

Contactless Card Read/Write Module

YW-201

User's Manual

(version 1.4)

English

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1 Summary

YW-201 contactless card Read/Write module was designed on high integrated reader ICs for contactless communication on 13.56MHz of Philips. YW-201 integrates MF RC500 RF base station. Engineers need not take care how to control MF RC500 RF base station. Just send command to module over IIC or UART.

YW-200 series contactless card Read/Write module support ISO14443-A Mifare One S50, S70, UltraLight, MifarePro, ISO14443-B SR176, ISO15693, ICODE SL2 and then other compatible card.

2 YW-200 Series Module

Type	Card Protocol	Vcc	Interface	Card supported	This Page
YW-201	ISO14443-A	+5V	IIC,UART(TTL)	Mifare S50,S70, Mifare Pro	✓
YW-202	ISO14443-A ISO14443-B	+3.3V~+5V	IIC,UART(TTL)	Mifare S50,S70, Mifare Pro, ISO14443-B SR176	
YW-203	ISO15693	+3.3V~+5V	IIC,UART(TTL)	ICODE SL2, ISO15693	
YW-204	ISO14443-A ISO14443-B ISO15693	+3.3V~+5V	IIC,UART(TTL)	Mifare S50,S70, Mifare Pro, ISO14443-B SR176, ICODE SL2, ISO15693	

3 YW-201 Characteristic

☞ Completely operation of Mifare One through simple command set.

☞ Communication Protocol:

1. **UART:** Baud Rate 19200bps。

2. **IIC:** Max rate 400Kbps。

☞ Auto request card: When the card put into antenna, the pin “CARDIN” will be low.

☞ Package: DIP32.

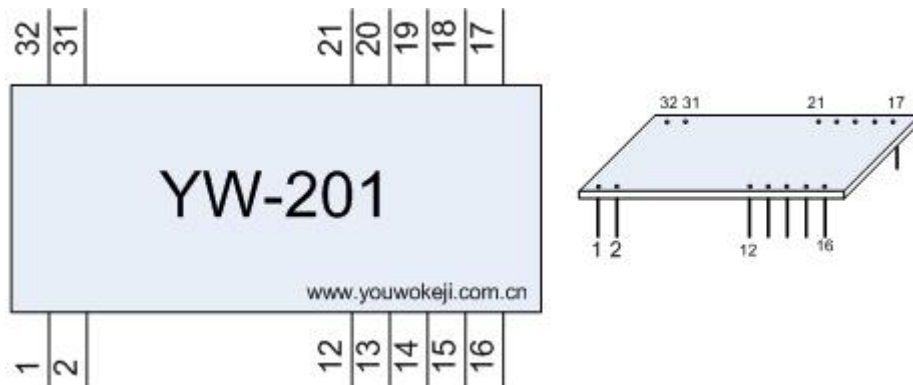
☞ Power supply : +4.5~+5.5V.

☞ Read Card distance 5~10cm. (Depend on the antenna)

☞ You can get C51 source code example with the module.

4 Function specification

4.1 Pin Function



Pic 1

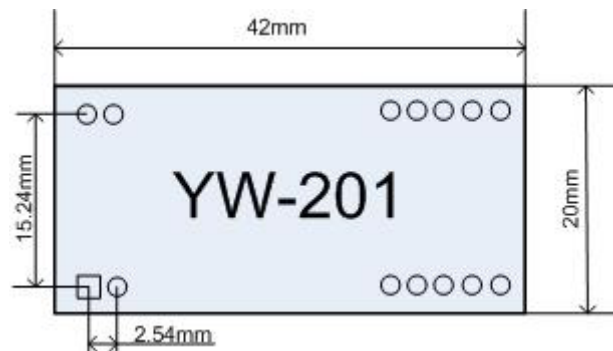
Pin function [Table 1]:

Pin	Function	Description
1	RX	Antenna Receive
2	TGND	Antenna GND
12	NC	Not Use
13	NC	Not Use
14	CARDIN	Card In/Out Indicate(Only when auto request) 0:Card In. 1:Card Out.
15	TXD/SDA	UART TXD/ IIC SDA
16	RXD/SCL	UART RXD/ IIC SCL
17	VCC	+5V VCC

18	GND	GND
19	PORTSEL	Communication Protocol Selector (0: IIC, 1: UART)
20	NC	Not Use
21	NC	Not Use
31	TX1	Antenna Output 1
32	TX2	Antenna Output 2

Table 1

4.2 Dimension



Pic 2

5 Protocols

5.1 UART Protocols of Commands

Uart Protocols of Commands use data blocks. The format of data block :

1) Format of TXD (MCU → YW-201 Module)

	[STX]	[LEN]	[CMD]	[DATA]	[CHK]	[ETX]
Description	0x02	Package Length	Commad	The Content of n bytes	CheckSum	0x03
Number of Byte	1	1	1	n	1	1

Table 2

- a) Asynchronism half duplex, 1 Start bit + 7 Data bits + 1 Stop bit.
- b) The default transfer speed is 19200 bit/s.
- c) Block Header STX=0x02, Block End ETX=0x03. From header to end , but not include the header STX and the end ETX, if there is 0x02, 0x03 or 0x10 , then must add 0x10 before it.
- d) Block Header STX=0x02.
- e) Package Length: the byte from Length itself to Checksum, but not include the added byte 0x10 due to 0x02, 0x03 or 0x10.
- f) Command: Refer to the Command List.
- g) The Content of n bytes: the parameter.
- h) CheckSum: XOR result from [**Length**] to then last byte of [**Content**], but not include the added byte 0x10 due to 0x02, 0x03 or 0x10.
- i) Block End ETX=0x02.

Example:

CMD: 0x10, DATA:0x00

Block Header:0x02.

LEN:0x04(=1Byte(Len) +1Byte(CMD)+1Byte(DATA)+1Byte(CHK))

CMD:0x10, 0x10. (Add 0x01 before 0x10)

DATA:0x00.

CHECKSUM:0x14(=0x04^0x10^0x00)

Package Send:0x02, 0x04, 0x10, 0x10, 0x00, 0x14, 0x03.

2) Respond Format (YW-201module → MCU)

	[STX]	[LEN]	[CMD]	[STATUS]	[DATA]	[CHK]	[ETX]
Content	0x02	Package Length	Command	0x00: Success 0xFF: Fail	The Content of n bytes	CheckSum	0x03
Num of Byte	1	1	1	1	n	1	1

Table 3

- a) Asynchronism half duplex, 1 Start bit + 7 Data bits + 1 Stop bit.
- b) The default transfer speed is 19200 bit/s.
- c) Block Header STX=0x02, Block End ETX=0x03. From header to end , but not include the header STX and the end ETX, if there is 0x02, 0x03 or 0x10 , then must add 0x10 before it.
- d) Block Header STX=0x02.
- e) Package Length: the byte from Length itself to Checksum, but not include the added byte 0x10 due to 0x02, 0x03 or 0x10.
- f) Command: Refer to the Command List. When the MCU send the command to the module, the module send back this command to the MCU.
- g) Status: Operation result. Success: 0x00. Fail: 0xFF.
- h) During the communication, command content.
- i) CheckSum: XOR result from [Length] to then last byte of [Content], but not include the added byte 0x10 due to 0x02, 0x03 or 0x10.
- j) Block End ETX=0x02.

5.2 IIC Protocol

1) Format of TXD(MCU → YW-201 Module)

	[Address of module] (W/R)	[LEN]	[CMD]	[DATA]	[CHK]
Content	Write: 0xA0	Package Length	Command	The Content of n bytes	CheckSum
	Read: 0xA1				
Num of Byte	1	1	1	n	1

Table 4

- a) Address of module (W/R):
- b) When Write to module, the Address is 0xA0.
- c) When Read from module, the Address is 0xA1.
- d) Package Length: the byte from Length itself to Checksum.

- e) Command: Refer to the Command List.
- f) The Content of n bytes: the parameter.
- g) CheckSum: XOR result from [Length] to then last byte of [DATA].

2) Respond Format(YW-201module → MCU)

	[LEN]	[CMD]	[STATUS]	[DATA]	[CHK]
Content	Package Length	Command	0x00:Success 0xFF: Fail	The Content of n bytes	CheckSum
Num of Byte	1	1	1	n	1

Table 5

- h) Package Length: the byte from Length itself to Checksum.
- i) Command: Refer to the Command List.
- j) Status: Operation result. Success: 0x00. Fail: 0xFF.
- k) The Content of n bytes: the parameter.
- l) CheckSum: XOR result from [Length] to then last byte of [DATA].

5.3 Switch of Uart and IIC

YW-201 Contactless card read/write module support UART and IIC, they can be switched by the port PORTSEL

PORTSEL = 1(High), UART is selected.

PORTSEL = 0(Low), IIC is selected.

6 Command List

	[CMD Name]	[Dir]	[LEN]	[CMD]	[STATUS and DATA]	[Description]
System Command						
1	Module	Send	0x04	0x01	0x00	4 combination with bit0 and bit1:

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	Setting				0x01		Antenna Status (BIT0) 0: Turn off Antenna 1: Turn on Antenna Auto Request (BIT1) 0: Turn off Auto Request 1: Turn on Auto Request
					0x02		
					0x03		
		Return	0x04	0x01	0x00		Status: 0x00: Success 0xFF: Fail
					0xFF		
2	Power Setting	Send	0x03	0x02			
		Return	0x04	0x02	0x00		Status: 0x00: Success 0xFF: Fail
					0xFF		
Contactless card Command							
3	Request Card	Send	0x04	0x10	0x00		Request card mode: 0x00: request all card in antenna area 0x01: request card that have not halted in antenna area
					0x01		
		Return	0x08	0x10	0x00	Serial No	Status: 0x00: Request success + Card Serial No(4 bytes). 0xFF: Request Fail.
			0x04		0xFF		
4	Read Block	Send	0x0B	0x11	8Byte		Key Set(1Byte)+Block No(1Byte) + Key(6Bytes) a. Key Set(1Byte): Select Key A,B(BIT0)->0:Key A;1:Key B Key Mode(BIT1)-> 0:Use key passed. 1:Use key downloaded. b. Index of Key Downloaded(BIT2~BIT7) ->0~31
		Return	0x14	0x11	0x00	Data	0x00: Success, 16 bytes of data return.
			0x04		0xFF		0xFF: Fail
5	Write Block	Send	0x1B	0x12	24bytes		Key set(1Byte)+Block No(1Byte) + Key(6Bytes)+ Data(16Bytes) a. Key Set(1Byte): Select Key A,B(BIT0)->0:Key A;1:Key B Key Mode(BIT1)->

							0:Use key passed. 1:Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) ->0~31
		Return	0x04	0x12	0x00		Status: 0x00: Success 0xFF: Fail
6	Read Sector	Send	0x0B	0x13	8bytes		Key Set (1Byte) + Index of Sector (1Byte) + Key (6Bytes) a. Key Set (1Byte): Select Key A, B (BIT0) -> 0:Key A; 1:Key B Key Mode (BIT1) -> 0:Use key passed. 1:Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) ->0~31
		Return	0x44	0x13	0x00	Data	0x00: success, 64bytes of data return.
			0x04	0x13	0xFF		0xFF: Fail
7	Initialize purse	Send	0x0F	0x14	12Bytes		Key Set (1Byte) + Index of Block (1Byte) + Key (6Bytes) + Purse Initial Value (4Bytes, LSB) a. Key Set (1Byte): Select Key A, B (BIT0) -> 0:Key A; 1:Key B Key Mode (BIT1) -> 0:Use key passed. 1:Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) ->0~31
		Return	0x04	0x14	0x00		Status: 0x00: Success
					0xFF		0xFF: Fail
8	Read purse	Send	0x0B	0x15	8Bytes		Key Set (1Byte) + Index of Block (1Byte) + Key (6Bytes) a. Key Set (1Byte): Select Key A, B (BIT0) -> 0:Key A; 1:Key B Key Mode (BIT1) -> 0:Use key passed. 1:Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) ->0~31

		Return	0x08	0x15	0x00	Data	0x00: Success, 4bytes of purse value(LSB)
			0x04		0xFF		0xFF: Fail
9	decrement	Send	0x0F	0x16	12Bytes	Key Set (1Byte) + Index of Block (1Byte) + Key (6Bytes) + value of decrement (4Bytes, LSB) a. Key Set (1Byte): Select Key A, B (BIT0) → 0: Key A; 1: Key B Key Mode (BIT1) → 0: Use key passed. 1: Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) → 0~31	
		Return	0x04	0x16	0x00	Status:	0x00: Success
					0xFF		0xFF: Fail
10	Increment	Send	0x0F	0x17	12Bytes	Key Set (1Byte) + Index of Block (1Byte) + Key (6Bytes) + value of Increment (4Bytes, LSB) a. Key Set (1Byte): Select Key A, B (BIT0) → 0: Key A; 1: Key B Key Mode (BIT1) → 0: Use key passed. 1: Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) → 0~31	
		Return	0x04	0x17	0x00	Status:	0x00: Success
					0xFF		0xFF: Fail
11	Purse backup	Send	0x0C	0x18	9Bytes	Key Set (1Byte) + Index of Block (1Byte) + Index of Block Backup (1Byte) + Key (6Byte) a. Key Set (1Byte): Select Key A, B (BIT0) → 0: Key A; 1: Key B Key Mode (BIT1) → 0: Use key passed. 1: Use key downloaded. b. Index of Key Downloaded (BIT2~BIT7) → 0~31 ps: the index of block and the backup block must be in the same sector.	
		Return	0x0C	0x18	0x00	Status:	0x00: Success
					0xFF		

							0xFF: Fail
12	Card Halt	Send	0x03	0x19			Status: 0x00: Success 0xFF: Fail
		Return	0x04	0x19			
					0x00		
					0xFF		
13	Key Download	Send	0x0A	0x1A	Index of key (1Byte, 0~31) + Key (6Bytes)		
		Return	0x04	0x1A	0x00	Status: 0x00: Success 0xFF: Fail	
					0xFF		
14	Read RC500 EEPROM	Send	0x06	0x1B			Address(2Bytes)+Legnth(1Bytes) Ps: Address: High byte afront Length: not more than 16
		Return	n+4	0x1B	0x00	Data	0x00: success, n(Length) bytes of data return.
			0x04		0xFF		
15	Write RC500 EEPROM	Send	n+5	0x1C	N bytes data		Address(2Bytes)+Data(nBytes) Ps: Address: High byte afront Data: not more than 16 bytes.
		Return	0x04	0x1C	0x00		Status: 0x00: Success 0xFF: Fail
					0xFF		

Table 6



Turn on the antenna before the operation of contactless card.

7 Command test sample

Samples below are based on uart protocol.

6.1. request card

Send: 02 04 10 10 00 14 03

Receive: 02 08 10 10 00 4D 56 A2 57 F6 03

6.2. read block

Send: 02 0B 11 00 3E FF FF FF FF FF FF 24 03

Receive: 02 14 11 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 04 03

6.3. write block

Send: 02 1B 12 00 3E FF FF FF FF FF FF 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 36 03

Receive: 02 04 12 00 16 03

6.4. download key

Send: 02 0A 1A 00 FF FF FF FF FF FF 10 10 03

Receive: 02 0A 1A 00 FF FF FF FF FF FF 10 10 03

6.5. initial purse

Send: 02 0F 14 00 3D FF FF FF FF FF FF 01 00 00 00 27 03

Receive: 02 04 14 00 10 10 03

6.6. read purse

Send: 02 0B 15 00 3D FF FF FF FF FF FF 23 03

Receive: 02 08 15 00 10 02 00 00 00 1F 03

6.7. increment of purse

Send: 02 0F 16 00 3D FF FF FF FF FF FF 01 00 00 00 25 03

Receive: 02 04 16 00 12 03

6.8. decrement of purse

Send: 02 0F 17 00 3D FF FF FF FF FF FF 01 00 00 00 24 03

Receive: 02 04 17 00 13 03

6.9. purse backup

6.9.1 initial purse 1

Send: 02 0F 14 00 3D FF FF FF FF FF FF 01 00 00 00 27 03

Receive: 02 04 14 00 10 10 03

6. 9. 2 initial purse 2

Send: 02 0F 14 00 3C FF FF FF FF FF FF 05 00 00 00 22 03

Receive: 02 04 14 00 10 10 03

6. 9. 3 purse backup from 1 to 2

Send: 02 0C 18 00 3D 3C FF FF FF FF FF FF 15 03

Receive: 02 04 18 00 1C 03

6. 9. 4 read purse 2

Send: 02 0B 15 00 3C FF FF FF FF FF FF 22 03

Receive: 02 08 15 00 FF 04 00 00 E6 03

6.10. card halt

Send: 02 10 03 19 1A 03

Receive: 02 04 19 00 1D 03

6.11. read RC500EEPROM

Send: 02 06 1B 00 70 10 10 7D 03

Receive: 02 14 1B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0F 03

6.12. write RC500EEPROM

Send: 02 15 1C 00 70 FF FF FF FF FF FF FF FF FF FF FF FF FF FF 79 03

Receive: 02 04 1C 00 18 03

6.13. module IDLE

Send: 02 10 03 10 02 01 03

Receive: 02 04 10 02 00 06 03

6.14. module set

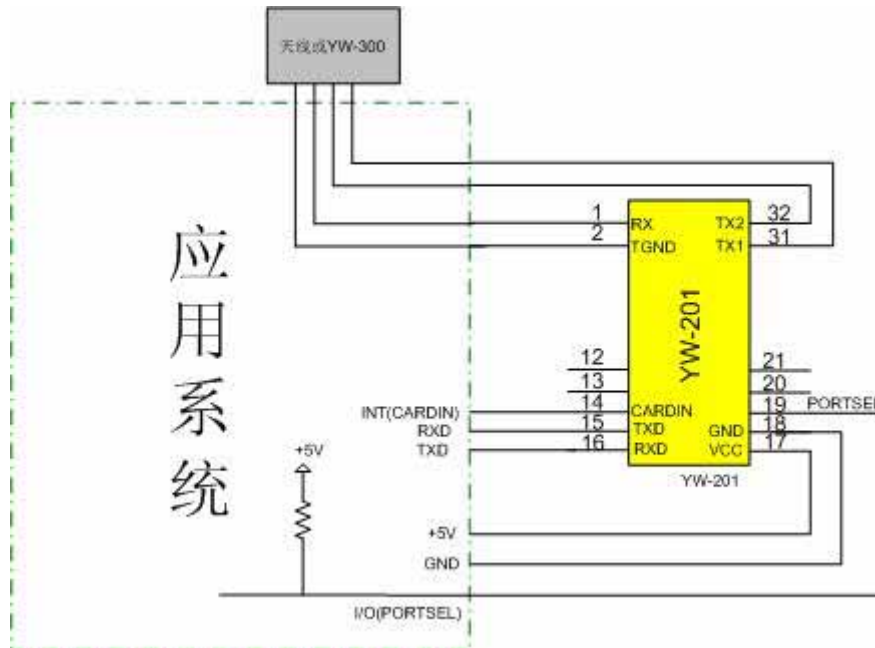
Send: 02 04 01 00 05 03(turn off antenna)

Receive: 02 04 01 00 05 03

Send: 02 04 01 01 04 03(turn on antenna)

Receive: 02 04 01 00 05 03

8 Application



Pic 3

9 About the Antenna

For higher capability, we can select YW-300 antenna module on the system of YW-201 Contactless card module. For more information about YW-300 antenna module, please visit <http://www.youwokeji.com.cn>.

10 Order

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