FCC 47 CFR PART 15 SUBPART B

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n and NFC

MODEL NUMBER : SM-A205YN

FCC ID: A3LSMA205YN

REPORT NUMBER: 4788931341-E6V1

ISSUE DATE: APR 03, 2019

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

Prepared by
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

ACCREDITED
Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	04/03/19	Initial issue	Sangyun Kim

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 4

2. TEST METHODOLOGY 5

3. FACILITIES AND ACCREDITATION 5

4. CALIBRATION AND UNCERTAINTY 5

4.1. MEASURING INSTRUMENT CALIBRATION 5

4.2. SAMPLE CALCULATION 5

4.3. MEASUREMENT UNCERTAINTY 6

5. EQUIPMENT UNDER TEST 7

5.1. DESCRIPTION OF EUT 7

5.2. PRELIMINARY TEST CONFIGURATIONS 7

5.3. MODE(S) OF OPERATION INVESTIGATED 7

5.4. MODIFICATIONS 8

5.5. DETAILS OF TESTED SYSTEM 8

6. APPLICABLE LIMITS AND TEST RESULTS 12

6.1. RADIATED EMISSIONS 12

6.2. AC MAINS LINE CONDUCTED EMISSIONS 33

7. SETUP PHOTOS 58

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS b/g/n, NFC and ANT+

MODEL NUMBER: SM-A205YN

SERIAL NUMBER: R38M305XVXE

DATE TESTED: MAR 28, 2019 - APR 02, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART B	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:

Changyoung Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Sangyun Kim
Suwon Lab Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2014, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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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, Below 1GHz	3.86 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS b/g/n, NFC and ANT+.

GENERAL INFORMATION

Type of device	Class B personal computers and peripherals Other Class B digital devices & peripherals FM Broadcast Receiver
Personal Computer power requirements	100-240 VAC / 50-60 Hz, 5.5 A
Travel Adapter power requirements	100-240 VAC / 50-60 Hz, 0.5 A
List of frequencies generated or used by the EUT	12.4 GHz (5th harmonic of the frequency of 2.4GHz BT)

5.2. PRELIMINARY TEST CONFIGURATIONS

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

5.3. MODE(S) OF OPERATION INVESTIGATED

Mode	Description
Test Case 1	Camera(Rear) + Charging + FM Radio Low Ch
Test Case 2	Camera(Rear) + Charging + FM Radio Mid Ch
Test Case 3	Camera(Front) + Charging + FM Radio High Ch
Test Case 4	Video and Audio Play + Charging
Test Case 5	USB Data Communication with PC
Test Case 6	Receiver Mode (Licensed Band within 30-960MHz)

Note: Receiver Mode (Licensed Band within 30-960MHz) radiated test result refer to WWAN test report Appendix A.
Receiver Mode (Licensed Band within 30-960MHz) AC mains line conducted test was tested to high power licensed band(GSM850).

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5.4. MODIFICATIONS

No modifications were made during testing.

5.5. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/DoC**
PC	HP	C8N27AV	CZC4125J25	DoC
LCD monitor	Lenovo	L2250pwD	V6-57137	DoC
Micro SD card	Samsung	128G	-	DoC
Mouse	Logitech	U0026	1451HS05S6G8	DoC
Keyboard	Logitech	Y-U0009	1410MG00RVY8	DoC
Earphone	Samsung	-	-	-
Charger	Samsung	EP-TA200	R37M1560CV1SE3	-

I/O CABLES

[DIAGRAM 1]

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length(m)**	**Remarks**
1	AC Power	1	Power	Direct	-	From Charger to AC Main
2	USB	1	Type-C	Shielded	1.1m	From Charger to EUT
3	Earphone	1	Mini-Jack	Shielded	1.2m	From EUT to Earphone

[DIAGRAM 2]

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length(m)**	**Remarks**
1	AC Power	1	Power	Unshielded	1.5m	From PC to AC Main
2	AC Power	1	Power	Unshielded	1.5m	From LCD Monitor to AC Main
3	D-SUB	1	D-SUB	Shielded	1.2m	From LCD Monitor to PC
4	USB	1	USB	Shielded	1.2m	From Keyboard to PC
5	USB	1	USB	Shielded	1.5m	From Mouse to PC
6	USB	1	Type-C	Shielded	1.1m	From EUT to PC
7	Audio	1	Mini-Jack	Shielded	1.2m	From EUT to Earphone
8	LAN	1	RJ-45	Shielded	0.8m	From PC to Ethernet(Outside of test site)

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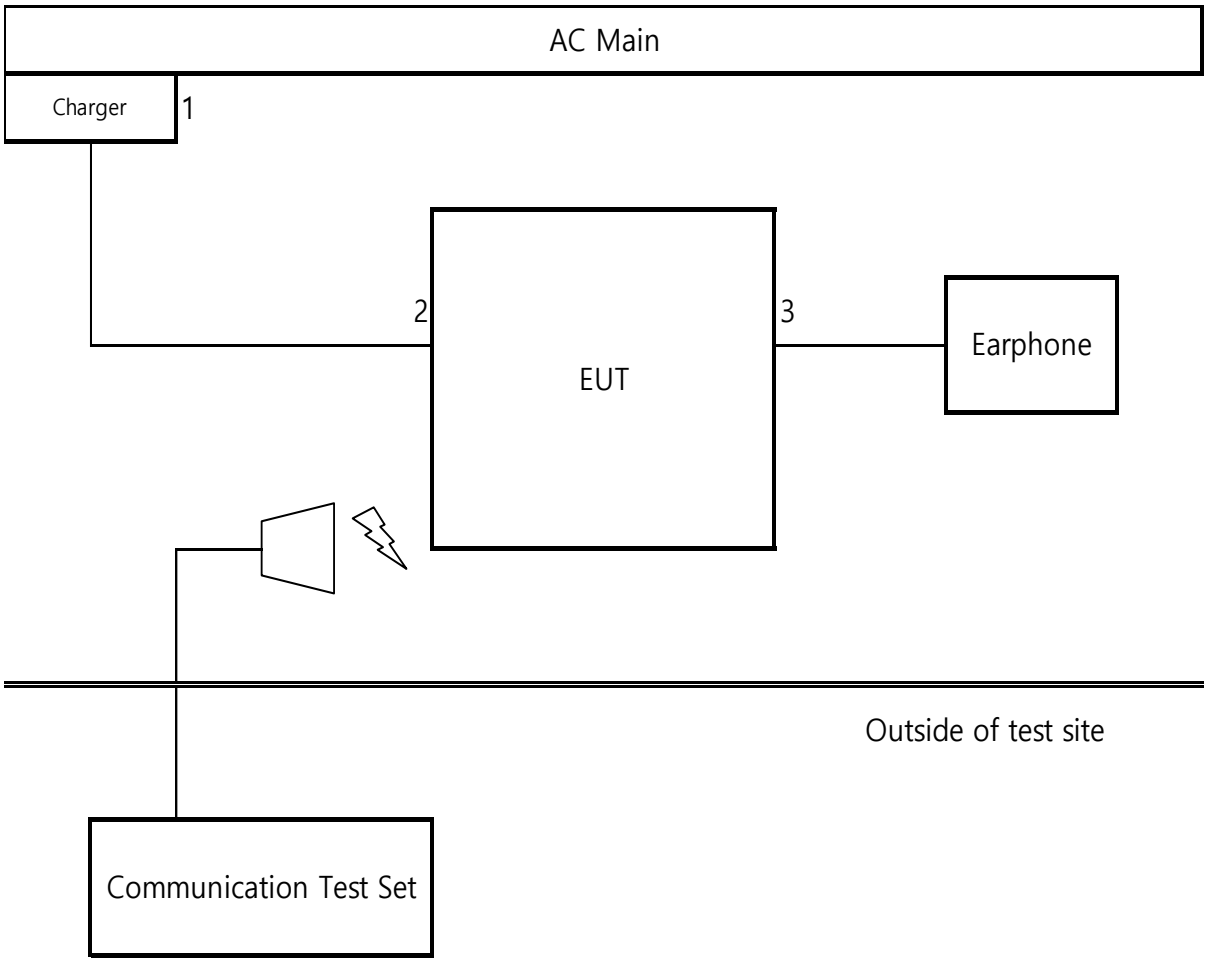
TEST SETUP

The EUT is installed in a typical configuration. Copy files from PC to EUT.

TEST SETUP DIAGRAM 1 for Test Case 1 to 4 and 6



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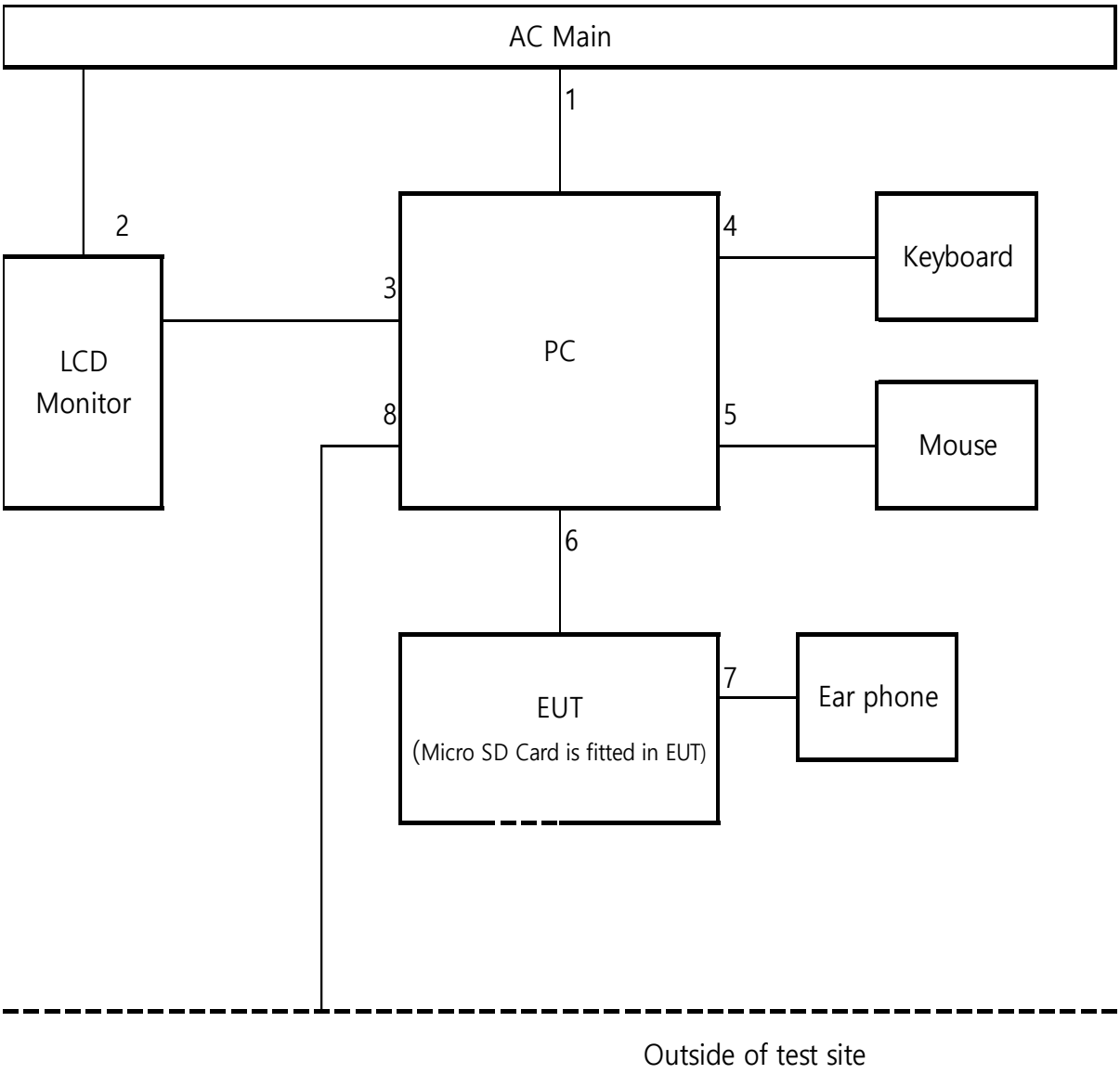
TEST SETUP DIAGRAM 2 for Test case 5



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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, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
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
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	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
Communications Test Set	R&S	CMW500	115331	08-07-19
LISN	R&S	ENV-216	101837	08-09-19
LISN	R&S	ENV-216	101837	08-09-19
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

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6. APPLICABLE LIMITS AND TEST RESULTS

6.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2014

The highest clock frequency generated or used in the EUT is 5.8GHz therefore the frequency range was investigated from 30 MHz to 30 GHz.

LIMIT

§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dBµV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54
Note: The lower limit shall apply at the transition frequency.	

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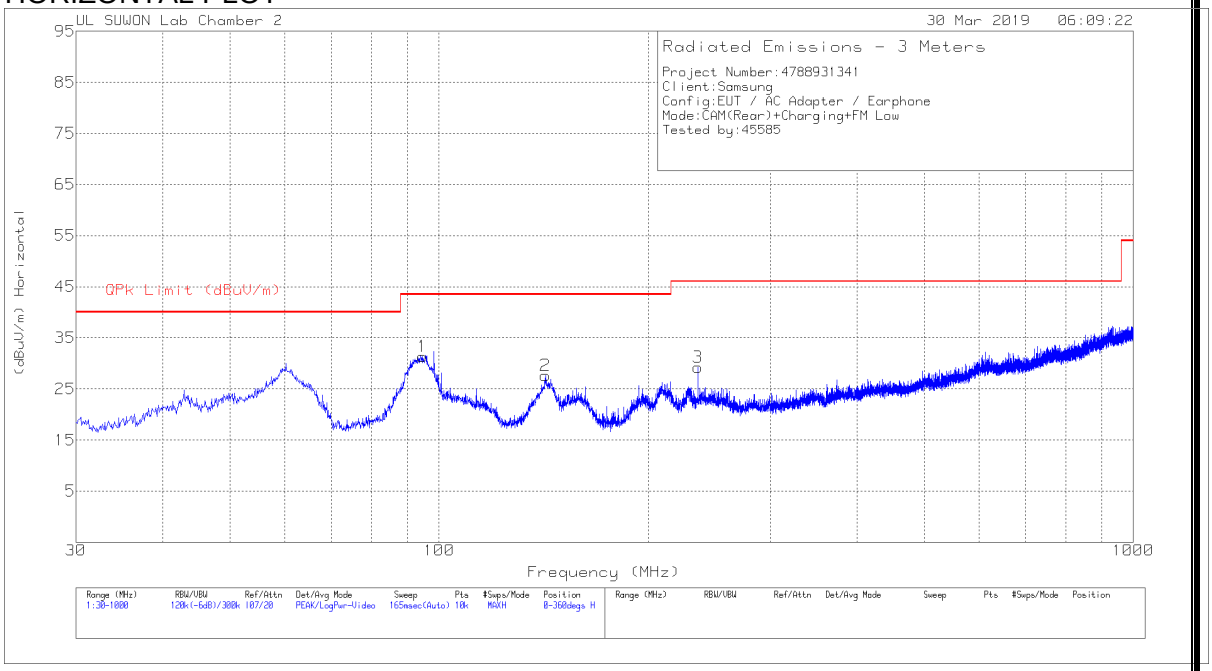
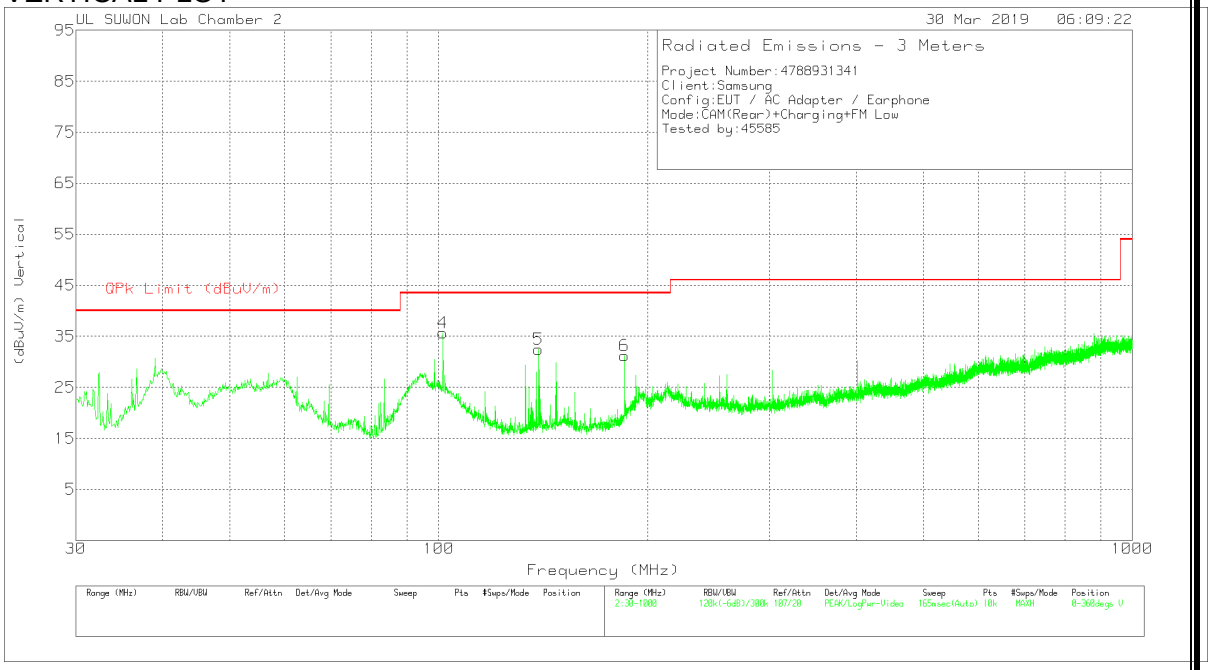
RESULTS Test Case 1

RADIATED EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	94.602	45.62	Pk	17.1	-31.4	31.32	43.52	-12.2	0-360	200	H
2	142.326	44.77	Pk	14.1	-31.2	27.67	43.52	-15.85	0-360	300	H
3	236.125	41.65	Pk	18.3	-30.7	29.25	46.02	-16.77	0-360	300	H
4	101.489	49.32	Pk	17.7	-31.4	35.62	43.52	-7.9	0-360	100	V
5	139.319	49.56	Pk	14.1	-31.2	32.46	43.52	-11.06	0-360	100	V
6	185.394	45.75	Pk	16.4	-30.9	31.25	43.52	-12.27	0-360	100	V

Pk - Peak detector

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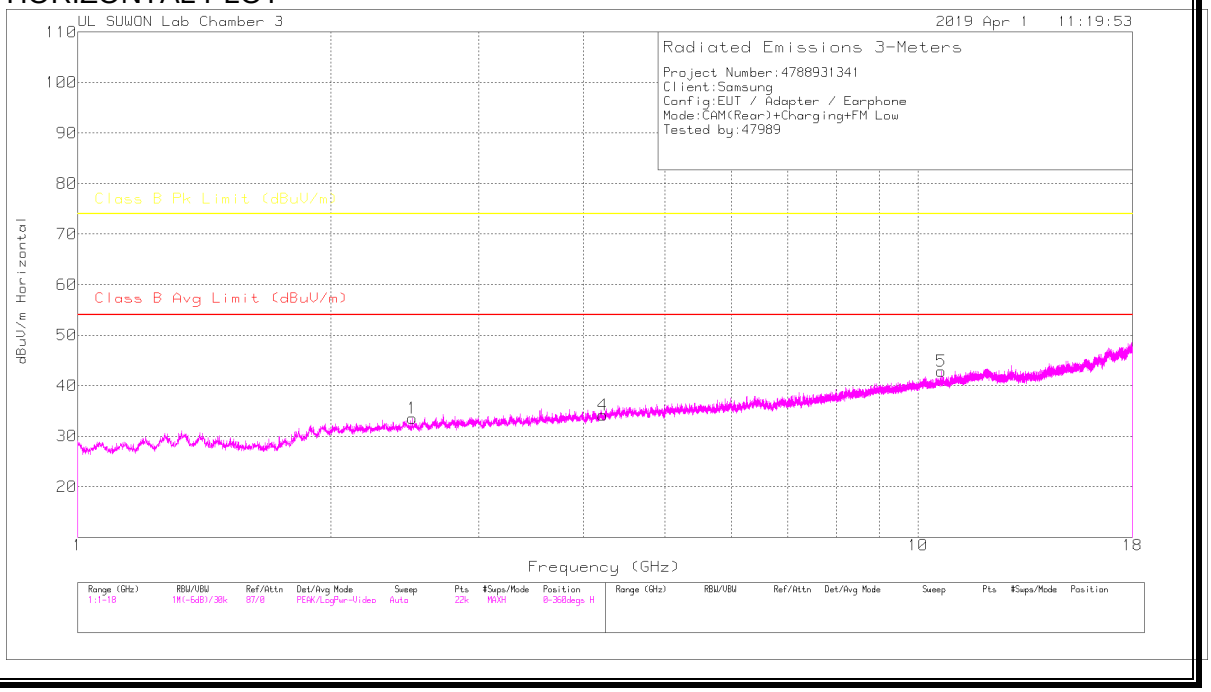
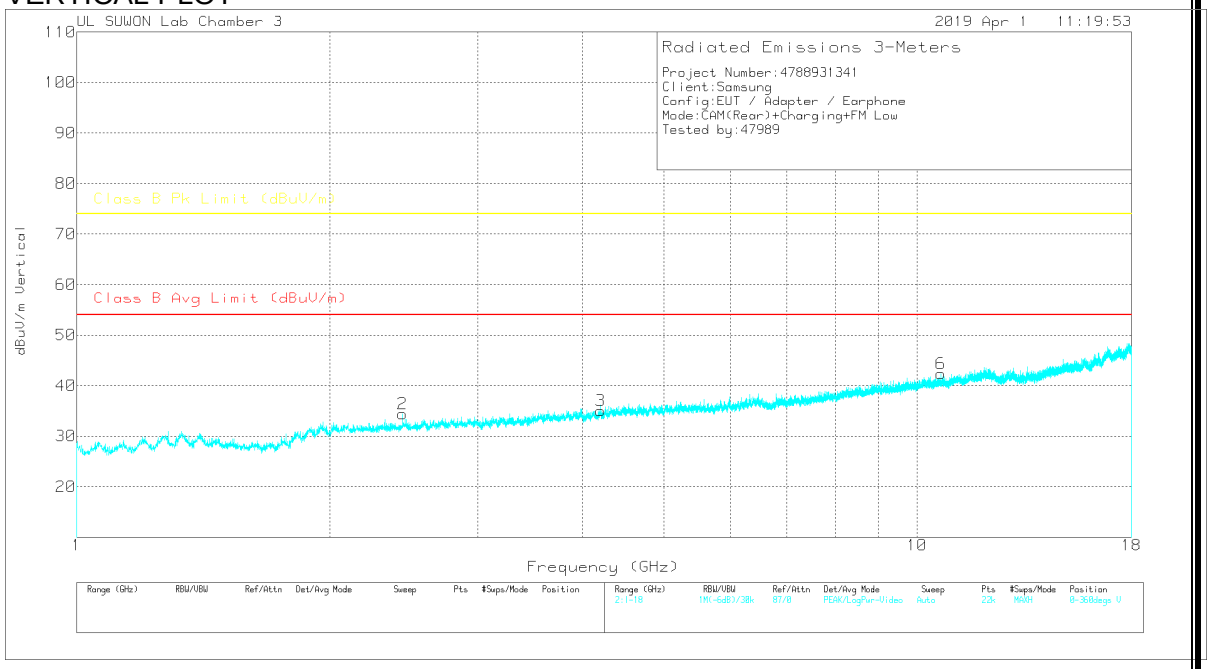
RADIATED EMISSIONS 1GHz to 18GHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.5	34.34	PK	31.9	-32.7	33.54	-	-	74	-40.46	0-360	100	H
4	4.22	30.53	PK	33.7	-30.1	34.13	-	-	74	-39.87	0-360	200	H
5	10.652	25.01	PK	37.8	-19.9	42.91	-	-	74	-31.09	0-360	200	H
2	2.442	35.39	PK	31.8	-32.8	34.39	-	-	74	-39.61	0-360	200	V
3	4.204	31.25	PK	33.7	-29.9	35.05	-	-	74	-38.95	0-360	100	V
6	10.681	24.55	PK	37.8	-20	42.35	-	-	74	-31.65	0-360	100	V

PK – Peak Detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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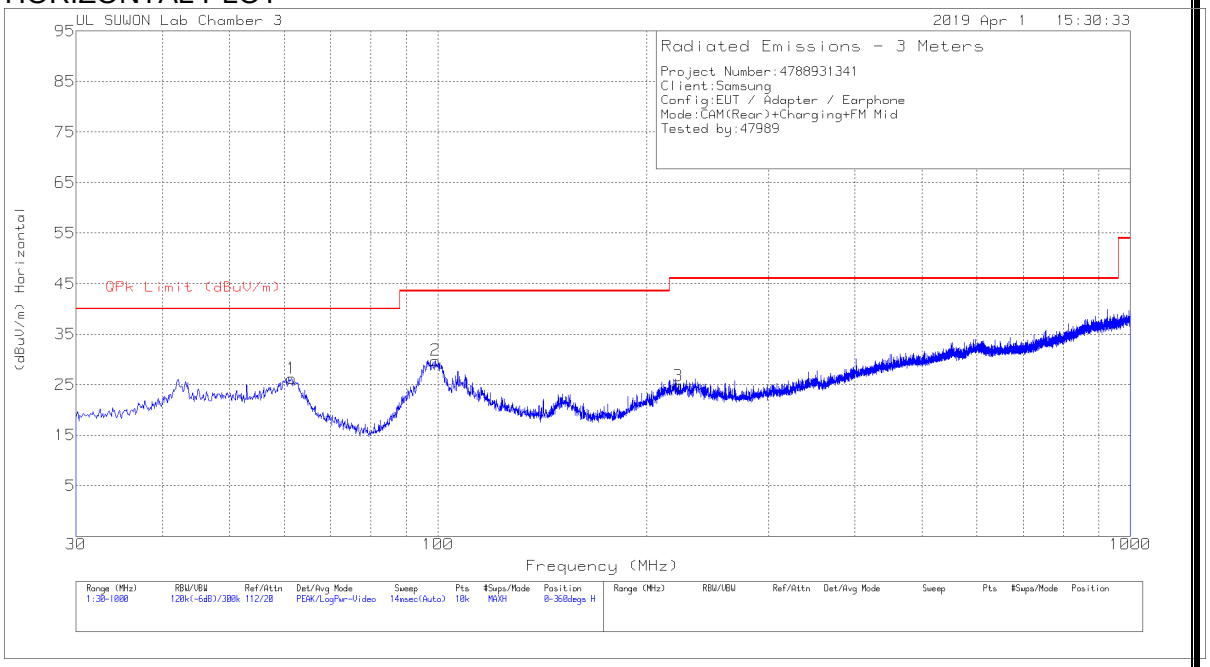
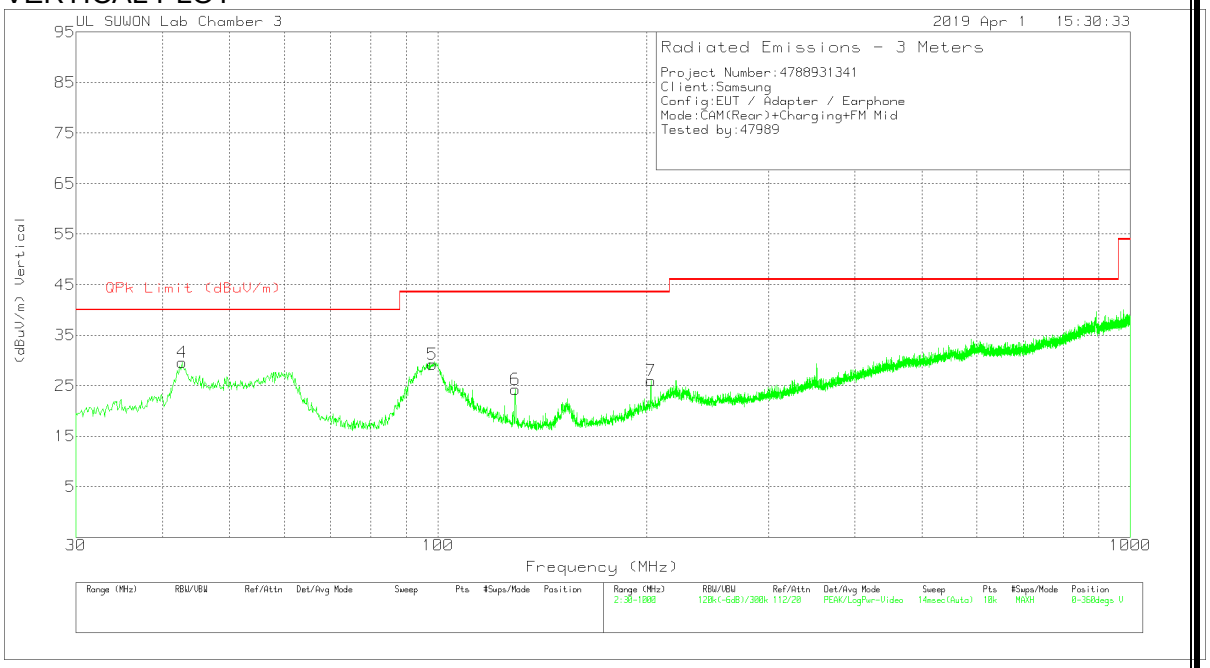
RESULTS Test Case 2

RADIATED EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-845	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	61.4312	40.06	Pk	18.1	-31.9	26.26	40	-13.74	0-360	400	H
2	99.0711	43.79	Pk	17.6	-31.6	29.79	43.52	-13.73	0-360	300	H
3	222.2738	38.49	Pk	17.3	-31	24.79	46.02	-21.23	0-360	100	H
4	42.7083	41.85	Pk	19.6	-31.9	29.55	40	-10.45	0-360	100	V
5	98.101	43.31	Pk	17.5	-31.6	29.21	43.52	-14.31	0-360	200	V
6	129.2412	40.98	Pk	14.8	-31.5	24.28	43.52	-19.24	0-360	100	V
7	202.9688	40.31	Pk	16.7	-31	26.01	43.52	-17.51	0-360	200	V

Pk - Peak detector

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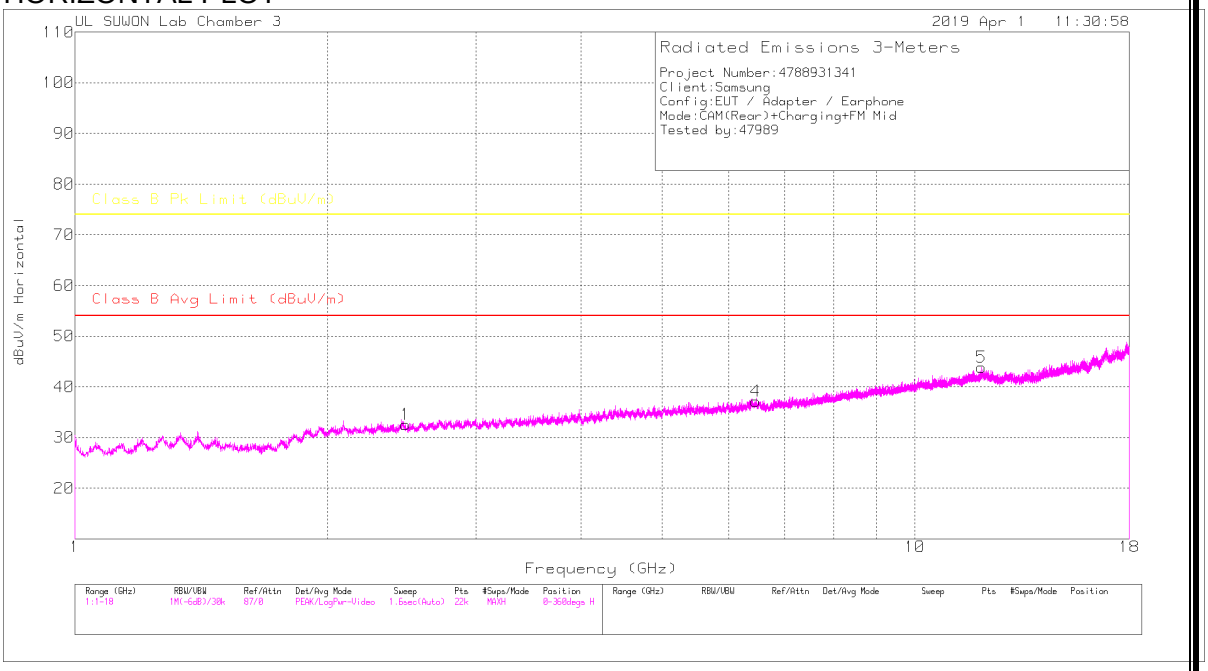
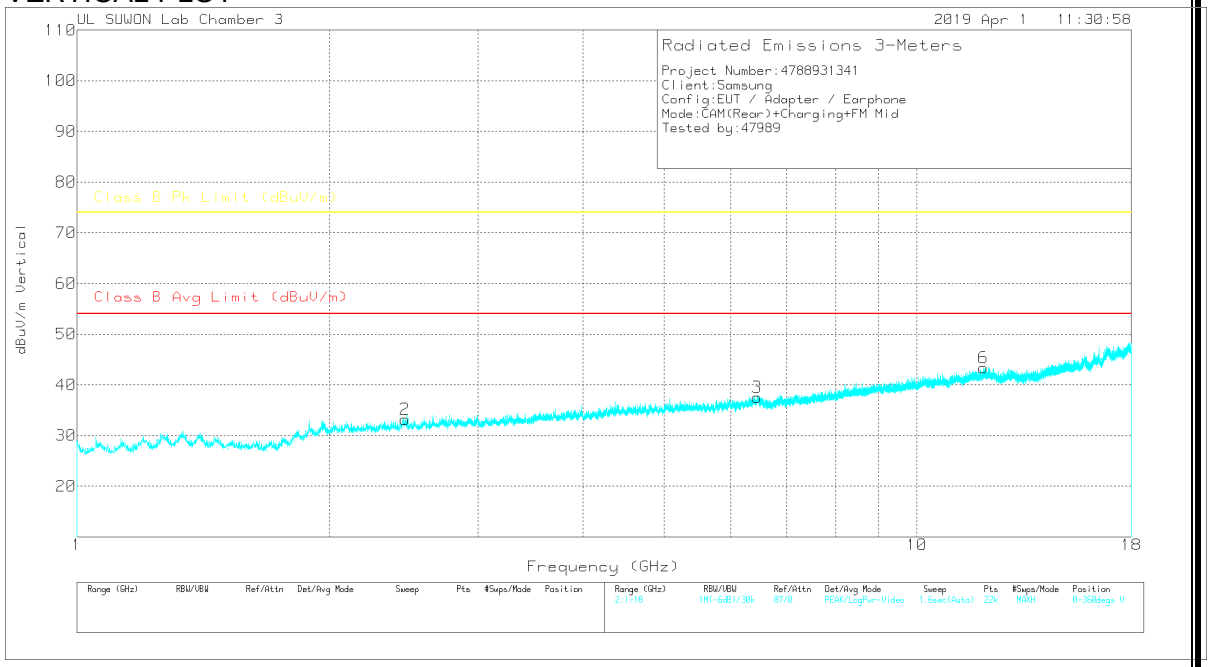
RADIATED EMISSIONS 1GHz to 18GHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.474	33.4	PK	31.9	-32.7	32.6	-	-	74	-41.4	0-360	100	H
4	6.458	28	PK	35.4	-26.2	37.2	-	-	74	-36.8	0-360	100	H
5	11.998	25.31	PK	39	-20.4	43.91	-	-	74	-30.09	0-360	100	H
2	2.457	34.04	PK	31.9	-32.8	33.14	-	-	74	-40.86	0-360	100	V
3	6.448	28.13	PK	35.4	-26	37.53	-	-	74	-36.47	0-360	200	V
6	11.995	24.96	PK	39	-20.6	43.36	-	-	74	-30.64	0-360	100	V

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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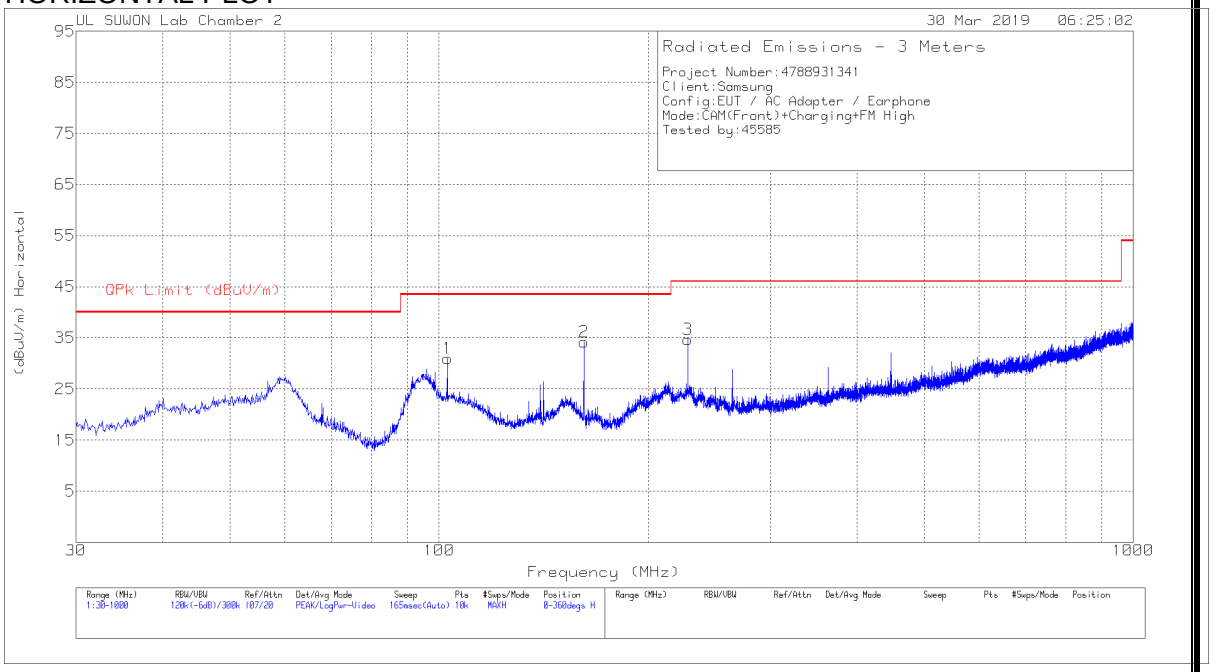
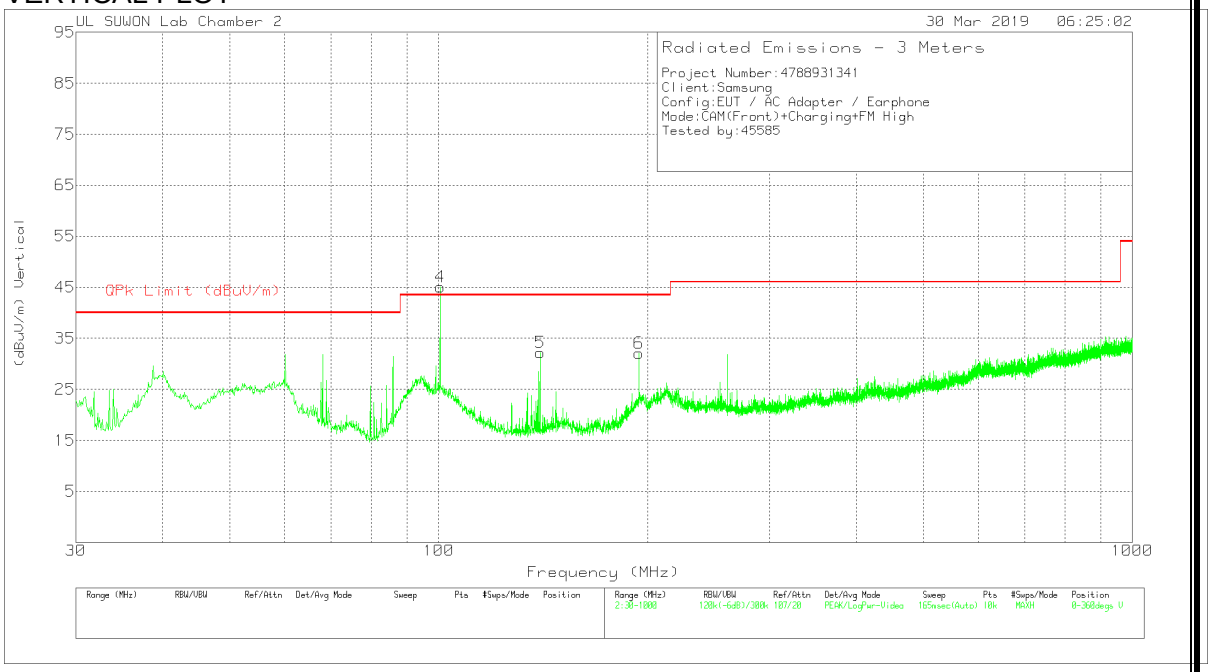
RESULTS Test Case 3

RADIATED EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	102.847	44.53	Pk	17.8	-31.4	30.93	43.52	-12.59	0-360	100	H
2	161.726	50.61	Pk	14.7	-31.1	34.21	43.52	-9.31	0-360	300	H
3	228.268	47.28	Pk	18.2	-30.8	34.68	46.02	-11.34	0-360	100	H
4	100.519	58.77	Pk	17.7	-31.4	45.07	**43.52**	**1.55**	0-360	100	V
5	139.998	49.43	Pk	14	-31.2	32.23	43.52	-11.29	0-360	100	V
6	194.318	45.12	Pk	17.9	-30.9	32.12	43.52	-11.4	0-360	100	V

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
100.519	35.26	Qp	17.7	-31.4	21.56	43.52	-21.96	360	102	V

Qp - Quasi-Peak detector

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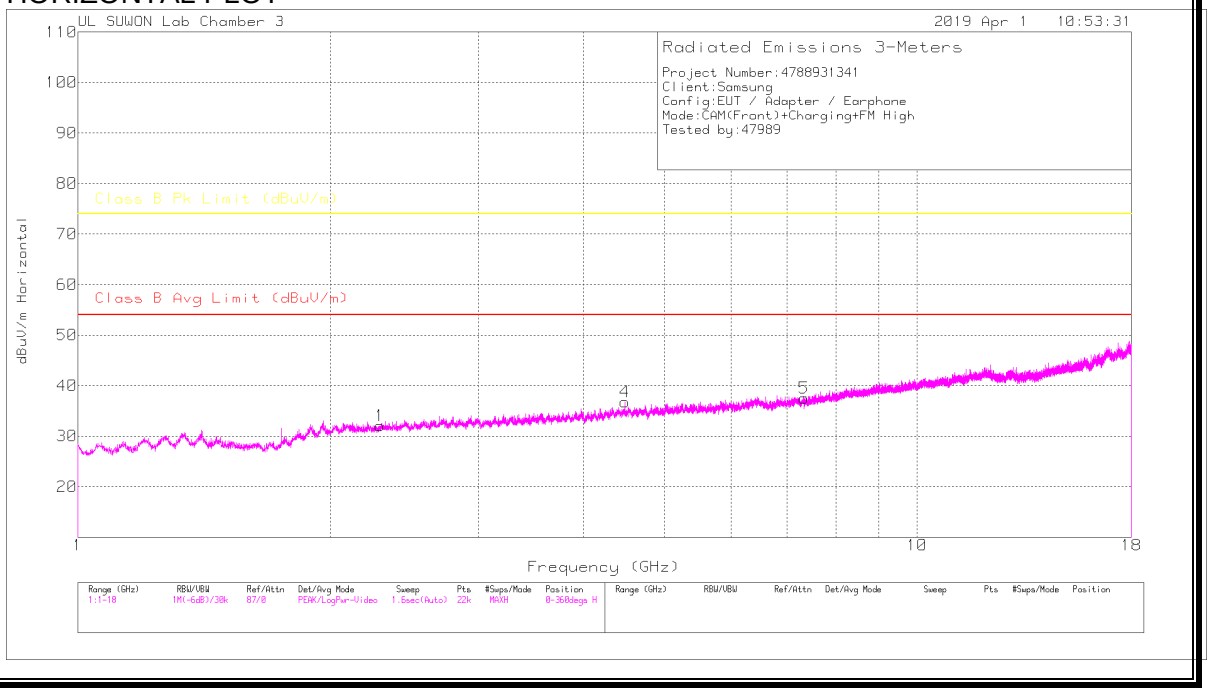
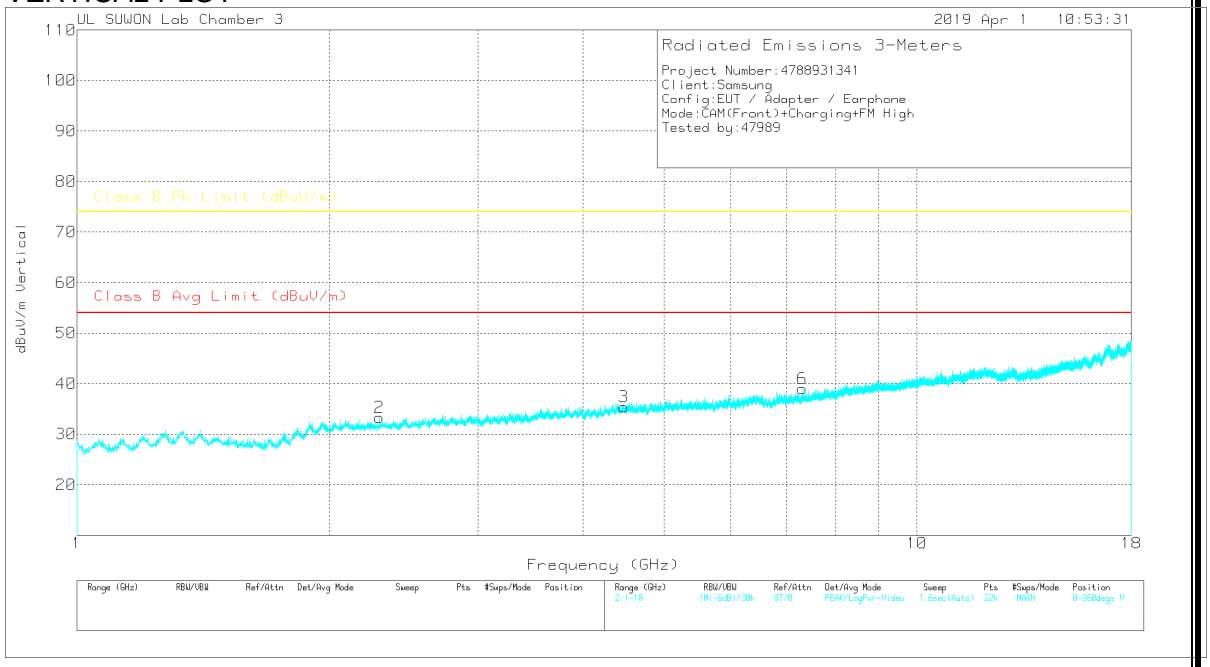
RADIATED EMISSIONS 1GHz to 18GHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.289	33.39	PK	31.4	-32.7	32.09	-	-	74	-41.91	0-360	200	H
4	4.485	32.14	PK	34.2	-29.6	36.74	-	-	74	-37.26	0-360	200	H
5	7.328	26.38	PK	35.8	-24.6	37.58	-	-	74	-36.42	0-360	200	H
2	2.291	34.66	PK	31.4	-32.7	33.36	-	-	74	-40.64	0-360	200	V
3	4.479	30.52	PK	34.2	-29.3	35.42	-	-	74	-38.58	0-360	100	V
6	7.3	27.58	PK	35.8	-24.4	38.98	-	-	74	-35.02	0-360	200	V

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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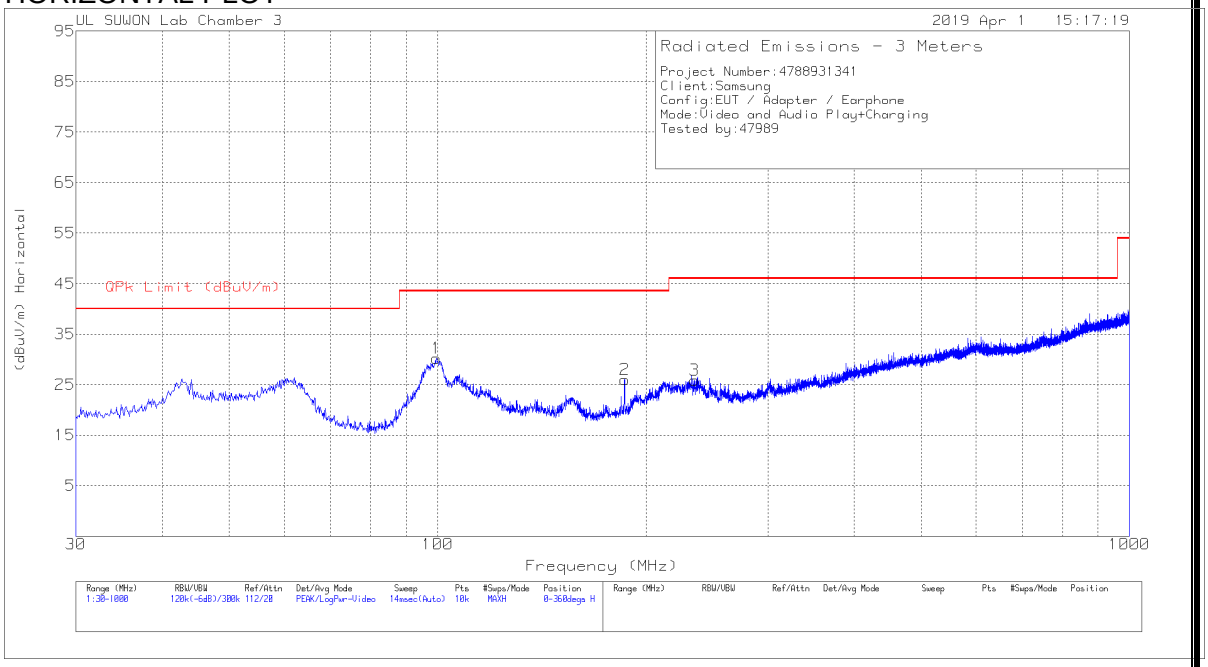
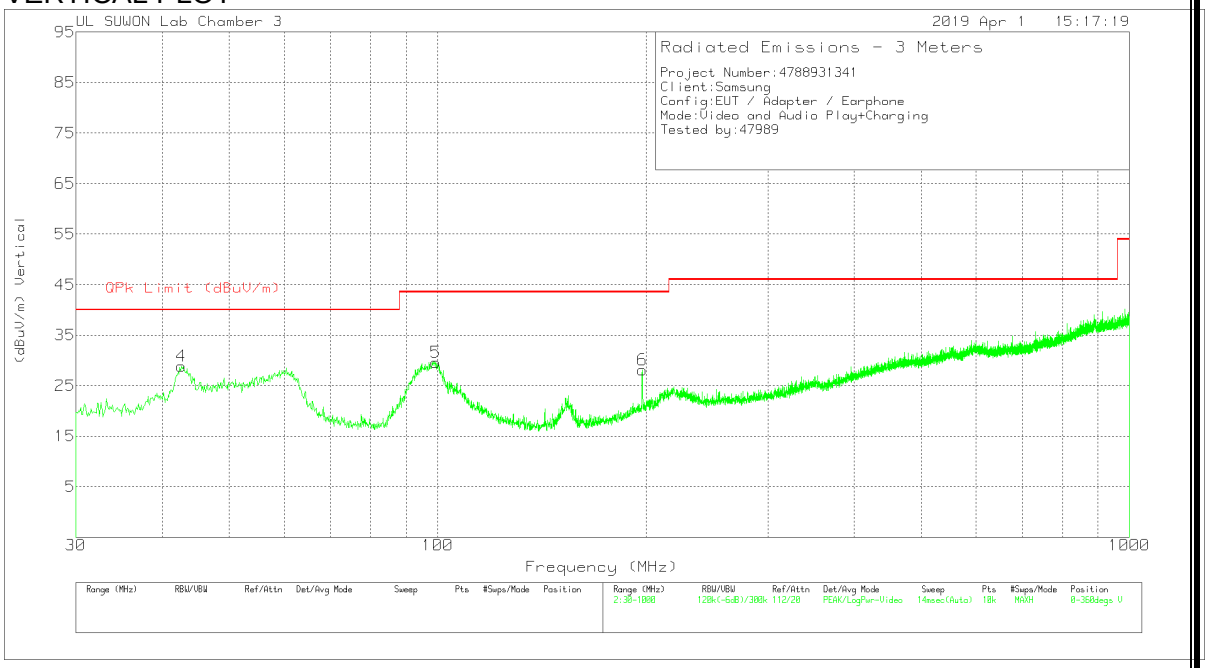
RESULTS Test Case 4

RADIATED EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-845	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	99.5562	44.13	Pk	17.7	-31.6	30.23	43.52	-13.29	0-360	200	H
2	186.2831	41.25	Pk	15.9	-31.1	26.05	43.52	-17.47	0-360	100	H
3	234.9821	39.02	Pk	17.8	-30.9	25.92	46.02	-20.1	0-360	100	H
4	42.6113	41.28	Pk	19.5	-31.9	28.88	40	-11.12	0-360	300	V
5	99.4592	43.49	Pk	17.7	-31.6	29.59	43.52	-13.93	0-360	200	V
6	197.5363	42.36	Pk	16.9	-31.1	28.16	43.52	-15.36	0-360	400	V

Pk - Peak detector

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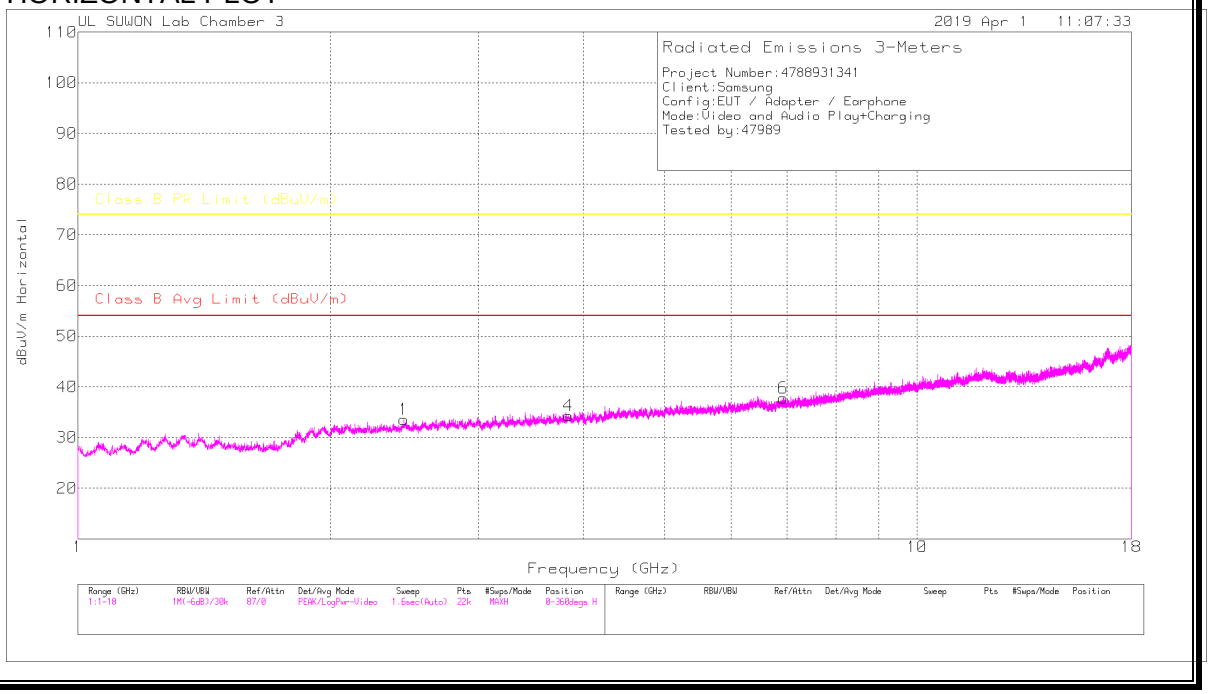
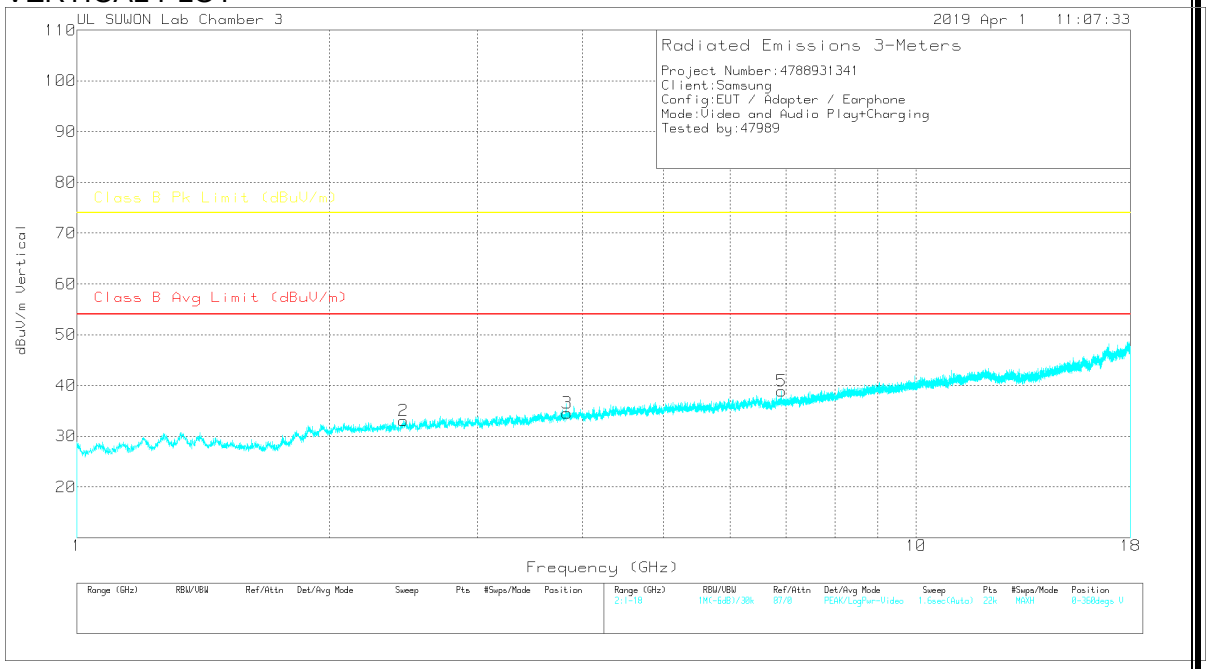
RADIATED EMISSIONS 1GHz to 18GHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.444	34.49	PK	31.8	-32.7	33.59	-	-	74	-40.41	0-360	200	H
4	3.839	31.9	PK	33.3	-30.9	34.3	-	-	74	-39.7	0-360	100	H
6	6.927	27.23	PK	35.7	-25.2	37.73	-	-	74	-36.27	0-360	200	H
2	2.45	33.93	PK	31.9	-32.8	33.03	-	-	74	-40.97	0-360	200	V
3	3.837	31.86	PK	33.3	-30.6	34.56	-	-	74	-39.44	0-360	200	V
5	6.913	28.37	PK	35.7	-25.2	38.87	-	-	74	-35.13	0-360	100	V

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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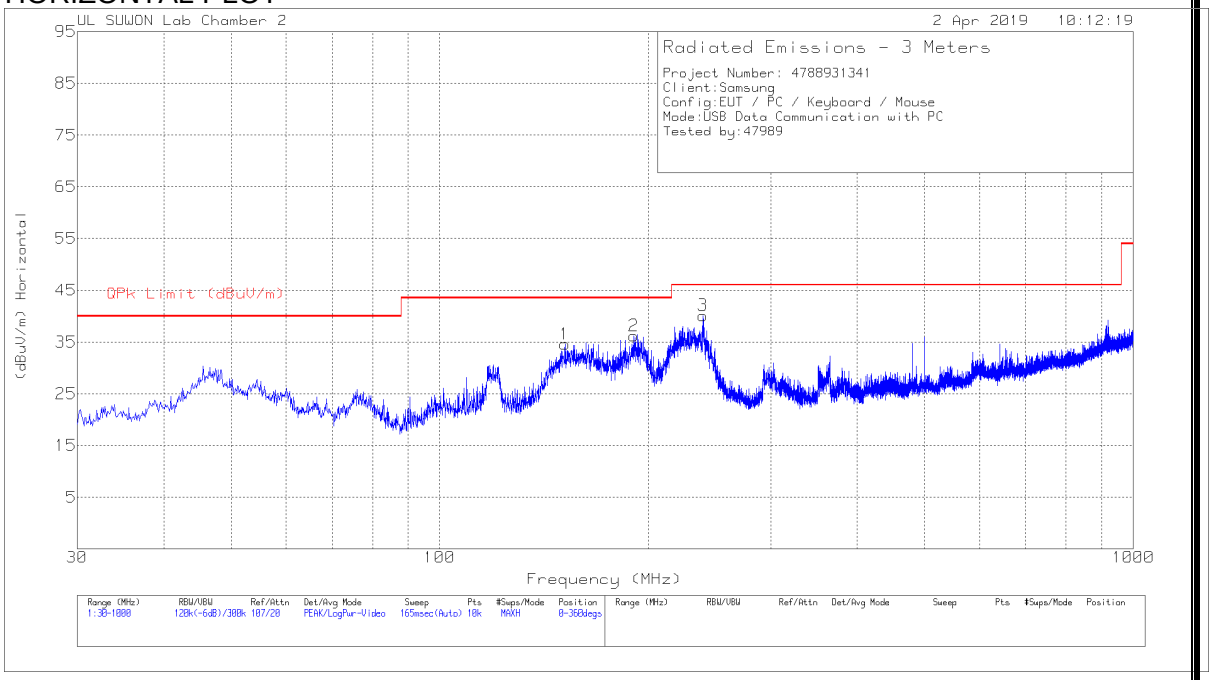
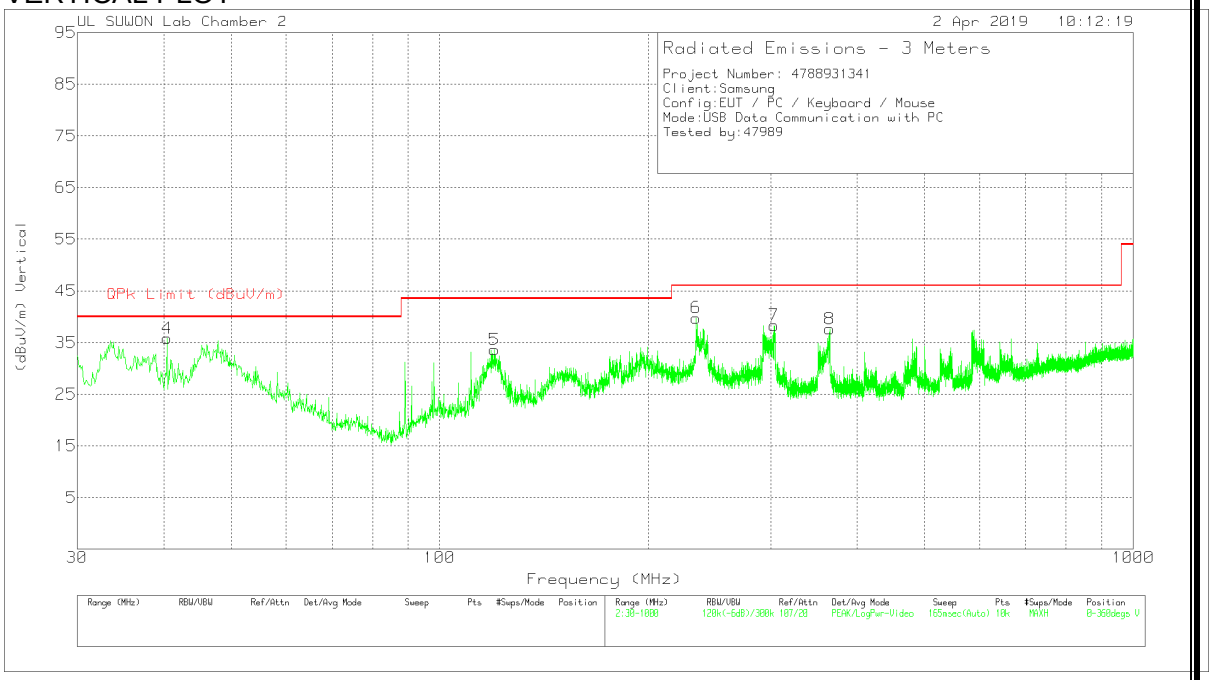
RESULTS Test Case 5

RADIATED EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	151.541	51.59	Pk	14.1	-31.1	34.59	43.52	-8.93	0-360	100	H
2	190.535	49.9	Pk	17.2	-30.9	36.2	43.52	-7.32	0-360	100	H
3	239.52	52.33	Pk	18.5	-30.7	40.13	46.02	-5.89	0-360	200	H
4	40.476	48.89	Pk	18.8	-31.9	35.79	40	-4.21	0-360	100	V
5	119.919	49.62	Pk	15.3	-31.3	33.62	43.52	-9.9	0-360	100	V
6	234.282	52.27	Pk	18.2	-30.7	39.77	46.02	-6.25	0-360	200	V
7	303.54	49.52	Pk	19.3	-30.5	38.32	46.02	-7.7	0-360	200	V
8	365.038	47.62	Pk	20.4	-30.4	37.62	46.02	-8.4	0-360	200	V

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
151.541	48.3	Qp	14.1	-31.1	31.3	43.52	-12.22	12	133	H
190.535	46.05	Qp	17.2	-30.9	32.35	43.52	-11.17	350	101	H
240.194	52.76	Qp	18.5	-30.7	40.56	46.02	-5.46	272	120	H
41.1216	35.35	Qp	19	-31.9	22.45	40	-17.55	0	100	V
118.207	44.49	Qp	15.6	-31.3	28.79	43.52	-14.73	3	100	V
234.282	48.53	Qp	18.2	-30.7	36.03	46.02	-9.99	153	186	V
303.54	48.17	Qp	19.3	-30.5	36.97	46.02	-9.05	35	152	V
365.038	48.15	Qp	20.4	-30.4	38.15	46.02	-7.87	28	136	V

Qp - Quasi-Peak detector

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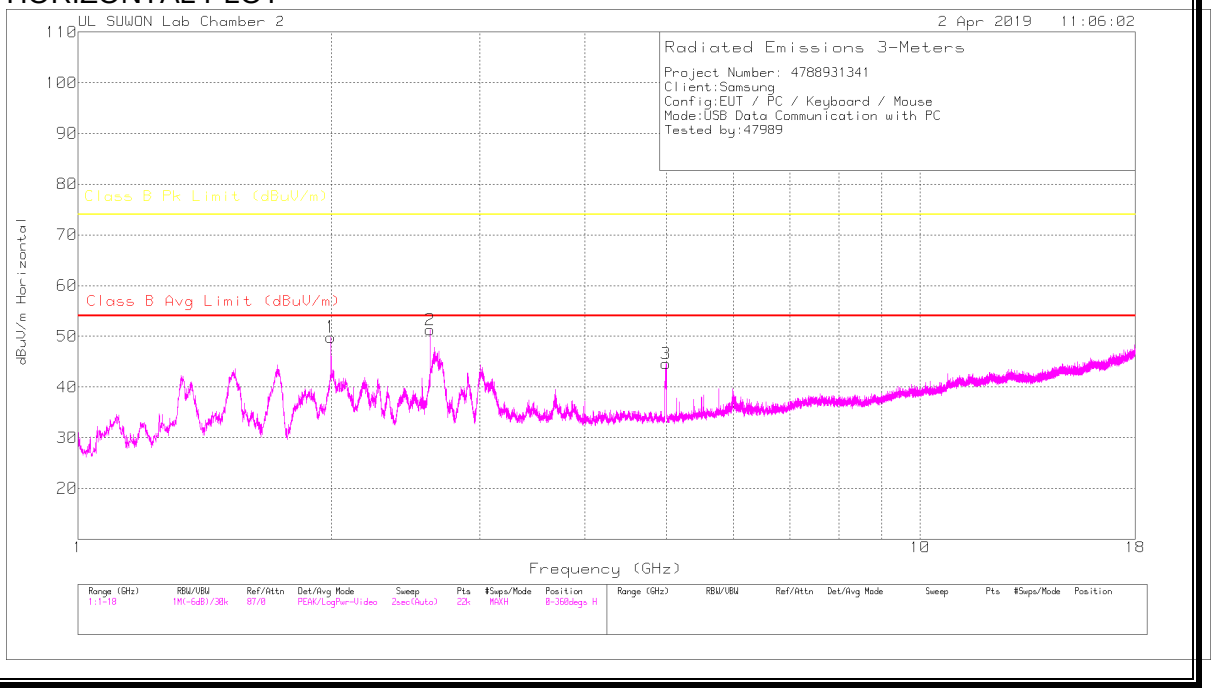
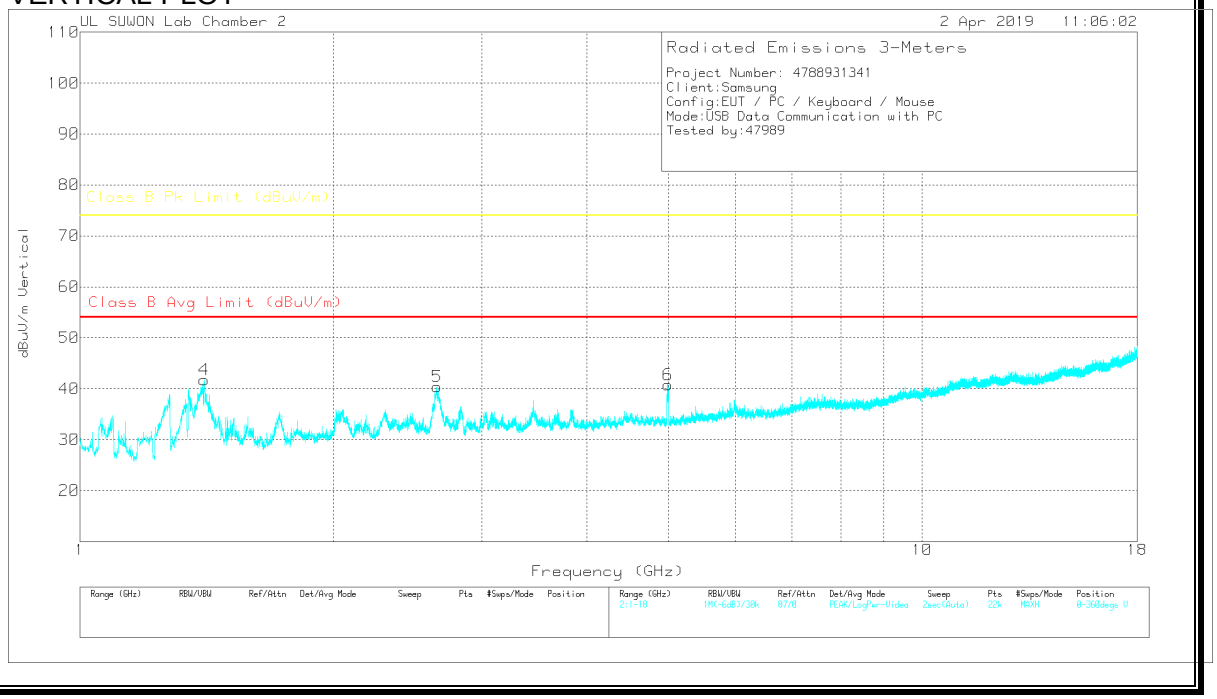
RADIATED EMISSIONS 1GHz to 18GHz

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.997	49.76	PK	31.2	-31.1	49.86	-	-	74	-24.14	0-360	200	H
2	2.62	49.51	PK	32.1	-30.3	51.31	-	-	74	-22.69	0-360	100	H
3	4.99	38.85	PK	34.1	-28.3	44.65	-	-	74	-29.35	0-360	200	H
4	1.404	44.11	PK	29.4	-31.7	41.81	-	-	74	-32.19	0-360	200	V
5	2.655	38.6	PK	32.1	-30.3	40.4	-	-	74	-33.6	0-360	200	V
6	4.993	34.98	PK	34.1	-28.3	40.78	-	-	74	-33.22	0-360	100	V

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	1-18GHz[dB]	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.998	59.56	Pk	31.2	-31	59.76	-	-	74	-14.24	11	214	H
1.998	33.78	Ca	31.2	-31	33.98	54	-20.02	-	-	11	214	H
2.619	47.34	Pk	32.1	-30.3	49.14	-	-	74	-24.86	2	104	H
2.619	31.21	Ca	32.1	-30.3	33.01	54	-20.99	-	-	2	104	H
4.99	41.64	Pk	34.1	-28.3	47.44	-	-	74	-26.56	193	159	H
4.99	25.17	Ca	34.1	-28.3	30.97	54	-23.03	-	-	193	159	H
1.404	61.05	Pk	29.4	-31.7	58.75	-	-	74	-15.25	147	222	V
1.404	34.65	Ca	29.4	-31.7	32.35	54	-21.65	-	-	147	222	V
2.655	43.36	Pk	32.1	-30.3	45.16	-	-	74	-28.84	39	317	V
2.655	29.37	Ca	32.1	-30.3	31.17	54	-22.83	-	-	39	317	V
4.993	45.22	Pk	34.1	-28.3	51.02	-	-	74	-22.98	351	130	V
4.993	27.6	Ca	34.1	-28.3	33.4	54	-20.6	-	-	351	130	V

Pk - Peak detector
Ca - CISPR average detection

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AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2014

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (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
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

RESULTS

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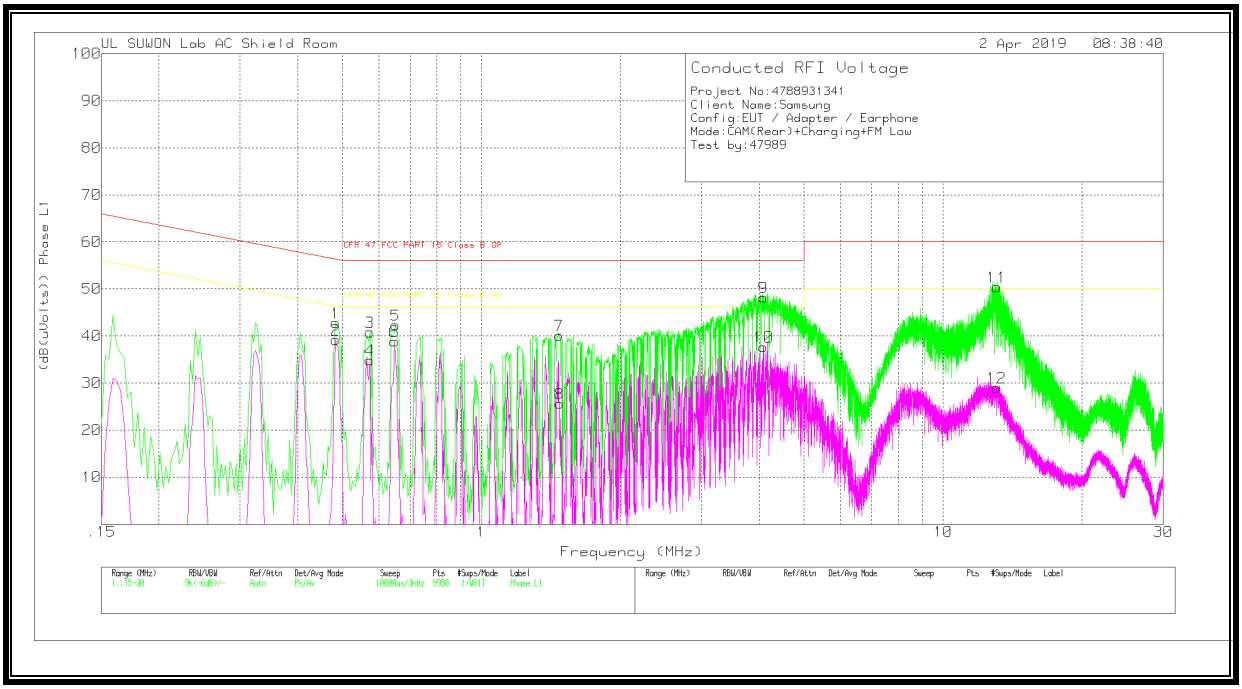
6 WORST EMISSIONS Test Case 1

Line-L1 .15 - 30MHz



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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	.483	32.71	Pk	9.9	.2	42.81	56.29	-13.48	-	-
2	.483	29.11	Av	9.9	.2	39.21	-	-	46.29	-7.08
3	.573	30.7	Pk	9.9	.2	40.8	56	-15.2	-	-
4	.573	24.76	Av	9.9	.2	34.86	-	-	46	-11.14
5	.651	32.21	Pk	9.9	.2	42.31	56	-13.69	-	-
6	.648	28.77	Av	9.9	.2	38.87	-	-	46	-7.13
7	1.473	29.97	Pk	9.8	.3	40.07	56	-15.93	-	-
8	1.476	15.54	Av	9.8	.3	25.64	-	-	46	-20.36
9	4.083	38.09	Pk	9.8	.3	48.19	56	-7.81	-	-
10	4.083	27.56	Av	9.8	.3	37.66	-	-	46	-8.34
11	13.059	39.91	Pk	10.1	.4	50.41	60	-9.59	-	-
12	13.059	18.48	Av	10.1	.4	28.98	-	-	50	-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)
4.08375	28.73	Qp	9.8	.3	38.83	56	-17.17	-	-
13.0583	29.33	Qp	10.1	.4	39.83	60	-20.17	-	-

Qp - Quasi-Peak detector

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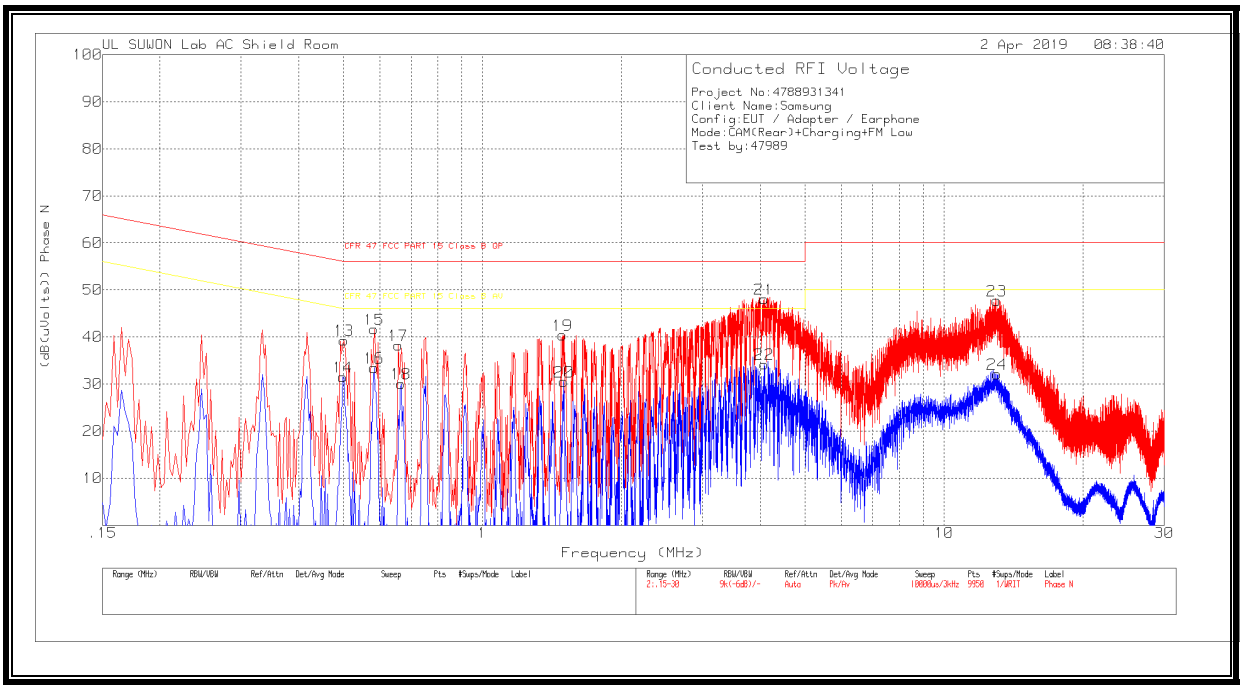
Line-L2 .15 - 30MHz



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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)
13	.501	29.18	Pk	9.9	.2	39.28	56	-16.72	-	-
14	.498	21.4	Av	9.9	.2	31.5	-	-	46.03	-14.53
15	.582	31.56	Pk	9.9	.2	41.66	56	-14.34	-	-
16	.582	23.37	Av	9.9	.2	33.47	-	-	46	-12.53
17	.657	28.15	Pk	9.9	.2	38.25	56	-17.75	-	-
18	.666	19.98	Av	9.9	.2	30.08	-	-	46	-15.92
19	1.491	30.39	Pk	9.7	.3	40.39	56	-15.61	-	-
20	1.5	20.51	Av	9.7	.3	30.51	-	-	46	-15.49
21	4.074	37.96	Pk	9.8	.3	48.06	56	-7.94	-	-
22	4.077	24.12	Av	9.8	.3	34.22	-	-	46	-11.78
23	12.999	37.25	Pk	10.1	.4	47.75	60	-12.25	-	-
24	13.023	21.55	Av	10.2	.4	32.15	-	-	50	-17.85

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)
4.07325	27.23	Qp	9.8	.3	37.33	56	-18.67	-	-
13.0238	27.63	Qp	10.2	.4	38.23	60	-21.77	-	-

Qp - Quasi-Peak detector

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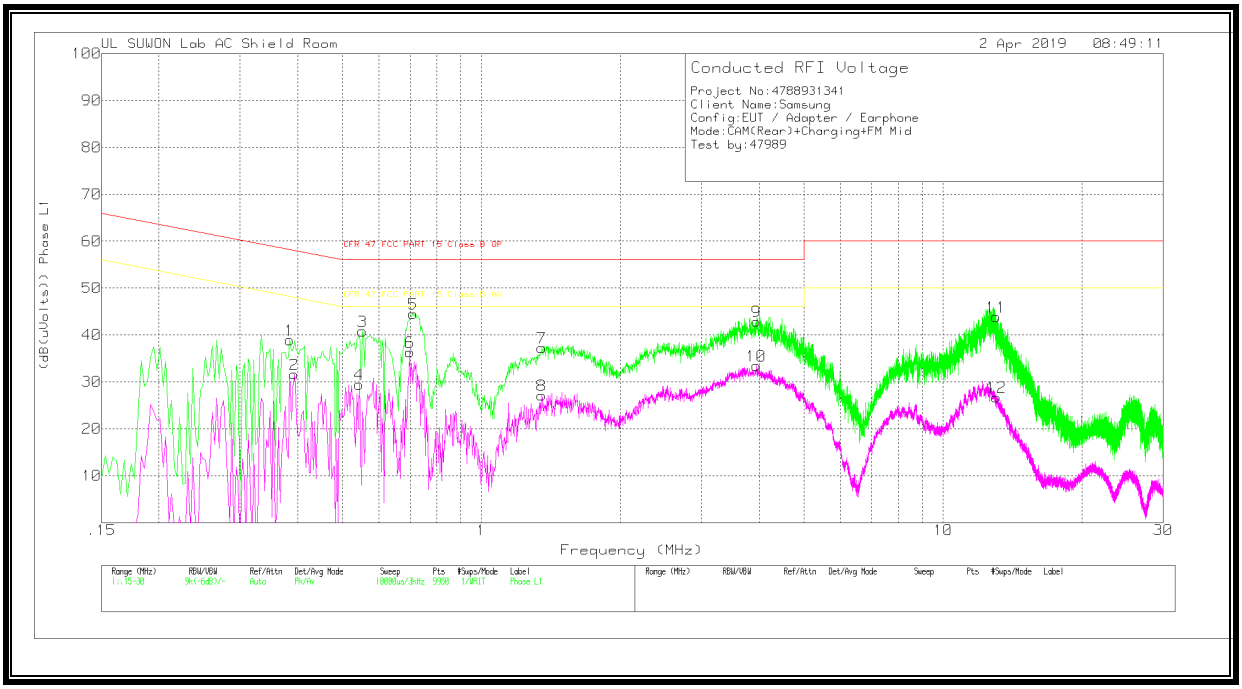
6 WORST EMISSIONS Test Case 2

Line-L1 .15 - 30MHz



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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	.384	28.85	Pk	9.9	.2	38.95	58.19	-19.24	-	-
2	.393	21.54	Av	9.9	.2	31.64	-	-	48	-16.36
3	.552	30.7	Pk	9.9	.2	40.8	56	-15.2	-	-
4	.543	19.35	Av	9.9	.2	29.45	-	-	46	-16.55
5	.711	34.42	Pk	9.9	.2	44.52	56	-11.48	-	-
6	.699	26.28	Av	9.9	.2	36.38	-	-	46	-9.62
7	1.35	27.17	Pk	9.8	.3	37.27	56	-18.73	-	-
8	1.35	17.04	Av	9.8	.3	27.14	-	-	46	-18.86
9	3.939	32.77	Pk	9.8	.3	42.87	56	-13.13	-	-
10	3.939	23.37	Av	9.8	.3	33.47	-	-	46	-12.53
11	13.017	33.39	Pk	10.1	.4	43.89	60	-16.11	-	-
12	13.05	16.24	Av	10.1	.4	26.74	-	-	50	-23.26

Pk - Peak detector
Av - Average detection

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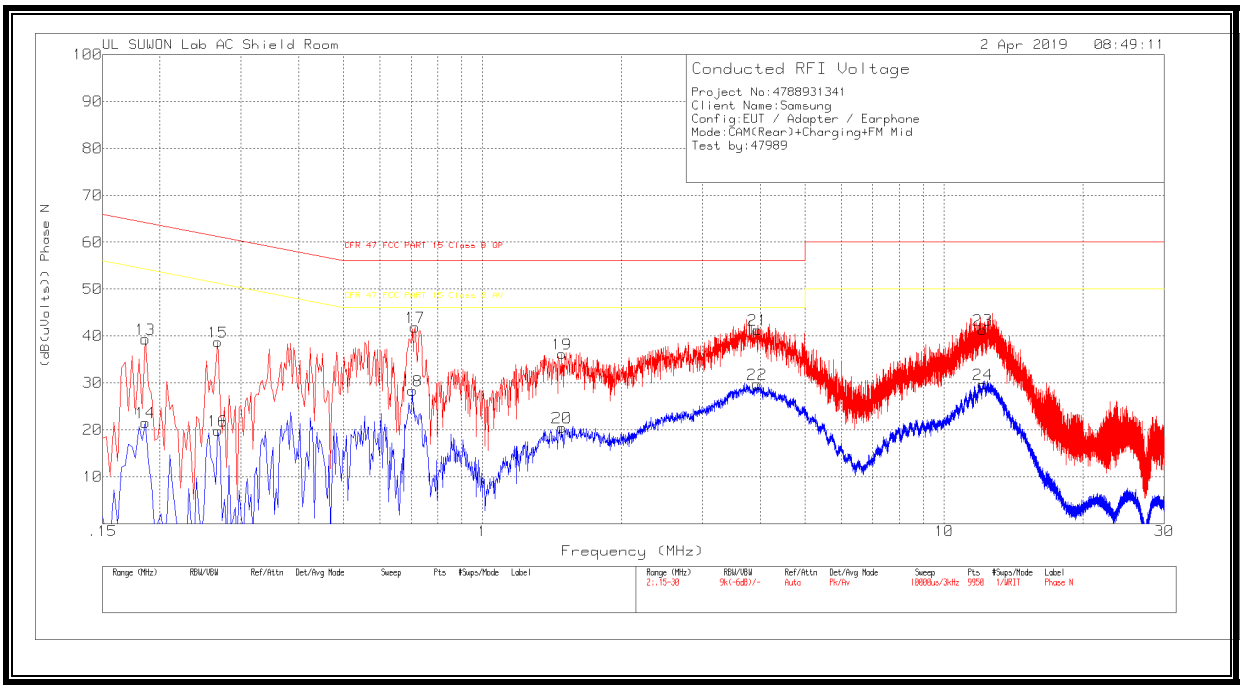
Line-L2 .15 - 30MHz



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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)
13	.186	29.22	Pk	9.9	.2	39.32	64.21	-24.89	-	-
14	.186	11.46	Av	9.9	.2	21.56	-	-	54.21	-32.65
15	.267	28.82	Pk	9.7	.2	38.72	61.21	-22.49	-	-
16	.267	9.91	Av	9.7	.2	19.81	-	-	51.21	-31.4
17	.714	31.78	Pk	9.9	.2	41.88	56	-14.12	-	-
18	.705	18.26	Av	9.9	.2	28.36	-	-	46	-17.64
19	1.485	26.17	Pk	9.7	.3	36.17	56	-19.83	-	-
20	1.485	10.49	Av	9.7	.3	20.49	-	-	46	-25.51
21	3.945	31.2	Pk	9.8	.3	41.3	56	-14.7	-	-
22	3.933	19.63	Av	9.8	.3	29.73	-	-	46	-16.27
23	12.126	30.87	Pk	10.1	.3	41.27	60	-18.73	-	-
24	12.135	19.3	Av	10.1	.3	29.7	-	-	50	-20.3

Pk - Peak detector
Av - Average detection

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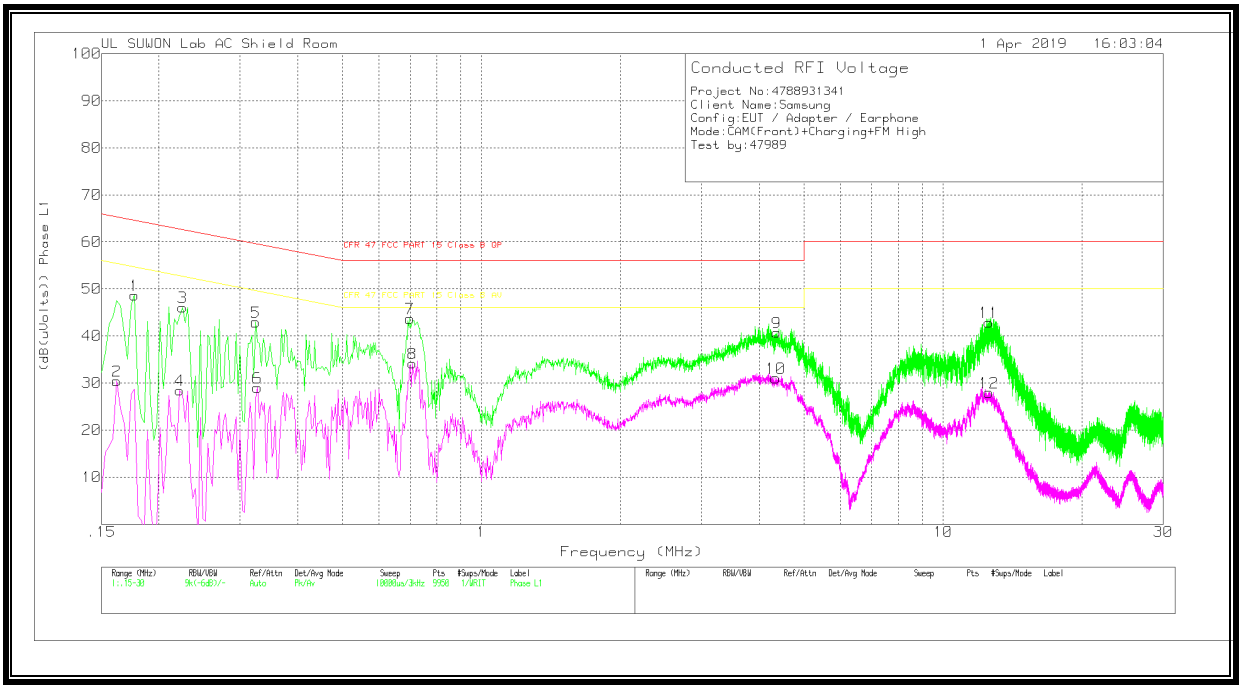
6 WORST EMISSIONS Test Case 3

Line-L1 .15 - 30MHz



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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	38.45	Pk	10	.2	48.65	64.63	-15.98	-	-
2	.162	20.33	Av	10	.1	30.43	-	-	55.36	-24.93
3	.225	36.11	Pk	9.8	.2	46.11	62.63	-16.52	-	-
4	.222	18.45	Av	9.8	.2	28.45	-	-	52.74	-24.29
5	.324	32.94	Pk	9.8	.2	42.94	59.6	-16.66	-	-
6	.327	19.03	Av	9.8	.2	29.03	-	-	49.53	-20.5
7	.699	33.61	Pk	9.9	.2	43.71	56	-12.29	-	-
8	.708	24.08	Av	9.9	.2	34.18	-	-	46	-11.82
9	4.362	30.61	Pk	9.8	.3	40.71	56	-15.29	-	-
10	4.338	20.96	Av	9.8	.3	31.06	-	-	46	-14.94
11	12.564	32.5	Pk	10.1	.3	42.9	60	-17.1	-	-
12	12.561	17.58	Av	10.1	.3	27.98	-	-	50	-22.02

Pk - Peak detector
Av - Average detection

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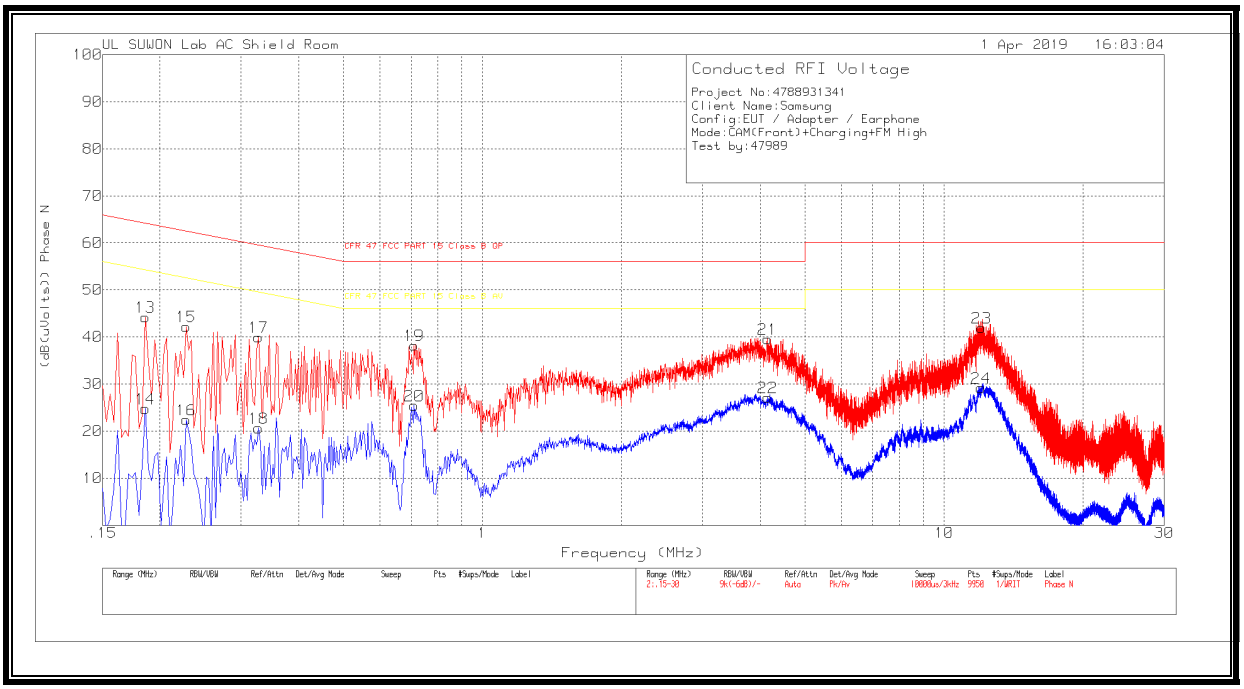
Line-L2 .15 - 30MHz



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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)
13	.186	34.11	Pk	9.9	.2	44.21	64.21	-20	-	-
14	.186	14.7	Av	9.9	.2	24.8	-	-	54.21	-29.41
15	.228	32.23	Pk	9.8	.2	42.23	62.52	-20.29	-	-
16	.228	12.42	Av	9.8	.2	22.42	-	-	52.52	-30.1
17	.327	29.97	Pk	9.8	.2	39.97	59.53	-19.56	-	-
18	.327	10.67	Av	9.8	.2	20.67	-	-	49.53	-28.86
19	.711	28.11	Pk	9.9	.2	38.21	56	-17.79	-	-
20	.711	15.37	Av	9.9	.2	25.47	-	-	46	-20.53
21	4.146	29.48	Pk	9.8	.3	39.58	56	-16.42	-	-
22	4.146	17.07	Av	9.8	.3	27.17	-	-	46	-18.83
23	12.045	31.55	Pk	10.1	.3	41.95	60	-18.05	-	-
24	12.021	18.82	Av	10.1	.3	29.22	-	-	50	-20.78

Pk - Peak detector
Av - Average detection

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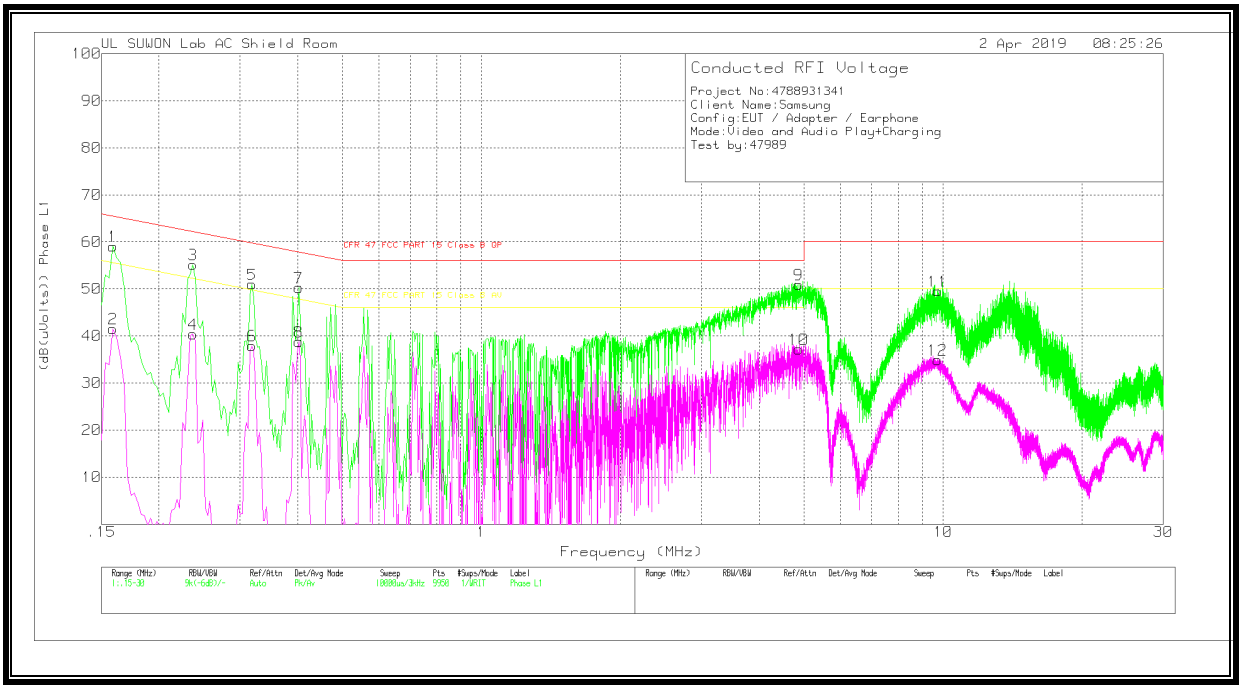
6 WORST EMISSIONS Test Case 4

Line-L1 .15 - 30MHz



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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	.159	49.07	Pk	9.9	.1	59.07	65.52	-6.45	-	-
2	.159	31.54	Av	9.9	.1	41.54	-	-	55.52	-13.98
3	.237	45.26	Pk	9.7	.2	55.16	62.2	-7.04	-	-
4	.237	30.53	Av	9.7	.2	40.43	-	-	52.2	-11.77
5	.318	40.99	Pk	9.8	.2	50.99	59.76	-8.77	-	-
6	.318	27.93	Av	9.8	.2	37.93	-	-	49.76	-11.83
7	.402	40.18	Pk	9.9	.2	50.28	57.81	-7.53	-	-
8	.402	28.71	Av	9.9	.2	38.81	-	-	47.81	-9
9	4.866	40.83	Pk	9.8	.3	50.93	56	-5.07	-	-
10	4.866	27.11	Av	9.8	.3	37.21	-	-	46	-8.79
11	9.726	39.13	Pk	10	.4	49.53	60	-10.47	-	-
12	9.726	24.56	Av	10	.4	34.96	-	-	50	-15.04

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)
.15825	31.96	Qp	9.9	.1	41.96	65.56	-23.6	-	-
.23625	31.34	Qp	9.8	.2	41.34	62.23	-20.89	-	-
.31725	27.56	Qp	9.8	.2	37.56	59.78	-22.22	-	-
.40125	17.86	Qp	9.9	.2	27.96	57.83	-29.87	-	-
4.86525	32.65	Qp	9.8	.3	42.75	56	-13.25	-	-
9.72615	27.44	Qp	10	.4	37.84	60	-22.16	-	-

Qp - Quasi-Peak detector

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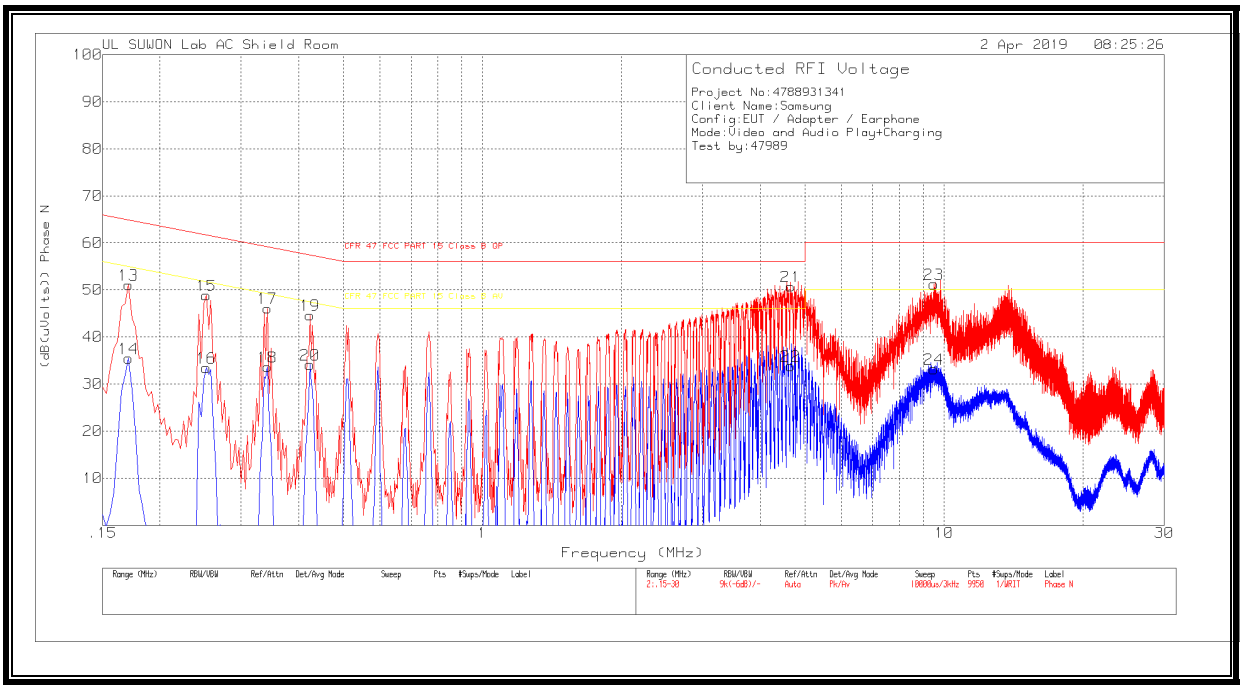
Line-L2 .15 - 30MHz



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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)
13	.171	40.86	Pk	10	.2	51.06	64.91	-13.85	-	-
14	.171	25.25	Av	10	.2	35.45	-	-	54.91	-19.46
15	.252	38.96	Pk	9.7	.2	48.86	61.69	-12.83	-	-
16	.252	23.58	Av	9.7	.2	33.48	-	-	51.69	-18.21
17	.342	36.09	Pk	9.8	.2	46.09	59.15	-13.06	-	-
18	.342	23.64	Av	9.8	.2	33.64	-	-	49.15	-15.51
19	.423	35.22	Pk	9.2	.2	44.62	57.39	-12.77	-	-
20	.423	24.73	Av	9.2	.2	34.13	-	-	47.39	-13.26
21	4.65	40.63	Pk	9.8	.3	50.73	56	-5.27	-	-
22	4.65	23.76	Av	9.8	.3	33.86	-	-	46	-12.14
23	9.504	40.84	Pk	10	.4	51.24	60	-8.76	-	-
24	9.504	22.81	Av	10	.4	33.21	-	-	50	-16.79

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	11.72	Qp	10	.2	21.92	64.95	-43.03	-	-
.25125	9.15	Qp	9.7	.2	19.05	61.72	-42.67	-	-
.34125	.48	Qp	9.8	.2	10.48	59.17	-48.69	-	-
.42225	1.08	Qp	9.2	.2	10.48	57.4	-46.92	-	-
4.65075	28.84	Qp	9.8	.3	38.94	56	-17.06	-	-
9.50325	26.69	Qp	10	.4	37.09	60	-22.91	-	-

Qp - Quasi-Peak detector

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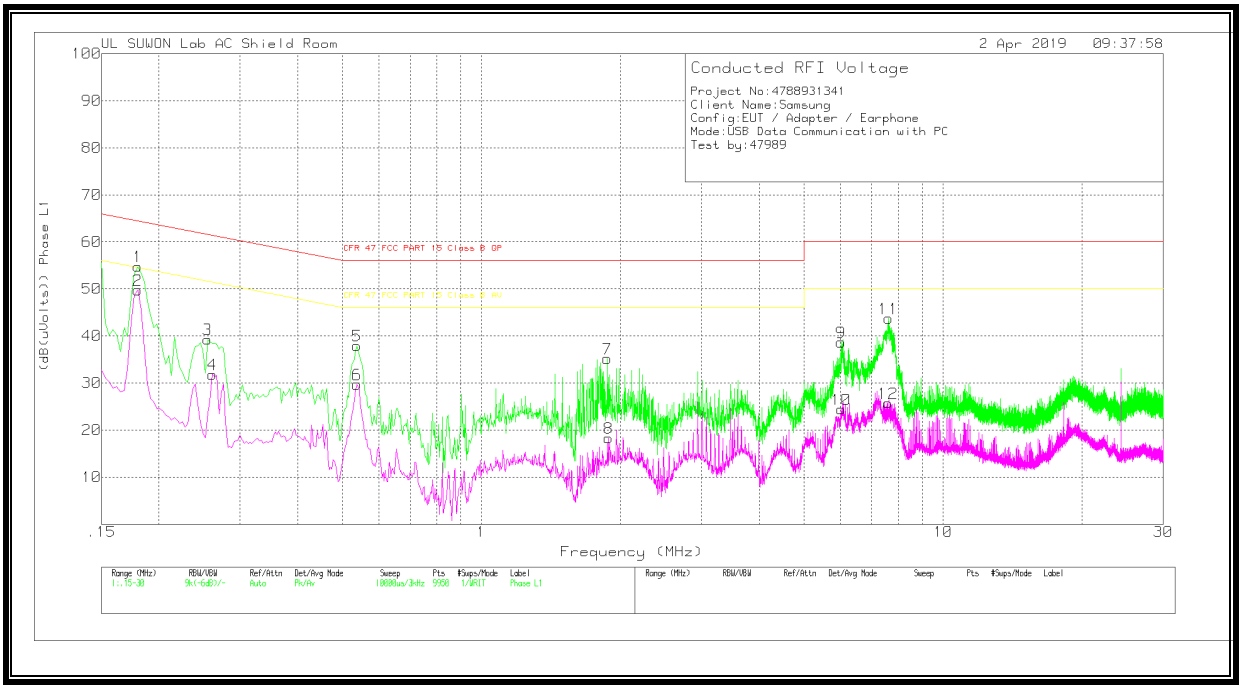
6 WORST EMISSIONS Test Case 5

Line-L1 .15 - 30MHz



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LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_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	.18	44.67	Pk	9.9	.2	54.77	64.49	-9.72	-	-
2	.18	39.64	Av	9.9	.2	49.74	-	-	54.49	-4.75
3	.255	29.5	Pk	9.6	.2	39.3	61.59	-22.29	-	-
4	.261	22.03	Av	9.6	.2	31.83	-	-	51.4	-19.57
5	.537	27.83	Pk	9.9	.2	37.93	56	-18.07	-	-
6	.537	19.64	Av	9.9	.2	29.74	-	-	46	-16.26
7	1.872	25.19	Pk	9.7	.3	35.19	56	-20.81	-	-
8	1.884	8.34	Av	9.7	.3	18.34	-	-	46	-27.66
9	6.009	28.66	Pk	9.7	.3	38.66	60	-21.34	-	-
10	6.015	14.43	Av	9.7	.3	24.43	-	-	50	-25.57
11	7.617	33.76	Pk	9.7	.3	43.76	60	-16.24	-	-
12	7.596	15.75	Av	9.7	.3	25.75	-	-	50	-24.25

Pk - Peak detector
Av - Average detection

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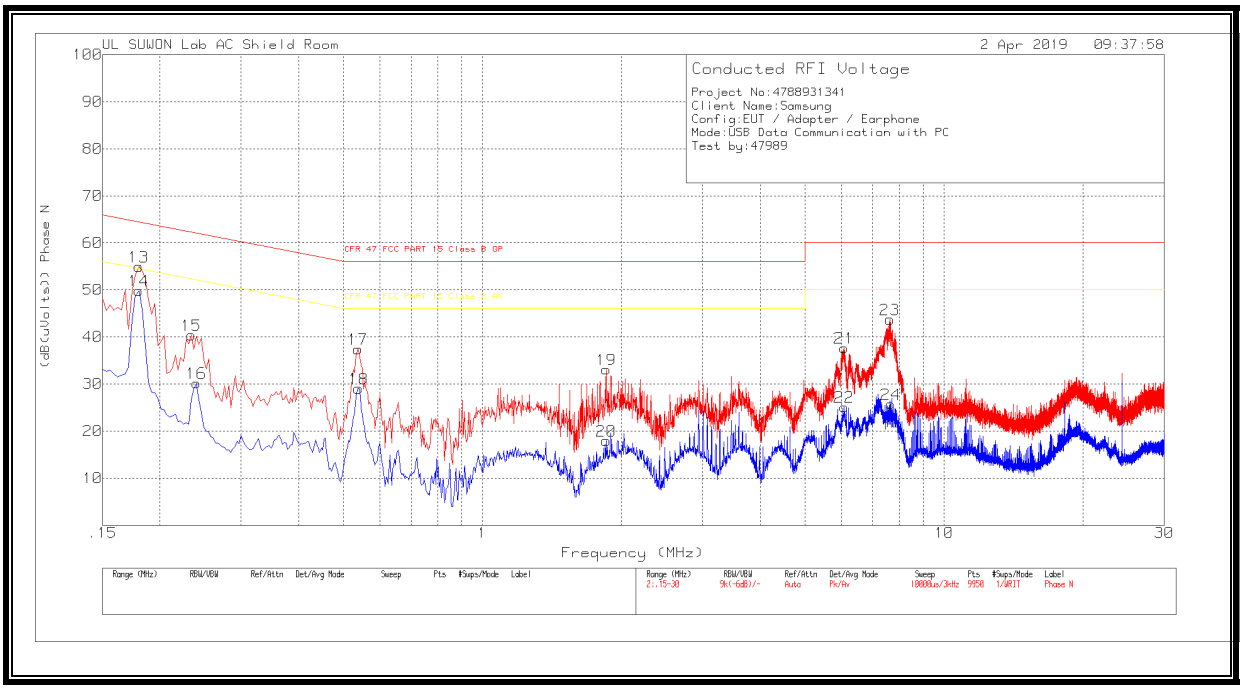
Line-L2 .15 - 30MHz



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LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_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	.18	44.86	Pk	9.9	.2	54.96	64.49	-9.53	-	-
14	.18	39.73	Av	9.9	.2	49.83	-	-	54.49	-4.66
15	.234	30.51	Pk	9.7	.2	40.41	62.31	-21.9	-	-
16	.24	20.41	Av	9.6	.2	30.21	-	-	52.1	-21.89
17	.537	27.44	Pk	9.8	.2	37.44	56	-18.56	-	-
18	.5385	19.04	Av	9.8	.2	29.04	-	-	46	-16.96
19	1.854	23.21	Pk	9.6	.3	33.11	56	-22.89	-	-
20	1.854	8.1	Av	9.6	.3	18	-	-	46	-28
21	6.075	27.66	Pk	9.7	.3	37.66	60	-22.34	-	-
22	6.075	15.15	Av	9.7	.3	25.15	-	-	50	-24.85
23	7.632	33.77	Pk	9.7	.3	43.77	60	-16.23	-	-
24	7.662	15.75	Av	9.7	.3	25.75	-	-	50	-24.25

Pk - Peak detector
Av - Average detection

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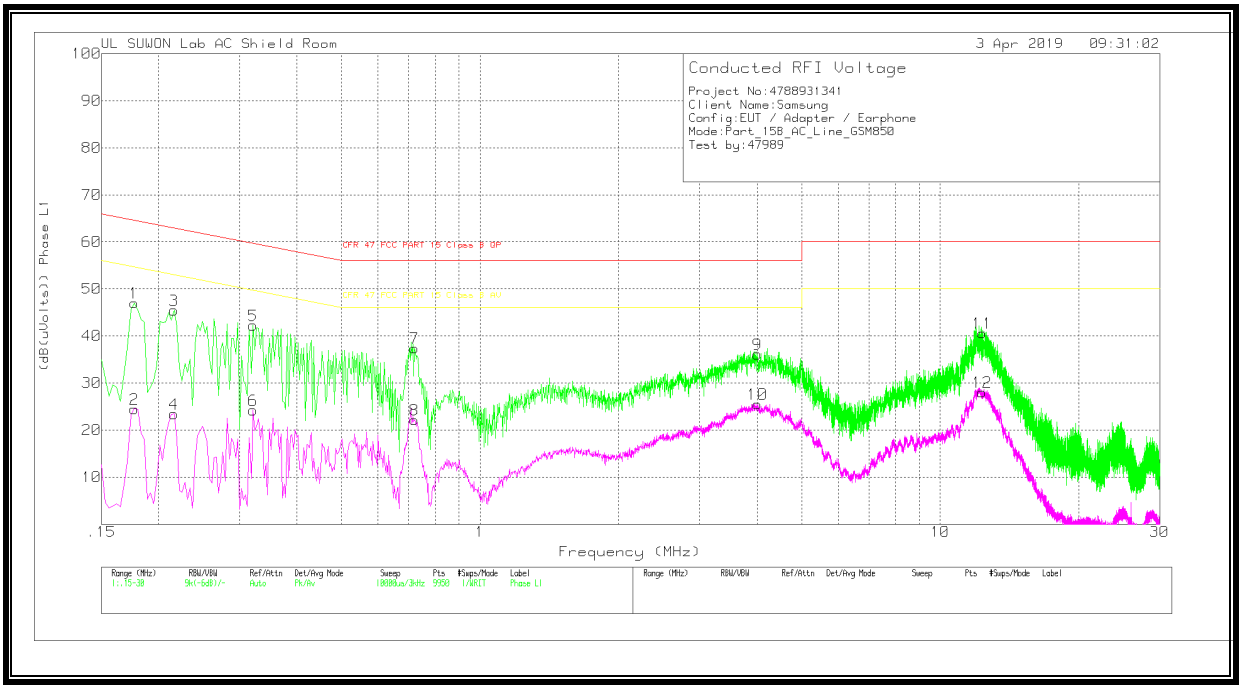
6 WORST EMISSIONS Test Case 6

Line-L1 .15 - 30MHz



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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	36.84	Pk	10	.2	47.04	64.63	-17.59	-	-
2	.177	14.29	Av	10	.2	24.49	-	-	54.63	-30.14
3	.216	35.48	Pk	9.8	.2	45.48	62.97	-17.49	-	-
4	.216	13.47	Av	9.8	.2	23.47	-	-	52.97	-29.5
5	.321	32.27	Pk	9.8	.2	42.27	59.68	-17.41	-	-
6	.321	14.27	Av	9.8	.2	24.27	-	-	49.68	-25.41
7	.72	27.3	Pk	9.9	.2	37.4	56	-18.6	-	-
8	.72	12.08	Av	9.9	.2	22.18	-	-	46	-23.82
9	4.008	26.04	Pk	9.8	.3	36.14	56	-19.86	-	-
10	4.011	15.45	Av	9.8	.3	25.55	-	-	46	-20.45
11	12.348	30.21	Pk	10.1	.3	40.61	60	-19.39	-	-
12	12.339	17.68	Av	10.1	.3	28.08	-	-	50	-21.92

Pk - Peak detector
Av - Average detection

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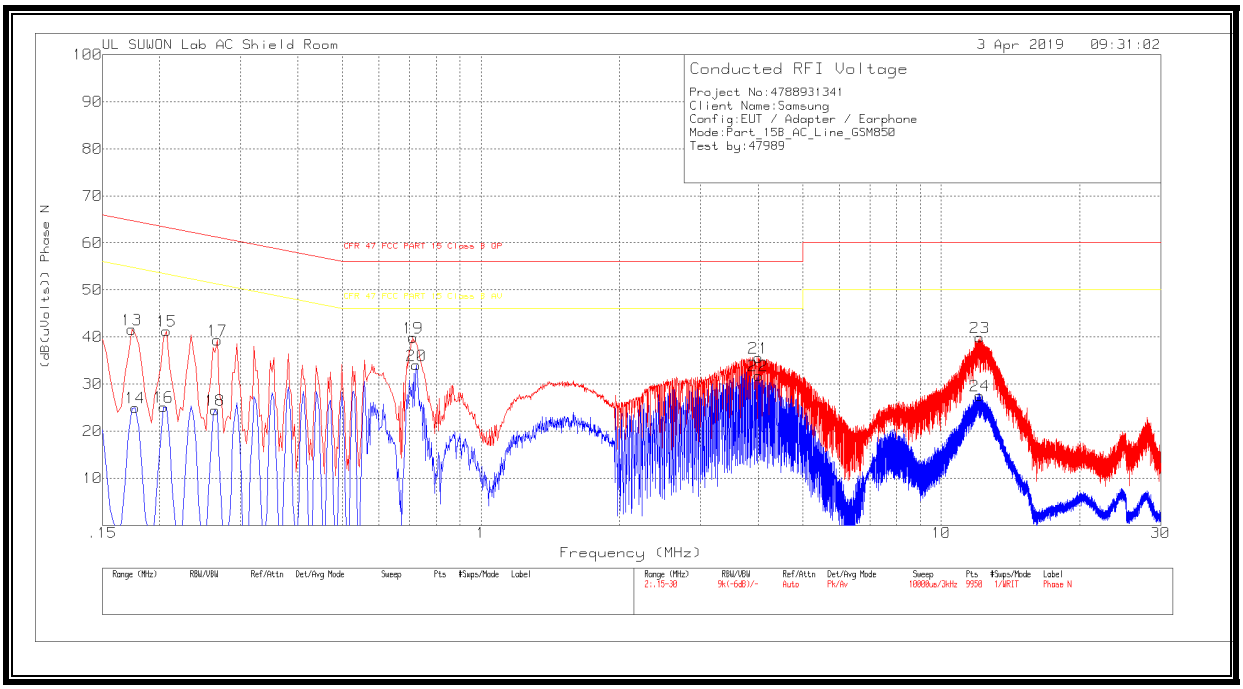
Line-L2 .15 - 30MHz



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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)
13	.174	31.41	Pk	10	.2	41.61	64.77	-23.16	-	-
14	.177	14.78	Av	10	.2	24.98	-	-	54.63	-29.65
15	.207	31.27	Pk	9.8	.2	41.27	63.32	-22.05	-	-
16	.204	15.05	Av	9.9	.2	25.15	-	-	53.45	-28.3
17	.267	29.45	Pk	9.7	.2	39.35	61.21	-21.86	-	-
18	.264	14.59	Av	9.7	.2	24.49	-	-	51.3	-26.81
19	.711	29.76	Pk	9.9	.2	39.86	56	-16.14	-	-
20	.723	23.93	Av	9.9	.2	34.03	-	-	46	-11.97
21	4.008	25.51	Pk	9.8	.3	35.61	56	-20.39	-	-
22	4.005	21.72	Av	9.8	.3	31.82	-	-	46	-14.18
23	12.132	29.51	Pk	10.1	.3	39.91	60	-20.09	-	-
24	12.132	17.16	Av	10.1	.3	27.56	-	-	50	-22.44

Pk - Peak detector
Av - Average detection

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