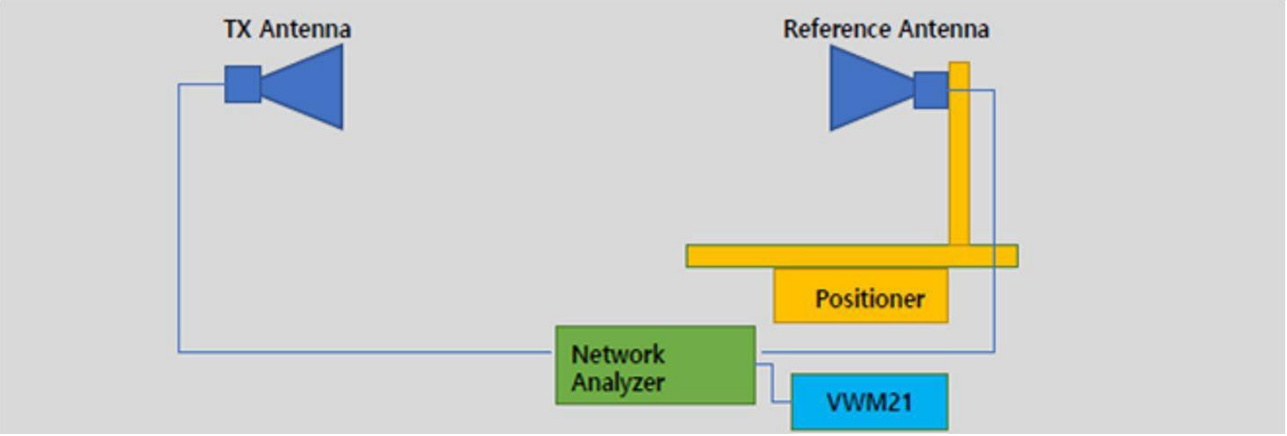
- FCC ID: A3LSMX510
- ISED ID : 649E-SMX510
- Model: SM-X510

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-X510 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.

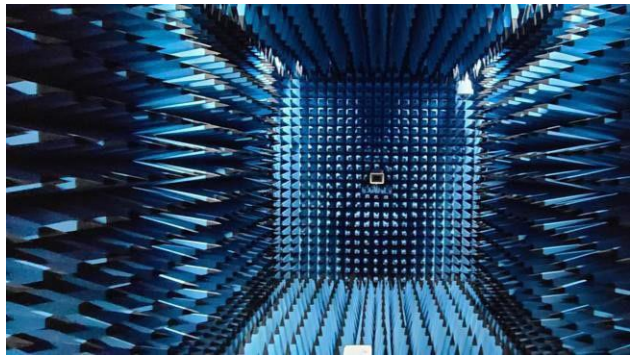
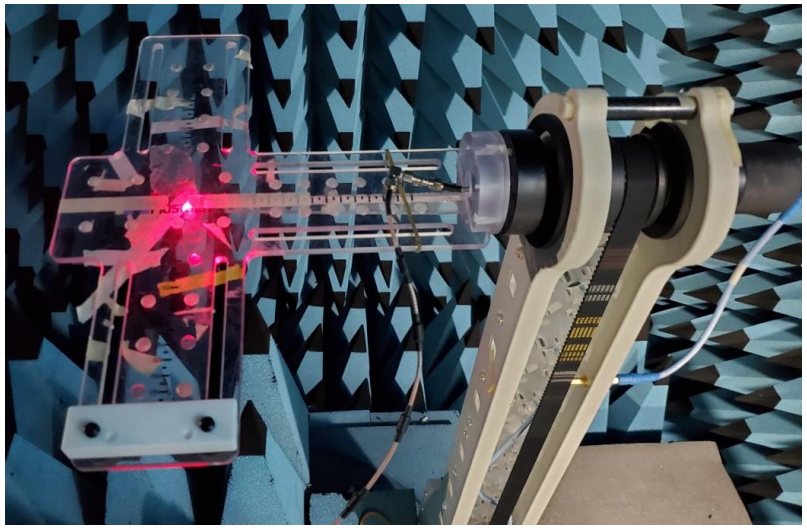


Figure 2: Geometry of Anechoic Chamber for Radiation patterns.

- ✓ 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-X510 is assembled in the same state as the user environment.

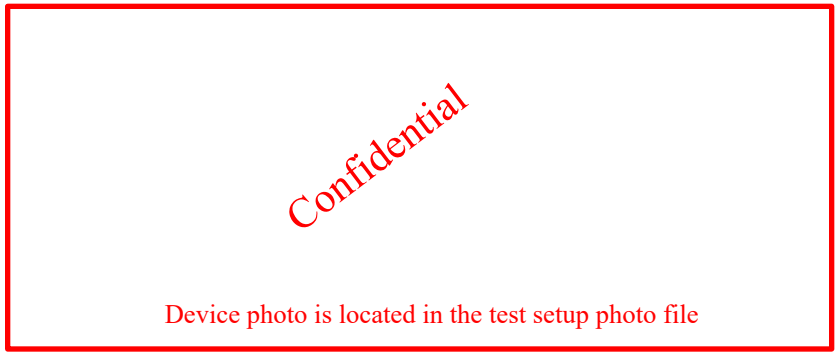


※ Coaxial cables are connected to each antenna.

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

3. Radiation Pattern Test

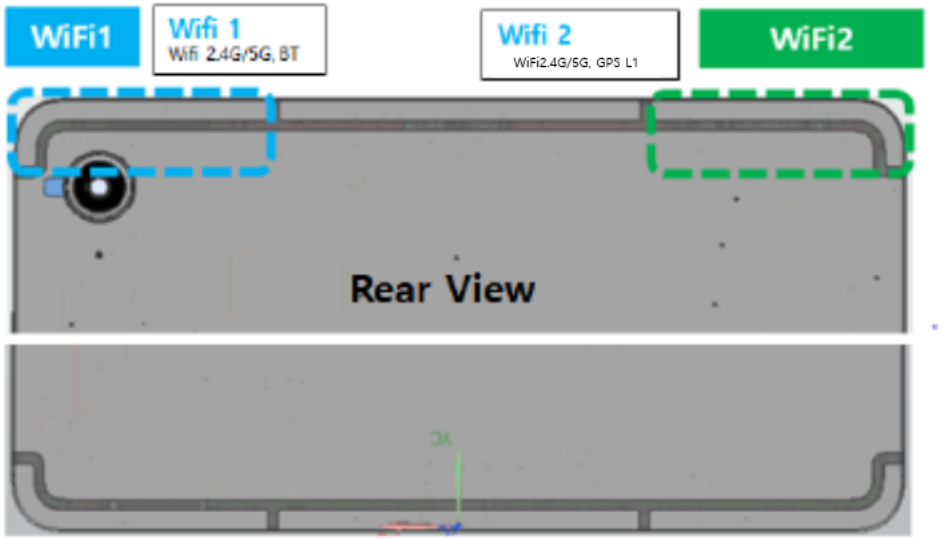
Antennas tested for Gain and Efficiency must be assembled into the enclosure and tested in the fully assembled and operating SM-X510 handset. The antenna is tested in free space in the anechoic chamber in the H, E1 and, E2 planes. The radiation patterns are measured at the center of transmit and receive bands.



4. Test Method (Manufacturing)

All measurements are done with SM-X510 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

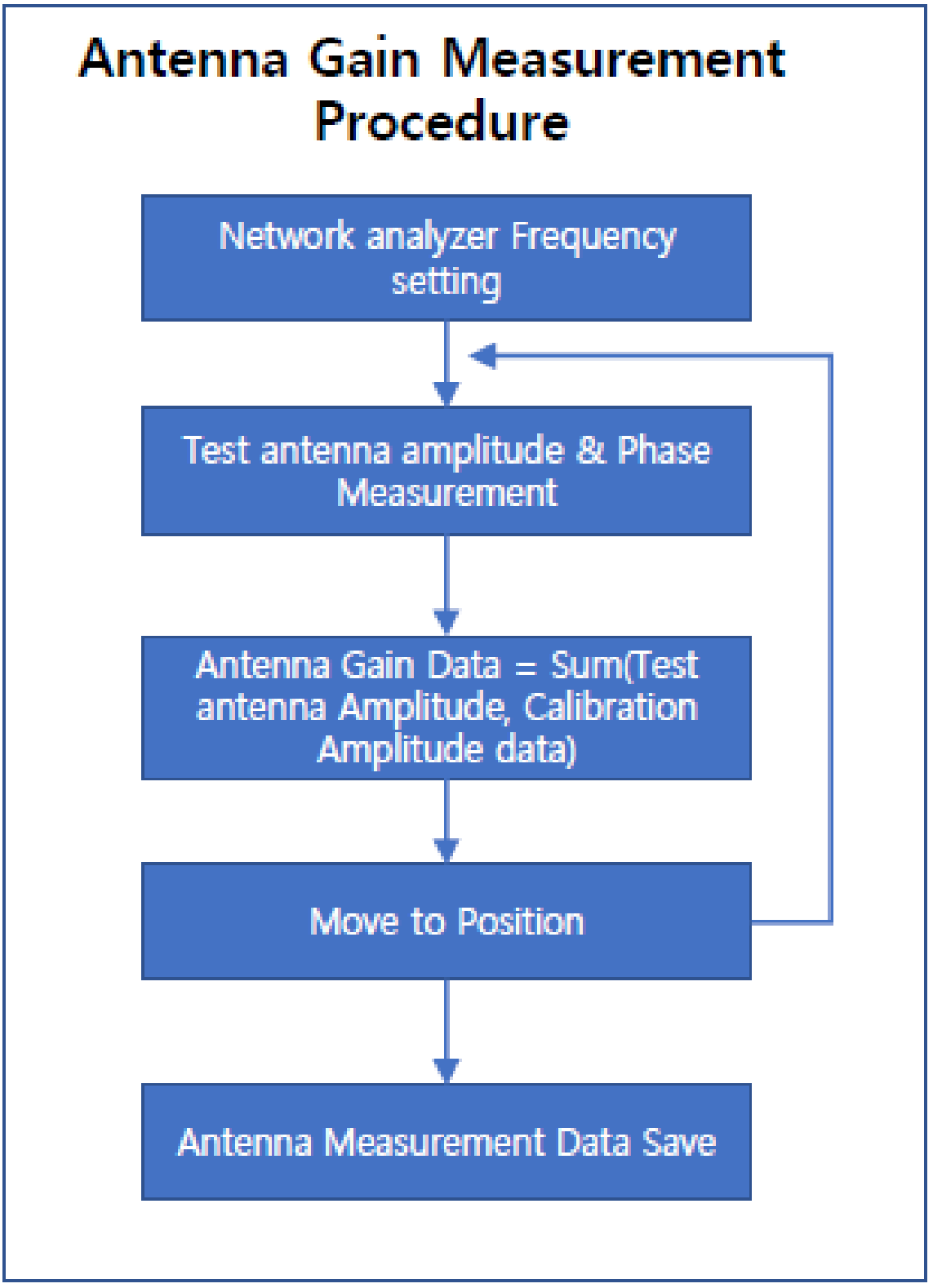


■ Antenna Manufacture

- 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)	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

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■ Name: Dongsuk Lee

■ Signature: