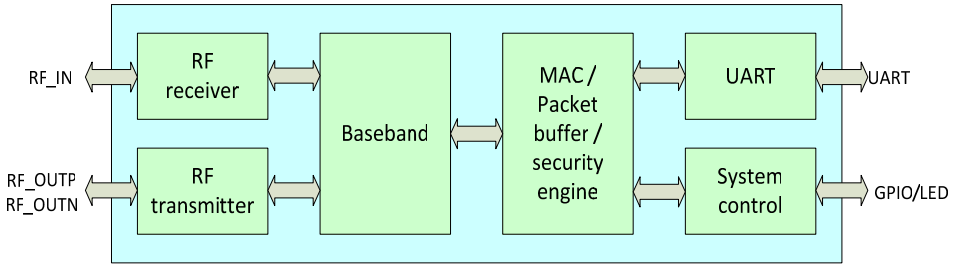
BroadLink

BroadLink 5005-HBS Wi-Fi Module Datasheet

1. Introduction

1.1 Overview

The 5005-HBS is a highly integrated Wi-Fi module, which supportsIEEE802.11b/g/n single stream, providing GPIO for intelligent control, and UART interfaces for device communication.
The 5005-HBS has 8Mbits flash and integrates power amplifier, low noise amplifier, and RF switch to reduce the module size and RF design capability required.
The 5005-HBS embedded ARM Cortex-M4F MCU, the Frequency could reach 200MHz, 512KB SRAM and 8Mbits Flash are included.



5005-HBS block diagram

1.2 Applications

- Smart home appliances
- Remote Control
- Medical/Health Care
- Network consumer devices

1.3 Key Features

- Single operation voltage: 5V
- Power consumption: 80mA for IDLE mode and 1.1mA for Sleep mode
- Wi-Fi connectivity
  - 802.11b, 802.11g, 802.11n (single stream) on channel 1-11@2.4GHz
  - WPA/WPA2 Enterprise
  - Transmit power: 16dBm@11b, 14dBm@11g,13dBm@11n
  - Receiver Sensitivity: <-78dBm (802.11b 11Mbs),<-68 dBm (802.11g 54Mbs), <-66dBm (802.11n MCS7)
  - Max Data rate: 11Mbps@11b，54Mbps@11g, MCS7@11n HT20
  - Wi-Fi modes: Station and AP
  - Patent SmartConfig™ technology
- On-board PCB antenna, IPEX connector for external antenna
- Operating Temperature: -10 ℃ to 70 ℃

1.4 Channels

802.11b, 802.11g, 802.11n(20MHz): 11

Working Frequency of Each Channel:			
channel	Frequency	channel	Frequency
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

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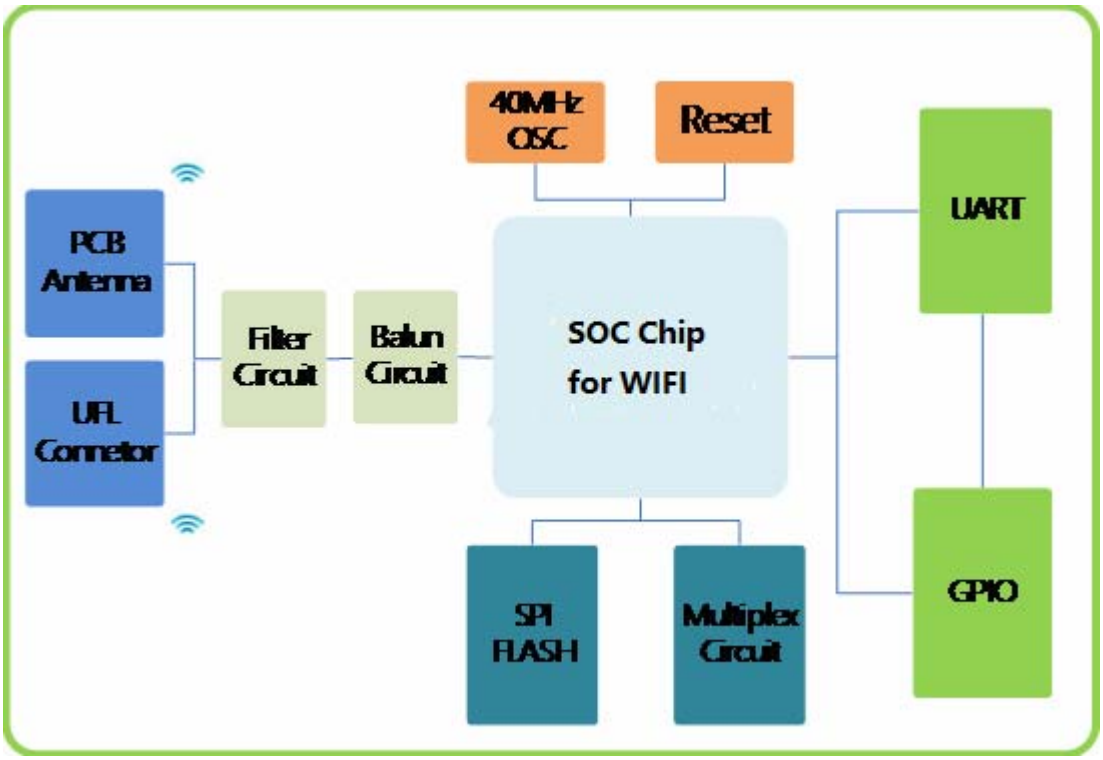
2. Product Overview

2.1 Product Picture

2.2 Block Diagram



3. Electrical Characteristics

3.1 WLAN Parameter

Frequency Range	2.412 GHz - 2.462 GHz
Wireless Standard	IEEE 802.11 b/g/n
Output Power	802.11b:16dBm 802.11g:15dBm 802.11n:15dBm
Antenna	PCB printed ANT
	IPEX connector for external antenna
Input Level Sensitivity	802.11b<-90dBm@1Mbps 802.11b<-80dBm@11Mbps 802.11g<-88dBm@6Mbps 802.11g<-70dBm@54Mbps
Protocol Stack	IPv4, TCP/UDP/FTP/HTTP/HTTPS/TLS/mDNS
Data Rate	11M@802.11b, 54M@802.11g, MCS7@802.11n
Security	data encryption standard：WEP/WEPA/WPA2 encryption algorithm：WEP64/WEP128/TKIP/AES
Network Type	STA/AP/STA+AP/WIFI Direct

3.2 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	℃
TA	Ambient operating	-20	85	℃
	temperature			

3.3 DC Voltage and Current

Specifications	Min.	Typ.	Max.	Units
VDD	4.5	5	5.5	V
VIL(input low voltage)	-0.4		0.7	V
VIH(input high voltage)	0.7*VDD		VDD+0.4	V
VOL(output low voltage)	-0.4		0.3*VDD	V
VOH(output high voltage)	0.7*VDD		VDD+0.4	V
Standby		60		mA
pulse current @TX 11b @16dBm 11Mbps		350		mA
pulse current @TX 11g @14dBm 54Mbps		350		mA

3.4 IEEE802.11b Mode

ITEM	Specification
Modulation Type	DSSS / CCK
Frequency range	2412MHz~2462MHz
Channel	CH1 to CH11
Data rate	1, 2, 5.5, 11Mbps

TX Characteristics	Min	Typical	Max.	Unit
Transmitter Output Power				
11bTarget Power		16		dBm
Frequency Error	-20		+20	ppm
Constellation Error(peak EVM)@ target power				
1~11Mbps		-28	-26	

RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
1Mbps (FER≦8%)		-95		dBm
11Mbps (FER≦8%)		-84		dBm
Maximum Input Level (FER≦8%)	-10			dBm

3.5 IEEE802.11g Mode

ITEM	**Specification**
Modulation Type	OFDM
Frequency range	2412MHz~2462MHz
Channel	CH1 to CH11
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps

TX Characteristics	Min	Typical	Max.	Unit
Transmitter Output Power				
11gTarget Power		14		dBm
Frequency Error	-20		+20	ppm
Constellation Error(peak EVM)@ target power				
6Mbps			-21	dB
54Mbps			-31	dB
Transmit spectrum mask				
@11MHz			-20	dBr
@20MHz			-28	dBr
@30MHz			-40	dBr

RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
6Mbps		-90		dBm
54Mbps		-72		dBm
Maximum Input Level (FER≦10%)	-20			dBm

3.6 IEEE802.11n 20MHz Bandwidth Mode

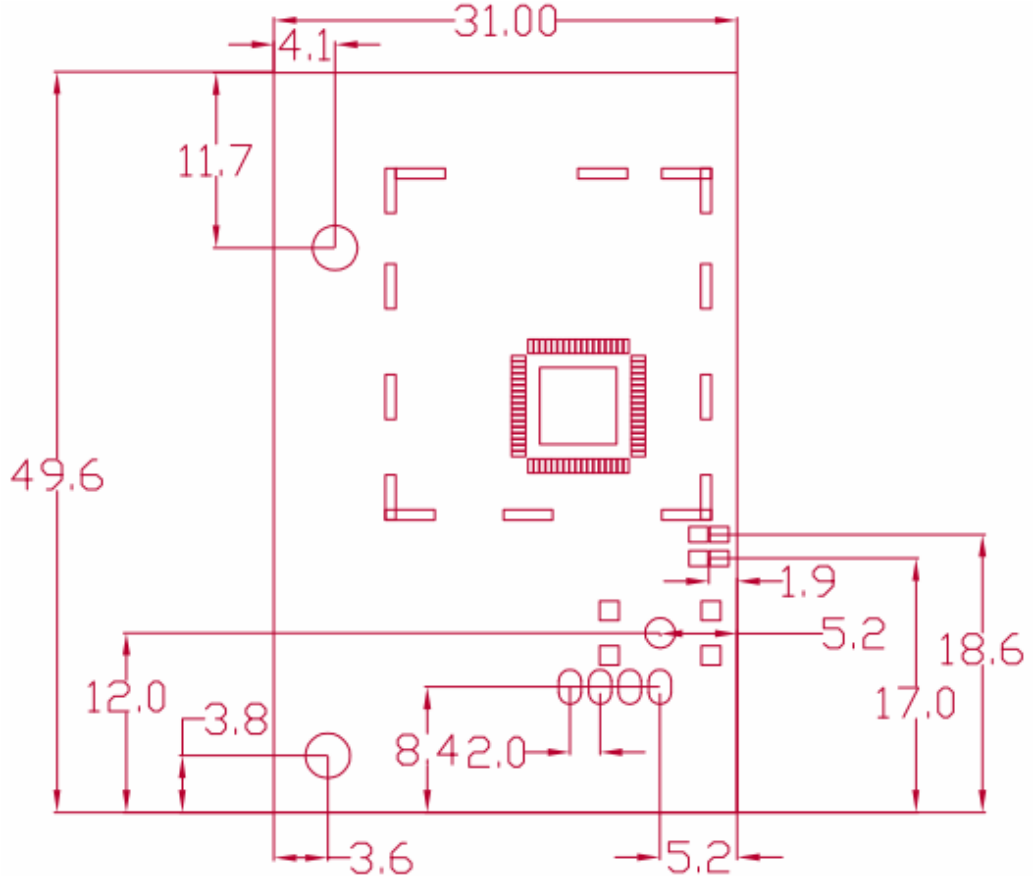
ITEM	**Specification**
Modulation Type	OFDM
Frequency range	2412MHz~2462MHz
Channel	CH1 to CH11
Data rate	MCS0/1/2/3/4/5/6/7

TX Characteristics	Min	Typical	Max.	Unit
Transmitter Output Power				
11n HT20 Target Power		13		dBm
Frequency Error	-20		+20	ppm
Constellation Error(peak EVM)@ target power				
MCS0			-19	dB
MCS7			-30	dB
Transmit spectrum mask				
@11MHz			-20	dBr
@20MHz			-28	dBr
@30MHz			-40	dBr

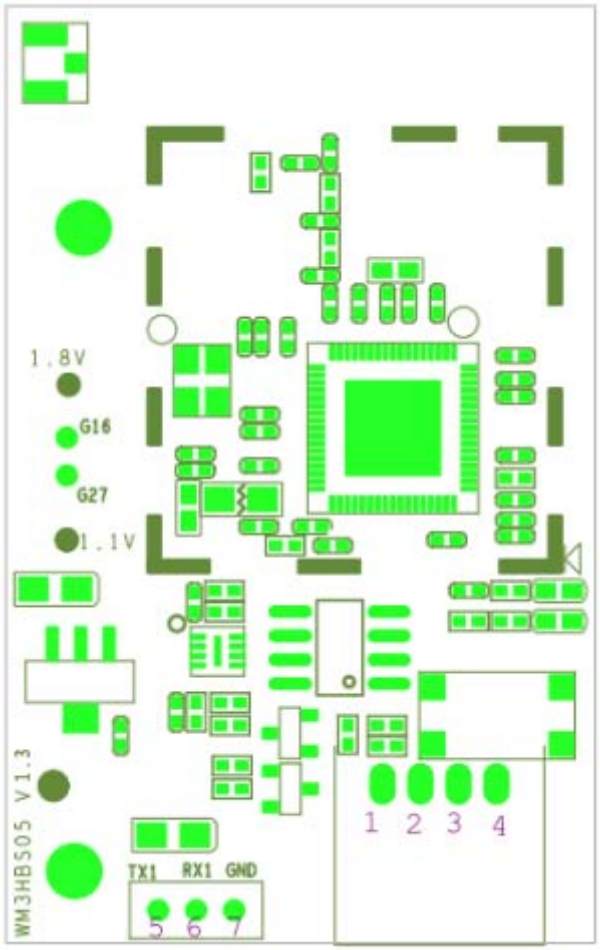
RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
MCS0		-90		dBm
MCS7		-72		dBm
Maximum Input Level (FER≦10%)	-20			dBm

4. Mechanical Characteristics

5005-HBS has 4 pins. The layout of PINs is shown in the figure below.



4.1 PIN Definitions

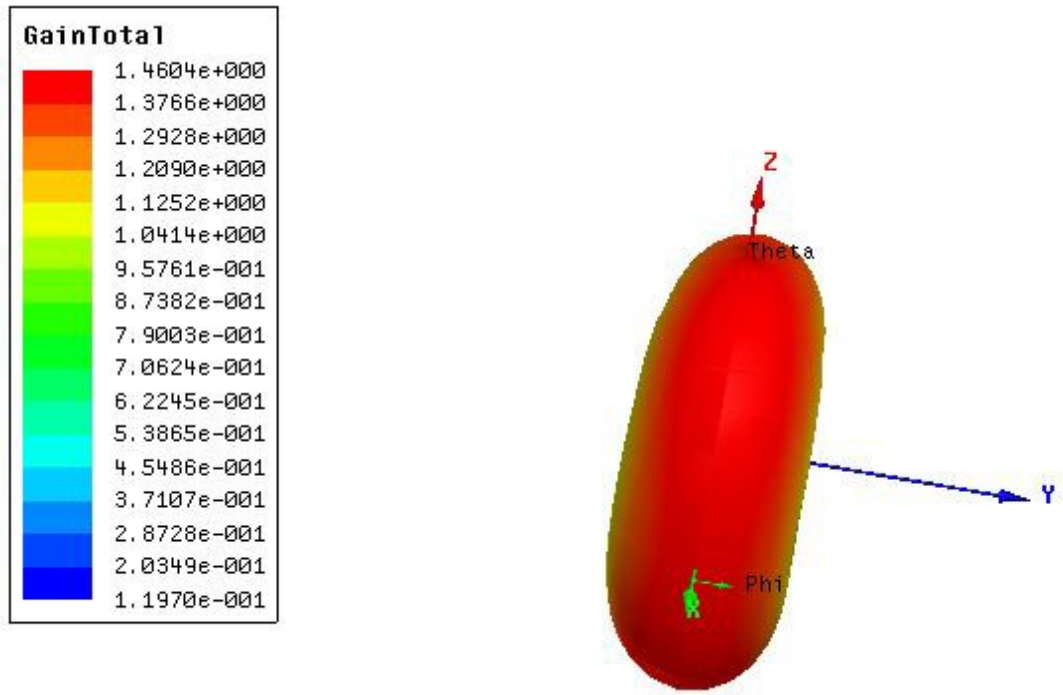


Pins	Pin Assignment	Notes
Pin1	**VCC**	5V
Pin2	**GND**	Ground
Pin3	**UART_TX_5V**	UART transmitter Pin
Pin4	**UART_RX_5V**	UART Receiver Pin

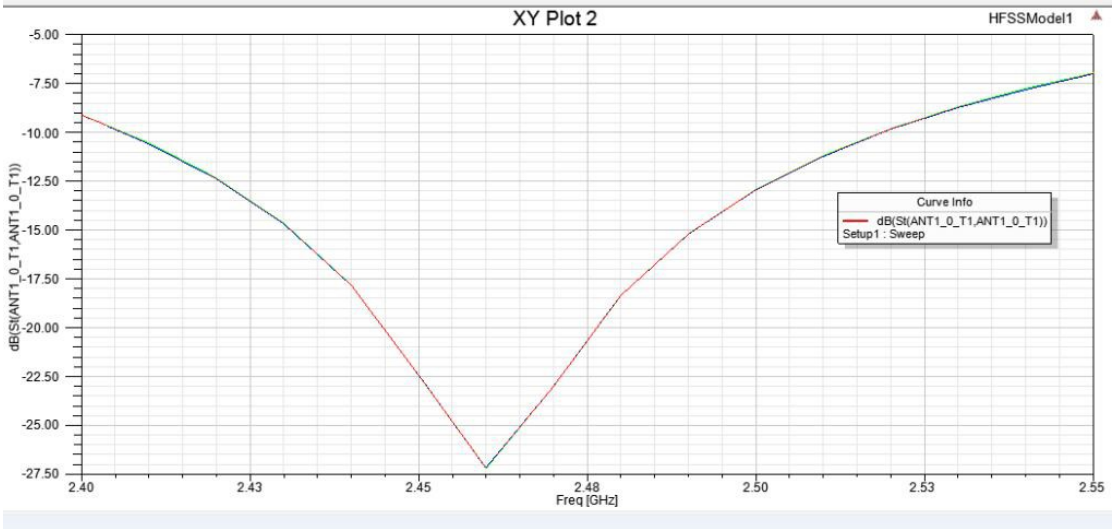
1. TX and RX of UART0 are used to communicate with peripheral processor using power source of 5V. Its output voltage level refers to the description in chapter 3.3 DC characteristics。
2. The 5005-HBS contains RC (resistance- capacitance) and WATCHDOG. Users also can use their RESET circuit.
3. The WIFI indicator LED is embedded in the module.
4. Press the reset button for more than 5 seconds, the module would be resettled,

4.2 Printed Antenna

The 5005-HBS supports on-board PCB printed antenna. When the Operating Frequency is between 2.4G~2.5GH, S11 of antenna port is less than-10dB and peak gain is about 2.2dBi.



Antenna radiation pattern simulation



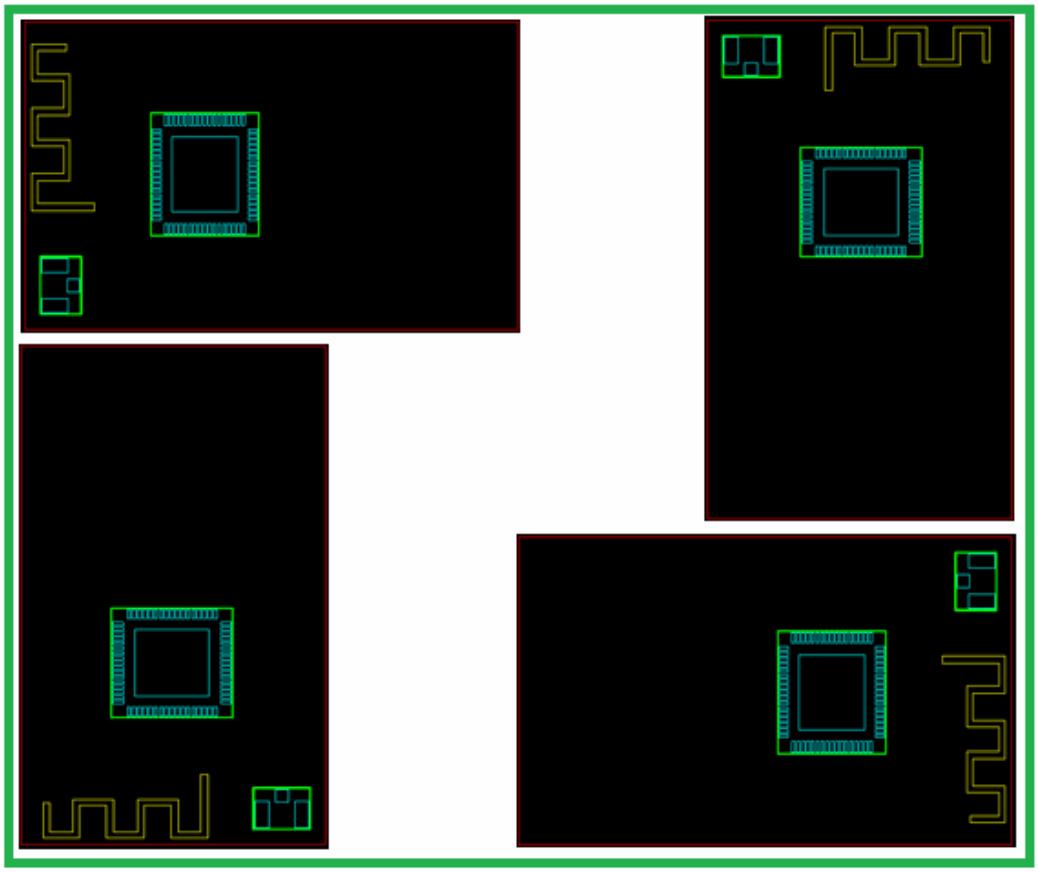
Antenna port S11 simulation curve

When integrating the Wi-Fi module with on board PCB printed antenna, make sure the three points as below:

1. The area under the antenna end of the module should be keep clear of metallic components, connectors, vias, traces and other materials that can interfere with the radio signal.

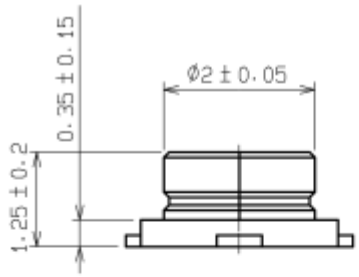
2. The area around the antenna end the module protrudes at least 10mm from the mother board PCB and any metal enclosure.

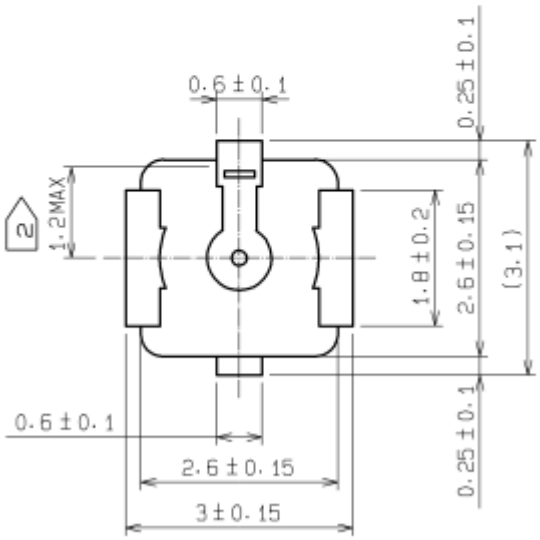
3. When planning PCB layout, it is recommended that user places the antenna of Wi-Fi module as close as possible to the edge of boarder to ensure the good performance of antenna, which is shown in the picture below

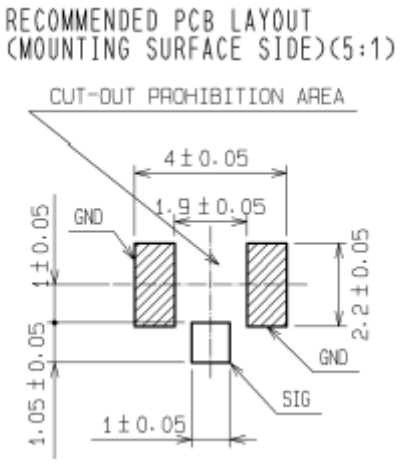


4.3 IPEX Connectors

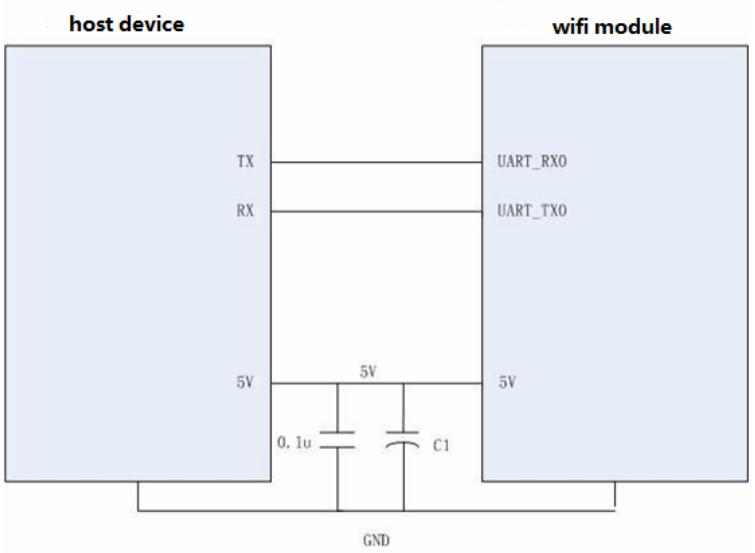
The external antenna is also supported by this wifi module, the dimension of IPEX connector shown as below.







5 Reference Design



5.1 Power Supply

1. For the devices using power source of 5V, the UARTs of host device and Wi-Fi module can be connected directly as the picture above to start communicating.
2. If the 5V power is supplied by LDO, the recommended capacitance C1 could be 10uF-22uF, if the 5V power is supplied by DCDC, the recommended capacitance C1 could be at least 100uF for electrolytic capacitor
3. When the wifi module is working, the peak current could reach more than 350mA, the suggested current supply should be more than 400mA.

a. It is a OEM/Integrators Installation Manual;
b. The module is limited to OEM installation ONLY;
c. The OEM integrators is responsible for ensuring that the end-user has no manual instruction to remove or install module;
d. The module is limited to installation in mobile or fixed application;
e. The separate approval is required for all other operating configurations;

6 Warning

6.1 Federal Communication Commission Interference Statement

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 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.

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 Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

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.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 13.

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with FCC multi-transmitter product procedures.
Refering to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without C2PC.
This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated. Additional testing and certification may be necessary when multiple modules are used.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and

operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.
If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following " Contains TX FCC ID: 2AHH3-5005HBS ". 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.

Contact Us

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