



Antenna Datasheet

Product OC (Antenna Only): YPCP001AA

Product OC (Antenna + Rectangular EVB): YPCP001AAEVB

Version: 1.0

Date: 2023-01-08

Status: Preliminary

Product Name: 4G SMD Antenna

Key Features:

High efficiency, Excellent performance

Frequency band: 600-960MHz, 1710-2690MHz

Peak efficiency: 76.79%

Dimensions: 36mm x 9mm x 3mm

Overview

□ Introduction

This wideband LTE/cellular/CDMA SMT antenna is suitable for 4G/3G/2G applications. Operating at 600-960MHz, 1710-2690MHz it's a high-efficiency antenna which is mounted to the device host PCB using conventional PCB reflow process. 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	600-960MHz, 1710-2690MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail								
SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	WIFI 2G	B38 /B41
	Freq. (MHz)	600 – 700	700 – 810	810 – 960	1700 – 2170	2300 – 2400	2400 – 2500	2500 – 2690
Max VSWR	On 130 * 45.5 mm EVB	3.4	2.9	2.9	3.3	4.1	3.3	2.3
	On 120 * 45.5 mm EVB	3.9	3.3	3.3	3.1	3.3	3.3	3.0
	On 110 * 45.5 mm EVB	12.7	2.8	2.0	2.5	2.6	2.5	2.5
	On 100 * 45.5 mm EVB	13.1	3.7	2.6	3.4	2.8	2.6	2.5
	On 90 * 45.5 mm EVB	14.6	4.1	3.0	3.7	3.4	3.1	2.9
	On 80 * 45.5 mm EVB	14.7	4.5	3.1	3.5	4.0	3.6	3.3
	On 65 * 45.5 mm EVB	14.4	5.5	3.6	2.8	3.3	3.2	3.0
Max	On 130 * 45.5 mm EVB	-5.2	-6.3	-6.1	-5.5	-4.4	-5.4	-8.0

Return Loss (dB)	On 120 * 45.5 mm EVB	-4.6	-5.5	-5.4	-5.7	-5.5	-5.4	-6.0
	On 110 * 45.5 mm EVB	-1.4	-6.4	-9.5	-7.3	-7.2	-7.3	-7.2
	On 100 * 45.5 mm EVB	-1.3	-4.9	-6.9	-5.3	-6.6	-7.1	-7.4
	On 90 * 45.5 mm EVB	-1.2	-4.3	-6.0	-4.9	-5.3	-5.8	-6.3
	On 80 * 45.5 mm EVB	-1.2	-3.9	-5.8	-5.1	-4.4	-5.0	-5.4
	On 65 * 45.5 mm EVB	-1.2	-3.2	-5.0	-6.4	-5.5	-5.6	-5.9
AVG Eff. (%)	On 130 * 45.5 mm EVB	37.1	50.3	46.1	60.3	49.3	56.2	72.7
	On 120 * 45.5 mm EVB	31.9	47.9	48.3	58.4	54.8	58.7	72.8
	On 110 * 45.5 mm EVB	15.4	59.8	62.5	58.5	66.2	63.6	63.6
	On 100 * 45.5 mm EVB	11.4	49.1	56.3	47.9	63.3	63.4	63.3
	On 90 * 45.5 mm EVB	8.8	41.4	53.5	46.8	58.7	59.8	62.3
	On 80 * 45.5 mm EVB	7.2	33.4	46.5	48.3	53.7	54.1	57.8
AVG Gain (dB)	On 130 * 45.5 mm EVB	-4.5	-3.0	-3.4	-2.2	-3.1	-2.5	-1.4
	On 120 * 45.5 mm EVB	-5.2	-3.2	-3.2	-2.3	-2.6	-2.3	-1.4
	On 110 * 45.5 mm EVB	-8.9	-2.3	-2.0	-2.4	-1.8	-2.0	-2.0
	On 100 * 45.5 mm EVB	-10.1	-3.2	-2.5	-3.2	-2.0	-2.0	-2.0
	On 90 * 45.5 mm EVB	-11.2	-4.0	-2.7	-3.3	-2.3	-2.2	-2.1
	On 80 * 45.5 mm EVB	-12.1	-4.9	-3.4	-3.2	-2.7	-2.7	-2.4
Max Peak Gain (dBi)	On 130 * 45.5 mm EVB	-0.3	-0.1	0.4	2.6	2.7	2.8	3.1
	On 120 * 45.5 mm EVB	-0.8	-0.4	0.5	2.7	3.0	2.9	3.0
	On 110 * 45.5 mm EVB	-2.0	1.1	1.5	3.1	3.1	2.9	2.7
	On 100 * 45.5 mm EVB	-3.3	0.4	1.1	2.5	2.4	2.4	2.4
	On 90 * 45.5 mm EVB	-4.4	0.0	0.9	2.7	2.7	2.4	2.4
	On 80 * 45.5 mm EVB	-5.4	-0.9	0.2	2.5	2.3	1.9	1.8
VSWR	On 130 * 45.5 mm EVB				≤ 4.1			
	On 120 * 45.5 mm EVB				≤ 3.3			

	On 110 * 45.5 mm EVB	≤ 2.8
	On 100 * 45.5 mm EVB	≤ 3.7
	On 90 * 45.5 mm EVB	≤ 4.1
	On 80 * 45.5 mm EVB	≤ 4.5
	On 65 * 45.5 mm EVB	≤ 5.5
Return Loss	On 120 * 45 mm EVB	≤ -4.4 dB
	On 130 * 45.5 mm EVB	≤ -5.4 dB
	On 120 * 45.5 mm EVB	≤ -6.4 dB
	On 110 * 45.5 mm EVB	≤ -4.9 dB
	On 100 * 45.5 mm EVB	≤ -4.3 dB
	On 90 * 45.5 mm EVB	≤ -3.9 dB
	On 80 * 45.5 mm EVB	≤ -3.2 dB
Peak Gain	On 130 * 45.5 mm EVB	≤ 3.1 dBi
	On 120 * 45.5 mm EVB	≤ 3 dBi
	On 110 * 45.5 mm EVB	≤ 3.1 dBi
	On 100 * 45.5 mm EVB	≤ 2.5 dBi
	On 90 * 45.5 mm EVB	≤ 2.7 dBi
	On 80 * 45.5 mm EVB	≤ 2.5 dBi
	On 65 * 45.5 mm EVB	≤ 2.4 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 > 20%.
- Based on 110 * 45.5mm EVB.

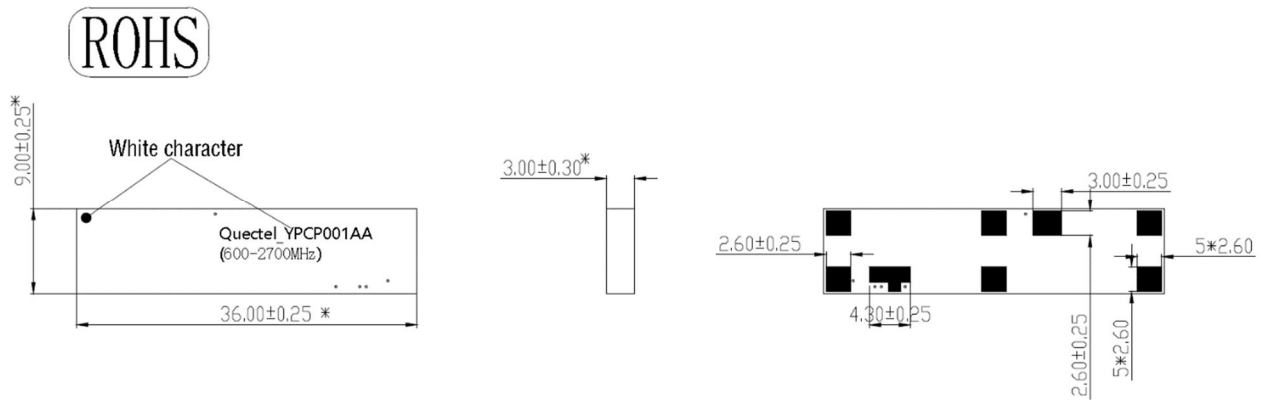
1.3. Mechanical, Environmental & Storage

Mechanical	
Antenna Size	36*9*3mm
Antenna Material & Color	FR4&BLACK
Antenna Weight	Typ:0.8 g
Mounting Type	Soldering
Recommended EVB Size	110*45.5*0.8mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Humidity	Non-condensing 65 °C 95 % RH
Ingress Protection Rating	-
RoHS & REACH Compliant	Yes
Storage	
Storage Temperature	-40 °C to +85 °C
Humidity	Less than 75% RH

Storage Place	Away from corrosive gas and direct sunlight
Packaging	Antennas should be stored in unopened sealed manufacturer's plastic packaging.

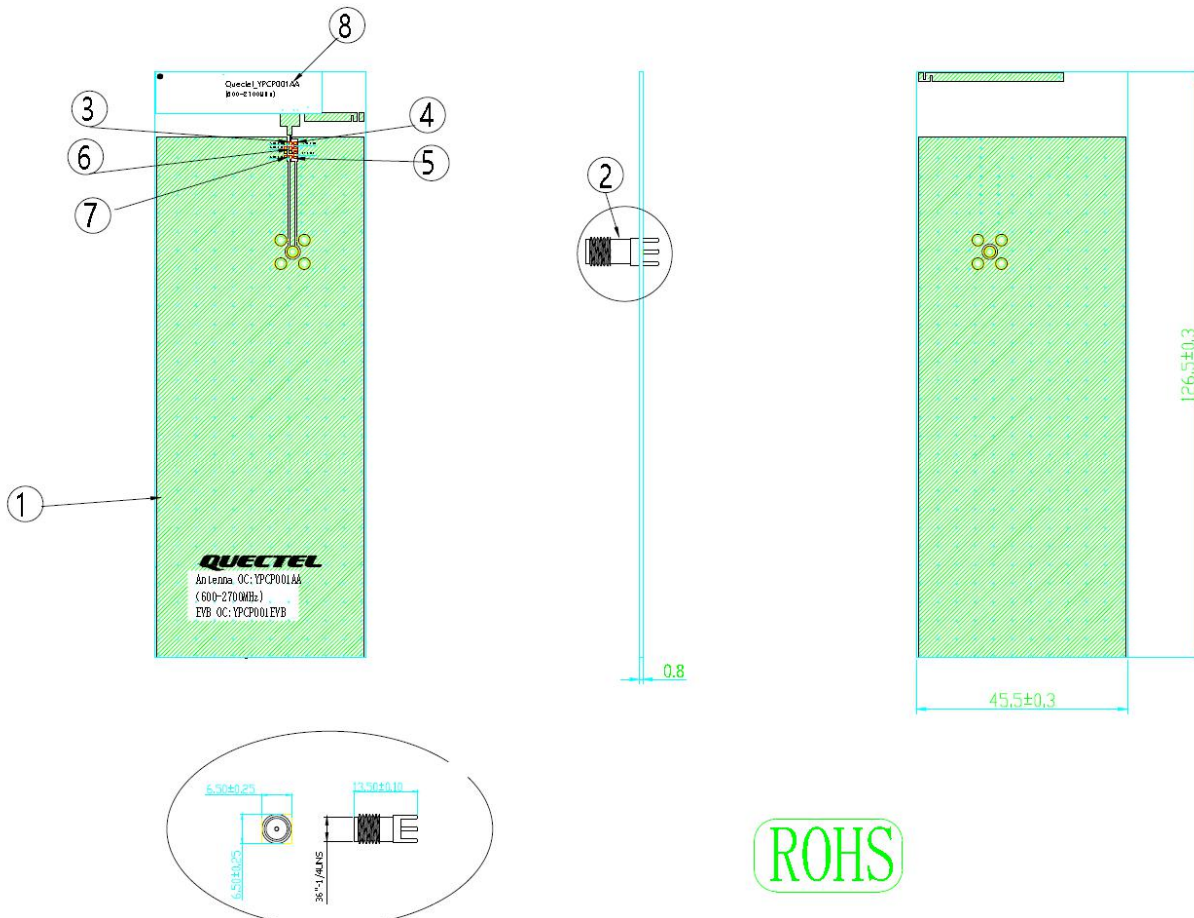
2 Drawing

2.1. PCB Size



2.2. EVB Size

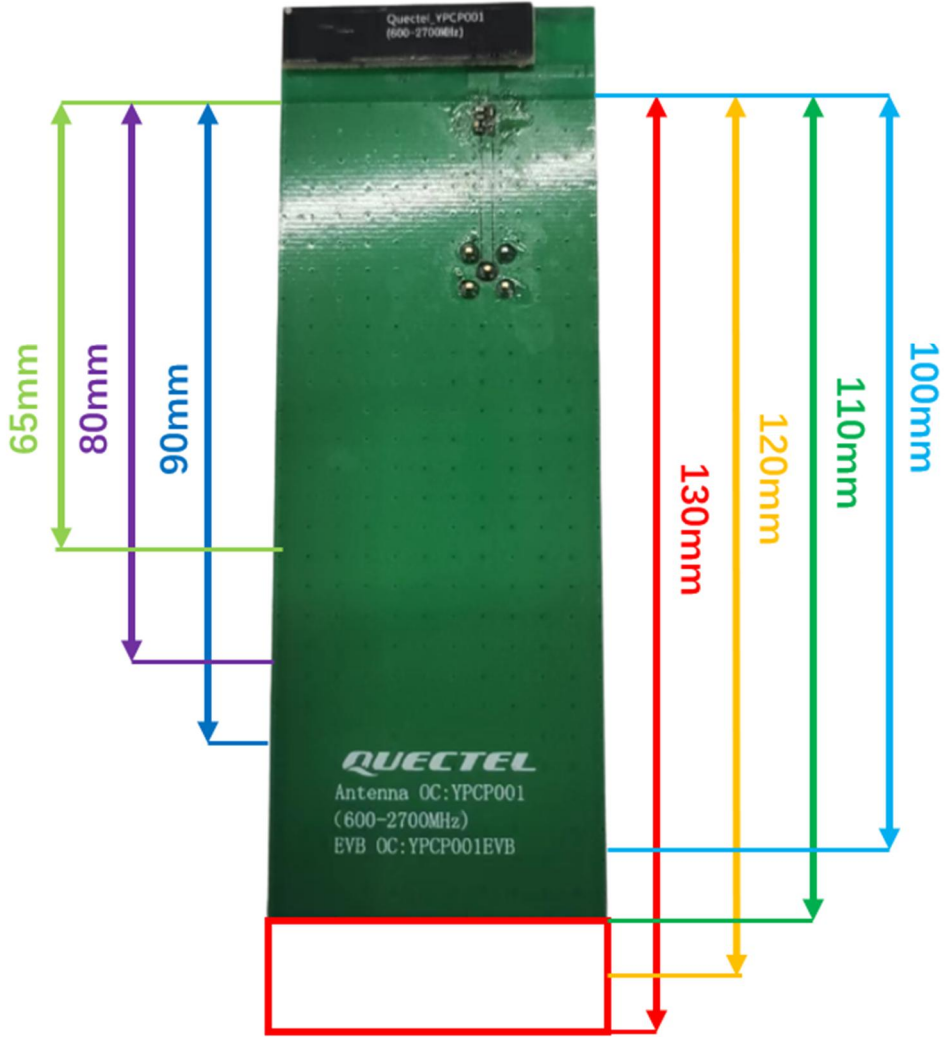
	Name	Material	Brand	QTY	NO
1	EVB-PCBA	FR4 0.8t	GREEN	1	
2	SMA-K	Brass	Gold Plated	1	
3	7.5 nH Inductor(0402)	Ceramics	MURATA	1	
4	4.7pF Inductor(0402)	Ceramics	MURATA	1	
5	0Ω nH Inductor(0402)	Ceramics	MURATA	1	
6	0.5pF Inductor(0402)	Ceramics	MURATA	1	
7	0.5pF Inductor(0402)	Ceramics	MURATA	1	
8	PCB	FR4 3.0t	BLACK	1	



3 Detailed Performance

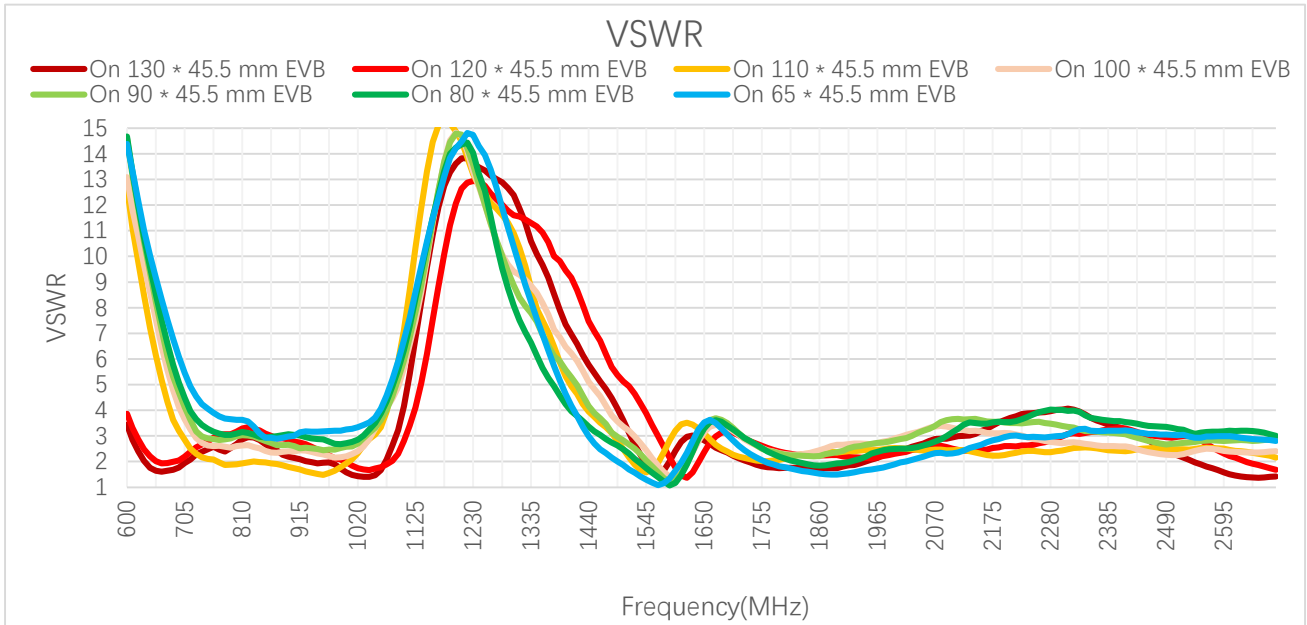
3.1. Overview

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

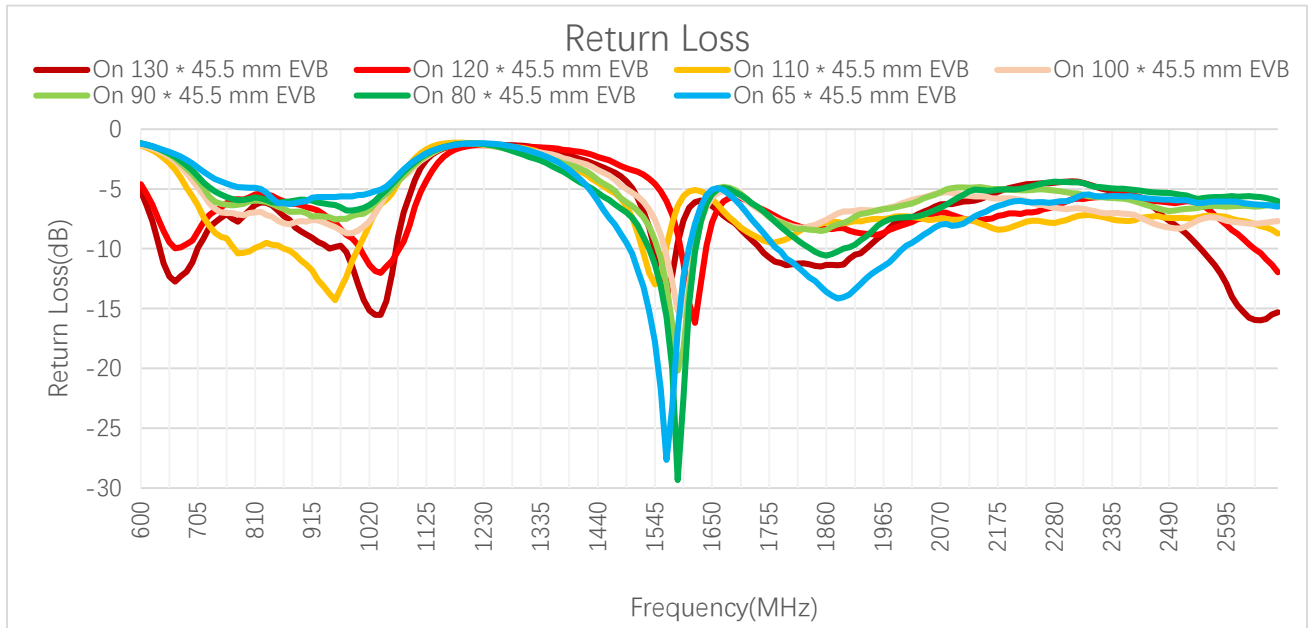
3.2.1. VSWR



VSWR

Frequency (MHz)	630	710	830	900	1740	1880	1950	2140	2450	2600
On 130 * 45.5 mm EVB	2.0	1.9	2.9	2.1	1.9	1.7	2.1	3.1	3.0	1.6
On 120 * 45.5 mm EVB	2.5	2.2	3.3	2.8	2.7	2.3	2.1	2.4	3.1	2.3
On 110 * 45.5 mm EVB	8.5	2.8	2.0	1.7	2.0	2.4	2.5	2.3	2.5	2.5
On 100 * 45.5 mm EVB	9.7	3.7	2.6	2.4	2.6	2.6	2.7	3.2	2.4	2.4
On 90 * 45.5 mm EVB	10.6	4.1	3.0	2.6	2.6	2.3	2.7	3.7	2.9	2.8
On 80 * 45.5 mm EVB	10.7	4.5	3.0	3.0	2.7	1.9	2.3	3.5	3.4	3.2
On 65 * 45.5 mm EVB	11.0	5.5	3.4	3.0	2.2	1.5	1.7	2.6	3.1	3.0

3.2.2. Return Loss

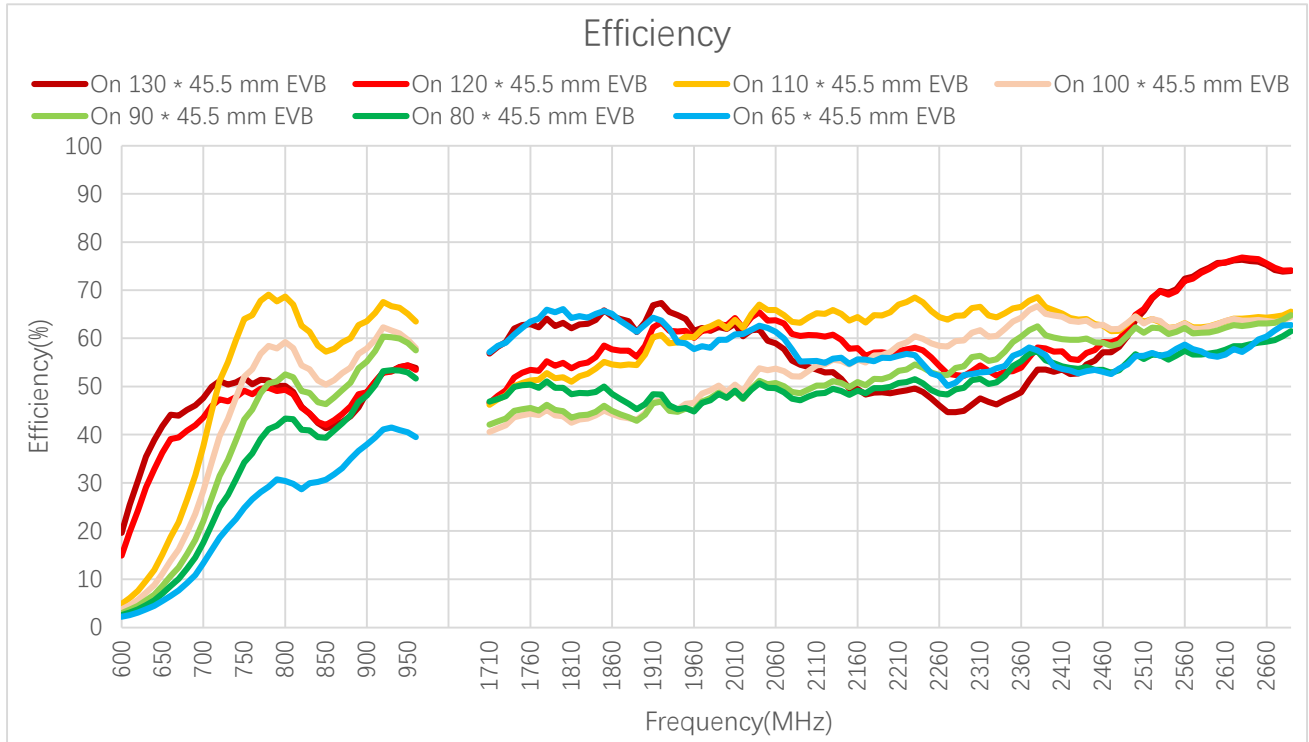


Return Loss (dB)

Frequency (MHz)	630	710	830	900	1740	1880	1950	2140	2450	2600
On 130 * 45.5 mm EVB	-9.4	-9.9	-6.2	-8.8	-10.3	-11.4	-9.1	-5.9	-6.1	-12.9
On 120 * 45.5 mm EVB	-7.4	-8.6	-5.5	-6.5	-6.8	-8.3	-8.8	-7.6	-5.9	-8.0
On 110 * 45.5 mm EVB	-2.1	-6.4	-9.5	-11.3	-9.3	-7.8	-7.5	-7.9	-7.4	-7.3
On 100 * 45.5 mm EVB	-1.8	-4.9	-7.2	-7.7	-6.9	-7.0	-6.8	-5.6	-7.6	-7.7
On 90 * 45.5 mm EVB	-1.6	-4.3	-6.1	-7.0	-6.9	-8.0	-6.8	-4.9	-6.3	-6.5
On 80 * 45.5 mm EVB	-1.6	-3.9	-5.9	-5.9	-6.9	-10.2	-8.1	-5.1	-5.2	-5.7
On 65 * 45.5 mm EVB	-1.6	-3.2	-5.3	-6.0	-8.7	-14.2	-11.8	-7.1	-5.8	-6.1

3.3. Radiation Performance Test

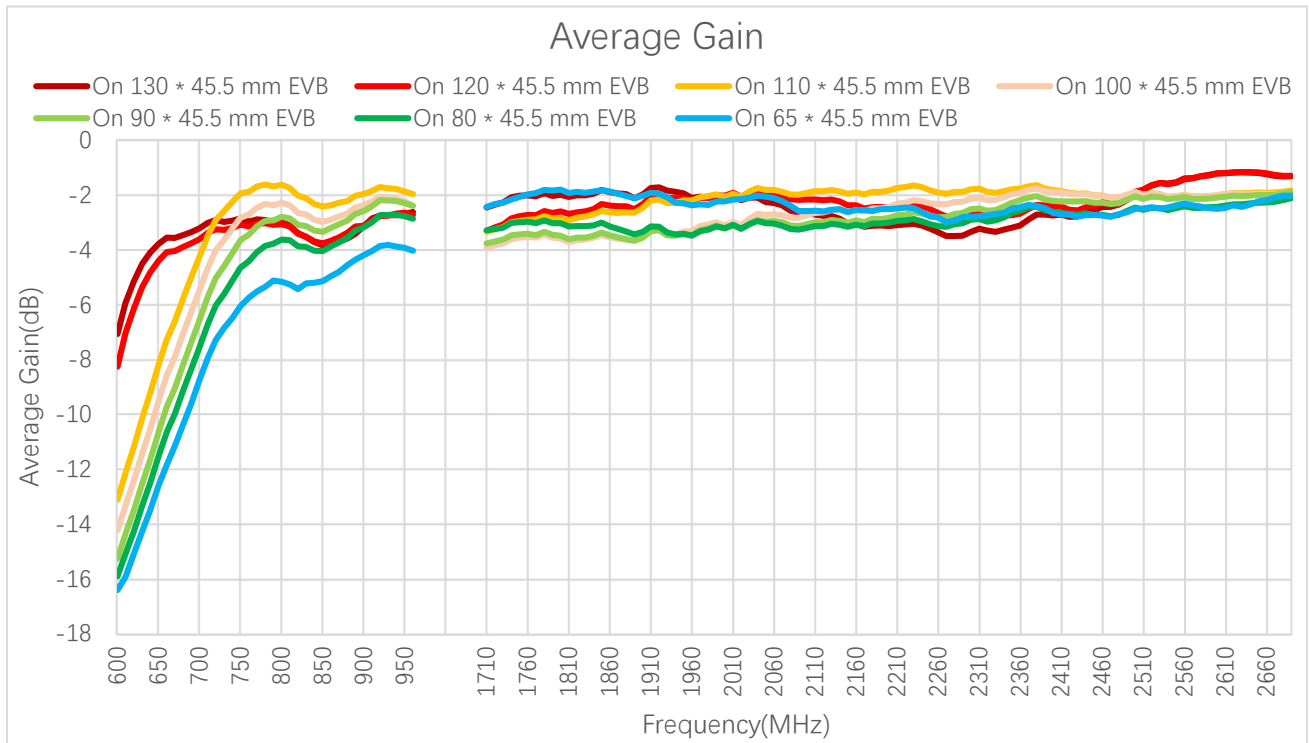
3.3.1. Efficiency



Efficiency (%)

Frequency (MHz)	630	710	830	900	1740	1880	1950	2140	2450	2600
On 130 * 45.5 mm EVB	35.4	49.9	44.4	48.8	62.0	63.5	64.0	51.6	55.4	75.7
On 120 * 45.5 mm EVB	29.1	46.0	44.4	48.8	51.9	57.5	61.6	59.7	57.6	75.4
On 110 * 45.5 mm EVB	9.7	44.8	61.4	63.5	50.1	54.6	60.4	65.1	63.0	63.0
On 100 * 45.5 mm EVB	7.2	34.2	53.6	57.9	43.6	43.4	46.4	55.3	62.6	62.9
On 90 * 45.5 mm EVB	5.6	26.8	48.7	55.2	45.0	43.6	45.4	50.8	59.2	61.6
On 80 * 45.5 mm EVB	4.6	21.3	40.9	48.1	49.9	46.4	45.6	49.1	53.4	57.1
On 65 * 45.5 mm EVB	3.7	16.0	30.0	38.0	60.8	62.5	58.9	56.0	53.5	56.2

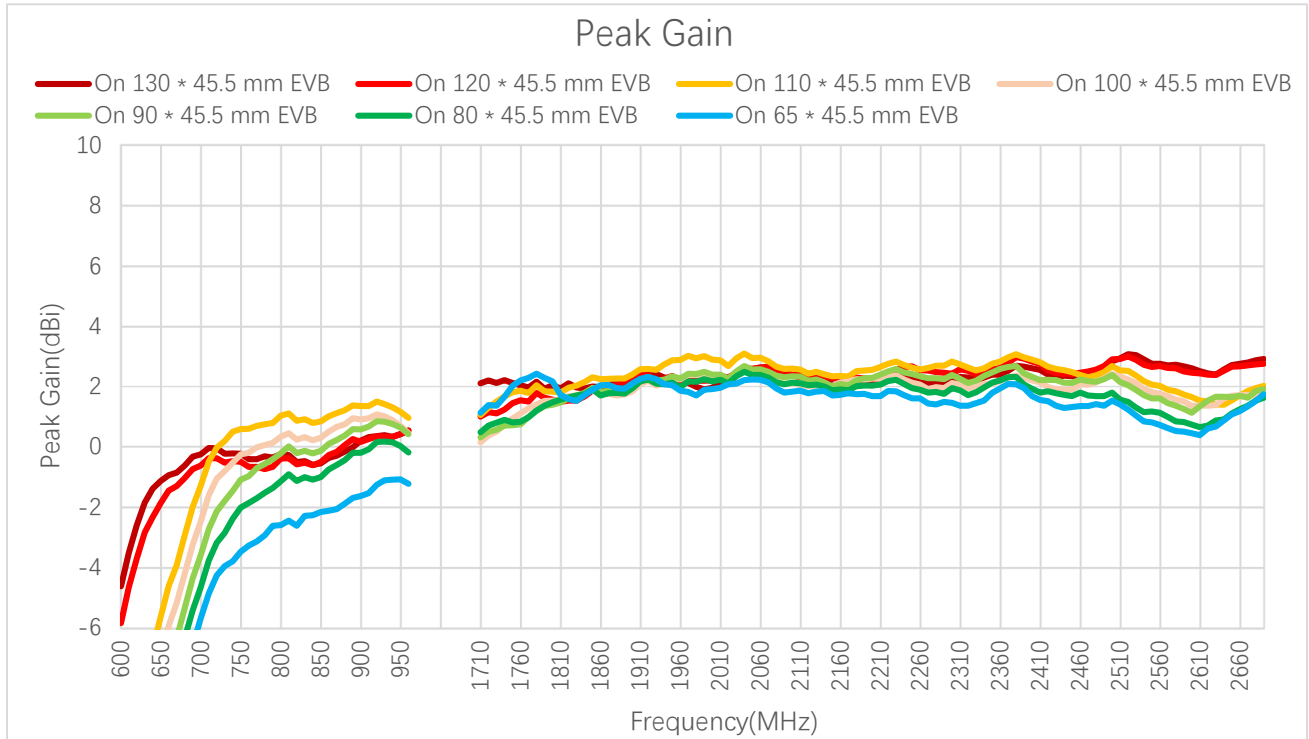
3.3.2. Average Gain



Average Gain (dB)

Frequency (MHz)	630	710	830	900	1740	1880	1950	2140	2450	2600
On 130 * 45.5 mm EVB	-4.5	-3.0	-3.5	-3.1	-2.1	-2.0	-1.9	-2.9	-2.6	-1.2
On 120 * 45.5 mm EVB	-5.4	-3.4	-3.5	-3.1	-2.9	-2.4	-2.1	-2.2	-2.4	-1.2
On 110 * 45.5 mm EVB	-10.2	-3.5	-2.1	-2.0	-3.0	-2.6	-2.2	-1.9	-2.0	-2.0
On 100 * 45.5 mm EVB	-11.4	-4.7	-2.7	-2.4	-3.6	-3.6	-3.3	-2.6	-2.0	-2.0
On 90 * 45.5 mm EVB	-12.5	-5.7	-3.1	-2.6	-3.5	-3.6	-3.4	-3.0	-2.3	-2.1
On 80 * 45.5 mm EVB	-13.3	-6.7	-3.9	-3.2	-3.0	-3.3	-3.4	-3.1	-2.7	-2.4
On 65 * 45.5 mm EVB	-14.3	-8.0	-5.2	-4.2	-2.2	-2.0	-2.3	-2.5	-2.7	-2.5

3.3.3. Peak Gain

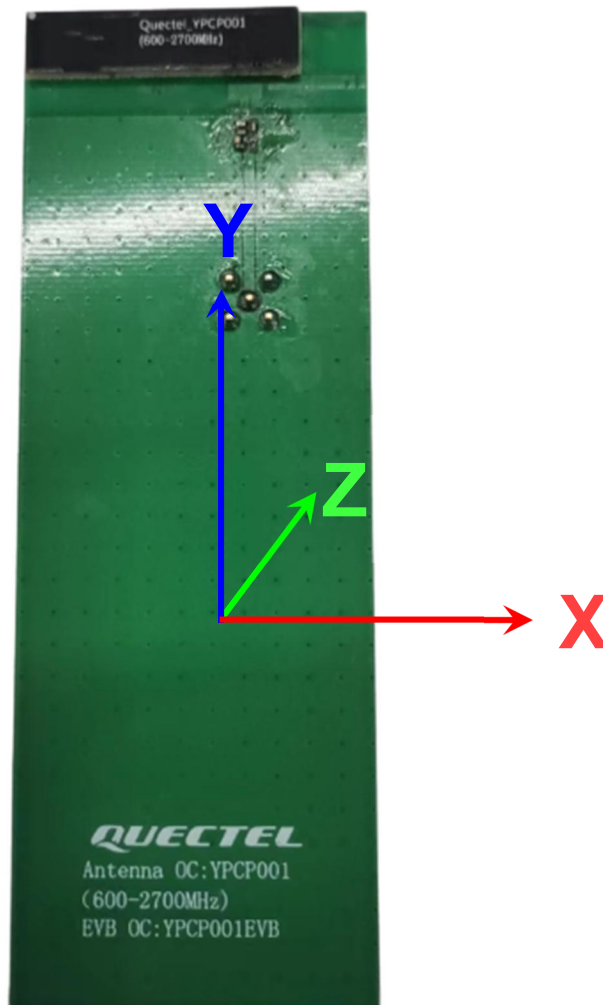


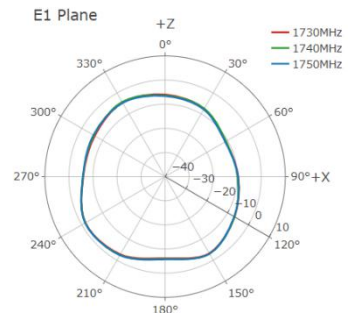
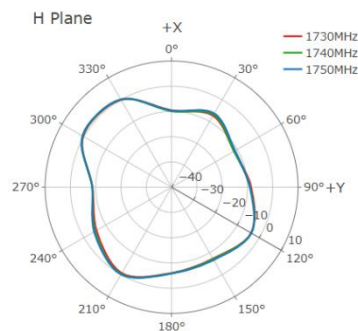
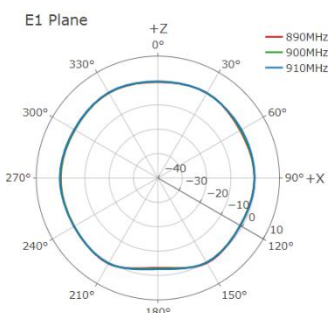
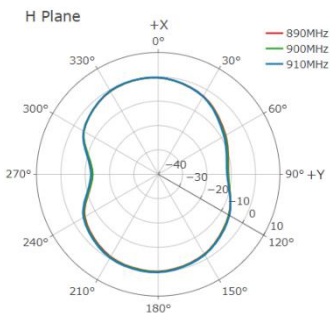
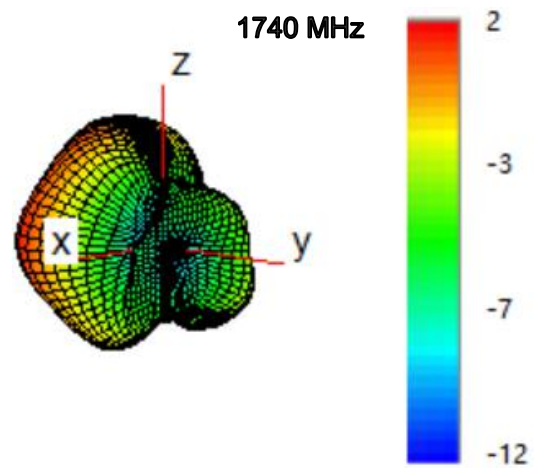
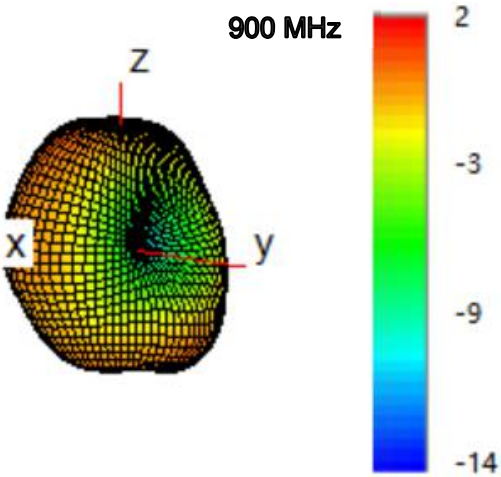
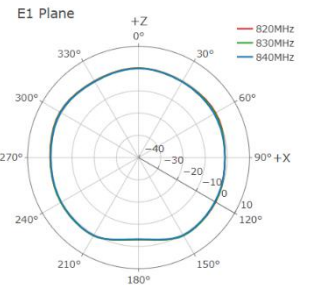
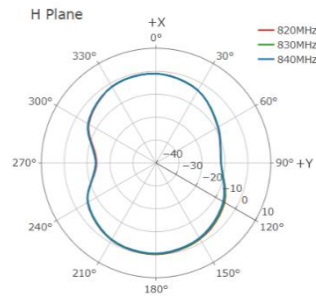
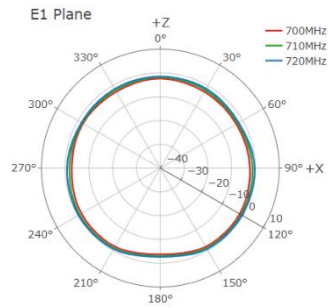
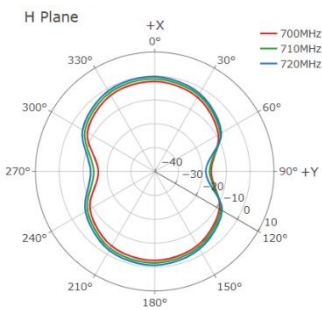
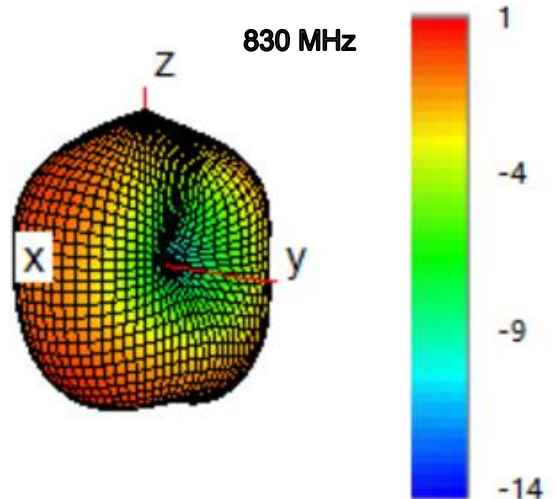
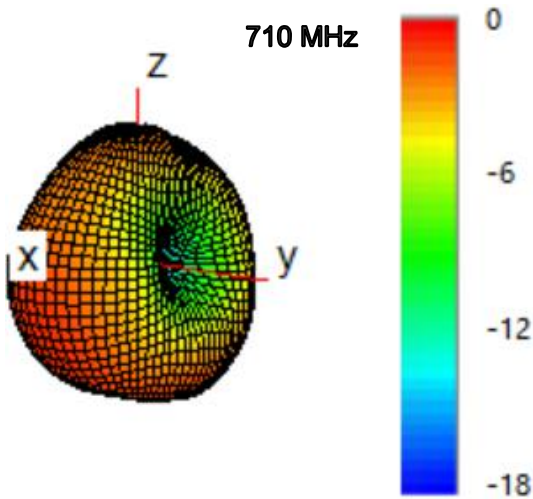
Peak Gain (dBi)

Frequency (MHz)	630	710	830	900	1740	1880	1950	2140	2450	2600
On 130 * 45.5 mm EVB	-1.9	-0.1	-0.5	0.2	2.2	2.2	2.3	2.2	2.3	2.6
On 120 * 45.5 mm EVB	-2.9	-0.4	-0.5	0.2	1.2	2.1	2.3	2.3	2.4	2.5
On 110 * 45.5 mm EVB	-7.7	-0.5	0.9	1.3	1.7	2.3	2.9	2.4	2.5	1.6
On 100 * 45.5 mm EVB	-9.1	-1.6	0.3	0.9	0.7	1.7	2.3	2.0	1.9	1.3
On 90 * 45.5 mm EVB	-10.1	-2.7	-0.1	0.6	0.7	1.8	2.3	2.1	2.1	1.1
On 80 * 45.5 mm EVB	-10.8	-3.8	-1.0	-0.2	0.9	1.8	2.1	2.0	1.7	0.7
On 65 * 45.5 mm EVB	-11.7	-4.9	-2.3	-1.6	1.7	1.9	2.0	1.8	1.3	0.4

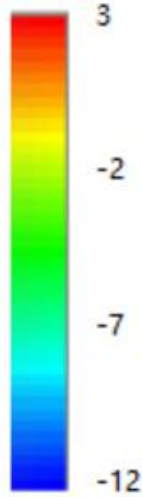
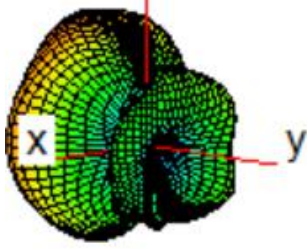
3.3.4. 3D & 2D Radiation Pattern

□ Test Status: Assembled on 110*45.5*0.8mm EVB

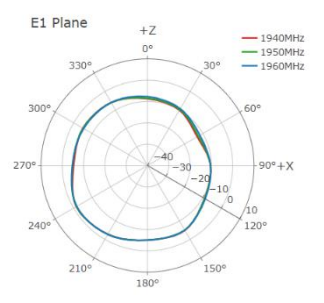
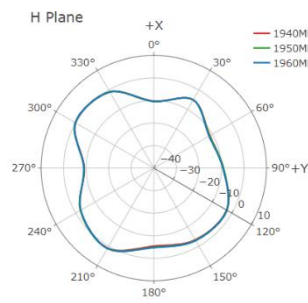
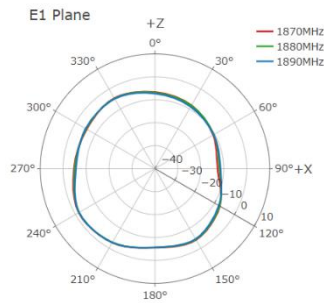
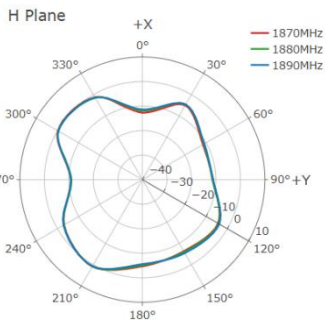
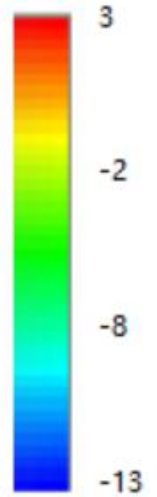
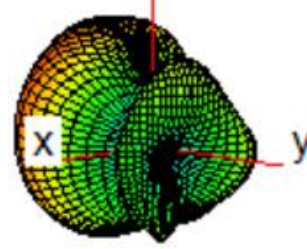




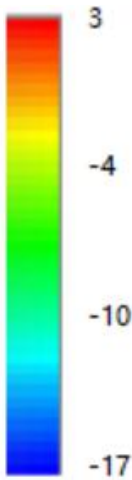
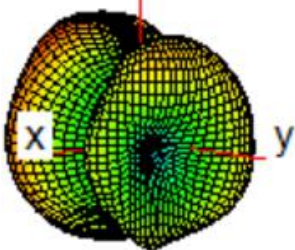
1880 MHz



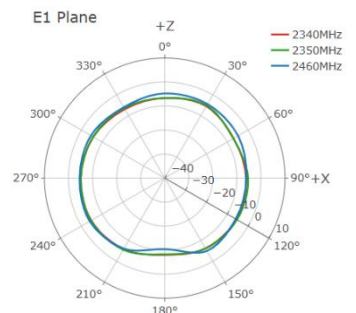
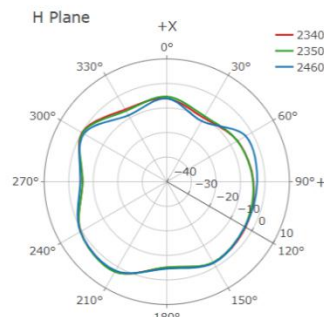
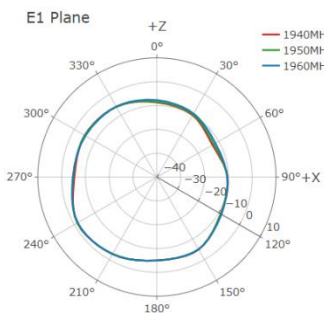
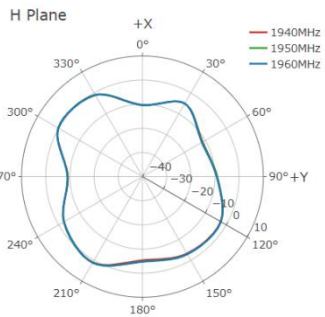
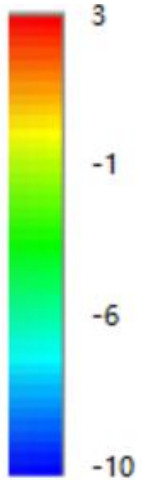
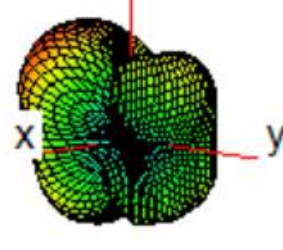
1950 MHz

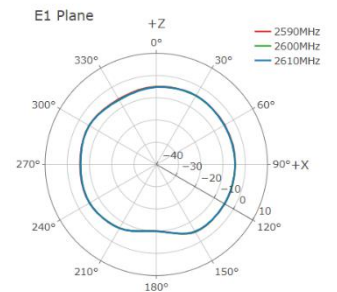
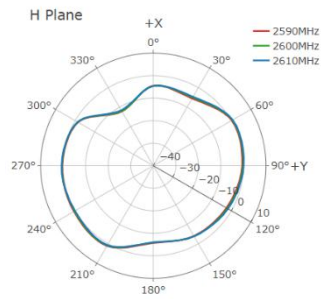
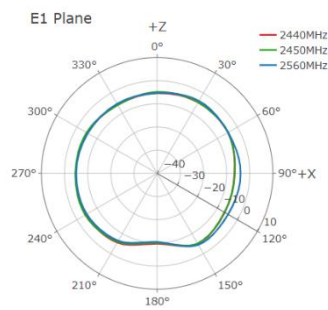
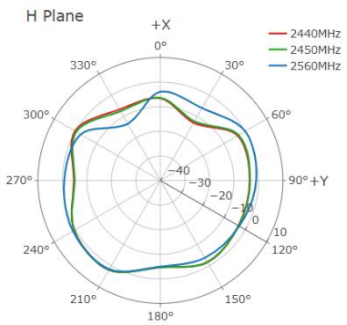
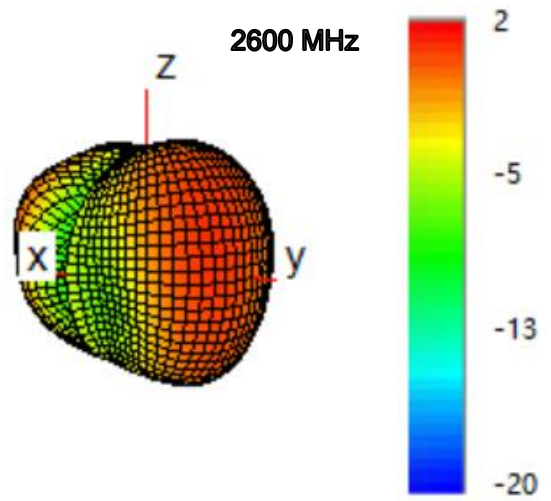
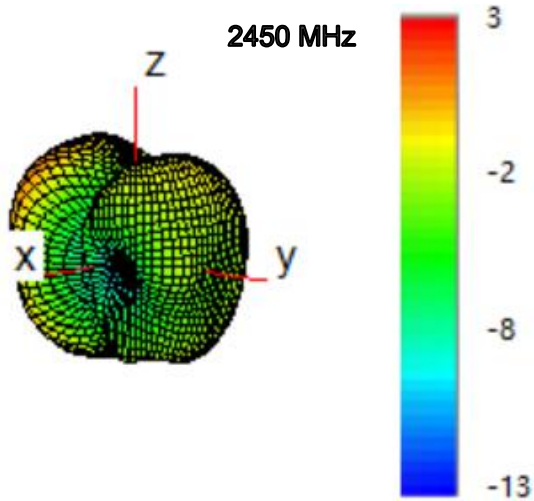


2140 MHz



2350 MHz

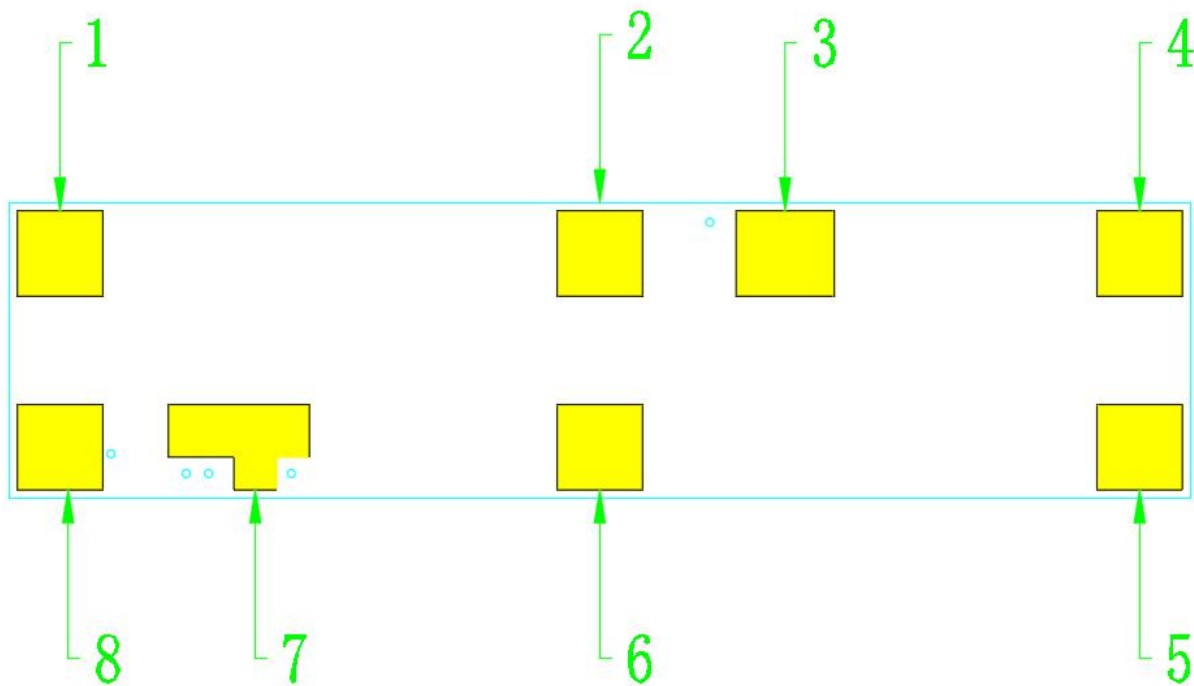




4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 8 pins with only three as functional. All other pins are for mechanical strength.

Pin	Description
7	Feed
1、2、4、5、6	Not used (Mechanical only)
3、8	Antenna Tuning



5 Transmission Line

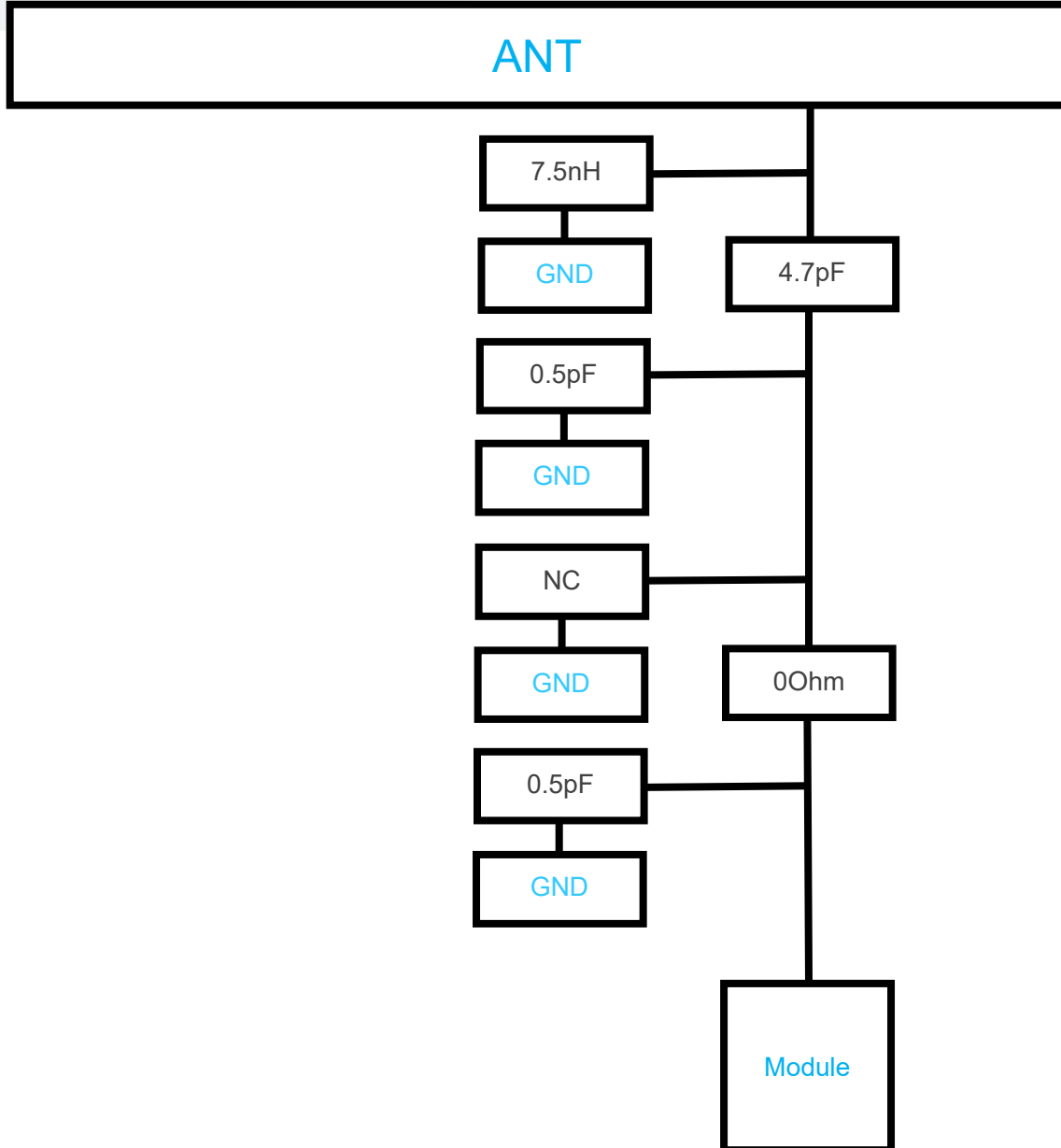
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- 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 .

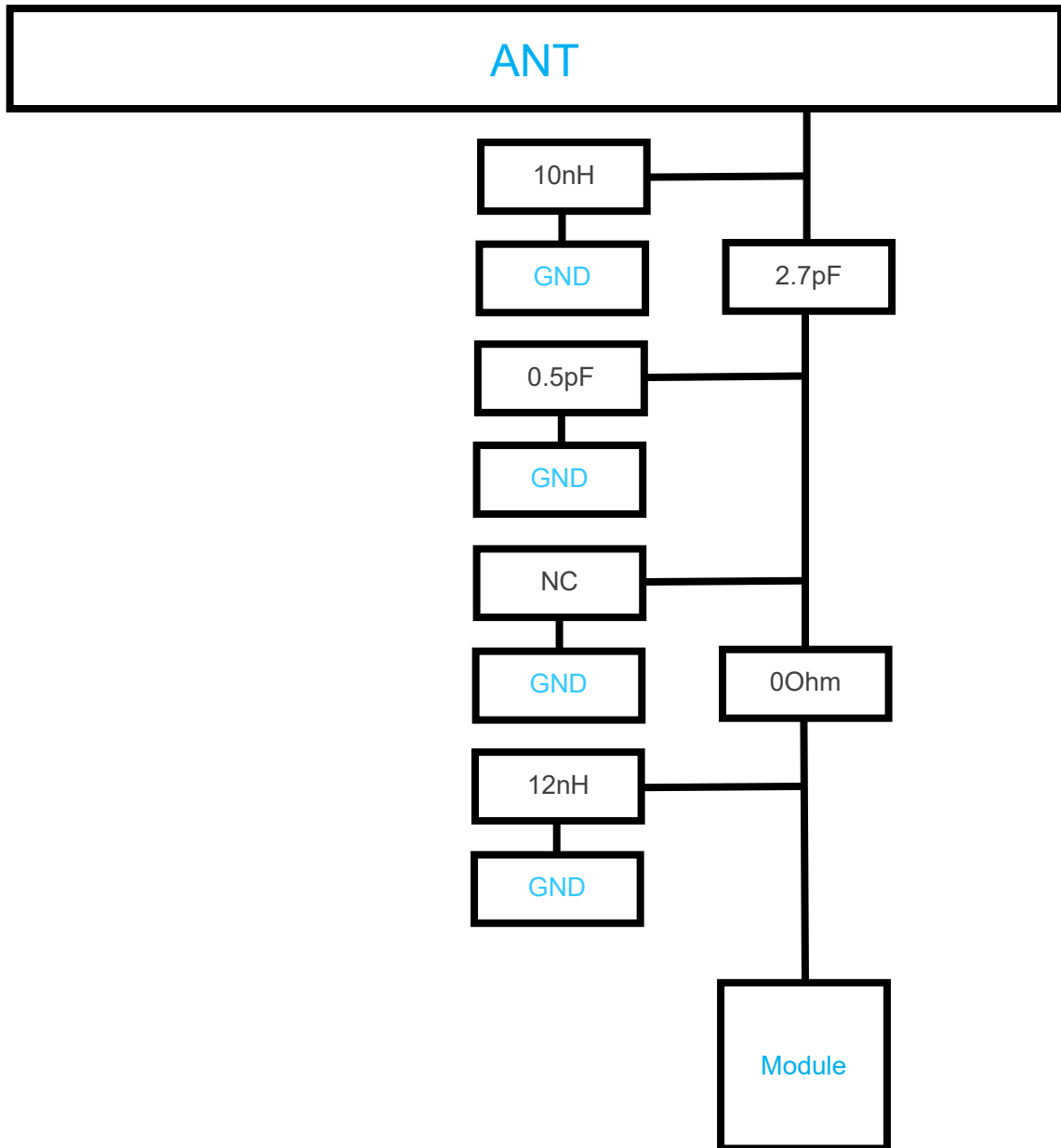
Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the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

7 Matching Circuit

7.1. 110*45.5*0.8mm EVB (A π + π -type matching circuit)



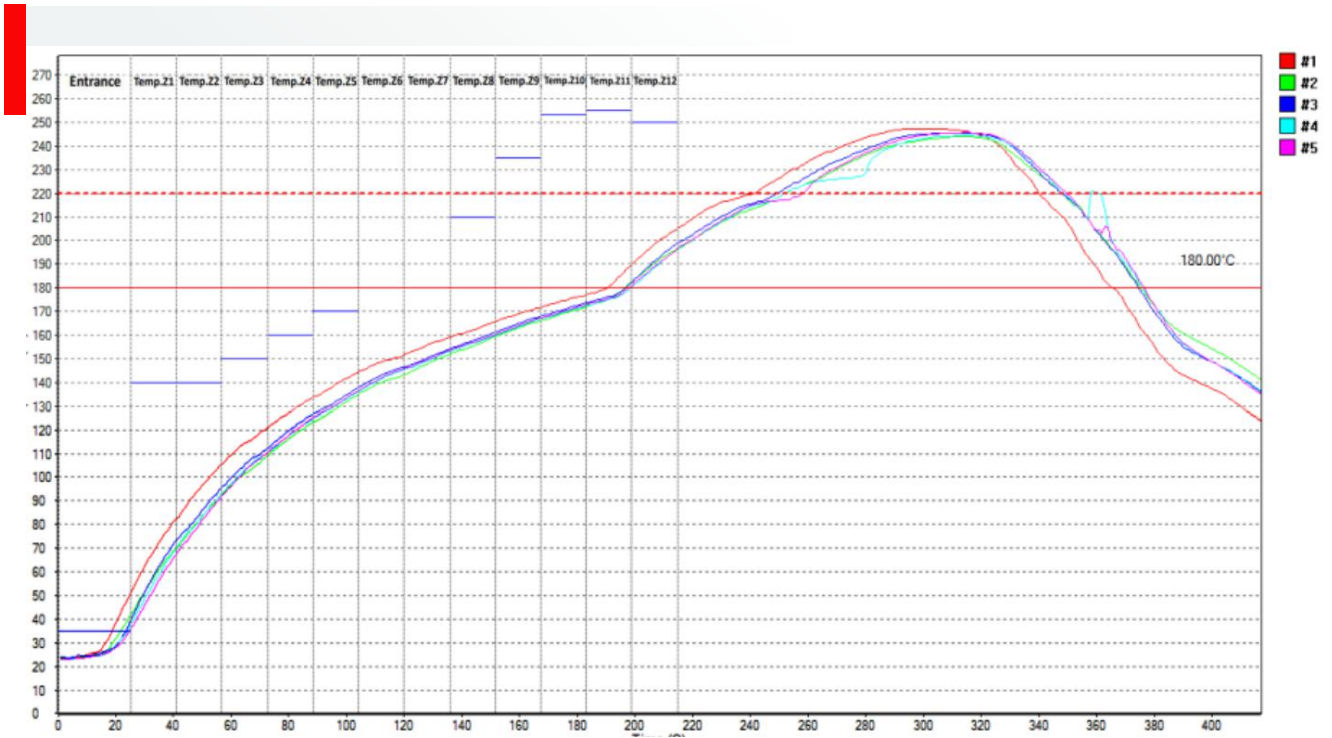
7.2. 120*45.5*0.8mm EVB (A π + π -type matching circuit)



8 Soldering Temperature

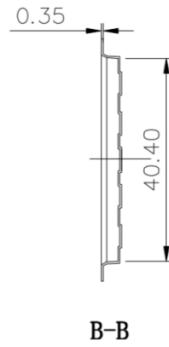
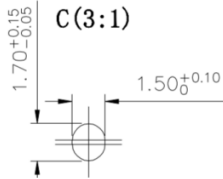
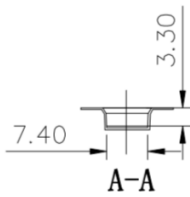
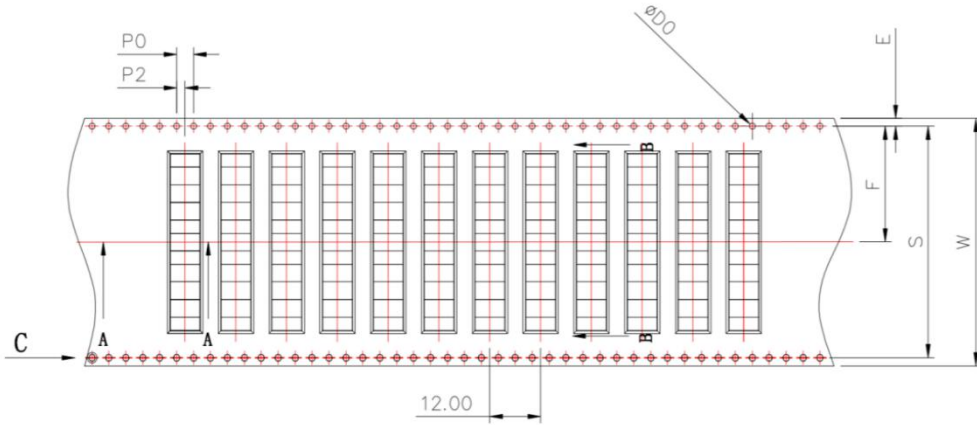
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (T _{max} to T _p)	3 °C/second (Max.)
PREHEAT	Temperature Min (T _{min}) Temperature Max (T _{max}) Time (t _{min} to t _{max})	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature (T _p)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

9 Reflow Profile



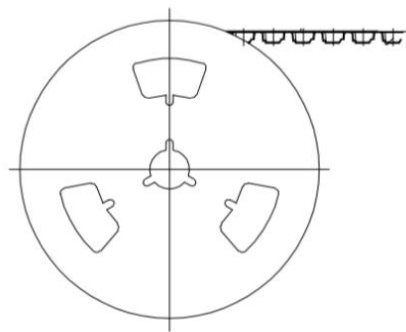
10 Packaging

- 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
φDo	1.50± ^{0.10} / _{0.00}
φD1	
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

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Tel: +86 21 5108 6236

Email: info@quectel.com

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Revision History

Version	Date	Author	Note
-	2023-01-08	Andy YAN/ Lance SUN	Creation of the document
1.0	2023-01-08	Andy YAN/ Lance SUN	First official release

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