FCC 47 CFR PART 15 SUBPART B
ICES-003 ISSUE 6

CERTIFICATION TEST REPORT

FOR

Wi-Fi/BT Transceiver

MODEL NUMBER : WCM730Q

FCC ID: A3LWCM730Q
IC ID : 649E-WCM730Q

REPORT NUMBER: 4787630783-E6V1

ISSUE DATE: OCT 31, 2016

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

Prepared by
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/31/16	Initial issue	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: Wi-Fi/BT Transceiver

MODEL NUMBER: WCM730Q

EUT WLAN MAC ADDRESS: B8BBAFC457EA, B8BBAFC457E9
B8BBAFC45874, B8BBAFC458A6

DATE TESTED: OCT 07, 2016 - OCT 28, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART B	Pass
ICES-003 ISSUE 6	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:

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

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, ICES-003 Issue 6.

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

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

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	4.14 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 Wi-Fi/BT Transceiver.

GENERAL INFORMATION

AC Adapter Power Requirements	100-240 VAC / 50-60 Hz, 1.5 A
List of frequencies generated or used by the EUT	30 GHz (5^{th} harmonic of the frequency of 5GHz WLAN)

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
Module control	EUT controlled by Laptop PC Program

5.4. MODIFICATIONS

No modifications were made during testing.

5.5. DETAILS OF TESTED SYSTEM

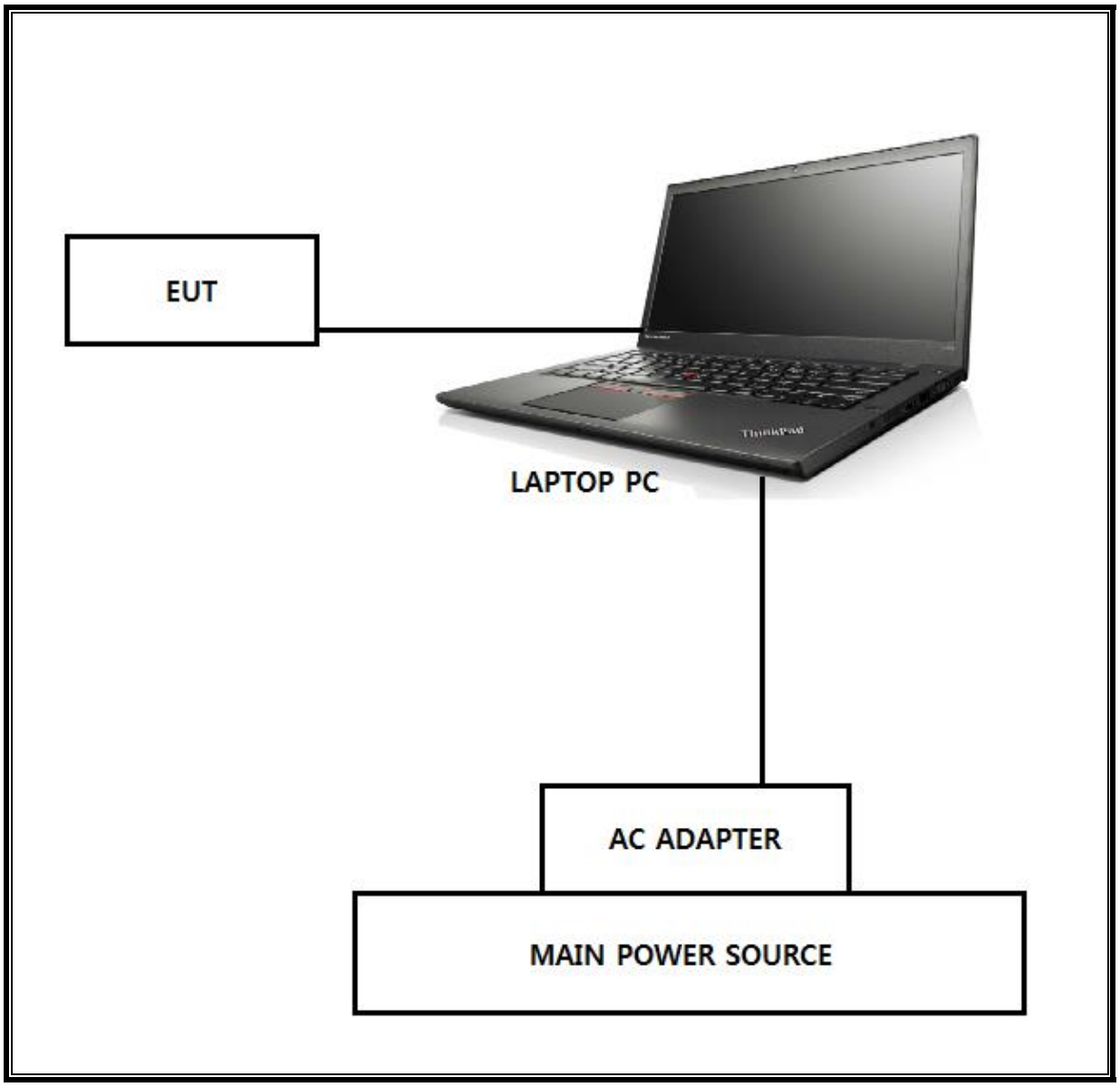
SUPPORT EQUIPMENT & PERIPHERALS

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
USB Cable	SAMSUNG	USB Cable	N/A	N/A
LAPTOP PC	LENOVO	T450	PC-07B394	N/A
ADAPTER	LENOVO	ADLX65NDC3A	N/A	N/A

TEST SETUP

The EUT is installed in a typical configuration. Test software exercised the EUT.

TEST SETUP DIAGRAM



5.6. MANUFACTURER and FACTORY INFORMATION

5.6.1. Manufacturer

1. Samsung Electronics Co., Ltd.
   129, Samsung-ro, Yeongtong-gu, Suwon-si,Gyeonggi-do, Korea, 16677

5.6.2. Factory

1. WISOL CO., LTD.
   531-7 Gajang-ro, Osan-si, Gyeonggi-do, Korea

2. WISOL HANOI Co., Ltd.
   26,ROAD 05,VSIP, PHU CHAN COMMUNE, TU SON DISTRICT,
   BAC NINH PROVINCE, VIETNAM

3. ShenZhen Zowee Technology Co., Ltd
   Block 5, Science&Technology Industrial Park of Privately Owned
   Enterprises, Pingshan, Xili Nanshan District Shenzhen Guangdong
   518055, China

4. ShenZhen Zowee Technology Co., Ltd
   BaoAn Subcompany Zowee Factory Tongfuyu Industrial Zone
   Songgang, Baoan District Shenzhen Guangdong 518105, China
   ShenZhen Zowda Precision Mold Co., Ltd

5. Block 2&Block 3(Floor 1&2) Zowee Factory Tongfuyu Industrial Zone
   Songgang, Baoan District Shenzhen Guangdong 518055, China

6. TianJin Zowda Science and Technology Develop Co., Ltd
   Between Xinye 1 Street and Xinhuan South Street West Zone,
   Economic Development Area Tianjin 300457, China

7. Chengdu Xuguang Technology Co., Ltd.
   No.86 2nd Section, Park Road, Longquanyi District, Chengdu City, Sichuan Province,
   P.R.China

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	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 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:

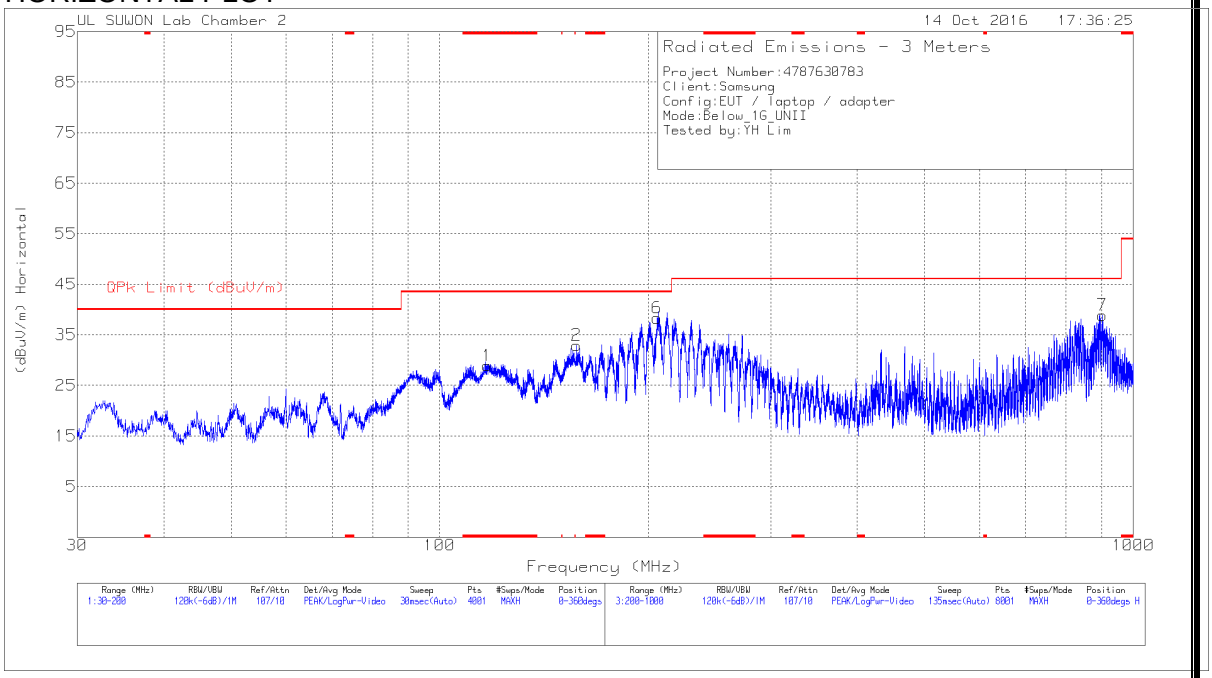
Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dBµV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54
Note: The lower limit shall apply at the transition frequency.	

Note : Spurious emissions from 5.95GHz to 6GHz were generated by laptop PC.
Refer to the section 7.2, test result of stand alone condition of laptop PC.

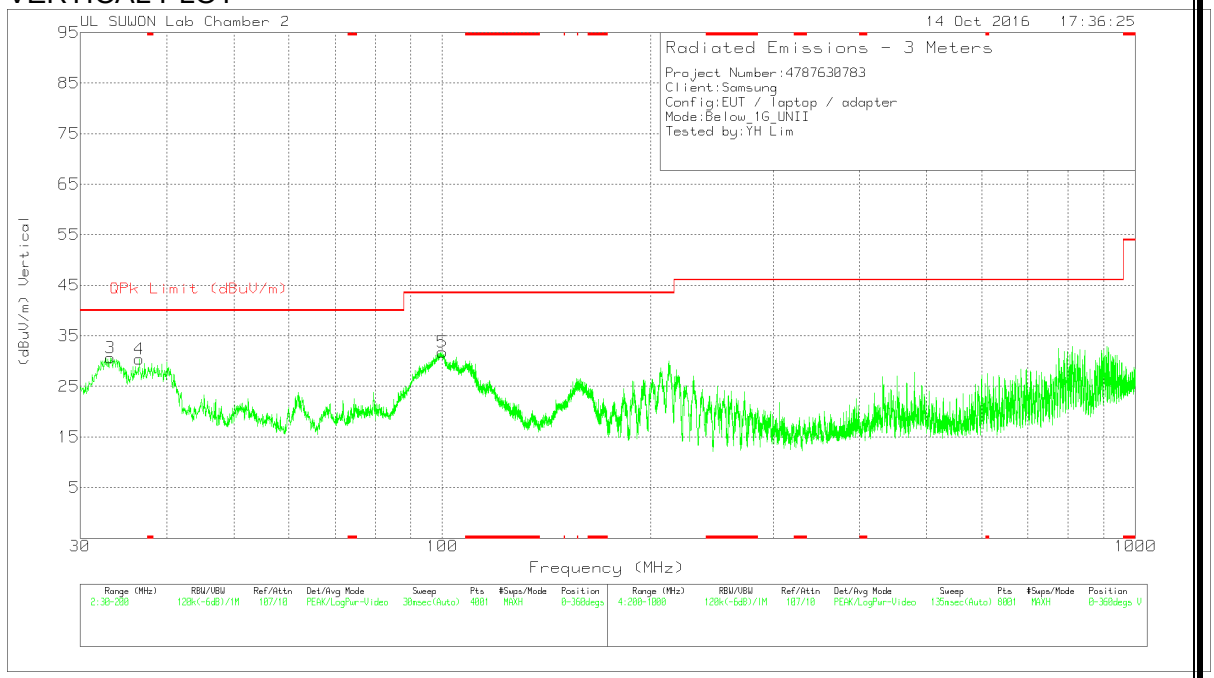
RESULTS

RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	Below_1G	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 117.0825	49.19	Pk	10.2	-30.5	28.89	43.52	-14.63	0-360	300	H
2	157.585	54.83	Pk	8.5	-30.4	32.93	43.52	-10.59	0-360	200	H
3	33.1875	50.83	Pk	10.6	-30.8	30.63	40	-9.37	0-360	100	V
4	36.5025	49.8	Pk	11.4	-30.8	30.4	40	-9.6	0-360	100	V
5	99.9975	50.63	Pk	11.6	-30.5	31.73	43.52	-11.79	0-360	100	V
6	205.7	57.12	Pk	11.5	-30.3	38.32	43.52	-5.2	0-360	100	H
7	902.1	47.08	Pk	19.6	-27.8	38.88	46.02	-7.14	0-360	100	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	Below_1G	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
206.555	55.52	Qp	11.5	-30.3	36.72	43.52	-6.8	360	122	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Qp - Quasi-Peak detector

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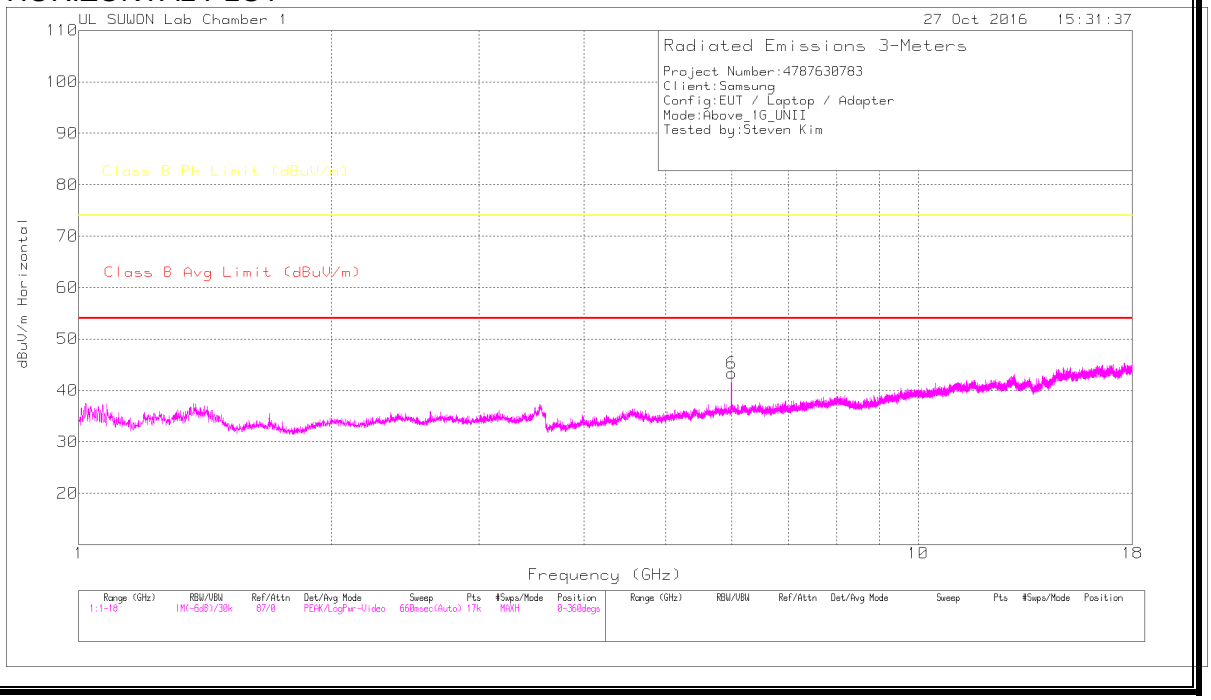
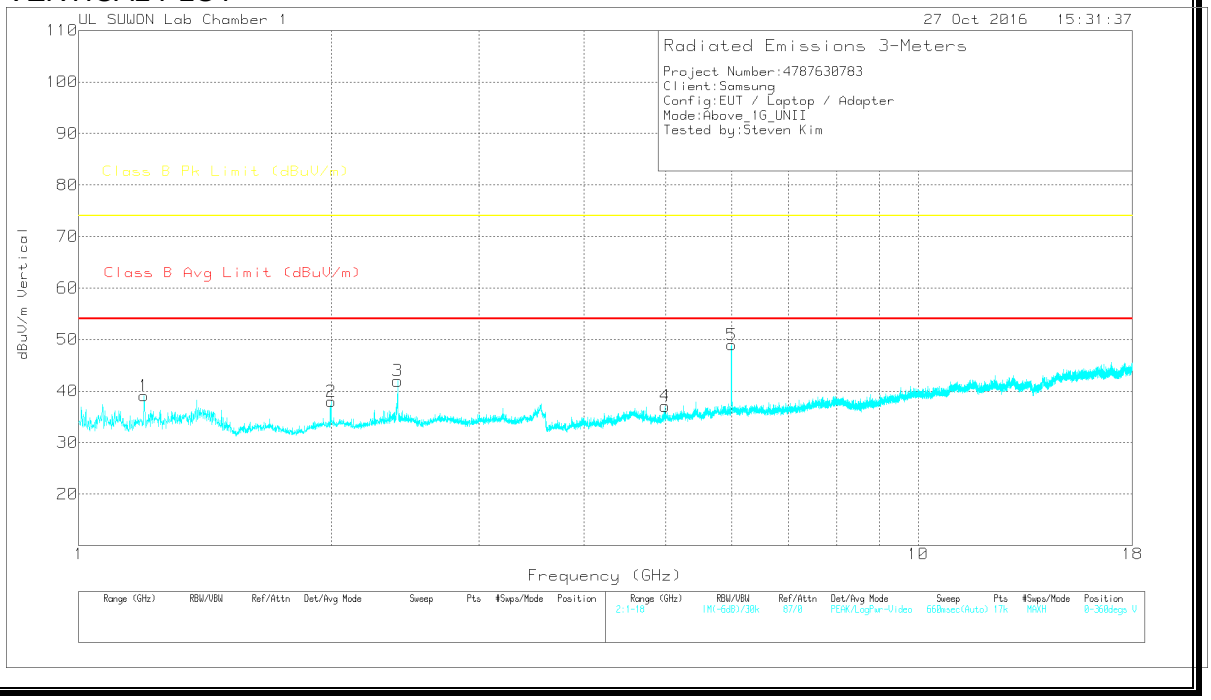
RADIATED EMISSIONS 1GHz to 18GHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	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
6	5.999	40.55	PK	34.9	-32.1	43.35	-	-	74	-30.65	0-360	100	H
1	1.196	50.64	PK	28.3	-39.9	39.04	-	-	74	-34.96	0-360	200	V
2	1.999	45.7	PK	31.1	-38.8	38	-	-	74	-36	0-360	100	V
3	2.398	48.56	PK	31.8	-38.4	41.96	-	-	74	-32.04	0-360	200	V
4	4.995	37.17	PK	34.1	-34.2	37.07	-	-	74	-36.93	0-360	100	V
5	5.998	46.19	PK	34.9	-32.1	48.99	-	-	74	-25.01	0-360	100	V

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	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
1.194	57.63	Pk	28.3	-39.9	46.03	-	-	74	-27.97	230	285	V
1.194	40.09	Av	28.3	-39.9	28.49	54	-25.51	-	-	230	285	V
1.998	57.9	Pk	31.1	-38.8	50.2	-	-	74	-23.8	172	298	V
1.998	37.21	Av	31.1	-38.8	29.51	54	-24.49	-	-	172	298	V
2.4	56.02	Pk	31.8	-38.4	49.42	-	-	74	-24.58	18	312	V
2.4	36.92	Av	31.8	-38.4	30.32	54	-23.68	-	-	18	312	V
4.994	46.84	Pk	34.1	-34.2	46.74	-	-	74	-27.26	90	125	V
4.994	30.36	Av	34.1	-34.2	30.26	54	-23.74	-	-	90	125	V
5.998	59.92	Pk	34.9	-32.1	62.72	-	-	74	-11.28	80	117	V
5.998	41.4	Av	34.9	-32.1	44.2	54	-9.8	-	-	80	117	V
5.998	47.09	Pk	34.9	-32.1	49.89	-	-	74	-24.11	23	350	H
5.998	31.05	Av	34.9	-32.1	33.85	54	-20.15	-	-	23	350	H

Pk - Peak detector

Av – CISPR Average detection

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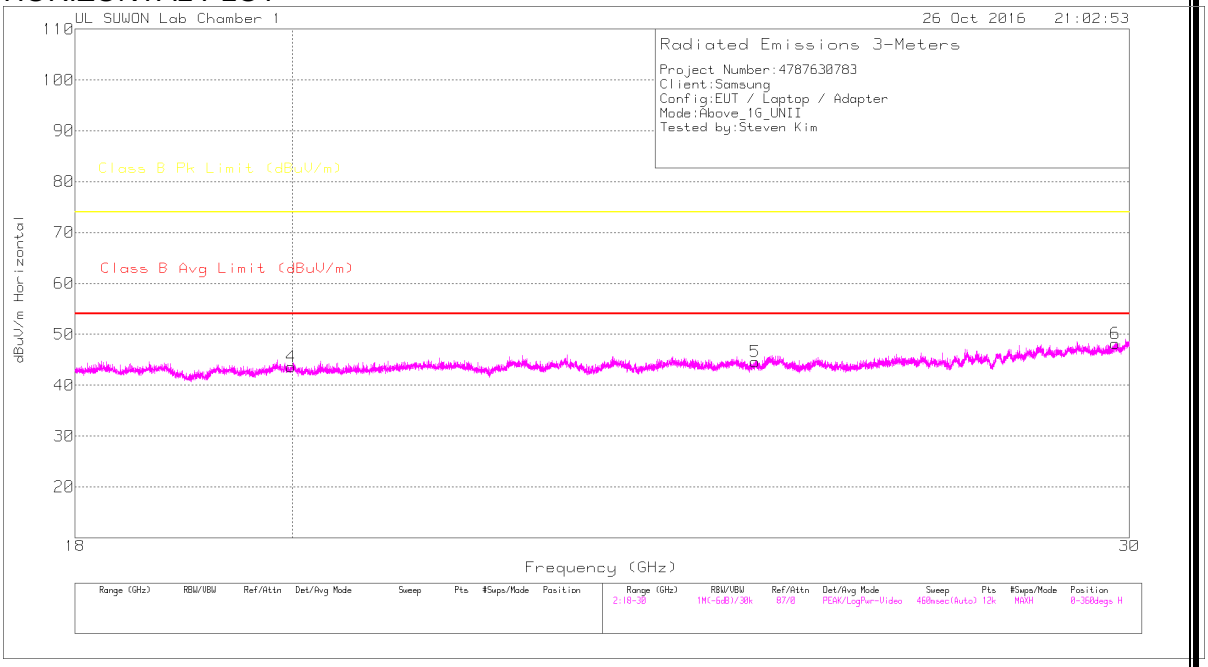
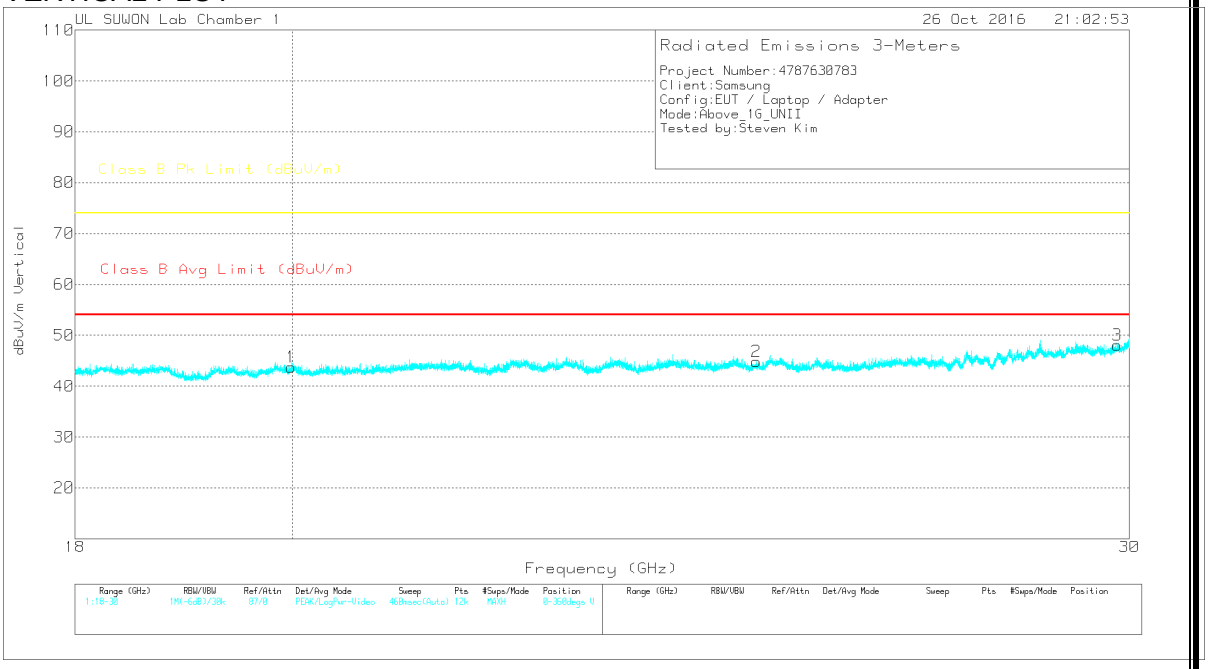
RADIATED EMISSIONS 18GHz to 30GHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

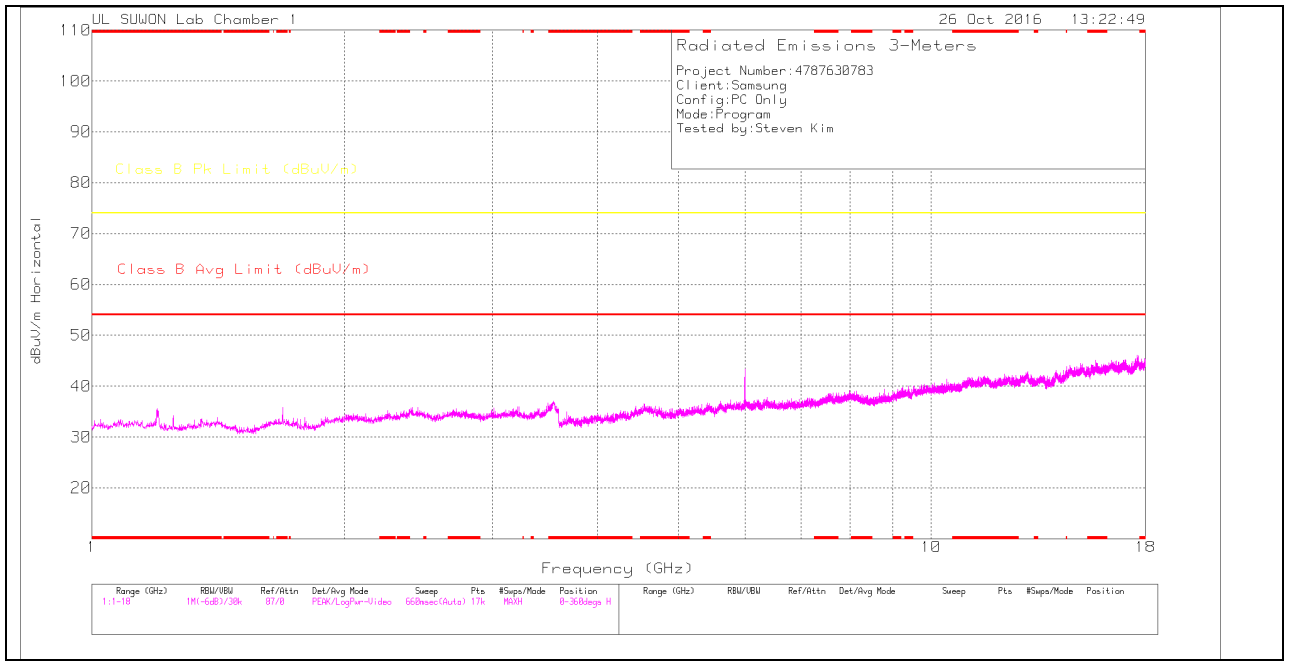
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3116PA	18G-40G	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.986	18.67	PK	7	18.1	43.77	-	-	74	-30.23	0-360	100	V
2	25.038	16.45	PK	7.7	20.7	44.85	-	-	74	-29.15	0-360	100	V
3	29.822	11.54	PK	14.3	22.2	48.04	-	-	74	-25.96	0-360	100	V
4	19.985	18.5	PK	7	18.1	43.6	-	-	74	-30.4	0-360	100	H
5	25.027	16.24	PK	7.7	20.7	44.64	-	-	74	-29.36	0-360	100	H
6	29.795	11.8	PK	14.2	22.2	48.2	-	-	74	-25.8	0-360	100	H

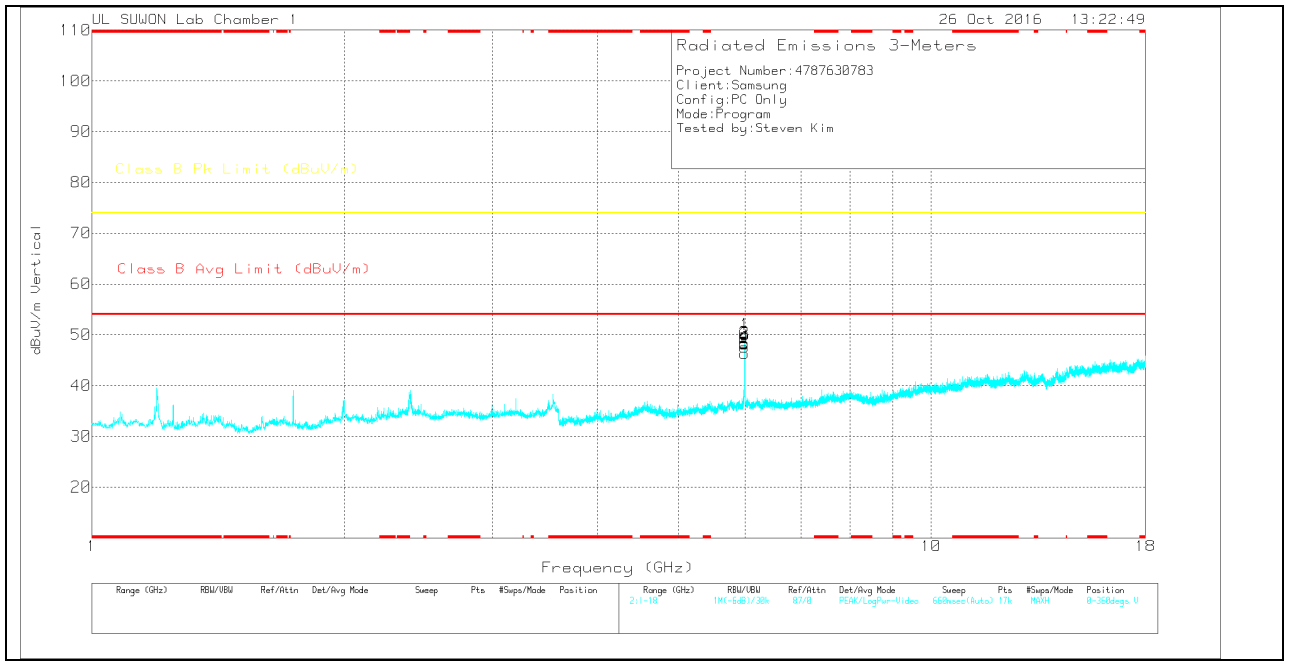
PK – Peak Detector

7.2. RADIATED EMISSIONS LAPTOP STAND ALONE CONDITION

HORIZONTAL



VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	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	5.998	47.3	PK	34.9	-32.1	50.1	-	-	74	-23.9	0-360	100	V
2	5.988	45.61	PK	34.9	-32.2	48.31	-	-	74	-25.69	0-360	200	V
3	5.99	45.79	PK	34.9	-32.2	48.49	-	-	74	-25.51	0-360	100	V
4	5.991	44.83	PK	34.9	-32.2	47.53	-	-	74	-26.47	0-360	100	V
5	5.994	43.55	PK	34.9	-32.1	46.35	-	-	74	-27.65	0-360	100	V
6	5.996	45.36	PK	34.9	-32.1	48.16	-	-	74	-25.84	0-360	100	V

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	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
5.994	56.43	Pk	34.9	-32.1	59.23	-	-	74	-14.77	272	108	V
5.994	38.64	Av	34.9	-32.1	41.44	54	-12.56	-	-	272	108	V

Pk - Peak detector

Av - Average detection

8. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2014

LIMIT

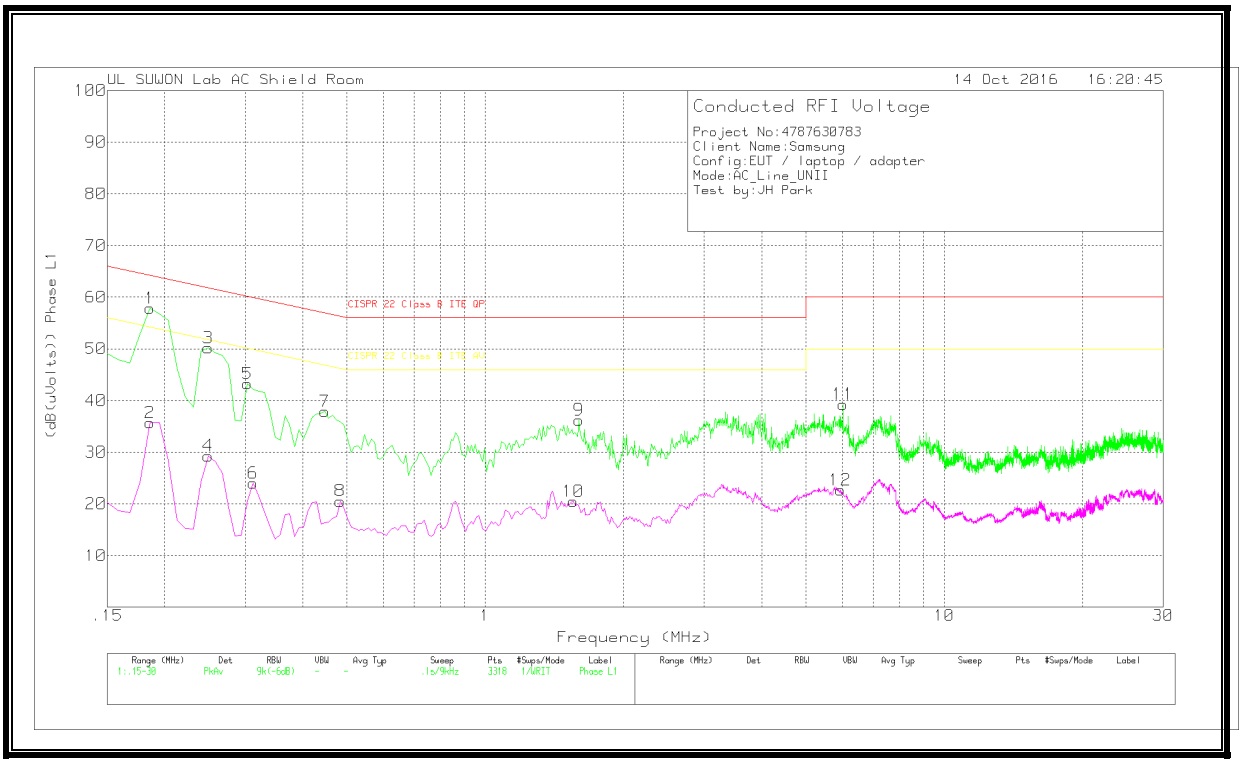
§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits 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

6 WORST EMISSIONS

Line-L1 .15 - 30MHz



LINE 1 RESULTS

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.186	47.76	Pk	10.1	0	57.86	64.21	-6.35	-	-
2	.186	25.62	Av	10.1	0	35.72	-	-	54.21	-18.49
3	.249	40.48	Pk	9.7	0	50.18	61.79	-11.61	-	-
4	.249	19.57	Av	9.7	0	29.27	-	-	51.79	-22.52
5	.303	33.34	Pk	9.9	0	43.24	60.16	-16.92	-	-
6	.312	14.1	Av	9.9	0	24	-	-	49.92	-25.92
7	.447	27.79	Pk	10.1	0	37.89	56.93	-19.04	-	-
8	.483	10.35	Av	10.2	0	20.55	-	-	46.29	-25.74
9	1.599	26.31	Pk	9.8	.1	36.21	56	-19.79	-	-
10	1.554	10.57	Av	9.8	.1	20.47	-	-	46	-25.53
11	6.018	29.25	Pk	9.9	.1	39.25	60	-20.75	-	-
12	5.937	12.65	Av	9.9	.1	22.65	-	-	50	-27.35

Pk - Peak detector

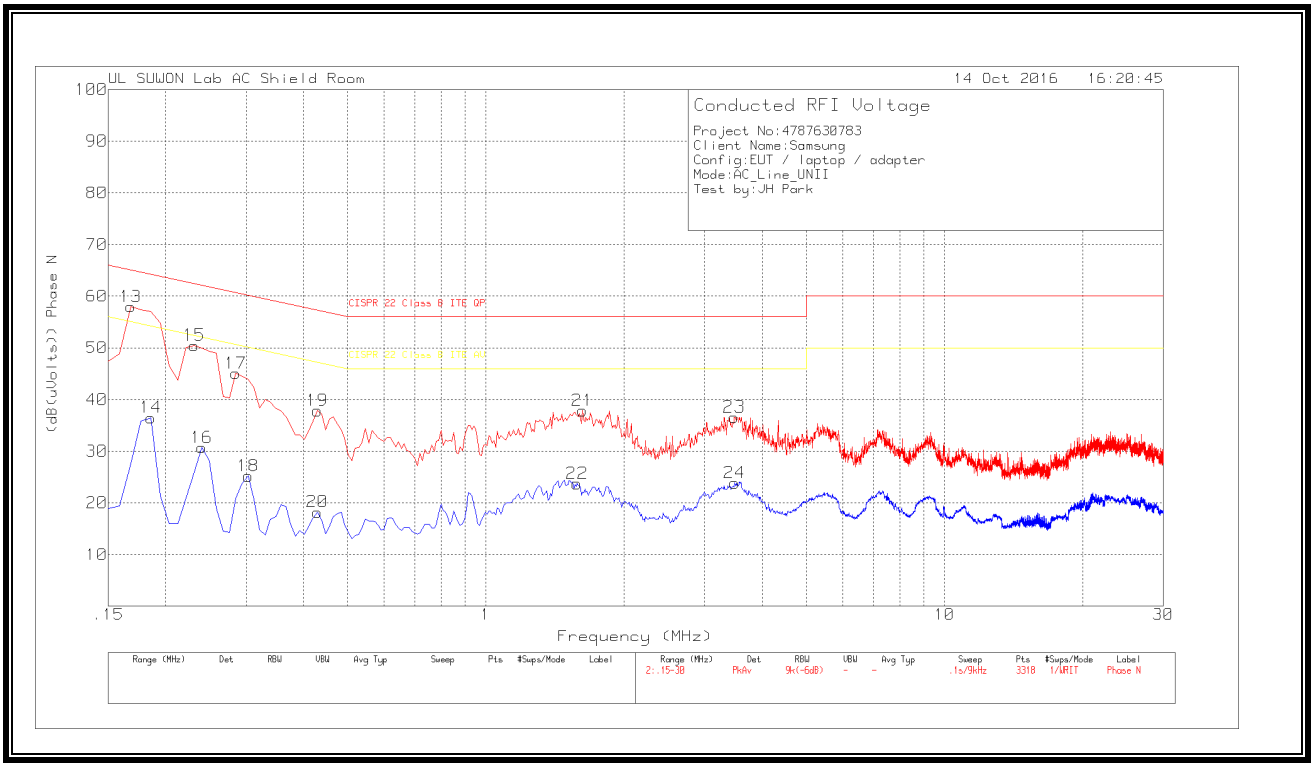
Av - Average detection

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1707	44.2	Qp	10.2	0	54.4	64.93	-10.53	-	-
.2346	25.32	Qp	9.8	0	35.12	62.29	-27.17	-	-
.438	23.79	Qp	10.1	0	33.89	57.1	-23.21	-	-

Qp - Quasi-Peak detector

Line-L2 .15 - 30MHz



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.168	47.79	Pk	10.2	0	57.99	65.06	-7.07	-	-
14	.186	26.5	Av	10	0	36.5	-	-	54.21	-17.71
15	.231	40.67	Pk	9.8	0	50.47	62.41	-11.94	-	-
16	.24	21.01	Av	9.7	0	30.71	-	-	52.1	-21.39
17	.285	35.28	Pk	9.8	0	45.08	60.67	-15.59	-	-
18	.303	15.3	Av	9.9	0	25.2	-	-	50.16	-24.96
19	.429	27.75	Pk	10.1	0	37.85	57.27	-19.42	-	-
20	.429	8.14	Av	10.1	0	18.24	-	-	47.27	-29.03
21	1.626	27.96	Pk	9.8	.1	37.86	56	-18.14	-	-
22	1.581	13.83	Av	9.8	.1	23.73	-	-	46	-22.27
23	3.48	26.71	Pk	9.8	.1	36.61	56	-19.39	-	-
24	3.489	13.96	Av	9.8	.1	23.86	-	-	46	-22.14

Pk - Peak detector

Av - Average detection

Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1869	45.21	Qp	10	0	55.21	64.17	-8.96	-	-
.2517	37.13	Qp	9.7	0	46.83	61.7	-14.87	-	-
.4524	19.88	Qp	10.1	0	29.98	56.83	-26.85	-	-

Qp - Quasi-Peak detector