



R-DT-NEO-UHF-USB
NEO UHF RFID Device
Communication Protocol

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1 Communication protocol structure

The longest data frame of commands or response can be 128 bytes.

1.1 Physical layer

This layer is to complete signal's bit data's send and receive.

Serial interface parameters are:

- 1 start bit
- 8 data bits
- 1 stop bit
- None parity checksum
- Baud rate: 115200 bps

1.2 Data link layer

This layer is to rule the type and data format of the commands and response frame, frame type is divided into command frame, response frame, reader command completed response frame

1.2.1 command frame definition

Command frame is data frame of Host operating reader, format as following:

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	n Bytes	1 Byte
0x03					

- Head is startbyte, always 0x03 (ETX)
- Len is package length, stands for amounts of all the bytes of the whole frame
- Addr is reader address, which range from 0...240, 255 (0xFF) is public address, 254 (0xFE) is broadcast address. Reader receive commands of its address, public address and broadcast address, and not reply to the broadcast address. Reader default address Addr is 0xAA (170)
- Cmd is command code domain
- Parameter is parameter domain of the commands frame, its length n is variable
- Check is checksum value, which is XOR value from head parameter to the last one.

1.2.2 Response frame format definition

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	n Bytes	1 Byte
0x02					

- Head is frame head frame, always 0x02 (STX)
- Len is package length, stands for amounts of all the bytes of the whole frame

- Addr is reader's itself address
- Cmd is command code domain, is command value received +1
- Parameter is parameter domain in the command frame, and its length n is variable
- Check is checksum value, which is XOR value from head parameter to the last one.

2 Commands Description

2.1 Tag Operation Commands

2.1.1 callAntennaPower is function to open/close antenna (0x01)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x03	Address	0x06	0x01	1 or 0	BCC

Parameter description

1 = enable

0 = disable

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x02	1 or 0	BCC

2.1.2 callSendFirmwareHardwareID is to check firmware version and hardware ID (0x02)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x03	Address	0x06	0x02	1 or 0	BCC

Parameter description

1 = get hardware version

0 = get software version

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	n + 5	0x03	1 or 0	BCC

Parameter description

The first byte of this parameter is software/hardware version remark, 1 stands for hardware version, 0 stands software version; other parameter is detailed software/hardware version number, and character string format sent with end of '0', also each byte stands ASCII code of each character respectively.

2.1.3 callConfigGen2 is to configure Gen2 Protocol (0x03)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	12 Bytes	1 Byte
0x03	Address	0x11	0x03		BCC

Parameter description

The 0, 2, 4, 6, 8 parameter bits stand for if need to write parameters into the 1,3,5,7,9 parameter bit (1 stands Yes, 0 stands No). Each bits contents as below:

Number	Description	Length
0	1/0	1 Byte
1	linkFreq	1 Byte
2	1/0	1 Byte
3	Coding	1 Byte
4	1/0	1 Byte
5	session	1 Byte
6	1/0	1 Byte
7	txext	1 Byte
8	1/0	1 Byte
9	gen2qbegin	1 Byte
10	1/0	1 Byte
11	Sensitivity	1 Byte

Detail description

linkFreq: is communication speed setup of tag;s reverse link, default value is 0x06

0x00 = 40 kHz

0x06 = 160 kHz

0x08 = 213 kHz

0x09 = 256 kHz

0x0c = 320 kHz

0x0f = 640 kHz

Coding: is communication coding setup of reverse link, default is 0x01

0x00 = FM0 coding for rx

0x01 = MILLER2 coding for rx

0x02 = MILLER4 coding for rx

0x03 = MILLER8 coding for rx

Session: is tag conversation choice, default is 0x00

0x00 = Inventoried (S0) */

0x01 = Inventoried (S1) */

0x02 = Inventoried (S2) */

0x03 = Inventoried (S3) */

0x04 = 100: SL

Trext: is pre-leading note choice of the preamble, default is 0x01

0x00 = no pilot tune of preamble

0x01 = preamble adding pilot tune

gen2qbeg: initial value choice of inventory tag , range from 0...15, default 4

Sensitivity: reader receiving sensitivity set value as the minus of type signed char (that is character string), the best sensitivity is -84, that is 0xAC. Default as 0xAC

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	12 Bytes	1 Byte
0x02	Address	0x11	0x04		BCC

Parameter description

Number	Description	Length
0	0	1 Byte
1	linkFreq	1 Byte
2	0	1 Byte
3	Coding	1 Byte
4	0	1 Byte
5	session	1 Byte
6	0	1 Byte
7	trext	1 Byte
8	0	1 Byte
9	gen2qbeg	1 Byte
10	0	1 Byte
11	Sensitivity	1 Byte

2.1.4 callInventoryRSSI inventory tag with RSSI, Gen2 command (0x04)

Send

Head	Address	Length	Command	Parameter 0	Parameter 1	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Bytes	1 Byte
0x03	Address	0x07	0x05	0x01		BCC

Parameter description

Parameter 0: always 0x01

Parameter 1:

When this parameter is 1, means continuously inventory lasting 2 seconds, when is 0, means stopping continuously inventory. Using this way enable to better control process of scanning tags, that is firstly continuously scanning, afterwards send command to stop.

After stop scan, there still be few tags got, at this time, it should not to get the response command of stop scan, but it's to get complete for other remained tags.

After stop scan, sending other commands will get the tags data scanned, at this time it should repeat trying the commands few times, to avoid getting tags' return data.

Value 2 means only inventory one time

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	n Bytes	1 Byte
0x02	Address		0x06		BCC

Parameter description

If the parameter are the 3bytes 00 00 00, that means not getting any tags, if get tags, then it will return as following format:

Number	Description	Length	Remark
0	Tag information amount	1 Byte	Tag information including this parameter, if this parameter is 0, then no any tag got
1	RSSI value	1 Byte	Range from 0~255, the higher value, the stronger signal
2	Receive frequency low	3 Byte	Rank from LSB, if frequency is 921000KHz, then data sent in turn as 0xa8 0x0d 0x0e
3	PC and EPC total length	1 Byte	The total PC and EPC length of all tags
4	PC	1 Byte	
5	EPC	n Byte	Tag's EPC information inventoried is from this position to the last byte of parameter, each PC including thereafter EPC length
6	PC	2 Bytes	
7	EPC	n Bytes	
...			
N	...		
N+1	...		

2.1.5 callSelectTag- Select Tag (0x06)

This command is used before operating to single tag (operation to single tag including Read/write tag memory, lock, kill tag, etc)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	n +1 Bytes	1 Byte
0x03	Address	5 + n + 1	0x06		BCC

Parameter description

Parameter 0: EPC length

Parameter 1...n: EPC (4...62 Bytes)

Example03 AA 12 06 **0C** 30 08 33 B2 DD D9 01 40 00 00 00 00 CC

Above data remarked with yellow is EPC length, the gray ones is tag EPC value

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x07	Status	BCC

Status

0x00 = select tag succeed

0x09 = select tag failed

2.1.6 callWriteToTag- write Gen2 Tag operation (0x07)**Send**

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	7 + n Bytes	1 Byte
0x03	Address		0x07		BCC

Parameter description

Number	Description	Length	Remark
0	Mem_type	1 Byte	Tag memory bank
1	address	1 Byte	Start address
2	access_pw	4 Bytes	Access password
3	data_len	1 Byte	Data length
4	Data	2 × data_len Bytes	Data

Detail description

Mem_type: 0: reserved membank data

1: EPC membank data

2: TID membank data

3: USER membank data

access_pw: 4 bytes length of Tag's access password

address: Tag's 16 bits start address be written into, one 16 bits as 2 bytes data_len: 16 bits character length be written into, one 16 bits as 2 bytes

Example

write 2 words (4 bytes data) in the position 01 of USER area

03 AA 10 07 03 01 00 00 00 01 02 AA EE CC FF CC

Response

Head	Address	Length	Command	Parameter 0	Parameter 1	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Bytes	1 Byte
0x02	Address	0x07	0x08	Status	Length	BCC

Status

0xff = data not finish writing

0x09 = Tag not be selected

0x01 = password authenticate failed

0x04 = data writing succeed

0x00 = data writing succeed

2.1.7 callChangeFreq - change READER search frequency parameter (0x08)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	5 Bytes	1 Byte
0x03	Address	0x0A	0x08		BCC

Parameter description

When setting frequency , it need to operate as following:

1. Erase frequency list Parameter0 = 0x08, other parameter as empty Returned parameter fixed as 3 bytes, 0xFE 0xFF 0x00
2. Add search frequency Parameter0 = 0x04, add frequency point, frequency accuracy as kHz, for example 889.750 MHz in the software stands as 897500

Number	Description	Length	Remark
0	Select action	1 Byte	
1	Frequencies low 8 bits	1 Byte	
2	Frequencies middle 8 bits	1 Byte	
3	Frequencies high 8bits	1 Byte	
4	RSSI threshold	1 Byte	Type as minus of signed char

Detail description

RSSI threshold: max noisy signal allowed of this frequency

Return parameter: if succeed, then return frequency value set

Error: 0x00 0x00 0x00 = memory full

0x00 0x01 0x00 = Over allowed range

2.1.8 callReadFromTag-- read data of selected Gen2 tag (0x09)

Read selected tag data

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	4 Bytes	1 Byte
0x03	Address	0x09	0x09		BCC

Parameter description**Parameter description**

Number	Description	Length	Remark
0	Mem_type	1 Byte	Tag memory bank
1	address	1 Byte	Start address
2	data_len	1 Byte	Data length
3	Password	4 Bytes	Read Password

Detail description

Mem_type: 0: reserved membank data

1: EPC membank data

2: TID membank data

3: USER membank data

Address: data area address of membank (named 2 bytes as one data library)

Data_len: data blocks number to be read (unknown length fill with 0)

Example

Read EPC: 03 AA 09 09 01 00 00 00 00 00 00 00 CC

Data_len: data length, 1...16 bit word

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte		1 Byte
0x02	Address		0x0A		BCC

Parameter description

Number	Description	Length	Remark
0	status	1 Byte	Reading status
1	Data_len	1 Byte	Data Length
2	data	Data_len × 2 Bytes	Data

Detail description

Status: 0x0A —read data timeout

0xFF— unknown error

0x84— this block be locked, other parts cannot be read

0x83— data get read the last data block

0x09— this tag cannot be selected temporarily, cannot read data

0x08 — this tag's data read not complete, can be continuing to read remained parts

0x00 — this tag's data read not complete, can be continuing to read remained parts

Others —data not finish reading,need continuing reading and re-send this command and data block address

Special remark, when need to read completely membank, and the last reading command still not finish reading all data completely,the membank address of next reading commands will be: address =0+datalen0+ datalen1 ...

Other value — need to read out data of membank according to protocol

2.1.9 callKillTag EPC Gen2--kill tag (0x0A)

Send

Head	Address	Length	Command	Parameter 0	Parameter 1	Check
1 Byte	1 Byte	1 Byte	1 Byte	4 Bytes	1 Bytes	1 Byte
0x03	Address	0x0A	0x0A	Password	RFU	BCC

Parameter description

Number	Description	Length	Remark
0	Password	4 Bytes	Kill Password
1	RFU	1 Byte	Reserved for future use

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x0B	Status	BCC

Parameter description

Status: 0x00 = kill succeed

Others = kill failed

2.1.10 callLockUnlock- Lock EPC operation (0x0B)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	6 Bytes	1 Byte
0x03	Address	0x0B	0x0B		BCC

Parameter description

Number	Description	Length	Remark
0	Lock_Un	1 Byte	Lock or unlock options
1	Mem_space	1 Byte	Memory bank

3...5	Access_password	4 Bytes	Access Password
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Detail description

Lock_un: 0:unlock,memory area unlock
 1: lock, memory area lock
 2: permalock, permanent unlock
 3: lock & permalock, permanent lock

Memory_space: 0: kill password
 1:access password
 2: EPC
 3: TID
 4: User

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x0C	Status	BCC

Parameter description

Status: 0x02 = password authenticate error
 0x00 = lock or unlock succeed
 0x84 = tag permanent lock or unlock, unable unlock or lock forbidden
 Other: failed

2.1.11 calNXPCommands- operation with special NXP Tag (0x0C)**Send**

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	6 Bytes	1 Byte
0x03	Address	0x0B	0x0C		BCC

Parameter description

Number	Description	Length	Remark
0	NXP_Cmd	1 Byte	NXP command: 0x01:ChangeEAS 0x02:ReadProtect 0x04:EAS_Alarm
1	NXP_Param	1 Byte	When parameter 0 is 0x01, parameter 1 is 0x01, mean to set EAS, parameter 1 is 0x00,mean to cancel EAS When parameter 0 is 0x02, parameter 1 is 0x01, mean to set protection bit, parameter 1 is 0x00, stands for cancel protection bit according to password of parameter 2 to parameter 5
2...5	Access password	4 Bytes	Access password

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x0D	Status	BCC

Parameter description

Status: 0x00 = success

Others = failure

2.1.12 callInventory6B-- Inventory ISO18000-6B tags (0x0D)**Send**

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	11 Bytes	1 Byte
0x03	Address	0x10	0x0D		BCC

Parameter description

Number	Description	Length	Remark
0	startscan	1 Byte	Start scan, must be 1
1	mask	1 Byte	Some of special setup bit, which is 0 in common situation
2	filter	8 Bytes	8 byte long filter data storage area
3	startaddress	1 Byte	Head address of the data to be compared This command can select the inventory tag

Example :

1 inventory all tags: 03 AA 10 0D 01 00 00 00 00 00 00 00 00 00 00 B5

2 inventory all tags from address 0x00 and data as E0 04 00 00 C8: 03 AA 10 0D 01 05 E0 04 00 00 C8 00 00 00 00 9C

Response

Head	Address	Length	Command	Tag num.	Tag ID	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	8 Byte	1 Byte
0x02	Address	0x0E	0x0E			BCC

Parameter description

Number	Description	Length	Remark
0	Tag_number	1 Byte	When is 0, means no any tag read, if tag number is positive number n, that means there are n pieces tags be found including this information
1	UID	8 Bytes	Tag UID be found

2.1.13 callWriteToTag6B—write ISO18000-6B tags (0x0E)

Send

Head	Address	Length	Command	UID	Addr	Data	Len	Check
1 Byte	1 Byte	1 Byte	1 Byte	8 Bytes	1 Byte	Len Bytes	1 Byte	1 Byte
0x03	Address	0x0F + len	0x0E					BCC

Parameter description

UID: Tag uid to be written

addr: head address of tag's data to be written

data: tag data to be written

len: data length to be written

Example:

write 4bytes data 11 11 11 11 into 0x12 address of the tag, which UID is E0 04 00 00 C8 21 89 01

03 AA 13 0E E0 04 00 00 C8 21 89 01 12 04 11 11 11 11 27

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x0F	Status	BCC

Parameter description

Status: 0x00 = success

Others = failure

2.1.14 callReadFromTag6B – read data of ISO18000-6B tag (0x0F)

Send

Head	Address	Length	Command	UID	Addr	Len	Check
1 Byte	1 Byte	1 Byte	1 Byte	8 Bytes	1 Byte	1 Byte	1 Byte
0x03	Address	0x0F	0x0F			< 64	BCC

Parameter description

UID: Tag uid to be written

addr: head address of tag's data to be written

len: data length to be written

Remark

Data address range to be read from tag please refer to tag datasheet, or it may be error on the data read. Recommend to read data byte number less than 64, or the data read may be error

Example

write 8bytes into 0x00 address of the tag ,which UID is E0 04 00 00 C8 21 89 01

03 AA 0F 0F E0 04 00 00 C8 21 89 01 10 08 34

Response

Head	Address	Length	Command	Status	Len	Data	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	len Bytes	1 Byte
0x02	Address	0x07 + lenF	0x10				BCC

Parameter description

Status: 0x00 = success

Others = failure

len: data length to follow

2.2 System Commands

2.2.1 callSetReadAddr—set to read Reader Addr (0x14)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	2 Byte	1 Byte
0x03	Address	0x07	0x14		BCC

Parameter description

Number	Description	Length	Remark
0	set_or_read	1 Byte	1 is to set new Addr Others is to read Addr
1	new_ID	1 Byte	New Addr need to be set, range from 0x00...0xF0

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x15	New Address	BCC

2.2.2 callConfigRFPower—to read/write configured RF Power (0x16)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x03	Address	0x06	0x16	Attenuation	BCC

Parameter description

An attenuation value of 0...19 (dB) decreases the RF power.

A value of 0xFF reads out the current setting.

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x17	Attenuation	BCC

Parameter description

The attenuation value.

Important Note

This setting is volatile and will be lost after power cycle.

2.2.3 callPowerdownMode—enter low-power mode (0x17)

Introduction this command enable module into powerdown sleep mode,after succeed, re- import any character strings,will enable wake up from powerdown mode

Send

Head	Address	Length	Command	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x03	Address	0x05	0x17	BCC

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x18	Status	BCC

Parameter description

Status: 0x00 = success
 Others = failure

2.2.4 callResetParam— reset reader parameter (0x18)**Send**

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	1 Byte
0x03	Address	0x07	0x18	0x00 FA	BCC

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x19	Status	BCC

Parameter description

Status: 0x00 = success
 Others = failure

2.2.5 callReStart— restart reader (0x19)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	1 Byte
0x03	Address	0x07	0x19	0x00 FA	BCC

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
0x02	Address	0x06	0x1A	Status	BCC

Parameter description

Status: 0x00 = success

Others = failure

2.2.6 callIOControl—control module IO ports IO1...IO4 (0x1A)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	3 Bytes	1 Byte
0x03	Address	0x08	0x1A		BCC

Parameter description

Number	Description	Length	Remark
0	paramater0	1 Byte	Operation type option: 0x00: set IO direction 0x01:set IO electric level 0x02: read IO electric level, PINs operating pls refer to Parameter 2
1	parameter1	1 Byte	Parameter value range from 0x01~0x04, which accord to IO1~IO4 to be operated
2	parameter2	1 Byte	Parameter value is 0x00 or 0x01. When parameter0 is 0x00,parameter2 is 0x01,means to set correspond IO as output mode; parameter2 is 0x00,means set correspond IO as input mode; When parameter0 is 0x01,parameter2 is 0x01,means to set correspond IO as high level, parameter2 is 0, means to set correspond IO is low level When parameter is 2, this parameter is meaningless

Response

Head	Address	Length	Command	Parameter	Check
------	---------	--------	---------	-----------	-------

1 Byte	1 Byte	1 Byte	1 Byte	3 Bytes	1 Byte
0x02	Address	0x08	0x1B		BCC

Parameter description

Number	Description	Length	Remark
0	paramater0	1 Byte	Operation type: 0x00 is to set IO direction 0x01 is to set IO electric level 0x02 is to read IO electric level
1	parameter1	1 Byte	Operate port 0x01~0x04 is respectively correspond to IO1~IO4
2	parameter2	1 Byte	When parameter0 is 0x00, parameter2 is 0x01, means set IO direction succeed 0x00 stands set IO direction failed ; When parameter0 is 0x01, parameter2 is 0x01, means set IO electric level succeed ; 0x00 means set IO electric level failed ; When parameter0 is 0x02, parameter2 is x01, means set IO as high level, parameter2 is 0x00, means set IO as low level

Port control examples

```

/* set IO direction as import and read */
03 AA 08 1A 00 01 00 BA /* IO1 import */
03 AA 08 1A 02 01 00 B8 /* IO1 Read */
03 AA 08 1A 00 02 00 B9 /* IO2 import */
03 AA 08 1A 02 02 00 BB /* IO2 Read */
03 AA 08 1A 00 03 00 B8 /* IO3 import */
03 AA 08 1A 02 03 00 BA /* IO3 Read */
03 AA 08 1A 00 04 00 BF /* IO4 import */
03 AA 08 1A 02 04 00 BD /* IO4 Read */

/* set IO direction as output */
03 AA 08 1A 00 01 01 BB /* IO1 output */
03 AA 08 1A 01 01 01 BA /* IO1 high level */
03 AA 08 1A 01 01 00 BB /* IO1 low level */
03 AA 08 1A 02 01 00 B8 /* IO1 Read */
03 AA 08 1A 00 02 01 B8 /* IO2 output */
03 AA 08 1A 01 02 01 B9 /* IO2 high level */
03 AA 08 1A 01 02 00 B8 /* IO2 low level */
03 AA 08 1A 02 02 00 BB /* IO2 Read */
03 AA 08 1A 00 03 01 B9 /* IO3 output */
03 AA 08 1A 01 03 01 B8 /* IO3 high level */

```

03 AA 08 1A 01 03 00 B9 /* IO3 low level */

03 AA 08 1A 02 03 00 BA /* IO3 Read */

03 AA 08 1A 00 04 01 BE /* IO4 output */

03 AA 08 1A 01 04 01 BF /* IO4 high level */

03 AA 08 1A 01 04 00 BE /* IO4 low level */

03 AA 08 1A 02 04 00 BD /* IO4 Read */

2.2.7 callSetSleepTime--Set module Sleep time (0x1D)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x03	Address	0x06	0x1D	0x00...09	BCC

Parameter description

0x00 = read out current setting

0x01 = configure sleep time in minutes

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x02	Address	0x06	0x1E	0x01...09	BCC

Parameter description

Current sleep time in minutes.

2.2.8 callSetSensitivity --set module sensitivity (0x1F)

Send

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x03	Address	0x06	0x1F	Sensitivity	BCC

Parameter description

0xFF = read out current setting

0x00...AC = configure sensitivity, signed integer

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x02	Address	0x06	0x20	Sensitivity	BCC

Parameter description

Parameter is current sensitivity

Important Note

This setting is volatile and will be lost after power cycle.

2.2.9 callSetMode - set module working mode (0x21)**Send**

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x03	Address	0x06	0x21	Mode	BCC

Parameter description

mode = 0x00, stands standard mode

mode = 0x01, stands auto-adjust mode

The difference between auto-adjust mode and standard mode is: when set as auto-adjust mode, module will auto-convert based on the pre-set RF power and sensitivity when inventory and Read/write tags.

When module set as standard mode, module's output power and sensitivity will be invariable during working process, module default mode is standard mode.

Response

Head	Address	Length	Command	Parameter	Check
1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes	1 Byte
0x02	Address	0x06	0x22	Mode	BCC

Parameter description

0x01 = setting succeed

0x00 = setting failed

3 Other Introduction

3.1 Parameter Introduction

Above words Parameter0, Parameter1, Parameter2 and others else, all stands the Zeroth, the First, the Second byte data, others are similar

3.2 ISO18000-6C tag memory area Introduction

3.2.1 Reserved Memory Bank (0x00)

it should include Kill password and access password. Kill password should be stored in address of f 00h to 1Fh. Access password is stored in address of 20h to 3Fh. if tag not operate kill and/or access password, then this tag still working, but no matter if tag be locked permanently and not able to read/write password reset, there is no need correspond storage place in this reserved memory.

3.2.2 EPC Memory Bank (0x01)

e EPC storage should include CRC- 16in position of 00h to 1Fh, Control(PC) bit complaint with protocol of 10h to 1Fh storage address, and EPC start from 20h.PC is divided into EPC Length in 10h to 1Fh storage address, RFU in 15h to 17Fh storage address, and Number system Identification (NSI) in 18h to 1Fh storage address , CRC- 16, PC, EPC priority storage MSB (MSB of EPC should store in 20h position

3.2.3 TID Memory Bank (0x10)

TID storage includes 8bit ISO15693 distribution identification in position of 00h to 07h (for EPCglobal, it is 111000102), 12 bit task mask layout design in position of 08h to13h (EPCglobal member is free), and 12 bit tag type in position of 14h to 1Fh. Tag can include tag assign data and provider assign data in TID storage, which more than 1Fh (such as Tag serial number)

3.2.4 User Memory Bank (0x11)

User storage only allow to store assign data by user, this storage structure is defined by user.