



# NAVIKA-300 Technical Document

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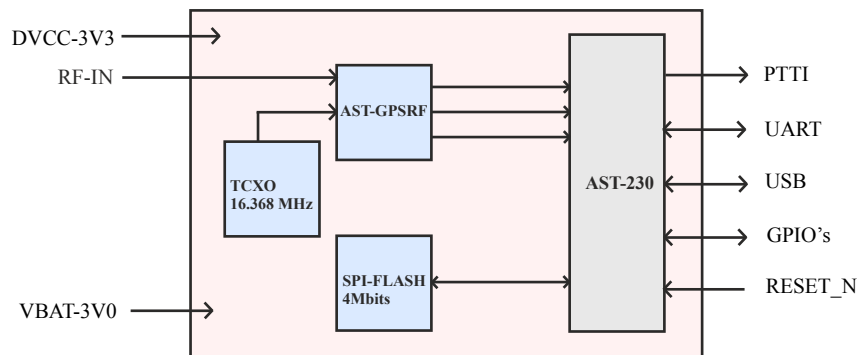
## Overview

Navika-300 is a L1, C/A code based GPS-SBAS receiver module. With a form-factor of 12.2mm x 16 mm, Navika-300 lends itself for integration into applications with severe space constraints. Navika-300 supports NMEA-0183 message protocol to communicate the location information. In addition, Navika proprietary messages convey additional information for a tighter integration with the end application.



NAVIKA-300  
(12.2mm x 16mm)

## Block Diagram



Navika-300 Block Diagram

- ❑ AST-230 is a high performance GPS baseband with an ARM7 processing core and integrated peripherals.
- ❑ AST-GPSRF is a high performance, fully integrated GPS RF front-end chip for down conversion and signal amplification. It is designed for GPS L1 (1575.42MHz), C/A and Galileo OS (1575.42MHz) receivers.

## Specifications of Navika-300 Module

### Performance Characteristics

Receiver :32 channels L1-C/A code GPS-SBAS

### Sensitivity

Acquisition : -155dBm (Hot start, 1SV @ -140dBm)  
-160dBm (Reacquisition)  
Tracking : -163dBm

### Time to First Fix

Hot Start (with valid ephemeris, almanac, position and time estimate) : 2-3 sec (typical) switch OFF/ON cycle less than 1 hour

Warm Start (with almanac, position and time estimate) : 30 sec (typical)

Cold Start (without almanac, time, or position) : 35 sec (typical)

*Note: Active antenna kept under open sky with HDOP<2 and C/N0 > 40dB-Hz*

### Accuracy

Position (Horizontal) : <2.5 m (RMS)  
Velocity : 0.1 m/sec (90% without S/A)

*Note: Active antenna kept under open sky with HDOP<2 and C/N0 > 40dB-Hz*

### Reacquisition

Signal : < 1 sec  
Position : < 1 sec  
Blockage Time : 3 minutes

### Navigation Solution

PVT : 2D/3D position, velocity, and time 183 geodetic datum supported (default) (WGS84)  
Position Update Rate : 1 Hz

### Timing

1PPS : < +/- 10ns, RMS without errors  
Pulse Width : 386us (adjustable between 386us to 500ms in steps of 386us)  
Pulse Edge : Rising (configurable)  
Pulse Delay : 0ns (adjustable between -999 to +999ns)

### PC/Host Communication

Interface : UART  
Baud Rate : 115300 (by default)  
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 : -40°C to +85°C  
Humidity : 95% non-condensing +30°C to 60°C  
Altitude : 18,000 meters

### Electrical Characteristics

Total Current Consumption : 85mA @ 3.3V

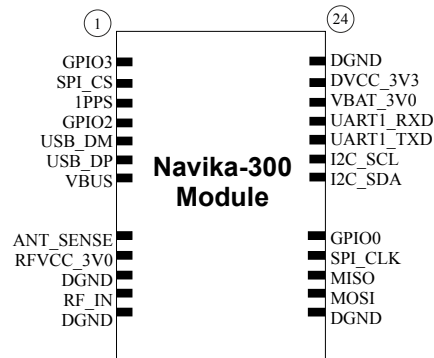
### Output Messages

NMEA : \$GPGGA, \$GPGSA, \$GPRMC, \$GPGLL, \$GPGSV, \$GPVTG, \$GPZDA  
ASCII : Version, Receiver Configuration, Antenna Status, PPS mode

### Input Messages

ASCII : NMEA message control and Configuration, Elevation Mask, DOP settings, Factory reset, Restart, 1PPS configuration

## Pin Diagram

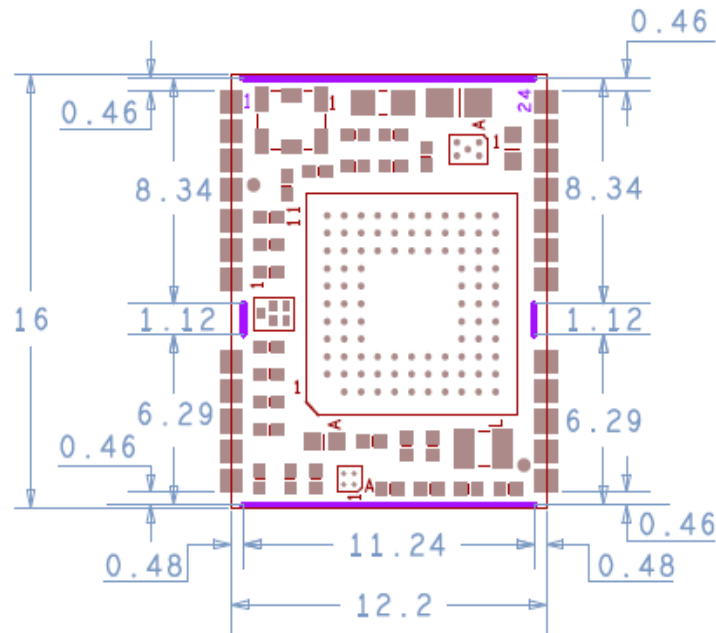


## Pin Description

Pin #	NAME	I/O	Description
1	GPIO3	I/O, I by default	Reserved
2	SPI_CS	O	SPI chip select
3	PTTI	O	Time pulse (IPPS)
4	GPIO2	I/O, I by default	Reserved
5	USB_DM	I/O	USB Data -
6	USB_DP	I/O	USB Data +
7	VBUS	I	USB supply
8	ANT_SENSE	I	Active antenna detect
9	VRFB-3V0	I	Antenna Bias voltage
10	GND		Ground
11	RF_IN	I	GPS signal input
12	GND		Ground
13	GND		Ground
14	SPI_MOSI	O	SPI MOSI
15	SPI_MISO	I	SPI MISO
16	SPI_CLK	O	SPI clock
17	GPIO0	I/O, I by default	Reserved
18	I2C_SDA	I/O	I2C Data line
19	I2C_SCL	I/O	I2C clock
20	UART_TXD	O	Serial port
21	UART_RXD	I	Serial Port
22	VBAT_3V0	I	Back-up voltage supply
23	DVCC-3V3	I	Supply voltage
24	GND		Ground

## Mechanical details

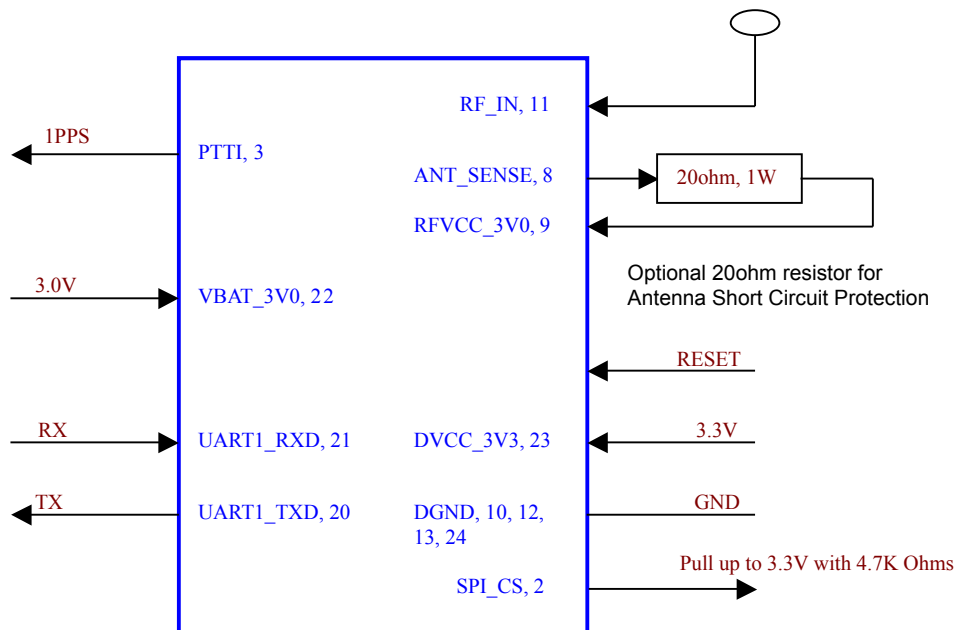
Length = 16 mm  
Width = 12.2 mm  
Height = 2.90mm  
Pad Pitch = 1.1 mm  
Pad Width = 0.8128 mm



## Operating conditions

Parameter	Symbol	Min.	Typ.	Max	Units
Power supply voltage	DVCC_3V3	3.14	3.3	3.47	Volts
Supply voltage USB	USB_VCC	3.0	3.3	3.6	Volts
Backup battery voltage	VBAT_3V0	2.7	3.0	3.3	Volts
Antenna gain	Gain		28	50	dB
Operating temperature	Temp	-40		+85	<sup>o</sup> C

## Application Circuit Recommendations



## Recommendations

In order to build a complete GPS 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-300.

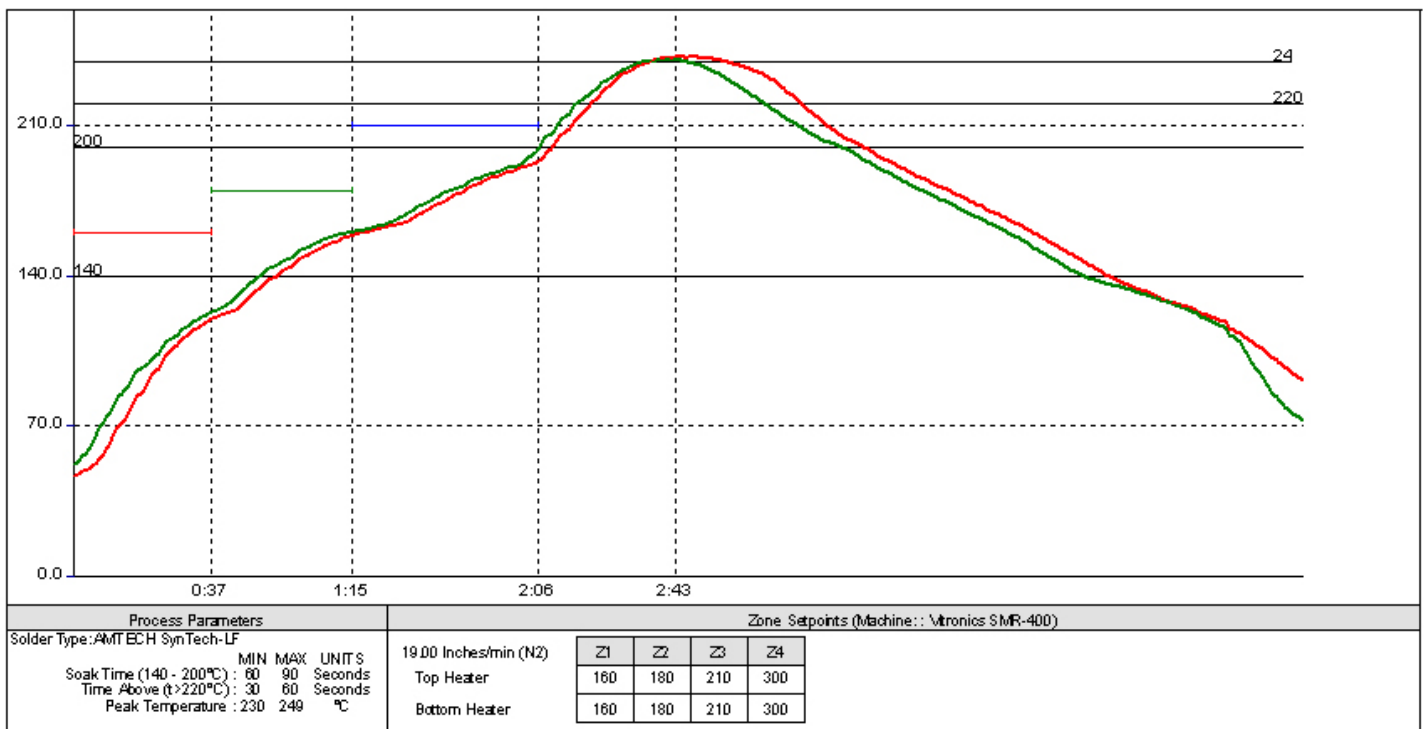
- Connect a 50 Ohm trace between the RF\_IN pad and the antenna connector
- Connect a 20 Ohm, 1W resistor between the ANT\_SENSE and RFVCC\_3V0 pads. This is required to sense a short circuit on the antenna power line as well as to protect the power-ground short circuit. If this function is not required, the ANT\_SENSE and RFVCC\_3V0 pads can be directly connected
- The host communication can be tapped at the UART1\_RXD and UART1\_TXD lines
- Mains power of 3.3V +/- 5% should be applied at DVCC\_3V3 pad. The maximum current draw of the board would be about 85mA. It is recommended to mount a decoupling capacitor of 1uF close to the DVCC\_3V3 pad
- A backup battery of 3.0V should be applied at VBAT\_3V0 pad. The recharge circuitry (in case of a rechargeable battery) should be provisioned on the motherboard
- Pull up SPI\_CS pad to 3.3V

## Solder paste details

### Below is the information on Solder paste details

Make : AMTECH or similar  
 Type : 3  
 Profile : Normally available with supplier. Also dependent on the PCB finish. The Navika-300 is finished with ENIG.

## Reflow - Temperature profile



## Ordering Information

Navika-300 : GPS module

Navika-300-Eval: Evaluation board of Navika-300 Contains Navika-300 module mounted on an evaluation PCB and packaged into a plastic enclosure, USB cable, active GPS antenna and GUI installation CD