



## Product Specification

Customer Name: Shenzhen Hanfeng Electronics Co., Ltd

Project Name: 2.4G Copper tube antenna

Product Spec:

REV: ZK-2.4G-1.13-IPEX1-72

2.4G Copper tube antenna, L=72mm, IPEX-1

Date: 2026.05.13

|               |            |               |
|---------------|------------|---------------|
| drawing       | check      | approved      |
| Huang Yongjun | Wang Yumei | Jiang Zhenhua |



### Customer Approve

|       |          |          |
|-------|----------|----------|
| check | approved | approval |
|       |          |          |



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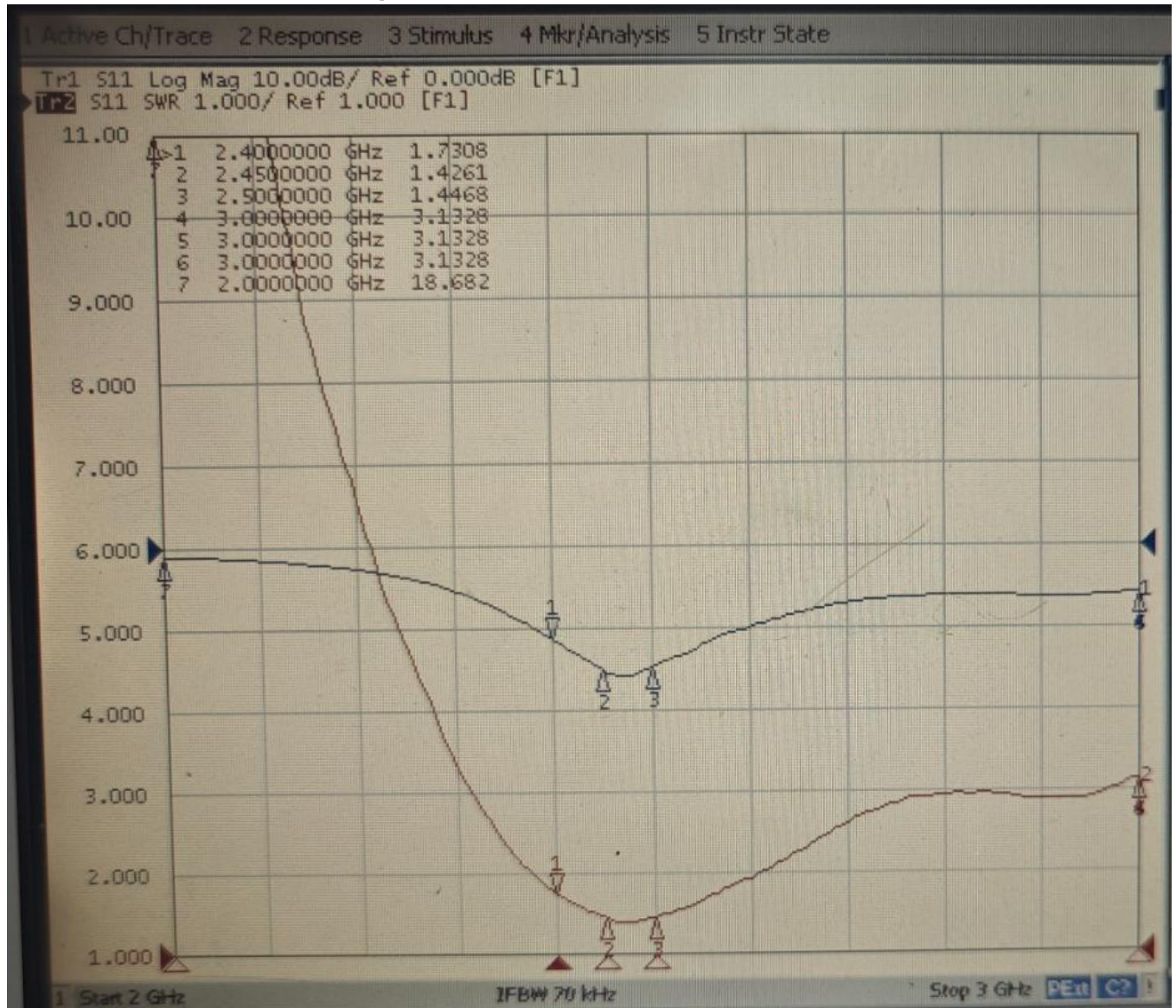


## Electrical Performance Index

| Electrical Specifications |                |
|---------------------------|----------------|
| frequency range           | 2400-2480MHz   |
| VSWR                      | $\leq 2.0$     |
| GAIN                      | $\leq 2.0$ DBI |
| Radiation                 | OMNI           |
| Polarizatin               | LINEAR         |
| Input Impedance           | 50 $\Omega$    |
| Mechanical Specifications |                |
| Input connector           | IPEX-1         |
| Antenna materia           | copper tube    |
| Working Temperature       | -30℃~+80℃      |
| Working Humidity          | 40~85%         |

## Test report

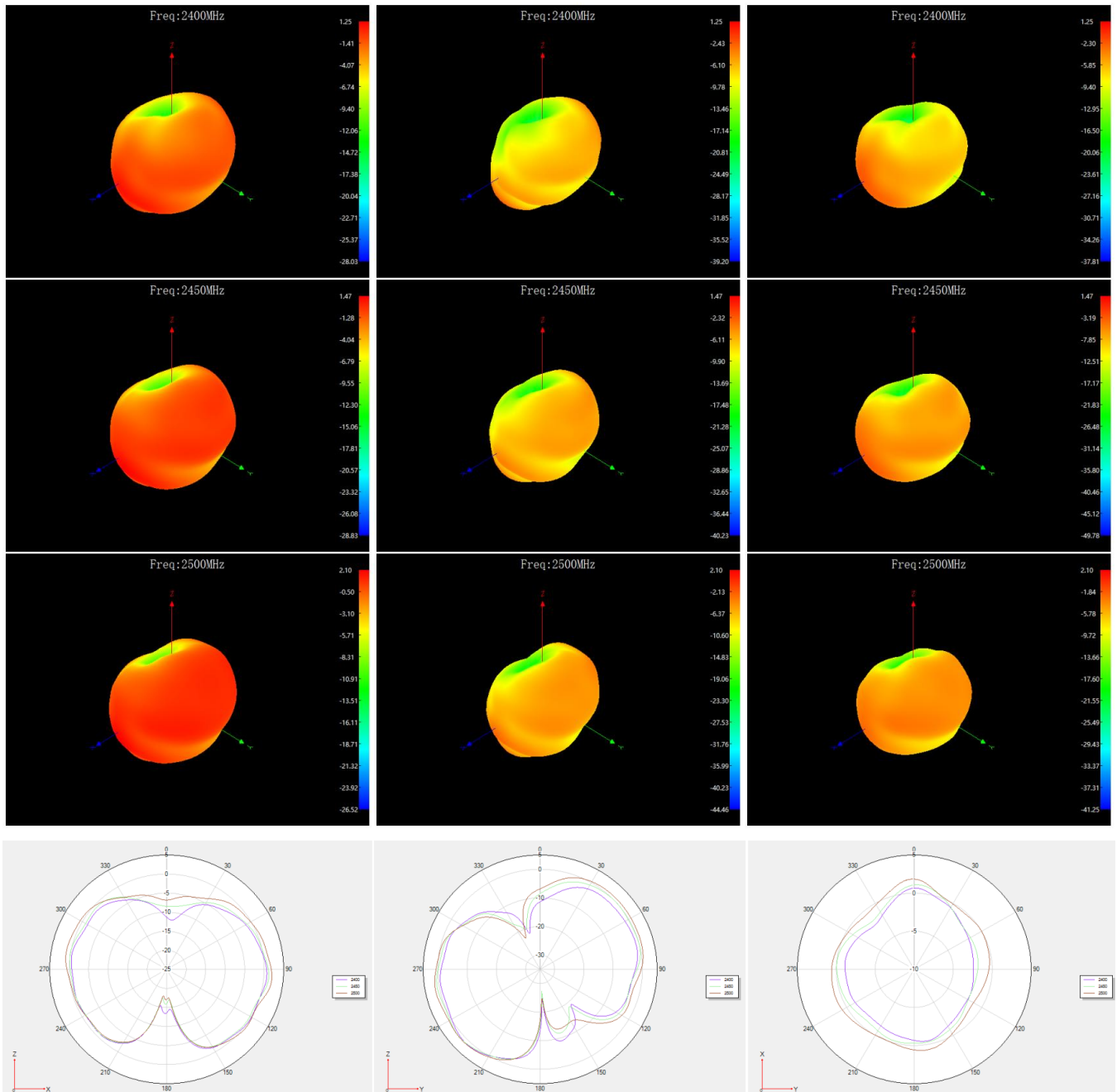
## 1. Antenna in wave diagram



## 2. antenna effeciency

| Frequency/Mhz | Efficiency / % | MaxGain/dBi |
|---------------|----------------|-------------|
| 2400          | 56.36          | 1.25        |
| 2410          | 55.21          | 1.98        |
| 2420          | 62.81          | 1.98        |
| 2430          | 67.14          | 1.88        |
| 2440          | 73.28          | 2.0         |
| 2450          | 65.16          | 1.47        |
| 2460          | 63.97          | 1.93        |
| 2470          | 61.24          | 1.81        |
| 2480          | 65.77          | 1.91        |
| 2490          | 66.53          | 1.98        |
| 2500          | 63.83          | 1.91        |

### 3. Antenna pattern



## Testing Equipment and Principle

### 1. testing facility

Network Analyzers :

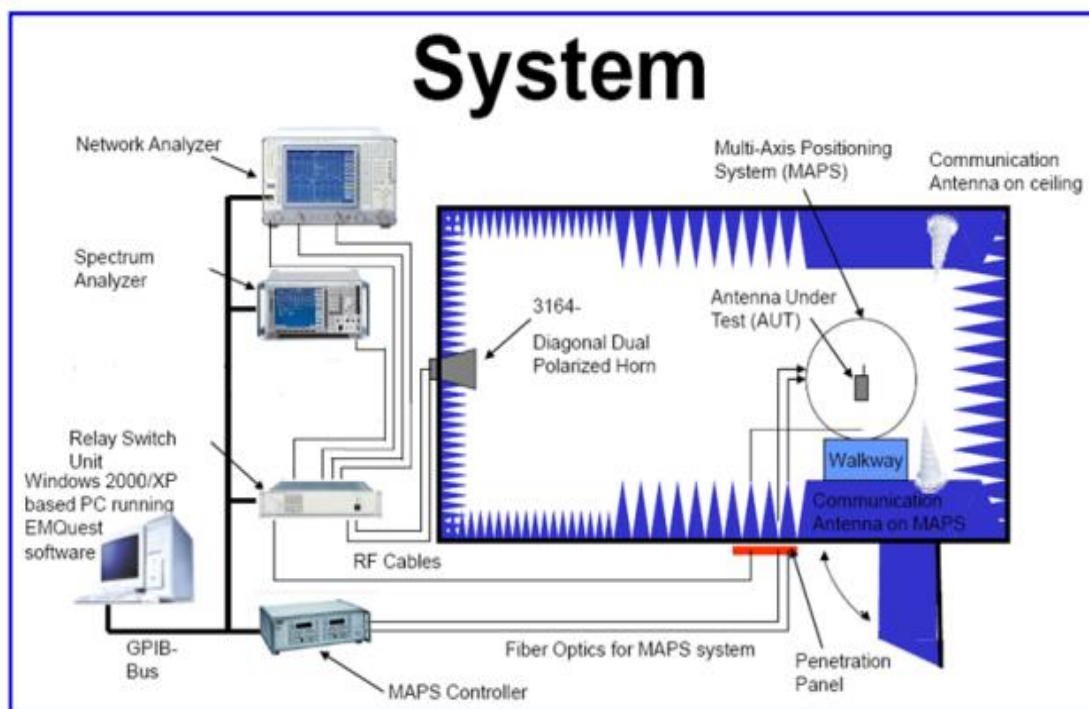
Agilent 8753D 5071B

Communications Test Set:

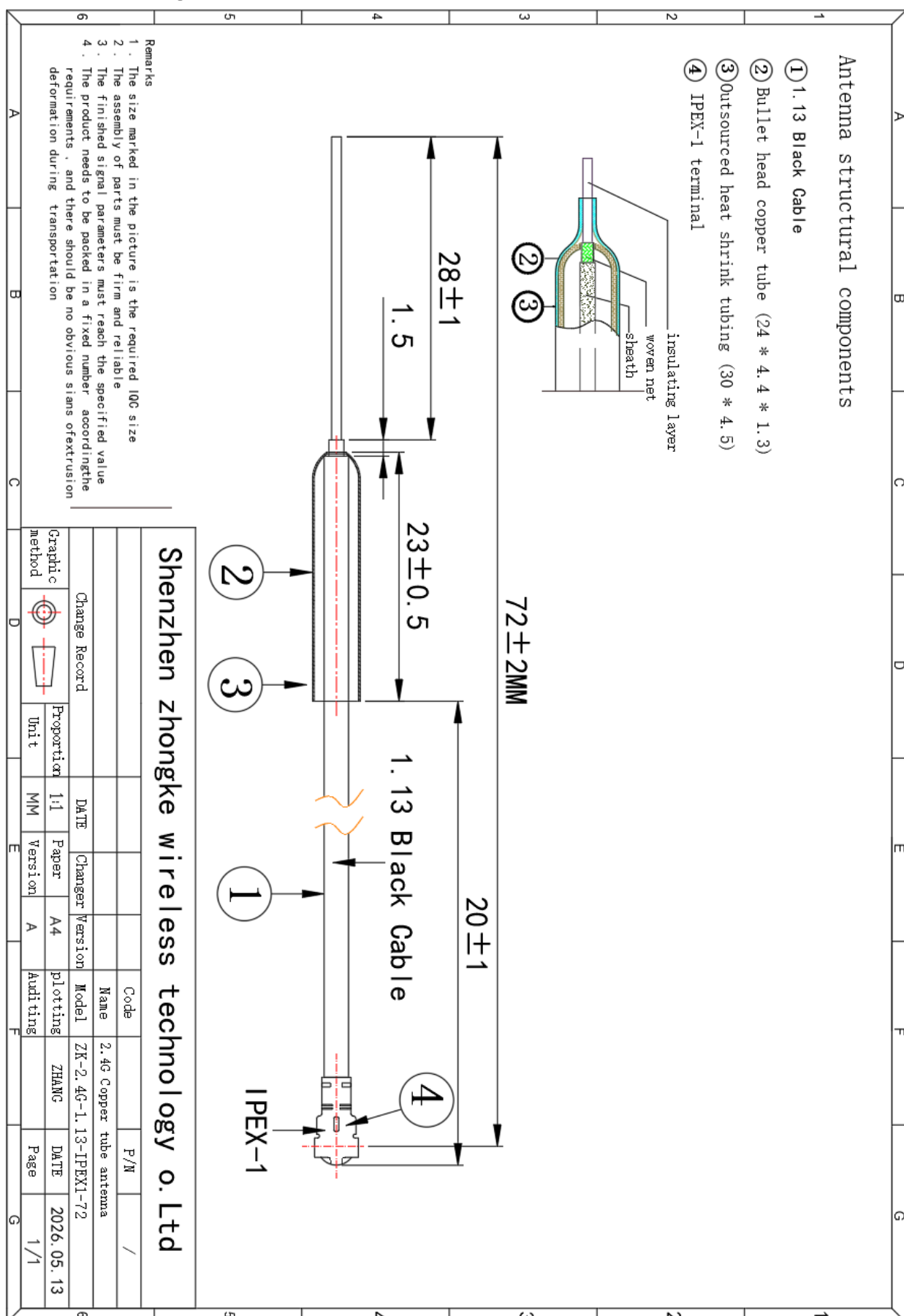
Agilent E5515C

3D Chamber Test System:

### 2. The test principle:



# Product Drawing





## Reliability test report

| test item; test project |                                  | test method                                                                                                          | ask                                                                                           | bear fruit |
|-------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------|
| C1                      | V. S. W. R.                      | Design net analyzer parameters for testing                                                                           | Directive DUT specification                                                                   | pass       |
| M1                      | antenna gain                     | Design the parameters of the antenna dark chamber for testing                                                        | Directive DUT specification                                                                   | pass       |
| M2                      | Vibration                        | GB / T2423.48-2008<br>Amplitude: 0.03 inch (1.5mm); Freq: 20 to 80 to 20 Hz 3 directions; 2 hours for each direction | 1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$                                           | pass       |
| M6                      | Random Drop                      | GB / T2423.8-1995 Single: Height: 1.0 Meter; 3 directions; 1 time for each direction                                 | 1. No parts separated、fracture<br>2. Frequency Tol. $\leq 5\%$                                | pass       |
| E3                      | Dimension                        | Inspection of dimension, color, material, package, surface process.                                                  | Directive DUT specification                                                                   | pass       |
| E4                      | Temperature and Humidity Chamber | GB / T 2423.3-2006 Temp: 80°C / 12 H; -40°C / 12H RH: $\geq 90\%$ ; Time: 24H 温度 80°C                                | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$                 | pass       |
| E5                      | Thermal Shock                    | GB / T 2423.22 - 2008 - 40°C (30 minutes) to + 80°C (30 minutes); Cycles: 24-40°C                                    | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$ 频率偏移 $\leq 5\%$ | pass       |
| R1                      | Aging test                       | GB / T 2423.2-2008 Temp: 80°C; Time: 24 hours                                                                        | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$                 | pass       |
| M1                      | RoHS                             | With Reference to IEC 62321: 2008 with flow chart                                                                    | Directive RoHS 2015/863/EU                                                                    | pass       |

## packing specifications

Product name / specification:

### 1、 labeling requirement

| *****                         |       |
|-------------------------------|-------|
| Purchase order number         | ***** |
| material code                 | ***** |
| Product name<br>specification | ***** |
| Quantity                      | ***** |
| remarks                       | ***** |

| *****                         |       |
|-------------------------------|-------|
| Purchase order number         | ***** |
| material code                 | ***** |
| Product name<br>specification | ***** |
| Quantity                      | ***** |
| remarks                       | ***** |

### 2、 The packing requirements

job description :

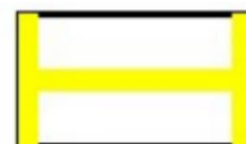
#### 1). inner packing:

Product\_\_\_PCS in a small bag

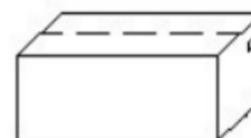


#### 2). external packing:

Determine the quantity / box according to the actual quantity



carton



### 3、 matters need attention:

- Whether to add a partition board, pearl cotton;
- Attachment of labels, such as ROHS;