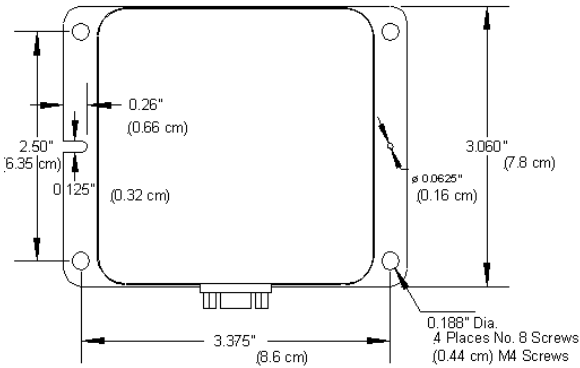
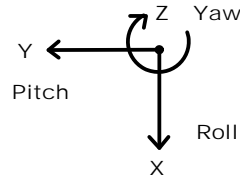


# MRM 30 Analog IMU



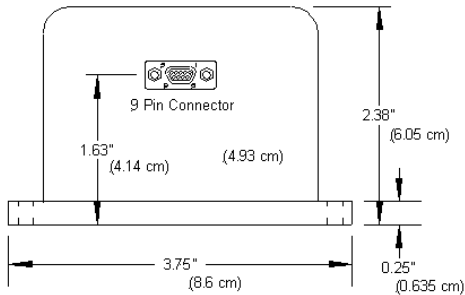
Axes (Top View) Right Hand Rule



## MRM 30 Analog IMU

MRM30IMU-025-02-200 or -6 or -10  
 MRM30IMU-100-02-200 or -6 or -10  
 MRM30IMU-175-02-200 or -6 or -10  
 MRM30IMU-300-02-200 or -6 or -10

## Specification



Mating Connector: M83513/O1-BN

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Case
5	<b>+6V to +36V Input Power</b>
6	External Sync Input (1kHz) Option Connect to ground if not using
7	Temperature = 50mV/°C typical
8	Signal Ground
9	Self Test 3.3V Logic Level
10	Roll Gyro (X) Analog Out ± 5V
11	Pitch Gyro (Y) Analog Out ± 5V
12	Yaw Gyro (Z) Analog Out ± 5V
13	X Accelerometer Analog Out ± 5V
14	Y Accelerometer Analog Out ± 5V
15	Z Accelerometer Analog Out ± 5V

**Standard -200 Model:** The analog signals are ±5 volt scaled maximum measured with respect to signal ground pin 8. Load ≥ 5K Ohms & <100pf on each signal.

**Special -250 Model:** All analog signals are scaled ±2.5 volt maximum with respect to signal reference +2.5V on pin 8. Load ≥ 5K Ohms & <100pf on each signal.

PARAMETER	MRM 30 Analog IMU					
	RATE AXES			ACCEL AXES		
Range	±100°/sec	±150°/sec	±300°/sec	±2 g's	±6 g's	±10 g's
Bias (Over Temp.)	<0.03°/sec 2σ			<1.0mg	<1.3mg 1σ	<1.5mg
Bias (In Run Stability)	8°/hour 1σ			0.02mg	0.04mg 1σ	0.08mg
Scale Factor	-200 -250	50mV/°s 25mV/°s	33.3mV/°s 16.7mV/°s	16.7mV/°s 8.3mV/°s	2.5V/g 1.25V/g	0.83V/g 0.417V/g
Scale Factor Error %	≤0.08% (over temperature) 1σ					
Resolution	0.0015°	0.0025° /sec	0.003°	0.02mg	0.05mg	0.06mg
Angle Random Walk	0.003°	0.005° /sec/√Hz 1σ	0.006°	0.04mg	0.1mg /√Hz 1σ	0.12mg
Alignment	1mrad 1σ					
G-Sensitivity	<0.01°/sec/g 1σ					
Self Test On	Δ 8°/s ± 4 °/s	Δ 8°/s ± 4 °/s	Δ 8°/s ± 4 °/s	Δ 1 ±0.25g	Δ 1.25 ±0.75g	Δ 1.25 ±0.75g
Temp Range	Operating: -40°C to +85°C Non-Operating: -55°C to +100°C					
Bandwidth	140 Hz					
Temp Sensors	6 Internal Temperature Sensors					
Start-up Time	< 0.3 sec					
Input Power	<b>+6.0V to +36V Max. Input (single sided) (Input Transient Protection to 80V)</b>					
Power Consumption	2500 mW at +12V typical 3000 mW at +12V maximum					
Size	U.S.:	3.0 x 3.06 x 2.38 = 21.85 in <sup>3</sup>				
	Metric:	7.62 x 7.8 x 6.05 = 359.59cm <sup>3</sup>				
Weight	399 grams					
Mounting	4ea No.8 or M4 Screws					
Shock	500g's ½ sine 30 msec powered					
Vibration	6 gRMS (20Hz - 2KHz ~ 10g accelerometers)					
MTBF	No inherent wear out modes for long life.					

Specification subject to change without notice



**Gladiator Technologies**



High Performance Inertial MEMS

Gladiator Technologies, Inc.  
 8022 Bracken Place SE  
 Snoqualmie, WA 98065 USA

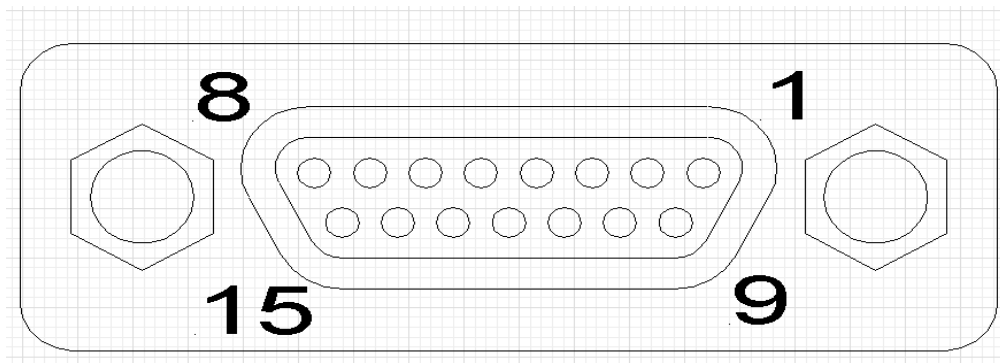
Rev. 14Feb21  
 SN: 253

Pin No.	Assignment	Color
1	RS-485 A (+)	Black
2	RS-485 B (-)	Brown
3	Power Ground	Red
4	Case	Orange
5	<b>+6V to +36V Input Power</b>	Yellow
6	External Sync Input (1kHz) Option Connect to ground if not using	Green
7	Temperature = 50mV/° C typical	Blue
8	Signal Ground	Violet
9	Self Test 3.3V Logic Level	Gray
10	Roll Gyro (X) Analog Out ± 5V	White
11	Pitch Gyro (Y) Analog Out ± 5V	Black
12	Yaw Gyro (Z) Analog Out ± 5V	Brown
13	X Accelerometer Analog Out ± 5V	Red
14	Y Accelerometer Analog Out ± 5V	Orange
15	Z Accelerometer Analog Out ± 5V	Yellow

**Standard -200 Model:** The analog signals are ±5 volt scaled maximum measured with respect to signal ground pin 8. Load ≥ 5K Ohms & <100pf on each signal.

Note:

The last 5 pins have duplicate colors of the first 5 pins – DO NOT MIX THEM UP.



15 pin connector as viewed on the front of the MRM



MRM30IMU-300-10-200

Rate Spin Test

Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	14403.16	-12.935	6.608	0.115	-0.412	-8.3775	2507.907
NX	-14403.38	-15.598	4.398	0.2315	-1.5705	-8.3405	2508.725
Diff/2	14403.27	1.3315	1.105	-0.05825	0.57925	-0.0185	-0.409
Ave	-0.114	-14.2665	5.503	0.17325	-0.99125	-8.359	2508.316
PY	-6.45	14400.14	5.015	-1.553	0.7515	-8.3665	2504.477
NY	-16.308	-14404.55	4.422	-0.5945	0.6305	-8.417	2503.354
Diff/2	4.929	14402.34	0.2965	-0.47925	0.0605	0.02525	0.5615
Ave	-11.379	-2.205	4.7185	-1.07375	0.691	-8.39175	2503.916
PZ	-11.258	-13.18	14401.37	-8.108	-1.2295	1.3805	2504.18
NZ	-11.035	-13.675	-14398.61	-9.0455	-1.2715	1.402	2504.776
Diff/2	-0.1115	0.2475	14399.99	0.46875	0.021	-0.01075	-0.298
Ave	-11.1465	-13.4275	1.3845	-8.57675	-1.2505	1.39125	2504.478
RSF Norm	1.000227	1.000163	0.999999				Temp °C 25.06

Gyro Mis-Align deg/sec	Input Rate			
x		0.05	0.00	x
y	0.01		0.00	y
z	0.01	0.00		z

Gyro Mis-align mrad	Input Rate			
x		0.34	-0.01	x
y	0.09		0.02	y
z	0.08	0.02		z

Accepted by:





MRM30IMU-300-10-200  
Accelerometer Tumble Test

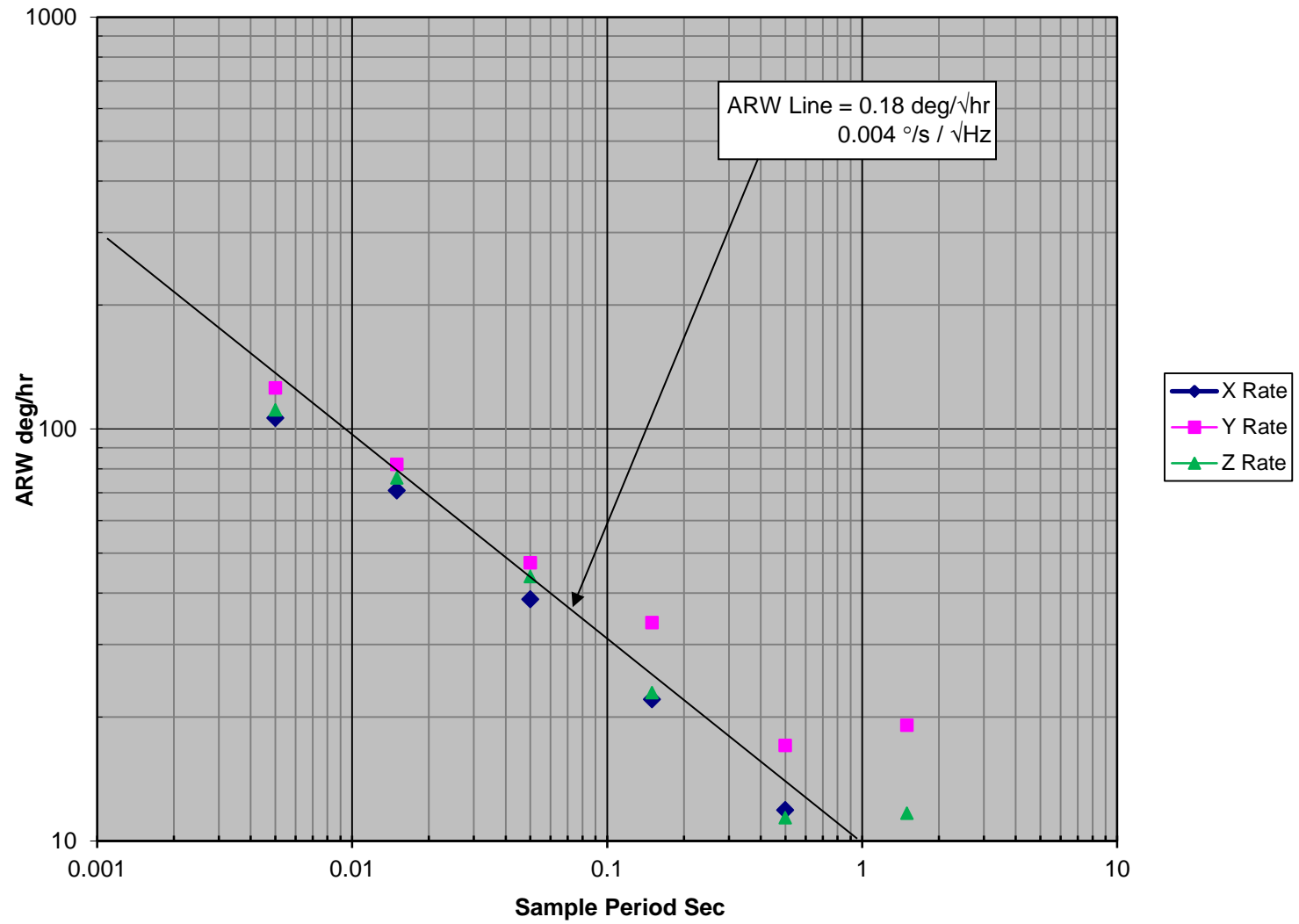
Test	gyroX	gyroY	gyroZ	accelX	accelY	accelZ	temp X
PX	-0.159	-0.14	0.38	999.198	0.256	-0.592	2506.123
NX	-0.151	-0.154	-0.381	-1000.617	1.0405	0.4495	2507.997
Diff/2	-0.004	0.007	0.3805	999.9075	-0.39225	-0.52075	-0.937
Ave	-0.155	-0.147	-0.0005	-0.7095	0.64825	-0.07125	2507.06
PY	0.231	-1.115	0.515	-0.084	998.6745	0.007	2505.992
NY	0.514	-0.81	-0.013	0.1975	-1001.543	-0.237	2506.832
Diff/2	-0.1415	-0.1525	0.264	-0.14075	1000.109	0.122	-0.42
Ave	0.3725	-0.9625	0.251	0.05675	-1.434	-0.115	2506.412
PZ	0.219	-0.933	0.38	-0.0665	-0.8815	1000.179	2506.009
NZ	0.231	-1.123	0.367	0.3705	-0.805	-1000.07	2504.298
Diff/2	-0.006	0.095	0.0065	-0.2185	-0.03825	1000.124	0.8555
Ave	0.225	-1.028	0.3735	0.152	-0.84325	0.0545	2505.154
Bias %s,mg	0.001	-0.007	0.002	0.10	-0.10	-0.09	25.06
ASF Norm				0.9999	1.0001	1.0001	Temp °C

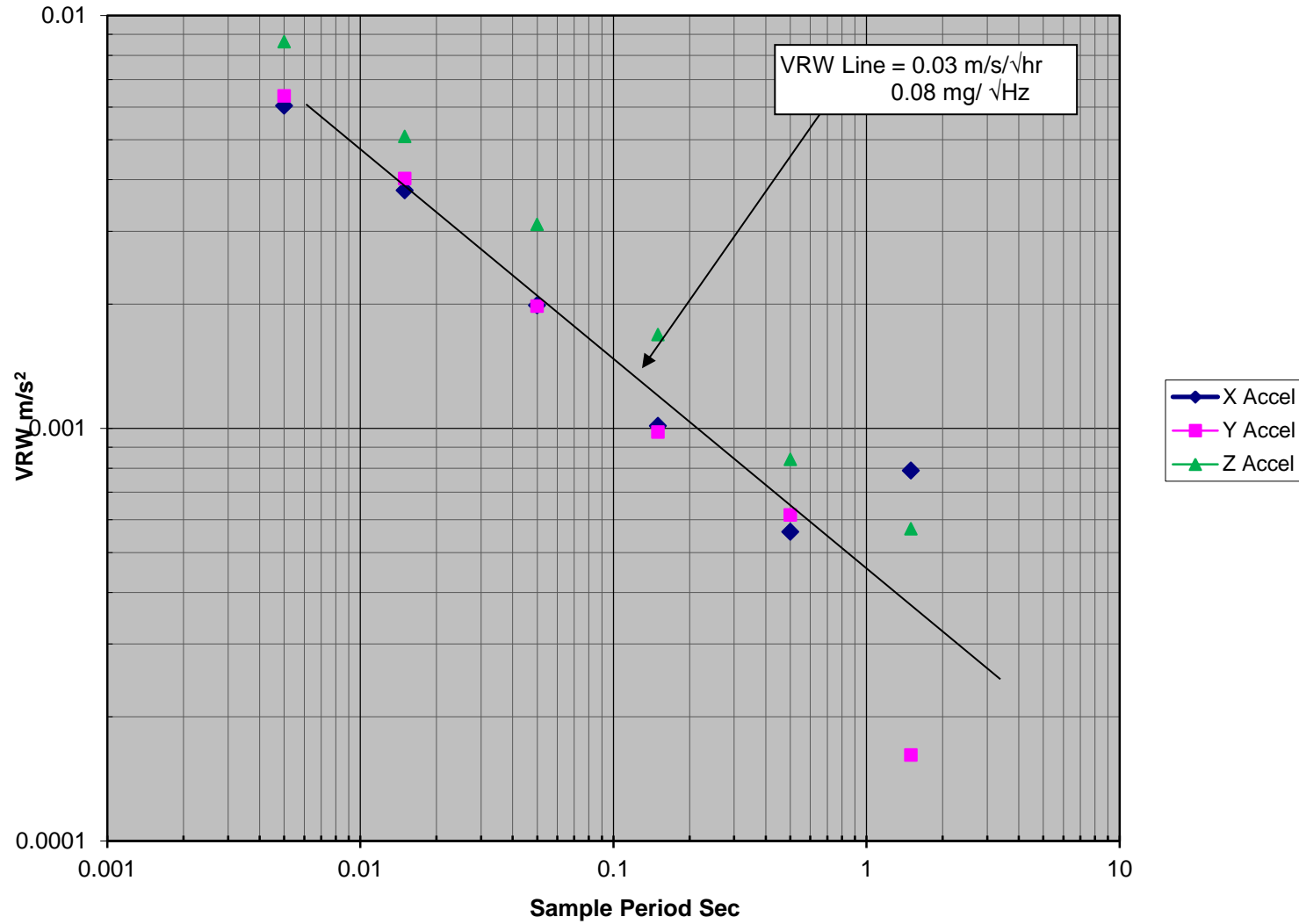
Gyro %s /g	Input g =			Accel In g's
x	0.000	-0.001	0.000	x
y	0.000	-0.002	0.001	y
z	0.004	0.003	0.000	z

Accel		Accel In
Mis-Align	mrads	
-0.14	-0.22	x
-0.39	-0.04	y
-0.52	0.12	z

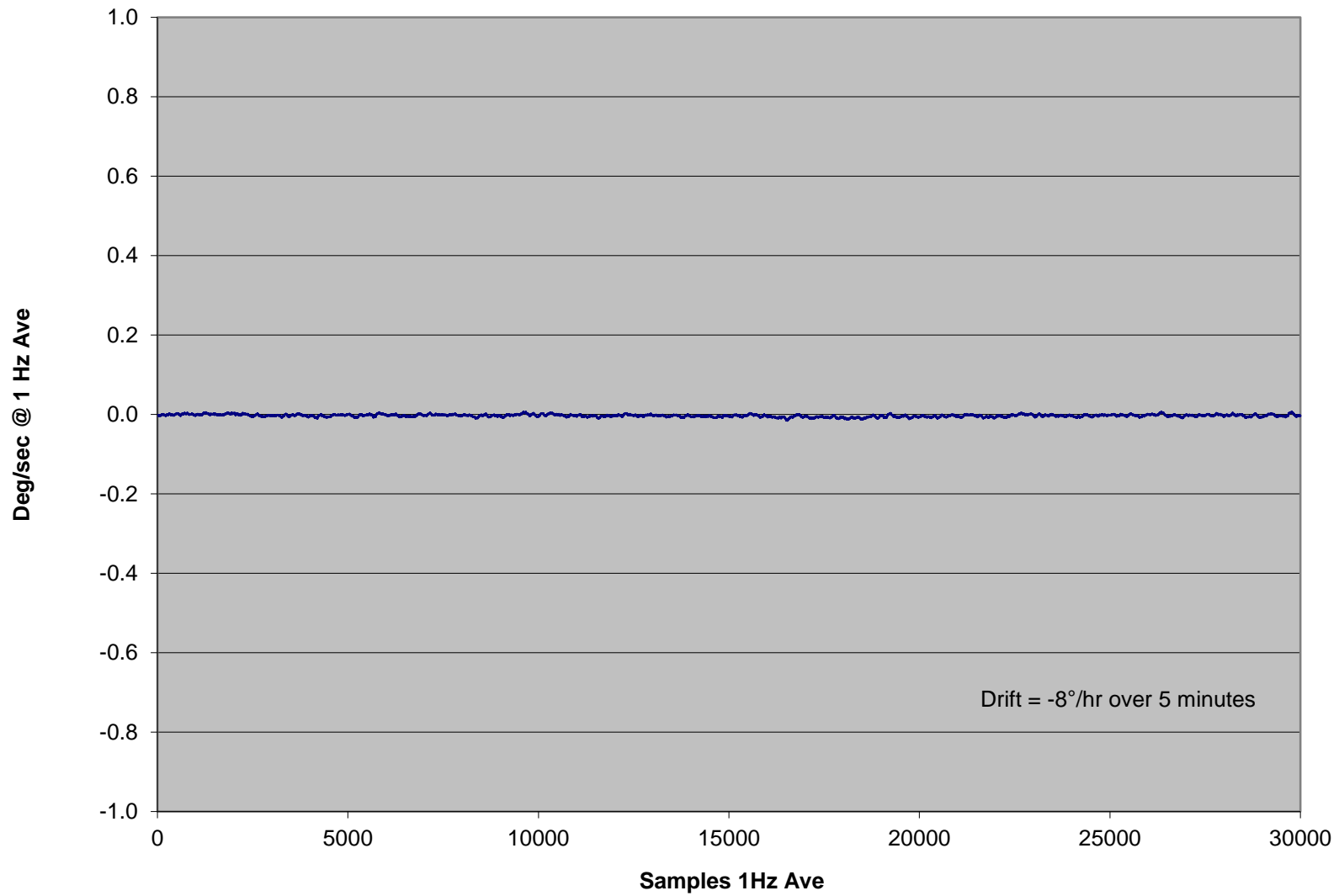
Accepted by:



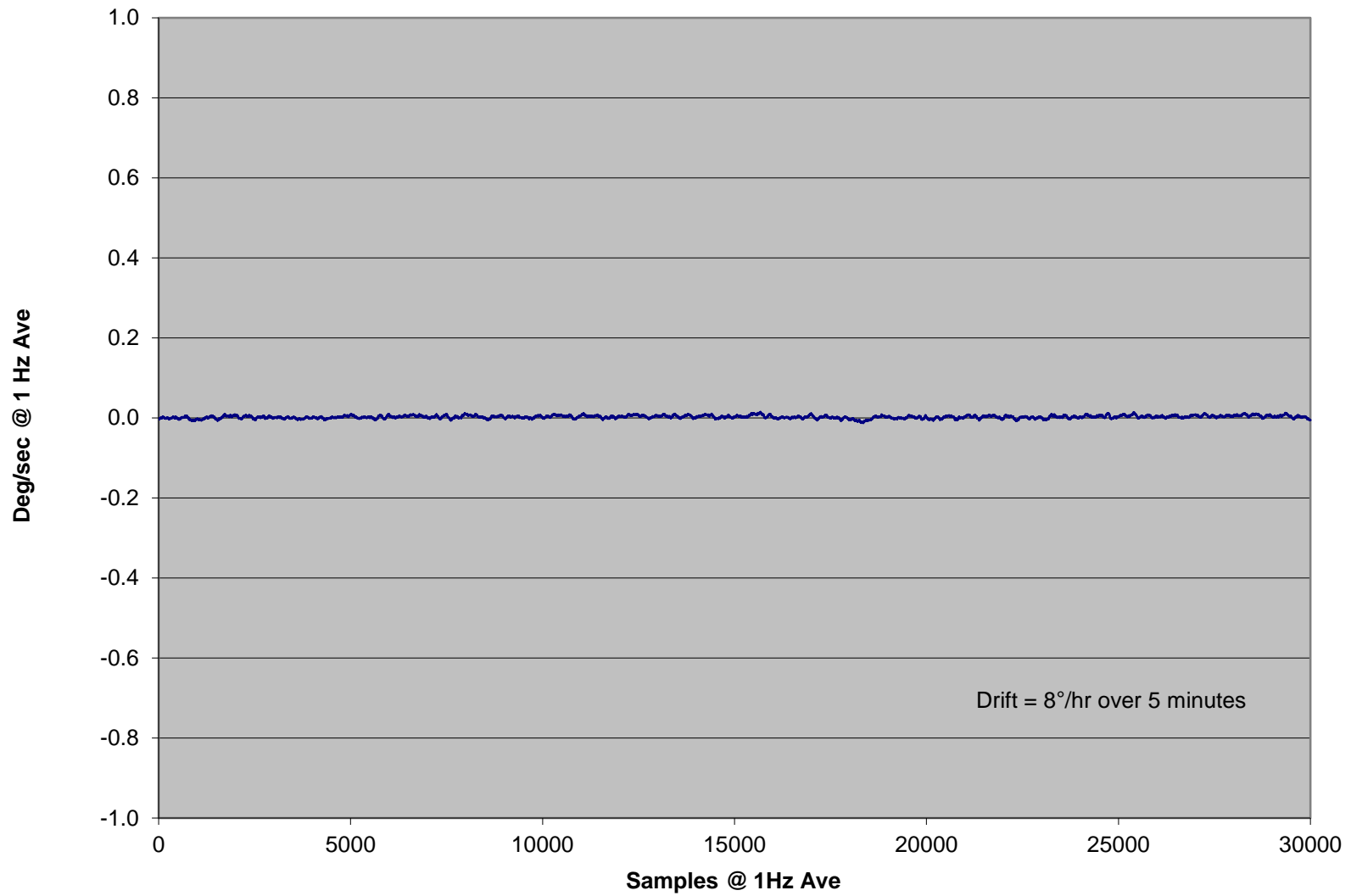




### X Gyro In-Run Bias

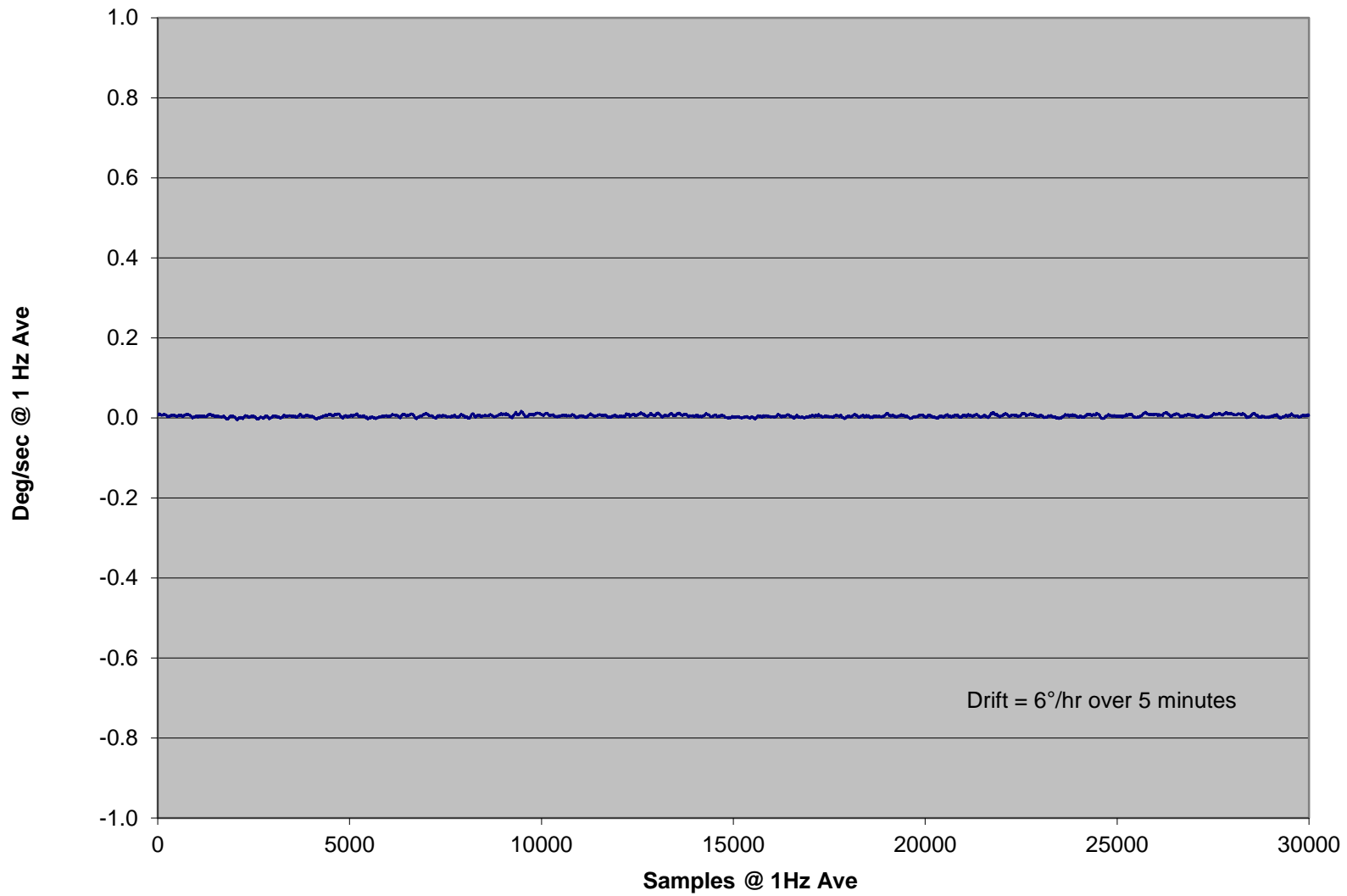


### Y Gyro In-Run Bias

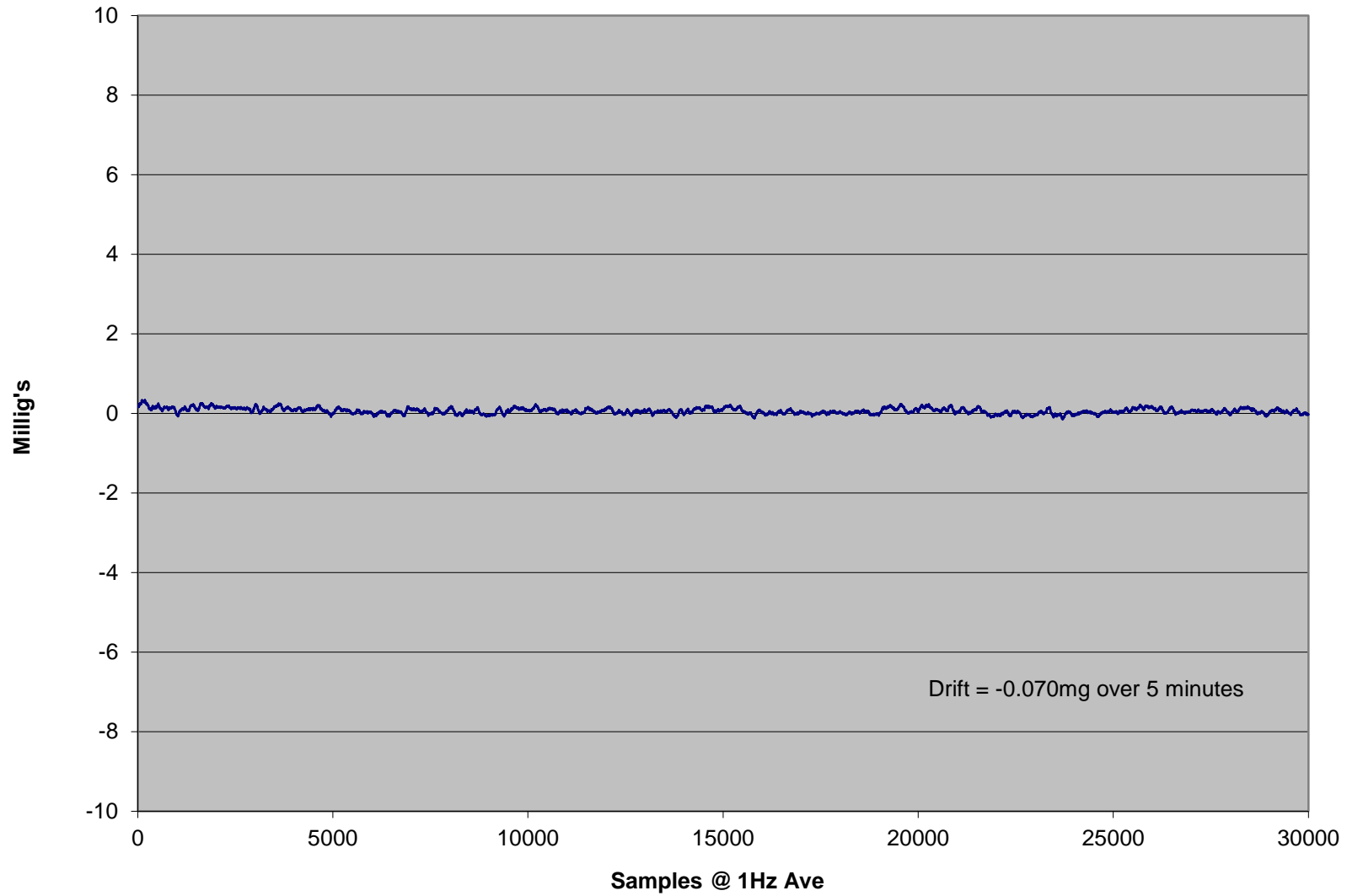




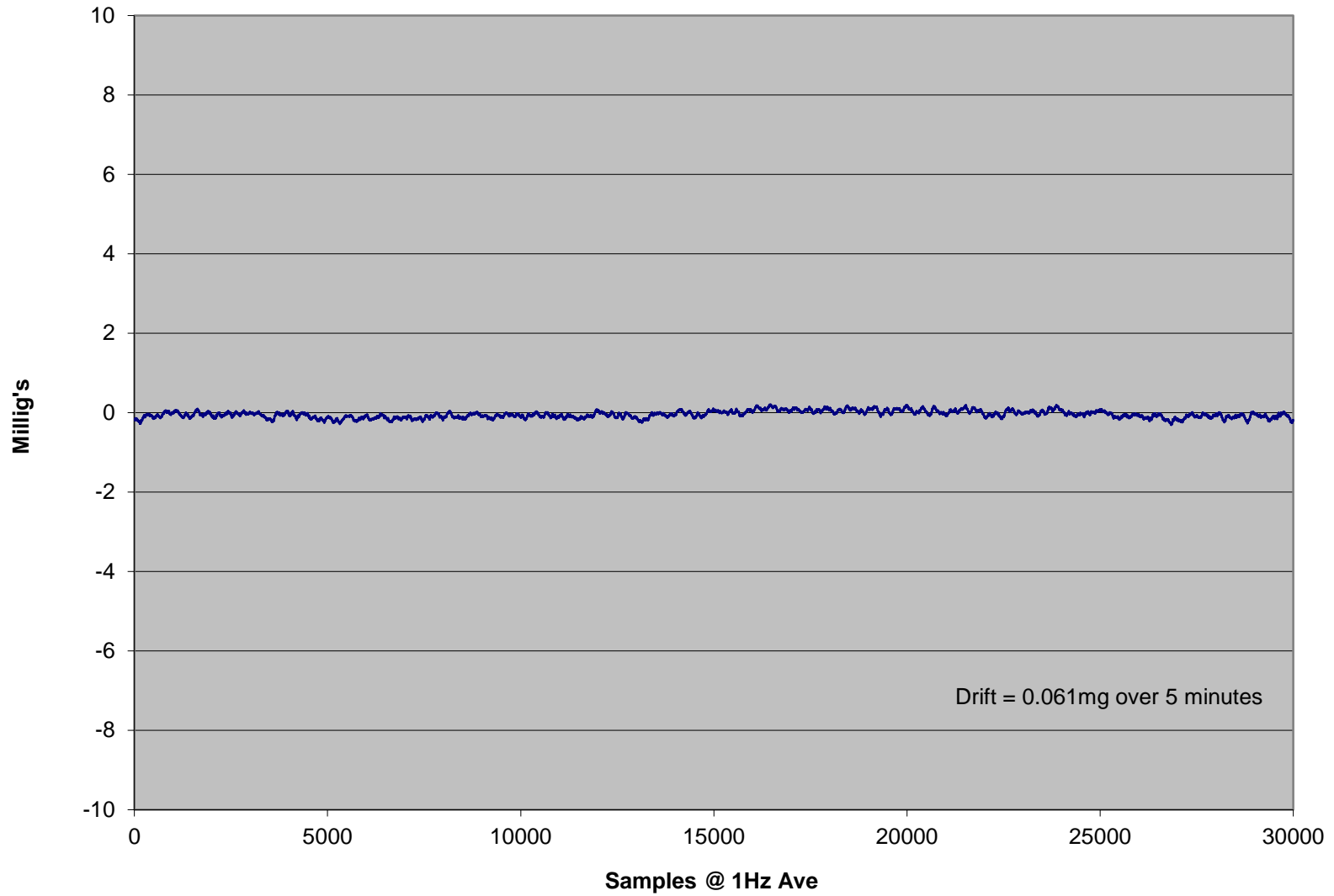
### Z Gyro In-Run Bias



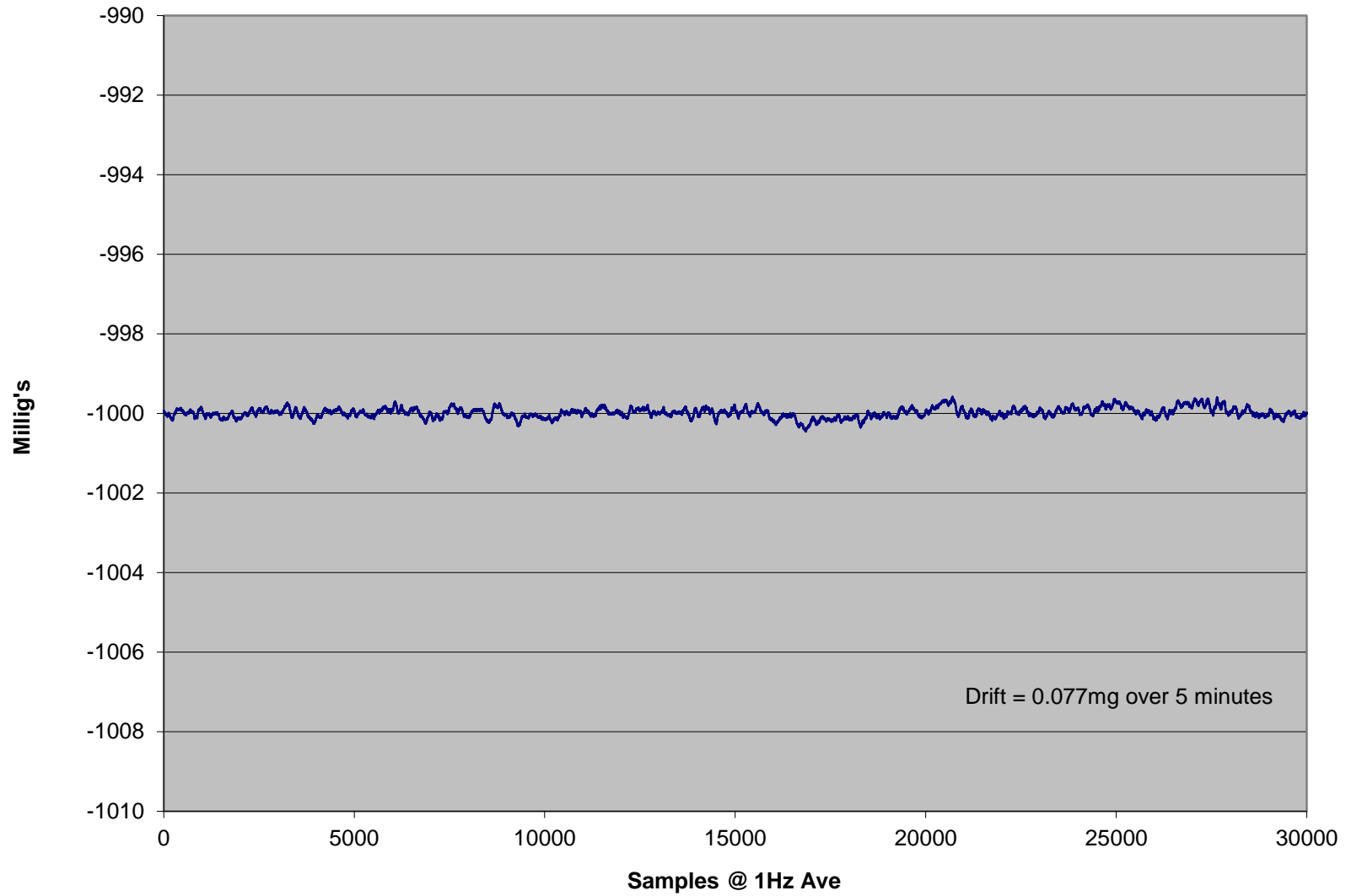
### X Accel In-Run



### Y Accel In-Run



### Z Accel In-Run



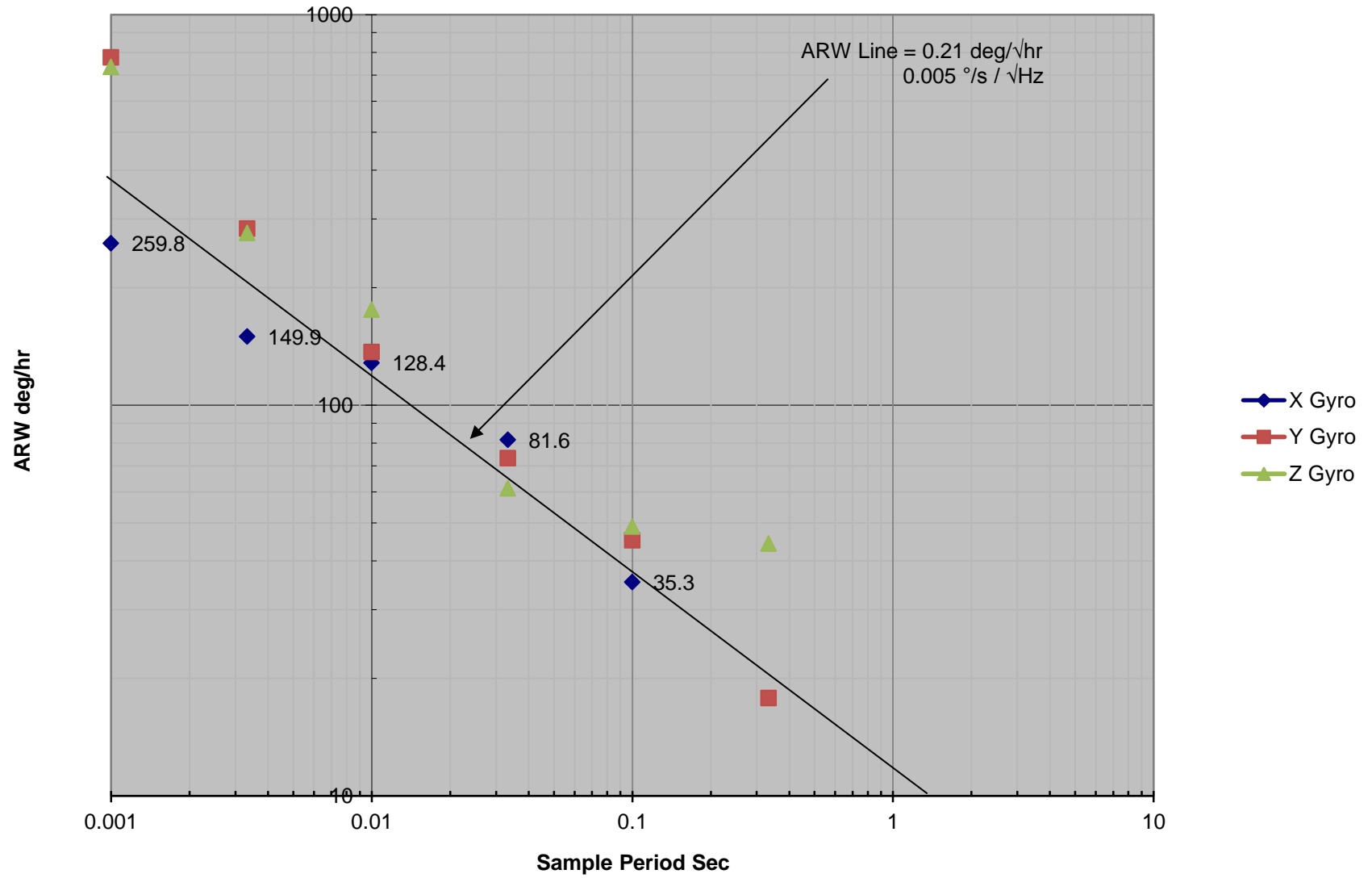
MRM30IMU-300-10-200  
Rate Spin Test

Row	Time	X Rate	X Ref	Y Rate	Y Ref	Z Rate	Z Ref	X Accel	A Ref	Y Accel	A Ref	Z Accel	A Ref	Temp	open	ST	V In	Head C	
SN254 Rate Range 300 Spin 144 %s Initial Temp 25.2 C Scan rate: 0.001 seconds Number of scans: 10,000																			
PXSF	RSF V dps	2.3987 2.3992	-0.0005 0.0167	-0.0026 -0.0020	-0.0005 0.0000	0.0007 0.0012	-0.0005 0.0000	-0.0005 0.0000	-0.0005	-0.0005	-0.0011	-0.0005	-0.0046	-0.0005	1.2265	1.2523	0.0548	8.8861	25.4
NXSF	RSF V dps	-2.4001 -2.3996	-0.0005 -0.0167	-0.0033 -0.0028	-0.0005 0.0000	0.0004 0.0009	-0.0005 0.0000	-0.0004	-0.0005	-0.0011	-0.0005	-0.0046	-0.0005	1.2307	1.2564	0.0548	8.8875	25.4	
	X RSF=	V/°sec		radians		0.0167		0.0001		0.0001		0.0035							
	Align to X	degrees		57.2958		0.0087		0.0035											
PYSF	RSF V dps	-0.0021 -0.0016	-0.0006 0.0000	2.3970 2.3976	-0.0006 0.0166	0.0007 0.0012	-0.0006 0.0000	-0.0012	-0.0006	0.0000	-0.0006	-0.0046	-0.0006	1.2532	1.2796	0.0547	8.8979	25.4	
NYSF	RSF V dps	-0.0032 -0.0027	-0.0005 0.0000	-2.3986 -2.3981	-0.0005 -0.0167	0.0001 0.0005	-0.0005 0.0000	-0.0011	-0.0005	0.0000	-0.0005	-0.0045	-0.0005	1.2541	1.2788	0.0547	8.8985	25.4	
	Y RSF=	V/°sec		0.0167		0.0001		0.0001		0.0080									
	Align to Y	degrees		0.0134		0.0002		0.0080											
PZSF	RSF V dps	-0.0029 -0.0024	-0.0005 0.0000	-0.0027 -0.0022	-0.0005 0.0000	2.3995 2.4001	-0.0005 0.0167	-0.0049	-0.0005	-0.0011	-0.0005	0.0005	-0.0005	1.2601	1.2854	0.0547	8.9023	25.4	
NZSF	RSF V dps	-0.0021 -0.0016	-0.0005 0.0000	-0.0029 -0.0024	-0.0005 0.0000	-2.4001 -2.3995	-0.0005 -0.0167	-0.0005	-0.0005	-0.0011	-0.0005	0.0006	-0.0005	1.2597	1.2852	0.0547	8.9024	25.4	
	Z RSF=	V/°sec		0.0167		0.0001		0.0167											
	Align to Z	radians		-0.0002		0.0000		0.0000		0.0000		0.0000		Ave Temp		25.4			
		degrees		-0.0096		0.0028													
Summary	X RSF=	0.01666																	
V/°sec	Y RSF=	0.01665																	
	Z RSF=	0.01667																	
Alignment Matrix in radians	Corrected						Measured						Uncorrected Error in degrees						
	X =	1.0000	-0.0002	0.0002		Xin	0.00	0.01	-0.01										
	Y =	-0.0002	1.0000	0.0000		Yin	0.01	0.00	0.00										
	Z =	-0.0001	-0.0001	1.0000		Zin	0.00	0.01	0.00										
	Abs Ave =	0.0001					Abs Ave =	0.01 degrees											
	Std Dev=	0.0001					Std Dev=	0.01 degrees											

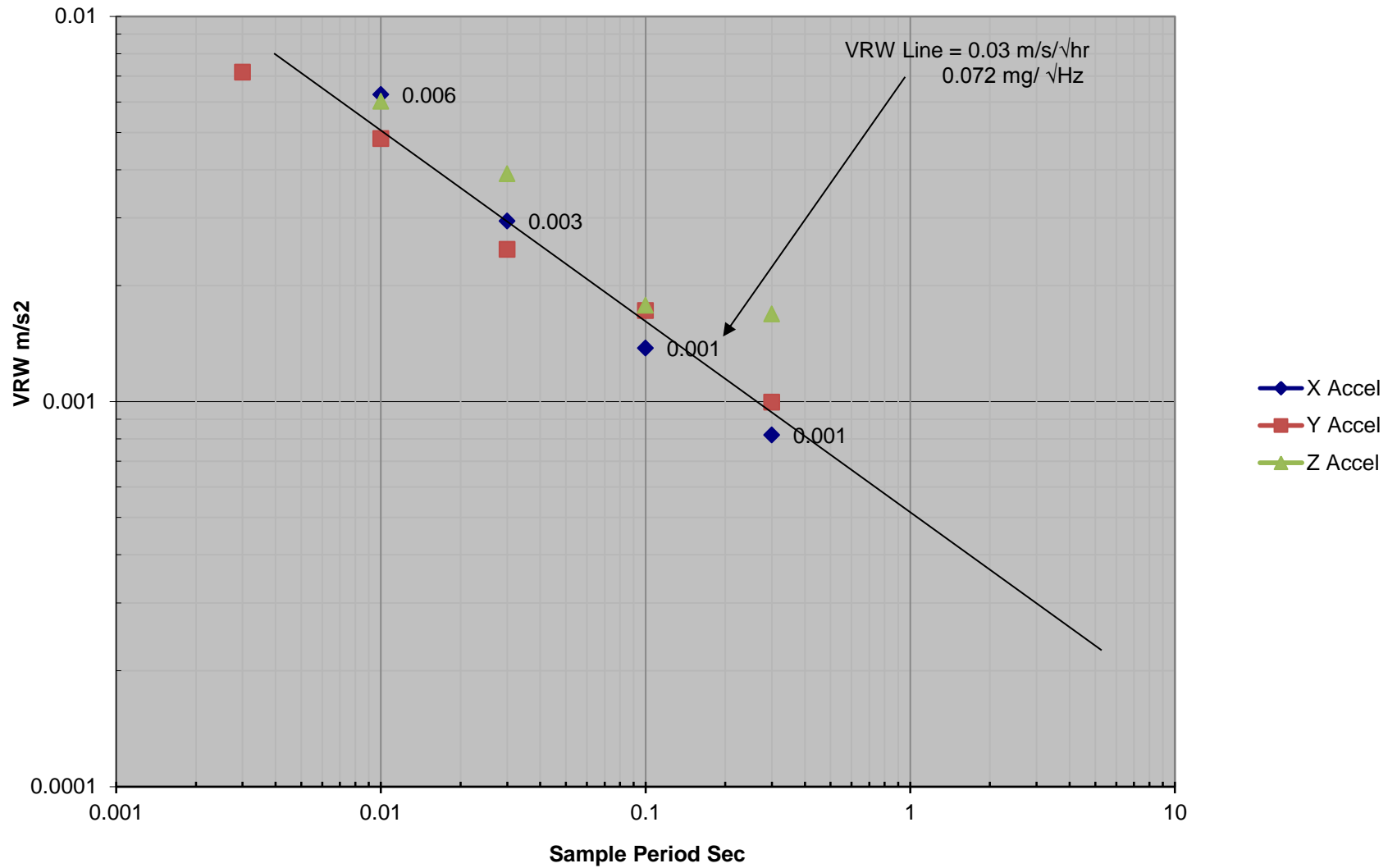
MRM30IMU-300-10-200  
Accelerometer Tumble Test

SN254		Rate Range	300 Spin			144 °/s	Initial Temp		25.2 C									
Scan rate: 0.01 seconds			Number of scans: 1000															
Row	Time	X Rate	X Ref	Y Rate	Y Ref	Z Rate	Z Ref	X Accel	A Ref	Y Accel	A Ref	Z Accel	A Ref	Temp	open	ST	V In	Head C
+X Accel	Ave	-0.0007	-0.0005	-0.0006	-0.0005	-0.0005	-0.0005	0.4989	-0.0005	-0.0002	-0.0005	-0.0010	-0.0005	1.2520	1.2777	0.0547	8.8975	25.4
-X Accel	Ave	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.5007	-0.0005	0.0002	-0.0005	0.0000	-0.0005	1.2509	1.2761	0.0547	8.8968	25.4
	SF V/g	0.0000		-0.0001		0.0000		0.4998		-0.0002		-0.0005						
X Data	Bias V		-0.0001		0.0000		0.0000		-0.0004		0.0005		0.0000	1.2515	1.2769	0.0547	8.8971	25.4
+Y Accel	Ave	-0.0006	-0.0005	-0.0008	-0.0005	-0.0004	-0.0005	-0.0007	-0.0005	0.4989	-0.0005	-0.0004	-0.0005	1.2045	1.2301	0.0549	8.8815	25.3
-Y Accel	Ave	-0.0007	-0.0005	-0.0006	-0.0005	-0.0005	-0.0005	-0.0004	-0.0005	-0.5013	-0.0005	-0.0006	-0.0005	1.2188	1.2443	0.0549	8.8842	25.3
	SF V/g	0.0000		-0.0001		0.0000		-0.0002		0.5001		0.0001						
Y Data	Bias V		-0.0002		-0.0002		0.0001		0.0000		-0.0007		0.0000	1.2116	1.2372	0.0549	8.8828	25.3
+Z Accel	Ave	-0.0007	-0.0005	-0.0007	-0.0005	-0.0005	-0.0005	-0.0006	-0.0005	-0.0012	-0.0005	0.4996	-0.0005	1.2126	1.2385	0.0548	8.8827	25.3
-Z Accel	Ave	-0.0006	-0.0005	-0.0007	-0.0005	-0.0004	-0.0005	-0.0004	-0.0005	-0.0010	-0.0005	-0.5002	-0.0005	1.1934	1.2180	0.0550	8.8810	25.2
	SF V/g	0.0000		0.0000		0.0000		-0.0001		-0.0001		0.4999						
Z Data	Bias V		-0.0002		-0.0002		0.0001		0.0000		-0.0006		0.0002	1.2030	1.2283	0.0549	8.8818	25.3
Summary	Bias V	X Rate <b>-0.0001</b>	Y Rate <b>-0.0001</b>	Z Rate <b>0.0001</b>				X Accel <b>-0.0001</b>	Y Accel <b>-0.0003</b>	Z Accel <b>0.0000</b>				1.222		0.055	8.887	25.3
								<b>0.4998</b>	<b>0.5001</b>	<b>0.4999</b>				Temp Sensor		ST	Vin	
G-Sens	%/sec/g	-0.002	-0.004	0.001	g Input			Xcor rad	1.0000	0.0003	0.0002	Accel In						
	%/sec/g	0.002	-0.005	0.003	x		Align	Ycor rad	0.0004	1.0000	0.0002	x						
	%/sec/g	-0.002	-0.001	-0.002	y			Zcor rad	0.0009	-0.0002	1.0000	z						
	Abs Ave =		0.002	%/sec/g				Abs Ave =	0.0004	0.0	degrees							
	StdDev =		0.003	%/sec/g				StdDev =	0.0004	0.0	degrees							
										radians								

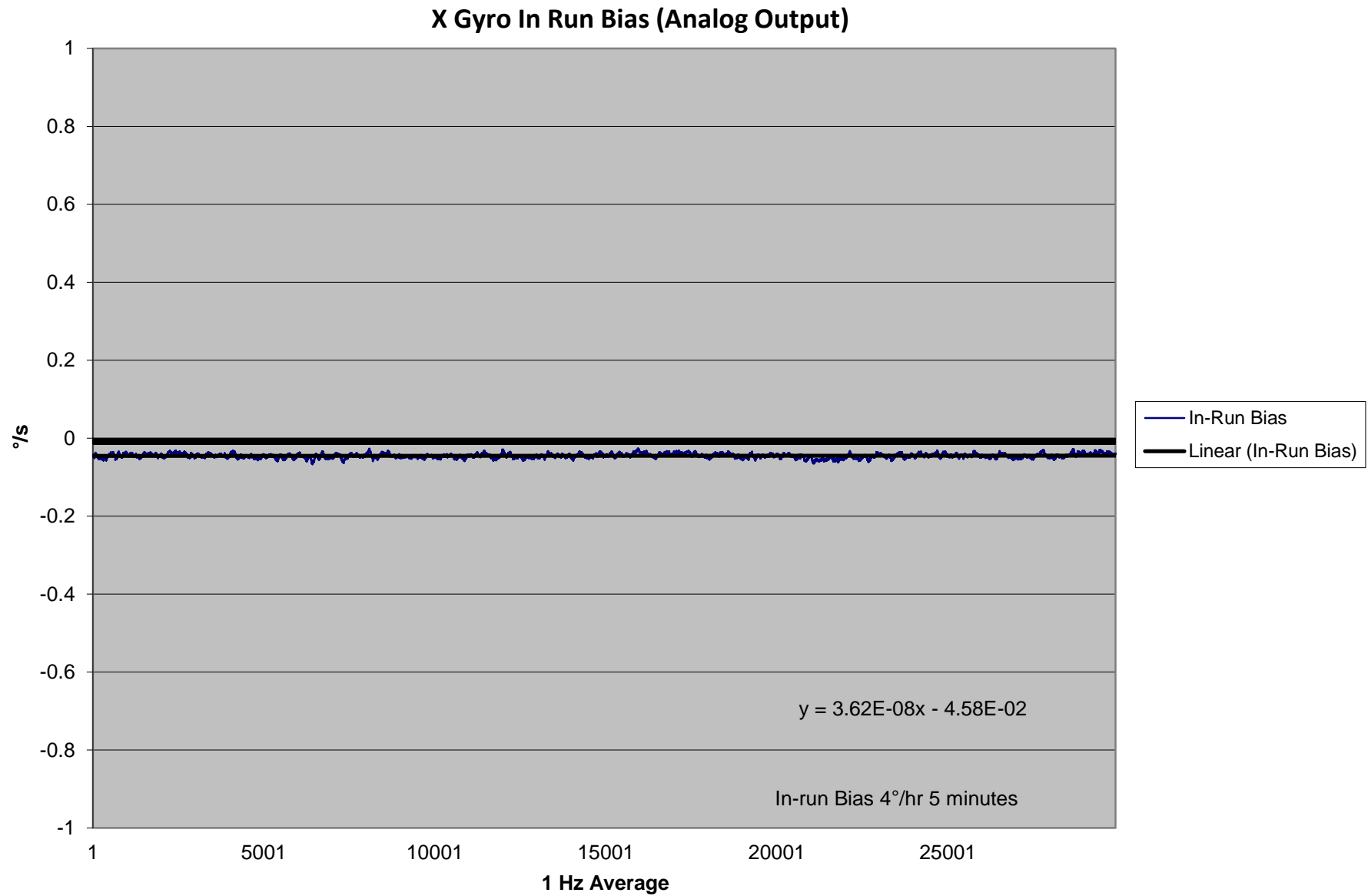
Rate Allan Variance



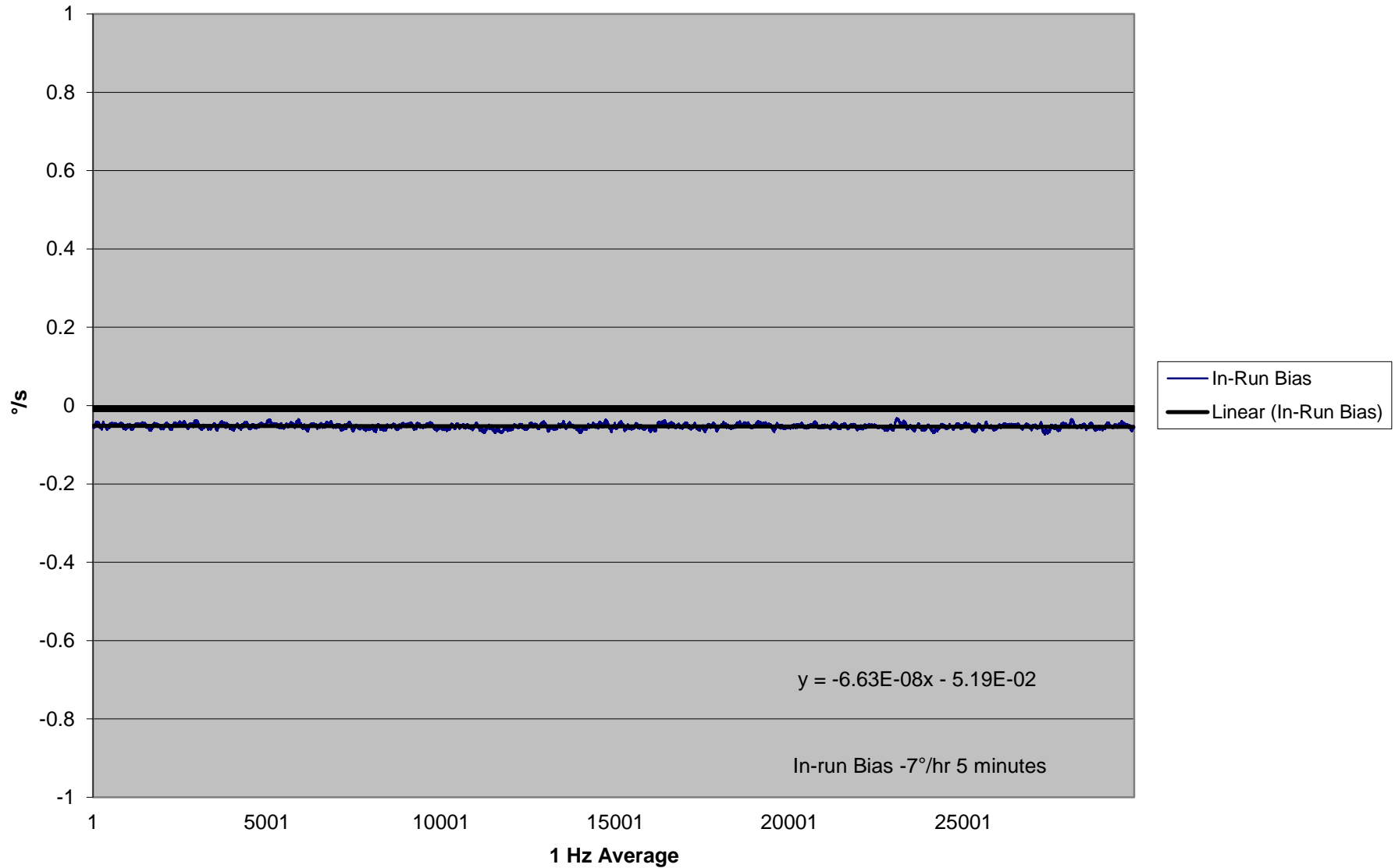
Accel Allan Variance



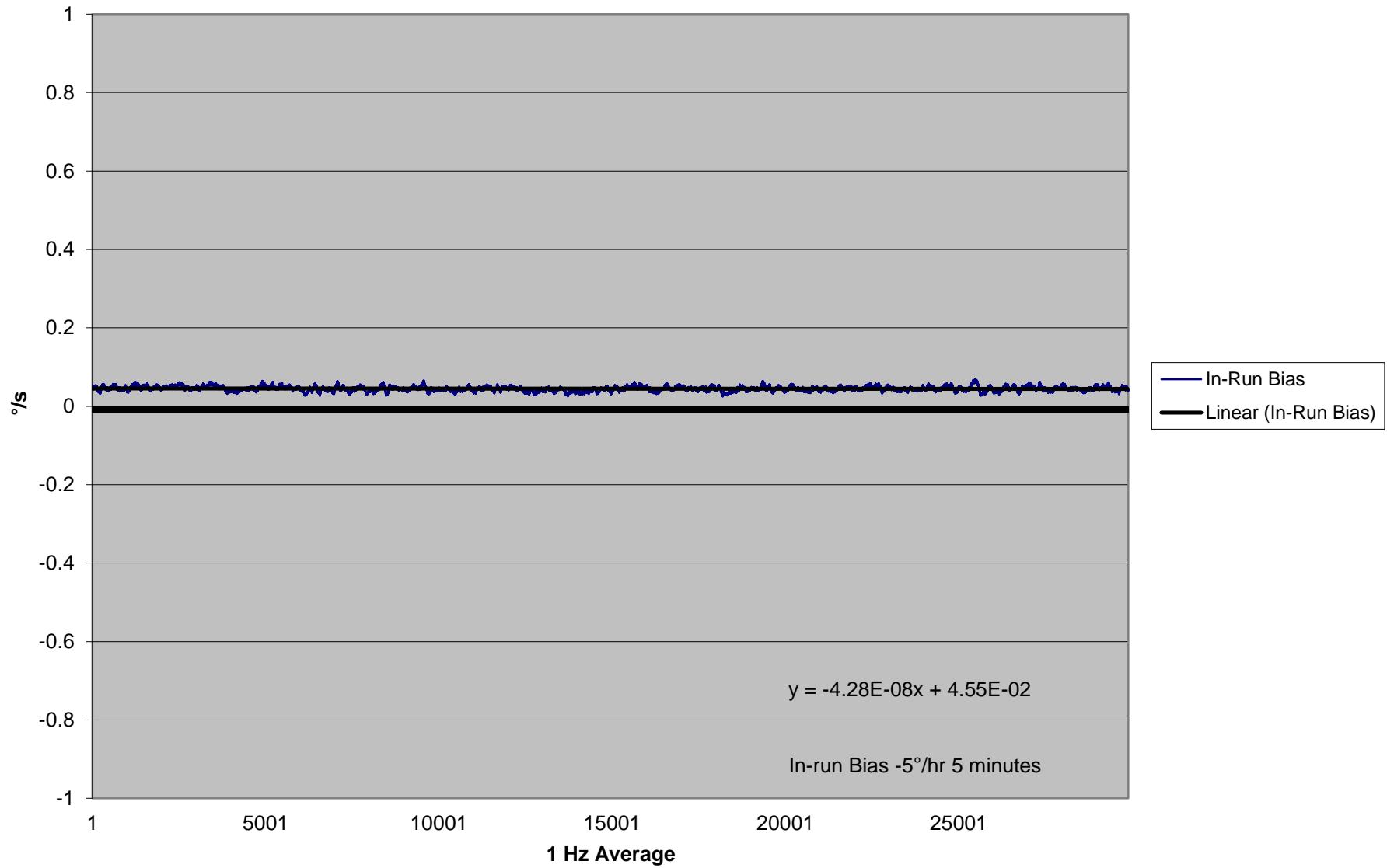




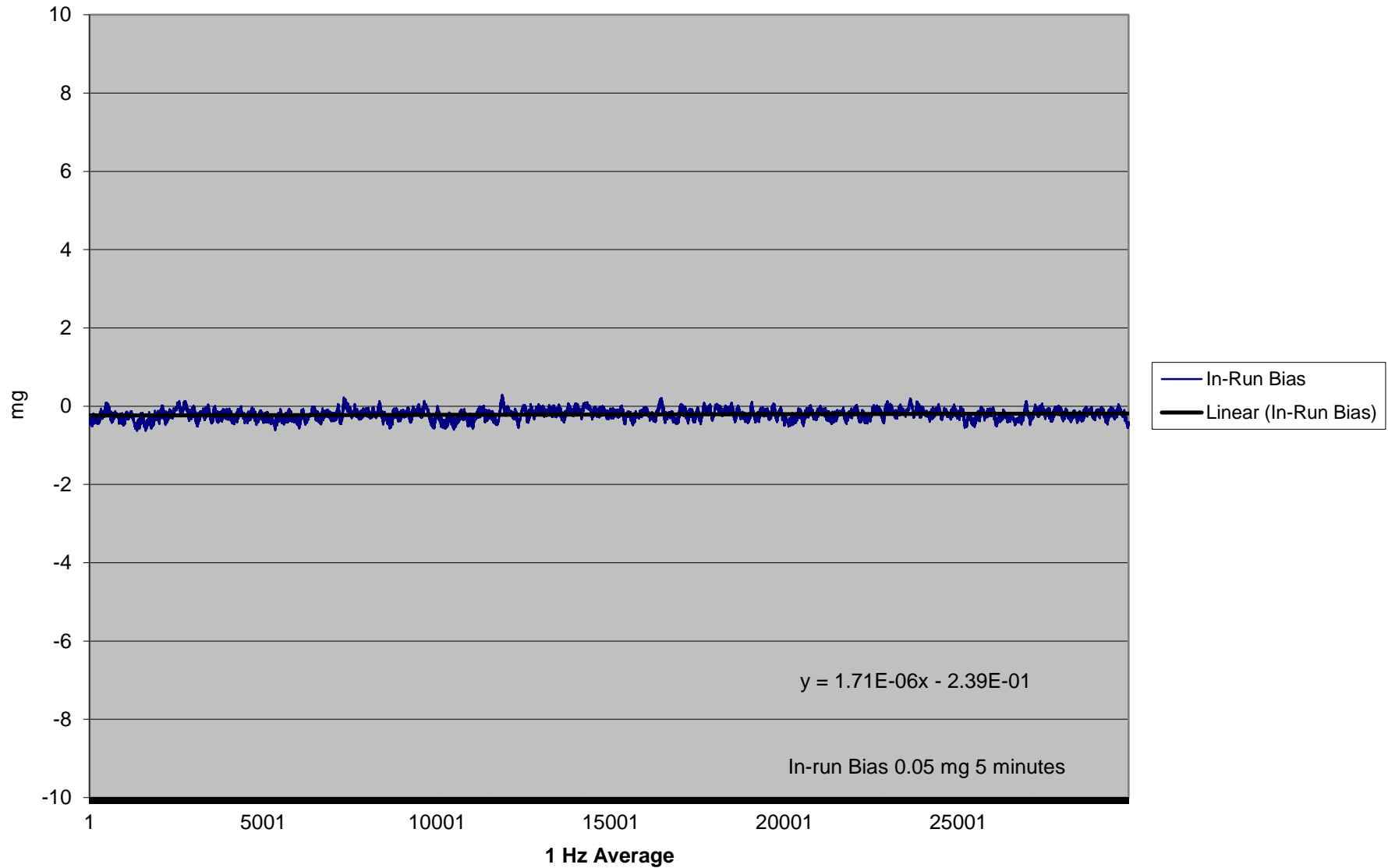
### Y Gyro In Run Bias (Analog Output)

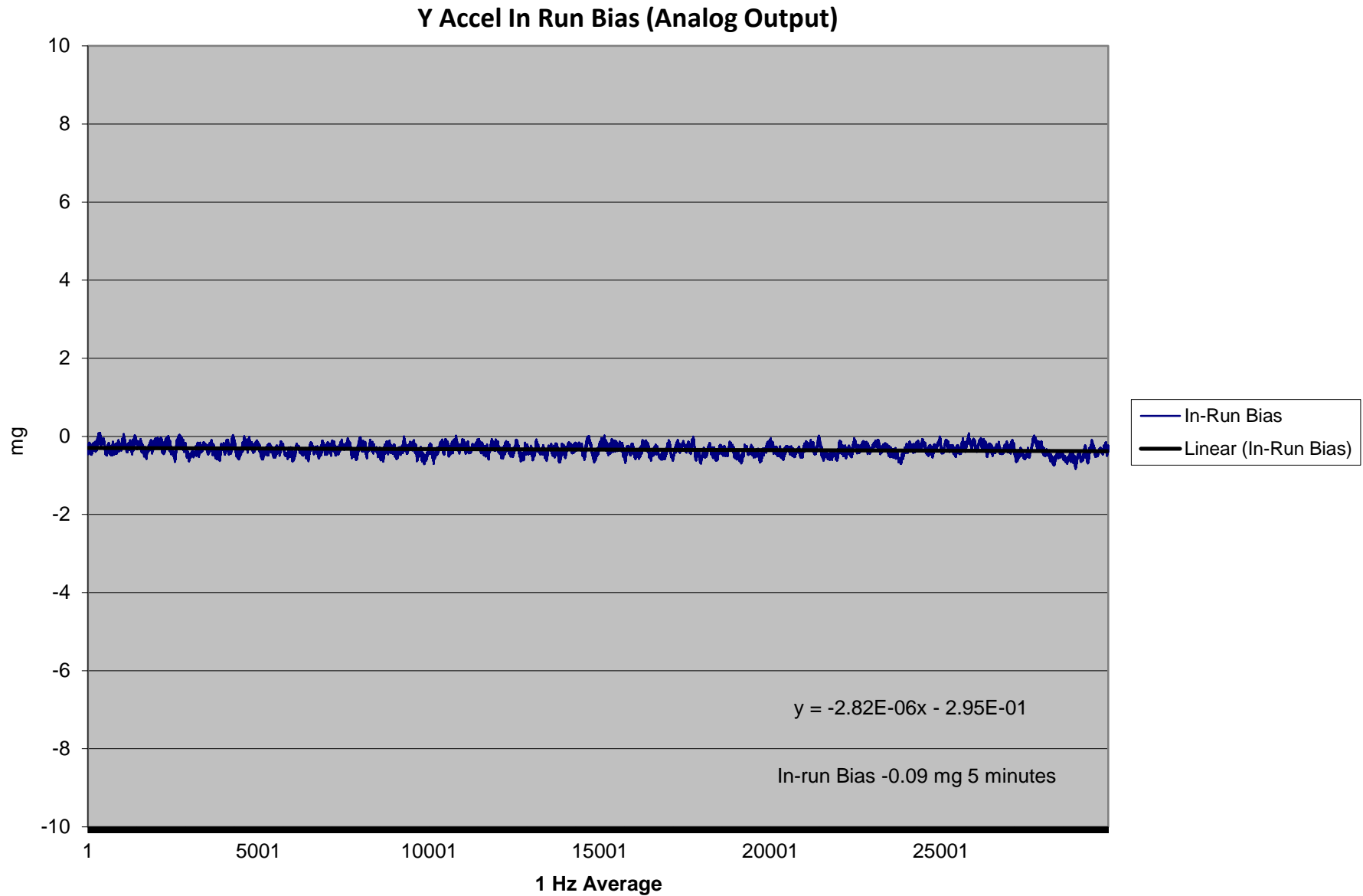


### Z Gyro In Run Bias (Analog Output)



### X Accel In Run Bias (Analog Output)





### Z Accel In Run Bias (Analog Output)

