TCP

Module user manual

Module Model ： TCPWIFI8710BX-04

Hardware Version：V1.3

Date： 2019-12-05

Draft （**Hardware Engineer**）	
Check （**Hardware Manager**）	
Approve （**Product Line Deputy Manager**）	
Customer Approve	
Sign in （**Project Manager**）	

Changes Record

*A - Add   M - Modify   D - Delete

Version	Date	（A*M*D）	Modifier	Description	Remark

Contents

1. Introduction

   TCPWIFI8710BX-04, a 2.4GHZ wireless WIFI module is designed for smart LED light by TCP with RTL8710BX as the main chip, which meets standards of IEEE 802.11b/g/n. Also it can be used on DIM, CCT, RGB or other kinds of light products.

Features:

- PCB on-board antenna, no need for customer RF debugging

- AP configuration

- Concise and user-friendly UI on APP

- Wireless network built: Station/Soft AP/Soft AP+Station

- Security mechanism : WPA/ WPA-PSK/WPA2 PSK,

- Encryption type: WEP/TKIP/AES

- WIFI automatic recovery after disconnect

- Network Protocol: TCP/UDP/HTTP

- Ports supported:UART、GPIO, 5 PWM available

- Low Energy

- Size: 24 X 16MM, highly cost-effective

Application

- Wireless smart lamp

- Wireless socket switch

- Wireless sensor

- Mesh network

- Industrial wireless control

- Home automation control

2. Technical Specifications

Network Standard	Wireless：IEEE 802.11b、IEEE 802.11g、IEEE 802.11n(HT20)				
Channel No.	1-11(Channels vary from country to country)				
Frequency Range	2.412-2.462GHz(Frequency varies from country to country)				
Transmit Power	Test Item	Minimum Value	Reference Value	Max Value	Unit
	802.11b 1M	18	19	19.5	dBm
	802.11g 6M,	18	19	19.5	dBm
	802.11n(HT20) MCS7	18	19	19.5	dBm
	Frequency Error	-15	-	15	KHZ
EVM	802.11b 1M EVM	-35	-26	-10	dB
	802.11g 6M EVM	-35	-33	-25	dB
	802.11n(HT20) MCS0	-35	-33	-27	dB
Receive Sensitivity	802.11b 1M	-100	-95	-83	dBm
	802.11b 11M	-95	-89	-76	dBm
	802.11g 6M	-85	-75	-65	dBm
	802.11n(HT20) MCS0	-85	-72	-64	dBm
Antenna					
Type	On-board				
Functional Parameter					
WIFI work mode	Device mode				
Others					
Environment Temp.	Work Temp.：-20-85℃				

3. Electrical Property

Parameters	Symbol	Minimum	Reference	Max	Unit
3.3V Power supply	VDD	3.15	3.3	3.45	V
3.3V Power consumption			80	400	mA
Voltage high input	VIH	2.8	-	3.6	V
Voltage low input	VIL	-0.3	-	0.3	V
Voltage high output	VOH	2.2	-	3.45	V
Voltage low output	VOL		0	0.4	V
Output current in high voltage	IOH		5		mA
Output current in low voltage	IOL		5		mA

4. Top View and Pins Rank

WIFI8710BX-04
V1.3

1	16
2	15
3	14
4	13
5	12
6	11
7	10
8	9

5. Pin Definition

Pin No.	Symbol	Input/ Output	Description	RTL8710BX IC Pin
2	CHIP_EN	I	NC	RTL8710BX_PIN12
4	GPIOA_19	I/O	GPIO reserved	RTL8710BX_PIN30
5	PWM2_B	O	PWM2_B	RTL8710BX_PIN14
6	PWM3_G	O	PWM3_G	RTL8710BX_PIN17
7	PWM5_CT	O	PWM5_CT	RTL8710BX_PIN28
8	VDD	O	3.3V/400mA Voltage Input	RTL8710BX_PIN3/6/8/10/11/24/25
9	GND	P	GND	RTL8710BX_PIN7/33
10	GPIOA_11	I/O	GPIO reserved	RTL8710BX_PIN23
12	GPIOA_22	I/O	GPIO reserved	RTL8710BX_PIN31
13	PWM1_R	I	PWM1_R	RTL8710BX_PIN13
14	PWM4_W	O	PWM4_W	RTL8710BX_PIN17
15	RX	I	UART	RTL8710BX_PIN29
16	TX	O	UART reserved	RTL8710BX_PIN32
1,3,11	/	/	Impending	/

6. Structure
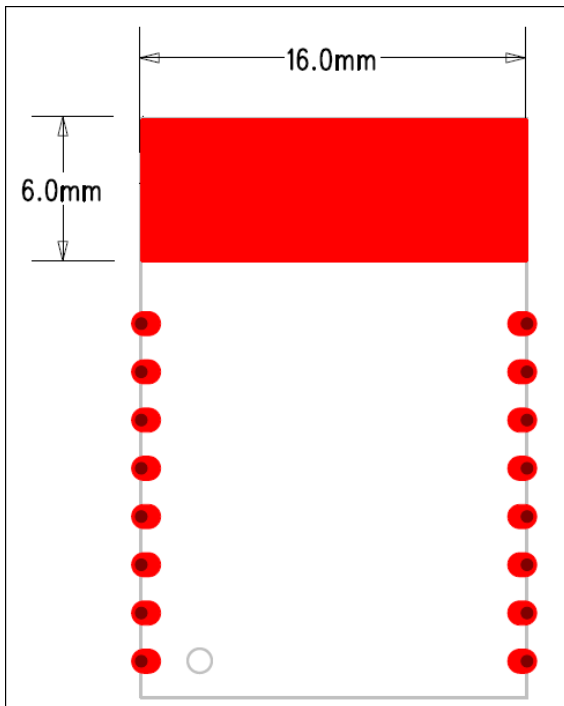
6.1 Module Package
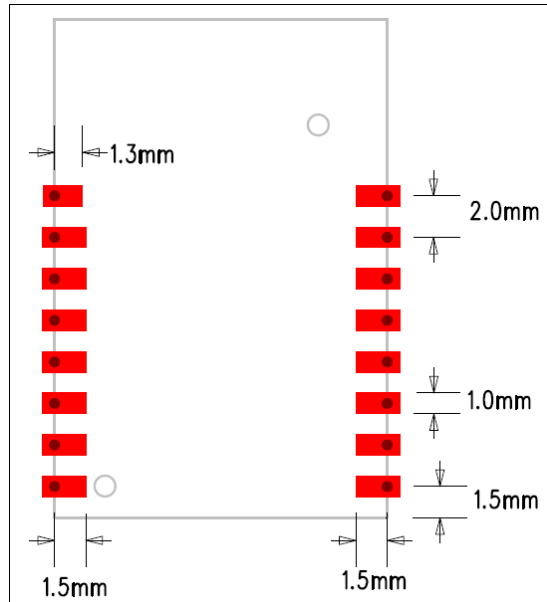

TOP View

6.2 Module Size
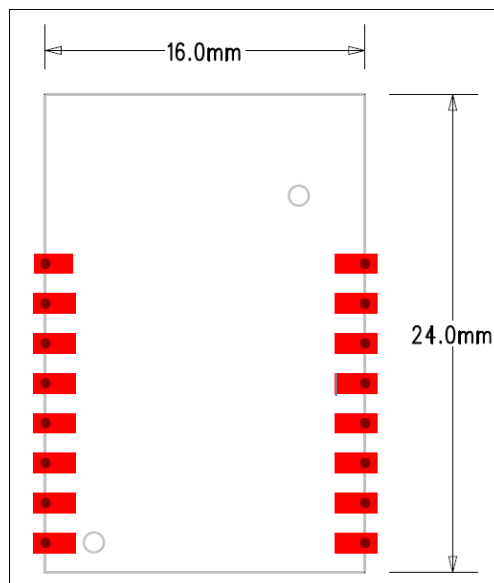
24*16*3.0MM

7. Attentions for Antenna

Followings are attentions for on-board antenna.

1. Components and GND are not allowed to place in red zone below. It is suggested to be hollow.

2. Metals should be far away from antenna, at lease 10mm away from the highest component.

3. Antenna can not be covered by metal shell.

4. Components are prefer to place in red zone below to reduce the impact to antenna. Also you can ask for technical support about layout design.
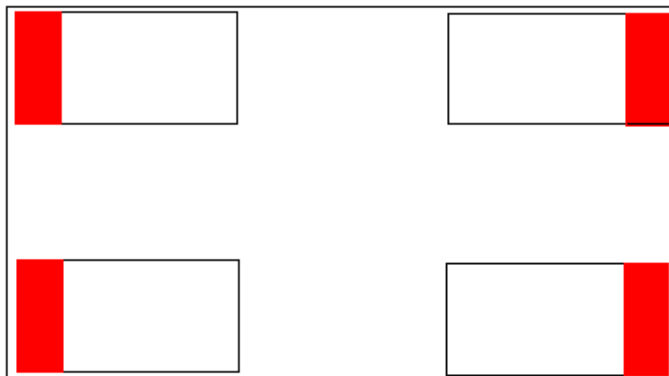
8. Regulatory Module Integration Instructions

8.1 List of applicable FCC rules

This device complies with part 15.247 of the FCC Rules.

8.2 Summarize the specific operational use conditions

This module can be used in household electrical appliances as well as lighting equipments. The input voltage to the module should be nominally 3.0~3.6 VDC ,typical value 3.3VDC and the ambient temperature of the module should not exceed 85°C.

This module using only one kind of antennas with maximum gain is 0 dBi .Other antenna arrangement is not covered by this certification.

The antenna is not field replaceable. If the antenna needs to be changed, the certification should be re-applied.

8.3 Limited module procedures

This module can be used in lighting equipment, smart frontpanel, household electrical appliances.   Normally   host device   should   provide   a   power   supply   in   range   3.0-3.6VDC, typically 3.3VDC   for this module. The limited module manufacturer will reviews detailed test data or host designs prior to giving the host manufacturer approval.

8.4 Trace antenna designs Not applicable

8.5 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.

8.6 Antennas

Module only contains one PCB antenna. No additional external connectors.

8.7 Label and compliance information

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: NIR-WIFI8710 ",or "Contains FCC ID: NIR-WIFI8710", Any similar wording that expresses the same meaning may be used.

8.8 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 has been corrected

Below are steps for on test modes：

For the convenience of customers to test and debug Ameba Series IC, we offer our customers a windows- based system UI_mptool; The tool contains four sub-interface Main, PSD, Efuse, Reg.

Operation steps:

1.   Open "Setup/ Realtek_DUT_Selection.exe",and set every item according to the picture below, Module，RF Mode， Software Control Interface setup Items are particularly important.

Note ： Module for Ameba1 （ 8195AM/8711AM/8711AF ） ,Please select " RTL81 XXE Series " ： For AmebaZ(8710BN/8711BN/8711BG),Please select " RTL871XB Series" .

2.   Open" UI_mptool.exe". Firstly, you must "Initialize" the DUT,and then the four sub interface: Main,PSD,Efuse,Reg can be operated.

3.   Main:

Note: When you select "Initialize with Pidx in EEPROM",

a） It means that TX Power Index Column A will show the Efuse Index Value, which also have been limited by "Power by rate table " (limit power by rate in each mode) and "Power limit table " (limit power by channel plan value) before shown.

b） If you want to load power index only from Efuse, not count in the

"Power by rate table" and "Power limit table" ,you can modify the \WiFiChip\Realtek_WiFi_Device_Setup to "CalculateIndexByDriver .If TX Power Index show '0' , It's probably that the MAC address have not been programmed in Efuse, thus you should PG Efuse entirely in Another Page.

8.9 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.   Frequency spectrum to be investigated

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.

Operating the host product

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 placed into a normal 'paired' mode with another WIFI device, as per the normal intended use of the product (for example, transferring data).

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

ISED RSS Warning:

This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS standard(s).
Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RF exposure statement:

This equipment complies with ISED 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.This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés.Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm ton corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

IC 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 IC: 9486A-WIFI8710",or "Contains IC:9486A-WIFI8710", Any similar wording that expresses the same meaning may be used.
Instructions d'étiquetage IC:
L'extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser des libellés tels que: contient le module émetteur IC:9486A-WIFI8710 "ou" contient: IC: 9486A-WIFI8710 ", tout libellé similaire exprimant le même sens peut être utilisé.