

Antenna

YC0003AA Datasheet

Antenna Services

OC (Antenna Only): **YC0003AA**

OC (Antenna + EVB): **YC0003AAEVB**

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About the Document

Revision History

Version	Date	Author	Note
1.0	2020-06-23	Kenny YIN	Initial
2.0	2020-08-28	Kenny YIN	Updated the specifications.
2.1	2020-12-11	Kenny YIN	Updated the antenna image in Chapter 2.
2.2	2021-01-14	Kenny YIN	Added the coordinate picture of the product in the lab.
2.3	2021-01-15	Kenny YIN	Added the return loss and package information.
2.4	2021-01-20	Kenny YIN	Updated the direction map.
2.5	2021-03-17	Kenny YIN	Updated the product height tolerance (Chapter 12).
3.0	2021-07-13	Aria CHU	Updated all test data in this datasheet.
3.1	2021-09-28	Aria CHU	1. Added the new OC YC0003AAEVB on the cover. 2. Added Chapter 13.
3.2	2021-12-06	Aria CHU	Updated the product description in Chapter 1.

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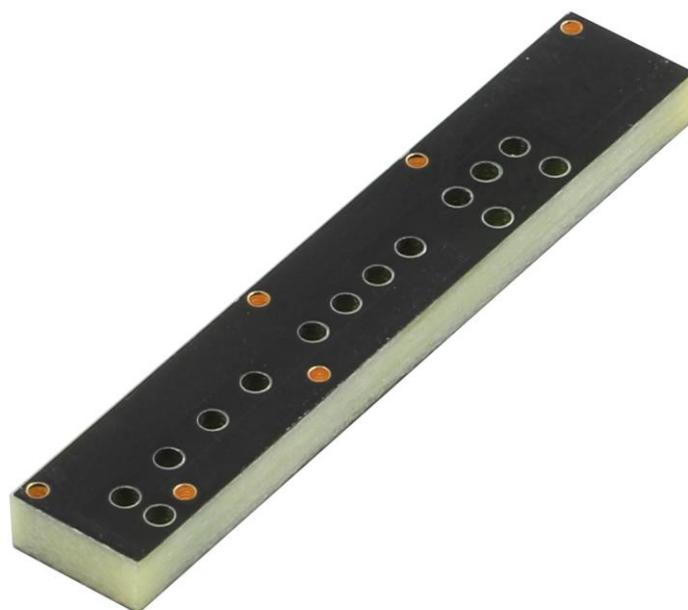
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1 Product Description

This Quectel embedded 4G FPC 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 independent, it's designed to be mounted directly to the underside of either a plastic or non-metallic enclosure. Ease of integration with a cable and connector which can be customized to meet your product design and RF module.

2 Product Features

- LTE
- High efficiency
- Excellent performance



3 Product Specifications

Passive Electrical Specifications

Frequency Range	698–960 MHz, 1695–2200 MHz, 2300–2700 MHz
Input Impedence	50 Ω
VSWR	135 mm x 40 mm < 4.0
	125 mm x 40 mm < 5.0
	115 mm x 40 mm < 5.0
	105 mm x 40 mm < 5.0
	95 mm x 40 mm < 6.0
	85 mm x 40 mm < 6.0
75 mm x 40 mm < 7.0	
Gain	< 6.0 dBi
Polarization Type	Linear

Mechanical Specifications

Antenna Size	40 mm (L) × 7 mm (W) × 3 mm (H)
Carrier	FR4
Connector Type	SMD
Working Temperature	-40 °C to +85 °C
Radome Color	Black

4 Overall Performance

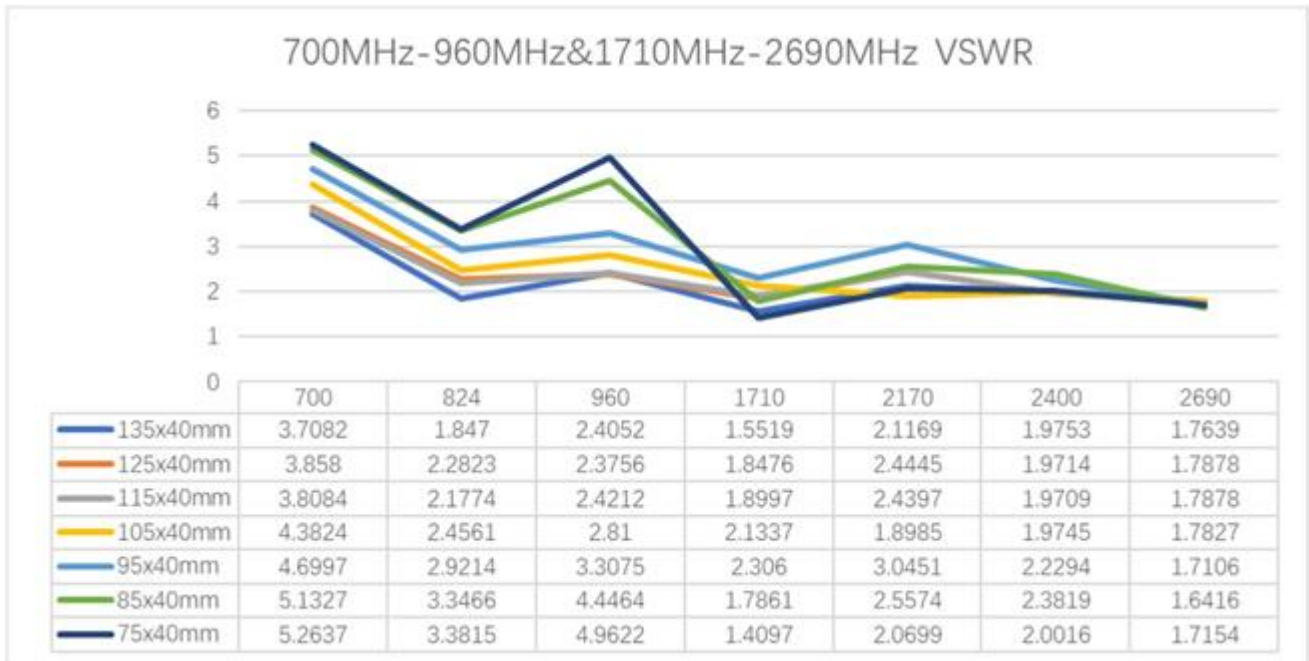
4.1. Test Environment

- KEYSIGHT VNA Network Analyzer E5063A 100 kHz – 8.5 GHz
- RayZone® 2800 Chamber 5G (FR1) SISO/MIMO, 400 MHz – 8.0 GHz



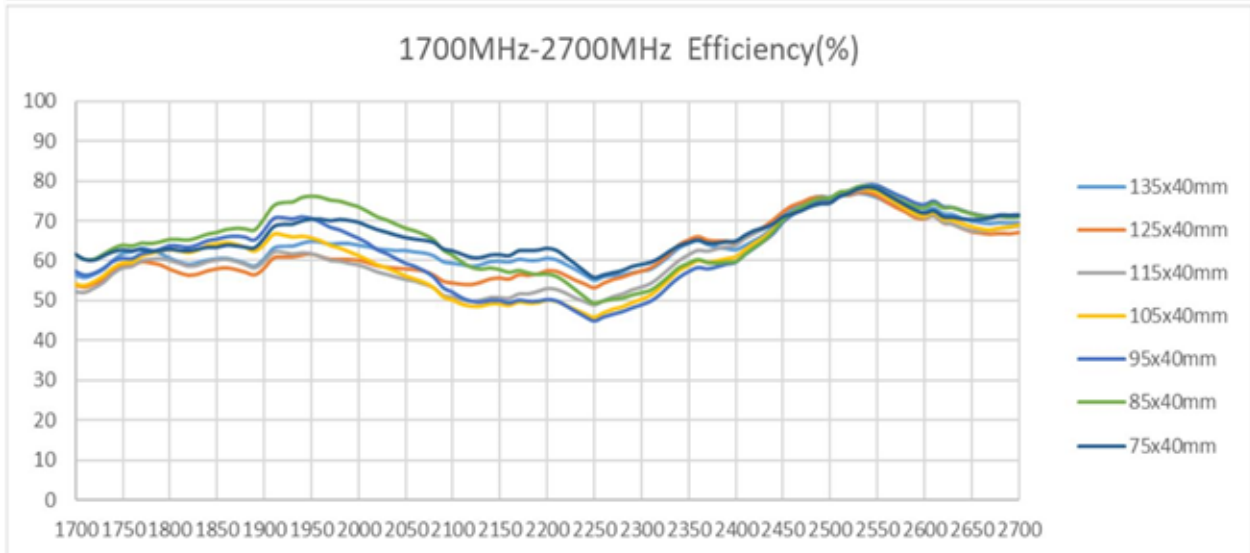
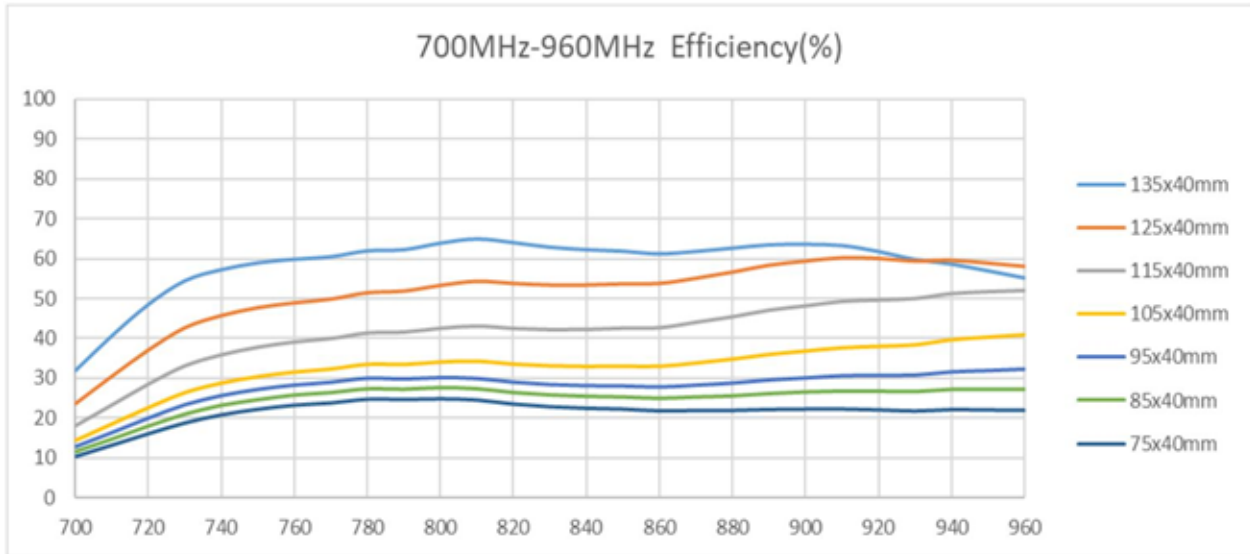
- Antenna on PCB evaluation board with different length:
 - 135 mm x 40 mm
 - 125 mm x 40 mm
 - 115 mm x 40 mm
 - 105 mm x 40 mm
 - 95 mm x 40 mm
 - 85 mm x 40 mm
 - 75 mm x 40 mm

4.2. VSWR



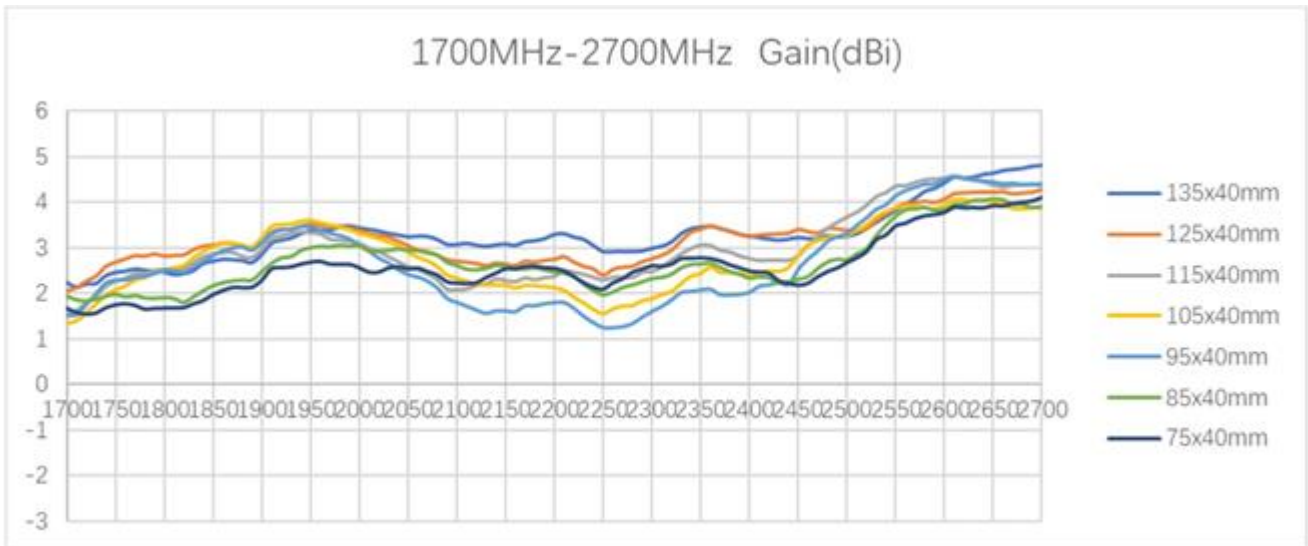
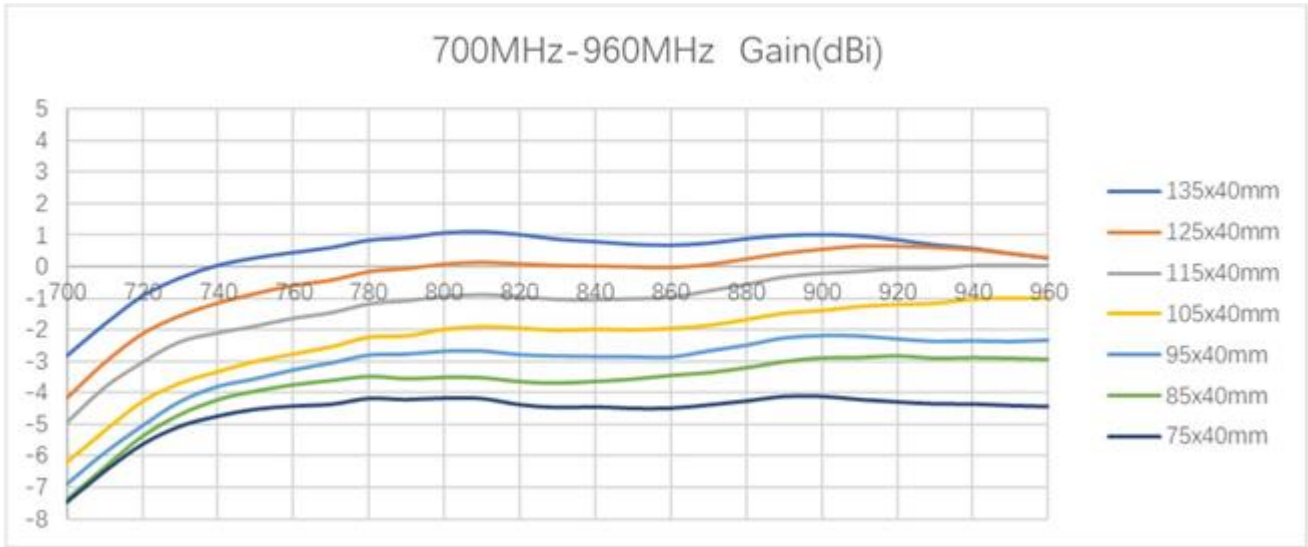
Frequency (MHz)	700	820	960	1710	2170	2400	2690
VSWR < 4.0 (135 mm x 40 mm)	3.70	1.84	2.40	1.55	2.11	1.97	1.76
VSWR < 5.0 (125 mm x 40 mm)	3.85	2.28	2.37	1.84	2.44	1.97	1.78
VSWR < 5.0 (115 mm x 40 mm)	3.80	2.17	2.42	1.89	2.43	1.97	1.78
VSWR < 5.0 (105 mm x 40 mm)	4.38	2.45	3.06	2.13	1.89	1.97	1.78
VSWR < 6.0 (95 mm x 40 mm)	4.69	2.92	3.79	2.30	3.04	2.22	1.71
VSWR < 6.0 (85 mm x 40 mm)	5.13	3.34	3.97	1.78	2.55	2.38	1.64
VSWR < 7.0 (75 mm x 40 mm)	5.26	3.38	5.32	1.40	2.06	2.00	1.71

4.3. Efficiency



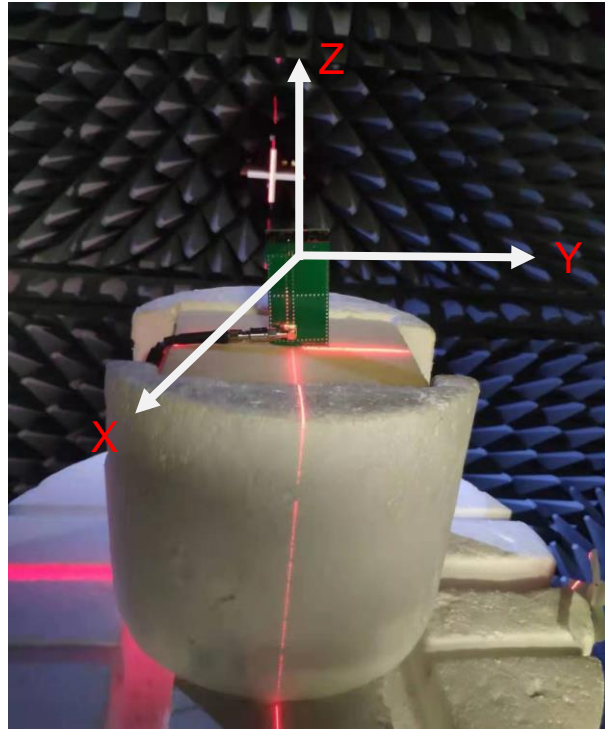
Frequency (MHz)	700	820	960	1710	2170	2400	2690
Efficiency (135 mm x 40 mm)	32%	64%	55%	56%	60%	63%	69%
Efficiency (125 mm x 40 mm)	24%	54%	58%	53%	56%	65%	67%
Efficiency (115 mm x 40 mm)	18%	43%	54%	52%	52%	64%	68%
Efficiency (105 mm x 40 mm)	15%	34%	52%	54%	50%	61%	68%
Efficiency (95 mm x 40 mm)	13%	29%	32%	56%	50%	60%	72%
Efficiency (85 mm x 40 mm)	12%	26%	27%	60%	58%	60%	71%
Efficiency (75 mm x 40 mm)	11%	24%	22%	60%	63%	65%	71%

4.4. Gain

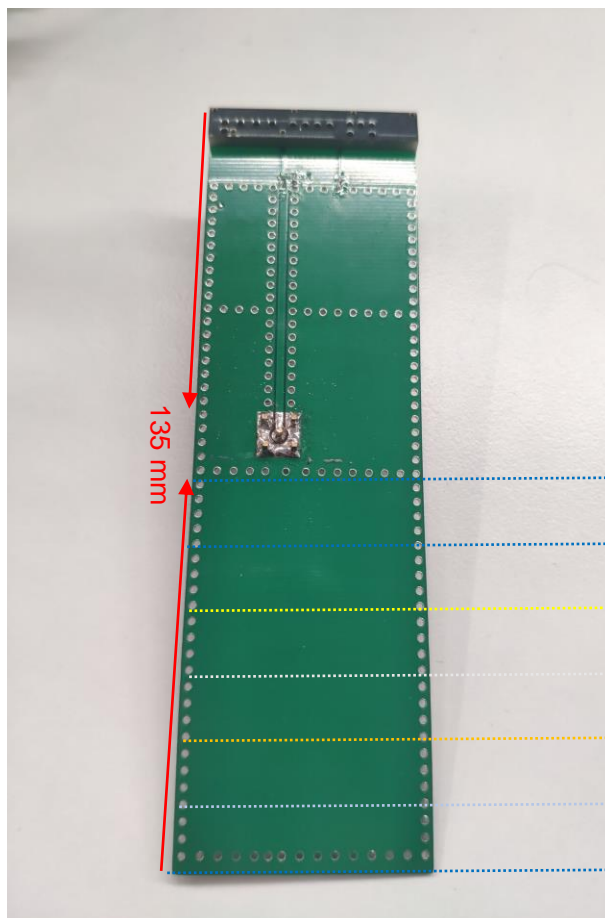


Frequency (MHz)	700	820	960	1710	2170	2400	2690
Gain < 6 dBi (135 mm x 40 mm)	-2.8	1.02	0.29	2.13	3.13	3.26	4.80
Gain < 6 dBi (125 mm x 40 mm)	-4.17	0.10	0.29	2.11	2.69	3.23	4.21
Gain < 6 dBi (115 mm x 40 mm)	-4.94	-0.95	0.02	1.61	2.32	2.75	4.38
Gain < 6 dBi (105 mm x 40 mm)	-6.22	-1.93	-0.99	1.39	2.17	2.39	3.86
Gain < 6 dBi (95 mm x 40 mm)	-6.91	-2.80	-2.34	1.53	1.73	2.02	4.38
Gain < 6 dBi (85 mm x 40 mm)	-7.39	-3.66	-2.95	1.86	2.53	2.34	3.88
Gain < 6 dBi (75 mm x 40 mm)	-7.45	-4.36	-4.42	1.56	2.57	2.47	4.01

4.5. Radiation Pattern



H plane: the tangent of XY
E1 plane: the tangent of XZ
E2 plane: the tangent of YZ

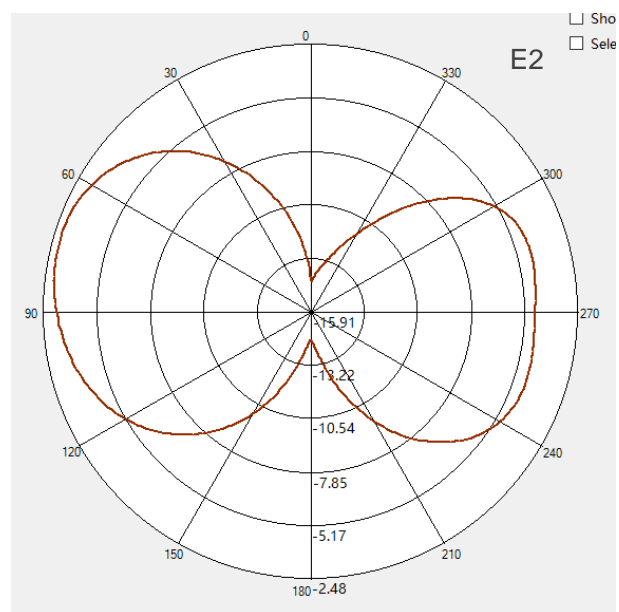
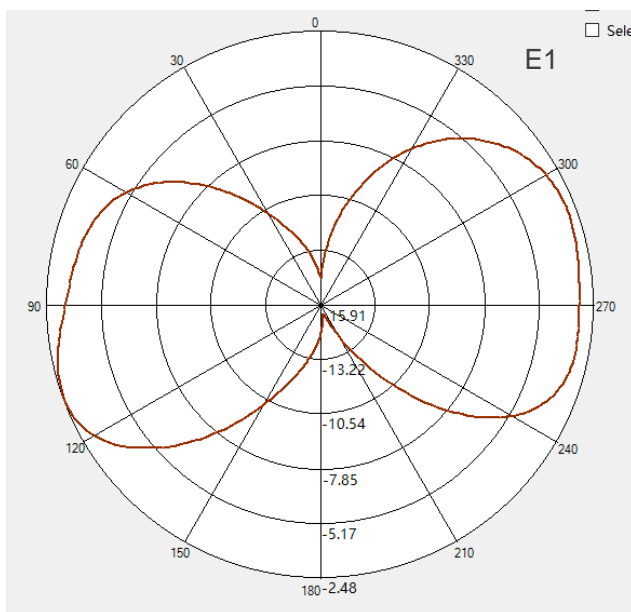
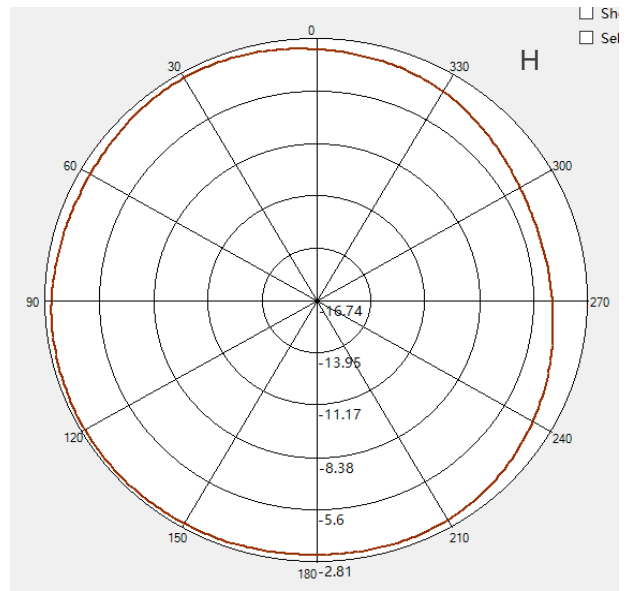
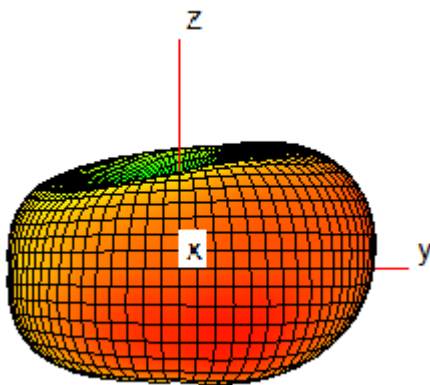


135 mm

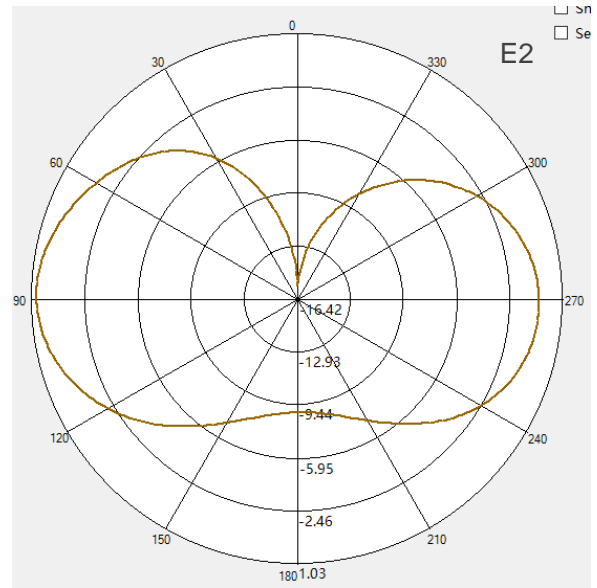
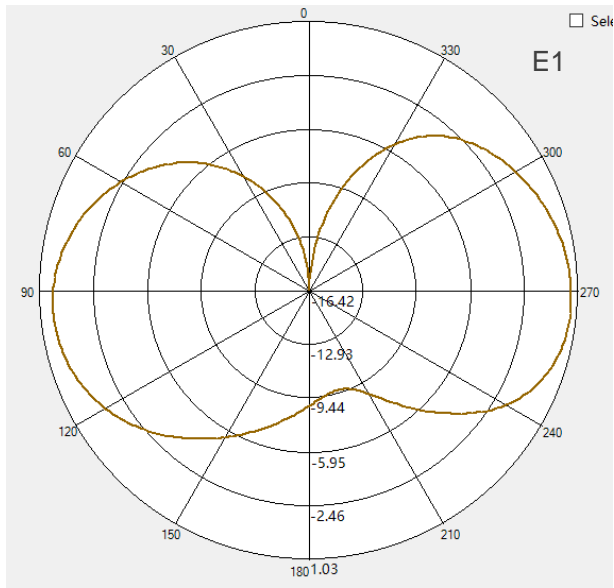
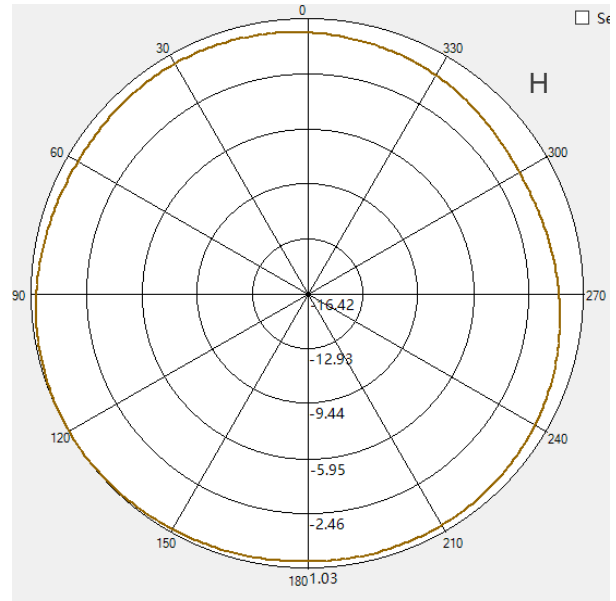
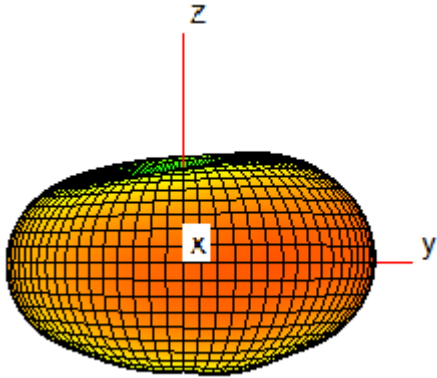
- ▶ 75 mm x 40 mm
- ▶ 85 mm x 40 mm
- ▶ 95 mm x 40 mm
- ▶ 105 mm x 40 mm
- ▶ 115 mm x 40 mm
- ▶ 125 mm x 40 mm
- ▶ 135 mm x 40 mm

4.5.1. 135 mm × 40 mm (PCB Evaluation Board)

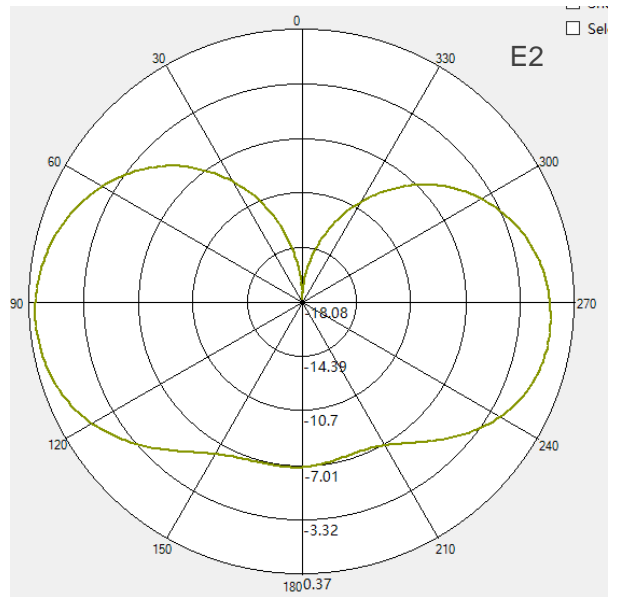
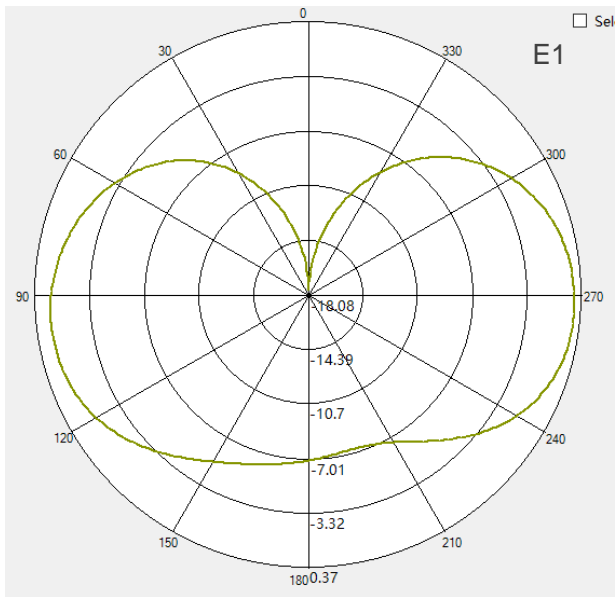
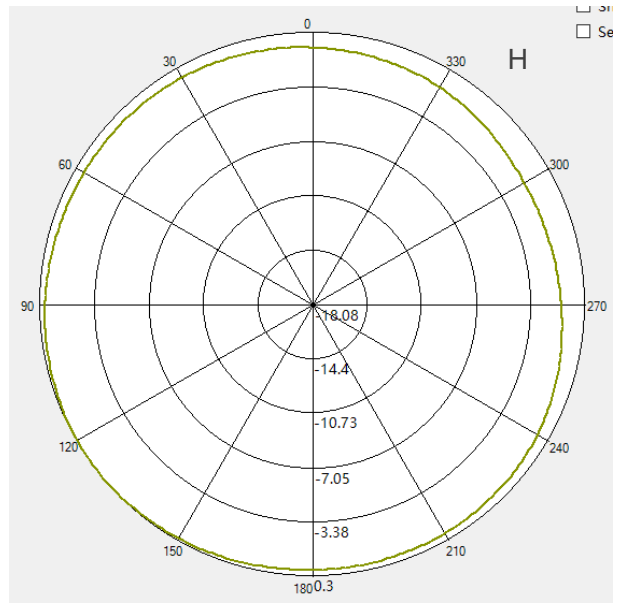
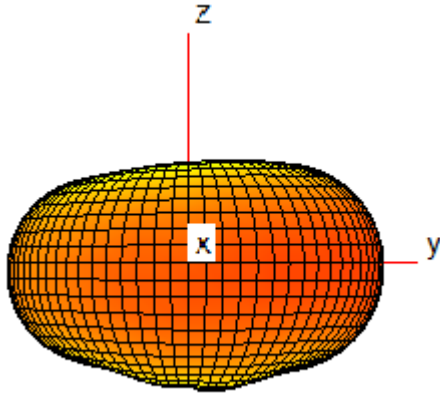
4.5.1.1. 700 MHz



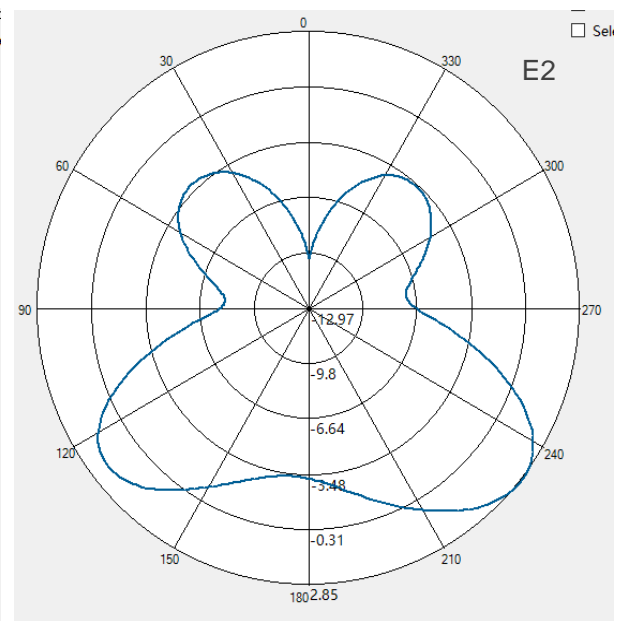
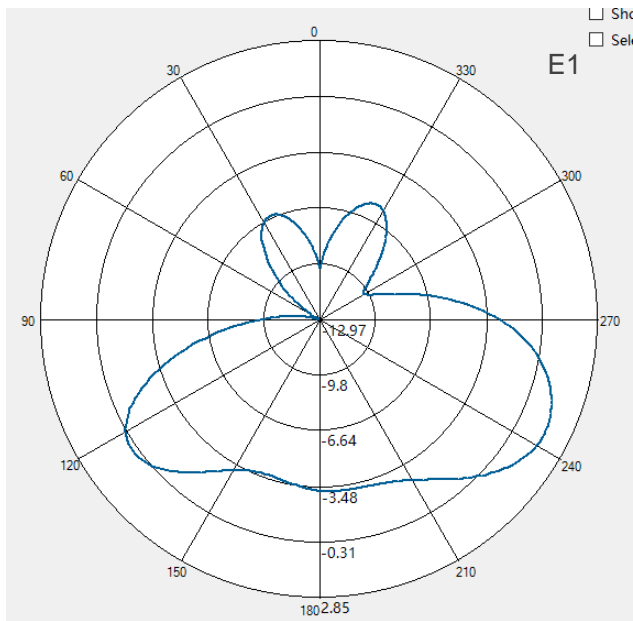
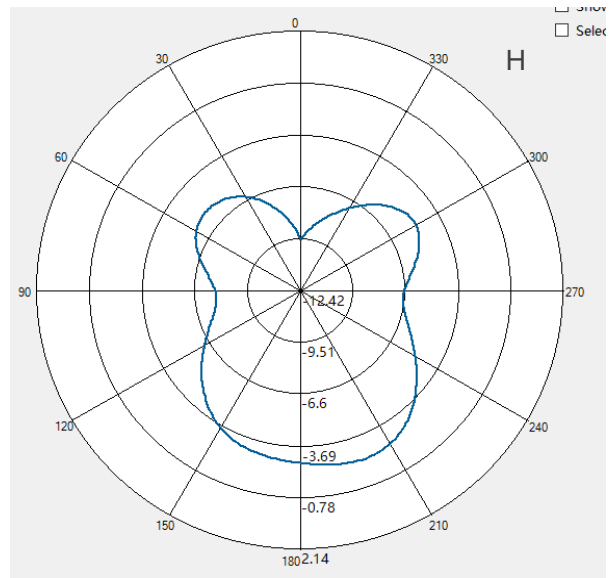
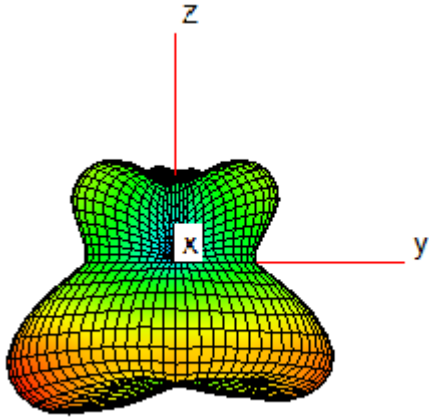
4.5.1.2. 820 MHz



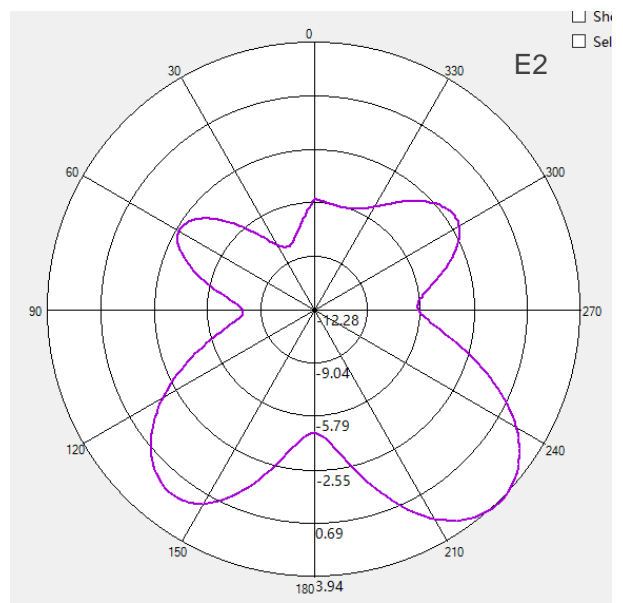
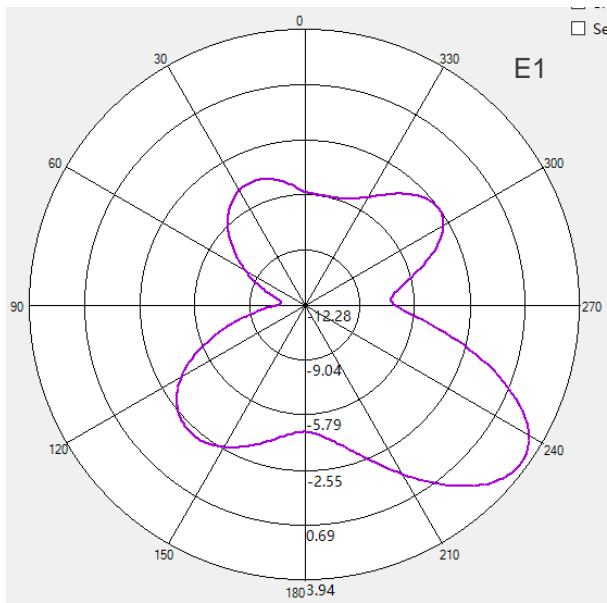
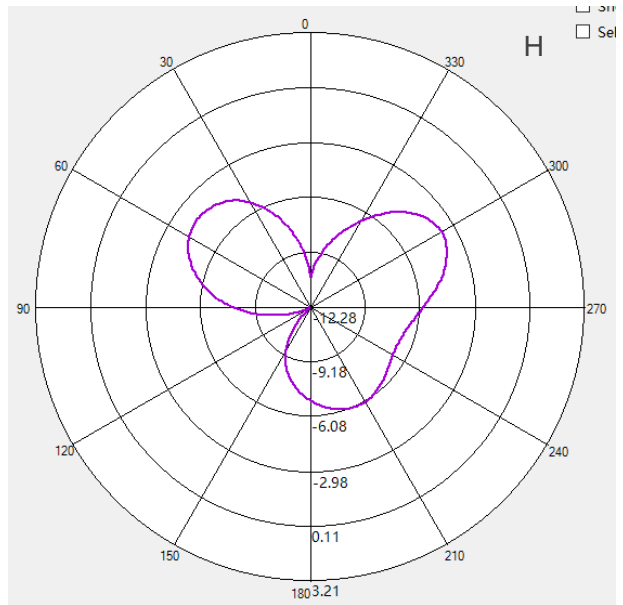
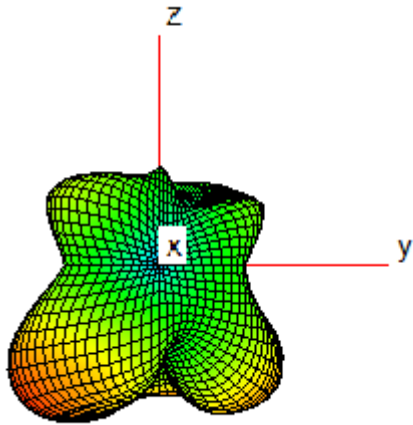
4.5.1.3. 960 MHz



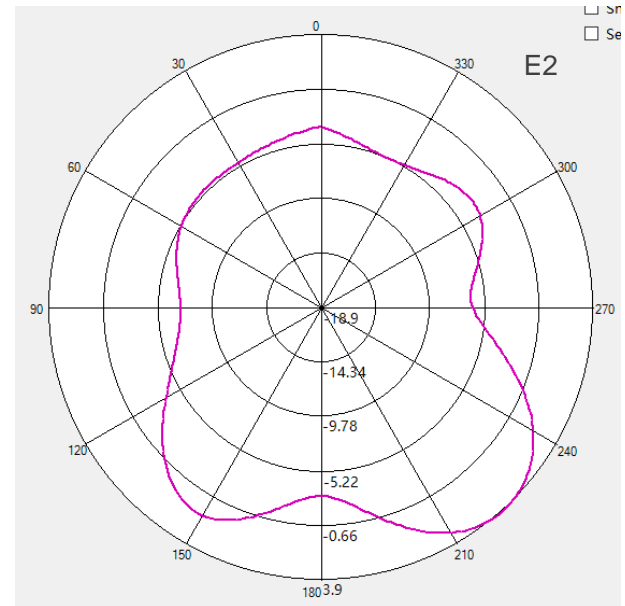
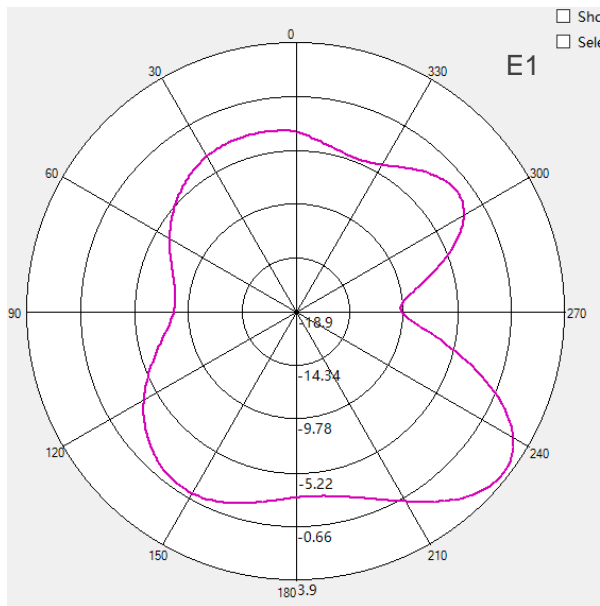
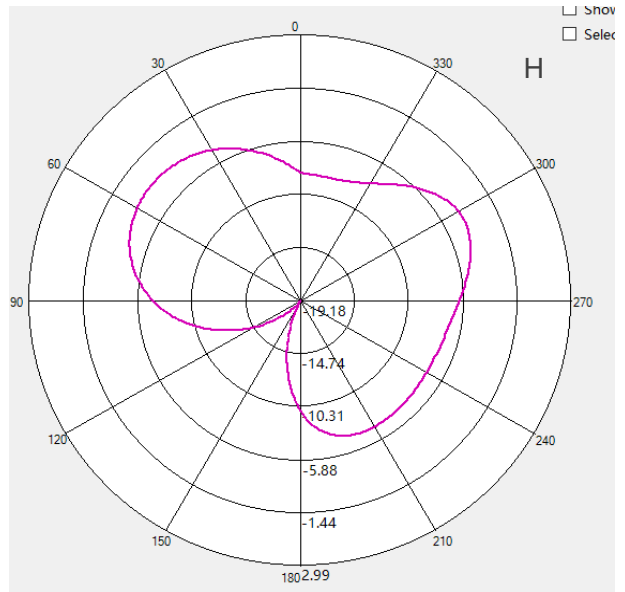
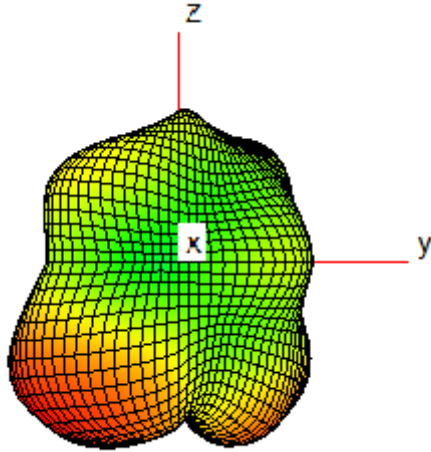
4.5.1.4. 1710 MHz



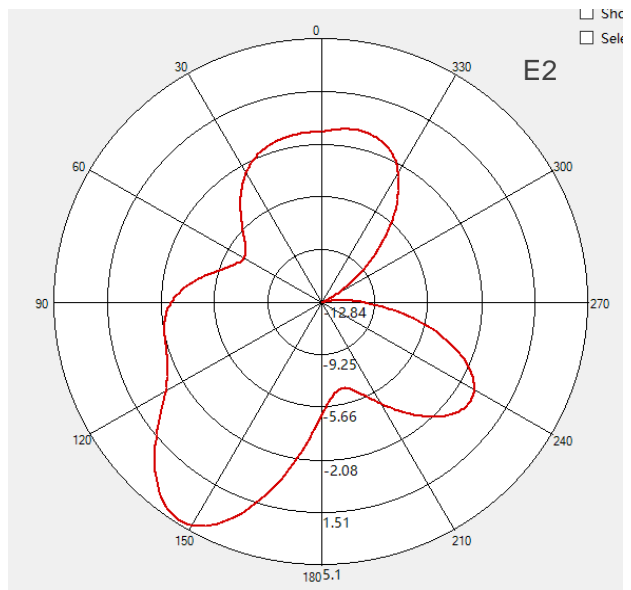
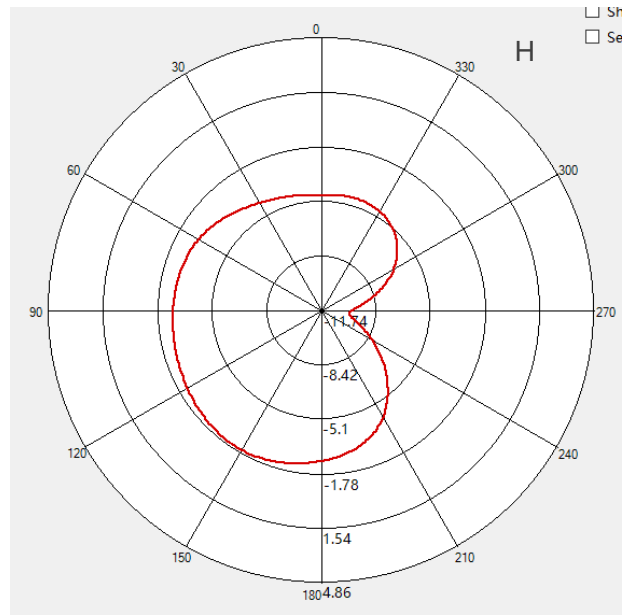
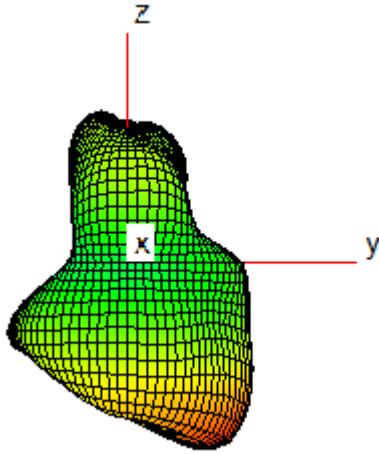
4.5.1.5. 2170 MHz



4.5.1.6. 2300 MHz

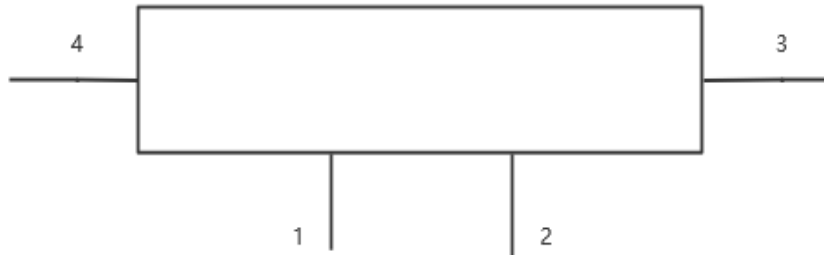


4.5.1.7. 2690 MHz



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
2	Return/GND
3, 4	Not used (Mechanical only)

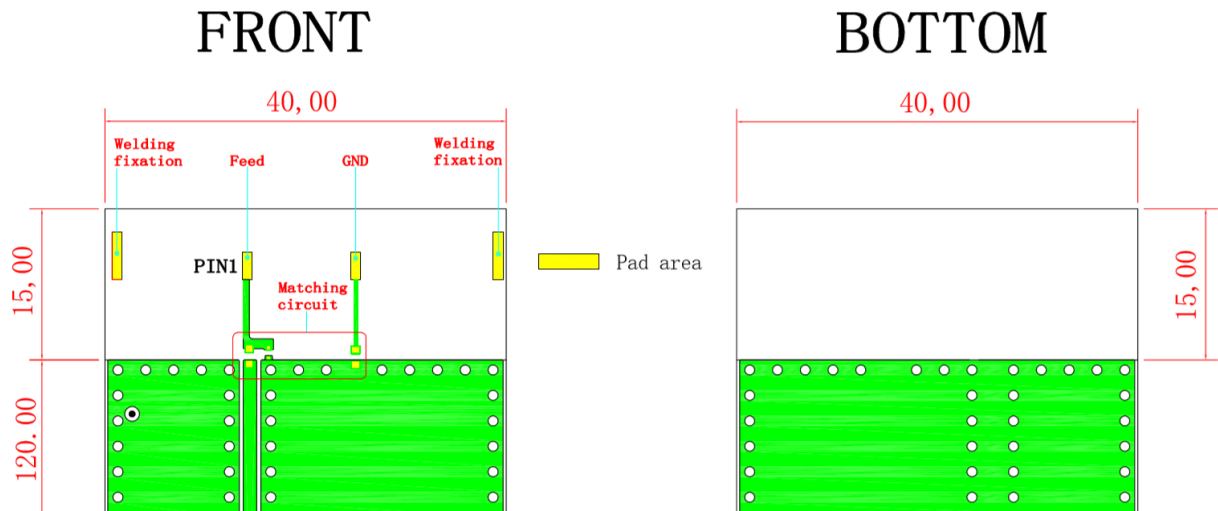
6 Transmission Line

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

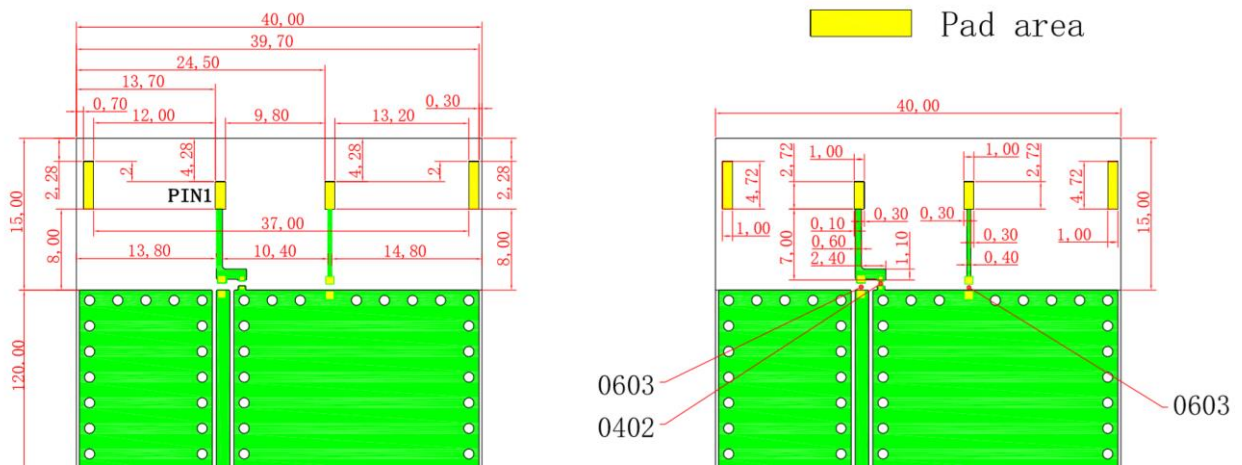
- The length of the transmission lines should be kept to as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

7 Recommend PCB Layout

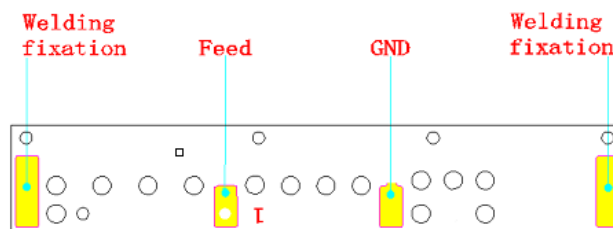
- Test PCB Size: 135 mm × 40 mm
- PCB Clearance Area: 15 mm × 40 mm



● Front Layout Details

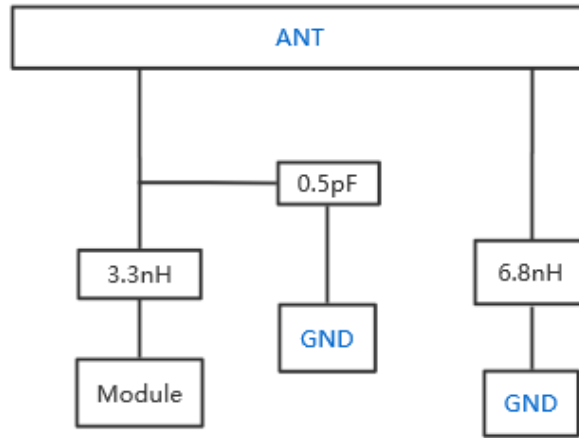


● Antenna Pad



Front: Perspective view

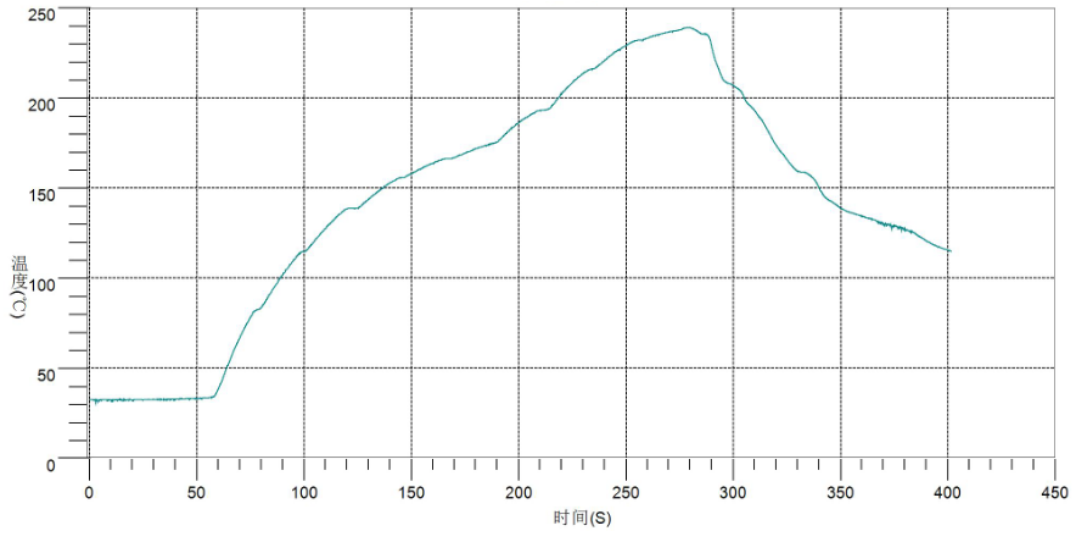
8 Matching Circuit



9 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})	150 °C
	Temperature Max (T _{smax})	190 °C
	Time (t _{smin} to t _{smax})	110 seconds (Max.)
REFLOW	Temperature (T _L)	220 °C
	Total Time above T _L (t _l)	90 seconds (Max.)
PEAK	Temperature (T _p)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

10 Reflow Profile

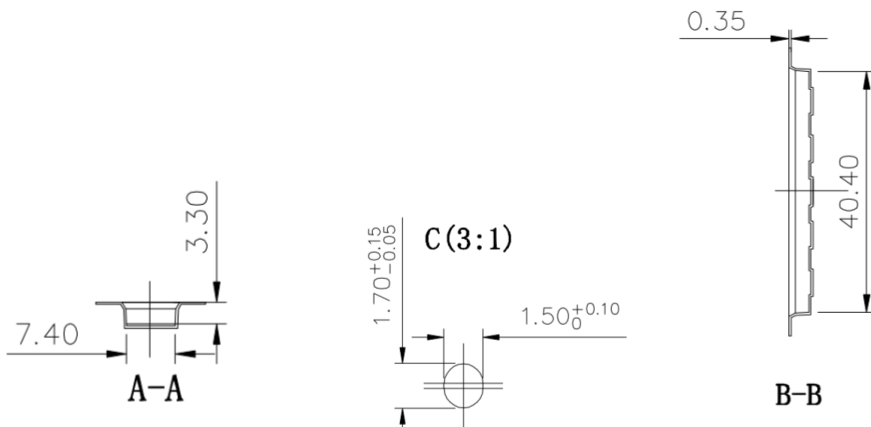
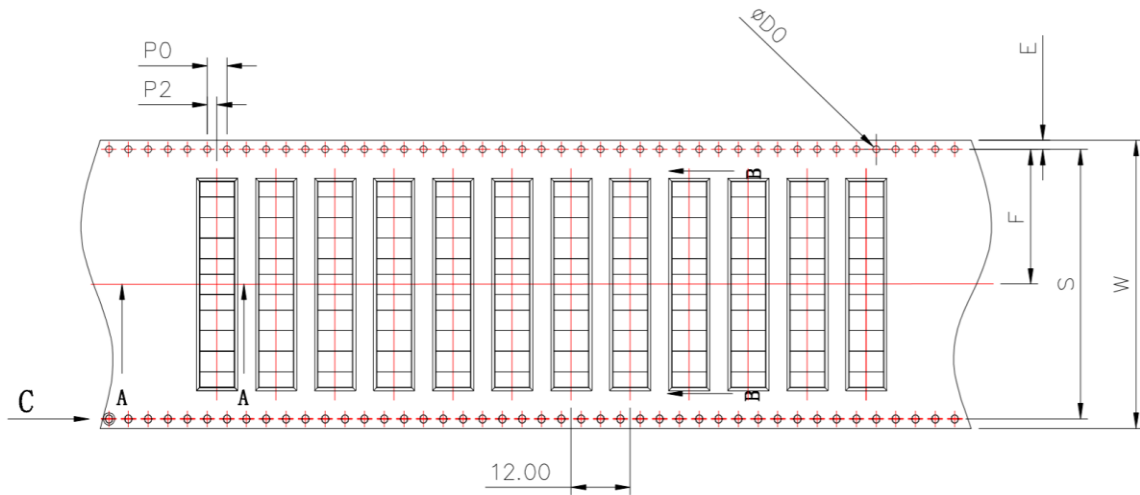


No	Probe name	150-190°C		>220°C	peak temperature°C
		60-110s	slope 0.0-3.0	40-90s	230-250°C
No.1	J1	67.9	0.59	52.4	239

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

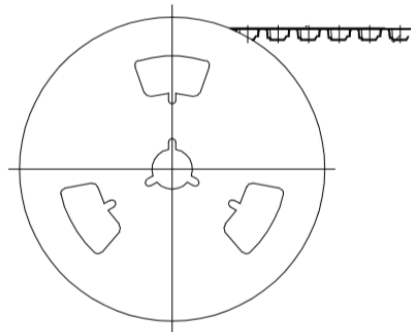
11 Package

- Quantity/Reel: 1500 pcs/Reel
- Carrier Tape Dimensions (mm)



E	1.75±0.10
F	26.20±0.15
S	52.40±0.10
P2	2.00±0.10
$\phi D0$	1.50± $\begin{matrix} 0.10 \\ 0.00 \end{matrix}$
$\phi D1$	
P0	4.00±0.10
10P0	40.00±0.20
W	56.00±0.30

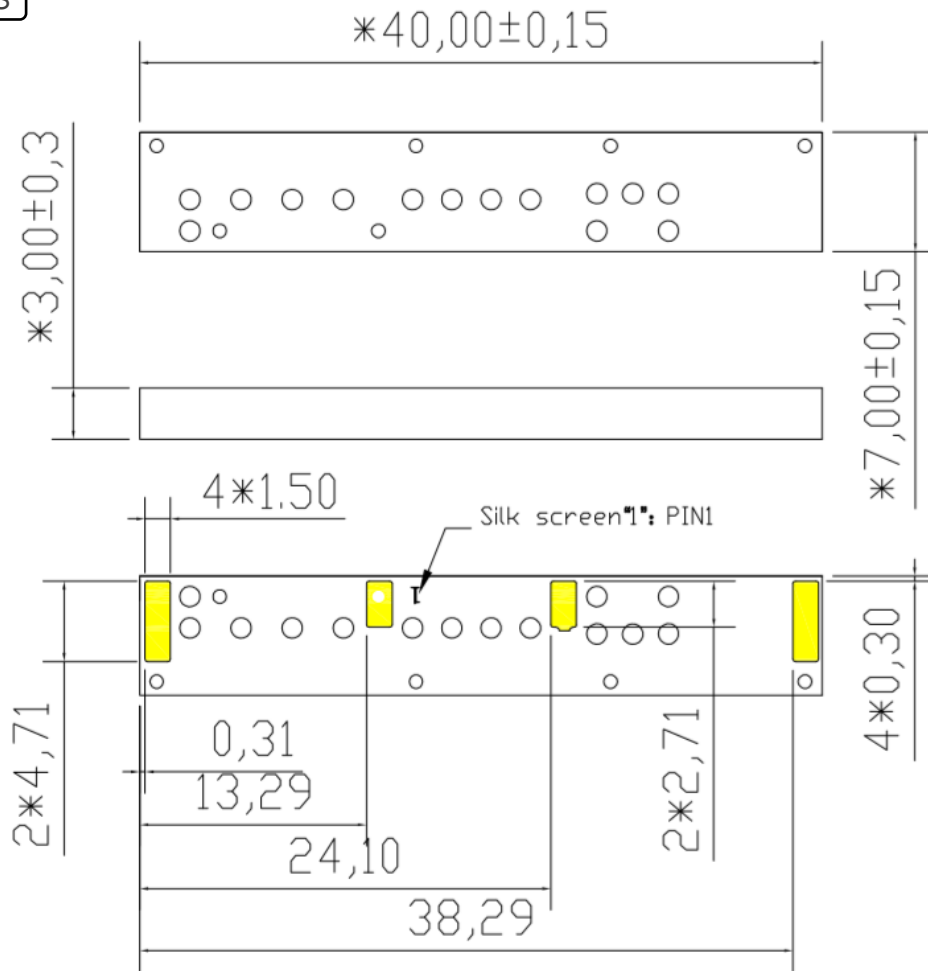
- Taping Reel Dimensions (mm)



330 mm x 56 mm

12 Product Size (Unit: mm)

RoHS



13 EVB Size

	Name	Material	Brand	QTY	No.
1	Antenna	FR4 3.0t	Black	1	
2	PCBA	FR4 0.8t	Green	1	
3	SMA	Brass	Gold Plated	1	
4	3.3NH(0603)	Ceramics	MURATA	1	LQG18HN3N3S00D
5	0.5PF(0402)	Ceramics	MURATA	1	GJM1555C1HR50BB01D
6	6.8NH(0603)	Ceramics	MURATA	1	LQG18HN6N8J00D

