



Hanyang Antenna Design Co.,Ltd

Antenna Approval Sheet



Product name	Internal PCB Antenna
Model name	F04602000245
Date	2023-10-31
Manufacture	Hanyang Antenna Design

	R&D	Quality	Approval
Sign			
Date	10/31	10/31	10/31

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1. Document reversion history

No.	Date	Detail revision and change	Reversion
1	2023-10-31	Initial release	1.0
2			
3			
4			
5			
6			



2. Material certificate

No.	Part name	Material	Color	Quantity	Processing method	Partner	Remarks
1	Φ1.13 Coaxial cable	Tinned cable	Black	1	Cocentra MHF plug	Shenyu	
2	Antenna	FR4	Black	1		Yaoxian	1.0mm



3. Technical information

3.1 Electrical specifications

Frequency	2400~2500MHz	5150~5875MHz
VSWR	2.0 :1 blow	2.0 :1 blow
Peak gain	1.9 dBi	2.0 dBi
Input impedance	50 Ω	
Polarization	Linear	
Radiation properties	Omni-directional	
Maximum power	2Watts	

3.2 Mechanical specifications

Antenna size	33.5(mm) x 9.0(mm) x 1.0(mm)
Material	FR4
Connector type	COCENTRA ANCZ1131-1B1
Cable length	100mm
Cable color	Black
Operating temperature	-40 °C to +80 °C
Operating humidity	0 ~ 95%

3.3 Packaging specifications

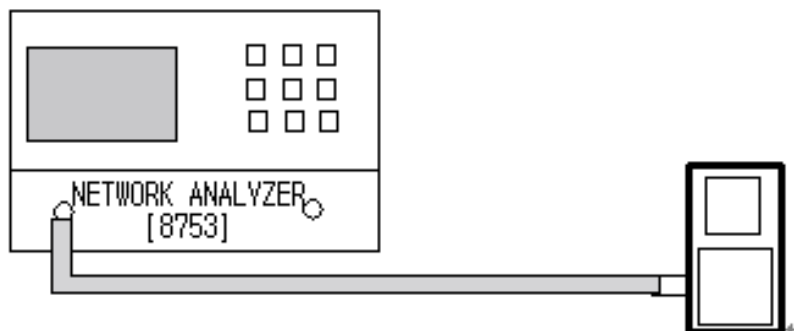
Part name	Quantity	Material	Remarks
Polybag (small)	1Bag (200pcs)	PP	240x160mm
Polybag (large)	1Bag (1000pcs)	PP	325x220mm
Out box	1Box (4,000pcs)	K=k paper	



4. Electrical test environment

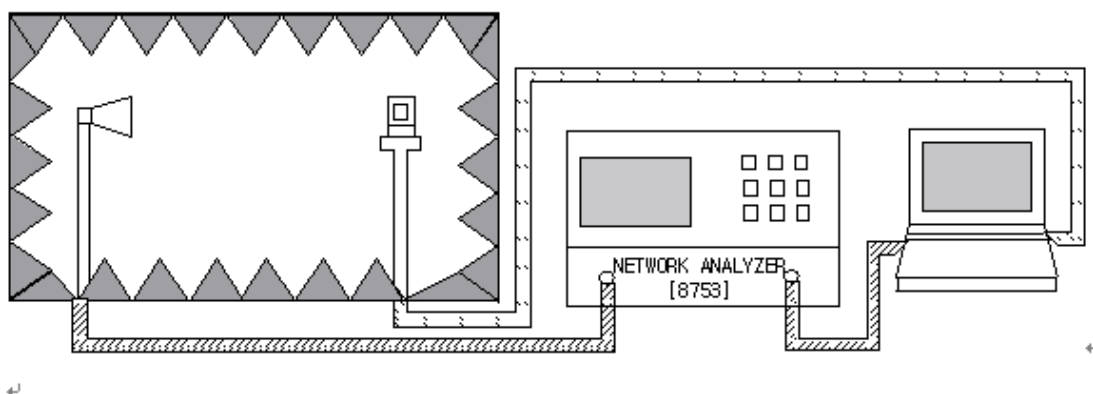
4.1 VSWR

- ① Connect the measurement cable to the Network analyzer.
- ② Set and calibrate the Network analyzer to match the measurement frequency.
- ③ Install the antenna and measure the VSWR.



4.2 Radiation pattern & Gain

- ① Calibrate the chamber system using the reference antenna, the software for controlling the chamber system is set to the measurement frequency band.
- ② Fit the antenna in chamber.
- ③ Measure the gain, efficiency, and radiation pattern.



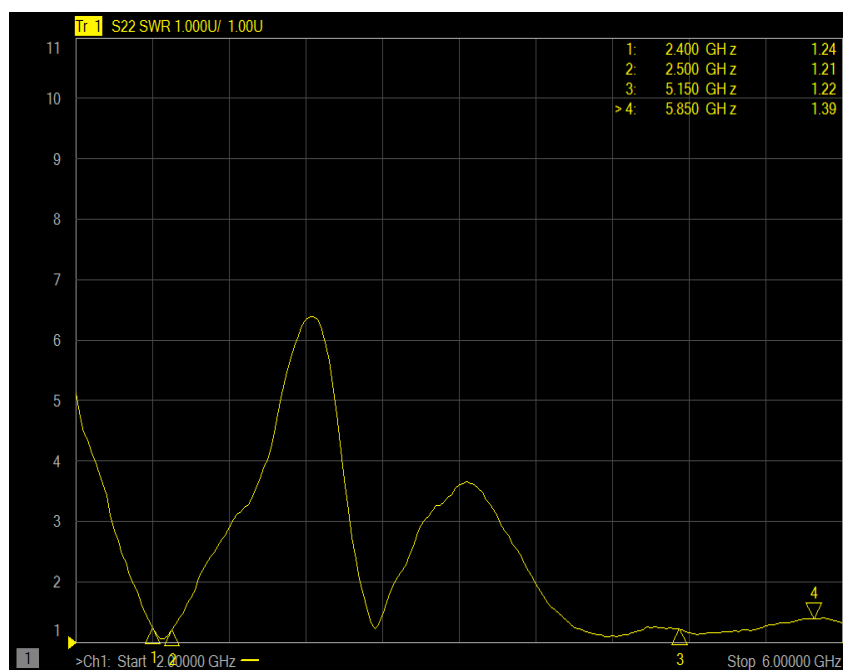


5. Electrical characteristic

5.1 VSWR

The VSWR characteristics must satisfy the following electrical demands.

Frequency	2400~2500MHz	5150~5875MHz
VSWR	2.0 :1 blow	2.0 :1 blow





5.2 Gain & Efficiency

The unit of gain is “dBi” and it must satisfy the following specifications.

Frequency	2400~2500MHz	5150~5875MHz
Peak gain	1.9 dBi	2.0 dBi

Passive Performance																		
EUT																		
Test Date	Mon 30/Oct/2023 16:12:58																	
Event Status																		
Serial Number																		
Hardware Version																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
Frequency [MHz]	2400	2420	2440	2460	2480	2500	5150	5250	5350	5450	5550	5650	5750	5850				
Efficiency [dB]	-2.84	-2.58	-2.14	-2.08	-2.24	-2.01	-1.25	-1.00	-0.98	-1.45	-0.98	-1.54	-1.18	-1.69				
Efficiency [%]	52.0	55.2	61.0	62.0	59.7	63.0	75.0	79.4	79.7	71.6	79.8	70.2	76.1	67.8				
TRG _θ [dB]	-8.72	-8.37	-7.96	-7.93	-8.07	-7.90	-5.80	-5.84	-5.89	-6.57	-6.04	-6.92	-6.78	-7.44				
Gain _{θ Peak} [dB]	-2.92	-2.51	-1.87	-1.67	-1.37	-0.88	1.55	0.91	0.99	0.38	0.59	0.19	1.31	0.52				
Gain _{θ Min} [dB]	-20.36	-19.88	-22.03	-23.12	-25.54	-30.95	-28.07	-20.64	-22.60	-26.96	-25.43	-30.89	-28.26	-21.68				
TRG _φ [dB]	-4.14	-3.91	-3.46	-3.39	-3.56	-3.30	-3.12	-2.73	-2.68	-3.05	-2.60	-3.02	-2.58	-3.03				
Gain _{φ Peak} [dB]	1.19	1.36	1.80	1.85	1.01	1.50	1.49	1.90	2.02	1.90	1.90	1.97	1.90	1.90				
Gain _{φ Min} [dB]	-33.85	-36.36	-30.55	-25.64	-26.67	-33.64	-30.95	-25.20	-23.73	-26.34	-33.77	-40.48	-23.39	-27.51				
UHRG [dB]	-6.08	-5.65	-5.12	-4.99	-5.08	-4.76	-3.91	-3.51	-3.32	-3.70	-3.05	-3.50	-3.21	-3.68				
UHRG/TRG [%]	47.5	49.4	50.4	51.2	52.0	53.1	54.2	56.1	58.4	59.5	62.1	63.6	62.8	63.3				
H-Plane	-11.81	-11.95	-12.03	-12.55	-13.19	-13.22	-9.00	-9.47	-9.11	-9.81	-9.60	-10.81	-11.35	-11.15				
E1-Plane, AVG [dB]	-14.74	-14.69	-14.57	-15.02	-15.83	-16.15	-11.10	-11.54	-11.74	-12.52	-12.85	-14.59	-15.50	-16.17				
E2-Plane, AVG [dB]	-4.61	-4.12	-3.58	-3.42	-3.49	-3.30	-1.75	-2.02	-2.15	-2.95	-2.24	-2.84	-2.44	-3.09				
Peak Gain [dB]	1.31	1.44	1.88	1.94	1.11	1.59	1.94	1.92	2.09	2.03	1.94	1.99	2.02	1.98				
Directivity [dB]	4.15	4.02	4.03	4.02	3.35	3.60	3.18	2.92	3.08	3.48	2.92	3.53	3.21	3.67				
Minimum Gain [dB]	-15.58	-16.49	-16.68	-16.03	-16.71	-18.29	-9.53	-9.23	-10.82	-11.81	-11.19	-12.72	-12.64	-14.59				
Test Condition	FS																	
Antenna Type																		
Average Efficiency	-1.67 dB 68.04 %																	



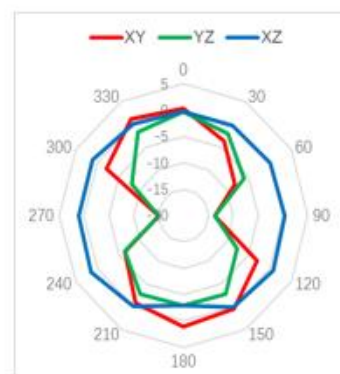
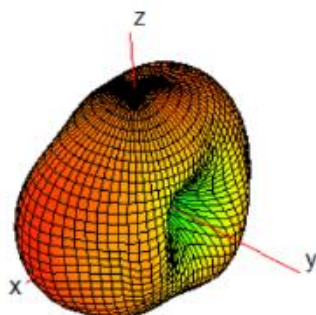
5.3 Radiation pattern

Radiation pattern of the antenna has Omni-directional pattern in H-Plane.

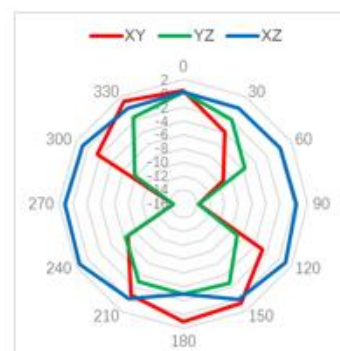
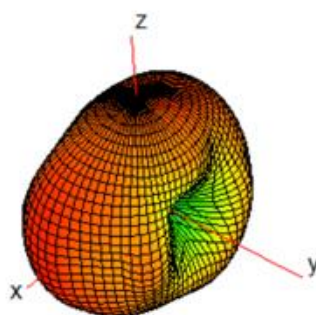


5.3.1 2.4G

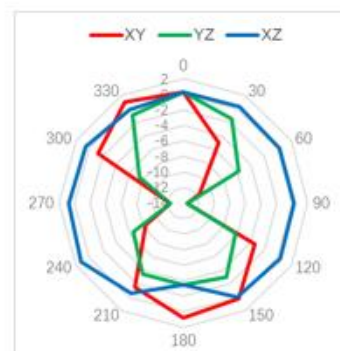
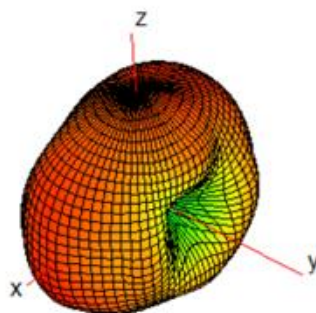
2400MHz



2440MHz



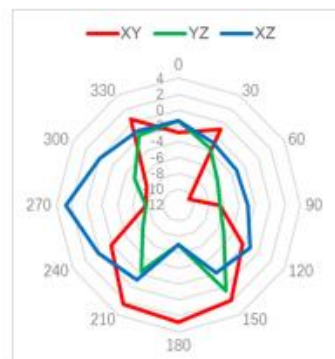
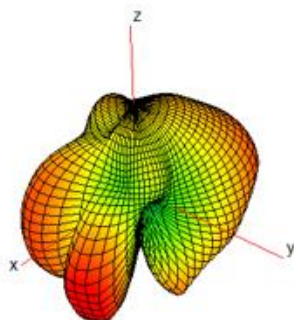
2500MHz



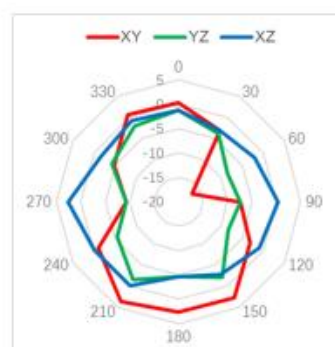
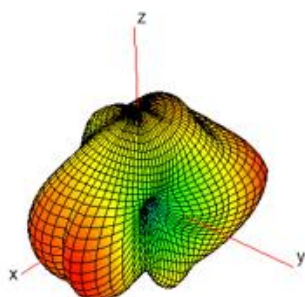


5.3.2 5G

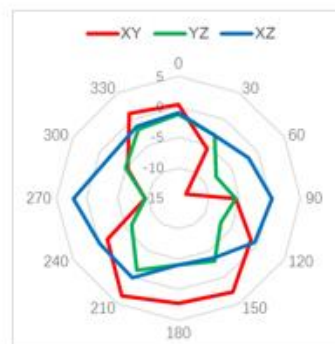
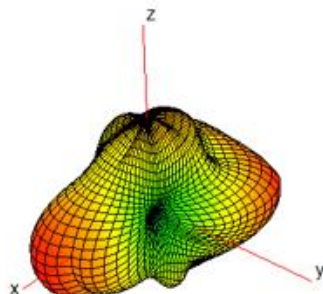
5150MHz



5550MHz



5850MHz





6. Environmental reliability test

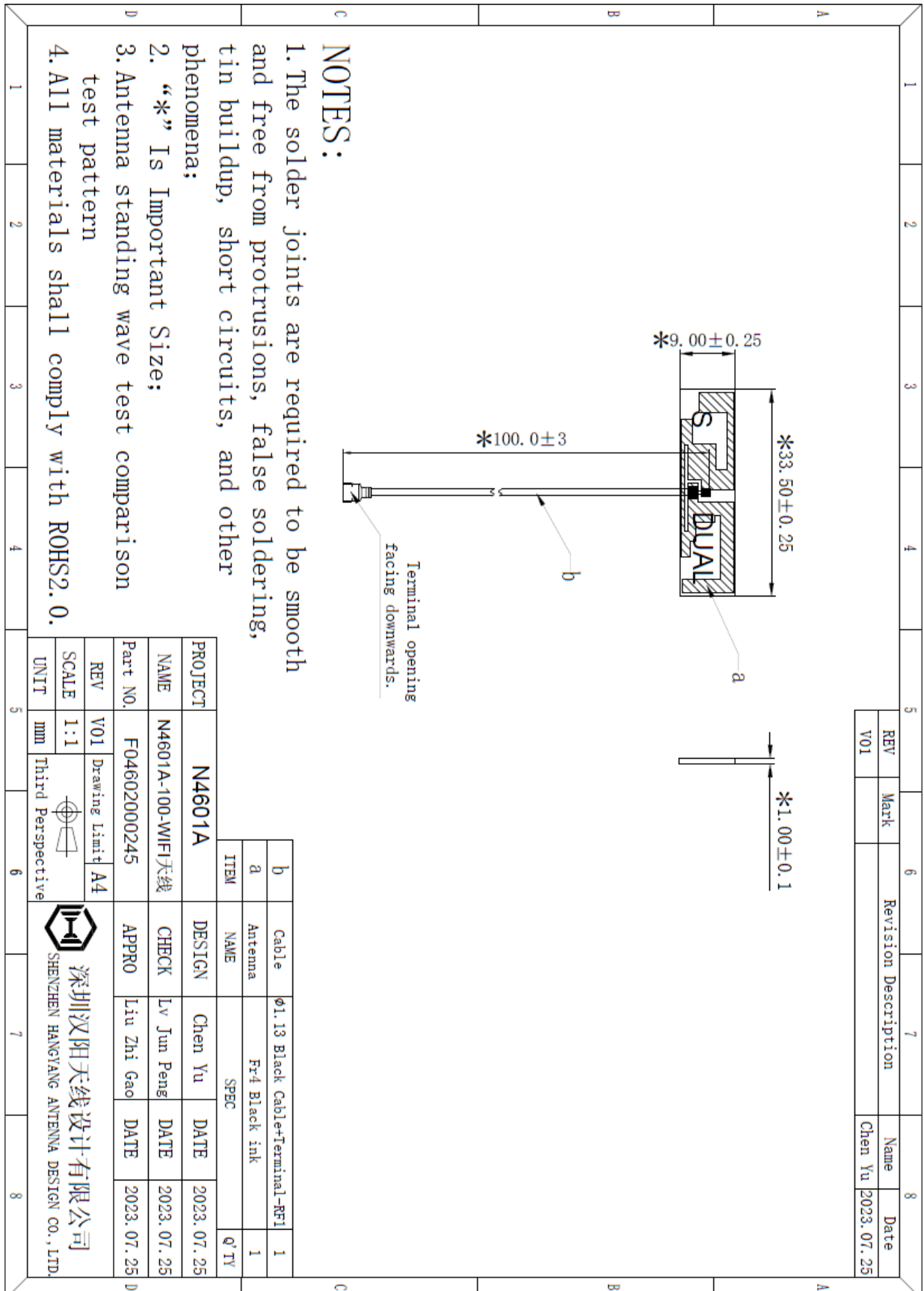
Test item	Test method	Test Standard	Test result	Number of samples
High temperature and Humidity	1. Check the test surface to keep it clean and dry without bubbles and scratches. 2. T=60±2°C, RH=93±3%, test time 48 hours. After 48 hours, recover at room temperature for 2 hours, take out the product and inspect the appearance of the sample, check the mechanical properties, and test the electrical properties.	- No cracks, obvious deformation, falling off, RF test pass is qualified; - When the tape is peeled off, the coating cannot be peeled off, otherwise it is judged NG.	Pass	10pcs
High temperature storage	1. Check the test surface to keep it clean and dry without bubbles and scratches. 2. The sample was placed in a precision constant temperature and humidity test chamber, and stored at 70°C±2°C for 72h. After the test, it was placed in room temperature for 2h to check the appearance of the product.	- Parts without cracks, obvious deformation, falling off, paint adhesion test OK, RF test qualified; - When the tape is peeled off, the coating cannot be peeled off, otherwise it is judged NG.	Pass	10pcs
Low temperature storage	1. Check the test surface to keep it clean and dry without bubbles and scratches. 2. The sample was placed in a precision constant temperature and humidity test chamber and stored at -40°C±2°C for 72h. After the test, it was placed in room temperature for 2 hours to check the appearance of the product.	- Parts without cracks, obvious deformation, falling off, paint adhesion test OK, RF test qualified; - When the tape is peeled off, the coating cannot be peeled off, otherwise it is judged NG.	Pass	10pcs



Salt spray tester	1. Put the test sample into the salt spray tester. 2. Close the test chamber door and set the spray parameters. At $35^{\circ}\text{C}\pm 2^{\circ}\text{C}$, humidity $>85\%$, pH value in the range of 6.5-7.2, with $5\%\pm 1\%$ NaCl solution continuously sprayed 48h salt water, 3. After the above cycle, take out the product, rinse it with tap water, dry it at room temperature, and test the test surface.	- Inspect the surface of the specimen without any cracks, corrosion, foaming, obvious deformation, discoloration, wrinkling or poor overall shedding.	Pass	10pcs
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7. Antenna mechanical drawing





8. Packaging Specification

