

F8L10T LoRa Terminal User Manual	Document Version	Page
	V1.0.0	
	Product Name: F8L10T	Total:20

# F8L10T LoRa Terminal User Manual

The user manual is suitable for the following model:

F8L10T-N	LoRa data transmission terminal (Without PA)
F8L10T-E	LoRa data transmission terminal (With PA)



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## Files Revised Record

Date	Version	Remark	Author
2016-12-19	V1.0.0	Initial version	WSP/LZQ

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Note: There may be different components and interfaces in different model, please in kind prevail.

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## Chapter 1 Brief Introduction of Product

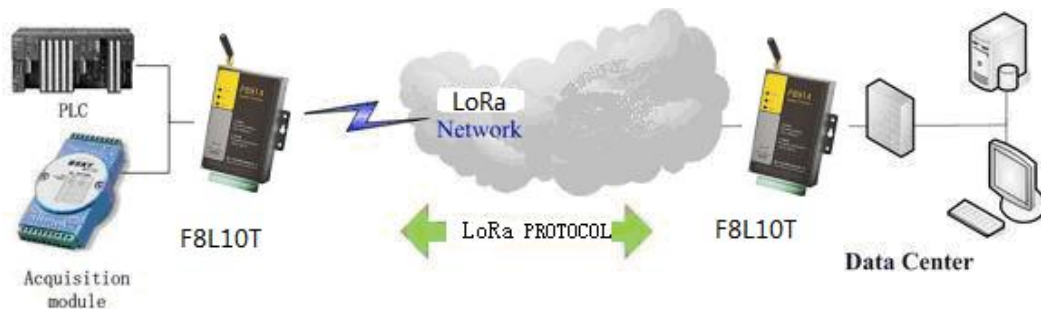
### 1.1 General

F8L10T LoRa data transmission terminal is a wireless data transmission terminal based on LoRa spread spectrum technology. At the same time using Lora wireless transmission technology for short distance data transmission.

This product adopts industrial grade LoRa scheme with high performance, based on embedded real-time operating system as the software platform, while providing RS232 and RS485 (or RS422) interface, can be directly connected to the serial device, realize the transparent data transmission function; low power design, lowest power consumption is less than 5mA@ 12VDC; 5 I/O, can achieve the digital input output, analog input, pulse counting function.

It has been widely used on M2M fields, such as electric power, intelligent traffic, wireless metering, industrial automation, telemetry, water supply, environment protection, weather, and so on.

The typical application of LoRa Terminal is shown in figure 1-1:



### 1.2 Features and Benefits

#### Design for Industrial Application

- ◆ High-powered industrial LoRa chip
- ◆ High-powered industrial 32 bits CPU
- ◆ Support low power consumption mode, including multi-sleep and trigger modes to reduce the power dissipation farthest
- ◆ Housing: iron, providing IP30 protection
- ◆ Power range: DC 5~36V

#### Stability and Reliability

- ◆ Support hardware and software WDT
- ◆ RS232/RS485/RS422 port: 15KV ESD protection

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- ◆ Power port: reverse-voltage and over-voltage protection
- ◆ Antenna port: lightning protection(optional)

#### Standard and Convenience

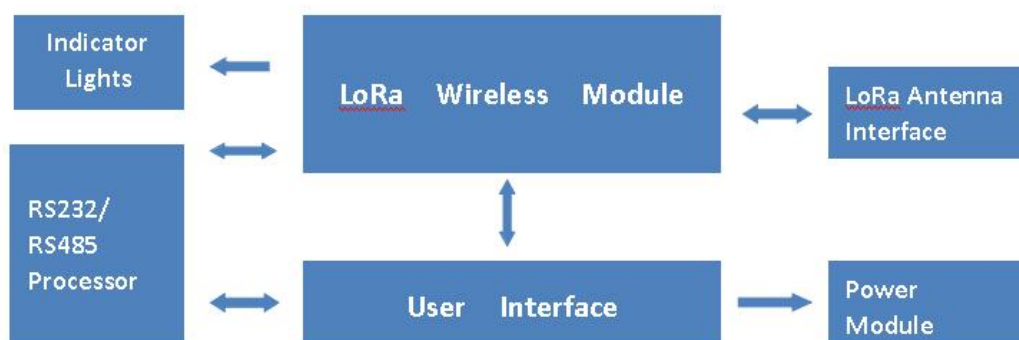
- ◆ Adopt terminal block interface, convenient for industrial application
- ◆ Support standard RS232 and RS485(or RS422) port that can connect to serial devices directly
- ◆ TTL logic level RS232 interface can be customized, ADC interface can be customized
- ◆ Support intellectual mode, enter into communication state automatically when powered
- ◆ Provide management software for remote management
- ◆ Support several work modes
- ◆ Convenient configuration and maintenance interface

#### High-performance

- ◆ Support LoRa wireless short-range data transmission capabilities, with self-organizing network capabilities
- ◆ Relay routing and terminal device functionality
- ◆ Network capacity: 65000 nodes (typical number of 300)
- ◆ Send mode flexible: Broadcast send or destination address send mode optional
- ◆ Supply 5 I/O channels, can achieve the analog input of the 3 channels, the digital input and output of the 2 channels; compatible with the pulse count function of the 2 channels

## 1.3 Working Principle

The principle chart of the LoRa Terminal is as following:



## 1.4 Specifications

### LoRa Specification

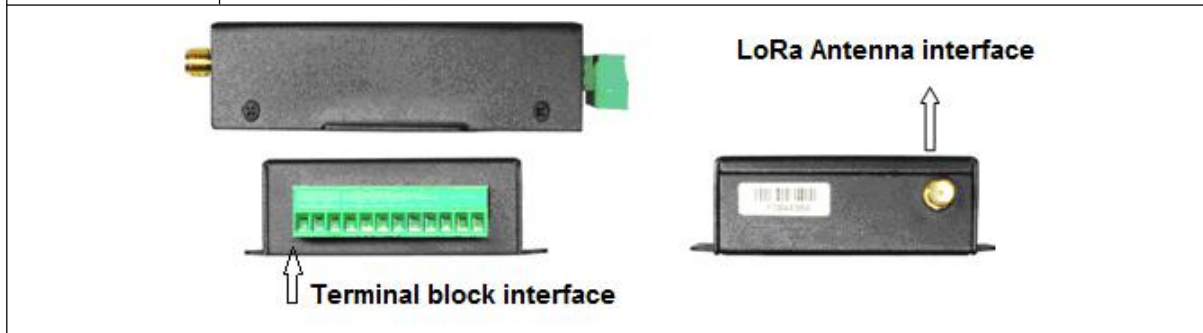
Item	Content
Communication Frequency Band	410MHz - 441MHz, 1000KHz Step, Recommend 433±5MHz, Factory Setting 433 MHz
Indoor/Urban Communication Distance	F8L10T-N:1km                      F8L10T-E:2km
Outdoor/Visual Communication Distance	F8L10T-N:3.5km                      F8L10T-E:11.5km
TX Power	F8L10T-N:20dBm(100mW)    F8L10T-E:30dBm(1W)
RX Sensitivity	-140dBm
Bandwidth	6 level adjustable (0.3、0.6、1.0、1.8、3.1、5.5Kbps)
Channel Number	32

### Hardware System

Item	Content
CPU	Industrial 32bits CPU
FLASH	128KB
RAM	16KB

### Interface type

Item	Content
Serial	1 RS232 port and 1 RS485(orRS422) port, 15KV ESD protection Data bits: 8 Stop bits: 1, 2 Parity: none, even, odd, space, mark Baud rate: 300、600、1200、2400、4800、9600、19200、38400、57600、115200bps
Indicator	“Power”, “ACT”, “Online”
Antenna	LoRa : Standard SMA female interface, 50 ohm, lightning protection(optional)
Power	Terminal block interface, reverse-voltage and over-voltage protection





### Power supply

Item	Content
Standard Power	DC 12V/0.5A
Power range	DC 5~36V

### Consumption

	Item	Content
F8L10T-N	Sleep	3.1~3.2mA@12 VDC
	Receive data	13.2~13.4mA@12 VDC
	Transmit data	60.3~61.2mA@12 VDC
	Sleep	7.3~7.4mA@5 VDC
	Receive data	26.1~26.2mA@5 VDC
	Transmit data	107.3~115.1mA@5 VDC
F8L10T-E	Sleep	3.1~3.3mA@12 VDC
	Receive data	13.2~13.4mA@12 VDC
	Transmit data	110-125mA@12 VDC
	Sleep	7.2~7.4mA@5 VDC
	Receive data	26.3~26.5mA@5 VDC
	Transmit data	210~213mA@5 VDC

### Physical Characteristics

Item	Content
Housing	Iron, providing IP30 protection
Dimensions	91x58.5x22 mm
Weight	205g

### Environmental Limits

Item	Content
Operating Temperature	-40~+85°C (-40~+185°F)
Storage Temperature	-40~+125°C (-40~+257°F)
Operating Humidity	95% (unfreezing)

## Chapter 2 Installation Introduction

### 2.1 General

The LoRa Terminal must be installed correctly to make it work properly.

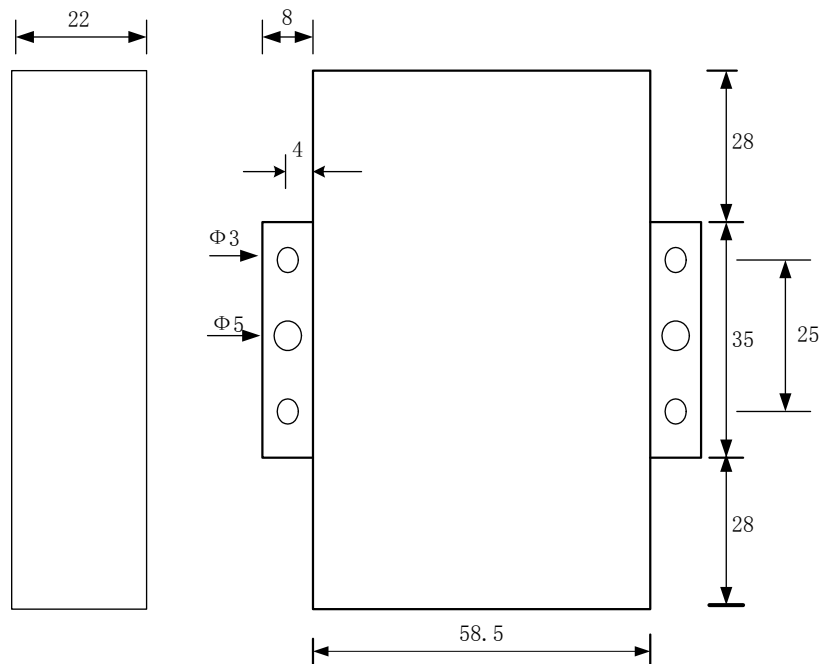
Warning: Forbid to install the MODEM when powered!

### 2.2 Encasement List

Name	Quantity	Remark
LoRa Terminal host	1	
LoRa Antenna	1	
Power adapter	1	
RS232 data cable	1	optional
RS485 data cable	1	optional
Manual CD	1	
Certification card	1	
Maintenance card	1	

### 2.3 Installation and Cable Connection

Dimension: (unit: mm)



### Installation of antenna:

Screw the SMA male pin of the LoRa antenna to the male SMA interface of the LoRa Terminal.

### User Interface Signal Definition

Pin Number	Signal Name	Default Function	Extensible Function
1	PWR	Power input anode	N/A
2	GND	Power Ground	N/A
3	GND	Power Ground	N/A
4	RX	RS232 RX	N/A
5	TX	RS232 TX	N/A
6	A	RS485 anode	N/A
7	B	RS485 cathode	N/A
8	IO1	GPIO	sleep control
9	IO2	GPIO	N/A
10	IO3	ADC, analog input function (voltage acquisition 0 ~ 5 V)	GPIO
11	IO4	ADC, analog input function (current collection 0 ~ 20 mA)	GPIO
12	IO5	ADC, analog input function (current collection 0 ~ 20 mA)	GPIO



### Installation of cable:

F8L10T adopts industrial terminal block interface. The recommendatory cable is 28-16AWG. The detail description of standard layout adapter and communication cables as is following:

Adapter (Rating Output 12VDC/0.5A) :

Cable Color	Power Output Polarity
Black & White Alternate	Anode
Black	Cathode

RS232 Cable:

Cable Color	Corresponding DB9-M Pin Number
Brown	Pin 2
Blue	Pin 3
Black	Pin 5

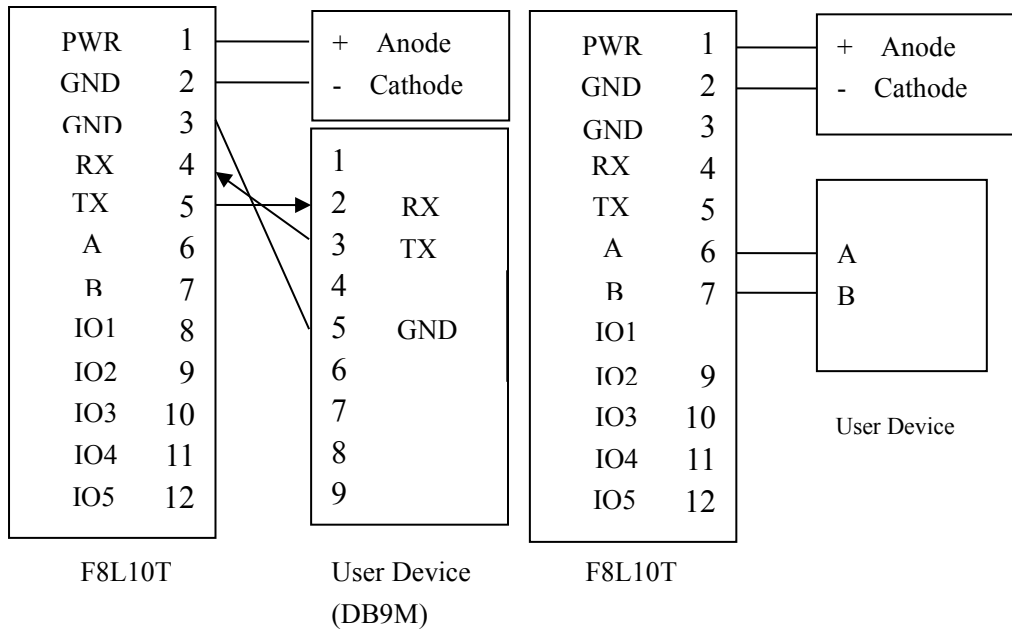
RS485 Cable:

Cable Color	Signal definition
Red	RS485(A)
Black	RS485(B)

Power adapter and communication cable connection chart as following:

**Connect via RS232**

**Connect via RS485**



## 2.4 Power

The power range of the LoRa Terminal is DC 5~36V.

Warning: When we use other power, we should make sure that the power can supply power above 4W.

We recommend user to use the standard DC 12V/0.5A power.

## 2.5 Indicator Lights Introduction

The LoRa Terminal provides three indicator lights: "Power", "ACT", "Online".

Indicator Light	State	Introduction
Power	ON	LoRa Terminal is powered on
	OFF	LoRa Terminal is powered off
ACT	BLINK	Data is communicating
	OFF	No data
Online	ON	LoRa Terminal has logged on network
	OFF	LoRa Terminal hasn't logged on network

## Chapter 3 Configuration

### 3.1 Configure connection

In the LoRa terminal configuration, the need to pass the factory configuration RS232 serial cable or RS232-485 conversion line LoRa terminal and configured to connect the PC together, as follows:



Figure 3-1 F8L10T configuration connection with PC

### 3.2 Introduction of parameter configuration

F8L10T parameter configuration in two ways:

Through the specialized configuration software: all configuration is configured with the corresponding entry software interface, this configuration is only suitable for users to facilitate the configuration of PC Case.

By extending the at command (hereinafter referred to as the AT command) way to deploy: in this configuration, the user only needs to have the serial communication program can configure all parameters such as F8L10T, windows of the super terminal, Linux minicom, putty, or directly by the user's SCM system to node configuration. In the use of extended at command to configure F8L10T to bring F8L10T into the configuration state.

The following application to expand the configuration of the at command configuration details of the main f8l10t, but also gives configuration software corresponding to the configuration items.

Configure the F8L10T parameters by configuration software, as shown in Figure 3-2.

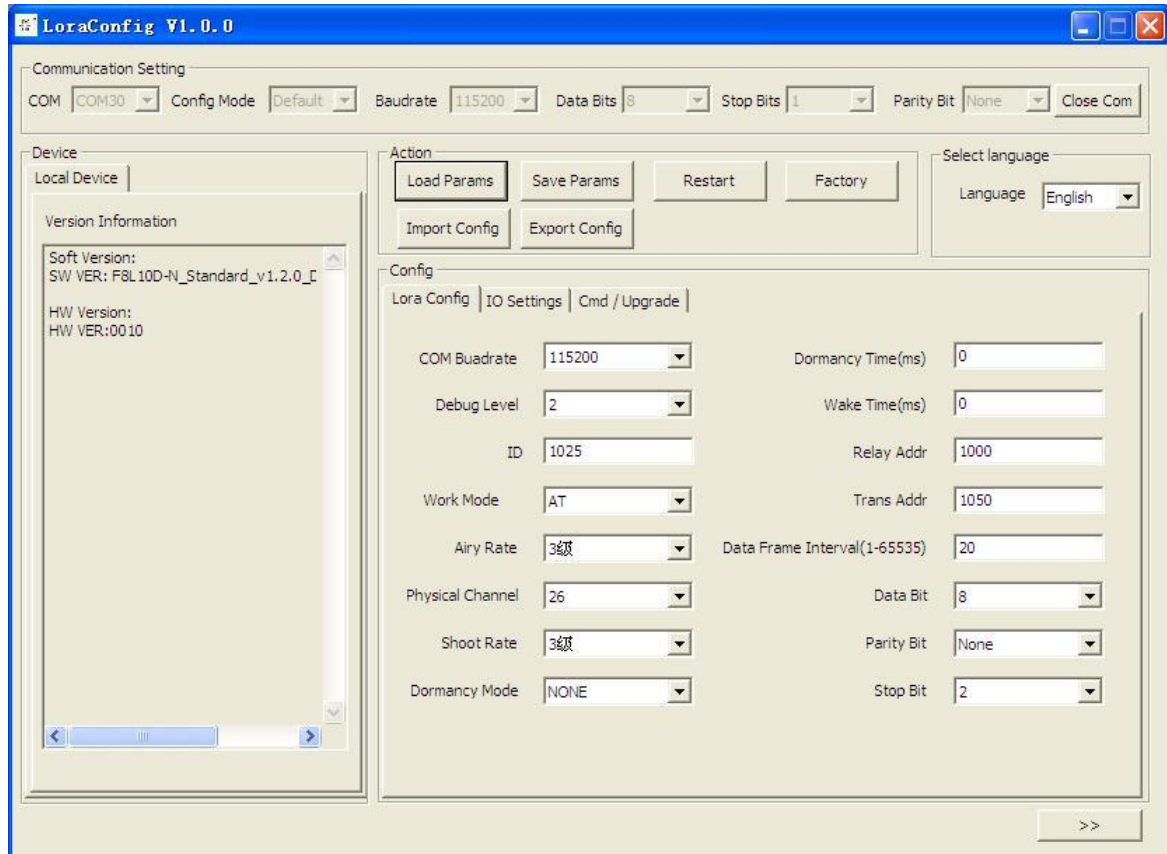


Figure 3-2 configuration interface

Column display serial parameters currently open serial port settings in the serial port parameters, the default is com115200, and the serial port has been opened, if the actual serial parameters you connect to the f8l10t do not match, please choose the correct value of this configuration, at the same time, open the serial port. The serial port parameter settings column if the right button is displayed as "closed serial". That serial port has been opened, otherwise please open the serial port. The serial port is opened, will give a message in the output column information: serial port (COM) is open, please re power equipment, electrical equipment is waiting after entering the configuration state...

The main interface includes the serial configuration attribute configuration, log information, the f8l10t configuration area. Which configuration: serial configuration configuration of the current baud rate, data bits, stop bits, parity bit. The log information display device, log information for the current configuration process. The operation part is "query", "Settings", "query version." "restore factory settings", "restart" and "hardware version".

The equipment again after power, configuration software f8l10t into the configuration state, and automatically load the current configuration parameters of equipment, in the area on the right side of the display parameters, thus can start all configuration parameters in the configuration F8L10T, as shown in Figure 3-2.

### 3.3 Detailed parameters

#### 3.3.1 Debug level

Debug level control module log display, can be divided into three debugging levels, which:

0 do not output any log information

1 output Key log information

2 output detailed log information

Default: 1

As shown in figure 3-3:

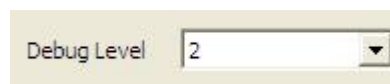


figure 3-3 Debug level

#### 3.3.2 ID

Set the module ID, configurable range 0~65535, as shown in figure 3-4:



figure 3-4 module ID

#### 3.3.3 sleep mode

When the device is in low power mode, can be set to none (not dormant), time (timing dormant) and deep (deep sleep). Regular sleep, you need to configure the "wake up time" and "sleep time"; the depth of dormancy, only through the IO1 pin to wake up.

Default: NONE

As shown in figure 3-5:

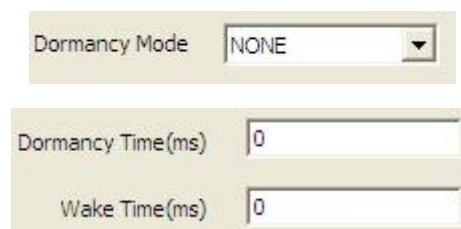


figure 3-5 Sleep mode setting



### 3.3.4 Wake up time

In regular sleep, keep the device wake-up time, unit MS, when the device wake up super this time will go to sleep, as shown in Figure 3.3.

### 3.3.5 sleep time

In regular sleep, keep the device dormant time, unit MS, when the device sleep over this time will wake up, in a normal working state.

As shown in figure 3-5:

### 3.3.6 Work agreement

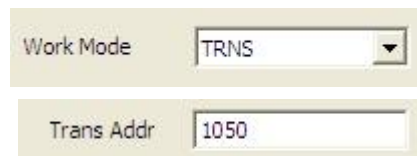
Module serial data protocol can be divided into "pro" and "trns".

"Trns": data transmission, when the need to pass through the address configuration, namely the destination address.

"Pro": serial data must be based on a certain data format for sending and receiving, protocol format reference "Lora API API payload data manual. The maximum length is 100 bytes.

Default: TRNS

As shown in figure 3-6:



The image shows a configuration interface with two fields. The first field is labeled 'Work Mode' and has a dropdown menu with 'TRNS' selected. The second field is labeled 'Trans Addr' and has a text input box containing the value '1050'.

figure 3-6 Work Mode, TRNS need to config Trans Addr

### 3.3.7 Physical channel

Module data transfer physical channel, LoRa communication frequency band 410M~441MHz, 1000KHz Step, So there are 32 channels to choose. Different channel interference factors, bit error rate is not the same. Therefore, you need to adjust this value according to the actual environment.

Default: 24

As shown in figure 3-7:



The image shows a configuration interface with a single field labeled 'Physical Channel' and a dropdown menu with '24' selected.

figure 3-7 Physical channel

### 3.3.8 Air speed

The rate of data in the air can be divided into 6 levels, The higher the level, the higher the rate. Under the same conditions, the higher the rate, the closer the transmission distance. Therefore, you need to adjust this value according to the actual environment.

**Attention: all devices must be at the same rate, otherwise they can not communicate.**

Default: 4 Level

As shown in figure 3-8:



figure 3-8 Air speed

### 3.3.9 Transmitting power

Without PA maximum 20dBm. 4 levels, the higher the level, the greater the power.

Default: 4 Level

As shown in figure 3-9:



figure 3-9 Transmitting power

### 3.3.10 serial port configuration

It can configure the baud rate, data bit, parity bit and stop bit of the communication serial port.

Default: 115200 Baud rate, Attributes 8N1.

As shown in figure 3-10:

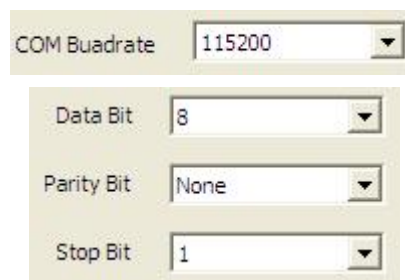


figure 3-10 serial port configuration



Form	Command	Return
Query	AT+DVn?	+DVn: number string OK

**Description :**

Get local IO pin value (ADC , GPIO value)

ADC value convert voltage or electric current value formula:

Voltage:  $(\text{ADC value}) \times 3.3 \times 20.16 / (4095 \times 12.1)$  (V)

Electric current:  $(\text{ADC value}) \times 3.3 \times 1000 / (4095 \times 150)$  (mA)