Antenna Datasheet

Product OC (Antenna Only)**:** YC0002BA
(Antenna + Rectangular EVB)**:** YC0002BAEVB
Version: 2.3
Date: 2025-03-11
Status: Released

Product Name: 4G SMT Mount PCB Chip IFA Embedded Antenna
Key Features:
High efficiency, excellent performance
Frequency band: 698–960 MHz, 1710–2690 MHz
Peak efficiency: 75.3 % (On 116 mm × 60 mm GND)
Dimensions: 42 mm × 10 mm × 3 mm

Overview

This Quectel embedded 4G SMD antenna covers main 4G LTE bands and is compatible with 3G/2G/LPWA bands. Featuring high efficiency and gain, it is an ideal antenna for a smooth and stable connection with high-efficiency data transmission even under the influence of the device's internal structure. Ground plane dependent, it's designed to be mounted directly to the device host PCB using a conventional PCB reflow process. Supplied tape and reel for high volume pick and place assembly, this SMD antenna can be tuned specifically for the final device environment with a simple PI matching circuit.

Contents

1 Specification

Test Condition: Assembled On EVB

1.1. Electrical

Electrical	
Frequency Range	698–960 MHz, 1710–2690 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical – Detail

Band / SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41
	Freq. (MHz)	600–700	700–810	820–960	1700–2170	2300–2400	2400–2500	2500–2690
Max VSWR	On 116 × 60 mm GND	-	4.8	3.5	3.7	2.1	2.1	1.9
	On 106 × 60 mm GND	-	5.2	3.6	4.0	2.0	2.0	1.9
	On 96 × 60 mm GND	-	5.8	4.4	4.0	1.9	1.9	1.9
	On 86 × 60 mm GND	-	6.6	4.9	3.7	1.9	1.9	1.8
	On 76× 60 mm GND	-	7.0	5.7	3.2	1.9	1.9	1.8
Max Return Loss (dB)	On 116 × 60 mm GND	-	-3.7	-5.1	-4.8	-9.0	-9.0	-9.9
	On 106 × 60 mm GND	-	-3.4	-5.0	-4.4	-9.6	-9.6	-9.9
	On 96 × 60 mm GND	-	-3.0	-4.0	-4.4	-10.3	-10.1	-10.3

	On 86 × 60 mm GND	-	-2.7	-3.6	-4.9	-10.4	-10.4	-11.2
	On 76 × 60 mm GND	-	-2.5	-3.1	-5.5	-9.9	-9.9	-10.9
AVG Eff. (%)	**On 116 × 60 mm GND**	-	42.9	48.8	51.3	72.5	71.9	72.5
	On 106× 60 mm GND	-	39.6	44.9	48.6	71.1	71.8	73.3
	On 96 × 60 mm GND	-	35.9	45.7	47.5	71.7	72.8	74.3
	On 86 × 60 mm GND	-	30.2	39.5	44.3	69.2	72.3	76.4
	On 76 × 60 mm GND	-	24.5	34.8	47.8	69.7	70.7	75.5
AVG AVG Gain (dB)	**On 116 × 60 mm GND**	-	-3.7	-3.1	-2.9	-1.4	-1.4	-1.4
	On 106× 60 mm GND	-	-4.1	-3.5	-3.1	-1.5	-1.4	-1.4
	On 96 × 60 mm GND	-	-4.5	-3.4	-3.3	-1.4	-1.4	-1.3
	On 86 × 60 mm GND	-	-5.3	-4.0	-3.5	-1.6	-1.4	-1.2
	On 76 × 60 mm GND	-	-6.2	-4.6	-3.2	-1.6	-1.5	-1.2
Max Peak Gain (dBi)	**On 116 × 60 mm GND**	-	-0.2	0.0	2.7	2.8	4.0	4.1
	On 106 × 60 mm GND	-	-0.1	0.4	2.4	2.9	3.5	4.4
	On 96 × 60 mm GND	-	-0.4	0.2	2.0	2.8	3.2	3.7
	On 86 × 60 mm GND	-	-1.2	-0.6	0.8	2.7	3.3	3.5
	On 76 × 60 mm GND	-	-2.2	-1.4	1.1	2.7	3.4	3.5

VSWR	**On 116 × 60 mm GND**	≤ 4.8
	On 106 × 60 mm GND	≤ 5.2
	On 96 × 60 mm GND	≤ 5.8
	On 86 × 60 mm GND	≤ 6.6
	On 76 × 60 mm GND	≤ 7.0
Return Loss	**On 116 × 60 mm GND**	≤ -3.7 dB
	On 106 × 60 mm GND	≤ -3.4 dB
	On 96× 60 mm GND	≤ -3.0 dB
	On 86× 60 mm GND	≤ -2.7 dB

	On 76× 60 mm GND	≤ -2.5 dB
Peak Gain	**On 116 × 60 mm GND**	≤ 4.1 dBi
	On 106 × 60 mm GND	≤ 4.4 dBi
	On 96 × 60 mm GND	≤ 3.7 dBi
	On 86 × 60 mm GND	≤ 3.5 dBi
	On 76 × 60 mm GND	≤ 3.5 dBi

1.2. Supported Bands

5G NR / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / GPRS / GSM / NB-IoT				
Band	**Frequency (MHz)**	**Uplink (MHz)**	**Downlink (MHz)**	**Covered**
1	2100	1920–1980	2110–2170	√
2	1900	1850–1910	1930–1990	√
3	1800	1710–1785	1805–1880	√
4	1700	1710–1755	2110–2155	√
5	850	824–849	869–894	√
7	2600	2500–2570	2620–2690	√
8	900	880–915	925–960	√
9	1800	1749.9-1784.9	1844.9-1879.9	√
11	1500	1427.9–1447.9	1475.9–1495.9	-
12	700	699–716	729–746	√
13	700	777–787	746–756	√
14	700	788–798	758–768	√
17	700	704–716	734–746	√
18	850	815–830	860–875	√
19	850	830–845	875–890	√

20	800	832–862	791–821	√
21	1500	1447.9–1462.9	1495.9–1510.9	-
22	3500	3410–3490	3510–3590	-
23	2100	2000–2020	2180–2200	√
24	1600	1626.5–1660.5	1525–1559	-
25	1900	1850–1915	1930–1995	√
26	850	814–849	859–894	√
28	700	703–748	758–803	√
31	450	452.5–457.5	462.5–467.5	-
34	2100	2010–2025		√
38	2600	2570–2620		√
39	1900	1880–1920		√
40	2300	2300–2400		√
41	2500	2496–2690		√
42	3500	3400–3600		-
48	3500	3550–3700		-
66	1700	1710–1780	2110–2200	√
71	600	663–698	617–652	-
74	1500	1427–1470	1475–1518	-
77	3500	3300–4200		-
78	3500	3300–3800		-
79	4500	4400–5000		-

Note:

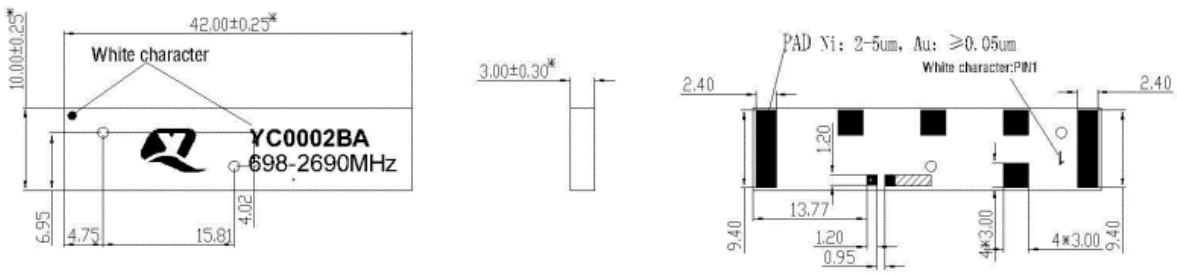
- Based on 116 mm × 60 mm GND.

1.3. Mechanical & Environmental

Mechanical	
Antenna Size	42 mm × 10 mm × 3 mm
Antenna Material & Color	FR4 & Black
Antenna Weight	Typ. 1 g
Mounting Type	SMD
Recommended EVB Size	131 mm × 60 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

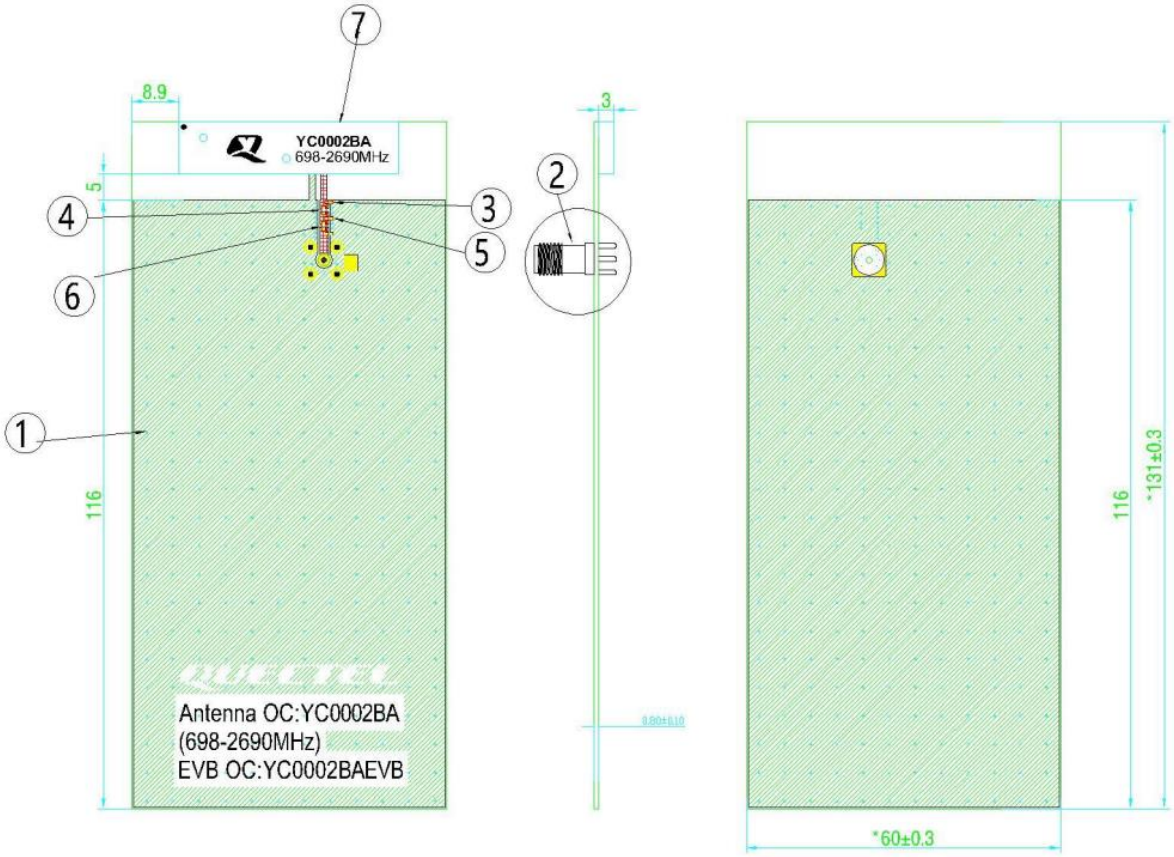
2 Drawing

2.1. Antenna



All dimensions in (mm)

2.2. EVB

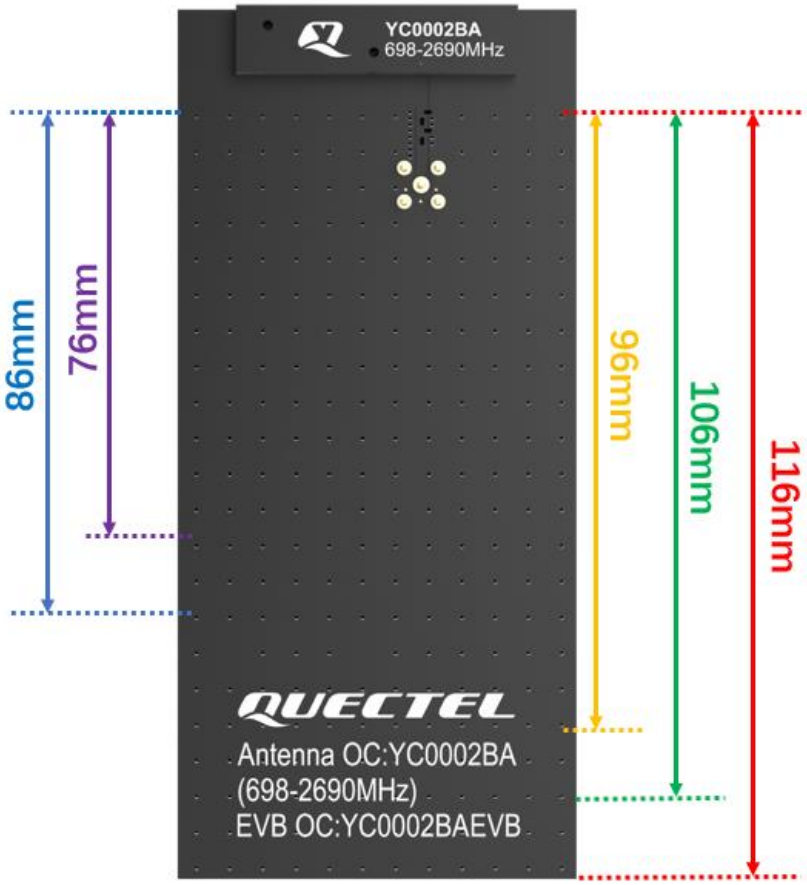


All dimensions in (mm)

3 Detailed Performance

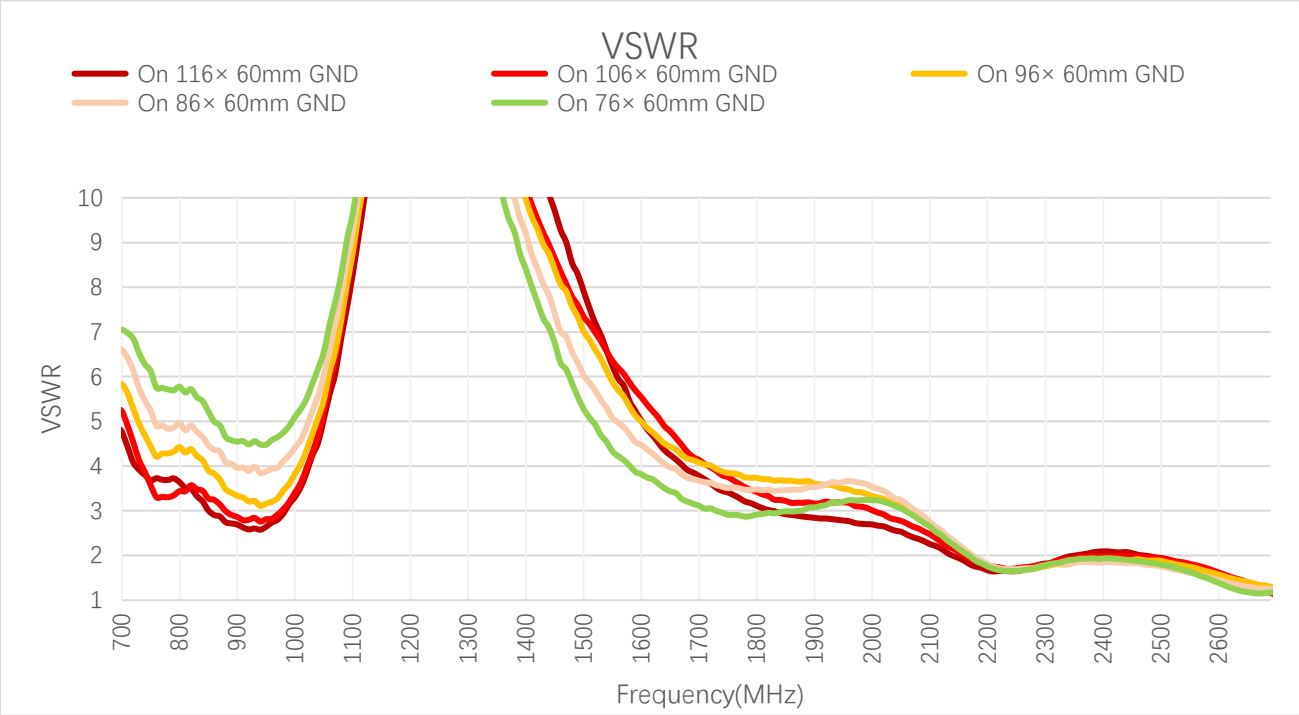
3.1. Overview

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. As shown below you can see the effect of the GND plane length vs the efficiency.



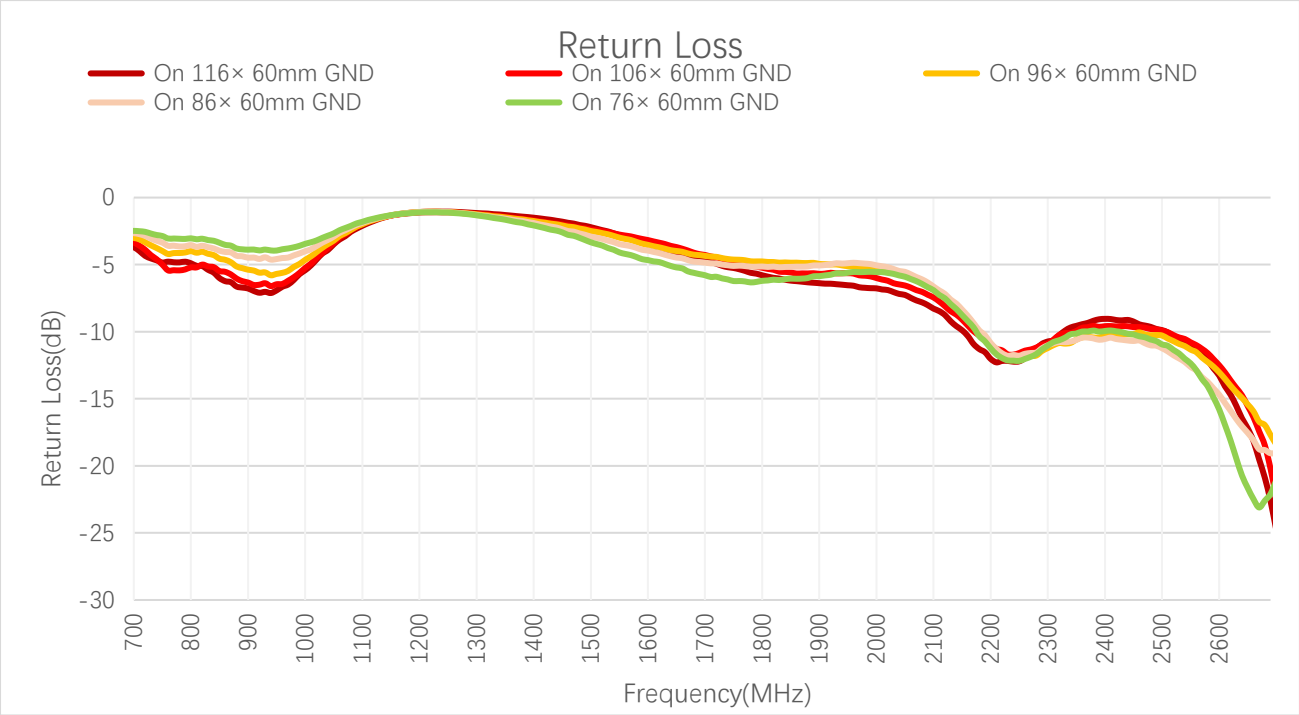
3.2. S-Parameter Test

3.2.1. VSWR



Frequency (MHz)	710	830	900	1740	1880	1950	2140	2450	2600	2690
On 116 × 60 mm GND	4.4	3.3	2.7	3.4	2.9	2.8	2.0	2.1	1.6	1.2
On 106 × 60 mm GND	4.9	3.5	2.9	3.8	3.2	3.2	2.2	2.0	1.6	1.2
On 96 × 60 mm GND	5.6	4.2	3.3	3.9	3.7	3.5	2.3	1.9	1.6	1.3
On 86 × 60 mm GND	6.4	4.8	4.0	3.5	3.5	3.6	2.3	1.8	1.5	1.3
On 76 × 60 mm GND	7.0	5.5	4.5	3.0	3.0	3.2	2.2	1.9	1.4	1.2

3.2.2. Return Loss

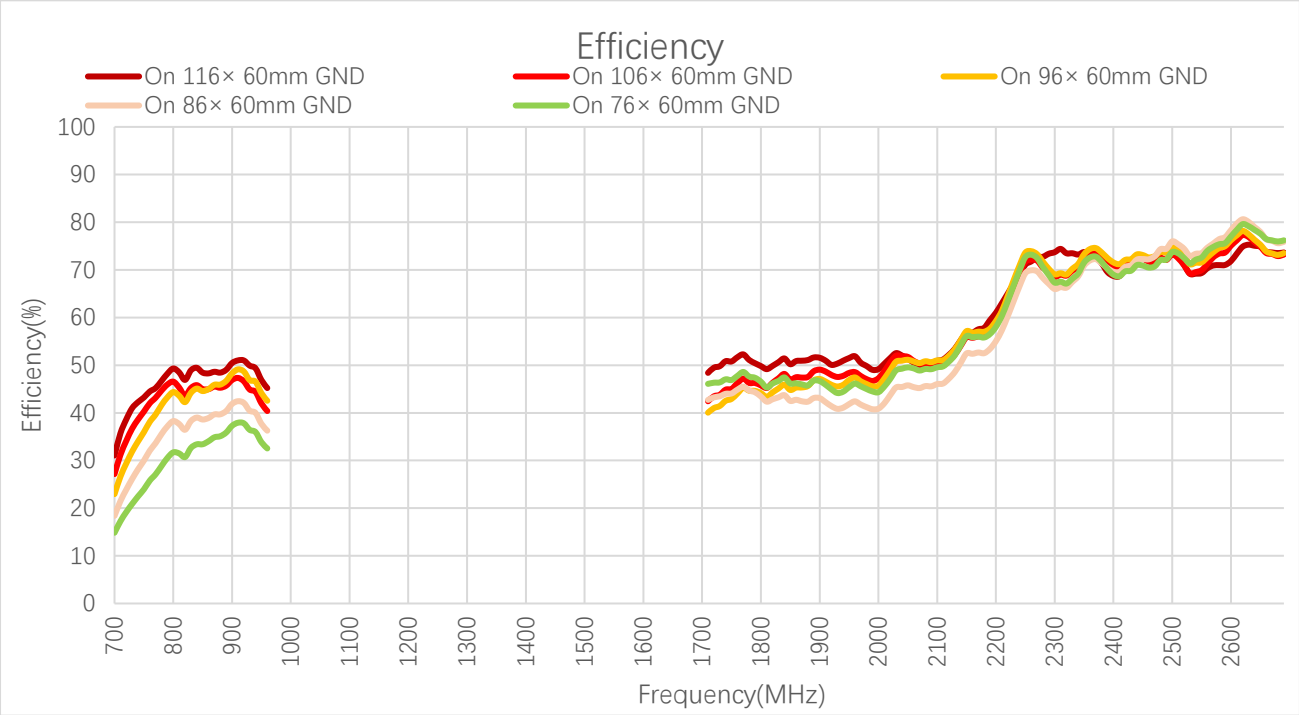


Return Loss (dB)

Frequency (MHz)	710	830	900	1740	1880	1950	2140	2450	2600	2690
On 116 × 60mm GND	-4.0	-5.4	-6.8	-5.2	-6.3	-6.5	-9.6	-9.2	-13.3	-22.6
On 106 × 60 mm GND	-3.6	-5.1	-6.3	-4.7	-5.7	-5.6	-8.7	-9.7	-12.5	-20.2
On 96 × 60 mm GND	-3.1	-4.2	-5.4	-4.6	-4.9	-5.1	-8.2	-10.2	-13.0	-17.7
On 86 × 60 mm GND	-2.7	-3.7	-4.5	-5.0	-5.1	-4.9	-7.9	-10.7	-14.7	-19.1
On 76 × 60 mm GND	-2.5	-3.2	-3.9	-6.1	-6.0	-5.6	-8.3	-10.2	-15.8	-22.1

3.3. Radiation Performance Test

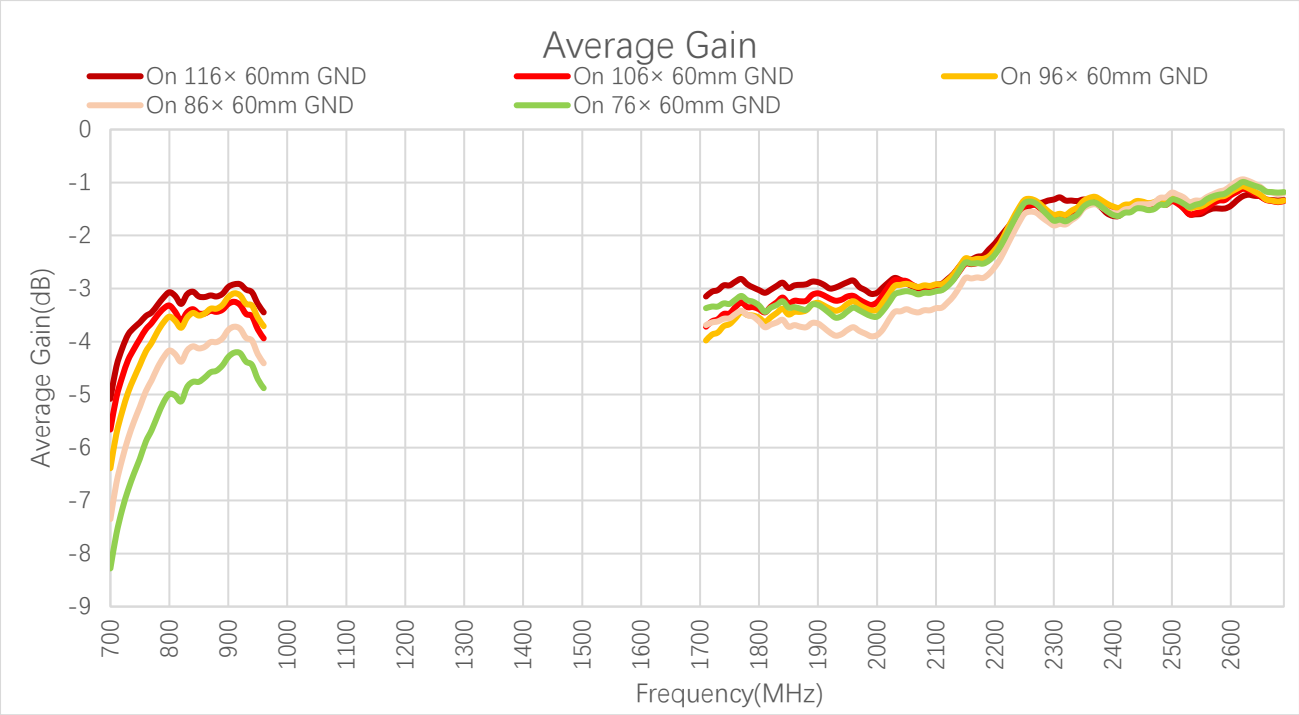
3.3.1. Efficiency



Efficiency (%)

Frequency (MHz)	710	830	900	1740	1880	1950	2140	2450	2600	2690
On 116 × 60 mm GND	35.7	48.9	50.5	50.8	51.1	51.5	55.2	72.8	71.9	73.7
On 106 × 60 mm GND	31.2	45.2	46.9	44.9	47.5	48.4	54.1	72.4	75.1	73.2
On 96 × 60 mm GND	26.6	44.2	48.3	42.5	45.6	46.9	55.3	73.1	76.2	73.5
On 86 × 60 mm GND	21.5	38.3	41.9	44.0	42.4	41.8	50.5	72.3	78.3	75.9
On 76 × 60 mm GND	17.2	32.6	37.3	47.0	45.8	45.4	54.2	70.9	77.0	76.2

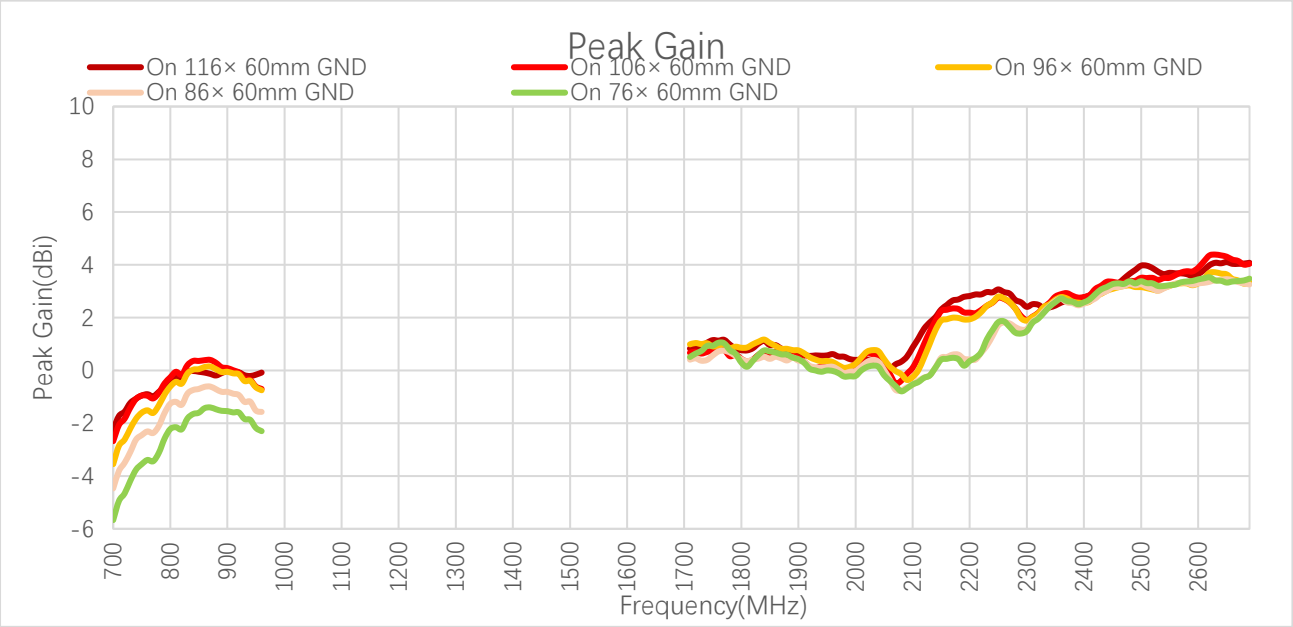
3.3.2. Average Gain



Average Gain (dB)

Frequency (MHz)	710	830	900	1740	1880	1950	2140	2450	2600	2690
On 116 × 60 mm GND	-4.5	-3.1	-3.0	-2.9	-2.9	-2.9	-2.6	-1.4	-1.4	-1.3
On 106 × 60 mm GND	-5.1	-3.5	-3.3	-3.5	-3.2	-3.2	-2.7	-1.4	-1.2	-1.4
On 96 × 60 mm GND	-5.8	-3.6	-3.2	-3.7	-3.4	-3.3	-2.6	-1.4	-1.2	-1.3
On 86 × 60 mm GND	-6.7	-4.2	-3.8	-3.6	-3.7	-3.8	-3.0	-1.4	-1.1	-1.2
On 76 × 60 mm GND	-7.6	-4.9	-4.3	-3.3	-3.4	-3.4	-2.7	-1.5	-1.1	-1.2

3.3.3. Peak Gain

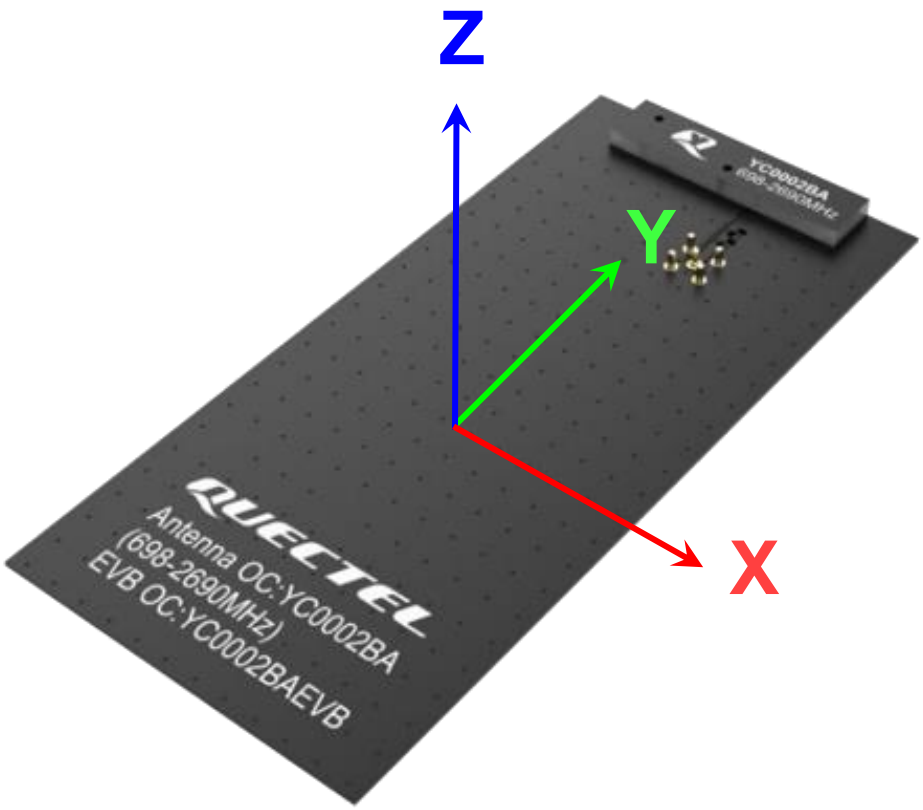


Peak Gain (dBi)

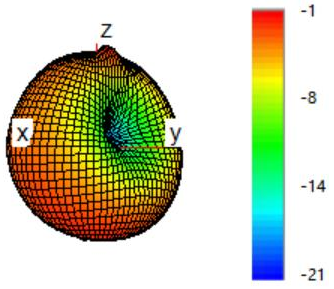
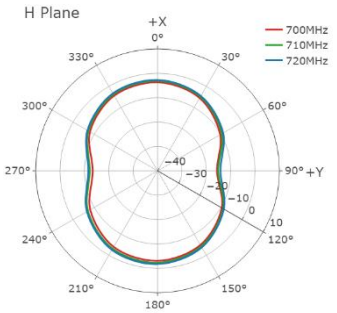
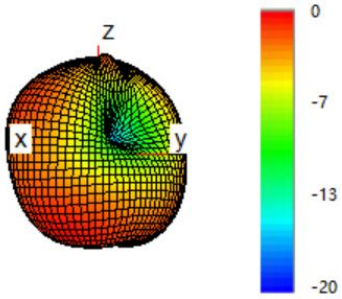
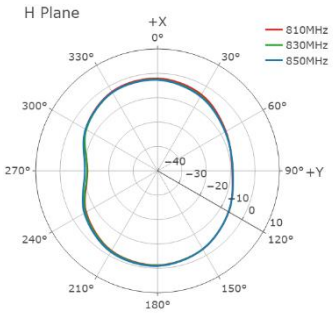
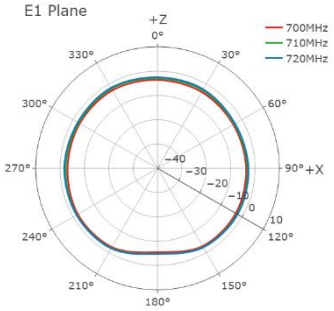
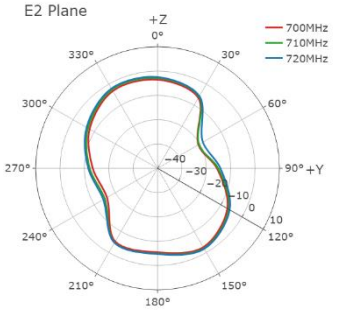
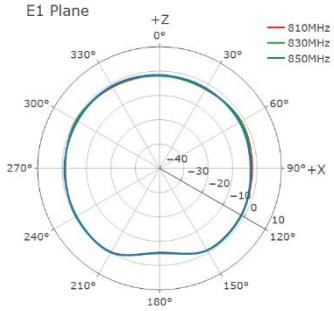
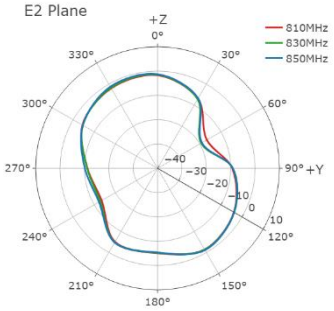
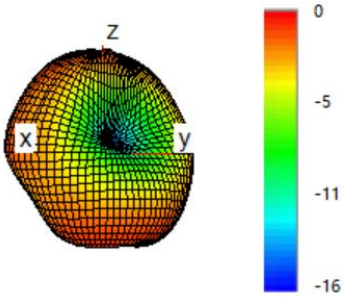
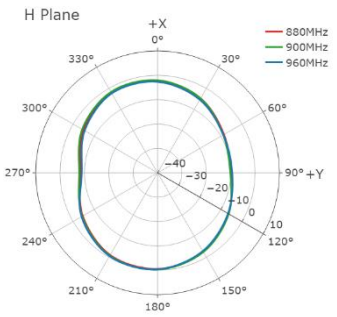
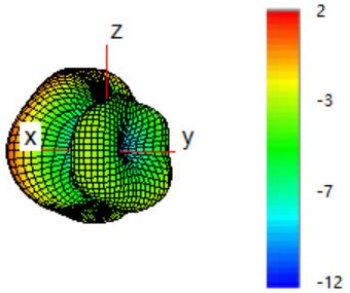
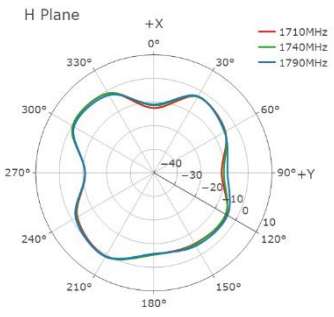
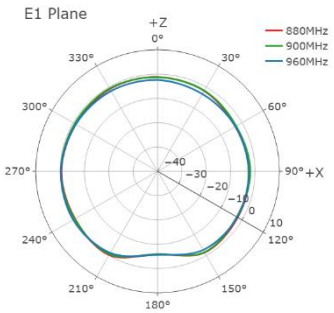
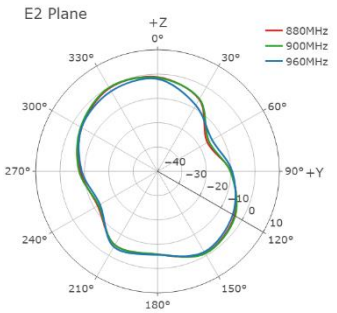
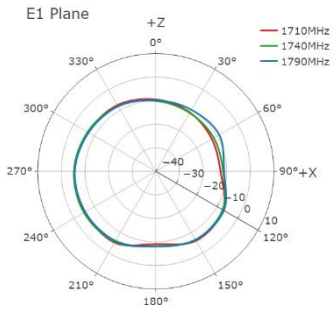
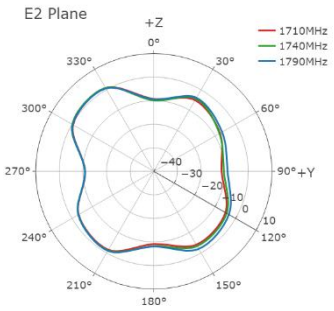
Frequency (MHz)	710	830	900	1740	1880	1950	2140	2450	2600	2690
On 116 × 60 mm GND	-1.7	-0.1	0.0	1.1	0.8	0.6	2.0	3.2	3.7	4.1
On 106 × 60 mm GND	-2.1	0.2	0.1	0.7	0.5	0.1	1.9	3.4	3.9	4.0
On 96 × 60 mm GND	-2.9	-0.1	-0.1	1.0	0.8	0.4	1.5	3.1	3.3	3.3
On 86 × 60 mm GND	-3.8	-0.9	-0.8	0.4	0.4	0.1	0.1	3.2	3.3	3.3
On 76 × 60 mm GND	-5.0	-1.8	-1.5	0.9	0.6	0.0	0.1	3.3	3.5	3.5

3.3.4. 3D & 2D Radiation Pattern

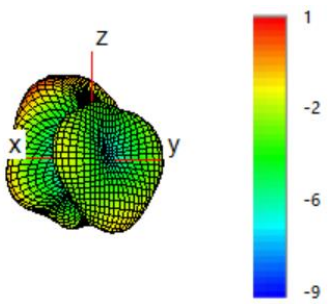
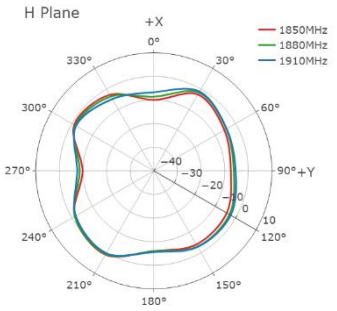
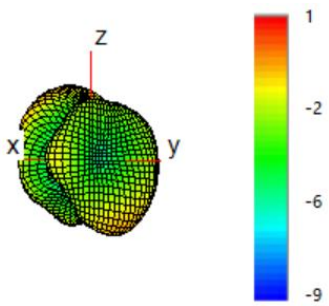
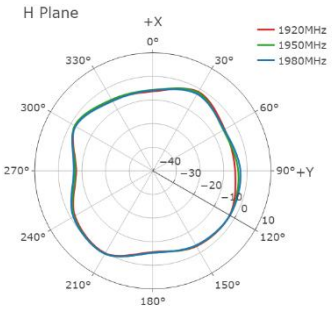
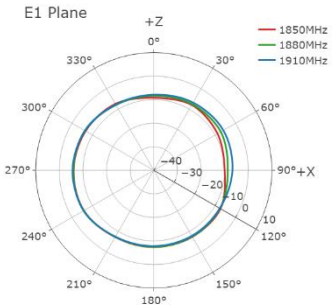
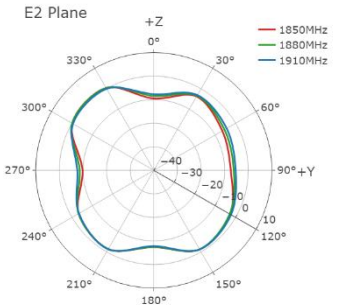
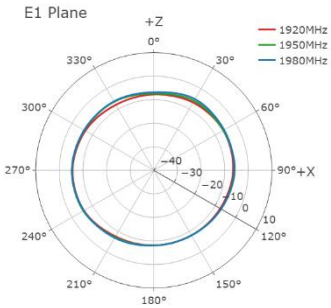
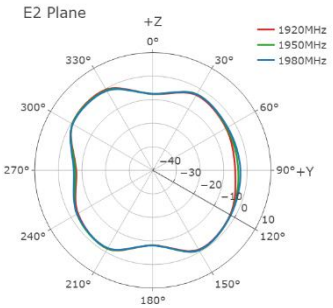
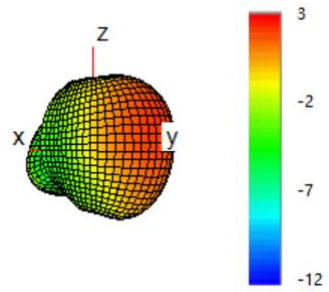
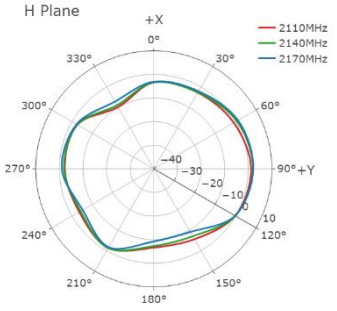
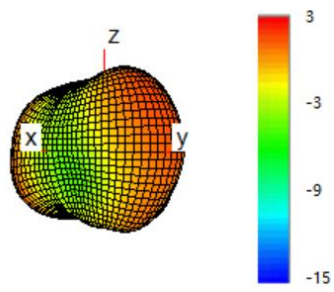
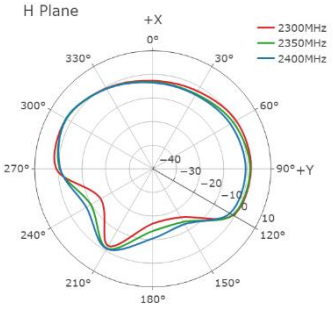
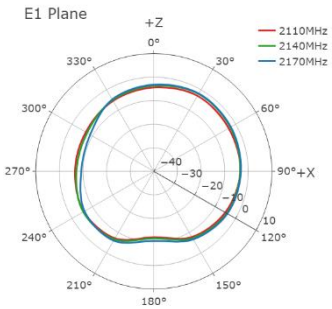
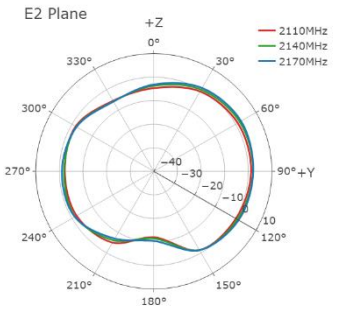
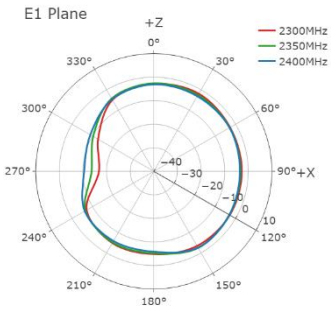
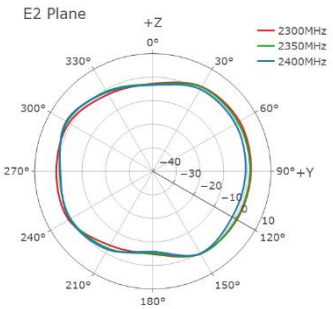
- Test Status: Assembled on 116 mm × 60 mm GND



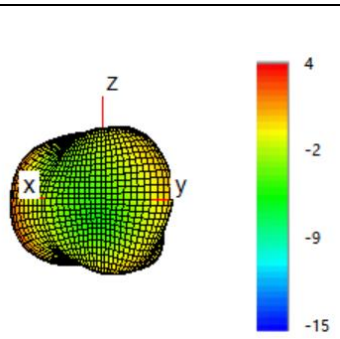
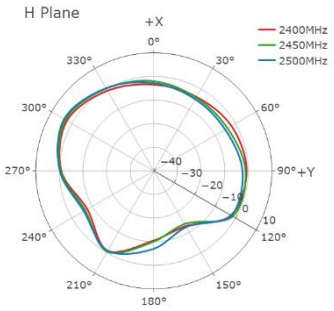
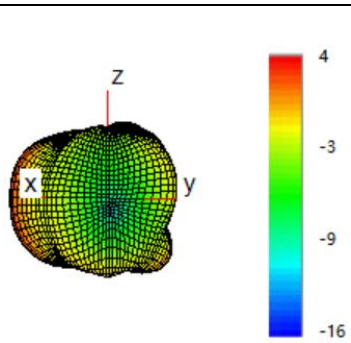
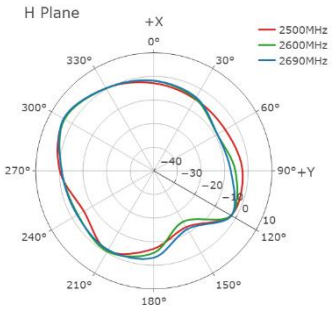
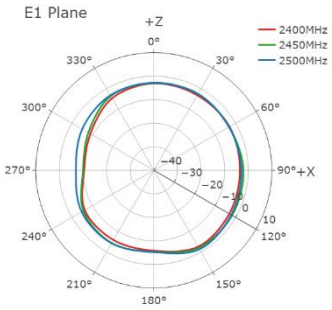
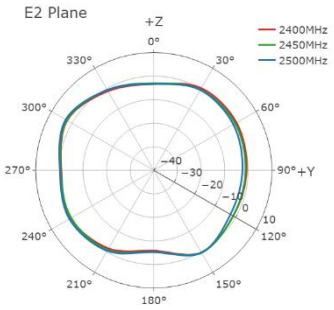
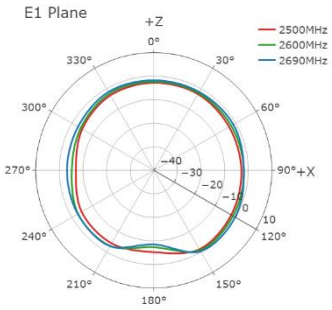
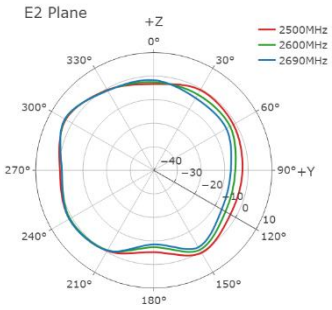
- **4G**

710 MHz		830 MHz	
			
			
900 MHz		1740 MHz	
			
			

- **4G**

1880 MHz		1950 MHz	
			
			
2140 MHz		2350 MHz	
			
			

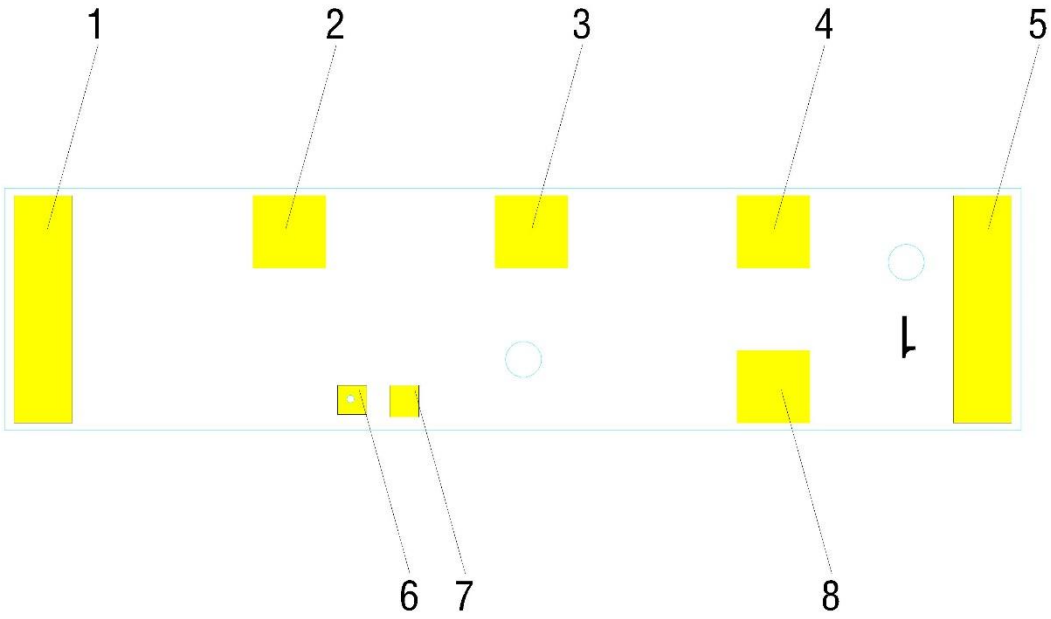
- **4G**

2450 MHz		2600 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 two of which work. All other pins are for mechanical strength.

Pin	Description
6	Feed
1, 2 3, 4, 5, 8	Not used (Mechanical only)
7	GND



5 Transmission Line

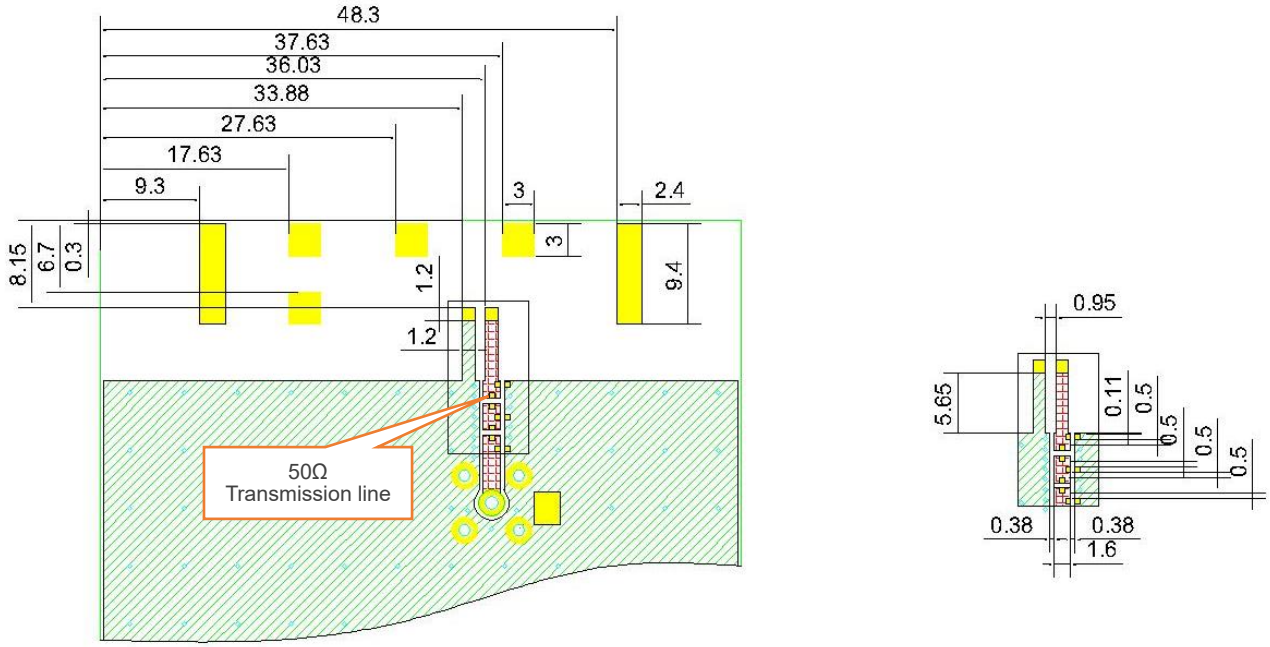
The characteristic impedance of all transmission lines shall be designed as 50 Ω.

- 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.

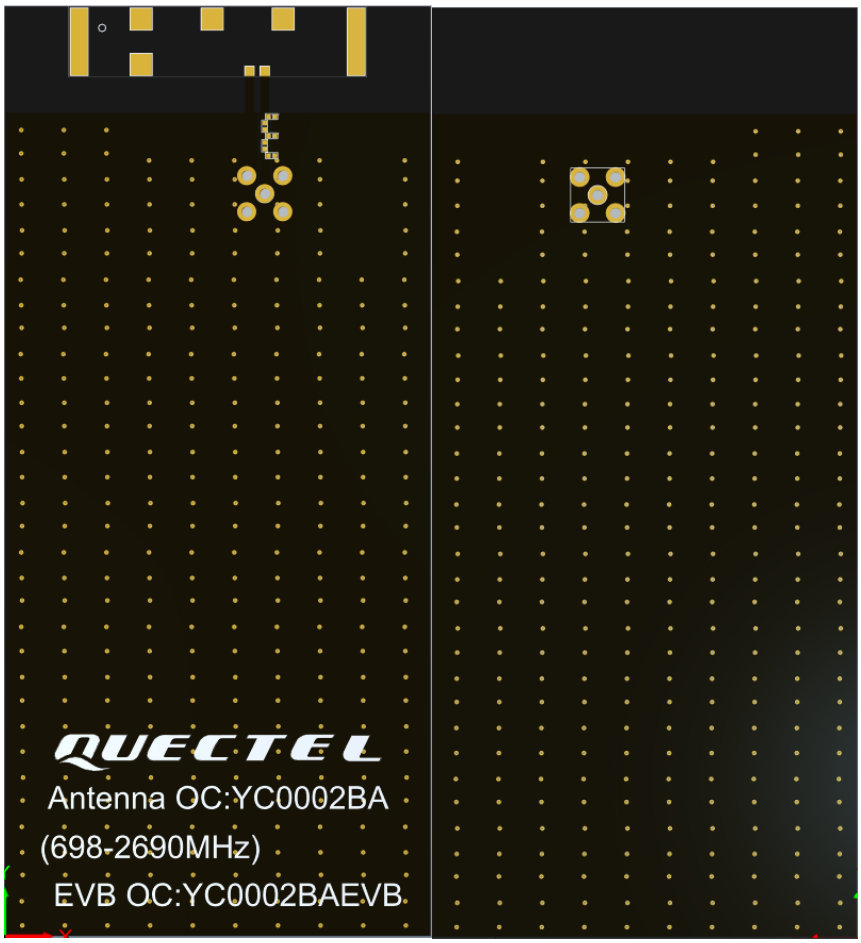
6 Recommended PCB Layout

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

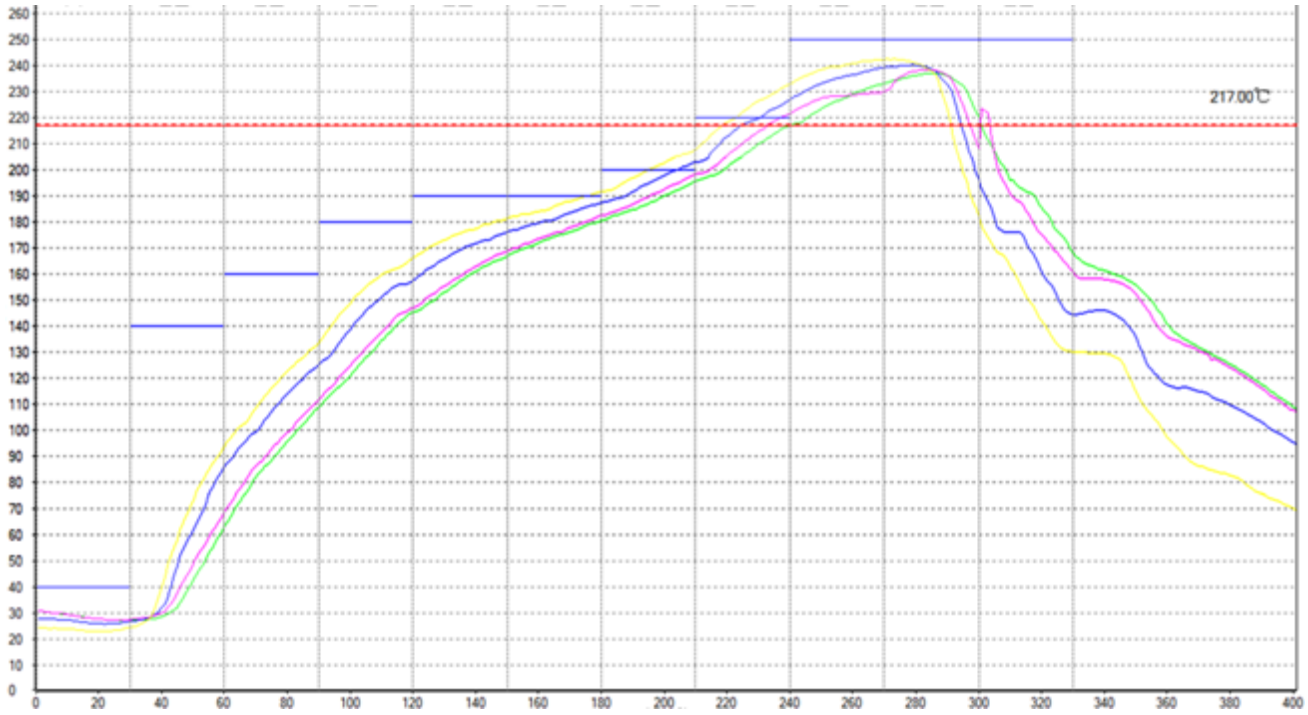


	P1	S1	P2	S2	P3
Default Matching	9.1 nH	8.2 pF	0.75 pF	2.7 nH	NC
Tolerance	±5 %	±5 %	±5 %	±5 %	N/A

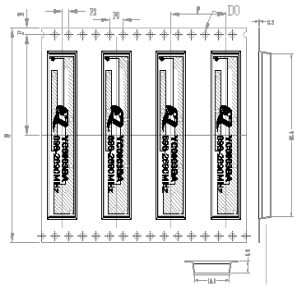
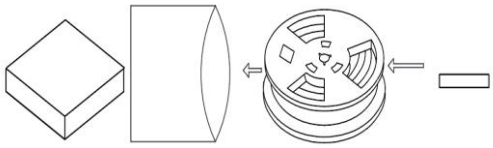
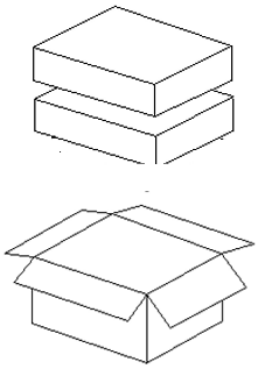
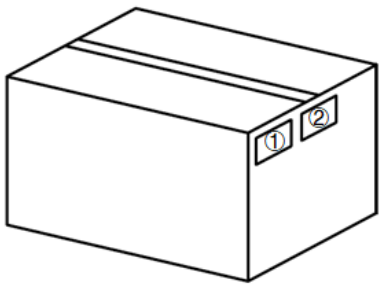
8 Soldering Temperature

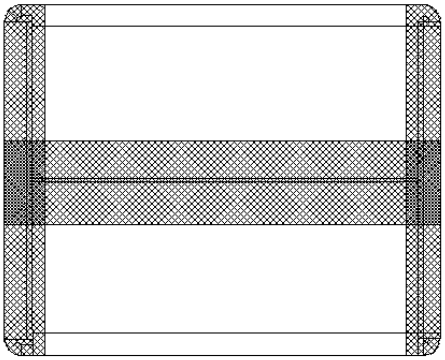
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second (Max.)
PREHEAT	Temperature Min (Tsmin) Temperature Max (Tsmax) Time (tsmin to tsmax)	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature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

9 Reflow Profile



10 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Reel
2		(1600 PCS Antenna Products / Reel) The reel tape is vacuum-sealed within the inner box.
3		(2 Inner Boxes / Carton Box) (3200 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 × W × H = 430 × 430 × 165 mm
4		**Position for Attaching Labels** ① Carton Label ② Quality Label

5		**Sealing Cartons** H-shaped sealing cartons

Contact Us

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Revision History

Version	Date	Author	Note
-	2022-09-22	Kane LIU/ Joye WANG	Creation of the document
1.0	2022-09-22	Kane LIU/ Joye WANG	First official release
1.1	2023-04-20	Joye WANG	Added drawings in Chapters 5 and 6.
2.0	2023-09-27	Kane LIU/ Joye WANG/ David LIU/ Vinnie LIU	Updated the templates.
2.1	2023-11-21	Kane LIU/ Joye WANG/ David LIU/ Vinnie LIU	Updated matching circuit (Chapter 7).
2.2	2024-04-09	David LIU/ Vinnie LIU	Updated the packaging (Chapter 10).
2.3	2025-03-11	Rainey LIAO	1. Updated the starting frequency to 698 MHz (Homepage and Chapter 1.1). 2. Deleted the note about the efficiency (Chapter 1.2).

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