WiFi Module BL3353-P Product Manual v1.1

Version	Date	Note
1.0	Jul 15, 2018	Preliminary version
1.1	Apr 19, 2019	Added some data

Features

a. Support IEEE802.11 b/g/n standards
b. Support WEP, WPA and WPA2 encryption
c. Support UART/PWM/ADC/GPIO/I2C interfaces
d. Support STA/AP/AP+STA modes
e. Support SmartConfig
f. Support TLS/SSL/mDNS protocols
g. Support PCB antenna
h. 3.3V power supply
i. Dimensions (17.7±0.2) mm * (30±0.2) mm * (3.6±0.2) mm (with shielding case)

1. Overview

BL3353-P is an 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 125MHz and 256KB SRAM with external 1MB flash.

1.1 Basic Specification

1.1.1 WLAN Parameter

Radio range	2.412 GHz - 2.462 GHz
Wireless standards	IEEE 802.11 b/g/n
Radio output	802.11b :16.5dBm ± 1.5dBm 802.11g :14dBm ± 1.5dBm 802.11n:13.5dBm±1.5dBm
Antenna type	PCB antenna
Receiving sensitivity	802.11b<-83dBm@11Mbps 802.11g<-72dBm@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

1.1.2 Absolute Maximum Ratings

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

1.1.3 DC Voltage and Current

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
RX		135		mA
pulse current @TX 11b @17dBm 11Mbps			335	mA
pulse current @TX 11g @14dBm 54Mbps			335	mA
pulse current @TX 11n @14dBm 65Mbps			340	mA

1.1.4 IEEE802.11b mode

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

TX Characteristics	Min.	Typical	Max.	Unit
Power@11Mbps		16.5		dBm
Frequency Error	-10		+10	ppm
EVM@11Mbps			-20	dB
Transmit spectrum mask				
Pass				

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
11Mbps (FER≦8%)	-86			dBm

1.1.5 IEEE802.11g mode

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

TX Characteristics	Min.	Typical	Max.	Unit
Power@54Mbps		14		dBm
Frequency Error	-10		+10	ppm
EVM@54Mbps			-30	dB
Transmit spectrum mask				
Pass				

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
54Mbps	-74			dBm

1.1.6 IEEE802.11n 20MHz bandwidth mode

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

TX Characteristics	Min.	Typical	Max.	Unit
Power@HT20, MCS7		13.5		dBm
Frequency Error	-10		+10	ppm
EVM@HT20, MCS7			-30	dB
Transmit spectrum mask				
Pass				

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

1.1.7 IEEE802.11n 40MHz bandwidth mode

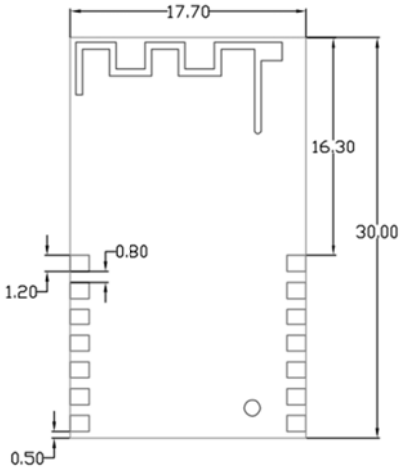
ITEM	Specification
Modulation Type	OFDM
Frequency range	2412MHz~2452MHz
Channel	CH1 to CH9
Data rate	MCS0/1/2/3/4/5/6/7

TX Characteristics	Min.	Typical	Max.	Unit
Power@HT40, MCS7		13		dBm
Frequency Error	-10		+10	ppm
EVM@HT40, MCS7			-30	dB
Transmit spectrum mask				
Pass				

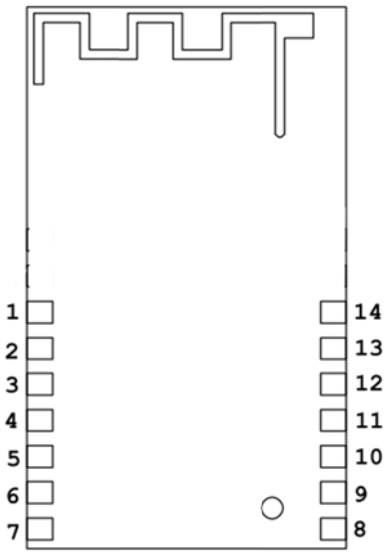
RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
MCS7	-66			dBm

1.2 Hardware

1.2.1 Mechanical Dimensions



1.2.2 Pin Definitions



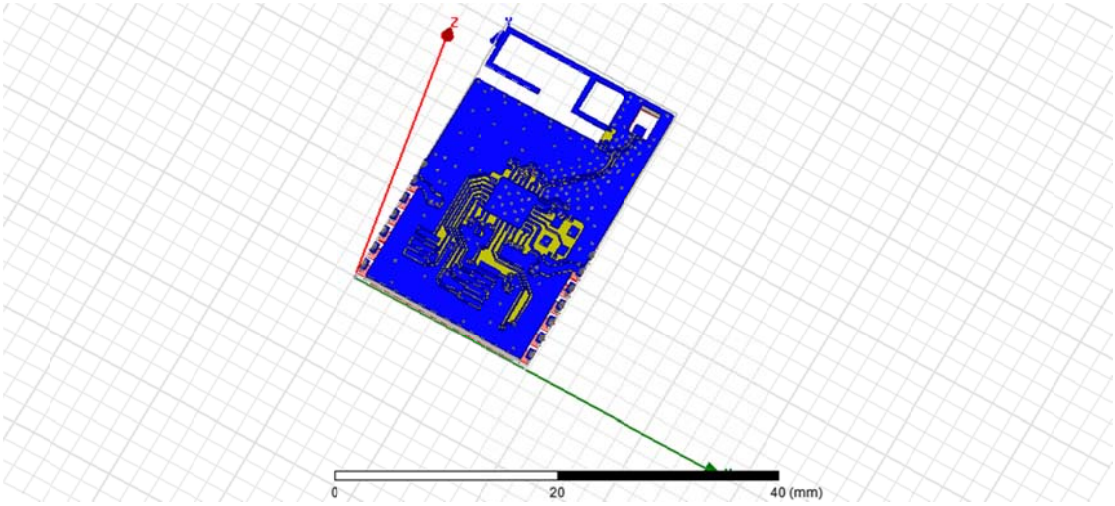
Pin	Interface	Description	Type
1	GND	GND	POWER
2	VDD	3.3V	POWER
3	NRST	HW reset	I
	TX0	UART0 TX	O
	SPI_MOSI	SPI interface	
4	GPIOA23	Support PWM0	I/O

	RX0	UART0 RX	I
	SPI_CLK	SPI interface	
5	GPIOA18		I/O
	TX2	UART2 TX	O
	GPIOA30	Support PWM3	I/O
6	I2C0_SDA	I2C interface	
	RX2	UART2 RX	I
	GPIO29	Support PWM4	I/O
7	I2C_SCL	I2C interface	
	I2C0_SDA	I2C interface	
	GPIO19		I/O
8	SPI_CS	SPI interface	
	I2C0_SCL	I2C interface	
	GPIOA22		I/O
9	SPI_MISO	SPI interface	
10	GPIOA5	Support PWM4	I/O
	GPIOA14	Support PWM0	I/O
11	SWD_CLK		I
	GPIOA15	Support PWM1	I/O
12	SWD_DATA		
13	VDD	3.3V	POWER
14	GND	GND	POWER

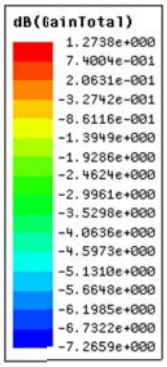
Note:

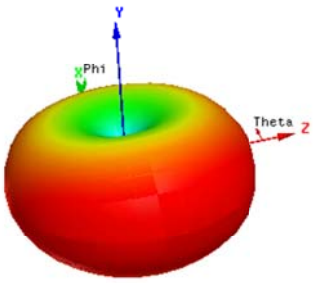
1. In default, UART0 is used for bypass communication and UART2 is used for output of debugging information. Please refer to the description in DC Characteristics for UART output current level.
2. RESET is hardware reset pin and will be effective with VIL. Configuration information will be remained after module reset. The module is already designed with RC reset upon power-on.
3. 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.

1.2.3 PCB Antenna



The gain of PCB antenna on this module is approximate 1.2dB, as shown in the figure below.

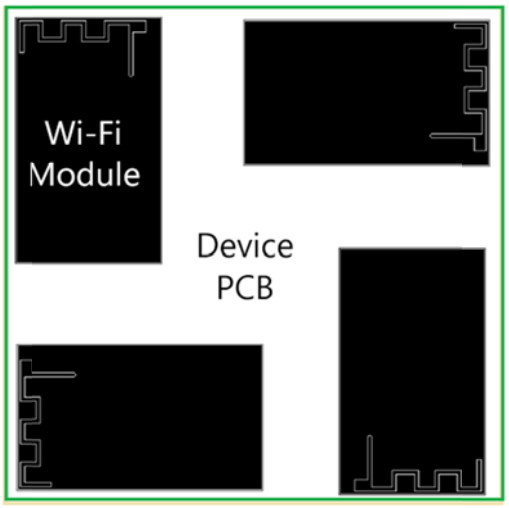




Simulated radiation pattern of antenna gain

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

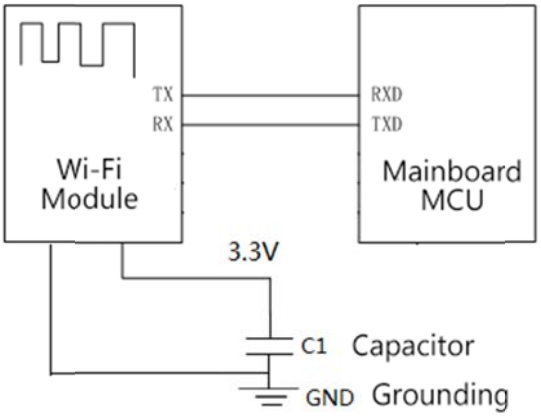
- Do not place any electrical components or grounding in antenna area on main board and it's better to leave this area blank on PCB.
- It is recommended to not place any electrical components within 30mm range of module antenna and not design any circuit or bond copper on main board under this area.
- Do not use the module inside any metal case or containers with metal painting.
- Keep the antenna of Wi-Fi module next to the edge of main board during design of PCB to ensure better performance of antenna, as illustrated below.



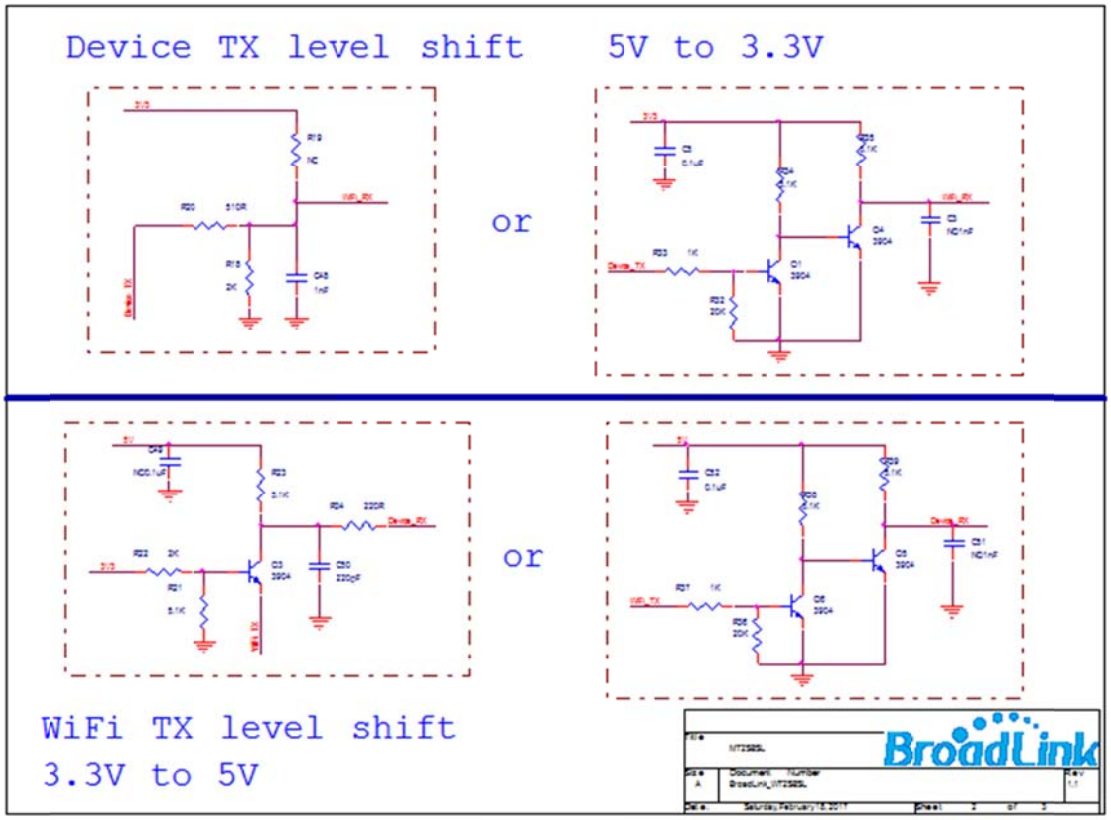
1.3 Reference Design

1.3.1 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.



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



1.3.2 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
- The module is designed with 2x 3.3V pins. You can power the module with either pin or both pins.

1.4 Other

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 Specific operational use conditions

product is a Single-modular transmitter policies independent of any host. not applicable.

2.4 Limited module procedures

product is a Single-modular transmitter. it is not a limited module. not applicable.

2.5 Trace antenna designs

prodcut with a PCB antenna. not applicable.

2.6 RF exposure considerations

20 cm from a person’s body

2.7 Antennas

prodcut with a PCB antenna. not applicable.

2.8 Label and compliance information

Remind end customers to add "Contain FCC ID:2ATEV-BL3353-P"

2.9 Information on test modes and additional testing requirements

product is a Single-modular transmitter.Test stand alone. not applicable.

2.10 Additional testing, Part 15 Subpart B disclaimer

Part 15B required for the entire device even though module is 15C certified.

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.

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.

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 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.

Note 5: 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 6: FCC ID label on the final system must be labeled with “Contains FCC ID: 2ATEV-BL3353-P” or “Contains transmitter module FCC ID: 2ATEV-BL3353-P”.

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:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes:
1. L’appareil ne doit pas produire de brouillage;
2. L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

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.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

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.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.

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-BL3353P ".