



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-N970F/DS, SM-N970F, SM-N970X

FCC ID: A3LSMN970F

REPORT NUMBER: 4789014604-E12V2

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ACCREDITED*

Testing
Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/28/19	Initial issue	Sangyun Kim
V2	07/01/19	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-N970F/DS, SM-N970F, SM-N970X

SERIAL NUMBER: R38M6037F5L (RADIATED);

DATE TESTED: JUN 24, 2019 – JUN 26, 2019;

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
UL Korea, Ltd. By:

Tested By:



Changyoung Choi
Suwon Lab Engineer
UL Korea, Ltd.



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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.

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.

This report covers the Samsung models SM-N970F/DS, SM-N970F and SM-N970X. These models are identical in hardware except SM-N970F has single SIM tray and model SM-N970X has been disabled all cellular bands by software. With some pre-scan, model SM-N970F/DS was set for final test.

5.2. MAXIMUM OUTPUT POWER

- Power sharing mode

Fundamental Frequency (KHz)	Mode	E field (300m distance) FCC (dBuV/m)
110 - 148	Charging	3.84

- S-pen charging mode

Fundamental Frequency (KHz)	Mode	E field (30m distance) FCC (dBuV/m)
590-625	Charging	16.65

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 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. <i>The EUT condition is charging from TA</i>

For radiated test, test case 1/3/5/7, 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, 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 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

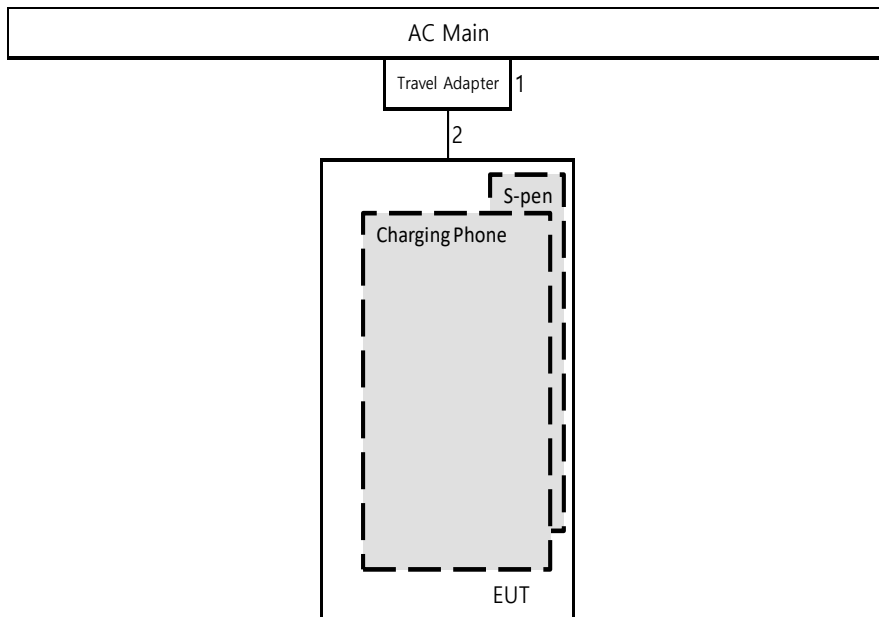
TEST SETUP

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

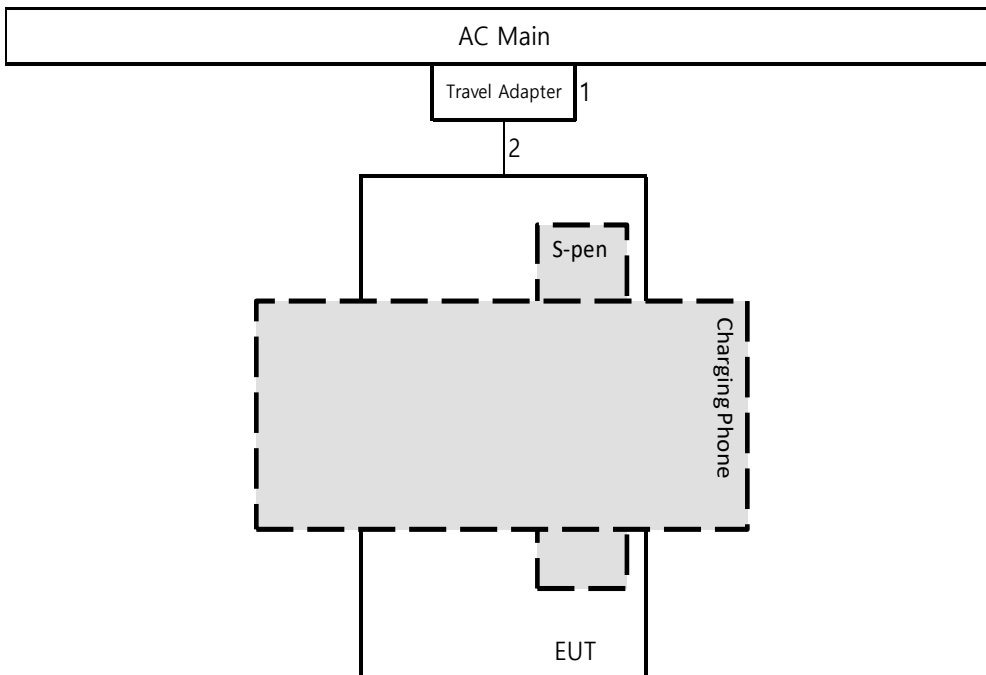
TEST SETUP DIAGRAM

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

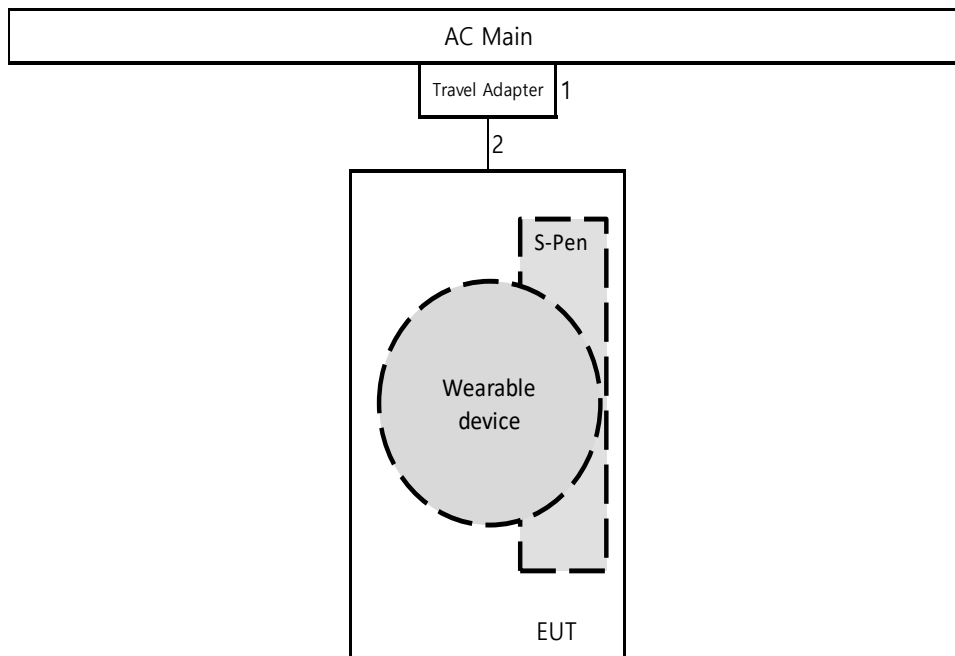
- Test Case1 and 2 : Charging Phone(S-pen is fully charged condition)



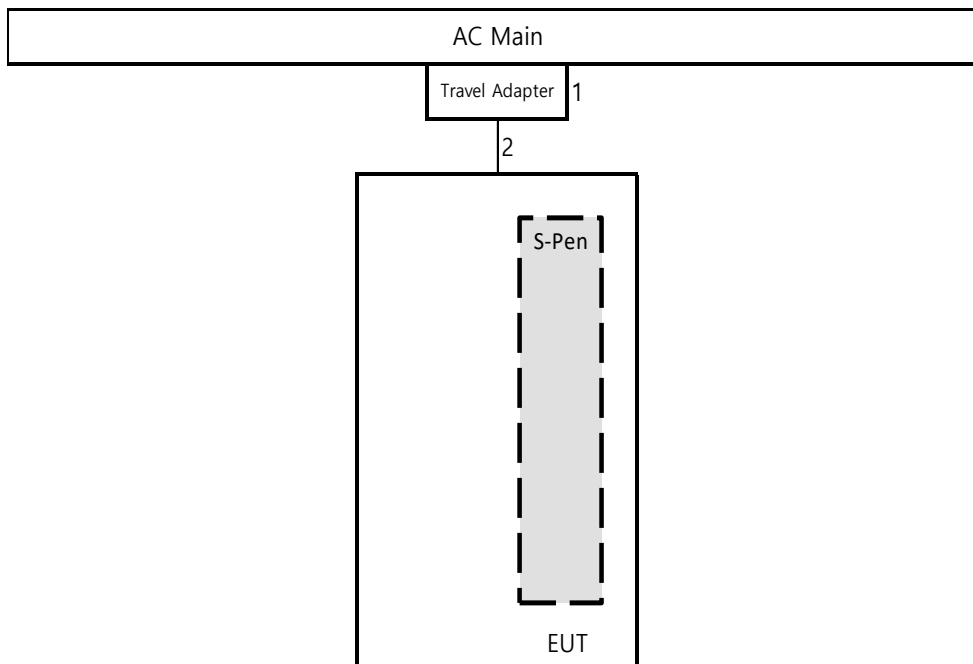
- Test Case 3 and 4 : Charging Phone(Cross position, S-pen is fully charged condition)



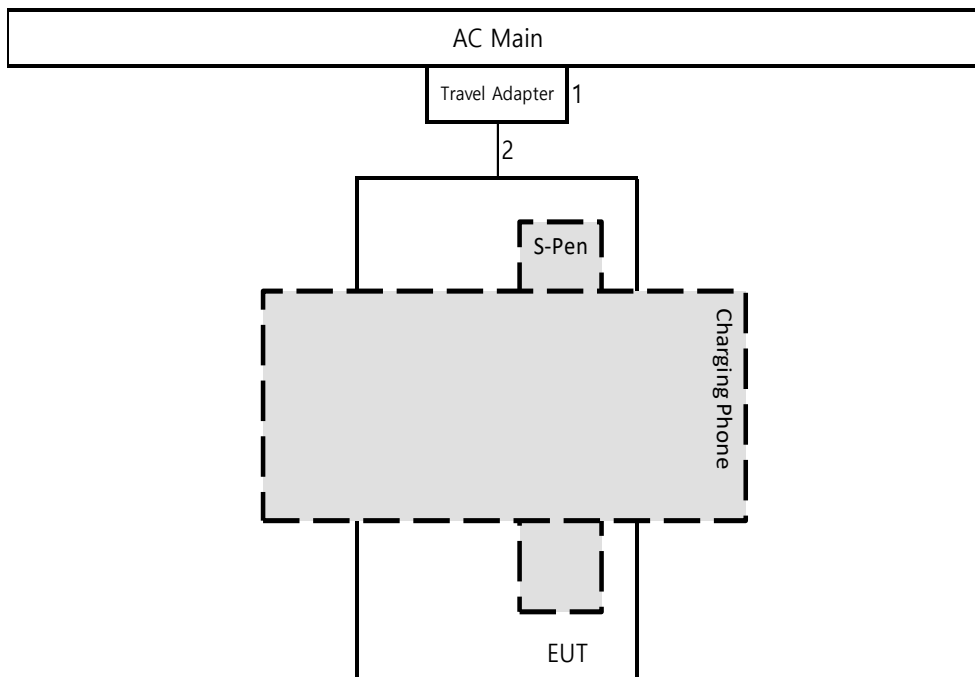
- Test Case 5 and 6 : Charging Wearable device(S-pen is fully charged condition)



- 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.		

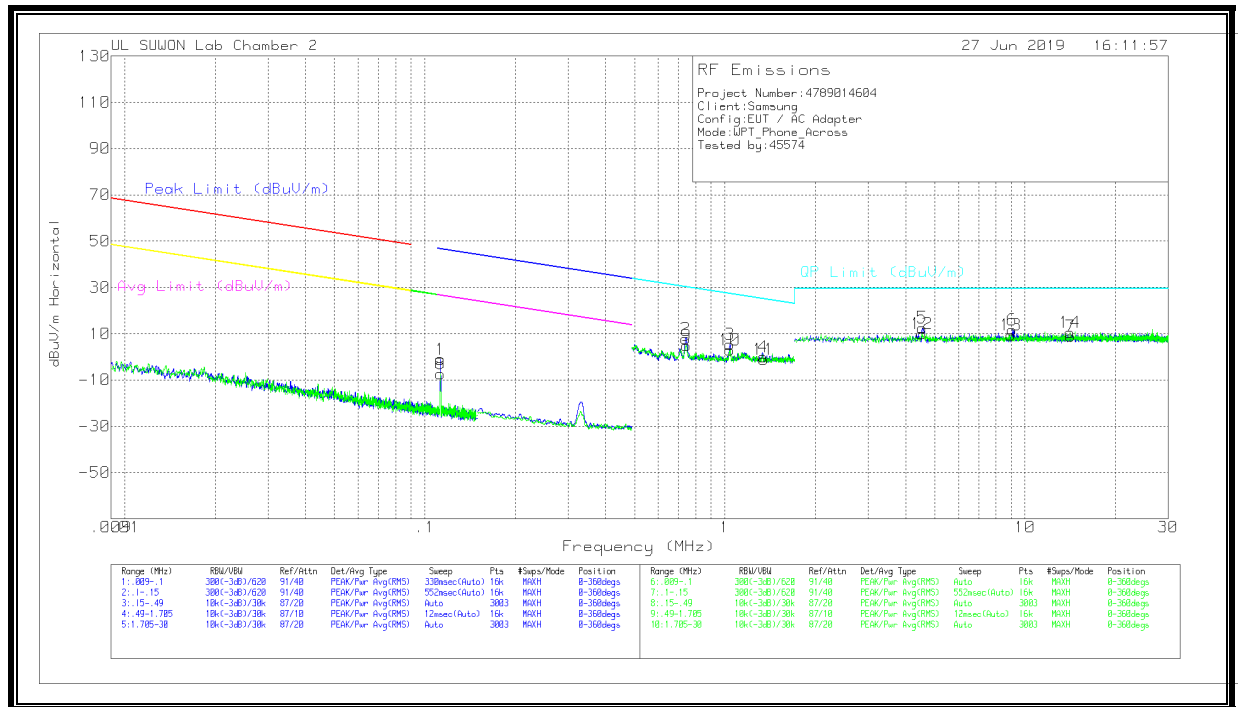
RESULTS

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 4)



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	.11278	59.09	Pk	19.7	.1	-80	-1.11	46.58	-47.69	26.58	-27.69	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	.74034	28.13	Pk	19.7	.1	-40	7.93	30.23	-22.3	0-360
3	1.03967	25.42	Pk	19.7	.2	-40	5.32	27.28	-21.96	0-360
4	1.34181	20.04	Pk	19.7	.2	-40	-.06	25.07	-25.13	0-360
5	4.55135	32.49	Pk	19.8	.3	-40	12.59	29.5	-16.91	0-360
6	9.07535	31.09	Pk	20	.5	-40	11.59	29.5	-17.91	0-360
7	14.16485	28.43	Pk	19.8	.6	-40	8.83	29.5	-20.67	0-360

[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)
**8	.11276	52.77	Pk	19.7	.1	-80	-7.43	46.58	-54.01	26.58	-34.01	0-360

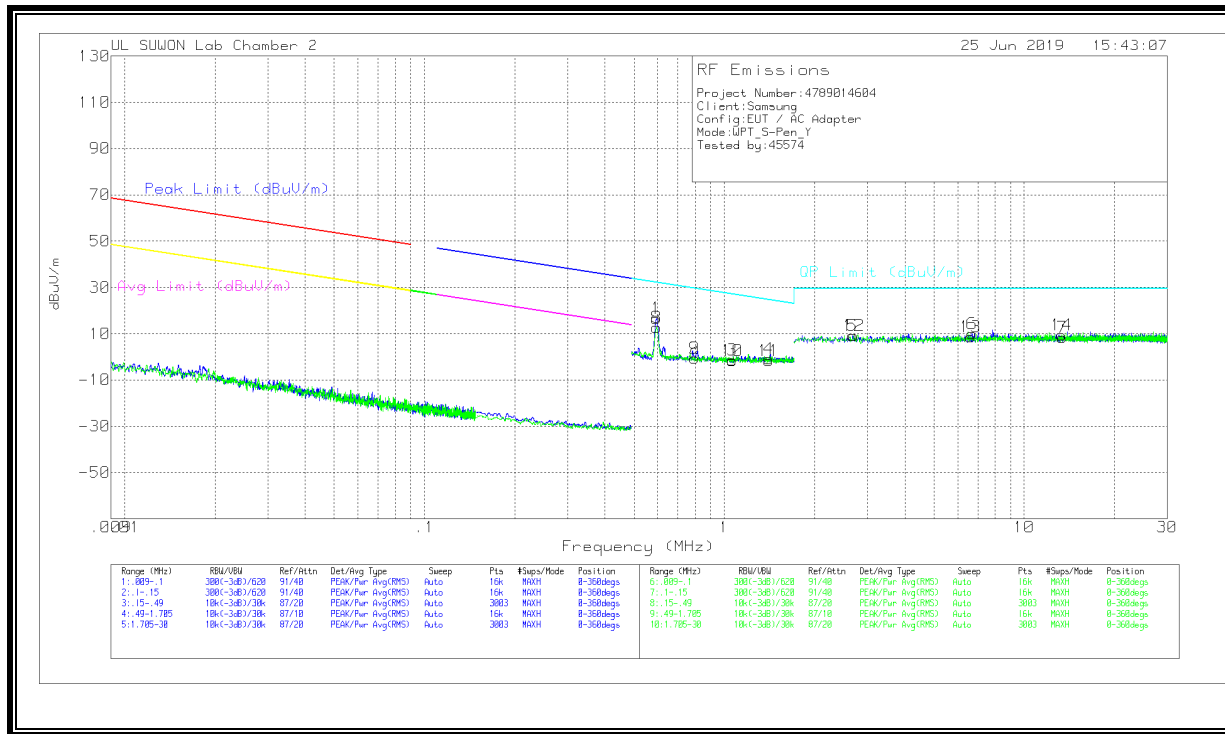
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
9	.74221	25.12	Pk	19.7	.1	-40	4.92	30.2	-25.28	0-360
10	1.04009	23.16	Pk	19.7	.2	-40	3.06	27.28	-24.22	0-360
11	1.34625	18.9	Pk	19.7	.2	-40	-1.2	25.05	-26.25	0-360
12	4.5325	29.96	Pk	19.8	.3	-40	10.06	29.5	-19.44	0-360
13	8.99053	28.93	Pk	20	.5	-40	9.43	29.5	-20.07	0-360
14	14.1083	30.05	Pk	19.8	.6	-40	10.45	29.5	-19.05	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 8)



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	.59385	36.85	Pk	19.7	.1	-40	16.65	32.14	-15.49	0-360
2	.79636	19.66	Pk	19.7	.2	-40	-.44	29.59	-30.03	0-360
3	1.06281	18.64	Pk	19.7	.2	-40	-1.46	27.09	-28.55	0-360
4	1.40626	19.18	Pk	19.7	.2	-40	-.92	24.67	-25.59	0-360
5	2.67578	28.98	Pk	19.8	.3	-40	9.08	29.5	-20.42	0-360
6	6.70025	29.66	Pk	19.9	.4	-40	9.96	29.5	-19.54	0-360
7	13.40143	28.07	Pk	19.9	.5	-40	8.47	29.5	-21.03	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	.59439	32.96	Pk	19.7	.1	-40	12.76	32.13	-19.37	0-360
9	.79468	19.49	Pk	19.7	.2	-40	-.61	29.61	-30.22	0-360
10	1.06129	18.54	Pk	19.7	.2	-40	-1.56	27.11	-28.67	0-360
11	1.4077	18.5	Pk	19.7	.2	-40	-1.6	24.66	-26.26	0-360
12	2.70405	28.98	Pk	19.8	.3	-40	9.08	29.5	-20.42	0-360
13	6.606	28.33	Pk	19.9	.4	-40	8.63	29.5	-20.87	0-360
14	13.34488	28.98	Pk	19.9	.5	-40	9.38	29.5	-20.12	0-360

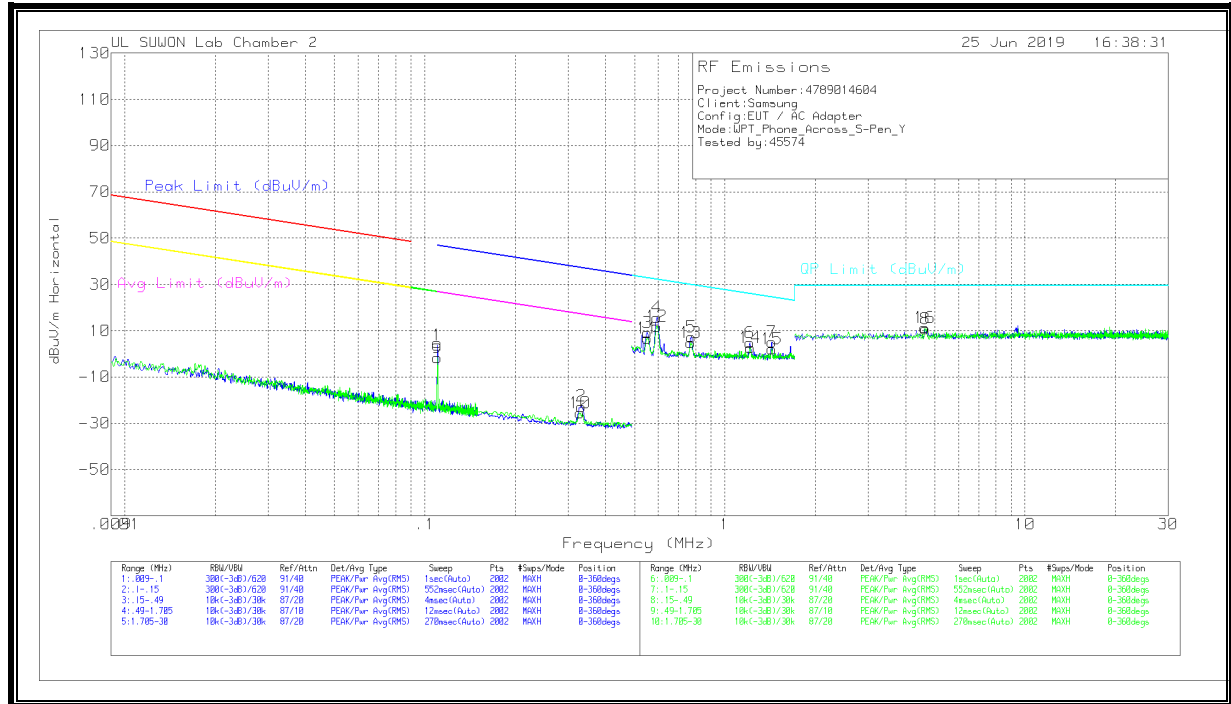
Pk - Peak detector

**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(Simutaneous charging mode Test Case 9)

This test mode is to confirm that with both transmitters operational the spurious emissions remain below the limit and also do not exceed the highest intentional signal level.



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	.11018	64.04	Pk	19.7	.1	-80	3.84	46.79	-42.95	26.79	-22.95	0-360
2	.33199	37.76	Pk	19.5	.1	-80	-22.64	37.19	-59.83	17.19	-39.83	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)
3	.5504	29.38	Pk	19.7	.1	-40	9.18	32.79	-23.61	0-360
**4	.5938	35.84	Pk	19.7	.1	-40	15.64	32.14	-16.5	0-360
5	.77317	27.36	Pk	19.7	.2	-40	7.26	29.85	-22.59	0-360
6	1.21142	24.95	Pk	19.7	.2	-40	4.85	25.96	-21.11	0-360
7	1.43176	25.31	Pk	19.7	.2	-40	5.21	24.51	-19.3	0-360
8	4.64612	30.72	Pk	19.8	.3	-40	10.82	29.5	-18.68	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	.11014	58.53	Pk	19.7	.1	-80	-1.67	46.79	-48.46	26.79	-28.46	0-360
10	.32918	34.83	Pk	19.5	.1	-80	-25.57	37.26	-62.83	17.26	-42.83	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)
11	.55131	26.99	Pk	19.7	.1	-40	6.79	32.78	-25.99	0-360
**12	.59319	32.22	Pk	19.7	.1	-40	12.02	32.14	-20.12	0-360
13	.76892	24.96	Pk	19.7	.2	-40	4.86	29.9	-25.04	0-360
14	1.21415	22.79	Pk	19.7	.2	-40	2.69	25.94	-23.25	0-360
15	1.43176	22.26	Pk	19.7	.2	-40	2.16	24.51	-22.35	0-360
16	4.63198	31.19	Pk	19.8	.3	-40	11.29	29.5	-18.21	0-360

Pk - Peak detector

*Power Sharing Fundamental

**S-Pen 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.

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)

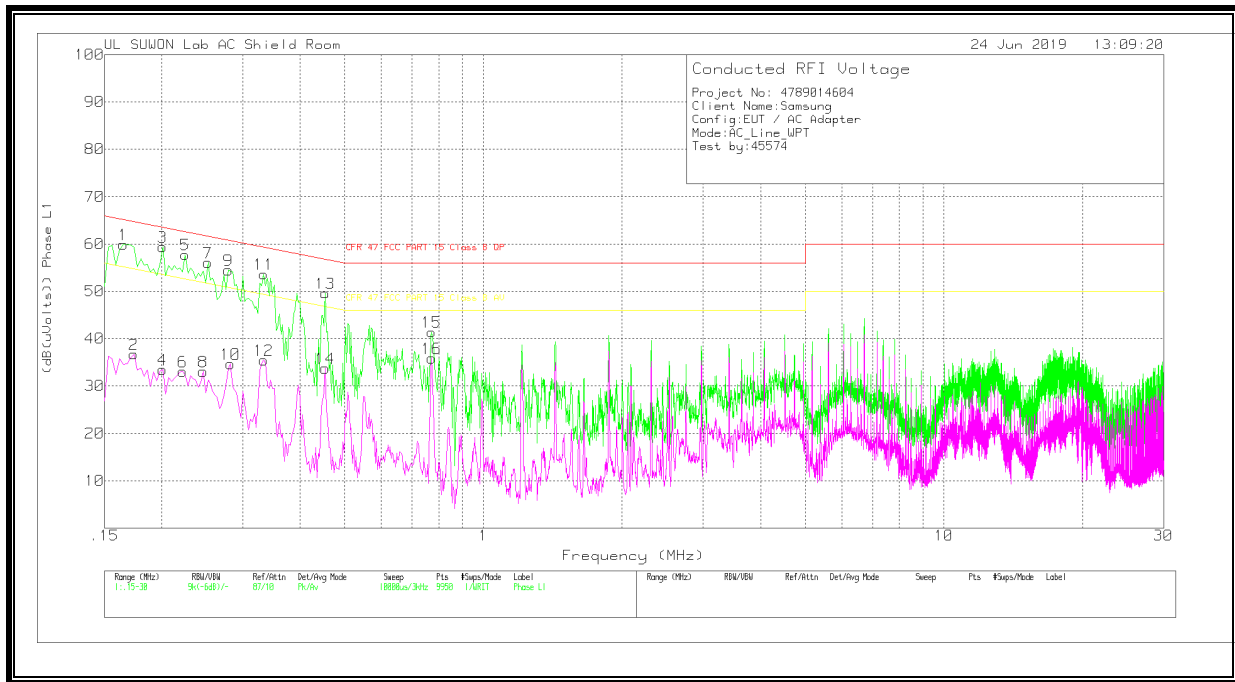
Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
*Decreases with the logarithm of the frequency.		

RESULTS

The EUT belongs to Test Case 3 and 7.

6 WORST EMISSIONS(Power sharing mode Test Case 4)

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	.165	49.81	Pk	10	.1	59.91	65.21	-5.3	-	-
2	.174	26.51	Av	10	.2	36.71	-	-	54.77	-18.06
3	.201	49.29	Pk	9.9	.2	59.39	63.57	-4.18	-	-
4	.201	23.36	Av	9.9	.2	33.46	-	-	53.57	-20.11
5	.225	47.73	Pk	9.8	.2	57.73	62.63	-4.9	-	-
6	.222	23.06	Av	9.8	.2	33.06	-	-	52.74	-19.68
7	.252	46.17	Pk	9.7	.2	56.07	61.69	-5.62	-	-
8	.246	23.19	Av	9.7	.2	33.09	-	-	51.89	-18.8
9	.279	44.57	Pk	9.7	.2	54.47	60.85	-6.38	-	-
10	.282	24.79	Av	9.7	.2	34.69	-	-	50.76	-16.07
11	.333	43.64	Pk	9.8	.2	53.64	59.38	-5.74	-	-
12	.333	25.49	Av	9.8	.2	35.49	-	-	49.38	-13.89
13	.453	39.5	Pk	9.9	.2	49.6	56.82	-7.22	-	-
14	.453	23.62	Av	9.9	.2	33.72	-	-	46.82	-13.1
15	.771	31.29	Pk	9.9	.2	41.39	56	-14.61	-	-
16	.771	25.76	Av	9.9	.2	35.86	-	-	46	-10.14

Pk - Peak detector

Av - Average detection

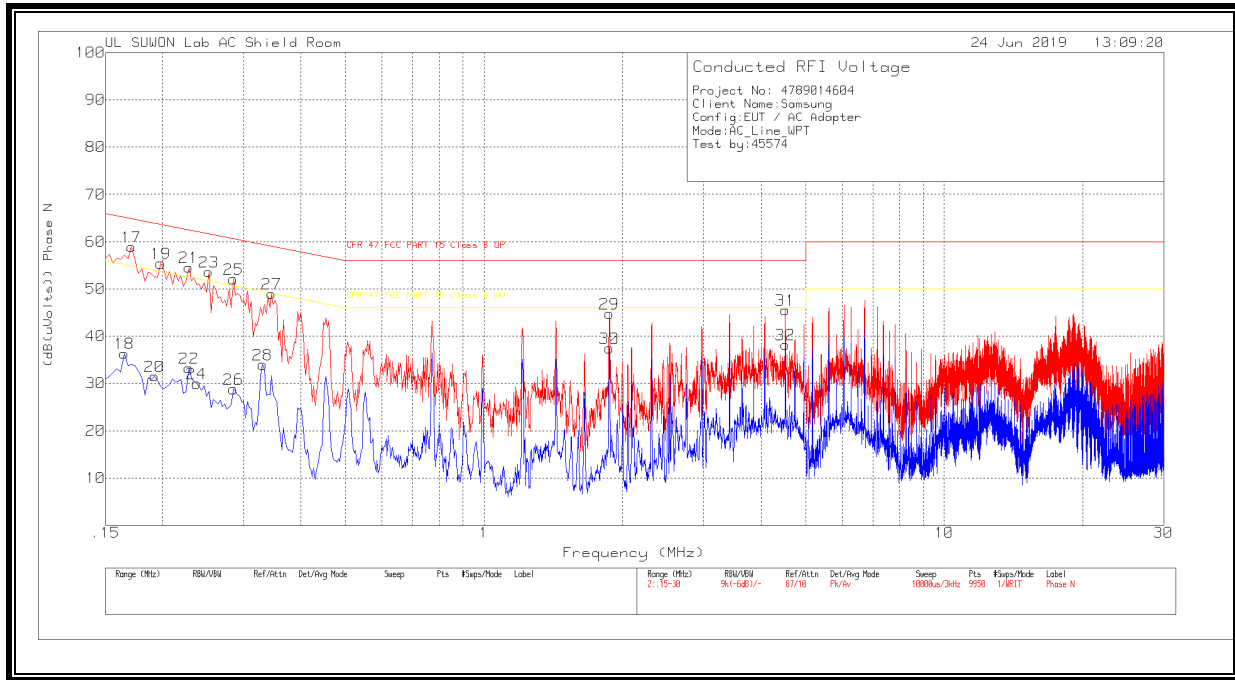
Quasi-Peak Emissions

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)
.16515	40.24	Qp	10	.1	50.34	65.2	-14.86	-	-
.20175	39.84	Qp	9.9	.2	49.94	63.54	-13.6	-	-
.22275	35.71	Qp	9.8	.2	45.71	62.72	-17.01	-	-
.24615	33.83	Qp	9.7	.2	43.73	61.89	-18.16	-	-
.28125	31.21	Qp	9.7	.2	41.11	60.78	-19.67	-	-
.45375	32.33	Qp	9.9	.2	42.43	56.81	-14.38	-	-

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_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)
17	.171	48.71	Pk	10	.2	58.91	64.91	-6	-	-
18	.165	26.24	Av	10	.1	36.34	-	-	55.21	-18.87
19	.198	45.33	Pk	9.9	.2	55.43	63.69	-8.26	-	-
20	.192	21.42	Av	9.9	.2	31.52	-	-	53.95	-22.43
21	.228	44.57	Pk	9.8	.2	54.57	62.52	-7.95	-	-
22	.228	23.24	Av	9.8	.2	33.24	-	-	52.52	-19.28
23	.252	43.7	Pk	9.7	.2	53.6	61.69	-8.09	-	-
24	.237	20.11	Av	9.7	.2	30.01	-	-	52.2	-22.19
25	.285	42.17	Pk	9.7	.2	52.07	60.67	-8.6	-	-
26	.285	18.9	Av	9.7	.2	28.8	-	-	50.67	-21.87
27	.345	38.99	Pk	9.8	.2	48.99	59.08	-10.09	-	-
28	.33	24.02	Av	9.8	.2	34.02	-	-	49.45	-15.43
29	1.872	34.79	Pk	9.7	.3	44.79	56	-11.21	-	-
30	1.872	27.47	Av	9.7	.3	37.47	-	-	46	-8.53
31	4.515	35.45	Pk	9.8	.3	45.55	56	-10.45	-	-
32	4.515	28.11	Av	9.8	.3	38.21	-	-	46	-7.79

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

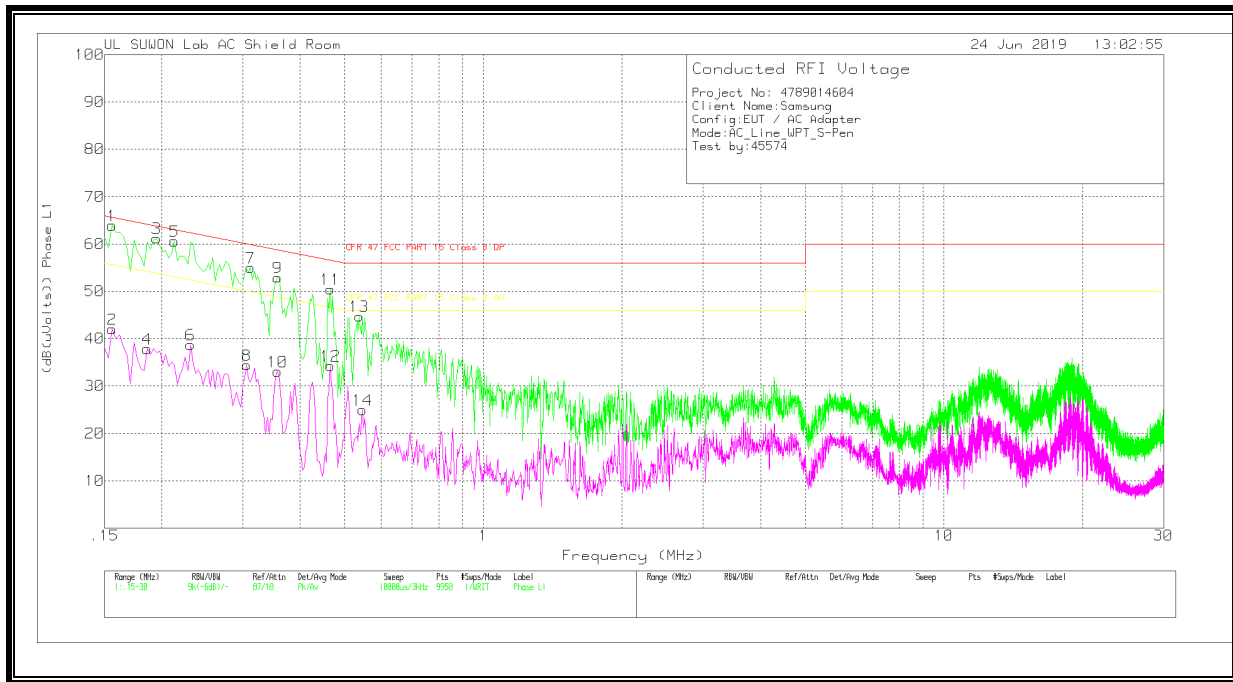
Range 2: Phase N .15 - 30MHz

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)
.17025	37.18	Qp	10	.2	47.38	64.95	-17.57	-	-
.19875	36.34	Qp	9.9	.2	46.44	63.66	-17.22	-	-
.22815	36.04	Qp	9.8	.2	46.04	62.52	-16.48	-	-
.23625	33.47	Qp	9.7	.2	43.37	62.23	-18.86	-	-

Qp - Quasi-Peak detector

6 WORST EMISSIONS(S-pen charging mode Test case8)

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	.156	53.91	Pk	9.9	.1	63.91	65.67	-1.76	-	-
2	.156	32.02	Av	9.9	.1	42.02	-	-	55.67	-13.65
3	.195	51.08	Pk	9.9	.2	61.18	63.82	-2.64	-	-
4	.186	27.68	Av	10	.2	37.88	-	-	54.21	-16.33
5	.213	50.5	Pk	9.9	.2	60.6	63.09	-2.49	-	-
6	.231	28.73	Av	9.8	.2	38.73	-	-	52.41	-13.68
7	.312	45.03	Pk	9.8	.2	55.03	59.92	-4.89	-	-
8	.306	24.43	Av	9.8	.2	34.43	-	-	50.08	-15.65
9	.357	42.82	Pk	9.9	.2	52.92	58.8	-5.88	-	-
10	.357	22.96	Av	9.9	.2	33.06	-	-	48.8	-15.74
11	.465	40.36	Pk	9.9	.2	50.46	56.6	-6.14	-	-
12	.465	24.17	Av	9.9	.2	34.27	-	-	46.6	-12.33
13	.537	34.62	Pk	9.9	.2	44.72	56	-11.28	-	-
14	.546	14.88	Av	9.9	.2	24.98	-	-	46	-21.02

Pk - Peak detector

Av - Average detection

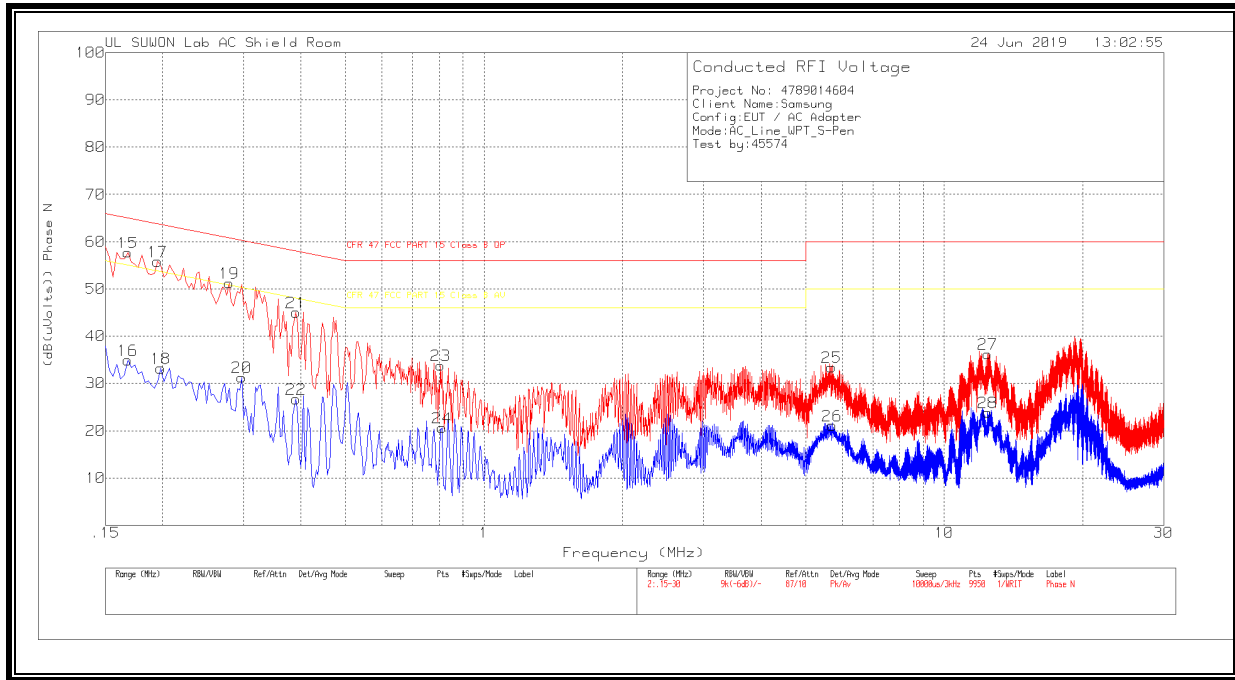
Quasi-Peak Emissions

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)
.15525	32	Qp	9.9	.1	42	65.71	-23.71	-	-
.19515	29.83	Qp	9.9	.2	39.93	63.81	-23.88	-	-
.21375	28.25	Qp	9.8	.2	38.25	63.06	-24.81	-	-
.31275	22.63	Qp	9.8	.2	32.63	59.9	-27.27	-	-
.35625	24.87	Qp	9.9	.2	34.97	58.82	-23.85	-	-
.46425	10.73	Qp	9.9	.2	20.83	56.62	-35.79	-	-
.53775	18.83	Qp	9.9	.2	28.93	56	-27.07	-	-

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)
15	.168	47.61	Pk	10	.1	57.71	65.06	-7.35	-	-
16	.168	24.86	Av	10	.1	34.96	-	-	55.06	-20.1
17	.195	45.69	Pk	9.9	.2	55.79	63.82	-8.03	-	-
18	.198	23.13	Av	9.9	.2	33.23	-	-	53.69	-20.46
19	.279	41.31	Pk	9.7	.2	51.21	60.85	-9.64	-	-
20	.297	21.38	Av	9.7	.2	31.28	-	-	50.33	-19.05
21	.39	35.65	Pk	9.2	.2	45.05	58.06	-13.01	-	-
22	.39	17.3	Av	9.2	.2	26.7	-	-	48.06	-21.36
23	.804	23.83	Pk	9.8	.2	33.83	56	-22.17	-	-
24	.81	10.62	Av	9.8	.2	20.62	-	-	46	-25.38
25	5.691	23.34	Pk	9.8	.3	33.44	60	-26.56	-	-
26	5.709	11.02	Av	9.8	.3	21.12	-	-	50	-28.88
27	12.435	25.82	Pk	10.1	.3	36.22	60	-23.78	-	-
28	12.435	13.47	Av	10.1	.3	23.87	-	-	50	-26.13

Pk - Peak detector

Av - Average detection

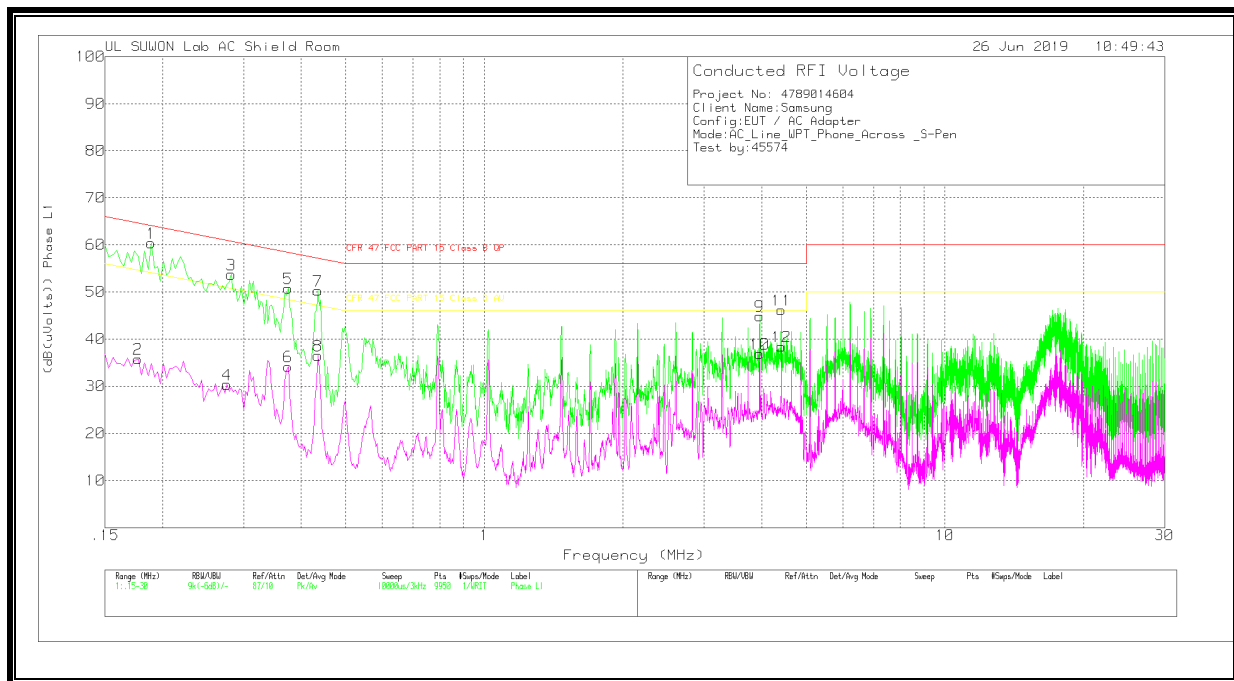
Quasi-Peak Emissions

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)
.16875	30.94	Qp	10	.1	41.04	65.02	-23.98	-	-
.19575	29.22	Qp	9.9	.2	39.32	63.79	-24.47	-	-
.27975	22.58	Qp	9.7	.2	32.48	60.82	-28.34	-	-

Qp - Quasi-Peak detector

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	.189	50.22	Pk	10	.2	60.42	64.08	-3.66	-	-
2	.177	25.59	Av	10	.2	35.79	-	-	54.63	-18.84
3	.282	43.81	Pk	9.7	.2	53.71	60.76	-7.05	-	-
4	.276	20.45	Av	9.7	.2	30.35	-	-	50.94	-20.59
5	.375	40.66	Pk	9.9	.2	50.76	58.39	-7.63	-	-
6	.375	24.08	Av	9.9	.2	34.18	-	-	48.39	-14.21
7	.435	40.19	Pk	9.9	.2	50.29	57.16	-6.87	-	-
8	.435	26.42	Av	9.9	.2	36.52	-	-	47.16	-10.64
9	3.963	34.78	Pk	9.8	.3	44.88	56	-11.12	-	-
10	3.963	26.81	Av	9.8	.3	36.91	-	-	46	-9.09
11	4.416	36.07	Pk	9.8	.3	46.17	56	-9.83	-	-
12	4.416	28.33	Av	9.8	.3	38.43	-	-	46	-7.57

Pk - Peak detector

Av - Average detection

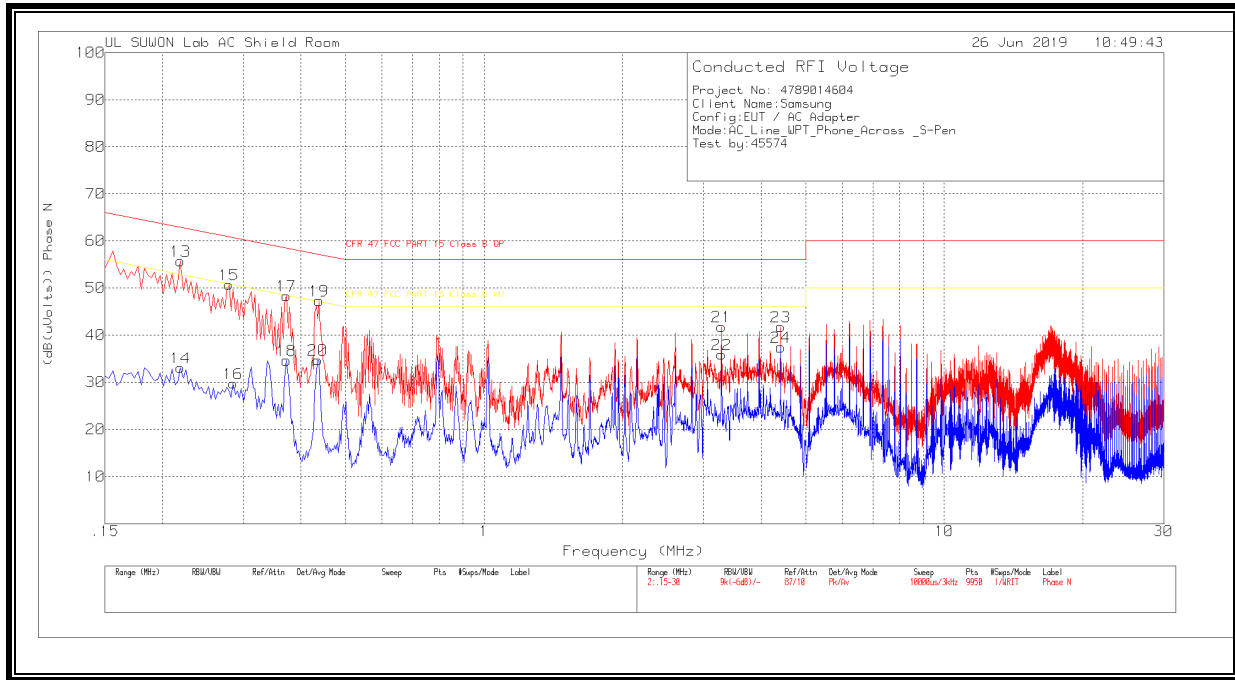
Quasi-Peak Emissions

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)
.18975	35.92	Qp	10	.2	46.12	64.05	-17.93	-	-
.28125	28.65	Qp	9.7	.2	38.55	60.78	-22.23	-	-
.37575	26.14	Qp	9.9	.2	36.24	58.37	-22.13	-	-
.43515	29.63	Qp	9.9	.2	39.73	57.15	-17.42	-	-
4.41675	32.64	Qp	9.8	.3	42.74	56	-13.26	-	-

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	.219	45.75	Pk	9.8	.2	55.75	62.86	-7.11	-	-
14	.219	23.08	Av	9.8	.2	33.08	-	-	52.86	-19.78
15	.279	40.82	Pk	9.7	.2	50.72	60.85	-10.13	-	-
16	.285	19.85	Av	9.7	.2	29.75	-	-	50.67	-20.92
17	.372	38.64	Pk	9.5	.2	48.34	58.46	-10.12	-	-
18	.372	24.95	Av	9.5	.2	34.65	-	-	48.46	-13.81
19	.438	37.83	Pk	9.3	.2	47.33	57.1	-9.77	-	-
20	.435	25.22	Av	9.3	.2	34.72	-	-	47.16	-12.44
21	3.285	31.8	Pk	9.7	.3	41.8	56	-14.2	-	-
22	3.285	25.88	Av	9.7	.3	35.88	-	-	46	-10.12
23	4.416	31.67	Pk	9.8	.3	41.77	56	-14.23	-	-
24	4.416	27.33	Av	9.8	.3	37.43	-	-	46	-8.57

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)
.21975	33.28	Qp	9.8	.2	43.28	62.83	-19.55	-	-
.27915	31.16	Qp	9.7	.2	41.06	60.84	-19.78	-	-
.37275	22.59	Qp	9.5	.2	32.29	58.44	-26.15	-	-
.43875	32.66	Qp	9.4	.2	42.26	57.09	-14.83	-	-

Qp - Quasi-Peak detector