

# ESPS3-32

## 2.4GHz Wi-Fi & BLE5.0 Coexistence Module

Version: 1.0

Date: Feb.08, 2025

### Product Specification

#### Features

##### ■ General

- Chip: ESP32-S3 Series
- Module Size: 18mm x 25.5mm x 3mm
- Xtensa® dualCore32-bit. LX7 microprocessor 240MHz
- 384KB ROM
- 512K SRAM
- 16 KB RTC SRAM

##### ■ Wi-Fi Features

- IEEE 802.11 b/g/n-compliant
- Center frequency range of operating channel: 2412 ~ 2484 MHz
- 1T1R mode with data rate up to 150 Mbps
- TX/RX A-MPDU, TX/RX A-MSDU
- Immediate Block ACK

##### ■ Bluetooth Features

- Bluetooth® 5 (LE) Bluetooth mesh
- Speed: 125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps
- Advertising extensions
- Multiple advertisement sets
- Channel selection algorithm #2
- Coexistence of Wi-Fi and Bluetooth

##### ■ Peripheral Interfaces

- GPIO \* 36;
- I2C;
- I2S;
- SDIO;
- TWAI (CAN 2.0);
- SPI;

- EN ;
- MCPWM;
- ADC;
- LED PWM;

- Working Temperature: -40°C~85°C

#### Applications

- Serial transparent transmission;
- Wi-Fi probe;
- Smart power plug/Smart LED light/Smart home;
- Camera product;
- Sensor networks;
- Over-the-top (OTT) devices;
- Wireless location system beacon;
- Industrial field bus;

#### Module Type

| Model          | Flash    | PSRAM   | Antenna |
|----------------|----------|---------|---------|
| ESPS3-32-N4    | 32M bit  | -       | PCB     |
| ESPS3-32-N8    | 64M bit  | -       | PCB     |
| ESPS3-32-N8R2  | 64M bit  | 16M bit | PCB     |
| ESPS3-32-N16R2 | 128M bit | 16M bit | PCB     |
| ESPS3-32-N16R8 | 128M bit | 64M bit | PCB     |

#### Module Structure



# Update Record

| Date       | Version | Update         |
|------------|---------|----------------|
| 2025-02-28 | V1.0    | First released |

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## 1. Introduction

ESPS3-32 Wi-Fi and BLE coexistence Module is a highly integrated single-chip low power 802.11b/g/n Wireless LAN (WLAN) network controller. It combines a dual-core 240MHz CPU, WLAN MAC, a 1T1R capable WLAN baseband, RF, and Bluetooth in a single chip. It also provides a bunch of configurable GPIO, which are configured as digital peripherals for different applications and control usage.

ESPS3-32 integrates rich peripherals, including SPI, parallel IO, ADC, UART, I2C, I2S, RMT (TX/RX), LED pulse width modulation, USB2.0 serial port, JTAG controller, MCPWM, SDIO slave controller, GDMA, Twai ®controller, on-chip JTAG debugging function, event task matrix. And up to 36 GPIO and so on.

ESPS3-32 module use ESPS3-32 as Wi-Fi and BLE coexistence SOC chip.

ESPS3-32 module integrates internal memories for complete Wi-Fi protocol functions. The embedded memory configuration also provides convenient application developments.

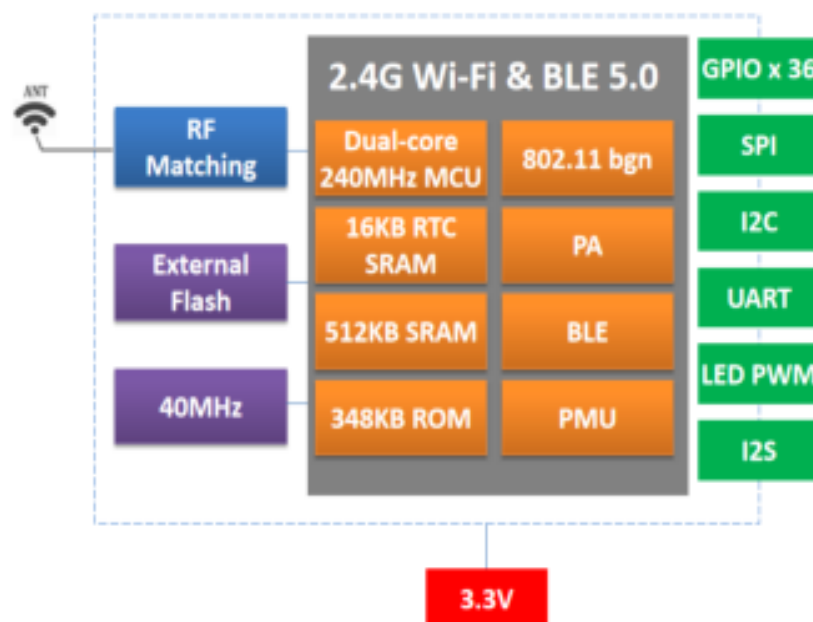


Fig.1.1 ESPS3-32 Module Structure

Technical parameters for ESPS3-32 are listed as follows.

Table.1.1 ESPS3-32 Parameters

| Type     | Item                    | Parameter   |
|----------|-------------------------|---|
| Wi-Fi    | Frequency               | 2.4G~2.5G (2412M~2484M)                           |
|          | Transmit power          | 802.11b: +27 dBm                                  |
|          |                         | 802.11g: +28 dBm                                  |
|          |                         | 802.11n: +27 dBm                                  |
|          | Receiver sensitivity    | 802.11b: -88 dBm (11Mbps)                         |
|          |                         | 802.11g: -76 dBm (54Mbps)                         |
|          |                         | 802.11n: -74 dBm (MCS7, HT20)                     |
|          |                         | 802.11n: -71 dBm (MCS7, HT40)                     |
|          | EVM                     | -24dB @802.11b,11Mbps @19dBm                      |
|          |                         | -27dB @802.11g,54Mbps @17dBm                      |
|          |                         | -29dB @802.11n,HT20,MCS7 @15dBm                   |
|          |                         | -29dB @802.11n,HT40,MCS7 @15dBm                   |
|          | Antenna                 | PCB   |
| BLE      | RF power control range  | -2.0~1.0dBm (2402 ~ 2480 MHz)                     |
| Hardware | CPU                     | Xtensa®dualCore32-bit.LX7microprocessor<br>240MHz |
|          | Interface               | UART/SDIO/SPI/I2C/GPIO                            |
|          | Working voltage         | 3.0V ~ 3.6V(Standard 3.3V)                        |
|          | Working temperature     | -40°C ~ 85°C                                      |
|          | Environment temperature | -40°C ~ 105°C                                     |
|          | Shape                   | 18mm x 25.5mm x 3mm                               |
| Software | Wi-Fi working mode      | STA, Soft-AP and sniffer modes                    |
|          | Security mode           | WPS / WEP / WPA / WPA2 / WPA3                     |
|          | Update firmware         | UART Download/USB Download                        |
|          | Software develop        | SDK   |
|          | Network protocol        | IPv4, TCP/UDP/HTTP/FTP/MQTT                       |

## 2. Interface Definition

ESPS3-32 Wi-Fi & BLE module interface definition is shown as below.

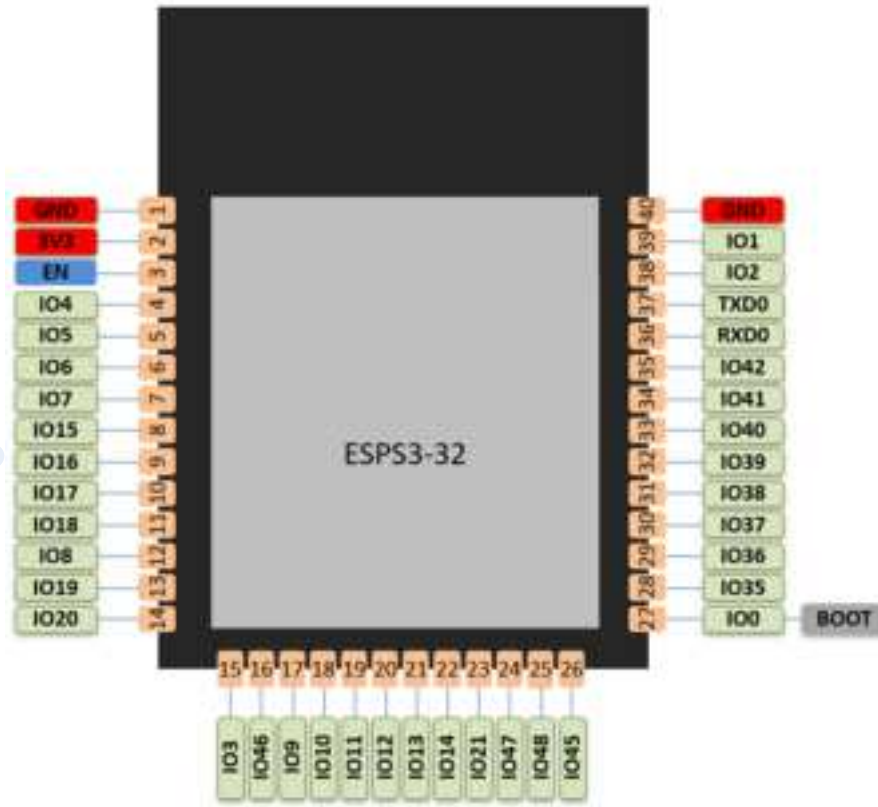


Fig.2.1 ESPS3-32 Pins Definition (Top view)

Working modes and pins function is shown in Table 2.1.

Table.2.1 Working Mode

| Mode               | IO0 Voltage Level |
|--------------------|-------------------|
| UART Download Mode | LOW               |
| Flash Boot Mode    | HIGH (Default)    |

Table.2.2 Pins Function Definition

| Num. | Pin Name | Type | Function |
|------|----------|------|----------|
| 1    | GND      | P    | Ground   |

|    |      |     |  |
|----|------|-----|--|
| 2  | 3V3  | P   | Power supply   |
| 3  | EN   | I   | Chip enable; Internal Pull-up. HIGH: enable the chip.              |
| 4  | IO4  | I/O | RTC_GPIO4, GPIO4, TOUCH4, ADC1_CH3                                 |
| 5  | IO5  | I/O | RTC_GPIO5, GPIO5, TOUCH5, ADC1_CH4                                 |
| 6  | IO6  | I/O | RTC_GPIO6, GPIO6, TOUCH6, ADC1_CH5                                 |
| 7  | IO7  | I/O | MTDO, GPIO7, LP_GPIO7, LP_I2C_SCL, FSPID                           |
| 8  | IO15 | I/O | RTC_GPIO15, GPIO15, U0RTS, ADC2_CH4, XTAL_32K_P                    |
| 9  | IO16 | I/O | RTC_GPIO16, GPIO16, U0CTS, ADC2_CH5, XTAL_32K_N                    |
| 10 | IO17 | I/O | RTC_GPIO17, GPIO17, U1TXD, ADC2_CH6                                |
| 11 | IO18 | I/O | RTC_GPIO18, GPIO18, U1RXD, ADC2_CH7, CLK_OUT3                      |
| 12 | IO8  | I/O | RTC_GPIO8, GPIO8, TOUCH8, ADC1_CH7, SUBSPICS1                      |
| 13 | IO19 | I/O | RTC_GPIO19, GPIO19, U1RTS, ADC2_CH8, CLK_OUT2, USB_D-              |
| 14 | IO20 | I/O | RTC_GPIO20, GPIO20, U1CTS, ADC2_CH9, CLK_OUT1, USB_D+              |
| 15 | IO3  | I/O | RTC_GPIO3, GPIO3, TOUCH3, ADC1_CH2                                 |
| 16 | IO46 | I/O | GPIO46   |
| 17 | IO9  | I/O | RTC_GPIO9, GPIO9, TOUCH9, ADC1_CH8, FSPIHD, SUBSPIHD               |
| 18 | IO10 | I/O | RTC_GPIO10, GPIO10, TOUCH10, ADC1_CH9, FSPICS0, FSPIIO4, SUBSPICS0 |
| 19 | IO11 | I/O | RTC_GPIO11, GPIO11, TOUCH11, ADC2_CH0, FSPID, FSPIIO5, SUBSPID     |
| 20 | IO12 | I/O | RTC_GPIO12, GPIO12, TOUCH12, ADC2_CH1, FSPICLK, FSPIIO6, SUBSPICLK |
| 21 | IO13 | I/O | RTC_GPIO13, GPIO13, TOUCH13, ADC2_CH2, FSPIQ, FSPIIO7, SUBSPIQ     |
| 22 | IO14 | I/O | RTC_GPIO14, GPIO14, TOUCH14, ADC2_CH3, FSPIWP, FSPIDQS, SUBSPIWP   |
| 23 | IO21 | I/O | RTC_GPIO21, GPIO21   |
| 24 | IO47 | I/O | SPICLK_P_DIFF, GPIO47, SUBSPICLK_P_DIFF                            |

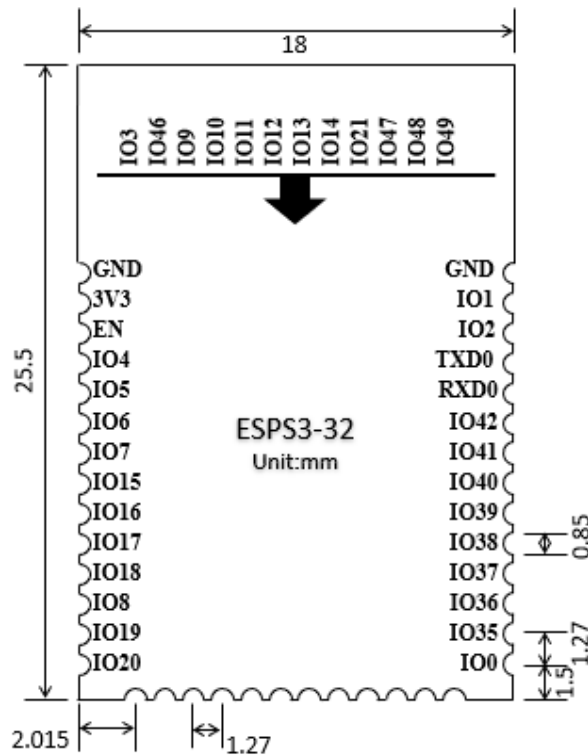
|    |      |     |   |
|----|------|-----|---|
| 25 | IO48 | I/O | SPICLK_N_DIFF, GPIO48, SUBSPICLK_N_DIFF |
| 26 | IO45 | I/O | GPI45                                   |
| 27 | IO0  | I/O | RTC_GPIO0, GPIO0                        |
| 28 | IO35 | I/O | SPIIO6, GPIO35, FSPID, SUBSPID          |
| 29 | IO36 | I/O | SPIIO7, GPIO36, FSPICLK, SUBSPICLK      |
| 30 | IO37 | I/O | SPIDQS, GPIO37, FSPIQ, SUBSPIQ          |
| 31 | IO38 | I/O | GPIO38, FSPIWP, SUBSPIWP                |
| 32 | IO39 | I/O | MTCK, GPIO39, CLK_OUT3, SUBSPICS1       |
| 33 | IO40 | I/O | MTDO, GPIO40, CLK_OUT2                  |
| 34 | IO41 | I/O | MTDI, GPIO41, CLK_OUT1                  |
| 35 | IO42 | I/O | MTMS, GPIO42                            |
| 36 | RXD0 | I/O | U0RXD, GPIO44, CLK_OUT2                 |
| 37 | TXD0 | I/O | U0TXD, GPIO43, CLK_OUT1                 |
| 38 | IO2  | I/O | RTC_GPIO2, GPIO2, TOUCH2, ADC1_CH1      |
| 39 | IO1  | I/O | RTC_GPIO1, GPIO1, TOUCH1, ADC1_CH0      |
| 40 | GND  | P   | Ground                                  |
| 41 | EPAD | P   | Ground                                  |

### 3. Size and Layout

Size for ESPS3-32 can be shown as follows.



Fig.3.1 Shape for ESPS3-32 (Model in pic is ESPS3-32-N4)



(a) (Top view)



(b) Side View

Fig.3.2 Size for ESPS3-32

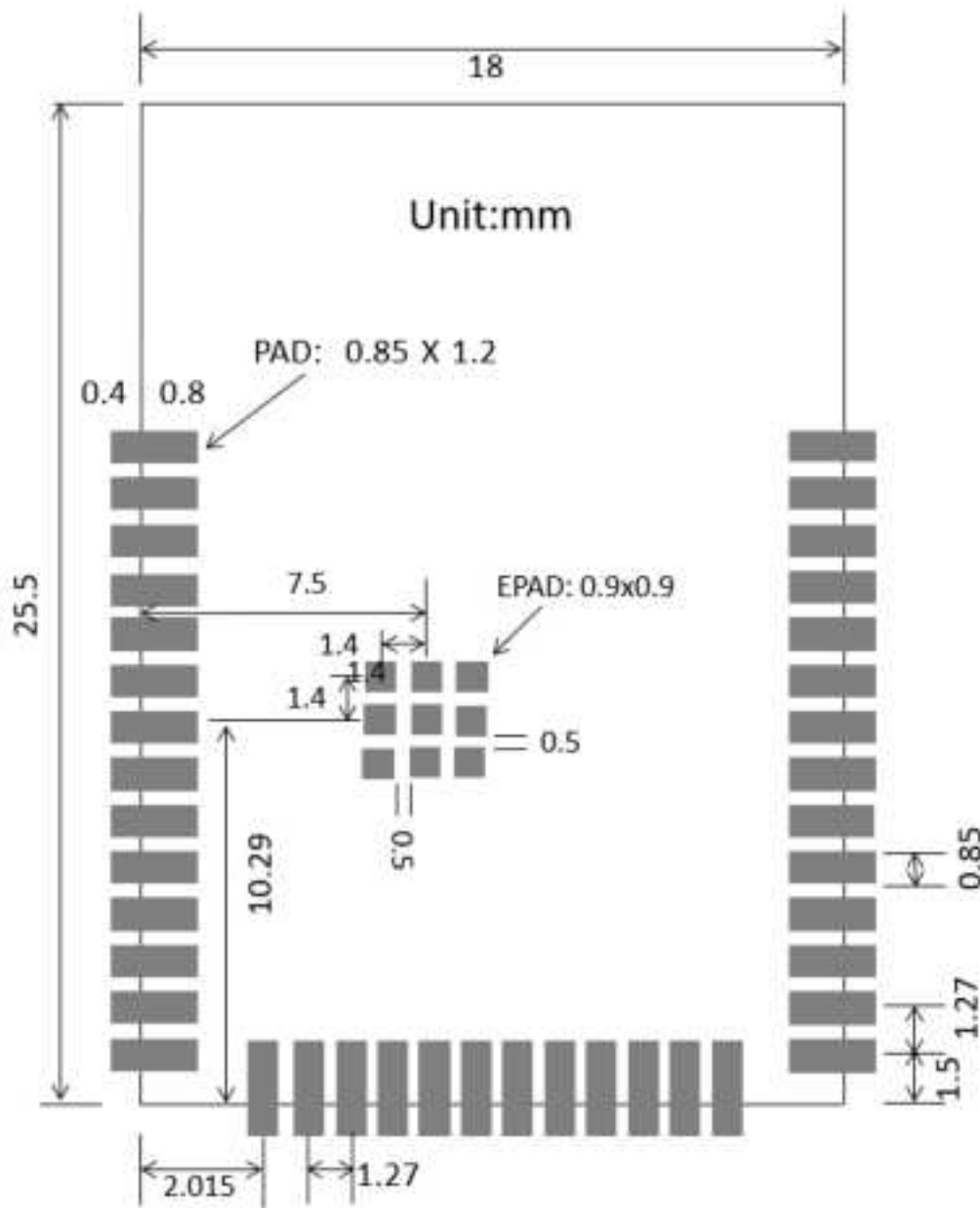


Fig. 3.3 PCB Layout for ESPS3-32 (Top view)

## 4. Electronica Characteristics

Table.4.1 Electronica Characteristics

| Parameters                                     |                 | Condition           | Min      | Classical | Max      | Unit |
|--|-----------------|---------------------|----------|-----------|----------|------|
| Store Temperature                              |                 | -                   | -40      | Normal    | 105      | °C   |
| Sold Temperature                               |                 | IPC/JEDEC J-STD-020 | -        | -         | 260      | °C   |
| Working Voltage                                |                 | -                   | 3.0      | 3.3       | 3.6      | V    |
| I/O  | V <sub>IL</sub> | -                   | -0.3     | -         | 0.25*VDD | V    |
|  | V <sub>IH</sub> | -                   | 0.75*VDD | -         | VDD+0.3  |      |
|  | V <sub>OL</sub> | -                   | -        | -         | 0.1*VDD  |      |
|  | V <sub>OH</sub> | -                   | 0.8*VDD  | -         | -        |      |
| Electrostatic Release Quantity (Human model)   |                 | TAMB=25°C           | -        | -         | 2        | KV   |
| Electrostatic Release Quantity (Machine model) |                 | TAMB=25°C           | -        | -         | 0.5      | KV   |

## 5. Power Consumption

Table.5.1 Power Consumption

| Parameters                             | Min | Classical | Max | Unit |
|--|-----|-----------|-----|------|
| RX 11n, HT20                           | -   | -         | 88  | mA   |
| RX 11n, HT40                           | -   | -         | 91  | mA   |
| TX 11b, 11Mbps @19dBm                  | -   | -         | 326 | mA   |
| TX 11g, 54Mbps @17dBm                  | -   | -         | 270 | mA   |
| TX 11n, HT20, MCS7, @15dBm             | -   | -         | 256 | mA   |
| TX 11n, HT40, MCS7, @15dBm             | -   | -         | 260 | mA   |
| Modem-sleep, CPU is powered on @40MHz  | -   | 18        | -   | mA   |
| Light-sleep                            | -   | 240       | -   | uA   |
| Deep-sleep, RTC timer + RTC memory     | -   | 7         | -   | uA   |
| Power off, CHIP_PU is set to low level | -   | 1         | -   | uA   |

The peak current consumption of ESPS3-32 exceed 500mA when the module start work (RF calibration work consumes maximum current). Therefore, the recommended power supply is no less than 500mA.

Note:

1. Active Mode: CPU and RF are all turned on.
2. Modem-sleep Mode: CPU is turned on. RF and baseband are turned off, but the communication is still connected.
3. Light-sleep Mode: CPU is turned off. RTC/external interrupt/MAC can wake up the chip. The communication is still connected.
4. Deep-sleep Mode: Only RTC is turned on.

## 6. Wi-Fi RF Characteristics

The data in the following table is gotten when voltage is 3.3V in the indoor temperature environment.

Table.6.1 Wi-Fi TX Characteristics

| Parameters      | Min  | Classical | Max  | Unit |
|-----------------|------|-----------|------|------|
| Input frequency | 2412 | -         | 2484 | MHz  |
| 802.11b         | -    | 19        | -    | dBm  |
| 802.11g,54Mbps  | -    | 17        |      | dBm  |
| 802.11n,MCS7    | -    | 15        | -    | dBm  |

Table.6.2 Wi-Fi RX Sensitivity

| Parameters        | Min | Classical | Max | Unit |
|-------------------|-----|-----------|-----|------|
| 802.11b,1Mbps     | -   | -98       | -   | dBm  |
| 802.11b,11Mbps    | -   | -88       | -   | dBm  |
| 802.11g,6Mbps     | -   | -94       | -   | dBm  |
| 802.11g,54Mbps    | -   | -76       | -   | dBm  |
| 802.11n,HT20,MCS0 | -   | -93       | -   | dBm  |
| 802.11n,HT20,MCS7 | -   | -74       | -   | dBm  |

|                   |   |     |   |     |
|-------------------|---|-----|---|-----|
| 802.11n,HT40,MCS0 | - | -90 | - | dBm |
| 802.11n,HT40,MCS7 | - | -71 | - | dBm |

Table.6.3 Wi-Fi RX Characteristics

| Parameters                           | Min | Classical | Max | Unit |
|--------------------------------------|-----|-----------|-----|------|
| ADJ Channel Rejection @11b, 1Mbps    | -   | 35        | -   | dB   |
| ADJ Channel Rejection @11b, 11Mbps   | -   | 35        | -   | dB   |
| ADJ Channel Rejection @11g, 6Mbps    | -   | 31        | -   | dB   |
| ADJ Channel Rejection @11g, 54Mbps   | -   | 14        | -   | dB   |
| ADJ Channel Rejection @11n,HT20,MCS0 | -   | 31        | -   | dB   |
| ADJ Channel Rejection @11n,HT20,MCS7 | -   | 13        | -   | dB   |
| ADJ Channel Rejection @11n,HT40,MCS0 | -   | 19        | -   | dB   |
| ADJ Channel Rejection @11n,HT40,MCS7 | -   | 8         | -   | dB   |

## 7. Bluetooth LE Radio

Table.7.1 TX Transmitter General Characteristics (Bluetooth Radio 2402 ~ 2480 MHz)

| Parameters                             | Min | Classical | Max | Unit |
|--|-----|-----------|-----|------|
| RF power control range                 | -24 | 4         | 10  | dBm  |
| ADJ channel Transmit Power @F-F0±2MHz  | -   | -37       | -   | dBm  |
| ADJ channel Transmit Power @F-F0±3MHz  | -   | -42       | -   | dBm  |
| ADJ channel Transmit Power @F-F0±>3MHz | -   | -44       | -   | kHz  |
| △f1avg                                 | -   | -         | 213 | kHz  |
| △f2max                                 | 196 | -         | -   | kHz  |
| ICFT                                   | -   | -10       | -   | kHz  |

Table.7.2 RX Transmitter General Characteristics (Bluetooth Radio 2402 ~ 2480 MHz)

| Parameters                            | Min | Classical | Max  | Unit |
|---------------------------------------|-----|-----------|------|------|
| B<br>L<br>E<br>Sensitivity @30.8% PER | -92 | -         | -103 | dBm  |
| Maximum received signal @30.8% PER    | 0   | -         | -    | dBm  |

|  |                |   |   |   |    |
|--|----------------|---|---|---|----|
|  | Co-channel C/I | - | 8 | - | dB |
|--|----------------|---|---|---|----|

## 8. Recommended Solder Temperature Curve

- (1) Reflow Times  $\leq 2$  times (Max.)
- (2) Max Rising Slope:  $3^{\circ}\text{C}/\text{sec}$
- (3) Max Falling Slope:  $-3^{\circ}\text{C}/\text{sec}$
- (4) Over  $217^{\circ}\text{C}$  Time: 60~120sec
- (5) Peak Temp:  $240^{\circ}\text{C} \sim 250^{\circ}\text{C}$

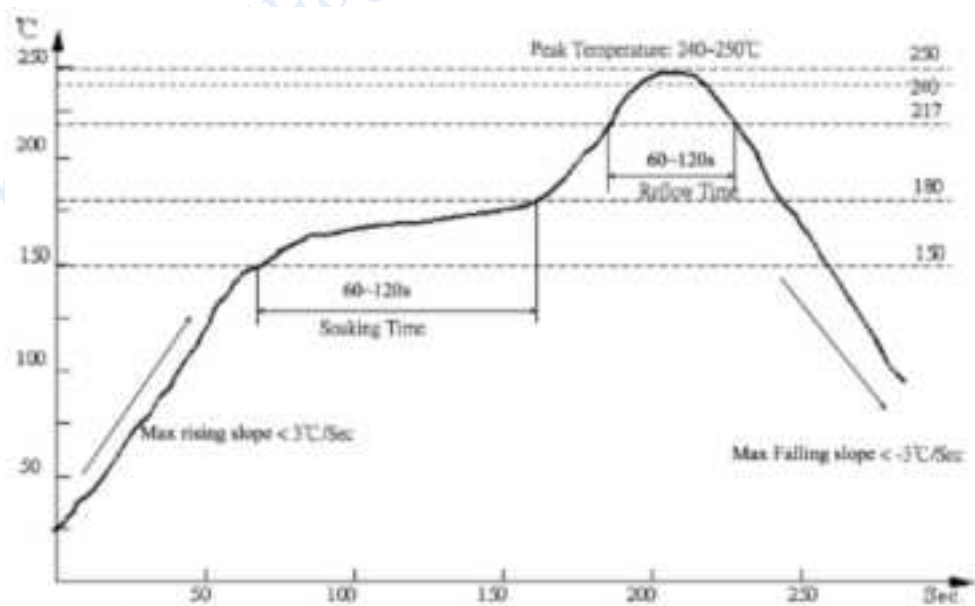


Fig.8.1 Recommended Reflow Profile

## 9. Minimum User System

This module can work just at 3.3V voltage condition:

Note:

- (1) The working voltage for module is DC 3.3V;
- (2) The max current from IO of this module is 40mA;
- (3) Wi-Fi module is at download mode: IO0 is LOW level, then module reset to power;

(4) Wi-Fi module is connected to RXD of the other MCU, and TXD is connected to RXD of the other MCU.

## 10. Recommended Layout Design

ESPS3-32 module can be sold on PCB board directly. For the high RF performance for the device, please notice the placement of the module. There are three ways to use the module for Wi-Fi Module with PCB antenna.

Solution 1: optical solution. The Wi-Fi module is placed on the side of the board, and the antennas are all exposed, and there is no metal material around the antenna, including wires, metal casings, weight plates, and the like.

Solution 2: sub-optical solution. The Wi-Fi module is placed on the side of the board, and the antenna below is hollowed out. There is a gap of not less than 5 mm reserved with the PCB, and there is no metal material around the antenna, including wires, metal casings, weight plates, and the like.

Solution 3: The Wi-Fi module is placed on the side of the board, and the PCB area under the antenna is empty, and copper cannot be laid.

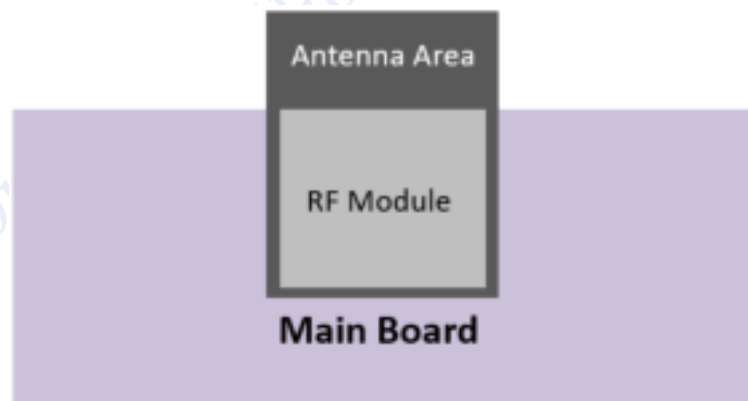


Fig.10.1 Solution 1

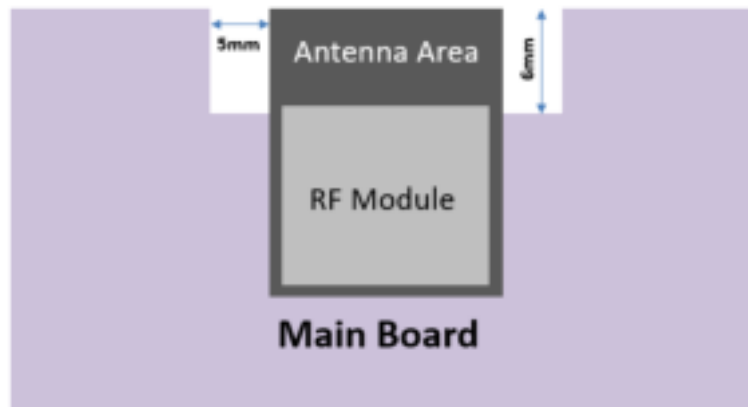


Fig.10.2 Solution 2

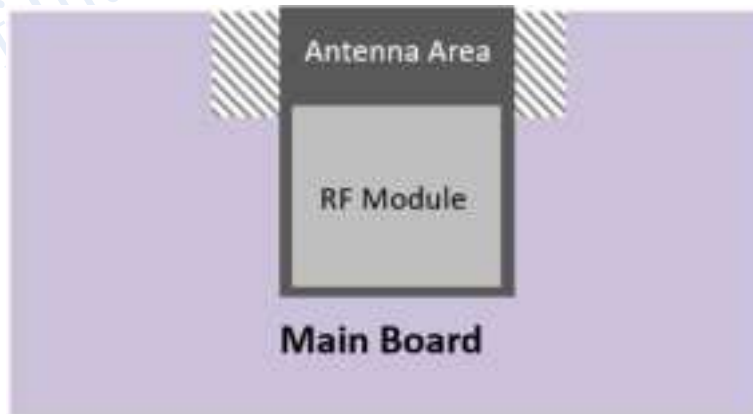


Fig.10.3 Solution 3

## 11. Peripheral Design Suggestion

Wi-Fi module is already integrated into high-speed GPIO and Peripheral interface, which may be generated the switch noise. If there is a high request for the power consumption and EMI characteristics, it is suggested to connect a serial 10~100 ohm resistance, which can suppress overshoot when switching power supply, and can smooth signal. At the same time, it also can prevent electrostatic discharge (ESD).

## 12. Product Handling

### 12.1 Storage Conditions

The products sealed in moisture barrier bags (MBB) should be stored in a non-condensing atmospheric environment of  $< 40\text{ }^{\circ}\text{C}$  and 90%RH. The module is rated at the moisture sensitivity level (MSL) of 3. After unpacking, the module must be soldered within 168 hours with the factory conditions  $25\pm 5\text{ }^{\circ}\text{C}$  and 60%RH. If the above conditions are not met, the module needs to be baked.

## 12.2 Electrostatic Discharge (ESD)

- Human body model (HBM):  $\pm 2000$  V
- Charged-device model (CDM):  $\pm 500$  V

## 13. Packing Instruction

The product is packed in a tray, as shown in the following figure.

The size of the single box is: 340 x 360 x 60mm, and 650 pieces module is in the box. And the outer box size is 355 x 375 x 325mm, including 5 single box which include 3250 pieces module.



Fig.13.1 Module Package

**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

Important Note:

**Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

**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: **2BB77-ESPS3-32** "

**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 v01r01

### 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

This equipment complies with FCC 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.

### 2.7 Antennas

This radio transmitter **FCC ID: 2BB77-ESPS3-32** 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.

| Antenna No.  | Model No.<br>of antenna: | Type of antenna: | Gain of the antenna<br>(Max.) | Frequency<br>range: |
|--------------|--------------------------|------------------|-------------------------------|---------------------|
| BLE/2.4GWIFI | /                        | PCB Antenna      | 3.57 dBi                      | 2400-2500MHz        |

### 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following "Contains **FCC ID: 2BB77-ESPS3-32**".

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

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

### 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.

### 2.11 Note EMI Considerations

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.

### 2.12 How to make changes

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. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.