

HF-LPT120A

Low Power WiFi Module User Manual

V 1.3



Overview of Characteristic

- ✧ **Support IEEE802.11b/g/n Wireless Standards**
- ✧ **Based on Self-developed High Cost Effective SOC**
- ✧ **Support UART/GPIO Data Communication Interface**
- ✧ **Support Work As STA/AP Mode**
- ✧ **Support Smart Link Function (APP program provide)**
- ✧ **Support Wireless and Remote Firmware Upgrade Function**
- ✧ **support WPS Function**
- ✧ **Support External I-PEX or Internal PCB Antenna Option**
- ✧ **Single +3.3V Power Supply**
- ✧ **Smallest Size: 22mm x 13.5mm x 6mm, 1x10 2mm Connector**
- ✧ **FCC/CE Certificated**

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.

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

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.

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 INFORMATION (additional)**OEM INTEGRATION INSTRUCTIONS:**

This device is intended only for OEM integrators under the following conditions: The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2ACSVHF-LPT120A".

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

This device must be kept away from all persons by 20cm or more and installations using less distance, or installations using antennas with gain greater than that with which this was Certified will require additional approvals.

Antenna Specification:

Type: Integrated

Model: HF-LPT120A

Brand: High-Flying

Gain: 1.5dBi

TABLE OF CONTENTS

LIST OF FIGURES.....	5
LIST OF TABLES.....	6
HISTORY.....	7
1. PRODUCT OVERVIEW.....	8
1.1. GENERAL DESCRIPTION.....	8
1.1.1 DEVICE FEATURES.....	8
1.1.2 DEVICE PAREMETERS.....	9
1.1.3 KEY APPLICATION.....	9
1.2. HARDWARE INTRODUCTION.....	10
1.2.1. PINS DEFINITION.....	10
1.2.2. ELECTRICAL CHARACTERISTICS.....	11
1.2.3. MECHANICAL SIZE.....	12
1.2.4. ON-BOARD PCB ANTENNA.....	13
1.2.5. EXTERNAL ANTENNA.....	13
1.2.6. ORDER INFORMATION.....	14
APPENDIX A: HW REFERENCE DESIGN.....	15
APPENDIX B: HTTP PROTOCOL TRANSFER.....	16
B.1. HTTP AT COMMAND(REERVED).....	16
B.1.1 AT+HTTPURL.....	16
B.1.2 AT+HTTPTP.....	16
B.1.3 AT+HTTTPH.....	16
B.1.4 AT+HTTPCN.....	17
B.1.5 AT+HTTPIA.....	17
B.1.6 AT+HTTPTD.....	17
B.2. HTTP EXAMPLE.....	17
B.3. SENDING HTTP RAW DATA IN THROUGHPUT MODE(RECOMMEND).....	18
B.4. SENDING HTTP REQUEST BY AT COMMAND.....	19
APPENDIX C:REFERENCES.....	21
C.1. HIGH-FLYING MASS PRODUCTION TOOL.....	21
C.2. SMARTLINK APP V7 CONFIG TOOL.....	21
C.3. EVK QUICK START GUIDE.....	21
C.4. MODULE UPGRADE.....	21
APPENDIX D: CONTACT INFORMATION.....	22

LIST OF FIGURES

FIGURE 1. HF-LPT120A PINS MAP.....	10
FIGURE 2. HF-LPT120A MECHANICAL DIMENSION.....	12
FIGURE 3. HF-LPT120AA MECHANICAL DIMENSION.....	12
FIGURE 4. SUGGESTED MODULE PLACEMENT REGION.....	13
FIGURE 5. HF-LPT120A EXTERNAL ANTENNA PICTURE.....	13
FIGURE 6. HF-LPT120A ORDER INFORMATION.....	14
FIGURE 7. HF-LPT120AA ORDER INFORMATION.....	14

LIST OF TABLES

TABLE 1	HF-LPT120A MODULE TECHNICAL SPECIFICATIONS.....	9
TABLE 2	HF-LPT120A PINS DEFINITION.....	10
TABLE 3	ABSOLUTE MAXIMUM RATINGS:.....	11
TABLE 4	POWER SUPPLY & POWER CONSUMPTION:.....	11
TABLE 5	HF-LPT120A EXTERNAL ANTENNA PARAMETERS.....	13

HISTORY

- Ed. V1.02** 11-03-2015 First Version.
- Ed. V1.03** 11-11-2015 Modify IO PIN Description.
- Ed. V1.04** 11-27-2015 Change Module PCB.
- Ed. V1.1** 12-21-2015 Update AT command supported by 2.0.01 version firmware.
- Ed. V1.1.1** 01-04-2016 Add HF-LPT100-A Type.
- Ed. V1.2** 01-29-2016 Modify HF-LPT100-A to HF-LPT100A Type, Update AT command supported by 2.0.03 version firmware. Add support for AT+E、AT+SOCKB、AT+TCPDISB、AT+TCPTOB、AT+TCPLKB、AT+WALK、AT+WALKIND command. Correct the AT+NETP command description.
- Ed. V1.3** 03-14-2015 Update AT command supported by 2.0.04 version firmware. Add support for AT+MAXSK、AT+WAPMXSTA command. Update AT+NETP、AT+UART command. **All the reserved function is not supported yet.** See appendix C to get new firmware.

1. PRODUCT OVERVIEW

1.1. General Description

The HF-LPT120A is a fully self-contained small form-factor, single stream, 802.11b/g/n Wi-Fi module, which provide a wireless interface to any equipment with a Serial/PWM interface for data transfer. HF-LPT120A 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.

The HF-LPT120A 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-LPT120A integrates all Wi-Fi functionality into a low-profile, 22mm x 13.5mm x 6mm module package that can be easily mounted on main PCB with application specific circuits. Also, module provides built-in antenna, external antenna option.

1.1.1 Device Features

- Single stream Wi-Fi @ 2.4 GHz with support for WEP security mode as well as WPA/WPA2
- Based on Self-developed High Cost Performance SOC
- Includes all the protocol and configuration functions for Wi-Fi connectivity.
- Support STA/AP Mode
- Support Smart Link Function
- Support Wireless and Remote Firmware Upgrade Function
- Support External I-PEX or Internal PCB antenna connector options.
- Compact surface mount module 22mm x 13.5mm x 6mm
- Single supply – 3.3V operation.
- FCC/CE Certified.
- RoHS Compliant.

1.1.2 Device Parameters

Table 1 HF-LPT120A Module Technical Specifications

Class	Item	Parameters
Wireless Parameters	Certification	FCC/CE
	Wireless standard	802.11 b/g/n
	Frequency range	2.412GHz-2.462GHz
	Transmit Power	802.11b: +16 +/-2dBm (@11Mbps)
		802.11g: +14 +/-2dBm (@54Mbps)
		802.11n: +13 +/-2dBm (@HT20, MCS7)
	Receiver Sensitivity	802.11b: -93 dBm (@11Mbps ,CCK)
		802.11g: -85 dBm (@54Mbps, OFDM)
		802.11n: -82 dBm (@HT20, MCS7)
Hardware Parameters	Antenna Option	External:I-PEX Connector
		Internal:PCB Printed Antenna
	Data Interface	UART
		GPIO
	Operating Voltage	2.95~3.6V
	Operating Current	Peak [Continuous TX]: ~280mA Average. ~20mA
	Operating Temp.	-20℃ - 85℃
	Storage Temp.	-40℃ - 125℃
Software Parameters	Dimensions and Size	22mm x 13.5mm x 6mm
	External Interface	1x10, 2mm DIP
	Network Type	STA /AP
	Security Mechanisms	WEP/WPA-PSK/WPA2-PSK
	Encryption	WEP64/WEP128/TKIP/AES
	Update Firmware	Local Wireless, Remote
	Customization	Support customization
Software Parameters	Network Protocol	IPv4, TCP/UDP/HTTP
	User Configuration	AT+instruction set. Android/ iOS Smart Link APP tools

1.1.3 Key Application

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

1.2. Hardware Introduction

1.2.1. Pins Definition

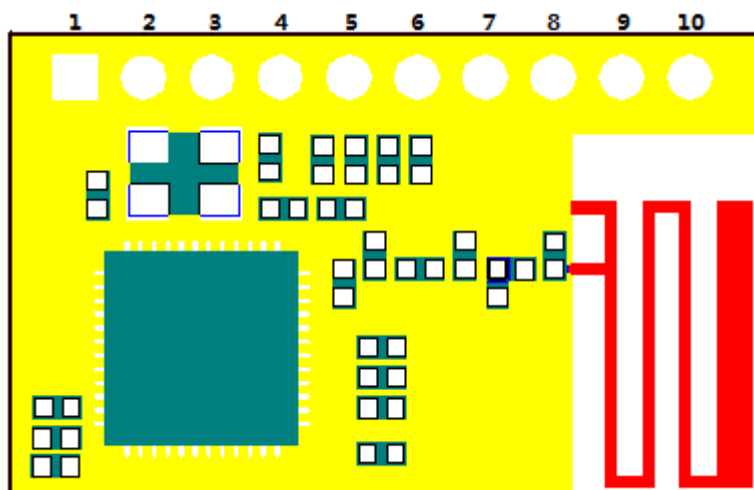


Figure 1. HF-LPT120A Pins Map

Table 2 HF-LPT120A Pins Definition

Pin	Description	Net Name	Signal Type	Comments
1	Ground	GND	Power	
2	+3.3V Power	DVDD	Power	3.3V@300mA
3	Restore Configuration	nReload	I/O,PU	Can be configured as GPIO_2 Detailed functions see <Notes>
4	Module Reset	EXT_RESETn	I,PU	“Low” effective reset input.
5	UART0	UART0_RX	I	GPIO_19
6	UART0	UART0_TX	O,PU	GPIO_20
7	GPIO_5	GPIO_5	I/O	GPIO_5,UART1_TXD UART1 Debug Output
8	GPIO_6	GPIO_6	I/O	GPIO_6, UART1_RXD UART1 Debug Input
9	GPIO_3	nReady	I/O	Can be configured as nReady,GPIO
10	GPIO_15	nLink	I/O	Can be configured as nLink,GPIO Detailed functions see <Notes>

I—Input, O—Output,PU—Internal Pullup Resistor; I/O: Digital I/O; Power—Power

<Notes>

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 D to download software tools for customer batch configuration and upgrade firmware during mass production)

2. After module is powered up, short press this button (“Low” < 2s) to make the module go into “Smart Link “ config mode, waiting for APP to set password and other information. (See Appendix D to download SmartLink APP)
3. After module is powered up, long press this button (“Low” > 4s) to make the module recover to factory setting.

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

nLink Pin (LED) function:

1. At wireless firmware and config upgrade mode , this LED used to indicate configure and upgrade status.
 2. At “Smart Link “ config mode, this LED used to indicate APP to finish setting.
 3. At normal mode, it’s Wi-Fi link status indicator
- High-Flying strongly suggest customer fan out this pin to LED.

1.2.2. Electrical Characteristics

Table 3 Absolute Maximum Ratings:

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage temperature range		-40		125	°C
Maximum soldering temperature	IPC/JEDEC J-STD-020			260	°C
Supply voltage		0		3.6	V
Voltage on any I/O pin		0		3.6	V
ESD (Human Body Model HBM)	TAMB=25°C			2.5	KV
ESD (MM)	TAMB=25°C			0.25	KV

Table 4 Power Supply & Power Consumption:

Parameter	Condition	Min.	Typ.	Max.	Unit
Operating Supply voltage		2.95	3.3	3.6	V
Supply current, peak	Continuous Tx		280		mA
Supply current, IEEE PS	DTIM=100ms		20		mA

1.2.3. Mechanical Size

HF-LPT120A modules physical size (Unit: mm) as follows:

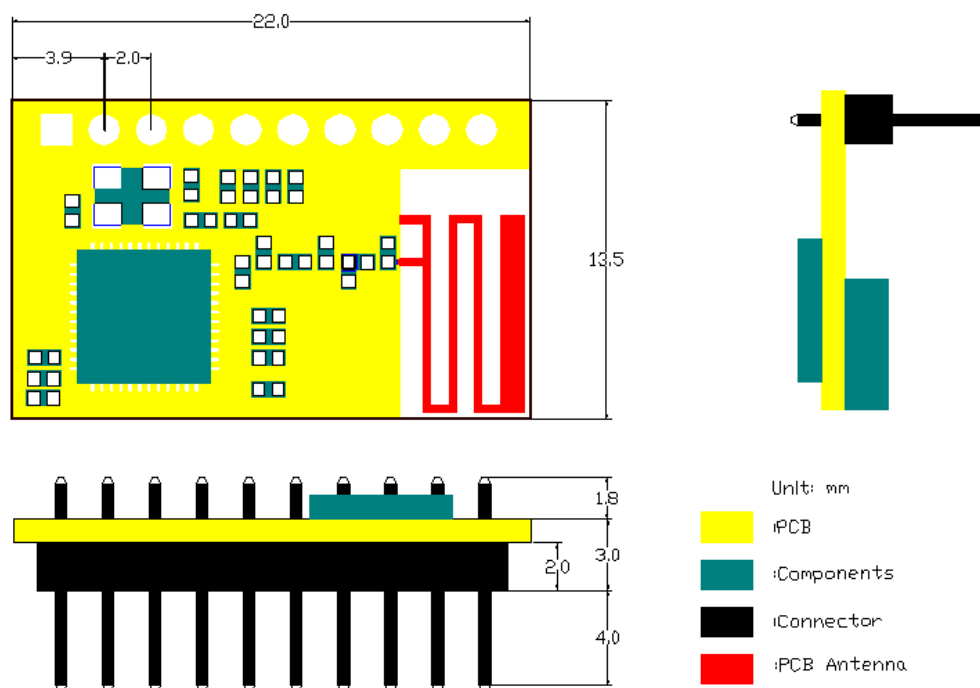


Figure 2. HF-LPT120A Mechanical Dimension

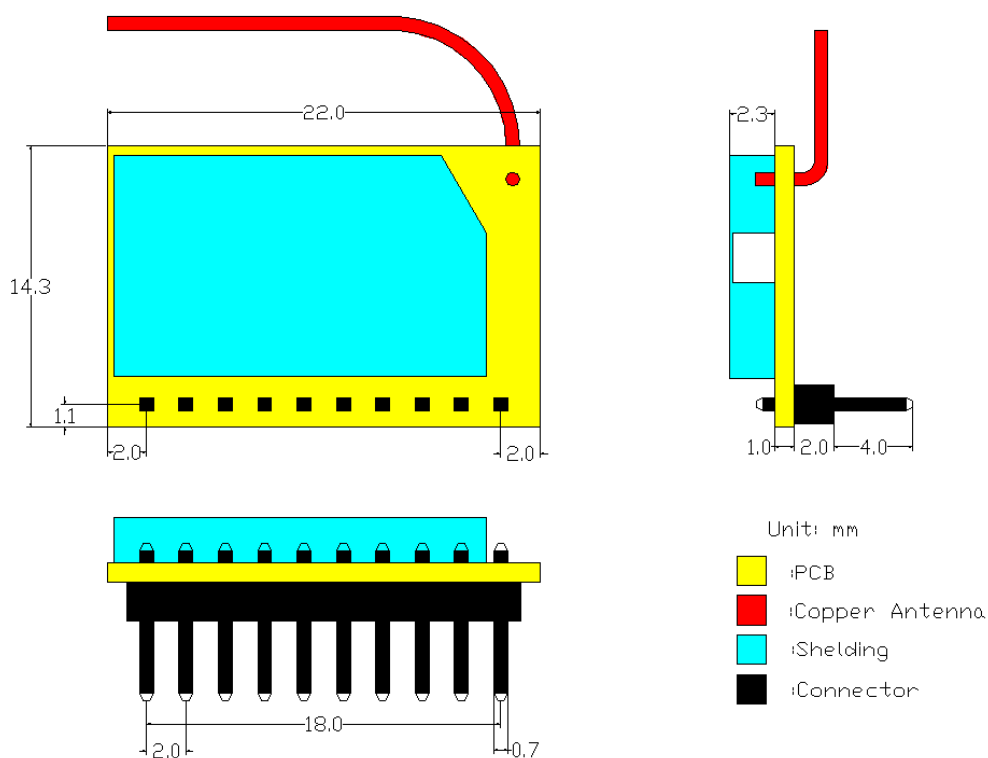


Figure 3.

HF-LPT120AA Mechanical Dimension

1.2.4. On-board PCB Antenna

HF-LPT120A module 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, RED color region (8x10mm) can't put componet or paste GND net;
- Antenna must away from metal or high components at least 10mm;
- Antenna can't be shielded by any metal enclosure;

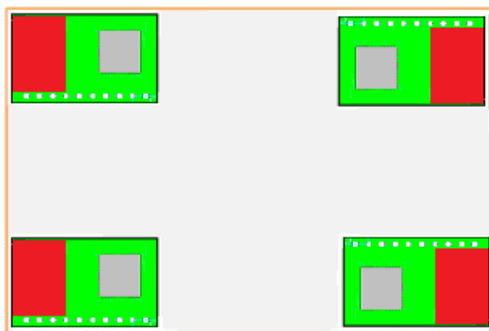


Figure 4. Suggested Module Placement Region

High-Flying suggest HF-LPB100 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.

1.2.5. External Antenna

HF-LPT120A supports two way of external antenna as the following picture show, The I-PEX interface or the PAD interface(remove the I-PEX connector). The user may choose one of them. If user select external antenna, HF-LPT120A modules must be connected to the 2.4G antenna according to IEEE 802.11b/g/n standards.

The antenna parameters required as follows:



Figure 5.

HF-LPT120A External Antenna picture

Table 5 HF-LPT120A External Antenna Parameters

Item	Parameters
Frequency range	2.4~2.5GHz
Impedance	50 Ohm
VSWR	2 (Max)
Return Loss	-10dB (Max)
Connector Type	I-PEX or populate directly

1.2.6. Order Information

Base on customer detailed requirement, HF-LPT120A series modules provide different variants and physical type for detailed application.

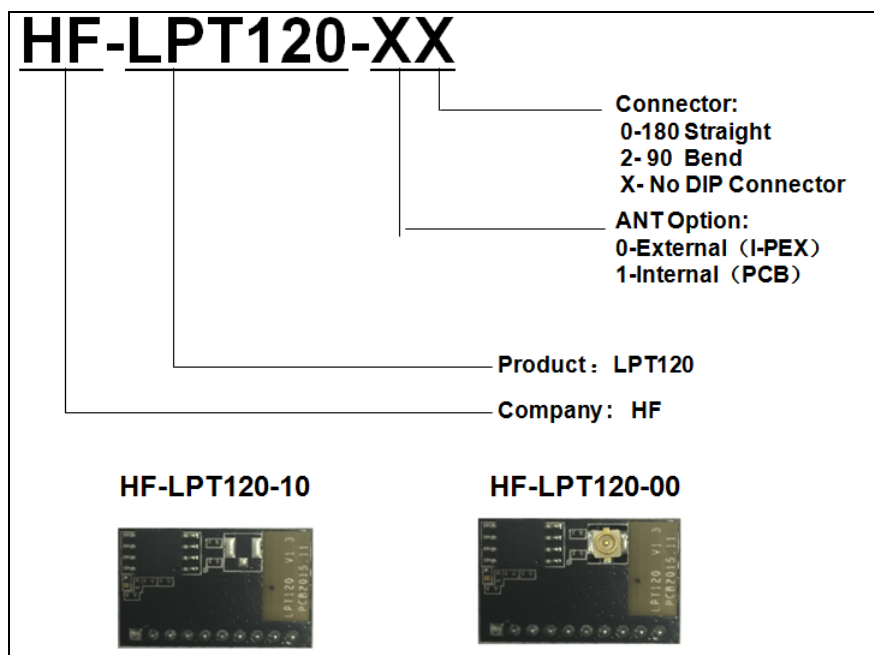


Figure 6. HF-LPT120A Order Information

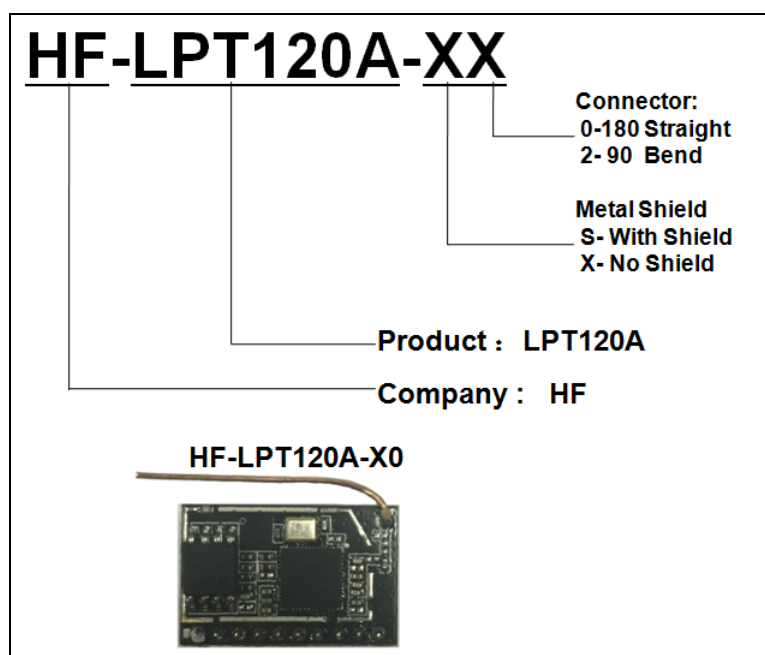


Figure 7. HF-LPT120AA Order Information

	1	2	3	4
D	POWER			
C				
B	KEY&WIFI			
A				RS232

Shanghai High-Flying Electronics Technology Co., Ltd(www.hi-flying.com)

APPENDIX B: HTTP PROTOCOL TRANSFER

HF-LPB120 module support http data transfer in command mode. If any detailed HTTP protocol, contact us and we may support customization.

B.1. HTTP AT command(Reserved)

B.1.1 AT+HTTPURL

- Function:Set /Query HTTP server IP address and Port Number.
- Format:
 - ◆ Query Operation
`AT+HTTPURL<CR>`
`+ok=<IP,Port><CR><LF><CR><LF>`
 - ◆ Set Operation
`AT+HTTPURL=<IP,Port><CR>`
`+ok<CR><LF><CR><LF>`
- Parameters:
 - ◆ IP: IP address.
 - ◆ Port: Port number.

B.1.2 AT+HTTPTP

- Function:Set /Query HTTP request type
- Format:
 - ◆ Query Operation
`AT+HTTPTP<CR>`
`+ok=<Type><CR><LF><CR><LF>`
 - ◆ Set Operation
`AT+HTTPTP=<Type><CR>`
`+ok<CR><LF><CR><LF>`
- Parameters:
 - ◆ Type: GET(default) or POST。

B.1.3 AT+HTTPPH

- Function:Set/Query HTTP protocol header path.
- Format:
 - ◆ Query Operation
`AT+HTTPPH<CR>`
`+ok=<Path><CR><LF><CR><LF>`
 - ◆ Set Operation
`AT+HTTPPH=<Path><CR>`
`+ok<CR><LF><CR><LF>`
- Parameters:

- ◆ Path: Max length is 50 bytes.

B.1.4 AT+HTTPCN

- Function: Set/Query Connection of HTTP protocol header

- Format:

- ◆ Query Operation

AT+HTTPCN<CR>

+ok=<Connection><CR><LF><CR><LF>

- ◆ Set Operation

AT+HTTPCN=<Connection><CR>

+ok<CR><LF><CR><LF>

- Parameters:

- ◆ Connection: Max length is 20 bytes.

B.1.5 AT+HTTPUA

- Function: Set/Query User-Agent of HTTP protocol header.

- Format:

- ◆ Query Operation

AT+HTTPUA<CR>

+ok=<Parameter><CR><LF><CR><LF>

- ◆ Set Operation

AT+HTTPUA=<Parameter><CR>

+ok<CR><LF><CR><LF>

- Parameters:

- ◆ Parameter: Max length is 20 bytes.

B.1.6 AT+HTTPDPT

- Function: Send HTTP request or data.

- Format:

- ◆ Set Operation

AT+HTTPDPT=<Data><CR>

+ok<CR><LF><CR><LF>

- Parameters:

- ◆ Data: HTTP request data, send AT+HTTPDPT directly if no data to be sent.

B.2. HTTP Example

HTTP parameter settings are as follows:

AT+HTTPURL=192.168.1.1,80	Set HTTP server address and port
AT+HTTPPT=POST	Set HTTP request type
AT+HTTPPH=/abcd	Set HTTP protocol header path
AT+HTTPCN= keep-alive	Set HTTP Connection area
AT+HTTPUA= lwip1.3.2	Set HTTP User-Agent area

If send "AT+HTTPD", the data packet will be sent as the following instance including the two new line:

```
POST /abcd HTTP/1.1
Connection:keep-alive
User-Agent:lwip1.3.2
Content-Length:0
Host:192.168.0.127:8999
```

If send AT+HTTPD=abcd, the data packet will be sent as the following instance:

```
POST /abcd HTTP/1.1
Connection:keep-alive
User-Agent:lwip1.3.2
Content-Length:4
Host:192.168.0.127:8999
```

abcd

The data received from HTTP server will be output to serial port and end with "+ok".

If the module hasn't received data from HTTP server for 5 second, it will cut the TCP link with HTTP server.

B.3. Sending HTTP Raw Data in Throughput Mode(Recommend)

Step 1、Configure HTTP server information

```
AT+NETP=tcp,client,80,testnewjava.gotoip4.com
+ok
```

Step 2、Configure module connecting to router AP and reboot.

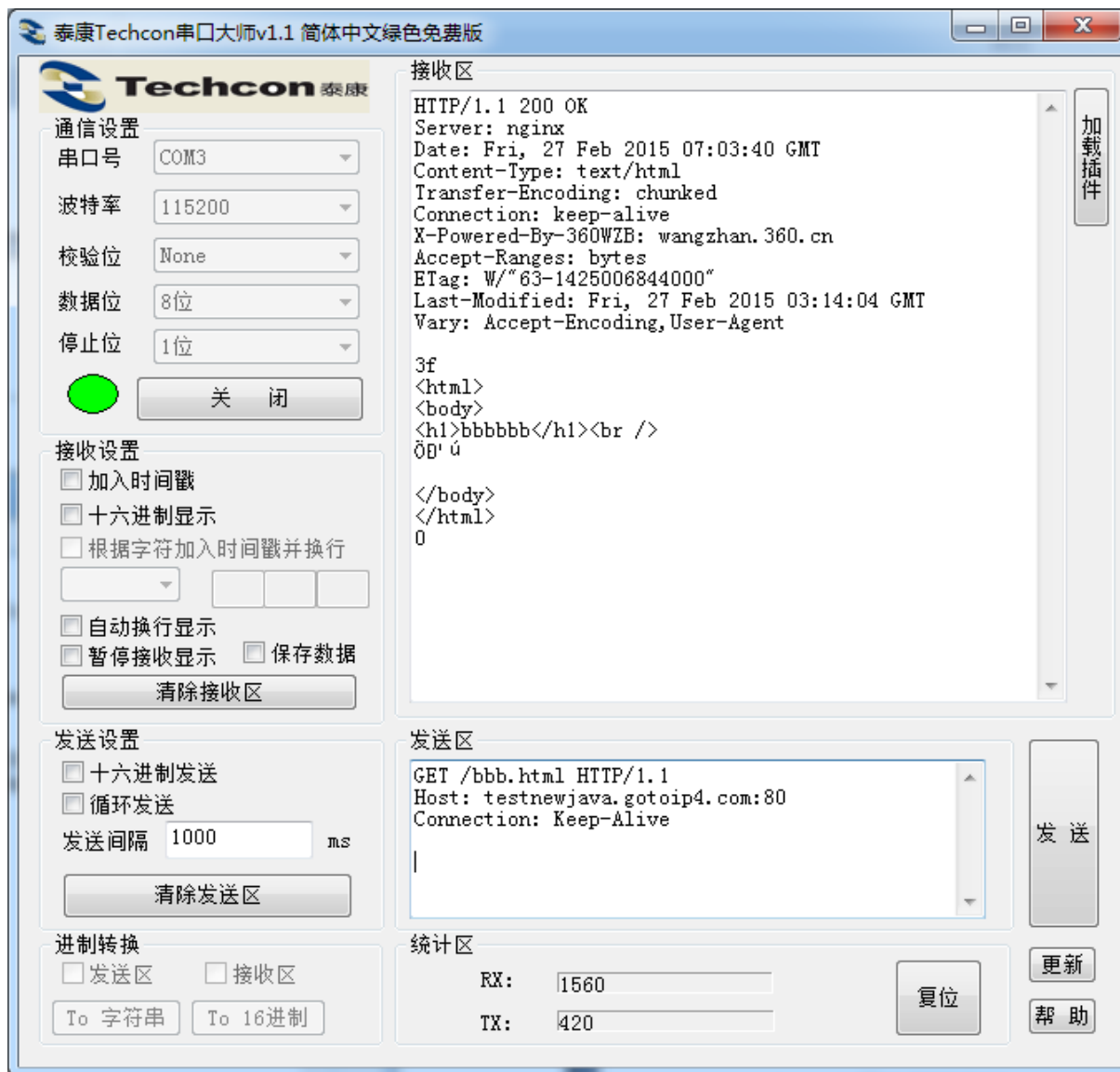
```
AT+WSSSID=Tenda_GYH
+ok

AT+WSKEY=wpa2psk,aes,12345678
+ok

AT+WMODE=sta
+ok

AT+Z
```

Step 3、Sending HTTP raw data via UART, end the data with<CR><LF><CR><LF>



B.4. Sending HTTP Request By AT Command

Step 1、Configure HTTP AT command. SOCKB must set as None.

```
AT+HTTTPURL
+ok=testnewjava.gotoip4.com,80

AT+HTTPTP
+ok=GET

AT+HTTTPPH
+ok=/bbb.html

AT+HTTTPCN
+ok=Keep-Alive

AT+HTTTPUA
+ok=lwip1.3.2

AT+SOCKB
+ok=NONE
```

Step 2、Configure module connecting to router AP and reboot.

```
AT+WSSSID=Tenda_GYH
+ok

AT+WKEY=wpa2psk,aes,12345678
+ok

AT+WMODE=sta
+ok

AT+Z
```

Step 3、Send HTTP request

```
AT+HTTPD
HTTP/1.1 200 OK
Server: nginx
Date: Fri, 27 Feb 2015 07:12:11 GMT
Content-Type: text/html
Transfer-Encoding: chunked
Connection: keep-alive
X-Powered-By-360wZB: wangzhan.360.cn
Accept-Ranges: bytes
ETag: w/"63-1425006844000"
Last-Modified: Fri, 27 Feb 2015 03:14:04 GMT
Vary: Accept-Encoding,User-Agent

3f
<html>
<body>
<h1>bbbbbb</h1><br />
中 国

</body>
</html>
0

+ok
```

APPENDIX C:REFERENCES

C.1. High-Flying Mass Production Tool

Download Address: http://www.hi-flying.com/download_detail_dc/&downloadsId=07bc0a59-0a0d-4fb4-a5e5-c3403f09ab08&comp_stats=comp-FrontDownloads_list01-dc.html

C.2. SmartLink APP V7 Config Tool

IOS Platform : http://www.hi-flying.com/download_detail_dc/&downloadsId=5cc0c241-77b4-48c1-bf9c-2ad2954b3b50&comp_stats=comp-FrontDownloads_list01-dc.html

Android Platform: http://www.hi-flying.com/download_detail_dc/&downloadsId=9a0d0290-477e-4184-8636-18510eaed6b1&comp_stats=comp-FrontDownloads_list01-dc.html

C.3. EVK Quick Start Guide

Download Address: http://www.hi-flying.com/download_detail_dc/&downloadsId=b545c662-4ec7-49a4-aea4-e0997f062a62&comp_stats=comp-FrontDownloads_list01-dc.html

C.4. Module Upgrade

Download Address: http://www.hi-flying.com/download_detail_fir/&downloadsId=825a57bc-5535-4f07-bf23-6f5e7ad2700b.html

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)

Sales Contact: sales@hi-flying.com

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

<END OF DOCUMENT>

© Copyright High-Flying, May, 2011

The information disclosed herein is proprietary to High-Flying and is not to be used by or disclosed to unauthorized persons without the written consent of High-Flying. The recipient of this document shall respect the security status of the information. The master of this document is stored on an electronic database and is “write-protected” and may be altered only by authorized persons at High-Flying. Viewing of the master document electronically on electronic database ensures access to the current issue. Any other copies must be regarded as uncontrolled copies.