

CERTIFICATION TEST REPORT

Report Number. : 4790976580-E10V1

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

Model : SC-51E, SCG25

FCC ID : A3LSMS921JPN

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

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

Date Of Issue:

2024-01-22

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2024-01-22	Initial issue	Dexter(Hyunsik) Yun

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 (0.15 – 30 MHz)	13
8.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz.....	14
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz	15
8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [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, NFC and WPT
MODEL NUMBER: SC-51E, SCG25
SERIAL NUMBER: R3CWB0FGX3Y (RADIATED)
DATE TESTED: 2023-12-11 ~ 2024-01-22

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
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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 47 CFR Part 2.
2. FCC 47 CFR 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	
<input type="checkbox"/>	Chamber 1(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

$$\begin{aligned} \text{Corrected Reading (dBuV)} &= \text{Meter Reading (dBuV)} + \text{External Cable (dB)} + \\ &\text{Cableloss (dB)} \\ 46.62 \text{ dBuV} + 9.8 \text{ dB} + 0.1 \text{ dB} &= 56.52 \text{ dBuV} \end{aligned}$$

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	2.80 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 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 Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.

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 and WPT. This test report addresses the DX (NFC) operational mode.

Representative model	Difference	Derivative model
		SCG25
SC-51E	Hardware	Same as SC-51E
	Software	Different UI

The model SC-51E 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 21.76 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	

The fundamental level of the EUT was investigated each type and bitrate. All test was performed worst case condition(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	R37W61WENTASEA	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02117A	N/A

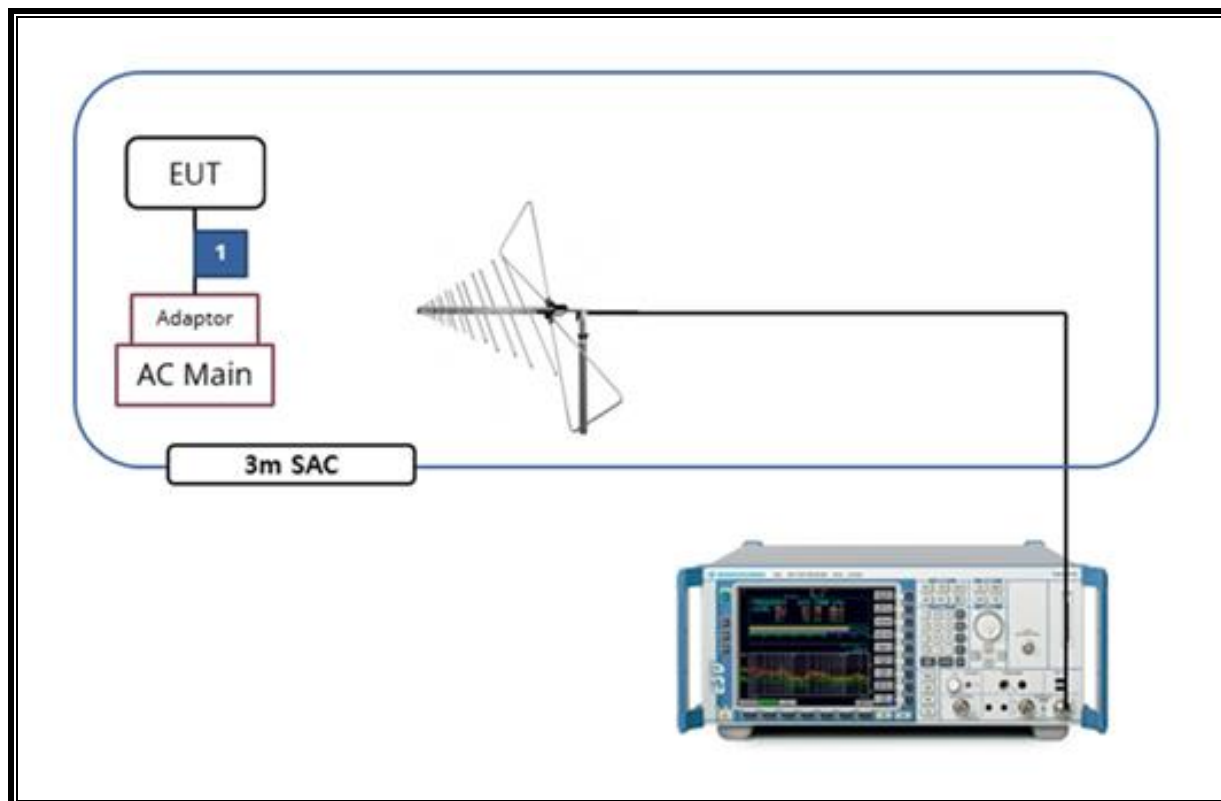
I/O CABLE

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	

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 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

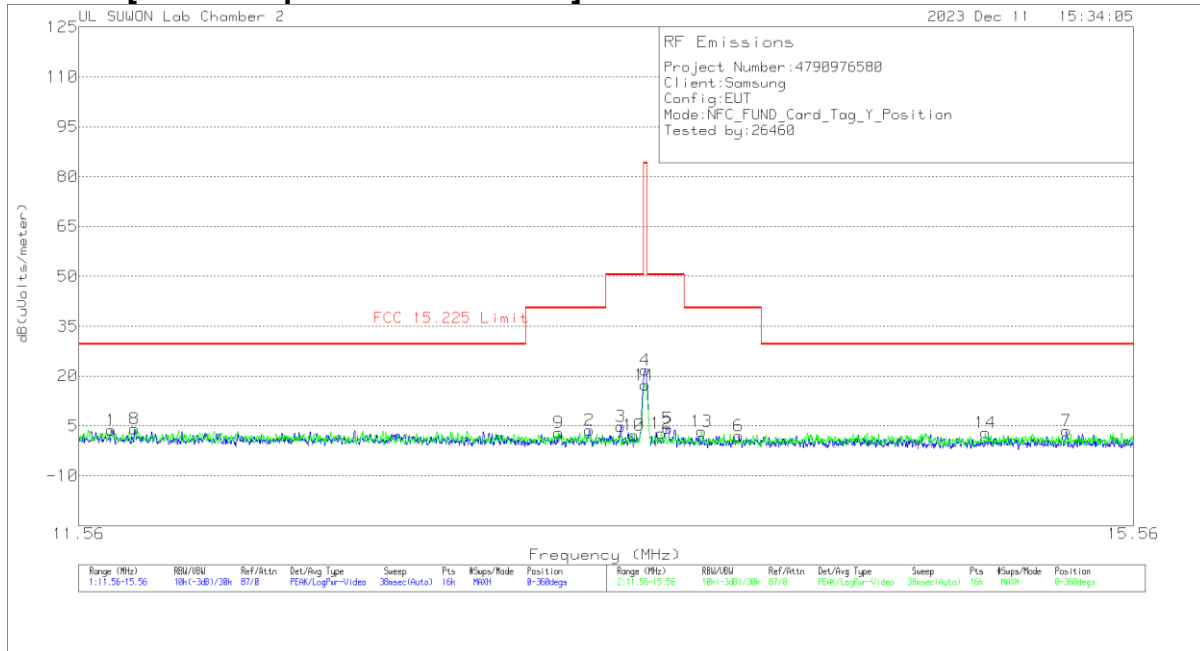
ANSI C63.10-2013

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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
1	11.66725	23.08	Pk	20.2	-40	.5	3.78	29.54	-25.76	0-360
2	13.34888	23.09	Pk	20.1	-40	.5	3.69	40.51	-36.82	0-360
3	13.46788	24.28	Pk	20.1	-40	.5	4.88	50.5	-45.62	0-360
**4	13.56	41.16	Pk	20.1	-40	.5	21.76	84	-62.24	0-360
5	13.64738	23.68	Pk	20.1	-40	.6	4.38	50.5	-46.12	0-360
6	13.92263	21.41	Pk	20.1	-40	.6	2.11	40.51	-38.4	0-360
7	15.26863	22.87	Pk	20.1	-40	.6	3.57	29.54	-25.97	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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
8	11.74238	23.33	Pk	20.2	-40	.5	4.03	29.54	-25.51	0-360
9	13.23288	22.43	Pk	20.1	-40	.5	3.03	40.51	-37.48	0-360
10	13.51813	21.64	Pk	20.1	-40	.5	2.24	50.5	-48.26	0-360
**11	13.55988	36.68	Pk	20.1	-40	.5	17.28	84	-66.72	0-360
12	13.62275	22.16	Pk	20.1	-40	.6	2.86	50.5	-47.64	0-360
13	13.77688	22.74	Pk	20.1	-40	.6	3.44	40.51	-37.07	0-360
14	14.92438	22.22	Pk	20.1	-40	.6	2.92	29.54	-26.62	0-360

Pk - Peak detector
 **Fundamental

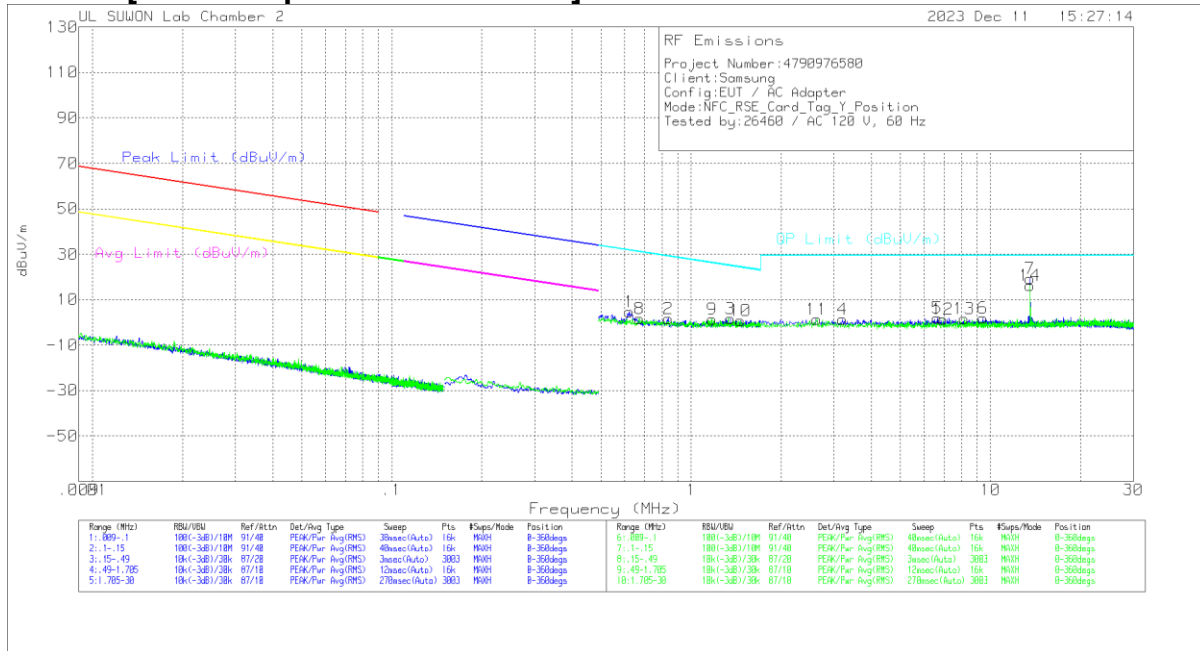
Note 1 : Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

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	.62129	24.47	Pk	20	.1	-40	4.57	31.74	-27.17	0-360
2	.83998	21.44	Pk	20	.2	-40	1.64	29.13	-27.49	0-360
3	1.35195	21.34	Pk	20	.2	-40	1.54	25.01	-23.47	0-360
4	3.20358	20.97	Pk	20.2	.3	-40	1.47	29.5	-28.03	0-360
5	6.62485	21.32	Pk	20.2	.4	-40	1.92	29.5	-27.58	0-360
6	9.41465	21.21	Pk	20.2	.5	-40	1.91	29.5	-27.59	0-360
**7	13.56165	38.63	Pk	20.1	.5	-40	19.23	29.5	-10.27	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	.67115	21.55	Pk	20	.1	-40	1.65	31.08	-29.43	0-360
9	1.17415	21.23	Pk	20	.2	-40	1.43	26.23	-24.8	0-360
10	1.46269	20.62	Pk	20	.2	-40	.82	24.33	-23.51	0-360
11	2.63336	20.97	Pk	20.2	.3	-40	1.47	29.5	-28.03	0-360
12	6.91703	20.83	Pk	20.2	.4	-40	1.43	29.5	-28.07	0-360
13	8.17998	21.06	Pk	20.2	.4	-40	1.66	29.5	-27.84	0-360
**14	13.56165	35.57	Pk	20.1	.5	-40	16.17	29.5	-13.33	0-360

Pk - Peak detector

**Fundamental

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

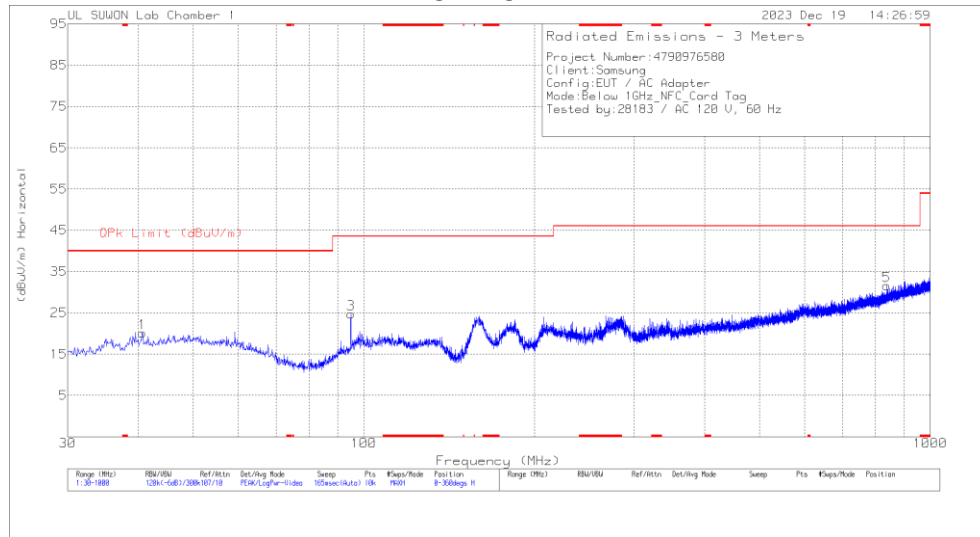
Please refer to section 8.1.1 about the fundamental level.

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

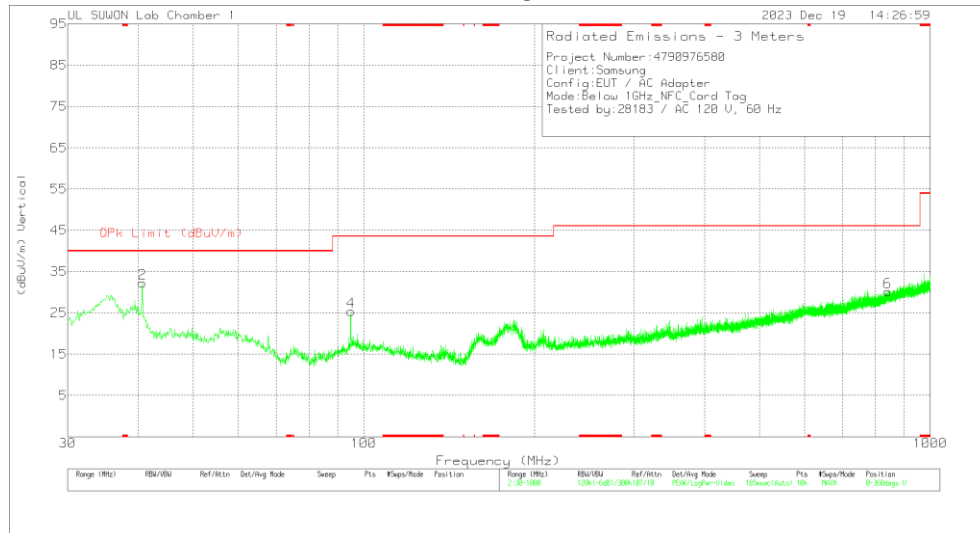
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

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

HORIZONTAL



VERTICAL

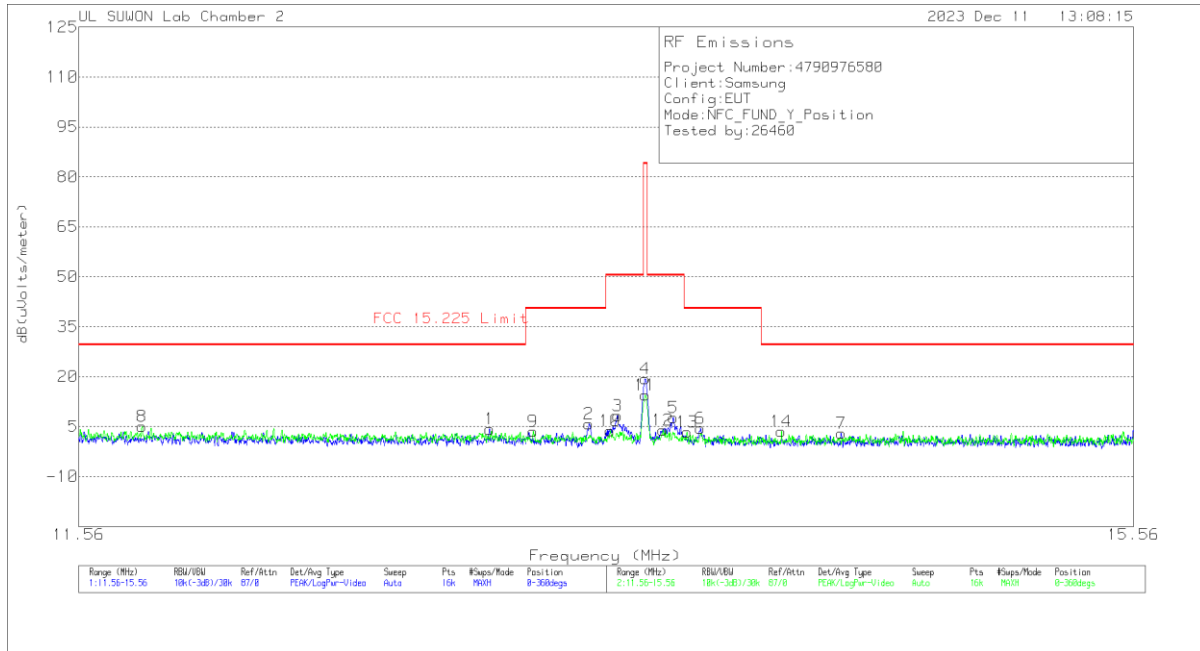


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	OPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.6215	32.67	Pk	18.6	-31.1	0	20.17	40	-19.83	0-360	200	H
2	40.67	44.7	Pk	18.6	-31.1	0	32.2	40	-7.8	0-360	200	V
3	94.893	38.31	Pk	16.7	-30.3	0	24.71	43.52	-18.81	0-360	200	H
4	94.893	38.97	Pk	16.7	-30.3	0	25.37	43.52	-18.15	0-360	200	V
5	837.04	31.19	Pk	26.3	-25.9	0	31.59	46.02	-14.43	0-360	300	H
6	841.599	29.52	Pk	26.4	-25.8	0	30.12	46.02	-15.9	0-360	200	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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
1	12.97838	23.61	Pk	20.1	-40	.5	4.21	29.54	-25.33	0-360
2	13.34763	25.28	Pk	20.1	-40	.5	5.88	40.51	-34.63	0-360
3	13.45438	27.68	Pk	20.1	-40	.5	8.28	50.5	-42.22	0-360
**4	13.56038	38.8	Pk	20.1	-40	.5	19.4	84	-64.6	0-360
5	13.66738	26.96	Pk	20.1	-40	.6	7.66	50.5	-42.84	0-360
6	13.77338	23.75	Pk	20.1	-40	.6	4.45	40.51	-36.06	0-360
7	14.33025	22.31	Pk	20.1	-40	.6	3.01	29.54	-26.53	0-360

Face off

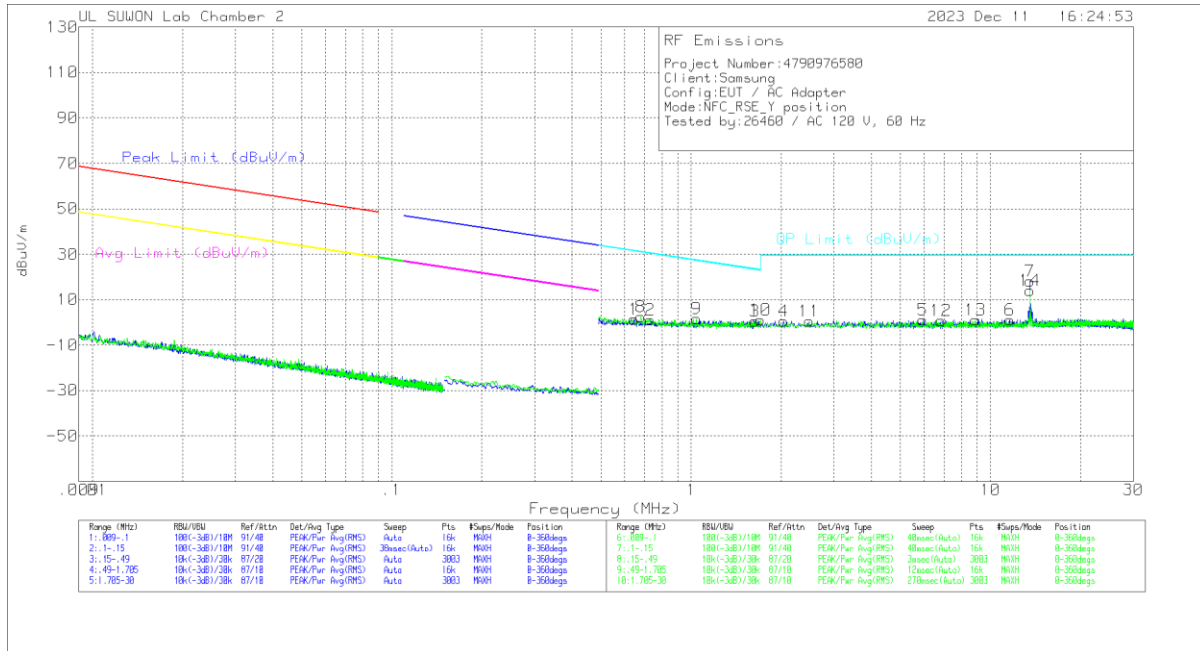
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m(dB)	Cable Loss (dB)	Corrected Reading (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
8	11.76813	24.43	Pk	20.2	-40	.5	5.13	29.54	-24.41	0-360
9	13.13938	22.88	Pk	20.1	-40	.5	3.48	40.51	-37.03	0-360
10	13.42788	23.17	Pk	20.1	-40	.5	3.77	50.5	-46.73	0-360
**11	13.56	33.85	Pk	20.1	-40	.5	14.45	84	-69.55	0-360
12	13.62838	23.29	Pk	20.1	-40	.6	3.99	50.5	-46.51	0-360
13	13.72113	22.66	Pk	20.1	-40	.6	3.36	40.51	-37.15	0-360
14	14.09113	22.83	Pk	20.1	-40	.6	3.53	29.54	-26.01	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	.64515	21.29	Pk	20	.1	-40	1.39	31.42	-30.03	0-360
2	.73058	20.95	Pk	20	.1	-40	1.05	30.34	-29.29	0-360
3	1.63133	20.3	Pk	20.1	.2	-40	.6	23.38	-22.78	0-360
4	2.03488	20.19	Pk	20.1	.2	-40	.49	29.5	-29.01	0-360
5	5.94625	20.45	Pk	20.2	.4	-40	1.05	29.5	-28.45	0-360
6	11.5824	20.48	Pk	20.2	.5	-40	1.18	29.5	-28.32	0-360
**7	13.56165	37.52	Pk	20.1	.5	-40	18.12	29.5	-11.38	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	.67882	22.43	Pk	20	.1	-40	2.53	30.98	-28.45	0-360
9	1.04111	21.39	Pk	20	.2	-40	1.59	27.27	-25.68	0-360
10	1.70125	20.68	Pk	20.1	.2	-40	.98	23.02	-22.04	0-360
11	2.47785	20.06	Pk	20.1	.3	-40	.46	29.5	-29.04	0-360
12	6.82278	20.19	Pk	20.2	.4	-40	.79	29.5	-28.71	0-360
13	8.89628	20.45	Pk	20.2	.5	-40	1.15	29.5	-28.35	0-360
**14	13.56165	33.53	Pk	20.1	.5	-40	14.13	29.5	-15.37	0-360

Pk - Peak detector

**Fundamental

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

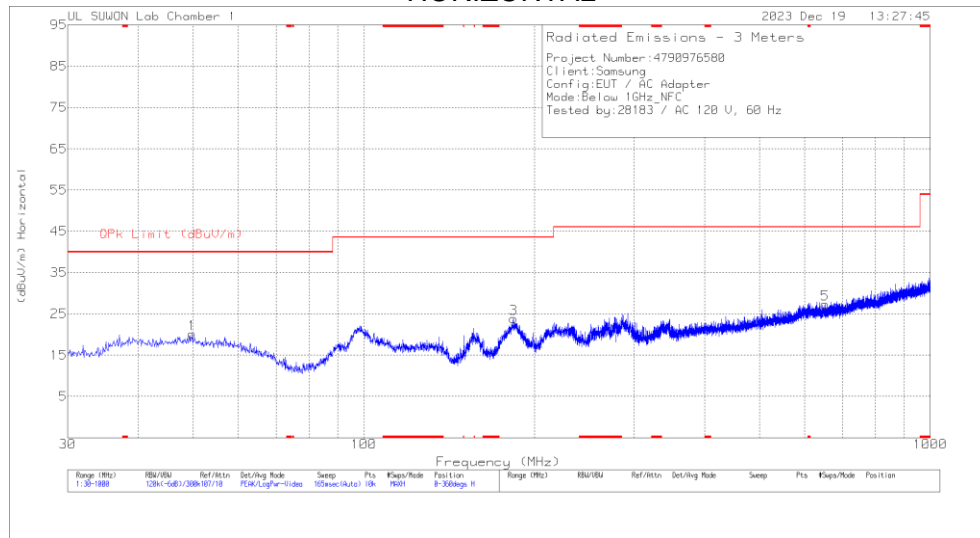
Please refer to section 8.1.4 about the fundamental level.

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

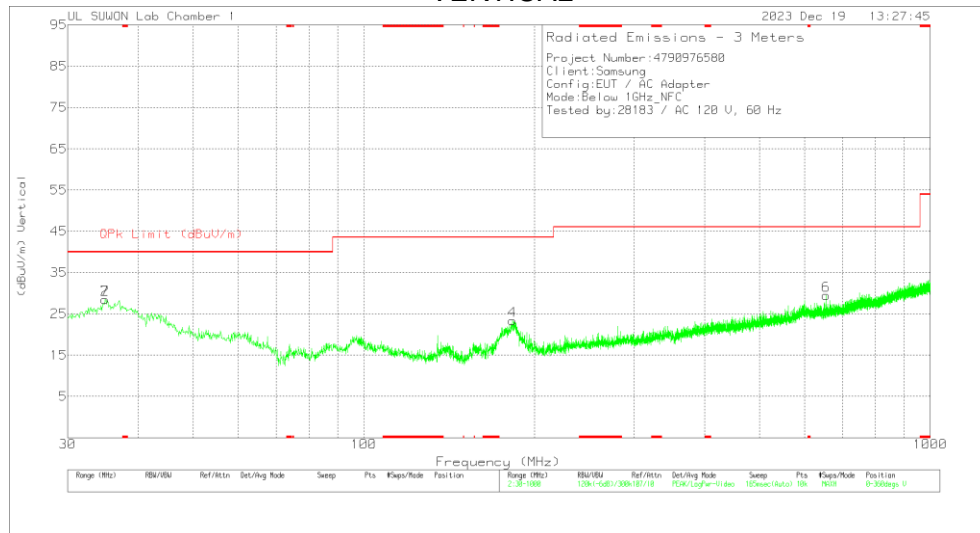
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

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 Correction Factor (dB/m)	Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	OPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	49.788	31.3	Pk	19.6	-30.8	0	20.1	40	-19.9	0-360	100	H
2	34.947	43.17	Pk	16.5	-31.2	0	28.47	40	-11.53	0-360	200	V
3	183.648	37.75	Pk	15.5	-29.4	0	23.85	43.52	-19.67	0-360	100	H
4	183.163	37.32	Pk	15.5	-29.4	0	23.42	43.52	-20.1	0-360	200	V
5	651.867	29.93	Pk	24.3	-26.9	0	27.33	46.02	-18.69	0-360	300	H
6	654.486	32.2	Pk	24.3	-27	0	29.5	46.02	-16.52	0-360	400	V
7	34.947	43.17	Pk	16.5	-31.2	0	28.47	40	-11.53	0-360	200	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 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.

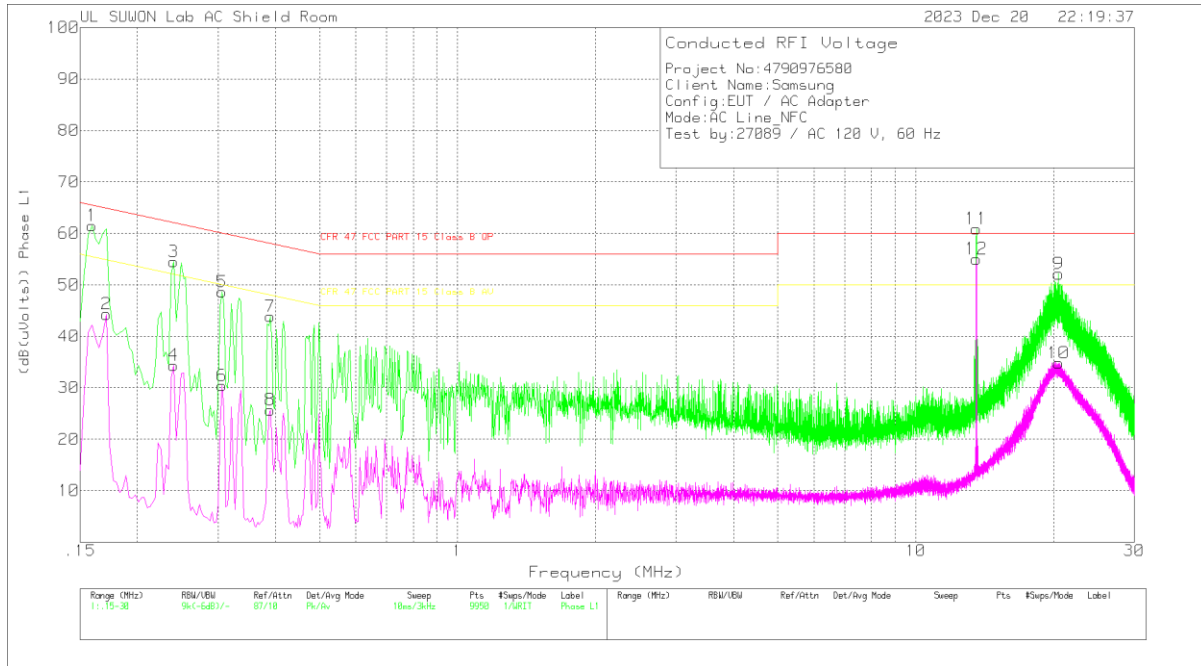
Line conducted data is recorded for both NEUTRAL and HOT lines.

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_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
1	.159	51.92	Pk	9.5	.1	61.52	65.52	-4	-	-
2	.171	34.6	Av	9.5	.2	44.3	-	-	54.91	-10.61
3	.24	44.79	Pk	9.5	.2	54.49	62.1	-7.61	-	-
4	.24	24.67	Av	9.5	.2	34.37	-	-	52.1	-17.73
5	.306	38.93	Pk	9.5	.2	48.63	60.08	-11.45	-	-
6	.306	20.71	Av	9.5	.2	30.41	-	-	50.08	-19.67
7	.39	34.17	Pk	9.5	.2	43.87	58.06	-14.19	-	-
8	.39	15.99	Av	9.5	.2	25.69	-	-	48.06	-22.37
9	20.499	42.13	Pk	9.6	.4	52.13	60	-7.87	-	-
10	20.499	24.81	Av	9.6	.4	34.81	-	-	50	-15.19
11	13.56	50.89	Pk	9.6	.4	60.89	60	.89	-	-
12	13.56	45.01	Av	9.6	.4	55.01	-	-	50	5.01

Pk - Peak detector

Av - Average detection

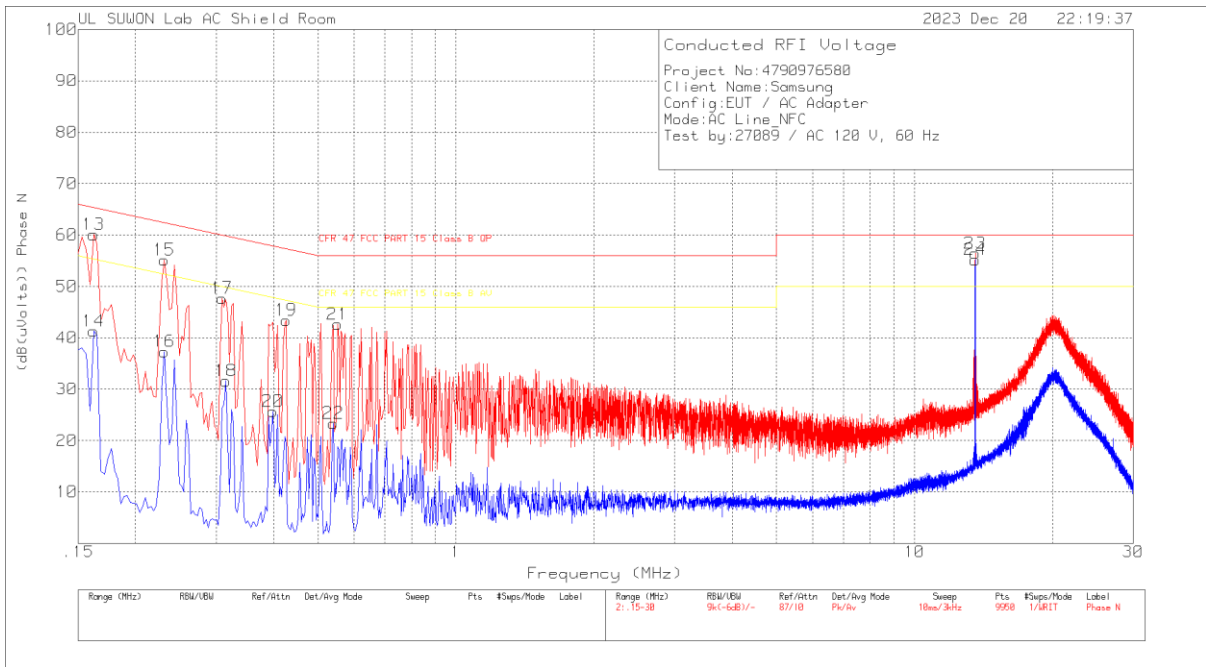
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.15825	43.74	Qp	9.5	.1	53.34	65.56	-12.22	-	-
.23925	36.6	Qp	9.5	.2	46.3	62.12	-15.82	-	-
20.4992	29.2	Qp	9.6	.4	39.2	60	-20.8	-	-

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_AU TO_Width EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
13	.162	50.48	Pk	9.5	.1	60.08	65.36	-5.28	-	-
14	.162	31.69	Av	9.5	.1	41.29	-	-	55.36	-14.07
15	.231	45.42	Pk	9.5	.2	55.12	62.41	-7.29	-	-
16	.231	27.62	Av	9.5	.2	37.32	-	-	52.41	-15.09
17	.309	37.97	Pk	9.5	.2	47.67	60	-12.33	-	-
18	.315	21.9	Av	9.5	.2	31.6	-	-	49.84	-18.24
19	.426	33.72	Pk	9.5	.2	43.42	57.33	-13.91	-	-
20	.399	15.98	Av	9.5	.2	25.68	-	-	47.87	-22.19
21	.552	32.82	Pk	9.6	.2	42.62	56	-13.38	-	-
22	.54	13.56	Av	9.6	.2	23.36	-	-	46	-22.64
23	13.56	46.46	Pk	9.6	.4	56.46	60	-3.54	-	-
24	13.56	45.19	Av	9.6	.4	55.19	-	-	50	5.19

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

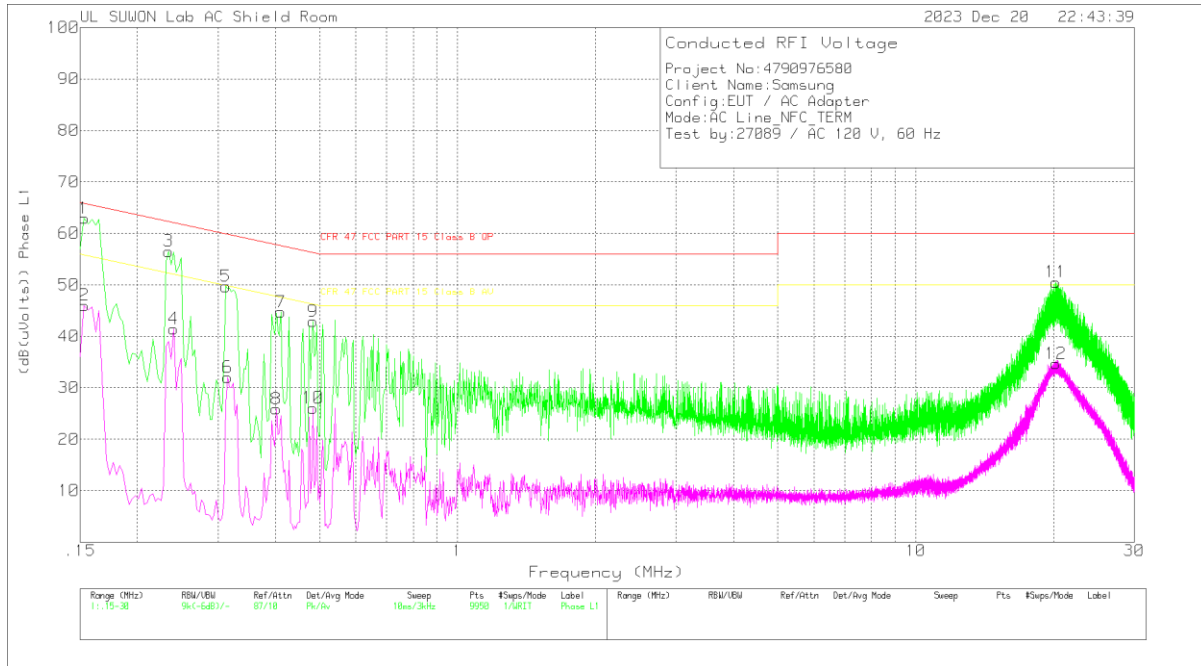
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_Width EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.16125	42.02	Qp	9.5	.1	51.62	65.4	-13.78	-	-
.23025	41.89	Qp	9.5	.2	51.59	62.44	-10.85	-	-

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_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
1	.153	53.34	Pk	9.5	.1	62.94	65.84	-2.9	-	-
2	.153	36.41	Av	9.5	.1	46.01	-	-	55.84	-9.83
3	.234	46.82	Pk	9.5	.2	56.52	62.31	-5.79	-	-
4	.24	31.75	Av	9.5	.2	41.45	-	-	52.1	-10.65
5	.312	39.99	Pk	9.5	.2	49.69	59.92	-10.23	-	-
6	.315	22.33	Av	9.5	.2	32.03	-	-	49.84	-17.81
7	.411	35.01	Pk	9.5	.2	44.71	57.63	-12.92	-	-
8	.402	16.18	Av	9.5	.2	25.88	-	-	47.81	-21.93
9	.483	33.19	Pk	9.5	.2	42.89	56.29	-13.4	-	-
10	.483	16.35	Av	9.5	.2	26.05	-	-	46.29	-20.24
11	20.22	40.53	Pk	9.6	.4	50.53	60	-9.47	-	-
12	20.202	24.67	Av	9.6	.4	34.67	-	-	50	-15.33

Pk - Peak detector

Av - Average detection

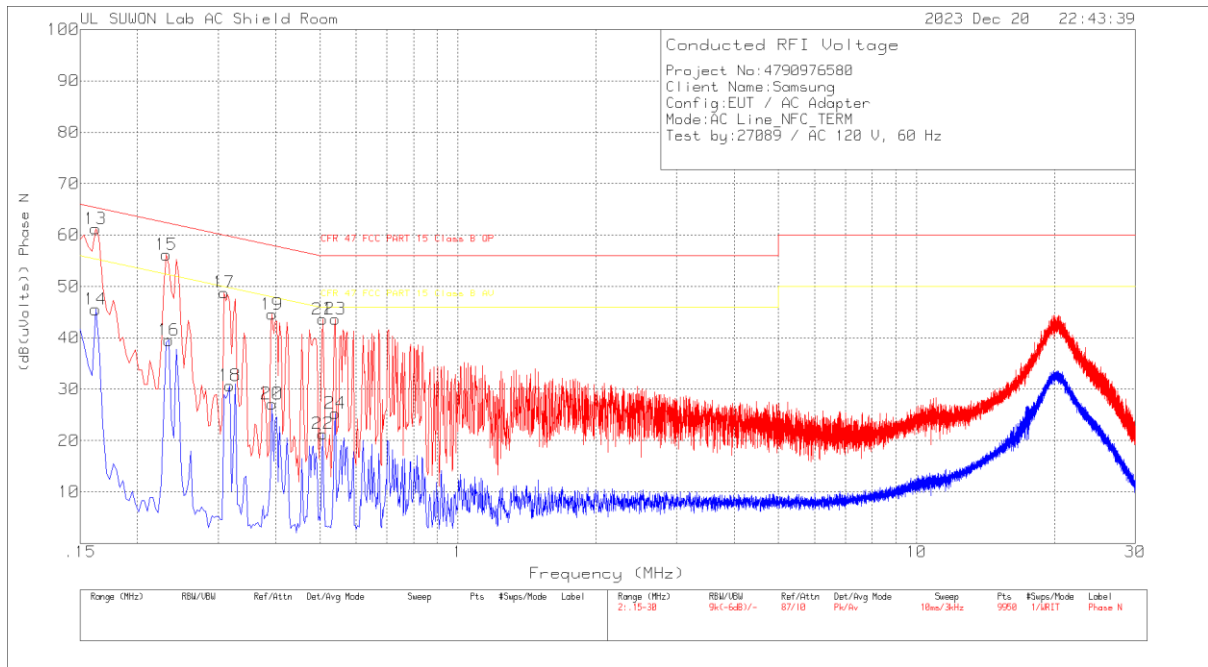
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.15225	46.94	Qp	9.5	.1	56.54	65.88	-9.34	-	-
.23325	41.23	Qp	9.5	.2	50.93	62.33	-11.4	-	-
20.2208	29.83	Qp	9.6	.4	39.83	60	-20.17	-	-

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_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
13	.162	51.62	Pk	9.5	.1	61.22	65.36	-4.14	-	-
14	.162	35.93	Av	9.5	.1	45.53	-	-	55.36	-9.83
15	.231	46.47	Pk	9.5	.2	56.17	62.41	-6.24	-	-
16	.234	29.84	Av	9.5	.2	39.54	-	-	52.31	-12.77
17	.309	39.12	Pk	9.5	.2	48.82	60	-11.18	-	-
18	.318	21	Av	9.5	.2	30.7	-	-	49.76	-19.06
19	.393	34.9	Pk	9.5	.2	44.6	58	-13.4	-	-
20	.393	17.46	Av	9.5	.2	27.16	-	-	48	-20.84
21	.507	33.81	Pk	9.6	.2	43.61	56	-12.39	-	-
22	.507	11.5	Av	9.6	.2	21.3	-	-	46	-24.7
23	.54	33.86	Pk	9.6	.2	43.66	56	-12.34	-	-
24	.54	15.5	Av	9.6	.2	25.3	-	-	46	-20.7

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	47 CFR FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	47 CFR FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.16125	43.3	Qp	9.5	.1	52.9	65.4	-12.5	-	-
.23025	42.2	Qp	9.5	.2	51.9	62.44	-10.54	-	-

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	2024-1-11
Test Engineer	25546

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	13.559967532	-0.118	13.559965332	-0.280	13.559961945	-0.530	13.559960410	-0.643	100
3.88	40	13.559961012	-0.599	13.559961333	-0.575	13.559961178	-0.586	13.559961425	-0.568	100
3.88	30	13.559965095	-0.297	13.559966923	-0.163	13.559970188	0.078	13.559967376	-0.129	100
3.88	20	13.559969128	0.000	13.559970978	0.136	13.559972678	0.262	13.559970627	0.111	100
3.88	10	13.559985887	1.236	13.559995161	1.920	13.560002085	2.430	13.560006272	2.739	100
3.88	0	13.560043112	5.456	13.560046818	5.729	13.560048167	5.829	13.560049050	5.894	100
3.88	-10	13.560052570	6.154	13.560052907	6.178	13.560053774	6.242	13.560054428	6.291	100
3.88	-20	13.560047789	5.801	13.560042115	5.383	13.560037832	5.067	13.560035516	4.896	100
3.88	-30	13.560012669	3.211	13.560001183	2.364	13.559993378	1.788	13.559989557	1.507	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	13.560006010	2.720	13.560002722	2.477	13.560000504	2.314	13.559997642	2.103	100
3.88	20	13.559969128	0.000	13.559970978	0.136	13.559972678	0.262	13.559970627	0.111	100
4.45	20	13.559987735	1.372	13.559985797	1.229	13.559986630	1.291	13.559984361	1.123	100

No non-compliance noted.

END OF TEST REPORT