Product Data Sheet

AHRS-8

Attitude Heading Reference System

Description
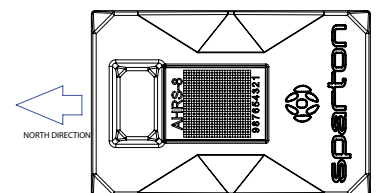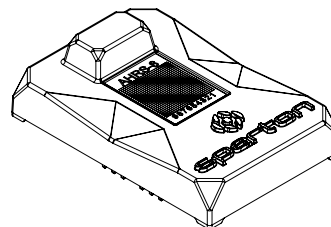
The AHRS-8 is a fully temperature compensated Attitude Heading Reference System (AHRS), individually calibrated over the -40° C to +70° C operating range. It delivers industry leading heading accuracy in a broad range of challenging dynamic and magnetic environments. Proprietary state-of-the-art AdaptNav II™ algorithms allow the AHRS-8 to provide accurate attitude and heading outputs, including full 360° tilt compensation, even when subject to highly dynamic harsh operating environments and in the presence of transient magnetic interference. AdaptNav II™ also includes enhanced adaptive in-field calibration algorithms to provide superior system performance, even in the presence of magnetic distortions due to ferrous objects and mechanical vibrations within the mounting platform. The AHRS-8 incorporates the World Magnetic Model allowing it to provide a True North output at all locations around the globe and is fully pin-for-pin compatible with the Sparton DC-4E and GEDC-6E. The AHRS-8 also incorporates NorthTek™, Sparton's on-board programming environment, making it the world's only fully programmable and user-configurable AHRS. NorthTek™ provides users virtually limitless product customization and integration flexibility.
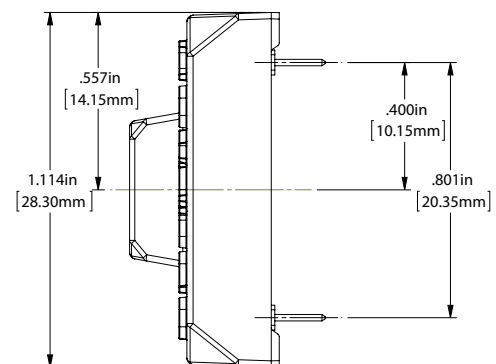
Features

- Integrated AdaptNav II™ provides real-time noise characterization and active gyro drift compensation for superior heading, pitch and roll performance in electrically and mechanically noisy environments
- Fully temperature compensated over the entire operating range, individually calibrated from -40° to +70° C
- Powerful user programmable sensor customization apps via NorthTek™ Forth interpreter
- 2D and 3D adaptive in-field cal providing hard and soft magnetic interference compensation
- Advanced sensing technology (3-axis magnetic, 3-axis MEMS acceleration, and 3-axis MEMS gyro)
- Selectable 4g or 8g accelerometer ranges, suitable for highly dynamic application environments
- Magnetic and True North heading (yaw), pitch, and roll measurement
- Full 360° rollover capability
- Low power consumption and power management (Sleep Mode) functionality
- Supports multiple communication protocols
- In-field calibration point selection and distribution indicator
- Quality of in-field calibration indicator
- Centripetal acceleration correction

AHRS-8

Typical Applications

- Complex platforms with motors/electrical noise
- Platform stabilization and positioning
- Pan and tilt, mapping and antenna pointing
- Laser range finders and optical targeting systems
- Accurate attitude, position and orientation sensing
- Precision autonomous unmanned vehicle guidance
- Applications with extreme temperature ranges

NORTH DIRECTION

ISOMETRIC VIEW
FOR VISUAL AID ONLY

.557in [14.15mm]

1.114in [28.30mm]

.400in [10.15mm]

.801in [20.35mm]

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NAVIGATION AND EXPLORATION

Specifications

Dynamic Heading Accuracy	1.0° RMS[1]
Static Heading Accuracy	0.2° RMS (<1.0° RMS from -40° to +70° C)[2]
Heading Repeatability	0.1° RMS
Dynamic Pitch/Roll Accuracy	1.0° RMS[1]
Static Pitch/Roll Accuracy	0.2° RMS
Pitch/Roll Repeatability	0.1° RMS
Pitch/Roll Range	± 90°, ± 180°
Accelerometer Range (Selectable)	+/- 4g or +/- 8g (+/- 1g)[3]
Accelerometer Noise Density	126 µg/√Hz
Accelerometer Bias Stability	0.023 mg
Accelerometer Velocity Random Walk (VRW)	0.063 m/s
Gyro Dynamic Range (Selectable)	± 480°/sec (± 300°/sec)[4]
Gyro Noise Density	0.03 dps/√Hz
Gyro Bias Stability	10.8°/Hr
Gyro Angular Random Walk (ARW)	1.5 deg/Sqrt[Hr]
Magnetic Range	±1.2 Gauss (±900 MGauss)[4]
Maximum Magnetic Inclination (Dip)	± 80°[5]
Update Rate (Samples/Sec)	100
Baud Rate	0.3, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbaud
Dimensions L x W x H	42 x 28 x 12 mm (1.66 x 1.11 x 0.43 inches)
Mass	16g
Encapsulated or Enclosure	Yes
Operating and Storage Temperature	-40° to +85° C
Humidity Resistance	95%, 70° C, 240 hrs Meets MIL-STD-202G – Method 103A, Test Condition A
Shock Resistance	1500g, 1ms Pulse, Half-Sine Wave Meets MIL-STD-202G – Method 213B, Test Condition F
Vibration Resistance	.06 dB Power Spectral Density, 9.26 G RMS Meets MIL-STD-202G – Method 214A, Test Condition I/C
Power Supply Input (Unregulated Voltage)	+4 to +10V DC
Input Power, Operating Mode (Typical @ 4V)	330 mW
Input Power, Sleep Mode (Typical @ 4v)	16mW
3.3V Logic UART Interface	Yes
2D and 3D In-Field Calibration	Yes
Able To Maintain Function When Inverted	Yes
Quaternion/Rotation Matrix Output	Yes
True North Heading Output	Yes
NorthTek™ User Programmable Customization	Yes
Includes World Magnetic Model	Yes
Fully Temperature Compensated	Yes
Pin Connectivity Gold Plating	Meets MIL-G-45204 Type III Class 4
Individually Calibrated Over Temperature Range (-40° to +70° C)	Yes
RoHS Compliant	Yes

Pin #	Pin Name	I/O	Function
P1-1	V_TEST	O	3.3V regulator output for test purposes (factory use only)
P1-2	DEBUG_RXD	I	3.3V logic RXD Input to Debug Port (factory use only)
P1-3	DEBUG_TXD	O	3.3V logic TXD Output from Debug Port (factory use only)
P1-4		N/A	Pin removed for keying
P1-5	#WP_EE-PROM	I	3.3V logic, active-low EEPROM write protect (the pin has 10kΩ pull-down)
P1-6	Factory Use	I	Do not connect (factory use only)
P1-7	GND	N/A	System Ground
P2-1	V+	I	+4 to +10V DC power supply input. Max load = 80mA
P2-2	USER_RXD	I	3.3V logic RXD input to User Com Port
P2-3	USER_TXD	O	3.3V logic TXD output from User Com Port
P2-4	#RESET	I	3.3V logic, active-low reset input (the pin has a weak pull-up)
P2-5	#EINT0	I	3.3V logic, active-low interrupt input (the pin has a weak pull-up). Used for programming purposes
P2-6	GND	N/A	System Ground
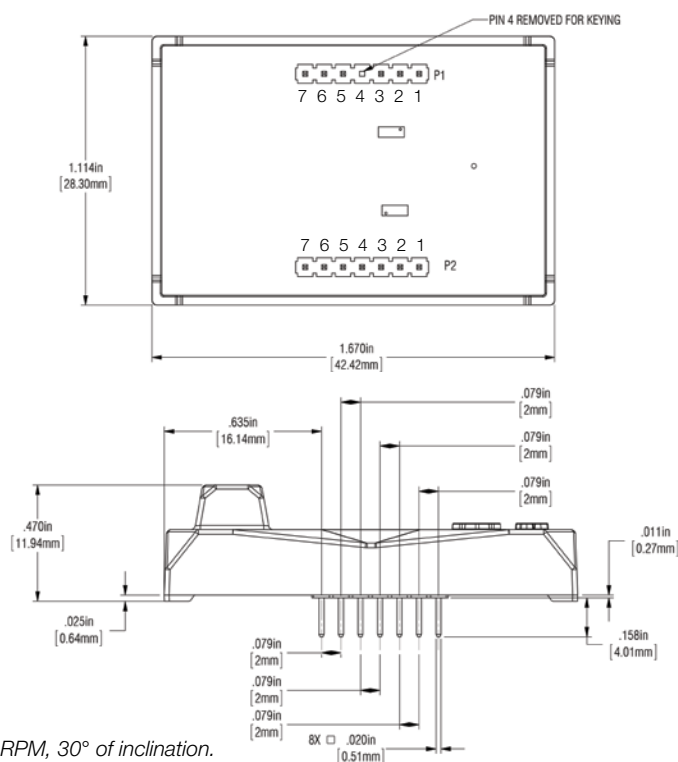
[1] Dynamic heading accuracy derived from Scorsby table set for 7 RPM, 30° of inclination.
[2] Performance data applies under the following conditions unless otherwise specified: 23°C, 0° Pitch/Roll, 300mGauss Horizontal and 0mGauss Vertical Magnetic Field.
[3] Note selection of the high range mode for the accelerometers results in decreased sensitivity, but also offers increased dynamic range. Consequently, optimal mode selection is dependent upon the intended application and associated linear accelerations present.
[4] Specifications in parentheses represent current limits of calibration methodology.
[5] Performance at maximum dip angle will be degraded.
Specifications subject to change without notice.
Performance data applies to 23°C, 0° for Pitch/Roll unless otherwise specified.
For more information and detailed specifications scan QR code. For support, please e-mail: productsupport@sparton.com

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