W3050-10 Product Instructions

Product model: W3050-10
Version No.: 10.01.xx
Updated on: August 10, 2019

北京风桥科技有限公司

Beijing WindsBridge Technology Co.,Ltd

1.Table of Contents

2.Applicable Model

No.	Product Model	Description
1	W3050-10	Broadband Power Line carrier communication module

3.Copyright Statement

4.Note

Due to product version upgrade or other reasons, the contents of this document will be updated periodically. Unless otherwise agreed, this document is only used as a guide. All statements, information and suggestions in this document do not constitute any express or implied guarantee.

5.Document Revision History

Version	Updated on	Description
V1.0.0	2019-08-10 August 10, 2019	Initial version

1.Preface

1.1.Description

This paper describes information on electrical characteristics, performance, structural dimension, application environment, etc. of the broadband carrier communication module (hereinafter referred to as W3050-10). With the help of this document and other related documents, users can quickly understand the functions of W3050-10 and use the hardware and software of the product.

1.2.Specification Reference Standard

This product is designed with reference to the following standards:

- Related standards and technical requirements in Code for Acquisition System of Power Consumer's Electricity Information of State Grid Corporation of China
- Technical Specification for Interconnection of Low-voltage Power Line Broadband Carrier Communication

1.3.Related Documents

- Part 4-1 of Technical Specification for Interconnection of Low-voltage Power Line Broadband Carrier Communication
- Part 4-2 of Technical Specification for Interconnection of Low-voltage Power Line Broadband Carrier Communication
- Part 4-3 of Technical Specification for Interconnection of Low-voltage Power Line Broadband Carrier Communication

2. Product Overview

2.1.Overview

W3050-10 is a high-performance broadband power line carrier communication module, which is integrated with AC-DC isolated power supply function, and can export 3.3 V at 500 mA power supply.

This module adopts SOC technology of OFDM modulation-demodulation, and the communication technology supports IEEE1901.1 international specification, which has the characteristics of high speed rate, low power consumption and less peripheral devices. Carrier communication module can form network transmission and other functions with any MCU.

2.2.Technical Specifications

The specifications are as follows:

Specifications	
Modulation mode	Broadband OFDM
Bandwidth	2MHz~12MHz
Communication rate	• The physical layer is no less than 1 Mbps. • Application layer peak value is 256 Kbps.
National network standard	Support national network interconnection standard.
Physical layer	• The sub-carrier supports QPSK, 16QAM modulation mode; • It supports FEC and CRC functions, and has powerful denoising and error correcting capability.
Transmitting power	20dBm
Networking function	• Support self-adaptive Ad Hoc Network and dynamic multi-channel addressing functions. • Support Level 16 relaying.
Rate	• Point-to-point data transmitted or sent is 100-1K bytes.
Characteristics of power grid	～110VAC/220VAV±30% 50Hz
Power consumption	Average power consumption ≤ 280 mW
Working environment	• Operating temperature: -40°C ~ +85°C • Storage temperature: -40°C ~ +85°C
	Operating humidity：： 10%RH ～100%RH；
Operating voltage	AC 110~220V
Output operating voltage	AC-DC isolated power supply output DC 3.3 V and DC 12 V

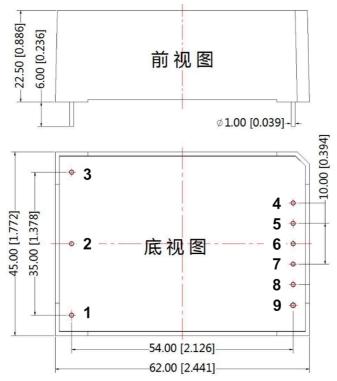| Specifications	
Physical characteristics	AC interface: single row pin 2P Signal interface: single row pin 5P
	Dimensions: 62 mm (L) × 45 mm (W) × 22mm (H), excluding pin height
	Weight: g
Interface	
Functional interface	Weak current interface: L N
	Signal interface: serial port, customized IO port, 2 pieces

3. External Dimension

3.1. Appearance

The communication module is made of ABS material, and has the characteristics of high temperature and flame resistance. Its external dimension diagram is as shown in the following figure:

3.2. Dimension

The external dimension of the communication module is 62 mm (L) × 45 mm (W) × 22.5 mm (H). The shell is resistant to high temperature and flame. The schematic diagram of the external dimension diagram of the module is as shown in the following figure:

4. Interface Definition

4.1. Signal Interface

The interface definition is described as follows:

No.	Category	Name	Direction (for modules)	Description
4	Power supply	VDD	Output	• Output 3.3 V ± 0.3 V signal power supply, 50 mA current and 30 mV voltage ripple, provided by the terminal to the module. • voltage range: 12 V ± 1 V, voltage ripple ≤ 120 mV, output current ≥ 125 mA
5	Ground	GND	-	
6	Signal	MOD	Input	For mode switching, low level refers to data mode, and high level refers to command mode. Drive capability of low level current ≥ 0.5 mA, level 3.3 V ± 0.3 V.
7	Signal	RXD	Input	UART receiving pin
8	Signal	TXD	Input	UART transmitting pin
9	reserved	-	Empty pin	

4.2. AC Interface

The interface definition is described as follows:
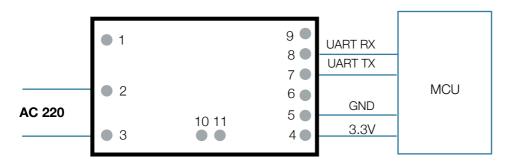
No.	Category	Name	Direction (for modules)	Description
1	NC	NC		
2	AC input	AC（N）		
3	AC input	AC（L）	-	

5. Reference Design

5.1. Typical Application Circuit

Typical use examples are as follows:

In the above figure, 10 and 11 are network status light and equipment status light respectively, which are explained in the following chapters.

5.2. Typical Application Description

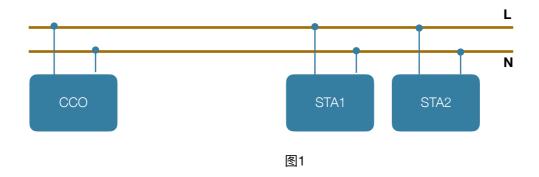10 and 11 are LED lights, which serve as reminders by default and have the following functions.

Light Number	Status	Function	Description
10	The green light is normally on.	The communication module networking is completed.	
10	The green light flashes.	The communication module is in the status of networking.	Frequency: 1 Hz
10	The green light flashes slowly and then is normally on.	Online communication module is discovered.	The light flashes once every 2 seconds, and is normally on after 5 times.
10	The green light flashes quickly and then is normally on.	Offline communication module is discovered.	The light flashes twice every second, and is normally on after 5 times.
10	The green light is normally off.	The light is turned off.	The reminders can be opened and closed through command, which is opened by default.
11	The red light is normally on.	The system works normally.	
11	The red light flashes.	The system is abnormal.	Frequency: 1 Hz
11	The red light is normally off.	System outage	

6. SDK Application

6.1. Overview

Self-networking is conducted after the communication module is powered on to form a host node (CCO) and several slave nodes (STA) which are shown in Figure 1. After the communication module networking is completed, CCO can send commands or data to the designated STA or all the STAs, and STA can send commands or data to CCO.

图1

Through the serial port of communication module, the working status and networking status of communication module can be queried, and data can also be transmitted between CCO and STA.

The communication module supports command mode and data mode. The communication module works in command mode by default after being powered on, and is switched to data mode after being pulled down through IO port MOD.

6.2. Range of SDK Application

SDK data path： https://github.com/WindsBridge/w3050

The communication module supports the application of MCU side, and can also support customized development built in the communication module, including basic functions such as data acquisition of sensors.

If the communication module transmits data through MCU, the data format described in this article can be used for communication.

6.3. Interface Definition

The communication module communicates with MCU through UART. The frame format is as follows.

HRD（1byte）	DATA	Checksum(1B)	Terminator（1B）
FE	frame data	sum	FE

6.4. Use Flow of UART

6.4.1. Typical Examples

```
u8 cco_mac[6]  = {0x0a,0x0b,0x0c,0x0d,0x0e,0x01};
u8 sta2_mac[6] = {0x0a,0x0b,0x0c,0x0d,0x0e,0x02};
u8 sta3_mac[6] = {0x0a,0x0b,0x0c,0x0d,0x0e,0x03};
u8 data1[] = {0xFE, ,0xFE};
u8 data2[] = {0xFE, ,0xFE};
w3050_mcu_uart_send_data(data1, sizeof(data2));    // CCO sends  to STA2
w3050_mcu_uart_send_data(data2, sizeof(data2));    // STA3 sends  to CCO
```

6.5. Use Flow of SDK's C Function

MCU can use SDK provided by W3050 to program and send and receive W3050. The flow is as follows.

- Initialize through w3050_mcu_init
- In the serial port interruption of MCU, w3050_mcu_uart_data_input interface is invoked to process data, and the data is received in w3050_mcu_rev_data_proc interface.
- Send data to the designated STA through w3050_mcu_send_data. The parameters are the mac address of STA or CCO, data to be sent, and length.
- w3050_mcu_uart_send_data interface in SDK is a user implementation interface. The above process can only be used after implementation.

6.5.1. Typical Examples

```
u8 cco_mac[6] = {0x0a,0x0b,0x0c,0x0d,0x0e,0x01} ;
u8 sta2_mac[6] = {0x0a,0x0b,0x0c,0x0d,0x0e,0x02} ;
u8 sta3_mac[6] = {0x0a,0x0b,0x0c,0x0d,0x0e,0x03} ;


w3050_mcu_send_data(sta2_mac,  "hello", 5);   // CCO sends  to STA2
w3050_mcu_send_data(cco_mac,  "hello", 5);    // STA3 sends  to CCO
```