CR028 Low Power Low cost Reader Module

User Manual

1. Mifare Standard Support

- Mifare s50 1k memory
- Mifare S70 4k memory
- Mifare UltraLight
- Mifare Pro x
- Other ISO14443 A

2. Technical Specification

- Power supply: 2.5-3.6 V, 30-50mA
- Sleep Mode <10mA , Halt < 5uA
- Interface: TTL232
- Transmission speed: Default 19200 bps
- R/W distance of up to 50mm
- Storage temperature: -40 ºC ~ +125 ºC
- Operating temperature: -25ºC ~ +80 ºC

3. Communication setting

The communication protocol is byte oriented. Both sending and receiving bytes are in hexadecimal format. The communication parameters are as follows,

Baud rate:	19200 bps
Data:	8 bits
Stop:	1 bit
Parity:	None
Flow control:	None

4. Dimension

SIZE

38.2×38.2*3.10（mm）

PIN

PIN	Name	description
1	Nc	
2	VCC	+2.5v – 3.60
3	GND	GND
4	RXD	TTL Rx
5	TXD	TTL Tx
6	INT0	Low to Wake up Reader in Halt
7	Nc	
8	Nc	
9	SCL	SPI_SCL
10	MISO	SPI_SCL
11	MOSI	SPI_MOSI
12	SS	SPI_SS

Character

Parameter	Min	Type	Max	Units
voltage	2. 5		3. 6	V
current (include antenna)		40		mA
Initialization time		600		uS
Opertating temperature	－25		＋85	℃
Storage temperature	－40		＋125	℃

Transmission rate	Default 19200, N, 8, 1					
Data format	Binary HEX “hexadecimal”					
Data package						
Head	Length	Node ID	Function Code	Data …	XOR	

COMMAND :

	Data length (Byte)		X O R	S U M
Head	02	Fixed: 0xAA , 0xBB		
Length	02	There are several effective bytes that including XOR follows this column.	FF	00
Node ID	02	Destination Node Address Number. xx xx: Low byte first 00 00: Broadcast to each reader.	X	S
Function code	02	It will be transmission ability of each different command . Low byte frist	X	S
Data	00~D0	Data length is not fixed, according to its purpose.	X	S
XOR	01	XOR each byte from Node ID to Last Data byte with 0xFF.		S

REPLY DATA FORMAT :

	Data length (Byte)		X O R	S U M
Head	02	Fixed: 0xAA , 0xBB		
Length	02	There are several effective bytes that including XOR follows this column.	FF	00
Node ID	02	Destination Node Address Number. xx xx: Low byte first 00 00: Broadcast to each reader.	X	S
Function code	02	It will be transmission ability of each different command . Low byte frist	X	S
Status	1	Reply result , if succeed is 0 ,other fail .		
Data	00~D0	Data length is not fixed, according to its purpose.	X	S
XOR	01	XOR each byte from Node ID to Last Data byte		S

NOTE: if from "Length" to "XOR " have a data is "AA" then should follow a data "0x00" ,but length don't changed.

While a command send and after 100ms no reply then consider this command failed .

Command List

1、 Initialize port ：0x0101
2、 **Set device node number : 0x0102 Ignore**
3、 **Read device node number : 0x0103 Ignore**
4、 **Read device Mode : 0x0104**
5、 **Set buzzer beep: 0x0106 Ignore**
6、 **Set Led color : 0x0107**
7、 **Set reader working status : 0x0108 Ignore**
8、 **Set antenna status 。0x010c**
9、 **Mifare Request , 0x0201**
10、 Mifare anticollision , 0x0202:
11、 **Mifare Select 0x0203:**
12、 **Mifare Hlta , 0x0204:**
13、 **Mifare Authentication1 0x0206 : Ignore**
14、 Mifare Authentication2 0x0207:
15、 Mifare Read 0x0208:
16、 Mifare Write 0x0209:
17、 Mifare Initval 0x020A:
18、 Mifare Read Balance 0x020B:
19、 Mifare Decrement 0x020C:
20、 Mifare Increment 0x020D:
21、 Mifare Restore 0x020E: Ignore
22、 Mifare Transfer 0x020F Ignore
23、 Mifare UltraLight Anticoll 0x0212:
24、 Mifare UltraLight Write 0x0213:
25、 Write key store in RC500 EEPROM 。 Ignore
26、 Set Reader to Sleep Mode
27、 Set Reader to Halt Mode

1. Initialize port ：0x0101

Function： set baud rate

Format ： aa bb 06 00 00 01 01 "Baud_para" "xor Chk"

Baud_parameter ：

0 = 4800;
1 = 9600;
2 = 14400;
3 = 19200;
4 = 28800;
5 = 38400; Don’t use this module
6 = 57600;
7 = 115200; Don’t use this module

sample ：Host To Reader;
aa bb 06 00 00 00 01 01 03 03 Set Baud Rate as 19200

Respond: aa bb 06 00 bf ff 01 01 00 40

2. Set device node number : 0x0102 not use of this version。

3. Read device node number : 0x0103 not use of this version 。

4. Read device Mode : 0x0104

function： read device mode and version
Host to Reader : aa bb 05 00 00 00 04 01 05
Respond: aa bb 12 00 52 51 04 01 00 43 52 35 30 30 4c 52 2d 31 32 30 33 11
C R 5 0 0 L R - 1 2 0 3
This module should be CR028 xxxxx

5. Set buzzer beep: 0x0106 Ignore

Function ：beep
format ：aa bb 06 00 00 00 06 01 Delay XOR
Delay*10ms beep time ， XOR is xor check。
Sample ：Host to Reader : aa bb 06 00 00 00 06 01 64 63
Respond : aa bb 06 00 52 51 06 01 00 04

6. Set Led color : 0x0107

Host To Reader;
aa bb 06 00 00 00 07 01 03 05 // set Red&green LED on 。
Respond: aa bb 06 00 bf bf 07 01 00 06
Tenth data is LED parameter ,function as below :
0 = LED_RED Off , LED_GREEN Off
1 = LED_RED On , LED_GREEN = Off
2 = LED_GREEN Off , LED_RED On
3 = LED_GREEN On , LED_RED ON

7. Set reader working status : 0x0108 Ignore。

8. Set antenna status 。0x010c

Host To Reader;
aa bb 06 00 00 00 0c 01 00 0D //set antenna off。
Tenth data is Antenna status parameter ； 0 = Close Filed 1= Open Filed.

9. Mifare Request， 0x0201

Function ： Request Type a Card

Format ：aa bb 06 00 00 00 01 02 req_code XOR

req_code=Request mode

req_code=0x52: request all Type A card In filed

req_code=0x26: request idle card

sample：Host To Reader:

aa bb 06 00 00 00 01 02 52 51

Respond : aa bb 08 00 52 51 01 02 00 04 00 04

TagType： 0x4400 = ultra_light

0x0400 = Mifare_One(S50)

0x0200 = Mifare_One(S70)

0x4403 = Mifare_DESFire

0x0800 = Mifare_Pro

0x0403 = Mifare_ProX

10. Mifare anticollision， 0x0202:

Function ：card anticollision

Format ： aa bb 05 00 00 00 02 02 00

Respond ： aa bb 0a 00 52 51 02 02 00 46 ff a6 b8 a4

“ 46 ff a6 b8 ” is card serial number。

11．Mifare Select 0x0203:

Function ：Select card

Format ： aa bb 09 00 00 00 03 02 xx xx xx xx XOR

Ninth to twelfth is card serial number 。

Sample ： Host to Reader : aa bb 09 00 00 00 03 02 46 ff a6 b8 a6

Respond : aa bb 07 00 52 51 03 02 00 08 0a

12. Mifare Hlta， 0x0204:

Function ：Hlta card

Host to reader ：aa bb 05 00 00 00 04 02 06

Respond ：aa bb 06 00 52 51 04 02 00 05

13. Mifare Authentication1 0x0206： Ignore

Function ：authenticate Card (Key Stroe in RC500)

Format ：aa bb xx 00 00 00 06 02 Auth_mode Block KeyEE CHK

Auth_mode=**Authenticate mode**,0x60: Key A ,0x61: Key B

Block= Authenticate block

KeyEE = Key store in RC500 EEPROM group，from 0 to 31 total 32 。

Sample ：Host to Reader : aa bb 08 00 00 00 06 02 60 04 01 61

Authenticate Block 4 Key = “group 01 ”

Respond : aa bb 06 00 11 12 06 02 00 07

14. Mifare Authentication2 0x0207:

Function ：authenticate Card

Format ：aa bb xx 00 00 00 07 02 Auth_mode Block xx xx xx xx xx xx XOR

Auth_mode= **Authenticate mode** ,0x60: KEY A ,0x61: KEY B

Block = Authenticate block

Sample ：Host to Reader : aa bb 0d 00 00 00 07 02 60 04 ff ff ff ff ff ff 61
Authenticate Block 4 Key A = “FF FF FF FF FF FF”
Respond : aa bb 06 00 52 51 07 02 00 06

15. Mifare Read 0x0208:

Function ：Read block
Format ：aa bb 06 00 00 00 08 02 Block XOR
Block = which block want read
Sample ：Host to Reader : aa bb 06 00 00 00 08 02 04 0e
Respond ：aa bb 16 00 52 51 08 02 00 00 00 00 00 00 00 00 00 00 00 00 12 34 56 78 01
Tenth to sixteenth byte is Data。

16. Mifare Write 0x0209:

Function ： write block
Format ： aa bb 16 00 00 00 09 02 Block
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 Da Db Dc Dd De Df XOR
Sample ： write data to Block4
Host to Reader
aa bb 16 00 00 00 09 02 04 00 00 00 00 00 00 00 00 00 00 00 00 12 34 78 56 07
Respond: aa bb 06 00 52 51 09 02 00 08

17. Mifare Initval 0x020A:

Function ： initialize purse
Format ： aa bb 0a 00 00 00 0a 02 Block V0 V1 V2 V3 XOR

18. Mifare Read Balance 0x020B:

Function ：read balance
Format ：aa bb 06 00 00 00 0B 02 Block XOR
Return four byte balance 。

19 Mifare Decrement 0x020C:

Function ： decrease balance
Format ：aa bb 0a 00 00 00 0c 02 Block V0 V1 V2 V3 XOR

20. Mifare Increment 0x020D:

Function ：increase balance
Format ：aa bb 0a 00 00 00 0D 02 Block V0 V1 V2 V3 XOR

21. Mifare Restore 0x020E: Ignore

Function ：Restore a mifare_one block data to buffer
Format ：aa bb 06 00 00 00 0E 02 Block XOR

22. Mifare Transfer 0x020F

Function ：Transfer buffer data to a block
Format ：aa bb 06 00 00 00 0F 02 Block XOR

23. Mifare UltraLight Anticoll 0x0212:

Function ：UltraLight anticollision ,respond ultralight ID。
Format ：aa bb 05 00 00 00 12 02 CHK
Sample ：Host to Reader: aa bb 05 00 00 00 12 02 10

Respond : aa bb 0d 00 52 51 12 02 00 *04 1f ae 11 14 7a 00* d9

'04 1f ae 11 14 7a 00' is card serial number 。

24. Mifare UltraLight Write 0x0213:

Function ： write mifare Ultralight

Format ： aa bb 0a 00 00 00 13 02 Page D0 D1 D2 D3 XOR

Page which page want write data ；

D0…D3 data ；

XOR xor check。

Sample ： Host to Reader : aa bb 0a 00 00 00 13 02 04 88 88 88 88 15

Respond: aa bb 06 00 52 51 13 02 00 12

25. Write key store in RC500 EEPROM 。 Ignore

Format ：aa bb xx 00 00 00 16 02 Auth_mode group xx xx xx xx xx xx XOR

Auth_mode= 0x60: KEY A ,0x61: KEY B (ignore in this command)

Group = 0—31 ，write RC500 Eeprom Address from 0x80 to 0x1FF ，total 32 group。

"xx xx xx xx xx xx " = KEY should be writed to EEPROM。

Sample ：Host to Reader : aa bb 0d 00 00 00 16 02 60 01 ff ff ff ff ff ff 75

Write group 01 Key = "FF FF FF FF FF FF"

Respond : aa bb 06 00 11 12 16 02 00 17

26、 Set Reader to Sleep Mode

Format aa bb 06 00 00 00 11 01 Sleep_Mode xor

Sleep_Mode = 0x01 set RF chip sleep;

Aa bb 06 00 00 00 11 01 01 11

Sleep_Mode = 0x00 set RF chip work;

Aa bb 06 00 00 00 11 01 00 10

27、 Set Reader to Halt Mode

Format : aa bb 05 00 00 00 12 01 13

After rececived this command reader should turn to Halt mode, Need a Low Pull on INT0 can wake up reader.