BL3332-P

Embedded

Version：1.2   Release date： May 13, 2019

Wi-Fi Module

Features

- 125MHz ARM Cortex M4 MCU

- 256KB SRAM/2MB FLASH

- Support AES，MD5，SHA1

- Support XIP

- Working voltage: DC 3.3V

- 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

  - PCB antenna

- Peripheral

  - 2x UART

  - 2x I2C

  - 1x SPI

  - 5x PWM

  - Up to 10x GPIOs

- Working temperature: -10℃ to +80℃

- 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
BL3332-P	PCB antenna	Default

Content

1. Overview

BL3332-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　BL3332-P Power Consumption Data

Specifications	Min.	Typ.	Max.	Units
VDD	3	3.3	3.6	V
VIL(input low voltage)	0		0.8	V
VIH(input high voltage)	2		3.6	V
VOL(output low voltage)	0		0.4	V
VOH(output high voltage)	2.4		3.6	V
R_{PU}		75		KΩ
R_{PD}		75		KΩ
Io	8		24	mA
Standby (SP mini)		115		mA
pulse current @TX 11b @16dBm 11Mbps			331	mA
pulse current @TX			325	mA

11g @14dBm 54Mbps				
pulse current @TX 11n @14dBm 65Mbps			340	mA

2.2. Working Environment

Please refer to Table 2 for working environment data.

Table 2   BL3332-P Working Environment Data

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	℃
TA	Ambient operating temperature	-10	80	℃
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   BL3332-P Radio Specification

Radio range	2.412 GHz - 2.472 GHz
Wireless standards	IEEE 802.11 b/g/n
Radio output (conductive)	802.11b:16±1.5dBm@11Mbps
	802.11b: 16±1.5dBm@1Mbps
	802.11g: 14±1.5dBm@54Mbps
	802.11g: 16.5±1.5dBm@6Mbps
	802.11n: 13.5±1.5dBm@MCS7/HT20
	802.11n: 16±1.5dBm@MCS0/HT20
Antenna type	Internal: PCB antenna

	External: Not supported
Receiving sensitivity	802.11b<-88dBm@11Mbps
	802.11g<-75dBm@54Mbps
	802.11n/HT20<-72dBm@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			**-21**	dB
Transmit spectrum mask				
Pass				

Table 6 Receiving performance under IEEE802.11b

RX Characteristics	Min.	Typical	Max.	Unit
11Mbps Input Level Sensitivity				
Minimum Input Level (FER≦8%)			**-88**	dBm
Maximum Input Level (FER≦8%)			-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≦10%)			**-75**	dBm

Maximum Input Level (FER ≦ 10%)			-20	dBm

3.2.3 IEEE802.11n

IEEE802.11n 20MHz bandwidth mode

Table 10Basic 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		13.5		dBm
Frequency Error	-10		+10	ppm
EVM@HT20, MCS7			-32	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 ≦ 10%)			-72	dBm
Maximum Input Level (FER ≦ 10%)			-20	dBm

IEEE802.11n 40MHz bandwidth mode

Table 13Basic 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		**14**		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≦10%)			**-69**	dBm
Maximum Input Level (FER≦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
				13	<20
		11g	6M	1	<20
				6	<20
				13	<20
	TRP	11g	6M	1	≥12
				6	≥12
				13	≥12
	TIS	11g	54M	1	≤-72
				6	≤-72
				13	≤-72

4. BL3332-P Hardware Information

4.1. PIN Sequence

Please refer to Fig 1 for the pin sequence.
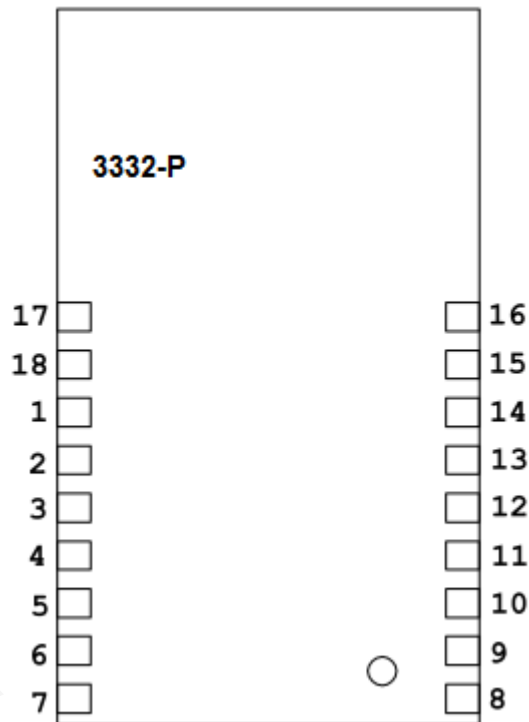

Fig 1   BL3332-P pin sequence

4.2. PIN Definitions

Please refer to Table17   for the pin definitions.

Table17   BL3332-P pin definitions

Pin	Interface	Description	Type
1	GND	GND	POWER
2	VDD	3.3V	POWER

3	NRST	HW reset	I
4	TX0	UART0 TX	O
	SPI_MOSI	SPI interface	
	GPIOA23	Support PWM0	I/O
5	RX0	UART0 RX	I
	SPI_CLK	SPI interface	
	GPIOA18		I/O
6	TX2	UART2 TX	O
	GPIOA30	Support PWM3	I/O
	I2C0_SDA	I2C interface	
7	RX2	UART2 RX	I
	GPIO29	Support PWM4	I/O
	I2C_SCL	I2C interface	
8	RX2	UART2 RX	I
	GPIO29	Support PWM4	I/O
	I2C_SCL	I2C interface	
9	TX2	UART2 TX	O
	GPIOA30	Support PWM3	I/O
	I2C0_SDA	I2C interface	
10	GPIOA5	Support PWM4	I/O
11	GPIOA14	Support PWM0	I/O
	SWD_CLK		I
12	GPIOA15	Support PWM1	I/O
	SWD_DATA		
13	VDD	3.3V	POWER
14	GND	GND	POWER
15	GPIOA12	Support PWM3	I/O

16	ADCIN		I/O
17	I2C0_SCL	I2C interface	I/O
	SPI_MISO	SPI interface	
	GPIOA22	Support PWM5	I/O
18	I2C0_SDA	I2C interface	I/O
	SPI_CS	SPI interface	
	GPIOA19		I/O

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:

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

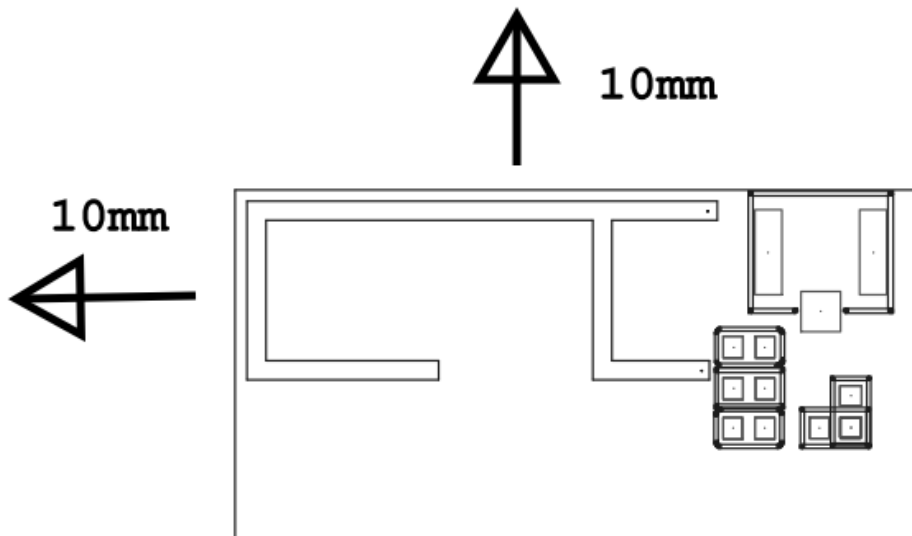Please refer to Fig 2 for PCB antenna.

Fig 2 BL3332-P Antenna layout

The module support PCB antenna in 2.4G~2.5G frequency with S11 port less than -10dB and max gain of 1.5dB at 2.45GHz, as shown in Fig 3.
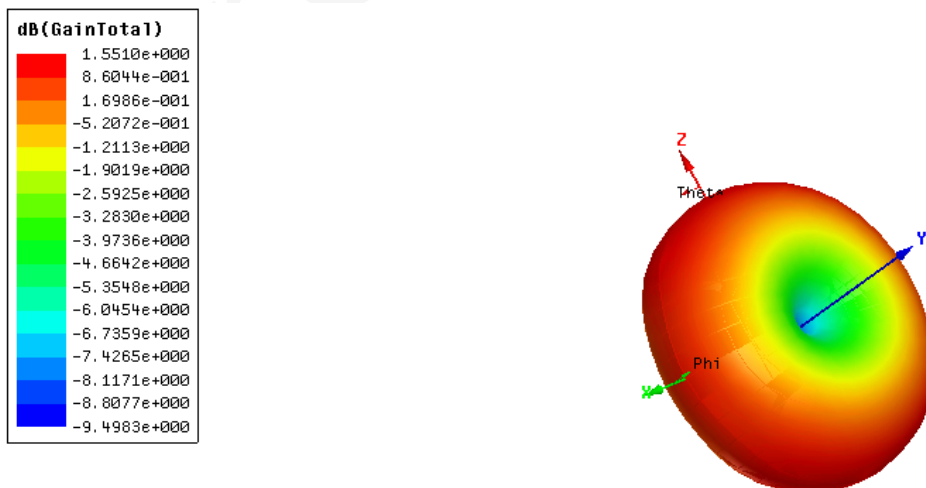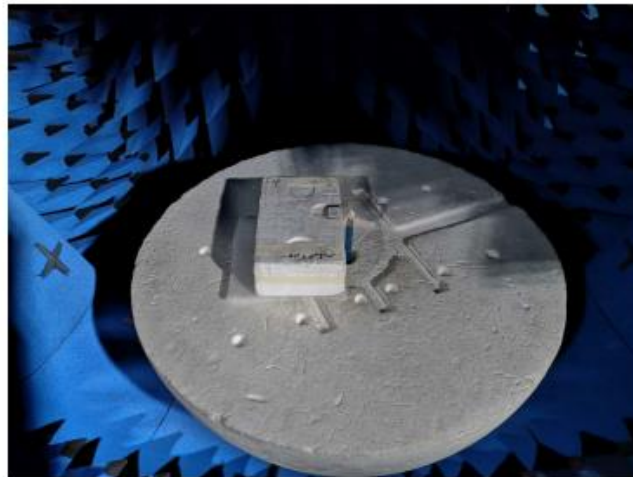

Fig 3 Simulated radiation pattern of antenna gain

Please refer to Fig 4 for real testing environment for module antenna.

2.4 样品实测摆放图

Fig 4 Antenna testing environment

The testing was performed according to the following standards in Table 18.

Table 18 Testing standards

Object	Testing item	Testing method	Standard
Mobile communication antenna	Antenna gain	General Technical Specifications for Mobile Communication Antenna	GB/T 94 10-2008
Antenna performance	Radiation efficiency	IEEE Standard Process of Antenna Testing	ANSI/IEEE STD 149-1979

Please refer to Table 19 for the actual performance of module antenna.

Table 19 Actual gain and efficiency of antenna

Frequency / MHz	2410~2480
Max gain / dBi	0.6~1.9
Efficiency / %	>48

The following precautions should be considered during designing with PCB antenna:

Do not place any electrical components or grounding in antenna area on main board and it's better to leave this area blank on PCB.

It is recommended to not place any electrical components within 10mm range of module antenna and not design any circuit or bond copper on main board under this area.

Do not use the module inside any metal case or containers with metal painting.

Keep the antenna of wifi module next to the edge of main board (as shown in Fig 5) during design of PCB to ensure better performance of antenna.
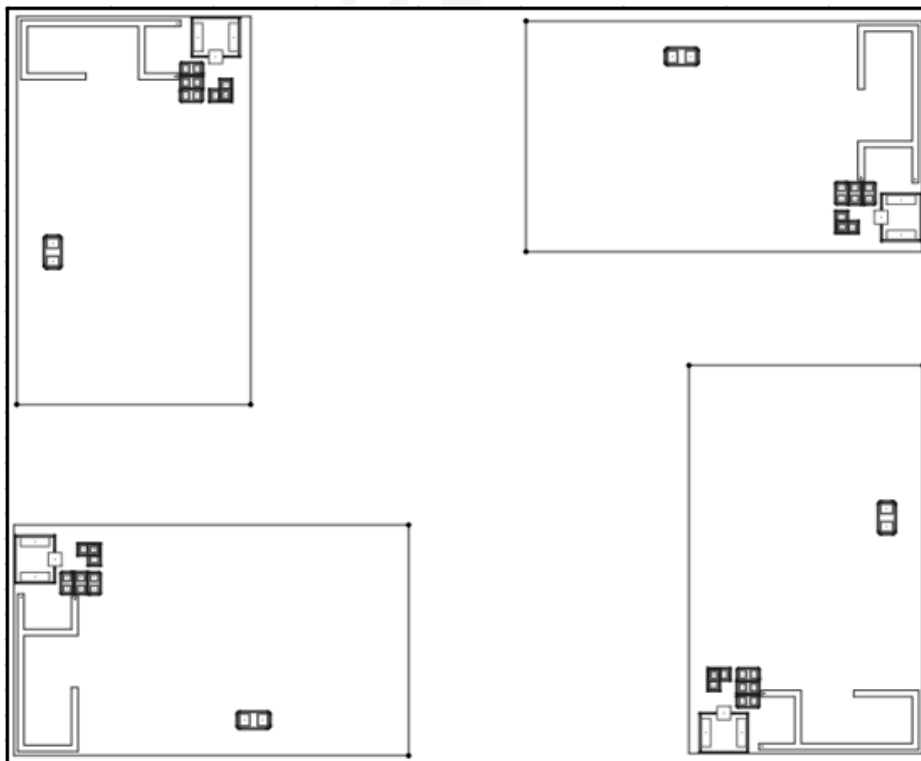
Fig 5 BL3332-P Recommended PCB layout

4.4. Mechanical Dimensions
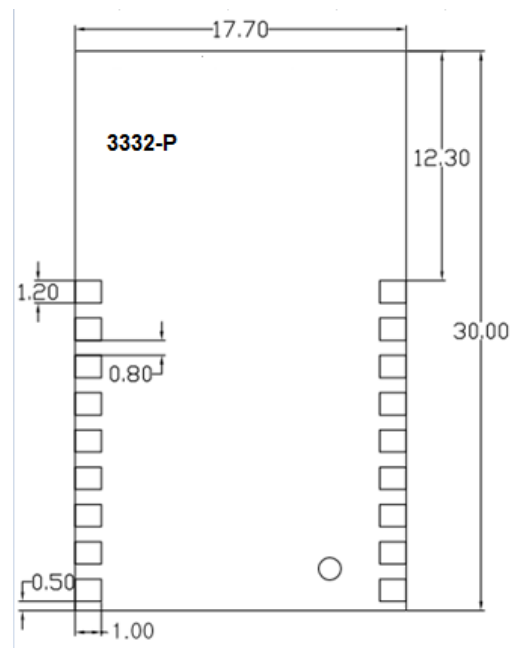
Please refer to Fig 6 for the dimensions of module.

Fig 6 BL3332-P Dimensions

Note: Dimensions (17.7±0.2) mm * (30±0.2) mm * (3.8)mm (with shielding case)

4.5. Recommended Pad Size

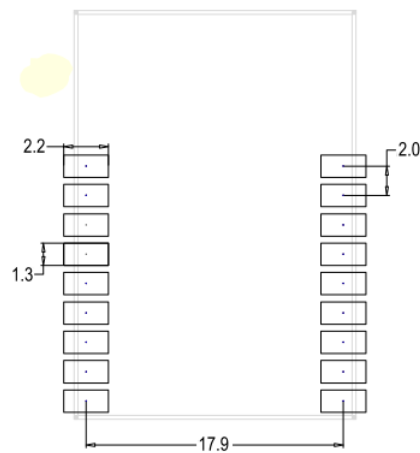Please refer to Fig 7 for the recommended pad size

Fig 7 BL3332-P Recommended pad size

4.6. Certifications

1. Compliant and certified with SRRC standard (CMIIT ID: 2017DP6839).

2. Compliant with requirement of RoHS 2.0.

3. Compliant with requirement of REACH.

4.7. Label

Fig 8　BL3332-P label content

Please refer to Fig 8 for the content description on label.

Model: *******   : Module model

CMIIT ID: *********   : SRRC ID

SN: 00ACA3FE75D7   : Module unique MAC address

Code: 888888888888888: BroadLink internal code

Ver: *********   : Firmware version

The QR code contains information including but not limited to:
FCC ID: 2ATEV-BL3332-P
IC: 25062-BL3332P
Manufacturer:
Hangzhou BroadLink Technology Co., Ltd.
Building C, 57 Jiang'er Road, Binjiang District, Hangzhou, Zhejiang, P.R.China

4.8. Shielding Case Dimensions

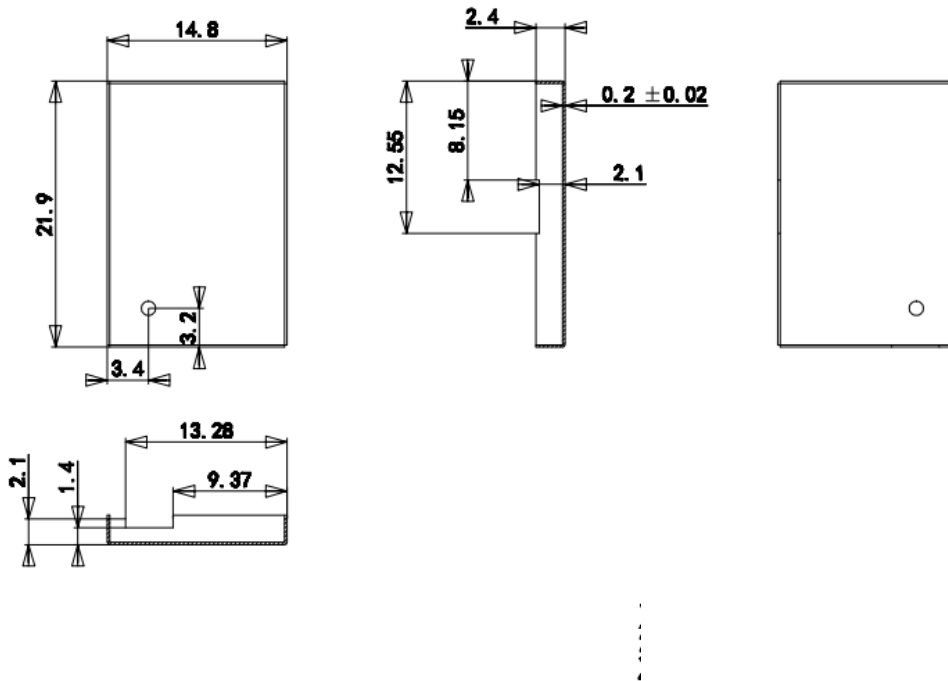Please refer to Fig 9 for the dimensions of shielding case.

Fig 9 BL3332-P Dimensions of shielding case

(Unit: mm)

4.9. Packaging

BL3332-P is packed in reel with 850 pcs/reel

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.
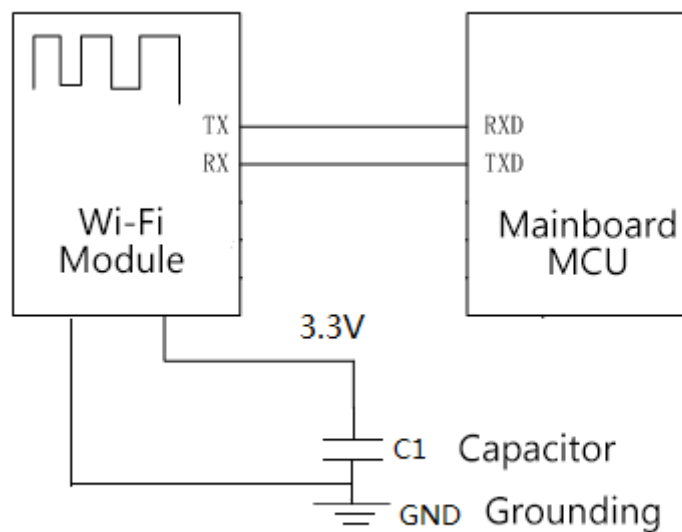

Fig 12 Circuit diagram (3.3V)

If your device is powered by 5V, 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.

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.

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 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

2.6 RF exposure considerations
This equipment complies with the FCC RF 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.

2.8 Label and compliance information
FCC ID label on the final system must be labeled with "Contains FCC ID: 2ATEV-BL3369T-P" or "Contains transmitter module FCC ID: 2ATEV-BL3369T-P".

2.9 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.

2.10 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 the 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.

Note 1: This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.
A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: Additional testing and certification may be necessary when multiple modules are used.

Note 4: The module operated only with the antenna which it is authorized.

The host product shall be properly labelled to identify the modules within the host product. The ISED certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labelled to display the ISED certification number for the module, preceded by the word "contains" or similar wording expressing the same meaning, as follows:
Contains IC: 25062-BL3332P

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.

Revision History

Date	Version	Updated Content
12/10/2018	1.0	Preliminary version
4/23/2019	1.1	Modified RF power, packaging and label information.
5/13/2019	1.2	Revised some parameters and added actual testing data of antenna and certification information.

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