

## LandMark™ 21 AHRS



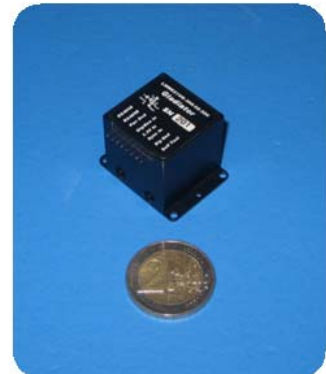
- **Miniature Low Noise AHRS**
- **Rugged Packaging**
- **Low Noise Silicon MEMS AHRS**
- **Low Gyro Noise**  $0.004^\circ/\text{sec}/\sqrt{\text{Hz}}$  ( $100^\circ/\text{sec}$ )
- **Low Accel Noise**  $0.25\text{mg}/\sqrt{\text{Hz}}$  ( $6g$ )
- **In-Run Gyro Bias**  $10^\circ/\text{hour}$   $1\sigma$
- **Heading (Yaw) Angles**  $0.5^\circ$  typical
- **Pitch & Roll Angles**  $0.25^\circ$  typical
- **Fully Temperature Compensated Bias and Scale Factor**
- **Compensated Misalignment**  $1\text{mrad}$  and **g-Sensitivity**  $<0.02^\circ/\text{sec}/g$  typical
- **External Sync Input** ( $1\text{kHz}$  or  $1\text{pps}$ )
- **Low Power**  $<550\text{ mWatt}$  typical
- **Low Voltage**  $+3.3\text{V}$  (single sided power)
- **Light Weight**  $38\text{ grams}$
- **Small Size**  $< 1.23\text{in}^3$
- **Wide Sensor Bandwidth**  $200\text{ Hz}$
- **Bandwidth Filtering Capability**
- **RS485 Data Rate**  $100\text{ Hz}$  (user selectable)
- **Internal Vibration Isolation**
- **Internal Temperature Sensors**

**Very Small, Rugged, Low Power, Low Noise And Accurate MEMS AHRS**

Export Classification: Commerce ECCN7A994

The all new miniature 1.23 cubic inch LandMark™ 21 features low noise gyros and accelerometers with excellent in-run bias as well as over temperature bias performance with ruggedized environmentally sealed packaging enclosure with heading accuracy to  $0.5^\circ$  and pitch and roll accuracy to  $0.25^\circ$ . The unit is ideal for tight space applications demanding excellent performance coupled with challenging environmental requirements at low cost. Other features include:

low power consumption, small size, light weight, long life MTBF and enhanced packaging with environmental sealing and EMI protection. The signature feature of the LandMark™ 21 AHRS is the miniature package of **low noise gyros and accelerometers**, which enable precision measurement and excellent bias in-run and bias over temperature. This unit includes a triaxial magnetometer for heading, that is calibrated over temperature, as well as pitch and roll angle outputs. The AHRS's performance is optimized with **fully temperature compensated bias and scale factor and compensated misalignment and g-sensitivity**. The unit is well suited for the harsh environments of commercial automotive and motorcycle testing, motorsports racing, commercial aircraft and sea applications that require both low cost and high performance as well as rugged durability. Custom ranges available (consult factory).



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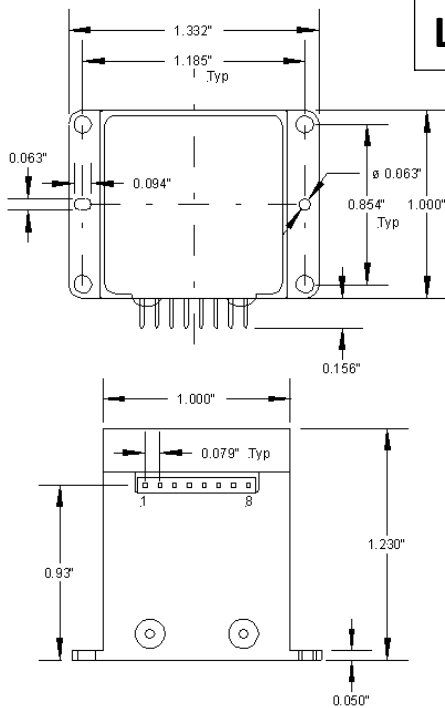
High Performance Inertial MEMS

**Gladiator Technologies, Inc.**

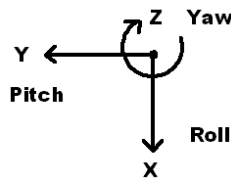
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Rev. 12Oct08  
SN: 100

## LandMark™ 21 AHRS



Axes (Top View)  
Right Hand Rule



LandMark™ 21 AHRS
LMRK21AHRS-100-06-100 or -10
LMRK21AHRS-300-06-100 or -10

### Preliminary Specification

Note: Front two No.2 button head screws provide cable clamp and case/shield ground

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	+3.1V to +4.2V Input Power
6	External Sync Input (1kHz or 1pps)
7	Signal Ground
8	Self Test In

Note: Any unused inputs (Pins 4, 6, 8) must be connected to signal ground (Pin 7).

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	Magnetometers: (X), (Y), (Z)
11	Pressure - N/A
12, 13, 14	Angles: Roll, Pitch, Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	Altitude - N/A, Temp, Forward Velocity

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

PARAMETER	RATE AXES	ACCEL AXES	
Range	±100°/sec    ±300°/sec	±6 g's	±10 g's
Bias (Over Temp.)	<0.05°/sec 1 σ	< 2mg 1 σ	
Bias (In Run Stability)	15°/hour 1 σ	0.1mg 1 σ	
Scale Factor Error %	≤0.1% (over temperature) 1 σ		
Resolution	0.01°/sec	0.12mg	
Angle Random Walk (Typical)	0.004°/sec/√Hz 1σ    0.006°/sec/√Hz 1σ	0.25mg/√Hz 1σ	
Alignment	1mrad typical		
G-Sensitivity	<0.02°/sec/g typical		
Self Test On	NA	Δ 0.6g ± 0.3g	
	Logic 1 = 3V to 5V at Pin 8		
Temp Range	Operating: -40°C to +85°C Non-Operating: -55°C to +85°C		
Heading	± 0.5° typical		
Pitch & Roll	± 0.25° typical		
Update Rate	100 Hz or 10 Hz (user selectable)		
Temp Sensors	Internal Temperature Sensors		
Start-up Time	< 0.65 sec AHRS 200 Hz		
Input Power	+3.1V to 5.5V Max. Input (single sided)		
Power Consumption	550 mW at 3.3V typical 700 mW at 3.3V maximum		
Size	U.S.: 1.00 x 1.00 x 1.23 = 1.23 in <sup>3</sup> Metric: 2.54 x 2.54 x 2.54 = 16.4 cm <sup>3</sup>		
Weight	38 grams		
Mounting	4ea No.8 or M4 Screws		
Shock	500g's ½ sine 30 msec powered		
Vibration	6gRMS (20Hz to 2KHz ~ 10g accelerometers)		
MTBF	31,428 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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