

# Acknowledgment

Recognized manufacturers: \_\_\_\_\_

Manufacturer: Shenzhen Kexin wireless Technology Co., LTDDescription: 4G FPC Antenna (FPC: 44\*10mm L: 60mm IPEX)

Model: \_\_\_\_\_

(Product Type)

Customer:				
Customer Approval	Check	Reviewer	Approve	Date

Provider:				
Provider Approval	Maker	Check	Approve	Date
				2024.04.26

Document preparation, modification and cancellation records

Version	Date	Change content
A1	2024.04.26	First production

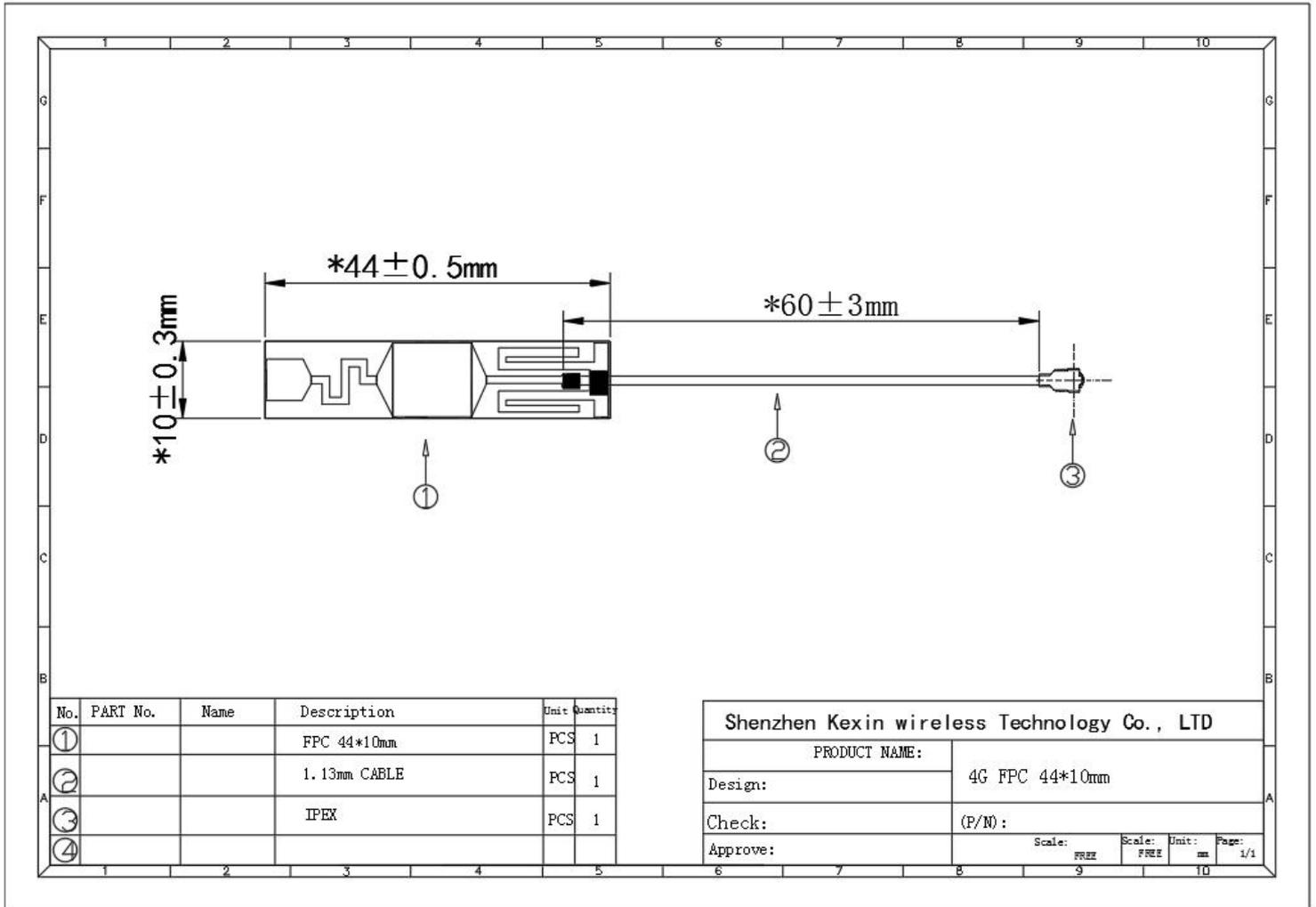
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## 1、 Table of Product Performance Parameters

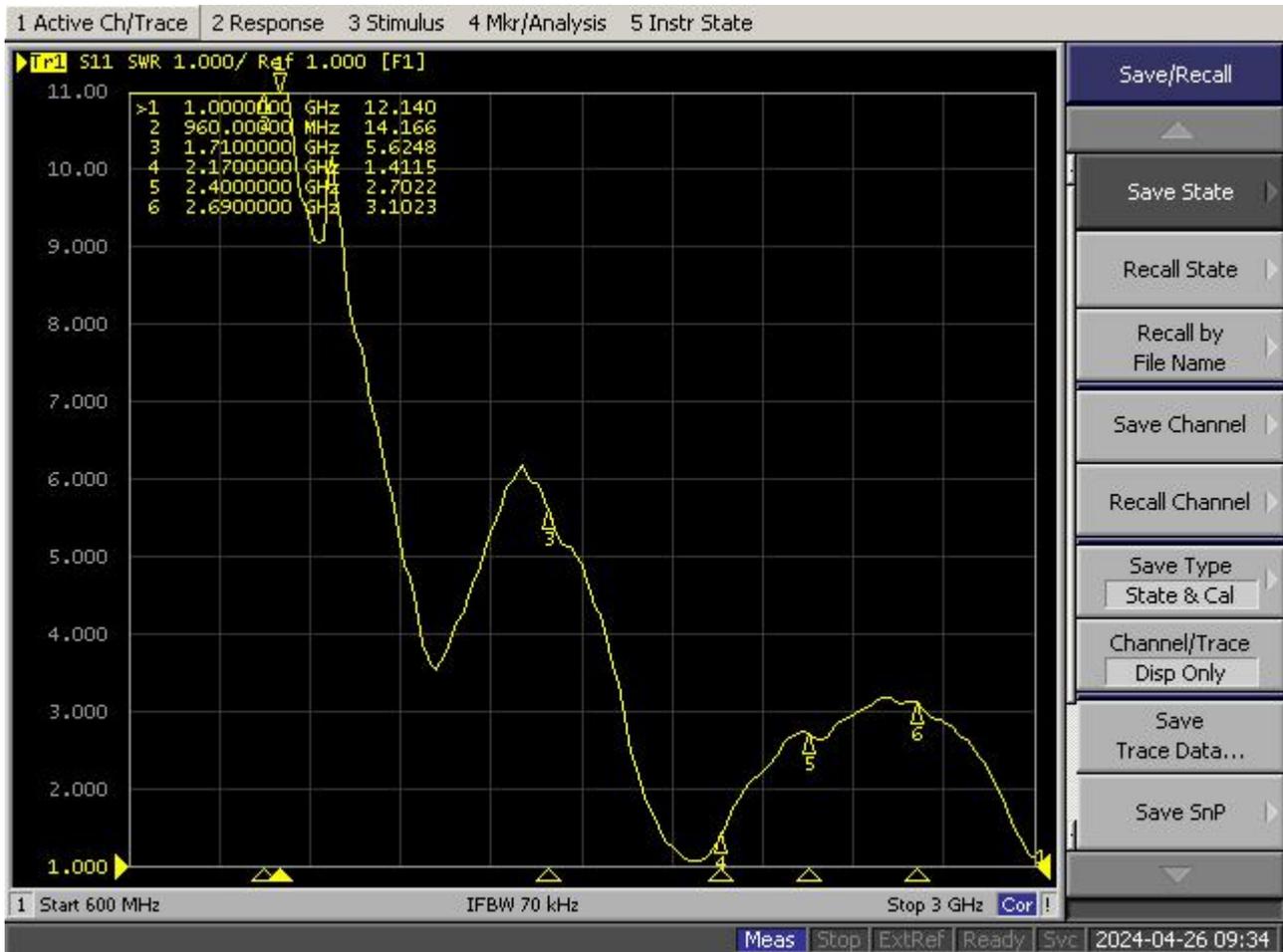
<b>Electrical Specifications</b>	
Frequency Range (MHz)	700-2700
Input Impedence ( $\Omega$ )	50
V.S.W.R	<2.0 (Unmatched devices are for reference only)
Gain (dBi)	$3 \pm 1$ (Unmatched devices are for reference only)
Polarization Type	Vertical
Maximum power(W)	5W
Water plane lobe Angle (H)	360°
<b>Mechanical Specifications</b>	
Material	FPC
Connect Type	IPEX
Size	44*10 mm
Storage Temp	-25 ~ +75°C

## 2、Product Structure Drawing



### 3、Electrical test report

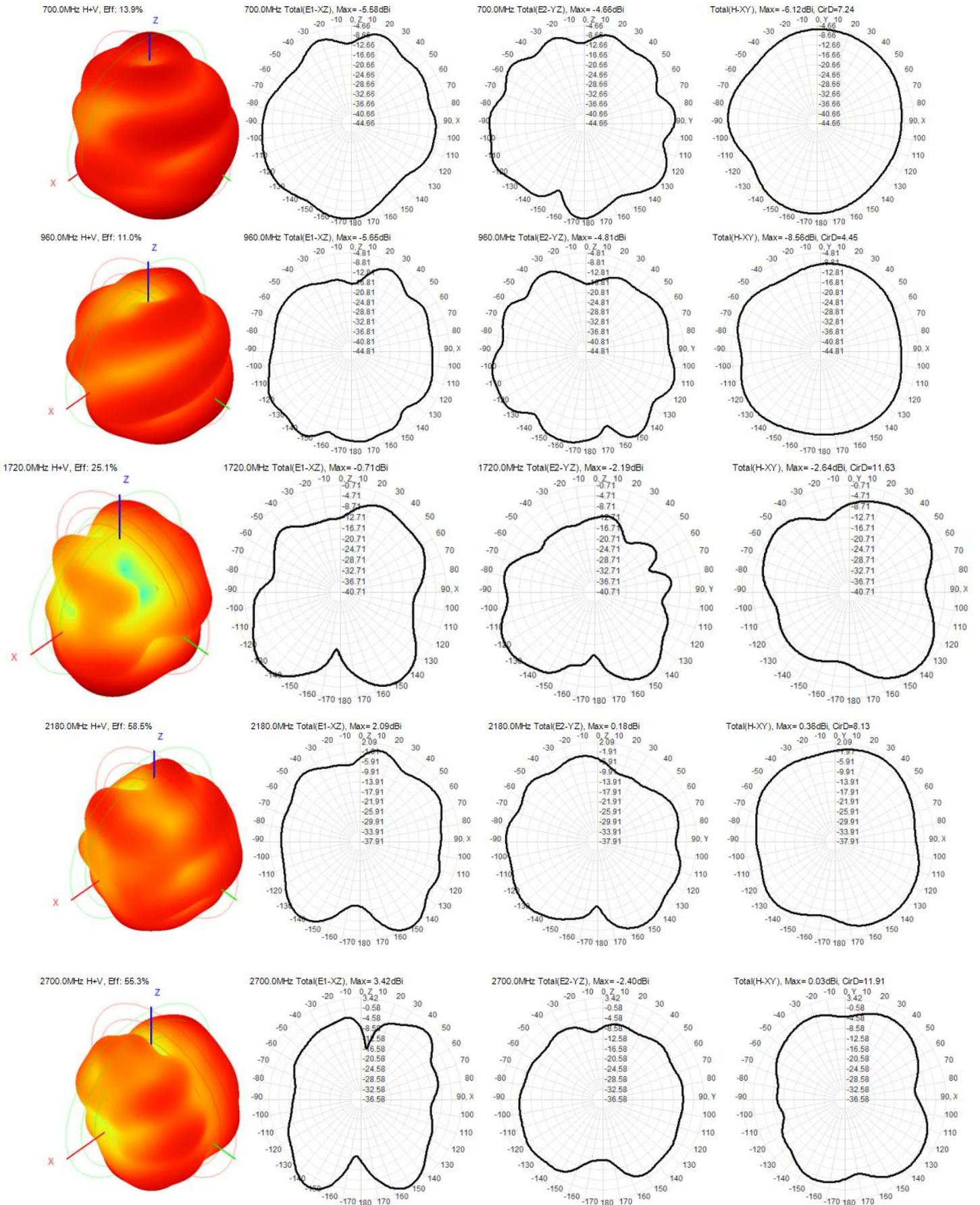
#### 3.1 VSWR



### 3.2 Efficiency&gain

Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
700	13.93	-3.99
960	10.96	-4.69
1720	25.10	-0.01
2180	58.47	3.23
2700	55.31	3.42

### 3.3 3D&2D Pattern



#### 4. Product pictures



## 5、Reliability test

	Test items	Specific description
1.	Bending durability test	<p>Test purpose: to verify that the antenna elbow with bending function can meet the durability of long-term use;            Preset conditions:            1) The electrical performance of the test sample meets the requirements, and the sample appearance is free of cracks, abrasion and other defects;            2) Minimum number of samples: 3 pcs.            Test process:            1. Check whether the mechanical and electrical functions of the antenna are normal before the test; Place the whole antenna horizontally and fix the antenna connector;            2. Manually or mechanically rotate the antenna base to a position 90 degrees from the connector, and then rotate it to the original position. Count it back and forth one by one. Test frequency: 30-40 times per minute, 500 times in total, with an interval of 5min every 100 times;            3. After the test, check the appearance and mechanical performance of the antenna.            Criteria:            1. After the test, the antenna shall be free of obvious physical damage, and shall not slide when the antenna is folded at 30 degrees from the vertical direction.            2. There is no change in electrical performance before and after the test;</p>
2.	Antenna side voltage test	<p>Test purpose: to verify the lateral pressure resistance of the integrated external antenna of the product, and test the strength of the antenna itself, the strength of the contact part between the product and the equipment, such as the strength of the shell, the strength of the stop stop bar, etc.            Preset conditions:            1) The electrical performance of the test sample meets the requirements, and the sample appearance is free of cracks, abrasion and other defects.            2) The antenna shall be installed on the product in normal state and the product shall be fixed.            3) Each test sample shall be at least 3 pcs;            Test steps:            1. Before the test, check the appearance and function of the sample to be tested;            2. Carry out the following two tests, using two sets of materials respectively:            Test 1: Make the antenna open and straight. Apply 20N force inwards, outwards, upwards and downwards respectively at the 5mm position at the end of the antenna, and keep it for 5s. Repeat the operation for 10 times in each direction.            Test 2: Make the antenna in a 90 degree bending state. When twisting the antenna until the stop stop bar works, apply 20N force at the 5mm position at the end of the antenna, and keep it for 5s. Repeat this operation for 10 times.            Complete the test of the positive and negative limit positions.            3. In the above two groups of tests, if it is found that the external force is still less than 20N when the antenna deformation angle is more than 30 ° after the antenna is stressed, the deformation angle is kept at 30 °, and the external force is withdrawn after 5 seconds, and the above operation is repeated for 10 times; Complete 4 direction tests for 40 times in total;            4. After the test, check the mechanical and electrical properties of the sample.            5. If there are multiple antennas on the same product, each antenna installation location on the product should be tested.            Criteria:            1. The mechanical and electrical functions of the antenna are normal after the test;            2. The antenna can be bent manually, the shell is not allowed to crack, and the wire core is not allowed to break.            3. The limit bar of the main equipment is cracked, and the shell buckle shall not be loose or broken;            4. There is no change in the electrical performance of the antenna before and after the test;</p>
3.	Antenna rotation durability test	<p>Test purpose: to verify that the antenna with free rotation function between the antenna fixed head and the antenna body can meet the durability requirements for long-term use;            Preset conditions: the electrical performance of the test sample meets the requirements, and the sample appearance is free of cracks, wear and other defects;            Test process:            180 degree rotatable antenna:            1. Before the test, ensure that the mechanical and electrical functions of the antenna are normal without physical damage;            2. Bend the antenna base to the direction perpendicular to the connector            3. Install the antenna on the fixed platform of the corresponding model, and bend the antenna base to make it perpendicular to the connector.            4. Manually or mechanically rotate the antenna base to the left to the horizontal position (90 degrees), then to the original position, and then to the right to the horizontal position (90 degrees), and then to the original position, and count the whole reciprocating once.            5. The test frequency is 30-40 times per minute, with 1000 rotations in total;            6. After the test, check the mechanical and electrical performance of the antenna.            360 degree rotatable antenna:            1. Before the test, ensure that the mechanical and electrical functions of the antenna are normal without physical damage;            2. Bend the antenna base to the direction perpendicular to the connector            2. Install the antenna on the fixed platform of the corresponding model, and bend the antenna base to make it</p>

		<p>perpendicular to the connector</p> <p>3. Manually or mechanically rotate the antenna base 360 degrees to the left to return to the original position, and then rotate the antenna base 360 degrees to the right to return to the original position. The whole reciprocating count is twice.</p> <p>4. The test frequency is 30-40 times per minute, with 1000 rotations in total;</p> <p>5. After the test, check the mechanical and electrical performance of the antenna.</p> <p>Criteria:</p> <p>1. After the test, the antenna shall not have obvious physical damage, and the antenna rotating head shall also have the function of fixing the rotating position of the antenna, and the limit structure of the main equipment shall not be damaged;</p> <p>2. There is no change in electrical performance before and after the test.</p>
4.	Complete machine free drop test	<p>Verify whether the drop strength of desktop and handheld terminal meets the requirements during use/handling.</p> <p>Test procedure:</p> <p>1. Test conditions:</p> <p>(1) When the antenna is open, the drop height of the whole machine is 0.8 m, 6 sides, 1 cycle, 6 times in total, marble platform, controlled drop;</p> <p>(2) Minimum number of samples: 3 pcs</p> <p>2. Procedure</p> <p>(1) Ensure that the mechanical and electrical functions of the sample are normal;</p> <p>(2) Each sample shall be subject to controlled drop according to the required height and drop times;</p> <p>(3) During the test, it is required to check the appearance and function of each test surface. When testing the next surface, if the fault is caused, it can be recovered manually. After the manual recovery, the test can be carried out.</p> <p>Criteria:</p> <p>After the completion of one cycle test, the mechanical and electrical functions of the sample are normal, allowing manual recoverable mechanical failure. Minor mechanical failures that do not affect the normal use and safety of users are allowed.</p>
5.	Antenna tension test	<p>Test purpose: to verify whether the strength of the antenna connection meets the requirements;</p> <p>Preset conditions: the electrical performance of the test sample meets the requirements, and the sample appearance is free of cracks, wear and other defects;</p> <p>Test process:</p> <p>1. Initial inspection before test to ensure the normal function of prototype accessories before test;</p> <p>2. Fix the fixed head, apply 1kgf tension on the antenna shaft, and keep it for 2S when the force reaches 1kgf;</p> <p>3. Repeat operation step (2) for 20 times;</p> <p>4. Fix the antenna shaft, apply 1kgf pull force to the antenna end, and maintain 2S when the force reaches 1kgf;</p> <p>5. Repeat operation step (4) 20 times.</p> <p>Criteria:</p> <p>1. The antenna shall not have obvious physical damage after the test.</p> <p>2. There is no change in electrical performance before and after the test.</p>
6.	Antenna installation force	<p>Test purpose: to verify whether the installation force of antenna in production and assembly meets the human comfort requirements;</p> <p>Preset conditions: ONT and antenna must be brand new samples for initial installation; For the second installation, due to the wear of structural parts, the installation force will be significantly reduced, resulting in invalid test data;</p> <p>Test process:</p> <p>1. The initial inspection before the test shall ensure that the ONT shell and antenna are new prototypes, and the antenna has not been installed;</p> <p>2. Fix the ONT shell and press the antenna into the antenna mounting hole of the ONT shell; Use a press to record the installation force of the antenna.</p> <p>3. Number of prototypes: 3 pcs</p> <p>Checkpoints, requirements to be met, indicators and expected results:</p> <p>1. Antenna installation force is less than 30N;</p>
7.	Antenna abnormal noise test	<p>Test purpose: to verify that the antenna is free of abnormal noise during shaking;</p> <p>Test criteria: manually shake the single antenna without abnormal noise;</p>

## 6、Environmental requirements

	Environmental parameters	index	Reference standards
1	Storage temperature range (°C)	-25~+75	Reference standards:IEC 60068-2-1/2/6/14/30/31/78 ETSI EN 300 019-2-1/2/3 GR-63-CORE
2	Operating temperature range (°C)	-25~+75	
3	Storage humidity range	40°C, 95%humidity, 96h	
4	Operating humidity range	5%~95%	
5	Alternating damp heat	1) Keep the temperature at+25 °C, and increase the humidity to 95% RH within 1 hour 2) Keep the humidity at 95% RH; Raise the temperature to+55 °C within 3 hours; 3) Hold at+55 °C, 95% RH for 9 hours 4) Keep the humidity at 95% RH; Cool down to+25 °C within 3 hours; 5) Hold at+25 °C, 95% RH for 9 hours 6) Repeat steps 2) to 5) for 5 times (6 cycles in total); 7) Keep the temperature at+25 °C and reduce the humidity to 50% within 1 hour; 8) Hold at+25 °C, 50% RH for 2 hours Required indicators and expected results that the checkpoint should achieve: 1. The antenna shall be free from discoloration, cracking, degumming, warping, deformation, loss of function, etc. 2. The damping force between the antenna and the ONT has no obvious change, and the damping force matched with the antenna and the product can keep the antenna stable at any angle;	
6	Temperature cycle	1) High temperature limit: 1) 75 °C; 2) Low temperature limit: - 30 °C; 3) Temperature change and holding time: it shall be kept at the extreme value of high and low temperature for at least 4h, and the time from high temperature to low temperature or from low temperature to high temperature shall not exceed 4h; 4) Number of cycles: 9 cycles in total 5) Recovery time: 24h 6) Minimum number of samples: 3 pcs Required indicators and expected results that the checkpoint should achieve: 1. The antenna shall be free from discoloration, cracking, degumming, warping, deformation, loss of function, etc. 2. The damping force between the antenna and the ONT has no obvious change, and the damping force matched with the antenna and the product can keep the antenna stable at any angle;	
7	High temperature storage	Raise the temperature to 75 °C at the rate of 1 °C/min, and keep it at 75 °C for 24 hours; Cool down to+25 °C at the rate of 1 °C/min for 2 hours. Minimum number of samples: 3 pcs Required indicators and expected results that the checkpoint should achieve: 1. The antenna shall be free from discoloration, cracking, degumming, warping, deformation, loss of function, etc. 2. The damping force between the antenna and the ONT has no obvious change, and the damping force matched with the antenna and the product can keep the antenna stable at any angle;	

8	Low temperature storage	Cool down to - 30 °C at the rate of 1 °C/min, and keep it at - 30 °C for 24 hours; Raise the temperature at the rate of 1 °C/min to +25 °C for 2 hours. Required indicators and expected results that the checkpoint should achieve: 1. The antenna shall be free from discoloration, cracking, degumming, warping, deformation, loss of function, etc. 2. The damping force between the antenna and the ONT has no obvious change, and the damping force matched with the antenna and the product can keep the antenna stable at any angle;	
9	Constant salt spray	After 12 hours of salt spray test, the product indexes, functions and mechanical properties are all normal at room temperature.	
10	illumination	/	
11	Bare metal vibration	requirement; 1. Frequency: 10~30Hz, placement distance: 0.38mm, 3 cycles, 5 minutes each; 2. Frequency: 30~60Hz, placement distance: 0.38mm, 3 cycles, 5 minutes each; 3. Repeat once in 3 axis directions; After the test, the product indicators, functions and mechanical properties are all normal.	
12	Vibration with packaging	/	
13	Static pressure with package		
14	Dump with package		
15	Impact of packaging		
16	Free fall with packaging		
19	Environmental requirements	RHOS\REA CH	yes
21		Lead free requirements for electroplating	yes