SM-A236M Ant Specification

Main Ant A/B, Sub Ant C/D/E/F/G
  - Antenna Type : MFA
  - Antenna Manufacturer : Galtronics
  - Antenna test date : 2022.06.16

Gain value is measured by Galtronics
Gain Value is measured in active call & Antenna selection.

Antenna gain is measured in MTG Chamber.

* MTG Chamber

Anechoic chamber is available for Over The Air Test per CTIA, WiFi and LTE Test. Also it is available for antenna pattern measurement for design and development. It's important to RF shielding, absorbing material, absorber layout, precision mechanical alignment and positioner accuracy, when anechoic chamber is designed and installed. MTG can provide the design and construction of anechoic chamber for customer requirements. MTG has a series of positioners, microwave transmit and receive instruments and measurement data acquisition and analysis software. We have the experience to offer anechoic chamber of any size; from the smallest unit for simple RF test to the largest and most complex custom-build for a research and development laboratory.

*Test Equipment list

| Description	Manufacturer	Model	S/N	Cal Due
Network Analyzer	Agilent Technologies	E5071B	MY4230186	2023.02.11.

● Return Loss & VSWR Test

The VSWR measurement of antennas assembled into a fully operating SM-A236M phone handset is measured on the Network Analyzer. The handset is set up with a 50 Ohm coaxial cable connected to the 50 Ohm point. Calibration is done at the end of the 50 Ohm coaxial cable connection. The other end of the 50 Ohm coaxial cable is connected to a network analyzer. The handset is positioned on a non-conductive table for free space measurements.

● Return Loss & VSWR Test

Galtronics has a system that can measure VSWR using MTG chamber and E5071B network analyzer for passive measurement. In order to measure the VSWR of each antenna, the lab connects the coaxial cable to the point in contact with the antenna on the main board. The VSWR is measured through the coaxial cable connected in the set. At this time, SM-A236M is assembled in the same state as the user environment
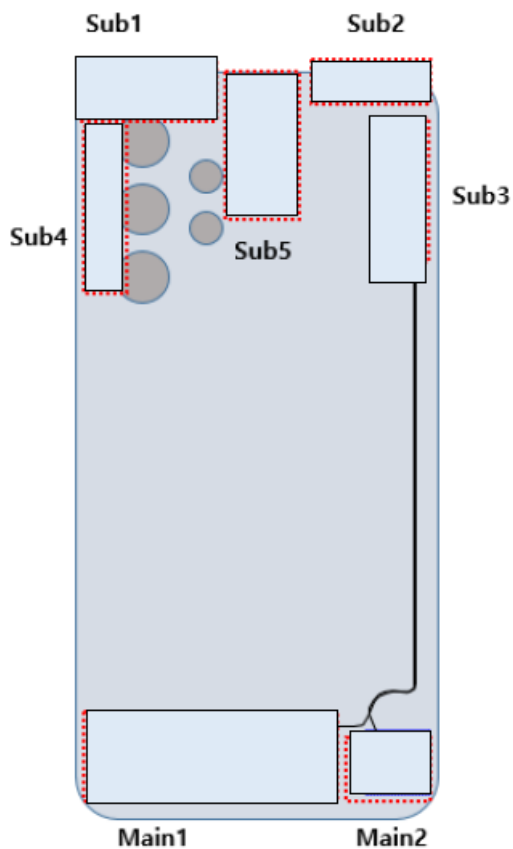
● Radiation Pattern Test

Antennas tested for Gain and Efficiency must be assembled into the enclosure and tested in the fully assembled and operating SM-A236M handset. The antenna is tested in free space in the anechoic chamber in the H, E1 and, E2 planes. The radiation patterns are measured at the center of transmit and receive bands.
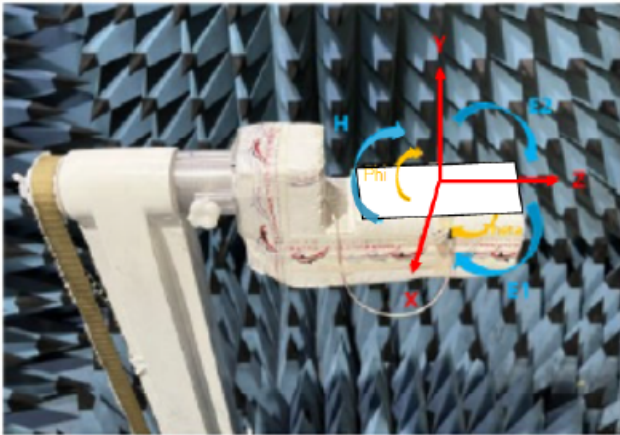
● Test Method (Manufacturing)
  All measurements are done with SM-A236M fully assembled. Measure in consideration of the Customer's usage environment. Use a fully shielded chamber environment to prevent any noise -induced errors. Typically. The electrical properties of antenna are measured using a jig that Can hold the set.

SM-A236M

RF Antenna Gain

Antenna A(Main1)

-MFA

-Manufacturer : Galtronics.

	Band	B12/N12	B17	B28/N28	B13	B26	B5/N5	B20/N20
Antenna A	Peak gain (dBi)	-3.98	-4.83	-3.85	-3.92	-4.31	-4.05	-4.41
	Ave. gain (dBi)	-7.62	-8.65	-7.71	-7.13	-7.42	-7.26	-7.58
	Band	B8/N8						
	Peak gain (dBi)	-3.46						
	Ave. gain (dBi)	-7.06						

Antenna B(Main2)

-MFA

-Manufacturer : Galtronics.

	Band	B4	B66/N66	B3/N3	B2	B1/N1	B40/N40	B7/N7
Antenna B	Peak gain (dBi)	-0.83	-0.55	-0.64	0.55	0.54	-0.57	0.03
	Ave. gain (dBi)	-5.12	-5.07	-5.16	-4.44	-5.28	-5.97	-4.07
	Band	B41/N41	B38/N38	B78	B77	N79		
	Peak gain (dBi)	0.12	0.11	-3.61	-4.78	-1.03		
	Ave. gain (dBi)	-3.98	-4.01	-8.67	-9.79	-5.33		

Antenna C(Sub1)

-MFA

-Manufacturer : Galtronics.

	Band	B1/N1	B2	B3/N3	B4	B5/N5	B7/N7
Antenna C	Peak gain (dBi)	-0.27	-2.11	-1.79	-0.09	-5.34	-3.33
	Ave. gain (dBi)	-6.18	-5.64	-5.25	-5.84	-8.16	-6.29
	Band	B8	B12	B13	B17	B20/N20	B26
	Peak gain (dBi)	-4.19	-5.23	-5.91	-5.31	-8.69	-5.30
	Ave. gain (dBi)	-7.79	-8.56	-9.07	-8.61	-6.09	-8.11
	Band	B28/N28	B32	B38/N38	B40/N40	B41/N41	B66/N66
	Peak gain (dBi)	-6.73	-2.64	-1.18	-3.39	-1.11	-1.35
	Ave. gain (dBi)	-9.51	-7.53	-4.73	-7.21	-4.71	-6.92

Antenna D(Sub2)

-MFA

-Manufacturer : Galtronics.

	Band	B1/N1	B3/N3	B2	B4	B25	B48
Antenn D	Peak gain (dBi)	-4.29	-3.76	-3.47	-3.1	-3.24	-1.09
	Ave. gain (dBi)	-10.98	-9.21	-9.96	-8.34	-9.78	-7.24
	Band	N70	N77	N78	GPS		
	Peak gain (dBi)	-2.66	-0.06	-1.27	-0.32		
	Ave. gain (dBi)	-7.45	-5.96	-7.63	-4.85		

Antenna E(Sub3)

-MFA

-Manufacturer : Galtronics.

Antenna E	Band	B1/N1	B3/N3	B66/N66	N77	N78	N79
	Peak gain (dBi)	-2.5	-3.14	-3.16	-1.71	-0.51	4.27
	Ave. gain (dBi)	-5.99	-8.34	-6.39	-5.08	-4.49	-2.1

Antenna F(Sub4)

-MFA

-Manufacturer : Galtronics.

Antenna F	Band	B7/N7	B38/N38	B41/N41	N79
	Peak gain (dBi)	-3.09	-1.93	-1.97	0.54
	Ave. gain (dBi)	-8.53	-7.56	-7.52	-6.41

Antenna G(Sub5)

-MFA

-Manufacturer : Galtronics.

Antenna G	Band	B7	B38	B41	N77	N78	N79
	Peak gain (dBi)	-5.81	-6.13	-6.04	-7.46	-7.63	-4.01
	Ave. gain (dBi)	-11.23	-11.54	-11.58	-12.71	-11.71	-10.91
	Band	Wifi 2G	Wifi 5G				
	Peak gain (dBi)	-4.7	-3.9				
	Ave. gain (dBi)	-6.7	-4.6				

● Radiation Pattern
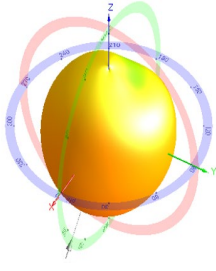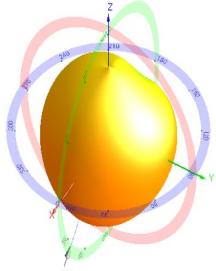
There is Radiation Pattern due to passive measurement with MTG chamber.

Antenna A(Main1)

주파수 대역	Main1	
(Frequency Band)	B12/N12	B17
3D Radiation Pattern	707.500MHz	710.000MHz
Efficiency[%]	17.28	13.64
Avg Gain [dBi]	-7.62	-8.65
Peak Gain [dBi]	-3.98	-4.83

주파수 대역	Main1	
(Frequency Band)	B28/N28	B13
3D Radiation Pattern	725.500MHz	782.000MHz
Efficiency[%]	16.93	19.38
Avg Gain [dBi]	-7.71	-7.13
Peak Gain [dBi]	-3.85	-3.92

주파수 대역	Main1	
(Frequency Band)	B26	B5/N5
3D Radiation Pattern	831.500MHz	836.500MHz
Efficiency[%]	18.12	18.8
Avg Gain [dBi]	-7.42	-7.26
Peak Gain [dBi]	-4.31	-4.05

주파수 대역	Main1	
(Frequency Band)	B20/N20	B8/N8
3D Radiation Pattern	847.000MHz	897.500MHz
Efficiency[%]	17.44	19.69
Avg Gain [dBi]	-7.58	-7.06
Peak Gain [dBi]	-4.41	-3.46

Antenna B(Main2)

주파수 대역	Main2	
(Frequency Band)	B4	B66/N66
3D Radiation Pattern	1732.500MHz	1745.000MHz
Efficiency[%]	30.77	31.14
Avg Gain [dBi]	-5.12	-5.07
Peak Gain [dBi]	-0.83	-0.55

주파수 대역	Main2	
(Frequency Band)	B3/N3	B2
3D Radiation Pattern	1747.500MHz	1880.000MHz
Efficiency[%]	30.47	36.01
Avg Gain [dBi]	-5.16	-4.44
Peak Gain [dBi]	-0.64	0.55

주파수 대역	Main2	
(Frequency Band)	B1/N1	B40/N40
3D Radiation Pattern	1950.000MHz	2350.000MHz
Efficiency[%]	29.64	25.29
Avg Gain [dBi]	-5.28	-5.97
Peak Gain [dBi]	0.54	-0.57
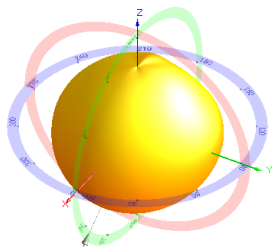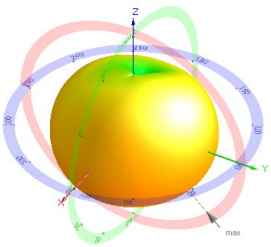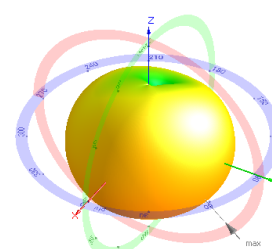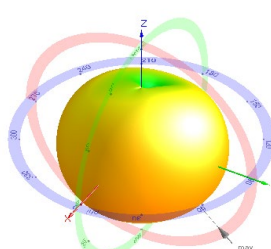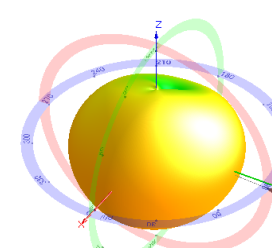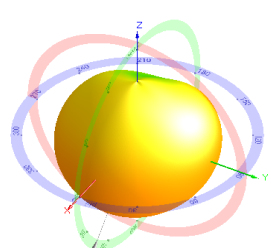
주파수 대역	Main2	
(Frequency Band)	B7/N7	B41/N41
3D Radiation Pattern	2535.000MHz	2593.000MHz
Efficiency[%]	39.15	40
Avg Gain [dBi]	-4.07	-3.98
Peak Gain [dBi]	0.03	0.12
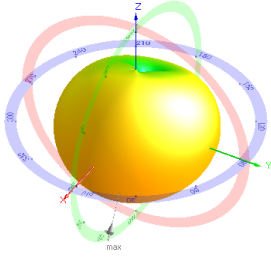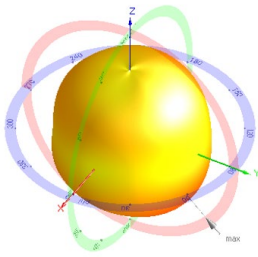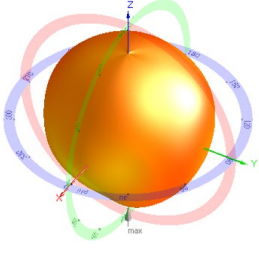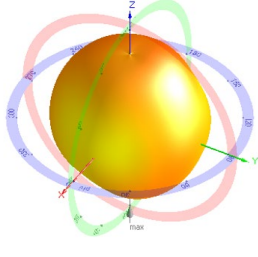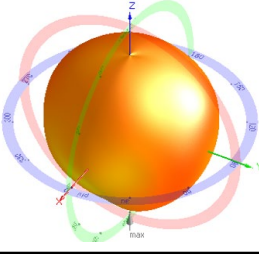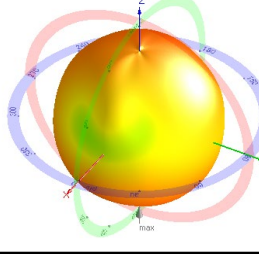
주파수 대역	Main2	
(Frequency Band)	B38/N38	N78
3D Radiation Pattern	2595.000MHz	3550.000MHz
Efficiency[%]	39.74	13.6
Avg Gain [dBi]	-4.01	-8.67
Peak Gain [dBi]	0.11	-3.61

주파수 대역	Main2	
(Frequency Band)	N77	N79
3D Radiation Pattern	3750.000MHz	4700.000MHz
Efficiency[%]	10.5	29.31
Avg Gain [dBi]	-9.79	-5.33
Peak Gain [dBi]	-4.78	-1.03
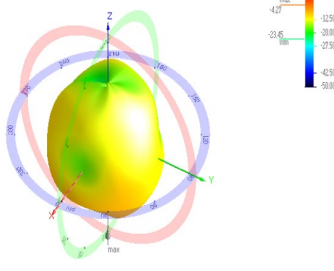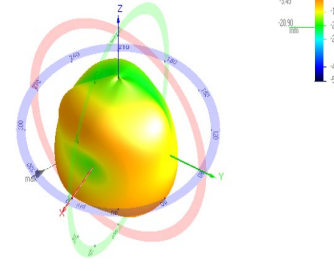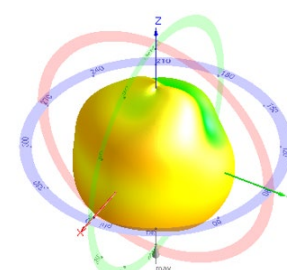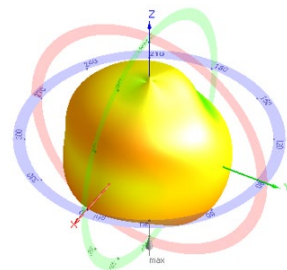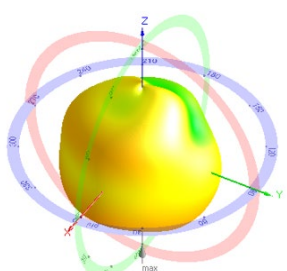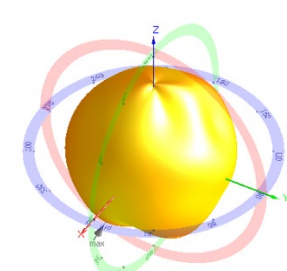
Antenna C(Sub1)
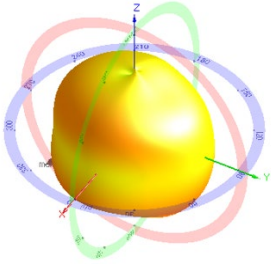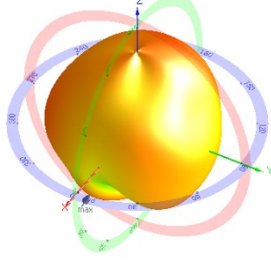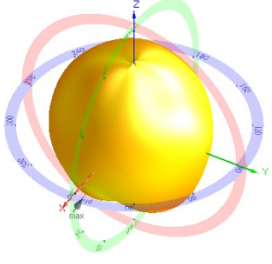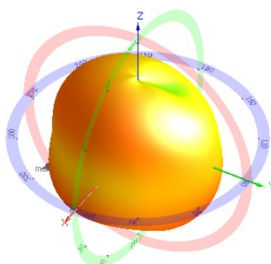
주파수 대역	Sub1	
(Frequency Band)	B1/N1	B2
3D Radiation Pattern	2140.000MHz	1960.000MHz
Avg Gain [dBi]	-6.18	-5.64
Efficiency[%]	24.1	27.28
Peak Gain [dBi]	-0.27	-2.11

주파수 대역	Sub1	
(Frequency Band)	B3/N3	B4
3D Radiation Pattern	1842.000MHz	2132.000MHz
Avg Gain [dBi]	-5.25	-5.84
Efficiency[%]	29.85	26.05
Peak Gain [dBi]	-1.79	0.09

주파수 대역	Sub1	
(Frequency Band)	B5/N5	B7/N7
3D Radiation Pattern	881.000MHz	2655.000MHz
Avg Gain [dBi]	-8.16	-6.29
Efficiency[%]	15.28	23.49
Peak Gain [dBi]	-5.34	-3.33

주파수 대역	Sub1	
(Frequency Band)	B8	B12
3D Radiation Pattern	942.000MHz	737.000MHz
Avg Gain [dBi]	-7.79	-8.56
Efficiency[%]	16.64	13.94
Peak Gain [dBi]	-4.19	-5.23

주파수 대역	Sub1	
(Frequency Band)	B13	B17
3D Radiation Pattern	751.000MHz	740.000MHz
Avg Gain [dBi]	-9.07	-8.61
Efficiency[%]	12.38	13.77
Peak Gain [dBi]	-5.91	-5.31

주파수 대역	Sub1	
(Frequency Band)	B20/N20	B26
3D Radiation Pattern	806.000MHz	876.000MHz
Avg Gain [dBi]	-8.69	-8.11
Efficiency[%]	13.51	15.44
Peak Gain [dBi]	-6.09	-5.3

주파수 대역	Sub1	
(Frequency Band)	B28/N28	B32
3D Radiation Pattern	780.000MHz	1474.000MHz
Avg Gain [dBi]	-9.51	-7.53
Efficiency[%]	11.2	17.64
Peak Gain [dBi]	-6.73	-2.64

주파수 대역	Sub1	
(Frequency Band)	B38/N38	B40/N40
3D Radiation Pattern	2595.000MHz	2350.000MHz
Avg Gain [dBi]	-4.73	-7.21
Efficiency[%]	33.68	19.03
Peak Gain [dBi]	-1.18	-3.39

주파수 대역	Sub1	
(Frequency Band)	B41/N41	B66/N66
3D Radiation Pattern	2593.000MHz	2155.000MHz
Avg Gain [dBi]	-4.71	-6.92
Efficiency[%]	33.77	20.32
Peak Gain [dBi]	-1.11	-1.35

Antenna D(Sub2)
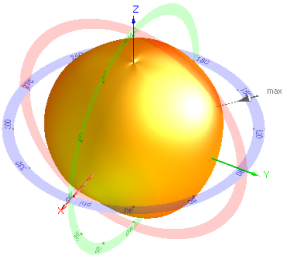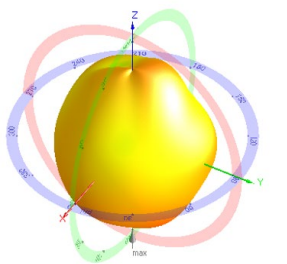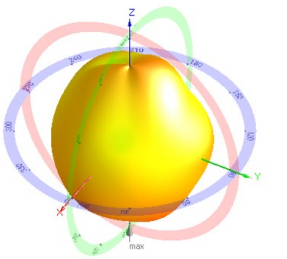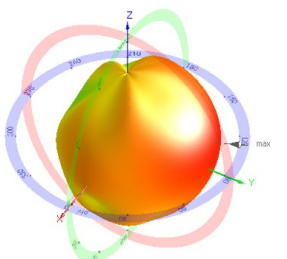
주파수 대역	Sub2	
(Frequency Band)	B1/N1	B3/N3
3D Radiation Pattern	2140.000MHz	1842.500MHz
Avg Gain [dBi]	-10.98	-9.21
Efficiency[%]	7.99	12
Peak Gain [dBi]	-4.29	-3.76

주파수 대역	Sub2	
(Frequency Band)	B2	B4
3D Radiation Pattern	1880.000MHz	1732.500MHz
Efficiency[%]	10.1	14.67
Avg Gain [dBi]	-9.96	-8.34
Peak Gain [dBi]	-3.47	-3.1

주파수 대역	Sub2	
(Frequency Band)	B25	B48
3D Radiation Pattern	1882.500MHz	3625.000MHz
Efficiency[%]	10.52	18.86
Avg Gain [dBi]	-9.78	-7.24
Peak Gain [dBi]	-3.24	-1.09

주파수 대역	Sub2	
(Frequency Band)	N70	N77
3D Radiation Pattern	1702.500MHz 	3750.000MHz
Efficiency[%]	18.01	25.33
Avg Gain [dBi]	-7.45	-5.96
Peak Gain [dBi]	-2.66	-0.06

주파수 대역	Sub2	
(Frequency Band)	N78	GPS
3D Radiation Pattern	3550.000MHz 	1575.000MHz
Efficiency[%]	17.26	32.74
Avg Gain [dBi]	-7.63	-4.85
Peak Gain [dBi]	-1.27	-0.32

Antenna E(Sub3)
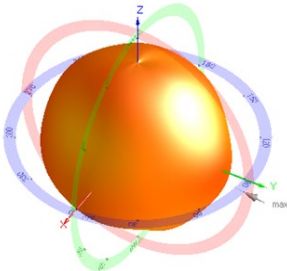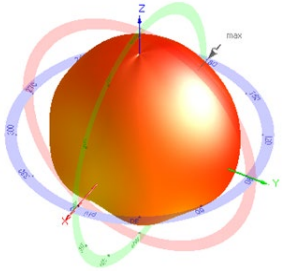
주파수 대역	Sub3	
(Frequency Band)	B1/N1	B3/N3
3D Radiation Pattern	2140.000MHz	1842.500MHz
Avg Gain [dBi]	-5.99	-8.34
Efficiency[%]	25.16	14.66
Peak Gain [dBi]	-2.5	-3.14

주파수 대역	Sub3	
(Frequency Band)	B66/N66	N77
3D Radiation Pattern	2155.000MHz	3750.000MHz
Avg Gain [dBi]	-6.39	-5.08
Efficiency[%]	22.97	31.04
Peak Gain [dBi]	-3.16	-1.71

주파수 대역	Sub3	
(Frequency Band)	N78	N79
3D Radiation Pattern	3550.000MHz	4700.000MHz
Avg Gain [dBi]	-4.49	-2.1
Efficiency[%]	35.55	61.61
Peak Gain [dBi]	-0.51	4.27

Antenna F(Sub4)

주파수 대역	Sub4	
(Frequency Band)	B7/N7	B38/N38
3D Radiation Pattern	2655.000MHz	2595.000MHz
Avg Gain [dBi]	-8.53	-7.56
Efficiency[%]	14.01	17.52
Peak Gain [dBi]	-3.09	-1.93

주파수 대역	Sub4	
(Frequency Band)	B41/N41	N79
3D Radiation Pattern	2593.000MHz	4850.000MHz
Avg Gain [dBi]	-7.52	-6.41
Efficiency[%]	17.69	22.85
Peak Gain [dBi]	-1.97	0.54

Antenna G(Sub5)

주파수 대역	Sub5	
(Frequency Band)	B7	B38
3D Radiation Pattern	2655.000MHz	2595.000MHz
Avg Gain [dBi]	-11.23	-11.54
Efficiency[%]	7.54	7.01
Peak Gain [dBi]	-5.81	-6.13

주파수 대역	Sub5	
(Frequency Band)	B41	N77
3D Radiation Pattern	2593.000MHz	3750.000MHz
Avg Gain [dBi]	-11.58	-12.71
Efficiency[%]	6.95	5.35
Peak Gain [dBi]	-6.04	-7.46

주파수 대역	Sub5	
(Frequency Band)	N78	N79
3D Radiation Pattern	3550.000MHz	4700.000MHz
Avg Gain [dBi]	-11.71	-10.91
Efficiency[%]	6.74	8.11
Peak Gain [dBi]	-7.63	-4.01

주파수 대역	Sub5	
(Frequency Band)	WiFi 2G	WiFi 5G
3D Radiation Pattern	 2436.000MHz	 5500.000MHz
Efficiency[%]	21.52	34.48
Avg Gain [dBi]	-6.7	-4.6
Peak Gain [dBi]	-4.7	-3.9