REYAX
TECHNOLOGY CORPORATION, LTD

RYB080I

2.4GHz Bluetooth 4.2 & 5.0 Low Energy Module with Integrated Antenna

Datasheet

5

11*11*2.2mm

產品介紹

RYB080I 是符合藍芽 4.2 與 5.0 超低耗電標準模組，可利用愛坦科技開發的 AT command，讓產品快速與簡易地連接智慧型手機與各種藍芽設備。

功能與特色

- 藍芽 4.2 & 5.0 超低耗電標準
- TI CC2640R2F ARM®Cortex®-M3 工業級核心
- 可同時連接兩個藍芽裝置
- 支援主從腳色
- SMD 超小型化帶天線設計模組，面積 115.94mm^2
- 防電磁干擾保護金屬蓋
- 2pins 完成資料收發與喚醒功能
- 容易使用的 AT command
- 標準 GATT
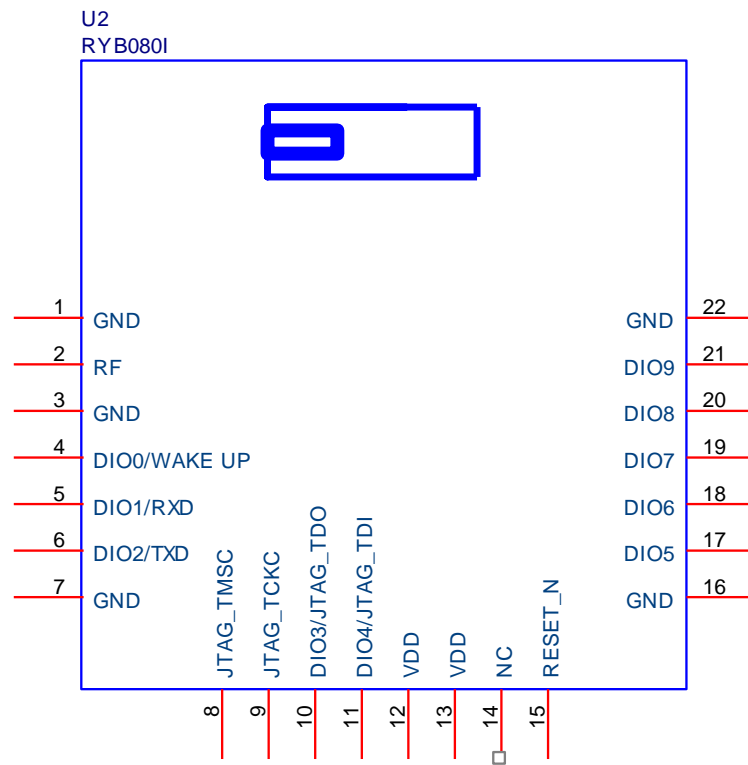
應用範圍

- 智慧型手機周邊產品
- 各類藍芽監控產品
- 家庭自動化
- 室內定位

可符合法規

- FCC CFR47 Part 15 (US)
- ETSI EN 300 328, EN300 440 class 2 (Europe)
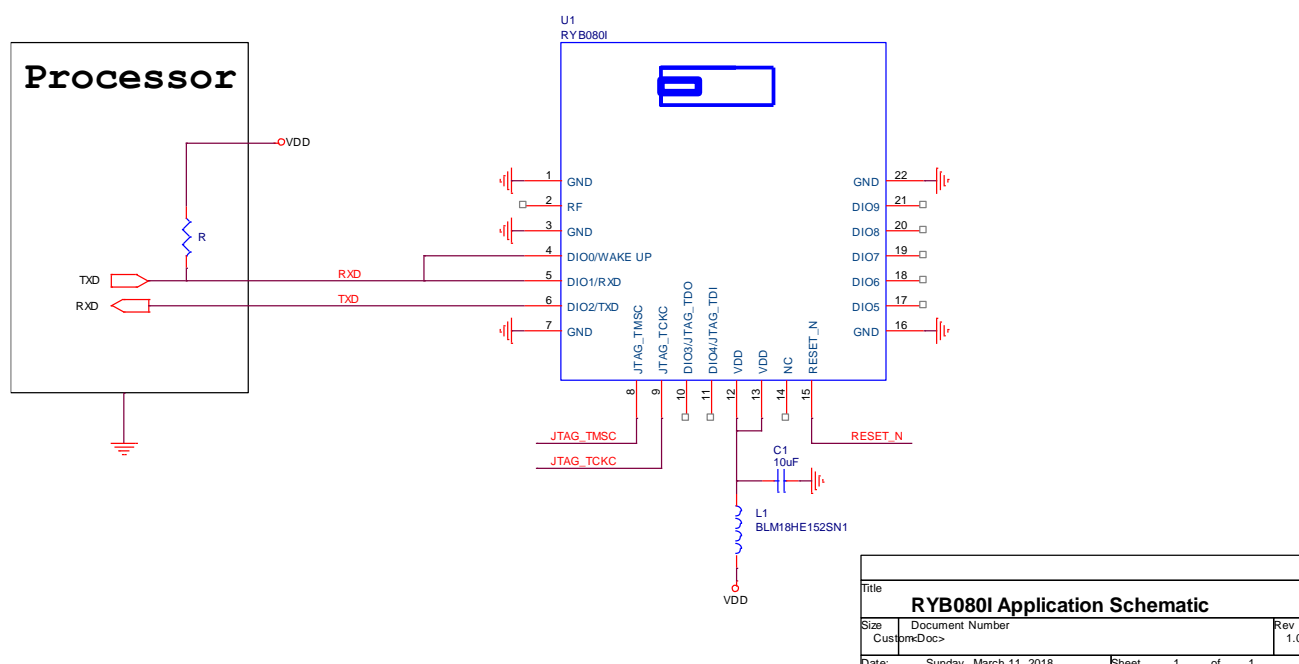- ARIB STD-T66 (Japan)
- NCC (Taiwan)

SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
Operation Voltage	1.8	3.0	3.8	V	VDD
RF Output Power	-21		5	dBm	
Active Current		1.5		mA	UART 功能可用，有 BLE 廣播
Advertising Average Current		0.2		mA	100ms BLE 廣播一次
Advertising Average Current		23		uA	1 秒 BLE 廣播一次
Advertising Average Current		6		uA	10 秒 BLE 廣播一次
Standby Current		3		uA	AT+CFUN=0
Wake Up Time		2		ms	
Simultaneous connections		2			
UART Baud Rate		9600	115200	bps	
RF Frequency Range	2400		2483.5	MHz	
Flash erase cycles		100		K	Cycles
Operating Temperature	-40	25	+85	˚C	
Antenna					Embedded Ceramic Antenna
Weight		0.8		g	

PIN DESCRIPTION

U2
RYB080I

Pin	Name		Pin	Name
1	GND		22	GND
2	RF		21	DIO9
3	GND		20	DIO8
4	DIO0/WAKE UP		19	DIO7
5	DIO1/RXD		18	DIO6
6	DIO2/TXD		17	DIO5
7	GND		16	GND

8	JTAG_TMSC
9	JTAG_TCKC
10	DIO3/JTAG_TDO
11	DIO4/JTAG_TDI
12	VDD
13	VDD
14	NC
15	RESET_N

Pin	Name	I/O	Condition
1	GND	-	Ground
2	RF		External Antenna Version Used
3	GND	-	Ground
4	DIO0/WAKE UP	I	WAKE UP pin
5	DIO1/RXD	I	UART Data Input
6	DIO2/TXD	O	UART Data Output
7	GND	-	Ground
8	JTAG_TMSC	I/O	JTAG TMSC
9	JTAG_TCKC	I/O	JTAG TCKC
10	DIO3/JTAG_TDO	I/O	GPIO, High-drive capability, JTAG_TDO
11	DIO4/JTAG_TDI	I/O	GPIO, High-drive capability, JTAG_TDI
12	VDD	I	Power Supply
13	VDD	I	Power Supply
14	NC	-	Leave Unconnected.
15	RESET_N	I	Low Reset
16	GND	-	Ground
17	DIO5	I/O	GPIO, Sensor Controller, Analog
18	DIO6	I/O	GPIO, Sensor Controller, Analog
19	DIO7	I/O	GPIO, Sensor Controller, Analog
20	DIO8	I/O	GPIO, Sensor Controller, Analog
21	DIO9	I/O	GPIO, Sensor Controller, Analog
22	GND	-	Ground

APPLICATION SCHEMATIC

Title		
	RYB080I Application Schematic	
Size Custom<Doc>	Document Number	Rev 1.0
Date: Sunday , March 11, 2018	Sheet 1 of 1	

BLOCK DIAGRAM
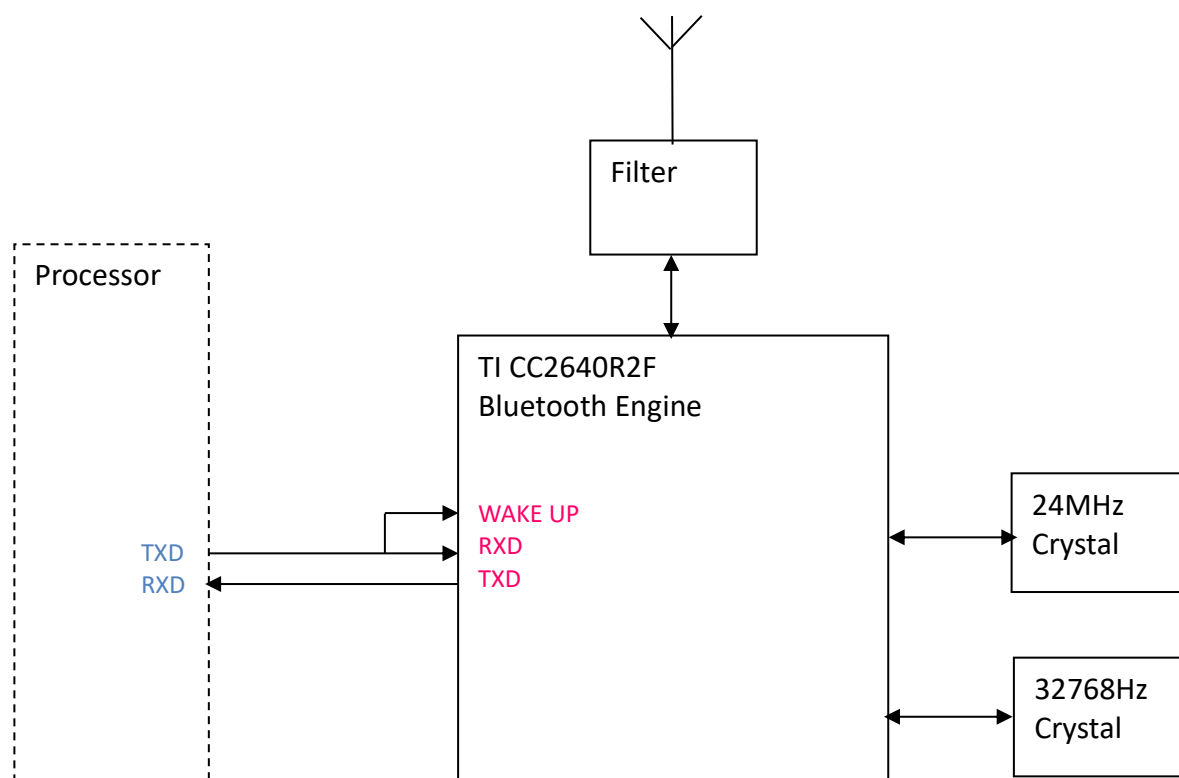
REFLOW SOLDERING

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.
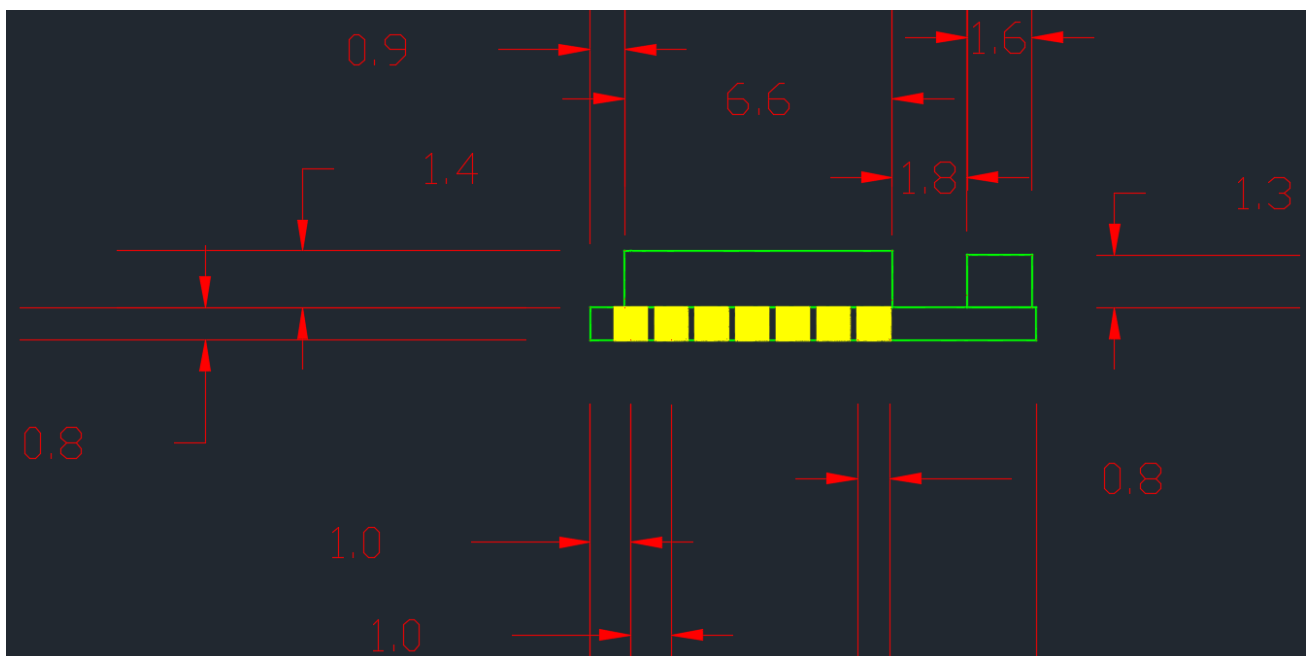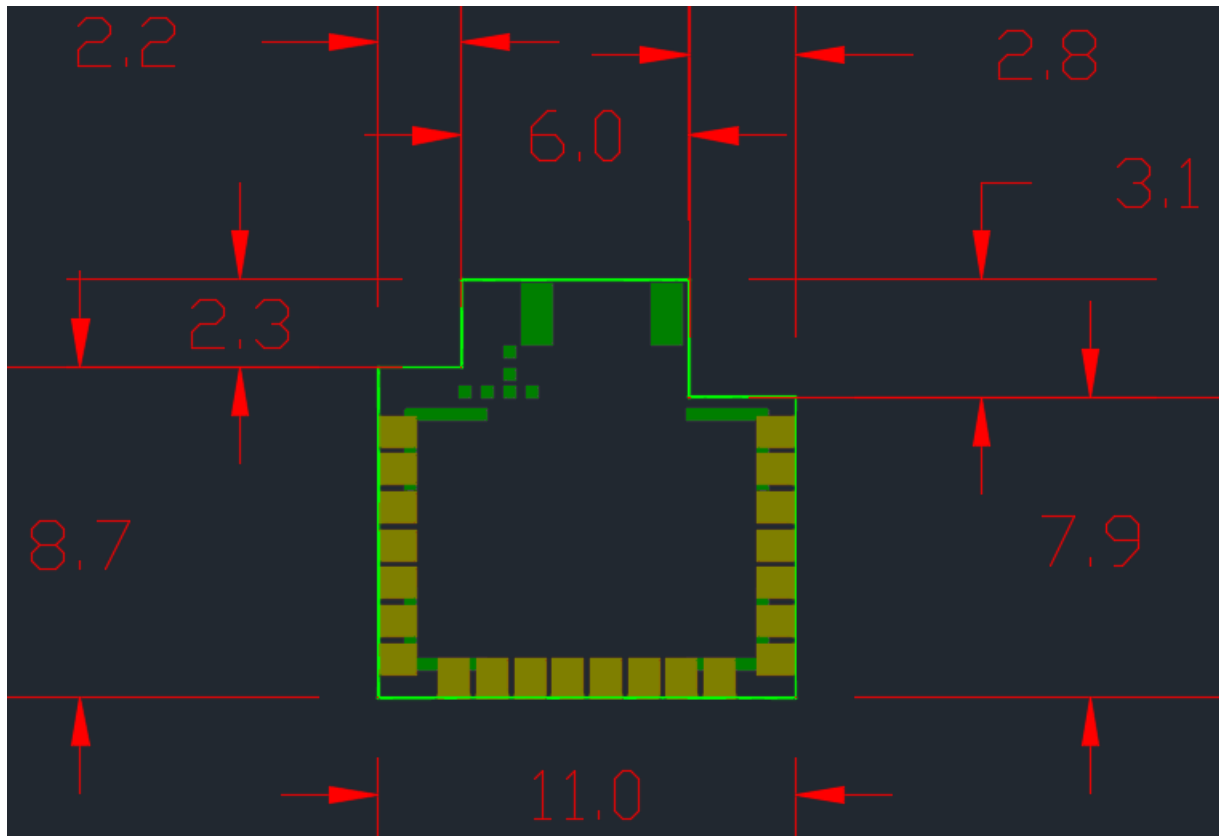
- Temperature fall rate: max 4 °C/s To avoid falling off, the REYAX RYB070I module should be placed on the topside of the motherboard during soldering.
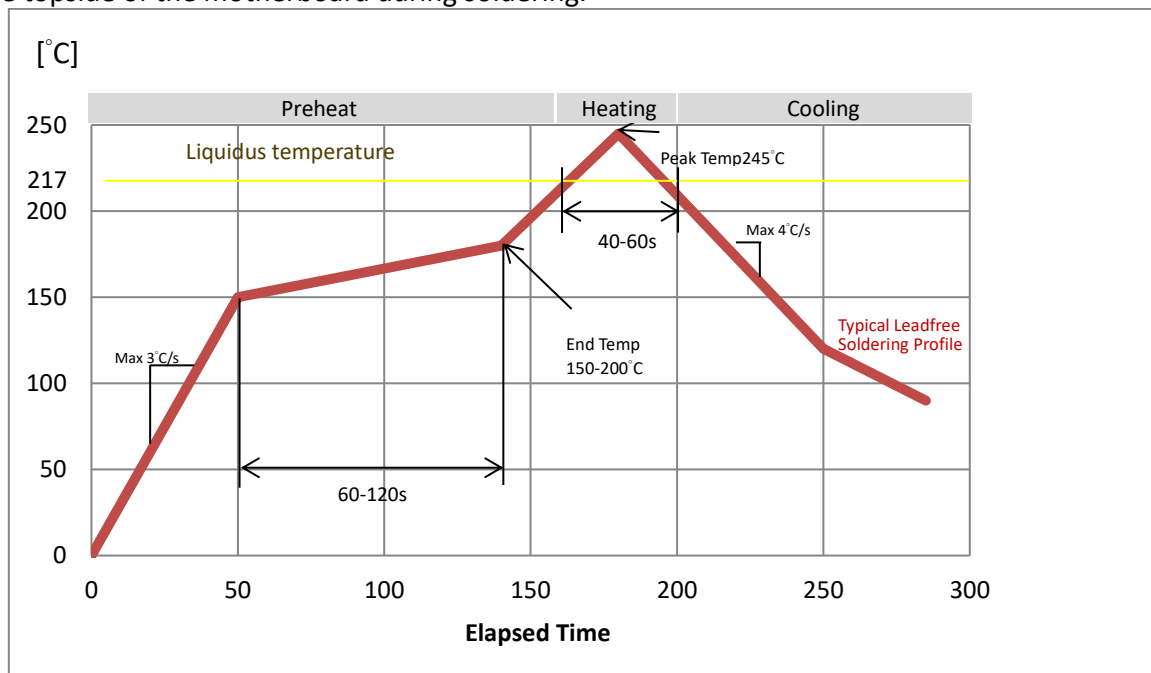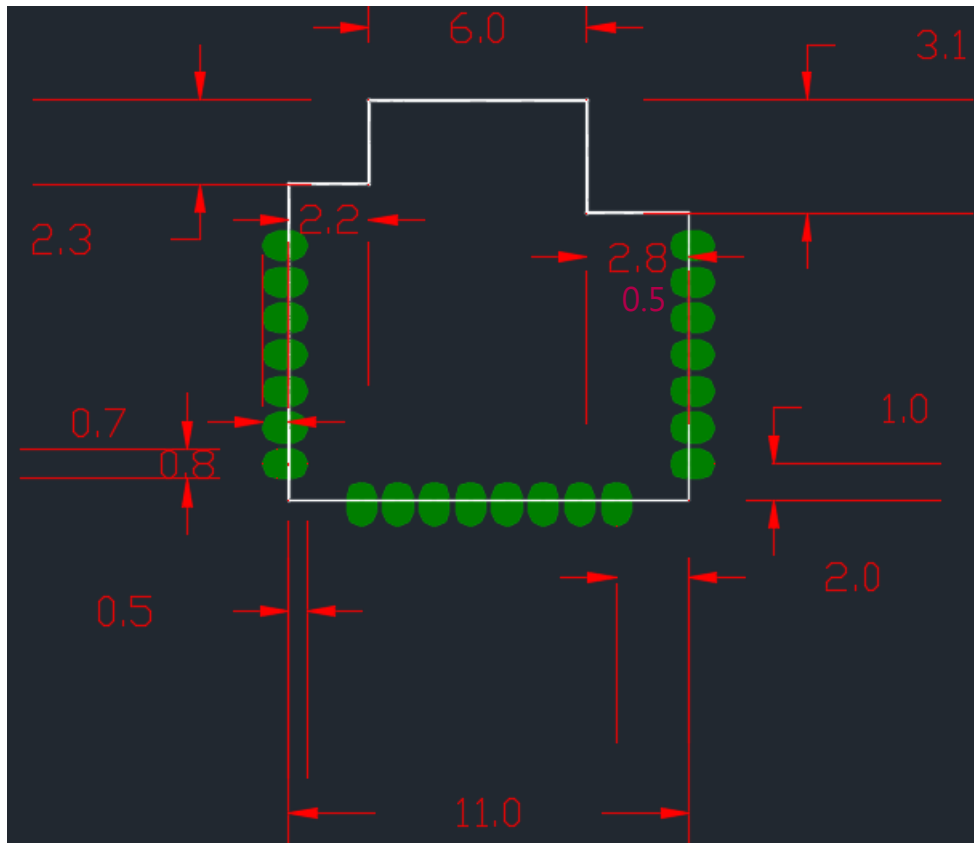
Recommended soldering profile
Note: Does not support upside-down/bottom side reflow.
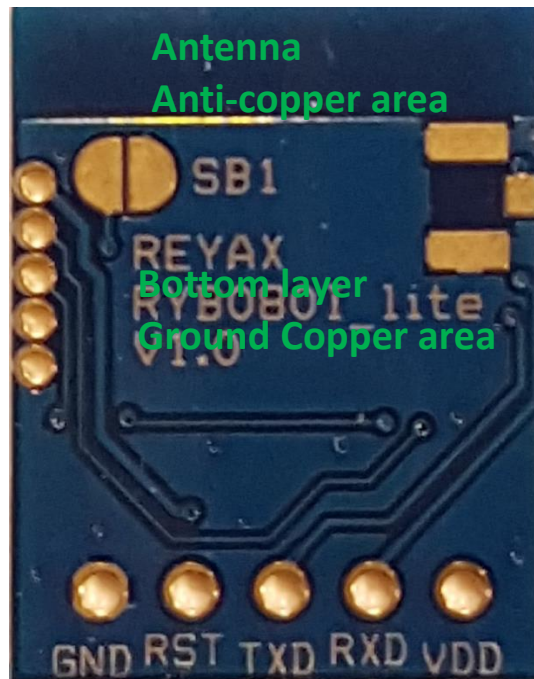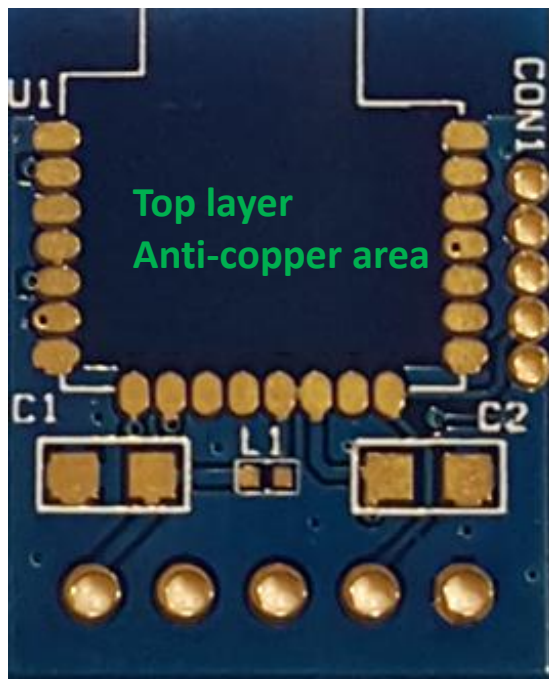
DIMENSIONS

Unit : mm

LAYOUT FOOTPRINT RECOMMENDATIONS

Unit : mm

Top layer
Anti-copper area

C1   C2

Antenna
Anti-copper area

SB1

REYAX
RYB080I lite
V1.0

Bottom layer
Ground Copper area

GND RST TXD RXD VDD

認證資訊

Taiwan NCC Statement 低功率電波輻射性電機管理辦法:

第十二條 經型式認證合格之低功率射頻電機,非經許可,公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信;經發現有干擾現象時,應立即停用,並改善至無干擾時方得繼續使用。前項合法通信,指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

CCAN19LP0100T4

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 : QLY-RYB070I ". 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.

QLY-RYB080I

AT COMMAND

[1] RYB080I開機後處於低功耗廣播模式，無法接收AT Command。當pin4 (WAKE UP)受到任何輸入信號觸發後(例如可以傳送一字元＂A＂)，UART介面被喚醒，RYB080I此時可以接收AT command，當UART介面5秒內沒有收到任何指令時會再度進入低功耗廣播的模式。此模式可以利用AT Command修改。

[2]出廠的預設值AT Command 結尾都需要加入＂**enter**＂ 或 ＂**\r\n**＂ **(0x0D 0x0A)**，指令後面加＂**?**＂為詢問目前設定值。

[3]RYB080I有兩個藍芽連線埠<Port>可以分別當作主HOST或從CLIENT角色。

[4]AT Command可以從RXD輸入，結果由TXD輸出。

[5]AT Command也可以在藍芽連接後由無線輸入，結果由TXD輸出。

1. **AT** 測試模組回應

命令	回覆
AT	+OK

2. 軟體RESET

命令	回覆
AT+RESET	+READY

3. **AT+NAME** 設定藍芽模組廣播名稱

命令	回覆
AT+NAME=<Name> <Name>最多 20 個 ASCII 字元 範例：設定藍芽模組廣播名稱為 REYAX_BLE_RYB080I AT+NAME=REYAX_BLE_RYB080I *設定完後需 RESET 才會生效 *設定完成會記憶在 Flash	+OK
AT+NAME?	+NAME= REYAX_BLE_RYB080I

4. **AT+ATTR**設定藍芽模組設備名稱

命令	回覆
AT+ATTR=<attribute> <attribute>最多 20 個 ASCII 字元 範例：設定藍芽模組設備名稱為 REYAX_BLE_RYB080I AT+ATTR=REYAX_BLE_RYB080I *設定完後需下 AT+RESET 或硬體 RESET 才會生效 *某些 iOS APP 是用此名稱來辨識藍芽裝置 *設定完成會記憶在 Flash	+OK
AT+ATTR?	+ATTR= REYAX_BLE_RYB080I

5. **AT+CRFOP** 設定藍芽模組廣播發射功率

命令	回覆
AT+CRFOP=<Power> <Power>範圍為 0 到 C 0=-21dBm 1=-18dBm 2=-15dBm 3=-12dBm 4=-9dBm 5=-6dBm 6=-3dBm 7=0dBm 8=1dBm 9=2dBm A=3dBm B=4dBm C=5dBm(預設值) 範例：設定發射功率為-9dBm AT+CRFOP=4 *設定完成會記憶在 Flash	+OK
AT+CRFOP?	+CRFOP=4

6. AT+CNE 設定是否可被其他藍芽裝置連接

命令	回覆
AT+CNE=<Connect> <Connect>為 RYB080I 是否可被連線 0：拒絕藍芽連線 1：接受藍芽連線 (預設值) 範例：設定拒絕藍芽連線 AT+CNE=0 *設定完成會記憶在 Flash 並 Reset	+RESET!
AT+CNE?	+CNE=0

7. AT+PERIOD 設定藍芽廣播週期

命令	回覆
AT+PERIOD =<Parameter> <Parameter>>範圍 0 到 9 0:25ms 1:50ms 2:100ms (預設值) 3:200ms 4:500ms 5:1s 6:2s 7:3s 8:5s 9:10s 範例：設定每秒內藍芽廣播週期為 500ms AT+PERIOD=4 *設定完後需 RESET 才會生效 *設定完成會記憶在 Flash	+OK
AT+PERIOD?	+PERIOD=4

8. **AT+PWMODE** 設定省電管理模式

命令	回覆
AT+PWMODE=<Mode> <Mode>為省電模式 0：全功能模式：UART 介面與藍芽廣播皆持續運作 1：標準省電模式：pin4 被觸發後 UART 介面可以下達 AT Command，如果 pin4 5 秒內沒有再觸發就會進入純廣播模式(預設值) 2：休眠模式：標準省電模式下關閉藍芽廣播 3：自訂省電模式：自行設置藍芽廣播開啟與關閉的循環時間 AT+PWMODE=3, <藍芽廣播開啟秒數>, <藍芽廣播關閉秒數>，開啟秒數與關閉秒數設定範圍為<000~600>秒。 ***請注意<藍芽廣播開啟秒數>時間需大於等於藍芽廣播週期** 範例：設定進入電源模式 3,開啟 1 秒,關閉 20 秒持續循環。 AT+PWMODE=3,001,020	+OK
AT+PWMODE?	+ PWMODE=3

9. **AT+CFUN** 設定藍芽廣播開關

命令	回覆
AT+CFUN=<Advertising> <Advertising>為藍芽廣播開關 0：藍芽廣播關閉 1：啟動藍芽廣播模式 (開機預設值) 範例：設定藍芽廣播關閉 AT+CFUN=0	+OK
AT+CFUN?	+CFUN=0

10. **AT+IPR** 設定Baud Rate

命令	回覆
AT+IPR=<Rate> <Rate>為 Baud Rate 4：9600 (出廠值) 5：19200 6：38400 7：57600 8：115200 範例：設定為 57600，設定完成會記憶並 RESET 模組 AT+IPR=7 *設定完後需 RESET 才會生效 *設定完成會記憶在 Flash	+OK
AT+IPR?	+IPR=7

*Byte Size=8 ，Parity=None， Stop Bits=1

11. **AT+ADDR** 詢問MAC位址資訊

命令	回覆
AT+ADDR?	+ADDR=123456ABCDEF

12. **AT+ENTER** 設定每行指令結尾是否需要ENTER*(0x0D 0x0A)*

命令	回覆
AT+ENTER=<Status> <Status>為每行指令結尾是否需要 ENTER*(0x0D 0x0A)* 0：不需要 1：需要 (出廠值) 範例：設定結尾不需要 ENTER*(0x0D 0x0A)*， AT+ENTER=0 *設定完成會記憶在 Flash	+OK
AT+ENTER?	+ENTER=0

13. AT+CONNECT? 詢問連線狀態

命令	回覆
AT+CONNECT?	+CONNECT=<Port1>,<Port2> <Port1>,<Port2>為兩個藍芽連線埠的狀態 0：沒有任何連線 H：連線中，角色為 Host C：連線中，角色為 Client
AT+CONNECT?	+CONNECT=0,C

14. AT+SCAN 主機掃描附近的從機

命令	回覆
AT+SCAN 範例 ： 掃描附近可連結從機	+..... +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +Found <Quantity> <NO.>從機序號從 1~5 <MAC>MAC 位址資訊 <rssi>從機功率 dBm <Quantity>找到從機的數量，最大為 5 +..... +1:0x341513E481FA,BLE_MODULE ,- 46dBm +2:0x546C0E591BD2,BLE5_MODULE,-31dBm +Found 2

15. AT+CON 主機以MAC位址連接從機

命令	回覆
AT+CON=<MAC> <MAC>MAC 位址資訊 範例：主機連接 MAC 位址為 123456ABCDEF 的從機 AT+CON=123456ABCDEF	+++++<Role><Port> <Role>為 H 代表本身為 Host 腳色， C 代表本身為 Client 腳色 <Port>為藍芽連線埠 +++++H1

*適用愛坦藍芽BLE產品

16. AT+CONT 主機以AT+SCAN序號連接從機

命令	回覆
AT+CONT=<NO.> <NO.>從機序號從 1~8 範例：連接 AT+SCAN 結果序號為 2 的從機 AT+CONT=2	+++++<Role><Port> <Role>為 H 代表本身為 Host 腳色， C 代表本身為 Client 腳色 <Port>為藍芽連線埠 +++++H2

*適用愛坦藍芽BLE產品

17. AT+DCON 主動中斷連線

命令	回覆
AT+DCON=<Port> <Port>為藍芽連線埠 0: 中斷 Port1 & Port2 1：中斷 Port1 2：中斷 Port2 範例：藍芽連線埠號 1 連線中斷 AT+DCON=1	+-----<Role><Port> <Role>為 H 代表本身為 Host 腳色， C 代表本身為 Client 腳色 <Port>為藍芽連線埠 +-----H1

18. AT+GPIO 控制GPIO輸出為High或Low

命令	回覆
AT+GPIO=<GPIO NO.>, <H/L> < GPIO NO. >範圍為 5/6/7 <H/L>為 GPIO 輸出的電壓 0 代表 Low， 1 代表 High 範例：設定 GPIO 埠號 5 輸出為 High AT+GPIO=5,1	+OK

19. 連線接收資料與接收傳送資料

資料格式	回覆
[1]當與藍芽裝置建立連線後會顯示 +++++<Role><Port> +MTU:<Data> <Role>為 H 代表本身為 Host 腳色，C 代表本身為 Client 腳色 <Port>連線埠編號 1 或 2 <Data>單一封包的 MAX 資料量(Byte) 範例：連線埠 1 建立連線，腳色是 Client，單一封包可傳送的資料量為 62Bytes (MTU-3)	+++++C1 +MTU:65
[2]接收資料格式:<RxData> <RxData>接收到的資料 範例：當收到遠端透過 UUID FFF1 傳來字串: FGHIJ	FGHIJ
[3]接收資料 格式 2 (利用 UUID FFF4) <Port>:< RxData > < Port>：為藍芽連線埠號 <RxData>：接收到的資料 範例：當收到 Client 端透過 UUID FFF4 由連線埠 1 傳來字串: FGHIJ	1: FGHIJ
[4]傳送資料 <TxData> <TxData>:為要傳送的資料 範例：透過 UUID FFF4 傳送 ABCDE 傳送至藍芽連線埠 1 及 2 傳送字串: ABCDE	+1:OK +2:OK
[5]指定埠號傳送資料(指定藍芽連線埠傳送資料) <Port>><TxData> < Port>：為藍芽連線埠號 <TxData>：為要傳送的資料 範例：透過 UUID FFF4 傳送 ABCDE 到藍芽連線埠 2 傳送字串: ABCDE 2>ABCDE 於此模式下，TxData 數量不可超過 MTU size -5 例如 MTU 62 Bytes，則最大 TxData 數量為 60 (若包含 "enter"，"enter" 佔 2 個 Bytes)	+2:OK

20. **AT+CGMS?** 取軟體版本資訊

命令	回覆
AT+CGMS?	+CGMS=RYB080I_56312E30

21. 其他回覆訊息

敘述	回覆
RESET 後	+READY +ENTER=1

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

TOOLS

[1]協助下 AT Command 的終端機 Access Port 免費軟體請至此網址下載：http://www.sudt.com/en/ap/

ORDER INFORMATION

Ordering No.	Antenna
RYB080I	Internal
RYB080E	External

*如果需要透傳模式，請聯絡我們

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