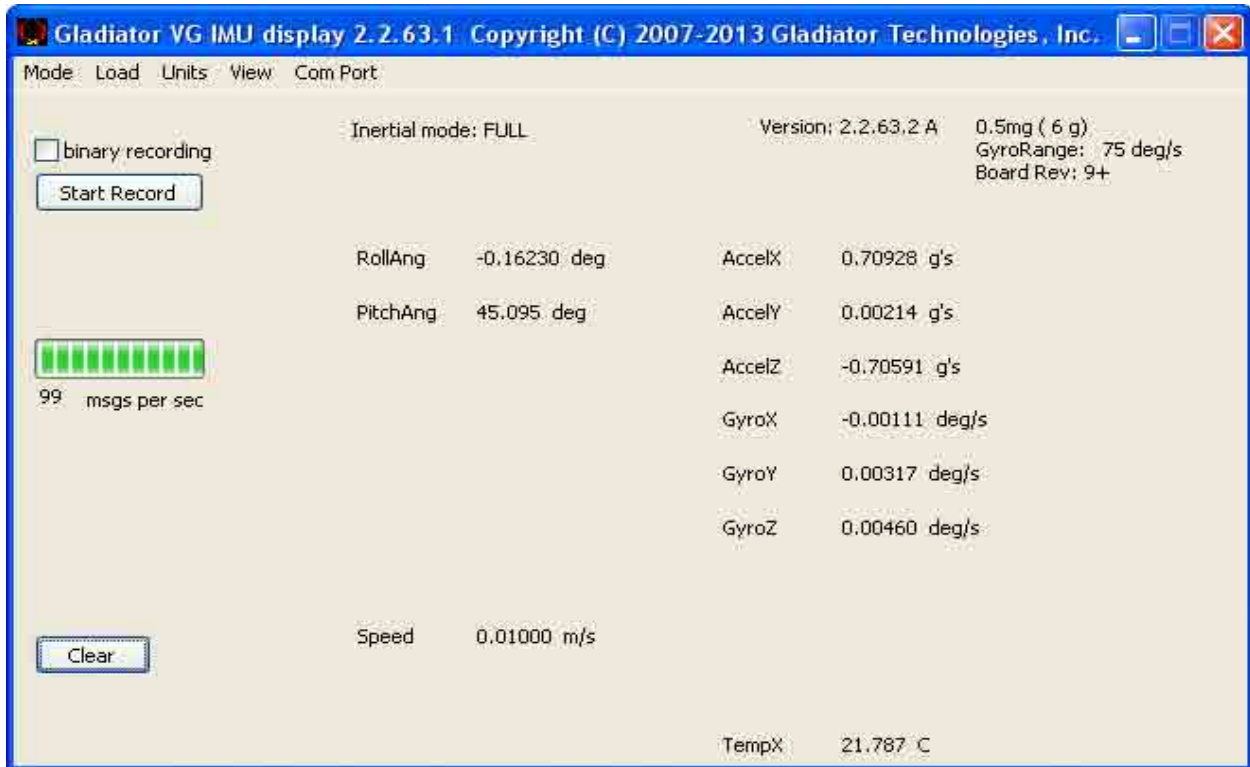
Rev. 13July26  
SN: 206



Initial Bench Readout (above)

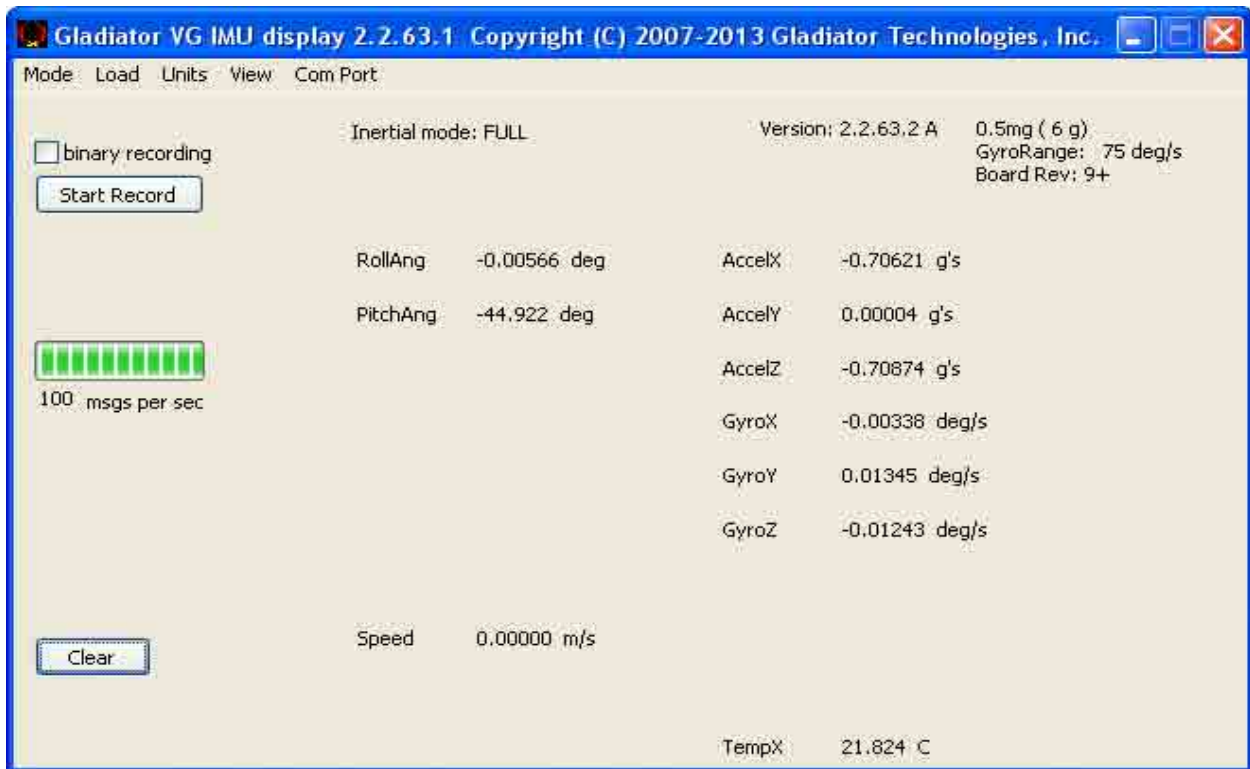
Self Test (below)

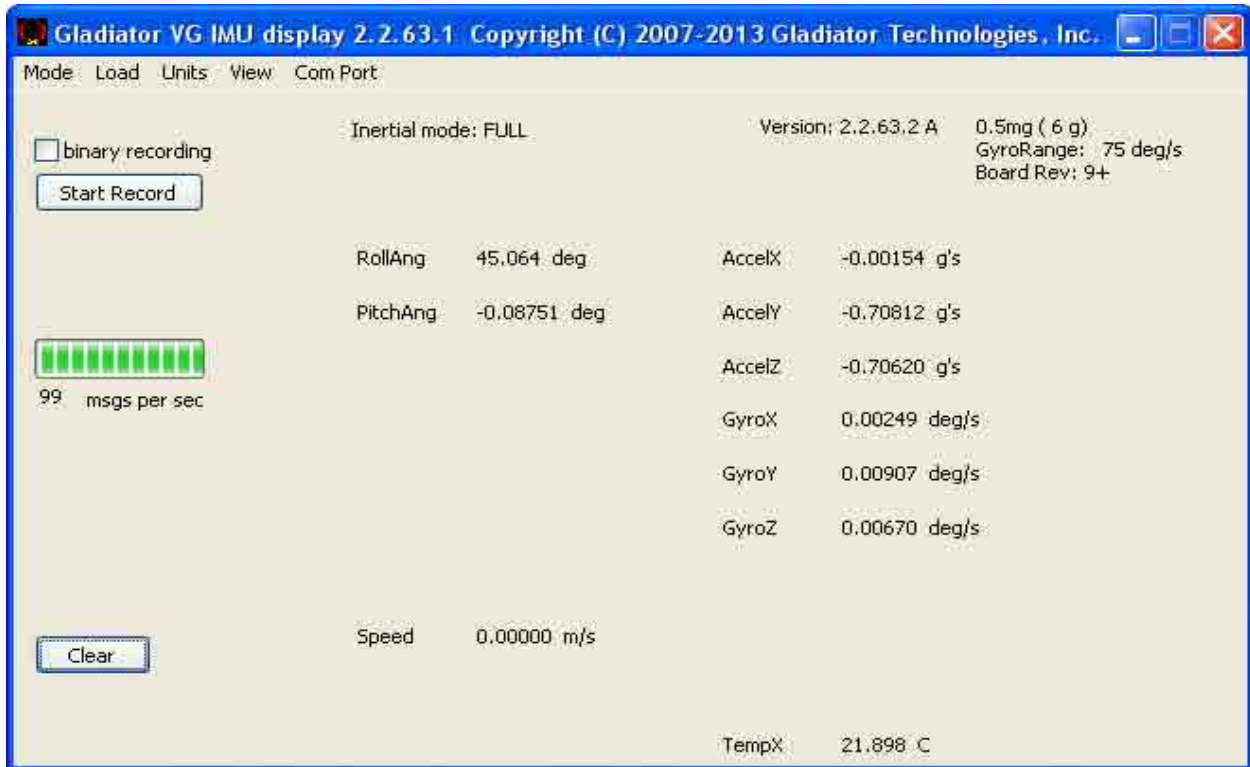




Pitch Up 45° (above)

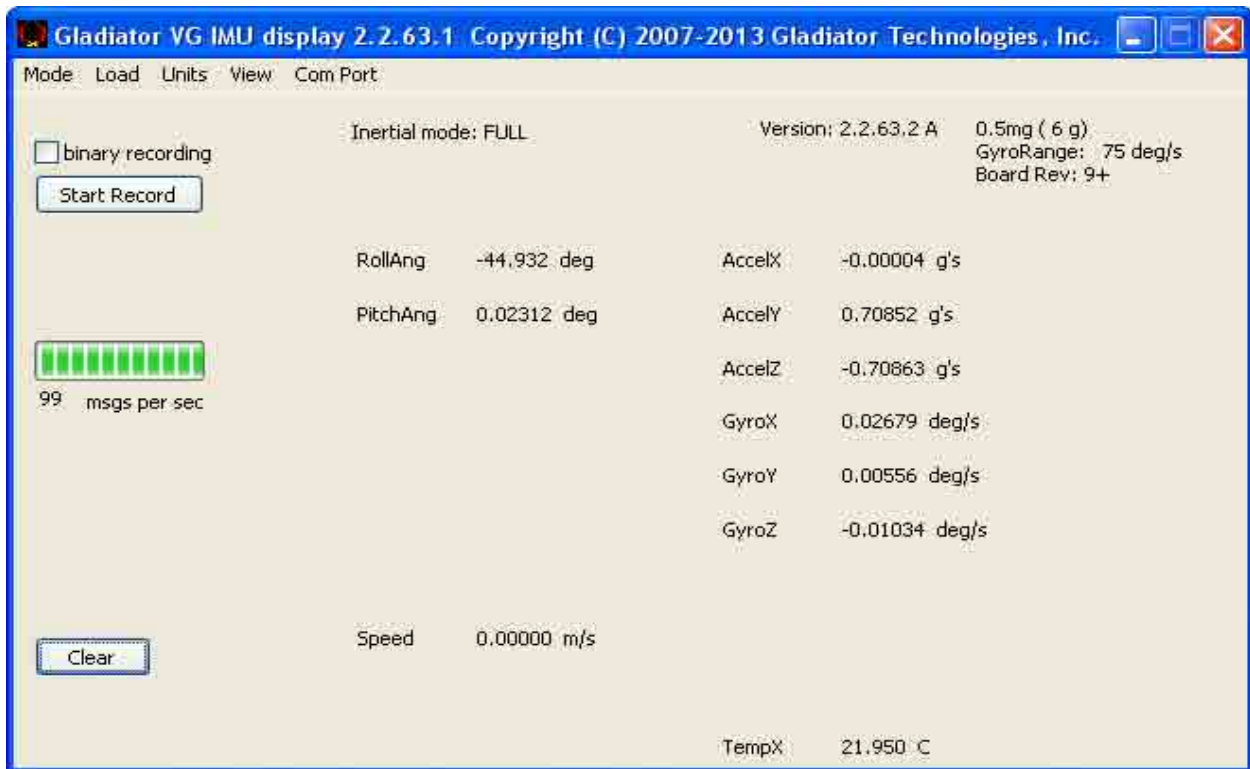
Pitch Down 45° (below)





Roll 45° (above)

Roll -45° (below)





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High Performance Inertial MEMS

# SN206 ATP

1/14/2014

LMRK10VG-075-06-100

Rate Spin Test

Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	3605.695	0.552	-3.048	-0.8155	-1.3995	-4.6985	2729.701
NX	-3598.823	-1.236	-1.502	-0.582	2.2945	-6.0555	2726.39
Diff/2	3602.259	0.894	-0.773	-0.11675	-1.847	0.6785	1.6555
Ave	3.436	-0.342	-2.275	-0.69875	0.4475	-5.377	2728.046
PY	0.58	3599.685	-3.715	3.8185	0.419	-4.557	2758.547
NY	2.983	-3601.31	-2.953	0.1835	0.5365	-6.221	2754.604
Diff/2	-1.2015	3600.498	-0.381	1.8175	-0.05875	0.832	1.9715
Ave	1.7815	-0.8125	-3.334	2.001	0.47775	-5.389	2756.576
PZ	3.78	-0.818	3598.992	-63.4565	163.982	-0.807	2799.343
NZ	2.809	0.494	-3600.707	-2.5185	1.929	-0.997	2794.361
Diff/2	0.4855	-0.656	3599.85	-30.469	81.0265	0.095	2.491
Ave	3.2945	-0.162	-0.8575	-32.9875	82.9555	-0.902	2796.852
RSF Norm	1.000628	1.000138	0.999958				Temp °C 27.60

Gyro Mis-Align deg/sec	Input Rate			
x		-0.01	0.00	x
y	0.01		-0.01	y
z	-0.01	0.00		z

Gyro Mis-align mrad	Input Rate			
x		-0.33	0.13	x
y	0.25		-0.18	y
z	-0.21	-0.11		z

Accepted by:



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High Performance Inertial MEMS

SN206 ATP

1/14/2014

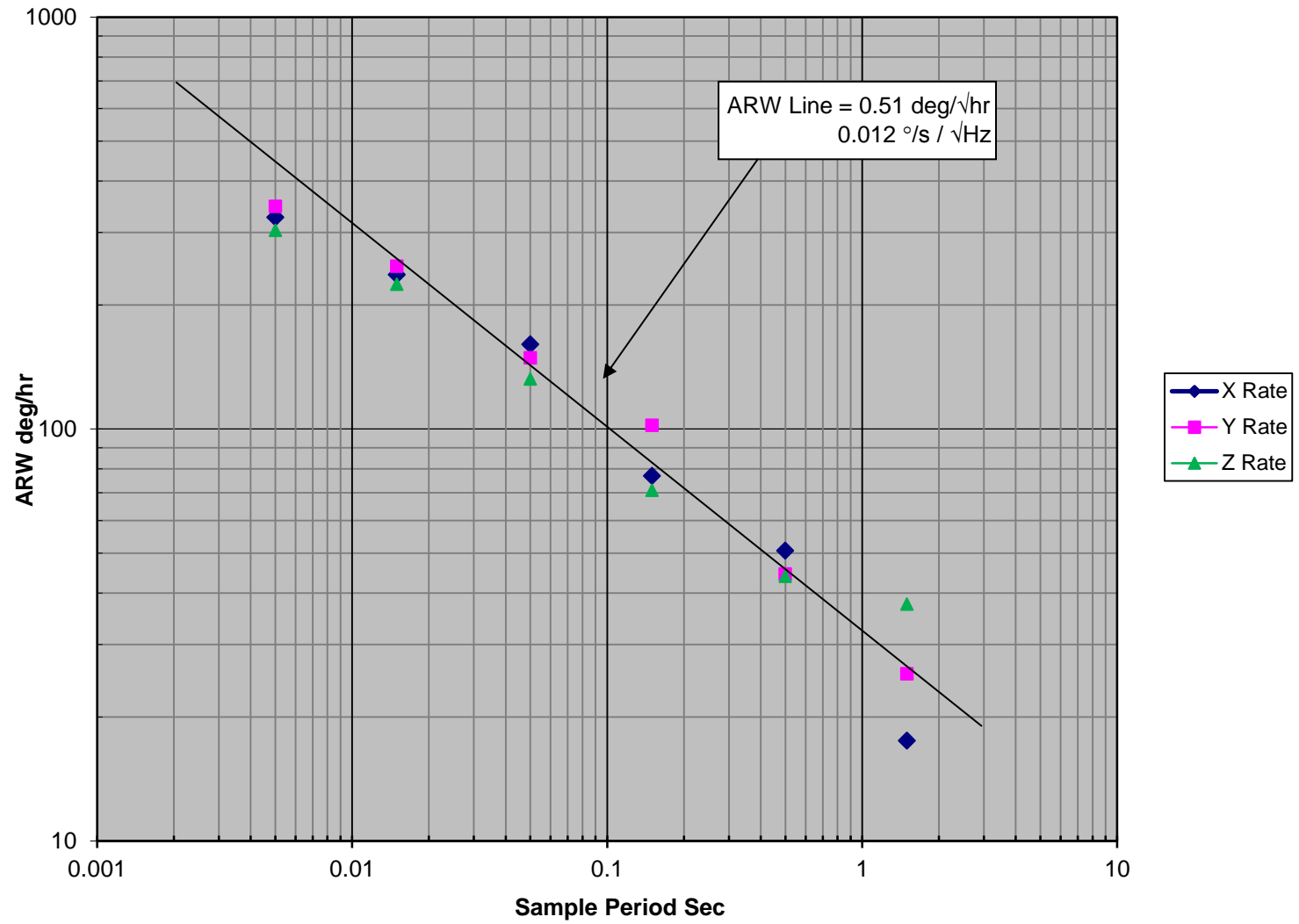
LMRK10VG-075-06-100  
Accelerometer Tumble Test

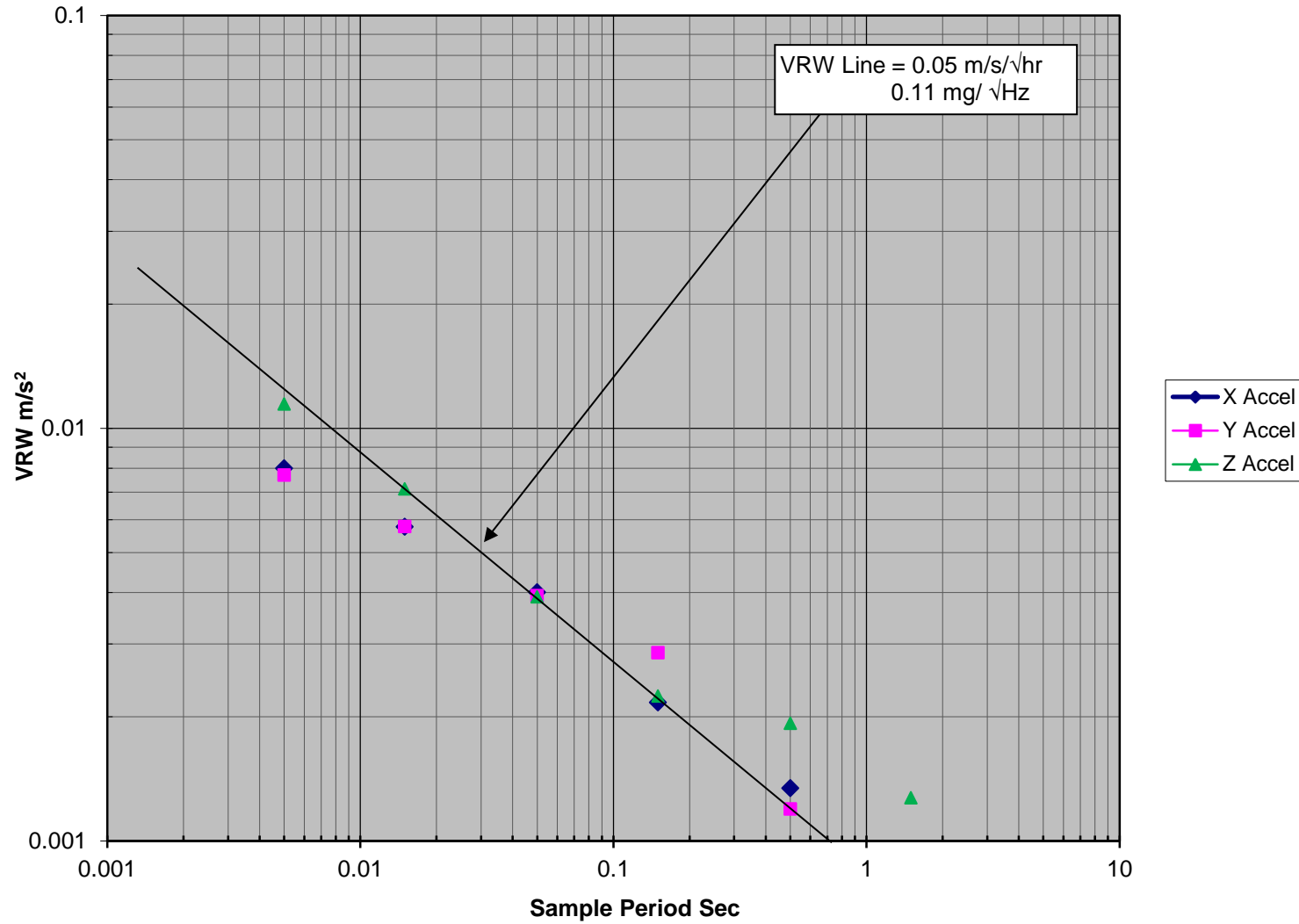
Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	4.163	-0.383	-1.075	1001.337	0.1975	-0.2695	2763.666
NX	3.641	-0.932	-2.982	-998.773	-0.196	-0.5425	2767.648
Diff/2	0.261	0.2745	0.9535	1000.055	0.19675	0.1365	-1.991
Ave	3.902	-0.6575	-2.0285	1.28175	0.00075	-0.406	2765.657
PY	3.406	-1.886	-1.192	-0.5255	1001.978	0.397	2739.297
NY	1.142	-1.555	-2.023	-0.11	-998.1885	-0.818	2734.301
Diff/2	1.132	-0.1655	0.4155	-0.20775	1000.083	0.6075	2.498
Ave	2.274	-1.7205	-1.6075	-0.31775	1.89475	-0.2105	2736.799
PZ	3.324	-1.882	-0.507	-0.2865	0.8045	998.613	2737.776
NZ	3.254	-0.407	-2.356	-0.3985	2.324	-1001.18	2740.78
Diff/2	0.035	-0.7375	0.9245	0.056	-0.75975	999.8963	-1.502
Ave	3.289	-1.1445	-1.4315	-0.3425	1.56425	-1.28325	2739.278
Bias %s,mg	0.032	-0.012	-0.017	-0.33	0.78	-0.31	27.47
ASF Norm				1.0001	1.0001	0.9999	Temp °C

Gyro %s /g	Input g =			Accel In g's
x	0.003	0.011	0.000	x
y	0.003	-0.002	-0.007	y
z	0.010	0.004	0.009	z

Accel		Accel In
Mis-Align	mrads	
-0.21	0.06	x
0.20	-0.76	y
0.14	0.61	z

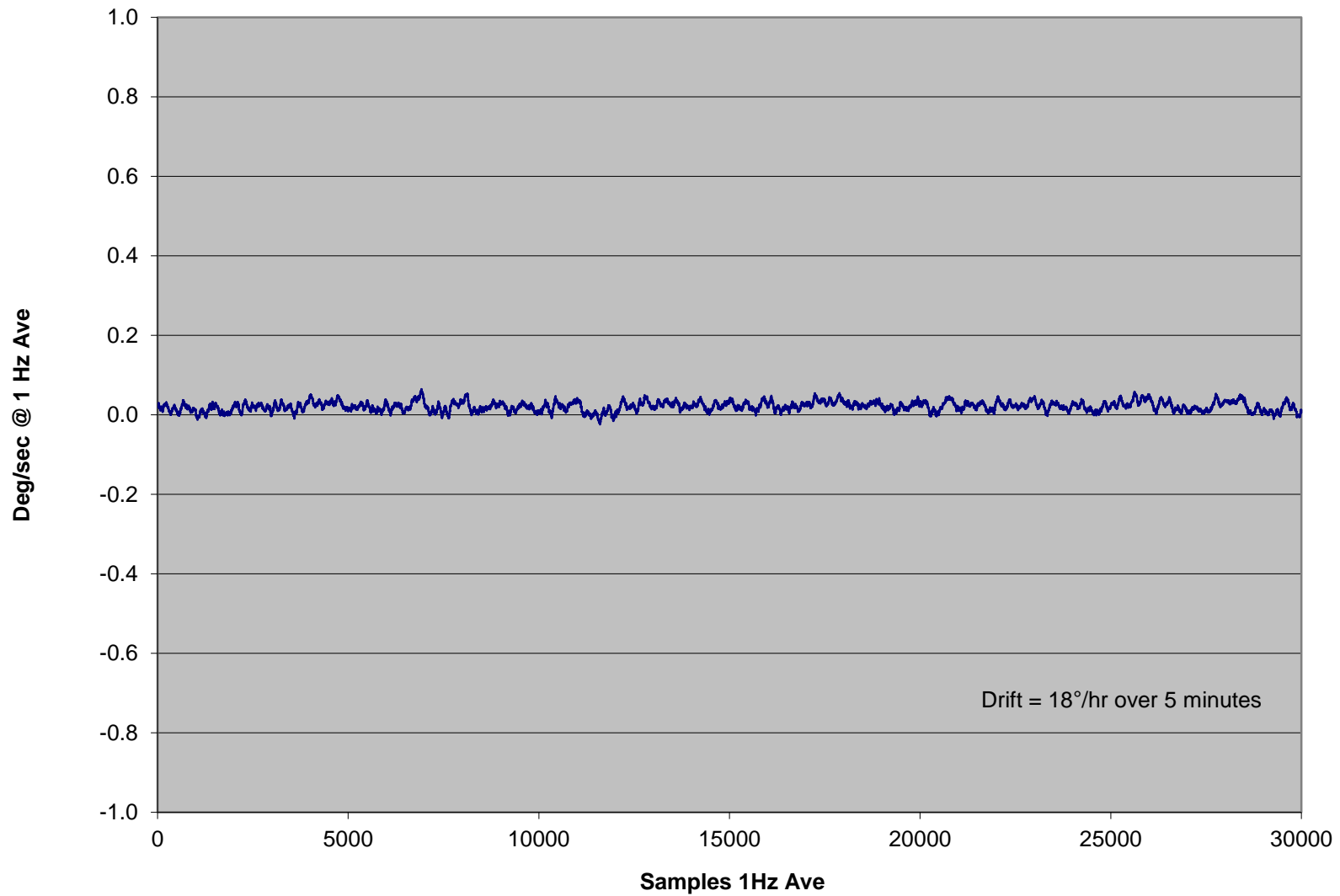
Accepted by:



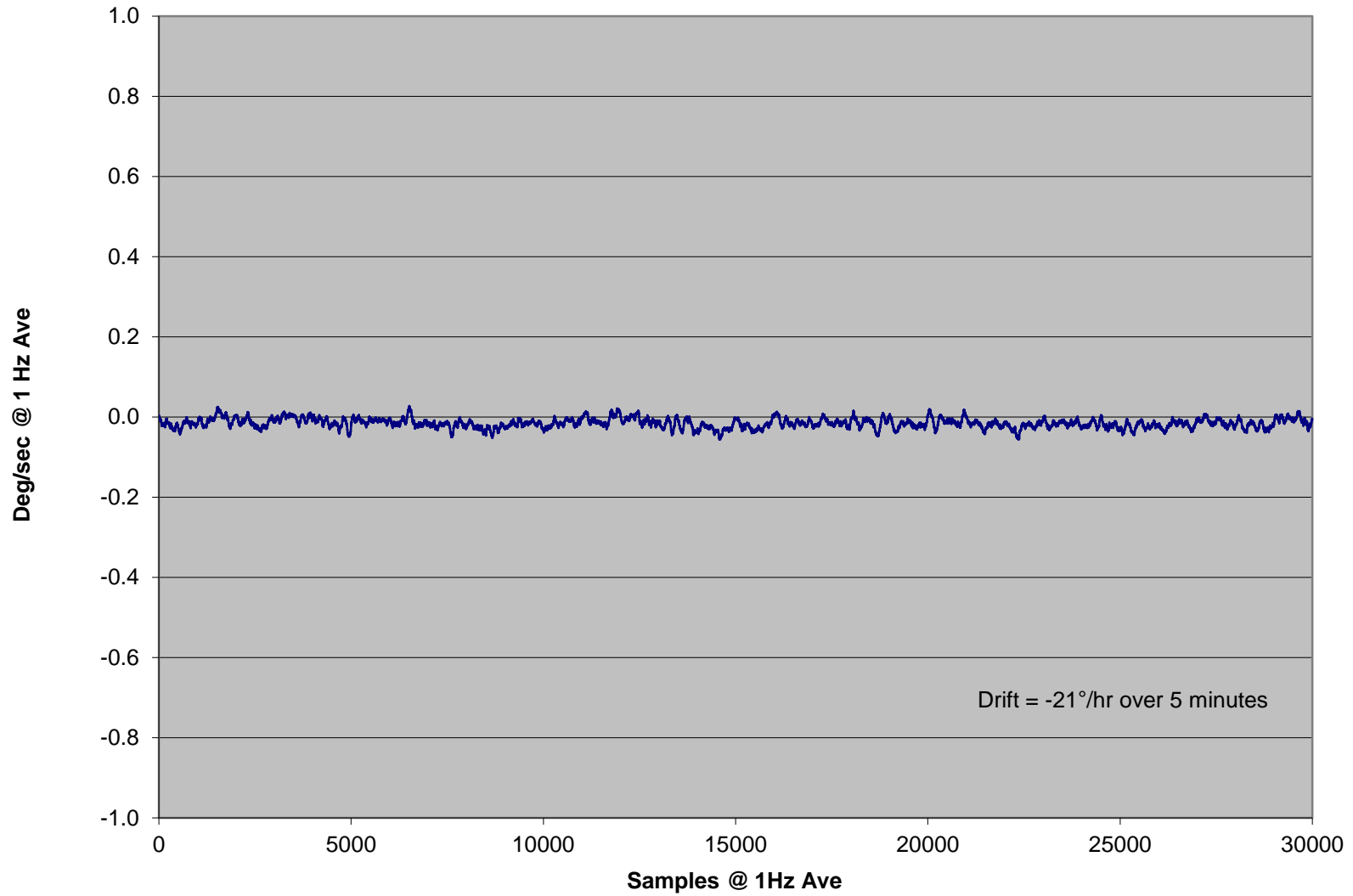




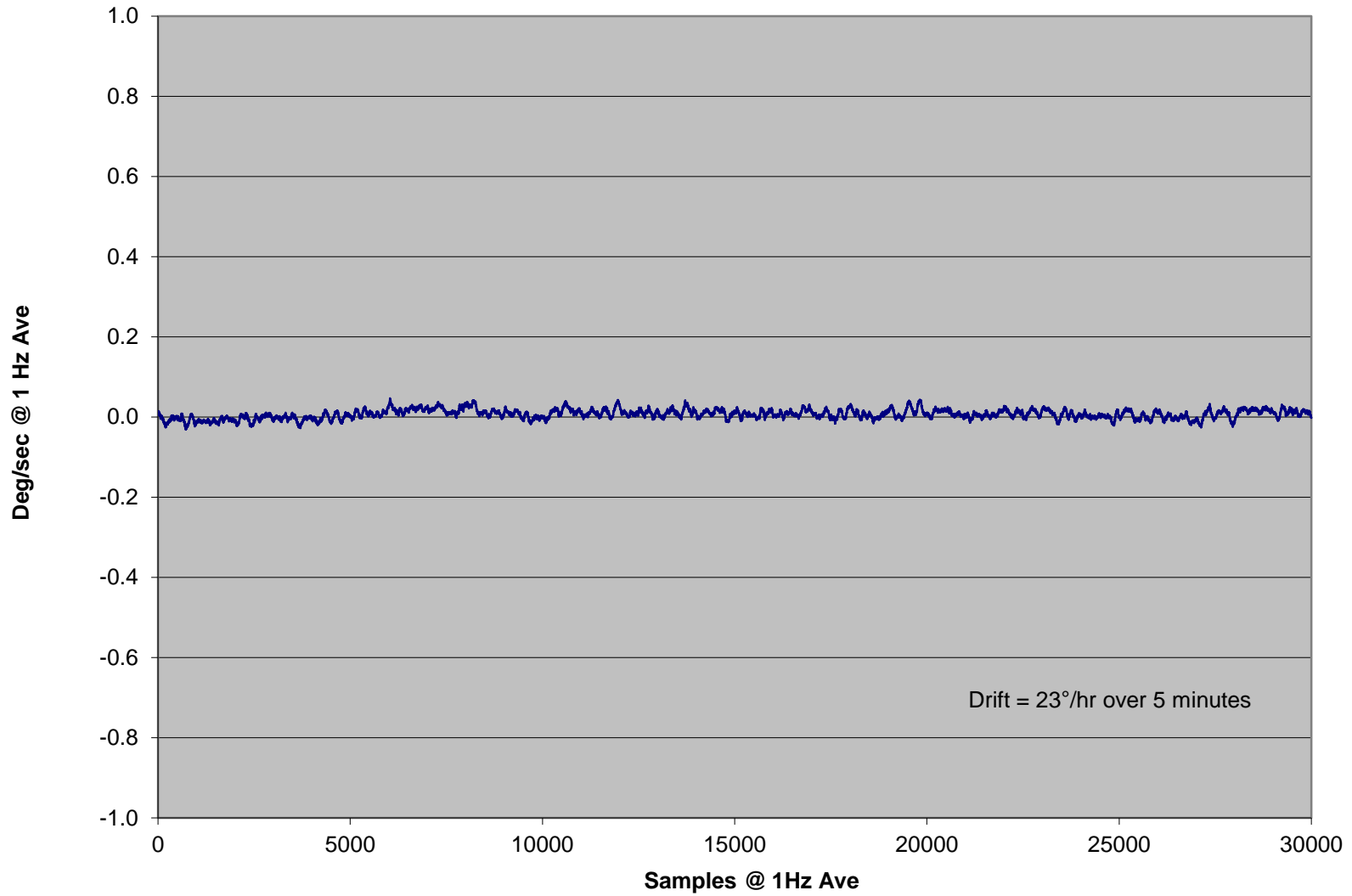
### X Gyro In-Run Bias



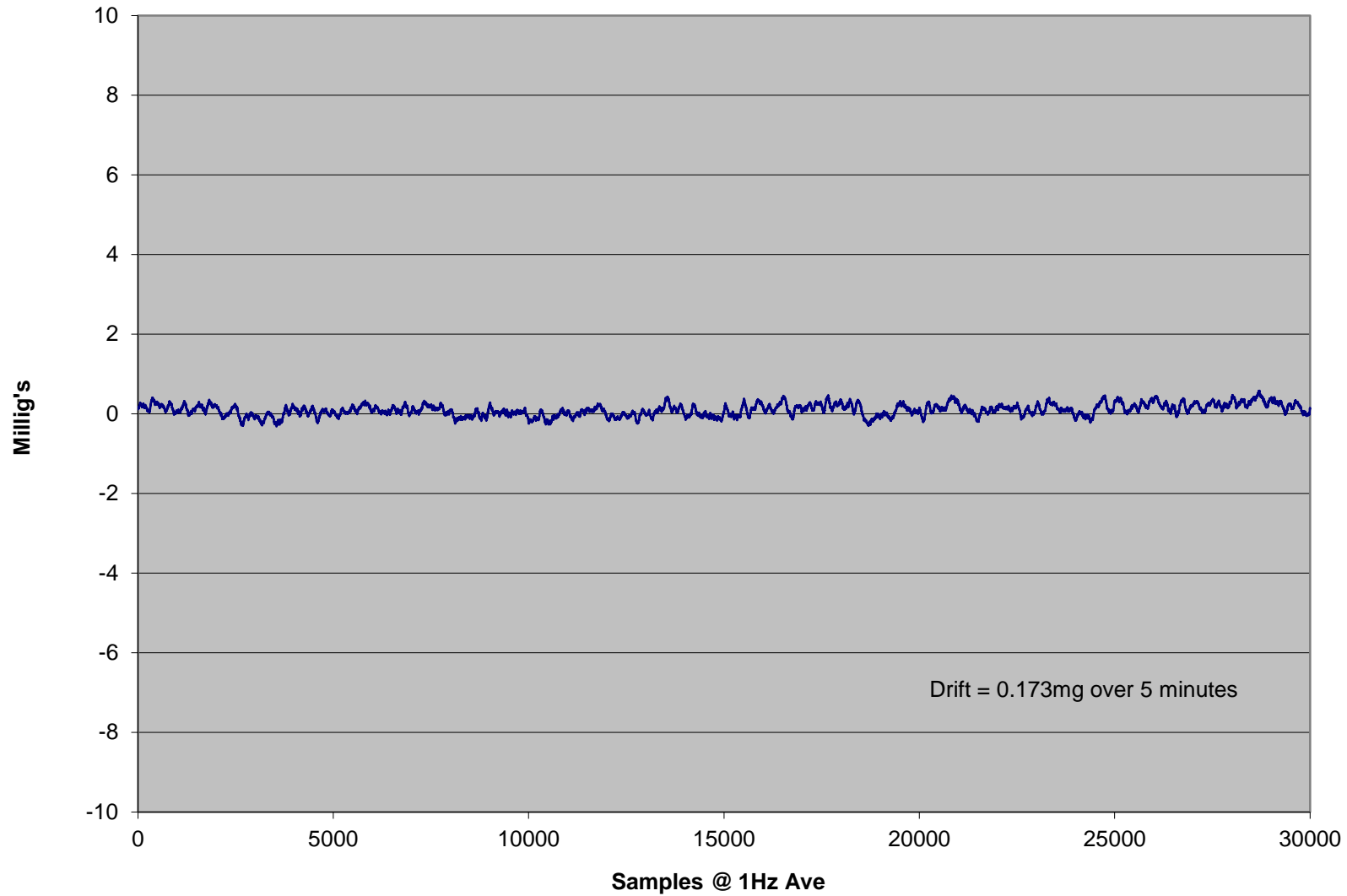
### Y Gyro In-Run Bias



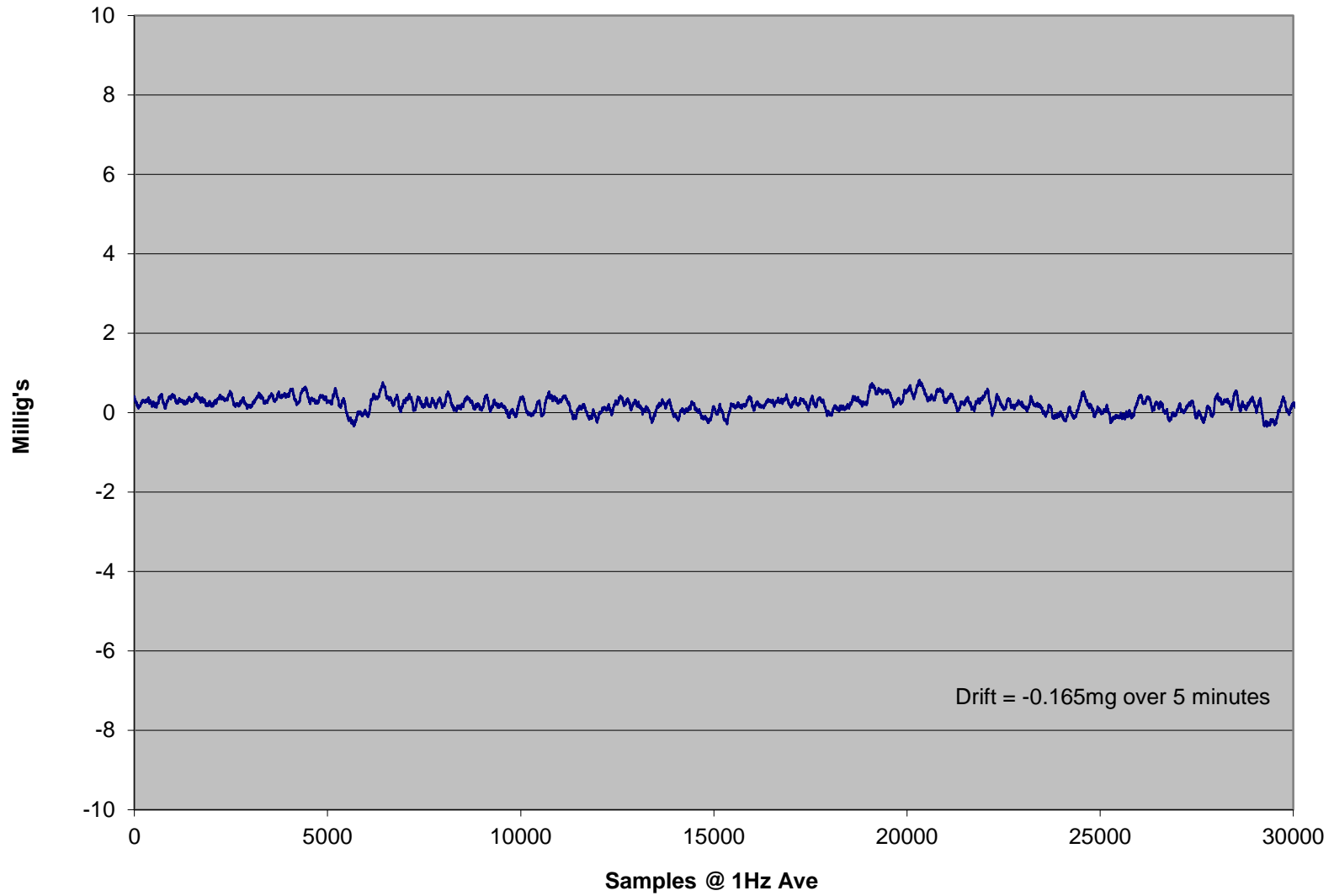
### Z Gyro In-Run Bias



### X Accel In-Run



### Y Accel In-Run



### Z Accel In-Run

