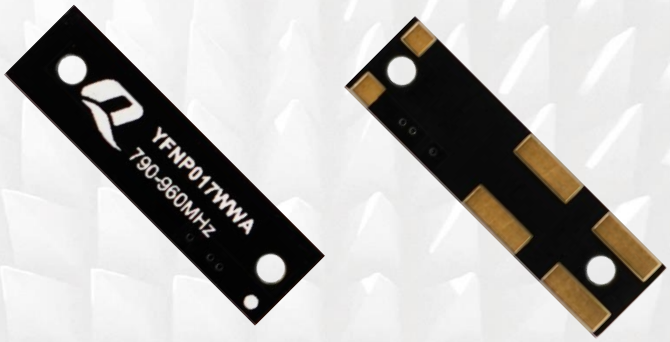


Antenna Datasheet

Product OC (Antenna Only)**:** YFNP017WWA
(Antenna + Rectangular EVB)**:** YFNP017WWA EVB
Version: 1.2
Date: 2024-10-28
Status: Released

Product Name: LoRa & NB-IOT SMD Antenna
Key Features:
High efficiency, excellent performance
Frequency band: 868 MHz/915 MHz/790–960 MHz
Peak efficiency: 70.65 %
Dimensions: 25 mm × 7 mm × 3 mm

Overview

The antenna is designed for superior performance, and can be widely used for wireless applications.

We provide comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

Contents

1 Specification

Test Condition: Assembled on EVB 105.5 mm × 25 mm

1.1. Electrical

Electrical	
Frequency Range	860–880 MHz, 900–930 MHz, 790–960 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

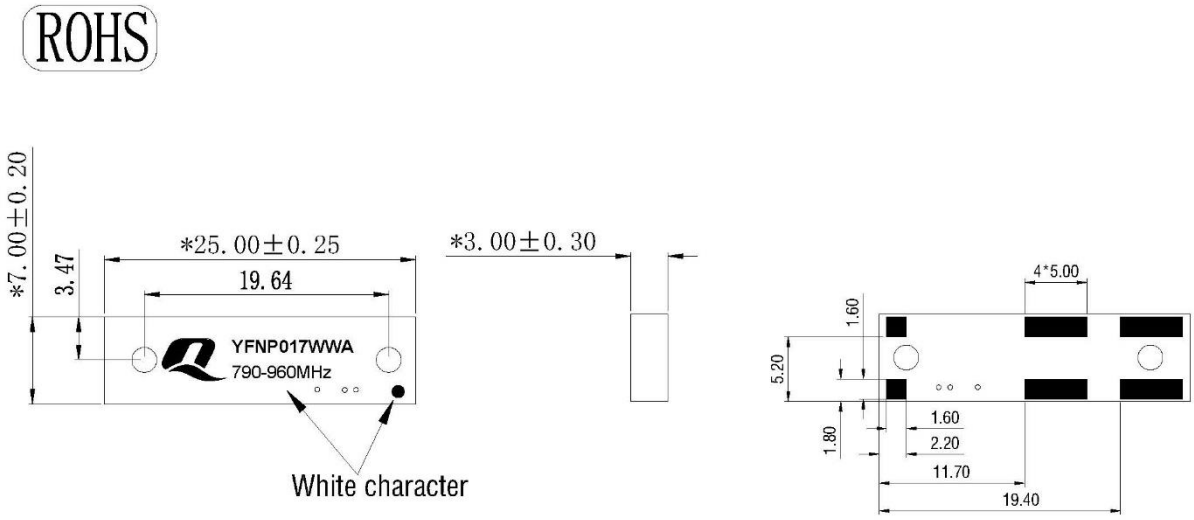
Electrical – Detail				
Band / **SPEC**	**Band**	**LoRa-868**	**LoRa-915**	**NB IoT B5/B8/B20**
	Freq. (MHz)	**860–880**	**900–930**	**790–960**
Max. VSWR		1.3	1.3	3.3
Max Return Loss (dB)		-16.8	-18.5	-5.4
AVG Eff. (%)		62.1	68.7	55.5
AVG AVG Gain (dB)		-2.1	-1.6	-2.6
Max Peak Gain (dBi)		1.0	1.4	0.5

1.2. Mechanical & Environmental

Mechanical	
Antenna Size	25 mm × 7 mm × 3 mm
Antenna Material & Color	FR4 & Black
Antenna Weight	Typ. 1.08 g
Mounting Type	SMT
Recommended EVB Size	105.53 mm × 25 mm × 0.8 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

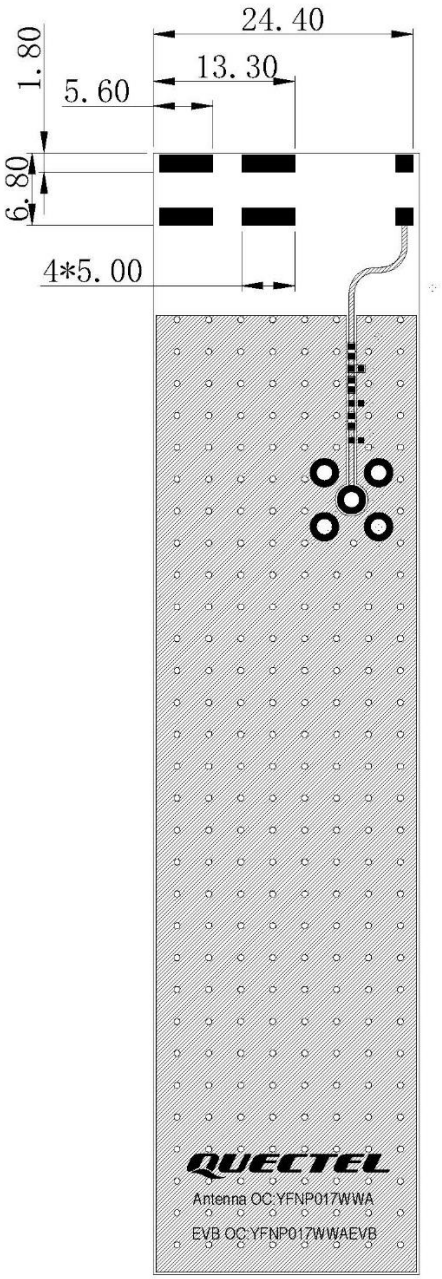
2 Drawing

2.1. Antenna



All dimensions in (mm)

2.2. EVB



All dimensions in (mm)

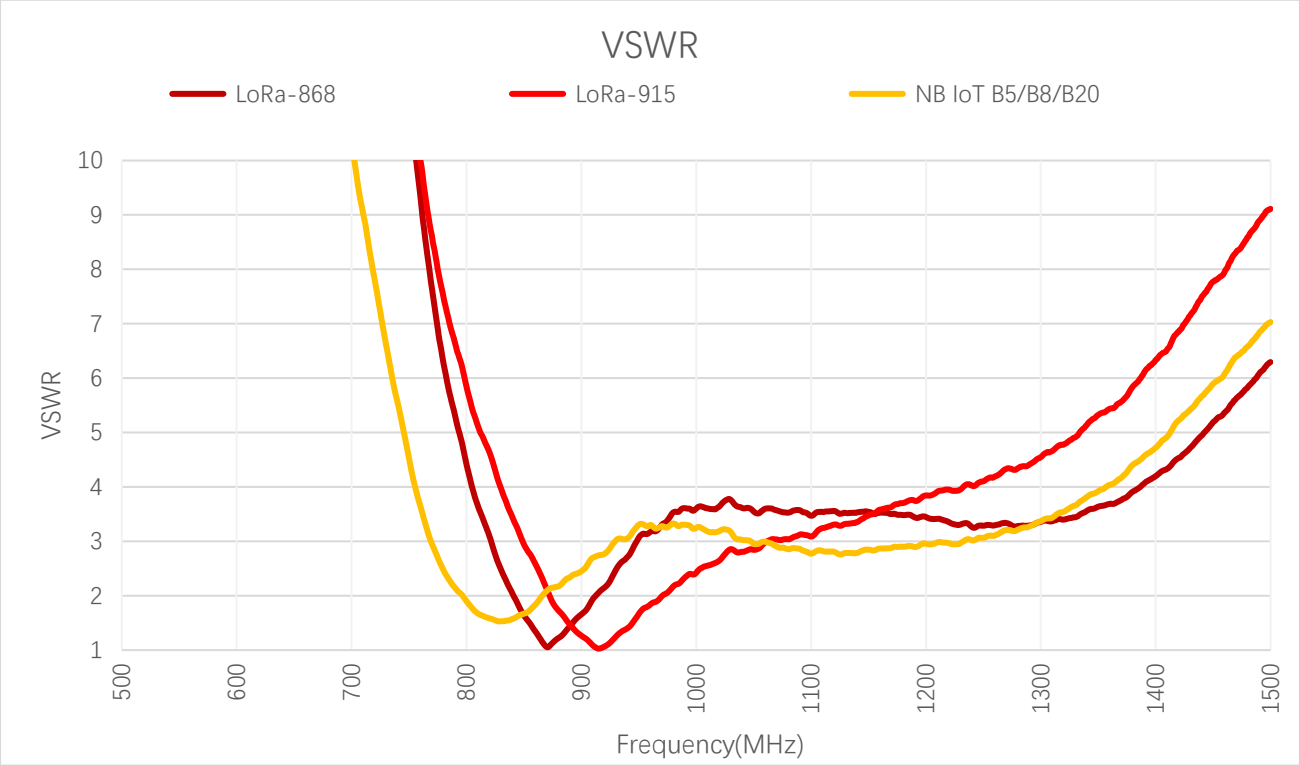
3 Detailed Performance

3.1. Overview

The performance of the low bands is highly dependent on the ground plane length. The host PCB ground needs to be as long as the device allows. Reducing the GND directly relates to the performance of the low bands.

3.2. S-Parameter Test

3.2.1. VSWR



VSWR – LoRa-868

Frequency (MHz)	860	862	868	875	880
VSWR	1.3	1.3	1.1	1.1	1.2

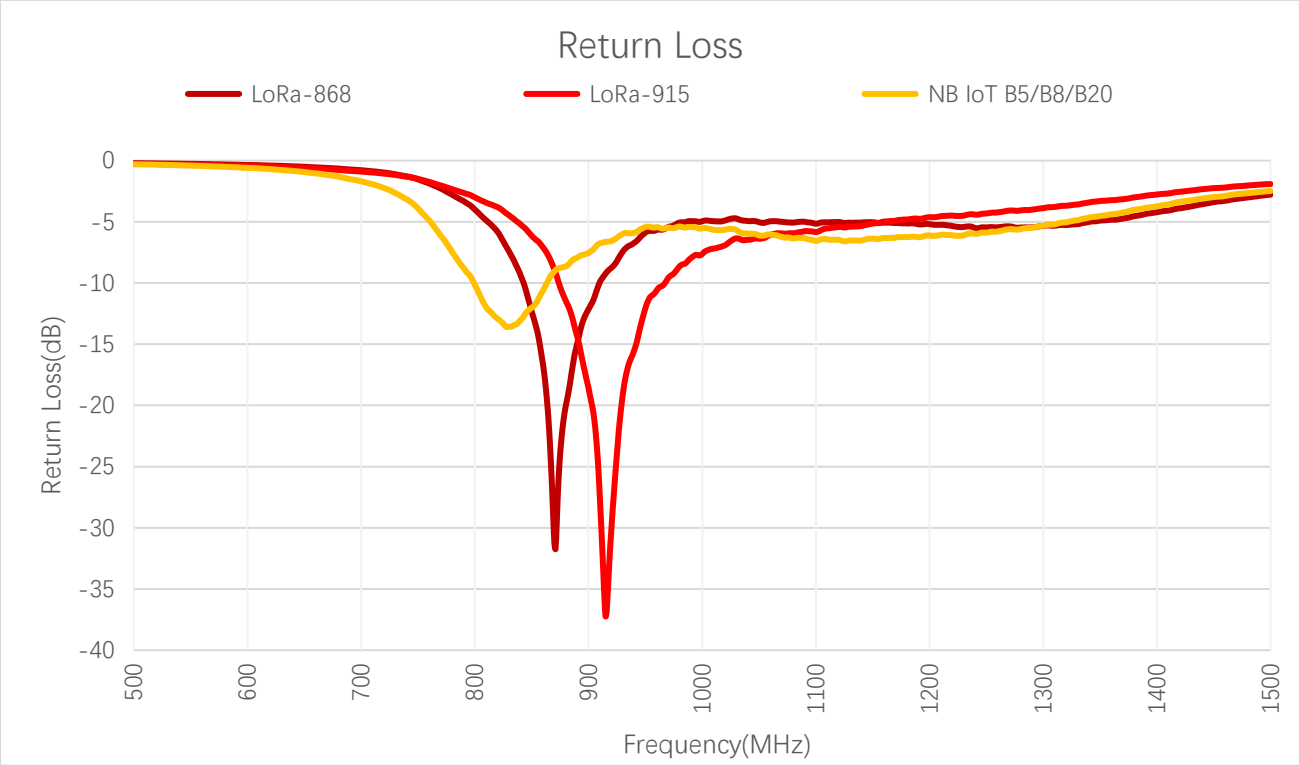
VSWR – LoRa-915

Frequency (MHz)	900	910	915	925	930
VSWR	1.3	1.1	1.0	1.1	1.3

VSWR – NB IoT B5/B8/B20

Frequency (MHz)	790	830	880	930	960
VSWR	2.2	1.5	2.2	3.0	3.3

3.2.2. Return Loss



Return Loss (dB) – LoRa-868

Frequency (MHz)	860	862	868	875	880
Return Loss (dB)	-16.8	-18.2	-26.4	-24.3	-20.1

Return Loss (dB) – LoRa-915

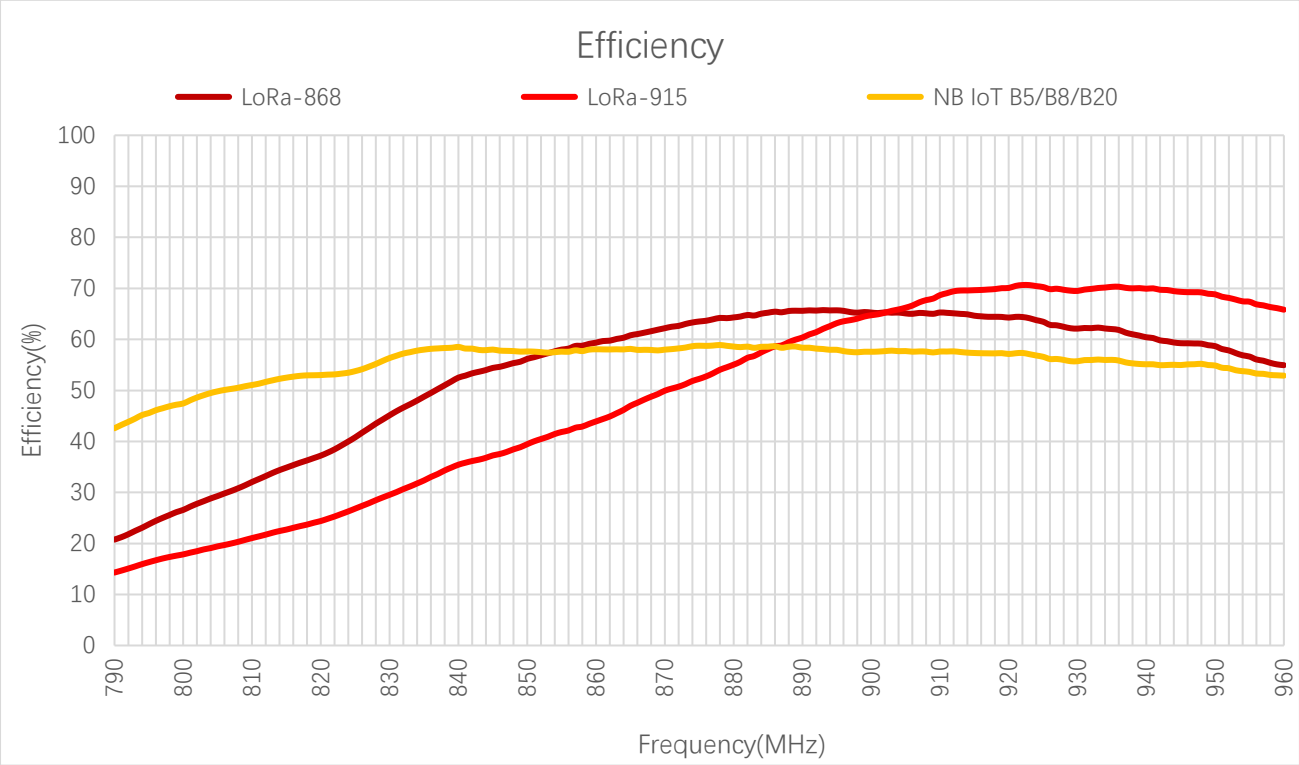
Frequency (MHz)	900	910	915	925	930
Return Loss (dB)	-18.5	-27.3	-36.6	-23.7	-19.1

Return Loss (dB) – NB IoT B5/B8/B20

Frequency (MHz)	790	830	880	930	960
Return Loss (dB)	-8.8	-13.6	-8.7	-6.0	-5.4

3.3. Radiation Performance Test

3.3.1. Efficiency



Efficiency (%) – LoRa-868

Frequency (MHz)	860	862	868	875	880
Efficiency (%)	59.4	59.8	61.6	63.5	64.3

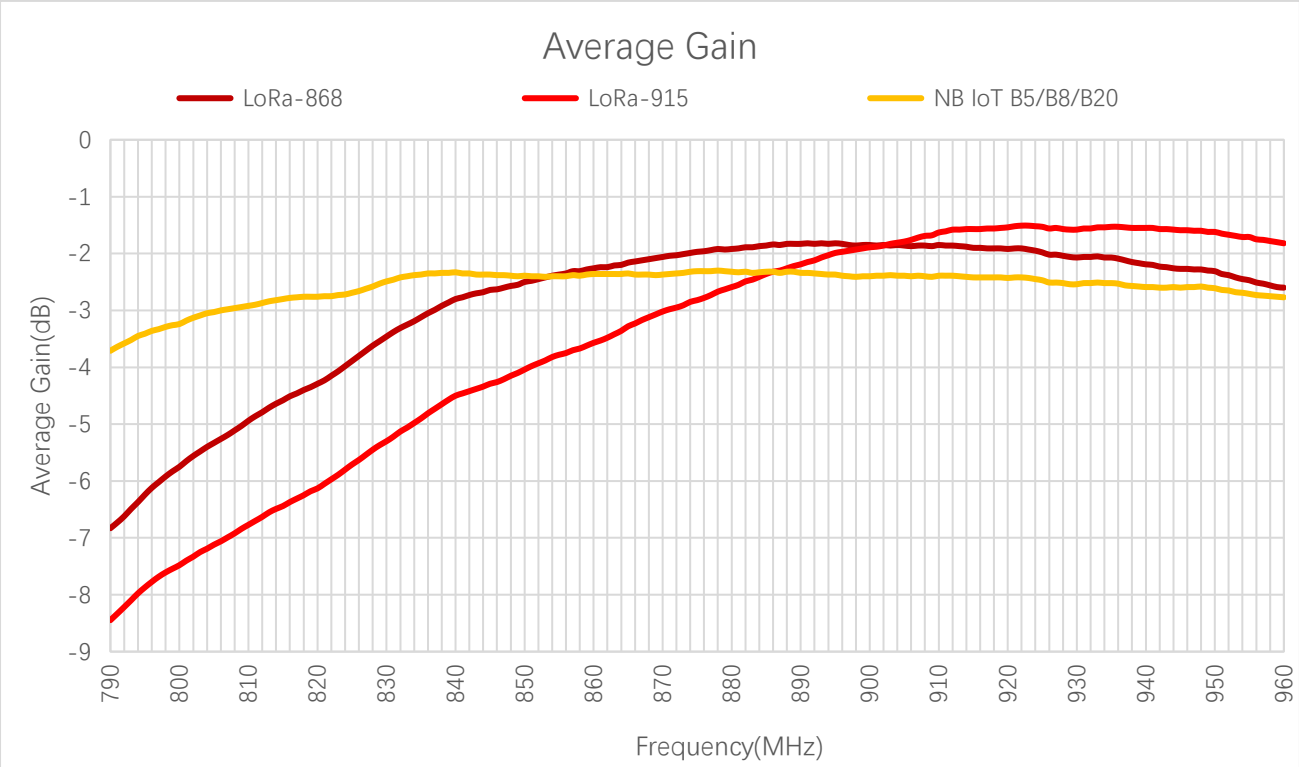
Efficiency (%) – LoRa-915

Frequency (MHz)	900	910	915	925	930
Efficiency (%)	64.7	68.7	69.6	70.3	69.5

Efficiency (%) – NB IoT B5/B8/B20

Frequency (MHz)	790	830	880	930	960
Efficiency (%)	42.6	56.4	58.6	55.7	52.9

3.3.2. Average Gain



Average Gain (dB) – LoRa-868

Frequency (MHz)	860	862	868	875	880
Average Gain (dB)	-2.3	-2.2	-2.1	-2.0	-1.9

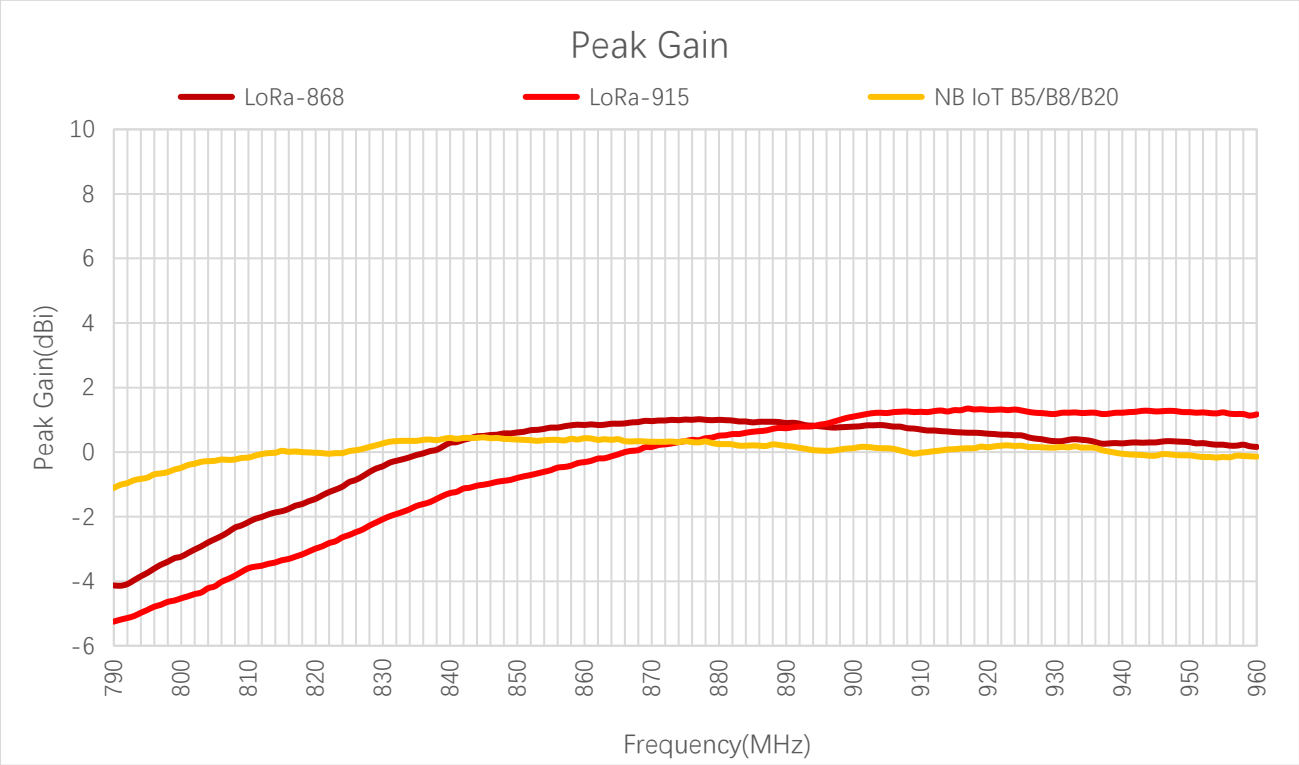
Average Gain (dB) – LoRa-915

Frequency (MHz)	900	910	915	925	930
Average Gain (dB)	-1.9	-1.6	-1.6	-1.5	-1.6

Average Gain (dB) – NB IoT B5/B8/B20

Frequency (MHz)	790	830	880	930	960
Average Gain (dB)	-3.7	-2.5	-2.3	-2.5	-2.8

3.3.3. Peak Gain



Peak Gain (dBi) – LoRa-868

Frequency (MHz)	860	862	868	875	880
Peak Gain (dBi)	0.8	0.8	0.9	1.0	1.0

Peak Gain (dBi) – LoRa-915

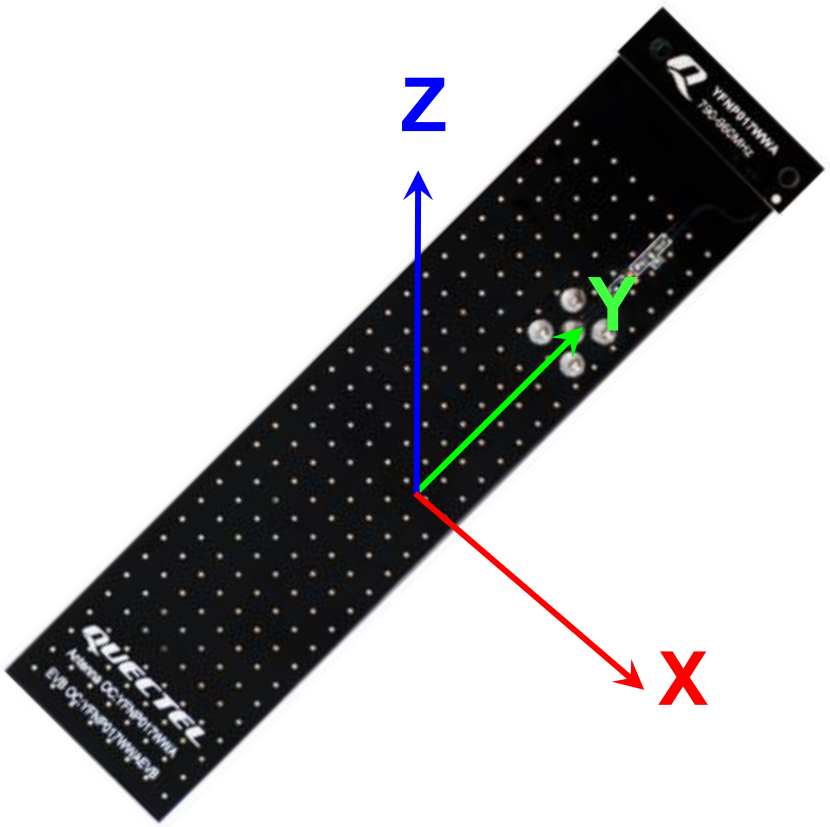
Frequency (MHz)	900	910	915	925	930
Peak Gain (dBi)	1.1	1.3	1.3	1.3	1.2

Peak Gain (dBi) – NB IoT B5/B8/B20

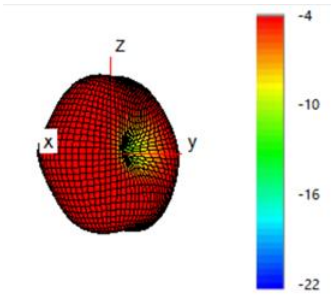
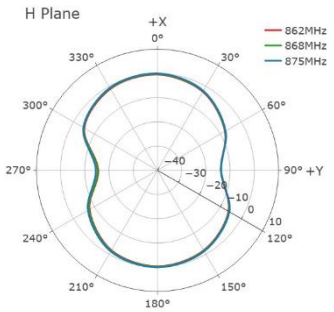
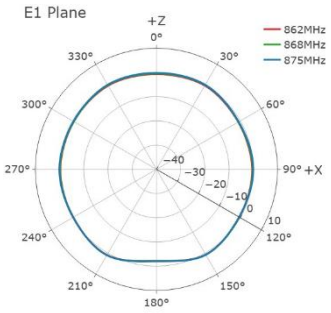
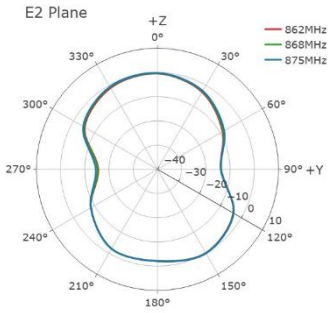
Frequency (MHz)	790	830	880	930	960
Peak Gain (dBi)	-1.1	0.3	0.3	0.1	-0.1

3.3.4. 3D & 2D Radiation Pattern

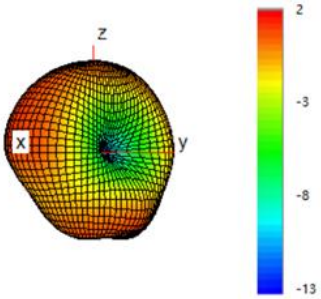
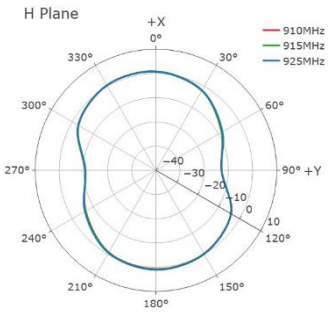
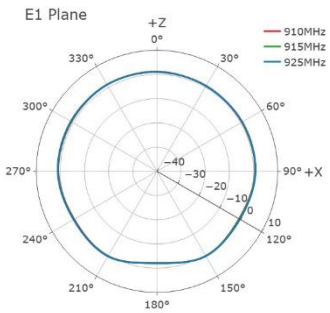
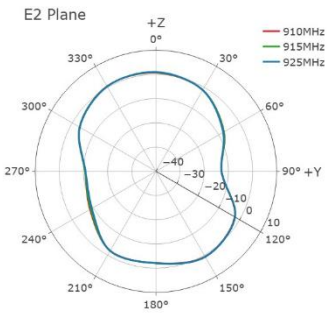
- Test Status: Assembled on 90 mm × 25 mm × 1 mm GND



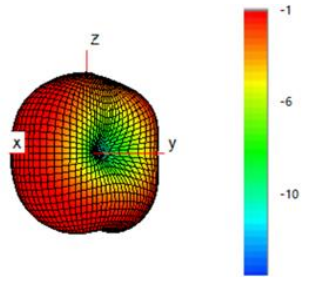
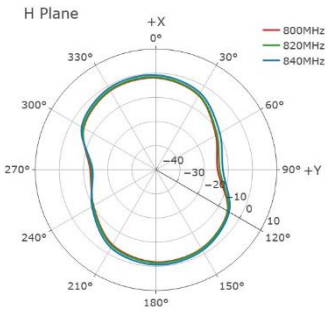
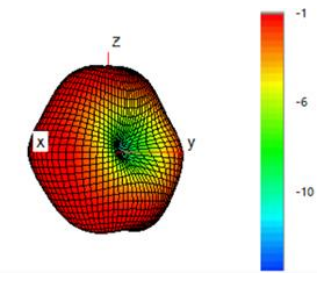
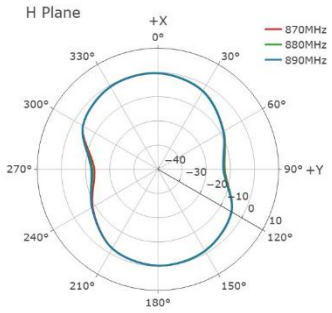
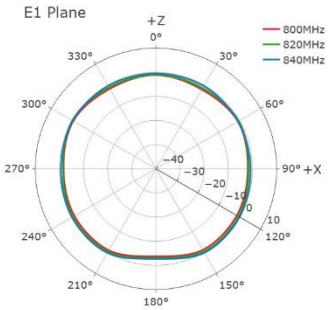
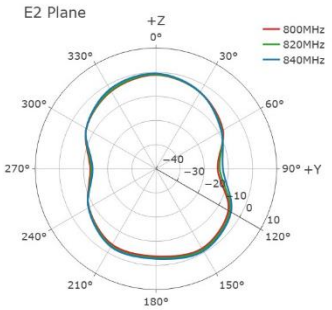
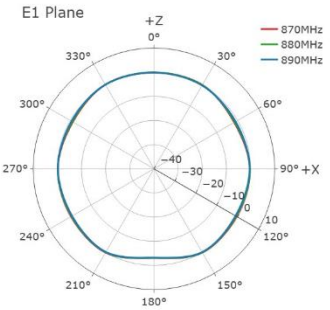
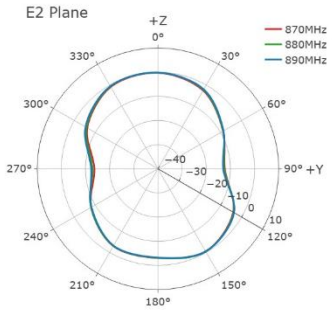
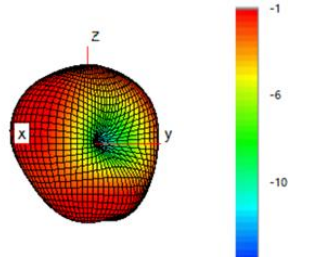
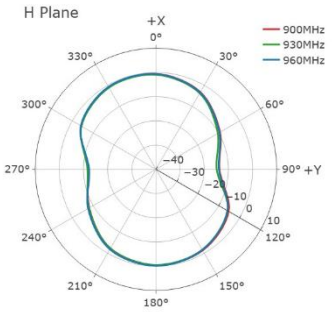
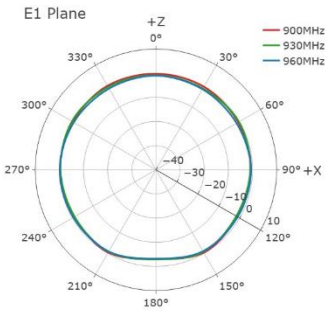
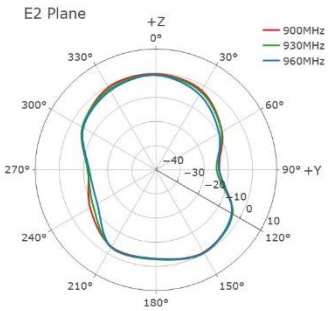
- LoRa-868

868 MHz	
	
	

- LoRa-915

915 MHz	
	
	

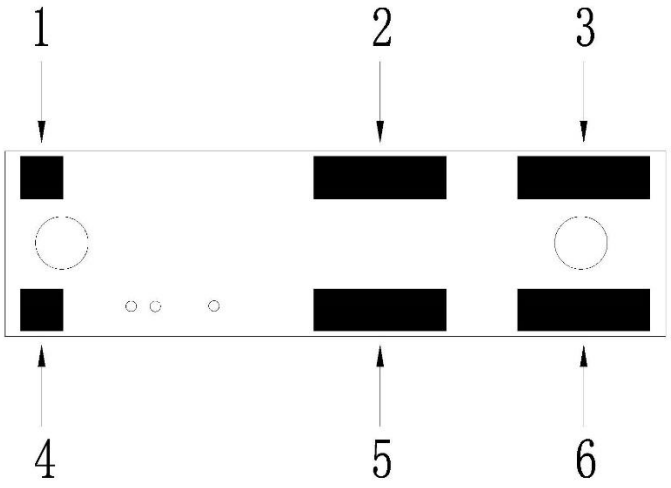
- NB IoT-B5/B8/B20

830 MHz		880 MHz	
			
			
930 MHz			
			
			

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
4	Feed
1, 2, 3, 5, 6	Not used (Mechanical only)



5 Transmission Line

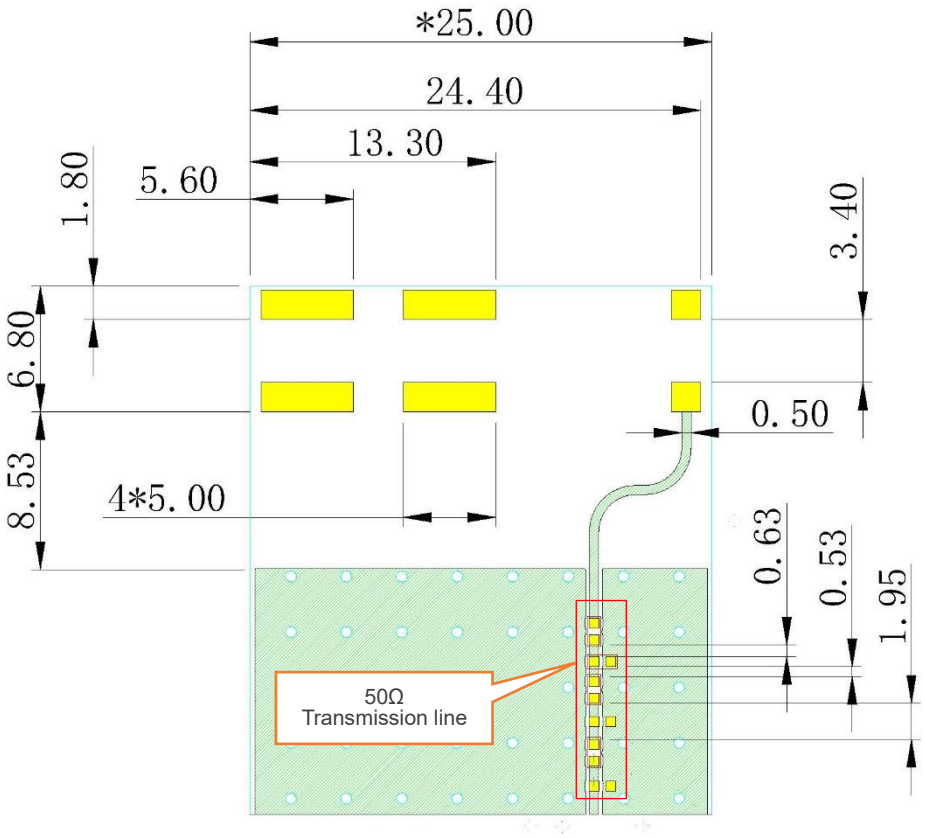
The characteristic impedance of all transmission lines shall be designed as 50 Ω.

- 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.

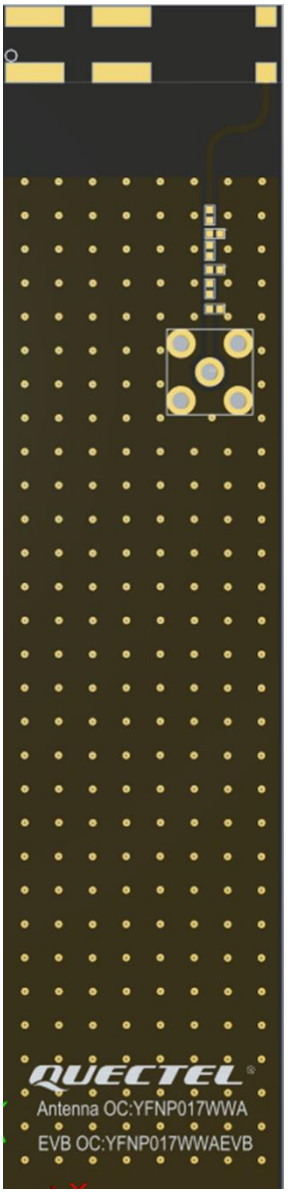
6 Recommended PCB Layout

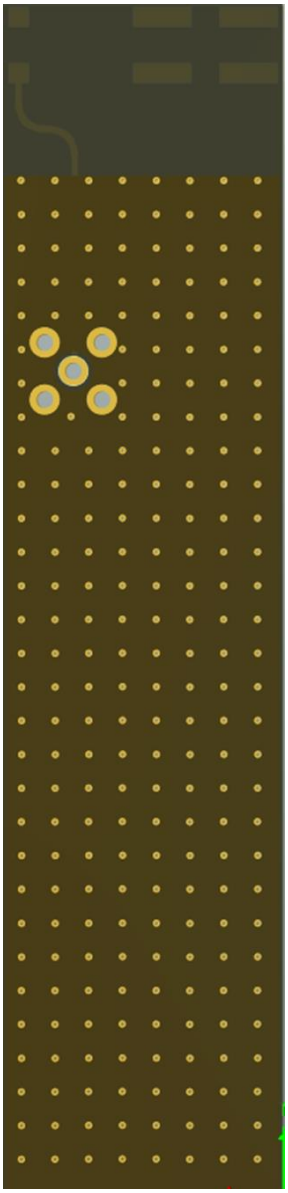
The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.

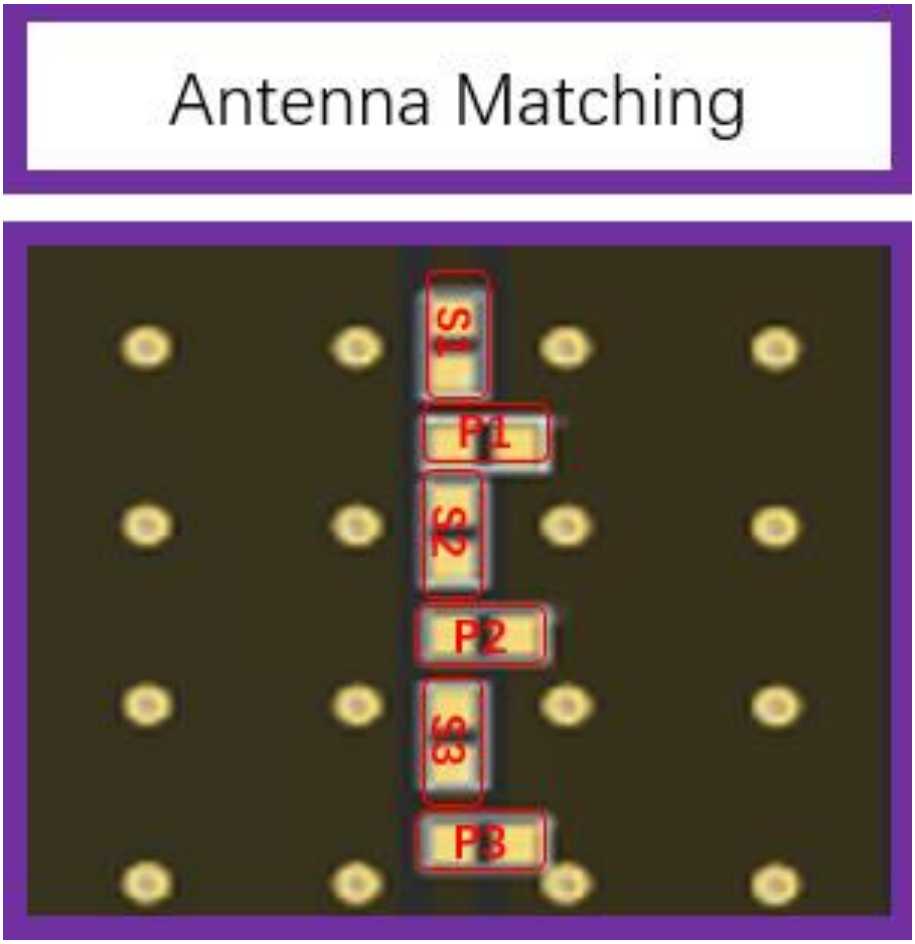


All dimensions in (mm)

7 Matching Circuit







LoRa-868

	S1	P1	S2	P2	S3	P3
Default Matching	1.2nH	6.2nH	2.5 pF	NC	0Ω	NC
Tolerance	±5 %	±5 %	±5 %	N/A	±5 %	N/A

LoRa-915

	S1	P1	S2	P2	S3	P3
Default Matching	0Ω	5.6nH	3.9 pF	NC	0Ω	N/A
Tolerance	±5 %	±5 %	±5 %	N/A	±5 %	N/A

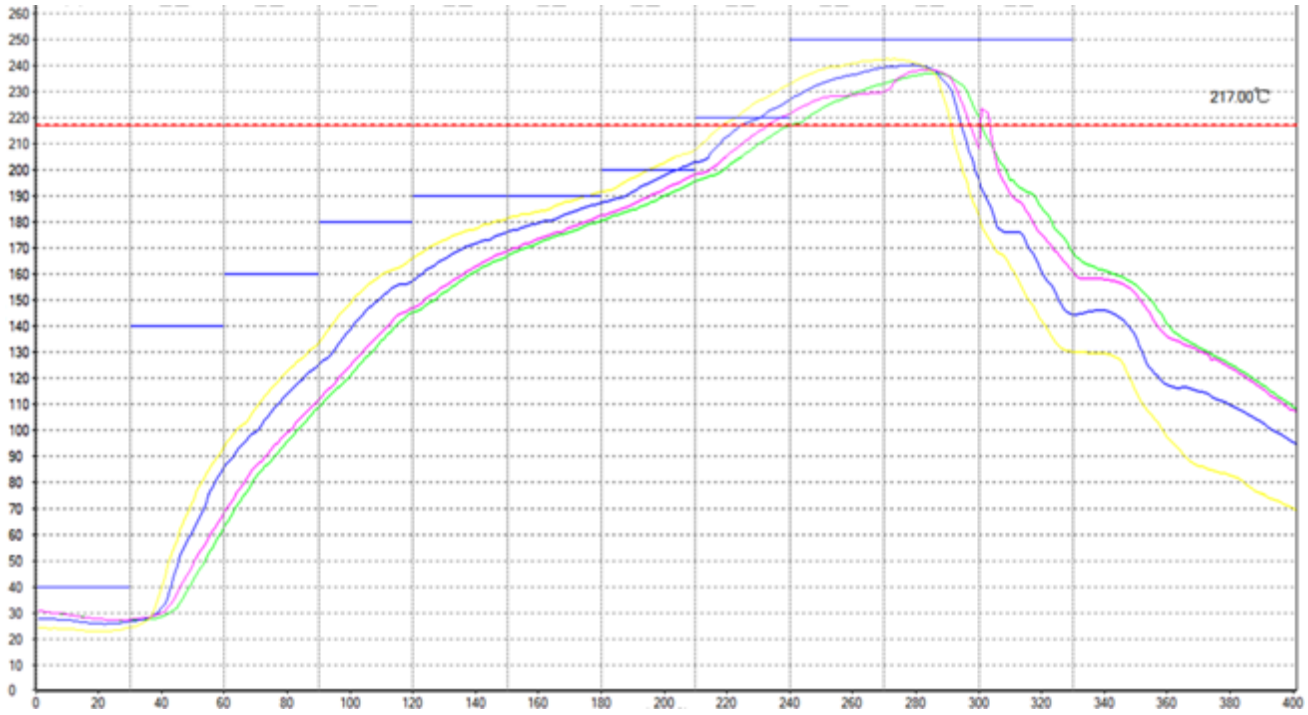
NB IoT-B5/B8/B20

	S1	P1	S2	P2	S3	P3
Default Matching	3nH	7.5nH	3 pF	NC	0Ω	N/A
Tolerance	±5 %	±5 %	±5 %	N/A	±5 %	N/A

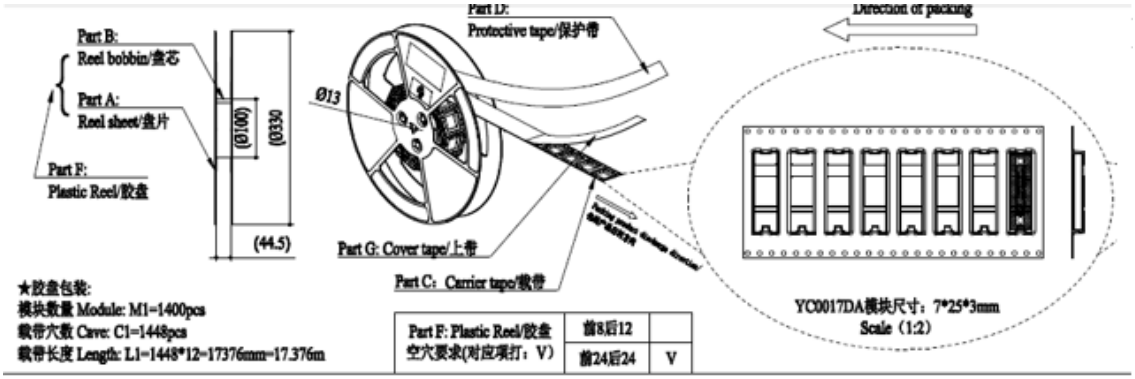
8 Soldering Temperature

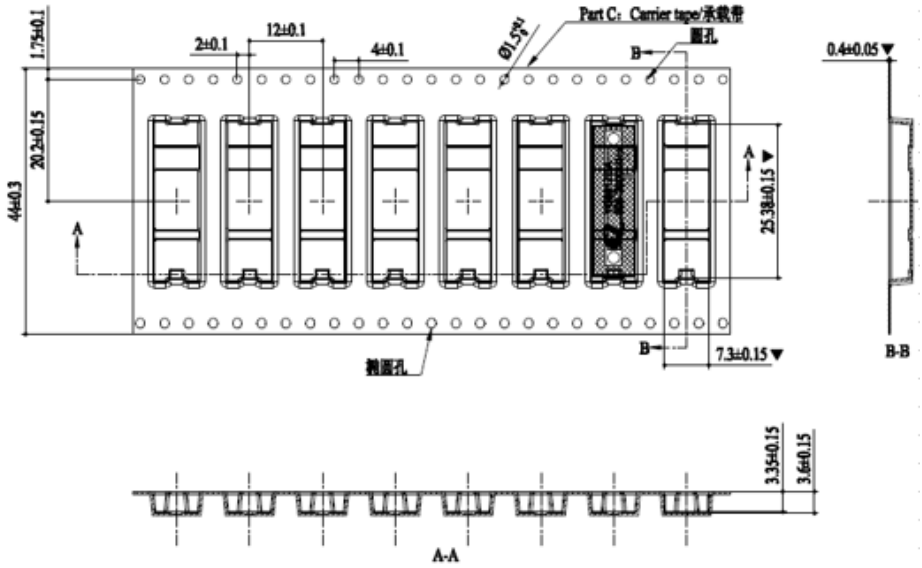
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second (Max.)
PREHEAT	Temperature Min (Tsmin) Temperature Max (Tsmax) Time (tsmin to tsmax)	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature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

9 Reflow Profile

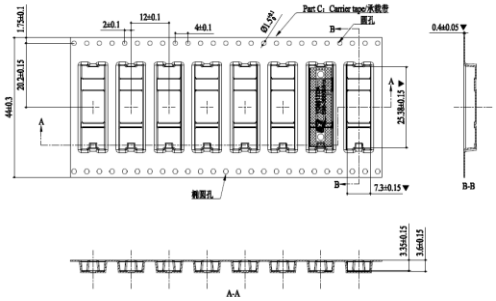
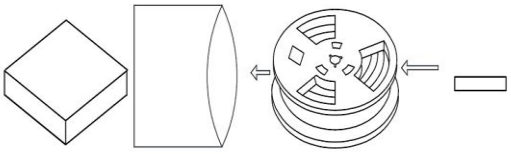
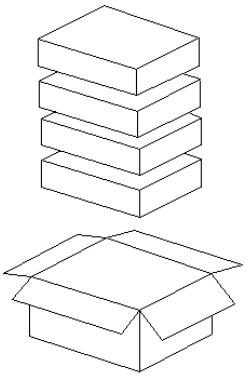
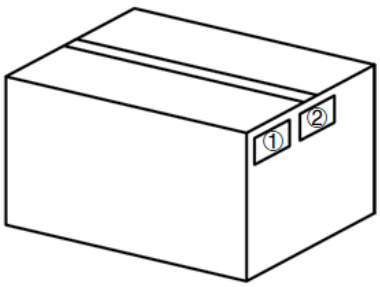


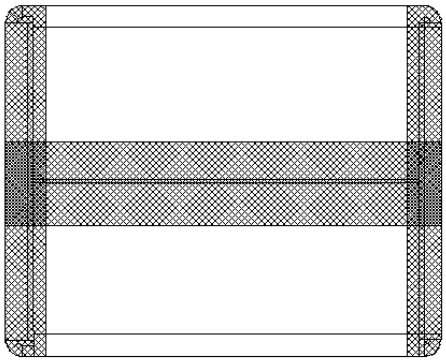
10 Packaging





ITEM	W	P	T	A0	A1	B0	B1	K0	K1	F	E	D0	D1	P0	P2
DIM.	44.00	12.00	0.40	7.30	/	25.38	/	3.35	3.60	20.20	1.75	1.50	/	4.00	2.00
TOLE.	±0.30	±0.10	±0.05	±0.15	±0.30	±0.15	±0.30	±0.15	±0.15	±0.15	±0.10	+0.10	+0.10	±0.10	±0.10

Step	Packaging Picture / 2D Picture	Description
1		Reel
2		(1400 PCS Antenna Products / Reel) Reel tape is vacuumed into the inner box.
3		(4 Inner Boxes / Carton Box) (5600 PCS Antennas / Carton Box) Carton Size: L × W × H = 370 × 370 × 295 mm
4		**Position for Attaching Labels** ① Carton Label ② Quality Label

5		**Sealing Cartons** “工” type sealing cartons

Contact Us

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Revision History

Version	Date	Author	Note
-	2023-09-14	Kane LIU/ Bailey ZHANG/ David LIU/ Aria CHU	Creation of the document
1.0	2023-09-14	Kane LIU/ Bailey ZHANG/ David LIU/ Aria CHU	First official release
1.1	2023-12-11	Bailey ZHANG/ Kane LIU/ Aria CHU	1. Updated the product image (Home page and Chapters 3.1 and 3.3.4). 2. Updated the drawing (Chapters 2.1). 3. Updated the packaging (Chapter 10).
1.2	2024-10-28	Bailey ZHANG	Updated mounting type (Chapter 1.2).

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