UHF Gate
User's Manual V1.2

Contents

1 COMMUNICATION INTERFACE SPECIFICATION

UHF Gate communicates with host (MCU，MPU，Gate) using serial communication interface RS232 and complete corresponding operation according to the host command. The communication parameter is 38400bps 1 start bit, 8 data bits, 1 stop bit with even 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

Communication procedure is sponsored by the host sending commands and data to the gate and the gate returns the result status and data to host after command execution ('A' command is a command without any result returned. 'A' command is special command used as an acknowledgement to command 'C' and 'L'. Without this acknowledge, 'C' and 'L' commands will keep return the same response data block.).

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

HOST	DIRECTION	GATE
Command Data Block	→	

The command data block the host sending to the gate should conform to the format of the protocol. The block includes gate address, operation command symbol, command operand and CRC-16 checksum.

The feedback of command execution results is as follows:

GATE	DIRECTION	HOST
Response data block	→	

The response data block includes address, command execution result status and response data. After the feedback, a whole communication process finishes.

3 DATA BLOCK FORMAT

3.1 COMMAND DATA BLOCK

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

Len: Command data block length 1 byte (including itself). Value range is 5~255.
Con_adr: Gate address, 1 byte. Value range is 0~254. Only will the gate conforming to the address respond the command data block. Value 255 is broadcasting address. All gates will respond the

command data block with a broadcasting address.
Cmd: Operation command symbol, 1 byte.
Data[]: Operation command parameters.
CRC16: CRC-16 checksum, 2 bytes with least significant byte first.

3.2 RESPONSE DATA BLOCK

Len	Con_adr	Status	Data[]	LSB-CRC16	MSB-CRC16

Len: Response data block length, 1 byte (including itself). Value range is 5~255.
Con_adr: Gate address, 1 byte. Value rang is 0~254.
Status: Result status value, 1byte.
Data[]: Response data.
CRC16: CRC-16 checksum, 2 bytes with least significant byte first.

4 CRC16 ALGORITHM

Cyclic Redundancy Check (CRC) computation includes all data from Len. The CRC generation polynomial is $X^{16} + X^{12} + X^5 + 1$ (CRC_POLYNOM = 0x8408) with preset value 0xFFFF (CRC_PRESET = 0xFFFF). The least significant byte of the CRC checksum should be transferred first.

4.1 C code sample

```
unsigned integer crc = CRC_PRESET;
for (i=0; i<cnt; i++)  /*cnt:the length of the data to be caculated/
{
    crc ^= DATA[i];
    for (j=0; j<8; j++)
    {
        if (crc & 0x0001)
            crc = (crc >> 1) ^ CRC_POLYNOM;
        else
            crc = (crc>>1);
    }
}
```

4.2 VB code sample

```
    Const CRC_POLYNOM = &H8408& 'Polynominal
```

```
'In    iDatByteNumToCreate Total Data byte( except CRC 2 byte)
'Out   CRC_MSB,CRC_LSB

Public Sub CalcCrc16(iDatByteNumToCreateCRC As Integer)
    Dim lngCRC As Long 'Integer
    Dim i As Integer, j As Integer
    Dim lngTest As Long
    lngCRC = &HFFFF&
    For i = 0 To iDatByteNumToCreateCRC - 1
        lngTest = bCommData(i)
        lngCRC = lngCRC Xor (bCommData(i))
        lngCRC = lngCRC And &HFFFF&
        For j = 0 To 7
            If lngCRC And &H1 Then
                lngCRC = (lngCRC \ 2) Xor CRC_POLYNOM
                lngCRC = lngCRC And &HFFFF&
            Else
                lngCRC = lngCRC \ 2
            End If
        Next j
    Next i
    CRC_MSB = lngCRC And &HFF
    CRC_LSB = ((lngCRC \ 256) And &HFF) ' 8bit Shift to Right.
End Sub
```

5 OPERATION COMMAND (CMD) SUMMARY

No.	CMD Name	CMD value	Comment	Response
1	**M** Mode Switch	0x4D	Switch the system between inventory mode and EAS mode	Y
2	**C** Get Inventory mode Information	0x43	Get the tag's EPC/TID and other information in inventory mode	Y
3	**A** Acknowledge	0x41	Acknowledge the receiving of the result of the 'C' and 'L' commands	N
4	**O** Relay Control	0x4F	Control the built-in relay	Y
5	**B** Buzzer and LED	0x42	Control the buzzer and LED	Y
6	**@** Set time	0x40	Set the real clock	Y
7	**D** Delete	0x44	Delete the tags and message buffer content in the gate	Y
8	**F** Configure	0x46	Configure the gate	Y
9	**R** Get command 'F' configure data	0x52	Get current gate configuration data set by command 'F'	Y
10	**G** Get system info	0x47	Get system information	Y
11	**Z** Get reader status	0x5A	Get the connection status between reader and gate	Y
12	**K** Set gate address	0x4B	Set the gate address	Y
13	**N** Infrared sensor direction setting	0x4E	Set the infrared sensor's detecting sequence	Y
14	**L** Get EAS mode Information	0x4C	Get the EAS alarm and other information in EAS mode	Y
15	**S** Set EAS parameters	0x73	Set EAS detection parameters	Y
16	**g** Get EAS parameters	0x67	Get EAS detection parameters	Y
17	**q** Set inventory parameters	0x71	Set EPC/TID inventory parameters used in inventory mode	Y
18	**I** Get inventory parameters	0x69	Get EPC/TID inventory parameters used in inventory mode	Y
19	**j** set reader parameters	0x6A	Set reader working parameters	Y
20	**k** get reader parameters	0x6B	Get reader working parameters	Y
21	**t** get statistical data	0x74	Get statistical data of person-passing and EAS alarm	Y
22	**u** clear statistical data	0x75	Clear statistical data of person-passing and EAS alarm	Y

6 LIST OF COMMAND EXECUTION RESULT STATUS

Status is one byte length with the lowest 4bit for status code and the most significant 4bit to indicate the IR status.

Status（bit3～bit0）	Meaning	Comment
xxxx0000	Operations succeed or response contains tag's EPC/TID or EAS alarm message.	Command operation has been successfully carried out. For 'C' or 'L' command, it is routine response.
xxxx0001	Response contains a person-passing message.	For 'C' or 'L' command, it is auxiliary response.
xxxx0010	Particular response when emulate EAS alarm enabled.	For 'L' command, it contains EPC of tag alarmed.
xxxx0011-xxxx0111	Reserved	Reserved
xxxx1000	Invalid command	The command is invalid.
xxxx1001	Mode error	The command in current mode is invalid.
xxxx1010-xxxx1101	Reserved	Reserved.
xxxx1110	EEPROM operation error	Error occurs when writing data to EEPROM during command execution
xxxx1111	Response is an error message	Gate sends to the host this message when error occurs in command execution.

Status（bit7～bit4）	Meaning
0000xxxx	IR1,2,3,4 Sync
0001xxxx	IR2,3,4 Sync,IR1 Blocked
0010xxxx	IR1,3,4 Sync,IR2 Blocked
0011xxxx	IR3,4 Sync,IR1,2 Blocked
……	……
1111xxxx	IR1,2,3,4 Blocked

7 DETAILED DESCRIPTION OF OPERATION COMMAND

7.1 Command

There are two work modes for the gate. One is inventory mode and the other is EAS mode. Some of the commands are only available in one mode and other commands are available in both modes. If a command is only effective in one mode, it will be explicitly noted.

7.1.1 'M' command

Host use 'M' command to get or alter the work mode of the gate.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX①	0x4D	1byte②	LSB	MSB

① Gate address: 1byte length ranging from 0~254. Only will the gate conforming to the address respond the command. Value 255(0xFF) is broadcasting address. All gates will respond the command with a broadcasting address.

② Work mode:

Bit1	Bit0	Work mode
0	0	Inventory
0	1	EAS

bit7 = 0, Get current work mode;

bit7 = 1, Set current work mode according to bit0 and bit1.

Other bits are reserved and should be 0.

The newly set work mode is also effective even after power off and on reset. The work mode must be changed by this command explicitly.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's highest 4bits indicate IR status*

① bit0 and bit1 indicates the current work mode. Other bits are 0.

Bit1	Bit0	Work mode
0	0	Inventory
0	1	EAS

7.1.2 'C' command (Inventory Mode only)

Host uses 'C' command to get person-passing message and tag's EPC/TID.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x43	—	LSB	MSB

The responses of 'C' command can be classified into two types indicating by different Status byte. One is routine response with tag's EPC/TID information. The other is auxiliary responses of person-passing message.

The gate adopts a uniform format for the routine message and auxiliary messages. This greatly facilitates application software development and timely reaction to various situations.

If both person-passing message and EPC/TID information are valid at the same time, person-passing message will be returned first.

(1) Routine Response（Host←Gate）

Len	Con_adr	Status*	Data[]			CRC-16	
			Time	Num	EPC ID		
0xXX	0xXX	0x00	6bytes①	1byte②	EPC-1, EPC-2, EPC-3…③	LSB	MSB

** The status's highest 4bits indicate IR status*

① 6bytes time stamp for day-hour-minute-second-millisecond(MSB)-millisecond(LSB). The first four bytes are in 24hour format. Millisecond is 16 bits in length and from 0 to 999.

② the number of tag detected.

③ Inventoried tag's EPC/TID data. **EPC-1** is the first tag's **EPC/TID length** plus **EPC/TID** data and so on. The most significant word of EPC/TID is transmitted first and the most significant byte of a word is also transmitted first. **EPC/TID length** is one byte.

(2) Auxiliary Response（Host←Gate）

Len	Con_adr	Status*	Data[]					CRC-16	
			In/Out	forward passing	reverse passing	alarm count	time		
0x16	0xXX	0x01	1byte①	3bytes②	3bytes③	4bytes④	6bytes⑤	LSB	MSB

** The status's highest 4bits indicate IR status.*

① direction data. Bit0 represent the motion direction.
Bit0 = 0, forwardly passing;
Bit0 = 1, reversely passing.
Other bits are reserved and should be 0.

② forward passing personnel number with LSB first.

③ reversely passing personnel number with LSB first.

④ EAS alarm counting result with LSB first.

⑤ 6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

7.1.3 'A' command

When the host has successfully received the feedback of command 'C' and 'L', it should issue this command as an acknowledgement. Host also can be no need to acknowledge by disabled "A" command (see the 'F' command session).

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x41	-	LSB	MSB

Host←Gate

None

7.1.4 'O' command

The host uses this command to control the device's built-in relay to pick-up and last for a requested time then drop out.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
			Action Time		
0x06	0xXX	0x4F	1byte①	LSB	MSB

① the relay's pick-up duration is Time*100ms, 0<Time<255.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.5 'B' command

The host uses this command to control the device's built-in LED and Buzzer to flash or beep.

Host→Gate

Len	Con_adr	Cmd	Data[]						CRC-16	
			Buzzer beep time in one cycle	Buzzer mute time in one cycle	Buzzer action times	LED on time in one cycle	LED off time in one cycle	LED color and flash times		
0x0B	0xXX	0x42	1byte T1①	1byte T2②	1byte T3③	1byte T4④	1byte T5⑤	1byte T6⑥	LSB	MSB

①Buzzer beep duration(T1*100ms), 0<=T1<=255.

②Buzzer mute duration (T2*100ms), 0<=T2<=255.
③Buzzer action times(0<=T3<=255).
④LED light on duration(T4*100ms), 0<=T4<=255.
⑤LED light off duration(T5*100ms), 0<=T5<=255.
⑥LED flash times (0<=T6<=255).

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.6 '@' command

The host uses this command to set the device's built-in real time clock.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x40	①	LSB	MSB

① 6bytes time stamp for year-month-day-hour-minute-second in 24hour format. If all bytes are 0s, the host will not set the real time clock but get the current time of it.

Host← Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x0B	0xXX	0x00	Time	LSB	MSB
			①		

** The status's highest 4bits indicate IR status.*

① 6bytes time stamp for year-month-day-hour-minute-second in 24hour format. It is the current time of the gate's real time clock.

7.1.7 'D' command

The host uses this command to clear EPC/TID and message buffers of gate.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x44	—	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status*

7.1.8 'F' command

The host uses this command to configure the gate's parameters. These parameters will be stored in nonvolatile memory of the gate and be kept despite power off. If the parameters are corrupted, they will be replaced by their default value. The parameters can be retrieved by 'R' command.

Host→Gate

Len	Con_adr	Cmd	Data[]							CRC-16	
			IR trigger enable	IR trigger delay time	tag filter time	buzzer, led and relay alarm enable	relay active time	person-passing message enable	'A' command enable		
0x0C	0xXX	0x46	1byte ①	1byte T1②	1byte T2③	1byte ④	1byte T3⑤	1byte ⑥	1byte ⑦	LSB	MSB

① When IR trigger enabled, gate detects tags only when at least one of the four infrared is blocked.
bit0 = 0, IR trigger disabled and is the default setting.
bit0 = 1, IR trigger enabled.
Other bits are reserved and should be 0.

② When IR trigger enabled, gate will not stop tags detection immediately but last T1(T1*1s，0 <= T1 <= 255) time when the infrared blocking action is remove. The default value is 0.

③ In inventory mode, the same tag's EPC/TID will only be return once during the filter time T2(T2*1s，0<＝T2<＝255). The default value is 0.

④ This setting is used to enable the action of buzzer, LED and relay when alarming in EAS mode.
bit0 = 0, disabled.
bit0 = 1, enabled and is the default setting.
Other bits are reserved and should be 0.

⑤ When alarming in EAS mode and the action of buzzer, LED and relay is enabled, relay will pick-up and last for a time T3(T3*100ms，0<＝T3<＝255). The default value is 0.

⑥ The host can request the gate not to generate person-passing message by this setting.
bit0 = 0, disabled.
bit0 = 1, enabled and is the default setting.
Other bits are reserved and should be 0.

⑦ When 'A' command disabled, the host is no need to acknowledge the receiving the feedback of command 'C' and 'L'.
bit0 = 0, disabled.
bit0 = 1, enabled and is the default setting.
Other bits are reserved and should be 0.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.9 'R' command

The host used this command to retrieve the gates' parameters set by command 'F'.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x52	-	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]							CRC-16	
			IR trigger enable	IR trigger delay time	tag filter time	buzzer, led and relay alarm enable	relay active time	person-passing message enable	'A' command enable		
0x0C	0xXX	0x00	1byte ①	1byte T1②	1byte T2③	1byte ④	1byte T3⑤	1byte ⑥	1byte ⑦	LSB	MSB

** The status's highest 4bits indicate IR status.*

①②③④⑤⑥⑦ refer to command 'F'.

7.1.10 'G' command

The host uses this command to get gate system information.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x47	—	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]			CRC-16	
			Production Code	Main version	Second version		
0x08	0xXX	0x00	1byte	1byte	1byte	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.11 'Z' command

The host uses this command to check whether the reader is correctly connected with the gate.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x5A	—	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's highest 4bits indicate IR status.*

① bit7 indicates the connection status of the gate and the reader. If bit7 is set to 1, the connection is normal. If bit7 is cleared to 0, the connection is broken and the gate is trying to reconnect with the reader.

Please notice that if the connection of the gate and the reader is broken, the feedback of this command may be delayed. The maximum feedback delay will be the reader's Inventory Scan Time plus 100ms.

7.1.12 'K' command

The host uses this command to set or get the gate's address. If command 'K' is executed successfully, the gate will reply using new address. Otherwise the gate still uses its old address.

Host→Gate

Len	Con_adr	Cmd	Data[]		CRC-16	
0x07	0xXX	0x4B	1byte①	1byte②	LSB	MSB

① Flag byte. Value 0 means to get the gate's current address. Value 1 means to set the gate's address as the given parameter. Other value will be treated as 0.

② New gate address parameter. Range is 0~254.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.13 'N' command

The host uses this command to query or set the infrared sensor sensing sequences..

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x4E	1byte①	LSB	MSB

① Operation flag:

bit0 = 0: forward infrared sensor sequence.

bit0 = 1: reversed infrared sensor sequence.

bit7 = 0: query operation. Bit0 value should be neglected.

bit7 = 1: set operation. The infrared sensor sequence will be set as bit0 defined.

Other bits are reserved.

Host←Gate

For successful set operation, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits indicate IR status.*

For successful query operation, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's highest 4bits indicate IR status.*

① bit0=0: forward infrared sensor sequence.

bit0=1: reversed infrared sensor sequence.

Other bits are reserved.

7.1.14 'L' command (EAS Mode only)

The host uses 'L' command to get person-passing message and EAS alarm message in EAS mode.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x4C	—	LSB	MSB

The responses of 'L' command can be classified into two types indicating by different Status byte. One is routine response that messages about EAS alarm and the other is auxiliary responses that messages about personnel passed.

The gate adopts a uniform format for the routine message and auxiliary messages. This greatly facilitates application software development and timely reaction to various situations.

If both person-passing message and EAS message are valid at the same time, the message generated earlier will be returned first.

(1) Routine Response（Host←Gate）

Len	Con_adr	Status*	Data[]		CRC-16	
0x0C	0xXX	0x00	1byte①	6bytes②	LSB	MSB

** The status's highest 4bits indicate IR status.*

① Flag byte.

0: No EAS.

1: EAS alarming

Other values are reserved.

② 6 bytes time stamp for year-month-day-hour-minute-second in 24hour format.

(2) Auxiliary Response（Host←Gate）

Len	Con_adr	Status*	Data[]					CRC-16	
			In/Out	forward passing	reverse passing	alarm count	time		
0x16	0xXX	0x01	1byte①	3bytes②	3bytes③	4bytes④	6bytes⑤	LSB	MSB

** The status's highest 4bits indicate IR status.*

① direction data. Bit0 represent the motion direction.

Bit0 = 0, forwardly passing;

Bit0 = 1, reversely passing.

Other bits are reserved and should be 0.

② forward passing personnel number with LSB first.

③ reversely passing personnel number with LSB first.

④ EAS alarm counting result with LSB first.

⑤ 6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

7.1.15 's' command

The host uses this command to configure EAS detection.

Gate supports two ways to achieve EAS alarm function. One is the standard EAS detection offered by some NXP dedicated chip. The other is emulate EAS alarm using the bit92 and bit93 of EPC as the EAS status bit.

When emulate EAS alarm enabled, gate detects tags whose bit92-93 value of EPC is 01 then alarms. The host can also request gate put the EPC of tag alarmed into EAS alarm message and return it (see below).

Host→Gate

Len	Con_adr	Cmd	Data[]		CRC-16	
0x07	0xXX	0x73	1byte①	1byte②	LSB	MSB

① Configure byte. Only bit0 and bit4 are valid. Other bits are reserved and should be 0.

bit0=0, standard EAS detection enabled and is the default setting.

bit0=1, emulate EAS alarm enabled.

bit4=0, when emulate EAS alarm enabled and EAS alarm detected, routine response of 'L' command conform as description in 7.1.14 session. It's the default setting.

bit4=1, when emulate EAS alarm enabled and EAS alarm detected, routine response of 'L' command conform as follows:

Len	Con_adr	Status*	Data[]			CRC-16	
0xXX	0xXX	0x02	0x01	Time(6 bytes)	EPC(n bytes)	LSB	MSB

** The status's highest 4bits indicate IR status.*

Time: 6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

EPC: EPC of tag alarmed. The most significant word of EPC is transmitted first and the most significant byte of a word is also transmitted first. EPC length is equal to (Len-12).

②emulate Type:

Valid at the time of simulation EAS alarm Settings.

0: when the detection to the label of the EPC number 92-93 bit values of 01 alarm, when other values do not call the police.

1: when the detection to the label of EPC area the first word of highest alarm when equal to zero, equal to 1 does not report to the police.

2: alarming delected the label with any EPC number,otherwise don't call the police.

Other values, the default is 0

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's highest 4bits said IR status.*

7.1.16 'g' command

The host uses this command to query the configure of EAS detection set by command 's'.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x67	—	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]		CRC-16	
0x07	0xXX	0x00	1byte①	1byte②	LSB	MSB

** The status's highest 4bits indicate IR status.*

① refer to command 's'.
② refer to command 's'.

7.1.17 'q' command

The host uses this command to set inventory parameters used in inventory mode.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0xXX	0xXX	0x71	n byte	LSB	MSB

Data parameter as follows:

Q	Session	AdrTID	LenTID	MaskMem	MaskAdr	MaskLen	MaskData
1byte①	1byte②	1byte③	1 byte④	1 byte⑤	2 byte⑥	1 byte⑦	variable⑧

① Q value, range is 0-15. Q value setting should make 2^Q approximately equal to tag quantity.
② Session value for the inventory round.
0x00:S0.
0x01:S1.
0x02:S2.
0x03:S3.
0xFF: Auto session. (Only valid for EPC query)
③ The starting word address for TID query.
④ The number of words to be read for TID query. Range is 0-15. For TID query, it must be greater than 0. Value 0 means EPC query not TID query and is the default setting.
⑤ It specifies whether mask pattern applies to EPC, TID, or User memory.
0x01: EPC.
0x02: TID.
0x03: User.
⑥ It specifies the start bit address in target memory when applying mask pattern. Range is from 0 to 16383.
⑦ It specifies the bit length of the mask pattern. For particular query with mask, it must be greater than 0. 0 is the default setting and means ignore parameters ⑤⑥⑦⑧ but query all tags.
⑧ Mask pattern data. The length of MaskData is MaskLen/8. If MaskLen can not be divided exactly by 8, the length of MaskData is int(MaskLen/8)+1 with 0 padding in the least significant bit of last byte of MaskData.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	——	LSB	MSB

** The status's highest 4bits indicate IR status.*

7.1.18 'i' command

The host uses this command to get inventory parameter used in inventory mode.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x69	——	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0xXX	0xXX	0x00	n 字节	LSB	MSB

** The status's highest 4bits indicate IR status*

Data parameter as follows：

Data[]							
Q	Session	AdrTID	LenTID	MaskMem	MaskAdr	MaskLen	MaskData
1byte①	1byte②	1byte③	1 byte④	1 byte⑤	2 byte⑥	1 byte⑦	variable⑧

①②③④⑤⑥⑦⑧ refer to command 'q'.

7.1.19 'j' command

The host uses this command to set reader working parameters.

Host→Gate

Len	Con_adr	Cmd	Data[]				CRC-16	
			Power	Frequency		BeepEn		
				MaxFre	MinFre			
0x09	0xXX	0x6A	1byte①	1byte②	1byte③	1byte④	LSB	MSB

① It specifies the RF output power. The value range is from 0 to 30 with 30 for around 30dbm

② Bit7~Bit6 is used to indicate frequency band and Bit5~Bit0 is used to specify the maximum frequency point. As to the frequency band definition, please refer to the following table.

③ Bit7~Bit6 is used to indicate frequency band and Bit5~Bit0 is used to specify the minimum frequency point. As to the frequency band definition, please refer to the following table.

Please note that MaxFre should be greater than MinFre.

Frequency Band Table:

MaxFre(Bit7)	MaxFre(Bit6)	MinFre(Bit7)	MinFre(Bit6)	FreqBand
0	0	0	0	Reserve
0	0	0	1	Chinese band2
0	0	1	0	US band
0	0	1	1	Korean band
0	1	0	0	EU band
0	1	0	1	Reserve
…	…	…	…	…
1	1	1	1	Reserve

Various Region Frequency Band Calculations:

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]。

EU band: Fs = 865.1 + N*0.2(MHz) N∈[0, 14]。

④ Enable/disable beep notification. The inner buzzer will beep once when a tag detected.

bit0 = 0, disable and is the default setting.

bit0 = 1, enable.

bit1～bit7 are reserved and should be 0.

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	——	LSB	MSB

** The status's highest 4bits indicate IR status*

7.1.20 'k' command

The host uses this command to get reader working parameters.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x6B	——	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]				CRC-16	
			Power	Frequency		BeepEn		
				MaxFre	MinFre			
0x09	0xXX	0x00	1byte①	1 byte②	1 byte③	1 byte④	LSB	MSB

** The status's highest 4bits indicate IR status*

①②③④ refer to command 'j'.

7.1.21 't' command

The host uses this command to get statistical data of person-passing and EAS alarm.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x74	——	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]			CRC-16	
			forward number	reverse number	alarm count		
0x0f	0xXX	0x00	3 bytes①	3 bytes②	4 bytes③	LSB	MSB

** The status's highest 4bits indicate IR status*

①forward passing personnel number with LSB first.

②reversely passing personnel number with LSB first.

③EAS alarm counting result with LSB first.

7.1.22 'u' command

The host uses this command to clear statistical data of person-passing and EAS alarm.

Host→Gate

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x75	——	LSB	MSB

Host←Gate

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	——	LSB	MSB

** The status's highest 4bits indicate IR status.*