



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

**CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

802.11a/b/g/n 2x2 Radio Module inside PANASONIC TABLET PC CF-C1

MODEL NUMBER: WL11A

**FCC ID: ACJ9TGWL11A
IC: 216A-CFWL11A**

REPORT NUMBER: 11J13739-1

ISSUE DATE: April 28, 2011

Prepared for
**PANASONIC CORPORATION
1-10-12 YAGUMO-HIGASHI-MACHI
MORIGUCHI CITY, OSA 570-0021, JAPAN**

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	04/28/11	Initial Issue	F. Ibrahim

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PANASONIC CORPORATION
1-10-12 YAGUMO-HIGASHI-MACHI
MORIGUCHI CITY, OSA 570-0021, JAPAN

EUT DESCRIPTION: 802.11a/b/g/n 2x2 Radio Module inside PANASONIC TABLET PC
CF-C1

MODEL: WL11A

SERIAL NUMBER: Serial number 1

DATE TESTED: APRIL 4th TO APRIL 11, 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:



JOSEPH DANISI
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:

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

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 802.11a/b/g/n is an Intel Corporation Centrino advanced-N 6205 which is a PCIe half mini card form factor IEEE 802.11 a/b/g/n wireless network adaptor that operates in both the 2.4GHz and 5 GHz spectra. The card supports 2x2 MIMO for 802.11n in both the 20MHz and 40MHz channels and in legacy modes 1x2 operation is supported.

The radio module is manufactured by Intel.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding Portable Host (Representative model; CF-C1).

5.3. MAXIMUM OUTPUT POWER

Same power values were used from original reports, except for Channel 9 in 11n HT40 mode in the 2.4 GHz band, the AV power was reduced to 8.92 dBm in order to pass BE test.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 1.01 dBi for the Main and 1.37 dBi for the Aux.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was DRTU, version. 1.1.3.

Driver software is V14.1.4.115.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Radiated Emissions below 1 GHz was performed with EUT set to transmit at the channel with highest output power.

Worst-case data rates used per input from the client are as follows:

- 11b: 1Mbps
- 11g: 6 Mbps
- 11n HT20: MCS0
- 11n HT40: MCS0

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

Worst-case modes were selected for BE and Harmonics based on an investigation of the original reports, as shown in the summary table below:

Worst-case Modes to test					
2.4 GHz			5.8 GHz		
Low BE	High BE	Harmonics	Low BE	High BE	Harmonics
11n 20M Chain A Channel 2 Pwr AV=16.1 dBm Margin= -0.7 dB	11n 40M Chain A Channel 9 Pwr AV=9.6 dBm Margin= -1.1 dB	11b Chain A Channel 11 Pwr AV=15.8 dBm AV Margin= -6.1 dB Freq= 4924 MHz	No need to test	No need to test	11n 20M Chain A+B Channel 165 (5825MHz) Pwr AV=16.6, 16.8 dBm AV Margin= -6.9 dB Freq= 11649.9 MHz
5.2 GHz			5.3 GHz		
Low BE	High BE	Harmonics	Low BE	High BE	Harmonics
11n 20M Chain A+B Channel 36 (5180MHz) Pwr AV=12.4, 12.5 dBm Margin= -1.1 dB	No need to test	11n 20M Chain A+B Channel 40 (5200MHz) Pwr AV=16.5 dBm AV Margin= -6.3 dB Freq= 11000.3 MHz	No need to test	11n 20M Chain A+B Channel 64 (5320MHz) Pwr AV=13.2, 13.1 dBm Margin= -5.4 dB	No need to test
5.6 GHz					
Low BE	High BE	Harmonics			
11n 40M Chain A+B Channel 102 (5510MHz) Pwr AV=12.6, 12.4 dBm Margin= -4.6 dB	11n 20M Chain A+B Channel 140 (5700MHz) Pwr AV=13.4, 13.6 dBm Margin= -16.5 dB	11a 20M Chain B Channel 100 (5500MHz) Pwr AV=16.1, 16 dBm AV Margin= -9.7 dB Freq= 7500.1 MHz			

5.6 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Stand-alone EUT.

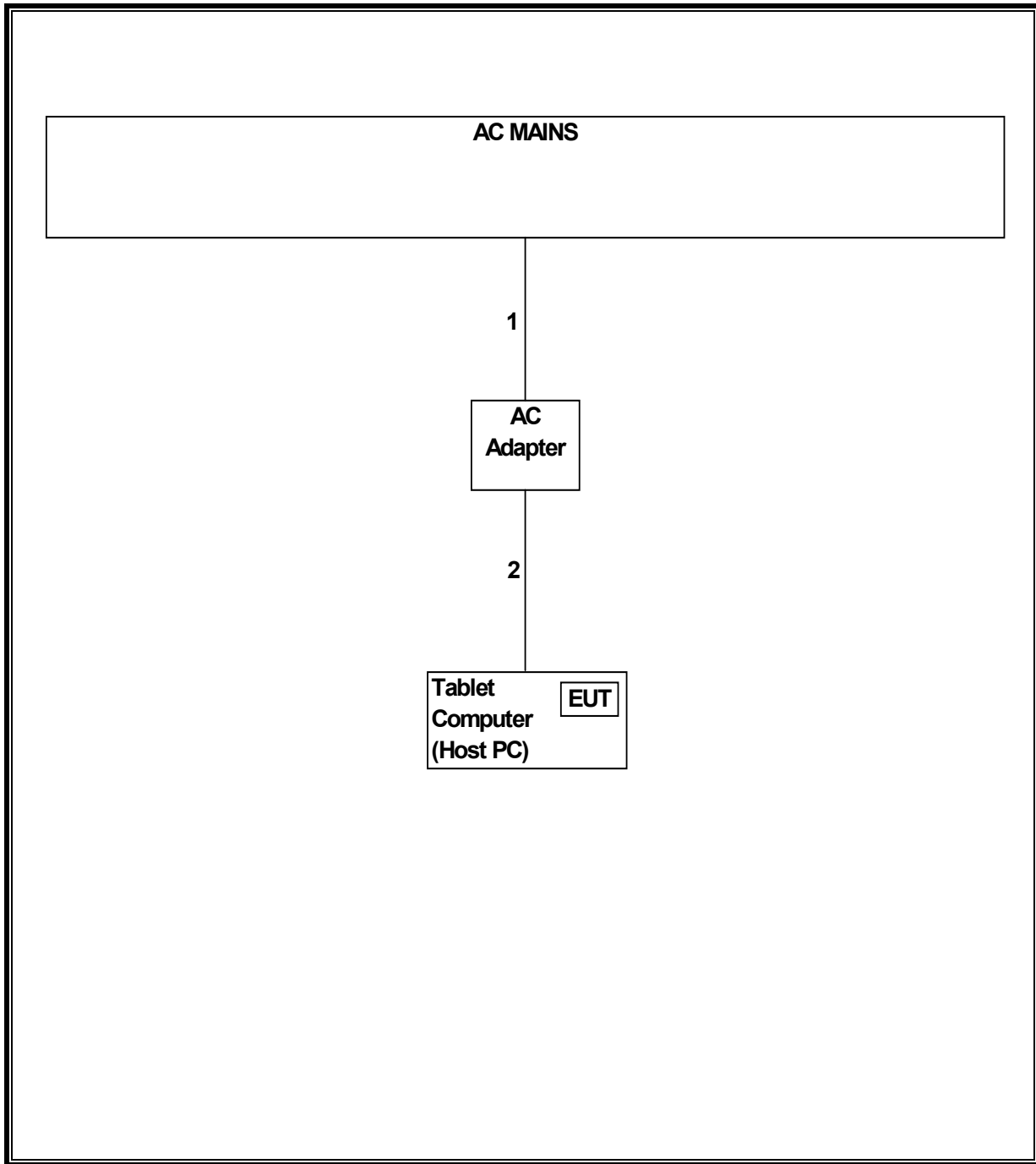
I/O CABLES

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	N/A

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 Date	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/10	07/12/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/10	07/14/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/10	08/30/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/10	06/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/27/11	01/27/12
Power Meter	Agilent / HP	438A	C01068	12/16/09	06/16/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/10	04/05/11
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	06/25/10	06/25/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/10	06/29/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/10	07/14/11
Antenna, Horn, 18 GHz	ETS	3117	C01022	01/00/00	CNR
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	01/00/00	CNR
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/27/11	01/27/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/10	07/12/11

7. RADIATED TEST RESULTS

7.1. 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.

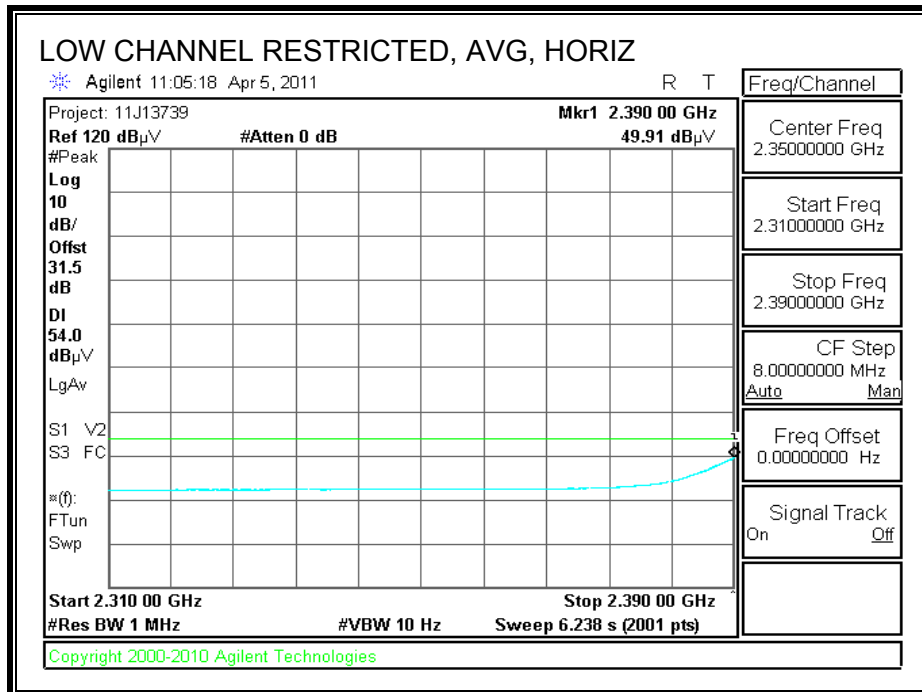
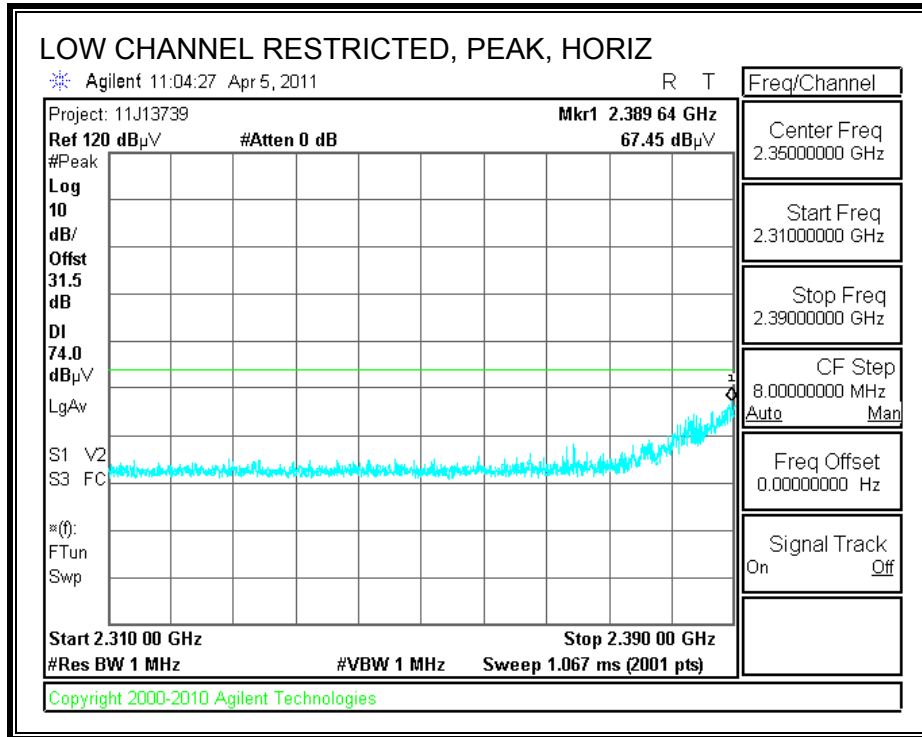
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

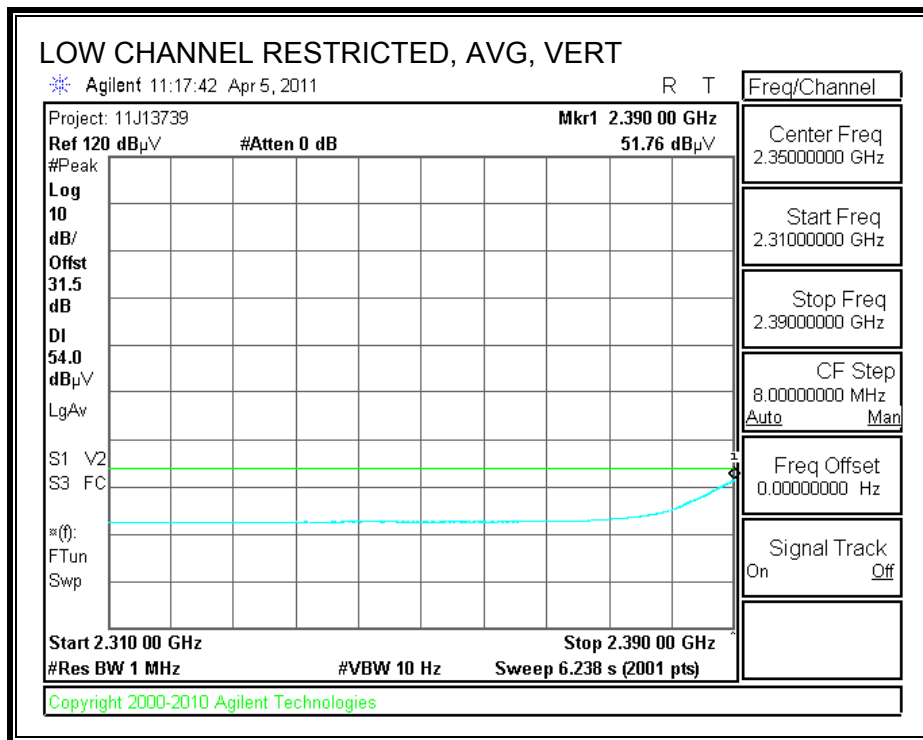
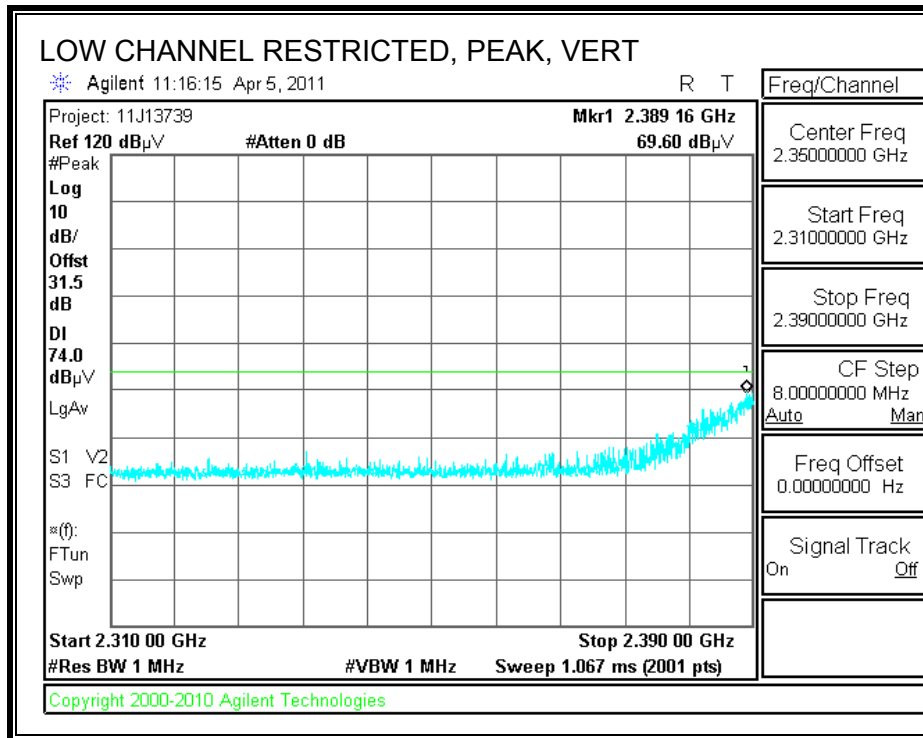
7.2. TRANSMITTER ABOVE 1 GHz (worst-case modes)

7.2.1. 2.4 GHz BAND

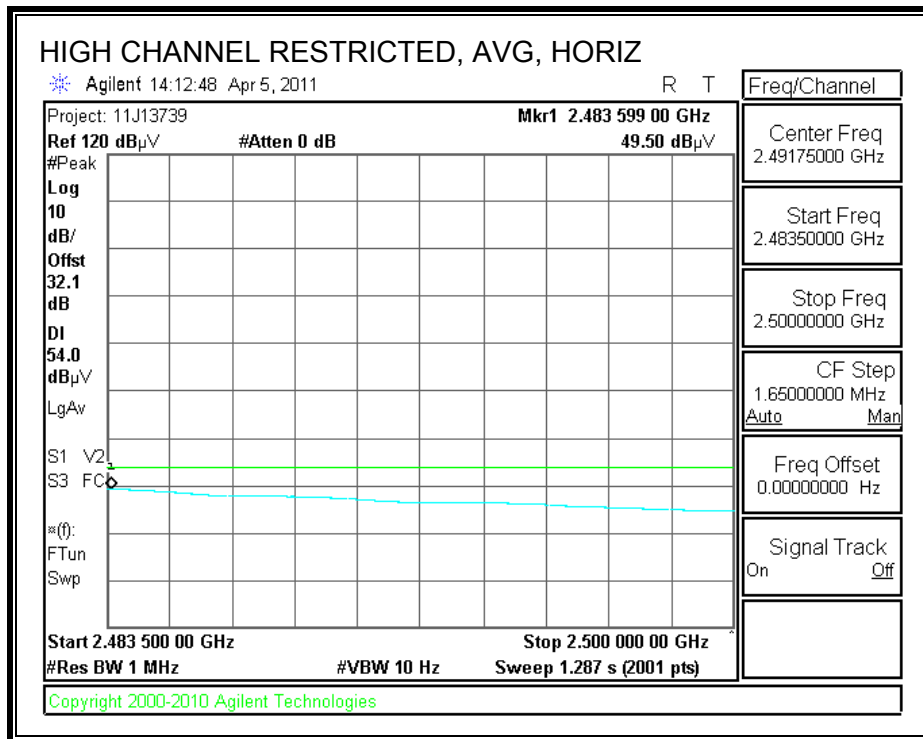
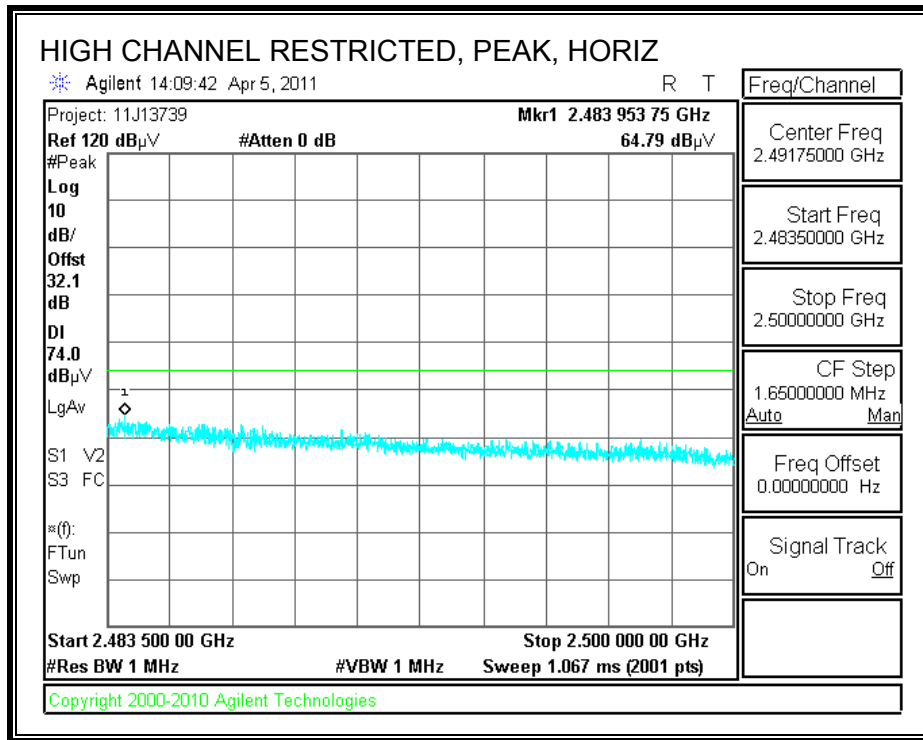
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



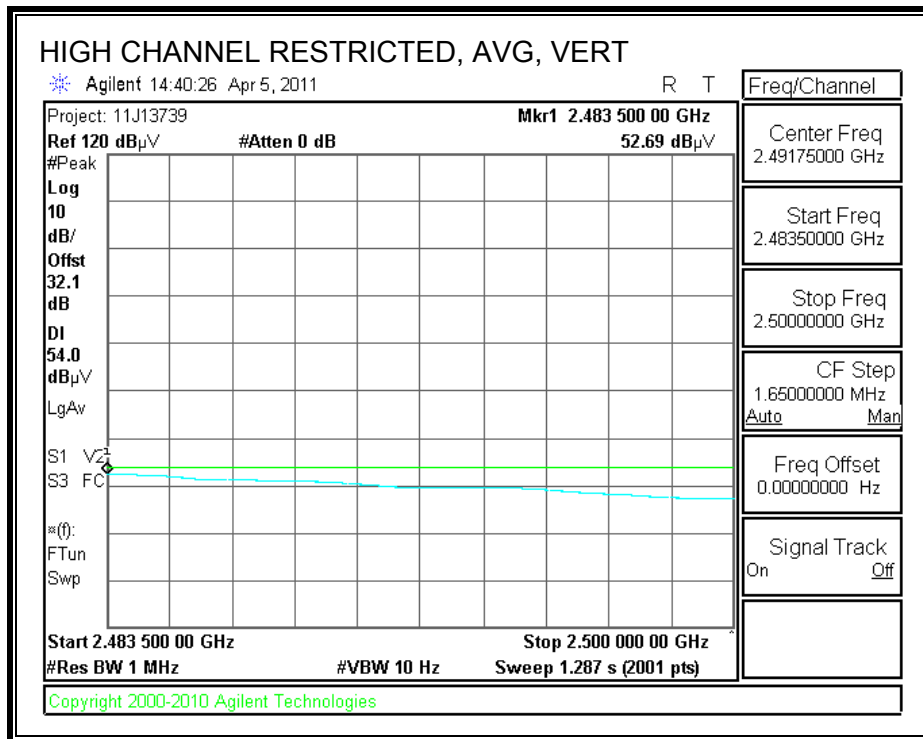
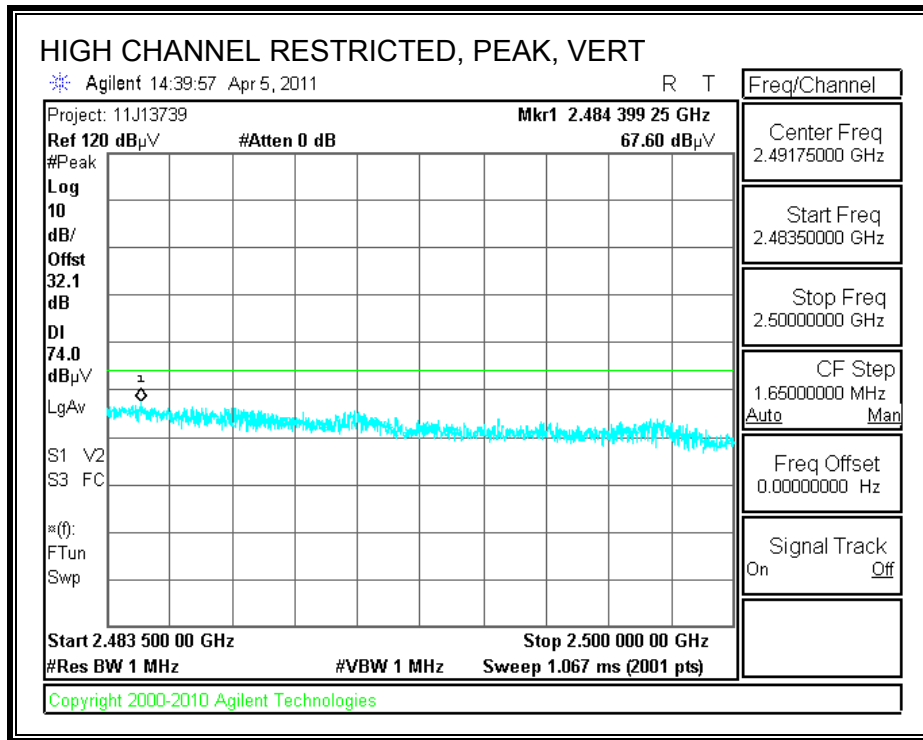
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: PANASONIC CORP.
 Project #: 11J13739
 Date: 4 April to 8 April 2011
 Test Engineer: Joe Danisi/Vahan N Pilibosian
 Configuration: 2.4GHz WLAN
 Mode: 11b, Chain A

Test Equipment:

Horn 1-18GHz T59; S/N: 3245 @3m	Pre-amplifier 1-26GHz T145 Agilent 3008A0056	Pre-amplifier 26-40GHz	Horn > 18GHz T125; ARA 18-26GHz; S/N:1007	Limit FCC 15.209
Hi Frequency Cables			HPF	Reject Filter R_001
3' cable 22807700 3' cable 22807700	12' cable 22807600 12' cable 22807600	20' cable 22807500 20' cable 22807500		Measurements VBW=1MHz Measurements Hz; 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)
4.924	3.0	43.3	34.4	32.8	5.9	-34.9	0.0	0.0	47.2	38.3	74	54	-26.8	-15.7	V
7.386	3.0	38.0	24.0	35.3	7.3	-34.6	0.0	0.0	46.0	31.9	74	54	-28.0	-22.1	V
12.310	3.0	35.6	21.1	38.7	9.9	-32.4	0.0	0.0	51.8	37.2	74	54	-22.2	-16.8	V
19.696	3.0	40.0	27.0	33.3	13.2	-32.1	0.0	0.0	54.4	41.4	74	54	-19.6	-12.6	V
22.158	3.0	33.7	19.9	33.9	14.2	-32.3	0.0	0.0	49.6	35.8	74	54	-24.4	-18.2	V
4.924	3.0	41.6	31.3	32.8	5.9	-34.9	0.0	0.0	45.5	35.2	74	54	-28.5	-18.8	H
7.386	3.0	38.2	24.0	35.3	7.3	-34.6	0.0	0.0	46.2	31.9	74	54	-27.8	-22.1	H
12.310	3.0	35.5	21.1	38.7	9.9	-32.4	0.0	0.0	51.7	37.2	74	54	-22.3	-16.8	H
19.696	3.0	35.4	20.4	33.3	13.2	-32.1	0.0	0.0	49.9	34.8	74	54	-24.1	-19.2	H
22.158	3.0	34.4	20.0	33.9	14.2	-32.3	0.0	0.0	50.2	35.8	74	54	-23.8	-18.2	H
															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		

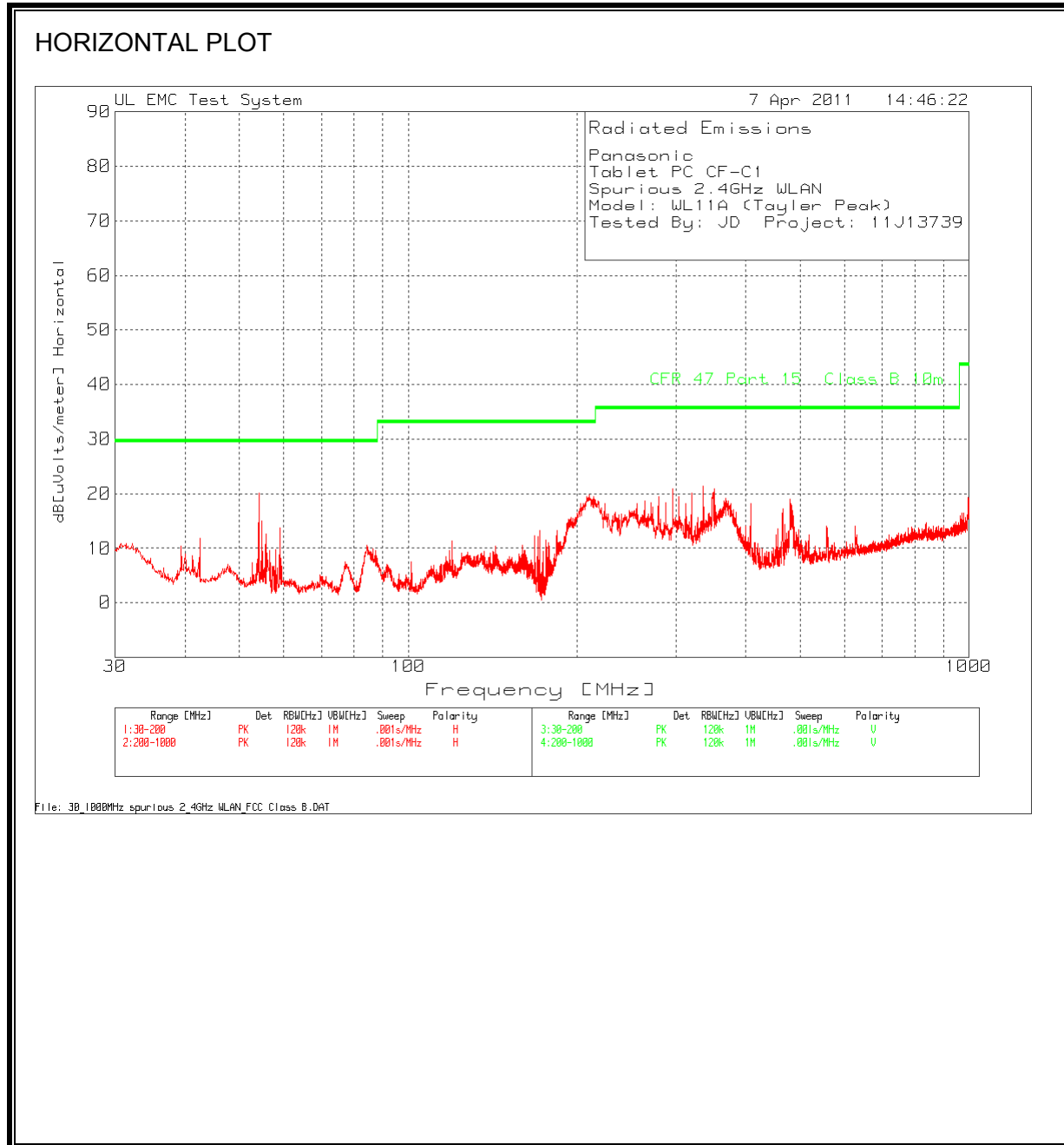
7.2.2. 5.8 GHz BAND

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Test Engr:		Joe Danisi															
Date:		April 4th to April 8th 2011															
Project #:		11J13739															
Company:		PANASONIC CORP.															
Configuration:		Chain A&B															
Mode Oper:		11n 20M															
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			
11.650	3.0	34.3	38.2	9.6	-32.9	0.0	0.0	49.2	74.0	-24.8	V	P	100.0	310.2			
11.650	3.0	22.0	38.2	9.6	-32.9	0.0	0.0	36.9	54.0	-17.1	V	A	100.0	310.2			
11.650	3.0	34.4	38.2	9.6	-32.9	0.0	0.0	49.3	74.0	-24.7	H	P	125.6	109.3			
11.650	3.0	22.5	38.2	9.6	-32.9	0.0	0.0	37.3	54.0	-16.7	H	A	125.6	109.3			

Rev. 4.1.2.7
 Note: No other emissions were detected above the system noise floor.

7.3. WORST-CASE BELOW 1 GHz

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

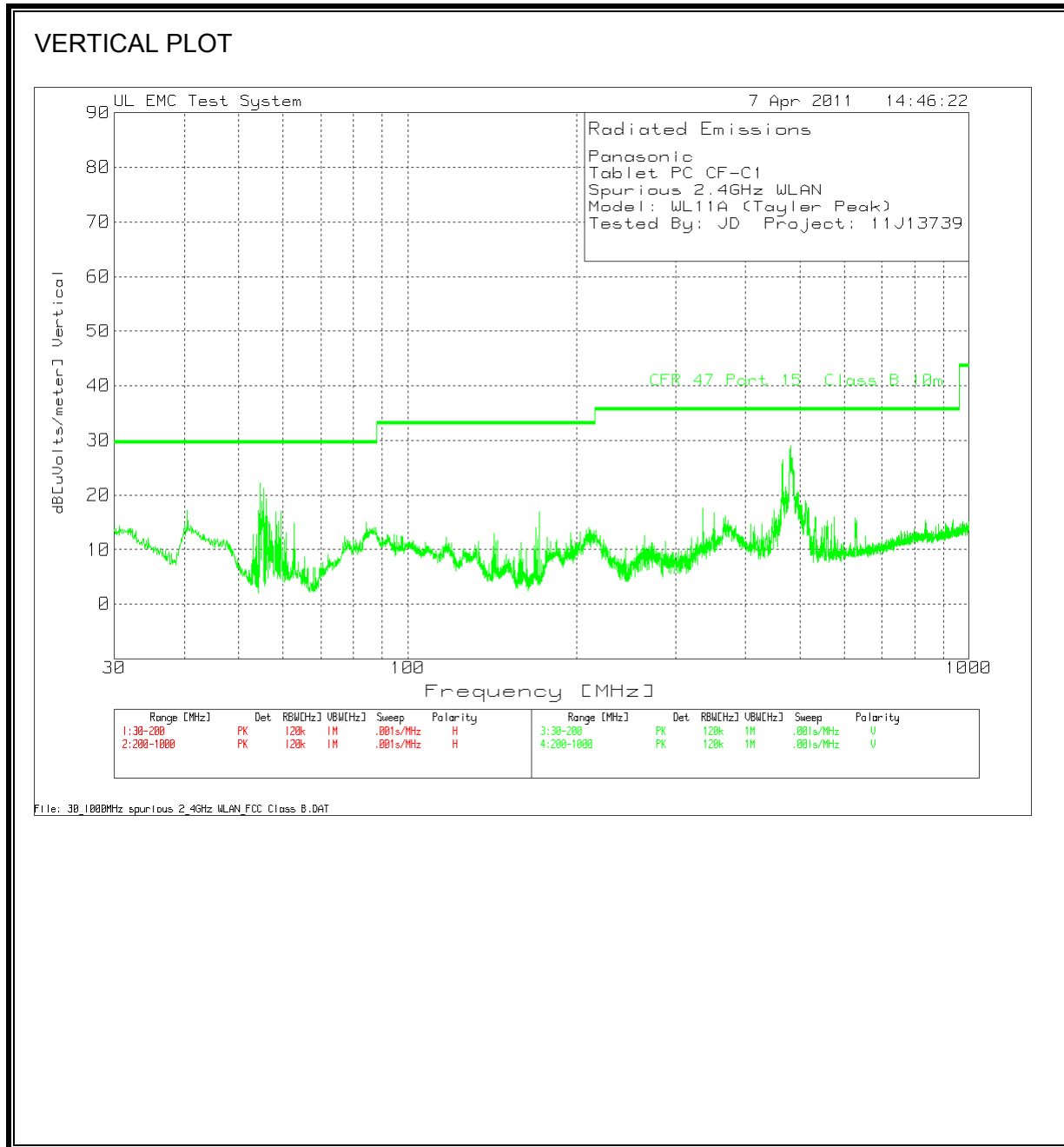


HORIZONTAL DATA

Panasonic											
Tablet PC CF-C1											
Spurious 2.4GHz WLAN											
Model: WL11A (Tayler Peak)											
Tested By: JD Project: 11J13739											
Horizontal 30 - 200MHz											
Test Freq	Meter Rea	Detector	Chamber E	T10 Below	T130 Bilog	10m to 3m	dB[uVolts/	CFR 47 P	Margin	Height [cm	Polarity
54.1279	50.95	PK	1.1	-29.4	7.9	-10.5	20.05	29.6	-9.55	400	Horz
Horizontal 200 - 1000MHz											
Test Freq	Meter Rea	Detector	Chamber E	T10 Below	T130 Bilog	10m to 3m	dB[uVolts/	CFR 47 P	Margin	Height [cm	Polarity
407.8614	39.66	PK	2.8	-29	15.2	-10.5	18.16	35.6	-17.44	100	Horz
465.1566	37.9	PK	3	-29.3	16.2	-10.5	17.3	35.6	-18.3	301	Horz
480.0799	39.31	PK	3	-29.3	16.4	-10.5	18.91	35.6	-16.69	301	Horz
210.1266	45.17	PK	2	-28.9	12	-10.5	19.77	33.1	-13.33	100	Horz
335.9094	44.11	PK	2.5	-28.7	13.9	-10.5	21.31	35.6	-14.29	100	Horz
351.8987	43.36	PK	2.6	-28.8	14.2	-10.5	20.86	35.6	-14.74	100	Horz

Note: No other emissions were detected above noise floor

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



VERTICAL DATA

Panasonic		
Tablet PC CF-C1		
Spurious 2.4GHz WLAN		
Model: WL11A (Tayler Peak)		
Tested By: JD Project: 11J13739		

Vertical 30 - 200MHz														
Test Freq	Rea	Detector	Chamber	ε	T10	Below	T130	Bilog	10m to 3m	dB[uVolts/	CFR 47 P	Margin	Height [cm	Polarity
54.6377	53.06	PK	1.1		-29.4		7.9		-10.5	22.16	29.6	-7.44	109	Vert
55.4023	52.11	PK	1.1		-29.4		7.9		-10.5	21.21	29.6	-8.39	109	Vert
55.912	50.18	PK	1.1		-29.4		7.9		-10.5	19.28	29.6	-10.32	109	Vert
Vertical 200 - 1000MHz														
Test Freq	Rea	Detector	Chamber	ε	T10	Below	T130	Bilog	10m to 3m	dB[uVolts/	CFR 47 P	Margin	Height [cm	Polarity
465.1566	47.04	PK	3		-29.3		16.2		-10.5	26.44	35.6	-9.16	100	Vert
480.6129	49.5	PK	3		-29.4		16.5		-10.5	29.1	35.6	-6.5	100	Vert

Note: No other emissions were detected above noise floor