

Antenna Specification

project name:	NABE5 North American version				
Material number code:	QK1027200304				
Name of supplier:	Shenzhen Shangyuan Technology Co., LTD				
name of material:	NABE5 main antenna (SZ22711IB68)				
Material description:	NABE5 MAIN ANT & BLU ANT 1105*32817.6mm steel sheet surface pressure NABE 5 character print R0				
Date of sample delivery:	April 21, 2023				
main performance ☐	blueprint ☐	Measurement report ☐	Key material ☐	reliability report ☐	Packaging information ☐
examine and verify	Research and development department	project department	purchase department	quality department	

ShenzhenShangyuanTechnologyCo.,LTD

Antenna Specification

Customer name:		Project name: NABE5 North American version	
Working frequency band: CAT-M1 Band2/4/5/8/12/13/25/28/66			
Hardware version:			
Shangyuan material specifications			
specifications and models	Shang Yuan material number		Customer material number
Steel plate bracket, antenna assembly	SZ22711IB60		QK1027200304

Change the resume				
Preparation / change date	Change the content		Change the person	edition
April 21, 2023	A new release		Xu Wei	A
Shang Yuan will sign the column				
research and development	structure:	examine and verify:	Quality Engineer:	ratify:
	radio frequency:	examine and verify:		
The customer will sign the column				
electronic engineer	project manager		construction engineer	Quality engineer

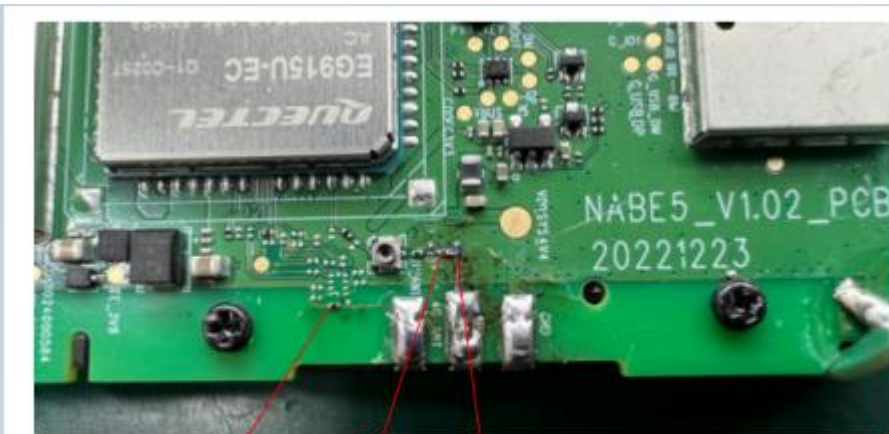
catalogue

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1. Main antenna image



2. Main antenna matching circuit



Grounding point strand 0Ω and 12nH
strand 0Ω

BT antenna matching circuit



strand 0Ω

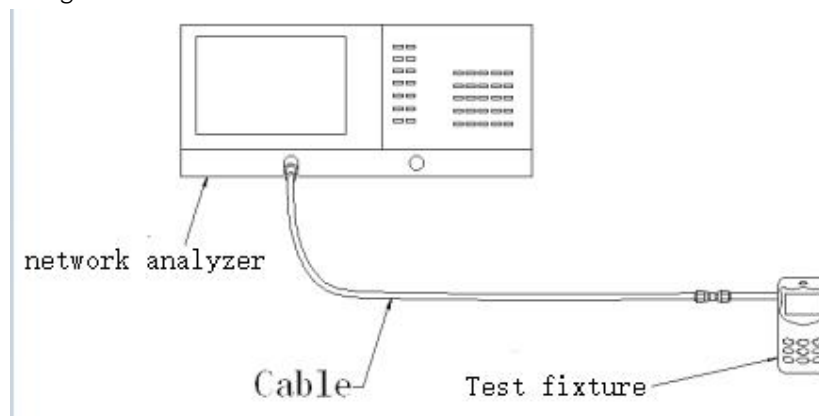
3. Complete machine test data

3.1 S11 Description of the test method

Test Equipment: Network Analyzer (Agilent E5071C)

Test method: Export a 50 Ohm CABLE cable from the instrument test port, connect the SMA connector of the test device after the calibrator, and record the echo loss and standing wave ratio corresponding to the relevant frequency point.

The test schematic diagram is as follows:



Schematic diagram of the test

3.2 Test environment

Test System: MPS 6450 Multi-probe OTA Measurement System (XH-IoT)

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

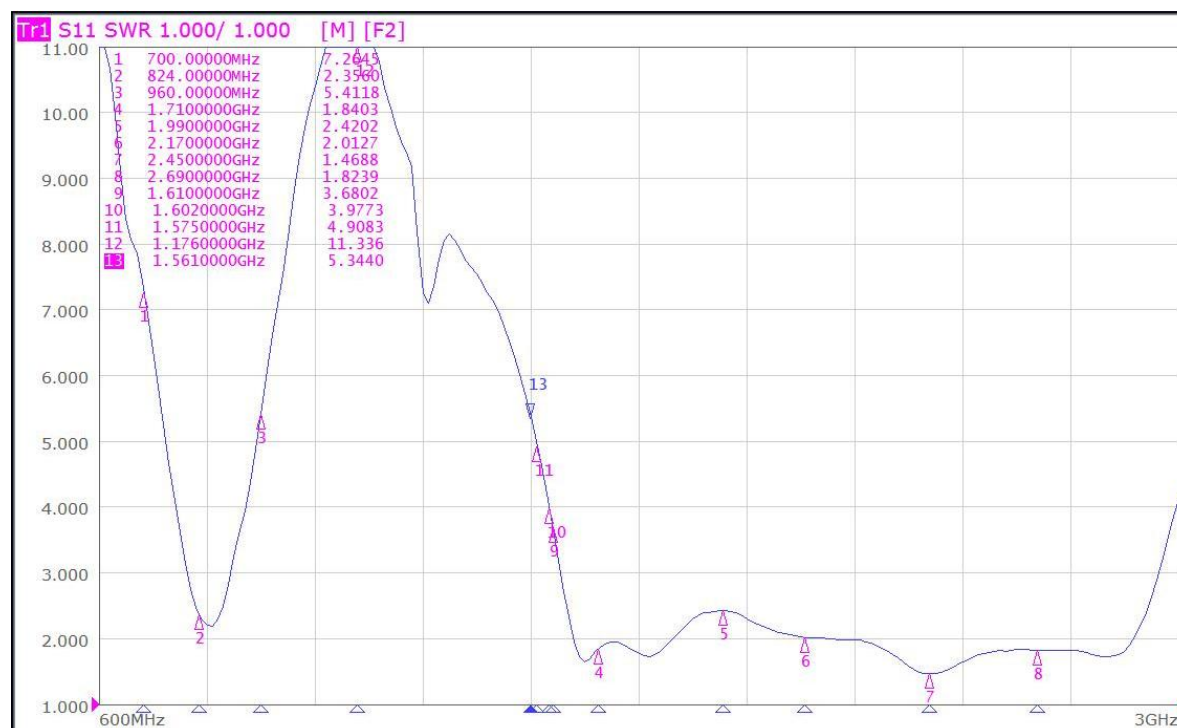
Test equipment: Use the network analyzer R & S ZND / Agilent E5071C when testing the passive data

When testing active data, use the comprehensive meter Agilent 8960 / CMW500 / S P9500E / SP 8315



3.3 S 11 test parameters

Main antenna standing ratio VSWR



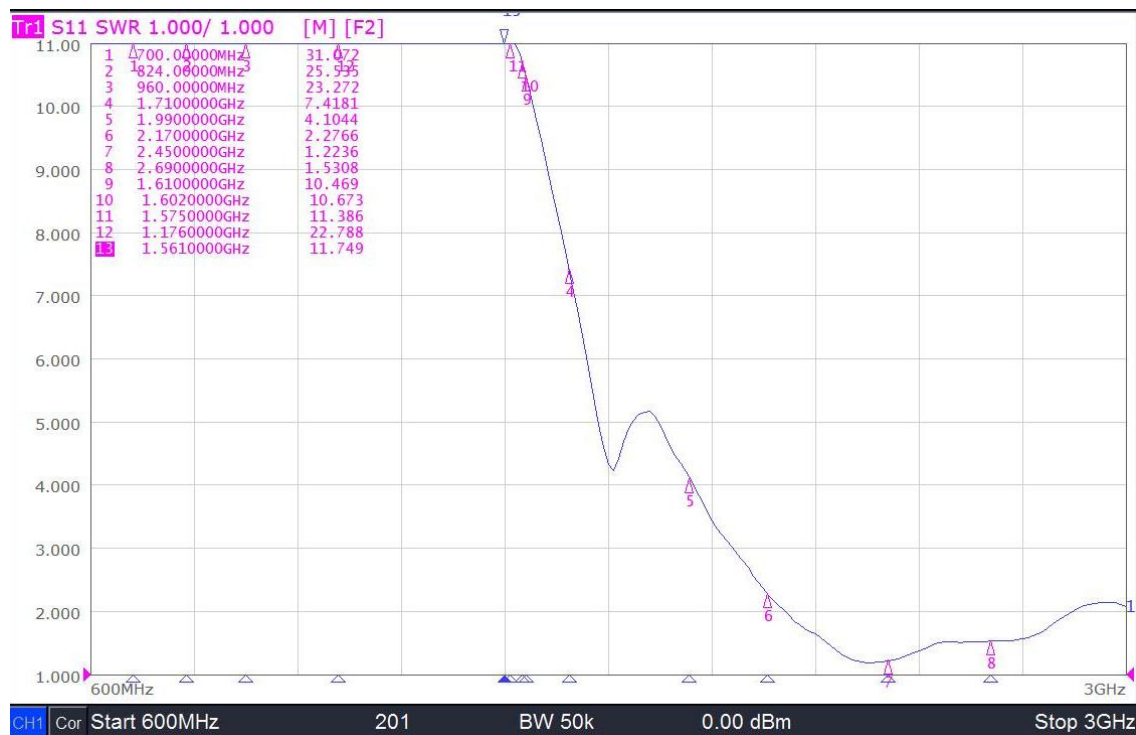
main antenna passive data

Frequency/Mhz	Efficiency / %	MaxGain/dBi
700	9.68	-3.25
710	10.94	-2.69
720	11.97	-2.58
730	13.55	-2.64
740	16.26	-1.89
750	18.58	-0.99
760	21.43	-0.31
770	22.44	-0.17
780	21.63	-0.2
790	20.7	-0.11
800	17.91	-2.22
810	15.6	-2.71
820	13.34	-3.62
830	12.62	-3.96
840	11.48	-4.76
850	9.79	-5.56
860	9.2	-6.04
870	8.79	-6.41
880	7.83	-7.36
890	6.87	-7.62
900	6	-7.87
1710	44.16	1.87
1720	44.98	1.62
1730	44.26	1.34
1740	42.56	1.15
1750	40.55	1.03
1760	42.46	1.22
1770	43.35	1.37
1780	41.4	1
1790	39.99	0.93
1800	39.45	1.15
1810	39.72	1.65
1820	38.82	1.92
1830	36.98	1.87
1840	38.64	2.03
1850	38.82	1.88
1860	35.81	1.48
1870	31.99	1.05
1880	31.62	0.98
1890	30.55	0.79

1900	29.79	0.63
1910	30.06	0.5
1920	30.41	0.14
1930	29.72	-0.23
1940	30.06	-0.43
1950	30.13	-0.43
1960	30.41	0.07
1970	31.77	0.67
1980	31.84	0.77
1990	31.55	0.93
2000	34.12	1.31
2010	34.83	1.3
2020	34.51	1.37
2030	35.56	1.49
2040	36.9	1.83
2050	36.98	1.36
2060	36.64	1.28
2070	37.93	0.94
2080	39.99	1.28
2090	41.3	1.18
2100	39.26	1.18
2110	38.99	1.17
2120	41.88	1.82
2130	42.66	1.66
2140	40.83	1.39
2150	41.59	1.41
2160	42.27	1.58
2170	42.76	1.78
2180	43.25	2.11
2190	43.15	2.35
2200	44.46	2.67
2210	43.85	2.68
2220	42.85	2.64
2230	41.69	2.5
2240	42.46	2.62
2250	42.17	2.62
2260	41.59	2.68
2270	43.25	2.88
2280	44.16	3.11
2290	43.05	3.05
2300	41.11	3.04
2310	42.17	3.26
2320	43.25	3.52

2330	42.17	3.38
2340	39.99	3.19
2350	40.27	3.14
2360	40.46	3.18
2370	39.08	3.03
2380	36.56	2.85
2390	35.4	2.69
2400	34.51	2.57
2410	31.99	2.03
2420	29.04	1.51
2430	28.12	1.41
2440	28.38	1.7
2450	26.73	1.55
2460	23.71	1.28
2470	23.44	1.33
2480	22.39	1.38
2490	20.18	1.03
2500	18.66	1.01
2510	18.03	0.98
2520	16.33	0.78
2530	14.86	0.46
2540	14.03	0.45
2550	13.46	0.32
2560	12.5	0.24
2570	11.48	-0.15
2580	10.52	-0.44
2590	10.59	-0.55
2600	9.84	-0.81
2610	8.81	-1.5
2620	8.38	-1.74
2630	8.43	-1.99
2640	7.89	-2.43
2650	7.21	-3.12
2660	7.08	-3.36
2670	6.81	-3.78
2680	6.73	-4.03
2690	6.55	-4.33

BT antenna standing wave ratio



3.4 Active test data of the main antenna

Measurement	Band	Channel	Total
TRP	CATM1_B2	18650	16.71
TRP	CATM1_B2	18900	16.64
TRP	CATM1_B2	19150	16.73
TRP	CATM1_B4	20000	18.96
TRP	CATM1_B4	20175	18.69
TRP	CATM1_B4	20350	18.94
TRP	CATM1_B12	23060	14.54
TIS	CATM1_B12	23095	15.31
TRP	CATM1_B12	23130	15.39
TRP	CATM1_B13	23230	14.00
TRP	CATM1_B25	26090	16.63
TIS	CATM1_B25	26365	16.33
TRP	CATM1_B25	26640	17.02
TRP	CATM1_B66	132022	19.61
TRP	CATM1_B66	132322	19.56
TIS	CATM1_B66	132622	19.11

3.5 BT without passive data

The BT antenna has a passive efficiency

Frequency/Mhz	Efficiency / %	MaxGain/dBi
2400	44.65	2.11
2410	44.78	2.14
2420	45.25	2.14
2430	46.78	2.27
2440	47.69	2.09
2450	48.25	2.18
2460	47.25	1.91
2470	47.66	2.54
2480	46.4	2.42
2490	45.62	2.64
2500	45.13	2.47

4. The model environment processing mode

No added environmental treatment

5. Antenna loading position

The antenna is welded directly to the main board

6. Mass production antenna index

When the antenna is in mass production, the standing wave ratio is used as the test standard for mass production.

Based on the differences of the project itself, the following criteria are given:

Frequency (MHz)	Mass production standards
824-960MHz 1710-2690MHz 2400-2500MHz	VSWR (mass production performance) <VSWR (recognized performance) + 0.5

DEV-QR-06

Technical requirements:

- material: including bracket PC-FR2820T and steel sheet SUS304 ;
- When the steel sheet and the plastic bracket are hot-melted, they should be close together, and cannot be loosened and tilted; Hot-melt columns must be added to the side of the spring angle contact position of steel sheet;
- Tensile test of steel sheet after hot melting: It is required that the hot-melt column should not break or fall off, and the steel sheet should not be tilted.
- After hot melting, the steel sheet does not fall off, does not tilt, has no gap to loosen, and the mushroom head after hot melting does not break.
- The product surface shall be free of defects such as crush, scratch and oil stain; Contactable surfaces shall not have sharp corners, sharp burrs, etc.
- The dimensions not noted shall be subject to the three-dimensional model; Reference tolerance table without tolerance,
- Packaging: Pallet packaging
- Dimensions with “V” symbol are the key control dimensions; “[]” is used for inspection and production control, and IQC detects the size.

Top view dimensions: $\phi 1.7 \pm 0.15$, $\phi 23.50 \pm 0.1$, $\phi 1.25 \pm 0.1$, $\phi 22.00 \pm 0.1$, $\phi 44.00 \pm 0.1$, $3 \times \phi 1.7 \pm 0.1$.

Front view dimensions: (17.8 ± 0.2) , $\phi 1.7 \pm 0.1$, (71.37 ± 0.2) , $\phi 12.5 \pm 0.1$, $\phi 2.46 \pm 0.1$, $\geq 1.90 \pm 0.15$, $\phi 5.3 \pm 0.1$, $\phi 12.1 \pm 0.1$.

Side view dimensions: (32.67 ± 0.2) , $\phi 110.52 \pm 0.2$.

Bottom view dimensions: $\phi 8.7 \pm 0.15$.

Sunnyway Technology (China) Co., LTD.					
NO.	name	Specifications	colour	dosage	remarks
4	Bt Antenna	H=0.2mm	SUS304	inherent	1
3	Parasitism Antenna	H=0.2mm	SUS304	inherent	1
2	Main Antenna	H=0.2mm	SUS304	inherent	1
1	support	PC	black	1	/

PART NAME : Antenna assembly MABE5		DATE :	2023-04-21	
PART NO :	SZ22711B88	DRAWN :	XU WEI	
MATERIAL :		CHECKED :	CHEN MIN	
FINISHING :		APPROVED :		
UNIT : mm		SCALE : 1:1	TEST : T:A	

TOLERANCE

X.X	±0.25
.XX	±0.20
.XXX	±0.05
ANGULAR	≤ ±0.5°