



# 惠州硕贝德无线科技股份有限公司

## Huizhou Speed Wireless Technology Co.,Ltd

# APPROVAL SHEET

|                          |                              |             |
|--------------------------|------------------------------|-------------|
| CUSTOMER NAME            | Nokia                        |             |
| CUSTOMER P/N             | P624789                      |             |
| PART NAME                | Dual-band WiFi Antenna       |             |
| P/ N                     | F-0Y-55-0013-000-00          |             |
| APPROVAL REV.            | A0                           |             |
| DELIVERY DATE            | 8 <sup>th</sup> , July, 2022 |             |
| PREPARED BY              | Zhao Ma                      |             |
| CHECKED BY               | Lei Xu                       |             |
| APPROVED BY              |                              |             |
| <b>Customer Approved</b> |                              |             |
| Approved By              | Checked By                   | Prepared By |
|                          |                              |             |

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## 1 Project Overview

This document is the specifications of the dual-band WiFi antenna. The antenna is suitable for outdoor use, product photo is shown as below.



## 2 Antenna Specification

| Electrical Specifications |                        |
|---------------------------|------------------------|
| Frequency Range           | 2400-2500/5150-5850MHz |
| VSWR                      | <1.92                  |
| Input Impedance           | 50 $\Omega$            |
| Direction                 | All                    |
| Gain                      | 2dBi                   |
| Mechanical Specifications |                        |
| Antenna Color             | Black                  |
| Input connector           | RP-SMA                 |
| Length of antenna         | 68 mm                  |
| Working Temperature       | -40°C~+85°C            |
| Working Humidity          | 20%~80%                |
| UL Rating                 | UL 94V-0               |

## 3 Test Environment

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The measuring equipment for antenna return loss, voltage standing wave ratio and isolation is Keysight E5071C vector network analyzer, shown as below:



Keysight E5071C vector network analyzer

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The efficiency, gain, and pattern of the antenna are all tested in Chamber Satimo. 64 probes are used to electronically scan the antenna's radiation performance, collect data, and then analyze data through computer, which can provide antenna testing from 400MHz to 6.0GHz frequency.



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## 4 Test Results



2D、3D(2.4G/5G)test data:

| Frequency(MHz ) | Efficiency (%) | Gain.(dBi) |
|-----------------|----------------|------------|
| 2400MHz         | 72.28          | 2.79       |
| 2410MHz         | 78.34          | 2.72       |
| 2420MHz         | 71.61          | 2.91       |
| 2430MHz         | 73.45          | 2.28       |
| 2440MHz         | 72.61          | 2.58       |
| 2450MHz         | 79.62          | 2.43       |
| 2460MHz         | 74.82          | 3.03       |
| 2470MHz         | 70.79          | 2.07       |
| 2480MHz         | 71.45          | 2.49       |
| 2490MHz         | 76.38          | 2.09       |
| 2500MHz         | 74.13          | 2.78       |
| 5150MHz         | 73.58          | 1.76       |
| 5250MHz         | 70.53          | 1.97       |
| 5350MHz         | 71.61          | 2.07       |

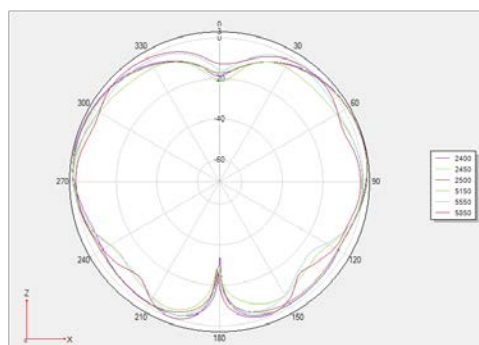
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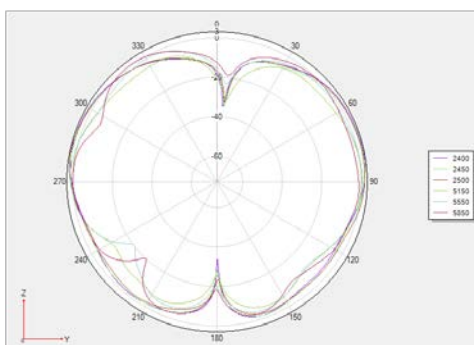
# Confidential Information

|         |       |      |
|---------|-------|------|
| 5450MHz | 72.6  | 2.15 |
| 5550MHz | 70.81 | 1.97 |
| 5650MHz | 77.16 | 2.03 |
| 5750MHz | 75.88 | 1.96 |
| 5850MHz | 72.95 | 1.77 |

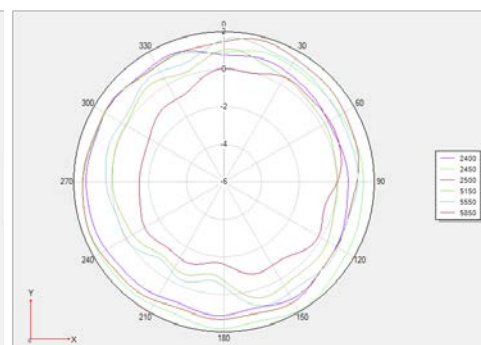
Phi 0 2D:



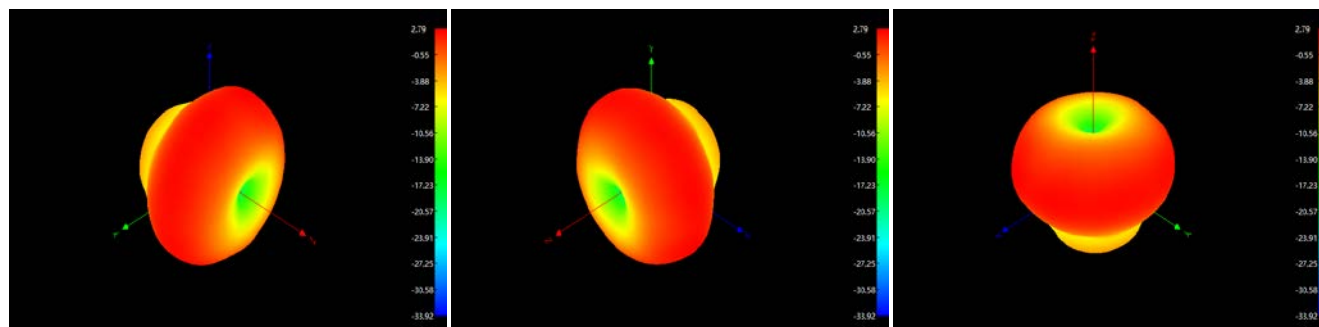
Phi 90 2D:



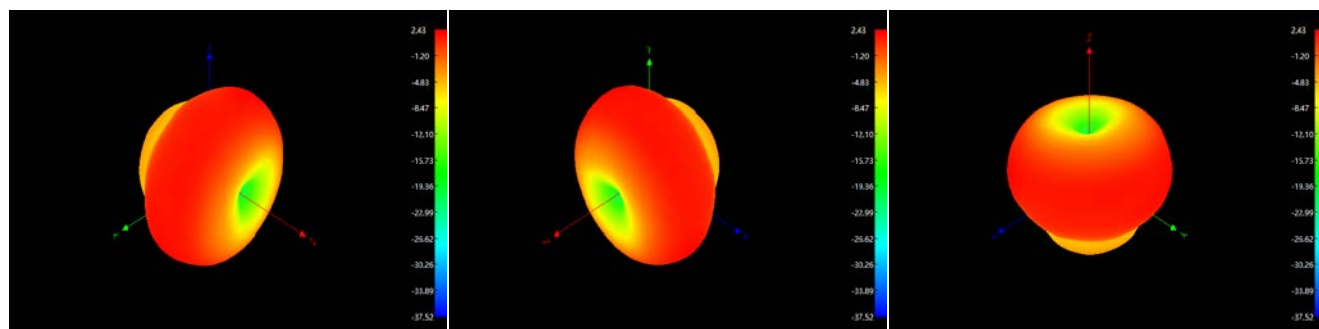
Theta 90 2D:



3D 2400:



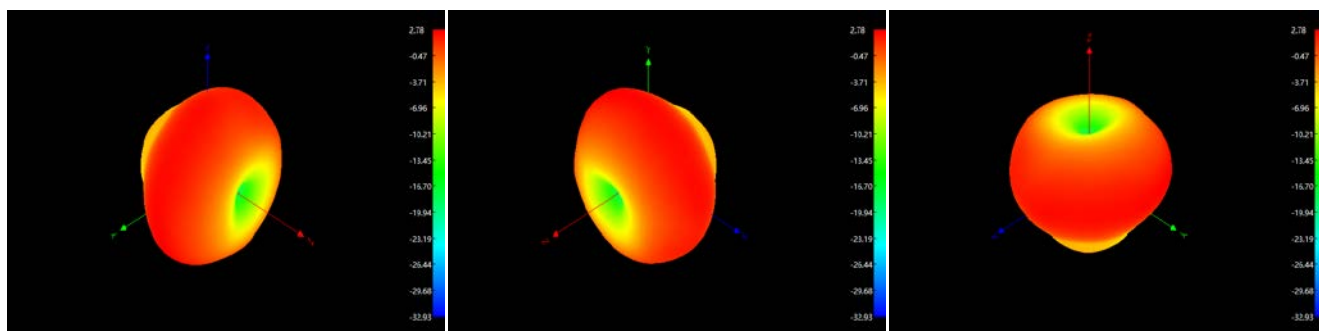
3D 2450:



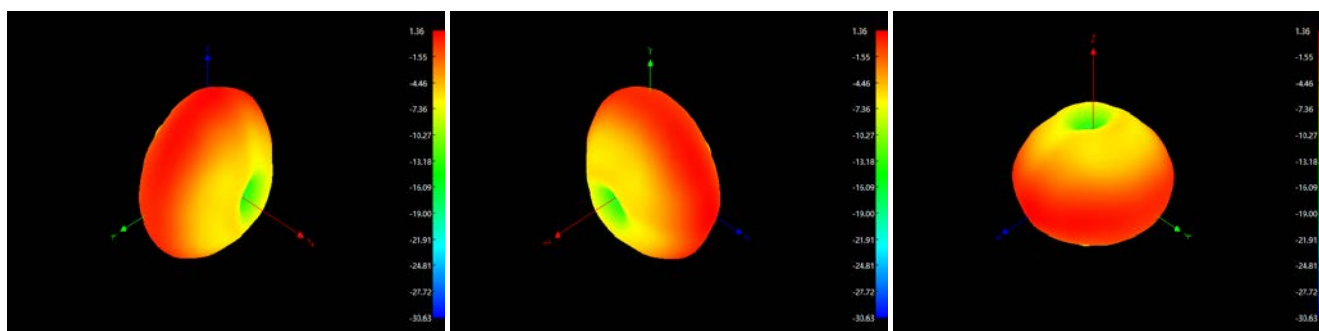
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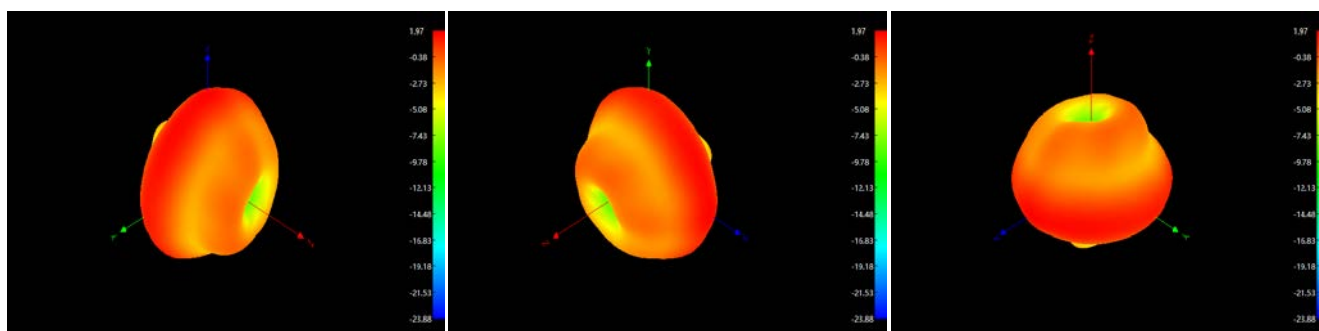
3D 2500:



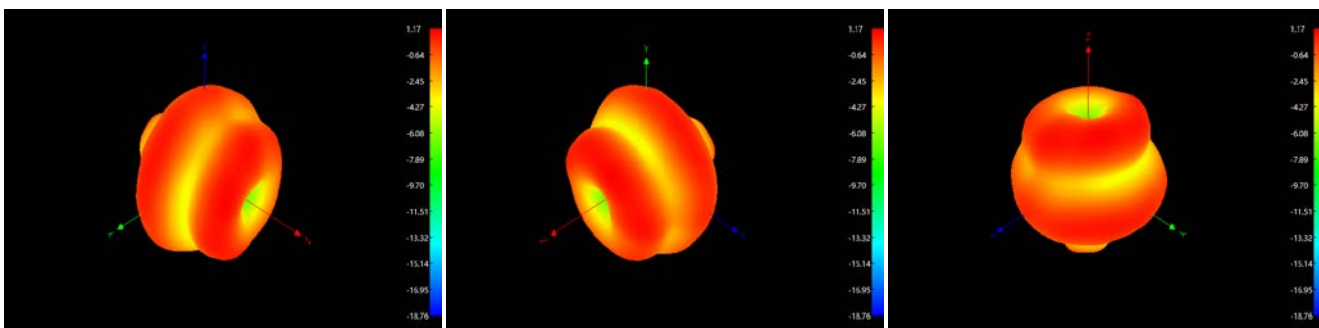
3D 5150:



3D5550:



3D5850:



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## 5 Reliability Test Standard

| item                        | test condition                                                                                                                                                                                                                                                   | standard                                                                                           |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| storage environment         | 1. temperature ranges from -20℃ to +70℃<br>2. relative humidity is 45%-85%<br>3. air pressure is 86kpa-106kpa                                                                                                                                                    | The electrical and mechanical properties are OK                                                    |
| thermocycling               | Five cycles were carried out between 70℃ and -20℃, and then 1-2H under normal conditions to check the appearance quality.                                                                                                                                        | The dimensions shall meet the requirements and shall meet the mechanical and electrical properties |
| Temperature / Humidity test | The relative humidity was 95±3%, and the test temperature was 40℃. After 2H of action, the electrical performance was measured within 5min after the sample was taken out, and the appearance quality of the sample was checked for 1-2h under normal conditions | The dimensions shall meet the requirements and shall meet the mechanical and electrical properties |
| vibration test              | Vibration frequency range 10-55Hz, displacement amplitude: 0.35mm, acceleration amplitude: 50.0M/S, frequency sweep cycle number: 30                                                                                                                             | The electrical and mechanical properties are OK                                                    |
| drop test                   | 1M high in the air and fall three times in the direction of mutually perpendicular axes                                                                                                                                                                          | The electrical and mechanical properties are OK                                                    |
| waterproof test             | Meet the IP65 test requirements                                                                                                                                                                                                                                  | The electrical and mechanical properties are OK                                                    |

## 6 Structure Diagram

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| <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>REV</p> <p>DATE</p> <p>DESCRIPTION</p> <p>NAME</p>                                                    |      |     |      |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------|-----|------|---|--------|------|-----|-----|------|----------|-----|------|-----|-----|---------|-----|-----|-----|-----|---------|-----|-----|-----|-----|---------|-----|-----|-----|-----|---------|-----|-----|-----|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>技术要求:</p> <p>1. 成品须100%测试导通OK;</p> <p>2. “*”为重点标注尺寸, 未注公差满足公差表。</p> <p>3. 产品表面要求无流痕、缺胶、缩水、油污、气纹等外观不良现象。</p> <p>4. 产品需满足IP65要求: 防火等级需达到UL 94V-0</p> <p>5. 符合我司《产品中有毒有害物质管理标准》包括但不限于欧盟RoHS2.0。</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>母针</p> <p>*68±2.0</p> <p>*9.1±0.15</p> <p>*φ8.1±0.3</p> <p>司螺</p> <p>8.0</p>                          |      |     |      |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| <p>频率范围 (FREQUENCY RANGE)</p> <p>增益 (Gain)</p> <p>电压驻波比 (VSWR)</p> <p>极化 (Polarization)</p> <p>最大功率 (Max Power rating)</p> <p>特性阻抗 (Impedance)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>2400-2500/150-5850MHz</p> <p>2.0dBi</p> <p>&lt;1.92</p> <p>Linear/Vertical</p> <p>50W</p> <p>50欧姆</p> |      |     |      |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| <p>公差表</p> <table border="1"> <thead> <tr> <th>公差</th> <th>M</th> <th>S</th> <th>P</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>0-0.05</td> <td>0.05</td> <td>0.1</td> <td>0.1</td> <td>0.05</td> </tr> <tr> <td>0.05-0.1</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.1</td> </tr> <tr> <td>0.1-0.2</td> <td>0.2</td> <td>0.3</td> <td>0.3</td> <td>0.2</td> </tr> <tr> <td>0.2-0.3</td> <td>0.3</td> <td>0.5</td> <td>0.5</td> <td>0.3</td> </tr> <tr> <td>0.3-0.5</td> <td>0.5</td> <td>0.8</td> <td>0.8</td> <td>0.5</td> </tr> <tr> <td>0.5-1.0</td> <td>1.0</td> <td>1.5</td> <td>1.5</td> <td>1.0</td> </tr> </tbody> </table> | 公差                                                                                                       | M    | S   | P    | C | 0-0.05 | 0.05 | 0.1 | 0.1 | 0.05 | 0.05-0.1 | 0.1 | 0.15 | 0.2 | 0.1 | 0.1-0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2-0.3 | 0.3 | 0.5 | 0.5 | 0.3 | 0.3-0.5 | 0.5 | 0.8 | 0.8 | 0.5 | 0.5-1.0 | 1.0 | 1.5 | 1.5 | 1.0 | <p>零件名称 (PART NAME)</p> <p>双频室外VWF天线</p> <p>单位 (UNIT)</p> <p>mm</p> <p>比例 (SCALE)</p> <p>1:1</p> <p>版本 (REV)</p> <p>A0</p> <p>幅面 (SIZE)</p> <p>A4</p> <p>产品规格 (PRODUCT SPECIFICATION)</p> <p>产品型号 (PRODUCT NO.)</p> <p>F-0V-55-0013-000-00</p> <p>第1页, 共1页</p> <p>第1页日期 (ORIGINAL DATE)</p> <p>2023.08.01</p> <p>Speed Wireless Technology Co., Ltd.</p> |
| 公差                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | M                                                                                                        | S    | P   | C    |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0-0.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.05                                                                                                     | 0.1  | 0.1 | 0.05 |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0.05-0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.1                                                                                                      | 0.15 | 0.2 | 0.1  |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0.1-0.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.2                                                                                                      | 0.3  | 0.3 | 0.2  |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0.2-0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.3                                                                                                      | 0.5  | 0.5 | 0.3  |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0.3-0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.5                                                                                                      | 0.8  | 0.8 | 0.5  |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |
| 0.5-1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.0                                                                                                      | 1.5  | 1.5 | 1.0  |   |        |      |     |     |      |          |     |      |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |         |     |     |     |     |                                                                                                                                                                                                                                                                                                                                                          |

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## 7 ROHS Material Control Report

| ROHS material control report                                                                                                                                                                                                                                                                                                   |                                 |                              |                   |                   |               |       |    |                  |     |      |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------|-------------------|-------------------|---------------|-------|----|------------------|-----|------|-----------------------------|
| This is to certify that the components delivered to your company, the raw materials used in the auxiliary materials, and the additives used in the production engineering comply with the environmental protection requirements of the RoHS Directive on Limiting the Use of Hazardous Substances (RoHS Directive 2011/65/EC). |                                 |                              |                   |                   |               |       |    |                  |     |      |                             |
| The components of components, raw materials used for auxiliary materials, packaging materials and additives used in the production process are reported as follows:                                                                                                                                                            |                                 |                              |                   |                   |               |       |    |                  |     |      |                             |
| 组件材料<br>名称<br>+<br>/Part<br>Name                                                                                                                                                                                                                                                                                               | 组成材料<br>Material<br>Composition | ICP 报告编<br>号<br>ICP report # | 测试机构<br>Test Org. | 测试时间<br>Test Date | 有害 物质 含量(ppm) |       |    |                  |     |      | 是否合格<br>PASS or<br>NOT PASS |
|                                                                                                                                                                                                                                                                                                                                |                                 |                              |                   |                   | Cd            | Pb    | Hg | Cr <sup>6+</sup> | PBB | PBDE |                             |
| cable                                                                                                                                                                                                                                                                                                                          | Teflon<br>coaxial<br>cable      | SZHEC2102<br>641803          | SGS               | 2021/8/23         | ND            | ND    | ND | ND               | ND  | ND   | PASS                        |
| plastic                                                                                                                                                                                                                                                                                                                        | TPE                             | TSNEC2101<br>417101          | SGS               | 2021/7/20         | ND            | ND    | ND | ND               | ND  | ND   | PASS                        |
|                                                                                                                                                                                                                                                                                                                                | Aldary                          | CANEC2200<br>189312          | SGS               | 2022/1/12         | ND            | 27364 | ND | ND               | ND  | ND   | PASS                        |
| SMA-<br>connect                                                                                                                                                                                                                                                                                                                | plastic                         | SHAEC2118<br>528402          | SGS               | 2021/8/30         | ND            | ND    | ND | ND               | ND  | ND   | PASS                        |
|                                                                                                                                                                                                                                                                                                                                | Alloy<br>plating                | SZHEC2103<br>405301          | SGS               | 2021/11/12        | ND            | 24    | ND | ND               | ND  | ND   | PASS                        |
| copper<br>pipe                                                                                                                                                                                                                                                                                                                 | brass<br>strip                  | SHAEC2127<br>949504          | SGS               | 2021/12/30        | ND            | 35    | ND | ND               | ND  | ND   | PASS                        |

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