

Antenna Datasheet

2.4G SMD Chip Antenna

Model:

BW2.4MNX5020

Description:

2.4G SMD Chip Antenna

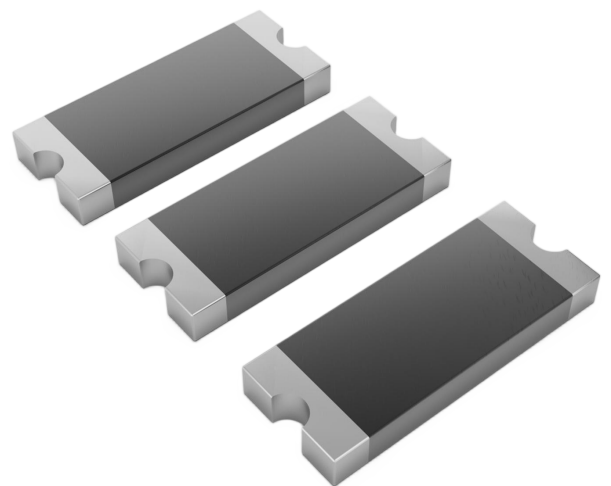
Features:

2400-2500MHz Frequency Range

360° Omnidirectional Radiation

Dimensions: 5.0mm x 2.0mm x 1.0mm

Compliant with RoHS & REACH Regulations



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BW2.4MNX5020

Part Number Explanation

BW	Company	Bat Wireless
2.4	Frequency	2400-2500MHz
M	Name	SMD Chip Antenna
N	Type	Internal
X	Content	X
5020	Package Dimensions	5020

1. Description

Bat Wireless **BW2.4MNX5020** is an antenna commonly used in wireless communication. It features high integration for space-saving, with compactness and integration as its key attributes. The patch antenna is directly printed on the SMD, occupying minimal space and making it suitable for compact devices. It offers low cost: utilizing SMD technology for one-time fabrication, it requires no additional antenna components, thus being ideal for mass production. This antenna is suitable for miniaturized devices and widely applied in modules such as IoT, consumer electronics, and industrial equipment.

Classic Application Scenarios:

Consumer Electronics: Remote controls, smart home devices

IoT Devices: Smart meters, trackers

Industrial Equipment: Remote monitoring terminals, vehicle-mounted communication modules

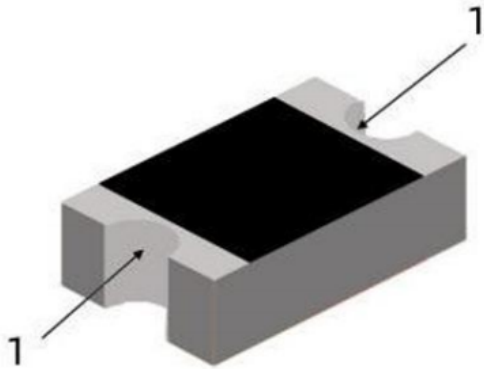
Bat Wireless provides customized services to optimize your equipment. We have a mature R&D team that can respond quickly to meet your needs. If you have any requirements, please contact our sales and FAE.



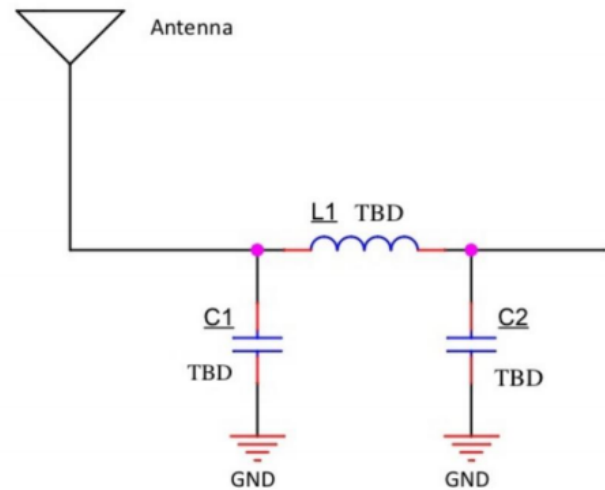
2. Specification

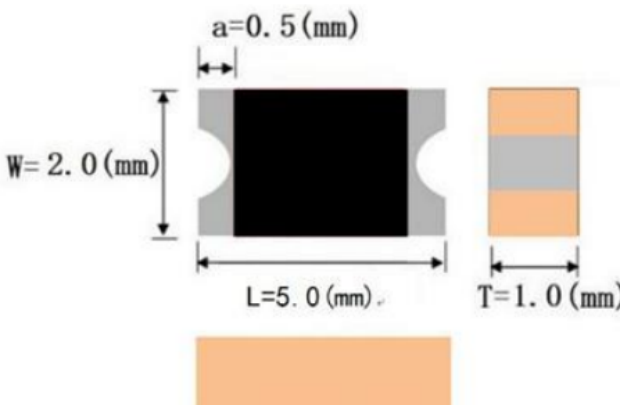
Parameters	Typ.	Unites	Notes
Electrical Characteristics			
Antenna Type	SMD Chip Antenna		
Frequency Range	2400-2500	MHz	
Input Impedence	50	Ω	
V.S.W.R	<2		
Gain	4.3	dBi	
Polarization Type	Vertical		
Power Capacity	50	W	
Lightning Protection	-		
DC Voltage	-	V	
Radiator	-		
Mechanical Characteristics			
Dimensions	5.0 x 2.0 x 1.0	mm	
Connector Type	-		
Cable Type	-		
Cable Length	-	mm	
Mount way	SMD		
Color	Black		
Meterial	PCB		
Weight	0.2	g	
Environmental Characteristics			
Waterproof Rating	-		
ROHS Compliant	Compliant		
Operating Temperature	-45~ +85	$^{\circ}\text{C}$	
Storage Temperature	-45~ +85	$^{\circ}\text{C}$	

3. Dimensions & Drawing & Impedance Matching



The antenna is symmetric; its feed and ground pads are identical and interchangeable.



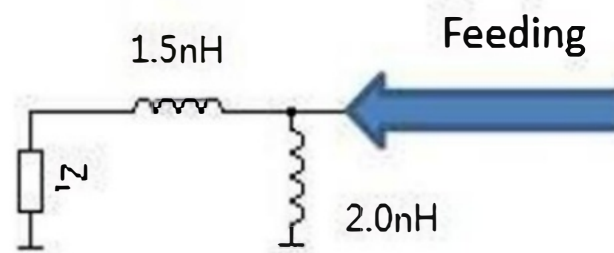
Antenna Structure Drawing	Symbol	Dimension (MM)
	L	5.0±0.1
	w	2.0±0.1
	T	1.0±0.1
	a	0.5±0.1

4. Evaluation Board Reference

Antenna schematic and matching network on circuit board.

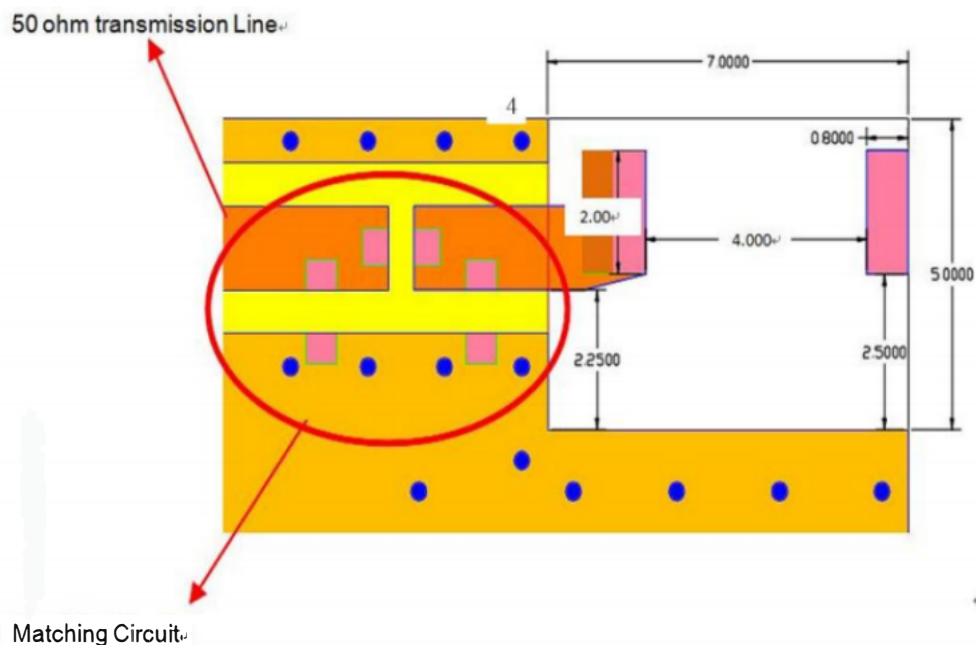
Any type of antenna requires impedance matching to ensure that the antenna performance meets the impedance specification requirements. Similarly, the Z502010F245 patch antenna also needs to add a matching network to ensure that the antenna performance meets the standards.

The recommended schematic diagram of the antenna part on the circuit board is shown in the following figure.



The device values shown in the above figure are for our testing circuit board and can be used as reference values.

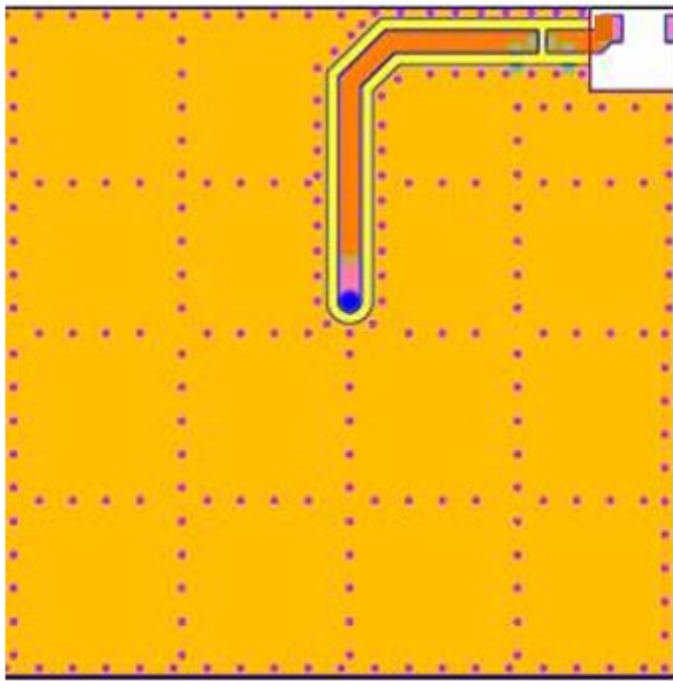
Antenna pads and size packaging on the circuit board.



The above picture is the recommended antenna pad.
The recommended pad size and pad spacing are marked in millimeters (mm) as shown in the diagram.

4. Evaluation Board Reference

Design of circuit board antenna, placement of antenna, and clearance treatment



It is recommended to place the antenna at the edge or corner of the circuit board, not in the middle of the circuit board, and not to surround the antenna with conductors.

The antenna area near the circuit board requires clearance treatment, as shown in the following figure. The EmptyArea (white area) in the circuit board is the clearance area of the antenna. The so-called clearance area refers to an area that cannot be paved or wired except for antenna pads and antenna signal wiring. The clearance treatment in this area should be targeted at all layers of the PCB circuit board, not just the surface layer.

The antenna clearance area should be as large as possible, and the antenna should be placed as close to the edge of the board as possible, so that the antenna body is far away from the ground of the circuit board. A larger clearance area means better antenna efficiency and gain performance.

In terms of the overall structure, it is recommended that there should be no conductors above or below the clearance area in the PCB direction when viewed from above, as this will affect the antenna performance.

Non-clearance areas need to be paved, and the ground between different layers should be connected with as many through holes as possible.

5. Test Equipment



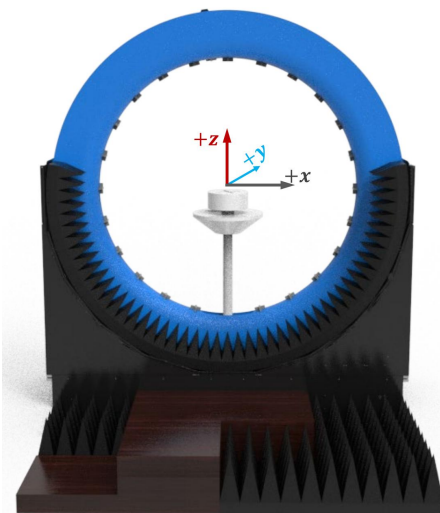
Keysight/E5071C Network Analyzer



R&S/CMW500 Comprehensive Tester



R&S/SMBV100B Signal Generator



DT-3500 Datasheet

Specification:

Specification:	Description
Test Frequency	400MHz-8.5GHz
System Size	L*W*H=4*3.5*3.5m
Number of Probes	23 (Probe) + 1 (link)
Interval Angle	15°
Sampling Diameter	2200mm
Carring Capacity	≤40kg

Testing Capability

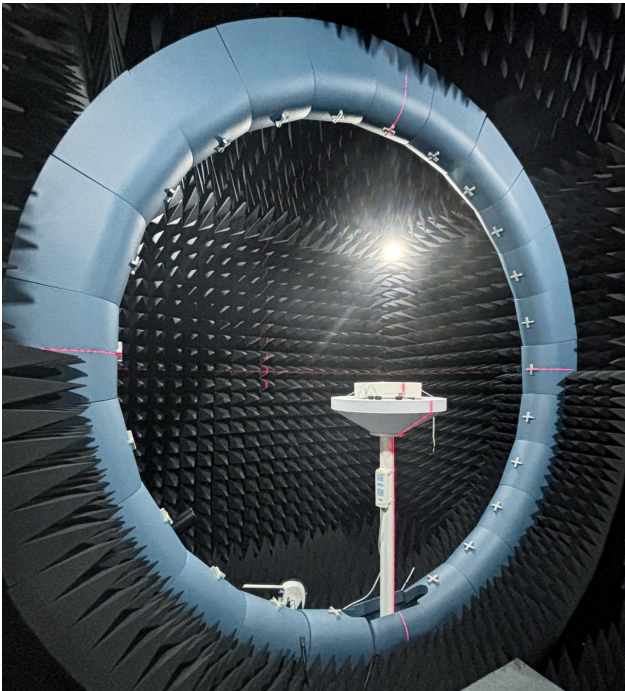
Description

Active measurement

Capability : TRP、TIS、EIRP、EIS,. etc
Mode : 2G/3G/4G/5G、Wi-Fi b/g/n/a/ac/ax、BT、NB-IOT、Cat-M (eMTC)、GPS/BEIDOU/GLONASS、ZigBee、LoRa(Non-Signaling),.etc

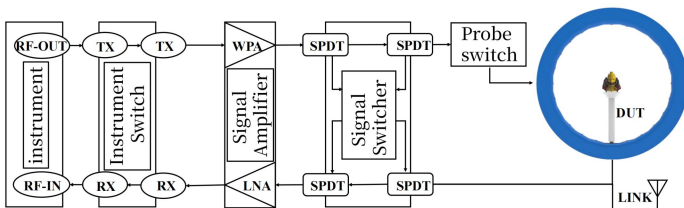
Passive measurement

Test category : Gain、Efficiency、2D pattern、3D pattern、Pattern roundness、Axial Ratio、ECC,Phase center,. etc
Polarization : Circular polarization, linear polarization, elliptical polarization

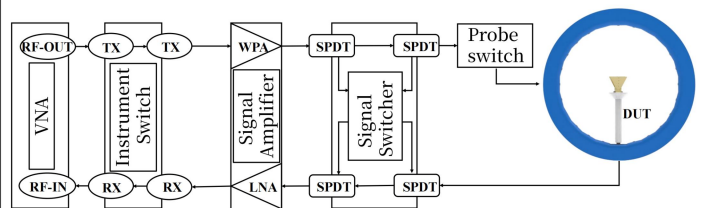


RF Link diaram of multi probe spherical near-field testing system

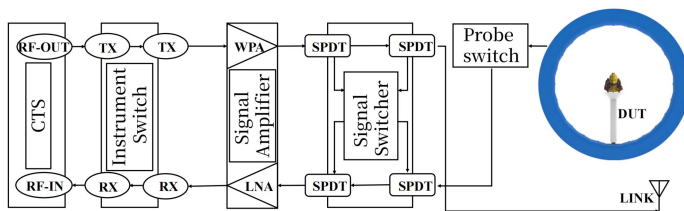
RF Link Overview



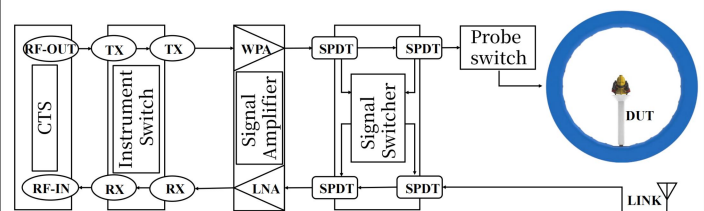
RF Link of Passive measurement



RF Link Overview

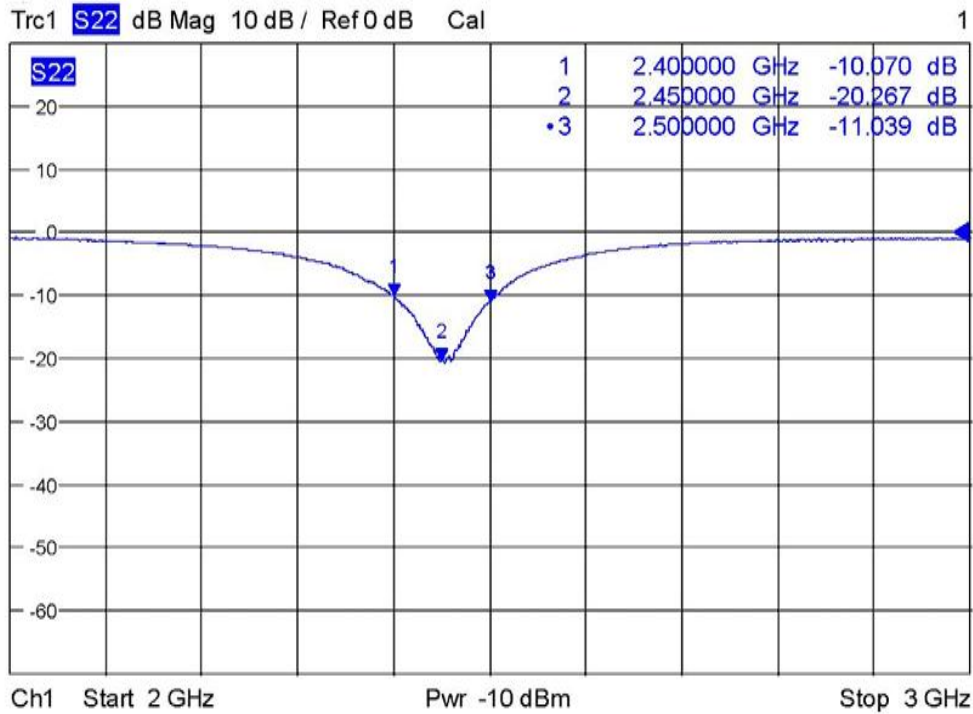


RF Link of Passive measurement



6. Performance Data

6.1 Return Loss



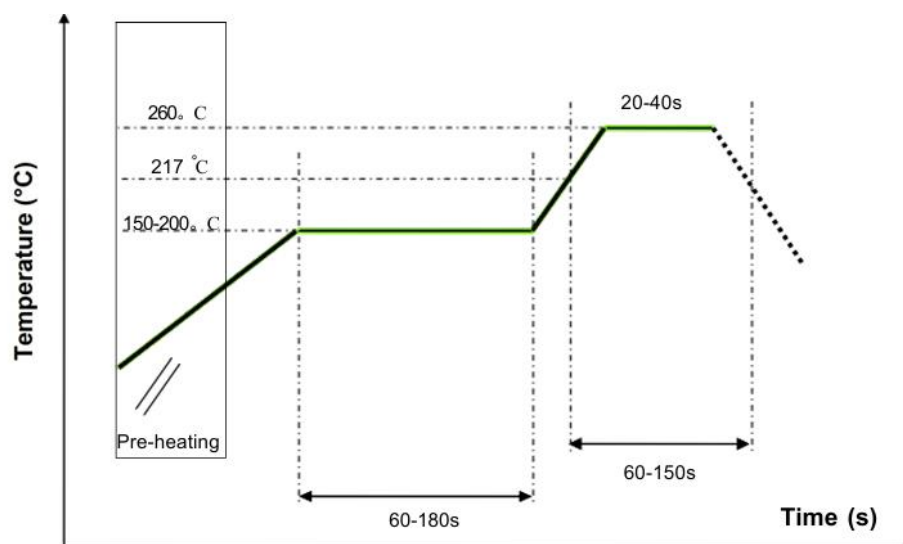
6.2 Efficiency and Gain

Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)	Directivity (dBi)
2400MHz	64.77 %	2.62 dBi	5.15 dBi
2450MHz	75.12 %	3.19 dBi	5.03 dBi
2500MHz	66.18 %	2.64 dBi	5.10 dBi

7. Reliability and Test Conditions

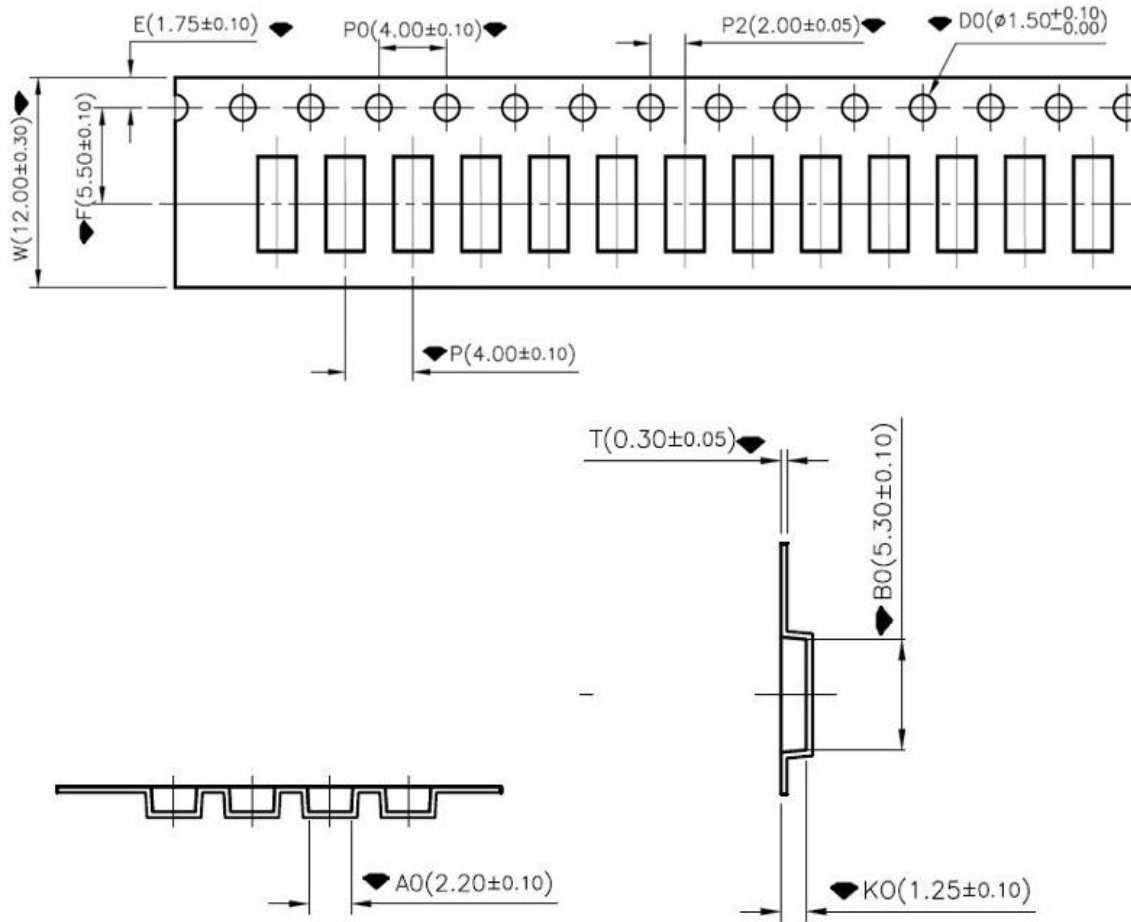
Test Item	Test Conditions / Methods	Specifications
Solderability (JIS C 0050-4.6, JESD22-B102D)	<ul style="list-style-type: none"> - Solder bath temperature: $235^{\circ}\text{C} \pm 5^{\circ}\text{C}$ - Immersion time: 2 seconds ± 0.5 seconds - Solder composition: Sn3Ag0.5Cu lead-free solder alloy At least 95% of the surface area of each terminal 	At least 95% of the surface area of each terminal electrode must be covered with fresh solder.
Metallization Layer Corrosion Resistance (IEC 60068-2-58)	<ul style="list-style-type: none"> - Solder bath temperature: 260 ± 5 - Immersion time for metallization corrosion test: 30 seconds ± 0.5 seconds - Solder composition: SN63A 	The loss of the metallization layer in the edge area of each electrode shall not exceed 25% .
Bending Test (JIS C 0051-7.4.1)	<ul style="list-style-type: none"> - Use a pressure bar to apply pressure to the center of the substrate at a rate of 1 mm/s until the substrate deflects by 1 mm. Maintain the pressure for 5 ± 1 seconds after reaching the specified deflection. - After the test, the sample shall be left at room temperature (23 ± 2) for 24 ± 2 hours. 	<ul style="list-style-type: none"> - No mechanical damage. - The electrical specifications shall meet the requirements specified in the electrical characteristics within the operating temperature range of -40°C to 85°C.
Solder Heat Resistance (JIS C 0050-5.4)	<ul style="list-style-type: none"> - Preheating temperature: $120 \sim 150$ - Soldering temperature: 270 ± 5 - Immersion time: 10 ± 1 seconds - Solder: Sn3Ag0.5Cu lead-free - Measure after storing at room temperature for 24 ± 2 hours. 	<ul style="list-style-type: none"> - No mechanical damage. - The electrical specifications shall meet the requirements specified in the electrical characteristics within the operating temperature range of -40 to 85 . - The metallization layer loss at the edge of each electrode shall not exceed 25%.

8. Soldering and Mounting

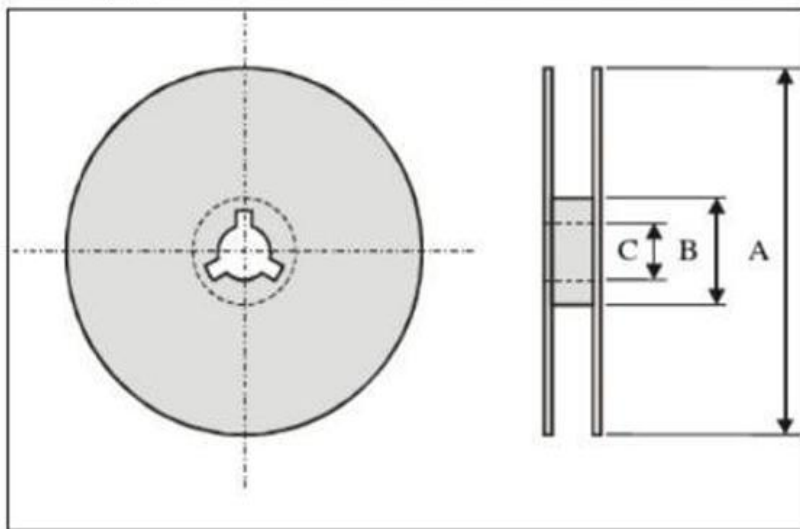




9 . Packaging



卷盘尺寸



Index	A	B	C
Dimension(mm)	178	60	13.5

标准数量: 2500 PCS/盘.



10. Antenna Application Precautions

1. If space permits, it is advisable not to choose antennas with too small dimensions.
2. It is best to have a large clearance area between the antenna and nearby objects; otherwise, matching adjustment will become difficult, and the radiation pattern will be severely distorted.
3. There should be no circuit layout or ground plane beneath the antenna.
4. The antenna should not be placed too close to metal objects, such as batteries and chips, and should not overlap with metal objects like batteries.
5. Note that internal cables (such as battery power cables) should preferably not be too close to the antenna.
6. A monopole antenna requires a reasonable ground plane to achieve optimal performance.
7. Performing antenna matching on the final product solution can shorten the adjustment cycle; whereas on a bare board, repeated adjustments are often needed.
8. Without matching, the same antenna placed on completely different layout boards may not work properly.
9. Do not use a metal housing or a plastic housing with metal covering around the antenna.
10. Do not use very thin antenna feeder wires; the feeder should have a certain width, not less than 0.1mm.
11. Calculate the feeder impedance based on the thickness and dielectric constant of the PCB; 50 ohms will make antenna adjustment easier.
12. Chip antennas should be assembled as far as possible from batteries, EMI shielding materials, foldable speakers, metal nails, LCD screens, etc.

11. Storage and Transportation Information

Storage Conditions

To ensure the solderability of terminal electrodes:

Temperature and humidity requirements: -10~40°C, relative humidity 30~70%.

Recommended service life: Use up within 6 months from the date of delivery.

Packaging storage environment: Should be placed in an air environment free of chlorine and sulfur. Transportation Conditions Handle with care to avoid product damage caused by collision or contamination from sweat, skin oils, etc.

Transportation Conditions

Handle with care to avoid product damage caused by collision or contamination from sweat, skin oils, etc.

Handling Recommendations: It is strongly recommended to use tweezers or a vacuum pen to pick up individual components.

Requirements for bulk handling: Friction and mechanical impact should be minimized.



DECLARATION:

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