DHSK-P21

ES1 Antenna Test Report (Free space)

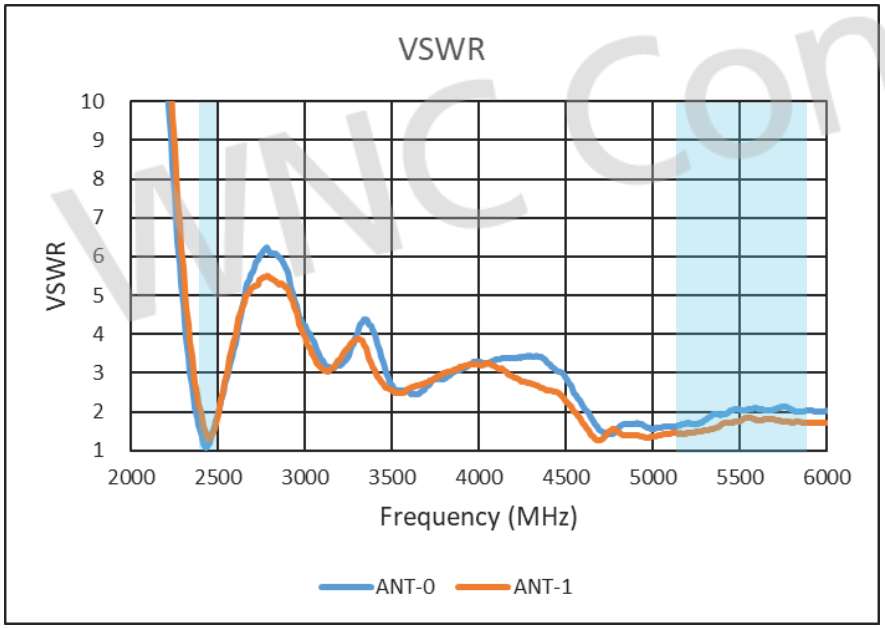
Sep. 20. 2024

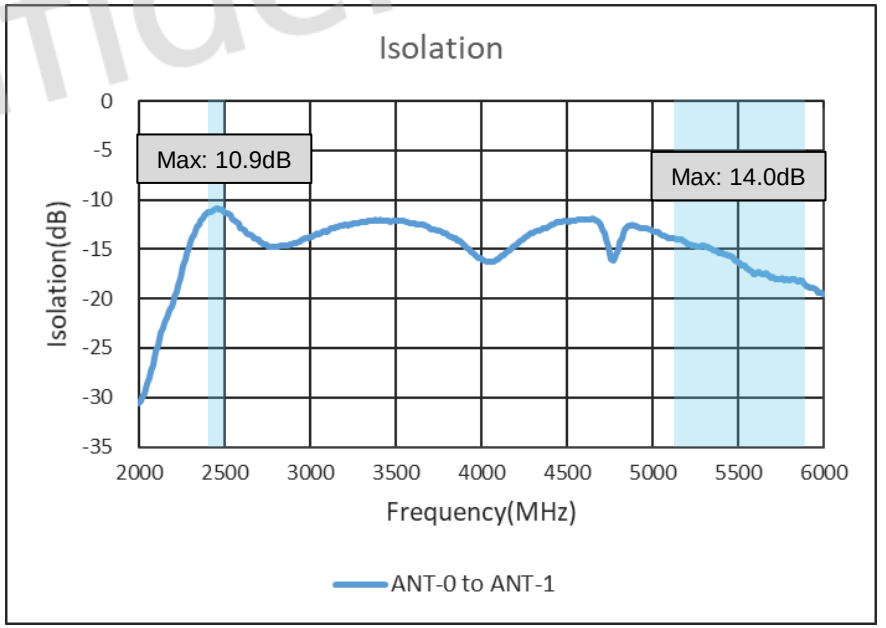
Ver.01

Summary

- ***VSWR***
  - *< 2.0 for Antennas_2.4GHz (free space)*
  - *< 2.2 for Antennas_5GHz (free space)*
- ***Isolation***
  - *> 10.9dB for Antennas_2.4GHz (free space)*
  - *> 14.0dB for Antennas_5GHz (free space)*
- ***Average Radiation Efficiency***
  - *51% ~ 60% for Antennas_2.4GHz (free space)*
  - *64% ~ 69% for Antennas_5GHz (free space)*
- ***Peak Gain***
  - *Max 1.88dBi for Antennas_2.4GHz (free space)*
  - *Max 5.86dBi for Antennas_5GHz (free space)*

VSWR and Isolation

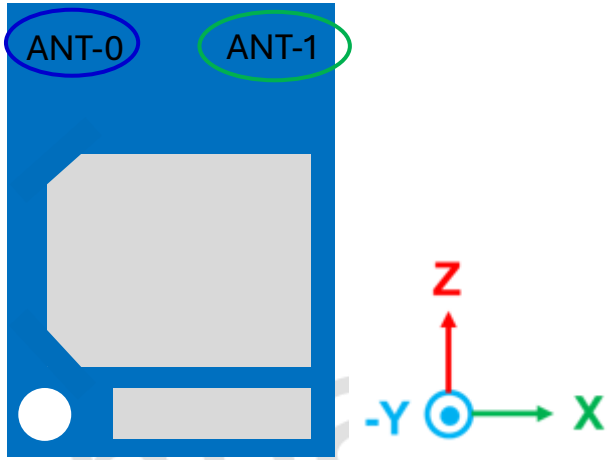




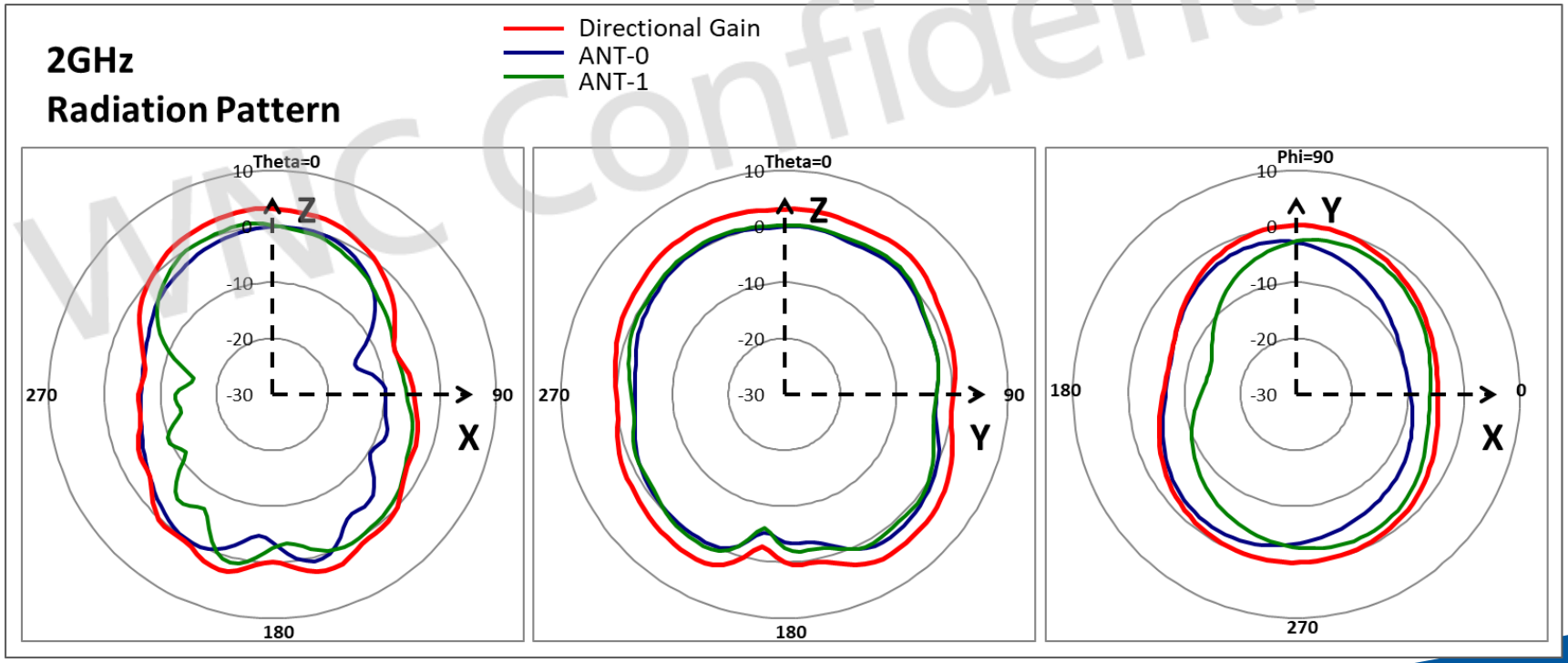
Radiation Efficiency

Antenna	Frequency (MHz)	2400	2450	2500	5150	5350	5550	5750	5850	Unit
ANT-0	Efficiency	46.68%	53.51%	51.26%	56.48%	54.38%	55.29%	57.78%	53.70%	--
	Average gain	-3.31	-2.72	-2.90	-2.48	-2.65	-2.57	-2.38	-2.70	dBi
	Peak gain	1.30	1.46	0.90	4.96	4.93	4.41	3.75	3.73	dBi
ANT-1	Efficiency	47.29%	54.78%	51.41%	55.08%	55.73%	57.71%	58.19%	57.86%	--
	Average gain	-3.25	-2.61	-2.89	-2.59	-2.54	-2.39	-2.35	-2.38	dBi
	Peak gain	0.28	0.63	1.00	4.99	4.60	3.86	4.48	4.36	dBi

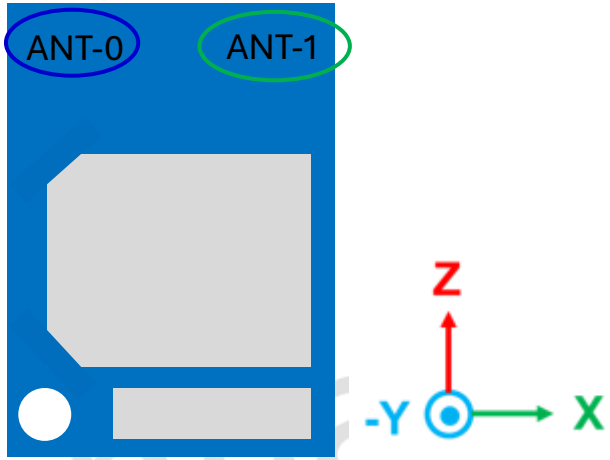
Radiation Pattern at 2.45 GHz



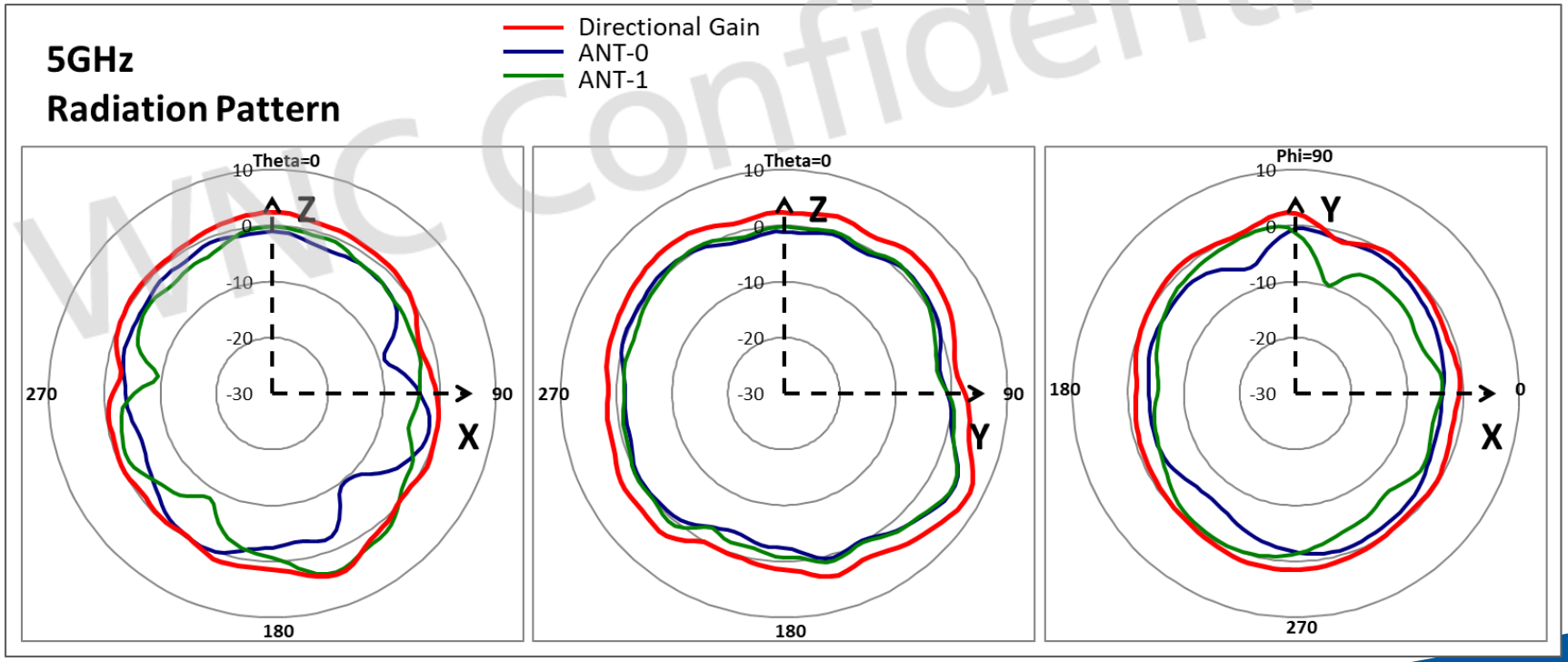
(Please ignore the directional gain)



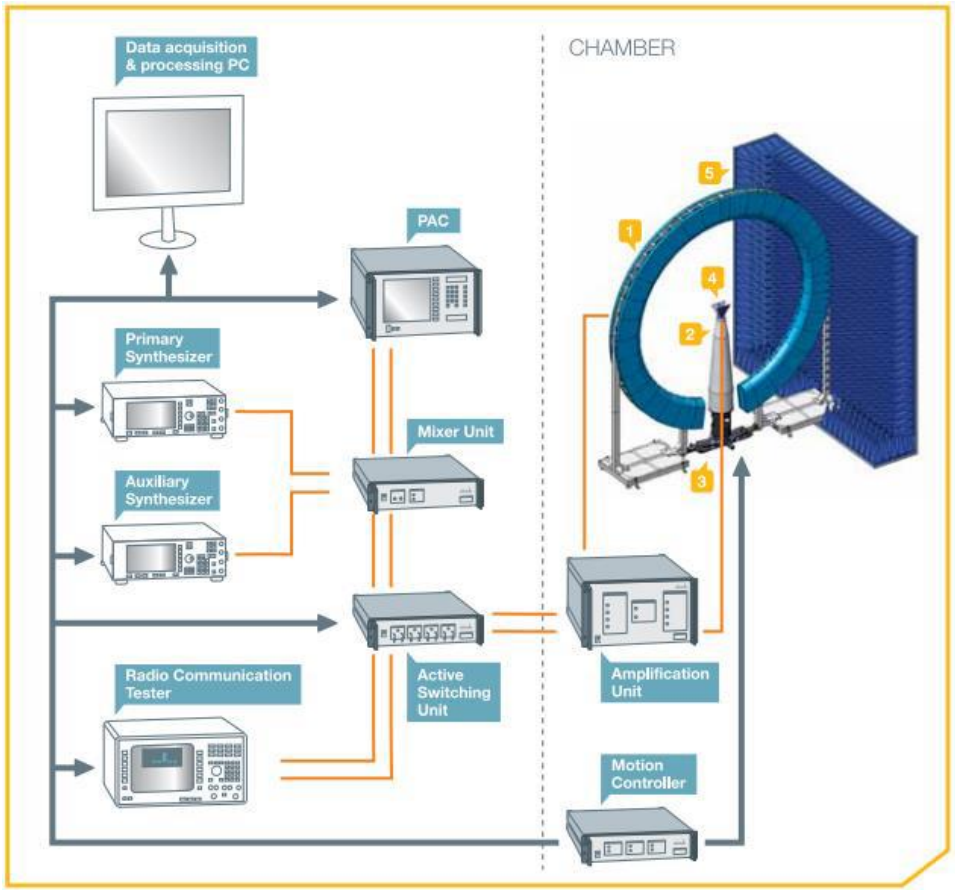
Radiation Pattern at 5.5 GHz



(Please ignore the directional gain)



Measurement Setup & Test Method



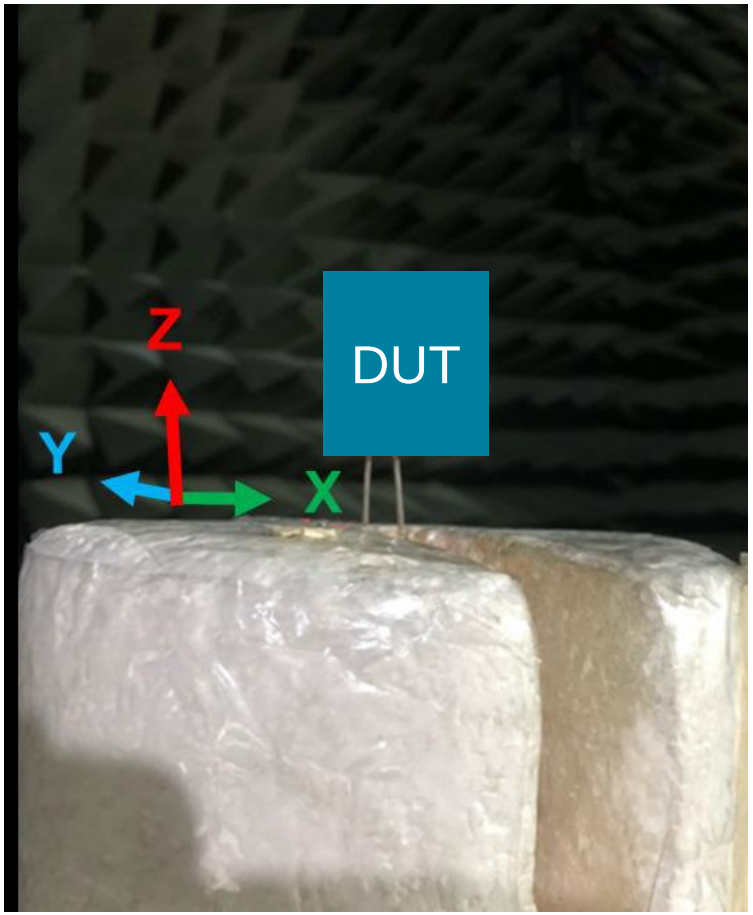
SG 64 uses analog RF signal generators to emit EM waves from the probe array to the antenna under test (AUT) or vice versa.

It uses the NPAC as an RF receiver for antenna measurements. The NPAC also drives the electronic scanning of the probe array.

The NPAC includes the fastest and most accurate sources and receivers on the market.

Test Procedure & SW

- Place the device at the center of the chamber.
- Connect the antenna cable to RF cable of the chamber
- Run Satimotest SW (NPAC Spherical Measurement, v1.5.4 (GIT E6965664)) which is Satimo'sproprietary SW.
- Get 3D data in 2.8125 degree step from phi 0°~360° and theta 90° ~ +90°, including efficiency, peak gain, 2D & 3D radiation pattern.
- This is passive measurement, which means the device is off and not in any operating mode.



Calibration and Measurement Equipment List

Device	Type/Model	S/N	Manufacturer	Characteristics	Calibrated Date	Calibrated until
SG64 antenna test chamber	Standard	SG64	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Turn table	Customization	-	Machinery Dept.	-	2024/03/30	2025/03/30
New probe array controller	N/A	1102341-4535	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Power supply unit	N/A	1103211-13204	MVG	-	2024/03/30	2025/03/30
Active switching unit	N/A	1102347-7214	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Tx amplification unit	N/A	1102527-5909	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Rx amplification unit	N/A	1102536-3823	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Transfer switching unit	N/A	1102183-3351	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Mixer unit	N/A	1102545-7208	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Power and control unit	N/A	1102706-7209	MVG	-	2024/03/30	2025/03/30
Antenna probe	DP 400-6000	-	MVG	400MHz ~ 6GHz	2024/03/30	2025/03/30
Cable 13.7m – 400MHz to 18GHz	SS402	00100A1F5A1XXS	Woken	-	2024/03/30	2025/03/30
Temperature & Humidity meter	HTC-01	-	Metravi	-	2024/03/30	2025/03/30

Note:
1. There're 63 set antenna probes in WNC's SG64 test chamber.
2. This antenna test chamber is located at WNC (address: 20 Park Ave. II, Hsinchu Science Park, Hsinchu 300, Taiwan)

Manufacturer

Manufacturer:	Wistron NeWeb Corporation (WNC)
Address:	20 Park Ave. II, Hsinchu Science Park, Hsinchu 300, Taiwan.
TEL:	+886 3 666 7799
製造商:	啟碁科技股份有限公司
地址:	300新竹科學園區園區二路20號
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