



CERTIFICATION TEST REPORT

Report Number. : 4790541052-E8V2

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

Model : SM-S918B/DS, SM-S918B

FCC ID : A3LSMS918B

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:

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2022-10-28	Initial issue	Yeonhee Lim
V2	2022-11-09	Updated to address TCB's question	Yeonhee Lim

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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-S918B/DS, SM-S918B
SERIAL NUMBER: R3CT70824QW (Radiated);
DATE TESTED: 2022-09-28 ~ 2022-11-09;

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

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:



Yeonhee Lim
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	
<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	3.02 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.72 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 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 115:2007.

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

This report covers the Samsung models SM-S918B/DS and SM-S918B. These models are identical in hardware except SM-S918B has single SIM tray. With some pre-scan, model SM-S918B/DS was set for final test.

5.2. MAXIMUM E-FIELD STRENGTH

Fundamental Frequency (MHz)	Mode	E-Field (30m distance) FCC (dBuV/m)
13.56	without tag mode	21.48
	with tag mode	22.73

5.3. WORST-CASE CONFIGURATION AND MODE

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

The NFC with tag mode's fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Y orientation was the worst-case orientation; therefore radiated testing was reported with the EUT in the Y orientation while generating continuous emissions.

The NFC without tag mode's fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Y orientation was the worst-case orientation; therefore radiated testing was reported with the EUT in the Y orientation while generating continuous emissions.

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	R37R38J4A28SE3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-021111ABBE	N/A
NFC Check card	SHINHAN	N/A	N/A	N/A

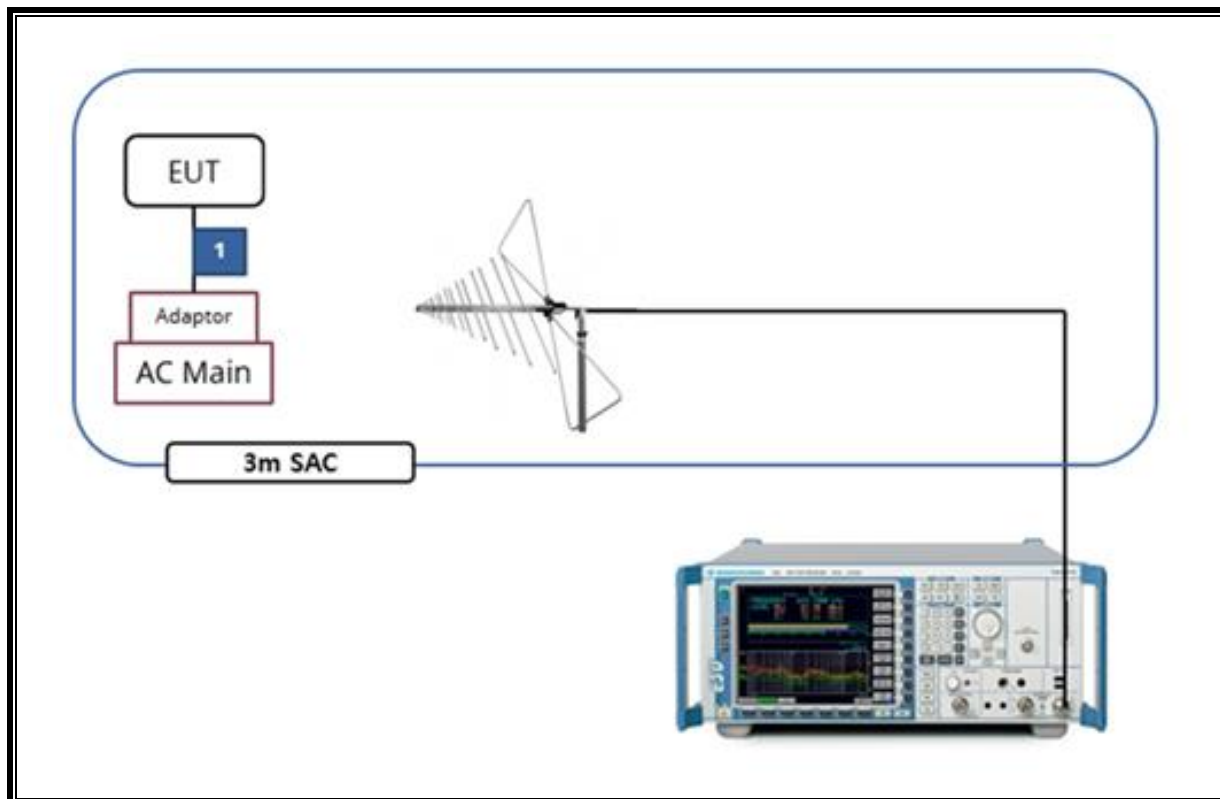
I/O CABLE

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.

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)



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	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2023-08-01
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2023-08-01
DC Power Supply	Agilent / HP	E3640A	MY54226395	2023-08-02
Temperature Chamber	ESPEC	SH-642	93001109	2023-08-01
LISN	R&S	ENV216	101837	2023-08-04
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Spectrum Analyzer	R&S	FSW50	101538	2023-01-18
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

6. 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 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

Frequency [MHz]	20 dB Bandwidth [kHz]
13.56	437.28

20dB Bandwidth Plot



7. RADIATED EMISSION TEST RESULTS

7.1. 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 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

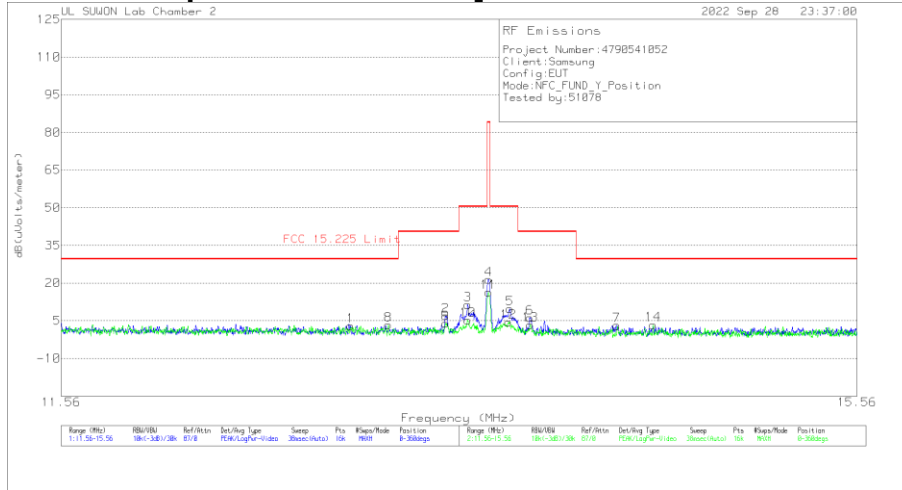
The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

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

[EUT without passive TAG mode]



Trace Markers
 Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
1	12.87913	22.46	Pk	20	-40	.5	2.96	29.54	-26.58	0-360
2	13.34463	26.39	Pk	20	-40	.5	6.89	40.51	-33.62	0-360
3	13.45488	30.87	Pk	20	-40	.5	11.37	50.5	-39.13	0-360
**4	13.56025	40.98	Pk	20	-40	.5	21.48	84	-62.52	0-360
5	13.668	29.21	Pk	20	-40	.6	9.81	50.5	-40.69	0-360
6	13.77063	25.65	Pk	20	-40	.6	6.25	40.51	-34.26	0-360
7	14.22513	22.48	Pk	20	-40	.6	3.08	29.54	-26.46	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
8	13.06213	22.93	Pk	20	-40	.5	3.43	29.54	-26.11	0-360
9	13.34525	23.41	Pk	20	-40	.5	3.91	40.51	-36.6	0-360
10	13.45463	24.67	Pk	20	-40	.5	5.17	50.5	-45.33	0-360
**11	13.56025	35.94	Pk	20	-40	.5	16.44	84	-67.56	0-360
12	13.66213	23.83	Pk	20	-40	.6	4.43	50.5	-46.07	0-360
13	13.77363	22.69	Pk	20	-40	.6	3.29	40.51	-37.22	0-360
14	14.41963	22.85	Pk	20	-40	.6	3.45	29.54	-26.09	0-360

Pk - Peak detector
 **Fundamental

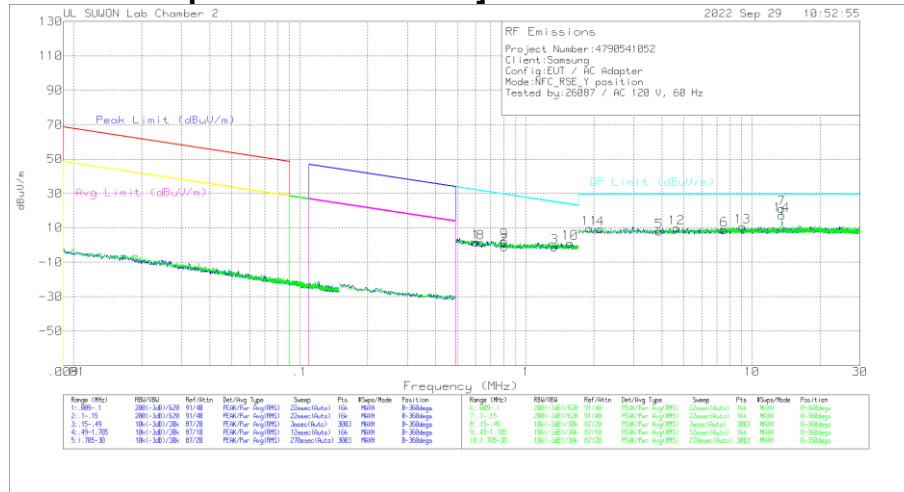
Note 1 : Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

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.

7.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz

[EUT without passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.59906	21.79	Pk	19.7	.1	-40	1.59	32.06	-30.47	0-360
2	.80236	18.92	Pk	19.8	.2	-40	-1.08	29.53	-30.61	0-360
3	1.33683	18.99	Pk	19.8	.2	-40	-1.01	25.11	-26.12	0-360
4	2.13855	29.22	Pk	19.9	.2	-40	9.32	29.5	-20.18	0-360
5	3.88218	27.82	Pk	19.9	.3	-40	8.02	29.5	-21.48	0-360
6	7.53908	28.4	Pk	19.9	.4	-40	8.7	29.5	-20.8	0-360
**7	13.56165	40.6	Pk	20	.5	-40	21.1	29.5	-8.4	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.63189	21.59	Pk	19.7	.1	-40	1.39	31.6	-30.21	0-360
9	.80217	22.22	Pk	19.8	.2	-40	2.22	29.53	-27.31	0-360
10	1.56787	21.24	Pk	19.8	.2	-40	1.24	23.73	-22.49	0-360
11	1.91235	29.77	Pk	19.8	.2	-40	9.77	29.5	-19.73	0-360
12	4.63618	29.81	Pk	19.8	.3	-40	9.91	29.5	-19.59	0-360
13	9.07535	30.29	Pk	20	.5	-40	10.79	29.5	-18.71	0-360
**14	13.56165	36.82	Pk	20	.5	-40	17.32	29.5	-12.18	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.

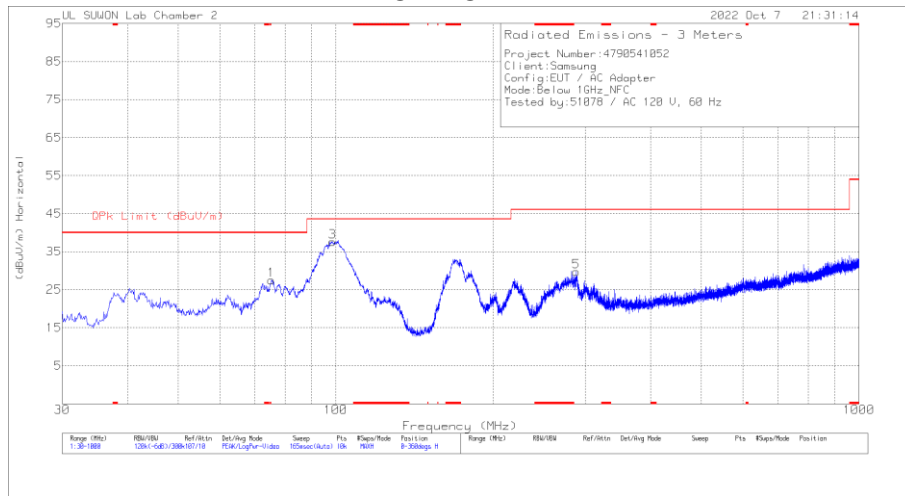
Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

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.

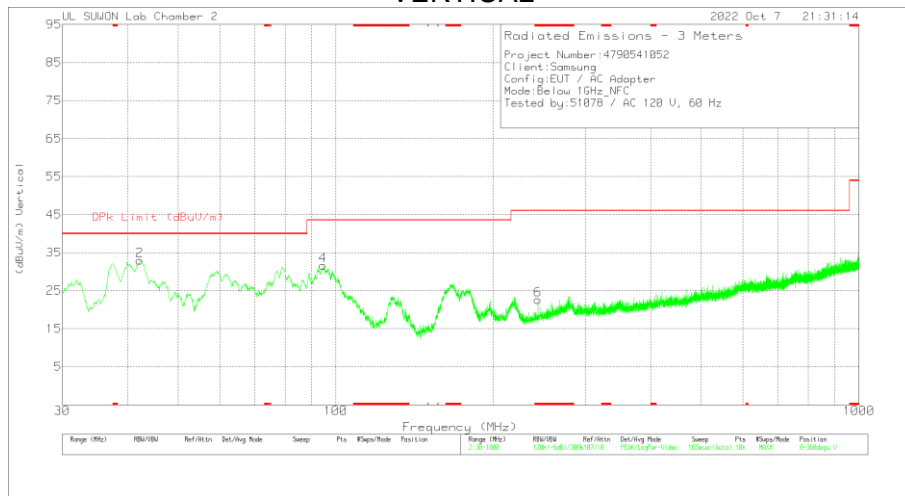
7.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

[EUT without passive TAG mode]

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	75.396	44.78	Pk	13.5	-30.8	27.48	40	-12.52	0-360	100	H
3	98.482	51	Pk	17.2	-30.6	37.6	43.52	-5.92	0-360	200	H
5	288.408	39.77	Pk	19	-29	29.77	46.02	-16.25	0-360	100	H
2	42.222	45.02	Pk	19.3	-31.4	32.92	40	-7.08	0-360	100	V
4	94.602	45.65	Pk	16.5	-30.6	31.55	43.52	-11.97	0-360	100	V
6	* 243.4	33.71	Pk	18.3	-29.4	22.61	46.02	-23.41	0-360	100	V

Pk - Peak detector

7.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [EUT with passive TAG mode]



Trace Markers
 Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
1	12.39163	22.63	Pk	20	-40	.5	3.13	29.54	-26.41	0-360
2	13.35113	23.64	Pk	20	-40	.5	4.14	40.51	-36.37	0-360
3	13.44588	26.44	Pk	20	-40	.5	6.94	50.5	-43.56	0-360
**4	13.56038	42.23	Pk	20	-40	.5	22.73	84	-61.27	0-360
5	13.62938	25.8	Pk	20	-40	.6	6.4	50.5	-44.1	0-360
6	13.71688	22.74	Pk	20	-40	.6	3.34	40.51	-37.17	0-360
7	14.97438	22.4	Pk	20	-40	.6	3	29.54	-26.54	0-360

Face off

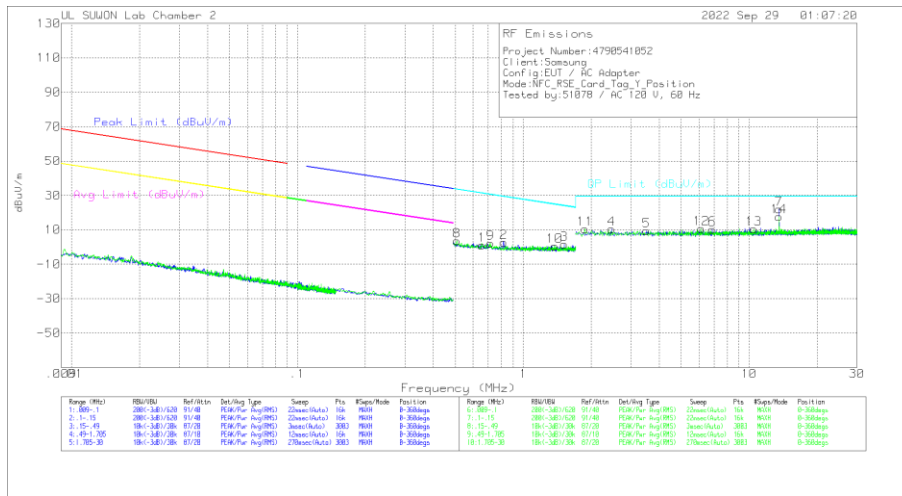
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
8	12.30013	22.99	Pk	20	-40	.5	3.49	29.54	-26.05	0-360
9	13.321	22.35	Pk	20	-40	.5	2.85	40.51	-37.66	0-360
10	13.45138	22.11	Pk	20	-40	.5	2.61	50.5	-47.89	0-360
**11	13.56	37.18	Pk	20	-40	.5	17.68	84	-66.32	0-360
12	13.6685	21.48	Pk	20	-40	.6	2.08	50.5	-48.42	0-360
13	13.79313	21.74	Pk	20	-40	.6	2.34	40.51	-38.17	0-360
14	14.03663	21.66	Pk	20	-40	.6	2.26	29.54	-27.28	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.

7.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT with passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.65492	21.23	Pk	19.7	.1	-40	1.03	31.29	-30.26	0-360
2	.81878	22.66	Pk	19.8	.2	-40	2.66	29.35	-26.69	0-360
3	1.51824	21.6	Pk	19.8	.2	-40	1.6	24	-22.4	0-360
4	2.459	30.34	Pk	19.9	.2	-40	10.44	29.5	-19.06	0-360
5	3.5146	29.23	Pk	19.9	.3	-40	9.43	29.5	-20.07	0-360
6	6.86048	30.03	Pk	19.9	.4	-40	10.33	29.5	-19.17	0-360
**7	13.56165	41.48	Pk	20	.5	-40	21.98	29.5	-7.52	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.50851	23.67	Pk	19.7	.1	-40	3.47	33.48	-30.01	0-360
9	.71416	22.5	Pk	19.7	.1	-40	2.3	30.54	-28.24	0-360
10	1.3754	20.48	Pk	19.8	.2	-40	.48	24.86	-24.38	0-360
11	1.87465	30.39	Pk	19.8	.2	-40	10.39	29.5	-19.11	0-360
12	6.14418	30.6	Pk	19.8	.4	-40	10.8	29.5	-18.7	0-360
13	10.4891	29.91	Pk	20	.5	-40	10.41	29.5	-19.09	0-360
**14	13.56165	37.22	Pk	20	.5	-40	17.72	29.5	-11.78	0-360

Pk - Peak detector

**Fundamental

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

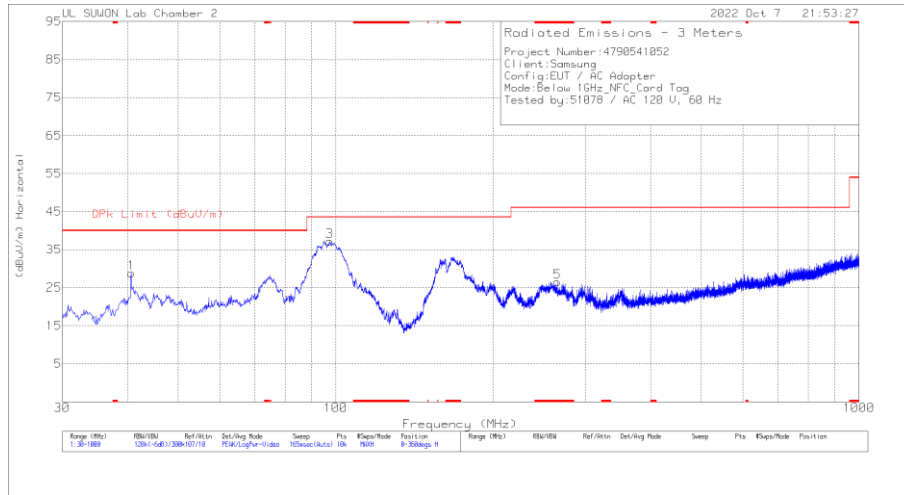
Please refer to section 8.1.4 about the fundamental level.

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.

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

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	41.31	Pk	18.9	-31.4	28.81	40	-11.19	0-360	200	H
3	97.318	50.75	Pk	17	-30.6	37.15	43.52	-6.37	0-360	200	H
5	* 265.031	37.47	Pk	18.3	-29.3	26.47	46.02	-19.55	0-360	100	H
2	40.67	49.46	Pk	18.9	-31.4	36.96	40	-3.04	0-360	100	V
4	91.983	47.14	Pk	16.3	-30.6	32.84	43.52	-10.68	0-360	100	V
6	458.934	31.31	Pk	21.8	-28.3	24.81	46.02	-21.21	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	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
97.318	45.32	Qp	17	-30.6	31.72	43.52	-11.8	146	294	H
40.67	45.72	Qp	18.9	-31.4	33.22	40	-6.78	232	101	V

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

Qp - Quasi-Peak detector

8. 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.

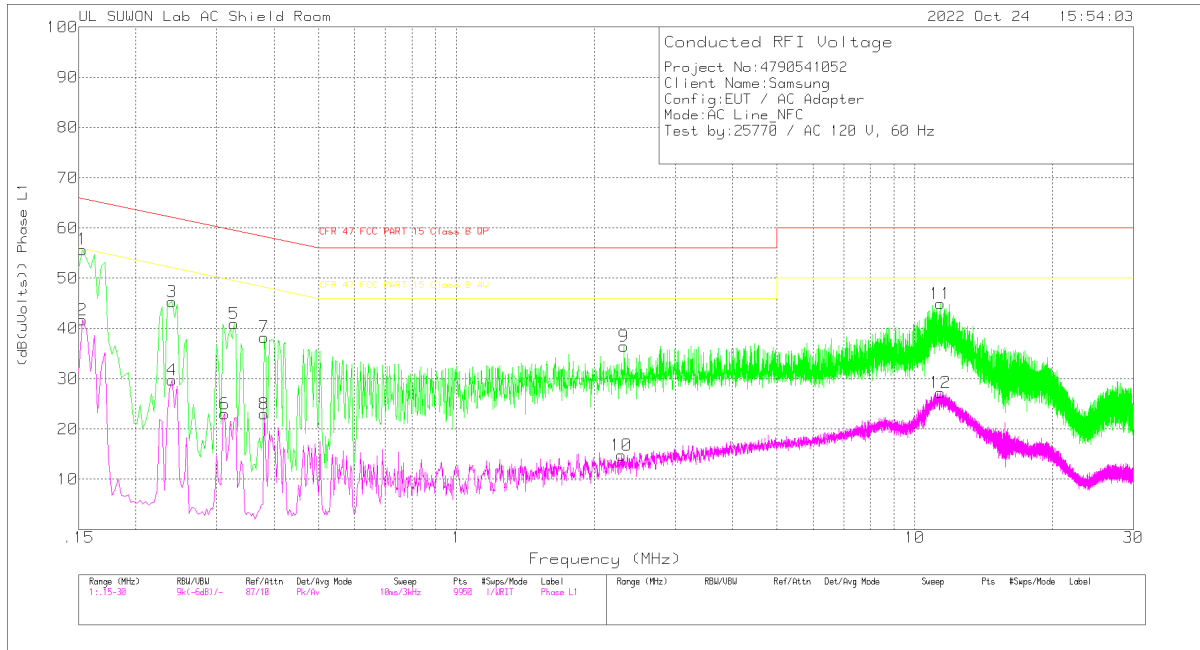
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

The EUT belongs to Test Case with Tag mode

WORST EMISSIONS(Terminated EUT's loop antenna)

LINE 1 PLOT



LINE 1 RESULTS

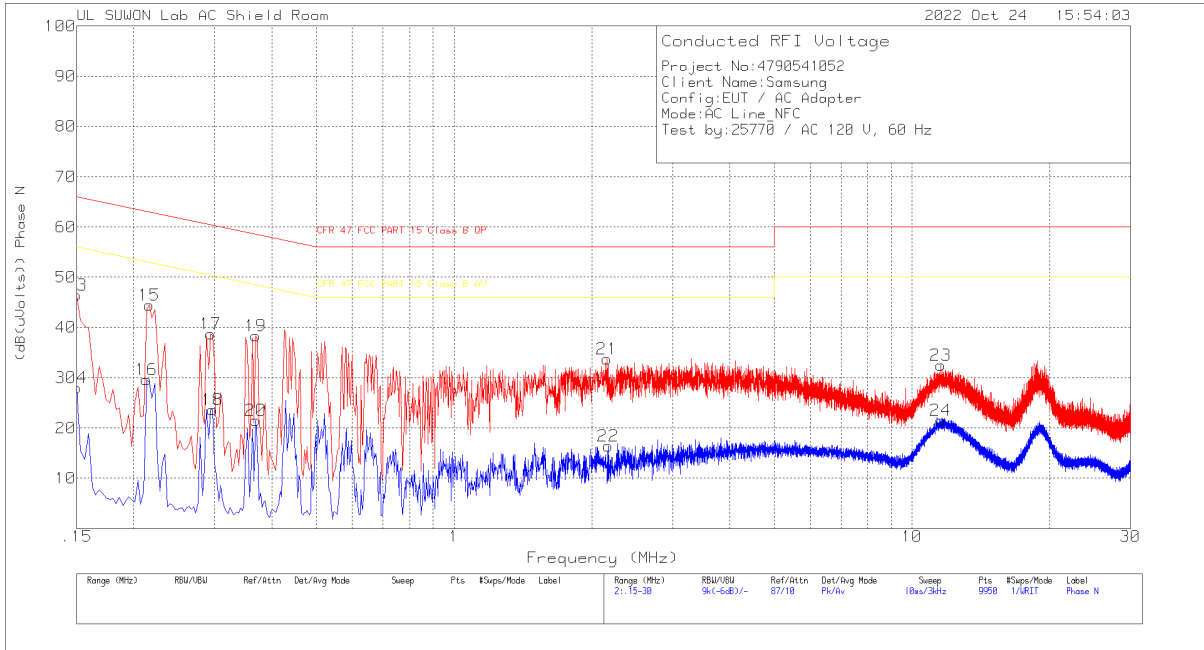
Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency(MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.153	45.83	Pk	9.8	.1	55.73	65.84	-10.11	-	-
2	.153	31.79	Av	9.8	.1	41.69	-	-	55.84	-14.15
3	.24	35.4	Pk	9.7	.2	45.3	62.1	-16.8	-	-
4	.24	19.79	Av	9.7	.2	29.69	-	-	52.1	-22.41
5	.327	31.06	Pk	9.7	.2	40.96	59.53	-18.57	-	-
6	.312	13.11	Av	9.7	.2	23.01	-	-	49.92	-26.91
7	.381	28.28	Pk	9.8	.2	38.28	58.26	-19.98	-	-
8	.381	13.03	Av	9.8	.2	23.03	-	-	48.26	-25.23
9	2.322	26.47	Pk	9.7	.3	36.47	56	-19.53	-	-
10	2.289	4.78	Av	9.7	.3	14.78	-	-	46	-31.22
11	11.388	34.74	Pk	9.9	.3	44.94	60	-15.06	-	-
12	11.364	17.05	Av	9.9	.3	27.25	-	-	50	-22.75

Pk - Peak detector
 Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

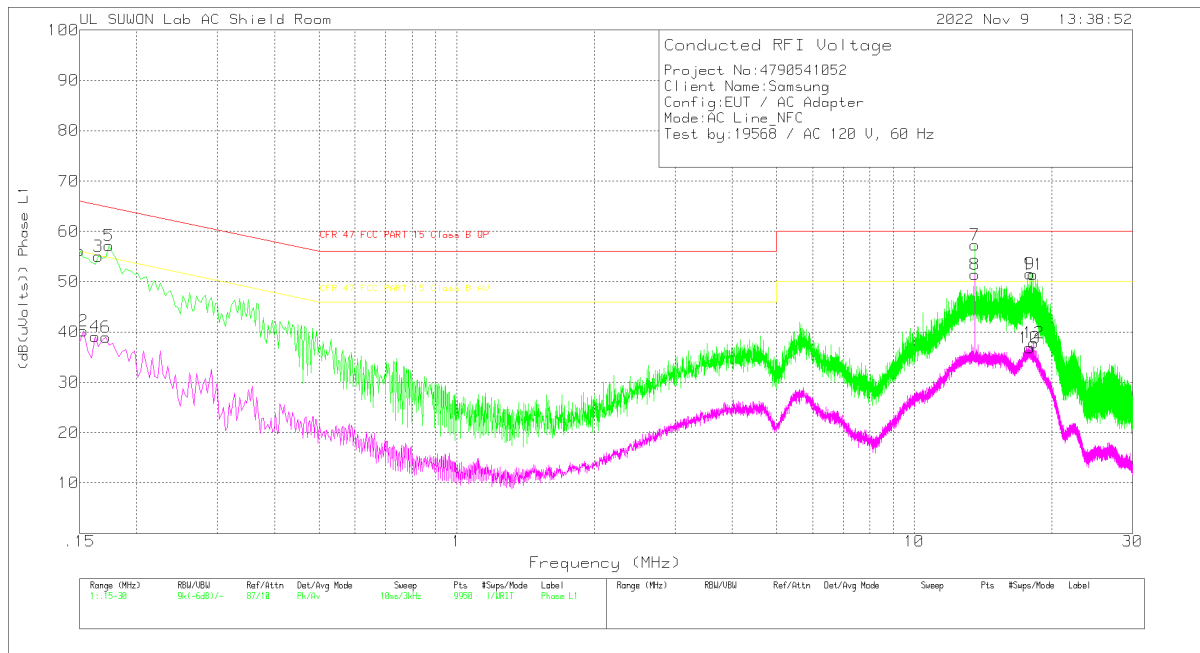
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.15	36.69	Pk	9.7	.1	46.49	66	-19.51	-	-
14	.15	18.16	Av	9.7	.1	27.96	-	-	56	-28.04
15	.216	34.5	Pk	9.8	.2	44.5	62.97	-18.47	-	-
16	.213	19.59	Av	9.8	.2	29.59	-	-	53.09	-23.5
17	.294	28.85	Pk	9.7	.2	38.75	60.41	-21.66	-	-
18	.297	13.76	Av	9.7	.2	23.66	-	-	50.33	-26.67
19	.369	28.36	Pk	9.8	.2	38.36	58.52	-20.16	-	-
20	.369	11.47	Av	9.8	.2	21.47	-	-	48.52	-27.05
21	2.157	23.76	Pk	9.7	.3	33.76	56	-22.24	-	-
22	2.169	6.38	Av	9.7	.3	16.38	-	-	46	-29.62
23	11.541	22.28	Pk	9.9	.3	32.48	60	-27.52	-	-
24	11.559	11.27	Av	9.9	.3	21.47	-	-	50	-28.53

Pk - Peak detector

Av - Average detection

WORST EMISSIONS(Not 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]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.15	46.4	Pk	9.7	.1	56.2	66	-9.8	-	-
2	.153	30.26	Av	9.8	.1	40.16	-	-	55.84	-15.68
3	.165	45.01	Pk	9.9	.1	55.01	65.21	-10.2	-	-
4	.162	29.11	Av	9.9	.1	39.11	-	-	55.36	-16.25
5	.174	46.96	Pk	10	.2	57.16	64.77	-7.61	-	-
6	.171	28.74	Av	10	.2	38.94	-	-	54.91	-15.97
7	13.56	46.94	Pk	10	.4	57.34	60	-2.66	-	-
8	13.56	41.02	Av	10	.4	51.42	-	-	50	1.42
9	17.922	41	Pk	10.1	.4	51.5	60	-8.5	-	-
10	17.871	26.39	Av	10.1	.4	36.89	-	-	50	-13.11
11	18.192	40.89	Pk	10.1	.4	51.39	60	-8.61	-	-
12	18.225	27.37	Av	10.1	.4	37.87	-	-	50	-12.13

Pk - Peak detector

Av - Average detection

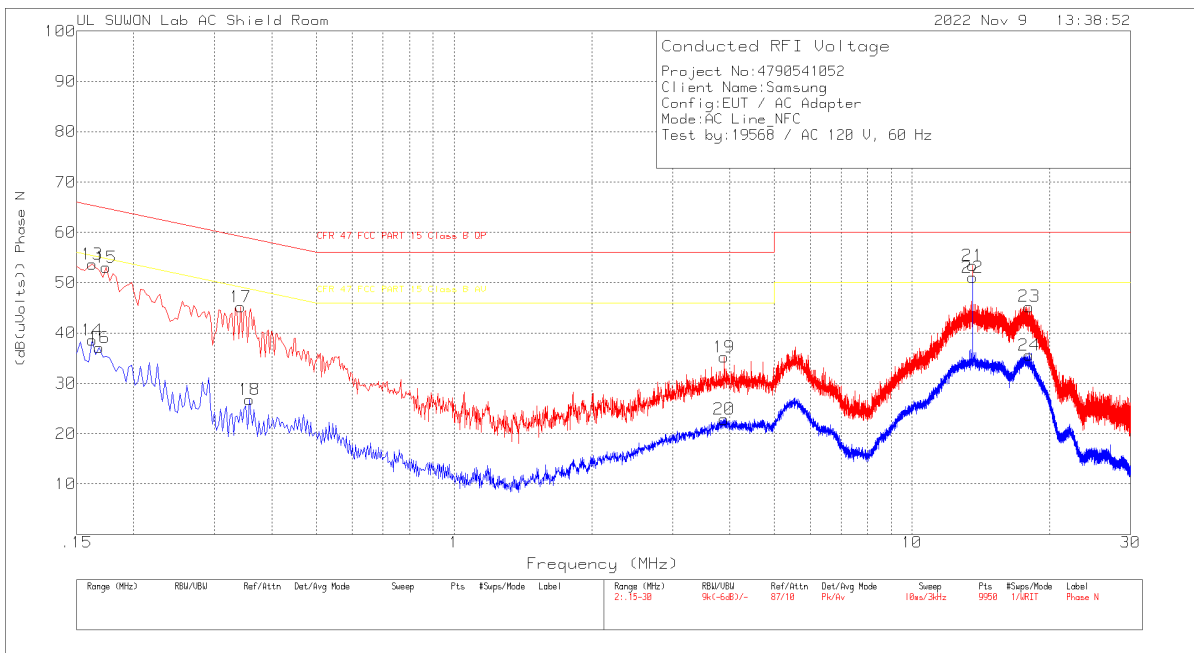
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.1515	36.89	Qp	9.7	.1	46.69	65.92	-19.23	-	-
.17325	31.5	Qp	10	.2	41.7	64.8	-23.1	-	-
13.5602	45.15	Qp	10	.4	55.55	60	-4.45	-	-
17.9222	28.76	Qp	10.1	.4	39.26	60	-20.74	-	-
18.1928	28.15	Qp	10.1	.4	38.65	60	-21.35	-	-

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_With EX_N[dB]	CABLELOSS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.162	43.7	Pk	9.9	.1	53.7	65.36	-11.66	-	-
14	.162	28.64	Av	9.9	.1	38.64	-	-	55.36	-16.72
15	.174	42.82	Pk	10	.2	53.02	64.77	-11.75	-	-
16	.168	27.05	Av	10	.1	37.15	-	-	55.06	-17.91
17	.342	35.15	Pk	9.8	.2	45.15	59.15	-14	-	-
18	.357	16.73	Av	9.8	.2	26.73	-	-	48.8	-22.07
19	3.891	25.17	Pk	9.7	.3	35.17	56	-20.83	-	-
20	3.891	12.83	Av	9.7	.3	22.83	-	-	46	-23.17
21	13.56	43.05	Pk	10	.4	53.45	60	-6.55	-	-
22	13.56	40.66	Av	10	.4	51.06	-	-	50	1.06
23	18.039	34.66	Pk	10.2	.4	45.26	60	-14.74	-	-
24	18.039	24.99	Av	10.2	.4	35.59	-	-	50	-14.41

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13.5602	42.25	Qp	10	.4	52.65	60	-7.35	-	-
18.0392	24.5	Qp	10.2	.4	35.1	60	-24.9	-	-

Qp - Quasi-Peak detector

9. 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	2022-10-11
Test Engineer	51078

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	13.559950450	-5.205	13.559943730	-5.701	13.559933710	-6.440	13.559926700	-6.956	100
3.88	40	13.559985610	-2.612	13.559975410	-3.364	13.559964800	-4.147	13.559956630	-4.749	100
3.88	30	13.560009470	-0.853	13.560005480	-1.147	13.559999150	-1.614	13.559990490	-2.252	100
3.88	20	13.560021030	0	13.560021670	0.047	13.560022090	0.078	13.560022420	0.103	100
3.88	10	13.560009360	-0.861	13.560024280	0.240	13.560045210	1.783	13.560055120	2.514	100
3.88	0	13.560075420	4.011	13.560078420	4.232	13.560080310	4.372	13.560084190	4.658	100
3.88	-10	13.560088480	4.974	13.560090080	5.092	13.560090760	5.142	13.560090250	5.105	100
3.88	-20	13.560085910	4.785	13.560080120	4.358	13.560074630	3.953	13.560068470	3.499	100
3.88	-30	13.560054690	2.482	13.560044110	1.702	13.560033650	0.931	13.560022250	0.090	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)
3.88	20	13.560021030	0	13.560021670	0.047	13.560022090	0.078	13.560022420	0.103	100
4.40	20	13.560021230	0.015	13.560021800	0.057	13.560022180	0.085	13.560022670	0.121	100
3.70	20	13.560021340	0.023	13.560021970	0.069	13.560022320	0.095	13.560022820	0.132	100

No non-compliance noted.

END OF TEST REPORT