MEMSENSE

NANO IMU

Triaxial Magnetometer, Accelerometer & Gyroscope
Analog Inertial Sensor

FUNCTIONAL DESCRIPTION

The nIMU provides serial digital outputs of triaxial acceleration, rate of turn (gyro) and magnetic field data. Custom algorithms provide high performance, temperature compensated data in real time via the I^2C protocol. The nIMU is available in a custom package measuring 1.8 in. × 0.9 in. × 0.5 in. height. The nIMU is provided with a 8 inches cable terminated in a JST receptacle. Table 2 details the pinout of the connector configuration.

For pricing information contact MEMSense Sales at 888.668.8743, Extension Number 15, or via email at sales@memsense.com.

APPLICATIONS

- Remote Human Motion Sensing
- Laboratory Biomechanics
- Sports Performance Analysis
- Human Factors Engineering

FEATURES

- Miniature Package
- Triaxial Accelerometer
- Triaxial Magnetometer (compass)
- Triaxial Angular Rate Sensor
- Solid State MEMS Reliability
- 2000g Powered Shock Operation

ORDERING INFORMATION

Table 1 – Standard Part Numbers

Part Number	Accel (g)	Rate (°/s)	Bandwidth (Hz)	Protocol
NA02-0150F050R	2	150	50	RS422
NA02-0300F050R	2	300	50	RS422
NA05-0300F050R	5	300	50	RS422
NA05-0600F050R	5	600	50	RS422
NA10-1200F050R	10	1200	50	RS422

ORIENTATION DIAGRAM

Figure 1 - nIMU

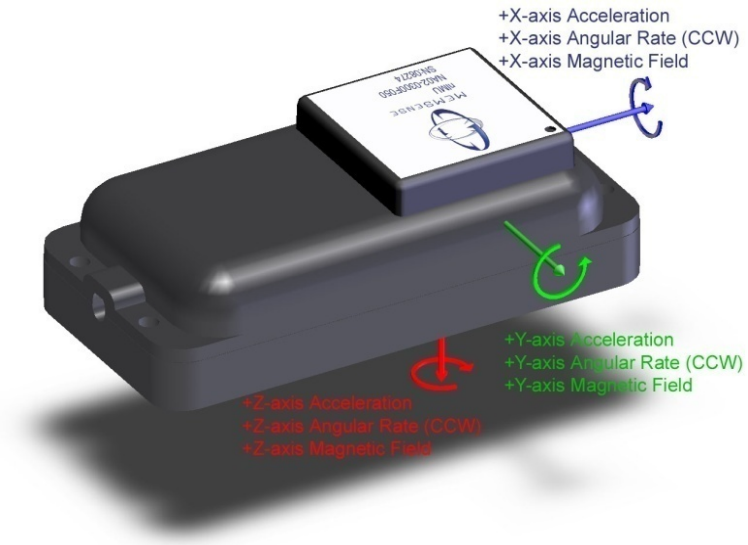


Figure 2 - nIMU Orientation Diagram

SPECIFICATIONS

Table 2 – Specifications

PARAMETER	SPECIFICATION				UNITS	CONDITIONS
Operational Requirements						
Supply Voltage	5.4 to 9.0				VDC	unregulated
Supply Current	120/140				mA	Typical I2C/RS422
Physical Properties						
Alignment Error	±1				%	
Mass	20				grams	
Acceleration	**NA02**	**NA05**	**NA10**			
Dynamic Range	± 2	± 5	± 10		g	
Offset	±30	± 30	± 30		mg	0 to 70 °C Maximum
Nonlinearity	± 0.4 (± 1.0)	± 0.4 (± 1.0)	± 0.4 (± 1.0)		% of FS	Typical (Maximum)
Noise	0.6 (0.8)	1.1 (1.3)	2.1 (2.8)		mg	Typical (Maximum), 1 σ
Digital Sensitivity	$9.1553x10^{-5}$	$2.2888x10^{-4}$	$4.5776 x10^{-4}$		g/bit	See Equation 1 on page 9
Bandwidth [1]	50	50	50		Hz	-3dB point
Angular Rate	**-0150F050**	**-0300F050**	**-0600F050**	**-1200F050**		
Dynamic Range	± 150	± 300	± 600	± 1200	°/s	
Offset	+/-1.5	+/-1.5	+/-1.5	+/-1.5	°/s	0 to 70 °C Maximum
Cross-Axis Sensitivity	+/-1	+/-1	+/-1	+/-1	%	Maximum
Nonlinearity	0.1	0.1	0.1	0.1	% of FS	Best fit straight line
Noise	0.36 (0.95)	0.56 (0.95)	0.56 (0.95)	0.56 (0.95)	°/s	Typical (Maximum), 1 σ
Digital Sensitivity	$6.8664x10^{-3}$	$1.3733x10^{-2}$	$2.7465x10^{-2}$	$5.4932x10^{-2}$	°/s/bit	See Equation 1 on page 9
Bandwidth [1]	50	50	50	50	Hz	-3dB point
Magnetic Field						
Dynamic Range	±1.9				gauss	
Drift	2700				ppm/°C	
Nonlinearity	0.5				% of FS	Best fit straight line
Noise	0.00056(0.0015)				gauss	Typical (Maximum), 1 σ
Digital Sensitivity	$8.6975x10^{-5}$				gauss/bit	See Equation 1 on page 9
Bandwidth[1]	50				Hz	-3dB point
Temperature						
Digital Sensitivity	1.8165×10^{-2}				ºC/bit	
Absolute Max Ratings						
Acceleration Powered	2000 max				*g*	Any axis 0.5ms
Input Voltage	-0.3 (min) +12 (max)				VDC	
Operating Temperature	0 to +70				°C	
Storage Temperature	-55 to +125				°C	

Typical Values at 25°C, V_{supply} = 5.6 VDC, 0 °/s, unless otherwise noted.
nIMU configurations are not subject to ITAR export controls.

1.) Other bandwidth configurations are available upon request.
2.) Other configurations are available on a special order basis. Contact sales for more information.
3.) I^2C Protocol available upon request.

FUNCTIONAL BLOCK DIAGRAM

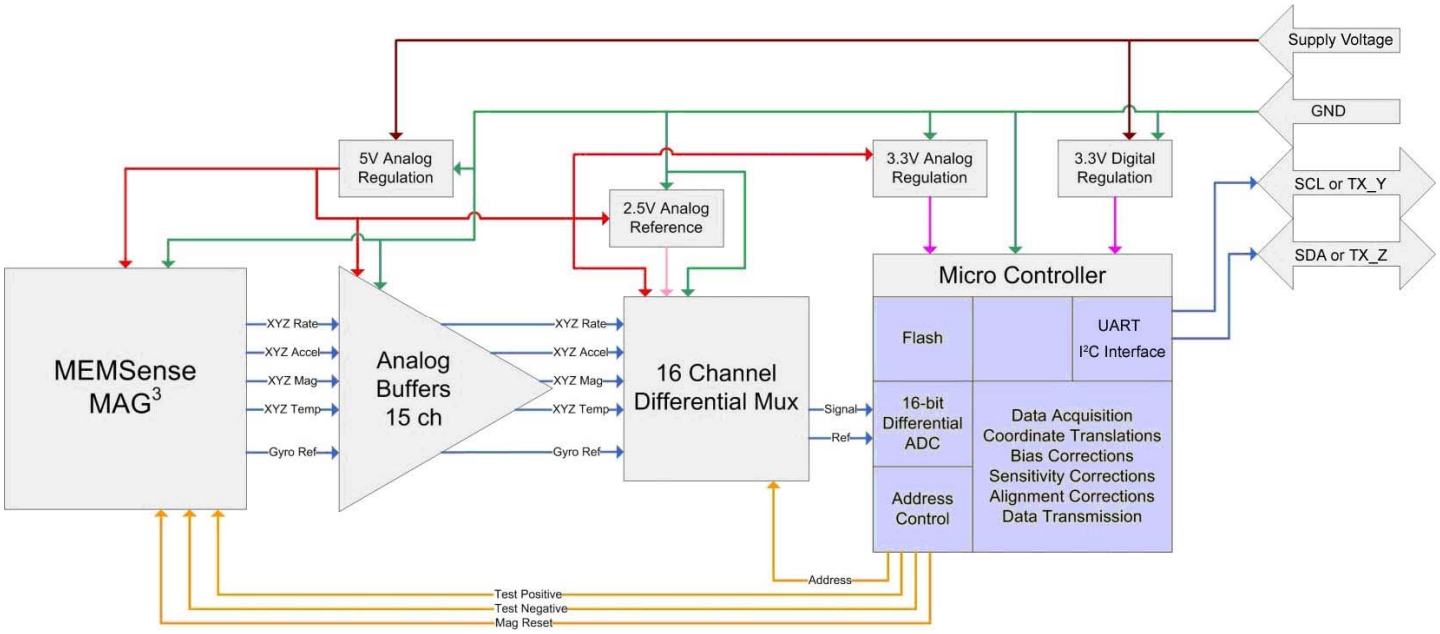


Figure 3 - nIMU Functional Block Diagram

PIN FUNCTION DESCRIPTIONS

Table 3 - Pin functions for HR30-6P-6S manufactured by HIROSE.

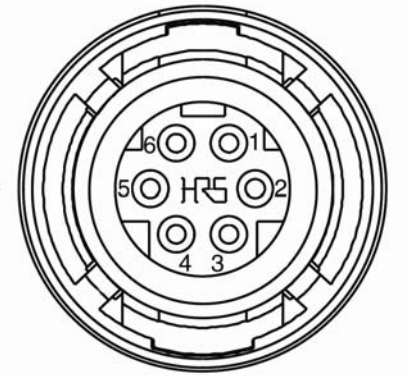
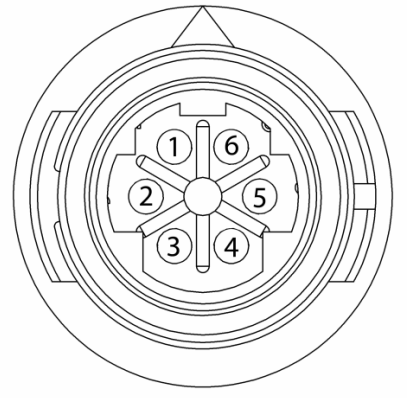
INTERFACE PIN FUNCTIONS – IMU Connector			
	**Port No.**	**I²C**	**RS422**
	1	SDA	Not Used
	2	VDD	VDD
	3	Not Used	TX_Y
	4	Not Used	TX_Z
	5	GND	GND
Figure 4 - HIROSE PN: HR30-6P-6S	6	SCL	Not Used

Table 4 - Matting Connector: *Mates with Hirose HR30-6R-6P Male or HR30-6J-6P Inline Male*

INTERFACE PIN FUNCTIONS – Mating Connector			
	**Port No.**	**I²C**	**RS422**
	1	SDA	Not Used
	2	VDD	VDD
	3	Not Used	RX_A
	4	Not Used	RX_B
	5	GND	GND
Figure 5 - *HR30-6J-6P*	6	SCL	Not Used

USB Data Acquisition (DAQ) Module Options

Every nIMU ordered comes standard with a USB Data Acquisition DAQ Module that is powered via USB. No external power supply is required. A USB DAQ with leads to connect to an external power supply is also available; if this is your preference please let sales know when you place your order and they will substitute the externally power powered USB DAQ for no additional charge. The I^2C version of the nIMU is only available with the externally powered DAQ configuration.

Table 5 – USB DAQ Module Options

Model Number	Description	Max Voltage	Power Source	Protocol	Availability
USB-N-8.5UR	nIMU USB RS422 DAQ, USB power	8.5V	USB	RS422	Standard – with all nIMUs ordered
USB-N-8.5XR	nIMU USB RS422 DAQ, Ext. power	8.5V	External Power	RS422	Option available upon request
USB-N-8.5XC	nIMU USB RS422 DAQ, Ext. power	8.5V	External Power	I^2C	Custom – for I^2C nIMU

PHYSICAL DIMENSIONS

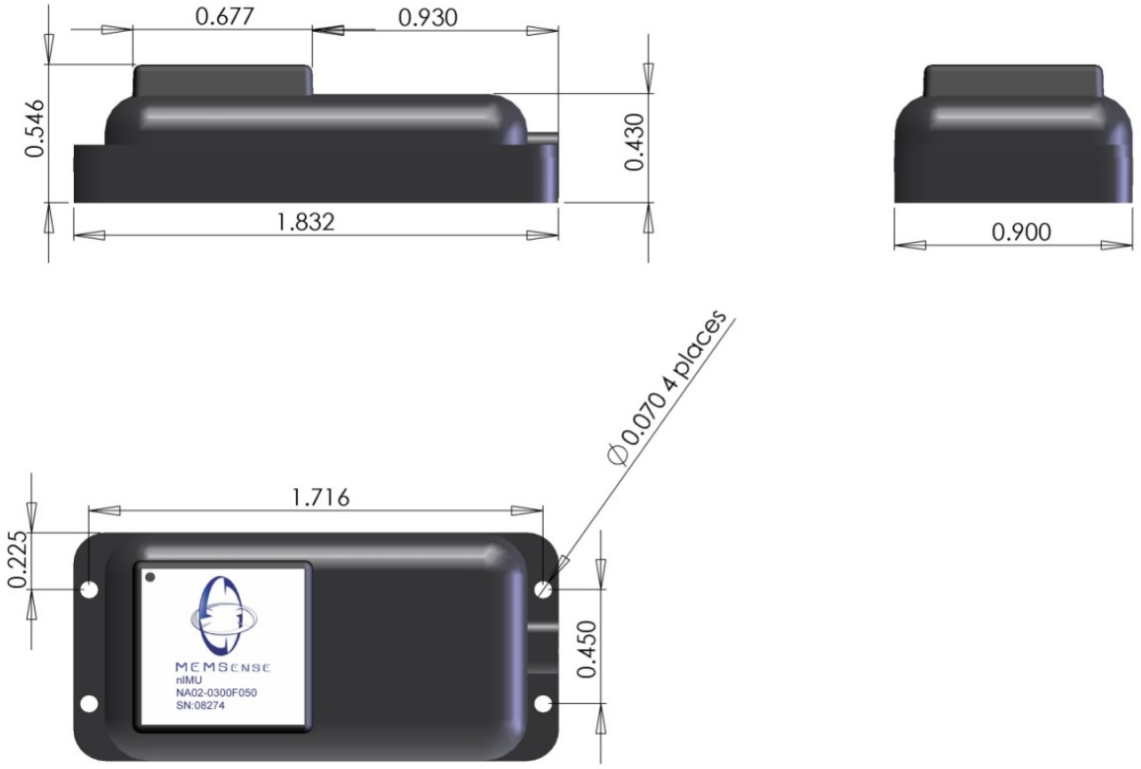


Figure 6 – Physical Dimensions in inches

Document Change History

Rev	Status	Description	Date
A	Obsolete	New Data Sheet; Created at Rev A to match current Rev of PSD-0822 NANO IMU Product Specification User's Guide.	2/23/2009
B	Obsolete	Corrected axis labels on Figure 1. Added USB DAQ Options section and Table 5.	9/29/2008
C	Released	Updated product photo. Added Model Numbers to Table 4. Normalized figure and table font sizes. Normalized overall formatting	12/02/2009