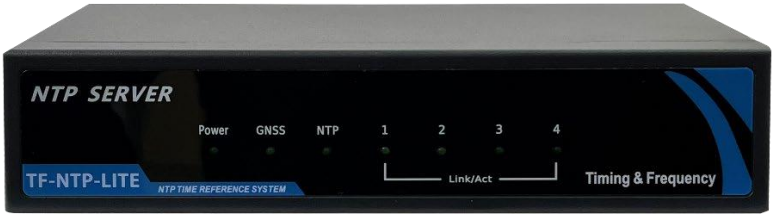
NETWORK TIME SERVER

GF-NTP-LITE

USER GUIDE



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1 Introduction

The GF-NTP-LITE is a stratum 1 NTP server with an integrated GNSS receiver. It provides NTP, 1PPS and TOD timing outputs. The NTP server uses GNSS (Global Navigation Satellite Systems) signals from GPS, GLONASS, Beidou, and QZSS as the primary time source for synchronization.

The time server can use its built-in, TCXO (temperature compensated crystal oscillator) as autonomous time base for providing several hours of accurate holdover in case that GNSS signals are not available.

The time server has 4 ethernet ports isolated physically, the ports have no communication with each other to ensure network security.

The time server has small size in a rack-mountable enclosure, convenient installation, ultra-low power consumption.

2 Key Features

- 6000 transaction/second for every port
- NTP accuracy 0.5-2ms
- 4 ethernet ports with full physical isolation to ensure network security
- TCXO (temperature compensated crystal oscillator)
- Web UI monitoring and management
- Multi-GNSS receiver (GPS, GLONASS, Beidou and QZSS)
- NTP v2 (RFC 1119)，NTP v3 (RFC 1305)，NTP v4 (RFC5905)
- SNTP v3 (RFC 1769), SNTP v4 (RFC 2030)
- NTP md5 authentication
- NTP Unicast and Broadcast mode
- 1PPS output
- 1 RS-232 serial port with ToD output (NMEA ZDA or RMC)
- GPSd is supported via ethernet port 1 (TCP protocol, port 4001)
- 9 ~ 60 VDC
- Power consumption <5W

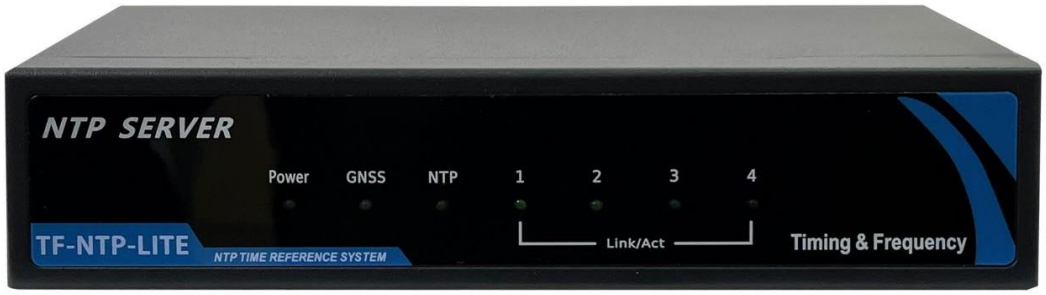
3 Mechanical Size

Without extension plate: 200 W × 44.5 H × 100 D (mm)

With extension plate: 482 W × 44.5 H × 100 D (mm)

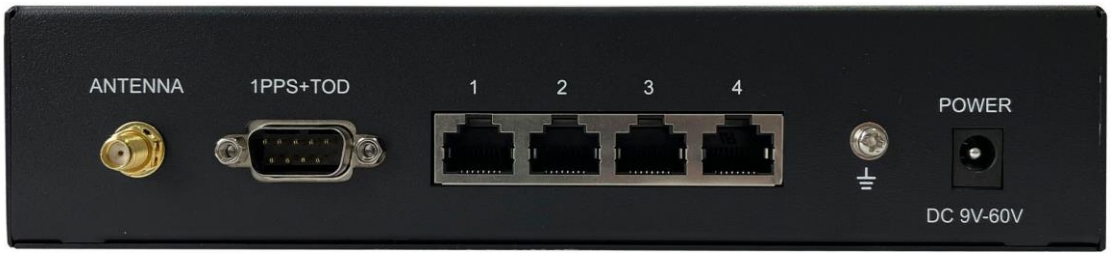
4 Physical Specifications

4.1 Front panel



Item	Label	Comment
1	Power	Power indication
2	GNSS	GNSS position valid indication ON - Valid, OFF - Invalid
3	NTP	NTP service state ON - Active, OFF - Stop
4	1	Ethernet port 1 state ON – Link ok, Blink – TX/RX activity, OFF – Link down
5	2	Ethernet port 2 state ON – Link ok, Blink – TX/RX activity, OFF – Link down
6	3	Ethernet port 3 state ON – Link ok, Blink – TX/RX activity, OFF – Link down
7	4	Ethernet port 4 state ON – Link ok, Blink – TX/RX activity, OFF – Link down

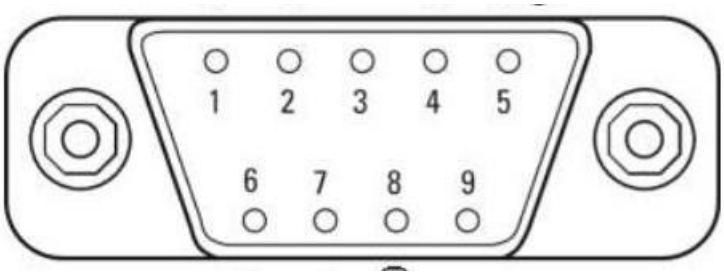
4.2 Back panel



Item	Label	Comment
1	ANTENNA	GNSS input, SMA connector
2	1PPS+TOD	1PPS and TOD output 1PPS with LVTTL 3.3V, TOD with RS232 level
3	1 (Ethernet port)	RJ45 connector, 10BASE-T/100BASE-TX Default IP: 192.168.0.101
4	2 (Ethernet port)	RJ45 connector, 10BASE-T/100BASE-TX Default IP: 192.168.0.102
5	3 (Ethernet port)	RJ45 connector, 10BASE-T/100BASE-TX Default IP: 192.168.0.103
6	4 (Ethernet port)	RJ45 connector, 10BASE-T/100BASE-TX Default IP: 192.168.0.104
7	⏚	Ground
8	POWER	9V ~ 60V DC input

4.3 1PPS+TOD

1PPS and TOD output via the male DB9 connector, below table is the pin assignment.



Pin	Name	Comment	Type	Levels
1	1PPS	1PPS output	Output	3.0-3.6V
2	RXD	Data Receive	Input	RS-232
3	TXD	Data Transmit	Output	RS-232
4	-	-	-	-
5	GND	Ground	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-

5 GNSS Antenna Placement

The antenna receives the GNSS satellite signals and passes them to the receiver. The GNSS signals are spread spectrum signals in the 1575 MHz to 1610 MHz range and do not penetrate conductive or opaque surfaces. Therefore, **the antenna must be located outdoors with a clear view of the sky.**

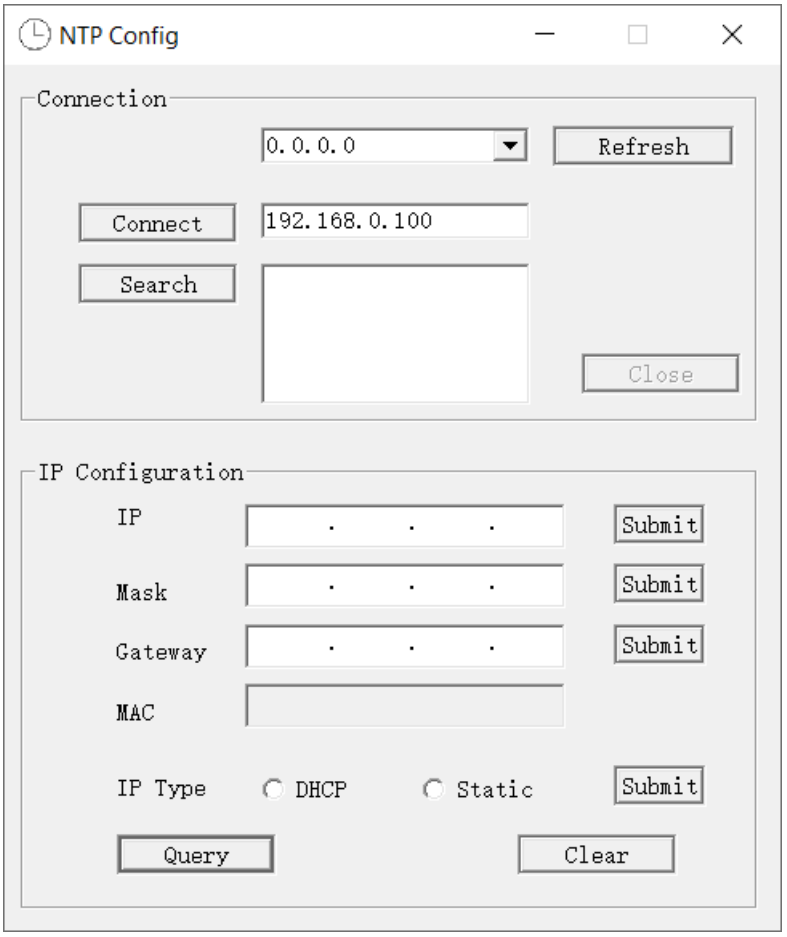
GNSS signals can only be received on a direct line of sight between antenna and satellite. The antenna should see as much as possible of the total sky. Seen from the northern hemisphere of the earth, more satellites will be visible in the southern direction rather than in northern direction. The antenna should therefore have open view to the southern sky. If there are obstacles at the installation site, the antenna should be placed south of the obstacles, preferably, in order not to block sky-view to the south.

If the installation site is in the southern hemisphere of the earth, then the statements above are reversed – more satellites will be visible in the northern direction. Near to the equator, it doesn't matter.

6 IP Configuration with Software

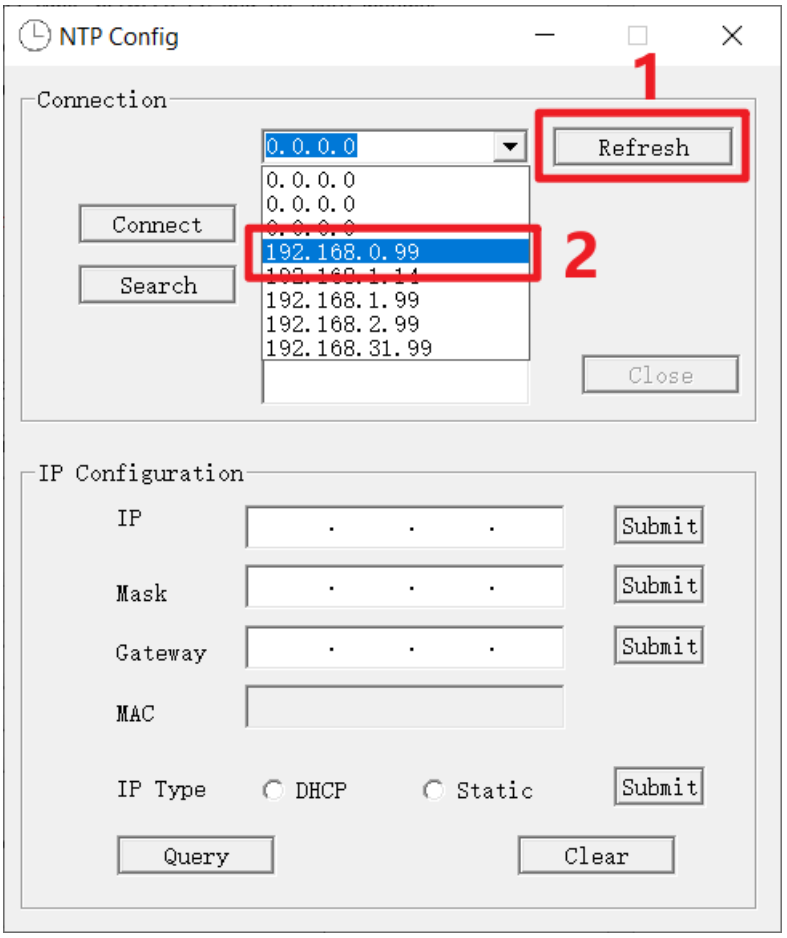
Prepare a PC and plug the ethernet cable between PC and the corresponding ethernet port which to be configured. For example, if you want to configure the IP address of ethernet port 2, then should connect the cable to it. The IP configuration software looks like below picture.

The default subnet is 192.168.0.X for this NTP server, so the IP address of the PC must been set to the same subnet before the configuration.



1. Click the Refresh button

2. Select the IP which connected to NTP server port from the list box

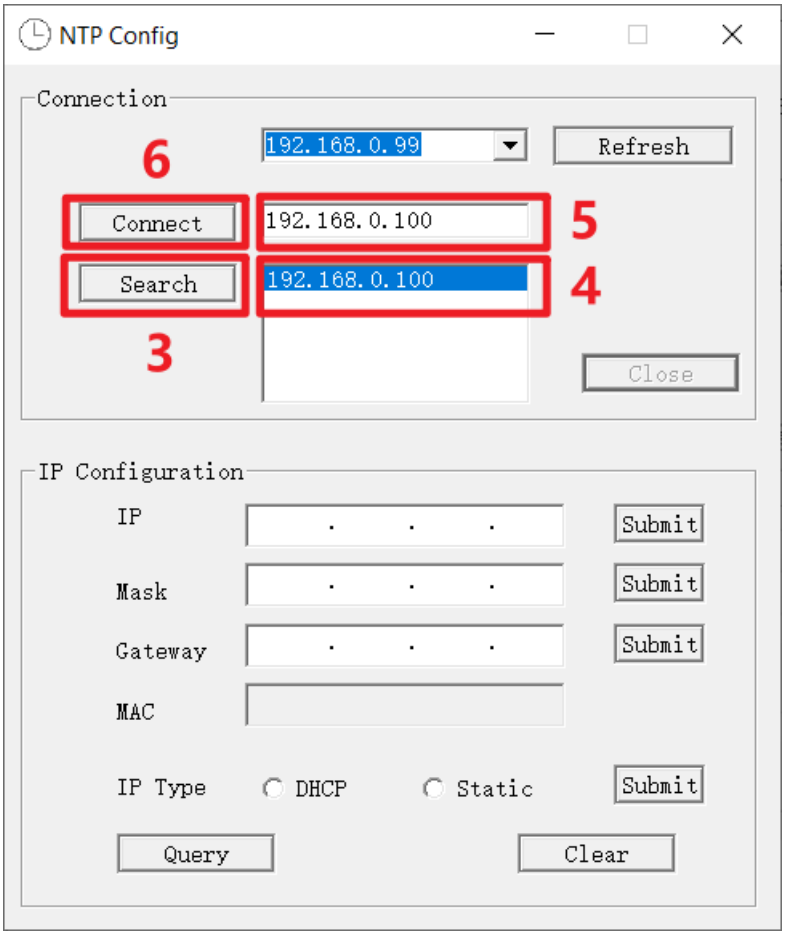


3. Click the search button

4. The IP address will be scanned on the edit box

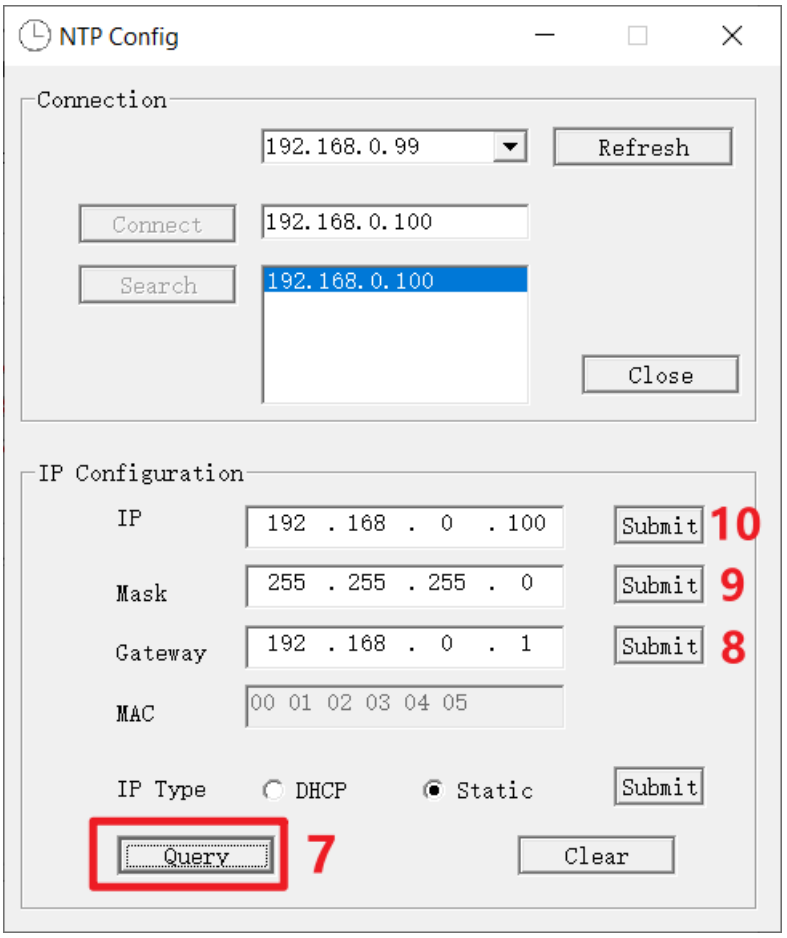
5. Input the scanned the IP address on the edit box right of connect button

6. Click the connect button



7. Click the Query button

8. Edit the value on the IP edit box, and then click the set button to modify the IP. The suggested modification order is Gateway - > Mask - > IP address



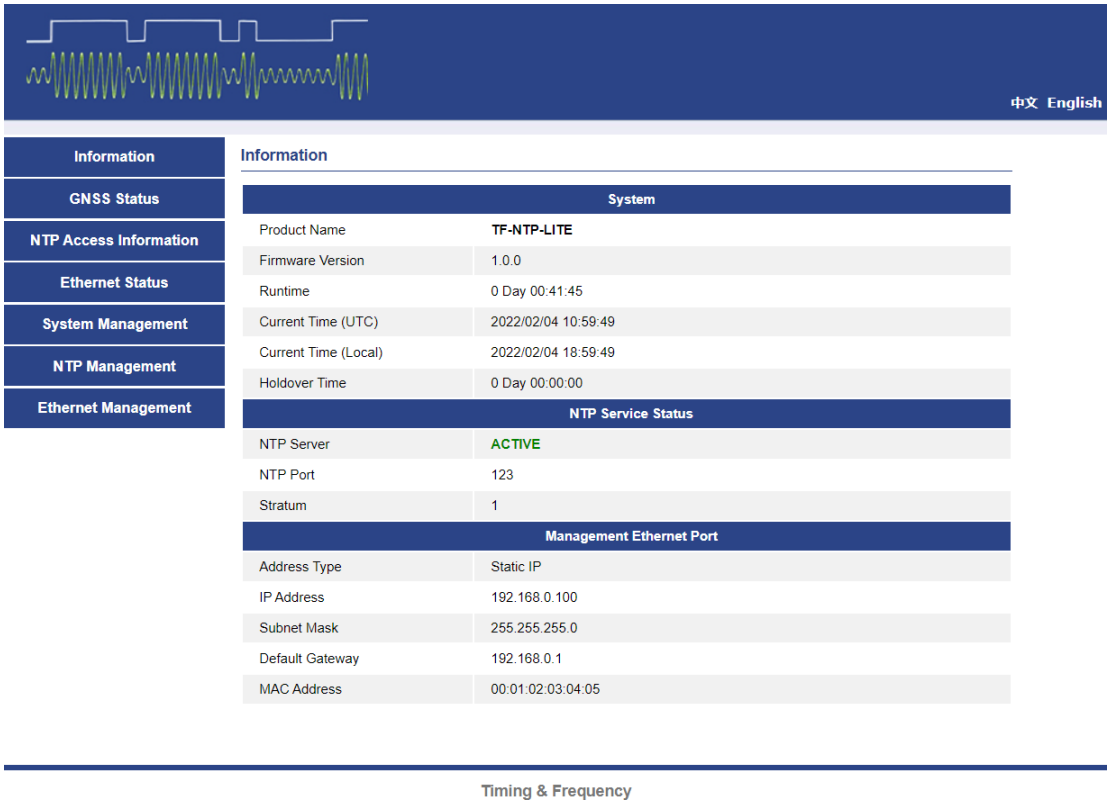
Note: If you want to check the configuration then click the Close button and reconnect the port from step 1 and query the IP parameters.

7 Web Interface

7.1 Main Page

Web access is permitted only through Ethernet port 1. Launch a web browser and open a connection to the NTP Server by entering the URL that specifies the IP address, http://192.168.0.101 with username admin, password admin by default. Internet Explorer is not supported, Firefox, and Chrome are recommended.

Entering the IP address will launch the main page.

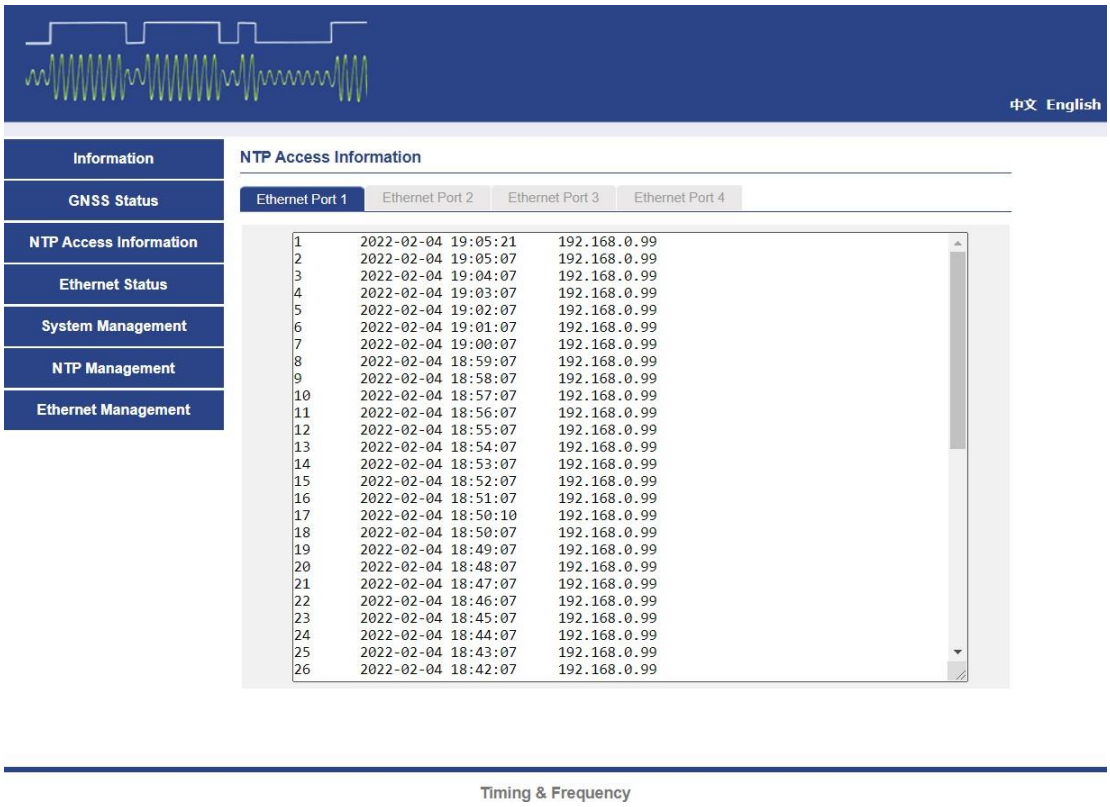


7.2 GNSS Status

The antenna connection, constellation, satellites tracking, and position information can be viewed on the GNSS status page.

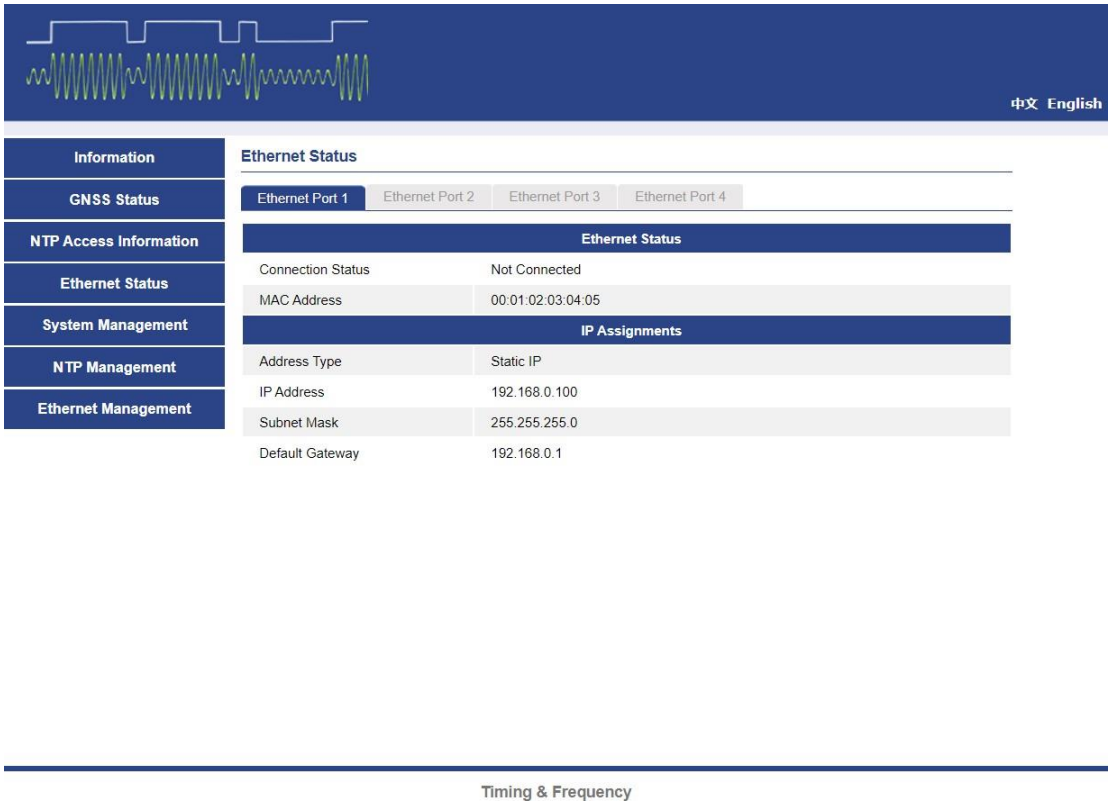
7.3 NTP Access Information

The NTP clients access information can be viewed on this page.



7.4 Ethernet Status

The connection status and IP address configuration can be viewed on this page.



7.5 System Management

7.5.1 System

Timing Service:

By default, this NTP server will allow the timing service for a period of 24 hours from loss of the GNSS. The NTP service can be enabled when GNSS available only.

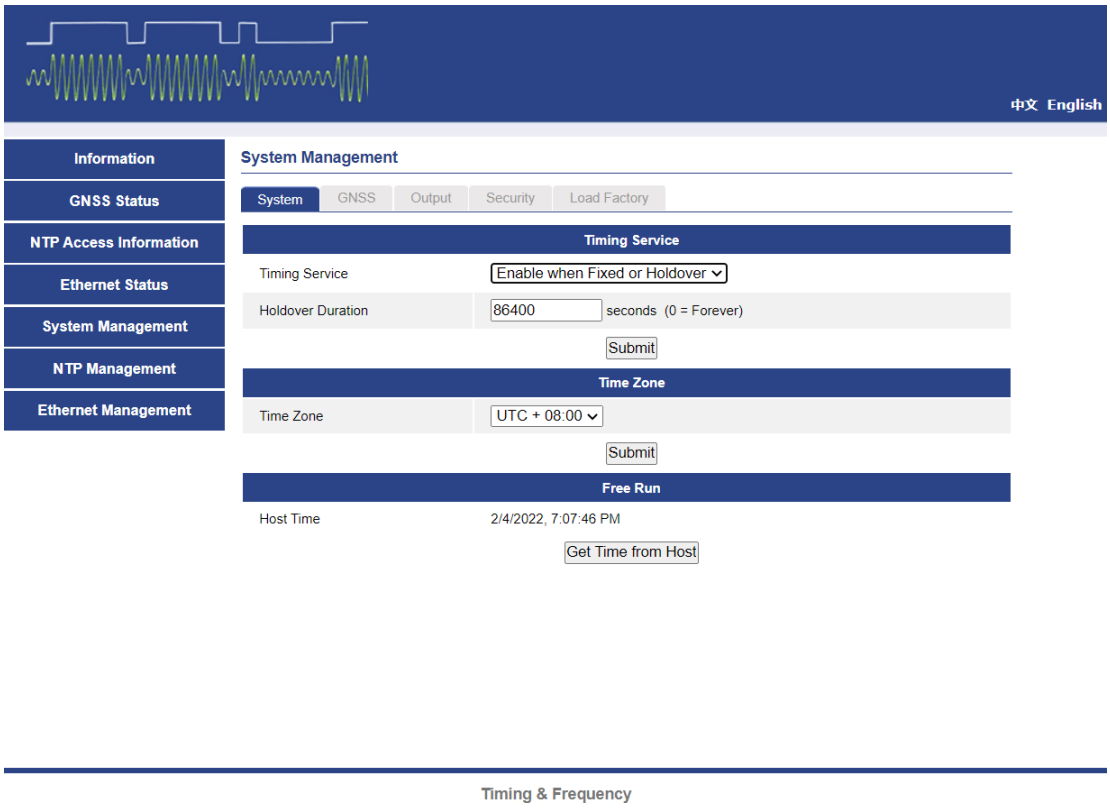
The holdover duration is adjustable in ‘seconds’ increments. To always allow time dissemination and always consider the internal clock source “valid”, set the duration to a value of zero “0”

Time Zone:

The time zone is UTC+8 by default.

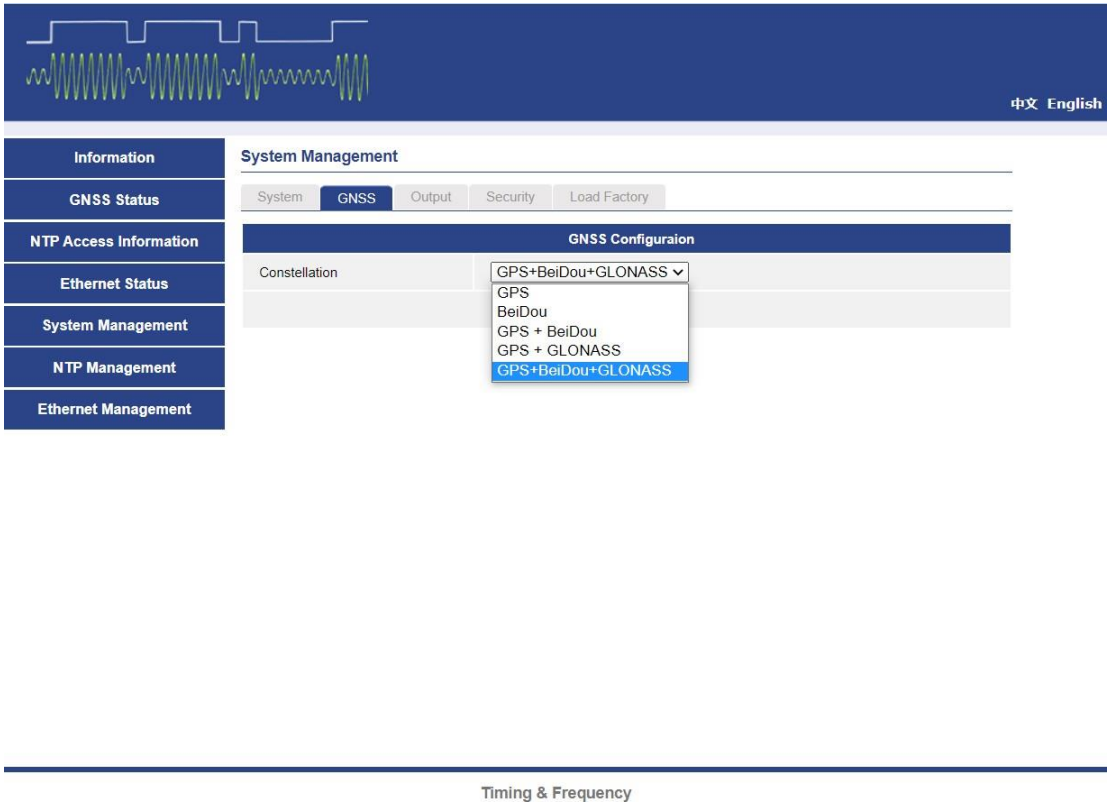
Free Run:

When the time cannot be received from GNSS, the time can be configured manually from local PC and provide NTP service.



7.5.2 GNSS

The constellation can be configured as GPS only, BeiDou only, GPS + BeiDou, GPS + GLONASS, GPS + GLONASS + BeiDou.



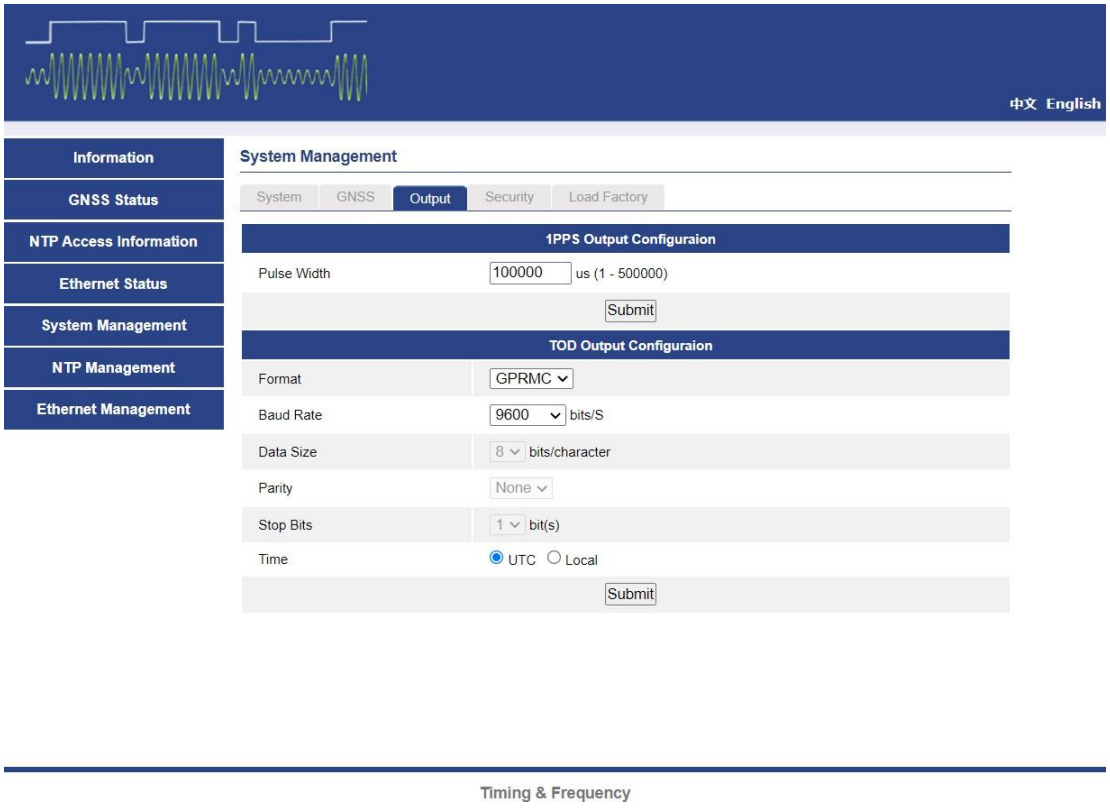
7.5.3 Output

1PPS Output:

The pulse width is 100 000 us by default, the value range is 1-500000 us.

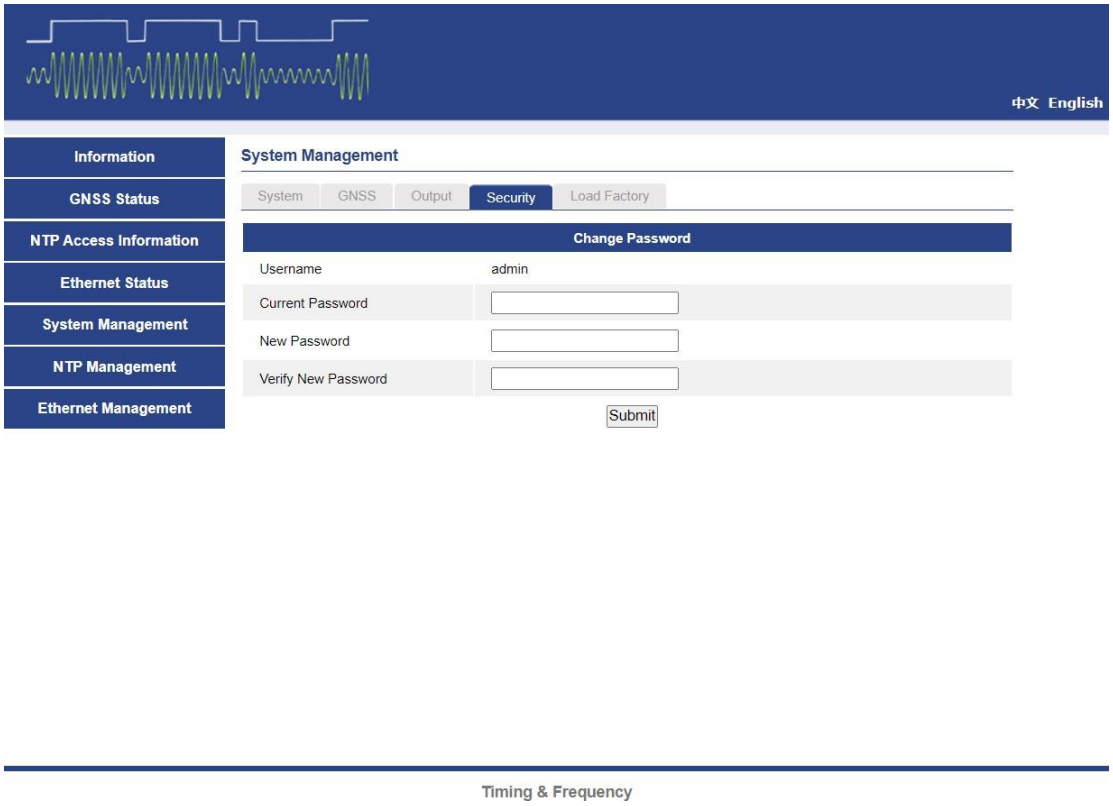
TOD Output:

The TOD format is GPRMC or GPZDA, baud rate is 9600 by default, the date size, parity and stop bits are not configurable. The time can be configured as UTC or local.



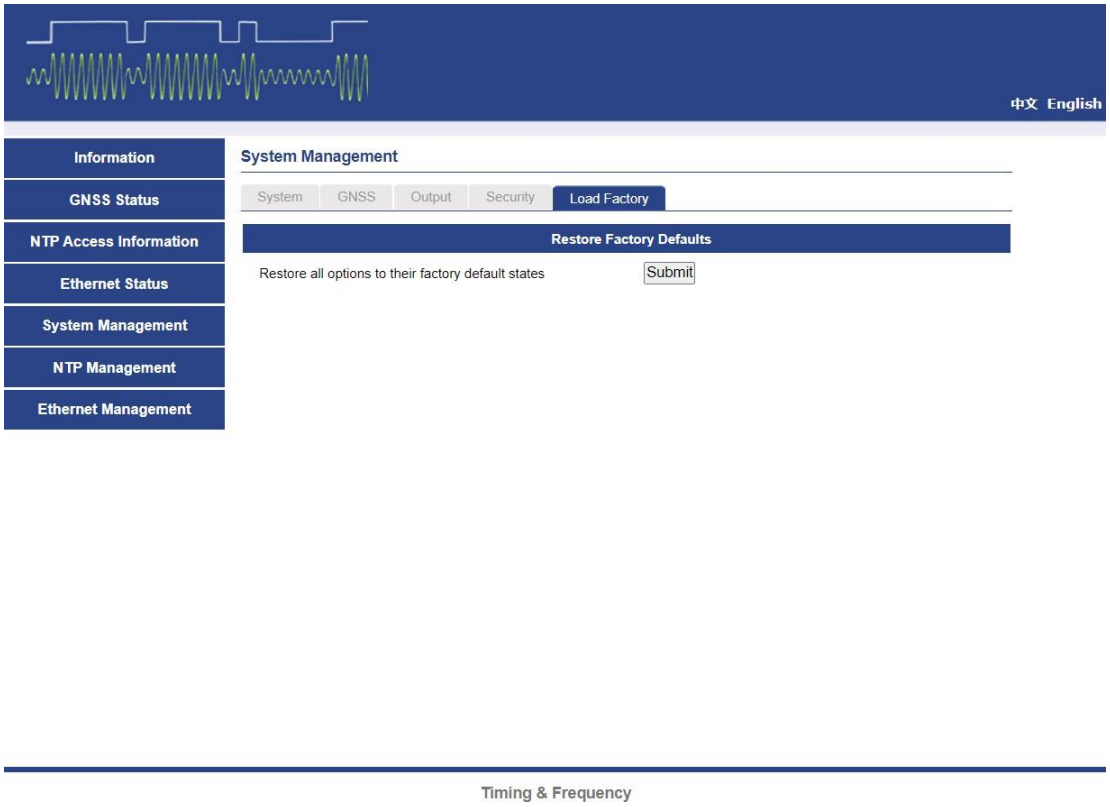
7.5.4 Security

The password can be changed on this page, please note that the default login name is admin, and can't be modified.



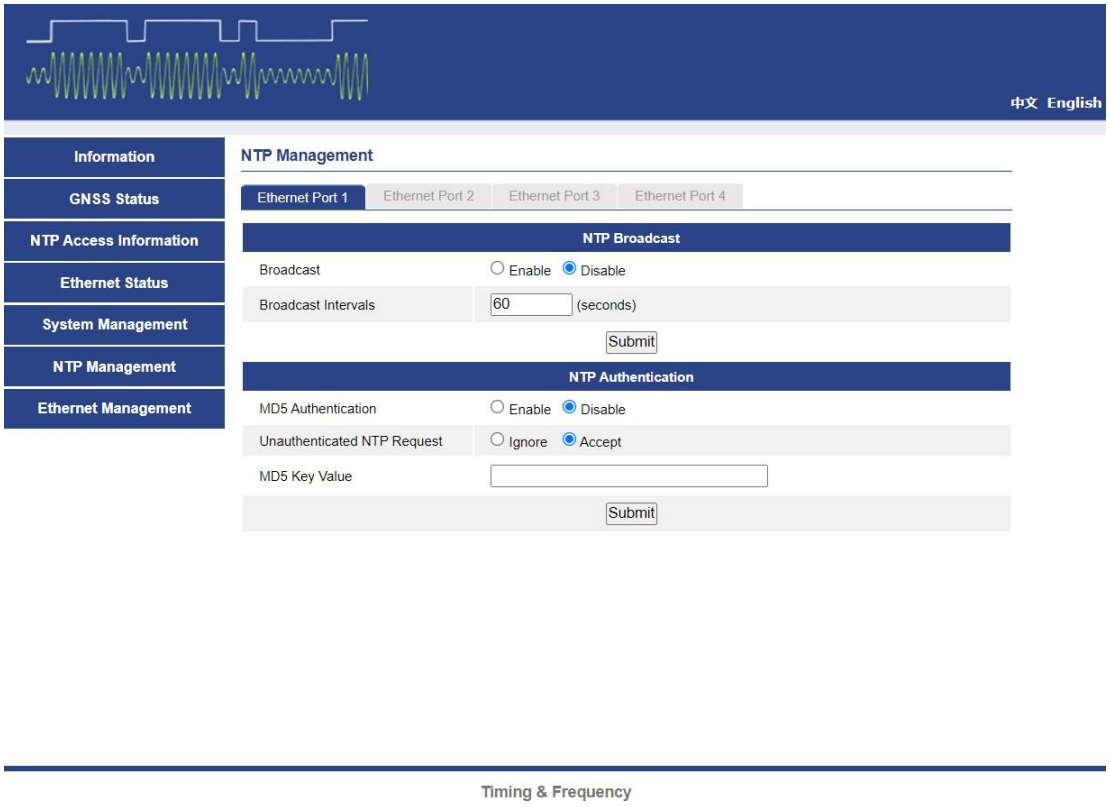
7.5.5 Load Factory

The configuration can be restored to factory default on this page.



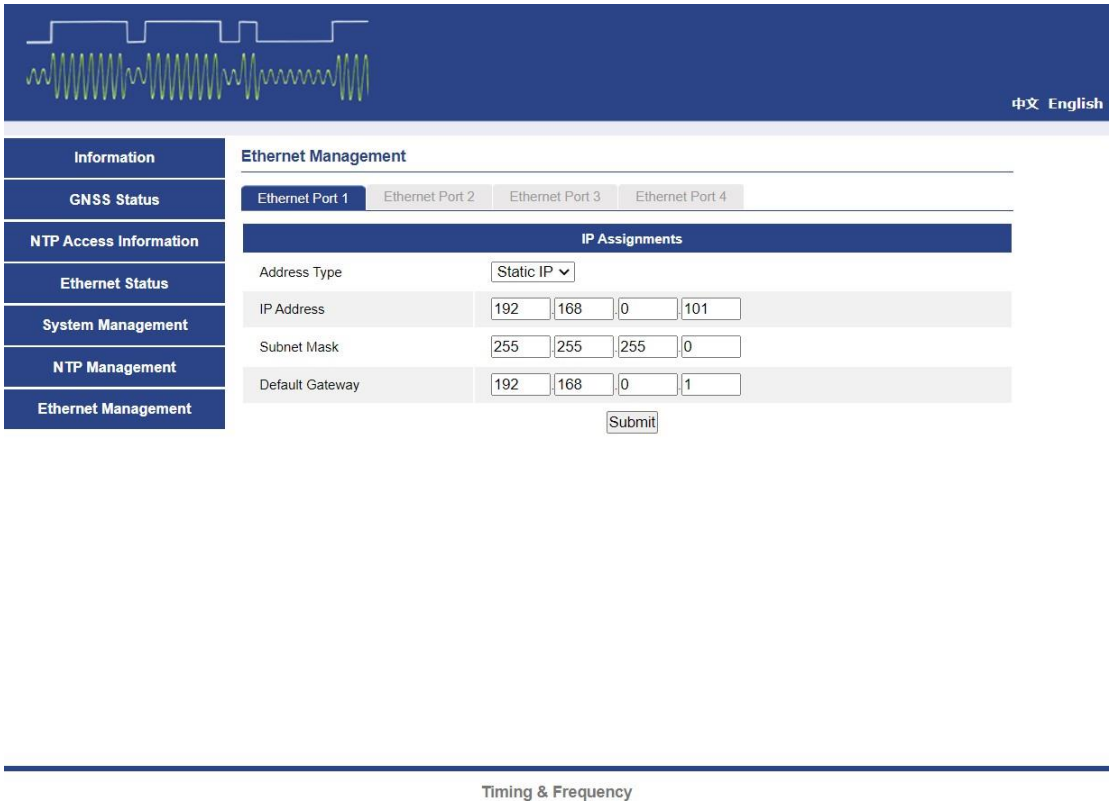
7.6 NTP Management

NTP broadcast and authentication of all ethernet ports can be configured on this page.



7.7 Ethernet Management

The IP address of all ethernet ports can be configured on this page.



8 Specification

NTP

Parameter	Description
Interface	10BASE-T/100BASE-TX Conforms to the IEEE 802.3
Connector	RJ-45 × 4
Accuracy	0.5-2ms
Standard	NTP v2 (RFC 1119) NTP v3 (RFC 1305) NTP v4 (RFC5905) SNTP v3 (RFC 1769) SNTP v4 (RFC 2030)
MD5 Authentication	Yes
NTP Broadcast	Yes

1PPS

Parameter	Description
Connector	DB9 male
Level	3.3V LVTTL
High Level Width	100ms (default)
Rising Edge	⩽5ns
Timing Accuracy	⩽50ns (1σ)
Holdover	⩽1s (7 days)

TOD

Parameter	Description
Connector	DB9 male
Level	RS232
Format	GPRMC or GPZDA
Baud Rate	9600 (default)

GNSS Receiver

Parameter	Description
Constellation	GPS L1 Beidou B1 GLONASSL1 QZSS L1
Antenna Power Feed	3.3V
Horizontal Position Accuracy	<2.5 m CEP50 (autonomous) <2 m CEP50 (SBAS)
Vertical Position Accuracy	<5 m CEP50 (autonomous) <3 m CEP50 (SBAS)
Time to First Fix	<46s (50%), <50s (90%) cold start
Sensitivity	Tracking: -160 dBm Acq: -148 dBm
Dynamic	Velocity 515m/s

Power

Parameter	Description
DC Input Voltage	9 ~ 60 VDC
Power Consumption	< 5W

Environmental

Parameter	Description
Operating Temperature	-20 ~ 60℃
Storage Temperature	-45 ~ 85℃
Operating Humidity	5% ~ 95% RH (non-condensing)
Storage Humidity	5% ~ 95% RH (non-condensing)