



# User Manual

## AB6031X-44PE Wi-Fi and BLE Module

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AltoBeam Inc.

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### **REVISION HISTORY**

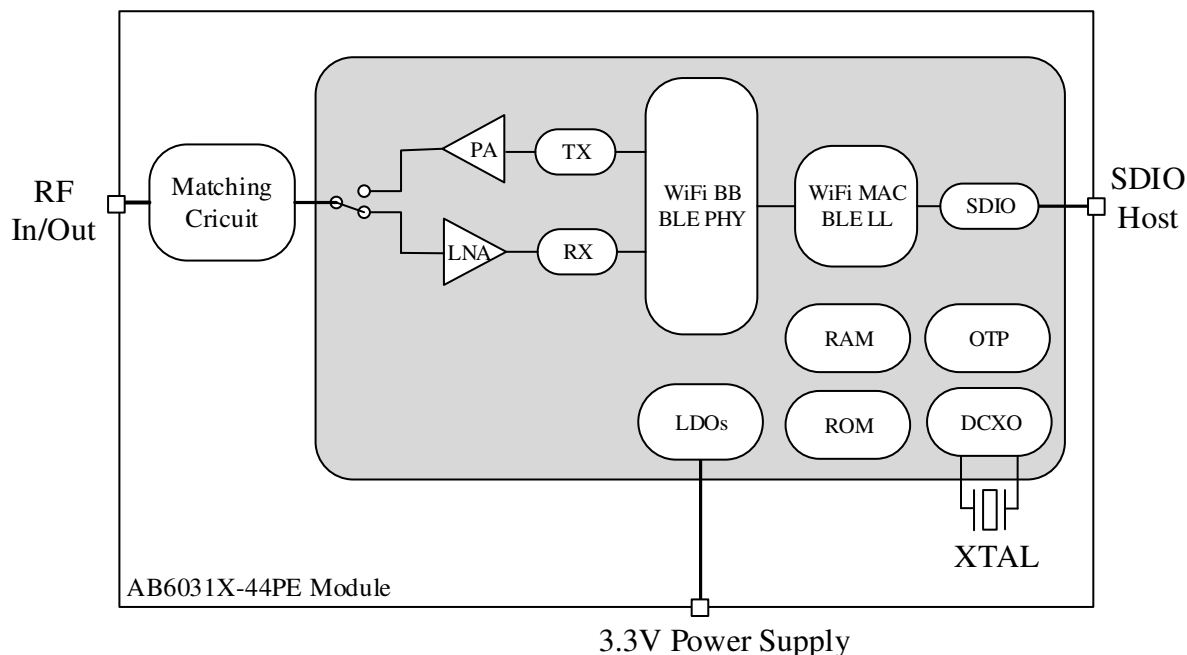
Revision Number	Revision Date	Changes	
		Item	Description
1.0	2023-09-12		Formal release

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# 1 Overview

AB6031X-44PE module is a highly integrated 1T1R 2.4GHz IEEE 802.11b/g/n and Bluetooth LE v4.2 device with SDIO interface (SDIO 2.0 compliant), based on AltoBeam's ATBM6031-X IC chip. The AB6031X-44PE module can be used in IP camera, printer and smart household products that need to connect Wi-Fi networks.



# 2 Product Characteristics

Main chipset	AltoBeam ATBM6031-X Wi-Fi and BLE chip
Operating frequency	2.412 ~ 2.472 GHz
Wi-Fi Standard	IEEE 802.11b/g/n 1T1R
BLE Standard	Bluetooth LE v4.2
Wi-Fi Modulation	802.11b: DBPSK (1Mbps), DQPSK (2Mbps), CCK (5.5, 11Mbps) 802.11g/n: OFDM
Wi-Fi Bandwidth	802.11b/g/n 20MHz: $\leq 20\text{MHz}$ 802.11n 40MHz: $\leq 40\text{MHz}$
Wi-Fi PHY data rates	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0~7, up to 150Mbps
Wi-Fi sensitivity	802.11b 1Mbps: -97.5dBm; 802.11b 11Mbps: -90.0dBm; 802.11g 6Mbps: -93.5dBm; 802.11g 54Mbps: -76.5dBm; 802.11n MSC7 HT20: -74.0dBm; 802.11n MSC7 HT40: -71.0dBm
Wi-Fi transmitting power	802.11b 11Mbps: 19.19dBm; 802.11g 54Mbps: 16.92dBm; 802.11n HT20 MSC7: 15.89dBm; 802.11n HT40 MCS7: 13.67dBm
BLE transmitting power	12.1dBm
BLE sensitivity	1Mbps: -99.5dBm

Host interface	SDIO 2.0
Operation range	More than 150 meters in open space
RF antenna	External antenna (2.4GHz 50Ohm Resistance)
Security	WEP, WPA, WPA2, WPA3 personal
Power consumption	DC3.3V Max.300mA
Operating temperature	-20 ~ +70°C ambient temperature
Storage temperature	-40~ +125°C ambient temperature
Humidity	5% to 90% maximum (non-condensing)
Dimension	Typical L12.0*W12.0*H2.25mm

### 3 Mechanical Specification

#### 3.1 Outline drawing

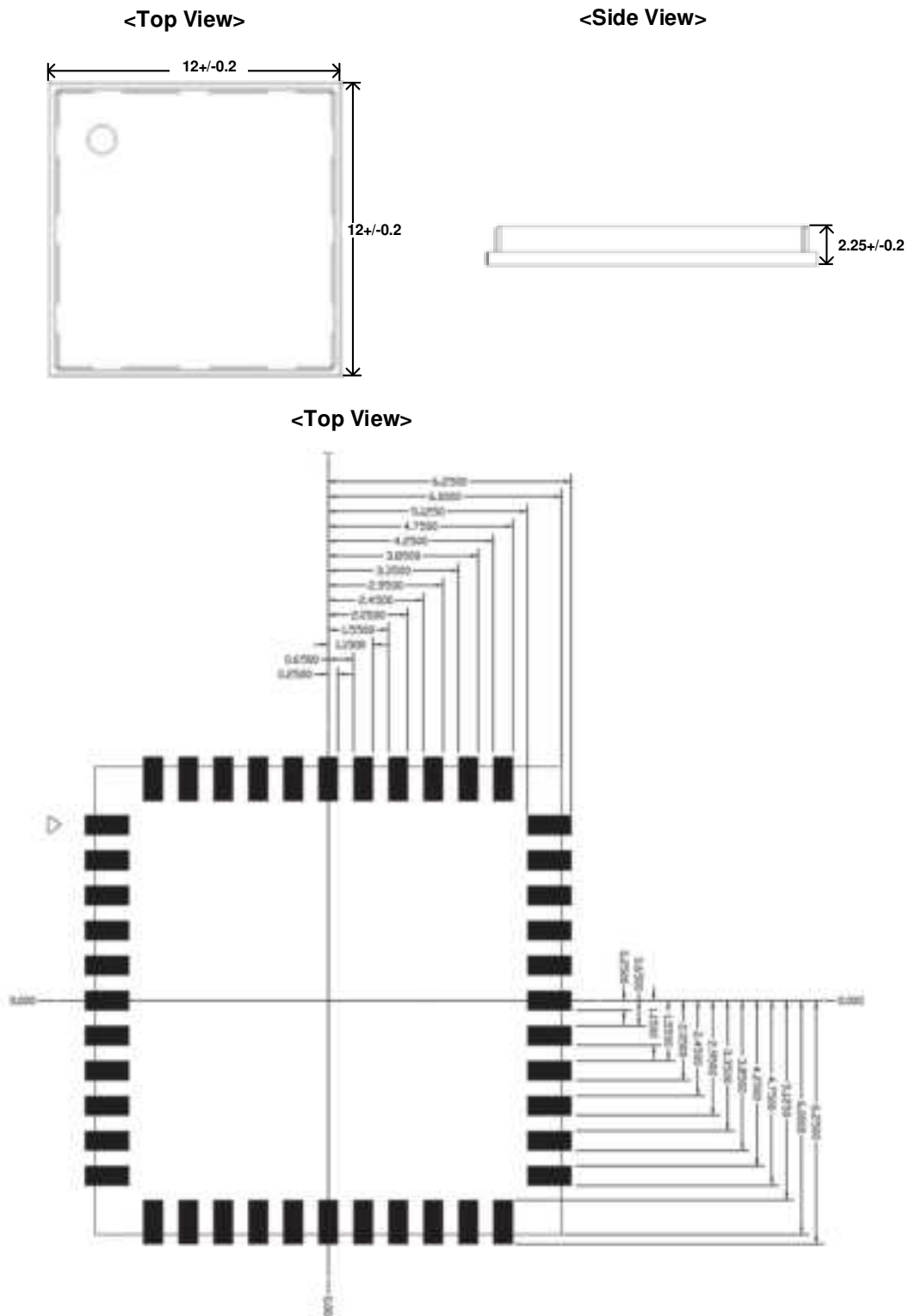
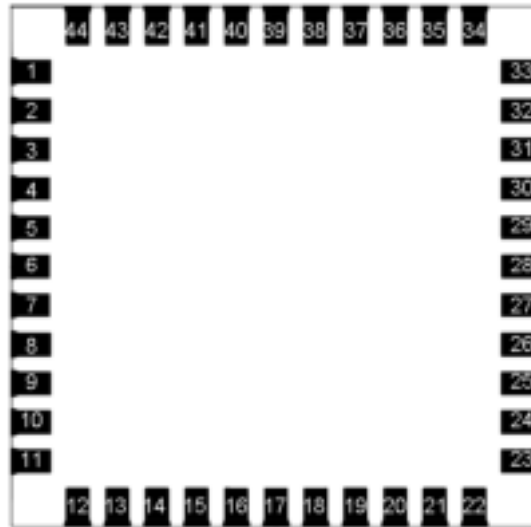


Fig. Outline drawing

## 3.2 Pin definition



<Top View>

Pin Number	Pin Name	Pin Description
1	GND	Ground
2	RF_ANT	External Antenna (2.4GHz 50ohm)
3	GND	Ground
4	NC	
5	NC	
6	NC	
7	NC	
8	NC	
9	VDD	3.3V DC power supply input
10	NC	
11	NC	
12	CS	Internal regulator disable pin, low level is chip power down
13	WAKE_HOST	WLAN to wake up host
14	SDIO_DAT2	SDIO data line 2
15	SDIO_DAT3	SDIO data line 3
16	SDIO_CMD	SDIO command line
17	SDIO_CLK	SDIO clock line
18	SDIO_DAT0	SDIO data line 0
19	SDIO_DAT1	SDIO data line 1
20	GND	Ground
21	NC	
22	VDD	3.3V DC power supply input
23	NC	I2C SDA for debug
24	NC	I2C SCL for debug
25	NC	

Pin Number	Pin Name	Pin Description
26	NC	
27	NC	Left it floating
28	NC	
29	NC	
30	NC	
31	GND	Ground
32	NC	
33	GND	Ground
34	NC	
35	NC	
36	GND	Ground
37	NC	
38	NC	
39	NC	
40	NC	
41	GND	Ground
42	NC	
43	NC	
44	NC	

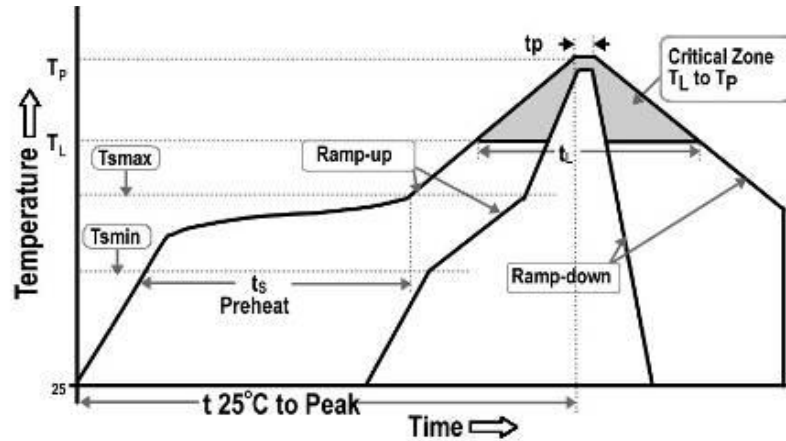


## 4 Solder Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature:  $<260^{\circ}\text{C}$

Number of Times:  $\leq 2$  times



Profile Feature		Specification*
Average ramp-up rate ( $t_{smax}$ to $t_p$ )		$2^{\circ}\text{C}/\text{second max.}$
Pre-heat	Minimal temperature ( $T_{smin}$ )	$150^{\circ}\text{C}$
	Maximal temperature ( $T_{smax}$ )	$200^{\circ}\text{C}$
	Time ( $t_s$ )	60~120 seconds
Time maintained above	Temperature ( $T_L$ )	$217^{\circ}\text{C}$
	Time ( $t_L$ )	40~60 seconds
Peak/Classification temperature ( $T_p$ )		$260^{\circ}\text{C}$
Time within $5^{\circ}\text{C}$ of actual peak temperature ( $t_p$ )		10~20 seconds
Ramp-down rate		$2.5^{\circ}\text{C}/\text{second max.}$
Time $25^{\circ}\text{C}$ to peak temperature		8 minutes max.

## 5 Warning

- 1) Do not use this product under humid or hot conditions.
- 2) Do not use overloaded.
- 3) FCC compliance statement

### [§15.19 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.

### [§15.21 Information to user](#)

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

### [#List of applicable FCC Rules:](#)

47 CFR Part 15, Subpart C 15.203  
47 CFR Part 15, Subpart C 15.205  
47 CFR Part 15, Subpart C 15.207  
47 CFR Part 15, Subpart C 15.209  
47 CFR Part 15, Subpart C 15.247  
47 CFR Part 2.1091

### [#Summarize the specific operational use conditions](#)

This module can be used in IOT devices, the input voltage to the module is nominally 5V.

### [#Limited module procedures](#)

This module is not a limited module.

### [#Trace antenna designs](#)

The antenna is not a trace antenna.

### [#RF Exposure compliance statement](#)

This Module 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 and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

### [# 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 (new application) procedure followed by a Class II permissive change application.

### [#Labelling Instruction for Host Product Integrator](#)

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: 2BAVS-AB6031X-44PE" any similar wording that expresses the same meaning may be used.

§ 15.19 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.

### [#Information on test modes and additional testing requirements](#)

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.

Test software access to different test modes: AltoBeam WIFI GUI (for BT and WiFi test)

Testing item, Frequencies, Transmit Power, Modulation Type can be selected on the test script instructions.

### [#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.*

## 4) ISED compliance statement

This device contains licence-exempt transmitter(s)/receiver(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.

#### ISED Radiation Exposure statement

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 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps. Cet émetteur ne doit pas être colocalisé ou fonctionner en conjonction avec une autre antenne ou un autre émetteur.

Please notice that if the 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 IC: 31395-AB6031X44PE" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit : **Contient IC : 31395-AB6031X44PE** est le numéro d'homologation du module

This radio transmitter [**IC: 31395-AB6031X44PE**] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

a list of all antenna types

Dipole Antenna	2.25 dBi
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