



Shenzhen Foruo Technology Co., Ltd. SHENZHEN FROG TECHNOLOGY CO., LTD

Sample approval letter

No.: X12NFT-20231214

material code	FD. 69. X12NYE11	name of	Three-in-one antenna	
Applicable model	X12NFT	Specificati on description	X12NFT/B/G/W three-in-one antenna /FPC+ coaxial line/line length: 23mm/ silkscreen: X12NFT-YST-BGW-V1.0	
Material category	☒ Structure, electronics, and packaging categories ☐ ☐			
Supplier		supplier	Renesola	
Recognize the	◇ New project ◇ New supplier ◇ cost reduction ◇ material change ◇ Planning change ◇			
Material validation	Structural Engineer and Product Manager (concurrently: ID, Engineer)			
	▽MD	☐ Recognition ☐ does not approve ☐ others	Confirm content	structure size
	▽ID	☐ Recognition ☐ does not approve ☐ others	Confirm content	1. Color difference
				2. Gloss
				3. Silk-printed LOGO
				4. Light transmittance
	▽ Attachment	☐ Material specification ☐ Structure full size report ☐ Others:		
	Structural Engineer (signature)		Product Manager (signatu	
	Device engineer			
	▽ electrical	☐ Recognition ☐ does not approve ☐ others	▽ESD	☐ Recognition ☐ does not approve ☐ others
	▽ function	☐ Recognition ☐ does not approve ☐ others		
	▽ Attachment	☐ Material specification ☐ Electrical test report ☐ Functional test report ☐ Others:		
	Device Engineer		examine and	
	Quality engineer			
	▽ reliability	☐ Recognition ☐ does not approve ☐ others	▽ function	☐ Recognition ☐ does not approve ☐ others
	▽ surface	☐ Recognition ☐ does not approve ☐ others		
	▽ Attachment	☐ Reliability test report ☐ Quality control plan (QC drawing) ☐ ROHS test report ☐ Cpk report / process yield report, etc		
	remarks			
	DQE, Engineer (signature)		examine and verify	
	project manager			
ensemble	☐ Recognition ☐ does not approve ☐ others	else	☐ Recognition ☐ does not approve ☐ others	
remarks				
Project Manager		exami ne		
comprehensive assessment:				
☐ Approval ☐ Limited approval (quantity:) ☐ Non-approval:				

X12NFT Project antenna material requirements specification

Customer name: Forog

Customer product name: X12NFT

Product name: three-in-one antenna

Product specification: See the BOM table for more details

Material code: FD. 69. X12NYE11

Change Content CV:

order number	edition	state	Start and end date	person liable	page number	remarks
1	editio princeps	editio princeps	2024-02-24	Li Jieyi	11	

The Supplier acknowledges the signature of the following documents:

Responsible person / date		IQC/ date	Review / Date	Approval / Date
MD	Feng jiwu	Su guangfeng	Chen kehong	
RF	Xiao jinbao			

The demander acknowledges the signature (please send it back after the confirmation):

The demander's judgment result: ☐ qualified ☐ unqualified			
Development & Design Engineer / Date	SQE Engineer / Date	Purchasing Leader / Date	Development Manager approval / date

catalogue

1. OVERVIEW	3
1.1 SCOPE OF APPLICATION	3
1.2 PROJECT BASIC INFORMATION	3
2. TECHNICAL INDEX REQUIREMENTS	3
2.1 INTRODUCTION OF TEST ITEMS AND EQUIPMENT	3
2.2 ACTIVE REPORTING	3
2.2.1 TEST INSTRUCTIONS	3
2.2.2 ANTENNA ACTIVE PARAMETERS	4
2.2.34-IN-ONE ANTENNA EFFICIENCY	4
2.2.4 ANTENNA DIRECTION DIAGRAM —— GPS	5
2.2.5 ANTENNA FLAT GRAPH —— GPS	5
2.2.6 ANTENNA DIRECTION DRAWING —— 2.4G	5
2.2.7 FLAT ANTENNA DIAGRAM —— 2.4G	6
2.2.8 ANTENNA DIRECTION DIAGRAM —— 5G	6
2.2.9 FLAT ANTENNA DIAGRAM —— 5G	6
2.2.10 GPS MEASURED TO SEARCH FOR THE STAR	7
2.2.11 ENVIRONMENTAL TREATMENT	7
3. ENGINEERING DRAWINGS	9
BGW ANTENNA	9
4. LIST OF MATERIALS	10
5. PACKAGE SCHEMATIC DIAGRAM	11

1. Overview

1.1 Scope of application

This requirement specifies the antenna technical requirements and material requirements specifications for X12NFT products.

This requirement is applicable to the antenna selection, testing and acceptance of X12NFT products.

1.2 Project basic information

Antenna name:	<u>X12NFT</u>
Antenna frequency:	2G: GSM850/900/1800/1900 3G: WCDMA B1/2/5/8 4G: LTE B2/3/4/5/7/8/17/28/38/66 GWB: 1575.42MHz/2.4G DRX : 1700MHz-2700MHz
Antenna material:	FPC+ coaxial cable

2. Technical index requirements

2.1 Introduction of test items and equipment

inventory	test item	equipment
S11 parameter	Standing wave ratio, echo loss	network analyzer
Active test	TRP,TIS	Integrated tester, microwave darkroom
Passive test	Gain, efficiency	network analyzer

2.2 Active Reporting

2.2.1 Test instructions

Test tools: Agilent8960 instrument, R & S CMW500, full wave far field ETS dark room, high precision positioning system and its controller and computer with automatic test program

Test environment: temperature $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$, humidity $50\% \pm 15\%$

Test method: DUT is fixed in the center of the turntable with H plane, on the same horizontal line as the center of the horn antenna. The positioning system enables the DUT to rotate in the whole sphere to satisfy the high-precision 3 D positioning. Each RF instrument and turntable controller communicate with the PC with automatic test software through the GPIB interface

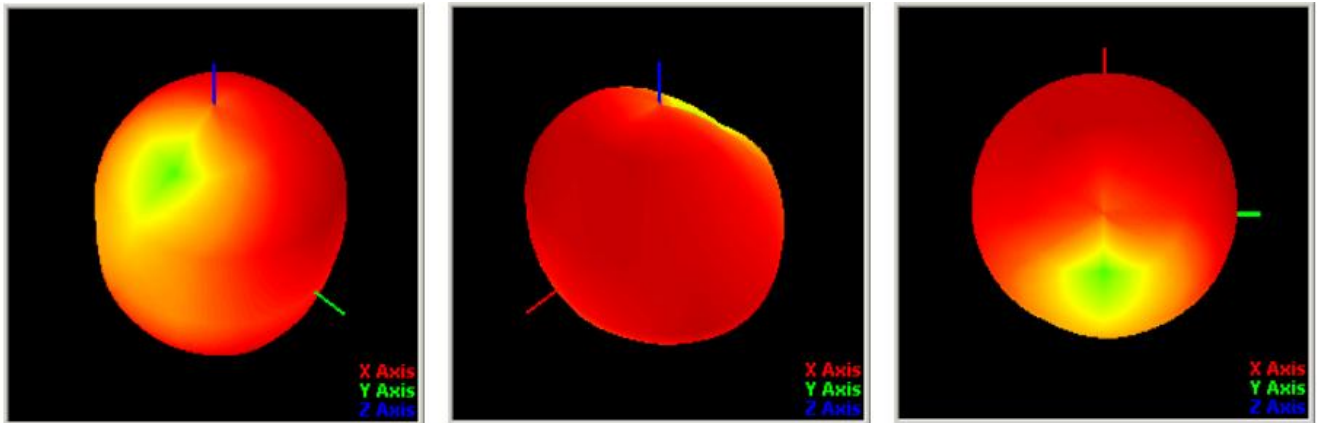
2.2.2 Antenna active parameters

	frequent	CH	TRP (db)	TIS (dbm) the screen is off	TIS (dbm) brighten the screen
WIFI	11b	1	12.52		
		6	12.69		
		11	12.61	-83.18	-82.54
	11g	1	12.20		
		6	12.52		
		11	12.16	-69.43	-68.72
	11n	1	10.37		
		7	10.48		
		13	10.42	-67.21	66.58
	11a	36	8.30		
		149	8.73		
		165	8.21	-67.63	-67.10

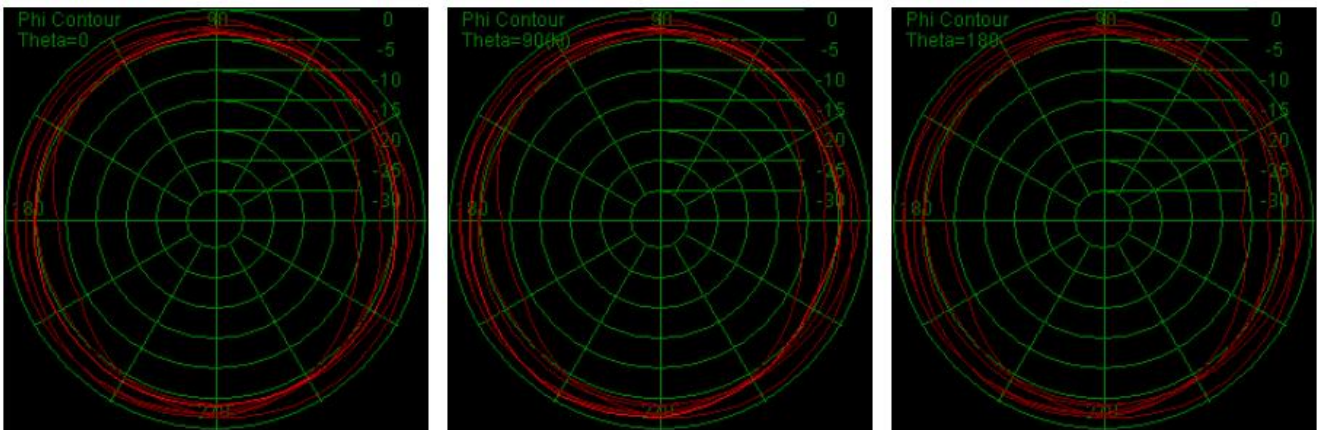
2.2.3 in-one antenna efficiency

Freq (MHz)	Effi (%)	Freq (MHz)	Effi (%)	Freq (MHz)	Effi (%)
1550	42.3	2400	42.5	5100	33.3
1560	43.9	2420	43.0	5200	34.1
1570	44.5	2440	45.3	5300	37.6
1575	43.4	2450	46.2	5400	35.4
1580	42.8	2460	43.7	5500	34.5
1590	41.7	2480	42.2	5600	34.1
		2500	41.9	5700	33.7
				5800	32.9

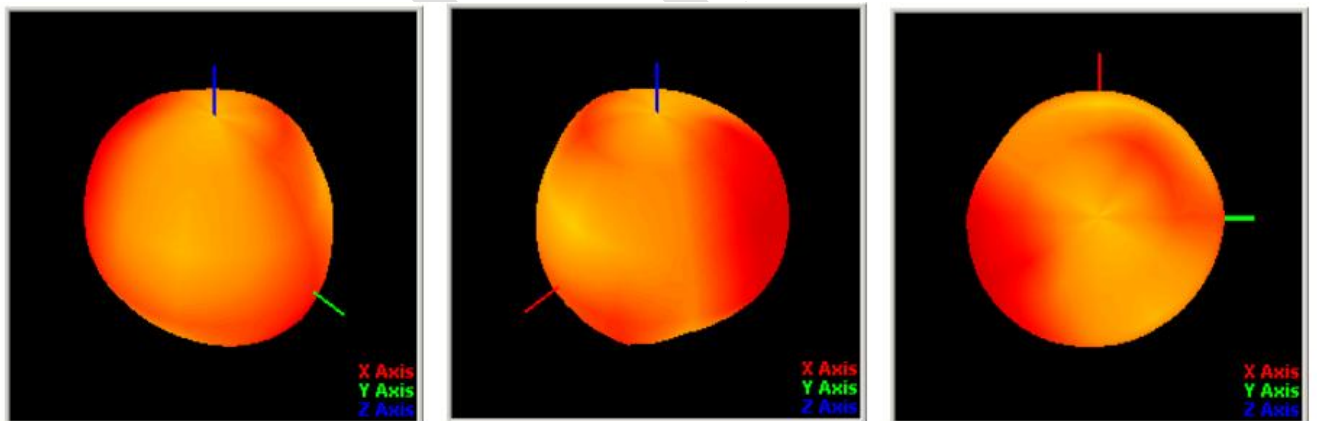
2.2.4 Antenna direction diagram — GPS



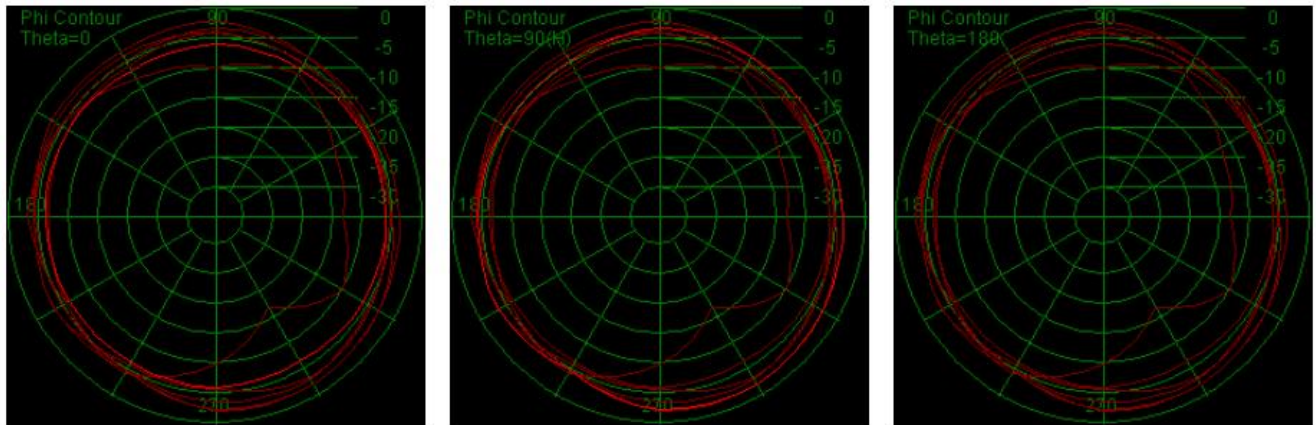
2.2.5 Antenna flat graph — GPS



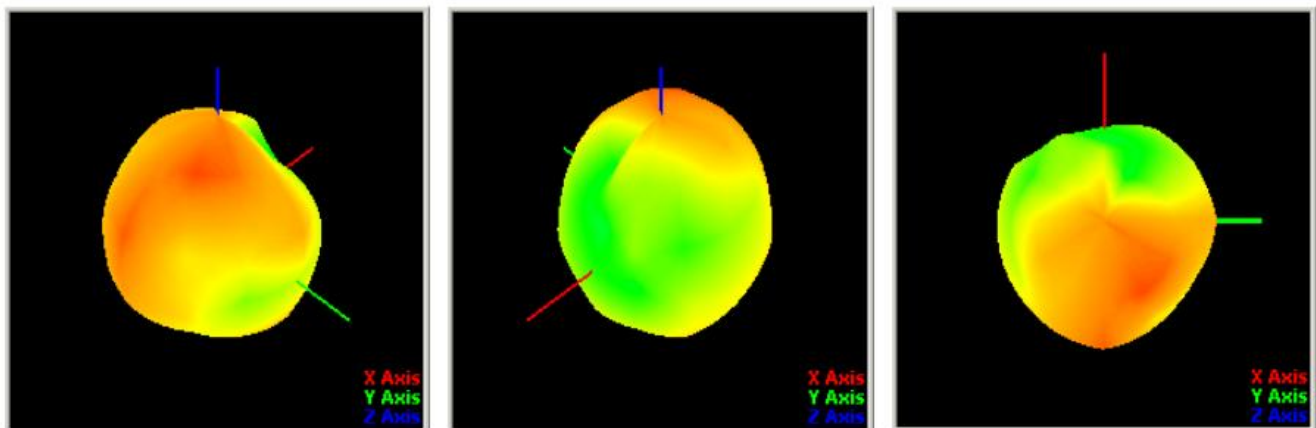
2.2.6 Antenna direction drawing — 2.4G



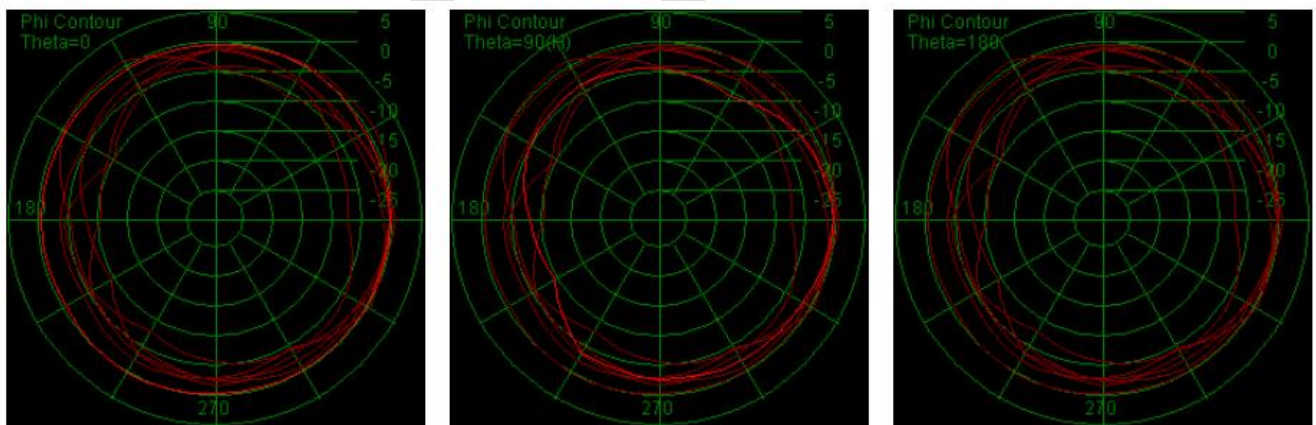
2.2.7 Flat antenna diagram — 2.4G



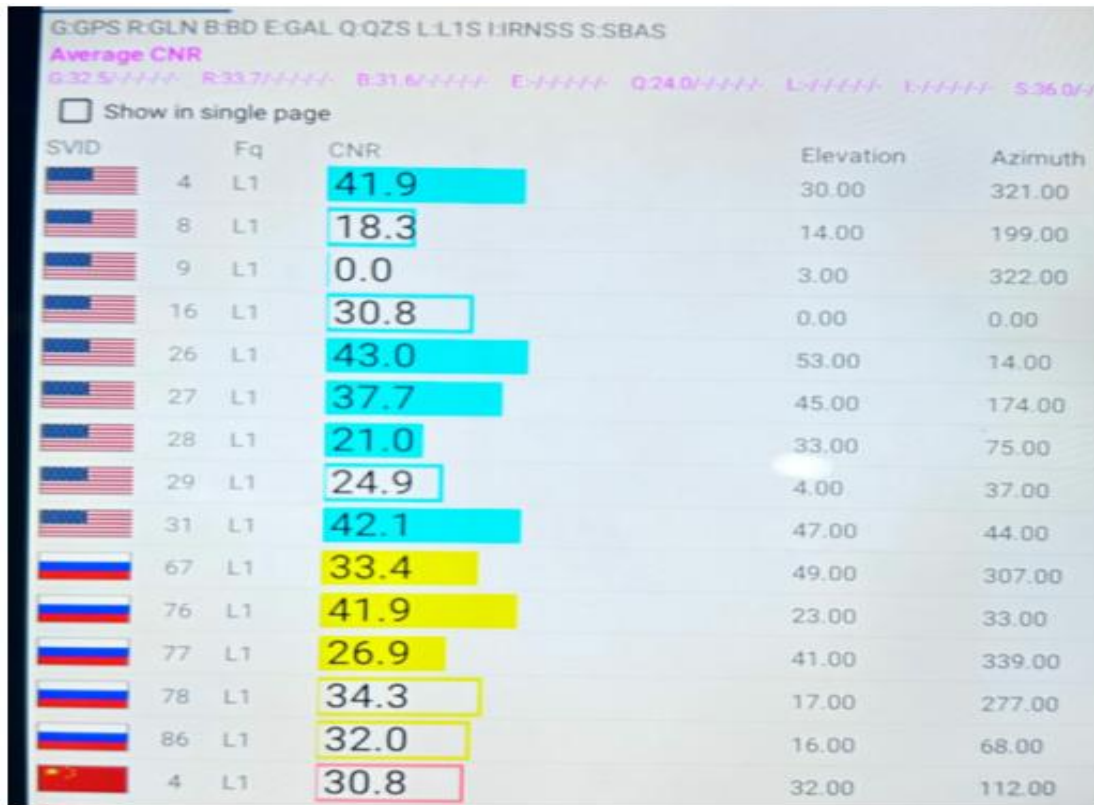
2.2.8 Antenna direction diagram — 5G



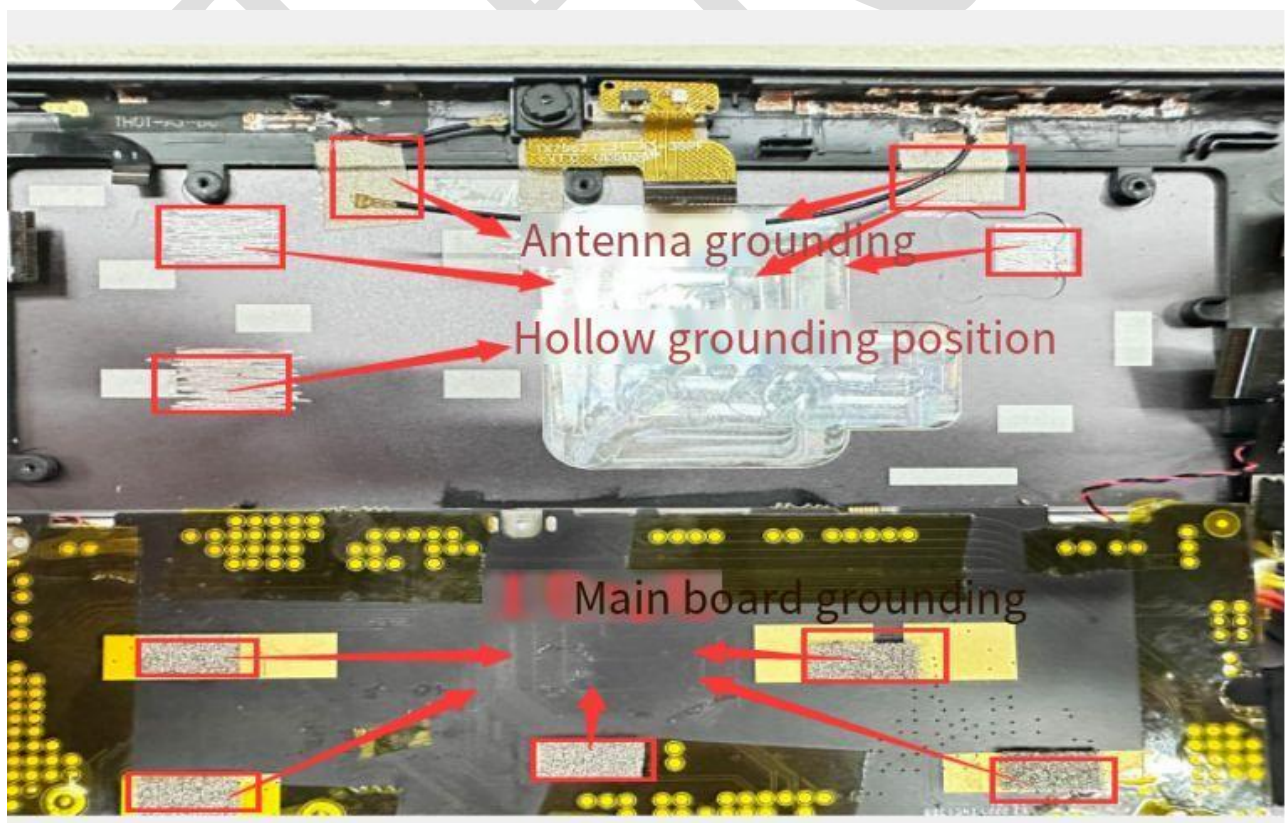
2.2.9 Flat antenna diagram — 5G

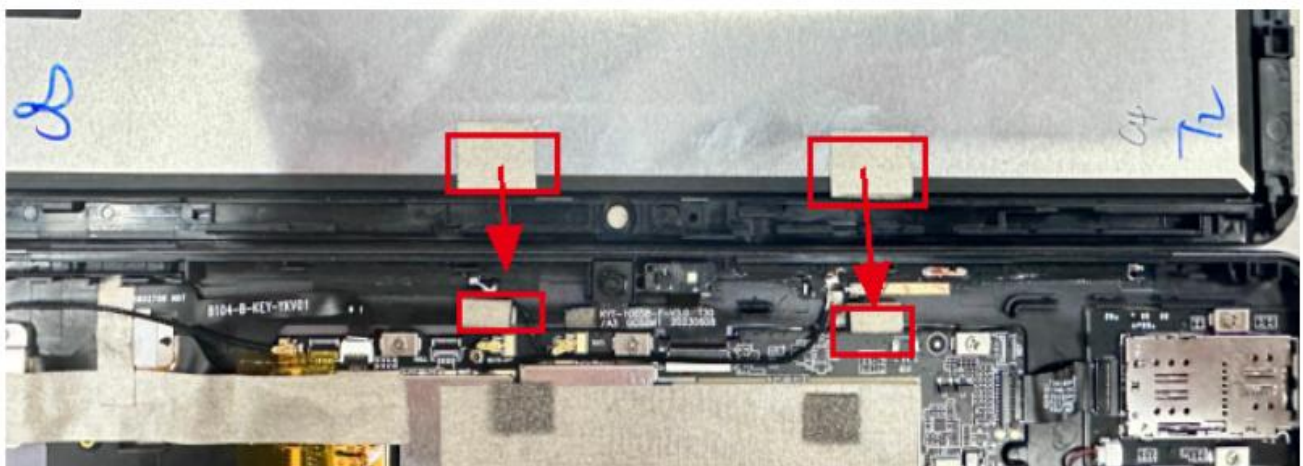
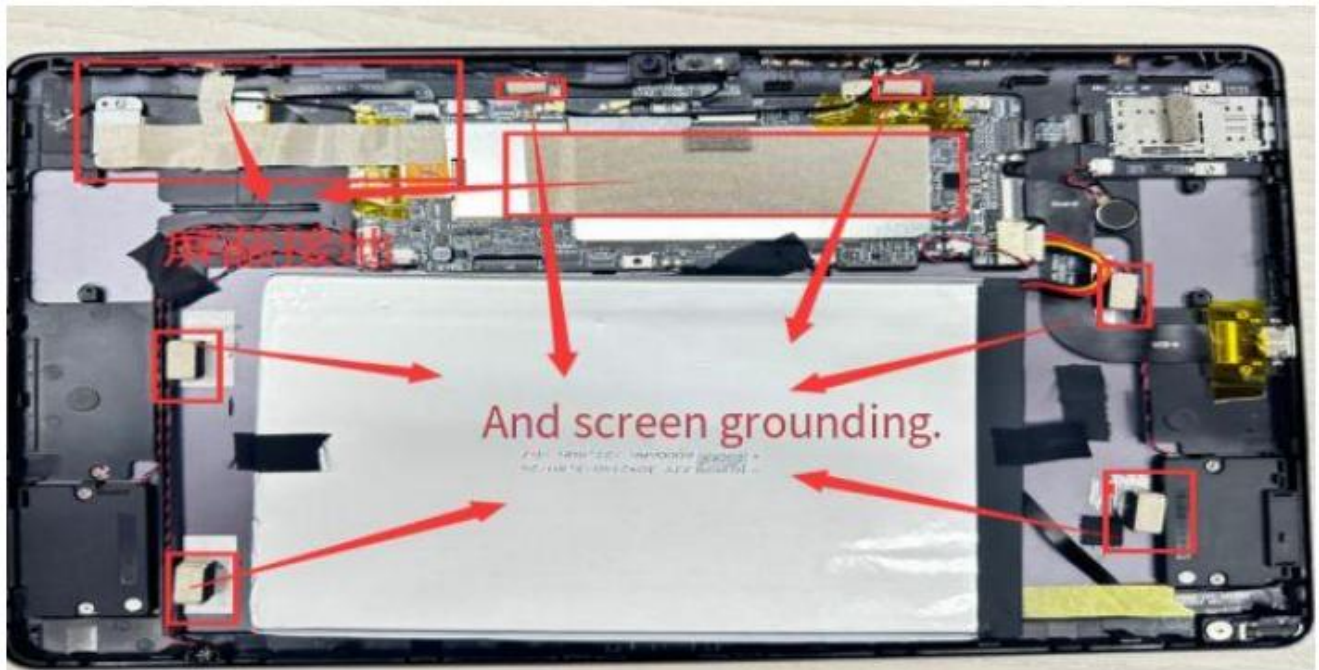
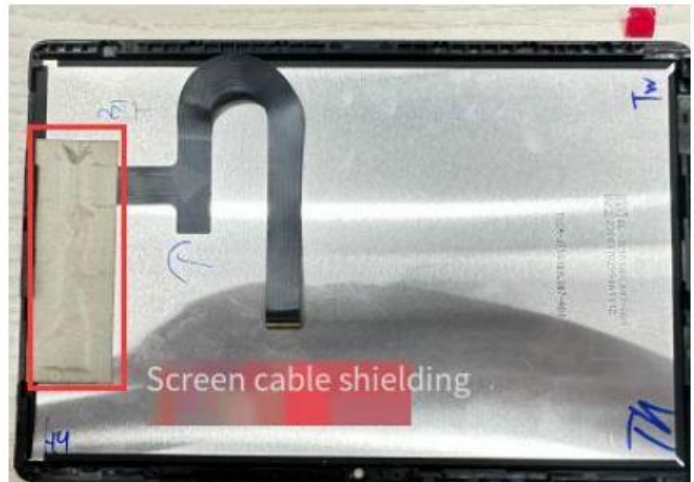
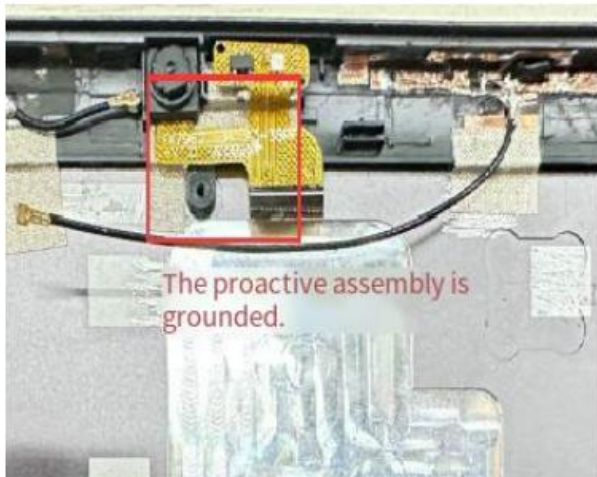


2.2.10 GPS measured to search for the star



2.2.11 Environmental treatment

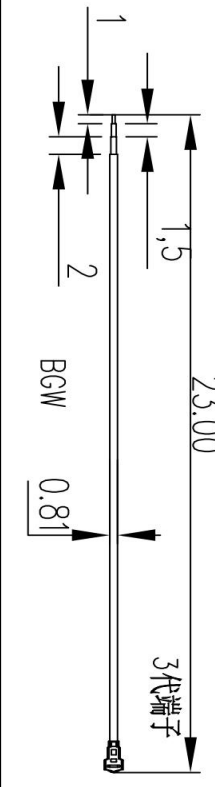
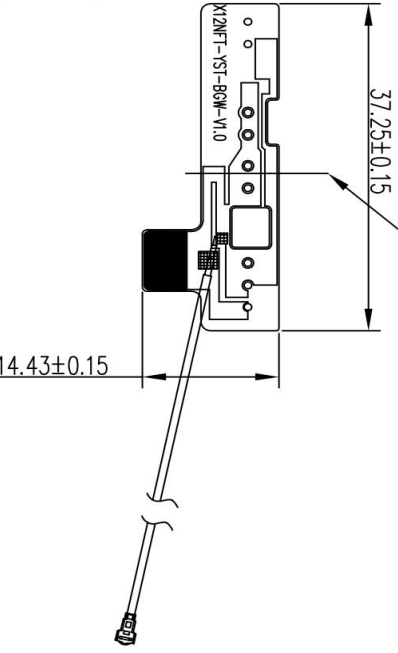




The edge of the screen increases the ground position of the antenna

3. Engineering drawings

BGW antenna

1		2		3		4		5		6		7		8																						
																																				
Centrifugal paper separation line 																																				
由 Autodesk 教育版产品制作																																				
skills requirements: <table border="1"> <tr> <td>1. PCB substrate specifications:</td> <td>PI substrate:</td> <td>Electrolytic copper (half to half)</td> </tr> <tr> <td>2. Electroplating specifications:</td> <td>Electrolytic copper:</td> <td>0.5oz (B)</td> </tr> <tr> <td>3. Surface ink requirements:</td> <td>Double-sided tape:</td> <td>3M-9471LSE</td> </tr> <tr> <td></td> <td>Nickel plated:</td> <td>38um</td> </tr> <tr> <td></td> <td>Surface ink color:</td> <td>Glidel: 0.0125mm</td> </tr> <tr> <td></td> <td>Printing font color:</td> <td>Bright black</td> </tr> <tr> <td></td> <td>Printing font height:</td> <td>According to drawings</td> </tr> </table>																1. PCB substrate specifications:	PI substrate:	Electrolytic copper (half to half)	2. Electroplating specifications:	Electrolytic copper:	0.5oz (B)	3. Surface ink requirements:	Double-sided tape:	3M-9471LSE		Nickel plated:	38um		Surface ink color:	Glidel: 0.0125mm		Printing font color:	Bright black		Printing font height:	According to drawings
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	Printing font color:	Bright black																																		
	Printing font height:	According to drawings																																		
4. Reliability requirements: 1. Reliability test: salt spray test\rubber friction test\alcohol resistance test\100 grid test. 2. The front ink, the surface of the ink is required to be folded in half without cracking, scratching, etc.																																				
5. Tolerance requirements: 1. Shape tolerance ± 0.10; 2. Copper foil circuit tolerance ± 0.05; 3. The position of the copper foil to the shape is ± 0.15; 4. Hole-to-hole position tolerance ± 0.10; hole-to-shape position tolerance ± 0.15; 5. The size tolerance of gold finger is ± 0.20; 6. For other unmarked dimensions, refer to 2D drawings.																																				
6. Key control size: The dimensions marked with numbers are regarded as important dimensions, and the others refer to 2D drawings																																				
7. Environmental requirements: Parts meet RH82.0/H/Reel/CP environmental protection requirements																																				
8. Packaging requirements: Packed in PE bags, the quantity of each bag is 100PCS, there is a mark on the outside of the bag																																				
DATE Modify the content Version Revise																																				
1 2 3 4 5 6 7 8																																				

Autodesk A

Shenzhen Yu Sheng Communication Equipment Co., Ltd.

Model	DATE	20240222
Model	Model	Model
Part NO	Part NO	Part NO
Material quality	Material quality	Material quality
Weld surface treatment	Weld surface treatment	Weld surface treatment
Appearance treatment	Appearance treatment	Appearance treatment
UNIT	UNIT	UNIT
mm	mm	mm
proportion	proportion	proportion
FT	FT	FT
Revise	Revise	Revise
R: A	R: A	R: A

4. List of materials

299002 (X12NFT) BOM

Edition: R:A

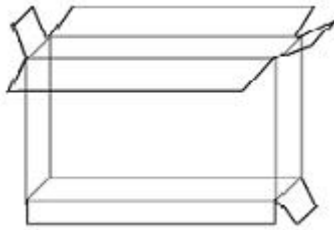
client:299

Model: 299002

date: 20240222

Item	Part No	Name	Types of	version	specification	colour	unit	Quantity	Craft
1	299002-IA-RA	GSM antenna		X12NFT	black GSM-FPC + CABLE	black	PCS	1	
1.1	299002-IA-01-RA	GSM -FPC		X12NFT	black GSM-FPC 71.02*12.50*0.12MM	black	PCS	1	
1.2	299002-IA-02-RA	GSM-CABLE		X12NFT	black 3代 0.81*68.00MM	black	PCS	1	
1.3	299002-IA-03-RA	6.8 NH 0402		X12NFT	6.8 NH 0402	black	PCS	1	
2	299002-IB-RA	DIV antenna		X12NFT	black DIV-FPC + CABLE	black	PCS	1	
2.1	299002-IB-01-RA	DIV -FPC		X12NFT	black DIV-FPC 20.00*9.00*0.12MM	black	PCS	1	
2.2	299002-IB-02-RA	DIV-CABLE		X12NFT	black 3代 0.81*64.00MM	black	PCS	1	
3	299002-IC-RA	BGW antenna		X12NFT	black BGW-FPC + CABLE	black	PCS	1	
3.1	299002-IC-01-RA	BGW -FPC		X12NFT	black BGW-FPC 20.00*9.00*0.12MM	black	PCS	1	
3.2	299002-IC-02-RA	BGW-CABLE		X12NFT	black 3代 0.81*23.00MM	black	PCS	1	
Confirmation:			Review:			Production: FJW			

5. Package schematic diagram

Packaging method diagram		
product name	FPC antenna	
P / N	299002	
Project model	X12NFT	
File details	Carton Size 1: 270*260*200MM Carton Size 2: 260*200*200MM Carton Size 3: Depending on the order quantity / volume	
	Boating method	Packaging by order quantity
	Total number of binning	Packaging by order quantity
labeling requirement	Tag Size 1: Universal use 100 * 100mm Tag Size 2: According to customer requirements	
matters need attention		
1. Due to the limitation of order quantity, the packing method of each material is the size of the box according to the total quantity of the order or the physical volume		
2. Storage temperature: room temperature		
3. Preservation conditions: store them in a cool and dry place		