ANTENNA INFORMATION

OEM		Lenovo
ODM		Wistron
Platform model name		Lenovo 500w 2-in-1 Gen 5
Intel platform (ex: Yes, No or NA)		Yes
Platform type (ex: regular NB, convertible PC, AIO…etc)		convertible NB
SAR minimum separation (mm)	FCC (1g)	3
	ISED (1g)	3
	ISED (10g)	N/A

Antenna manufacturer	Company name	High-Tek Electronics Co., Ltd
	Address	17F., No.100, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22102, Taiwan
Test location	Company name	High-Tek Electronics Co., Ltd
	Address	17F., No.100, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22102, Taiwan
Test Personnel	Name(Full name)	Matthew Chang
	E-mail	matthew_chang@hightek.com.tw
	Tel/Mobile	+886-2-26961996
Testing date		2024/01/05

Antenna Part number	Main	025.9026Y.0001
	Aux	025.9026Z.0001
Antenna type (ex: PIFA, Dipole…etc)		PIFA

Antenna Peak gain w/ cable loss (dBi)*										
	2.4GHz 2400-2483.5 MHz	**5.2GHz** 5150-5250MHz	**5.3GHz** 5250-5350MHz	**5.6GHz** 5470-5725MHz	**5.8GHz** 5725-5850MHz	**5.9GHz** 5850-5895MHz	**6.2GHz** 5925-6425MHz	**6.5GHz** 6425-6525MHz	**6.7GHz** 6525-6875MHz	**7.0 GHz** 6875-7125MHz
Main	-1.46	-1.22	-1.21	-1.44	-1.75	-1.75	-1.09	-1.99	-1.99	-1.98
Aux	-1.9	-1.14	-1.14	-1.68	-1.54	-1.54	-0.4	-0.79	-0.78	-1.98

Cable Assembly Part Number and Information					
	Cable PN	**Cable length**(mm)	**Cable diameter**(mm)	**Impedance**(ohm)	**Connector type**
Main	210SY0W63609	350	0.81	50	SpeedTech
Aux	210SY0W63601	502	0.81	50	SpeedTech

* 3D Antenna Peak Gain required being test in system basis.

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1. Intel Reference Gain and Type

Antenna Peak gain w/ cable loss (dBi)											
Band/Frequency		**2.4GHz** 2400-2483.5 MHz	**5.2GHz** 5150-5250MHz	**5.3GHz** 5250-5350MHz	**5.6GHz** 5470-5725MHz	**5.8GHz** 5725-5850MHz	**5.9GHz** 5850-5895MHz	**6.2GHz** 5925-6425MHz	**6.5GHz** 6425-6525MHz	**6.7GHz** 6525-6875MHz	**7.0 GHz** 6875-7125MHz
Design	EU/UK	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
PIFA	For WiFi 6E and earlier	3.24	3.64	3.73	4.77	4.97	4.72	4.83	4.30	5.37	5.59
	From WiFi 7	2.95	5.11	4.55	5.15	5.13	4.45	5.02	5.02	4.96	4.96
Dipole	For WiFi 6E and earlier	2.89	2.92	3.19	4.41	4.22	4.22	4.83	4.30	4.49	5.34
	From WiFi 7	2.95	4.03	4.11	5.15	5.13	4.45	5.02	4.71	4.49	4.96
Monopole	From WiFi 7	2.83	4.57	4.44	4.95	4.95	4.43	4.87	4.91	4.91	4.79

3D Peak Antenna gain should be equal or greater than -2 dBi

If a host integrator plans to use a lower gain antenna of the same type, additional CBP(FCC)/EDT(EU) testing need to be performed while the module is installed in the host.

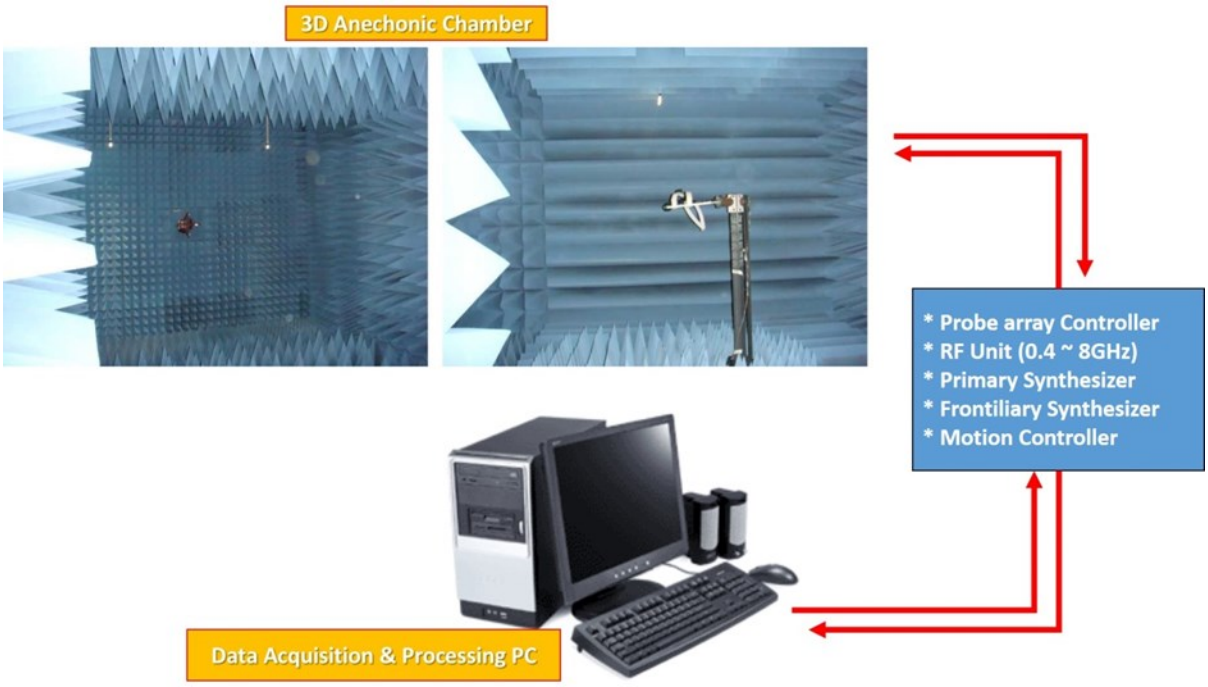
2. Document Revision History

Revision #	Revision Details	Issued Date
Rev. 00	First Issue	

3. Test & System Description

3.1 Measurement Method and System

The radiation pattern of antenna is measured in both horizontal polarization and vertical polarization. The radiation pattern measurements are performed in the three-dimensional anechoic chamber. The chamber provides less than –30dB reflectivity from 800MHz through 8GHz. The chamber is calibrated using both standard dipole antenna and horn antenna. The Gain here is expressed as dBi that standardizes the isotropic antenna. The Gain measurements and antenna radiation pattern are also performed in the same chamber described previously. Figure shows the schematic diagram for measuring radiation pattern and Gain.



3.2 Test setup

1. Frequency Range

2400~2500MHz, for WLAN application.

5150~7125MHz, for WLAN application

2. Antenna Configuration

The antenna basically has two parts; the stamping and the cable assembly with the connector on one side. The detailed drawing is attached.

3. VSWR

The VSWR is measured with network analyzer that support up to 8GHz. All the measurements are performed with the customer provided fixture. Figure 1 shows the typical schematic diagram for measuring VSWR.

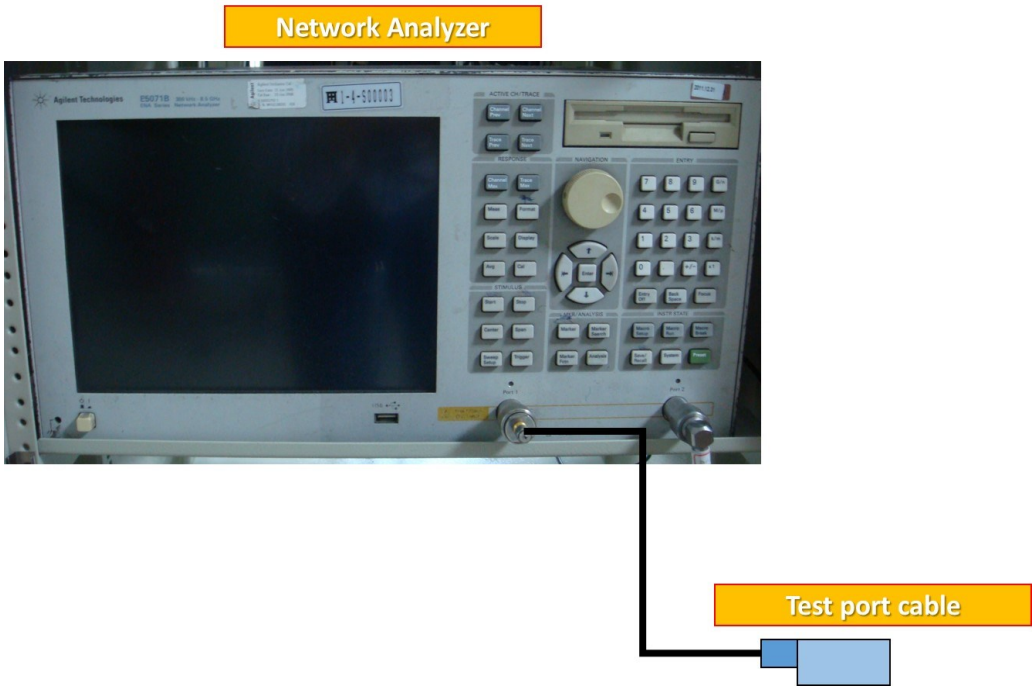


Figure 1. The schematic diagram for measuring VSWR

3.3 Equipment list

The equipment for the antenna measurement we used is as follows:

A. Network Analyzer, support up to 8GHz, to measure the VSWR and input impedance of antenna.
B. Three-dimensional anechoic chamber to measure antenna gain and radiation pattern(Standard horn antenna was used to calibrate the chamber)
C. Digital caliper to measure the dimensions.
D. Climatic chamber for mechanical tests.

Radiated Setup

item	Device	Type/Model	manufacturer	Cal. Date	Cal. Due Date
1	Anechoic Chamber	AMS-8500	ETS-Lindgren	2023/01/30	2024/01/30
2	Turn Table	ETS	ETS-Lindgren	N/A	N/A
3	Measurement SW	EMQuest1.08	ETS-Lindgren	N/A	N/A
4	Vector Network Analyzer	Agilent E5071B	Agilent	2023/01/30	2024/01/30
5	Receive Antenna Absorber Nested Dual- Polarized Dual-Vivaldi Array Antenna 700MHz to 6GHz	EMCO 3164-08	ETS-Lindgren	N/A	N/A
6	Multi Axis Positioning System (MAPS™)	EMCO 2115CR	ETS-Lindgren	N/A	N/A
7	MAPS™ Controller	MECO 2090	ETS-Lindgren	N/A	N/A
8	Horn antenna	3164-08	ETS-Lindgren	2023/01/30	2024/01/30
9	Cable 0.5m - 700MHz~10GHz	RG316	Senyu	2023/01/30	2024/01/30

N/A : Not Applicable