Galaxy Navigation Corp.

LNS-250®GNSS/DR

Inertial Navigation Module for Cars

LNS-250® is a high precision inertial **L**and **N**avigation **S**ystem for cars, which combines ultra-low noise MEMS 3-axis gyros, 3-axis accelerometer, barometer, odometer and GNSS module on a single, compact board. When GNSS signals are limited or not available, such as in urban canyons and tunnels, **LNS-250®** module provides reliable and accurate navigation information. Odometer is used to improve dead reckoning (DR) distance accuracy. All sensors of **LNS-250®** module are calibrated over their temperature, bias, scale factor and axis alignment in order to make them ideal for demanding applications.

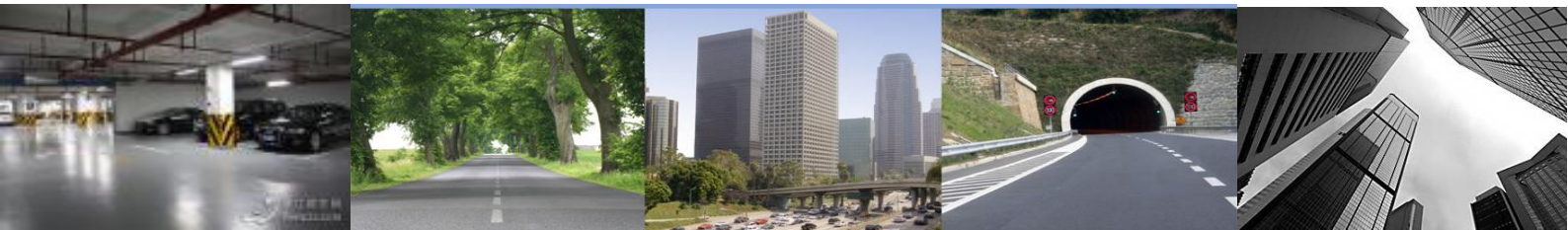
LNS-250® sophisticated GNSS/DR (GPS+GLONASS/Dead Reckoning) algorithm auto calibrates and optimally blends the sensors inputs with kalman filter to generate optimal and accurate position outputs in the most hostile GNSS environments. DR estimates position based on distance traveled since the last known position from GNSS. For car navigation system, **LNS-250®** is the only one that provides 6-axis sensors, 3D navigation position output and DR error is only 6m/km for 2km distance traveled.

Application：

- The field which wants knowing the more accurate location of the vehicle in telemetric.
- Navigation function improvement in personal vehicle navigation system.
- Vehicle location tracking which is accurate in vehicle control system such as taxi, bus, fleet management and freight transportation.
- Improvement of vehicle location tracking function in insurance company, commercial bank when it occurs vehicle breakdown or vehicle robbery.
- Autonomous vehicles

Feature：

- System integrates ultra-low noise MEMS inertial sensors, barometer and GNSS module.
- All inertial sensors individually have temperature compensation, bias, scale factor and axis alignment calibration.
- Provides absolute and relative height data.
- Auto self-calibrate attitude when system fixed and power on.
- **DR error is 0.6% of 2km distance traveled(12m).**
- Low cost and high C/P value.
- Lead free / RoHS compliant.
- 3 years warranty



Specification

Sensors	
Angular rate (3-axis)	±100°/s
• Noise density(yaw axis)	0.004°/s√Hz
• Non linearity(yaw axis)	±0.5% of FS
• Noise density(pitch/roll axis)	0.014°/s√Hz
• Non linearity(pitch/roll axis)	±1.0% of FS
Acceleration (3-axis)	±2 g/±6 g
• Noise density	50 μg√Hz
• Non linearity	±0.5% of FS
Barometer	
• Pressure range	300 ~1,100hPa(9,000m~-500m)
• Resolution of output data	Pressure 0.01 hPa
	Temperature 0.1°C

GNSS Module	
Channels	167
GPS	L1, C/A code 1575.42 M Hz
BDS	B1 1561.098 +/- 3 M Hz
GLONASS	1602 +/- 4 MHz
Protocols	NMEA0813 v3.01
NMEA messages	GGA,GSA,GSV,RMC,VTG
Sensitivity	
• Cold starts	–148dBm
• Reacquisition	–160dBm
• Tracking	–165dBm
Accuracy	
• Position	2.5m CEP
• Velocity	0.1 m/s
• 1 PPS	20 ns
Time-to-first-fix (TTFF)	
• Hot start	< 1 s
• Cold start	< 29 s
• Reacquisition	< 1 s

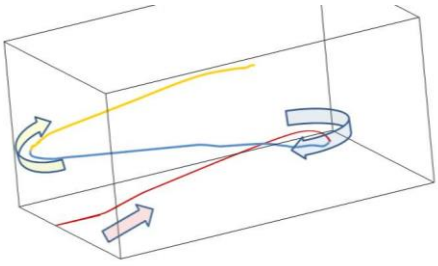
Dynamics	
Acceleration	≤4g
Velocity	515 m/s
Altitude limit	18,000 m
Update rate	
GNSS navigation	2 Hz
DR navigation	2 Hz
Power	
Prime power	5±5%V DC
Antenna power	3~3.3V DC
Power consumption	< 0.5 W
Interface and Connector	
Interface	UART
Antenna connector	SMA female
Power/data connector	12-pin Header(6 x 2; 2.0 mm)
Baud rate	4,800~115,200 bps
	(default 115,200 bps)
DR error	
Horizontal error	0.6% of 2Km distance traveled
	(6m/km)
Vertical error	2.5% of 20m height traveled
	(<0.5m)
Environment	
Compensated temperature	– 10°C to +70°C
Operating temperature	– 40°C to +85°C
Storage temperature	– 40°C to +85°C
Physical	
Dimensions	70 mm x 50 mm x 11.5 mm
Weight	<25 grams

LNS-250-GB : GPS + BeiDou

LNS-250-GG : GPS + GLONASS

Car speed : 20~60 Km/hr
DR horizontal error : 12m (0.6%)
(2.0km road distance traveled)

Car speed : 70 Km/hr
DR horizontal error : 28m (0.6%)
(4.9km tunnel distance traveled)



Car speed : 20 Km/hr
DR altitude error : <0.5m (2.5%)
(20m high parking house traveled)