



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8
CLASS II PERMISSIVE CHANGE**

CERTIFICATION TEST REPORT

FOR

**802.11bgn 2x2 PCIe MINICARD
(Tested inside Panasonic Laptop PC CF-19)**

MODEL NUMBER: WL11E

FCC ID: ACJ9TGWL11E

REPORT NUMBER: 11J13997-1

ISSUE DATE: AUGUST 29, 2011

Prepared for

**PANASONIC CORPORATION OF NORTH AMERICA
ONE PANASONIC WAY, 4B-8
SECAUCUS, NEW JERSEY 07094
U.S.A.**

Prepared by

**COMPLIANCE CERTIFICATION SERVICES (UL CCS)
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--		Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PANASONIC CORPORATION OF NORTH AMERICA
ONE PANASONIC WAY, 4B-8
SECAUCUS, NEW JERSEY 07094, U.S.A.

EUT DESCRIPTION: 802.11bgn 2x2 PCIe Mini Card
(Tested inside Panasonic Laptop PC CF-19)

MODEL: WL11E

SERIAL NUMBER: Not Available

DATE TESTED: AUGUST 17 - 29, 2011

CHAINPLICABLE 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:

Tested By:



FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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:

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

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

The EUT is an 802.11bgn 2x2 PCIe Mini Card and tested Panasonic Laptop PC CF-19.

The radio module is manufactured by Atheros.

5.2. MAXIMUM OUTPUT POWER

The test measurement passed within ± 0.5 dBm of the original output power.

5.1. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding tablet platform, Panasonic CF-19.

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 2 IFA integrated antennas, with the following peak gains:

Frequency Range (MHz)	Chain 1 Peak gain dBi	Chain 2 Peak gain dBi
2.400 - 2483.5	0.86	2.93

5.3. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Atheros 11n AR928xAnwi Diagnostic Kernel, ver 7.6.0.0.

The test utility software used during testing was ART Revision 0.9 Built #34 Art_11n

5.4. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions and Power line Conducted Emissions, the channel with the highest conducted output power was selected.

Worst-case data rates as provided by the manufacturer are:

For 11b mode: 1Mbps

For 11g mode: 6Mbps

For 11n HT20 (2.4 GHz band): MCS0

For 11n HT40 (2.4 GHz band): MCS0

The tablet laptop was investigated in normal position and in three orthogonal orientations X, Y, Z and it was determined that normal position is the worst-case; therefore, all testing in this report was conducted with EUT in worst case position (see setup photos).

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Panasonic	CF-19	1EKSA00599	DoC
AC Adapter	Panasonic	CF-AA6503A M3	5713AM110Z12696A	DoC

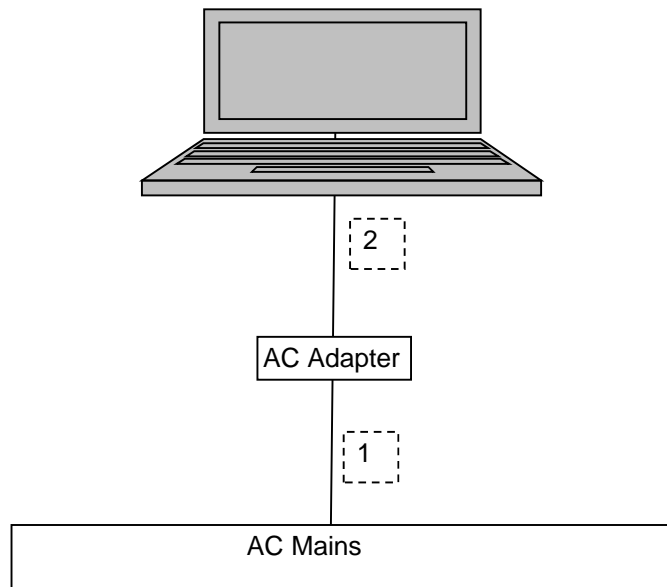
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Un-Sheilded	180 cm	N/A
2	DC	1	DC	Un-Sheilded	180 cm	Ferrite at laptop end

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card. A laptop computer was used to configure the EUT to continuously transmit at a specified output power or continuously receive on the channel specified in the test data. For transmit modes the worst case was evaluated.

SETUP DIAGRAM FOR TESTS



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
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/12
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/12
Antenna, Horn, 26.5 GHz	ARA	MMH-1826/B	C00980	07/29/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/12
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/08/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5 (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.

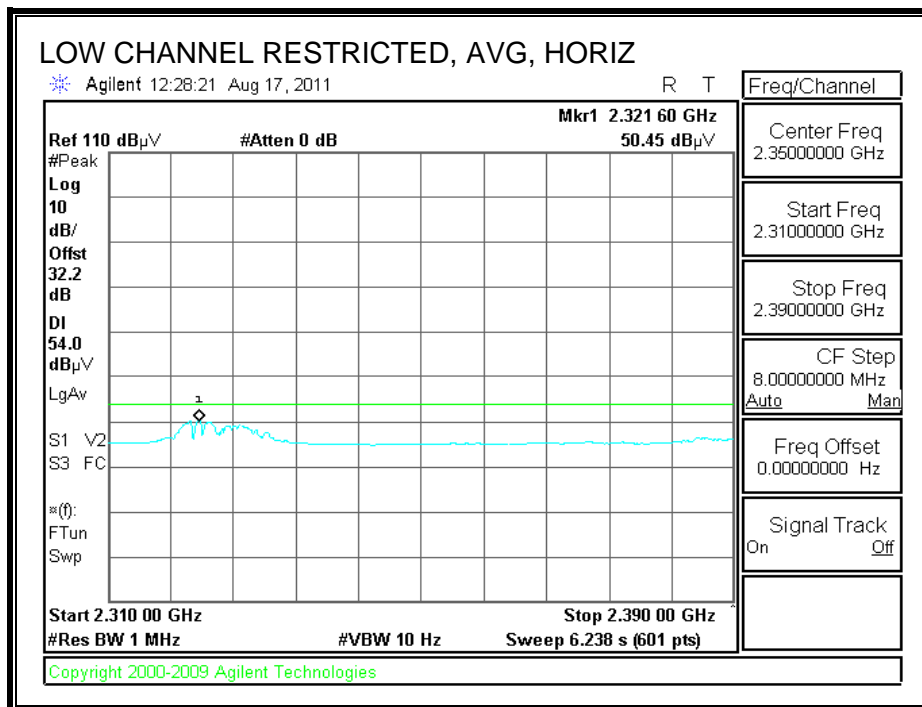
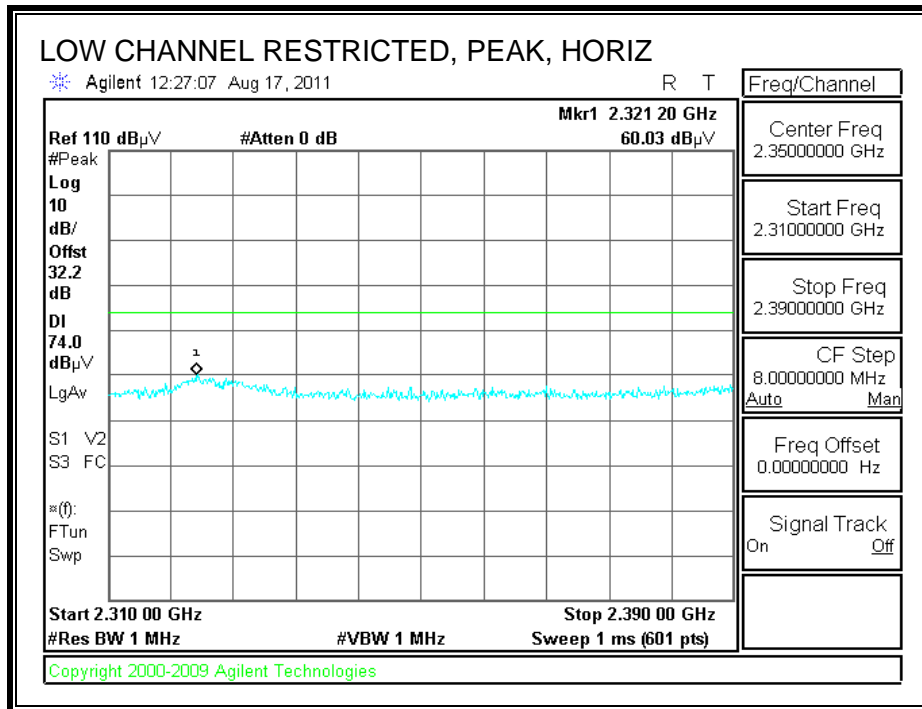
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

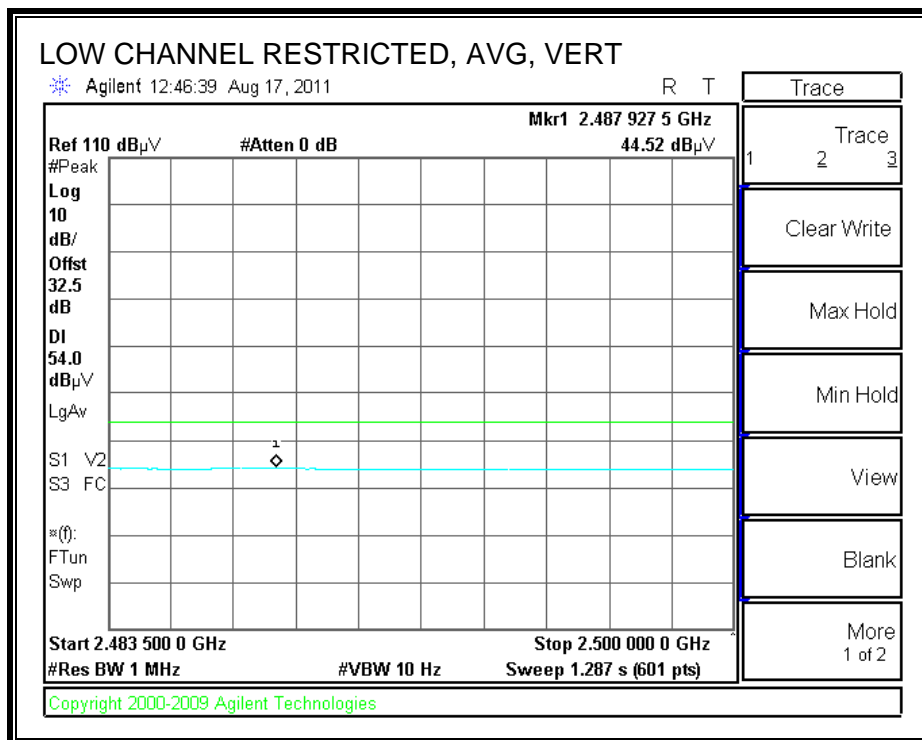
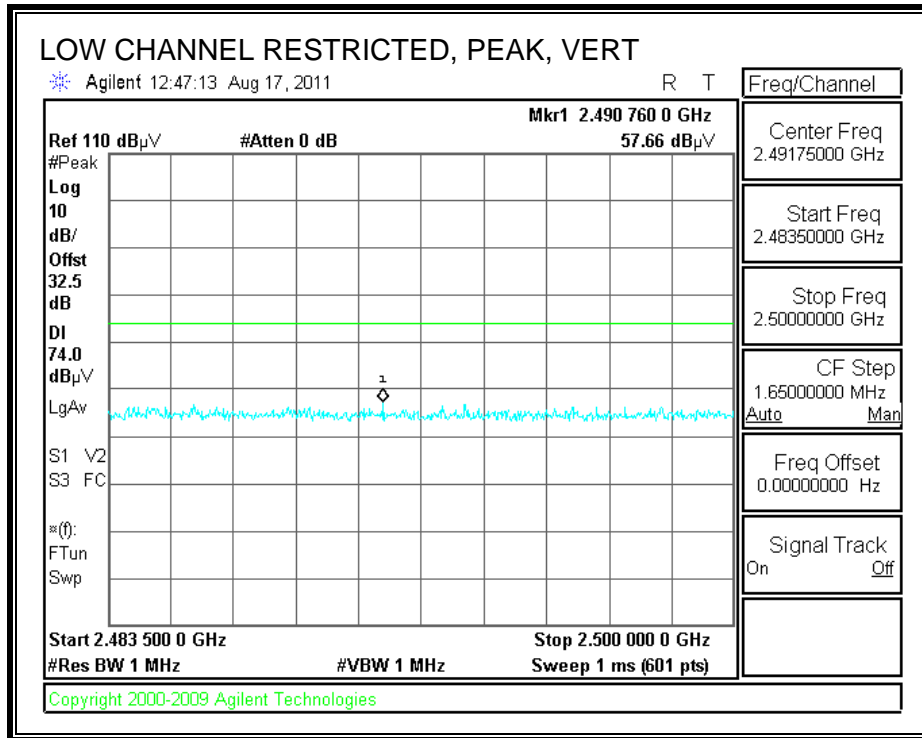
7.2. TRANSMITTER ABOVE 1 GHz

7.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

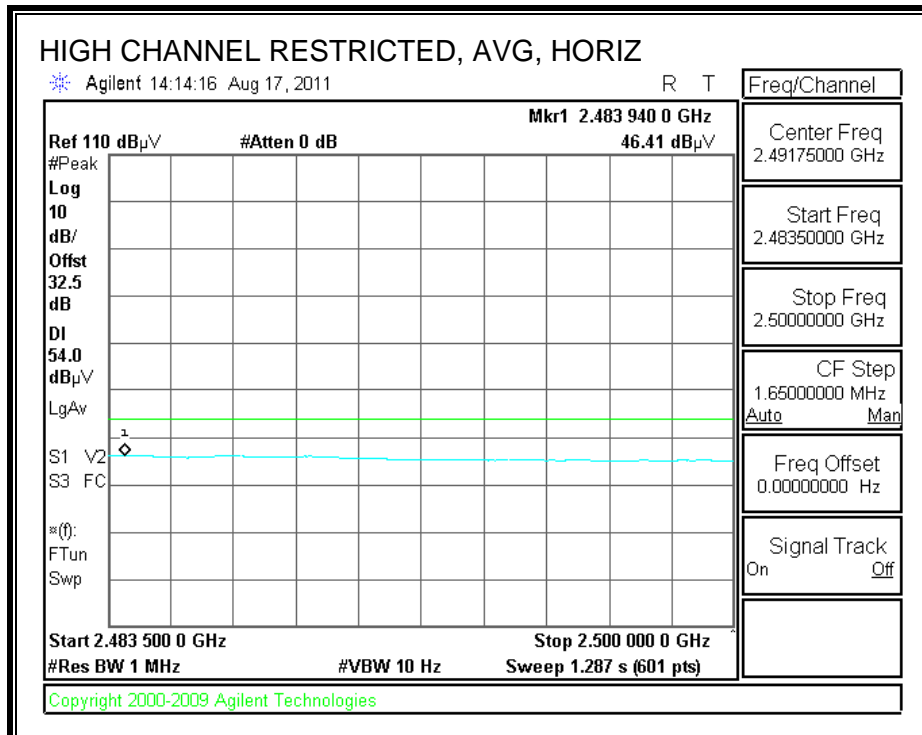
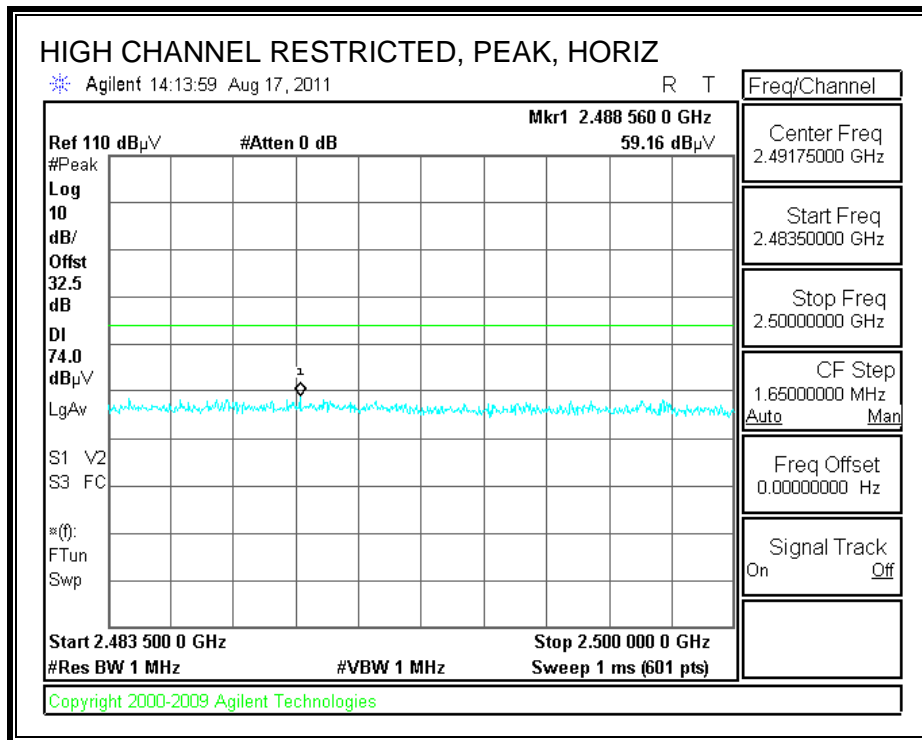
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



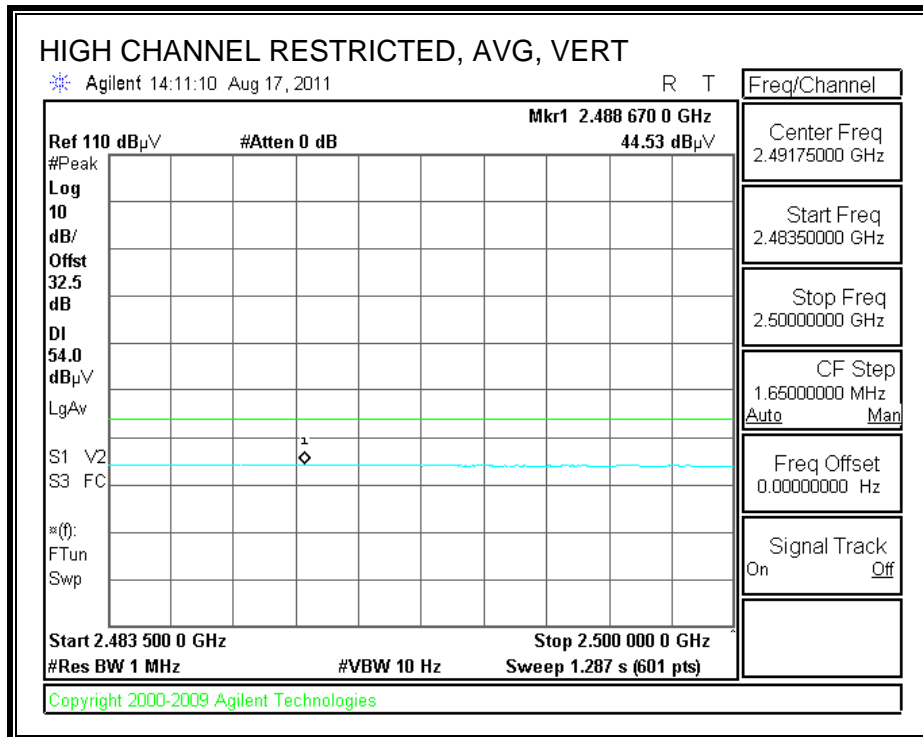
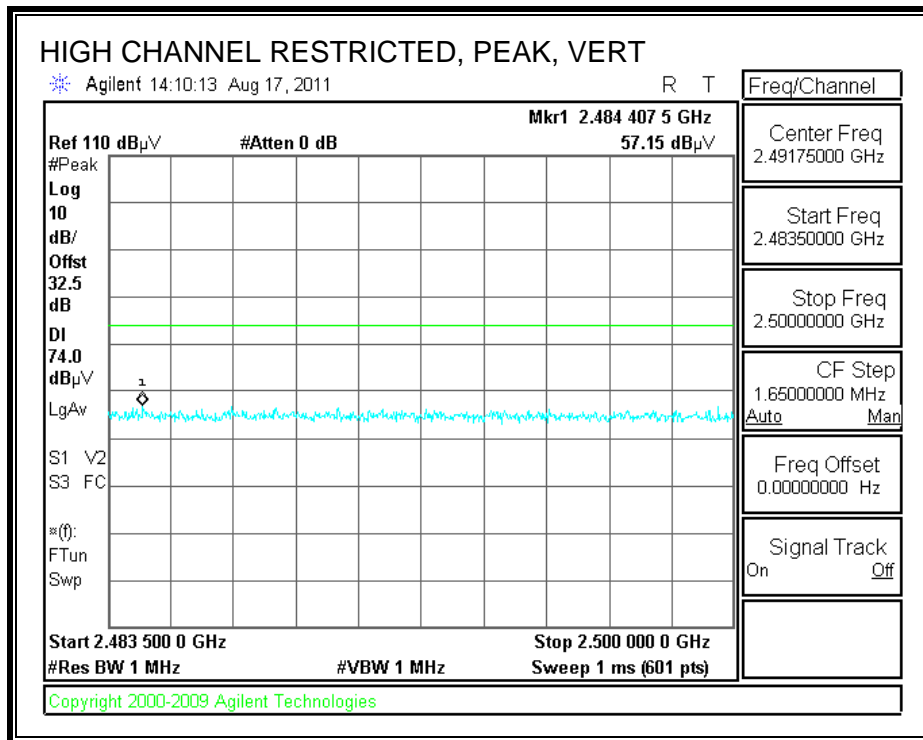
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
 Date: 08/26/11
 Project #: 11J13997
 Company: Panasonic
 Test Target: FCC Class B
 Mode Oper: Tx 11b Mode

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

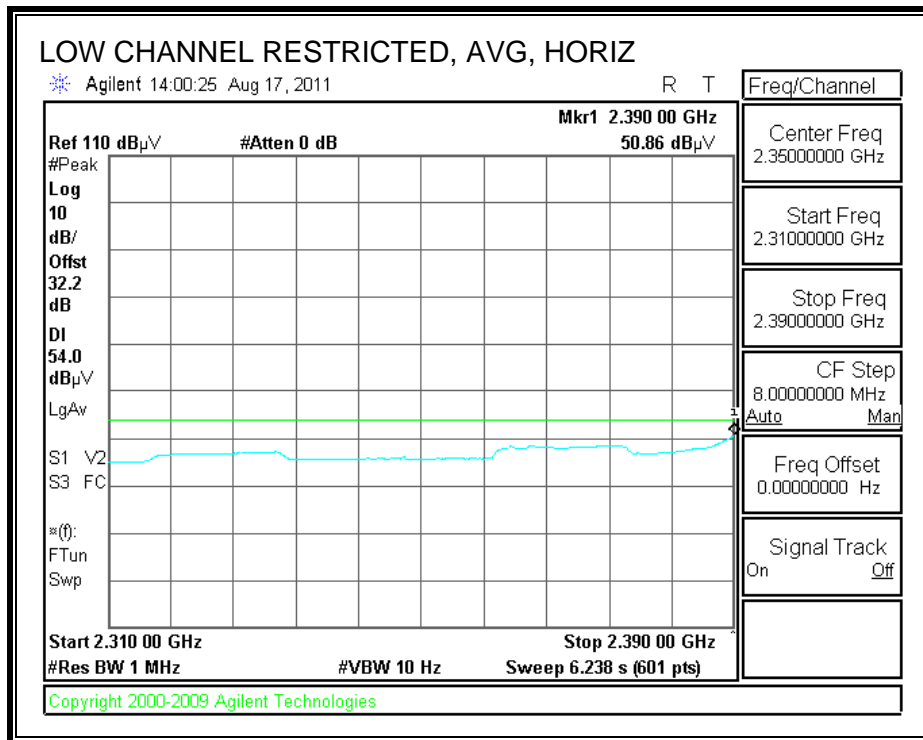
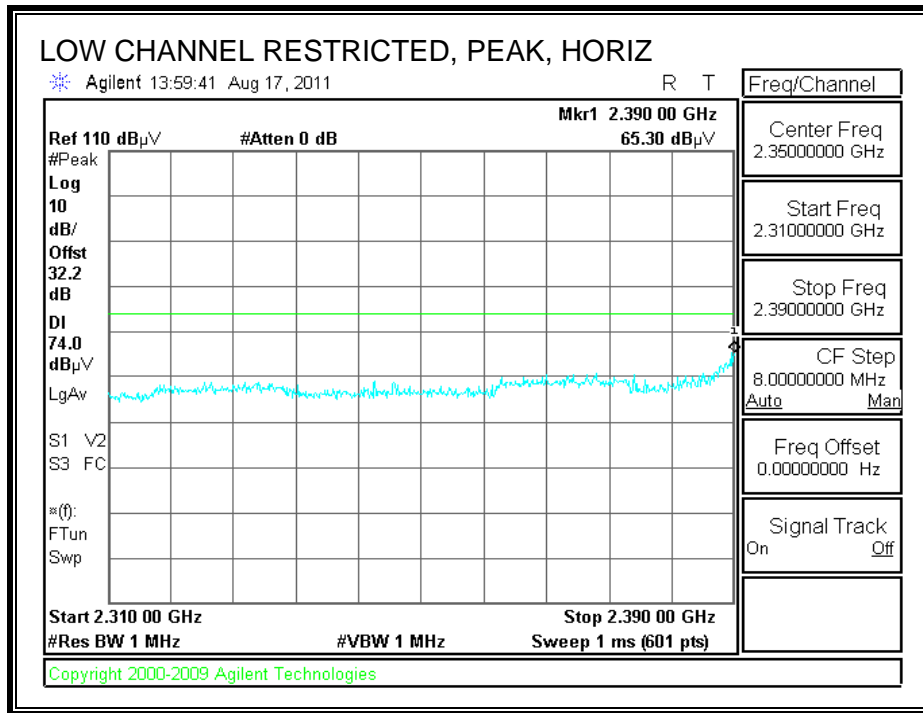
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 2412MHz															
4.824	3.0	46.7	34.6	6.2	-35.5	0.0	0.0	52.0	74.0	-22.0	V	P	100.0	140.7	
4.824	3.0	41.4	34.6	6.2	-35.5	0.0	0.0	46.7	54.0	-7.3	V	A	100.0	140.7	
12.060	3.0	35.5	38.8	11.3	-35.4	0.0	0.0	50.2	74.0	-23.8	V	P	100.5	243.9	
12.060	3.0	23.3	38.8	11.3	-35.4	0.0	0.0	38.0	54.0	-16.0	V	A	100.5	243.9	
4.824	3.0	40.3	34.6	6.2	-35.5	0.0	0.0	45.6	74.0	-28.4	H	P	116.3	72.4	
4.824	3.0	33.4	34.6	6.2	-35.5	0.0	0.0	38.7	54.0	-15.3	H	A	116.3	72.4	
12.060	3.0	34.9	38.8	11.3	-35.4	0.0	0.0	49.5	74.0	-24.5	H	P	100.0	100.8	
12.060	3.0	23.0	38.8	11.3	-35.4	0.0	0.0	37.7	54.0	-16.3	H	A	100.0	100.8	
MID CHANNEL, 2437MHz															
4.874	3.0	47.2	34.7	6.2	-35.5	0.0	0.0	52.6	74.0	-21.4	V	P	100.2	54.5	
4.874	3.0	44.0	34.7	6.2	-35.5	0.0	0.0	49.5	54.0	-4.5	V	A	100.2	54.5	
7.311	3.0	38.8	36.2	8.4	-35.4	0.0	0.0	48.0	74.0	-26.0	V	P	161.9	23.9	
7.311	3.0	28.9	36.2	8.4	-35.4	0.0	0.0	38.1	54.0	-15.9	V	A	161.9	23.9	
4.874	3.0	43.9	34.7	6.2	-35.5	0.0	0.0	49.4	74.0	-24.6	H	P	101.5	68.3	
4.874	3.0	38.8	34.7	6.2	-35.5	0.0	0.0	44.3	54.0	-9.7	H	A	101.5	68.3	
7.311	3.0	38.5	36.2	8.4	-35.4	0.0	0.0	47.7	74.0	-26.3	H	P	158.7	153.4	
7.311	3.0	26.1	36.2	8.4	-35.4	0.0	0.0	35.2	54.0	-18.8	H	A	158.7	153.4	
12.185	3.0	34.7	38.7	11.3	-35.3	0.0	0.0	49.4	74.0	-24.6	H	P	199.5	347.3	
12.185	3.0	22.7	38.7	11.3	-35.3	0.0	0.0	37.4	54.0	-16.6	H	A	199.5	347.3	
HIGH CHANNEL, 2462MHz															
4.924	3.0	43.1	34.8	6.3	-35.5	0.0	0.0	48.7	74.0	-25.3	V	P	100.0	56.2	
4.924	3.0	38.8	34.8	6.3	-35.5	0.0	0.0	44.4	54.0	-9.6	V	A	100.0	56.2	
7.386	3.0	37.3	36.3	8.4	-35.5	0.0	0.0	46.6	74.0	-27.4	V	P	200.0	266.6	
7.386	3.0	25.1	36.3	8.4	-35.5	0.0	0.0	34.3	54.0	-19.7	V	A	200.0	266.6	
4.924	3.0	42.4	34.8	6.3	-35.5	0.0	0.0	48.0	74.0	-26.0	H	P	100.7	52.3	
4.924	3.0	37.0	34.8	6.3	-35.5	0.0	0.0	42.6	54.0	-11.4	H	A	100.7	52.3	
7.386	3.0	38.0	36.3	8.4	-35.5	0.0	0.0	47.3	74.0	-26.7	H	P	112.1	11.0	
7.386	3.0	25.0	36.3	8.4	-35.5	0.0	0.0	34.3	54.0	-19.7	H	A	112.1	11.0	

Rev. 4.1.2.7

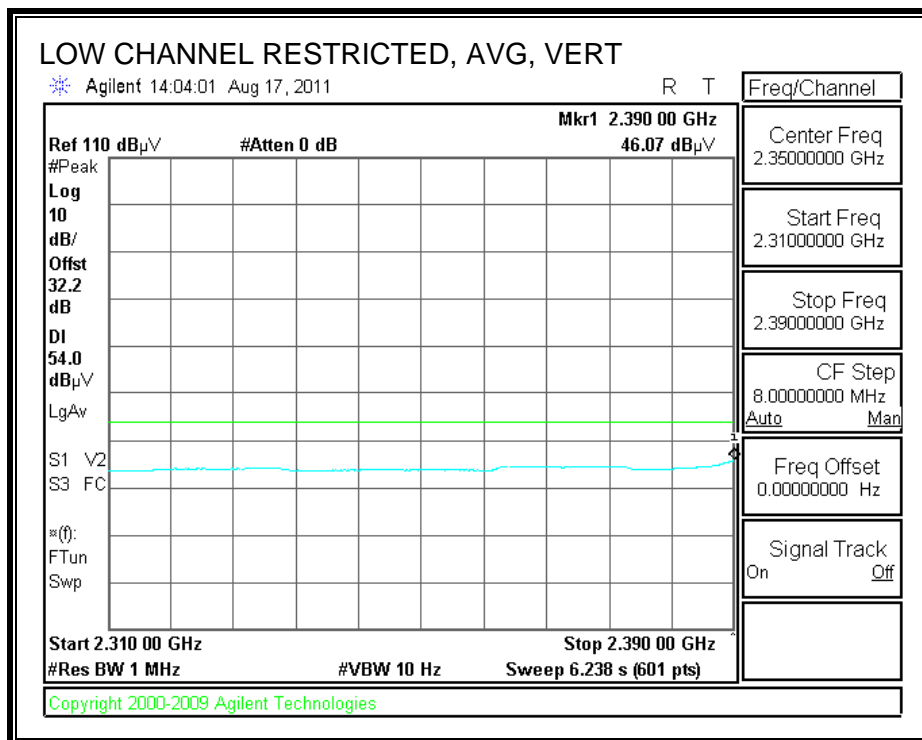
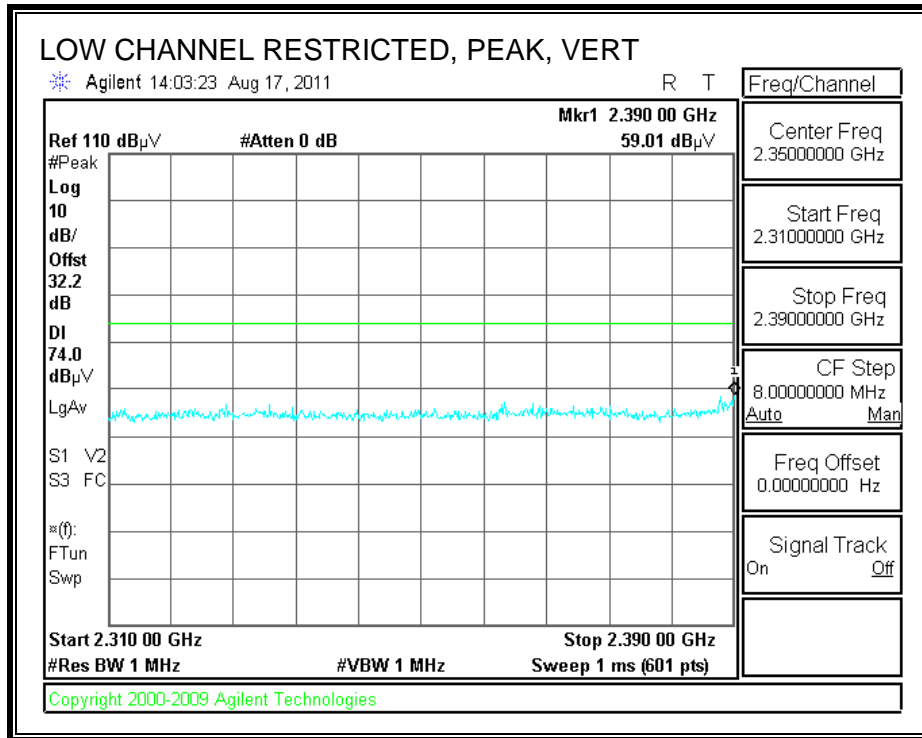
Note: No other emissions were detected above the system noise floor.

7.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

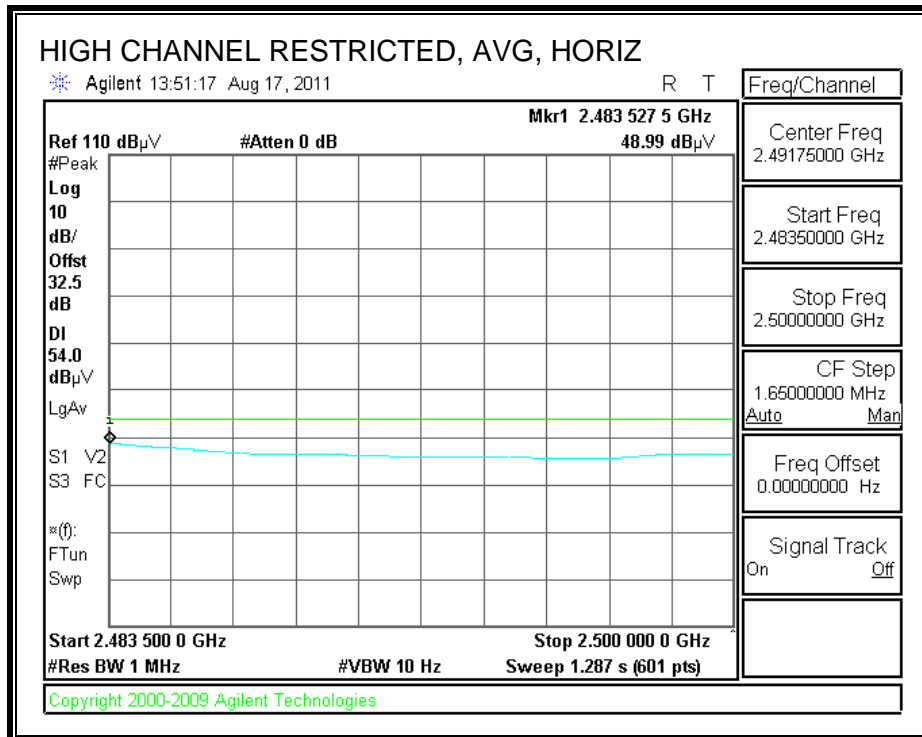
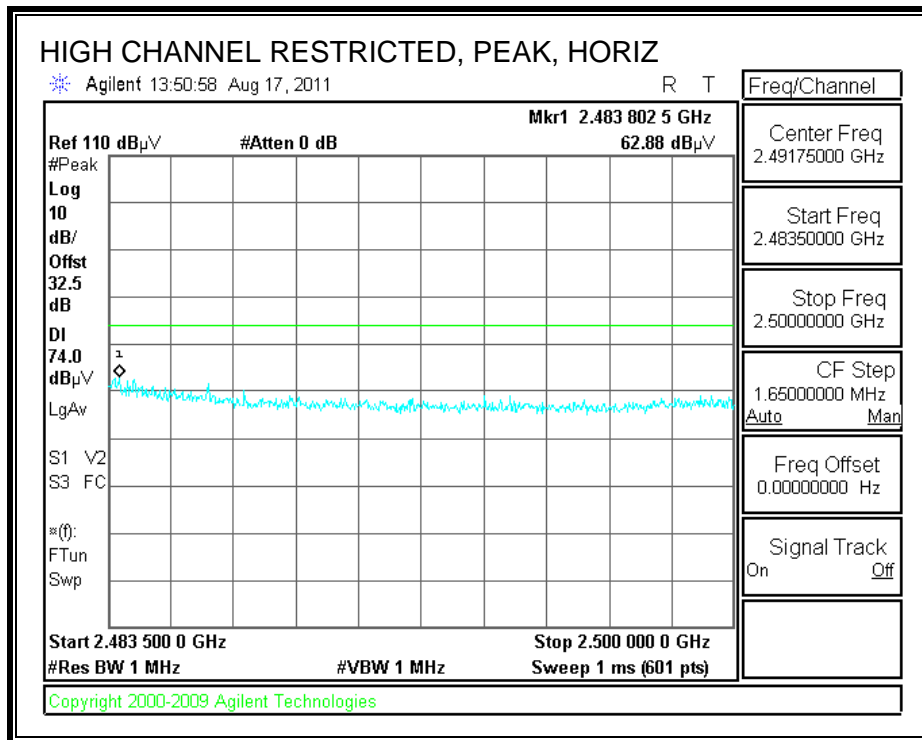
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



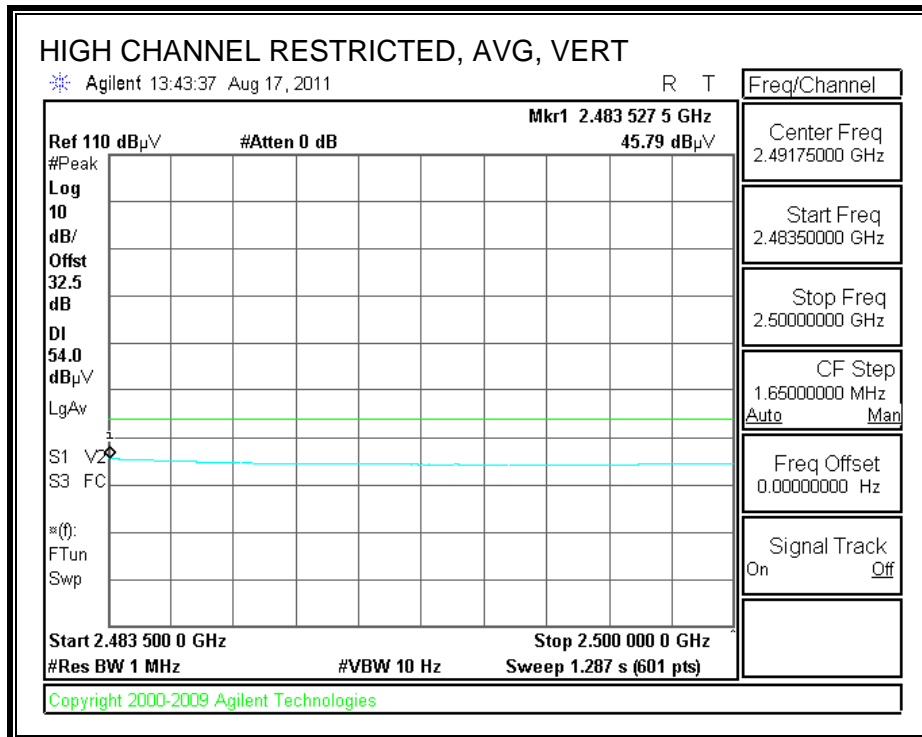
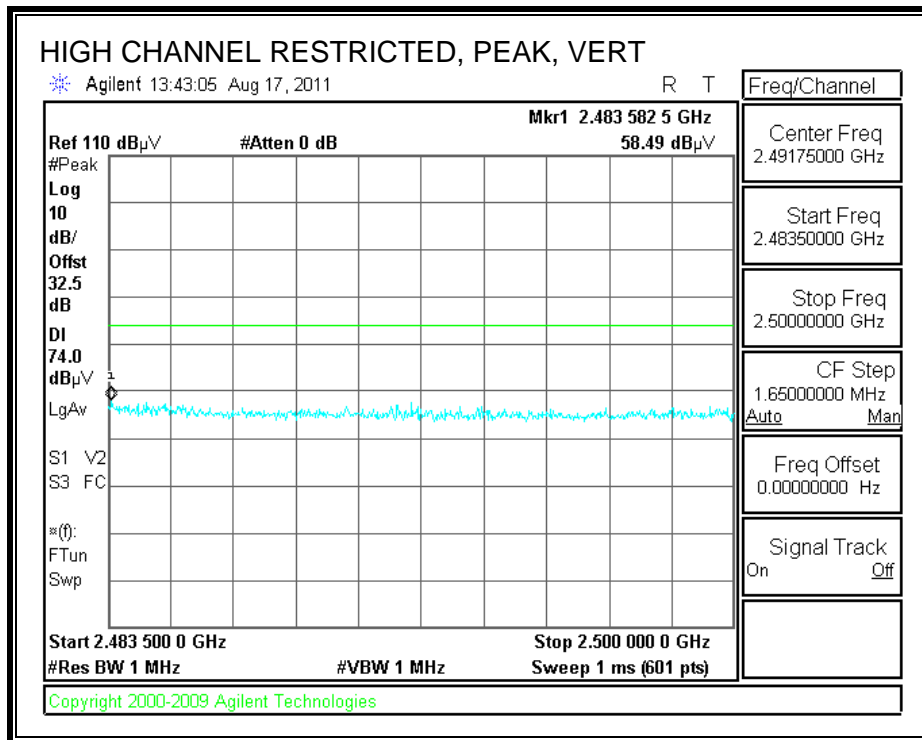
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

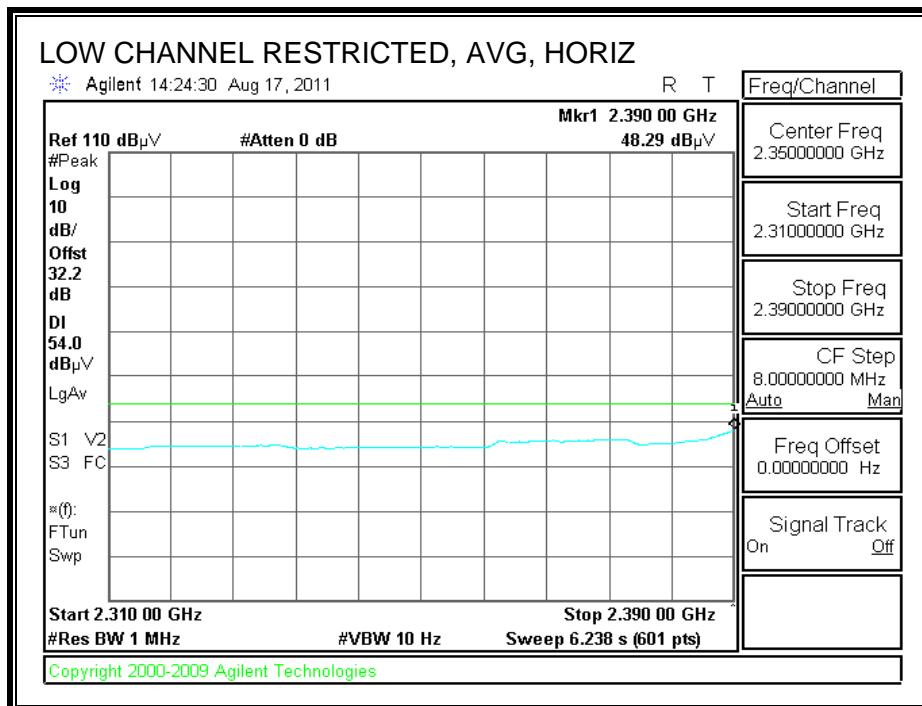
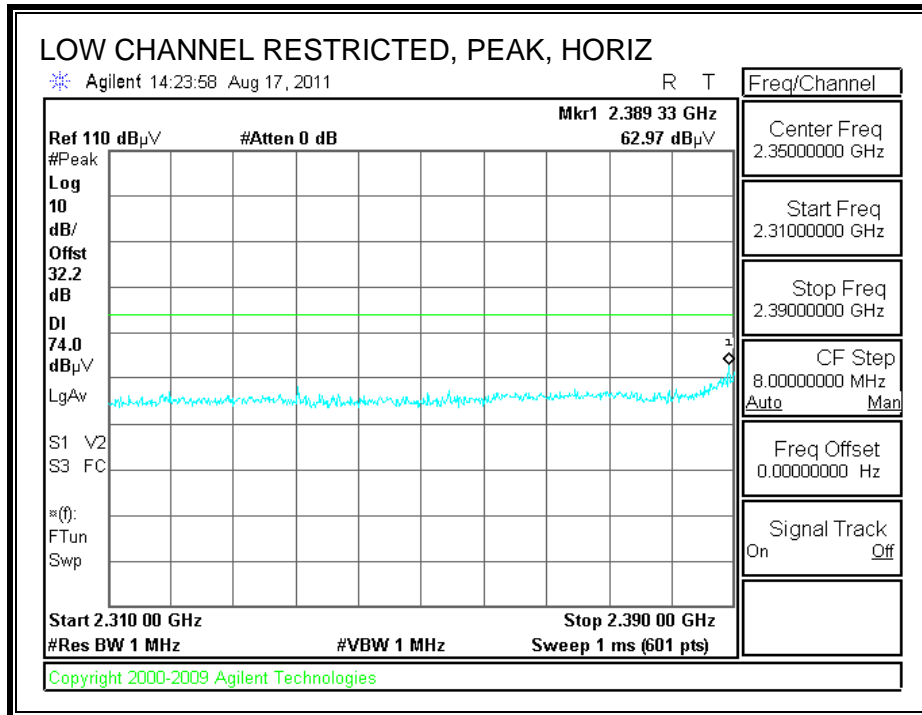
High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Test Engr:		Vien Tran													
Date:		08/26/11													
Project #:		11J13997													
Company:		Panasonic													
Test Target:		FCC Class B													
Mode Oper:		Tx 11g Mode													
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit											
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit											
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit											
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit											
CL	Cable Loss	HPF	High Pass Filter												
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 2412MHz															
4.824	3.0	43.2	34.6	6.2	-35.5	0.0	0.0	48.5	74.0	-25.5	V	P	100.0	139.9	
4.824	3.0	29.6	34.6	6.2	-35.5	0.0	0.0	35.0	54.0	-19.0	V	A	100.0	139.9	
12.060	3.0	35.3	38.8	11.3	-35.4	0.0	0.0	50.0	74.0	-24.0	V	P	181.0	70.9	
12.060	3.0	23.1	38.8	11.3	-35.4	0.0	0.0	37.7	54.0	-16.3	V	A	181.0	70.9	
4.824	3.0	38.5	34.6	6.2	-35.5	0.0	0.0	43.9	74.0	-30.1	H	P	100.0	94.8	
4.824	3.0	26.0	34.6	6.2	-35.5	0.0	0.0	31.3	54.0	-22.7	H	A	100.0	94.8	
MID CHANNEL, 2437MHz															
4.874	3.0	49.9	34.7	6.2	-35.5	0.0	0.0	55.3	74.0	-18.7	V	P	100.4	68.5	
4.874	3.0	35.7	34.7	6.2	-35.5	0.0	0.0	41.2	54.0	-12.8	V	A	100.4	68.5	
7.311	3.0	42.0	36.2	8.4	-35.4	0.0	0.0	51.2	74.0	-22.8	V	P	139.0	4.7	
7.311	3.0	28.2	36.2	8.4	-35.4	0.0	0.0	37.3	54.0	-16.7	V	A	139.0	4.7	
12.185	3.0	34.8	38.7	11.3	-35.3	0.0	0.0	49.5	74.0	-24.5	V	P	136.8	131.7	
12.185	3.0	22.8	38.7	11.3	-35.3	0.0	0.0	37.5	54.0	-16.5	V	A	136.8	131.7	
4.874	3.0	39.5	34.7	6.2	-35.5	0.0	0.0	45.0	74.0	-29.0	H	P	100.6	87.1	
4.874	3.0	27.8	34.7	6.2	-35.5	0.0	0.0	33.2	54.0	-20.8	H	A	100.6	87.1	
7.311	3.0	39.0	36.2	8.4	-35.4	0.0	0.0	48.2	74.0	-25.8	H	P	100.0	305.7	
7.311	3.0	27.2	36.2	8.4	-35.4	0.0	0.0	36.3	54.0	-17.7	H	A	100.0	305.7	
HIGH CHANNEL, 2462MHz															
4.924	3.0	37.5	34.8	6.3	-35.5	0.0	0.0	43.0	74.0	-31.0	V	P	101.4	176.0	
4.924	3.0	25.9	34.8	6.3	-35.5	0.0	0.0	31.5	54.0	-22.5	V	A	101.4	176.0	
7.386	3.0	37.3	36.3	8.4	-35.5	0.0	0.0	46.6	74.0	-27.4	V	P	101.3	290.4	
7.386	3.0	25.2	36.3	8.4	-35.5	0.0	0.0	34.5	54.0	-19.5	V	A	101.3	290.4	
4.924	3.0	37.0	34.8	6.3	-35.5	0.0	0.0	42.6	74.0	-31.4	H	P	100.8	311.0	
4.924	3.0	25.5	34.8	6.3	-35.5	0.0	0.0	31.0	54.0	-23.0	H	A	100.8	311.0	
7.386	3.0	37.6	36.3	8.4	-35.5	0.0	0.0	46.9	74.0	-27.1	H	P	110.7	225.4	
7.386	3.0	25.2	36.3	8.4	-35.5	0.0	0.0	34.5	54.0	-19.5	H	A	110.7	225.4	

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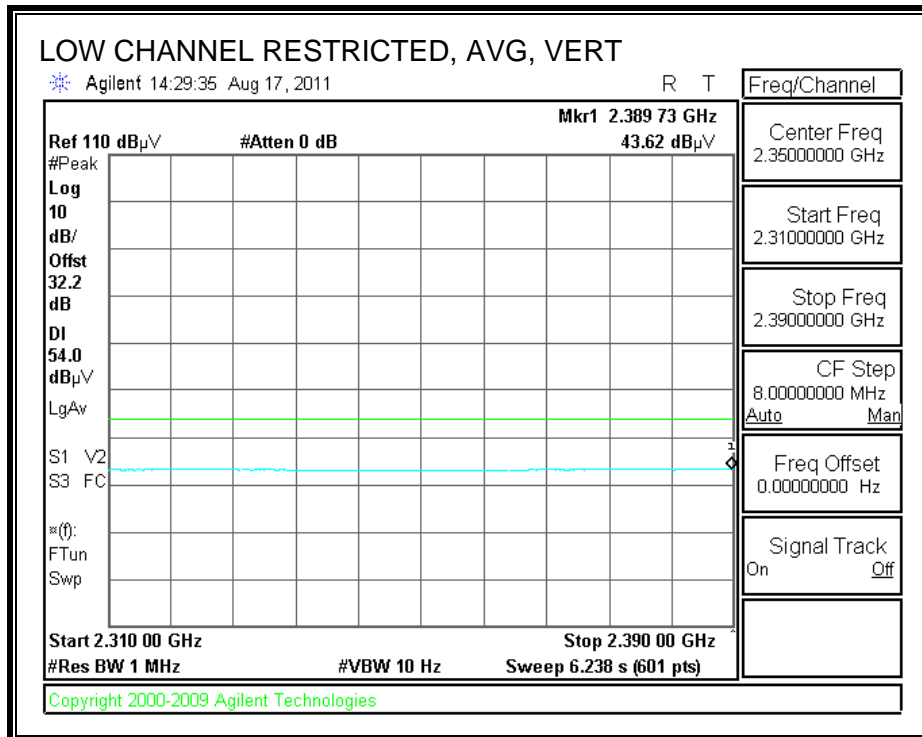
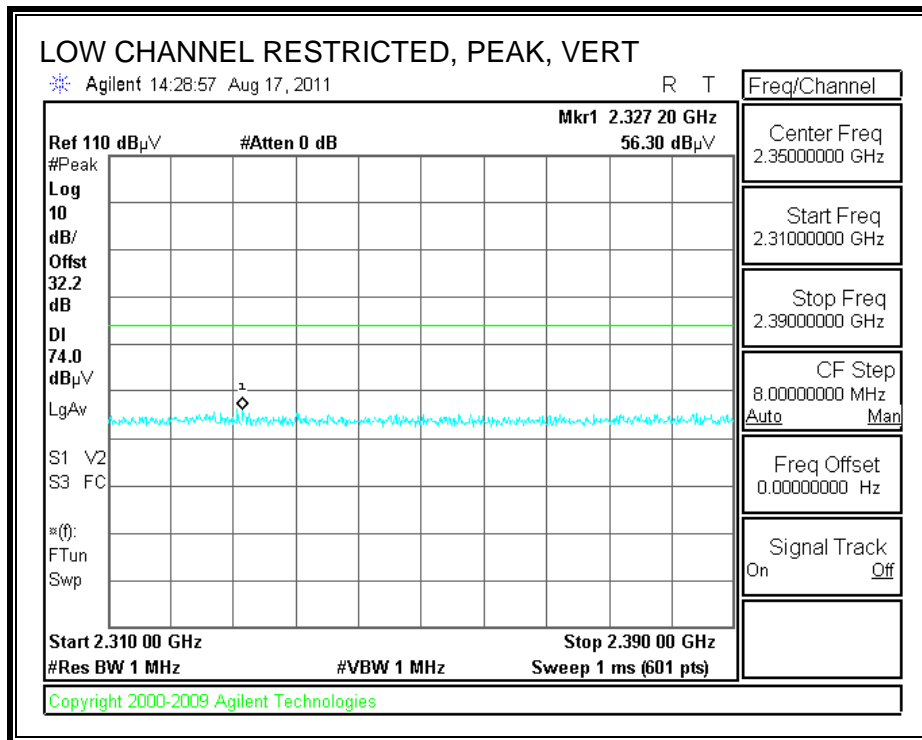
Note: No other emissions were detected above the system noise floor.

7.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

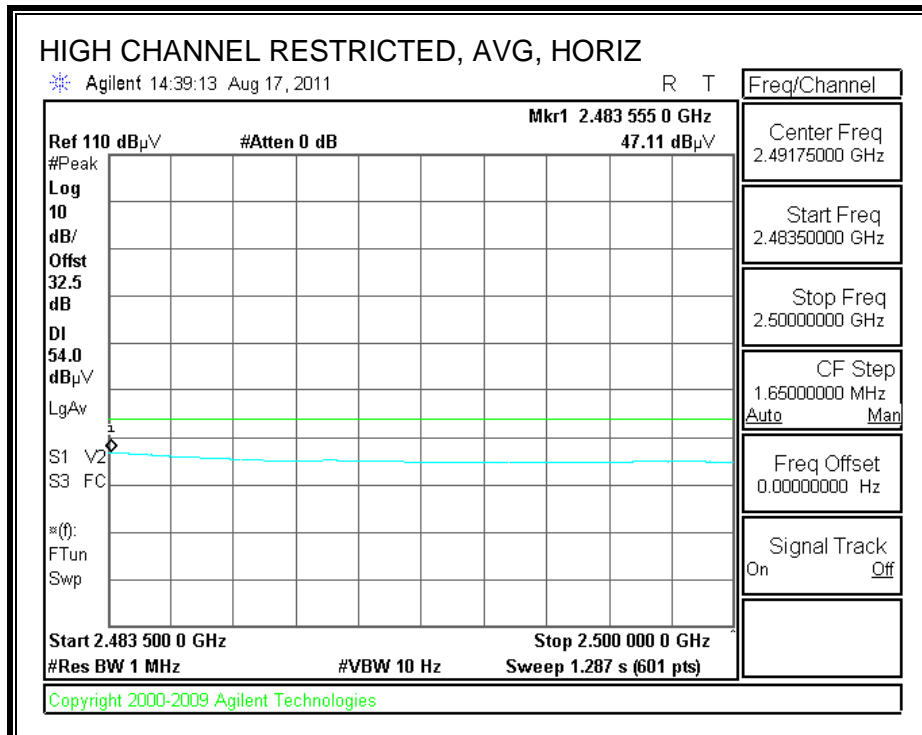
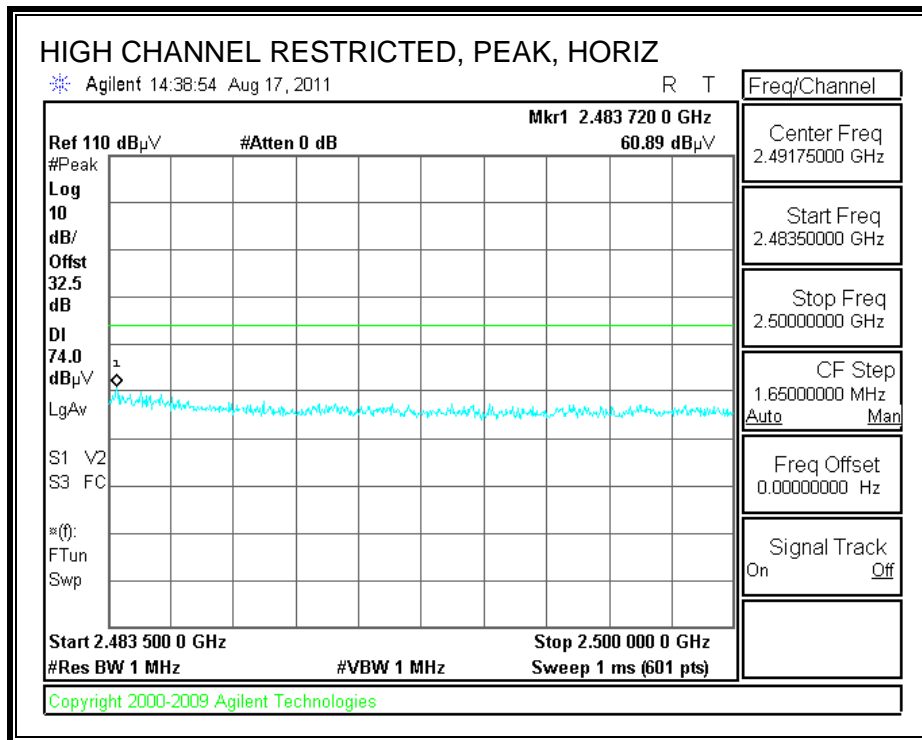
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



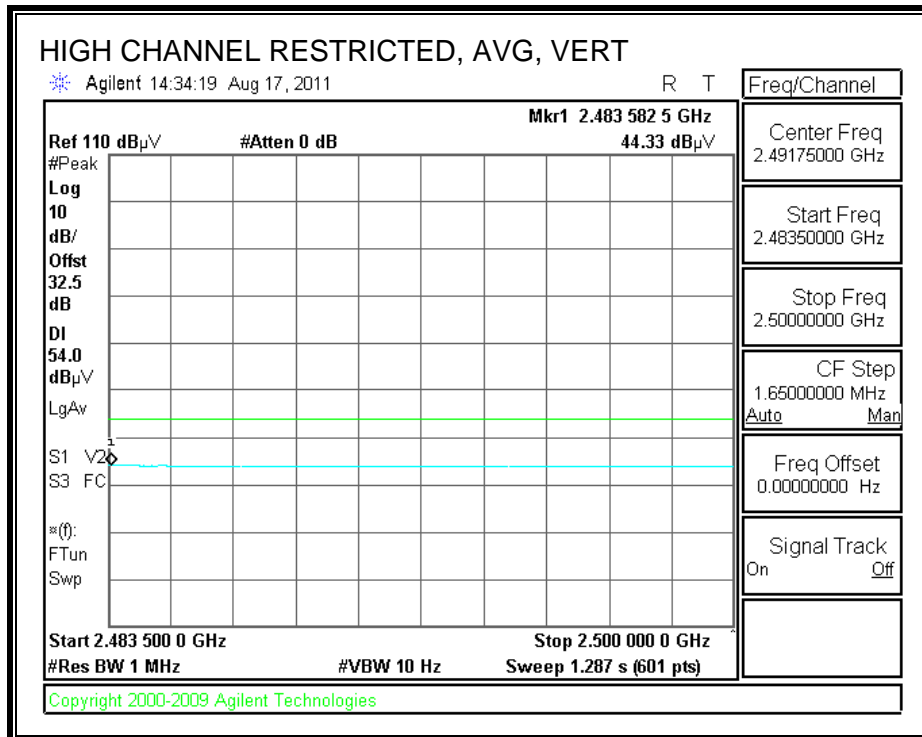
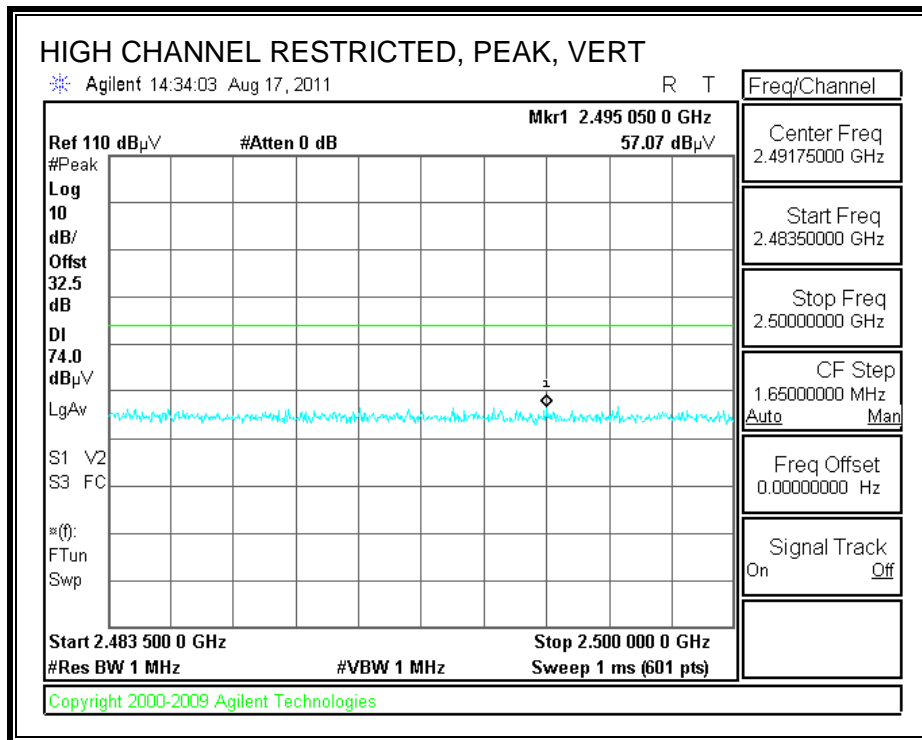
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
 Date: 08/26/11
 Project #: 11J13997
 Company: Panasonic
 Test Target: FCC Class B
 Mode Oper: Tx 11n HT20 Mode

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

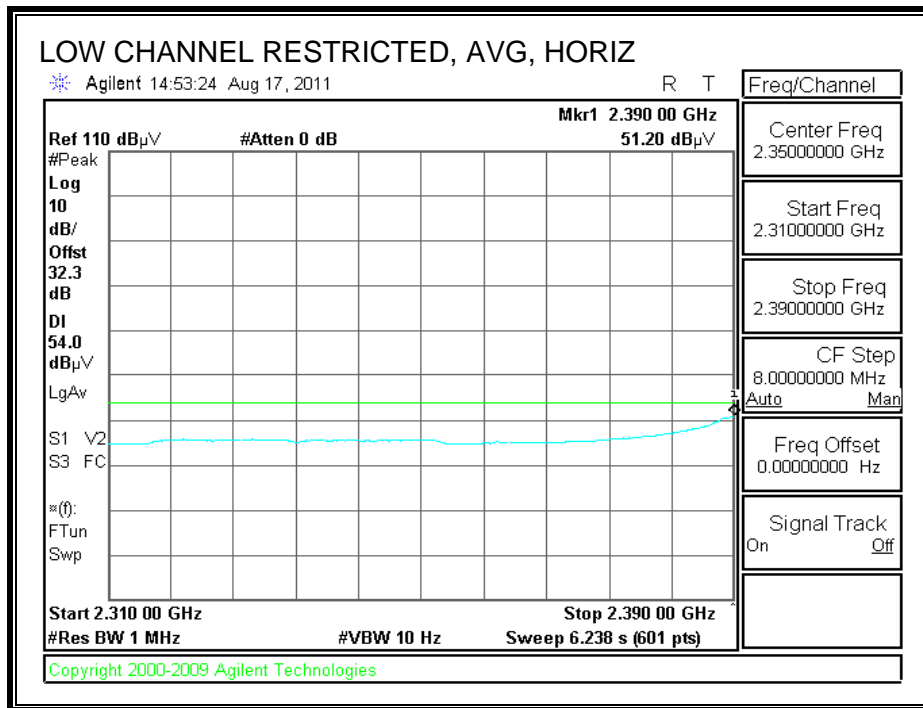
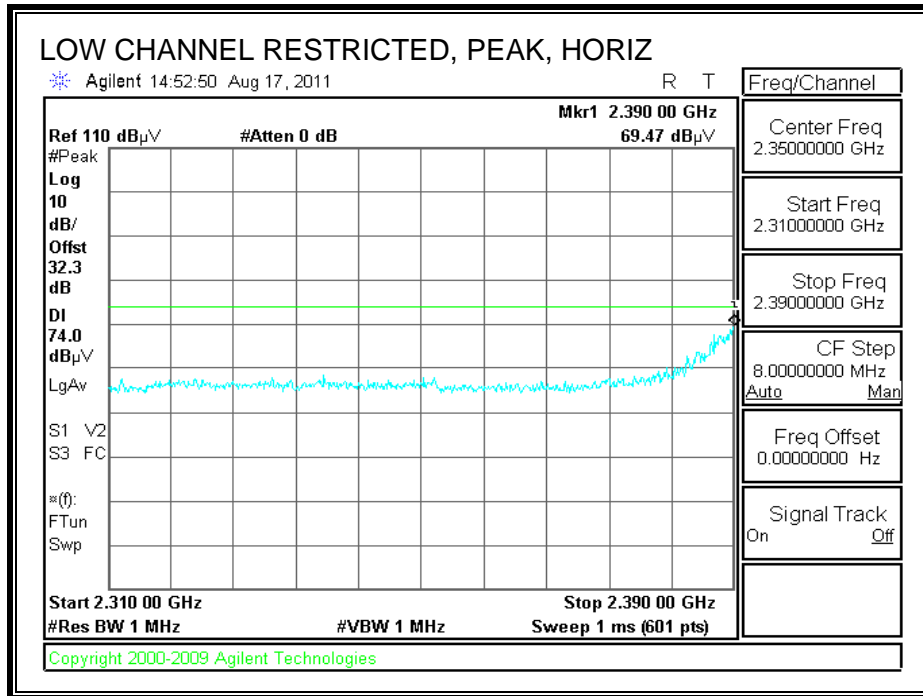
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
LOW CHANNEL, 2412MHZMHz															
4.824	3.0	38.3	34.6	6.2	-35.5	0.0	0.0	43.6	74.0	-30.4	V	P	162.0	212.9	
4.824	3.0	26.0	34.6	6.2	-35.5	0.0	0.0	31.3	54.0	-22.7	V	A	162.0	212.9	
4.824	3.0	37.8	34.6	6.2	-35.5	0.0	0.0	43.2	74.0	-30.8	H	P	159.1	156.1	
4.824	3.0	25.5	34.6	6.2	-35.5	0.0	0.0	30.8	54.0	-23.2	H	A	159.1	156.1	
MID CHANNEL, 2437MHZMHz															
4.874	3.0	39.2	34.7	6.2	-35.5	0.0	0.0	44.7	74.0	-29.3	V	P	100.1	64.8	
4.874	3.0	27.0	34.7	6.2	-35.5	0.0	0.0	32.4	54.0	-21.6	V	A	100.1	64.8	
7.311	3.0	38.0	36.2	8.4	-35.4	0.0	0.0	47.1	74.0	-26.9	V	P	197.5	211.6	
7.311	3.0	25.2	36.2	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	V	A	197.5	211.6	
4.874	3.0	37.9	34.7	6.2	-35.5	0.0	0.0	43.3	74.0	-30.7	H	P	190.7	249.7	
4.874	3.0	25.5	34.7	6.2	-35.5	0.0	0.0	31.0	54.0	-23.0	H	A	190.7	249.7	
7.311	3.0	37.7	36.2	8.4	-35.4	0.0	0.0	46.8	74.0	-27.2	H	P	193.4	30.6	
7.311	3.0	25.2	36.2	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	H	A	193.4	30.6	
HIGH CHANNEL, 2462MHZMHz															
4.924	3.0	37.9	34.8	6.3	-35.5	0.0	0.0	43.5	74.0	-30.5	V	P	131.0	233.8	
4.924	3.0	25.4	34.8	6.3	-35.5	0.0	0.0	31.0	54.0	-23.0	V	A	131.0	233.8	
7.386	3.0	37.3	36.3	8.4	-35.5	0.0	0.0	46.5	74.0	-27.5	V	P	178.6	309.0	
7.386	3.0	25.1	36.3	8.4	-35.5	0.0	0.0	34.4	54.0	-19.6	V	A	178.6	309.0	
4.924	3.0	37.6	34.8	6.3	-35.5	0.0	0.0	43.1	74.0	-30.9	H	P	190.7	350.7	
4.924	3.0	25.4	34.8	6.3	-35.5	0.0	0.0	31.0	54.0	-23.0	H	A	190.7	350.7	
4.924	3.0	38.4	34.8	6.3	-35.5	0.0	0.0	43.9	74.0	-30.1	H	P	150.3	299.5	
4.924	3.0	25.4	34.8	6.3	-35.5	0.0	0.0	31.0	54.0	-23.0	H	A	150.3	299.5	
7.386	3.0	37.6	36.3	8.4	-35.5	0.0	0.0	46.9	74.0	-27.1	H	P	180.6	17.2	
7.386	3.0	25.1	36.3	8.4	-35.5	0.0	0.0	34.4	54.0	-19.6	H	A	180.6	17.2	

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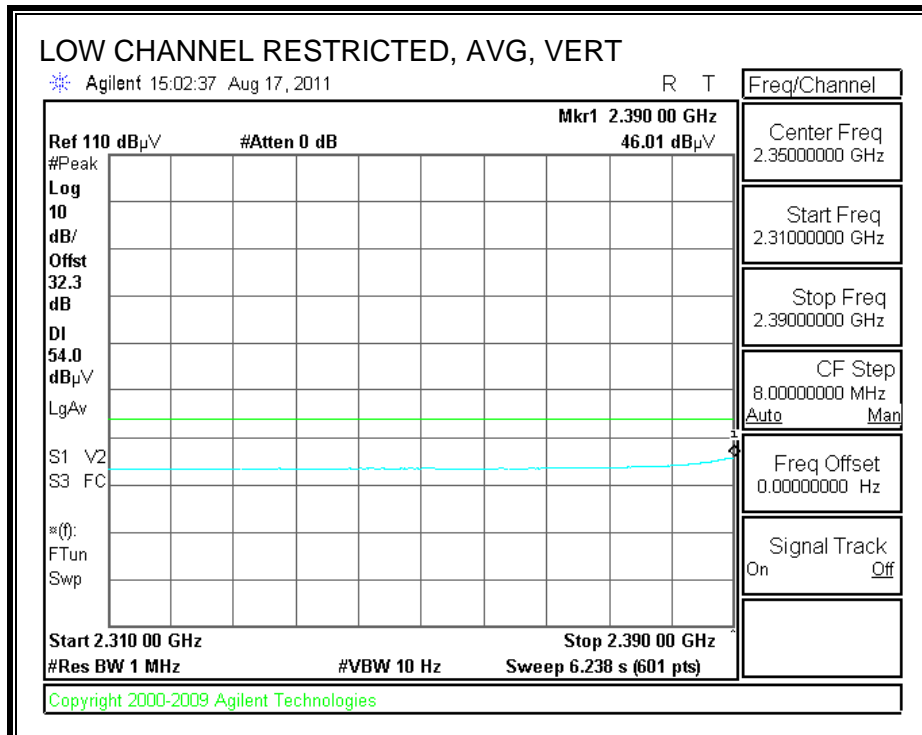
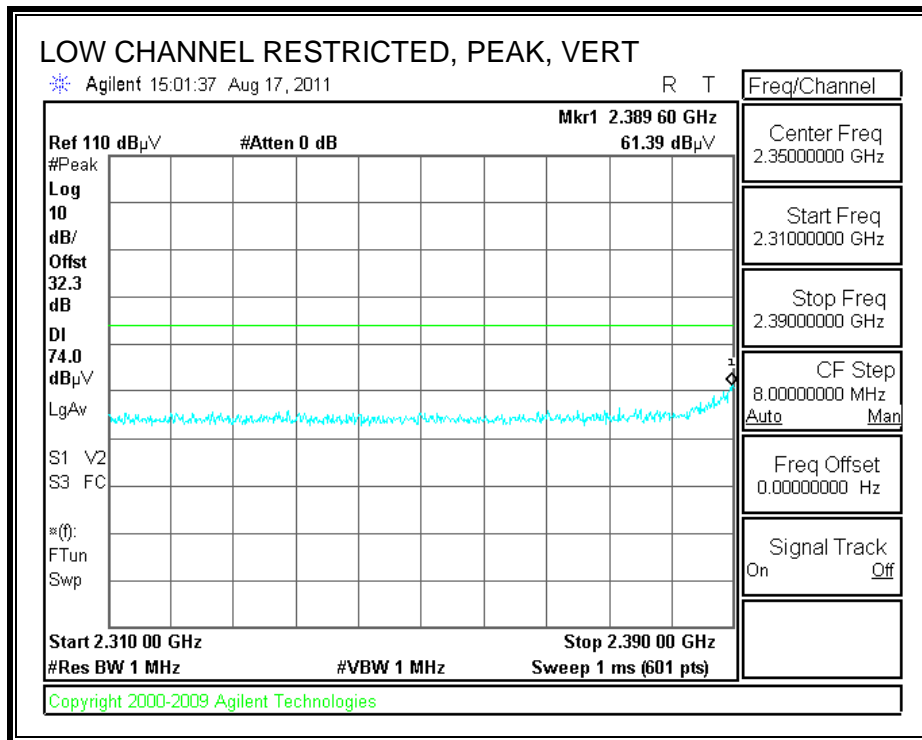
Note: No other emissions were detected above the system noise floor.

7.2.4. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

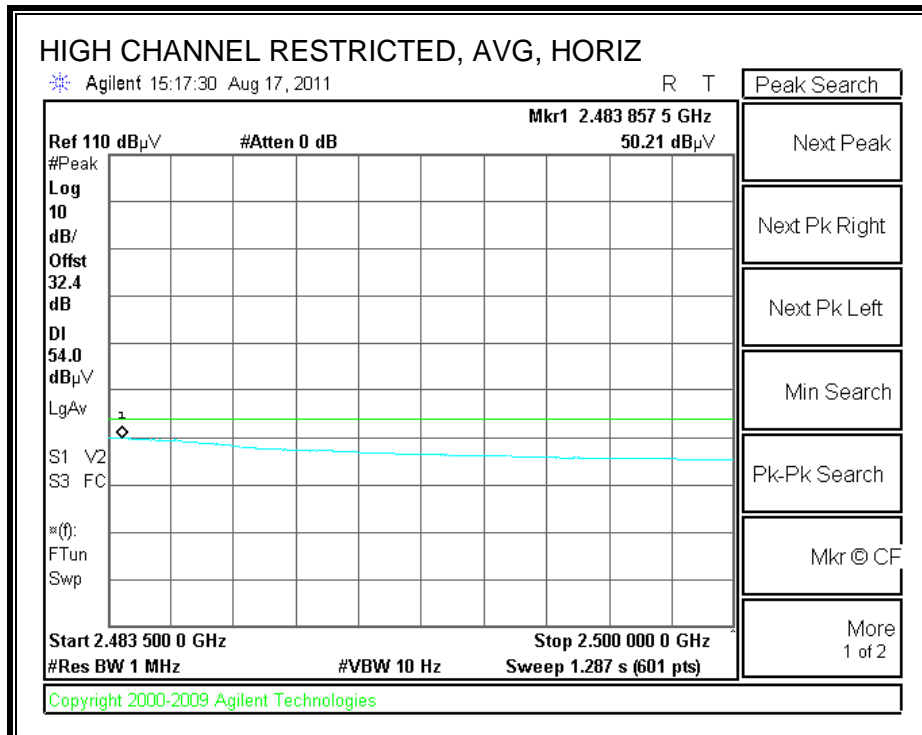
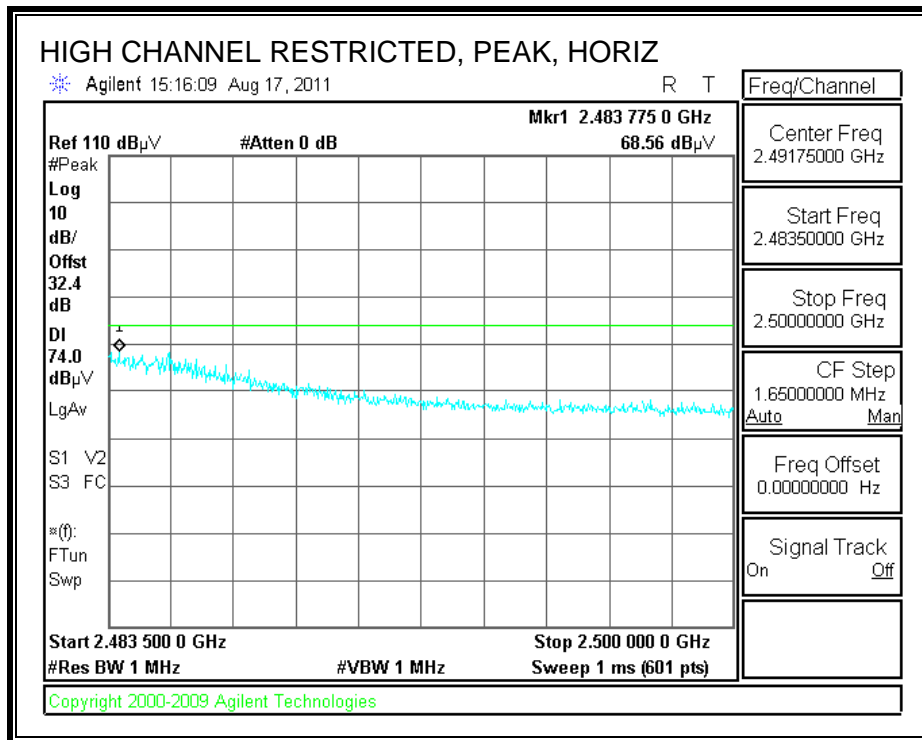
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



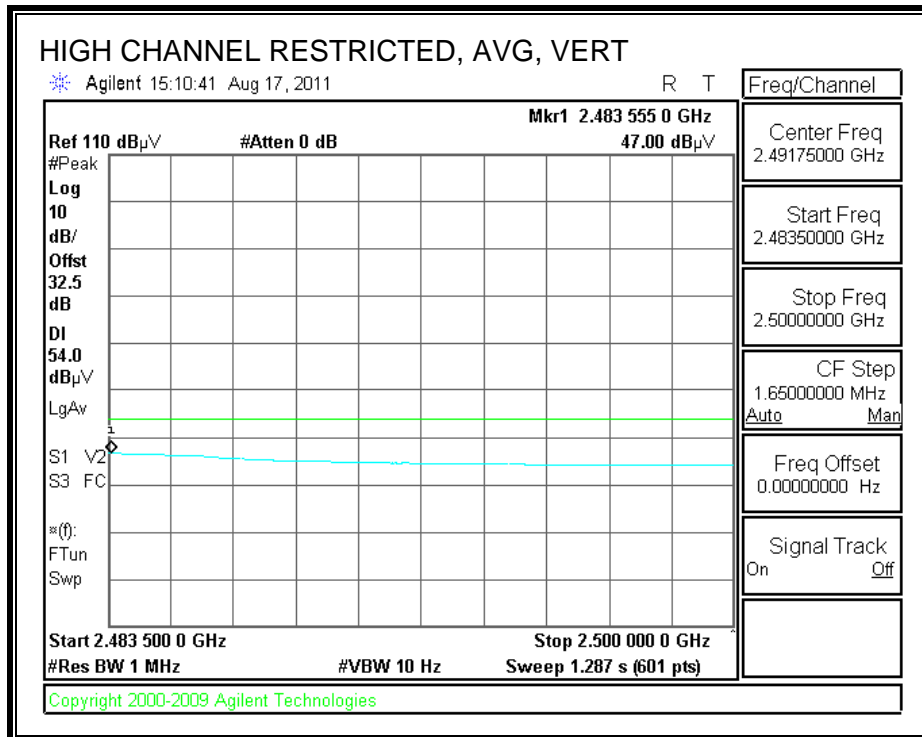
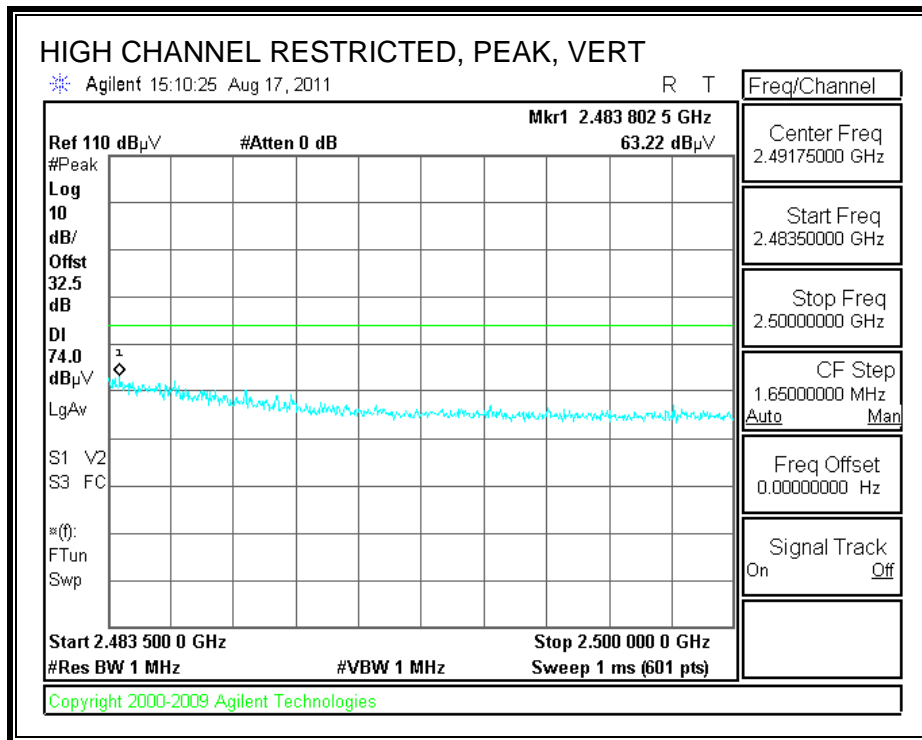
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Test Engr:		Vien Tran													
Date:		08/26/11													
Project #:		11J13997													
Company:		Panasonic													
Test Target:		FCC Class B													
Mode Oper:		Tx 11n HT40 Mode													
f	Measurement Frequency		Amp	Preamp Gain		Average Field Strength Limit									
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Peak Field Strength Limit									
Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Margin vs. Average Limit									
AF	Antenna Factor		Peak	Calculated Peak Field Strength		Margin vs. Peak Limit									
CL	Cable Loss		HPF	High Pass Filter											
f	Dist	Read	AF	CL	Amp	D Corr	Filtr	Corr.	Limit	Margin	Ant. Pol.	Det.	Ant.High	Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	cm	Degree	
LOW CHANNEL, 2422MHZMHz															
4.844	3.0	39.3	34.6	6.2	-35.5	0.0	0.0	44.6	74.0	-29.4	H	P	108.7	38.8	
4.844	3.0	25.9	34.6	6.2	-35.5	0.0	0.0	31.2	54.0	-22.8	H	A	108.7	38.8	
4.844	3.0	38.7	34.6	6.2	-35.5	0.0	0.0	44.0	74.0	-30.0	H	P	105.6	5.0	
4.844	3.0	25.7	34.6	6.2	-35.5	0.0	0.0	31.0	54.0	-23.0	H	A	105.6	5.0	
MID CHANNEL, 2437MHZMHz															
4.874	3.0	38.8	34.7	6.2	-35.5	0.0	0.0	44.3	74.0	-29.7	V	P	107.1	124.4	
4.874	3.0	26.5	34.7	6.2	-35.5	0.0	0.0	32.0	54.0	-22.0	V	A	107.1	124.4	
7.311	3.0	38.1	36.2	8.4	-35.4	0.0	0.0	47.2	74.0	-26.8	V	P	157.4	343.8	
7.311	3.0	25.3	36.2	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	V	A	157.4	343.8	
4.874	3.0	37.6	34.7	6.2	-35.5	0.0	0.0	43.0	74.0	-31.0	H	P	133.6	147.8	
4.874	3.0	25.7	34.7	6.2	-35.5	0.0	0.0	31.1	54.0	-22.9	H	A	133.6	147.8	
7.311	3.0	37.8	36.2	8.4	-35.4	0.0	0.0	47.0	74.0	-27.0	H	P	194.9	153.3	
7.311	3.0	25.3	36.2	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	H	A	194.9	153.3	
HIGH CHANNEL, 2452MHZMHz															
4.904	3.0	37.4	34.8	6.3	-35.5	0.0	0.0	43.0	74.0	-31.0	V	P	100.8	179.5	
4.904	3.0	25.4	34.8	6.3	-35.5	0.0	0.0	30.9	54.0	-23.1	V	A	100.8	179.5	
7.356	3.0	37.6	36.3	8.4	-35.4	0.0	0.0	46.9	74.0	-27.1	V	P	193.9	69.4	
7.356	3.0	25.2	36.3	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	V	A	193.9	69.4	
4.904	3.0	37.5	34.8	6.3	-35.5	0.0	0.0	43.0	74.0	-31.0	H	P	122.5	184.1	
4.904	3.0	25.3	34.8	6.3	-35.5	0.0	0.0	30.9	54.0	-23.1	H	A	122.5	184.1	
7.356	3.0	37.4	36.3	8.4	-35.4	0.0	0.0	46.6	74.0	-27.4	H	P	122.5	184.1	
7.356	3.0	25.2	36.3	8.4	-35.4	0.0	0.0	34.4	54.0	-19.6	H	A	122.5	184.1	

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Note: No other emissions were detected above the system noise floor.

7.3. RECEIVER ABOVE 1 GHz

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Panasonic
 Project #: 11J13997
 Date: 08/26/11
 Test Engineer: Vien Tran
 Configuration: Stand Alone
 Mode: Rx Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001	Average Measurements RBW=1MHz ; VBW=10Hz

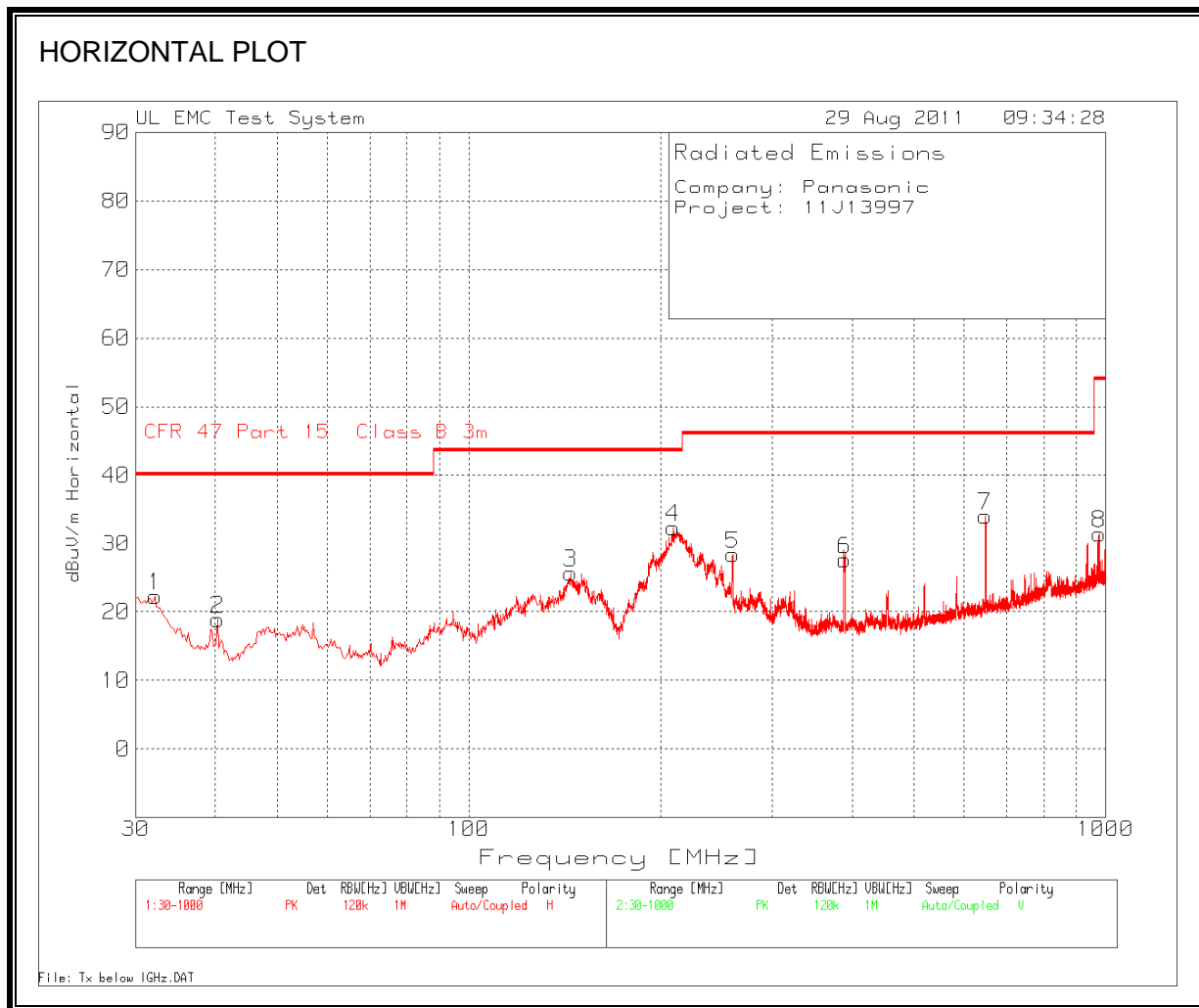
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.330	3.0	51.0	38.2	25.3	3.1	-38.4	0.0	0.0	41.0	28.2	74	54	-33.0	-25.8	V
1.857	3.0	51.1	40.3	27.3	3.7	-37.7	0.0	0.0	44.5	33.7	74	54	-29.5	-20.3	V
2.433	3.0	50.2	33.1	29.2	4.3	-36.9	0.0	0.0	46.8	29.7	74	54	-27.2	-24.3	V
1.330	3.0	46.8	38.2	25.3	3.1	-38.4	0.0	0.0	36.9	28.2	74	54	-37.1	-25.8	H
1.857	3.0	47.7	40.3	27.3	3.7	-37.7	0.0	0.0	41.0	33.7	74	54	-33.0	-20.3	H
2.433	3.0	42.8	33.1	29.2	4.3	-36.9	0.0	0.0	39.4	29.7	74	54	-34.6	-24.3	H

No other emissions found were detected above system noise floor

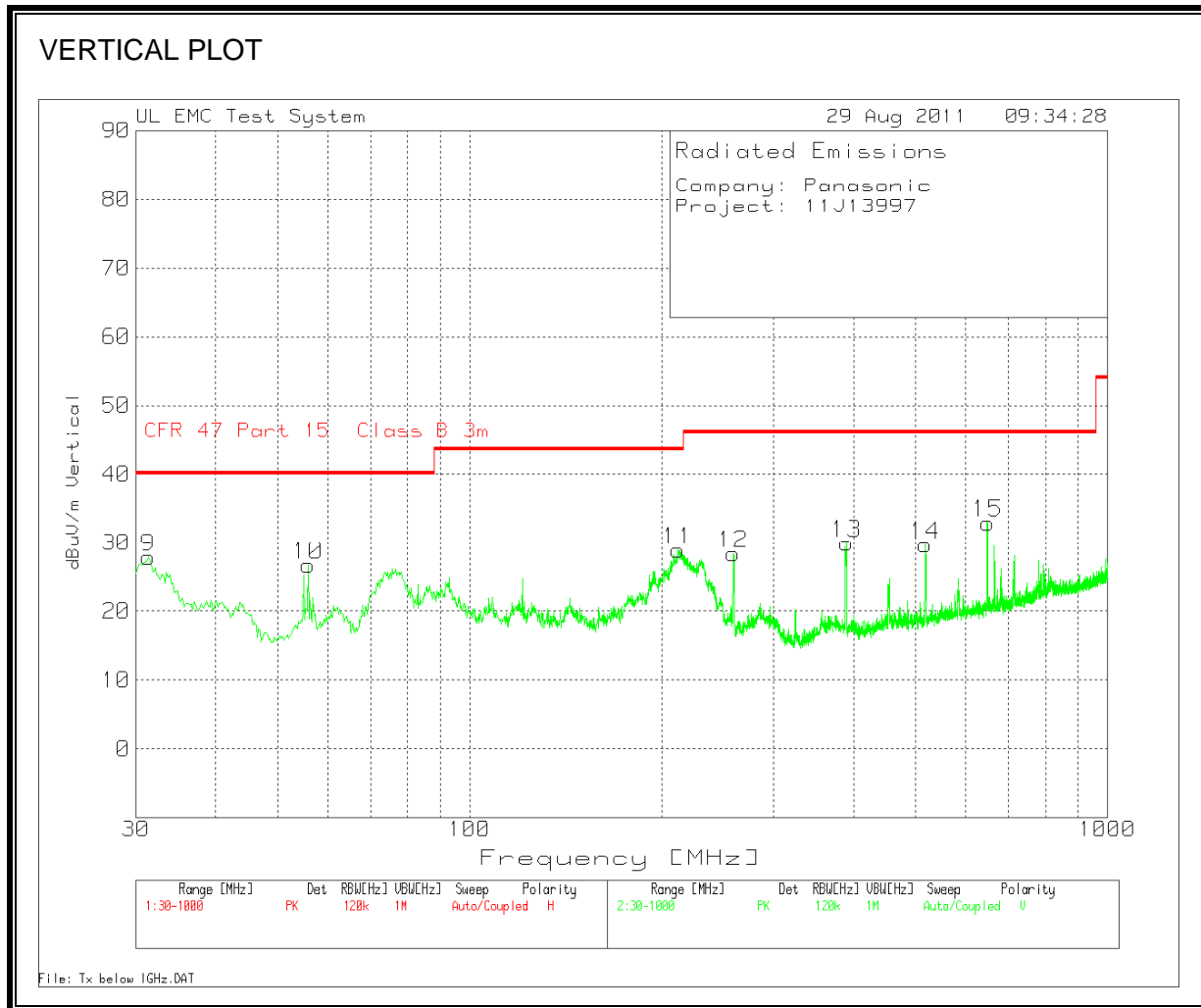
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

7.4. RADIATED BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (VERTICAL)



TABULATED DATA

Company: Panasonic										
Project: 11J13997										
EUT Description: 802.11bgn 2x2, HT20 & HT40) with Panasonic Tablet CF-19										
30 - 1000MHz - HORIZONTAL										
Test Frequency	Meter Reading	Detector	Chamber 5B Below 1GHz Cable.TX [dB]	T10 Below 1 GHz PreAmp. TXT [dB]	T130 Bilog Factors. TXT [dB]	dB[uVolts/ meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
32.1323	31.42	PK	0.9	-29.5	19.4	22.22	40.0	-17.78	300	Horz
40.2738	33.53	PK	0.9	-29.4	13.9	18.93	40.0	-21.07	100	Horz
144.3685	40.17	PK	1.7	-29.1	12.9	25.67	43.5	-17.83	100	Horz
209.6942	47.31	PK	2.0	-28.9	12.0	32.41	43.5	-11.09	100	Horz
259.9001	42.82	PK	2.2	-28.7	12.1	28.42	46.0	-17.58	100	Horz
389.5823	39.00	PK	2.7	-28.9	14.8	27.60	46.0	-18.40	100	Horz
647.2022	41.06	PK	3.6	-29.3	18.7	34.06	46.0	-11.94	100	Horz
977.7078	32.97	PK	4.4	-28.3	22.4	31.47	54.0	-22.53	100	Horz
30 - 1000MHz - VERTICAL										
Test Frequency	Meter Reading	Detector	Chamber 5B Below 1GHz Cable.TX [dB]	T10 Below 1 GHz PreAmp. TXT [dB]	T130 Bilog Factors. TXT [dB]	dB[uVolts/ meter]	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
31.3569	36.71	PK	0.9	-29.5	19.7	27.81	40.0	-12.19	100	Vert
55.78	47.09	PK	1.1	-29.4	7.9	26.69	40.0	-13.31	100	Vert
212.4081	43.77	PK	2.0	-28.9	12.0	28.87	43.5	-14.63	100	Vert
258.9309	42.73	PK	2.2	-28.7	12.1	28.33	46.0	-17.67	200	Vert
389.7762	41.20	PK	2.7	-28.9	14.9	29.90	46.0	-16.10	100	Vert
517.7138	38.79	PK	3.2	-29.4	17.1	29.69	46.0	-16.31	100	Vert
649.9161	39.95	PK	3.6	-29.3	18.7	32.95	46.0	-13.05	100	Vert
PK - Peak detector QP - Quasi-Peak detector LnAv - Linear Average detector LgAv - Log Average detector Av - Average detector CAV - CISPR Average detector RMS - RMS detection CRMS - CISPR RMS detection Text File: Tx below 1GHz_EUT_Vert 1.TXT File: RE 30-1000 MHz 3m FCC Class B Full Scan.TST										

8. 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

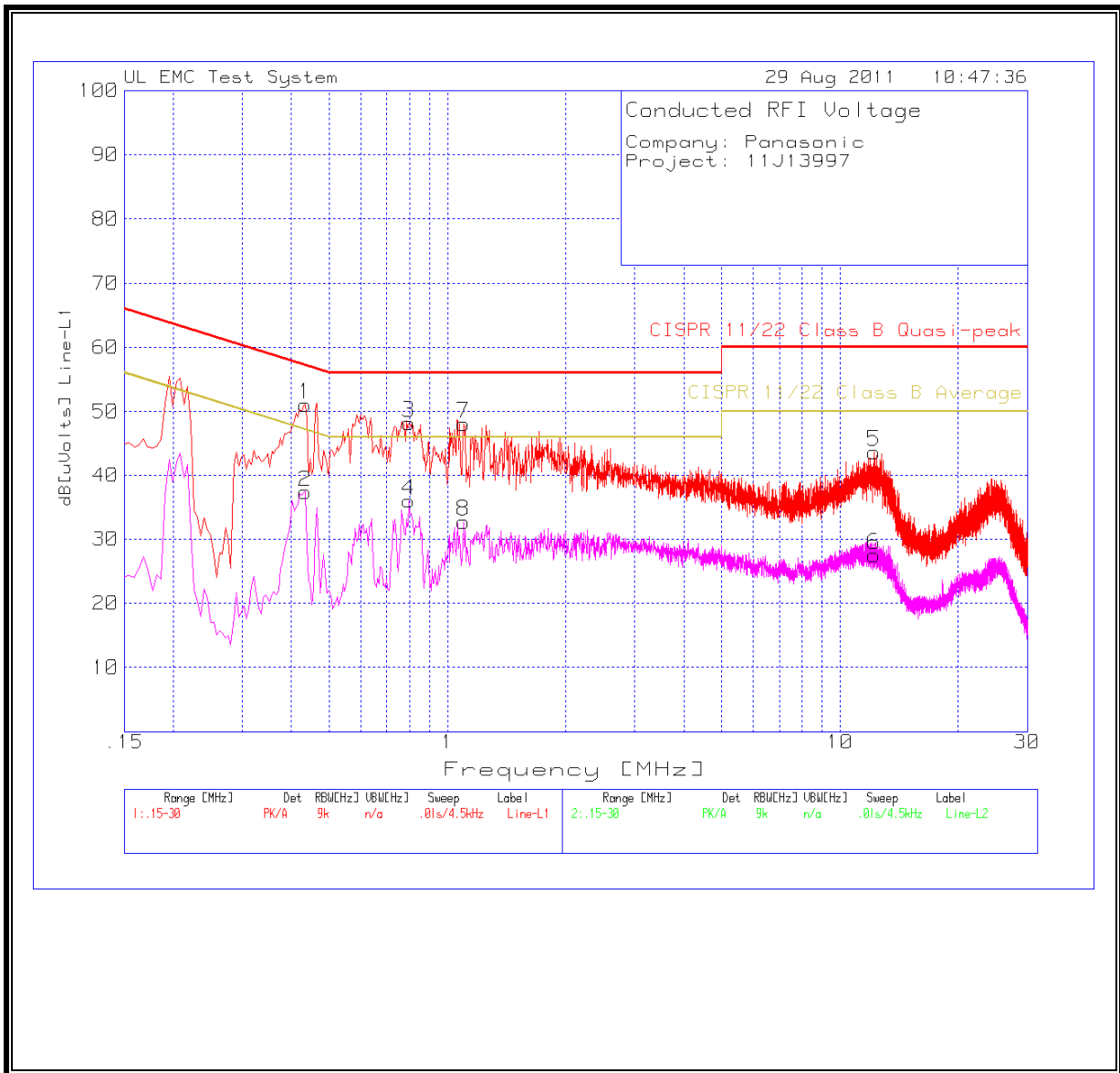
ANSI C63.4

RESULTS

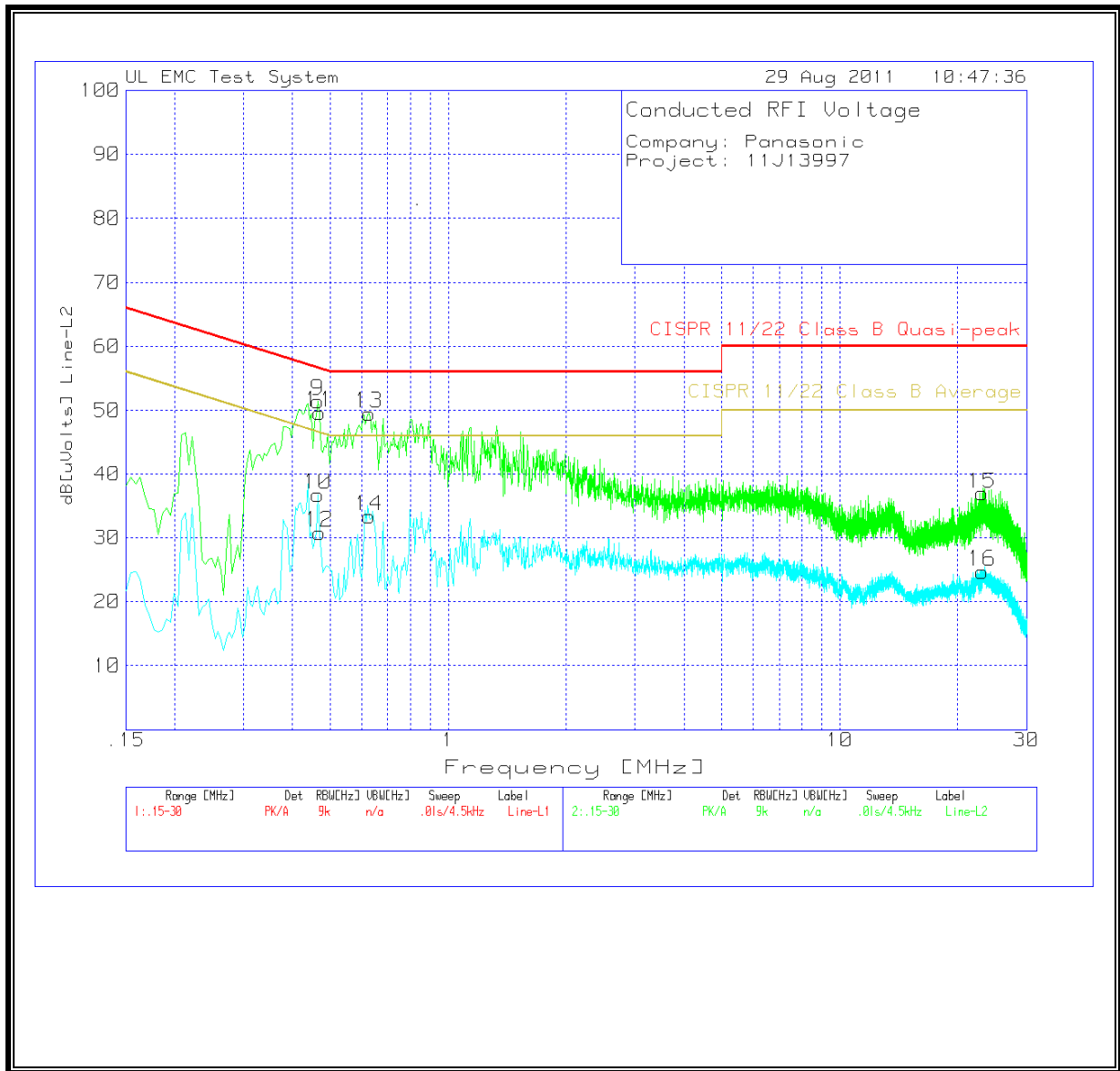
6 WORST EMISSIONS

Company: Panasonic						Test Enginner: Vien Tran			
Project: 11J13997						Date: 08/29/11			
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.4335	51.02	PK	0	0	51.02	57.20	-6.18	47.20	3.82
0.4335	37.31	Av	0	0	37.31	-	-	47.20	-9.89
0.798	48.19	PK	0	0	48.19	56.00	-7.81	46.00	2.19
0.798	35.99	Av	0	0	35.99	-	-	46.00	-10.01
12.219	43.68	PK	0	0	43.68	60.00	-16.32	50.00	-6.32
12.219	27.50	Av	0	0	27.50	-	-	50.00	-22.50
1.0995	48.14	PK	0	0	48.14	56.00	-7.86	46.00	2.14
1.0995	32.71	Av	0	0	32.71	-	-	46.00	-13.29
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolts]	Class B QP Limit	Margin	Class B Avg Limit	Margin
0.465	51.5	PK	0	0	51.50	56.60	-5.10	46.60	4.90
0.465	36.73	Av	0	0	36.73	-	-	46.60	-9.87
0.4695	49.65	PK	0	0	49.65	56.50	-6.85	46.50	3.15
0.4695	30.77	Av	0	0	30.77	-	-	46.50	-15.73
0.627	49.48	PK	0	0	49.48	56.00	-6.52	46.00	3.48
0.627	33.28	Av	0	0	33.28	-	-	46.00	-12.72
23.0955	36.90	PK	0	0	36.90	60.00	-23.10	50.00	-13.10
23.0955	24.68	Av	0	0	24.68	-	-	50.00	-25.32
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detector									
Av - Average detector									
CAV - CISPR Average detector									
RMS - RMS detection									
CRMS - CISPR RMS detection									

LINE 1 RESULTS



LINE 2 RESULTS



9. 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/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616 000 / <i>f</i> ^{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/m² is equivalent to 1 mW/cm².
 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:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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.

$$\text{Total EIRP} = (P_1 * G_1) + (P_2 * G_2) + \dots + (P_n * G_n)$$

where

P_x = Power of transmitter x

G_x = Numeric gain of antenna x

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

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

Multiple chain or colocated transmitters									
Band	Mode	Chain for MIMO	Separation Distance (m)	Output AV Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	1		20.21	0.86	21.07	0.13		
2.4 GHz	WLAN	2		20.31	2.93	23.24	0.21		
2.4 GHz	BT	N/A		13.00	3.50	16.50	0.04		
Combined			0.20				0.34	0.67	0.067