



# Antenna Datasheet

**Product OC:** YECN028AA

**Version:** 2.0

**Date:** 2023-11-07

**Status:** Released

**Product Name:** 5G/NTN External Antenna

**Key Features:**

Frequency Band: 410–470 MHz, 617–960 MHz, 1427–6000 MHz

Dimensions: 225 mm × 54.5 mm × 13 mm

Efficiency: Up to 83.3 % (5G-EVB)

RoHS and REACH Compliant

IP66(housing)

# Overview

This Quectel external 5G/NTN antenna covers 5G NR Sub-6 GHz frequency bands and is compatible with 4G/3G/2G/LPWA bands, NTN bands. Featuring high efficiency and gain, it is an ideal omni-directional antenna solution to ensure high-speed data transmission, which can be widely used in a diversity of wireless communication devices such as AP, routers, outdoor equipment, real-time monitoring equipment, and many more. The antenna is designed to work with any ground plane size or in free space for ease of integration. Quectel also offers flexible installation with custom cable length and connector options.

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# 1 Specification

Test Condition: In Free Space & On 130 mm × 130 mm EVB

## 1.1. Electrical

Electrical	
Frequency Range	410–470 MHz, 617–960 MHz, 1427–6000 MHz
Radiation Pattern	Omni-directional
Polarization	Linear
Impedance	50 Ω

Electrical - NTN Bands						
SPEC	Band	L Band	L Band	L Band	B256 / B23	B256 / B23
		1518-1559	1620-1665	1668-1675	1980-2020	2170-2200
Max. VSWR	FS	1.8	2.2	2.2	2.2	1.5
	EVB	1.7	2.3	2.4	2.1	1.9
Max. Return Loss (dB)	FS	-10.8	-8.7	-8.5	-8.6	-14.1
	EVB	-11.8	-8.0	-7.7	-8.8	-10.3
AVG Eff. (%)	FS	64.0	60.1	62.3	65.7	68.3
	EVB	74.7	64.6	62.5	71.0	72.2
AVG AVG Gain (dB)	FS	-1.9	-2.2	-2.1	-1.8	-1.7
	EVB	-1.3	-1.9	-2.0	-1.5	-1.4
Max. Peak Gain (dBi)	FS	2.5	0.8	0.4	1.4	2.4
	EVB	3.4	2.5	2.0	2.8	3.7
Upper Hemisphere Efficiency (dB)	FS	-3.5	-3.5	-3.8	-2.5	-2.2
	EVB	-6.1	-5.9	-5.9	-3.9	-3.6

VSWR	FS	≤ 2.2
	EVB	≤ 2.4
Return	FS	≤ -8.5 dB
Loss	EVB	≤ -7.7 dB
Peak Gain	FS	≤ 2.5 dBi
	EVB	≤ 3.7 dBi

**Note:**

- FS: In Free Space
- EVB: On 130 mm × 130 mm EVB

**Electrical - Detail**

SPEC	Band	Band	B31	B5/B8 /B12 /B13 /B26 /B28 /B71	N74 /N75 /N76	B1 /B2 /B3	B40 /Wi-Fi 2G	Wi-Fi 2G	B42 /B48 /N77 /N79	Wi-Fi 5G
		Freq. (MHz)	410 - 470	617 - 960	1420 - 1520	1710 - 2170	2300 - 2500	2500 - 2690	3300 - 5000	5150 - 6000
Max VSWR	FS		4.9	3.0	1.6	2.8	2.0	1.9	2.9	2.4
	EVB		6.5	3.8	1.7	3.3	2.0	1.9	2.8	4.6
Max Return Loss (dB)	FS		-3.6	-6.0	-12.4	-6.4	-9.7	-10.4	-6.4	-7.6
	EVB		-2.7	-4.7	-12.1	-5.5	-9.6	-10.2	-6.5	-3.8
AVG Eff. (%)	FS		45.1	64.5	54.9	64.4	75.2	65.2	58.7	60.9
	EVB		49.9	68.6	74.4	65.1	74.1	74.9	62.1	51.2
AVG AVG Gain (dB)	FS		-3.5	-2.0	-2.6	-1.9	-1.2	-1.9	-2.3	-2.2
	EVB		-3.3	-1.7	-1.3	-1.9	-1.3	-1.3	-2.1	-3.0
Max Peak Gain(dBi)	FS		0.0	0.5	2.8	2.0	2.5	2.2	5.5	5.8
	EVB		0.5	1.3	3.6	3.7	3.7	3.0	5.5	5.3
VSWR	FS		≤ 4.9							
	EVB		≤ 6.5							
Return	FS		≤ -3.6 dB							
Loss	EVB		≤ -2.7 dB							
Peak Gain	FS		≤ 5.8 dBi							
	EVB		≤ 5.5 dBi							

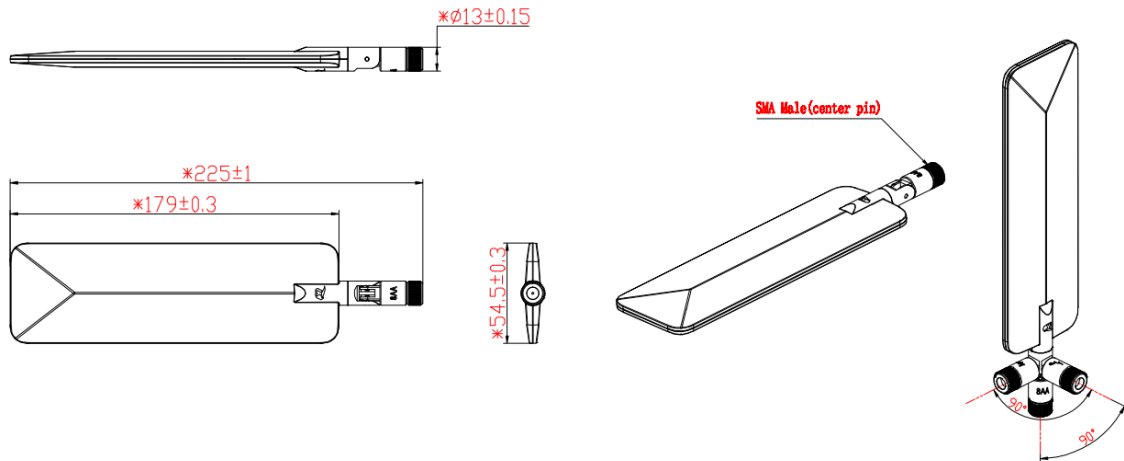
**Note:**

- FS: In Free Space
- EVB: On 130 mm × 130 mm EVB

## 1.2. Mechanical & Environmental

Mechanical	
Antenna Dimensions	225 mm × 54.5 mm × 13 mm
Casing Material & Color	PC & Black
Connector Type	SMA Male
Mounting Type	Terminal
Weight	Typ. 75 g
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
Ingress Protection (IP) Rating	Antenna plastic housing could meet IP66, SMA connector is not waterproof. After installation, SMA connector needs additional waterproof methods.
RoHS & REACH Compliant	Yes

# 2 Drawing



### Installation Instructions:

**Step 1:** Adjust the antenna to the preferred orientation and place it on the SMA(F) connector of the device.

**Step 2:** Hold the antenna with one hand and use the other hand to rotate the SMA(M) connector until it is fully tightened. When the antenna is tightened, it will maintain its position without shifting even in high vibration environments.



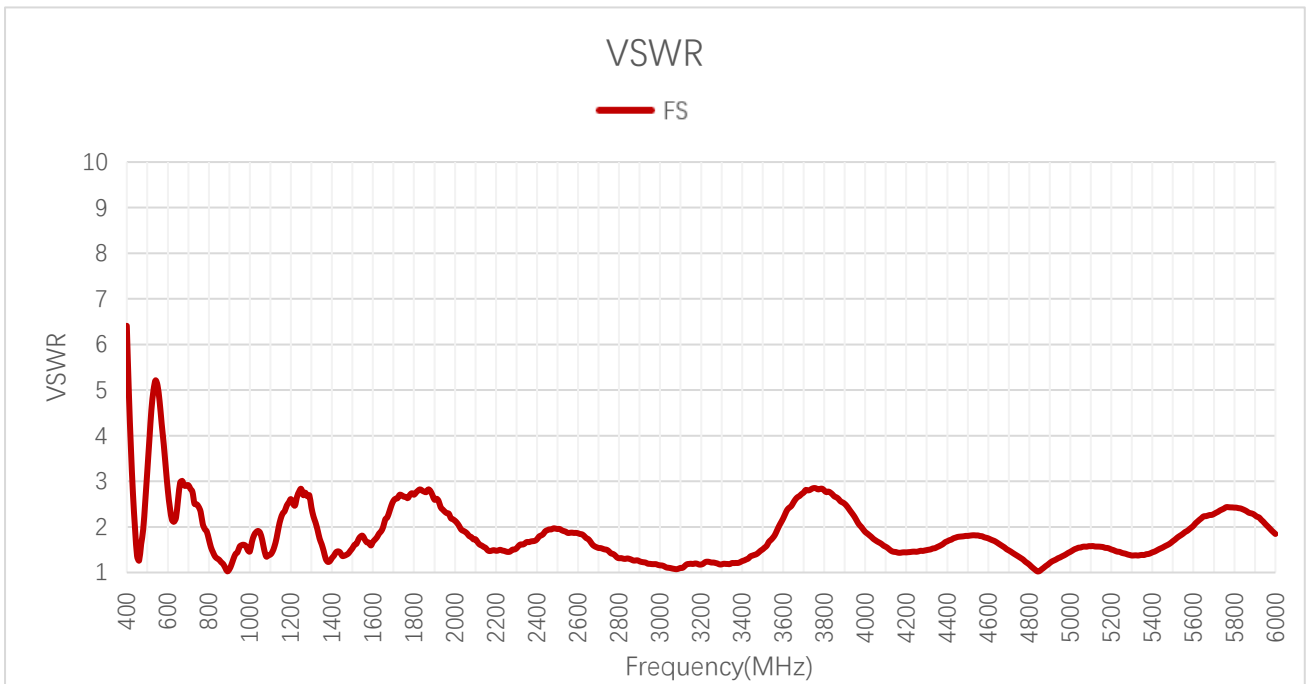
**Note:** If you use a torque wrench, the recommended force for mounting the antenna is 0.9Nm and the maximum torque to prevent antenna damage is 1.17Nm.

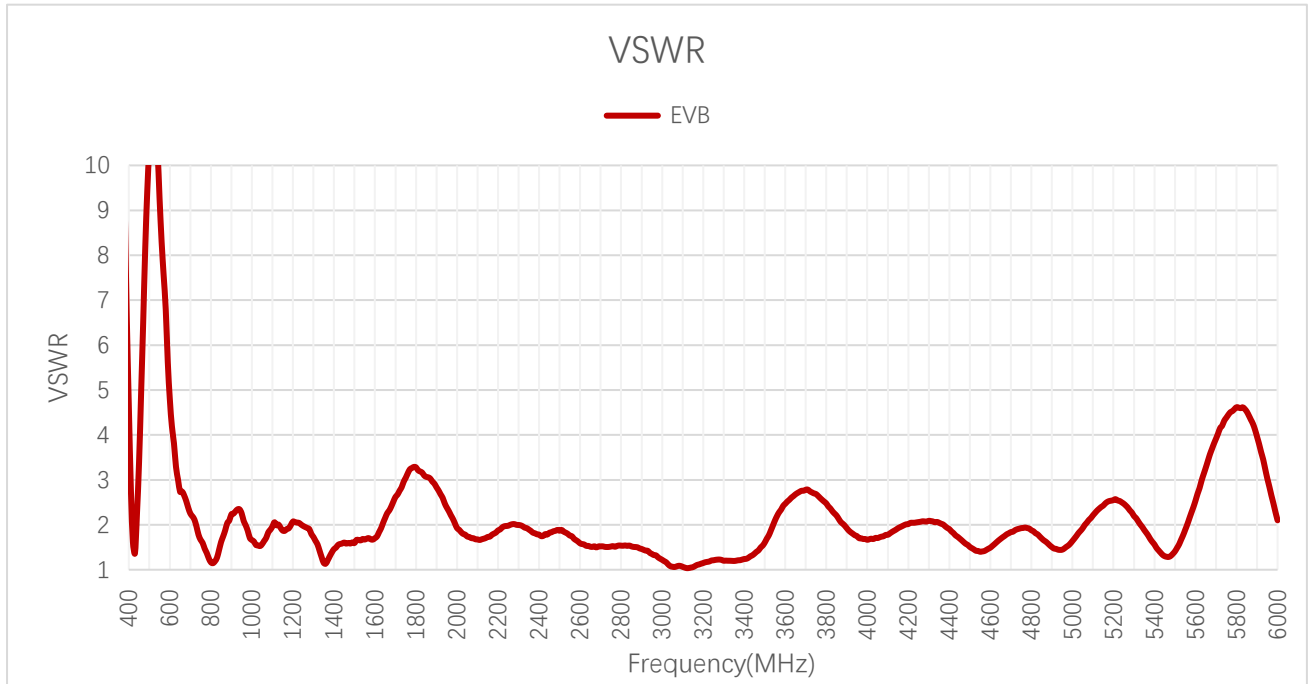


# 3 Detailed Performance

## 3.1. S-Parameter Test

### 3.1.1. VSWR





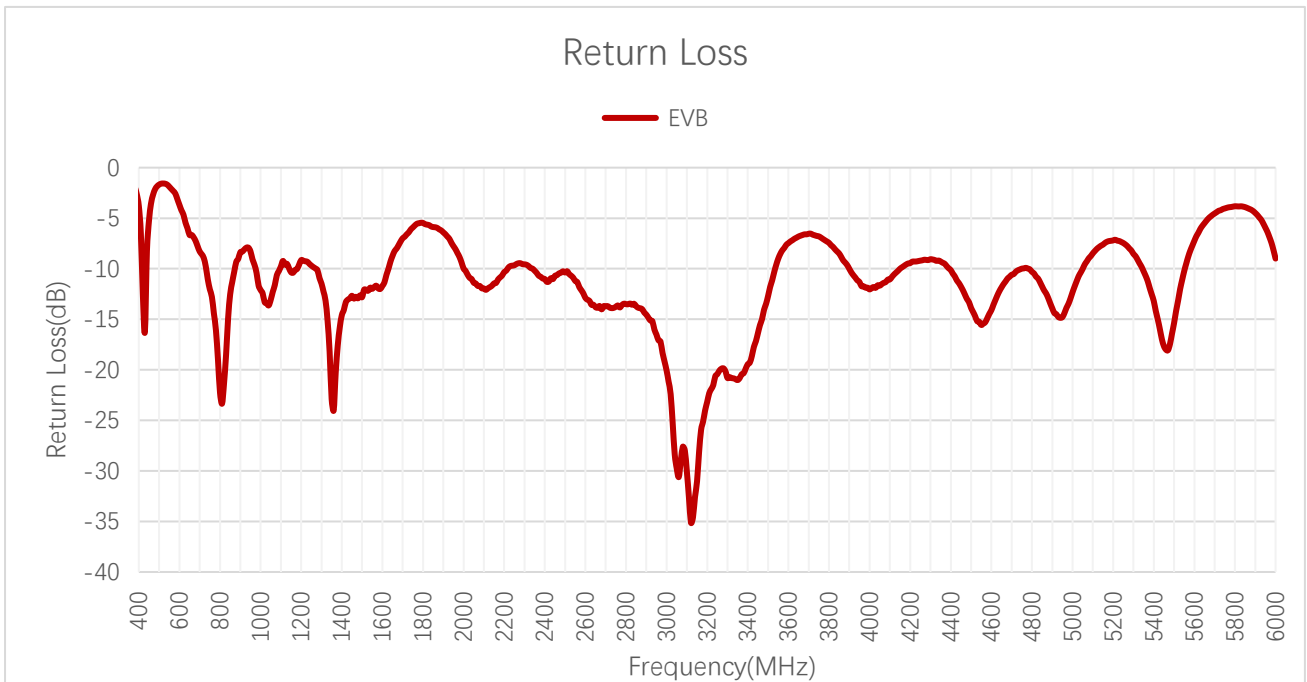
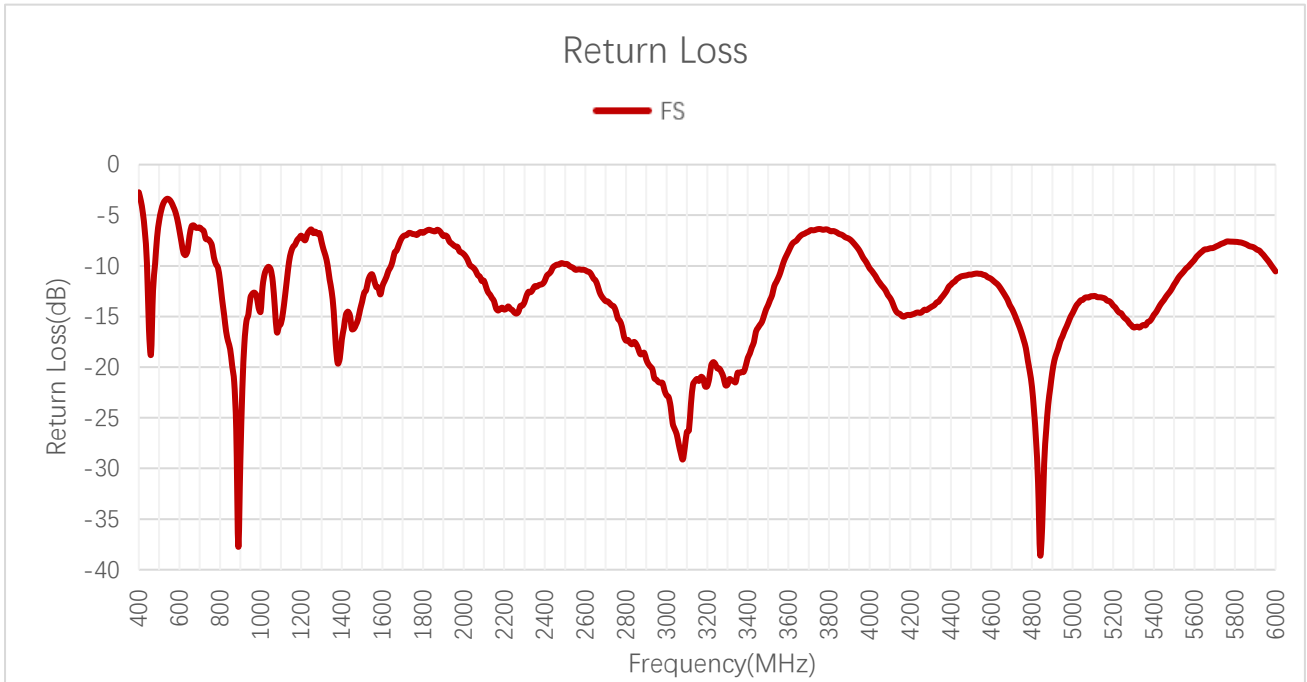
**VSWR**

<b>Frequency (MHz)</b>	<b>410</b>	<b>420</b>	<b>460</b>	<b>470</b>	<b>600</b>	<b>630</b>	<b>700</b>	<b>710</b>	<b>810</b>
<b>FS</b>	4.9	3.7	1.3	1.6	2.8	2.1	2.9	2.8	1.6
<b>EVB</b>	2.8	1.6	4.9	6.5	4.8	3.3	2.3	2.2	1.1
<b>Frequency (MHz)</b>	<b>830</b>	<b>900</b>	<b>960</b>	<b>1440</b>	<b>1710</b>	<b>1740</b>	<b>1880</b>	<b>1950</b>	<b>2140</b>
<b>FS</b>	1.4	1.1	1.6	1.4	2.6	2.7	2.8	2.3	1.6
<b>EVB</b>	1.3	2.2	2.1	1.6	2.7	3.0	3.0	2.4	1.7
<b>Frequency (MHz)</b>	<b>2350</b>	<b>2450</b>	<b>2600</b>	<b>2700</b>	<b>3600</b>	<b>4000</b>	<b>4700</b>	<b>5500</b>	<b>6000</b>
<b>FS</b>	1.7	1.9	1.9	1.5	2.2	1.9	1.5	1.7	1.8
<b>EVB</b>	1.9	1.8	1.6	1.5	2.5	1.7	1.8	1.4	2.1

**VSWR - NTN Bands**

<b>Frequency (MHz)</b>	<b>1520</b>	<b>1560</b>	<b>1630</b>	<b>1680</b>	<b>2000</b>	<b>2200</b>
<b>FS</b>	1.6	1.7	1.9	2.3	2.1	1.5
<b>EVB</b>	1.7	1.7	1.9	2.4	1.9	1.9

### 3.1.2. Return Loss



**Return Loss (dB)**

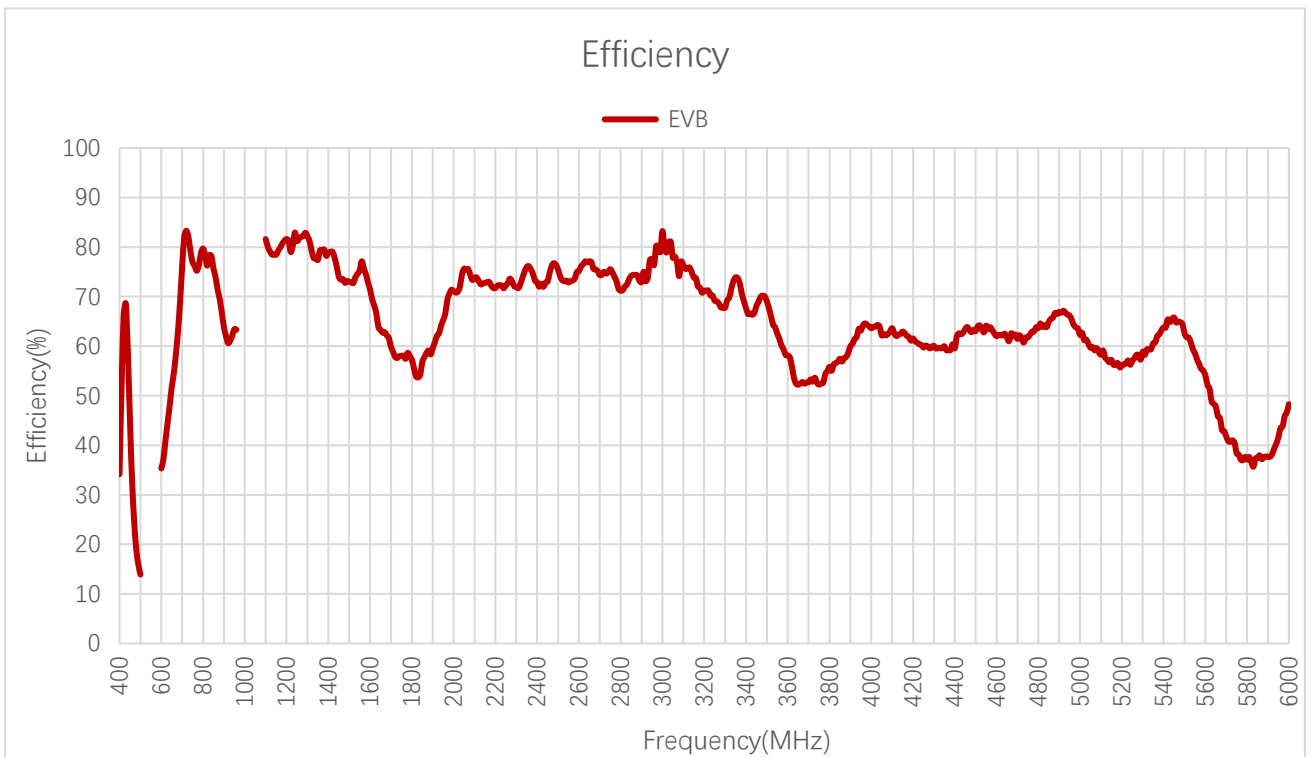
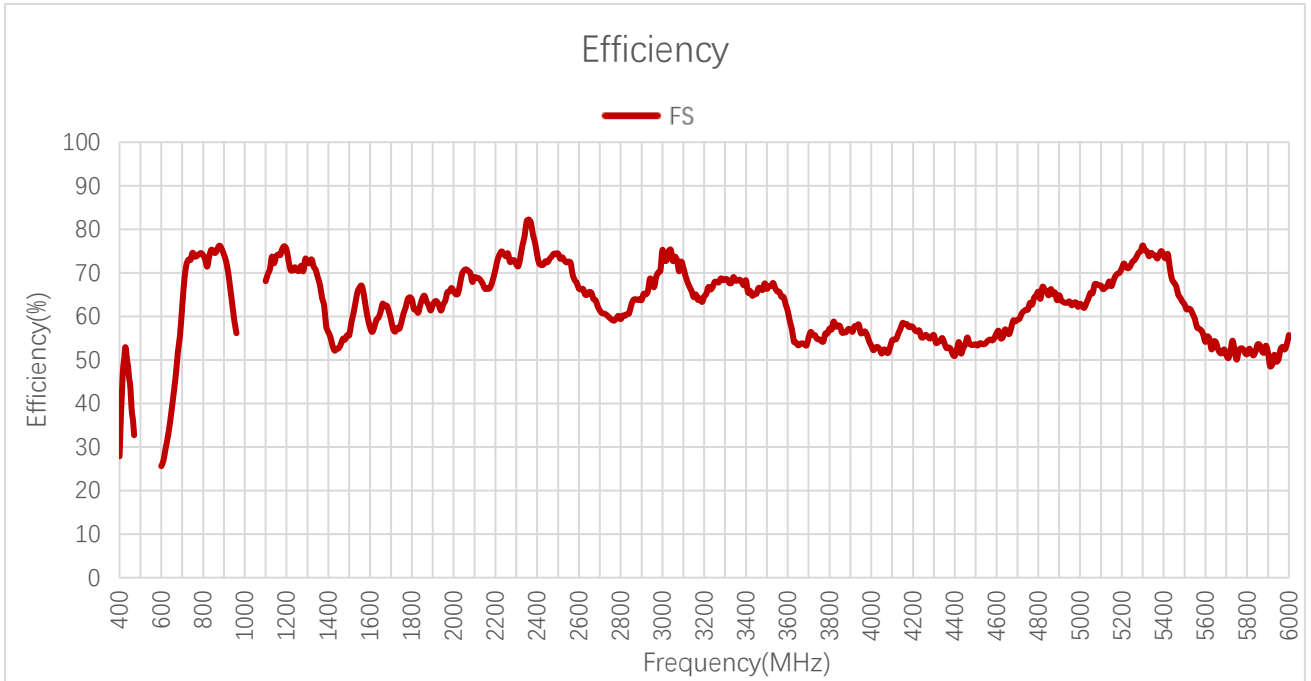
Frequency (MHz)	410	420	460	470	600	630	700	710	810
FS	-3.6	-4.8	-18.7	-12.5	-6.5	-8.9	-6.2	-6.4	-13.2
EVB	-6.5	-12.6	-3.6	-2.7	-3.7	-5.4	-8.3	-8.6	-23.3
Frequency (MHz)	830	900	960	1440	1710	1740	1880	1950	2140
FS	-16.5	-29.4	-12.7	-14.9	-7.0	-6.8	-6.5	-7.9	-13.2
EVB	-18.5	-8.4	-9.1	-12.9	-6.8	-6.1	-6.1	-7.8	-11.7
Frequency (MHz)	2350	2450	2600	2700	3600	4000	4700	5500	6000
FS	-12.0	-10.0	-10.4	-13.5	-8.6	-10.2	-14.2	-11.9	-10.5
EVB	-10.2	-10.7	-12.9	-13.7	-7.5	-12.0	-10.6	-15.4	-9.0

**Return Loss (dB) - NTN Bands**

Frequency (MHz)	1520	1560	1630	1680	2000	2200
FS	-12.4	-11.5	-10.5	-8.0	-8.8	-14.3
EVB	-12.1	-11.8	-10.0	-7.7	-10.0	-10.3

### 3.2. Radiation Performance Test

#### 3.2.1. Efficiency



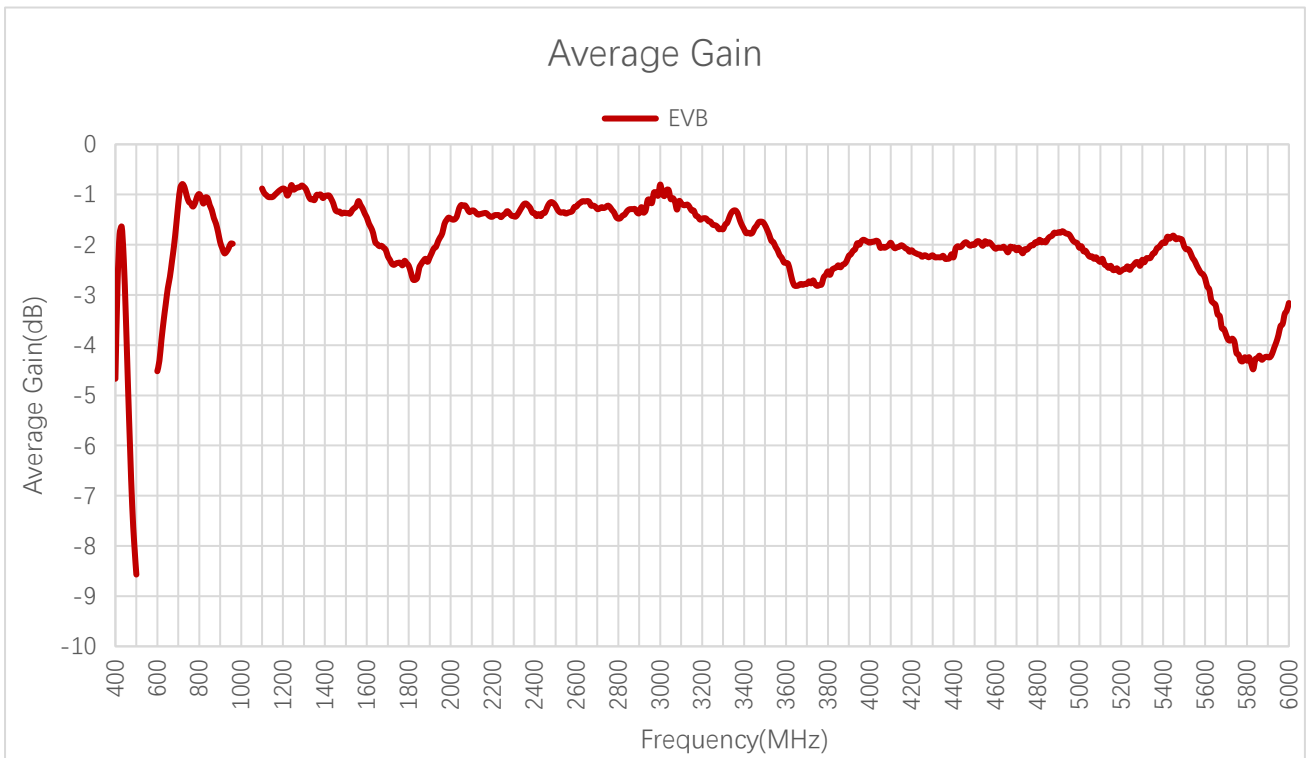
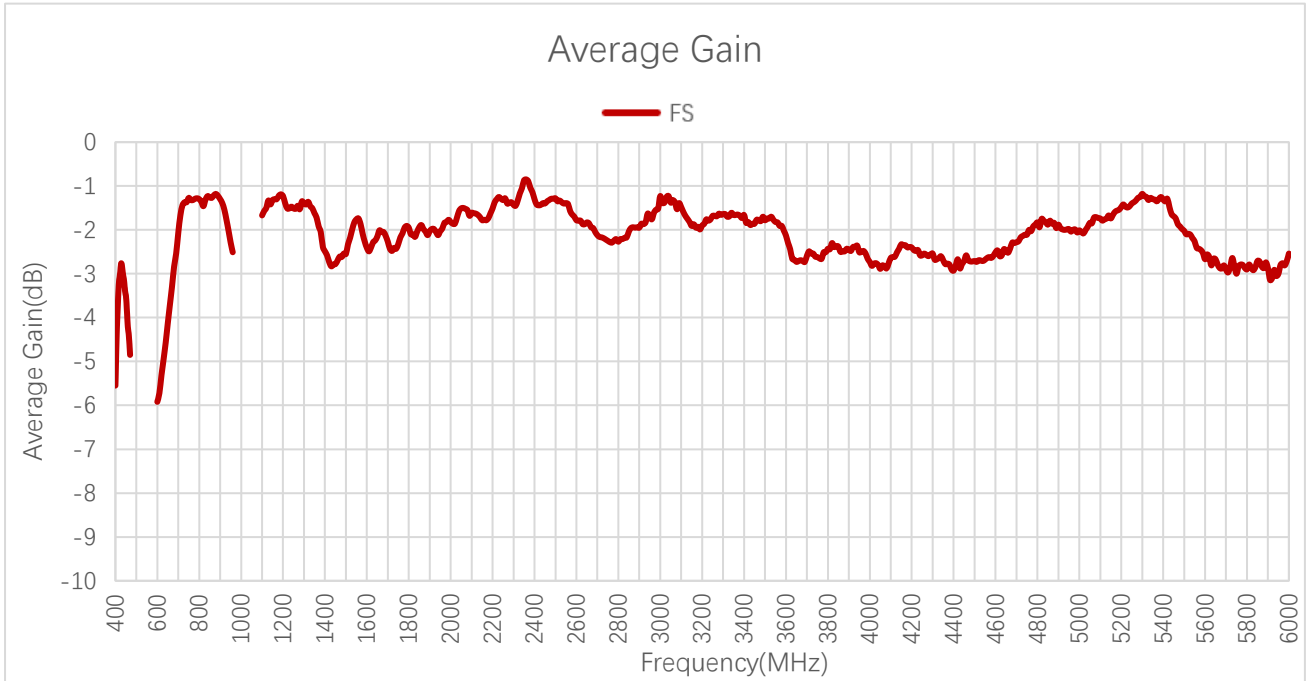
**Efficiency (%)**

Frequency (MHz)	410	420	460	470	600	630	700	710	810
FS	40.8	49.2	37.7	32.7	25.6	32.0	62.1	68.1	73.1
EVB	52.2	66.3	33.0	24.9	35.3	44.4	76.1	82.0	78.4
Frequency (MHz)	830	900	960	1440	1710	1740	1880	1950	2140
FS	73.9	74.2	56.1	52.6	57.2	57.2	62.6	62.7	67.4
EVB	78.3	63.9	63.3	76.1	58.9	58.0	59.1	65.3	72.6
Frequency (MHz)	2350	2450	2600	2700	3600	4000	4700	5500	6000
FS	81.9	72.4	66.4	61.4	61.3	53.3	59.2	62.8	55.7
EVB	76.0	73.0	75.1	74.4	58.1	63.6	61.5	62.6	48.3

**Efficiency (%) - NTN Bands**

Frequency (MHz)	1520	1560	1630	1680	2000	2200
FS	60.6	67.0	59.2	62.4	65.8	70.7
EVB	72.7	77.1	66.6	62.2	71.1	71.7

### 3.2.2. Average Gain



**Average Gain (dB)**

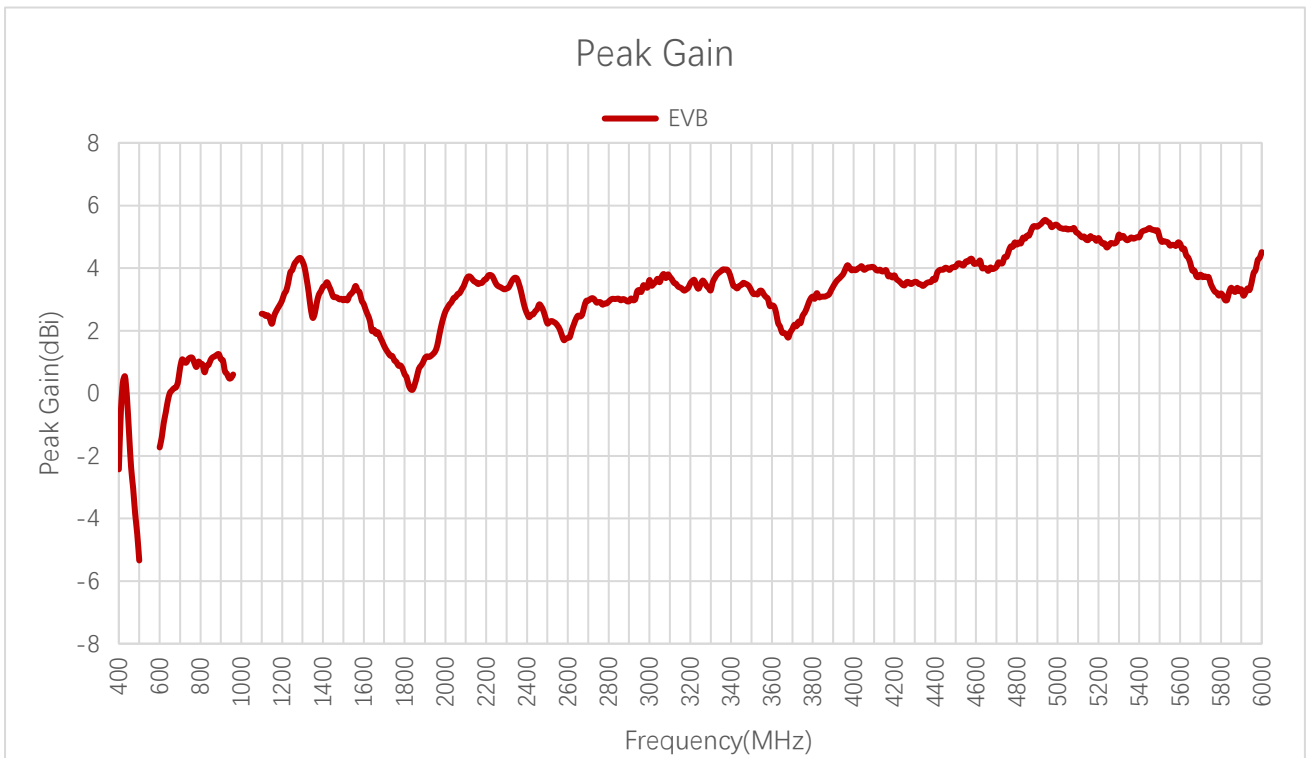
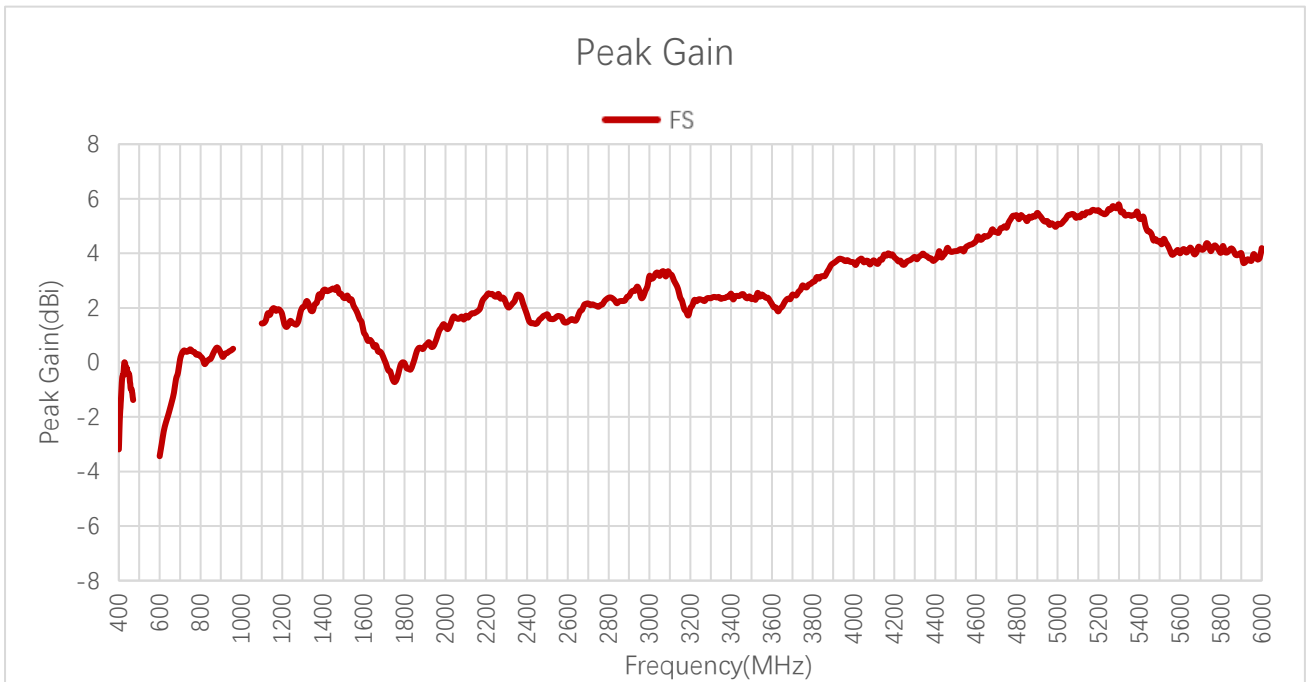
Frequency (MHz)	410	420	460	470	600	630	700	710	810
FS	-3.9	-3.1	-4.2	-4.9	-5.9	-5.0	-2.1	-1.7	-1.4
EVB	-2.8	-1.8	-4.8	-6.1	-4.5	-3.5	-1.2	-0.9	-1.1
Frequency (MHz)	830	900	960	1440	1710	1740	1880	1950	2140
FS	-1.3	-1.3	-2.5	-2.8	-2.4	-2.4	-2.0	-2.0	-1.7
EVB	-1.1	-2.0	-2.0	-1.2	-2.3	-2.4	-2.3	-1.9	-1.4
Frequency (MHz)	2350	2450	2600	2700	3600	4000	4700	5500	6000
FS	-0.9	-1.4	-1.8	-2.1	-2.1	-2.7	-2.3	-2.0	-2.5
EVB	-1.2	-1.4	-1.2	-1.3	-2.4	-2.0	-2.1	-2.0	-3.2

**Average Gain (dB) - NTN Bands**

Frequency (MHz)	1520	1560	1630	1680	2000	2200
FS	-2.2	-1.7	-2.3	-2.1	-1.8	-1.5
EVB	-1.4	-1.1	-1.8	-2.1	-1.5	-1.4



### 3.2.3. Peak Gain



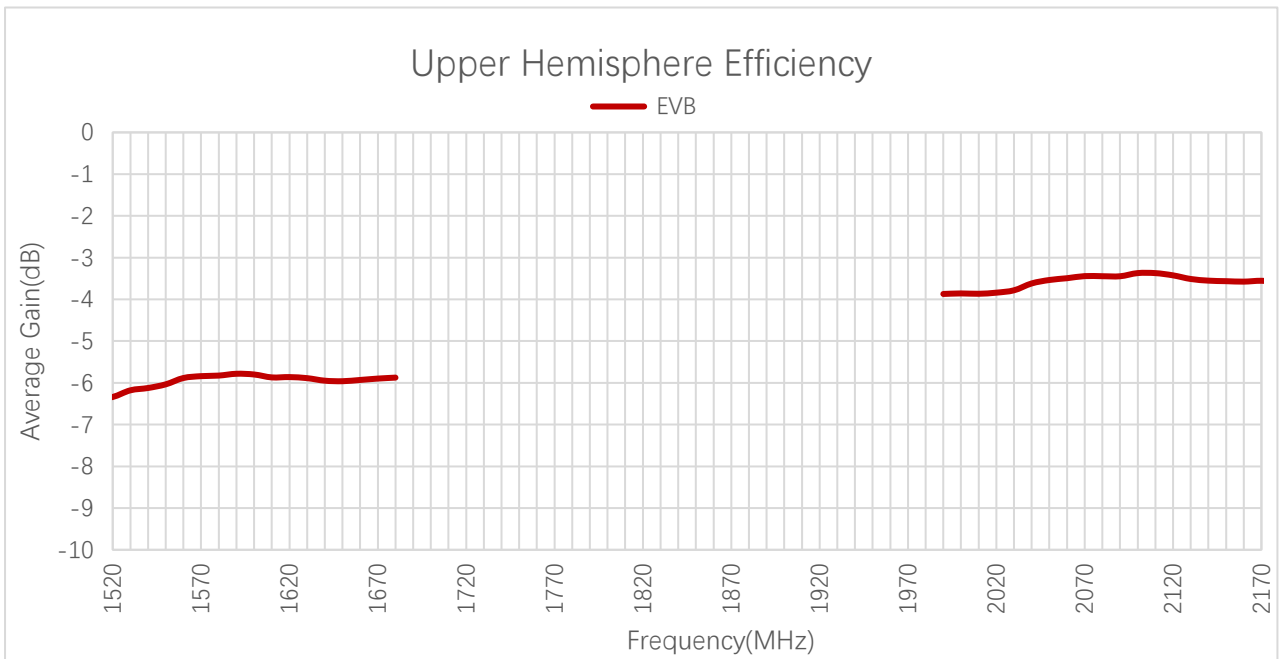
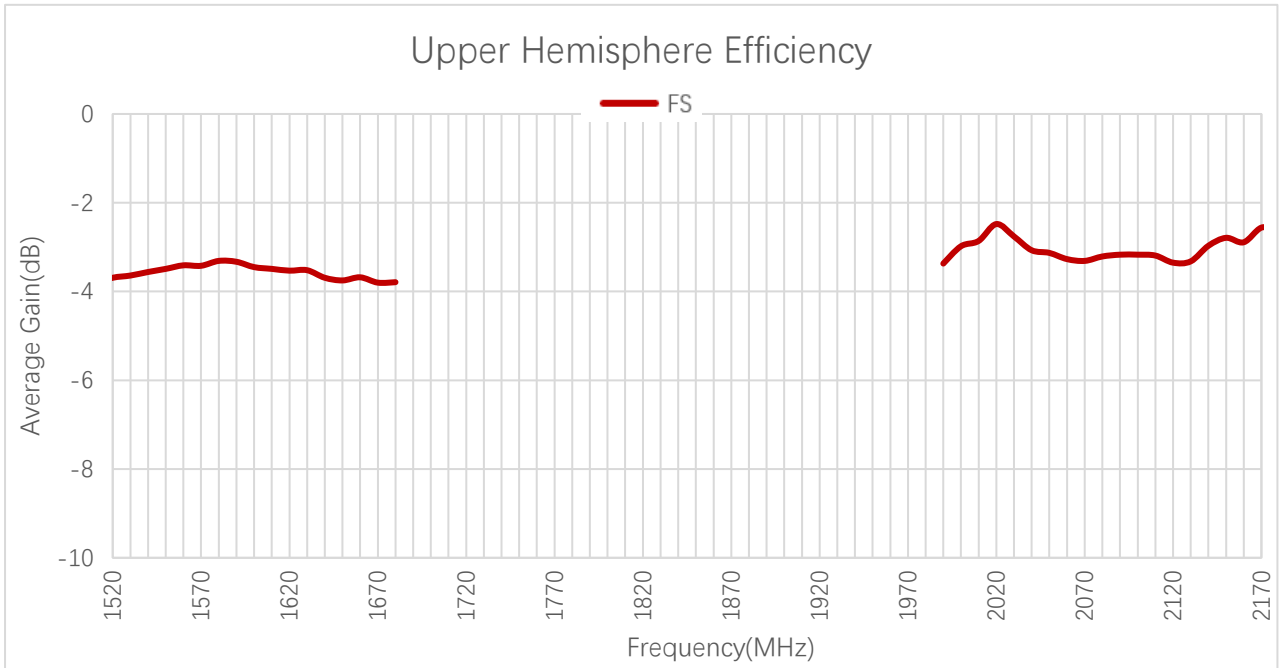
**Peak Gain (dBi)**

Frequency (MHz)	410	420	460	470	600	630	700	710	810
FS	-1.4	-0.5	-1.0	-1.4	-3.4	-2.2	0.1	0.4	0.1
EVB	-0.6	0.4	-2.4	-3.0	-1.7	-0.6	0.8	1.1	0.9
Frequency (MHz)	830	900	960	1440	1710	1740	1880	1950	2140
FS	0.0	0.3	0.5	2.7	-0.1	-0.6	0.5	0.7	1.8
EVB	0.9	1.1	0.6	3.3	1.4	1.2	0.9	1.3	3.6
Frequency (MHz)	2350	2450	2600	2700	3600	4000	4700	5500	6000
FS	2.5	1.4	1.5	2.2	2.1	3.7	4.8	4.5	4.2
EVB	3.7	2.7	1.8	3.0	2.8	4.0	4.0	5.0	4.5

**Peak Gain (dBi) - NTN Bands**

Frequency (MHz)	1520	1560	1630	1680	2000	2200
FS	2.5	2.0	0.8	0.4	1.3	2.4
EVB	3.0	3.4	2.3	1.8	2.6	3.7

**3.2.4. Upper Hemisphere Efficiency**



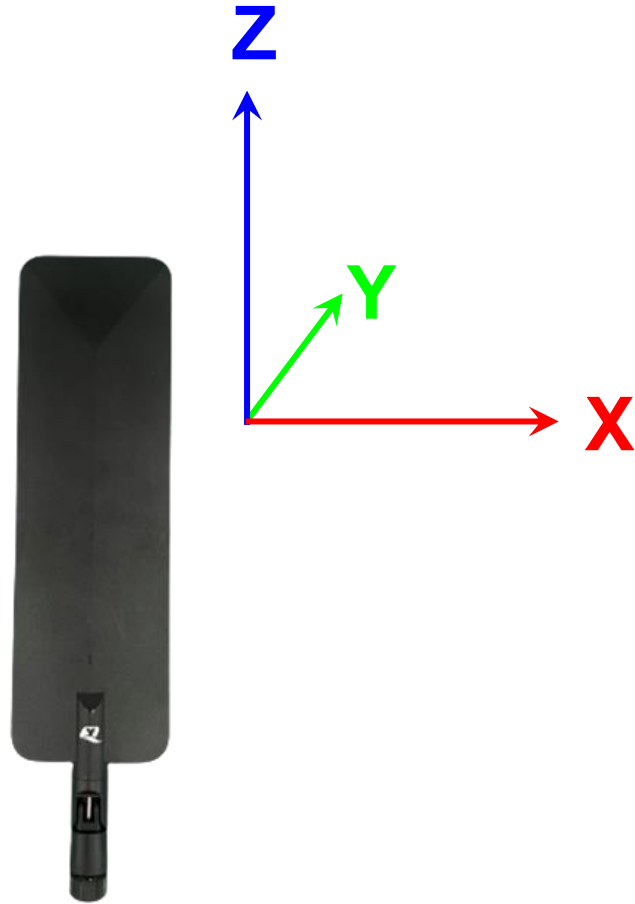
**Upper Hemisphere Efficiency (dB) - NTN Bands**

Frequency (MHz)	1520	1560	1630	1680	2000	2200
<b>FS</b>	-3.7	-3.4	-3.5	-3.8	-3.0	-2.2
<b>EVB</b>	-6.3	-5.9	-5.9	-5.9	-3.9	-3.6

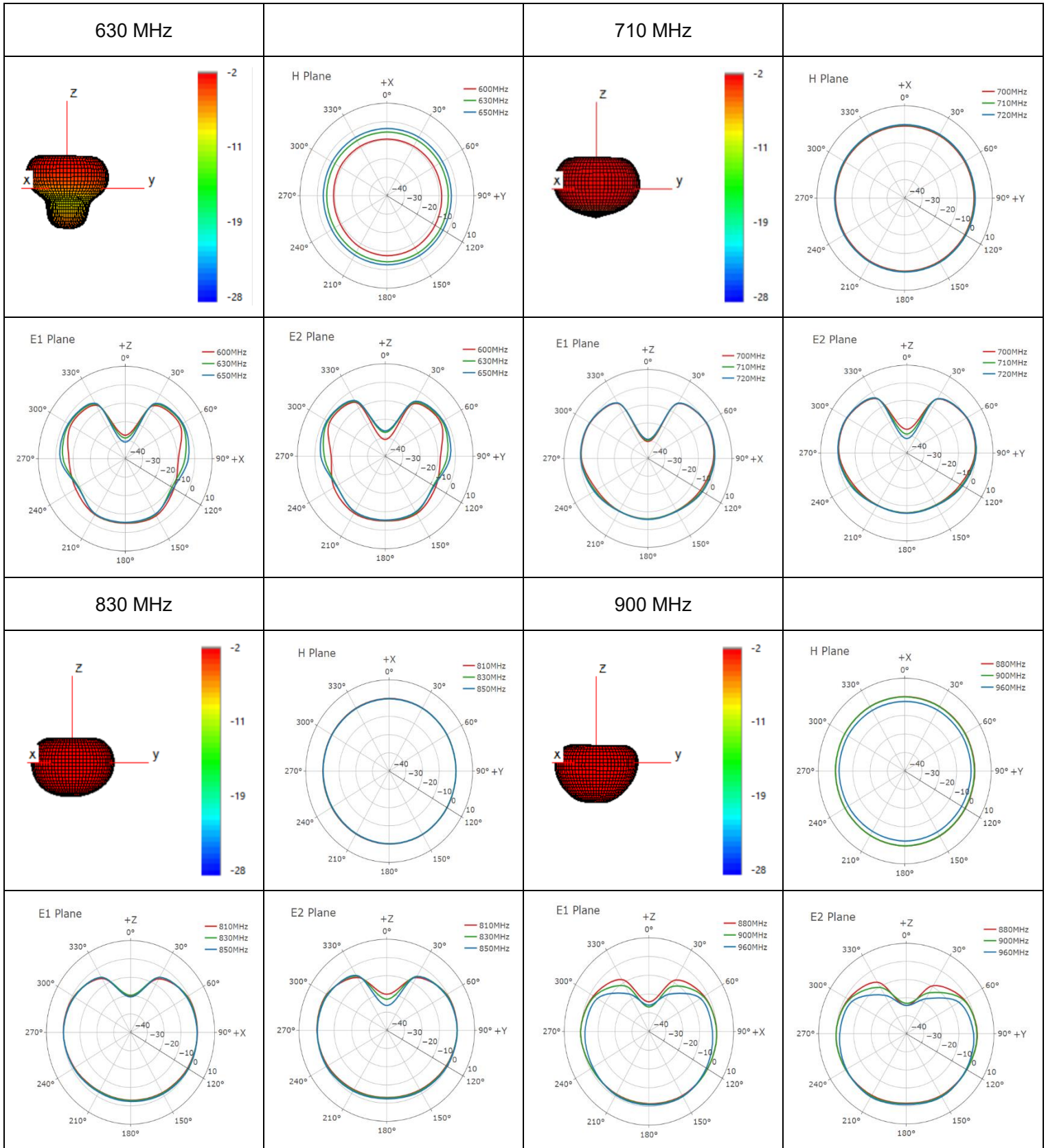
### 3.2.5. 3D & 2D Radiation Pattern

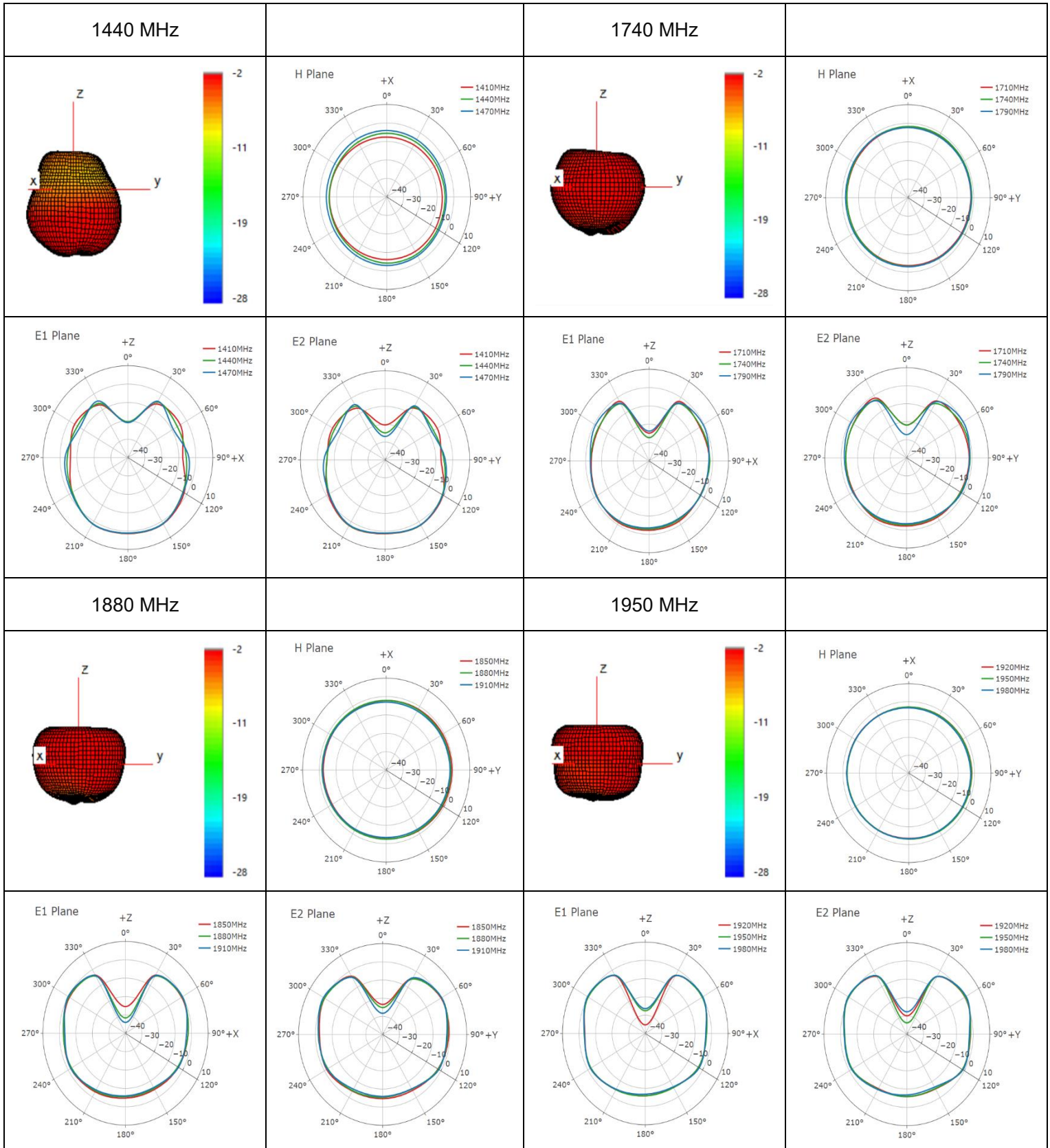
#### 3.2.5.1. Test Condition: In Free Space

- Test Chamber: HF-G-1

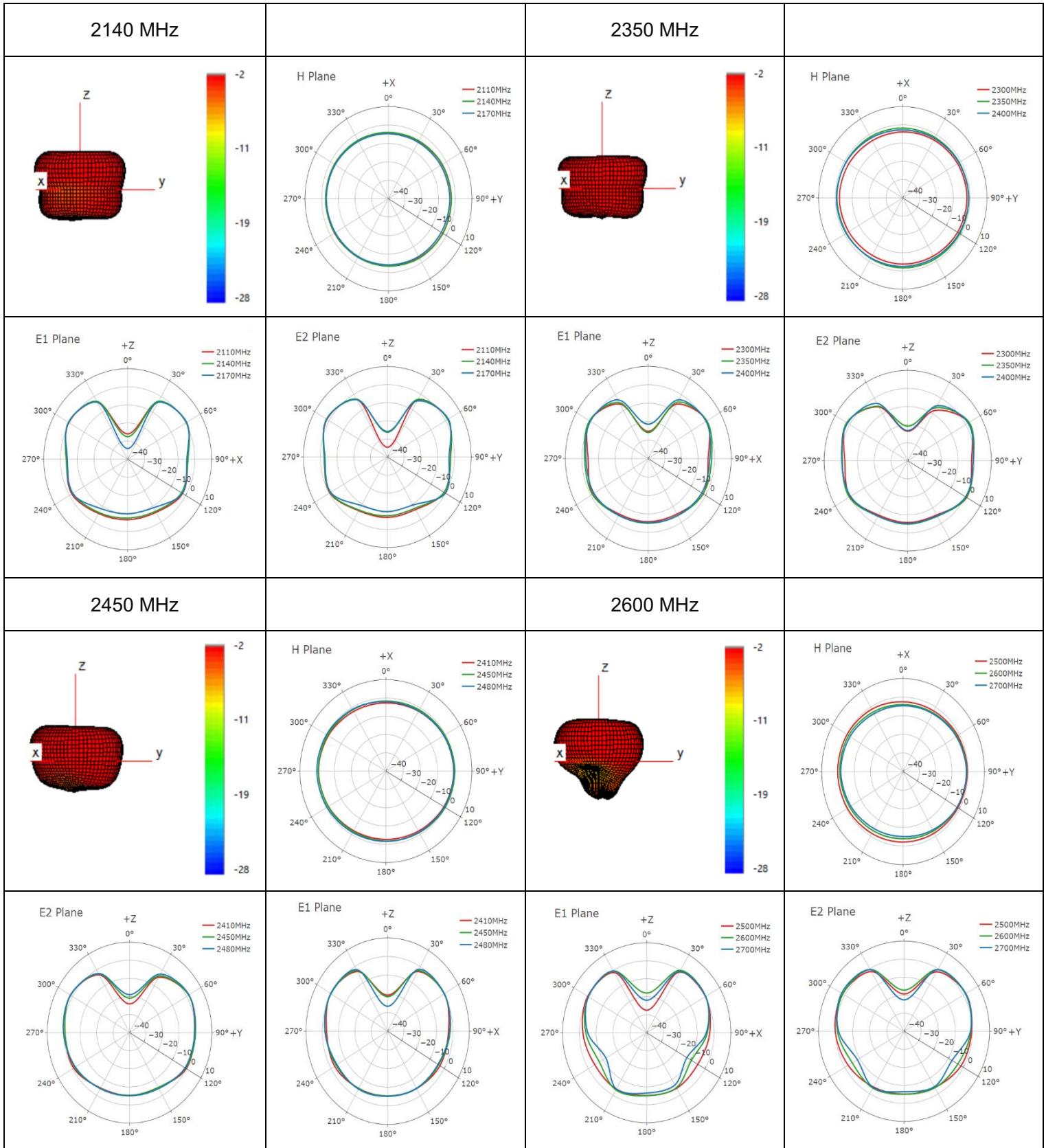


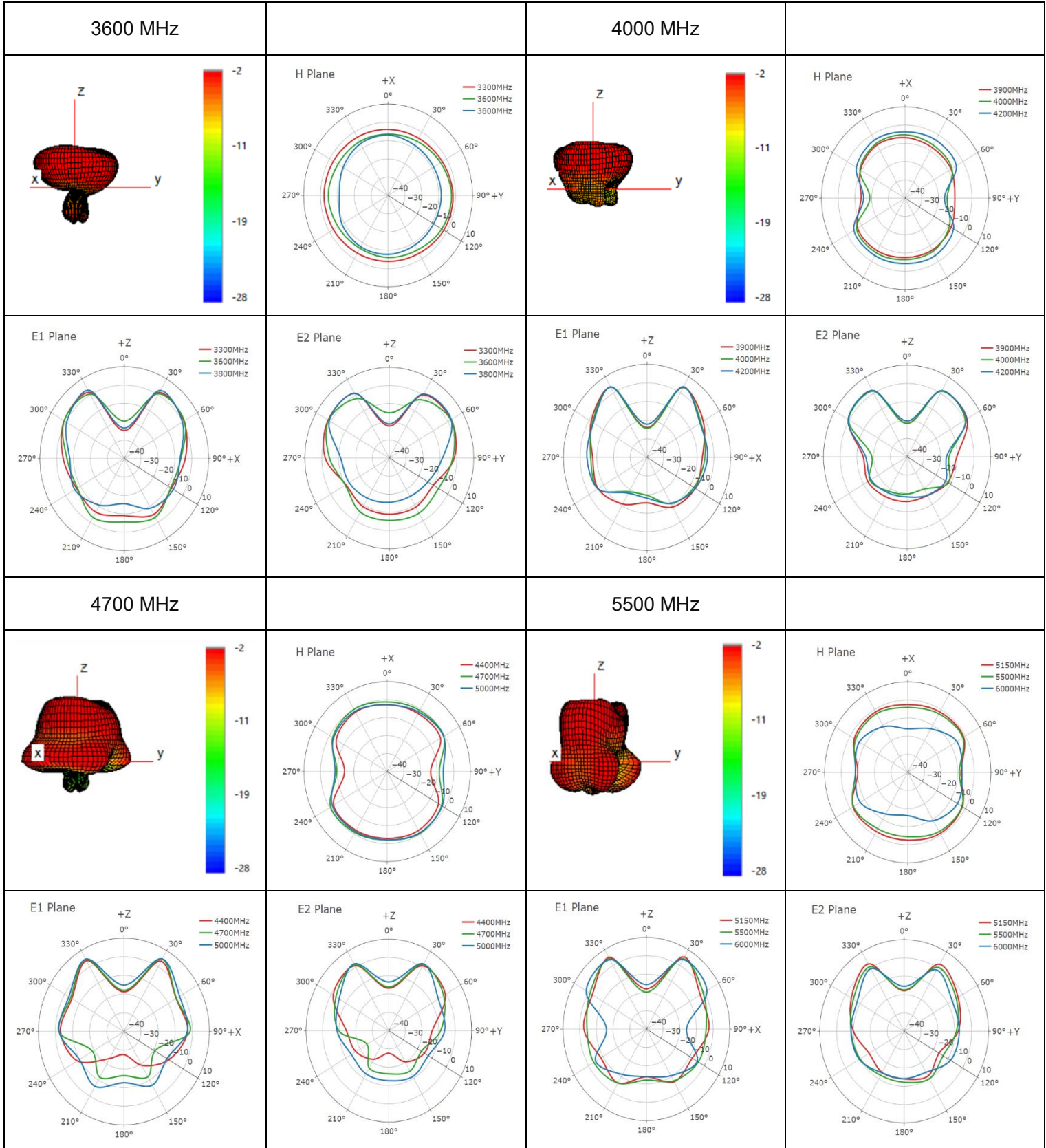
● 5G Bands





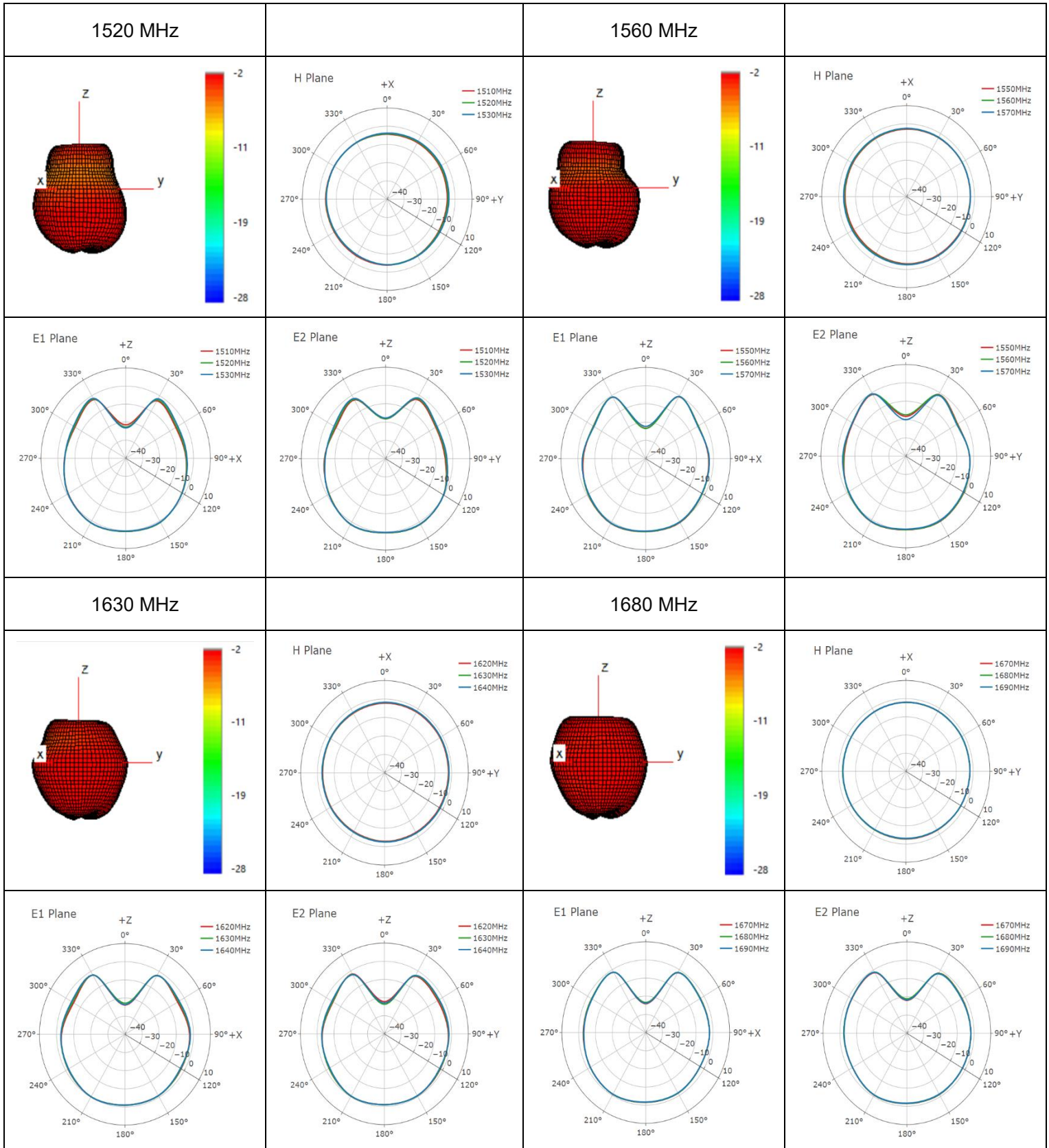


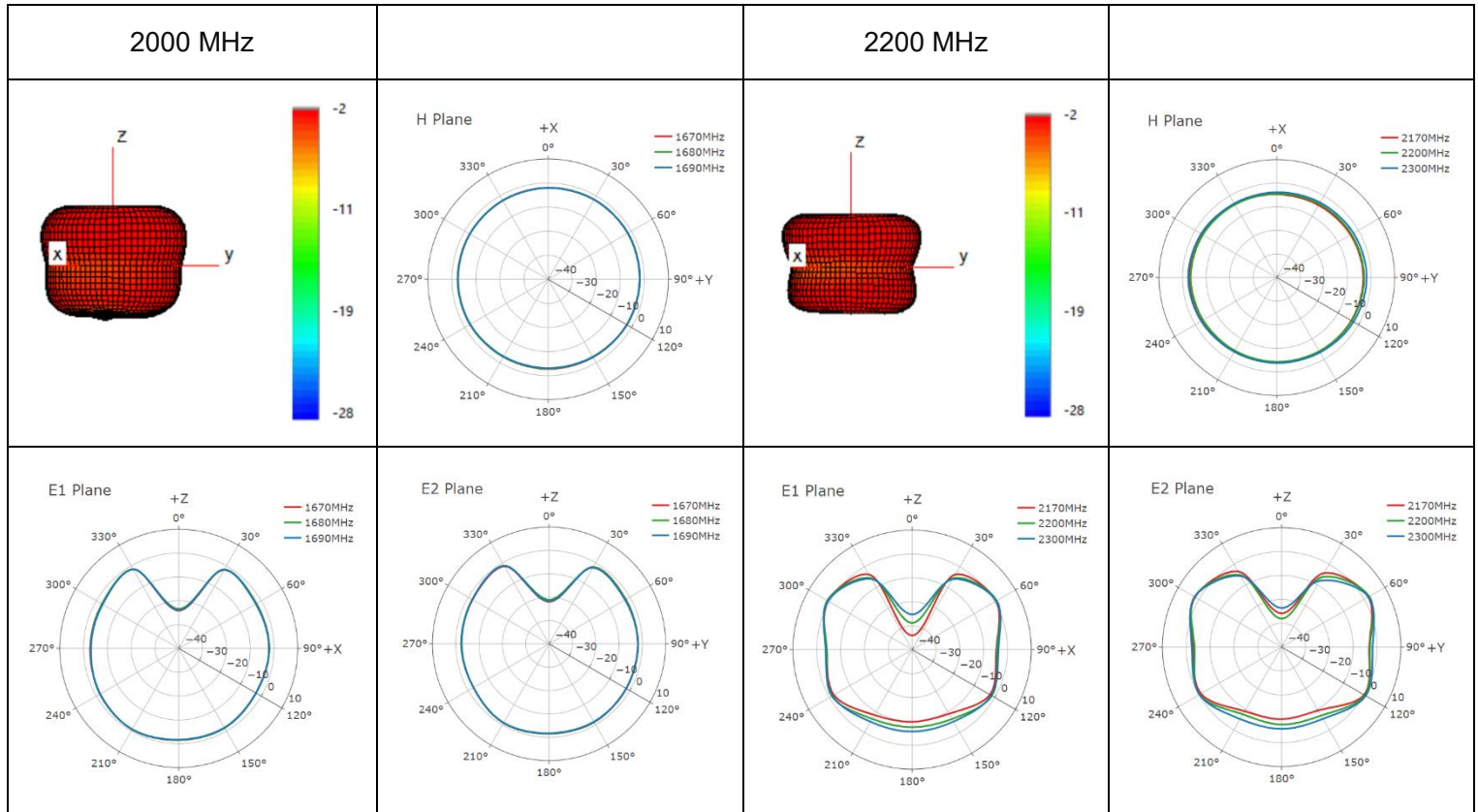






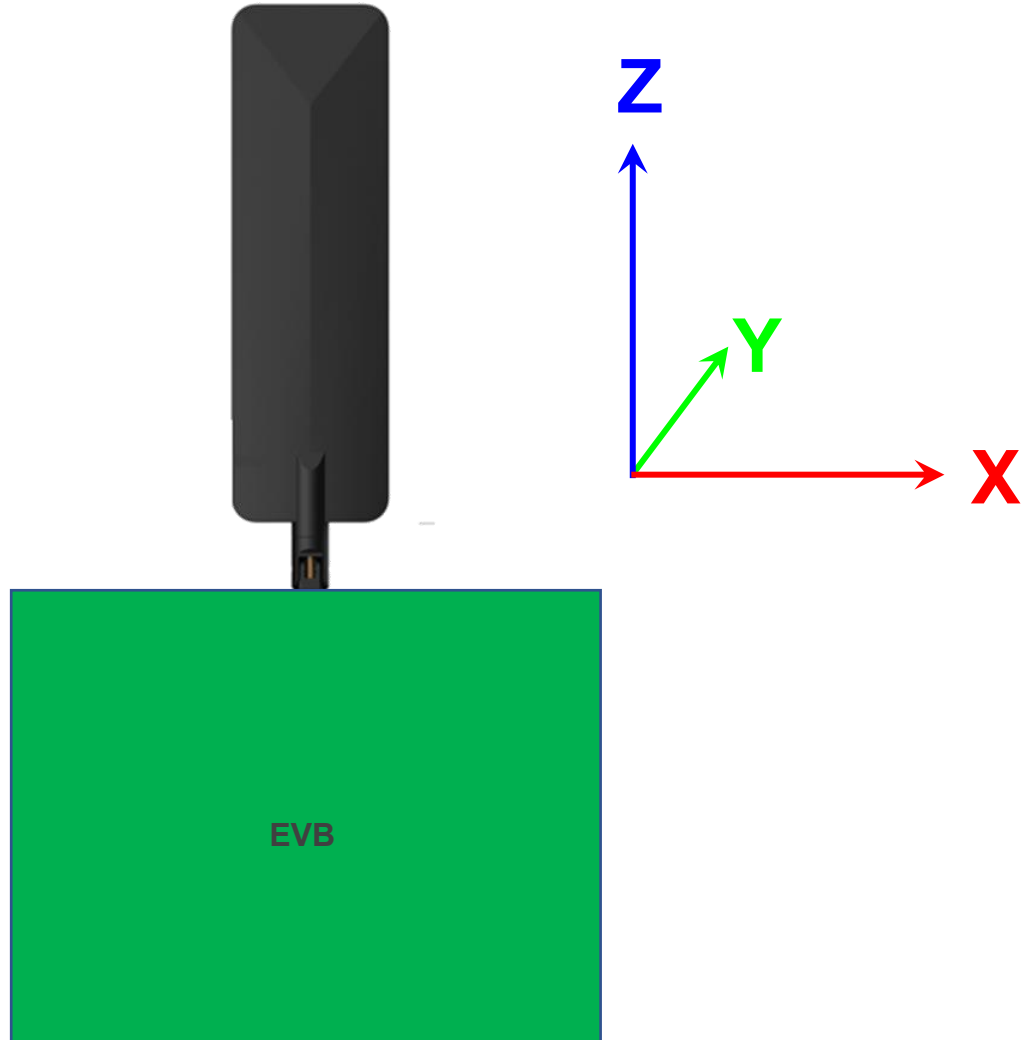
● NTN Bands



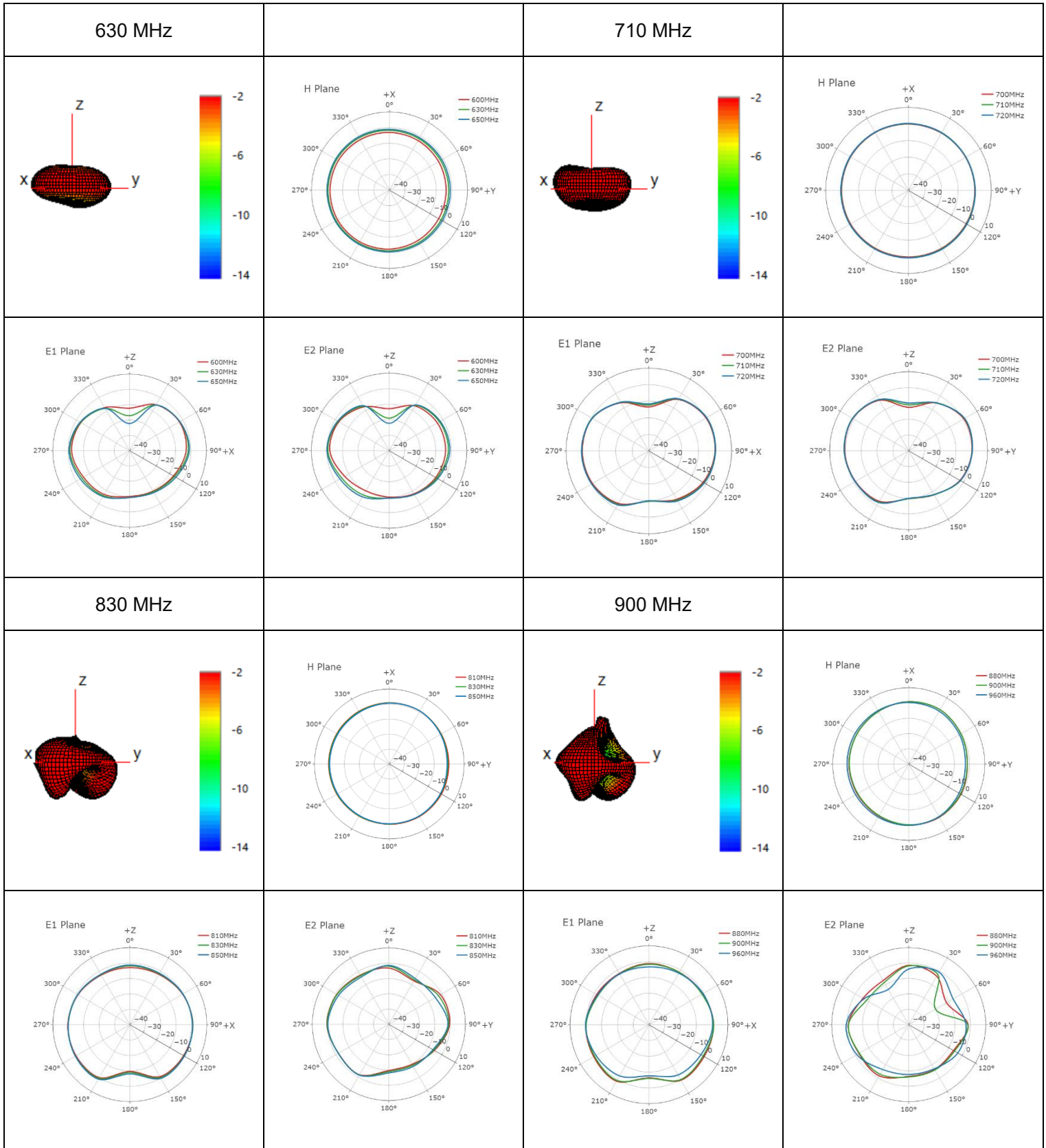


3.2.5.2. Test Condition: On 130 mm x 130 mm EVB

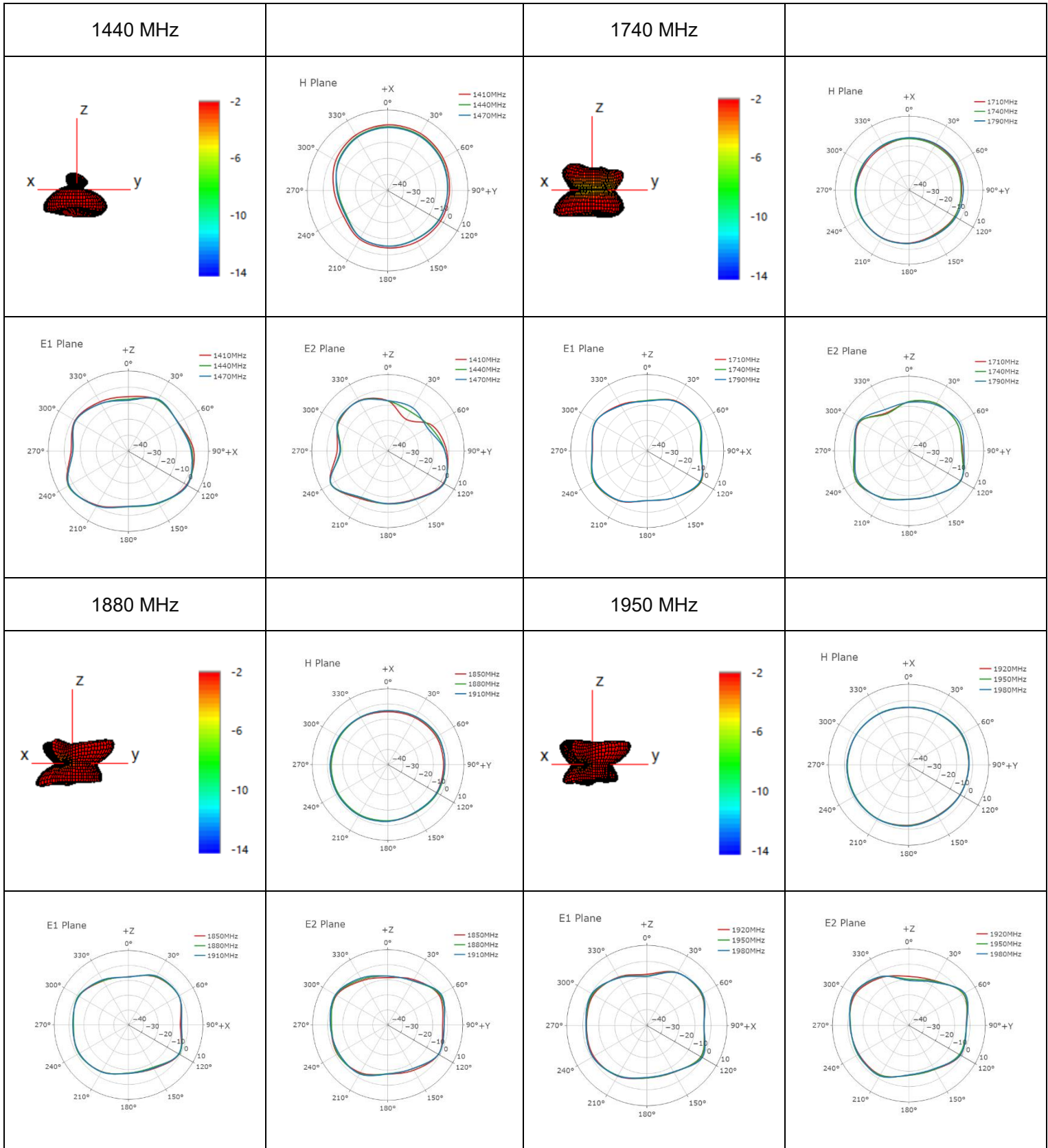
- Test Chamber: HF-G-1

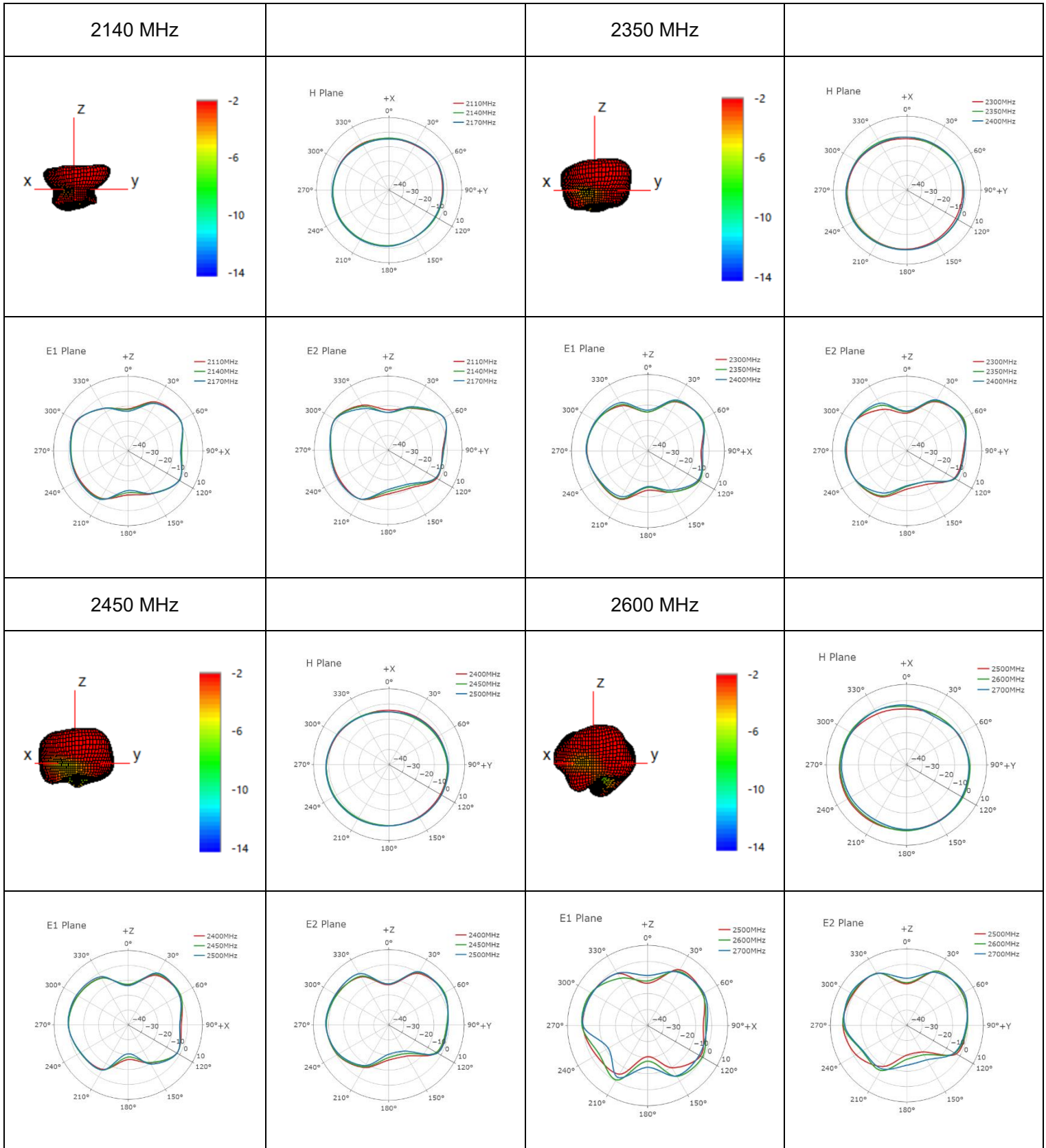


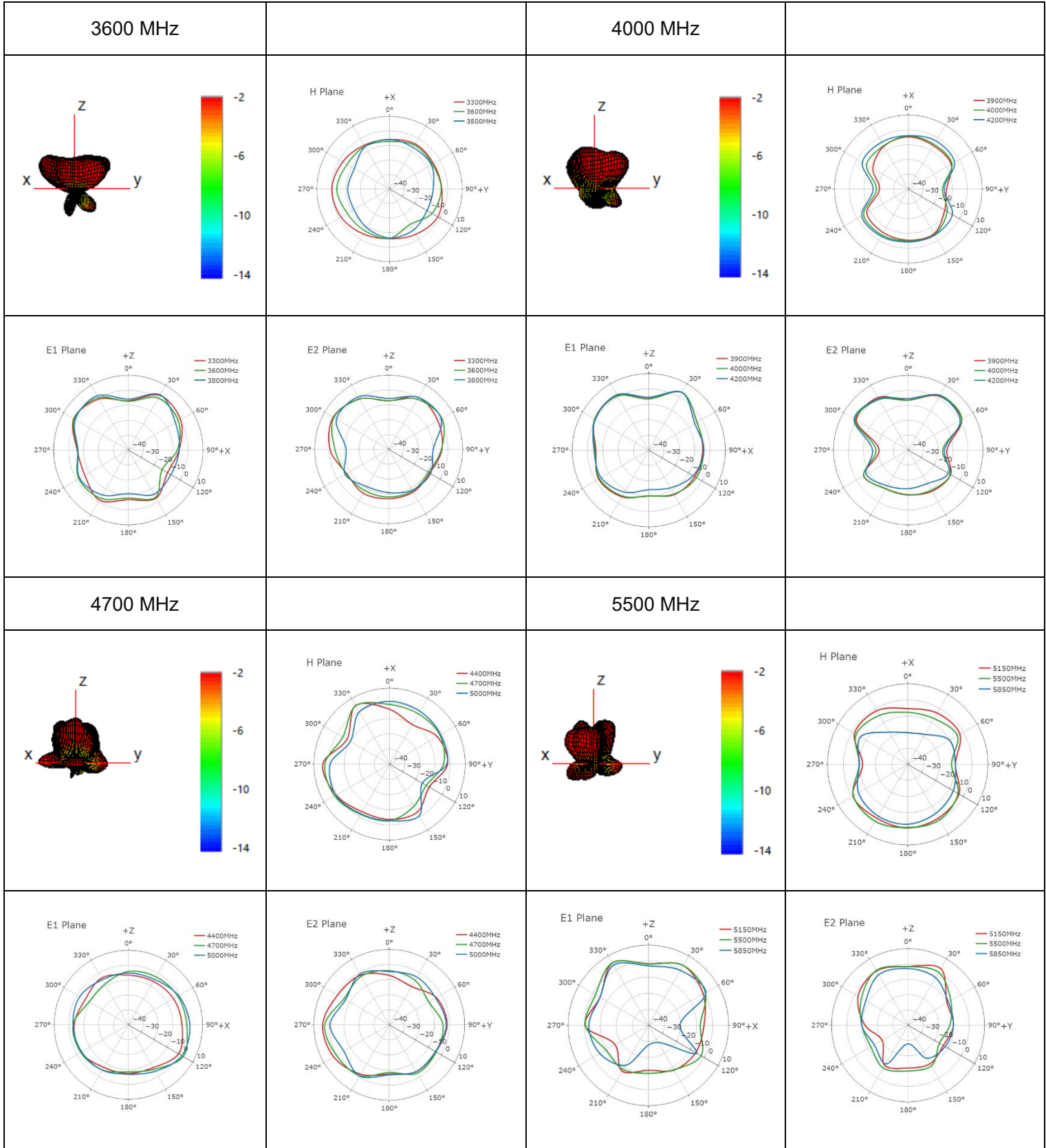
● 5G Bands



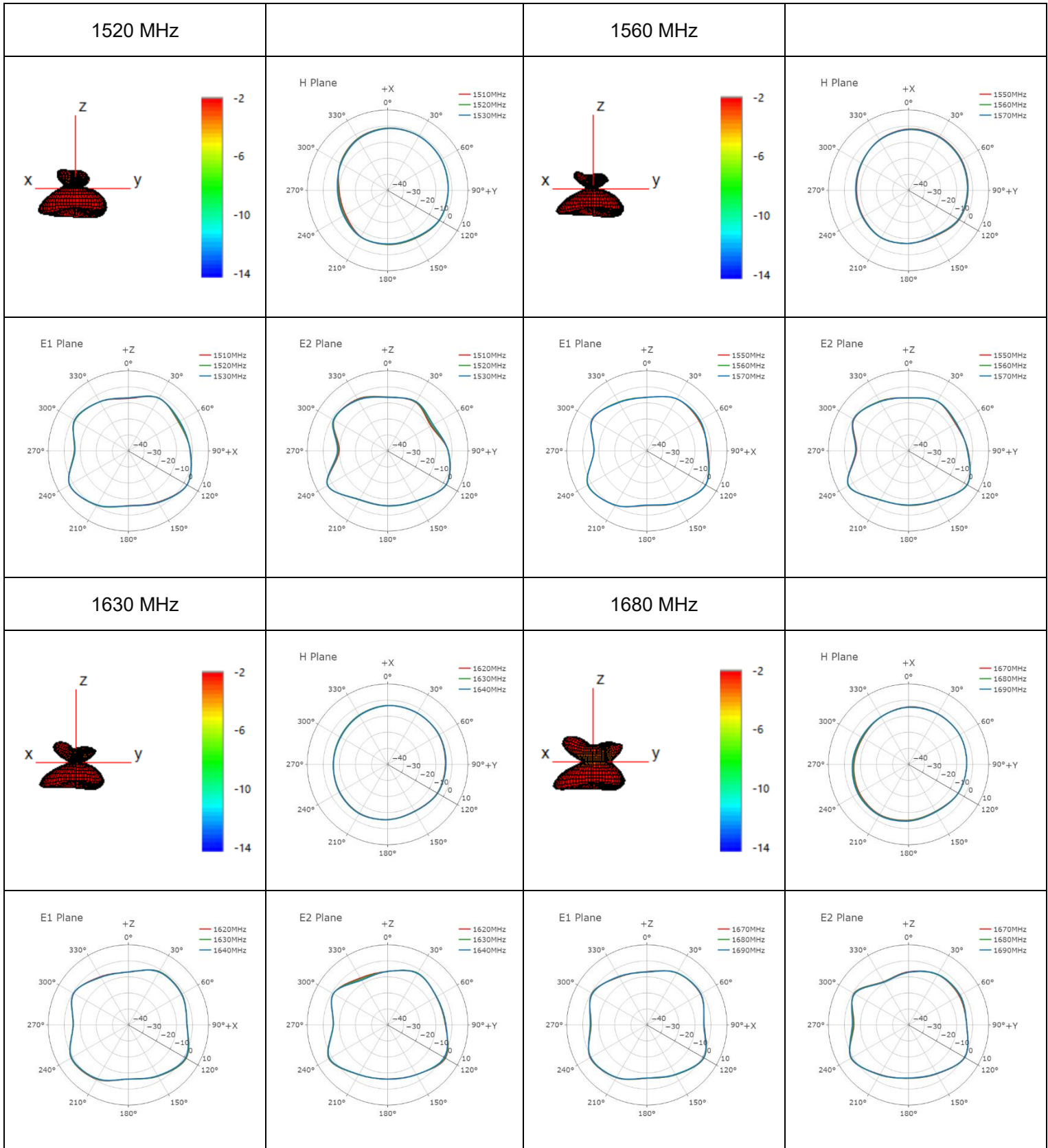




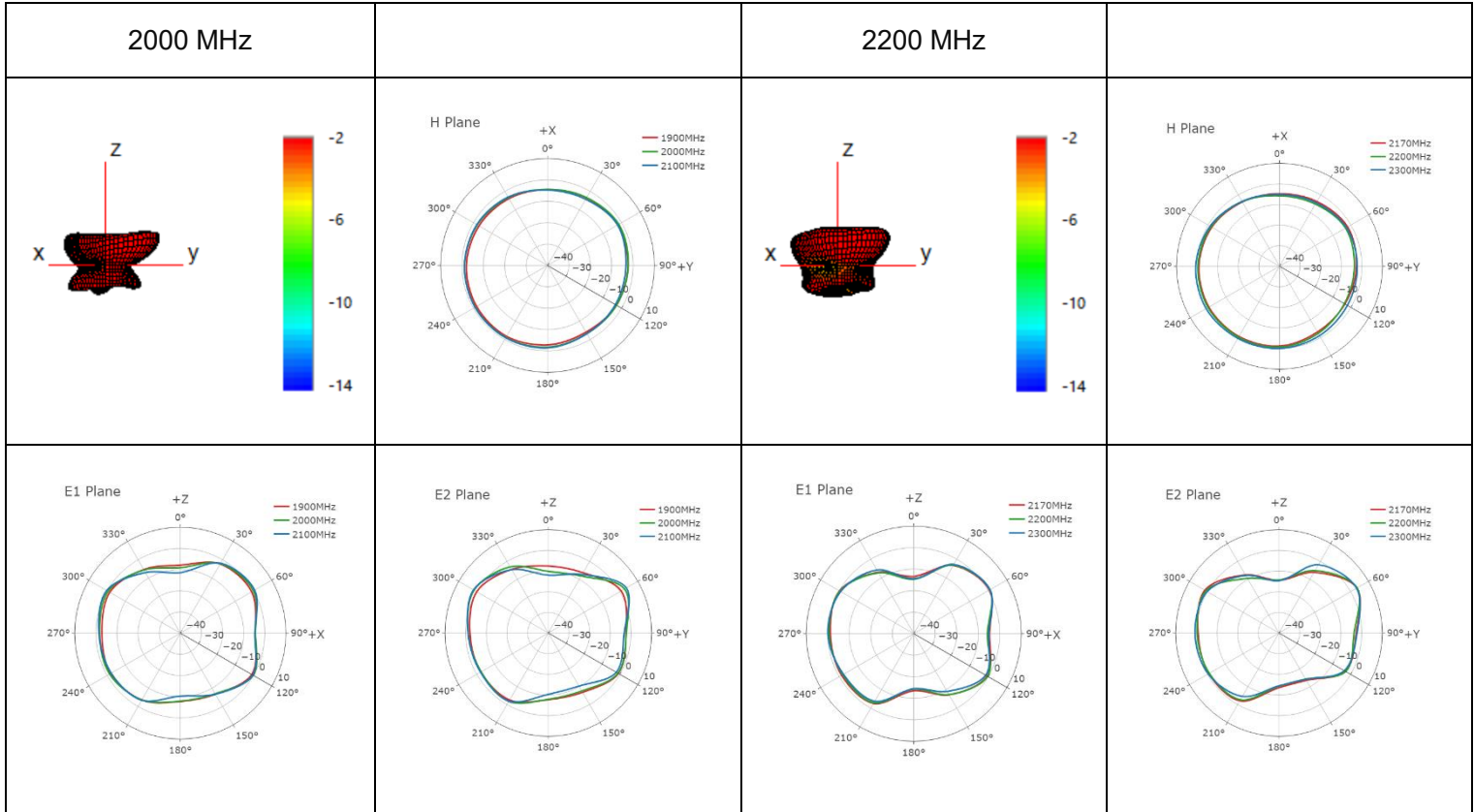




● NTN Bands

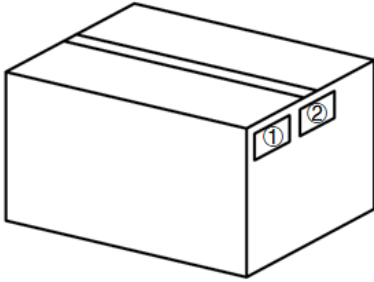
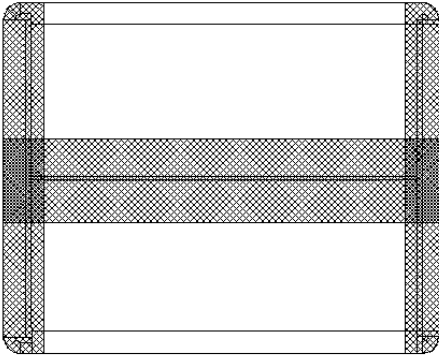






# 4 Packaging

Step	Packaging Picture / 2D Picture	Description
1		<p>Put the product in a one-piece bag; Each one-piece bag contains 10 products.</p>
2		<p>10 pcs antenna products in a PE bag; (10 pcs antennas per PE bag)</p> <p><u>PE Bag Size: L × W = 320 × 220 mm</u></p>
3		<p>Put bubble bags at the bottom of the carton. (10 PE bags per carton box) (100 pcs antennas per carton box)</p> <p><u>Carton Size:</u> <u>L × W × H = 405 × 293 × 185 mm</u></p>

4		<p><b>Position for Attaching Labels</b></p> <ul style="list-style-type: none"><li>① Carton Label</li><li>② Quality Label</li></ul>
5		<p><b>Sealing Cartons</b></p> <p>“I” type sealing cartons</p>

# 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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**Or our local offices. For more information, please visit:**

<http://www.quectel.com-support-sales.htm>

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# Revision History

Version	Date	Author	Note
-	2023-05-25	Ezail TAN/ Hart HU/ David LIU/ Bunny ZHANG	Creation of the document
1.0	2023-05-25	Ezail TAN/ Hart HU/ David LIU/ Bunny ZHANG	First official release
1.1	2023-07-14	Aria CHU	Updated Chapter 1.2.
1.2	2023-09-01	Hart HU	Updated the drawing (Chapter 2).
2.0	2023-11-07	Hart HU/ Black LI	<ol style="list-style-type: none"> <li>1. Updated efficiency data (Front page)</li> <li>2. Added antenna installation instructions (Chapter 2).</li> <li>3. Added EVB status test data (Chapter 3).</li> </ol>

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