

CERTIFICATION TEST REPORT

Report Number. : S-4791655852-E9V3

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SC-54F

FCC ID : A3LSMA366JPN

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax
and NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

2025-04-17

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Revision History

Rev.	Issue Date	Revisions	Prepared By
V1	2025-04-01	Initial issue	David Jung
V2	2025-04-14	Updated to address TCB's question	David Jung
V3	2025-04-17	Updated to address TCB's question	David Jung

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION	6
4.3. MEASUREMENT UNCERTAINTY.....	6
4.4. DECISION RULE.....	6
5. EQUIPMENT UNDER TEST.....	7
5.1. DESCRIPTION OF EUT	7
5.2. MAXIMUM E-FIELD STRENGTH	7
5.3. WORST-CASE CONFIGURATION AND MODE.....	7
5.4. DESCRIPTION OF TEST SETUP.....	8
6. TEST AND MEASUREMENT EQUIPMENT	9
7. 20dB BANDWIDTH	10
8. RADIATED EMISSION TEST RESULTS.....	11
8.1. LIMITS AND PROCEDURE	11
8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS [EUT with passive TAG mode] .	13
8.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz [EUT with passive TAG mode].....	14
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT with passive TAG mode]	15
8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS) [EUT without passive TAG mode] .	16
8.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT without passive TAG mode].....	17
8.1.6. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT without passive TAG mode] .	18
9. AC MAINS LINE CONDUCTED EMISSIONS.....	19
10. FREQUENCY STABILITY.....	24

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax and NFC.

MODEL NUMBER: SC-54F

SERIAL NUMBER: R3CXB0VFYTR, R3CXB0VFX0A (CONDUCTION);
R3CXB0VFYSZ, R3CXB0VFYFL (RADIATION)

DATE TESTED: 2025-02-11 – 2025-04-01

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 15 Subpart C	Complies

UL KOREA LTD. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL KOREA LTD. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL KOREA LTD. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL KOREA LTD. By:



Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:



David Jung
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 15.
3. ANSI C63.10-2020.
4. KDB 414788 D01 Radiated Test Site v01r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
☐	Chamber 1(3m semi-anechoic chamber)
☒	Chamber 2(3m semi-anechoic chamber)
☐	Chamber 3(3m semi-anechoic chamber)
☐	Chamber 4(3m Full-anechoic chamber)
☐	Chamber 5(3m Full-anechoic chamber)

UL KOREA LTD. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) +
Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

Corrected Reading (dBuV) = Meter Reading (dBuV) + External Cable (dB) +
Cableloss (dB)

46.62 dBuV + 9.8 dB + 0.1 dB = 56.52 dBuV

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Occupied Bandwidth	0.04 %
Frequency Stability	5.3 x 10-8 Hz
Conducted Disturbance, 0.15 to 30 MHz	1.84 dB
Radiated Disturbance, 9 kHz to 30 MHz	2.41 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.69 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Clause 4.4.3 in IEC Guide 115:2023.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax and NFC, This test report addresses the DXX (NFC) operational mode.

5.2. MAXIMUM E-FIELD STRENGTH

The testing was performed at 3 meter. The transmitter maximum E-field at 30m distance is 13.03 dBuV/m which convert from 3 meter data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz.

Worst case of antenna axis:

NFC with tag mode	NFC without tag mode
Y	Z

The fundamental level of the EUT was investigated each type and bitrate.
All test was performed worst case condition.

- ISO/IEC 14443-A(Type A) and bit rate 106 kbps

Radiated(fundamental level and spurious emissions) tests were performed both without reading a passive tag condition[test mode] and with reading a passive tag condition.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

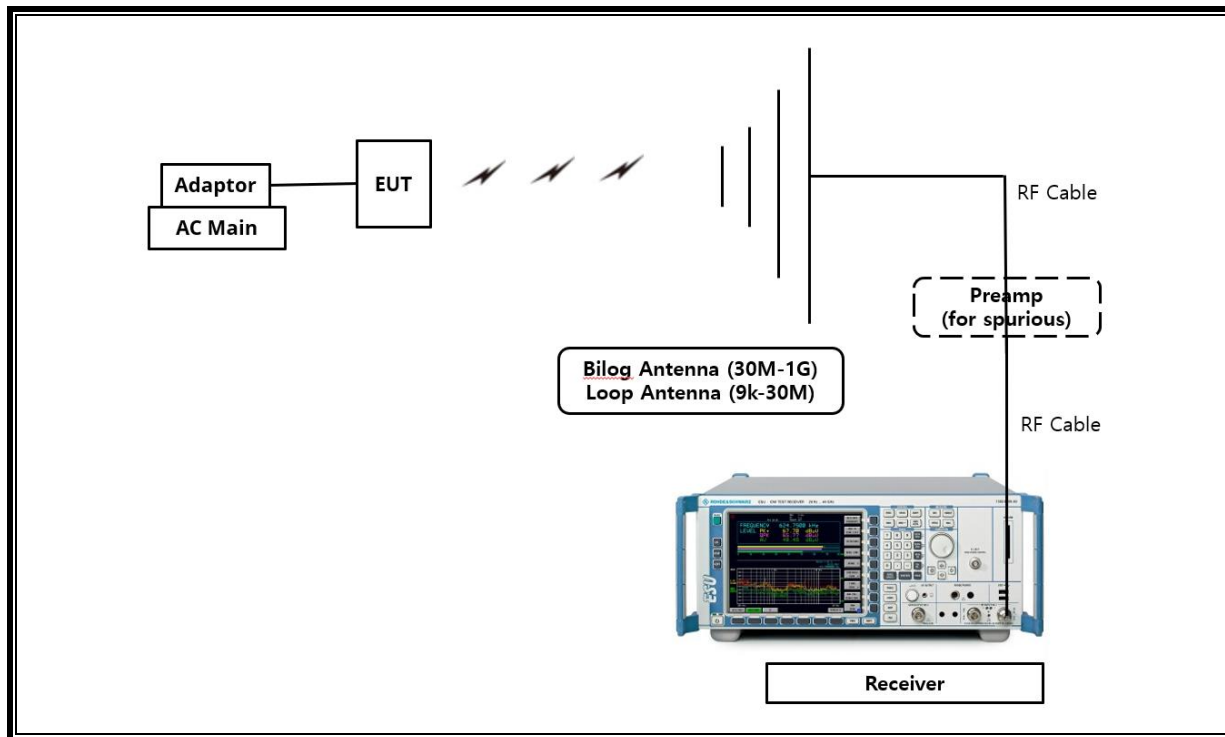
Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37W75RPPJASEB	N/A
Data Cable	SAMSUNG	EP-DN980B	N/A	N/A

I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

The EUT is a stand-alone device configured and tested in a worst-case setup.

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	845	2026-07-30
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	749	2026-08-12
Preamplifier, 1000 MHz	Sonoma	310N	341282	2025-07-22
Preamplifier, 1000 MHz	Sonoma	310N	351741	2025-07-22
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2025-07-23
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143652	2025-07-22
EMI Test Receive, 3 GHz	R&S	ESR 3	101832	2025-07-22
DC Power Supply	Agilent / HP	E3640A	MY54226395	2025-07-24
Temperature Chamber	ESPEC	SH-642	93001109	2025-07-23
LISN	R&S	ENV216	101836	2025-07-22
LISN	R&S	ENV216	101837	2025-07-22
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2E	100900	2025-07-25
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. 20dB BANDWIDTH

LIMITS

§15.215

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated

§15.225

Operation within the band 13.110 – 14.010MHz

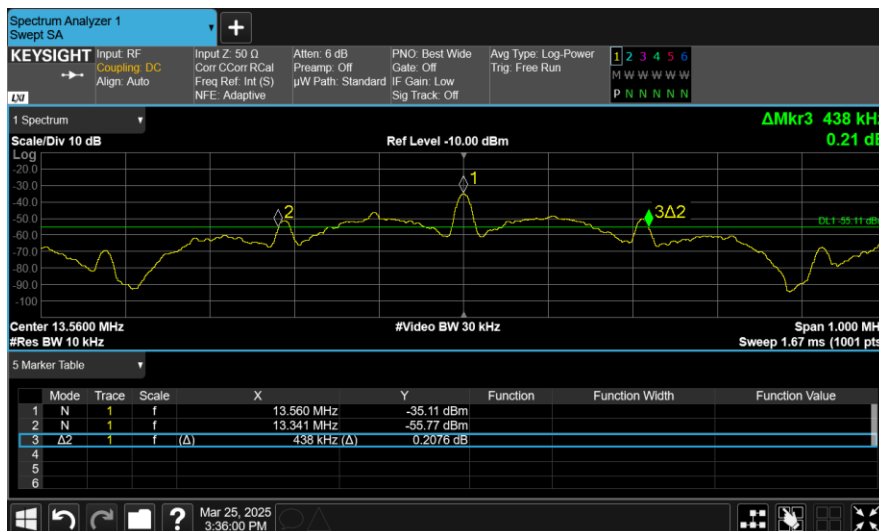
TEST PROCEDURE

The spectrum analyzer connected receive antenna and the EUT placed on near the receive antenna. The RBW is set to 1-5% of emission BW. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

Frequency [MHz]	20 dB Bandwidth [kHz]
13.56	438

20dB Bandwidth Plot



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (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.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from µV/m to dBµV/m is:

Limit (dBµV/m) = 20 log limit (µV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10-2020

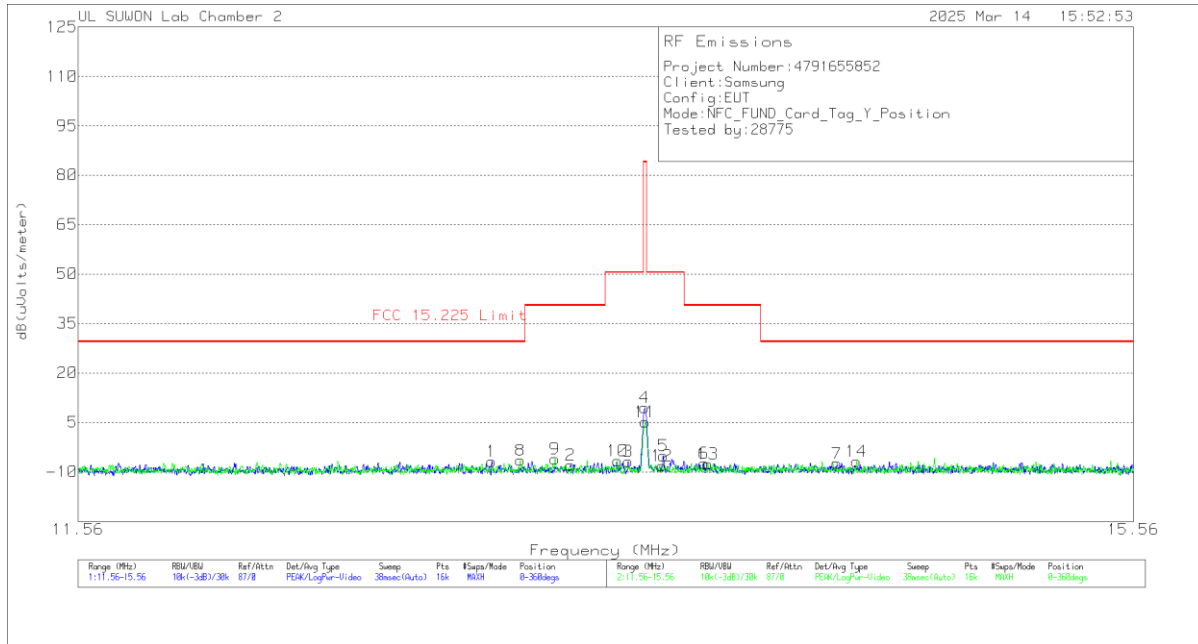
The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

- a) Set the RBW = 100 Hz for the emissions below 150kHz
9 kHz for the emissions between 150kHz and 30MHz
(The minimum RBW setting value for the Spectrum analyzer is 10 kHz)
100 kHz for the emissions between 30MHz and 1GHz
(The minimum RBW setting value for the Spectrum analyzer is 120 kHz)
- b) Set VBW $\geq 3 \times$ RBW;
- c) Sweep time = Auto;
- d) Detector = Peak;
- e) Trace mode = Max Hold;

RESULTS

No non-compliance noted:

8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS [EUT with passive TAG mode]



Trace Markers Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m[dB]	Cable Loss[dB]	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	12.98838	12.66	Pk	20.1	-40	.5	-6.74	29.54	-36.28	0-360
2	13.28038	11.46	Pk	20.1	-40	.5	-7.94	40.51	-48.45	0-360
3	13.49663	12.64	Pk	20.1	-40	.5	-6.76	50.5	-57.26	0-360
**4	13.55988	28.85	Pk	20.1	-40	.5	9.45	84	-74.55	0-360
5	13.63013	14.2	Pk	20.1	-40	.6	-5.1	50.5	-55.6	0-360
6	13.7875	11.88	Pk	20.1	-40	.6	-7.42	40.51	-47.93	0-360
7	14.31363	11.83	Pk	20.1	-40	.6	-7.47	29.54	-37.01	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m[dB]	Cable Loss[dB]	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	13.09238	12.89	Pk	20.1	-40	.5	-6.51	29.54	-36.05	0-360
9	13.22138	13.34	Pk	20.1	-40	.5	-6.06	40.51	-46.57	0-360
10	13.456	12.77	Pk	20.1	-40	.5	-6.63	50.5	-57.13	0-360
**11	13.56025	24.5	Pk	20.1	-40	.5	5.1	84	-78.9	0-360
12	13.62538	11.18	Pk	20.1	-40	.6	-8.12	50.5	-58.62	0-360
13	13.80188	11.78	Pk	20.1	-40	.6	-7.52	40.51	-48.03	0-360
14	14.39325	12.5	Pk	20.1	-40	.6	-6.8	29.54	-36.34	0-360

Pk - Peak detector

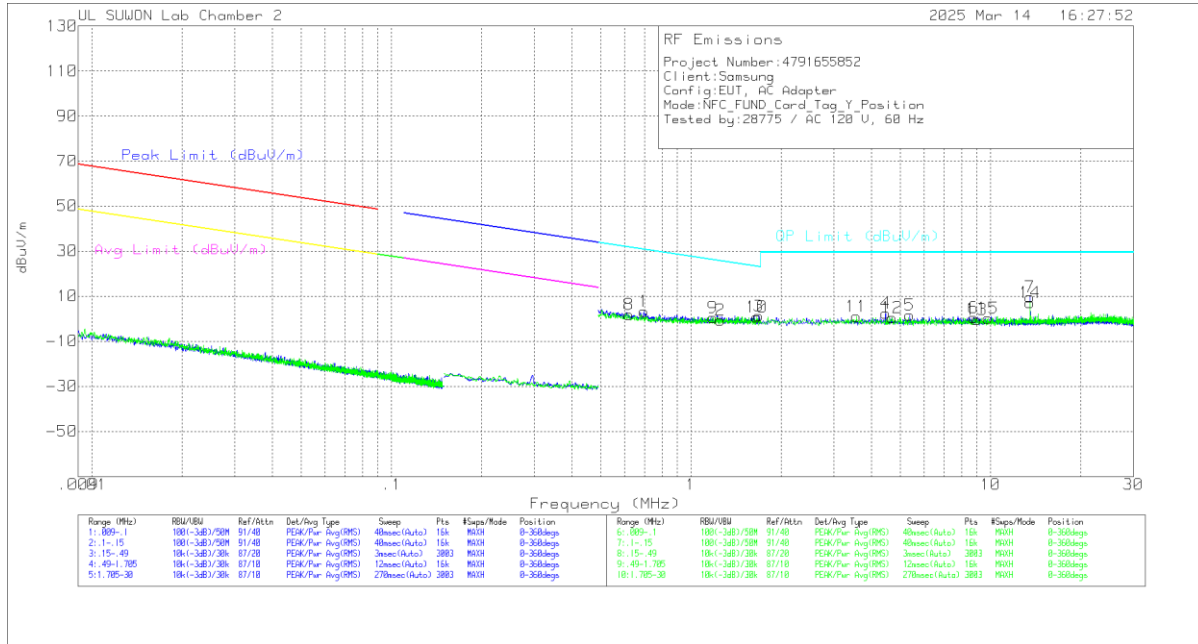
**Fundamental

Note 1 : Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz [EUT with passive TAG mode]



Trace Markers

[Face on]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss [dB]	Dist Corr 30m[dB]	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.69657	23.22	Pk	19.9	.1	-40	3.22	30.75	-27.53	0-360
2	1.256	19.36	Pk	19.9	.2	-40	-.54	25.65	-26.19	0-360
3	1.68575	21.04	Pk	20	.2	-40	1.24	23.1	-21.86	0-360
4	4.46653	22.11	Pk	20.1	.3	-40	2.51	29.5	-26.99	0-360
5	5.38075	21.19	Pk	20.1	.4	-40	1.69	29.5	-27.81	0-360
6	8.79731	20.07	Pk	20	.4	-40	.47	29.5	-29.03	0-360
**7	13.56165	29.12	Pk	20	.5	-40	9.62	29.5	-19.88	0-360

[Face off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss [dB]	Dist Corr 30m[dB]	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.62061	21.94	Pk	19.9	.1	-40	1.94	31.75	-29.81	0-360
9	1.18544	20.34	Pk	19.9	.2	-40	.44	26.15	-25.71	0-360
10	1.66006	20.62	Pk	20	.2	-40	.82	23.23	-22.41	0-360
11	3.57115	20.71	Pk	20.1	.3	-40	1.11	29.5	-28.39	0-360
12	4.69273	20.08	Pk	20.1	.3	-40	.48	29.5	-29.02	0-360
13	8.99995	19.17	Pk	20	.5	-40	-.33	29.5	-29.83	0-360
**14	13.56165	26.6	Pk	20	.5	-40	7.1	29.5	-22.4	0-360

Pk - Peak detector

**Fundamental

Note 1: The data for marker number 7 and 14 are the fundamental signal.

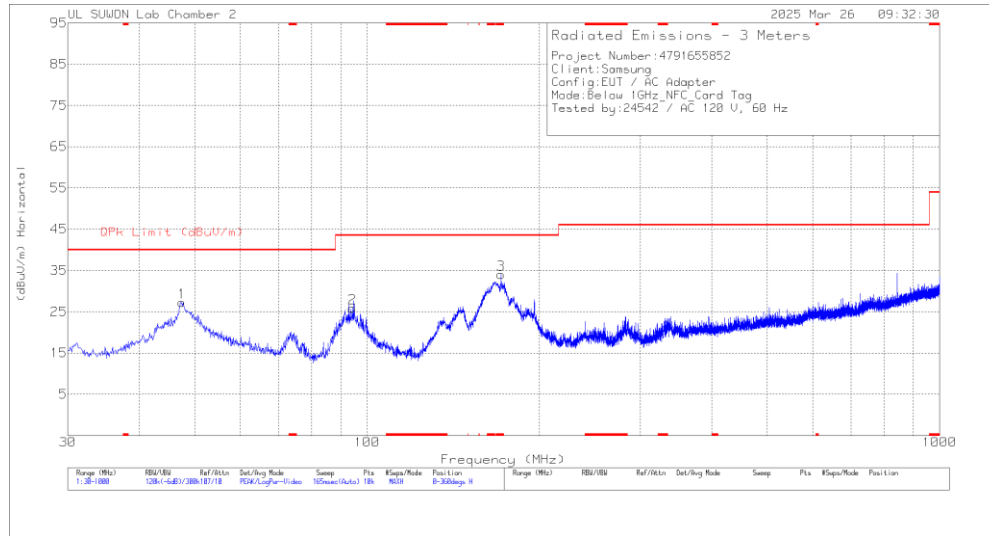
Please refer to section 8.1.1 about the fundamental level.

Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

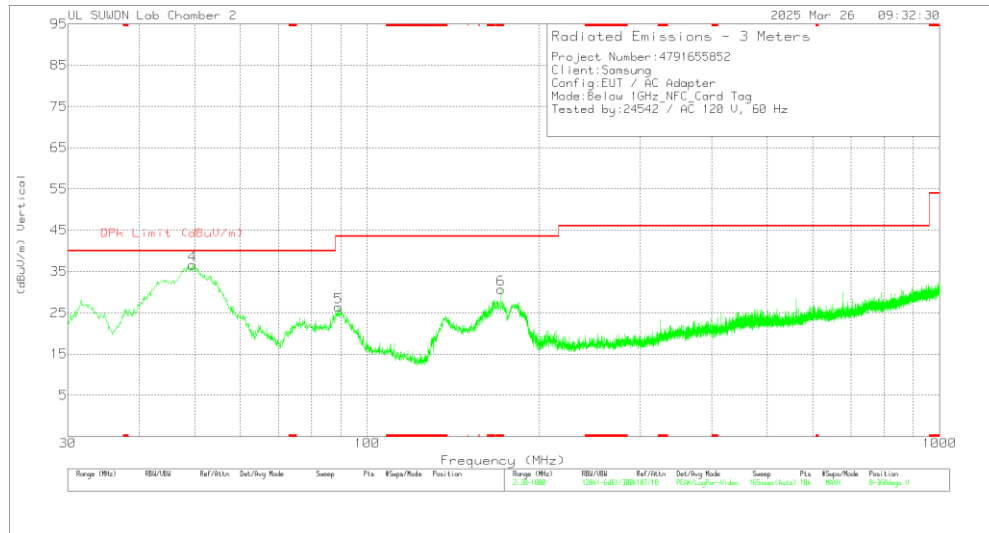
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT with passive TAG mode]

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Factor (dB/m)	Below_1G_Path Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.46	39.13	Pk	19.7	-31.6	27.23	40	-12.77	0-360	200	H
2	94.311	40.75	Pk	16.5	-31.4	25.85	43.52	-17.67	0-360	200	H
3	* 171.426	50.58	Pk	14.4	-30.9	34.08	43.52	-9.44	0-360	100	H
4	49.497	48.45	Pk	19.8	-31.7	36.55	40	-3.45	0-360	100	V
5	89.17	42.26	Pk	15.5	-31.4	26.36	43.52	-17.16	0-360	100	V
6	* 171.329	47.16	Pk	14.4	-30.9	30.66	43.52	-12.86	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

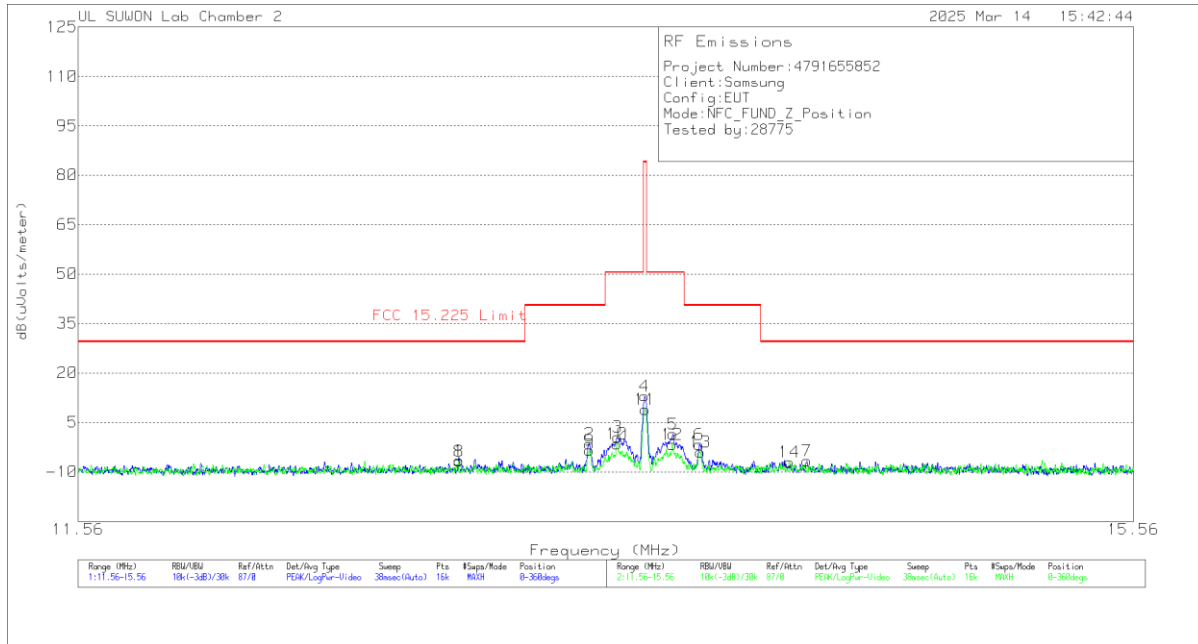
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Factor (dB/m)	Below_1G_Path Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
49.497	33.82	Qp	19.8	-31.7	21.92	40	-18.08	259	125	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Qp - Quasi-Peak detector

8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS) [EUT without passive TAG mode]



Trace Markers Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m[dB]	Cable Loss[dB]	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	12.86975	12.89	Pk	20.1	-40	.5	-6.51	29.54	-36.05	0-360
2	13.34888	17.92	Pk	20.1	-40	.5	-1.48	40.51	-41.99	0-360
3	13.45663	19.94	Pk	20.1	-40	.5	.54	50.5	-49.96	0-360
**4	13.55988	32.43	Pk	20.1	-40	.5	13.03	84	-70.97	0-360
5	13.66713	20.76	Pk	20.1	-40	.6	1.46	50.5	-49.04	0-360
6	13.76963	17.6	Pk	20.1	-40	.6	-1.7	40.51	-42.21	0-360
7	14.193	12.67	Pk	20.1	-40	.6	-6.63	29.54	-36.17	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m[dB]	Cable Loss[dB]	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	12.86838	12.67	Pk	20.1	-40	.5	-6.73	29.54	-36.27	0-360
9	13.35038	15.92	Pk	20.1	-40	.5	-3.48	40.51	-43.99	0-360
10	13.45463	17.98	Pk	20.1	-40	.5	-1.42	50.5	-51.92	0-360
**11	13.56063	28.34	Pk	20.1	-40	.5	8.94	84	-75.06	0-360
12	13.66463	17.69	Pk	20.1	-40	.6	-1.61	50.5	-52.11	0-360
13	13.77338	15.41	Pk	20.1	-40	.6	-3.89	40.51	-44.4	0-360
14	14.123	12.37	Pk	20.1	-40	.6	-6.93	29.54	-36.47	0-360

Pk - Peak detector

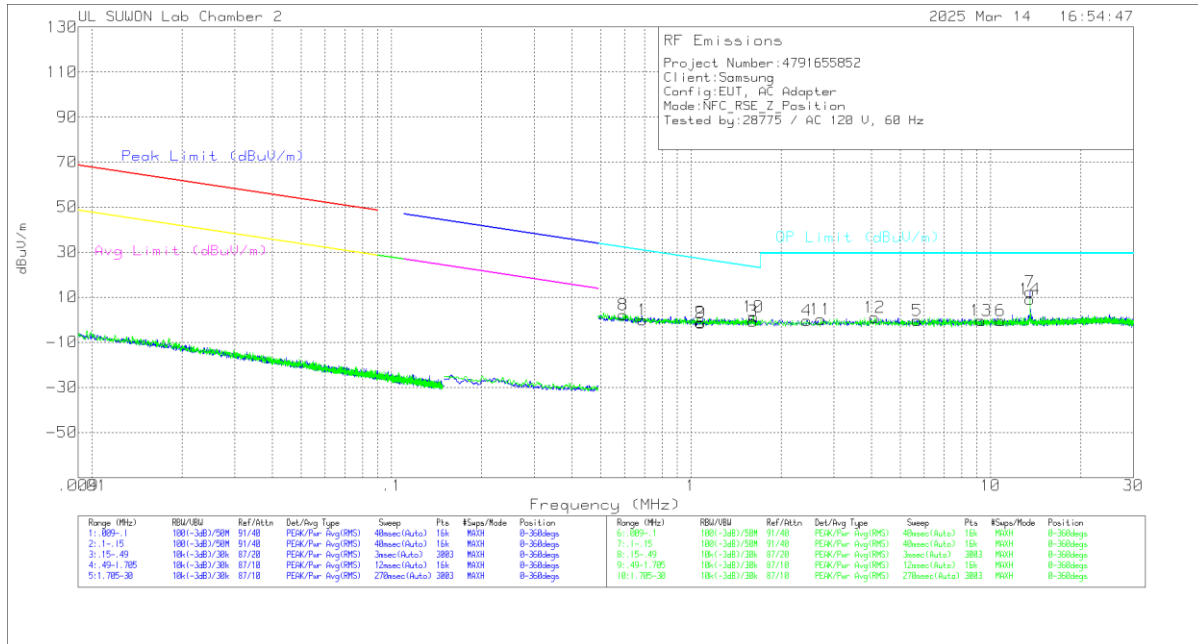
**Fundamental

Note 1: Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT without passive TAG mode]



Trace Markers

[Face on]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss [dB]	Dist Corr 30m[dB]	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.69106	19.88	Pk	19.9	.1	-40	-12	30.82	-30.94	0-360
2	1.07539	18.74	Pk	19.9	.2	-40	-1.16	26.99	-28.15	0-360
3	1.61206	19.17	Pk	20	.2	-40	-.63	23.49	-24.12	0-360
4	2.44015	19.51	Pk	20	.2	-40	-.29	29.5	-29.79	0-360
5	5.69178	19.11	Pk	20.1	.4	-40	-.39	29.5	-29.89	0-360
6	10.80013	19.23	Pk	20	.5	-40	-.27	29.5	-29.77	0-360
**7	13.56165	32.01	Pk	20	.5	-40	12.51	29.5	-16.99	0-360

[Face off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss [dB]	Dist Corr 30m[dB]	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.59488	22.23	Pk	19.9	.1	-40	2.23	32.12	-29.89	0-360
9	1.07881	18.52	Pk	19.9	.2	-40	-1.38	26.96	-28.34	0-360
10	1.61499	21.28	Pk	20	.2	-40	1.48	23.47	-21.99	0-360
11	2.71348	19.89	Pk	20.1	.3	-40	.29	29.5	-29.21	0-360
12	4.10838	20.61	Pk	20.1	.3	-40	1.01	29.5	-28.49	0-360
13	9.3204	19.18	Pk	20	.5	-40	-.32	29.5	-29.82	0-360
**14	13.56165	28.58	Pk	20	.5	-40	9.08	29.5	-20.42	0-360

Pk - Peak detector

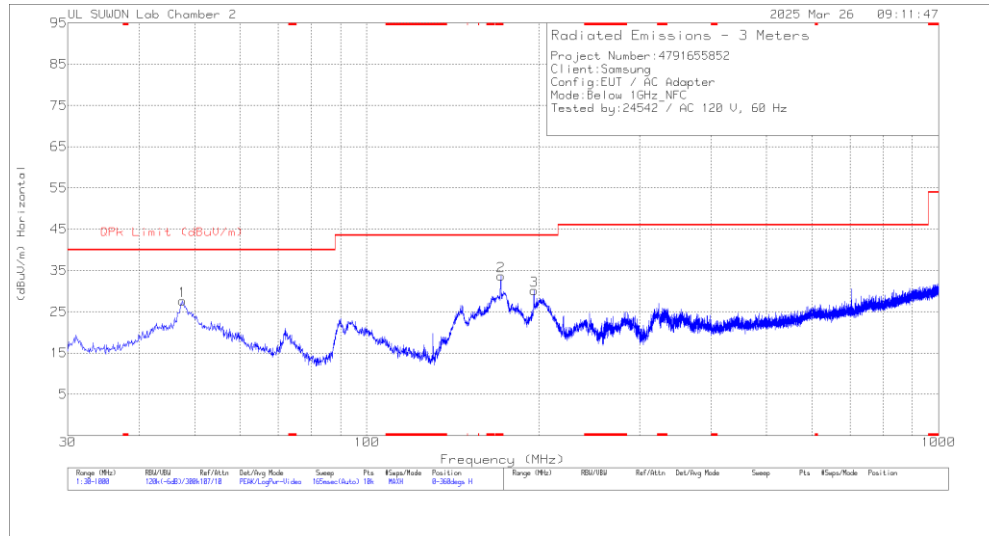
**Fundamental

Note 1: The data for marker number 7 and 14 are the fundamental signal. Please refer to section 8.1.4 about the fundamental level. Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

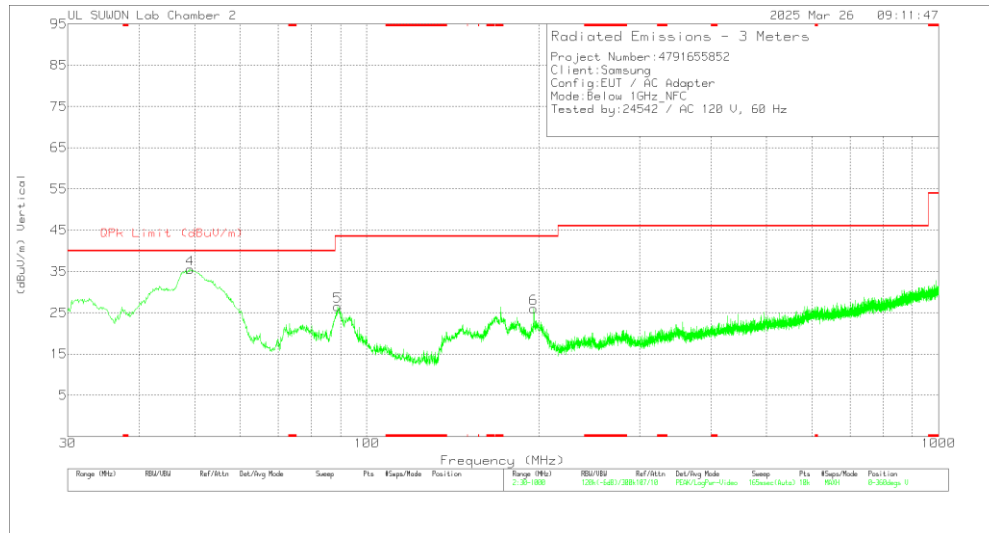
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.6. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT without passive TAG mode]

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Factor (dB/m)	Below 1G Path Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.654	39.51	Pk	19.7	-31.6	27.61	40	-12.39	0-360	200	H
2	* 171.62	50.04	Pk	14.5	-30.9	33.64	43.52	-9.88	0-360	100	H
3	196.064	43.53	Pk	17.4	-30.8	30.13	43.52	-13.39	0-360	100	H
4	49.109	47.52	Pk	19.7	-31.7	35.52	40	-4.48	0-360	100	V
5	88.976	42.56	Pk	15.4	-31.4	26.56	43.52	-16.96	0-360	100	V
6	195.967	39.46	Pk	17.4	-30.8	26.06	43.52	-17.46	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Factor (dB/m)	Below 1G Path Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
49.109	42.72	Qp	19.7	-31.7	30.72	40	-9.28	245	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Qp - Quasi-Peak detector

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, 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). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

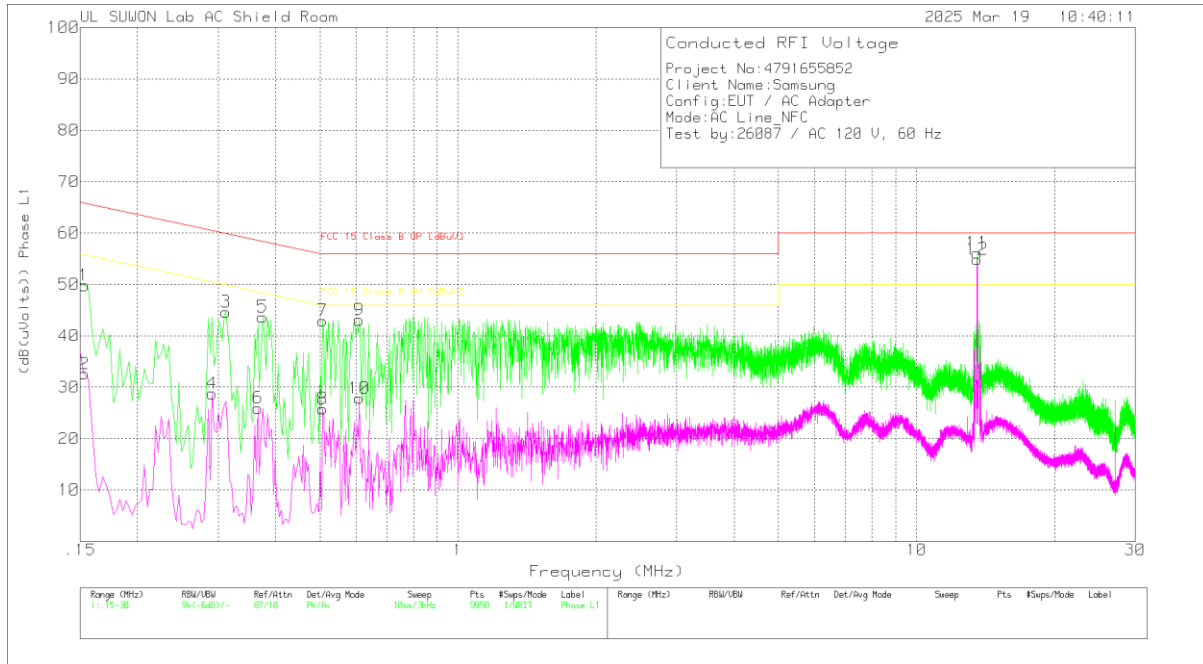
Test was performed with NFC antenna terminated.

RESULTS

No non-compliance noted:

WORST EMISSIONS(non-Terminated)

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

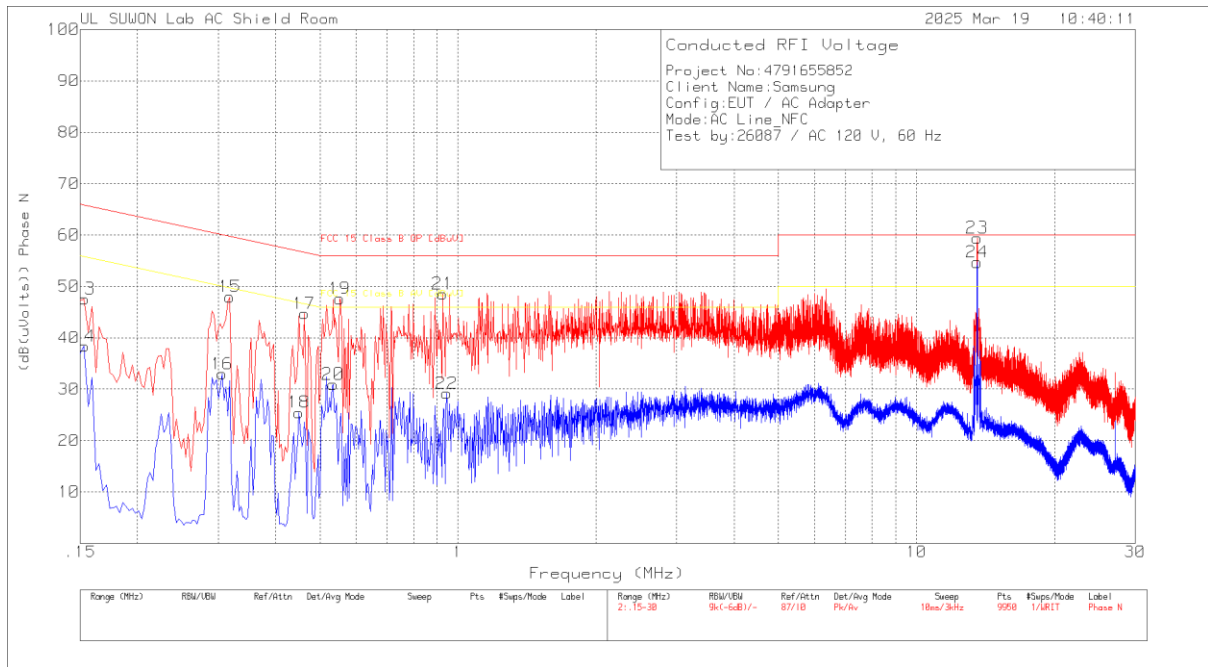
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_L1 [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.153	40.01	Pk	9.7	.1	49.81	65.84	-16.03	-	-
2	.153	22.81	Av	9.7	.1	32.61	-	-	55.84	-23.23
3	.312	34.93	Pk	9.6	.1	44.63	59.92	-15.29	-	-
4	.291	19.09	Av	9.6	.1	28.79	-	-	50.5	-21.71
5	.375	33.87	Pk	9.7	.1	43.67	58.39	-14.72	-	-
6	.366	16.16	Av	9.7	.1	25.96	-	-	48.59	-22.63
7	.507	33.02	Pk	9.8	.1	42.92	56	-13.08	-	-
8	.507	15.89	Av	9.8	.1	25.79	-	-	46	-20.21
9	.609	33.29	Pk	9.7	.1	43.09	56	-12.91	-	-
10	.609	18.03	Av	9.7	.1	27.83	-	-	46	-18.17
11	13.56	46.11	Pk	9.7	.3	56.11	60	-3.89	-	-
12	13.56	44.89	Av	9.7	.3	54.89	-	-	50	4.89

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.153	37.78	Pk	9.7	.1	47.58	65.84	-18.26	-	-
14	.153	28.55	Av	9.7	.1	38.35	-	-	55.84	-17.49
15	.318	38.27	Pk	9.6	.1	47.97	59.76	-11.79	-	-
16	.306	23.27	Av	9.6	.1	32.97	-	-	50.08	-17.11
17	.462	34.9	Pk	9.7	.1	44.7	56.66	-11.96	-	-
18	.45	15.67	Av	9.7	.1	25.47	-	-	46.88	-21.41
19	.552	37.82	Pk	9.7	.1	47.62	56	-8.38	-	-
20	.534	21.02	Av	9.8	.1	30.92	-	-	46	-15.08
21	.927	38.74	Pk	9.7	.1	48.54	56	-7.46	-	-
22	.945	19.37	Av	9.7	.1	29.17	-	-	46	-16.83
23	13.56	49.53	Pk	9.6	.3	59.43	60	-.57	-	-
24	13.56	44.81	Av	9.6	.3	54.71	-	-	50	4.71

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

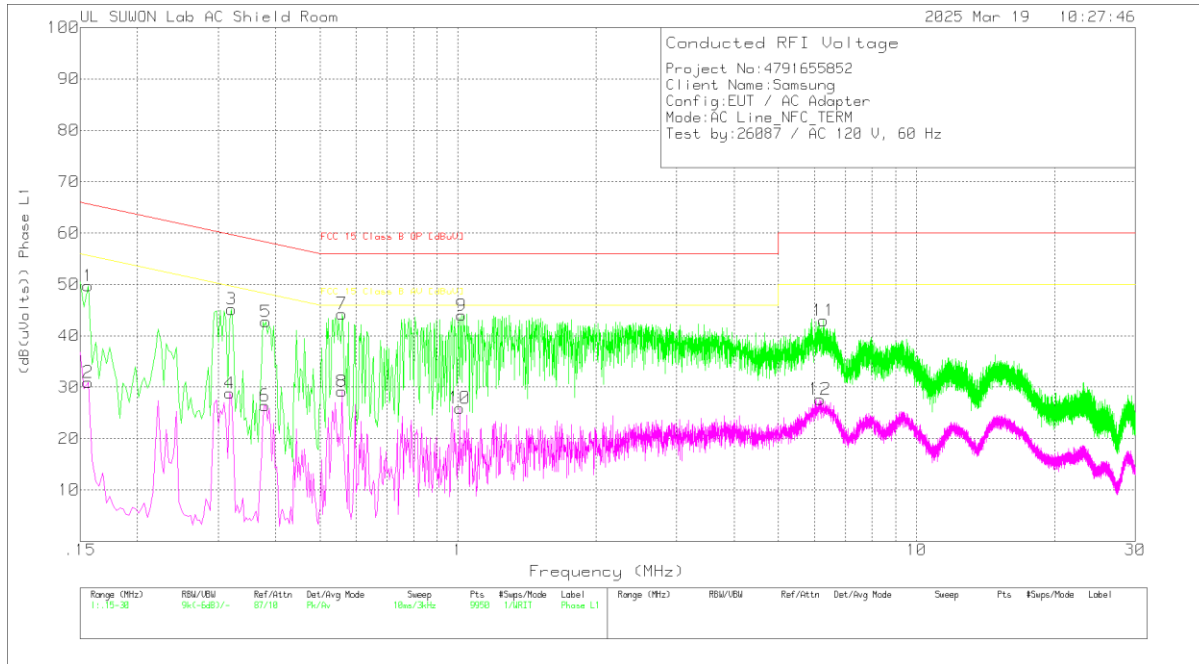
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.55275	25.41	Qp	9.7	.1	35.21	56	-20.79	-	-
.92715	26.02	Qp	9.7	.1	35.82	56	-20.18	-	-

Qp - Quasi-Peak detector

WORST EMISSIONS(Terminated)

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

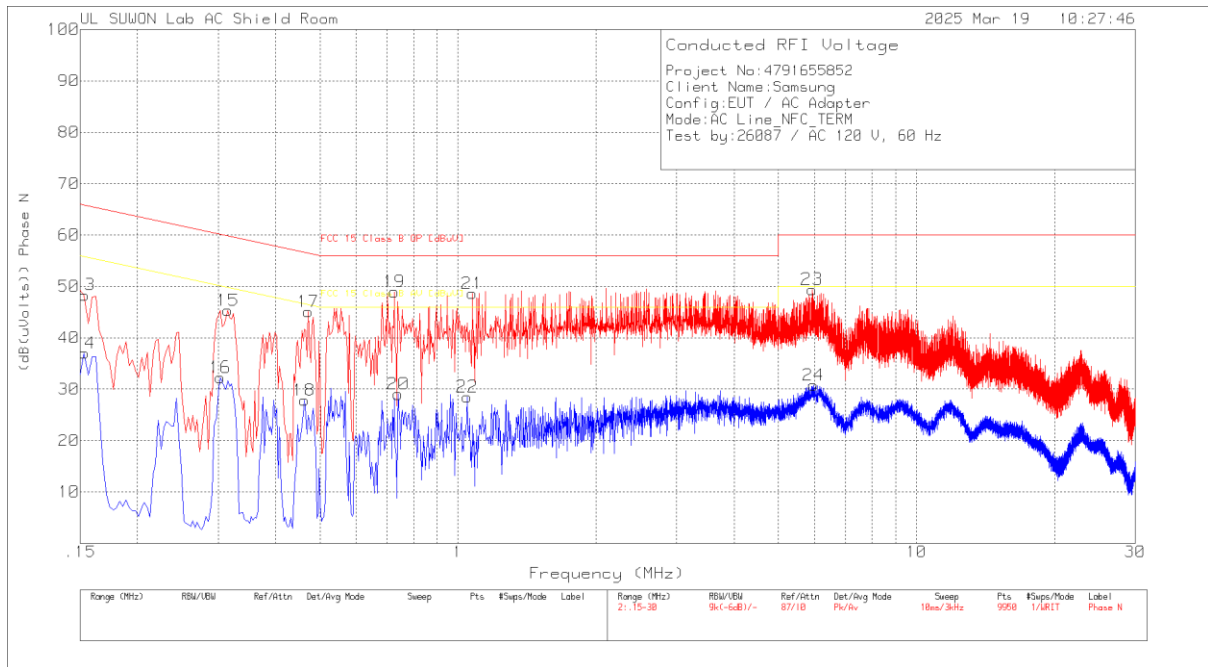
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1 [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.156	39.91	Pk	9.7	.1	49.71	65.67	-15.96	-	-
2	.156	21.12	Av	9.7	.1	30.92	-	-	55.67	-24.75
3	.321	35.47	Pk	9.6	.1	45.17	59.68	-14.51	-	-
4	.318	19.11	Av	9.6	.1	28.81	-	-	49.76	-20.95
5	.381	32.94	Pk	9.7	.1	42.74	58.26	-15.52	-	-
6	.3795	16.59	Av	9.7	.1	26.39	-	-	48.29	-21.9
7	.558	34.36	Pk	9.8	.1	44.26	56	-11.74	-	-
8	.558	19.27	Av	9.8	.1	29.17	-	-	46	-16.83
9	1.017	34.16	Pk	9.7	.1	43.96	56	-12.04	-	-
10	1.008	16.13	Av	9.7	.1	25.93	-	-	46	-20.07
11	6.276	33.18	Pk	9.6	.2	42.98	60	-17.02	-	-
12	6.159	17.83	Av	9.6	.2	27.63	-	-	50	-22.37

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.153	38.53	Pk	9.7	.1	48.33	65.84	-17.51	-	-
14	.153	27.19	Av	9.7	.1	36.99	-	-	55.84	-18.85
15	.315	35.63	Pk	9.6	.1	45.33	59.84	-14.51	-	-
16	.303	22.56	Av	9.6	.1	32.26	-	-	50.16	-17.9
17	.471	35.18	Pk	9.8	.1	45.08	56.5	-11.42	-	-
18	.462	18.03	Av	9.7	.1	27.83	-	-	46.66	-18.83
19	.726	39.15	Pk	9.7	.1	48.95	56	-7.05	-	-
20	.741	19.24	Av	9.7	.1	29.04	-	-	46	-16.96
21	1.074	38.92	Pk	9.6	.1	48.62	56	-7.38	-	-
22	1.047	18.78	Av	9.6	.1	28.48	-	-	46	-17.52
23	5.919	39.61	Pk	9.6	.2	49.41	60	-10.59	-	-
24	5.958	20.96	Av	9.6	.2	30.76	-	-	50	-19.24

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_N [dB]	Cable Loss [dB]	Corrected Reading [dBuV]	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.72675	30.02	Qp	9.7	.1	39.82	56	-16.18	-	-
1.07415	30.6	Qp	9.6	.1	40.3	56	-15.7	-	-

Qp - Quasi-Peak detector

10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI C63.10 §6.8

RESULTS

Test Date	2025-03-25
Test Engineer	33535

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply (Vdc)	Envir. Temp (°C)	Frequency Deviation Measured with Time Elapse								
		Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.88	50	13.559968962	-2.704	13.559968553	-2.735	13.559968425	-2.744	13.559968391	-2.746	100
3.88	40	13.559973111	-2.398	13.559971236	-2.537	13.559970811	-2.568	13.559970544	-2.588	100
3.88	30	13.559994114	-0.849	13.559991054	-1.075	13.559990076	-1.147	13.559989076	-1.221	100
3.88	20	13.560005633	0.000	13.560005562	-0.005	13.560005319	-0.023	13.560005494	-0.010	100
3.88	10	13.560011244	0.414	13.560016520	0.803	13.560024392	1.383	13.560025640	1.475	100
3.88	0	13.560033269	2.038	13.560038582	2.430	13.560046325	3.001	13.560051570	3.388	100
3.88	-10	13.560061507	4.120	13.560065825	4.439	13.560073252	4.987	13.560063793	4.289	100
3.88	-20	13.560044950	2.899	13.560055625	3.687	13.560058174	3.875	13.560062157	4.168	100
3.88	-30	13.560043589	2.799	13.560032414	1.975	13.560029855	1.786	13.560034849	2.155	100

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply (Vdc)	Envir. Temp (°C)	Frequency Deviation Measured with Time Elapse								
		Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.70	20	13.560003525	-0.155	13.560003485	-0.158	13.560003625	0.007	13.560003958	-0.124	100
3.88	20	13.560005633	0.000	13.560005562	-0.005	13.560005319	-0.023	13.560005494	-0.010	100
4.45	20	13.560001525	-0.303	13.560001326	-0.318	13.560001547	-0.301	13.560001629	-0.295	100

No non-compliance noted.

END OF TEST REPORT