Antenna

YC0003BA Datasheet

Antenna Services

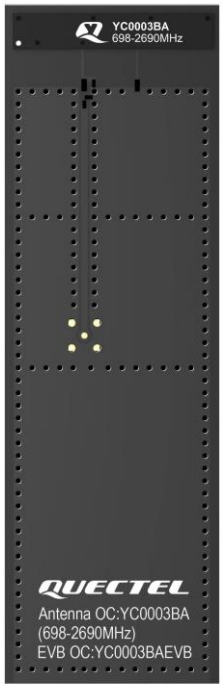
Version: 2.1

OC (Antenna Only): **YC0003BA**

OC (Antenna + EVB): **YC0003BAEVB**

Date: 2023-04-20

Status: Released



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About the Document

Revision History

Version	Date	Author	Note
-	2022-09-22	Kane LIU/ Joye WANG	Creation of the document
1.0	2022-09-22	Kane LIU/ Joye WANG	First official release
2.0	2023-01-12	Kane LIU/ Joye WANG/ Vinnie LIU/ David LIU	Added Chapters 5,6,7,9,10,11 and 13.
2.1	2023-04-20	Joye WANG	Added drawings in Chapters 5 and 6.

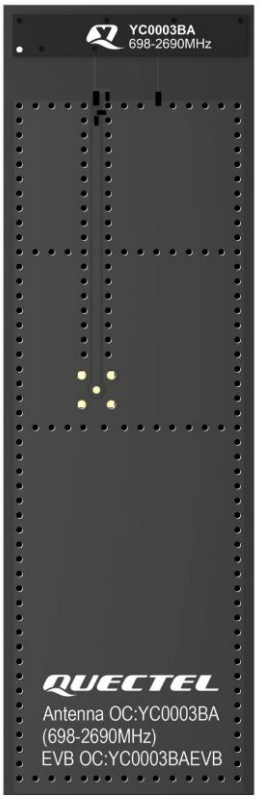
Contents

1 Product Description

This Quectel embedded 4G SMD antenna covers main 4G LTE bands and is compatible with 3G/2G/LPWA bands. Featuring high efficiency and gain, it is an ideal antenna for a smooth and stable connection with high-efficiency data transmission even under the influence of the device's internal structure. Ground plane dependent, it's designed to be mounted directly to the device host PCB using a conventional PCB reflow process. Supplied tape and reel for high volume pick and place assembly, this SMD antenna can be tuned specifically for the final device environment with a simple PI matching circuit.

2 Product Features

- Cellular 4G
- High efficiency
- Excellent performance



3 Product Specifications

Passive Electrical Specifications	
Frequency Range	700–2690 MHz
Input Impedance	50 Ω
VSWR	≤ 2.94
Gain	≤ 3.65 dBi
Polarization Type	Linear

Detailed Passive Electrical Specifications								
Frequency Range (MHz)	**700–960**	**1176–1280**	**1400–1610**	**1710–2170**	**2170–2690**	**3300–4000**	**4000–5000**	**5000–6000**
VSWR (Max.)	2.94	-	-	2.6	2.6	-	-	-
Average Efficiency (%)	58.2	-	-	56.8	60.8	-	-	-
Max. Peak Gain (dBi)	1.02	-	-	2.75	3.65	-	-	-

Mechanical Specifications	
Antenna Size	40 × 7 × 3 mm
Color	Black
Working Temperature	-40 °C to +85 °C
Mounting Type	SMD

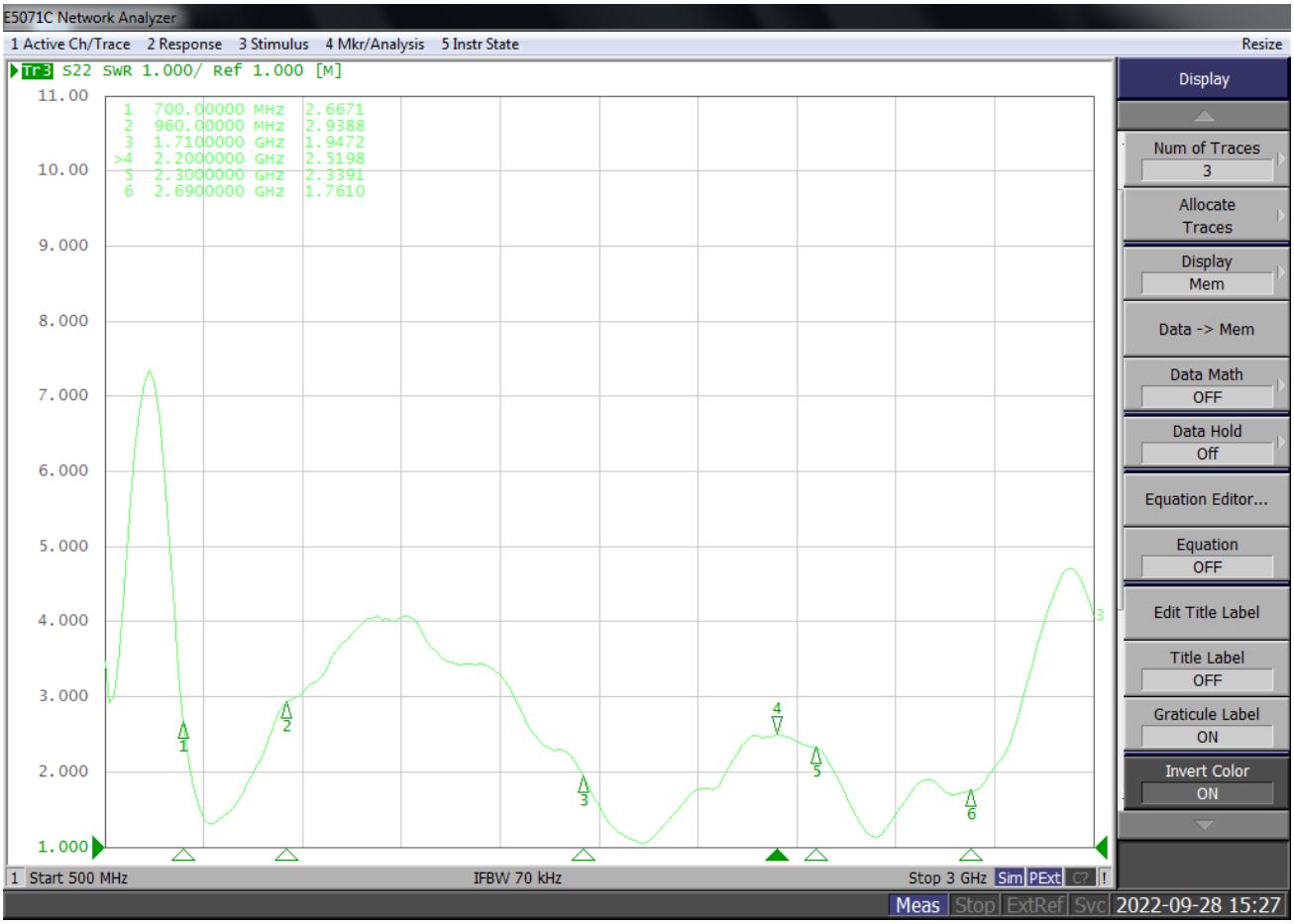
EVB Mechanical Specifications	
EVB Size	136.5 × 43 × 1 mm
Material	FR 4
Connector Type	SMA Female
Working Temperature	-40 °C to +85 °C
Mounting Type	Screw

4 Overall Performance

4.1. Test Environment

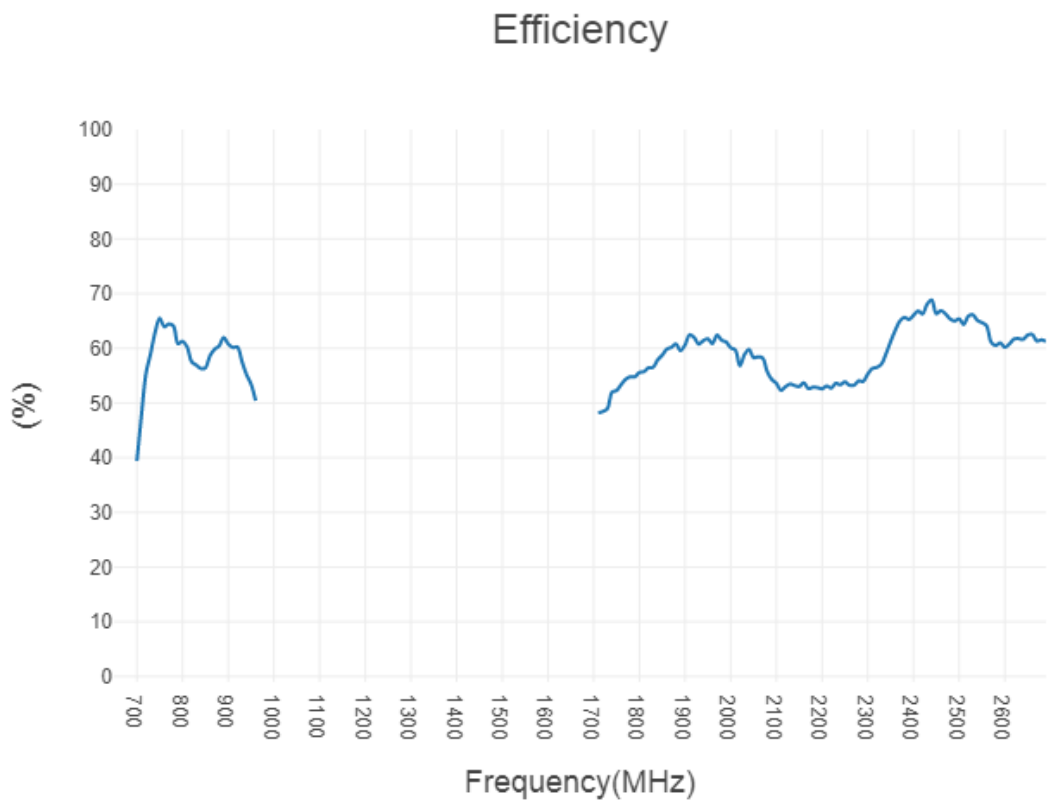
- KEYSIGHT ENA Network Analyzer E5063A 100 kHz – 8.5 GHz
- RayZone® 2800 Chamber 5G (FR1) SISO/MIMO, 600 MHz – 8.5 GHz

4.2. VSWR



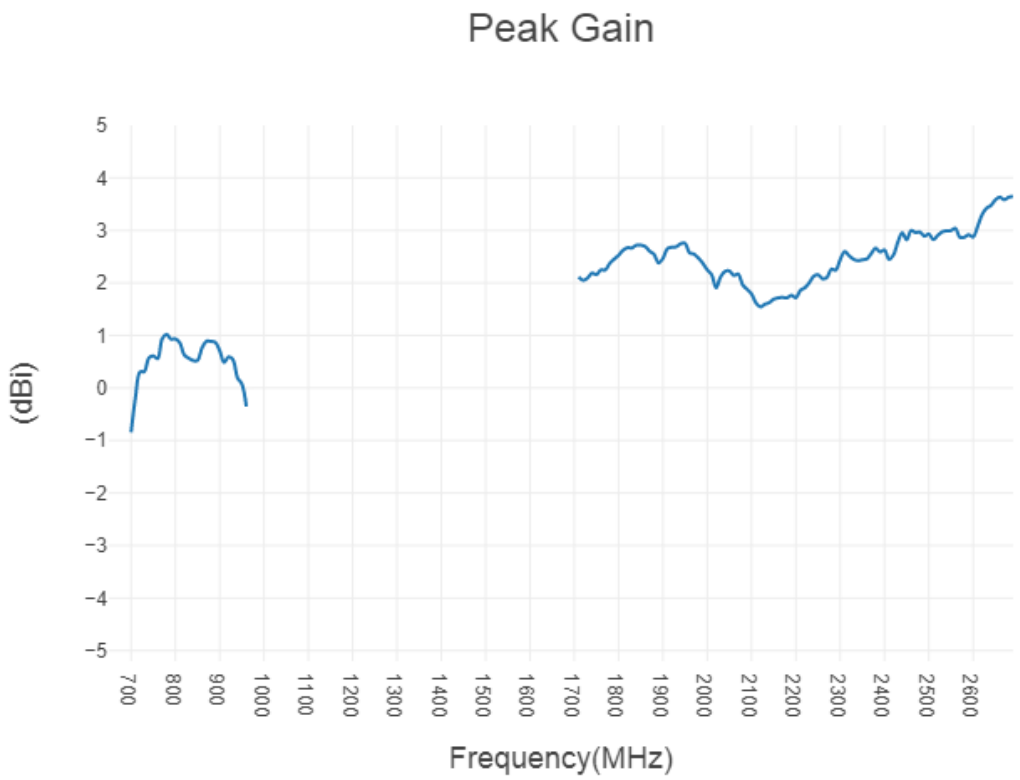
Frequency (MHz)	700	960	1710	2200	2300	2690
VSWR	2.66	2.94	1.95	2.52	2.34	1.76

4.3. Efficiency



Frequency (MHz)	700	960	1710	2200	2300	2690
Efficiency (%)	39.4	50.4	48.2	52.6	55.3	61.3

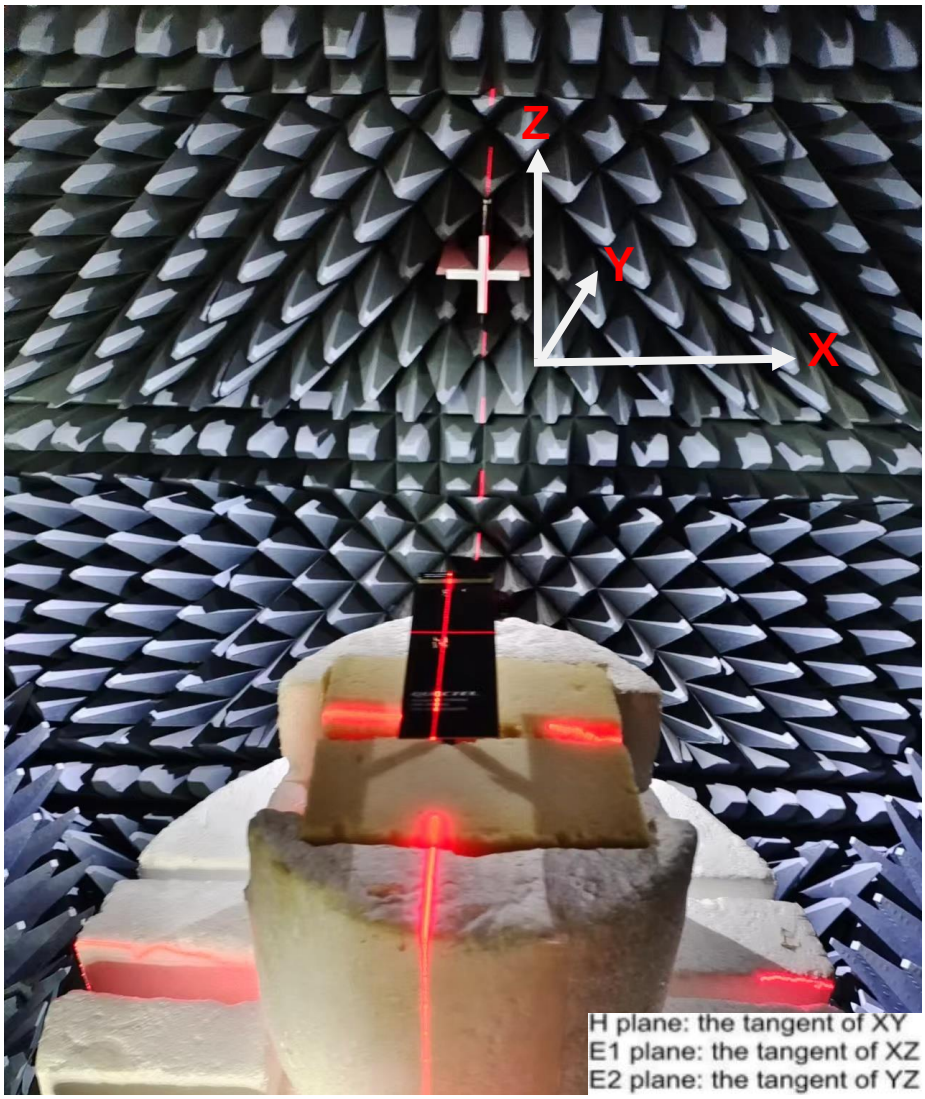
4.4. Gain



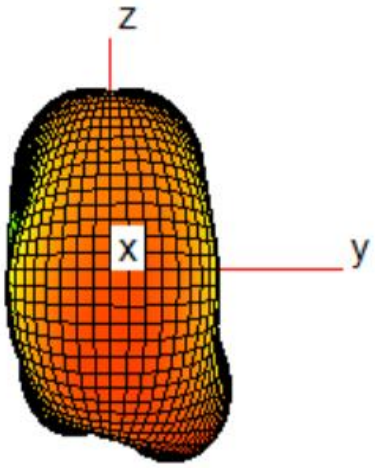
Frequency (MHz)	700	960	1710	2200	2300	2690
Gain (dBi)	-0.84	-0.35	1.72	2.09	2.44	3.65

4.5. Radiation Pattern

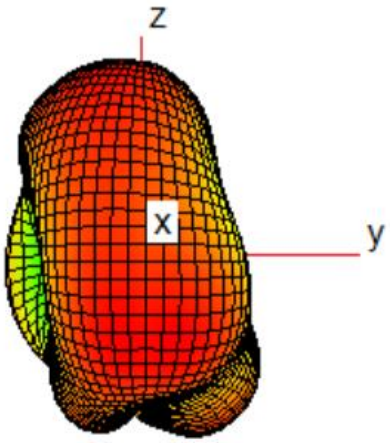
- Test Condition: Assembled on 136.5 × 43 mm EVB.



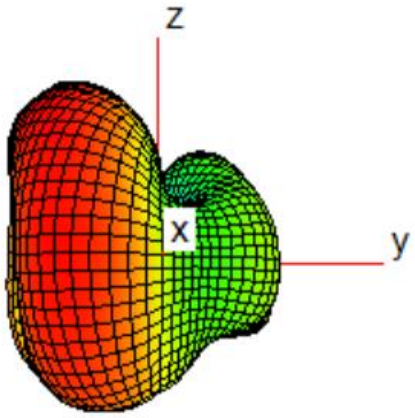
700 MHz



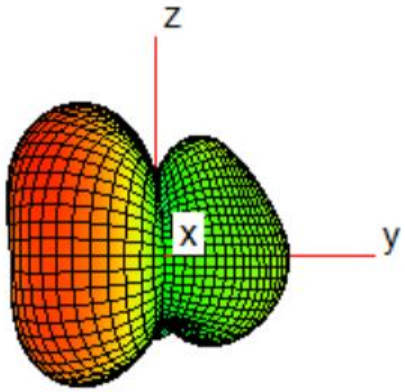
960 MHz



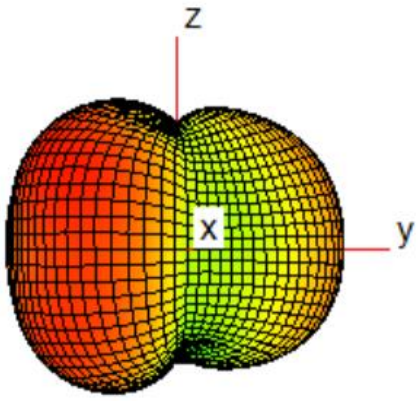
1710 MHz



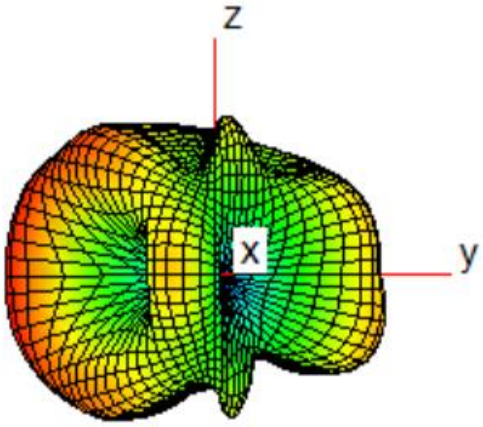
2200 MHz

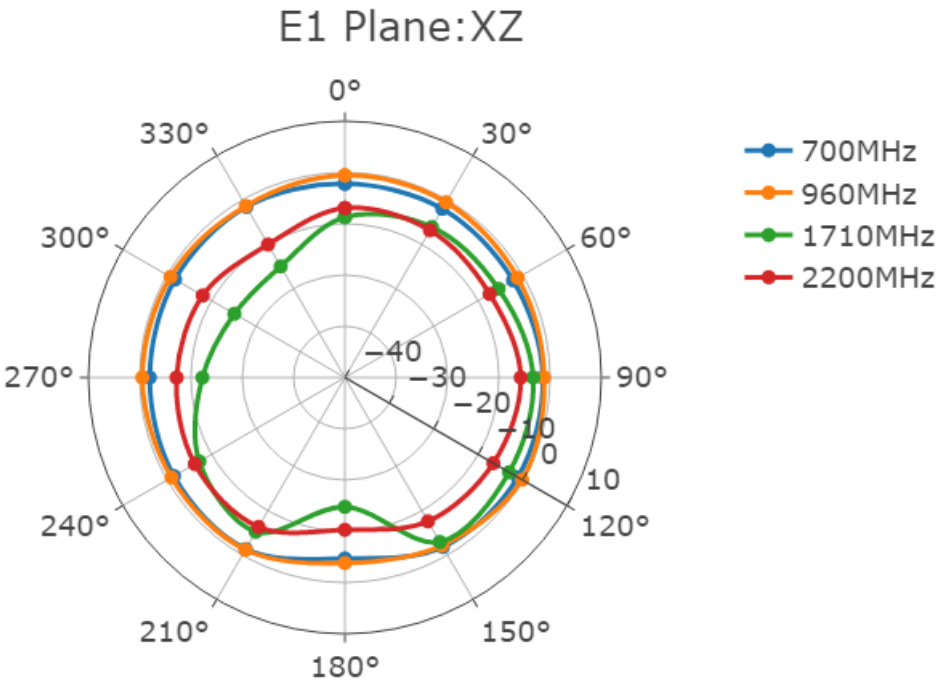


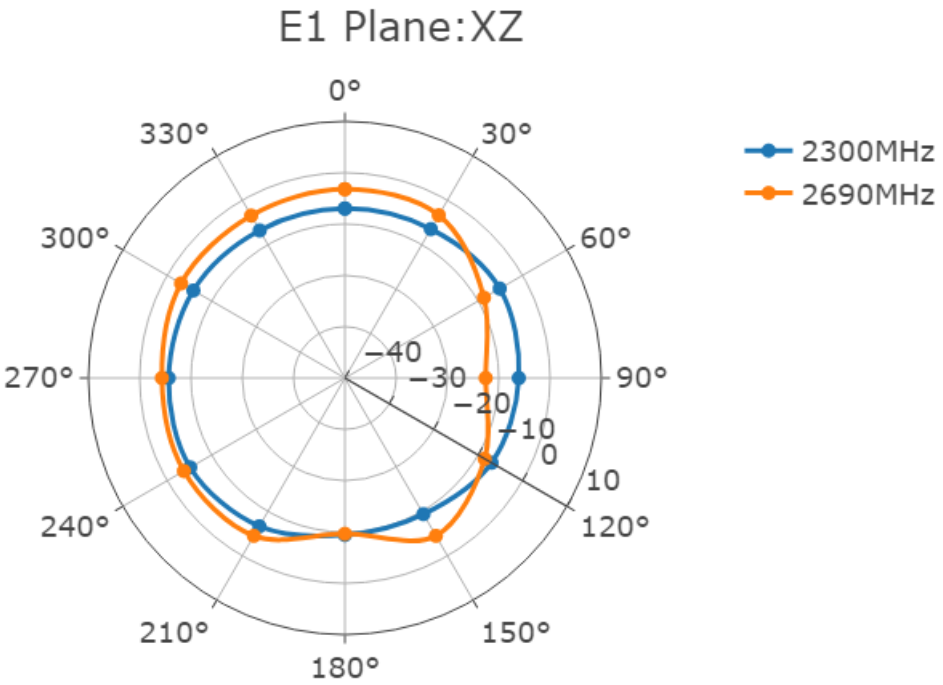
2300 MHz

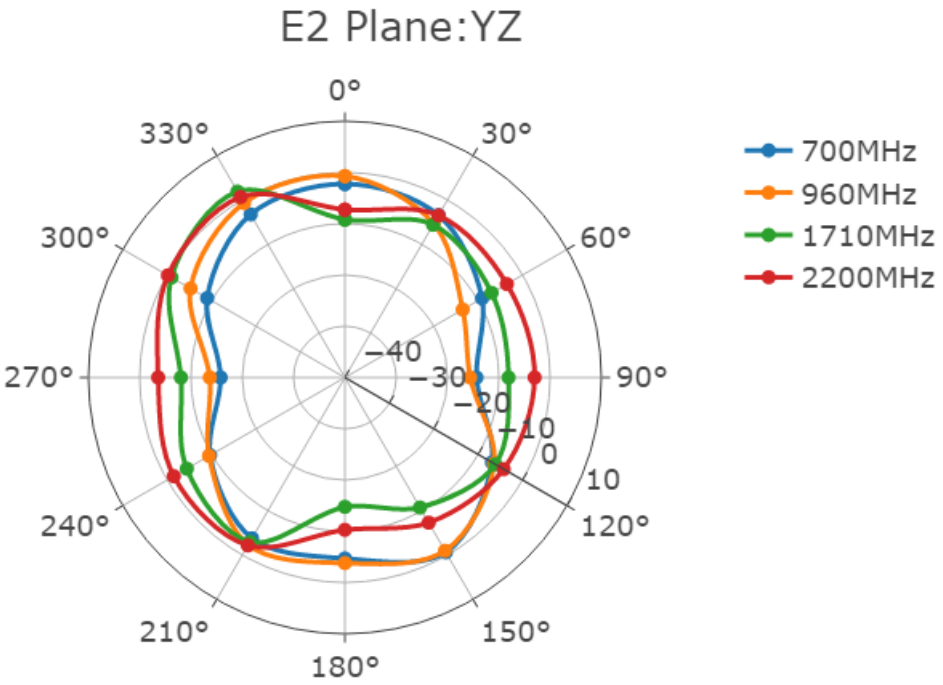


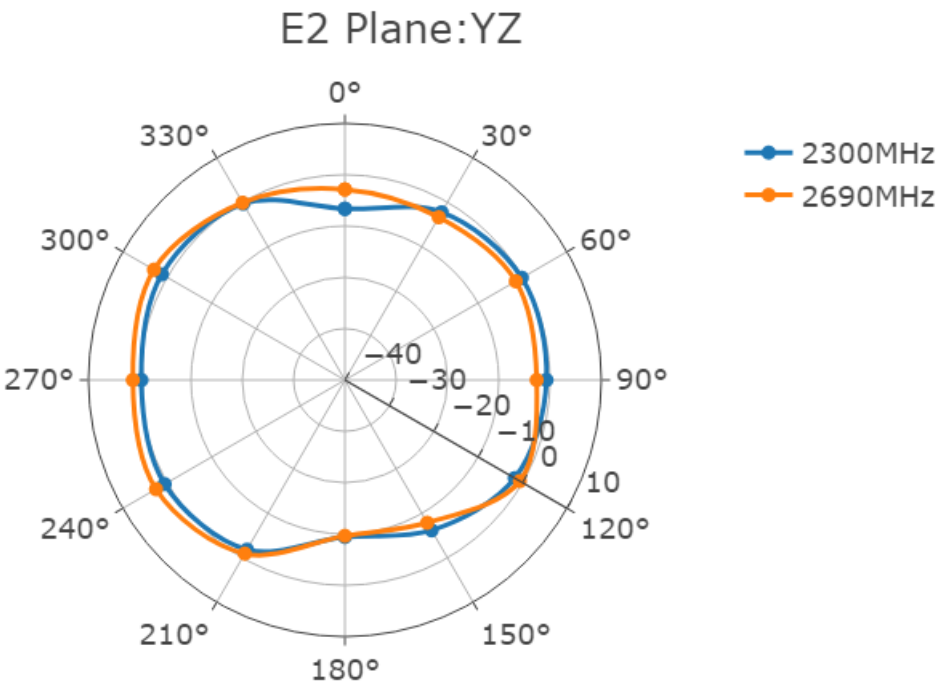
2690 MHz

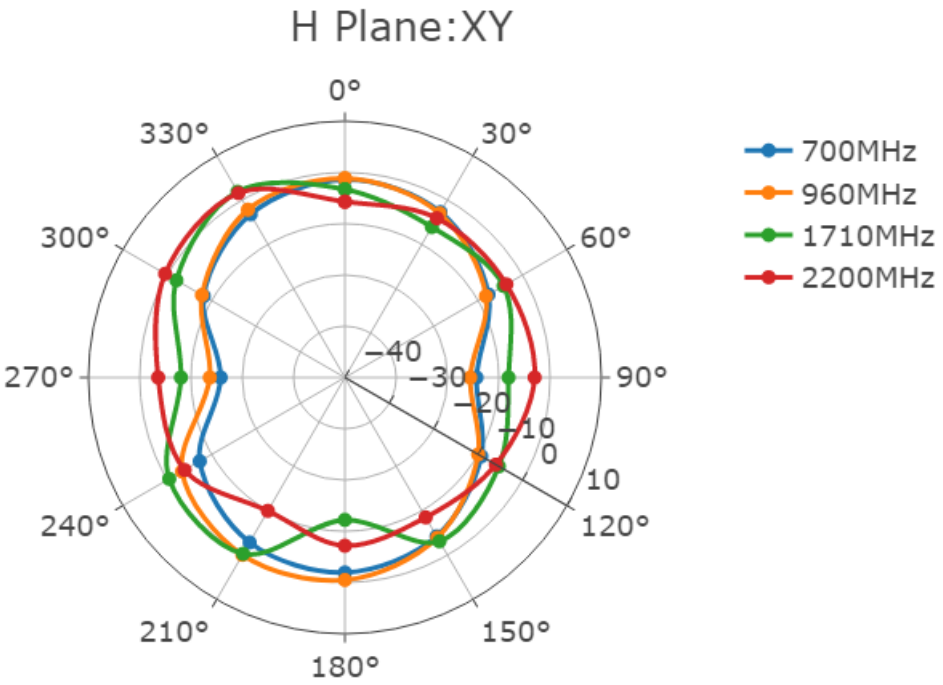


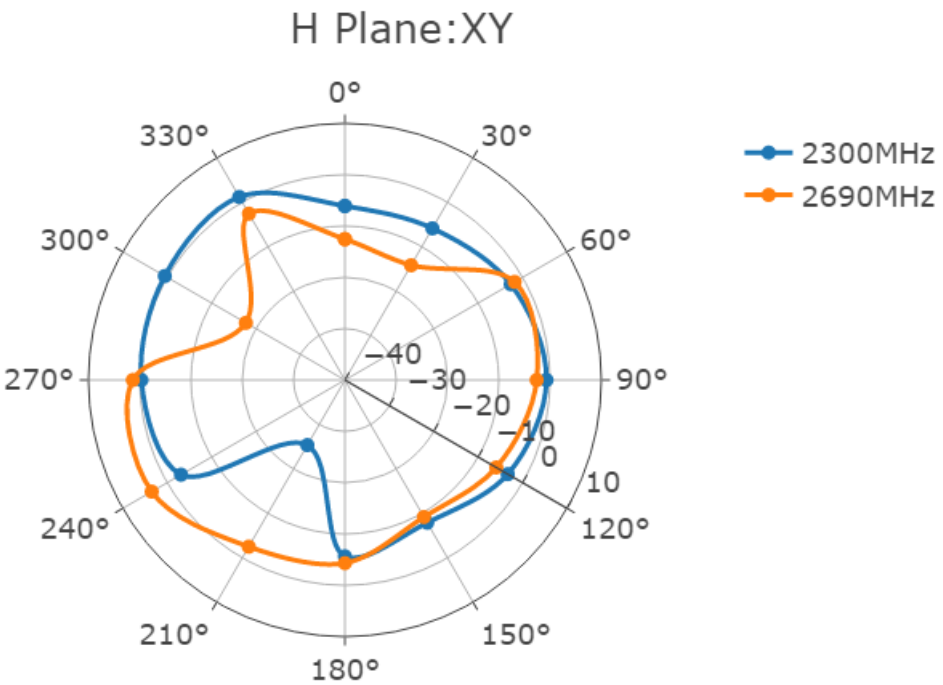

E1 Plane:XZ
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
700MHz
960MHz
1710MHz
2200MHz


E1 Plane:XZ
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
2300MHz
2690MHz


E2 Plane:YZ
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
700MHz
960MHz
1710MHz
2200MHz

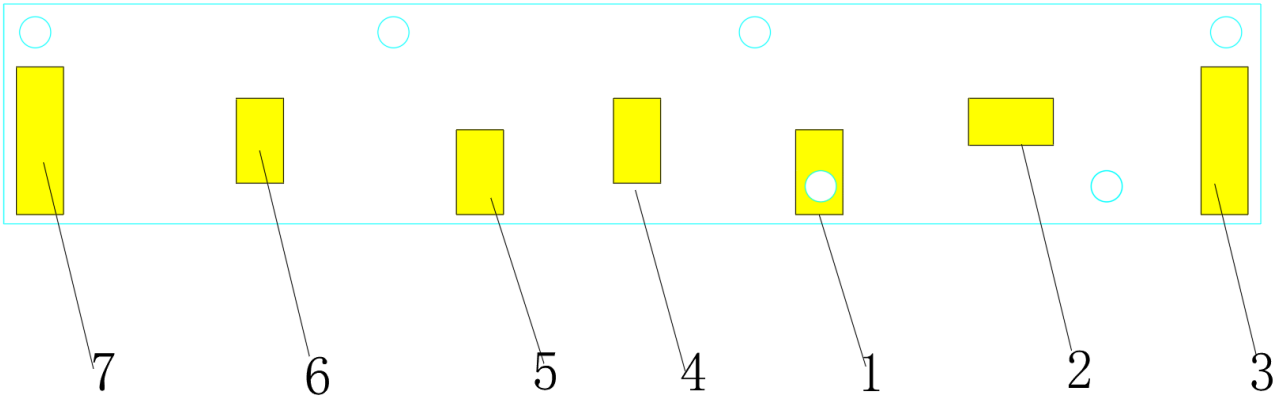

E2 Plane:YZ
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
2300MHz
2690MHz


H Plane:XY
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
700MHz
960MHz
1710MHz
2200MHz


H Plane:XY
0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
−40
−30
−20
−10
0
10
2300MHz
2690MHz

5 Schematic Symbol and Pin Definition

The pin assignment for the antenna is as follows. The antenna has 4 pins and only two work. All other pins are designed for mechanical strength.



Pin No.	Description
1	Feed
5	Return/GND
2, 3, 4, 6, 7	Not used (Mechanical only)

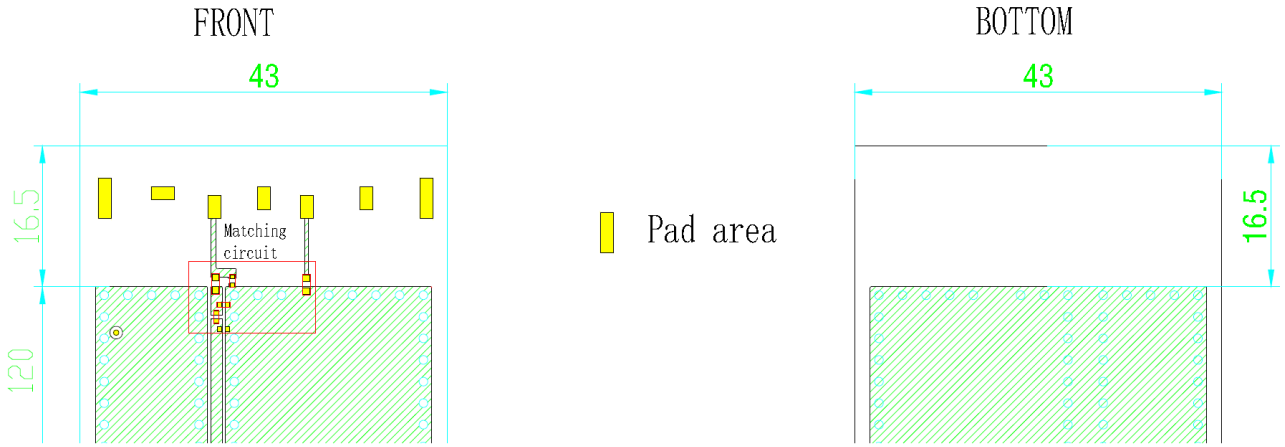
6 Transmission Line

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

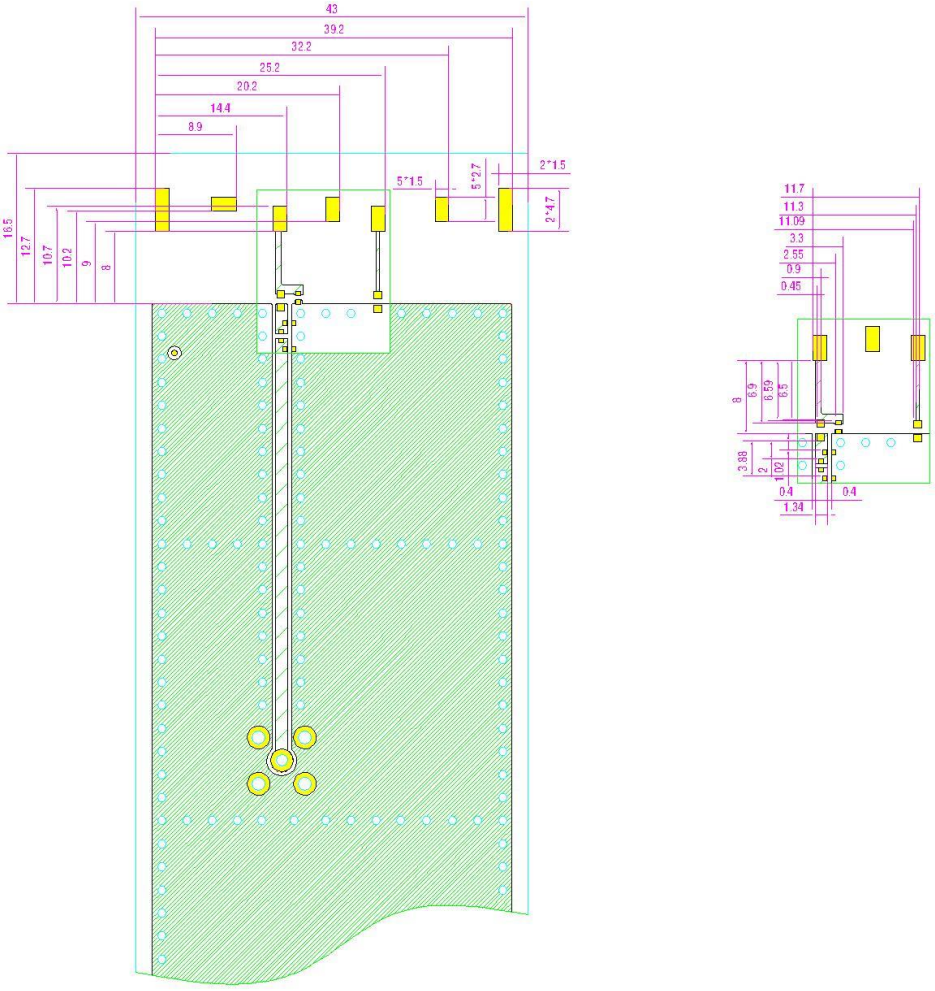
- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω.

7 Recommend PCB Layout

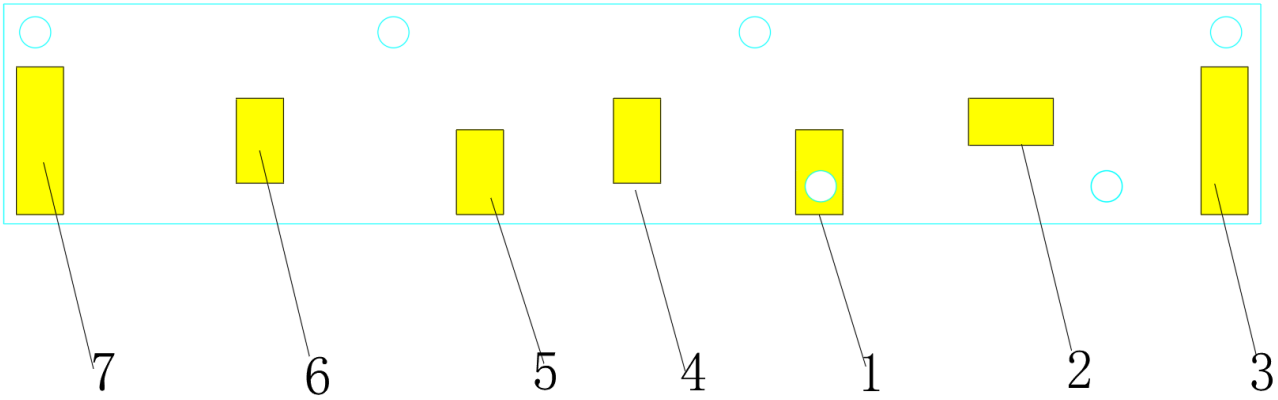
- Test PCB Size: 136.5 × 43 mm
- PCB Clearance Area: 7 × 40 mm



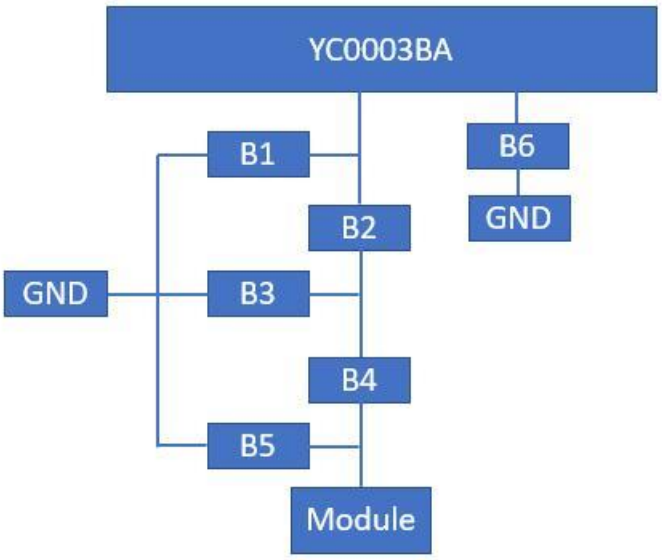
- Front Layout Details


43
39.2
32.2
25.2
20.2
14.4
8.9
16.5
12.7
10.7
10.2
9
8
5*1.5
5*2.7
2*1.5
2*4.7
11.7
11.3
11.09
3.3
2.55
0.9
0.45
8
6.9
6.59
6.5
3.88
2
1.02
0.4
0.4
1.34

- Antenna Pad


7
6
5
4
1
2
3

8 Matching Circuit

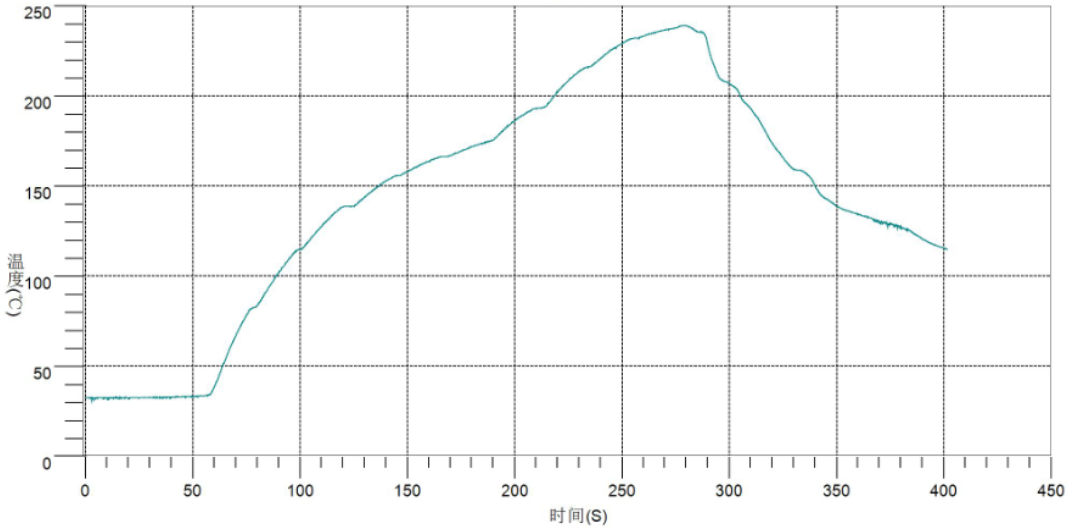


Component	Value	Ordering Code	Manufacture
B1	0.75PF	GRM1555C1HR75CZ01D	Murata
B2	3.3NH	LQG15HS3N3J02D	Murata
B3	12NH	LQG15HS12J02D	Murata
B4	4.7PF	GRM1555C1H4R7CZ01D	Murata
B5	/	/	/
B6	10NH	LQG15HS10J02D	Murata

9 Soldering Temperature

Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second (Max.)
PREHEAT	Temperature Min (Tsmin) Temperature Max (Tsmax) Time (tsmin to tsmax)	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (TL) Total Time above TL (tl)	220 °C 90 seconds (Max.)
PEAK	Temperature (Tp)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

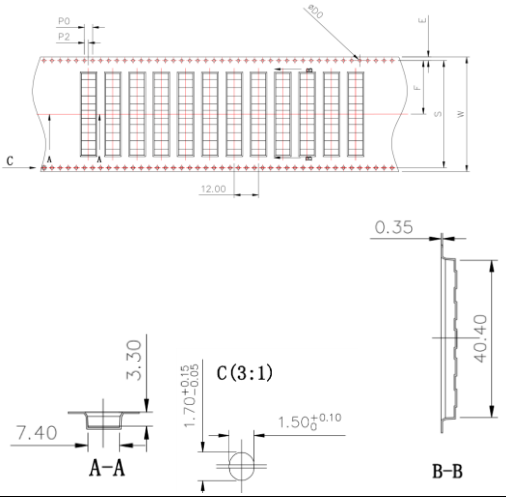
10 Reflow Profile

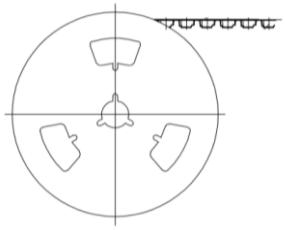
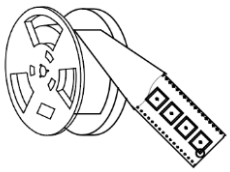
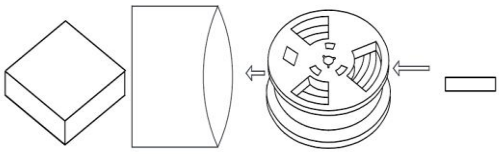
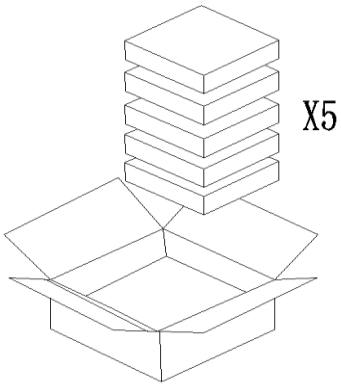
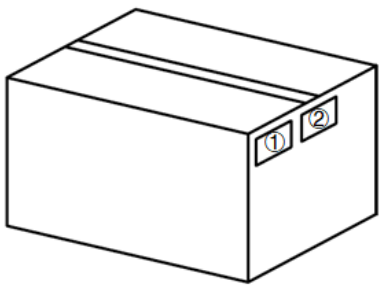


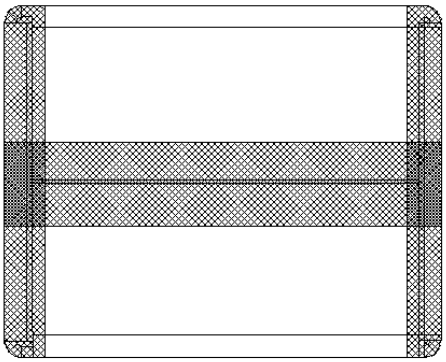
No	Probe name	150-190℃		>220℃	peak temperature℃
		60-110s	slope 0.0-3.0	40-90s	230-250℃
No.1	J1	67.9	0.59	52.4	239

furnace parameter	1	2	3	4	5	6	7	8	9	10	11	12
Up Temperature zone	175.0	185.0	185.0	185.0	190.0	195.0	230.0	275.0	275.0	275.0		
Down Temperature zone	175.0	185.0	185.0	185.0	190.0	195.0	230.0	275.0	275.0	275.0		
Temperature zone length	0	0	0	0	0	0	0	0	0	0	0	0

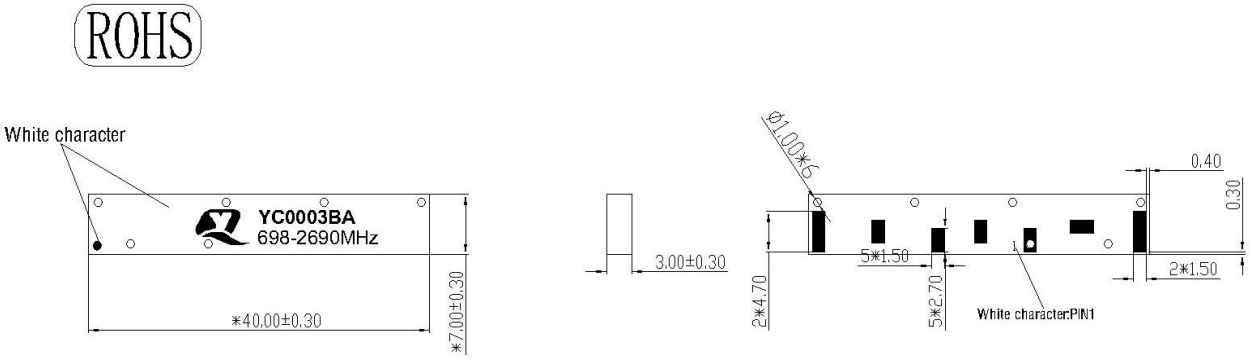
11 Package

Step	Packaging Picture / 2D Picture	Description
1		Reel

2	<table><tr><td>E</td><td>1.75±0.10</td></tr><tr><td>F</td><td>26.20±0.15</td></tr><tr><td>S</td><td>52.40±0.10</td></tr><tr><td>P2</td><td>2.00±0.10</td></tr><tr><td>φDo</td><td>1.50 +0.10 −0.00</td></tr><tr><td>φD1</td><td></td></tr><tr><td>Po</td><td>4.00±0.10</td></tr><tr><td>10Po</td><td>40.00±0.20</td></tr><tr><td>W</td><td>56.00±0.30</td></tr></table>  330 mm × 56 mm 	Reel
3		(3000 pcs antenna products per reel) Reel tape is vacuumed into the inner box.
4		(5 inner boxes per carton box) (15000 pcs antennas per carton box) Carton Size: L × W × H = 440 × 440 × 150 mm
5		**Position for Attaching Labels** ① Carton Label ② Quality Label

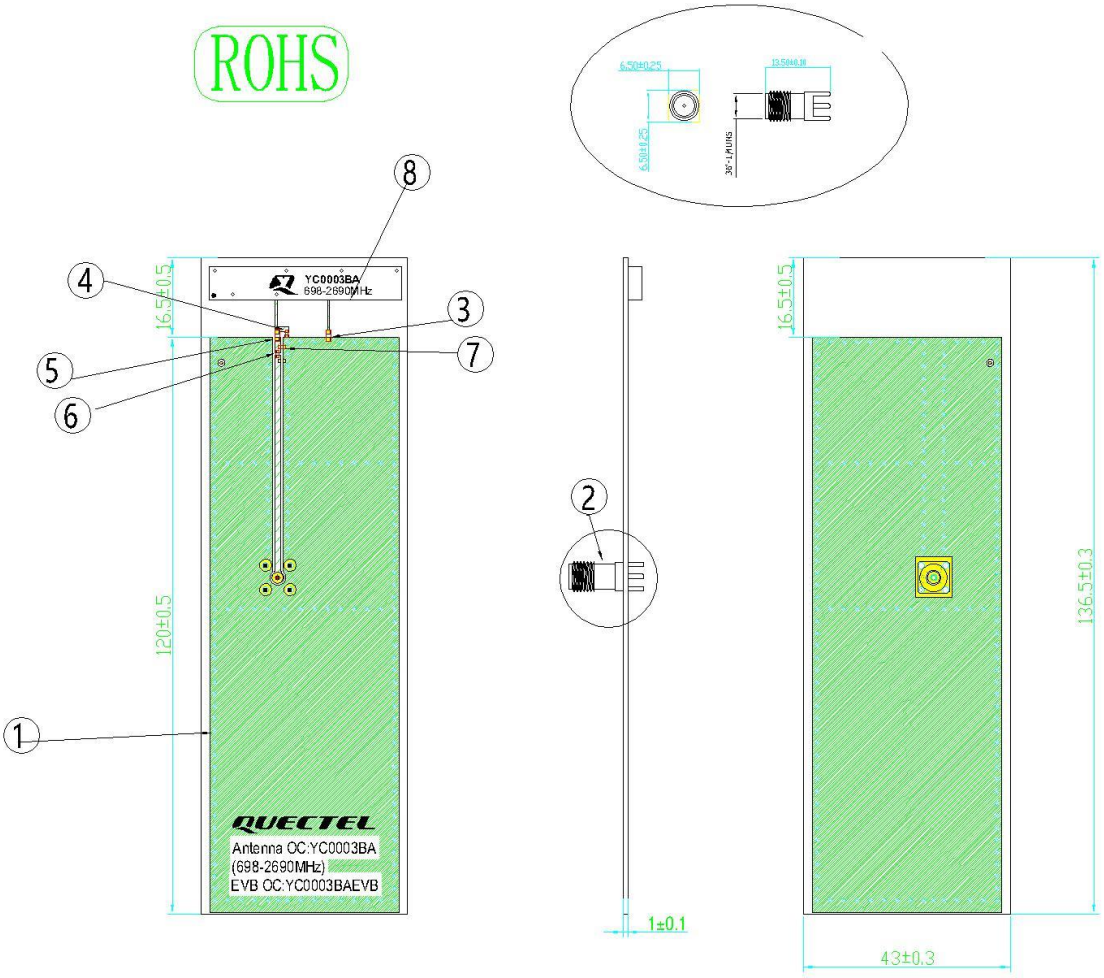
6		**Sealing Cartons** “工” type sealing cartons

12 Product Size (Unit: mm)



13 EVB Size

	Name	Material	Brand	QTY	NO
1	EVB-PCBA	FR4 1.0t		1	
2	SMA-K	Brass		1	
3	10.0 nH Inductor(0603)	Ceramics	MURATA	1	
4	0.75pF Inductor(0402)	Ceramics	MURATA	1	
5	3.3 nH Inductor(0603)	Ceramics	MURATA	1	
6	4.7pF Inductor(0402)	Ceramics	MURATA	1	
7	12.0 nH Inductor(0402)	Ceramics	MURATA	1	
8	PCB	FR4 3.0t		1	


ROHS
YC0003BA
698-2690MHz
16.5±0.5
120±0.5
QUECTEL
Antenna OC:YC0003BA
(698-2690MHz)
EVB OC:YC0003BAEVB
1±0.1
43±0.3
136.5±0.3