

# **AC6956C Datasheet**

**Version: 1.1**

**Date: 2026.05.11**



# AC6956C Features

## CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 240MHz programmable processor
- 64Vectored interrupts
- 4 Levels interrupt priority

## DSP Audio Processing

- SBC, AAC Audio decodes supported for BT audio
- mSBC voice codecs supported for BT phone
- Supports MP2, MP3, WMA, APE, FLAC, AAC, MP4, M4A, WAV, AIF, AIFC audio decoding
- Packet Loss Concealment (PLC) for voice processing
- Acoustic echo cancellation/suppression (AEC,AES)
- Single/Dual MIC Environmental Noise Cancellation (ENC)
- Multi-band DRC limiter
- 30-band EQ configuration for voice Effects

## Audio Codec

- Two channels 16-bit DAC, SNR  $\geq$  95dB
- Three channels 16-bit ADC , SNR  $\geq$  90dB
- Sampling rates of 8KHz/11.025KHz/16KHz/22.05KHz/24KHz/32KHz/44.1KHz/48KHz are supported
- One analog MIC amplifier, build-in MIC bias generator
- Supports two PDM digital MIC inputs
- three channels Stereo analog MUX
- Supports cap-less, single-ended, and differential mode at the DAC path
- Supports 16ohm and 32ohm Speaker loading

## Bluetooth

- Compliant with Bluetooth V5.1+BR+EDR+BLE specification

- Meet class1 class2 and class3 transmitting power requirement
- Provides +6dbm transmitting power
- receiver with -90dBm sensitivity
- Fast AGC for enhanced dynamic range
- Supports a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdp\l2cap profile

## Peripherals

- One full speed USB 2.0 OTG controller
- Four multi-function 16-bit timers, support capture and PWM mode
- Three 16-bit PWM generator for motor driving
- Three full-duplex basic UART, UART0 and UART1 supports DMA mode
- Two SPI interface supports host and device mode
- One hardware IIC interface supports host and device mode
- Built-in Cap Sense Key controller
- 10-bit ADC for analog sampling
- External wake up/interrupt on all GPIOs

## PMU

- Low voltage LDO for internal digital and analog circuit supply
- 3uA current consumption in the soft-off mode
- Built-in LDO for the core, I/O, Bluetooth and flash
- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V

## Packages

- QFN32(4mm\*4mm)

### **Temperature**

- Operating temperature: -20°C to +70°C
- Storage temperature: -65°C to +150°C

### **Applications**

- Bluetooth Stereo Sound Box
- Bluetooth Mono Sound Box
- Bluetooth TWS Sound Box

# 1、 Pin Definition

## 1.1 Pin Assignment

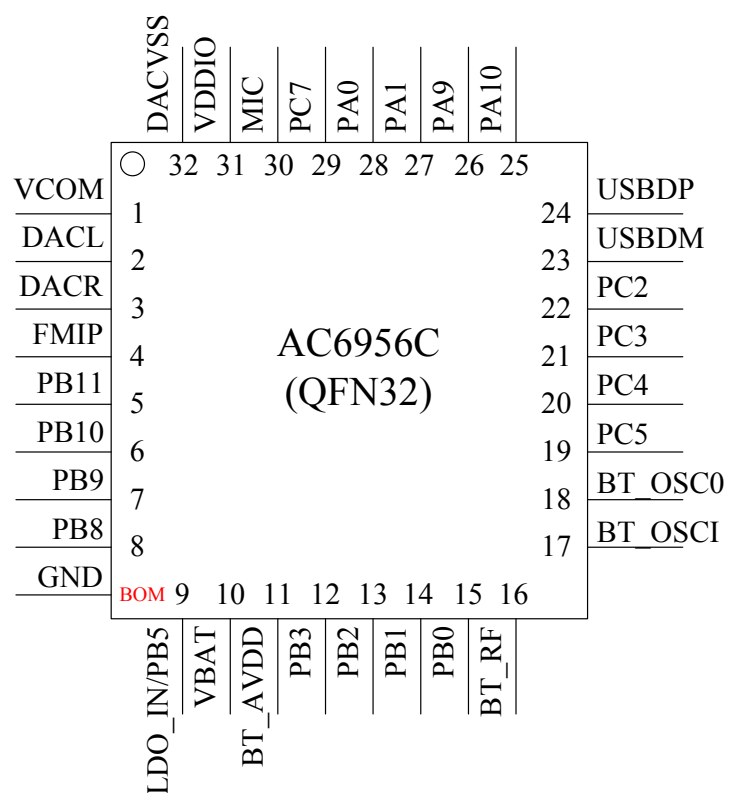


Figure 1-1 AC6956C Package Diagram

## 1.2 Pin Description

Table 1-1 AC6956C Pin Description

| PIN NO. | Name    | I/O Type | Drive (mA) | Function                          | Other Function   |
|---------|---------|----------|------------|-----------------------------------|--|
| 1       | VCOM    | P        | /          |                                   | DAC Reference  |
| 2       | DACL    | O        | /          |                                   | DAC Left Channel   |
| 3       | DACR    | O        | /          |                                   | DAC Right Channel  |
| 4       | FMIP    | I        | /          |                                   | FM Single Input  |
| 5       | PB11    | I/O      | /          | GPIO                              | SDPG:SDC Power Gate;<br>SPDIF_OUT: Sony/Philips Digital Interface Out  |
| 6       | PB10    | I/O      | 8/24       | GPIO                              | AMUX2R: Analog Channel2 Right;<br>SPI2DOA: SPI2 Data Out(A);<br>ADC9: ADC Input Channel 9;<br>UART2RXC: Uart2 Data In(C);<br>PWMCH3L: Motor PWM Channel3(L); |
| 7       | PB9     | I/O      | 8/24       | GPIO                              | AMUX2L: Analog Channel2 Left;<br>SPI2CLKA: SPI2 Clk(A);<br>CAP0: Timer0 Capture;<br>UART2TXC: Uart2 Data Out(C);<br>PWMCH3H: Motor PWM Channel3(H);          |
| 8       | PB8     | I/O      | 8/24       | GPIO                              | AMUX1R: Analog Channel1 Right;<br>SPI2_DIA: SPI2 Data In(A);<br>ADC8: ADC Input Channel 8;<br>CLKOUT1: Clk Out1;   |
| 9       | LDO_IN  | P        | /          |                                   | Battery Charge Input   |
|         | PB5     | I/O      | 8          | GPIO<br>(High Voltage Resistance) | PWM3: Timer3 PWM Output;<br>CAP1: Timer1 Capture;<br>UART0TXC: Uart0 Data Out(C);<br>UART0RXC: Uart0 Data In(C);   |
| 10      | VBAT    | P        | /          |                                   | Power Supply   |
| 11      | BT_AVDD | P        | /          |                                   | BT Power   |
| 12      | PB3     | I/O      | 8/24       | GPIO                              | PWM2: Timer2 PWM Output;<br>ADC6: ADC Input Channel 6;   |
| 13      | PB2     | I/O      | 8          | GPIO<br>(High Voltage Resistance) | SPI1DIA: SPI1 Data In(A);<br>PWMCH1L: Motor PWM Channel1 (L);  |
| 14      | PB1     | I/O      | 8/24       | GPIO<br>(pull up)                 | Long Press Reset;<br>SPI1DOA: SPI1 Data Out(A);  |

|    |         |     |      |                                      |   |
|----|---------|-----|------|--------------------------------------|---|
|    |         |     |      |                                      | ADC5: ADC Input Channel 5;<br>TMR2: Timer2 Clock Input;<br>UART1RXA: Uart1 Data In(A);  |
| 15 | PB0     | I/O | 8    | GPIO<br>(High Voltage<br>Resistance) | SPI1CLKA: SPI1 Clock(A);<br>UART1TXA: Uart1 Data Out(A);<br>PWMCH1H: Motor PWM Channel1(H);   |
| 16 | BT_RF   | /   | /    |                                      | BT Antenna  |
| 17 | BT_OSCI | I   | /    | OSC In                               |   |
| 18 | BT_OSCO | O   | /    | OSC Out                              |   |
| 19 | PC5     | I/O | 8/24 | GPIO                                 | SD1CLKA: SD1 Clock(A);<br>SPI1DOB: SPI1 Data Out(B);<br>UART2RXD: Uart2 Data In(D);<br>IIC_SDA_B: IIC SDA(B);<br>ADC13: ADC Input Channel 13;<br>PWMCH5L: Motor PWM Channel5(L);  |
| 20 | PC4     | I/O | 8/24 | GPIO                                 | SD1CMDA: SD1 Command(A);<br>SPI1CLKB: SPI1 Clock(B);<br>UART2TXD: Uart2 Data Out(D);<br>IIC_SCL_B: IIC SCL(B); ADC10: ADC Input<br>Channel 10;<br>PWMCH5H: Motor PWM Channel5(H);   |
| 21 | PC3     | I/O | 8/24 | GPIO                                 | SD1DAT0A: SD1 Data0(A);<br>SPI1DIB: SPI1 Data In(B);  |
| 22 | PC2     | I/O | 8/24 | GPIO                                 | SD1DAT1A: SD1 Data1(A); ALNK1_DAT0:<br>Audio Link Data0;<br>Touch12: Touch Input Channel 12;<br>FPIN5: Motor Auto-Stop Protective Pin5;   |
| 23 | USBDM   | I/O | 4    | USB Negative<br>Data<br>(pull down)  | UART1RXD: Uart1 Data In(D);<br>IIC_SDA_A: IIC SDA(A);   |
| 24 | USBDP   | I/O | 4    | USB Positive Data<br>(pull down)     | UART1TXD: Uart1 Data Out(D);<br>IIC_SCL_A: IIC SCL(A);<br>ADC12: ADC Input Channel 12;  |
| 25 | PA10    | I/O | 8/24 | GPIO                                 | SD0CLKA: SD0 Clock(A);<br>ALNK0_LRCKB: Audio Link Word Select(B);<br>ADC3: ADC Input Channel 3; SPDIF_IN_B:<br>Sony/Philips Digital Interface Input(B)<br>TMR1: Timer1 Clock Input;<br>Touch9: Touch Input Channel 9;<br>UART2RXB: Uart2 Data In(B);<br>PWMCH4L: Motor PWM Channel4(L); |
| 26 | PA9     | I/O | 8/24 | GPIO                                 | SD0CMA: SD0 Command(A);   |

|    |        |     |      |      |  |
|----|--------|-----|------|------|--|
|    |        |     |      |      | ALNK0_SCLKB: Audio Link Serial Clock(B);<br>SPDIF_IN_A: Sony/Philips Digital Interface Input(A)<br>Touch8: Touch Input Channel 8;<br>UART2TXB: Uart2 Data Out(B);<br>PWMCH4H: Motor PWM Channel4(H); |
| 27 | PA1    | I/O | 8/24 | GPIO | AMUX0R: Analog Channel0 Right;<br>Touch1: Touch Input Channel 1;<br>ADC0: ADC Input Channel 0;<br>UART1RXC: Uart1 Data In(C);<br>PWMCH0L: Motor PWM Channel0(L);                                     |
| 28 | PA0    | I/O | 8/24 | GPIO | AMUX0L: Analog Channel0 Left;<br>Touch0: Touch Input Channel 0;<br>CLKOUT0:<br>UART1TXC: Uart1 Data Out(C);<br>PWMCH0H: Motor PWM Channel0(H);   |
| 29 | PC7    | I/O | /    | GPIO | MIC_BIAS: Microphone Bias Output   |
| 30 | MIC    | I   | /    |      | MIC: MIC Input Channel;  |
| 31 | VDDIO  | P   | /    |      | IO Power 3.3v  |
| 32 | DACVSS | P   | /    |      | DAC Ground   |

## 2、Electrical Characteristics

### 2.1 Absolute Maximum Ratings

Table 2-1

| Symbol             | Parameter             | Min  | Max       | Unit |
|--------------------|-----------------------|------|-----------|------|
| Tamb               | Ambient Temperature   | -20  | +70       | °C   |
| Tstg               | Storage temperature   | -65  | +150      | °C   |
| VBAT               | Supply Voltage        | 2.2  | 5.5       | V    |
| LDO_IN             | Charger Voltage       | 4.5  | 5.5       | V    |
| V <sub>3.3IO</sub> | 3.3V IO Input Voltage | -0.3 | VDDIO+0.3 | V    |

### 2.2 PMU Characteristics

Table 2-2

| Symbol               | Parameter       | Min | Typ | Max | Unit | Test Conditions          |
|----------------------|-----------------|-----|-----|-----|------|--------------------------|
| VBAT                 | Voltage Input   | 2.2 | 3.7 | 5.5 | V    |                          |
| LDO_IN               | Charger Voltage | 4.5 | 5.0 | 5.5 | V    |                          |
| V <sub>3.3</sub>     | Voltage output  | —   | 3.3 | —   | V    | VBAT = 5V, 100mA loading |
| V <sub>BT_AVDD</sub> | Voltage output  |     | 1.3 |     | V    | VBAT=5V, 100mA loading   |
| V <sub>DACVDD</sub>  | DAC Voltage     | —   | 2.7 | —   | V    | VBAT = 5V, 10mA loading  |
| I <sub>L3.3</sub>    | Loading current | —   | —   | 150 | mA   | VBAT = 5V                |

### 2.3 Battery Charge

Table 2-3

| Symbol              | Parameter              | Min  | Typ | Max  | Unit | Test Conditions                        |
|---------------------|------------------------|------|-----|------|------|--|
| LDO_IN              | Charge Input Voltage   | 4.5  | 5   | 5.5  | V    | —                                      |
| V <sub>Charge</sub> | Charge Voltage         | 4.15 | 4.2 | 4.25 | V    | —                                      |
| I <sub>Charge</sub> | Charge Current         | 20   |     | 320  | mA   | Charge current at fast charge mode     |
| I <sub>Trinkl</sub> | Trickle Charge Current | 20   | 45  | 70   | mA   | V <sub>BAT</sub> < V <sub>Trinkl</sub> |

## 2.4 IO Input/Output Electrical Logical Characteristics

Table 2-4

| IO input characteristics  |                           |            |     |            |      |                 |
|---------------------------|---------------------------|------------|-----|------------|------|-----------------|
| Symbol                    | Parameter                 | Min        | Typ | Max        | Unit | Test Conditions |
| $V_{IL}$                  | Low-Level Input Voltage   | -0.3       | –   | 0.3* VDDIO | V    | VDDIO = 3.3V    |
| $V_{IH}$                  | High-Level Input Voltage  | 0.7* VDDIO | –   | VDDIO+0.3  | V    | VDDIO = 3.3V    |
| IO output characteristics |                           |            |     |            |      |                 |
| $V_{OL}$                  | Low-Level Output Voltage  | –          | –   | 0.33       | V    | VDDIO = 3.3V    |
| $V_{OH}$                  | High-Level Output Voltage | 2.7        | –   | –          | V    | VDDIO = 3.3V    |

## 2.5 Internal Resistor Characteristics

Table 2-5

| Port  | General Output | High Drive | Internal Pull-Up Resistor | Internal Pull-Down Resistor | Comment   |
|---|----------------|------------|---------------------------|-----------------------------|---|
| PA0、PA1<br>PA9、PA10<br>PB1、PB3<br>PB8~PB10<br>PC2~PC5 | 8mA            | 24mA       | 10K                       | 10K                         | 1、PB1 default pull up<br>2、USBDM & USBDP default pull down<br>3、PB0, PB2, PB5 can pull-up resistance to 5V<br>4、internal pull-up/pull-down resistance   accuracy $\pm 20\%$<br>5、PRx supply by RTCVDD |
| PB11<br>PC7   | Output 0       | 8mA        | 10K                       | 10K                         |   |
|   | Output 1       | 8mA        |                           |                             |   |
| PB0、PB2<br>PB5  | 8mA            | –          | 10K                       | 10K                         |   |
| USBDP   | 4mA            | –          | 1.5K                      | 15K                         |   |
| USBDM   | 4mA            | –          | 180K                      | 15K                         |   |

## 2.6 DAC Characteristics

Table 2-6

| Parameter          | Min | Typ | Max | Unit | Test Conditions  |
|--------------------|-----|-----|-----|------|--|
| Frequency Response | 20  | –   | 20K | Hz   | 1KHz/0dB<br>10Kohm loading<br>With A-Weighted Filter   |
| THD+N              | –   | -75 | –   | dB   |  |
| S/N                | –   | 95  | –   | dB   |  |
| Crosstalk          | –   | -90 | –   | dB   |  |
| Output Swing       |     | 1   |     | Vrms |  |
| Dynamic Range      |     | 90  |     | dB   | 1KHz/-60dB<br>10Kohm loading<br>With A-Weighted Filter |
| DAC Output Power   | 11  |     | –   | mW   | 32ohm loading  |

## 2.7 ADC Characteristics

Table 2-7

| Parameter     | Min | Typ | Max | Unit | Test Conditions |
|---------------|-----|-----|-----|------|-----------------|
| Dynamic Range |     | 80  |     | dB   | 1KHz/-60dB      |
| S/N           | –   | 90  | 91  | dB   | 1KHz/-60dB      |
| THD+N         | –   | -70 | –   | dB   |                 |
| Crosstalk     | –   | -80 | –   | dB   |                 |

## 2.8 BT Characteristics

### 2.8.1 Transmitter

#### Basic Data Rate

Table 2-8

| Parameter              | Min   | Typ | Max  | Unit | Test Conditions                             |
|------------------------|-------|-----|------|------|---|
| RF Transmit Power      |       |     | 0.52 | dBm  | 25°C,<br>Power Supply<br>VBAT=5V<br>2441MHz |
| RF Power Control Range |       | 20  |      | dB   |   |
| 20dB Bandwidth         |       | 950 |      | KHz  |   |
| Adjacent Channel       | +2MHz |     | -40  | dBm  |   |
|                        | -2MHz |     | -38  | dBm  |   |
| Transmit Power         | +3MHz |     | -44  | dBm  |   |
|                        | -3MHz |     | -35  | dBm  |   |

**Enhanced Data Rate****Table 2-9**

| Parameter                          |       | Min | Typ | Max | Unit | Test Conditions                             |
|------------------------------------|-------|-----|-----|-----|------|---|
| Relative Power                     |       |     | -1  |     | dB   | 25°C,<br>Power Supply<br>VBAT=5V<br>2441MHz |
| Adjacent Channel<br>Transmit Power | +2MHz |     | -40 |     | dBm  |   |
|                                    | -2MHz |     | -38 |     | dBm  |   |
|                                    | +3MHz |     | -44 |     | dBm  |   |
|                                    | -3MHz |     | -35 |     | dBm  |   |

**2.8.2 Receiver****Basic Data Rate****Table 2-10**

| Parameter                                  |       | Min | Typ | Max | Unit | Test Conditions                             |
|--|-------|-----|-----|-----|------|---|
| Sensitivity                                |       |     | -90 |     | dBm  | 25°C,<br>Power Supply<br>VBAT=5V<br>2441MHz |
| Co-channel Interference Rejection          |       |     | -13 |     | dB   |   |
| Adjacent Channel<br>Interference Rejection | +1MHz |     | +5  |     | dB   |   |
|  | -1MHz |     | +2  |     | dB   |   |
|  | +2MHz |     | +37 |     | dB   |   |
| Interference Rejection                     | -2MHz |     | +36 |     | dB   |   |
|  | +3MHz |     | +40 |     | dB   |   |
|  | -3MHz |     | +35 |     | dB   |   |

**Enhanced Data Rate****Table 2-11**

| Parameter                                  |       | Min | Typ | Max | Unit | Test Conditions                             |
|--|-------|-----|-----|-----|------|---|
| Sensitivity                                |       |     | -90 |     | dBm  | 25°C,<br>Power Supply<br>VBAT=5V<br>2441MHz |
| Co-channel Interference Rejection          |       |     | -13 |     | dB   |   |
| Adjacent Channel<br>Interference Rejection | +1MHz |     | +5  |     | dB   |   |
|  | -1MHz |     | +2  |     | dB   |   |
|  | +2MHz |     | +37 |     | dB   |   |
| Interference Rejection                     | -2MHz |     | +36 |     | dB   |   |
|  | +3MHz |     | +40 |     | dB   |   |
|  | -3MHz |     | +35 |     | dB   |   |

## 3、 Package Information

### 3.1 QFN32\_4x4

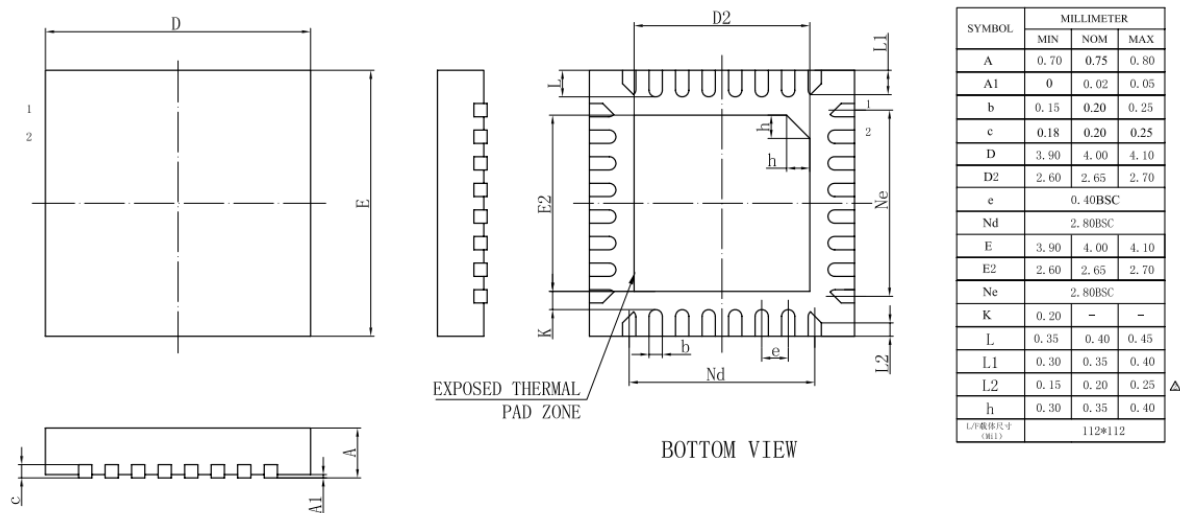


Figure 3-1 AC6956C Package

## 4. Summarize the specific operational use conditions

**4.1.** This modular transmitter is only for professional technicians to install, debug, and maintain. Non-professionals are not allowed to replace the antenna, configure power parameters, or modify the RF link without authorization.

**4.2.** All usage restrictions, antenna constraints, power limits, and installation specifications of this module also apply to the accompanying user manual provided by the main unit manufacturer. The main unit manufacturer must fully quote and incorporate all the constraints of this module into the product manual of the main unit, and publicize the compliance requirements for end users.

**5.** Human Safety Distance Requirements: This product is a mobile device type. To meet radio frequency radiation safety standards, the distance between the product and the human body must be greater than 5mm during normal operation. This distance requirement must be strictly adhered to during use and installation. It is not allowed to use the product in scenarios where the distance to the human body is less than 5mm. The overall design of the host device must meet this safety distance specification to ensure that terminal usage complies with relevant radiation safety regulations.

## 6. Antenna Type

Plannar Inverted F Antenna on board

**7.** Module have received FCC “Modular Approvals”, in compliance with CFR 47 FCC part 15 Subpart C regulations

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.

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.

### **WARNING!**

#### **FCC Radiation Exposure Statement:**

This portable equipment with its antenna complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. To maintain compliance follow the instructions below;

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna, or keep it to a minimum while using this equipment.

**This transmitter module is authorized to be used in other devices only by OEM integrators under the following condition:**

The transmitter module must not be co-located with any other antenna or transmitter.

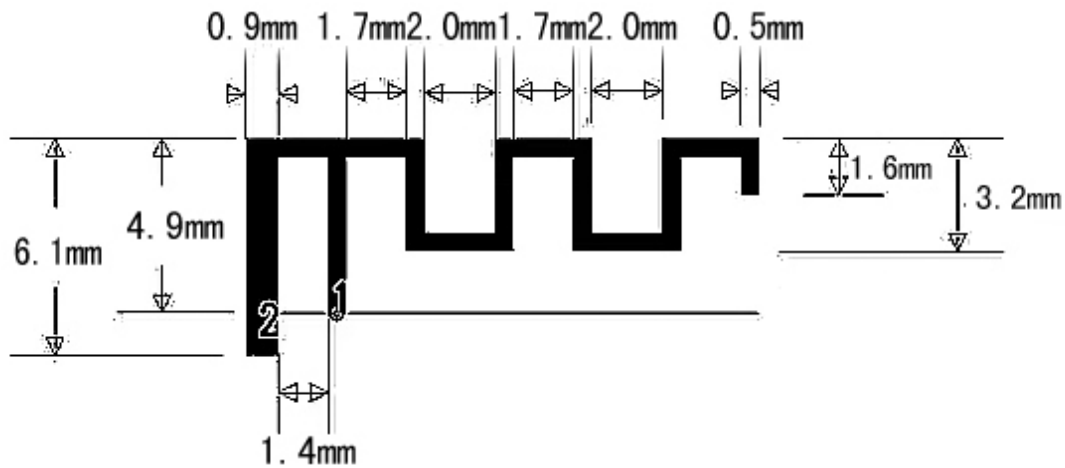
As long as the above condition is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

**8.** The OEM must ensure that FCC labeling requirements are met. This shall include a clearly visible label on the exterior of the end product with the following nomenclature:  
Contains FCC ID: 2BR5R58000

### 9. Antenna efficiency and gain

| Frequency (MHz) | Gain (dBi) | Efficiency (%) | AverageGain (dBi) | Efficiency (dB) |
|-----------------|------------|----------------|-------------------|-----------------|
| 2400            | 2.92       | 72.20%         | -1.14             | -1.41           |
| 2410            | 1.95       | 61.36%         | -2.05             | -2.12           |
| 2420            | 2.00       | 61.00%         | -1.98             | -2.15           |
| 2430            | 0.80       | 47.29%         | -3.09             | -3.25           |
| 2440            | 0.12       | 40.82%         | -3.87             | -3.89           |
| 2450            | 0.97       | 48.41%         | -3.08             | -3.15           |
| 2460            | 1.28       | 53.80%         | -2.81             | -2.69           |
| 2470            | 1.29       | 51.75%         | -2.98             | -2.86           |
| 2480            | 1.79       | 58.79%         | -2.45             | -2.31           |
| Average         | 1.46       | 55.05%         | -2.61             | -2.65           |
| Peak            | 2.92       | 72.20%         | -1.14             | -1.41           |

### 10.Trace antenna designs



**11.** 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. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.



## 12 、 Revision History

| Date       | Revision | Description     |
|------------|----------|-----------------|
| 2026.05.11 | V1.0     | Initial Release |
|            |          |                 |
|            |          |                 |

