

Shanghai Sunnyway Communication Technology Limited Company

Temporary antenna specification

Customer: Tongli		The project: MT95L-A3
Operating frequency band: LTE Band 1/3/5/8/34/38/39/40/41 GPS&北斗		
Motherboard version: 110101011612 V102 20230516		
Shangyuan material specifications		
Specifications and models	Shangyuan material number	Customer part number
LTE	SH23353IB77	
conductive foam	SH23105IA24	
ceramics	SH23353IA54	

The record of project changes			
Date of preparation/change	Changes	Change of person	version

Sunnyway counter-signature bar				
Research and development	ME:	Auditor:	QE:	Approver:
	RF:	Auditor:		
Client Counter-signature bar				
EE	PM		RF	QE

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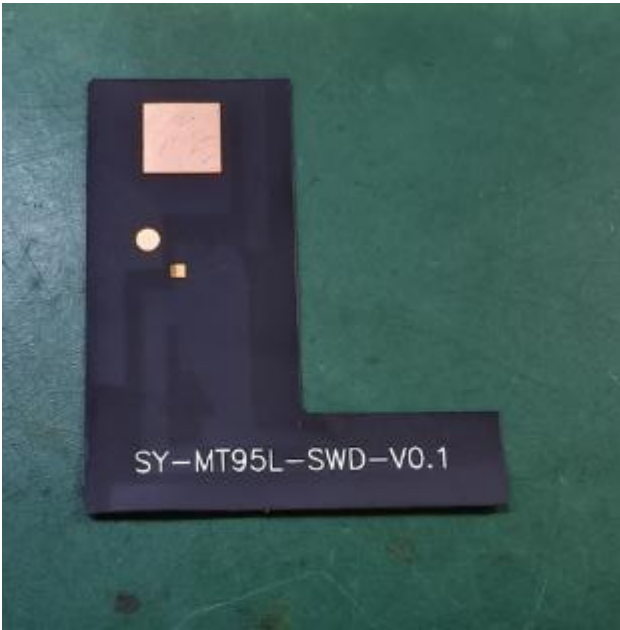
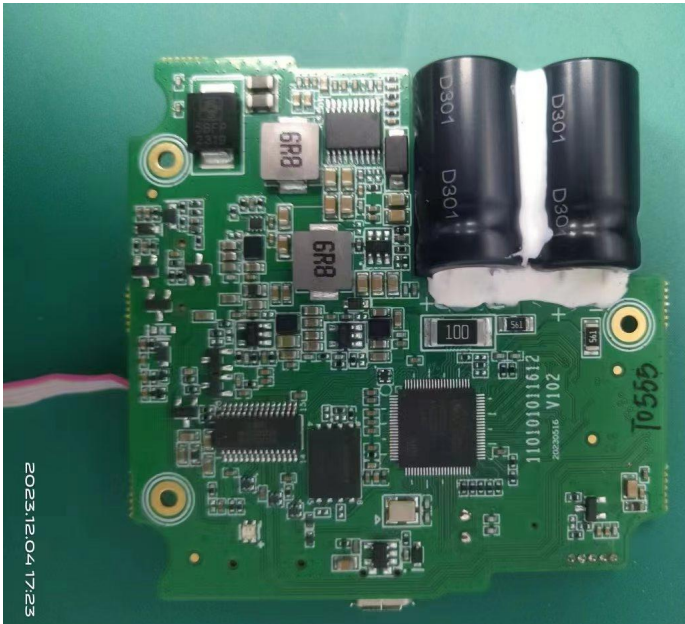
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1. Project information

Machine information



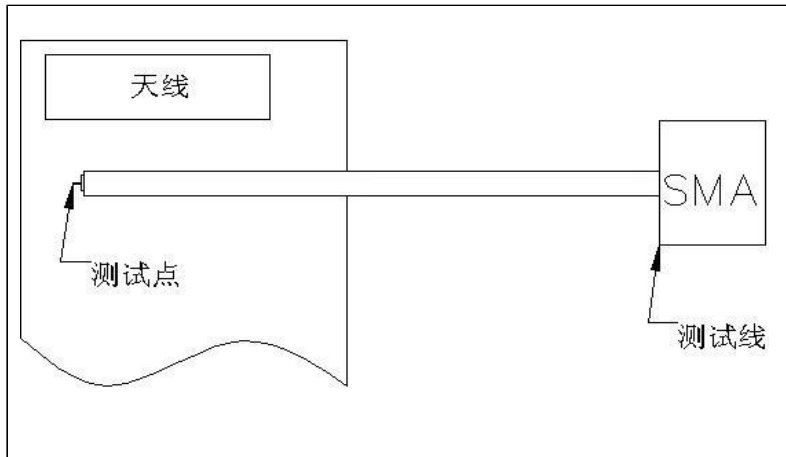
MAIN Antenna	110101011612 V102 20230516
Antenna version	SY-MT95L-SWD-0.1

Note: The customer finally verified that the antenna performance prototype was retained in our company for at least one year, which is convenient for analysis and solution to abnormal situations in antenna mass production.

2. Test fixtures

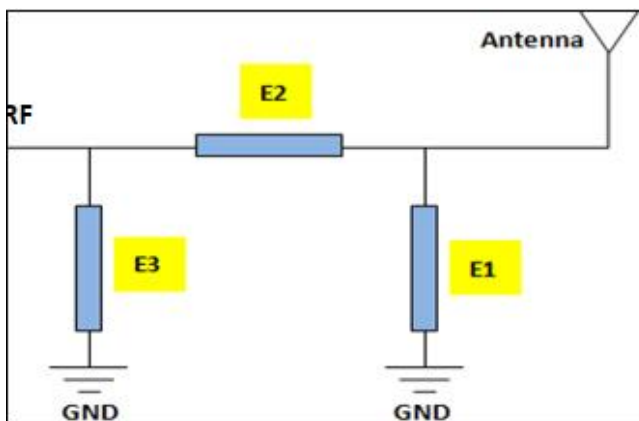
Purpose: To test the passive parameters of the antenna as accurately as possible.

How to make: The prototyping mechanism is made of a 50 ohm coaxial cable, one end is connected to the test point at the back of the matching circuit of the prototype motherboard (the front of the RF test hole), and the other end is connected to the SMA connector. The schematic diagram is as follows:



3. Matching circuits

Main antenna



Element	Value	specification
E1	N/A	
E2	OR	
E3	N/A	

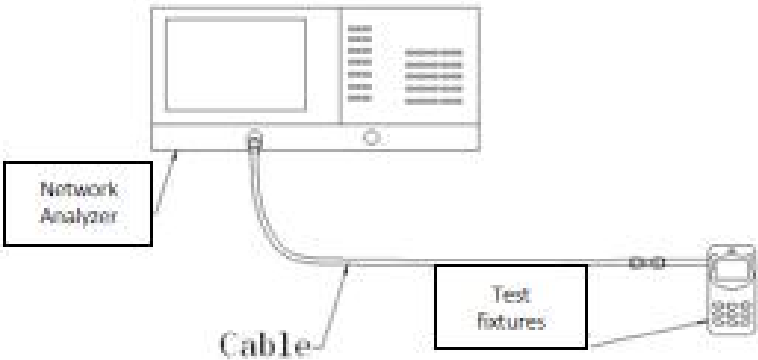
4. S11 test

4.1 S11 Test Method Description

Test Equipment: Network Analyzer (E5071C)

Test method: A 50 ohm CABLE cable is derived from the instrument test port, and the SMA connector of the prototype is connected after calibration using the calibrator to record the return loss and standing wave ratio corresponding to the relevant frequency point.

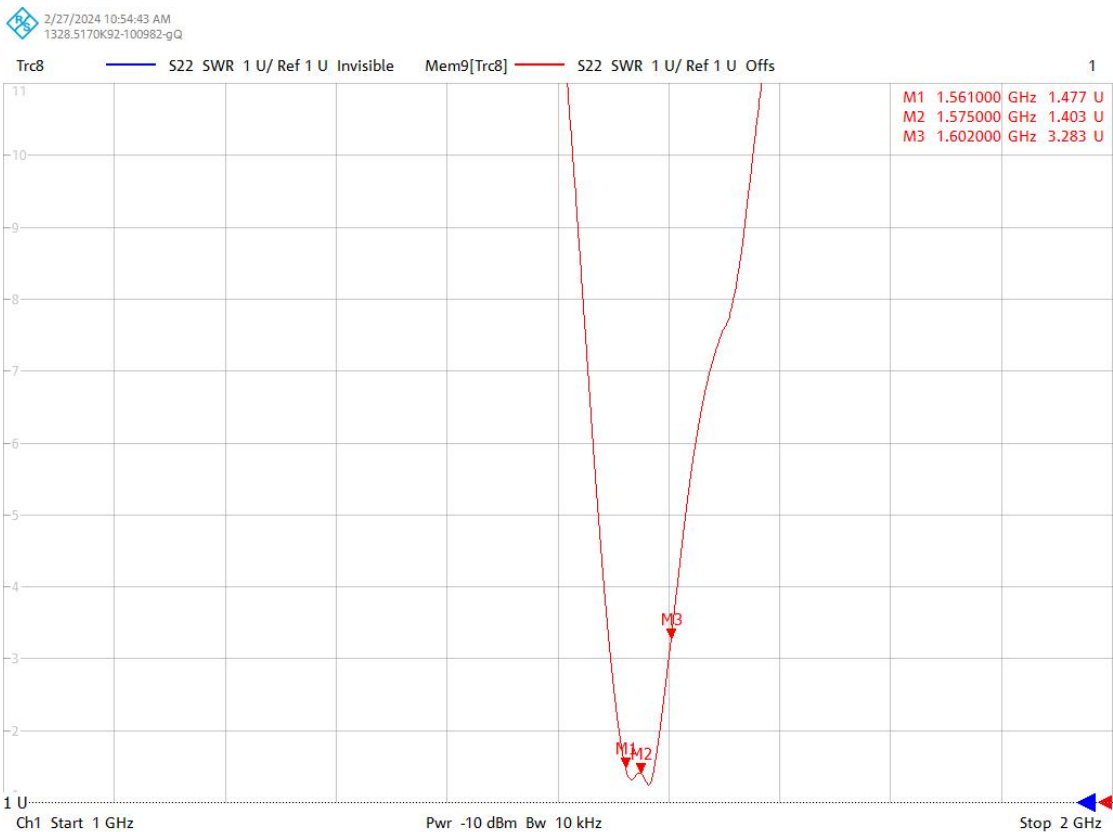
The test diagram is as follows:



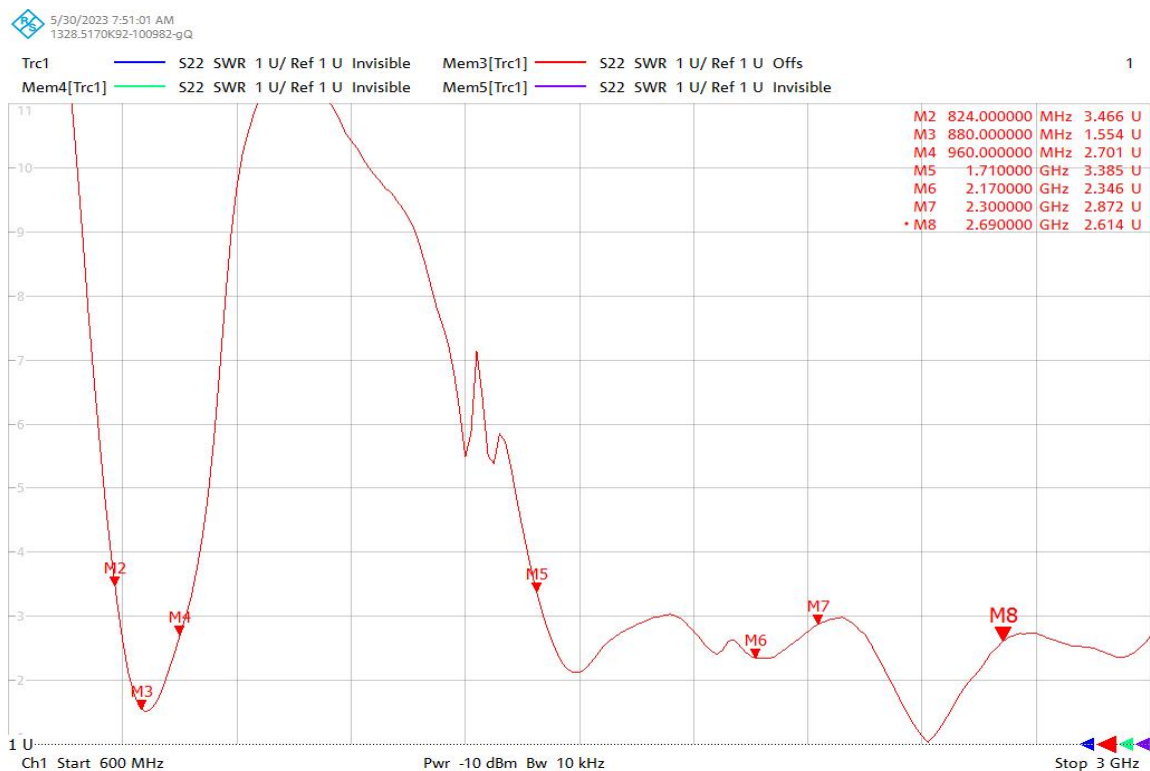
Test the schematic

4.2 S11 parameter

GPS Antenna



MAIN Antenna



5 Darkroom test data

Test system: Shielded darkroom

Test environment: temperature $22^{\circ}\text{C}\pm 3^{\circ}\text{C}$, humidity
 $50\%\pm 15\%$

Test equipment: When testing passive data, use the

Network Analyzer Agilent E5062C When testing
active data, the Comprehensive Tester Agilent 8960
/CMW500/E4438C is used

5.1 Passive test data

GPS antenna efficiency

Frequency/MHz	Efficiency / dB	Efficiency / %	MaxGain/dBi
1550	-3.44	45.24	-1.11
1555	-2.69	53.79	0.16
1560	-2.43	57.15	0.85
1565	-2.41	57.38	1.14
1570	-2.4	57.6	1.39
1575	-2.32	58.64	1.5
1580	-2.41	57.38	1.65
1585	-2.63	54.63	1.36
1590	-3.1	48.98	0.21
1595	-3.88	40.94	-0.99
1600	-4.26	37.51	-1.03

Shanghai Shangyuan Communication Technology Co., Ltd. antenna recognition
MAIN antenna efficiency

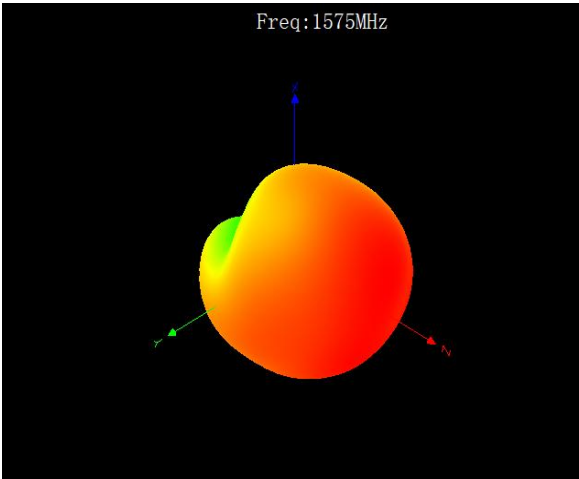
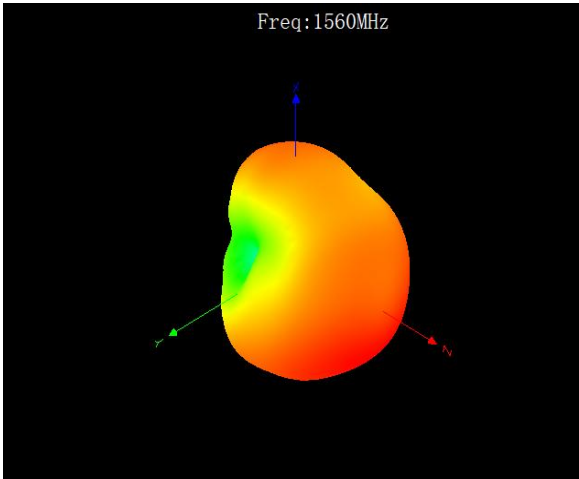
Frequency/MHz	Efficiency / dB	Efficiency / %	MaxGain/dBi	Frequency/MHz	Efficiency / dB	Efficiency / %	MaxGain/dBi	Frequency/MHz	Efficiency / dB	Efficiency / %	MaxGain/dBi	Frequency/MHz	Efficiency / dB	Efficiency / %	MaxGain/dBi
820	-6.46	22.59	-3.76	1830	-4.15	38.46	-1.73	2110	-3.45	45.19	-1.63	2500	-3.17	48.21	2.07
830	-6.23	23.81	-3.14	1840	-4.22	37.84	-2.07	2120	-3.46	45.08	-1.15	2510	-3.05	49.55	2.18
840	-5.88	25.8	-2.49	1850	-4.18	38.19	-2.09	2130	-3.58	43.85	-0.75	2520	-3.05	49.58	2.3
850	-5.63	27.33	-1.79	1860	-4.15	38.46	-2.02	2140	-3.54	44.26	-0.63	2530	-2.86	51.8	1.88
860	-5.48	28.3	-1.21	1870	-4.13	38.64	-2.14	2150	-3.4	45.71	-0.57	2540	-2.79	52.64	1.82
870	-5.38	28.96	-1.24	1880	-4.15	38.46	-2.34	2160	-3.35	46.24	-0.5	2550	-2.83	52.16	1.71
880	-5.31	29.42	-0.89	1890	-4.2	38.02	-2.7	2170	-3.27	47.1	-0.1	2560	-2.84	52.03	1.22
890	-5.41	28.76	-0.7	1900	-4.2	38.02	-2.85					2570	-2.92	51.07	1.18
900	-5.59	27.59	-1.46	1910	-4.16	38.37	-2.88	2300	-3.97	40.13	0.63	2580	-2.87	51.65	1.11
910	-5.73	26.71	-1.95	1920	-4.11	38.82	-2.83	2310	-3.94	40.38	0.62	2590	-3.02	49.9	0.81
920	-5.89	25.75	-2.13	1930	-4.1	38.9	-2.63	2320	-3.96	40.2	0.5	2600	-3.29	46.9	0.49
930	-6.13	24.36	-2.16	1940	-4.11	38.82	-2.49	2330	-3.77	41.96	0.33	2610	-3.5	44.69	0.27
940	-6.41	22.84	-2.47	1950	-4.09	38.99	-2.54	2340	-3.83	41.39	0.46	2620	-3.72	42.48	0.08
950	-6.73	21.23	-2.56	1960	-4.01	39.72	-2.56	2350	-3.74	42.26	0.16	2630	-3.83	41.41	-0.44
960	-7.04	19.77	-3.18	1970	-3.91	40.64	-2.35	2360	-3.68	42.85	-0.06	2640	-4.06	39.28	-0.62
				1980	-3.8	41.69	-2.08	2370	-3.92	40.55	0.1	2650	-4.17	38.29	-0.87
1710	-4.59	34.75	-4.13	1990	-3.71	42.56	-1.96	2380	-3.96	40.17	-0.16	2660	-4.25	37.6	-1.53
1720	-4.39	36.39	-3.78	2000	-3.61	43.55	-1.79	2390	-3.87	41.03	-0.31	2670	-4.38	36.48	-1.02
1730	-4.21	37.93	-3.47	2010	-3.7	42.66	-1.92	2400	-4.09	39	0.43	2680	-4.5	35.44	-1.5
1740	-4.1	38.9	-3.22	2020	-3.87	41.02	-1.65	2410	-3.68	42.87	0.44	2690	-4.54	35.19	-1.74
1750	-4.08	39.08	-3.13	2030	-3.96	40.18	-1.47	2420	-3.48	44.88	0.48				
1760	-4.04	39.45	-3.05	2040	-3.91	40.64	-1.24	2430	-3.67	42.96	1.02				
1770	-4	39.81	-2.83	2050	-3.8	41.69	-1.05	2440	-3.69	42.77	1.19				
1780	-3.94	40.36	-2.57	2060	-3.46	45.08	-1.76	2450	-3.77	41.99	1.16				
1790	-3.93	40.46	-2.23	2070	-3.5	44.67	-2.46	2460	-3.97	40.1	1.53				
1800	-3.95	40.27	-1.7	2080	-3.45	45.19	-2.67	2470	-3.81	41.6	2.33				
1810	-4.02	39.63	-1.46	2090	-3.48	44.87	-2.62	2480	-3.71	42.58	1.53				
1820	-4.08	39.08	-1.52	2100	-3.38	45.92	-2.15	2490	-3.68	42.86	1.89				

5.2 Active test data

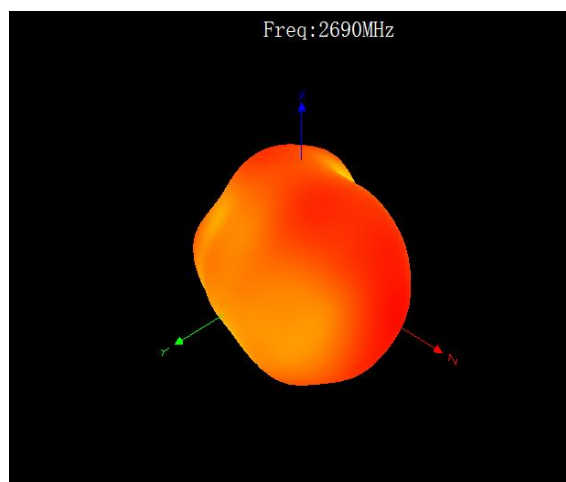
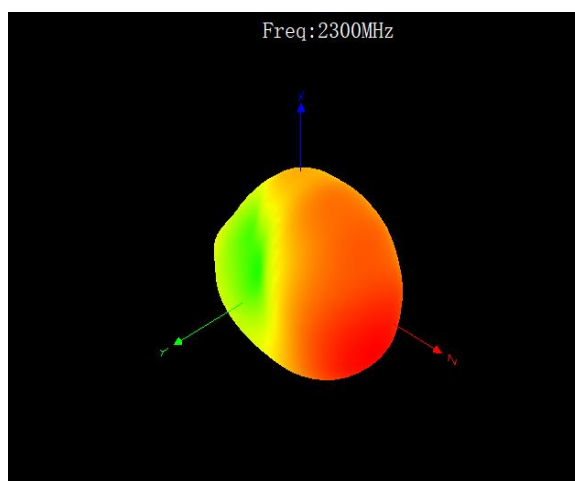
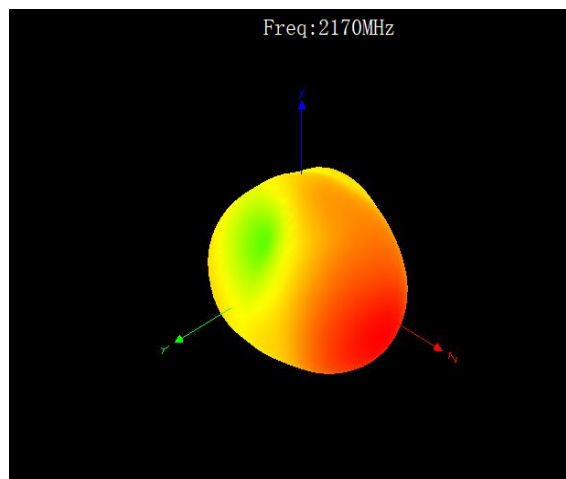
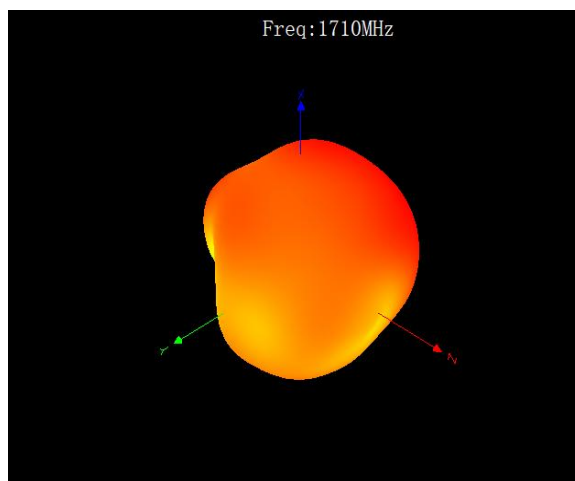
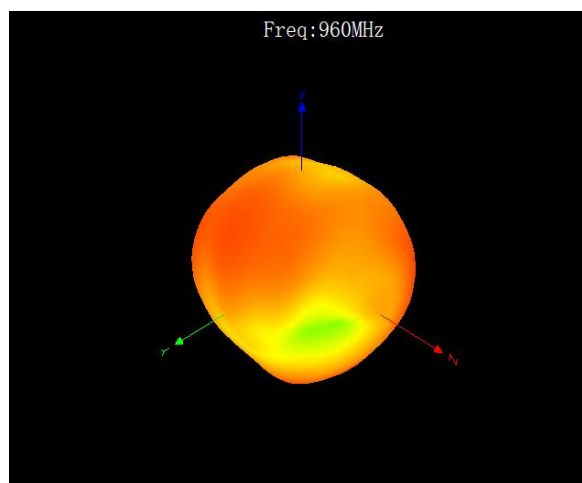
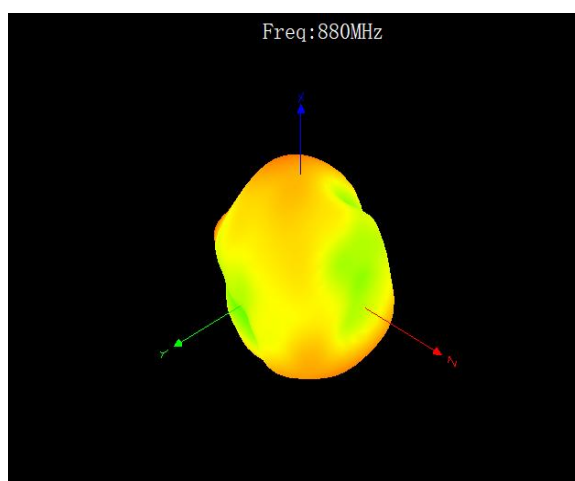
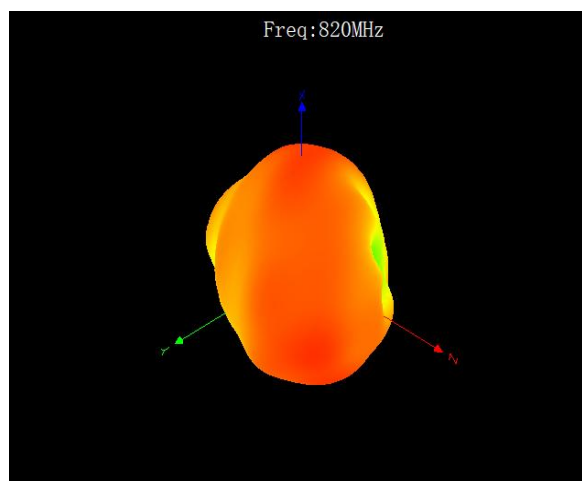
Band	Channel	OTA		Band	Channel	OTA	
		TRP (dB)	TIS (dB)			TRP (dB)	TIS (dB)
FDD Band 1 (10M)	L	18.33		TDD Band 34 (10M)	L	17.73	
	M	19.59			M	17.76	
	H	19.71	-90.41		H	17.15	-90.87
FDD Band 3 (10M)	L	18.25		TDD Band 38 (20M)	L	19.95	
	M	19.26			M	20.19	
	H	19.99	-91.05		H	21.39	-91.29
FDD Band 5 (10M)	L	15.14		TDD Band 39 (20M)	L	20.07	
	M	15.21			M	20.65	
	H	16.6	-72.48		H	20.74	-89.02
FDD Band 8 (10M)	L	15.13		TDD Band 40 (20M)	L	20.88	
	M	15.14			M	20.64	
	H	15.76	-74.38		H	20.49	-92.23
				TDD Band 41 (20M)	L	19.93	
					M	20.13	
					H	20.27	-89.87

6. 3D diagram

GPS antenna 3D diagram



MAIN antenna 3D diagram



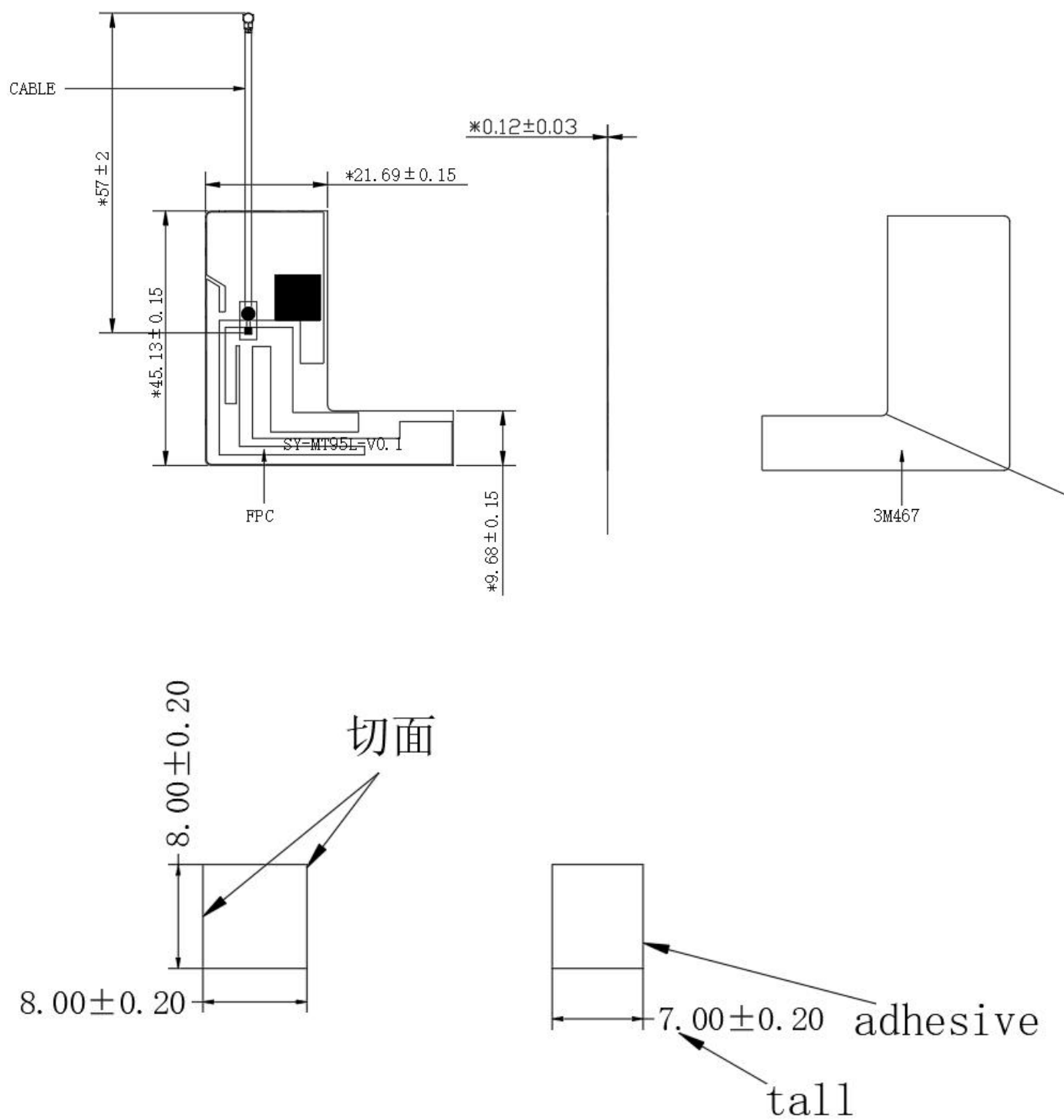
7. Prototype grounding treatment

8. Mass production antenna indicators

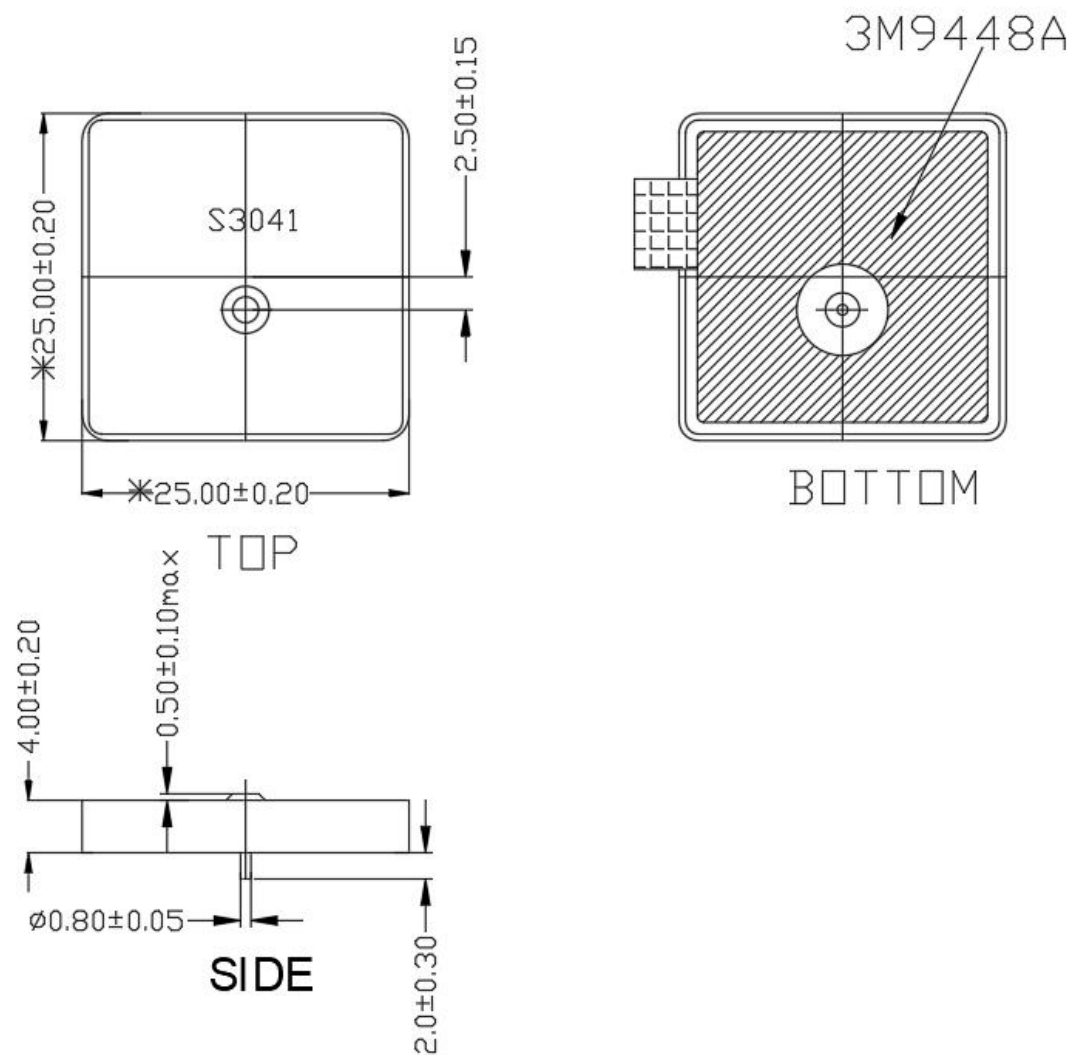
When the antenna is mass-produced, the standing wave ratio is used as the mass production test standard. According to the differences in the project itself, the following criteria are given:

frequency (MHz)	Mass production standards
700--960; 1710--2690	VSWR (Mass production performance) <VSWR(Acknowledge performance)+1
1561; 1575; 1602	VSWR (Mass production performance) <VSWR(Acknowledge performance)+1

9. Drawings



9. Drawings



Antenna

YC0009AA Datasheet

Antenna Services

Version: 1.5

OC (Antenna Only): **YC0009AA**

OC (Antenna + EVB): **YC0009AAEVB**

Date: 2021-11-30

Status: Released



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About the Document

Revision History

Version	Date	Author	Note
-	2020-09-20	Kenny YIN	Creation of the document
1.0	2020-09-20	Kenny YIN	First official release
1.1	2021-01-12	Kenny YIN	Updated the antenna image in Chapter 2.
1.2	2021-06-25	Aria CHU	Updated VSWR values in Chapter 3.
1.3	2021-07-25	Kenny YIN	Updated package quantity. (Chapter 8)
1.4	2021-09-28	Aria CHU	Added the new OC YC0009AAEVB on the cover.
1.5	2021-11-30	Aria CHU	Updated the product description in Chapter 1.

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1 Product Description

Quectel Wi-Fi antenna covers 2.4 GHz, 5 GHz, and up to 7 GHz bands, fully satisfying customers' requirements for Wi-Fi 5, Wi-Fi 6, and Wi-Fi 6E. There are various antenna types, including built-in FPC antenna, ceramic patch antenna, and other external antennas of different shapes or sizes. The antenna performance meets the customers' demands for efficiency, gain, and radiation and ensures the superior experience of the customers' products in use.

We provide comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

2 Product Features

- Wi-Fi/Bluetooth
- High efficiency
- Excellent performance



3 Product Specifications

Passive Electrical Specifications

Frequency Range	2400–2500 MHz
Input Impedence	50 Ω
VSWR	≤ 2.0
Gain	≤ 4 dBi
Polarization Type	Linear

Mechanical Specifications

Antenna Size	3.2 mm $\times$ 1.6 mm $\times$ 0.5 mm
Casing	Ceramic
Connector Type	SMD
Working Temperature	-40 °C to +85 °C
Radome Color	-

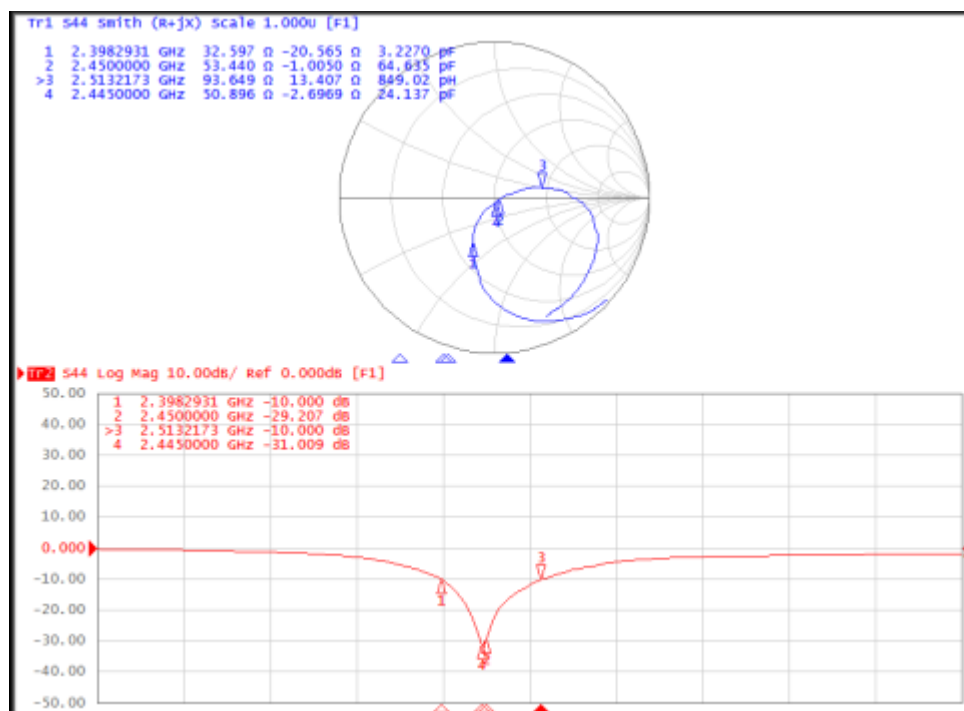
4 Overall Performance

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



4.2. Return Loss



Frequency (MHz)	2390	2450	2513
Return Loss	-10	-29.2	-10

4.3. Efficiency

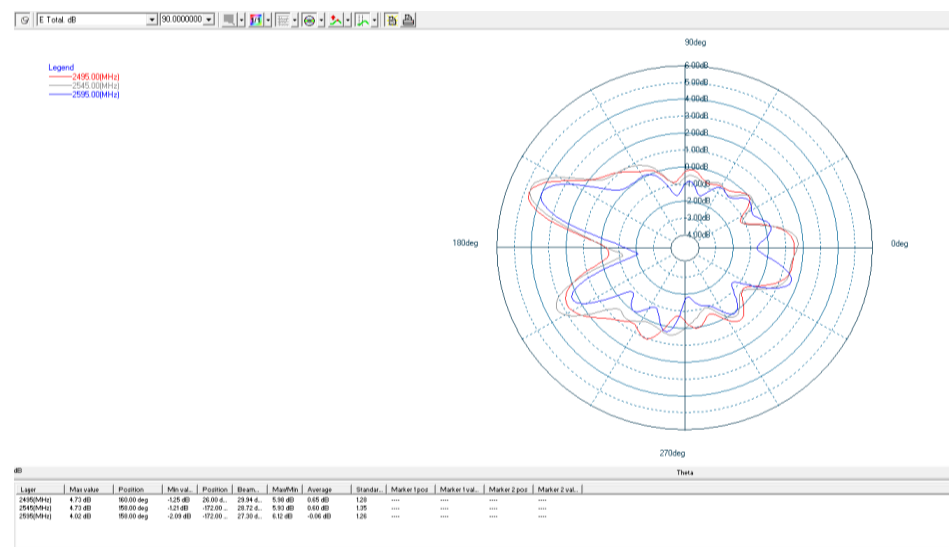
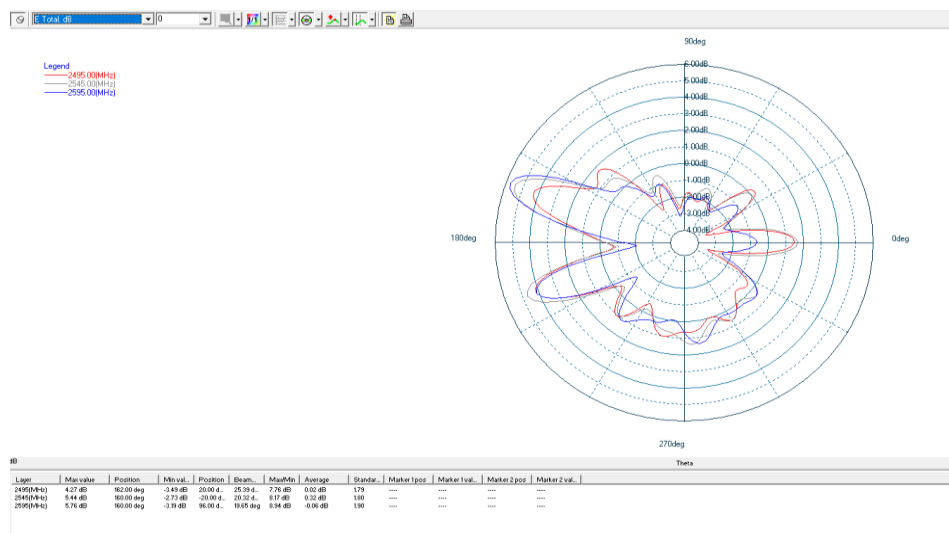
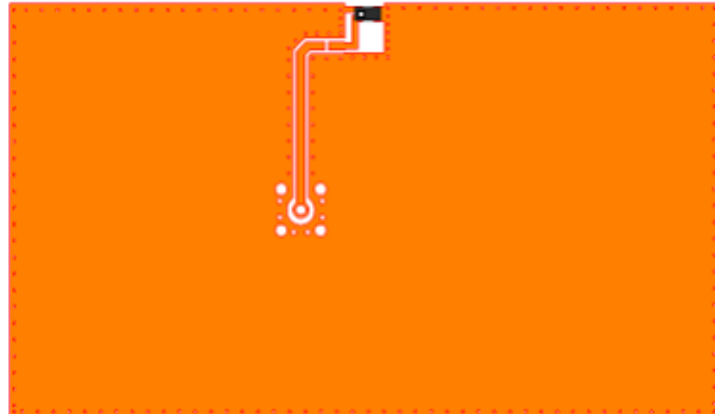
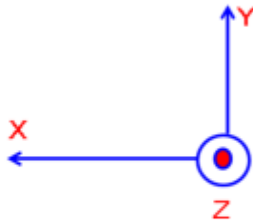
Frequency (MHz)	2400	2450	2500
Efficiency (%)	72.1	78.2	71.8

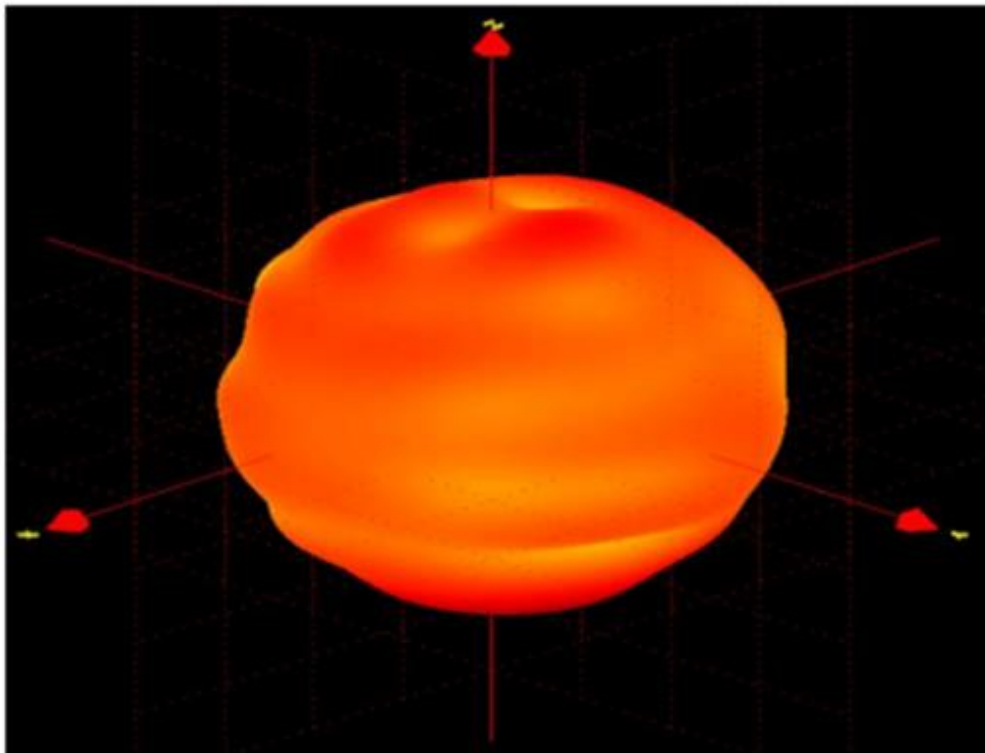
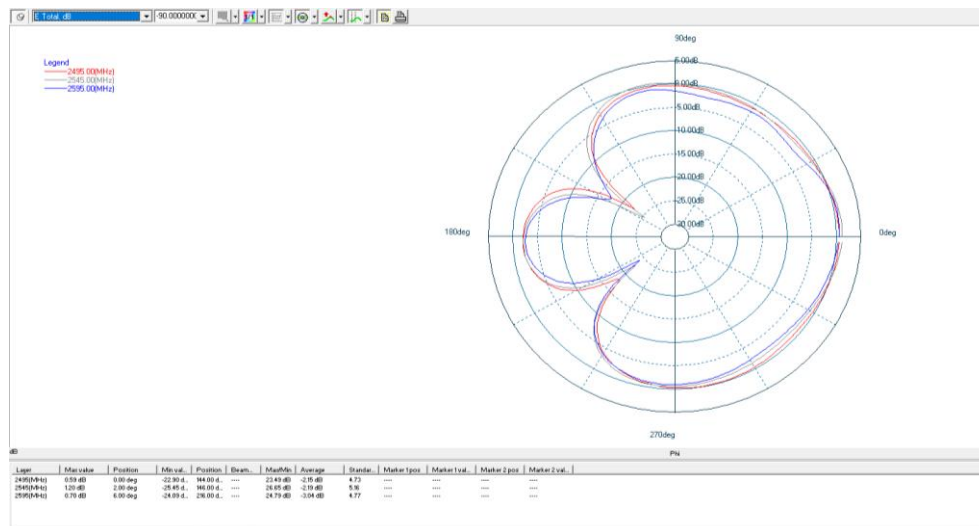
4.4. Gain

Frequency (MHz)	2400	2450	2500
Gain	1.76	4.08	2.53

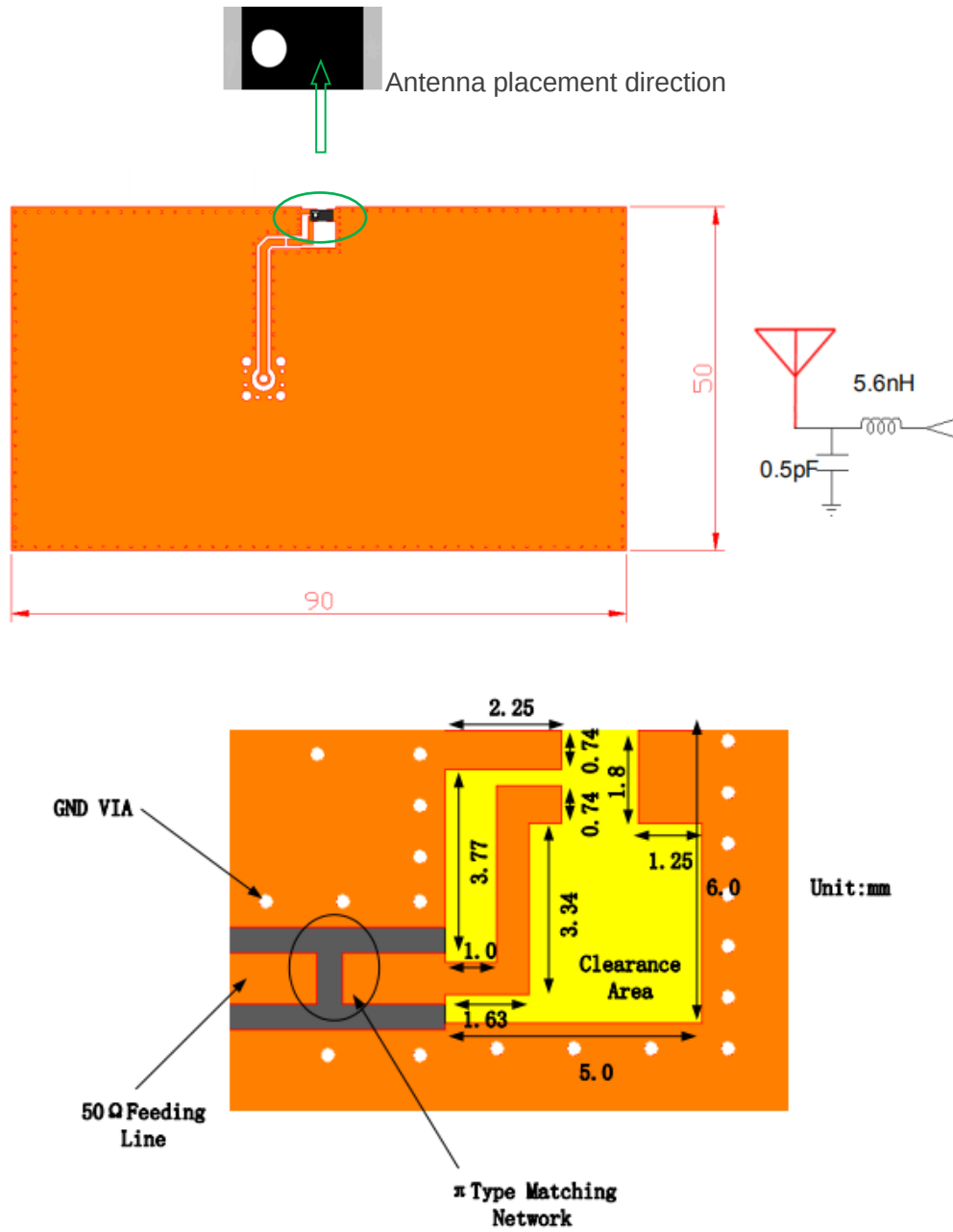
4.5. Radiation Pattern

coordinates:

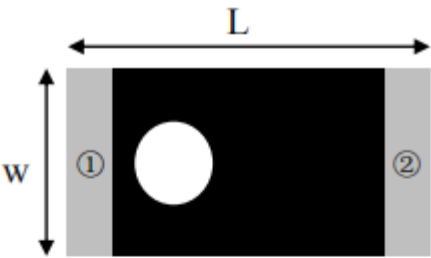




4.6. Reference PCB Design (Unit: mm)



5 Product Size



(Top View)

Number	Terminal Name
①	INPUT
②	NC



(Bottom View)



(Side View)

Symbols	L	W	T	A
Dimensions	3.2+/-0.2	1.6+/-0.2	0.5+/-0.1	0.4+/-0.1

6 Reliability Test

Temperature Range	25 ±5 °C
Relative Humidity Range	55–75 %
Operating Temperature Range	-40 °C to +85 °C
Storage Temperature Range	-40 °C to +85 °C

6.1. Vibration Resistance

The device should fulfil the electrical specification after being applied to the vibration of 10–55 Hz with amplitude of 1.5 mm for 2 hours in X, Y and Z directions respectively.

6.2. Drop and Shock Tests

The device should have no mechanical damage after dropping onto the hard wooden board from the height of 100 cm for 3 times at each facet of the 3 dimensions of the device.

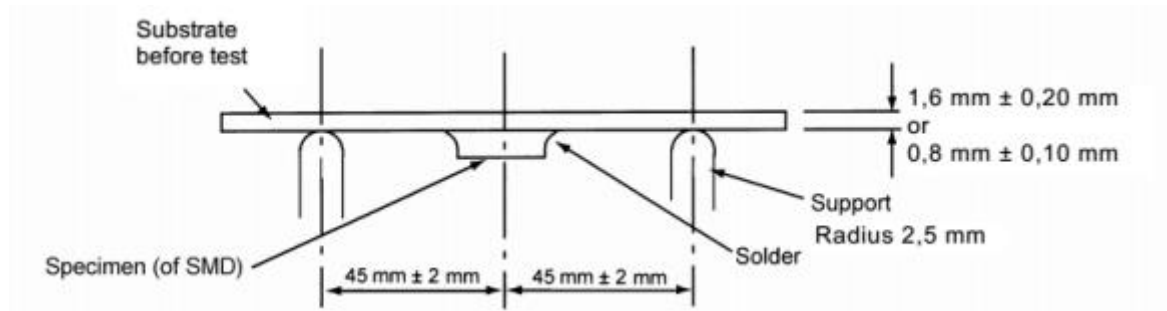
6.3. Resistance to Soldering Heat

The device should have no damage after pre-heating at 120–150 °C for 120 seconds and immersion in Sn solder at 255 ±10 °C for 5 ±0.5 seconds, or electric iron at 300 ±10 °C for 3 ±0.5 seconds.

6.4. Adhesive Strength of Termination

The device have no remarkable damage or removal of the termination after horizontal force of 5 N (≤ 0603); 10 N (> 0603) for 10 ±1 seconds.

6.5. Bending Resistance Test



Weld the product to the central part of the PCB with the thickness 1.6 ± 0.2 mm or 0.8 ± 0.1 mm as the illustration shows, and keep exerting force arrow-ward on it at speed of 1 mm/s, and hold for 5 ± 1 seconds at the position of 1.5 mm bending distance, so far, any peeling-off of the product metal coating should not be detected.

6.6. Moisture Proof

The device should fulfil the electrical specifications after being exposed to the temperature 60 ± 2 °C and the relative humidity 90–95 % for 96 hours and experiencing 1–2 hours recovery time under normal condition.

6.7. High Temperature Endurance

The device should fulfil the electrical specifications after being exposed to temperature 85 ± 5 °C for 96 ± 2 hours and experiencing 1–2 hours recovery time under normal temperature.

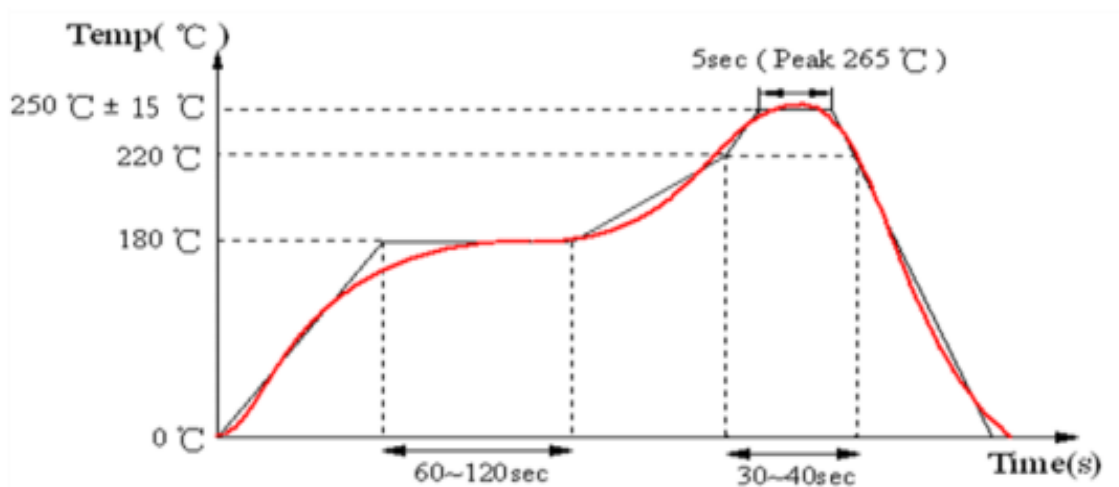
6.8. Low Temperature Endurance

The device should fulfil the electrical specifications after being exposed to the temperature -40 °C ± 5 °C for 96 ± 2 hours and experiencing 2 hours recovery time under normal temperature.

6.9. Temperature Cycle Test

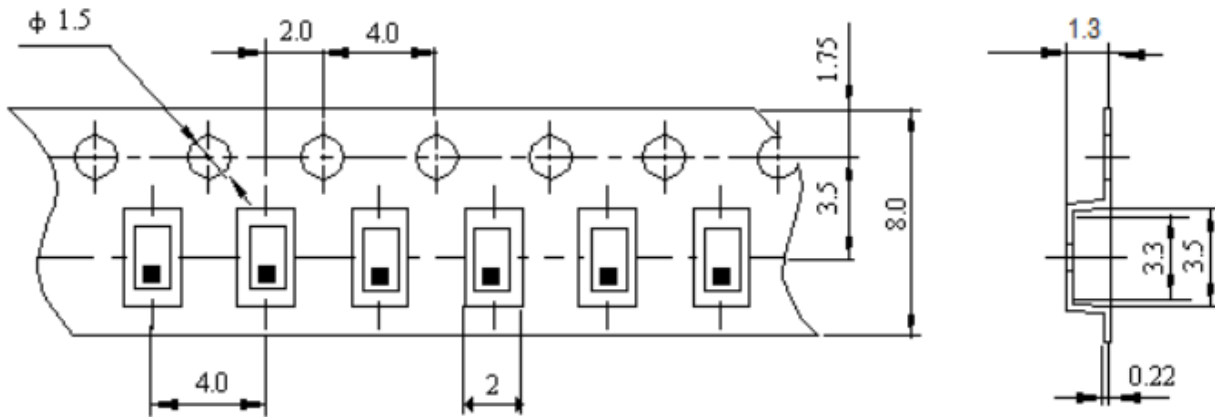
The device should fulfil the electrical specifications after being exposed to the low temperature -40 °C and high temperature $+85$ °C for 30 ± 2 minutes each by 5 cycles and experiencing 1 to 2 hours recovery time under normal temperature.

7 Reflow Soldering Standard Condition



8 Packaging and Dimensions

8.1. Plastic Tape



Packaging Note:

Reserve 150–200 mm of space at the trailing end of the carrier, 250–300 mm of space at the front end of the carrier and a further 250 mm space of cover tape at the front end of the carrier.

8.2. Reel (6000 pcs/reel)

