

BL3389-P

Embedded

Product

Version: 1.0

Release date: June, 16, 20,21

Features

- Support IEEE802.11 b/g/n standards
- Support BLE 5.0
- Support WEP, WPA and WPA2 encryption
- Support UART/PWM/ADC/GPIO/I2C

interfaces

- Support TLS/SSL protocols
- Support PCB antenna
- 3.3V power supply
- Wi-Fi related features
 - Support 802.11 b/g/n with 20M
 - Support station and soft AP
 - Support SmartConfig/ AP

configuration

- Integrated balun/PA/LNA
- TCP/IP stack optimized for IoT

application

- PCB antenna
- Peripheral
 - 2x UART
 - 1x I2C
 - 1x SPI
 - 3x PWM
 - Up to 9GPIOs

- Working temperature: -10°C to +85°C
- Stamp style SMD for surface mounting production

Applications

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

Models

Model	Antenna type	Note
BL3389-P	PCB antenna	Default

Content

1. Overview.....	- 3 -
2. Basic Specifications.....	- 3 -
2.1. Power Consumption	- 3 -
2.2. Working Environment	- 4 -
3. Radio Specifications.....	- 4 -
3.1. Basic Radio Specification	- 4 -
3.2. Radio Performance.....	- 5 -
3.2.1. IEEE 802.11b	- 5 -
3.2.2. IEEE 802.11g	- 5 -
3.2.3 IEEE802.11n.....	- 6 -
4. BL3389-P Hardware Information.....	- 7 -
4.1. Footprint Sequence	- 7 -
4.2. Footprint Definitions	- 8 -
4.3. PCB Antenna	- 9 -
5. Reference Design.....	- 10 -
5.1. UART Interface Design.....	- 10 -
5.2. Power Supply Requirement.....	- 12 -
Revision History	- 13 -
Copyrights.....	- 13 -
Contact Us	- 13 -

1. Overview

BL3389-P is a cost-effective embedded Wi-Fi module designed by BroadLink, which supports 802.11 b/g/n standards and UART communication with other devices. 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.

The module integrates an ARM Cortex-M4 processor speed up to 160MHz with 352KB SRAM and 1MB flash.

2. Basic Specifications

2.1. Power Consumption

Please refer to Table 1 for power consumption data.

Table 1 BL3389-P Power Consumption Data

Specifications	Min.	Typ.	Max.	Units
VDD ¹	3.0	3.3	3.6	V
VIL(input low voltage)	0		0.8	V
VIH(input high voltage)	2.0		3.6	V
VOL(output low voltage)			0.4	V
VOH(output high voltage)	2.4		3.6	V
Standby (SP mini)		55		mA
pulse current @TX 11b @ 11Mbps			260	mA
pulse current @TX 11g @ 54Mbps			240	mA
pulse current @TX 11n @ 65Mbps			235	mA
BLE			175	mA

2.2. Working Environment

Please refer to Table 2 for working environment data.

Table 2 BL3389-P Working Environment Data

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	°C
TA	Ambient operating temperature	-10	85	°C
Vdd	Supply voltage	3.3	3.6	V
Vio	Voltage on IO pin	0	VDD	V

3. Radio Specifications

3.1. Basic Radio Specification

Please refer to Table 3 for radio specification.

Table 3 BL3389-P Radio Specification

Frequency Band	2400MHz – 2483.5MHz
Wireless standards	IEEE 802.11 b/g/n, BLE
Radio output	802.11b:14dBm±1dBm 802.11g:11.5dBm±1dBm 802.11n:11.5dBm±1dBm BLE:3.5dBm±1dBm
Antenna type	Internal: PCB antenna External: Not supported
Receiving sensitivity	802.11b<-85dBm@11Mbps 802.11g<-75dBm@54Mbps 802.11n<-71dBm@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		14		dBm
Frequency Error	-20		+20	ppm
EVM@11Mbps			-15	dB
Transmit spectrum mask				
Pass				

Table 6 Receiving performance under IEEE802.11b

RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
11Mbps (FER ≤ 8%)			-85	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
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Table 8 Transmitting performance under IEEE802.11g

TX Characteristics	Min.	Typical	Max.	Unit
Power@54Mbps		11.5		dBm
Frequency Error	-20		+20	ppm
EVM@54Mbps			-29	dB
Transmit spectrum mask				
Pass				

Table 9 Receiving performance under IEEE802.11g

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
54Mbps			-75	dBm

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		11.5		dBm

Frequency Error	-20		+20	ppm
EVM@HT20, MCS7			-29	dB
Transmit spectrum mask				
Pass				

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

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
MCS7			-71	dBm

4. BL3389-P Hardware Information

4.1. Footprint Sequence

Please refer to Fig 1 for the footprint sequence of BL3389-P.

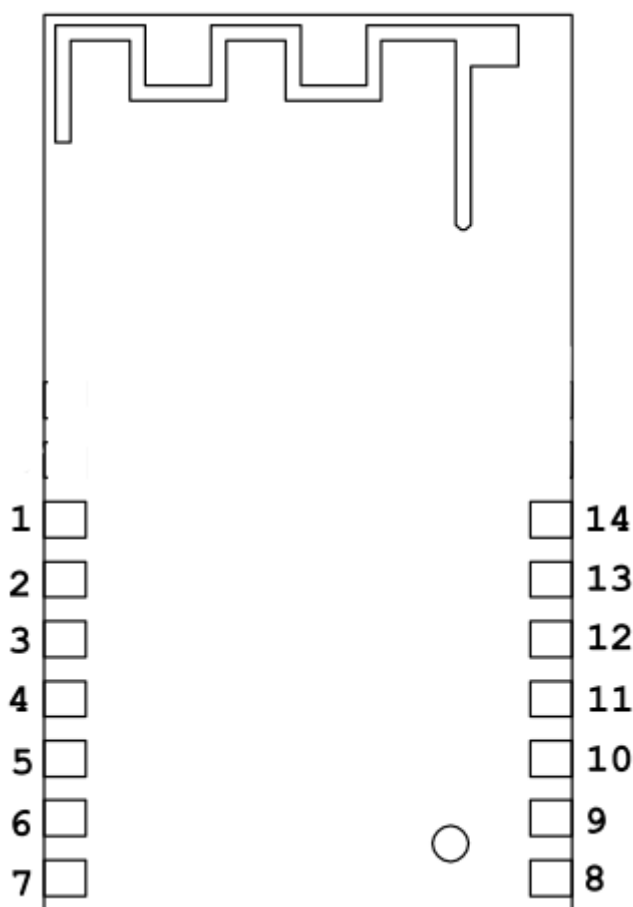


Fig 1 BL3389-P Footprint sequence

4.2. Footprint Definitions

Please refer to Table 13 for the footprint definitions of BL3389-P.

Table 13 BL3389-P footprint definitions

PIN	Function	Description
1	GDN	
2	VDD	
3	RST	Pull up internal
4	GPIO12	SPI, I2C, UART, PWM, ADC, GPIO
5	GPIO17	SPI, I2C, UART, PWM, GPIO
6	GPIO16	TX0
7	GPIO7	RX0
8	GPIO8	SPI, I2C, UART, PWM, ADC, GPIO
9	GPIO22	SPI, I2C, UART, PWM, GPIO
10	GPIO0	SPI, I2C, UART, PWM, GPIO

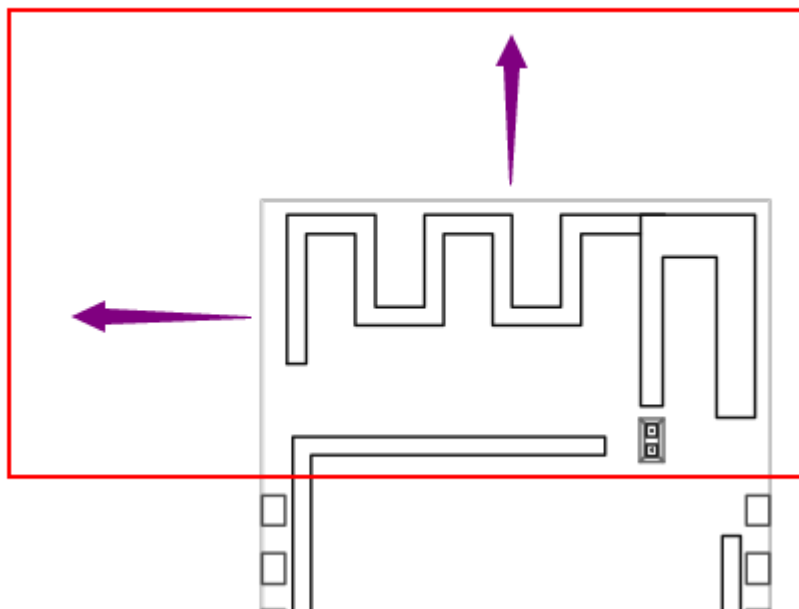
11	GPIO1	SPI, I2C, UART, PWM, GPIO
12	GPIO2	SPI, I2C, UART, PWM, GPIO
13	VDD	
14	GND	

Note:

1. In default, UART2 (pin4 and pin5) are used for bypass communication and UART0 (pin6 and pin7) are used for output of debugging information and burning firmware. Please refer to the description in DC Characteristics for UART output current level.
2. The module is powered on when GPIO8 is pulled up, it enters the burning mode

4.3. PCB Antenna

for PCB antenna. Please avoid to place any electrical components, wiring or grounding under PCB antenna area on main board and it's better to leave this area blank on PCB.



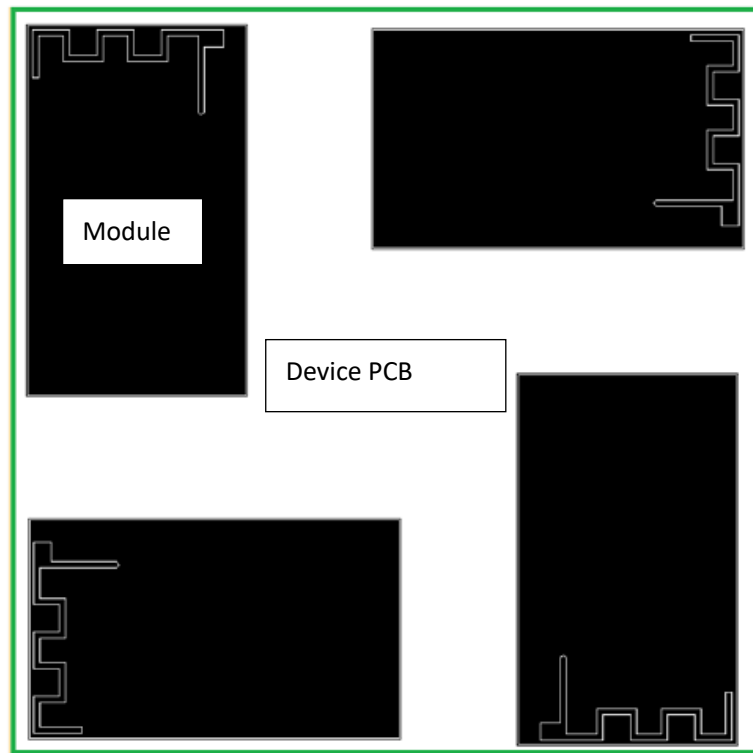


Fig 2 BL3389-P Recommended PCB layout

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 Fig 3.

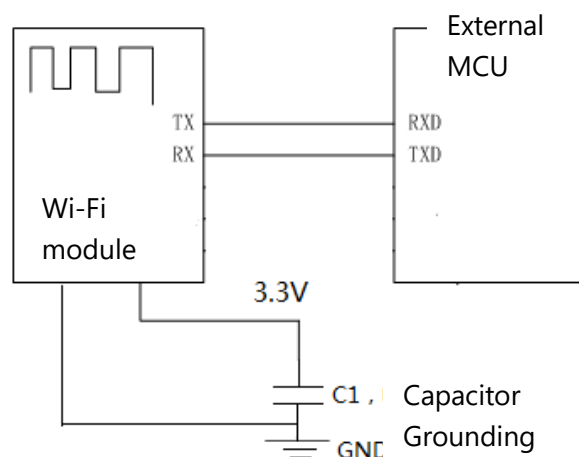


Fig 3 Circuit diagram (3.3V)

If your device is powered by 5V, you can refer to the circuit shown in Fig Fig 4 or design your own circuit for power conversion. The value of resistor can be adjusted according to actual circuit design.

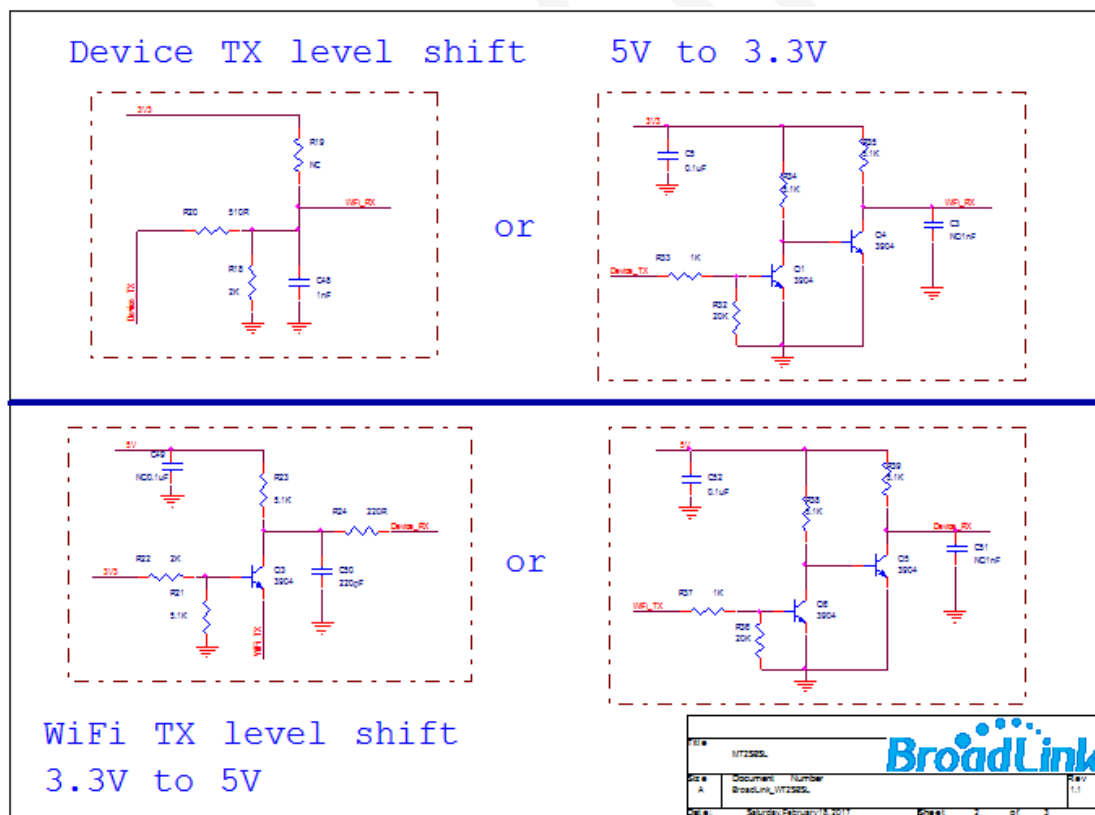


Fig 4 Circuit diagram (5V)

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.

Revision History

Date	Version	Updated Content
June 16, 2021	1.0	Preliminary version

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For more information of BroadLink Wi-Fi modules, please visit our website:

www.broadlink.com.cn

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 ID:2ATEV-BL3389-P

IC ID:25062-BL3389P

CAN ICES-3 (B)/NMB-3(B)

Please take attention that changes or modification 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.

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.

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.

Under Industry Canada regulations, this radio transmitter may only operate using an

antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiating power (EIRP)

(1) Operational use conditions

***if your module has professional users use condition limitations, please keep below sentence here Module has professional users use condition limitations, Host product manufacturer please ensure giving such warning like "Product is limited to professional users use" in your product's instruction.

(2) Antenna used

Antenna Type	Brand/ manufacturer	Model No.	Max. Antenna Gain
PCB	Hangzhou BroadLink Technology Co.,Ltd	/	2dBi

(3) Notice to Host Product Manufacturer

Any deviation(s) from the defined parameters of the antenna trace, as described by this instruction, host product manufacturer must notify us that you wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID and IC ID (new application) procedure followed by a Class II permissive change application.

(4) Labelling Instruction for Host Product Integrator

Please notice that if the FCC 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-BL3389-P" and "Contains IC: 25062-BL3389P" any similar wording that expresses the same meaning may be used.

§ 15.19 and RSS-Gen Labelling requirements shall be complied on end user device. Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.

(5) Installation Notice to Host Product Manufacturer

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

The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1093 and difference antenna configurations.

(6) Antenna Change Notice to Host manufacturer

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID and IC ID (new application) procedure followed by a Class II permissive change application.

(7) FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any

other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 Information to the user or such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

For Class B

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.*

For Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.