

# ED-GWL2110

AN OUTDOOR GATEWAY BASED ON RASPBERRY PI CM4

Shanghai EDA Technology Co.,Ltd  
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# 1 Product Overview

ED-GWL2110 is an outdoor gateway. The whole machine is sealed with all-aluminum alloy outer box, which has good waterproof, moisture-proof, insect-proof and lightning-proof performance. It is designed based on CM4. It has SATA interface specially used for LoRa module, and supports LoRa modules with different frequency bands (external antennas with different frequency bands are required); It has a 4G module to ensure that outdoor equipment can upload and download data normally; The equipment has onboard GPS module, which can easily meet the positioning requirements; The watchdog module is provided, which can effectively prevent the equipment from being stuck and greatly increase the stability of the equipment operation; Moreover, this device is equipped with a special encryption chip, which is mounted on the I2C bus to ensure the information security of the device. The equipment is also equipped with RTC module to ensure the reliability.

## 1.1 Target Application

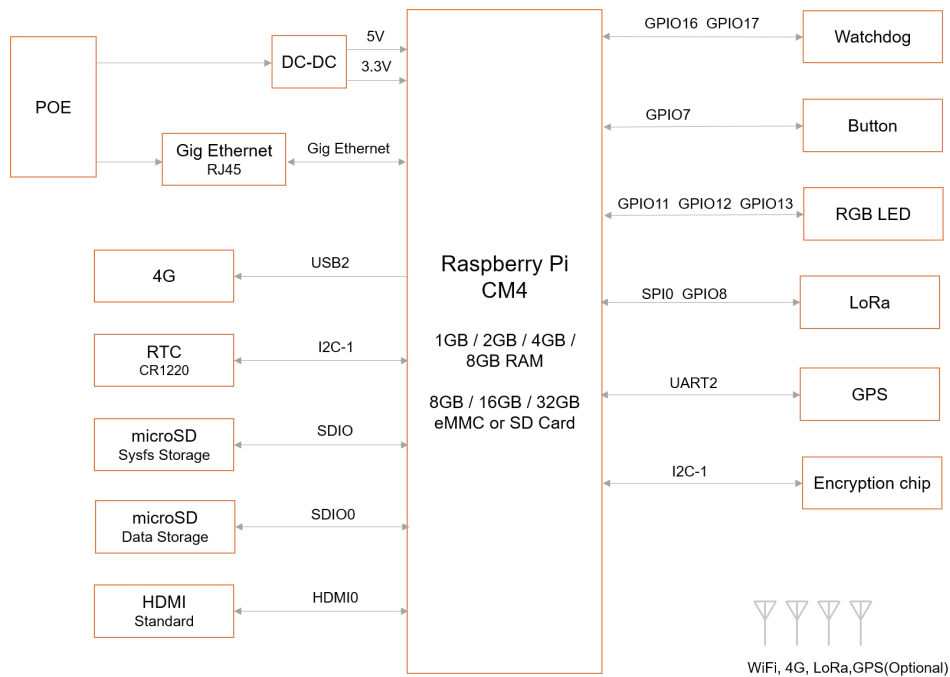
- LoRa intelligent gateway
- Smart manufacturing
- Smart city
- Smart transportation

## 1.2 Specifications and Parameters

Function	Parameters
CPU	BCM2711 4core, ARM Cortex-A72(ARM v8), 1.5GHz, 64Bit CPU
Memory	1GB / 2GB / 4GB / 8GB option
Dual micro SD Card	SD card system card
	option 8GB / 16GB / 32GB / 64GB
	Extend SD card storage card(option)
	option 8GB / 16GB / 32GB / 64GB
HDMI	1x standard HDMI
Ethernet	1x Gigabit Ethernet
WiFi	2.4G / 5.8G dual WiFi, compatible IEEE 802.11 b/g/n/ac
Bluetooth	Standard 5.0, support BLE
4G	1x 4G/LTE module(option), Full netcom, supporting mobile, Unicom and telecom network standards.
LoRa	Support LoRa WAN protocol
	Support frequency band
	- 868MHz(EU868,RU864)

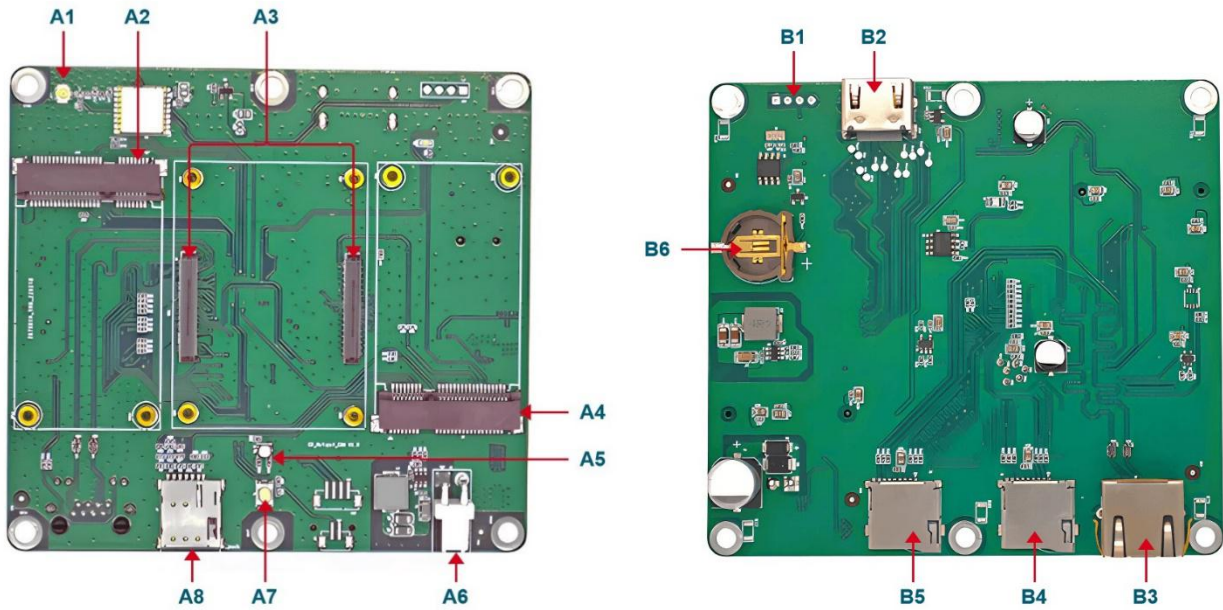
Function	Parameters
	- 915MHz(US915,AS923-1/2/3,AU915)
	- 470MHz(CN470)
GPS	Support multi-satellite system
	- GPS L1 C/A: 1575.42 ±1.023 MHz
	- BeiDou B1I: 1561.098 ±2.046 MHz
	- GLONASS L1: 1597.78~1605.66 MHz
Serial(TTL)	1x Serial(TTL), available for the system default console.
Real Time Clock	1x RTC, Use CR1220 button cell
Independent button	1x User-defined button
LED	1x RGB three-colour LED
Watchdog	Support watchdog function to prevent the system from being stuck.
Encryption chip	On-board encryption chip
Power input	POE power supply 40V~57V
Dimensions	195(L) x 195(W) x 65(H) mm
Case	Cast aluminum waterproof shell, IP24 waterproof grade.
Working environment temperature	-25 ~ 60°C environment temperature

### 1.3 System Diagram



ED-GWL2110

## 1.4 Functional Layout



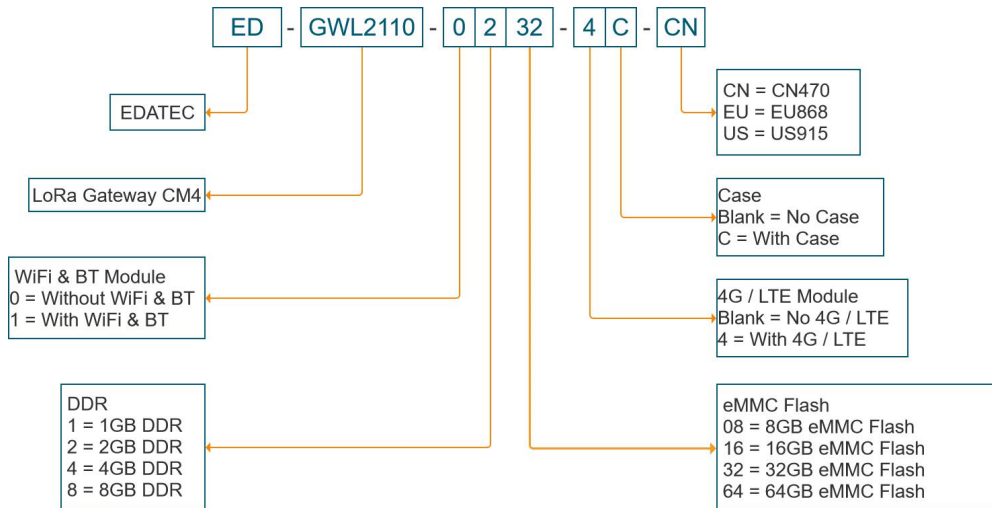
Item	Function Description	Item	Function Description
A1	GPS antenna IPX port	A5	RGB LED
A2	LoRa mini-PCle port	A6	12V power connector
A3	CM4 slot	A7	Button
A4	4G mini-PCle port	A8	Nano SIM slot

Item	Function Description	Item	Function Description
B1	UART port	B5	Storage expansion SD slot
B2	HDMI type A port	B6	RTC Battery slot
B3	Ethernet RJ45 port		
B4	System micro SD slot		

## 1.5 Packing List

- 1x ED-GWL2110 host
- [option]1x LoRa antenna
- [option WiFi/BT version]1x 2.4GHz/5GHz WiFi/BT antenna
- [option 4G version]1x 4G/LTE antenna

## 1.6 Order Code

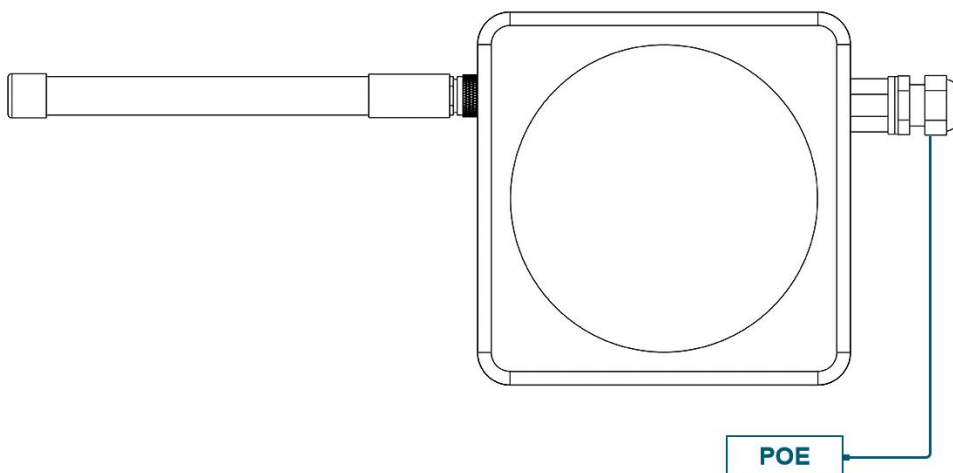


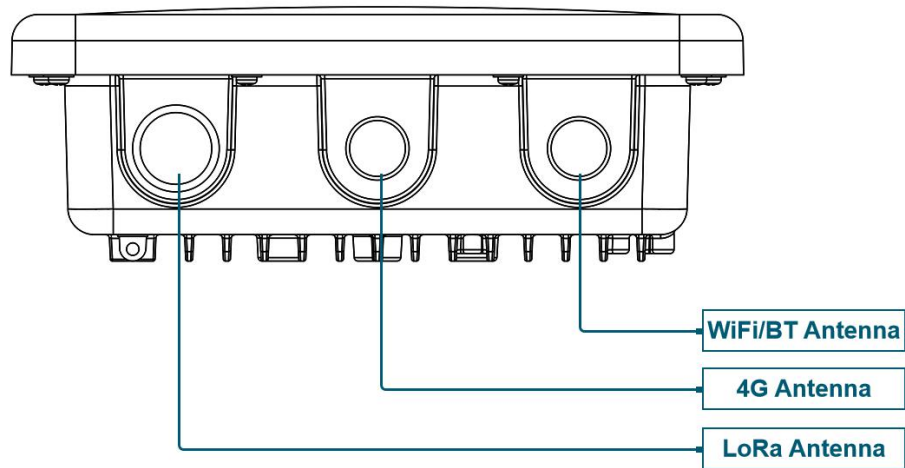
**Example**

**Part#** : ED-GWL2110-1232-4C-CN  
**Configuration** : GWL2110 LoRa Gateway  
 1pcs Raspberry Pi certified WiFi/Bluetooth Antenna  
 CM4102032 Compute Module with Wireless, 2GB DDR and 32GB eMMC Flash  
 4G Module with 1pcs 4G antenna  
 Metal Case  
 CN470 LoRa Module

# 2 Product Appearance and Structure

## 2.1 Product Appearance





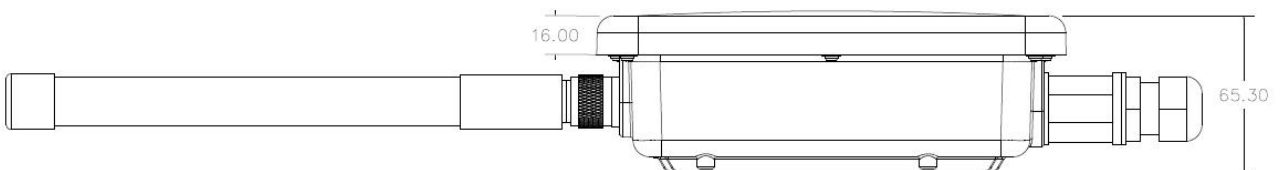
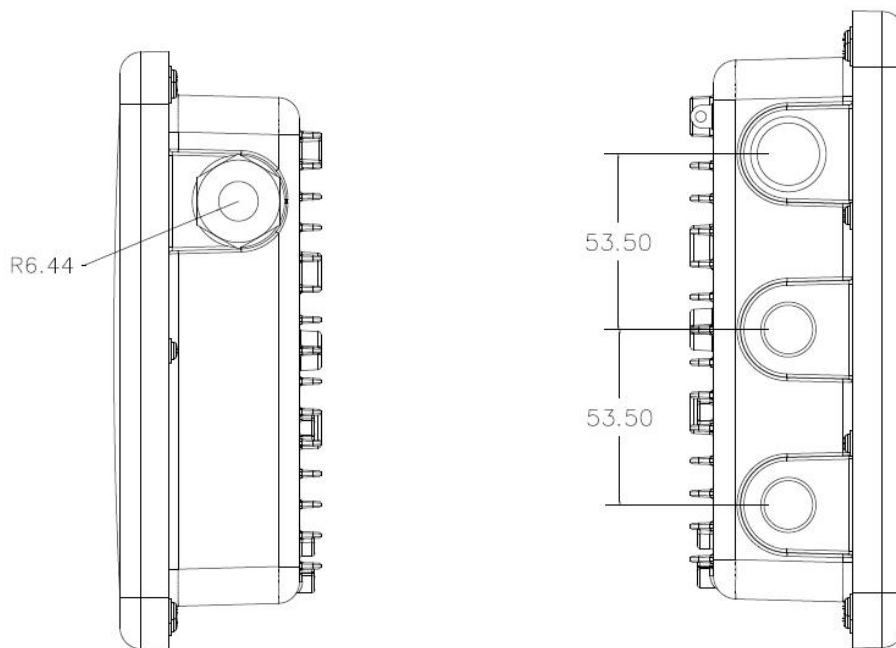
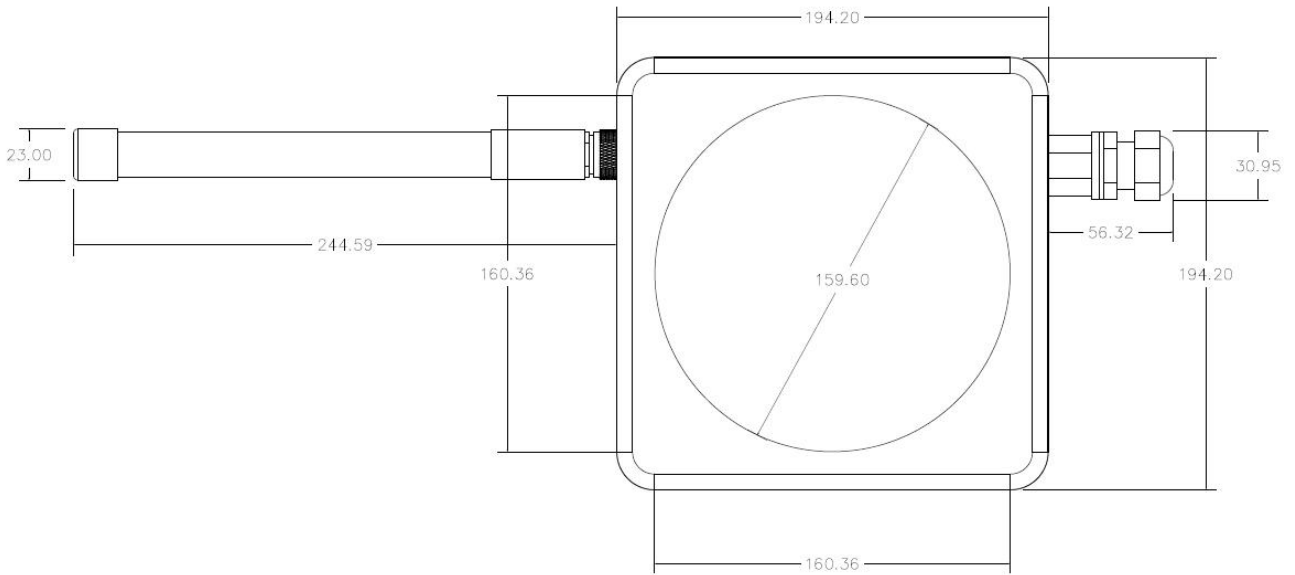
## 2.2 Product Photo





## 2.3 Dimensions

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



## 3 Interfaces and Connectors

### 3.1 POE Ethernet Interface

ED-GWL2110 uses POE Ethernet interface for power supply and network communication. It is a gigabit network port.

Pin ID	Pin Name
1	TRD0+
2	TRD0-
3	TRD1+
4	TRD2+
5	TRD2-
6	TRD1-
7	TRD3+
8	TRD3-

### 3.2 Antennas

The ED-GWL2110 has three SMA headers on the opposite side of the network interface, corresponding to the WiFi/BT antenna interface, the 4G antenna interface and the LoRa antenna interface respectively.

## 4 Internal Interface

### 4.1 HDMI

The ED-GWL2110 has a standard HDMI Type A interface, which can be directly connected to the HDMI display to work.

### 4.2 RTC

ED-GWL2110 is integrated with RTC, and for the version sold in China, we will ship the product with CR1220 button cell (RTC backup power supply) by default. In this way, the system can be guaranteed to have an uninterrupted and reliable clock, which is not affected by factors such as equipment power down.

RTC clock chip is mounted on i2c-1 bus, and the device address is 0x51.

### 4.3 Button

ED-GWL2110 has a user key, and the user can customize the key function. The key is connected with GPIO7, which is high by default. When the key is pressed, it will drive GPIO7 to low level.

#	Signal	Pin
1	Button	GPIO7

### 4.4 LED

ED-GWL2110 has a three-color LED indicator, which is controlled by three GPIO, and can display eight different colors according to different configuration states. The control pins are GPIO11 for blue, GPIO12 for green, GPIO13 for red, and gpio for low level.

#	Signal	Pin
1	LED_Blue	GPIO11
2	LED_Green	GPIO12
3	LED_Red	GPIO13

### 4.5 micro-SD Card

ED-GWL2110 uses CM4 Lite core module, without eMMC on board, but has two micro SD card slots, and interfaces J4 and J3 correspond to system card and data storage expansion SD card respectively.

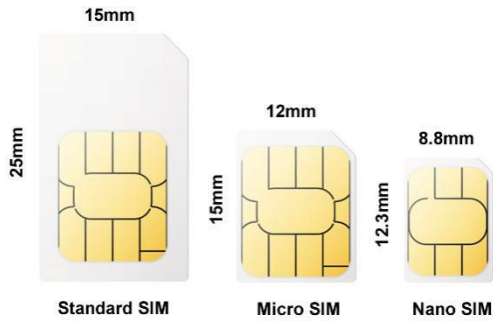
Interface J4, located on the left side of RJ45 network port, is used to store the main file system. If you choose CM4 module with eMMC, this micro SD card slot is unavailable, and it shares an MMC port with eMMC.

Interface J3, which is only used for data storage expansion SD card, cannot be used for system startup.

### 4.6 SIM Card

ED-GWL2110 supports 4G LTE, and it uses Nano SIM card.

The size differences between standard SIM and Micro SIM and Nano SIM cards are as follows:



## 4.7 LoRa mini-PCle Interface

The Mini PCIe interface of ED-GWL2110 under GPS is specially used to expand 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 GPIO8.

LoRa mini-PCle pins 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:

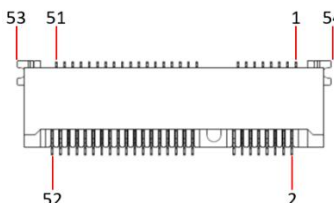
#	Signal	Pin
1	LoRa_Reset	GPIO8

## 4.8 4G mini-PCle Interface

The Mini PCIe interface above the ED-GWL2110 power supply is specially used to expand the 4G module.

The 4G mini-PCle pin is defined as follows:

	Pin ID	Pin Name	Pin ID	Pin Name	Pin ID	Pin Name
	1	NC	21	GND	41	3V3
	2	3V3	22	4G_Reset	42	LED_WWAN
	3	NC	23	NC	43	GND
	4	GND	24	3V3	44	NC
	5	NC	25	NC	45	NC
	6	NC	26	GND	46	NC
	7	NC	27	GND	47	NC
	8	USIM_VDD	28	NC	48	NC
	9	GND	29	GND	49	NC
	10	USIM_DATA	30	NC	50	GND
	11	NC	31	NC	51	NC
	12	USIM_CLK	32	NC	52	3V3
	13	NC	33	NC	53	GND



	14	USIM_RST	34	GND	54	GND
	15	GND	35	GND		
	16	NC	36	USB_DM		
	17	NC	37	GND		
	18	GND	38	USB_DP		
	19	NC	39	3V3		
	20	3V3	40	GND		

4G module reset pin definition:

#	Signal	Pin
1	4G_Reset	GPIO10

## 4.9 GPS

ED-GWL2110 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 UART2 of CM4 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 GPIO4. 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 GPIO5. Pulling this pin low for 100ms will reset the module. SET signal is connected with GPIO6, 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	Pin
1	GPS_WakeUp	GPIO4
2	GPS_Reset	GPIO5
3	GPS_Set	GPIO6

## 4.10 Watchdog

ED-GWL2110 has a watchdog timer, which is used to automatically correct temporary hardware failures and prevent errors or malware from interfering with system operation.

Watchdog pin definition:

#	Signal	Pin	Description
1	WD_OE	GPIO17	Output is high to enable watchdog, output is low to disable watchdog, and default is disabled.
2	WD_A	GPIO16	Watchdog Feed dog input signal

## 4.11 Encryption chip

ED-GWL2110 is equipped with ATECC608 encryption chip, which is connected to i2c-1 bus, and the default address of the device is 0x60.

# 5 Wireless Communication

## 5.1 WiFi

ED-GWL2110 support 2.4G / 5G dual WiFi.

2.4G frequency band

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

5G frequency band

Parameter	Feature
Frequency range	802.11a/n/ac: 5150-5350MHz 5470-5725MHz 5725-5850MHz
Modulation system	BPSK
Frequency Step	5M

## 5.2 Bluetooth

ED-GWL2110 support bluetooth5.0。

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

## 5.3 4G LTE

The ED-GWL2110 has a mini PCIe slot for 4G LTE module connection. It can support a wide range of frequency bands through different 4G module variants.

#	4G Module	Support Country	Support Band
1	EC20-CE	China / India	LTE FDD: B1/B3 LTE TDD: B38/B39/B40/B41 TDSCDMA: B34/B39 WCDMA: B1 CDMA 1x/EVDO: BC0 GSM: 900/1800MH
1	EC25-AFX	North America	LTE-FDD: B2/B4/B5/B12/B13/B14/B66/B71 LTE-TDD: / WCDMA: B2/B4/B5 GSM/EDGE: /
2	EC25-AUX	Latin America / Australia / New Zealand	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B28 LTE-TDD: B40 WCDMA: B1/B2/B4/B5/B8 GSM/EDGE: B2/B3/B5/B8
3	EC25-EUX	EMEA / Thailand	LTE-FDD: B1/B3/B7/B8/B20/B28A LTE-TDD: B38/B40/B41 WCDMA: B1/B8 GSM/EDGE: B3/B8

## 5.4 GPS

GPS module performance parameters:

parameter	Description
Default galaxy configuration	GPS + BeiDou



Frequency band	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 Re-capture: -159 dBm Track: -162 dBm
TTF (AGNSS on, real network 500 Average value of secondary test)	Cold reboot: 5.5 s Warm start: 2 s Reset: 2 s
TTF (AGNSS off, real network 500 Average value of secondary test)	Cold reboot: 30 s Warm start: 2 s Reset: 2 s
Horizontal position accuracy (autonomous)	<2.0m CEP, 50%, Static for 2 hours, -130 dBm, More than six satellites
Refresh rate	The default is 1 Hz, and the maximum is 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.

GPS module power consumption parameters:

Vcc=3.3V@-130 dBm

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

## 5.5 Antennas

### 5.5.1 WiFi / BT Antenna

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

Impedance	50 OHM
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### 5.5.2 4G LTE Antenna

Parameter	Feature
Antenna type	External antenna
Frequency band	LTE-FDD, LTE-TDD
Frequency range	698-894MHz, 1710-2200MHz, 2496-2690MHz
Antenna gain	2 dBi
Impedance	50 OHM

### 5.5.3 GPS Antenna

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

### 5.5.4 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

## 6 Electrical Characteristics

### 6.1 Electrical Parameters

Parameters	Minimum	Typical	Max	Unit
System power input	40	48	57	V
Working temperature	-25	25	60	°C
Storage temperature	-25	25	60	°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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