



QMS & CERTS
AS9100D

LandMark™ 005 INS/GPS

Low Noise MEMS GPS-Aided INS

Cage Code: 47L11
Division of
LKD Aerospace
SAM Registered
JCP certified

Low Noise Inertial MEMS Rugged Low Cost Sensors & Systems

Automated Testing

Comprehensive ERP
Environmental Test Lab:

- Shock
- Vibration
- Temperature Calibration
- G-Sensitivity
- Axis Alignment
- Centrifuge
- GPS Simulation

Products:

Gyros
Accelerometers
IMU
VG
AHRS
VG/GPS
GPS/AHRS
INS/GPS

- Low Cost Non-ITAR Commercial MEMS GPS-Aided AHRS
- 72 channel GPS 10 Hz Position Update Rate
- GPS Accuracy ± 2.0 meters CEP with SBAS
- Supports SBAS: WAAS, EGNOS & MSAS
- GPS Altitude ± 3 meters typical
- GPS-Aided Velocity & Built-in Turning Error Correction
- Heading Angle $\pm 0.5^\circ$
- Pitch & Roll Angles $\pm 0.25^\circ$
- Fully Compensated Bias & Scale Factor Over Temperature -40°C to $+85^\circ\text{C}$
- Low Noise Gyros $0.0028^\circ/\text{sec}/\sqrt{\text{Hz}}$
- Low Noise Accels $0.071\text{mg}/\sqrt{\text{Hz}}$
- In-Run Gyro Bias $5^\circ/\text{hour } 1\sigma$
- Single RS-485 Data Rate 100 Hz
- Low Power < 700 mW typical
- Low Voltage $+5$ V (single sided power)
- Light Weight ≤ 55 grams
- Small Size < 35 cm³/2.13 in³
- Rugged Environmentally Sealed Package

Applications

Flight Navigation
Flight Control
Ship Navigation
Automotive Testing
Laboratory Use

Export Classification:
Commerce
ECCN7A994 (NLR)

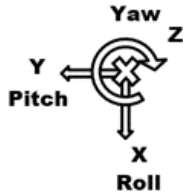


Gladiator Technologies Division
LKD Aerospace
8020 Bracken Place SE
Snoqualmie, WA 98065 USA
Tel: +1.425.396.0829 Fax: +1.425.396.1129



sales@gladiatortechnologies.com
www.gladiatortechnologies.com

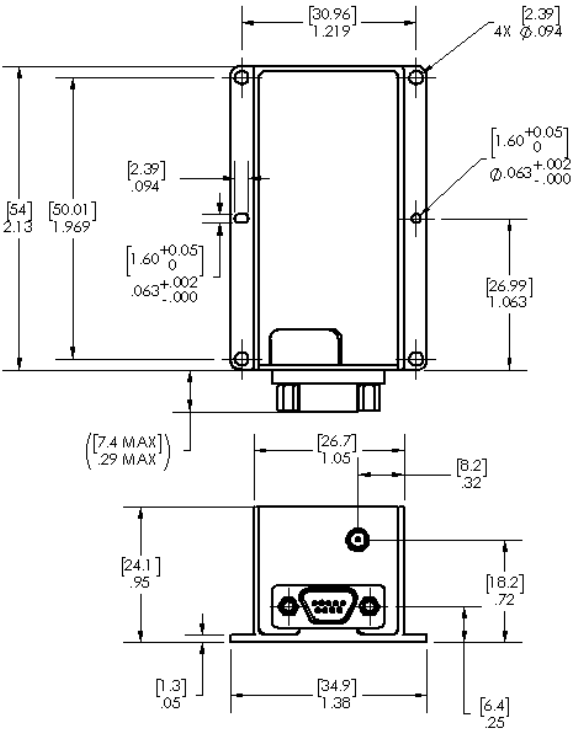
LandMark™ 005 INSGPS



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LMRK005INSGPS-490-15-100

Specification



Mating Connector: M83513/03-BN

PARAMETER	RATE AXES	ACCEL AXES
Power Requirements		
Input Voltage	+3.8 V to +5.5 VDC	
Power <i>Typical (Max)</i>	700 mW (900 mW)	
Inertial Performance		
Standard Full Scale Ranges	±490°/s	±15 g's
Scale Factor Error %	≤ 0.1% (over temperature) 1σ	
Bias In-Run Stability	5 °/hour 1σ	0.05mg 1σ
Bias Over Temperature	< 0.1 °/sec 1σ	< 1.0mg 1σ
Sensor Resolution	0.001°/sec	0.05mg
ARW / VRW	0.0028°/ sec/√Hz 1σ	0.071mg /√Hz 1σ
Alignment	0.5 mrad 1σ	
G-Sensitivity	≤ 0.003°/sec/g 1σ	
GPS/AHRS System Performance		
Channels	72 Channels	
Receiver Type	GPS L1C/A; GPS, SBAS, QZSS; GLONAS, BeiDou, GALILEO	
GPS Horizontal Position Accuracy	Autonomous 2.5 m	
SBAS - EGNOS WAAS MSAS	< 2.0 m CEP	
Time Pulse Signal Accuracy	RMS 30 ns 99% 60 ns	
Velocity Accuracy	0.1 m/s	
Heading (GPS)	±0.5°	
Pitch & Roll Angles	±0.25°	
Altitude (<i>barometric</i>)	±3 m 1σ	
Start-Up Time (<i>inertial</i>)	< 0.65 sec	
GPS Acquisition (<i>Cold Start</i>)	27 sec	
GPS Reacquisition (<i>Aided Starts</i>)	4 sec	
GPS Reacquisition (<i>Hot Start</i>)	1 sec	
Update Rate (<i>inertial</i>)	100 Hz	
Max Navigation Update Rate (GPS)	10 Hz	
Sensitivity (GPS & GLONAS)		
Tracking	-167 dBm	
Cold Starts	-148 dBm	
Warm Starts	-156 dBm	
RTC Crystal	Built-In	
Anti Jamming	Active CW Detection and Removal	
Physical		
Weight	≤ 55 grams ±2 grams	
Size	U.S.: Metric:	1.05 x 0.95 x 2.13 = 2.12 in ³ 2.67 x 2.41 x 5.41 = 34.8 cm ³
Operating Life	10 Years <i>typical</i>	
Environments		
Operating Temperature	-40°C to +85°C	
Storage Temperature	-55°C to +100°C	
Vibration Operating	4g _{RMS} (20 Hz to 2 kHz ~ 15g accelerometers)	
Shock	500g's ½ sine 1 msec powered, any axis	

Pin No.	INS/GPS Assignment
1	RS-485 A (+) AHRS
2	RS-485 B (-) AHRS
3	Power Ground
4	RS-485 A (+) Combined GPS/AHRS
5	+3.8 V to +5.5 V Input Power
6	RS-485 B (-) Combined GPS/AHRS
7	NC
8	Signal Ground
9	Self-Test

Specification subject to change without notice



LandMark™ 005 INSGPS Feature Guide

INSGPS Feature Guide	GPS-Aided INS with Velocity Correction, Mags. & Barometric Pressure
Inertial	
Magnetic Heading	√
Pitch, Roll & Yaw Angles - X, Y & Z	√
Inertial Data Accels - X, Y & Z	√
Inertial Data Gyros - X, Y & Z	√
Redundant Altitude (Barometric Pressure)	√
Temperature	√
External Sync	√
Unit of Measure Selection	√
Real-Time Display Software (in DEMO KIT)	√
GPS	
Latitude	√
Longitude	√
GPS Altimeter	√
GPS Velocity	√
GPS Heading	√
vDOP	√
hDOP	√
Number of Satellites	√
GPS Week millisecond time (ms)	√
GPS Week Number	√
EGNOS, WAAS, SBAS Capable	√
Kalman Filter CCA	
Single Synchronized (Time Correlated) Output	√
GPS Turning Error Correction with Short-Term GPS Loss	√
Barometric Aiding	√

Outputs	Serial Sequence at 100 Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accels: Fwd (X), Right (Y), Down (Z)
7	Temperature
8, 9, 10	Mags: X, Y, Z
11	Barometric Pressure
12, 13, 14	AHRS: Roll (X), Pitch (Y), Yaw (Z)
15, 16, 17	INS Velocities: North, East, Up
18, 19, 20	INS: Roll (X), Pitch (Y), Heading (Z)
21	INS Crab Angle
22	Airspeed
23, 24	vDOP, hDOP
25, 26	INS: Longitude, Latitude
27, 28	INS: Time ms, Time Week
29	INS: Altitude
30, 31	GPS: Velocity, Heading
32	No. of SV's
33, 34	AHRS Status, INS Status, Checksum

Messaging Protocol Notes:

- The checksum byte is the two's complement of the sum of all bytes in the message excluding the checksum byte.
- All 16-bit data are transferred in little-endian format (LSB first).
- Total transport time per message packet is:
Full: (76 bytes * 11 bits/byte) / 115200 bps = 7.2ms

