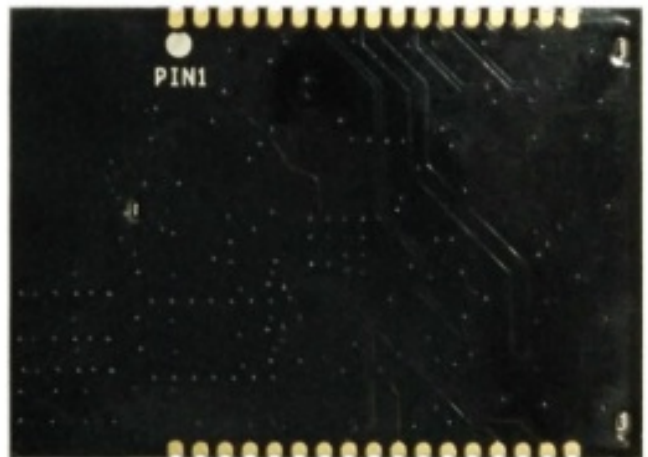


HFLPB170 Low Power WiFi BLE Module User Manual

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HFLPB170 Low Power WiFi BLE Module



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Overview of Characteristic

- [Support Wi-Fi IEEE 802.11b/g/n and BLE5.0 Wireless Standards](#)

- Based on RISC SOC, 160MHz CPU, 276KB RAM,2MB Flash
- Support UART Data Communication with Wi-Fi or BLE
- Support Wi-Fi STA/AP Mode
- **Support BLE Smart BLE Link Config**
- Support Wi-Fi AP Smart AP Link and Sniffer Smart Link V8 Config
- Support Wireless and Remote Firmware Upgrade Function
- Support Software SDK for Develop
- Support Different Antenna Option
 - HF-LPB170 Internal PCB
- Single +3.3V Power Supply for HF-LPB170
- Size:
 - HF-LPB170 23.1mm x 32.8mm x 3.5mm,SMT34 package

HISTORY

Ed.V1.0 06-09-2020 First Version.

Ed.V1.1 06-10-2020 Update some error description

Ed.V1.2 07-16-2020 Update 1MB and 2MB software difference.

Ed.V1.3 08-24-2020 Add HF-LPT170, HF-LPB170, HF-LPB175 type.

Ed.V1.4 09-16-2020 Delete 1MB version, and Add HF-LPT270, HF-LPT271 type.

PRODUCT OVERVIEW

General Description

The HF-LPB170 module is a fully self-contained small form-factor, single stream, 802.11b/g/n WiFi+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 and BLE solution for a variety of applications.

The HF-LPB170 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.

Key Application

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

Device Parameters

Table1. HF-LPB170 Module Technical Specifications

Class	Item	Parameters
Wi-Fi Parameters	Wireless standard	802.11 b/g/n
	Frequency range	2.412GHz-2.462GHz
	Transmit Power	802.11b: +18dBm \pm 2dBm (@1Mbps)
		802.11g: +22dBm \pm 2dBm (@6Mbps)
		802.11n: +22dBm \pm 2dBm (@HT20, MCS0)
	ReceiverSensitivity	802.11b: -98dBm (@1Mbps)
		802.11b: -91dBm (@11Mbps)
		802.11g: -93dBm (@6Mbps)
		802.11g: -77dBm (@54Mbps)
		802.11n: -93dBm (@MCS0)
		802.11n: -73dBm (@MCS7)
BLE Parameters	Wireless standard	BLE5.0
	Frequency range	2.402GHz-2.480GHz
	Transmit Power	Max 8.6dBm
	ReceiverSensitivity	-90dBm
Hardware Parameters	Antenna Option	HF-LPT270: Internal: PCB antenna External:1 st IPEX antenna or PAD out HF-LPT170: Internal:PCB antenna HF-LPT271: Internal:PCB antenna HF-LPB170: Internal: PCB antenna HF-LPB175: Internal: PCB antenna External: 1 st IPEX antenna
	Data Interface	UART
		GPIO,SPI,PWM, ADC
	Operating Voltage	3.3V
	Operating Current	Peak (1msforevery100ms): <350mA Average(STA, No data): 45mA Average(STA, Continuous TX): 60mA Average(AP): 70mA Standby:200uA(Reset Pin set to low)
	Operating Temp.	-40°C- 85°C
	StorageTemp.	-40°C- 125°C
	Humidity	<85%
	MSL	Level 3

	Dimensions and Size	HF-LPT270 22.5mm x 13.5mm x 3mm HF-LPT170 22mmx15.6mmx8mm HF-LPT271 24mmx16mmx 3mm HF-LPB170 23.1mm x 32.8mm x 3.5mm HF-LPB175 41.3mm x 24.1mm x 6mm
Software Parameters	Network Type	STA/AP
	Security Mechanisms	WEP/WPA-PSK/WPA2-PSK
	Encryption	WEP64/WEP128/TKIP/AES
	Update Firmware	Local Wireless, Remote OTA
	Customization	Support SDK for application develop
	Network Protocol	IPv4, TCP/UDP/HTTP/TLS(SDK)
	User Configuration	AT+instruction set. Smart BLE Link BLE Config Smart AP Link AP Config Smart Link Config

Hardware Introduction

HF-LPB170 Wi-Fi module appearance is as following.

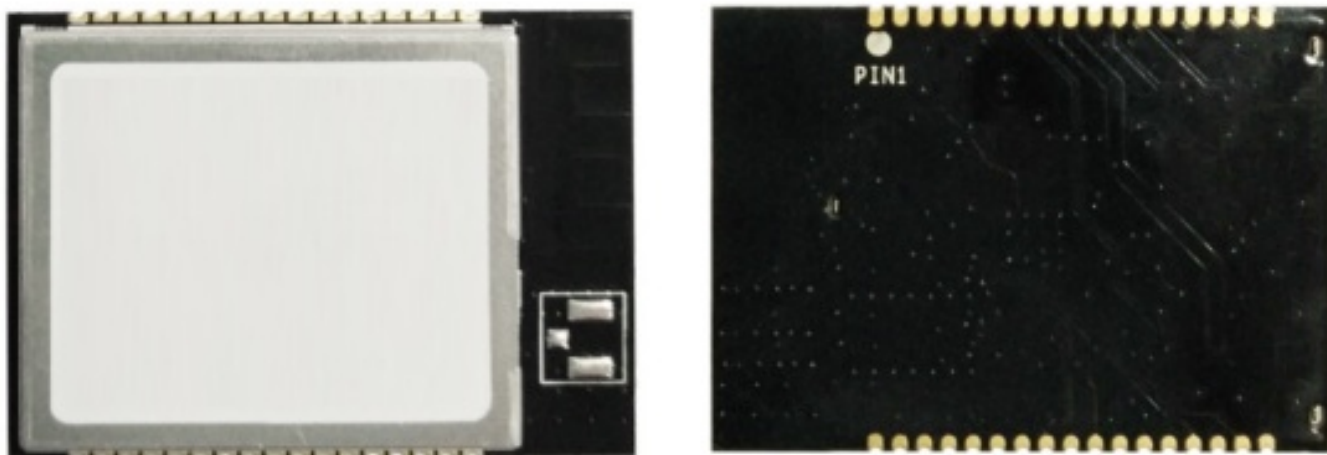


Figure 2. HF-LPB170 Appearance

HF-LPB170 Pins Definition

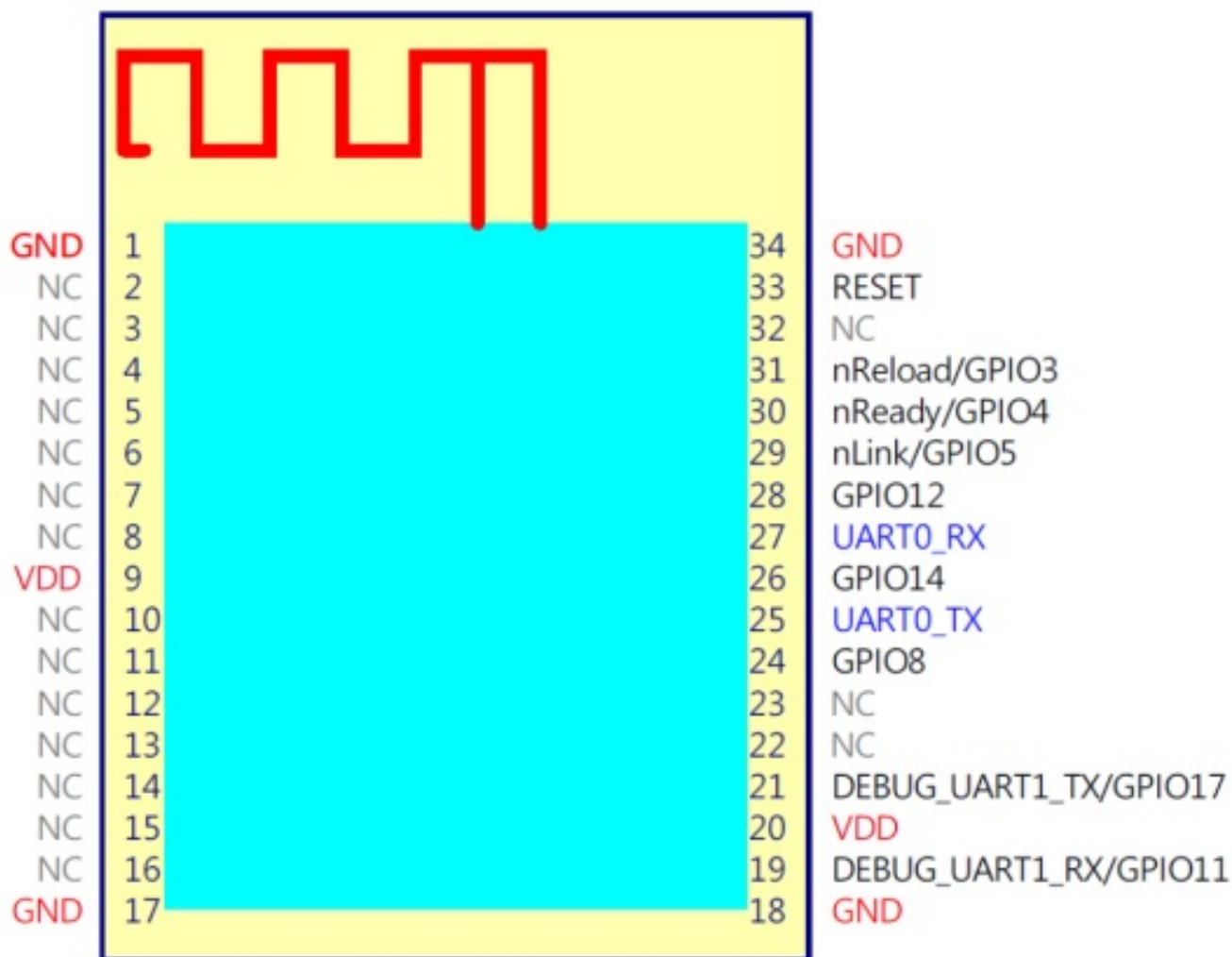


Figure 3. HF-LPB170 Pins Map

Table2. HF-LPB170 Pins Definition

1,17,18,34	Ground	GND	Power	
2, 3, 4, 5, 6, 7, 8		N.C		NoConnection
9,20	+3.3V Power	VDD	Power	
10, 11, 12, 13, 14, 15, 16		N.C		
19	UART1_RX	DEBUG_UART1_RX	I	3.3V TTL UART1 Debug Input GPIO11
21	UART1_TX	DEBUG_UART1_TX	O	3.3V TTL UART1 Debug Output GPIO 17
22, 23		N.C		
24		GPIO8	I/O	Boot Select, default low,leave it unconnected. Low: boot from flash. High: boot from UART.
25	UART0	UART0_TX	O,PU	3.3V TTL UART0 Communication Output GPIO16
26	GPIO14	GPIO14	I/O	GPIO14
27	UART0	UART0_RX	I	3.3V TTL UART0 Communication Input GPIO7
28	GPIO12	GPIO12	I/O	GPIO12
29	Wi-Fi Status	nLink	O	“0” – Wi-Fi connect to router “1” – Wi-Fi unconnected; Detailed functions see <Notes> GPIO5
30	Module Boot Up Indicator	nReady	O	“0” – Boot-up OK; “1” – Boot-up Fail; GPIO4, PWM2
31	Multi-Function	nReload	I,PU	Detailed functions see <Notes> GPIO3, PWM3
32		N.C		
33	Module Reset	RESET	I,PU	“Low” effective reset input. There is RC reset circuit internally. No need of external RC reset circuit.

<Notes>

I– Input O– Output

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

nReload Pin (Button) function:

1. 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.
2. After module is powered up, short press this button (0.2s<“Low” <1.5s) and loose to make the module

go into Smart BLE Link config mode, waiting for APP to set router SSID and password, config module connect to router. **Recommend to use Smart Ble Link BLE method config, may use AT+SMART CONFIG to choose other config mode(Smart Link V8 and Smart AP Link).**

See Appendix to download Smart BLE Link, Smart Link V8 and Smart AP Link APP

3. 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 “Smart Link” 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):

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1. At wireless firmware and config upgrade mode , this LED used to indicate configure and upgrade status.
2. At “SmartLink” 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.

UART1 Debug

1. Is used for debug log or firmware program, baud rate 921600.

Electrical Characteristics

Table3. Absolute Maximum Ratings:

Parameter	Condition	Min.	Typ.	Max.	Unit
Work temperature range		-40		85	°C
Maximum soldering temperature	IPC/JEDEC J-STD-020			260	°C
ESD (Human Body Model HBM)	TAMB=25°C			2.5	KV
ESD (MM)	TAMB=25°C			0.25	KV

On-board PCB Antenna

HF modules support internal on-board PCB 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 10mm;
- Antenna can't be shieldedby any meal enclosure; All cover, include plastic, shall away from antenna at least 10mm;

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.

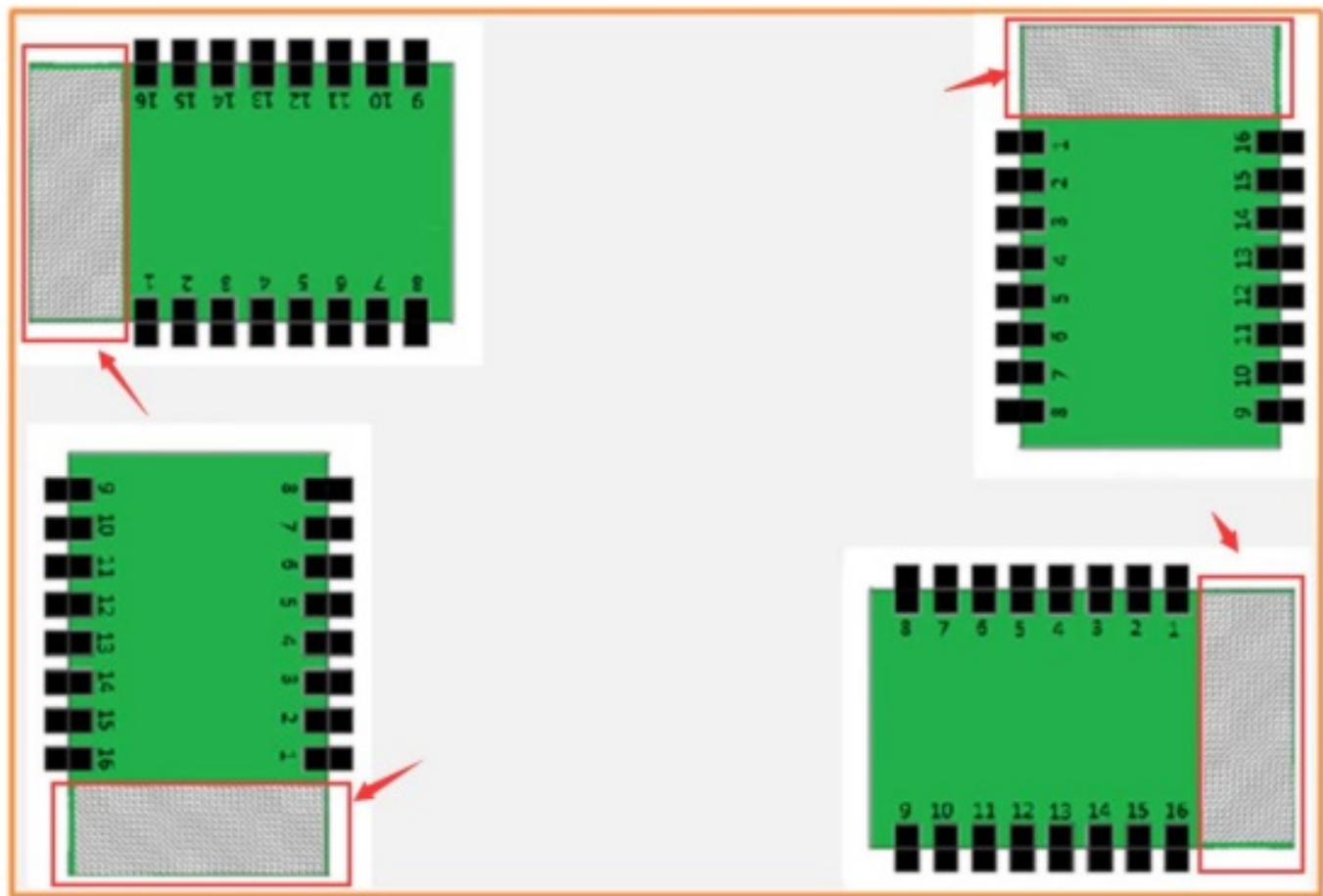


Figure 5. Suggested Module Placement Region

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 UARTconvetor) or Wireless interface to configure the parameters, manage the module or do the some functional tests.

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:

Table4. Evaluation Kit Interface Description

Function	Name	Description
External Interface	RS232	Main data/command RS-232 interface, this interface maximum baud rate is 460800. Can not be used for debug UART log (it needs 921600)
	USB	USB to UART interface, can be used for debug UART log
	DC5V	DC jack for power in, 5V input.
LED	Power	Power LED
	Ready	nReady LED
	Link	nLink LED
Button	nReload	Smart link and Restore factory default configuration. See more for PIN Definition

Order Information

Based on customer detailed requirement, HF-LPB170 modules provide different variants and physical type for detailed application.

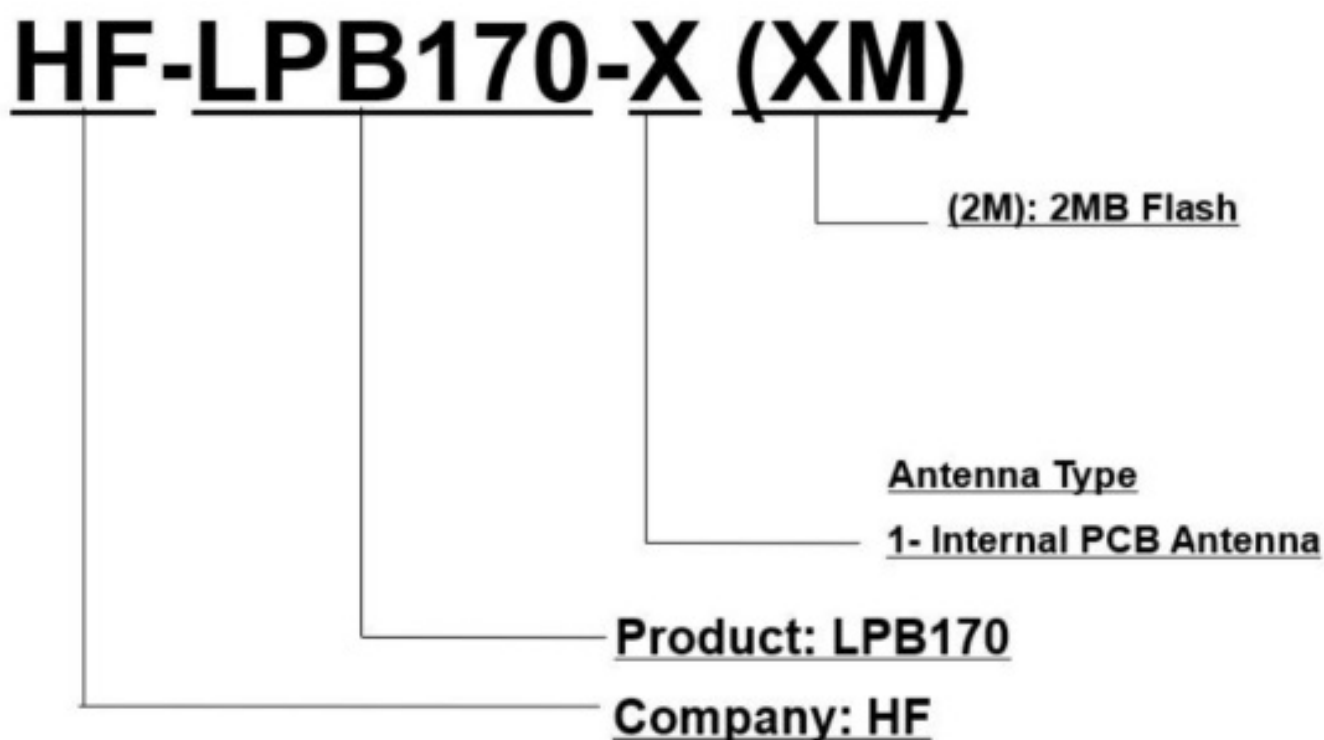


Figure 6. HF-LPB170 Order Information

Hardware Typical Application

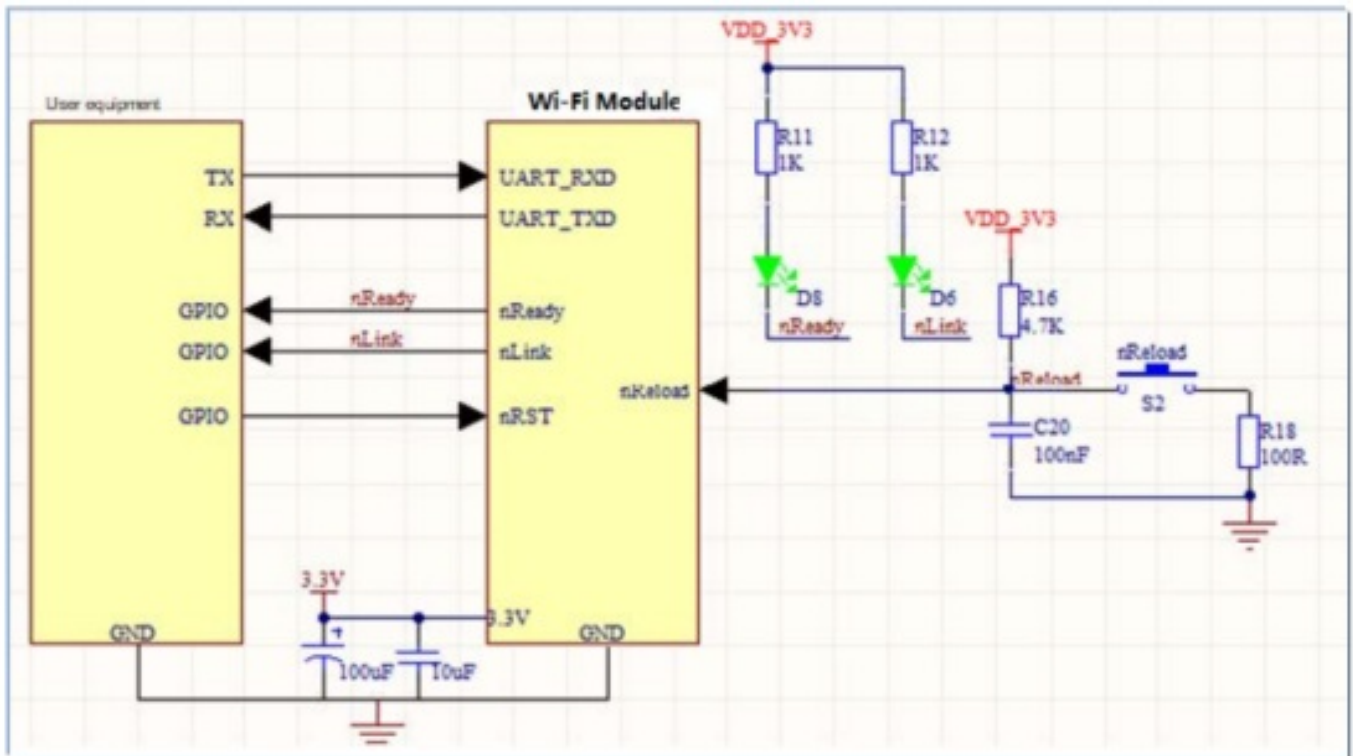


Figure 7. HF-LPB170 Hardware Typical Application

Notes:

nR

eset- Module hardware reset signal. Input. Logics "0" effective. There is pull-up resistor internal and no external pull-up required. When module power up or some issue happened, MCU need assert nRST signal "0" at least 10ms, then set "1" to keep module fully reset.

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.

APPENDIX D:CONTACT INFORMATION

Address: [Room 1002,Building 1,No.3000,Longdong Avenue,Pudong New Area,Shanghai,China,201203](#)

Web: www.hi-flying.com

Service Online: [400-189-3108/18616078755](tel:400-189-3108/18616078755)

For more information about High-Flying modules, applications, and solutions, please visit our web site <http://www.hi-flying.com/en/>

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OEM/Integrators Installation Manual

1. List of applicable FCC rules

This module has been tested and found to comply with part 15.247 requirements for Modular Approval.

2. Summarize the specific operational use conditions

This module can be used in IoT devices. The input voltage to the module should be nominally 3.3VDC and the ambient temperature of the module should not exceed 85. HF-LPB170 has one PCB antenna with max antenna gain 2.0dBi. If the antenna needs to be changed, the certification should be re-applied.

3. Limited module procedures

NA

4. Trace antenna designs

NA

5. RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by § 2.1093.

6. Antennas

Antenna type: PCB antenna	2.4GHz band Peak Gain: 2.0dBi
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7. Label and compliance information

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains

FCC ID: 2ACSV-HFLPB170" The FCC ID can be used only when all FCC ID compliance requirements are met.

8. Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not

exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference have been corrected , WIFI and Bluetooth testing using QRCT in FTM mode.

9. Additional testing, Part 15 Subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device. The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369. For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details. The product under test is set into a link/association with a partnering WLAN device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.

FCC Statement:

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

(2) This device must accept any interference received, including interference that may cause undesired operati

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Documents / Resources

	<p>HF HFLPB170 Low Power WiFi BLE Module [pdf] User Manual HFLPB170, 2ACSV-HFLPB170, 2ACSVHFLPB170, HFLPB170, Low Power WiFi BLE Module</p>
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[Manuals+](#).