



# **CERTIFICATION TEST REPORT**

**Report Number.** : 4790089631-E9V3

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

**Model** : SM-S908B/DS

**FCC ID** : A3LSMS908B

**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:**

2021-12-21

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ACCREDITED

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**TL-637**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2021-10-29	Initial issue	Dexter(Hyunsik) Yun
V2	2021-11-10	Updated to address TCB's question	Dexter(Hyunsik) Yun
V3	2021-12-21	Added Version 2 & 3 data	Dexter(Hyunsik) Yun

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>5</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION.....</i>	6
4.2. <i>SAMPLE CALCULATION.....</i>	6
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	6
4.4. <i>DECISION RULE.....</i>	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. <i>DESCRIPTION OF EUT.....</i>	7
5.2. <i>MAXIMUM E-FIELD STRENGTH.....</i>	7
5.3. <i>PRELIMINARY TEST CONFIGURATIONS.....</i>	7
5.4. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	8
5.5. <i>MODIFICATIONS.....</i>	9
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	9
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>13</b>
<b>7. APPLICABLE LIMITS AND TEST RESULTS .....</b>	<b>14</b>
7.1. <i>RADIATED EMISSIONS.....</i>	14
7.2. <i>Version 1 data.....</i>	15
7.3. <i>Version 2 data.....</i>	21
7.4. <i>Version 3 data.....</i>	27
7.5. <i>AC MAINS LINE CONDUCTED EMISSIONS.....</i>	33

# 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-S908B/DS

**SERIAL NUMBER:** R3CR80AB9PK (RADIATED, Version 1);  
R3CRB0V31DB, R3CRB0V31CF (RADIATED, Version 2)  
R3CRB0V2YPF (RADIATED, Version 3)

**DATE TESTED:** 2021-10-27 ~ 2021-12-21

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

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  
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Junwhan Lee  
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. 680106 D01 RF Exposure Wireless Charging Apps v03 r01.

## 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>.

## 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 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 wireless low power transmitter(DCD) operational mode.

This report covers the Samsung model SM-S908B/DS version1, 2 and 3.

These versions are identical in all hardware except WPT Chipset.

Therefore radiated emission was full tested each version.

### 5.2. MAXIMUM E-FIELD STRENGTH

- Power sharing mode

Fundamental Frequency (KHz)	Mode	E field (300m distance) FCC (dBuV/m)		
		Version 1	Version 2	Version 3
EUT Version	-	Version 1	Version 2	Version 3
110 - 148	Charging	-6.76	0.40	3.08

- S-pen charging mode

Fundamental Frequency (KHz)	Mode	E field (30m distance) FCC (dBuV/m)		
		Version 1	Version 2	Version 3
EUT Version	-	Version 1	Version 2	Version 3
590 - 625	Charging	14.19	12.73	17.24

### 5.3. PRELIMINARY TEST CONFIGURATIONS

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

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

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

### 5.4. WORST-CASE CONFIGURATION AND MODE

Mode 1	Test Case	Description
Power sharing mode (S-pen is fully charged condition)	1	Charging from EUT to Phone
	2	Charging from EUT(Charging from TA) to Phone
	3	Charging from EUT to Phone (Cross position)
	4	Charging from EUT(Charging from TA) to Phone (Cross position)
	5	Charging from EUT to Wearable device
	6	Charging from EUT(Charging from TA) to Wearable device

Mode 2	Test Case	Description
S-pen Charging mode	7	Charging from EUT to S-Pen
	8	Charging from EUT(Charging from TA) to S-Pen

Mode 3	Test Case	Description
Simutaneous charging mode(Power sharing and S-pen charging)	9	Charging from EUT to Phone (Cross position) and Charging from EUT to S-Pen
	10	Charging from EUT to Phone (Cross position) and Charging from EUT to S-Pen(EUT was Charging from TA)

For radiated test, test case 1/3/5/7/9, the EUT can operate the power sharing mode when battery level is over 30%. Because test results are not different between fully charged status and battery level 30% status(EUT condition), test were performed fully charged condition.

Also according to current client device's(Phone and Wearable device) battery level, test results are different.Because the test results were worst when the battery level was 1%~20%, tests were performed when the battery level was 1%~20%.(Client device)

For S-pen, both fully charged and non-fully charged condition were investigated, test case 7/8/9 were performed non-fully charged condition as worst case.

During radiated test for test case 1/3/5/7/9, the EUT didn't connected AC adapter, but for AC line conducted test for all test case was performed with connected with AC adapter.

For power sharing mode, test results of case 4 is worst and S-pen Charging mode, test results of case 8 is worst, so this test report described test case 4, test case 8 and test case 10.

## 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	R37N9BV0382HM3	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A
Mobile Phone	SAMSUNG	SM-G986B	R3CMB0C70XN	A3LSMG986B
Wearable Device	SAMSUNG	SM-R835	RFAM90ZXFTF	A3LSMR835

### 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

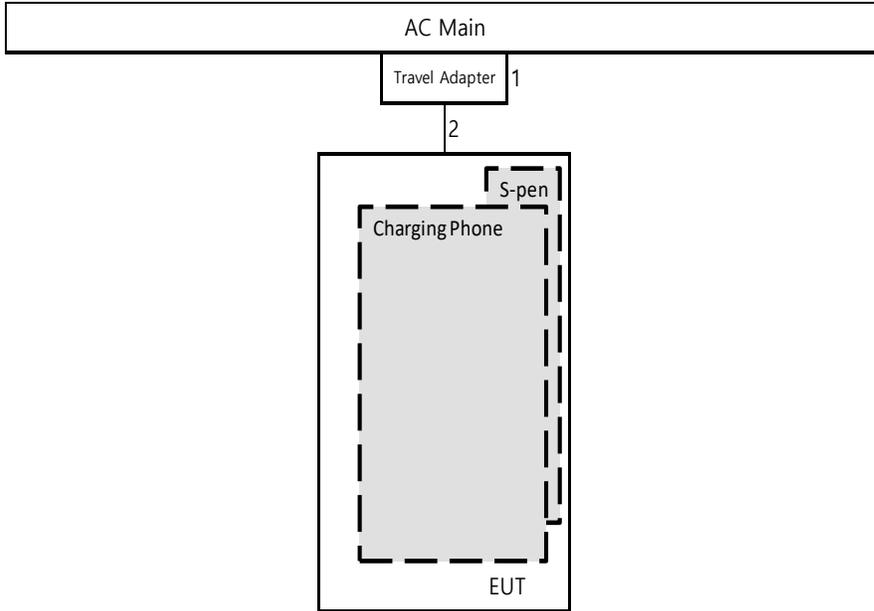
### TEST SETUP

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

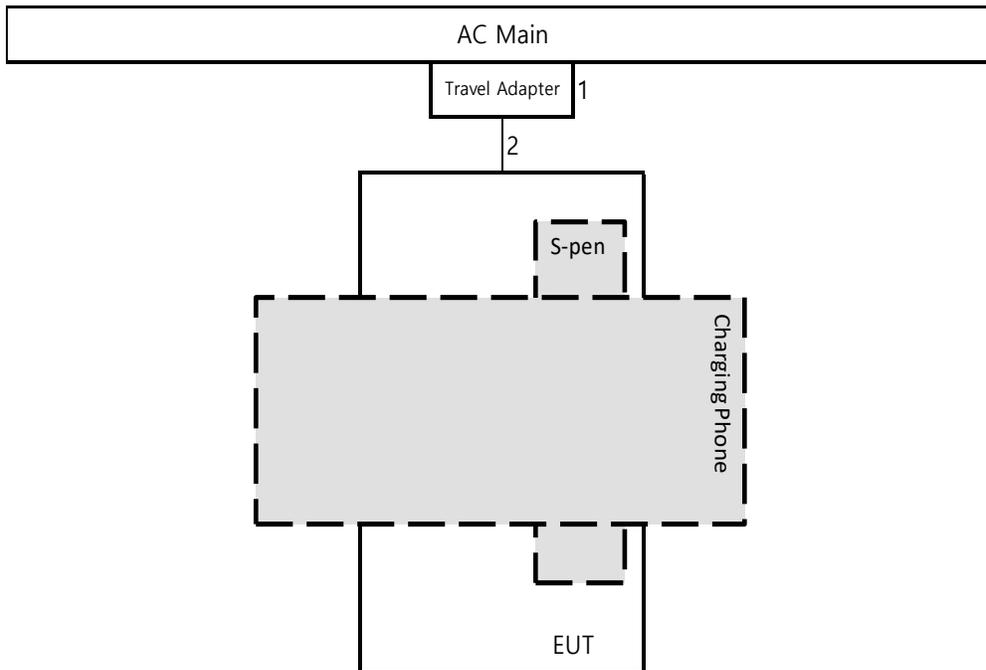
**TEST SETUP DIAGRAM**

NOTE : Test case 1/3/5/7/9, EUT did not connected with Travel adapter(AC Main) in below set-up diagram for radiated test.

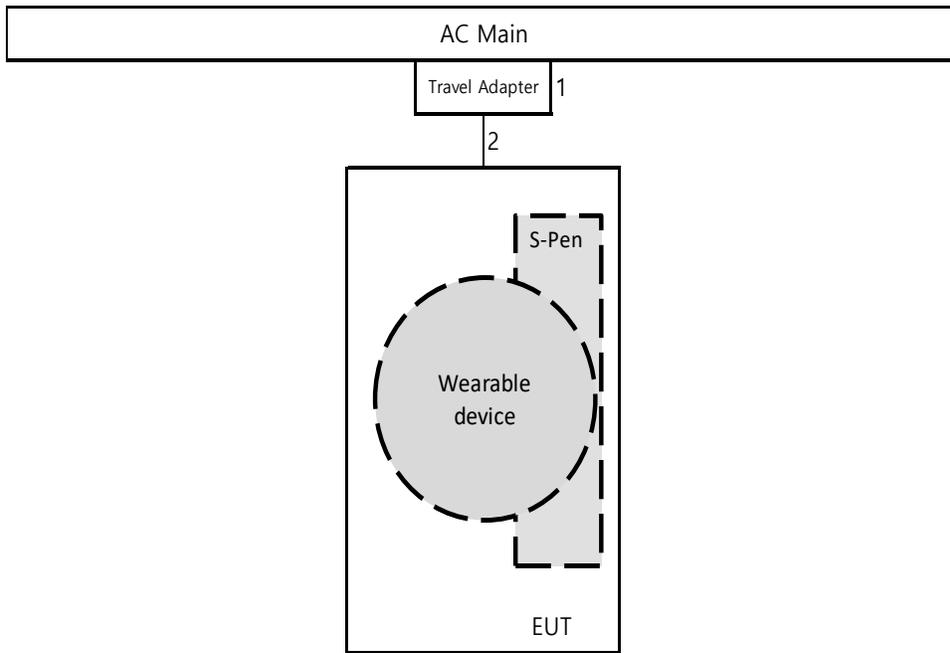
- Test Case1 and 2 : Charging Phone(S-pen is fully charged condition)



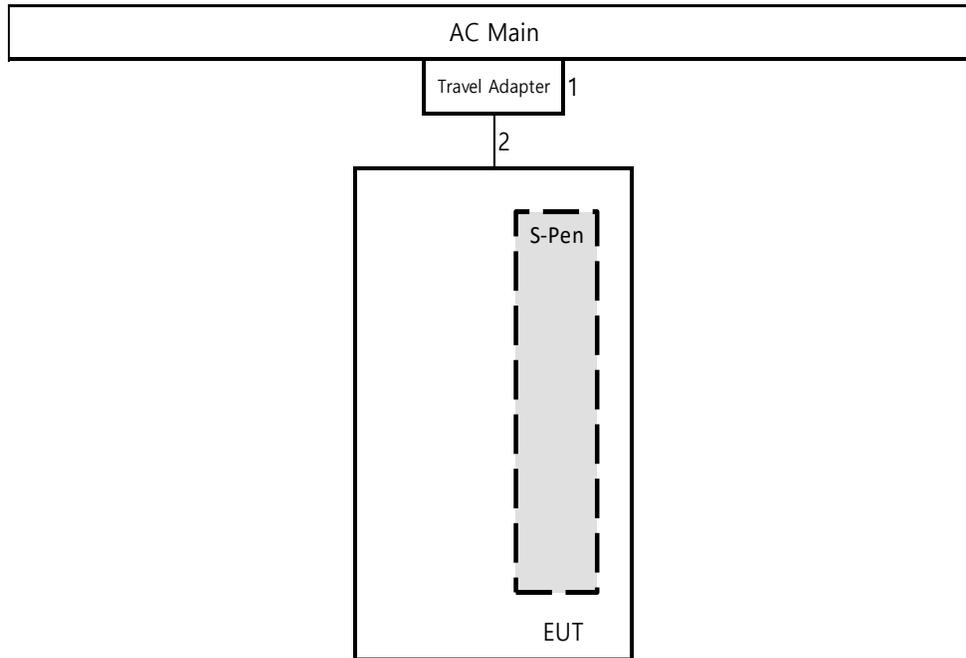
- Test Case 3 and 4 : Charging Phone(Cross position, S-pen is fully charged condition)



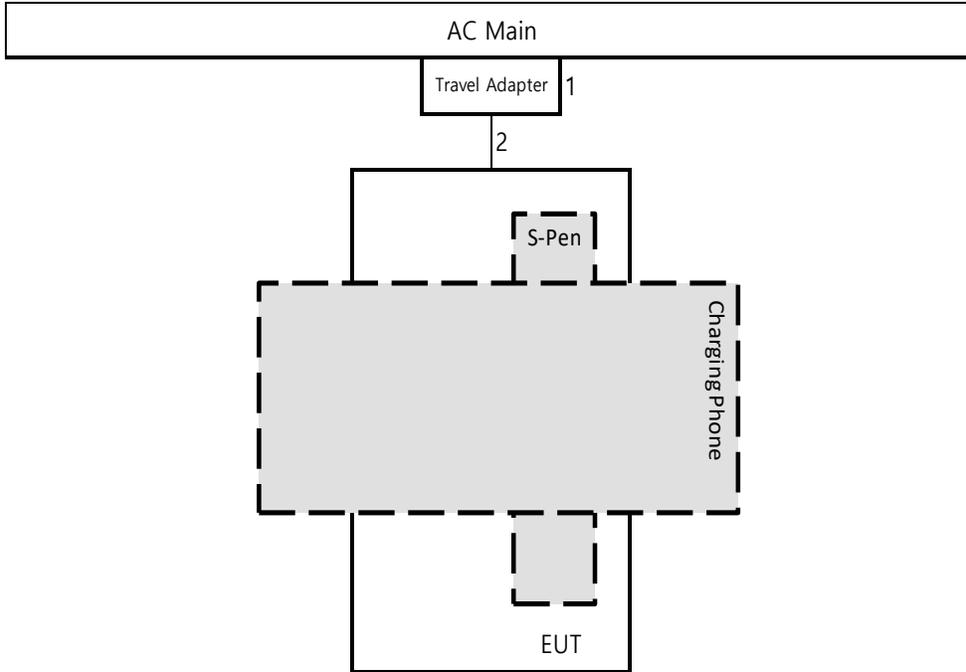
- Test Case 5 and 6 : Charging Wearable device(S-pen is fully charged condition)



- Test Case 7 and 8 : S-Pen Charging



- Test case 9 and 10 : Simutaneous charging (Power sharing and 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 6.2, 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.

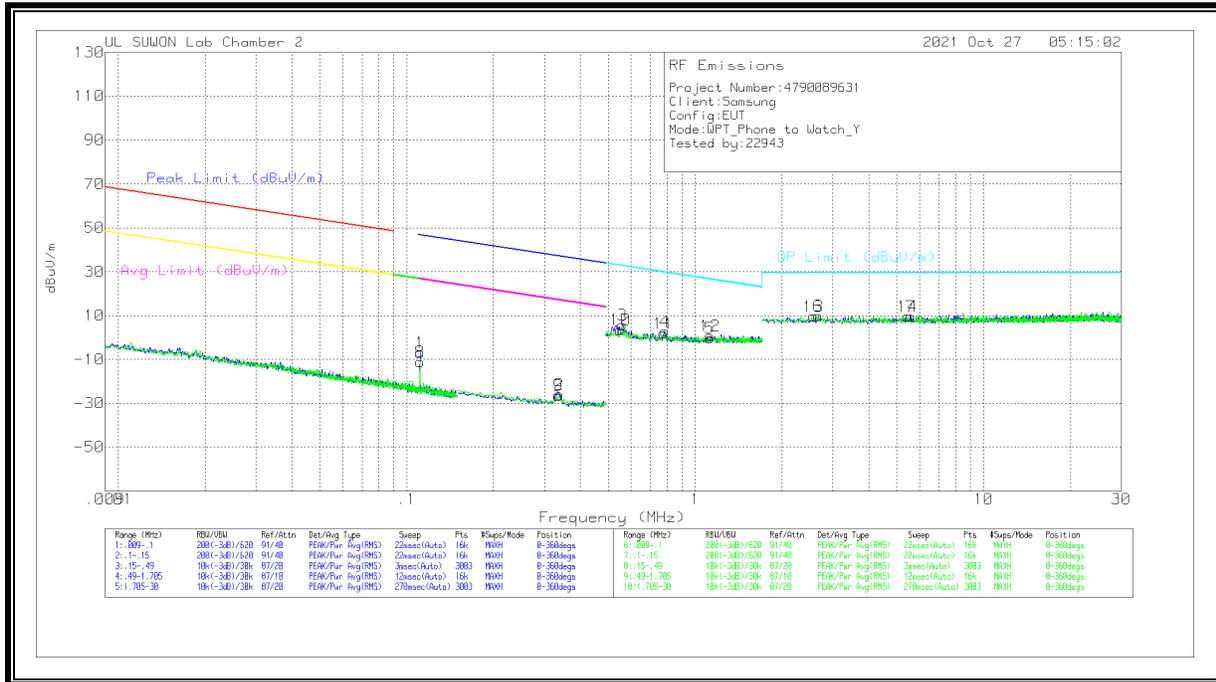
#### RESULTS

The EUT belongs to Test Case 4 and 8 and 10.

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.

## 7.2. Version 1 data

### RADIATED EMISSIONS 9 KHz to 30 MHz(Power sharing mode Test Case 5)



**TEST DATA**

Trace Markers

[Face-On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**1	.11123	53.34	Pk	19.8	.1	-80	-6.76	46.7	-53.46	26.7	-33.46	0-360
2	.33769	34.42	Pk	19.7	.1	-80	-25.78	37.04	-62.82	17.04	-42.82	0-360

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)
3	.5606	25.96	Pk	19.7	.1	-40	5.76	32.63	-26.87	0-360
4	.78332	22.87	Pk	19.8	.2	-40	2.87	29.74	-26.87	0-360
5	1.12357	19.68	Pk	19.8	.2	-40	-.32	26.61	-26.93	0-360
6	2.66635	29.62	Pk	19.9	.3	-40	9.82	29.5	-19.68	0-360
7	5.56925	29.42	Pk	19.8	.4	-40	9.62	29.5	-19.88	0-360

[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.11123	48.96	Pk	19.8	.1	-80	-11.14	46.7	-57.84	26.7	-37.84	0-360
9	.33543	33.62	Pk	19.7	.1	-80	-26.58	37.1	-63.68	17.1	-43.68	0-360

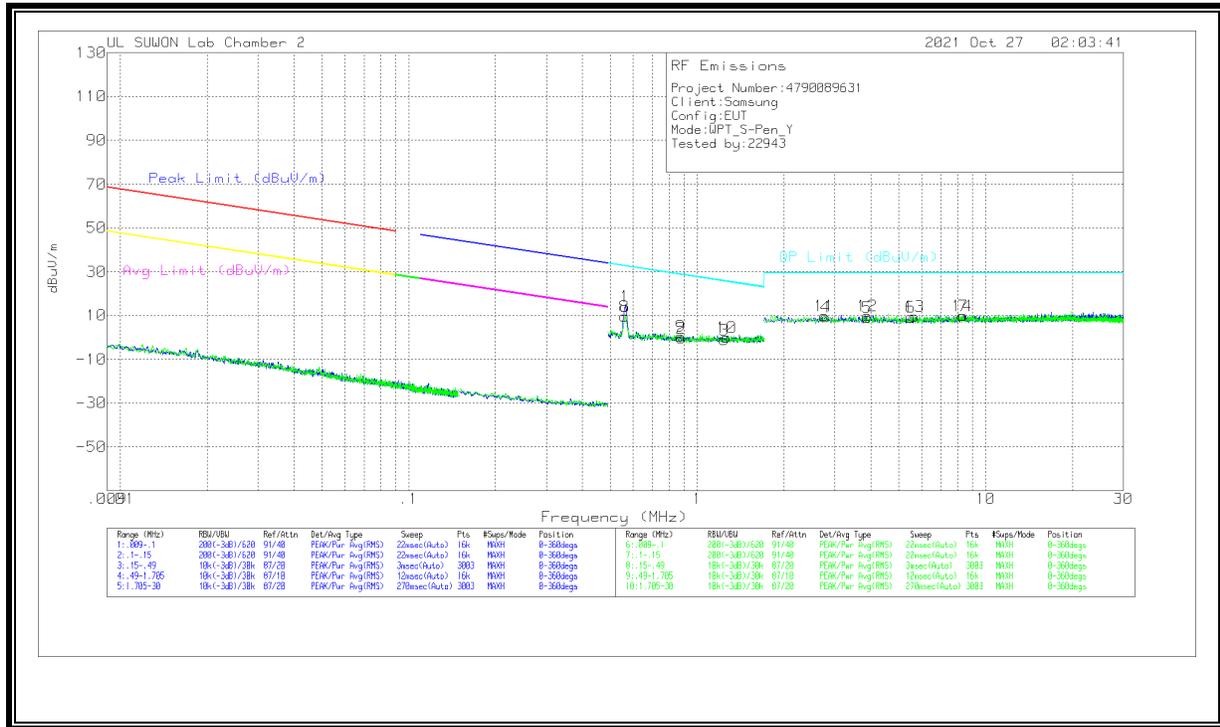
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
10	.55038	23.77	Pk	19.7	.1	-40	3.57	32.79	-29.22	0-360
11	.778	21.9	Pk	19.8	.2	-40	1.9	29.8	-27.9	0-360
12	1.12775	20.79	Pk	19.8	.2	-40	.79	26.58	-25.79	0-360
13	2.5721	29.36	Pk	19.9	.3	-40	9.56	29.5	-19.94	0-360
14	5.45615	29.45	Pk	19.8	.4	-40	9.65	29.5	-19.85	0-360

Pk - Peak detector

\*\* Fundamental

Note : 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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(S-pen charging mode Test case 7)**



**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	.56345	34.39	Pk	19.7	.1	-40	14.19	32.59	-18.4	0-360
2	.88113	19.6	Pk	19.8	.2	-40	-.4	28.72	-29.12	0-360
3	1.23875	18.87	Pk	19.8	.2	-40	-1.13	25.77	-26.9	0-360
4	2.78888	29.05	Pk	19.9	.3	-40	9.25	29.5	-20.25	0-360
5	3.88218	28.77	Pk	19.9	.3	-40	8.97	29.5	-20.53	0-360
6	5.50328	29.04	Pk	19.8	.4	-40	9.24	29.5	-20.26	0-360
7	8.34963	29.72	Pk	19.9	.4	-40	10.02	29.5	-19.48	0-360

[Face Off]

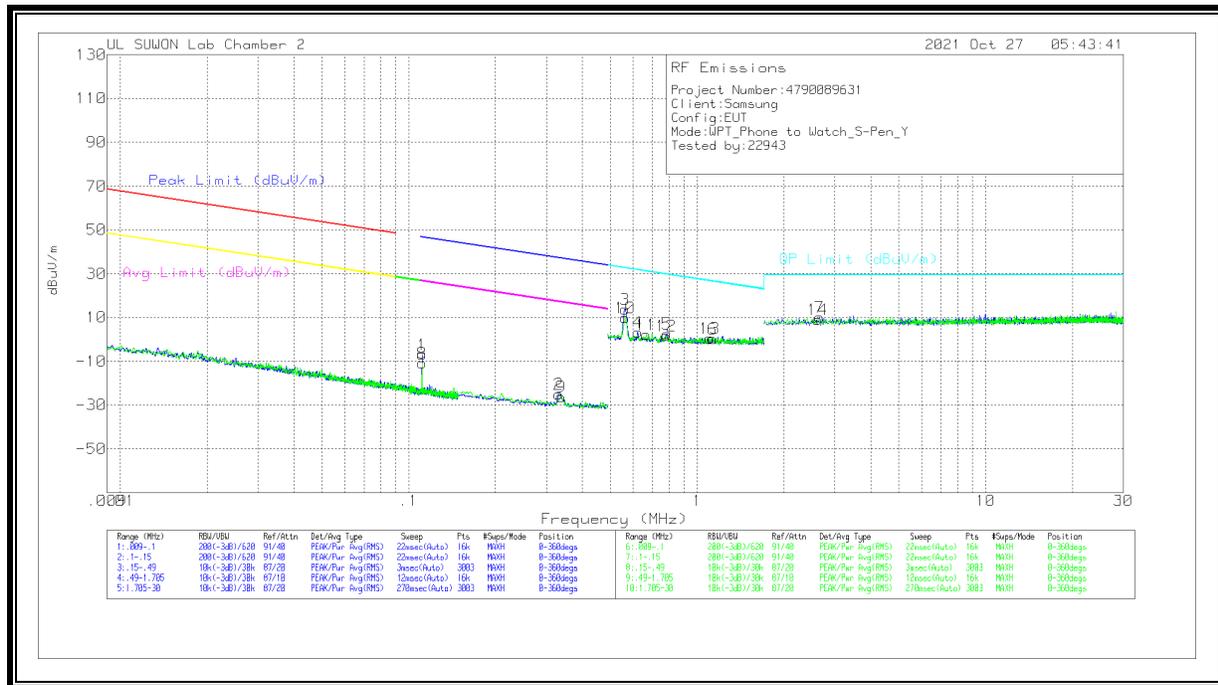
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.56091	29.76	Pk	19.7	.1	-40	9.56	32.63	-23.07	0-360
9	.87752	20.49	Pk	19.8	.2	-40	.49	28.75	-28.26	0-360
10	1.26433	20.04	Pk	19.8	.2	-40	.04	25.59	-25.55	0-360
11	2.7606	29.68	Pk	19.9	.3	-40	9.88	29.5	-19.62	0-360
12	3.88218	29.74	Pk	19.9	.3	-40	9.94	29.5	-19.56	0-360
13	5.6635	29.52	Pk	19.8	.4	-40	9.72	29.5	-19.78	0-360
14	8.29308	29.6	Pk	19.9	.4	-40	9.9	29.5	-19.6	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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(Simutaneous charging mode Test Case 9)**



**TEST DATA**

Trace Markers

[Face-On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*1	.11124	53.15	Pk	19.8	.1	-80	-6.95	46.7	-53.65	26.7	-33.65	0-360
2	.3312	35.25	Pk	19.7	.1	-80	-24.95	37.21	-62.16	17.21	-42.16	0-360

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)
**3	.5625	33.91	Pk	19.7	.1	-40	13.71	32.6	-18.89	0-360
4	.6219	23.55	Pk	19.7	.1	-40	3.35	31.74	-28.39	0-360
5	.78477	22.61	Pk	19.8	.2	-40	2.61	29.72	-27.11	0-360
6	1.13254	20.4	Pk	19.8	.2	-40	.4	26.54	-26.14	0-360
7	2.65693	30.1	Pk	19.9	.3	-40	10.3	29.5	-19.2	0-360

[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*8	.11123	49.31	Pk	19.8	.1	-80	-10.79	46.7	-57.49	26.7	-37.49	0-360
9	.33752	33.94	Pk	19.7	.1	-80	-26.26	37.04	-63.3	17.04	-43.3	0-360

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)
**10	.56239	30.24	Pk	19.7	.1	-40	10.04	32.61	-22.57	0-360
11	.66651	22.44	Pk	19.7	.1	-40	2.24	31.14	-28.9	0-360
12	.78021	21.73	Pk	19.8	.2	-40	1.73	29.77	-28.04	0-360
13	1.10378	20.63	Pk	19.8	.2	-40	.63	26.77	-26.14	0-360
14	2.61923	28.79	Pk	19.9	.3	-40	8.99	29.5	-20.51	0-360

Pk - Peak detector

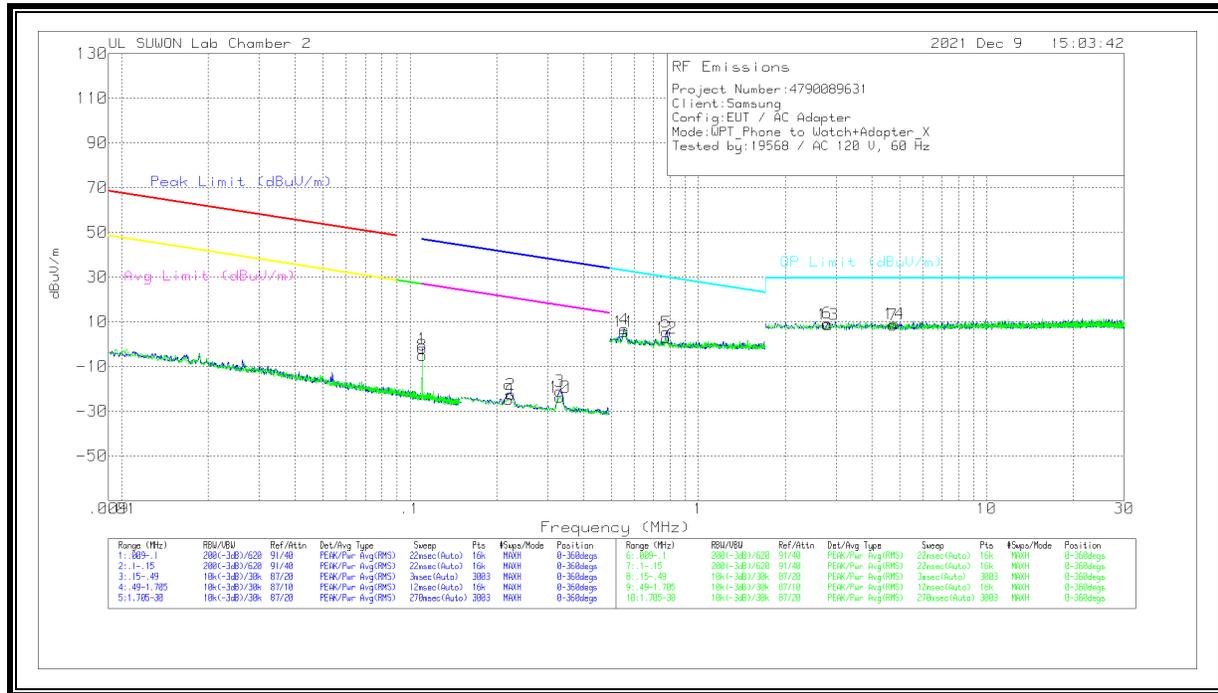
\*Power Sharing Fundamental

\*\*S-Pen 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.

### 7.3. Version 2 data

#### RADIATED EMISSIONS 9 KHz to 30 MHz(Power sharing mode Test Case 5)



**TEST DATA**

**Trace Markers**  
**[Face-On]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**1	.11031	58.18	Pk	19.8	.1	-80	-1.92	46.78	-48.7	26.78	-28.7	0-360
2	.22345	37.66	Pk	19.7	.1	-80	-22.54	40.63	-63.17	20.63	-43.17	0-360
3	.33108	39.17	Pk	19.7	.1	-80	-21.03	37.21	-58.24	17.21	-38.24	0-360

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)
4	.55388	26.91	Pk	19.7	.1	-40	6.71	32.74	-26.03	0-360
5	.77527	25.35	Pk	19.8	.2	-40	5.35	29.83	-24.48	0-360
6	2.7983	29.13	Pk	19.9	.3	-40	9.33	29.5	-20.17	0-360
7	4.73985	28.43	Pk	19.8	.3	-40	8.53	29.5	-20.97	0-360

**[Face-Off]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.11029	55.08	Pk	19.8	.1	-80	-5.02	46.78	-51.8	26.78	-31.8	0-360
9	.22012	35.42	Pk	19.7	.1	-80	-24.78	40.76	-65.54	20.76	-45.54	0-360
10	.33114	36.47	Pk	19.7	.1	-80	-23.73	37.21	-60.94	17.21	-40.94	0-360

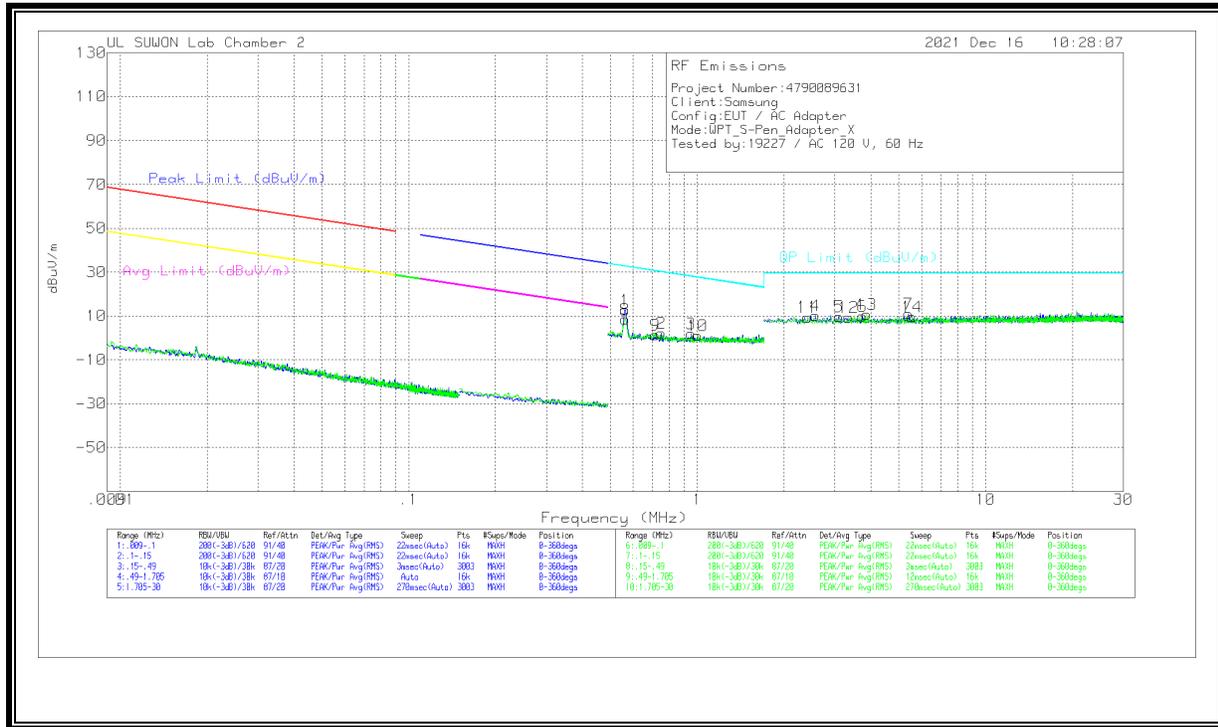
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
11	.55335	25.75	Pk	19.7	.1	-40	5.55	32.75	-27.2	0-360
12	.77458	22.7	Pk	19.8	.2	-40	2.7	29.83	-27.13	0-360
13	2.81715	28.58	Pk	19.9	.3	-40	8.78	29.5	-20.72	0-360
14	4.77755	29.01	Pk	19.8	.3	-40	9.11	29.5	-20.39	0-360

Pk - Peak detector

\*\* Fundamental

Note : 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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(S-pen charging mode Test case 7)**



**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	.56315	32.93	Pk	19.7	.1	-40	12.73	32.59	-19.86	0-360
2	.75057	22.13	Pk	19.8	.2	-40	2.13	30.11	-27.98	0-360
3	.95113	21.85	Pk	19.8	.2	-40	1.85	28.06	-26.21	0-360
4	2.5721	29.89	Pk	19.9	.3	-40	10.09	29.5	-19.41	0-360
5	3.09519	29.58	Pk	19.9	.3	-40	9.78	29.5	-19.72	0-360
6	3.7408	29.68	Pk	19.9	.3	-40	9.88	29.5	-19.62	0-360
7	5.3996	30.94	Pk	19.8	.4	-40	11.14	29.5	-18.36	0-360

[Face Off]

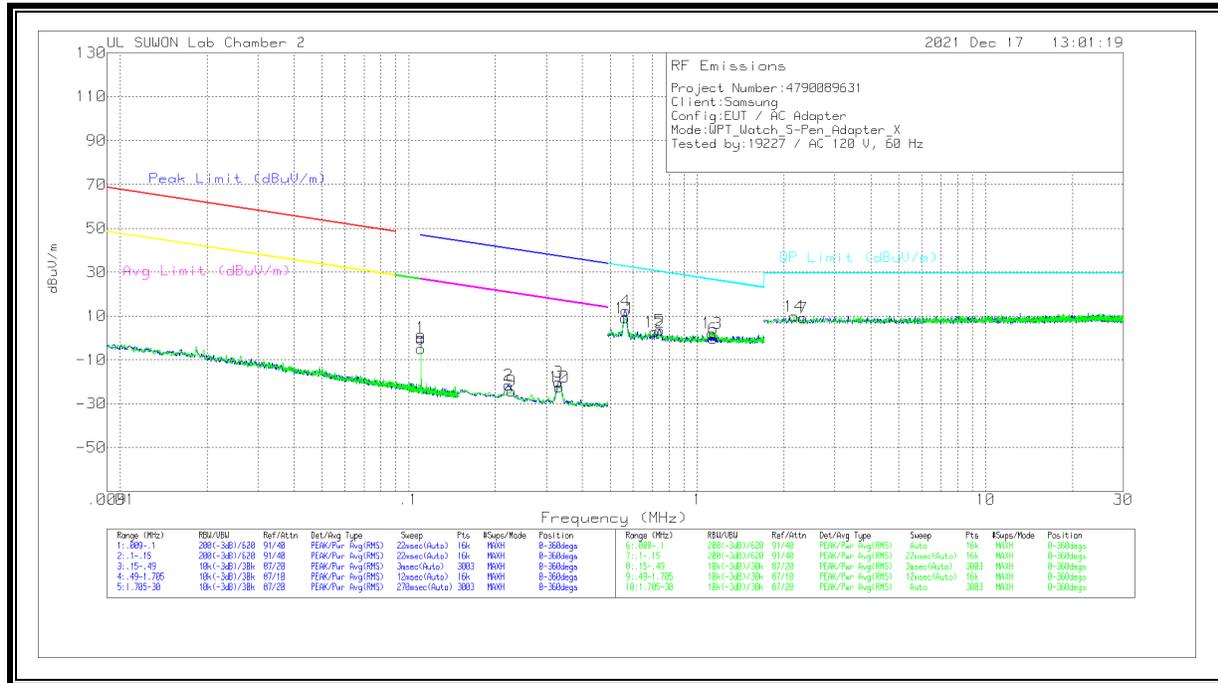
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.56353	28.78	Pk	19.7	.1	-40	8.58	32.59	-24.01	0-360
9	.7158	21.69	Pk	19.7	.1	-40	1.49	30.52	-29.03	0-360
10	1.00441	21.15	Pk	19.8	.2	-40	1.15	27.58	-26.43	0-360
11	2.41188	29.4	Pk	19.9	.2	-40	9.5	29.5	-20	0-360
12	3.34495	29.15	Pk	19.9	.3	-40	9.35	29.5	-20.15	0-360
13	3.86333	30.58	Pk	19.9	.3	-40	10.78	29.5	-18.72	0-360
14	5.55983	29.41	Pk	19.8	.4	-40	9.61	29.5	-19.89	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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(Simutaneous charging mode Test Case 9)**



**TEST DATA**

**Trace Markers**  
**[Face-On]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*1	.11029	60.5	Pk	19.8	.1	-80	.4	46.78	-46.38	26.78	-26.38	0-360
2	.2217	38.58	Pk	19.7	.1	-80	-21.62	40.7	-62.32	20.7	-42.32	0-360
3	.33097	40.07	Pk	19.7	.1	-80	-20.13	37.21	-57.34	17.21	-37.34	0-360

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)
**4	.56509	32.52	Pk	19.7	.1	-40	12.32	32.57	-20.25	0-360
5	.74145	23.83	Pk	19.7	.1	-40	3.63	30.21	-26.58	0-360
6	1.13535	19.61	Pk	19.8	.2	-40	-.39	26.52	-26.91	0-360
7	2.32705	28.92	Pk	19.9	.2	-40	9.02	29.5	-20.48	0-360

**d**  
**[Face-Off]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*8	.11028	55.26	Pk	19.8	.1	-80	-4.84	46.78	-51.62	26.78	-31.62	0-360
9	.22774	35.88	Pk	19.7	.1	-80	-24.32	40.47	-64.79	20.47	-44.79	0-360
10	.33261	37.84	Pk	19.7	.1	-80	-22.36	37.17	-59.53	17.17	-39.53	0-360

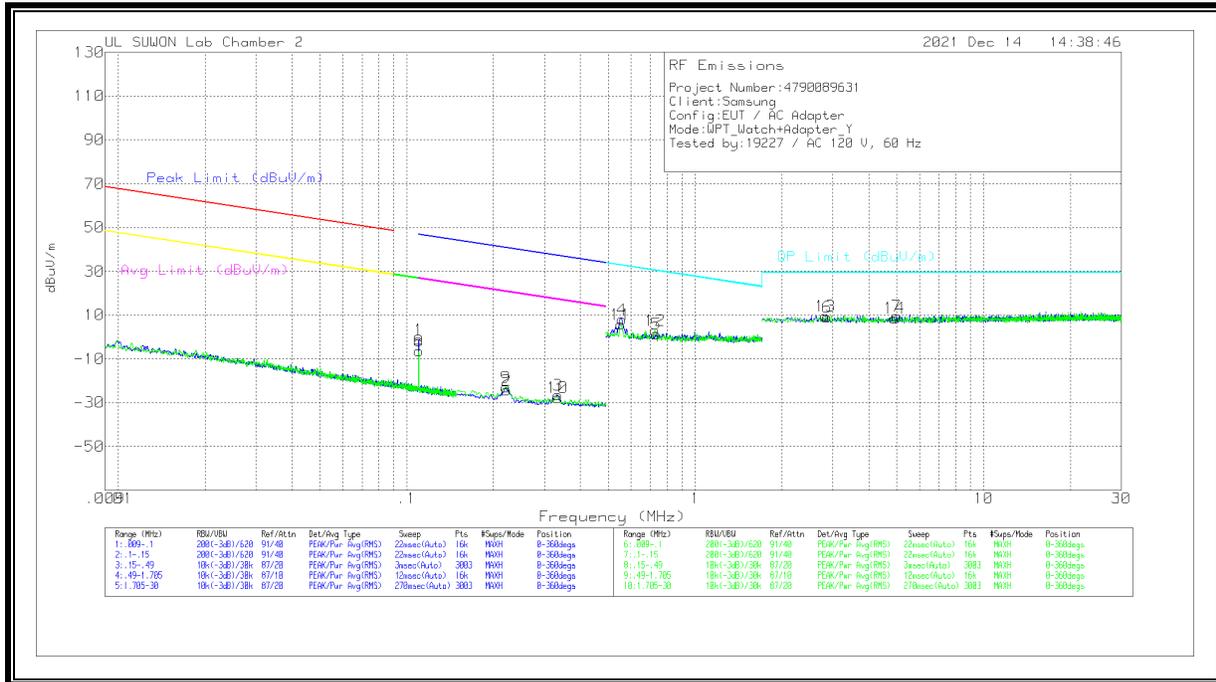
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**11	.56155	29.19	Pk	19.7	.1	-40	8.99	32.62	-23.63	0-360
12	.71317	23.03	Pk	19.7	.1	-40	2.83	30.55	-27.72	0-360
13	1.12525	22.15	Pk	19.8	.2	-40	2.15	26.6	-24.45	0-360
14	2.16683	29.84	Pk	19.9	.2	-40	9.94	29.5	-19.56	0-360

Pk - Peak detector  
 \*Power Sharing Fundamental  
 \*\*S-Pen 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.

### 7.4. Version 3 data

#### RADIATED EMISSIONS 9 KHz to 30 MHz(Power sharing mode Test Case 5)



**TEST DATA**

**Trace Markers**  
**[Face-On]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**1	.11009	58.91	Pk	19.8	.1	-80	-1.19	46.79	-47.98	26.79	-27.98	0-360
2	.22221	35.94	Pk	19.7	.1	-80	-24.26	40.68	-64.94	20.68	-44.94	0-360
3	.33346	33.67	Pk	19.7	.1	-80	-26.53	37.15	-63.68	17.15	-43.68	0-360

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)
4	.55658	28.24	Pk	19.7	.1	-40	8.04	32.7	-24.66	0-360
5	.73286	21.55	Pk	19.7	.1	-40	1.35	30.31	-28.96	0-360
6	2.8737	28.8	Pk	19.9	.3	-40	9	29.5	-20.5	0-360
7	5.00375	29.66	Pk	19.8	.3	-40	9.76	29.5	-19.74	0-360

**[Face-Off]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.11009	53.65	Pk	19.8	.1	-80	-6.45	46.79	-53.24	26.79	-33.24	0-360
9	.22096	37.3	Pk	19.7	.1	-80	-22.9	40.73	-63.63	20.73	-43.63	0-360
10	.3334	32.51	Pk	19.7	.1	-80	-27.69	37.15	-64.84	17.15	-44.84	0-360

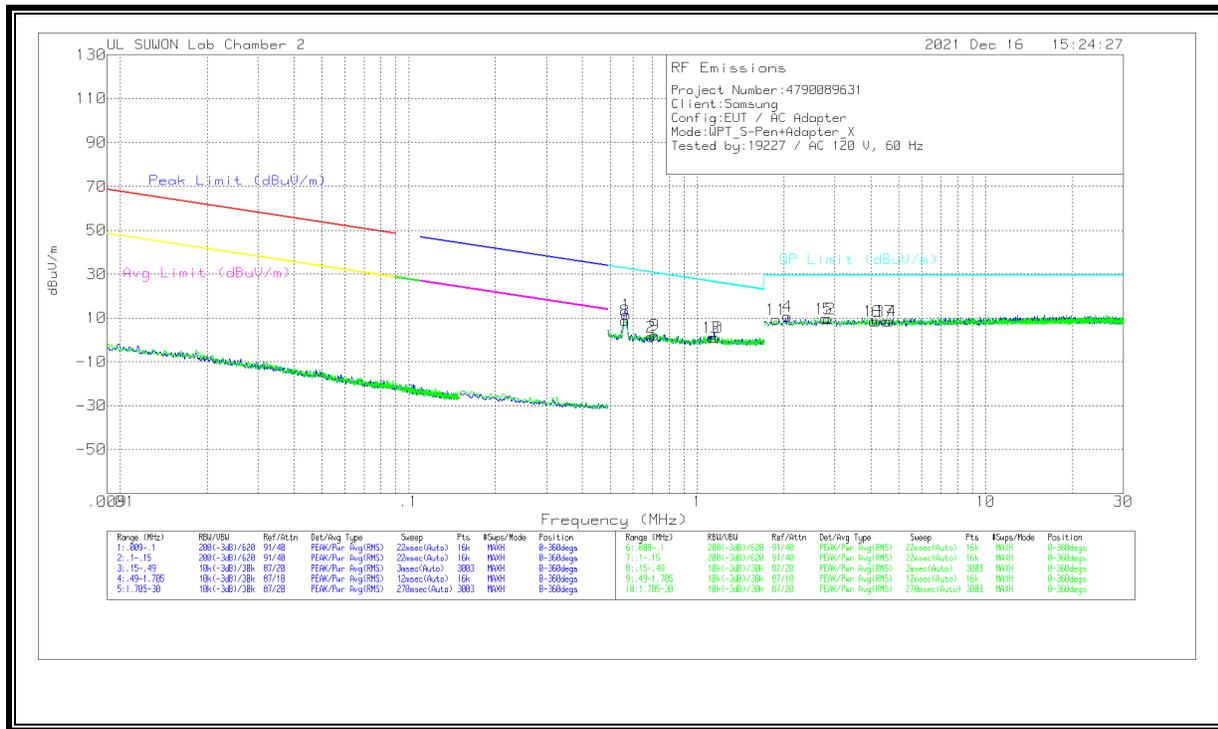
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
11	.55274	26.02	Pk	19.7	.1	-40	5.82	32.76	-26.94	0-360
12	.72602	23.17	Pk	19.7	.1	-40	2.97	30.39	-27.42	0-360
13	2.82658	29.36	Pk	19.9	.3	-40	9.56	29.5	-19.94	0-360
14	4.9095	28.58	Pk	19.8	.3	-40	8.68	29.5	-20.82	0-360

Pk - Peak detector

\*\* Fundamental

Note : 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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(S-pen charging mode Test case 7)**



**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	.56714	31.71	Pk	19.7	.1	-40	11.51	32.53	-21.02	0-360
2	.69167	21.55	Pk	19.7	.1	-40	1.35	30.81	-29.46	0-360
3	1.15238	21.17	Pk	19.8	.2	-40	1.17	26.39	-25.22	0-360
4	2.05373	30.59	Pk	19.9	.2	-40	10.69	29.5	-18.81	0-360
5	2.84543	29.48	Pk	19.9	.3	-40	9.68	29.5	-19.82	0-360
6	4.20263	28.34	Pk	19.8	.3	-40	8.44	29.5	-21.06	0-360
7	4.65503	28.32	Pk	19.8	.3	-40	8.42	29.5	-21.08	0-360

[Face Off]

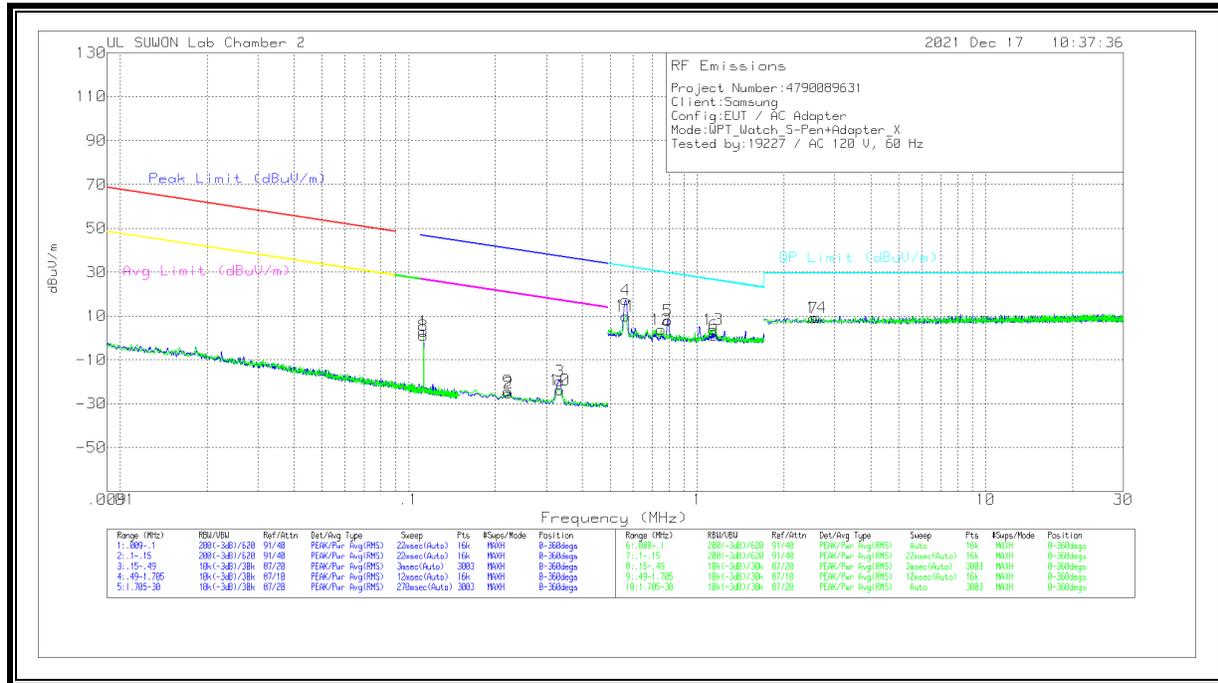
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.56345	28.94	Pk	19.7	.1	-40	8.74	32.59	-23.85	0-360
9	.71306	22.44	Pk	19.7	.1	-40	2.24	30.55	-28.31	0-360
10	1.13304	21.07	Pk	19.8	.2	-40	1.07	26.54	-25.47	0-360
11	1.87465	29.43	Pk	19.8	.2	-40	9.43	29.5	-20.07	0-360
12	2.77945	29.38	Pk	19.9	.3	-40	9.58	29.5	-19.92	0-360
13	4.09895	28.48	Pk	19.8	.3	-40	8.58	29.5	-20.92	0-360
14	4.52308	28.54	Pk	19.8	.3	-40	8.64	29.5	-20.86	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.

**RADIATED EMISSIONS 9 KHz to 30 MHz(Simutaneous charging mode Test Case 9)**



**TEST DATA**

**Trace Markers**  
**[Face-On]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*1	.11255	63.18	Pk	19.8	.1	-80	3.08	46.6	-43.52	26.6	-23.52	0-360
2	.22232	35.04	Pk	19.7	.1	-80	-25.16	40.68	-65.84	20.68	-45.84	0-360
3	.33374	40.62	Pk	19.7	.1	-80	-19.58	37.14	-56.72	17.14	-36.72	0-360

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)
**4	.56482	37.44	Pk	19.7	.1	-40	17.24	32.57	-15.33	0-360
5	.791	28.05	Pk	19.8	.2	-40	8.05	29.65	-21.6	0-360
6	1.14409	21.09	Pk	19.8	.2	-40	1.09	26.46	-25.37	0-360
7	2.52498	28.9	Pk	19.9	.3	-40	9.1	29.5	-20.4	0-360

**[Face-Off]**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
*8	.11252	61.27	Pk	19.8	.1	-80	1.17	46.6	-45.43	26.6	-25.43	0-360
9	.22091	35.85	Pk	19.7	.1	-80	-24.35	40.73	-65.08	20.73	-45.08	0-360
10	.33413	36.44	Pk	19.7	.1	-80	-23.76	37.13	-60.89	17.13	-40.89	0-360

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)
**11	.56437	30.26	Pk	19.7	.1	-40	10.06	32.58	-22.52	0-360
12	.75049	23.98	Pk	19.8	.2	-40	3.98	30.11	-26.13	0-360
13	1.13733	23.91	Pk	19.8	.2	-40	3.91	26.51	-22.6	0-360
14	2.59095	29.24	Pk	19.9	.3	-40	9.44	29.5	-20.06	0-360

Pk - Peak detector  
 \*Power Sharing Fundamental  
 \*\*S-Pen 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.

## 7.5. 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 $\mu$ 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

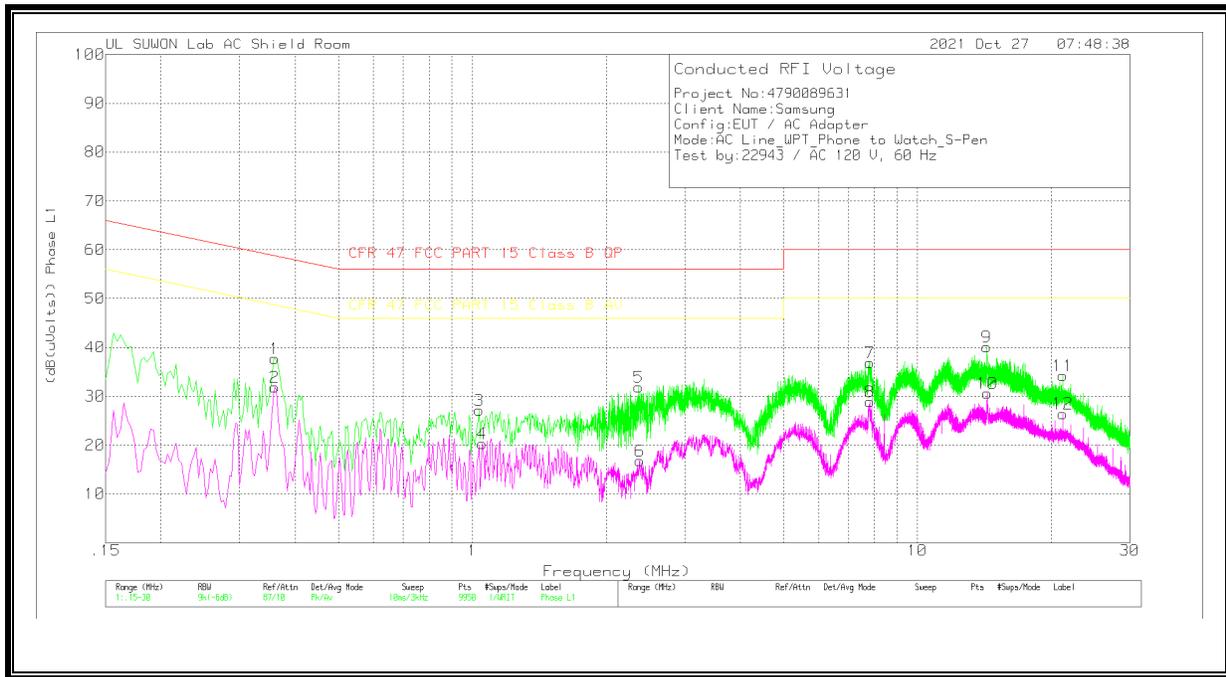
\*Decreases with the logarithm of the frequency.

### RESULTS

The EUT belongs to Test Case 5 and 7.

**6 WORST EMISSIONS(Power sharing mode Test Case 9)**

**Line-L1 .15 - 30MHz**



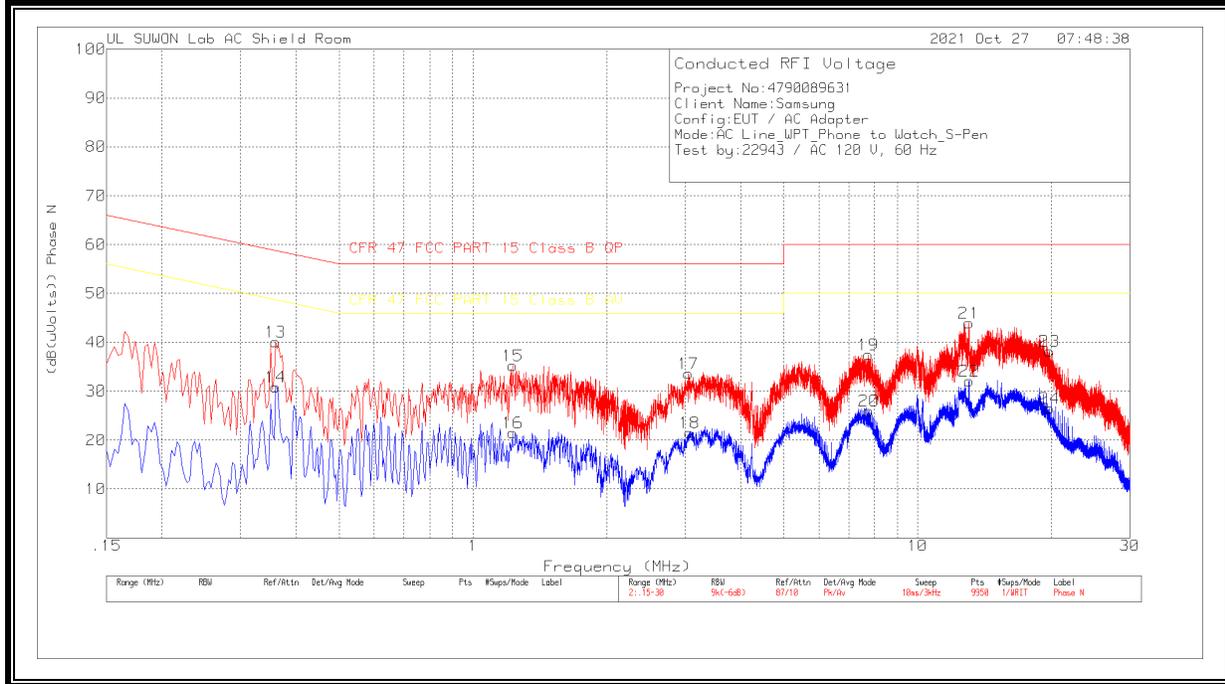
**Trace Markers**

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	.36	27.71	Pk	9.8	.2	37.71	58.73	-21.02	-	-
2	.36	21.87	Av	9.8	.2	31.87	-	-	48.73	-16.86
3	1.035	17.1	Pk	9.7	.3	27.1	56	-28.9	-	-
4	1.053	10.33	Av	9.7	.3	20.33	-	-	46	-25.67
5	2.364	21.83	Pk	9.7	.3	31.83	56	-24.17	-	-
6	2.379	6.74	Av	9.7	.3	16.74	-	-	46	-29.26
7	7.815	26.79	Pk	9.8	.3	36.89	60	-23.11	-	-
8	7.812	18.74	Av	9.8	.3	28.84	-	-	50	-21.16
9	14.328	29.68	Pk	10	.4	40.08	60	-19.92	-	-
10	14.34	20.26	Av	10	.4	30.66	-	-	50	-19.34
11	21.231	23.59	Pk	10.2	.4	34.19	60	-25.81	-	-
12	21.231	15.84	Av	10.2	.4	26.44	-	-	50	-23.56

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	.36	30.11	Pk	9.8	.2	40.11	58.73	-18.62	-	-
14	.36	20.89	Av	9.8	.2	30.89	-	-	48.73	-17.84
15	1.23	25.22	Pk	9.7	.3	35.22	56	-20.78	-	-
16	1.23	11.57	Av	9.7	.3	21.57	-	-	46	-24.43
17	3.051	23.61	Pk	9.7	.3	33.61	56	-22.39	-	-
18	3.069	11.49	Av	9.7	.3	21.49	-	-	46	-24.51
19	7.758	27.34	Pk	9.8	.3	37.44	60	-22.56	-	-
20	7.764	15.92	Av	9.8	.3	26.02	-	-	50	-23.98
21	13.044	33.5	Pk	10	.4	43.9	60	-16.1	-	-
22	13.05	21.7	Av	10	.4	32.1	-	-	50	-17.9
23	19.776	27.56	Pk	10.2	.4	38.16	60	-21.84	-	-
24	19.776	15.89	Av	10.2	.4	26.49	-	-	50	-23.51

Pk - Peak detector  
 Av - Average detection

**END OF TEST REPORT**