興暘科技股份有限公司
SUNION TECHNOLOGY CO., LTD.

RF-009V+

User Manual

V2.0

2024/01/11

Sunion Technology Co., Ltd.
Tel: +886-2-8512-1456 Fax: +886-2-8512-1457
6F, No.69, Sec. 2, Guangfu Rd., Sanchong Dist., New Taipei City 241 Taiwan R.O.C.
http://www.sunion.com.tw

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─ Table of contains ─

1、Specification

1.1 Specifications：

Part Number	RF-009V+
RF frequency	134.2 KHz
RFID TYPE	Read Only Read/Write Multi Page
Input	1*Input (dry contact)
Output	1*Relay Output
Power Supply	DC 12V/1A
Power Consumption	100mA / 12V DC(Max.) in operation
Operating Temperature	- 20℃ ~ 85℃
Storage Temperature	- 40℃ ~ 85℃
Storage Humidity	5 ~ 95% non-condensing
Communication Interface	RS-485
baud rate	9600, N, 8, 1
Number of connections	up to 15 devices on bus
Dimensions(L x W x H)	(L)83 ×(W)65.7 ×(H)18mm
Weight	120g ±20%
other	LED、Buzzer

Federal Communication Commission Interference Statement

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 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.

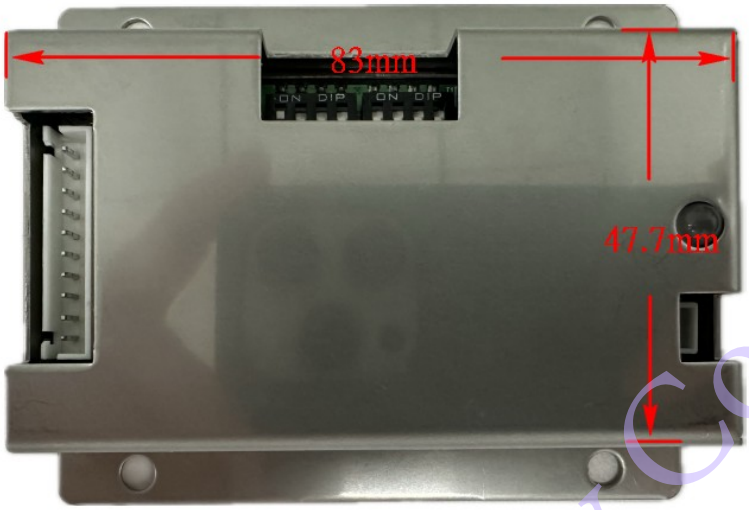
FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

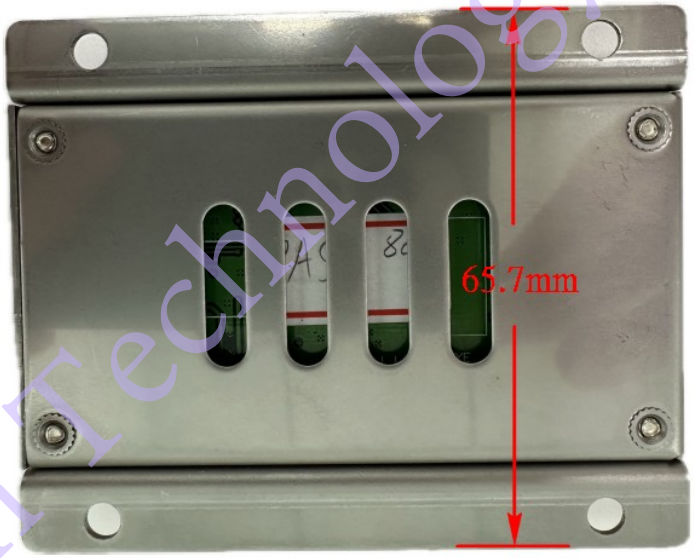
This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

1.2 Dimensions：

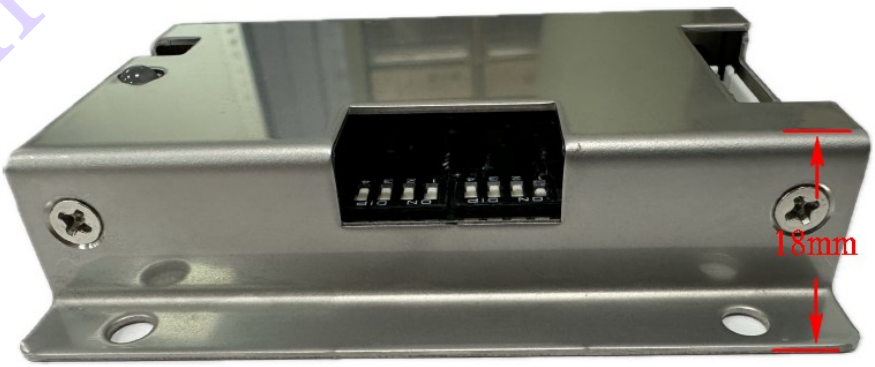
1. top view：



2. bottom view：

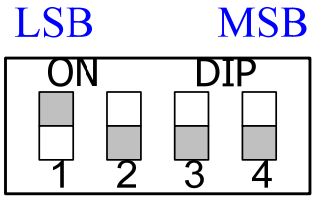


3. side view：



1.3 DIP Switch

1. **SW1**：Use 1~4 to set ID number. The ID number could be set between 01 and 15 (ID0 is reserved, not recommended). You have to set ID number before using the reader.



LSB：low bit；MSB：High bit

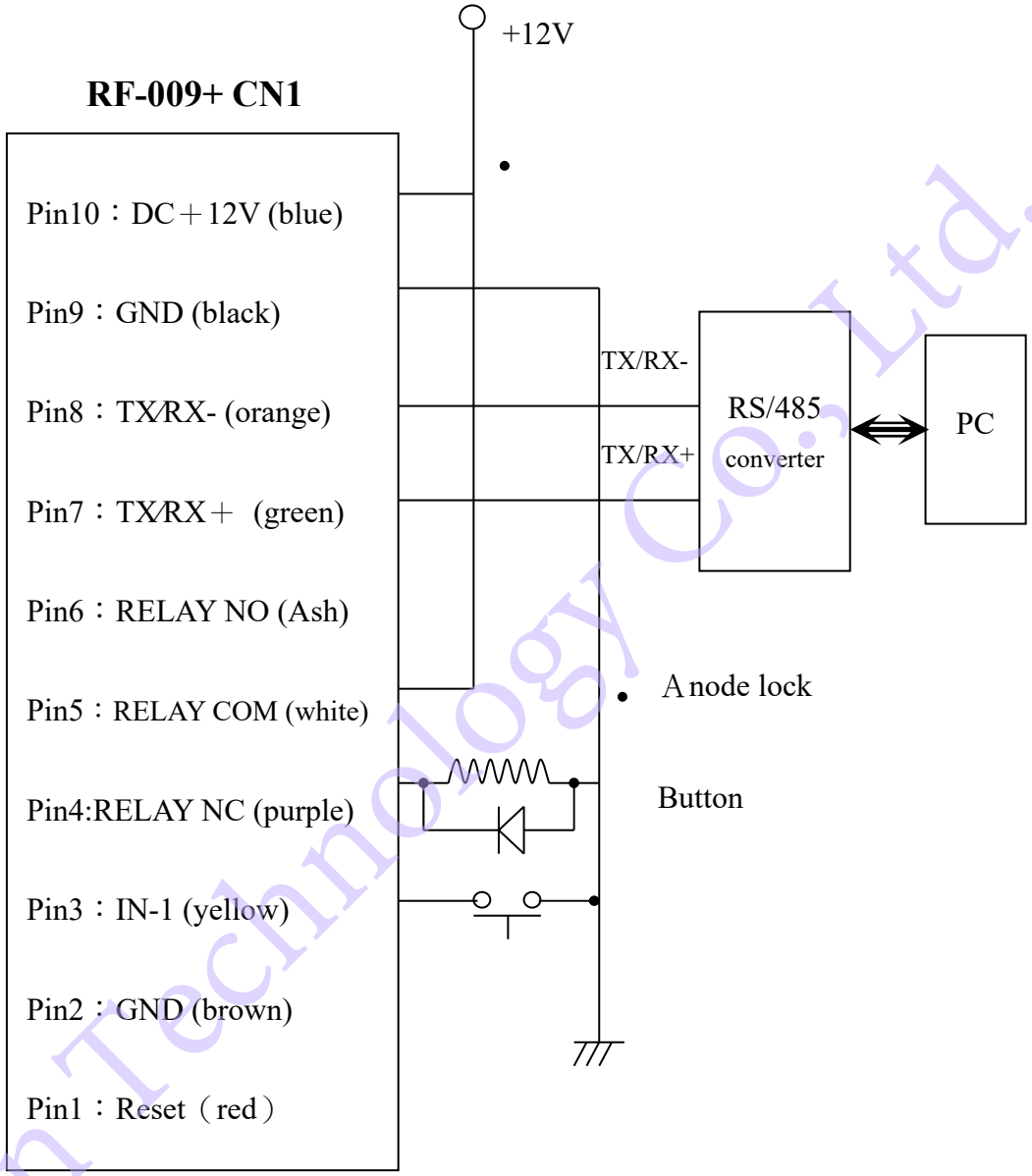
LSB			**MSB**	
1	2	4	8	value
Key 1	Key 2	Key 3	Key 4	ID number
OFF	OFF	OFF	OFF	Reserve
ON	OFF	OFF	OFF	01
OFF	ON	OFF	OFF	02
ON	ON	OFF	OFF	03
OFF	OFF	ON	OFF	04
ON	OFF	ON	OFF	05
OFF	ON	ON	OFF	06
ON	ON	ON	OFF	07
OFF	OFF	OFF	ON	08
ON	OFF	OFF	ON	09
OFF	ON	OFF	ON	10
ON	ON	OFF	ON	11
OFF	OFF	ON	ON	12
ON	OFF	ON	ON	13
OFF	ON	ON	ON	14
ON	ON	ON	ON	15

2. **SW2**：

1.Transmitting Format(LSB/MSB):	ON	Low Byte First
	OFF	High Byte First
2.Return Tag ID Automatically Mode:	ON	Enable
	OFF	Disable
3.Data Format:	ON	ASCII
	OFF	HEX
4.Buzzer Sound:	ON	Reader beeps when Tag is returned.
	OFF	No sound.

Notice 1: Return Tag ID Automatically Mode: The reader will perform A0 command automatically while system is power on. Reader reads Tag Id continuously and returns Tag ID to Host until Host sends another command. If Host sends the command during the module returning Tag ID, maybe the reader can not receive the command.

1.4 Wiring examples and pin descriptions



1. (PIN10) +12V ：Supply voltage +12V
2. (PIN9) GND ：Ground reference
3. (PIN8) TX/RX- ：RS-485 _RX-
4. (PIN7) TX/RX+ ：RS-485 _RX+
5. (PIN6) Relay NO
6. (PIN5) Relay COM
7. (PIN4) Relay NC
8. (PIN3) IN-1 ：Input Low Enable
9. (PIN2) GND ：Ground reference
10. (PIN1) Reset ：Low Enable

2、Command function description

2.1 Communication protocol

RF-009 series use the National Standard **UART** format to communicate with host, and the parameters must be set to **9600, N, 8, 1.**

The command format as below:

HEADER						DATA			CHECK
SOH	PT	ID1	ID2	FC1	FC2	STX	DATA	ETX	BCC
01	Identify	01		Function Code		02	Data	03	Check sum

Description:

1. Each SOH, STX and ETX are all one byte character for system, the definition of these characters as follows:
   SOH=01H, STX=02H, ETX=03H
   Note: The "SOH" represents the start byte of the command.
   The "STX" represents the start byte for "Data".
   The "ETX" represents the end byte for "Data".
   You need these characters to determine the content of data string which is sent or received; the length of data string might be different, It's depended on the command that you send.
2. PT (Packet Type) is used to identify the message was sent by the host or RF-009series; "S" represents that the command was sent by the host, and "s" represents that the message was sent byMD-55xx+_USB series.
3. ID1, ID2 are the reader ID code, the value of ID1 and ID2 combination is always "01".
4. FC1 and FC2 are function codes, and the combination of FC1 and FC2 determines the content of DATA string and the string length, please refers to the below pages about the all functions of RF-009 series.
5. BCC is the checksum to ensure the command transferred correctly, the command each bytes from SOH to ETX do "xor", and do "or" 20H finally.
6. Time Out should be set to 100ms after each command was sent.
7. The returned data format is LSB.
8. The example of BCC operation:

The host send the command as follow:

SOH	"S"	"01"	"A1"	STX	"010"	ETX	BCC

BCC = ***01H***xor 53H xor 30H xor 31H xor 41H xor 31H xor ***02H***
Xor 30H xor 31H xor 30H xor ***03H*** or 20H =33H

2.2 Command list

No	Code	Description	Page
1	"A0"	Tag ID will be auto returned.	9
2	"A1"	Get Tag ID by command.	10
3	"B0"	Buzzer sound off	11
4	"B1"	Buzzer sound on	12
5	"B2"	Invert buzzer status	13
6	"B3"	Buzzer beeps at once	14
7	"C0"	Relay 1 off (OUT-1)	15
8	"C1"	Relay 1 on (OUT-1)	16
9	"C2"	Invert Relay 1 status (OUT-1)	17
10	"E0"	Get I/O status	18
11	"E1"	Get the firmware version	19
12	"E7"	Get SW2 Status	20
13	"K0"	Read data from specified block	21
14	"K1"	Write data into specified block	22
15	"K2"	Lock specified block	23

2.3 Command description：

1. “A0”: Tag ID will be auto returned.

The command is sent by host:

SOH	“S”	ID1	ID2	“A”	“0”	STX	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“A”	“0”	STX	**data**	ETX	BCC

Data description:

1. The format of “data” is the Card type (1 byte) + UID (16 byte).
2. Card type: “R” for read only, “W” for read/write, “M” for Multi-Page.
3. The digits of card number include “0”～ “9”, “A” ～ “F” (Hex).For example, “R0000000000123456”.

Function description:

1. If the module could not get the Tag ID, it will not respond.
2. The data which include Tag ID will be returned while reader got the Tag ID.
3. The module will respond “Y” before the reading is started.

Example:

The command is sent by host:

SOH + “S01A0” + STX + ETX + BCC

The message is responded by reader:

Success:

SOH + “s01A0” + STX + “M0000000000123456” + ETX + BCC

Failure:

SOH + “s01A0” + STX + ETX + BCC

2. “A1”: Get Tag ID by command.

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“A”**	**“1”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“A”**	**“1”**	STX	**data**	ETX	BCC

Data description:

1. The format of “data” is the Card type (1 byte) + UID (16 byte).
2. Card type: “R” for read only, “W” for read/write, “M” for Multi-Page.
3. The digits of card number include “0”～ “9”, “A” ～ “F” (Hex). For example, “R0000000000123456”.

Function description:

1. Use this function to obtain card UID.
2. The “data” will be “N” if reader couldn’t get card UID. Such as: STX + “N” + ETX.
3. Reader clear data after responding.

Example：

The command is sent by host:

SOH + “S01A1” + STX + ETX + BCC

The message is responded by reader:

Success:

SOH + “s01A1” + STX + “M0000000000123456” + ETX + BCC

Failure:

SOH + “s01A1” + STX + “N” + ETX + BCC

3. “B0”: Buzzer Sound Off

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“B”**	**“0”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“B”**	**“0”**	STX	**data**	ETX	BCC

Description of Function:

1. Use this function to set buzzer sound off.
2. data is **“Y”** for success, **“N”** for unsuccess.

Example:

The command is sent by host:

SOH + "S01B0" + STX + ETX + BCC

The message is responded by reader:

SOH + "s01B0" + STX + **“Y”**+ ETX + BCC (Successful)

4. “B1”: Buzzer Sound On

The command is sent by host:

SOH	“S”	ID1	ID2	“B”	“1”	STX	**DATA**	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“B”	“1”	STX	**data**	ETX	BCC

Description of Data:

1. The range of DATA is between **"1"** ~ **"255".** (0.2 sec/unit，if DATA is "25", Timer is set to 0.2 * 25 = 5 sec)
2. Buzzer sound is always on if DATA is "255" until reader received **“B0”** or **“B2”**.
3. data is **“Y”** for success, **“N”** for unsuccess.

Description of Function:

1. Use this function to set buzzer sound on.
2. The buzzer on reader will be switched off when specified time is out.

Example:

The command is sent by host:

SOH + "S01B1" + STX + "12" + ETX + BCC

The message is responded by reader:

SOH + "s01B1" + STX + "Y" + ETX + BCC (Successful)

Description:

1. DATA = "12" means the buzzer sound is turned on 12 x 0.2 = 2.4 sec.

5. “B2”: Invert Buzzer Status

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“B”**	**“2”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“B”**	**“2”**	STX	**data**	ETX	BCC

Description of Function:

1. Use this function to invert buzzer sound status.
2. data is **“Y”** for success, **“N”** for unsuccess.

Example:

The command is sent by host:

SOH + "S12B2" + STX + ETX + BCC

The message is responded by reader:

SOH + "s12B2" + STX + **“Y”**+ ETX + BCC (Successful)

6. “B3”: Buzzer Beeps at once

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“B”**	**“3”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“B”**	**“3”**	STX	**data**	ETX	BCC

Description of Data:

1. data is **“Y”** for success, **“N”** for unsuccess.

Description of Function:

1. Use this function to make a beep sound.

Example:

The command is sent by host:

SOH + "S01B3" + STX + ETX + BCC

The message is responded by reader:

SOH + "s01B3" + STX + "Y" + ETX + BCC (Successful)

7. “C0”: Relay 1 off

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“C”**	**“0”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“C”**	**“0”**	STX	**data**	ETX	BCC

Description of Function:

1. Use this function to turn off Relay 1 (OUT-1)。
2. data is **“Y”** for success, **“N”** for unsuccess.

Example:

The command is sent by host:

SOH + "S08C0" + STX + ETX + BCC

The message is responded by reader:

SOH + "s08C0" + STX + "**Y**" + ETX + BCC (Successful)

8. “C1”: Relay 1 on

The command is sent by host:

SOH	“S”	ID1	ID2	“C”	“1”	STX	**DATA**	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“C”	“1”	STX	**data**	ETX	BCC

Description of Data:

1. The range of DATA is between **"1"** ~ **"255".** (0.2 sec/unit，if DATA is "25", Timer is set to 0.2 * 25 = 5 sec)
2. Buzzer sound is always on if DATA is "255" until reader received **“C0”**
3. data is **“Y”** for success, **“N”** for unsuccess.

Description of Function:

1. Use this function to turn on Relay 1 (OUT-1)。
2. data is **“Y”** for success, **“N”** for unsuccess.

Example:

The command is sent by host:

SOH + "S07C1" + STX + "12" + ETX + BCC

The message is responded by reader:

SOH + "s07C1" + STX + "**Y**" + ETX + BCC (Successful)

Notice：If DATA is "12"，it means relay 1 on time is 12 * 0.2 = 2.4(sec).

9. “C2”: Invert Relay 1 status

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“C”**	**“2”**	STX	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“C”**	**“2”**	STX	**data**	ETX	BCC

Description of Function:
1. Use this function to invert Relay 1 (OUT-1) status.
2. data is **“Y”** for success, **“N”** for unsuccess.

Example:
The command is sent by host:
SOH + "S12C2" + STX + ETX + BCC

The message is responded by reader:
SOH + "s12C2" + STX + **“Y”**+ ETX + BCC (Successful)

10. “E0”:Get I/O status

The command is sent by host:

SOH	“S”	ID1	ID2	“E”	“0”	STX	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“E”	“0”	STX	**data**	ETX	BCC

Description of data:

1. data include reader I/O status.

Description of Function:

1. Use this function to get I/O ports status.
2. These is an input port on reader, “IN-1”.
   These are two output ports on reader, “Buzzer” & “OUT-1”.
3. The first byte of data means input port status，the second byte of data means output ports status.

1st byte/Input	IN-1
“0”	OFF
“2”	ON

2nd byte/Output	Buzzer	OUT-1
“0”	OFF	OFF
“1”	ON	OFF
“2”	OFF	ON
“3”	ON	ON

Example:

The command is sent by host:

SOH + "S07E0" + STX + ETX + BCC

The message is responded by reader:

SOH + "s07E0" + STX + "01" + ETX + BCC

Description:

1.I/O status：

data	IN-1	Buzzer	OUT-1
01	OFF	ON	OFF

11. “E1”: Get the firmware version

The command is sent by host:

SOH	“S”	ID1	ID2	“E”	“1”	STX	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“E”	“1”	STX	**data**	ETX	BCC

Data description：

The string of data” includes model number and current firmware version.

Function description：

Use this function to get model number and firmware version of reader.

Example：

The command is sent by host:

SOH + "S01E1" + STX + ETX + BCC

The message is responded by reader:

SOH + "s01E1" + STX + " V1.00 RF-009V+ " + ETX + BCC

Description：

1. The model name is RF-009V+ and the firmware version is V1.00.

Sunion Electronics Corp. reserves the right to update firmware at any time without notice.

12. “E7”: Get SW2 Status

The command is sent by host:

SOH	“S”	ID1	ID2	“E”	“7”	STX	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“E”	“7”	STX	**data**	ETX	BCC

Description of data:

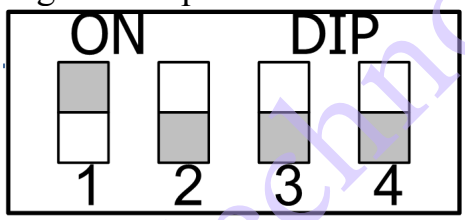
1. data is SW2 status.

Description of function:

1. Use this function to get SW2 status.
2. Value:

Byte	Status
“0”	OFF
“1”	ON

3. Responding data maps to SW2:



1: Transmitting Format(LSB/MSB)
2: Return Tag ID Automatically Mode
3: Data Format
4: Buzzer Sound

※Refer to section 1.3.2 for more detail description DIP SWITCH.

Example:

The command is sent by host:

SOH + "S07E7" + STX + ETX + BCC

The message is responded by reader:

SOH + "s07E7" + STX + "1010" + ETX + BCC

Description:

1. SW2-1= ON: Transmitting Format is set to LSB.
2. SW2-2= OFF: Return Tag ID Automatically Mode is set to OFF.
3. SW2-3= OFF: Data Format is set to ASCII.
4. SW2-4= OFF: Buzzer Sound is set to OFF.

13. “K0”: Read data from specified block

The command is sent by host:

SOH	“S”	ID1	ID2	“K”	“0”	STX	**DATA**	ETX	BCC

The message is responded by reader:

SOH	“s”	ID1	ID2	“K”	“0”	STX	**data**	ETX	BCC

Desciprtion of data:

1. DATA is consist of **Tag Type** (1 Byte) + **Page Number** (2 Bytes).
2. Card Type:
   “**R**”： Read Only Type。
   “**W**”： Read / Write Type。
   “**M**”： Multi Page Type。
3. If you want to read data from a **M**ulti **P**age Tag，you have to add Page Number after Card Type "M” , length of Page Number are fixed 2 bytes, range is between "01" to "11". (HEX), total of page number are 17 pages.
4. **If Card Type is** Multi Page, **data** will return **Card Type + Status + Page Number + Data of Page** (**Notice 2**), if **Card Type** is **R**ead **O**nly or **R**ead/**W**rite, **data** will just return **Card Type** & **Data**.

Notice 2: Stats of **M**ulti **P**age:
“0”：means the page could be wrote data.
“2”：means the page is already locked.

Description of function:

1. Use this function to specify page number and get data, data won’t be returned if **Card Type** is wrong.

Example:

The command is sent by host:
SOH + "S12K0" + STX + "M0E" + ETX + BCC
The message is responded by reader:
SOH + "s12K0" + STX + "M00E0123456789ABCDEF" + ETX + BCC

Description:

1. data is returned:
   "M0": It is Mulit Page Tag and is available to write data into this page.
   "0E" : Page Number is 0E.
   "0123456789ABCDEF": data on page 0E.

14. “K1”: Write data into specified block

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“K”**	**“1”**	STX	**DATA**	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“K”**	**“1”**	STX	**data**	ETX	BCC

Description of Data:

1.DATA is consist of **Card Type** (1 Byte) + **Page Number** (2Bytes) + **Data** (16 Bytes).

2. Card Type:

“**W**”： Read / Write。

“**M**”： Multi Page。

3. If you want to write data into a **M**ulti **P**age Tag，you have to add Page Number after Card Type "M” , length of Page Number are fixed 2 bytes, range is between "01" to "11" (HEX), total of page number are 17 pages.

4. data is “Y” for success, “N” for unsuccess.

Description of function:

1.Use this function to write data into specified page of Read/Write or Multi Page Tag.

2.It is not available to write data into Read Only Tag.

Example:

The command is sent by host:

SOH+"S01K1"+STX+"M06111122223333444"+ETX+BCC

The message is responded by reader:

SOH+"s01K1"+STX+"**Y**"+ETX+BCC (Successful)

The message is responded by reader:

SOH+"s01K1"+STX+"**N**"+ETX+BCC (Failed)

15. “K2”: Lock specified block

The command is sent by host:

SOH	**“S”**	ID1	ID2	**“K”**	**“2”**	STX	**DATA**	ETX	BCC

The message is responded by reader:

SOH	**“s”**	ID1	ID2	**“K”**	**“2”**	STX	**data**	ETX	BCC

Description of Data:

1. DATA is consist of **Card Type** (1 Byte) + **Page Number** (2Bytes).
2. Card Type: “**M**” for Multi Page。
3. Range of Page Number is between "01" to "11" (HEX), total of page number are 17 pages.

Description of function:

1. Use this function to lock specified page of Multi Page Tag.
2. It could not be write data into the locked page, just for reading data.
3. Read Only or Read/Write Tag could not use this function.
4. data is “Y” for success, “N” for unsuccess.

Example:

The command is sent by host:

SOH+"S01K2"+STX+"M07"+ETX+BCC

The message is responded by reader:

SOH+"s01K2"+STX+"**Y**"+ETX+BCC