



ED-GWL501

AN INDOOR LIGHT GATEWAY BASED ON RASPBERRY PI ZERO 2 W
DESIGN

Shanghai EDA Technology Co.,Ltd
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1 Product Overview

ED-GWL501 is an indoor light gateway designed based on Raspberry Pi Zero 2 W. This product uses the LoRa gateway module of the new generation SX1302 and SX1303 baseband chips, which has the characteristics of long transmission distance, large node capacity and high receiving sensitivity. In addition, this gateway has strong performance, light structure and simple deployment, which can greatly simplify and shorten your development threshold and design time.

1.1 Target Application

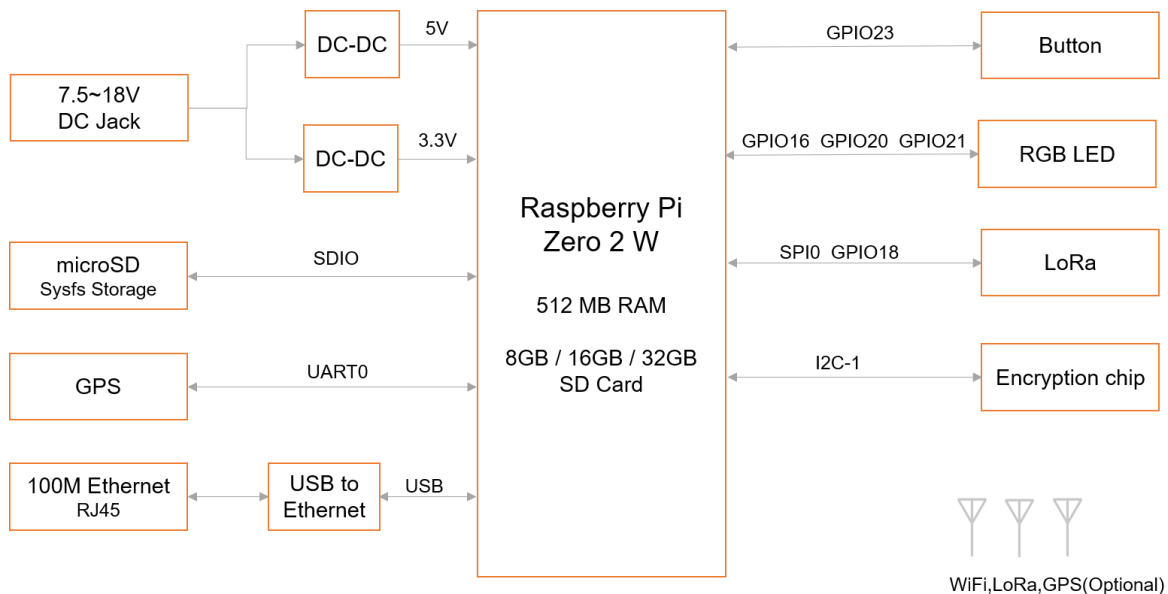
- LoRa intelligent gateway
- Industrial control
- Smart manufacturing
- Intelligent city
- Intelligent transportation

1.2 Specifications and Parameters

Function	Parameters
CPU	Broadcom BCM2710A1 4 core, ARM Cortex-A53, 1GHz, 64bit CPU
Memory	512MB SDRAM
SD card	micro SD Card
Ethernet	1x 10/100M Ethernet
WiFi / Bluetooth	2.4GHz 802.11 b/g/n WiFi, Bluetooth 4.2, Support BLE
LoRa	SX1303+SX1250
	868 ~ 870 MHz (EU868, IN865, RU864)
	902 ~ 928 MHz (US915, AU915, KR920, AS923-1/2/3)
Security	Embedded ATECC608A security chip
GPS	Support multi-satellite system
	- GPS L1 C/A: 1575.42 ±1.023 MHz
	- BeiDou B1I: 1561.098 ±2.046 MHz
	- GLONASS L1: 1597.78~1605.66 MHz
Button	1x User Button
LED Indicator	1x RGB LED
Power input	7.5V ~ 18V

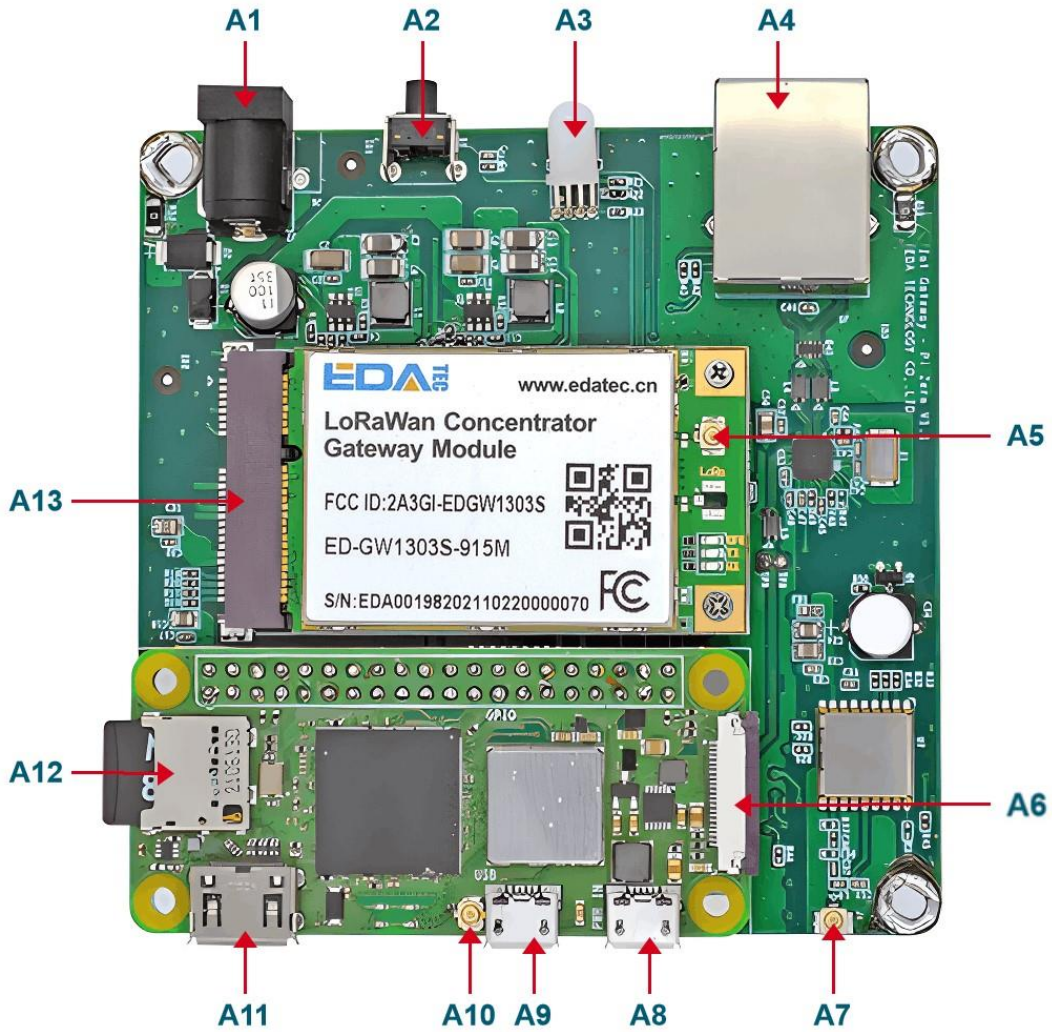
Function	Parameters
Antenna accessory	WiFi/BT external antenna, which has passed wireless authentication together with Raspberry Pi Zero 2 W.
	1x 2.5dBi LoRa Antenna [option]
	1x GPS Antenna [option]
Working environment temperature	-25 ~ 50°C
OS	Compatible with official Raspberry Pi OS, provides BSP software support package, and supports online installation and update of APT.
Software resources	Provide example guidance for LoRaWAN networks such as ChipStack.
Dimensions	105(L) x 90(W) x 25(H) mm
Certification	CE / FCC
OTA	Support online updating BSP

1.3 System Diagram



ED-GWL501

1.4 Functional Layout

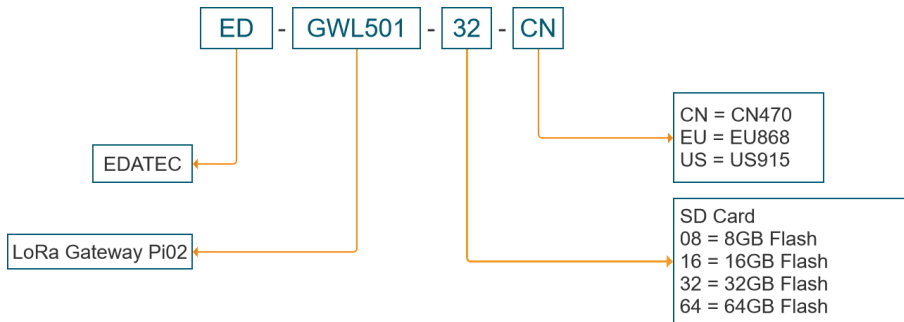


Item	Function Description	Item	Function Description
A1	12V DC power socket	A9	USB OTG port
A2	Key	A10	IPX connector of WiFi/BT antenna
A3	RGB LED	A11	Mini HDMI port
A4	Ethernet RJ45 port	A12	Micro SD slot
A5	LoRa antenna IPX connector	A13	LoRa mini-PCle port
A6	CSI port		
A7	IPX connector of GPS antenna		
A8	Micro USB Power supply port		

1.5 Packing List

- 1x ED-GWL501 host
- [option] WiFi/BT antenna
- [option 4G version] 1x 4G/LTE antenna

1.6 Order Code



Example

Part# : ED-GWL501-32-CN

Configuration : GWL501 LoRa Gateway

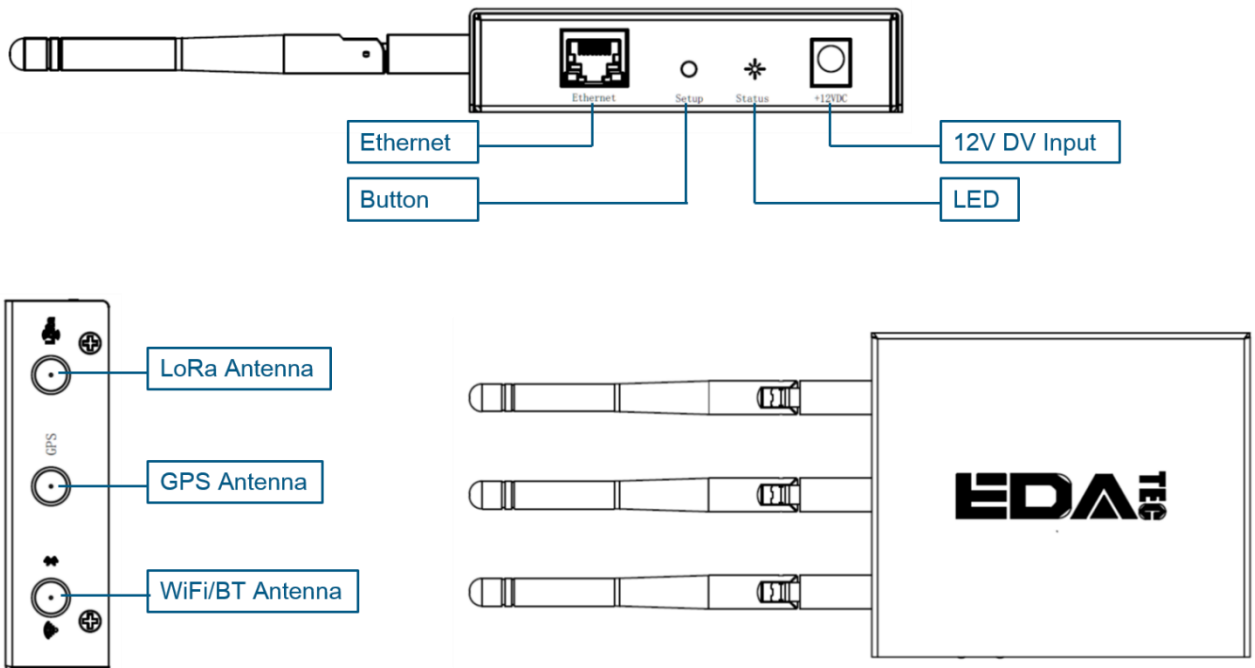
1pcs Raspberry Pi Zero 2 W certified WiFi/Bluetooth Antenna

512MB SDRAM and 32GB SD Card Flash

CN470 LoRa Module

2 Product Appearance and Structure

2.1 Product Appearance

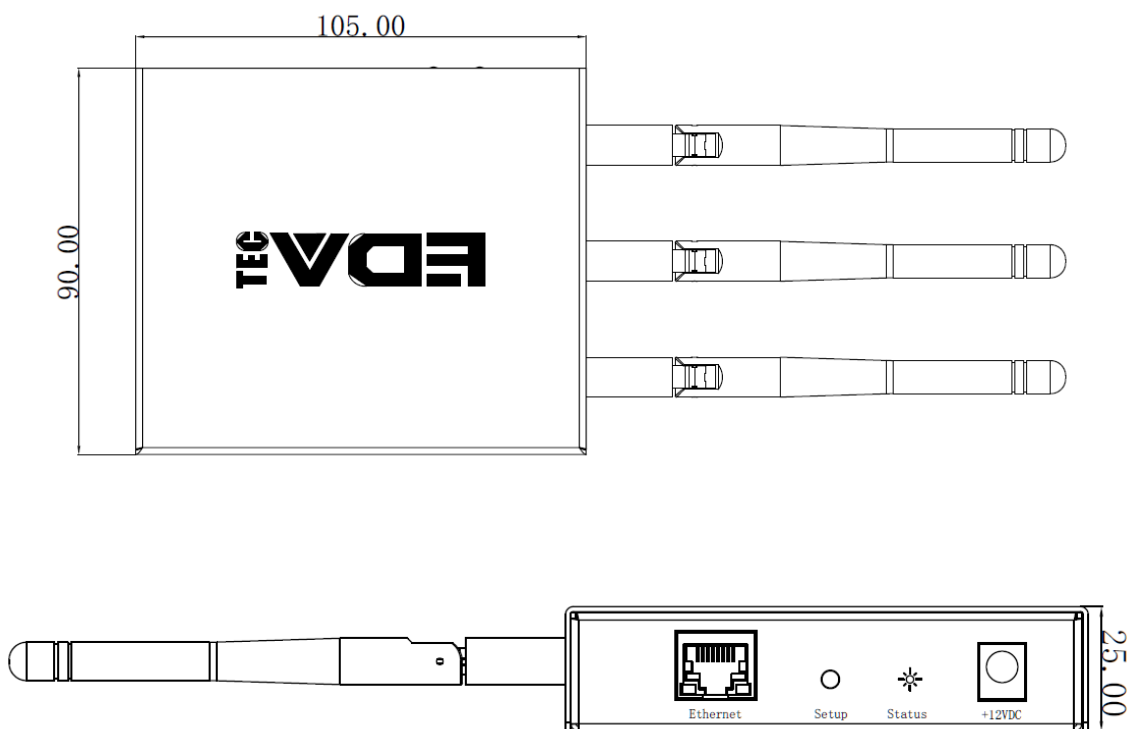


2.2 Product Photo



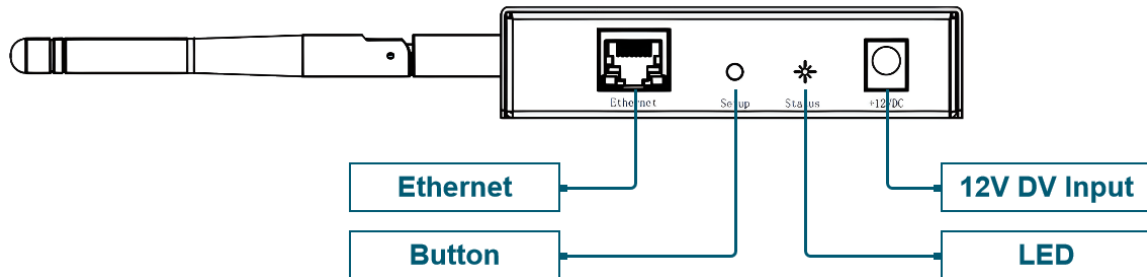
2.3 Dimensions

unit: mm, tolerance: $\pm 0.1\text{mm}$



3 Interfaces and Connectors

3.1 Front Panel



3.1.1 Power Input

The standard input power supply of ED-GWL501 is 12V@1A.

WARN: The power range supported by the input power supply is 7.5V~18V.

3.1.2 Indicator Light

ED-GWL501 has an RGB tricolor LED indicator.

#	RGB LED	PIN
1	Blue	GPIO16
2	Green	GPIO20
3	Red	GPIO21

3.1.3 User Button

ED-GWL501 has a user button, which is connected to GPIO23 of CPU. By default, it is at high level, and when the button is pressed, this pin is at low level.

#	Signal	PIN
1	Button	GPIO23

3.1.4 Ethernet

ED-GWL501 has an adaptive 10/100Mbps Ethernet interface, with the screen-printed logo: Ethernet, which is extended by the built-in USB interface.

	Pin ID	Pin Name
	1	Tx+
	2	Tx-
	3	Rx+
	4	-
	5	-
	6	Rx-
	7	-
	8	-

4 Internal Interface

4.1 micro SD

There is a micro SD card slot on ED-GWL501, and the SD card is used for main file system storage.

4.2 mini-PCle Interface

The Mini PCIe interface of ED-GWL501 is specially used to extend the LoRa module.

LoRa module is mounted on SPI bus. Before using it, it is necessary to confirm that the device has enabled SPI. By default, the device mapped by LoRa module in the system is /dev/spidev0.0, and the reset function of LoRa module is controlled by GPIO18.

LoRa mini-PCle pin are defined as follows:

	Pin ID	Pin Name	Pin ID	Pin Name	Pin ID	Pin Name
	1	NC	21	GND	41	3V3
	2	3V3	22	LoRa_Reset	42	NC
	3	NC	23	NC	43	GND
	4	GND	24	3V3	44	NC
	5	NC	25	NC	45	LoRa_SCK
	6	NC	26	GND	46	NC
	7	NC	27	GND	47	LoRa_MISO

	8	NC	28	NC	48	NC
	9	GND	29	GND	49	LoRa_MOSI
	10	NC	30	NC	50	GND
	11	NC	31	NC	51	LoRa_CSN
	12	NC	32	NC	52	3V3
	13	NC	33	NC	53	GND
	14	NC	34	GND	54	GND
	15	GND	35	GND		
	16	NC	36	NC		
	17	NC	37	GND		
	18	GND	38	NC		
	19	GPS PPS	39	3V3		
	20	NC	40	GND		

LoRa module reset pin definition:

#	Signal	Pin
1	LoRa_Reset	GPIO18

4.3 GPS

The ED-GWL501 gateway integrates L76K GPS module, which is AGNSS module that supports multi-satellite systems (GPS, BeiDou, GLONASS, QZSS), multi-system joint positioning and single-system independent positioning, supports agnss function, has built-in low-noise amplifier and acoustic surface filter, and can provide users with fast, accurate and high-performance positioning experience.

- GPS L1 C/A: 1575.42 ±1.023 MHz
- BeiDou B1I: 1561.098 ±2.046 MHz
- GLONASS L1: 1597.78~1605.66 MHz

The communication interface of GPS module is UART serial port, and the default baud rate is 9600bps, which is connected with UART0 of ED-GWL501 equipment. 1PPS function is supported, and 1PPS output signal is connected with PPS pin of LoRa module.

The WakeUp signal of L76K GPS module is connected to GPIO19. If the pin module is pulled down, it will enter standby mode, and if it is pulled up or suspended, it will return to continuous mode. The Reset signal is connected to GPIO26. Pulling this pin low for 100ms will reset the module. SET signal is connected with GPIO13, which is used to configure the satellite combination. When the pin is suspended

or high level, the satellite combination is GPS and Beidou, and when the pin is low level, the satellite combination is GPS and GLONASS.

#	Signal	CM4 Pinout
1	GPS_WakeUp	GPIO19
2	GPS_Reset	GPIO26
3	GPS_Set	GPIO13

4.4 IPEX-1 Connector

Inside the ED-GWL501 gateway, there is an IPEX-1 connector on the Pi Zero 2 W core board, the LoRa module and the main board, which correspond to the ports of WiFi/BT antenna, LoRa antenna and GPS antenna respectively.

The specifications of the connector are as follows:

Recommended P/N	20279-001E-03	
PART NO.	PACKING REEL	QUANTITY IN 1 REEL
20279-001E-01	PLASTIC REEL	2,500
	CORRUGATED PAPER REEL	2,500
20279-001E-03	PLASTIC REEL	5,000
20279-001E-05	PLASTIC REEL	10,000

NOTES

- APPLICABLE CONNECTOR PART NO.
MHF I PLUG
20278-11*R-**-
20351-***R-37
20631-***R-**-
20670-001R-**-
20767-001R-20
MHF II PLUG
20311-011R-**-
20686-001R-08
- COPLANARITY: 0.1mm MAX.
- THIS IS "Pb-FREE" CONNECTOR.

3	GROUND CONTACT	PHOSPHOR BRONZE	ALL OVER Ni 1.00 μm MIN. CONTACT PART Au 0.05 μm MIN. SOLDERING PART Au 0.05 μm MIN.
2	CONTACT	BRASS	ALL OVER Ni 1.00 μm MIN. CONTACT PART Au 0.10 μm MIN. SOLDERING PART Au 0.03 μm MIN.
1	HOUSING	LCP	UL94V-0. WHITE

NO.	DISCRIPTION	MATERIAL	FINISH	REMARKS	
27	Z210232	S.T	2021/03/08	M.T	ANGLE ±2° 6 OVER 30 MAX. ±0.3
26	Z200434	TOI	2020/04/20	Y.H	6 MAX. ±0.2 30 OVER 120 MAX. ±0.5
25	Z200282	TOI	2020/03/05	Y.H	GENERAL TOLERANCE.
24	Z191405	Y.F	2019/10/23	Y.S	DWG. DATE
23	Z181523	M.N	2018/11/20	Ken	CHK. K.Oobayashi 2001/06/07
22	Z180765	M.N	2018/10/30	Ken	APP. E.Kawabe 2001/06/07
REV.	ECN	BY	DATE	APP.	APP.
					REVISION RECORD
					K.Katabuchi 2001/06/07

*LENGTH: 4.0±0.4 AT PLUG PART NO. 20670-001R-08, 20670-001R-13, 20670-001R-32
4.7±0.4 AT PLUG PART NO. 20670-001R-18, 20670-001R-37
5.6 AT PLUG PART NO. 20767-001R-20 (REFERENCE DIMENSION)
3.8±0.3 AT PLUG PART NO. 20686-001R-08, 20311-011R-**-

*MATING HEIGHT: 2.5 MAX. AT PLUG PART NO. 20670-001R-**-
3.0 MAX. AT PLUG PART NO. 20767-001R-20
2.0±0.1 AT PLUG PART NO. 20686-001R-08, 20311-011R-**-

MATING CONDITION

PROJECTION	SERIES No.	SCALE
	R9	10:1
		UNIT
		mm

TITLE: MHF® I/II RECEPTACLE

SCALE: 10:1

UNIT: mm

SIZE: A3

SHEET: 1/8

REV: 27

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I-PEX

5 Wireless Communication

5.1 WiFi

ED-GWL501 support 2.4G WiFi.

Parameter	Feature
Frequency range	802.11b/g/n(HT20): 2412-2472MHz 802.11n(HT40): 2422-2462MHz
Modulation system	802.11b:DSSS 802.11g/n:OFDM
Frequency Step	5M

5.2 Bluetooth

ED-GWL501 Support Bluetooth 4.2.

Parameter	Feature
Frequency range	2402-2480MHz
Modulation system	GFSK,DPSK
Frequency Step	2M

5.3 GPS

GPS module performance parameters:

Parameter	Instruction
Default satellite configuration	GPS + BeiDou
Frequency	GPS L1 C/A: 1575.42 ±1.023 MHz BeiDou B1I: 1561.098 ±2.046 MHz GLONASS L1: 1597.78~1605.66 MHz
Receiving sensitivity (GPS+BeiDou)	Capture: -147 dBm Recapture: -159 dBm Tracker: -162 dBm
TTF (AGNSS open, Real network 500 Average value of secondary test)	Cold boot: 5.5 s Warm start: 2 s Reset: 2 s
TTF (AGNSS close, Real network 500 Average value of secondary test)	Cold boot: 30 s Warm start: 2 s Reset: 2 s

Horizontal position accuracy (autonomous)	<2.0m CEP, 50%, static 2 hours, -130 dBm, More than six satellites
Refresh rate	Default 1 Hz, Highest to 5 Hz
1PPS Signal accuracy	Typical accuracy: < 30 ns Pulsewidth: 100 ms
Speed accuracy	<0.1 m/s
Dynamic property	Acceleration: 4 G
UART Port	Default baud rate: 9600 bps Used for command input and NMEA statement output.

Power consumption parameters of GPS module:

Vcc=3.3V@-130 dBm

	GPS	GPS+BeiDou	GPS+GLONASS
Capture (mA)	23	26	26
Tracking (mA)	23	26	26
Standby (uA)	20	20	20
Backup (uA)	8	8	8

5.4 Antennas

5.4.1 WiFi / BT Antenna

Parameter	Feature
Antenna type	External antenna
Frequency band	2400-2500MHz, 5150-5850 MHz
Antenna gain	2 dBi
Impedance	50 OHM

5.4.2 LoRa Antenna

868MHz Antenna

Parameter	Feature
Antenna type	External antenna
Frequency band	863-870MHz
Bandwidth	125KHz / 250KHz / 500KHz
Antenna gain	2 dBi
Impedance	50 OHM

915MHz Antenna

Parameter	Feature
Antenna type	External antenna
Frequency band	902-928MHz

Bandwidth	125KHz / 250KHz / 500KHz
Antenna gain	2 dBi
Impedance	50 OHM

5.4.3 GPS Antenna

Parameter	Feature
Antenna type	External antenna
Frequency band	1559-1609MHz
Antenna gain	2 dBi
Impedance	50 OHM

6 Electrical Characteristics

6.1 Electrical Parameters

Parameters	Minimum	Typical	Max	Unit
System power input	7.5	12	18	V
Working temperature	-25	25	50	°C
Storage temperature	-25	25	50	°C
Working environment humidity	0		90	%

7 About Us

7.1 About EDATEC

EDATEC, located in Shanghai, is one of Raspberry Pi's global design partners. Our vision is to provide hardware solutions for Internet of Things, industrial control, automation, green energy and artificial intelligence based on Raspberry Pi technology platform.

We provide standard hardware solutions, customized design and manufacturing services to speed up the development and time to market of electronic products.

7.2 Contact Us

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