



NTL102.SMT

OEM GNSS MODULE

Overview

2021



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1 INTRODUCTION

The NTL102.SMT OEM module supports multiple frequencies and multiple constellations including GPS L1, L5, NavIC L5, S-band and SBAS L1 signals to improve the continuity and reliability of positioning.

The NTL102.SMT can be used for the following purposes:

- as a source of navigational data (Position, Velocity, Time) derived in autonomous mode (standalone mode, SBAS), 1Hz;
- as a source of raw ranging measurements (include pseudoranges, measured by code and carrier phase), Base Mode, 20Hz.

The view of the NTL102.SMT is presented in figure 1.1. Dimensions of the module are shown in the figure 1.2.

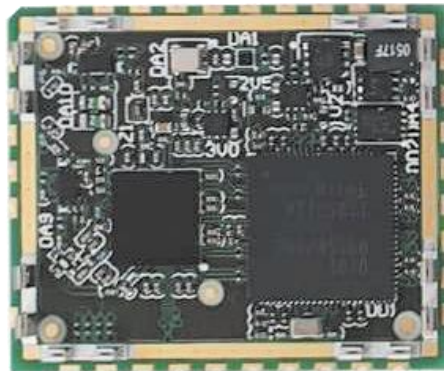


Figure 1.1 – NTL102.SMT OEM module view

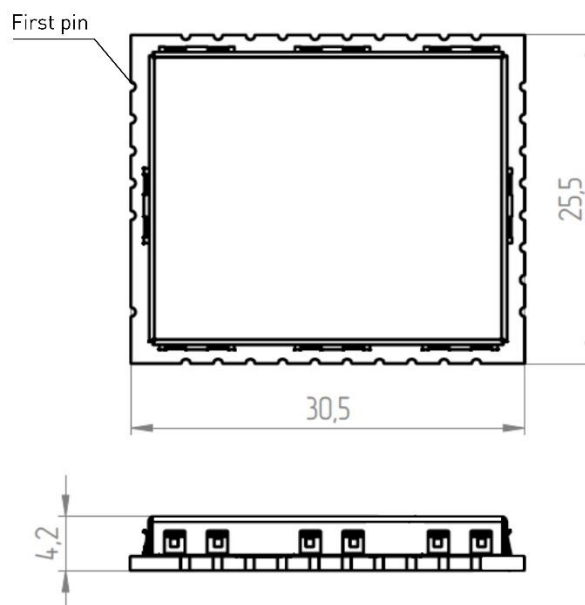


Figure 1.2 – NTL102.SMT OEM module dimensions, mm

2 BLOCK DIAGRAM

The general block diagram of the **NTL102.SMT** is shown in the figure 2.1.

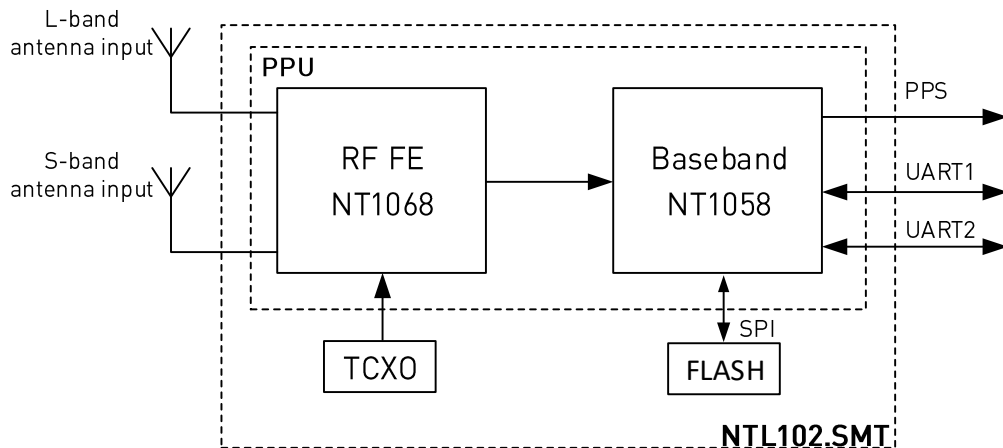


Figure 2.1 – The block diagram of the **NTL102.SMT**

Primary Processing Unit (PPU) is a basic functional block of **NTL102.SMT** module. It is the source of standard accuracy navigation data and raw ranging measurements. Refer to the «GNSS-PPU-SETUP-GUIDE-AA-BB-CC.pdf» for details.

PPU is implemented on chips set which are designed by NTLab company:

- NT1068 is a 4-channel L1, L2, L5, S multi-bands Radio-Frequency Front-End (RF FE) integrated circuit for GNSS signals receiving and their processing: for amplification, filtering and down converting of the received signals to a fixed intermediate frequency (IF);
- NT1058 is microcontroller which includes digital baseband processor and 64 dual channels hardware correlator for GNSS signals tracking and primary processing of digital signals.

The **NTL102.SMT** has two physical UART ports (UART1 and UART2) which can be used to transmit navigation information in the autonomous mode, to output raw ranging measurements, to monitor status information and configure the module. Each of the serial ports consist of RX and TX line. The baud rates can be set individually for each serial port. Refer to Chapter 6 for information about default UART settings.

The **NTL102.SMT** contains on-module SPI serial flash memory to store two configurations. Firmware upgrade is possible through any of UART channels.

The *PPS* is a time synchronization output signal from NT1058 with 1 second period (corresponds to the frequency of navigation solution). The PPS adjusts to the GPS system time with an accuracy of +/-15 ns. It is

possible to additionally shift the PPS edge along the time axis to the left/right (perform calibration). The PPS adjusts can be performed for the system time of any GNSS that the receiver supports (not only GPS).

Voltage logic level is 2.5V, pulse width is 1ms. PPS is triggered by the leading edge. Polarity cannot be reversed. Duty cycle can be reversed (up to 1sec).

3 POWER SUPPLY

NTL102.SMT host-device must provide DC voltage for the module and antenna:

- 3.3...5.5V DC **module power supply** is provided from Pin 26;
- 5V DC **antenna power supply** is provided from Pin 35.

GNSS external active antenna requirements:

- Antenna voltage supply 5V;
- Maximum current 100mA;
- LNA gain range (minus signal loss) 20...35dB.

4 PIN DEFINITION

The pinout of the **NTL102.SMT** module is shown in the figure 4.1.

Pins assignment is presented in the Table 4.1.

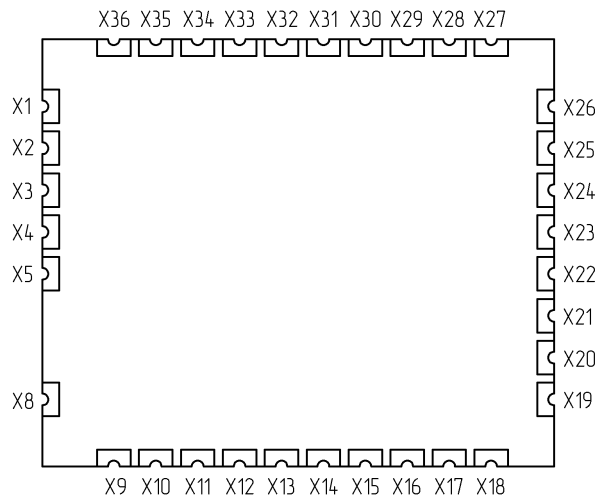


Figure 4.1 – Pinout of the **NTL102.SMT** module

Table 4.1 – Pins assignment of the **NTL102.SMT** module

Pin number	Name	Type	Description
X1, X3, X5, X8, X25, X27, X34, X36	GND	Power	Signal and Power Ground
X2	RF_IN_L	Input	L-band antenna input
X4	RF_IN_S	Input	S-band antenna input
X9	68_SCK	Input	SPI NT1068 ¹
X10	68_MOSI	Input	SPI NT1068 ¹
X11	68_MISO	Output	SPI NT1068 ¹
X12	68_CS	Input	SPI NT1068 ¹
X13	LED	Output	NT1058 Ready signal
X14	Vbat	Power	Battery power input ²
X15	PPS	Output	PPS time mark
X16	UART2_TX	Output	UART2 transmit data

¹ Used for service purposes

² Reserved for connecting a backup battery. At the moment, this option is not available.

Table continuation 4.1 – Pins assignment of the NTL102.SMT module

Pin number	Name	Type	Description
X17	UART2_RX	Input	UART2 receive data
X18	DBGCLK	I/O	NT1058 debug interface ³
X19	DBGIO	I/O	NT1058 debug interface ³
X20	nPOR	Input	NT1058 debug interface ³
X21	UART1_TX	Output	UART1 transmit data
X22	UART1_RX	Input	UART1 receive data
X23	BOOT	Input	Boot mode selection
X24	DEF	I/O	-
X26	Vin	Power	NTL102.SMT power supply
X28	58_CS	Output	SPI NT1058 ³
X29	58_MISO	Input	SPI NT1058 ³
X30	58_MOSI	Output	SPI NT1058 ³
X31	58_CLK	Output	SPI NT1058 ³
X32	TCXO_EN	Input	Internal TCXO enabled ⁴
X33	TCXO_EXT	Input	TCXO External input
X35	ANT_Vcc	Power	Antenna power supply

³ Used for service purposes

⁴ By default, high level. Set low level when is used TCXO External.

5 SPECIFICATION

The limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134).

Table 5.1 – Specification of the NTL102.SMT

SUPPORTED GNSS CONSTELLATIONS		
GPS L1,L5, NavIC L5,S-band and SBAS L1		
TECHNICAL SPECIFICATION		
Parameter	Value	Note
Measurement Precision (RMS): – C/A pseudoranges, cm – Carrier phase, mm	20 0.8	Smoothed pseudoranges
Standalone mode Accuracy (RMS): – Position Horizontal/Vertical, m	2.1 / 3.5	Depends on atmospheric conditions, satellite visibility and geometry, multipath conditions, GNSS antenna
DGPS mode Accuracy (RMS): – Position Horizontal/Vertical, m	0.8 / 1.1	GPS+SBAS
Data update rates: – Position, velocity, time Hz – Raw data, Hz	1 20	no options 1,5,10 Hz available
Electrical parameters: – Supply voltage, V – Power consumption, W	3.3...5.5 <0.65	
Environmental characteristics: – Operating temperature, °C – Storage temperature, °C	-40° to +80°C -55° to +85°C	
Weight and size: – Dimensions (L x W x H), mm; – Weight (without package), g	30.5 x 25.5 x 4.2 < 15	

Warning: The product is not protected against overvoltage or reversed voltages.

All specifications are at an ambient temperature of 25 °C. Extreme operating temperatures can significantly impact specification values.

6 COMMUNICATION INTERFACE

The following external interfaces are available: 2xUART.

There are several interface protocols: RTCM3.3 (MSM + Legacy messages), NovAtel OEM, NMEA-0183, NTL Binary.

Table 6.1 – Interface setting

Interface	Description
<p style="text-align: center;">UART1 Tx/Rx (Pin 21/22)</p>	<p>Available data transmission formats:</p> <ul style="list-style-type: none"> • NMEA-0183 or NTL Binary for nav. data transmission and control; • RTCM3.3 or Novatel OEMv7 for raw ranging data transmission. <p>Available baud rate diapason: 9600 to 460800. <i>Default settings:</i> 115200 Baud, 8 bits, no parity bit, 1 stop bit, NMEA.</p>
<p style="text-align: center;">UART2 Tx/Rx (Pin 16/17)</p>	<p>Available data transmission formats:</p> <ul style="list-style-type: none"> • NMEA-0183 or NTL Binary for nav. data transmission and control; • RTCM3.3 or Novatel OEMv7 for raw ranging data transmission. <p>Available baud rate diapason: 9600 to 460800. <i>Default settings:</i> 115200 Baud, 8 bits, no parity bit, 1 stop bit, no data.</p>

Refer to «GNSS-DCP-BUILD-AA-BB-CC.pdf» document to get more information about interface performance details.

CONTACTS

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