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

CT-21xx

User Manual

V2.11

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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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NOTE

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1、Specification

1.1 Specifications：

Part Number	CT-2104	CT-2112
Power Supply	DC 12~24V/1A	
Input	IR Input × 4	IR Input × 12
Power Consumption(MAX)	Operating:24V/250mA(Max.) Standby:24V/50mA(Max.)	
Operating Temperature	－20℃ ～ +80℃	
Storage Temperature	－30℃ ～ +100℃	
Storage Humidity	5～95% non-condensing	
Dimensions(L x W x H)	226 × 83 × 30 /mm	226 × 83 × 76 /mm
Weight	510g (around)	835g (around)
Communication Interface	RS-485	

* PS: Reading Range Depend on antenna type and antenna matching

This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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1.2 Dimensions：

CT-2104：(L)226 ×(W)83 ×(H)30 mm

1.top view：

2.bottom view：

3.side view：

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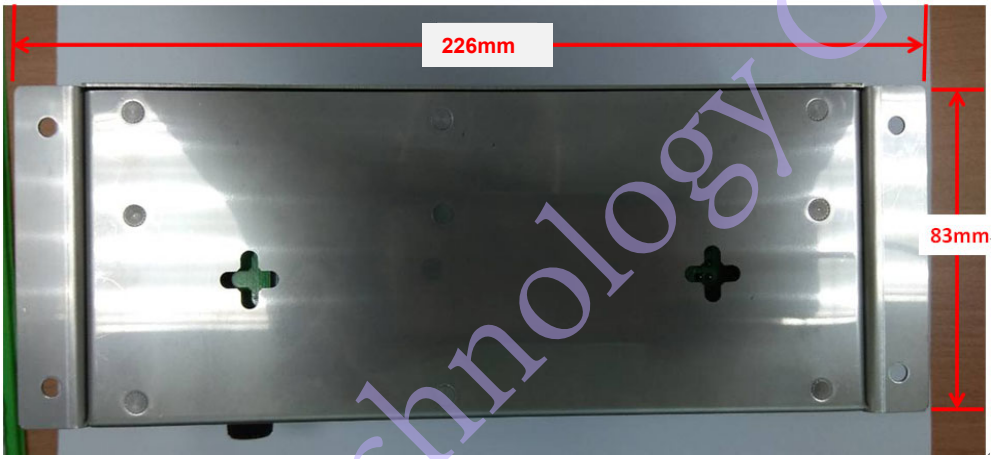
CT-2112：(L)226 ×(W)83 ×(H)76 mm

1.top view：

2.bottom view：



3.side view：

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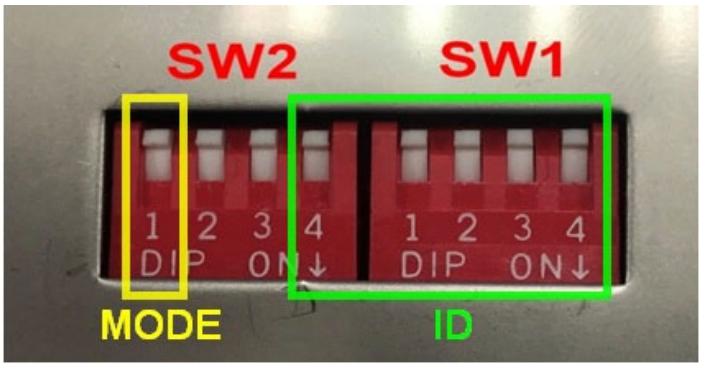
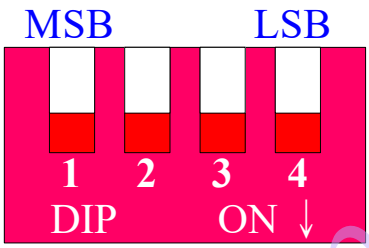
1.3 DIP Switch function



- SW1_4 ~ SW2_4:
  - Machine ID
  - 01 ~ 31, 0 is NOT recommend
  - SW1_4 is LSB, SW2_4 is MSB



    - ID_01 (only SW1_4 is ON)
    - ID_02 (only SW1_3 is ON)
    - ID_31 (all of them are ON)
- SW2_23:
  - ON: Data will be send in High Byte first
  - OFF : Data will be send in Low Byte first
- SW22_3:
  - Reserve
- SW2_1:
  - return mode, influence A0, A1, A2, A3 command
  - Mode 0 (ON)
    - return all set data of antennas, the DATA in A1, A2, A3 command is useless
    - maximum return page can be set to 2 if is CT-2112
    - maximum return page can be set to 4 if is CT-2108
    - maximum return page can be set to 8 if is CT-2104
    - use this mode only if connecting one device to host
  - Mode 1 (OFF)
    - return 1 set data of antennas
    - maximum return page can be set to 17
    - when using A1, A2 and A3 function, need to specify which antenna in DATA field

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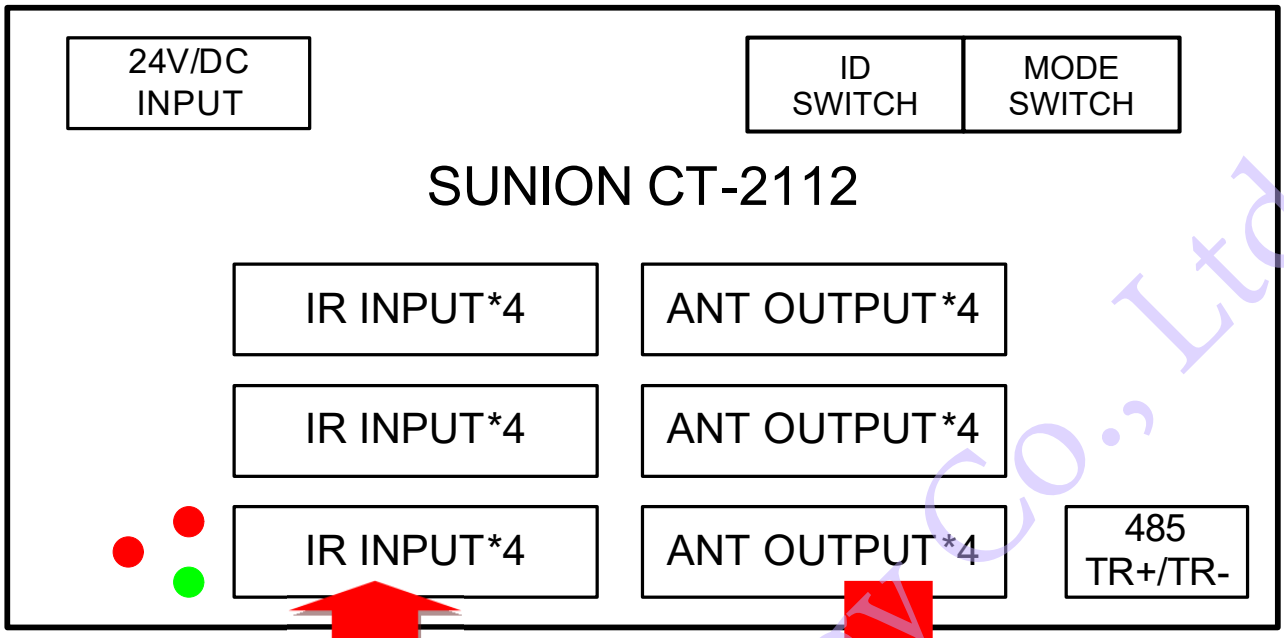
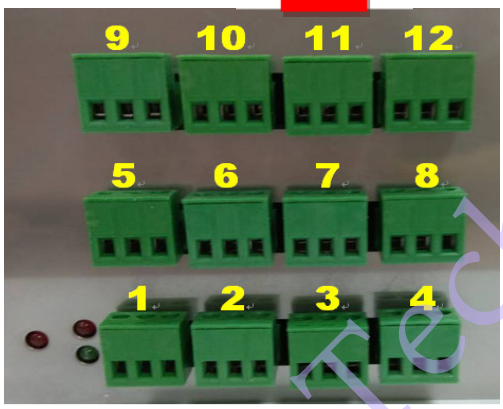
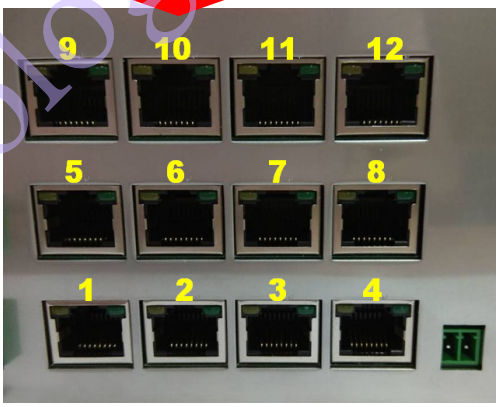
1.4 Example







IN1

1. VCC:IR Sensor power(=DC INPUT).
2. IN:IR Sensor Output(High).
3. GND:IR Sensor Ground.

Yellow LED: IN Low
Green LED: Blinks when in action

Operating Frequency：134.2KHz

Supported Transponder：
Read Only,
Read/Write,
Multi Page

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2. Command function description

2.1 Communication protocol

CT-21xx is using RS-485 as communication interface. And using 9600 bps, no parity bit, 8 data bits, 1 stop bit (9600,n,8,1)

Protocol：

HEADER						DATA			CHECK
SOH	PT	ID1	ID2	FC1	FC2	STX	DATA	ETX	BCC
01H	Identify	Machine ID		Function code		02H	data	03H	Checksum

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 CT-21xx; “S” represents that the command was sent by the host, and “s” represents that the message was sent by CT-21xx.
3. ID1, ID2 are the Machine ID, the value of ID1 and ID2 can be “01” ~ “31”.
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 CT-21xx. (Data can’t include 01H 02H 03H)
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.

Example：

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

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2.2 Command List

	Function	
1	“A0”	set to IR_trigger_Auto_return mode
2	“A1”	set to IR_trigger_Command_return mode and get data
3	“A2”	set to Timing_trigger_Command_return mode and get data
4	“A3”	set to Command_trigger_Command_return mode and get data
5	“B0”	stop buzzer
6	“B1”	start buzzer
7	“B2”	toggle buzzer
8	“B3”	a short beep
9	“E0”	get I/O state
10	“E1”	get FW version
11	“J2”	get parameter of RF reading
12	“J3”	set parameter of RF reading
13	“K0”	read one page using a specify antenna
14	“K1”	write one page using a specify antenna
15	“K2”	lock one page using a specify antenna

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2.3 Command description

- **A0**, IR_trigger_Auto_return mode

Host send:

SOH	**'S'**	ID1	ID2	**'A'**	**'0'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'A'**	**'0'**	STX	**data**	ETX	BCC

- CT-21xx will read the tag data and auto report them to host when any one of IR state change after using this command.
- Reading parameter is set by "J3" command
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail
- Auto report data will influenced by DIP switch SW2_1
  - If no tag on antenna, data will be set to "--------"
  - Mode 0 (ON)
    - When one of the IR state changed, CT-21xx will read the corresponded tag and **auto** report all tag data to host. (tag data won't change if the IR state doesn't change) For example, you will get 12 tag's data (using CT-2112) and only tag_1 data is updated other are old data if IR_1 state change.
    - Maximum report page of tag can be 2 if is CT-2112
    - Maximum report page of tag can be 4 if is CT-2108
    - Maximum report page of tag can be 8 if is CT-2104
    - Report data format:
      - (1 byte + 8 * N_{report_page} byte) * N_{antenna}
        - The first byte of every antenna
          - Means IR state of every corresponded antenna
          - '0' is HIGH
          - '1' is LOW
        - Following bytes of every antenna
          - It need to spilt by 8 byte
          - First block is the data in start page you set, second block is (start page + 1)
        - For example, if you got data "1AAAABBBB1CCCCDDDD0EEEEFFFF0--------" by using CT-2104 and set start page 1, report page 1
          - IR_1 state LOW, tag_1 page 1 data is AAAABBBB
          - IR_2 state LOW, tag_2 page 1 data is CCCCDDDD
          - IR_3 state HIGH, tag_3 page 1 data is EEEEFFFF
          - IR_4 state HIGH, no tag on antenna_4

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- Mode 1 (OFF)
  - When one of the IR state changed, CT-21xx will read the corresponded tag and **auto** report that tag data to host.
  - Maximum report page of tag can be 17.
  - Report data format:
    - 2 byte + 'M' + 1 byte + 8 *N_{report_page} byte
      - First 2 byte
        - Tag (antenna) number, hex int in ASCII format
        - "01" means tag_1 (antenna_1)
        - "0C" means tag_12 (antenna_12)
      - Third byte
        - fixed as 'M'
      - Fourth byte
        - IR state
        - '0' means HIGH
        - '1' means LOW
      - Following bytes
        - It need to spilt by 8 byte
      - First block is the data in start page you set, second block is (start page + 1) ...
      - For example, if you got data "0CM1AAAABBBBCCCCDDDD" by using CT-2112 and set start page 13, report page 2
        - It's tag_12
        - IR_12 is LOW
        - Page_13 is AAAABBBB
        - Page 14 is CCCCDDDD

Host sending：
    SOH + "S08A0" + STX + ETX + BCC
CT-21xx respond：
    SOH + "s08A0" + STX + 'Y' + ETX + BCC (means setting success)

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- **A1**, IR_trigger_Command_return mode and get data

Host send:

SOH	**'S'**	ID1	ID2	**'A'**	**'1'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'A'**	**'1'**	STX	**data**	ETX	BCC

- CT-21xx will read the tag data when any one of IR state change (cache them) and report them to host when using another "A1" command. CT-21xx will respond only when Machine ID match.
- Reading parameter is set by "J3" command
- Host sending **DATA** format
  - 2 bytes, used to specify the tag (antenna), hex in ASCII format
  - "01" means tag_1
  - "0C" means tag_12
  - Only useful when using Mode 1 (OFF)
  - If the tag (antenna) host specify out of range, CT-21xx will report 1 byte data 'N' means setting fail
- report data will influenced by DIP switch SW2_1
  - If no tag on antenna, data will be set to "--------"
  - Mode 0 (ON)
    - When one of the IR state changed, CT-21xx will read all tag and **cache** it, and report it on next time using "A1" or "A2" command.
    - Maximum report page of tag can be 2 if is CT-2112
    - Maximum report page of tag can be 4 if is CT-2108
    - Maximum report page of tag can be 8 if is CT-2104
    - Report data format:
      - Same as "A0" command
  - Mode 1 (OFF)
    - When one of the IR state changed, CT-21xx will read the corresponded tag and **cache** it, and report it on next time using "A1" or "A2" command.
    - Maximum report page of tag can be 17.
    - Host have to specify the tag (antenna)
    - Report data format:
      - Same as "A0" command

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- **A2**, Timing_trigger_Command_return mode and get data

Host send:

SOH	**'S'**	ID1	ID2	**'A'**	**'2'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'A'**	**'2'**	STX	**data**	ETX	BCC

- CT-21xx will read the tag data every N seconds (cache them) and report them to host when using another "A1" or "A2" command. CT-21xx will respond only when Machine ID match.
- Reading parameter is set by "J3" command
- Host sending **DATA** format
  - Same as "A1" command
- report data will influenced by DIP switch SW2_1
  - If no tag on antenna, data will be set to "--------"
  - Mode 0 (ON)
    - When timer trigger, CT-21xx will read all tag and **cache** it, and report it on next time using "A1" or "A2" command
    - Maximum report page of tag can be 2 if is CT-2112
    - Maximum report page of tag can be 4 if is CT-2108
    - Maximum report page of tag can be 8 if is CT-2104
    - Report data format:
      - Same as "A0" command
  - Mode 1 (OFF)
    - When timer trigger, CT-21xx will read the corresponded tag and **cache** it, and report it on next time using "A1" or "A2" command.
    - Maximum report page of tag can be 17.
    - Host have to specify the tag (antenna)
    - Report data format:
      - Same as "A0" command

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- **A3,** Command_trigger_Immediately _return mode

Host send:

SOH	**'S'**	ID1	ID2	**'A'**	**'3'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'A'**	**'3'**	STX	**data**	ETX	BCC

- CT-21xx will read the tag data only when getting "A3" command and report them to host immediately. CT-21xx will respond only when Machine ID match.
- Reading parameter is set by "J3" command
- Host sending **DATA** format
  - Same as "A1" command
- respond data will influenced by DIP switch SW2_1
  - If no tag on antenna, data will be set to "--------"
  - Mode 0 (ON)
    - CT-21xx will read all tag and report it to host immediately
    - Maximum report page of tag can be 2 if is CT-2112
    - Maximum report page of tag can be 4 if is CT-2108
    - Maximum report page of tag can be 8 if is CT-2104
    - Report data format:
      - Same as "A0" command
  - Mode 1 (OFF)
    - CT-21xx will read the corresponded tag and report it to host immediately
    - Maximum report page of tag can be 17.
    - Host have to specify the tag (antenna)
    - Report data format:
      - Same as "A0" command

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- **B0,** Stop Buzzer

Host send:

SOH	**'S'**	ID1	ID2	**'B'**	**'0'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'B'**	**'0'**	STX	**data**	ETX	BCC

- stop buzzer whether it's on or off
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08B0" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08B0" + STX + 'Y' + ETX + BCC (means setting success)

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- **B1,** Start Buzzer

Host send:

SOH	**'S'**	ID1	ID2	**'B'**	**'1'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'B'**	**'1'**	STX	**data**	ETX	BCC

- start buzzer whether it's on or off
- Host sending **DATA** format
  - from "1" ~ "255" (INT in ASCII), unit is 0.2s
  - example:
    - "1" means 0.2s
    - "2" means 0.4s
    - "10" means 2s
    - "254" means 50.8s
    - "255" means forever
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08B1" + STX + "10" + ETX + BCC (means on for 2s)

CT-21xx respond：

SOH + "s08B1" + STX + 'Y' + ETX + BCC (means setting success)

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- **B2**, toggle buzzer

Host send:

SOH	**'S'**	ID1	ID2	**'B'**	**'2'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'B'**	**'2'**	STX	**data**	ETX	BCC

- Toggle buzzer
  - If original is ON then come to OFF
  - If original is OFF then come to ON forever
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08B2" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08B2" + STX + 'Y' + ETX + BCC (means setting success)

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- **B3**, do a short beep

Host send:

SOH	**'S'**	ID1	ID2	**'B'**	**'3'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'B'**	**'3'**	STX	**data**	ETX	BCC

- Do a short beep
  - If the buzzer is already on, you won't hear the beep. Buzzer will off until the time set in B2 command (won't off if is "255")
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08B3" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08B3" + STX + 'Y' + ETX + BCC (means setting success)

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- **E0**, get I/O state

Host send:

SOH	**'S'**	ID1	ID2	**'E'**	**'0'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'E'**	**'0'**	STX	**data**	ETX	BCC

- Get all I/O state
- Will respond 5 bytes data:
  - Byte_1
    - always '0' (0x30)
  - Byte_2
    - Buzzer state
    - '0' (0x30) means off
    - '1' (0x31) means on
  - Byte_3 ~ Byte_5
    - IR state
    - Each byte is a hex Int in ASCII word ('0' ~ 'F') and every bit means one IR state, 0 means off, 1 means on

Byte_3	IR-4	IR-3	IR-2	IR-1
"0"	OFF	OFF	OFF	OFF
"1"	OFF	OFF	OFF	ON
~				
"F"	ON	ON	ON	ON
Byte_4	**IR-8**	**IR-7**	**IR-6**	**IR-5**
"0"	OFF	OFF	OFF	OFF
"1"	OFF	OFF	OFF	ON
~				
"F"	ON	ON	ON	ON
Byte_5	**IR-12**	**IR-11**	**IR-10**	**IR-9**
"0"	OFF	OFF	OFF	OFF
"1"	OFF	OFF	OFF	ON
~				
"F"	ON	ON	ON	ON

Host sending：

SOH + "S08E0" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08E0" + STX + "01FA8" + ETX + BCC

Buzzer	IR_12	IR_11	IR_10	IR_9	IR_8	IR_7	IR_6	IR_5	IR_4	IR_3	IR_2	IR_1
OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF	ON	OFF	ON	OFF

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- **E1,** get FW version

Host send:

SOH	**'S'**	ID1	ID2	**'E'**	**'1'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'E'**	**'1'**	STX	**data**	ETX	BCC

■ Get CT-21xx FW version

Host sending：

SOH + "S08E1" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08E1" + STX + "V1.10 CT-2112" + ETX + BCC

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- **J2, get parameter of reading**

Host send:

SOH	**'S'**	ID1	ID2	**'J'**	**'2'**	STX	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'J'**	**'2'**	STX	**data**	ETX	BCC

- Get parameter of reading
- Will respond at least 12 byte
  - 14 byte if the FW version bigger than V1.20
  - 16 byte if the FW version bigger than V2.10 (include)

1 and 2	3 and 4	5 and 6	7 and 8	9 and 10	11 and 12	13 and 14	15 and 16
RF Timeout	Buzzer	Start Page	Read Page Count	Start-Up Mode	A2 Interval	Ex RF Timeout	Ex RF Fail Retry Times

- RF Timeout:
  - the timeout (judged to be unreadable) when IR state happen a HIGH to LOW trigger
  - Unit is second, Hex in ASCII format ("10" means 16s)
  - Used in "A0" "A1" command
- Buzzer
  - Does buzzer auto beep when finish a reading
  - "01" does, "00" doesn't
- Start Page
  - Set the start page of reading
  - Hex in ASCII format ("0A" means page 10)
- Read Page Count (report page)
  - How many page need to read
  - Hex in ASCII format ("0A" means read 10 page)
    - Mode 0 (ON)
      - Maximum can be 2 if is CT-2112
      - Maximum can be 4 if is CT-2108
      - Maximum can be 8 if is CT-2104
    - Mode 1 (OFF)
      - Maximum can be 17
- Start-Up Mode
  - The default mode after start-up
  - "00" for "A0", "01" for "A1", "02" for "A2", "03" for "A3"
- A2 Interval
  - Time interval foe "A2" command
  - Unit is second, Hex in ASCII format ("10" means 16s)

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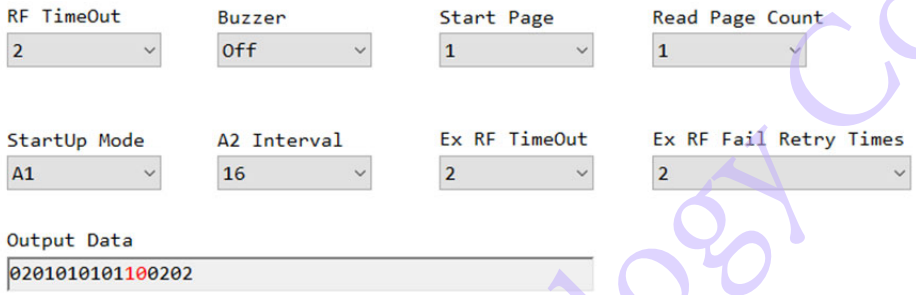
- Ex RF Timeout
  - the timeout (judged to be unreadable) when IR state happen a LOW to HIGH trigger
  - Unit is second, Hex in ASCII format (“10” means 16s)
  - Used in “A0” “A1” command
- Ex RF Fail Retry Times
  - Retry times if fail
  - Used in “K0” “K1” “K2” command

Host sending：

SOH + "S08J2" + STX + ETX + BCC

CT-21xx respond：

SOH + "s08J2” + STX + “0201010101100202” + ETX + BCC



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- **J3, set parameter of RF reading**

Host send:

SOH	**'S'**	ID1	ID2	**'J'**	**'3'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'J'**	**'3'**	STX	**data**	ETX	BCC

- set parameter of reading
- Host sending **DATA** format
  - Same as "J2" respond format
- When host sending this command, CT-21xx will send back a 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08J3" + STX + "0201010101100202" + ETX + BCC

CT-21xx respond：

SOH + "s08J3" + STX + 'Y' + ETX + BCC (means setting success)

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- **K0**, read one page using a specify antenna

Host send:

SOH	**'S'**	ID1	ID2	**'K'**	**'0'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'K'**	**'0'**	STX	**data**	ETX	BCC

- read one page using a specify antenna
- Host sending **DATA** format
  - 5 byte
    - First 2 byte
      - Which antenna
      - Hex in ASCII format ("0A" means antenna 10)
    - Third byte
      - fixed as 'M' (tag is Multi Page)
    - Last 2 byte
      - Which page
      - Hex in ASCII format ("0A" means page 10)
      - Form "01" to "11" (1 ~ 17)
- respond data
  - Read fail
    - 1 byte data 'N'
  - Read success
    - 14 byte
      - First 2 byte
        - Which antenna
        - Hex in ASCII format ("0A" means antenna 10)
      - Byte_3
        - fixed as 'M' (tag is Multi Page)
      - Byte_4
        - Page status
        - '2' means lock, '0' means un-lock
      - Byte_5 Byte_6
        - Which page
        - Hex in ASCII format ("0A" means page 10)
        - Form "01" to "11" (1 ~ 17)
      - Last 8 byte
        - Data in page

Host sending：

SOH + "S08K0" + STX + "02M05" + ETX + BCC

CT-21xx respond：

SOH + "s08K0" + STX + 'N' + ETX + BCC (read fail)

SOH + "s08K0" + STX + '02M00501234567' + ETX + BCC

Antenna 2, tag is Multi Page, page 5, un-lock, data is "01234567"

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- **K1, write one page using a specify antenna**

Host send:

SOH	**'S'**	ID1	ID2	**'K'**	**'1'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'K'**	**'1'**	STX	**data**	ETX	BCC

- write one page using a specify antenna
- Host sending **DATA** format
  - 13 byte
    - First 2 byte
      - Which antenna
      - Hex in ASCII format ("0A" means antenna 10)
    - Byte_3
      - fixed as 'M' (tag is Multi Page)
    - Byte_4 Byte_5
      - Which page
      - Hex in ASCII format ("0A" means page 10)
      - Form "01" to "11" (1 ~ 17)
    - Last 8 byte
      - Data want to write in page
- Respond 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08K1" + STX + "02M0611223344" + ETX + BCC

Using antenna 2 to write page 6, data is "11223344"

CT-21xx respond：

SOH + "s08K1" + STX + 'Y' + ETX + BCC (write success)

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- **K2**, lock one page using a specify antenna

Host send:

SOH	**'S'**	ID1	ID2	**'K'**	**'2'**	STX	**DATA**	ETX	BCC

CT-21xx respond：

SOH	**'s'**	ID1	ID2	**'K'**	**'2'**	STX	**data**	ETX	BCC

- lock one page using a specify antenna
- if page been lock, there is no way to un-lock. So only use this command when you really want to lock it
- Host sending **DATA** format
  - Same as "K0"
- Respond 1 byte state report to host
  - 'Y' means setting success
  - 'N' means setting fail

Host sending：

SOH + "S08K2" + STX + "02M06" + ETX + BCC

Using antenna 2 to lock page 6

CT-21xx respond：

SOH + "s08K2" + STX + 'Y' + ETX + BCC (lock success)

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Date	Revise contents
2022/07/06	V2.10
2022/08/18	V2.11 **1.3 DIP Switch** SW2_2: Reserve → ON: Data will be send in High Byte first OFF: Data will be send in Low Byte first
2023/02/14	V2.11 **1.1 Specification** Add. Warning sign.

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