

FCC NFC REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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16677, Rep. of Korea

Date of Issue:
November 07, 2023

Test Site/Location:
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si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2311-FC017

FCC ID: A3LSMA155M

APPLICANT: SAMSUNG Electronics Co., Ltd.

Model: SM-A155M/DSN

Additional Model: SM-A155M/N

EUT Type: Mobile Phone

RF Output Field Strength: 14.32 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-2311-FC017

REVIEWED BY



Report prepared by : Kyung Jun Woo
Engineer of Telecommunication Testing Center

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

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.

Test Report Statement:

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2311-FC017	November 07, 2023	- First Approval Report

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1. EUT DESCRIPTION

Model	SM-A155M/DSN
Additional Model	SM-A155M/N
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Frequency of Operation	13.56 MHz
Transmit Power	14.32 dB μ V/m @30 m
Modulation Type	ASK
Date(s) of Tests	October 06, 2023 ~ November 07, 2023
Serial number	Radiated : R38W900BYPX

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 March 31, 2022 (CAB identifier: 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 $\mu\text{V/m}$ = 84.0dB $\mu\text{V/m}$
2. 334 $\mu\text{V/m}$ = 50.47 dB $\mu\text{V/m}$
3. 106 $\mu\text{V/m}$ = 40.51dB $\mu\text{V/m}$

Limit(Radiated Spurious Emissions)

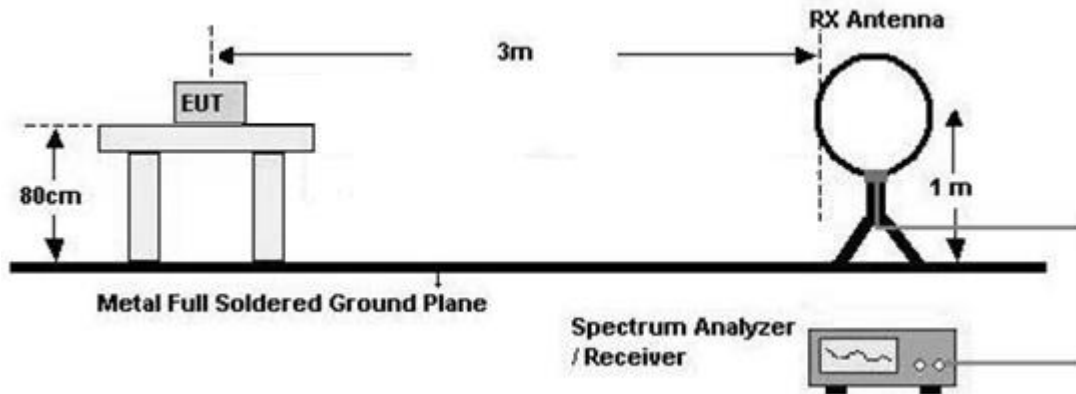
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	* 100	3
88-216	* 150	3
216-960	* 200	3
Above 960	500	3

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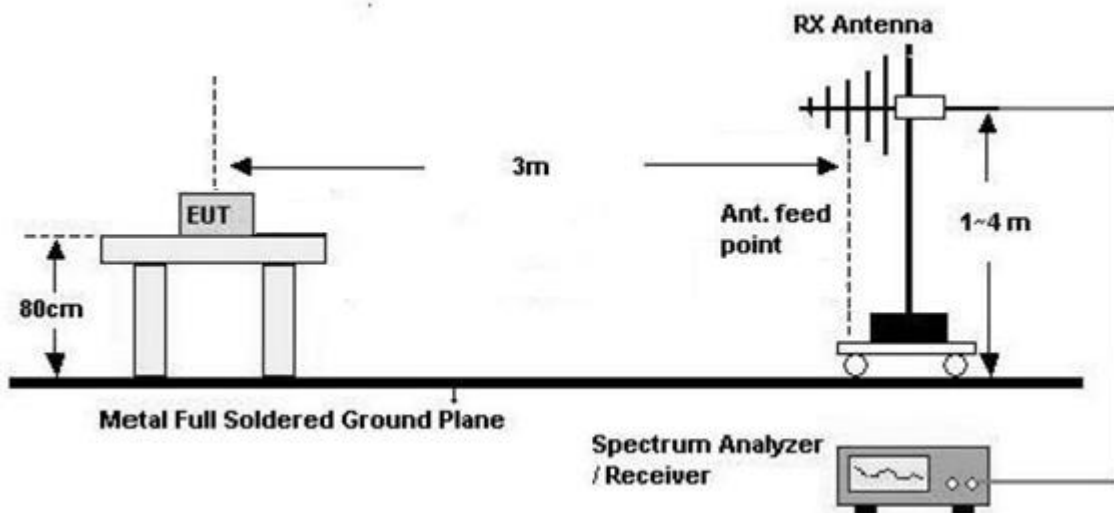
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.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

2) Frequency Range = 150 kHz ~ 30 MHz

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

2) Frequency Range = 150 kHz ~ 30 MHz

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

9. Total(Measurement Type : Peak)

= Peak 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.

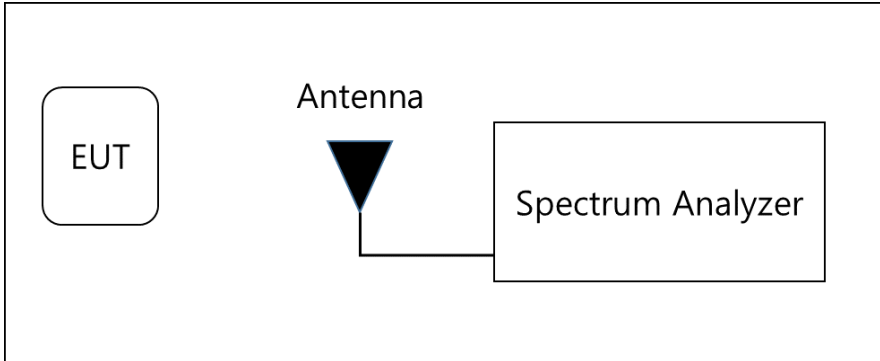
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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 :

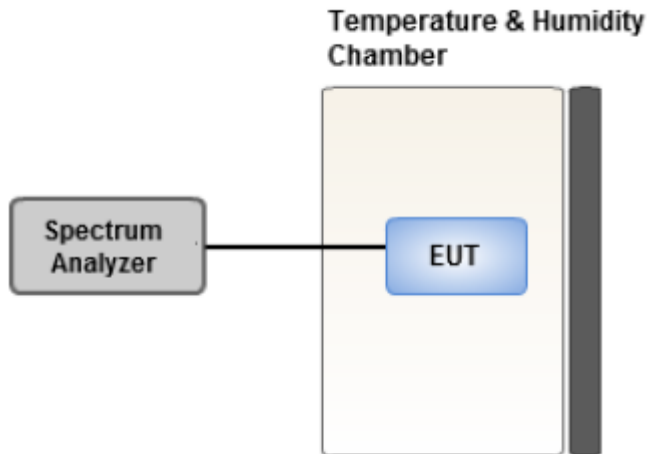
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

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 $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ 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 : X
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.
 - Worst case : Without Tag
5. 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
6. SM-A155M/DSN, SM-A155M/N were tested and the worst case results are reported.
(Worst case : SM-A155M/DSN)

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. SM-A155M/DSN, SM-A155M/N were tested and the worst case results are reported.
(Worst case : SM-A155M/DSN)

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-A155M/DSN, SM-A155M/N were tested and the worst case results are reported.
(Worst case : SM-A155M/DSN)

8. TEST SUMMARY

Regulation	Requirement	Result
Part 15.225 (a)	Radiated Electric Field Emissions (13.553 MHz to 13.567 MHz)	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 (9 kHz to 30 MHz)	Pass
Part 15.209	Radiated Electric Field Emissions (30 MHz to 1 GHz)	Pass
Part 15.225 (e)	Frequency Stability	Pass
Part 15.207	AC power conducted emissions (150 kHz to 30 MHz)	Pass
Part 15.215 (c)	20 dB Bandwidth	Pass

9. TEST RESULT

9.1. Operation within the band 13.110 MHz – 14.010 MHz

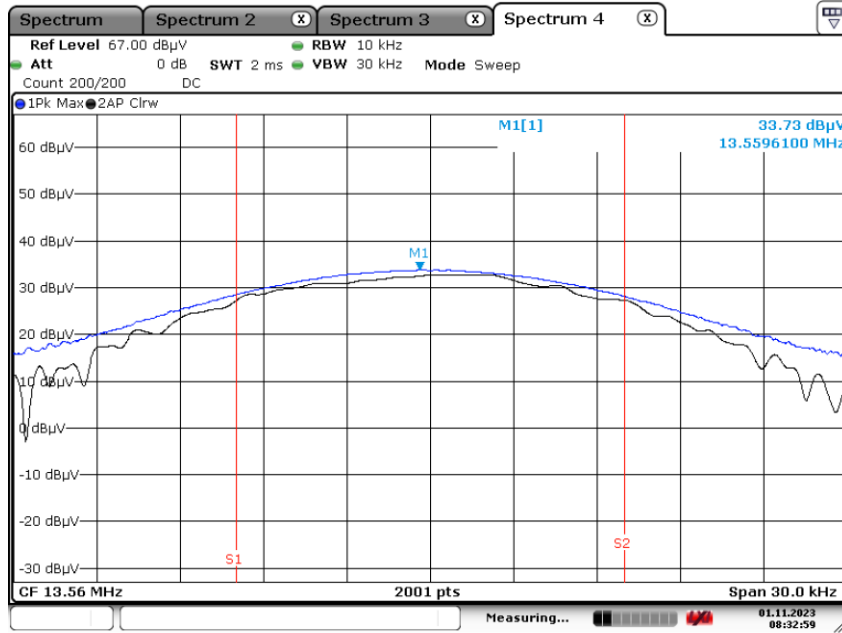
Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Ant. POL (H/V)	Distance Correction (dB)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.55961	33.73	20.59	H	-40.00	14.32	84.00	69.68
13.56021	33.16	20.59	V	-40.00	13.75	84.00	70.25

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)	Ant. POL (H/V)	Distance Correction (dB)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.55295	28.83	20.59	H	-40.00	9.42	50.47	41.05
13.56692	28.07	20.59	H	-40.00	8.66	50.47	41.81

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)	Ant. POL (H/V)	Distance Correction (dB)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.34786	19.39	20.59	H	-40.00	-0.02	40.51	40.53
13.77099	19.68	20.59	H	-40.00	0.27	40.51	40.24

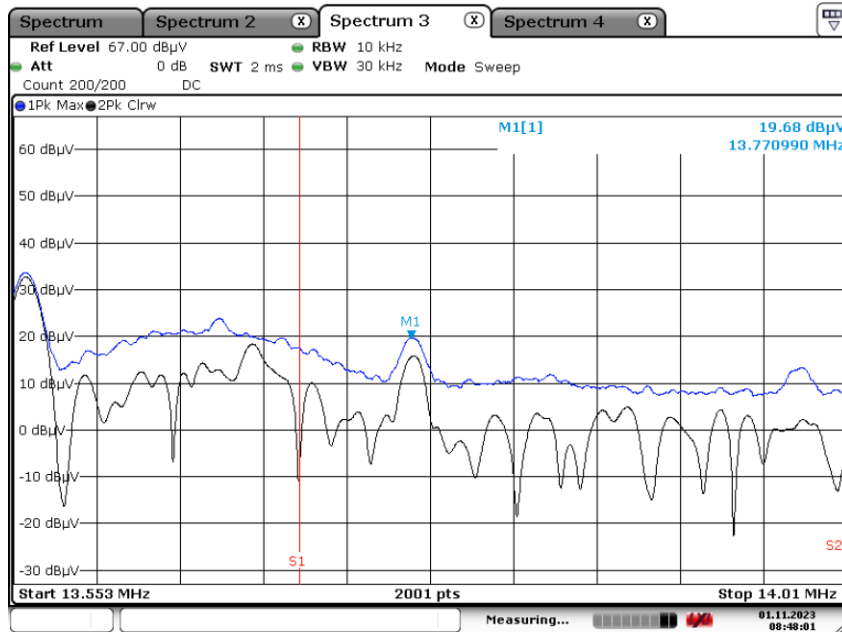
Test Plot

13.553 MHz ~ 13.567 MHz



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Worst Case (13.710 MHz - 14.010 MHz)



Date: 1.NOV.2023 08:48:02

Note:

Plot of worst case are only reported.

9.2. Radiated Emission 9kHz – 30 MHz

Measured Frequency Range : 9 kHz - 490 kHz							
Frequency (kHz)	Measured Value (dBμV/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Ant. POL (H/V)	Distance Correction (dB)	Total (dBμV/m) @300 m	Limit (dBμV/m) @300 m	Margin (dB)
0.0185	35.72	19.62	H	-80.00	-24.66	42.24	66.90
0.1518	27.69	20.14	H	-80.00	-32.17	23.98	56.15
Measured Frequency Range : 490 kHz - 30 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant. Factor +Cable Loss (dB/m)	Ant. POL (H/V)	Distance Correction (dB)	Total (dBμV/m) @30 m	Limit (dBμV/m) @30 m	Margin (dB)
0.4903	23.69	20.05	H	-40.00	3.74	33.79	30.05
13.0274	11.83	20.60	H	-40.00	-7.57	29.54	37.11
14.0859	12.35	20.60	H	-40.00	-7.05	29.54	36.59

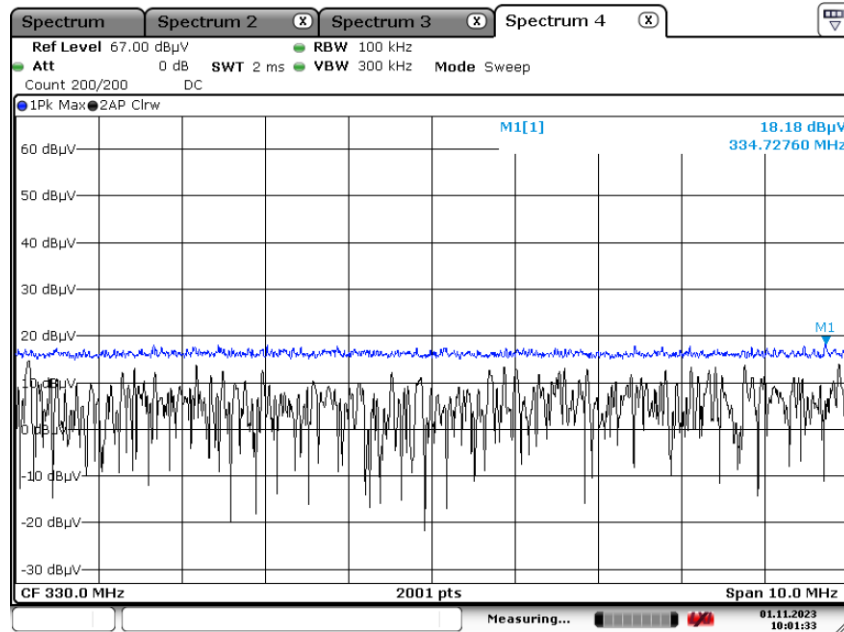
9.3. Radiated Emission 30MHz – 1000 MHz

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)
#124.1856	15.85	17.38	0.98	H	34.21	43.52	9.31
153.2547	16.47	19.48	1.08	H	37.03	43.52	6.49
179.2145	16.81	17.72	1.14	H	35.67	43.52	7.85
214.1950	17.64	15.60	1.28	H	34.52	43.52	9.00
#257.3689	18.00	17.72	1.38	H	37.10	46.02	8.92
#334.7276	18.18	20.02	1.55	H	39.75	46.02	6.27

Note:

1. # is the result for restricted band.

Test Plot



Date: 1.NOV.2023 10:01:33

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	13.560091	91	0.0006711
100%		-10	13.560023	23	0.0001696
100%		0	13.560067	67	0.0004941
100%		+10	13.560074	74	0.0005457
100%		+20(Ref.)	13.560053	53	0.0003909
100%		+30	13.560076	76	0.0005605
100%		+40	13.560067	67	0.0004941
100%		+50	13.560057	57	0.0004204
LOW	3.65	+20	13.560067	67	0.0004941
HIGH	4.47	+20	13.560009	9	0.0000664

2 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560014	14	0.0001032
100%		-10	13.560085	85	0.0006268
100%		0	13.560007	7	0.0000516
100%		+10	13.560041	41	0.0003024
100%		+20(Ref.)	13.560091	91	0.0006711
100%		+30	13.560043	43	0.0003171
100%		+40	13.560048	48	0.0003540
100%		+50	13.560010	10	0.0000737
LOW		3.65	+20	13.560020	20
HIGH	4.47	+20	13.560010	10	0.0000737

5 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560092	92	0.0006785
100%		-10	13.560003	3	0.0000221
100%		0	13.560073	73	0.0005383
100%		+10	13.560068	68	0.0005015
100%		+20(Ref.)	13.560044	44	0.0003245
100%		+30	13.560058	58	0.0004277
100%		+40	13.560030	30	0.0002212
100%		+50	13.560068	68	0.0005015
LOW	3.65	+20	13.560010	10	0.0000737
HIGH	4.47	+20	13.560012	12	0.0000885

10 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ± 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560095	95	0.0007006
100%		-10	13.560094	94	0.0006932
100%		0	13.560054	54	0.0003982
100%		+10	13.560080	80	0.0005900
100%		+20(Ref.)	13.560086	86	0.0006342
100%		+30	13.560016	16	0.0001180
100%		+40	13.560057	57	0.0004204
100%		+50	13.560092	92	0.0006785
LOW		3.65	+20	13.560082	82
HIGH	4.47	+20	13.560052	52	0.0003835

9.6. POWERLINE CONDUCTED EMISSIONS

Conducted Emissions

Test

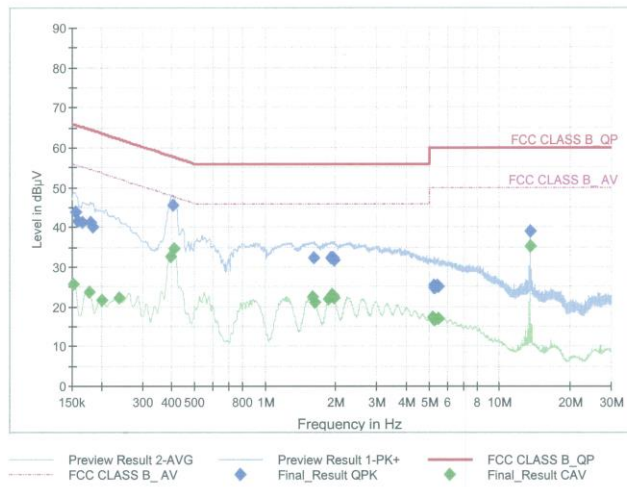
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Test Report

Common Information

EUT : SM-A155M/DSN
 Operating Conditions : NFC Mode
 Comment :

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1545	43.77	65.75	21.98	9.000	L1	9.6
0.1590	41.48	65.52	24.03	9.000	N	9.6
0.1658	41.32	65.17	23.86	9.000	L1	9.6
0.1793	41.33	64.52	23.19	9.000	L1	9.6
0.1838	40.13	64.31	24.19	9.000	N	9.6
0.4020	45.50	57.81	12.32	9.000	L1	9.6
1.6070	32.22	56.00	23.78	9.000	L1	9.7
1.9040	32.29	56.00	23.71	9.000	L1	9.7
1.9175	32.30	56.00	23.70	9.000	L1	9.7
1.9490	32.22	56.00	23.78	9.000	L1	9.7
1.9625	31.59	56.00	24.41	9.000	L1	9.7
1.9760	31.75	56.00	24.25	9.000	L1	9.7
5.2205	25.25	60.00	34.75	9.000	L1	9.8
5.2633	24.89	60.00	35.11	9.000	L1	9.8
5.2880	24.89	60.00	35.11	9.000	L1	9.8
5.4410	25.45	60.00	34.55	9.000	L1	9.8
5.4680	25.23	60.00	34.77	9.000	L1	9.8
13.5590	38.87	60.00	21.13	9.000	L1	10.1

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1523	25.65	55.88	30.23	9.000	L1	9.6
0.1770	23.53	54.63	31.09	9.000	L1	9.6
0.2018	21.69	53.54	31.84	9.000	L1	9.6
0.2378	22.19	52.17	29.98	9.000	L1	9.6
0.3930	32.57	48.00	15.43	9.000	L1	9.6
0.4065	34.66	47.72	13.06	9.000	L1	9.6
1.5935	22.61	46.00	23.39	9.000	L1	9.7
1.6363	21.18	46.00	24.82	9.000	L1	9.7
1.8568	21.88	46.00	24.12	9.000	L1	9.7
1.9243	23.08	46.00	22.92	9.000	L1	9.7
1.9490	22.79	46.00	23.21	9.000	L1	9.7
1.9738	22.30	46.00	23.70	9.000	L1	9.7
5.1643	17.25	50.00	32.75	9.000	L1	9.8
5.2228	16.68	50.00	33.32	9.000	L1	9.8
5.2610	16.65	50.00	33.35	9.000	L1	9.8
5.3173	16.67	50.00	33.33	9.000	L1	9.8
5.4725	17.06	50.00	32.94	9.000	L1	9.8
13.5590	35.10	50.00	14.90	9.000	L1	10.1

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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	08/02/2024	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	05/26/2024	Annual
Temperature Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
DC Power Supply	E3632A	Agilent	KR75305528	01/03/2024	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	06/02/2024	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	S3AM	08/03/2025	Biennial
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	FSVA40 (10 Hz ~ 40 GHz)	Rohde & Schwarz	101502	03/17/2024	Annual
Signal Analyzer	N9030A	Keysight	MY52350879	01/02/2024	Annual
RF Switching System	FBSR-03A (3dB ATT+LNA)	T&M SYSTEM	S3L4	12/05/2023	Annual
RF Switching System	FBSR-03A (10dB ATT+LNA)	T&M SYSTEM	S3L2	12/05/2023	Annual
Power Amplifier	310N	SONOMA INSTRUMENT	186169	02/15/2024	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-2311-FC017-P