

# Datasheet

产品名称 (Product): BT 5.0 module

产品型号 (Model No.): HOLYIOT-21031 -nRF52805

1. Description.....	3
Hardware :.....	3
Features :.....	3
Application:.....	4
2. Introduction.....	5
2.1 Programmer.....	5
2.2 Software development Tool.....	5
2.3 Protocols.....	5
Software Development Kit.....	5
2.4 SoftDevices.....	5
3. Product Descriptions.....	6
3.1 Mechanical drawings.....	6
3.2 Pin assignments.....	6
4. Mounting our board on the host PCBA.....	8
5. Miscellaneous.....	9
6. Absolute maximum ratings.....	9

# 1. Description

HOLYIOT-21031 BLE module is based on Nordic nRF52805 SoC, the nRF52805 SoC is an ultra-low power *Bluetooth*® 5.2 System on Chip (SoC) supporting Bluetooth Low Energy and 2.4 GHz proprietary protocols. It supports Bluetooth high-throughput 2 Mbps, transferring data faster and more efficiently, and Bluetooth channel selection algorithm #2 (CSA #2), improving coexistence and reducing interference. The radio has up to 4 dBm TX power and -97 dBm sensitivity (1 Mbps Bluetooth Low Energy).the nRF52805 SoC device compliments the extensive nRF52 Series platform with an SoC in a WLCSP optimized for small two-layer PCB designs, significantly decreasing cost compared to four-layer PCBs. A 9.5 x 8.8 mm reference layout with all ten GPIOs available is provided, requiring only 10 external passive components (including two crystal load capacitors). nRF52805 features a 64 MHz Arm® Cortex®-M4 processor with 192 kB of flash memory and 24 kB of RAM. A wide range of analog and digital interfaces is integrated, including a 2-channel 12-bit ADC, SPI, UART, and TWI. It is the perfect choice for applications such as beacons, disposable medical devices, sensors, styluses, and presenters.

Multiprotocol radio (bluetooth low energy, ANT, 2.4G proprietary)

## Hardware :

SWD programmer (SWDIO,SWCLK,VDD,GND)

nRF52805 -CAAA-WLCSP

Size : 9mm\*7mm

BLE stack & RF 2.4Ghz

## Features :

- Bluetooth® 5.0, 2.4 GHz transceiver
  - -97 dBm sensitivity in 1 Mbps Bluetooth® Low Energy mode
  - Max. peak power: 3dBm
  - -20 to +4 dBm TX power, configurable in 4 dB steps
  - On-air compatible with nRF52, nRF51, nRF24L, and nRF24AP Series
  - Supported data rates:
    - Bluetooth® 5.0 - 2 Mbps, 1 Mbps
    - Proprietary 2.4 GHz – 2 Mbps, 1 Mbps
  - Single-ended antenna output (on-chip balun)
  - 4.6 mA peak current in TX (0 dBm)
  - 4.6 mA peak current in RX
  - RSSI (1 dB resolution)
- Arm® Cortex®-M4 32-bit processor, 64 MHz
  - 144 EEMBC CoreMark® score running from flash memory
  - 34.4 µA/MHz running CoreMark from flash memory
  - 32.8 µA/MHz running CoreMark from RAM
  - Serial wire debug (SWD)
- Flexible power management
  - 1.7 V to 3.6 V supply voltage range
  - On-chip DC/DC and LDO regulators with automated low current modes
  - Fast wake-up using 64 MHz internal oscillator
  - 0.3 µA at 3 V in System OFF mode, no RAM retention
  - 0.5 µA at 3 V in System OFF mode with full 24 kB RAM retention
  - 1.1 µA at 3 V in System ON mode, with full 24 kB RAM retention, wake on RTC (running from LFXO clock)
  - 1.0 µA at 3 V in System ON mode, no RAM retention, wake on RTC (running from LFXO clock)
- 192 kB flash and 24 kB RAM
- Advanced on-chip interfaces
  - Programmable peripheral interconnect (PPI)
  - 10 general purpose I/O pins
  - EasyDMA automated data transfer between memory and peripherals
- Nordic SoftDevice ready with support for concurrent multiprotocol

- Temperature sensor
- 12-bit, 200 ksps ADC – 2 configurable channels with programmable gain
- 3x 32-bit timer with Counter mode
- SPI master/slave with EasyDMA
- I2C compatible two-wire master/slave
- UART (CTS/RTS) with EasyDMA
- Quadrature decoder (QDEC)
- AES HW encryption with EasyDMA
- 2x real-time counter (RTC)
- Single crystal operation
- Package variants
  - WLCSP package, 2.482 x 2.464 mm

### **Application:**

- Proprietary protocol devices
- Network processor
- Beacons
- Smart Home sensors
- Presenters/Stylus
- Health monitoring
- Drug delivery
- Asset tags
- Toys
- Retail tags and labels

## 2. Introduction

### 2.1 Programmer

HOLYIOT-21031 module use the Serial Wire Debug(SWD port ), the module which layout the SWDIO, SWCLK, VDD, GND for debug and flash your own firmware, more info about the SWD, please visit [https://www.silabs.com/community/mcu/32-bit/knowledge-base.entry.html/2014/10/21/serial\\_wire\\_debugs-qKCT](https://www.silabs.com/community/mcu/32-bit/knowledge-base.entry.html/2014/10/21/serial_wire_debugs-qKCT)

You can using the Jlink or Jtag for programmer.

### 2.2 Software development Tool

It supports the standard Nordic Software Development Tool-chain using Segger Embedded Studio, Keil, IAR and GCC. More info please visit <https://www.nordicsemi.com/Software-and-Tools/Development-Tools>

### 2.3 Protocols

This module support Bluetooth 5, Bluetooth Low Energy,Bluetooth mesh,Thread,802.15.4,ANT, 2.4GHz proprietary. So we can use different protocols for different situations.

#### **Software Development Kit**

Nordic Semiconductor's Software Development Kits (SDK) are your starting point for software development on the nRF51 and nRF52 Series. It contains source code libraries and example applications covering wireless functions, libraries for all peripherals, bootloaders, wired and OTA FW upgrades, RTOS examples, serialization libraries.

More info please visit <https://www.nordicsemi.com/Software-and-Tools/Software/nRF5-SDK>

You can also download the SDK for coding development .

### 2.4 SoftDevices

Nordic Semiconductor protocol stacks are known as SoftDevices. SoftDevices are pre-compiled, pre-linked binary files. SoftDevices can be programmed in nRF5 series devices, and are freely downloadable from the Nordic website. Please download that here:

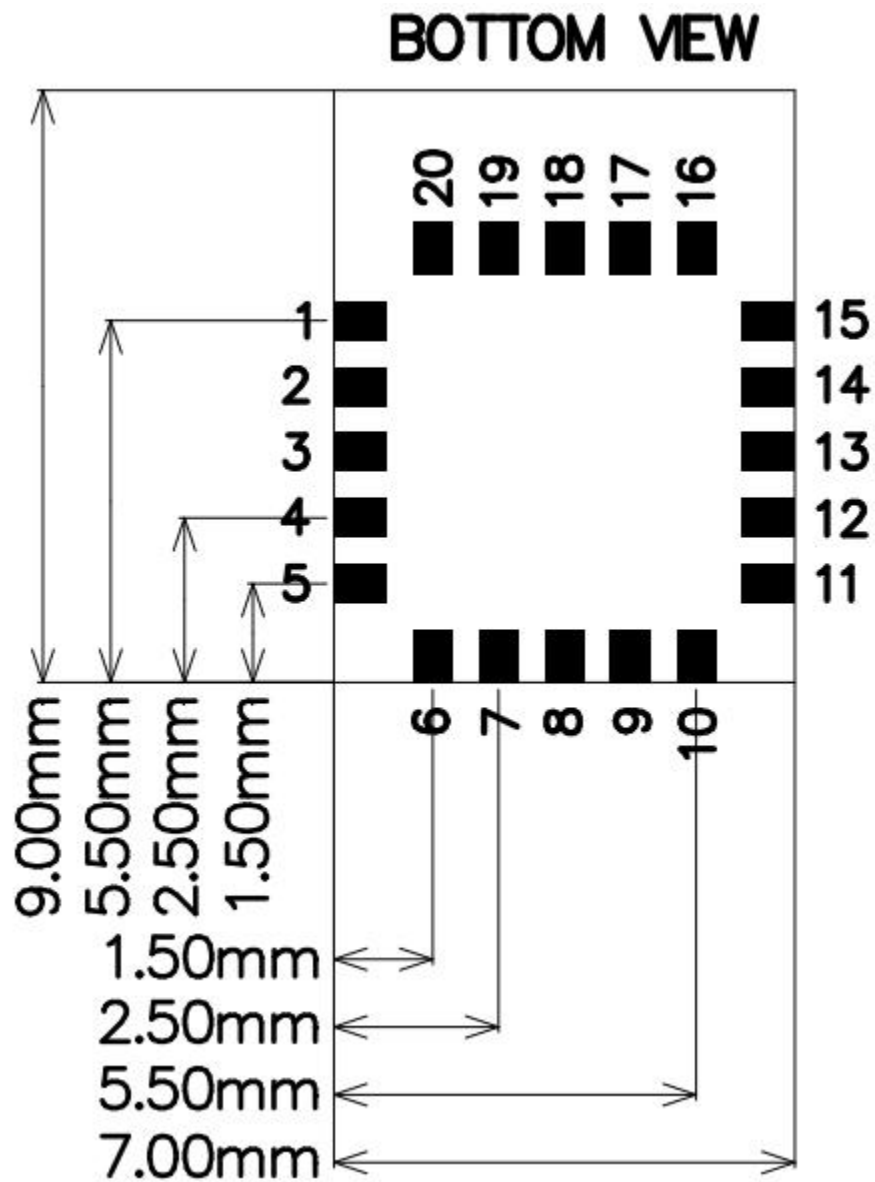
<https://www.nordicsemi.com/Software-and-Tools/Software/S132>

#### **Over-The-Air DFU**

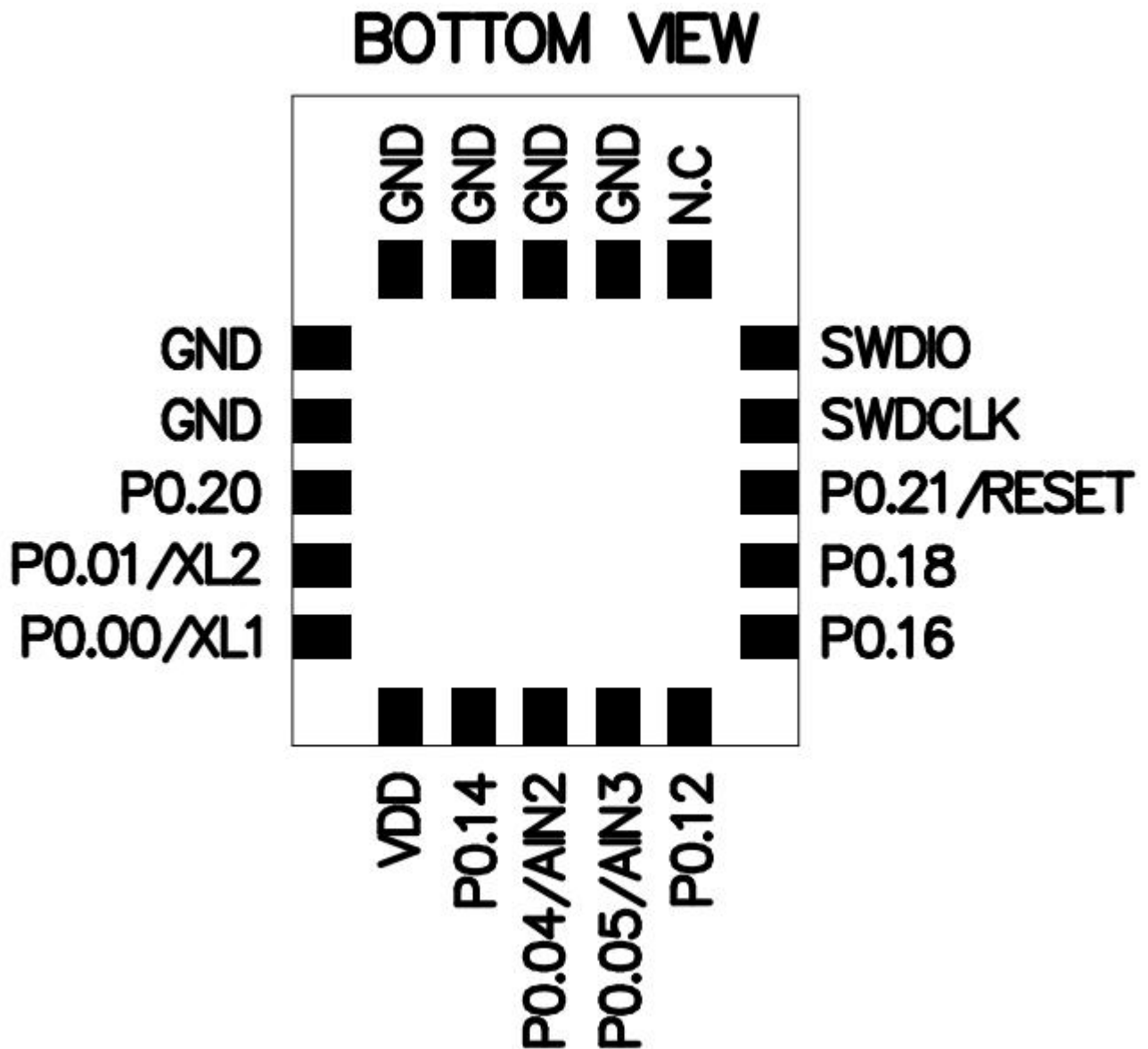
The SoC is supported by an Over-The-Air Device Firmware Upgrade (OTA DFU) feature. This allows for in the field updates of application software and SoftDevice.

### 3. Product Descriptions

#### 3.1 Mechanical drawings



### 3.2 Pin assignments



PIN No.	PIN define	Functions
1	GND	Ground
2	GND	Ground
3	P0.20	General purpose I/O
4	P0.01 XL2	Digital I/O Connection for 32.768 kHz crystal (LFXO)
5	P0.00 XL1	Digital I/O Connection for 32.768 kHz crystal (LFXO)

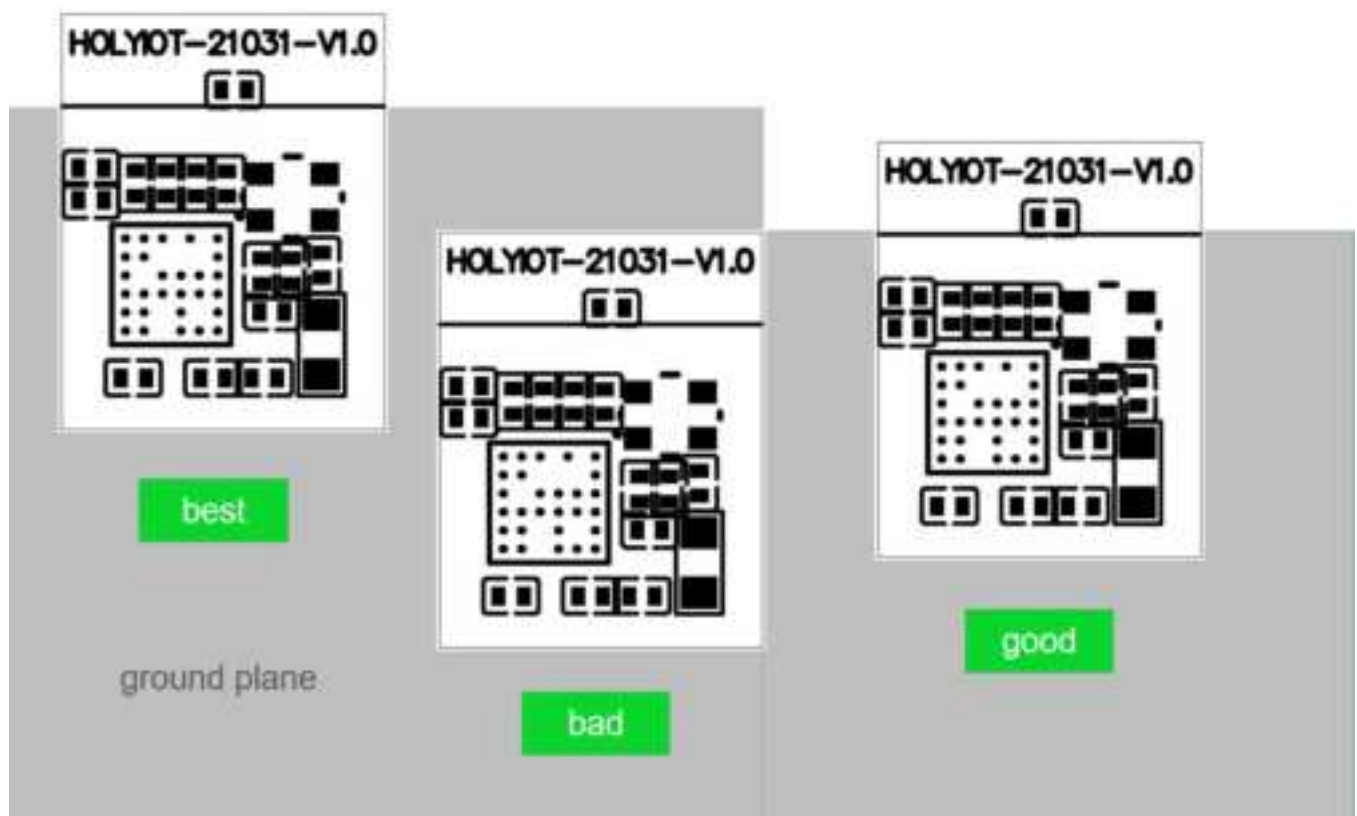


6	VDD	Power (battery) supply
7	P0.14	General purpose I/O
8	P0.04 AIN2	General purpose I/O SAADC input
9	P0.05 AIN3	Digital I/O(general purpose I/O <sup>2</sup> SAADC input
10	P0.12	General purpose I/O
11	P0.16	General purpose I/O
12	P0.18	General purpose I/O
13	P0.21 nRESET	General purpose I/O Configurable as pin reset
14	SWDCLK	Serial wire debug clock input for debug and programming
15	SWDIO	Serial wire debug I/O for debug and programming
16	N.C	Not Connect
17	GND	Ground
18	GND	Ground
19	GND	Ground
20	GND	Ground

## 4. Mounting our board on the host PCBA

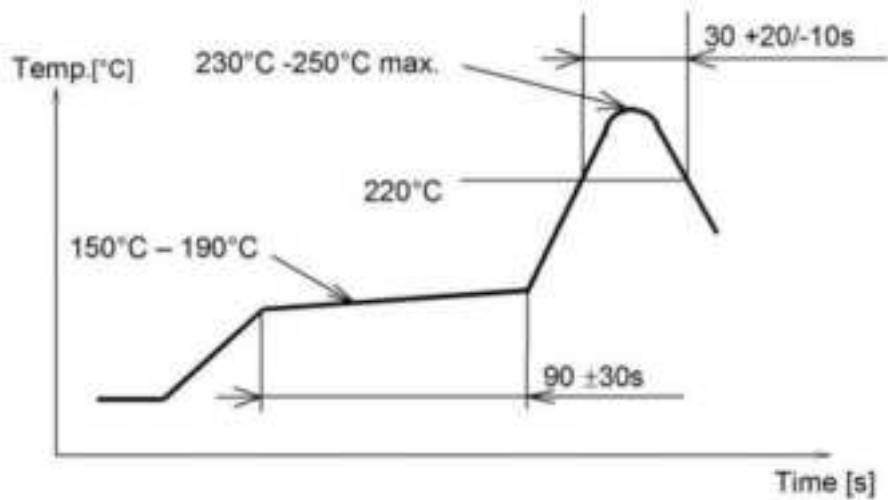
We suggest that you mount our RF board(HOLYIOT-21033 -nRF52832) on the board like that:

1. For the best Bluetooth performance, the antenna of the area need to extend about several mm without ground under the antenna of the edge of the host PCB.
2. The second choice is that place our board at the corner of host PCB, the antenna of board need to extend several mm outside of the Ground plane of the host PCB.



## 5. Miscellaneous

Soldering Temperature-Time Profile for Re-Flow Soldering. Maximum number of cycles for re-flow is 2. No opposite side re-flow is allowed due to module weight.



## 6. Absolute maximum ratings

Maximum ratings are the extreme limits to which the chip can be exposed for a limited amount of time without permanently damaging it. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the device.

Absolute maximum ratings:

	Note	Min.	Max.	Unit
<b>Supply voltages</b>				
VDD		-0.3	+3.9	V
VSS			0	V
<b>I/O pin voltage</b>				
V <sub>IO</sub> , VDD ≤3.6 V		-0.3	VDD + 0.3	V
V <sub>IO</sub> , VDD ≥3.6 V		-0.3	3.9	V
<b>Environmental WLCSP package</b>				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		1	
ESD HBM	Human Body Model		3	kV
ESD HBM Class	Human Body Model Class		2	
ESD CDM	Charged Device Model		1	kV
<b>Flash memory</b>				
Endurance		10 000		write/erase cycles
Retention at 85 °C		10		years



## **FCC 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.

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

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 important announcement

## **Radiation Exposure Statement**

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

## **Important Note:**

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

## **End Product Labeling**

The final end product must be labeled in a visible area with the following "Contains FCC ID:2ALGY-21031".

## **Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

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

### **2.2 List of applicable FCC rules**

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter.

### **2.3 Specific operational use conditions**

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

### **2.4 Limited module procedures**

Not applicable

### **2.5 Trace antenna designs**

Not applicable

### **2.6 RF exposure considerations**

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

### **2.7 Antennas**

This radio transmitter 2ALGY-21031 has been approved by Federal Communications Commission 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.

Model	Type	Peak Gain(dBi)
2400-2500MHz	PCB antenna	0 dBi

### **2.8 Label and compliance information**

The final end product must be labeled in a visible area with the following "Contains FCC ID:2ALGY-21031".

### **2.9 Information on test modes and additional testing requirements**

Host manufacturer which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.247 and 15.209 requirement, only if the test result comply with FCC part 15.247 and 15.209 requirement, then the host can be sold legally.

### **2.10 Additional testing, Part 15 Subpart B disclaimer**

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.