Navika-150 – High Performance GPS-GLONASS Module

Features

- Stand-alone GPS-GLONASS and SBAS positioning module
- 16 parallel channels each for Acquisition and Tracking of GPS and GLONASS satellites
- High performance Correlator for ultra low signal detection and tracking
- Extremely fast fix times
- GPS-only, GLONASS-only and GPS-GLONASS position output
- Precise Time output
- Common GPS and GLONASS antenna interface with short / open circuit protection / detection
- 25mm x 35mm small form-factor
- Single 3.3V input supply
- Edge half-PTH connection points for easy assembly
- NMEA0183 compatible message format and Custom binary message for host communication

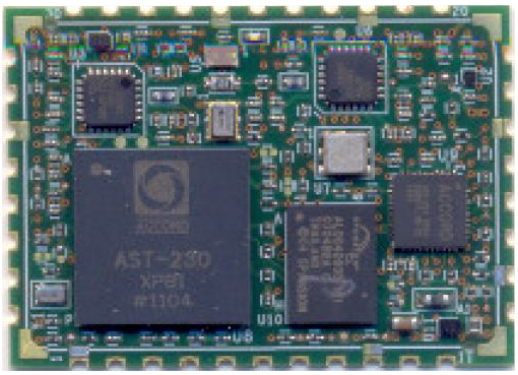


Figure 1: Navika-150

Product Description

The Navika-150 is a 25mmx35mm module combining the advantages of multiple GNSS constellations. By making use of GPS and GLONASS signals, the Navika-150 provides better availability and accuracy of position as compared to a stand-alone GPS or GLONASS module.

Navika-150 caters to applications that demand high performance where a GPS-only module cannot deliver.

Navika-150 supports sub-second positioning in hot start and reacquisition while providing faster location under warm and cold start modes too.

Navika-150 can be interfaced to either active or passive GPS-GLONASS antenna. In addition, the module provides protection/detection circuitry for accidental short/open of the active GPS-GLONASS antenna.

The module provides plethora of interfaces. An SPI port, TWI port, two UART ports, CAN controller port and a full-speed USB port allow the module to be interfaced in a variety of ways to the outside world. The module also supports six general purpose I/O's that can be used to drive LED's or digital input-output ports.

For applications that require precise timing, Navika-150 outputs a highly precise pulse every second that is synchronized to the GPS / UTC second boundary. The pulse can be adjusted for edge, width and delay to cater to the equipment that requires the time synchronization.

Navika-150 supports NMEA-0183 message protocol to communicate the location information. In addition, Accord proprietary messages convey additional information for a tighter integration with the end application.

Navika-150 Module Details

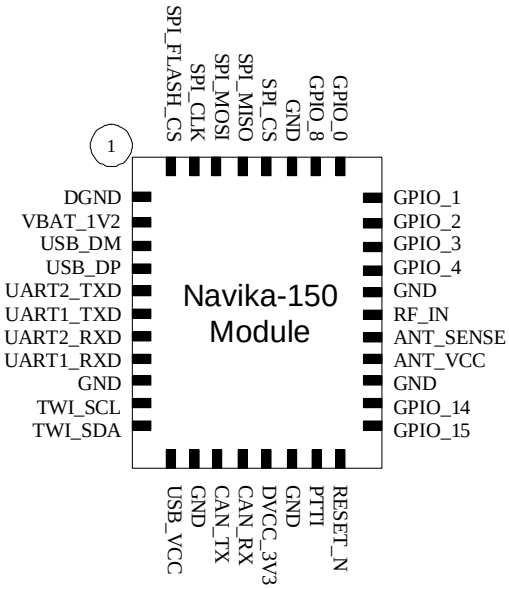
The Navika-150 brings out some of the essential peripherals for host interface such as SPI port, TWI port, two UART ports, CAN port, USB port and GPIO's.

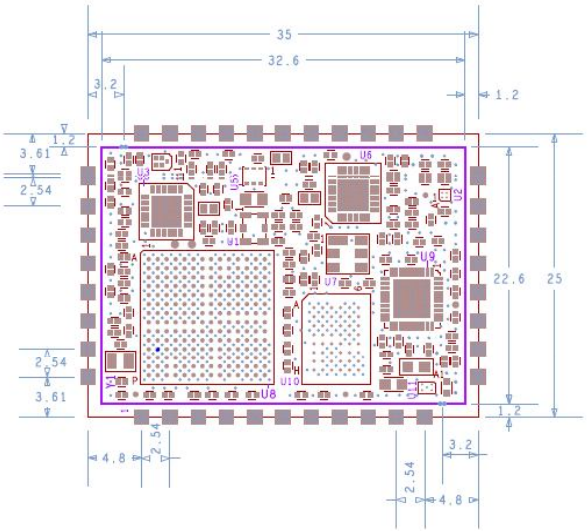
The Navika-150 is targeted for applications that require positioning and/or timing outputs. In addition to the user co-ordinates, Navika-150 is capable of delivering unmatched timing accuracy. Typical applications where Navika-150 could be integrated are –

- Vehicle tracking
- Security
- Geo-tagging
- Wireless base-stations

The Navika-150 is a 25mmx35mm sized GPS-GLONASS module. It requires a single 3.3V supply and a 1.2V battery feed that would enable the user to fully exploit all its features.

The module has been designed keeping all components on one side of the PCB and provides half plated through holes (PTH) on all the four sides for electrical and mechanical connectivity.





Navika-150 – Connection Diagram

In order to build a complete GPS-GLONASS receiver using the module, all it takes are a few connections. The diagram below depicts the interconnections to be done in order to use the Navika-150.

1. Connect a 50Ω trace between the RF_IN pad and the antenna connector
2. Connect a 20Ω, 1W resistor between the ANT_SENSE and ANT_VCC_3V pads. This is required to sense a short circuit on the antenna power line as well as to protect the power-ground short circuit
3. An active low power ON reset of at least 25ms should be provided on the /RESET pad
4. The host communication can be tapped at the UART1_RXD and UART1_TXD lines
5. Mains power of 3.3V +/- 5% should be applied at DVCC_3V3 pad. The maximum current draw of the board would be about 80mA (excluding antenna current). It is recommended to mount a decoupling capacitor of 1uF close to the DVCC_3V3 pad
6. A backup battery of 1.2V should be applied at VBAT_1V2 pad. The recharge circuitry (in case of a rechargeable battery) should be provisioned on the motherboard

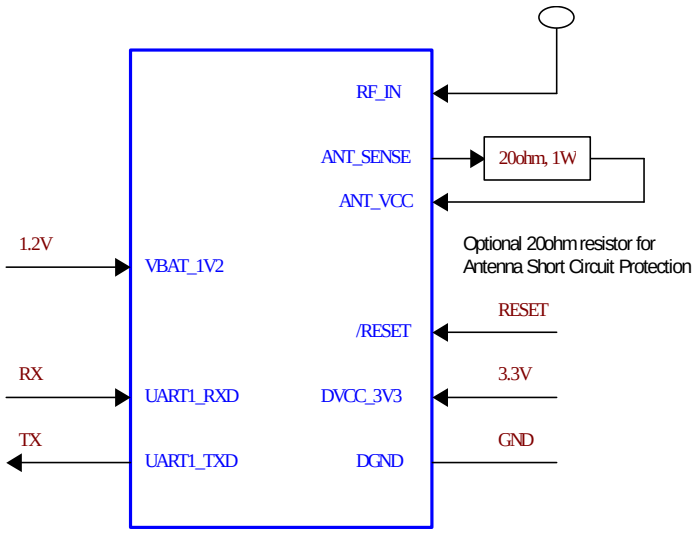
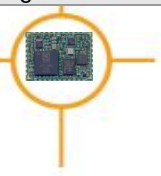


Figure 2: Circuit Interconnection using Navika-150 module

Specifications of Navika-150 Module

Performance Characteristics	
Receiver	32 channels L1-C/A code GPS-GLONASS, SBAS
Sensitivity	
Acquisition (both GPS and GLONASS)	-155dBm (Hot start, 1SV @ -140dBm) -160dBm (Reacquisition)
Tracking	-162dBm (GPS) / -159dBm (GLONASS)
Time to First Fix	
Hot Start (with valid ephemeris, almanac, position and time estimate; combined fix)	1 sec (typical) switch OFF/ON cycle less than 1 hour
Warm Start (with almanac, position and time estimate; combined fix)	18 to 36 sec (typical, open sky)
Cold Start (without almanac, time, or position; combined fix)	18 to 36 sec (typical, open sky)
Accuracy	
Position (Horizontal)	10 m (90% without S/A)
Velocity	0.1 m/sec (90% without S/A)
Reacquisition	
Signal	< 1 sec
Position	< 1 sec
Blockage Time	3 minutes
Timing	
1PPS	< +/- 10ns, 1σ without errors
Pulse Width	400us (adjustable between 400us to 39.6ms in steps of 400us)
Pulse Edge	Rising (configurable)
Pulse Delay	0ns (adjustable between –999 to +999ns)
Single Satellite PPS	
Min. C/N0	12dB-Hz (adjustable between 12dB-Hz and 60dB-Hz; default is 35dB-Hz)
Min. Elevation Mask	7 deg
Position averaging	50s minimum, extends upto 1000s
Validity of 1PPS	6 hours continuously in single satellite PPS mode
Navigation Solution	
PVT	2D/3D position, velocity, and time 183 geodetic datum supported (default) (WGS84)
Position Update Rate	1 Hz
PC/Host Communication	
Interface	UART
Baud Rate	115200
Message Formats	NMEA0183 Ver. 3.01 ASCII, as well as proprietary messages
Environmental Characteristics	
Operational Temperature Range (Ambient)	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Humidity	95% non-condensing +30°C to 60°C
Altitude	18,000 meters
Electrical Characteristics	
Total Current Consumption	100mA @ 3.3V
Output Messages	
NMEA	$GP, $GL, $GN messages
ASCII	Version, Kalman Filter, Receiver Configuration, Antenna Status, PPS mode
Input Messages	
ASCII	NMEA message control and configuration, Elevation mask, DOP settings, Factory reset, Restart, 1PPS configuration

Table 1: Specifications of Navika-150 Module



NAVIKA

Navika Electronics
51, Goldhill Plaza,
07-10/11,
SINGAPORE 308900

India Office
37, K.R. Colony, Domlur Layout,
Bangalore - 560 071. INDIA.
Tel: +91 - 80 2535 0105
Fax: +91 - 80 2535 2723
Website: www.navika-electronics.com