



CERTIFICATION TEST REPORT

Report Number. : 4790101669-E6V3

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

Model : SM-X900

FCC ID : A3LSMX900

IC : 649E-SMX900

EUT Description : DTS/UNII a/b/g/n/ac/ax Tablet + BT/BLE and WPT

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-216 Issue 2
INDUSTRY CANADA RSS-GEN Issue 5

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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



ACCREDITED

Testing Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2021-11-30	Initial issue	Dexter(Hyunsik) Yun
V2	2021-12-07	Update to address TCB's Question	Dexter(Hyunsik) Yun
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
1.1. INTRODUCTION OF TEST DATA REUSE	5
1.2. DIFFERENCE	5
1.3. SPOT CHECK VERIFICATION DATA.....	5
1.4. REFERENCE DETAIL.....	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION	7
4. CALIBRATION AND UNCERTAINTY	8
4.1. MEASURING INSTRUMENT CALIBRATION.....	8
4.2. SAMPLE CALCULATION.....	8
4.3. MEASUREMENT UNCERTAINTY	8
4.4. DECISION RULE	8
5. EQUIPMENT UNDER TEST	9
5.1. DESCRIPTION OF EUT.....	9
5.2. MAXIMUM E-FIELD STRENGTH.....	9
5.3. PRELIMINARY TEST CONFIGURATIONS.....	9
5.4. WORST-CASE CONFIGURATION AND MODE	9
5.5. MODIFICATIONS.....	10
5.6. DESCRIPTION OF TEST SETUP	10
6. TEST AND MEASUREMENT EQUIPMENT	12
7. APPLICABLE LIMITS AND TEST RESULTS	13
7.1. RADIATED EMISSIONS	13
7.2. AC MAINS LINE CONDUCTED EMISSIONS.....	16

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: DTS/UNII a/b/g/n/ac/ax Tablet + BT/BLE and WPT
MODEL NUMBER: SM-X900
SERIAL NUMBER: R32RB0078SW (RADIATED);
R32RB00B40E (SPOT-CHECK);
DATE TESTED: 2021-11-15 ~ 2021-11-26 (Original);
2021-11-26 (Spot-Check);

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
INDUSTRY CANADA RSS-216 Issue 2	Complies
INDUSTRY CANADA RSS-GEN Issue 5	Complies

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, 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.

1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMX906B DTS(FCC CFR 47 Part 15C).
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMX900 (IC : 649E-SMX900, Model number : SM-X900) shares the same enclosure and circuit board as FCC ID: A3LSMX906B (Model number : SM-X906B). The WPT antennas and surrounding circuitry and layout are identical between these two units for re-used bands.

In SM-X900 model, all of the RF parts(5G/LTE/WCDMA/GSM) are removed from the PCB.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMX906B (Model number : SM-X906B) remains representative of FCC ID: A3LSMX900 (IC : 649E-SMX900, Model number : SM-X900). The test data of FCC ID: A3LSMX906B (Model number : SM-X906B) being submitted for this application to cover WPT features.

Model number, SM-X906B, is not certified for ISED certification.

1.3. SPOT CHECK VERIFICATION DATA

Mode	Test Item	Frequency	Original model	Spot check model	Deviation	Remark
			SM-X906B Results	SM-X900 Results		
			FCC ID : A3LSMX906B	FCC ID : A3LSMX900		
WPT	RSE	0.53104 MHz (S-pen)	19.63 dBuV/m	20.69 dBuV/m	1.06 dB	

Comparison of two models, upper deviation is within 3dB range and all test results are under FCC technical limits.

1.4. REFERENCE DETAIL

Reference application that contains the re-used reference data.

Equipment Class	Reference FCC ID	Type Grant/Permissive Change	Reference Application	Folder Test/RF Exposure	Report Title / Section
DTS	A3LSMX906B	Grant	4790101660-E4	Test	Report DTS [b, g, n ax] WLAN / All sections
			4790101660-E5	Test	Report BLE / All sections
DSS	A3LSMX906B	Grant	4790101660-E6	Test	Report BT / All sections
NII	A3LSMX906B	Grant	4790101660-E7	Test	Report UNII [a, n, ac, ax] WLAN / All sections
NII (6E)	A3LSMX906B	Grant	4790101660-E8	Test	Report UNII 6E [a, ax] WLAN / All sections
WPT	A3LSMX906B	Grant	4790101660-E9	Test	Report WPT / All sections

Note: ISED not supported U-NII 6E.

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. 680106 D01 RF Exposure Wireless Charging Apps v03r01.
5. IC RSS-GEN Issue 5.
6. IC RSS-216 Issue 2.
7. KDB 484596 D01 Referencing Test Data v01

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
<input checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	Chamber 3

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>.

Used ISED Test Site Reg.(company number) : 2324L
CAB Identifier: KR0161

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:

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

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 DTS/UNII a/b/g/n/ac/ax Tablet + BT/BLE and WPT.
 This test report addresses the wireless low power transmitter(DCD) operational mode.

5.2. MAXIMUM E-FIELD STRENGTH

- S-pen charging mode

Fundamental Frequency (KHz)	Mode	E field (30m distance) FCC (dBuV/m)
530	Charging	19.63

5.3. PRELIMINARY TEST CONFIGURATIONS

The S-Pen charging mode of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.4. WORST-CASE CONFIGURATION AND MODE

Mode	Test Case	Description
S-pen Charging mode	1 (Worst case)	Charging from EUT to S-Pen
	2 (AC line)	Charging from EUT(Charging from TA) to S-Pen

For S-pen, both fully charged and non-fully charged condition were investigated, all test case were performed non-fully charged condition as worst case.

During radiated test for test case 1, the EUT didn't connected AC adapter, but for AC line conducted test for all test case was performed with connected with AC adapter.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37R8YN0CD1RC3	N/A
Data Cable	SAMSUNG	EP-DW767JWE	N/A	N/A
SPEN	SAMSUNG	-	1386600000549	N/A

I/O CABLES

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

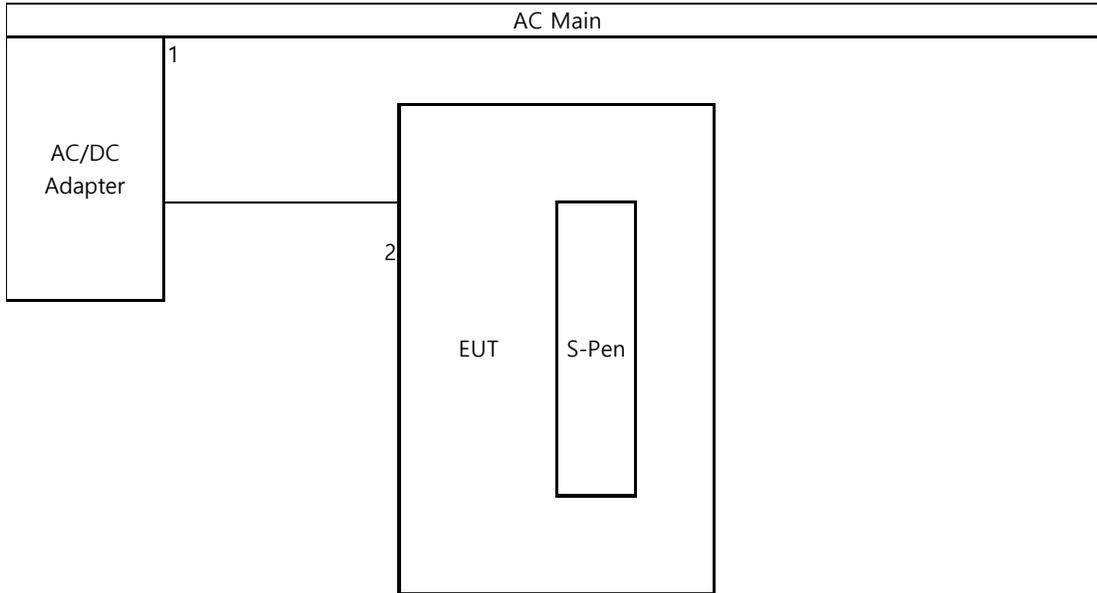
TEST SETUP

The EUT is installed in a typical configuration. Charging from EUT.

TEST SETUP DIAGRAM

NOTE : Test case 1, EUT did not connected with Travel adapter(AC Main) in below.
set-up diagram for radiated test.

- Test Case 1 and 2 : S-Pen Charging



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	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
DC Power Supply	Agilent / HP	E3640A	MY54226395	2022-08-02
Temperature Chamber	ESPEC	SH-642	93001109	2022-08-02
LISN	R&S	ENV216	101837	2022-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
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. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.10: 2013

The highest clock frequency generated or used in the EUT is 600 kHz therefore the frequency range was investigated from 9 kHz to 30 MHz.

LIMIT

FCC §15.209 (a)
ICES-001 Section 3.4, IC RSS-216 6.2.2, and IC RSS-GEN Sections 8.9 and 8.10.

Frequency (MHz)	Field Strength (microvolts/meter)	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 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3

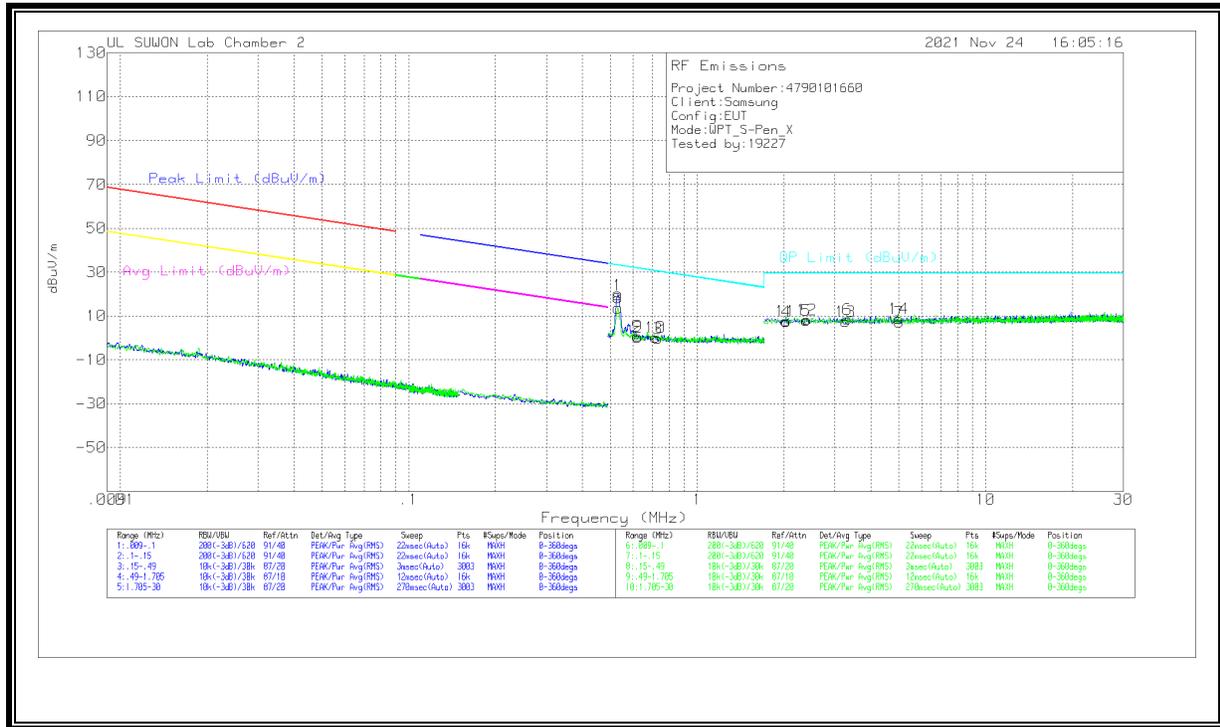
Note: The lower limit shall apply at the transition frequency.

RESULTS

The EUT belongs to Test Case 1 and 2.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 300 m open field 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 D01.

RADIATED EMISSIONS 9 KHz to 30 MHz(S-pen charging mode Test case 1)



TEST DATA

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	.53104	39.83	Pk	19.7	.1	-40	19.63	33.1	-13.47	0-360
2	.6214	20.38	Pk	19.7	.1	-40	.18	31.74	-31.56	0-360
3	.72841	19.93	Pk	19.7	.1	-40	-.27	30.37	-30.64	0-360
4	2.03488	27.31	Pk	19.9	.2	-40	7.41	29.5	-22.09	0-360
5	2.39303	27.78	Pk	19.9	.2	-40	7.88	29.5	-21.62	0-360
6	3.30725	28.39	Pk	19.9	.3	-40	8.59	29.5	-20.91	0-360
7	5.0226	27.08	Pk	19.8	.3	-40	7.18	29.5	-22.32	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	.53043	33.85	Pk	19.7	.1	-40	13.65	33.11	-19.46	0-360
9	.62087	20.94	Pk	19.7	.1	-40	.74	31.75	-31.01	0-360
10	.71564	20.54	Pk	19.7	.1	-40	.34	30.52	-30.18	0-360
11	2.02545	27.5	Pk	19.9	.2	-40	7.6	29.5	-21.9	0-360
12	2.40245	28.05	Pk	19.9	.2	-40	8.15	29.5	-21.35	0-360
13	3.26013	27.28	Pk	19.9	.3	-40	7.48	29.5	-22.02	0-360
14	4.99433	28.69	Pk	19.8	.3	-40	8.79	29.5	-20.71	0-360

PK – Peak Detector

** Fundamental

Note 1: 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.

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.10: 2013

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.

LIMIT

FCC §15.207 (a)

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

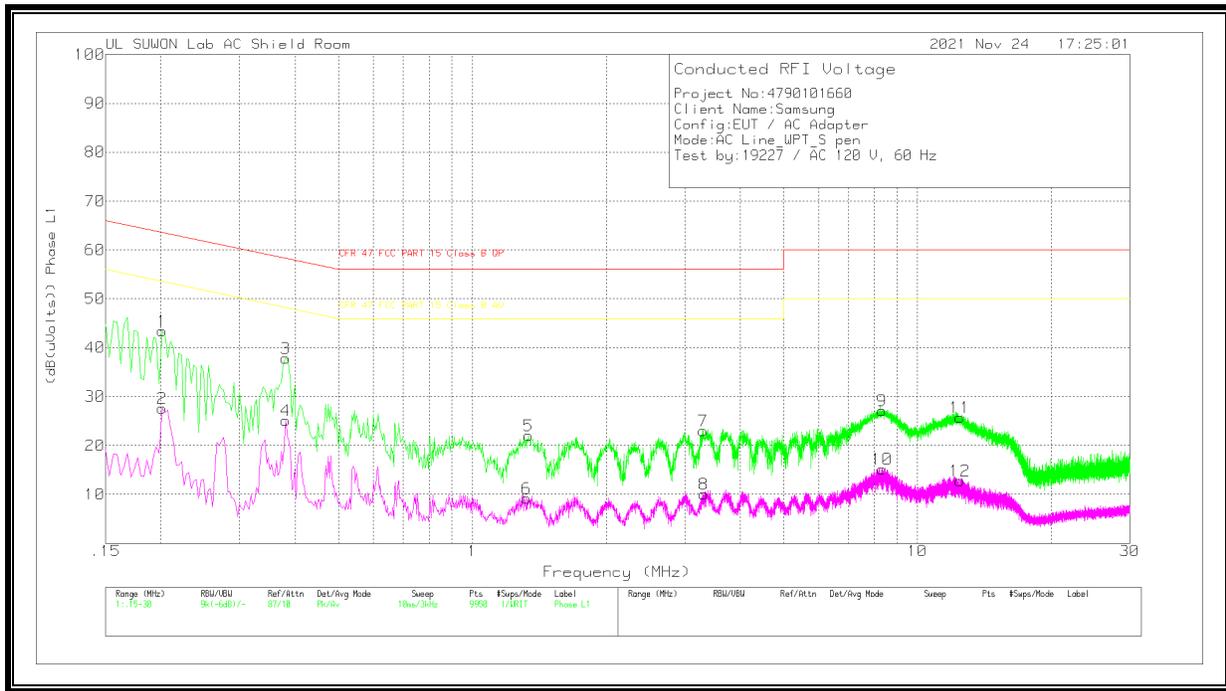
*Decreases with the logarithm of the frequency.

RESULTS

The EUT belongs to Test Case 1 and 2.

6 WORST EMISSIONS(S-pen charging mode Test case 1)

Line-L1 .15 - 30MHz



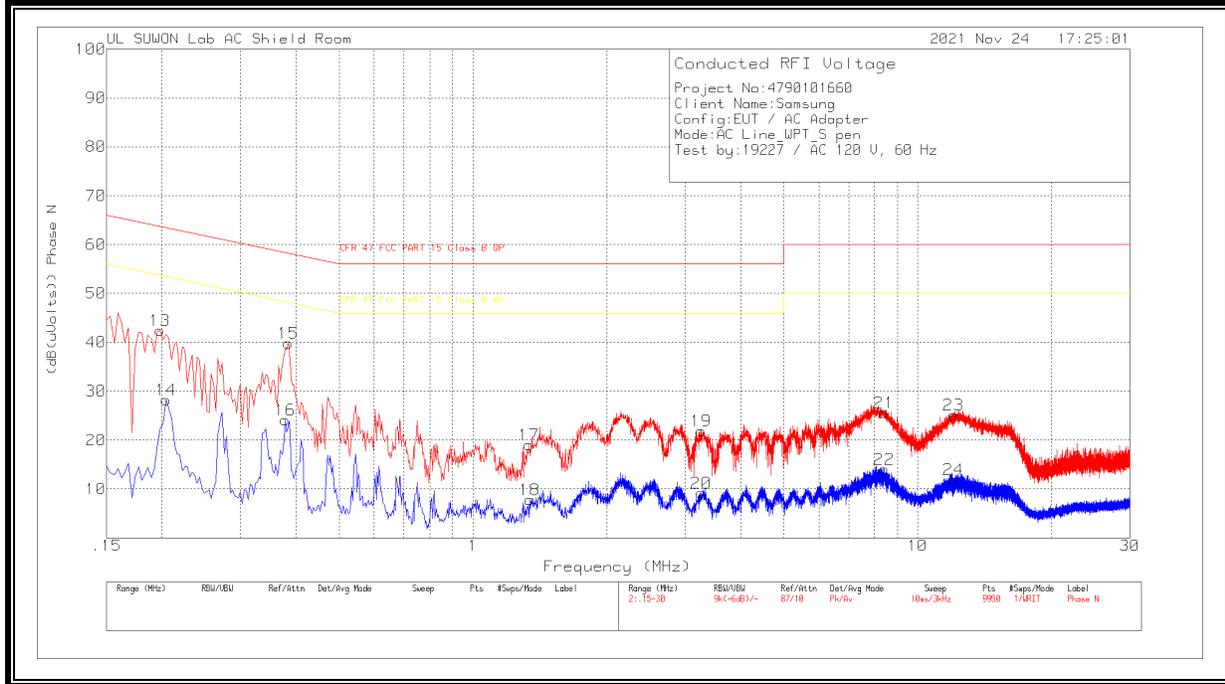
Trace Markers

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	.201	33.49	Pk	9.8	.2	43.49	63.57	-20.08	-	-
2	.201	17.57	Av	9.8	.2	27.57	-	-	53.57	-26
3	.381	27.79	Pk	9.8	.2	37.79	58.26	-20.47	-	-
4	.381	15.13	Av	9.8	.2	25.13	-	-	48.26	-23.13
5	1.338	11.99	Pk	9.7	.3	21.99	56	-34.01	-	-
6	1.326	-.77	Av	9.7	.3	9.23	-	-	46	-36.77
7	3.3	13.04	Pk	9.7	.3	23.04	56	-32.96	-	-
8	3.309	.09	Av	9.7	.3	10.09	-	-	46	-35.91
9	8.325	17.06	Pk	9.8	.3	27.16	60	-32.84	-	-
10	8.322	5.02	Av	9.8	.3	15.12	-	-	50	-34.88
11	12.453	15.56	Pk	9.9	.3	25.76	60	-34.24	-	-
12	12.459	2.54	Av	9.9	.3	12.74	-	-	50	-37.26

Pk - Peak detector
 Av - Average detection

Line-L2 .15 - 30MHz



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	.198	32.5	Pk	9.8	.2	42.5	63.69	-21.19	-	-
14	.204	18.24	Av	9.8	.2	28.24	-	-	53.45	-25.21
15	.384	29.86	Pk	9.8	.2	39.86	58.19	-18.33	-	-
16	.378	14.1	Av	9.8	.2	24.1	-	-	48.32	-24.22
17	1.338	9.07	Pk	9.7	.3	19.07	56	-36.93	-	-
18	1.341	-2.22	Av	9.7	.3	7.78	-	-	46	-38.22
19	3.258	11.93	Pk	9.7	.3	21.93	56	-34.07	-	-
20	3.255	-.84	Av	9.7	.3	9.16	-	-	46	-36.84
21	8.412	15.48	Pk	9.8	.3	25.58	60	-34.42	-	-
22	8.409	3.91	Av	9.8	.3	14.01	-	-	50	-35.99
23	12.042	14.8	Pk	10	.3	25.1	60	-34.9	-	-
24	12.051	1.64	Av	10	.3	11.94	-	-	50	-38.06

Pk - Peak detector

Av - Average detection

END OF TEST REPORT