

A photograph of a small, rectangular antenna component is centered in the upper half of the page. The component is black with a thin white border. It is set against a background of white, pyramid-shaped acoustic foam. A horizontal red bar runs across the page below the image.

Antenna Datasheet

Product OC (Antenna Only): YCIS001AA

Product OC (Antenna + Rectangular EVB): YCIS001AAEVB

Version: 2.0

Date: 2023-11-15

Status: Released

Product Name: ISM Ceramic SMD Antenna

Key Features:

Frequency band: 863–870 MHz

Efficiency: Up to 45.9 %

Dimensions: 5 mm × 3 mm × 0.5 mm

RoHS Compliant

Overview

Quectel provides a range of antenna products that support the ISM radio band. These antennas are mounted inside the device to minimize the interference of the devices' internal environment. With the antenna performance and this ensures a better efficiency, gain and omni-directional radiation, offering a superior user experience. Quectel also offers flexible installation with custom cable length and connector options.

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1 Specification

Test Condition: Assembled On 80 mm × 40 mm EVB

1.1. Electrical

Electrical	
Frequency Range	863–870 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

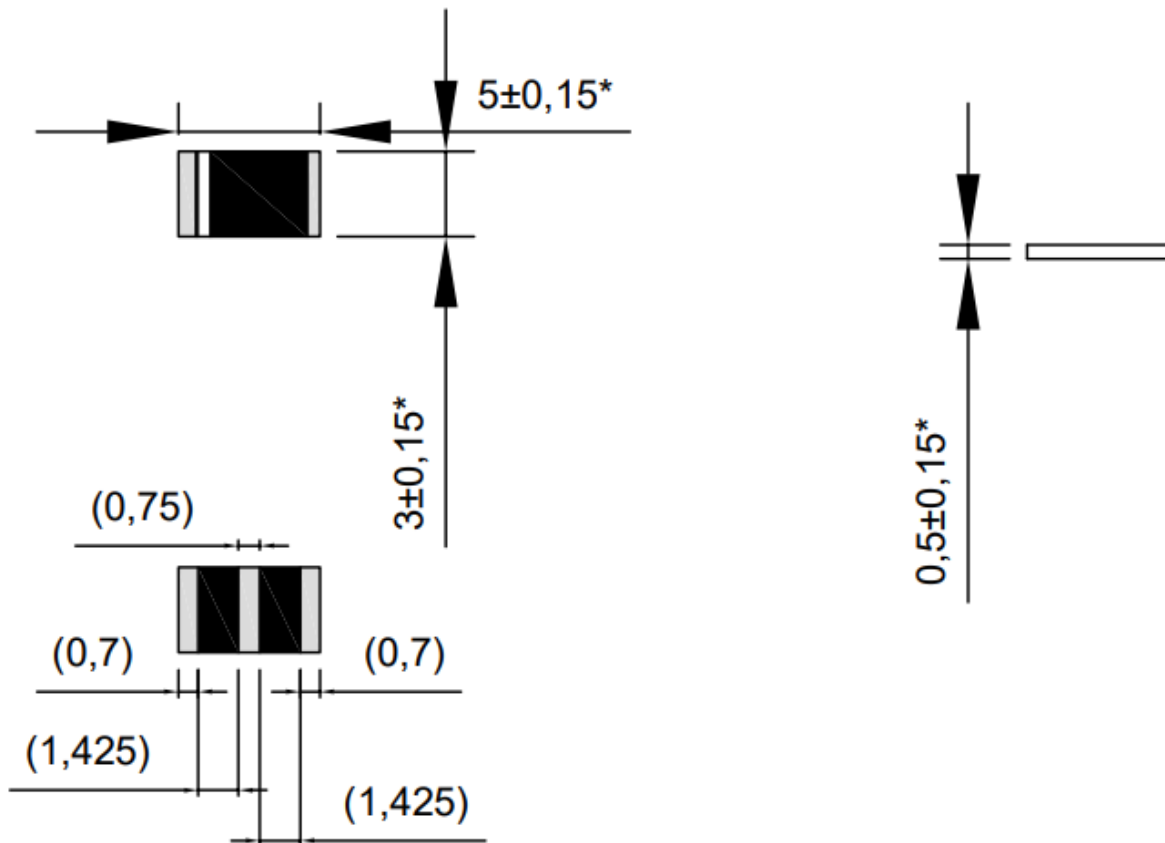
Electrical - Detail		
SPEC	Band	ISM 868 MHz
	Band Freq. (MHz)	863-870 MHz
Max VSWR		2.2
Max Return Loss (dB)		-8.7
AVG Eff. (%)		43.0
AVG AVG Gain(dB)		-3.7
Max Peak Gain (dBi)		0.5
VSWR		≤ 2.2
Return Loss		≤ -8.7 dB
Peak Gain		≤ 0.5 dBi

1.2. Mechanical & Environmental

Mechanical	
Antenna Size	5 mm × 3 mm × 0.5 mm
Material & Color	Ceramic & Natural
Antenna Weight	Typ. 0.025 g
Mounting Type	SMD
Recommended EVB Size	Rectangular EVB: 80 × 40 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS Compliant	Yes

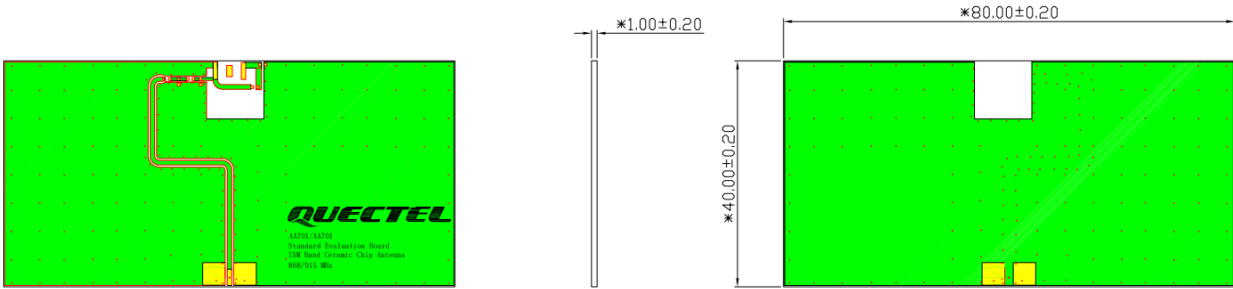
2 Drawing

2.1. Antenna



All dimensions are in mm

2.2. Rectangular EVB

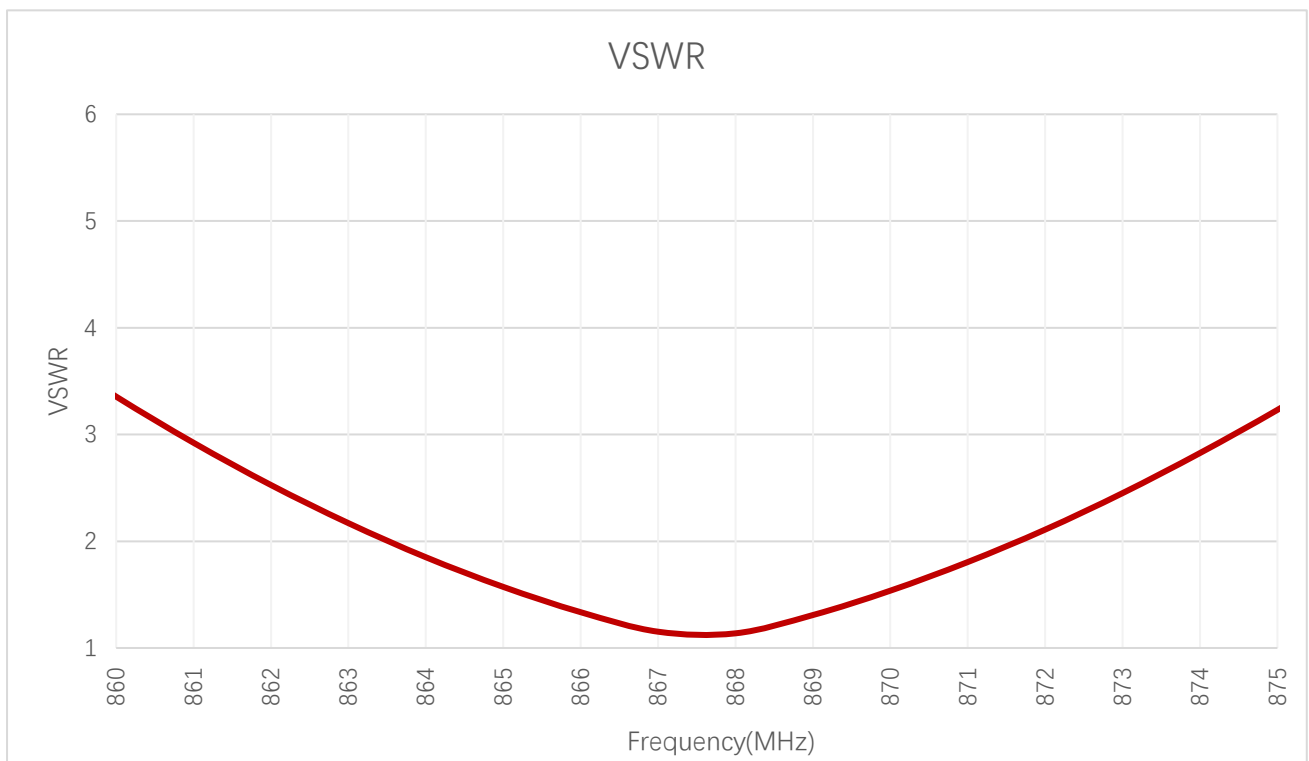


All dimensions are in mm.

3 Detailed Performance

3.1. S-Parameter Test

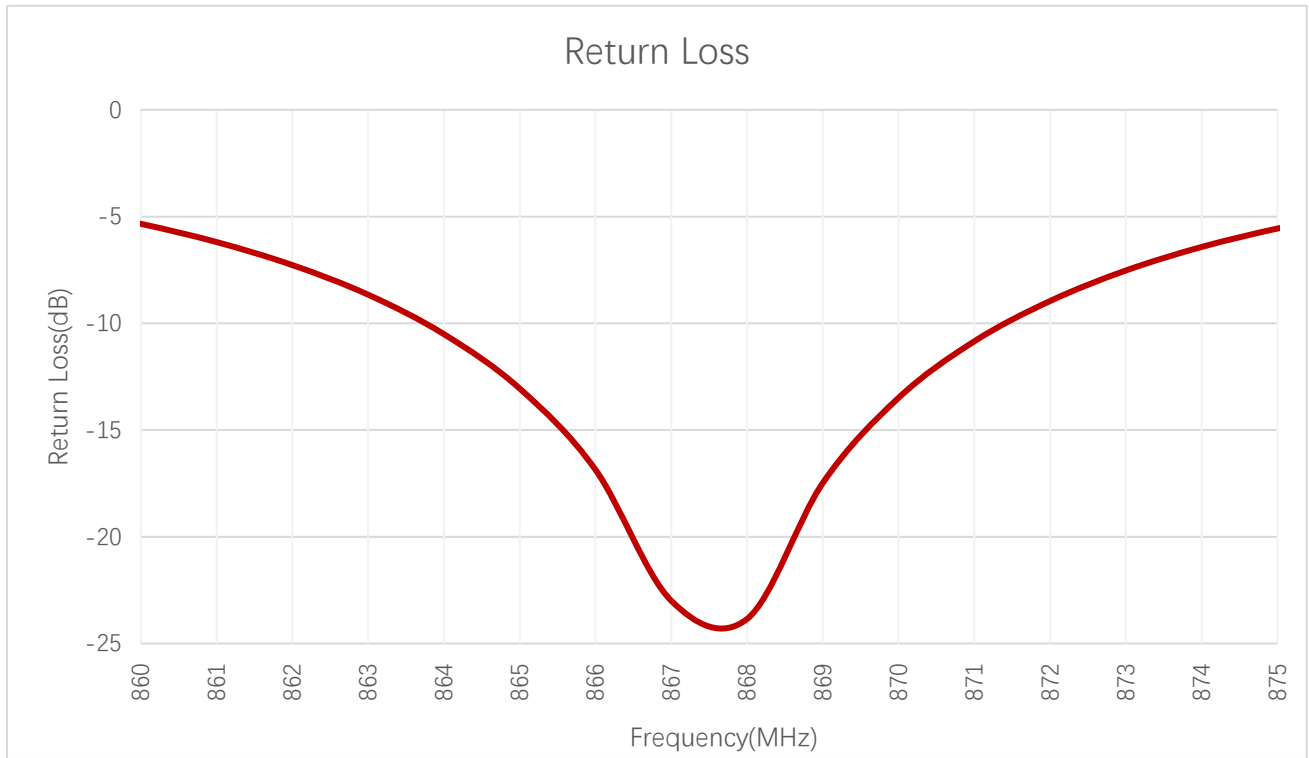
3.2.1. VSWR



VSWR

Frequency (MHz)	863	868	870
On 80 × 40 mm EVB	2.2	1.1	1.5

3.2.2. Return Loss

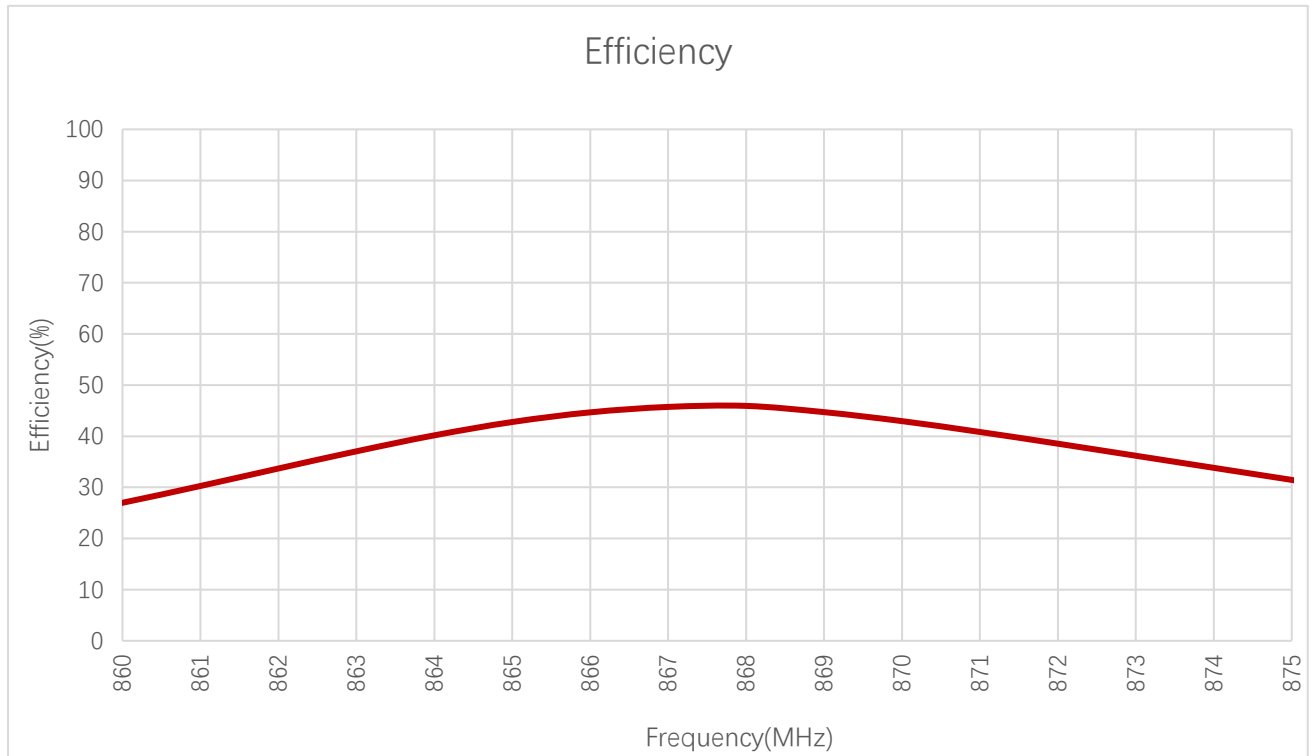


Return Loss (dB)

Frequency (MHz)	863	868	870
On 80 × 40 mm EVB	-8.7	-23.9	-13.5

3.2. Radiation Performance Test

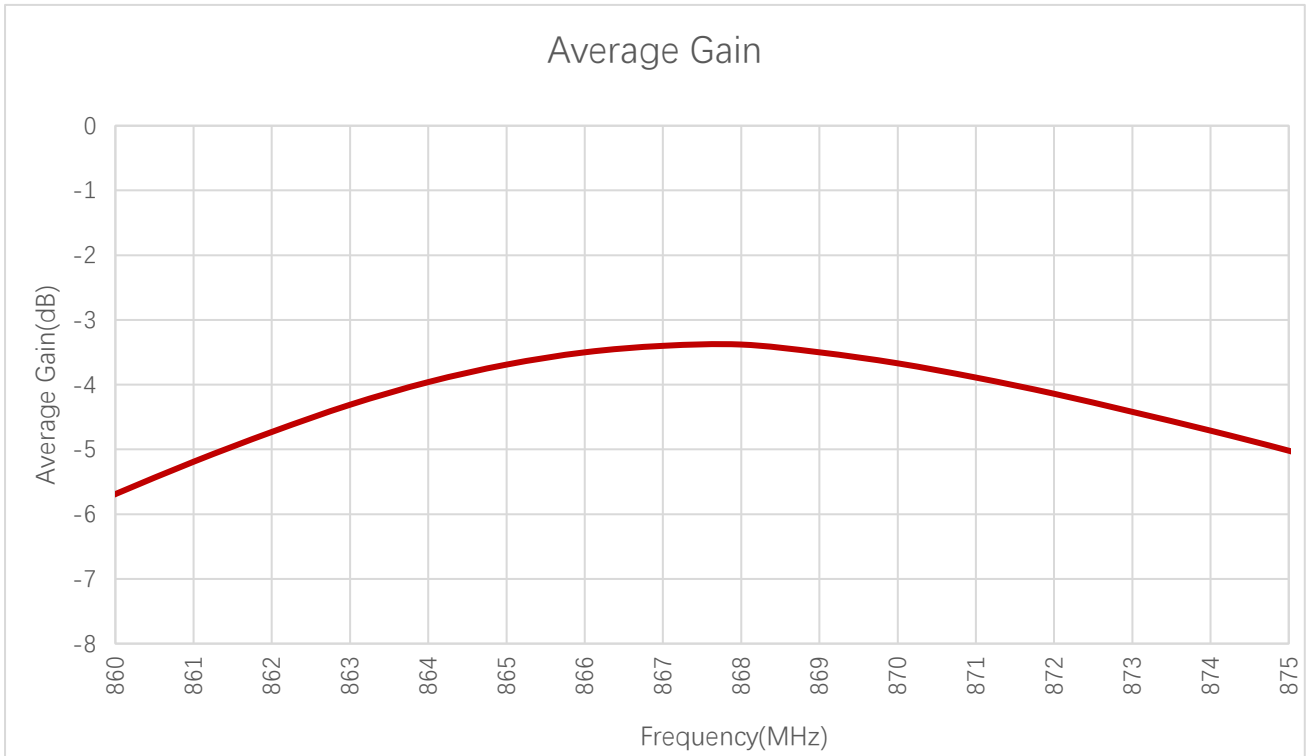
3.3.1. Efficiency



Efficiency (%)

Frequency (MHz)	863	868	870
On 80 × 40 mm EVB	37.1	45.9	43.0

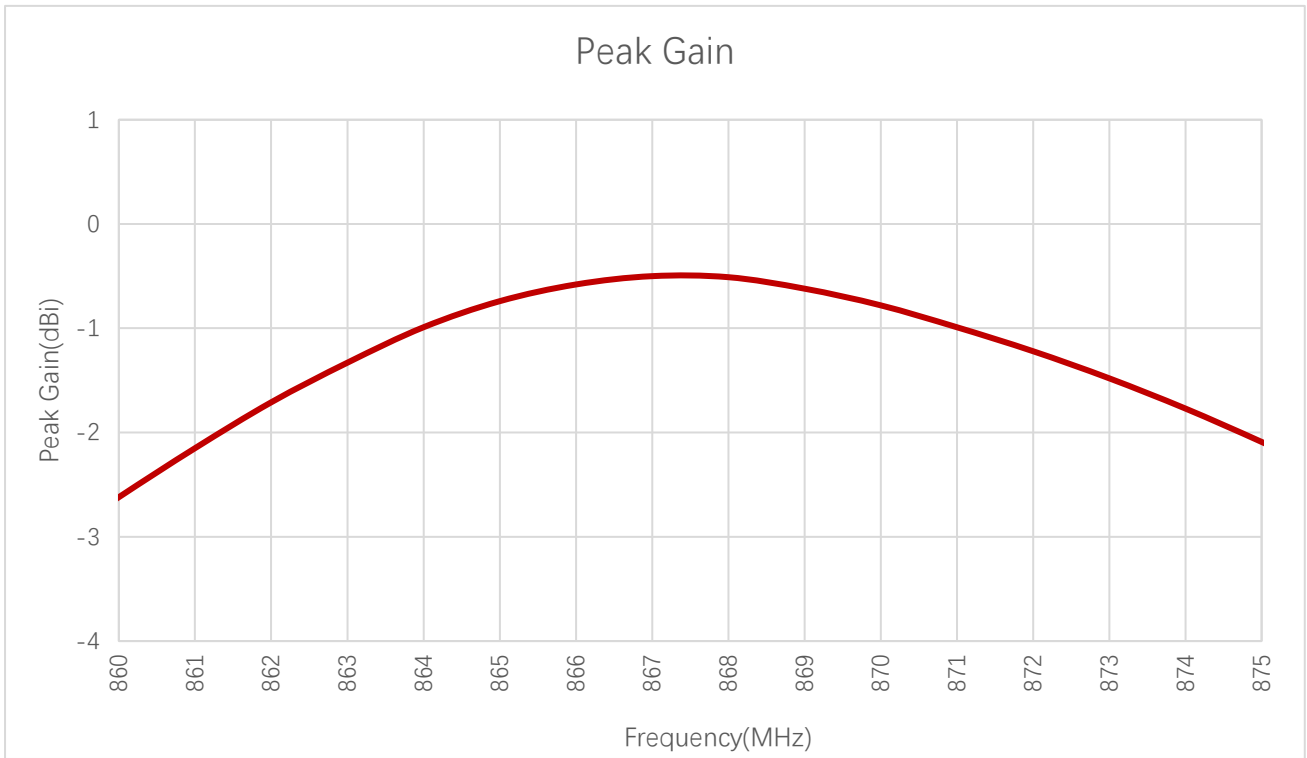
3.3.2. Average Gain



Average Gain (dB)

Frequency (MHz)	863	868	870
On 80 × 40 mm EVB	-4.3	-3.4	-3.7

3.3.3. Peak Gain

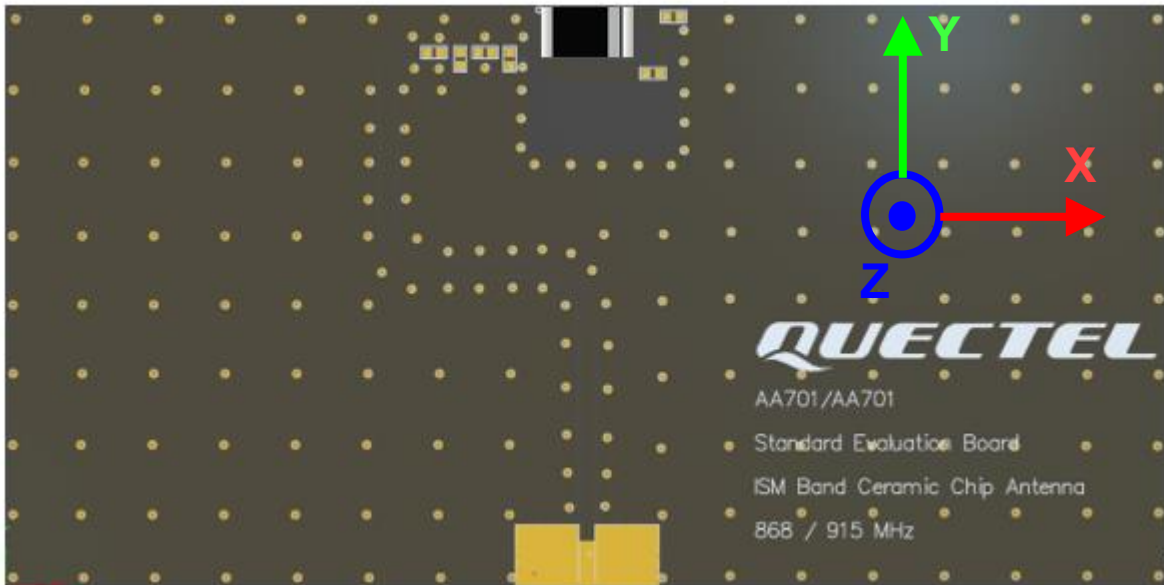


Peak Gain (dBi)

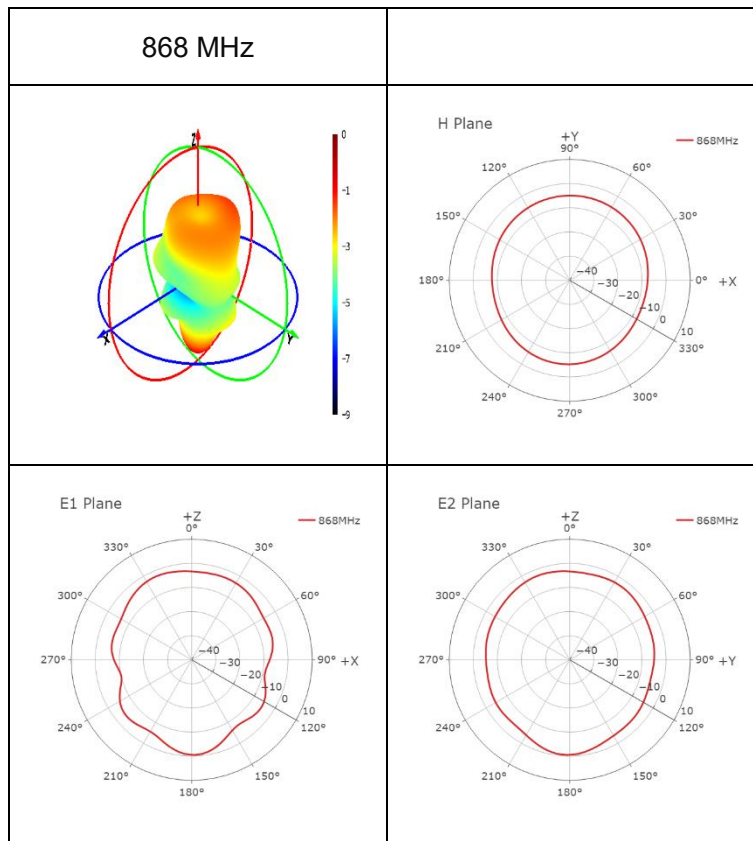
Frequency (MHz)	863	868	870
On 80 × 40 mm EVB	-1.3	-0.5	-0.8

3.3.4. 3D & 2D Radiation Pattern

- Test Status: Assembled on 80 × 40 mm EVB
- Test Chamber: GL-S-1



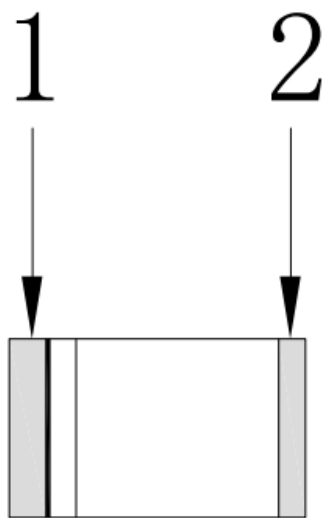
- ISM



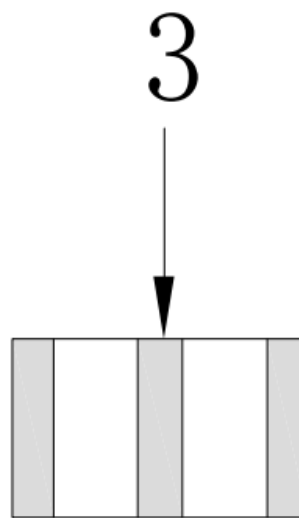
4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 3 pins, only two of which works. All other pins are for mechanical strength.

Pin	Description
1	Return / GND
2	Feed
3	N/C



TOP



BOTTOM

5 Transmission Line

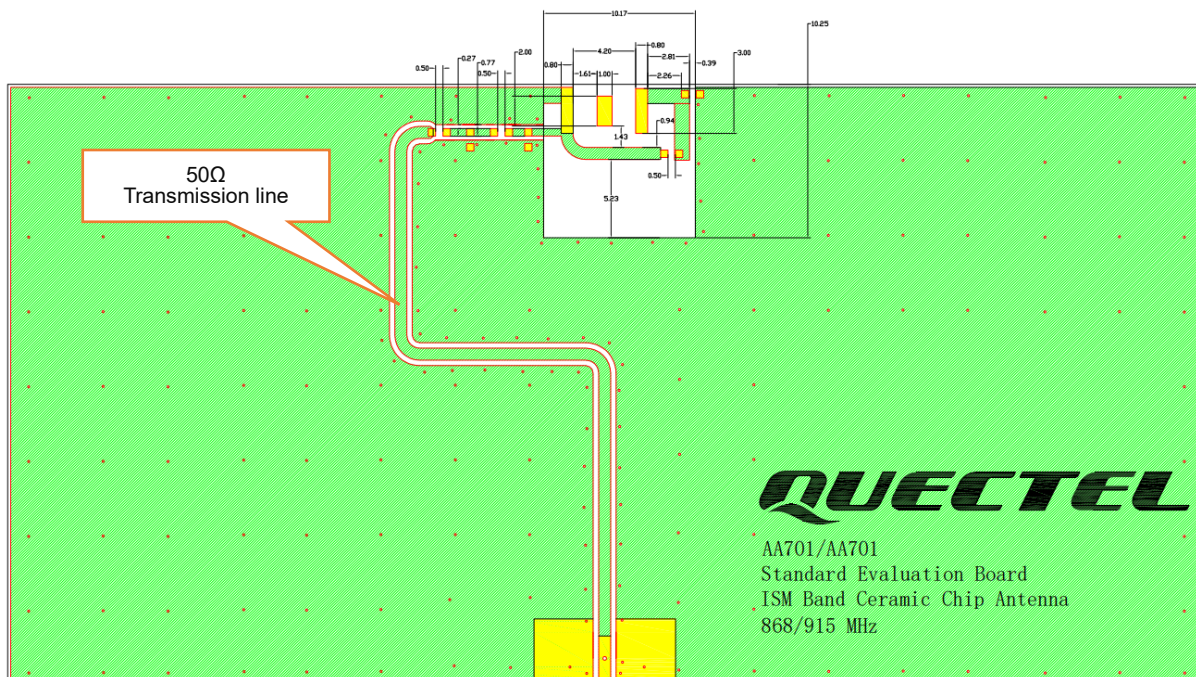
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the track so the characteristic impedance of the coplanar transmission is 50 Ω .

6 Recommended PCB Layout

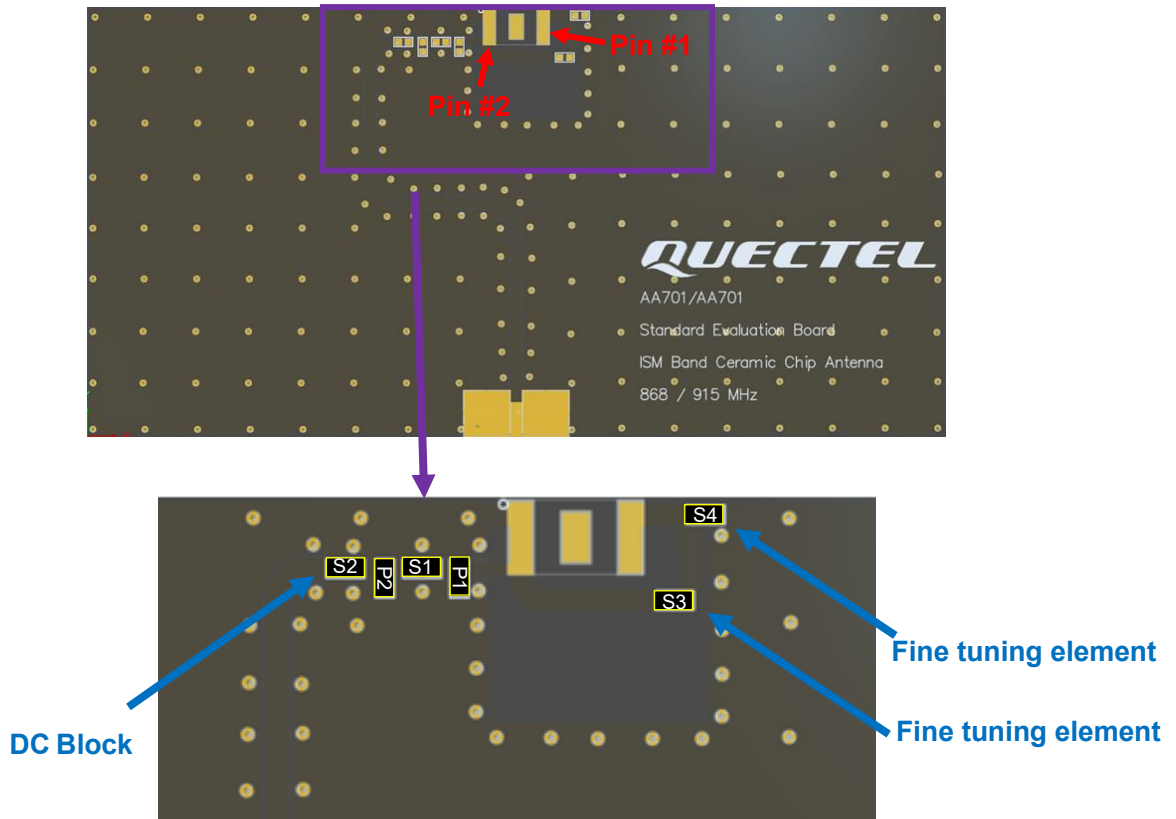
The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.



All dimensions are in mm.

7 Matching Circuit

Demo Board Top View



Matching circuit: (Center frequency is about 868 MHz at @ 80 × 40 mm Evaluation Board)

	P1	S1	P2	S2	S3	S4
Default Matching	N/A	0Ω	12nH	22pF	2.7pF	2.7pF
Tolerance	N/A	/	±5%	±0.05pF	±0.05pF	±0.05pF

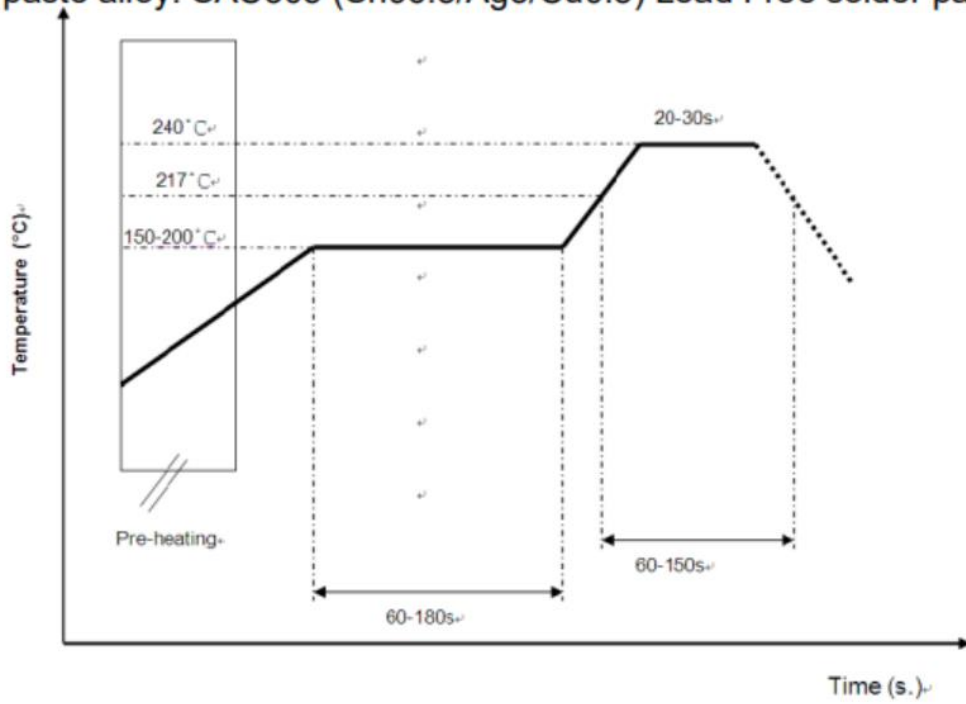
Pin #	Description
1	Return / GND
2	Feed

8 Soldering Temperature

Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (T _{smax} to T _p)	3 °C/second (Max.)
PREHEAT	Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (t _{smin} to t _{smax})	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature (T _p)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

9 Reflow Profile

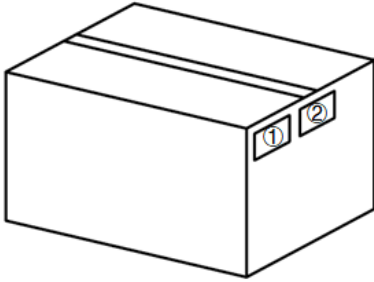
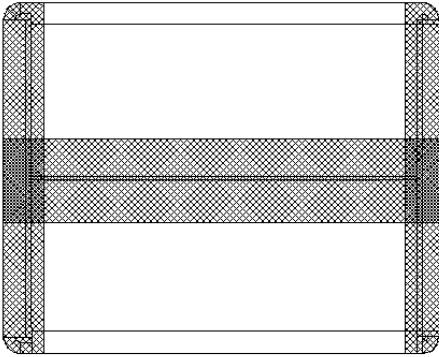
Solder paste alloy: SAC305 (Sn96.5/Ag3/Cu0.5) Lead Free solder paste



*Recommended solder paste alloy: SAC305 (Sn96.5 /Ag3 /Cu0.5) Lead Free solder paste.

10 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Reel
2		<p>(5000 PCS Antenna Products / Reel) Put 3 reels into the inner box.</p>
3		<p>(12 Inner Boxes / Carton Box) (180000 PCS Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <u>Carton Size:</u> <u>L × W × H = 400 × 400 × 200 mm</u></p>

<p>4</p>		<p>Position for Attaching Labels</p> <p>① Carton Label ② Quality Label</p>
<p>5</p>		<p>Sealing Cartons</p> <p>“I” type sealing cartons</p>
<p>6</p>	<p>The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.</p>	

Contact Us

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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Revision History

Version	Date	Author	Note
-	2022-04-28	Junsen LI/ Joye WANG	Creation of the document
1.0	2022-04-28	Junsen LI/ Joye WANG	First official release
1.1	2022-09-20	Junsen LI	Added Chapter 6.
2.0	2023-11-15	Nico PAN/ Lucky FENG/ David LIU/ Vinnie LIU	Numerous changes were made to this document. It should be read in its entirety.

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