



Antenna Datasheet

Product OC (Antenna Only): YMCP001AA

Product OC (Antenna + Rectangular EVB): YMCP001AAEVBAA

Product OC (Antenna + Circular EVB): YMCP001AAEVBBA

Version: 1.2

Date: 2024-06-07

Status: Released

Product Name: 4G LTE Metal Antenna with Stand

Key Features:

Frequency band: 698–960 MHz, 1710–2700 MHz

Efficiency: Up to 72.6 %

Dimensions: 43.19 × 12.73 × 8.15 mm

RoHS & REACH Compliant

Overview

This wideband LTE/cellular/CDMA metal antenna is suitable for 4G/3G/2G applications. Operating at 698–960 MHz, 1710–2200 MHz and 2300–2700 MHz, it's a high-efficiency antenna which is mounted to the host PCB using screwing and soldering method. Ideal for all 4G/LTE applications, it also supports worldwide Cat M and NB-IoT frequency bands too. Supplied on tape and reel for high-volume applications, it is compatible with all Quectel's 4G/3G/2G including LPWA modules. We provide comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

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1 Specification

Test Condition: Assembled On EVB

1.1. Electrical

Electrical	
Frequency Range	698–960 MHz, 1710–2700 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail									
SPEC	Band		B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41
	Freq. (MHz)		600– 698	700– 790	790– 960	1700– 2170	2300– 2400	2400– 2500	2500– 2690
Max VSWR	On 145 × 75 mm EVB		-	8.6	6.1	3.6	2.3	1.8	1.6
	On Φ 85 mm EVB		-	20.9	6.1	2.8	3.6	3.9	4.1
Max Return Loss (dB)	On 145 × 75 mm EVB		-	-2.0	-2.9	-5.0	-7.9	-10.6	-12.4
	On Φ 85 mm EVB		-	-0.8	-2.9	-6.5	-5.0	-4.5	-4.4
AVG Eff. (%)	On 145 × 75 mm EVB		-	27.9	36.1	53.2	59.2	68.2	67.1
	On Φ 85 mm EVB		-	10.8	35.9	52.0	45.4	49.2	38.3
AVG Gain (dB)	On 145 × 75 mm EVB		-	-3.3	-3.0	-2.2	-2.1	-1.4	-1.4
	On Φ 85 mm EVB		-	-6.7	-3.8	-2.4	-3.0	-2.9	-3.6

Max Peak Gain (dBi)	On 145 × 75 mm EVB	-	-3.1	-1.9	0.5	0.6	2.0	1.9
	On Φ 85 mm EVB	-	-7.9	-1.7	0.2	-0.4	1.1	-0.3
VSWR	On 145 × 75 mm EVB				≤ 8.6			
	On Φ 85 mm EVB				≤ 20.9			
Return Loss	On 145 × 75 mm EVB				≤ -2.0 dB			
	On Φ 85 mm EVB				≤ -0.8 dB			
Peak Gain	On 145 × 75 mm EVB				≤ 2.2 dBi			
	On Φ 85 mm EVB				≤ 1.4 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:

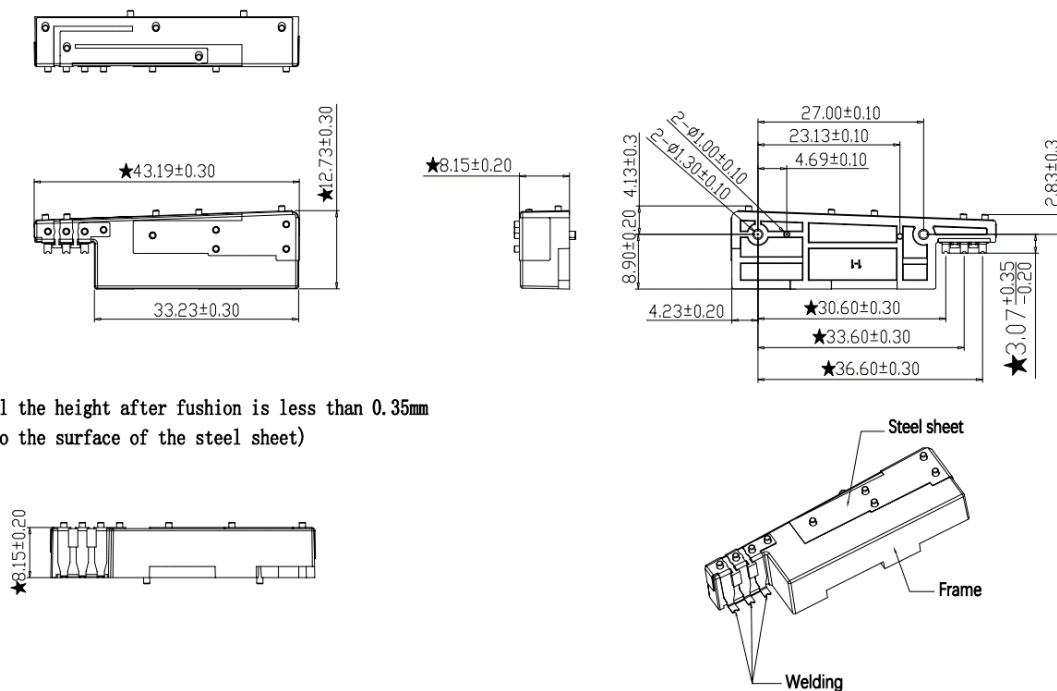
- Covered √ means efficiency > 10%.
- Based on 145 × 75 mm GND.

1.3. Mechanical & Environmental

Mechanical	
Antenna Size	43.19 × 12.73 × 8.15 mm
Material & Color	Stainless Steel, Nickel-plated Surface & Natural
Antenna Weight	Typ. 2.8 g
Mounting Type	Screw
Recommended EVB Size	Rectangular EVB: 145 × 75 mm
	Circular EVB: Φ 85 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

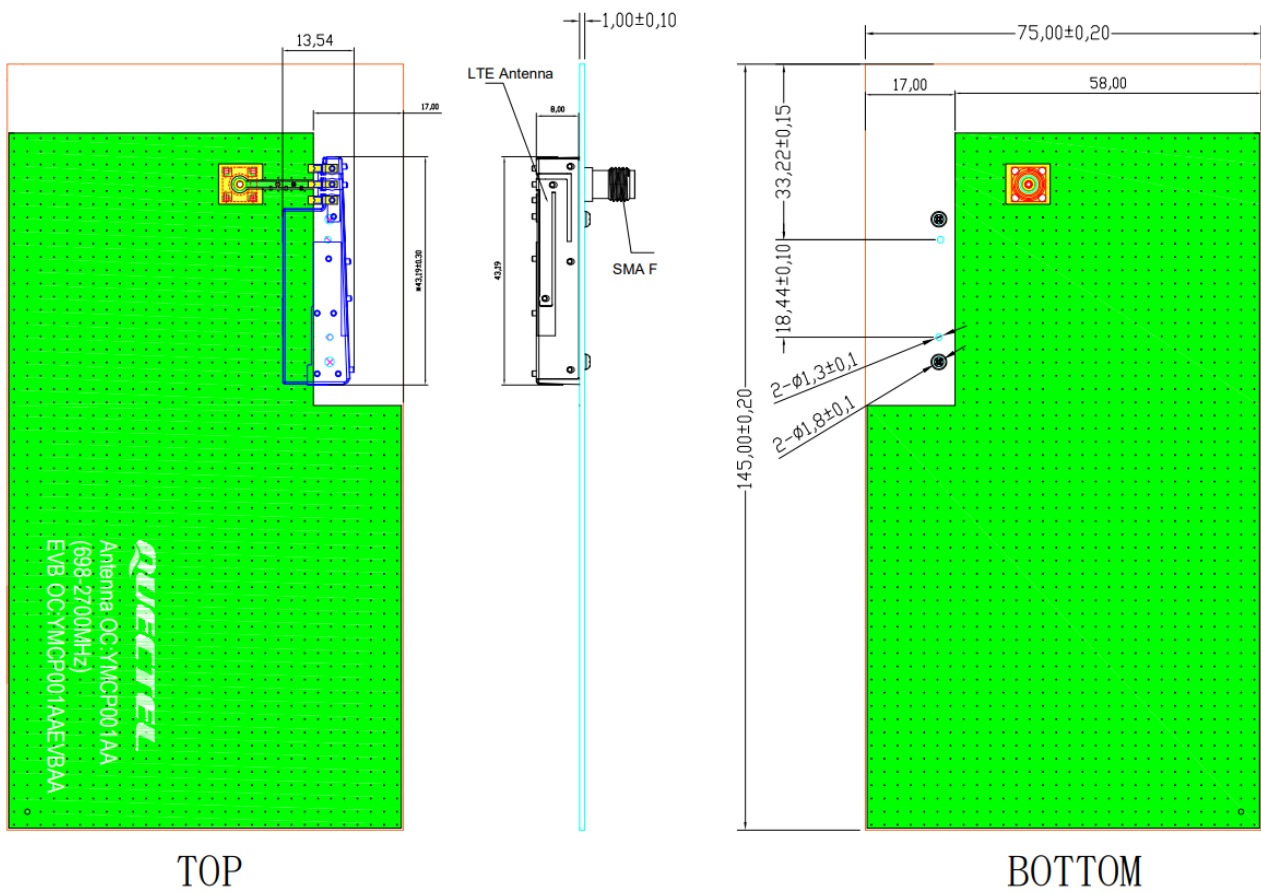


All the height after fushion is less than 0.35mm
(To the surface of the steel sheet)

All dimensions are in mm

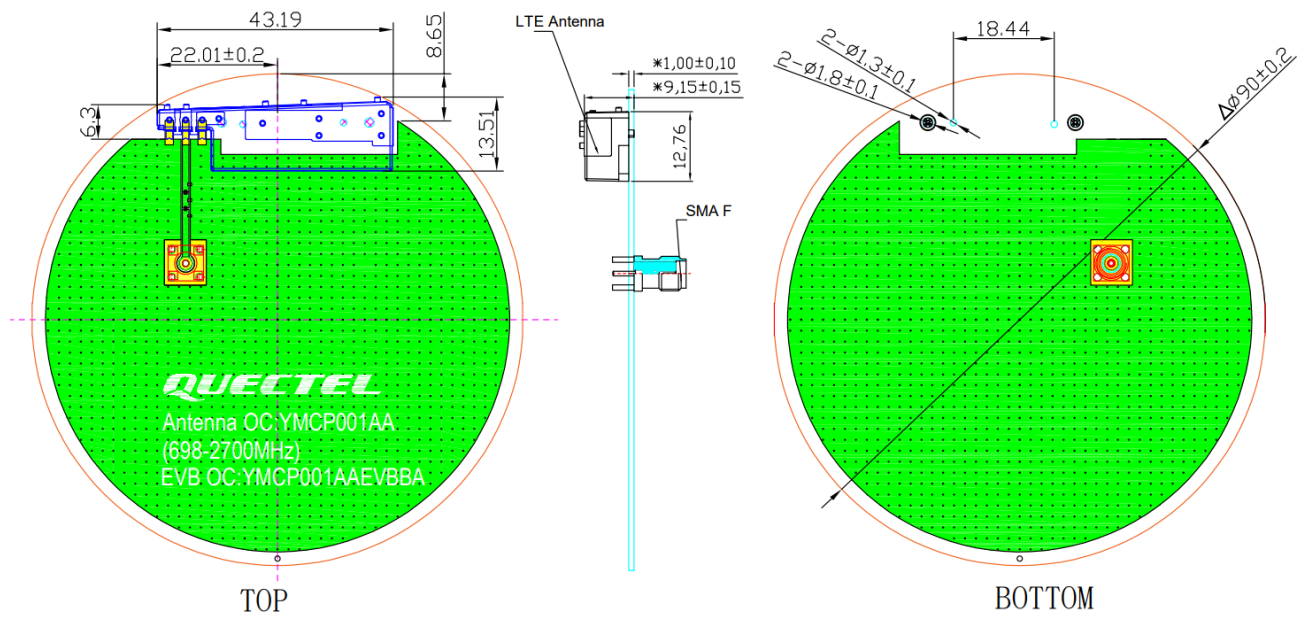
	Name	Material	Brand	QTY	Model
1	Antenna	Stainless Steel, Nickel-plated Surface	Quectel	1	YMCP001AA
2	PCB	FR4 1.0t	Quectel	1	YMCP001AAEVBA
3	Bracket	PC	Quectel	1	YMCP001AABracket
4	12nH	Ceramics	Murata	1	-
5	10pF	Ceramics	Murata	1	-
6	0 Ω	Ceramics	Murata	1	-
7	SMA Female Connector	Brass	Quectel	1	-

2.2. Rectangular EVB



All dimensions are in mm.

2.3. Circular EVB

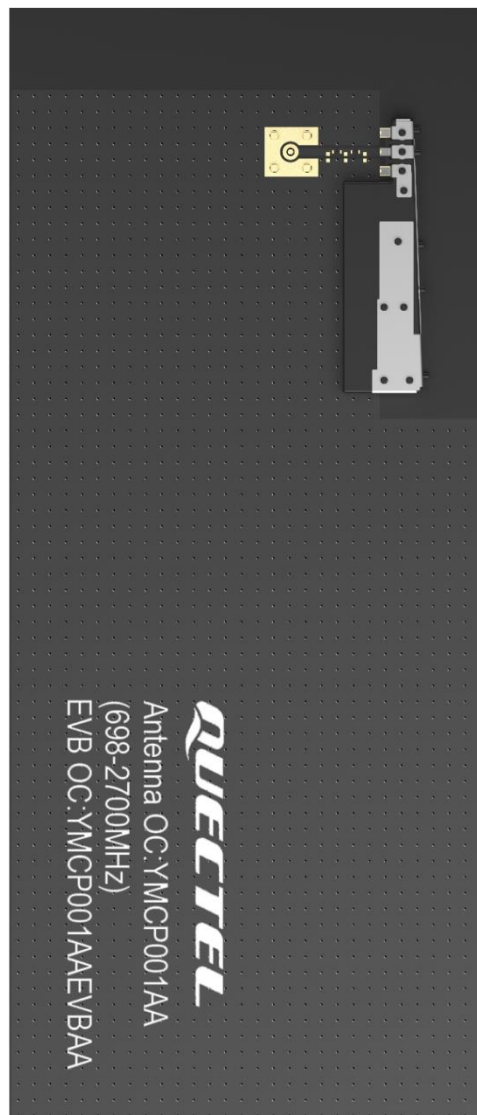


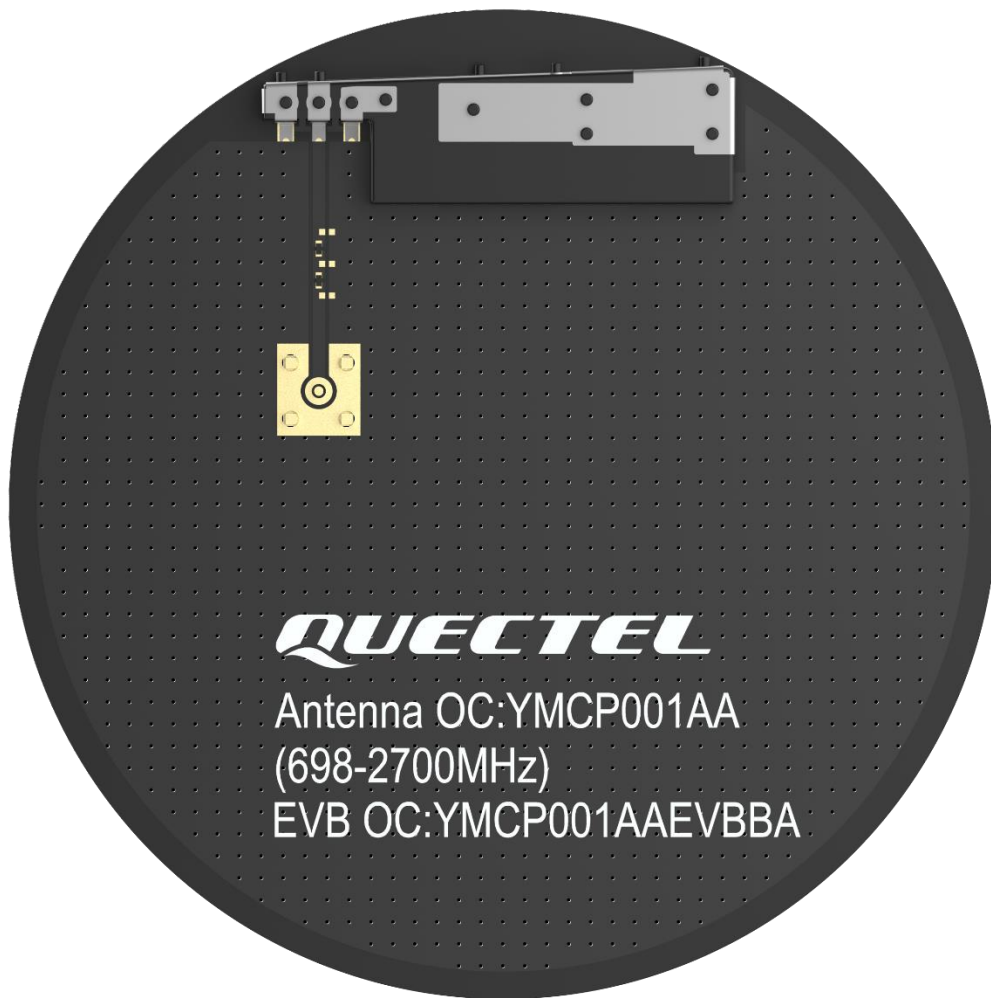
All dimensions are in mm.

3 Detailed Performance

3.1. GND Length Dimensions Overview

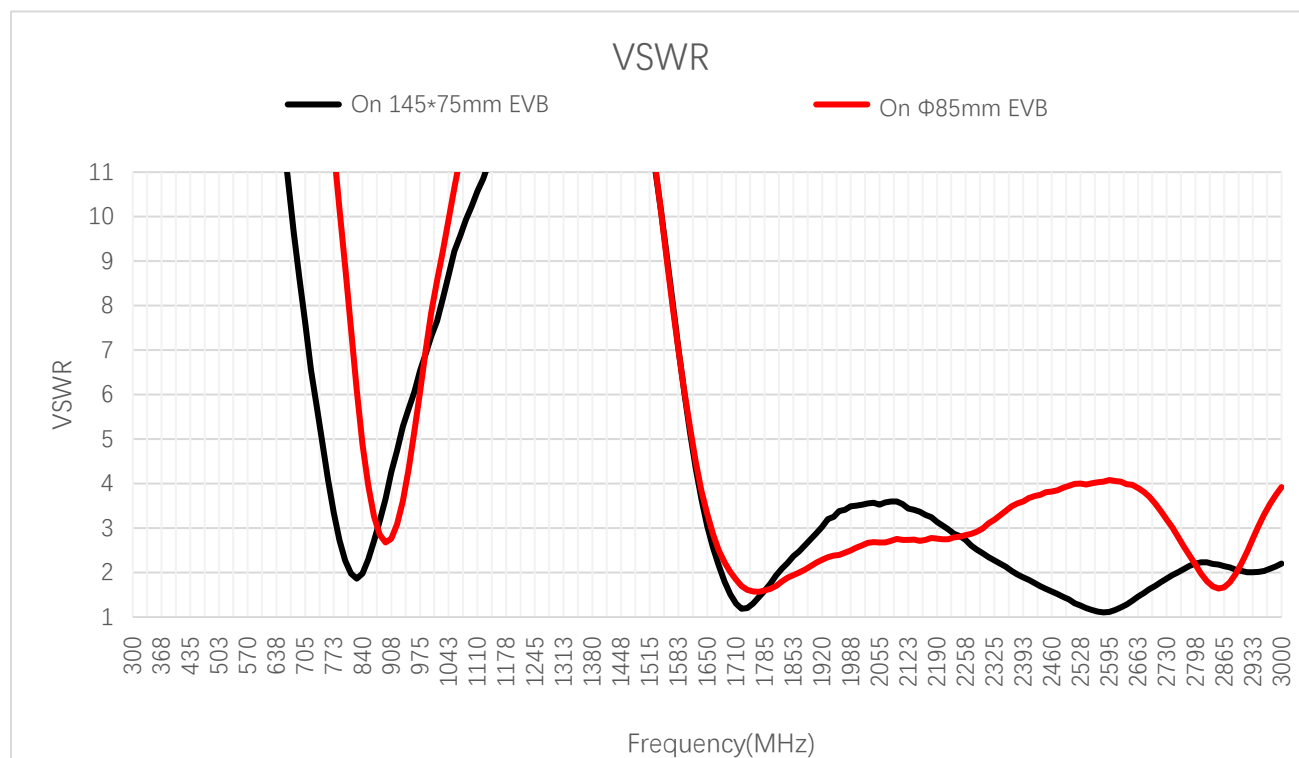
The performance of the low bands is highly dependent on the ground plane length. The host PCB ground needs to be as long as the device allows. Reducing the GND directly relates to the performance of the low bands. As shown below you can see the effect of the different shapes vs the efficiency.





3.2. S-Parameter Test

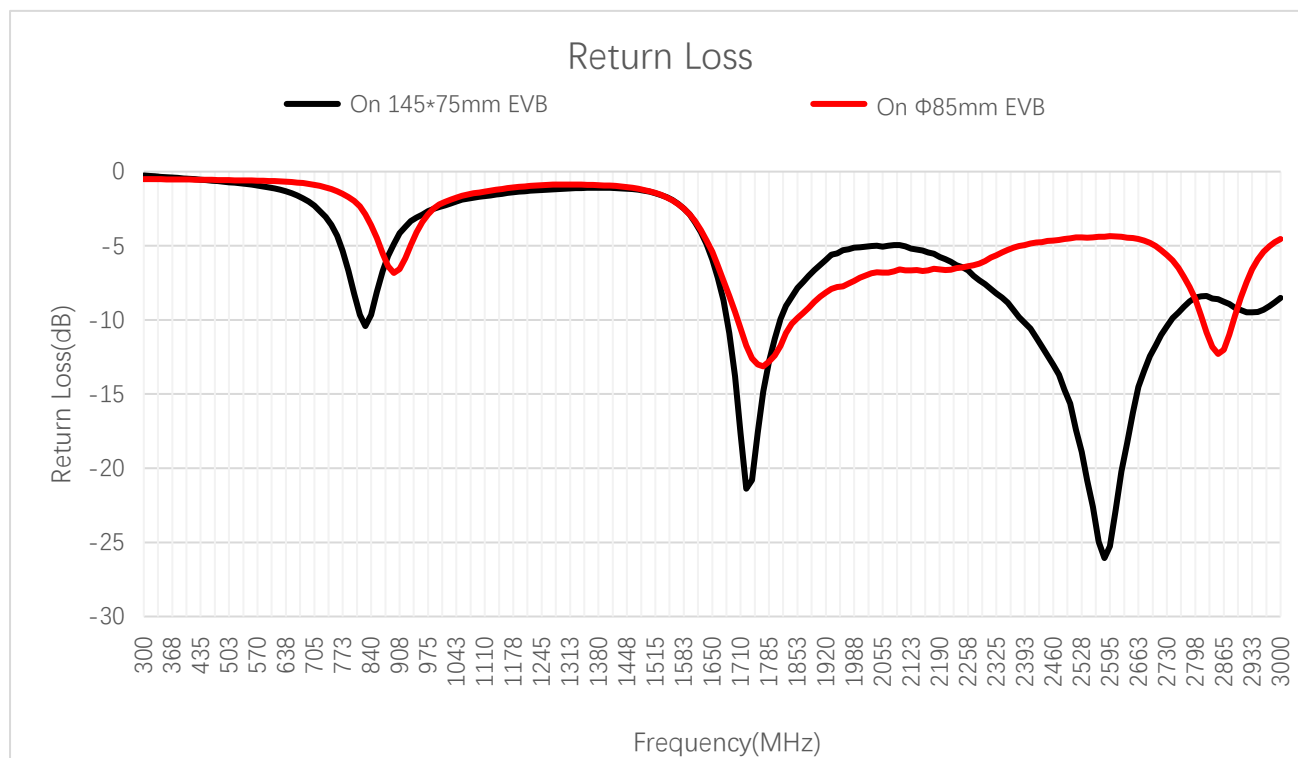
3.2.1. VSWR



VSWR

Frequency (MHz)	698	824	920	960	1710	1950	2170	2450	2570	2690
On 145 × 75 mm EVB	8.6	1.9	4.7	6.1	1.3	3.3	3.2	1.6	1.1	1.6
On Φ 85 mm EVB	20.9	6.1	3.1	5.2	1.8	2.4	2.8	3.8	4.0	3.7

3.2.2. Return Loss

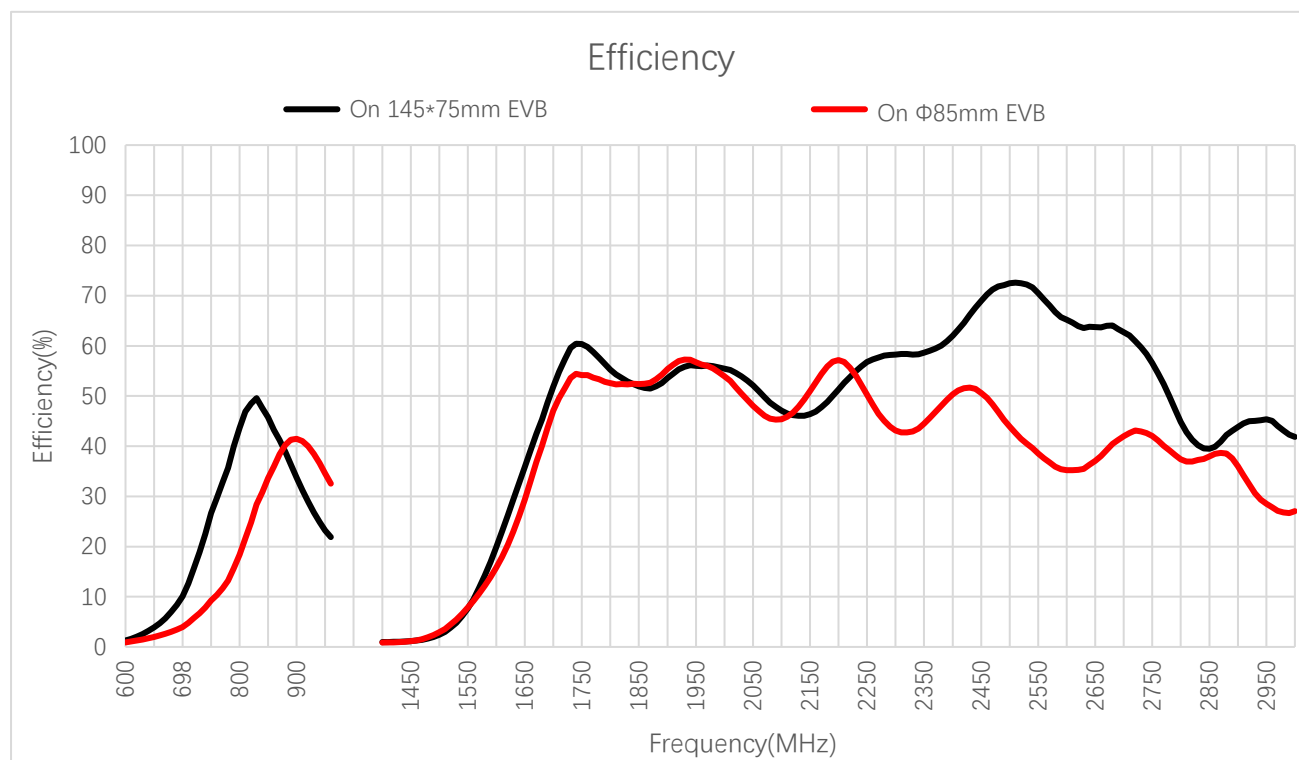


Return Loss (dB)

Frequency (MHz)	698	824	920	960	1710	1950	2170	2450	2570	2690
On 145 × 75 mm EVB	-2.0	-10.4	-3.7	-2.9	-17.6	-5.5	-5.5	-12.4	-25.0	-12.4
On Φ 85 mm EVB	-0.8	-2.9	-5.8	-3.4	-10.6	-7.8	-6.5	-4.7	-4.4	-4.8

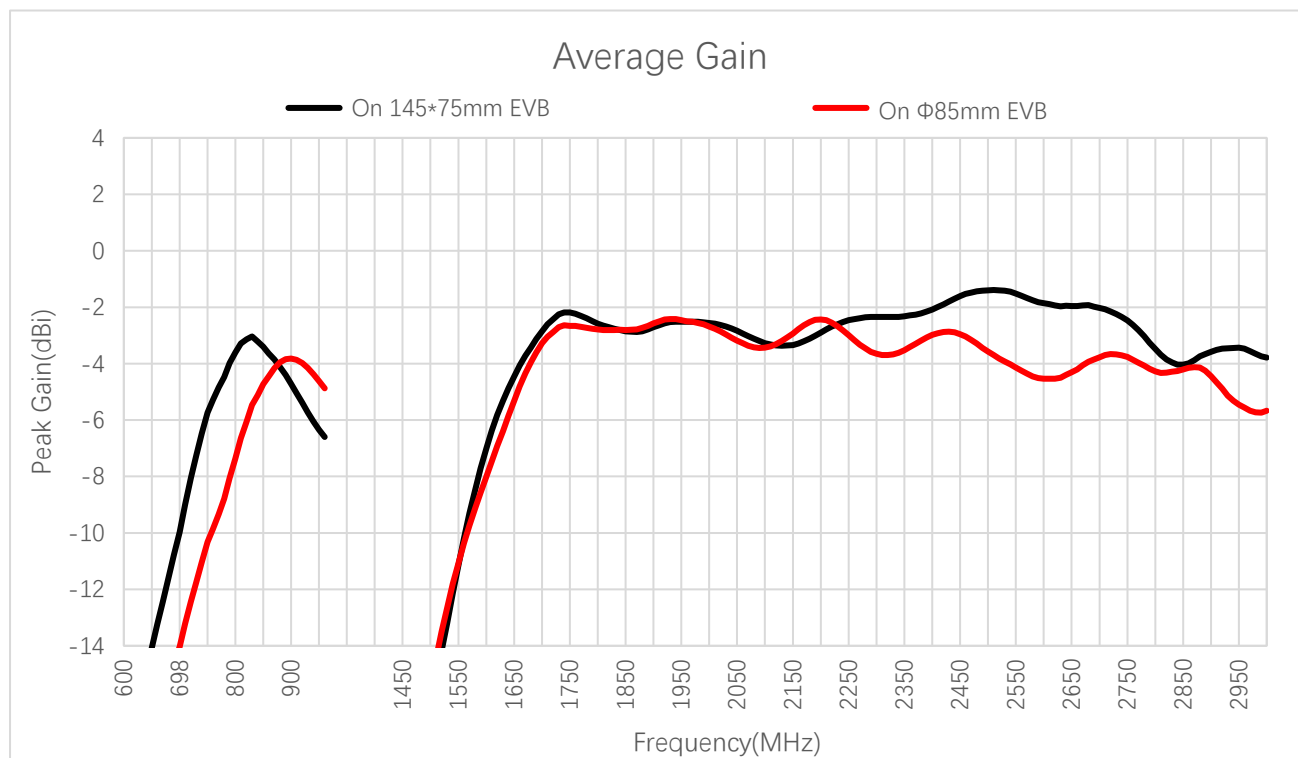
3.3. Radiation Performance Test

3.3.1. Efficiency



Efficiency (%)										
Frequency (MHz)	698	824	920	960	1710	1950	2170	2450	2570	2690
On 145 × 75 mm EVB	10.1	48.5	28.9	21.9	54.8	56.0	47.8	69.0	68.0	63.3
On Φ 85 mm EVB	4.0	24.8	40.0	32.5	49.6	56.7	54.4	50.6	36.7	41.2

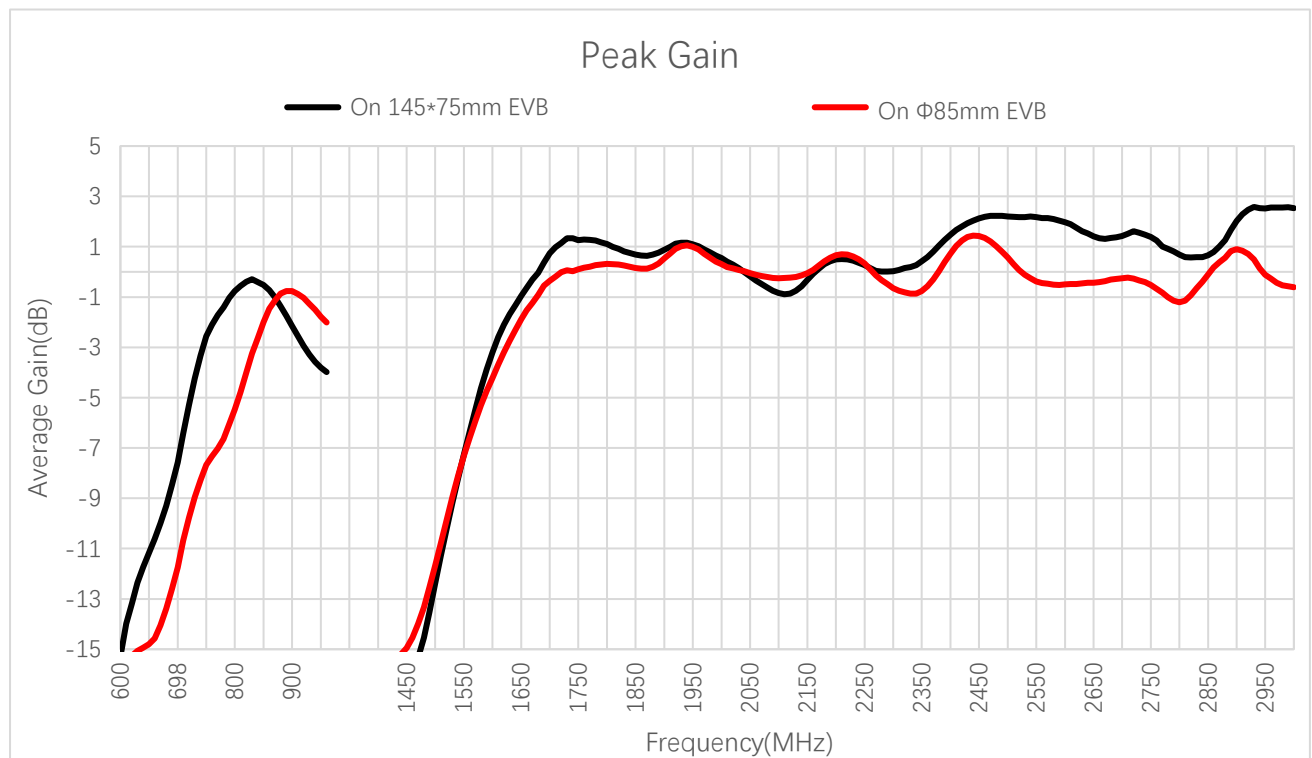
3.3.2. Average Gain



Average Gain (dB)

Frequency (MHz)	698	824	920	960	1710	1950	2170	2450	2570	2690
On 145 × 75 mm EVB	-10.0	-3.1	-5.4	-6.6	-2.6	-2.5	-3.2	-1.6	-1.7	-2.0
On Φ 85 mm EVB	-14.0	-6.1	-4.0	-4.9	-3.1	-2.5	-2.6	-3.0	-4.4	-3.9

3.3.3. Peak Gain

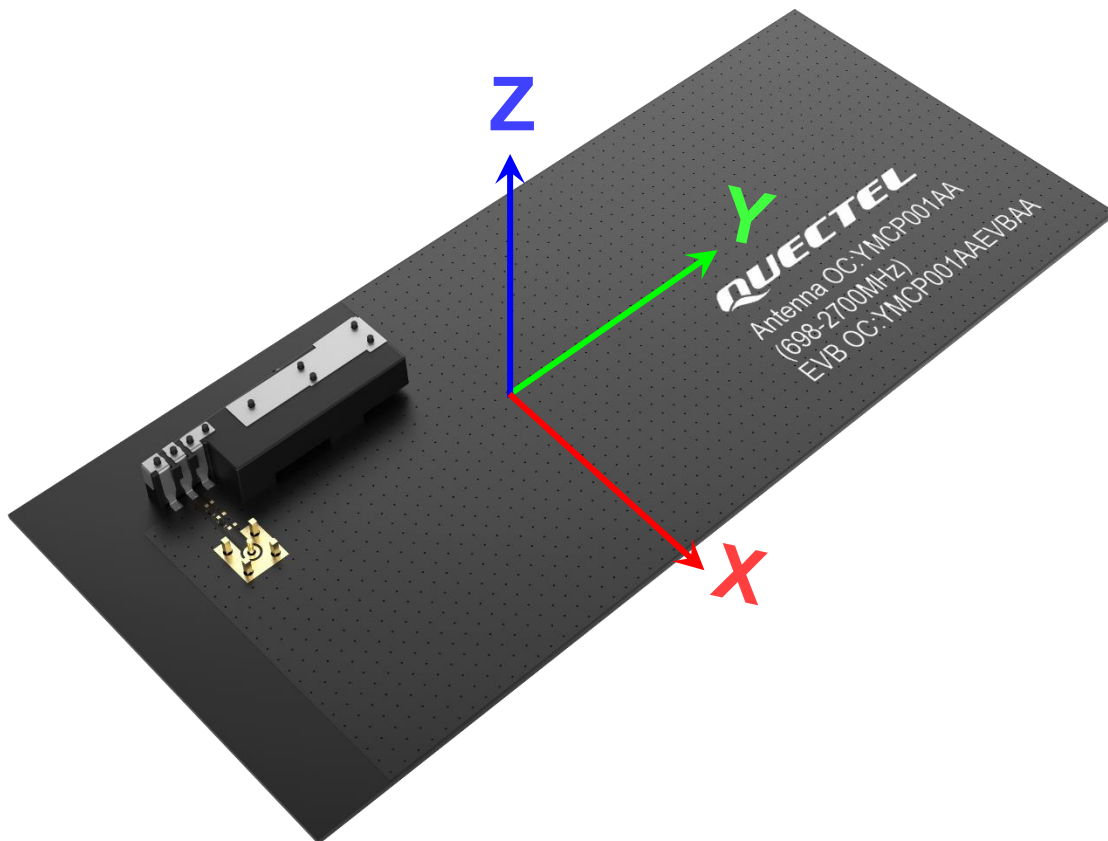


Peak Gain (dBi)

Frequency (MHz)	698	824	920	960	1710	1950	2170	2450	2570	2690
On 145 × 75 mm EVB	-7.6	-0.4	-2.9	-4.0	1.0	1.1	0.1	2.1	2.1	1.4
On Φ 85 mm EVB	-11.8	-4.0	-1.0	-2.0	-0.2	1.0	0.3	1.4	-0.5	-0.3

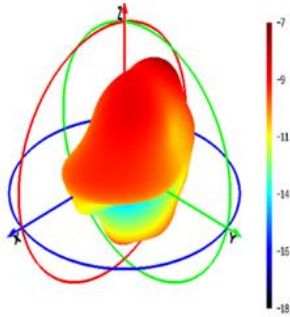
3.3.4. 3D & 2D Radiation Pattern

- Test Status: Assembled on $145 \times 75 \times 1$ mm GND EVB
- Test Chamber: GL-S-1

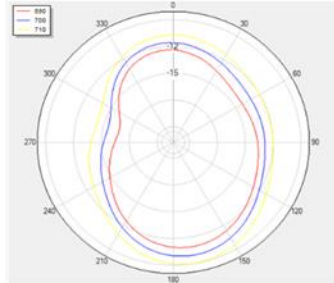


● 4G

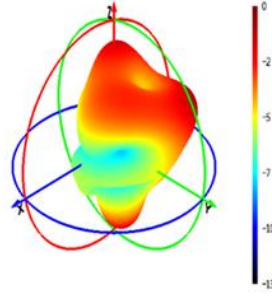
698 MHz



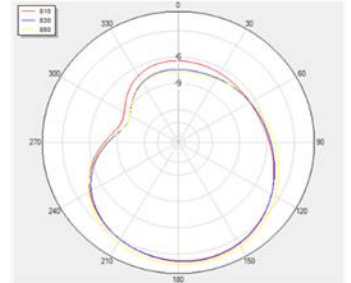
Theta=90



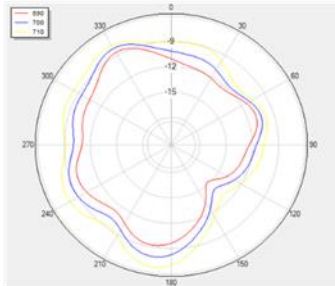
830 MHz



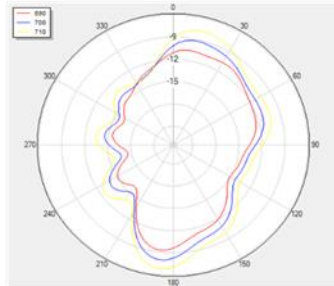
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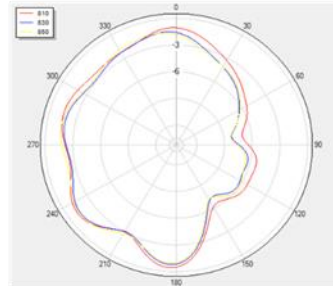
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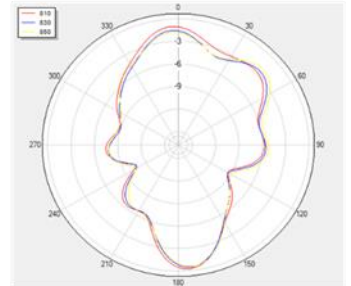
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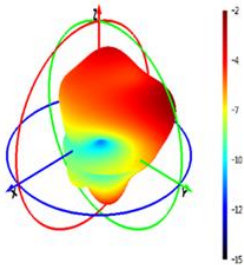
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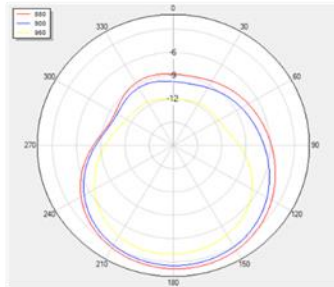
Phi=90



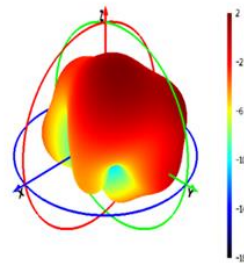
900 MHz



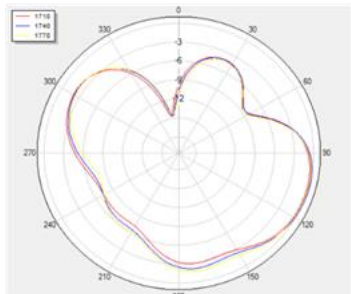
Theta=90



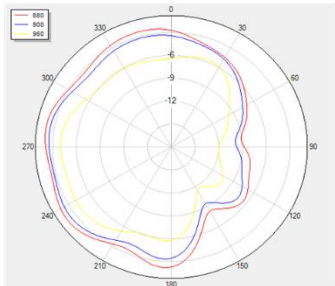
1740 MHz



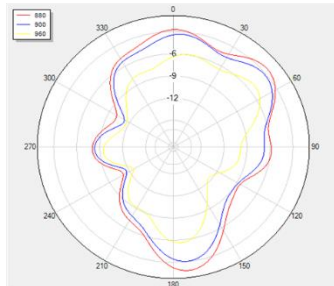
Theta=90



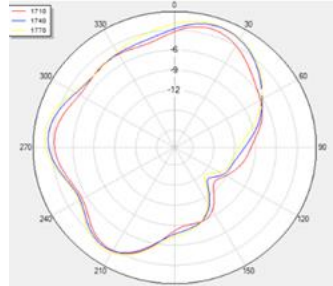
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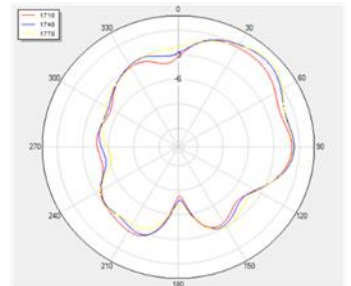
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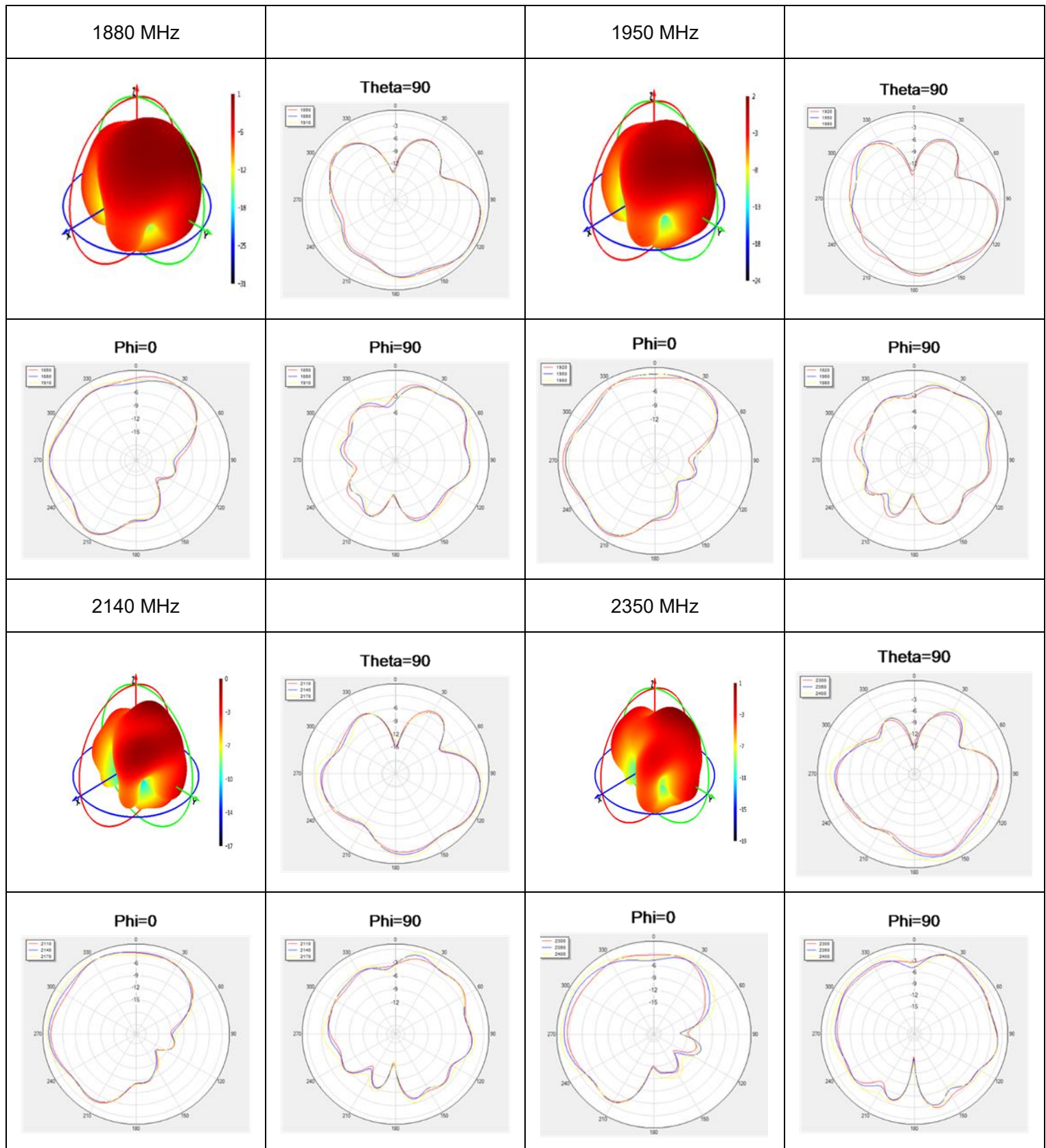
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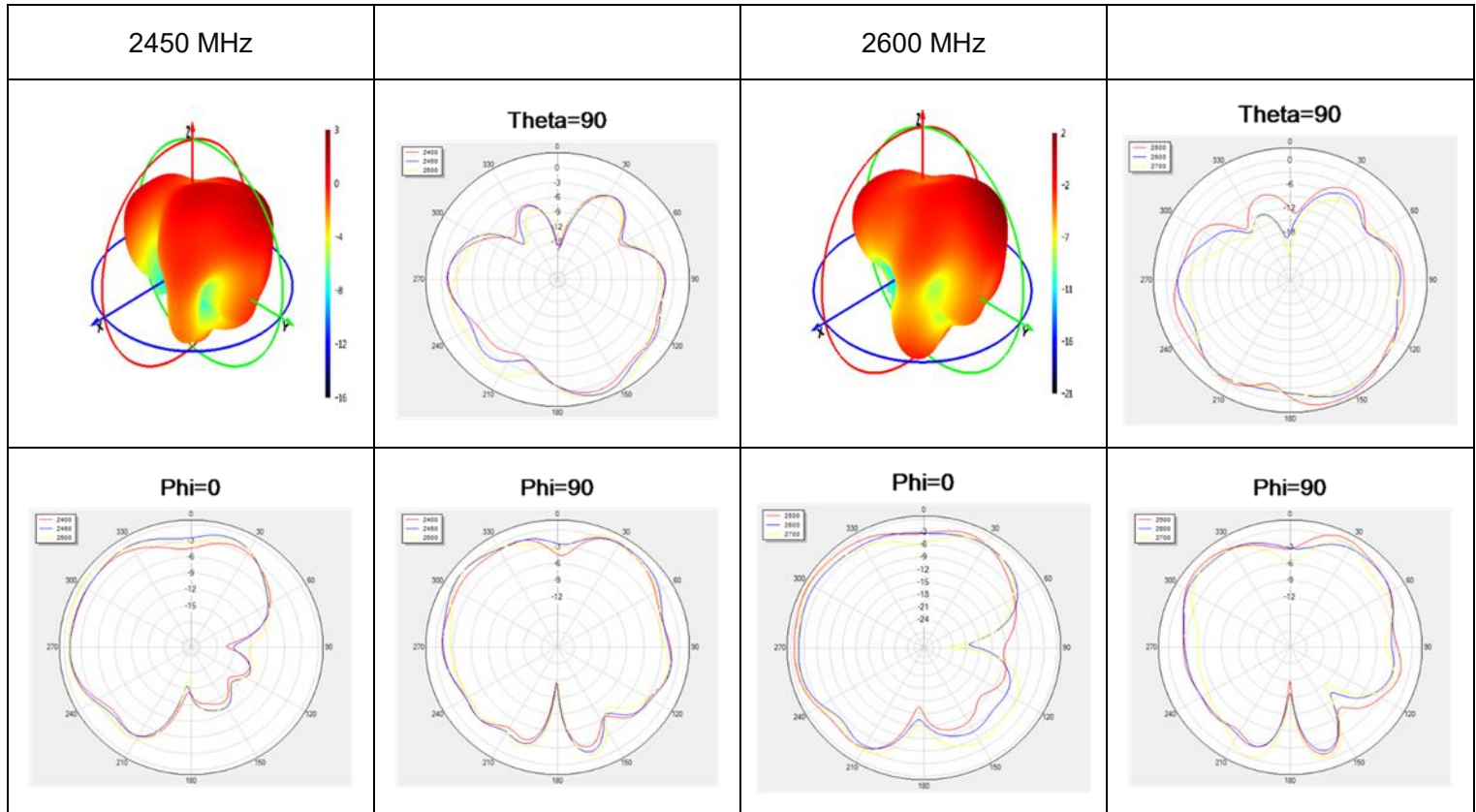
Phi=90



● 4G



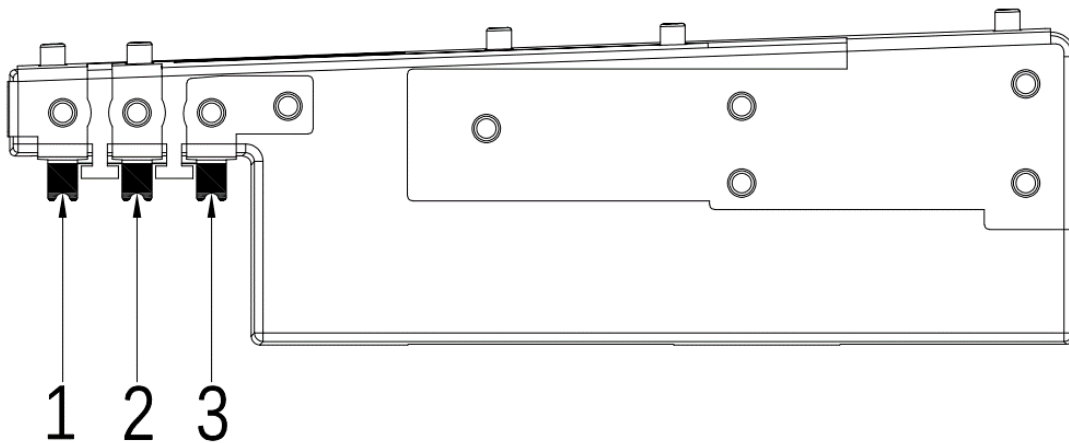
● 4G



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 3 pins, only one of which works. All other pins are for mechanical strength.

Pin	Description
1	Return / GND
2	Feed
3	Parasitism



5 Transmission Line

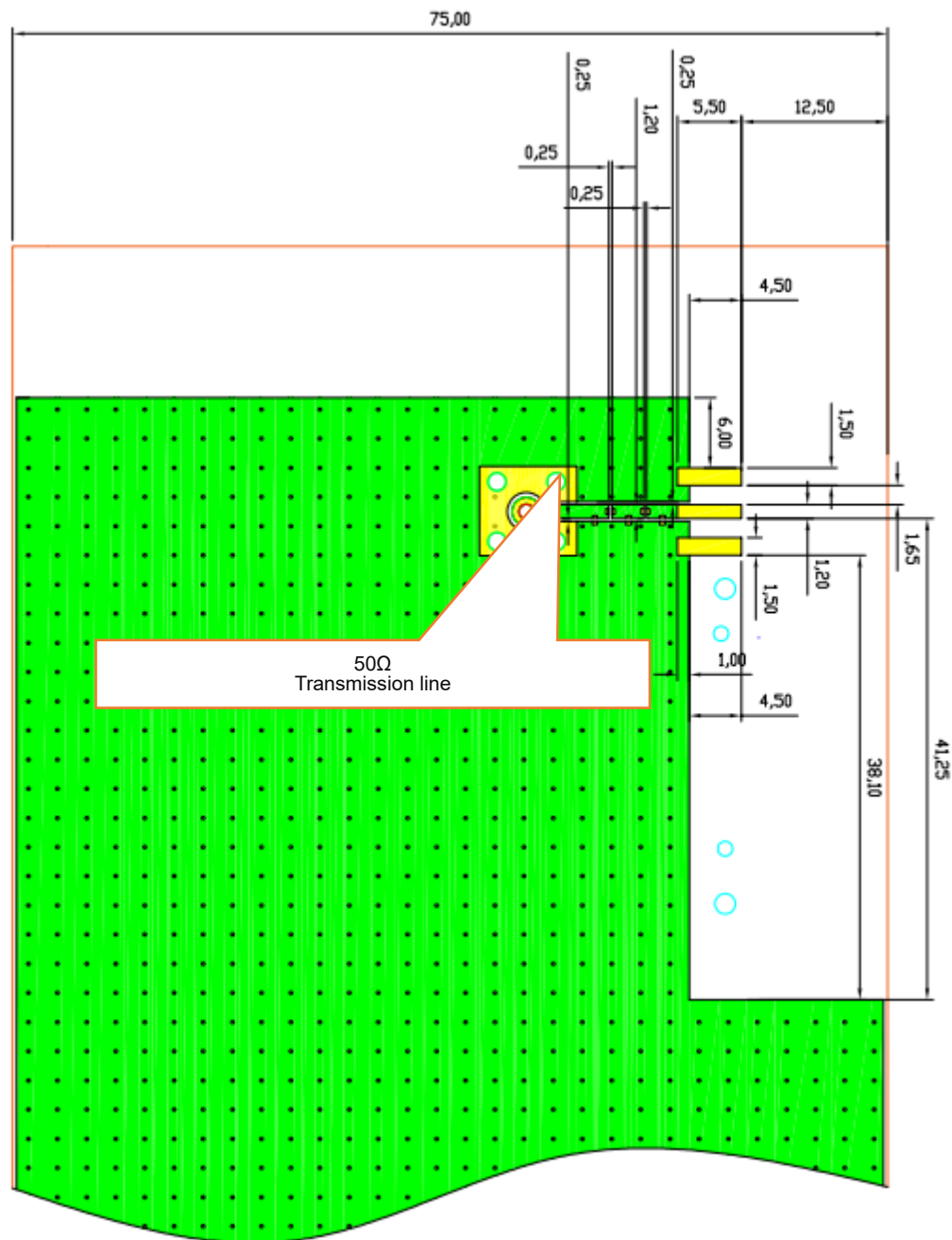
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- 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 .

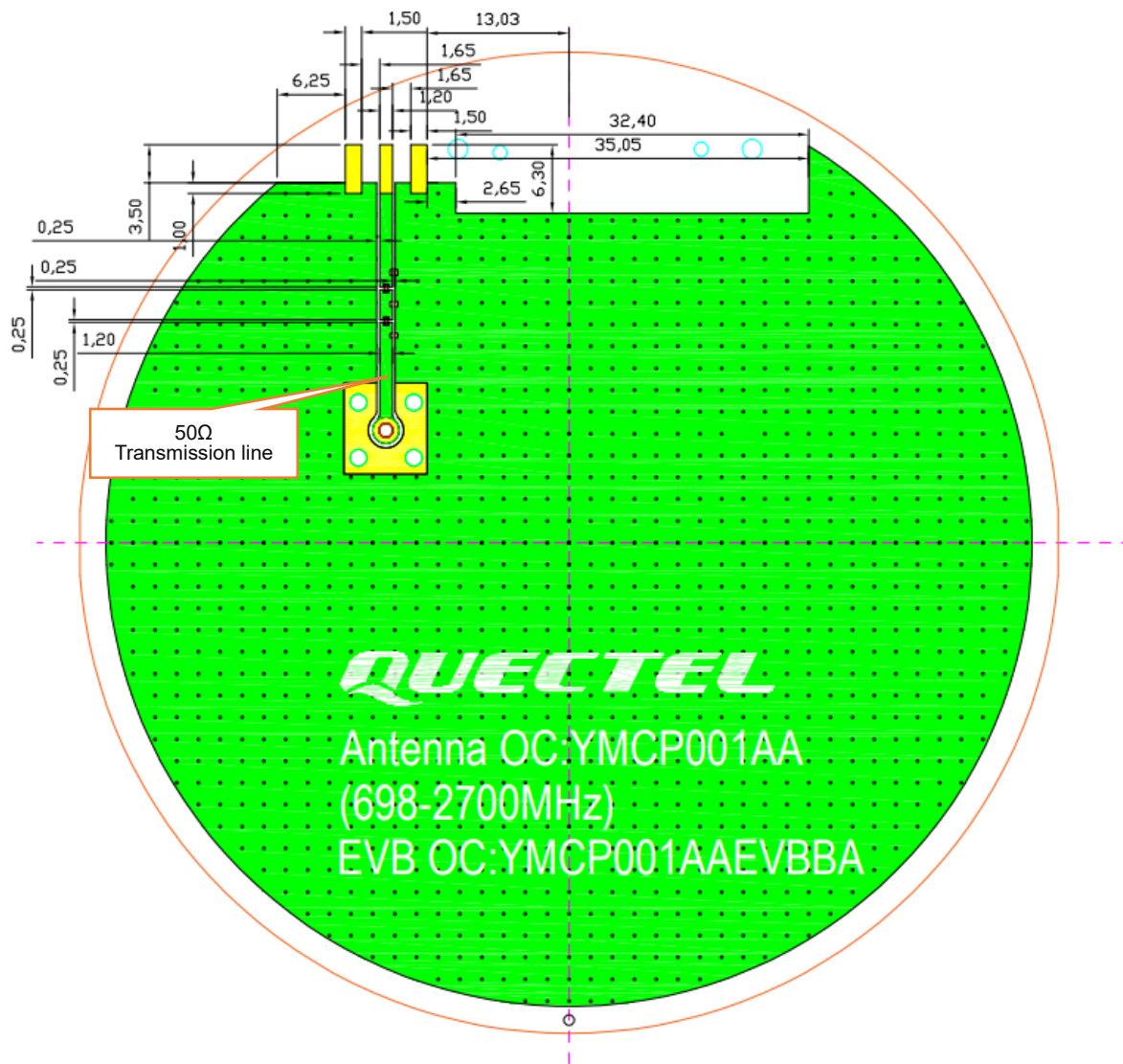
Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the 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.



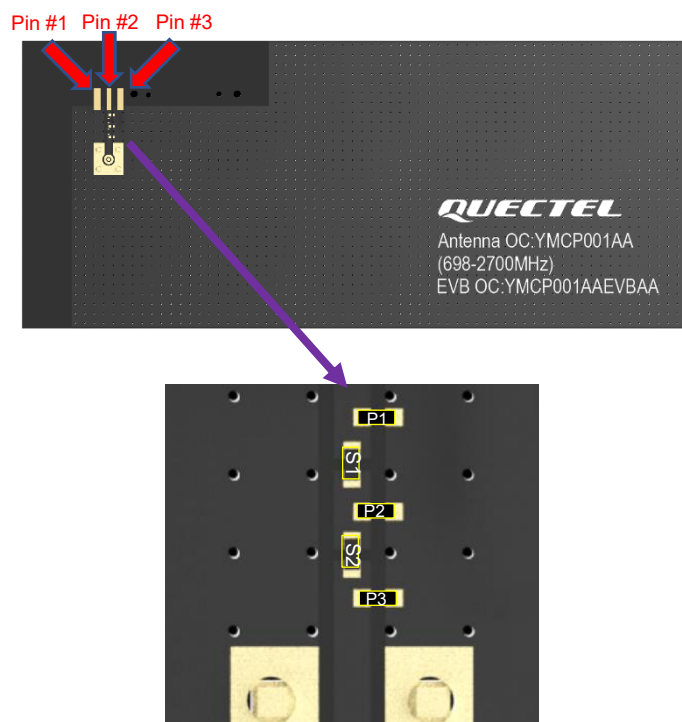
All dimensions are in mm.



All dimensions are in mm.

7 Matching Circuit

Demo Board Top View

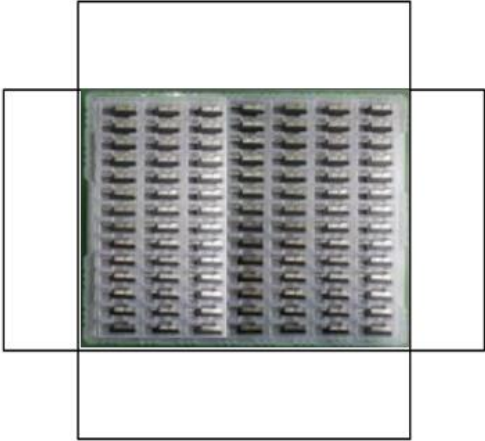
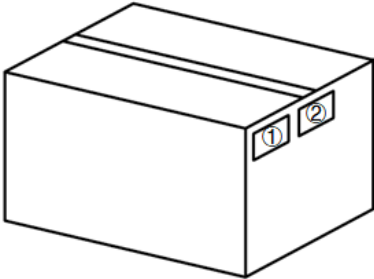
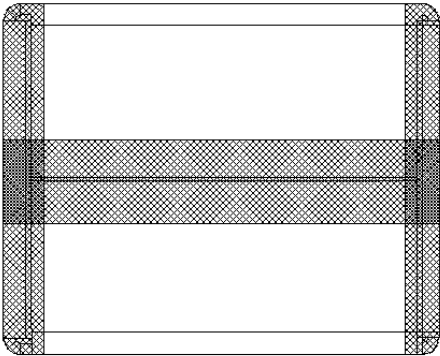


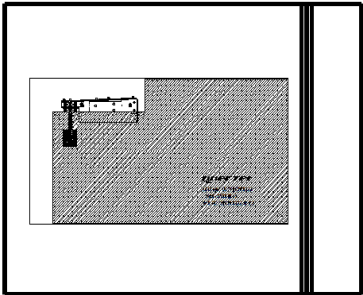
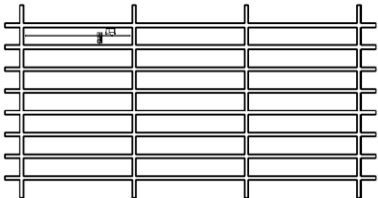
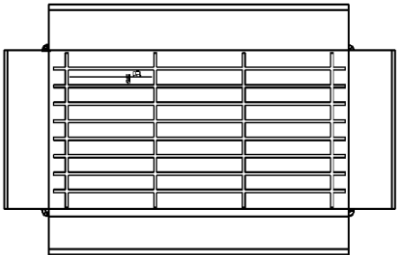
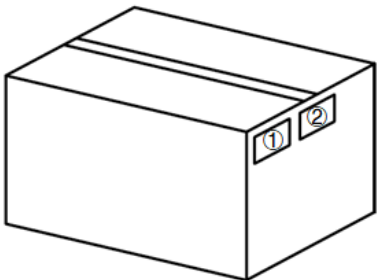
	P1	S1	P2	S2	P3
Default Matching	12 nH	10 pF	DNI	0 Ohm	DNI
Tolerance	±5 %	±5 %	N/A	-	N/A

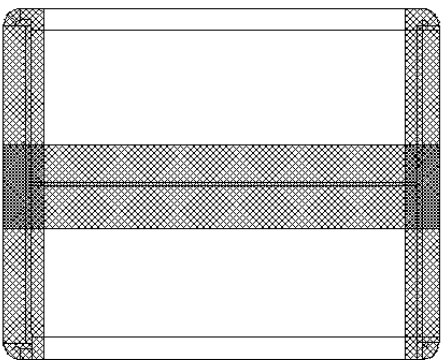
Pin #	Description
1	Return / GND
2	Feed
3	Parasitism

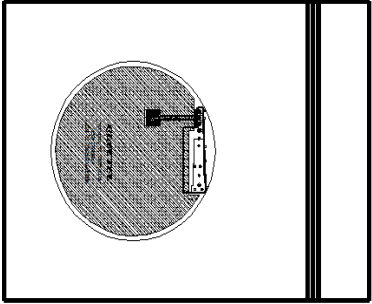
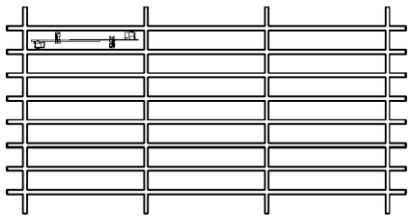
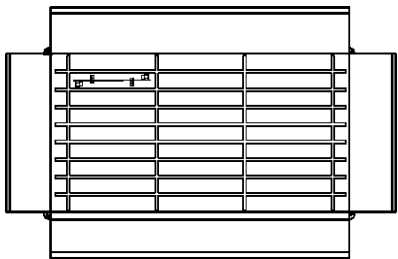
8 Packaging

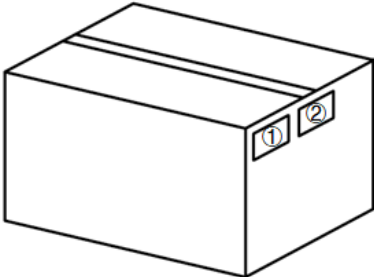
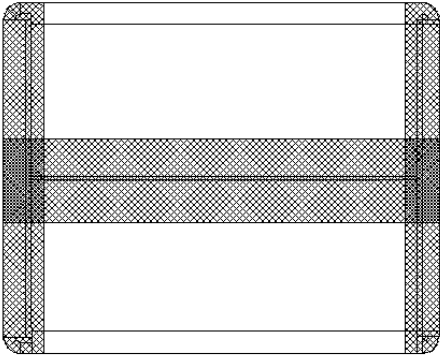
Step	Packaging Picture / 2D Picture	Description
1		Product drawing
2		Put the product into the tray 98 pcs/tray

3		Stack 17 trays (1666 Antennas / Carton Box) <u>Carton Size:</u> <u>L × W × H = 430 × 350 × 220 mm</u>
4		Position for Attaching Labels ① Carton Label ② Quality Label
5		Sealing Cartons “I” type sealing cartons

Step	Packaging Picture / 2D picture	Description
1		1 antenna product in a small PE bag. (1 Antenna / Small PE Bag) <u>PE Bag Size: L × W = 200 × 150 mm</u>
2		Each card slot is loaded with 1 product. 27 products with a layer of knife card.
3		Knife holder stacks 3 layers. (81 Antennas / Carton Box) <u>Carton Size:</u> <u>L × W × H = 530 × 260 × 310 mm</u>
4		Position for Attaching Labels ① Carton Label ② Quality Label

5		Sealing Cartons “工” type sealing cartons
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Step	Packaging Picture / 2D Picture	Description
1		1 antenna product in a small PE bag. (1 Antenna / Small PE Bag) <u>PE Bag Size: L × W = 200 × 150 mm</u>
2		Each card slot is loaded with 2 products. 54 products with a layer of knife card.
3		Knife holder stacks 3 layers. (162 Antennas / Carton Box) <u>Carton Size:</u> <u>L × W × H = 530 × 260 × 310 mm</u>

4		Position for Attaching Labels ① Carton Label ② Quality Label
5		Sealing Cartons “Ⅰ” type sealing cartons

Contact Us

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Revision History

Version	Date	Author	Note
-	2023-04-10	Ezail TAN/ Lucky FENG/ David LIU/ Vinnie LIU	Creation of the document
1.0	2023-04-10	Ezail TAN/ Lucky FENG/ David LIU/ Vinnie LIU	First official release
1.1	2023-08-04	Lucky FENG	1. Updated the peak gain data (Chapter 1.1). 2. Deleted soldering temperature and reflow profile (previous Chapters 8 and 9).
1.2	2024-06-07	Lucky FENG	1. Updated the antenna drawing (Chapter 2.1). 2. Updated the circular EVB drawing (Chapter 2.3).



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