

AW3155-50

IEEE 802.11a/b/g/n/ac 1T1R+Bluetooth5.0 Combo Module

FCC ID: VYVAW3155-50-50R

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Table of Contents

1. Device Overview	3
1.1 Features	3
1.1.1 General Features	3
1.1.2 IEEE 802.11X Key Features	3
1.1.3 Bluetooth Key Features	3
1.2 Descriptions.....	4
1.3 Functional Block Diagram	4
2. Pin Configuration and Functions	5
2.1 Module Pin Diagram.....	5
2.2 Pin Functions.....	5
3. Specifications.....	7
3.1 General Characteristics.....	7
3.2 RF Characteristics.....	8
3.2.1 Receiver RF Specifications.....	8
3.2.2 Transmitter RF Specifications.....	10
3.2.3 Bluetooth RF Specifications.....	13
4. Application, Implementation, and Layout.....	13
4.1 Wi-Fi Application Diagram.....	13
5. Mechanical and Package	14
5.1 Mechanical Size	14
5.2 Package Information	14
6. Thermal Reflow.....	15
7. Ordering Information.....	15
8. Revision History.....	16

1. Device Overview

1.1 Features

1.1.1 General Features

- 32bit MCU for Wi-Fi protocols and host offload
- 32bit MCU for Bluetooth controller
- Embedded SRAM/ROM
- Programmable and multiplexed GPIO pins
- Integrated high efficiency power management unit
- 15.0mm*13.0mm LGA package

1.1.2 IEEE 802.11X Key Features

- IEEE 802.11 a/b/g/n/ac compliant
- Supports 20MHz, 40MHz, 80MHz bandwidth in 2.4GHz/5GHz band
- Integrated LNA, PA, T/R switch and diplexer
- Comprehensive RF and analog self-calibration
- SDIO 3.0 interface up to 208MHz
- STBC decoding
- LDPC encoding and decoding
- Beam-forming receiving
- AMPDU and AMSDU for maximum throughput
- GTK offload (optional)
- ARP/NS offload (optional)
- DHCP offload (optional)
- Wake-on-Wireless with programmable magic packet
- TCP/UDP Keep Alive
- P2P concurrent mode

1.1.3 Bluetooth Key Features

- Integrated Balun and PA
- Dual-mode BT 5.0 supporting BDR, EDR, LE1M, LE2M, LE2S and LE8S rates
- Supports LE privacy, DPLE, LE secure connection
- Supports HS UART and PCM host interfaces
- Supports eSCO with retransmission
- Supports 2 antenna configuration
- Supports AFH for interference avoidance
- Supports Bluetooth Core 5.0 features
- Supports Bluetooth Core 4.2 features
- Supports low power mode

1.2 Descriptions

The AW3155-50 module is a complete dual-band (2.4 GHz and 5 GHz) Wi-Fi 1 × 1 MU-MIMO MAC/PHY/Radio System-on-a-Module. It provides a high level of integration with a stream IEEE 802.11ac MAC/baseband/radio and Bluetooth 5.0 with supporting high power mode, Mesh, Direction Finding and Long Range. In IEEE 802.11ac mode, the WLAN operation supports rates of MCS0–MCS9 (up to 256 QAM) in 20 MHz, 40MHz, and 80 MHz channels for data rates up to 433 Mbps. In addition, all the IEEE 802.11a/b/g/n rates are supported.

The AW3155-50 module integrates several peripheral interfaces including UART (Bluetooth), SDIO (Wi-Fi). It Supports 2 antenna configuration for Wi-Fi and Bluetooth.

1.3 Functional Block Diagram

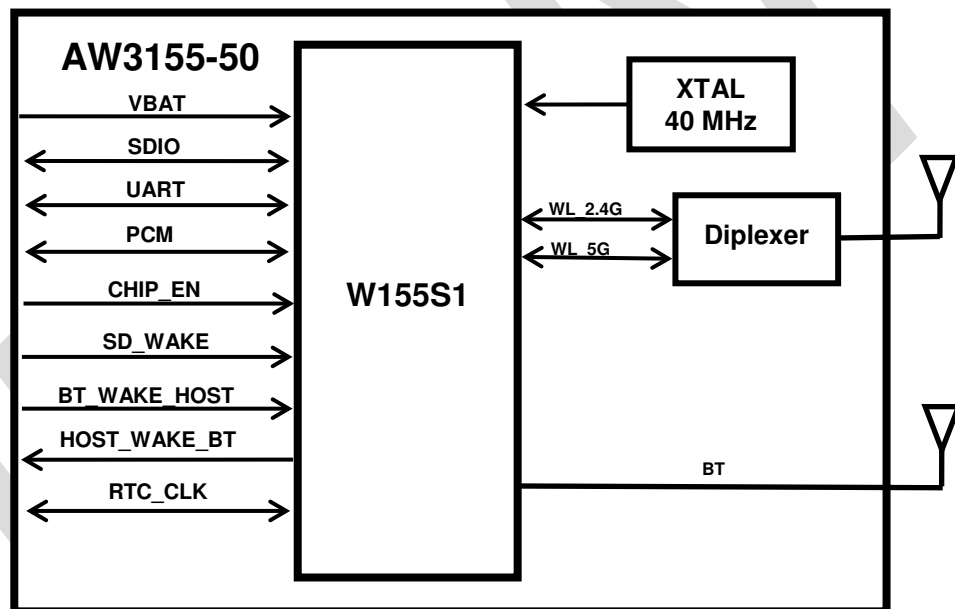


Figure 1. Block Diagram of AW3155-50

2. Pin Configuration and Functions

2.1 Module Pin Diagram

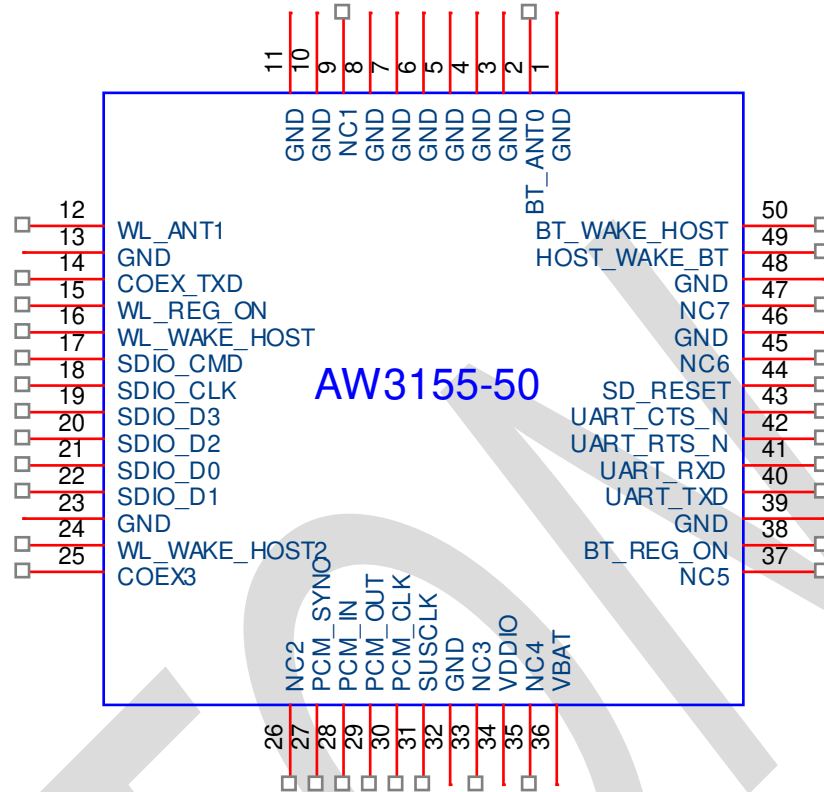


Figure 2.Pin Diagram of AW3155-50

2.2 Pin Functions

Pin	Name	Description
1	GND	Ground
2	BT_ANT0	BT antenna port
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	NC1	No connected
10	GND	Ground
11	GND	Ground
12	WL_ANT1	Wi-Fi antenna port

13	GND	Ground
14	COEX_TXD	No connected
15	WL_REG_ON	Chip enable
16	WL_WAKE_HOST	WIFI host interrupt
17	SDIO_CMD	SDIO Command Input
18	SDIO_CLK	SDIO Clock Input
19	SDIO_DATA_3	SDIO Data Line 3
20	SDIO_DATA_2	SDIO Data Line 2
21	SDIO_DATA_0	SDIO Data Line 0
22	SDIO_DATA_1	SDIO Data Line 1
23	GND	Ground
24	WL_WAKE_HOST2	No connected
25	COEX3	No connected
26	NC2	No connected
27	PCM_SYNC	PCM synchronization control
28	PCM_IN	PCM data input
29	PCM_OUT	PCM data output
30	PCM_CLK	PCM clock
31	SUSCLK	32KHz clock input
32	GND	Ground
33	NC3	No connected
34	VDDIO	1.8V power supply
35	NC4	No connected
36	VBAT	3.3V power supply
37	NC5	No connected
38	BT_REG_ON	No connected
39	GND	Ground
40	UART_TXD	UART port0 TX
41	UART_RXD	UART port0 RX
42	UART_RTS_N	UART port0 RTS
43	UART_CTS_N	UART port0 CTS
44	SD_RESET	No connected
45	NC6	No connected
46	GND	Ground
47	NC7	Antenna select
48	GND	Ground

49	HOST_WAKE_BT	Host wake up Bluetooth device
50	BT_WAKE_HOST	BT wake up Host

3. Specifications

3.1 General Characteristics

Category	Descriptions
Dimension	L*W*H :15mm (±0.2mm)*13mm (±0.2mm)*2.2mm (±0.2mm)
Chip-set	W155S1
Standard	IEEE 802.11a/b/g/n/ac +Bluetooth 5.0
Modulation Type	WIFI:DSSS,OFDM (16 QAM/64 QAM/256 QAM) Bluetooth:GFSK, $\pi/4$ -DQPSK,8-DPSK
Frequency Band	2412~2472MHz,5180-5825MHz
Interface	WLAN SDIO, Bluetooth UART
Spread Spectrum	DSSS
Transmission Distance	Indoor up to 100m, outdoor up to 300m (limited in an environment)
Data Security	WEP,WPA/WPA2/WPA3
Transmit Power	2.4G: 11b 11M:17±2dBm 11g 54M:14±2dBm 11n HT20 MCS7:15±2dBm 11n HT40 MCS7:14±2dBm 5G: 11a 54M:14±2dBm 11n HT20 MCS7:14±2dBm 11n HT40 MCS7:13±2dBm 11ac VTH80 MCS9:11±2dBm
Rx Sensitivity	2.4G: 11b 11M:-86dBm@8% PER 11g 54M: -74dBm@10% PER 11n HT20 MCS7: -72dBm@10% PER 11n HT40 MCS7: -68dBm@10% PER 5G: 11a 54M:-74dBm@10% PER 11n HT20 MCS7: -72dBm@10% PER 11n HT40 MCS7: -68dBm@10% PER 11ac VTH80 MCS9:-58dBm@10% PER
Data Rate	802.11b [11,5.5,2 and 1Mbps] 802.11g [54,48,36,24,18,12,9&6Mbps] 802.11n HT20:up to 72.2Mbps

	802.11n HT40:up to 150Mbps 802.11ac VHT80:up to 433Mbps
Frequency Error	2.4GHz:<±25 ppm(11b),<±20 ppm(11g/n);5GHz:<±20 ppm
Ambient Temperature	0°C~ 60°C
Storage Temperature	-40°C~ 125°C
Antenna	External PF antenna
Operating System	Linux
Operating Voltage	3~3.6V DC,1A above

3.2 RF Characteristics

All measurements are made under nominal supply voltage & room temperature, and conducted conditions at each antenna port rather than antenna.

3.2.1 Receiver RF Specifications

Parameter	Conditions		Min.	Nom.	Max.	Unit
Receive Input Frequency						
2.4GHz	802.11b/g/n mode		2412	-	2472	MHz
Receiver Sensitivity						
802.11b	1Mbps	FER<8%, Packet size= 1,024bytes	-	-	-82	dBm
	2Mbps		-	-	-80	dBm
	5.5Mbps		-	-	-78	dBm
	11Mbps		-	-	-76	dBm
802.11g	6Mbps	PER<10%, Packet size= 1,024bytes	-	-	-82	dBm
	9Mbps		-	-	-81	dBm
	12Mbps		-	-	-79	dBm
	18Mbps		-	-	-77	dBm
	24Mbps		-	-	-74	dBm
	36Mbps		-	-	-70	dBm
	48Mbps		-	-	-66	dBm
	54Mbps		-	-	-65	dBm
802.11n (HT20)	MCS0.	PER<10%, Packet size= 4,096bytes	-	-	-80	dBm
	MCS1.		-	-	-77	dBm
	MCS2		-	-	-75	dBm
	MCS3.		-	-	-72	dBm
	MCS4.		-	-	-68	dBm
	MCS5.		-	-	-64	dBm
	MCS6.		-	-	-63	dBm
	MCS7.		-	-	-62	dBm
802.11n	MCS0.	PER<10%,	-	-	-77	dBm

(HT40)	MCS1.	Packet size= 4,096bytes	-	-	-74	dBm
	MCS2		-	-	-72	dBm
	MCS3.		-	-	-69	dBm
	MCS4.		-	-	-65	dBm
	MCS5.		-	-	-61	dBm
	MCS6.		-	-	-60	dBm
	MCS7.		-	-	-59	dBm
Maximum Input Level						
802.11b	FER<8%		-10	-	-	dBm
802.11g	FER<10%		-20	-	-	dBm
802.11n	FER<10%		-30			dBm

Parameter	Conditions		Min.	Nom.	Max.	Unit
Receive Input Frequency						
5GHz	802.11a/n/ac mode		5180	-	5825	MHz
Receiver Sensitivity						
802.11a	6Mbps	FER<10%, Packet size= 1,024bytes	-	-	-82	dBm
	9Mbps		-	-	-81	dBm
	12Mbps		-	-	-79	dBm
	18Mbps		-	-	-77	dBm
	24Mbps		-	-	-74	dBm
	36Mbps		-	-	-70	dBm
	48Mbps		-	-	-66	dBm
	54Mbps		-	-	-65	dBm
802.11n (HT20)	6Mbps	PER<10%, Packet size= 4,096bytes	-	-	-80	dBm
	9Mbps		-	-	-77	dBm
	12Mbps		-	-	-75	dBm
	18Mbps		-	-	-72	dBm
	24Mbps		-	-	-68	dBm
	36Mbps		-	-	-64	dBm
	48Mbps		-	-	-63	dBm
	54Mbps		-	-	-62	dBm
802.11n (HT40)	MCS0.	PER<10%, Packet size= 4,096bytes	-	-	-77	dBm
	MCS1.		-	-	-74	dBm
	MCS2		-	-	-72	dBm
	MCS3.		-	-	-69	dBm
	MCS4.		-	-	-65	dBm
	MCS5.		-	-	-61	dBm
	MCS6.		-	-	-60	dBm
	MCS7.		-	-	-59	dBm
802.11ac (VHT80)	MCS0.	PER<10%, Packet size=	-	-	-76	dBm
	MCS1.		-	-	-73	dBm

	MCS2	4,096bytes	-	-	-71	dBm
	MCS3.		-	-	-68	dBm
	MCS4.		-	-	-64	dBm
	MCS5.		-	-	-60	dBm
	MCS6.		-	-	-59	dBm
	MCS7.		-	-	-58	dBm
	MCS8.		-	-	-53	dBm
	MCS9.		-	-	-51	dBm
Maximum Input Level						
802.11a	FER<10%		-30	-	-	dBm
802.11n	FER<10%		-30	-	-	dBm
802.11ac	FER<10%		-30	-	-	dBm

3.2.2 Transmitter RF Specifications

Parameter	Condition	Min.	Nom.	Max.	Unit.
Receive Input Frequency					
802.11b/g/n	2.4GHz	2412	-	2472	MHz
Transmit Power					
802.11b	11Mbps	15	17	19	dBm
802.11g	54Mbps	13	15	17	dBm
802.11n	HT20, MCS7	12	14	16	dBm
	HT40, MCS7	12	14	16	dBm
Spectrum Mask					
802.11b	$f_c - 22\text{MHz} < f < f_c - 11\text{MHz} \& f_c + 11\text{MHz} < f < f_c + 22\text{MHz}$	-	-	-30	dBr
	$f_c - 55\text{MHz} < f < f_c - 22\text{MHz} \& f_c + 22\text{MHz} < f < f_c + 55\text{MHz}$	-	-	-50	dBr
802.11g	$f_c \pm 9\text{MHz}$	-	-	0	dBr
	$f_c \pm 11\text{MHz}$	-	-	-20	dBr
	$f_c \pm 20\text{MHz}$	-	-	-28	dBr
	$f_c \pm 30\text{MHz}$	-	-	-40	dBr
802.11n	$f_c \pm 9\text{MHz}$	-	-	0	dBr
	$f_c \pm 11\text{MHz}$	-	-	-20	dBr
	$f_c \pm 20\text{MHz}$	-	-	-28	dBr
	$f_c \pm 30\text{MHz}$	-	-	-45	dBr
Center Frequency Tolerance					
802.11b		-25	-	+25	pmm
802.11g/n		-20	-	+20	pmm
EVM (Error Vector Magnitude)*					
802.11b	1Mbps	-	-	35	%

	2Mbps	-	-	35	%
	5.5Mbps	-	-	35	%
	11Mbps	-	-	35	%
802.11g	6Mbps	-	-	-5	%
	9Mbps	-	-	-8	dB
	12Mbps	-	-	-10	dB
	18Mbps	-	-	-13	dB
	24Mbps	-	-	-16	dB
	36Mbps	-	-	-19	dB
	48Mbps	-	-	-22	dB
	54Mbps	-	-	-25	dB
802.11n	MCS0.	-	-	-5	dB
	MCS1.	-	-	-10	dB
	MCS2	-	-	-13	dB
	MCS3.	-	-	-16	dB
	MCS4.	-	-	-19	dB
	MCS5.	-	-	-22	dB
	MCS6.	-	-	-25	dB
	MCS7.	-	-	-28	dB
Remarks					
EVM : <Test condition> Method: composite EVM method. Phase correction: Symbol-by-symbol correction. Channel estimation: Raw channel estimate Raw Long Symbols. Symbol timing correction: on. Frequency Sync: Long training symbol.					

Parameter	Condition	Min.	Nom.	Max.	Unit.
Receive Input Frequency					
802.11a/n/ac	5GHz	5180	-	5825	MHz
Transmit Power					
802.11a	54Mbps	12	14	16	dBm
802.11n	HT20, MCS7	12	14	16	dBm
	HT40, MCS7	11	13	15	dBm
802.11ac	VHT80,MCS9	9	11	13	dBm
Spectrum Mask					
802.11a	$f_c \pm 9\text{MHz}$	-	-	0	dBr
	$f_c \pm 11\text{MHz}$	-	-	-20	dBr
	$f_c \pm 20\text{MHz}$	-	-	-28	dBr
	$f_c \pm 30\text{MHz}$	-	-	-40	dBr
802.11n	$f_c \pm 9\text{MHz}$	-	-	0	dBr

	$f_c \pm 11\text{MHz}$	-	-	-20	dBr
	$f_c \pm 20\text{MHz}$	-	-	-28	dBr
	$f_c \pm 30\text{MHz}$	-	-	-45	dBr
802.11ac(VHT80)	$f_c \pm 39\text{MHz}$	-	-	0	dBr
	$f_c \pm 41\text{MHz}$	-	-	-20	dBr
	$f_c \pm 80\text{MHz}$	-	-	-28	dBr
	$f_c \pm 120\text{MHz}$	-	-	-40	dBr
Center Frequency Tolerance					
802.11a/n/ac		-20	-	+20	pmm
EVM(Error Vector Magnitude)*					
802.11a	6Mbps	-	-	-5	%
	9Mbps	-	-	-8	dB
	12Mbps	-	-	-10	dB
	18Mbps	-	-	-13	dB
	24Mbps	-	-	-16	dB
	36Mbps	-	-	-19	dB
	48Mbps	-	-	-22	dB
	54Mbps	-	-	-25	dB
802.11n	MCS0.	-	-	-5	dB
	MCS1.	-	-	-10	dB
	MCS2	-	-	-13	dB
	MCS3.	-	-	-16	dB
	MCS4.	-	-	-19	dB
	MCS5.	-	-	-22	dB
	MCS6.	-	-	-25	dB
	MCS7.	-	-	-28	dB
802.11ac	MCS0.	-	-	-5	dB
	MCS1.	-	-	-10	dB
	MCS2	-	-	-13	dB
	MCS3.	-	-	-16	dB
	MCS4.	-	-	-19	dB
	MCS5.	-	-	-22	dB
	MCS6.	-	-	-25	dB
	MCS7.	-	-	-27	dB
	MCS8.	-	-	-30	dB
	MCS9.	-	-	-32	dB
Remarks					

EVM :

<Test condition>

Method: composite EVM method.

Phase correction: Symbol-by-symbol correction.

Channel estimation: Raw channel estimate Raw Long Symbols.

Symbol timing correction: on.

Frequency Sync: Long training symbol.

3.2.3 Bluetooth RF Specifications

Parameter	Conditions	Minimum	Typical	Maximum	Unit
Frequency range		2402		2480	MHz
RX sensitivity	1 Mbps	-	-91	-	dBm
	2 Mbps	-	-92	-	dBm
	3 Mbps	-	-85	-	dBm
Initial carrier frequency offset		-24	5	24	KHz
Output power	Class 1/GFSK	-	4	-	dBm
	Class 2/GFSK	-6	0	4	dBm

4. Application, Implementation, and Layout

4.1 Wi-Fi Application Diagram

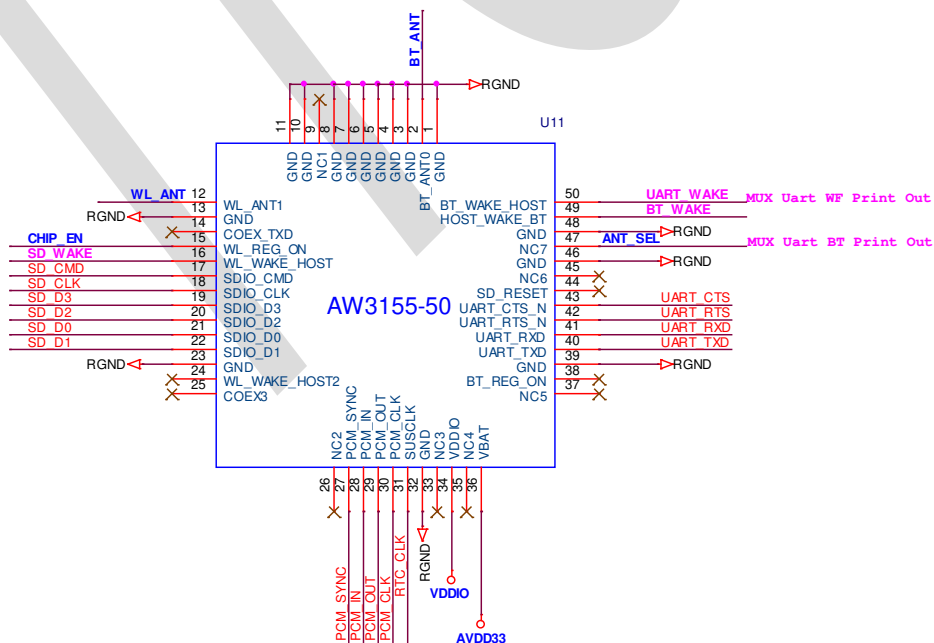


Figure 3. Application Circuit Diagram of AW3155-50

5. Mechanical and Package

5.1 Mechanical Size

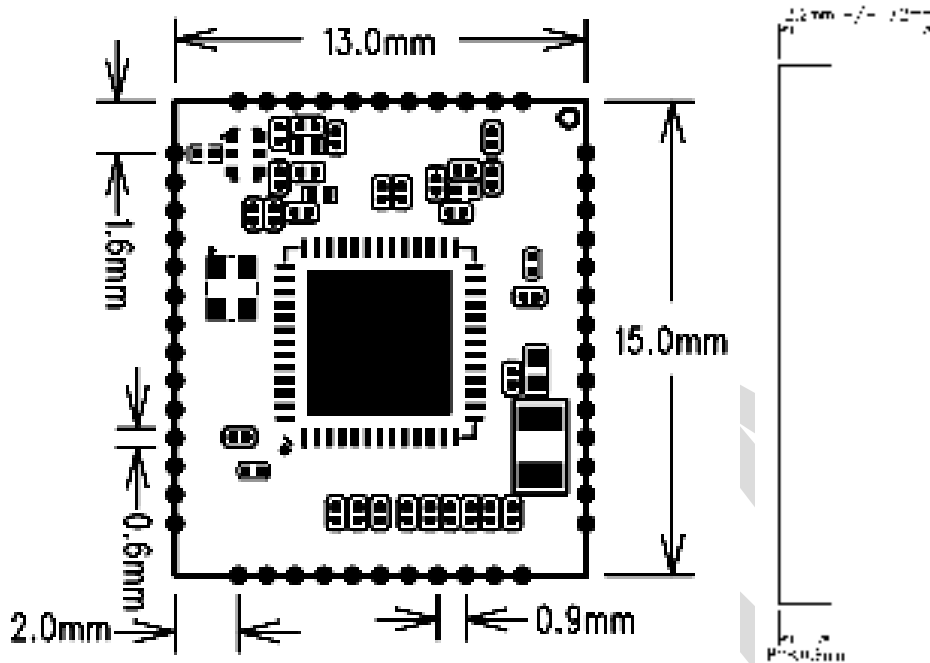


Figure 4. Mechanical Size of AW3155-50

5.2 Package Information

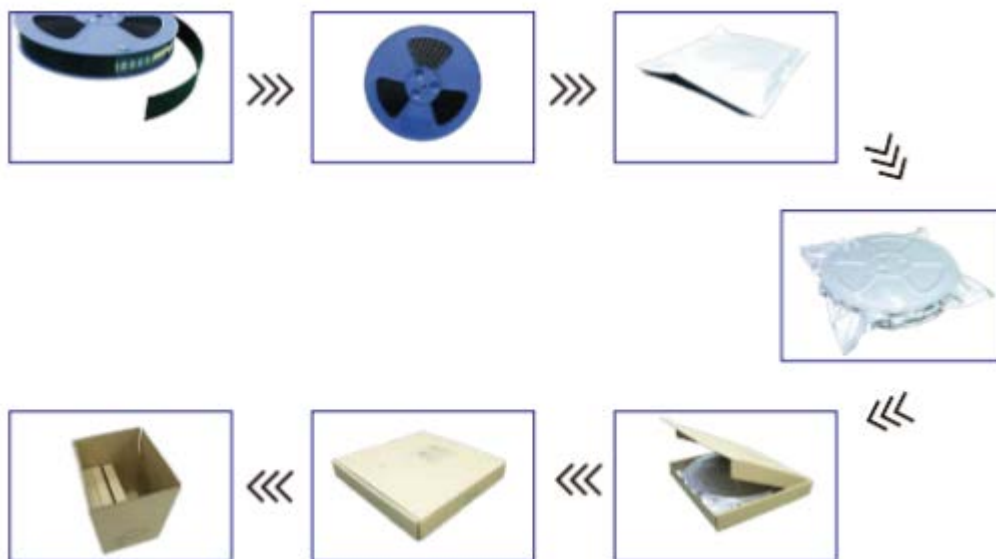


Figure 5. Brief Packaging Process of AW3155-50 Modules

6. Thermal Reflow

Referred to IPC/JEDEC standard.

Peak temperature: <250°C

Number of times: ≤2

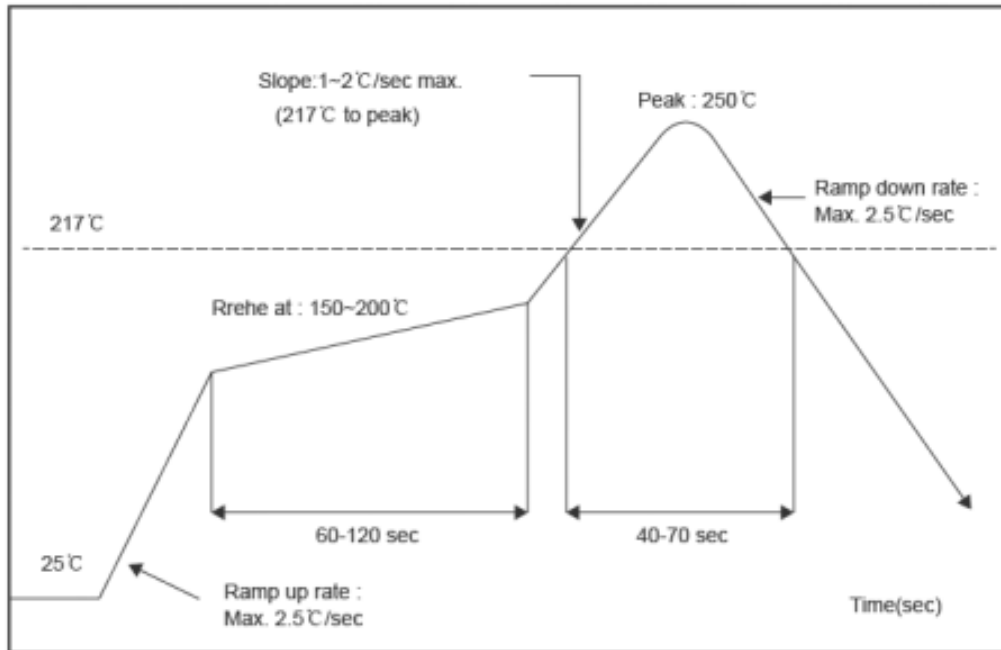


Figure 6. Recommended Reflow for Lead Free Solder

Note: The module is recommended not to go through reflow oven twice.

7. Antenna Information

Antenna	Antenna Type	Gain(dBi)	Operation frequency(MHz)
Bluetooth	FPC	3.3	2402~2480
2.4G WIFI	FPC	3.3	2412~2472
5G WIFI	FPC	4.4	5180~5825

8. Ordering Information

Part NO.	Working Voltage	ANT	Shielding Cover
AW3155-50	3~3.6V DC	External PF antenna	Included

9. Revision History

Version	Change Content	Reviser	Date
V0.1	Initial Version	Phil Ye	2021.01.26
V0.2	Update RF parameters	Phil Ye	2021.06.08
V0.3	Update RF parameters	Phil Ye	2021.07.22

List of applicable FCC rules

FCC CFR Title 47, Part 15, Subpart C CFR Title 47, Part 15, Subpart E

Summarize the specific operational use conditons

This module has been granted Single Modular Approval for mobile applications . OEM integrators for host products may use the module in their final products without additional FCC certifications if they meet the following conditions . Otherwise , additional FCC approvals must be obtained The host product with the module installed must be evaluated for simultaneous transmission requirements The users manua for the host product must clearly indicatethe operating requirements and conditions that must be observed to ensure compliancewith curent FCC RF exposure guidelines . To comply with FCC regulations limiting bothmaximum RF ouput power and human exposure to RF radiationA label must be affixed to the outside of the host product product with the followingstatement . This device contains FCC ID : VYVAW3155-50-50R

The final Module combinations master need to be evaluated against the FCC Part15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device

Information on test modes and additional testing requirement

Consider multi-transmission mode in the host

Additional testing , Part 15 Subpart B disclaimer

When the module is installed in the host, SDoC needs to be evaluated.

Single module procedures

The module has meet the requirements to satisfy the conditions

Trace antenna designs

Not apply.

RF exposure considerations

The host device manufacturer should confirm that a separation distance of 20cm or more should be maintained between the antenna of this host device and persons during the host device operation.

Antennas

The antenna of the product is connected by an external matching circuit of EUT, and the matching component is a 0Ω resistor.customer can use the FPC antenna with antenna gain isn't greater than 4.4 dBi.

Lable and compliance information

If this certified module is installed inside the host device . then the outsideof the host must be labeledwith " Contains FCC ID : FCC ID : VYVAW3155-50-50R



Hereby, [ITON Technology Corp] declares that the radio equipment type [IEEE 802.11a/b/g/n/ac 1T1R + Bluetooth 5.0 Combo Module AW3155-50] is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: <https://www.sziton.com/>. Attention: In EU member states and EFTA countries, the operation in the frequency range 5150MHz-5350MHz is only permitted indoors..

FCC Statement

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.

FCC Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and consider removing the no-collocation statement.

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.

Caution!

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

Please notice that if the FCC 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: VYVAW3155-50-50R" any similar wording

that expresses the same meaning may be used.

This equipment complies with FCC 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 & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

The module is limited to installation in mobile or fixed application.

A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.