FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

WIRELESS STEREO HEADSET

MODEL NUMBER: CECHYA-0080

FCC ID: ZL2CECHYA0080
IC: 409P-CECHYA0080

REPORT NUMBER: 11U13854-1, Revision A

ISSUE DATE: June 30, 2011

Prepared for

Sony Computer Entertainment America
919 East Hillsdale Blvd
Foster City, CA United States 94404-2175

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/28/11	Initial Issue	F. Ibrahim
A	06/30/11	Update support equipment list, test equipment list	C. Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sony Computer Entertainment America
919 East Hillsdale Blvd
Foster City, CA United States 94404-2175

EUT DESCRIPTION: Wireless Stereo Headset

MODEL: CECHYA-00 80

SERIAL NUMBER: PVT-62, PVT-67

DATE TESTED: JUNE 21-28, 2011

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL CCS) 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

CHIN PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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

The EUT is a wireless stereo headset.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405-2477 Pi/4	DQPSK	2.58	1.81

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes diversity printed antennas as follows:

Antenna 1, with a maximum peak gain of -0.17 dBi
Antenna 2, with a maximum peak gain of 0 dBi

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was AV7251.

The EUT driver software installed during testing was AMD7 developer-1_5_1.exe.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power; radiated emissions 30-1000 MHz and power line conducted emissions were performed with the EUT set to transmit at the worst-case channel.

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

There is only a single modulation and data rate for this device, the modulation is Pi/4 DQPSK.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop SONY		PCG-6F1L	281946303110705	DoC
AC Adapter	SONY	VGP-AC16V8	147886060112680	DoC
Wireless Adaptor	SONY CECHYA-0081		PVT-59, PVT-64	ZL2CECHYA0081

I/O CABLES

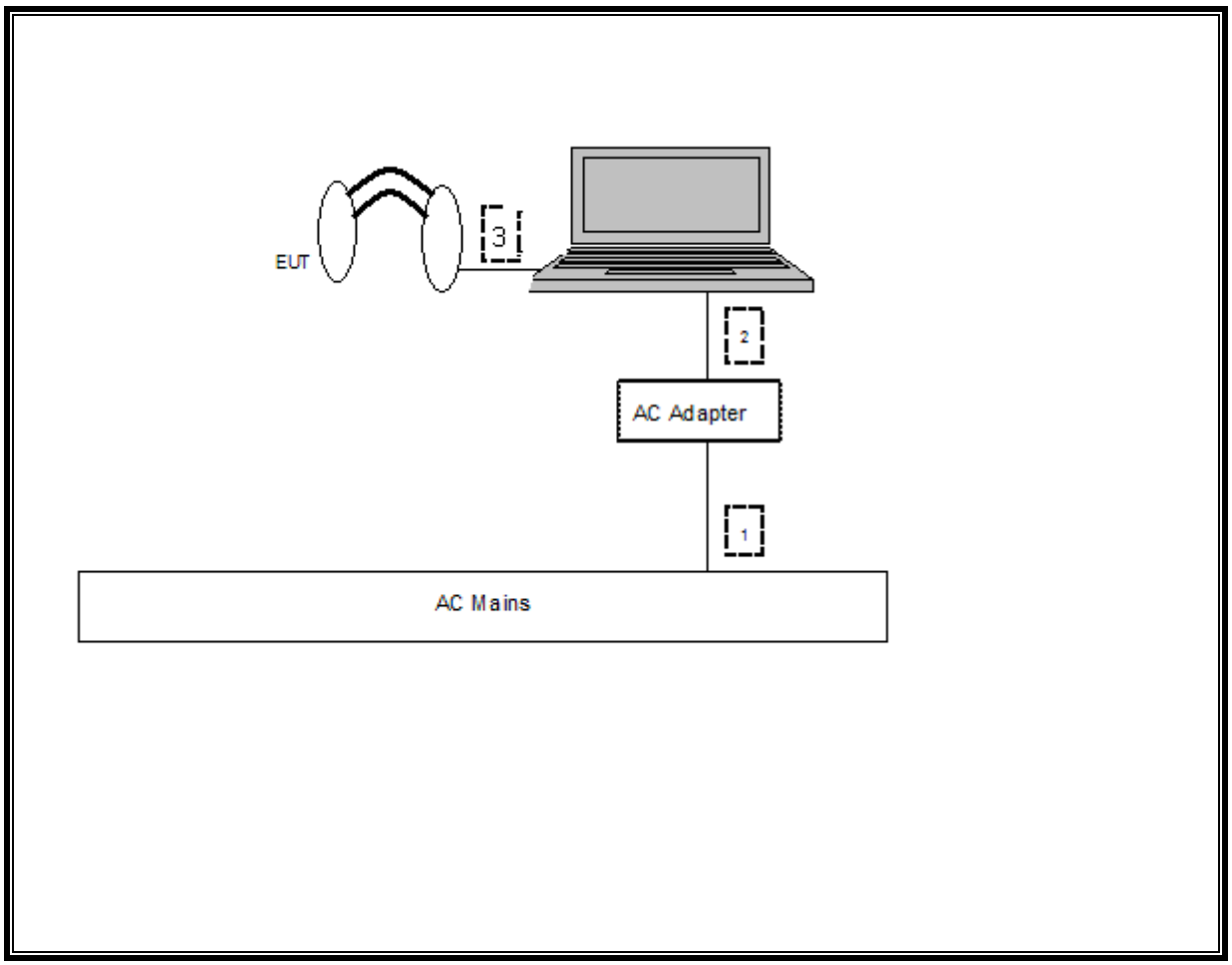
I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Shielded	1.5m	NA
2	DC	1	DC	Un-shielded	1.5m	Ferrite at laptop's end
3	USB	1	USB	Un-shielded	1.8m	NA

TEST SETUP

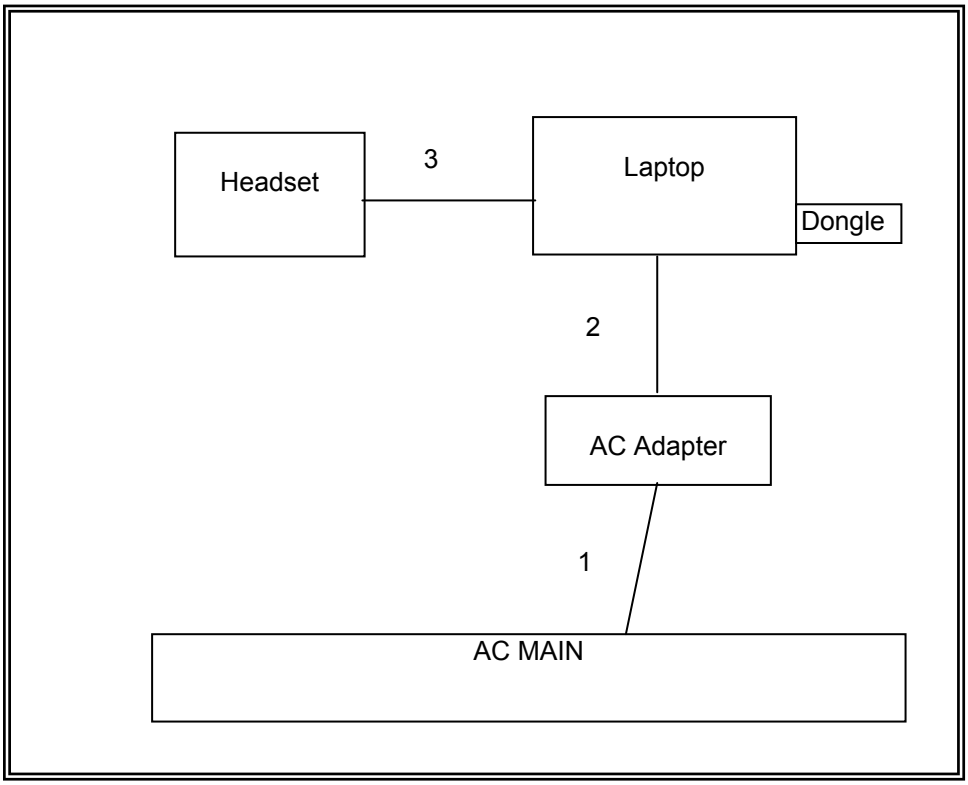
The EUT is connected to a host laptop computer during the tests.

SETUP DIAGRAM FOR TESTS

FOR RF RADIATED TEST SETUP



FOR BELOW 1G RADIATED AND LC TEST SETUP



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**	**Asset**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	12-07-11
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	N/A	07-02-11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11-10-11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08-30-11
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	2012-4-13
Peak Power Meter	Agilent / HP	E4416A	C00963	2013-3-22
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06-29-11
Reject Filter, 2.0-2.9 GHz	Micro-Tronics	BRM50702	N02684	CNR
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07-14-11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07-12-11

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

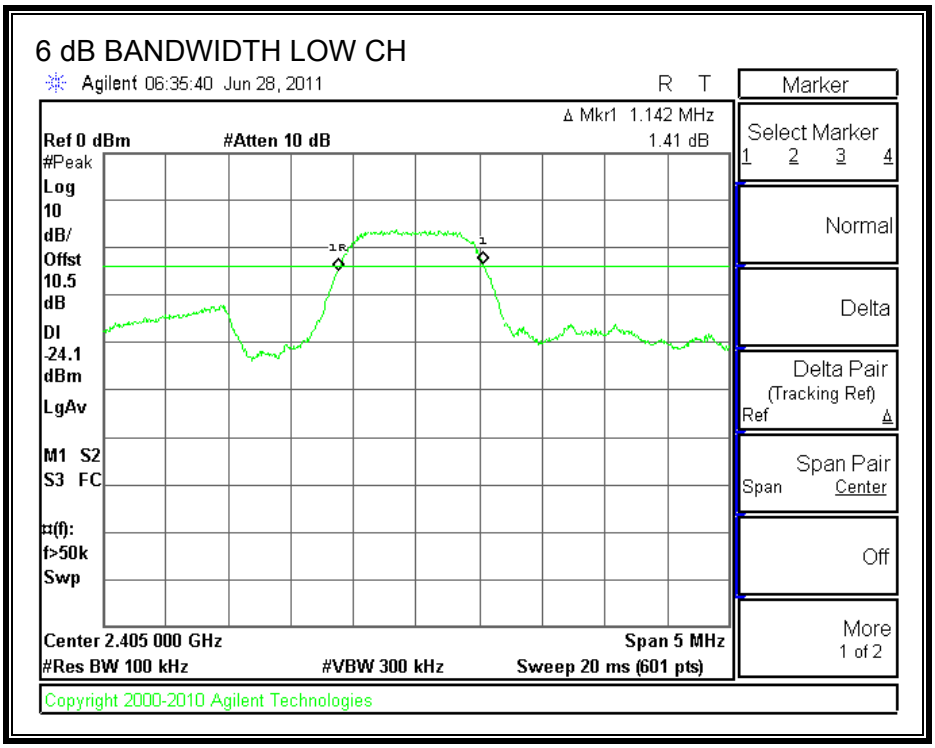
TEST PROCEDURE

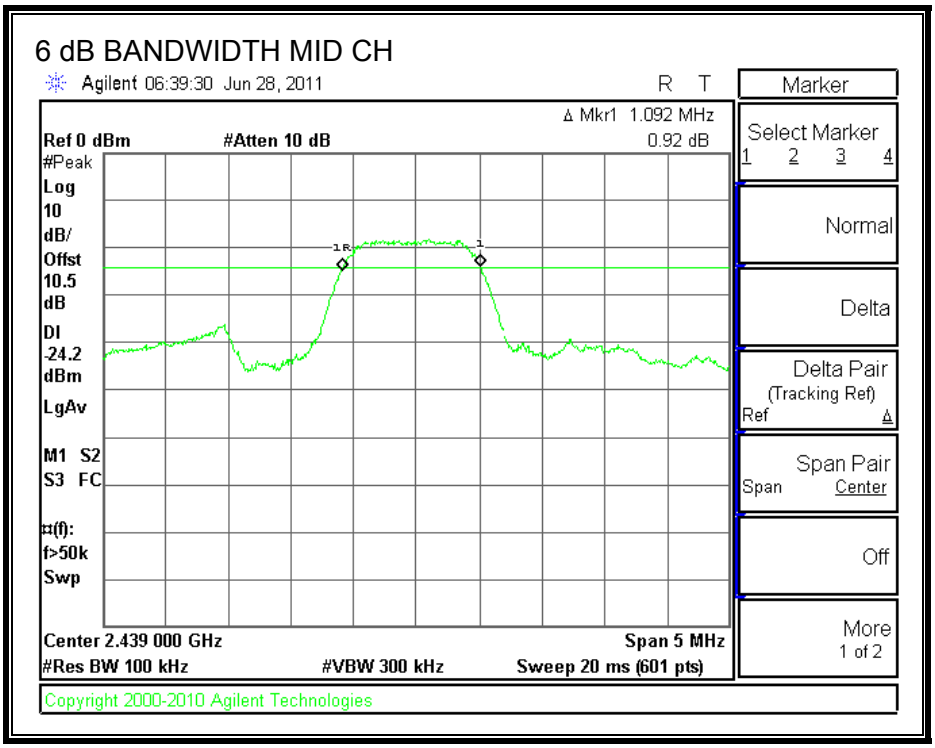
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

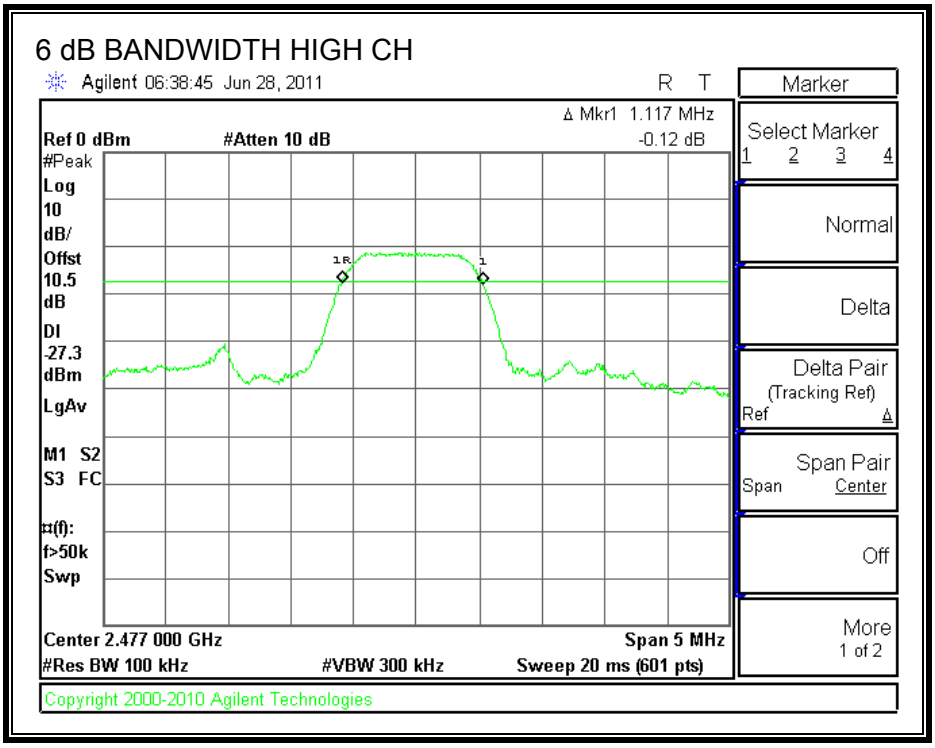
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2405	1.142	0.5
Middle	2439	1.092	0.5
High	2477	1.117	0.5

6 dB BANDWIDTH







7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

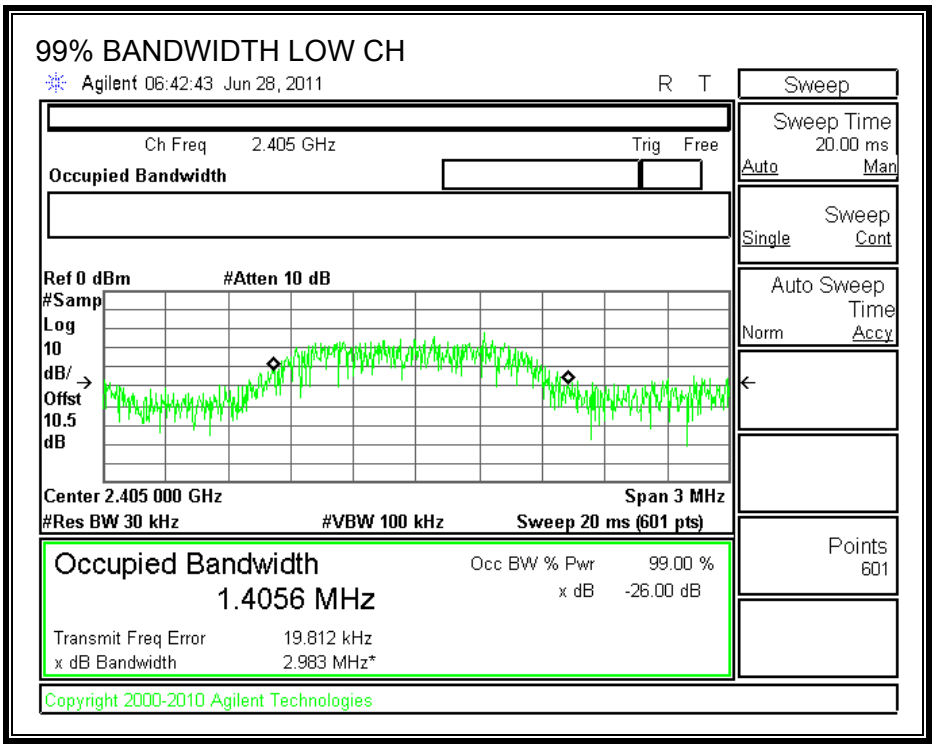
TEST PROCEDURE

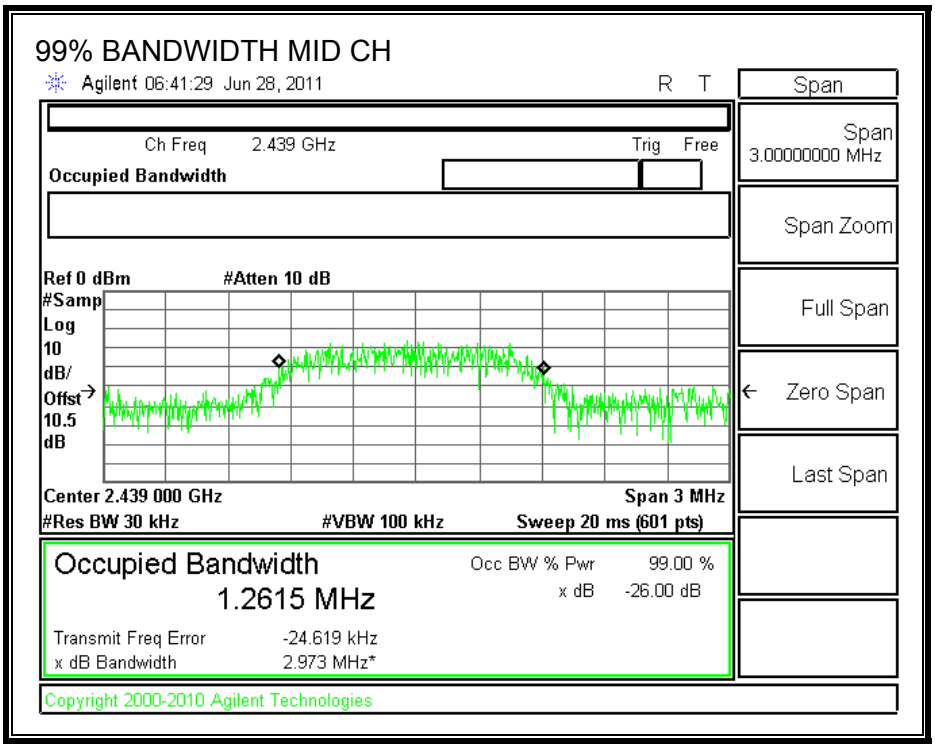
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

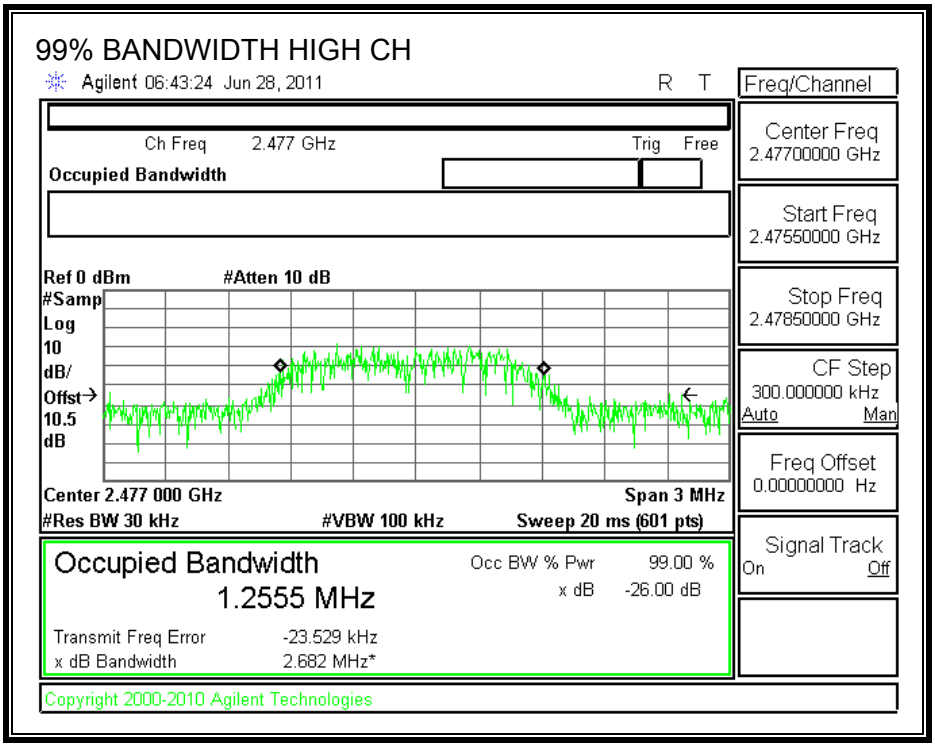
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	1.4056
Middle	2439	1.2615
High	2477	1.2555

99% BANDWIDTH







7.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Sco pes A1 - A4" by Joe D ichoso, May 2003.

Peak power is measured using wide bandwidth Peak Power Meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2405	2.4	30	-27.60
Middle	2439	2.58	30	-27.42
High	2477	0.75	30	-29.25

7.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2405	0.40
Middle	2437	0.50
High	2477	-1.27

7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

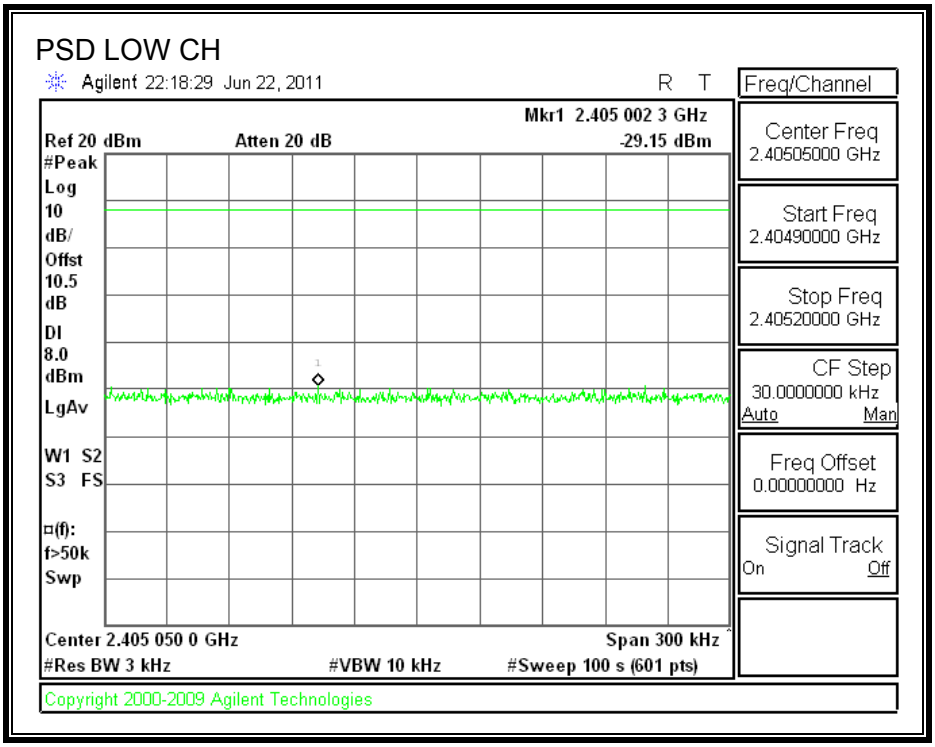
TEST PROCEDURE

Output power was measured base d on the use of a peak measurement, therefor e the power spectral de nsity was measured using PSD Option 1 in accordan ce with FCC documen t "Measurement of Digital Transmission Systems Operati ng under Section 15.2 47", March 23, 2005.

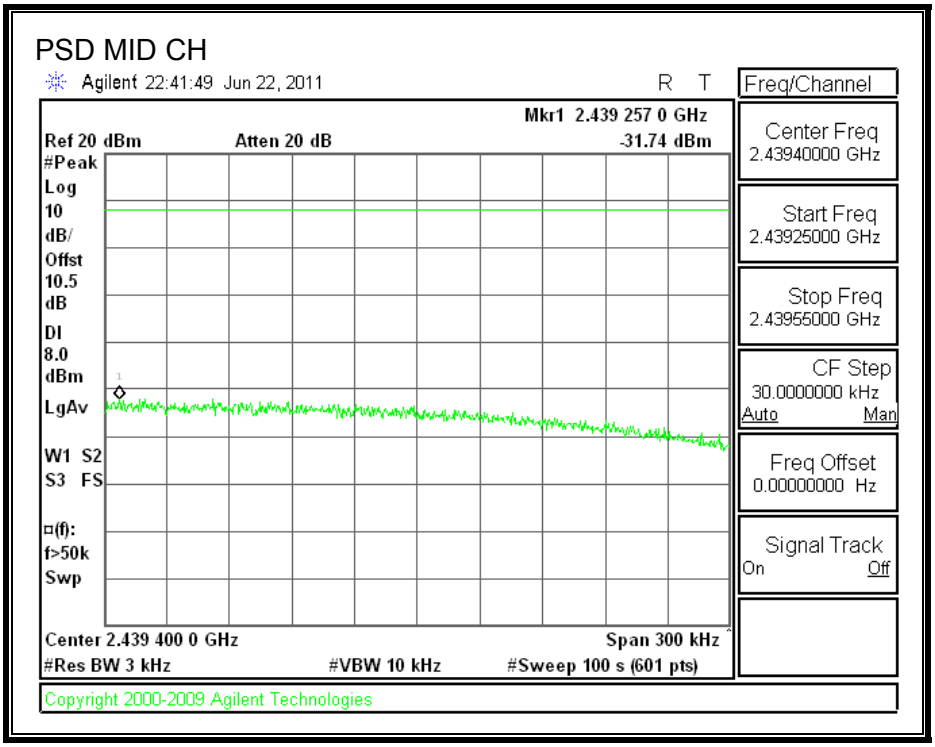
RESULTS

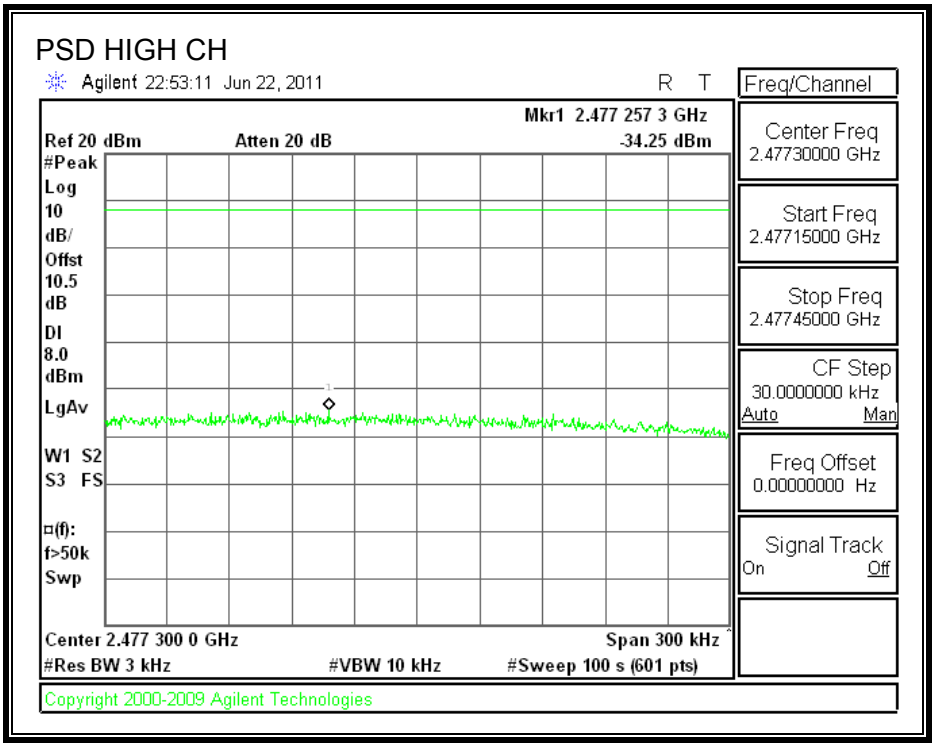
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2405	-29.15	8	-37.15
Middle	2439	-31.74	8	-39.74
High	2477	-34.25	8	-42.25

POWER SPECTRAL DENSITY



PSD MID CH





7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

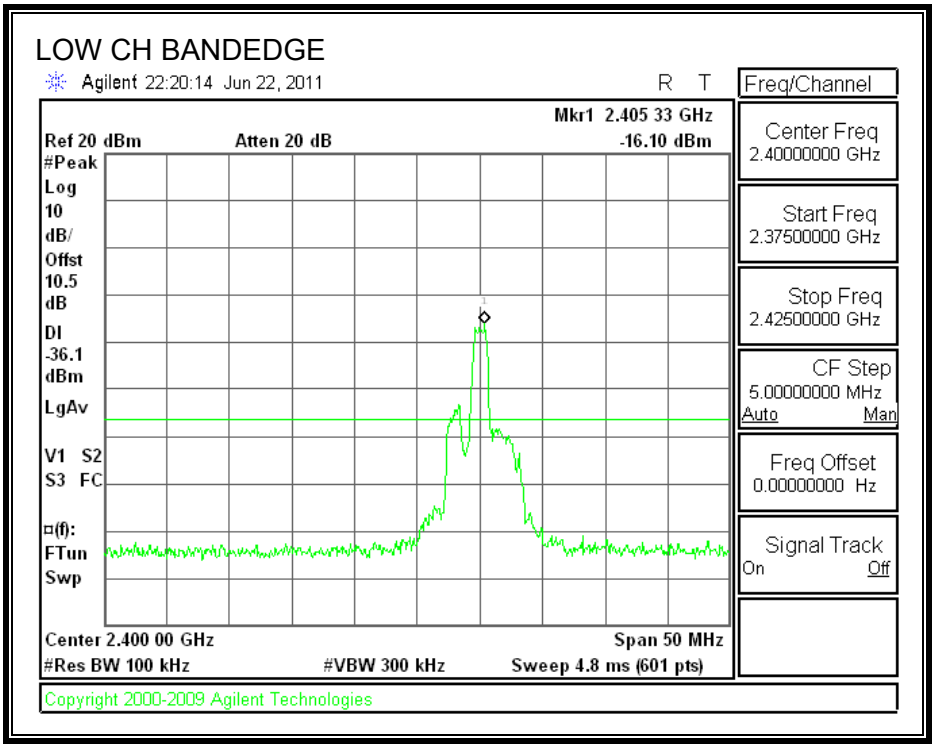
TEST PROCEDURE

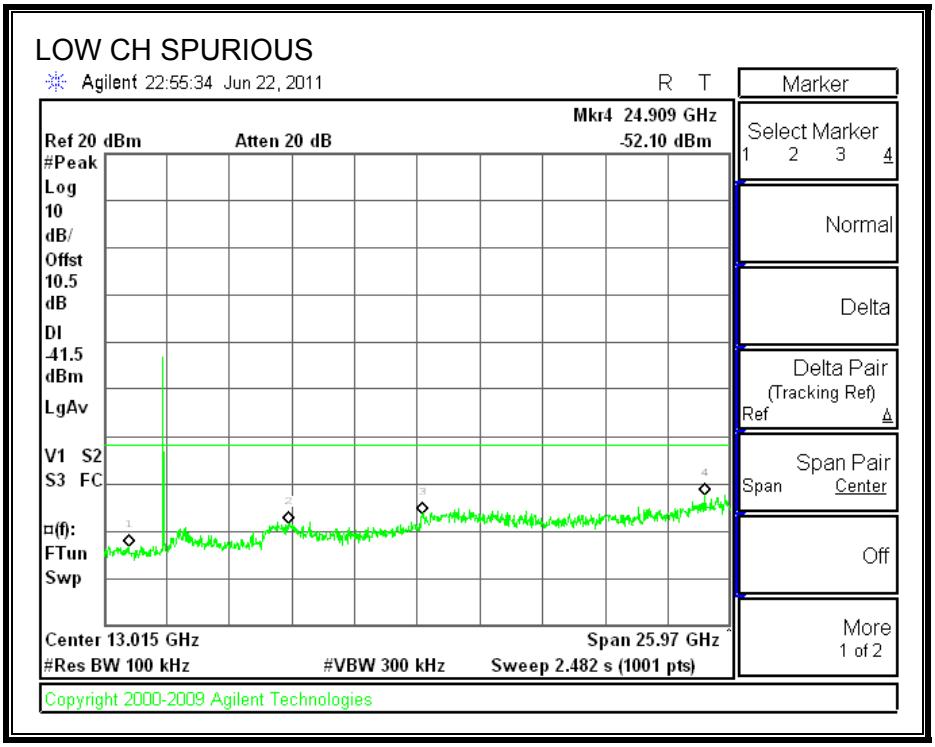
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

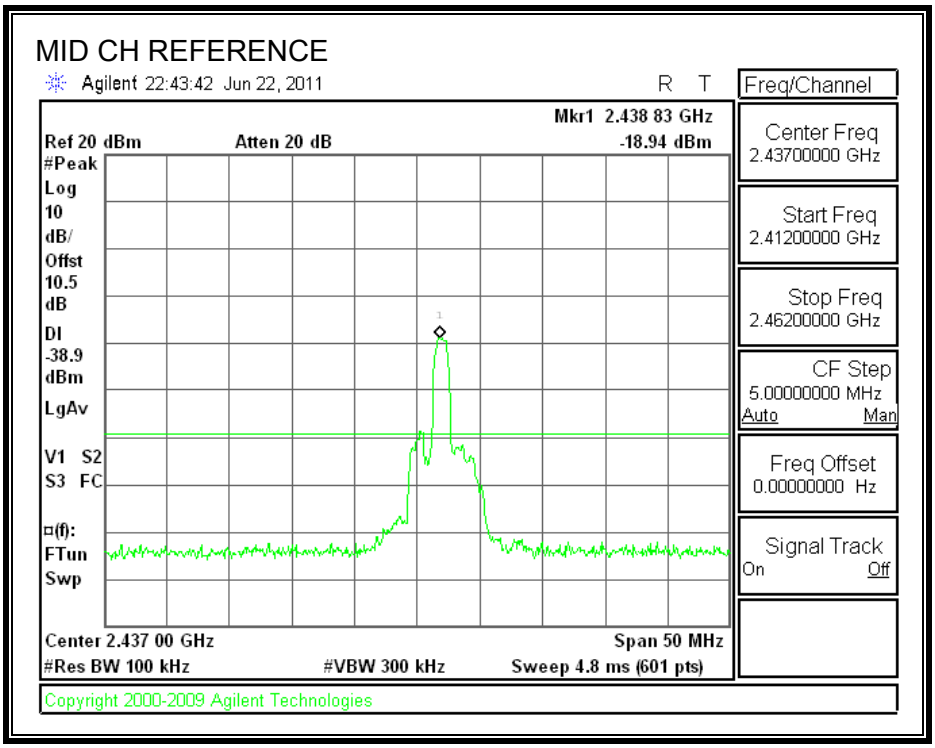
RESULTS

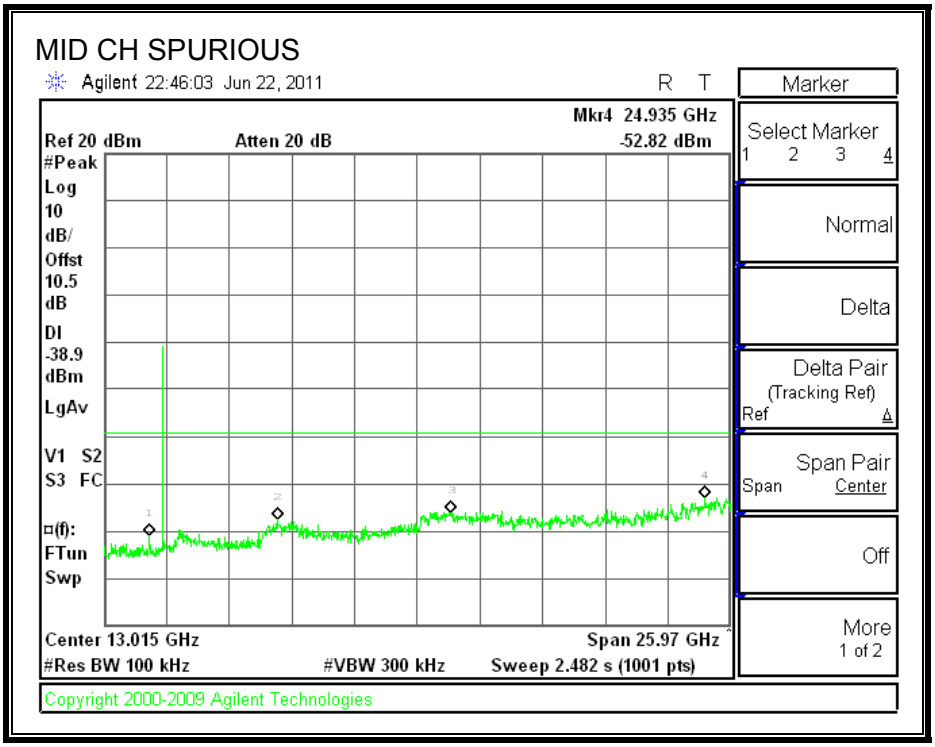
SPURIOUS EMISSIONS, LOW CHANNEL



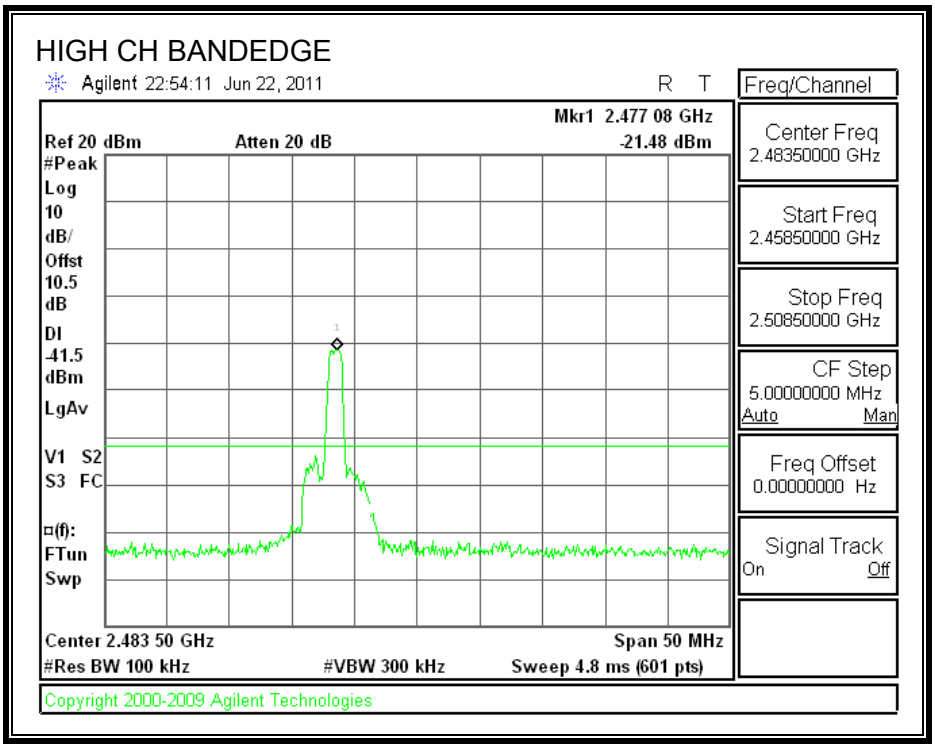


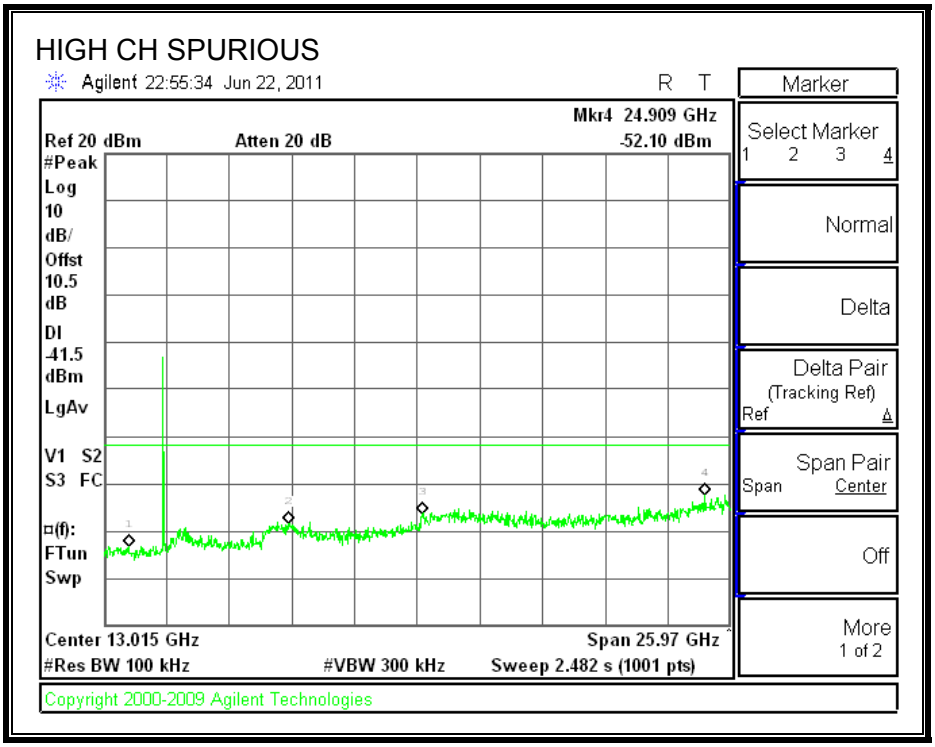
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

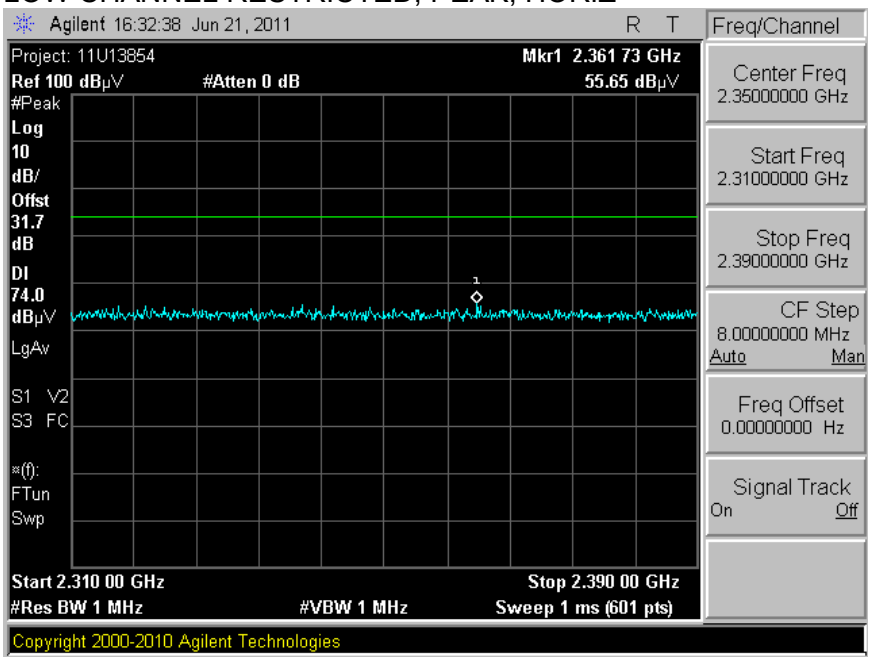
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

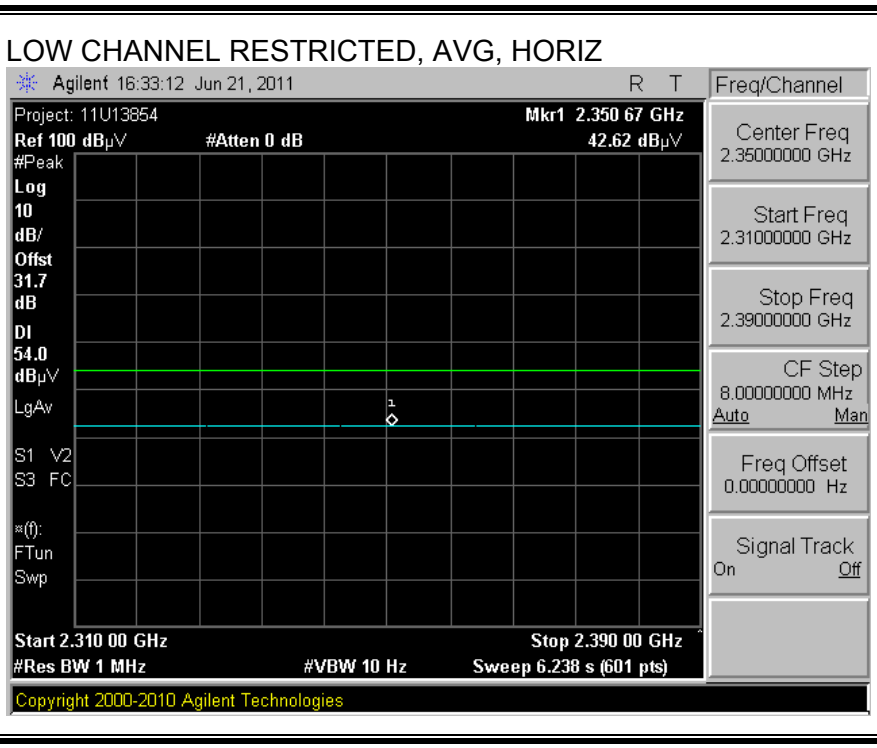
8.2. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

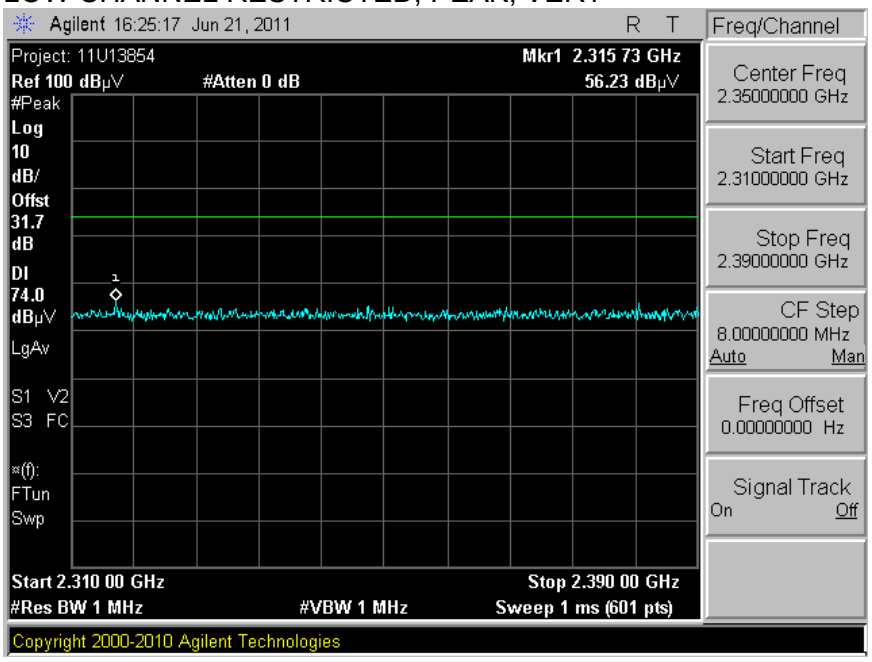


LOW CHANNEL RESTRICTED, AVG, HORIZ

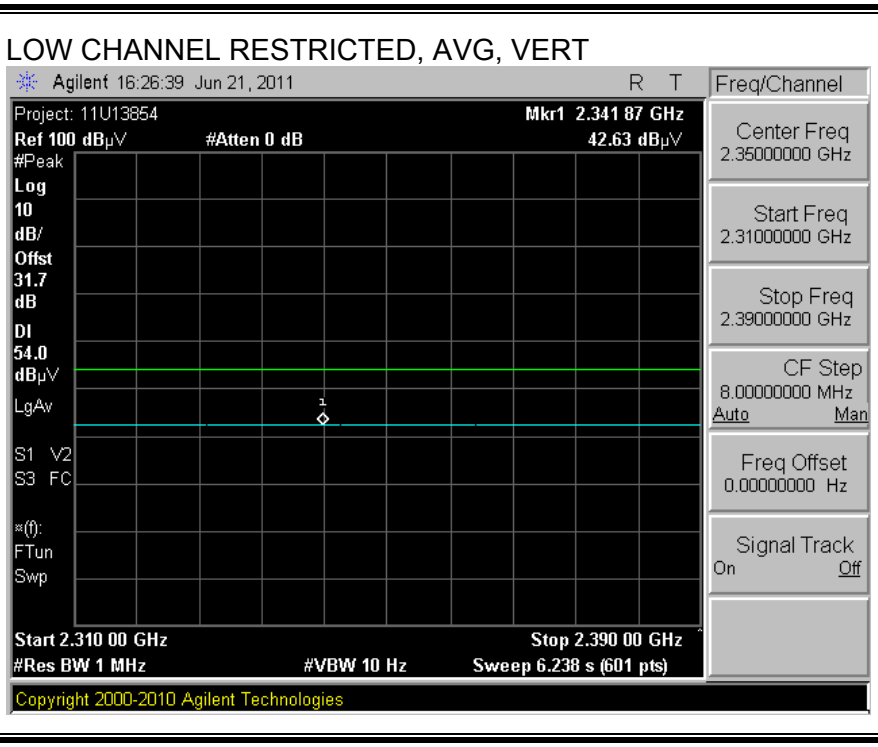


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

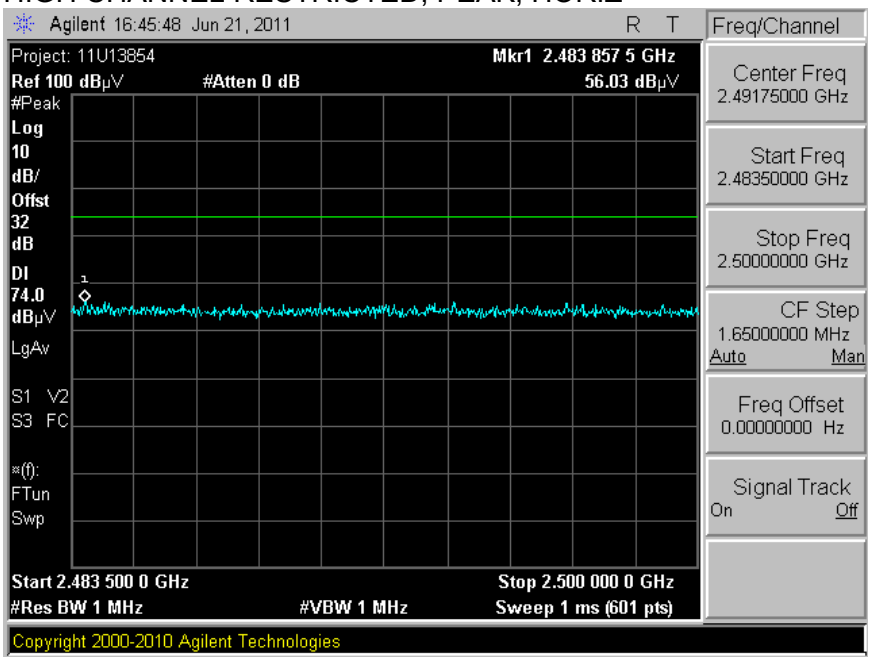


LOW CHANNEL RESTRICTED, AVG, VERT

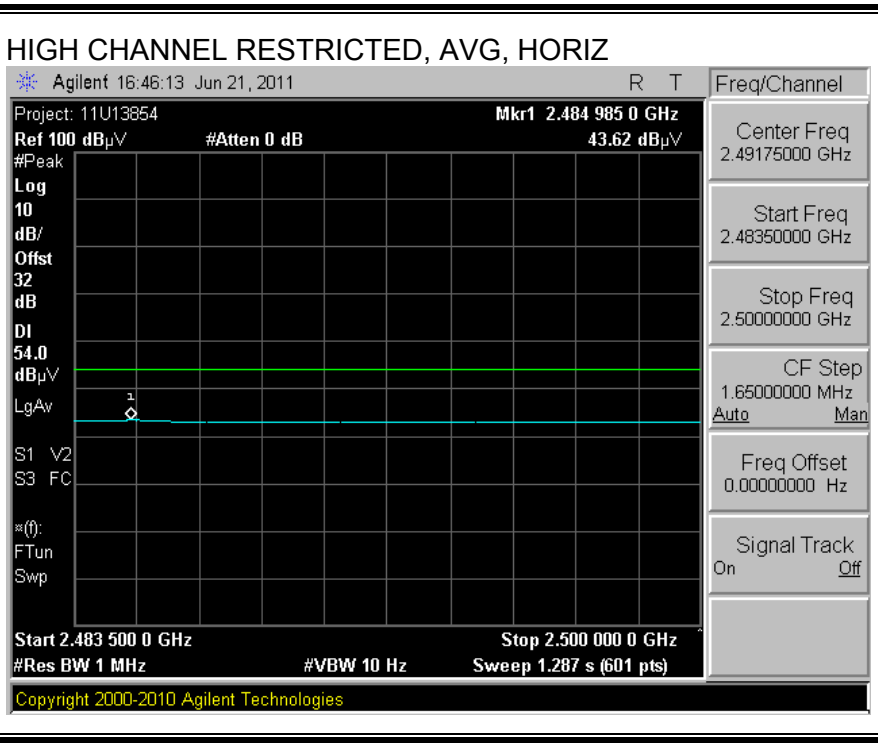


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

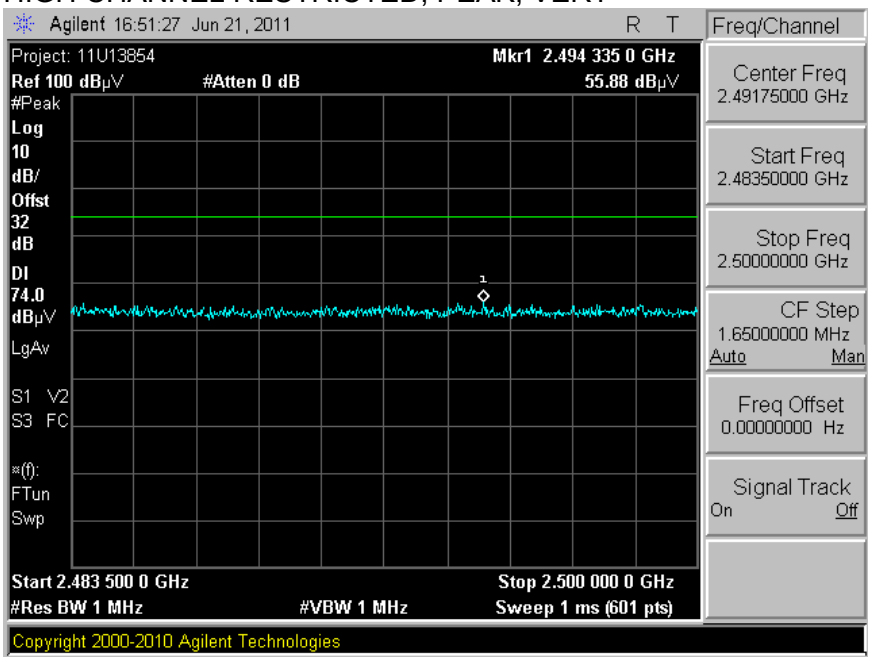


HIGH CHANNEL RESTRICTED, AVG, HORIZ

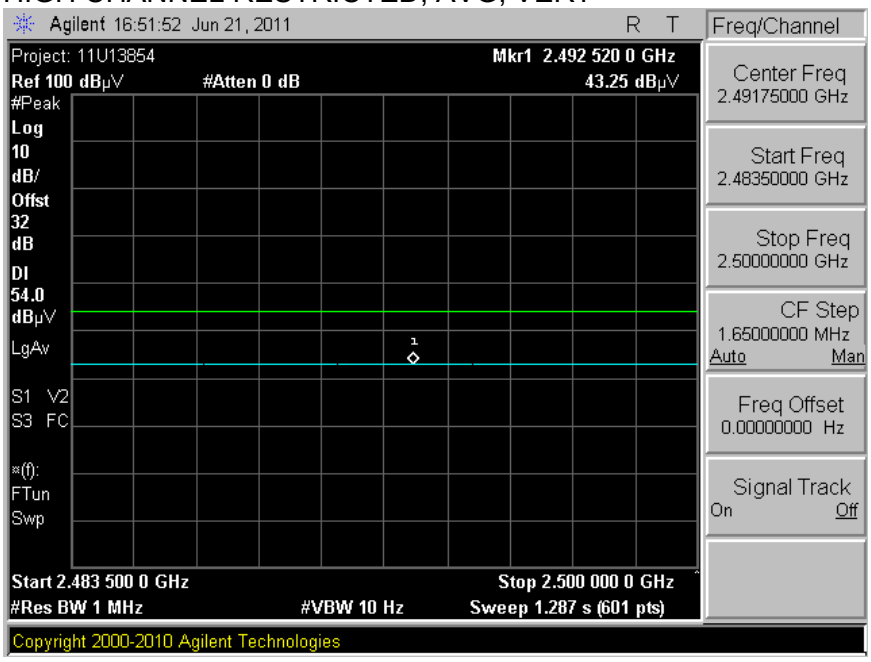


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Sony
Project #: 11U13854
Date: 2011-6-21
Test Engineer: G.Paul
Configuration: Headset Z Plane
Mode: Tx

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Lo Ch (2405MHz)															
4.810	3.0	37.4	28.2	32.8	5.8	-34.8	0.0	0.0	41.1	31.9	74	54	-32.9	-22.1	V
4.810	3.0	39.5	28.4	32.8	5.8	-34.8	0.0	0.0	43.2	32.1	74	54	-30.8	-21.9	H
Mid Ch (2439MHz)															
4.878	3.0	39.0	29.1	32.8	5.8	-34.9	0.0	0.0	42.8	32.9	74	54	-31.2	-21.1	V
7.317	3.0	40.4	28.3	35.2	7.3	-34.7	0.0	0.0	48.2	36.1	74	54	-25.8	-17.9	V
4.878	3.0	38.5	28.0	32.8	5.8	-34.9	0.0	0.0	42.2	31.8	74	54	-31.8	-22.2	H
Hi Ch (2477MHz)															
4.954	3.0	40.9	32.1	32.9	5.9	-34.9	0.0	0.0	44.8	36.0	74	54	-29.2	-18.0	V
7.431	3.0	40.7	32.2	35.4	7.3	-34.6	0.0	0.0	48.7	40.3	74	54	-25.3	-13.7	V
4.954	3.0	40.3	28.9	32.9	5.9	-34.9	0.0	0.0	44.2	32.8	74	54	-29.8	-21.2	H
7.431	3.0	37.6	26.8	35.4	7.3	-34.6	0.0	0.0	45.7	34.8	74	54	-28.3	-19.2	H

Rev. 07.22.09

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.3. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Sony
Project #: 11U13854
Date: 2011-6-21
Test Engineer: G.Paul
Configuration: Headset Z Plane
Mode: Rx

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.000	3.0	51.8	37.1	23.9	2.4	-36.2	0.0	0.0	41.9	27.2	74	54	-32.1	-26.8	H
1.170	3.0	51.3	31.7	24.6	2.6	-36.0	0.0	0.0	42.4	22.8	74	54	-31.6	-31.2	H
1.425	3.0	47.9	33.5	25.5	2.9	-35.8	0.0	0.0	40.4	26.0	74	54	-33.6	-28.0	H
9.103	3.0	38.3	25.7	36.9	8.2	-34.8	0.0	0.0	48.6	36.0	74	54	-25.4	-18.0	H
1.085	3.0	51.8	35.4	24.2	2.5	-36.1	0.0	0.0	42.4	26.0	74	54	-31.6	-28.0	V
1.510	3.0	46.6	33.2	25.8	3.0	-35.8	0.0	0.0	39.6	26.2	74	54	-34.4	-27.8	V
7.998	3.0	38.0	27.2	36.1	7.6	-34.5	0.0	0.0	47.2	36.4	74	54	-26.8	-17.6	V

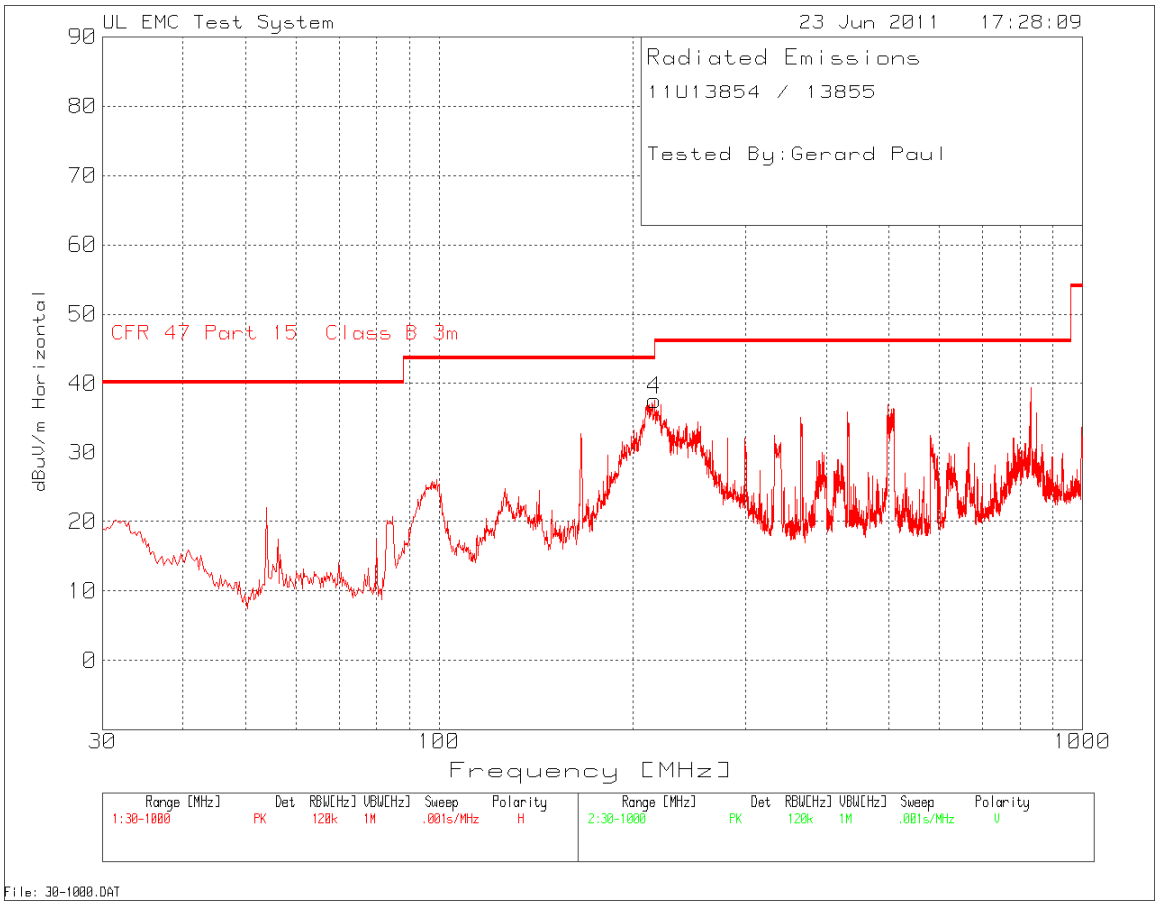
Rev. 07.22.09

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.4. WORST-CASE BELOW 1 GHz

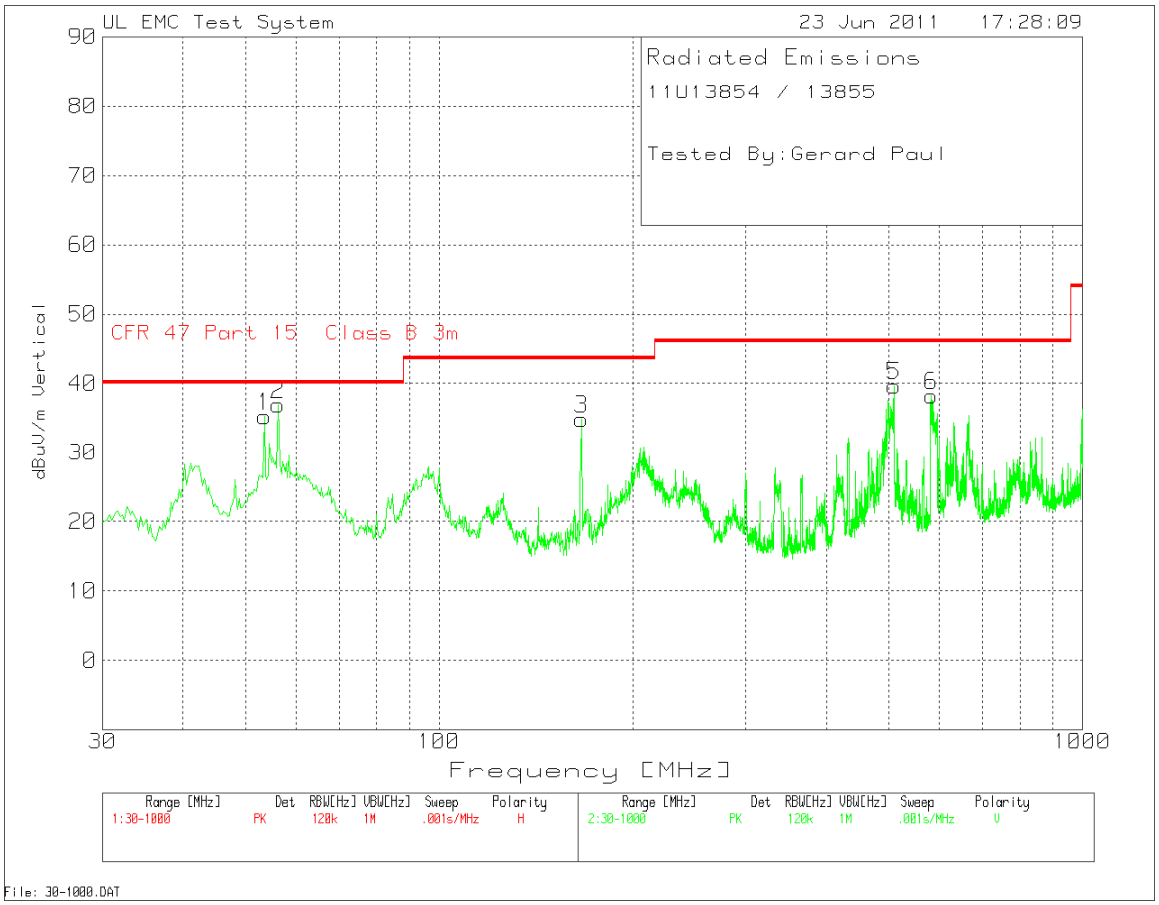
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

11U13854 / 13855											
Tested By: Gerard Paul											
Range 1 30 - 1000MHz											
Test Frequency	Meter Reading	Detector	Cable (dB)	PreAmp (dB)	Bilog [dB]	Corrected Measurement dBuV/m	Limit Class B 3m	Margin	Height [cm]	Polarity	
216.3427	52.59	PK	2	-28.9	11.9	37.59	46	-8.41	91	Horz	
Range 2 30 - 1000MHz											
Test Frequency	Meter Reading	Detector	Cable (dB)	PreAmp (dB)	Bilog [dB]	Corrected Measurement dBuV/m	Limit Class B 3m	Margin	Height [cm]	Polarity	
53.5049	55.76	PK	1	-29.4	7.9	35.26	40	-4.74	109	Vert	
56.1704	57.37	PK	1.1	-29.4	7.9	36.97	40	-3.03	109	Vert	
166.4252	51.77	PK	1.8	-29.1	10.4	34.87	43.5	-8.63	109	Vert	
509.7902	49.07	PK	3.1	-29.4	16.9	39.67	46	-6.33	109	Vert	
582.9703	46.24	PK	3.4	-29.4	18	38.24	46	-7.76	109	Vert	
Range 1 30 - 1000MHz											
Test Frequency	Meter Reading	Detector	Cable (dB)	PreAmp (dB)	Bilog [dB]	Corrected Measurement dBuV/m	Limit Class B 3m	Margin	Azimuth [Degs]	Height [cm]	Polarity
213.2376	48.69	QP	2	-28.9	11.9	33.69	43.5	-9.81	223	160	Horz
Range 2 30 - 1000MHz											
Test Frequency	Meter Reading	Detector	Cable (dB)	PreAmp (dB)	Bilog [dB]	Corrected Measurement dBuV/m	Limit Class B 3m	Margin	Azimuth [Degs]	Height [cm]	Polarity
54.8001	44.73	QP	1.1	-29.4	7.9	24.33	40	-15.67	158	101	Vert
55.3116	44.29	QP	1.1	-29.4	7.9	23.89	40	-16.11	190	106	Vert
168.003	32.8	QP	1.8	-29.1	10.3	15.8	43.5	-27.7	11	105	Vert
PK - Peak detector											
QP - Quasi-Peak detector											

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

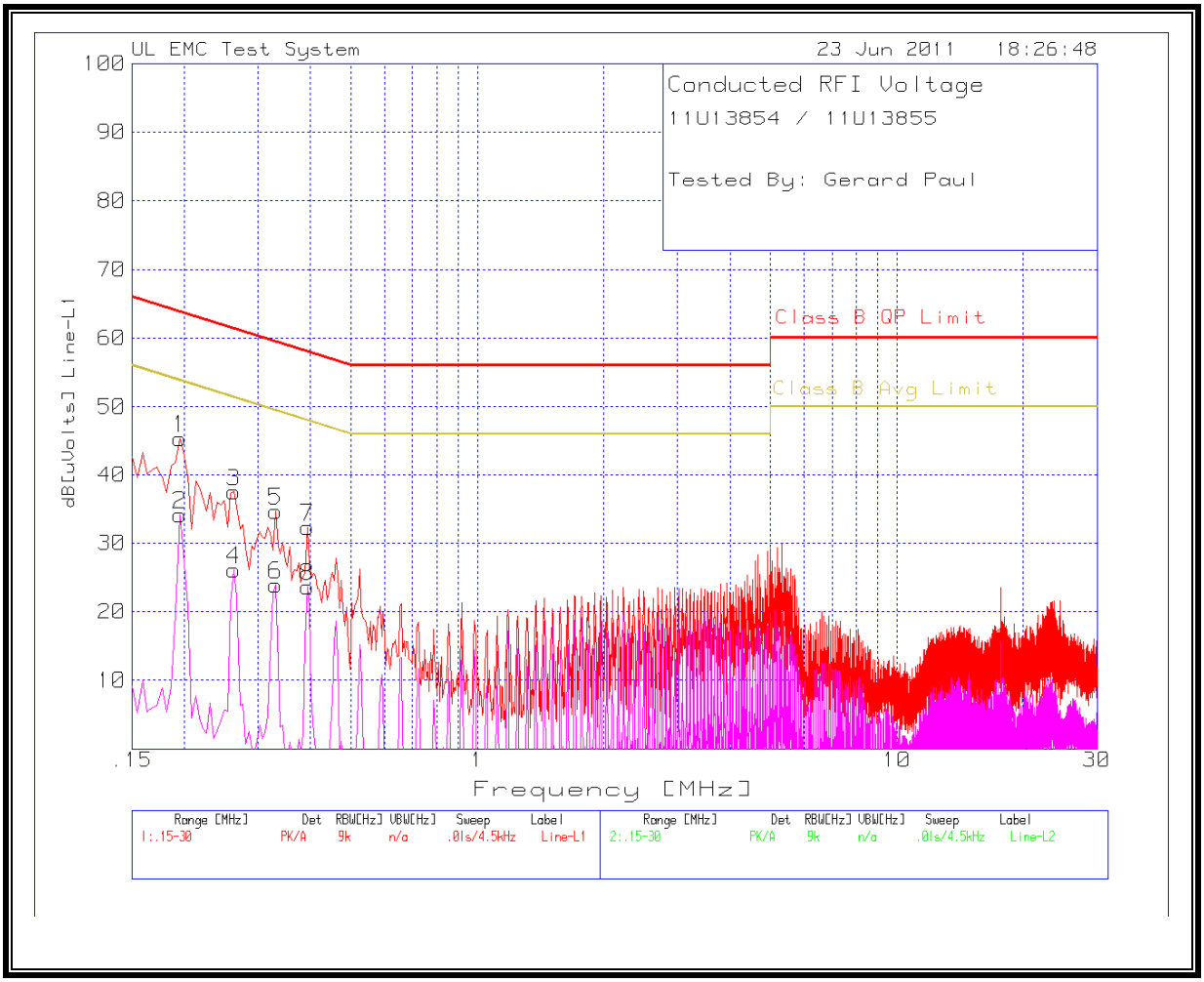
ANSI C63.4

RESULTS

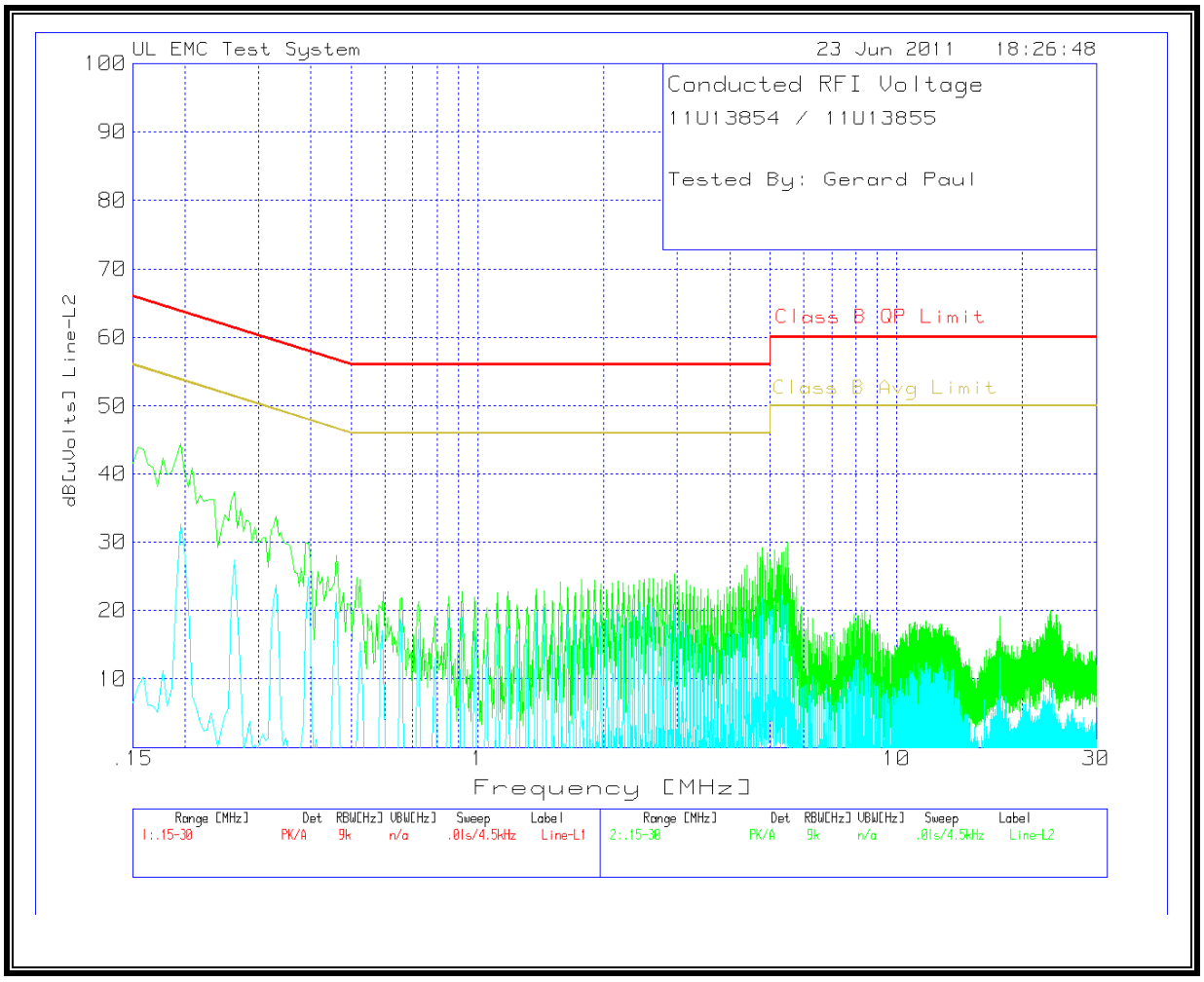
6 WORST EMISSIONS

11U13854 / 11U13855									
Tested By: Gerard Paul									
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Cable [dB]	Corrected Measurement dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.195	45.35	PK	0	0	45.35	63.8	-18.45	53.8	-8.45
0.195	34.13	Av	0	0	34.13	63.8	-29.67	53.8	-19.67
0.2625	37.49	PK	0	0	37.49	61.4	-23.91	51.4	-13.91
0.2625	26.05	Av	0	0	26.05	61.4	-35.35	51.4	-25.35
0.33	34.65	PK	0	0	34.65	59.5	-24.85	49.5	-14.85
0.33	23.87	Av	0	0	23.87	59.5	-35.63	49.5	-25.63
0.393	32.26	PK	0	0	32.26	58	-25.74	48	-15.74
0.393	23.59	Av	0	0	23.59	58	-34.41	48	-24.41
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply, a fraction of the exposure limit is established for each band, such that the sum of the fractions is less than or equal to one.

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

For mobile radio equipment operating in the cellular phone band, the lowest power density limit is calculated using the lowest frequency, as 824 MHz / 1500 = 0.55 mW/cm^2 (FCC) and 824 MHz / 150 = 5.5 W/m^2 (IC).

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Single Chain and non-colocated transmitters								
Band	**Mode**	**Separation Distance (m)**	**AV Output Power (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**EIRP (W)**	**IC Power Density (W/m^2)**	**FCC Power Density (mW/cm^2)**
2.4 GHz	DQPSK	0.20	0.50	0.00	0.50	0.0011	0.0022	0.0002