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# Letter of admission

**Customer Name:** \_\_\_\_\_

**Customer Material No. : Kexin Material No. : NZ1632** \_\_\_\_\_

**Specification description: 915MHz built-in FPC52.2 \* 9.1 mm-RG1.13-including terminal bus length 56mm-IPEX** \_\_\_\_\_

**Production date: July 15, 2024** \_\_\_\_\_

**Factory confirmation:**

Division	Audit	Approval
Radio frequency section	Liu Xiaoxiong	Liu Xiao
Structural Department	Li Zhixiao	Li Bin
Quality Department	Liu Chunyu	Zeng Pengfei

**Customer Confirmation:**

Inspect	Audit	Approval

## Records of document formulation, modification and abolition

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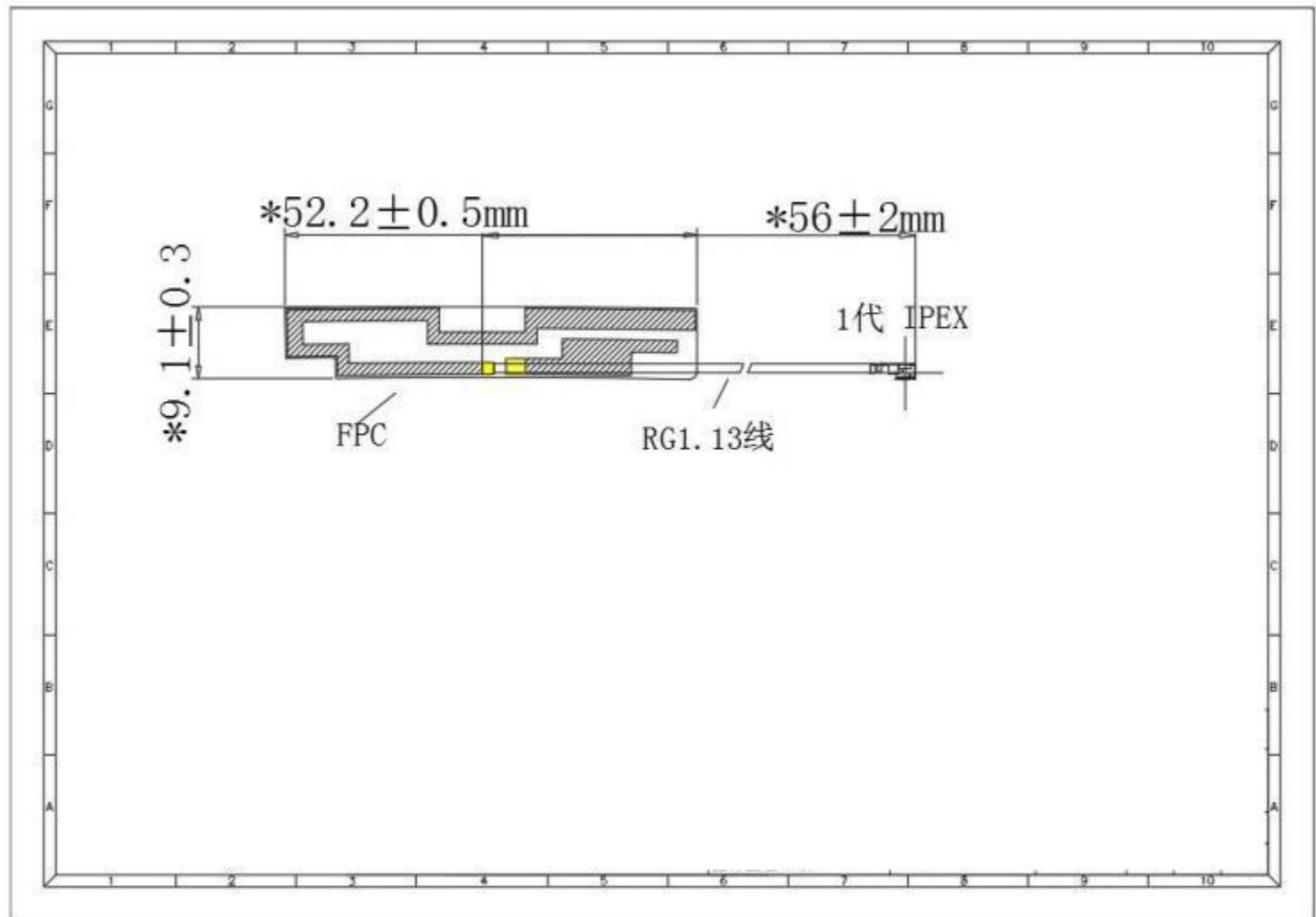
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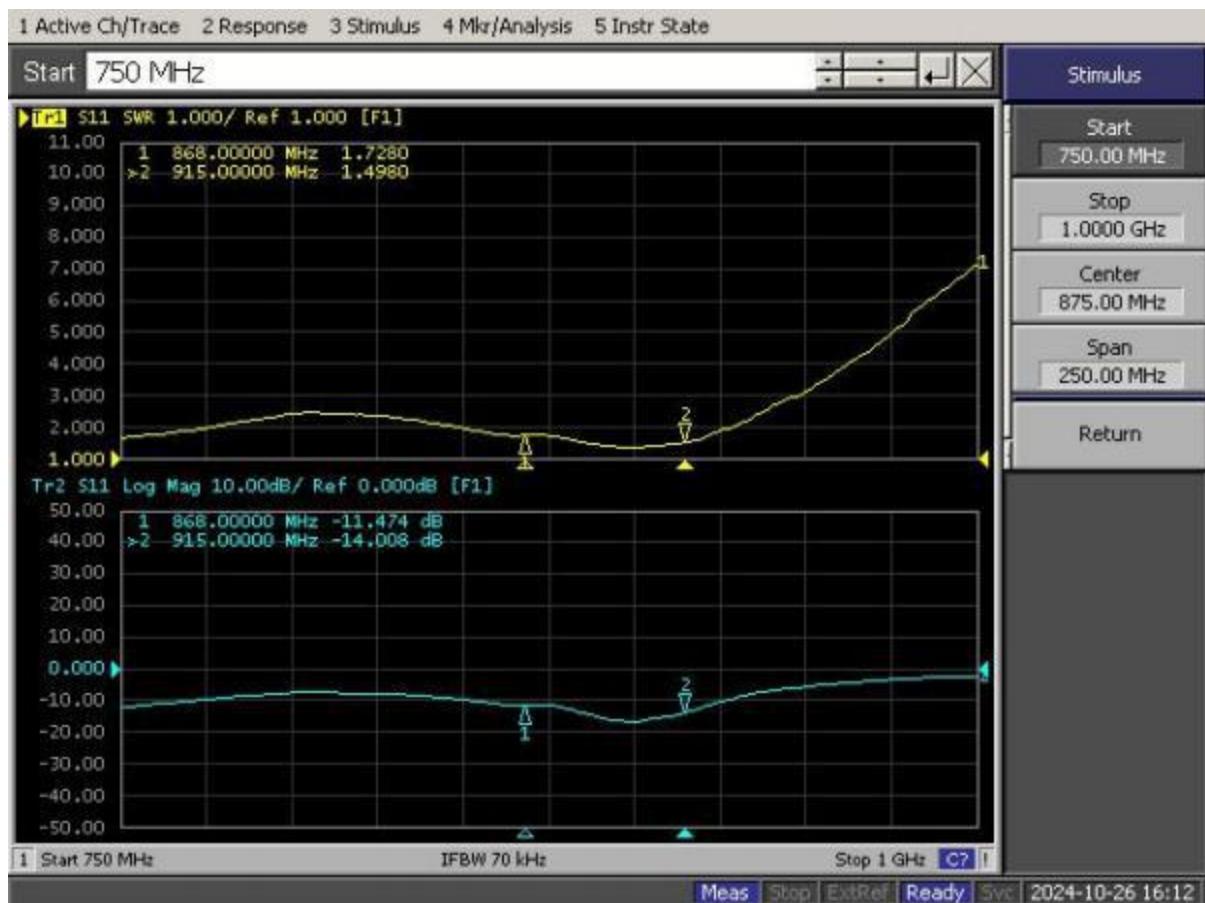
#### 4. Product performance parameters

电能能表标 Electrical Specifi cations	
Frequency range Frequency Range (MHz)	864MHz-868 MHz/915MHz-920MHz
Input impedance Input Impendence ( $\Omega$ )	50
Voltage Standing Wave Ratio V.S.W.R.	$\leq 2.0$ (installed on customer equipment and tested together)
Reference Gain Gain (dbi)	1 (installed on customer equipment and tested together)
Polarization Type	Vertical
Radiation Direction	Omni-Directional
On-off test Continuity Test	Pathway
Mechanical index Mechanical Spec ifications	
Antenna size (mm)	52.2 * 9.1 * 0.3 mm
Connector Model Connect Type	IPEX1 Generation
Wire Cable	RG1.13
Operating Temp	-25 ~ + 70 ° C

## 5. Product dimension drawing



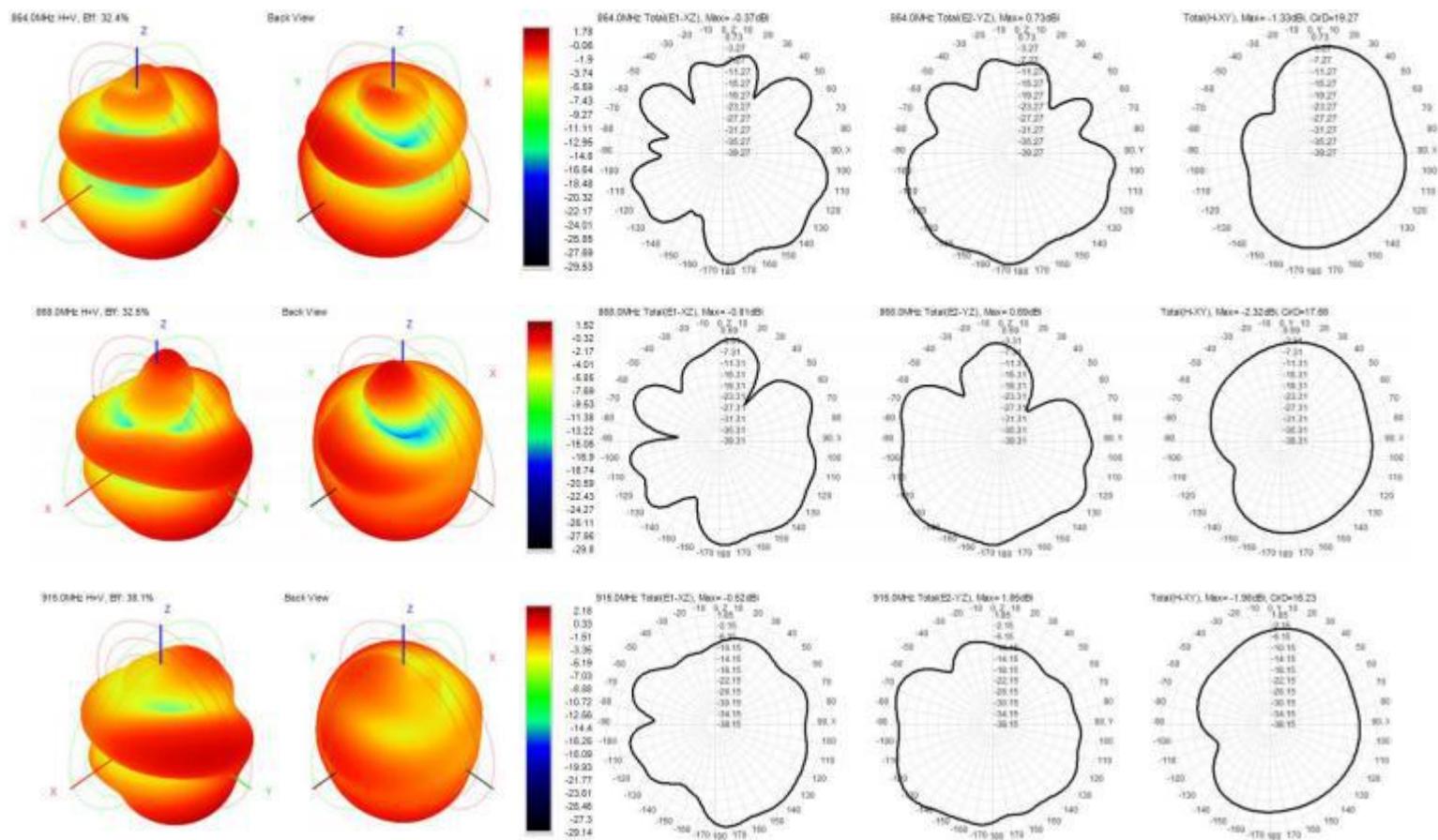
## 6. Electrical performance test report: VSWR ( Install on customer equipment and test together)



Gain vs. Efficiency (installed on customer equipment and tested together)

Freq(MHz)	Effi(%)	Gain(dBi)
864	32.4	1.78
868	32.46	1.52
915	38.12	2.18
920	38.02	2.09

## 3D & 2D Direction Patterns



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## 7. Actual product picture



## 8. Reliability test requirements

	Test item	Specific instructions
1.	Bending resistance Long test	<p>Test purpose: To verify that the antenna elbow with bending function can meet the durability of long-term use;</p> <p>Preset conditions:</p> <ol style="list-style-type: none"><li>1) The electrical properties of the test sample meet the requirements, and the appearance of the sample has no defects such as cracking and wear;</li><li>2) Minimum sample quantity: 3pcs. Test</li></ol> <p>Process:</p> <ol style="list-style-type: none"><li>1. Check whether the mechanical and electrical functions of the antenna are normal before testing; Positioning the entire antenna horizontally and fixing the antenna connector;</li><li>2. Rotate the antenna base manually or mechanically to a position of 90 degrees from the connector, then rotate to the original position, and count once a reciprocation. Test frequency: 30 to 40 times per minute, bending 500 times in total, every 100 times Interval of 5 minutes;</li><li>3. After testing, check the appearance and mechanical properties of the antenna.</li></ol> <p>Criteria:</p> <ol style="list-style-type: none"><li>1. After the test is completed, the antenna must not have obvious physical damage, and the antenna must not slide when folded at 30 degrees from the vertical direction.</li><li>2. There is no change in electrical performance before and after the test;</li></ol>

	<p>Test purpose: To verify the lateral pressure resistance of the external antenna of the product after integration, and to test the strength of the antenna itself and the strength of the contact parts between the product and the equipment, such as the strength of the shell, the strength of the stop-rotation limit rib, etc.</p> <p>Preset conditions:</p> <ol style="list-style-type: none"> <li>1) The electrical properties of the test sample meet the requirements, and the appearance of the sample has no defects such as cracking and wear.</li> <li>2) Install the antenna on the product according to the normal state, and fix the product.</li> <li>3) Each test sample is at least 3pcs; Test procedure:           <ol style="list-style-type: none"> <li>1. Before testing, check the appearance and function of the sample to be tested;</li> <li>2. Conduct the following two tests, using two sets of materials respectively:               <p>Test 1: Keep the antenna in an open and straightened state, apply 20N force inward, outward, upward and downward at a position 5mm at the end of the antenna, and hold it for 5S. Repeat this operation 10 times in each direction.</p> <p>Test 2: Make the antenna in a 90-degree bending state, twist the antenna until the stop-rotation limit rib works, apply 20N force at 5mm at the end of the antenna, hold it for 5S, and repeat this operation 10 times. Complete the test of positive and negative limit positions.</p> <li>3. In the above two sets of tests, if it is found that the external force is still less than 20N when the antenna deformation angle is greater than 30 after the antenna is stressed, keep the deformation angle at 30, cancel the external force after 5s, and repeat the above operation 10 times; Completed tests in 4 directions, totaling 40 times;</li> </li></ol> </li> </ol>
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		<p>4. After the test is completed, check the mechanical and electrical properties of the sample.</p> <p>5. If there are multiple antennas on the same product, each antenna installation position on the product must be tested.</p> <p>Criteria:</p> <ol style="list-style-type: none"> <li>1. After the test is completed, the mechanical and electrical functions of the antenna are normal;</li> <li>2. The antenna can have a manually recoverable bending phenomenon, the shell is not allowed to break, and the wire core is not allowed to break.</li> <li>3. The limit ribs of the main equipment are cracked, and the shell buckle cannot be loosened or broken;</li> <li>4. There is no change in the electrical performance of the antenna before and after the test;</li> </ol>
3.	Antenna rotation endurance test	<p>Test purpose: To verify that the antenna with free rotation function between the antenna fixing head and the antenna body can meet the durability requirements of long-term use;</p> <p>Preset conditions: the electrical properties of the test sample meet the requirements, and the appearance of the sample has no defects such as cracking and wear;</p> <p>Test Process:</p> <p>180-degree rotatable antenna:</p> <ol style="list-style-type: none"> <li>1. Before testing, ensure that the mechanical and electrical functions of the antenna are normal and there is no physical damage;</li> <li>2. Bend the antenna base in a direction perpendicular to the connector</li> <li>3. Install the antenna on the fixed platform of the corresponding model, and bend the antenna base to make it perpendicular to the connector.</li> <li>4. Manually or mechanically rotate the antenna base to the left to the horizontal position (90 degrees), then rotate to the original position, then rotate the antenna base to the right to the horizontal position (90 degrees), then rotate to the original position, and the entire reciprocation Count 1 time.</li> <li>5. The test frequency is 30 ~ 40 times per minute, with a total of 1000 rotations;</li> <li>6. After testing, check the mechanical and electrical performance of the antenna. 360-degree rotatable antenna:</li> </ol> <ol style="list-style-type: none"> <li>1. Before testing, ensure that the mechanical and electrical functions of the antenna are normal and there is no physical damage;</li> <li>2. Bend the antenna base in a direction perpendicular to the connector</li> <li>2. Install the antenna on the fixed platform of the corresponding model, and bend the antenna base so that it is perpendicular to the connector</li> <li>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 entire reciprocating count is 2 times.</li> <li>4. The test frequency is 30 ~ 40 times per minute, with a total of 1000 rotations;</li> <li>5. After testing, check the mechanical and electrical performance of the antenna.</li> </ol> <p>Criteria:</p> <ol style="list-style-type: none"> <li>1. After the test is completed, the antenna must not have obvious physical damage, and the antenna rotating head also has the function of fixing the antenna rotation position after the test, and the limit structure of the main equipment is not damaged;</li> <li>2. There is no change in electrical performance before and after the test.</li> </ol>

4.	Free drop test of whole machine	<p>Verify whether the drop strength of desktop and handheld terminal meets the requirements during use/handling.</p> <p>Test Procedure:</p> <p>Test Conditions:</p> <p>(1) The open state of the antenna together with the drop height of the whole machine is 0.8 m, 6 Face, 1 cycle, recorded 6 times in total, marble platform, controlled drop;</p> <p>(2) Minimum sample quantity: 3pcs</p> <p>2. Procedure</p> <p>(1) Ensure that the mechanical and electrical functions of the sample are normal;</p> <p>(2) Each sample is subjected to a controlled drop corresponding to the required height and number of drops;</p> <p>(3) During the test, it is required to check the appearance and function of each surface tested. When the next surface is tested, if the fault caused can be manually restored, and the test can be carried out after manual restoration.</p>
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		<p>Criteria:</p> <p>After completion of 1 cycle test, the mechanical function and electrical function of the sample are normal, allowing manually recoverable mechanical failure to occur. Minor mechanical failures that do not affect the normal use and safety of the user are allowed.</p>
5.	Antenna resistance Pull test	<p>Test purpose: to verify whether the strength of the antenna connection meets the requirements;</p> <p>Preset conditions: the electrical properties of the test sample meet the requirements, and the appearance of the sample has no defects such as cracking and wear;</p> <p>Test Process:</p> <ol style="list-style-type: none"> <li>1. Initial inspection before testing to ensure that the prototype accessories function normally before testing;</li> <li>2. Fix the fixed head and apply a pulling force of 1kgf to the antenna shaft. When the force reaches 1kgf, maintain 2S;</li> <li>3. Repeat the operation step (2) 20 times;</li> <li>4. Fix the antenna shaft, apply a pulling force of 3kgf to the antenna end, and maintain 2S when the force reaches 3kgf;</li> <li>5. Repeat step (4) 20 times. Criteria:</li> </ol> <ol style="list-style-type: none"> <li>1. After the test is completed, the antenna must not have obvious physical damage.</li> <li>2. There is no change in electrical performance before and after the test.</li> </ol>
6.	Antenna mounting force	<p>Test purpose: to verify whether the installation force of the antenna in production and assembly meets the requirements of human body comfort;</p> <p>Preset conditions: Both ONT and antenna must be brand-new samples and installed for the first time; In the second installation, due to the wear of structural parts, the installation force will be obviously reduced, resulting in invalid test data;</p> <p>Test Process:</p> <ol style="list-style-type: none"> <li>1. Preliminary inspection before testing to ensure that the ONT shell and antenna are brand-new prototypes and no antenna installation has been carried out;</li> <li>2. Fix the ONT shell and press the antenna into the antenna installation hole of the ONT shell; It can be done using a press to record the antenna mounting force.</li> <li>3. Number of prototypes: 3pcs</li> </ol> <p>Checkpoints, requirements to be met, indicators and expected results:</p> <ol style="list-style-type: none"> <li>1. The antenna installation force is less than 30N;</li> </ol>
7.	Antenna difference Sound test	<p>Test purpose: to verify that the antenna has no abnormal noise during shaking;</p> <p>Test criteria: Shake the single antenna manually, and there is no abnormal noise;</p>

## 9. Environmental requirements

	Environmental parameters	Index	Citation Standard
1	Storage Temperature Range (°C)	-40～+80	Reference standard: IEC 60068-2-
2	Operating temperature range (°C)	-25～+70	
3	Storage humidity range	40 °C, 95% humidity, 96 hours	
4	Operating humidity range	5%～95%	

5	Alternating humidity heat	<ol style="list-style-type: none"> <li>1) Maintain the temperature at + 25 ° C and raise the humidity to 95% RH within 1 hour</li> <li>2) Maintain the humidity at 95% RH; Warming up to + 55 ° C over 3 hours;</li> <li>3) Hold + 55 ° C, 95% RH for 9 hours</li> <li>4) maintaining humidity at 95% RH; Cooling to + 25 ° C within 3 hours;</li> <li>5) Hold + 25 ° C, 95% RH for 9 hours</li> <li>6) Repeat steps 2) to 5) 5 times (6 cycles in total);</li> <li>7) the temperature is maintained at + 25 ° C and the humidity is reduced to 50% within 1 hour;</li> <li>8) Hold + 25 ° C, 50% RH for 2 hours</li> </ol>	1/2/6/14/30/3 1/78ETSI EN300019-2- 1/2/3GR-63- CORE
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		<p>Required indicators and expected results to be achieved by the checkpoint:</p> <ol style="list-style-type: none"> <li>1. The antenna should not be discolored, cracked, degummed, warped, deformed, functional loss, etc.</li> <li>2. There is no obvious change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can keep the antenna stable at any angle;</li> </ol>
6	Temperature cycle	<p>1) High temperature limit value: 1) 75 °C;  2) Low temperature limit value: -35 °C;  3) Temperature change and holding time: Maintain the extreme value of high and low temperature for at least 2 hours, and the time from high temperature to low temperature or from low temperature to high temperature should not exceed 4 hours;  4) Number of cycles: 12 cycles were performed in total  5) Recovery time: 24h  6) Minimum sample quantity: 3pcs</p> <p>Required indicators and expected results to be achieved by the checkpoint:</p> <ol style="list-style-type: none"> <li>1. The antenna should not be discolored, cracked, degummed, warped, deformed, functional loss, etc.</li> <li>2. There is no obvious change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can keep the antenna stable at any angle;</li> </ol>
7	High temperature storage	<p>The temperature was raised to 80 °C at a rate of 1 °C/min, and the temperature was maintained at 80 °C for 2 hours; The temperature was lowered to -40 °C at a rate of 1 °C/min for 2 hours and cycled 12 times.</p> <p>Minimum sample quantity: 3pcs</p> <p>Required indicators and expected results to be achieved by the checkpoint:</p> <ol style="list-style-type: none"> <li>1. The antenna should not be discolored, cracked, degummed, warped, deformed, functional loss, etc.</li> <li>2. There is no obvious change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can keep the antenna stable at any angle;</li> </ol>
8	Cryogenic storage	<p>Cooling to -40 °C at a rate of 1 °C/min and maintaining at -40 °C for 2 hours; The temperature was raised to +80 °C at a rate of 1 °C/min for 2 hours. Required indicators and expected results to be achieved by the checkpoint:</p> <ol style="list-style-type: none"> <li>1. The antenna should not be discolored, cracked, degummed, warped, deformed, functional loss, etc.</li> <li>2. There is no obvious change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can keep the antenna stable at any angle;</li> </ol>
9	Constant salt spray	After 12-hour salt spray test, the product indexes, functions and mechanical properties are all normal at room temperature.
10	Illumination	/

11	Bare metal vibration	<p>Requirements;</p> <ol style="list-style-type: none"> <li>1. Frequency: 10 ~ 30Hz, placement distance: 0.38 mm, 3 cycles, each cycle lasts 5 minutes;</li> <li>2. Frequency: 30 ~ 60Hz, placement distance: 0.38 mm, 3 cycles, each cycle lasts for 5 minutes;</li> <li>3. Repeat once according to the three axis directions;</li> </ol>
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		After the test, the product indicators, functions and mechanical properties are all normal.	
12	Vibration with packaging		
13	Static pressure with packaging		
14	Pouring with packaging		
15	Collision Impact with Packaging	No testing is done, but it is required to go to the customers warehouse. The performance and appearance of the antenna are ok	
16	Free drop with packaging		
17	Appearance and quality requirements of antenna injection molding parts	/	"DKBA0400 0193 Plastics General Quality Requirements for Rubber Parts and Rubber Parts, paragraphs 1, 2, Sections 3, 5, 6 Requirements
18	Spraying quality requirements	Not involved	"ATOM Antenna Spraying Quality Requirement s"