# MEMS LANDMARK10 IMU/GPS


- **Low Cost Silicon MEMS 6 DOF Digital IMU & GPS**
- **Fully Temperature Compensated Bias, Scale Factor, Misalignment and g-Sensitivity IMU**
- **In Run Gyro Bias** *10° to 100°/hour typical*
- **GPS Receiver - 10Hz Raw Data Rate 16 Channel C/A Code**
- **Synchronized Timing Outputs for Inertial and GPS Data**
- **Supports DGPS, WAAS, EGNOS and MSAS**
- **Rechargeable Battery Power** up to (5 hrs int. / 16 hrs ext.)
- **Low Power** *< 430 milliwatts typical*
- **Light Weight** *< 143 /183 grams (w/battery)*
- **Small Size** *< 116cm³/7in³*
- **Low Voltage** *3 to 4V (single sided power)*
- **Bandwidth** *100 Hz (user selectable)*
- **RS485 Output** *200Hz/Inertial 10Hz/GPS*
- **Vibration Isolation, Precision Alignment, Shock Resistant**
- **Self Test & Internal Temp Sensors**

***Synchronized Timing & Rechargeable Battery Power***

Export Classification: Commerce ECCN7A994

The all new MEMS LandMark10 IMU/GPS is an ultra low power combined IMU that provides internally temperature compensated RS485 output of delta velocity and delta theta and a 16 channel C/A code GPS receiver with 10Hz position update rate.

The LandMark10 IMU/GPS is ideal for applications requiring ultra low power consumption or autonomous power, small size, light weight, as well as no inherent wear out modes for long life.

The signature feature of the LandMark10 IMU/GPS is the performance, which is optimized with **misalignment and g-sensitivity compensation plus fully temperature compensated bias and scale factor, 4Hz position update rate GPS with synchronized timing and rechargeable battery power.** In addition, the rate outputs are free from bias steps and linear outputs are without acceleration hysterisis. The unit is highly durable and can withstand environmental vibration and shock typically associated with commercial aircraft requirements.

The LandMark10 IMU/GPS offers various standard ranges and other customer options are available. This IMU/GPS is well suited for low cost flight control, navigation, antenna stabilization and pointing, general aviation as well as laboratory use. The LandMark10 IMU/GPS is ideal where excellent modeled performance, coupled with small size, ultra low or autonomous power and light weight are desired for MEMS digital IMU/GPS applications.

Gladiator Technologies, Inc.



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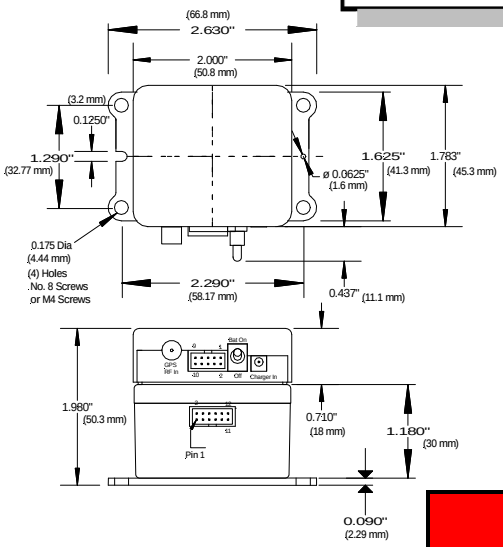
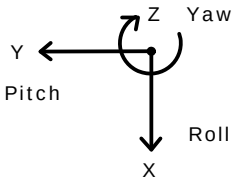
# MEMS LANDMARK10 IMU/GPS




Axes (Top View) Right Hand Rule




| Pin No. | IMU Assignment |
|---|---|
| 1 | RS-485 A |
| 2 | RS-485 B |
| 3 | Power Ground |
| 4 | Reserved NC |
| 5 | +3.0V to 4.2VDC Input |
| 6 | Sync Input (1kHz) |
| 7 | Reserved NC |
| 8 | Signal Ground |
| 9 | Self Test Input |
| 10 | 3.3V Regulator Out |
| 11 | 5V Regulator Out |
| 12 | Case |

| Standard LandMark10 IMU/GPS |
|---|
| LMRK10IGPS-300-12-100 |
| LMRK10IGPS-150-02-100 |
| LMRK10IGPS-075-02-100 |

| Inertial Output | Serial Sequence at 200Hz or 100Hz (optional) |
|---|---|
| 1 | Roll Gyro (X) |
| 2 | Pitch Gyro (Y) |
| 3 | Yaw Gyro (Z) |
| 4 | X Accelerometer |
| 5 | Y Accelerometer |
| 6 | Z Accelerometer |
| 7 | Temperature ± 0.5º C *typical* |

| GPS Output | Serial Data NMEA-1083 |
|---|---|
| 1 | GGA-GPS Fix Data |
| 2 | GLL-Latitude & Longitude |
| 3 | GSA-DOP & Active Satellites |
| 4 | GSV-GPS Satellites in View |
| 5 | RMC-Recommended Min Data |
| 6 | VTG-Ground Speed |
| 7 | ZDA-Time & Date |
| 8 | DTM- Datum Reference |
| 9 | TXT- Text Transmission |
| 10 | (Other Data Selectable) |

| Pin No. | GPS Assignment |
|---|---|
| J1 | GPS Antenna |
| 1 | +3.0V to +4.2VDC Ext. Input |
| 2 | Power Ground |
| 3 | GPS RS485 A |
| 4 | GPS RS485 B |
| 5 | Signal Ground |
| 6 | Battery Out (to IMU) |
| 7 | /RE (Not Read Enable) |
| 8 | DE (Drive Enable) |
| 9 | 1kHz Sync Pulse (to IMU) |
| 10 | +3.3V Power |

| PARAMETER | | RATE AXES | | ACCEL AXES | |
|---|---|---|---|---|---|
| **Power Requirements** | | | | | |
| Input Voltage | | +3.0V to 4.2VDC (or internal battery at 3.7V) | | | |
| Input Current *Typical (Max)* | | 430mW (550mW) | | | |
| Battery Life | | 5 hours *typical (internal battery) / 16 hours typical (external battery)* | | | |
| **Performance** | | | | | |
| Standard Full Scale Ranges | | ±75°/sec or ±150°/sec | ±300°/sec | ±1.7 g's | ±12 g's |
| Scale Factor Error % | | ≤1% (over temperature) typical | | | |
| Bias In-Run Stability | | 10° to 100°/hour *typical* | | 0.5mg *typical* | 2mg *typical* |
| Bias Over Temperature | | <0.2º/sec *typical* | | <3mg *typical* | <10mg *typical* |
| Resolution | | 0.03º/sec | 0.075º/sec | 0.3mg | 2mg |
| Noise | | 0.05º/sec/√Hz | 0.1º/sec/√Hz | 0.07mg/√Hz | 0.5mg/√Hz |
| Alignment | | 1mrad *typical* | | | |
| G-Sensitivity | | < 0.10°/sec/g *typical* | | | |
| Accuracy | | 2.5 m CEP | | | |
| Start-Up Time (Inertial) | | < 1 sec | | | |
| GPS Acquistion (cold start) | | < 30 sec | | | |
| GPS Reacquisition (warm start) | | < 1 sec | | | |
| Update Rate (Inertial) | | 200 Hz or 100 Hz *(user selectable)* | | | |
| Raw Data Rate (GPS) | | 10 Hz *typical* | | | |
| Weight | | < 183 grams or < 143 grams *(without battery)* | | | |
| Size | *U.S.* | 2.0 x 1.98 x 1.783 = 7.0 $in^3$ | | | |
| | *Metric* | 5.1 x 5..0 x 4.5 = 116 $cm^3$ | | | |
| Operating Life | | 10 Years *typical* | | | |
| **Environments** | | | | | |
| Operating Temperature | | -40°C to +85°C (w/out battery) / -30°C to +70°C (with battery) | | | |
| Storage Temperature | | -55°C to +100°C (w/out battery) / -30°C to +70°C (with battery) | | | |
| Vibration Operating | | 6gRMS *(12g accelerometers)* | | | |
| Shock | | 500g's ½ sine 30 msec powered, any axis *(w/o battery)* | | | |

*Specification subject to change without notice*

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