Acknowledgment

Approved vendor :_____

Manufacturers ： Shenzhen Kexin Wireless Technology Co., Ltd.

Product Name： 2.4G built-in antenna-FPC25*9MM

Product Model ： KX-2.4G-FPC-25*9MM

(Product Type)

Customer:				
Customer Approval	Check	Review	Approve	Recognition date
Provider:				
Provider Approval	Make	Review	Approve	Production date
	Xie Chunfa	Liu Jingxiong	Wang Fei	2023.05.24

Version	Date	Change content
X0	2023.05.24	New version

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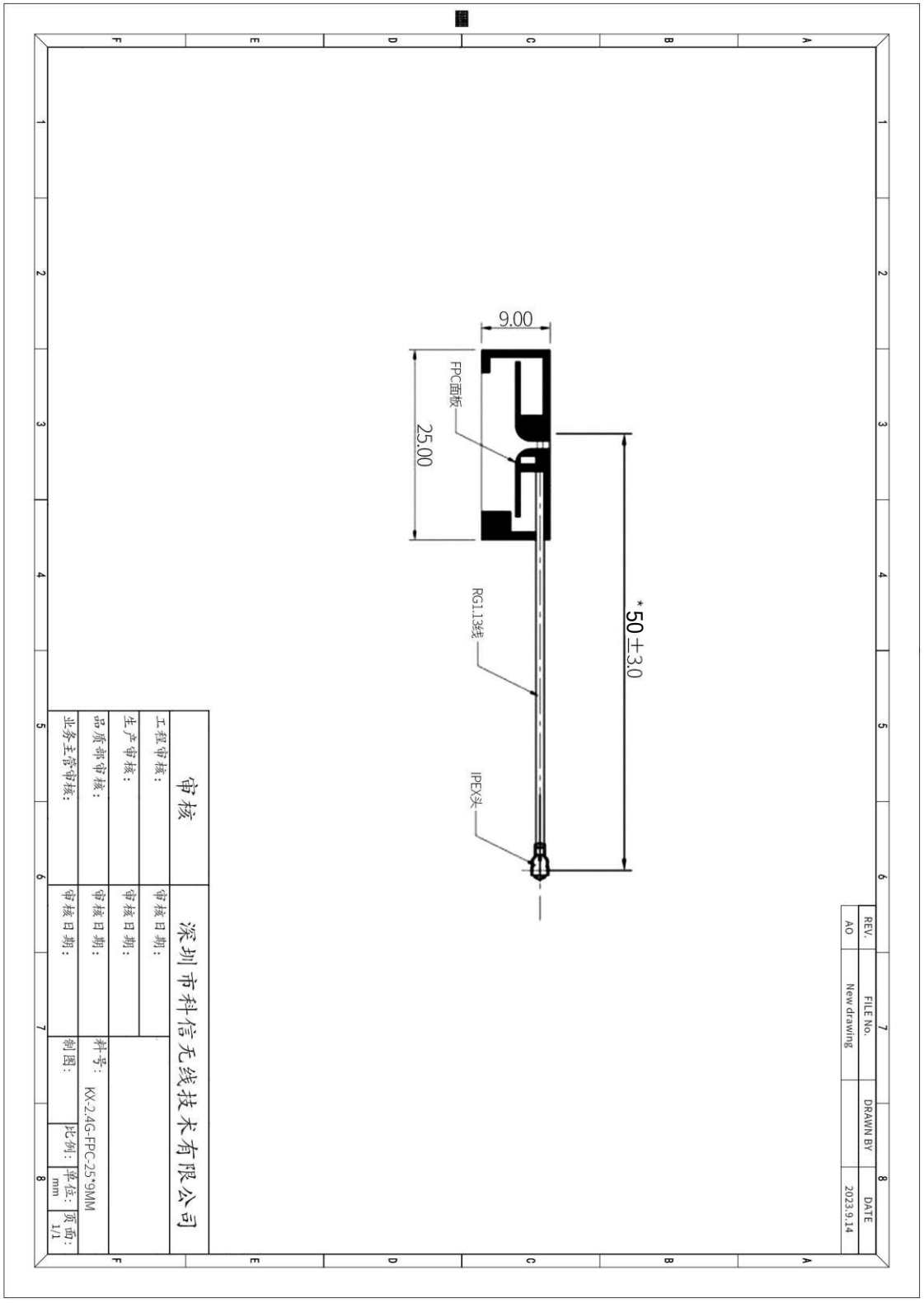
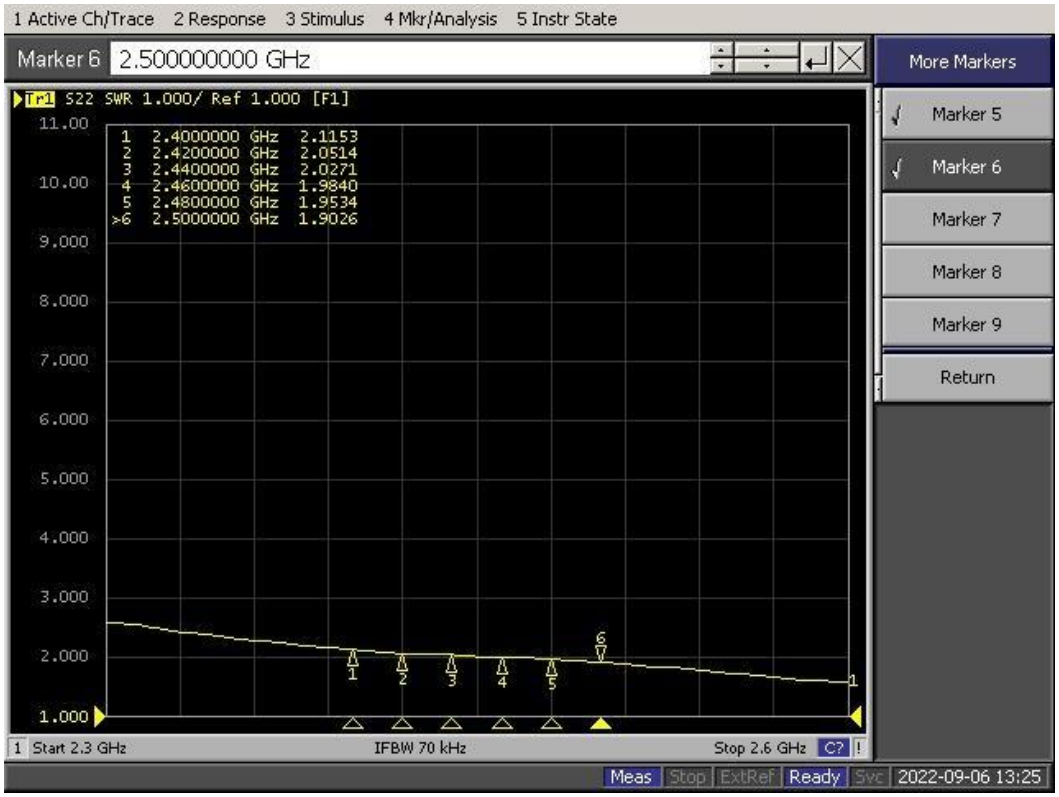
1、 Product performance parameter table

Electrical Specifications	
Frequency Range (MHz)	2400～2500
Band Width(MHz)	100
Input Impendence (Ω)	50
V.S.W.R	≤2.5（Unmatched device, for reference only）
Gain (dBi)	1.38(Unmatched device, for reference only）
Polarization Type	Vertical
Maximum power(W)	10W
Vertical lobe Angle（E）	28～50°
Water plane lobe Angle（H）	360°
Mechanical Specifications	
Material	FPC
Connect Type	（IPEX一代）RG1.13
Size	25*9mm
Operating Temp	-20 ～ +65 ˚C
Storage Temp	-30 ～ +75˚C

2 、Product Structure



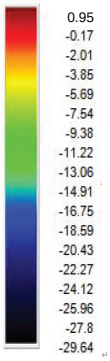
3.1 Standing wave ratio diagram

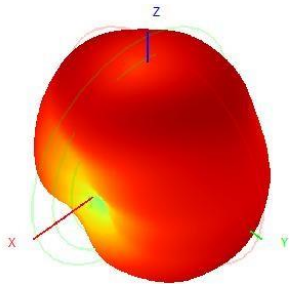


3.2 Test data

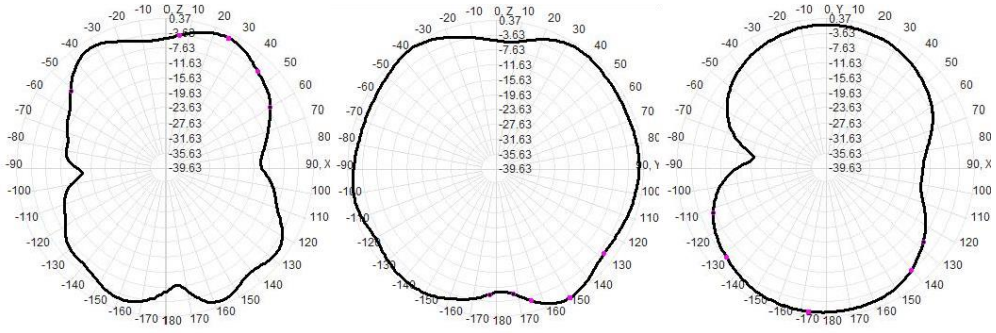
Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
2400	47.45	0.95
2410	47.54	1.04
2420	46.03	1.02
2430	45.41	1.14
2440	44.71	1.32
2450	43.75	1.37
2460	42.57	1.19
2470	43.22	1.07
2480	45.47	1.08
2490	48.18	1.15
2500	53.06	1.38

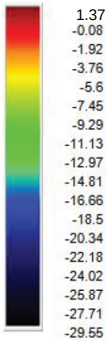
3.3 2D&3DDirection map

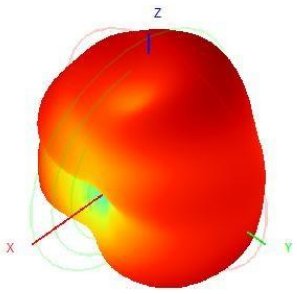




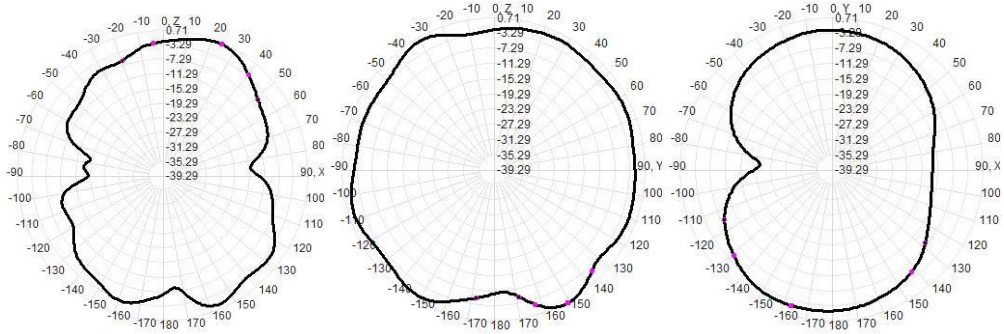
2400MHz

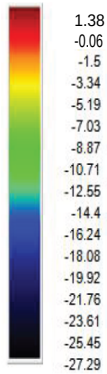


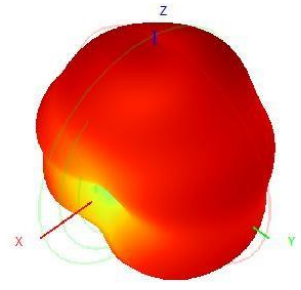




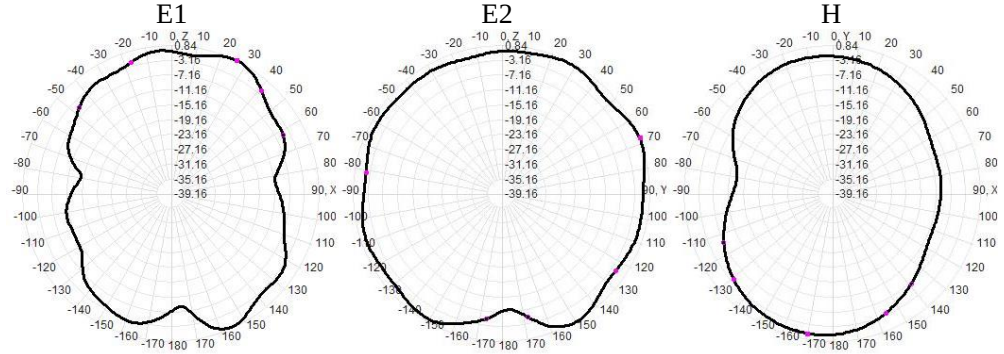
2450MHz







2500MHz



3.4 Product Image

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4、Reliability experiment

	Test items	Specific instructions
1.	Bending durability test	Test purpose: to verify that the antenna elbow with bending function can meet the durability of long-term use; Preconditions: 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; 2) Minimum sample quantity: 3pcs. Testing process: 1. Before testing, check whether the antenna mechanical and electrical functions are normal; place the entire antenna horizontally and fix the antenna connector; 2. Rotate the antenna base manually or mechanically to a position that is 90 degrees to the connector, and then rotate it to the original position, counting each reciprocation. , Test frequency: 30 to 40 times per minute, 500 bending times in total, 5 min interval every 100 times; 3. After the test, check the appearance and mechanical properties of the antenna. Criterion: 1. After the test is completed, there should be no obvious physical damage to the antenna, and the antenna cannot slide when folded at 30 degrees to the vertical direction.
2.	Antenna side pressure test	Test purpose: To verify the ability of the product's external antenna to withstand lateral pressure 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 anti-rotation limit ribs, etc. Preconditions: 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. 2) Install the antenna on the product in normal condition and secure the product. 3) Each test sample is at least 3pcs; test steps: 1. Before testing, check the appearance and function of the sample to be tested; 2. Carry out the following two tests, using two sets of materials for each test: Test 1: Keep the antenna in an open and straightened state, apply 20N force

		inwards, outwards, upwards and downwards at the 5mm position of the antenna end, and keep it for 5S , repeat this operation 10 times in each direction. Test 2: Put the antenna in a 90-degree bending state, twist the antenna until the anti-rotation limit rib comes into effect, apply a 20N force at the 5mm position at the end of the antenna, hold it for 5 seconds, and repeat this operation 10 times. Complete the test of both positive and negative limit positions. 3. In the above two sets of tests, if it is found that after the antenna is stressed, the deformation angle of the antenna is greater than 30° , but the external force is still less than 20N, then keep the deformation angle at 30° , cancel the external force after 5 seconds, and repeat the above operation 10 times ;Complete the test in 4 directions, a total of 40 times; 4. After the test is completed, check the mechanical and electrical properties of the sample. 5. If there are multiple antennas on the same product, each antenna installation position on the product must be tested. Criterion: 1. After the test is completed, the mechanical and electrical functions of the antenna are normal; 2. The antenna can bend manually and can be restored. The shell is not allowed to break and the core is not allowed to break. 3. The limiting ribs of the main equipment are cracked, and the housing buckles cannot be loosened or broken; 4. There is no change in the electrical performance of the antenna before and after the test;
	Antenna rotation durability test Antenna	Test purpose: to verify that the antenna with free rotation function between the antenna fixed head and the antenna body can meet the durability performance requirements for long-term use; 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; Testing process: 180 degree rotatable antenna: 1. Before testing, ensure that the mechanical and electrical functions of the antenna are normal and there must be no physical damage; 2. Bend the antenna base into a direction perpendicular to the connector 3. Install the antenna on the fixed platform of the corresponding model, and bend the antenna base so that it is perpendicular to the connector. 4. Rotate the antenna base to the left to the horizontal position (90 degrees) manually or mechanically, then rotate it to the original position, and then rotate the antenna base to the right. Seat to the horizontal position (90 degrees), then rotate to the original position, and count 1 time for the entire reciprocation. 5. The test frequency is 30 to 40 times per minute, with a total of 1,000 rotations;

3.	rotation durability test Antenna rotation durability test Antenna rotation durability test	6. After the test, check the mechanical and electrical performance of the antenna. 360 degree rotatable antenna: 1. Before testing, ensure that the mechanical and electrical functions of the antenna are normal and there must be no physical damage; 2. Bend the antenna base into a direction perpendicular to the connector 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. 3. Rotate 360 degrees to the left to return to the original position manually or mechanically, then rotate the antenna base 360 to the right to return to the original position, and the whole process is repeated. Count 2 times. 4. The test frequency is 30 to 40 times per minute, with a total of 1,000 rotations; 5. After the test, check the mechanical and electrical performance of the antenna. Criterion: 1. After the test is completed, there should be no obvious physical damage to the antenna, and after the test, the antenna rotating head also has the function of fixing the antenna rotation position, and the limiting structure of the main device is not damaged; 2. There is no change in electrical performance before and after the test.
4.	Free drop test of the whole machine	Verify whether the drop strength of desktop and handheld terminals meets the requirements during use/transportation. test program: Test conditions: (1) The antenna is turned on and the whole machine is dropped to a height of 0.8 m, 6 sides, 1 cycle, a total of 6 times, marble platform, controlled drop; (2) Minimum sample quantity: 3pcs 2. Program (1) Ensure that the mechanical and electrical functions of the sample are normal; (2) Each sample is subjected to a controlled drop corresponding to the required height and number of drops; (3) During the test process, it is required to check the appearance and function of each test surface. When testing the next surface, any faults caused can be manually restored and tested after manual recovery. Criterion: After 1 cycle test is completed, the sample has normal mechanical and electrical functions, allowing manually recoverable mechanical failures to occur. Allowed without affecting Minor mechanical failure for normal user use and safety.

5.	Antenna tensile test	Test purpose: to verify whether the strength of the antenna connection meets the requirements; 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; test process: 1. Initial inspection before testing to ensure that the prototype accessories are functioning properly before testing; 2. Fix the fixed head, apply a pulling force of 1kgf to the antenna shaft, and maintain it for 2S when the force reaches 1.5kgf; 3. Repeat step (2) 20 times; 4. Fix the antenna shaft, apply a pulling force of 1kgf to the antenna end, and maintain it for 2S when the force reaches 1.5kgf; 5. Repeat step (4) 20 times. Criterion: 1. There should be no obvious physical damage to the antenna after the test is completed. 2. There is no change in electrical performance before and after the test.
6.	Antenna instal lation force	Test purpose: to verify whether the installation force of the antenna in production assembly meets human body comfort requirements; Preset conditions: Both ONT and antenna must be brand new samples for initial installation; due to wear of structural parts during the second installation, the installation force will be significantly reduced, resulting in invalid test data; Testing process: 1. Preliminary inspection before testing to ensure that the ONT shell and antenna are brand new prototypes and no antenna installation has been performed; 2. Fix the ONT shell and press the antenna into the antenna installation hole of the ONT shell; you can use a press to record the antenna installation force. 3. Sample quantity: 3pcs Check points, requirements, indicators and expected results that should be met: 1. The antenna installation force is less than 30N;
7.	Different antennas Sound test	Test purpose: to verify that there is no abnormal noise during the shaking of the antenna; Test criteria: Manually shake the single antenna, no abnormal noise;

5、Environmental requirements

	Environmental parameters	Index	Reference Standard
1	Storage temperature range (℃)	-30～+75	
2	Range of working temperature (℃)	-20～+65	
3	Storage humidity range	40℃, 95%Humidity, 96小时	
4	Working humidity range	5%～95%	
		1) Keep the temperature at +25℃ and raise the humidity to 95%RH within 1 hour 2) Keep the humidity at 95%RH; heat up to +55℃ within 3 hours; 3) Keep at +55℃, 95%RH for 9 hours	

5	Alternating heat and humidity	4) Keep the humidity at 95%RH; cool down to +25℃ within 3 hours; 5) Keep at +25℃, 95%RH for 9 hours 6) Repeat steps 2) to 5) 5 times (6 cycles in total); 7) Keep the temperature at +25℃ and reduce the humidity to 50% within 1 hour; 8) Keep at +25℃, 50%RH for 2 hours Required indicators and expected results that the checkpoint should achieve: 1. The antenna should not undergo discoloration, cracking, degumming, warping deformation, loss of function, etc. 2. There is no significant change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can be	
6	Temperature cycling	1) High temperature limit value: 1) 75℃; 2) Low temperature limit: -30℃; 3) Temperature change and holding time: maintain at least 4 hours at high and low temperature extremes, from high temperature to low temperature or The time to rise from low temperature to high temperature should not exceed 4 hours; 4) Number of cycles: 9 cycles in total 5) Recovery time: 24h 6) Minimum sample quantity: 3pcs Required indicators and expected results that the checkpoint should achieve: 1. The antenna should not undergo discoloration, cracking, degumming, warping deformation, loss of function, etc. 2. There is no significant change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can be	Guideline: IEC 60068-2-1/2/6/ 14/30/31/78 ETSI EN 300 019-2-1/2/3 GR-63-CORE
7	High Temperature Storage	Raise the temperature to 75℃ at a rate of 1℃/min and maintain it at 75℃ for 24 hours; Cool down to +25° C at a rate of ℃/min and hold for 2 hours. Minimum sample quantity: 3pcs Required indicators and expected results that the checkpoint should achieve: 1. The antenna should not undergo discoloration,	

		cracking, degumming, warping deformation, loss of function, etc. 2. There is no significant change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can be Keep the antenna stable at any angle;	
8	Low temperature storage	Cool down to -30℃ at a rate of 1℃/min and maintain at -30℃ for 24 hours; Ramp to +25° C at a rate of ℃/min and hold for 2 hours. Required indicators and expected results that the checkpoint should achieve: 1. The antenna should not undergo discoloration, cracking, degumming, warping deformation, loss of function, etc. 2. There is no significant change in the damping force between the antenna and the ONT. The damping force between the antenna and the product can be	
9	Constant salt spray	48-hour salt spray test. After the test, all product indicators, functions and mechanical properties are at room temperature. normal.	
10	Bare metal vibration	Require; 1. Frequency: 10～30Hz, placement distance: 0.38mm, 3 cycles, 5 minutes each cycle; 2. Frequency: 30～60Hz, placement distance: 0.38mm, 3 cycles, 5 minutes each cycle; 3. Repeat once in three axis directions; After the test, the product indicators, functions and mechanical properties were all normal.	

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