



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.

Contents

Overview.....	1
Contents	2
1 Specification.....	3
1.1. Electrical.....	3
1.2. Mechanical & Environmental	5
2 Drawing	6
3 Detailed Performance	8
3.1. S-Parameter Test	8
3.1.1. VSWR.....	8
3.1.2. Return Loss	10
3.2. Radiation Performance Test.....	12
3.2.1. Efficiency	12
3.2.2. Average Gain	14
3.2.3. Peak Gain.....	16
3.2.4. Upper Hemisphere Efficiency	18
3.2.5. 3D & 2D Radiation Pattern.....	19
3.2.5.1. Test Condition: In Free Space.....	19
3.2.5.2. Test Condition: On 130 mm × 130 mm EVB	26
4 Packaging	33
Contact Us.....	35
Legal Notices	36
Revision History	38

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 Loss	FS	≤ -8.5 dB
	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 Loss	FS		≤ -3.6 dB							
	EVB		≤ -2.7 dB							
Peak Gain	FS		≤ 5.8 dBi							
	EVB		≤ 5.5 dBi							

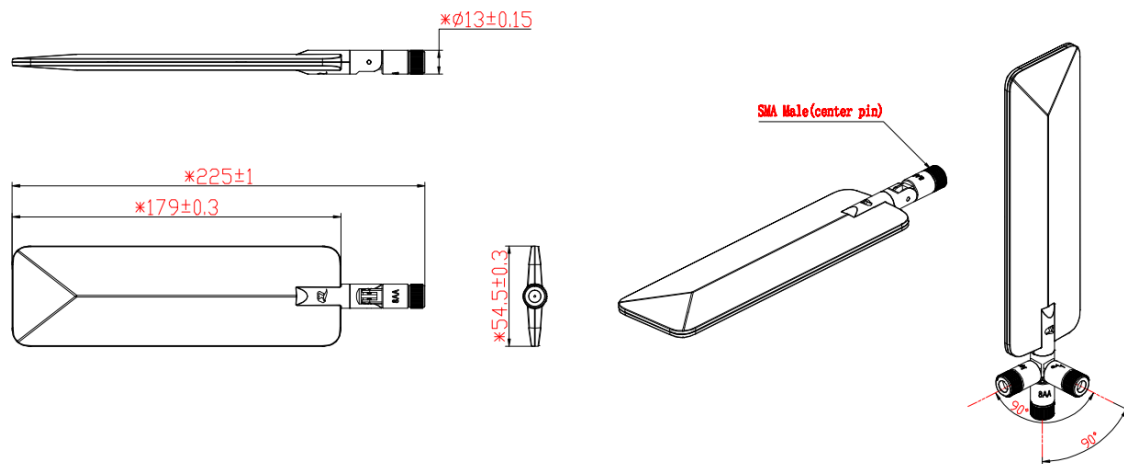
Note:

- 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.

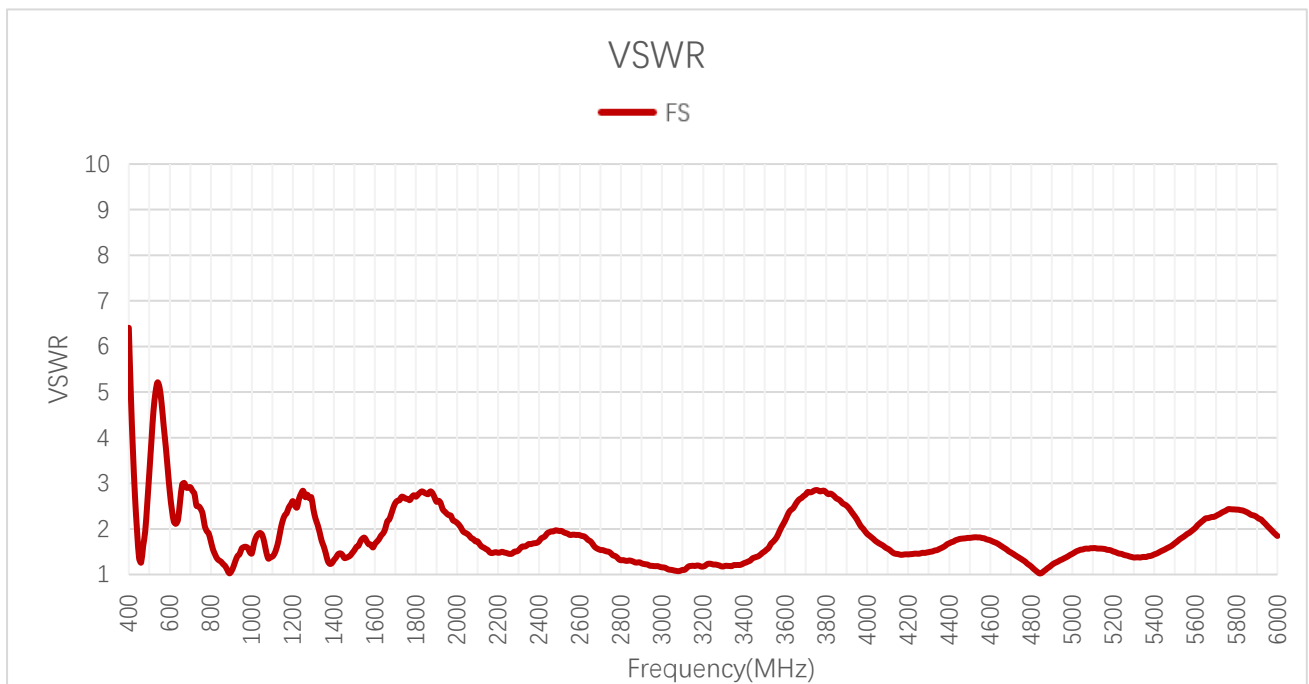


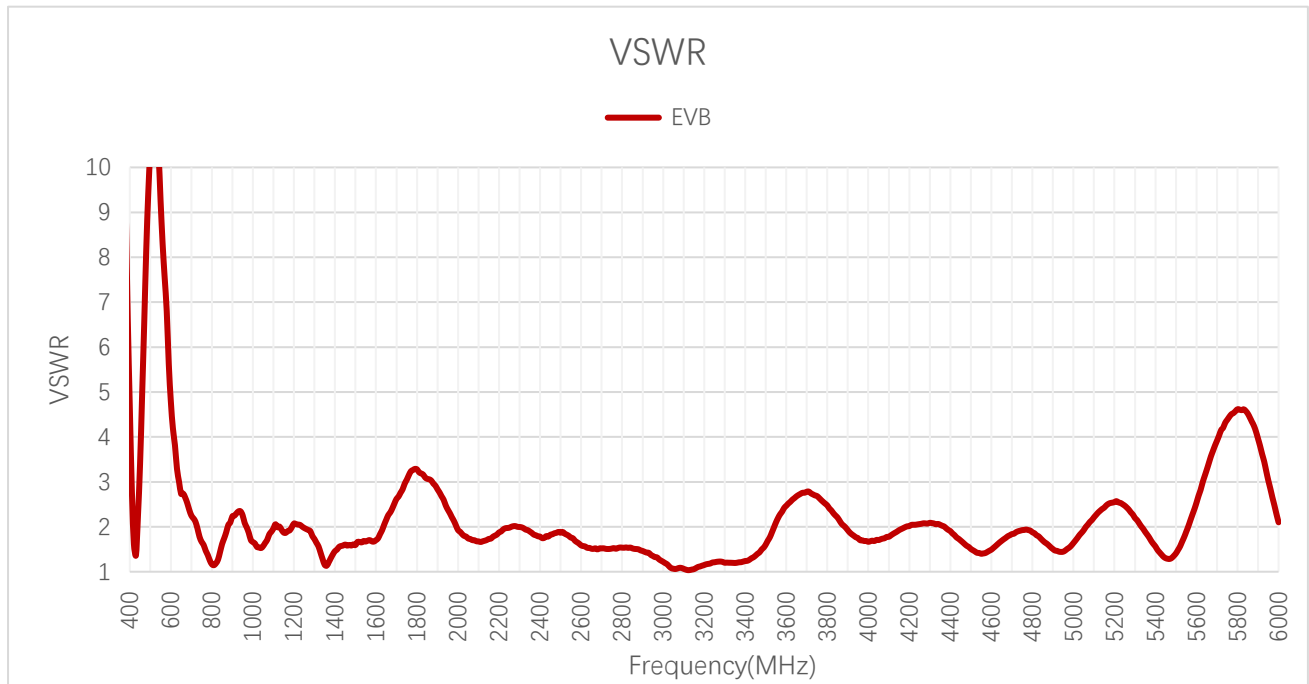
Note: If you use a torque wrench, the recommended force for mounting the antenna is 0.9Nm and the maximum torque to prevent antenna damage is 1.17Nm.

3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR





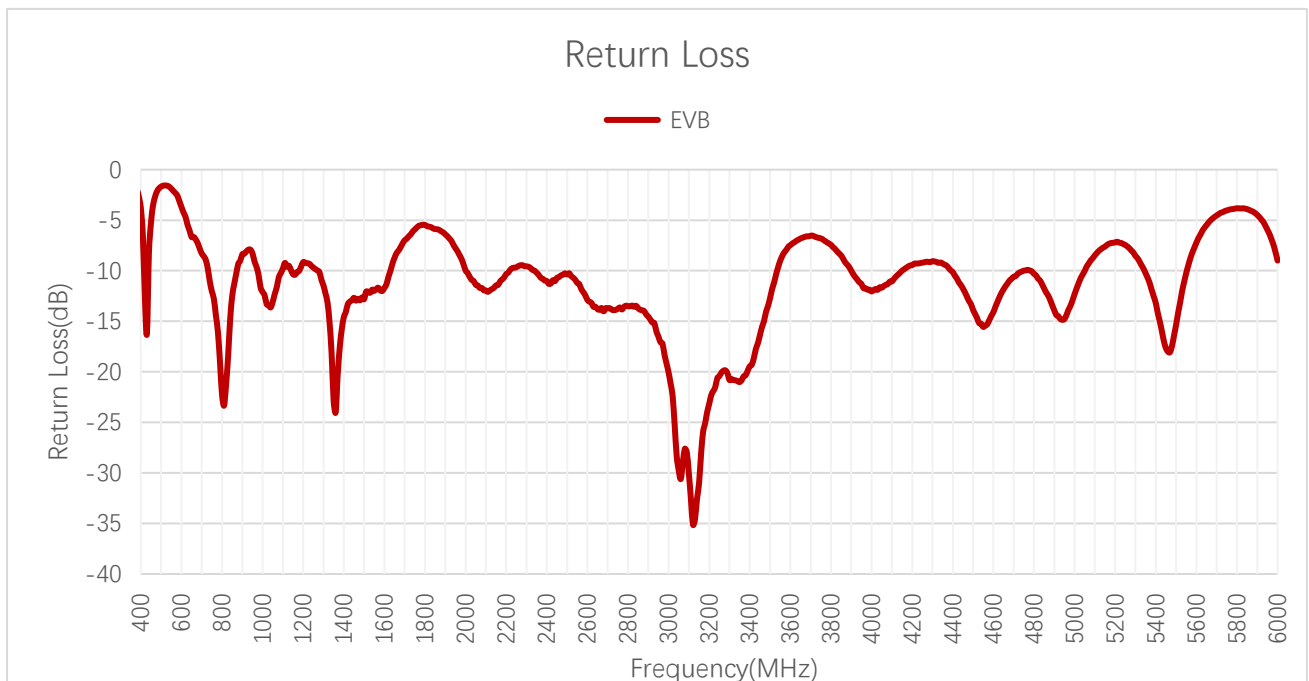
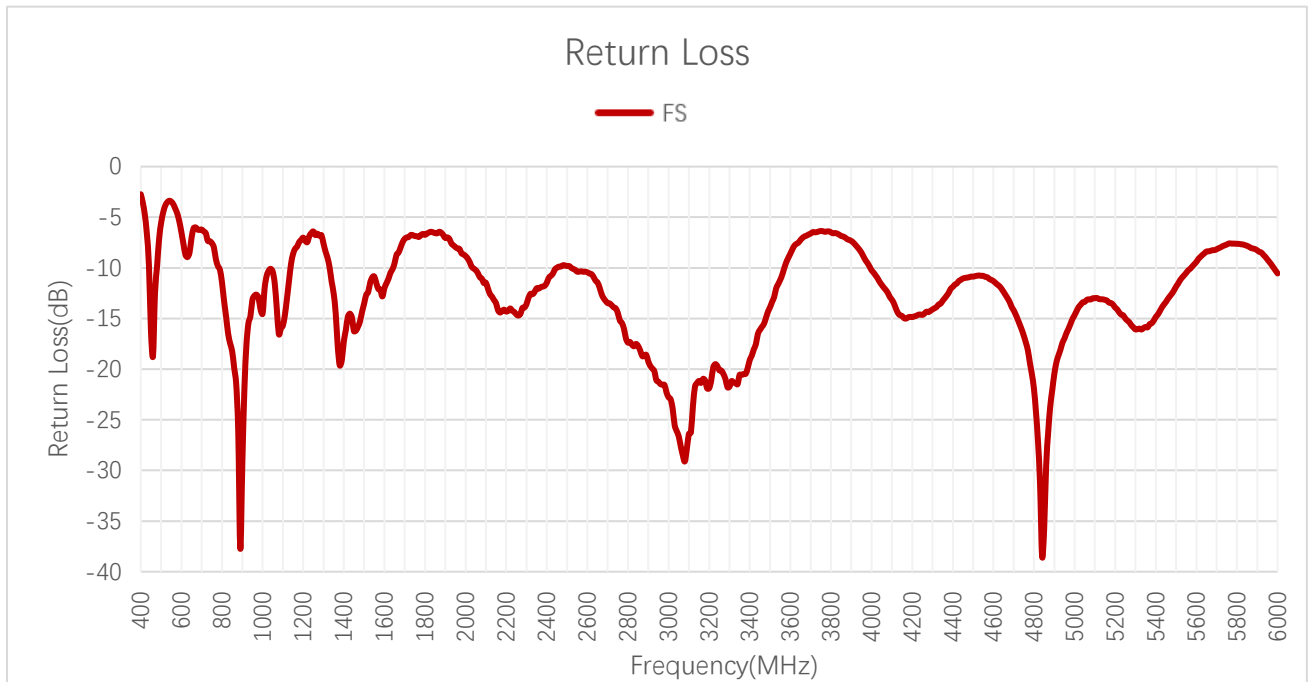
VSWR

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

VSWR - NTN Bands

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

3.1.2. Return Loss



Return Loss (dB)

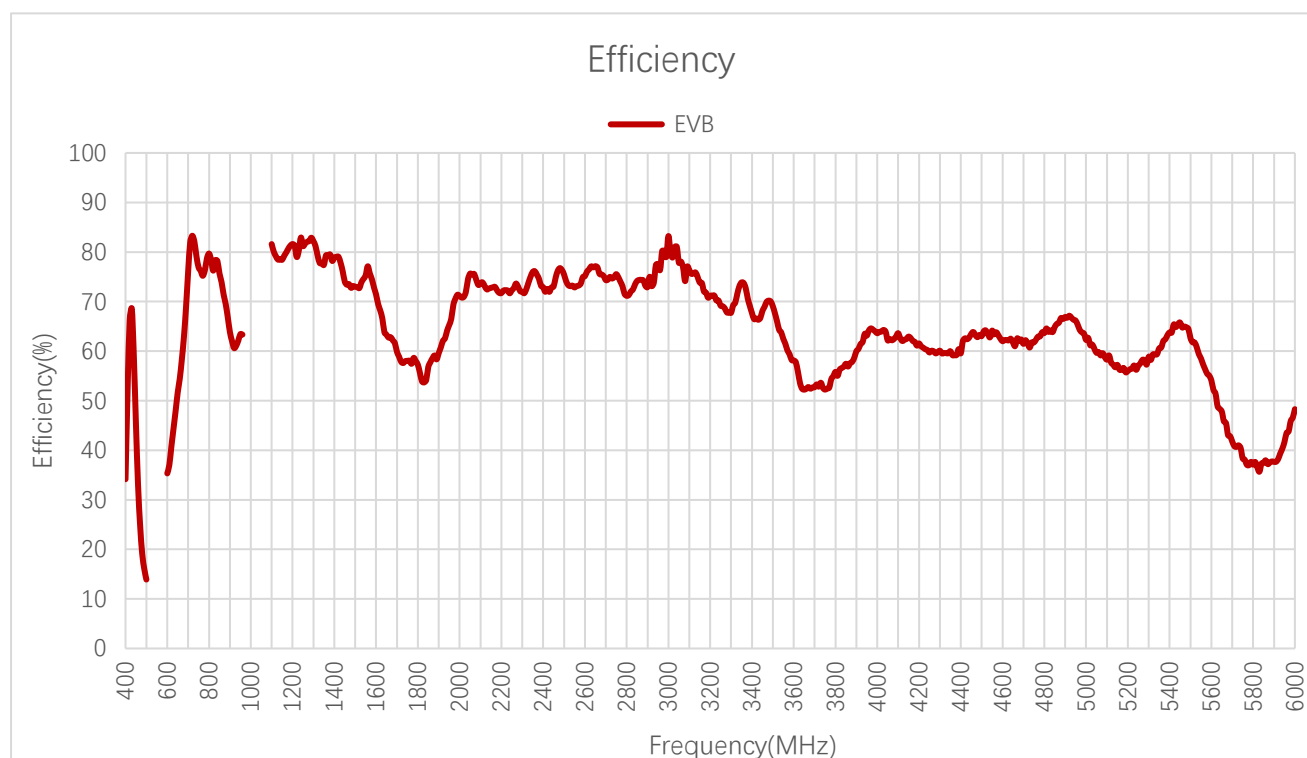
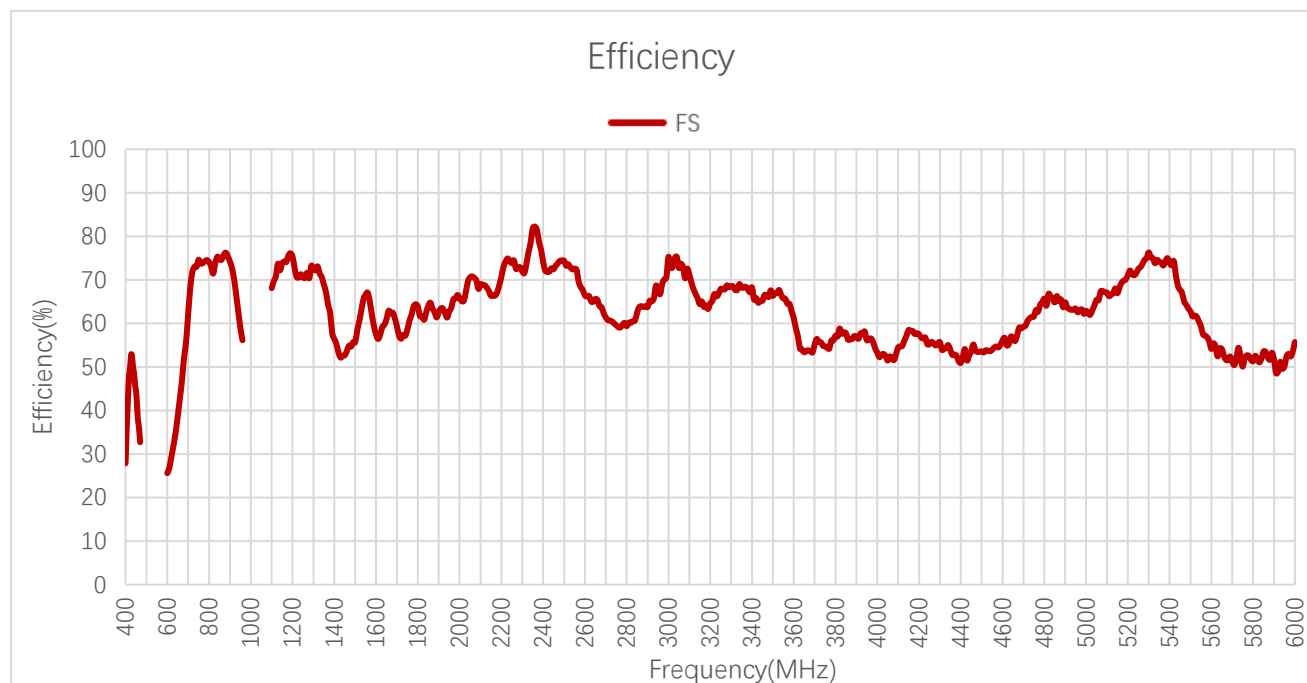
Frequency (MHz)	410	420	460	470	600	630	700	710	810
FS	-3.6	-4.8	-18.7	-12.5	-6.5	-8.9	-6.2	-6.4	-13.2
EVB	-6.5	-12.6	-3.6	-2.7	-3.7	-5.4	-8.3	-8.6	-23.3
Frequency (MHz)	830	900	960	1440	1710	1740	1880	1950	2140
FS	-16.5	-29.4	-12.7	-14.9	-7.0	-6.8	-6.5	-7.9	-13.2
EVB	-18.5	-8.4	-9.1	-12.9	-6.8	-6.1	-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



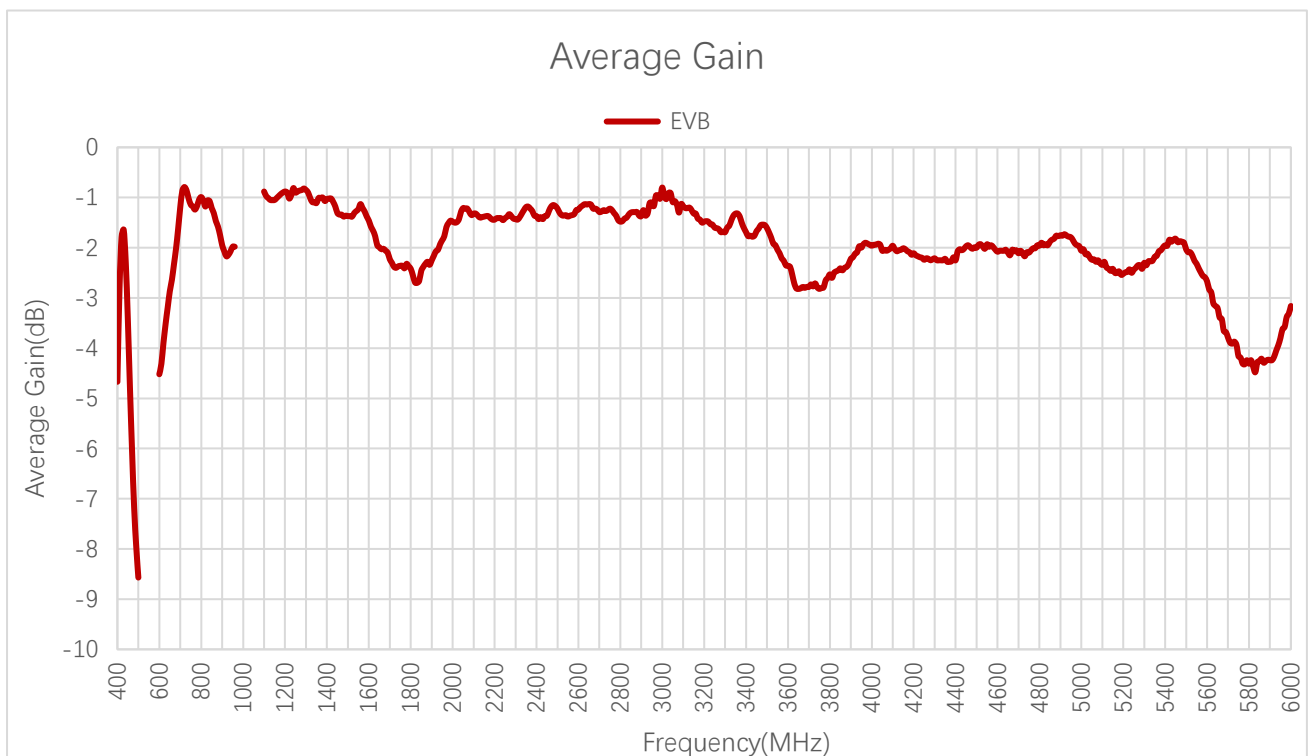
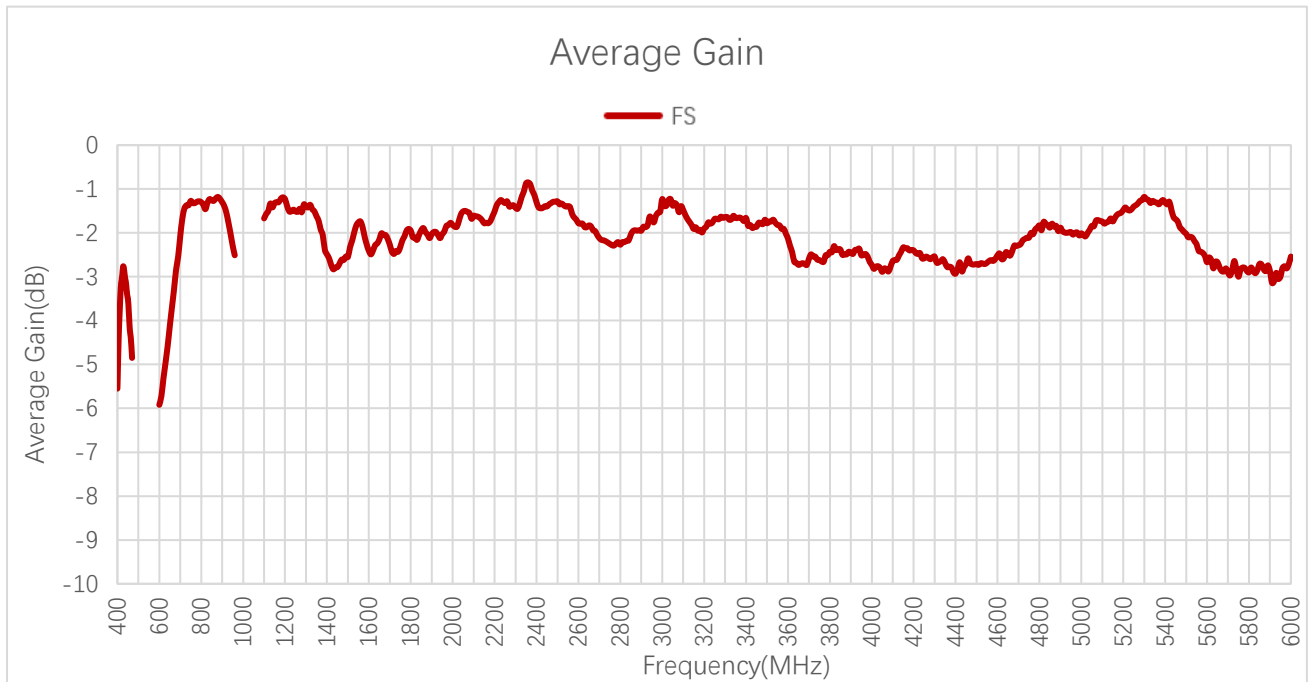
Efficiency (%)

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



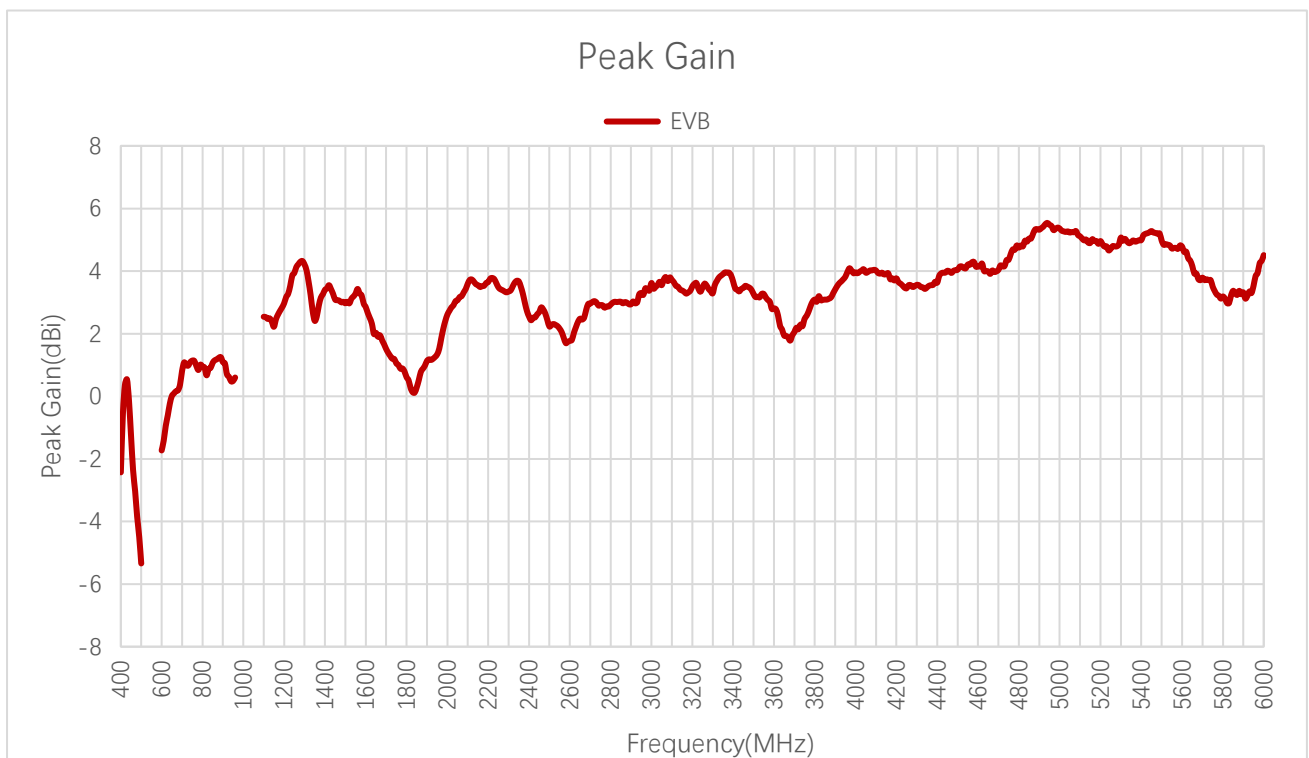
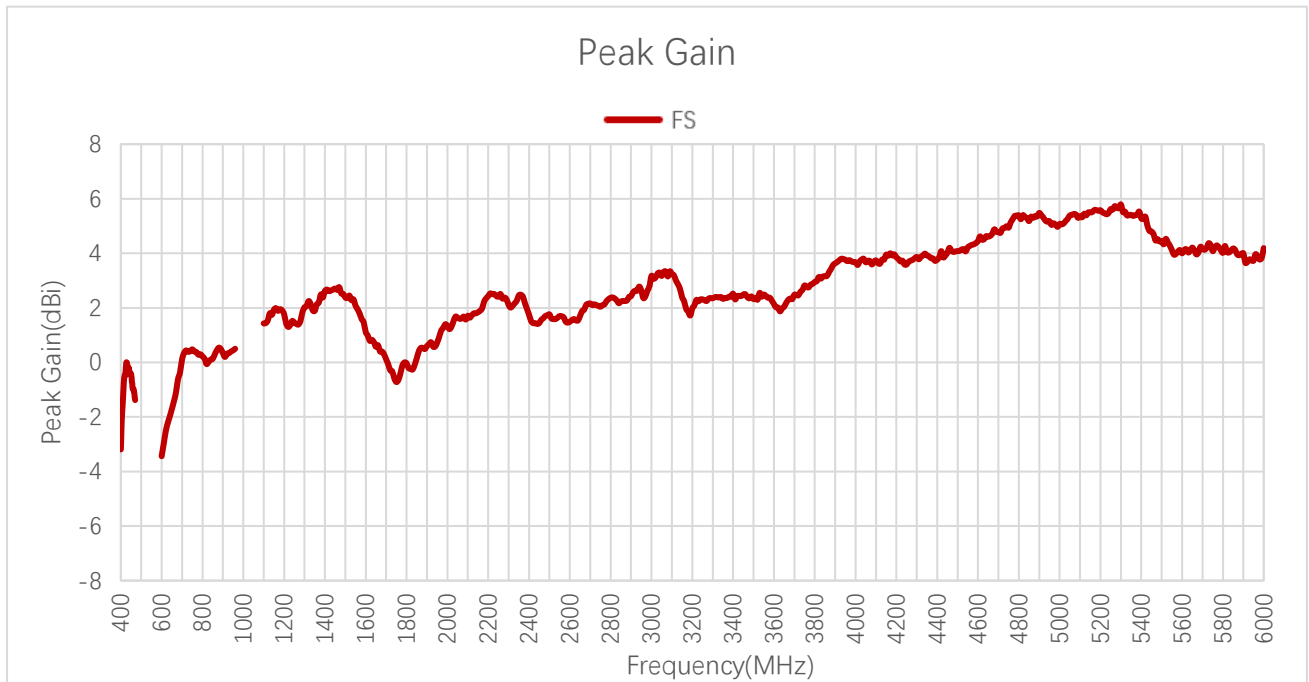
Average Gain (dB)

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



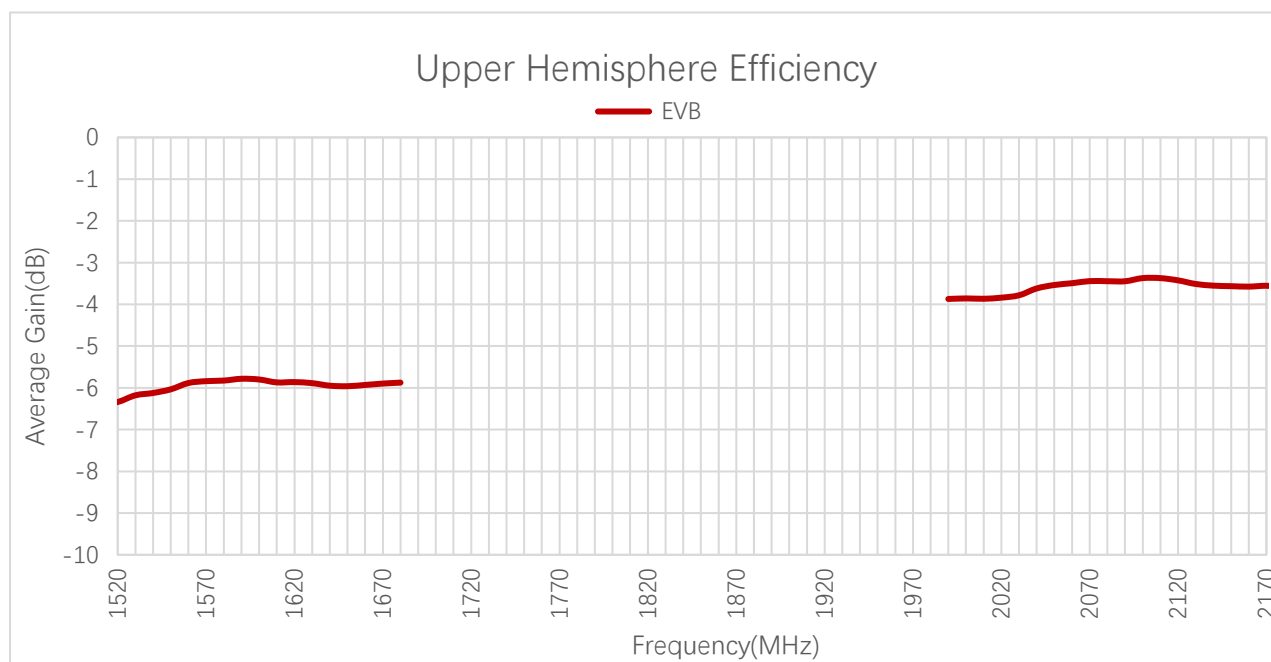
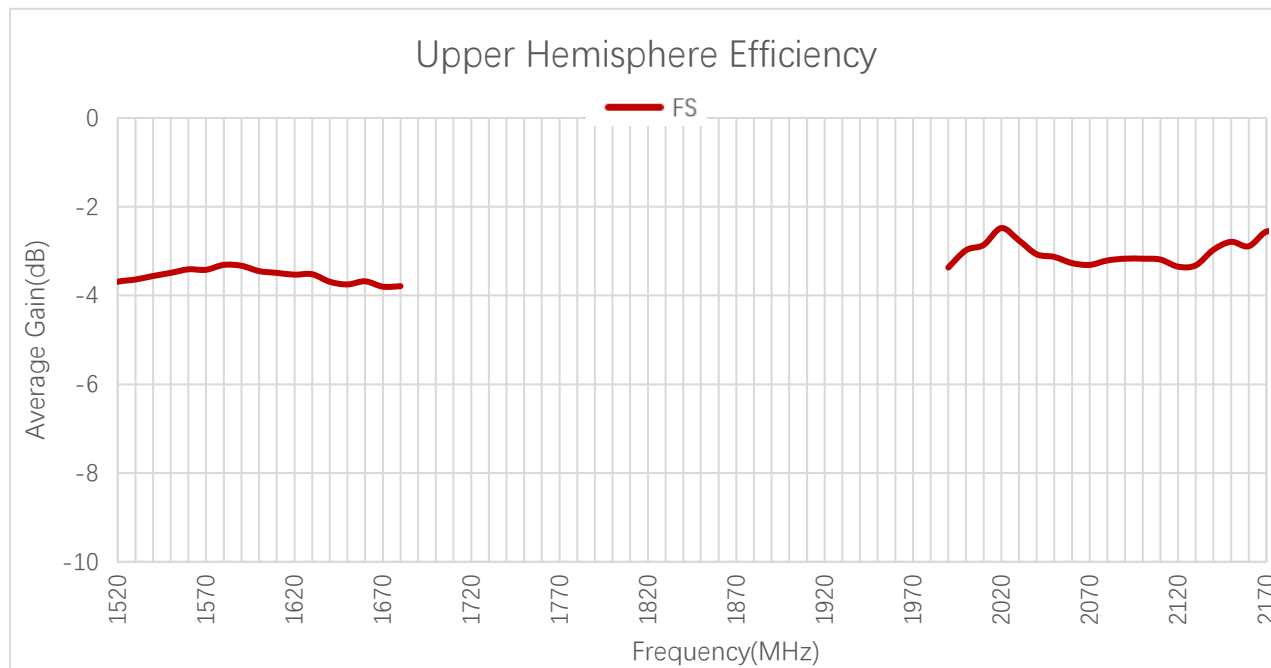
Peak Gain (dBi)

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



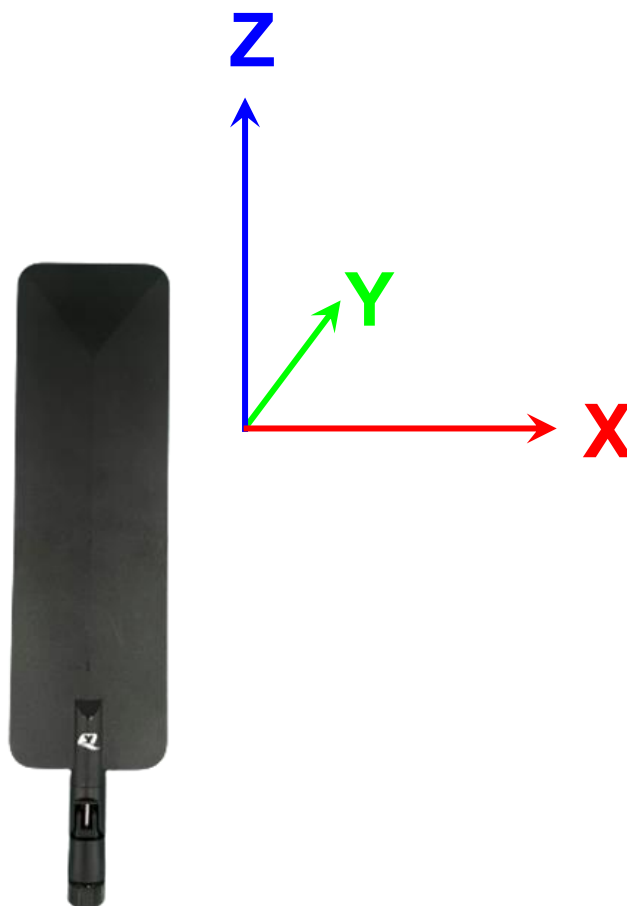
Upper Hemisphere Efficiency (dB) - NTN Bands

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

3.2.5. 3D & 2D Radiation Pattern

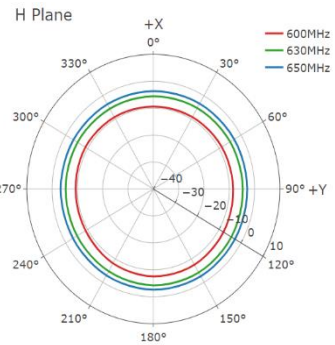
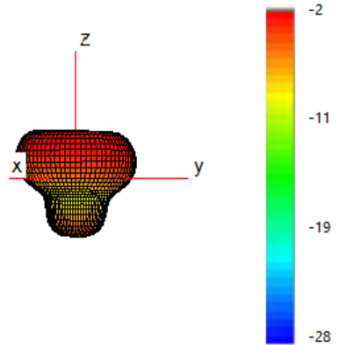
3.2.5.1. Test Condition: In Free Space

- Test Chamber: HF-G-1

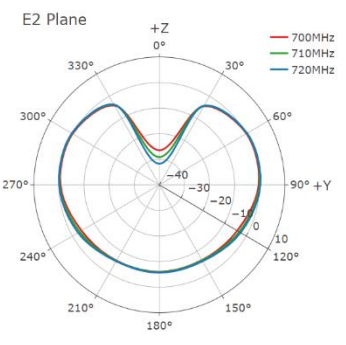
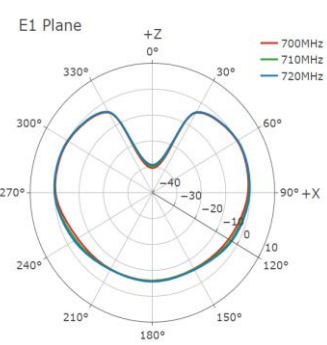
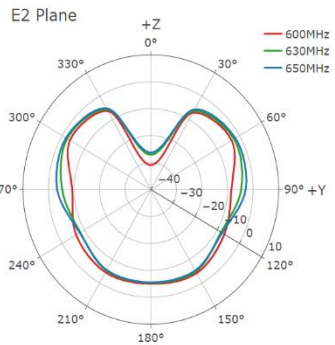
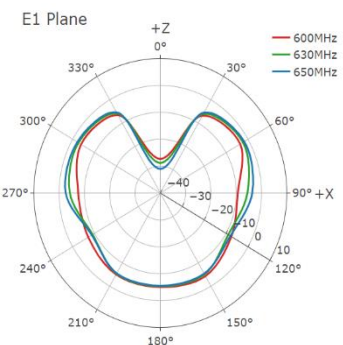
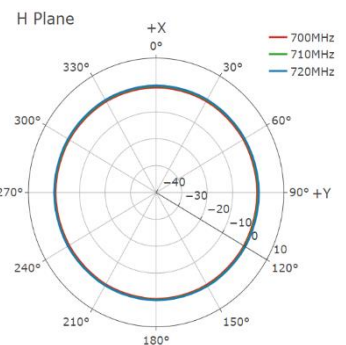
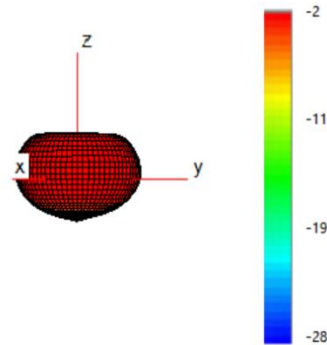


● 5G Bands

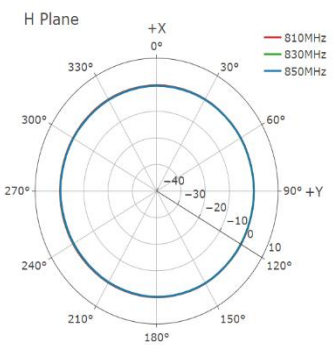
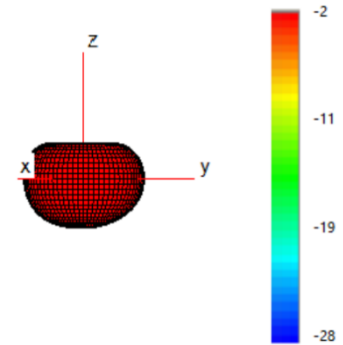
630 MHz



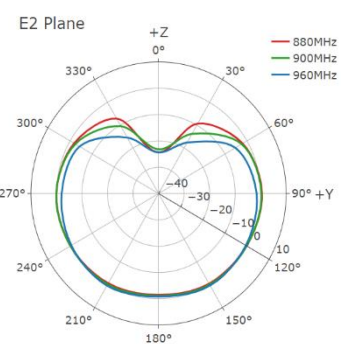
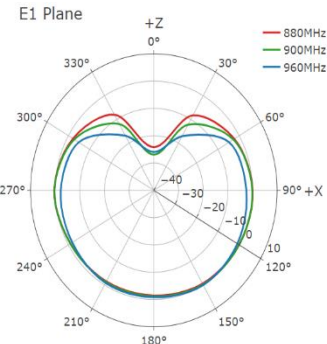
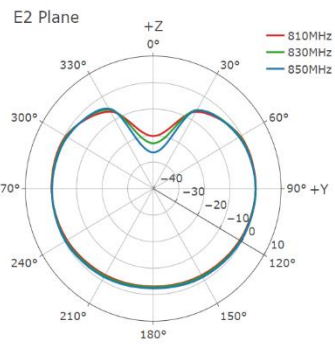
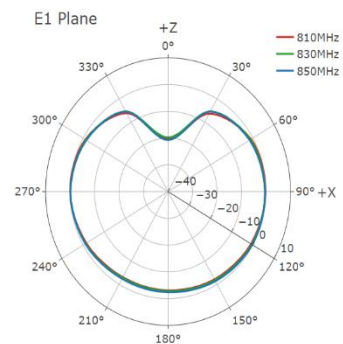
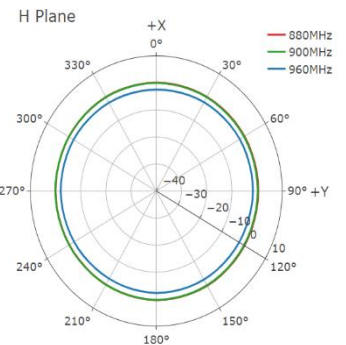
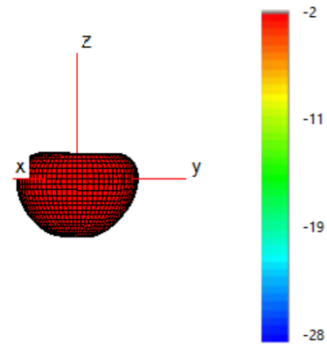
710 MHz

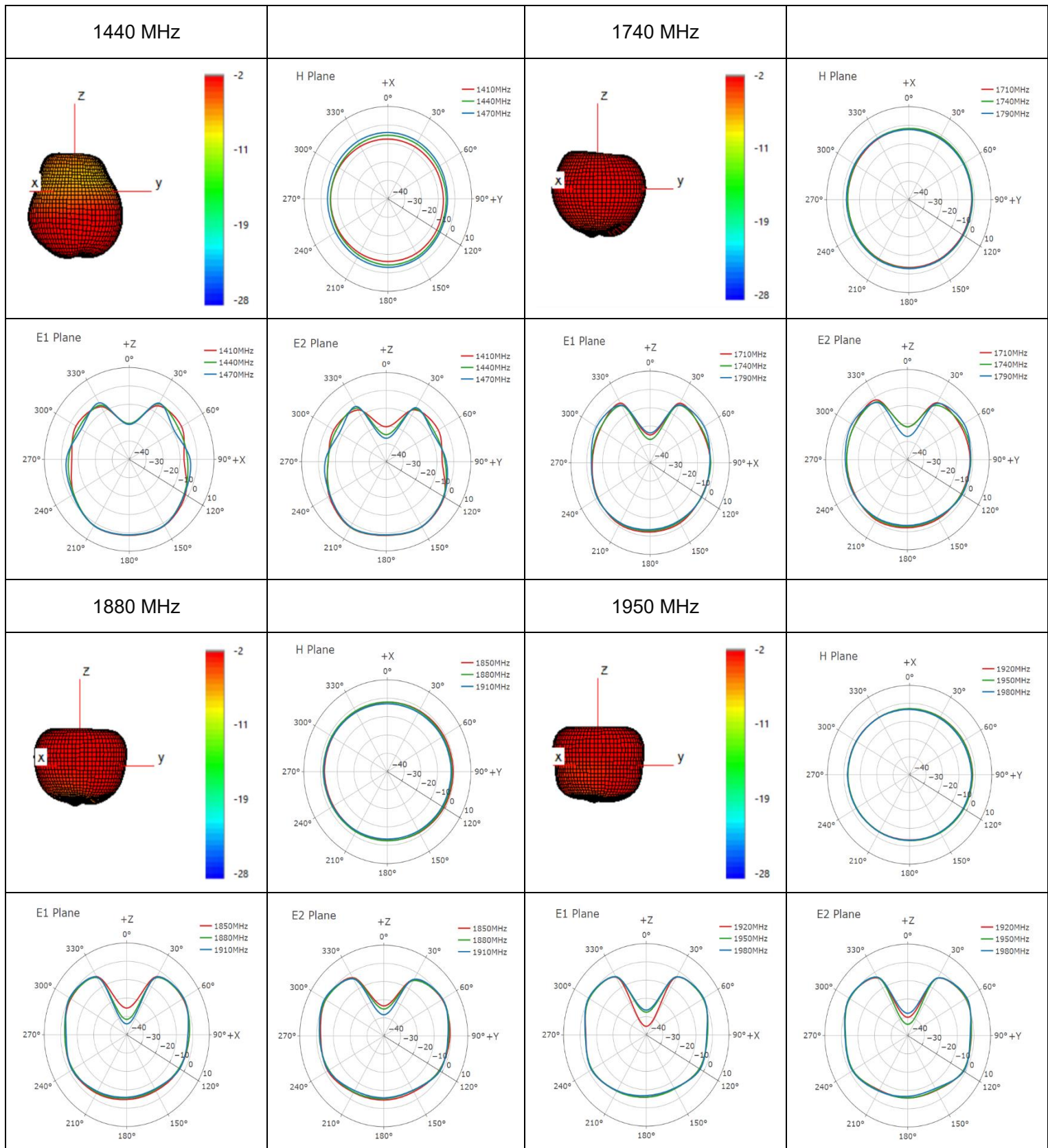


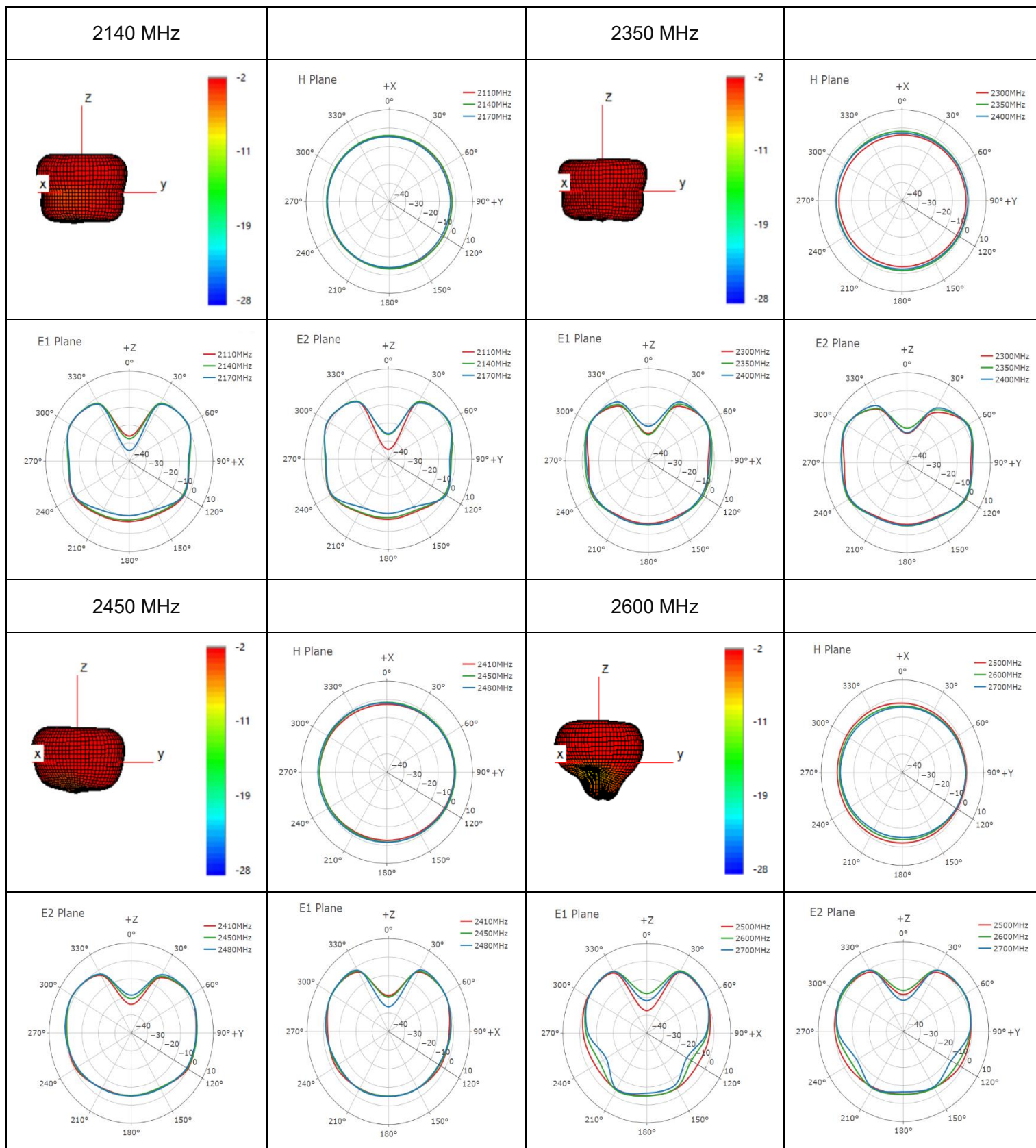
830 MHz

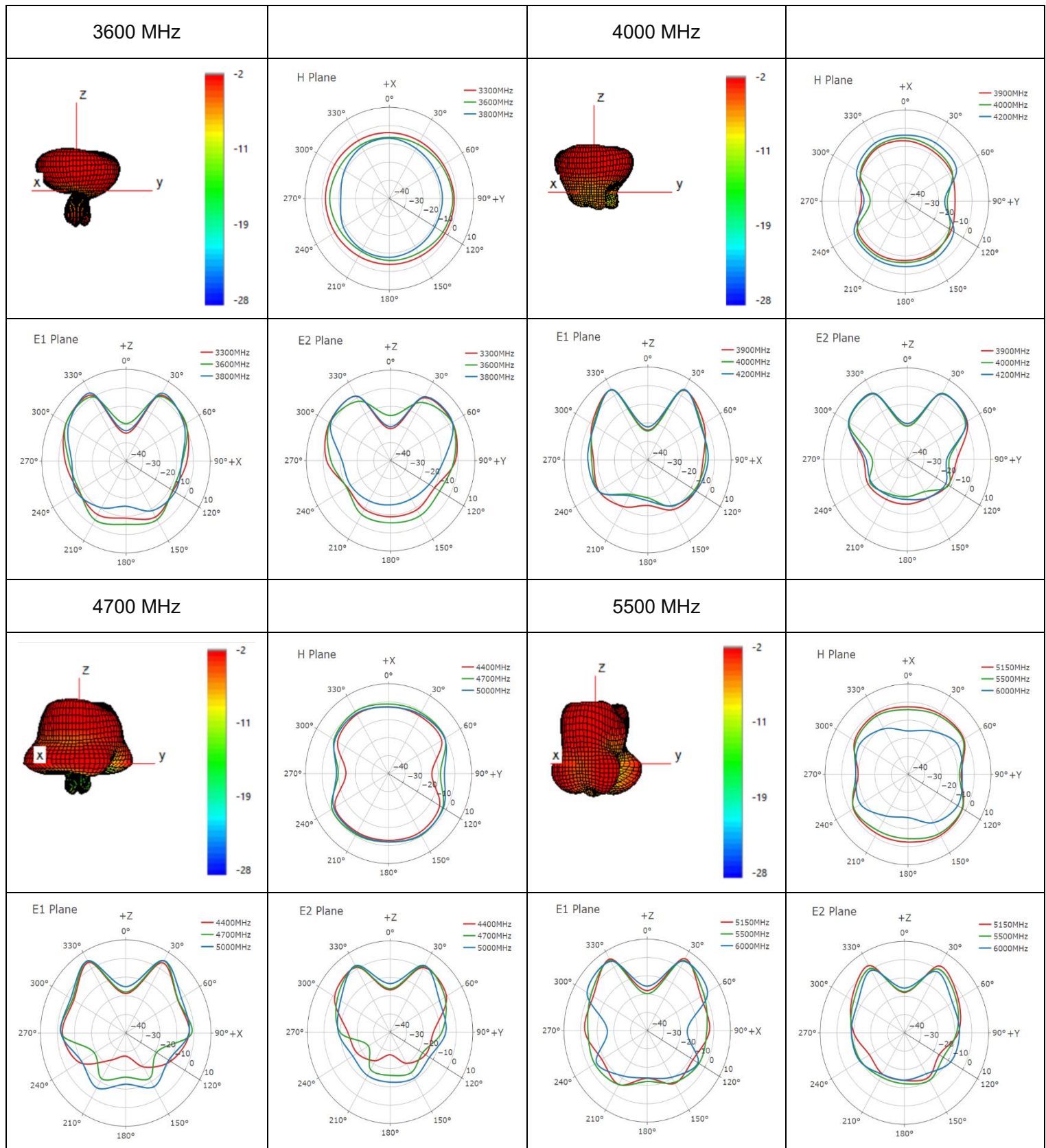


900 MHz

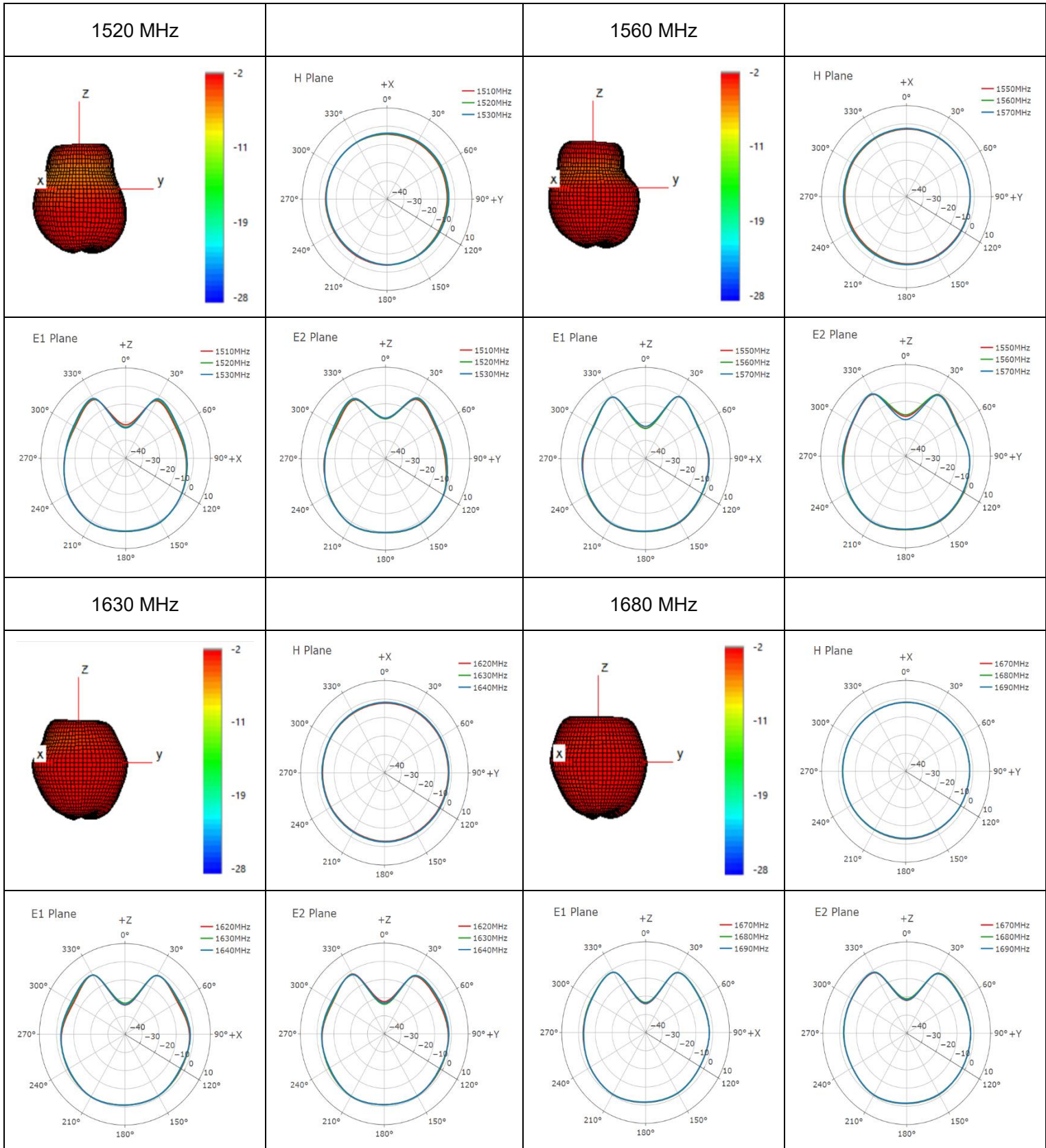


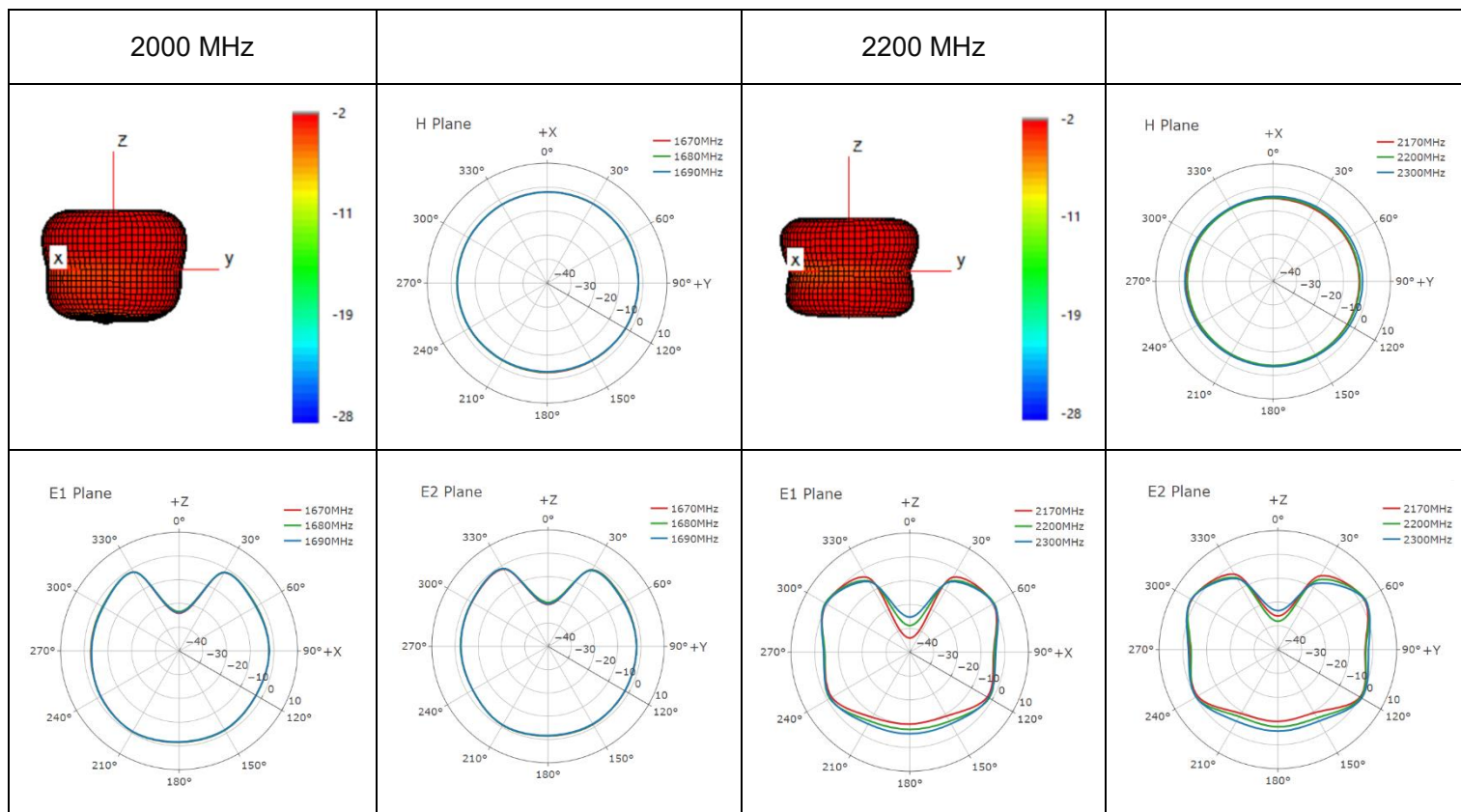






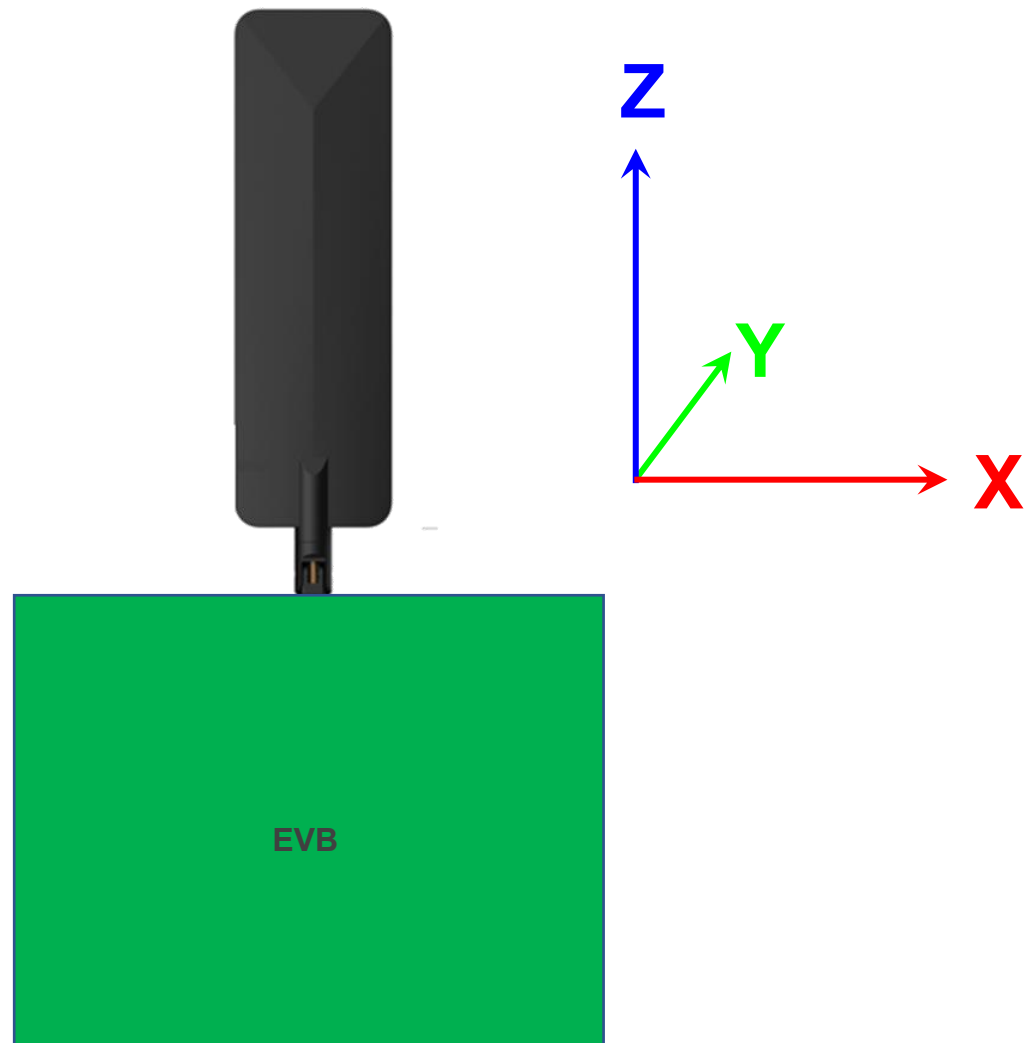
● NTN Bands



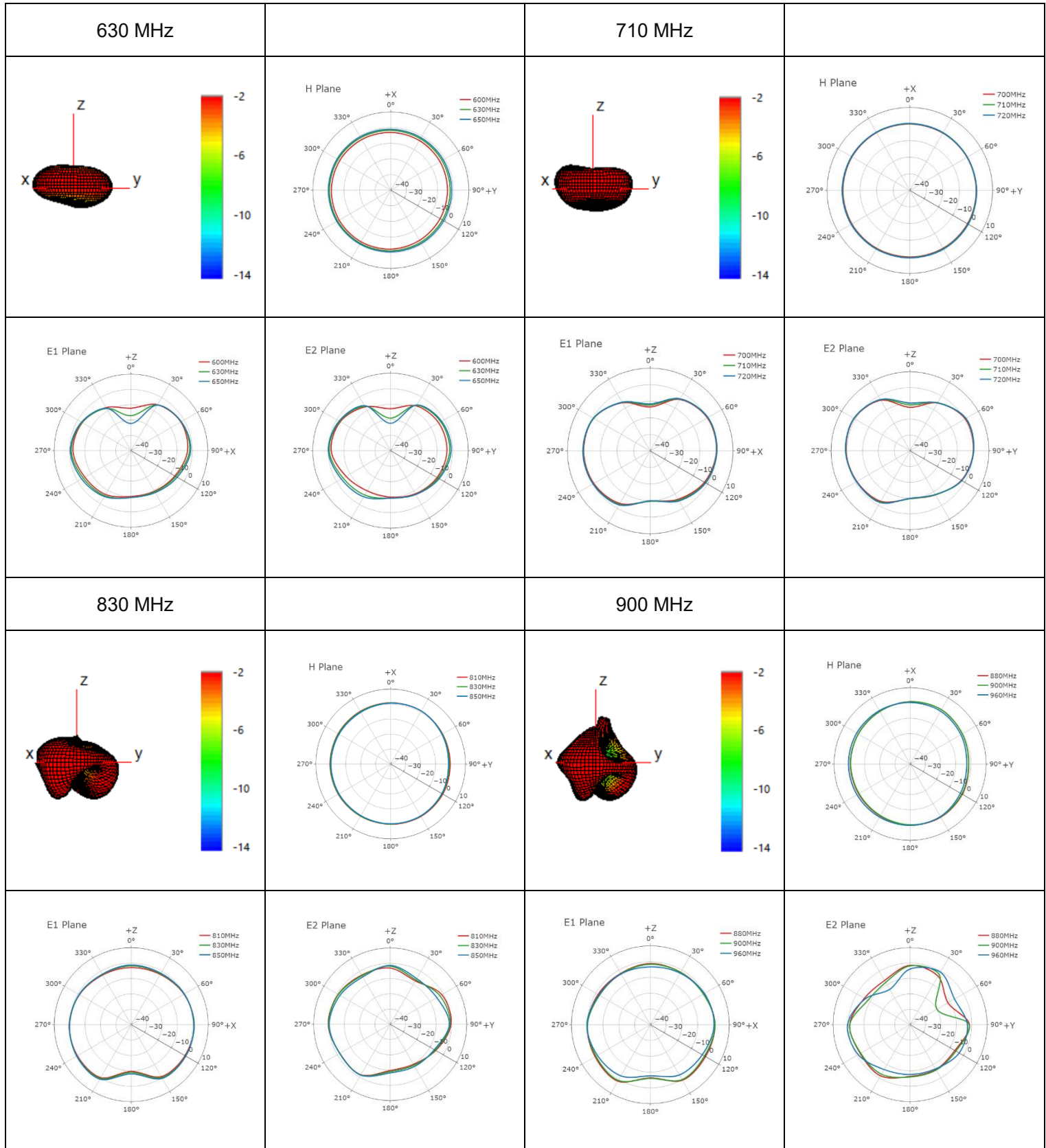


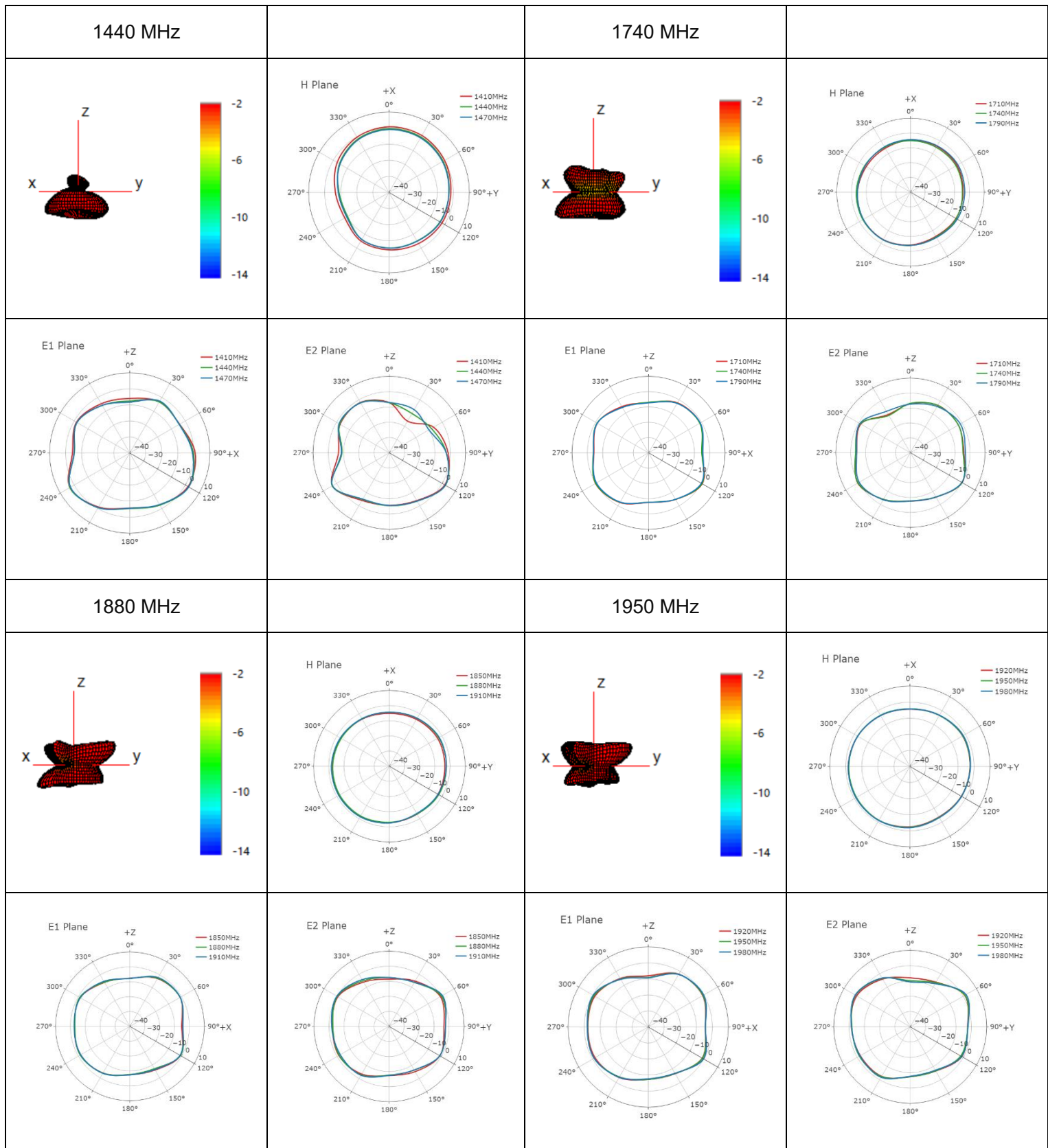
3.2.5.2. Test Condition: On 130 mm × 130 mm EVB

- Test Chamber: HF-G-1

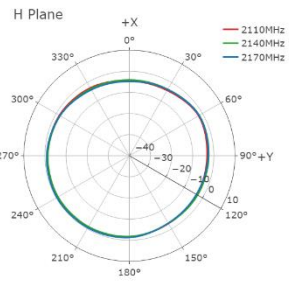
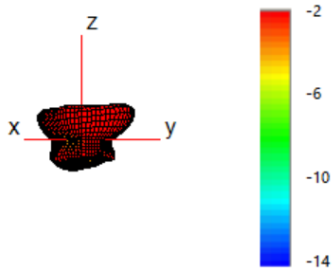


● 5G Bands

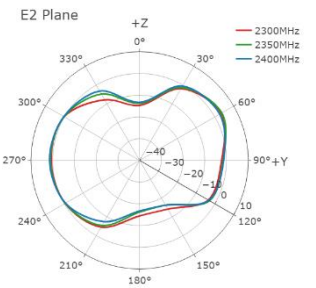
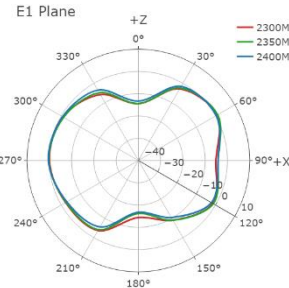
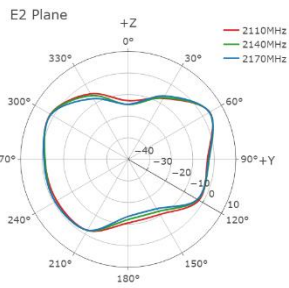
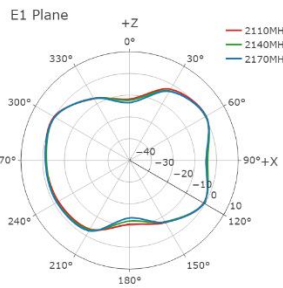
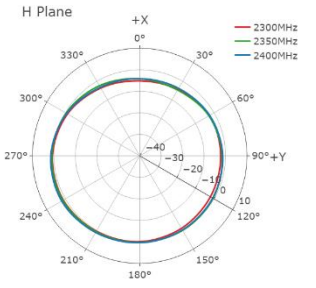
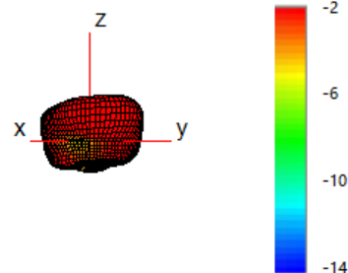




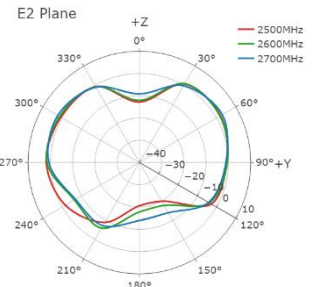
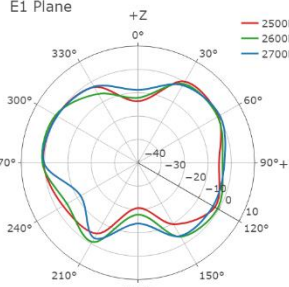
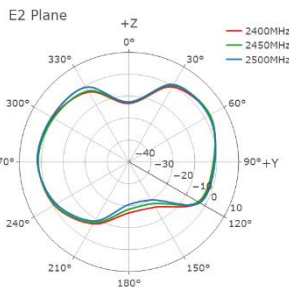
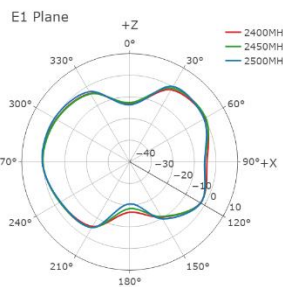
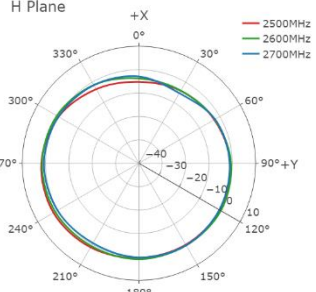
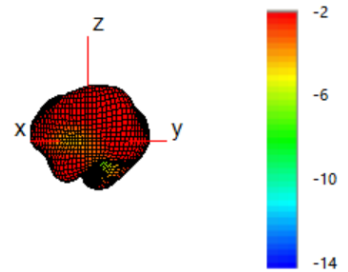
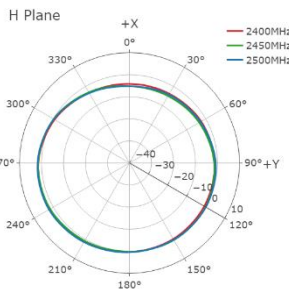
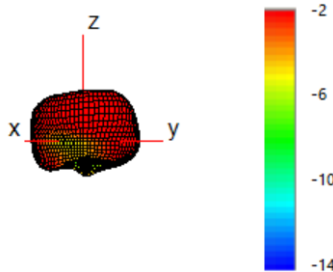
2140 MHz



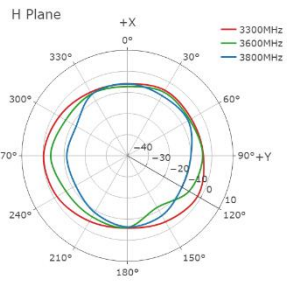
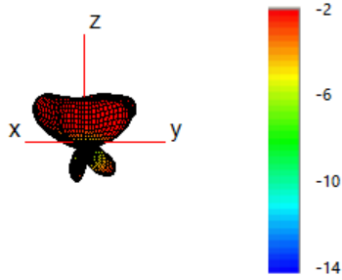
2350 MHz



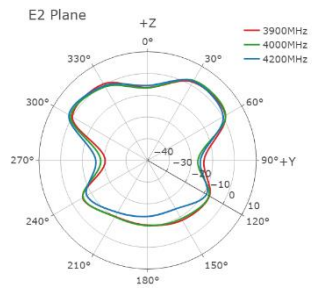
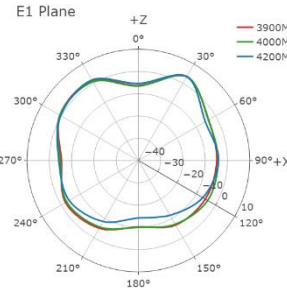
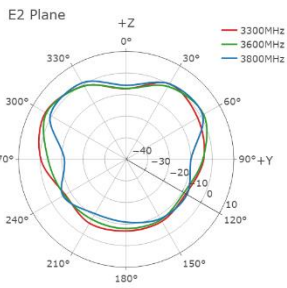
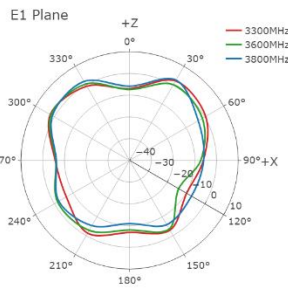
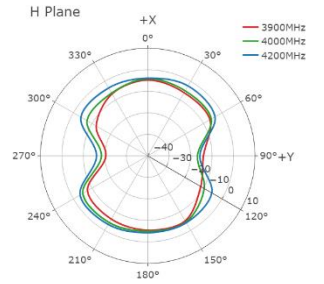
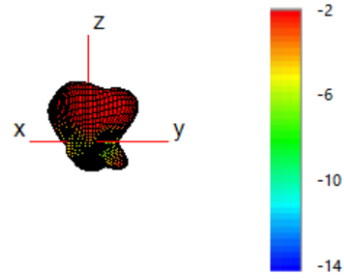
2450 MHz



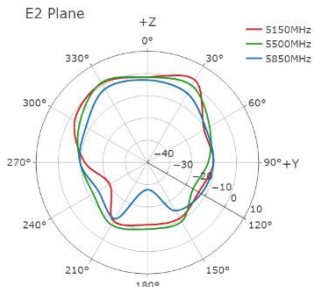
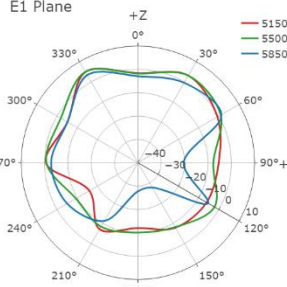
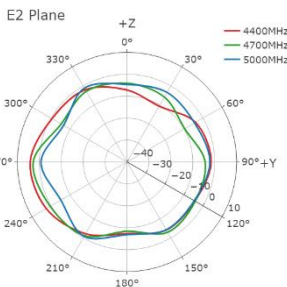
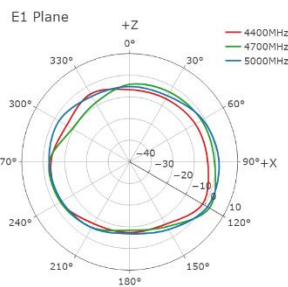
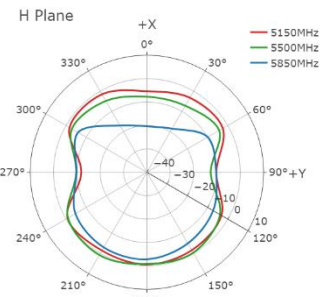
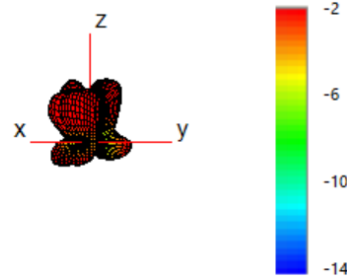
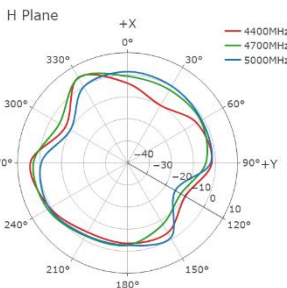
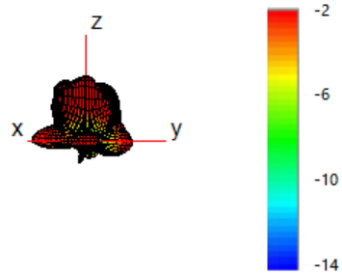
3600 MHz



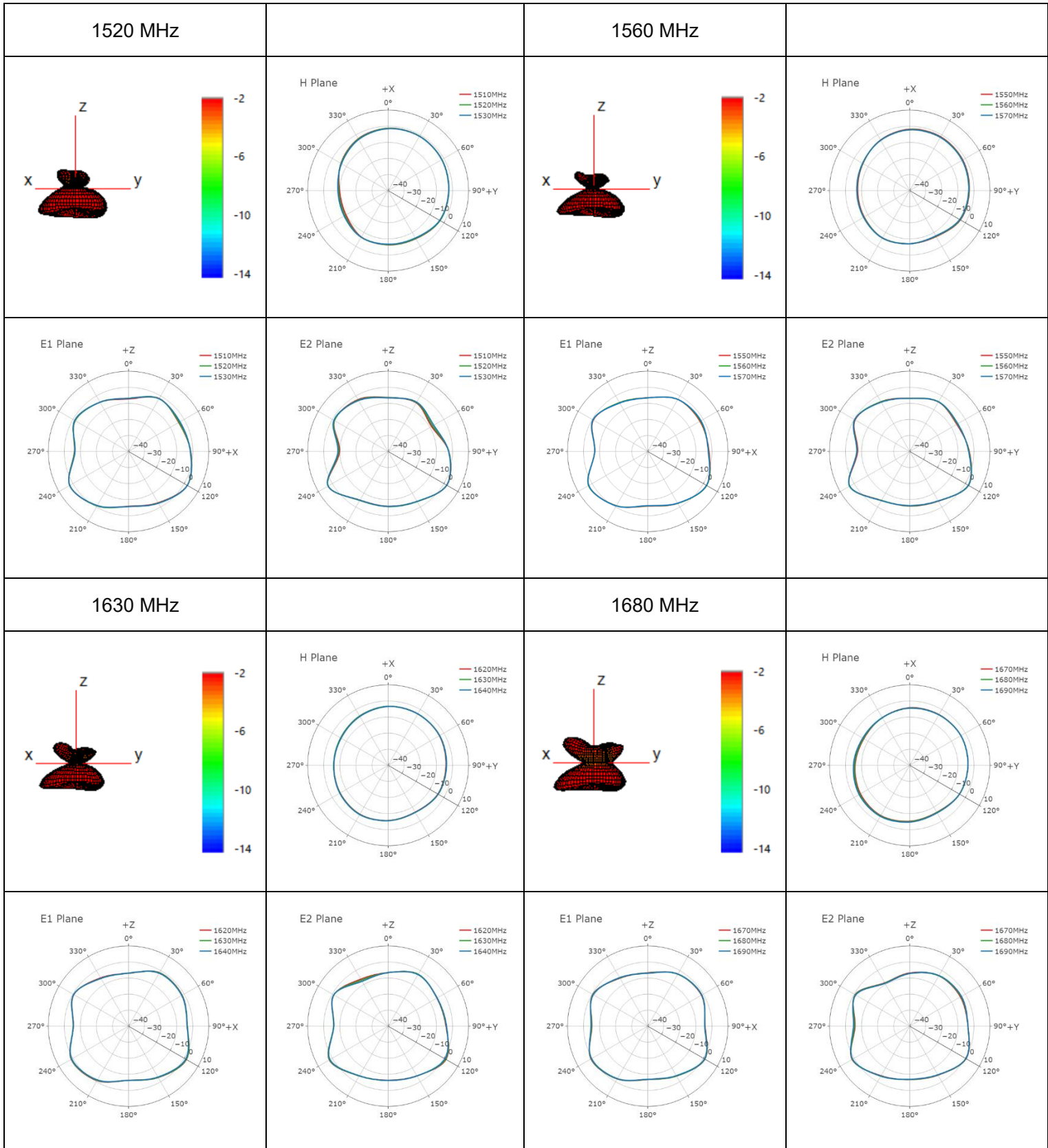
4000 MHz

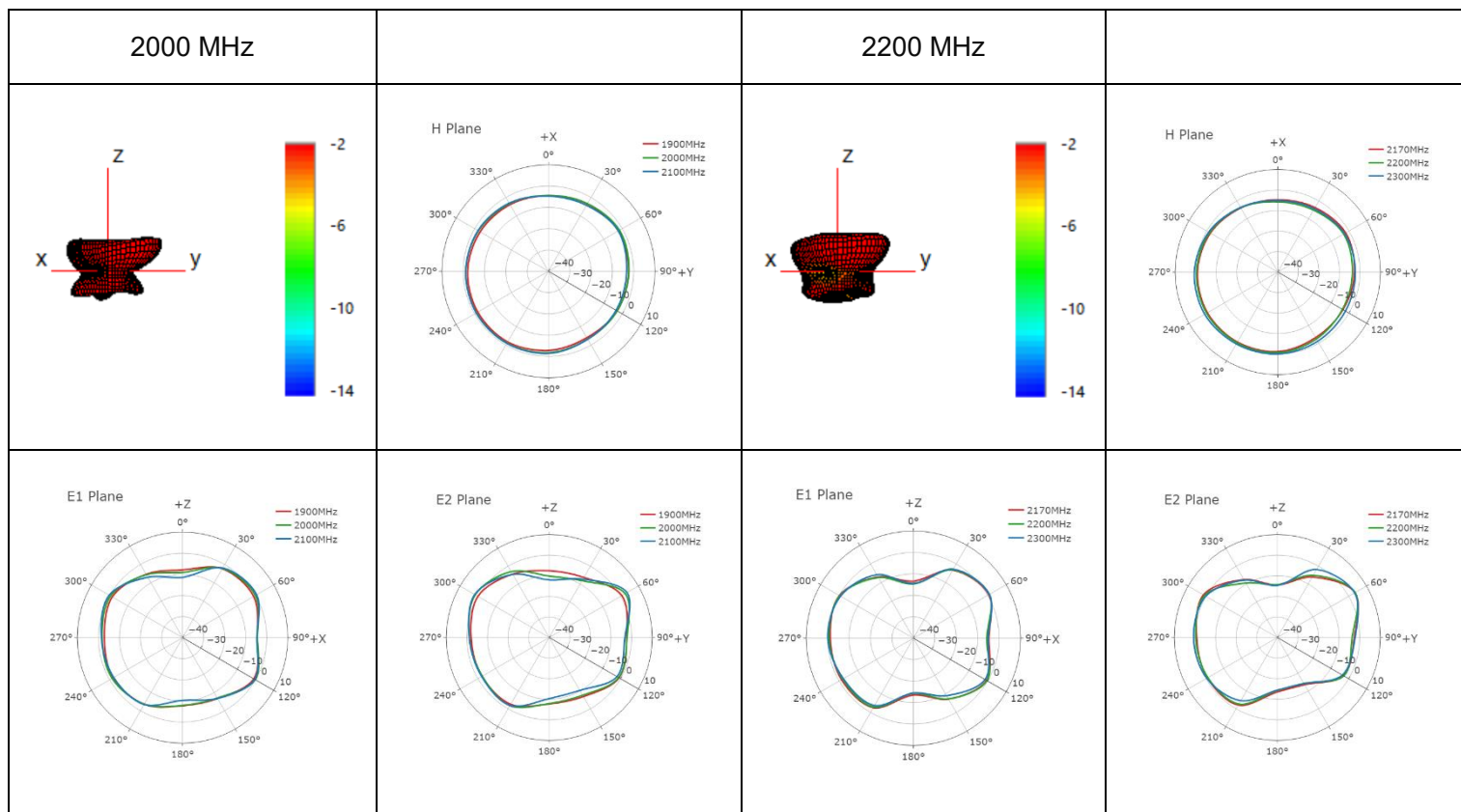


4700 MHz



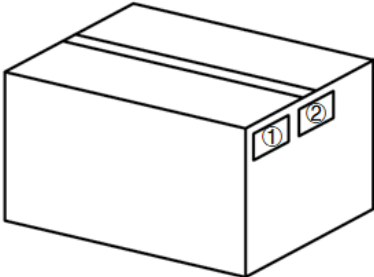
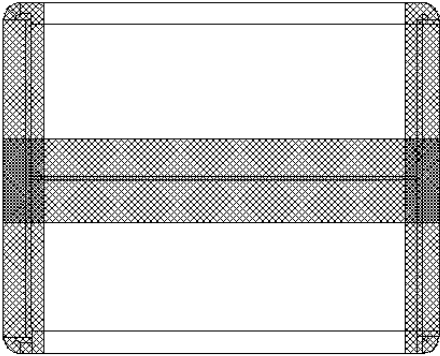
● NTN Bands





4 Packaging

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

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

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:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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

[http: www.quectel.com-support-sales.htm](http://www.quectel.com-support-sales.htm)

For technical support, or to report documentation errors, please visit:

[http: www.quectel.com-support-technical.htm](http://www.quectel.com-support-technical.htm)

Or email us at: support@quectel.com

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and-or documentation owned by one or more third parties (“third-party materials”). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

Disclaimer

- a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
- b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
- c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
- d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

Copyright © Quectel Wireless Solutions Co., Ltd. 2023. All rights reserved.

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	- Updated efficiency data (Front page) - Added antenna installation instructions (Chapter 2). - Added EVB status test data (Chapter 3).



www.quectel.com