

HF-LPT262

2.4GWi-Fi6+BLE+SLE Module

User Manual V1.33



Overview of Characteristic

- ◇ Support 2.4G Wi-Fi6 IEEE802.11b/g/n/ax, BLE5.4, SLE1.0 Wireless Standards
- ◇ Based on Andes RISC SOC, 240MHz CPU, 606KB RAM, 4MB Flash
- ◇ Support UART Data Communication with Wi-Fi or BLE
- ◇ Support Wi-Fi STA/AP/AP+STA Mode
- ◇ Support BLE SmartBLELink Config
- ◇ Support Wi-Fi AP SmartAPLink
- ◇ Support Wireless and Remote Firmware Upgrade Function
- ◇ Support Software SDK for Develop
- ◇ Support Different Antenna Option
 - HF-LPT262-1G: Internal PCB
 - HF-LPT262-0G: External 1st IPEX
 - HF-LPT262-0G: Antenna Pad Out
- ◇ Single +3.3V Power Supply
- ◇ Size:
 - 22±0.2mm x 13.5±0.2mm x 3±0.2mm, SMT21 package

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HISTORY

Ed. V1.0	2024-02-26	First Version.
Ed. V1.1	2024-04-26	Update some error description
Ed. V1.2	2024-08-09	Add external antenna type
Ed. V1.21	2024-08-29	Update module size information
Ed. V1.22	2024-09-10	Update nlink, nReload PIN number error
Ed. V1.23	2024-11-13	Update module height.
Ed. V1.24	2024-11-14	Update module PCB antenna name.
Ed. V1.25	2024-11-21	Update appearance.
Ed. V1.26	2025-01-23	Update module size information, Update module name
Ed. V1.27	2025-03-11	Add pull-up resistor requirement for UART RX
Ed. V1.30	2025-05-15	Update GPIO limit
Ed. V1.31	2025-07-03	Add HF-LPT262-1G type
Ed. V1.33	2025-10-09	Update PINs map

1. PRODUCT OVERVIEW

1.1. General Description

The HF-LPT262 module is a fully self-contained small form-factor, single stream, 802.11b/g/n Wi-Fi + BLE module, which provide a wireless interface to any equipment with a Serial interface for data transfer. This module integrate MAC, baseband processor, RF transceiver with power amplifier in hardware and all Wi-Fi protocol and configuration functionality and networking stack, in embedded firmware to make a fully self-contained 802.11b/g/n Wi-Fi, BLE and SLE solution for a variety of applications.

The HF-LPT262 module employs the world's lowest power consumption embedded architecture. It has been optimized for all kinds of client applications in the home automation, smart grid, handheld device, personal medical application and industrial control that have lower data rates, and transmit or receive data on an infrequent basis.

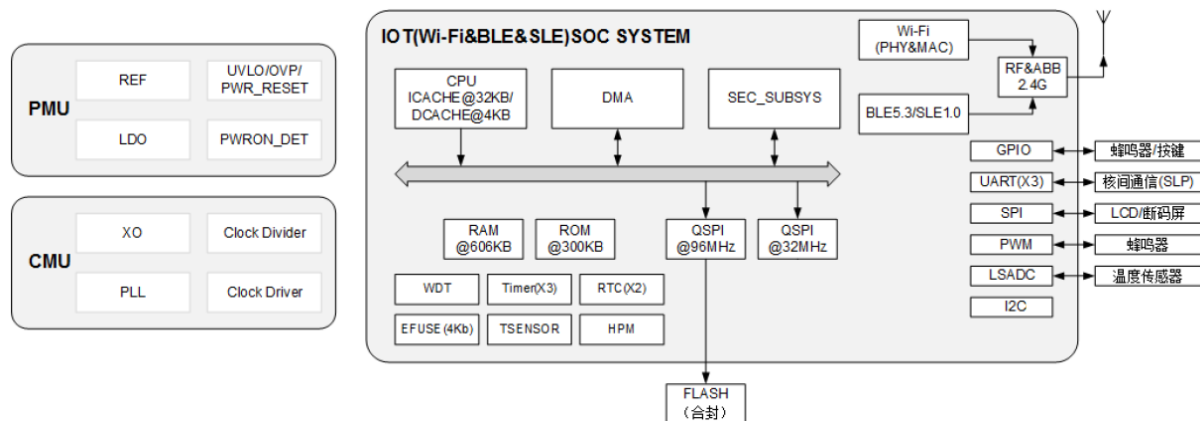


Figure 1. SOC Chip system

1.1.1 Key Application

- Remote equipment monitoring
- Asset tracking and telemetry
- Security
- Industrial sensors and controls
- Home automation
- Medical devices

1.1.2 Device Parameters

Table1. HF-LPT262 Module Technical Specifications

Class	Item	Parameters
	Wireless standard	802.11 b/g/n/ax

	Frequency range	2.412GHz-2.472GHz (CH1~CH13)
	Transmit Power	802.11b: +17dBm $\pm$ 1dBm (@11Mbps)
		802.11g: +15dBm $\pm$ 1dBm (@54Mbps)
		802.11n: +15dBm $\pm$ 1dBm (@HT20, MCS7)
		802.11n: +15dBm $\pm$ 1dBm (@HT40, MCS7)
		802.11ax: +15dBm $\pm$ 1dBm (@HT20, MCS7)
	Receiver Sensitivity	802.11b: $\leq$ -97dBm (@1Mbps)
		802.11b: $\leq$ -90dBm (@11Mbps)
		802.11g: $\leq$ -92.5dBm (@6Mbps)
		802.11g: $\leq$ -75.5dBm (@54Mbps)
		802.11n: $\leq$ -93dBm (@HT20 MCS0)
		802.11n: $\leq$ -73dBm (@HT20 MCS7)
		802.11n: $\leq$ -90dBm (@HT40 MCS7)
		802.11n: $\leq$ -70 dBm (@HT40 MCS7)
		802.11ax: $\leq$ -92 dBm (@HE20 MCS0)
BLE Parameters	Wireless standard	BLE5.4
	Frequency range	2.402GHz-2.480GHz
	Transmit Power	$\geq$ 14dBm
	Receiver Sensitivity	$\leq$ -97 dBm@1M $\leq$ -94 dBm@2M
SLE Parameters	Wireless standard	SLE 1.0
	Frequency range	2.402GHz-2.480GHz
	Transmit Power	$\geq$ 14dBm@1M GFSK
	Receiver Sensitivity	$\leq$ -96.5 dBm@1M GFSK
Hardware Parameters	Antenna	Internal: PCB antenna External: 1 st IPEX antenna or PAD out
	Interface	UART GPIO, SPI, PWM, ADC, I2C
	GPIO Driver Ability	Source and Sink Current: 3mA (GND+0.3V/VCC-0.3V)
	Operating Voltage	3~3.6V
	Operating Current	Peak (1ms for every 100ms): <350mA Average (STA): 70mA Average (AP): 70mA
	Operating Temp.	-40℃ - 85℃
	Storage Temp.	-40℃ - 125℃
	Humidity	<85%
	MSL	Level 3
	Dimensions and Size	22 $\pm$ 0.2mm x 13.5 $\pm$ 0.2mm x 3 $\pm$ 0.2mm
Software Parameters	Network Type	STA/AP/APSTA
	Security Mechanisms	WEP/WPA-PSK/WPA2-PSK/WPA3-SAE
	Encryption	WEP64/WEP128/TKIP/AES
	Update Firmware	Local Wireless, Remote OTA
	Customization	Support SDK for application develop
	Network Protocol	IPv4, TCP/UDP/HTTP/TLS 1.2
	User Configuration	AT+instruction set. SmartBLELink BLE Config SmartAPLink AP Config

1.2. Hardware Introduction

HF-LPT262 Wi-Fi module appearance is as following.



Figure 2. HF-LPT262-1G Appearance



Figure 3. HF-LPT262-0G Appearance

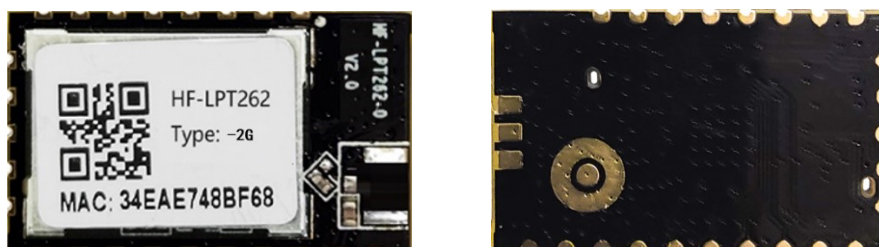


Figure 4. HF-LPT262-2G Appearance

1.2.1. HF-LPT262 Pins Definition

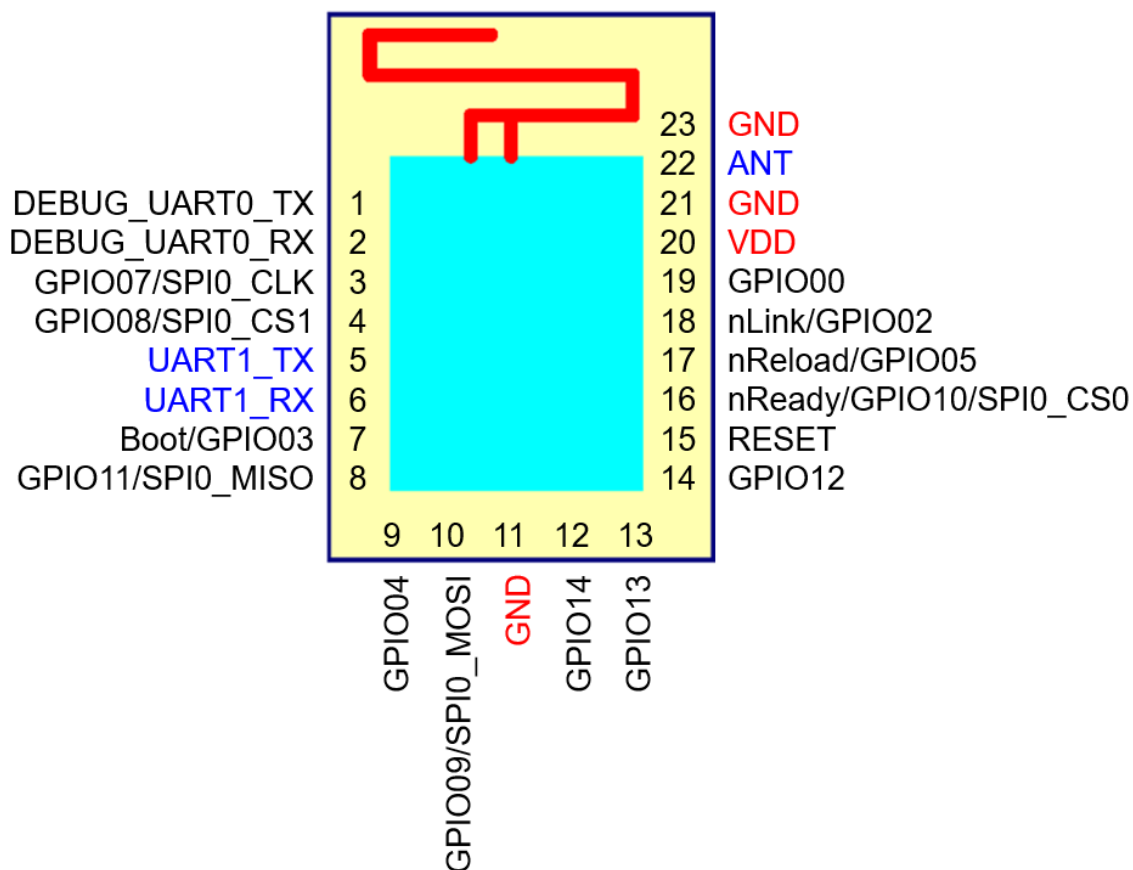


Figure 5. HF-LPT262 Pins Map

Table2. HF-LPT262 Pins Definition

Pin	Description	Net Name	Signal Type	Comments
1		DEBUG_UART0_TX	O	3.3V TTL UART Debug Output Internal 2.2K pull-up resistor
2		DEBUG_UART0_RX	I	3.3V TTL UART Debug Input Need external pull-up resistor
3	UART1_RTS	GPIO07	O	used as RTS when enable flow control
4	UART1_CTS	GPIO08	I	used as CTS when enable flow control
5	UART1_TX	UART1_TX	O	3.3V TTL UART1 Communication Output Internal 2.2K pull-up resistor
6	UART1_RX	UART1_RX	I	3.3V TTL UART1 Communication Input Need external pull-up resistor
7	Boot	GPIO03	IPD	Default pull-down, boot Select: Low: boot from soc internal flash High: boot from Debug UART, used for program flash firmware. This pin is used for HF factory program, user just keep it unconnected.
8		GPIO11	IO	

Pin	Description	Net Name	Signal Type	Comments
9		GPIO04	IO	
10		GPIO09	IO	
12		GPIO14	IO	
13		GPIO13	IO	
14		GPIO12	IO	
15	Module Reset	RESET	I,PU	“Low” effective reset input. There is RC reset circuit internally. No need of external RC reset circuit.
16	Module Boot Up Indicator	nReady	O	“0” – Boot-up OK; “1” – Boot-up Fail; GPIO10
17	Multi-Function	nReload	I,PU	Detailed functions see <Notes> GPIO5
18	Wi-Fi Status	nLink	O	“0” – Wi-Fi connect to router “1” – Wi-Fi unconncted; Detailed functions see <Notes> GPIO2
19		GPIO00	IO	
20	+3.3V Power	VDD	Power	
11,21	Ground	GND	Power	
22		ANT	Signal	Only -0 and -2 have these two pins Antenna Pad Out. See following for detailed.
23	Ground	GND	Power	

- -0 use external IPEX antenna, PIN22 is useless.
- -2 use PIN22 antenna PAD out
- -PAD use the back for antenna, see as following picture.

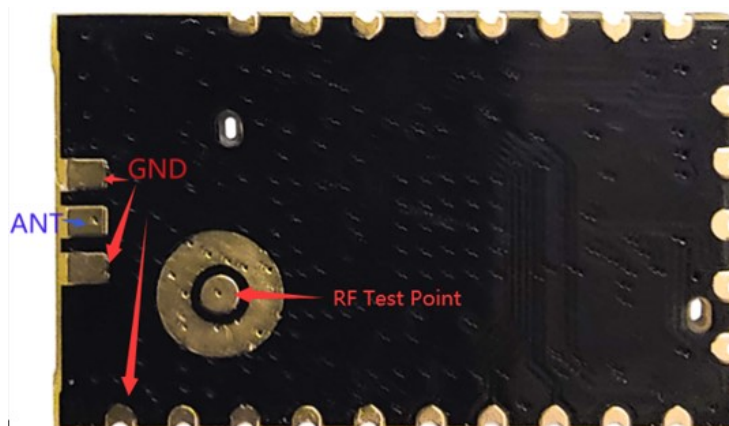


Table3. HF-LPT262-PAD Antenna Out

Table4. Pin GPIO mapping

	UART	I2C	PWM	SPI	ADC	其他1	其他2	备注
GPIO00			PWM0	SPI1_CS		TDI		SPI1只能做主机
GPIO01			PWM1	SPI1_IO0/SQ				启动脚，禁止加上拉 模块为未引出
GPIO02			PWM2	SPI1_IO3				
GPIO03			PWM3	SPI1_IO1/SI				上电时 低电平：正常启动（默认28K下拉） 高电平：进烧录模式
GPIO04			PWM4	SPI1_IO1/SI（推荐使用）		JTAG_ENABLE 硬件配置字	POWER_CTRL	上电时 低电平：普通GPIO 高电平：JTAG功能
GPIO05	UART2_CTS		PWM5	SPI0_IN SPI1_IO2				
GPIO06	UART2_RTS		PWM6	SPI0_OUT SPI1_SCK		REFCLK_FREQ_STATUS 硬件配置字		模块为未引出 上电时低电平：40MHz晶振（必须低） 高电平：24MHz晶振
GPIO07	UART2_RXD		PWM7	SPI0_SCK	ADC0	I2S_MCLK		
GPIO08	UART2_TXD		PWM0	SPI0_CS1	ADC1			
GPIO09			PWM1	SPI0_OUT	ADC2	I2S_DO/TDO	RADAR_ANT0_SW	启动脚，启动时不能与GPIO11同为高
GPIO10			PWM2	SPI0_CS0	ADC3	I2S_SCLK	ANT0_SW	
GPIO11			PWM3	SPI0_IN	ADC4	I2S_LRCLK	RADAR_ANT1_SW	启动脚，启动时不能与GPIO09同为高
GPIO12			PWM4		ADC5	I2S_DI	ANT1_SW	启动后内部boot会开输入上拉，持续80ms后关闭上拉
GPIO13	UART1_CTS					TMS/SWD	RADAR_ANT0_SW	启动后内部boot会开输入上拉，持续80ms后关闭上拉
GPIO14	UART1_RTS					TCK/SWC	RADAR_ANT1_SW	
UART1_TX	通讯串口	I2C1_SDA						
UART1_RX		I2C1_SCL						
UART0_TX	烧录调试串口	I2C0_SDA						
UART0_RX	支持5V	I2C0_SCL						

Table5. Boot GPIO limit

芯片启动GPIO初始状态限制一览表		
信号名	管脚电平	芯片工作模式
GPIO01	0	正常启动
	1	禁止
GPIO03	0	正常启动
	1	进烧录模式
GPIO04	0	正常启动
	1	使能JTAG调试接口
GPIO06	0	时钟选择40MHz
	1	时钟选择24MHz
GPIO09:GPIO11	0:0	正常工作
	0:1	正常工作
	1:0	正常工作
	1:1	禁止

<Notes>

I — Input; O — Output

PU—Internal Resistor Pull Up; I/O: Digital I/O; Power—Power Supply

nReload Pin (Button) function:

- When this pin is set to “low” during module boot up, the module will enter wireless firmware and config upgrade mode. This mode is used for customer manufacture. See Appendix to download software tools for customer batch configuration and upgrade firmware during mass production.
- After module is powered up, short press this button (0.2s < “Low” < 1.5s) and loose to make the module go into SmartBLELink and SmartAPLink config mode, waiting for APP to set router SSID and password, config module connect to router. **Recommend to use SmartBleLink BLE method config.**
See Appendix to download SmartBLELink and SmartAPLink APP
- After module is powered up, long press this button (“Low” > 4s) and loose to make the module recover to factory setting.

High-Flying strongly suggest customer fan out this pin to connector or button for “Manufacture” upgrade or “SmartLink” application.

nReady Pin (LED) function(Low effective):

1. OS initial finished indicator. Only after this pin output low, can the UART function be used.

nLink Pin (LED) function(Low effective):

1. At wireless firmware and config upgrade mode , this LED used to indicate configure and upgrade status.
2. At SmartAPLink and SmartBLELink config mode, this LED is used to indicate APP to finish setting.
3. At normal mode, it's Wi-Fi link status indicator. Output Low when STA mode connect to router AP or other STA connect to it when in AP mode.

High-Flying strongly suggest customer fan out this pin to LED.

Debug UART:

1. Is used for debug log or firmware program, baud rate 115200.

1.2.2. Electrical Characteristics

Table6. Absolute Maximum Ratings:

Parameter	Condition	Min.	Typ.	Max.	Unit
Maximum soldering temperature	IPC/JEDEC J-STD-020			260	°C
ESD (Human Body Model HBM)	TAMB=25°C			4	KV
ESD (CDM)	TAMB=25°C			0.5	KV

1.2.3. HF-LPT262 Mechanical Size

HF-LPT262 modules physical size (Unit: mm) as follows:

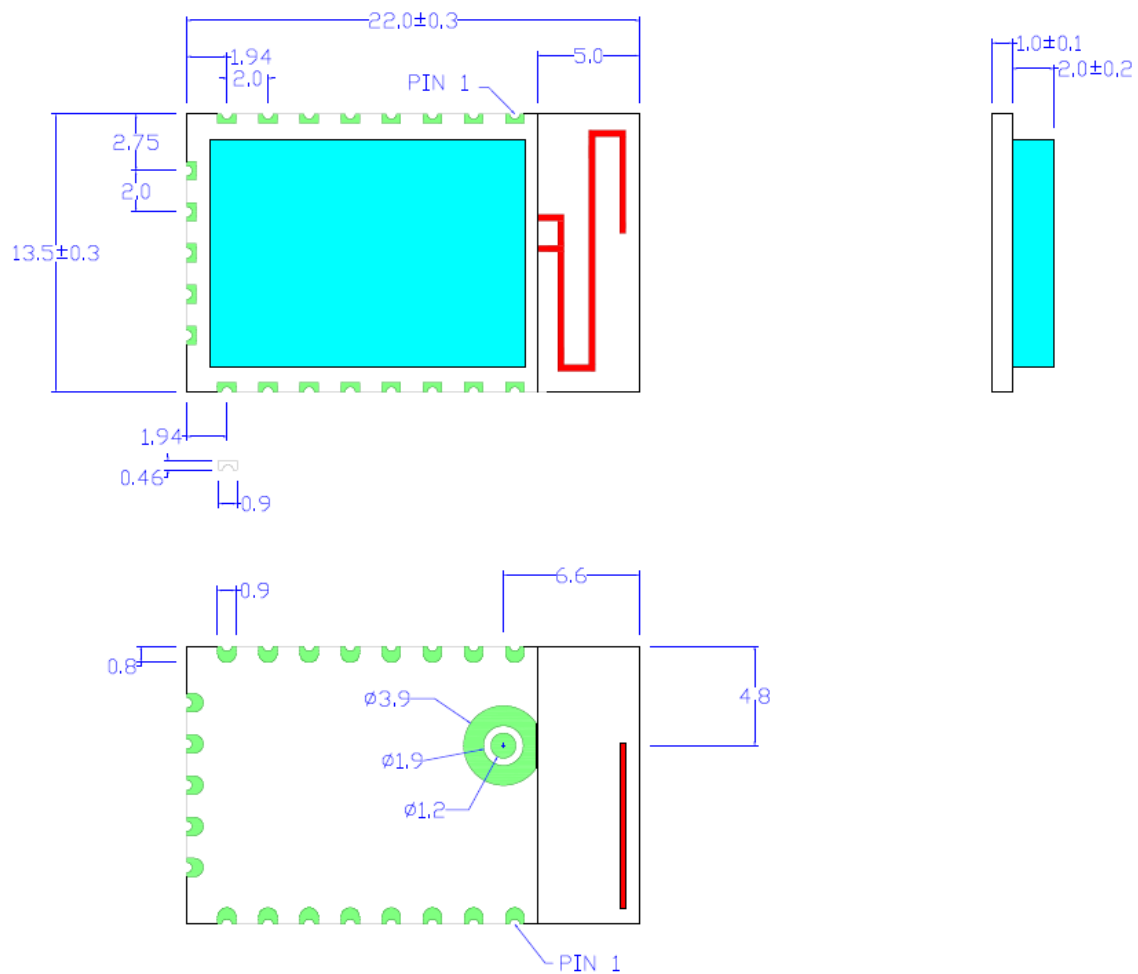


Figure 6. HF-LPT262-G Mechanical Dimension

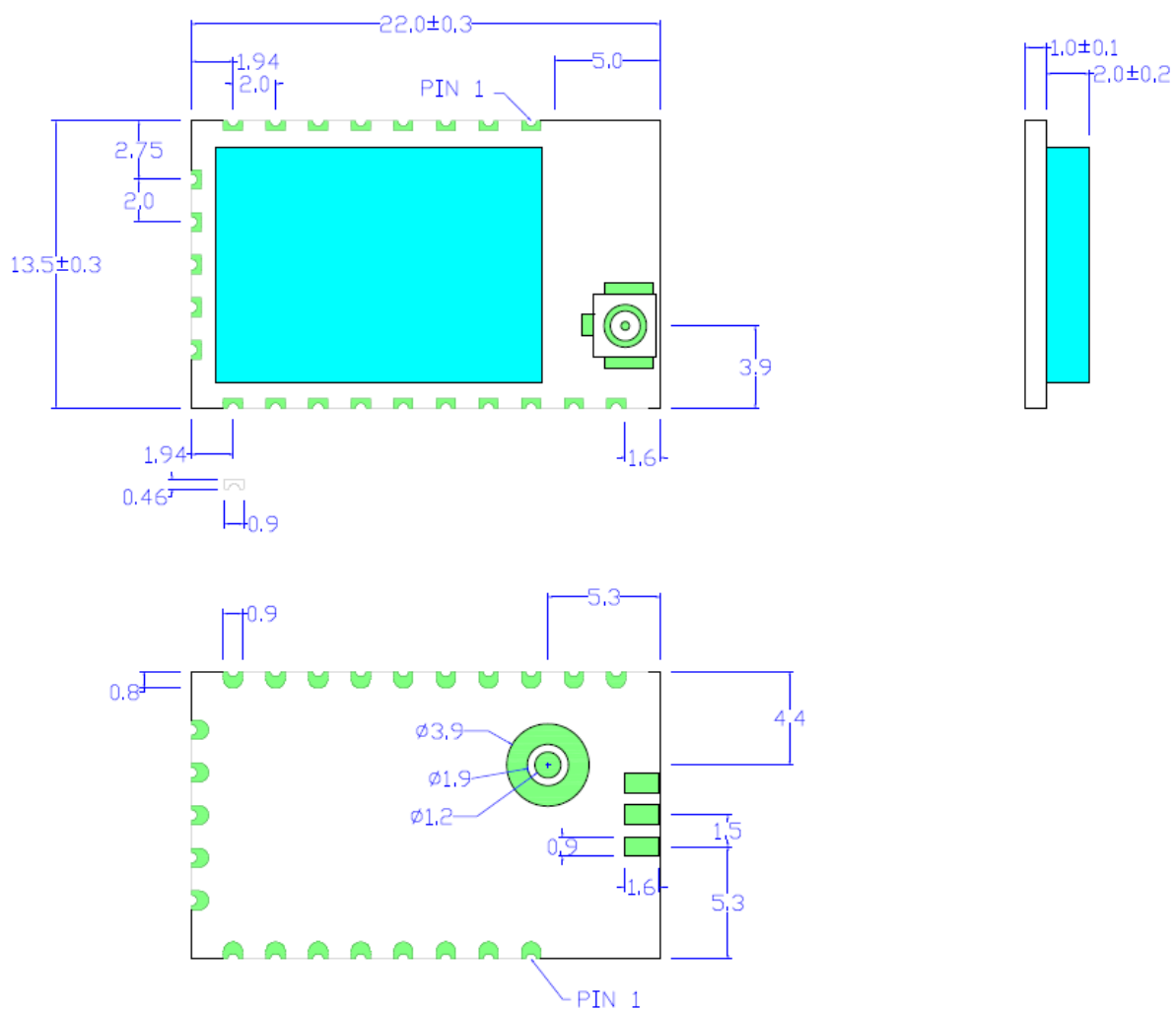


Figure 7. HF-LPT262-0G/2G Mechanical Dimension

1.2.4. On-board Chip Antenna

HF modules support internal on-board chip antenna option. When customer select internal antenna, you shall comply with following antenna design rules and module location suggestions:

- For customer PCB, module antenna area can't put componet or paste GND net;(See the following red arrow area)
- Antenna must away from metal or high components at least 16mm;
- Antenna can't be shieldedby any meal enclosure; All cover, include plastic, shall away from antenna at least 16mm;

High-Flying suggest module better locate in following region at customer board, which to reduce the effect to antenna and wireless signal, and better consult High-Flying technical people when you structure your module placement and PCB layout.

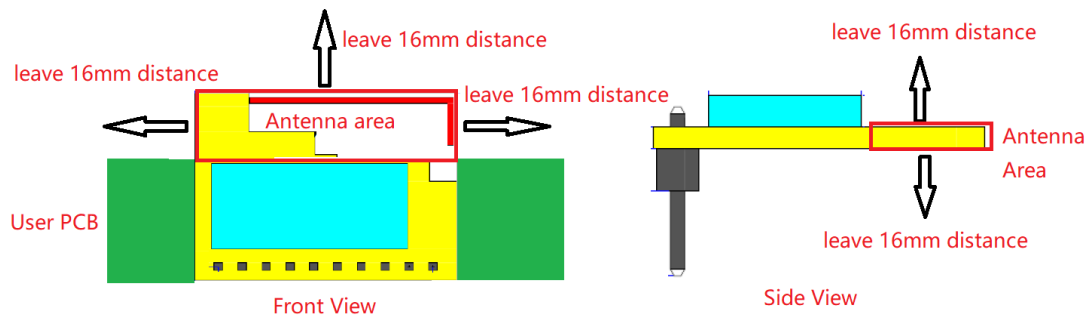


Figure 8. Suggested Module Placement Region

1.2.5. Evaluation Kit

High-Flying provides the EVK to promote user to familiar the product and develop the detailed application. The evaluation kit shown as below, user can connect to module with the RS-232 UART, USB (Internal USB to UART convetor) or Wireless interface to configure the parameters, manage the module or do the some functional tests.

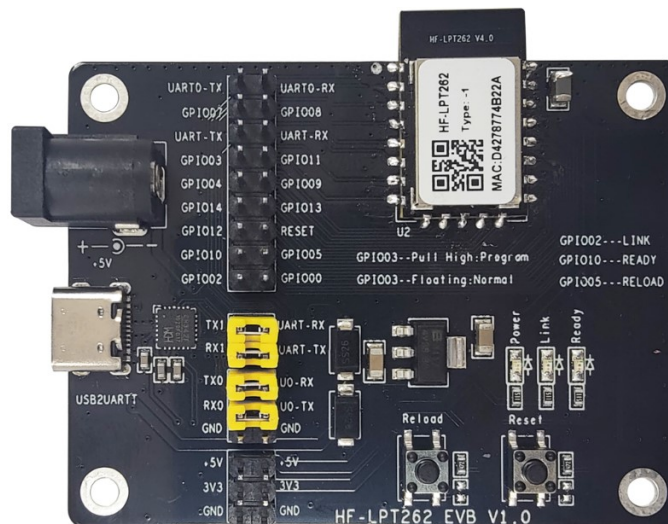


Figure 9. HF-LPT62X0 EVK

Notes: User need download USB to UART port driver from High-Flying web or contact with technical support people for more detail.

The external interface description for evaluation kit as follows:

Table7. Evaluation Kit Interface Description

Function	Name	Description
External Interface	DATA_UART	Power In and communication UART2 port.
	DEBUG_UART	Power In and debug UART port, baud rate 115200
	DC	DC jack for power in, 5V input. When USB power supply is not enough, may use external adapter.
LED	Power	Power LED
	Ready	nReady LED
	Link	nLink LED
Button	Reload	Smart Config and Restore factory default configuration.
	Reset	Reboot module

1.2.6. Order Information

Base on customer detailed requirement, modules provide different variants and physical type for detailed application.

标记★红色为主流型号										
型号	功能	天线类型	封装	PIN脚数	GPIO数	尺寸	输入电压	产品类别	串口电平	串口数
HF-LPT262-1G		内置PCB	SMT贴片	21	13	22.5 x 13.5 x 3mm	3.3VDC	Wi-Fi6&BLE	3.3V TTL	1通讯+1调试
HF-LPT262-0G		外置1代IPEX		23						
HF-LPT262-2G		外置引脚焊盘		23						

Figure 10. Order Information

1.2.7. Hardware Typical Application

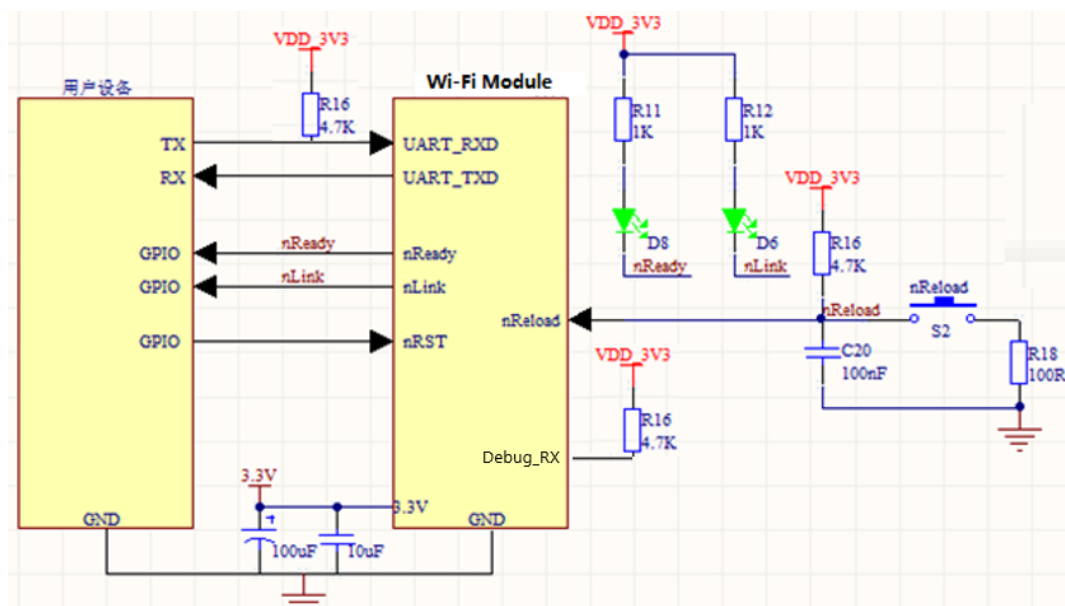


Figure 11. HF-LPT262 Hardware Typical Application

Notes:

nReset- Module hardware reset signal. Input. Logics “0” effective.

There is pull-up resistor internal and no external pull-up required. If need reset, set low at least 10ms and then set high.

nLink- Module WIFI connection status indication. Output.

(This pin is recommend to connect to LED, indicate status when the module in wireless upgrade mode)

When module connects to AP (AP associated), this pin will output “0”. This signal used to judge if module already at WiFi connection status. There is pull-up resistor internal and no external pull-up required. If nLink function not required, can leave this pin open.

nReady- Module boot up ready signal. Output. Logics “0” effective.

The module will output “0” after normal boot up. This signal used to judge if module finish boot up and ready for application or working at normal mode. If nReady function not required, can leave this pin open.

nReload- Module restore to factory default configuration. Input. Logics “0” effective.

(This pin is recommend to connect to button, is used to enter wireless upgrade mode)

User can de-assert nReload signal “0” more than 4s through button or MCU pin, then release, module will restore to factory default configuration and re-start boot up process.. If nReload function not required, can leave this pin open.

UART0_TXD/RXD- UART port data transmit and receive signal. **Need external pull-up resistor**
Debug_RX need external pull-up resistor

2. SMT INFORMATION

2.1. Recommended Reflow Profile

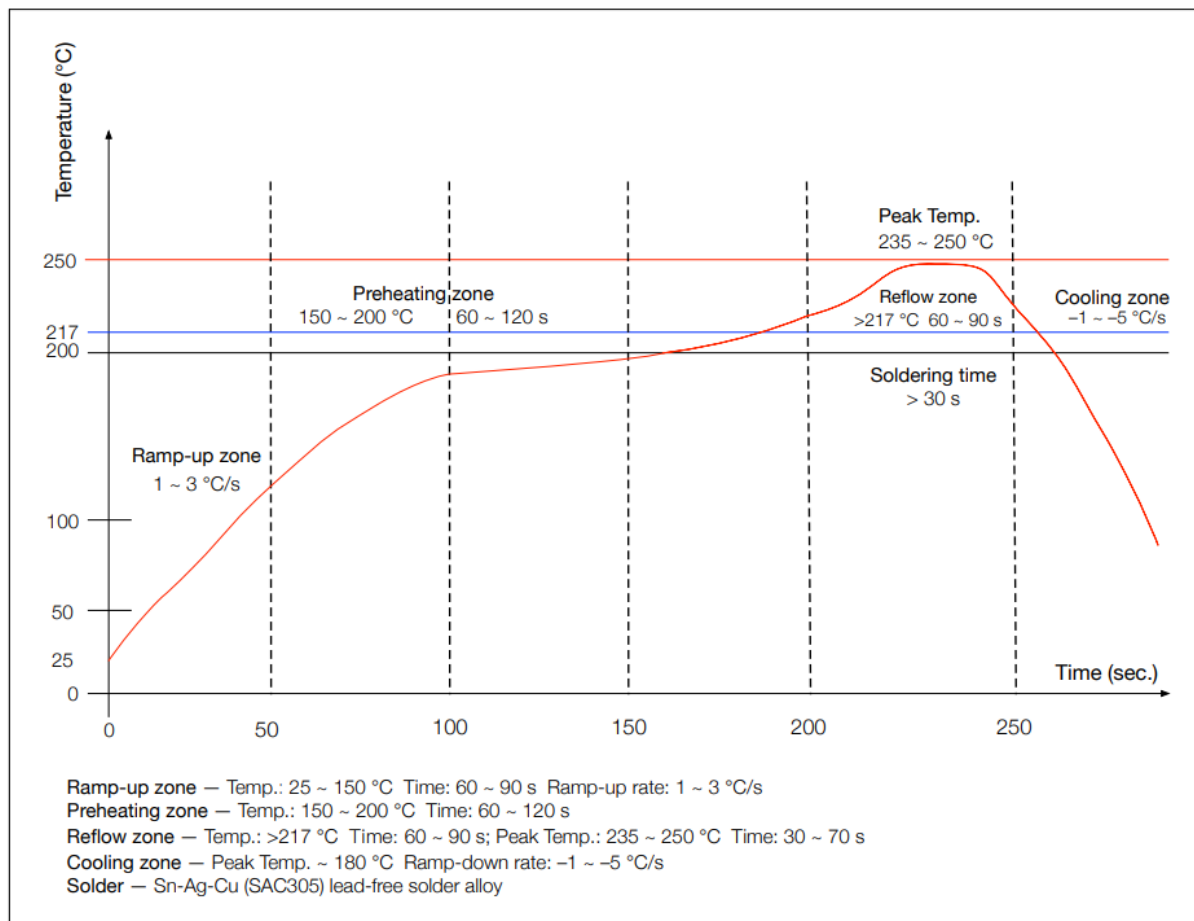


Figure 12. Reflow Soldering Profile

2.2. Device Handling Instruction (Module IC SMT Preparation)

1. Shelf life in sealed bag: 12 months, at <30°C and <60% relative humidity (RH)
2. After bag is opened, devices that will be re-baked required after last baked with window time 168 hours.
3. Recommend to oven bake with N2 supplied
4. Recommend end to reflow oven with N2 supplied
5. Baked required with 24 hours at 125±5°C before rework process.
6. Recommend to store at ≤10% RH with vacuum packing
7. If SMT process needs twice reflow:
 - (1) Top side SMT and reflow
 - (2) Bottom side SMT and reflow

Case 1: Wifi module mounted on top side. Need to bake when bottom side process over 168 hours window time, no need to bake within 168 hours

Case 2: Wifi module mounted on bottom side, follow normal bake rule before process

Note: Window time means from last bake end to next reflow start that has 168 hours space.

Refer to EVK.



APPENDIX B:REFERENCES

B.1. High-Flying Mass Production Tool

Download Address: <http://www.hi-flying.com/download-center-1/applications-1/download-item-production-tool>

B.2. SmartBleLink

Download Address: <http://www.hi-flying.com/download-center-1/applications-1/download-item-smartblelink>

B.3. SmartAPLink

Download Address: <http://www.hi-flying.com/download-center-1/applications-1/download-item-smartaplink>

APPENDIX C: CONTACT INFORMATION

For more information about High-Flying modules, applications, and solutions, please visit our web site

<http://www.hi-flying.com>

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