Antenna Datasheet

Product OC: YC0001CA
Version: 2.3
Date: 2025-03-11
Status: Released

Product Name: 4G SMT Mount PCB Chip IFA Embedded Antenna
Key Features:
Optimized for 4G/LTE/LTE-M/NB-IoT networks
High-efficiency, multiband SMD antenna
Low-profile antenna
Frequency band: 698–960 MHz, 1710–2700 MHz
Peak efficiency: 72.9 %
Dimensions: 35.0 mm × 8.5 mm × 3.0 mm
SMD-supplied tape and reel
RoHS and REACH compliant

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, 1710–2700 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 121.4 × 65 mm EVB**	-	5.8	6.7	3.8	1.4	1.4	1.4
Max Return Loss (dB)	**On 121.4 × 65 mm EVB**	-	-3.0	-2.6	-4.6	-16.1	-15.2	-15.0
AVG Eff. (%)	**On 121.4 × 65 mm EVB**	-	25.5	25.4	58.2	64.8	67.2	70.7
AVG AVG Gain(dB)	**On 121.4 × 65 mm EVB**	-	-6.0	-6.0	-2.4	-1.9	-1.7	-1.5
Max Peak Gain (dBi)	**On 121.4 × 65 mm EVB**	-	-2.6	-2.6	2.6	2.7	2.5	2.7
VSWR	**On 121.4 × 65 mm EVB**	≤ 6.7						
Return Loss	**On 121.4 × 65 mm EVB**	≤ -2.6 dB						

Peak Gain	**On 121.4 × 65 mm EVB**	≤ 2.7 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:

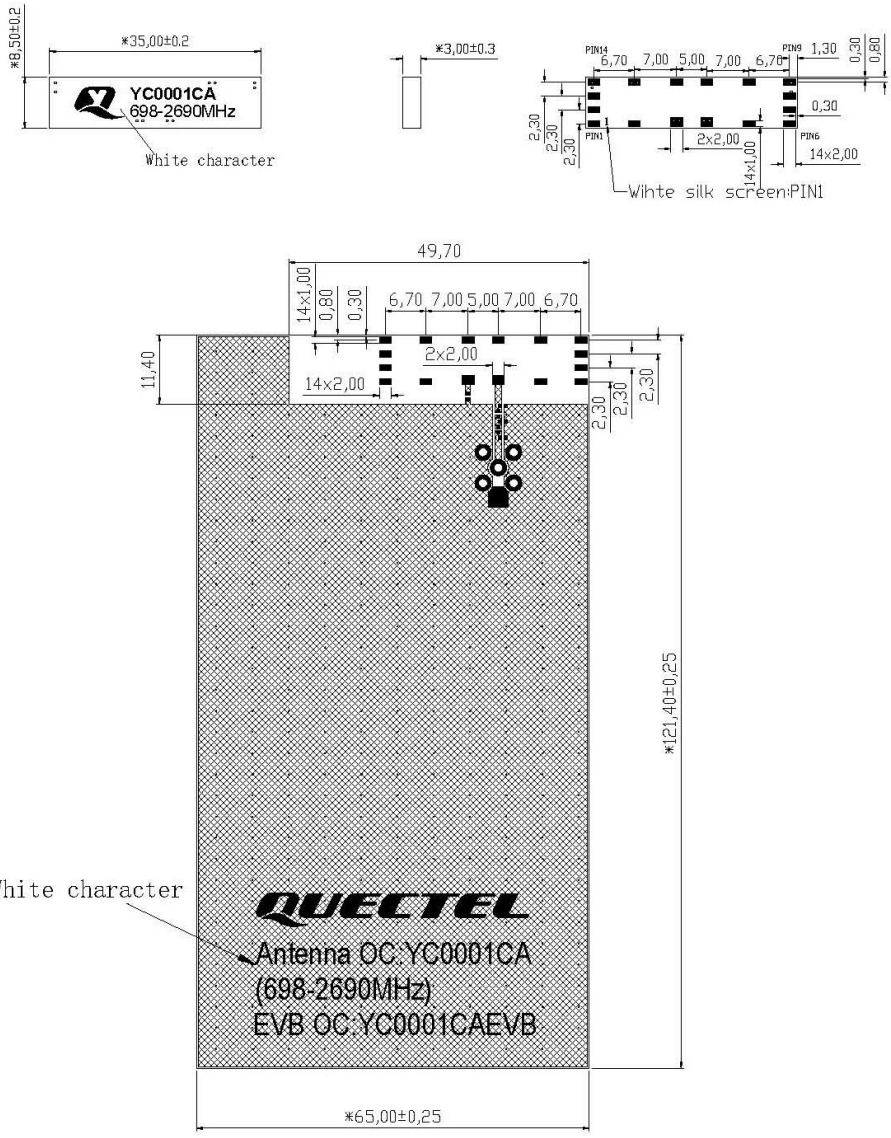
- Based on 121.4 mm × 65 mm EVB.

1.3. Mechanical & Environmental

Mechanical	
Antenna Size	35.0 mm × 8.5 mm × 3.0 mm
Antenna Material & Color	FR4 & Black
Antenna Weight	Typ. 1.9 g
Mounting Type	SMD
Recommended EVB Size	121.4 × 65 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

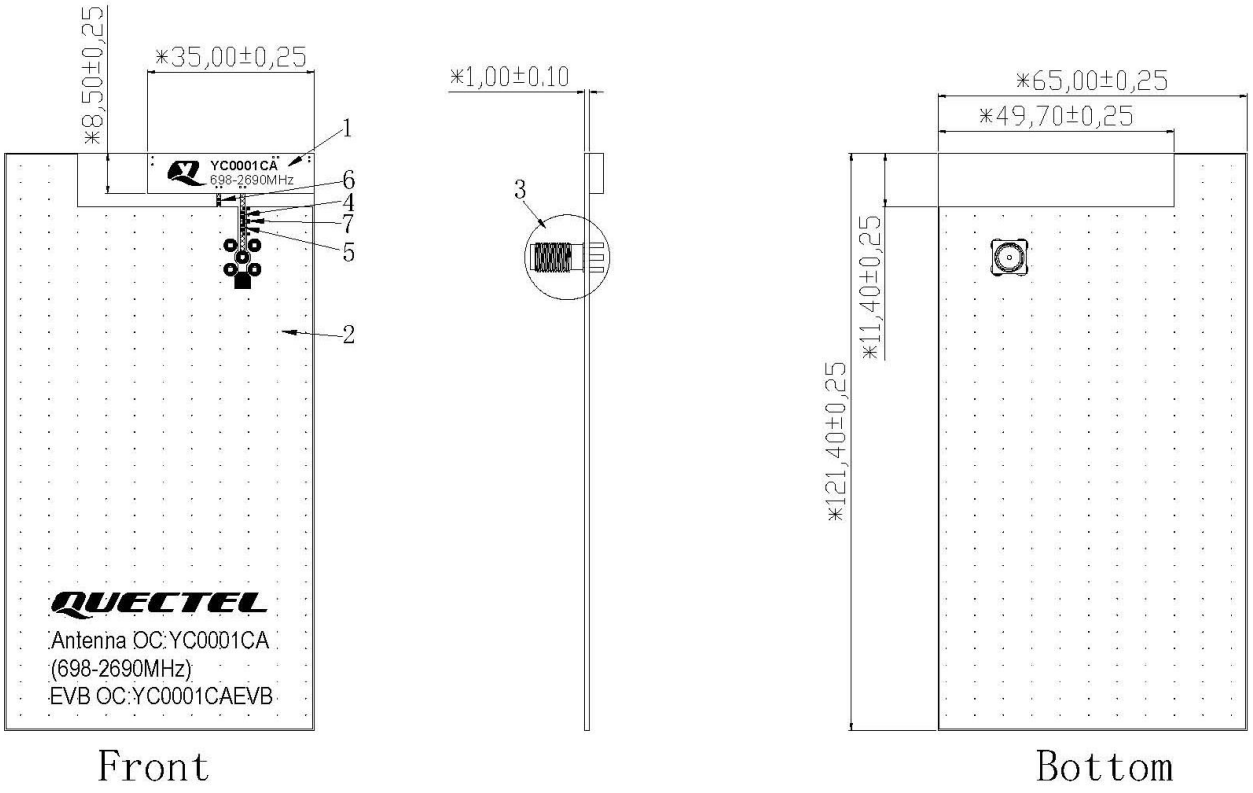
2 Drawing

ROHS



	Name	Material	Brand	QTY	Model
1	Antenna	FR4 3.0t	Quectel	1	YC0001CA
2	PCB	FR4 1.0t	Quectel	1	YC0001CAEVB
3	SMA Female Connector	Brass	Quectel	1	
4	2.4pF (0402)	Ceramics	Murata	1	
5	3nH (0402)	Ceramics	Murata	1	
6	7.5nH (0402)	Ceramics	Murata	1	
7	0.5pF (0402)	Ceramics	Murata	1	

ROHS

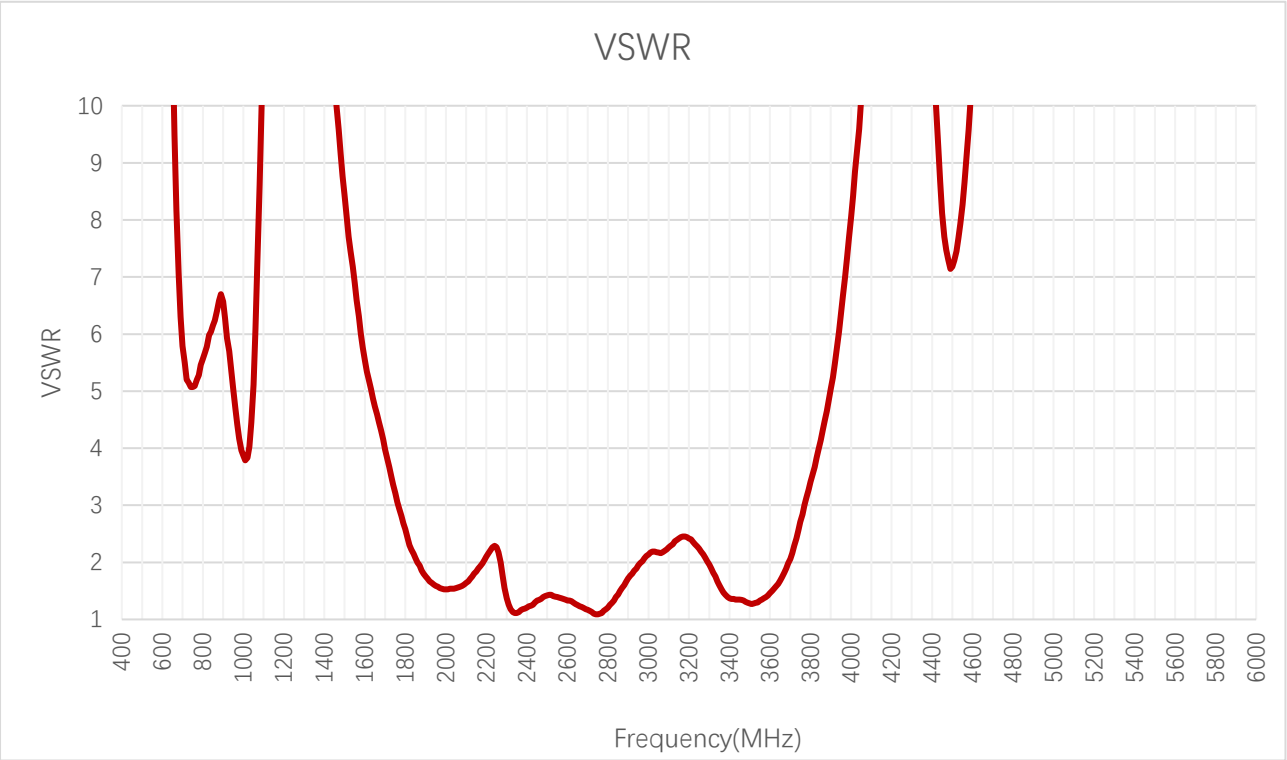


Front Bottom

3 Detailed Performance

3.1. S-Parameter Test

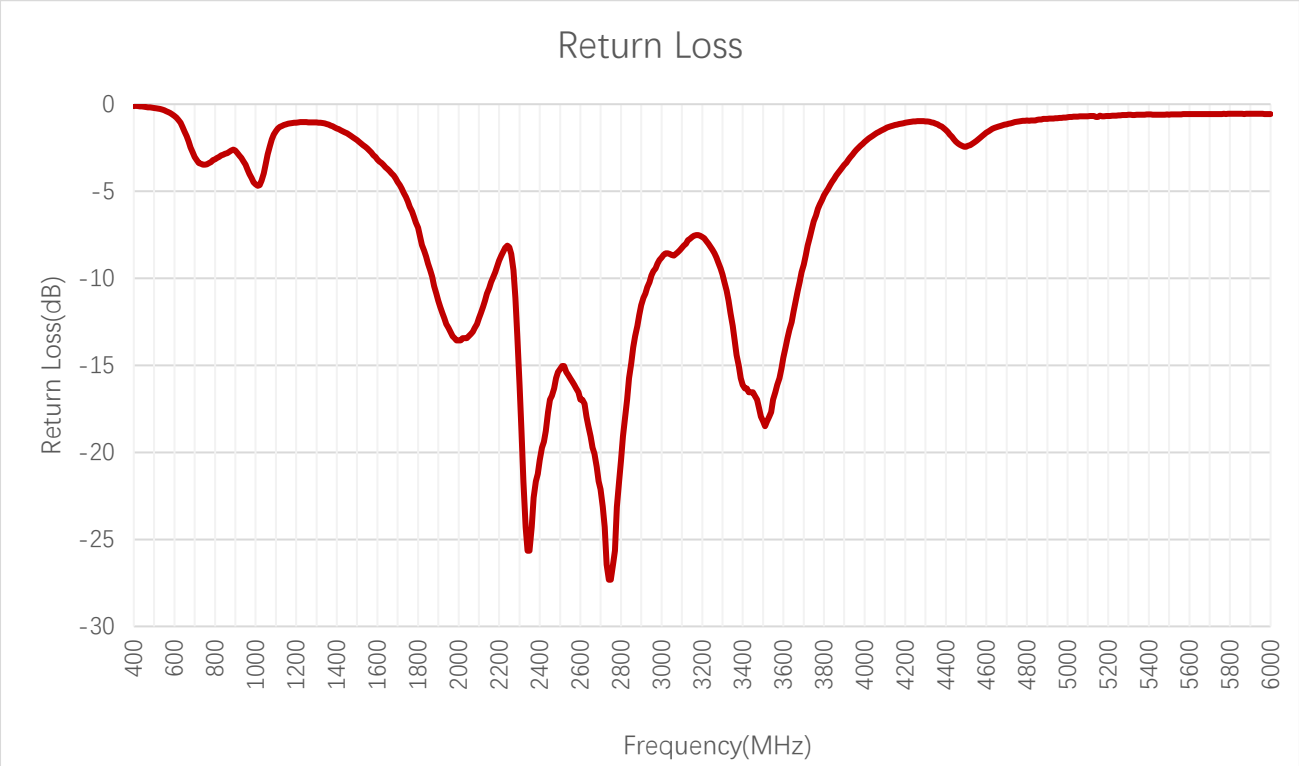
3.1.1. VSWR



VSWR

Frequency (MHz)	600	700	710	830	900	960	1440	1710	1740	1880
On 121.4 × 65 mm EVB	-	5.8	5.5	6.0	6.6	4.7	-	3.8	3.4	1.9
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
On 121.4 × 65 mm EVB	1.6	1.8	1.1	1.3	1.3	1.2	-	-	-	-

3.1.2. Return Loss

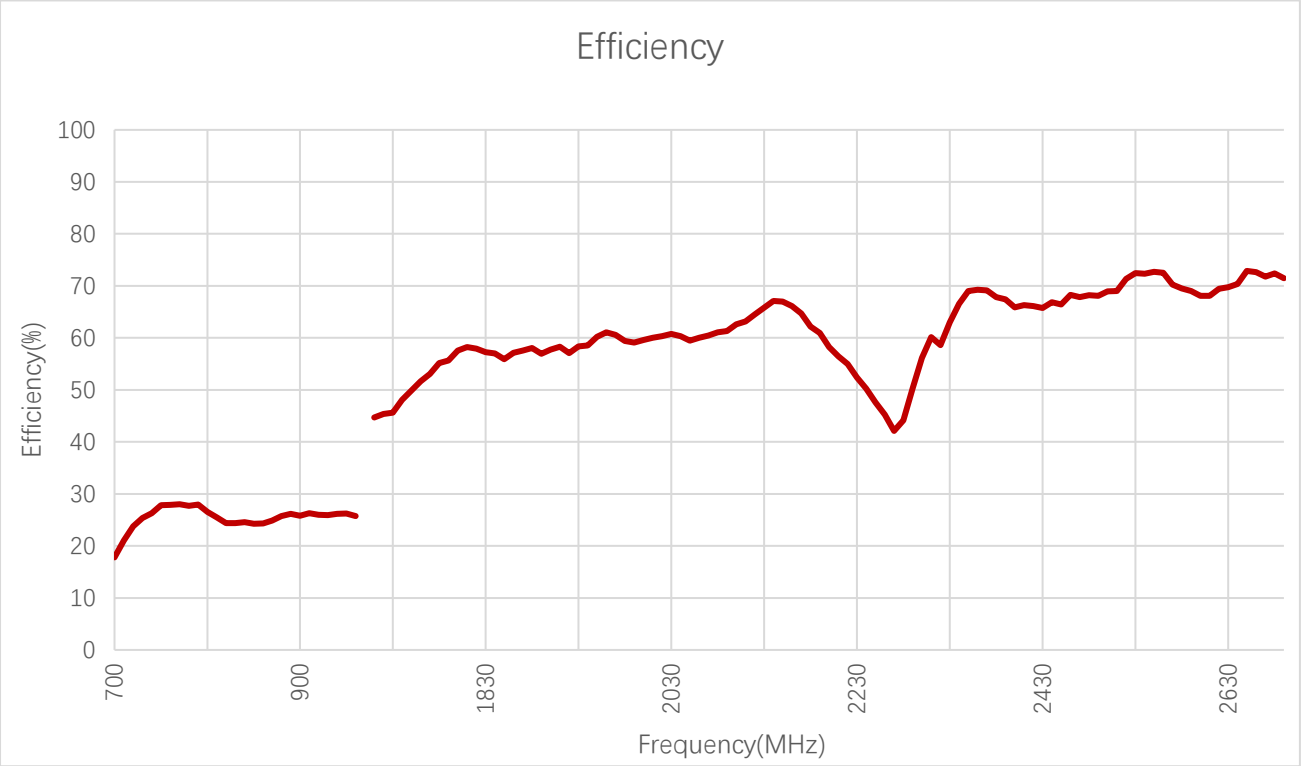


Return Loss (dB)

Frequency (MHz)	600	700	710	830	900	960	1440	1710	1740	1880
On 121.4 × 65 mm EVB	-	-3.0	-3.2	-2.9	-2.7	-3.7	-	-4.6	-5.3	-10.4
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
On 121.4 × 65 mm EVB	-12.8	-10.9	-25.7	-17.0	-17.0	-21.7	-	-	-	-

3.2. Radiation Performance Test

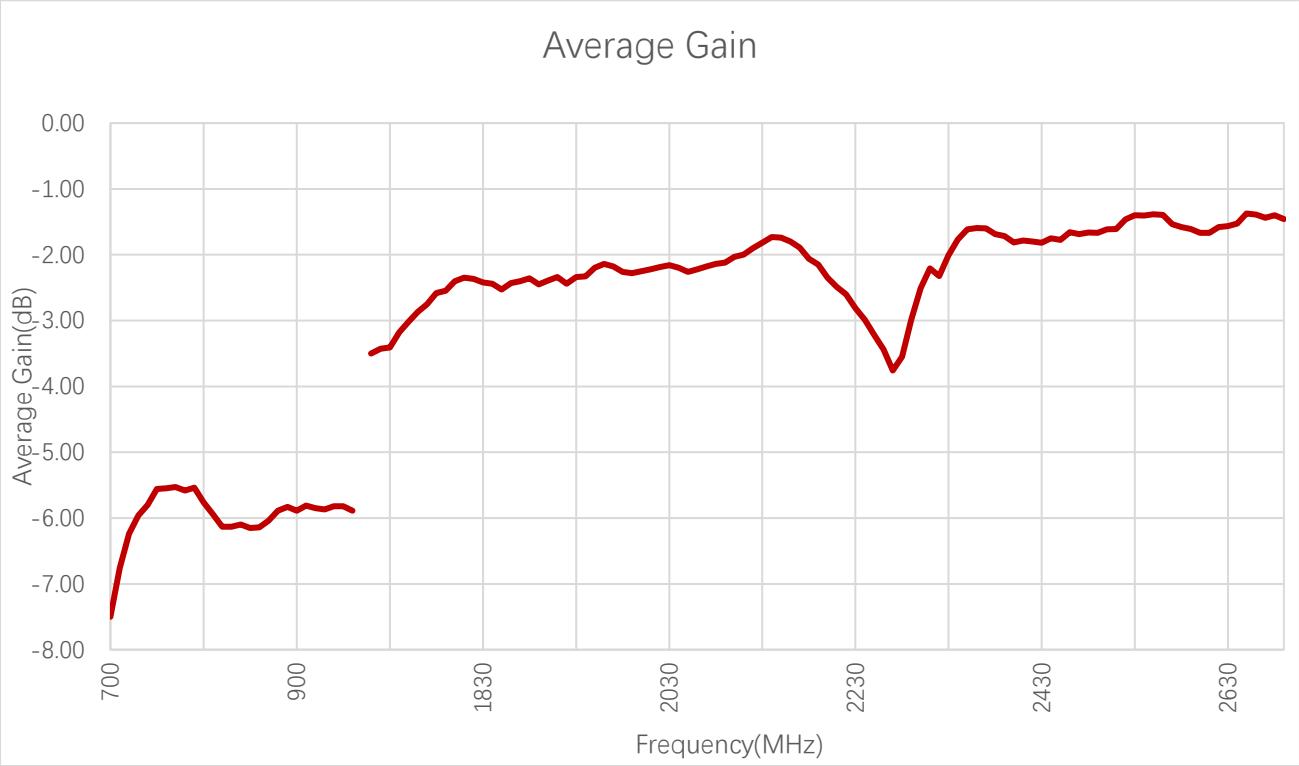
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	600	700	710	830	900	960	1440	1710	1740	1880
On 121.4 × 65 mm EVB	-	17.8	21.1	24.4	25.8	25.7	-	44.7	48.1	58.1
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
On 121.4 × 65 mm EVB	60.2	67.1	69.0	66.5	68.1	71.5	-	-	-	-

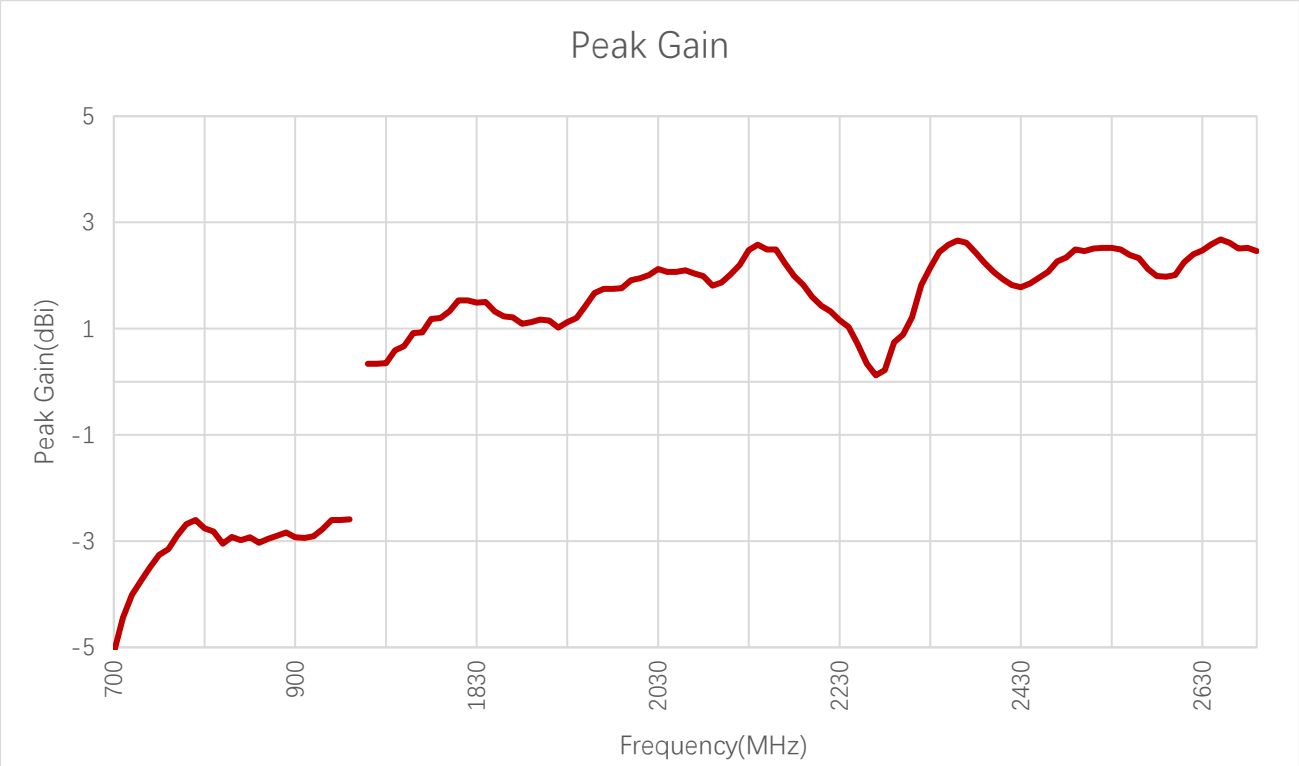
3.2.2. Average Gain



Average Gain (dB)

Frequency (MHz)	600	700	710	830	900	960	1440	1710	1740	1880
On 121.4 × 65 mm EVB	-	-7.5	-6.8	-6.1	-5.9	-5.9	-	-3.5	-3.2	-2.4
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
On 121.4 × 65 mm EVB	-2.2	-1.7	-1.6	-1.8	-1.7	-1.5	-	-	-	-

3.2.3. Peak Gain

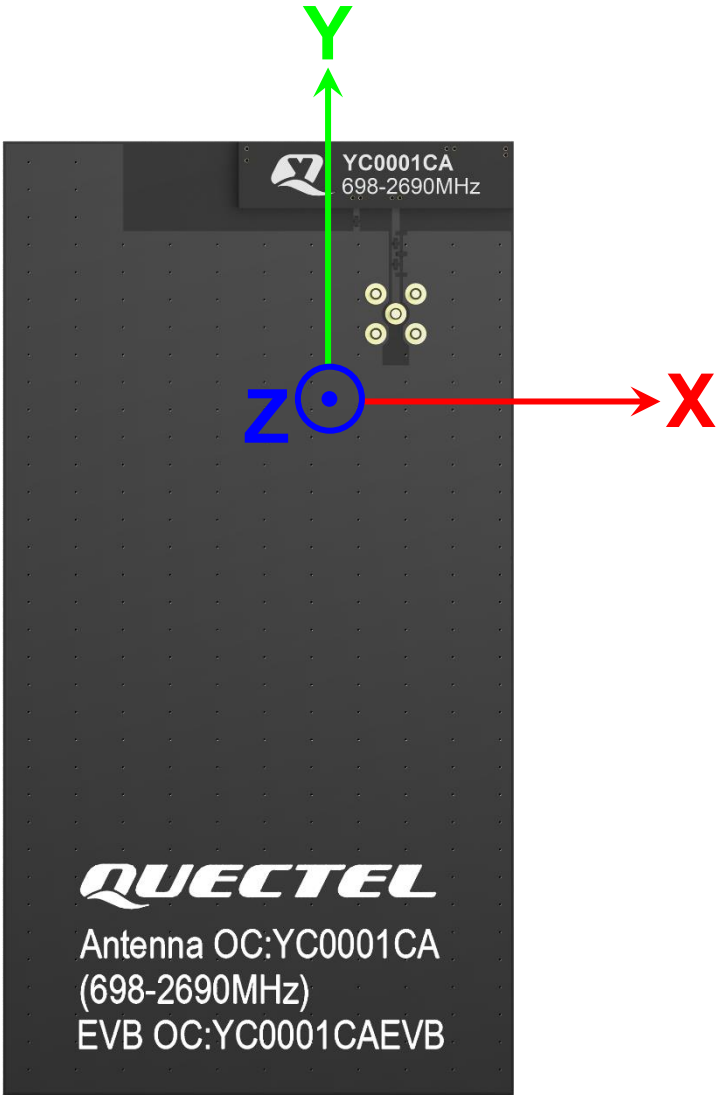


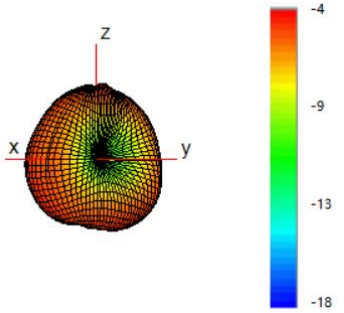
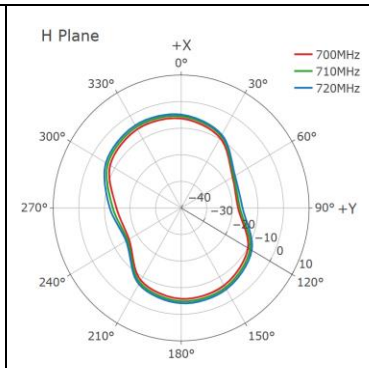
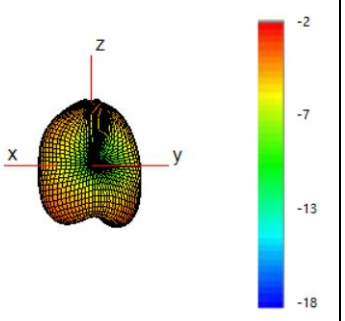
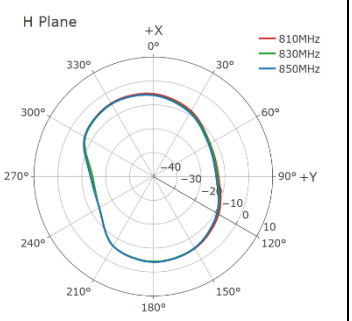
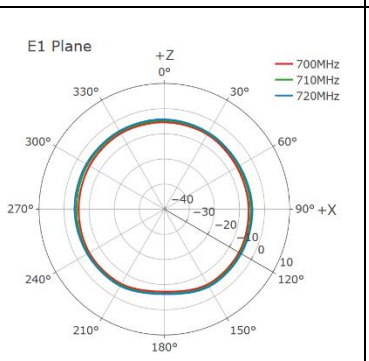
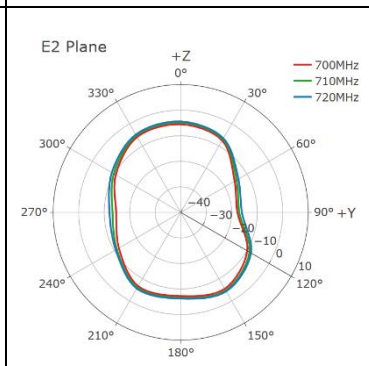
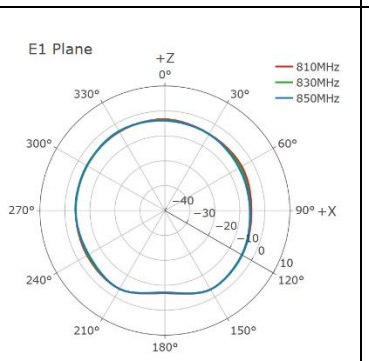
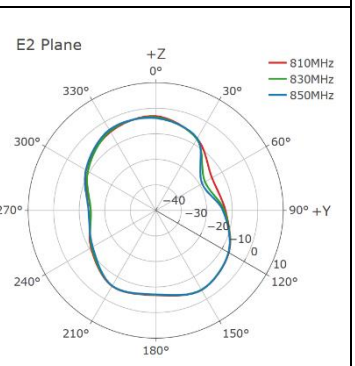
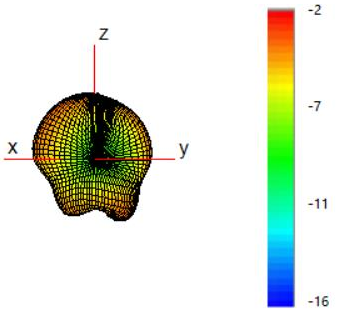
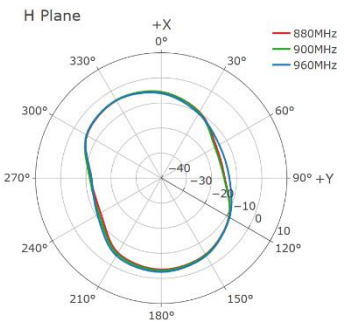
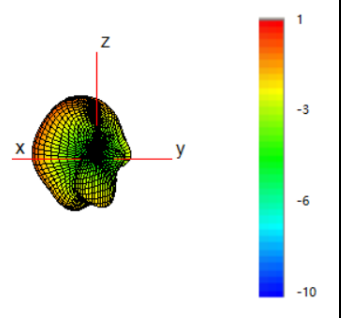
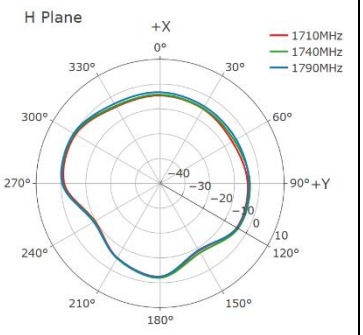
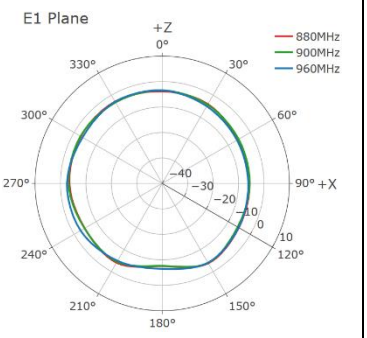
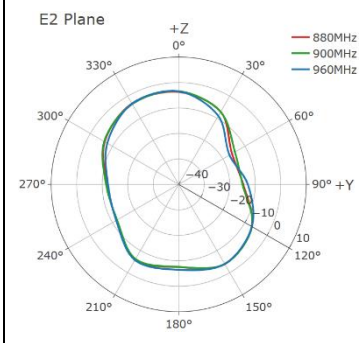
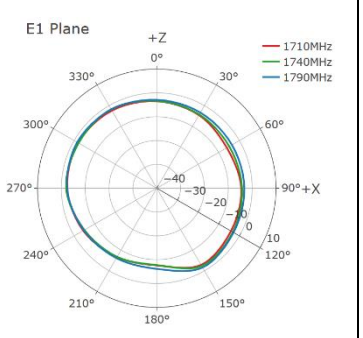
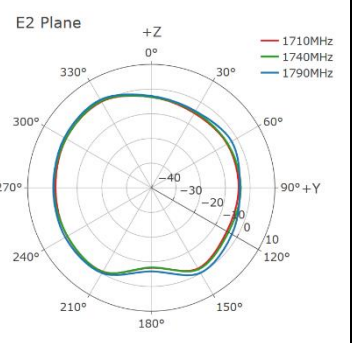
Peak Gain (dBi)

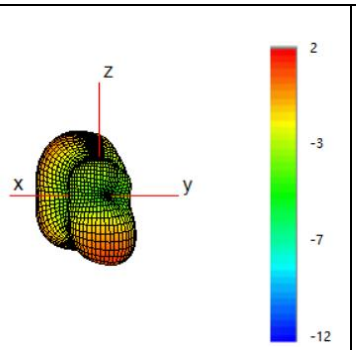
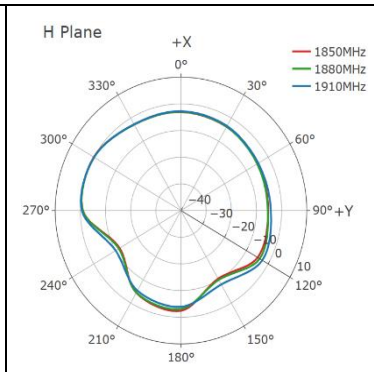
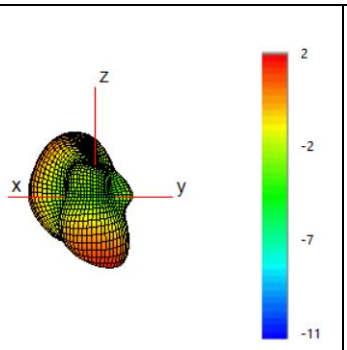
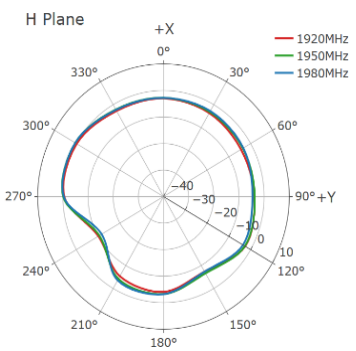
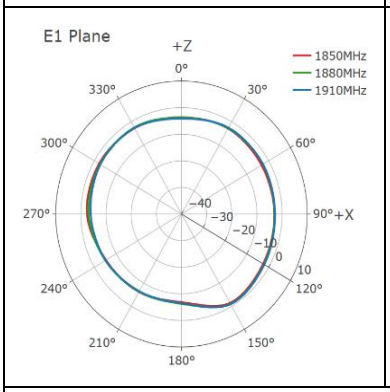
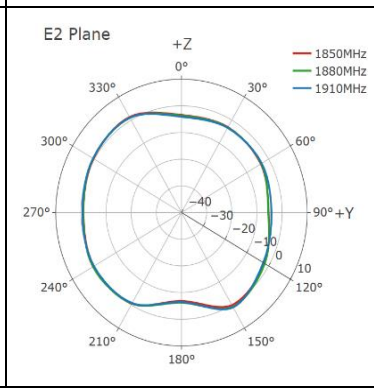
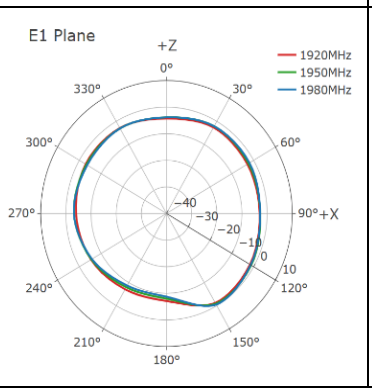
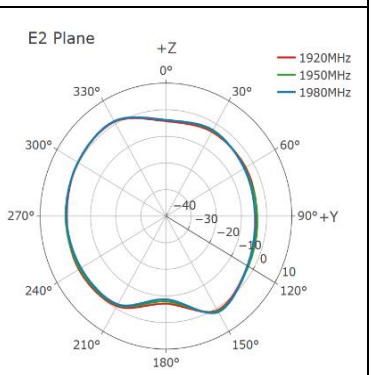
Frequency (MHz)	600	700	710	830	900	960	1440	1710	1740	1880
On 121.4 × 65 mm EVB	-	-5.1	-4.4	-2.9	-2.9	-2.6	-	0.3	0.6	1.1
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
On 121.4 × 65 mm EVB	1.4	2.6	2.6	2.0	2.0	2.5	-	-	-	-

3.2.4. 3D & 2D Radiation Pattern

- Test Status: Assembled on 121.4 mm × 65 mm EVB
- Test Chamber: HF-G-1



710 MHz		830 MHz	
			
			
900 MHz		1740 MHz	
			
			

1880 MHz		1950 MHz	
			
			
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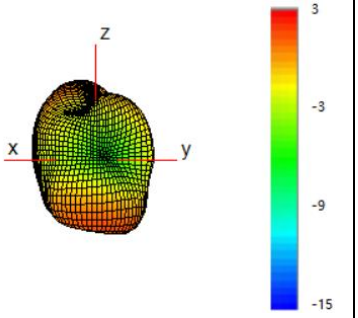	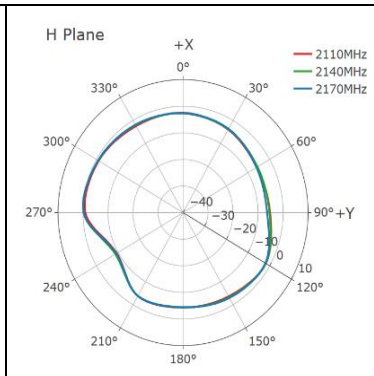	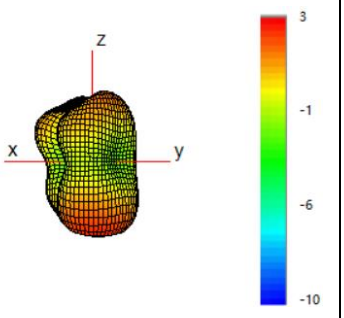	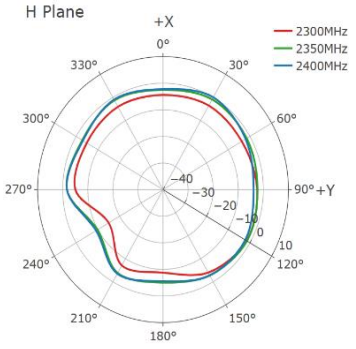
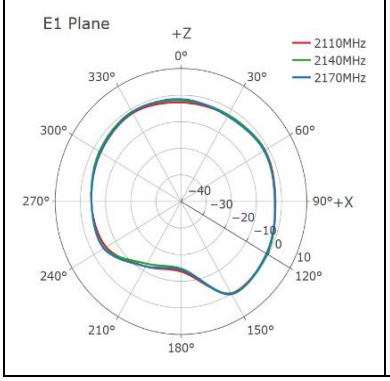	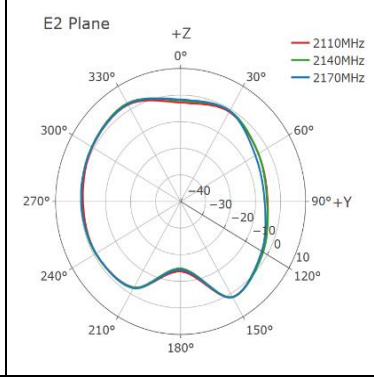	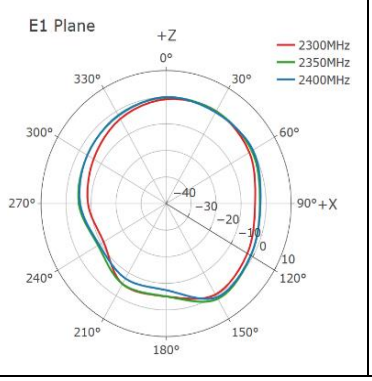	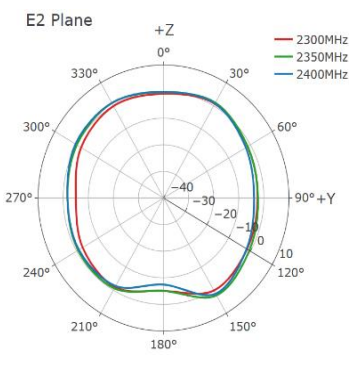

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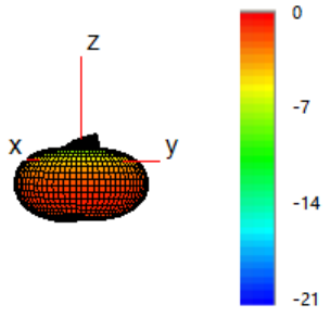
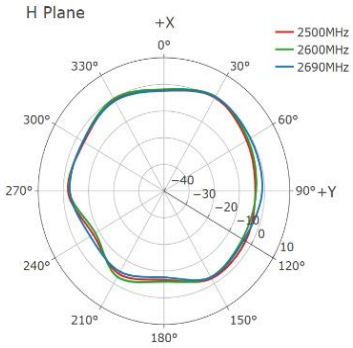
<tr><td> 
</td><td> 
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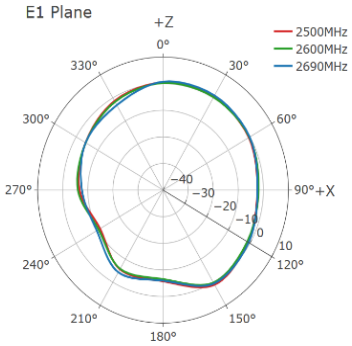
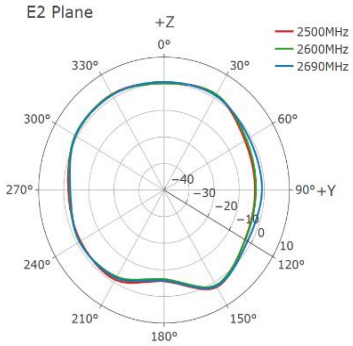
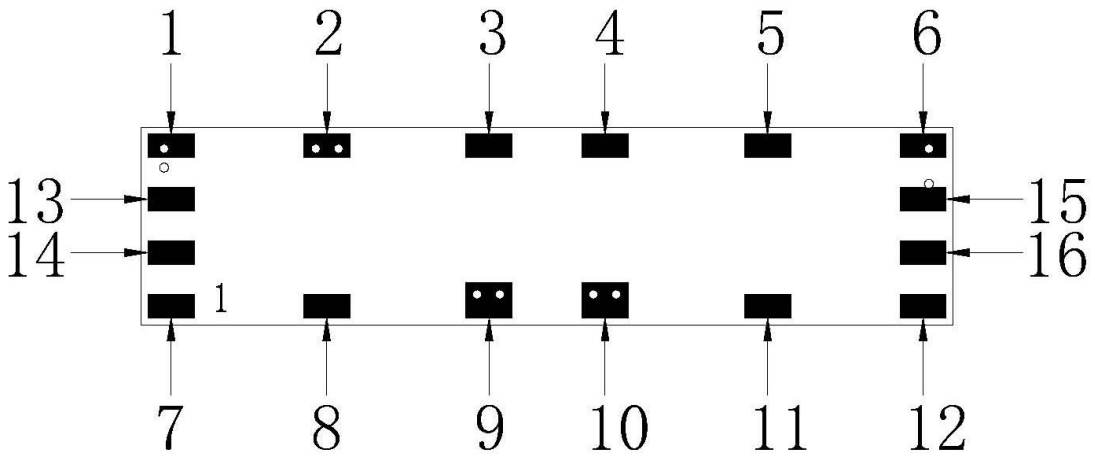
<tr><td> 
</td><td> 
</td></tr>
</table>

4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The antenna has 16 pins and only two work.
- All other pins are designed for mechanical strength.



Bottom:Perspective View

Pin No.	Description
10	GND
9	FEED
1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16	Not used (Mechanical only)

5 Transmission Line

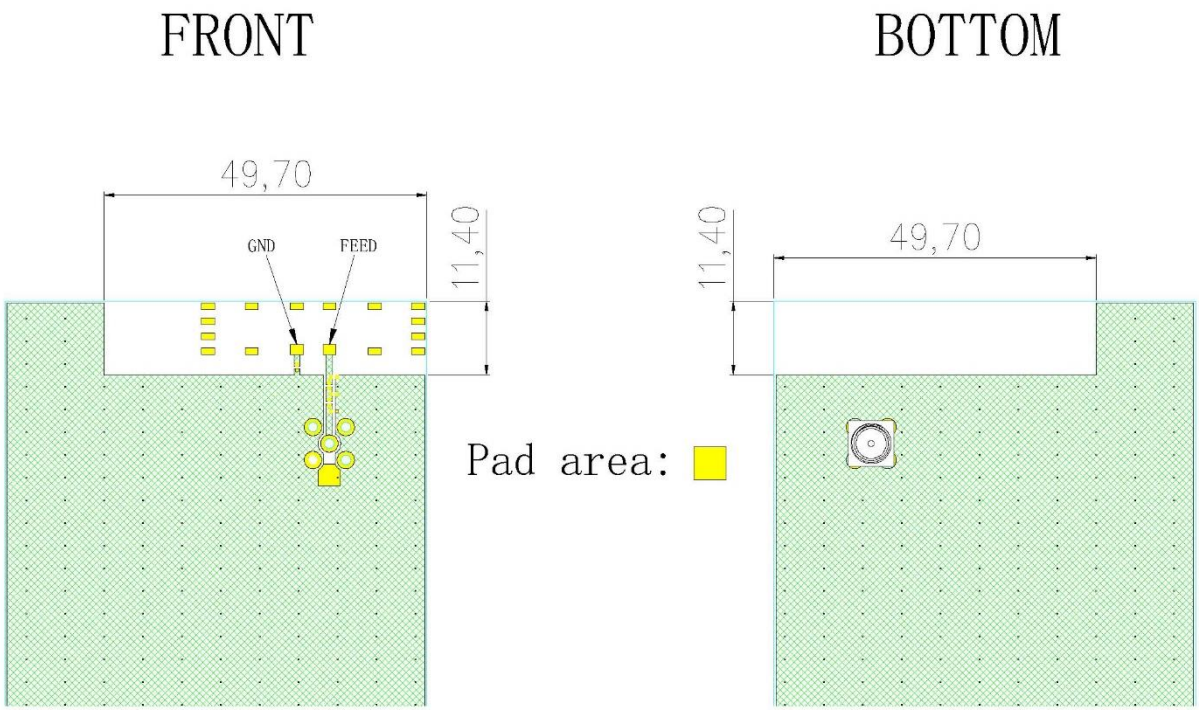
The characteristic impedance of all transmission lines shall be designed as 50 Ω.

- 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.

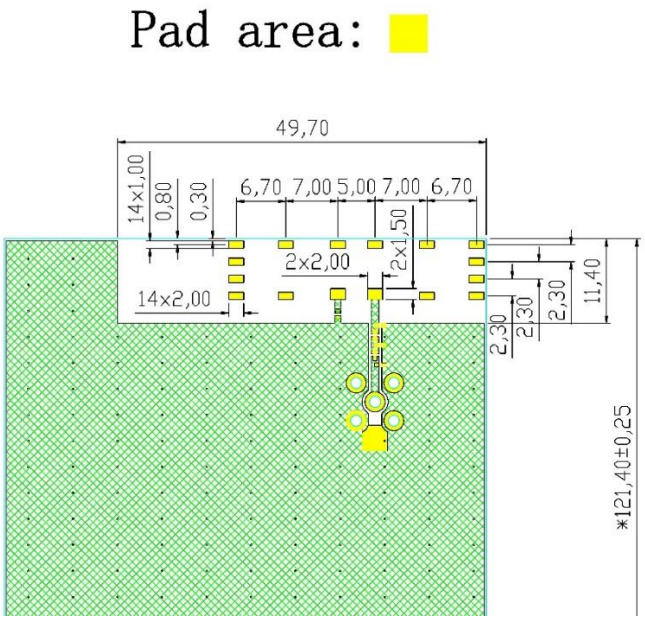
Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the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

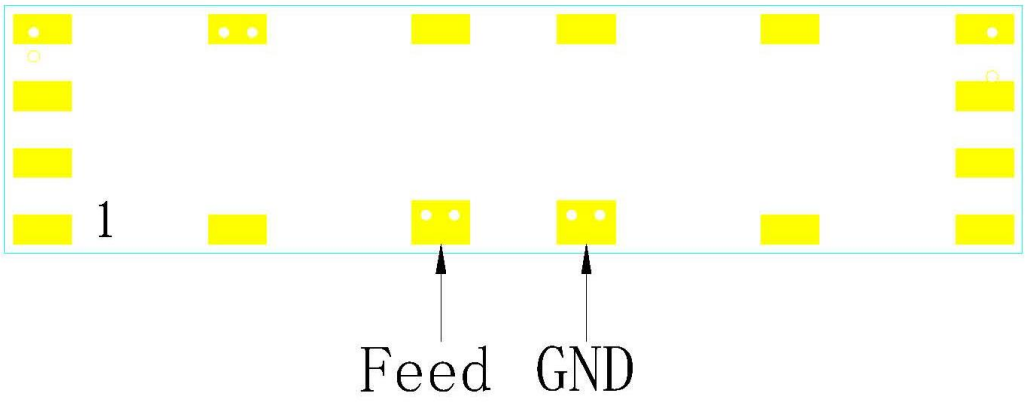
- Test EVB Size: 121.4 mm × 65 mm
- EVB Clearance Area: 11.4 mm × 49.7 mm



- Front Layout Details

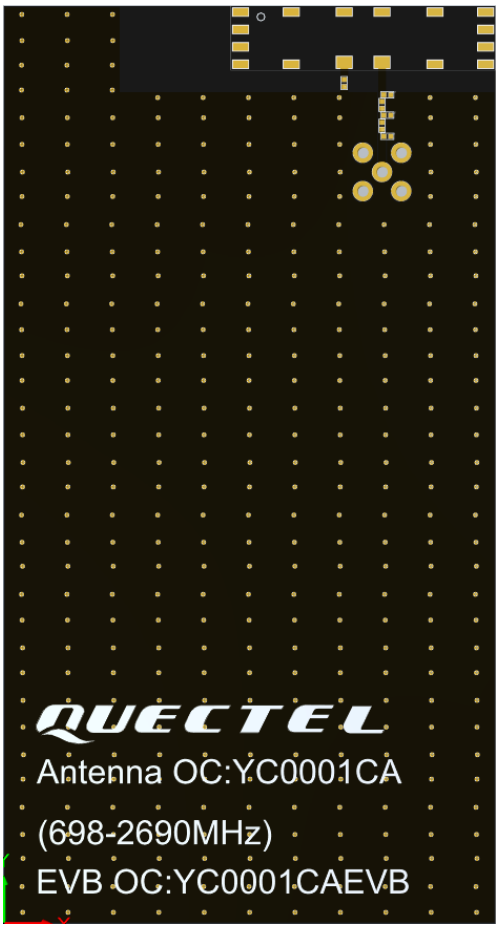


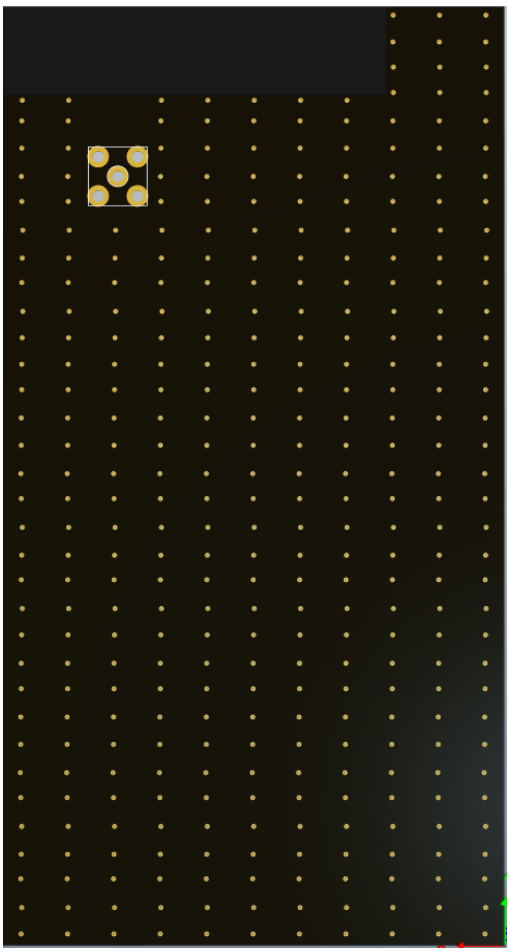
- Antenna Pad



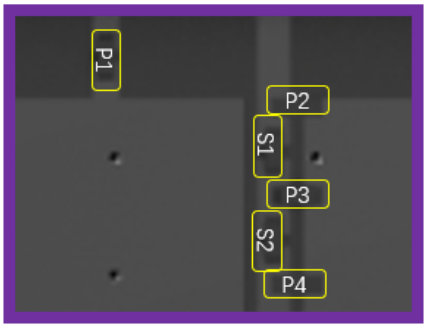
Bottom:Perspective View

7 Matching Circuit





Antenna Matching

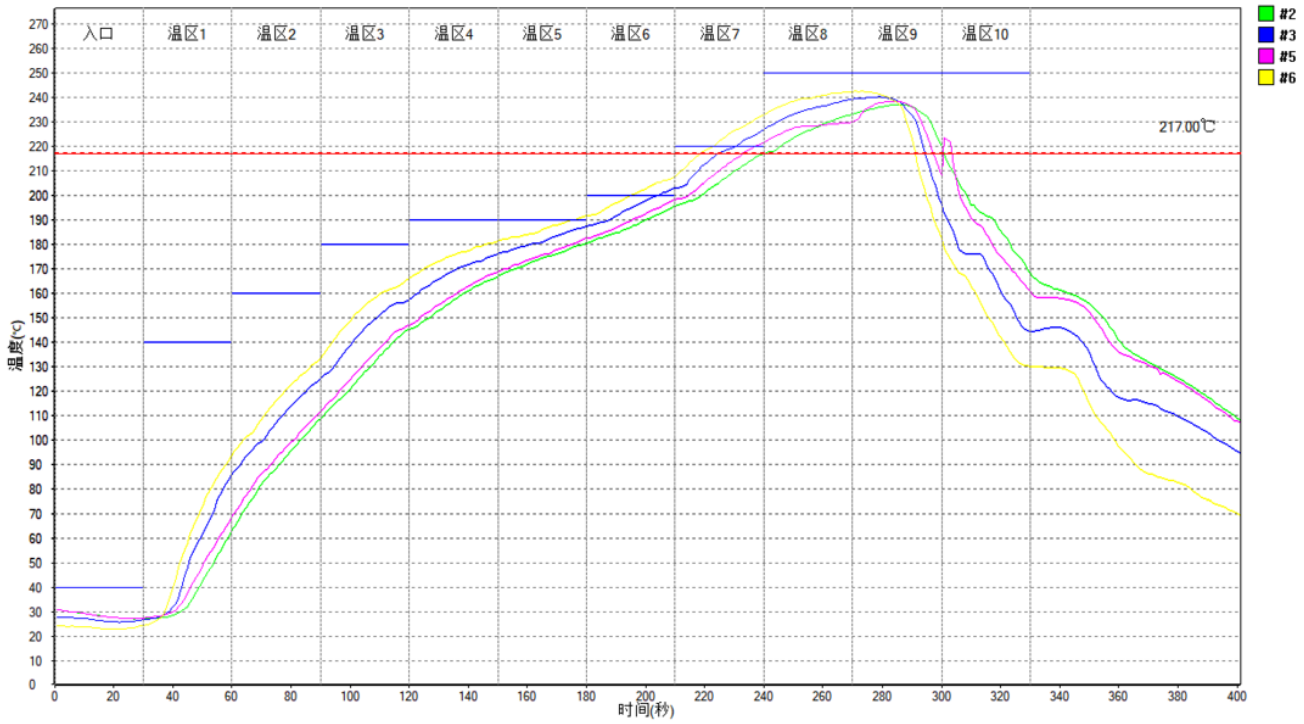


	P1	P2	S1	P3	S2	P4
Default Matching	7.5 nH	NC	2.4 pF	0.5 pF	3NH	NC
Tolerance	±5 %	N/A	±5 %	±5 %	±5 %	N/A

8 Soldering Temperature

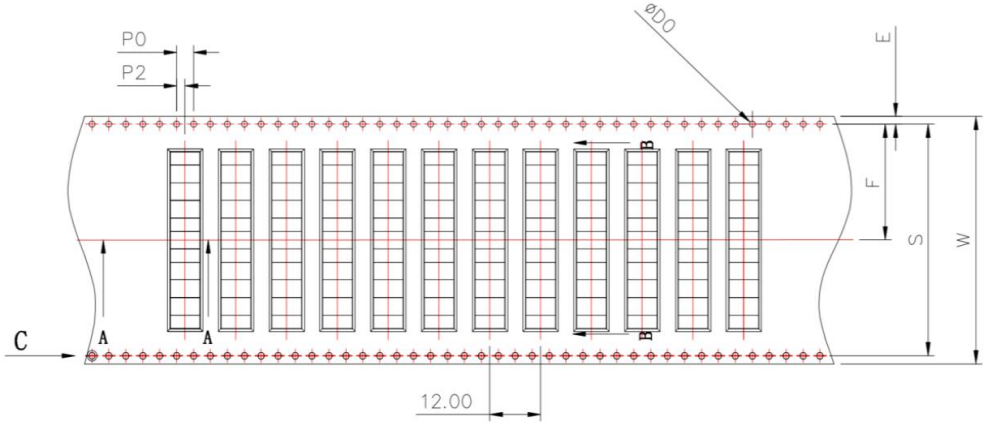
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	4 °C/second (Max.)
PREHEAT	Temperature Min (Tsmin) Temperature Max (Tsmax) Time (tsmin to tsmax)	150 °C 180 °C 120 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	217 °C 90 seconds (Max.)
PEAK	Temperature (Tp)	230–250 °C
RAMP-DOWN	Rate	-4 °C/second (Max.)

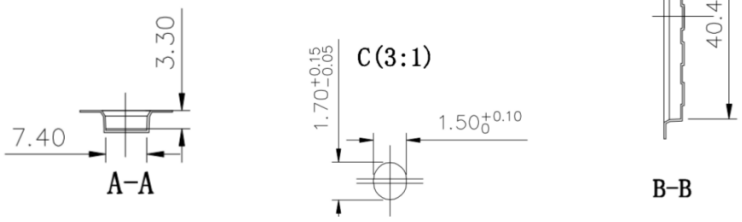
9 Reflow Profile



10 Packaging

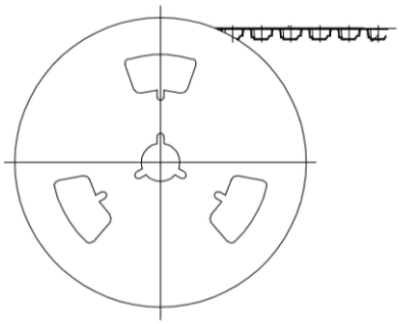
- Quantity/Reel: 1500 pcs/Reel
- Carrier Tape Dimensions (mm)





E	1.75±0.10
F	26.20±0.15
S	52.40±0.10
P2	2.00±0.10
øDo	1.50 +0.10 0.00
øD1	
Po	4.00±0.10
10Po	40.00±0.20
W	56.00±0.30

- Taping Reel Dimensions (mm)



330 mm × 56 mm

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

Or our local offices. For more information, please visit:
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Revision History

Version	Date	Author	Note
-	2023-01-28	Kane LIU/ Toby WANG	Creation of the document
1.0	2023-01-28	Kane LIU/ Toby WANG	First official release
2.0	2023-02-08	Kane LIU/ Toby WANG/ David LIU/ Vinnie LIU	Updated templates and test data.
2.1	2023-06-26	Kane LIU/ Toby WANG/ David LIU/ Vinnie LIU	Updated the drawing (Chapter 2).
2.2	2023-11-21	Kane LIU/ Toby WANG/ Vinnie LIU	1. Updated overview. 2. Updated matching circuit (Chapter 7).
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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