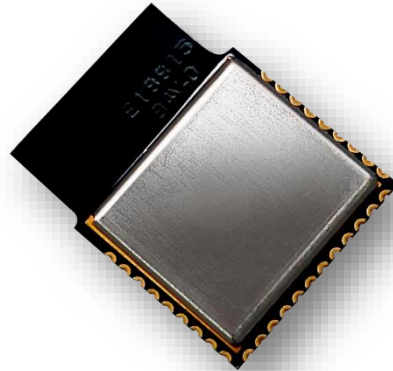# REEZ

E-1100A

2.4GHz Bluetooth Low Energy Module with Integrated Antenna

Data Sheet

Highlights

- ◢ Bluetooth v4.0 with Bluetooth Low Energy (Bluetooth Smart)
- ◢ High-Performance and Low-Power TI CC2541 industry-standard chip
- ◢ Designed with PCB integrated antenna, suitable for SMT
- ◢ Metal cover against EMI interference
- ◢ Transmitting, Receiving, Wake-up by only 2 UART pins
- ◢ Bluetooth Peer-to-Peer (P2P) Connection

Software

- ◢ Standard Generic Attribute Profile (GATT)
- ◢ Android APP source code support
- ◢ Apple iOS APP source code support
- ◢ Control easily by AT commands
- ◢ Firmware upgrade over the UART interface

Applications

- ◢ Smart phone/Tablet accessories
- ◢ Remote monitoring and control
- ◢ Indoor positioning

Certifications to Be Approved

- ◢ FCC CFR47 Part 15 (US)

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Specification

Item	Min.	Typical	Max.	Unit	Condition
Operation Voltage	2		3.6	V	VDD
RF Output Power	-23	0	0	dBm	
Power Status A		8.5		mA	UART function is available BLE is broadcasting
Power Status B		8.4		mA	UART function is available No BLE broadcast
Power Status C		0.5		mA	UART function is sleeping BLE is broadcasting
Power Status D		1		uA	UART function is sleeping No BLE broadcast
Wake Up Time		30		ms	From Power Status C/D to A/B
Baud Rate		9600	57600	bps	
RF Frequency Range	2379		2496	MHz	
Communication Range		10		M	Open Space
Operating Temperature	-40	25	+85	˚C	
Antenna					Embedded PCB Antenna
Dimensions					16.7mm*13mm*2.2mm
Weight		0.8		g	

Available Power Mode and Power Consumption Status
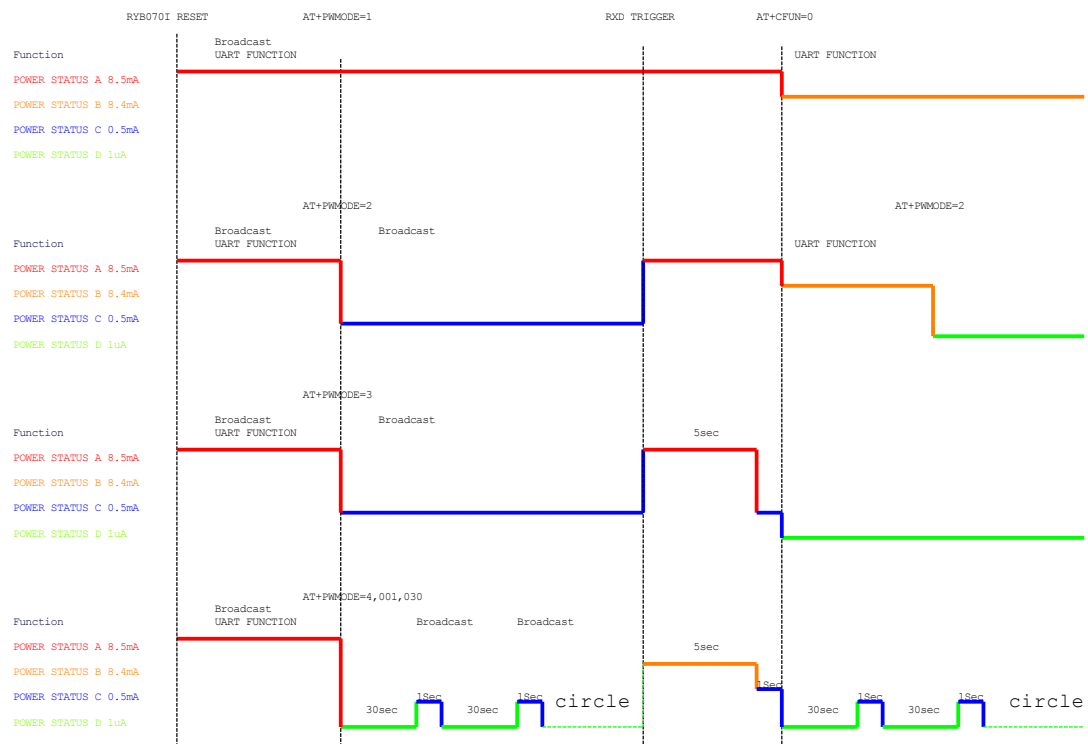
Wake Up UART Functions

When E-1100A is on Power Status C or Power Status D, users could use pin7 RXD to wake up the UART function. It will need some time to work normally after leaving low energy mode. In the process of waking up the UART function, the AT command may not be recognized by E-1100A, so the data of former bytes may be garbled. Users just need to send the commands again.

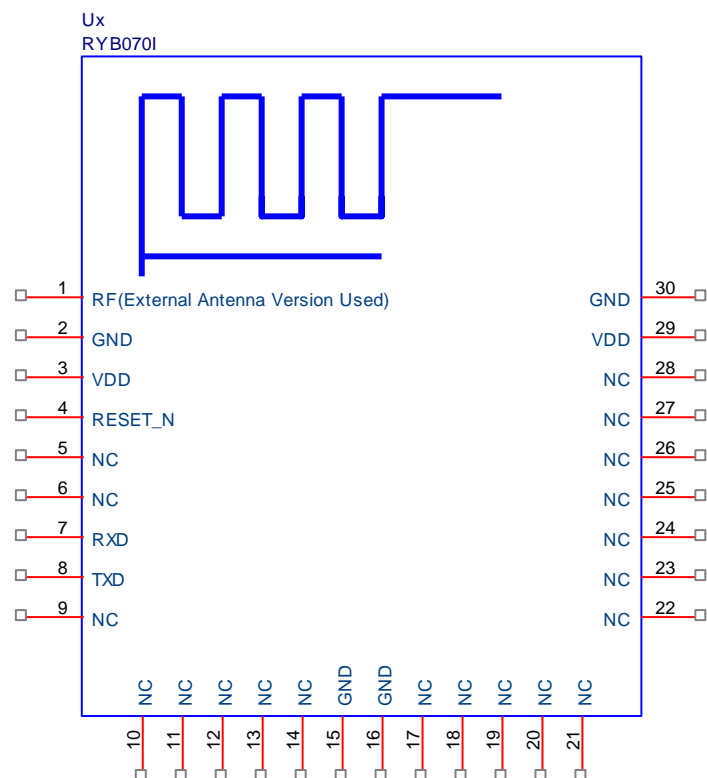When E-1100A is on PWMODE =2 / 3 / 4, the status will be as follows after trigger by the RXD (pin7) :

PWMODE =2 : E-1100A will become PWMODE =1 from PWMODE =2.
Send PWMODE =2 commands again to get back to power saving status.

PWMODE =3 : E-1100A will become Power Status A. It will return to Power Status C if there's no any communication on UART after 5 seconds.

PWMODE =4 : E-1100A will become Power Status A, but will still do BLE broadcast and sleep on schedule as the setting. When it is on Power Status A, it will leave PWMODE=4 after sending PWMODE=1.

Pin Description

Ux
RYB070I

Pin	Left Signal		Right Signal	Pin
1	RF(External Antenna Version Used)		GND	30
2	GND		VDD	29
3	VDD		NC	28
4	RESET_N		NC	27
5	NC		NC	26
6	NC		NC	25
7	RXD		NC	24
8	TXD		NC	23
9	NC		NC	22

Bottom pins:
10	11	12	13	14	15	16	17	18	19	20	21
NC	NC	NC	NC	NC	GND	GND	NC	NC	NC	NC	NC

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Pin	Name	I/O	Condition
1	RF		External Antenna Version Used
2	GND	-	Ground
3	VDD	I	Power Supply
4	RESET_N	I	Low Reset
5	NC	-	Leave Unconnected.
6	NC	-	Leave Unconnected.
7	RXD	I	UART Data Input
8	TXD	O	UART Data Output
9	NC	-	Leave Unconnected.
10	NC	-	Leave Unconnected.
11	NC	-	Leave Unconnected.
12	NC	-	Leave Unconnected.
13	NC	-	Leave Unconnected.
14	NC	-	Leave Unconnected.
15	GND	-	Ground
16	GND	-	Ground
17	NC	-	Leave Unconnected.
18	NC	-	Leave Unconnected.
19	NC	-	Leave Unconnected.
20	NC	-	Leave Unconnected.
21	NC	-	Leave Unconnected.
22	NC	-	Leave Unconnected.
23	NC	-	Leave Unconnected.
24	NC	-	Leave Unconnected.
25	NC	-	Leave Unconnected.
26	NC	-	Leave Unconnected.
27	NC	-	Leave Unconnected.
28	NC	-	Leave Unconnected.
29	VDD	I	Power Supply
30	GND	-	Ground

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Application Circuit

Block Diagram

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Reflow Soldering

Consider the "IPC-7530 Guidelines for temperature profiling for mass soldering (reflow and wave) processes, published 2001.

Preheat phase

Initial heating of component leads and balls. Residual humidity will be dried out. Please note that this preheat phase will not replace prior baking procedures.

- ◢ Temperature rise rate: max. 3 °C/s If the temperature rise is too rapid in the preheat phase it may cause excessive slumping.
- ◢ Time: 60 - 120 s If the preheat is insufficient, rather large solder balls tend to be generated. Conversely, if performed excessively, fine balls and large balls will be generated in clusters.
- ◢ End Temperature: 150 - 200 °C If the temperature is too low, non-melting tends to be caused in areas containing large heat capacity.
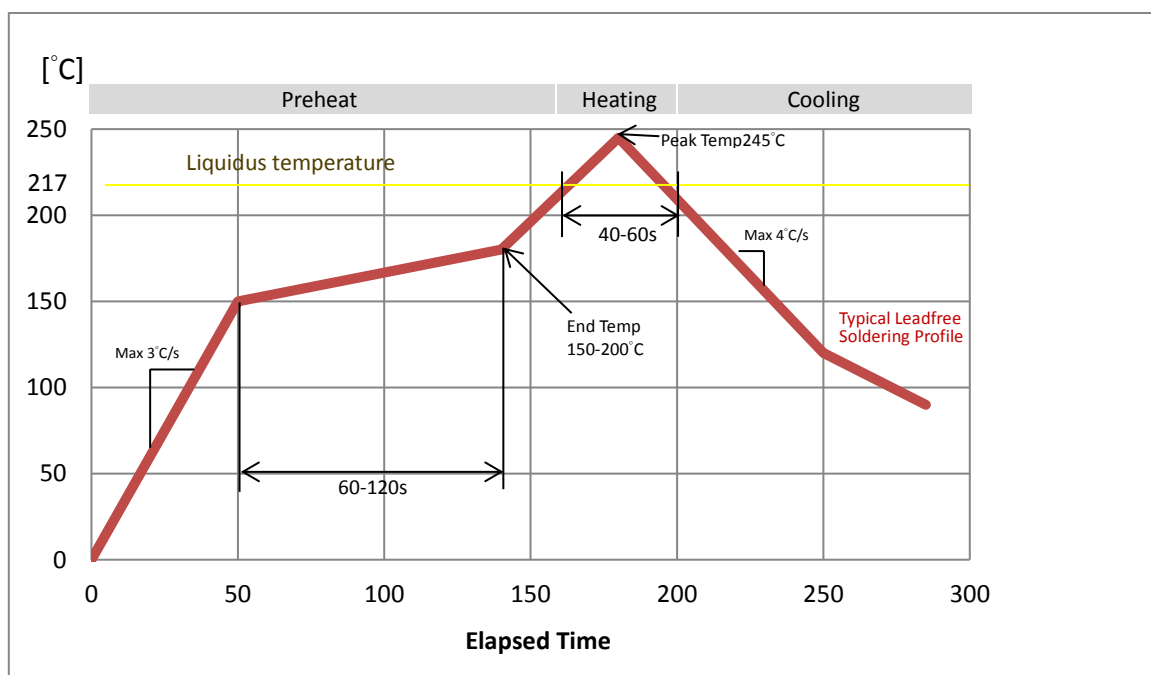
Heating/ Reflow phase

The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- ◢ Limit time above 217 °C liquidus temperature: 40 - 60 s
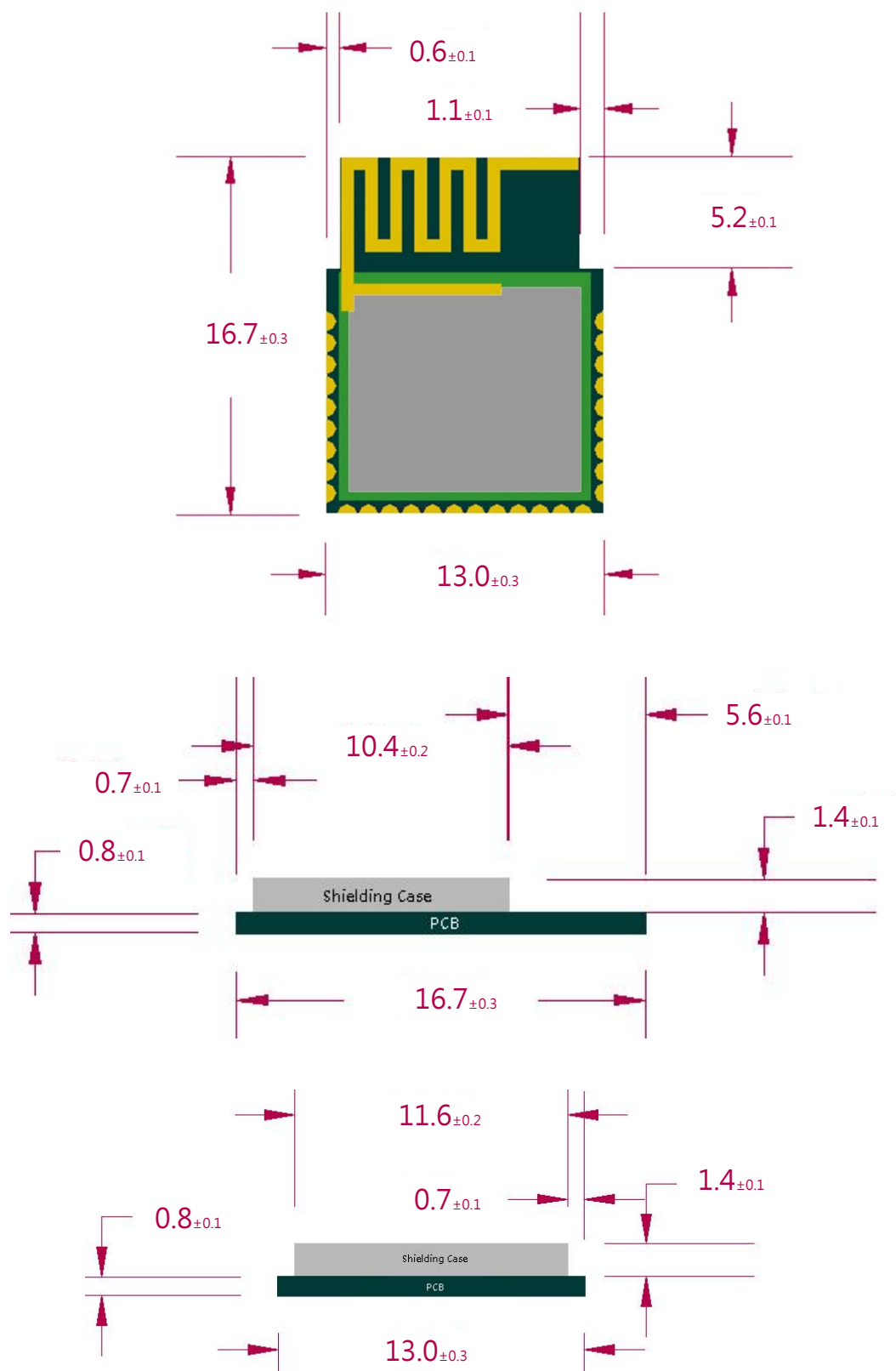- ◢ Peak reflow temperature: 245 °C

Cooling phase

A controlled cooling avoids negative metallurgical effects (solder becomes more brittle) of the solder and possible mechanical tensions in the products. Controlled cooling helps to achieve bright solder fillets with a good shape and low contact angle.

- ◢ Temperature fall rate: max 4 °C/s To avoid falling off, the REEZ E-1100A module should be placed on the topside of the motherboard during soldering.
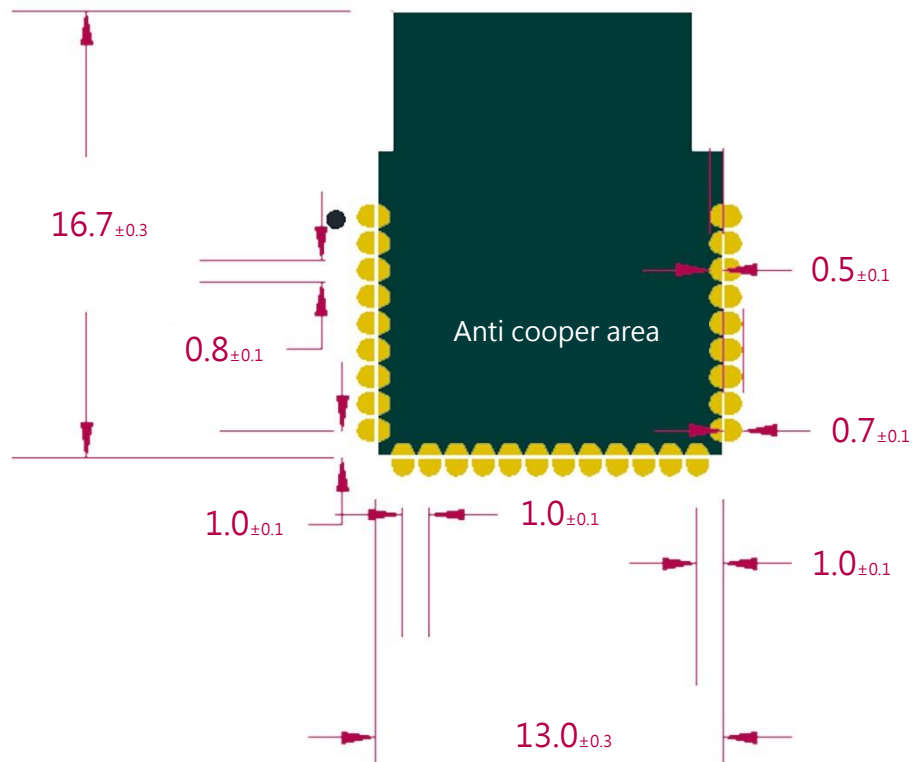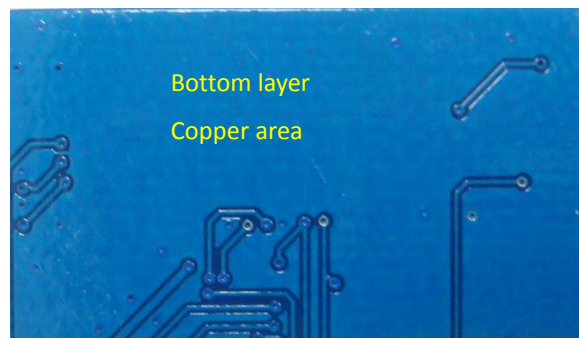

Recommended soldering profile

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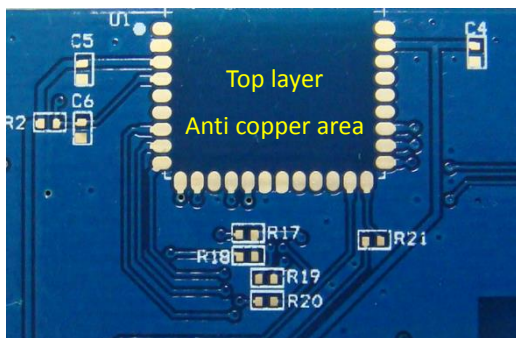
0.6 ±0.1

1.1 ±0.1

5.2 ±0.1

16.7 ±0.3

13.0 ±0.3

0.7 ±0.1

10.4 ±0.2

5.6 ±0.1

1.4 ±0.1

0.8 ±0.1

Shielding Case

PCB

16.7 ±0.3

11.6 ±0.2

0.7 ±0.1

1.4 ±0.1

0.8 ±0.1

Shielding Case

PCB

13.0 ±0.3

Unit : mm

Layout Footprint Recommendations

$16.7_{\pm 0.3}$

$0.8_{\pm 0.1}$

$0.5_{\pm 0.1}$

Anti cooper area

$0.7_{\pm 0.1}$

$1.0_{\pm 0.1}$

$1.0_{\pm 0.1}$

$1.0_{\pm 0.1}$

$13.0_{\pm 0.3}$

Unit : mm

Top layer

Anti copper area

Bottom layer

Copper area

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AT Command

It is required to key in "**enter**" or "**\r\n**" in the end of all AT Commands.

Add "**?**" in the end of the commands to ask the current setting value.

1. **AT** to test if the module responds

Syntax	Response
AT	+OK

2. **Software RESET**

Syntax	Response
AT+RESET	+RESET!

3. **AT+NAME** to set the broadcast name

Syntax	Response
AT+NAME=<name> <name> at most 20 ASCII characters Example: set the broadcast name as "REYAX_BLE_RYB070I" AT+NAME= REYAX_BLE_RYB070I * It will work after sending *AT+RESET* or pressing RESET bottom.	+OK
AT+NAME?	+NAME= REYAX_BLE_RYB070I

4. **AT+ATTR** to set the device name

Syntax	Response
AT+ATTR=<attribute> <attribute> at most 20 ASCII characters Example: set the device name as "REYAX_BLE_RYB070I" AT+ATTR= REYAX_BLE_RYB070I * It will work after sending *AT+RESET* or pressing RESET bottom. * Some iOS APP use this name to recognize the Bluetooth device.	+OK
AT+ATTR?	+ATTR= REYAX_BLE_RYB070I

5. **AT+CRFOP** to set the RF output power

Syntax	Response
AT+CRFOP=<power> <power> range 1 to 3 1 : 0dBm (default) 2 : -6dBm 3 : -23dBm Example: set the output power as -6dBm AT+CRFOP=2	+OK
AT+CRFOP?	+CRFOP=2

6. **AT+CFUN** to set the BLE broadcast (Advertising) ON/OFF

Syntax	Response
AT+CFUN=<Advertising> <Advertising> is the switch of BLE broadcast 0 : BLE broadcast off 1 : BLE broadcast on (default) Example: set the BLE broadcast off AT+CFUN=0	+OK
AT+CFUN?	+CFUN=0

7. **AT+CNE** to set the BLE can be connected or not

Syntax	Response
AT+CNE=<Connect> <Connect> set the BLE can be connected or not 0 : Reject other Bluetooth devices connecting. 1 : Accept other Bluetooth devices connecting (default) Example : Reject other Bluetooth devices connecting AT+CNE=0	+RESET!
AT+CNE=0	+RESET!

8. **AT+PWMODE** to set the power mode

Syntax	Response
AT+PWMODE=<mode> <mode> is the power saving mode 1 : Power Saving Mode 1 (default) 2 : Power Saving Mode 2 3 : Power Saving Mode 3 4 : Power Saving Mode 4 (Only in Peripheral mode) Example: use Power Saving Mode 3 AT+PWMODE=3	+OK
AT+PWMODE?	+ PWMODE=3
 Users could set the cycle time to switch the BLE broadcast ON/OFF in Power Saving Mode 4. AT+PWMODE=4<,time of BLE broadcast ON>,<time of BLE broadcast OFF> (Unit of time: Second) The second must be three-digit number. The minimum is 1 second, the maximum is 600 seconds. (001~600) Example: Setting the BLE broadcast cycle time as ON for 3 seconds and OFF for 5 seconds. AT+PWMODE=4,003,005 If users don't set the parameter of time, the default is: ON for 5 seconds and OFF for 10 seconds.	

9. **AT+CONNECT?** to inquire the connection status

Syntax	Response
AT+CONNECT?	+CONNECT=0 (unconnected) +CONNECT=1 (connecting)

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10. **AT+IPR** to set the UART baud rate

Syntax	Response
AT+IPR=<rate> <rate> is the UART baud rate 4 : 9600 (default) 5 : 19200 6 : 38400 7 : 57600 Example: set the baud rate as 57600, it will memorize the setting and reset the module. AT+IPR=7	+OK
AT+IPR?	+IPR=7

11. **AT+ADDR** to inquire MAC address

Syntax	Response
AT+ADDR?	+ADDR=123456ABCDEF

12. **AT+ENTER** to set if needed to key in ENTER*(0x0D 0x0A)* in the end of the commands

Syntax	Response
AT+ENTER=<state> <state> is whether needed to key in ENTER*(0x0D 0x0A)* in the end of the commands. 0 : no need 1 : needed (default) Example: setting there's no need to key in ENTER*(0x0D 0x0A)* in the end of the commands, it will memorize the setting and reset the module. AT+ENTER=0	+OK
AT+ENTER?	+ENTER=0

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13. **AT+AUE** to set if the module follows the Connection Parameter Update Request automatically

Syntax	Response
AT+AUE =<0/1> <0/1> is the switch of this function 0 : Not to follow automatically (default) 1 : Following automatically Example: Setting the module not to follow the Connection Parameter Update Request automatically, it will memorize the setting and reset the module. AT+AUE=0 *** Setting the module follow the Connection Parameter Update Request may cause the BLE connection unstable in iOS.**	+OK
AT+AUE?	+AUE=0

14. **AT+CGMS?** to inquire the firmware version

Syntax	Response
AT+CGMS?	+CGMS=RYB070I_56312E34

15. **AT+ROLE** to set the role as Peripheral or Central

Syntax	Response
AT+ROLE=<role> <role> is Peripheral or Central 0 : Peripheral (default) 1 : Central Example: set the role as Central, it will memorize the setting and reset the module. AT+ROLE=1	+OK
AT+ROLE?	+ROLE=1

16. **AT+SCAN** to scan the Peripherals near by the Central

Syntax	Response
AT+SCAN	+<MAC>,<rssi>
	+Found <Quantity>
	+<NO.>:<MAC>
	<MAC> MAC address
	<rssi> output power of Peripherals: -xxdBm
	<Quantity> quantity of found Peripherals; the maximum is 8.
	<NO.> item number of Peripherals: 1~8
	+123456ABCDEF,-79dBm
	+1237F3AB54CA,-60dBm
	+Found 2
	+1:123456ABCDEF
	+2:1237F3AB54CA

17. **AT+CON**   The Central connect to a Peripheral by MAC address

Syntax	Response
AT+CON=<MAC>	+Connected
<MAC> MAC address	
Example: the Central connect to the Peripheral	
whose MAC address is **123456ABCDEF**	
AT+CON=123456ABCDEF	

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18. **AT+CONT** The Central connect to a Peripheral by the item number from AT+SCAN

Syntax	Response
AT+CONT=<NO.> <NO.> the item number of the Peripherals: 1~8 Example: the Central connect to the Peripheral whose item number is 2 from AT+SCAN AT+CONT=2	+Connected

19. **AT+DISCON** to disconnect the Peripheral from the Central

Syntax	Response
AT+DISCON	+Disconnected

20. Other response messages

Syntax	Response
After RESET	+READY +ENTER=1 +ROLE=0
The data has been transmitted	+ > > > > >
BLE is connecting	+ + + + + +
BLE is unconnected	+ - - - - -

Our Company is not responsible for any technical malfunction or other problems if users modify the module by themselves.

Transmission Data Size

[1] The maximum transmission data size from E-1100A to smartphones APP is as follows:

➢ When **AT+ENTER=1 (default)**, it is needed to add *0x0D 0x0A* (2 bytes) in the end of each data, so the maximum data size is 18 bytes each time.

➢ When setting **AT+ENTER=0**, it is no need to add *0x0D 0x0A* (2 bytes) in the end of each data, so the maximum data size is 20 bytes each time.

[2] The maximum transmission data size from smartphone APP to E-1100A is 20 bytes each time.

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Certifications

FCC Statement:

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.

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

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following " Contains TX FCC ID : 2AMMC-E-1100A ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

FC 2AMMC-E-1100A

REEZ
GC464006
06/17

FCC ID: 2AMMC-E-1100A