



## **Antenna Datasheet**

Product OC: YFBC001WWA Version: 1.0 Date: 2024-06-17 Status: Released

Product Name: Wi-Fi SMT Mount Ceramic Chip Loop Antenna Key Features: Frequency band: 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz

Peak efficiency: 67.18 % Dimensions: 1.6 × 0.8 × 0.4 mm RoHS and REACH Compliant

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## Overview

Quectel YFBC001WWA is a compact form factor SMT mount ceramic chip antenna for Wi-Fi applications. Due to the dimensions of 1.6 × 0.8 × 0.4 mm, it is designed for very small space requirements for Wi-Fi, WLAN, BT, Zigbee and 802.11 terminals. YFBC001WWA is a ground-depended loop antenna, uses main PCB as its ground plane. It is delivered on tape and reel.

YFBC001WWA is a ceramic chip antenna, which can be mounted on terminals with super compact space requirement. Despite of this small factor, it has up to 67.18% efficiency in working bands. This antenna is developed on a 60 × 50 mm evaluation board. If the devices have different ground sizes, matching circuit can be used to tune the resonant frequency correctly. We also offer gerber file, 2D & 3D documents for PCB layout.

YFBC001WWA allows high efficiency, stable signal transmission and reception for Wi-Fi working bands in 2400-2500 MHz & 5150-5850MHz & 5925-7125 MHz. This product is RoHS & REACH compliant.

Typical applications include:

- Hand-held devices
- Bluetooth earphone systems
- Hand-held devices when Bluetooth/Wi-Fi functions are needed, e.g., Smart phone.
- IEEE802.11 b/g/n
- ZigBee
- Wireless PCMCIA cards or USB dongle

Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs. We have regional R & D centers to offer quick response to meet your requirements. Please contact our sales & FAEs if you have any requests.

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# **1** Specification

Test Condition: On 50 mm × 60 mm EVB

## 1.1. Electrical

Electrical				
Frequency Range	2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz			
Impedance	50 Ω			
Polarization	Linear			
Radiation Pattern	Omni-directional			

Band	Wi-Fi 2G	Wi-Fi 5G	Wi-Fi 7G			
Specification	2400 - 2500	5150 - 5850	5925 - 7125			
Max. VSWR	2.8	2.3	3.8			
Max. Return Loss (dB)	-6.6	-8.1	-4.7			
AVG Eff. (%)	49.6	58.2	48.2			
AVG Gain (dB)	-3.1	-2.4	-3.3			
Max. Peak Gain (dBi)	-0.3	2.3	1.5			
VSWR	≤ 3.8					
Return Loss	≤ -4.7 dB					
Peak Gain	≤ 2.3 dBi					

## 1.2. Mechanical & Environmental

Mechanical				
Antenna Size	1.6 × 0.8 × 0.4 mm			
Antenna Material & Color	Ceramic & Natural Color			
Antenna Weight	Тур. 0.00209 g			
Mounting Type	SMD			
Recommended EVB Size	60 × 50 × 1.0 mm			
Environmental				
Operation Temperature	-40 °C to +85 °C			
Storage Temperature	-40 °C to +85 °C			
RoHS and REACH Compliant	Yes			

# **2**Drawing

## 2.1. Antenna



## 2.2. EVB



## **3** Detailed Performance

## 3.1. S-Parameter Test

#### 3.1.1. VSWR



**VSWR** 

Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6725	7125
VSWR	2.1	1.9	2.8	1.8	1.7	2.3	2.2	3.1	3.8

#### 3.1.2. Return Loss



#### Return Loss (dB)

Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6725	7125
Return Loss (dB)	-9.1	-10.1	-6.6	-10.9	-11.9	-8.2	-8.6	-5.9	-4.7

## **3.2. Radiation Performance Test**

### 3.2.1. Efficiency



Efficiency (%) Frequency 2400 2450 5150 5500 5850 5925 6725 7125 2500 (MHz) Efficiency (%) 50.2 49.3 47.2 50.3 62.0 51.8 52.7 42.2 26.6

#### 3.2.2. Average Gain



Average Gain (dB)

Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6725	7125
Average Gain (dB)	-3.0	-3.1	-3.3	-3.0	-2.1	-2.9	-2.8	-3.8	-5.8



#### 3.2.3. Peak Gain



#### Peak Gain (dBi)

Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6725	7125
Peak Gain (dBi)	-0.3	-0.5	-1.0	0.2	1.9	0.9	0.9	-0.8	-2.3



#### 3.2.4. 3D & 2D Radiation Pattern

- Test Condition: On 50 mm × 60 mm EVB
- Test Chamber: GL-G-1







## **4** Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 6 pins, six of which work. All other pins are for mechanical strength.

Pin	Description
2, 3, 5, 6	Feed
1, 4	Antenna Tuning



# **5** Transmission Line

The characteristic impedance of all transmission lines shall be designed as 50  $\Omega$ .

- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω.

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the track so the characteristic impedance of the coplanar transmission is 50  $\Omega$ .

# 6 Recommended PCB Layout

The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.



All dimensions in (mm)

# **7** Matching Circuit

Demo Board Top View



	P1	P2	Р3
Default Matching	1.5 pF	0.1 pF	1.0 nH
Tolerance	±0.25 pF	±0.05 pF	±0.1 nH

# 8 Soldering Temperature

Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second (Max.)
	Temperature Min (Tsmin)	150 °C
PREHEAT	Temperature Max (Tsmax) Time	200 °C
	(tsmin to tsmax)	120 seconds (Max.)
	Temperature (TL) Total Time above	217 °C
	TL (tl)	90 seconds (Max.)
PEAK	Temperature (Tp)	260 °C
RAMP-DOWN	Rate	6 °C/second (Max.)





# **10**Packaging

Step	Packaging Picture / 2D Picture	Description
1	Taping Dimensions (Unit: trun) Sprocket Hole 91.5 (+0,1,0) $1.5 \pm 0.1$ $1.5 \pm 0.2$ true $1.5 \pm 0.2$ true 1.	Reel
2		(4000 PCS Antenna Products / Reel) One inner box contained 10 volumes.
3		(6 Inner Boxes / Carton Box) (240000 PCS Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <u>Carton Size:</u> <u>L × W × H = 390 × 370 × 190 mm</u>

4		Position for Attaching Labels① Carton Label② Quality Label	
5		<b>Sealing Cartons</b> "⊥" type sealing cartons	
Note	The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.		

## **Contact Us**

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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## **Revision History**

Version	Date	Author	Note
-	2024-06-17	Sly LIU/ Lucky FENG/ David LIU/ Rainey LIAO	Creation of the document
1.0	2024-06-17	Sly LIU/ Lucky FENG/ David LIU/ Rainey LIAO	First official release



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