



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-PM0791

REPORT NUMBER: 15J20225-E8

ISSUE DATE: MAY 05, 2015

**Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/05/15	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+ and NFC

SERIAL NUMBER: CB5A24D6BL (Radiated)

DATE TESTED: April 28 - 29, 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	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

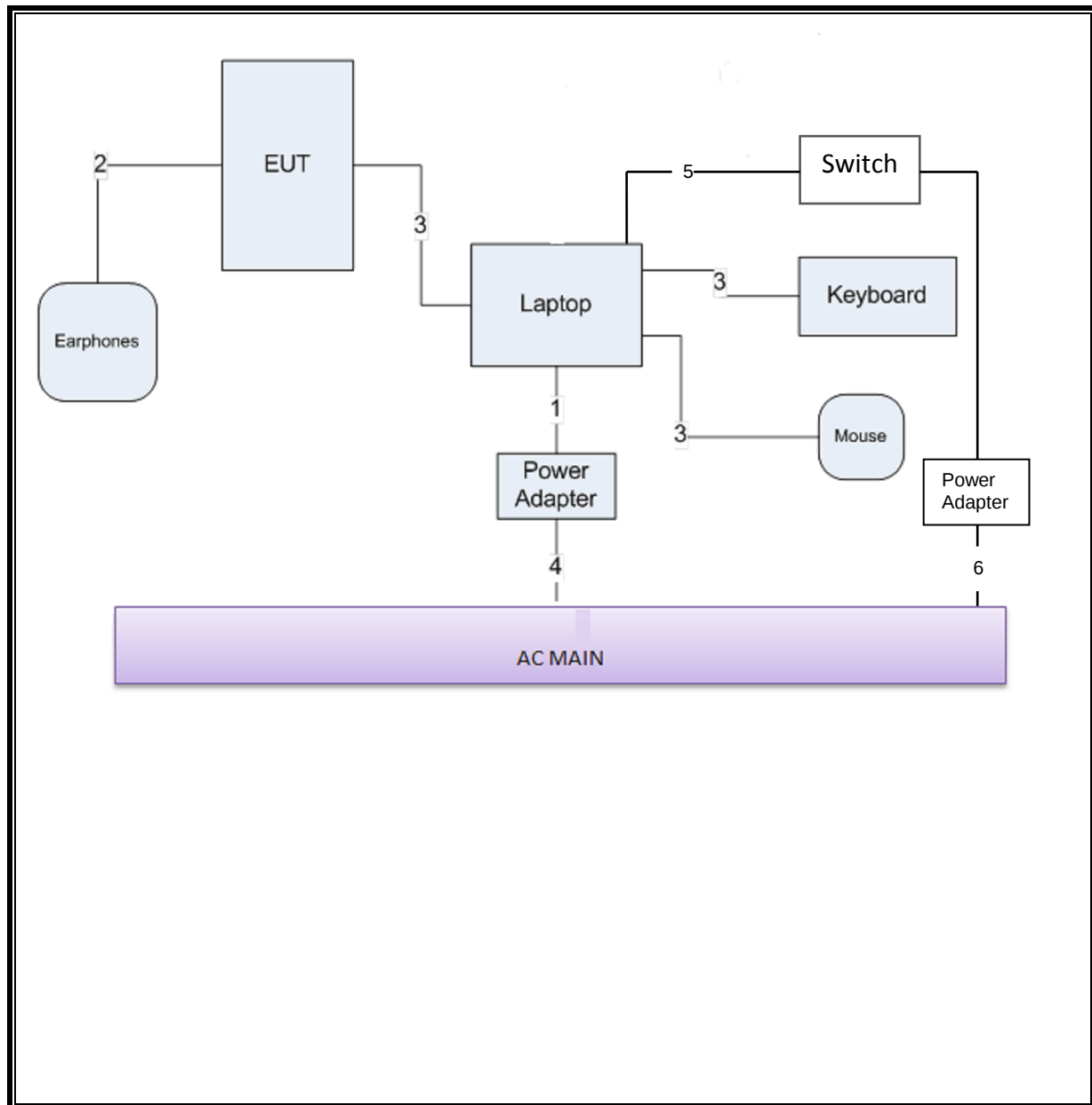
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Power	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A
3	USB	1	Mini-USB	Shielded	2m	N/A
4	AC Power	1	IEC	Unshielded	1m	N/A
5	Ethernet	1	RJ45	Unshielded	2m	N/A
6	MHL HDMI	1	MHL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

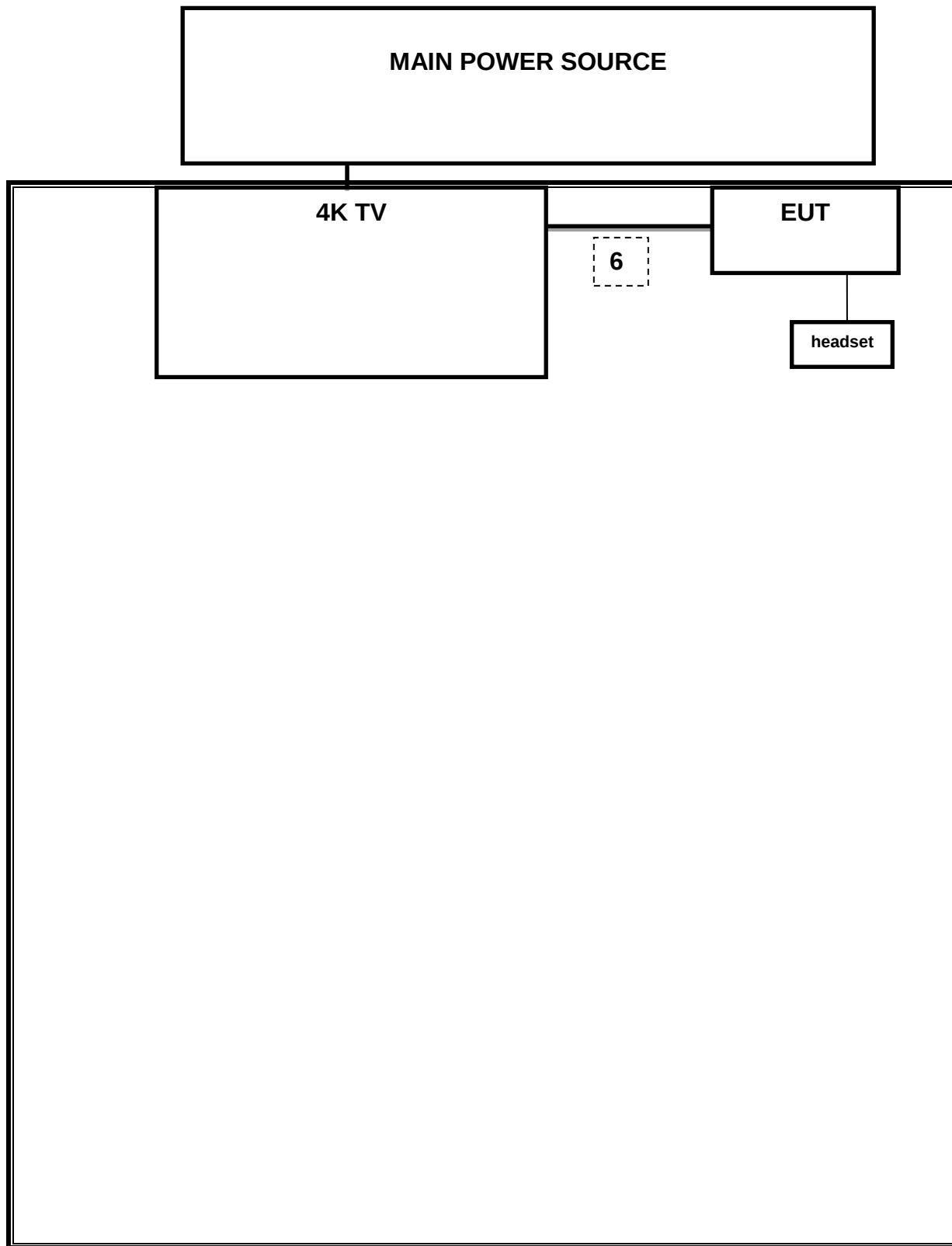
TEST SETUP

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

TEST SETUP DIAGRAM

Configuration #1





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
Preamplifier, 100KHz -> 1300MHz	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.

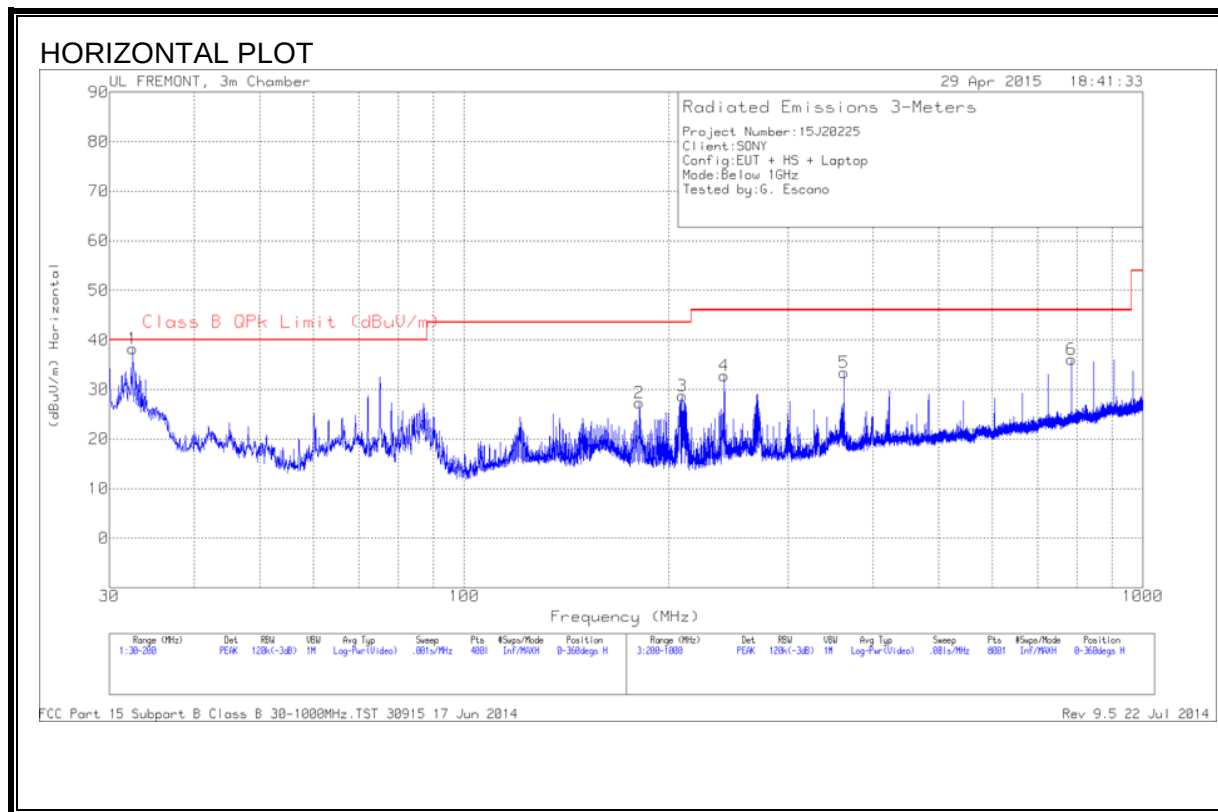
LIMIT

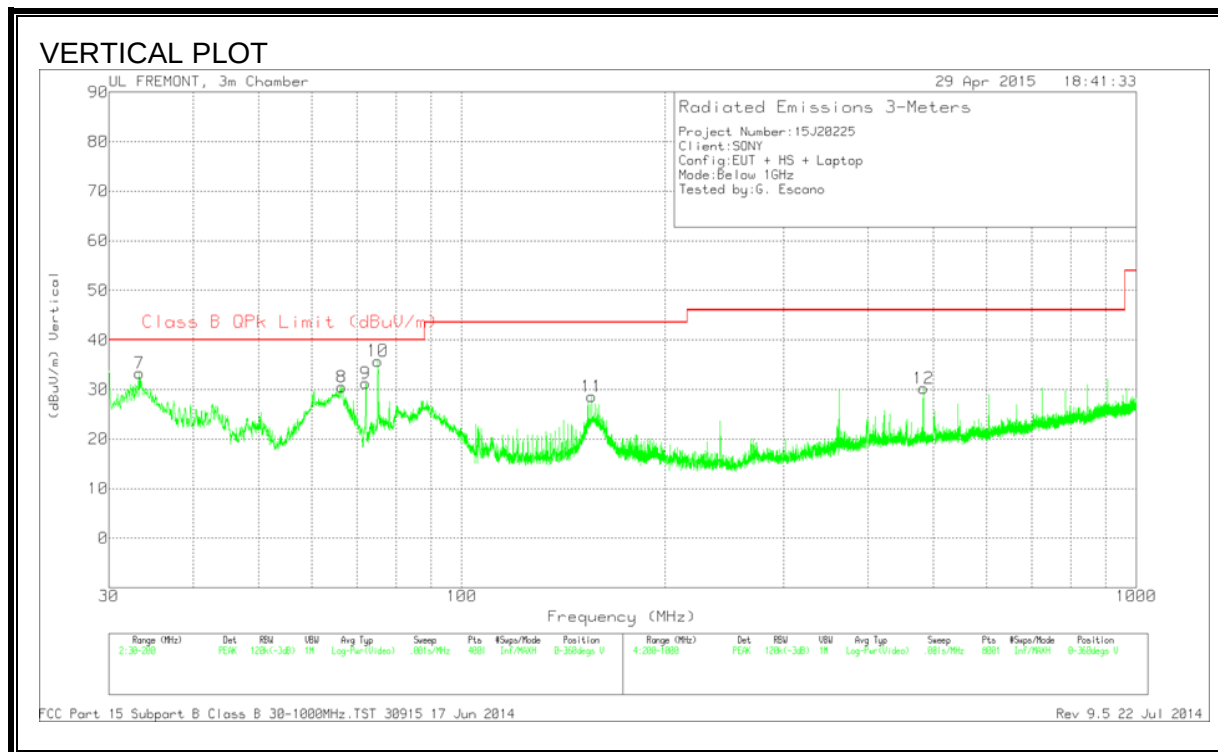
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/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)





Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.465	45.7	PK	20	-27.5	38.2	40	-1.8	0-360	100	H
7	33.2725	41.44	PK	19.3	-27.5	33.24	40	-6.76	0-360	100	V
8	66.465	49.56	PK	8.1	-27.1	30.56	40	-9.44	0-360	100	V
9	72.075	50.01	PK	8.4	-27.1	31.31	40	-8.69	0-360	100	V
10	75.0925	54.37	PK	8.4	-27	35.77	40	-4.23	0-360	100	V
11	155.885	42.8	PK	12	-26.2	28.6	43.52	-14.92	0-360	100	V
2	181.215	42.35	PK	11	-26	27.35	43.52	-16.17	0-360	200	H
3	209.7	43.97	PK	10.4	-25.7	28.67	43.52	-14.85	0-360	100	H
4	241.65	46.73	PK	11.5	-25.4	32.83	46.02	-13.19	0-360	100	H
5	362.5	44.05	PK	14.8	-25.4	33.45	46.02	-12.57	0-360	100	H
12	483.3	38.4	PK	17.6	-25.8	30.2	46.02	-15.82	0-360	200	V
6	785.4	39.99	PK	20.8	-24.7	36.09	46.02	-9.93	0-360	100	H

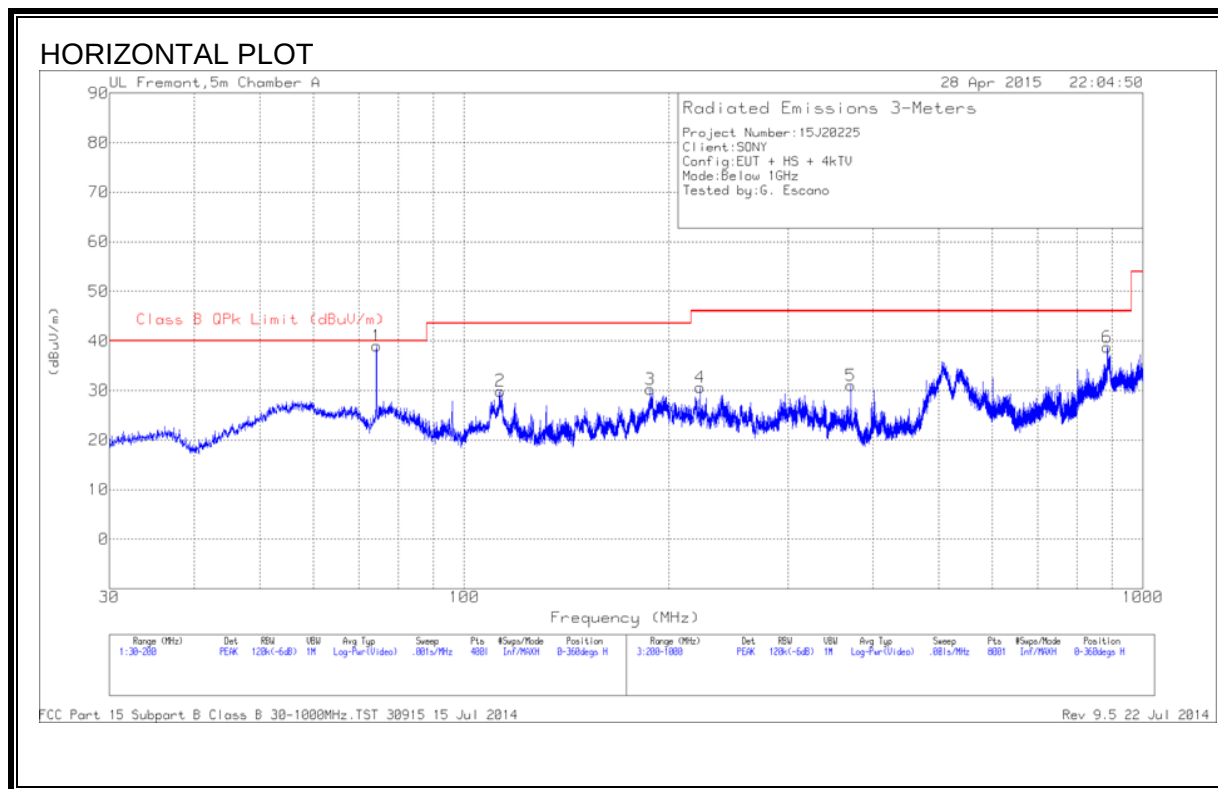
PK - Peak detector

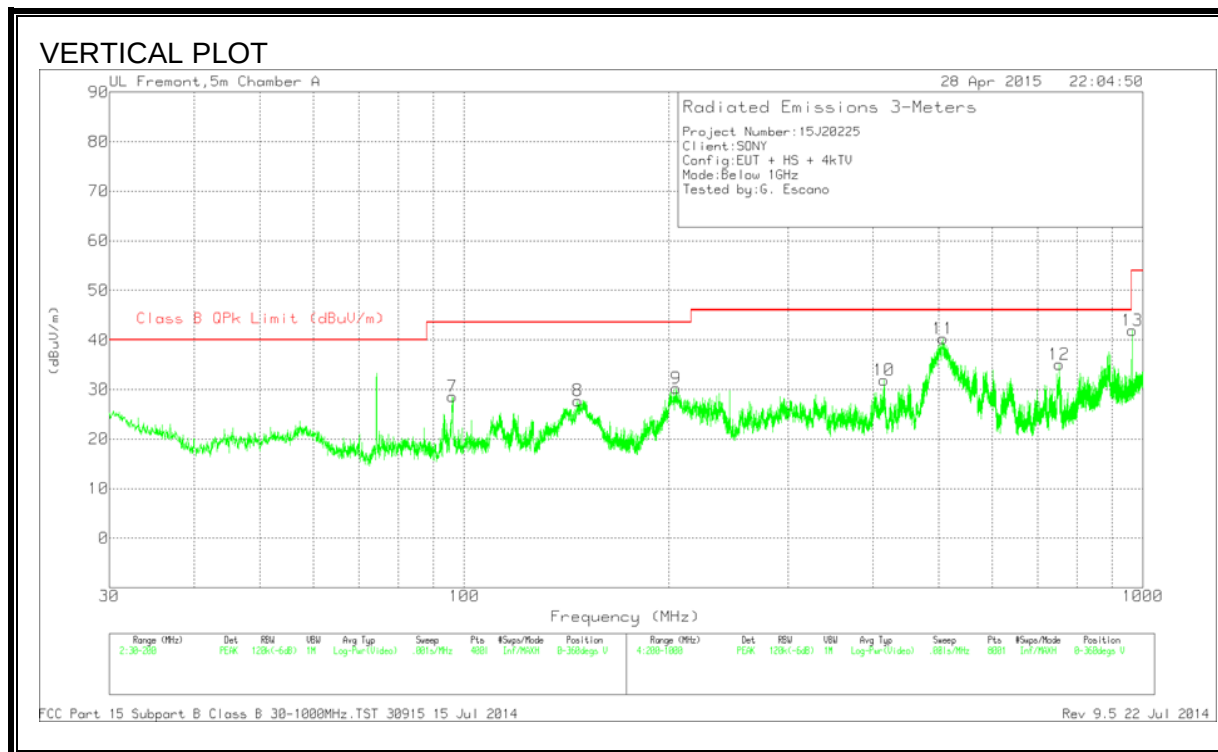
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
32.5084	29.53	QP	19.9	-27.5	21.93	40	-18.07	16	276	H
75.0949	53.57	QP	8.4	-27	34.97	40	-5.03	97	125	V

QP - Quasi-Peak detector

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





Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	74.2425	61.96	PK	7.8	-30.8	38.96	40	-1.04	0-360	400	H
7	96.0875	50.29	PK	8.9	-30.6	28.59	43.52	-14.93	0-360	101	V
2	112.9175	47.43	PK	13	-30.5	29.93	43.52	-13.59	0-360	200	H
8	146.9175	45.07	PK	12.9	-30.2	27.77	43.52	-15.75	0-360	101	V
3	188.1	48.7	PK	11.5	-30	30.2	43.52	-13.32	0-360	101	H
9	205.3	48.74	PK	11.4	-29.9	30.24	43.52	-13.28	0-360	200	V
4	222.7	49.66	PK	10.8	-29.8	30.66	46.02	-15.36	0-360	101	H
5	371.2	45.33	PK	14.8	-29.1	31.03	46.02	-14.99	0-360	101	H
10	415.3	45.1	PK	15.8	-29	31.9	46.02	-14.12	0-360	101	V
11	507.9	51.25	PK	17.6	-28.6	40.25	46.02	-5.77	0-360	101	V
12	753	42.42	PK	20.7	-28.1	35.02	46.02	-11	0-360	200	V
6	886.6	43.91	PK	22.2	-27.4	38.71	46.02	-7.31	0-360	101	H
13	965.3	46.01	PK	22.7	-26.8	41.91	53.97	-12.06	0-360	101	V

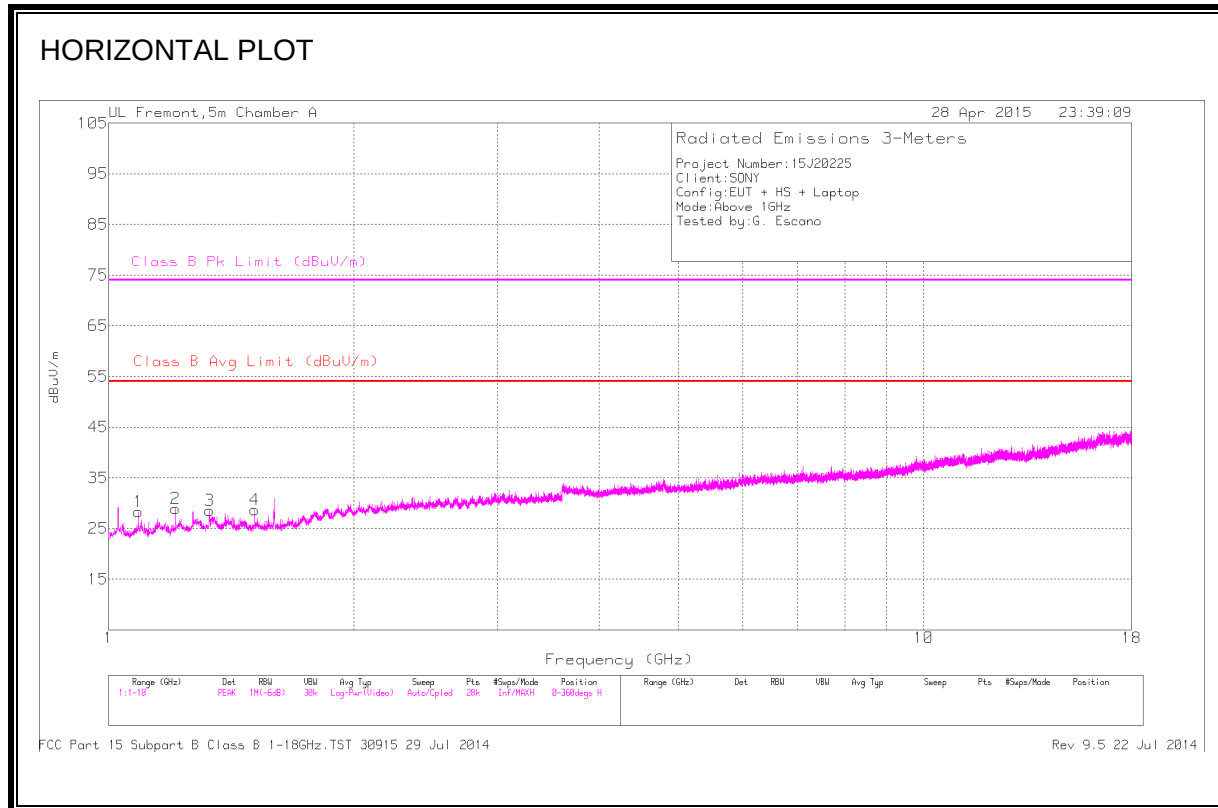
PK - Peak detector

Radiated Emissions

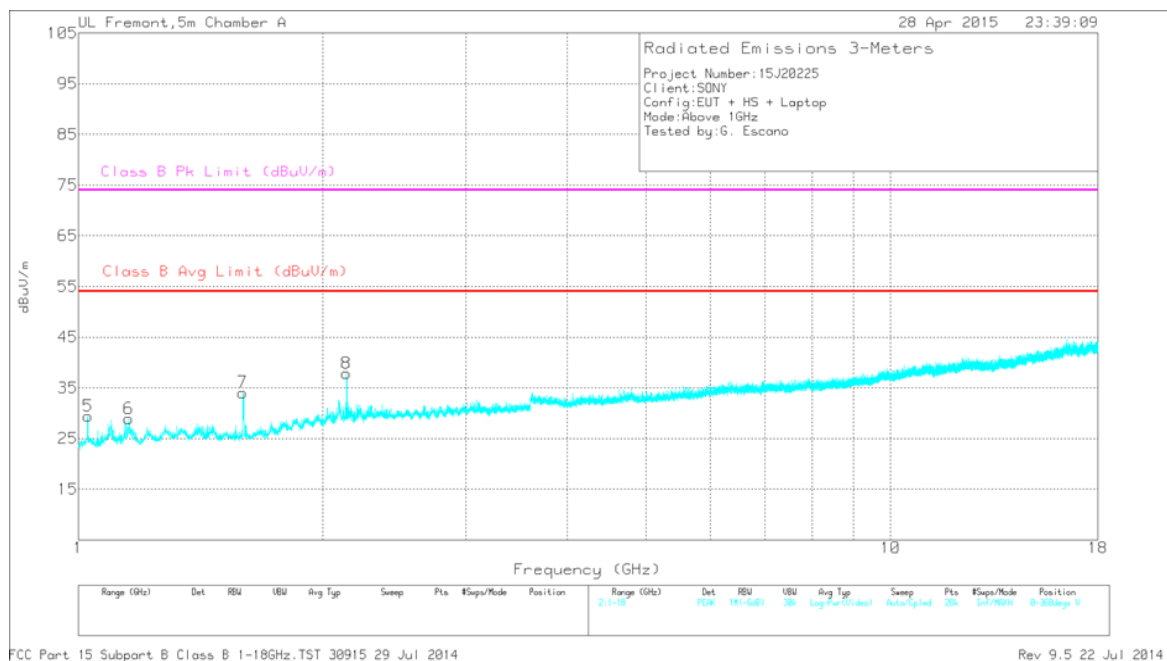
Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
74.254	61.87	QP	7.8	-30.8	38.87	40	-1.13	145	397	H
507.7939	47.54	QP	17.6	-28.6	36.54	46.02	-9.48	298	108	V

QP - Quasi-Peak detector

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



VERTICAL PLOT

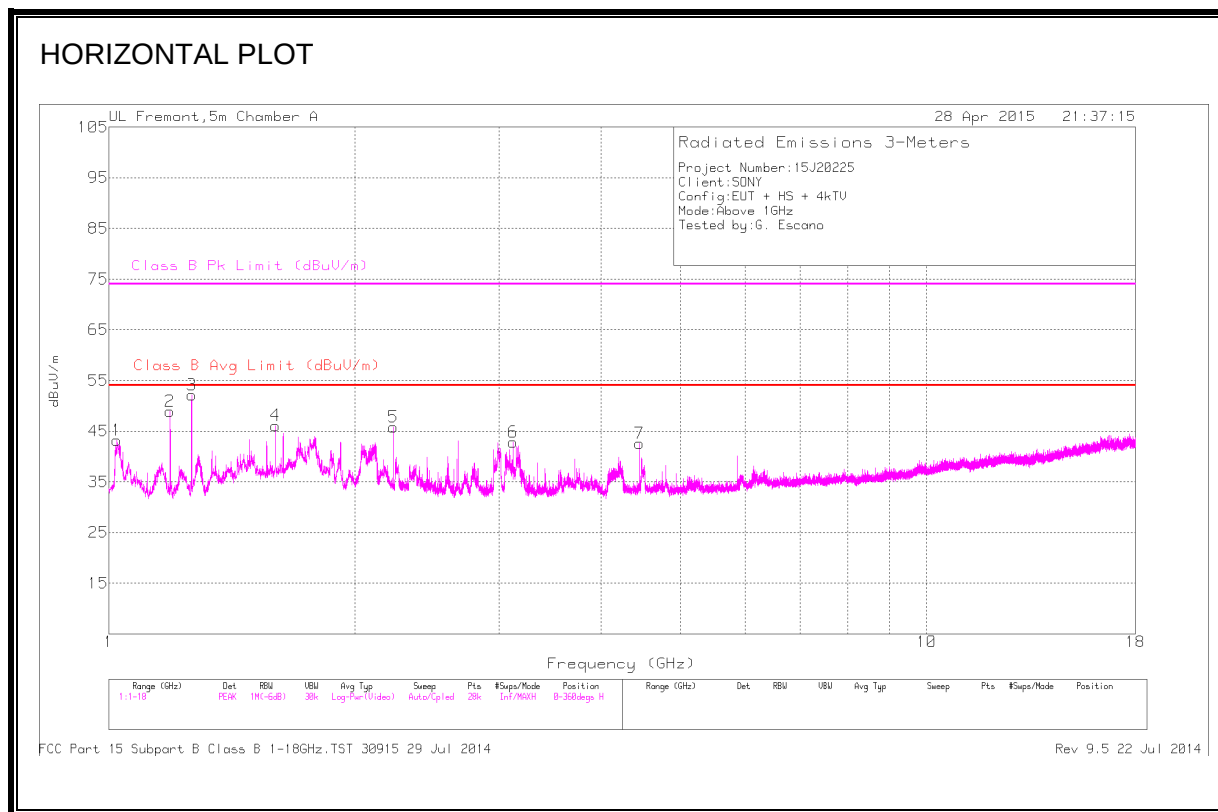


Trace Markers

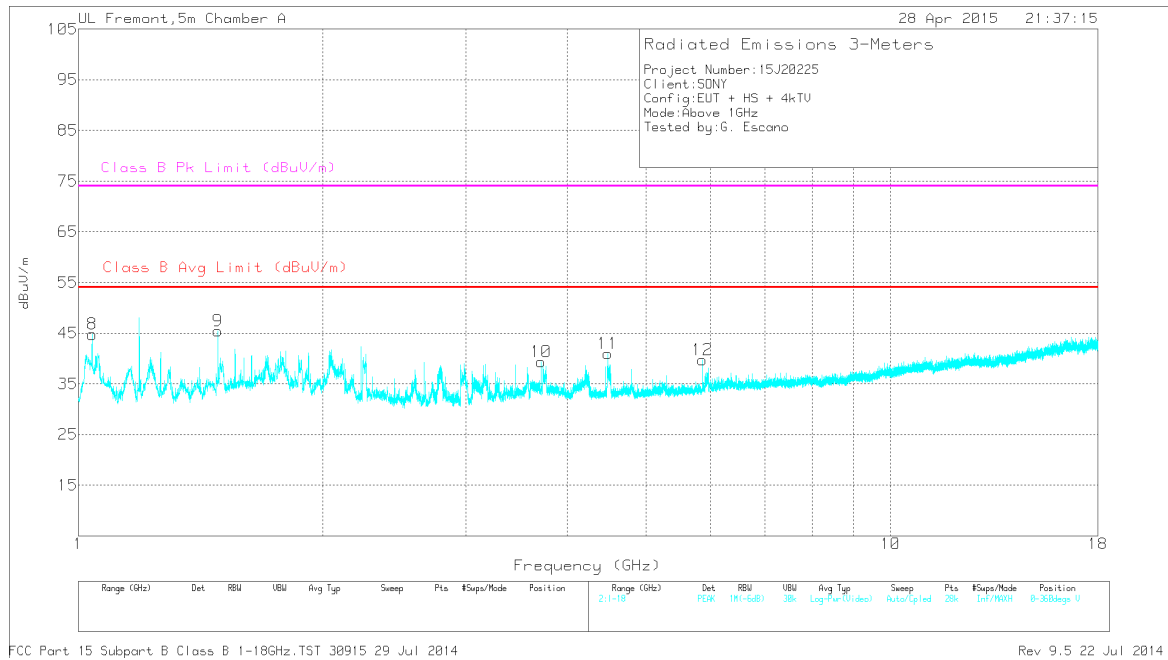
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	1.027	38.62	PK	27.1	-36.3	29.42	-	-	74	-44.58	0-360	201	V
1	1.087	37.41	PK	27.2	-36.3	28.31	-	-	74	-45.69	0-360	201	H
6	1.153	37.43	PK	27.6	-36.1	28.93	-	-	74	-45.07	0-360	100	V
2	1.208	36.96	PK	28.1	-36.1	28.96	-	-	74	-45.04	0-360	100	H
3	1.329	35.8	PK	28.8	-36	28.6	-	-	74	-45.4	0-360	100	H
4	1.51	36.38	PK	28.1	-35.8	28.68	-	-	74	-45.32	0-360	201	H
7	1.594	41.98	PK	27.9	-35.8	34.08	-	-	74	-39.92	0-360	100	V
8	2.139	41.55	PK	31.4	-35.1	37.85	-	-	74	-36.15	0-360	201	V

PK - Peak detector

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



VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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	1.022	52.45	PK	27.1	-36.3	43.25	-	-	74	-30.75	0-360	201	H
8	1.039	53.96	PK	27.1	-36.3	44.76	-	-	74	-29.24	0-360	100	V
2	1.188	56.96	PK	27.9	-36	48.86	-	-	74	-25.14	0-360	201	H
3	1.262	59.79	PK	28.5	-36.1	52.19	-	-	74	-21.81	0-360	100	H
9	1.485	53.11	PK	28.2	-35.9	45.41	-	-	74	-28.59	0-360	201	V
4	1.599	54.02	PK	27.9	-35.8	46.12	-	-	74	-27.88	0-360	100	H
5	2.228	49.52	PK	31.5	-35.2	45.82	-	-	74	-28.18	0-360	100	H
6	3.119	43.88	PK	32.9	-34	42.78	-	-	74	-31.22	0-360	100	H
10	3.712	39.47	PK	33.2	-33.3	39.37	-	-	74	-34.63	0-360	100	V
7	4.455	41.13	PK	33.8	-32.4	42.53	-	-	74	-31.47	0-360	100	H
11	4.482	39.36	PK	33.8	-32.2	40.96	-	-	74	-33.04	0-360	100	V
12	5.863	35.05	PK	35.1	-30.4	39.75	-	-	74	-34.25	0-360	100	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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	48.78	Av	28.5	-36.1	41.18	54	-12.82	74	-32.82	331	142	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 μ H/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 (dB μ V)	
	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

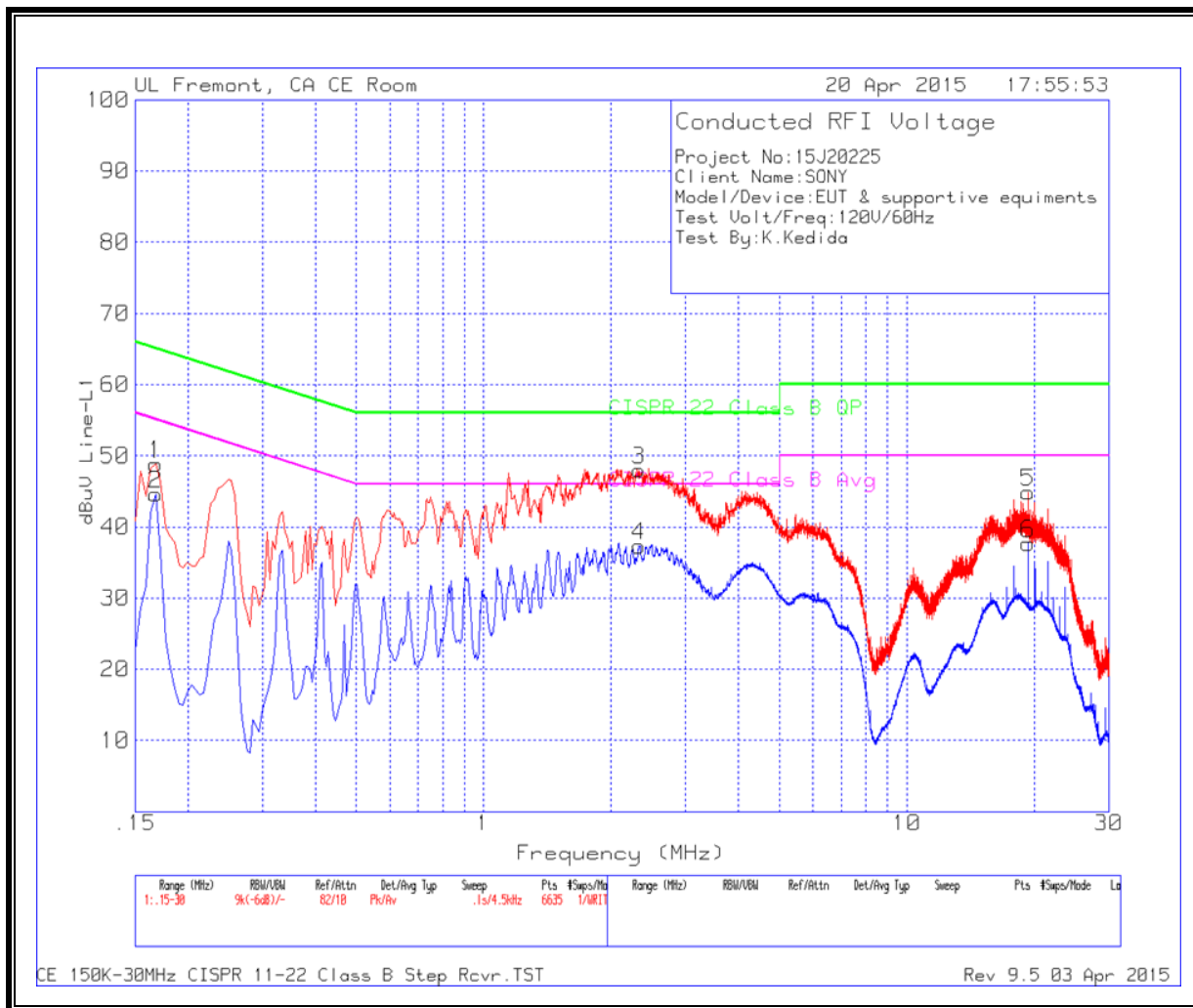
Notes:

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.

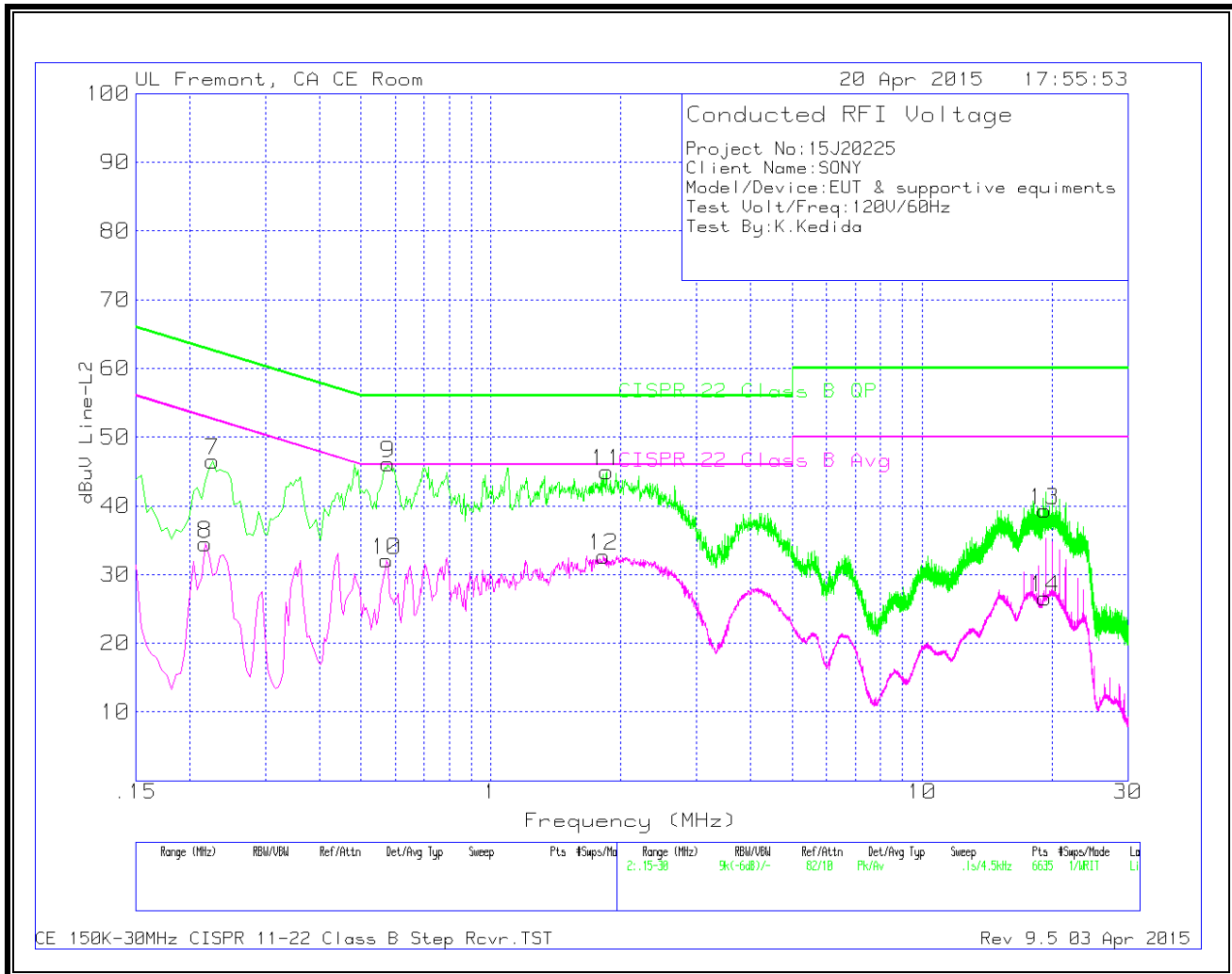
RESULTS

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	.168	47.61	Pk	1.2	0	48.81	65.06	-16.25	-	-
2	.168	43.43	Av	1.2	0	44.63	-	-	55.06	-10.43
3	2.328	47.7	Pk	.2	.1	48	56	-8	-	-
4	2.328	37.04	Av	.2	.1	37.34	-	-	46	-8.66
5	19.3425	44.39	Pk	.3	.2	44.89	60	-15.11	-	-
6	19.3425	37.18	Av	.3	.2	37.68	-	-	50	-12.32

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)
7	.2265	45.63	Pk	.9	0	46.53	62.58	-16.05	-	-
8	.2175	33.56	Av	.9	0	34.46	-	-	52.91	-18.45
9	.5775	45.84	Pk	.3	0	46.14	56	-9.86	-	-
10	.573	31.78	Av	.3	0	32.08	-	-	46	-13.92
11	1.8555	44.66	Pk	.2	.1	44.96	56	-11.04	-	-
12	1.824	32.39	Av	.2	.1	32.69	-	-	46	-13.31
13	19.239	38.84	Pk	.3	.2	39.34	60	-20.66	-	-
14	19.257	26.09	Av	.3	.2	26.59	-	-	50	-23.41

Pk - Peak detector

Av - Average detection