

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: May 24, 2023
Test Site/Location: 74, Seoicheon-ro 578 beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Report No.: HCT-RF-2305-FC058-R1

FCC ID:	A3LSMF946B
APPLICANT:	SAMSUNG Electronics Co., Ltd.

Model: SM-F946B/DS
Additional Model: SM-F946B
EUT Type: Mobile Phone
RF Output Field Strength: Half Open: 16.86 dB μ V/m @30 m
Closed: 16.86 dB μ V/m @30 m
Open Mode: 17.09 dB μ V/m @30 m
Frequency of Operation: 13.56 MHz
Modulation type: ASK
FCC Classification: Low Power Communication Device Transmitter (DXX)
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-2305-FC058-R1

REVIEWED BY



Report prepared by : Jin Gwan Lee
Engineer of Telecommunication Testing Center

Report approved by : Kwon Jeong
Manager of Telecommunication Testing Center

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 (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2305-FC058	May 19, 2023	- First Approval Report
HCT-RF-2305-FC058-R1	May 24, 2023	- Page 16, Revised The worst case configuration EUT Axis & Mode - Page 21, Revised Result table & Plot.

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1. EUT DESCRIPTION

Model	SM-F946B/DS
Additional Model	SM-F946B
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Frequency of Operation	13.56 MHz
Transmit Power	Half Open: 16.86 dB μ V/m @30 m Closed: 16.86 dB μ V/m @30 m Open Mode: 17.09 dB μ V/m @30 m
Modulation Type	ASK
Date(s) of Tests	March 24, 2023 ~ May 19, 2023
Serial number	Radiated: 723cc3597a4d7ece

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 equipment, 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_{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)	1.90 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, $k=2$)

7. DESCRIPTION OF TESTS

7.1. Radiated Test

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

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
13.553 – 13.567	15,848	30
$13.410 \leq f \leq 13.553$ $13.567 \leq f \leq 13.710$	334	30
$13.110 \leq f \leq 13.410$ $13.710 \leq f \leq 14.010$	106	30

Note:

1. $15,848 \mu\text{V/m} = 84.0\text{dB}\mu\text{V/m}$
2. $334 \mu\text{V/m} = 50.47 \text{dB}\mu\text{V/m}$
3. $106\mu\text{V/m} = 40.51\text{dB}\mu\text{V/m}$

Limit(Radiated Spurious Emissions)

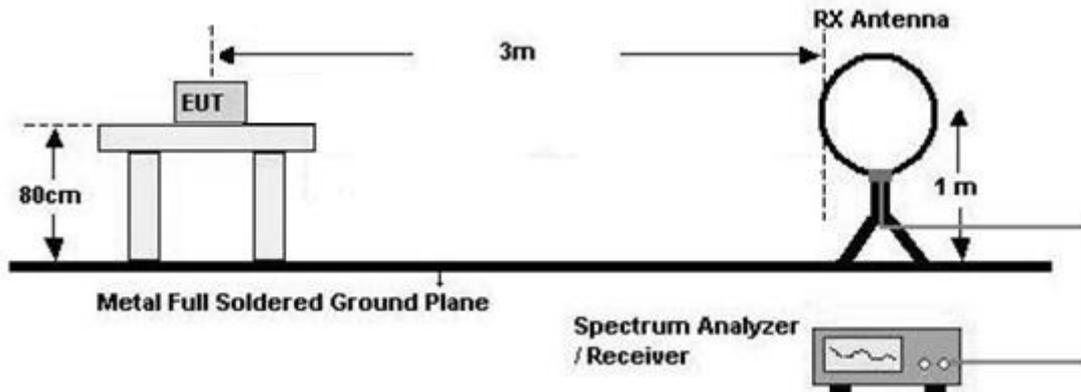
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	* 100	3
88-216	* 150	3
216-960	* 200	3
Above 960	500	3

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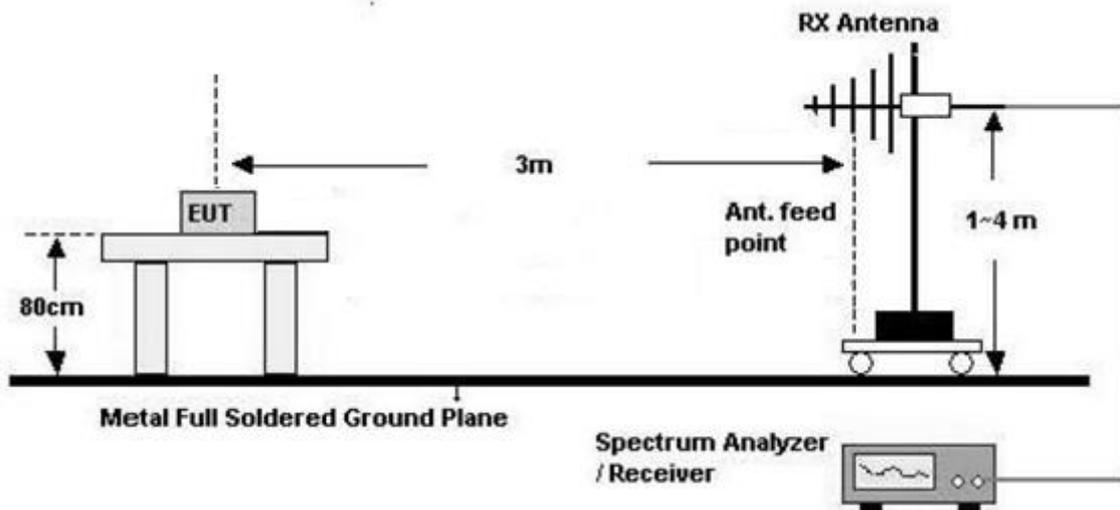
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.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

Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Test Procedure of in-band

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m 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(Below30 MHz)
7. Spectrum Setting

1) Frequency Range = 9 kHz ~ 150 kHz

- Detector = Peak
- Trace = Maxhold
- RBW = 300 Hz
- VBW $\geq 3 \times$ RBW

2) Frequency Range = 150 kHz ~ 30 MHz

- Detector = Peak
- Trace = Maxhold
- RBW = 10 kHz
- VBW $\geq 3 \times$ RBW

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

Test Procedure of Radiated spurious emissions(Below30 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 3 m 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

1) Frequency Range = 9 kHz ~ 150 kHz

- Detector = Peak
- Trace = Maxhold
- RBW = 300 Hz
- VBW $\geq 3 \times$ RBW

2) Frequency Range = 150 kHz ~ 30 MHz

- Detector = Peak
- Trace = Maxhold
- RBW = 10 kHz
- VBW $\geq 3 \times$ RBW

9.Total = Measured 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.

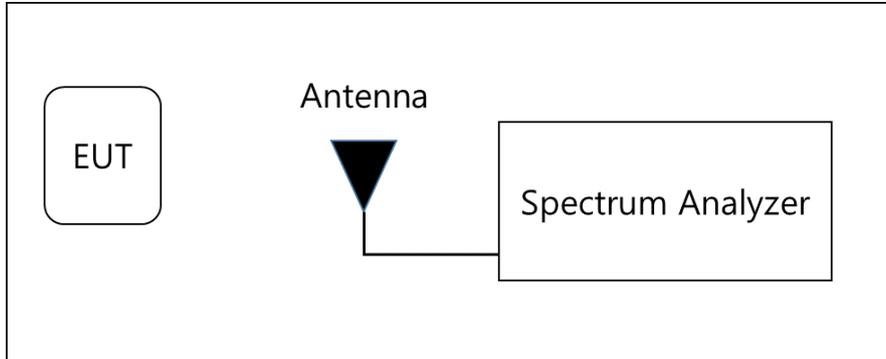
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Above30 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. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
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. Spectrum Setting
 - Frequency Range = 30 MHz ~ 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. 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. 20 dB 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 :

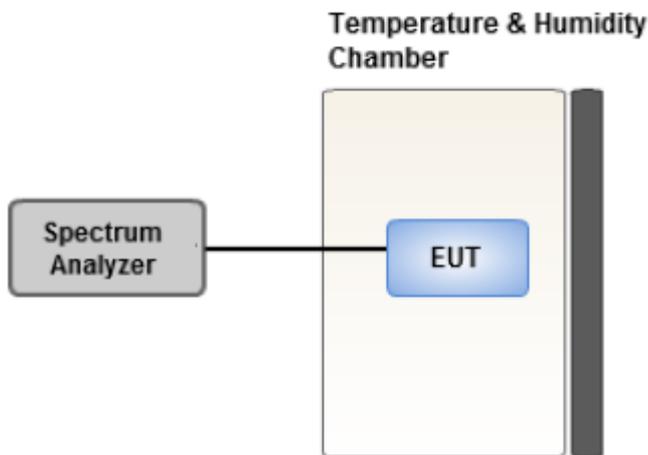
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

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 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 $+50^{\circ}\text{C}$ 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 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 ^(a)	56 to 46 ^(a)
0.50 to 5	56	46
5 to 30	60	50

^(a)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) = Measured 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)
 - Worst case : 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 mode of without tag and with tag were investigated and the worst case configuration results are reported.
 - Mode: Without Tag, With Tag
 - Worst case : Without Tag
5. The EUT was tested in three modes(Open, Half-open, Closed), the worst case configuration results are reported.
 - Mode: Open, Half-open, Closed
 - Worst case : Open Mode
6. All position of loop antenna were investigated and the worst case configuration results are reported.
 - Position : Horizontal, Vertical, Parallel to the ground plane
 - Worst case : Horizontal
7. SM-F946B/DS, SM-F946B were tested and the worst case results are reported.
(Worst case : SM-F946B/DS)

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
 - Worst case : Stand alone + Travel Adapter
2. All modes(For unterminated the Antenna, terminated the Antenna) of operation were investigated and the worst case configuration results are reported.
 - Worst case : Unterminated the Antenna
3. SM-F946B/DS, SM-F946B were tested and the worst case results are reported.
(Worst case : SM-F946B/DS)

20 dB Bandwidth & Frequency Stability

1. All type and bitrate were investigated and the worst case results are reported.
 - Worst case : Type A, 106 kbps
2. SM-F946B/DS, SM-F946B were tested and the worst case results are reported.
(Worst case : SM-F946B/DS)

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

Half Open

Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.5596	36.27	20.59	-40.00	X-H	16.86	84.00	67.14
13.5597	36.25	20.59	-40.00	X-H	16.84	84.00	67.16

Closed

Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.5593	36.27	20.59	-40.00	X-H	16.86	84.00	67.14
13.5592	36.24	20.59	-40.00	Z-H	16.83	84.00	67.17

Open Mode

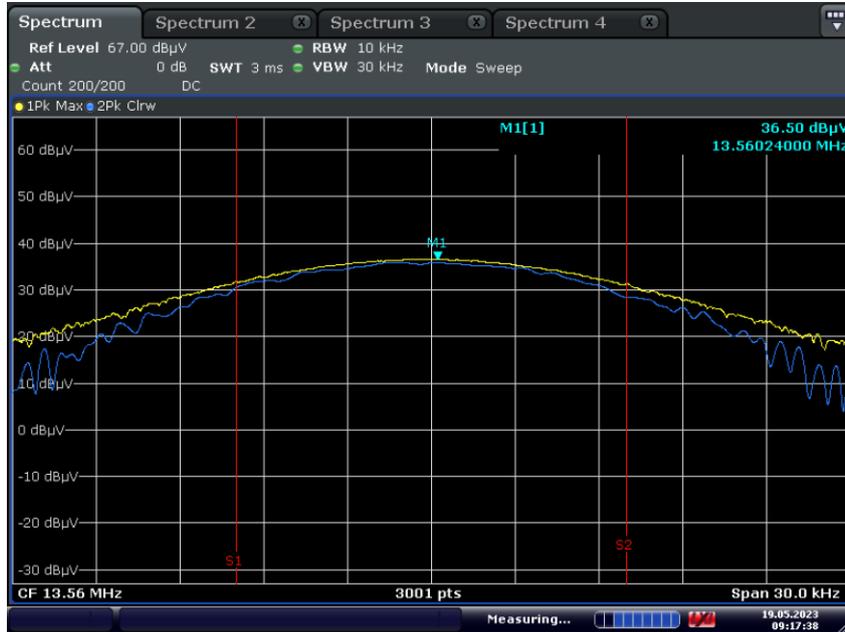
Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.5602	36.50	20.59	-40.00	Z-H	17.09	84.00	66.91
13.5558	36.45	20.59	-40.00	X-H	17.04	84.00	66.96

Measured Frequency Range :							
13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.5531	31.54	20.59	-40.00	Z-H	12.13	50.47	38.34
13.5669	30.34	20.59	-40.00	Z-H	10.93	50.47	39.54

Measured Frequency Range :							
13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.3481	22.27	20.59	-40.00	Z-H	2.86	40.51	37.65
13.7719	22.04	20.59	-40.00	Z-H	2.63	40.51	37.88

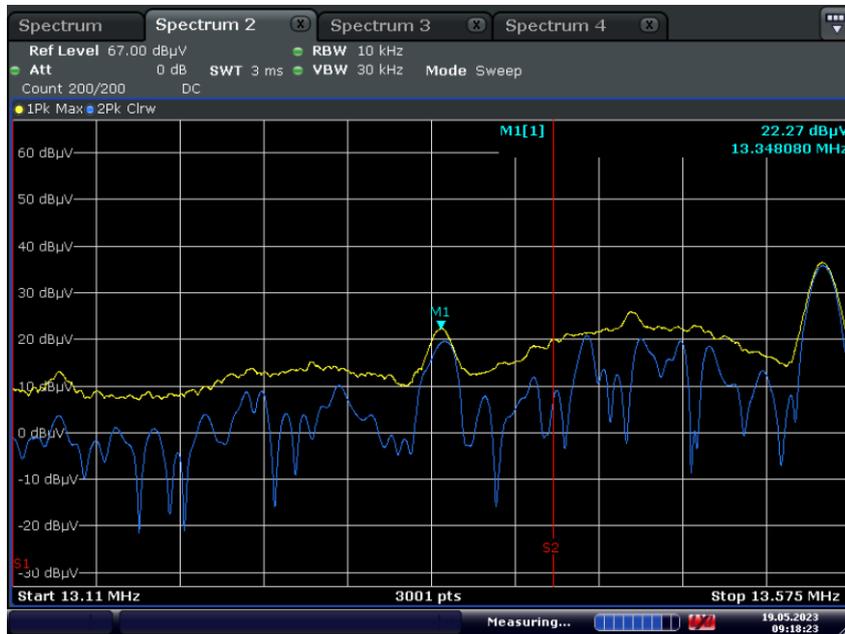
Test Plot(Open Mode)

13.553 MHz ~ 13.567 MHz



Date: 19.MAY.2023 09:17:39

Worst Case (13.110 MHz – 13.410 MHz)



Date: 19.MAY.2023 09:18:23

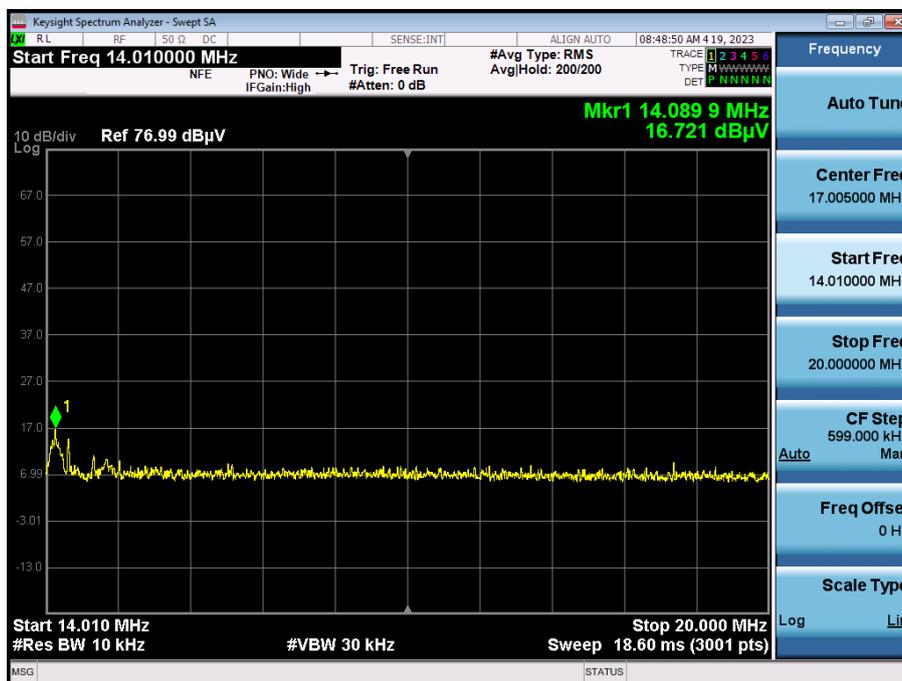
Note:

Plot of worst case are only reported.

9.2. Radiated Emission 9kHz – 30 MHz

Measured Frequency Range :							
9 kHz - 30 MHz							
Frequency (kHz)	Measured Value (dBμV/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dBμV/m) @300 m	Limit (dBμV/m) @300 m	Margin (dB)
18.5410	33.880	19.99	-80.00	Z-H	-26.13	42.24	68.37
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dBμV/m) @30 m	Limit (dBμV/m) @30 m	Margin (dB)
14.0899	16.721	20.59	-40.00	Z-H	-2.69	29.54	32.23
22.5600	8.919	20.79	-40.00	Z-H	-10.30	29.54	39.84
22.7500	8.824	20.79	-40.00	X-H	-10.39	29.54	39.93

Test Plot



Note:

Plot of worst case was only reported

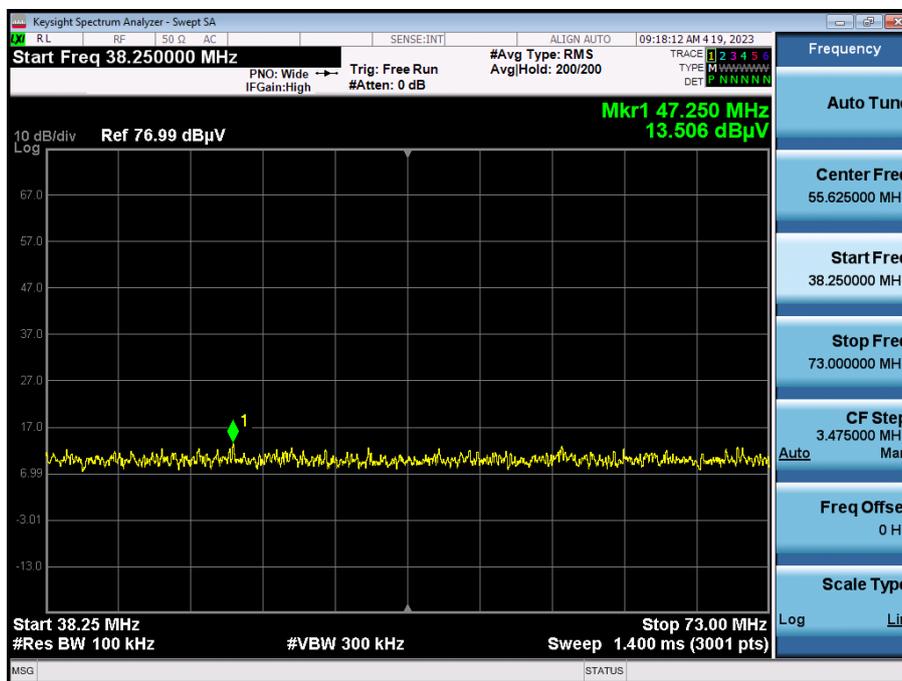
9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range :							
30 MHz - 1000 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant. Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBμV/m)	Limit (dBμV/m)	Margin (dB)
36.8300	13.155	13.10	0.51	H	26.77	40.00	13.24
#38.0475	13.296	13.10	0.51	H	26.91	40.00	13.09
47.2500	13.506	13.70	0.81	H	28.02	40.00	11.98
72.5130	14.785	11.50	0.96	H	27.25	43.50	16.26
#116.485	13.895	10.10	1.32	H	25.32	43.50	18.19
#171.1	13.457	12.60	1.60	H	27.66	43.50	15.84

Note:

1. # is the result for restricted band.

Test Plot



Note:

Plot of worst case was only reported

9.4. 20 dB Bandwidth



9.5. Frequency Stability

Startup

PERATING FREQUENCY: 13.56 MHz
REFERENCE VOLTAGE: 3.88 VDC
DEVIATION LIMIT: ± 0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560033	33	0.0002400
100%		-10	13.560057	57	0.0004224
100%		0	13.560098	98	0.0007232
100%		+10	13.560098	98	0.0007236
100%		+20(Ref.)	13.560011	11	0.0000842
100%		+30	13.560019	19	0.0001425
100%		+40	13.560036	36	0.0002682
100%		+50	13.560013	13	0.0000965
LOW	3.70	+20	13.560099	99	0.0007327
HIGH	4.45	+20	13.560094	94	0.0006940

2 minutes

PERATING FREQUENCY: 13.56 MHz
REFERENCE VOLTAGE: 3.88 VDC
DEVIATION LIMIT: ± 0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560050	50	0.0003722
100%		-10	13.560094	94	0.0006938
100%		0	13.560074	74	0.0005464
100%		+10	13.560010	10	0.0000722
100%		+20(Ref.)	13.560085	85	0.0006255
100%		+30	13.560089	89	0.0006592
100%		+40	13.560024	24	0.0001791
100%		+50	13.560051	51	0.0003756
LOW		3.70	+20	13.560002	2
HIGH	4.45	+20	13.560089	89	0.0006592

5 minutes

PERATING FREQUENCY: 13.56 MHz
REFERENCE VOLTAGE: 3.88 VDC
DEVIATION LIMIT: ± 0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560073	73	0.0005398
100%		-10	13.560014	14	0.0001032
100%		0	13.560052	52	0.0003811
100%		+10	13.560029	29	0.0002112
100%		+20(Ref.)	13.560095	95	0.0007024
100%		+30	13.560069	69	0.0005076
100%		+40	13.560048	48	0.0003546
100%		+50	13.560023	23	0.0001710
LOW	3.70	+20	13.560099	99	0.0007295
HIGH	4.45	+20	13.560050	50	0.0003678

10 minutes

PERATING FREQUENCY: 13.56 MHz
REFERENCE VOLTAGE: 3.88 VDC
DEVIATION LIMIT: ± 0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560013	13	0.0000923
100%		-10	13.560003	3	0.0000195
100%		0	13.560081	81	0.0005955
100%		+10	13.560010	10	0.0000719
100%		+20(Ref.)	13.560017	17	0.0001260
100%		+30	13.560042	42	0.0003104
100%		+40	13.560026	26	0.0001881
100%		+50	13.560064	64	0.0004716
LOW		3.70	+20	13.560034	34
HIGH	4.45	+20	13.560056	56	0.0004106

9.6. POWERLINE CONDUCTED EMISSIONS

Conducted Emissions

Test

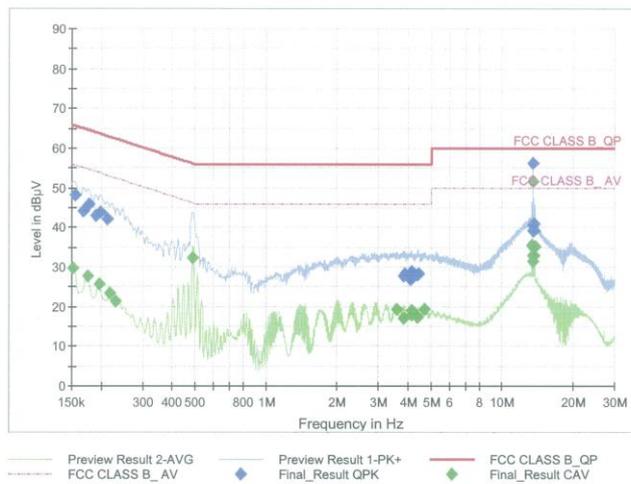
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Test Report

Common Information

EUT : SM-F946B/DS
 Operating Conditions : NFC Interm Mode
 Comment :

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	48.23	65.75	17.53	1000.0	9.000	N	OFF	9.6
0.1680	44.17	65.06	20.89	1000.0	9.000	L1	OFF	9.7
0.1770	45.87	64.63	18.75	1000.0	9.000	L1	OFF	9.7
0.1905	42.99	64.02	21.02	1000.0	9.000	L1	OFF	9.7
0.1995	43.93	63.63	19.71	1000.0	9.000	L1	OFF	9.7
0.2130	42.20	63.09	20.88	1000.0	9.000	L1	OFF	9.7
3.8368	27.61	56.00	28.39	1000.0	9.000	L1	OFF	9.8
3.8773	28.14	56.00	27.86	1000.0	9.000	L1	OFF	9.8
4.0910	26.80	56.00	29.20	1000.0	9.000	L1	OFF	9.8
4.1630	28.82	56.00	27.18	1000.0	9.000	L1	OFF	9.8
4.3993	28.07	56.00	27.93	1000.0	9.000	L1	OFF	9.8
4.4240	28.41	56.00	27.59	1000.0	9.000	L1	OFF	9.8
13.4420	39.10	60.00	20.90	1000.0	9.000	L1	OFF	10.1
13.4555	40.78	60.00	19.22	1000.0	9.000	L1	OFF	10.1
13.4623	39.35	60.00	20.65	1000.0	9.000	L1	OFF	10.1
13.5590	56.26	60.00	3.74	1000.0	9.000	L1	OFF	10.1
13.6648	41.08	60.00	18.92	1000.0	9.000	L1	OFF	10.2
13.6715	39.13	60.00	20.87	1000.0	9.000	L1	OFF	10.2

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	29.66	55.88	26.22	1000.0	9.000	N	OFF	9.6
0.1748	27.62	54.73	27.11	1000.0	9.000	L1	OFF	9.7
0.1973	25.59	53.73	28.14	1000.0	9.000	L1	OFF	9.7
0.2175	23.35	52.91	29.56	1000.0	9.000	L1	OFF	9.7
0.2288	21.41	52.50	31.09	1000.0	9.000	L1	OFF	9.7
0.4898	32.38	46.17	13.80	1000.0	9.000	L1	OFF	9.7
3.5915	19.24	46.00	26.76	1000.0	9.000	L1	OFF	9.8
3.8188	17.07	46.00	28.93	1000.0	9.000	L1	OFF	9.8
4.1473	17.98	46.00	28.02	1000.0	9.000	L1	OFF	9.8
4.1608	19.11	46.00	26.89	1000.0	9.000	L1	OFF	9.8
4.3745	17.28	46.00	28.72	1000.0	9.000	L1	OFF	9.8
4.6625	19.30	46.00	26.70	1000.0	9.000	L1	OFF	9.8
13.3475	35.53	50.00	14.47	1000.0	9.000	L1	OFF	10.1
13.4533	32.93	50.00	17.07	1000.0	9.000	L1	OFF	10.1
13.4668	31.39	50.00	18.61	1000.0	9.000	L1	OFF	10.1
13.5590	51.76	50.00	-1.76	1000.0	9.000	L1	OFF	10.1
13.6648	32.92	50.00	17.08	1000.0	9.000	L1	OFF	10.2
13.7728	35.27	50.00	14.73	1000.0	9.000	L1	OFF	10.2

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Test

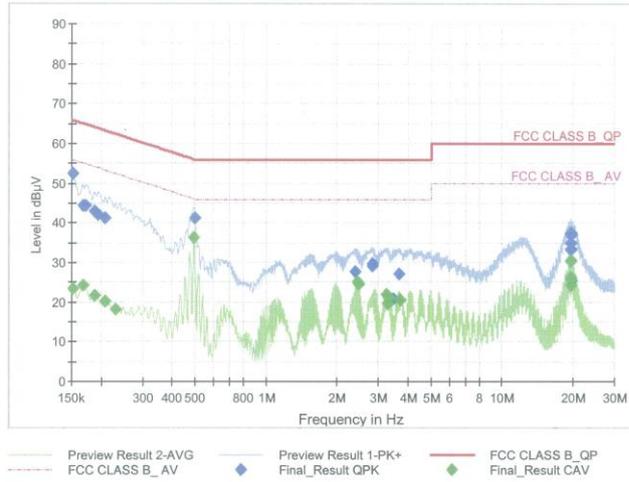
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Test Report

Common Information

EUT : SM-F946B/DS
Operating Conditions : NFC Term Mode
Comment :

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	52.44	65.88	13.44	1000.0	9.000	L1	OFF	9.7
0.1680	44.34	65.06	20.72	1000.0	9.000	L1	OFF	9.7
0.1725	44.41	64.84	20.42	1000.0	9.000	L1	OFF	9.7
0.1883	42.86	64.11	21.25	1000.0	9.000	L1	OFF	9.7
0.1950	42.05	63.82	21.77	1000.0	9.000	L1	OFF	9.7
0.2085	41.28	63.27	21.99	1000.0	9.000	L1	OFF	9.7
0.4988	41.35	56.02	14.67	1000.0	9.000	L1	OFF	9.7
2.3968	27.62	56.00	28.38	1000.0	9.000	L1	OFF	9.7
2.8288	29.62	56.00	26.38	1000.0	9.000	L1	OFF	9.8
2.8333	29.09	56.00	26.91	1000.0	9.000	L1	OFF	9.8
3.4588	20.87	56.00	35.13	1000.0	9.000	L1	OFF	9.8
3.6770	27.12	56.00	28.88	1000.0	9.000	L1	OFF	9.8
19.4855	36.84	60.00	23.16	1000.0	9.000	L1	OFF	10.3
19.5305	33.47	60.00	26.53	1000.0	9.000	L1	OFF	10.3
19.5530	34.89	60.00	25.11	1000.0	9.000	L1	OFF	10.3
19.5755	37.52	60.00	22.48	1000.0	9.000	L1	OFF	10.3
19.6003	37.07	60.00	22.93	1000.0	9.000	L1	OFF	10.3
19.6430	33.26	60.00	26.74	1000.0	9.000	L1	OFF	10.3

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	23.40	55.88	32.47	1000.0	9.000	N	OFF	9.6
0.1680	24.32	55.06	30.74	1000.0	9.000	L1	OFF	9.7
0.1883	21.75	54.11	32.36	1000.0	9.000	L1	OFF	9.7
0.2085	20.19	53.27	33.08	1000.0	9.000	L1	OFF	9.7
0.2288	18.22	52.50	34.28	1000.0	9.000	L1	OFF	9.7
0.4965	36.27	46.06	9.79	1000.0	9.000	L1	OFF	9.7
2.4463	25.03	46.00	20.97	1000.0	9.000	L1	OFF	9.7
2.4665	24.63	46.00	21.37	1000.0	9.000	L1	OFF	9.7
3.2360	21.81	46.00	24.19	1000.0	9.000	L1	OFF	9.8
3.2675	19.67	46.00	26.33	1000.0	9.000	L1	OFF	9.8
3.2968	21.00	46.00	25.00	1000.0	9.000	L1	OFF	9.8
3.6928	20.50	46.00	25.50	1000.0	9.000	L1	OFF	9.8
19.5350	24.29	50.00	25.71	1000.0	9.000	L1	OFF	10.3
19.5553	26.30	50.00	23.70	1000.0	9.000	L1	OFF	10.3
19.5778	30.31	50.00	19.69	1000.0	9.000	L1	OFF	10.3
19.5980	30.59	50.00	19.41	1000.0	9.000	L1	OFF	10.3
19.6610	25.80	50.00	24.20	1000.0	9.000	L1	OFF	10.3
19.6835	25.32	50.00	24.68	1000.0	9.000	L1	OFF	10.3

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10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/22/2023	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	02/22/2024	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	09/06/2023	Annual
DC Power Supply	E3632A	Agilent	KR75305528	01/03/2024	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	06/21/2023	Annual
Software	EMC32	Rohde & Schwarz	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

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM2090	Emco	060520	N/A	N/A
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1191	11/18/2023	Biennial
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/06/2023	Annual
Spectrum Analyzer	FSVA40(10 Hz ~ 40 GHz)	Rohde & Schwarz	101502	03/17/2024	Annual
Signal Analyzer	N9030A	Keysight	MY52350879	01/02/2024	Annual
ATT(3 dB) + LNA2(6~18 GHz)	18B-03, CBL06185030	WEINSCHEL CERNEX	N/A	12/05/2023	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEX	N/A	12/05/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/02/2024	Annual

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-2305-FC058-P