

TEST REPORT

FCC NFC Test for SM-A507FN/DS
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-1908-FC008-R2

DATE OF ISSUE
August 29, 2019

HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 F ax. +82 31 645 6401



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FCC ID
A3LSMA507FN

Applicant

SAMSUNG Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of
Korea

Eut Type
Model Name

Mobile Phone
SM-A507FN/DS

RF Output Field Strength

8.53 dBuV/m @30 m

Modulation type

ASK

FCC Classification

Low Power Communication Device – Transmitter

FCC Rule Part(s)

FCC Part 15.225 Subpart C

The result shown in this test report refer only to the sample(s) tested unless
otherwise stated.

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

Tested by
Jung Ki Lim

(signature)

Technical Manager
Jong Seok Lee

(signature)

HCT CO., LTD.

Soo Chan Lee

SooChan Lee / CEO
Accredited by KOLAS, Republic of KOREA

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	August 05, 2019	Initial Release
1	August 13, 2019	Revised the OBW / 20 dB Bandwidth
2	August 29, 2019	Added the ISO 17025 KOLAS logo.

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.

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

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.

CONTENTS

1. EUT DESCRIPTION	5
2. TEST METHODOLOGY	6
EUT CONFIGURATION	6
EUT EXERCISE	6
GENERAL TEST PROCEDURES.....	6
DESCRIPTION OF TEST MODES.....	7
3. INSTRUMENT CALIBRATION.....	7
4. FACILITIES AND ACCREDITATIONS.....	7
FACILITIES	7
EQUIPMENT	7
5. ANTENNA REQUIREMENTS.....	8
6. MEASUREMENT UNCERTAINTY	8
7. DESCRIPTION OF TESTS.....	9
8. SUMMARY TEST OF RESULTS	18
9. TEST RESULT	19
9.1 Operation within the band 13.110 MHz – 14.010 MHz.....	19
9.2 Radiated Emission 9 kHz – 30 MHz.....	22
9.3 Radiated Emission 30 MHz – 1000 MHz.....	23
9.4 20 dB Bandwidth	24
9.5 Frequency Stability	25
9.6 POWERLINE CONDUCTED EMISSIONS.....	29
10. LIST OF TEST EQUIPMENT	33
11. ANNEX A_ TEST SETUP PHOTO.....	35

1. EUT DESCRIPTION

Model	SM-A507FN/DS
EUT Type	Mobile Phone
Power Supply	DC 3.85 V
Battery Information	Model: EB-BA505ABU Type: Li-ion Battery
Travel Adapter Information	Model : EP-TA200 Manufacture: SOLUM
Data Cable Information	Model : EP-DR140ABE Manufacture: KSD
Ear-jack Information	Model : EHS61ASFBE Manufacture: FOSTER
Frequency of Operation	13.5598 MHz
Transmit Power	8.53 dBuV/m @30 m
Modulation Type	ASK
Antenna type	Internal Antenna
Date(s) of Tests	July 12, 2019 ~ August 01, 2019

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.”

* The antennas of this E.U.T are permanently attached.

* 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_{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)

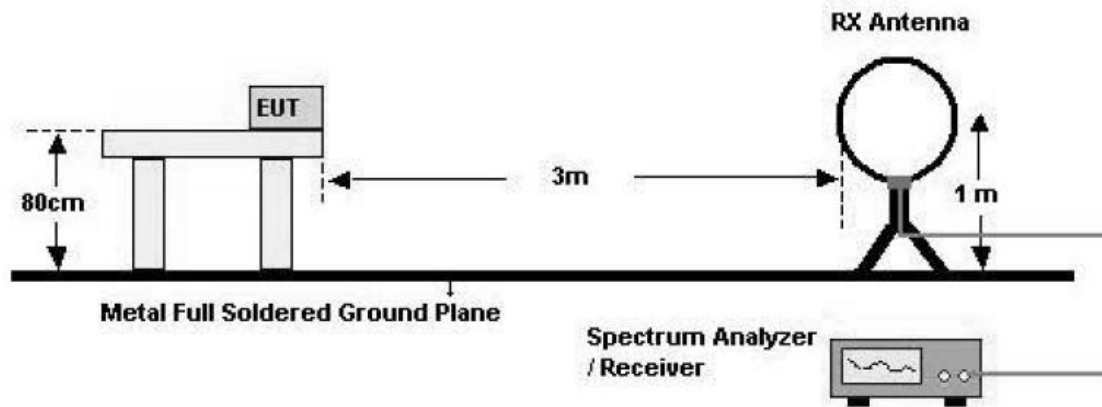
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	**100	3
88-216	**150	3
216-960	**200	3
Above 960	500	3

**.:

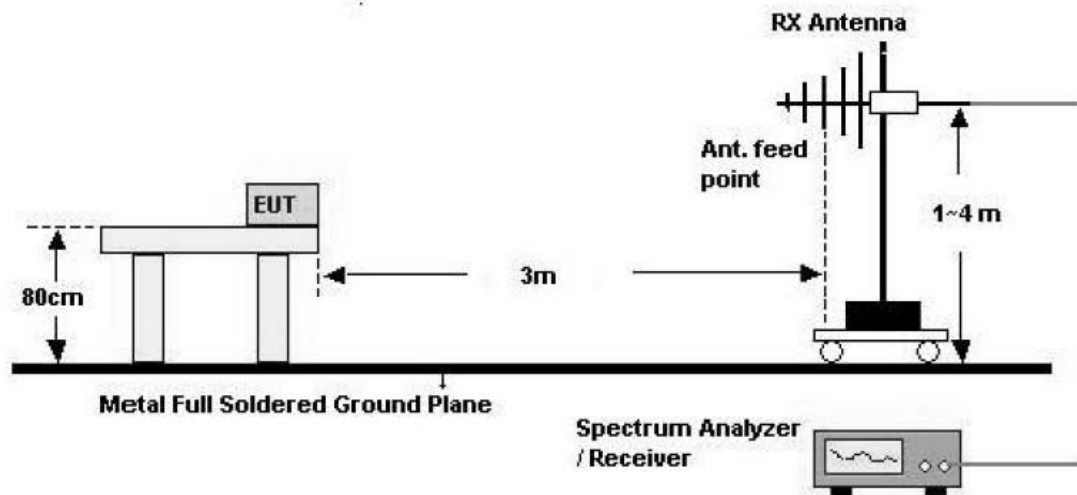
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Above 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 in detecting antenna.

5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

6. Distance Correction Factor = $40 \cdot \log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$

Measurement Distance : 3 m (Below 30 MHz)

7. Spectrum Setting

- Detector = Peak
- Trace = Maxhold
- RBW = 9 kHz
- VBW $\geq 3 \cdot \text{RBW}$

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) = $40 \cdot \log(3 \text{ m}/300 \text{ m}) = -80 \text{ dB}$

Measurement Distance : 3 m

7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40 \cdot \log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$

Measurement Distance : 3 m

8. Spectrum Setting

- Frequency Range = 9 kHz ~ 30 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 9 kHz
- VBW $\geq 3 \cdot \text{RBW}$

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.

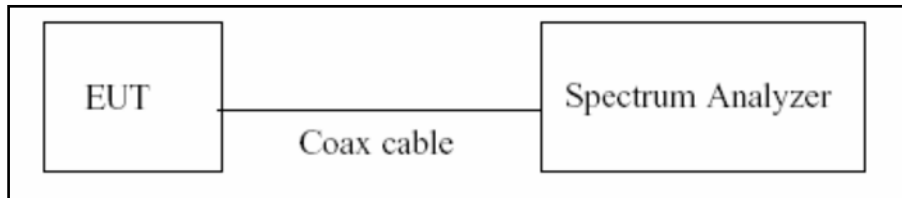
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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 $\geq 3 \times$ 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.

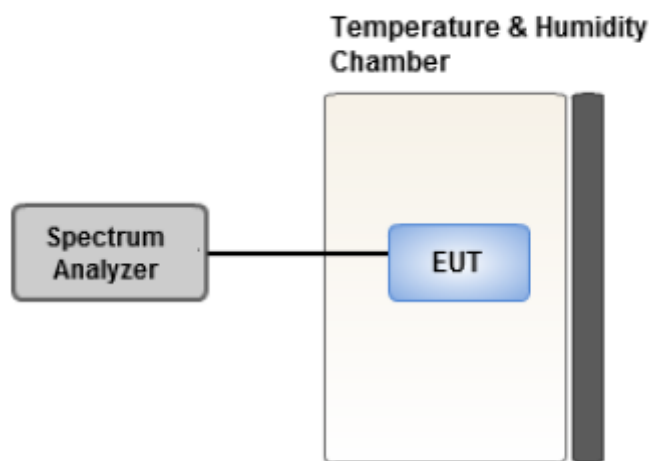
- 1) RBW = Auto
- 2) VBW = Auto
- 3) Span = Adequately in the operating Tx.
- 4) Detector = Peak
- 5) Trace mode = Max hold
- 6) Allow the trace to stabilize

Note :

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

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 tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.
- 5) The frequency 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°C to + 50°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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*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 : Y,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. SUMMARY TEST OF RESULTS

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5605	28.61	19.54	-40.00	8.15	84.00	75.85
13.5603	24.36	19.54	-40.00	3.90	84.00	80.10

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5529	23.71	19.54	-40.00	3.25	50.47	47.22
13.5671	22.79	19.54	-40.00	2.33	50.47	48.14

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.345	16.79	19.54	-40.00	-3.67	40.51	44.18
13.7727	15.59	19.54	-40.00	-4.87	40.51	45.38

Note:

1. Without Tag

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5598	28.99	19.54	-40.00	8.53	84.00	75.47
13.5609	25.15	19.54	-40.00	4.69	84.00	79.31

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5529	23.56	19.54	-40.00	3.10	50.47	47.37
13.5671	23.43	19.54	-40.00	2.97	50.47	47.50

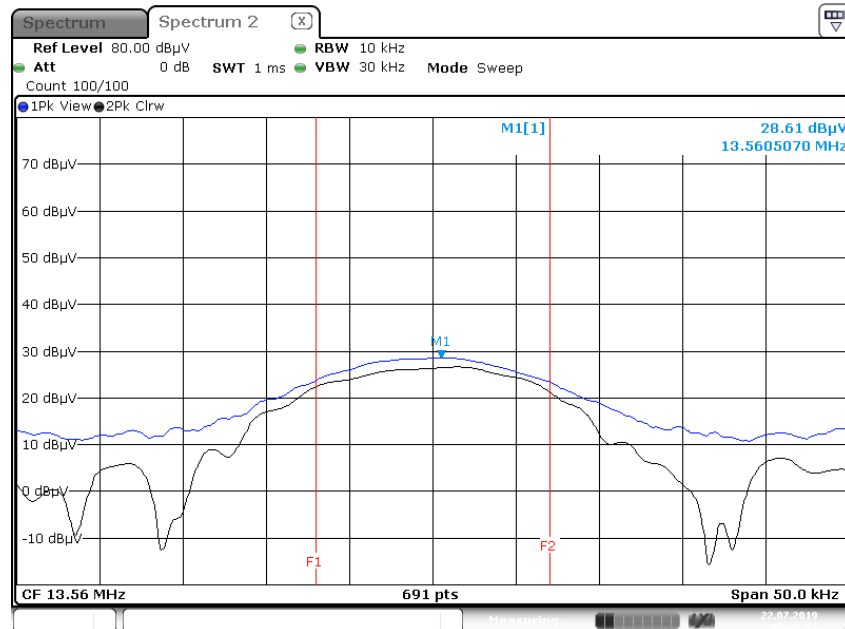
Measured Frequency Range : 13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.408	12.18	19.54	-40.00	-8.28	40.51	48.79
13.7723	12.88	19.54	-40.00	-7.58	40.51	48.09

Note:

1. With Tag(worst case)

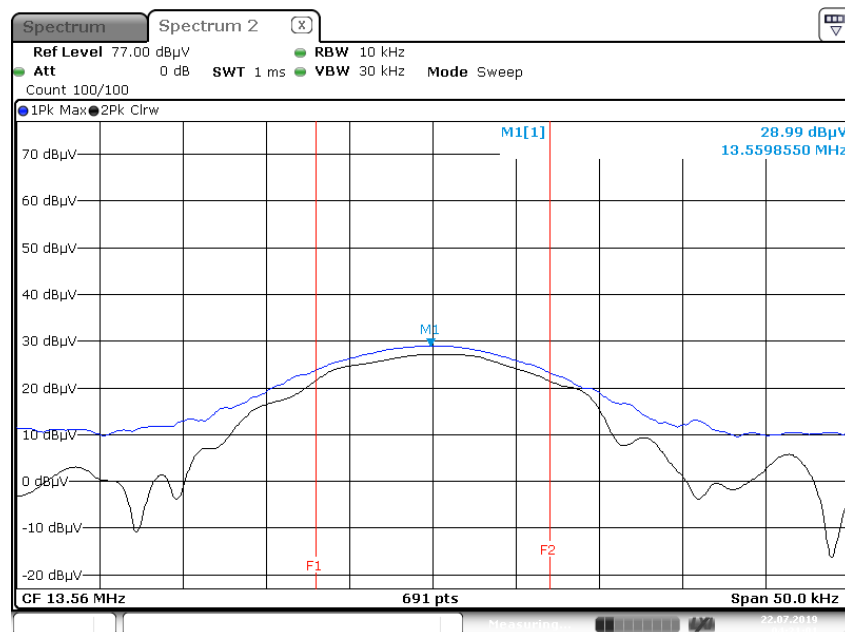
Test Plot

Without Tag (Worst case : Z-H)



Date: 22.JUL.2019 03:27:53

With Tag (Worst case : Y-H)



Date: 22.JUL.2019 04:21:01

Note:

Plot of worst case are only reported.

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)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
9.931	12.89	19.54	-40.00	-7.57	29.54	37.11
13.000	11.04	19.54	-40.00	-9.42	29.54	38.96
18.000	11.66	19.54	-40.00	-8.80	29.54	38.34
27.001	10.09	21.75	-40.00	-8.16	29.54	37.70

Note:

1. With Tag(worst case)
2. Data of worst case are only reported.

9.3 Radiated Emission 30 MHz – 1000 MHz

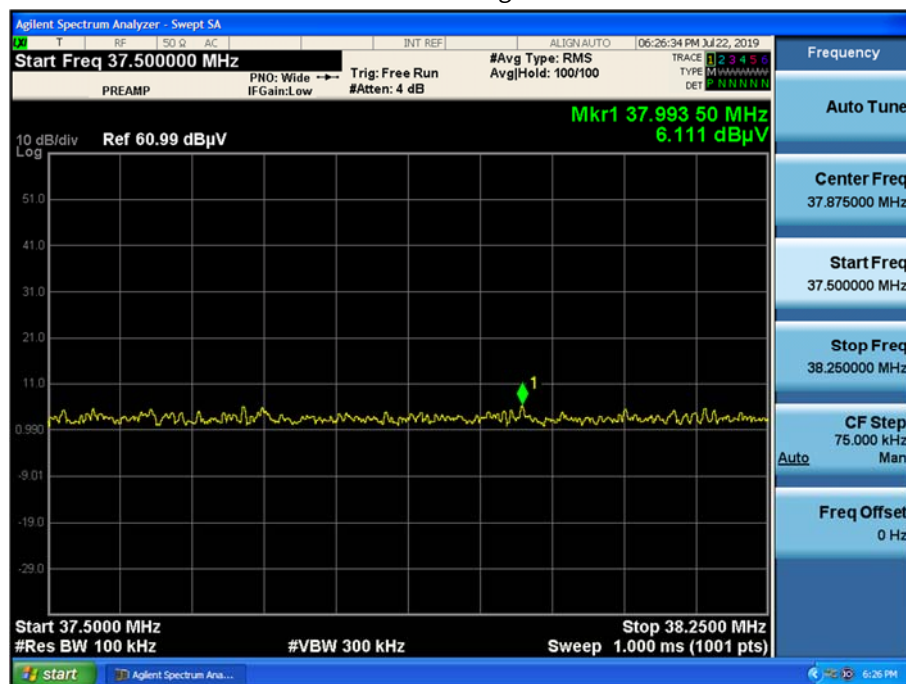
Measured Frequency Range : 30 MHz - 1000 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*37.9935	6.111	18.50	0.49	H	25.10	40.00	14.90
57.6080	5.859	17.30	0.61	H	23.77	40.00	16.23
101.0550	5.930	15.50	0.78	V	22.21	43.50	21.29
*115.9180	6.054	17.70	0.86	H	24.61	43.50	18.89
*128.5650	6.347	18.10	0.88	H	25.33	43.50	18.17
157.9600	6.249	18.80	0.98	V	26.03	43.50	17.47

Note:

1. '*' is the result for restricted band.
2. With Tag(worst case)
3. Data of worst case are only reported.

▣ Test Plot

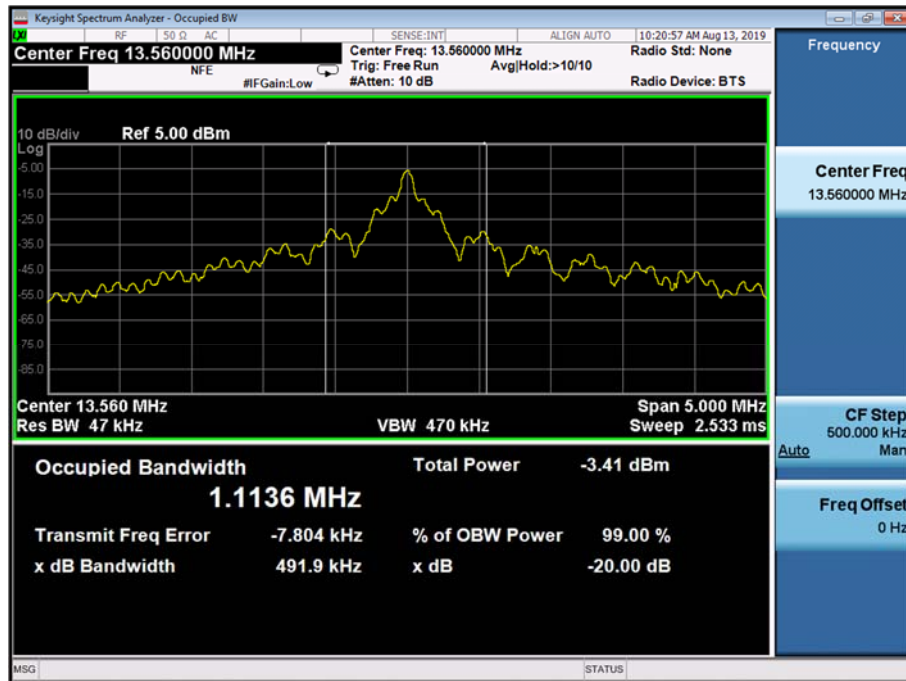
With Tag



Note:

Plot of worst case are only reported

9.4 20 dB Bandwidth



9.5 Frequency Stability

Startup

PERATING FREQUENCY	13.56 MHz
REFERENCE VOLTAGE	3.85 VDC
DEVIATION LIMIT	0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.85	-20	13.560096	96	0.0007080
100%		-10	13.560091	91	0.0006711
100%		0	13.560084	84	0.0006195
100%		+10	13.560077	77	0.0005678
100%		+20(Ref.)	13.560070	70	0.0005162
100%		+30	13.560065	65	0.0004794
100%		+40	13.560064	64	0.0004720
100%		+50	13.560059	59	0.0004351
High	4.35	+20	13.560068	68	0.0005015
End. Point	3.4	+20	13.560072	72	0.0005310

2 minutes

PERATING FREQUENCY	13.56 MHz
REFERENCE VOLTAGE	3.85 VDC
DEVIATION LIMIT	0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.85	-20	13.560094	94	0.0006932
100%		-10	13.560085	85	0.0006268
100%		0	13.560082	82	0.0006047
100%		+10	13.560076	76	0.0005605
100%		+20(Ref.)	13.560073	73	0.0005383
100%		+30	13.560069	69	0.0005088
100%		+40	13.560066	66	0.0004867
100%		+50	13.560062	62	0.0004572
High	4.35	+20	13.560071	71	0.0005236
End. Point	3.4	+20	13.560073	73	0.0005383

5 minutes

PERATING FREQUENCY	13.56 MHz
REFERENCE VOLTAGE	3.85 VDC
DEVIATION LIMIT	0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.85	-20	13.560088	88	0.0006490
100%		-10	13.560085	85	0.0006268
100%		0	13.560078	78	0.0005752
100%		+10	13.560075	75	0.0005531
100%		+20(Ref.)	13.560068	68	0.0005015
100%		+30	13.560065	65	0.0004794
100%		+40	13.560059	59	0.0004351
100%		+50	13.560056	56	0.0004130
High	4.35	+20	13.560072	72	0.0005310
End. Point	3.4	+20	13.560080	80	0.0005900

10 minutes

PERATING FREQUENCY	13.56 MHz
REFERENCE VOLTAGE	3.85 VDC
DEVIATION LIMIT	0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.85	-20	13.560082	82	0.0006047
100%		-10	13.560081	81	0.0005973
100%		0	13.560075	75	0.0005531
100%		+10	13.560074	74	0.0005457
100%		+20(Ref.)	13.560065	65	0.0004794
100%		+30	13.560062	62	0.0004572
100%		+40	13.560056	56	0.0004130
100%		+50	13.560052	52	0.0003835
High	4.35	+20	13.560069	69	0.0005088
End. Point	3.4	+20	13.560076	76	0.0005605

9.6 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

NFC MODE L1

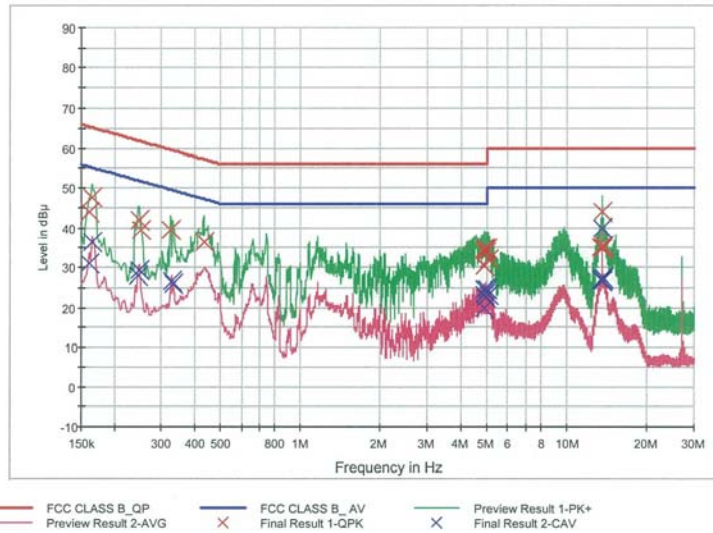
1 / 2

HCT TEST Report

Common Information

EUT: SM-A507FN/DS
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC MODE L1

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	44.1	9.000	Off	L1	9.7	21.4	65.5
0.164000	47.5	9.000	Off	L1	9.7	17.7	65.3
0.248000	42.0	9.000	Off	L1	9.7	19.8	61.8
0.252000	39.4	9.000	Off	L1	9.7	22.2	61.7
0.326000	39.5	9.000	Off	L1	9.7	20.0	59.6
0.434000	36.4	9.000	Off	L1	9.7	20.8	57.2
4.868000	30.3	9.000	Off	L1	10.0	25.7	56.0
4.894000	34.7	9.000	Off	L1	10.0	21.3	56.0
4.900000	34.5	9.000	Off	L1	10.0	21.5	56.0
4.974000	33.9	9.000	Off	L1	10.0	22.1	56.0
4.984000	34.6	9.000	Off	L1	10.0	21.4	56.0
5.054000	32.0	9.000	Off	L1	10.0	28.0	60.0
13.442000	35.2	9.000	Off	L1	10.4	24.8	60.0
13.470000	35.1	9.000	Off	L1	10.4	24.9	60.0
13.486000	35.1	9.000	Off	L1	10.4	24.9	60.0
13.558000	43.8	9.000	Off	L1	10.4	16.2	60.0
13.582000	34.7	9.000	Off	L1	10.4	25.3	60.0
13.654000	35.4	9.000	Off	L1	10.4	24.6	60.0

2019-07-24

오전 11:25:52

NFC MODE L1

2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	31.1	9.000	Off	L1	9.7	24.3	55.5
0.164000	36.5	9.000	Off	L1	9.7	18.7	55.3
0.244000	28.0	9.000	Off	L1	9.7	23.9	52.0
0.248000	29.4	9.000	Off	L1	9.7	22.4	51.8
0.328000	26.7	9.000	Off	L1	9.7	22.8	49.5
0.332000	26.0	9.000	Off	L1	9.7	23.4	49.4
4.868000	19.8	9.000	Off	L1	10.0	26.2	46.0
4.882000	23.1	9.000	Off	L1	10.0	22.9	46.0
4.900000	24.6	9.000	Off	L1	10.0	21.4	46.0
4.964000	22.5	9.000	Off	L1	10.0	23.5	46.0
4.984000	24.5	9.000	Off	L1	10.0	21.5	46.0
5.054000	23.2	9.000	Off	L1	10.0	26.8	50.0
13.442000	26.9	9.000	Off	L1	10.4	23.1	50.0
13.470000	27.0	9.000	Off	L1	10.4	23.0	50.0
13.486000	26.9	9.000	Off	L1	10.4	23.1	50.0
13.560000	39.9	9.000	Off	L1	10.4	10.1	50.0
13.582000	26.5	9.000	Off	L1	10.4	23.5	50.0
13.652000	27.2	9.000	Off	L1	10.4	22.8	50.0

2019-07-24

오전 11:25:52

Conducted Emissions (Line 2)

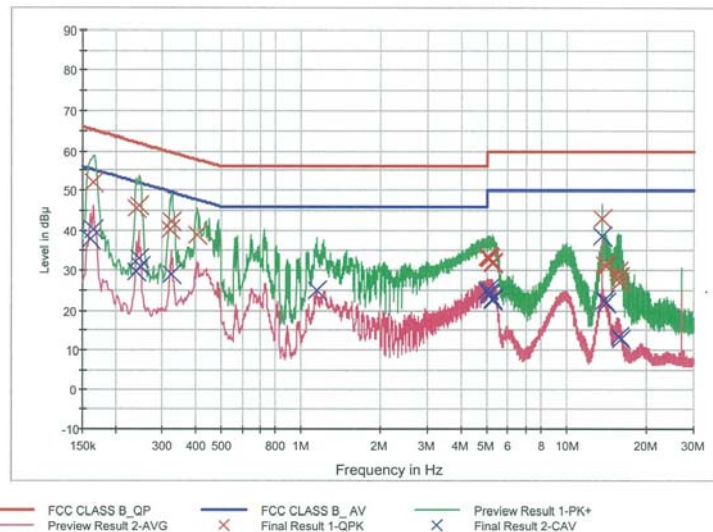
NFC MODE N

1 / 2

HCT TEST Report**Common Information**

EUT: SM-A507FN/DS
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: NFC MODE N

FCC CLASS B_Exten Cable

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.164000	51.9	9.000	Off	N	9.8	13.3	65.3
0.240000	45.5	9.000	Off	N	9.9	16.6	62.1
0.246000	46.3	9.000	Off	N	9.9	15.6	61.9
0.320000	40.3	9.000	Off	N	9.9	19.4	59.7
0.326000	42.2	9.000	Off	N	9.9	17.3	59.6
0.404000	38.9	9.000	Off	N	9.9	18.9	57.8
4.992000	33.5	9.000	Off	N	10.2	22.5	56.0
5.080000	33.2	9.000	Off	N	10.2	26.8	60.0
5.088000	33.4	9.000	Off	N	10.2	26.6	60.0
5.160000	33.1	9.000	Off	N	10.2	26.9	60.0
5.246000	31.6	9.000	Off	N	10.2	28.4	60.0
5.252000	32.2	9.000	Off	N	10.2	27.8	60.0
13.560000	43.0	9.000	Off	N	10.6	17.0	60.0
13.910000	31.3	9.000	Off	N	10.6	28.7	60.0
13.974000	31.0	9.000	Off	N	10.6	29.0	60.0
15.572000	29.8	9.000	Off	N	10.7	30.2	60.0
15.768000	28.4	9.000	Off	N	10.7	31.6	60.0
15.836000	26.9	9.000	Off	N	10.7	33.1	60.0

2019-07-24

오전 11:06:28

NFC MODE N

2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	37.7	9.000	Off	N	9.8	17.8	55.5
0.164000	40.0	9.000	Off	N	9.8	15.2	55.3
0.240000	29.7	9.000	Off	N	9.9	22.4	52.1
0.244000	33.2	9.000	Off	N	9.9	18.8	52.0
0.248000	31.1	9.000	Off	N	9.9	20.7	51.8
0.324000	29.1	9.000	Off	N	9.9	20.5	49.6
1.152000	25.0	9.000	Off	N	10.0	21.0	46.0
4.992000	24.9	9.000	Off	N	10.2	21.1	46.0
5.080000	24.3	9.000	Off	N	10.2	25.7	50.0
5.088000	25.2	9.000	Off	N	10.2	24.8	50.0
5.144000	23.8	9.000	Off	N	10.2	26.2	50.0
5.228000	22.6	9.000	Off	N	10.2	27.4	50.0
5.246000	22.9	9.000	Off	N	10.2	27.1	50.0
13.560000	38.4	9.000	Off	N	10.6	11.6	50.0
13.910000	22.5	9.000	Off	N	10.6	27.5	50.0
13.974000	21.9	9.000	Off	N	10.6	28.1	50.0
15.836000	13.3	9.000	Off	N	10.7	36.7	50.0
15.878000	12.6	9.000	Off	N	10.7	37.4	50.0

2019-07-24

오전 11:06:28

10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/12/2018	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/12/2019	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Agilent	N9020A / Signal Analyzer	05/24/2019	Annual	MY52090906
Agilent	N9030A / Signal Analyzer	01/10/2019	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/24/2019	Annual	101231
Agilent	N1911A / Power Meter	04/10/2019	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/10/2019	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/20/2018	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/24/2019	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/18/2019	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/02/2019	Annual	07560
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

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
Rohde & Schwarz	Loop Antenna	08/23/2018	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/03/2018	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/28/2018	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	05/23/2019	Annual	8
Wainwright Instruments	WHKX7.0/18G-8SS / High Pass Filter	05/03/2019	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/19/2019	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2019	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/04/2019	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/15/2019	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/01/2019	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/01/2019	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956

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.

11. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-1908-FC008-P