CERTIFICATION TEST REPORT

Report Number. : 4791196575-E12V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-F956U, SM-F956U1
FCC ID	:	A3LSMF956U
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2024-05-04

Prepared by:
UL KOREA LTD.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL KOREA LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-04-22	Initial issue	Dexter(Hyunsik) Yun
V2	2024-05-04	Updated to address TCB's question	Dexter(Hyunsik) Yun

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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, NFC, WPT and UWB
MODEL NUMBER:	SM-F956U, SM-F956U1
SERIAL NUMBER:	R3CW90BXLCD, R3CX309QRBH (RADIATED)
DATE TESTED:	2024-02-20 ~ 2024-04-22

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 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:

Dexter(Hyunsik) Yun
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

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

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.10-2013.
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
Conducted Disturbance, 0.15 to 30 MHz	2.79 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.07 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.

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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, NFC, WPT and UWB. This test report addresses the DXX (NFC) operational mode.

Representative model	Difference	Derivative model
		SM-F956U1
SM-F956U	Hardware	Same
	Software	The UI has changed according to Service Provider

The model SM-F956U was used for final testing and is representative of the test results in this report.

5.2. MAXIMUM E-FIELD STRENGTH

The testing was performed at 3 meter. The transmitter maximum E-field at 30m distance is 18.95 dBuV/m which convert from 3 meter data.

Foldable conditions	NFC with tag mode [dBuV/m]	NFC without tag mode [dBuV/m]
Open	18.94	18.08
Harf-folded	18.86	**18.25**
Full-folded	**18.95**	18.03

5.3. WORST-CASE CONFIGURATION AND MODE

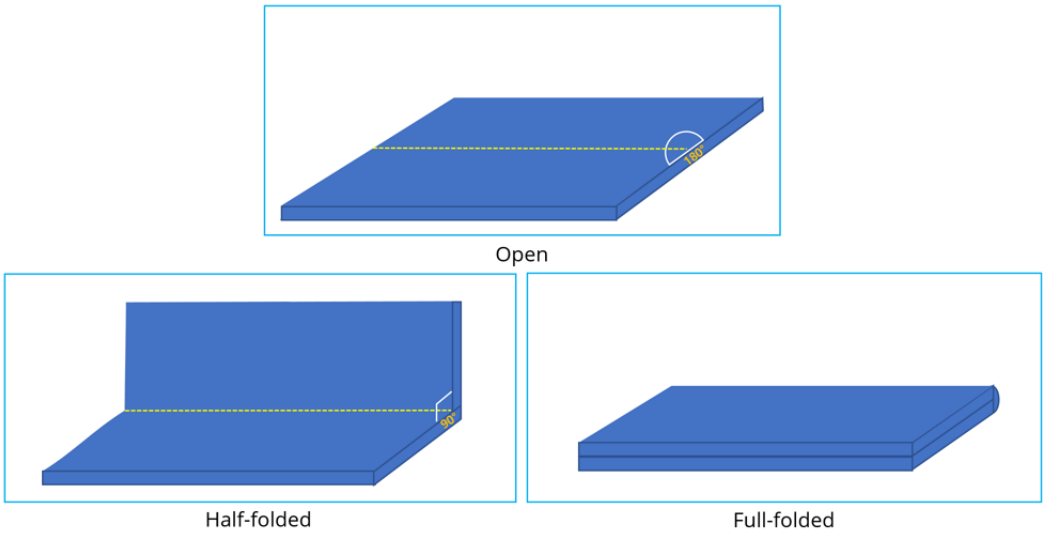
The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz.

i. Worst case of antenna axis:

NFC with tag mode	NFC without tag mode
Y	

ii. Foldable condition

NFC with tag mode	NFC without tag mode
Full-folded	Harf-folded



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

- 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.

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

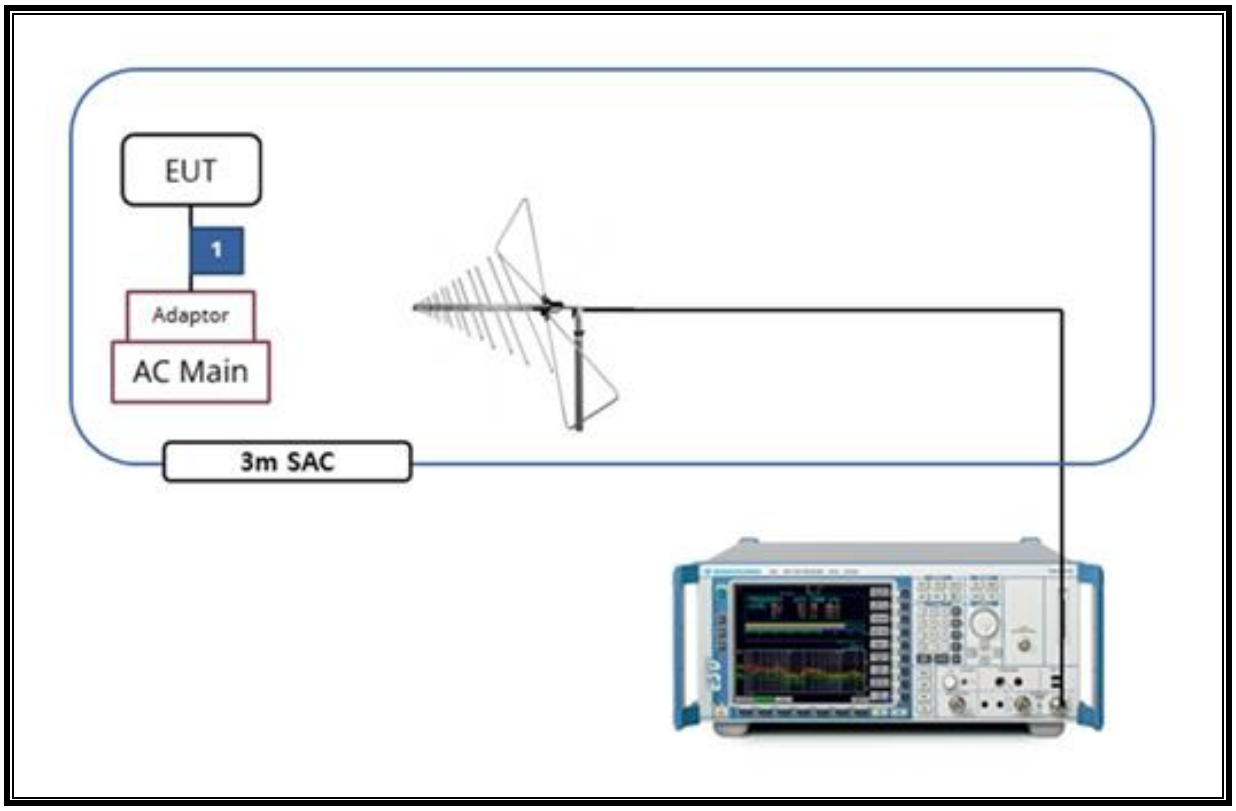
Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37N9QP6H39DK3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02111A	N/A

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.
Note: Worst case is using worst case orientation with AC charger attached to the EUT with NFC signal continuously transmitting.

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	VULB9163	845	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	2024-07-24
Preamplifier, 1000 MHz	Sonoma	310N	351741	2024-07-24
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2024-07-23
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030A	MY54170614	2024-07-24
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2024-07-23
DC Power Supply	Agilent / HP	E3640A	MY54226395	2024-07-24
Temperature Chamber	ESPEC	SH-642	93001109	2024-07-24
LISN	R&S	ENV-216	101836	2024-07-23
LISN	R&S	ENV-216	101837	2024-07-23
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-06
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

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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	439.50

20dB Bandwidth Plot

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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 filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/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 C63.10-2013

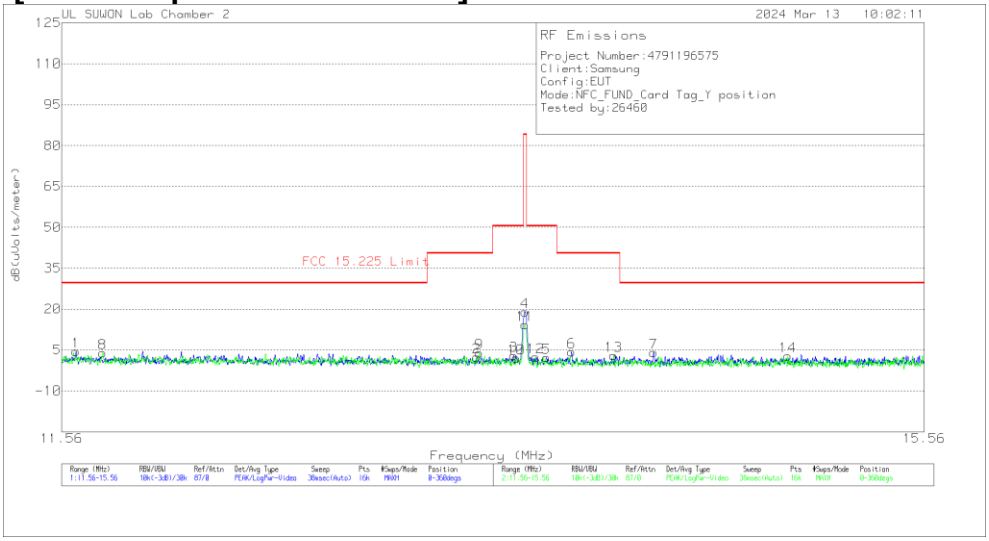
The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

[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	11.61763	23.8	Pk	20.2	-40	.5	4.5	29.54	-25.04	0-360
2	13.33738	21.78	Pk	20.1	-40	.5	2.38	40.51	-38.13	0-360
3	13.50788	22.37	Pk	20.1	-40	.5	2.97	50.5	-47.53	0-360
**4	13.56063	38.35	Pk	20.1	-40	.5	18.95	84	-65.05	0-360
5	13.66088	21.56	Pk	20.1	-40	.6	2.26	50.5	-48.24	0-360
6	13.77963	23.57	Pk	20.1	-40	.6	4.27	40.51	-36.24	0-360
7	14.17538	23.47	Pk	20.1	-40	.6	4.17	29.54	-25.37	0-360

Face off

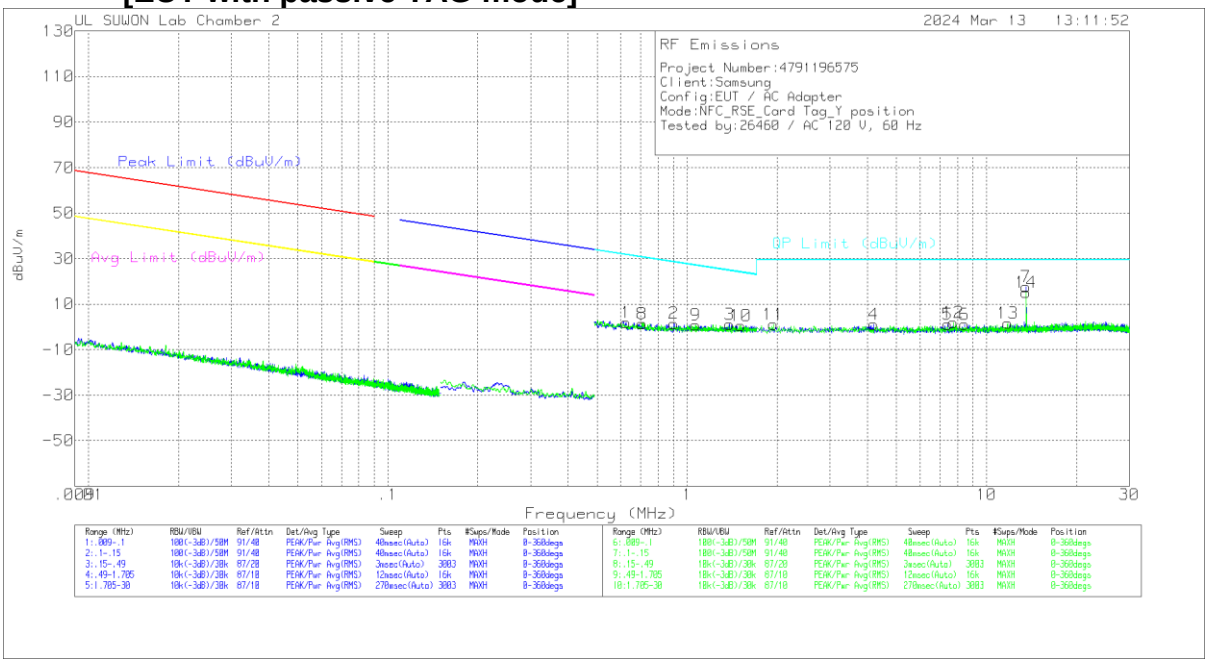
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	11.72463	23.27	Pk	20.2	-40	.5	3.97	29.54	-25.57	0-360
9	13.34963	23.36	Pk	20.1	-40	.5	3.96	40.51	-36.55	0-360
10	13.5195	21.47	Pk	20.1	-40	.5	2.07	50.5	-48.43	0-360
**11	13.56025	33.6	Pk	20.1	-40	.5	14.2	84	-69.8	0-360
12	13.61013	21.63	Pk	20.1	-40	.6	2.33	50.5	-48.17	0-360
13	13.98188	22.32	Pk	20.1	-40	.6	3.02	40.51	-37.49	0-360
14	14.84588	22.16	Pk	20.1	-40	.6	2.86	29.54	-26.68	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	.62479	21.94	Pk	19.9	.1	-40	1.94	31.7	-29.76	0-360
2	.90371	21.42	Pk	19.9	.2	-40	1.52	28.5	-26.98	0-360
3	1.38543	20.91	Pk	19.9	.2	-40	1.01	24.8	-23.79	0-360
4	4.20263	20.66	Pk	20.1	.3	-40	1.06	29.5	-28.44	0-360
5	7.41655	20.49	Pk	20.1	.4	-40	.99	29.5	-28.51	0-360
6	8.4533	20.78	Pk	20	.4	-40	1.18	29.5	-28.32	0-360
**7	13.56165	37.21	Pk	20	.5	-40	17.71	29.5	-11.79	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	.70713	21.46	Pk	19.9	.1	-40	1.46	30.62	-29.16	0-360
9	1.06597	20.66	Pk	19.9	.2	-40	.76	27.07	-26.31	0-360
10	1.50768	20.38	Pk	20	.2	-40	.58	24.07	-23.49	0-360
11	1.94063	21	Pk	20	.2	-40	1.2	29.5	-28.3	0-360
12	7.74643	21.53	Pk	20	.4	-40	1.93	29.5	-27.57	0-360
13	11.75205	21.11	Pk	20	.5	-40	1.61	29.5	-27.89	0-360
**14	13.56165	34.74	Pk	20	.5	-40	15.24	29.5	-14.26	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.

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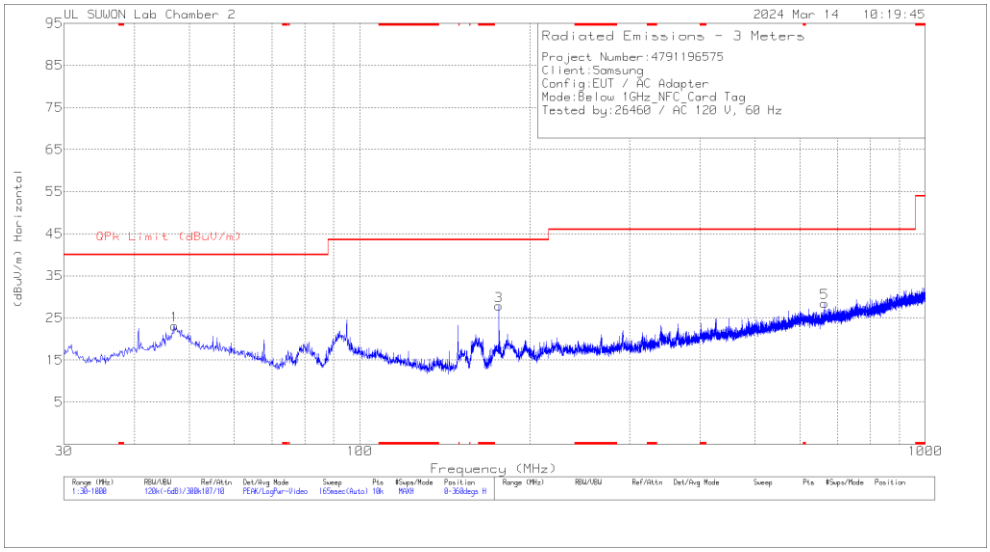
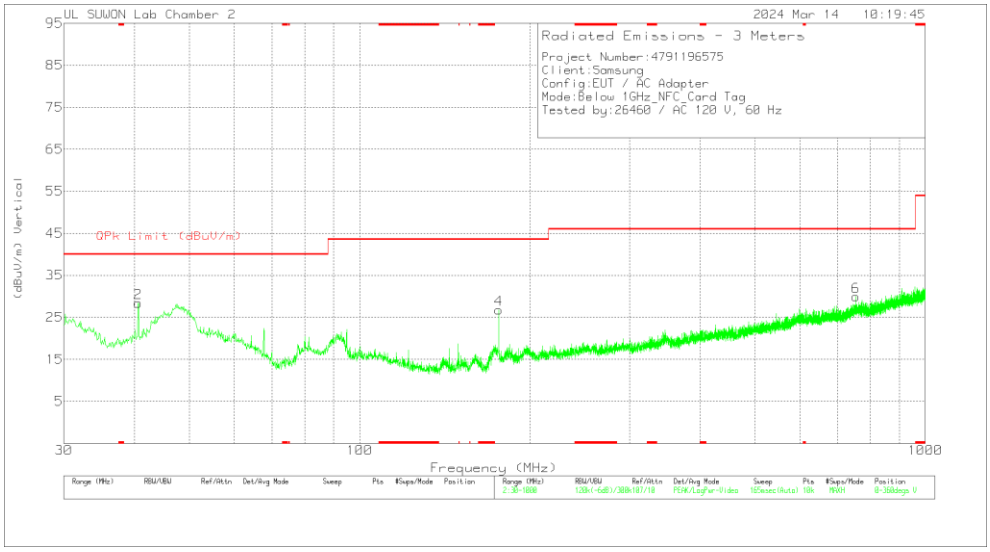
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

[EUT with passive TAG mode]

HORIZONTAL



VERTICAL

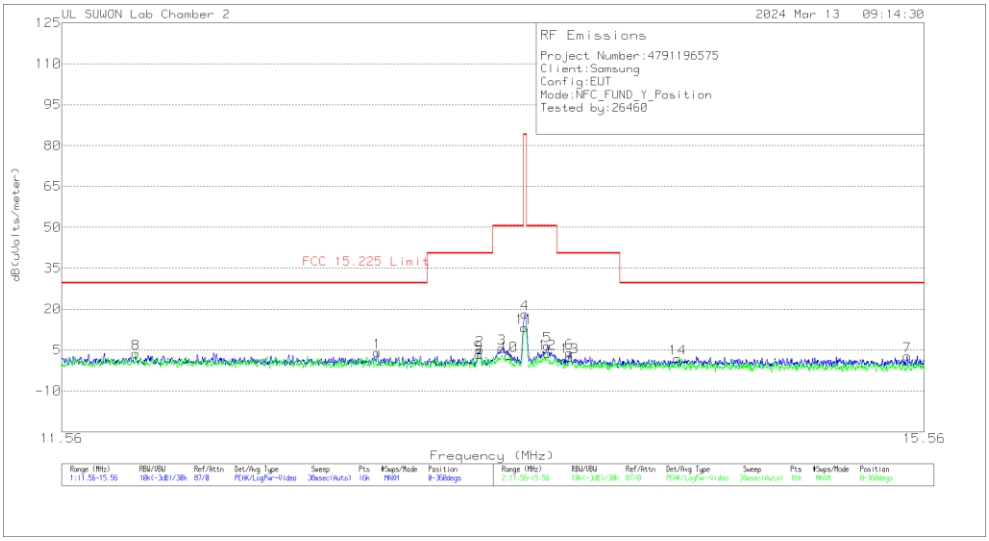


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna_749_Factor(dB/m)	Below_1G_Path Loss(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.072	34.85	Pk	20	-31.7	23.15	40	-16.85	0-360	200	H
3	176.276	43.56	Pk	15	-30.7	27.86	43.52	-15.66	0-360	100	H
5	663.507	32.44	Pk	25.1	-29	28.54	46.02	-17.48	0-360	100	H
2	40.573	41.22	Pk	18.9	-31.7	28.42	40	-11.58	0-360	100	V
4	176.276	42.52	Pk	15	-30.7	26.82	43.52	-16.7	0-360	100	V
6	754.396	32.04	Pk	26.5	-28.6	29.94	46.02	-16.08	0-360	100	V

Pk - Peak detector

8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [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	12.8875	23.49	Pk	20.1	-40	.5	4.09	29.54	-25.45	0-360
2	13.35213	24.48	Pk	20.1	-40	.5	5.08	40.51	-35.43	0-360
3	13.45325	25	Pk	20.1	-40	.5	5.6	50.5	-44.9	0-360
**4	13.56025	37.65	Pk	20.1	-40	.5	18.25	84	-65.75	0-360
5	13.66588	25.88	Pk	20.1	-40	.6	6.58	50.5	-43.92	0-360
6	13.77113	23.28	Pk	20.1	-40	.6	3.98	40.51	-36.53	0-360
7	15.46875	22.03	Pk	20.1	-40	.6	2.73	29.54	-26.81	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	11.85863	23.04	Pk	20.2	-40	.5	3.74	29.54	-25.8	0-360
9	13.34625	22.69	Pk	20.1	-40	.5	3.29	40.51	-37.22	0-360
10	13.48713	22.41	Pk	20.1	-40	.5	3.01	50.5	-47.49	0-360
**11	13.55888	32.59	Pk	20.1	-40	.5	13.19	84	-70.81	0-360
12	13.66513	23.11	Pk	20.1	-40	.6	3.81	50.5	-46.69	0-360
13	13.77138	21.78	Pk	20.1	-40	.6	2.48	40.51	-38.03	0-360
14	14.292	21.1	Pk	20.1	-40	.6	1.8	29.54	-27.74	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.

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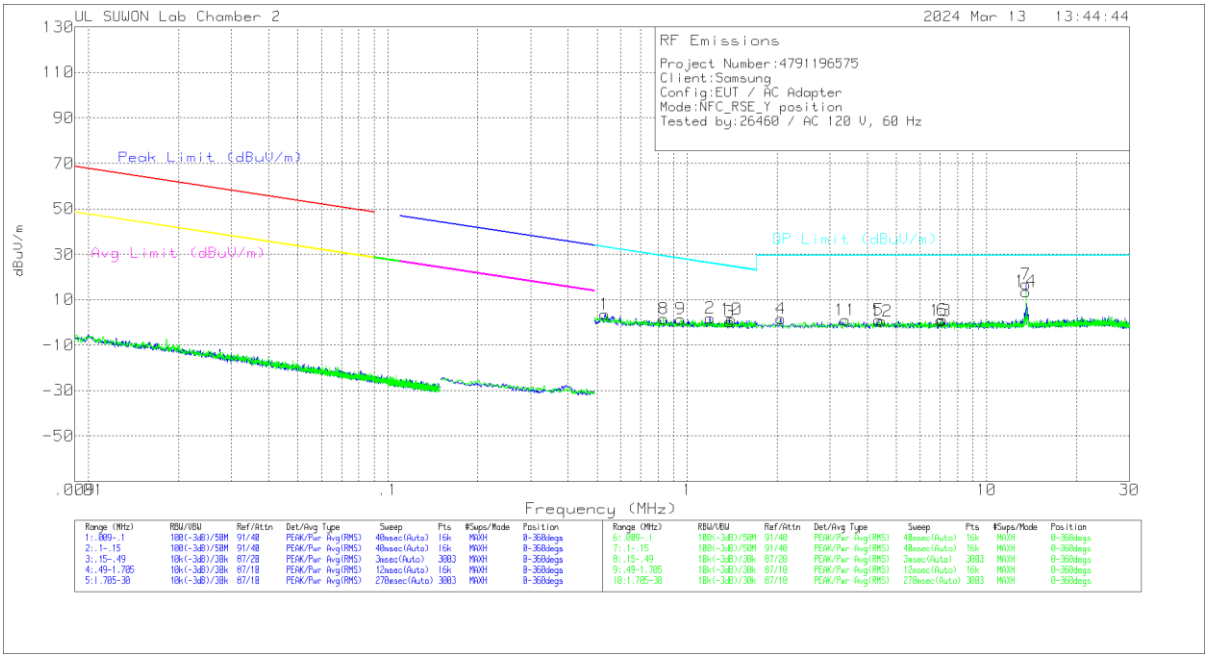
8.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT without passive TAG mode]



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	.53146	23.68	Pk	19.9	.1	-40	3.68	33.1	-29.42	0-360
2	1.19045	21.74	Pk	19.9	.2	-40	1.84	26.11	-24.27	0-360
3	1.38346	20.07	Pk	19.9	.2	-40	.17	24.81	-24.64	0-360
4	2.05373	21.36	Pk	20	.2	-40	1.56	29.5	-27.94	0-360
5	4.37228	20.77	Pk	20.1	.3	-40	1.17	29.5	-28.33	0-360
6	7.11495	20.65	Pk	20.1	.4	-40	1.15	29.5	-28.35	0-360
**7	13.56165	36.28	Pk	20	.5	-40	16.78	29.5	-12.72	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	.83333	21.63	Pk	19.9	.2	-40	1.73	29.2	-27.47	0-360
9	.95204	21.42	Pk	19.9	.2	-40	1.52	28.05	-26.53	0-360
10	1.40607	21.17	Pk	19.9	.2	-40	1.27	24.67	-23.4	0-360
11	3.37794	20.76	Pk	20.1	.3	-40	1.16	29.5	-28.34	0-360
12	4.46653	20.26	Pk	20.1	.3	-40	.66	29.5	-28.84	0-360
13	7.03013	20.38	Pk	20.1	.4	-40	.88	29.5	-28.62	0-360
**14	13.56165	33.14	Pk	20	.5	-40	13.64	29.5	-15.86	0-360

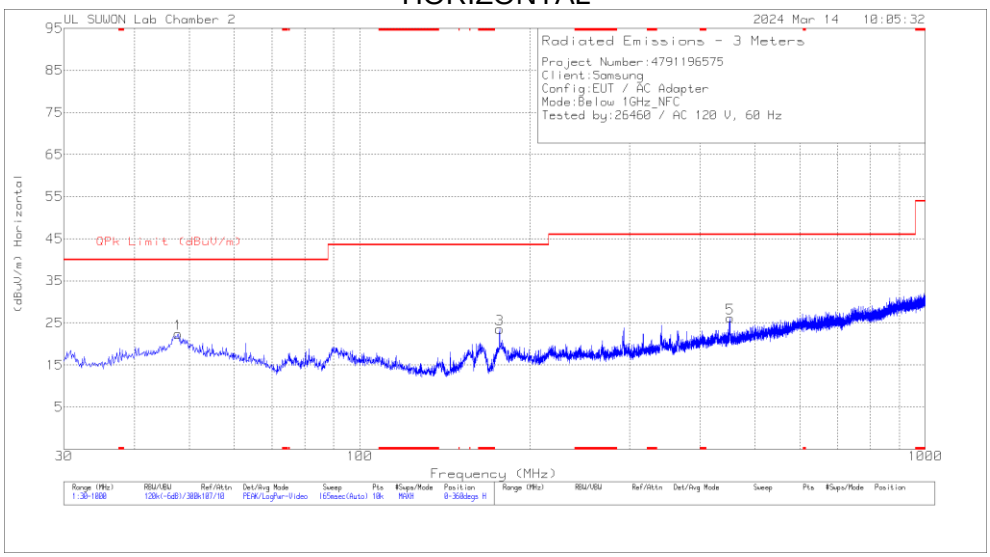
Pk - Peak detector
**Fundamental

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.

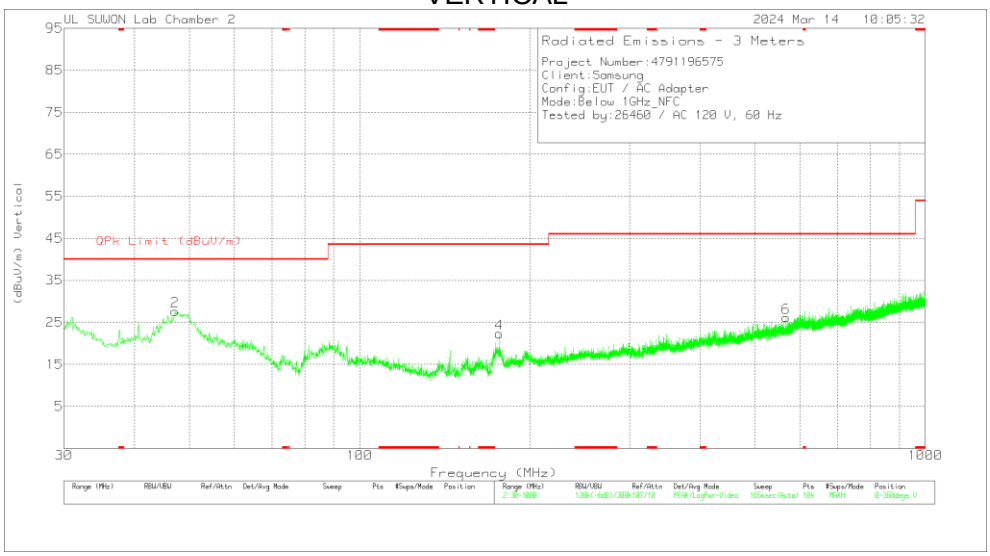
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

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_749_Factor(dB/m)	Below_1G_Path Loss(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.751	33.93	Pk	20.1	-31.6	22.43	40	-17.57	0-360	200	H
3	176.858	39.14	Pk	15.1	-30.7	23.54	43.52	-19.98	0-360	100	H
5	451.95	33.86	Pk	21.9	-29.6	26.16	46.02	-19.86	0-360	100	H
2	47.169	39.37	Pk	20	-31.7	27.67	40	-12.33	0-360	100	V
4	176.567	37.91	Pk	15.1	-30.7	22.31	43.52	-21.21	0-360	100	V
6	567.865	31.75	Pk	23.7	-29.3	26.15	46.02	-19.87	0-360	300	V

Pk - 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 50µH/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 (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
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.

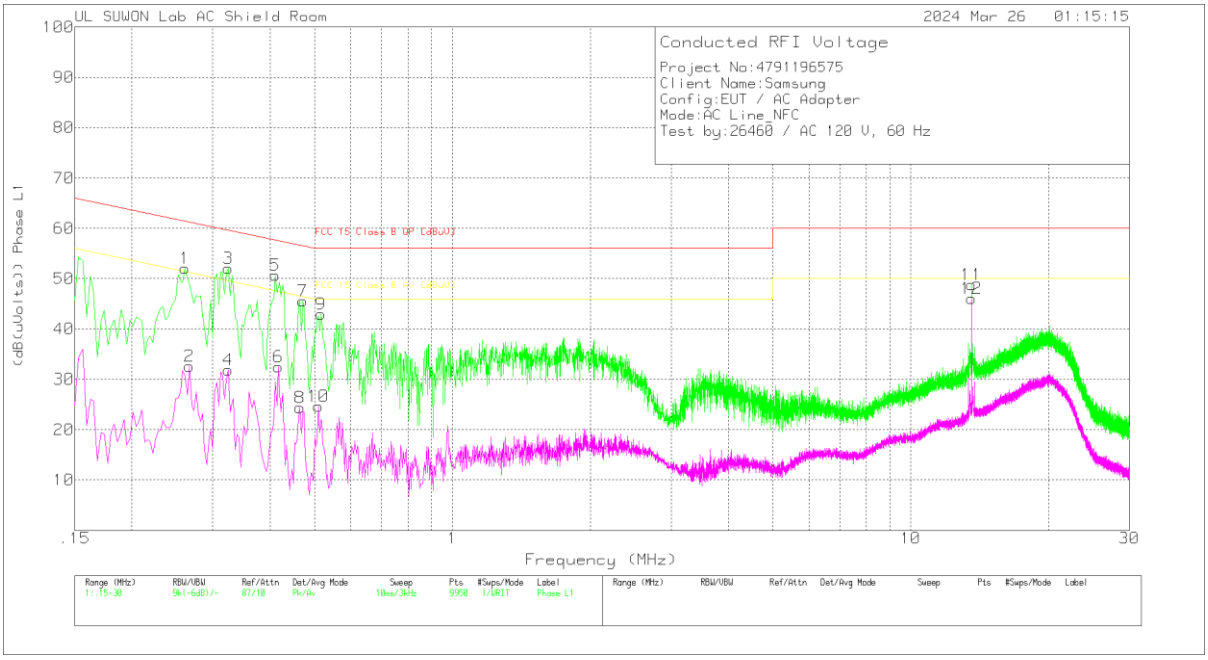
Line conducted data is recorded for both NEUTRAL and HOT lines.

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_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.261	42.34	Pk	9.6	.1	52.04	61.4	-9.36	-	-
2	.267	22.89	Av	9.6	.1	32.59	-	-	51.21	-18.62
3	.324	42.26	Pk	9.7	.1	52.06	59.6	-7.54	-	-
4	.324	22.03	Av	9.7	.1	31.83	-	-	49.6	-17.77
5	.411	40.78	Pk	9.8	.1	50.68	57.63	-6.95	-	-
6	.417	22.62	Av	9.8	.1	32.52	-	-	47.51	-14.99
7	.471	35.59	Pk	9.9	.1	45.59	56.5	-10.91	-	-
8	.465	14.47	Av	9.8	.1	24.37	-	-	46.6	-22.23
9	.516	33	Pk	9.9	.1	43	56	-13	-	-
10	.51	14.64	Av	9.9	.1	24.64	-	-	46	-21.36
11	13.56	38.5	Pk	10	.3	48.8	60	-11.2	-	-
12	13.56	35.82	Av	10	.3	46.12	-	-	50	-3.88

Pk - Peak detector
Av - Average detection

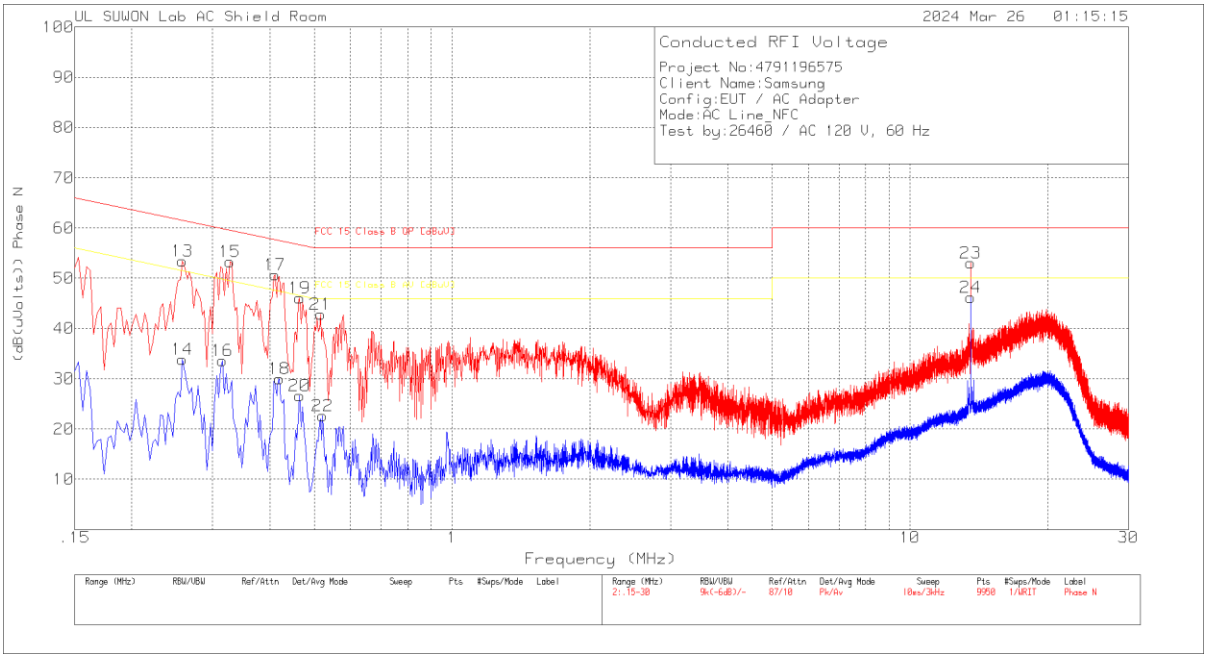
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.26025	40.68	Qp	9.6	.1	50.38	61.42	-11.04	-	-
.32415	39.04	Qp	9.7	.1	48.84	59.6	-10.76	-	-
.41175	36.77	Qp	9.8	.1	46.67	57.61	-10.94	-	-

Qp - Quasi-Peak detector

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.258	43.73	Pk	9.6	.1	53.43	61.5	-8.07	-	-
14	.258	24.19	Av	9.6	.1	33.89	-	-	51.5	-17.61
15	.327	43.46	Pk	9.7	.1	53.26	59.53	-6.27	-	-
16	.315	23.77	Av	9.7	.1	33.57	-	-	49.84	-16.27
17	.411	40.8	Pk	9.8	.1	50.7	57.63	-6.93	-	-
18	.42	20.04	Av	9.8	.1	29.94	-	-	47.45	-17.51
19	.465	36.15	Pk	9.8	.1	46.05	56.6	-10.55	-	-
20	.465	16.76	Av	9.8	.1	26.66	-	-	46.6	-19.94
21	.516	32.82	Pk	9.9	.1	42.82	56	-13.18	-	-
22	.522	12.68	Av	9.9	.1	22.68	-	-	46	-23.32
23	13.56	42.73	Pk	10	.3	53.03	60	-6.97	-	-
24	13.56	35.94	Av	10	.3	46.24	-	-	50	-3.76

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

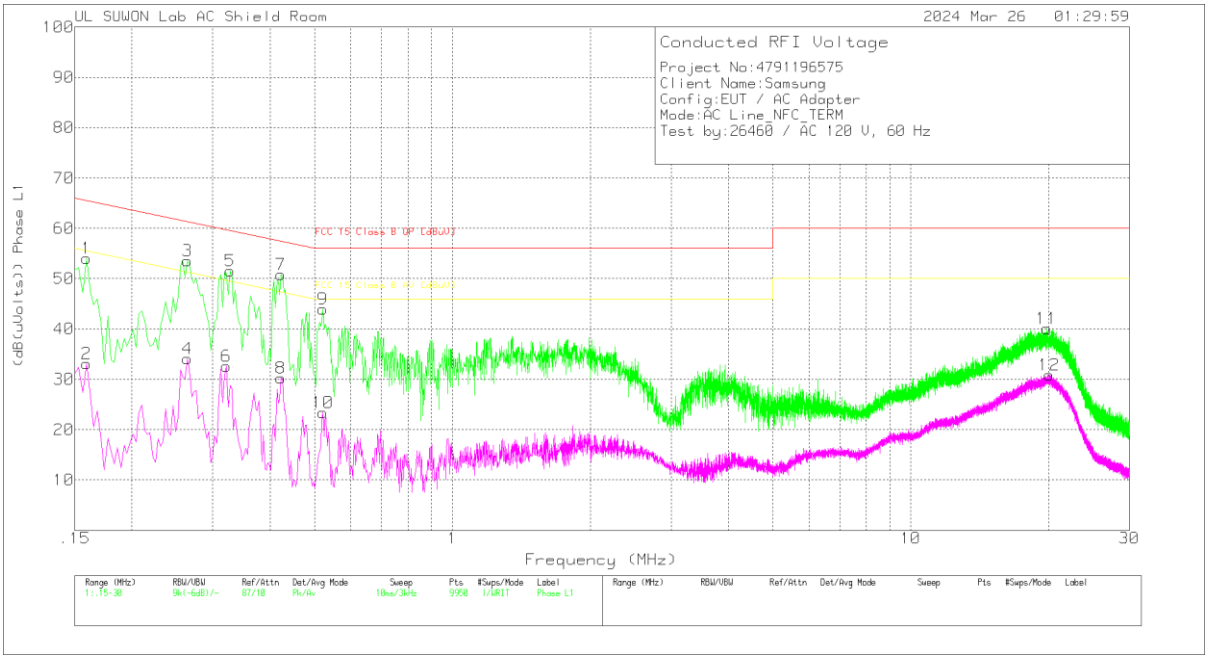
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.25875	40.91	Qp	9.6	.1	50.61	61.47	-10.86	-	-
.32625	39.46	Qp	9.7	.1	49.26	59.55	-10.29	-	-
.41175	37.16	Qp	9.8	.1	47.06	57.61	-10.55	-	-

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_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.159	44.19	Pk	9.8	.1	54.09	65.52	-11.43	-	-
2	.159	23.23	Av	9.8	.1	33.13	-	-	55.52	-22.39
3	.264	43.88	Pk	9.6	.1	53.58	61.3	-7.72	-	-
4	.264	24.39	Av	9.6	.1	34.09	-	-	51.3	-17.21
5	.327	41.8	Pk	9.7	.1	51.6	59.53	-7.93	-	-
6	.321	22.83	Av	9.7	.1	32.63	-	-	49.68	-17.05
7	.423	40.89	Pk	9.8	.1	50.79	57.39	-6.6	-	-
8	.423	20.34	Av	9.8	.1	30.24	-	-	47.39	-17.15
9	.522	33.97	Pk	9.9	.1	43.97	56	-12.03	-	-
10	.522	13.41	Av	9.9	.1	23.41	-	-	46	-22.59
11	19.806	29.59	Pk	10.2	.3	40.09	60	-19.91	-	-
12	20.034	20.34	Av	10.2	.3	30.84	-	-	50	-19.16

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.26325	36.4	Qp	9.6	.1	46.1	61.33	-15.23	-	-
.32775	30.05	Qp	9.7	.1	39.85	59.51	-19.66	-	-
.42375	38.5	Qp	9.8	.1	48.4	57.37	-8.97	-	-

Qp - Quasi-Peak detector

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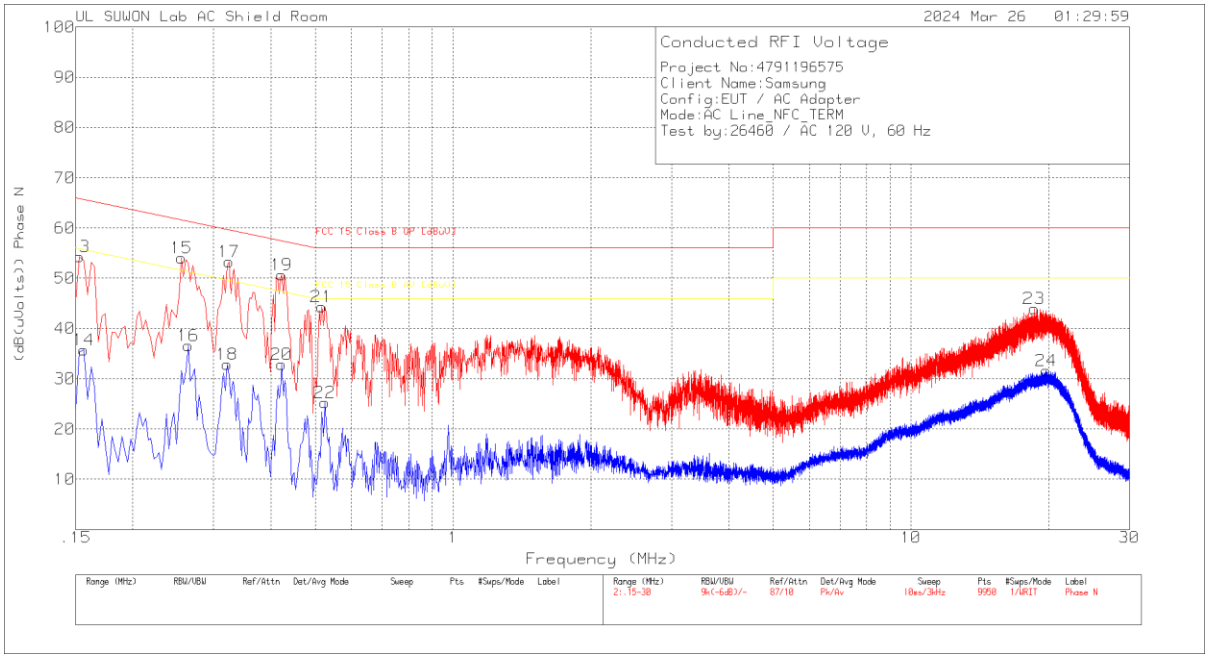
LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.153	44.37	Pk	9.8	.1	54.27	65.84	-11.57	-	-
14	.156	25.84	Av	9.8	.1	35.74	-	-	55.67	-19.93
15	.255	44.31	Pk	9.6	.1	54.01	61.59	-7.58	-	-
16	.264	26.91	Av	9.6	.1	36.61	-	-	51.3	-14.69
17	.324	43.51	Pk	9.7	.1	53.31	59.6	-6.29	-	-
18	.321	23.04	Av	9.7	.1	32.84	-	-	49.68	-16.84
19	.423	40.81	Pk	9.8	.1	50.71	57.39	-6.68	-	-
20	.423	23.01	Av	9.8	.1	32.91	-	-	47.39	-14.48
21	.516	34.38	Pk	9.9	.1	44.38	56	-11.62	-	-
22	.525	15.22	Av	9.9	.1	25.22	-	-	46	-20.78
23	18.561	33.45	Pk	10.2	.3	43.95	60	-16.05	-	-
24	19.752	20.99	Av	10.3	.3	31.59	-	-	50	-18.41

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading (dBuVolts)	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.25575	37.83	Qp	9.6	.1	47.53	61.57	-14.04	-	-
.32475	27.18	Qp	9.7	.1	36.98	59.58	-22.6	-	-
.42375	38.73	Qp	9.8	.1	48.63	57.37	-8.74	-	-

Qp - Quasi-Peak detector

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10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±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	2024-3-4
Test Engineer	51078

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir.	Frequency Deviation Measureed with Time Elapse								
(Vdc)	Temp (°C)	Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.88	50	13.559965161	-2.399	13.559960831	-2.719	13.559955287	-3.128	13.559952222	-3.354	100
3.88	40	13.559985379	-0.908	13.559980304	-1.283	13.559972850	-1.832	13.559967353	-2.238	100
3.88	30	13.559994057	-0.268	13.559991080	-0.488	13.559989031	-0.639	13.559987212	-0.773	100
3.88	***20***	***13.559997696***	***0.000***	***13.559997366***	***-0.024***	***13.559996530***	***-0.086***	***13.559996172***	***-0.112***	***100***
3.88	10	13.559989302	-0.619	13.560005923	0.607	13.560017831	1.485	13.560032035	2.532	100
3.88	0	13.560040851	3.183	13.560049438	3.816	13.560057232	4.391	13.560062582	4.785	100
3.88	-10	13.560069815	5.319	13.560071626	5.452	13.560073606	5.598	13.560074426	5.659	100
3.88	-20	13.560070825	5.393	13.560069434	5.290	13.560064704	4.942	13.560060219	4.611	100
3.88	-30	13.560052711	4.057	13.560046406	3.592	13.560031651	2.504	13.560016950	1.420	100

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir.	Frequency Deviation Measureed with Time Elapse								
(Vdc)	Temp (°C)	Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.70	20	13.559997640	-0.004	13.559997140	-0.041	13.559996232	-0.104	13.559995840	-0.133	100
3.88	***20***	***13.559997696***	***0.000***	***13.559997366***	***-0.024***	***13.559996530***	***-0.082***	***13.559996172***	***-0.108***	***100***
4.45	20	13.559997535	-0.012	13.559996535	-0.086	13.559996240	-0.103	13.559996050	-0.117	100

No non-compliance noted.

END OF TEST REPORT

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