BroadLink BL33A1-P Cost-Effective Embedded Wi-Fi Module Owner's Manual

July 24, 2025

Contents [hide]

BroadLink BL33A1-P Cost-Effective Embedded Wi-Fi Module

Features

- 100MHz 32bits MCU
- 256KB SRAM/2MB FLASH
- Support AES MD5 SHA1
- Support XIP
- Working voltage: DC 3.3V
- Support BLE4.2
- Wi-Fi related features
- Support 802.11 b/g/n standard
- 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
- Peripherals
- 1x UART
- 5x PWM
- Up to 8GPIOs
- Working temperature:0℃ to +85℃
- Gold finger encapsulation

Applications

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

Model

Model	Antenna type	Note
BL33A1-P	PCB antenna	Default

Overview

BL33A1-P is a cost-effective embedded Wi-Fi module designed by BroadLink, highly integrated with 32-bit MCU speed up to 100MHz, 256KB SRAM and 2MB flash, with 3.3V 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.

Basic Specifications

Power Consumption

Please refer to Table 1 for power consumption data.

Table 1 BL3372-P Power Consumption Data

Specifications	Min.	Typ.	Max.	Units
VDD	3.0	3.3	3.6	V
VIL(input low voltage)			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 (RX)		60		mA
pulse current @TX 11b @17.5dBm 11Mbps				mA

pulse current @TX 11g @15.5dBm 54Mbps				mA
pulse current @TX 11n @15.5dBm 65Mbps				mA
BLE @4dBm				

Working Environment

Please refer to Table 2 for working environment data.

Table 2 BL3372-P Working Environment Data

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	℃
TA	Ambient operating temperature	0	85	℃
Vdd	Supply voltage	3.0	3.6	V
Vio	Voltage on IO pin	0	3.6	V

Radio Specifications

Basic Radio Specification

Please refer to Table 3 for radio specification.

Table 3 BL33A1-P Radio Specification

Radio range	2.412 GHz - 2.472 GHz

Wireless standards	IEEE 802.11 b/g/n
Radio output (conductive)	802.11b:17±1.5dBm@11Mbps
	802.11g: 15±1.5dBm@54Mbps
	802.11n: 14.5±1.5dBm@MCS7/HT20
	BLE: 4±2dBm
Antenna type	Internal: PCB antenna
	External: Not supported
Receiving sensitivity	802.11b≦-89dBm@11Mbps
	802.11g≦-76dBm@54Mbps
	802.11n/HT20≦-73dBm@MCS7
Stack	IPv4, TCP/UDP/FTP/HTTP/HTTPS/TLS/mDNS
Data rate (max)Security	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

Radio Performance

IEEE802.11b

Table 4 Basic specifications under IEEE802.11b

ITEM	**Specification**

Modulation Type	DSSS / CCK
Frequency range	2412MHz~2472MHz
Channel	CH1 to CH13
Data rate	1, 2, 5.5, 11Mbps

Table 5 Transmitting performance under IEEE802.11b

TX Characteristics	Min	Typical	Max.	Unit
Power@11Mbps		**17**		dBm
Frequency Error	**-10**		**+10**	ppm
EVM@11Mbps			**-14**	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%)			**-89**	dBm

IEEE802.11g

Table 7 Basic specifications under IEEE802.11g

ITEM	**Specification**
Modulation Type	OFDM

Frequency range	2412MHz~2472MHz
Channel	CH1 to CH13
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		**15**		dBm
Frequency Error	**-10**		**+10**	ppm
EVM@54Mbps			-30	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

IEEE802.11n

IEEE802.11n 20MHz bandwidth mode

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

ITEM	**Specification**

Modulation Type	OFDM

Frequency range	2412MHz~2472MHz
Channel	CH1 to CH13
Data rate	MCS0/1/2/3/4/5/6/7

Table 2 Transmitting performance under IEEE802.11n with 20MHz

TX Characteristics	Min	Typical	Max.	Unit
Power@HT20, MCS7		**14.5**		dBm
Frequency Error	**-10**		**+10**	ppm
EVM@HT20, MCS7			**-30**	dB
Transmit spectrum mask				
Pass				

Table 3 Receiving performance under IEEE802.11n with 20MHz

RX Characteristics	Min	Typical	Ma x.	Unit
MCS7 Input Level Sensitivity				
Minimum Input Level (FER≦ 10%)			**-73**	dBm

BL33A1-P Hardware Information

PIN Sequence

Please refer to Fig 1 for the pin sequence.

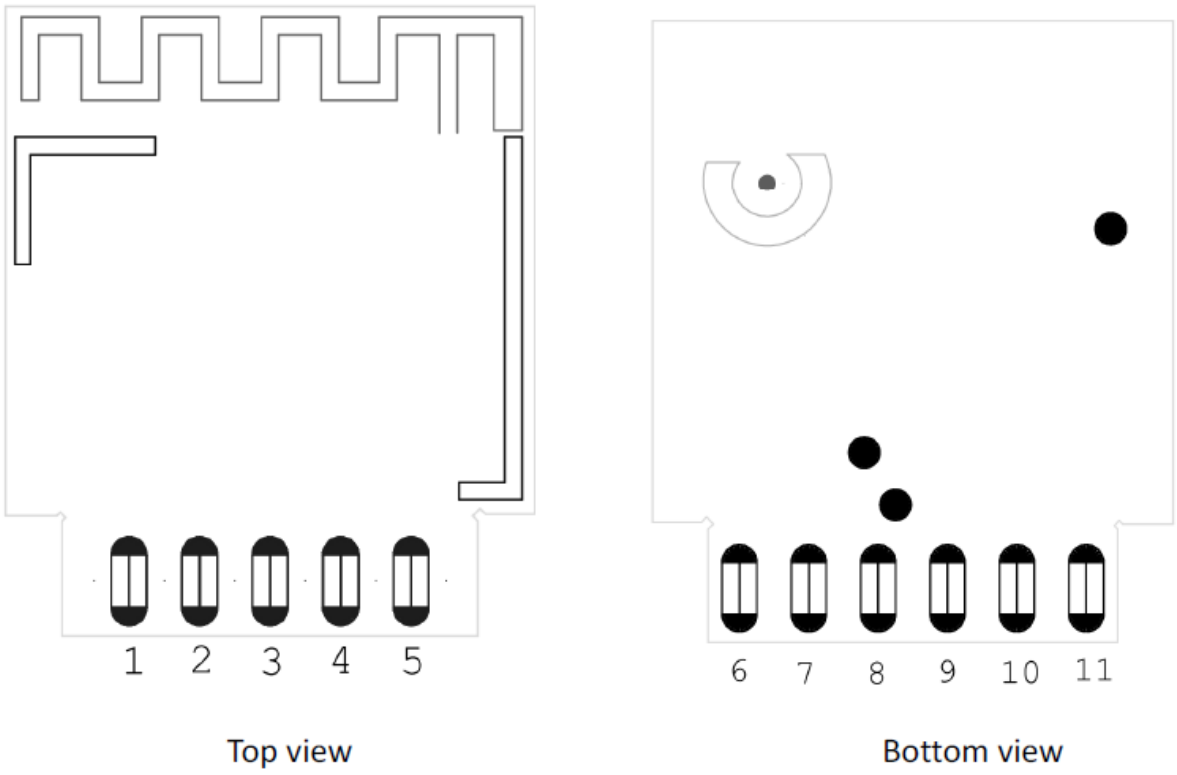

Fig 1 BL33A1-P pin sequence

PIN Definitions

Please refer to Table 13 for pin definitions.

PIN	Function 1	Function 2	Function 3	Function 4	Function 5
1	RST				
2	GPIO18		PWM6		
3	GPIO20		PWM0		
4	GPIO7				
5	GPIO4		PWM4		
6	VDD33				

7	GND				
8	GPIO13	RX0			
9	GPIO14	TX0			
10	GPIO19		PWM7		
11	GPIO17		PWM5		

Note

1. In default, UART0 (pin4 and pin5) are used for bypass communication Please refer to the description in DC Characteristics for UART output current level.
2. RST is the reset pin and will be effective with VIL. Configuration information will be remained after module reset. The module has pull-up process for RST designed internally.
3. The pins for reset button and LED indication should be defined according to actual firmware and circuit.

Recommendations

The following precautions should be considered during PCB designing: 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.

Mechanical Dimensions

Please refer to Fig 3 for the dimensions of module.

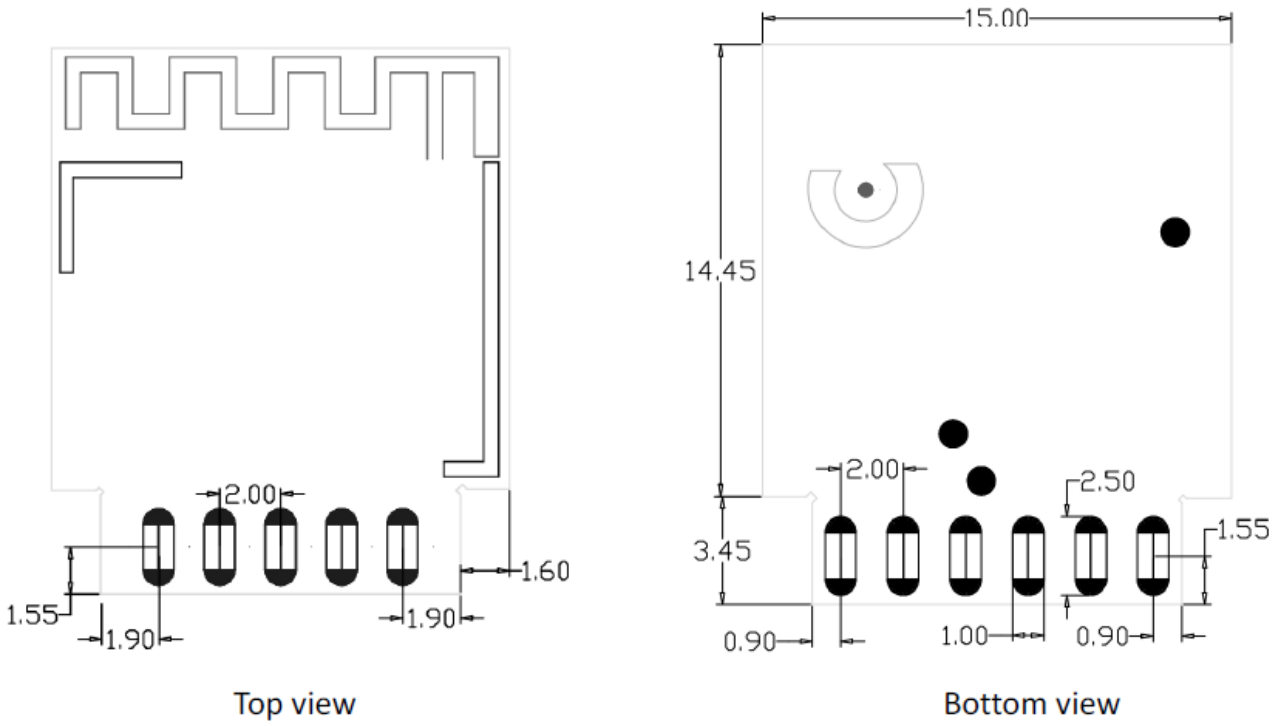

Fig 3 BL33A1-P Module Dimensions

Power Supply Requirement

If an LDO is used to supply the module with 3.3V power, C1 capacitor can be used with 10uF-22uF; If a DCDC is used to supply 3.3V power, C1 capacitor can be used with 22uF. It is recommended to supply the module with power higher than 450mA to ensure enough power supply to the module and avoid power down during data.

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

Revision History

Date	Version	Updated Content
2025.3.4	1.0	Preliminary version

Copyrights

figures.

Contact Us

Ms Zhou
Hangzhou BroadLink Technology Co., Ltd.

- Add: Building C, 57 Jiang'er Road, Binjiang District, Hangzhou, P.R.China
- Postcode: 310052 Tel: +86-571-85071744-8010
- Email: bingqi.zhou@broadlink.com.cn

- For more information of BroadLink Wi-Fi modules, please visit our website: www.broadlink.com.cn

List of applicable FCC rules

FCC Part 15.247

Label and compliance information

FCC ID label on the final system must be labeled with "Contains FCC ID: 2ATEV-BL33A1-P" or "Contains transmitter module FCC ID: 2ATEV-BL33A1-P".

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.

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.

FCC Warning

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

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

1. 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 mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement. A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.
2. 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.

3. Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.
4. Note 4: For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

IC WARNING

This device contains licence-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

IC Radiation Exposure Statement:

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures. Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

This equipment complies with 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 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. Additional testing and certification may be necessary when multiple modules are used.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. The final end product must be labeled in a visible area with the following " Contains IC: 25062-BL33A1P ".

Frequently Asked Questions

- **Q: What are some common applications for the BL33A1-P module?**
  A: Common applications include smart transportation, smart home/appliances, instruments, healthcare devices, industrial automation, intelligent security systems, and smart energy solutions.
- **Q: What is the working voltage of the BL33A1-P module?**
  A: The working voltage of the module is DC 3.3V.
- **Q: Does the BL33A1-P module support Wi-Fi standards?**
  A: Yes, the module supports 802.11 b/g/n standards along with station and soft AP configurations.

Documents / Resources

	BroadLink BL33A1-P Cost-Effective Embedded Wi-Fi Module [pdf] Owner's Manual BL33A1-P, BL33A1-P Cost Effective Embedded Wi Fi Module, Cost Effective Embedded Wi Fi Module, Embedded Wi Fi Module, Wi Fi Module, Module

References

- User Manual

BroadLink

BL33A1-P, BL33A1-P Cost Effective Embedded Wi Fi Module, BroadLink, Cost Effective Embedded Wi Fi Module, Embedded Wi Fi Module, Module, Wi-Fi Module

Leave a comment

Your email address will not be published. Required fields are marked *

Comment *

Name

Email

Website

Save my name, email, and website in this browser for the next time I comment.

Post Comment

Search:

e.g. whirlpool wrf535swhz

Search