Antenna

YBS00A1AA Datasheet

Antenna Services

Version: 1.2

Date: 2021-12-06

Status: Released

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.

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

About the Document

Revision History

Version	Date	Author	Note
-	2021-08-30	Jason LONG/ Xiaodong YANG	Creation of the document
1.0	2021-08-30	Jason LONG/ Xiaodong YANG	First official release
1.1	2021-09-15	Junsen LI	1. Added the weight information (Chapter 4). 2. Added the pictures of the VSWR before hybrid coupler (Chapter 5.2). 3. Updated the efficiency pictures (Chapter 5.3). 4. Updated the gain pictures (Chapter 5.4). 5. Updated the first axial ratio picture (Chapter 5.6).
1.2	2021-12-06	Aria CHU	Updated the product description in Chapter 1.

Contents

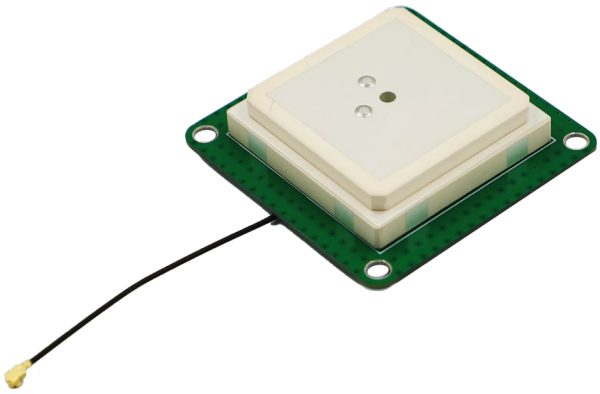
1 Product Description

This Quectel GNSS antenna adopts a diversity of forms to guarantee the most suitable polarization type. Quectel's positioning products support single-band or multi-band operation modes to meet various high-precision positioning requirements of customers' products. Quectel ~~also~~ provides both passive and active antennas to satisfy the customer demand for high gain. Such antenna supports different installation or connection methods such as pin mount, surface mount, magnetic mount, internal cable, and external SMA. Customized connector type and cable length are provided according to requirements.

We provide comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

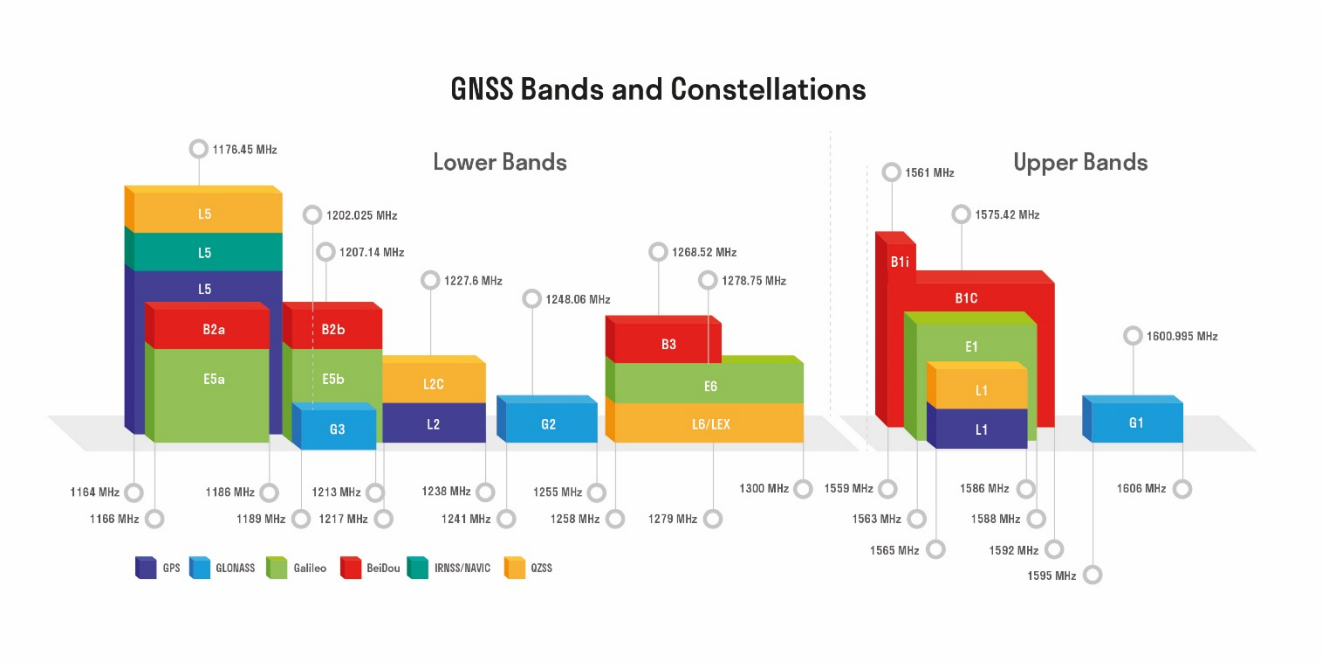
2 Product Features

- GNSS
- Compact Dual Feed Patch Element
- Excellent Performance



3 GNSS Frequency Band Checklist

GNSS Frequency Bands (MHz)					
GPS	**L1** Centre 1575.42 (1565–1586)	**L2** Centre 1227.6 (1217–1238)	**L5** Centre 1176.45 (1164–1189)		
	●	-	●		
GLONASS	**G1/L1OC/L1OF** Centre 1601 (1595–1606)	**G2/L2OC/L2OF** Centre 1248.06 (1241–1255)	**G3/L3OC** Centre 1202.025 (1189–1213)		
	●	-	-		
GALILEO	**E1** Centre 1575.42 (1563–1588)	**E5a** Centre 1176.45 (1166–1187)	**E5b** Centre 1207.14 (1197–1218)	**E6** Centre 1278.75 (1258–1300)	
	●	●	-	-	
BEIDOU	**B1I** Centre 1561.098 (1559–1564)	**B1C (BeiDou-3)** Centre 1575.42 (1559–1592)	**B2a/B2I** Centre 1176.45 (1166–1187)	**B2b** Centre 1207.14 (1197–1217)	**B3** Centre 1268.52 (1258–1279)
	●	●	●	-	-
QZSS	**L1** Centre 1575.42 (1573–1578)	**L2C** Centre 1227.6 (1226–1229)	**L5** Centre 1176.45 (1166–1187)	**L6** Centre 1278.75 (1257–1300)	
	●	-	●	-	
IRNSS	**L5** Centre 1176.45 (1164–1189)				
	●				


GNSS Bands and Constellations
Lower Bands
Upper Bands
1176.45 MHz
L5
L5
L5
B2a
E5a
1202.025 MHz
1207.14 MHz
B2b
E5b
G3
1227.6 MHz
L2C
L2
1248.06 MHz
G2
1268.52 MHz
1278.75 MHz
B3
E6
L6/LEX
1561 MHz
1575.42 MHz
B1i
B1C
E1
L1
L1
1600.995 MHz
G1
1164 MHz
1166 MHz
1186 MHz
1189 MHz
1213 MHz
1217 MHz
1238 MHz
1241 MHz
1255 MHz
1258 MHz
1279 MHz
1300 MHz
1559 MHz
1563 MHz
1565 MHz
1586 MHz
1588 MHz
1592 MHz
1595 MHz
1606 MHz
GPS
GLONASS
Galileo
BeiDou
IRNSS/NAVIC
QZSS

4 Product Specifications

- The antenna is tested on a 58.5 mm × 58.5 mm × 1 mm PCB.

Passive Electrical Specifications	
Frequency Range	L5: 1166–1186 MHz, L1: 1559–1606 MHz
Input Impedance	50 Ω
VSWR	< 2
Peak Gain	L1 = 3.55 dBi, L5 = 0.97 dBi
Polarization Type	RHCP
AR	L1 < 1 dB, L5 < 3 dB
Active Electrical Specifications	
Gain (LNA)	L5 ≥ 17 dB, L1 ≥ 17 dB
Noise Figure	L5: ≤ 3.0 dB, L1: ≤ 3.0dB
Filter Out-of-Band Attenuation	20 dB f0 ±50 MHz f0 (1176 MHz, 1575 MHz)
Output VSWR	≤ 2.0
Operation Voltage	3–5 V
Current	< 30 mA
Mechanical Specifications	
Antenna Size	58.7 mm × 58.7 mm × 14.4 mm
Casing	Ceramics
Connector Type	IPEX 1
Working Temperature	-40 °C to +85 °C
Weight	74 g (Approximation)
Radome Color	-
IP Rating	-

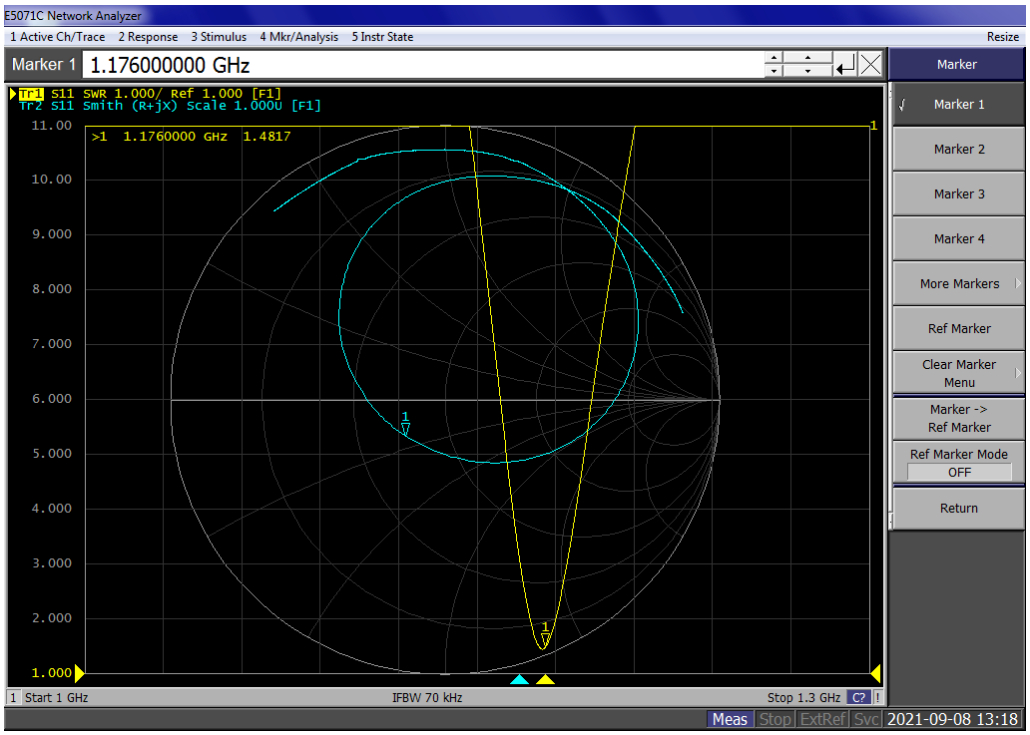
5 Overall Performance

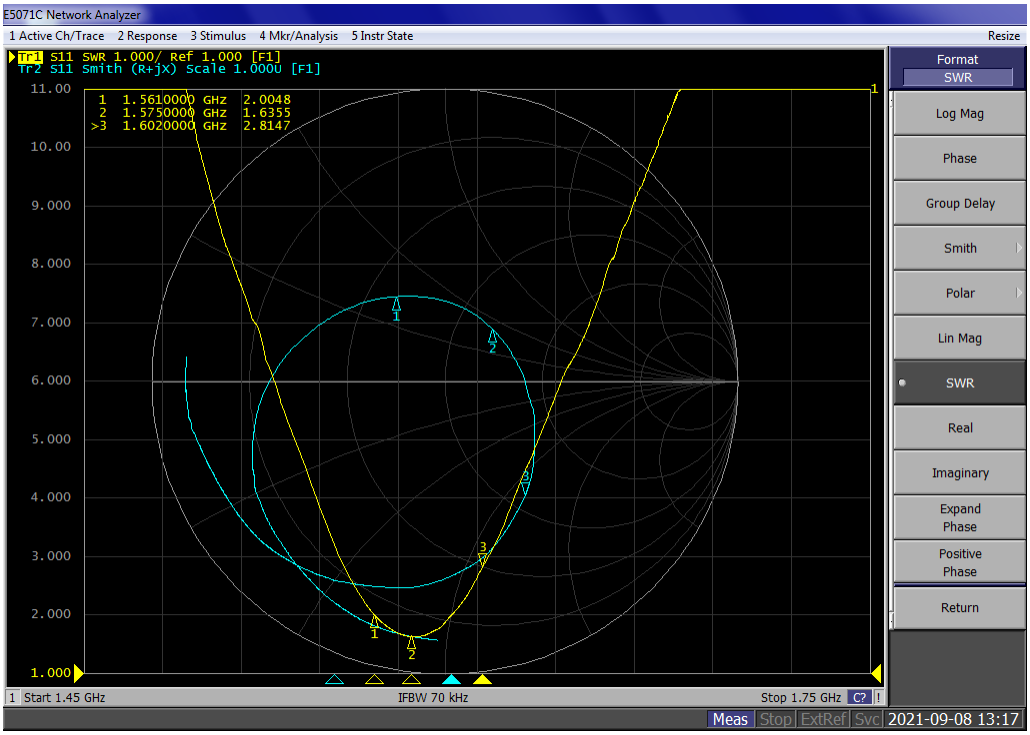
5.1. Test Environment

- KEYSIGHT VNA Network Analyzer E5063A 100 kHz – 8.5 GHz
- RayZone® 2800 Chamber 5G (FR1) SISO/MIMO, 400 MHz – 8.0 GHz

5.2. VSWR

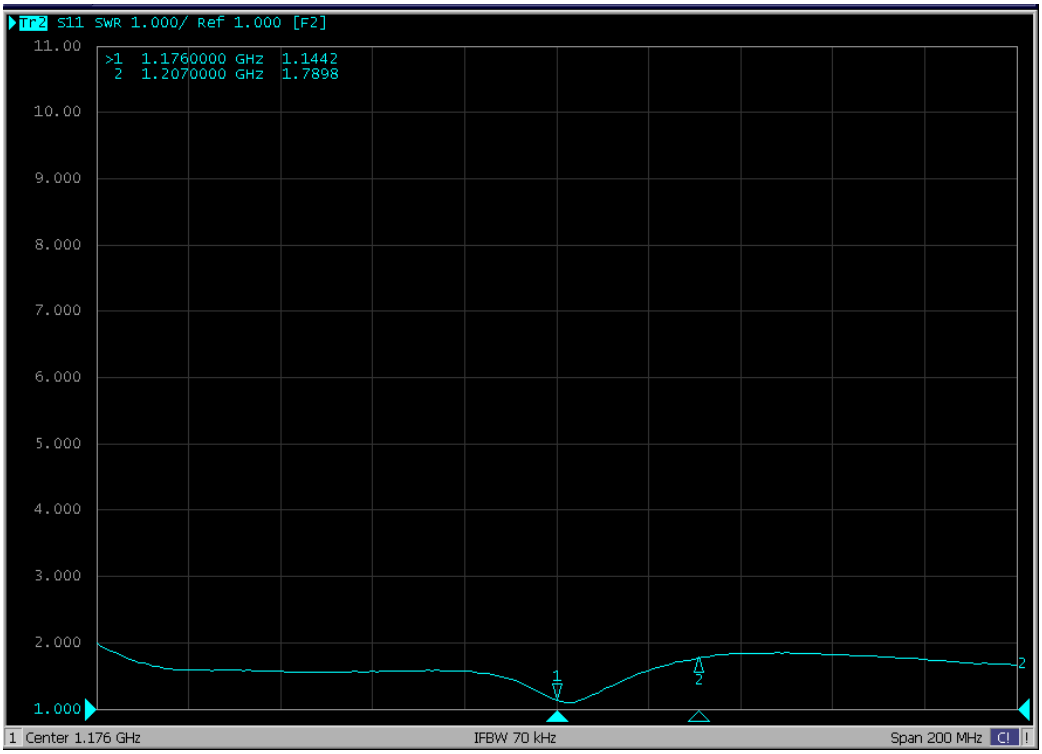
- Before hybrid coupler

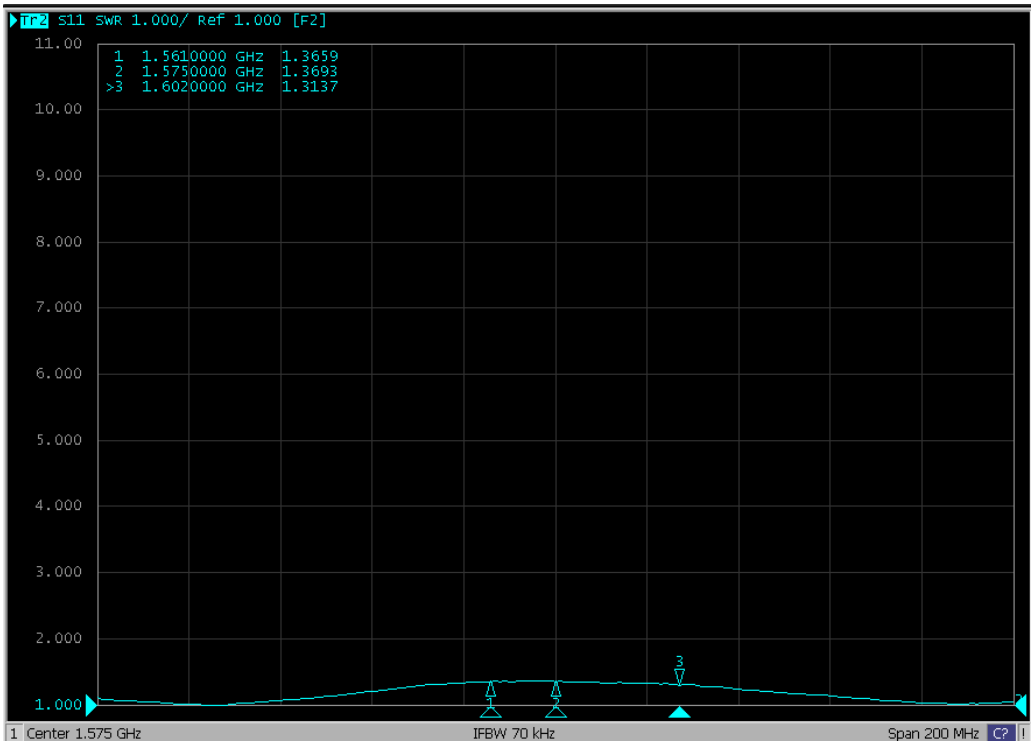




Frequency (MHz)	1176	1561	1575	1602
VSWR	1.48	2	1.63	2.8

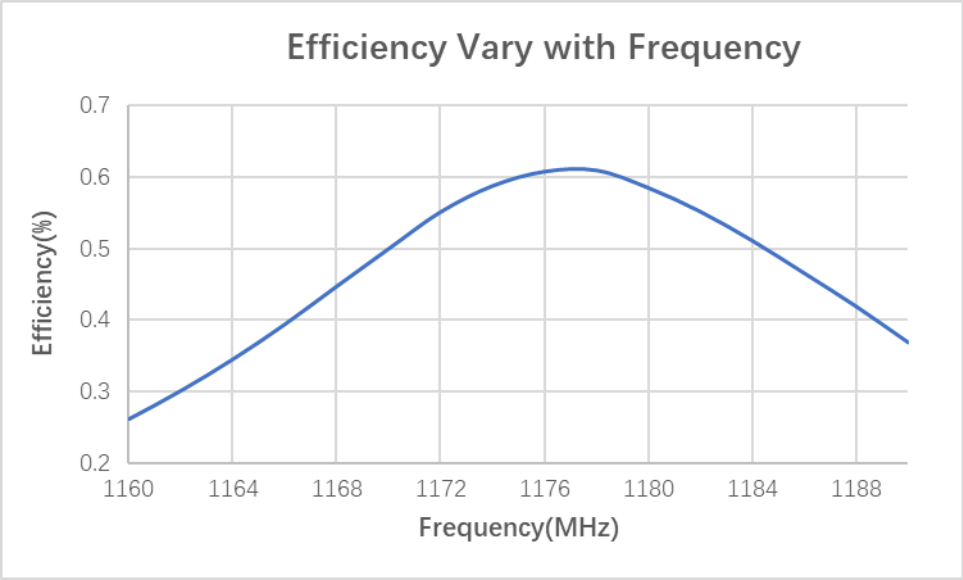
- After hybrid coupler

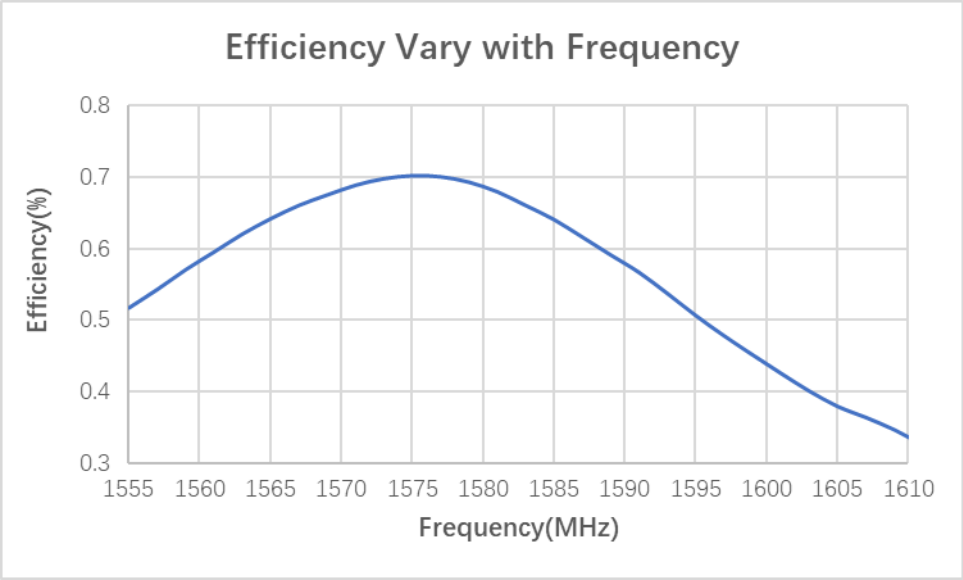




Frequency (MHz)	1176	1561	1575	1602
VSWR	1.14	1.36	1.36	1.31

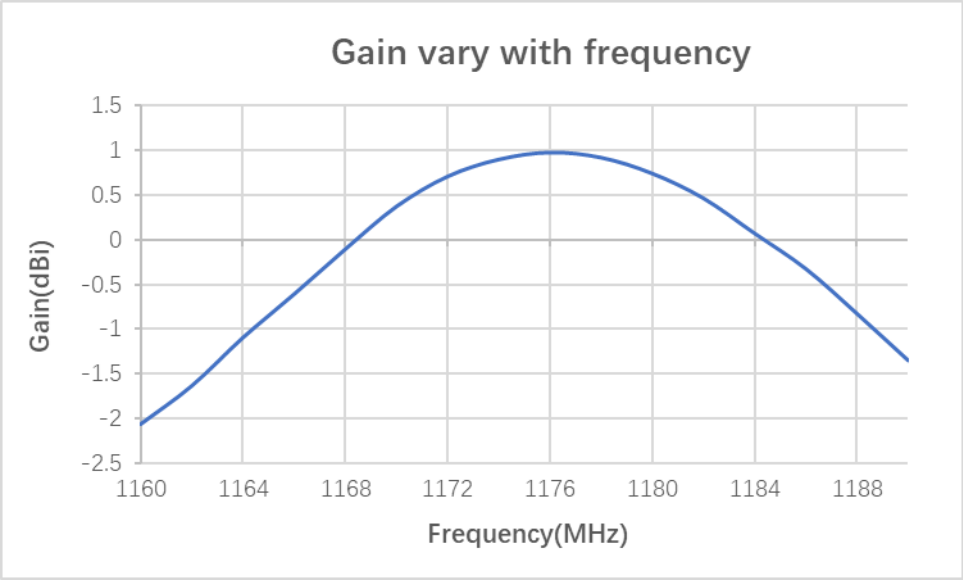
5.3. Efficiency

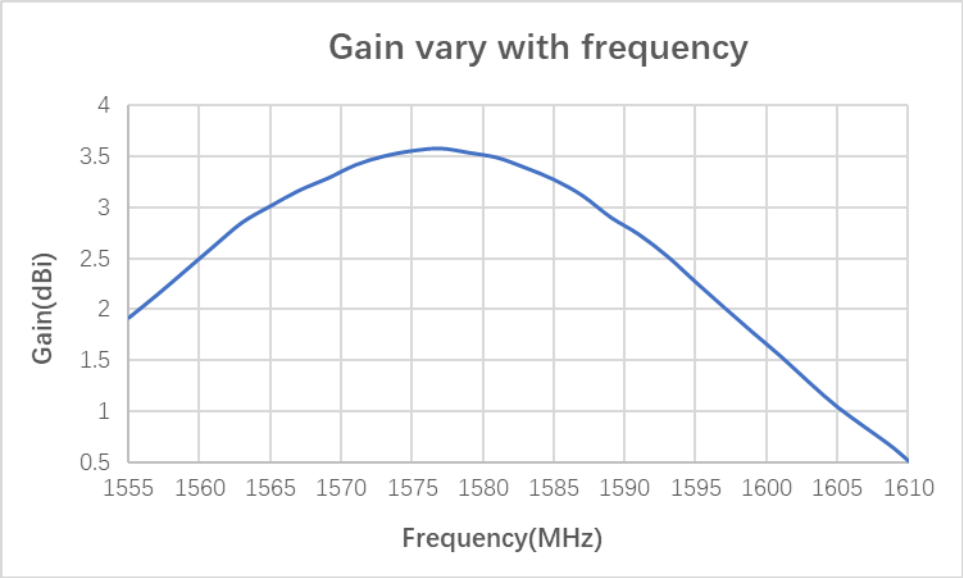




Frequency (MHz)	1176	1561	1575	1602
Efficiency (%)	61	60	70	43

5.4. Gain

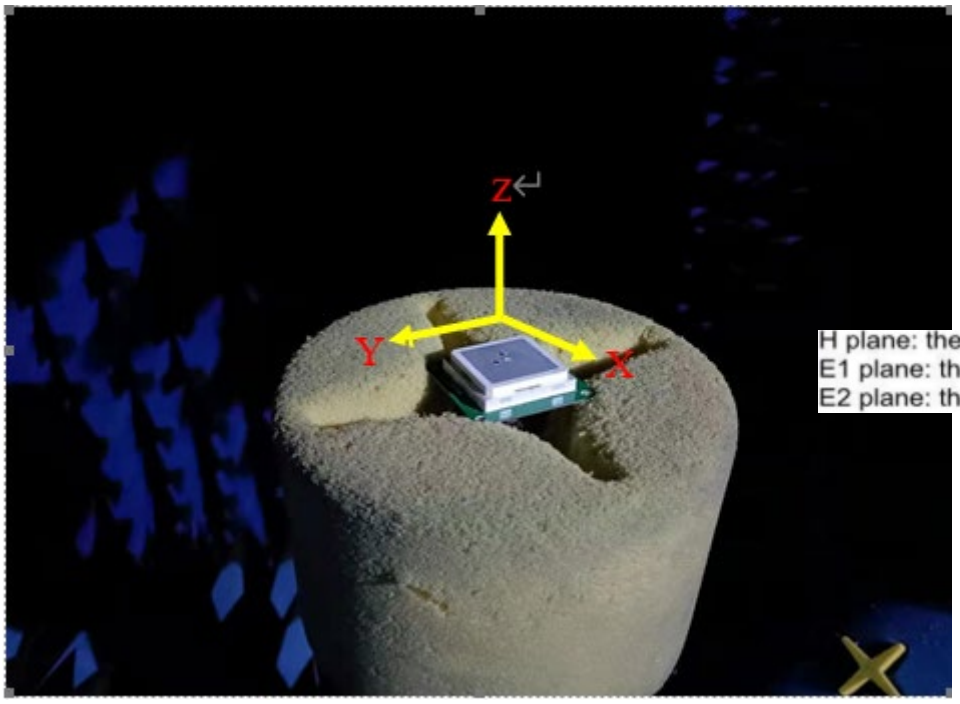




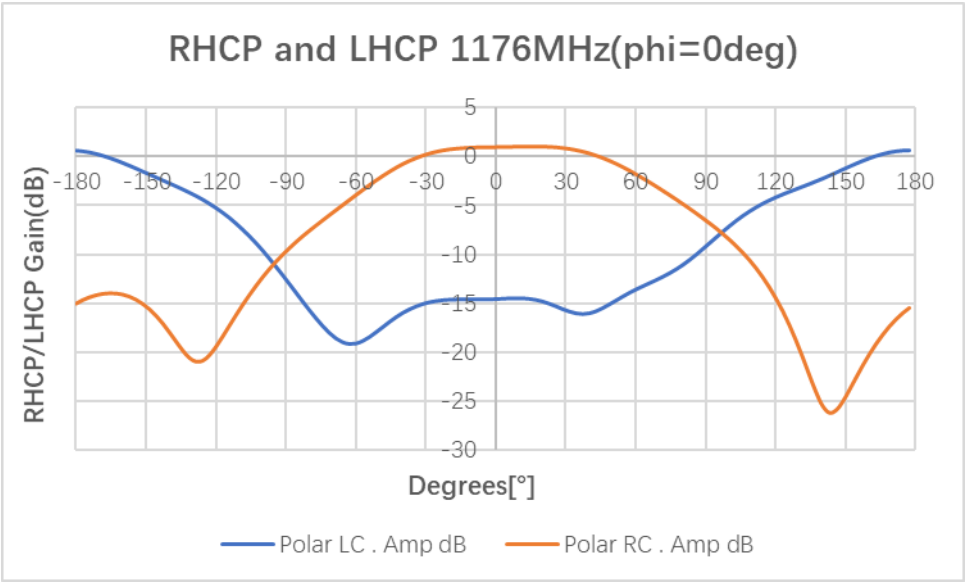
Frequency (MHz)	1176	1561	1575	1602
Gain（dBi）	0.97	2.62	3.56	1.54

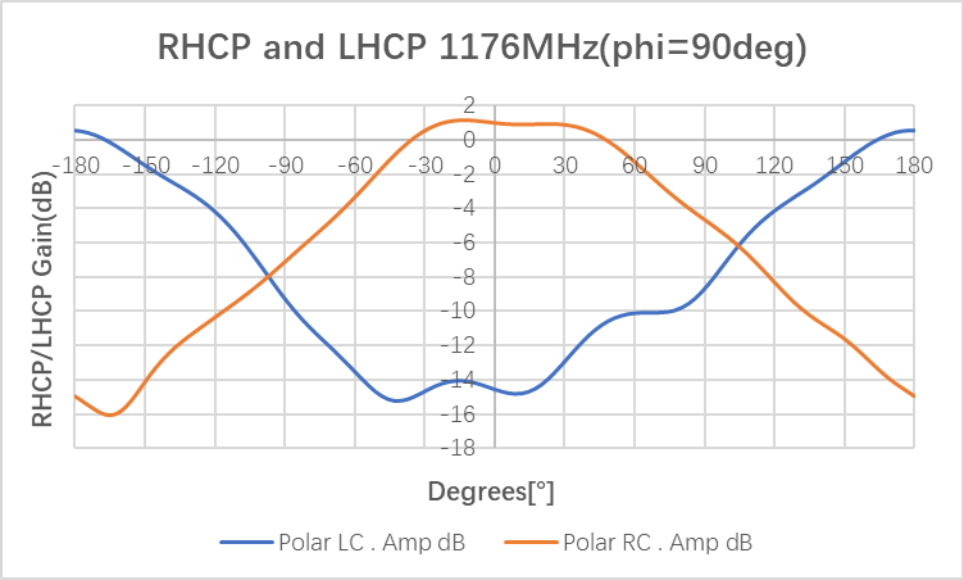
5.5. Radiation Pattern

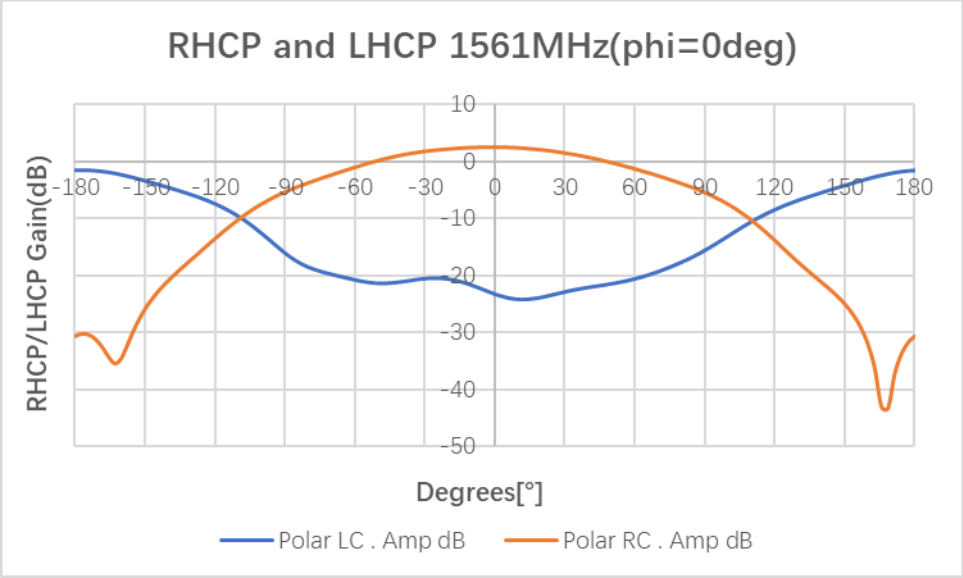
- Test condition: free space.

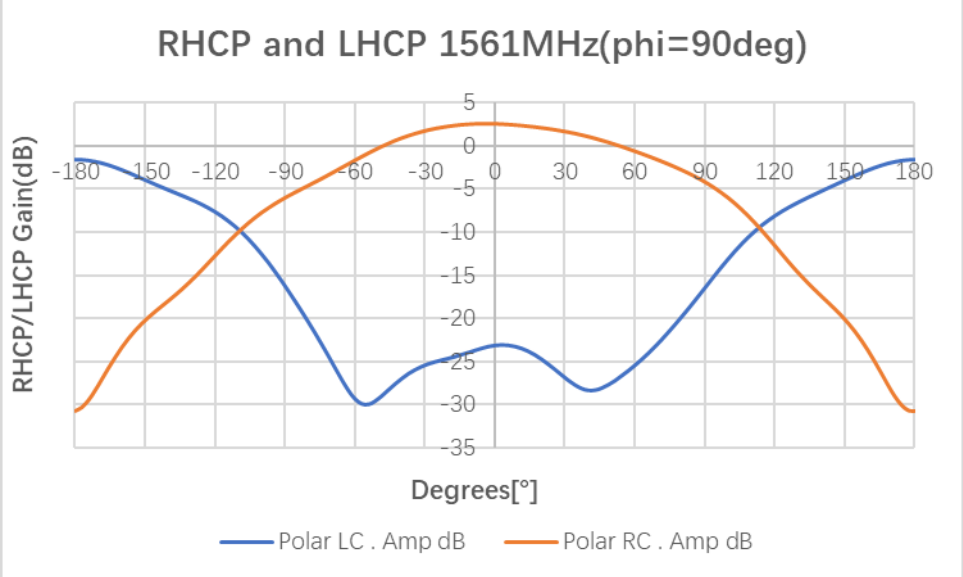


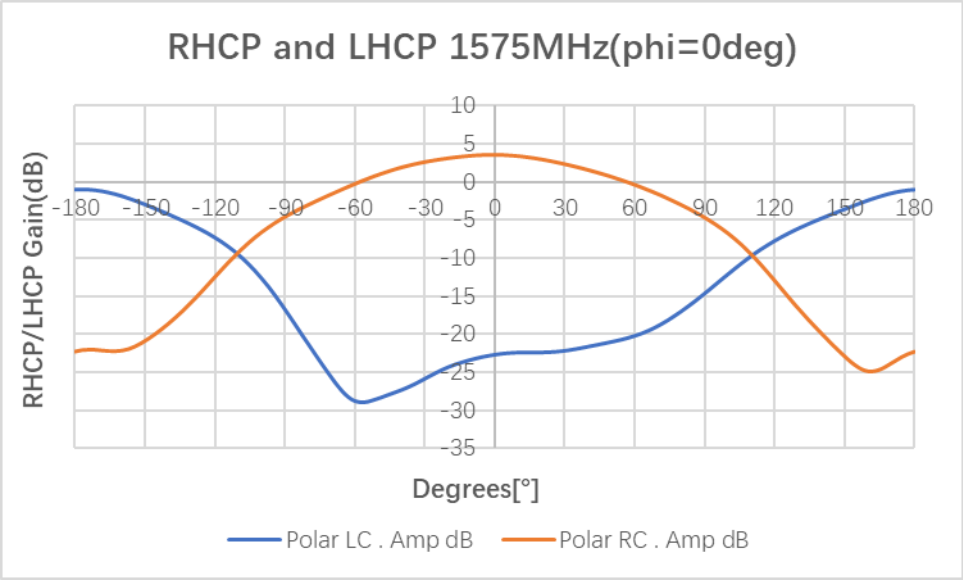
5.5.1. 2D RHCP and LHCP Gain

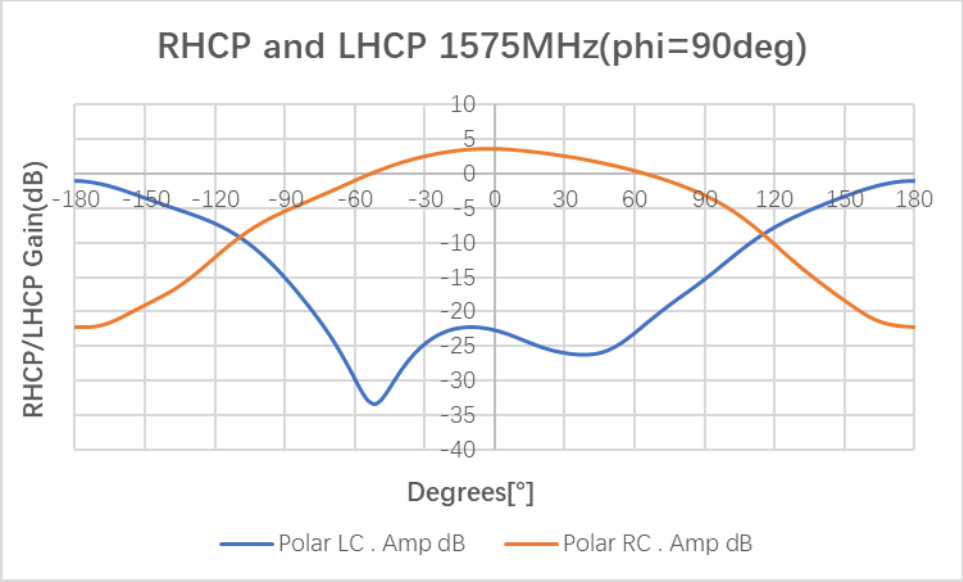


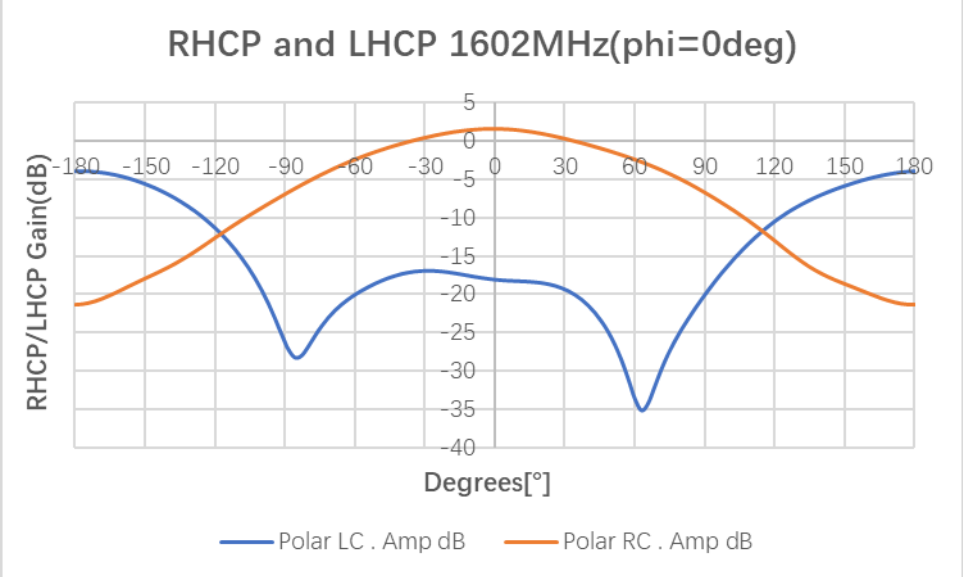

RHCP and LHCP 1176MHz(phi=90deg)
RHCP/LHCP Gain(dB)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB

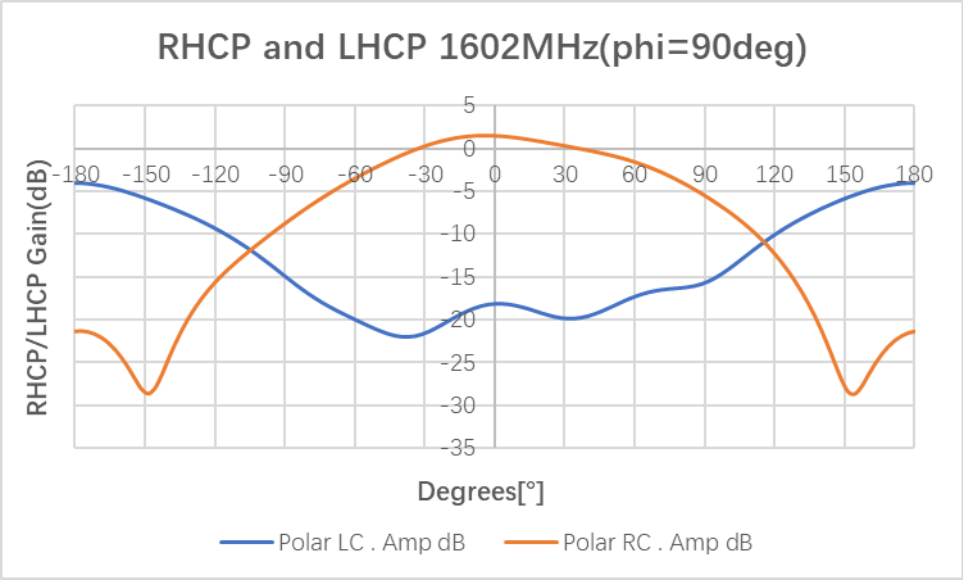

RHCP and LHCP 1561MHz(phi=0deg)
RHCP/LHCP Gain(dB)
10
0
-10
-20
-30
-40
-50
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB


RHCP and LHCP 1561MHz(phi=90deg)
RHCP/LHCP Gain(dB)
5
0
-5
-10
-15
-20
-25
-30
-35
-180 150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB


RHCP and LHCP 1575MHz(phi=0deg)
RHCP/LHCP Gain(dB)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB

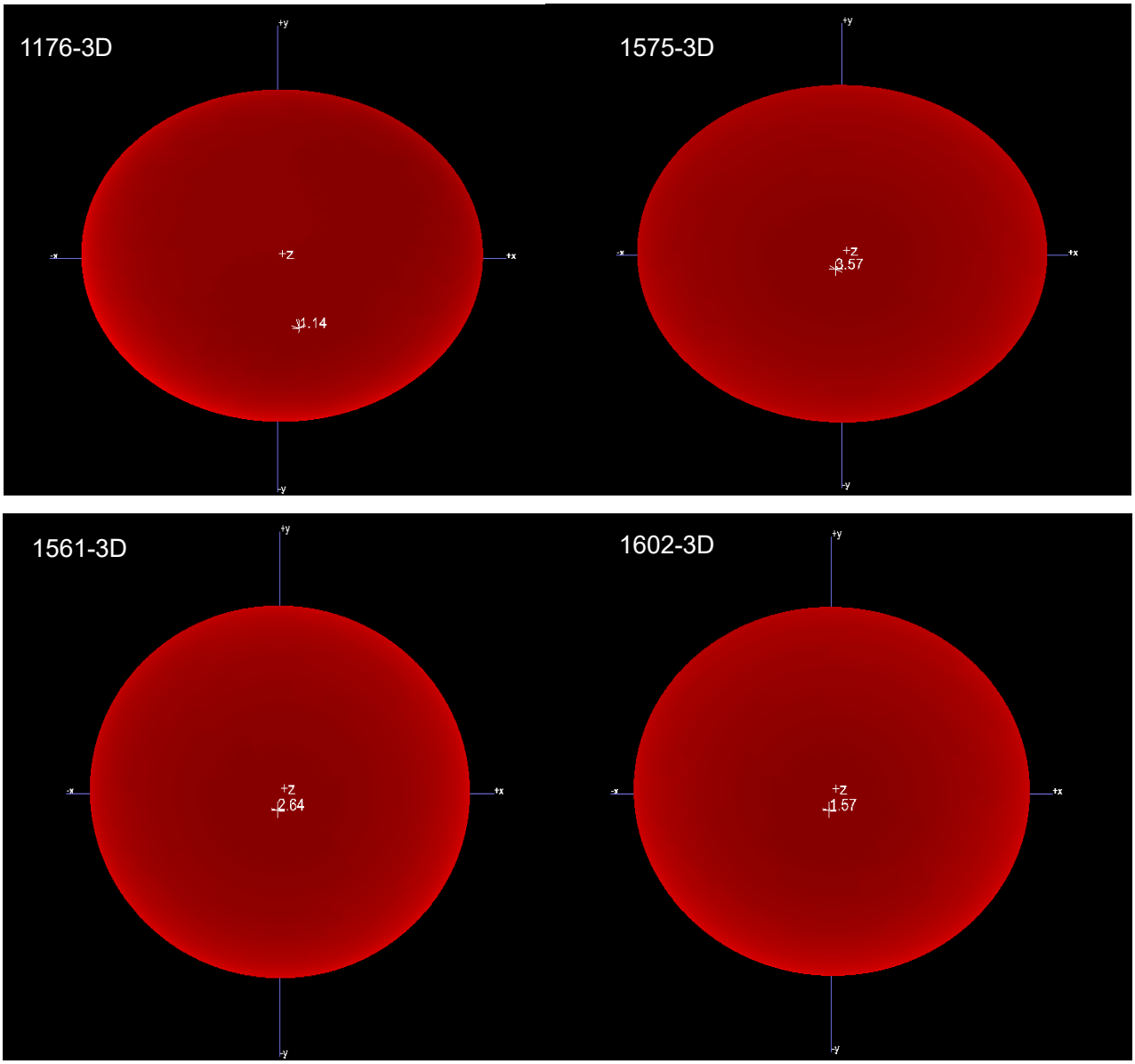

RHCP and LHCP 1575MHz(phi=90deg)
RHCP/LHCP Gain(dB)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB


RHCP and LHCP 1602MHz(phi=0deg)
RHCP/LHCP Gain(dB)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Degrees[°]
Polar LC . Amp dB
Polar RC . Amp dB

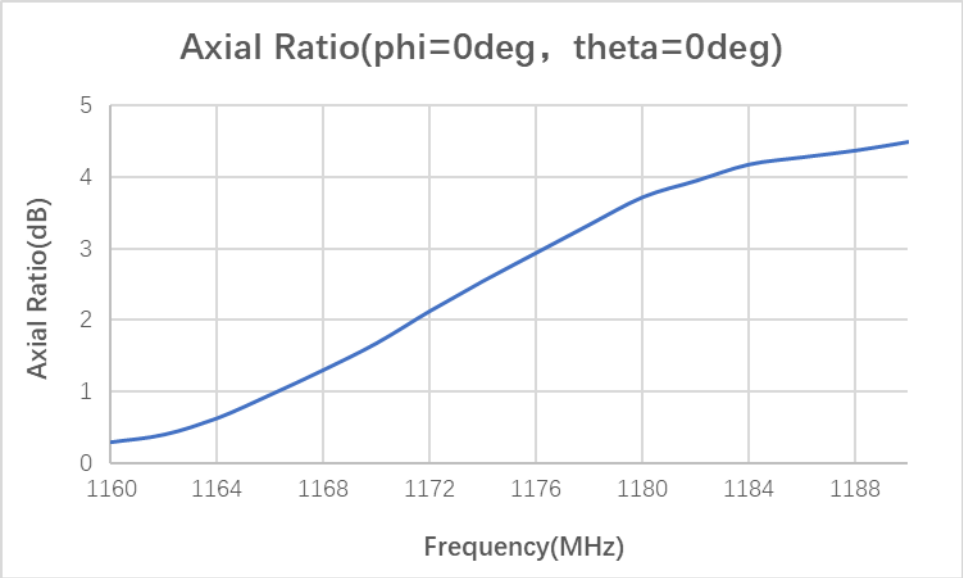


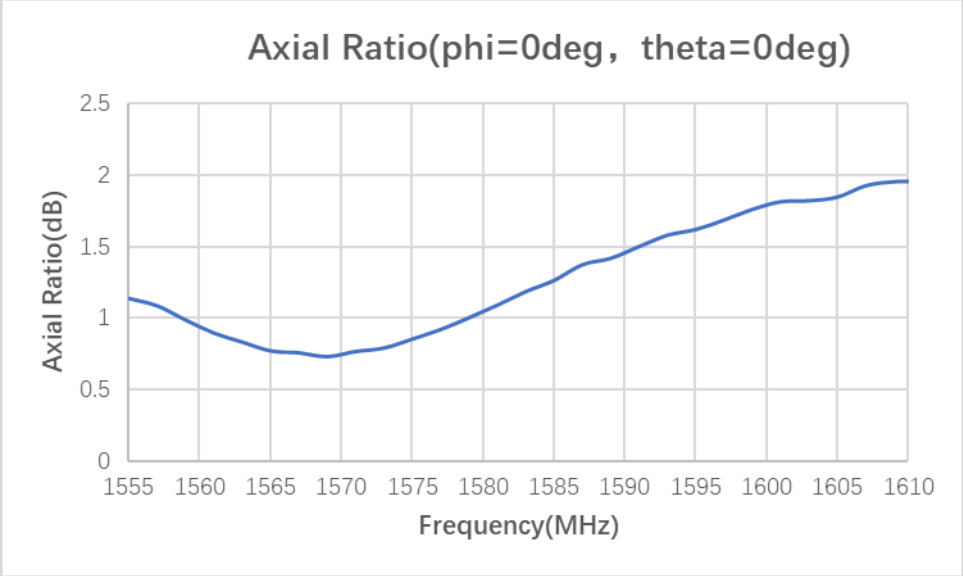
Frequency (MHz)	1176	1561	1575	1602
RC Gain (dB) Phi=0(deg)Theta=0(deg)	0.97	2.63	3.56	1.54
RC Gain (dB) Phi=90(deg)Theta=0(deg)	0.97	2.63	3.56	1.54
LC Gain (dB) Phi=0(deg) Theta=0(deg)	-14.54	-23.17	-22.65	-18.1
LC Gain (dB) Phi=90(deg)Theta=0(deg)	-14.54	-23.17	22.65	-18.1

5.5.2. 3D Radiation

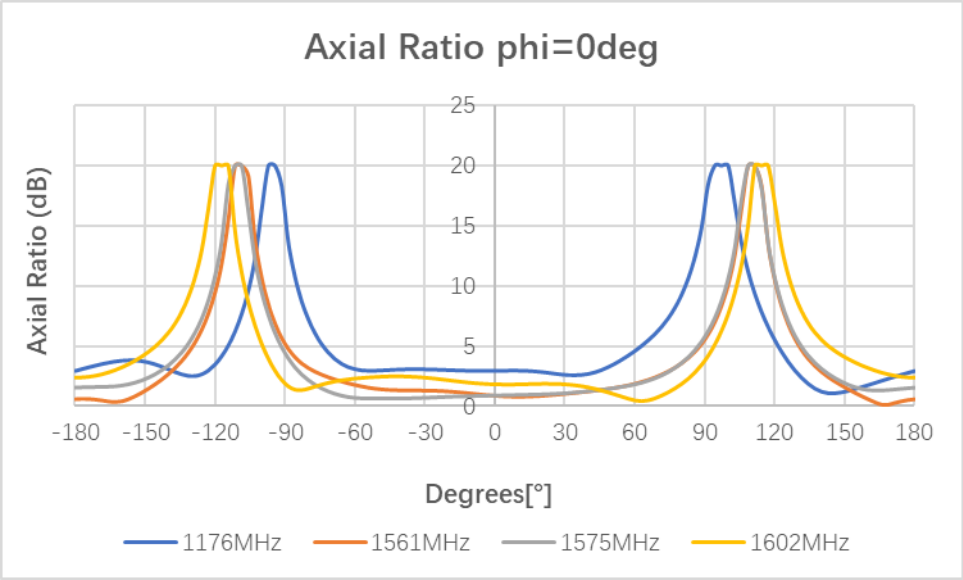


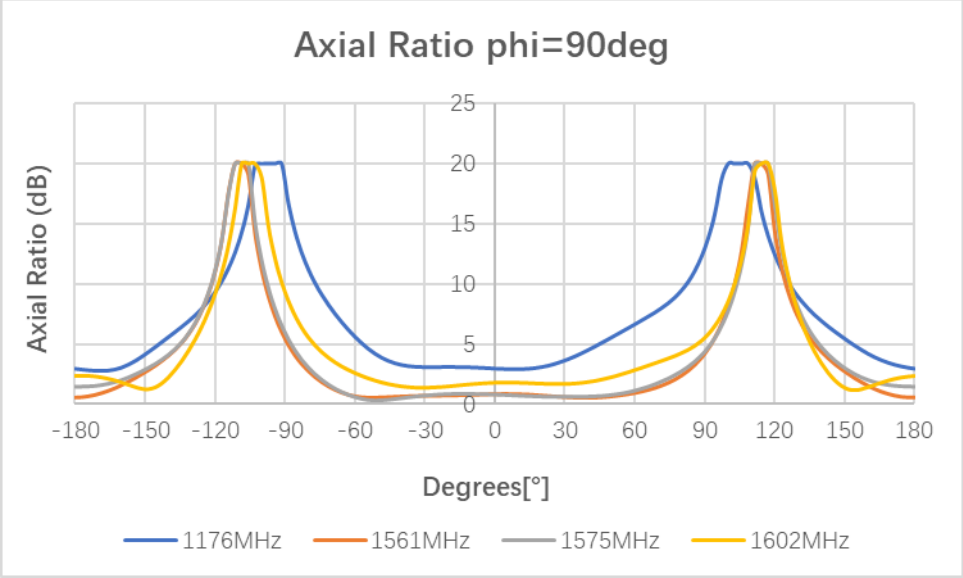
5.6. Axial Ratio





5.6.1. Axial Ratio in XOZ/YOZ

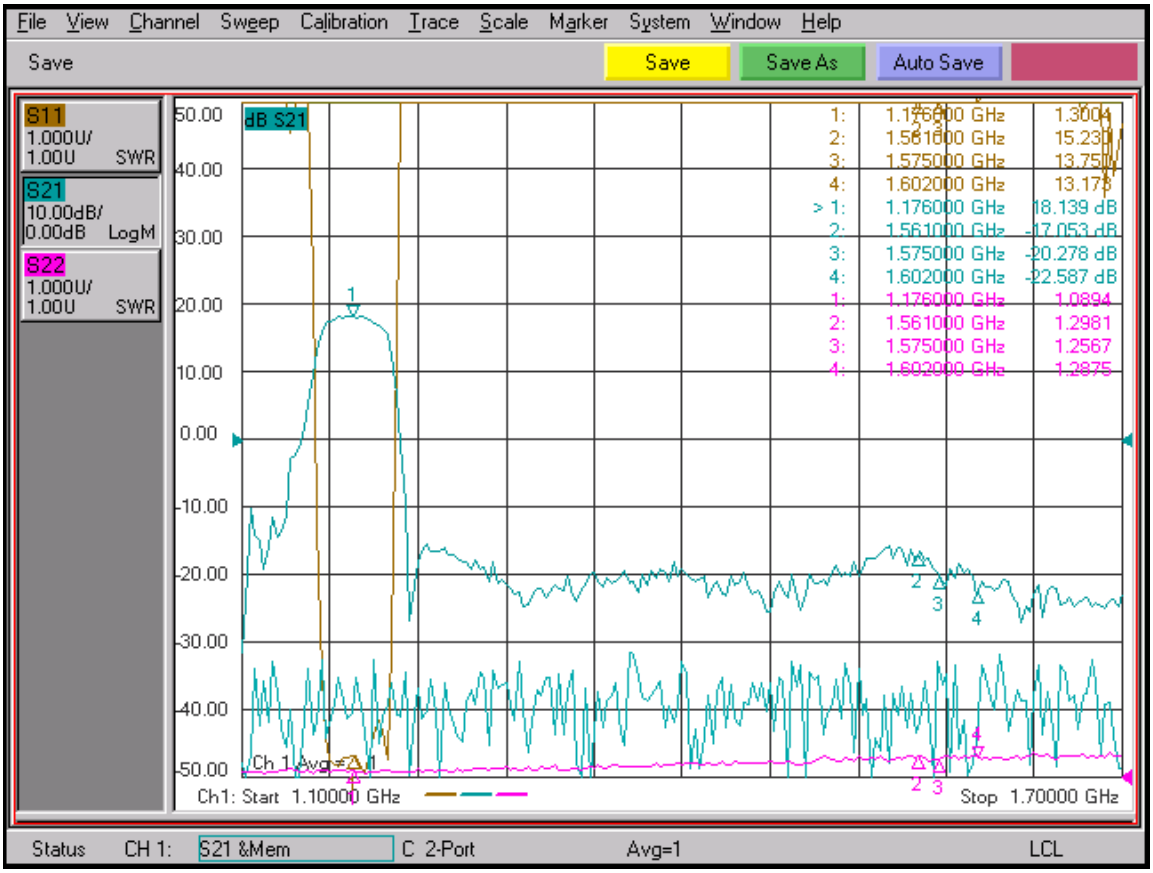




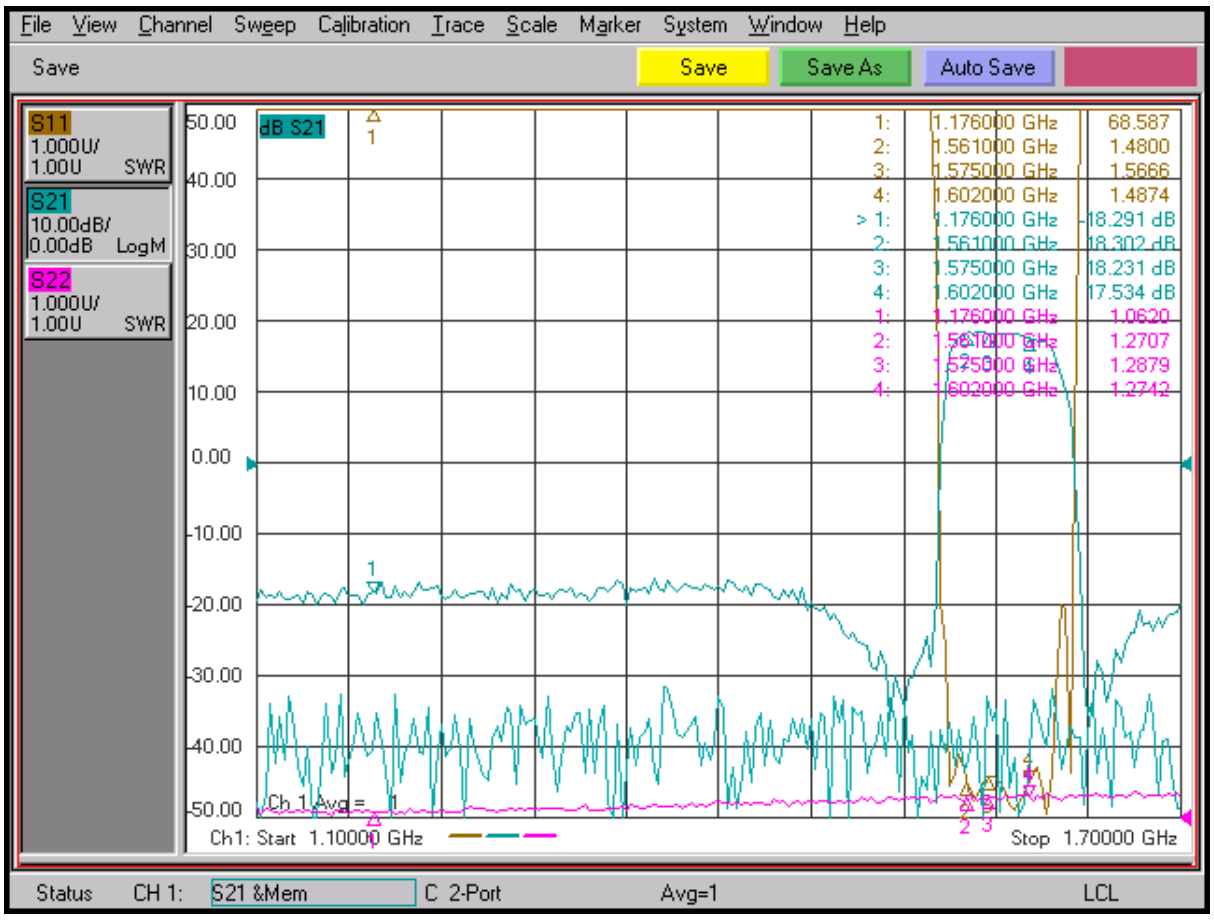
Frequency (MHz)	1176	1561	1575	1602
AR (dB) Phi = 0 (deg), Theta = 0 (deg)	2.94	0.89	0.85	1.82
AR (dB) Phi = 90 (deg), Theta = 0 (deg)	2.94	0.89	0.85	1.82

5.7. LNA Data

5.7.1. Input S11 and Output S22

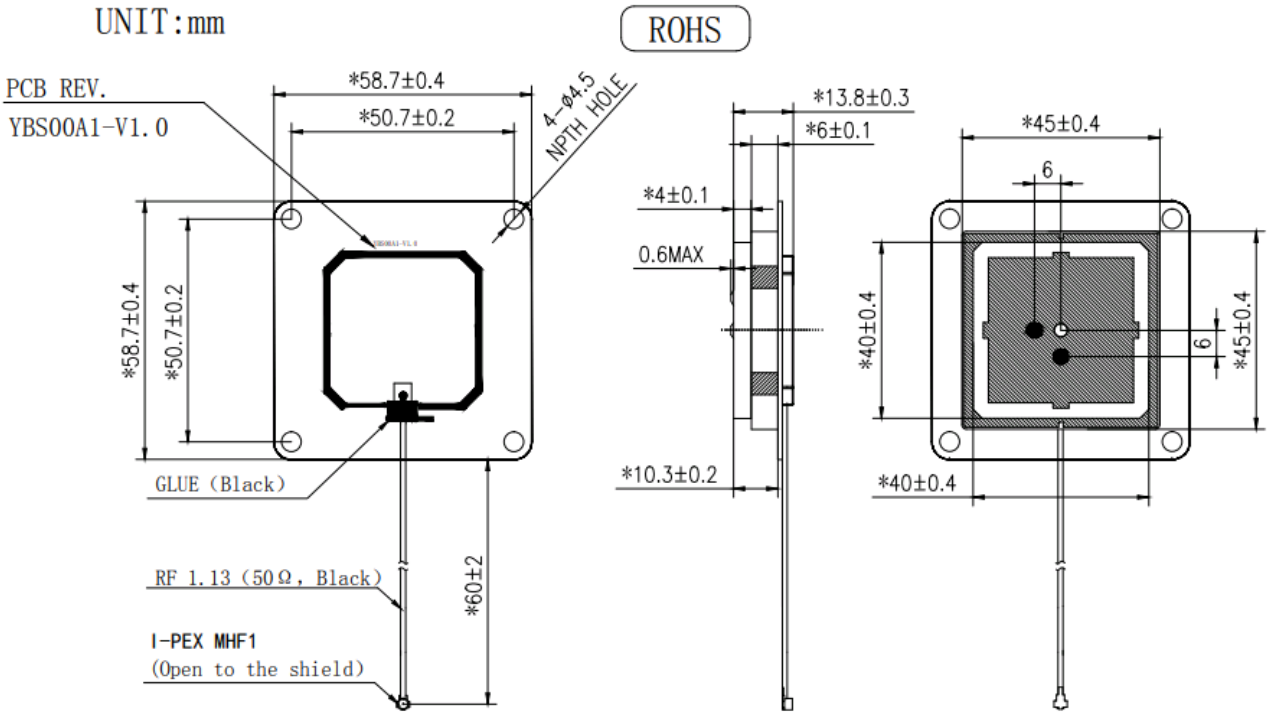


Frequency (MHz)	1176
LNA Gain (dB)	18.1
Input S11	1.3
Output S22	1.09

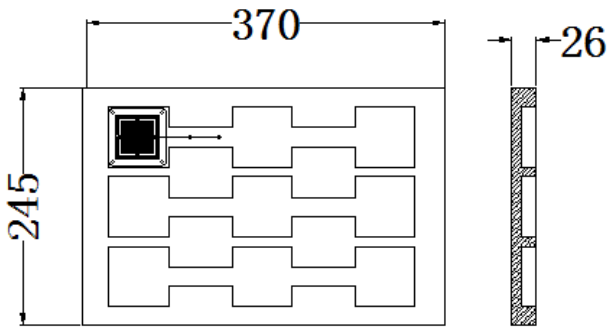
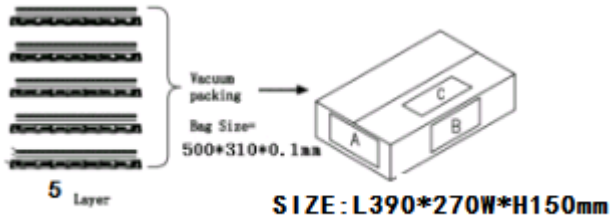


Frequency (MHz)	1561	1575	1602
LNA Gain (dB)	18.3	18.23	17.53
Input S11	1.48	1.57	1.49
Output S22	1.27	1.29	1.27

6. Product Size



7. Packaging

S/N	Content	QTY	Remark
1		9	● 9 PCS per EPE tray. ● Size: 370 mm × 245 mm × 26 mm.
2		9	● One paper card on EPE. ● Vacuum packing.
3		45	● Carton size: 390 mm (L) × 270 mm (W) × 150 mm (H). ● 5 layers. ● Antenna No.: 45 PCS.