



# **HF-LPB300-1**

## **Low Power WiFi Module User Manual**

**V 1.0**



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## HISTORY

**Ed. V1.0** Created on 4-2-2015.

# PRODUCT OVERVIEW

## General Description

The HF-LPB300-1 is a fully self-contained small form-factor, single stream, 802.11b/g/n-HT20 Wi-Fi module, which provide a wireless interface to any equipment with a Serial/SPI/USB/GPIO interface for data transfer. HF-LPB300-1 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 solution for a variety of applications.

HF-LPB300-1 support AP+STA wireless networking and support Wi-Fi Direct mode. HF-LPB300-1 also provides wireless and remote firmware upgrade, which satisfied all kinds of application requirement. HF-LPB300-1 support wakeup-on-wireless feature which make it a very suitable solution for battery applications with excellent power save scheme.

The HF-LPB300-1 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.

The HF-LPB300-1 integrates all Wi-Fi functionality into a low-profile, 23.1x32.8x 2.7mm SMT module package that can be easily mounted on main PCB with application specific circuits.

## Device Features

- Single stream Wi-Fi @ 2.4 GHz with support for WEP security mode as well as WPA/WPA2
- Fully self-contained serial-to-wireless functionality.
- Support IEEE802.11b/g/n-HT20 Wireless Standards
- Ultra-Low-Power for Battery Applications with Excellent Power Save Scheme
- Support UART/SPI/USB/PWM/ADC/GPIO Data Communication Interface
- Support Work As STA/AP/AP+STA/Wi-Fi Direct Mode
- Support Smart Link Function (APP for smart configuration)
- Support Wireless (OTA) and Remote Firmware Upgrade Function
- Support Wakeup-on-Wireless and Wakeup Local
- Support TLS/SSL and mDNS Protocol
- Support PCB Antenna
- Internal 4MB Flash Inside
- Single +3.3V Power Supply
- Smallest Size: 23.1mm x 32.8mm x 2.7mm
- FCC/CE Certificated

## Device Parameters

Table 1 HF-LPB300-1 Module Technical Specifications

Class	Item	Parameters
<b>Wireless Parameters</b>	Certification	FCC
	Wireless standard	802.11 b/g/n-HT20
	Frequency range	2.412GHz-2.462GHz
	RF Output Power(Peak)	802.11b:20.05 dBm (@1Mbps)
		802.11g: 18.89dBm (@6Mbps )
802.11n-HT20: 17.88dBm (@HT20, MCS0)		
Antenna	On-board PCB antenna	
<b>Hardware Parameters</b>	Data Interface	UART
		SPI, PWM, GPIO...
		Others: USB, ADC, RTC...
	Operating Voltage	2.97V~3.63V
	Operating Current	Peak [Continuous TX]: ~240mA Normal [WiFi ON/OFF, DTIM=100ms]: AP Associate: ~21mA; No-AP Associate:~26mA Wakeup-on-Wireless Mode: ~10mA; Deep Sleep: <100uA
	Operating Temp.	<b>-40°C- 85°C</b>
	Storage Temp.	-45°C- 125°C
Dimensions and Size	23.1mm×32.8mm×2.7mm	
<b>Software Parameters</b>	Network Type	STA /AP/STA+AP/Wi-Fi Direct
	Security Mechanisms	WEP/WPA-PSK/WPA2-PSK
	Encryption	WEP64/WEP128/TKIP/AES
	Update Firmware	Local Wireless (OTA), Remote
	Network Protocol	IPv4,TCP/UDP/FTP/HTTP,FTTTPS,TLS,mDNS
	User Configuration	AT+instruction set, Web page/ Android/ iOS Smart Link APP tools

### Key Application

- Remote equipment monitoring
- Smart Home/Energy
- Industrial sensors and controls
- Home automation
- Medical/Healthcare devices

## Hardware Introduction

### Pins Definition

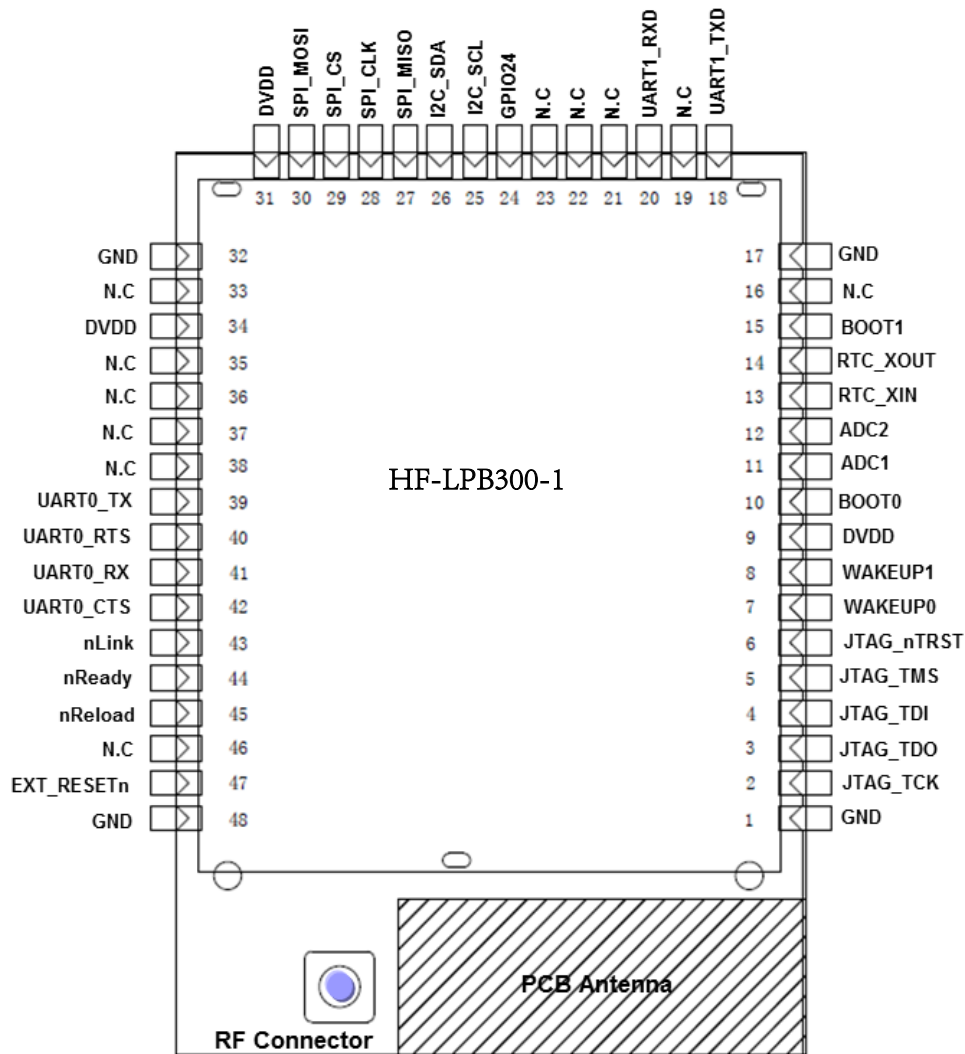


Figure 1. HF-LPB300-1 Pins Map

Table 2 HF-LPB300-1 Pins Definition

Pin	Description	Net Name	Signal Type	Comments
1,17,32,48	Ground	GND	Power	
2	JTAG Function	JTAG_TCK	I, PU	JTAG/Debug functional pin, No connect if not use. No connect
3	JTAG Function	JTAG_TDO	O	
4	JTAG Function	JTAG_TDI	I,PU	
5	JTAG Function	JTAG_TMS	I,PU	
6	JTAG Function	JTAG_nTRST	I,PU	
7	GPIO	WAKEUP0	I/O	GPIO7, No connect if not use.
8	GPIO	WAKEUP1	I/O	GPIO8, No connect if not use.
9	+3.3V Power	DVDD	Power	

10	GPIO	BOOT0	I/O	GPIO10, No connect if not use.
11	A/D Input 1	ADC1	I/O	GPIO11, No connect if not use.
12	A/D Input 2	ADC2	I/O	GPIO12, No connect if not use.
13	GPIO	RTC_XIN	I/O	GPIO13, No connect if not use.
14	GPIO	RTC_XOUT	I/O	GPIO14, No connect if not use.
15	GPIO	BOOT1	I/O	GPIO15, No connect if not use.
16		N.C		No connect
18	GPIO	UART1_TXD	I/O	GPIO18, No connect if not use.
19		N.C		No connect
20	GPIO	UART1_RXD	I/O	GPIO20, No connect if not use.
21		N.C		No connect
22		N.C		No connect
23		N.C		No connect
24	GPIO	GPIO24	I/O	GPIO24, No connect if not use.
25	I2C Interface	I2C_SCL	I/O	GPIO25, No connect if not use.
26	I2C Interface	I2C_SDA	I/O	GPIO26, No connect if not use.
27	SPI Data In	SPI_MISO	I	GPIO27, No connect if not use.
28	SPI Interface	SPI_CLK	I/O	GPIO28, No connect if not use.
29	SPI Interface	SPI_CS	I/O	GPIO29, No connect if not use.
30	SPI Data Out	SPI_MOSI	O	GPIO30, No connect if not use.
31	+3.3V Power	DVDD	Power	
33		N.C		No connect
34	+3.3 Power	DVDD	Power	
35		N.C		No connect
36		N.C		No connect
37		N.C		No connect
38		N.C		No connect
39	UART0	UART0_TX	O	UART Communication Pin
40	UART0	UART0_RTS	I/O	UART Pin (Or RS485 Control)
41	UART0	UART0_RX	I	UART Communication Pin
42	UART0	UART0_CTS	I/O	UART Communication Pin
43	GPIO	nLink	I/O	GPIO43, No connect if not use.
44	GPIO	nReady	I/O	GPIO44, No connect if not use.
45	GPIO	nReload	I/O,PU	GPIO45, No connect if not use.
46		N.C		No connect
47	Module Reset	EXT_RESETh	I,PU	“Low” effective reset input.

Electrical Characteristics

Absolute Maximum Ratings:

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage temperature range		-45		125	°C
Maximum soldering temperature	IPC/JEDEC J-STD-020			260	°C
Supply voltage		0		3.8	V
Voltage on any I/O pin		0		3.3	V
ESD (Human Body Model HBM)	TAMB=25°C			2	KV

ESD (Charged Device Model, CDM)	TAMB=25°C			500	V
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Power Supply & Power Consumption:

Parameter	Condition	Min.	Typ.	Max.	Unit
Operating Supply voltage		2.97	3.3	3.63	V
Supply current, peak	Continuous Tx		200	250	mA
Supply current, IEEE PS	DTIM=100ms		21		mA
Input high voltage		VDD*70%		VDD+0.4	V
Input low voltage		-.04		VDD*30%	V
Input leakage current		VDD On		2	uA
Input capacitance				5	pF
Pullup strength		10		50	uA
Pulldown strength		10		50	uA
Analog input range		0		3	V
Analog output range		0		3	V

Mechanical Size

HF-LPB300-1 modules physical size (Unit: mm) as

follows:

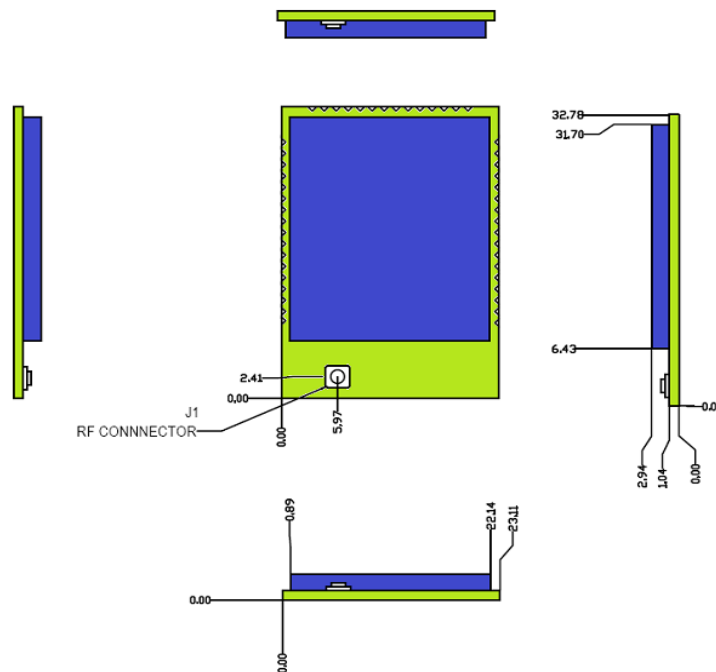


Figure 2. HF-LPB300-1 Mechanical

Dimension HF-LPB300-1 Module PCB symbol size (mm) as follows:



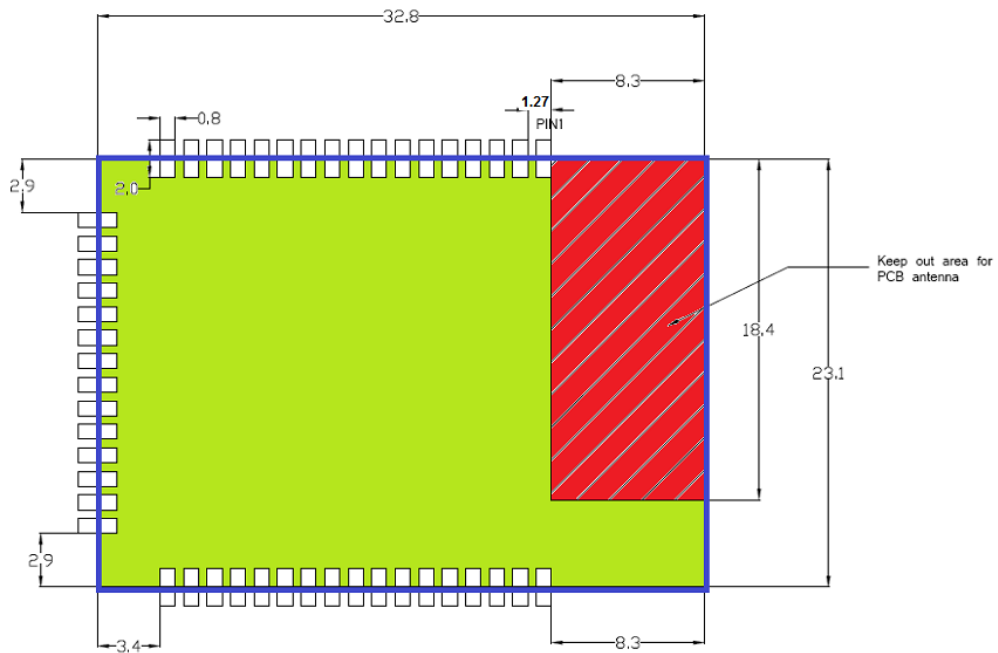


Figure 3. HF-LPB300-1 PCB Symbol Size

**On-board PCB Antenna**

HF-LPB300-1 module support internal on-board PCB antenna . When customer select internal antenna, you shall comply with following antenna design rules and module location suggestions:

- For customer PCB, RED color region (8.3x18.4mm) can't put componet or paste GND net;
- 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;

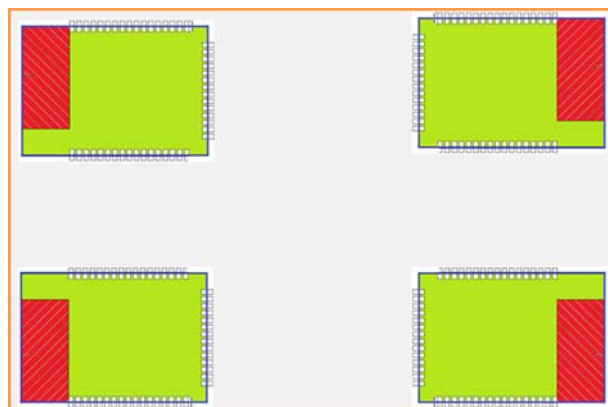


Figure 4. Suggested Module Placement Region

High-Flying suggest HF-LPB300-1 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.

# PACKAGE INFORMATION

## Recommended Reflow Profile

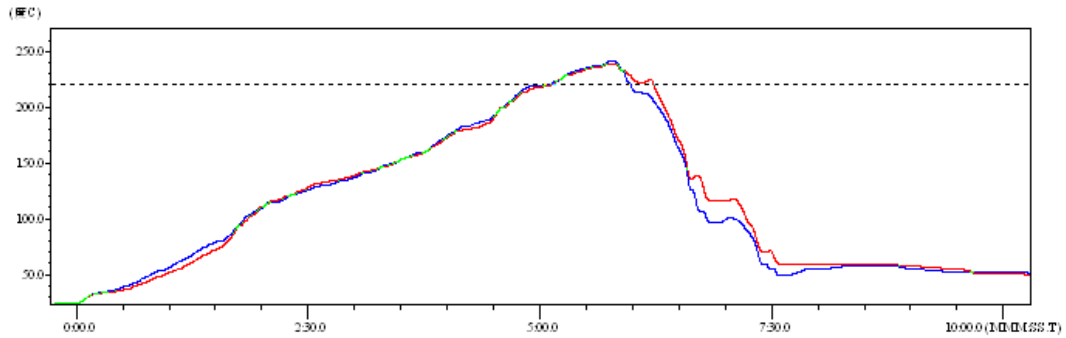


Figure 5. Reflow Soldering Profile

Table 11 Reflow Soldering Parameter

NO.	Item	Temperature (Degree)	Time(Sec)
1	Reflow Time	Time of above 220	35~55 sec
2	Peak-Temp	260 max	

- Note:**
1. Recommend to supply N2 for reflow oven.
  2. N2 atmosphere during reflow (O2<300ppm)

### Device Handling Instruction (Module IC SMT Preparation)

1. Shelf life in sealed bag: 12 months, at <math><30^{\circ}\text{C}</math> and <math><60\%</math> 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 <math>125\pm 5^{\circ}\text{C}</math> before rework process for two modules, one is new module and two is board with module
6. Recommend to store at  $\leq 10\%$  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

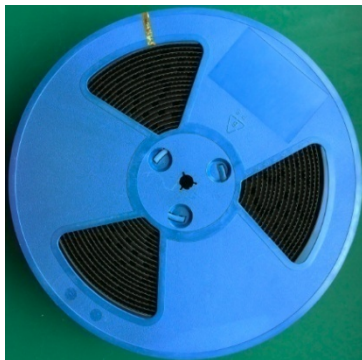
Case 2: Wifi module mounted on bottom side, follow normal bake rule before process

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

### Shipping Information

#### TAPE

Size: 340\*340\*70 mm



#### BOX

Size: 340\*340\*350 mm (inside)



Figure 7. Shipping Information

**Note:**

1 tape = 500pcs

1 box = 5 tapes = 5 \* 500 pcs = 2500pcs

## APPENDIX A: 88MW300 PIN MAPPING

HF-LPB300 VS 88MW300 Pins Map

HF-LPB300		88MW300		HF-LPB300		88MW300	
Pin	Net Name	Pin	Pin Name	Pin	Net Name	Pin	Pin Name
1	GND			25	IIC0_SCL	7	GPIO_5
2	JTAG_TCK	9	GPIO_7	26	IIC0_SDA	6	GPIO_4
3	JTAG_TDO	8	GPIO_6	27	SSP1_RXD	61	GPIO_45
4	JTAG_TDI	11	GPIO_9	28	SSP1_CLK	58	GPIO_42
5	JTAG_TMS	10	GPIO_8	29	SSP1_FRM	59	GPIO_43
6	JTAG_nTRST	12	GPIO_10	30	SSP1_TXD	60	GPIO_44
7	WAKEUP0	36	GPIO_22	31	DVDD		
8	WAKEUP1	37	GPIO_23	32	GND		
9	DVDD			33	N.C		
10	BOOT0	30	GPIO_16	34	DVDD		
11	ADC1	62	GPIO_46	35	N.C		
12	ADC2	63	GPIO_47	36	N.C		
13	RTC_XIN	39	GPIO_25	37	N.C		
14	RTC_XOUT	40	GPIO_26	38	N.C		
15	BOOT1	51	GPIO_27	39	UART0_TX	3	GPIO_2
16	N.C			40	UART0_RTS	2	GPIO_1
17	GND			41	UART0_RX	4	GPIO_3
18	UART1_TXD	64	GPIO_48	42	UART0_CTS	1	GPIO_0
19	N.C			43	nLink	52	GPIO_39
20	UART_RXD	65	GPIO_49	44	nReady	55	GPIO_40
21	N.C			45	nReload	56	GPIO_41
22	N.C			46	N.C		
23	N.C			47	S_RST#	35	RESETN
24	GPIO24	38	GPIO_24	48	GND		

## 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, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

## FCC Radiation Exposure Statement:

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.

## FCC Label Instructions

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID:2ACSV-HF-LPB300-1",or "Contains FCC ID:2ACSV-HF-LPB300-1", Any similar wording that expresses the same meaning may be used.