Antenna Datasheet

Product OC (Antenna Only)**:** YFNP002WWAM
(Antenna + Rectangular EVB)**:** YFNP002WWAMEVB
Version: 2.0
Date: 2024-09-19
Status: Released

Product Name: LoRa SMT Mount FR4 Chip Monopole Antenna
Key Features:
High efficiency, excellent performance
Frequency band: 433–435 MHz
Peak efficiency: 15.9 %
Dimensions: 17 mm × 4 mm × 1.5 mm
RoHS and REACH Compliant

Overview

Quectel YFCP002WWA is a compact form factor SMT mount FR4 Chip antenna for LoRa applications. Due to the dimensions of 17 × 4 × 1.5 mm, it is designed for very small space requirements for security alerts, wireless data-transmission and automated manufacturing. YFCP002WWA is a ground-depended monopole antenna, uses main PCB as its ground plane. It is delivered on tape and reel.

YFNP002WWAM is a FR4 chip antenna, which can be mounted on super compact space require terminals. Despite of this small factor, it has up to 15.9 % efficiency in working bands. This antenna is developed on a 197.7 × 92 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.

YFNP002WWAM allows high efficiency, stable signal transmission and reception for LoRa working bands in 433–435 MHz. This product is RoHS & REACH compliant.

Typical applications include:

- Security alerts
- Wireless data-transmission
- Automated manufacturing

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.

Contents

1 Specification

Test Condition: Assembled On 197.7 × 92 mm EVB

1.1. Electrical

Electrical	
Frequency Range	433–435 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

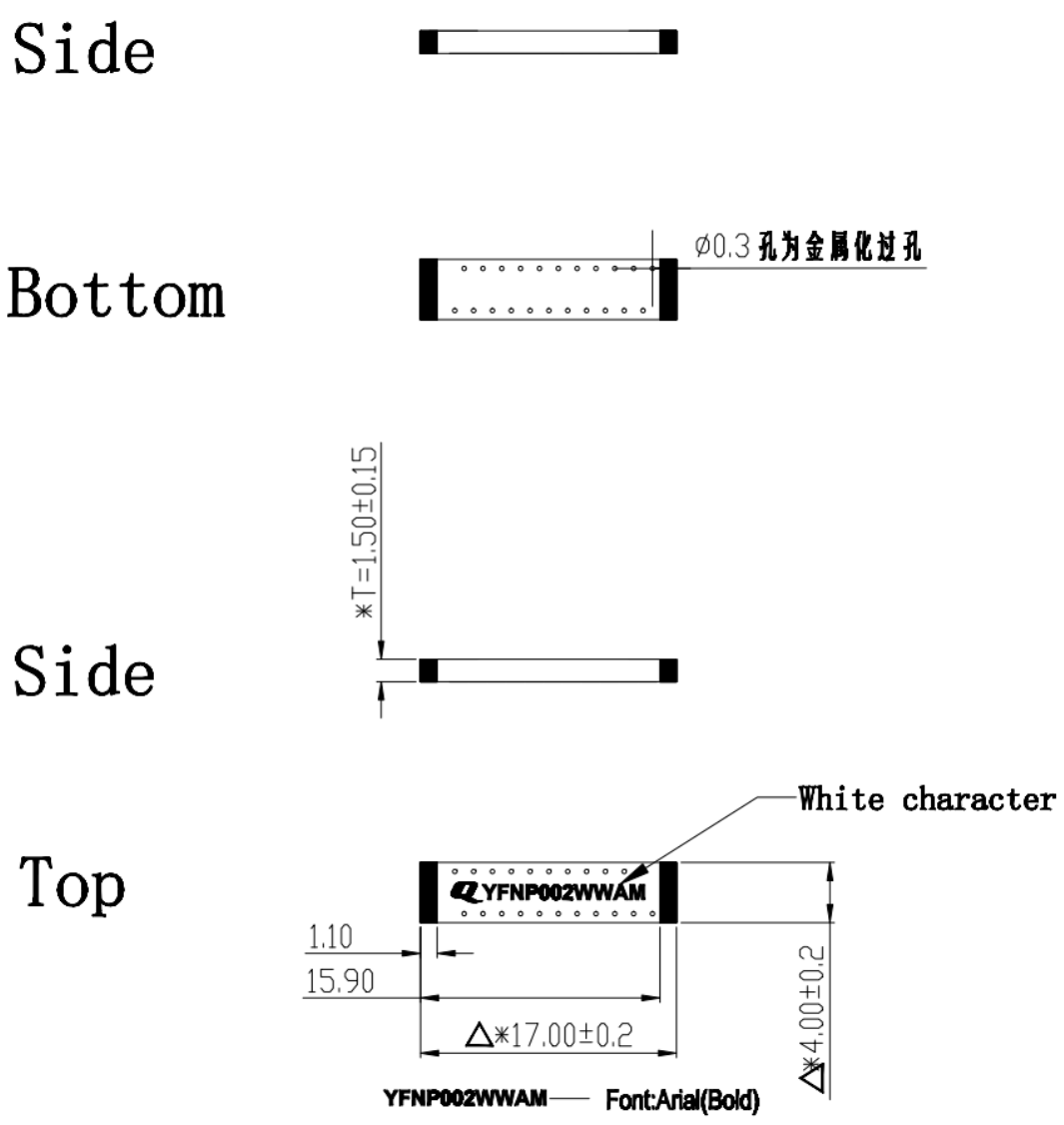
Electrical – Detail								
Band / **SPEC**	**Band**	**B88**	**EU433**	**B31**	**LoRa**	**B12 /B13 /B28**	**B5 /B8 /B26**	**B1 /B2 /B3**
	Freq. (MHz)	**412–427**	**433–435**	**450–470**	**470–510**	**700–810**	**820–960**	**1700–2170**
Max VSWR		-	2.1	-	-	-	-	-
Max Return Loss (dB)		-	-9.2	-	-	-	-	-
AVG Eff. (%)		-	15.8	-	-	-	-	-
AVG Gain (dB)		-	-8.0	-	-	-	-	-
Max Peak Gain (dBi)		-	-4.9	-	-	-	-	-
VSWR	≤ 2.1							
Return Loss	≤ -9.2 dB							
Peak Gain	≤ -4.9 dBi							

1.2. Mechanical & Environmental

Mechanical	
Antenna Size	17 mm × 4 mm × 1.5 mm
Antenna Material & Color	FR4 & BLACK
Antenna Weight	Typ. 0.2 g
Mounting Type	Soldering
Recommended EVB Size	197.7 mm × 92 mm × 1.0 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

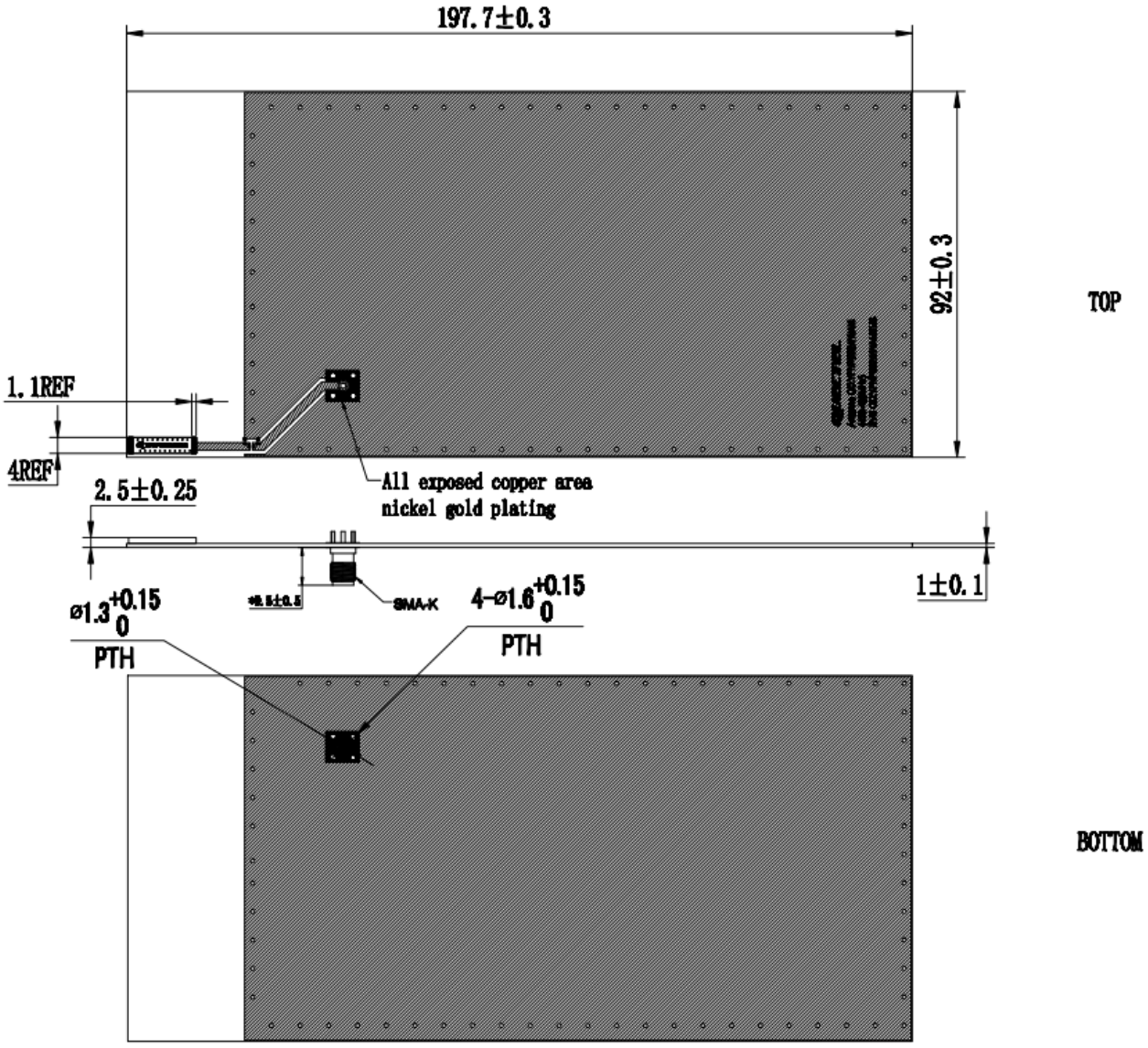
2 Drawing

2.1. Antenna



All dimensions in (mm)

2.2. EVB

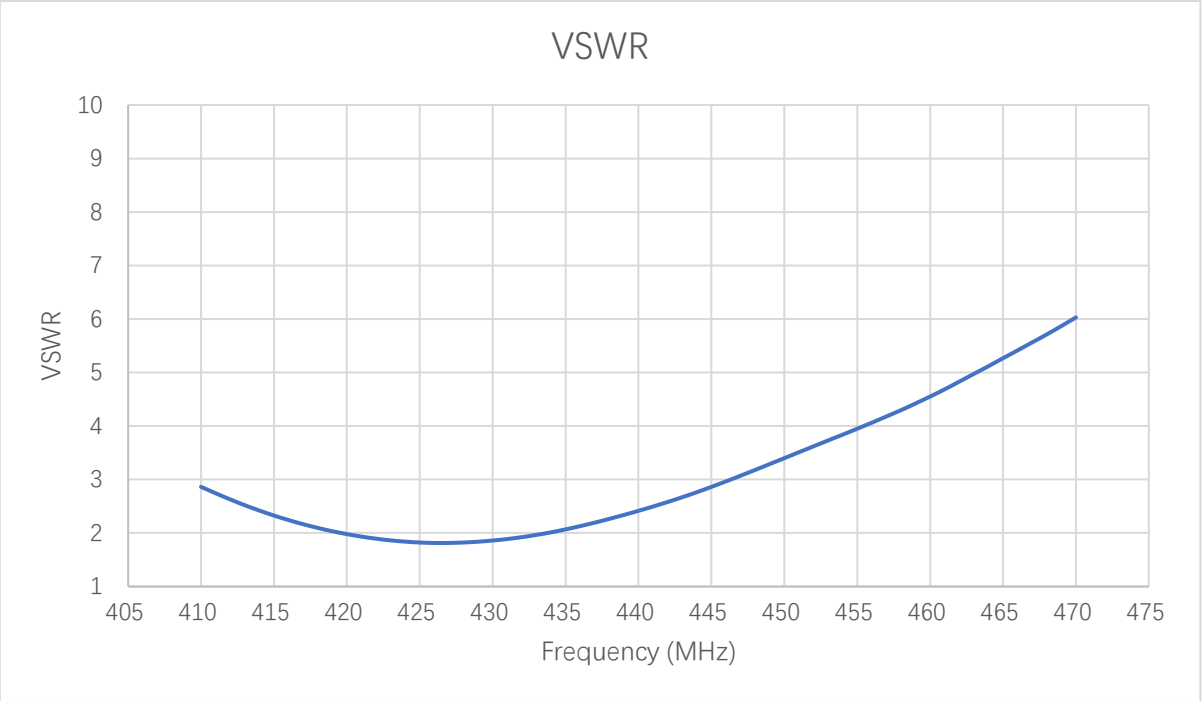


All dimensions in (mm)

3 Detailed Performance

3.1. S-Parameter Test

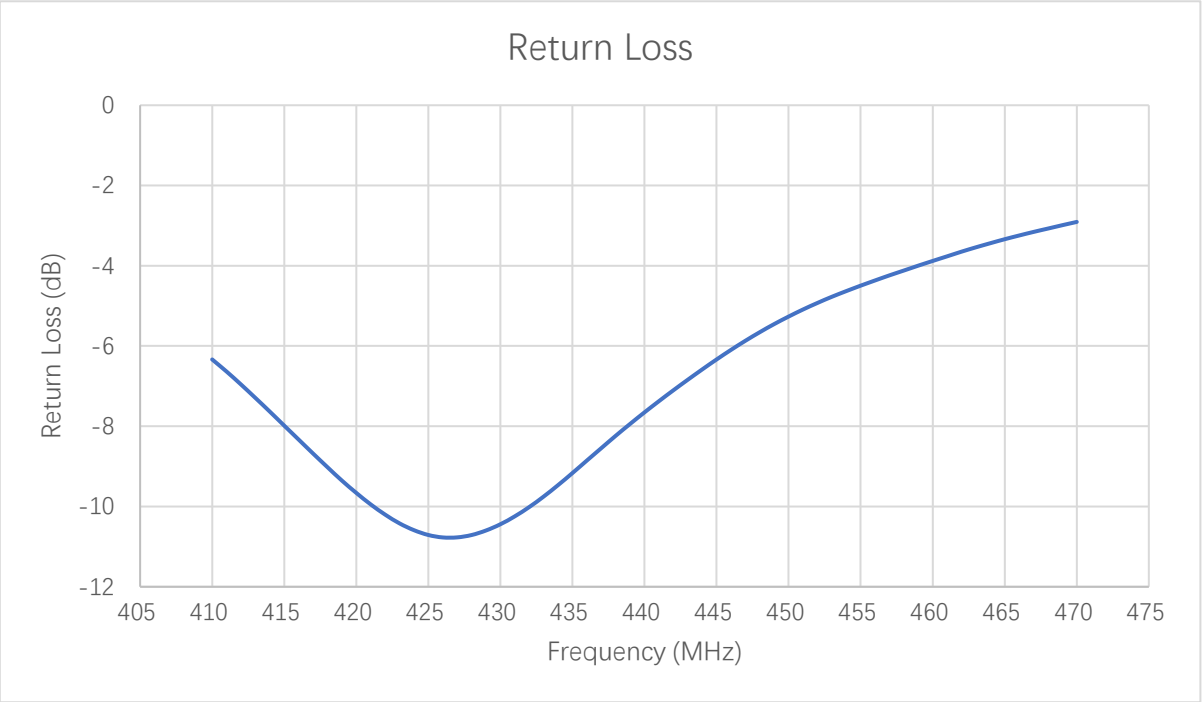
3.1.1. VSWR



VSWR

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
VSWR	-	-	2.0	2.1	-	-	-	-	-	-

3.1.2. Return Loss

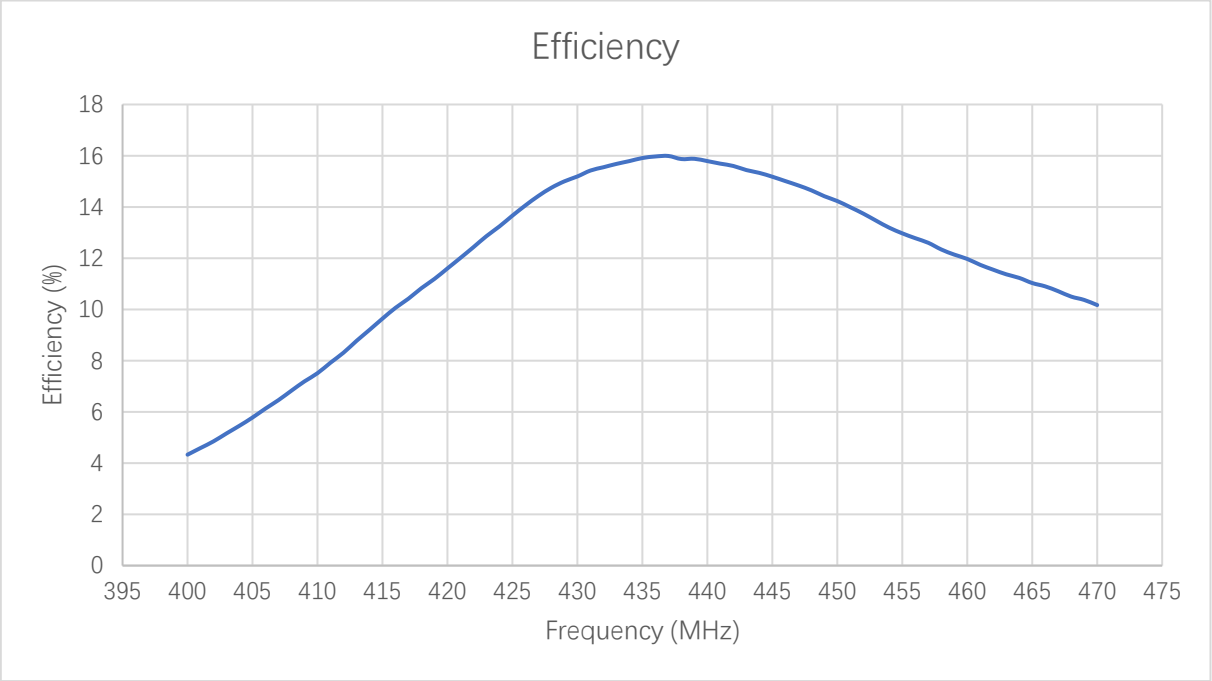


Return Loss (dB)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
Return Loss (dB)	-	-	-9.8	-9.2	-	-	-	-	-	-

3.2. Radiation Performance Test

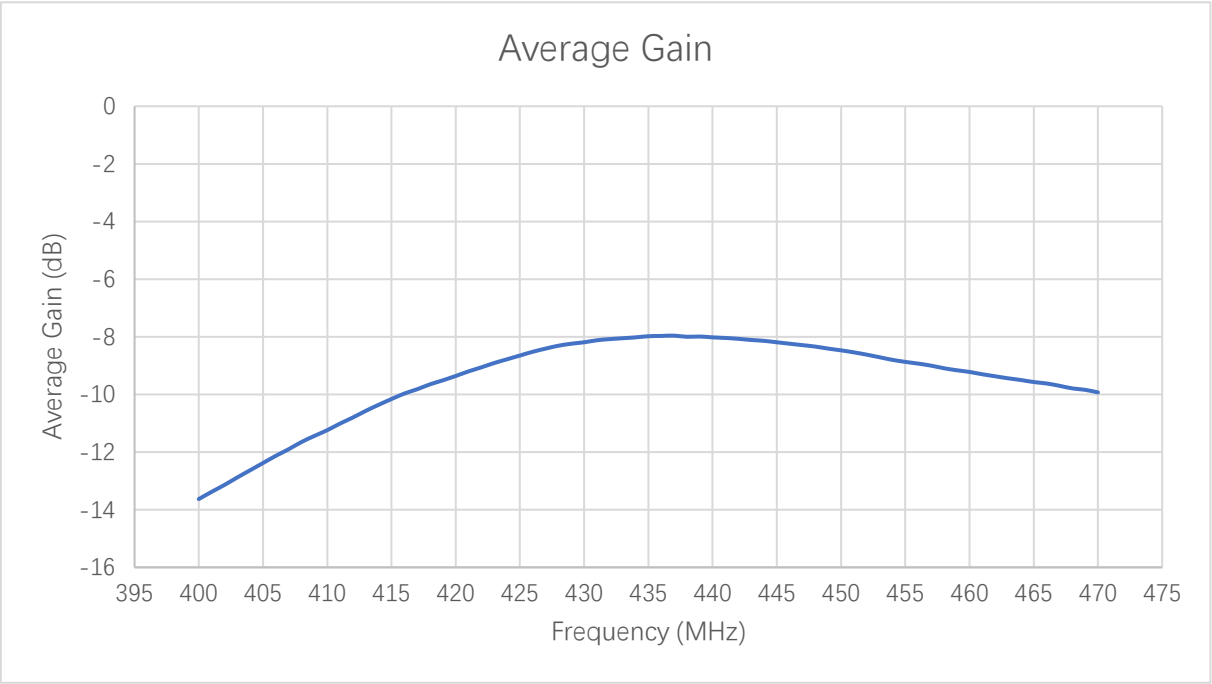
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
Efficiency (%)	-	-	15.7	15.9	-	-	-	-	-	-

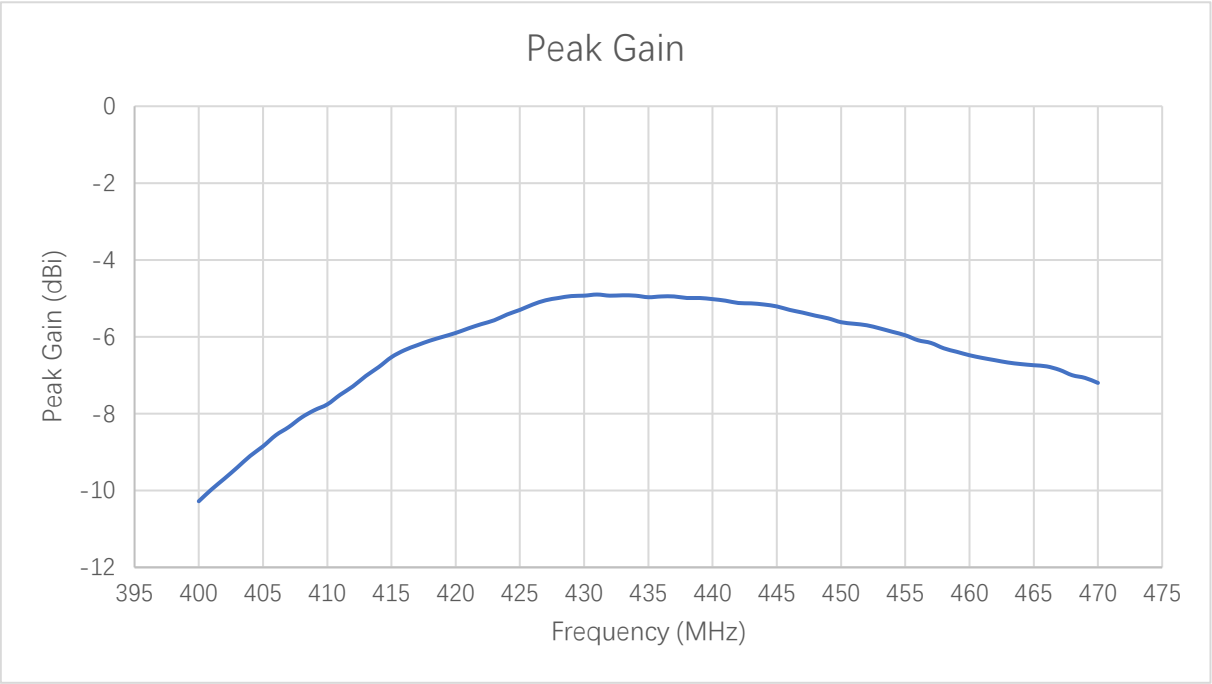
3.2.2. Average Gain



Average Gain (dB)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
Average Gain (dB)	-	-	-8.1	-8.0	-	-	-	-	-	-

3.2.3. Peak Gain

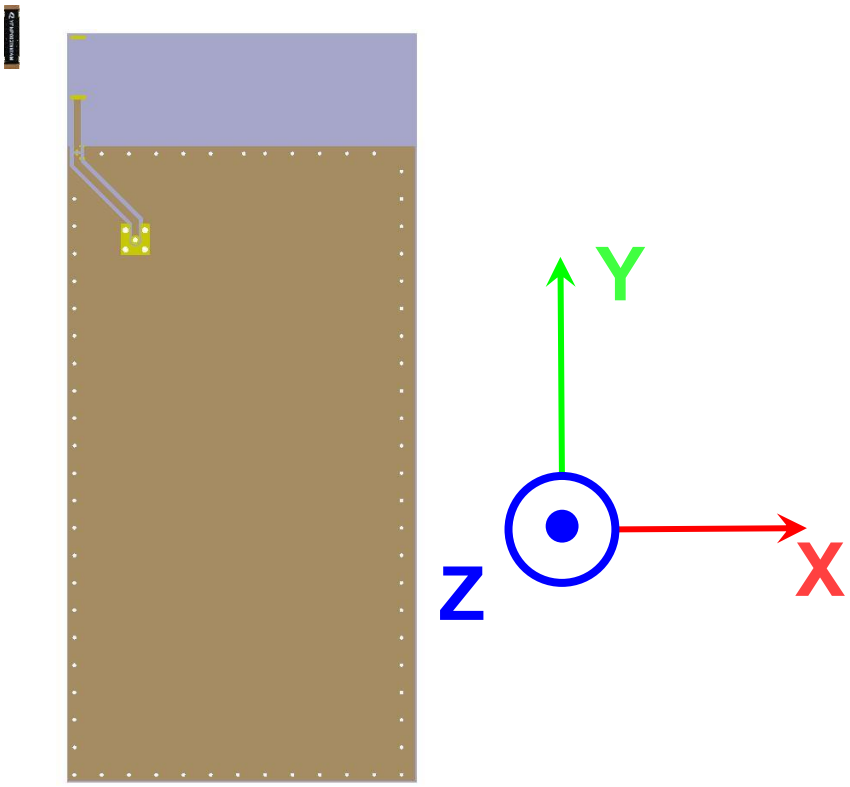


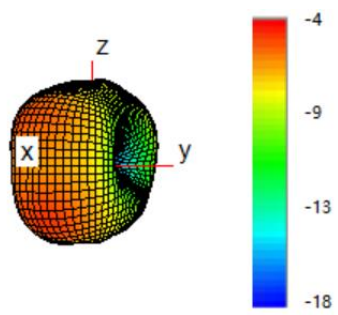
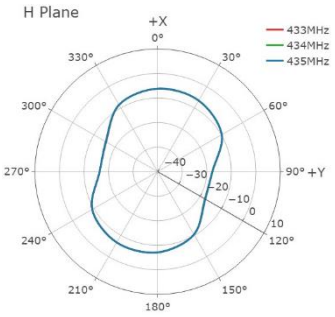
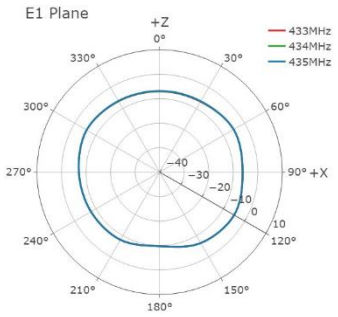
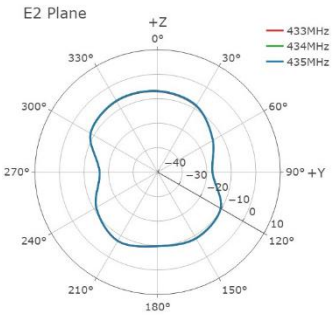
Peak Gain (dBi)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
Peak Gain (dBi)	-	-	-4.9	-5.0	-	-	-	-	-	-

3.2.4. 3D & 2D Radiation Pattern

- Test Condition: Assembled On 197.7 × 92 mm EVB
- Test Chamber: HF-G-1

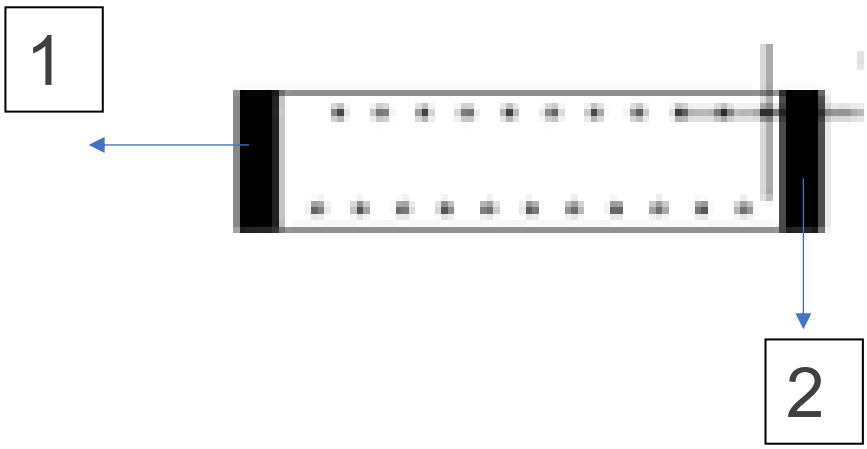


433 MHz	
 Z x y -4 -9 -13 -18	 H Plane +X 433MHz 434MHz 435MHz 90° +Y 180°
 E1 Plane +Z 433MHz 434MHz 435MHz 90° +X 180°	 E2 Plane +Z 433MHz 434MHz 435MHz 90° +Y 180°

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 8 pins, only three of which work. All other pins are for mechanical strength.

Pin	Description
1	Feed
2	Not used (Mechanical only)



5 Transmission Line

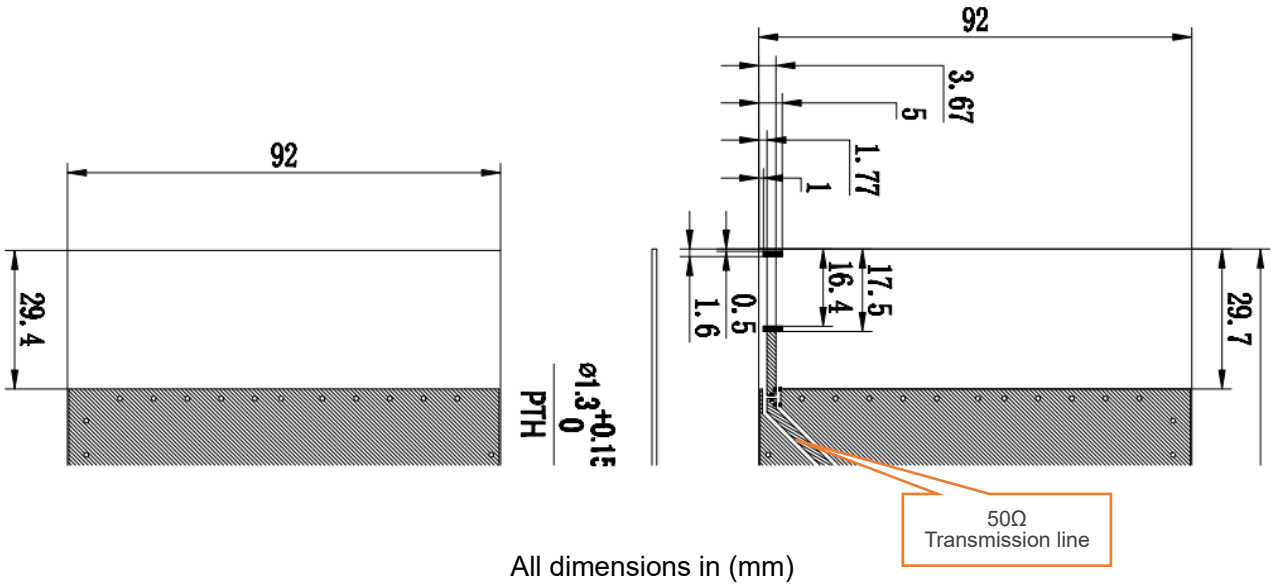
The characteristic impedance of all transmission lines shall be designed as 50 Ω.

- 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 Ω.

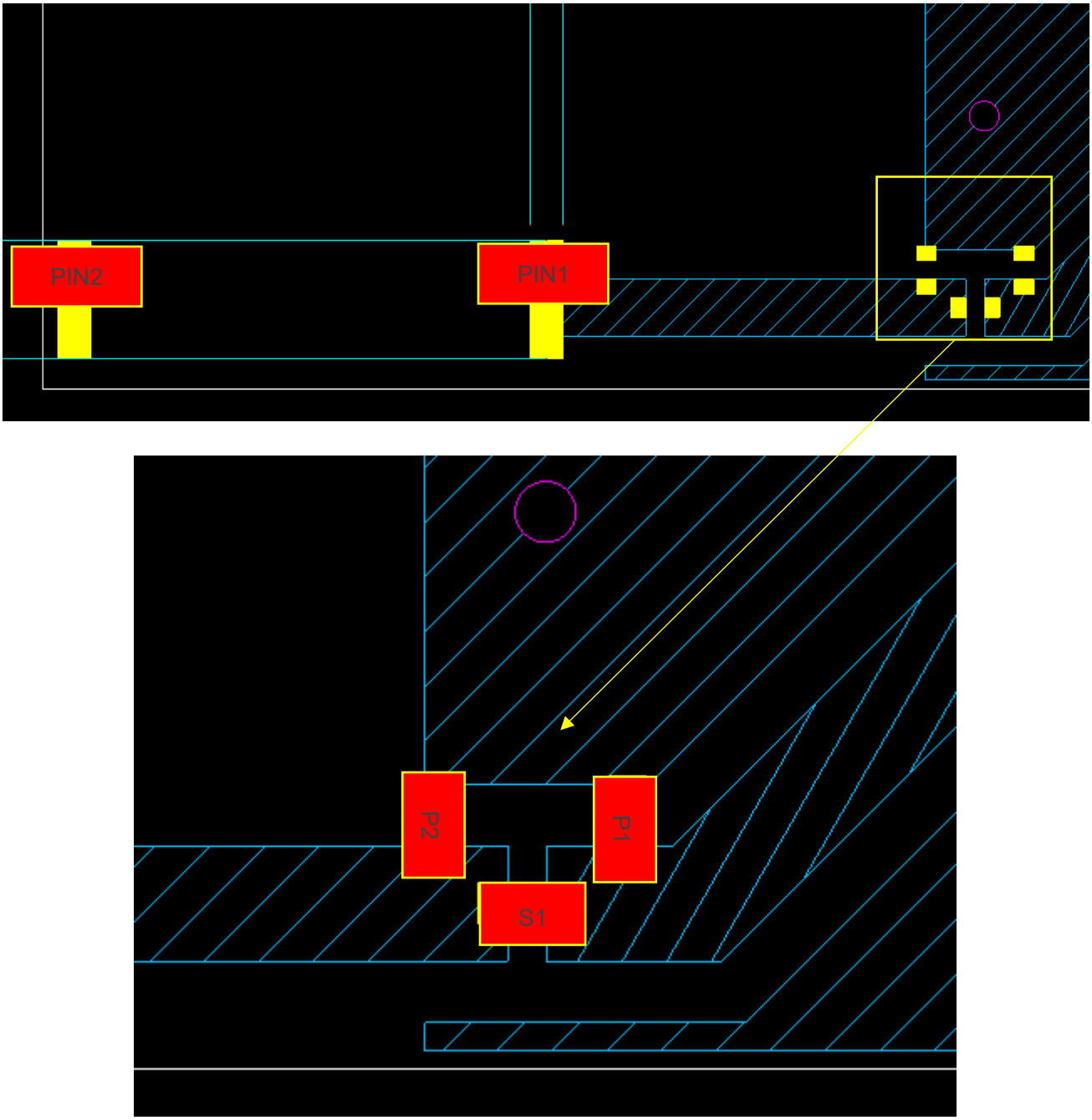
6 Recommended PCB Layout

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



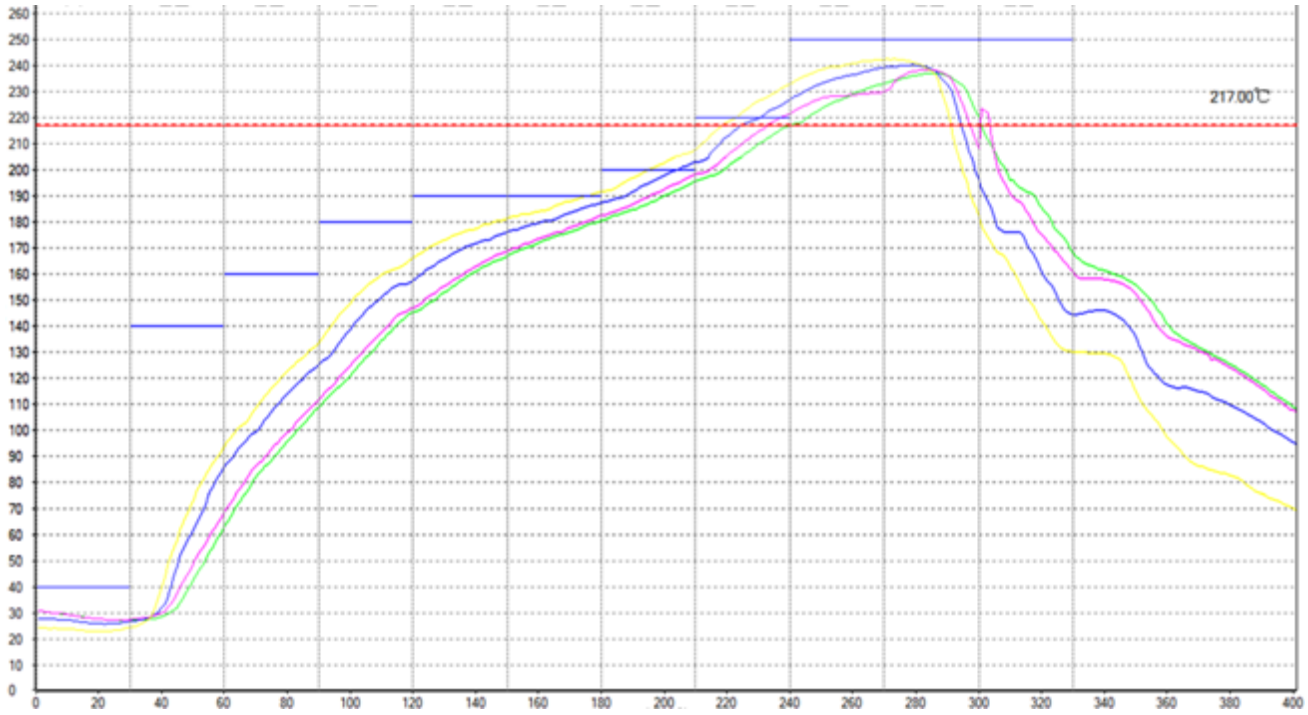
	P1	S1	P2
Default Matching	DNI	1.6 pF	47 nH
Tolerance	N/A	±5 %	±5 %

Pin #	Description
1	Feed
2	Dummy Pad

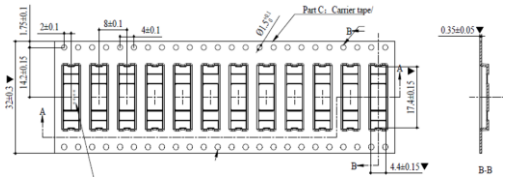
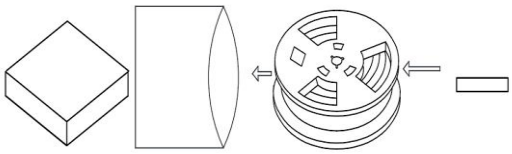
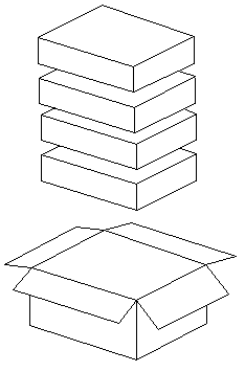
8 Soldering Temperature

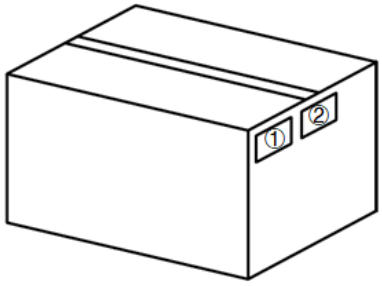
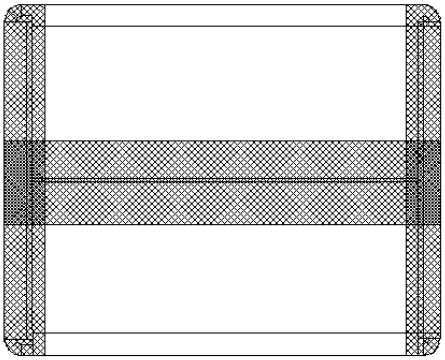
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second (Max.)
PREHEAT	Temperature Min (Tsmin) Temperature Max (Tsmax) Time (tsmin to tsmax)	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature (Tp)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

9 Reflow Profile



10 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Reel
2		(4000 PCS Antenna Products / Reel) Reel tape is vacuumed into the inner box.
3		(4 Inner Boxes / Carton Box) (16000 PCS Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. Carton Size: L x W x H = 370 × 370 × 295 mm

4		**Position for Attaching Labels** ① Carton Label ② Quality Label
5		**Sealing Cartons** "工" 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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Tel: +86 21 5108 6236
Email: info@quectel.com

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Revision History

Version	Date	Author	Note
-	2024-06-24	Mordecai LIU/ Hart HU/ David LIU/ Rainey LIAO	Creation of the document
1.0	2024-06-24	Mordecai LIU/ Hart HU/ David LIU/ Rainey LIAO	First official release
1.1	2024-08-06	David LIU	Updated the packaging (Chapter 10).
2.0	2024-09-19	Mordecai LIU	Numerous changes were made to this document. It should be read in its entirety.

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