



# N101

## Ruggedized Low Power GPS/ Multi-GNSS receiver



**AUTOMOTIVE GRADE (ISO7637)  
GPS/Multi-GNSS NAVIGATION MODULE  
WITH HIGH SENSITIVITY**

The specifications in this document are subject to change without Notice.  
Heol Design is not responsible for the operation or failure of operation of GPS  
satellites or the availability of GPS satellite signals.

The HEOL-N101 has been designed to provide **accurate** and **reliable** navigation information through a RS232 link. Based on a high performance GPS or GNSS (GPS+GLONASS/GALILEO/BEIDOU/QZSS) chipset, it delivers accurate position information, even in poor signal level environments (tree foliage, urban canyons).

### Performance

- Very-high sensitivity of **-165dBm**, enabling high performance in low level signals environments. Supports SBAS satellite system, for improved position accuracy.
- Time to get first fix information is around **38s** (cold start), and **1 second** in hot start.
- 2 **RS232** or 1 **RS422** serial ports can be accessed for monitoring and control in NMEA protocol.
- Highly accurate pps (pulse per second) signal (**±30ns**) available on SUB-D9 front panel. RS232, RS422 or TTL level.
- Active antenna is **voltage selectable** : 3.3V or 5V (patented).
- Optional **Back-up** capacitor for hot start-up after a power cut.
- **Internal logger** for the GNSS chipset (up to 16 hours logging at 15 seconds interval).

### Protection

- **Metal housing**, ruggedized and compact.
- RS232/RS422 ports are **15kV ESD** protected (+ **60V fault** protection for RS422).
- **Protection** against short circuit and overvoltage on the antenna.
- **Robust** power supply, protected against transients and reverse polarity.

### Compliance

- Connectors are compliant with **automotive standards**.
- According to **CE** directive, the HEOL-N101 module has passed the following tests:
  - EN55022/55011 class B : conducted and radiated emissions.
  - EN61000-4-2 : Immunity to electrostatic discharges.
  - EN61000-4-3 : Immunity tests on electromagnetic fields radiated at radio-electrical frequencies, with 10V/m electromagnetic field.
  - EN61000-4-4 : Immunity to rapid transients.
  - EN61000-4-5 : Immunity to surge.
  - EN61000-4-6 : Immunity tests on conducted interference, induced by radio-electrical fields.
  - **ISO7637-1/2/3** (for automotive applications).
- The HEOL-N101 module is RoHS (lead free) compliant.

**SPECIFICATIONS:**

<b>GPS L1 Receiver</b>	Channels	12 channels	
	Tracking Sensitivity	-160dBm	
Accuracy	Horizontal	<2.5 meters (50%), <5 meters (90%)	
	Altitude	<5 meters (50%), <8 meters (90%)	
	Horizontal (with SBAS)	<2 meters (50%), <4 meters (90%)	
	Altitude (with SBAS)	<3 meters (50%), <5 meters (90%)	
	Speed	0,06 m/sec (nominal)*	
	Time (pps)	±30 ns RMS	
Initial acquisition time	Cold (Time to First Fix)	< 39 seconds (90%)*	
	Warm start	< 35 seconds (90%)*	
	Hot start	< 3 seconds (90%)*	
<b>GNSS Receiver</b>	Frequency bands	GPS L1, GLONASS L1, QZSS L1, BEIDOU B1, GALILEO E1, SBAS L1	
	SBAS	WAAS (USA), EGNOS (EU), MSAS (Japan), GAGAN (India)	
	Channels	99 (acquisition) + 33 (tracking)	
	Tracking Sensitivity	-165dBm	
	Update rate	1Hz to 10Hz	
	Accuracy	Horizontal	<3.0 meters
		with SBAS	<2.5 meters
		With RTCM	<1.0 meter
	Speed	0,05 m/sec (with SBAS)*	
	Time (pps)	±30 ns RMS	
	Initial acquisition time	Cold (Time to First Fix)	< 35 seconds (90%)*
		Warm start	< 33 seconds (90%)*
		Hot start	< 1 seconds (90%)*
Logger	Internal logger (up to 16 hours at 15 Seconds interval)		
<b>Interfaces</b>	5V/3.3V Active antenna	SMB FAKRA (SMA or MCX on request)	
	Remote RS232/RS422	SUB-D9, 38400/8/No/1 (factory setting, user configurable)	
	Protocols	In /Out : NMEA 0183v3.0 (+TSIP , TAIP for GPS L1 receiver)	
<b>Power supply</b>	Input Voltage	•9 to 28 VDC, automotive (A option) → Full automotive ISO7637 qualification •9 to 50 VDC for industrial (J option)	
	Power consumption	30mA @12V (without antenna)	
<b>Environmental</b>	Operating Temperature	-40** / +85°C	
	Storage Temperature	-55 / +105°C	
	Humidity	90% non-condensing	
	Dimensions (mm)	112 x 91 x 26	
	Weight	240g	

\*Aerial field cleared

\*\* With optional capacitor, hot start can be slower between -20°C and -40°C

**CONNECTIONS:**

SUB-D9

Status LEDs

Fakra connector

**Figure 1 : Front view**

Main Power connector

**Figure 2 : Rear view****Connecting the RS232/RS422 cable**

In RS232, the SUB-D9 connector has standard asynchronous connection. Additional connections are added :

1	Auxiliary serial port Tx (GPS chipset only)
2	Main serial port Tx
3	Main serial port Rx
4	No Connect
5	Ground
6	Optional External Power supply
7	Auxiliary serial port Rx (GPS chipset only)
8	Pulse Per Second signal (RS232 or 5V level)
9	No Connect

In RS422, here is the associated pinning :

1	Serial connection Tx+
2	Serial connection Tx-
3	Serial connection Rx-
4	Serial connection Rx+
5	Ground
6	Optional External Power supply
7	Pulse Per Second signal -
8	Pulse Per Second signal +
9	No Connect

### Connecting the GPS/GNSS antenna

On the antenna connector, connect a 3V or 5V active antenna. This input is protected against short circuit that could occur on the antenna cable.

By default the N101 is configured for a 5V active antenna. To use a 3V active antenna, you must open the cover and move the switch near main power connector.

### Connecting the host system and the power

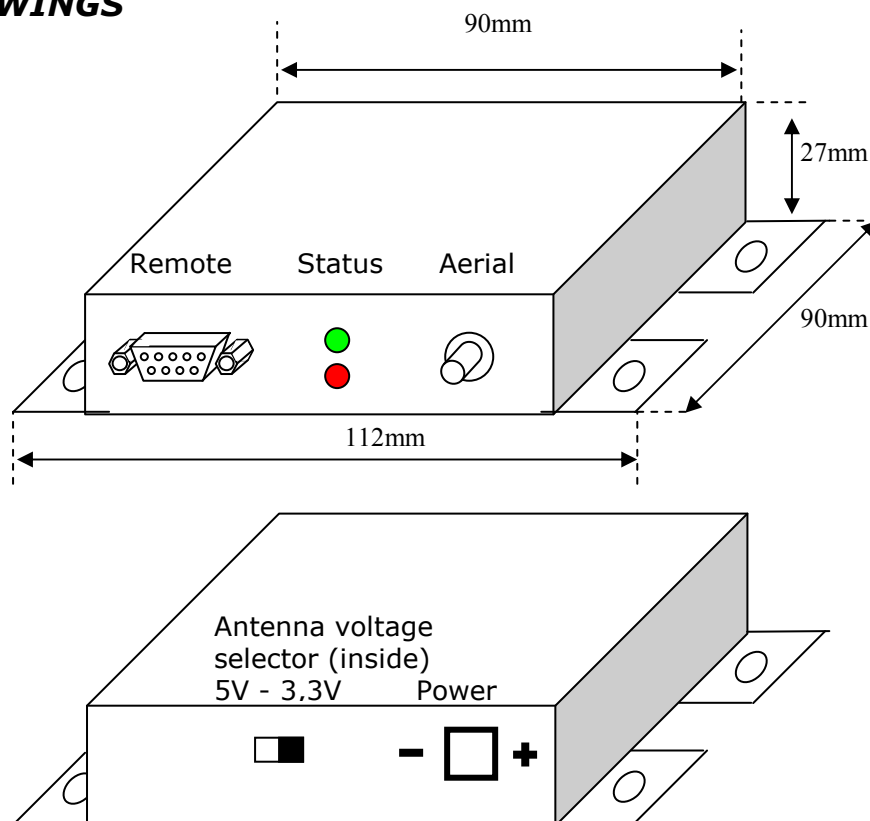
Power should be applied :

- Aux power plug. The connector type is AMP connector (ref 176271), included in the package. Contact HEOL DESIGN for AC adapter availability.
- QR on pin6 of RS232/RS422 connector (in option).

### Monitoring the LEDs

The LEDs available on the front panel are :

- Green LED : blinks every second (synchronized to pps); can also be configured to blink only when position is valid.
- Red LED : indicates that there is a problem with the antenna : it is not connected or is in short-circuit.

**MECHANICAL DRAWINGS****ORDERING PART NUMBER**

# HEOL-N101-P-2321-F-A-C-Px

Receiver type:

- P: GPS
- N: GNSS

Serial interface:

- 2321 : 1 port RS232
- 2322 : 2 ports RS232
- 422 : 1 port RS422

Antenna connector:

- F : SMB Fakra (default)
- A : SMA
- B : SMB
- X : MCX

Optional PPS (leave blank if not required) :

- P0 : RS232 \*
- P1 : 5V TTL
- P2 : RS422 \*

Optional Backup capacitor for hot start (leave blank if not required)

Input Voltage grade:

- A : 9V - 28V automotive
- I : 9V- 50V industrial

\*: P0 and P2 options not available with 2 ports RS232