RRU9809 UHF RFID Reader User's Manual
V1.2

Content

1、COMMUNICATION INTERFACE SPECIFICATION

The reader communicates with host (MCU，MPU，Controller) using USB port and complete corresponding operation according to the host command. The communication parameter is 57600bps 1 start bit, 8 data bits, 1 stop bit without parity check bit. In the process of serial communication, the least significant bit of one byte is transmitted first and the least significant byte of command data sequence is transmitted first.

2、PROTOCOL DESCRIPTION

A communication procedure is sponsored by the host sending commands and data to the reader and the reader returns the result status and data to host after command execution.

Reader receives a command executes a command, only the reader complete the implementation of a command, to receive the next command. During the implementation of the command in the reader, if sending commands to the reader, the command will be lost.

The following table shows the process of the host computer command:

HOST	DIRECTION	READER
Command Data Block	→	

The interval between two consecutive bytes in the command data block should be less than 15ms. During command data block sending, synchronization will lost if the host receives any data from the reader and the host should stop command sending and restart the communication after 15ms.

The reader completes command execution in inventory ScanTime (not including host sending data time) except inventory command after receiving host command and returns the results. During the period, it doesn’t process any host data. The feedback of command execution results is as follows:

READER	DIRECTION	HOST
Command Data Block	→	

The interval between two consecutive bytes in the response data block should be less than 15ms.

3、DATA BLOCK FORMAT

3.1 COMMAND DATA BLOCK

Len	Adr	Cmd	Data[]	LSB-CRC16	MSB-CRC16

COMMENT:

	LENGTH(Byte)	COMMENT
Len	1	Command data block length 1 byte (not including itself). Value range is 4~96. The number of Len equals the length of Data [] plus 4.
Adr	1	Reader address, 1 byte. Value range is 0~254. Only will the reader conforming to the address response the command data block. Value 255 is broadcasting address. All the readers will response to the command data block with a broadcasting address. The default value shall be zero.
Cmd	1	Operation command symbol, 1 byte.
Data[]	Variable	Operation command parameters. There is no parameter if the LEN item equals 4.
LSB-CRC16	1	CRC-16 LSB. CRC-16 checksum, 2 bytes with least significant byte first.
MSB-CRC16	1	CRC-16 MSB.

3.2 RESPONSE DATA BLOCK

Len	Adr	reCmd	Status	Data[]	LSB-CRC16	MSB-CRC16

COMMENT:

	LENGTH(Byte)	COMMENT
Len	1	Response data block length 1 byte (not including itself). The number of Len equals the length of Data [] plus 5.
Adr	1	Reader address, 1 byte. Value rang is 0~254.
reCmd	1	Response command symbol, 1 byte. If the command is unrecognized, the reCmd is 0x00.
Status	1	Result status value, 1byte. Refer to following table for details.
Data[]	Variable	Response data. There is no this item if Len equals 5.
LSB-CRC16	1	CRC16 LSB .CRC-16 checksum, 2 bytes with least significant byte first.
MSB-CRC16	1	CRC16 MSB

The default value of the reader address is 0x00. The host may change it by using reader-defined command

"Write Adr".

Cyclic Redundancy Check (CRC) computation includes all data from Len. A reference CRC computation program is presented as follow:

C-Example:

```
 #define PRESET_VALUE 0xFFFF
 #define POLYNOMIAL    0x8408
 unsigned int uiCrc16Cal(unsigned char const    * pucY, unsigned char ucX)
 {
      unsigned char ucI,ucJ;
      unsigned short int    uiCrcValue = PRESET_VALUE;

              for(ucI = 0; ucI < ucX; ucI++)
             {
                   uiCrcValue = uiCrcValue ^ *(pucY + ucI);
                   for(ucJ = 0; ucJ < 8; ucJ++)
                 {
                    if(uiCrcValue & 0x0001)
                    {
                          uiCrcValue = (uiCrcValue >> 1) ^ POLYNOMIAL;
                    }
                    else
                    {
                          uiCrcValue = (uiCrcValue >> 1);
                    }
              }
      }
      return uiCrcValue;
 }
```

4、OPERATION COMMAND (CMD) SUMMARY

4.1 EPC C1 G2（ISO18000-6C）COMMAND

NUM	COMMAND	CODE	COMMENT
1	Inventory	0x01	The function is used to inventory tags in the effective field and get their EPC values.
2	Read Data	0x02	The function is used to read part or all of a Tag's Password, EPC, TID, or User memory. To the word as a unit, start to read data from the designated address.
3	Write Data	0x03	The function is used to write several words in a Tag's Reserved, EPC, TID, or User memory.

4	Write EPC	0x04	The function is used to write EPC value in a Tag's EPC memory. Random write one tag in the effective field.
5	Kill Tag	0x05	The function is used to kill tag. After the tag killed, it never process command.
6	Lock	0x06	The function is used to set Password area as readable and writeable from any state, readable and writeable from the secured state, permanently readable and writeable, never readable and writeable. It used to set EPC, TID or User as writeable from any state, writeable from the secured state, permanently writeable, never writeable.
7	Block Erase	0x07	The function is used to erase multiple words in a Tag's Password, EPC, TID, or User memory.
8	ReadProtect	0x08	The function is used to set designated tag read protection. After the tag protected, it never process command. Even if inventory tag, reader can not get the EPC number. The read protection can be removed by executing Reset ReadProtect. Only NXP's UCODE EPC G2X tags valid.
9	Read Protect (without EPC)	0x09	The function is used to random set one tag read protection in the effective field. The tag must be having the same access password. Only NXP's UCODE EPC G2X tags valid.
10	Reset ReadProtect	0x0a	The function is used to remove only one tag read protection in the effective field. The tag must be having the same access password. Only NXP's UCODE EPC G2X tags valid.
11	Check ReadProtect	0x0b	The function is used to check only one tag in the effective field, whether the tag is protected. It can not check the tag whether the tag support protection setting. Only NXP's UCODE EPC G2X tags valid.
12	EAS Alarm	0x0c	The function is used to set or reset the EAS status bit of designated tag. Only NXP's UCODE EPC G2X tags valid.
13	Check EAS Alarm	0x0d	The function is used to check EAS status bit of any tag in the effective field. Only NXP's UCODE EPC G2X tags valid.
14	Block Lock	0x0e	The function is used to permanently lock the designated data in designated tag's user memory. The locked data can be read only, but not written and not erased. Only NXP's UCODE EPC G2X tags valid.
15	Inventory(Single)	0x0f	The function is used to inventory one tag in the effective field and get their EPC values.
16	Block Write	0x10	The function is used to write multiple words in a Tag's Reserved, EPC, TID, or User memory.

4.2 18000-6B COMMAND

NUM	COMMAND	CODE	CONNECT
1	Inventory signal 6B	0x50	The function is used to Inventory only one tag in the effective field and get their ID values. If more than one tag in the effective field at the same time, reader may be get nothing.
2	Inventory multiple 6B	0x51	The function is used to according to the given conditions Inventory tags in the effective field and get their ID values.
3	Read Data 6B	0x52	The function is used to start to read several bytes from the designated address.
4	Write Data 6B	0x53	The function is used to start to write several bytes from the designated address.
5	Check Lock 6B	0x54	The function is used to check whether the designated byte is locked.
6	Lock 6B	0x55	The function is used to lock the designated byte.

4.3 READER DEFINED COMMAND

NUM	COMMAND	CODE	CONNECT
1	GetReader Information	0x21	This function is used to get reader-related information such as reader address (Adr), firmware version, supported protocol type, Inventory ScanTime, power and frequency.
2	Set Region	0x22	Sets the current region. The function is used to set the reader working of the lower limit and the upper limit of frequency.
3	Set Address	0x24	This function is used to set a new address of the reader. The address value will store in reader’s inner nonvolatile memory. Default address value is 0x00. The value range is 0x00~0xFE. The address 0xFF is reserved as the broadcasting address. When user tries to write a 0xFF to Adr, the reader will set the value to 0x00 automatically.
4	Set ScanTime	0x25	This function is used to set a new value to Inventory ScanTime of an appointed reader. The range is 3~255 corresponding to 3*100ms~255*100ms Inventory ScanTime. The default value of Inventory ScanTime is 10*100ms.
5	Set Baud Rate	0x28	The function is used to change the serial port baud rate.
6	Set Power	0x2F	The function is used to set the power of reader.
7	Acousto-optic Control	0x33	Acousto-optic Control

5、LIST OF COMMAND EXECUTION RESULT STATUS

RESPONSE DATA BLOCK						STATES	CONNECT
Len	**Adr**	**reCmd**	**Status**	**Data[]**	**CRC16**		
Length of Data[] +5	0xXX	0xXX	0x00	……..	LSB+MSB	Success	Return status 0x00 to host after command is executed successfully. Data block contains result data.
Length of Data[] +5	0xXX	0x01	0x01	……..	LSB+MSB	Return before Inventory finished	Return status 0x01 to host when the reader executes an Inventory command and gets some complete **G2** tags' EPC before user-defined Inventory-ScanTime finished.
Length of Data[] +5	0xXX	0x01	0x02	……..	LSB+MSB	the Inventory-scan-time overflow	Return status 0x02 when the reader executes an Inventory command and does not get all **G2** tags' EPC before user-defined Inventory-ScanTime overflows.
Length of Data[] +5	0xXX	0x01	0x03	……..	LSB+MSB	More Data	Return status 0x03 when the reader executes an Inventory command and gets many **G2** tags' EPC, Data can not be completed within in a message, and then send in multiple.
Length of Data[] +5	0xXX	0x01	0x04	……..	LSB+MSB	Reader module flash is Full	Return status 0x04 when the reader executes an Inventory command and gets **G2** tags' EPC too much, more than the storage capacity of reader.
5	0xXX	0xXX	0x05	—	LSB+MSB	Access Password error	Return status 0x05 when the reader implements a command whit password, while the password is wrong.

5	0xXX	0x05	0x09	—	LSB+MSB	Kill Tag error	Return status 0x09 when the reader implement a Kill command, while the kill password error, or poor communication reader and tag.
5	0xXX	0x05	0x0a	—	LSB+MSB	Kill Password error can’t be zero	Return status 0x0a when the Kill Password is zero.
5	0xXX	0xXX	0x0b	—	LSB+MSB	Tag Not Support the command	Return status 0x0b when the **G2 Tag** dose not supports the command.
5	0xXX	0xXX	0x0c	—	LSB+MSB	Use the command, Access Password Can’t be Zero	Return status 0x0c when the **NXP UCODE EPC G2X Tag** is set read protection or EAS Alarm, the access password is zero.
5	0xXX	0x0a	0x0d	—	LSB+MSB	Tag is protected, cannot set it again	Return status 0x0d when the **NXP UCODE EPC G2X Tag** is protected.
5	0xXX	0x0a	0x0e	—	LSB+MSB	Tag is unprotected, no need to reset it	Return status 0x0e when the **NXP UCODE EPC G2X** Tag is unprotected or the tag does not support the command.
5	0xXX	0x53	0x10	—	LSB+MSB	There is some locked bytes, write fail	Return status 0x10 when the **6B Tag** is written data, while there are some locked bytes, write fail.
5	0xXX	0x55	0x11	—	LSB+MSB	can not lock it	Return status 0x11 when the **6B Tag** can’t be locked.
5	0xXX	0x55	0x12	—	LSB+MSB	Be locked, cannot lock it again	Return status 0x12 when the **6B Tag** has been locked.
5	0xXX	0xXX	0x13	—	LSB+MSB	Save Fail, Can Use Before Power	Return status 0x13 when the parameter is save fail.
5	0xXX	0xXX	0x14	—	LSB+MSB	Cannot adjust	Return status 0x14 when the power can not be adjusted.

Length of Data[] +5	0xXX	0x51	0X15	……..	LSB+MSB	Return before Inventory finished	Return status 0x15 to host when the reader executes an Inventory command and gets some complete **6B** tags' UID before user-defined Inventory-ScanTime finished.
Length of Data[] +5	0xXX	0x51	0x16	……..	LSB+MSB	Inventory-Scan-Time overflow	Return status 0x16 when the reader executes an Inventory command and does not get all **6B** tags' UID before user-defined Inventory-ScanTime overflows.
Length of Data[] +5	0xXX	0x51	0x17	……..	LSB+MSB	More Data	Return status 0x17 when the reader executes an Inventory command and gets many **6B** tags' UID, Data can not be completed within in a message, and then send in multiple.
Length of Data[] +5	0xXX	0x51	0x18	……..	LSB+MSB	Reader module flash is Full	Return status 0x18 when the reader executes an Inventory command and gets **6B** tags' UID too much, more than the storage capacity of reader.
5	0xXX	0xXX	0x19	—	LSB+MSB	Not Support Command Or Access Password	Return status 0x19 when the tag can't set EAS Alarm. There may be the tag does not support the command, or the tag's access password be zero.
5	0xXX	0xXX	0xF9	—	LSB+MSB	Command execute error	Return status 0xF9 when Command execute error
5	0xXX	0xXX	0xFA	—	LSB+MSB	Get Tag, Poor Communication, Inoperable	Return status 0xFA when there are some tags in the effective field, but Poor Communication between reader and tag.
5	0xXX	0xXX	0xFB	—	LSB+MSB	No Tag Operable	Return status 0xFB when there is no tag in the effective field.

6	0xXX	0xXX	0xFC	Err_code	LSB+MSB	Tag Return Error Code	Return status 0xFC when the tag returns Error Code.
5	0xXX	0xXX	0xFD	—	LSB+MSB	Command length wrong	Return status 0xFD when the length of command operands doesn’t conform to the command request.
5	0xXX	0x00	0xFE	—	LSB+MSB	Illegal command	Return status 0xFE when the command is an unrecognized command or CRC error.
5	0xXX	0xXX	0xFF	—	LSB+MSB	Parameter Error	Return status 0xFF when the command parameter is invalid.

6、TAG ERROR CODES

EPC C1G2（ISO18000-6C）Tag error codes:

Error-Code Support	Error-Code	Error-Code Name	Error Description
Error-specific	0x00	Other error	Catch-all for errors not covered by other codes.
	0x03	Memory overrun	The specified memory location does not exist or the EPC length field is not supported by the Tag.
	0x04	Memory locked	The specified memory location is locked and/or perm locked and is either not writeable or not readable.
	0x0b	Insufficient power	The Tag has insufficient power to perform the memory-write operation
Non-specific	0x0f	Non-specific error	The Tag does not support error-specific codes

7、TAG MEMORY AND ISSUES REQUIRING ATTENTION

A. EPC C1G2 TAG（G2 TAG）

Tag memory shall be logically separated into four distinct banks, each of which may comprise zero or more memory words. The four storage areas:

Reserved memory (password memory) shall contain the kill and and/or access passwords, if passwords are implemented on the Tag. The kill password shall be stored at memory addresses 00h to 1Fh; the access password shall be stored at memory addresses 20h to 3Fh.

EPC memory shall contain a Stored CRC at memory addresses 00h to 0Fh, a Stored PC at addresses 10h to 1Fh, a code (such as an EPC, and hereafter referred to as an EPC) that identifies the object to which the Tag is or will be attached beginning at address 20h, and if the Tag implements Extended Protocol Control (XPC) then either one or two XPC word(s) beginning at address 210h.

TID memory shall contain an 8-bit ISO/IEC 15963 allocation class identifier at memory locations 00h to 07h. TID memory shall contain sufficient identifying information above 07h for an Interrogator to uniquely identify the custom commands and/or optional features that a Tag supports.

User memory is optional. This area of different manufacturers is different. There is no user area in G2 tag of Inpinj Company. There are 28 words in Philips Company.

Can write protect in four distinct banks. It means this memory is never writeable or not writeable under the non-safe state; only password area can set unreadable.

B. 18000-6B TAG

6B tag has a memory space, the minimum 8 bytes (byte 0- 7) is UID of the tag, and can't be rewritten. Following byte all can be rewritten, can be locked too, but once locking, can't rewrite and unblock again.

8、DETAILED DESCRIPTION OF OPERATION COMMAND

8.1 COMMAND OVERVIEV

The reader supports three kinds of command, one kind is the ISO/IEC 18000-6 protocol command, another kind is reader-defined command, and also one kind is the transparent command.

If the host input of the command is an unrecognized command, such as the command does not support, or CRC error in the command, then the return value is as follows:

Len	Adr	reCmd	Status	CRC-16	
0x05	0xXX	0x00	0xFE	LSB	MSB

If the length of command operands doesn’t conform to the command request, the return value is as follows:

Len	Adr	reCmd	Status	CRC-16	
0x05	0xXX	0xXX	0xFD	LSB	MSB

Two kinds of command reader cannot respond:

1. The reader address error.
2. The command is incomplete, namely the command **Len** is longer than the actual command length.

8.2 EPC C1G2 COMMAND

8.2.1 Inventory

The command function is used to inventory tags in the effective field and get their EPC values. The reader executes an ***Inventory*** command and gets tag’s EPC before any other operation.

The user may accord need to establish this command the first biggest running time (Inventory scan time), before the command enquires. The reader completes command execution in inventory ScanTime (not including host sending data time) except inventory command after receiving host command and returns the results.

The default value is 0x0A (corresponding to 10*100ms=1s). The value range is 0x03~0xFF (corresponding to 3*100ms~255*100ms). In various environments, the actual inventory scan time may be 0~75ms longer than the InventoryScanTime defined.

If the inventory scan time establishes excessively short, possibly will inventory no tag appear in inventory scan time.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0x04	0xXX	0x01	——	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]		CRC-16	
				Num	EPC ID		
0xXX	0xXX	0x01	0xXX	0xXX	EPC-1, EPC-2, EPC-3…	LSB	MSB

Parameter Connect:

Status Table:

Status	Connect
0x01	Command over, and return inventoried tag's EPC.
0x02	The reader does not get all **G2** tags' EPC before user-defined Inventory-ScanTime overflows. Command force quit, and returns inventoried tags' EPC.
0x03	The reader executes an ***Inventory*** command and gets many **G2** tags' EPC. Data can not be completed within in a message, and then send in multiple.
0x04	The reader executes an ***Inventory*** command and gets **G2** tags' EPC too much, more than the storage capacity of reader, and returns inventoried tags' EPC.

Num: The number of tag detected.

EPC ID: Inventoried tag's EPC data, **EPC-1** is the first tag **EPC Len** + **EPC** data, etc. The most significant word (EPC C1 G2 data in word units) of EPC is transmitted first and the most significant byte of word is transmitted first. **EPC Len** is one byte.

8.2.2 Read Data

The command is used to read part or all of a Tag's Password, EPC, TID, or User memory. To the word as a unit, start to read data from the designated address.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x02	——	LSB	MSB

Data as follows:

Data[]							
ENum	**EPC**	**Mem**	**WordPtr**	**Num**	**Pwd**	**MaskAdr**	**MaskLen**
0xXX	Variable	0xXX	0xXX	0xXX	4Byte	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Mem: One byte. It specifies whether the Read accesses Password, EPC, TID, or User memory. 0x00: Password memory; 0x01: EPC memory; 0x02; TID memory; 0x03: User memory. Other values reserved. Other value when error occurred.

WordPtr: One byte. It specifies the starting word address for the memory read. For example, **WordPtr** = 00h specifies the first 16-bit memory word, **WordPtr** = 01h specifies the second 16-bit memory word, etc.

Num: One byte. It specifies the number of 16-bit words to be read. The value is less then 120, can not be 0.

Otherwise, it returns the parameters error message.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Only done the memory set to lock and the Tag's Access Password is not zero, it needs right **Pwd**. In other cases, **Pwd** can be zero.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the* ***MaskAdr*** *and* ***MaskLen*** *vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0xXX	0xXX	0x02	0x00	Word1，Word2,…	LSB	MSB

Parameter Connect:

Word1, Word2….: In word units, one word is two bytes. High byte is first. **Word1** is the word which reads from the start address, **Word2** is the word which reads from the second address, etc.

8.2.3 Write Data

The command is used to write several words in a Tag's Reserved, EPC, TID, or User memory.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x03	——	LSB	MSB

Data as follows:

Data[]								
WNum	**ENum**	**EPC**	**Mem**	**WordPtr**	**Wdt**	**Pwd**	**MaskAdr**	**MaskLen**
0xXX	0xXX	Variable	0xXX	0xXX	Variable	4Byte	0xXX	0xXX

Parameter Connect:

WNum: One byte. It specifies the number of 16-bit words to be written. The value can not be 0. Otherwise, it returns the parameters error message.

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first.

Requirement given here is a complete EPC number.

Mem: One byte. It specifies whether the Write accesses Password, EPC, TID, or User memory. 0x00: Password memory; 0x01: EPC memory; 0x02; TID memory; 0x03: User memory. Other values reserved. Other value when error occurred.

WordPtr: One byte. It specifies the starting word address for the memory write. For example, **WordPtr** = 00h specifies the first 16-bit memory word, **WordPtr** = 01h specifies the second 16-bit memory word, etc.

Wdt: Be written words. The most significant byte of each word is first. **Wdt** specifies the array of the word to be written. For example, **WordPtr** equal 0x02, then the first word in Data write in the address 0x02 of designated Mem, the second word write in 0x03, etc.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Only done the memory set to lock and the Access Password is not zero, it needs **Pwd**. In other cases, **Pwd** can be zero.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the* ***MaskAdr*** *and* ***MaskLen*** *vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x03	0x00	——	LSB	MSB

8.2.4 Write EPC

The command is used to write EPC number in a Tag’s EPC memory. Random write one tag in the effective field.

Command:

Len	Adr	Cmd	Data[]			CRC-16	
			ENum	Pwd	WEPC		
0xXX	0xXX	0x04	0xXX	4Byte	Variable	LSB	MSB

Parameter Connect:

ENum: One byte, it specifies the array of the word to be written EPC length，in word units. The length of EPC is not more than 15 words, can’t be 0. Otherwise, it returns the parameters error message.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Only done the memory set to lock and the Access Password is not zero, it needs **Pwd**. In other cases, **Pwd** can be zero.

WEPC: Be written EPC value. **WEPC** is not more than 15 words, can't be 0. Otherwise, it returns the parameters error message.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x04	0x00	——	LSB	MSB

8.2.5 Kill Tag

The command is used to kill tag. After the tag killed, it never process command.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x05	——	LSB	MSB

Data as follows:

Data[]				
ENum	**EPC**	**Killpwd**	**MaskAdr**	**MaskLen**
0xXX	Variable	4Byte	0xXX	0xXX

Parameter Connect:

ENum: EPC length， in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Killpwd: Four bytes, they are Kill Password. The most significant word of Kill Password is first, the most significant byte of word is first. The first bit of 32-bit Kill Password is left, and the last bit of 32-bit Kill Password is right. Tag's whose Kill Password is zero do not execute a kill operation; if such a Tag receives a ***Kill*** command it ignores the command and backscatters an error code

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

***Notes:** That a tag compares against complete EPC number when the **MaskAdr** and **MaskLen** vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x05	0x00	——	LSB	MSB

8.2.6 Lock

The ***Lock*** command Lock reversibly or permanently locks a password or an entire EPC, TID, or User memory bank in a readable/writeable or unreadable/unwriteable state.

Once tag's password memory establishes to forever may be readable and writable or unreadable and unwriteable, then later cannot change its read-write protection again. Tag's EPC memory, TID memory or user memory, if establishes to forever may be writeable or unwriteable, then later cannot change its read-write protection again. If sends the command to want forcefully to change the above several states, then the tag will return to the error code.

When the tag's memory established in a readable/writeable state, the command must give the Access Password, so tag's Access Password is not zero.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x06	——	LSB	MSB

Data as follows:

Data[]						
ENum	EPC	Select	SetProtect	Pwd	MaskAdr	MaskLen
0xXX	Variable	0xXX	0xXX	4Byte	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Select: One byte, defined as follows:

0x00: Control Kill Password protection setting.
0x01: Control Access password protection setting.
0x02: Control EPC memory protection setting.
0x03: Control TID memory protection setting.
0x04: Control User memory protection setting.
Other value when error occurred.

SetProtect:

When Select is 0x00 or 0x01, **SetProtect** means as follows:

0x00: readable and writeable from any state.
0x01: permanently readable and writeable.
0x02: readable and writeable from the secured state.
0x03: never readable and writeable

When Select is 0x02, 0x03 or 0x04, **SetProtect** means as follows:

0x00: writeable from any state.
0x01: permanently writeable.
0x02: writeable from the secured state.
0x03: never writeable.

Other value when error occurred.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. **Pwd** must be right Access Password.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

***Notes:** That a tag compares against complete EPC number when the **MaskAdr** and **MaskLen** vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x06	0x00	——	LSB	MSB

8.2.7 BlockErase

The command is used to erase multiple words in a Tag’s Password, EPC, TID, or User memory.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x07	——	LSB	MSB

Data as follows:

Data[]							
ENum	EPC	Mem	WordPtr	Num	Pwd	MaskAdr	MaskLen
0xXX	Variable	0xXX	0xXX	0xXX	4Byte	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Mem: One byte. It specifies whether the Erase accesses Password, EPC, TID, or User memory. 0x00: Password memory; 0x01: EPC memory; 0x02; TID memory; 0x03: User memory. Other values reserved. Other value when error occurred.

WordPtr: One byte. It specifies the starting word address for the memory block erase. For example, **WordPtr** = 00h specifies the first 16-bit memory word, **WordPtr** = 01h specifies the second 16-bit memory word, etc. **WordPtr** must be bigger than 0x00 when it erases EPC memory.

Num: One byte. It specifies the number of 16-bit words to be erased. If **Num** = 0x00, it returns the parameters error message.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Only done the memory set to lock and the Access Password is not zero, it needs **Pwd**. In other cases, **Pwd** can be zero.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the **MaskAdr** and **MaskLen** vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x07	0x00	——	LSB	MSB

8.2.8 ReadProtect (With EPC)

The command is used to set designated tag read protection. After the tag protected, it never process command. Even if inventory tag, reader can not get the EPC number. The read protection can be removed by executing Reset ReadProtect. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x08	——	LSB	MSB

Data as follows:

Data[]				
ENum	**EPC**	**Pwd**	**MaskAdr**	**MaskLen**
0xXX	Variable	4Byte	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Tags' Access Password can not be zero.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

***Notes:** That a tag compares against complete EPC number when the **MaskAdr** and **MaskLen** vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x08	0x00	——	LSB	MSB

8.2.9 ReadProtect (Without EPC)

The command is used to random set random one tag read protection in the effective field. The tag must be having the same access password. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
			Pwd		
0x08	0xXX	0x09	4Byte	LSB	MSB

Parameter Connect:

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Tags' Access Password can not be zero.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x09	0x00	——	LSB	MSB

8.2.10 Reset ReadProtect

The command is used to remove only one tag read protection in the effective field. The tag must be having the same access password. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
			Pwd		
0x08	0xXX	0x0a	4Byte	LSB	MSB

Parameter Connect:

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. **Pwd** must be right tag's Access Password.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x0a	0x00	——	LSB	MSB

Notes: *If a tag does not support the command, is unlocked.*

8.2.11 Check ReadProtect

The command is used to check only one tag in the effective field, whether the tag is protected. It can not check the tag whether the tag support protection setting. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0x04	0xXX	0x0b	——	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x06	0xXX	0x0b	0x00	ReadPro	LSB	MSB

Parameter Connect:

ReadPro	Connect
0x00	Tag is protected.
0x01	Tag is unprotected.

Notes: *If a tag does not support the command, is unprotected.*

8.2.12 EAS Alarm

The function is used to set or reset the EAS status bit of designated tag. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x0c	——	LSB	MSB

Data as follows:

Data[]					
ENum	**EPC**	**Pwd**	**EAS**	**MaskAdr**	**MaskLen**
0xXX	Variable	4Byte	0xXX	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Tags' Access Password can not be zero.

EAS: One byte. Bit0=0 means reset the EAS state, Bit0=1 means set the EAS state.Bit1~Bit7 default 0.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the **MaskAdr** and **MaskLen** vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x0c	0x00	——	LSB	MSB

8.2.13 Check EAS Alarm

The function is used to check EAS status bit of any tag in the effective field. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0x04	0xXX	0x0d	——	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x0d	0x00	——	LSB	MSB

It returns "no tag actionable" message when No EAS alarm

8.2.14 User Block Lock

The command is used to permanently lock the designated data in designated tag's user memory. ***Block Lock*** command supports an additional locking mechanism, which allows the locking of individual 32 bit blocks (rows) in the 224 bit User Memory. Once locked these locks cannot be unlocked. Only NXP's UCODE EPC G2X tags valid.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x0e	——	LSB	MSB

Data as follows:

Data[]					
ENum	**EPC**	**pwd**	**WrdPointer**	**MaskAdr**	**MaskLen**
0xXX	Variable	4Byte	0xXX	0xXX	0xXX

Parameter Connect:

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag's EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. **Pwd** must be right tag's Access Password.

WrdPointer: Each EEPROM row can be addressed by either of the two related WordPointers:

Either of two WordPointers can address one single User Memory row

WrdPointer	User EEPROM row
0 or 1	0
2 or 3	1
4 or 5	2
6 or 7	3
8 or 9	4

10 or 11	5
12 or 13	6

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the* ***MaskAdr*** *and* ***MaskLen*** *vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x0e	0x00	——	LSB	MSB

8.2.15 Inventory (Single)

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0x04	0xXX	0x0f	——	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]		CRC-16	
				Num	EPC ID		
0xXX	0xXX	0x0f	0x01	0x01	EPC-1	LSB	MSB

Num: The number of tag detected.

EPC ID: Inventoried tag’s EPC data, **EPC-1** is the first tag **EPC Len** + **EPC** data. The most significant word (EPC C1 G2 data in word units) of EPC is transmitted first and the most significant byte of word is transmitted first. **EPC Len** is one byte.

8.2.16 Block Write

The command is used to write multiple words in a Tag’s Reserved, EPC, TID, or User memory.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x10	——	LSB	MSB

Data as follows:

Data[]								
WNum	ENum	EPC	Mem	WordPtr	Wdt	Pwd	MaskAdr	MaskLen
0xXX	0xXX	Variable	0xXX	0xXX	Variable	4Byte	0xXX	0xXX

Parameter Connect:

WNum: One byte. It specifies the number of 16-bit words to be written. The value can not be 0. Otherwise, it returns the parameters error message.

ENum: EPC length，in word units. The length of EPC is less than 15 words, can be 0 or 15. Otherwise, it returns the parameters error message.

EPC: Be operated tag’s EPC number. **EPC** length according to the decision of the EPC number, EPC numbers in word units, and must be an integer number of lengths. High word first, the high byte of each word first. Requirement given here is a complete EPC number.

Mem: One byte. It specifies whether the Write accesses Password, EPC, TID, or User memory. 0x00: Password memory; 0x01: EPC memory; 0x02; TID memory; 0x03: User memory. Other values reserved. Other value when error occurred.

WordPtr: One byte. It specifies the starting word address for the memory write. For example, **WordPtr** = 00h specifies the first 16-bit memory word, **WordPtr** = 01h specifies the second 16-bit memory word, etc.

Wdt: Be written words. The most significant byte of each word is first. **Wdt** specifies the array of the word to be written. For example, **WordPtr** equal 0x02, then the first word in Data write in the address 0x02 of designated Mem, the second word write in 0x03, etc.

Pwd: Four bytes, they are Access Password. The most significant word of Access Password is first, the most significant byte of word is first. The first bit of 32-bit access password is left, and the last bit of 32-bit access password is right. Only done the memory set to lock and the Access Password is not zero, it needs **Pwd**. In other cases, **Pwd** can be zero.

MaskAdr: One byte, it specifies the starting byte address for the memory mask. For example, **MaskAdr** = 0x00 specifies the first **EPC** bytes, **MaskAdr** = 0x01 specifies the second **EPC** bytes, etc.

MaskLen: One byte, it is the mask length. That a Tag compares against the memory location that begins at **MaskAdr** and ends **MaskLen** bytes later. **MaskAdr + MaskLen** must be less the length of ECP number. Otherwise, it returns the parameters error message.

Notes: *That a tag compares against complete EPC number when the* ***MaskAdr*** *and* ***MaskLen*** *vacant.*

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x10	0x00	——	LSB	MSB

8.3 18000-6B COMMAND

8.3.1Inventory Signal 6B

The command is used to Inventory only one tag in the effective field and get their ID values. If more than one tag in the effective field at the same time, reader may be get nothing.

Command:

Len	Adr	Cmd	CRC-16	
0x04	0xXX	0x50	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x0d	0xXX	0x50	0x00	ID	LSB	MSB

Parameter Connect:

ID: 8 bytes, it is **6B** tag's UID. The low byte is fist.

8.3.2 Inventory Multiple 6B

The command is used to according to the given conditions Inventory tags in the effective field and get their ID values.

Command:

Len	Adr	Cmd	Data[]				CRC-16	
			Condition	Address	Mask	Word_data		
0x0f	0xXX	0x51	0xXX	0xXX	0xXX	8 Bytes	LSB	MSB

Parameter Connect:

Condition: The condition of detecting tags.

0x00: equal condition.

0x01: unequal condition.

0x02: greater than condition.

0x03: lower than condition.

Address: The tag's start address to compare.

Mask: It pointed to the data is used to compare. Highest bit in the mask correspond with the far-left byte in the Condition Content. The corresponding bit in the mask is 1 to compare the bit in the Condition Content with the corresponding byte in the tag. The corresponding bit in the mask is 0, not compare.

Word_data: 8 bytes. It pointed to the array is used to compare.

Respond:

Len	Adr	reCmd	Status	Num	Data[]	CRC-16	
0xXX	0xXX	0x51	0xXX	0xXX	UID1, UID2…	LSB	MSB

Parameter Connect:

Status Table:

Status	Connect
0x15	Command over, and return inventoried tag’s UID.
0x16	The reader does not get all **6B** tags’ UID before user-defined Inventory-ScanTime overflows. Command force quit, and returns inventoried tags’ UID.
0x17	The reader executes an ***Inventory*** command and gets many **6B** tags’ UID. Data can not be completed within in a message, and then send in multiple.
0x18	The reader executes an ***Inventory*** command and gets **6B** tags’ UID too much, more than the storage capacity of reader, and returns inventoried tags’ UID.

Num: The number of tag detected.

Data []: UID. Each UID length is 8 bytes. The least significant byte of UID is transmitted first.

8.3.3 Read Data 6B

The command is used to start to read several bytes from the designated address.

命令:

Len	Adr	Cmd	Data[]			CRC-16	
			Address	ID	Num		
0x0e	0xXX	0x52	0xXX	8 Bytes	0xXX	LSB	MSB

Parameter Connect:

Address: The tag’s start byte address to read. The range is 0~223. Otherwise, it returns the parameters error message.

Num: In byte units. It specifies the number of 8-bit bytes to be read. The value range is 1~32, and **Address** + **Num** must be less than 224. Otherwise, it returns the parameters error message.

ID: 8 bytes, it is **6B** tag’s UID. The low byte is fist.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x52	0x00	Data	LSB	MSB

Data: It is read data, the low byte is fist.

8.3.4 Write Data 6B

The command is used to start to write several bytes from the designated address.

Command:

Len	Adr	Cmd	Data[]			CRC-16	
			Address	ID	Wdata		
0xXX	0xXX	0x53	0xXX	8 Bytes	Variable	LSB	MSB

Parameter Connect:

Address: The tag’s start byte address to write. The range is 8~223. Otherwise, it returns the parameters error message.

ID: 8 bytes, it is **6B** tag's UID. The low byte is fist.

Wdata: It pointed to the array to write, range is 1~32. If **Address** + **WriteDataLen** greater than 224, or **Wdata** greater than 32 or is zero, reader will return parameter error message. The high bytes of **Wdata** write in the low address in tag.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x53	0x00	Data	LSB	MSB

8.3.5 Check Lock 6B

The command is used to check whether the designated byte is locked.

Command:

Len	Adr	Cmd	Data[]		CRC-16	
			Address	ID		
0x0d	0xXX	0x54	0xXX	8 Bytes	LSB	MSB

Parameter Connect:

Address: The tag's byte address to check lock. The range is 0~223. Otherwise, it returns the parameters error message.

ID: 8 bytes, it is **6B** tag's UID. The low byte is fist.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x06	0xXX	0x54	0x00	LockState	LSB	MSB

LockState:

0x00: Unlocked

0x01: locked

8.3.6 Lock 6B

The command is used to lock the designated byte.

Command:

Len	Adr	Cmd	Data[]		CRC-16	
			Address	ID		
0x0d	0xXX	0x55	0xXX	8 Bytes	LSB	MSB

Parameter Connect:

Address: The tag's byte address to lock. The range is 8~223. Otherwise, it returns the parameters error message.

ID: 8 bytes, it is **6B** tag's UID. The low byte is fist.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x55	0x00	——	LSB	MSB

8.4 READ-DEFINED COMMAND

8.4.1 Get Reader Information

The host sends this command to get the reader's information including reader's address (**Adr**), firmware version, reader type (**Type**), supported protocol (**Tr_Type**), reader power, work frequency, and InventoryScanTime value.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
0x04	0xXX	0x21	——	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x0d	0xXX	0x21	0x00	Version，Type，Tr_Type，DMaxFre，DMinFre， Power， Scntm	LSB	MSB

Parameter Connect:

Parameter	Length(Byte)	Connect
Version	2	The first byte is version number; the second byte is sub-version number.
Type	1	The reader type byte. 0x03 lines on RRU9803M
Tr_Type	1	One byte supported protocol information. Bit1 is 1 for18000-6C protocol; Bit0 is 1 for 18000-6B protocol.
DMaxFre	1	Bit7-Bit6 indicates Frequency Band and Bit5-Bit0 indicates the reader current maximum frequency.
DMinFre	1	Bit7-Bit6 indicates Frequency Band and Bit5-Bit0 indicates the reader current minimum frequency.
Power	1	The output power of reader. Range is 20 to 30, when Power is 0x00, it means the output power of reader unknown.
Scntm	1	Inventory Scan Time, the value of time limit for ***inventory*** command.

Frequency Band:

MaxFre(Bit7)	MaxFre(Bit6)	MinFre(Bit7)	MinFre(Bit6)	FreqBand
0	0	0	0	User band
0	0	0	1	Chinese band2
0	0	1	0	US band
0	0	1	1	Korean band
0	1	0	0	RFU

0	1	0	1	RFU
…	…	…	…	…
1	1	1	1	RFU

8.4.2 Set Region

The host sends this command to change the current region of the reader. The value is stored in the reader’s inner EEPROM and is nonvolatile after reader powered off.

Command:

Len	Adr	Cmd	Data[]		CRC-16	
			MaxFre	MinFre		
0x06	0xXX	0x22	0xXX	0xXX	LSB	MSB

Parameter Connect:

MaxFre: One byte, Bit7-Bit6 indicates Frequency Band and Bit5-Bit0 indicates the reader current maximum frequency.

MinFre: One byte, Bit7-Bit6 indicates Frequency Band and Bit5-Bit0 indicates the reader current minimum frequency (maximum frequency >= minimum frequency).

Frequency Band:

MaxFre(Bit7)	MaxFre(Bit6)	MinFre(Bit7)	MinFre(Bit6)	FreqBand
0	0	0	0	User band
0	0	0	1	Chinese band2
0	0	1	0	US band
0	0	1	1	Korean band
0	1	0	0	RFU
0	1	0	1	RFU
…	…	…	…	…
1	1	1	1	RFU

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x22	0x00	——	LSB	MSB

Various frequency bands formula:

User band:	Fs = 902.6 + N * 0.4 (MHz), N∈ [0, 62].
Chinese band2:	Fs = 920.125 + N * 0.25 (MHz), N∈ [0, 19].
US band:	Fs = 902.75 + N * 0.5 (MHz), N∈ [0, 49].
Korean band:	Fs = 917.1 + N * 0.2 (MHz), N∈ [0, 31].

8.4.3 Set Address

The host sends this command to change the address (**Adr**) of the reader. The address data is stored in the reader’s inner EEPROM and is nonvolatile after reader powered off. The default value of **Adr** is 0x00. The range of **Adr** is 0x00~0xFE. When the host tries to write 0xFF to **Adr**, the reader will set the value to 0x00 automatically.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
			Address		
0x05	0xXX	0x24	0xXX	LSB	MSB

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x24	0x00	——	LSB	MSB

Notes*: The* ***Adr*** *is old address, not new address.*

8.4.4 Set Scan Time

The host sends this command to change the value of InventoryScanTime of the reader. The value is stored in the reader's inner EEPROM and is nonvolatile after reader powered off.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
			Scantime		
0x05	0xXX	0x25	0xXX	LSB	MSB

Parameter Connect:

Scantime: Inventory Scan Time. The default value is 0x0A (corresponding to 10*100ms=1s). The value range is 0x03~0xFF (corresponding to 3*100ms~255*100ms). When the host tries to set value 0x00~0x02 to InventoryScanTime, the reader will set it to 0x0A automatically. In various environments, the actual inventory scan time may be 0~75ms longer than the InventoryScanTime defined.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x25	0x00	——	LSB	MSB

8.4.5 Set Band Rate

The host sends this command to change the value of band rate of the reader. The value is stored in the reader's inner EEPROM and is nonvolatile after reader powered off.

Command:

Len	Adr	Cmd	Data[]	CRC-16	
			BaudRate		
0x05	0xXX	0x28	0xXX	LSB	MSB

Parameter Connect:

BaudRate: The serial port baud rate default value is 57600 bps. **BaudRate** is 0 ~ 6, defined as follows:

BaudRate	Bps
0	9600bps
1	19200 bps
2	38400 bps
3	43000 bps
4	56000 bps
5	57600 bps
6	115200 bps

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x28	0x00	——	LSB	MSB

Notes: *The response of the baud rate for the original baud rate, and next command uses the new band rate.*

8.4.6 Acousto-optic Control

The host sends this command to control the LED lights flash and buzzer tweet.

Command:

Len	Adr	Cmd	Data[]			CRC-16	
			ActiveT	SilentT	Times		
0x07	0xXX	0x33	0xXX	0xXX	0xXX	LSB	MSB

Parameter Connect:

ActiveT: LED flash and buzzer tweet time. (**ActiveT***50ms), the default value is 0. 0<=**ActiveT**<=255.

SilentT: The LED and the buzzer silent time (**SilentT** *50ms), the default value is0. 0<= **SilentT** <=255.

Times: LED flash and buzzer tweet times (0<=**Times**<=255), the default value is0.

Respond:

Len	Adr	reCmd	Status	Data[]	CRC-16	
0x05	0xXX	0x33	0x00	——	LSB	MSB

9.FCC STATEMENT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1)this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation