

# FCC NFC REPORT

## Certification

**Applicant Name:**  
SAMSUNG Electronics Co., Ltd.

**Address:**  
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,  
16677, Rep. of Korea

**Date of Issue:**  
June 26, 2020

**Test Site/Location:**  
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-  
si, Gyeonggi-do, 17383 KOREA

**Report No.:** HCT-RF-2006-FC012

**FCC ID:** A3LSMA516U

**APPLICANT:** SAMSUNG Electronics Co., Ltd.

**Model:** SM-A516U

**Additional Model:** SM-A516U1

**EUT Type:** Mobile Phone

**RF Output Field Strength:** 12.73 dBuV/m @30 m

**Frequency of Operation:** 13.56 MHz

**Modulation type:** ASK

**FCC Classification:** Low Power Communication Device – Transmitter

**FCC Rule Part(s):** FCC Part 15.225 Subpart C

**Engineering Statement:**

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

Report No.: HCT-RF-2006-FC012

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REVIEWED BY



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Report prepared by : Jeong Ho Kim  
Engineer of Telecommunication Testing Center

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Report approved by : Jong Seok Lee  
Manager of Telecommunication Testing Center

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

This test results were applied only to the test methods required by the standard.

**This laboratory is not accredited for the test results marked \*.**

The above Test Report is the accredited test result by KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2006-FC012	June 26, 2020	- First Approval Report

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## 1. EUT DESCRIPTION

<b>Model</b>	SM-A516U
<b>Additional Model</b>	SM-A516U1
<b>EUT Type</b>	Mobile Phone
<b>Power Supply</b>	DC 3.86 V
<b>Battery Information</b>	Model: EB-BA516ABY Type: Li-ion Battery
<b>Travel Adapter Information</b>	Model : EP-TA200 Manufacture: DONG YANG E&P
<b>Data Cable Information</b>	Model : EP-DR140AWE Manufacture: KSD
<b>Ear-jack Information</b>	Model : EHS64AVFWE Manufacture: CRESYN
<b>Frequency of Operation</b>	13.56 MHz
<b>Transmit Power</b>	Without Tag: 12.38 dBuV/m @30 m With Tag: 12.73 dBuV/m @30 m
<b>Modulation Type</b>	ASK
<b>Date(s) of Tests</b>	May 01, 2020 ~ June 02, 2020

## 2. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) is used in the measurement of the test device.

### EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.225 under the FCC Rules Part 15 Subpart C.

## GENERAL TEST PROCEDURES

### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013).

## DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

### **3. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

### **4. FACILITIES AND ACCREDITATIONS**

#### **FACILITIES**

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

#### **EQUIPMENT**

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5. ANTENNA REQUIREMENTS**

#### **According to FCC 47 CFR §15.203:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of §15.203

## 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ( $\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05



## 7. DESCRIPTION OF TESTS

### 7.1. Radiated Test

#### Limit (Operation within the band 13.110 MHz – 14.010 MHz)

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
13.553 – 13.567	15,848	30
13.410 ≤ f ≤ 13.553 13.567 ≤ f ≤ 13.710	334	30
13.110 ≤ f ≤ 13.410 13.710 ≤ f ≤ 14.010	106	30

Note:

1. 15,848 uV/m = 84.0 dBuV/m
2. 334 uV/m = 50.47 dBuV/m
3. 106 uV/m = 40.51 dBuV/m

#### Limit (Radiated Spurious Emissions)

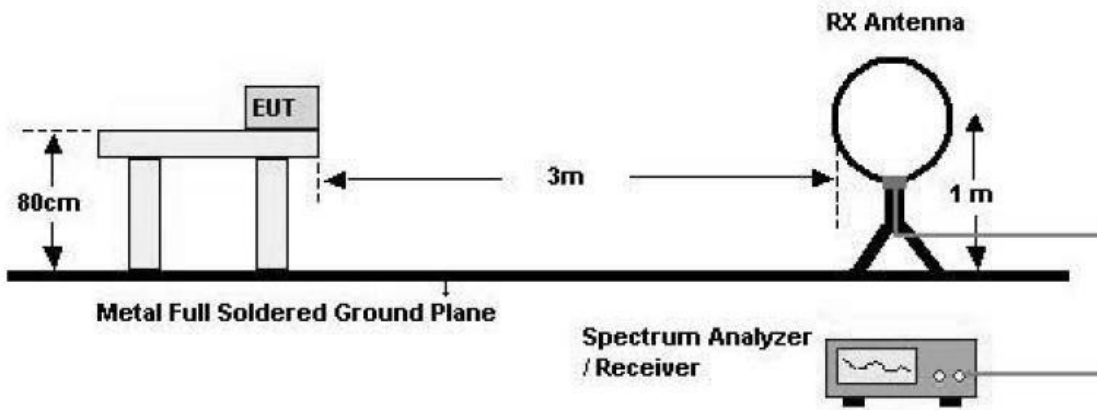
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	* 100	3
88-216	* 150	3
216-960	* 200	3
Above 960	500	3

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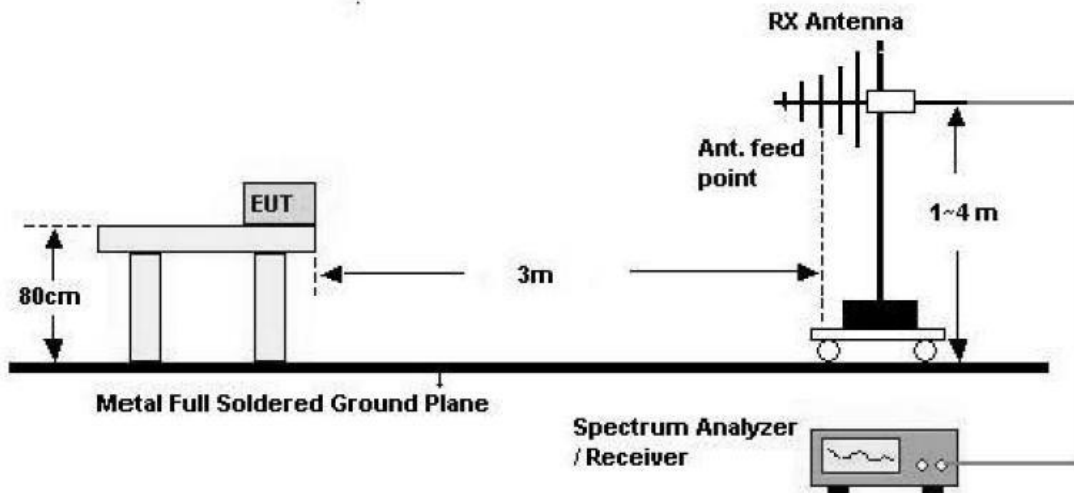
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**Test Configuration**

Below 30 MHz



30 MHz - 1 GHz



**Test Procedure of inband**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m (Below 30 MHz)

7. Spectrum Setting

- Detector = Peak
- Trace = Maxhold
- RBW = 9 kHz
- VBW  $\geq 3 \times$  RBW

8. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

**Test Procedure of Radiated spurious emissions(Below 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) =  $40\log(3 \text{ m}/300 \text{ m}) = - 80 \text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3 \text{ m}/30 \text{ m}) = - 40 \text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times$  RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

**KDB 414788 OFS and Chamber Correlation Justification**

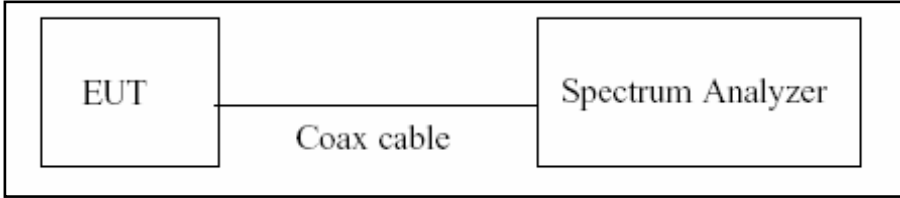
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

**Test Procedure of Radiated spurious emissions(Above 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Spectrum Setting
  - Frequency Range = 30 MHz ~ 1 GHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 100 kHz
  - VBW  $\geq$  3 x RBW
6. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
7. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

## 7.2. 20dB Bandwidth

### Test Configuration



### Test Procedure

The 20 dB bandwidth was measured by using a spectrum analyzer.

(Procedure 6.9.2 in ANSI 63.10-2013)

- 1) RBW = 1%~5% of the OBW
- 2) VBW = approximately three times RBW
- 3) Span = between two times and five times the OBW
- 4) Detector = Peak
- 5) Trace mode = Max hold
- 6) Allow the trace to stabilize

Note :

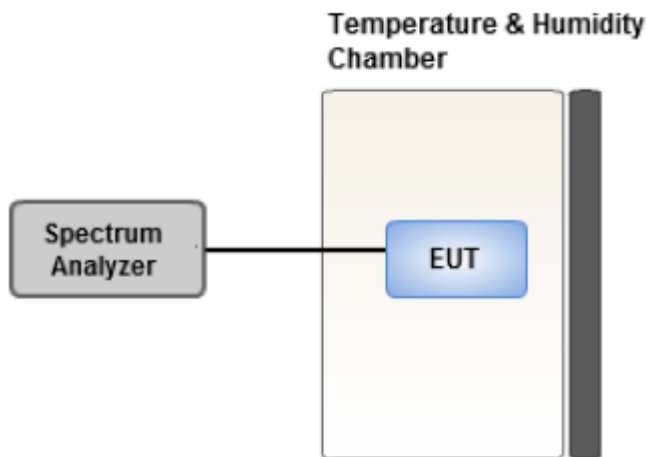
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Frequency Stability

#### Limit

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.

#### Test Configuration



#### Test Procedure

For battery operated equipment, the equipment tests shall be performed using a new battery.

- 1) Turn the EUT OFF and place it inside the environmental temperature chamber.  
For devices that have oscillator heaters, energize only the heater circuit.
- 2) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
- 3) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- 4) The frequency
- 5) tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.

#### Note:

- 1) Temperature:  
The temperature is varied from  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  using an environmental chamber.
- 2) Primary Supply Voltage :  
The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment.  
For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

**7.4. AC Power line Conducted Emissions**

**Limit**

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>
0.50 to 5	56	46
5 to 30	60	50

<sup>(a)</sup>Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

**Test Configuration**

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

**Test Procedure**

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.
5. The EUT is the device operating below 30 MHz.
  - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
  - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

**Sample Calculation**

Quasi-peak(Final Result) = Reading Value + Correction Factor

## **7.5. Worst case configuration and mode**

### **Radiated test**

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone, Stand alone + external accessories(Earphone, etc)
  - Worstcase : Stand alone
2. EUT Axis : Z
3. All type and bitrate were investigated and the worst case results are reported.  
(Worst case : Type A, 106 kbps)
4. All position of loop antenna were investigated and the worst case configuration results are reported.
  - Position : Horizontal, Vertical, Parallel to the ground plane
  - Worstcase : Horizontal

### **AC Power line Conducted Emissions**

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone+Earphone+Travel Adapter, Stand alone+Travel Adapter
  - Worstcase : Stand alone+Travel Adapter

### **20dB Bandwidth & Frequency Stability**

1. All type and bitrate were investigated and the worst case results are reported.  
(Worst case : Type A, 106 kbps)



## 8. TEST SUMMARY

Regulation	Requirement	Result
Part 15.225 (a)	Radiated Electric Field Emissions (13.553MHz to 13.567MHz)	Pass
Part 15.225 (b)	Radiated Electric Field Emissions ( $13.410 \leq f \leq 13.553$ , $13.567 \leq f \leq 13.710$ )	Pass
Part 15.225 (c)	Radiated Electric Field Emissions ( $13.110 \leq f \leq 13.410$ , $13.710 \leq f \leq 14.010$ )	Pass
Part 15.209	Radiated Electric Field Emissions (9kHz to 30MHz)	Pass
Part 15.209	Radiated Electric Field Emissions (30MHz to 1GHz)	Pass
Part 15.225 (e)	Frequency Stability	Pass
Part 15.207	AC power conducted emissions (150kHz to 30MHz)	Pass
Part 15.215 (c)	20 dB Bandwidth	Pass

## 9. TEST RESULT

### 9.1. Operation within the band 13.110 MHz – 14.010 MHz

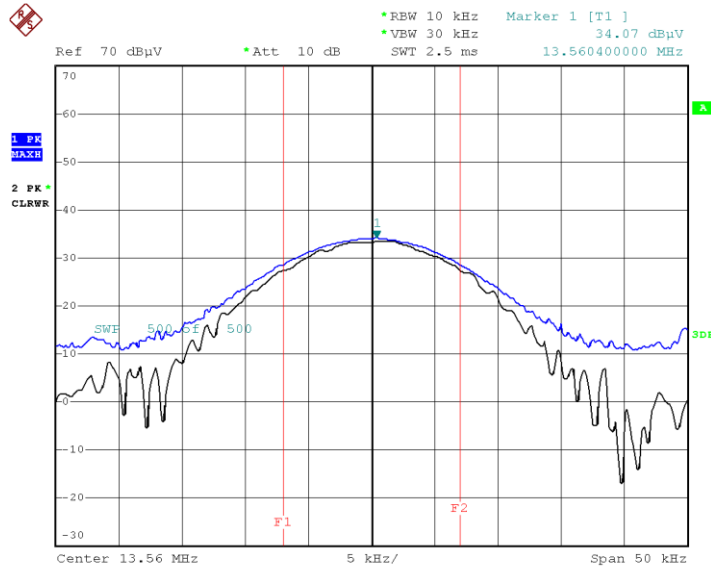
Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5604	34.07	18.66	-40.00	H	12.73	84.00	71.27
13.5603	31.65	18.66	-40.00	H	10.31	84.00	73.69

Measured Frequency Range : 13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5530	28.28	18.66	-40.00	H	6.94	50.47	43.53
13.5670	28.31	18.66	-40.00	H	6.97	50.47	43.50

Measured Frequency Range : 13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.3488	16.61	18.66	-40.00	H	-4.73	40.51	45.24
13.7718	16.38	18.66	-40.00	H	-4.96	40.51	45.47

**Note:** With Tag (worst case)

**Test Plot**



Date: 26.MAY.2020 11:26:57

**Note:**

Plot of worst case are only reported.

Without Tag Mode (only fundamental)

Measured Frequency Range :							
13.553 MHz-13.567 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5599	33.72	18.66	-40.00	H	12.38	84.00	71.62
13.5609	32.59	18.66	-40.00	H	11.25	84.00	72.75

## 9.2. Radiated Emission 9 kHz – 30 MHz

Measured Frequency Range :							
9 kHz - 30 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
4.9970	16.97	18.66	-40.00	H	-4.37	29.54	33.91
17.4318	13.91	18.66	-40.00	H	-7.43	29.54	36.97
27.1273	13.21	19.06	-40.00	H	-7.73	29.54	37.27
27.1082	12.10	19.06	-40.00	H	-8.84	29.54	38.38

**Note:**

1. With Tag (worst case)

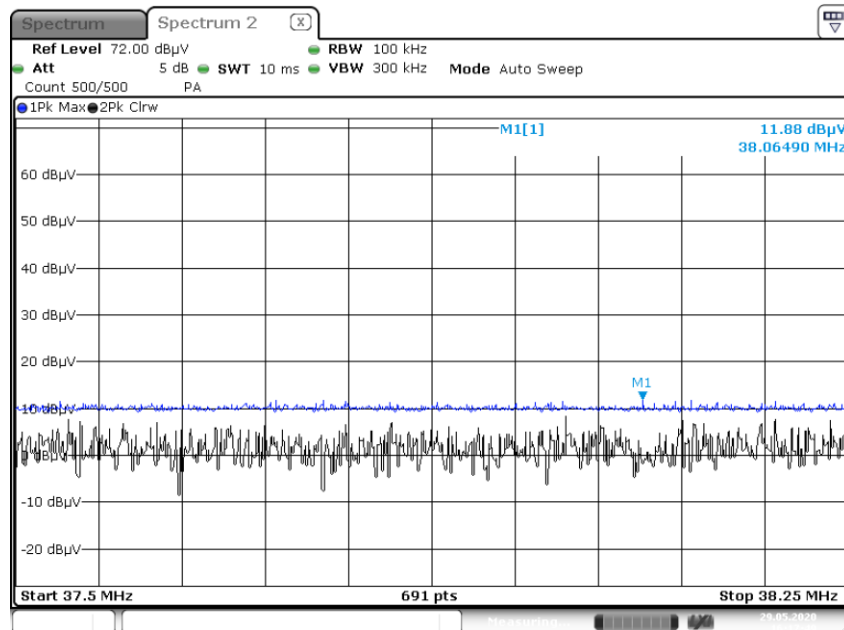
### 9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range : 30 MHz - 1000 MHz							
Frequency (MHz)	Read Level (dBuV/m) @3m	Ant.Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
35.1216	11.26	19.16	0.66	H	31.08	40.00	8.92
37.8348*	11.88	19.36	0.76	H	32.00	40.00	8.00
86.0120	10.89	15.36	1.06	V	27.31	40.00	12.69
120.2270*	11.80	18.20	1.30	H	31.30	43.50	12.20
136.6220*	10.77	19.55	1.42	H	31.74	43.50	11.76
166.9240	10.84	19.00	1.54	V	31.38	43.50	12.12

**Note:**

1. ‘\*’ is the result for restricted band.
2. With Tag (worst case)

■ **Test Plot**

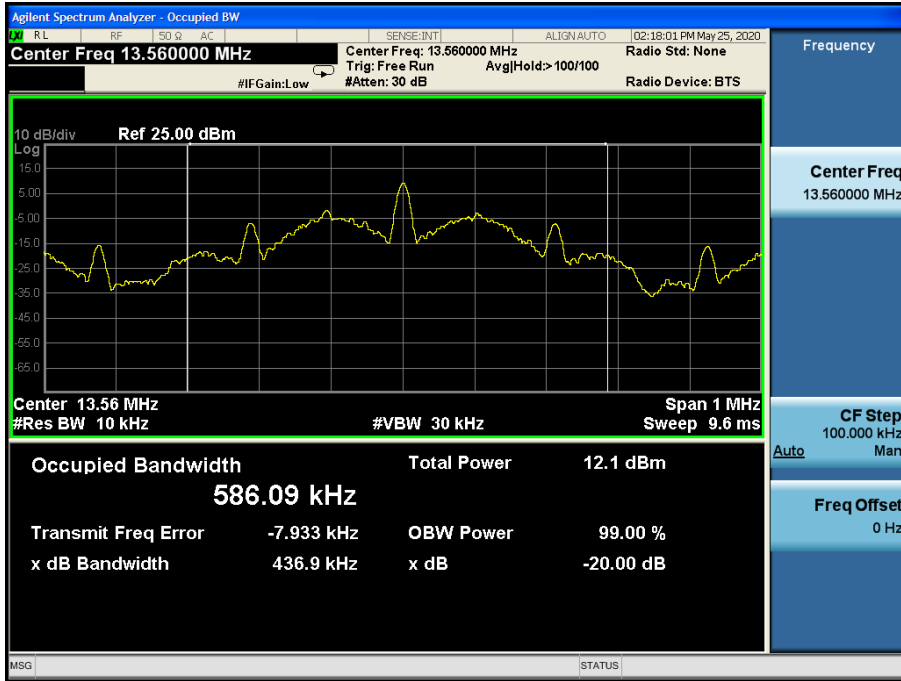


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**Note:**

Plot of worst case are only reported

### 9.4. 20 dB Bandwidth



### 9.5. Frequency Stability

**Startup**

OPERATING FREQUENCY: 13.56 MHz  
 REFERENCE VOLTAGE: 3.86 VDC  
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.86	-20	13.560044	44	0.0003240
100%		-10	13.560039	39	0.0002841
100%		0	13.560034	34	0.0002528
100%		+10	13.560031	31	0.0002287
100%		+20(Ref.)	13.560039	39	0.0002876
100%		+30	13.560033	33	0.0002408
100%		+40	13.560041	41	0.0003046
100%		+50	13.560047	47	0.0003456
High		4.38	+20	13.560046	46
Low	3.65	+20	13.560046	46	0.0003369

**2 minutes**

OPERATING FREQUENCY: 13.56 MHz  
 REFERENCE VOLTAGE: 3.86 VDC  
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.86	-20	13.560045	45	0.0003339
100%		-10	13.560039	39	0.0002853
100%		0	13.560034	34	0.0002501
100%		+10	13.560030	30	0.0002246
100%		+20(Ref.)	13.560041	41	0.0002988
100%		+30	13.560032	32	0.0002396
100%		+40	13.560042	42	0.0003080
100%		+50	13.560047	47	0.0003474
High		4.38	+20	13.560046	46
Low	3.65	+20	13.560046	46	0.0003413



**5 minutes**

OPERATING FREQUENCY: 13.56 MHz  
 REFERENCE VOLTAGE: 3.86 VDC  
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.86	-20	13.560046	46	0.0003396
100%		-10	13.560040	40	0.0002973
100%		0	13.560036	36	0.0002642
100%		+10	13.560033	33	0.0002405
100%		+20(Ref.)	13.560042	42	0.0003123
100%		+30	13.560032	32	0.0002369
100%		+40	13.560041	41	0.0003031
100%		+50	13.560045	45	0.0003321
High		4.38	+20	13.560044	44
Low	3.65	+20	13.560046	46	0.0003401

**10 minutes**

OPERATING FREQUENCY: 13.56 MHz  
 REFERENCE VOLTAGE: 3.86 VDC  
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.86	-20	13.560045	45	0.0003332
100%		-10	13.560039	39	0.0002861
100%		0	13.560035	35	0.0002549
100%		+10	13.560031	31	0.0002292
100%		+20(Ref.)	13.560041	41	0.0003030
100%		+30	13.560032	32	0.0002345
100%		+40	13.560042	42	0.0003066
100%		+50	13.560045	45	0.0003302
High		4.38	+20	13.560043	43
Low	3.65	+20	13.560046	46	0.0003398

## 9.6. POWERLINE CONDUCTED EMISSIONS

### Conducted Emissions (Line 1)

Test

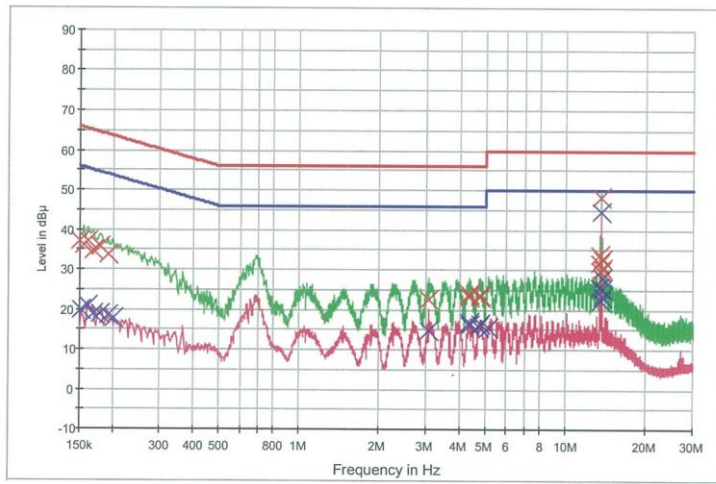
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## HCT TEST Report

### Common Information

EUT: SM-A516U  
 Manufacturer: SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC\_L1

FCC CLASS B\_Exten Cable



— FCC CLASS B\_OP      — FCC CLASS B\_AV      — Preview Result 1-PK+  
 — Preview Result 2-AVG      x Final Result 1-QPK      x Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	37.3	9.000	Off	L1	9.8	28.7	66.0
0.156000	36.0	9.000	Off	L1	9.8	29.7	65.7
0.160000	37.0	9.000	Off	L1	9.8	28.5	65.5
0.168000	34.8	9.000	Off	L1	9.8	30.2	65.1
0.178000	35.6	9.000	Off	L1	9.8	29.0	64.6
0.192000	33.7	9.000	Off	L1	9.8	30.2	63.9
3.068000	22.6	9.000	Off	L1	9.9	33.4	56.0
4.360000	23.9	9.000	Off	L1	10.0	32.1	56.0
4.376000	23.1	9.000	Off	L1	10.0	32.9	56.0
4.760000	23.4	9.000	Off	L1	10.0	32.6	56.0
4.786000	23.4	9.000	Off	L1	10.0	32.6	56.0
4.798000	23.6	9.000	Off	L1	10.0	32.4	56.0
13.454000	33.6	9.000	Off	L1	10.3	26.4	60.0
13.458000	31.6	9.000	Off	L1	10.3	28.4	60.0
13.488000	29.7	9.000	Off	L1	10.3	30.3	60.0
13.560000	48.4	9.000	Off	L1	10.3	11.6	60.0
13.650000	30.5	9.000	Off	L1	10.3	29.5	60.0
13.668000	32.6	9.000	Off	L1	10.3	27.4	60.0

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Test

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	19.7	9.000	Off	L1	9.8	36.2	55.9
0.160000	20.7	9.000	Off	L1	9.8	34.8	55.5
0.168000	18.9	9.000	Off	L1	9.8	36.1	55.1
0.178000	18.8	9.000	Off	L1	9.8	35.7	54.6
0.192000	18.4	9.000	Off	L1	9.8	35.5	53.9
0.202000	17.7	9.000	Off	L1	9.8	35.9	53.5
3.068000	14.9	9.000	Off	L1	9.9	31.1	46.0
4.360000	16.7	9.000	Off	L1	10.0	29.3	46.0
4.376000	16.0	9.000	Off	L1	10.0	30.0	46.0
4.744000	15.8	9.000	Off	L1	10.0	30.2	46.0
4.792000	16.5	9.000	Off	L1	10.0	29.5	46.0
5.150000	15.4	9.000	Off	L1	10.0	34.6	50.0
13.454000	25.6	9.000	Off	L1	10.3	24.4	50.0
13.488000	22.2	9.000	Off	L1	10.3	27.8	50.0
13.560000	44.7	9.000	Off	L1	10.3	5.3	50.0
13.650000	23.3	9.000	Off	L1	10.3	26.7	50.0
13.668000	25.2	9.000	Off	L1	10.3	24.8	50.0
13.772000	28.0	9.000	Off	L1	10.3	22.0	50.0

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**Conducted Emissions (Line 2)**

Test

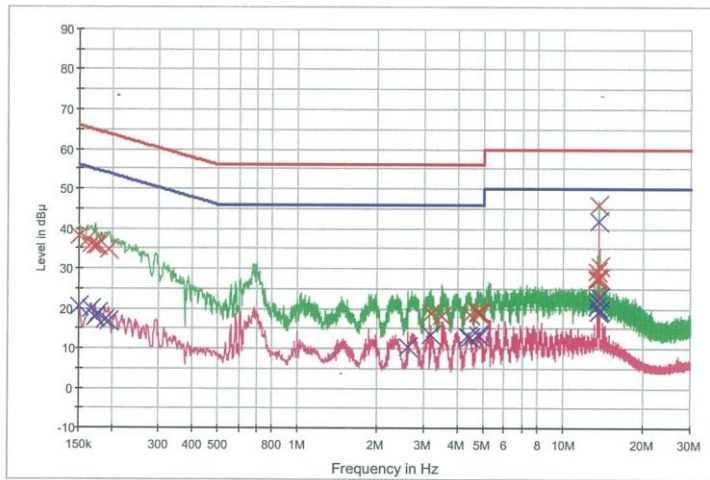
1 / 2

**HCT TEST Report**

**Common Information**

EUT: SM-A516U  
 Manufacturer: SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC\_N

FCC CLASS B\_Exten Cable



— FCC CLASS B\_QP      — FCC CLASS B\_AV      — Preview Result 1-PK+  
 — Preview Result 2-AVG      × Final Result 1-QPK      × Final Result 2-CAV

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.1	9.000	Off	N	9.8	27.9	66.0
0.160000	37.2	9.000	Off	N	9.8	28.3	65.5
0.166000	36.2	9.000	Off	N	9.8	29.0	65.2
0.172000	35.7	9.000	Off	N	9.8	29.2	64.9
0.176000	35.8	9.000	Off	N	9.8	28.8	64.7
0.194000	34.6	9.000	Off	N	9.8	29.3	63.9
3.164000	18.9	9.000	Off	N	9.9	37.1	56.0
3.506000	18.1	9.000	Off	N	10.0	37.9	56.0
4.446000	18.6	9.000	Off	N	10.0	37.4	56.0
4.772000	19.2	9.000	Off	N	10.0	36.8	56.0
4.806000	18.9	9.000	Off	N	10.0	37.1	56.0
4.910000	18.7	9.000	Off	N	10.0	37.3	56.0
13.448000	27.2	9.000	Off	N	10.4	32.8	60.0
13.456000	29.5	9.000	Off	N	10.4	30.5	60.0
13.462000	27.7	9.000	Off	N	10.4	32.3	60.0
13.560000	45.8	9.000	Off	N	10.4	14.2	60.0
13.666000	30.6	9.000	Off	N	10.4	29.4	60.0
13.672000	27.6	9.000	Off	N	10.4	32.4	60.0

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Test

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	20.7	9.000	Off	N	9.8	35.3	56.0
0.166000	19.9	9.000	Off	N	9.8	35.2	55.2
0.172000	17.7	9.000	Off	N	9.8	37.2	54.9
0.176000	18.9	9.000	Off	N	9.8	35.8	54.7
0.188000	17.3	9.000	Off	N	9.8	36.9	54.1
0.194000	16.6	9.000	Off	N	9.8	37.2	53.9
2.606000	10.3	9.000	Off	N	9.9	35.7	46.0
3.164000	13.2	9.000	Off	N	9.9	32.8	46.0
4.358000	13.2	9.000	Off	N	10.0	32.8	46.0
4.446000	12.6	9.000	Off	N	10.0	33.4	46.0
4.772000	13.4	9.000	Off	N	10.0	32.6	46.0
4.834000	13.1	9.000	Off	N	10.0	32.9	46.0
13.448000	20.5	9.000	Off	N	10.4	29.5	50.0
13.452000	22.3	9.000	Off	N	10.4	27.7	50.0
13.492000	19.0	9.000	Off	N	10.4	31.0	50.0
13.560000	41.8	9.000	Off	N	10.4	8.2	50.0
13.630000	19.4	9.000	Off	N	10.4	30.6	50.0
13.666000	22.9	9.000	Off	N	10.4	27.1	50.0

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## 10. LIST OF TEST EQUIPMENT

### Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/11/2019	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100584
ESPAC	SU-642 / Temperature Chamber	08/14/2019	Annual	0093000718
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	03/23/2020	Annual	MY49432108
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/23/2020	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/11/2019	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	02/24/2020	Annual	10545
Hewlett Packard	E3632A / DC Power Supply	09/27/2019	Annual	MY40004427
Agilent	8493C / Attenuator(10 dB)	07/02/2019	Annual	07560
Rohde & Schwarz	18N-20dB / Attenuator(20 dB)	03/23/2020	Annual	8
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A
Rohde & Schwarz	CBT / Bluetooth Tester	03/02/2020	Annual	100808

### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

**Radiated Test**

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/29/2019	Biennial	BBHA9170342
Rohde & Schwarz	FSP(9 kHz ~ 40 GHz) / Spectrum Analyzer	07/16/2019	Annual	100843
Rohde & Schwarz	FSV(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/13/2020	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/18/2020	Annual	3000C000276
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/21/2020	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/21/2020	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/21/2020	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/21/2020	Annual	None

**Note:**

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).



## 11. ANNEX A\_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2006-FC012-P