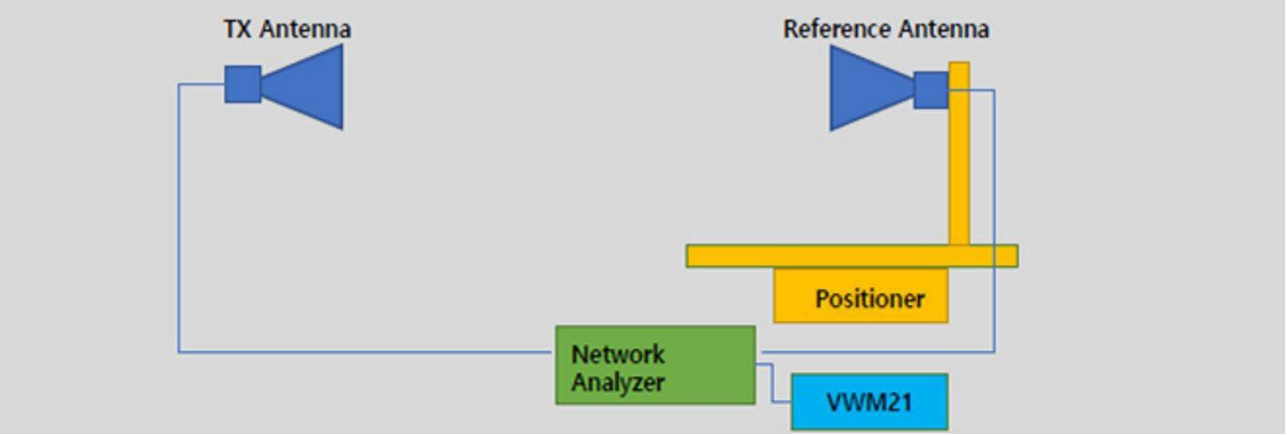
■ FCC ID: A3LSMX518U

■ Model: SM-X518U

1. Table of calibrated equipment



Part	Model Name	Specification	
Tx Antenna	QRH-006M-006G	600MHz to 6GHz	Calibrated date :2022.8.8 / Cal. Due : 2023.12.28
	QRH-002G-018G	2GHz to 18GHz	Calibrated date :2022.8.8 / Cal. Due : 2023.12.28
Reference Antenna	BBHA9120LFA	680MHz to 6500MHz	Calibration Frequency(680MHzto 6GHz) Calibrated date:2022.8.8 / Cal. Due : 2023.12.28
	BBHA9120C	2GHz to 18GHz	Calibration Frequency(2GHz to 8.5GHz) Calibrated date:2022.8.8 / Cal. Due : 2023.12.28
Network Analyzer	Agilent 5071B	300KHz to 8.5GHz	Calibrated date :2022.8.8 / Cal. Due : 2023.12.28
Measurement Software	VWM21		MTG Visual Wave-Mobile(Ver.2.1)

Test dates

2023.06.20

Names of test personnel

JIYEON YUN

Names of commercial test software being used

MTG Visual Wave-Mobile (Ver.2.1)

2.1. Return Loss & VSWR Test

The VSWR measurement of antennas assembled into a fully operating SM-X518U 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.

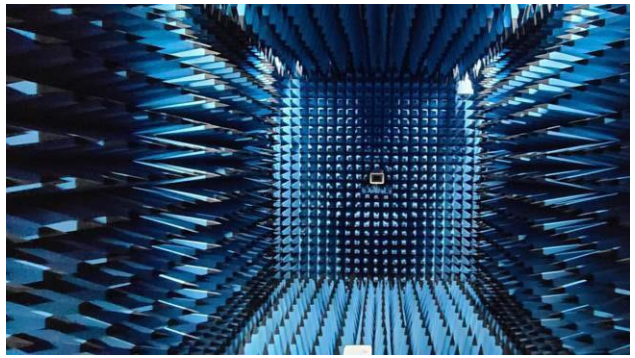
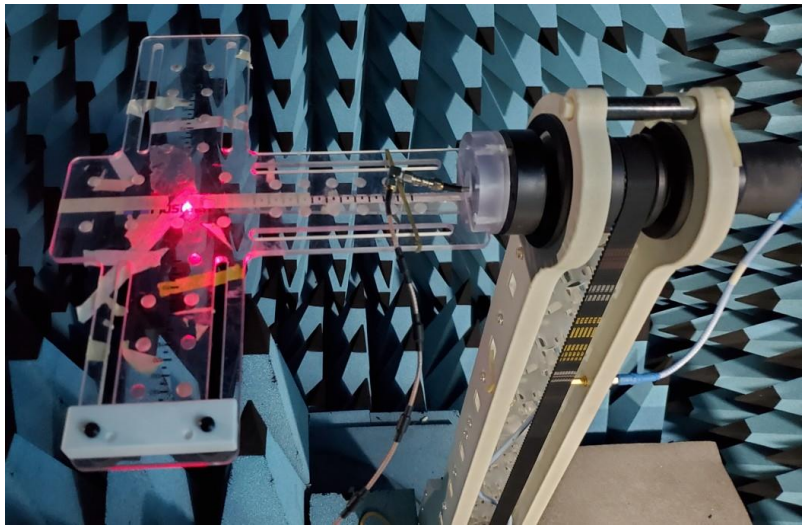


Figure 2: Geometry of Anechoic Chamber for Radiation patterns.

- ✓ Location : Samsung R&D Center R5 bld.
- ✓ Size : 4m x 2.5 x 2.5m (L x W x H)
- ✓ Frequency : 600 MHz -18GHz
- ✓ TX Antenna : 2GHz –18GHz Dual Polarization
- ✓ Quiet zone : 22cm @ 6GHz (Far-Field Length 2m)
- ✓ 2-axis DUT positioner -360°continuous rotation

2.2. Return Loss & VSWR Test

Samsung Antenna Lab has a system that can measure VSWR using Anechoic 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-X518U is assembled in the same state as the user environment.



Confidential

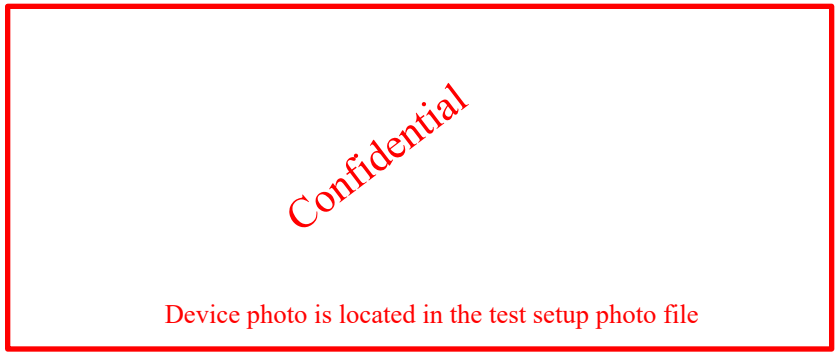
Device photo is located in the test setup photo file

※ Coaxial cables are connected to each antenna.

※ The coaxial cable is connected to the RTS60 chamber to measure the VSWR.

3. Radiation Pattern Test

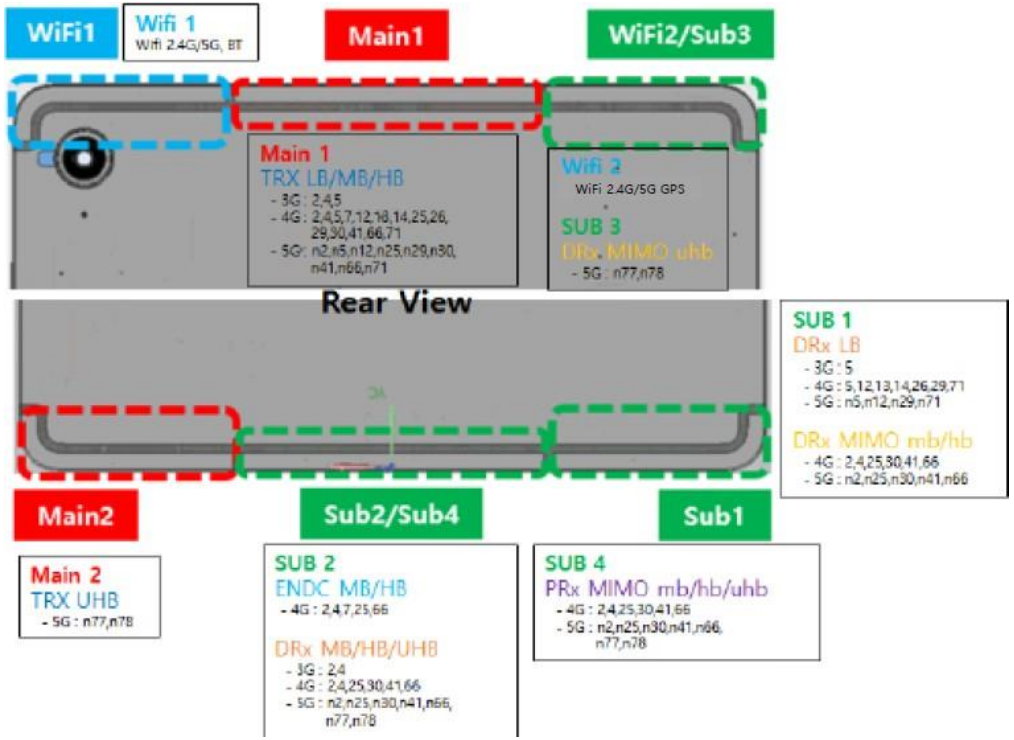
Antennas tested for Gain and Efficiency must be assembled into the enclosure and tested in the fully assembled and operating SM-X518U handset. The antenna is tested in free space in the anechoic chamber in the H, E1 and, E2 planes. The radiation patterns are measured at the center of transmit and receive bands.



4. Test Method (Manufacturing)

All measurements are done with SM-X518U 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 location

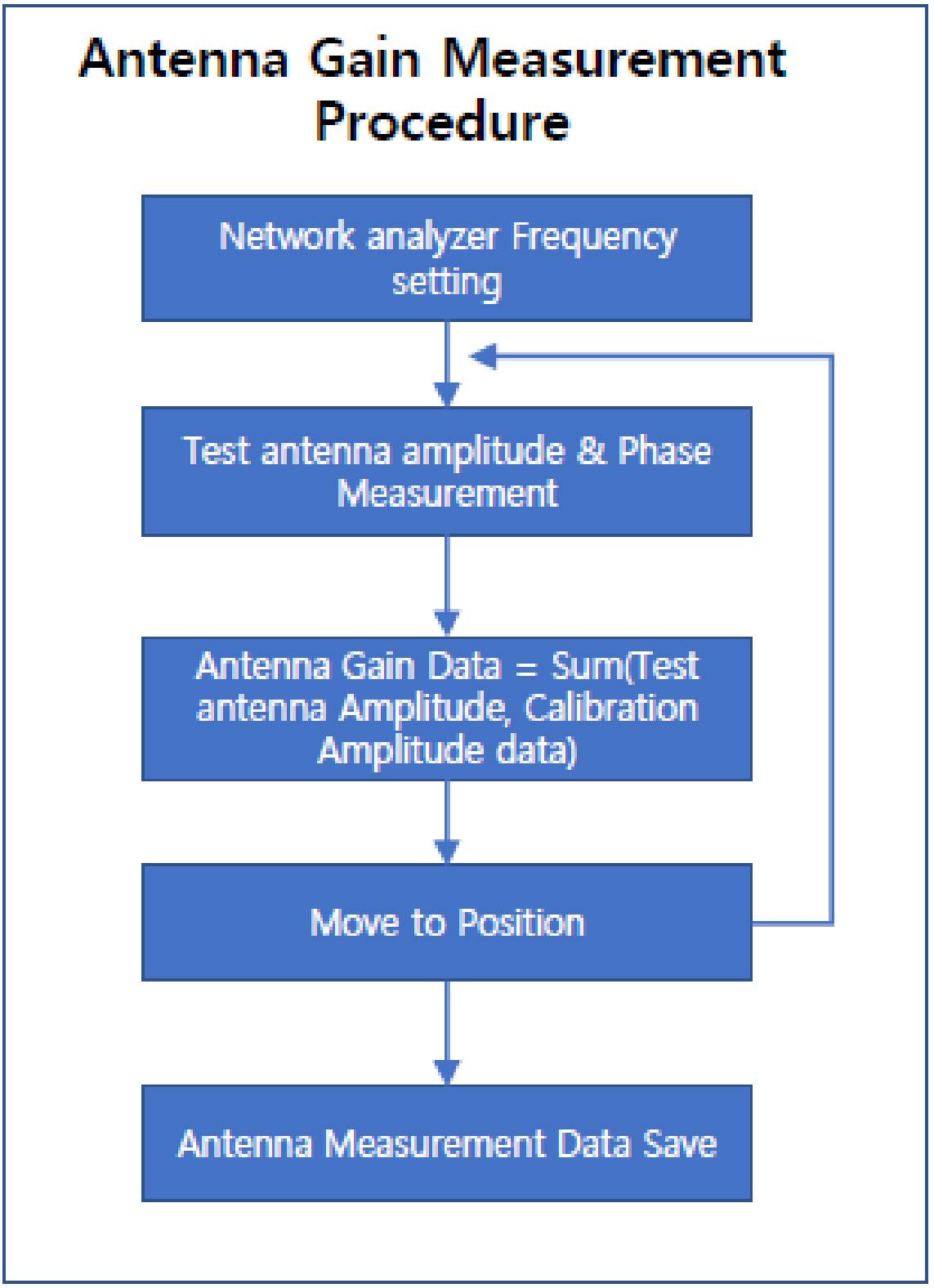


■ Antenna Manufacture
-Main1/2 Ant : SAMSUNG
-Metal PIFA

-WIFI1(BT/WIFI) Antenna: SAMSUNG
– Metal PIFA

-WIFI2(WIFI/GPS) Antenna: SAMSUNG
– Metal PIFA

6. Antenna Gain Measurement Procedure



7.Radiation Patterns

Ant	Band	Freq. (MHz)	EFF	AVG	Peak
M1	LTE B71 N71	617	11.7	-9.3	-7.3
		634	13.5	-8.7	-6.5
		652	20.9	-6.8	-4.5
		663	24.0	-6.2	-4.4
		680	22.9	-6.4	-4.1
		698	22.9	-6.4	-4.0
	LTE B12 N12	699	24.0	-6.2	-4.6
		707	23.4	-6.3	-4.7
		716	28.8	-5.4	-3.2
		729	27.5	-5.6	-3.1
		737	26.3	-5.8	-3.4
		746	25.7	-5.9	-4.0
	LTE B13, B14	746	33.1	-4.8	-2.8
		751	34.7	-4.6	-2.9
		756	35.5	-4.5	-2.7
		777	37.2	-4.3	-2.4
		782	38.9	-4.1	-2.1
		787	38.0	-4.2	-2.0
	WB5 LTE B5, B26 N5, N26	814	39.8	-4.0	-2.2
		831	37.2	-4.3	-1.8
		849	37.2	-4.3	-2.2
		859	39.8	-4.0	-1.9
		876	35.5	-4.5	-2.7
		894	31.6	-5.0	-3.5
	WB4 LTE B4, B66 N66	1710	46.8	-3.3	-1.7
		1745	46.8	-3.3	-1.5
		1780	46.8	-3.3	-1.4
		2110	30.2	-5.2	-3.2
		2155	24.5	-6.1	-4.6
		2200	20.9	-6.8	-4.6
	WB2 LTE B2, B25 N2, N25	1850	47.9	-3.2	-1.5
		1880	44.7	-3.5	-1.1
		1915	44.7	-3.5	-1.1
		1930	43.7	-3.6	-1.8
		1960	41.7	-3.8	-1.4
		1995	39.8	-4.0	-1.5
	LTE B30 N30	2300	30.2	-5.2	-3.1
		2320	29.5	-5.3	-3.4
		2340	26.3	-5.8	-4.3
		2360	27.5	-5.6	-3.6
		2380	25.7	-5.9	-3.5
		2400	25.1	-6.0	-4.1
	LTE B7, B41 N41	2500	30.9	-5.1	-3.1
		2540	27.5	-5.6	-4.0
		2580	30.2	-5.2	-3.1
		2620	28.2	-5.5	-3.6
		2660	28.8	-5.4	-3.7
		2700	30.2	-5.2	-2.9
M2	N77,N78	3300	24.5	-6.1	-4.4
		3480	22.4	-6.5	-4.5
		3660	22.4	-6.5	-4.1
		3840	27.5	-5.6	-3.3
		4020	30.2	-5.2	-3.1
		4200	26.3	-5.8	-3.5

Ant	Band	Freq. (MHz)	EFF	AVG	Peak
Sub2	LTE B4, B66	1710	19.5	-7.1	-5.0
		1732	20.9	-6.8	-5.0
		1755	22.4	-6.5	-4.8
	LTE B2, B25	1852	20.9	-6.8	-5.2
		1880	21.9	-6.6	-4.2
		1907	22.4	-6.5	-4.2
	LTE B7 N41(SRS#1)	2500	19.1	-7.2	-4.8
		2550	17.8	-7.5	-5.8
		2600	16.6	-7.8	-5.6
		2650	17.0	-7.7	-6.0
		2700	17.8	-7.5	-5.2
	N77,N78(SRS#1)	3300	23.4	-6.3	-4.2
		3480	24.0	-6.2	-3.8
		3660	19.5	-7.1	-4.7
		3840	22.9	-6.4	-4.0
		4020	19.1	-7.2	-5.5
		4200	17.8	-7.5	-5.5
Sub1	N41(SRS#3)	2500	28.2	-5.5	-3.1
		2550	28.8	-5.4	-3.6
		2600	27.5	-5.6	-3.9
		2650	26.3	-5.8	-4.3
		2700	23.4	-6.3	-4.3
Sub4	N41(SRS#2)	2500	9.1	-10.4	-8.6
		2550	11.5	-9.4	-7.2
		2600	12.9	-8.9	-7.3
		2650	13.8	-8.6	-6.4
		2700	14.1	-8.5	-6.0
	N77,N78(SRS#2)	3300	21.9	-6.6	-4.4
		3480	19.5	-7.1	-5.2
		3660	16.2	-7.9	-6.0
		3840	15.8	-8.0	-6.3
		4020	10.5	-9.8	-8.3
		4200	12.6	-9.0	-6.6
Sub3	N77,N78(SRS#3)	3300	17.0	-7.7	-5.2
		3480	16.6	-7.8	-5.5
		3660	17.0	-7.7	-5.3
		3840	15.5	-8.1	-6.6
		4020	16.6	-7.8	-5.6
		4200	16.2	-7.9	-5.5

Ant	Band	Freq. (MHz)	AVG	Peak
Wifi0	2.4G	2400	-6.3	-5.2
		2451	-6.4	-4.9
		2473	-6.6	-4.8
		2480	-6.5	-5.0
	5G	5150	-6.8	-5.5
		5350	-7.8	-6.0
		5500	-8.8	-5.9
		5700	-8.2	-6.0
		5795	-8.7	-6.3
		5815	-7.9	-6.6
		5825	-7.9	-6.2
		5850	-6.9	-6.4
		5885	-7.3	-6.5
Wifi1	2.4G	2400	-6.5	-5.2
		2451	-6.3	-5.5
		2473	-6.6	-5.2
		2480	-6.6	-5.2
	5G	5150	-8.1	-6.5
		5350	-8.7	-6.1
		5500	-8.9	-6.4
		5700	-8.8	-6.2
		5795	-8.9	-6.3
		5815	-8.5	-6.0
		5825	-8.7	-6.1
		5850	-8.8	-6.2
		5885	-8.5	-6.7

8. Contact person

■ Name: Dongsuk Lee

■ Signature: 이동석