HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
**TEL: +82-31-645-6300** **FAX: +82-31-645-6401**

# 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:**
December 26, 2018
**Location:**
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
**Report No.:** HCT-RF-1812-FC028

| | |
|---|---|
| **FCC ID:** | **A3LSMG887N** |
| **APPLICANT:** | **SAMSUNG Electronics Co., Ltd.** |

| | |
|---|---|
| **Model:** | SM-G887N |
| **EUT Type:** | Mobile Phone |
| **RF Output Field Strength:** | 6.94 dBuV/m @30 m |
| **Frequency of Operation:** | 13.5595 MHz |
| **Modulation type:** | ASK |
| **FCC Classification:** | Low Power Communication Device – Transmitter |
| **FCC Rule Part(s):** | FCC Part 15.225 Subpart C |

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.

**HCT CO., LTD.** Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

**Report prepared by : Jung Ki Lim**
**Engineer of Telecommunication testing center**

**Approved by : Jong Seok Lee**
**Manager of Telecommunication testing center**

# Version

| TEST REPORT NO. | DATE | DESCRIPTION |
|---|---|---|
| HCT-RF-1812-FC028 | December 26, 2018 | - First Approval Report |
| | | |
| | | |
| | | |

# Table of Contents

# 1. EUT DESCRIPTION

| | |
|---|---|
| Model | SM-G887N |
| EUT Type | Mobile Phone |
| Power Supply | DC 3.85 V |
| Battery Information | Model: EB-BA750ABU<br>Type: Li-ion Battery |
| Travel Adapter Information | Model: EP-TA20KWK<br>Manufacture: DONGYANG E&P |
| Frequency of Operation | 13.5595 MHz |
| Transmit Power | 6.94 dBuV/m @30 m |
| Modulation Type | ASK |
| Antenna Type | FPCB |
| Date(s) of Tests | November 28, 2018 ~ December 19, 2018 |

# 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 6.3 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 (±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) | 5.71 |

# 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<br>13.567 ≤ f ≤ 13.710 | 334 | 30 |
| 13.110 ≤ f ≤ 13.410<br>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)**

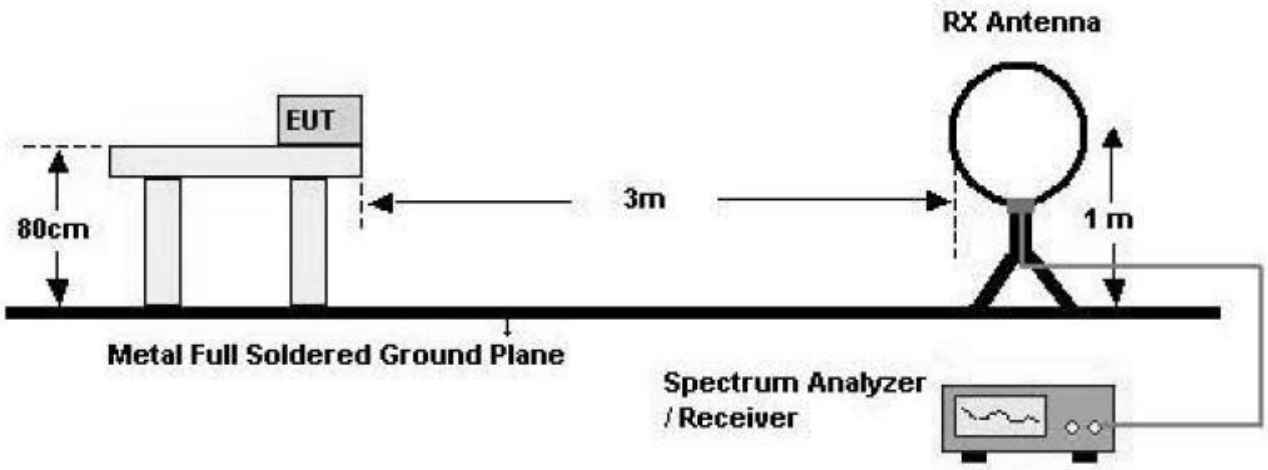
| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30-88 | **100 | 3 |
| 88-216 | **150 | 3 |
| 216-960 | **200 | 3 |
| Above 960 | 500 | 3 |

**:

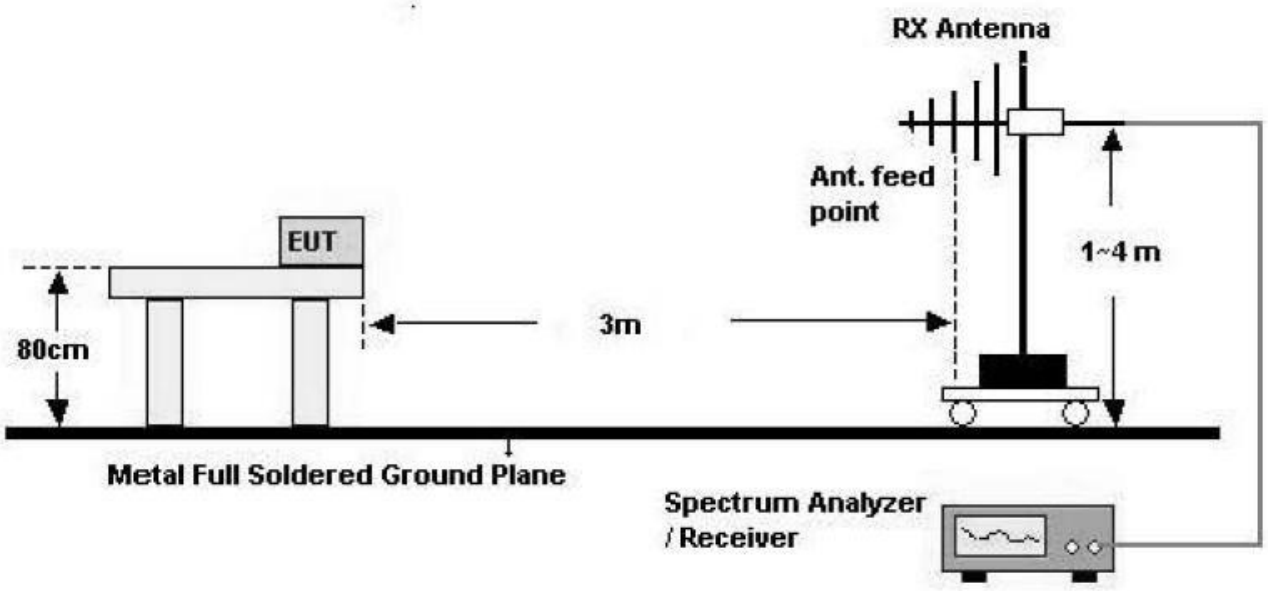
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, 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*log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m (Below 30 MHz)
7. Spectrum Setting
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3*RBW
8. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
9. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

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

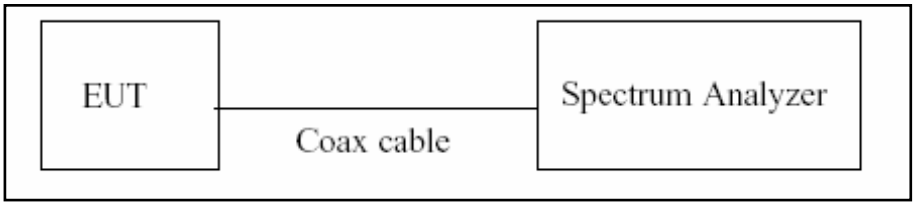
1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting 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 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40*log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3*RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. The test results for below 30 MHz is correlated to an open site.
    The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

**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 ≥ 3*RBW
6. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

### 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 :

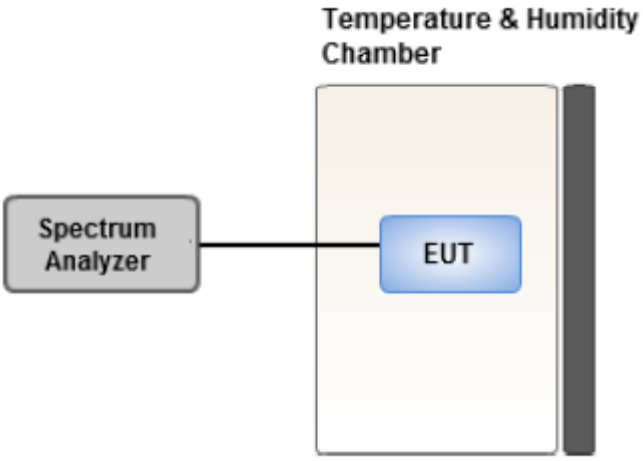
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Frequency Stability

**Limit**

The frequency tolerance of the carrier signal shall be maintained within ±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 freque
5) ncy tolerance of the carrier signal shall be maintained within +/- 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 battety 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* | 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 : Z-H
3. All type and bitrate were investigated and the worst case results are reported.
   (Worst case : Type A, 106 kbps)

**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 ≤ f ≤ 13.553, 13.567 ≤ f ≤ 13.710) | Pass |
| Part 15.225 (c) | Radiated Electric Field Emissions (13.110 ≤ f ≤ 13.410, 13.710 ≤ f ≤ 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

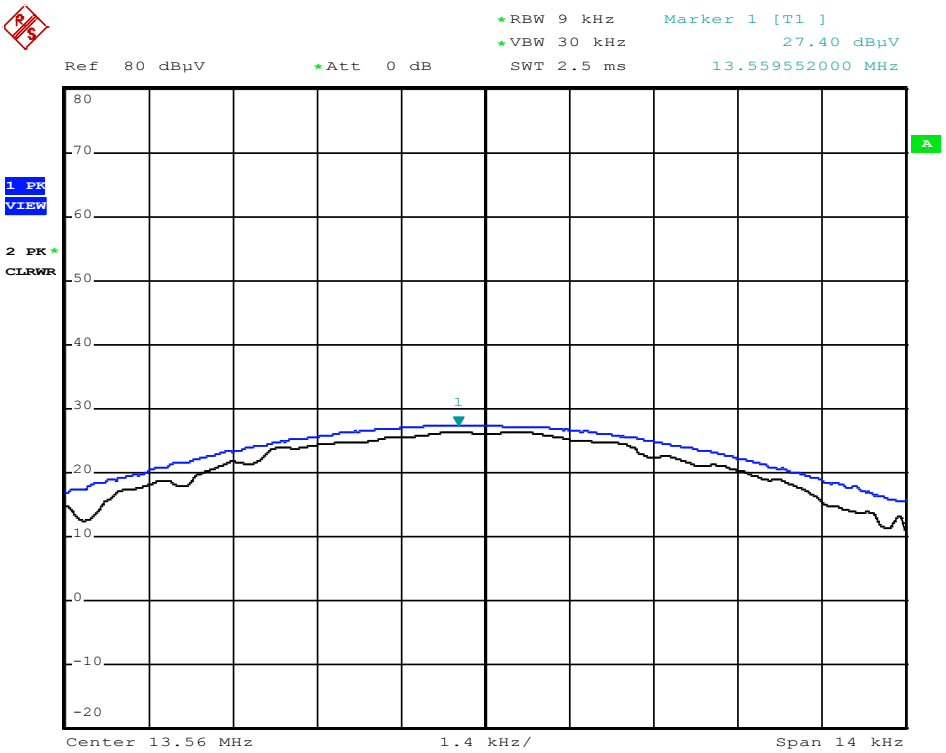
## 9.1. Operation within the band 13.110 MHz – 14.010 MHz

| 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) |
| 13.5595 | 27.40 | 19.54 | -40 | 6.94 | 84 | 77.06 |
| 13.5593 | 23.70 | 19.54 | -40 | 3.24 | 84 | 80.76 |

| 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) |
| 13.5530 | 17.33 | 19.54 | -40 | -3.13 | 50.47 | 53.60 |
| 13.6640 | 17.05 | 19.54 | -40 | -3.41 | 50.47 | 53.88 |

| 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) |
| 13.3488 | 14.40 | 19.54 | -40 | -6.06 | 40.51 | 46.57 |
| 13.7724 | 14.23 | 19.54 | -40 | -6.23 | 40.51 | 46.74 |

## ▣ Test Plot




Date: 17.DEC.2018 13:30:32

**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) |
| 9.4767 | 10.46 | 19.54 | -40 | -10.00 | 29.54 | 39.54 |
| 14.0740 | 11.04 | 19.54 | -40 | -9.42 | 29.54 | 38.96 |
| 26.8380 | 8.56 | 19.99 | -40 | -11.45 | 29.54 | 40.99 |
| 27.0040 | 8.52 | 19.99 | -40 | -11.49 | 29.54 | 41.03 |

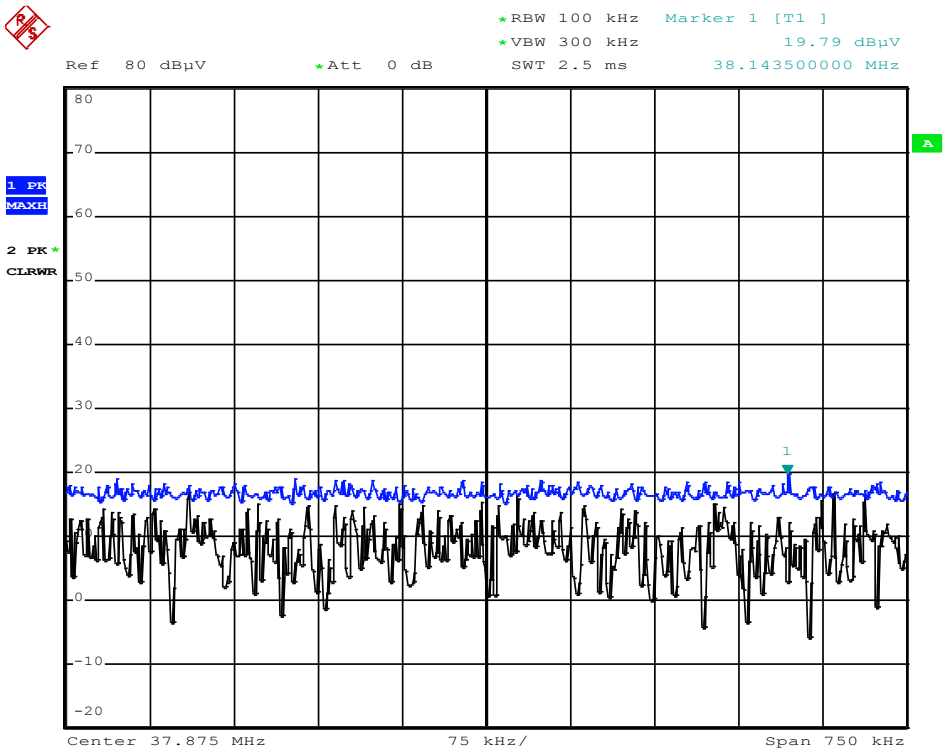
## 9.3. Radiated Emission 30 MHz – 1000 MHz

| 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) |
| * 38.1435 | 19.79 | 11.72 | 0.66 | H | 32.17 | 40 | 7.83 |
| 52.172 | 19.01 | 12.38 | 0.7 | H | 32.09 | 40 | 7.91 |
| 100.8523 | 18.44 | 9.27 | 0.78 | V | 28.49 | 43.5 | 15.01 |
| * 119.2914 | 17.43 | 11.64 | 0.81 | H | 29.88 | 43.5 | 13.62 |
| * 133.71 | 17.32 | 12.84 | 0.88 | H | 31.04 | 43.5 | 12.46 |
| 158.128 | 17.77 | 13.41 | 0.95 | V | 32.13 | 43.5 | 11.37 |

**Note:**

1. '*' is the result for restricted band.

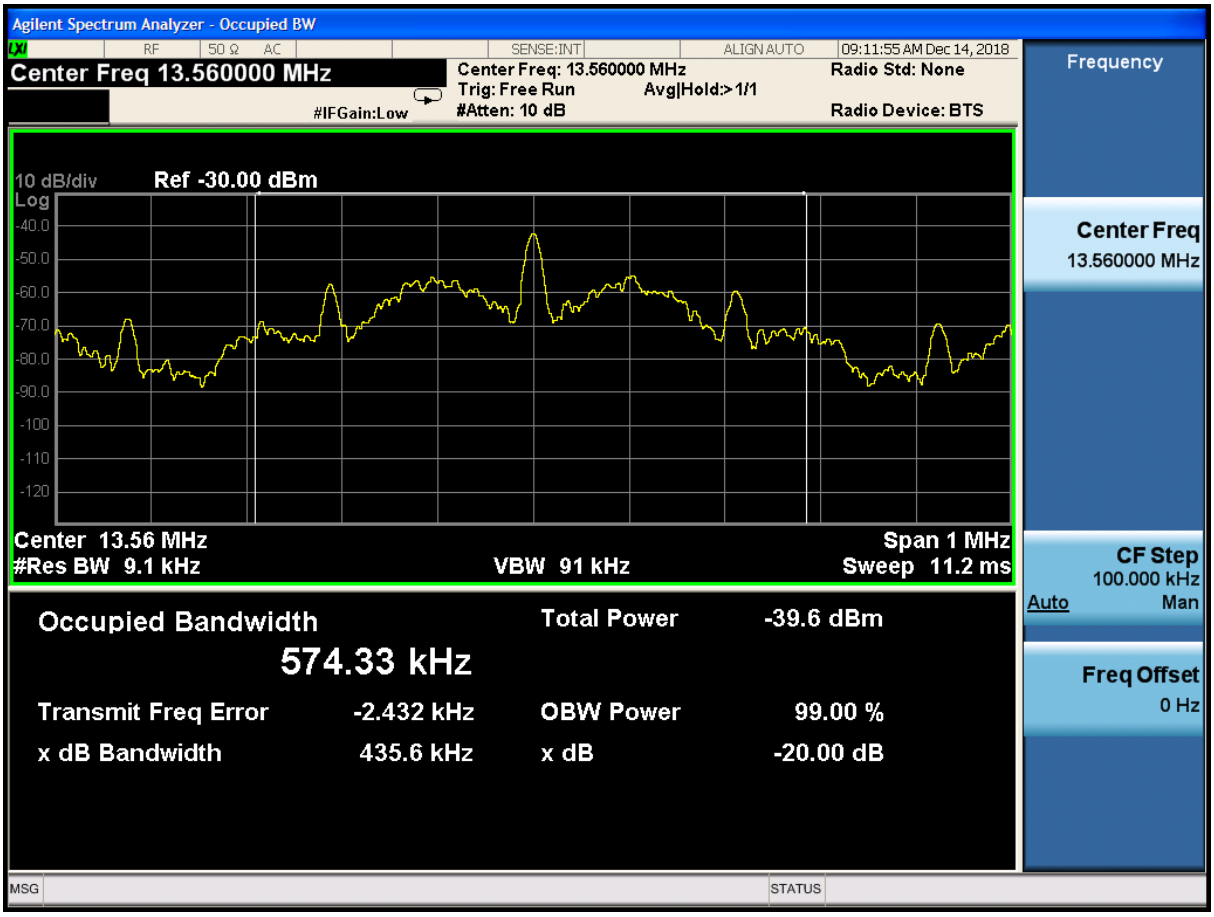
### ▣ Test Plot




**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. (℃) | Frequency (MHz) | Frequency Dev. (Hz) | Frequency Dev (%) |
|---|---|---|---|---|---|
| 100% | 3.85 | -20 | 13.560091 | 91 | 0.0006711 |
| 100% | | -10 | 13.560084 | 84 | 0.0006195 |
| 100% | | 0 | 13.560073 | 73 | 0.0005383 |
| 100% | | +10 | 13.560069 | 69 | 0.0005088 |
| 100% | | +20(Ref.) | 13.560065 | 65 | 0.0004794 |
| 100% | | +30 | 13.560055 | 55 | 0.0004056 |
| 100% | | +40 | 13.560052 | 52 | 0.0003835 |
| 100% | | +50 | 13.560049 | 49 | 0.0003614 |
| High | 4.40 | +20 | 13.560070 | 70 | 0.0005162 |
| End. Point | 3.60 | +20 | 13.560069 | 69 | 0.0005088 |

**2 minutes**

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

| Voltage (%) | Power (VDC) | Temp. (℃) | Frequency (MHz) | Frequency Dev. (Hz) | Frequency Dev (%) |
|---|---|---|---|---|---|
| 100% | 3.85 | -20 | 13.560088 | 88 | 0.0006490 |
| 100% | | -10 | 13.560084 | 84 | 0.0006195 |
| 100% | | 0 | 13.560073 | 73 | 0.0005383 |
| 100% | | +10 | 13.560069 | 69 | 0.0005088 |
| 100% | | +20(Ref.) | 13.560072 | 72 | 0.0005310 |
| 100% | | +30 | 13.560065 | 65 | 0.0004794 |
| 100% | | +40 | 13.560061 | 61 | 0.0004499 |
| 100% | | +50 | 13.560054 | 54 | 0.0003982 |
| High | 4.40 | +20 | 13.560068 | 68 | 0.0005015 |
| End. Point | 3.60 | +20 | 13.560075 | 75 | 0.0005531 |

.

**5 minutes**

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

| Voltage (%) | Power (VDC) | Temp. (℃) | Frequency (MHz) | Frequency Dev. (Hz) | Frequency Dev (%) |
|---|---|---|---|---|---|
| 100% | 3.85 | -20 | 13.560079 | 79 | 0.0005826 |
| 100% | | -10 | 13.560072 | 72 | 0.0005310 |
| 100% | | 0 | 13.560065 | 65 | 0.0004794 |
| 100% | | +10 | 13.560058 | 58 | 0.0004277 |
| 100% | | +20(Ref.) | 13.560060 | 60 | 0.0004425 |
| 100% | | +30 | 13.560061 | 61 | 0.0004499 |
| 100% | | +40 | 13.560053 | 53 | 0.0003909 |
| 100% | | +50 | 13.560049 | 49 | 0.0003614 |
| High | 4.40 | +20 | 13.560055 | 55 | 0.0004056 |
| End. Point | 3.60 | +20 | 13.560059 | 59 | 0.0004351 |

**10 minutes**

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: 0.01 % = 1356 Hz

| Voltage (%) | Power (VDC) | Temp. (℃) | Frequency (MHz) | Frequency Dev. (Hz) | Frequency Dev (%) |
|---|---|---|---|---|---|
| 100% | 3.85 | -20 | 13.560084 | 84 | 0.0006195 |
| 100% | | -10 | 13.560080 | 80 | 0.0005900 |
| 100% | | 0 | 13.560074 | 74 | 0.0005457 |
| 100% | | +10 | 13.560067 | 67 | 0.0004941 |
| 100% | | +20(Ref.) | 13.560066 | 66 | 0.0004867 |
| 100% | | +30 | 13.560061 | 61 | 0.0004499 |
| 100% | | +40 | 13.560057 | 57 | 0.0004204 |
| 100% | | +50 | 13.560055 | 55 | 0.0004056 |
| High | 4.40 | +20 | 13.560063 | 63 | 0.0004646 |
| End. Point | 3.60 | +20 | 13.560068 | 68 | 0.0005015 |

## 9.6. POWERLINE CONDUCTE EMISSIONS

### Conducted Emissions (Line 1)

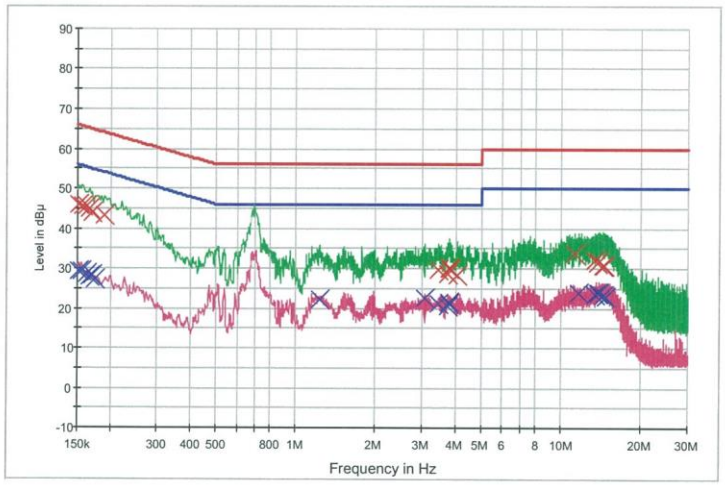
NFC MODE L1 1 / 2

# HCT TEST Report

## Common Information

| | |
|---|---|
| EUT: | SM-G887N |
| Manufacturer: | SAMSUNG |
| Test Site: | SHIELD ROOM |
| Operating Conditions: | NFC MODE L1 |

FCC CLASS B_Exten Cable




## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|
| 0.152000 | 45.8 | 9.000 | Off | L1 | 9.7 | 20.1 | 65.9 |
| 0.158000 | 45.5 | 9.000 | Off | L1 | 9.7 | 20.1 | 65.6 |
| 0.162000 | 45.4 | 9.000 | Off | L1 | 9.7 | 19.9 | 65.4 |
| 0.166000 | 45.1 | 9.000 | Off | L1 | 9.7 | 20.1 | 65.2 |
| 0.170000 | 44.0 | 9.000 | Off | L1 | 9.7 | 20.9 | 65.0 |
| 0.190000 | 43.1 | 9.000 | Off | L1 | 9.7 | 20.9 | 64.0 |
| 3.454000 | 29.6 | 9.000 | Off | L1 | 9.9 | 26.4 | 56.0 |
| 3.754000 | 28.8 | 9.000 | Off | L1 | 10.0 | 27.2 | 56.0 |
| 3.780000 | 30.0 | 9.000 | Off | L1 | 10.0 | 26.0 | 56.0 |
| 3.792000 | 29.9 | 9.000 | Off | L1 | 10.0 | 26.1 | 56.0 |
| 3.820000 | 29.9 | 9.000 | Off | L1 | 10.0 | 26.1 | 56.0 |
| 4.076000 | 28.4 | 9.000 | Off | L1 | 10.0 | 27.6 | 56.0 |
| 11.240000 | 33.8 | 9.000 | Off | L1 | 10.3 | 26.2 | 60.0 |
| 13.316000 | 32.2 | 9.000 | Off | L1 | 10.3 | 27.8 | 60.0 |
| 13.688000 | 31.4 | 9.000 | Off | L1 | 10.4 | 28.6 | 60.0 |
| 13.914000 | 31.6 | 9.000 | Off | L1 | 10.4 | 28.4 | 60.0 |
| 14.410000 | 30.8 | 9.000 | Off | L1 | 10.4 | 29.2 | 60.0 |
| 14.498000 | 30.6 | 9.000 | Off | L1 | 10.4 | 29.4 | 60.0 |

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NFC MODE L1 2 / 2

## Final Result 2

| Frequency (MHz) | CAverage (dBuV) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|---|
| 0.152000 | 29.4 | 9.000 | Off | L1 | 9.7 | 26.5 | 55.9 |
| 0.156000 | 29.2 | 9.000 | Off | L1 | 9.7 | 26.5 | 55.7 |
| 0.162000 | 28.5 | 9.000 | Off | L1 | 9.7 | 26.8 | 55.4 |
| 0.166000 | 27.9 | 9.000 | Off | L1 | 9.7 | 27.3 | 55.2 |
| 0.170000 | 28.2 | 9.000 | Off | L1 | 9.7 | 26.7 | 55.0 |
| 0.174000 | 27.3 | 9.000 | Off | L1 | 9.7 | 27.4 | 54.8 |
| 1.226000 | 22.3 | 9.000 | Off | L1 | 9.8 | 23.7 | 46.0 |
| 3.064000 | 22.4 | 9.000 | Off | L1 | 9.9 | 23.6 | 46.0 |
| 3.454000 | 21.1 | 9.000 | Off | L1 | 9.9 | 24.9 | 46.0 |
| 3.754000 | 20.6 | 9.000 | Off | L1 | 10.0 | 25.4 | 46.0 |
| 3.764000 | 21.4 | 9.000 | Off | L1 | 10.0 | 24.6 | 46.0 |
| 3.794000 | 21.1 | 9.000 | Off | L1 | 10.0 | 24.9 | 46.0 |
| 11.592000 | 23.8 | 9.000 | Off | L1 | 10.3 | 26.2 | 50.0 |
| 13.316000 | 23.7 | 9.000 | Off | L1 | 10.3 | 26.3 | 50.0 |
| 13.720000 | 23.9 | 9.000 | Off | L1 | 10.4 | 26.1 | 50.0 |
| 13.914000 | 23.9 | 9.000 | Off | L1 | 10.4 | 26.1 | 50.0 |
| 14.410000 | 23.1 | 9.000 | Off | L1 | 10.4 | 26.9 | 50.0 |
| 14.736000 | 22.8 | 9.000 | Off | L1 | 10.4 | 27.2 | 50.0 |

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**Conducted Emissions (Line 2)**

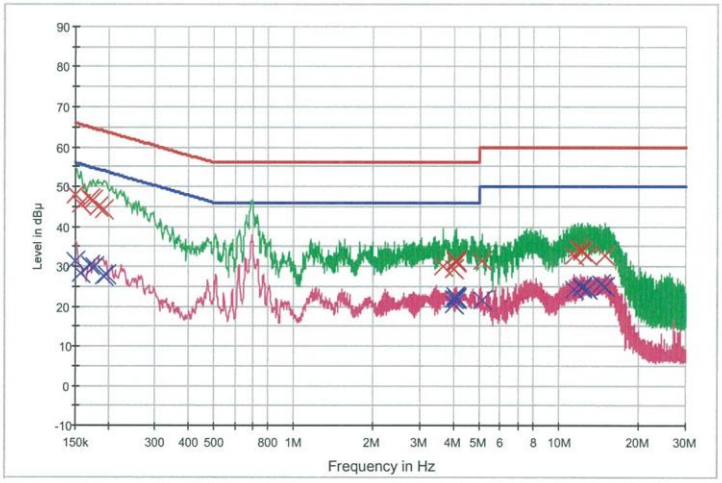
NFC MODE N 1 / 2

# HCT TEST Report

## Common Information

| | |
|---|---|
| EUT: | SM-G887N |
| 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) |
|---|---|---|---|---|---|---|---|
| 0.150000 | 47.9 | 9.000 | Off | N | 9.8 | 18.1 | 66.0 |
| 0.158000 | 45.6 | 9.000 | Off | N | 9.8 | 20.0 | 65.6 |
| 0.170000 | 46.8 | 9.000 | Off | N | 9.8 | 18.1 | 65.0 |
| 0.174000 | 46.5 | 9.000 | Off | N | 9.8 | 18.3 | 64.8 |
| 0.182000 | 44.9 | 9.000 | Off | N | 9.8 | 19.5 | 64.4 |
| 0.192000 | 44.2 | 9.000 | Off | N | 9.8 | 19.7 | 63.9 |
| 3.652000 | 30.0 | 9.000 | Off | N | 10.1 | 26.0 | 56.0 |
| 4.008000 | 29.2 | 9.000 | Off | N | 10.2 | 26.8 | 56.0 |
| 4.078000 | 31.4 | 9.000 | Off | N | 10.2 | 24.6 | 56.0 |
| 4.084000 | 30.9 | 9.000 | Off | N | 10.2 | 25.1 | 56.0 |
| 4.090000 | 31.2 | 9.000 | Off | N | 10.2 | 24.8 | 56.0 |
| 5.108000 | 31.3 | 9.000 | Off | N | 10.2 | 28.7 | 60.0 |
| 11.426000 | 32.9 | 9.000 | Off | N | 10.5 | 27.1 | 60.0 |
| 11.818000 | 34.8 | 9.000 | Off | N | 10.5 | 25.2 | 60.0 |
| 12.122000 | 34.0 | 9.000 | Off | N | 10.5 | 26.0 | 60.0 |
| 12.126000 | 33.9 | 9.000 | Off | N | 10.5 | 26.1 | 60.0 |
| 12.790000 | 32.8 | 9.000 | Off | N | 10.6 | 27.2 | 60.0 |
| 14.864000 | 32.6 | 9.000 | Off | N | 10.7 | 27.4 | 60.0 |

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NFC MODE N 2 / 2

## Final Result 2

| Frequency (MHz) | CAverage (dBuV) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|---|
| 0.150000 | 31.2 | 9.000 | Off | N | 9.8 | 24.8 | 56.0 |
| 0.158000 | 28.2 | 9.000 | Off | N | 9.8 | 27.4 | 55.6 |
| 0.170000 | 30.4 | 9.000 | Off | N | 9.8 | 24.6 | 55.0 |
| 0.176000 | 29.9 | 9.000 | Off | N | 9.8 | 24.8 | 54.7 |
| 0.192000 | 27.6 | 9.000 | Off | N | 9.8 | 26.4 | 53.9 |
| 0.196000 | 28.1 | 9.000 | Off | N | 9.8 | 25.7 | 53.8 |
| 4.008000 | 20.6 | 9.000 | Off | N | 10.2 | 25.4 | 46.0 |
| 4.018000 | 21.9 | 9.000 | Off | N | 10.2 | 24.1 | 46.0 |
| 4.078000 | 22.4 | 9.000 | Off | N | 10.2 | 23.6 | 46.0 |
| 4.084000 | 22.0 | 9.000 | Off | N | 10.2 | 24.0 | 46.0 |
| 4.094000 | 22.3 | 9.000 | Off | N | 10.2 | 23.7 | 46.0 |
| 5.108000 | 21.5 | 9.000 | Off | N | 10.2 | 28.5 | 50.0 |
| 11.426000 | 24.3 | 9.000 | Off | N | 10.5 | 25.7 | 50.0 |
| 12.122000 | 24.9 | 9.000 | Off | N | 10.5 | 25.1 | 50.0 |
| 12.126000 | 24.7 | 9.000 | Off | N | 10.5 | 25.3 | 50.0 |
| 12.790000 | 24.1 | 9.000 | Off | N | 10.6 | 25.9 | 50.0 |
| 14.324000 | 25.6 | 9.000 | Off | N | 10.6 | 24.4 | 50.0 |
| 14.864000 | 24.9 | 9.000 | Off | N | 10.7 | 25.1 | 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 | 12/12/2018 | Annual | 102245 |
| Rohde & Schwarz | ESCI / Test Receiver | 06/27/2018 | Annual | 100033 |
| ESPAC | SU-642 /Temperature Chamber | 03/30/2018 | Annual | 0093008124 |
| Agilent | N9020A / Signal Analyzer | 06/08/2018 | Annual | MY52090906 |
| Agilent | N1911A / Power Meter | 04/16/2018 | Annual | MY45100523 |
| Agilent | N1921A / Power Sensor | 04/16/2018 | Annual | MY52260025 |
| Hewlett Packard | 11667B / Power Splitter | 06/07/2018 | Annual | 05001 |
| Hewlett Packard | E3632A / DC Power Supply | 06/26/2018 | Annual | KR75303960 |
| Agilent | 8493C / Attenuator(10 dB) | 07/10/2018 | 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 | 04/19/2017 | Biennial | 1513-175 |
| Schwarzbeck | VULB 9168 / Hybrid Antenna | 04/06/2017 | Biennial | 760 |
| Schwarzbeck | VULB 9160 / TRILOG Antenna | 08/09/2018 | Biennial | 9160-3368 |
| Schwarzbeck | BBHA 9120D / Horn Antenna | 05/02/2017 | 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 | 06/08/2018 | Annual | MY51110085 |
| Wainwright Instruments | WHK3.0/18G-10EF / High Pass Filter | 06/07/2018 | Annual | 8 |
| Wainwright Instruments | WHKX7.0/18G-8SS / High Pass Filter | 05/09/2018 | Annual | 29 |
| Wainwright Instruments | WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter | 06/29/2018 | Annual | 2 |
| Wainwright Instruments | WRCJV5100/5850-40/50-8EEK / Band Reject Filter | 01/03/2018 | Annual | 2 |
| Api tech. | 18B-03 / Attenuator (3 dB) | 06/07/2018 | Annual | 1 |
| Agilent | 8493C-10 / Attenuator(10 dB) | 07/17/2018 | Annual | 08285 |
| CERNEX | CBLU1183540 / Power Amplifier | 07/10/2018 | Annual | 22964 |
| CERNEX | CBL06185030 / Power Amplifier | 07/10/2018 | Annual | 22965 |
| CERNEX | CBL18265035 / Power Amplifier | 01/10/2018 | Annual | 22966 |
| CERNEX | CBL26405040 / Power Amplifier | 06/29/2018 | Annual | 25956 |
| TESCOM | TC-3000C / Bluetooth Tester | 03/27/2018 | Annual | 3000C000276 |

**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-1812-FC028-P |
| 2 | HCT-RF-1812-FC029-P |
| 3 | HCT-RF-1812-FC030-P |
| 4 | HCT-RF-1812-FC031-P |
| 5 | HCT-RF-1812-FC032-P |
| 6 | HCT-RF-1812-FC033-P |
| 7 | HCT-RF-1812-FC034-P |