

Antenna Datasheet

Product OC (Antenna Only): YPCS001AA

Product OC (Antenna + EVB): YPCS001AAEVB

Version: 3.0

Date: 2023-10-27

Status: Released

Product Name: 5G SMD antenna

Key Features:

Frequency band: 1427-5850 MHz

Efficiency: Up to 65.1%

Dimensions: 20.0 × 10.0 × 3.0 mm

RoHS & REACH Compliant

Overview

This Quectel embedded 5G SMD antenna covers 5G NR Sub-6 GHz frequency bands and is compatible with 4G/3G/2G/LPWA bands. 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. Used with other 5G antennas, it can achieve MIMO (multiple input, multiple output) antenna technology for wireless communications in which multiple antennas are used at both the source (transmitter) and the destination (receiver).

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1 Specification

Test Condition: Assembled On 60 × 20 × 0.8 mm EVB

1.1. Electrical

Electrical	
Frequency Range	1427–5850 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail												
SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	N74 /N75 /N76	B1 /B2 /B3	B40	WIFI 2G	B38 /B41	B42 /B48 /N77	N79	Wi-Fi 5G
	Band Freq. (MHz)	600– 698	700– 790	790– 960	1420– 1520	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150– 5850
Max VSWR	On 60 × 20 mm EVB	-	-	-	4.8	5.1	3.1	3.0	2.9	2.2	2.9	5.5
Max Return Loss (dB)	On 60 × 20 mm EVB	-	-	-	-3.7	-3.5	-5.9	-5.9	-6.3	-8.7	-6.2	-3.2
AVG Eff. (%)	On 60 × 20 mm EVB	-	-	-	39.9	47.5	47.3	41.1	47.8	55.7	58.7	44.0
AVG Gain (dB)	On 60 × 20 mm EVB	-	-	-	-4.0	-3.2	-3.3	-3.9	-3.2	-2.6	-2.3	-3.7
Max Peak Gain (dBi)	On 60 × 20 mm EVB	-	-	-	0.2	0.6	1.3	0.0	0.8	2.6	2.1	2.3

VSWR	On 60 × 20 mm EVB	≤ 5.5
Return Loss	On 60 × 20 mm EVB	≤ -3.2 dB
Peak Gain	On 60 × 20 mm EVB	≤ 2.6 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 > 20%.
- Based on 60 × 20 mm EVB.

1.3. Mechanical & Environmental

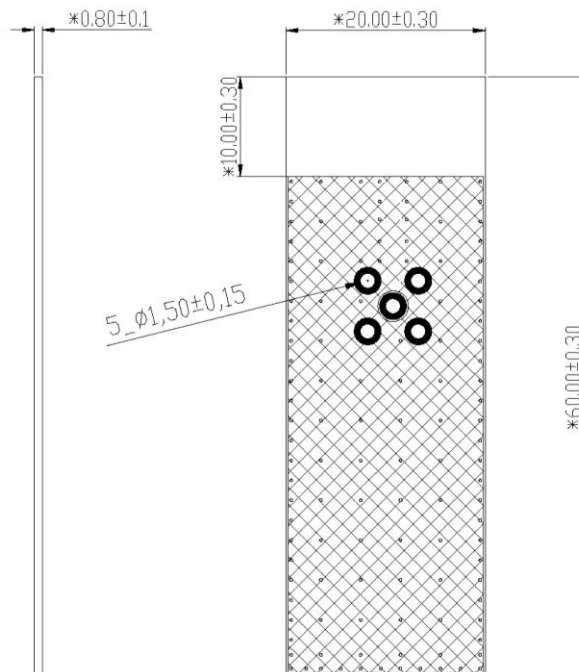
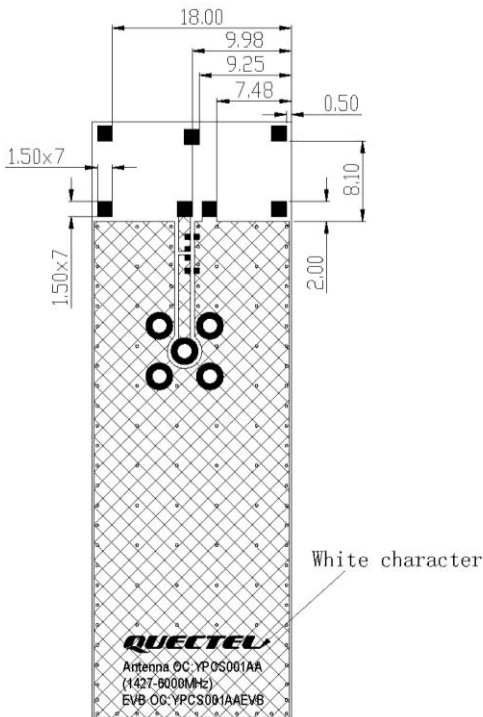
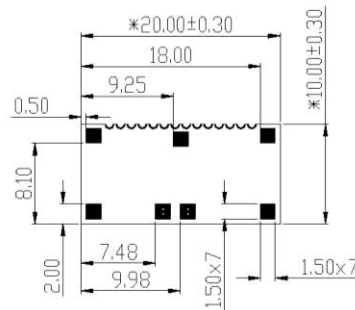
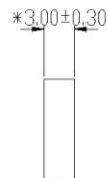
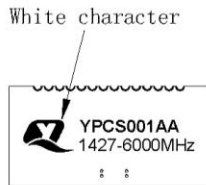
Mechanical	
Antenna Size	20.0 × 10.0 × 3.0 mm
Material & Color	PCB & Black
Antenna Weight	Typ. 1.2 g
Mounting Type	SMD
Recommended EVB Size	Rectangular EVB: 60 × 20 × 0.8 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

2 Drawing

2.1. Antenna

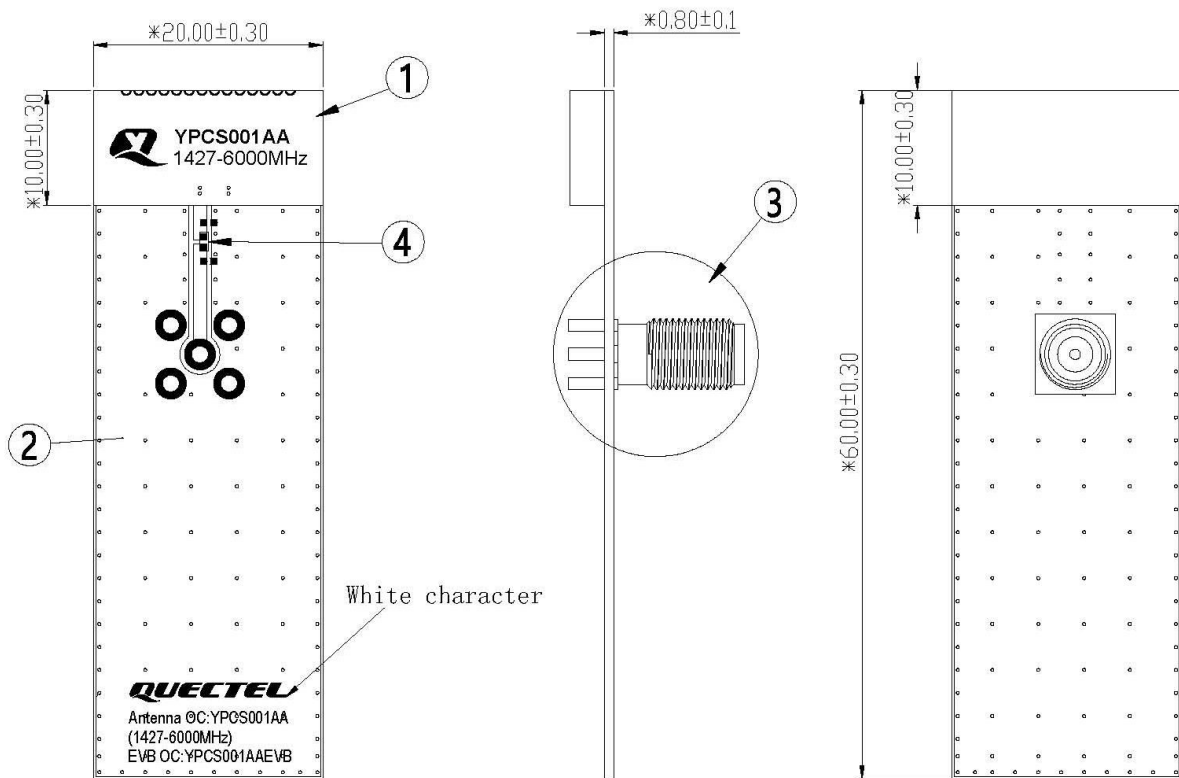


All dimensions are in mm



SN	Name	Material	Brand	QTY	Model
1	Antenna	FR4 3.0t	Quectel	1	YPCS001AA
2	PCB	FR4 0.8t	Quectel	1	YPCS001AA EVB
3	SMA Female Connector	Brass	Gold Plated	1	-
4	0 ohm inductor (0402)	Ceramics	N/A	1	-

2.2. Rectangular EVB

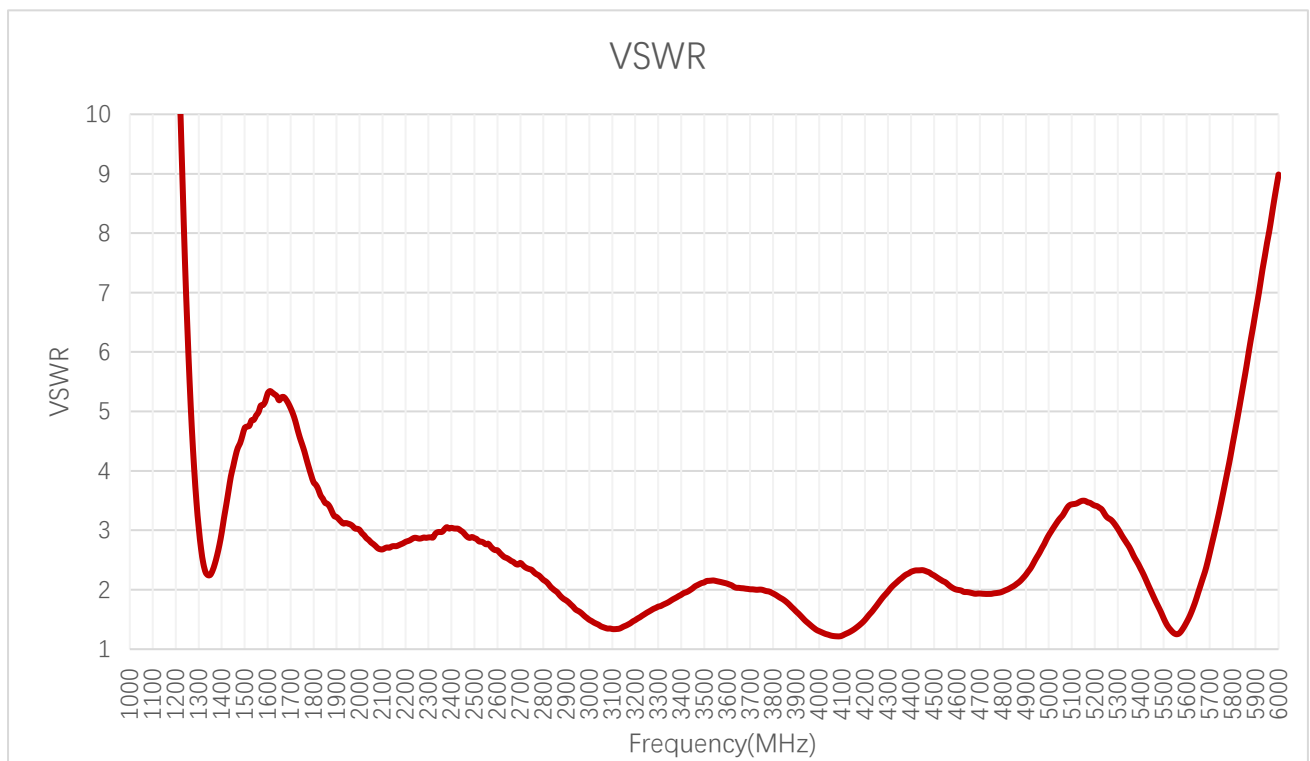


All dimensions are in mm.

3 Detailed Performance

3.1. S-Parameter Test

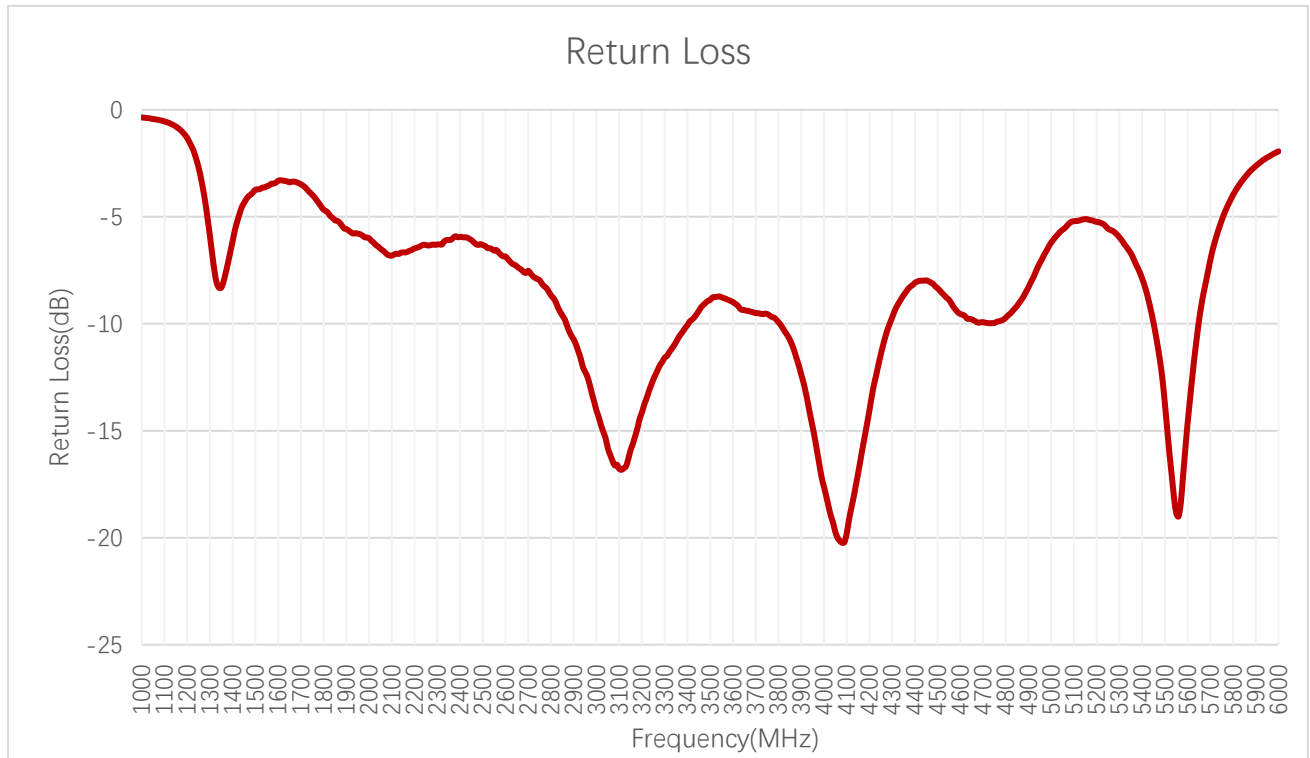
3.2.1. VSWR



VSWR

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
On 60 × 20 mm EVB	-	-	-	-	-	-	3.9	5.0	4.6	3.3
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
On 60 × 20 mm EVB	3.1	2.7	3.0	3.0	2.7	2.1	1.9	2.9	1.5	9.0

3.2.2. Return Loss

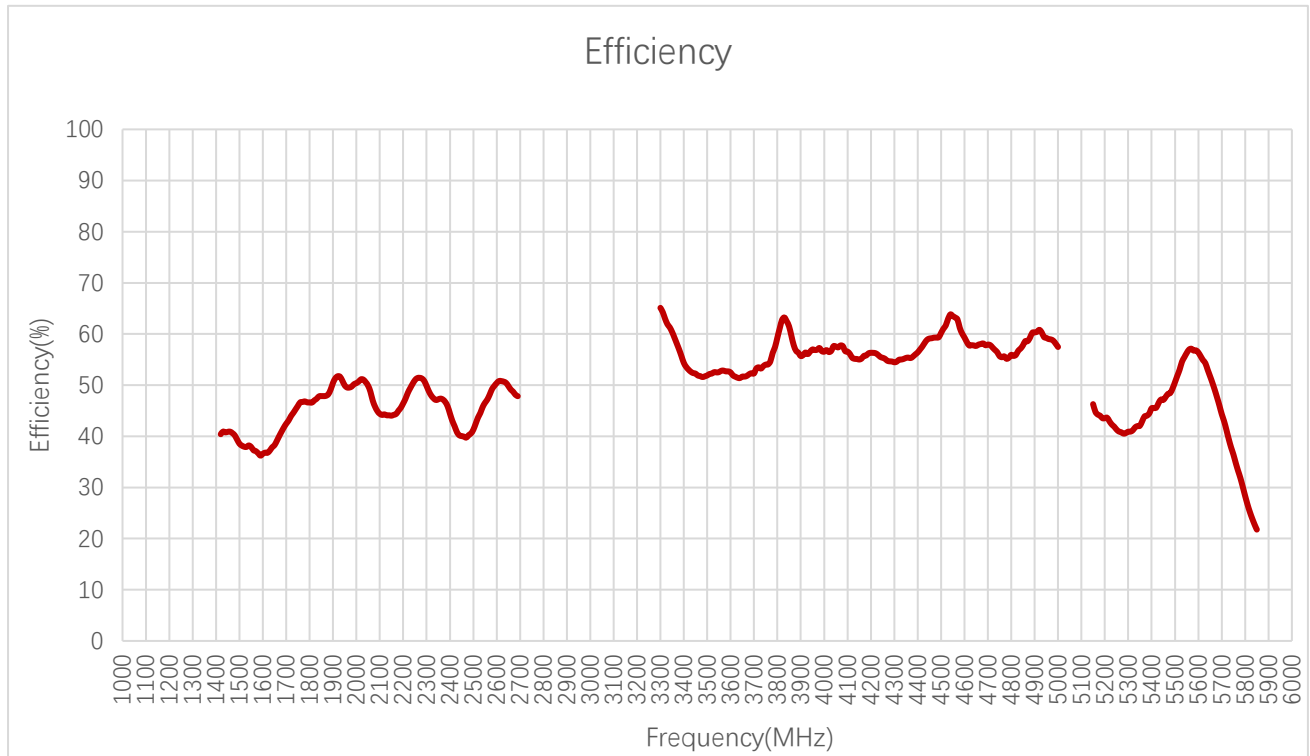


Return Loss (dB)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
On 60 × 20 mm EVB	-	-	-	-	-	-	-4.5	-3.6	-3.9	-5.4
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
On 60 × 20 mm EVB	-5.8	-6.7	-6.1	-6.1	-6.9	-9.0	-9.9	-6.2	-13.7	-1.9

3.2. Radiation Performance Test

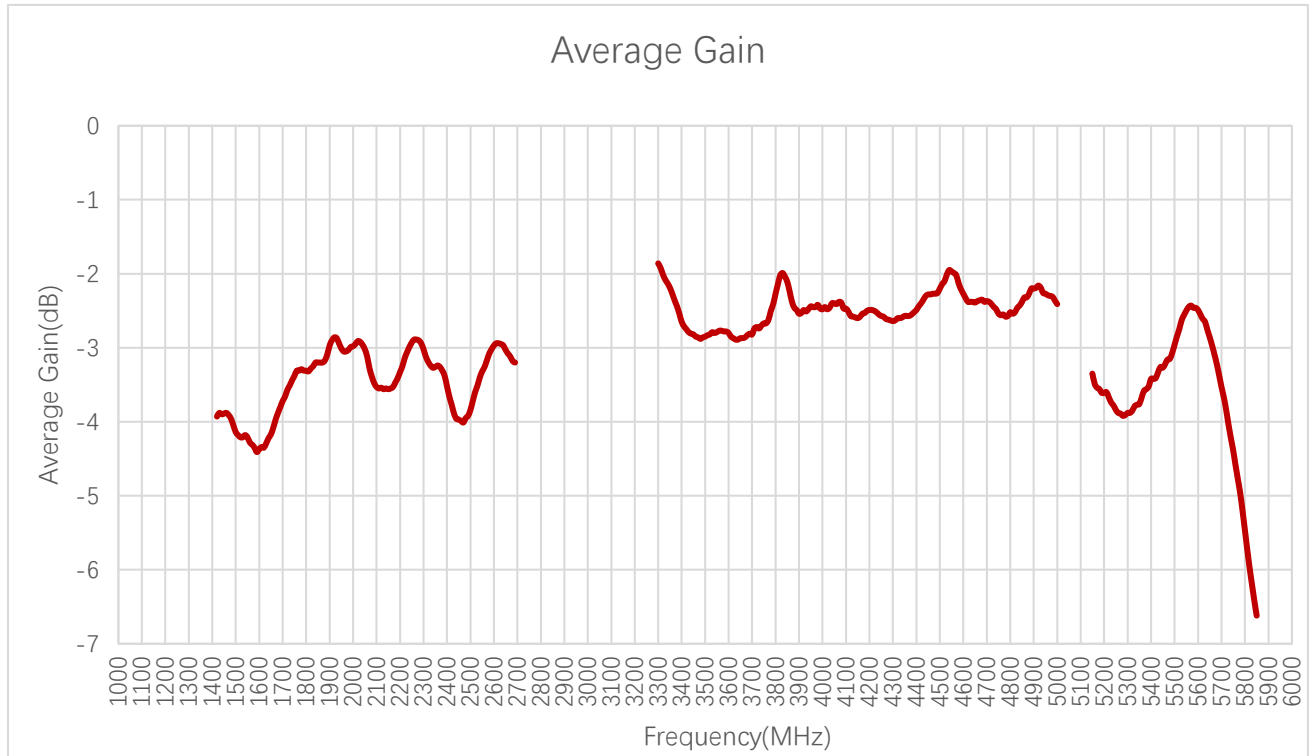
3.3.1. Efficiency



Efficiency (%)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
On 60 × 20 mm EVB	-	-	-	-	-	-	40.8	43.1	45.3	48.2
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
On 60 × 20 mm EVB	50.0	44.1	47.2	40.1	50.4	52.5	57.9	57.5	50.6	-

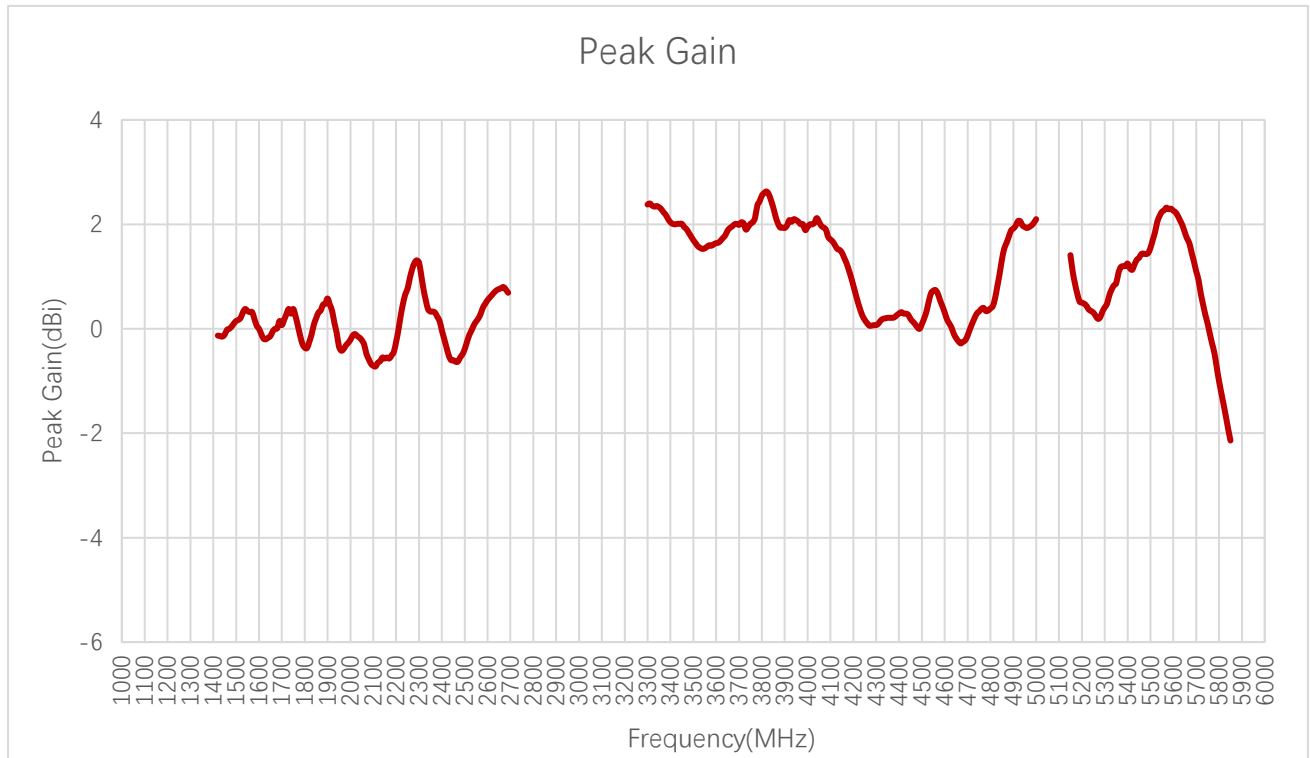
3.3.2. Average Gain



Average Gain (dB)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
On 60 × 20 mm EVB	-	-	-	-	-	-	-3.9	-3.7	-3.4	-3.2
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
On 60 × 20 mm EVB	-3.0	-3.6	-3.3	-4.0	-3.0	-2.8	-2.4	-2.4	-3.0	-

3.3.3. Peak Gain

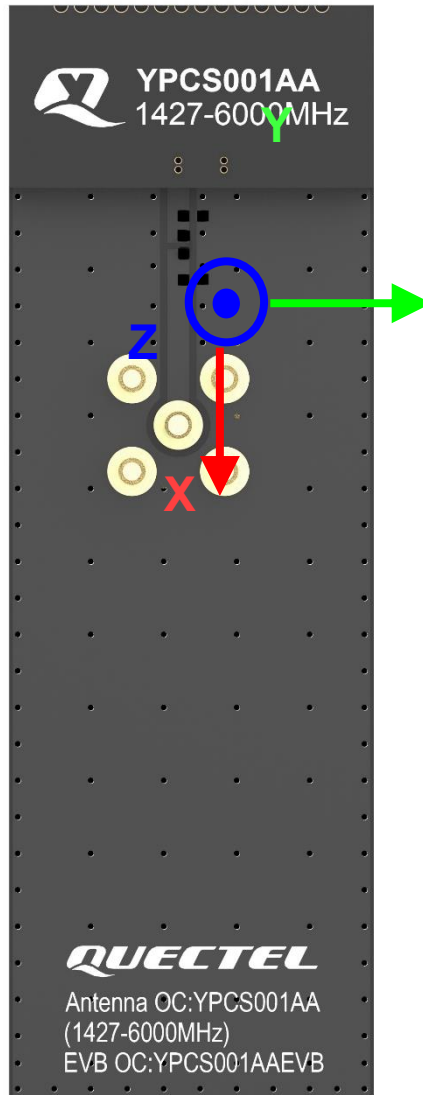


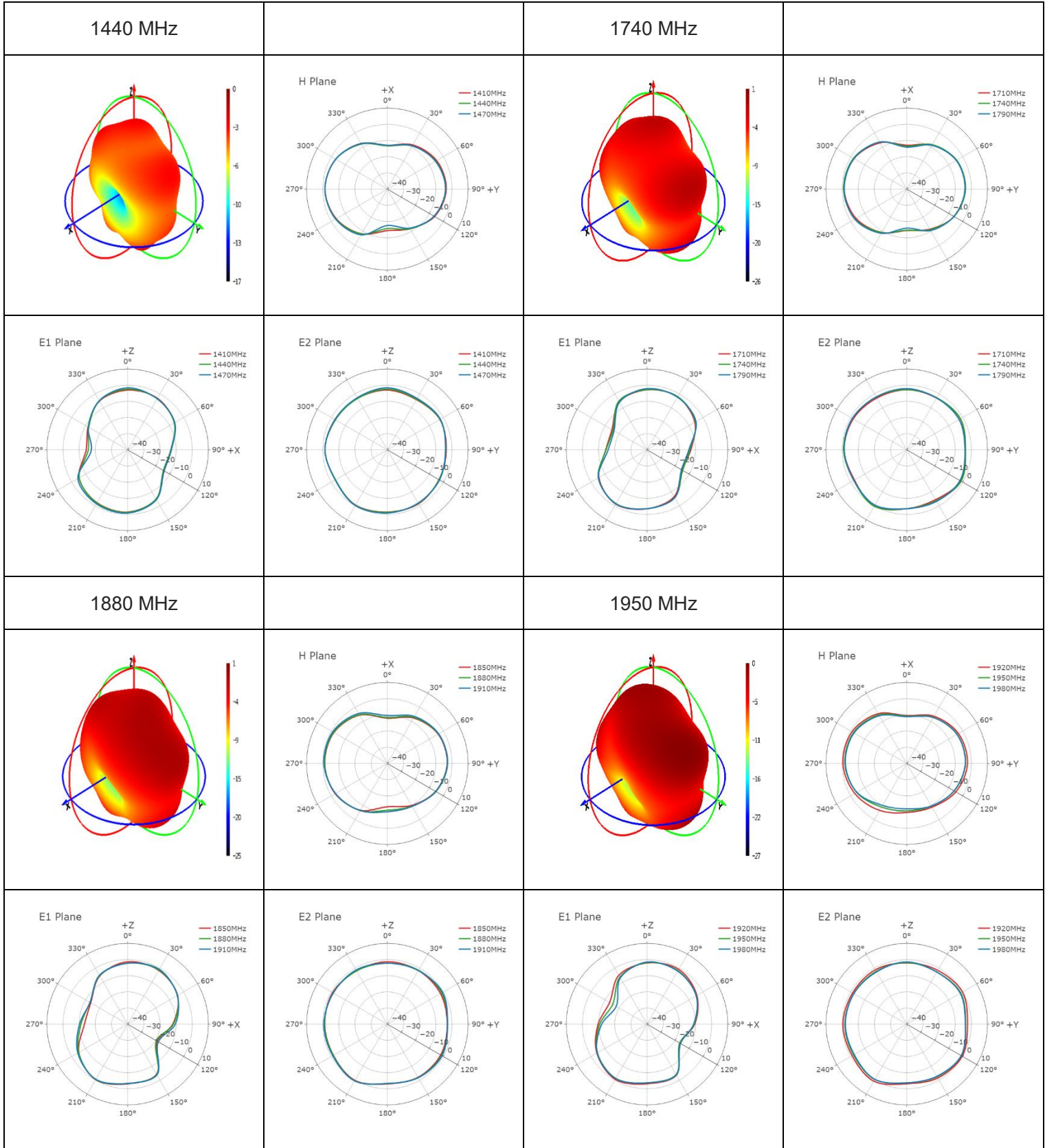
Peak Gain (dBi)

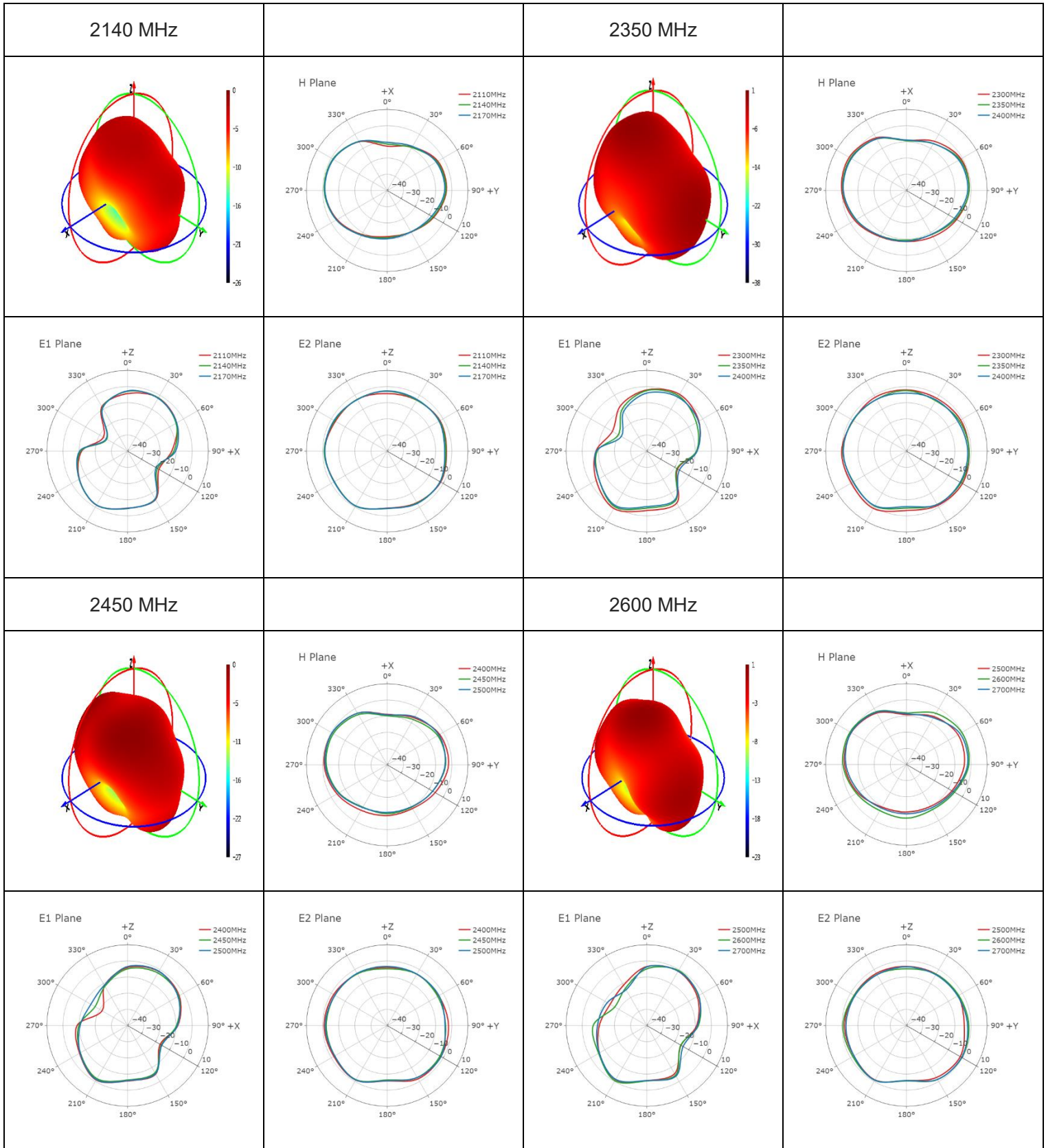
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
On 60 × 20 mm EVB	-	-	-	-	-	-	-0.2	0.2	0.3	0.5
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
On 60 × 20 mm EVB	-0.3	-0.6	0.3	-0.6	0.6	1.6	-0.1	2.1	1.6	-

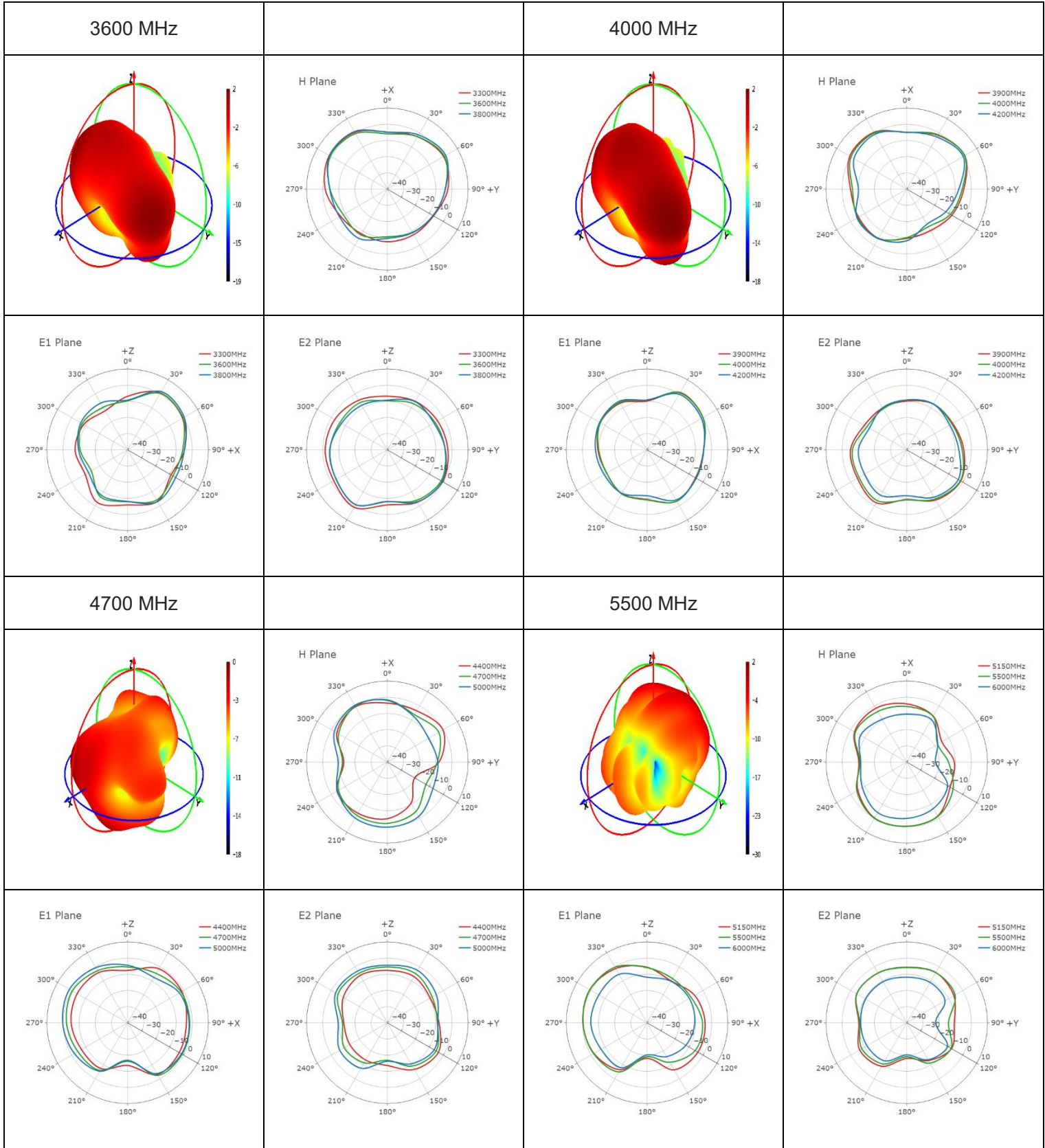
3.3.4. 3D & 2D Radiation Pattern

- Test Status: Assembled on 60 × 20 × 0.8 mm EVB
- Test Chamber: GL-S-1





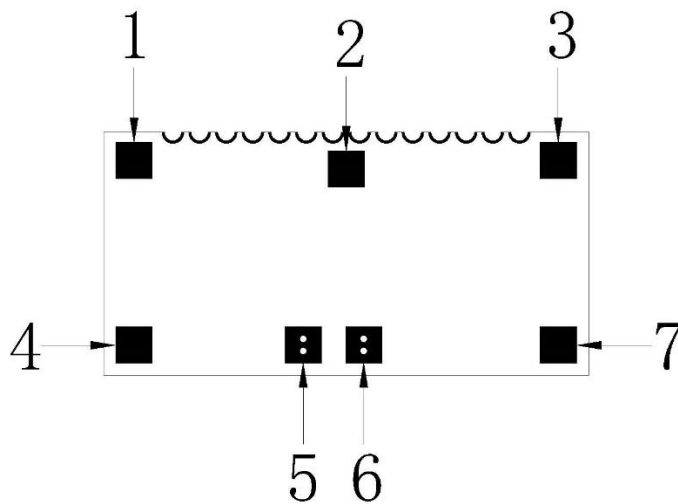




4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 7 pins, only one of which works. All other pins are for mechanical strength.

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



5 Transmission Line

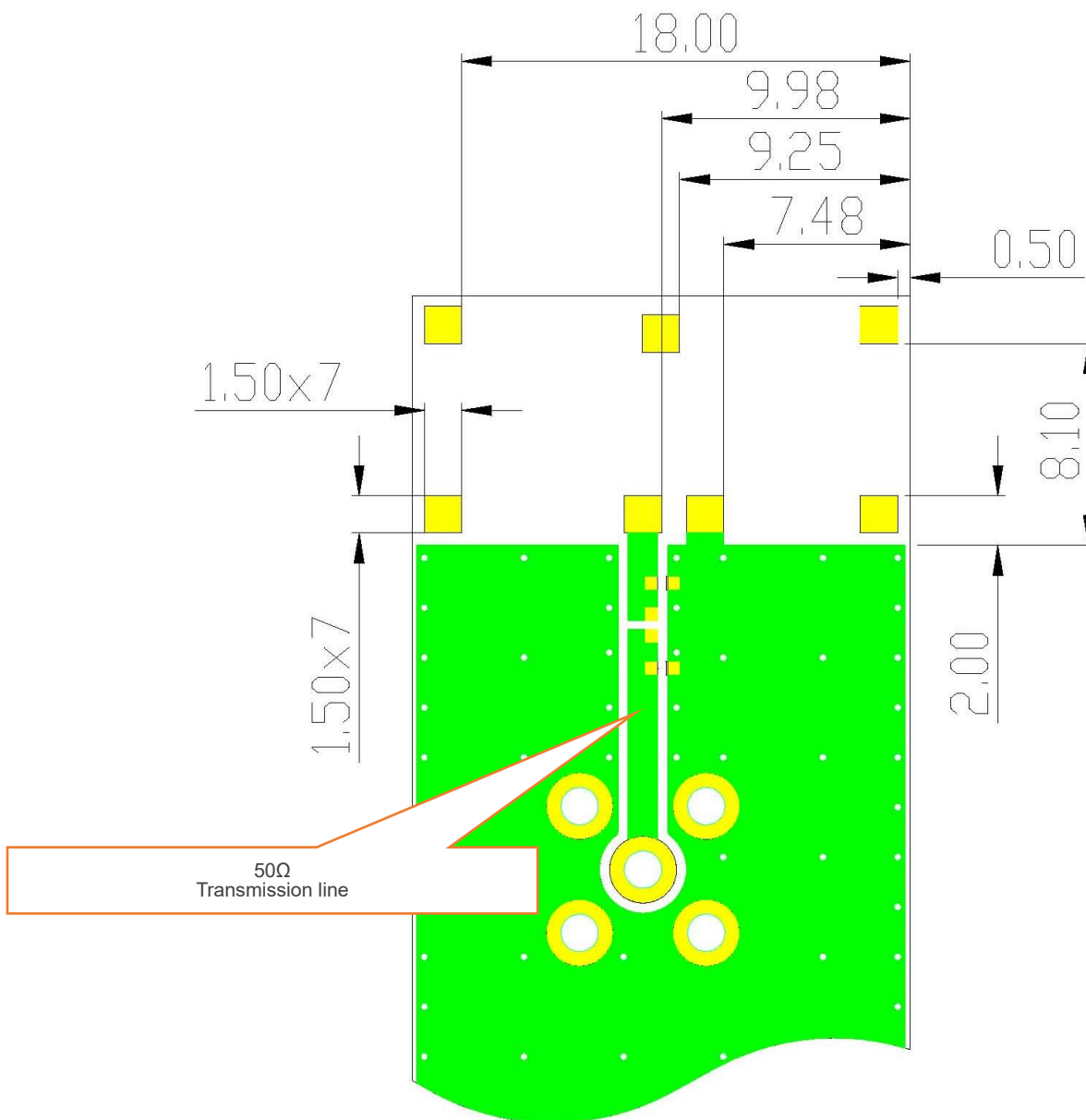
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- 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

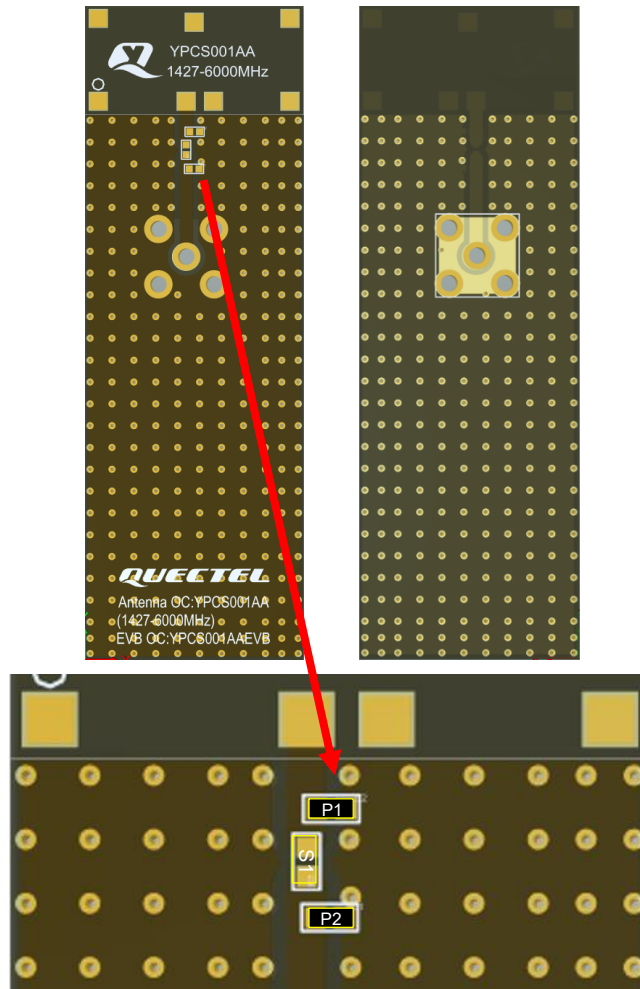
The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.



All dimensions are in mm.

7 Matching Circuit

Demo Board Top and Bottom View

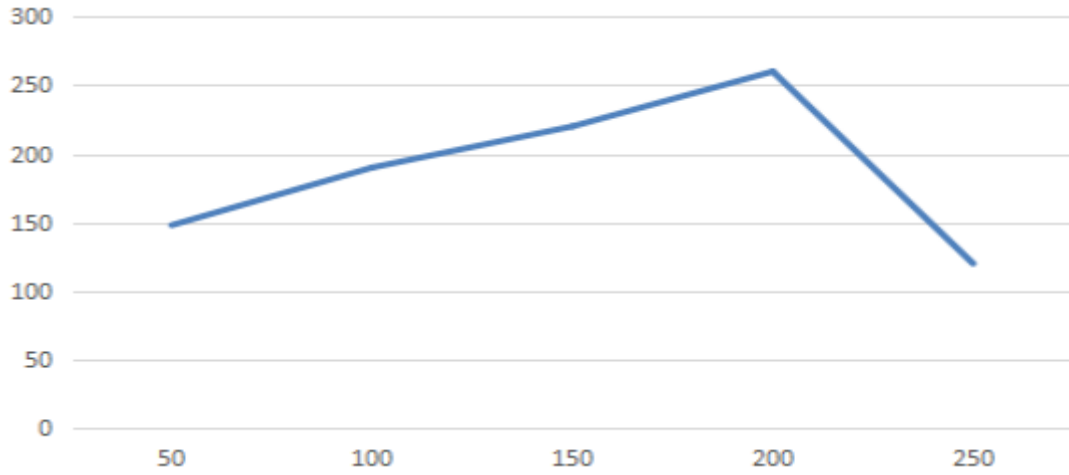


	P1	S1	P2
Default Matching	DNI	0 Ohm	DNI
Tolerance	N/A	-	N/A

8 Soldering Temperature

Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (T _{max} to T _p)	3 °C/second (Max.)
PREHEAT	Temperature Min (T _{min}) Temperature Max (T _{max}) Time (T _{min} to T _{max})	148 °C 190 °C 125 seconds (Max.)
REFLOW	Temperature (T _L) Total Time above T _L (T _L)	220°C 50 seconds (Max.)
PEAK	Temperature (T _p) Time (T _p)	260 °C 10 seconds (Max.)
RAMP-DOWN	Rate	5 °C/second (Max.)

9 Reflow Profile



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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Revision History

Version	Date	Author	Note
-	2021-03-16	Andy MIAO/ Toby WANG	Creation of the document
1.0	2021-03-16	Andy MIAO/ Toby WANG	First official release
2.0	2022-10-18	Andy MIAO/ Toby WANG	Second official release
2.1	2023-02-14	Vinnie LIU	Added packaging information (Chapter 9).
2.2	2023-06-26	Toby WANG	Updated the drawing (Chapter 9).
3.0	2023-10-27	Weston ZHANG/ Toby WANG/ David LIU/ Vinnie LIU	Updated all test data in this datasheet.

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