



Data Sheet

ATBM6162-44PE-02

Wi-Fi Module

1T1R 2.4&5GHz Wi-Fi6+BLE

WRITTEN	CHECKED	APPROVED

Document Rev. 1.5
Released: 2026-04-29
AltoBeam Inc.

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REVISION HISTORY

Revision Number	Revision Date	Changes	
		Item	Description
1.5	2026-04-29		Add module pictures
1.4	2026-01-29		Revised the requirement of power supply
1.3	2025-09-11		Add module pictures
1.2	2025-07-18		Changed typical Tx power of 5GHz band
1.1	2025-05-21		Changed the size of land pattern at the bottom of module
1.0	2024-12-24		Formal release

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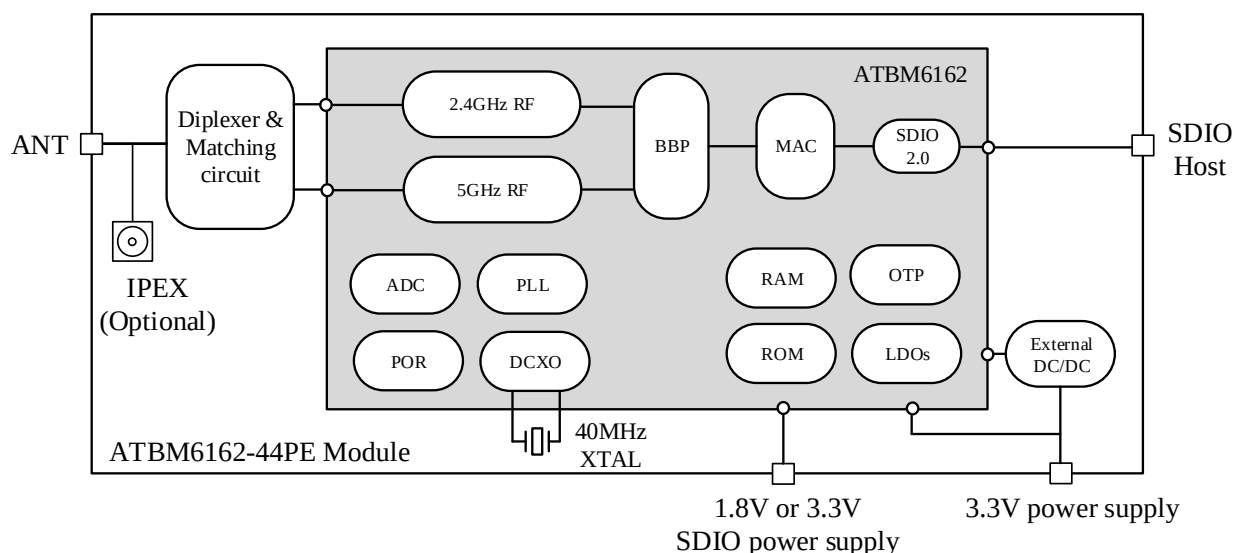
1 Overview

ATBM6162-44PE-02 series module is a highly integrated 2.4&5GHz dual band, Wi-Fi 4/5/6 (802.11 a/b/g/n/ac/ax), 20MHz and 40MHz bandwidth Wireless LAN (WLAN) device with SDIO 2.0 interface, based on AltoBeam's ATBM6162 chip. Optional support for IPEX connector and shielding case. ATBM6162-44PE supports Bluetooth LE v5.0, Long range (Coded PHY), and Wi-Fi pairing with BLE.

ATBM6162-44PE series modules consist of the following models.

Module models	Shielding case	IPEX connector
ATBM6162-44PE-02	Yes	No

The block diagram of ATBM6162-44PE-02 series modules is shown below.



1.1 General specifications

Wi-Fi chip	AltoBeam ATBM6162
Host interface	SDIO 2.0
RF antenna	External 2.4&5GHz dual band antenna
Security	WPA, WPA2, WPA3 personal
Power supply requirement	3.3VDC 800mA
Operating temperature	-40 ~ +85°C ambient temperature
Storage temperature	-50~ +125°C ambient temperature
Humidity	5% to 90% maximum (non-condensing)
Dimension	ATBM6162-44PE: Typical L12.00*W12.00*H1.80mm (±0.2mm) ATBM6162-44PE-01: Typical L12.00*W12.00*H2.00mm (±0.2mm) ATBM6162-44PE-02/03: Typical L12.00*W12.00*H2.40mm (±0.2mm)

1.2 2.4GHz Wi-Fi RF specifications

General specification		
Operating frequency	2.412 ~ 2.484 GHz	
Channel	CH1 ~ CH14 (20MHz channels)	
Standard	IEEE 802.11b/g/n/ax 1T1R	
Modulation	802.11b (DSSS/CCK): DBPSK, DQPSK, BPSK, QPSK 802.11g/n/ax (OFDM): BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM	
Bandwidth	802.11b/g: ≤20MHz 802.11n/ax: ≤40MHz	
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 802.11ax: MCS0~11, up to 286.8Mbps	
Frequency offset	≤±10ppm	
Rx performance		
Mode	Min. Sensitivity (dBm)	Max. Sensitivity (dBm)
802.11b, 1Mbps	-99.7	-10
802.11b, 11Mbps	-91.7	-10
802.11g, 6Mbps	-96.5	-10
802.11g, 54Mbps	-79.1	-10
802.11n, MCS0, HT20	-96.8	-10
802.11n, MCS7, HT20	-78.2	-10
802.11ax, MCS0, HE20	-97.7	-10
802.11ax, MCS11, HE20	-66.3	-10
802.11n, MCS0, HT40	-93.7	-10
802.11n, MCS7, HT40	-74.9	-10
802.11ax, MCS0, HE40	-94.5	-10
802.11ax, MCS11, HE40	-62.3	-10

1.3 5GHz Wi-Fi RF specifications

General specification		
Operating frequency	5.15 ~ 5.25GHz; 5.25 ~ 5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz	
Channel	CH36, CH40, CH44, CH48, CH52~CH64, CH100~CH140, CH149~CH165 (20MHz channel)	
Standard	IEEE 802.11a/n/ac/ax 1T1R	
Modulation	802.11a/n/ac/ax (OFDM): BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM	
Bandwidth	802.11a: ≤20MHz 802.11n/ac/ax: ≤40MHz	
PHY data rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0~7, up to 150Mbps 802.11ac: MCS0~9, up to 200Mbps 802.11ax: MCS0~11, up to 286.8Mbps	
Frequency offset	≤ ±10ppm	
Rx performance at CH36		
Mode	Min. Sensitivity (dBm)	Max. Sensitivity (dBm)
802.11a, 6Mbps	-94.5	-10
802.11a, 54Mbps	-76.7	-10
802.11n, MCS0, HT20	-95.4	-10
802.11n, MCS7, HT20	-76.0	-10
802.11ac, MCS0, VHT20	-95.2	-10
802.11ac, MCS8, VHT20	-72.2	-10
802.11ax, MCS0, HE20	-94.7	-10
802.11ax, MCS11, HE20	-63.2	-10
802.11n, MCS0, HT40	-92.3	-10
802.11n, MCS7, HT40	-72.9	-10
802.11ac, MCS0, VHT40	-92.3	-10
802.11ac, MCS9, VHT40	-67.0	-10
802.11ax, MCS0, HE40	-92.3	-10
802.11ax, MCS11, HE40	-59.1	-10
Rx performance at CH100		
Mode	Min. Sensitivity (dBm)	Max. Sensitivity (dBm)
802.11a, 6Mbps	-94.9	-10
802.11a, 54Mbps	-77.1	-10
802.11n, MCS0, HT20	-95.8	-10
802.11n, MCS7, HT20	-76.4	-10
802.11ac, MCS0, VHT20	-95.8	-10
802.11ac, MCS8, VHT20	-72.6	-10
802.11ax, MCS0, HE20	-95.9	-10
802.11ax, MCS11, HE20	-63.1	-10
802.11n, MCS0, HT40	-92.7	-10
802.11n, MCS7, HT40	-73.3	-10
802.11ac, MCS0, VHT40	-92.7	-10

802.11ac, MCS9, VHT40	-67.4	-10
802.11ax, MCS0, HE40	-92.7	-10
802.11ax, MCS11, HE40	-59.3	-10
Rx performance at CH161		
Mode	Min. Sensitivity (dBm)	Max. Sensitivity (dBm)
802.11a, 6Mbps	-93.3	-10
802.11a, 54Mbps	-75.7	-10
802.11n, MCS0, HT20	-94.4	-10
802.11n, MCS7, HT20	-75.0	-10
802.11ac, MCS0, VHT20	-94.4	-10
802.11ac, MCS8, VHT20	-71.2	-10
802.11ax, MCS0, HE20	-94.3	-10
802.11ax, MCS11, HE20	-62.1	-10
802.11n, MCS0, HT40	-91.3	-10
802.11n, MCS7, HT40	-71.9	-10
802.11ac, MCS0, VHT40	-91.3	-10
802.11ac, MCS9, VHT40	-66.0	-10
802.11ax, MCS0, HE40	-91.5	-10
802.11ax, MCS11, HE40	-59.1	-10

1.4 BLE RF specifications

Standard	Bluetooth LE v5.0
Operating frequency	2.402 ~ 2.480GHz
Rx Sensitivity	1Mbps: -100.0dBm 2Mbps: -97.0dBm Coded PHY, S=2: -102.0dBm Coded PHY, S=8: -107.0dBm

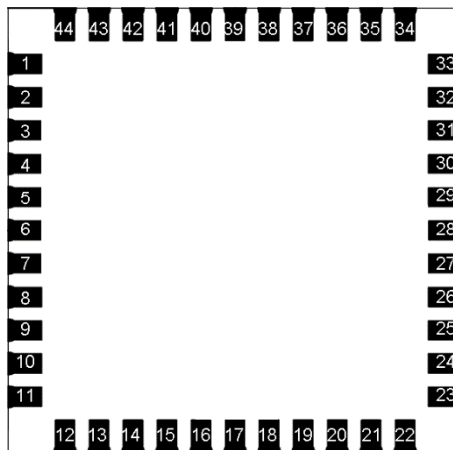
2 Mechanical Specification

2.1 Outline drawing

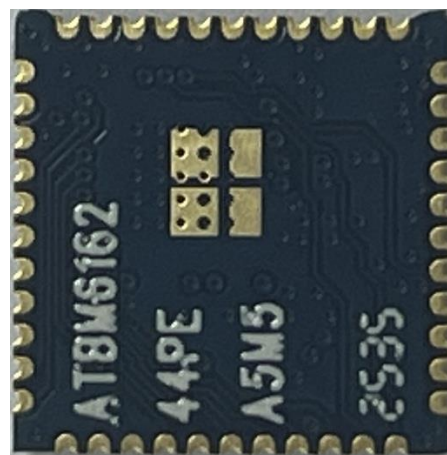
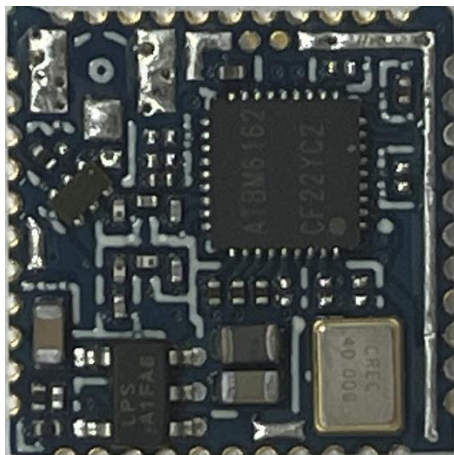
The typical module size of ATBM6162-44PE module is L12.00*W12.00*H1.80mm (± 0.2 mm).

The typical module size of ATBM6162-44PE-01 module is L12.00*W12.00*H2.00mm (± 0.2 mm).

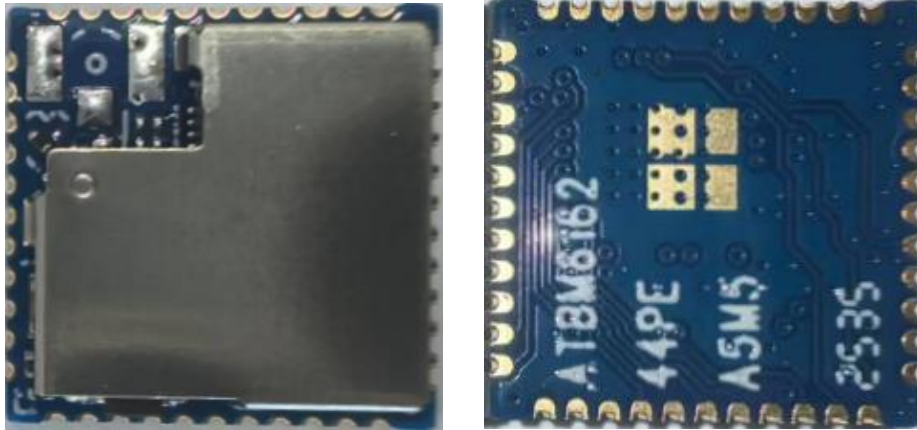
The typical module size of ATBM6162-44PE-02/03 module is L12.00*W12.00*H2.40mm (± 0.2 mm).



Outline drawing (Top View)



ATBM6162-44PE module appearance



ATBM6162-44PE-02 module appearance

2.2 Pin definition

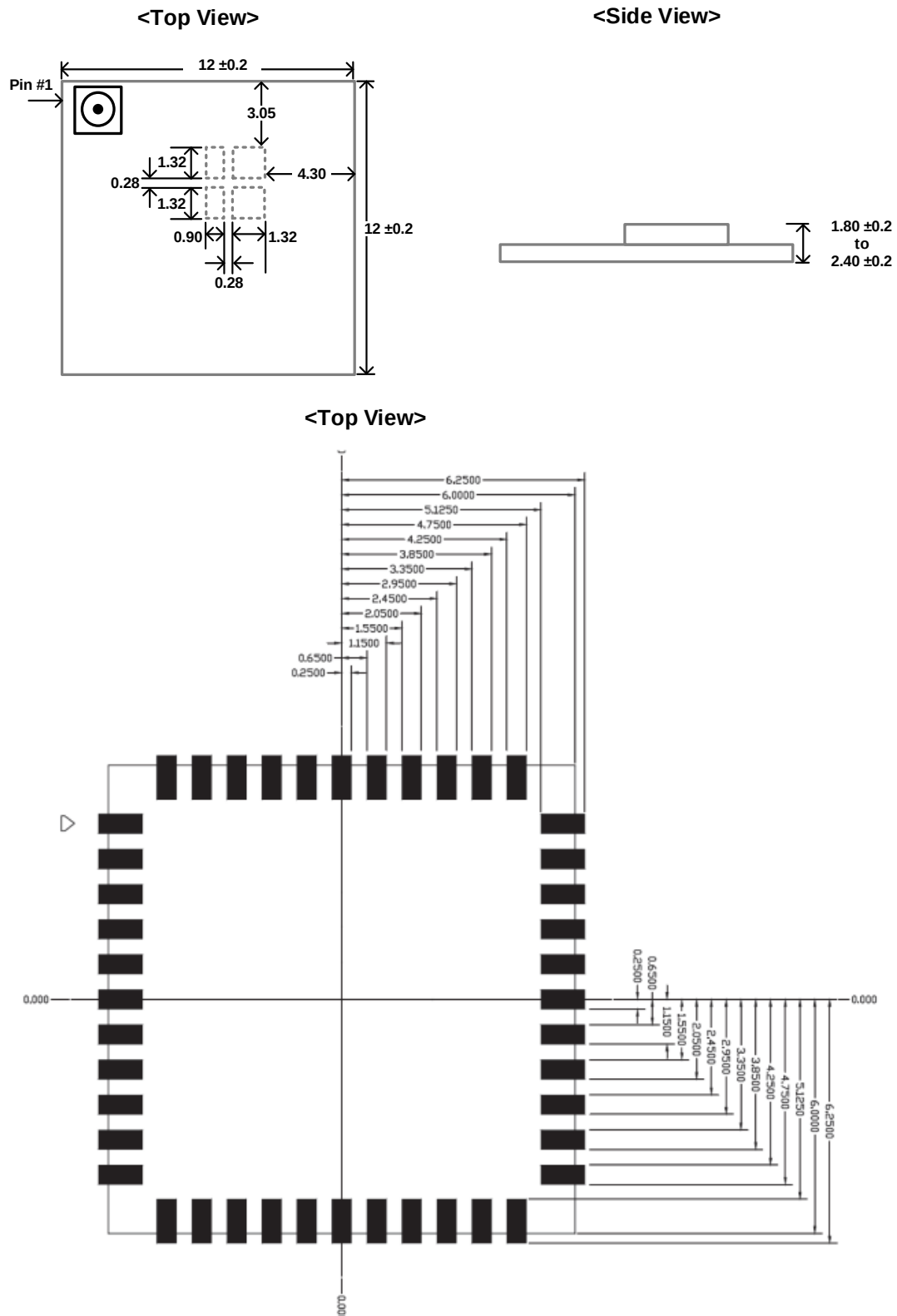
Pin Number	Pin Name	Pin Description
1	GND	Ground
2	ANT1	External Antenna (2.4&5GHz 50Ohm)
3	GND	Ground
4	NC	
5	NC	
6	NC	
7	BT_WAKE_HOST	BLE wakes up host, connected to GPIO18
8	NC	
9	VDD	DC 3.3V power supply
10	NC	
11	NC	
12	CS	Hardware reset pin, low level will reset chip. Note: The high level is 3.3V and doesn't vary with VDDIO voltage.
13	WL_WAKE_HOST	Wi-Fi wakes up host, connected to GPIO19
14	SDIO_DAT2	SDIO data 2
15	SDIO_DAT3	SDIO data 3
16	SDIO_CMD	SDIO command
17	SDIO_CLK	SDIO clock
18	SDIO_DAT0	SDIO data 0
19	SDIO_DAT1	SDIO data 1
20	GND	Ground
21	NC	
22	VDDIO	1.8V or 3.3V SDIO interface power supply Note: Even if SDIO interface is powered by 1.8V, the other digital I/Os are still 3.3V.
23	NC	I2C SDA for debug
24	NC	I2C SCL for debug
25	NC	
26	NC	
27	NC	
28	NC	
29	NC	
30	NC	
31	GND	Ground
32	NC	
33	GND	Ground
34	NC	
35	NC	

Pin Number	Pin Name	Pin Description
36	GND	Ground
37	NC	
38	NC	
39	NC	
40	NC	
41	GND	Ground
42	NC	
43	NC	
44	NC	
-	ANT2	Optional IPEX connector to external 2.4&5GHz antenna



3 Dimensions (Unit: mm)

Note: The solder mask opening is located on the bottom of module, the location of solder mask opening is top view position.

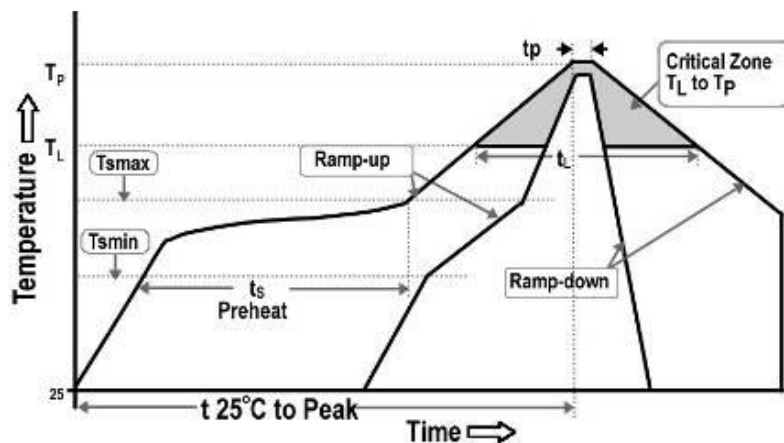


4 Solder Reflow Profile

Referred to IPC/JEDEC standard.

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

Number of Times: ≤ 2 times



Profile Feature		Specification
Average ramp-up rate (Tsmáx to Tp)		2°C/second max.
Pre-heat	Minimal temperature (Tsmín)	150°C
	Maximal temperature (Tsmáx)	200°C
	Time (ts)	60~120 seconds
Time maintained above	Temperature (TL)	217°C
	Time (tL)	40~60 seconds
Peak/Classification temperature (Tp)		260°C
Time within 5°C of actual peak temperature (tp)		10~20 seconds
Ramp-down rate		2.5°C/second max.
Time 25°C to peak temperature		8 minutes max.

5 Packing Information

Packing: Tape and Reel

MPQ (Minimum Packing Quantity): 1,500pcs

FCC WARNING

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

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

This equipment complies with FCC 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.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

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

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module FCC ID:2BN5S-2602B”

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of FCC part 15C(15.247).FCC Part 15.407

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain.

Explanation: The EUT only have one FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is BLE/BT/WIFI 2.4G:4.87dBi, and WIFI 5G:6.91dBi. The use condition of the prototype is mobile.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited

module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is a single module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: No, The module has no tracking antenna design, is FPC antenna.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement,

FCC ID: 2BN5S-2602B

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT only have one FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is BLE/BT/WIFI 2.4G:4.87dBi, and WIFI 5G:6.91dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2BN5S-2602B.

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: WiFiRanger, A CHINA DRAGON TECHNOLOGY LIMITED can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the 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. If the grantee markets their product as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The host should be evaluated by the FCC Subpart B.

This product uses FPC antenna with a maximum antenna gain of BLE/BT/WIFI 2.4G:4.87dBi, and WIFI 5G:6.91dBi.

2.11 Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode⁷; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

Explanation: The customer is an independent module and has been implemented in accordance with D04.

2.12 How to make changes

Since . only Grantees are permitted to make permissive changes, it is recommended that module manufactures provide contact information and some guidance to host providers in the integration instructions if they expect their module will be used differently than granted.

Explanation: Contact Information: We have provided our technical support contact (email: chenyx2@reolink.com.cn) for host manufacturers to reach us regarding any proposed changes to the module's operational conditions or integration method.

IC 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.

Cet appareil contient un émetteur (S)/ récepteur (S) exempté (S) de licence qui est conforme Avec l'innovation, la Science Et les RSS exemptées de permis de développement économique Canada. Le fonctionnement est Sous réserve de ce qui suit
Deux conditions:
(1) ce dispositif ne peut pas causer d'interférence.
(2) ce dispositif doit accepter toute interférence, y compris l'interférence qui peut Provoquer un fonctionnement indésirable de l'appareil.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.
Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

The radio transmitter IC: **33667-2602B** has been approved by The Ministry of Innovation, Science and Economic Development of Canada to use the following antenna types with the specified maximum allowed gain. Antenna types not included in this list, whose gain is higher than the maximum gain of any type listed, are strictly prohibited from use with this device.

Cet émetteur radio IC : **33667-2602B** a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous, avec le gain maximal admissible indiqué. Les types d'antenne non inclus dans cette liste qui ont un gain supérieur au gain maximum indiqué pour tout type répertorié sont strictement interdits pour une utilisation avec cet appareil.

Type of antenna:	FPC antenna
Antenna Gain:	2.4G :2400-2500(4.87dBi) 5G :5150-5850MHz(6.91dBi)

Impedance:	50hm
Manufacture:	SHENZHEN LINRONG TECHNOLOGY CO.,LTD
Model:	ATBM6162-44PE-02