

BL1206-P

Embedded

Product

Version: 1.2

Release date: May 13, 2020

Features

- 125MHz ARM Cortex M4 MCU
- 256KB SRAM/2MB FLASH
- Support AES, MD5, SHA1
- Support XIP
- Working voltage: DC 4.5~24V
- Wi-Fi related features
 - Support 802.11 b/g/n with 20M and 40M bandwidth
 - Support station and soft AP
 - Support SmartConfig and AP configuration
 - Support WEP/WPA2
 - Support multiple cloud services
 - Integrated balun/PA/LNA
 - TCP/IP stack optimized for IoT application

application

- PCB antenna

●Peripheral

- 2x UART
- 2x I2C
- 1x SPI
- 5x PWM
- Up to 10x GPIOs

- Working temperature: -10°C to +80°C
- Stamp style SMD for surface mounting production

Applications

- Smart transportation
- Smart home / appliances
- Instruments
- Health care
- Industrial automation
- Intelligent security
- Smart energy

Model

Model	Antenna type	Note
BL1206-P	PCB antenna	Default

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1. Overview

BL1206-P is a cost-effective embedded Wi-Fi module designed by BroadLink, which integrates an ARM Cortex-M4F processor speed up to 125MHz, 256KB SRAM and 2MB flash with 3.3V single power supply.

The module integrates radio transceiver, MAC, baseband, all Wi-Fi protocols, configurations and network stack. It can be widely used in applications like smart home devices, remote monitoring devices and medical care instruments.

2. Basic Specifications

2.1. Power Consumption

Please refer to Table 1 for power consumption data.

Table 1 BL1206-P Power Consumption Data

Specifications	Min.	Typ.	Max.	Units
VDD	4.5	12	24	V
VIL(input low voltage)	0		0.4	V
VIH(input high voltage)	4		5.5	V
VOL(output low voltage)	0		0.4	V
VOH(output high voltage)	4		5.5	V
Standby (SP mini)			60	mA
pulse current @TX 11b @17.5dBm 11Mbps			178	mA
pulse current @TX 11g @14dBm 54Mbps			178	mA
pulse current @TX 11n @14dBm 65Mbps			170	mA

2.2. Working Environment

Please refer to Table 2 for working environment data.

Table 2 BL1206-P Working Environment Data

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	°C
TA	Ambient operating temperature	-10	80	°C
Vdd	Supply voltage	3.0	3.6	V
Vio	Voltage on IO pin	0	3.3	V

3. Radio Specifications

3.1. Basic Radio Specification

Please refer to Table 3 for radio specification.

Table 3 BL1206-P Radio Specification

Radio range	2.412 GHz - 2.462 GHz
Wireless standards	IEEE 802.11 b/g/n
Radio output (conductive)	802.11b: 16 ± 1.5 dBm@11Mbps
	802.11b: 16 ± 1.5 dBm@1Mbps
	802.11g: 14 ± 1.5 dBm@54Mbps
	802.11g: 16 ± 1.5 dBm@6Mbps
	802.11n: 14 ± 1.5 dBm@MCS7/HT20
	802.11n: 16 ± 1.5 dBm@MCS0/HT20
	802.11n: 13.5 ± 1.5 dBm@MCS7/HT40
	802.11n: 16 ± 1.5 dBm@MCS0/HT40
Antenna type	Internal: PCB antenna
	External: Not supported
Receiving sensitivity	802.11b < -88 dBm@11Mbps
	802.11g < -75 dBm@54Mbps
	802.11n/HT20 < -72 dBm@MCS7

	802.11n/HT40<-69dBm@MCS7
Stack	IPv4, TCP/UDP/FTP/HTTP/HTTPS/TLS/mDNS
Data rate (max)	11M@802.11b, 54M@802.11g, MCS7@802.11n
Security	Encryption standard: Open/WEP-Open/WPA/WPA2
	Encryption algorithm: WEP64/WEP128/TKIP/AES
Network types	STA/AP/STA+AP/WIFI Direct

3.2. Radio Performance

3.2.1. IEEE 802.11b

Table 4 Basic specifications under IEEE802.11b

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

Table 5 Transmitting performance under IEEE802.11b

TX Characteristics	Min.	Typical	Max.	Unit
Power@11Mbps		16		dBm
Frequency Error	-10		+10	ppm
EVM@11Mbps			-17	dB
Transmit spectrum mask				
Pass				

Table 6 Receiving performance under IEEE802.11b

RX Characteristics	Min	Typical	Max	Unit
MCS7 Input Level Sensitivity				
Minimum Input Level (FER \leq 10%)			-73	dBm
Maximum Input Level (FER \leq 10%)	-10			dBm

3.2.2. IEEE 802.11g

Table 7 Basic specifications under IEEE802.11g

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

Table 8 Transmitting performance under IEEE802.11g

TX Characteristics	Min.	Typical	Max.	Unit
Power@54Mbps		14		dBm
Frequency Error	-10		+10	ppm
EVM@54Mbps			-32	dB
Transmit spectrum mask				
Pass				

Table 9 Receiving performance under IEEE802.11g

RX Characteristics	Min	Typical	Max	Unit
54Mbps Input Level Sensitivity				
Minimum Input Level (FER \leq 10%)			-88	dBm

Maximum Input Level (FER \leq 10%)	-10			dBm
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3.2.3 IEEE802.11n

IEEE802.11n 20MHz bandwidth mode

Table 10 Basic specifications under IEEE802.11n with 20MHz

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

Table 11 Transmitting performance under IEEE802.11n with 20MHz

TX Characteristics	Min.	Typical	Max.	Unit
Power@HT20, MCS7		14		dBm
Frequency Error	-10		+10	ppm
EVM@HT20, MCS7			-30	dB
Transmit spectrum mask				
Pass				

Table 12 Receiving performance under IEEE802.11n with 20MHz

RX Characteristics	Min.	Typical	Max	Unit
MCS7 Input Level Sensitivity				
Minimum Input Level (FER \leq 10%)			-72	dBm
Maximum Input Level (FER \leq 10%)	-10			dBm

IEEE802.11n 40MHz bandwidth mode

Table 13 Basic specifications under IEEE802.11n with 40MHz

ITEM	Specification
Modulation Type	OFDM
Frequency range	2422MHz~2452MHz
Channel	CH3 to CH9
Data rate	MCS0/1/2/3/4/5/6/7

Table 14 Transmitting performance under IEEE802.11n with 40MHz

TX Characteristics	Min.	Typical	Max.	Unit
Power@HT40, MCS7		13.5		dBm
Frequency Error	-10		+10	ppm
EVM@HT40, MCS7			-33	dB
Transmit spectrum mask				
Pass				

Table 15 Receiving performance under IEEE802.11n with 40MHz

RX Characteristics	Min.	Typical	Max.	Unit
MCS7 Input Level Sensitivity				
Minimum Input Level (FER \leq 10%)			-69	dBm
Maximum Input Level (FER \leq 10%)			-20	dBm

3.2.4 Testing Data for OTA

Refer to Table 1 for testing data.

Table 16 Actual power for EIRP, TRP and TIS

Testing equipment	Testing item	Mode	Speed	Channel	Power/dBm
CMW500	EIRP	11b	11M	1	<20
				6	<20
				11	<20
		11g	6M	1	<20
				6	<20
				11	<20
	TRP	11g	6M	1	≥12
				6	≥12
				11	≥12
	TIS	11g	54M	1	≤-72
				6	≤-72
				11	≤-72

4. BL1206-P Hardware Information

4.1. PIN Sequence

Please refer to Fig 1 for the pin sequence.

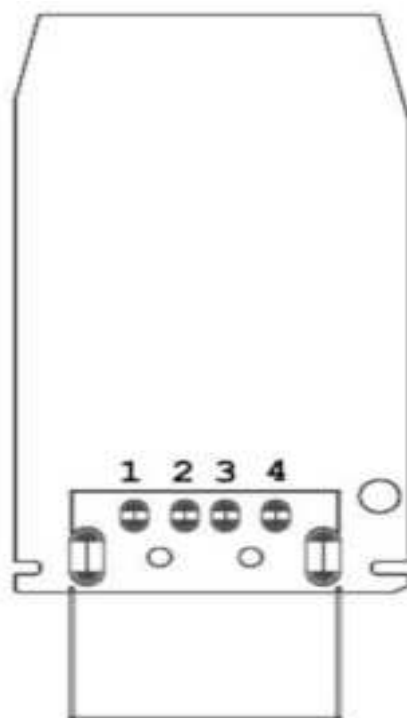


Fig 1 BL1206-P pin sequenc

4.2. PIN Definitions

Please refer to Table for the pin definitions.

Table17 BL1206-P pin definitions

Pin	Interface	Description	Type
1	GND	GND	POWER
2	TX	UART0_TX 5V	O
3	RX	UART0_RX 5V	I
4	VDD	4.5~24V[Typ:12V]	POWER

Note:

1. In default, UART0 is used for bypass communication and UART2 is used for output of debugging information. Please refer to the description in DC Characteristics for UART output current level.
2. NRST is hardware reset for the module and will be effective with VIL. Configuration

information will be remained after module reset. The module is already designed with RC reset upon power-on.

3. The pins for reset button and LED indication should be defined according to actual firmware and circuit design.
4. In default, PIN11 (GPIO14) is the module software reset PIN and will be effective with VIH. The previous configuration information will be cleared after the module is reset (reset to factory settings).
5. TX and RX in UART0 are used for communication with external MCU powered by 3V. Please refer to the description in 3.3. DC Characteristics for UART output current level.
6. It is recommended to ground unused GPIOs with 10pF capacitor.
7. GPIOA0 and GPIOA19 are Power on Trap Pin with functions described below:

GPIOA0	0	Normal operation mode
	1	Enter into test/debug mode
GPIOA30	0	Download image from UART
	1	Boot from Flash

The module will detect GPIO0 and GPIO19 when powered on and enter specific mode according to the IO state.

4.3. PCB Antenna

Please refer to Fig 2 for PCB antenna.



Fig 2 BL1206-P Antenna layout

The module support PCB antenna in 2.4G~2.5G frequency with S11 port less than -10dB and max gain of 1.8dB at 2.45GHz, as shown in Fig 3.

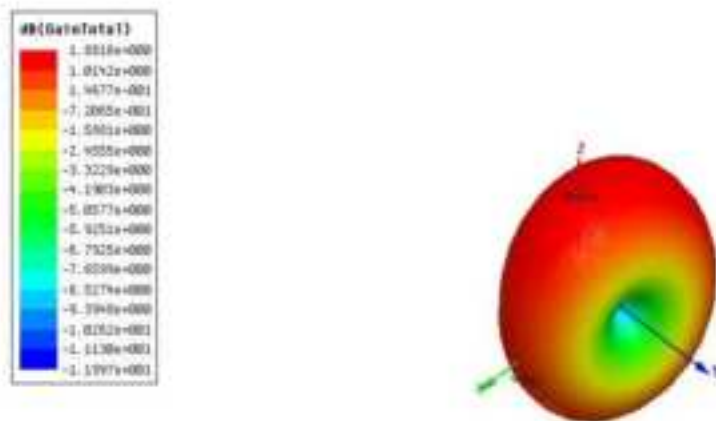


Fig 3 Simulated radiation pattern of antenna gain

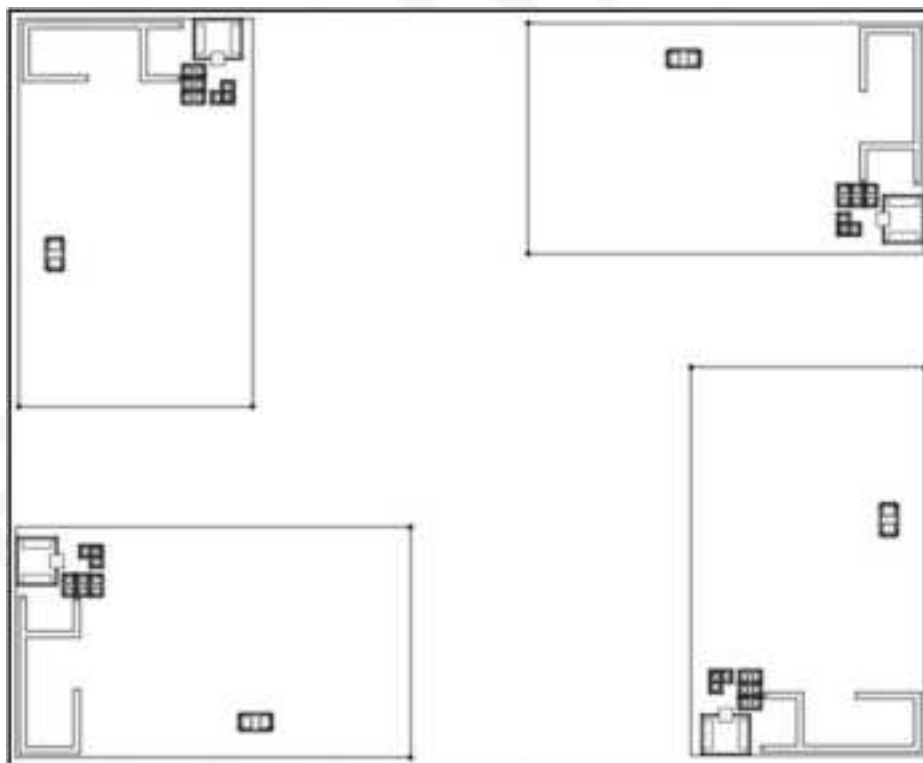


Fig 4 BL1206-P general sample Recommended PCB layout

4.4. Mechanical Dimensions

Please refer to Fig 6 for the dimensions of module.

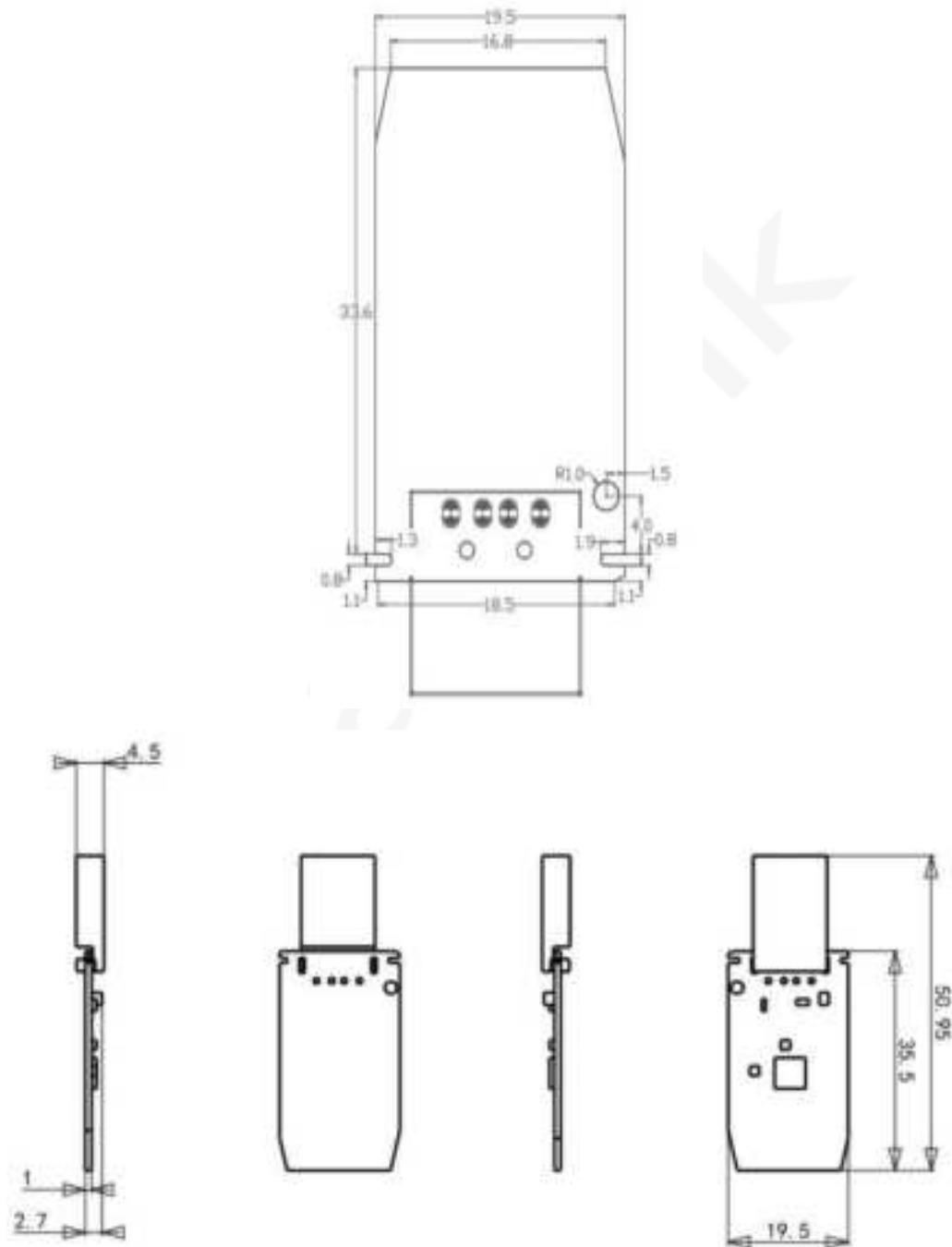


Fig 6 BL1206-P Dimensions

Note: Dimensions $(50.95 \pm 0.3) \text{ mm} * (19.5 \pm 0.3) \text{ mm} * (3.2 \pm 10\%) \text{ mm}$ (with shielding case)

5. Reference Design

5.1. UART Interface Design

For devices with 3.3V power supply, you can directly connect the device UART port with module UART port according to the illustration in Fig 12.

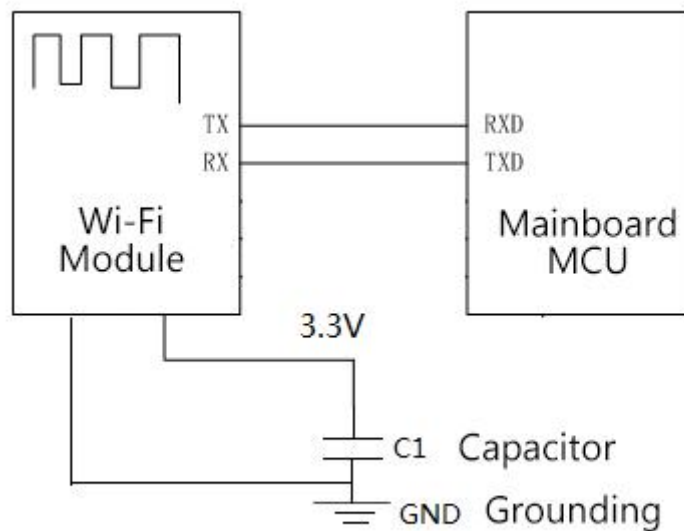


Fig 12 Circuit diagram (3.3V)

If your device is powered by 12V, you can refer to the circuit shown in Fig 13 or design your own circuit for power conversion. The value of resistor can be adjusted according to actual circuit design.

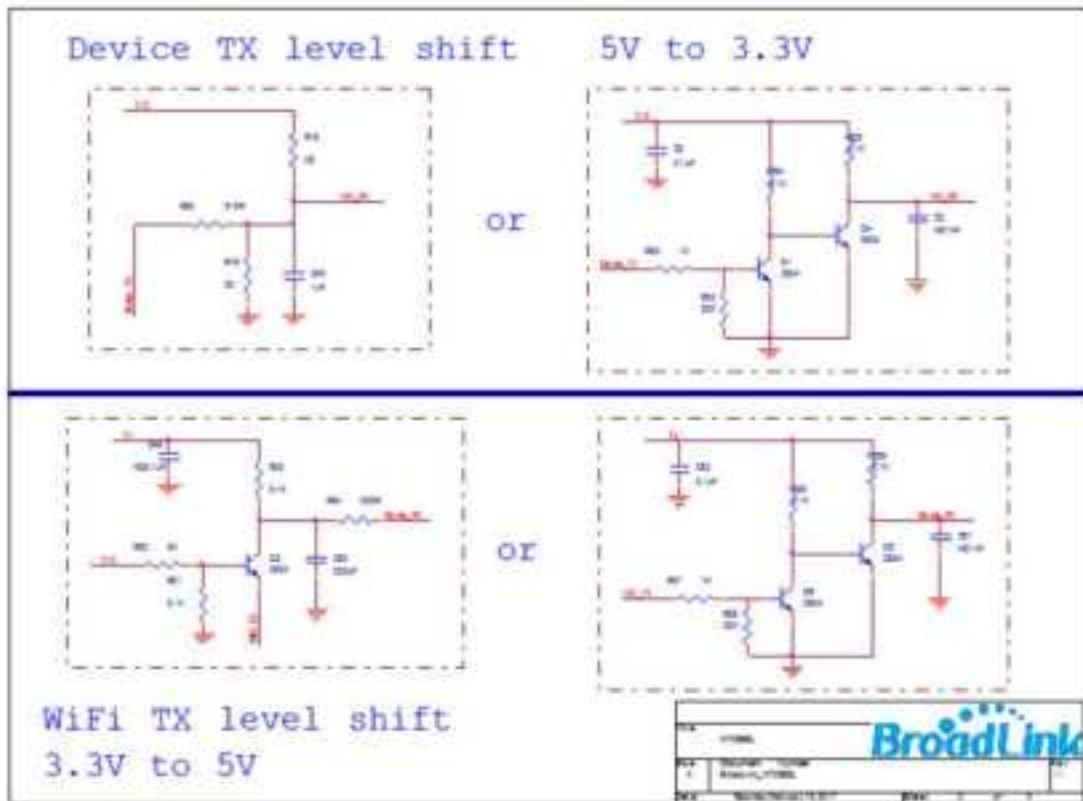


Fig 13 Circuit diagram (12V)

5.2. Power Supply Requirement

If an LDO is used to supply the module with 3.3V power, C1 capacitor can be considered to be used with 10u-22u; If a DCDC is used to supply 3.3V power, C1 capacitor can be considered to be used with 22uF.

It is recommended to supply the module with power higher than 400mA to ensure enough power supply to the module and avoid power down during data transmission.

The module is designed with 2x 3.3V pins. You can power the module with either pin or both pins.

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.

Note: This product 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 product 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 product 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.

OEM requirement and guidance for host manufactures

The module is limited to OEM installation ONLY

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

In case that FCC identification number and IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains FCC ID: 2ATEV-BL1206-P” and “Contains IC: 25062-BL1206P” the information should be also contained in the devices’ user manual.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. This device is intended only for OEM integrators under the following conditions: 1) The antenna must be installed such that 20 cm is maintained between the antenna and user. 2) The transmitter module may not be co-located with any other transmitter or antenna.

This equipment complies with FCC & IC RSS-102 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.

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 RF exposure considerations

This equipment complies with FCC/IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

2.4 Information on test modes and additional testing requirements

Contact Hangzhou BroadLink Technology Co., Ltd. will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

2.5 Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, Hangzhou BroadLink Technology Co., Ltd. shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

This device complies with Industry 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'Industrie Canada applicables aux appareils radioexempts 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.

Caution:

Use the Product in the environment with the temperature Between -20℃ and 85℃; Otherwise, it may damage your product. Products can only be used below 2000m altitude

For the following equipment:

Product Name: WiFi Module

Model: BL1206-P

Brand Name: Broadlink

Hangzhou BroadLink Technology Co., Ltd.

E-mail: mengjiao.yan@broadlink.com.cn



hereby declares that this [Name: WiFi Module, Model: BL1206-P is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

This product is intended for sale and application in a business environment.

RED Article 10 2

-This product can be used across EU member states

RED Article 10 10

-The product is class 1 product, No restrictions

Wi-Fi (2.4G)

Frequency Range:

2412-2462MHz for 802.11b/g/n(HT20)

2422-2452MHz for 802.11b/g/n(HT40)

Max.RF Output Power: 16.98dBm (EIRP)

The RF distance between product and body is 20cm

Revision History

Date	Version	Updated Content
13/5/2020	1.2	Preliminary version

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