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# 承认书

# APPROVAL SHEET

产品 (Product) : 5G 内置天线(L=60mm)  
5G built-in antenna (L=60mm)

型号 (Model) : NM3015

客户料号 (Customer Part Number) : 360100236

料号 (Part Number) : Z02-10189-R01

制作人 (Written By) : 胡 涛 Mr Hu

签发时间 (Issued Date) : 2022-12-21

## 客户 CUSTOMER

工程部 ENGINEER R&D DEPT	品质部 QUALITY DEPT	批准 APPROVED

## Free Walk

射频 R&D DEPT	工程部 ENGINEER R&D DEPT	批准 APPROVED
胡 涛	古政华	邓凯



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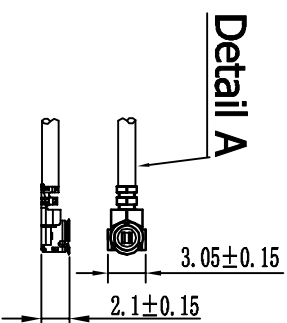
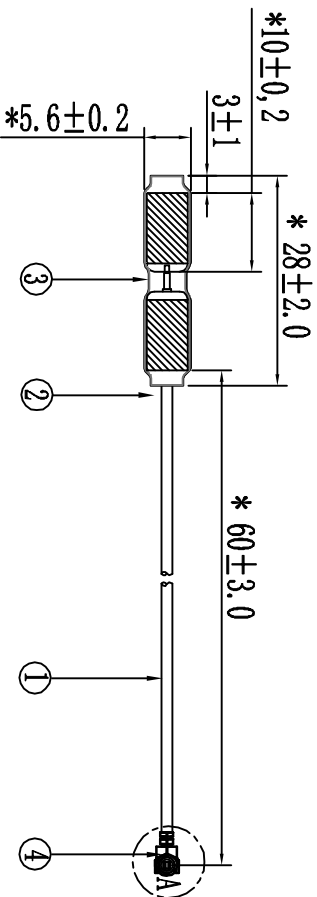
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### The basic parameters

A. Electrical Characteristics	
<b>Frequency</b>	<b>5150MHz~5850MHz</b>
<b>VSWR</b>	<b>&lt;2</b>
<b>Efficiency</b>	<b>&gt;40%</b>
<b>Impedance</b>	<b>50 Ohm</b>
<b>Polarization</b>	<b>Linear</b>
<b>Gain</b>	<b>5G 3±1dBi</b>
B. Material & Mechanical Characteristics	
<b>Material of Radiator</b>	
<b>Cable Type</b>	<b>Φ1.13 Gray</b>
<b>Connector Type</b>	<b>First generation IPEX</b>
<b>Dimension</b>	
C. Environmental	
<b>Operation Temperature</b>	<b>- 20 °C ~ + 60 °C</b>
<b>Storage Temperature</b>	<b>- 40 °C ~ + 80 °C</b>

序号 NO	品名 Name	材料/规格 Material	颜色 Colour	数量 Amount	备注 Remark
①	ø1.13射频线 RF line 铜管 Copper tube	Cut编织带 Cut-Woven belt Cu/ø5.2*10	灰色 grey	1	
②	热缩管 pyrocondensation pipe	PE	银色 silver	1	
③	热缩管 pyrocondensation pipe	第一代 The third generation	黑色 black	1	
④	IPEX		金色 golden	1	



notes:  
注:

- 1、Standard \* is the key dimension, Dimensions not marked with tolerance shall be tested according to  $\pm 0.15$   
标准\*为重点尺寸, 未标公差尺寸按 $\pm 0.15$ 检测
- 2、Refer to drawing without dimension; Other dimensions are subject to actual matching;  
未标尺寸参考图纸; 其它尺寸以实配为准;
- 3、The product shall be free of oil, dust, burr, etc;  
产品不能有油污、虚焊等不良现象;
- 4、accord with ROHS  
符合ROHS

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Shenzhen Free Walk Technology Co. LTD

Third angle system	机种/Project	NM5415	Date	2022/12/21
0~10	±0.10	○	0.02	
10~20	±0.15	◎	0.03	
20~40	±0.20	⊥	0.02	
40~	±0.25	∇	0.04	
Do not measure the drawings	Location	W/A	0.02	

品名/Part Name	2.4G-Antenna	Date	2022/12/21
料号/Part NO	Z02-10189-001	Checked by	MD Gudog
客户料号 Customer P/N	360100236	RF	Li wen ke

## Test Equipment & Conditions

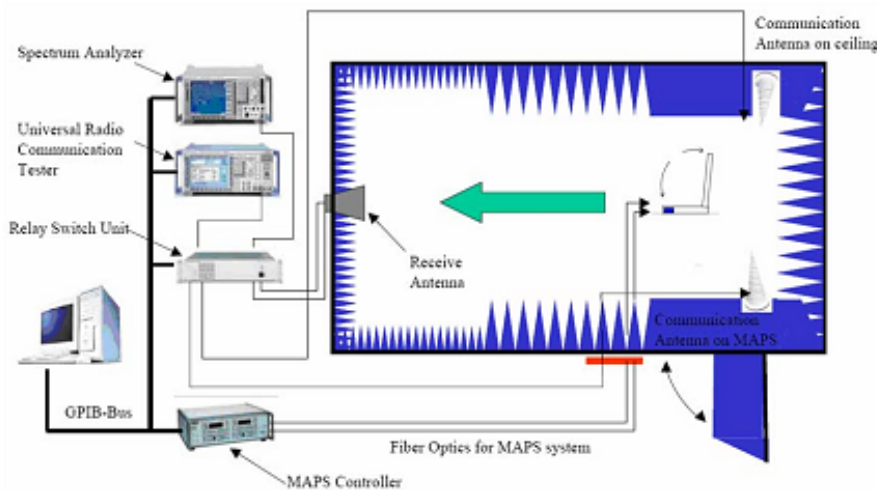
### 1. Network Analyzers :

Agilent 8753D 5071B

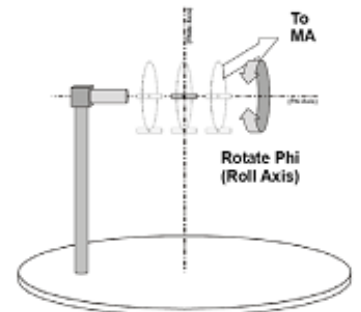
### 2. Communications Test Set:

Agilent 8960

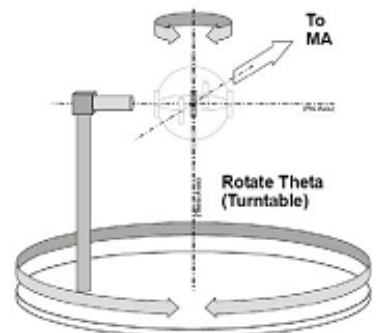
### 3. 3D Chamber Test System



(Testing by 3D anechoic chamber)

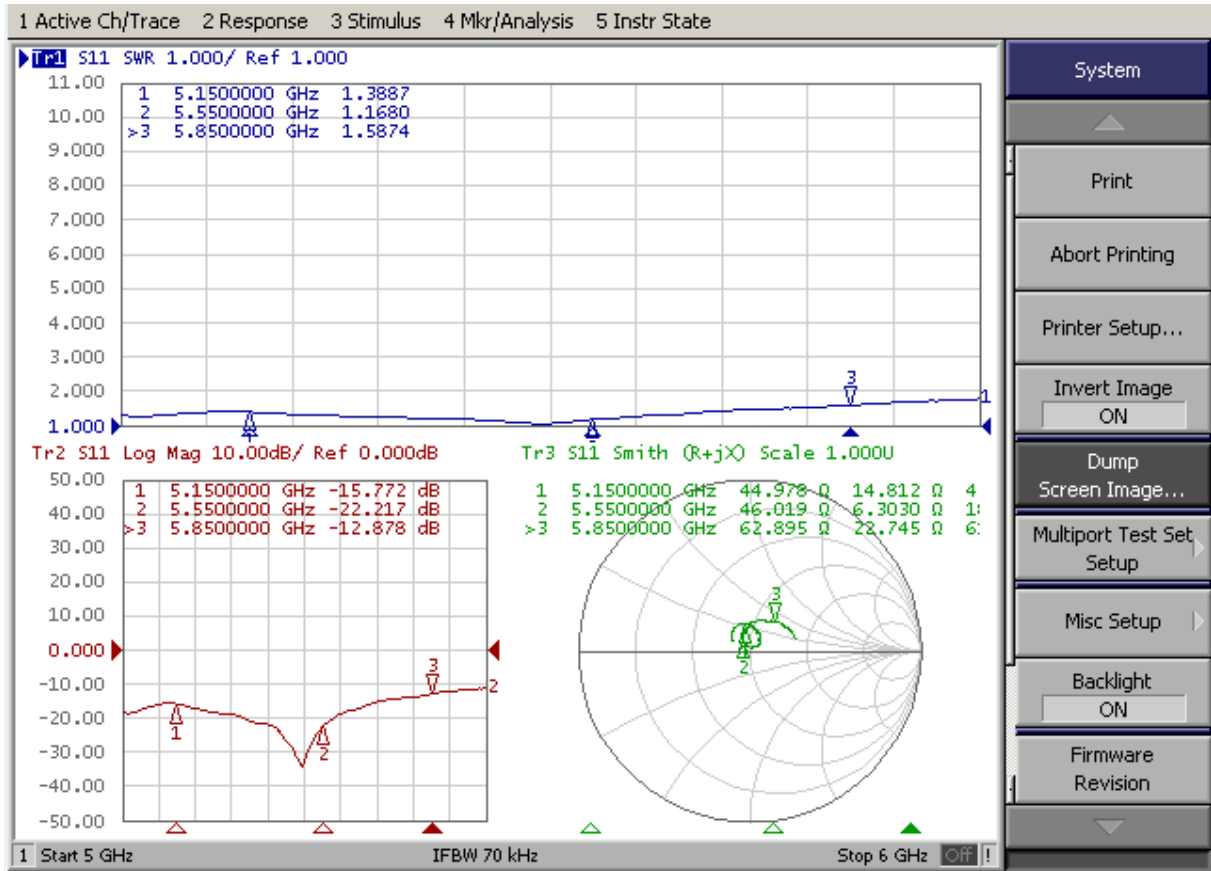


Phi axis test



Theta axis test

测试数据 Test Data



驻波比数据 SWR data

Freq/GHz	5.15	5.55	5.85
VSWR	1.3	1.1	1.5



效率&增益:

Efficiency&Gain

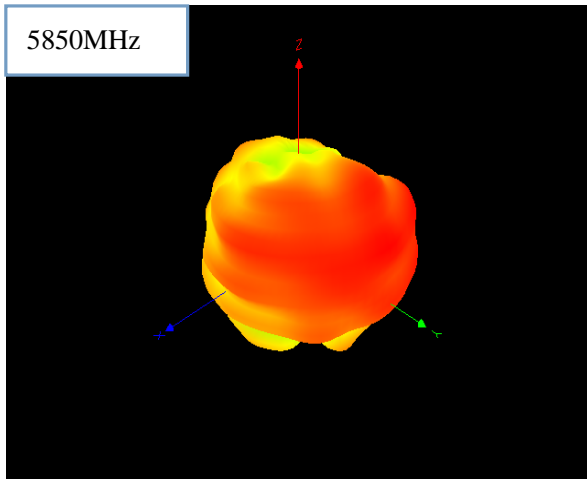
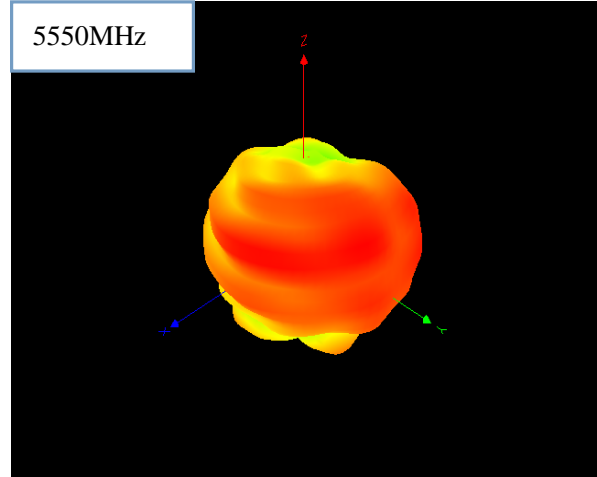
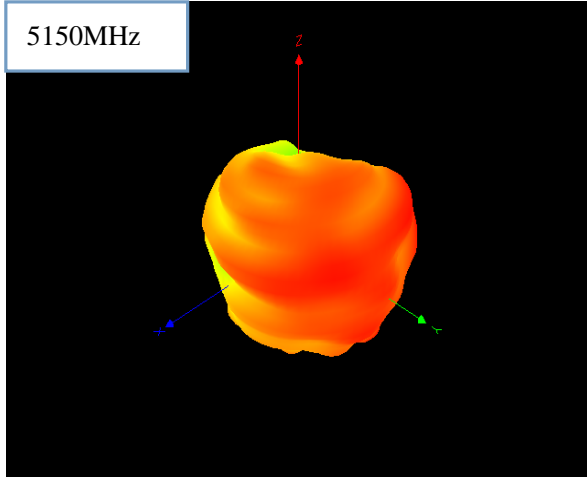
5.8G test data

Freq (MHz)	Effi (%)	Gain (dBi)
5150	69.33	3.56
5200	71.62	3.86
5250	68.72	3.55
5300	67.70	3.67
5350	67.30	3.44
5400	74.41	3.94
5450	71.62	3.56
5500	71.28	3.08
5550	69.98	2.90
5600	79.33	3.67
5650	60.31	2.20
5700	65.68	2.26
5750	62.28	2.33
5800	67.14	2.56
5850	65.16	2.26



方向图 (3D)

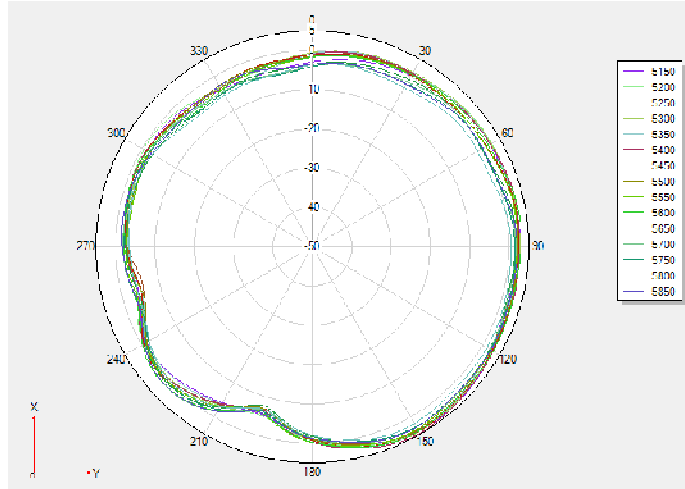
Directional map (3D)



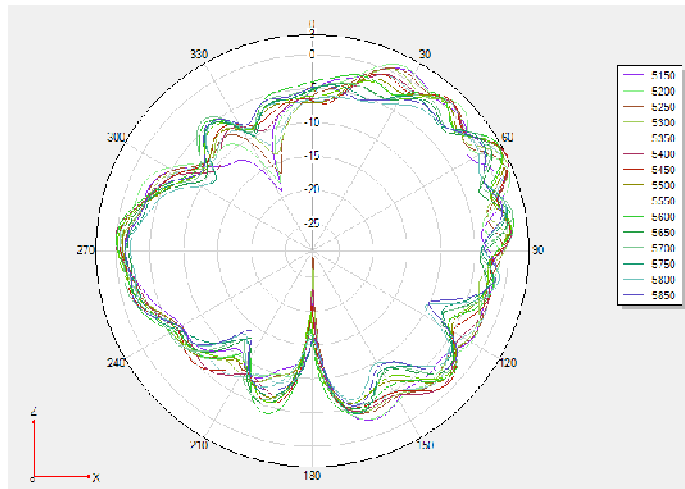
方向图 (2D)

Directional map (2D)

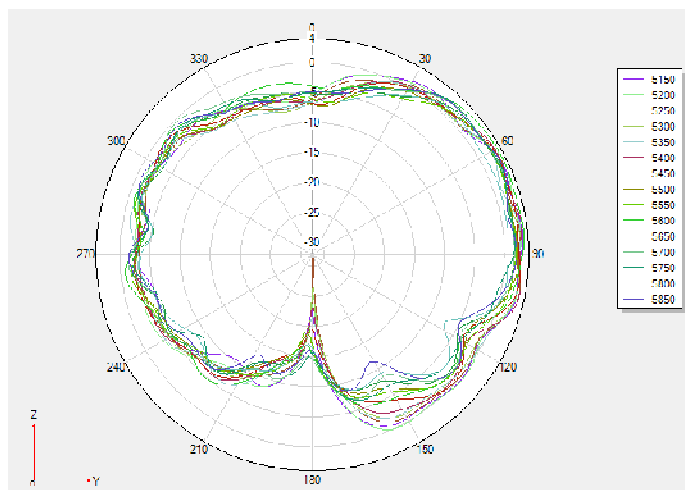
XOY surface



ZOX surface



ZOY surface



## 可靠性试验报告

### Reliability test report

#### 维持力 Sustaining power

试验/试验项目 Test/test item	维持力 Sustaining power				检验单号 Inspection order number
产品名称/规格 Product name/specification	5G 内置天线(L=60mm) 5G built-in antenna (L=60mm)				试验数量 (Number of tests) : 5 PCS
送检日期 (Inspection date) : 2021-11-16					完成日期 (Completion Date) : 2021-11-17
试验/检验设备 (Test/inspection equipment) :					
1. 拉力测试计 (Tensile tester)					
试验/检验条件 (Test/inspection conditions) :					
1. 温度 (Temperature) : 18-25℃					
2. 湿度 (Humidity) ≤65%RH					
试验/检验结果 (Test/inspection results) :					
项目 project 项目 conditi	端子与线缆之间的维持力 (Holding force between terminal and cable) ≥1kgf				
测试次数Testing frequency	1	2	3	4	5
测试结果Test Results	1.07	1.13	1.12	1.08	1.11
备注 (Remarks) :					
试验/检验判定 (Test/inspection judgment) :					
<input checked="" type="checkbox"/> 合格 (PASS) <input type="checkbox"/> 不合格 (NG) <input type="checkbox"/> 不作判定 (No judgment)					
测试 (test) : 梁艺叶 (Yiye Liang)			审核 (Review) : 黄俊 (Jun Huang)		

**恒温恒湿试验 Constant temperature and humidity test**

试验/试验项目 Test/test item	<b>恒温恒湿试验</b> Constant temperature and humidity test	检验单号 Inspection order number
产品名称/规格 Product name/specification	5G 内置天线(L=60mm) 5G built-in antenna (L=60mm)	试验数量 (Number of tests) : 5PCS
送检日期 (Inspection date) : 2021-11-16		完成日期 (Completion Date): 2021-11-17
试验/检验设备 (Test/inspection equipment) :		
1. 可编程恒温恒湿试验箱 (Programmable constant temperature and humidity experiment box)		
2. 8753ES 网络分析仪 (8753ES network analyzer)		
试验/检验条件 (Test/inspection conditions) :		
1. 恒温-30℃ 下试验 12H (Test at constant temperature -30℃ for 12H)		
2. +65℃ 65~70%RH 试验 12H, 共 24 小时: (+65℃ 65~70%RH test for 12H, a total of 24 hours;)		
<b>试验结果</b> test results		
判定标准 (judgement standard) :		
1、金属表面镀层应无剥落, 裂痕起皱, 分离等; 非金属部分不应发生变色, 开裂, 变形, 脱胶等不良; The metal surface coating should be free from peeling, cracks, wrinkles, separation, etc.; non-metal parts should not be discolored, cracked, deformed, or degummed;		
2、电气测试符合标准要求: 电压驻波比测试合格 The electrical test meets the standard requirements: the voltage standing wave ratio test is qualified		



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检验项目 Test items	恒温恒湿试验前 Before constant temperature and humidity test	恒温恒湿试验后 After constant temperature and humidity test	缺陷描述 Defect description	判定结果 judgement result
外观 Exterior	外观无变色开裂、变形、脱胶 No discoloration, cracking, deformation or degumming in appearance	外观无变色开裂、变形、脱胶 No discoloration, cracking, deformation or degumming in appearance	无 no	合格 PASS
电性能 Electrical properties	天线电压驻波比测试合格 The antenna voltage standing wave ratio test is qualified	天线电压驻波比测试合格 The antenna voltage standing wave ratio test is qualified	无 no	合格 PASS
试验/检验判定 (Test/inspection judgment) : <input checked="" type="checkbox"/> 合格 (PASS) <input type="checkbox"/> 不合格 (NG) <input type="checkbox"/> 不作判定 (No judgment)				
测试 (test) : 梁艺叶 (Yiye Liang)      审核 (Review) : 黄俊 (Jun Huang)				

## 高低温冷热冲击 High and low temperature shock

试验/试验项目 Test/test item	高低温冷热冲击 High and low temperature shock	检验单号 Inspection order number
产品名称/规格 Product name/specifica tion	5G 内置天线(L=60mm) 5G built-in antenna (L=60mm)	试验数量 (Number of tests) : 5PCS
送检日期 (Inspection date) : 2021-11-16		完成日 (Completion Date) : 2021-11-17
试验/检验设备(Test/inspection equipment): 1. 高低温交变湿热箱(High and low temperature alternating hot and humid box) 2. 8753ES 网络分析仪(8753ES network analyzer)		
试验/检验条件(Test/inspection conditions): -40°C (2H) ---间隔 80°C (2H) , 6 次循环, 共 24 小时 -40° C (2H) --- interval 80° C (2H), 6 cycles, 24 hours in total		
<b>试验结果</b> <b>test results</b>		
判定标准(judgement standard): 1、金属表面镀层应无剥落, 裂痕起皱, 分离等; 非金属部分不应发生变色, 开裂, 变形, 脱胶等不良; The coating on the metal surface should be free from peeling, cracks, wrinkles, separation, etc.; non-metal parts should not be discolored, cracked, deformed, or degummed; 2、电气测试符合标准: 电压驻波比测试合格。 Electrical test meets the standard: the voltage standing wave ratio test is qualified		



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Shenzhen Free Walk Communication Technology Co. LTD

检验项目 Test items	高低温冷热冲击试验前 Before high and low temperature thermal shock test	高低温冷热冲击试验后 After high and low temperature thermal shock test	缺陷描述 Defect description	判定结果 judgement result
外观 Exterior	外观无变色开裂、变形、脱胶 No discoloration, cracking, deformation or degumming in appearance	外观无变色开裂、变形、脱胶 No discoloration, cracking, deformation or degumming in appearance	无 no	合格 PASS
电性能 Electrical properties	天线电压驻波比测试合格 The antenna voltage standing wave ratio test is qualified	天线电压驻波比测试合格 The antenna voltage standing wave ratio test is qualified	无 no	合格 PASS
试验/检验判定 (Test/inspection judgment) : <input checked="" type="checkbox"/> 合格 (PASS) <input type="checkbox"/> 不合格 (NG) <input type="checkbox"/> 不作判定 (No judgment)				
测试 (test) : 梁艺叶 (Yiye Liang)      审核 (Review) : 黄俊 (Jun Huang)				

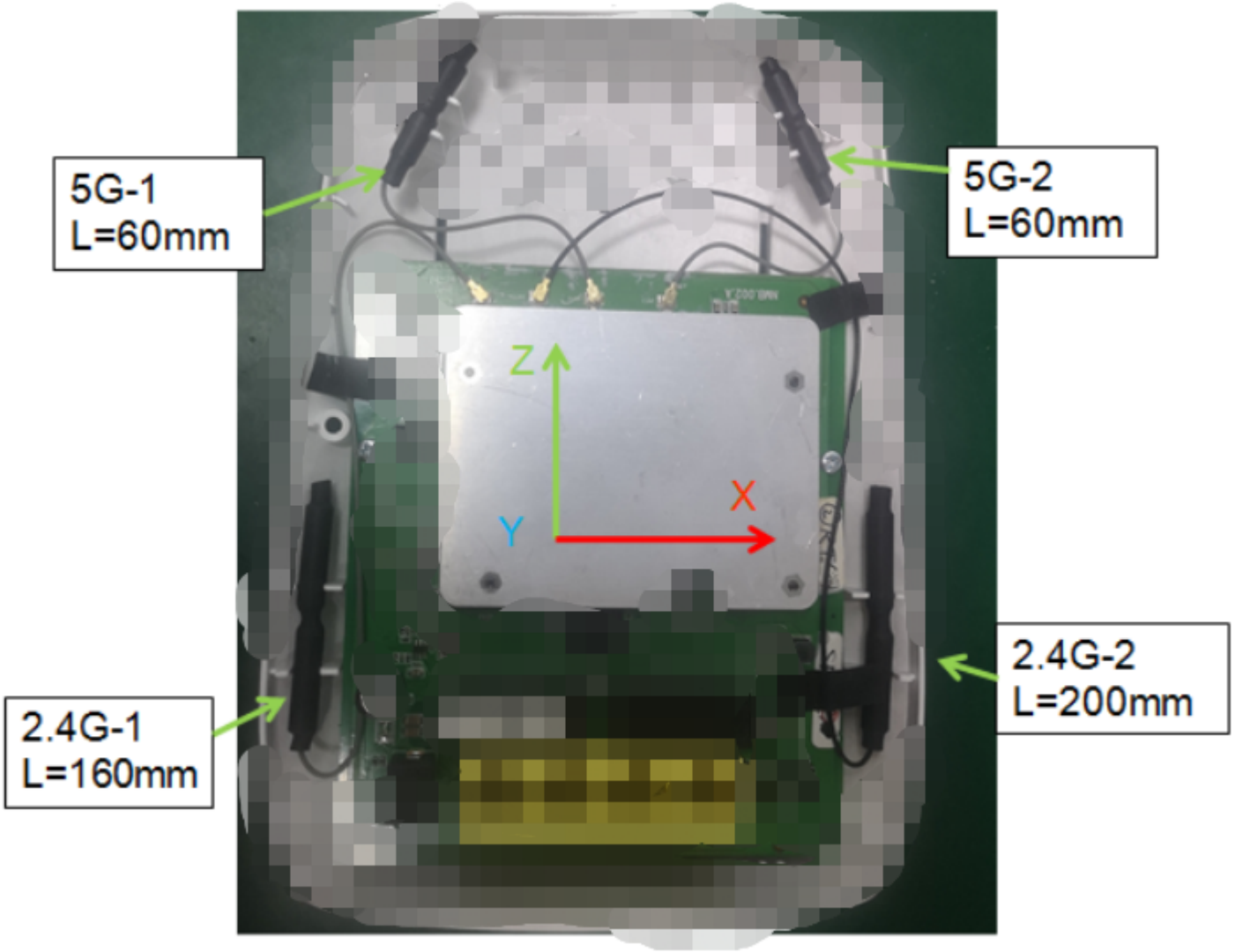
**盐雾测试 Salt spray test**

试验/试验项目 Test/test item	<b>盐雾测试</b> <b>Salt spray test</b>	检验单号 Inspection order number
产品名称/规格 Product name/specification	5G 内置天线(L=60mm) 5G built-in antenna (L=60mm)	试验数量 (Number of tests) : 5PCS
送检日期 (Inspection date) : 2021-11-16		完成日 (Completion Date) : 2021-11-17
试验/检验设备 (Test/inspection equipment): 1. HL-60-SS 盐雾测试仪 (HL-60-SS Salt Spray Tester)		
试验/检验条件 (Test/inspection conditions): 1. 盐雾箱内温度为 35±2℃; 试验室温度 22~30℃ The temperature in the salt spray box is 35±2℃; the temperature in the laboratory is 22~30℃ 2. 盐雾沉降速度经 24H 喷雾后每 80cm 面积为 1-2ML/h 氯化钠浓度为 50±10g/L, PH 值为 6.5/7.2 The sedimentation rate of the salt spray after 24H spraying is 1-2ML/h per 80cm area, the sodium chloride concentration is 50±10g/L, and the PH value is 6.5/7.2		
试验/检验结果 (Test/inspection results): 合格 (PASS)		
样品编号 Sample serial number	评价等级 Rating	缺陷描述 Defect description
1	合格 (PASS)	
2	合格 (PASS)	
3	合格 (PASS)	
4	合格 (PASS)	
5	合格 (PASS)	
试验/检验判定 (Test/inspection judgment) : <input checked="" type="checkbox"/> 合格 (PASS) <input type="checkbox"/> 不合格 (NG) <input type="checkbox"/> 不作判定 (No judgment)		
测试 (test) : 梁艺叶 (Yiye Liang)      审核 (Review) : 黄俊 (Jun Huang)		



天线图片

Antenna Picture



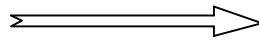
# Product packaging specification

Product Name: antenna

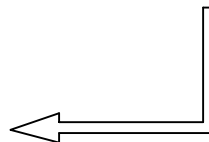
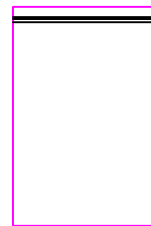
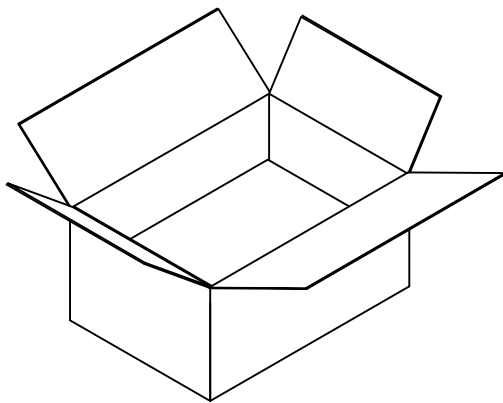
Rea : A00

Except for others

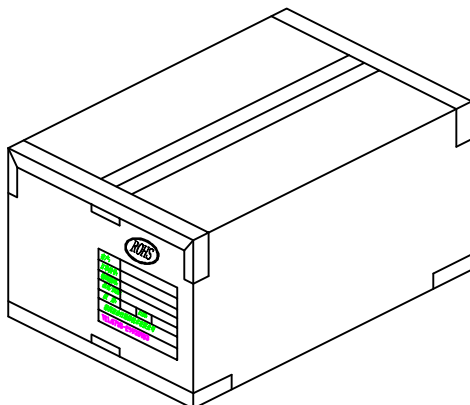
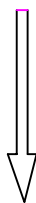
一: Antenna



二: Put them in PE bags, quantity is packed in (50 100pcs)  
Subject to the actual situation



三: Put the antenna in the carton



四: Seal the box and paste the production label and RoHS label on the outer box (actual situation shall prevail)