

General Description

The GOTOP GAM-1818B-TDBD is a complete GPS&Beidou engine module that features super sensitivity, ultra low power and small form factor. The GPS&Beidou signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

Its -163dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS&Beidou was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems.

Applications

- LBS (Location Based Service)
- PND (Portable Navigation Device)
- Vehicle navigation system
- Mobile phone



Figure : GAM-1818B-TDBD Top View

Features

- Build on high performance, low-power Taidou TD1030 GNSS chip set
- Ultra high Track sensitivity: -163dBm
- Extremely fast TTFB at low signal level
- Built in high gain LNA
- Low power consumption: Max $25\text{mA}@3.3\text{V}$
- NMEA-0183 compliant protocol
- Operating voltage: 3.3V to 5.0V
- Operating temperature range: -40 to 85°C
- Patch Antenna Size: $18.4 \times 18.4 \times 4\text{mm}$
- Small form factor: $18.5 \times 18.6 \times 7.2\text{mm}$
- Communication type: UART/TTL
- RoHS compliant (Lead-free)

1. Key Features

Table 1: Key Features

Parameter	Specification
Power Supply	<ul style="list-style-type: none"> Supply voltage: 3.3V~5.0V Typical: 3.3V
Power Consumption	<ul style="list-style-type: none"> Acquisition: 25mA @VCC=VBAT=3.3V Tracking: 20mA @VCC=VBAT=3.3V Backup: 15uA @VBAT=3.3V
Receiver Type	<ul style="list-style-type: none"> Code 56 search channels GPS&QZSS L1 1575.42MHz C/A , Beidou B1 1561.098MHz SBAS: WAAS, EGNOS, MSAS, GAGAN
Sensitivity	<ul style="list-style-type: none"> Tracking: -163dBm Re-acquisition: -156dBm Acquisition: -148dBm
TTF	<ul style="list-style-type: none"> Cold start(Autonomous): 35s typ @-130dBm Warm start (Autonomous): 30s typ @-130dBm Hot start (Autonomous): 1s typ @-130dBm
Horizontal Position Accuracy (Autonomous)	<ul style="list-style-type: none"> <2.5m CEP @-130 dBm
Update Rate	<ul style="list-style-type: none"> 1Hz
Accuracy of 1PPS Signal	<ul style="list-style-type: none"> not enabled
Acceleration Accuracy	<ul style="list-style-type: none"> Without aid: 0.1m/s²
Dynamic Performance	<ul style="list-style-type: none"> Maximum altitude: 18,000m Maximum velocity: 515m/s Acceleration: 4G
UART Port	<ul style="list-style-type: none"> UART Port: TXD and RXD Supports baud rate from 4800bps to 115200bps, 9600bps by default UART port is used for NMEA output, Taidou proprietary commands input
Temperature Range	<ul style="list-style-type: none"> Normal operation: -40°C ~ +85°C Storage temperature: -45°C ~ +125°C
Physical Characteristics	<ul style="list-style-type: none"> Size: 18.5±0.20 × 18.6±0.20 × 7.2±0.20mm Weight: Approx.6.8g

1.2 Power Supply

Regulated power for the GAM-1818B-TDBD is required. The VCC Pin Need a stable DC voltage supply. Power supply ripple must be less than 30mV. The input voltage Vcc should be 3.3V~5.0V, Recommended power supply voltage is 3.3V . maximum current is 25mA. Suitable decoupling must be provided by external decoupling circuitry.

1.3 UART Ports

The module supports two full duplex serial channels UART. All serial connections are at 3V CMOS logic levels, if need different voltage levels, use appropriate level shifters. The baud rate of both serial ports are fully programmable, the data format is however fixed: X, N, 8, 1, i.e. X baud rate, no parity, eight data bits and one stop bit, no other data formats are supported, LSB is sent first. The modules default baud rate is set up 9600bps, however, the user can change the default baud rate to any value from 4800 bps to 115kbps. UART port can be used for firmware upgrade, NMEA output and Taidou proprietary commands input.

2 Application

The module is equipped with a 5-pin pad that connects to your application platform. The GAM-1818B-TDBD module It consists of a Taidou TD1030 single chip GNSS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator, Also comes with a 0.22F crystal capacitor, can backup satellite ephemeris about 2 hour.

2.1. Pin Assignment

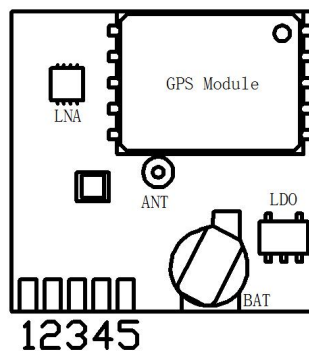


Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VBAT	I	RTC Battery Input	Voltage range: 1.8V~3.6V
2	TXD	O	UART Serial Data output	
3	RXD	I	UART Serial Data Input	
4	VCC	I	Module Power Supply	Voltage range: 3.3V~5.0V
5	GND	G	Ground	

2.2 Mechanical Dimensions

This chapter describes the mechanical dimensions of the GAM-1818B-TDBD module. Size unit (mm)

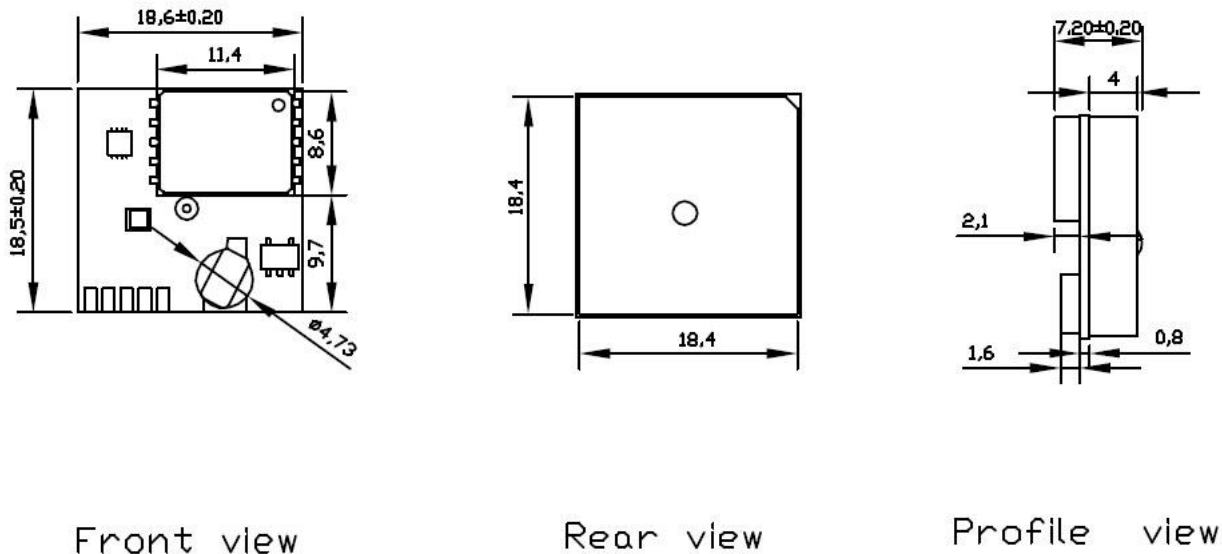


Figure 3: Specification size chart

3 NMEA 0183 Protocol

The NMEA protocol is an ASCII-based protocol, Records start with a \$ and with carriage return/line feed. GPS&BeiDou specific messages all start with \$GPxxx/GNxxx/BDxxx where xxx is a three-letter identifier of the message data that follows. NMEA messages have a check sum, which allows detection of corrupted data transfers.

The Gotop GAM-1818B-TDBD supports the following NMEA-0183 messages: \$GNGGA. \$GNRMC. \$GNGSA. \$GNGSA. \$BDGSV. \$GPGSV.

Table 1: NMEA-0183 Output Messages

NMEA Record	DESCRIPTION
Beidou only mode	
NMEA Out Put: BDRMC. BDGGA. BDGSV. BDGSA	
GPS only mode	
NMEA Out Put: GPRMC. GPGGA. GPGSV. GPGSA	
GPS+Beidou only mode	
NMEA Out Put: GNRMC. GNGGA. GPGSV. BDGSV. GNGSA. GNGSA	
xxGGA	Global positioning system fixed data
xxGLL	Geographic position—latitude/longitude
xxGSA	GNSS DOP and active satellites
xxGSV	GNSS satellites in view

3.1 GGA-Global Positioning System Fixed Data

\$xxGGA,062411.00,2238.52974,N,11401.96571,E,1,07,2.05,82.5,M,-2.2,M,,*6F

Table 2: GGA Data Format

Name	Example	Units	Description
Message ID	\$xxGGA		GGA protocol header
UTC Position	062411.00		hhmmss.ss
Latitude	2238.52974		ddmm.mmmmm
N/S indicator	N		N=north or S=south
Longitude	11401.96571		dddmm.mmmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	07		Range 0 to 12
HDOP	2.05		Horizontal Dilution of Precision

MSL Altitude	82.5	meters	
Units	M	meters	
Geoids Separation	-2.2	meters	
Units	M	meters	
Age of Diff.Corr.		second	Null fields when DGPS is not Used
Diff.Ref.Station ID			0000~1023
Checksum	*6F		
<CR> <LF>			End of message termination

Table 2-1: Position Fix Indicators

Value	Description
0	Fix not available or invalid
1	GPS&BD SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS&BD PPS Mode, fix valid

3.2 GSA-GNSS DOP and Active Satellites

\$xxGSA,A,3,06,30,02,,,,,,,,,2.95,2.05,2.12,1*0E

\$xxGSA,A,3,01,02,04,05,,,,,,,,,2.95,2.05,2.12,4*0E

Table 3: GSA Data Format

Name	Example	Units	Description
Message	\$xxGSA		GSA protocol header
Mode 1	A		See Table 3-2
Mode 2	3		See Table 3-1
Satellite Used	07		Sv on Channel 1
Satellite Used	02		Sv on Channel 2
...
Satellite Used			Sv on Channel 66
PDOP	2.95		Position Dilution of Precision
HDOP	2.05		Horizontal Dilution of Precision
VDOP	2.12		Vertical Dilution of Precision
GNSS System Identifier	1		See Table 3-3
Check sum	*0E		
<CR> <LF>			End of message termination

Table 3-1:

Value	Description
1	Fix not available
2	2D
3	3D

Table 3-2:

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

Table 3-3:

Value	Description
1	GPS positioning system
2	GLONASS positioning system
3	Galileo positioning system
4	Beidou positioning system

3.3 GSV-GNSS Satellites in View

\$xxGSV,2,1,06,02,06,240,35,06,42,255,43,22,,,34,30,24,198,45,0*52

\$xxGSV,2,2,06,42,51,128,36,50,46,123,38,0*63

Table 4: GGA Data Format

Name	Example	Units	Description
Message ID	\$xxGSV		GSV protocol header
Number of Message	2		Range 1 to 3
Message Number	1		Range 1 to 3
Satellites in View	06		
Satellite ID	02		Channel 1(Range 1 to 66)
Elevation	06	degrees	Channel 1(Maximum 90)
Azinmuth	240	degrees	Channel 1(True, Range 0 to 359)
SNR(C/NO)	35	dBHz	Range 0 to 99,null when not tracking
...			...
Satellite ID	06		Channel 4(Range 1 to 66)
Elevation	42	degrees	Channel 4(Maximum 90)

Azimuth	255	degrees	Channel 4(True, Range 0 to 359)
SNR(C/NO)	43	dBHz	Range 0 to 99, null when not tracking
Checksum	*52		
<CR> <LF>			End of message termination

Depending on the number of satellites tracked multiple messages of GSV data may be required.

3.4 RMC-Recommended Minimum Specific GNSS Data

\$xxRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13,309.62, 120598,, *10

\$xxRMC,062411.00,A,2238.52974,N,11401.96571,E,0.099,,280716,,,A,V*11

Table 5: RMC Data Format

Name	Example	Units	Description
Message ID	\$xxRMC		RMC protocol header
UTS Position	062411.00		hhmmss.ss
Status	A		A=data valid or V=data not valid
Latitude	2238.52974		ddmm.mmmmm
N/S Indicator	N		N=north or S=south
Longitude	11401.96571		dddmm.mmmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.099	Knots	
Course Over		Degrees	True
Date	280716		Dummy
True course of the earth		Degrees	East offset (E), subtract from true heading
True course of the earth		Degrees	West to offset (W), and true course addition.
Mode indication	A		See Table 5-1
Navigation state	V		See Table 5-2
Checksum	*11		
<CR> <LF>			End of message termination

Table 5-1: Mode 1

Value	Description
A	Autonomous Mode
D	Difference mode
E	Estimate (dead reckoning) mode
M	Manual input mode
S	Simulator mode
N	Null data

Table 5-2: Mode 2

Value	Description
S	Safe: mode corresponds to the level of accuracy, integrity is available and meet the requirements of actual navigation mode and the computation time of the effective position of traditional plane is less than 1s, for high speed aircraft is less than 0.5s
C	Caution: Integrity is not available.
U	Unsafe: navigation mode selection accuracy level, or good usability, but beyond the actual navigation mode, or new effective position can't be within the specified time calculation (1s for traditional aircraft, high-speed aircraft is 0.5s).
V	The navigation status is not valid and the device cannot provide navigation status indication.

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