



FCC 47 CFR PART 15 SUBPART C

WPT

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT

MODEL NUMBER : SM-N975F/DS, SM-N975F, SM-N975X

FCC ID: A3LSMN975F

REPORT NUMBER: 4789067225-E12V2

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ACCREDITED*

Testing
Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/27/19	Initial issue	Sangyun Kim
V2	06/28/19	Updated to address TCB's question	Sangyun Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT

MODEL NUMBER: SM-N975F/DS, SM-N975F, SM-N975X

SERIAL NUMBER: R3CM506MKPR (RADIATED, Original);
R38M50ASH5W, R38M50ASH2K (Spot check)

DATE TESTED: JUN 18, 2019 – JUN 26, 2019 (Original);
JUN 26, 2019 – JUN 27, 2019 (Spot check);

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.

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1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMN976B DCD WPT(Low Power Wireless Transmitter, 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: A3LSMN975F shares the same enclosure and circuit board as FCC ID: A3LSMN976B. The surrounding circuitry and layout for low power wireless transmitter are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMN976B remains representative of FCC ID: A3LSMN975F. The test data of FCC ID: A3LSMN976B being submitted for this application to cover low power wireless transmitter features.

1.3. SPOT CHECK VERIFICATION DATA (Worst case fundamental emissions)

Band	Test Item	Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-N976B	SM-N975F/DS		
					FCC ID : A3LSMN976B	FCC ID : A3LSMN975F		
WPT	Fundamental level	Power sharing mode	Original : 110.12 kHz Spot check : 113.27 kHz	Original : 46.79 dBuV/m Spot check : 46.55 dBuV/m	-2.82 dBuV/m	-2.46 dBuV/m	0.36 dB	E field (300m distance)
	Fundamental level	S-pen charging mode	Original : 599.48 kHz Spot check : 593.8 kHz	Original : 32.05 dBuV/m Spot check : 32.14dBuV/m	16.54 dBuV/m	14.7 dBuV/m	-1.84 dB	E field (30m distance)

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 reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMN976B	Original Grant	4789009800-E2	Test Report	4789067225-E2	All
			4789009800-E3	Test Report	4789067225-E3	All
DTS	A3LSMN976B	Original Grant	4789009800-E5 (802.11b/g/n)	Test Report	4789067225-E5 (802.11b/g/n)	All
			4789009800-E6 (802.11ax)	Test Report	4789067225-E6 (802.11ax)	All
			4789009800-E4 Bluetooth LE	Test Report	4789067225-E4 Bluetooth LE	All
DSS	A3LSMN976B	Original Grant	4789009800-E7 (Bluetooth)	Test Report	4789067225-E7 (Bluetooth)	All
NII	A3LSMN976B	Original Grant	4789009800-E8 (802.11a/n/ac)	Test Report	4789067225-E8 (802.11a/n/ac)	All
			4789009800-E9 (802.11ax)	Test Report	4789067225-E9 (802.11ax)	All
DXX	A3LSMN976B	Original Grant	4789009800-E10 (ANT+)	Test Report	4789067225-E10 (ANT+)	All
			4789009800-E11 (NFC)	Test Report	4789067225-E11 (NFC)	All
DCD	A3LSMN976B	Original Grant	4789009800-E12 (WPT)	Test Report	4789067225-E12 (WPT)	All

For this application the data reuse is summarized below for each equipment class:

Equipment Class	Reference FCC ID (Parent)	Application Type	Data Re-used
PCE	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
DTS	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
DSS	A3LSMN976B	Original Grant	All
DSS	A3LSMN976B	Original Grant	All except SAR (full test)
			All except SAR (full test)
NII	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
DXX	A3LSMN976B	Original Grant	All
			All
DCD	A3LSMN976B	Original Grant	All except RF exposure

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 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	
☒	Chamber 1
☒	Chamber 2
☐	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.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	2.32 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.65 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.86 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT. This test report addresses the wireless low power transmitter(DCD) operational mode.

5.2. MAXIMUM OUTPUT POWER

- Power sharing mode

Fundamental Frequency (KHz)	Mode	E field (300m distance) FCC (dBuV/m)
110 - 148	Charging	-2.82

- S-pen charging mode

Fundamental Frequency (KHz)	Mode	E field (30m distance) FCC (dBuV/m)
590 - 625	Charging	16.54

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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z 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 Simultaneous 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

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 3 is worst and S-pen Charging mode, test results of case 7 is worst, so this test report described test case 3, test case 7 and test case 9.

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/DoC
Tavel Adapter	Samsung	EP-TA800	R37M4PW4FW1SE3	DoC
USB Data Cable	Samsung	EP-DG977	-	-
Mobile Phone	Samsung	SM-N976B	R3CM506QA3N	A3LSMN976B
Wearable Device	Samsung	SM-R805U	R3AK4005MCY	A3LSMR805U

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	1.0m	N/A

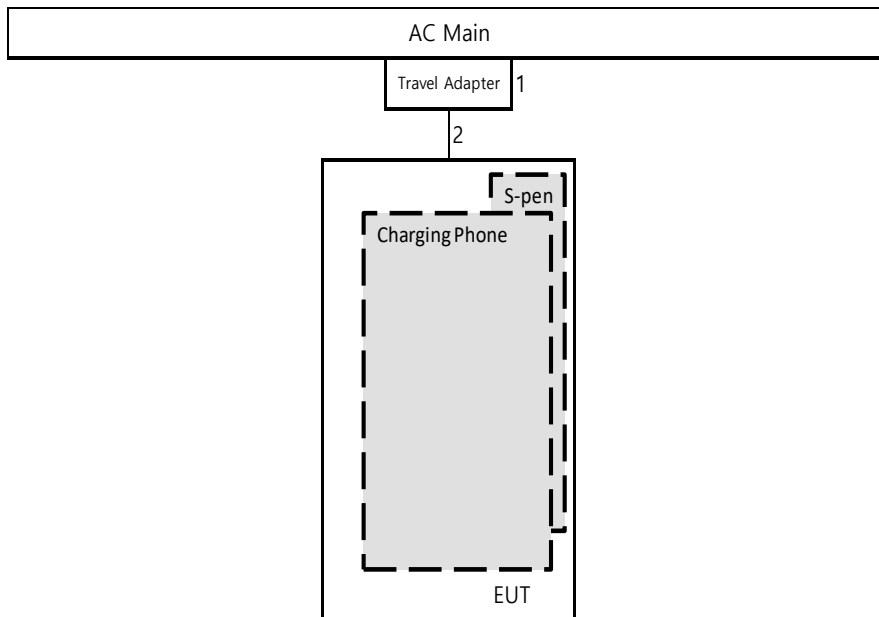
TEST SETUP

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

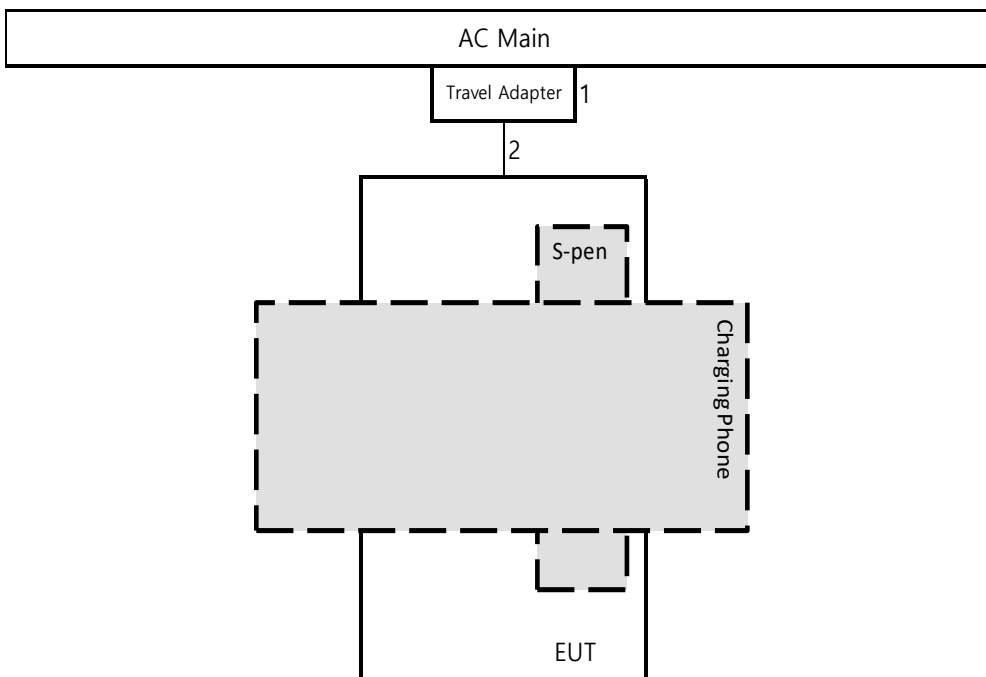
TEST SETUP DIAGRAM

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.

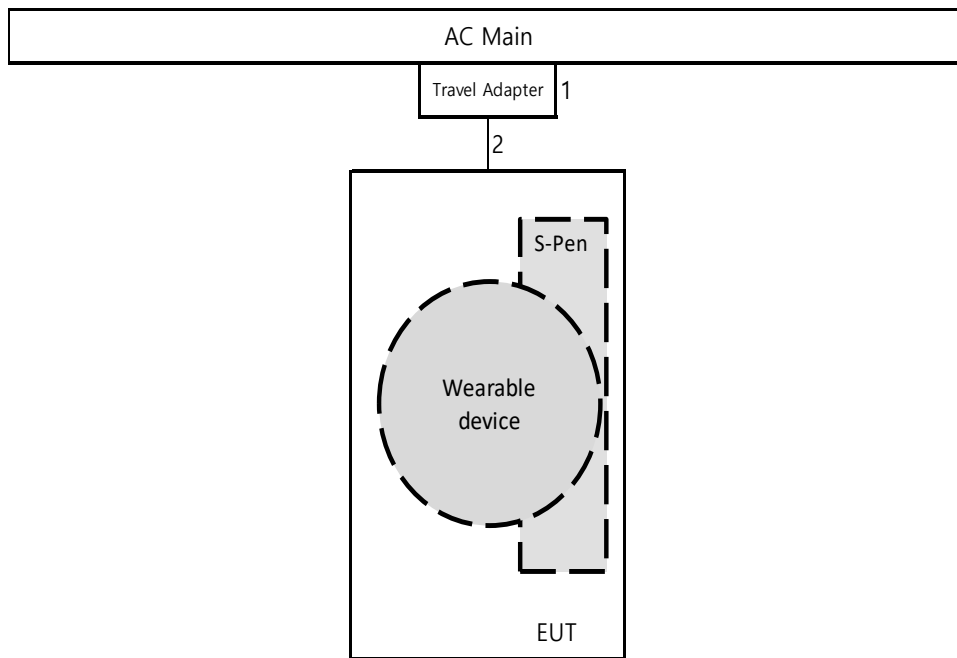
- Test Case1 and 2 : Charging Phone(S-pen is fully charged condition)



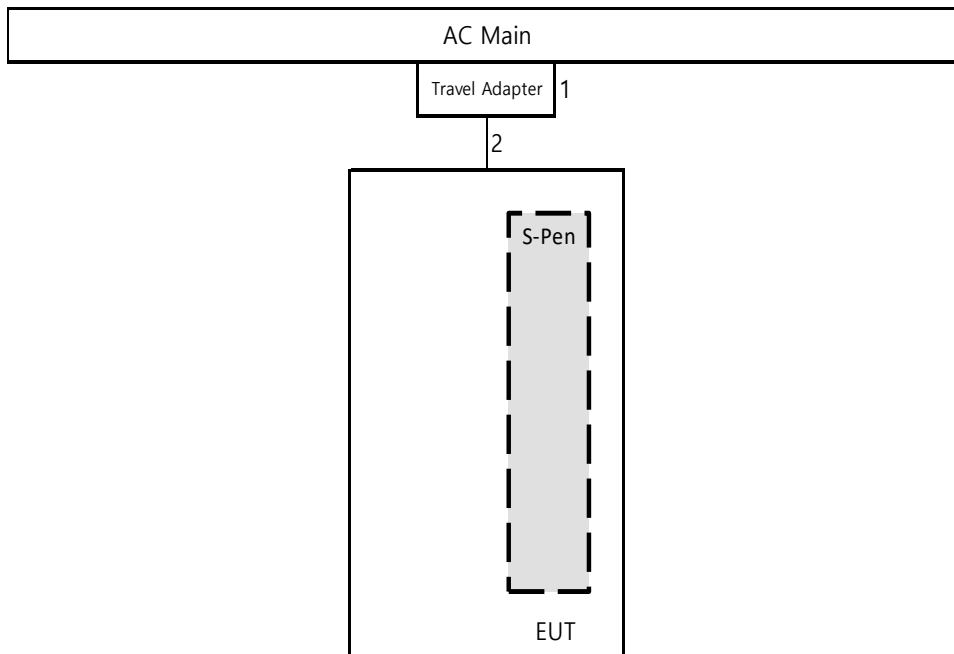
- Test Case 3 and 4 : Charging Phone(Cross position, S-pen is fully charged condition)



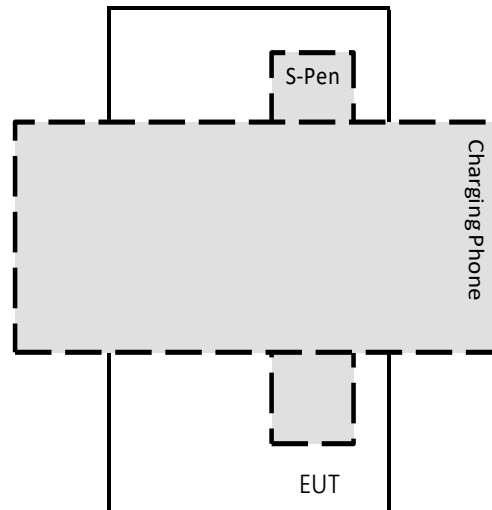
- Test Case 5 and 6 : Charging Wearable device(S-pen is fully charged condition)



- Test Case 7 and 8 : S-Pen Charging



- Test case 9 : Simultaneous 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	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-07-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	08-07-19
LISN	R&S	ENV-216	101837	08-09-19
LISN	R&S	ENV-216	101837	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-07-19
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.		

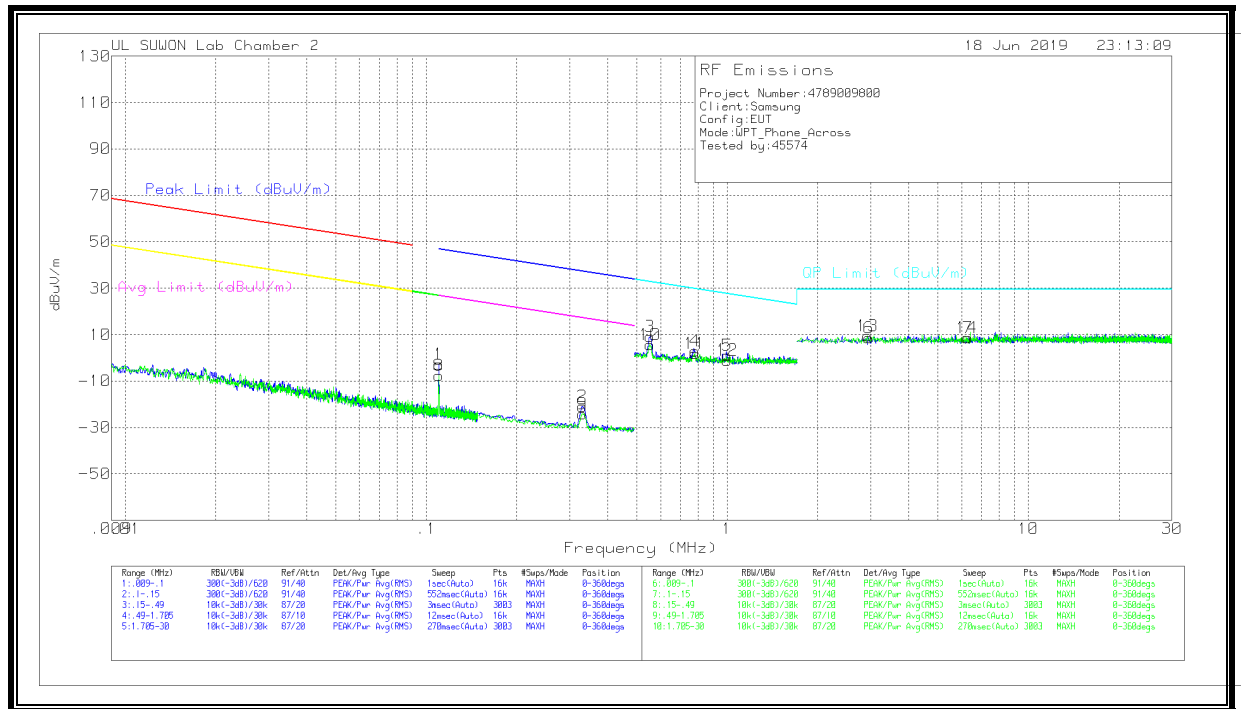
RESULTS

The EUT belongs to Test Case 3 and 7.

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(Power sharing mode Test Case 3)



TEST DATA

Trace Markers

[Face-On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	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	.11012	57.38	Pk	19.7	.1	-80	-2.82	46.79	-49.61	26.79	-29.61	0-360
2	.33012	39.47	Pk	19.5	.1	-80	-20.93	37.24	-58.17	17.24	-38.17	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.55449	29.5	Pk	19.7	.1	-40	9.3	32.73	-23.43	0-360
4	.77914	23.18	Pk	19.7	.2	-40	3.08	29.78	-26.7	0-360
5	.99829	21.09	Pk	19.7	.2	-40	.99	27.64	-26.65	0-360
6	2.9491	28.67	Pk	19.8	.3	-40	8.77	29.5	-20.73	0-360
7	6.32325	28.48	Pk	19.9	.4	-40	8.78	29.5	-20.72	0-360

[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	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	.11014	52.61	Pk	19.7	.1	-80	-7.59	46.79	-54.38	26.79	-34.38	0-360
9	.33012	36.39	Pk	19.5	.1	-80	-24.01	37.24	-61.25	17.24	-41.25	0-360

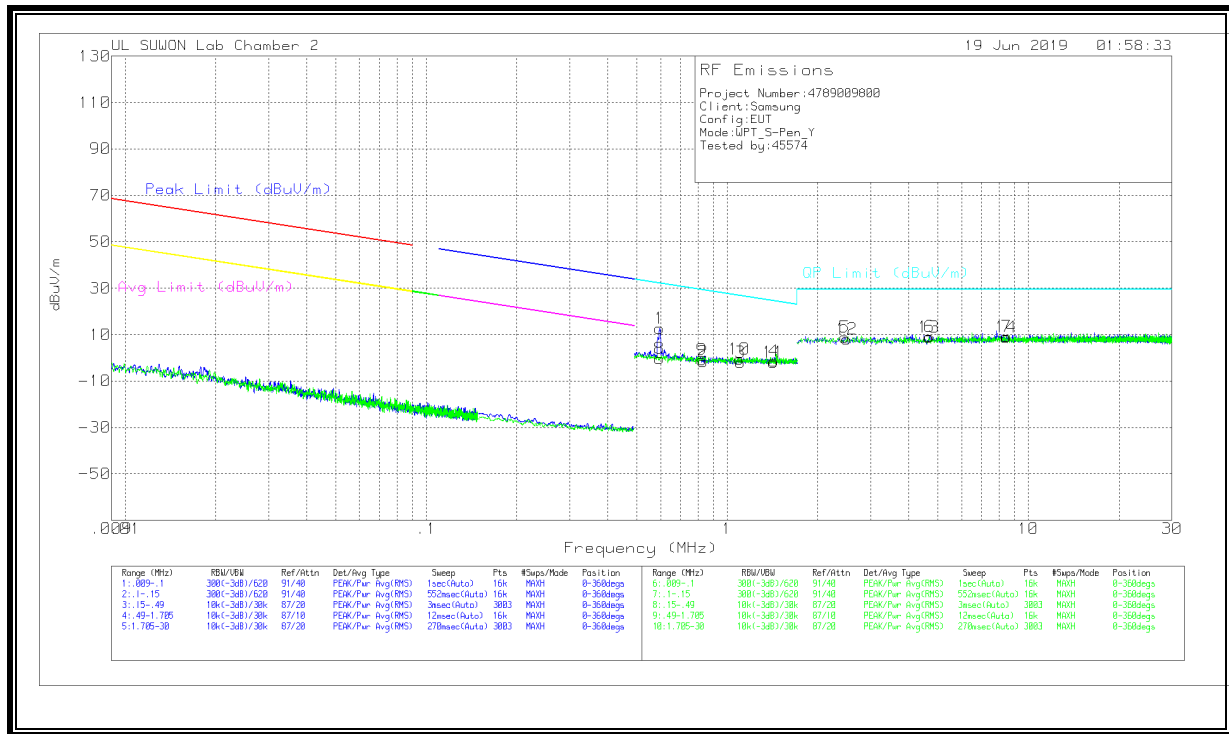
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
10	.55365	25.86	Pk	19.7	.1	-40	5.66	32.74	-27.08	0-360
11	.78021	22.04	Pk	19.7	.2	-40	1.94	29.77	-27.83	0-360
12	.99871	19.13	Pk	19.7	.2	-40	-.97	27.63	-28.6	0-360
13	2.92083	29.36	Pk	19.8	.3	-40	9.46	29.5	-20.04	0-360
14	6.23843	28.44	Pk	19.9	.4	-40	8.74	29.5	-20.76	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	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**1	.59598	32.97	Pk	19.7	.1	-40	12.77	32.1	-19.33	0-360
2	.83318	18.49	Pk	19.7	.2	-40	-1.61	29.2	-30.81	0-360
3	1.10431	18.29	Pk	19.7	.2	-40	-1.81	26.76	-28.57	0-360
4	1.4286	18.63	Pk	19.7	.2	-40	-1.47	24.53	-26	0-360
5	2.459	28.88	Pk	19.8	.2	-40	8.88	29.5	-20.62	0-360
6	4.70215	29.13	Pk	19.8	.3	-40	9.23	29.5	-20.27	0-360
7	8.47215	28.77	Pk	20	.4	-40	9.17	29.5	-20.33	0-360

[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**8	.59655	20.01	Pk	19.7	.1	-40	-.19	32.1	-32.29	0-360
9	.82489	19.32	Pk	19.7	.2	-40	-.78	29.29	-30.07	0-360
10	1.09412	19.6	Pk	19.7	.2	-40	-.5	26.84	-27.34	0-360
11	1.42282	18.19	Pk	19.7	.2	-40	-1.91	24.57	-26.48	0-360
12	2.48728	27.9	Pk	19.8	.3	-40	8	29.5	-21.5	0-360
13	4.6833	28.8	Pk	19.8	.3	-40	8.9	29.5	-20.6	0-360
14	8.42503	28.42	Pk	20	.4	-40	8.82	29.5	-20.68	0-360

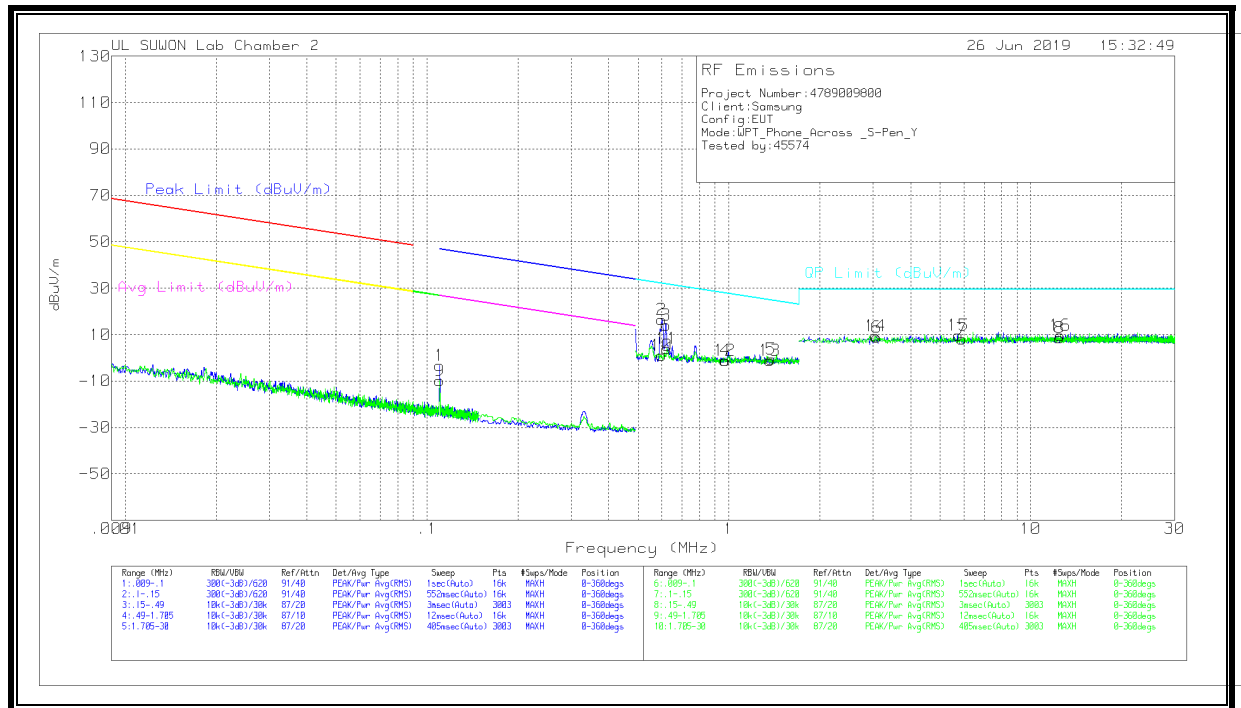
Pk - Peak detector

**Fundamental

Note 1: The emission level of marker 12~14 is higher than fundamental level of face-off condition(marker 8). However, it is only noise floor level and looks like higher than due to chamber characteristic. Also emission level of marker 12~14 is lower than fundamental level of face-on condition(marker 1).

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.

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	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	.11011	56.93	Pk	19.7	.1	-80	-3.27	46.79	-50.06	26.79	-30.06	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**2	.59948	36.74	Pk	19.7	.1	-40	16.54	32.05	-15.51	0-360
3	.6189	34.27	Pk	19.7	.1	-40	14.07	31.78	-17.71	0-360
4	.97275	19.03	Pk	19.7	.2	-40	-1.07	27.86	-28.93	0-360
5	1.38023	19.45	Pk	19.7	.2	-40	-.65	24.83	-25.48	0-360
6	3.09048	28.72	Pk	19.8	.3	-40	8.82	29.5	-20.68	0-360
7	5.91798	27.84	Pk	19.9	.4	-40	8.14	29.5	-21.36	0-360
8	12.47778	28.33	Pk	19.9	.5	-40	8.73	29.5	-20.77	0-360

[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	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)
*9	.11012	50.49	Pk	19.7	.1	-80	-9.71	46.79	-56.5	26.79	-36.5	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
**10	.59876	21.17	Pk	19.7	.1	-40	.97	32.06	-31.09	0-360
11	.62365	24.13	Pk	19.7	.1	-40	3.93	31.71	-27.78	0-360
12	.9715	18.9	Pk	19.7	.2	-40	-1.2	27.87	-29.07	0-360
13	1.36807	18.96	Pk	19.7	.2	-40	-1.14	24.91	-26.05	0-360
14	3.0622	29.36	Pk	19.8	.3	-40	9.46	29.5	-20.04	0-360
15	5.75775	29.33	Pk	19.9	.4	-40	9.63	29.5	-19.87	0-360
16	12.51548	29.32	Pk	19.9	.5	-40	9.72	29.5	-19.78	0-360

Pk - Peak detector

*Power Sharing Fundamental

**S-Pen Fundamental

Note 1: The emission level of marker 11, 14~16 is higher than fundamental level of face-off condition(marker 10). However, it is only noise floor level and looks like higher than due to chamber characteristic. Also emission level of marker 11, 14~16 is lower than fundamental level of face-on condition(marker 2).

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.

7.2. 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

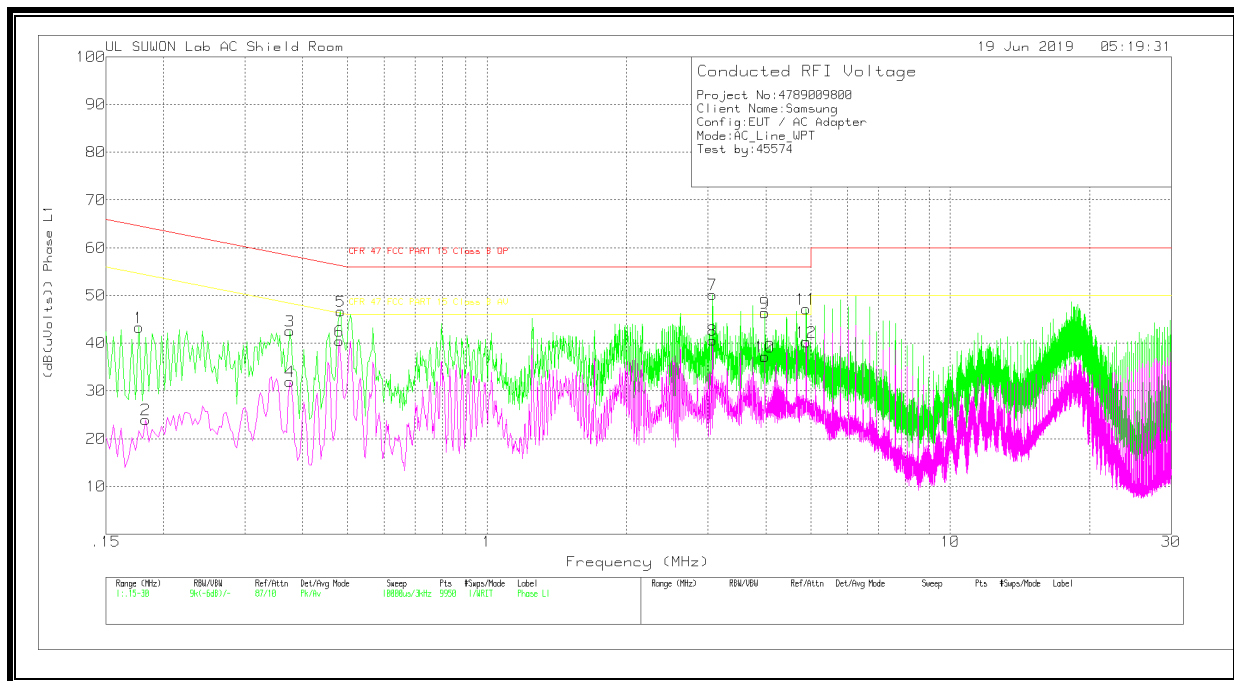
FCC §15.207 (a)

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
*Decreases with the logarithm of the frequency.		

RESULTS

The EUT belongs to Test Case 3 and 7.

Line-L1 .15 - 30MHz



LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_L1	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)
1	.177	33.1	Pk	10	.2	43.3	64.63	-21.33	-	-
2	.183	13.76	Av	10	.2	23.96	-	-	54.35	-30.39
3	.375	32.45	Pk	9.9	.2	42.55	58.39	-15.84	-	-
4	.375	21.87	Av	9.9	.2	31.97	-	-	48.39	-16.42
5	.483	36.57	Pk	9.9	.2	46.67	56.29	-9.62	-	-
6	.48	30.38	Av	9.9	.2	40.48	-	-	46.34	-5.86
7	3.069	39.88	Pk	10	.3	50.18	56	-5.82	-	-
8	3.069	30.29	Av	10	.3	40.59	-	-	46	-5.41
9	3.978	36.29	Pk	9.8	.3	46.39	56	-9.61	-	-
10	3.978	27.1	Av	9.8	.3	37.2	-	-	46	-8.8
11	4.887	37.09	Pk	9.8	.3	47.19	56	-8.81	-	-
12	4.89	30.17	Av	9.8	.3	40.27	-	-	46	-5.73

Pk - Peak detector

Av - Average detection

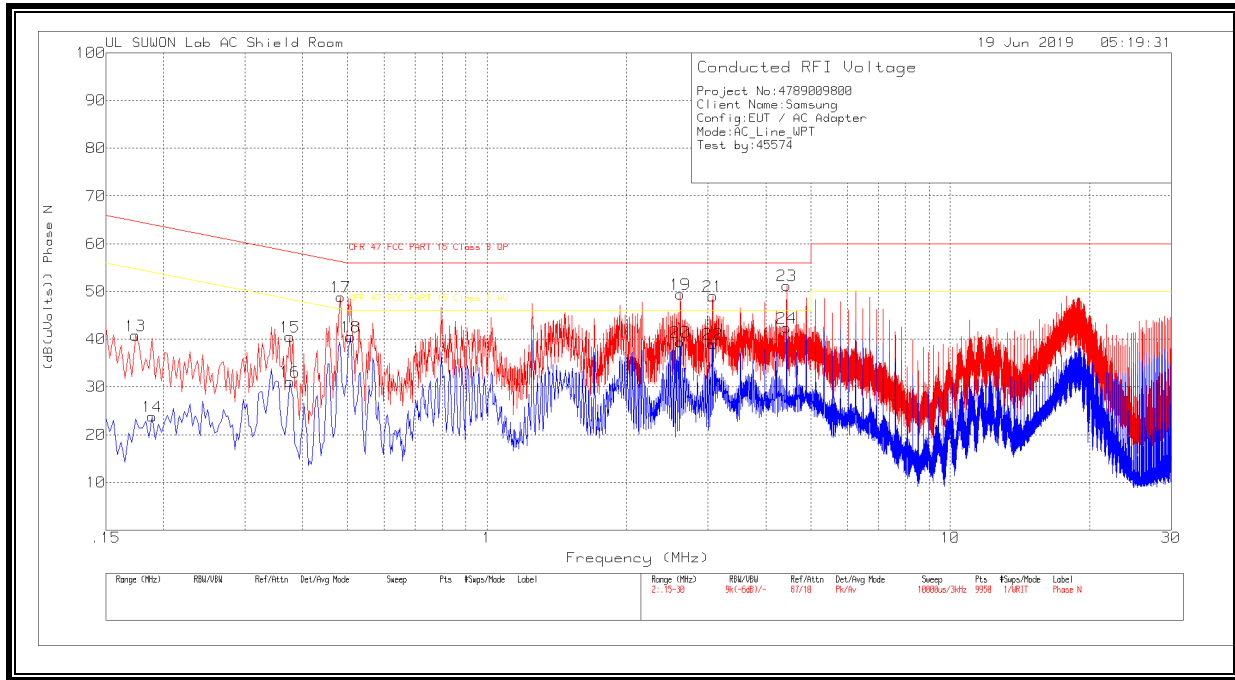
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_L1	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)
.37515	29.68	Qp	9.9	.2	39.78	58.39	-18.61	-	-
.48315	33.02	Qp	9.9	.2	43.12	56.28	-13.16	-	-
3.06915	33.46	Qp	10	.3	43.76	56	-12.24	-	-
4.88775	33.86	Qp	9.8	.3	43.96	56	-12.04	-	-

Qp - Quasi-Peak detector

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_N	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	.174	30.57	Pk	10	.2	40.77	64.77	-24	-	-
14	.189	13.7	Av	9.9	.2	23.8	-	-	54.08	-30.28
15	.375	30.92	Pk	9.4	.2	40.52	58.39	-17.87	-	-
16	.375	21.47	Av	9.4	.2	31.07	-	-	48.39	-17.32
17	.483	38.85	Pk	9.8	.2	48.85	56.29	-7.44	-	-
18	.507	30.44	Av	9.9	.2	40.54	-	-	46	-5.46
19	2.613	39.44	Pk	9.7	.3	49.44	56	-6.56	-	-
20	2.613	29.39	Av	9.7	.3	39.39	-	-	46	-6.61
21	3.072	39.05	Pk	9.7	.3	49.05	56	-6.95	-	-
22	3.072	29.03	Av	9.7	.3	39.03	-	-	46	-6.97
23	4.434	41.13	Pk	9.8	.3	51.23	56	-4.77	-	-
24	4.434	32.31	Av	9.8	.3	42.41	-	-	46	-3.59

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

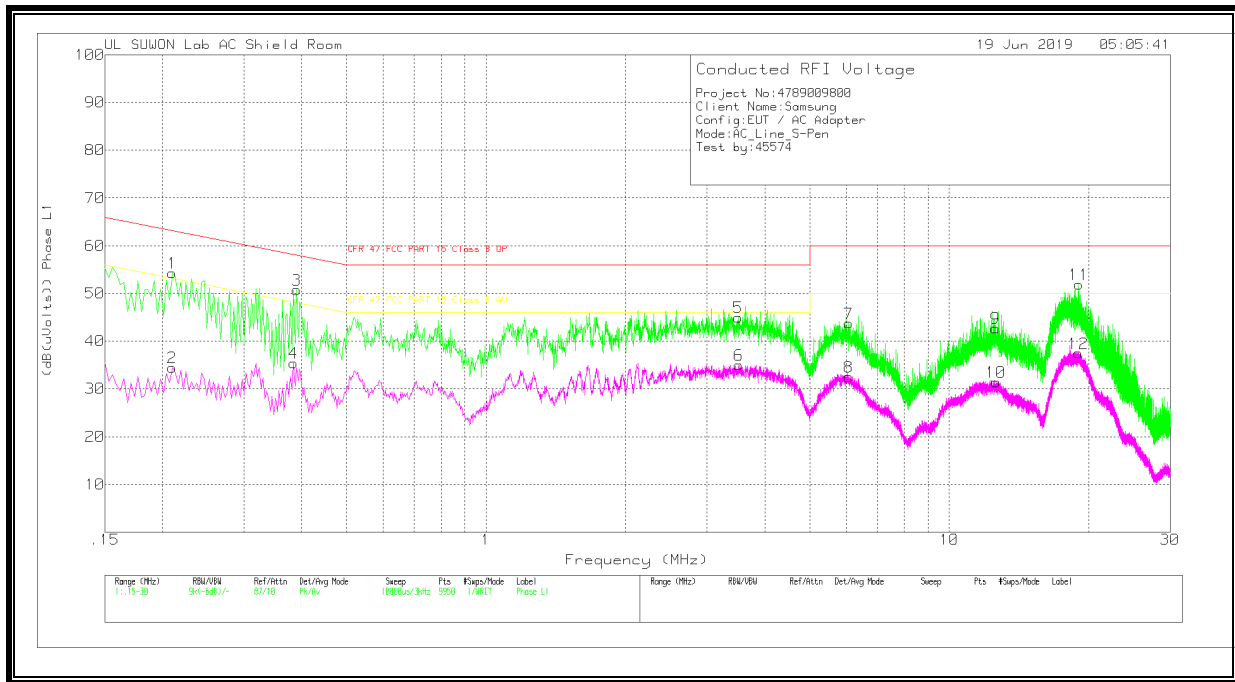
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836 _With ex-cord_N	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)
.37425	29.55	Qp	9.4	.2	39.15	58.41	-19.26	-	-
.50625	33.48	Qp	9.9	.2	43.58	56	-12.42	-	-
2.61375	34.17	Qp	9.7	.3	44.17	56	-11.83	-	-
3.07125	34.98	Qp	9.7	.3	44.98	56	-11.02	-	-
4.43475	33.8	Qp	9.8	.3	43.9	56	-12.1	-	-

Qp - Quasi-Peak detector

6 WORST EMISSIONS(S-pen charging mode Test case7)

Line-L1 .15 - 30MHz



LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_L1	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)
1	.21	44.19	Pk	9.9	.2	54.29	63.21	-8.92	-	-
2	.21	24.36	Av	9.9	.2	34.46	-	-	53.21	-18.75
3	.39	40.68	Pk	9.9	.2	50.78	58.06	-7.28	-	-
4	.384	25.32	Av	9.9	.2	35.42	-	-	48.19	-12.77
5	3.504	34.76	Pk	9.9	.3	44.96	56	-11.04	-	-
6	3.516	24.8	Av	9.9	.3	35	-	-	46	-11
7	6.069	33.54	Pk	9.9	.3	43.74	60	-16.26	-	-
8	6.066	22.35	Av	9.9	.3	32.55	-	-	50	-17.45
9	12.6	32.32	Pk	10.1	.3	42.72	60	-17.28	-	-
10	12.615	21.04	Av	10.1	.3	31.44	-	-	50	-18.56
11	19.056	41.1	Pk	10.4	.4	51.9	60	-8.1	-	-
12	19.02	26.69	Av	10.4	.4	37.49	-	-	50	-12.51

Pk - Peak detector

Av - Average detection

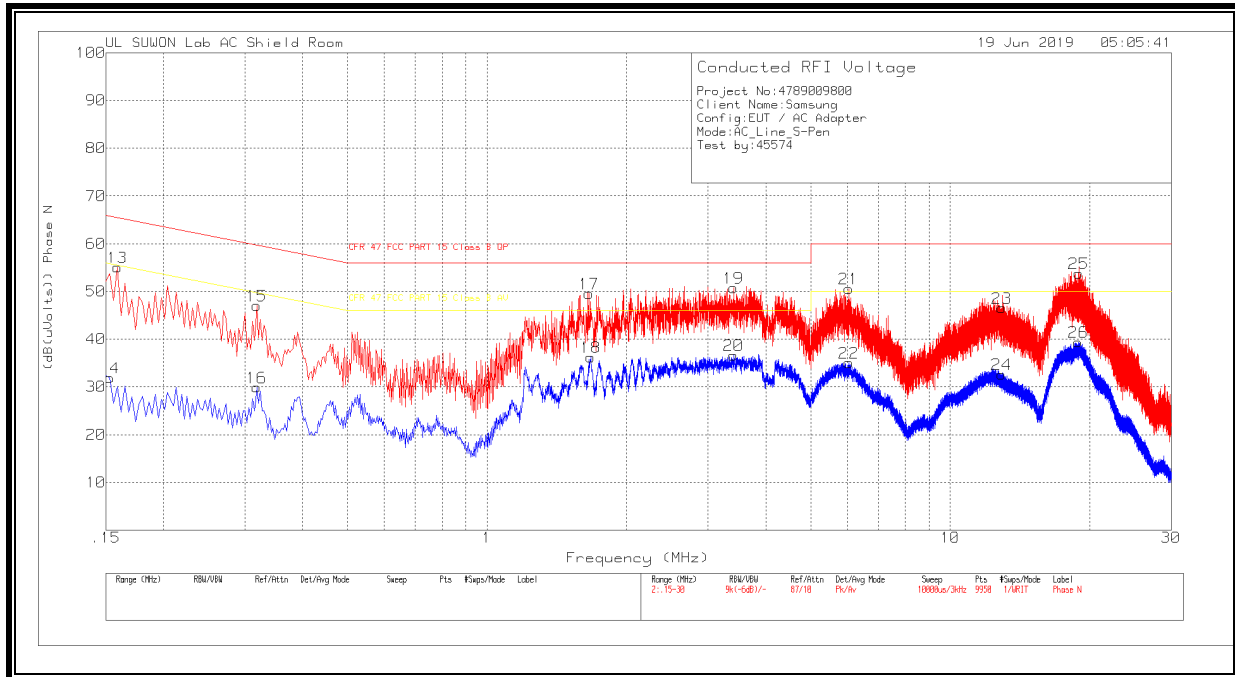
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836 _With ex-cord_L1	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)
.21075	34.75	Qp	9.9	.2	44.85	63.18	-18.33	-	-
.38925	22.84	Qp	9.9	.2	32.94	58.08	-25.14	-	-
19.0562	34.13	Qp	10.4	.4	44.93	60	-15.07	-	-

Qp - Quasi-Peak detector

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_N	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	.159	45.05	Pk	9.9	.1	55.05	65.52	-10.47	-	-
14	.153	22.01	Av	9.8	.1	31.91	-	-	55.84	-23.93
15	.318	37.03	Pk	9.8	.2	47.03	59.76	-12.73	-	-
16	.318	19.91	Av	9.8	.2	29.91	-	-	49.76	-19.85
17	1.659	39.54	Pk	9.7	.3	49.54	56	-6.46	-	-
18	1.674	26.24	Av	9.7	.3	36.24	-	-	46	-9.76
19	3.405	40.66	Pk	9.8	.3	50.76	56	-5.24	-	-
20	3.405	26.54	Av	9.8	.3	36.64	-	-	46	-9.36
21	6.039	40.45	Pk	9.8	.3	50.55	60	-9.45	-	-
22	6.039	24.98	Av	9.8	.3	35.08	-	-	50	-14.92
23	12.924	36.03	Pk	10.1	.4	46.53	60	-13.47	-	-
24	12.909	22.12	Av	10.1	.4	32.62	-	-	50	-17.38
25	18.945	42.88	Pk	10.5	.4	53.78	60	-6.22	-	-
26	18.9	28.51	Av	10.5	.4	39.41	-	-	50	-10.59

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

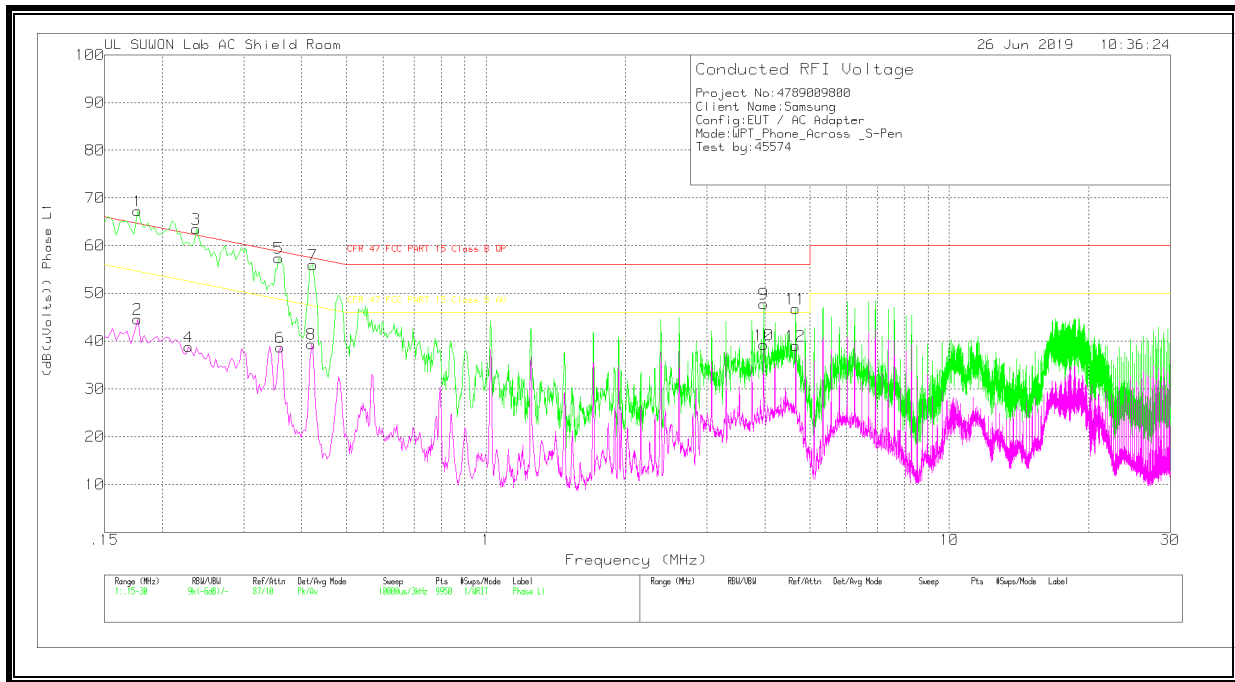
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836 _With ex-cord_N	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)
1.65915	29.35	Qp	9.7	.3	39.35	56	-16.65	-	-
1.67325	29.66	Qp	9.7	.3	39.66	56	-16.34	-	-
3.40515	33.22	Qp	9.8	.3	43.32	56	-12.68	-	-
6.03915	29.97	Qp	9.8	.3	40.07	60	-19.93	-	-
18.9458	36.42	Qp	10.5	.4	47.32	60	-12.68	-	-

Qp - Quasi-Peak detector

6 WORST EMISSIONS(Simutaneous charging mode Test Case 9)

Line-L1 .15 - 30MHz



LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_L1	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)
1	.177	57.06	Pk	10	.2	67.26	64.63	2.63	-	-
2	.177	34.4	Av	10	.2	44.6	-	-	54.63	-10.03
3	.237	53.61	Pk	9.7	.2	63.51	62.2	1.31	-	-
4	.228	28.81	Av	9.8	.2	38.81	-	-	52.52	-13.71
5	.357	47.32	Pk	9.9	.2	57.42	58.8	-1.38	-	-
6	.36	28.58	Av	9.9	.2	38.68	-	-	48.73	-10.05
7	.423	45.89	Pk	9.9	.2	55.99	57.39	-1.4	-	-
8	.42	29.28	Av	9.9	.2	39.38	-	-	47.45	-8.07
9	3.978	37.7	Pk	9.8	.3	47.8	56	-8.2	-	-
10	3.978	29.13	Av	9.8	.3	39.23	-	-	46	-6.77
11	4.659	36.68	Pk	9.8	.3	46.78	56	-9.22	-	-
12	4.659	28.93	Av	9.8	.3	39.03	-	-	46	-6.97

Pk - Peak detector

Av - Average detection

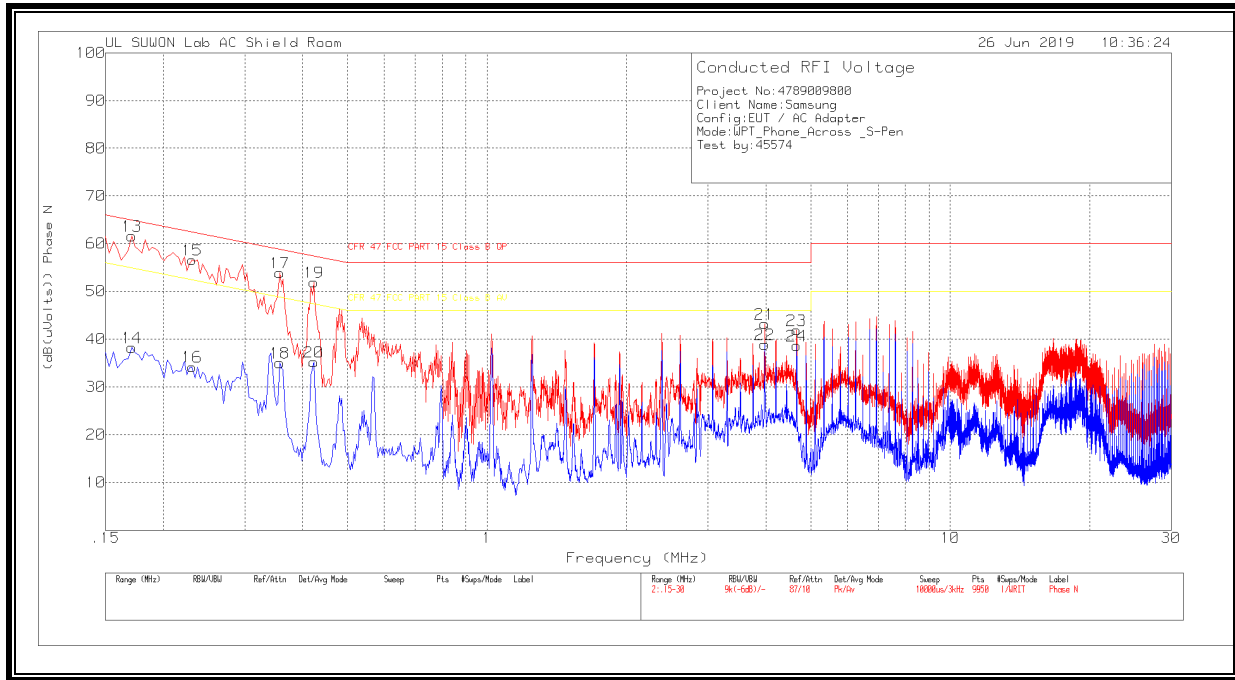
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_L1	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)
.17775	42.05	Qp	10	.2	52.25	64.59	-12.34	-	-
.23775	38.54	Qp	9.7	.2	48.44	62.17	-13.73	-	-
.35775	35.69	Qp	9.9	.2	45.79	58.78	-12.99	-	-
.42225	34.36	Qp	9.9	.2	44.46	57.4	-12.94	-	-
3.97875	34.63	Qp	9.8	.3	44.73	56	-11.27	-	-
4.65975	33.47	Qp	9.8	.3	43.57	56	-12.43	-	-

Qp - Quasi-Peak detector

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex-cord_N	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	.171	51.43	Pk	10	.2	61.63	64.91	-3.28	-	-
14	.171	28.05	Av	10	.2	38.25	-	-	54.91	-16.66
15	.231	46.68	Pk	9.7	.2	56.58	62.41	-5.83	-	-
16	.231	24.29	Av	9.7	.2	34.19	-	-	52.41	-18.22
17	.357	44	Pk	9.7	.2	53.9	58.8	-4.9	-	-
18	.357	25.15	Av	9.7	.2	35.05	-	-	48.8	-13.75
19	.423	42.52	Pk	9.2	.2	51.92	57.39	-5.47	-	-
20	.423	25.8	Av	9.2	.2	35.2	-	-	47.39	-12.19
21	3.978	33.11	Pk	9.8	.3	43.21	56	-12.79	-	-
22	3.978	28.78	Av	9.8	.3	38.88	-	-	46	-7.12
23	4.662	31.77	Pk	9.8	.3	41.87	56	-14.13	-	-
24	4.662	28.52	Av	9.8	.3	38.62	-	-	46	-7.38

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836 _With ex-cord_N	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)
.17115	39.79	Qp	10	.2	49.99	64.9	-14.91	-	-
.23025	37.25	Qp	9.7	.2	47.15	62.44	-15.29	-	-
.35775	35.89	Qp	9.7	.2	45.79	58.78	-12.99	-	-
.42225	35.57	Qp	9.2	.2	44.97	57.4	-12.43	-	-

Qp - Quasi-Peak detector