



Antenna Datasheet

Product OC (Antenna Only): YSIS001AA

(Antenna + Rectangular EVB 1): YSIS001AAEVBAA

(Antenna + Rectangular EVB 2): YSIS001AAEVBBA

Version: 1.0

Date: 2023-06-09

Status: Released

Product Name: 433 Spring Antenna

Key Features:

Frequency band: 433–435 MHz (Compatible with B31 and B88)

Efficiency: Up to 47.66% (On 167 × 90 mm GND)

Dimensions: 29 × 7 × 7 mm

RoHS & REACH Compliant

High efficiency, excellent performance

Overview

This metal spring antenna is suitable for LTE B31/B88 and EU433 applications. Operating at 412-427MHz or 433-435MHz or 450-470MHz by different match circuit, it's a high-efficiency antenna which is mounted to the device host PCB using conventional Metal spring antenna reflow process. Ideal for LTE B31/B88 and EU433 frequency bands applications. We provide comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

Contents

Overview.....	1
Contents.....	2
1 Specification.....	3
1.1. Electrical.....	3
1.2. Supported Bands	5
1.3. Mechanical, Environmental & Storage.....	7
2 Drawing	8
2.1. Antenna.....	8
2.2. EVB	9
3 Detailed Performance	11
3.1. Overview	11
3.2. S-Parameter Test	12
3.2.1. VSWR	12
3.2.2. Return Loss	13
3.3. Radiation Performance Test.....	14
3.3.1. Efficiency.....	14
3.3.2. Average Gain	15
3.3.3. Peak Gain	16
3.3.4. 3D & 2D Radiation Pattern	17
4 Schematic Symbol and Pin Definition	20
5 Transmission Line	21
6 Recommended PCB Layout.....	22
7 Matching Circuit.....	24
8 Soldering Temperature.....	26
9 Reflow Profile	27
10 Packaging	28
Contact Us.....	30
Legal Notices	31
Revision History	33

1 Specification

Test Condition: Assembled On EVB

1.1. Electrical

Electrical	
Frequency Range	412–427 MHz, 433–435 MHz, 450–470 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail									
SPEC	Band		B88	EU433	B31	LoRa	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3
	Freq. (MHz)		412– 427	433– 435	450– 470	470– 510	700– 810	820– 960	1700– 2170
Max VSWR	On 91 × 36 mm GND		3.1	1.6	4.1	-	-	-	-
	On 167 × 90 mm GND		2.2	1.7	2.4	-	-	-	-
Max Return Loss (dB)	On 91 × 36 mm GND		-5.8	-12.7	-4.3	-	-	-	-
	On 167 × 90 mm GND		-8.4	-12.0	-7.6	-	-	-	-
AVG Eff. (%)	On 91 × 36 mm GND		9.9	11.1	14.9	-	-	-	-
	On 167 × 90 mm GND		32.6	37.4	44.9	-	-	-	-
AVG Gain (dB)	On 91 × 36 mm GND		-10.0	-9.5	-8.3	-	-	-	-
	On 167 × 90 mm GND		-4.9	-4.3	-3.5	-	-	-	-
Max Peak Gain (dBi)	On 91 × 36 mm GND		-7.2	-7.0	-5.1	-	-	-	-
	On 167 × 90 mm GND		-1.9	-1.3	0.1	-	-	-	-
VSWR			On 91 × 36 mm GND			≤ 4.1			
			On 167 × 90 mm GND			≤ 2.5			
Return Loss			On 91 × 36 mm GND			≤ -4.3 dB			
			On 167 × 90 mm GND			≤ -7.5 dB			
Peak Gain			On 91 × 36 mm GND			≤ -5 dBi			
			On 167 × 90 mm GND			≤ 0.1 dBi			

1.2. Supported Bands

5G NR / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / GPRS / GSM / NB-IoT				
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	Covered
1	2100	1920–1980	2110–2170	-
2	1900	1850–1910	1930–1990	-
3	1800	1710–1785	1805–1880	-
4	1700	1710–1755	2110–2155	-
5	850	824–849	869–894	-
7	2600	2500–2570	2620–2690	-
8	900	880–915	925–960	-
9	1800	1749.9–1784.9	1844.9–1879.9	-
11	1500	1427.9–1447.9	1475.9–1495.9	-
12	700	699–716	729–746	-
13	700	777–787	746–756	-
14	700	788–798	758–768	-
17	700	704–716	734–746	-
18	850	815–830	860–875	-
19	850	830–845	875–890	-
20	800	832–862	791–821	-
21	1500	1447.9–1462.9	1495.9–1510.9	-
22	3500	3410–3490	3510–3590	-
23	2100	2000–2020	2180–2200	-
24	1600	1626.5–1660.5	1525–1559	-
25	1900	1850–1915	1930–1995	-
26	850	814–849	859–894	-

28	700	703–748	758–803	-
31	450	452.5–457.5	462.5–467.5	√
34	2100	2010–2025		-
38	2600	2570–2620		-
39	1900	1880–1920		-
40	2300	2300–2400		-
41	2500	2496–2690		-
42	3500	3400–3600		-
48	3500	3550–3700		-
66	1700	1710–1780	-	-
71	600	663–698	-	-
74	1500	1427–1470	-	-
77	3500	3300–4200		-
78	3500	3300–3800		-
79	4500	4400–5000		-
88	412	410–415	420–425	√
EU433	433	433–435	433–435	√

Note:

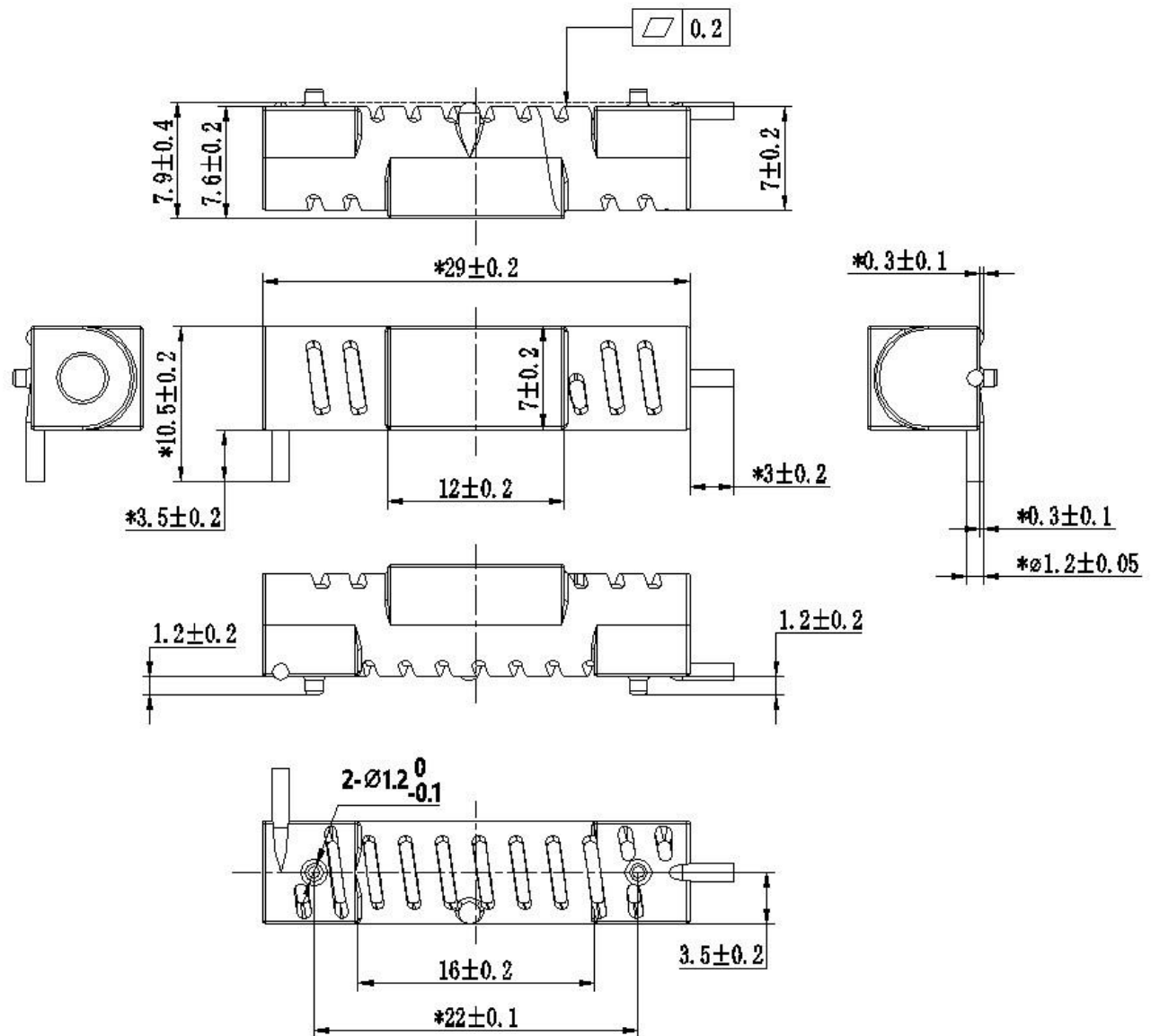
- Covered √ means efficiency > 20%.
- Based on 167 × 90 mm GND.

1.3. Mechanical, Environmental & Storage

Mechanical	
Antenna Size	29 × 7 × 7 mm
Material	Metal + LCP
Mounting Type	SMD
Weight	Typ. 3.3 g
Recommended EVB1 Size	185 × 90 × 1 mm
Recommended EVB2 Size	100 × 36 × 1 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes
Storage	
Storage Temperature	18 °C to 27 °C
Humidity	30–80 % RH
Storage Place	Away from corrosive gas and direct sunlight
Packaging	Antennas should be stored in unopened sealed manufacturer's plastic packaging

2 Drawing

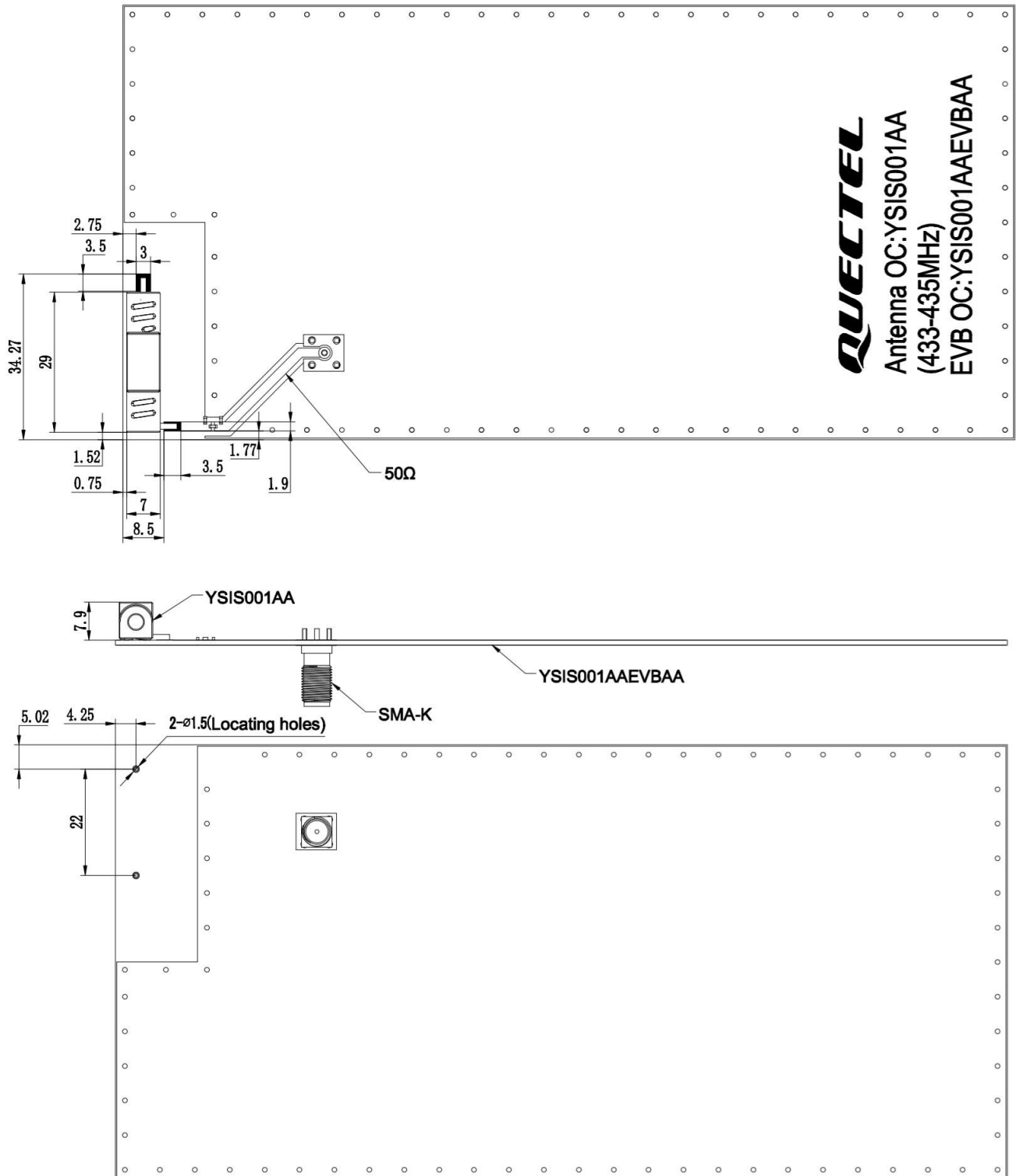
2.1. Antenna



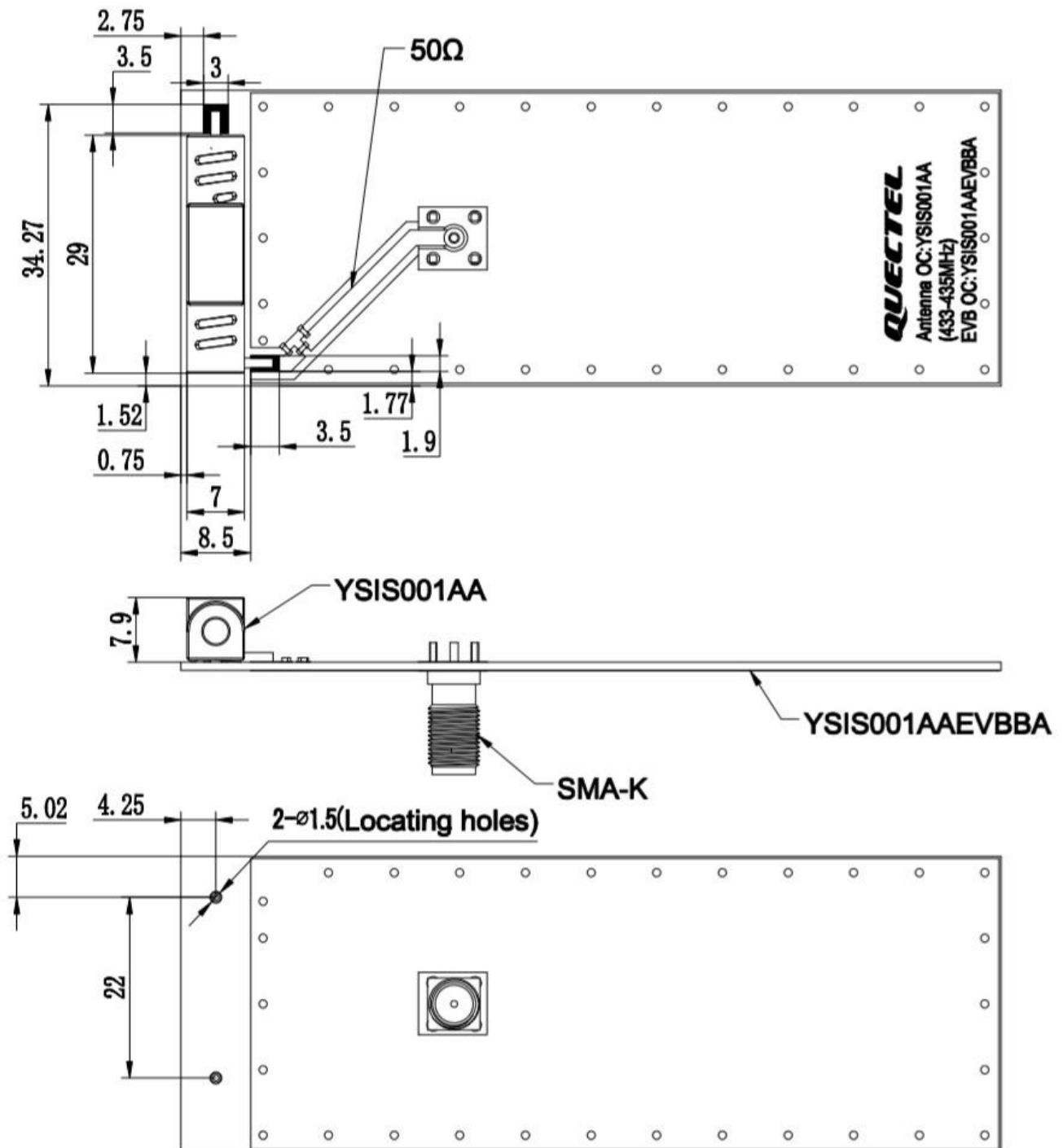
All dimensions in (mm)

2.2. EVB

- YSIS001AAEVBA



● YSIS001AAEVBBA

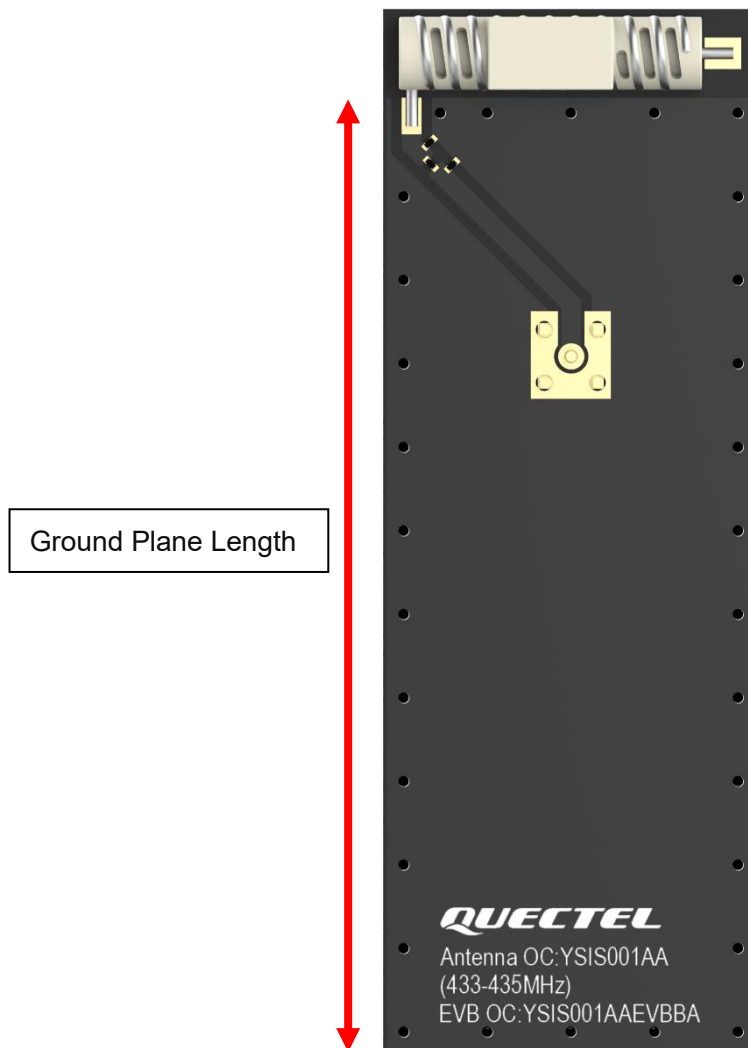


All dimensions in (mm)

3 Detailed Performance

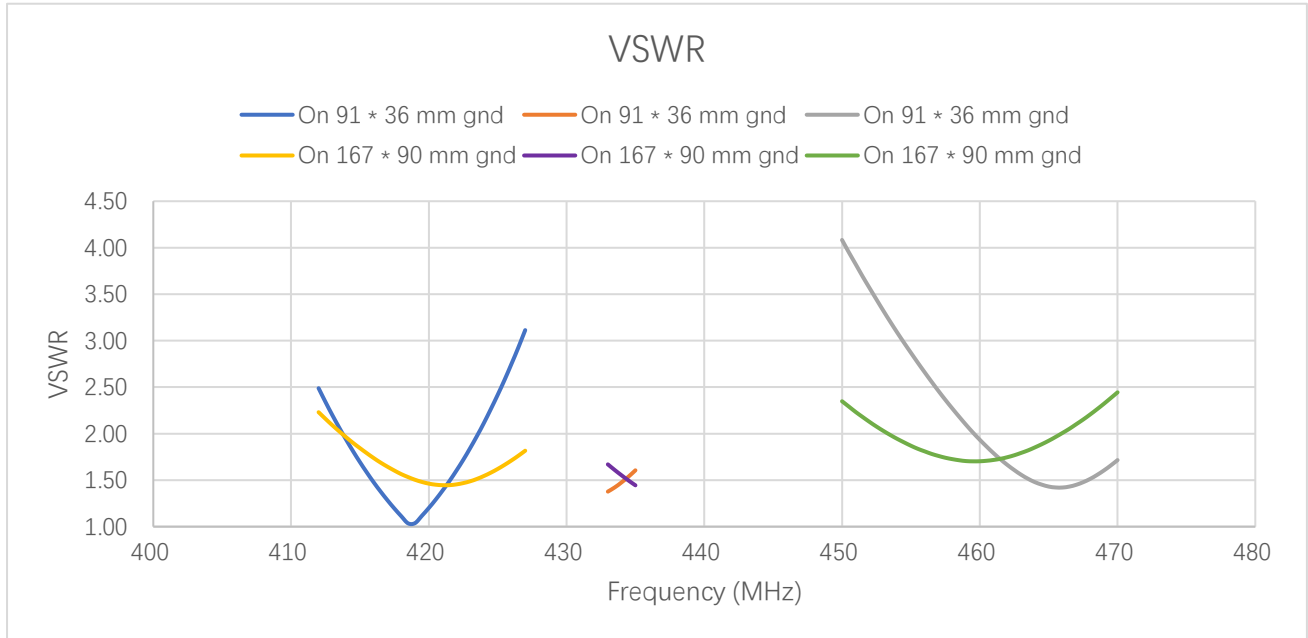
3.1. Overview

The performance of the 433 bands is highly dependent on the ground plane length. The host PCB ground needs to be as long as the device allows. Reducing the GND directly relates to the performance of the 433 bands.



3.2. S-Parameter Test

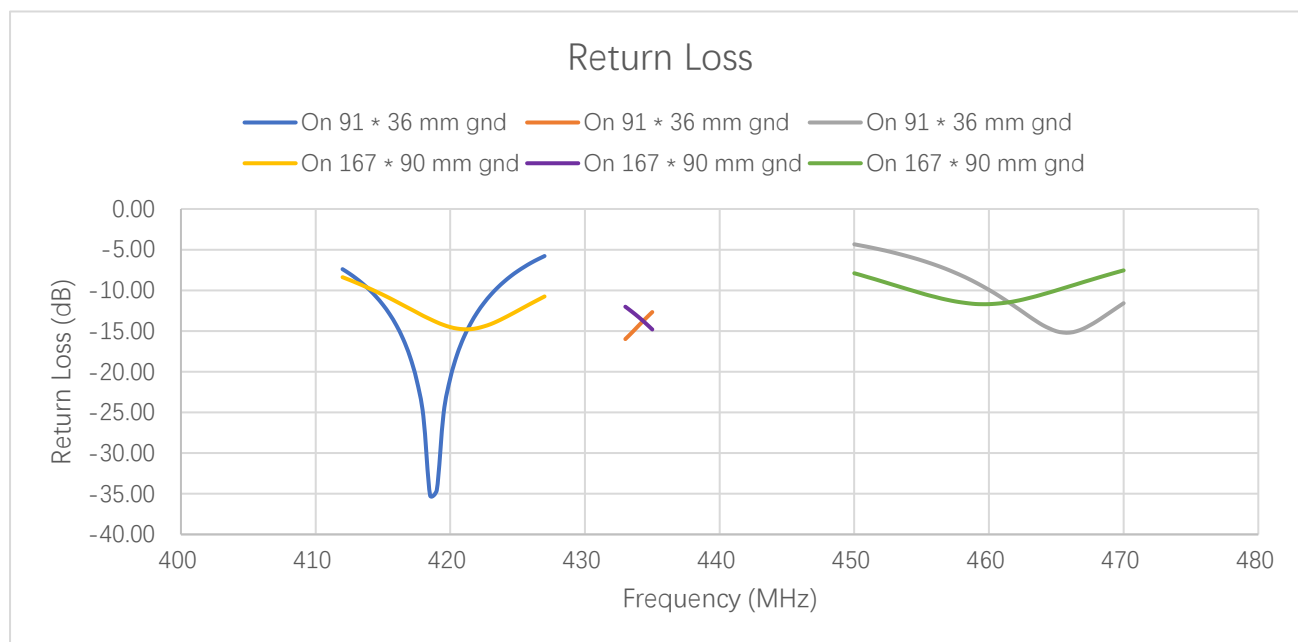
3.2.1. VSWR



VSWR

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
On 91 × 36 mm GND	2.5	3.1	1.4	1.6	4.1	1.7	-	-	-	-
On 167 × 90 mm GND	2.2	1.8	1.7	1.4	2.4	2.4	-	-	-	-

3.2.2. Return Loss

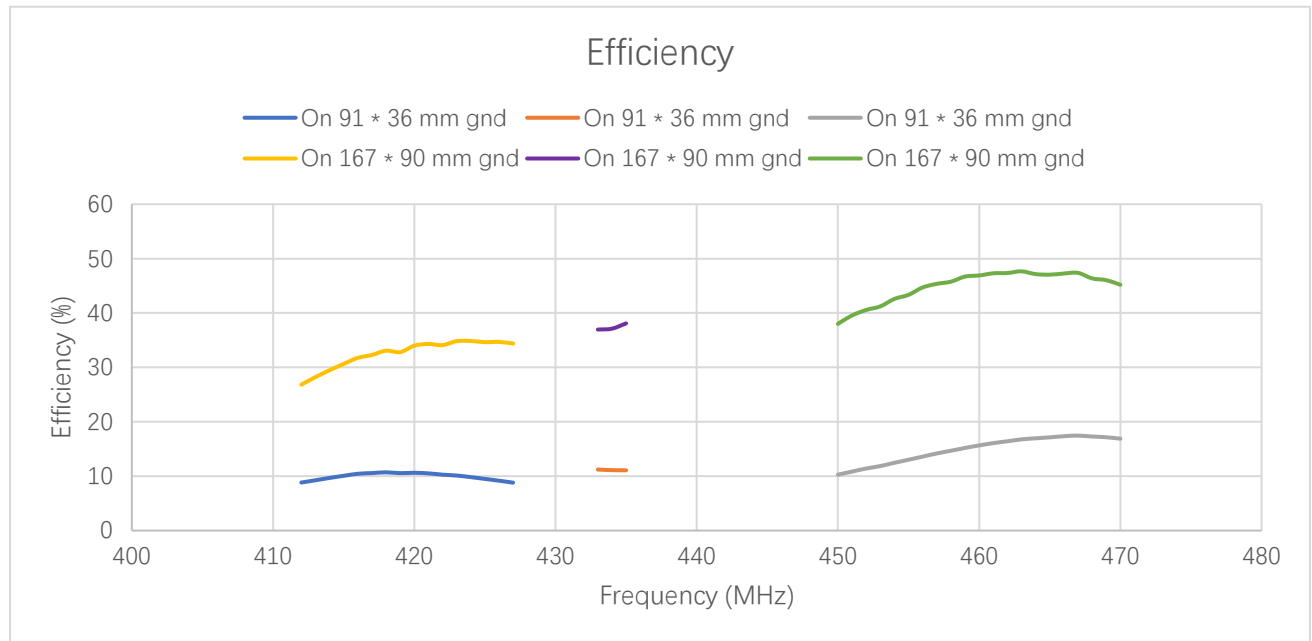


Return Loss (dB)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
On 91 × 36 mm GND	-7.4	-5.8	-16.0	-12.7	-4.3	-11.6	-	-	-	-
On 167 × 90 mm GND	-8.4	-10.8	-12.0	-14.8	-7.9	-7.6	-	-	-	-

3.3. Radiation Performance Test

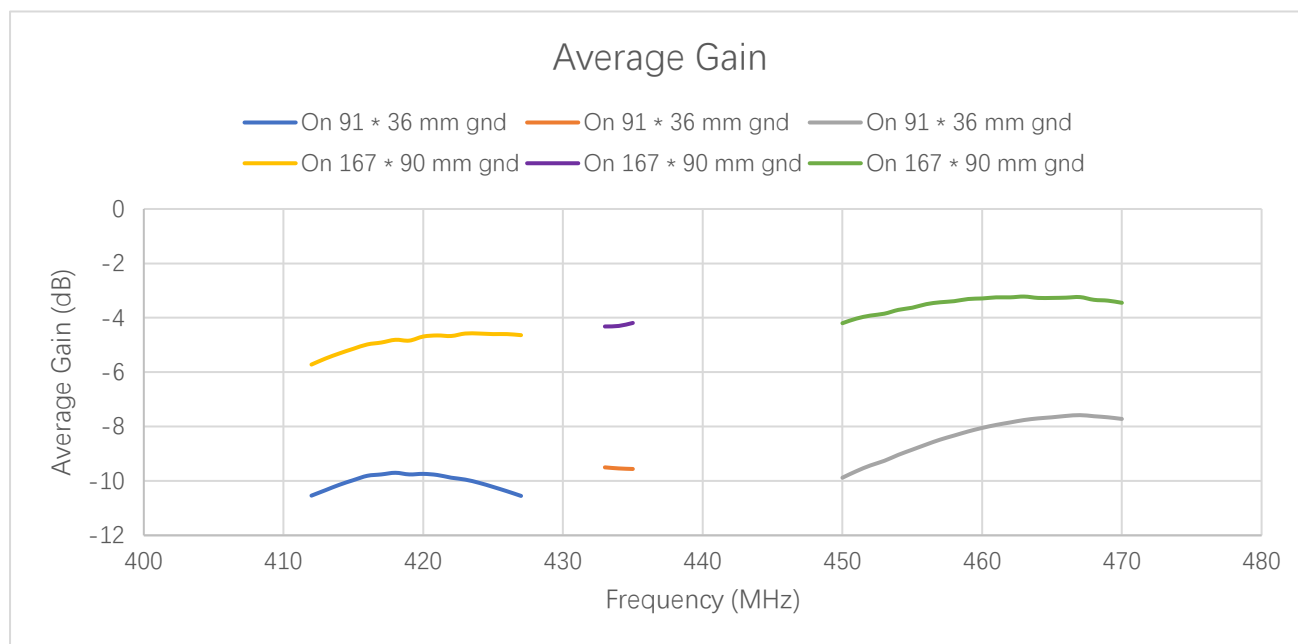
3.3.3. Efficiency



Efficiency (%)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
On 91 × 36 mm GND	8.8	8.8	11.2	11.1	10.3	16.9	-	-	-	-
On 167 × 90 mm GND	26.8	34.4	37.0	38.1	38.0	45.2	-	-	-	-

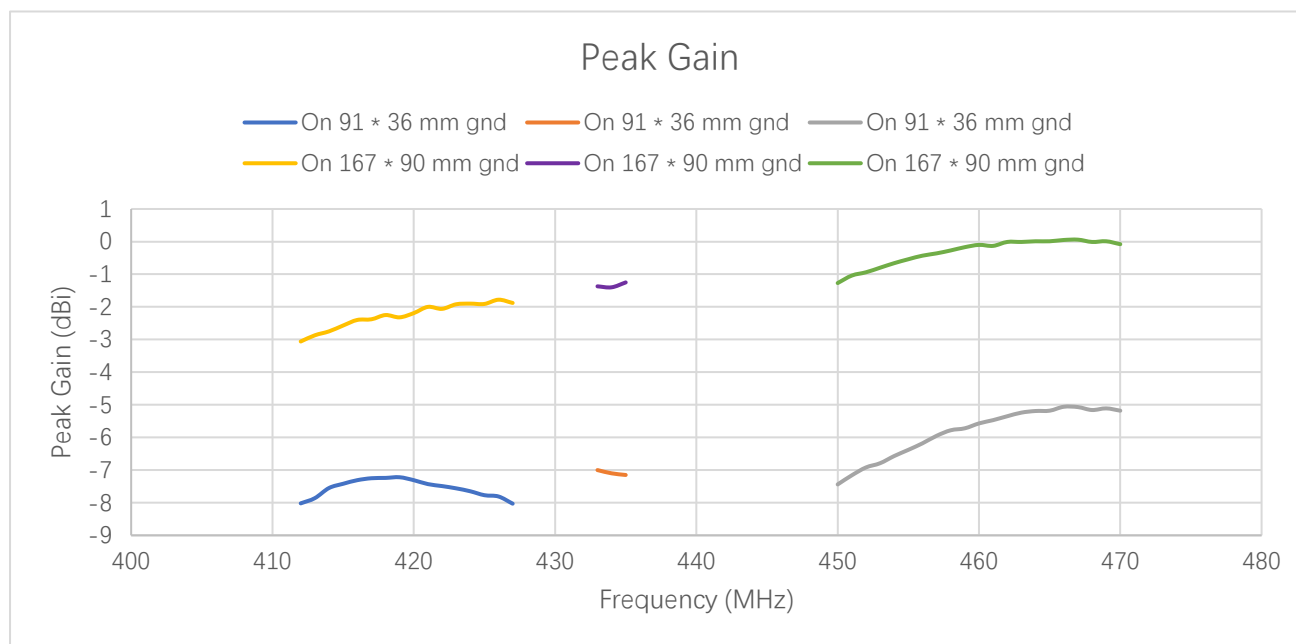
3.3.4. Average Gain



Average Gain (dB)

Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
On 91 × 36 mm GND	-10.5	-10.6	-9.5	-9.6	-9.9	-7.7	-	-	-	-
On 167 × 90 mm GND	-5.7	-4.6	-4.3	-4.2	-4.2	-3.5	-	-	-	-

3.3.5. Peak Gain

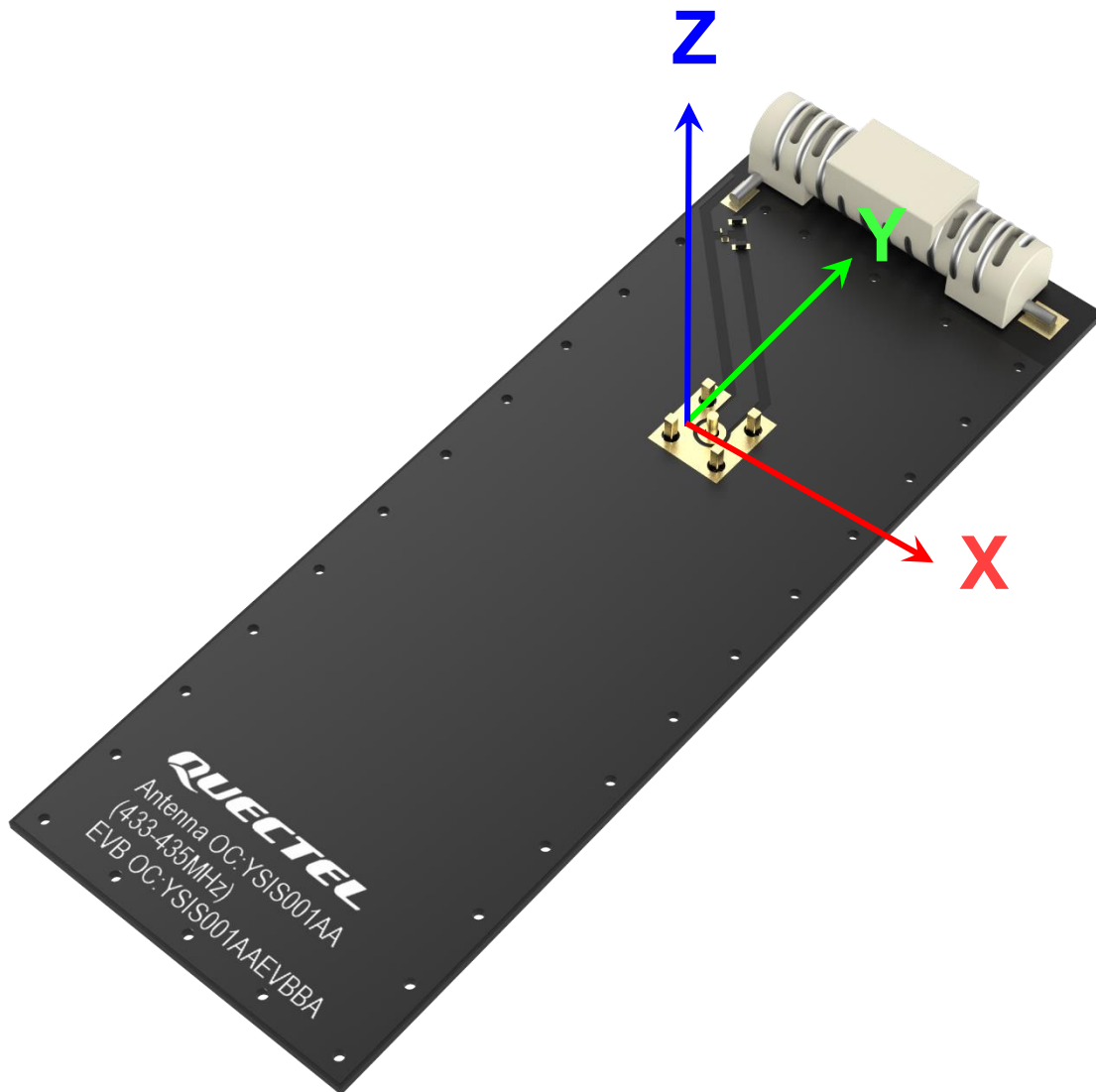


Peak Gain (dBi)

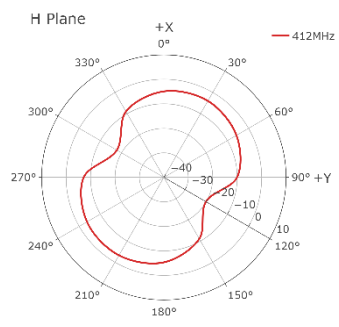
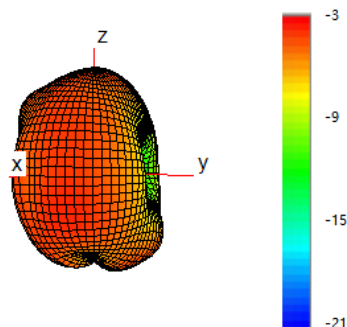
Frequency (MHz)	412	427	433	435	450	470	490	510	860	870
On 91 × 36 mm GND	-8.0	-8.0	-7.0	-7.2	-7.4	-5.2	-	-	-	-
On 167 × 90 mm GND	-3.1	-1.9	-1.4	-1.3	-1.3	-0.1	-	-	-	-

3.3.6. 3D & 2D Radiation Pattern

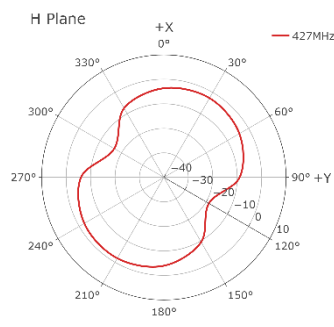
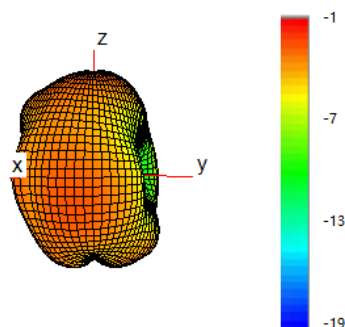
- Test Status: Assembled on $91 \times 36 \times 1$ mm GND



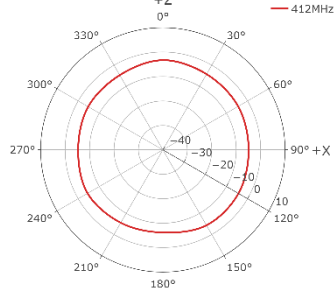
412 MHz



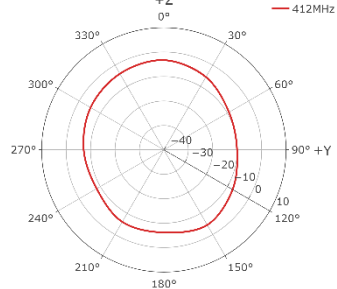
427 MHz



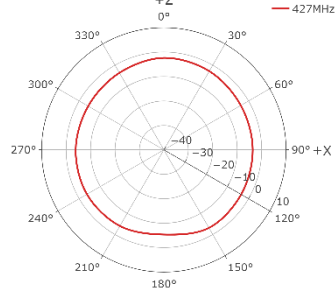
E1 Plane



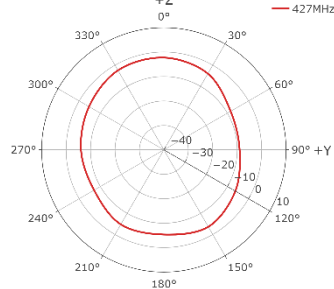
E2 Plane



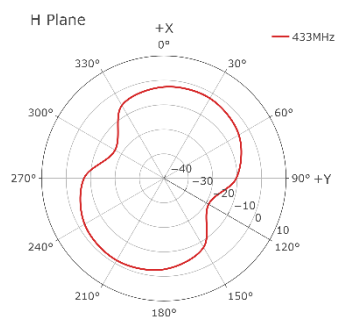
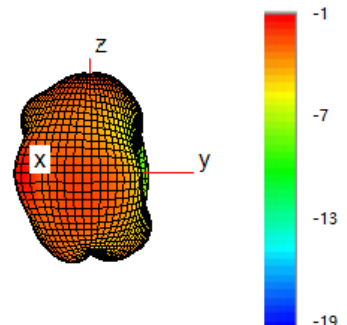
E1 Plane



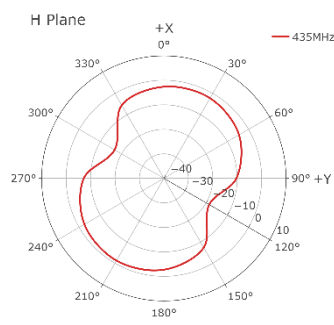
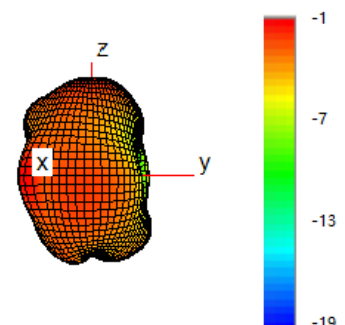
E2 Plane



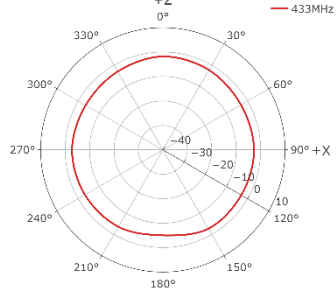
433 MHz



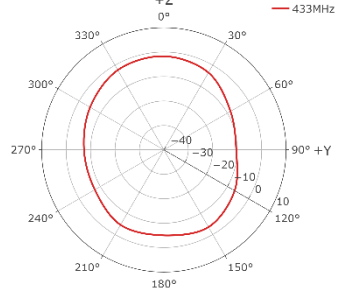
435 MHz



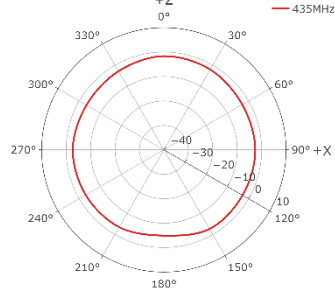
E1 Plane



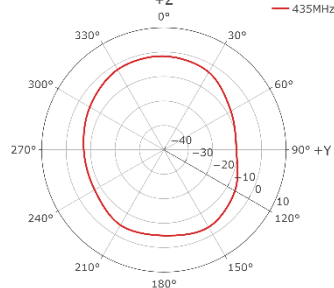
E2 Plane



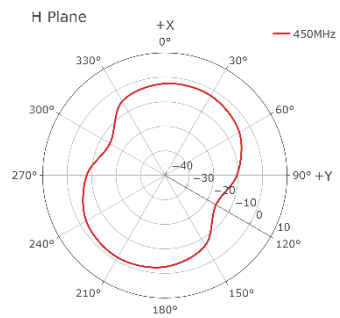
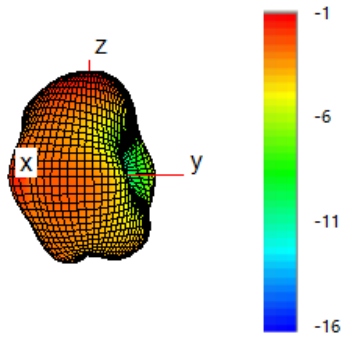
E1 Plane



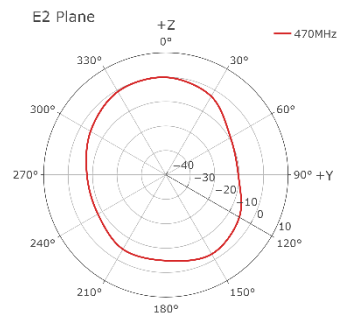
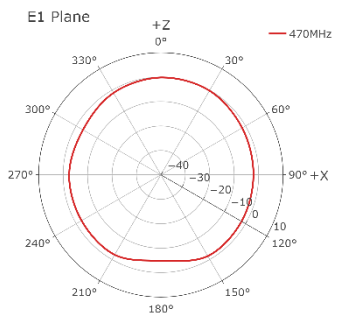
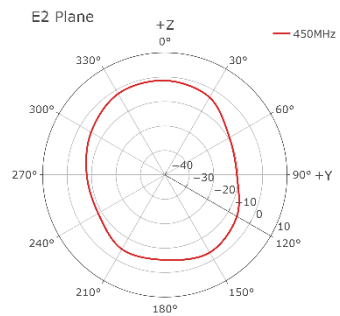
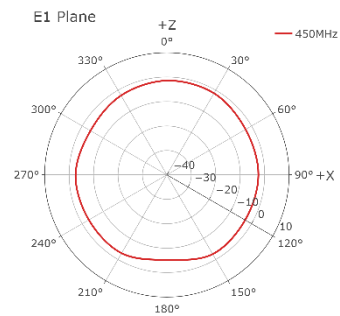
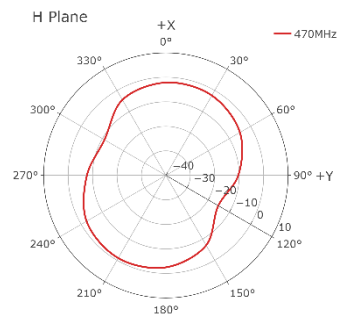
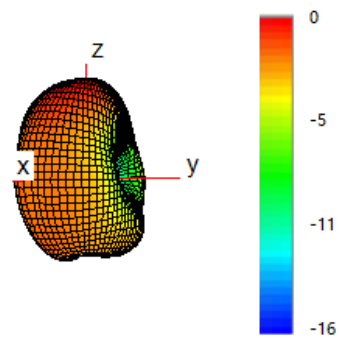
E2 Plane



450 MHz



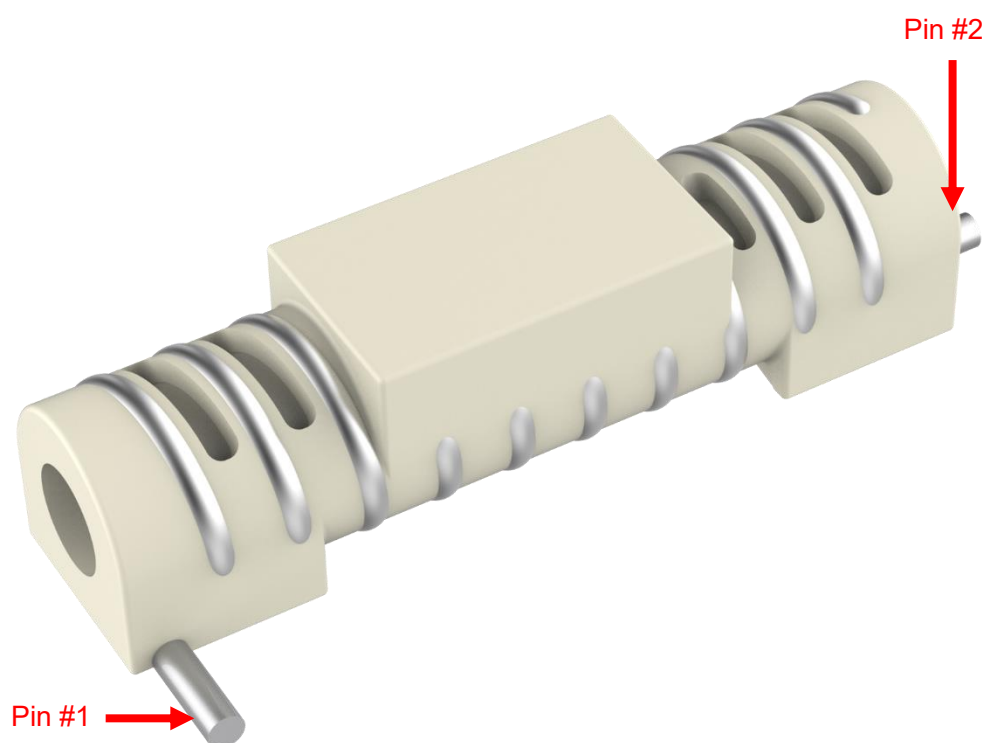
470 MHz



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 2 pins, only one of which work. All other pins are for mechanical strength.

Pin	Description
1	Feed
2	Not used (Mechanical only)



5 Transmission Line

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

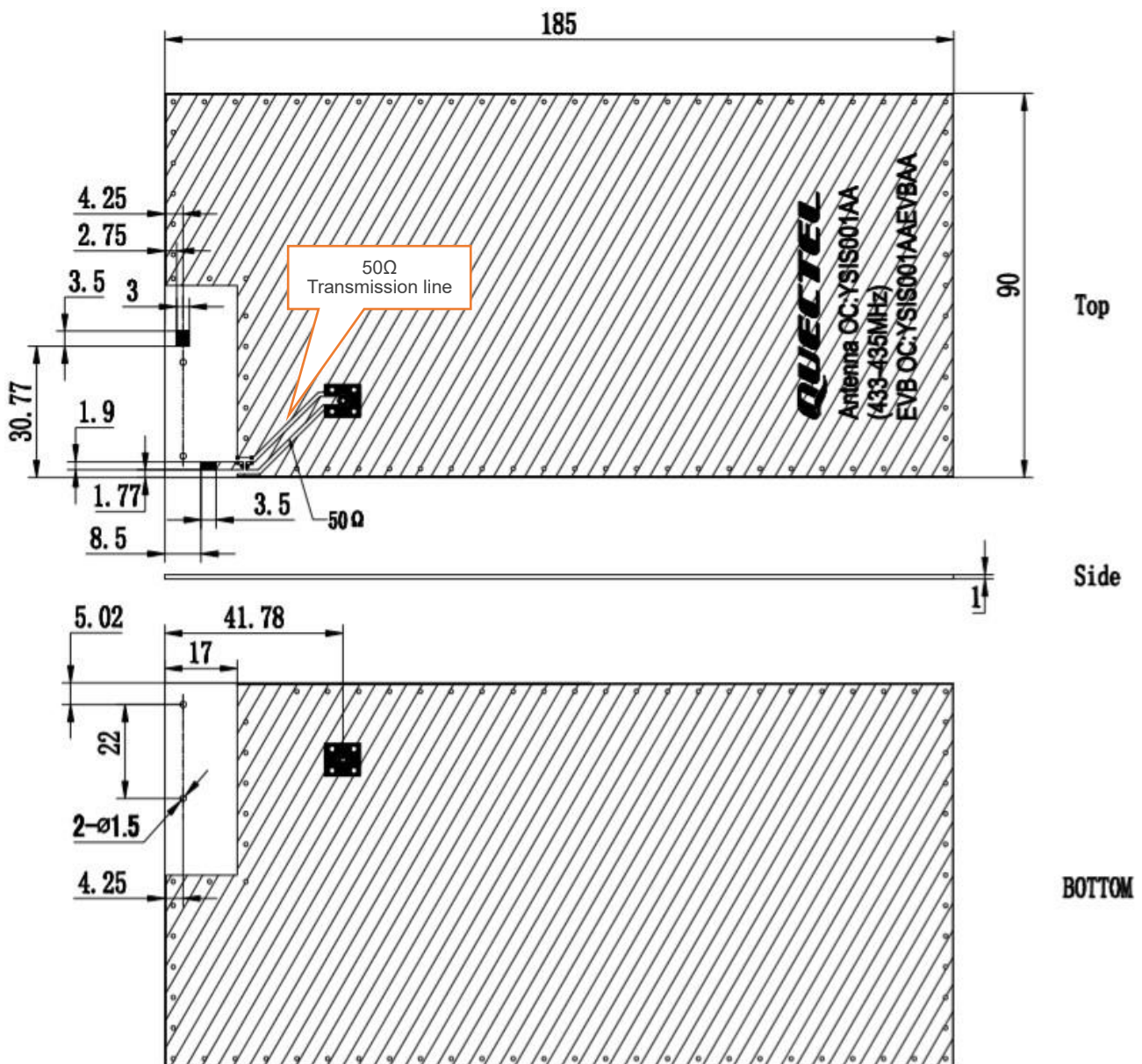
- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

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

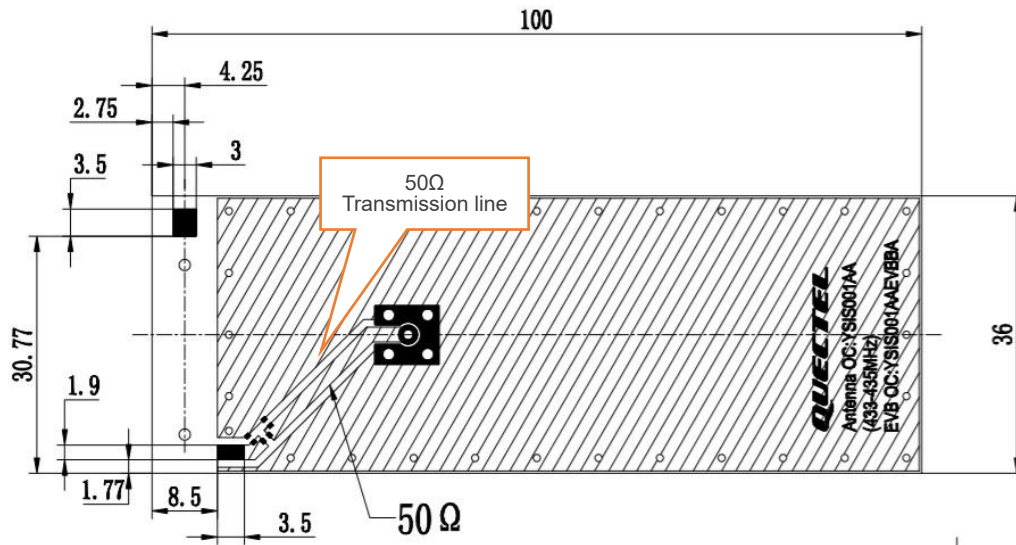
The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.

- YSIS001AAEVBA



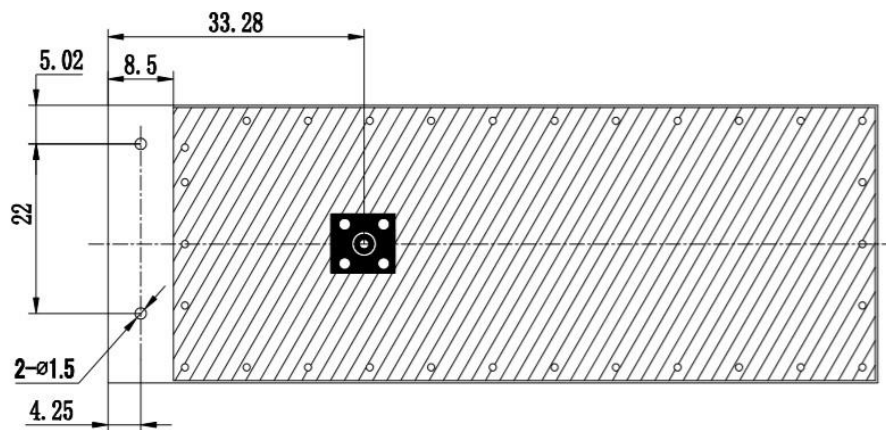
All dimensions in (mm)

● YSIS001AAEVBBB



Top

Side

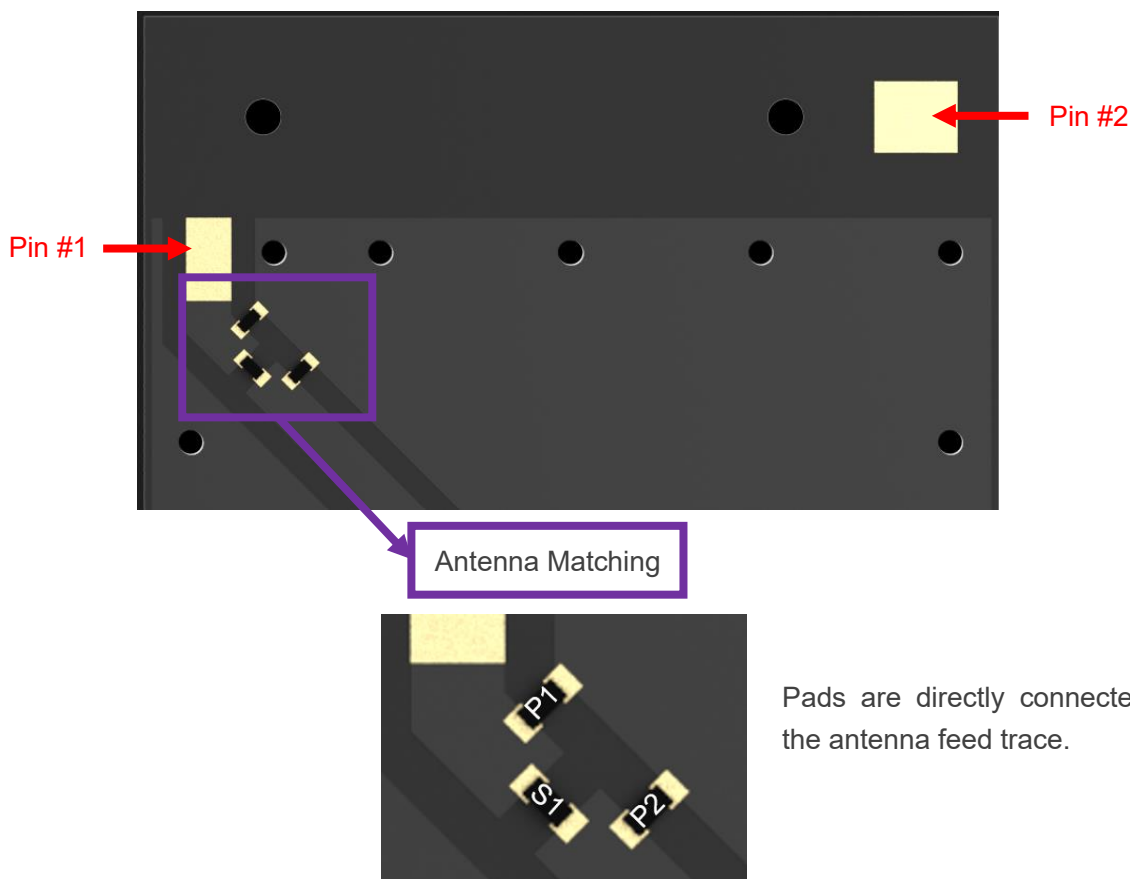


Bottom

All dimensions in (mm)

7 Matching Circuit

Demo Board Top View



GND Length = 91 × 36 mm

412-427 MHz	P1	S1	P2			
Default Matching	DNI	22 nH	6.2 nH			
Tolerance	N/A	±3 %	±3 %			

GND Length = 91 × 36 mm

433-435 MHz	P1	S1	P2			
Default Matching	DNI	18 nH	6.8 nH			
Tolerance	N/A	±3 %	±3 %			

GND Length = 91 × 36 mm

450-470 MHz	P1	S1	P2			
Default Matching	DNI	6.8 nH	6.8 nH			
Tolerance	N/A	±3 %	±3 %			

GND Length = 167 × 90 mm

412-427 MHz	P1	S1	P2			
Default Matching	DNI	39 nH	10 nH			
Tolerance	N/A	±3 %	±3 %			

GND Length = 167 × 90 mm

433-435 MHz	P1	S1	P2			
Default Matching	DNI	33 nH	9.1 nH			
Tolerance	N/A	±3 %	±3 %			

GND Length = 167 × 90 mm

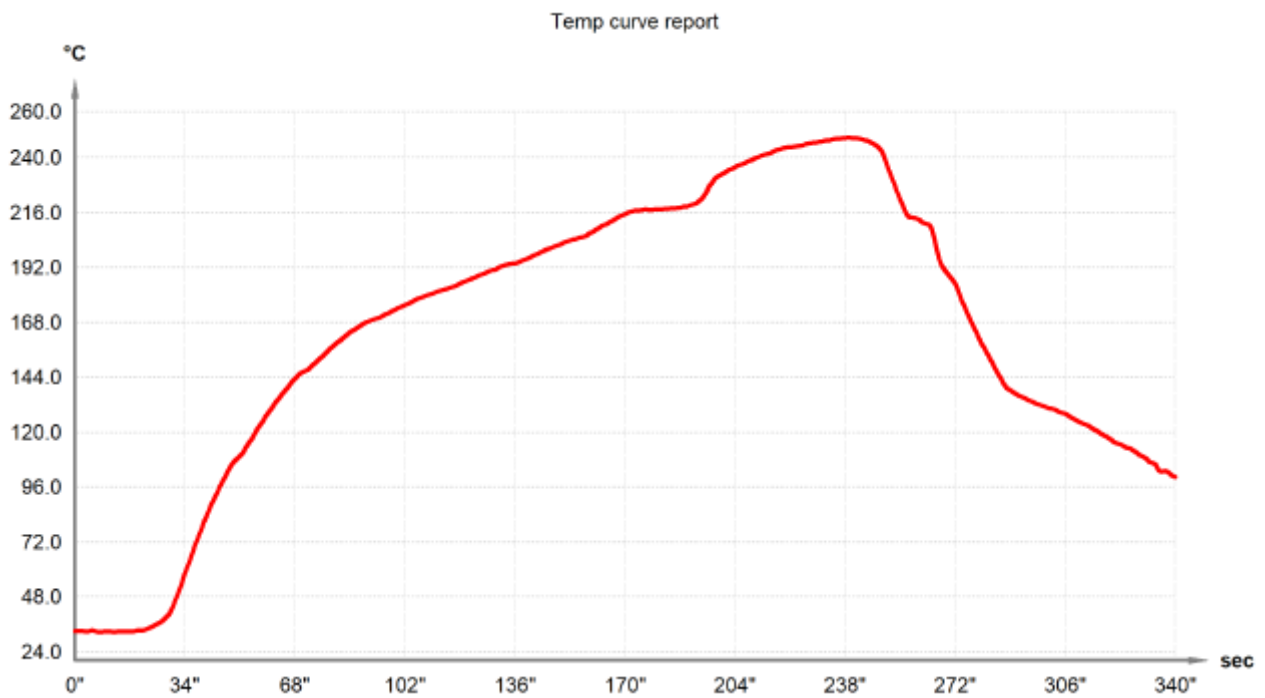
450-470 MHz	P1	S1	P2			
Default Matching	DNI	22 nH	10 nH			
Tolerance	N/A	±3 %	±3 %			

Pin #	Description
1	Feed
2	Not used (Mechanical only)

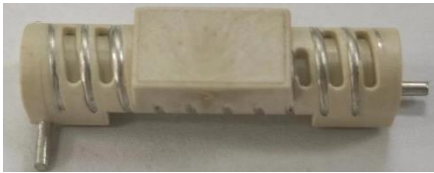
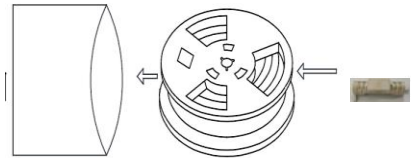
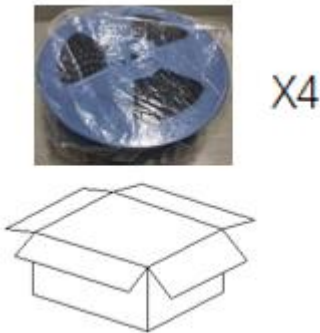
8 Soldering Temperature

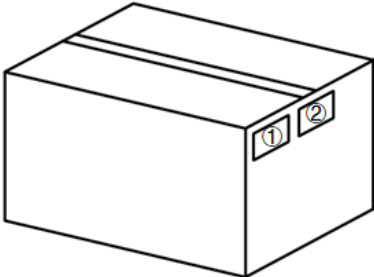
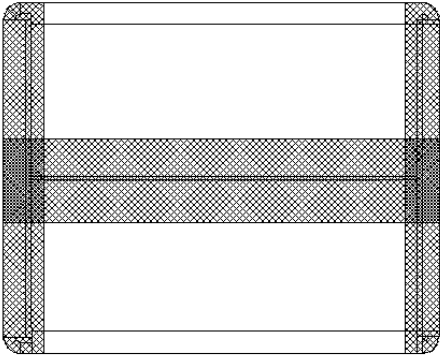
Channels	Name	Heating time 150.0-200.0°C	Above temp 217.0°C	Top temp	Heating slope 150.0-180.0°C	Cooling slope 180.0-150.0°C
1	Pin1	73"	82"	248.7	0.97	-2.92
Refrence value		70.0-95.0s	70.0-90.0s	240.0-250.0°C	0.0-3.0°C/s	-4.0--1.0°C/s

9 Reflow Profile



10 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Product drawing
2		300 antenna products in a reel. The product is vacuumed in a vacuum bag.
3		4 Vacuum Bags / Carton Box (1200 PCS / Carton Box) <u>Carton Size:</u> <u>L × W × H = 345 × 345 × 280 mm</u>

4		Position for Attaching Labels ① Carton Label ② Quality Label
5		Sealing Cartons “Γ” type sealing cartons

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:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local offices. For more information, please visit:

<http://www.quectel.com/support/sales.htm>.

For technical support, or to report documentation errors, please visit:

<http://www.quectel.com/support/technical.htm>.

Or email us at: support@quectel.com.

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties (“third-party materials”). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

Disclaimer

- a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
- b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
- c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
- d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

Copyright © Quectel Wireless Solutions Co., Ltd. 2023. All rights reserved.

Revision History

Version	Date	Author	Note
-	2023-06-09	Mordecai LIU/ Jason LONG/ David LIU/ Bunny ZHANG	Creation of the document
1.0	2023-06-09	Mordecai LIU/ Jason LONG/ David LIU/ Bunny ZHANG	First official release



www.quectel.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Quectel:](#)

[YSIS001AA](#)