



## 产品介绍

RYB080I 是符合蓝芽 4.2 与 5.0 超低耗电标准模块，可利用爱坦科技开发的 AT command，让产品快速与简易地连接智能型手机与各种蓝芽设备。

## 功能与特色

- 蓝芽 4.2 & 5.0 超低耗电标准
- TI CC2640R2F ARM®Cortex®-M3 工业级核心
- 可同时连接两个蓝芽装置
- 支援主从脚色
- SMD 超小型化带天线设计模块，面积 115.94mm<sup>2</sup>
- 防电磁干扰保护金属盖
- 2pins 完成数据收发与唤醒功能
- 容易使用的 AT command
- 标准 GATT

## 应用范围

- 智能型手机周边产品
- 各类蓝芽监控产品
- 家庭自动化
- 室内定位

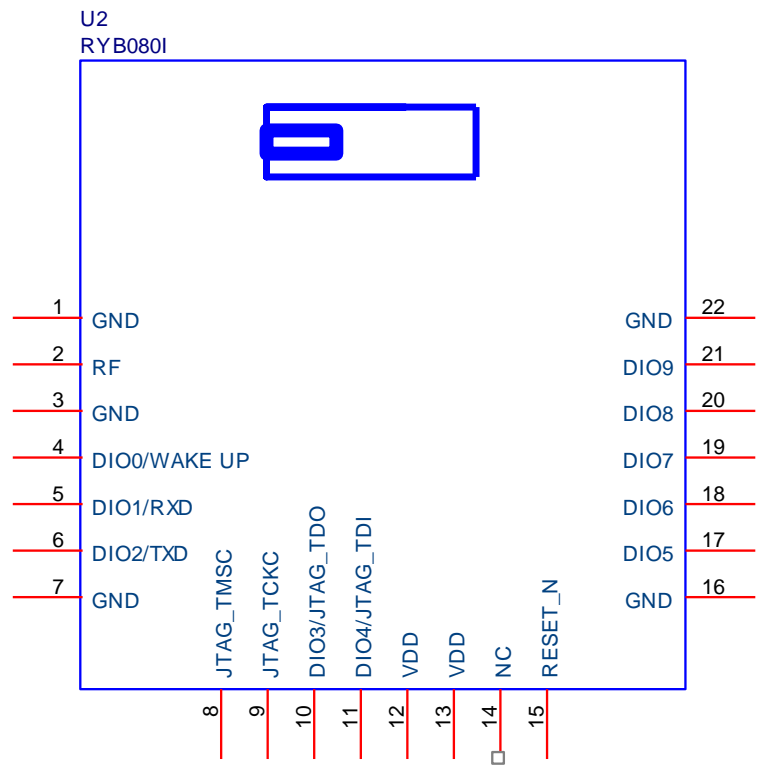
## 可符合法规

- FCC CFR47 Part 15 (US)
- NCC (Taiwan)
- MIC (Japan)

## SPECIFICATION

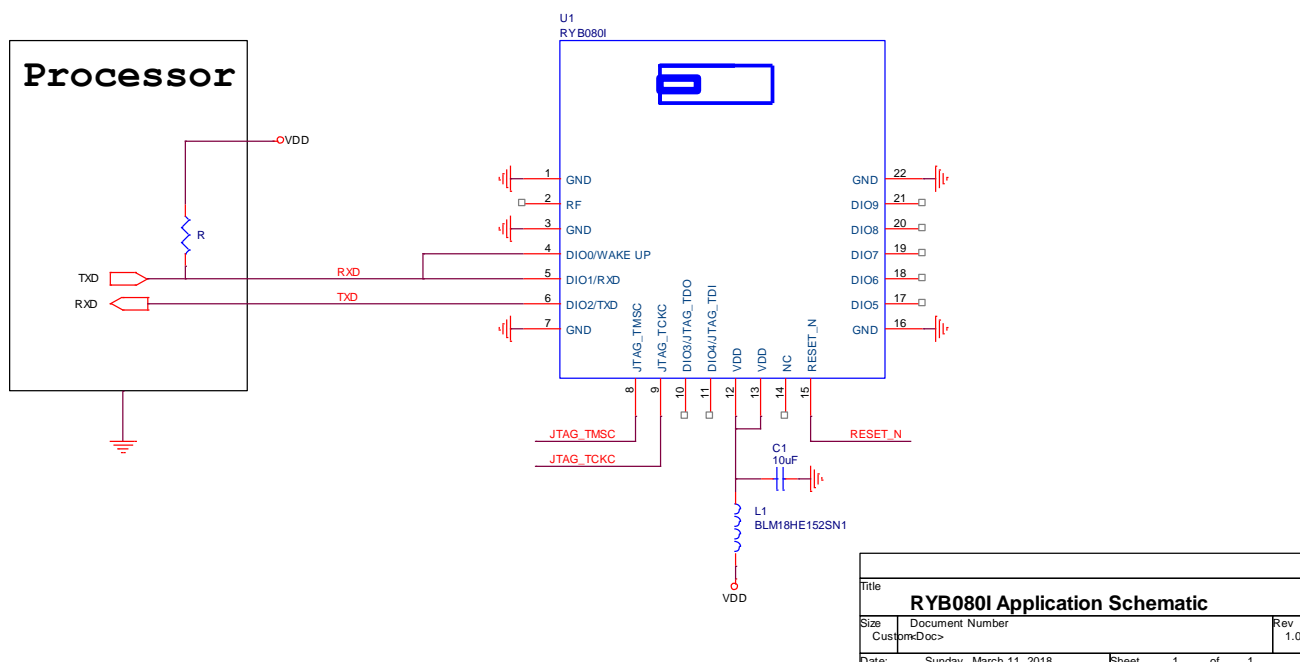
Item	Min.	Typical	Max.	Unit	Condition
Operation Voltage	1.8	3.0	3.8	V	VDD
RF Output Power	-21		5	dBm	
Active Current		1.5		mA	UART 功能可用，有 BLE 广播
Advertising Average Current		0.2		mA	100ms BLE 广播一次
Advertising Average Current		23		uA	1 秒 BLE 广播一次
Advertising Average Current		6		uA	10 秒 BLE 广播一次
Standby 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

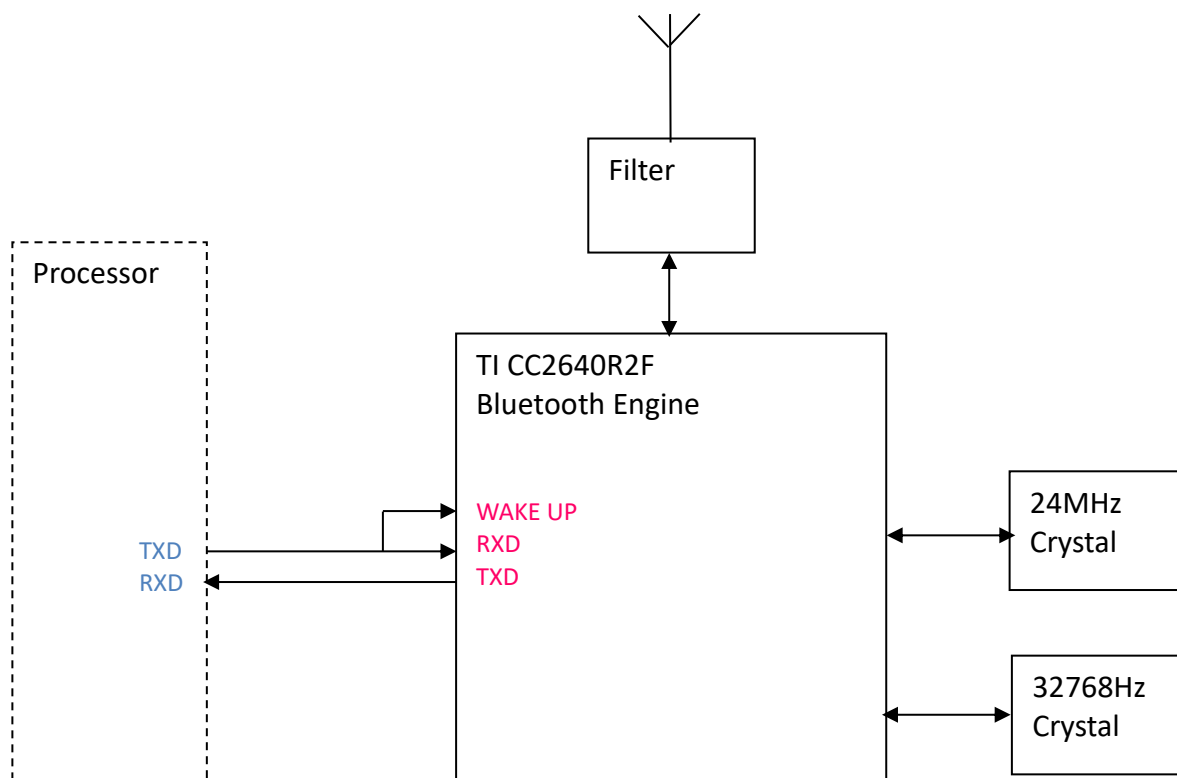


Pin	Name	I/O	Condition
1	GND	-	Ground
2	RF		External Antenna Version Used
3	GND	-	Ground
4	DIO0/WAKE UP	I	WAKE UP pin
5	DIO1/RXD	I	UART Data Input
6	DIO2/TXD	O	UART Data Output
7	GND	-	Ground
8	JTAG_TMSC	I/O	JTAG TMSC
9	JTAG_TCKC	I/O	JTAG TCKC
10	DIO3/JTAG_TDO	I/O	GPIO, High-drive capability, JTAG_TDO
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



# 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

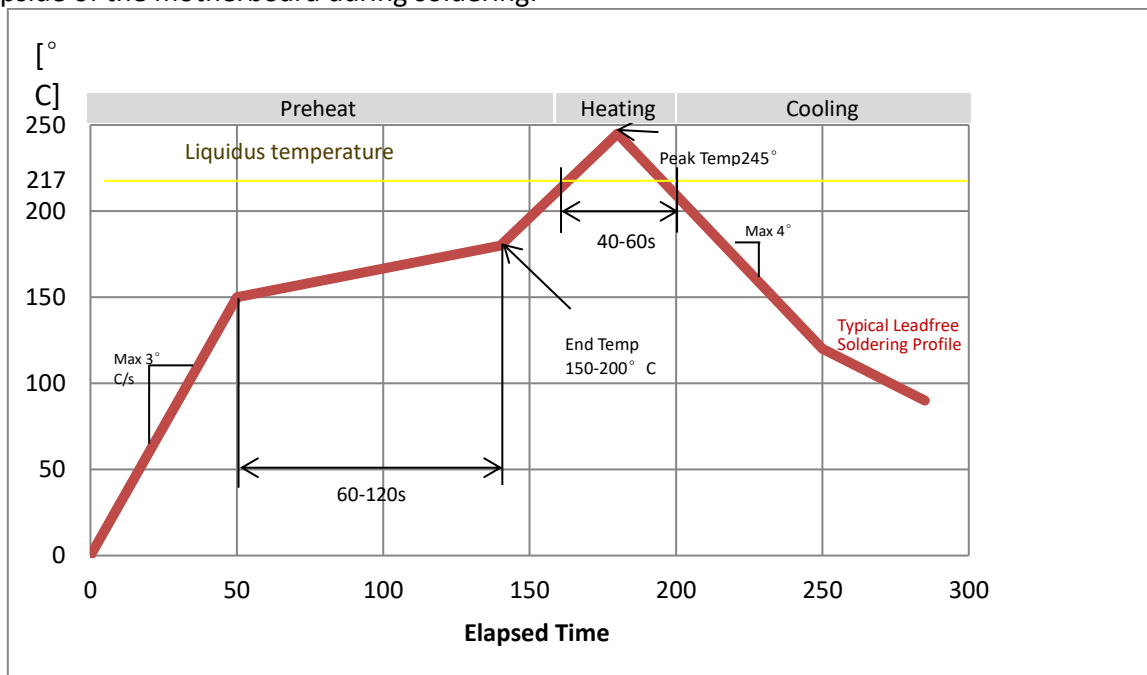
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- 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.

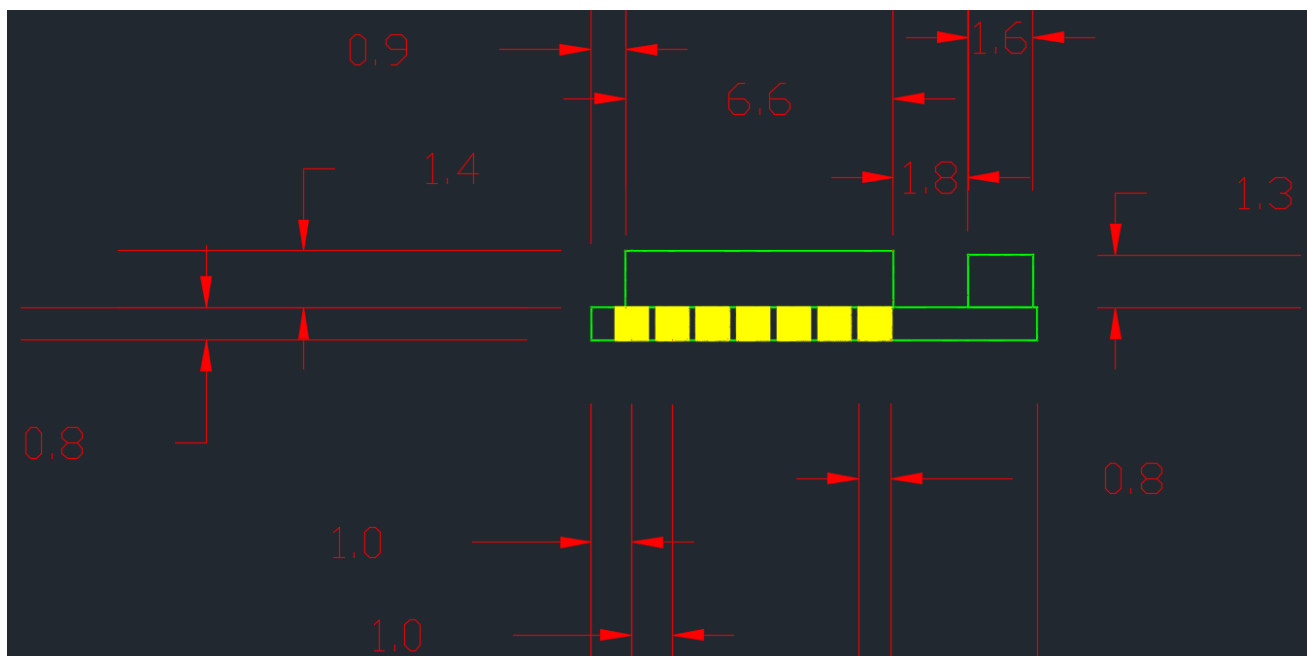
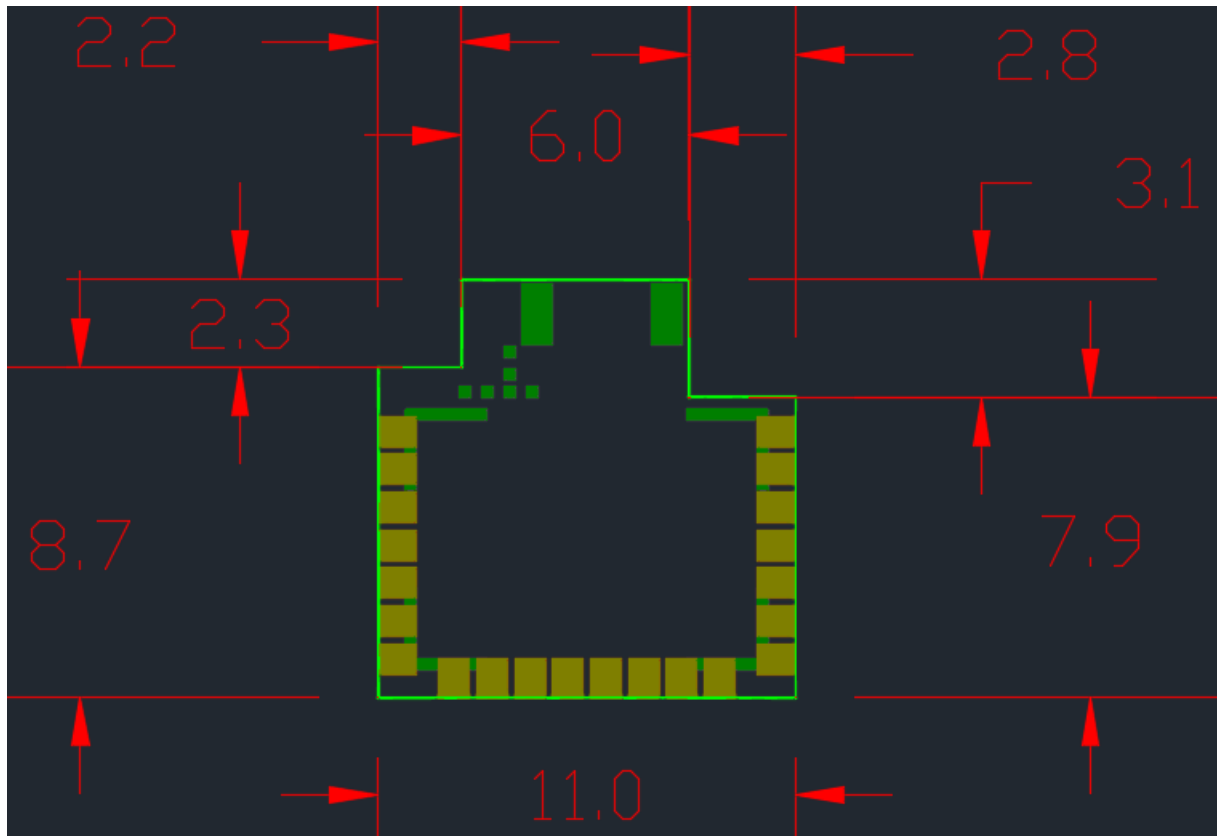
- Temperature fall rate: max 4 °C/s To avoid falling off, the REYAX module should be placed on the topside of the motherboard during soldering.



### Recommended soldering profile

\*Note: Does not support upside-down/bottom side reflow.

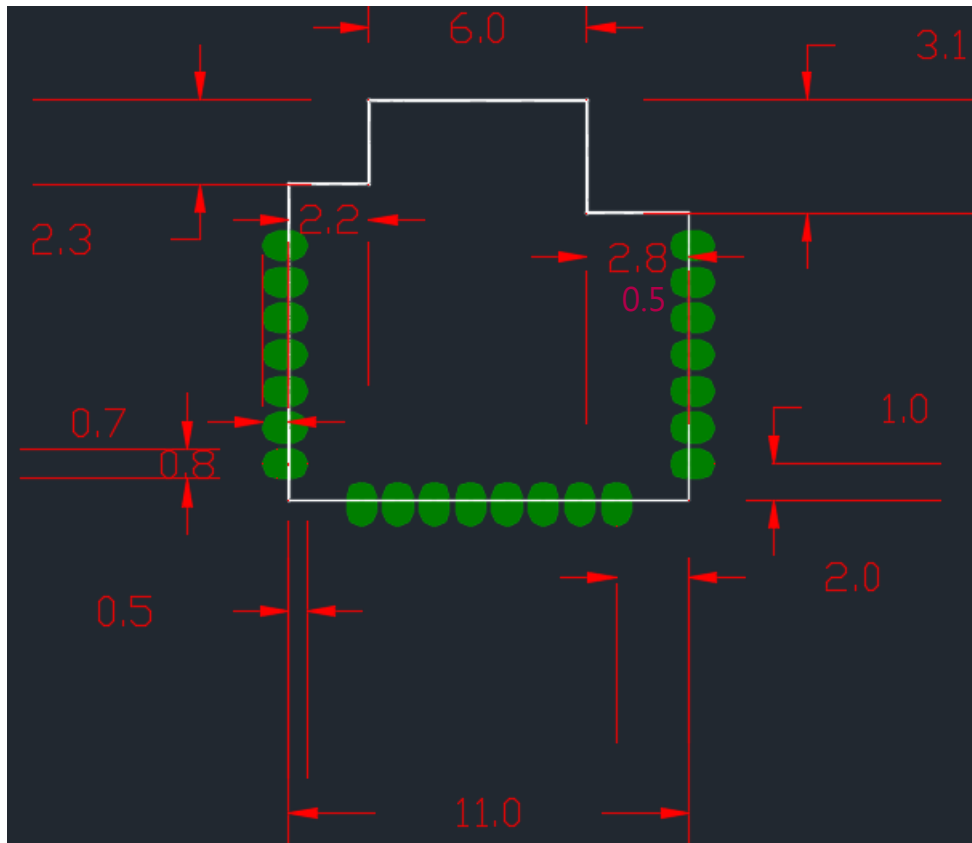
## DIMENSIONS



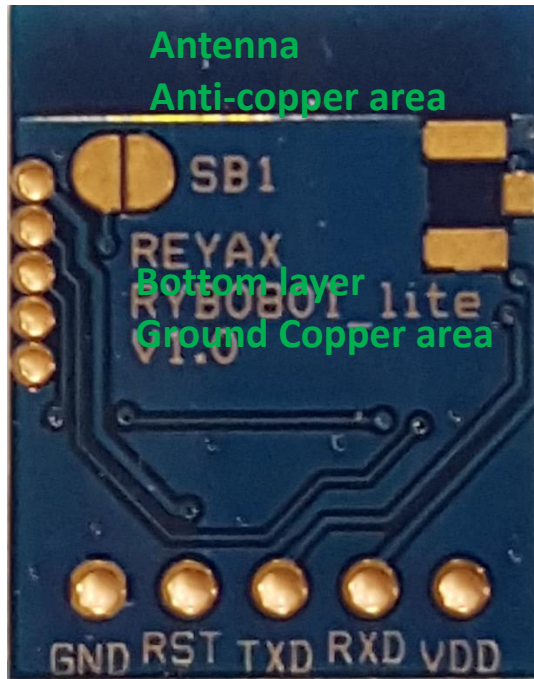
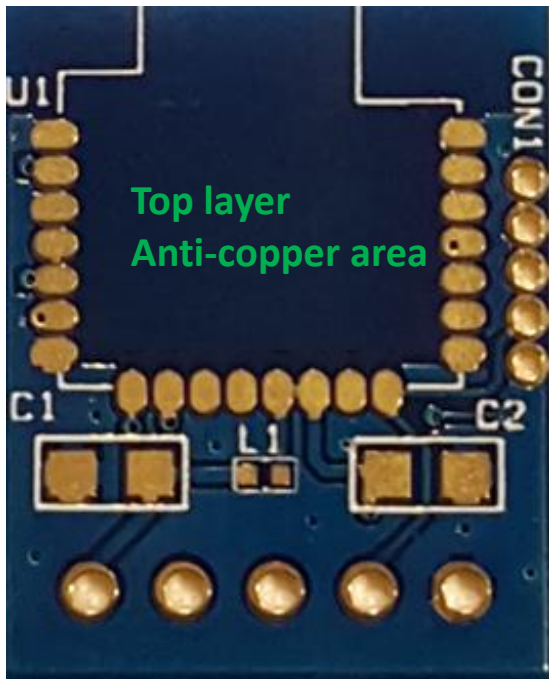
Unit : mm



# LAYOUT FOOTPRINT RECOMMENDATIONS



Unit : mm



## 认证信息

- **MIC Japan compliance**



上記のとおり、電波法第 38 条の 24 第 1 項の規定に基づく認証を行ったものであることを証する。

- **NCC Taiwan compliance**

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。



- **FCC compliance**

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.



## AT COMMAND

[1] RYB080I开机后处于低功耗广播模式，无法接收AT Command。当pin4 (WAKE UP)受到任何输入信号触发后(例如可以传送一字符 " A ")，UART接口被唤醒，RYB080I此时可以接收AT command，当UART接口5秒内没有收到任何指令时会再度进入低功耗广播的模式。此模式可以利用AT Command修改。

[2]出厂的默认值AT Command 结尾都需要加入“enter”或“\r\n” (0x0D 0x0A)，指令后面加“?”为询问目前设定值。

[3]RYB080I有两个蓝芽联机埠<Port>可以分别当作主HOST或从CLIENT角色。

[4]AT Command可以从RXD输入，结果由TXD输出。

[5]AT Command也可以在蓝芽连接后由无线输入，结果由TXD输出。

### 1. AT 测试模块响应

命令	回复
AT	+OK

### 2. 软件RESET

命令	回复
AT+RESET	+READY

### 3. AT+NAME 设定蓝芽模块广播名称

命令	回复
AT+NAME=<Name> <Name>最多 20 个 ASCII 字符 范例：设定蓝芽模块广播名称为 REYAX_BLE_RYB080I <b>AT+NAME=REYAX_BLE_RYB080I</b>  *设定完后需 RESET 才会生效 *设定完成会记忆在 Flash	+OK
AT+NAME?	+NAME= REYAX_BLE_RYB080I

#### 4. AT+ATTR设定蓝芽模块设备名称

命令	回复
<p>AT+ATTR=&lt;attribute&gt;</p> <p>&lt;attribute&gt;最多 20 个 ASCII 字符</p> <p>范例：设定蓝芽模块设备名称为 REYAX_BLE_RYB080I</p> <p>AT+ATTR=REYAX_BLE_RYB080I</p> <p>*设定完后需下 AT+RESET 或硬件 RESET 才会生效</p> <p>*某些 iOS APP 是用此名称来辨识蓝芽装置</p> <p>*设定完成会记忆在 Flash</p>	+OK
AT+ATTR?	+ATTR= REYAX_BLE_RYB080I

#### 5. AT+CRFOP 设定蓝芽模块广播发射功率

命令	回复
<p>AT+CRFOP=&lt;Power&gt;</p> <p>&lt;Power&gt;范围为 0 到 C</p> <p>0=-21dBm</p> <p>1=-18dBm</p> <p>2=-15dBm</p> <p>3=-12dBm</p> <p>4=-9dBm</p> <p>5=-6dBm</p> <p>6=-3dBm</p> <p>7=0dBm</p> <p>8=1dBm</p> <p>9=2dBm</p> <p>A=3dBm</p> <p>B=4dBm</p> <p>C=5dBm(默认值)</p> <p>范例：设定发射功率为-9dBm</p> <p>AT+CRFOP=4</p> <p>*设定完成会记忆在 Flash</p>	+OK
AT+CRFOP?	+CRFOP=4

## 6. AT+CNE 设定是否可被其他蓝芽装置连接

命令	回复
AT+CNE=<Connect> <Connect>为 RYB080I 是否可被联机 0：拒绝蓝芽联机 1：接受蓝芽联机 (默认值) 范例：设定拒绝蓝芽联机 AT+CNE=0 *设定完成会记忆在 Flash 并 Reset	+RESET!
AT+CNE?	+CNE=0

## 7. AT+PERIOD 设定蓝芽广播周期

命令	回复
AT+PERIOD =<Parameter> <Parameter>>范围 0 到 9 0:25ms 1:50ms 2:100ms (默认值) 3:200ms 4:500ms 5:1s 6:2s 7:3s 8:5s 9:10s 范例：设定每秒内蓝芽广播周期为 500ms AT+PERIOD=4 *设定完后需 RESET 才会生效 *设定完成会记忆在 Flash	+OK
AT+PERIOD?	+PERIOD=4

## 8. AT+PWMODE 设定省电管理模式

命令	回复
AT+PWMODE=<Mode> <Mode>为省电模式 0：全功能模式：UART 接口与蓝芽广播皆持续运作 1：标准省电模式：pin4 被触发后 UART 接口可以下达 AT Command，如果 pin4 5 秒内没有再触发就会进入纯广播模式(默认值) 2：休眠模式：标准省电模式下关闭蓝芽广播 3：自定义省电模式：自行设置蓝芽广播开启与关闭的循环时间 AT+PWMODE=3, <蓝芽广播开启秒数>, <蓝芽广播关闭秒数>，开启秒数与关闭秒数设定范围为<000~600>秒。 *请注意<蓝芽广播开启秒数>时间需大于等于蓝芽广播周期 范例：设定进入电源模式 3,开启 1 秒,关闭 20 秒持续循环。 AT+PWMODE=3,001,020	+OK
AT+PWMODE?	+ PWMODE=3

## 9. AT+CFUN 设定蓝芽广播开关

命令	回复
AT+CFUN=<Advertising> <Advertising>为蓝芽广播开关 0：蓝芽广播关闭 1：启动蓝芽广播模式 (开机默认值) 范例：设定蓝芽广播关闭 AT+CFUN=0	+OK
AT+CFUN?	+CFUN=0

## 10. AT+IPR 设定Baud Rate

命令	回复
AT+IPR=<Rate> <Rate>为 Baud Rate 4 : 9600 (出厂值) 5 : 19200 6 : 38400 7 : 57600 8 : 115200 范例：设定为 57600 · 设定完成会记忆并 RESET 模块 AT+IPR=7 *设定完后需 RESET 才会生效 *设定完成会记忆在 Flash	+OK
AT+IPR?	+IPR=7

\*Byte Size=8 · Parity=None · Stop Bits=1

## 11. AT+ADDR 询问MAC地址信息

命令	回复
AT+ADDR?	+ADDR=123456ABCDEF

## 12. AT+ENTER 设定每行指令结尾是否需要ENTER(0x0D 0x0A)

命令	回复
AT+ENTER=<Status> <Status>为每行指令结尾是否需要 ENTER(0x0D 0x0A) 0 : 不需要 1 : 需要 (出厂值) 范例：设定结尾不需要 ENTER(0x0D 0x0A) · AT+ENTER=0 *设定完成会记忆在 Flash	+OK
AT+ENTER?	+ENTER=0

### 13. AT+CONNECT? 询问联机状态

命令	回复
AT+CONNECT?	+CONNECT= <Port1>,<Port2>  <Port1>,<Port2>为两个蓝芽联机埠的状态 0: 没有任何联机 H: 联机中, 角色为 Host C: 联机中, 角色为 Client
AT+CONNECT?	+CONNECT=0,C

### 14. AT+SCAN 主机扫描附近的从机

命令	回复
AT+SCAN 范例: 扫描附近可链接从机	+..... +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +<NO.>,0x<MAC>,<rssi> +Found <Quantity>  <NO.>从机序号从 1~5 <MAC>MAC 地址信息 <rssi>从机功率 dBm <Quantity>找到从机的数量, 最大为 5 +..... +1:0x341513E481FA,BLE_MODULE ,- 46dBm +2:0x546C0E591BD2,BLE5_MODULE,- 31dBm +Found 2

### 15. AT+CON 主机以MAC地址连接从机

命令	回复
AT+CON=<MAC> <MAC>MAC 地址信息  范例: 主机连接 MAC 地址为 123456ABCDEF 的从机  AT+CON=123456ABCDEF	++++<Role> <Port> <Role>为 H 代表本身为 Host 脚色, C 代表本身为 Client 脚色 <Port>为蓝芽联机埠  ++++H1

\*适用爱坦蓝芽BLE产品



16. AT+CONT 主机以AT+SCAN序号连接从机

命令	回复
AT+CONT=<NO.> <NO.>从机序号从 1~8 范例：连接 AT+SCAN 结果序号为 2 的从机 AT+CONT=2	+++++<Role><Port> <Role>为 H 代表本身为 Host 脚色 · C 代表本身为 Client 脚色 <Port>为蓝芽联机埠 +++++H2

\*适用爱坦蓝芽BLE产品

17. AT+DCON 主动中断联机

命令	回复
AT+DCON=<Port> <Port>为蓝芽联机埠 0: 中断 Port1 & Port2 1: 中断 Port1 2: 中断 Port2 范例：蓝芽联机埠号 1 联机中断 AT+DCON=1	+-----<Role><Port> <Role>为 H 代表本身为 Host 脚色 · C 代表本身为 Client 脚色 <Port>为蓝芽联机埠 +-----H1

18. AT+GPIO 控制GPIO输出为High或Low

命令	回复
AT+GPIO=<GPIO NO.>, <H/L> < GPIO NO. > 范围为 5/6/7 <H/L>为 GPIO 输出的电压 0 代表 Low · 1 代表 High 范例：设定 GPIO 埠号 5 输出为 High AT+GPIO=5,1	+OK

## 19. 联机接收数据与接收传送数据

数据格式	回复
<p>[1]当与蓝芽装置建立联机后会显示 +++++&lt;Role&gt;&lt;Port&gt; +MTU:&lt;Data&gt; &lt;Role&gt;为 H 代表本身为 Host 脚色 · C 代表本身为 Client 脚色 &lt;Port&gt;联机埠编号 1 或 2 &lt;Data&gt;单一封包的 MAX 资料量(Byte) 范例：联机埠 1 建立联机 · 脚色是 Client · 单一封包可传送的数据量为 62Bytes (MTU-3)</p>	<p>+++++C1 +MTU:65</p>
<p>[2]接收数据格式:&lt;RxData&gt; &lt;RxData&gt;接收到的数据 范例：当收到远程透过 UUID FFF1 传来字符串: FGHIJ</p>	<p>FGHIJ</p>
<p>[3]接收数据 格式 2 (利用 UUID FFF4) &lt;Port&gt;:&lt; RxData &gt; &lt; Port&gt;: 为蓝芽联机埠号 &lt;RxData&gt;: 接收到的数据 范例：当收到 Client 端透过 UUID FFF4 由联机端口 1 传来字符串: FGHIJ</p>	<p>1: FGHIJ</p>
<p>[4]传送数据 &lt;TxData&gt; &lt;TxData&gt;:为要传送的数据 范例：透过 UUID FFF4 传送 ABCDE 传送至蓝芽联机端口 1 及 2 传送字符串: ABCDE</p>	<p>+1:OK +2:OK</p>
<p>[5]指定端口号传送数据(指定蓝芽联机端口传送数据) &lt;Port&gt;&gt;&lt;TxData&gt; &lt; Port&gt;: 为蓝芽联机埠号 &lt;TxData&gt;: 为要传送的数据 范例：透过 UUID FFF4 传送 ABCDE 到蓝芽联机端口 2 传送字符串: ABCDE 2&gt;ABCDE 于此模式下 · TxData 数量不可超过 MTU size -5 例如 MTU 62 Bytes · 则最大 TxData 数量为 60 (若包含 "enter" , "enter" 占 2 个 Bytes)</p>	<p>+2:OK</p>

20. AT+CGMS? 取软件版本信息

命令	回复
AT+CGMS?	+CGMS=RVB080I_56312E30

21. 其他回复讯息

叙述	回复
RESET 后	+READY +ENTER=1

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

## TOOLS

[1]协助下 AT Command 的终端机 Access Port 免费软件请至此网址下载：<http://www.sudt.com/en/ap/>

## ORDER INFORMATION

Ordering No.	Antenna
RVB080I	Internal
RVB080E	External

\*如果需要透传模式，请联系我们



E-mail : [sales@reyax.com](mailto:sales@reyax.com)  
 Website : <http://reyax.com>