



深圳自由行通信技术有限公司
Shenzhen Free Walk Communication Technology Co. LTD

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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



Document change history

Form number: QR-ZYX-084 Version: A0

[illegible]

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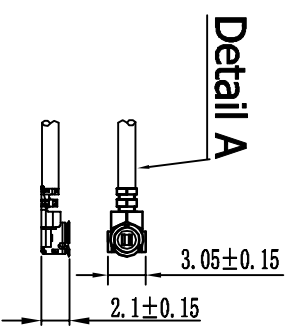
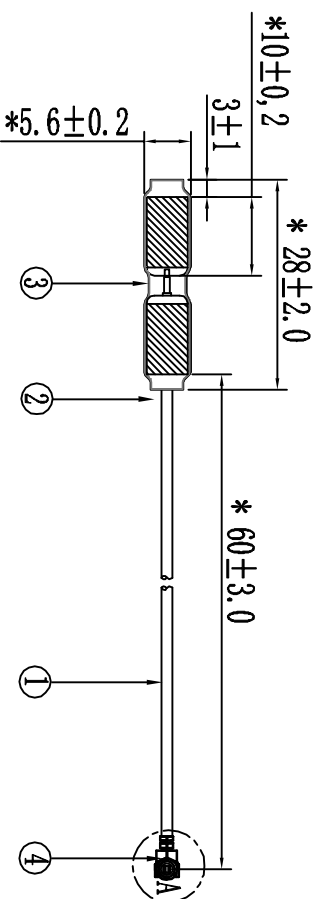
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The basic parameters

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

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 REline 铜管	Cut编织带 CutWoven belt	灰色 grey	1	
②	Copper tube 热缩管	Cu/ø5.2*10	银色 silver	1	
③	pyrocondensation pipe	PE	黑色 black	1	
④	IPEX	第一代 The third generation	金色 golden	1	



notes:
注:

- 1、Standard * is the key dimension, Dimensions not marked with tolerance shall be tested according to ± 0.15
标准*为重点尺寸, 未标公差尺寸按 ± 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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Third angle system	机种/Project	品名/Part Name	日期	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	N/A	0.02	
5	unit	mm	Scale	1:1
6	unit	mm	Scale	1:1
7	unit	mm	Scale	1:1
8	unit	mm	Scale	1:1

Checked by	MD	Li wen ke
RF	Li wen ke	

Test Equipment & Conditions

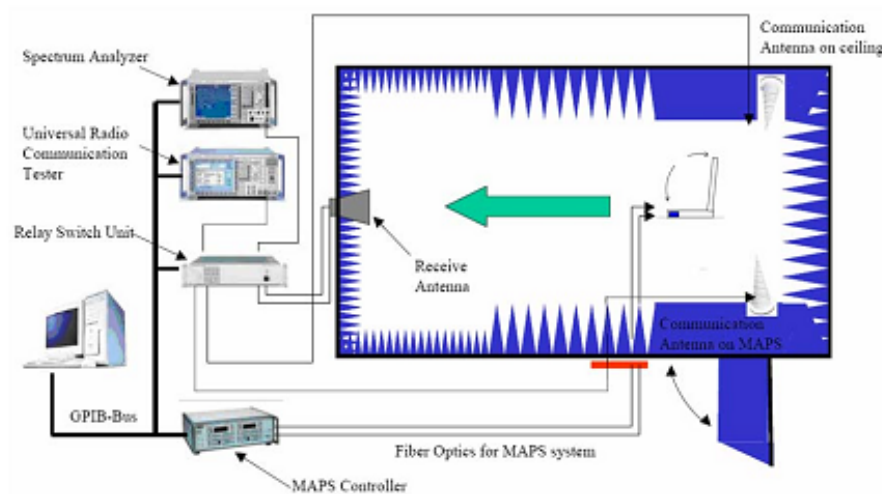
1. Network Analyzers :

Agilent 8753D 5071B

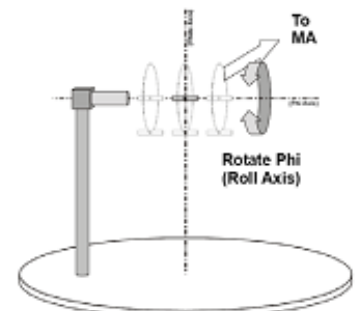
2. Communications Test Set:

Agilent 8960

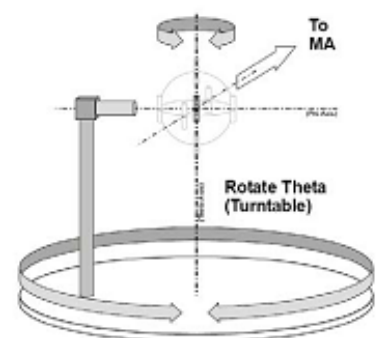
3. 3D Chamber Test System



(Testing by 3D anechoic chamber)

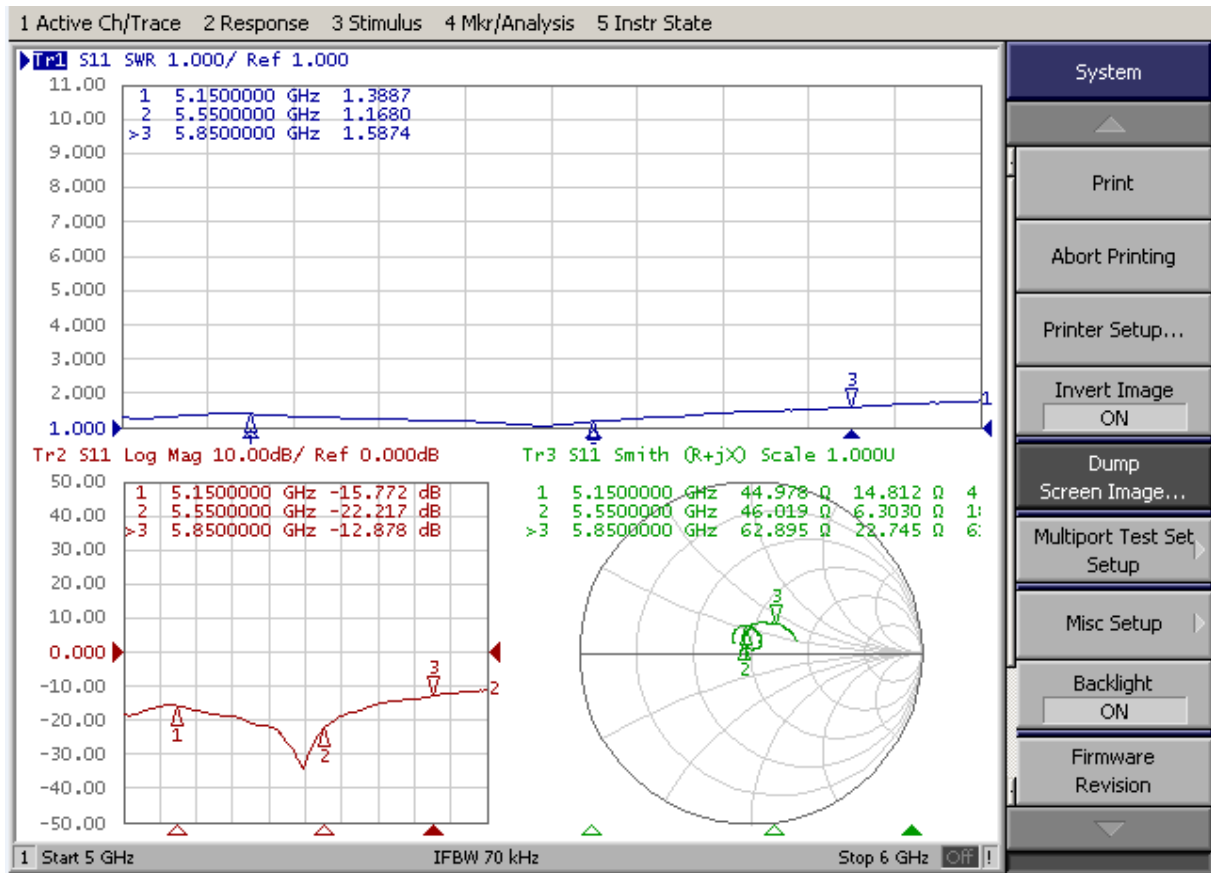


Phi axis test



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:

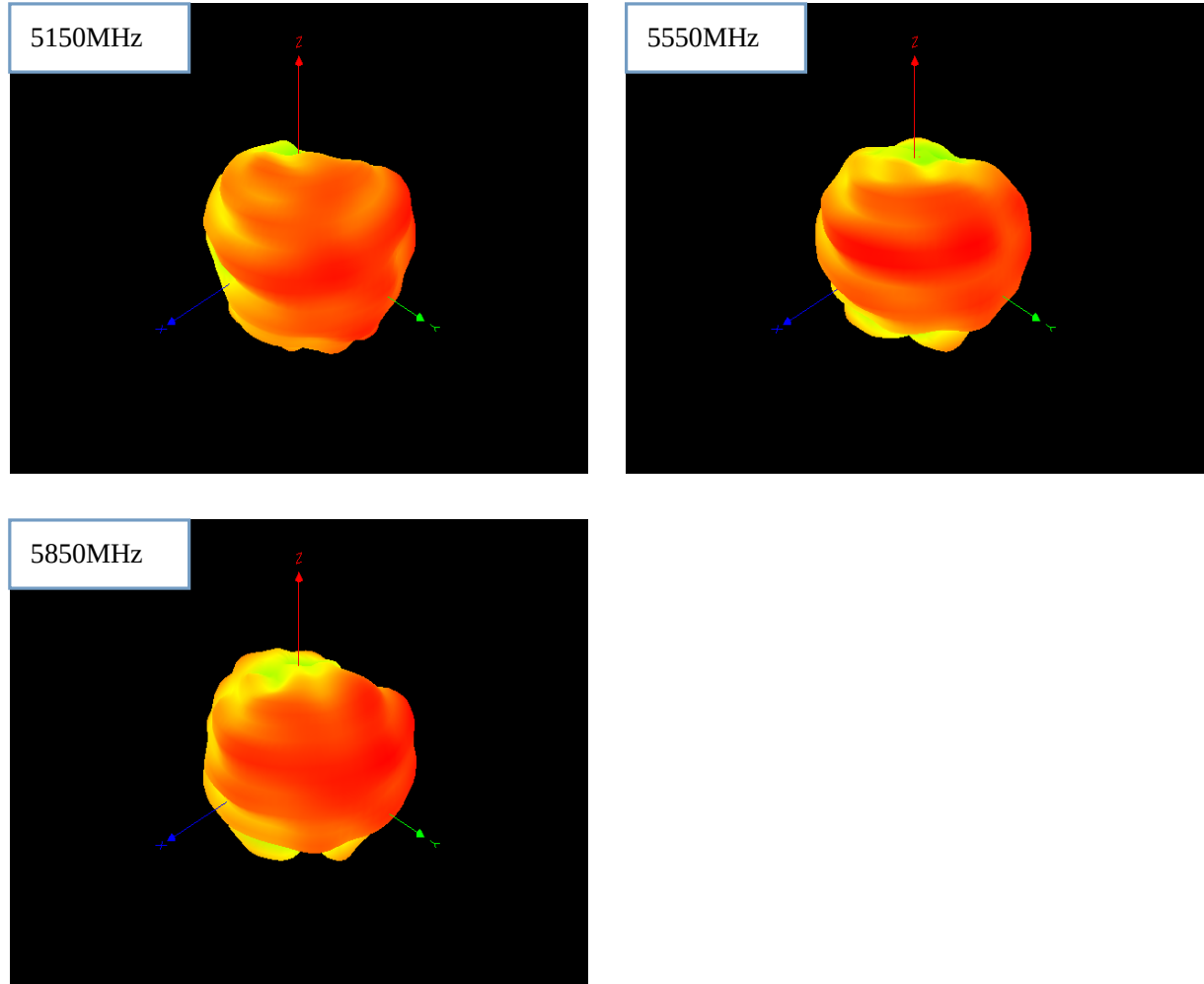
Efficiency&Gain

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)

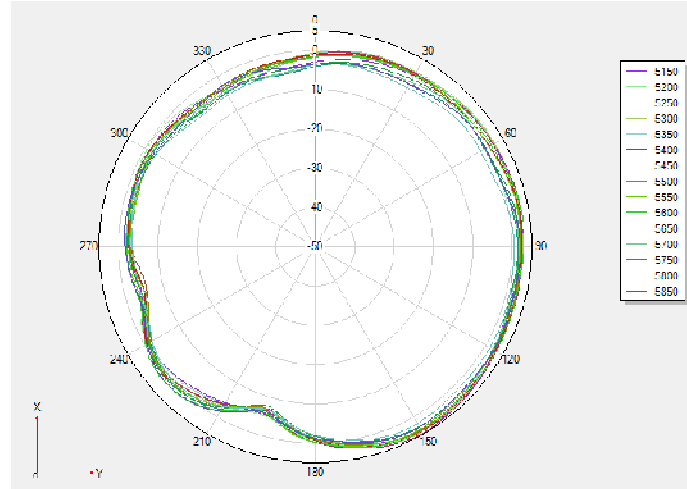
Directional map (3D)



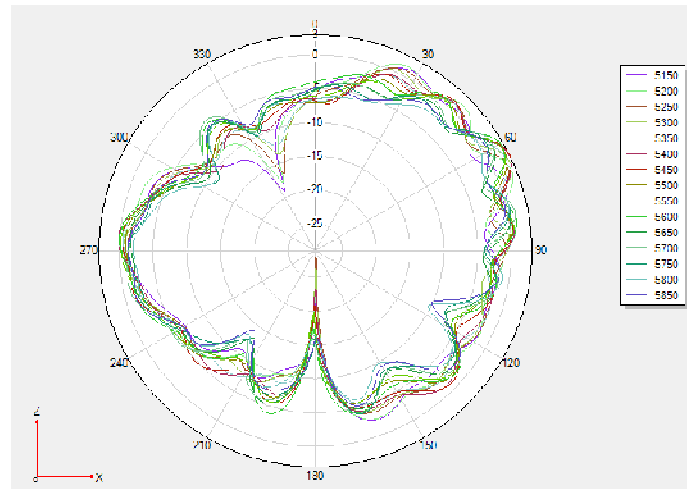
方向图 (2D)

Directional map (2D)

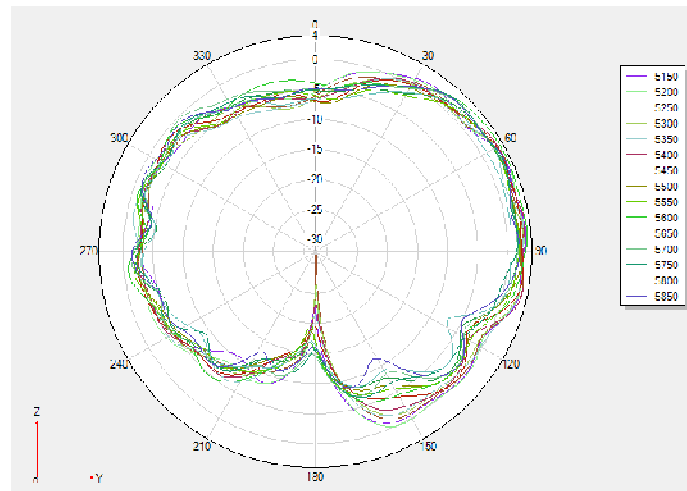
XOY surface



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) : ☒ 合格 (PASS) ☐ 不合格 (NG) ☐ 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	恒温恒湿试验 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;) ;		
试验结果 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) :
☒ 合格 (PASS) ☐ 不合格 (NG) ☐ 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/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. 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℃ (2H) ---间隔 80℃ (2H) , 6 次循环, 共 24 小时 -40° C (2H) --- interval 80° C (2H), 6 cycles, 24 hours in total		
试验结果 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 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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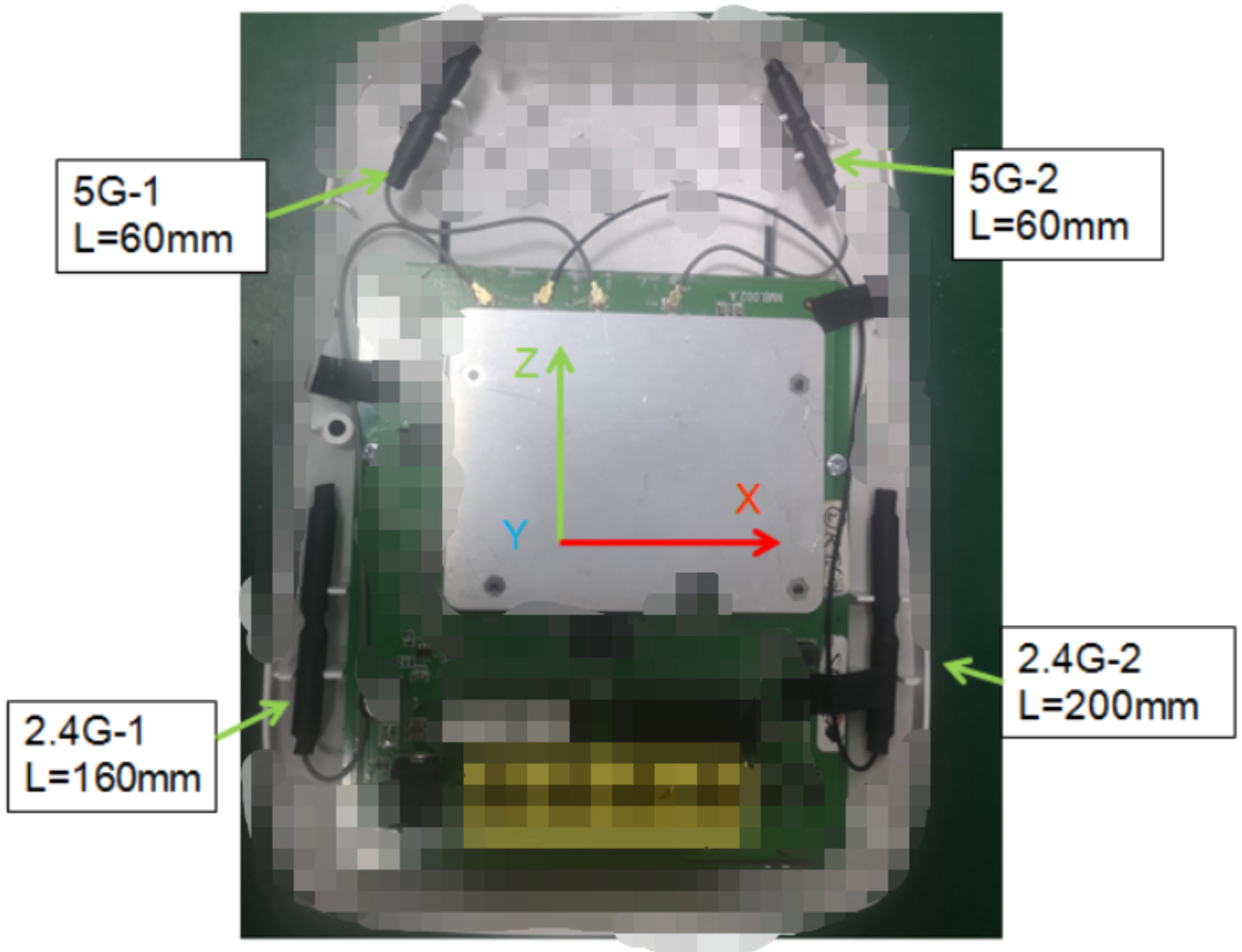
检验项目	高低温冷热冲击试验前	高低温冷热冲击试验后	缺陷描述	判定结果
Test items	Before high and low temperature thermal shock test	After high and low temperature thermal shock test	Defect description	judgement result
外观	外观无变色开裂、变形、脱胶	外观无变色开裂、变形、脱胶	无	合格
Exterior	No discoloration, cracking, deformation or degumming in appearance	No discoloration, cracking, deformation or degumming in appearance	no	PASS
电性能	天线电压驻波比测试合格	天线电压驻波比测试合格	无	合格
Electrical properties	The antenna voltage standing wave ratio test is qualified	The antenna voltage standing wave ratio test is qualified	no	PASS
试验/检验判定 (Test/inspection judgment) : ☒ 合格 (PASS) ☐ 不合格 (NG) ☐ 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	盐雾测试 Salt spray 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 (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 $35\pm 2^{\circ}\text{C}$; 试验室温度 $22\sim 30^{\circ}\text{C}$ The temperature in the salt spray box is $35\pm 2^{\circ}\text{C}$; the temperature in the laboratory is $22\sim 30^{\circ}\text{C}$ 2. 盐雾沉降速度经 24H 喷雾后每 80cm 面积上为 1-2ML/h 氯化钠浓度为 $50\pm 10\text{g/L}$, 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 $50\pm 10\text{g/L}$, 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) : ☒ 合格 (PASS) ☐ 不合格 (NG) ☐ 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

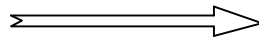
page: 1 of 1

Product Name: antenna

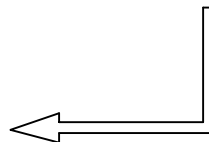
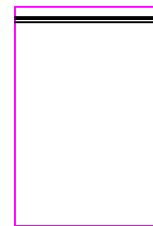
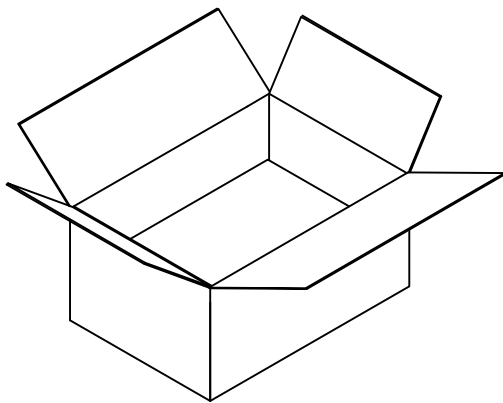
Rea : A00

Except for others

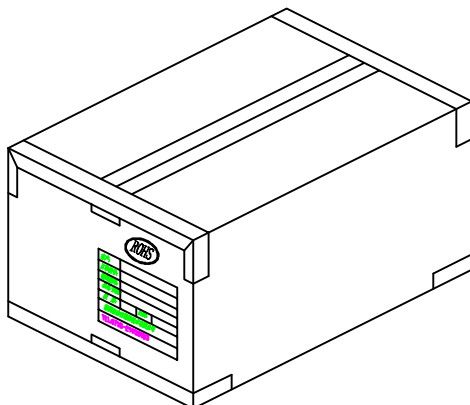
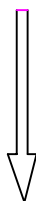
一: Antenna



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)