



NAVIKA-100 Technical Document

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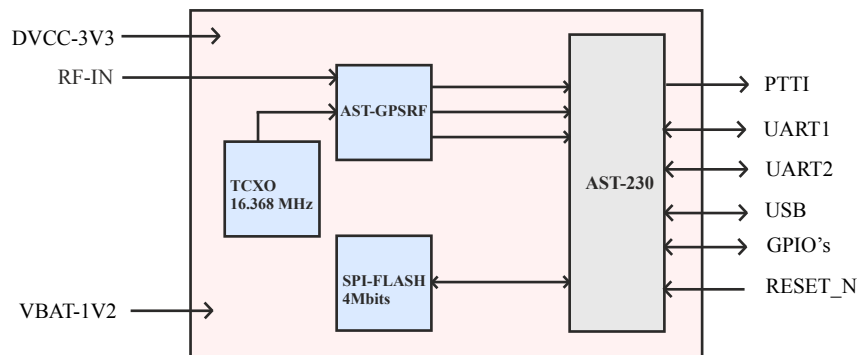
Overview

NAVIKA-100 is a L1, C/A code based GPS-SBAS receiver module with a form-factor of 25.4mm x 25.4mm. NAVIKA-100 has high performance correlator for ultra low signal detection and tracking. NAVIKA-100 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-100
(25.4mm x 25.4mm)

Block Diagram



NAVIKA-100 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-100 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 : 115200 (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

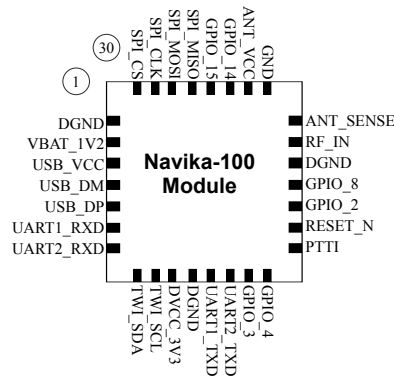
Output Messages

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

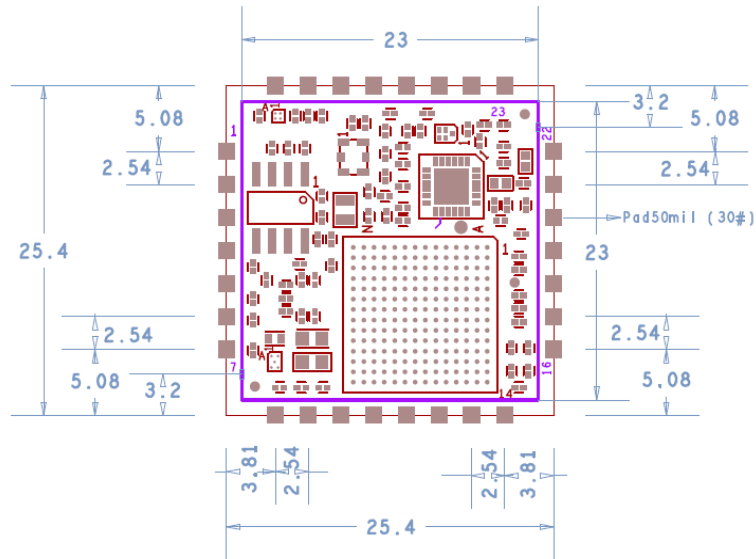


Pin Description

Pin number	NAME	I/O	Description
1	GND		Ground
2	VBAT_1V2	I	Back-up voltage supply
3	USB_VCC	I	USB supply
4	USB_DM	I/O	USB Data -
5	USB_DP	I/O	USB Data +
6	UART1_RXD	I	Serial Port
7	UART2_RXD	I	Serial Port
8	TWI_SDA	I/O	TWI Data
9	TWI_SCL	O	TWI Clock
10	DVCC-3V3	I	Supply voltage
11	GND		Ground
12	UART1_TXD	O	Serial port
13	UART2_TXD	O	Serial port
14	GPIO_3	I/O, I by default	Reserved
15	GPIO_4	I/O, I by default	Reserved
16	PTTI	O	Time pulse (IPPS)
17	RESET_N	I	External Reset
18	GPIO_2	I/O, I by default	Reserved
19	GPIO_8	I/O, I by default	Reserved
20	GND		Ground
21	RF_IN	I	GPS signal input
22	ANT_SENSE	I	Active antenna detect
23	GND		Ground
24	ANT_VCC	I	Active antenna detect
25	GPIO_14	I/O, I by default	Reserved
26	GPIO_15	I/O, I by default	Reserved
27	SPI_MISO	I	SPI MISO
28	SPI_MOSI	O	SPI MOSI
29	SPI_CLK	O	SPI clock
30	SPI_CS	I	SPI chip select

Mechanical details

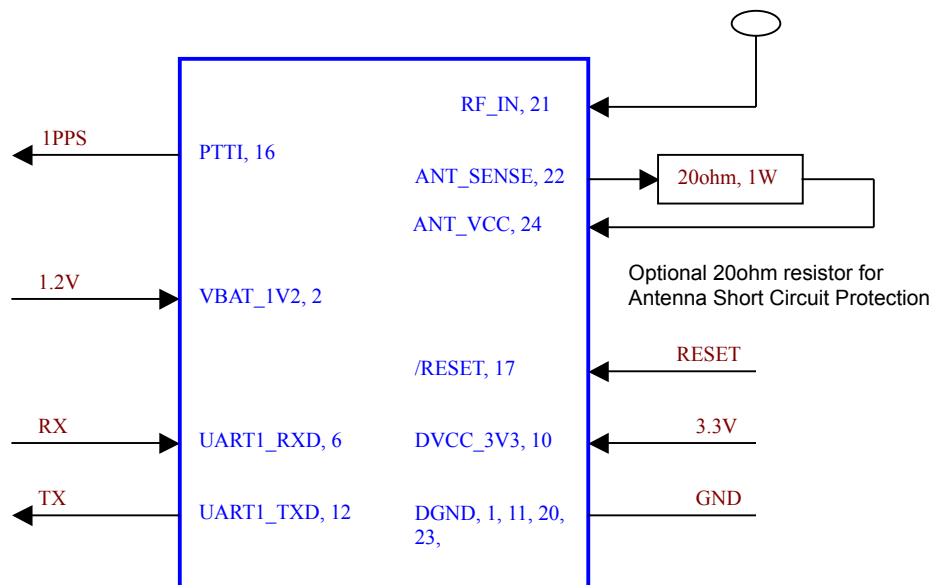
Length = 25.4 mm
 Width = 25.4 mm
 Height = 3.74 mm
 Pad Pitch = 2.54 mm
 Pad Width = 1.27 mm



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_1V2	1.08	1.2	1.32	Volts
Antenna gain	Gain		28	50	dB
Operating temperature	Temp	-40		+85	^o 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-100.

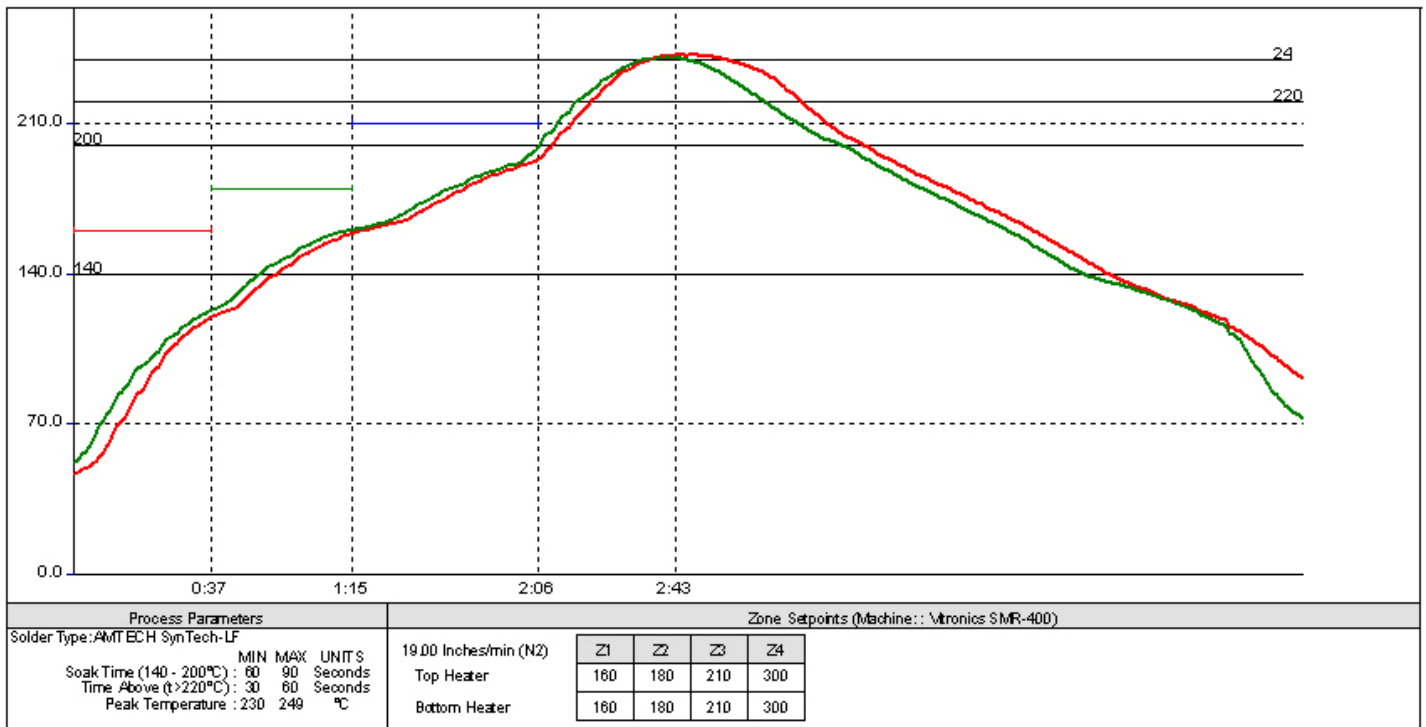
- Connect a 50 Ohm trace between the RF_IN pad and the antenna connector
- Connect a 20, 1W resistor between the ANT_SENSE and ANT_VCC_3V pads. This is required to sense a short circuit on the antenna power line as well as to protect the power-ground short circuit
- An active low power ON reset of at least 25ms should be provided on the /RESET pad
- 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 (excluding antenna current). It is recommended to mount a decoupling capacitor of 1uF close to the DVCC_3V3 pad
- 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

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-100 is finished with ENIG.

Reflow - Temperature profile



Ordering Information

Navika-100 : GPS application module

Navika-100-Eval: Evaluation board of Navika-100 Contains Navika-100 module mounted on an evaluation PCB and packaged into a plastic enclosure, USB cable, active GPS antenna and GUI installation CD