FCC 47 CFR PART 15 SUBPART B

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE + BLUETOOTH, DTS/UNII a/b/g/n/ac, ANT+ and NFC

FCC ID: PY7-TM0063

REPORT NUMBER: 15J20368-E7
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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/30/15	Initial issue	CHOON OOI

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.

EUT DESCRIPTION: GSM/WCDMA/LTE + BLUETOOTH, DTS/UNII a/b/g/n/ac & ANT+

SERIAL NUMBER: CB5A24PMWK (Radiated)

DATE TESTED: April 20, 2015

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.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☐ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

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	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

This EUT is a GSM/WCDMA/LTE + BLUETOOTH, DTS/UNII a/b/g/n/ac, ANT+ and NFC

AC Adapter Power Requirements	100-300 VAC / 50-60 Hz, 700mA
List of frequencies generated or used by the EUT	2.0GHz (Clock Frequency)

5.2. PRELIMINARY TEST CONFIGURATIONS

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

5.3. MODE(S) OF OPERATION INVESTIGATED

Mode	Description
Idle	Receive mode

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**
Laptop	Lenovo	TP00001A	60Y5028	DoC
Earphone	Samsung	GH59	N/A	DoC
AC Adapter	Samsung	ETA0U10EBE	N/A	N/A
Mouse	Logitech	M-U0026	1304HS02AX68	N/A
Keyboard	Lenovo	KU-0225	54Y9400	N/A
Switch	Netgear	GS108T	29SA3C5T00E79	DoC
SD card	Kingstone	N/A	N/A	DoC
4K TV	Sony	XBR-49X850B	N/A	N/A

I/O CABLES

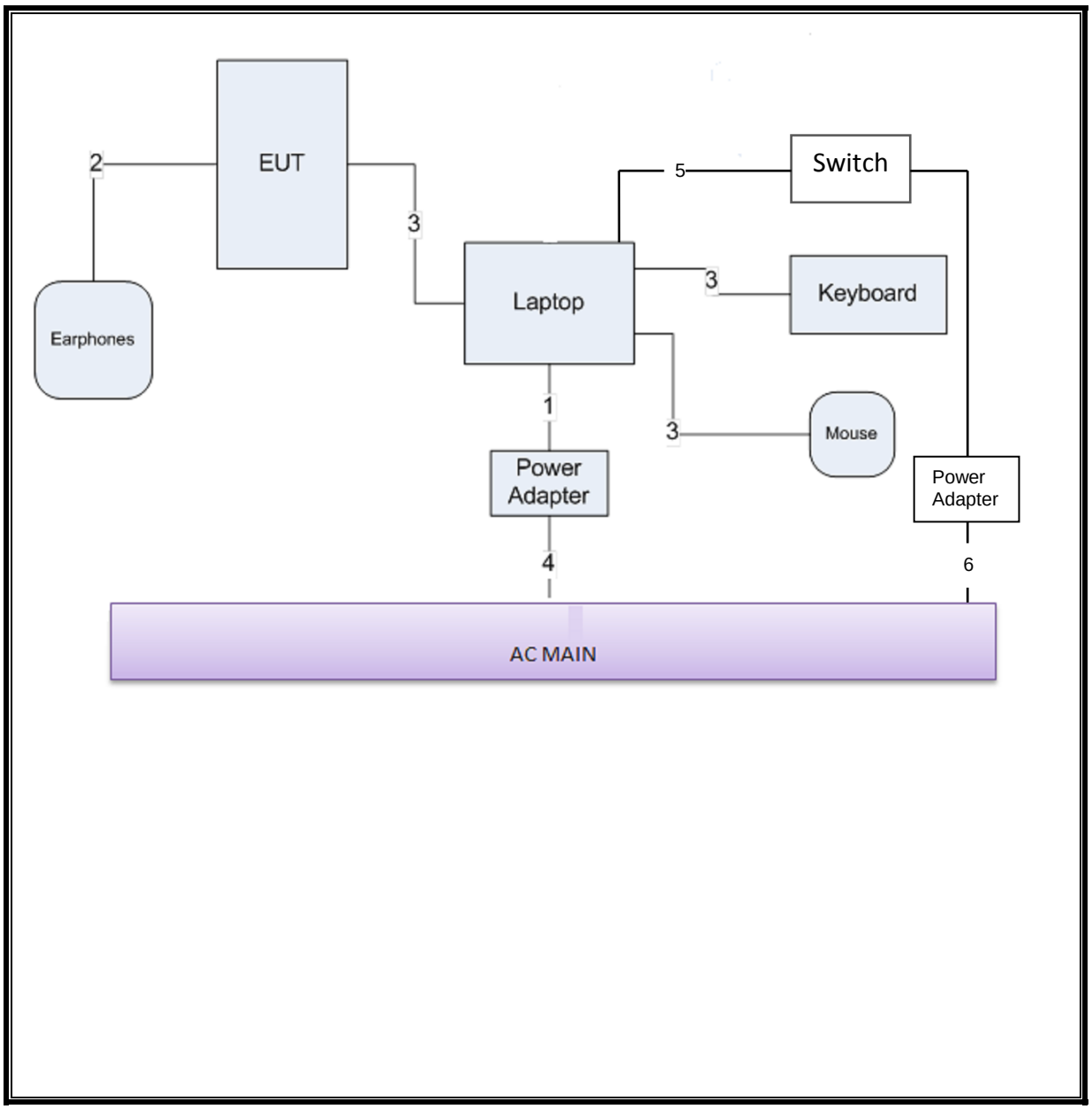
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Power	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A
3	USB	1	Mini-USB	Shielded	2m	N/A
4	AC Power	1	IEC	Unshielded	1m	N/A
5	Ethernet	1	RJ45	Unshielded	2m	N/A
6	MHL HDMI	1	MHL HDMI	Unshielded	3m	N/A

TEST SETUP

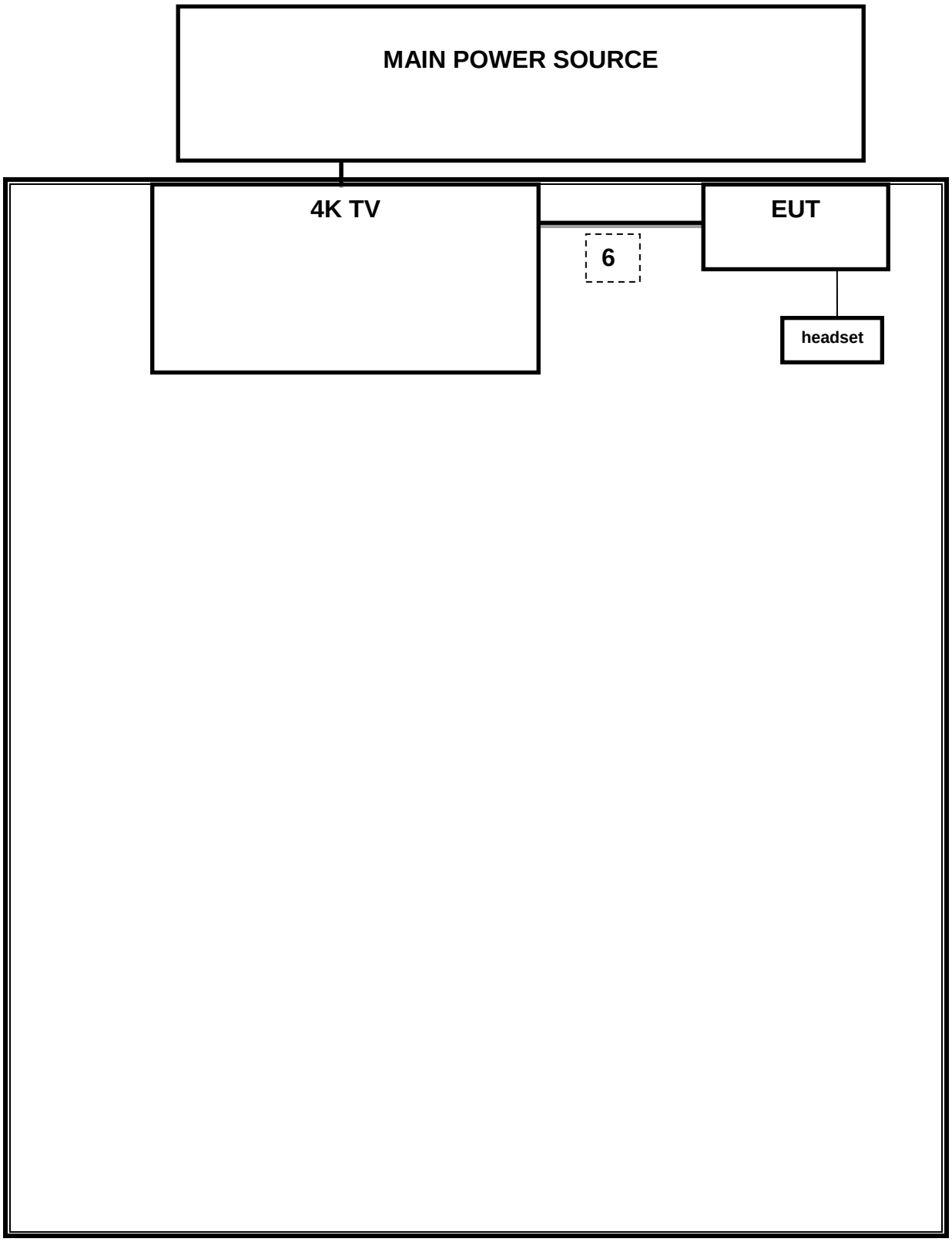
The EUT is installed in a typical configuration. Test software exercised the EUT.

TEST SETUP DIAGRAM

Configuration #1



Configuration #2



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**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/15
F Preamplifier, 100KHz -> 1300MH	HP	TBD	C00825	06/01/15
Antenna, Bilog, 30MHz-1GHz	Sunol Sciences	JB1	A0022704	08/14/15
Preamplifier, 26.5 GHz	Agilent/HP	8449B	3008A00931	10/22/15
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/15
EMI Test Receiver, 30 MHz	R&S	ESHS 20	827129/006	08/08/15
LISN, 30 MHz	FCC	50/250-25-2	114	01/16/16
LISN, 10 kHz-30MHz	Solar	8012-50-R-24-BNC	837990	C.N.R

6. APPLICABLE LIMITS AND TEST RESULTS

6.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2009

The highest clock frequency generated or used in the EUT is 1.0 GHz therefore the frequency range was investigated from 30 MHz to 18 GHz.

LIMIT

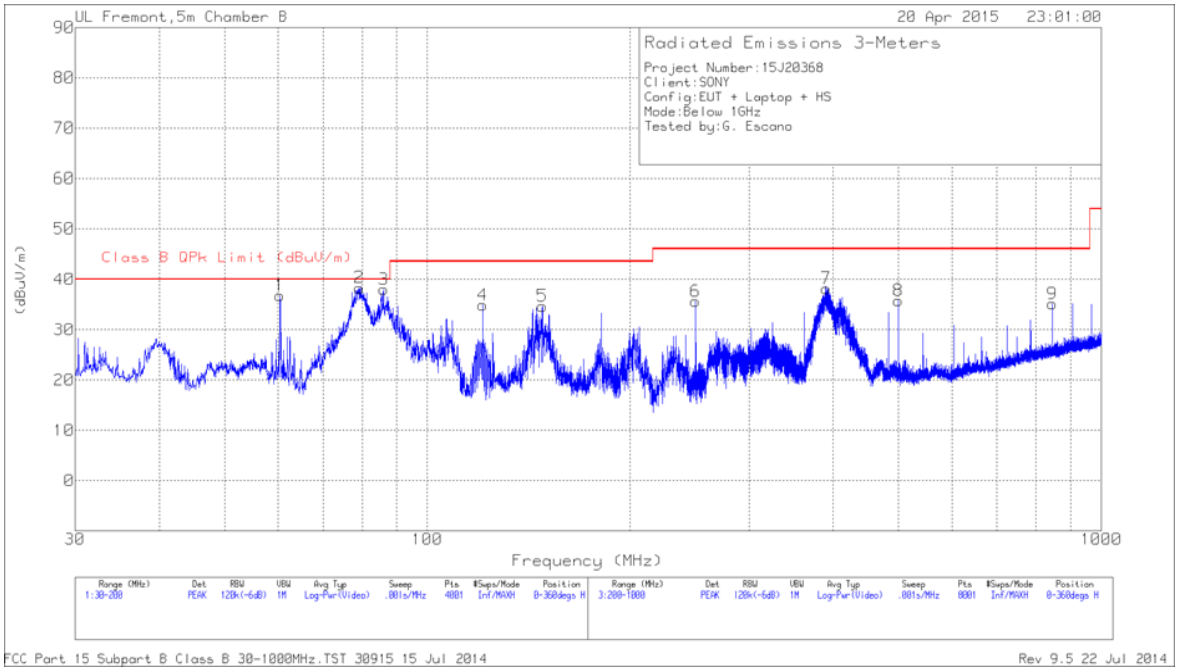
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

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.	

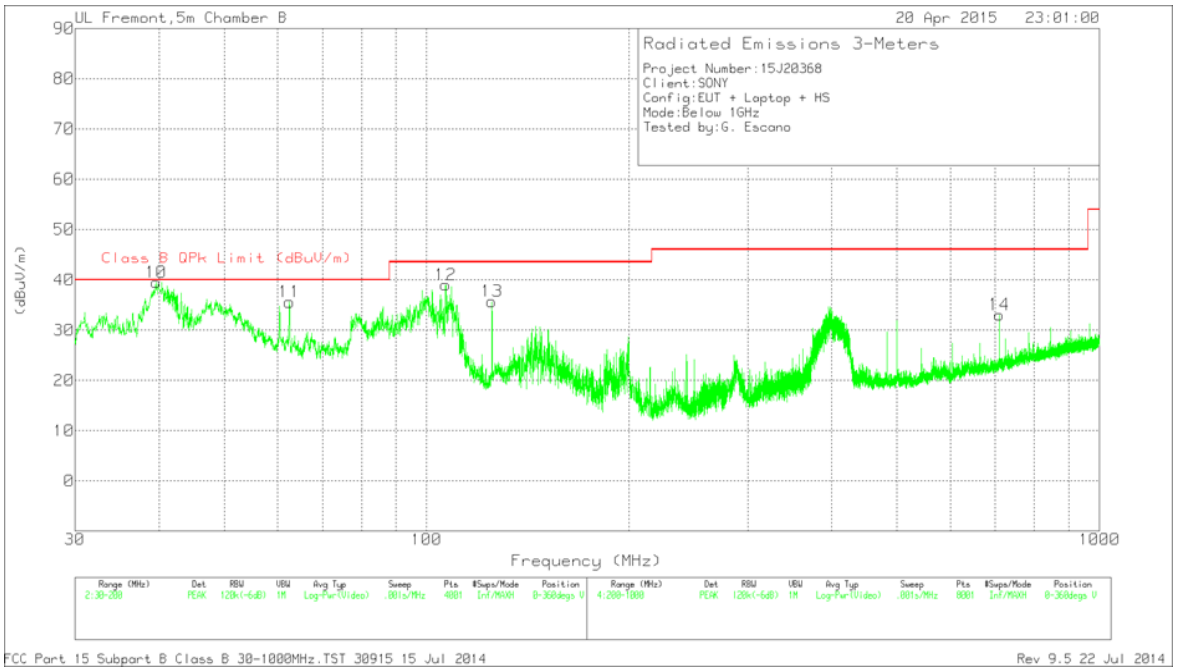
RESULTS

6.1.1. RADIATED EMISSIONS 30 TO 1000 MHz (LAPTOP CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
10	39.605	53.99	PK	14.3	-28.8	39.49	40	-.51	0-360	101	V
1	60.43	57.79	PK	7.5	-28.5	36.79	40	-3.21	0-360	300	H
11	62.5125	56.39	PK	7.7	-28.5	35.59	40	-4.41	0-360	101	V
2	79.3	59.02	PK	7.6	-28.3	38.32	40	-1.68	0-360	400	H
3	86.1	58.92	PK	7.4	-28.3	38.02	40	-1.98	0-360	400	H
12	106.7125	55.02	PK	12	-28	39.02	43.52	-4.5	0-360	101	V
4	120.8225	48.68	PK	14.1	-27.9	34.88	43.52	-8.64	0-360	300	H
13	124.9875	49.31	PK	14.2	-27.8	35.71	43.52	-7.81	0-360	101	V
5	148.1075	49.58	PK	12.6	-27.5	34.68	43.52	-8.84	0-360	200	H
6	250	50.51	PK	11.6	-26.5	35.61	46.02	-10.41	0-360	101	H
7	390.7	48.78	PK	15.3	-25.9	38.18	46.02	-7.84	0-360	101	H
8	500	43.78	PK	17.8	-25.8	35.78	46.02	-10.24	0-360	200	H
14	709.8	37.15	PK	20.4	-24.5	33.05	46.02	-12.97	0-360	200	V
9	845.8	36.61	PK	22	-23.5	35.11	46.02	-10.91	0-360	101	H

PK - Peak detector

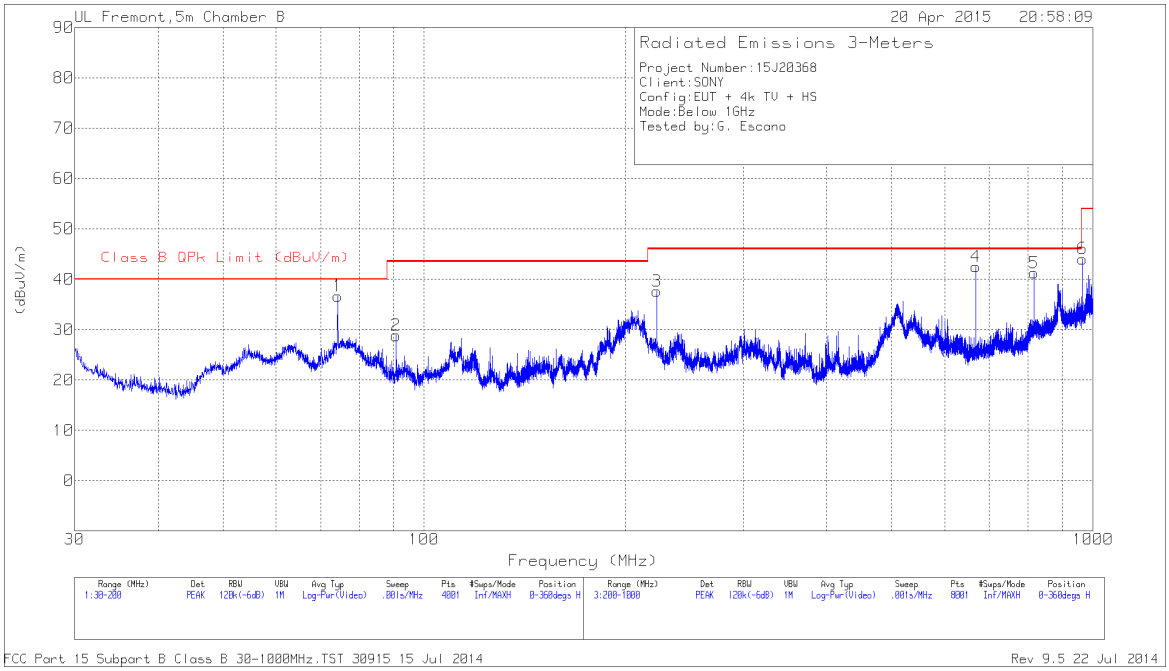
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
39.6573	48.51	QP	14.3	-28.8	34.01	40	-5.99	152	115	V
60.4161	57.44	QP	7.5	-28.5	36.44	40	-3.56	132	384	H
62.5082	51.29	QP	7.7	-28.5	30.49	40	-9.51	300	116	V
79.408	55.3	QP	7.6	-28.3	34.6	40	-5.4	264	229	H
86.0573	54.6	QP	7.4	-28.3	33.7	40	-6.3	273	398	H
106.7379	51.48	QP	12	-28	35.48	43.52	-8.04	282	114	V

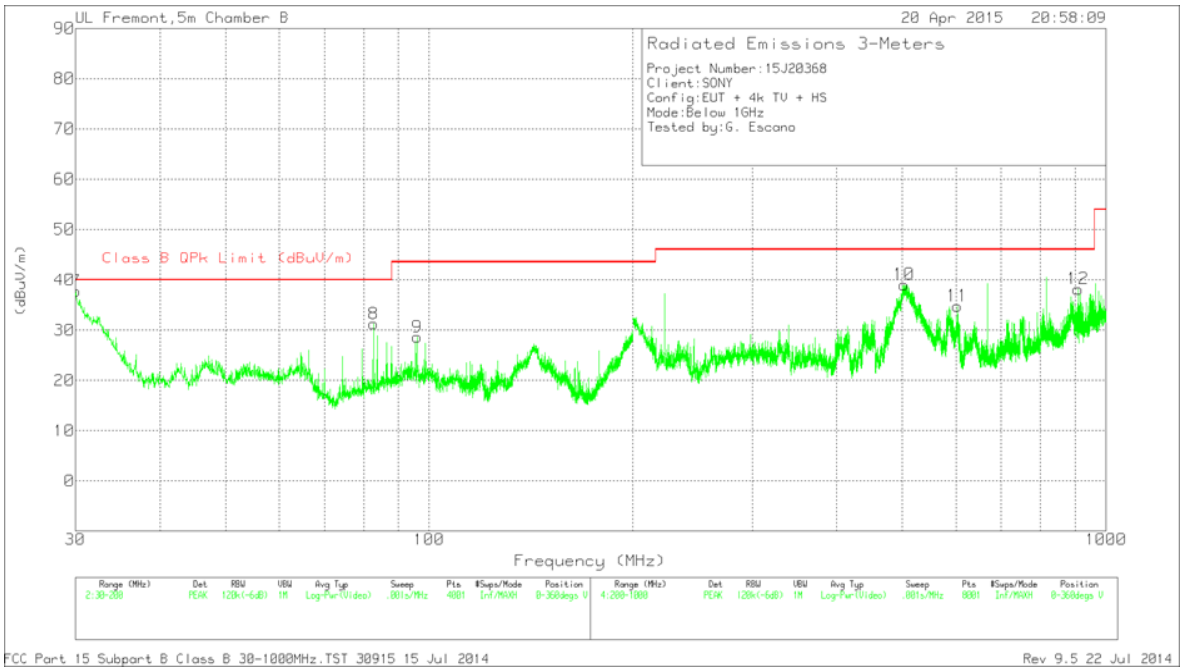
QP - Quasi-Peak detector

6.1.2. RADIATED EMISSIONS 30 TO 1000 MHz (4k TV CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	30.0425	45.96	PK	20.7	-28.9	37.76	40	-2.24	0-360	100	V
1	74.2425	57.07	PK	8	-28.4	36.67	40	-3.33	0-360	400	H
8	82.8275	52.17	PK	7.4	-28.3	31.27	40	-8.73	0-360	100	V
2	90.775	49.15	PK	7.9	-28.2	28.85	43.52	-14.67	0-360	300	H
9	96.0025	47.61	PK	9.1	-28.1	28.61	43.52	-14.91	0-360	100	V
3	222.7	53.52	PK	10.8	-26.7	37.62	46.02	-8.4	0-360	101	H
10	503	47.07	PK	17.8	-25.8	39.07	46.02	-6.95	0-360	101	V
11	603.2	41.39	PK	18.7	-25.3	34.79	46.02	-11.23	0-360	200	V
4	668.3	47.52	PK	19.9	-24.9	42.52	46.02	-3.5	0-360	101	H
5	816.7	43.24	PK	21.7	-23.7	41.24	46.02	-4.78	0-360	101	H
12	909.3	38.6	PK	22.5	-22.9	38.2	46.02	-7.82	0-360	101	V
6	965.2	43.47	PK	23	-22.4	44.07	53.97	-9.9	0-360	200	H

PK - Peak detector

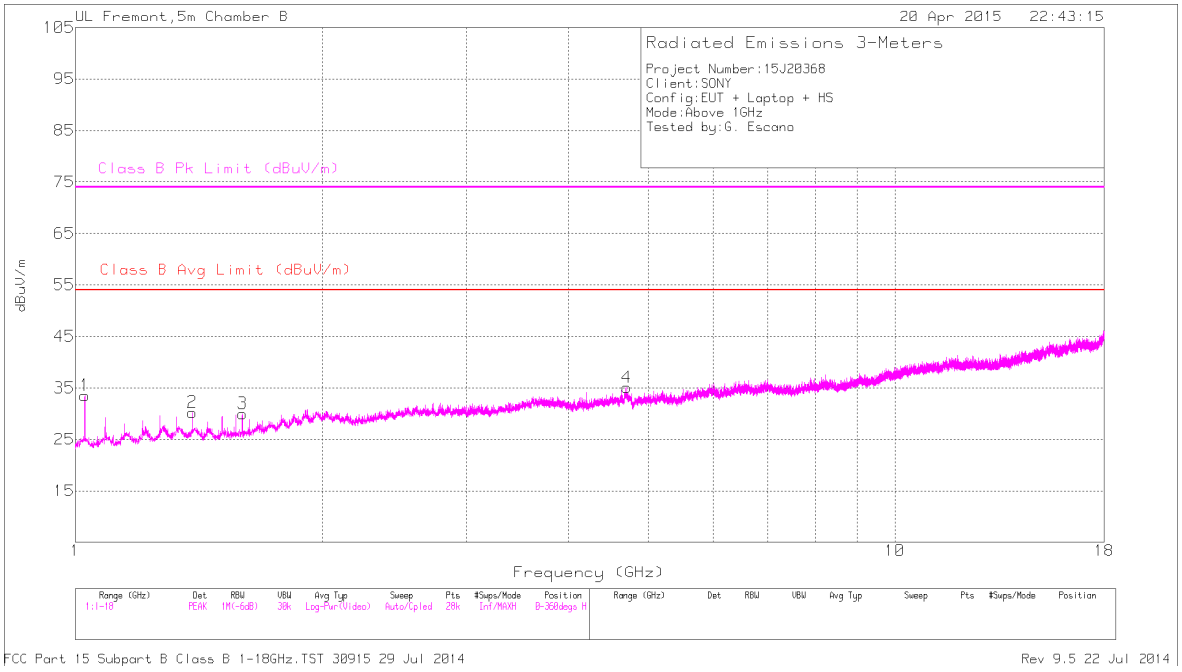
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.0184	32.14	QP	20.7	-28.9	23.94	40	-16.06	174	103	V
74.4614	45.27	QP	8	-28.4	24.87	40	-15.13	247	244	H
668.2554	22.58	QP	19.9	-24.9	17.58	46.02	-28.44	304	122	H
816.8454	22.37	QP	21.7	-23.7	20.37	46.02	-25.65	357	337	H

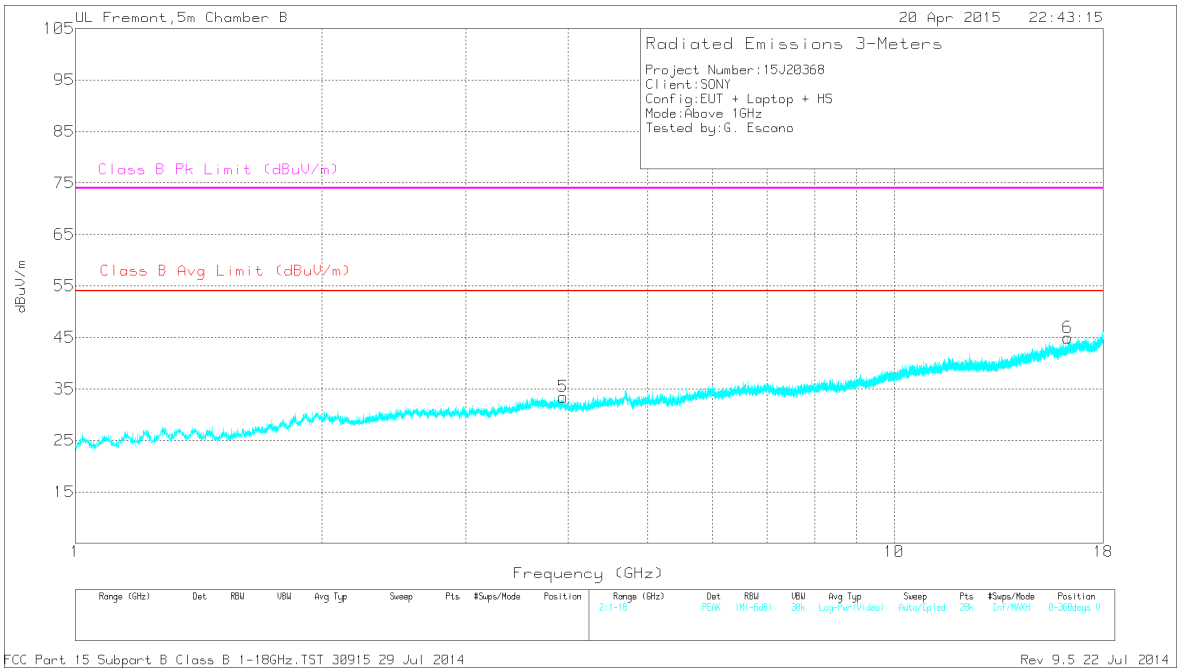
QP - Quasi-Peak detector

6.1.3. RADIATED EMISSIONS 1GHz to 18GHz (LAPTOP CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



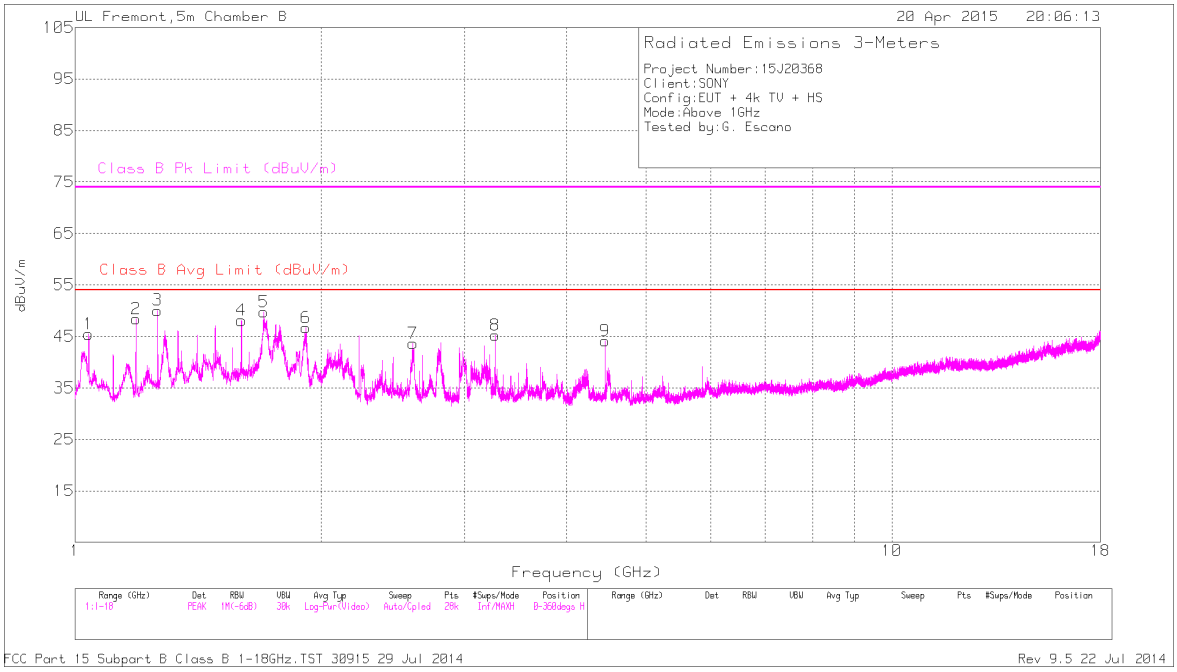
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl (dB)	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	1.027	40.62	PK	27.4	-34.5	33.52	-	-	74	-40.48	0-360	199	H
2	1.389	34.85	PK	29.4	-34	30.25	-	-	74	-43.75	0-360	199	H
3	1.599	34.71	PK	28.8	-33.5	30.01	-	-	74	-43.99	0-360	101	H
5	3.943	31.26	PK	33.4	-31.2	33.46	-	-	74	-40.54	0-360	199	V
4	4.709	31.7	PK	34.2	-30.8	35.1	-	-	74	-38.9	0-360	101	H
6	16.286	25.05	PK	41.1	-21.2	44.95	-	-	74	-29.05	0-360	199	V

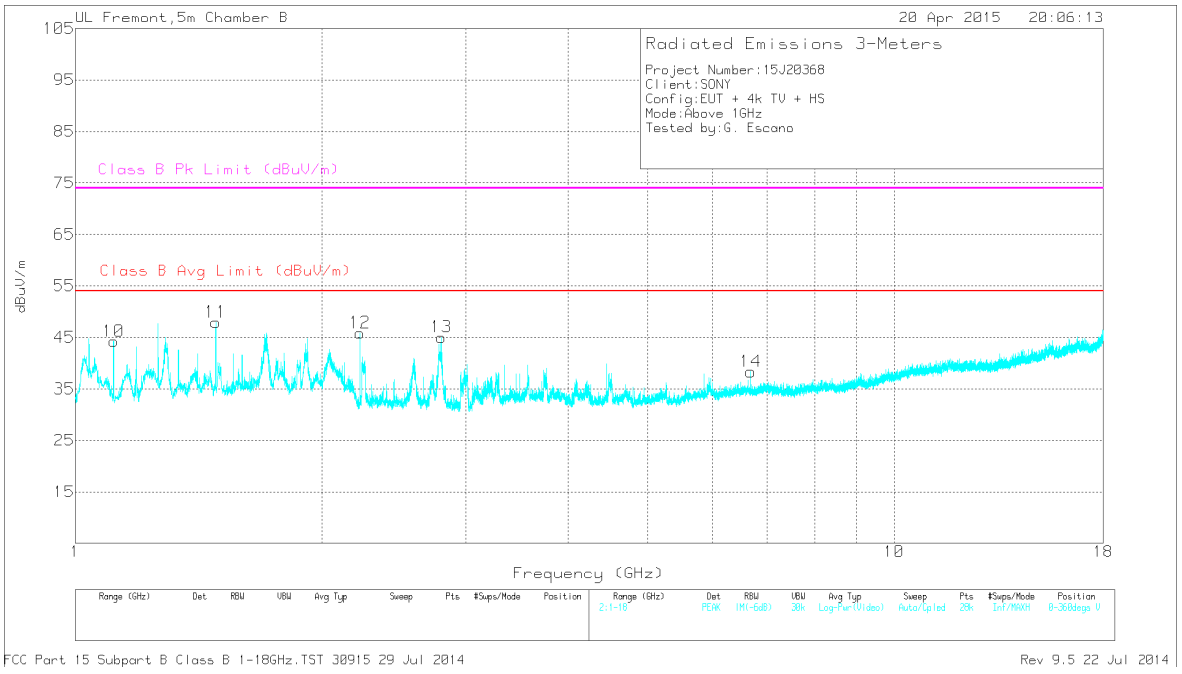
PK - Peak detector

6.1.4. RADIATED EMISSIONS 1GHz to 18GHz (4k TV CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl (dB)	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	1.039	52.44	PK	27.4	-34.4	45.44	-	-	74	-28.56	0-360	101	H
10	1.114	50.76	PK	27.7	-34.2	44.26	-	-	74	-29.74	0-360	101	V
2	1.188	54.11	PK	28.4	-34.1	48.41	-	-	74	-25.59	0-360	199	H
3	1.262	55.16	PK	29.1	-34.2	50.06	-	-	74	-23.94	0-360	101	H
11	1.485	53.15	PK	28.7	-33.9	47.95	-	-	74	-26.05	0-360	199	V
4	1.599	52.82	PK	28.8	-33.5	48.12	-	-	74	-25.88	0-360	101	H
5	1.703	53.23	PK	29.8	-33.3	49.73	-	-	74	-24.27	0-360	101	H
6	1.916	48	PK	31.9	-33.2	46.7	-	-	74	-27.3	0-360	199	H
12	2.228	47.59	PK	31.2	-32.9	45.89	-	-	74	-28.11	0-360	101	V
7	2.593	43.02	PK	32.8	-32.2	43.62	-	-	74	-30.38	0-360	101	H
13	2.8	44.55	PK	32.6	-32.1	45.05	-	-	74	-28.95	0-360	199	V
8	3.267	44.24	PK	32.6	-31.6	45.24	-	-	74	-28.76	0-360	101	H
9	4.454	41.01	PK	33.9	-30.8	44.11	-	-	74	-29.89	0-360	199	H
14	6.682	31.35	PK	35.9	-28.9	38.35	-	-	74	-35.65	0-360	101	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl (dB)	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
1.262	42.61	Av	29.1	-34.2	37.51	54	-16.49	74	-36.49	293	125	H

Av - average detection

6.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4: 2009

LIMIT

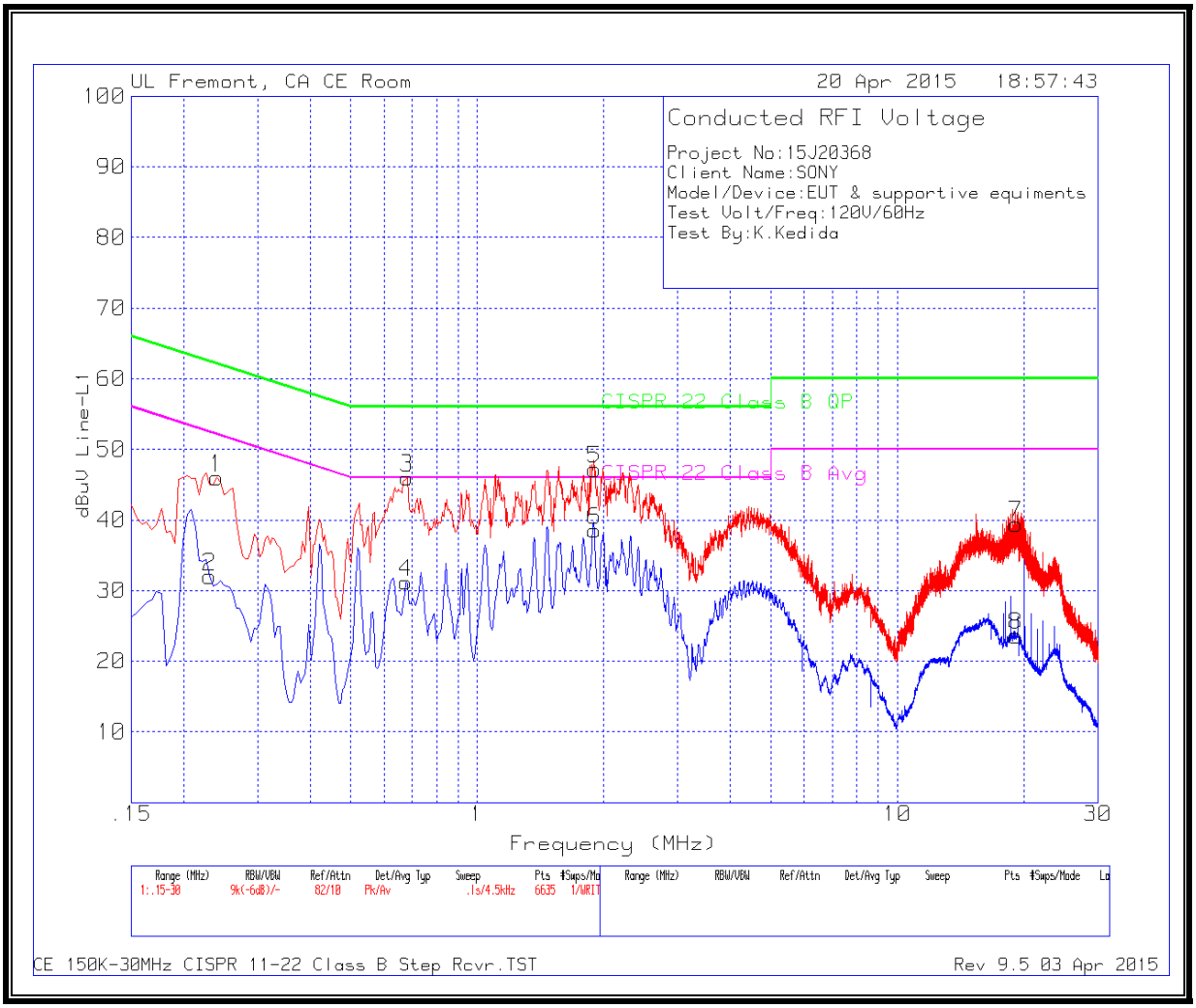
§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits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

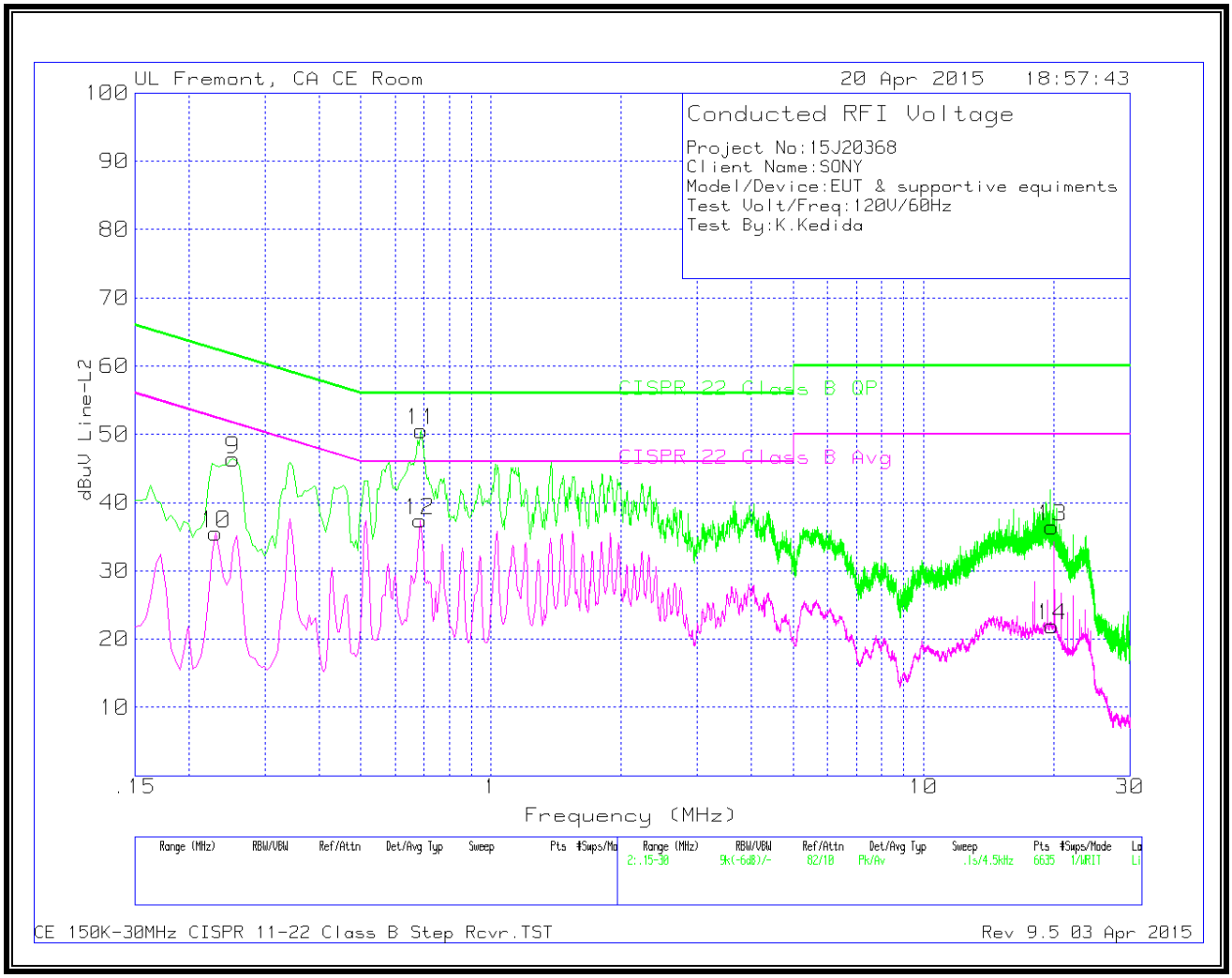
RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz



Line-L2 .15 - 30MHz



RESULTS

Trace Markers

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.24	45.29	Pk	.7	0	45.99	62.1	-16.11	-	-
2	.231	31.2	Av	.8	0	32	-	-	52.41	-20.41
3	.681	45.66	Pk	.3	0	45.96	56	-10.04	-	-
4	.6765	30.88	Av	.3	0	31.18	-	-	46	-14.82
5	1.9005	46.91	Pk	.2	.1	47.21	56	-8.79	-	-
6	1.9005	38.25	Av	.2	.1	38.55	-	-	46	-7.45
7	19.1265	38.91	Pk	.3	.2	39.41	60	-20.59	-	-
8	19.167	23.14	Av	.3	.2	23.64	-	-	50	-26.36

Pk - Peak detector

Av - Average detection

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
9	.2535	45.66	Pk	.7	0	46.36	61.64	-15.28	-	-
10	.231	34.69	Av	.8	0	35.49	-	-	52.41	-16.92
11	.69	50.26	Pk	.3	0	50.56	56	-5.44	-	-
12	.6855	37.1	Av	.3	0	37.4	-	-	46	-8.6
13	19.833	35.92	Pk	.3	.2	36.42	60	-23.58	-	-
14	19.8195	21.43	Av	.3	.2	21.93	-	-	50	-28.07

Pk - Peak detector

Av - Average detection