

1. Measurement information

- Measurement : Samsung Electronics Ant Lab.
- Equipment : RTS60 Chamber, ZNB 8 Network Analyzer.
- Equipment Cal Date : Jun.27.2022
- Test Date : Mar.16.2023
- Tester : Jeong-Wan Park

2.1. Return Loss & VSWR Test

The VSWR measurement of antennas assembled into a fully operating SM-X616B 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.

Photo #1

2.2. Return Loss & VSWR Test

Samsung Antenna Lab has a system that can measure VSWR using RTS60 chamber and ZNB8 network analyzer. In order to measure the VSWR of each antenna, the antenna 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, the SM-X616B is assembled in the same state as the user environment.

Photo #2

3. Radiation Pattern Test

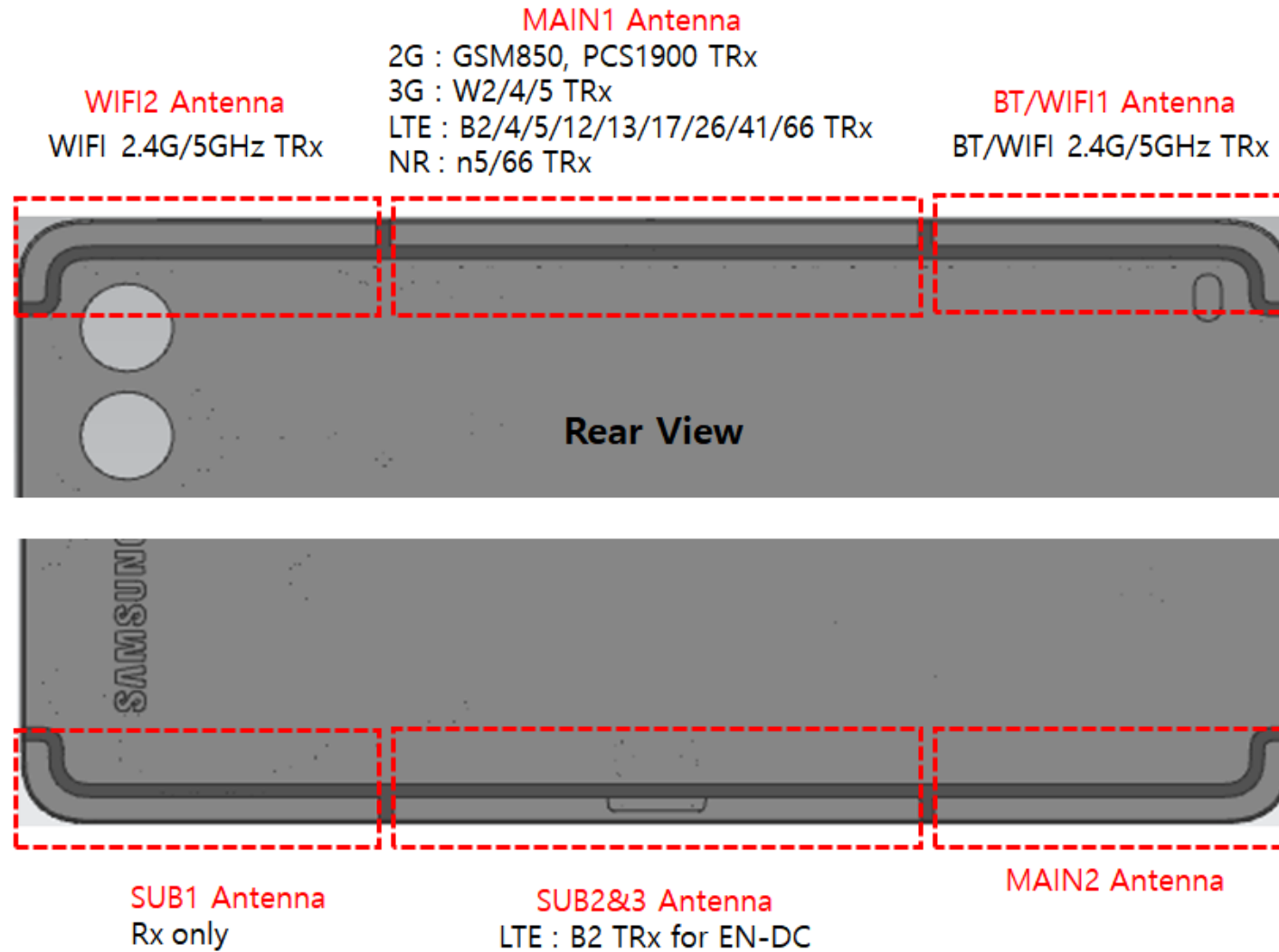
Antennas tested for Gain and Efficiency must be assembled into the enclosure and tested in the fully assembled and operating SM-X616B handset. **The antenna** is tested in free space in the anechoic chamber in the H, E1 and, E2 planes. The radiation patterns are measured at the center of transmit and receive bands.

Photo #3

4. Test Method (Manufacturing)

All measurements are done with SM-X616B 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 the antenna are measured using a jig that can hold the set.

5. Antenna



6. Radiation Patterns

Ant	Band	Freq. (MHz)	EFF	AVG	Peale
MAIN1	LTE 812,817	699	3388	-470	-2.22
		707	3548	-450	-2.04
		716	3981	-400	-201
		729	50.12	-300	-183
		737	40.74	-3.90	-147
		746	33.11	-4.80	-329
		746	33.11	-4.80	3.29
	LTE813	751	33.11	-4.80	-2.79
		756	3020	-5.20	-353
		777	3090	-5.10	-2.93
		782	33.11	-4.80	-2.69
		787	3090	-5.10	-3.33
		814	3548	-4.50	-2.94
		831	30.90	-5.10	-3.21
	LTE 85,826 W85 G850,NS	849	44.67	-3.50	-107
		859	4266	-3.70	-2.00
		876	3981	-400	-1.56
		894	37.15	-430	-2.79
		LTE 84,866 WB4, N66	1710	43.65	-3.60
	1745		41.69	-3.80	-263
	1780		37.15	-4.30	-261
	2110		43.65	-3.60	-1.96
	2155		26.92	-5.70	-221
	LTE82,825 W82 G1900	2200	2344	-6.30	-344
		1850	34.67	-4.60	-1.57
		1880	3802	-420	-1.95
		1915	41.69	-380	-1.84
		1930	42.66	-370	-1.92
		1960	47.86	-320	-1.33
		1995	47.86	-3.20	-1.39
LTE 841, N41	2496	3090	-5.10	-386	
	2593	37.15	-4.30	-2.32	
	2690	31.62	-5.00	-276	

Ant	Band	Freq.	EFF	AVG	Peak
		(MHz)			
SUB2	LTE 82	1850	20.42	-6.90	-4.36
		1880	22.39	-6.50	-326
		1915	22.91	-6.40	-354
		1930	17.78	-7.50	-4.41
		1960	25.12	-6.00	-2.52
		1995	25.12	-6.03	-3.34

Ant	Band	Freq.	EFF	AVG	Peak
		(MHz)			
BT/WiFi 1	BT/Wifi	2400	29.51	-5.30	-3.50
		2451	30.90	-5.10	-3.53
		2473	30.90	-5.10	-2.84
		2480	33.11	-4.80	-3.23
		5150	21.88	-6.60	-4.80
		5350	18.20	-7.40	-5.78
		5500	14.13	-8.50	-6.25
		5700	14.79	-8.30	-6.38
		5795	18.20	-7.40	-5.56
		5815	15.49	-8.10	-6.34
5825	18.62	-7.30	-5.00		

Ant	Band	Freq.	EFF	AVG	Peak
		(MHz)			
Wifi2	Wifi	2400	33.02	-4.70	-3.21
		2451	36.10	-4.40	-2.78
		2473	35.40	-4.50	-2.92
		2480	30.81	-5.01	-3.33
		5150	38.90	-4.10	-2.17
		5350	38.02	-4.20	-2.58
		5500	38.02	-4.20	-2.38
		5700	31.62	-5.00	-2.99
		5795	35.48	-4.50	-2.52
		5815	30.90	-5.10	-3.51
5825	30.90	-5.10	-2.71		