FCC CFR47 PART 15 SUBPART E
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-H2

MODEL NUMBER: WL11A

FCC ID: ACJ9TGWL11A
IC: 216A-CFWL11A

REPORT NUMBER: 11J13820-2

ISSUE DATE: MAY 23, 2011

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

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/23/11	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: 802.11a/b/g/n 2x2 Radio Module inside PANASONIC TABLET PC CF-C1

MODEL: WL11A

SERIAL NUMBER: 1DKSA00084

DATE TESTED: MAY 15 - 16, 2011

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	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:

MENGISTU MEKURIA
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, FCC 06-96, 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 an 802.11a/b/g/n 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 2.4GHa 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-H2).

5.3. MAXIMUM OUTPUT POWER

Same power settings were used from original reports.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 2.36 dBi for the Main and 4.8 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:

11a: 6Mbps
11n HT20: MCS0
11n HT40: MCS0

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

Based on preliminary investigation, vertical orientation was found to be worst-case orientation; therefore, for some of the BE plots only vertical orientation was performed.

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

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC/DC	PANASONIC	CF-AA6373A M1	6373AM110Z04805A	DoC

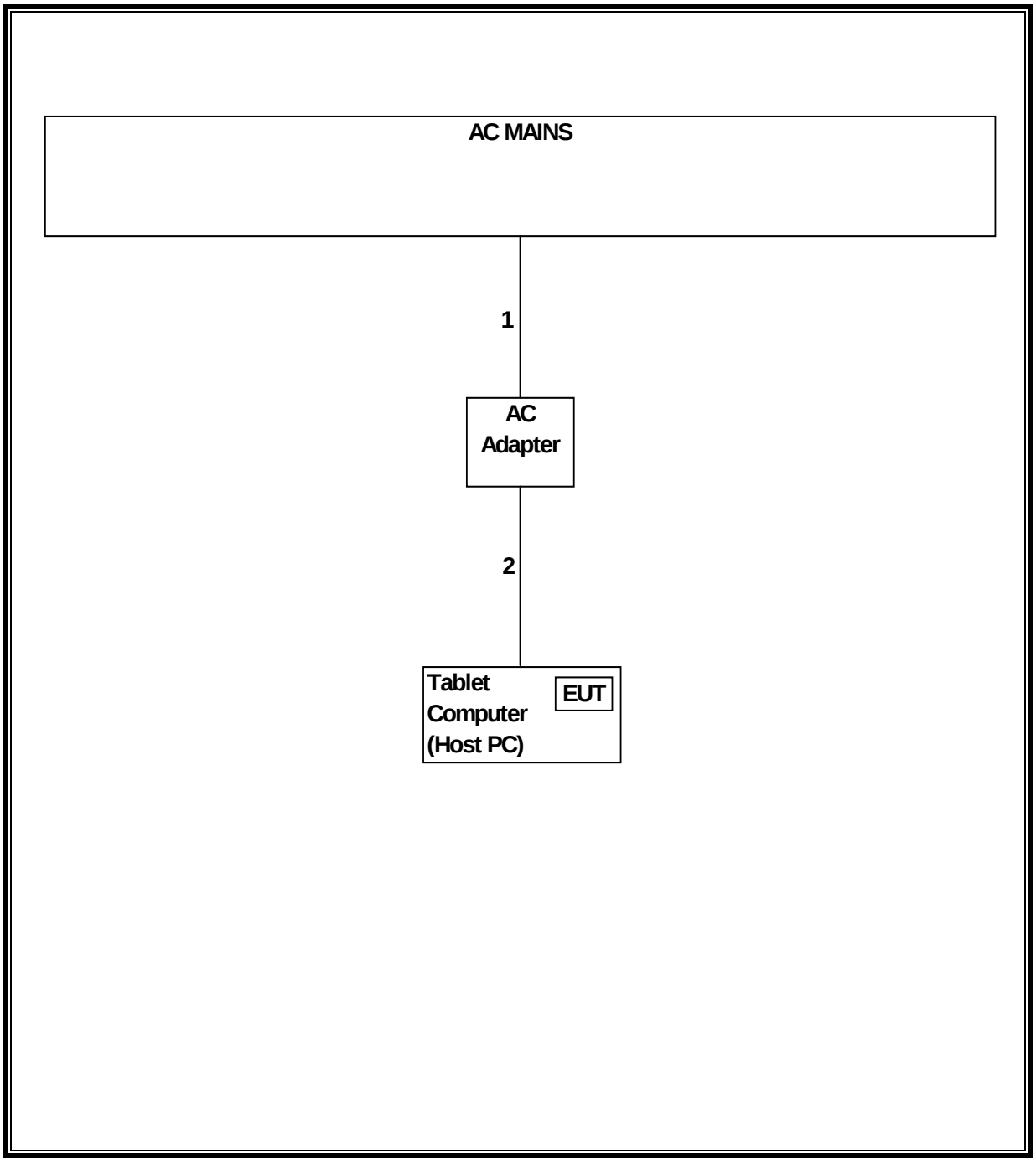
I/O CABLES

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	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
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/10	06/29/11
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	06/25/10	06/25/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/10	07/14/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/27/11	01/27/12
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/10	08/30/11
Power Meter	Agilent / HP	438A	C01068	12/16/09	06/16/11
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678		CNR
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	01/00/00	CNR

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.

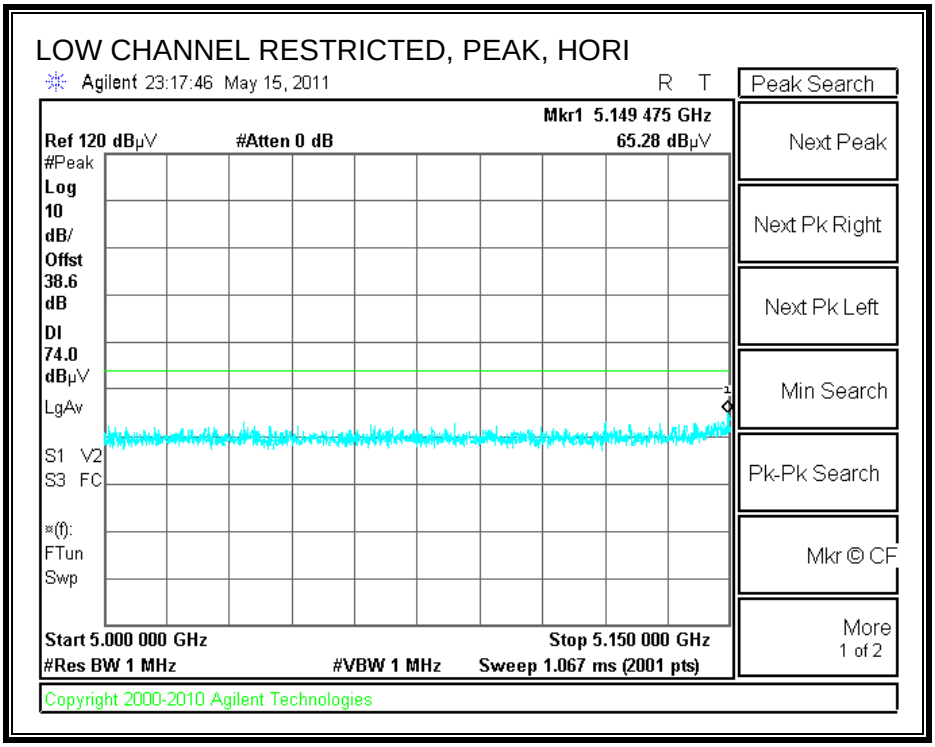
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

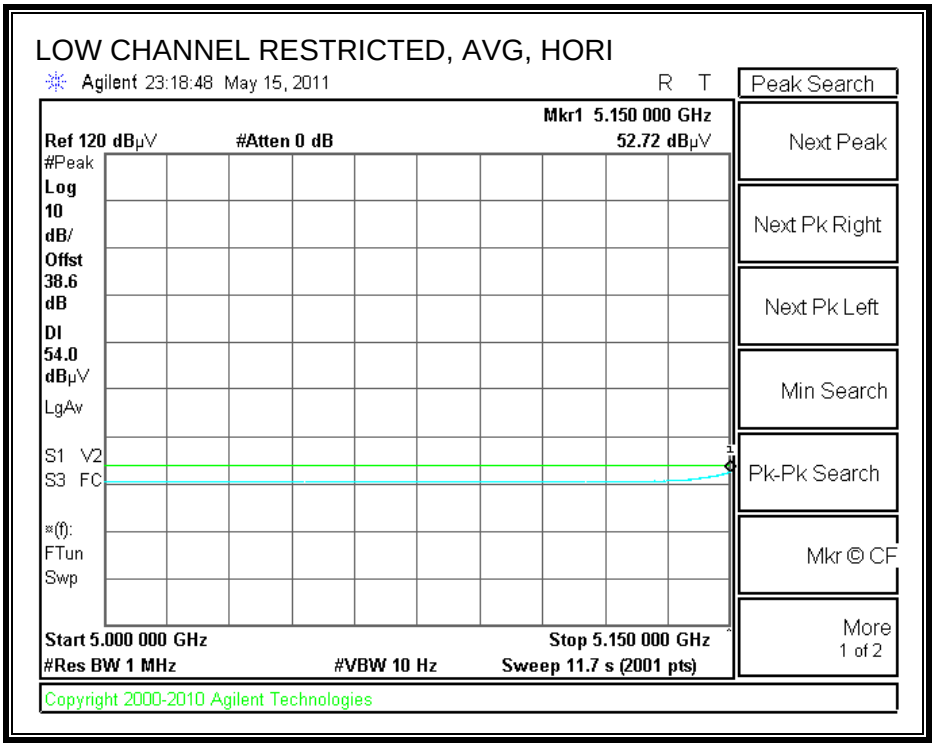
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

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

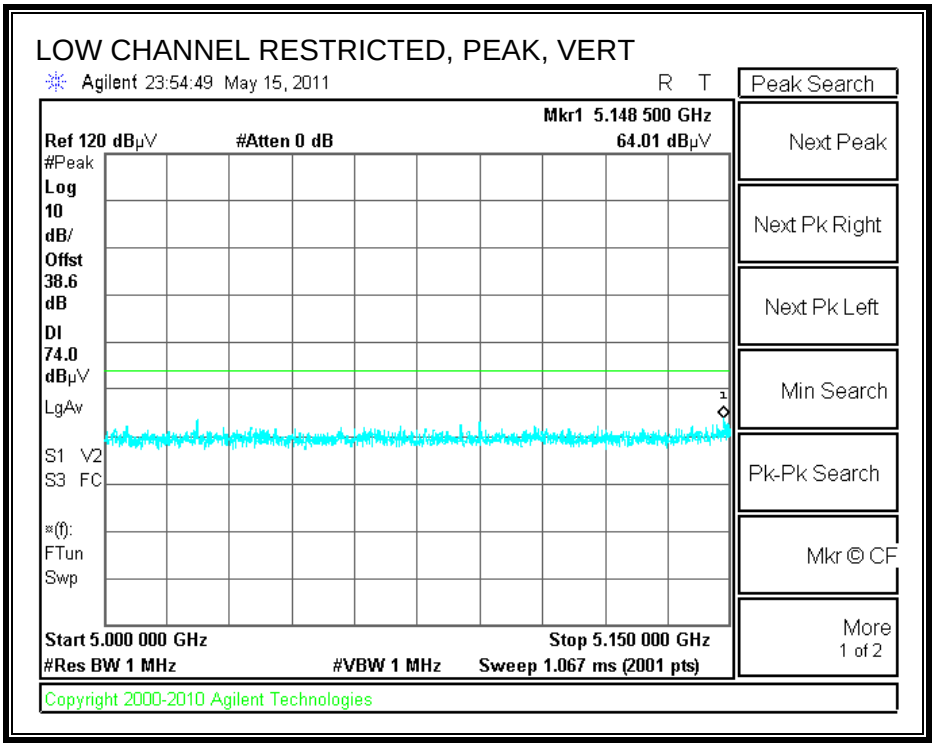
7.1.1. 5.2 GHz BAND

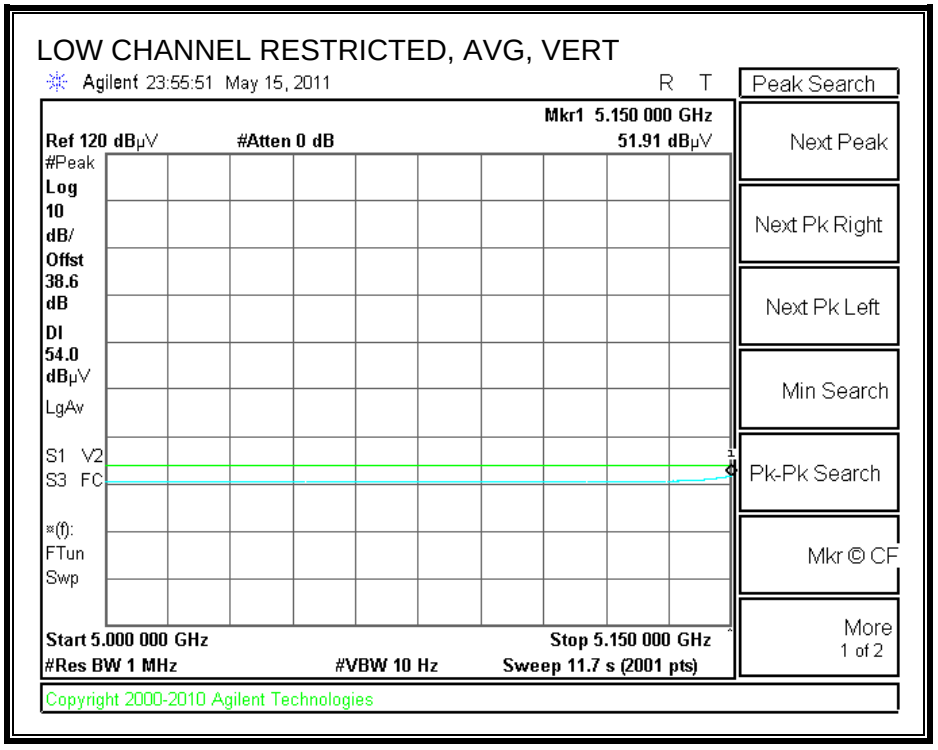
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: PANASONIC
Project #: 11J13820
Date: 5/15/2011
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 802.11n 20MHz MODE

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.209

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

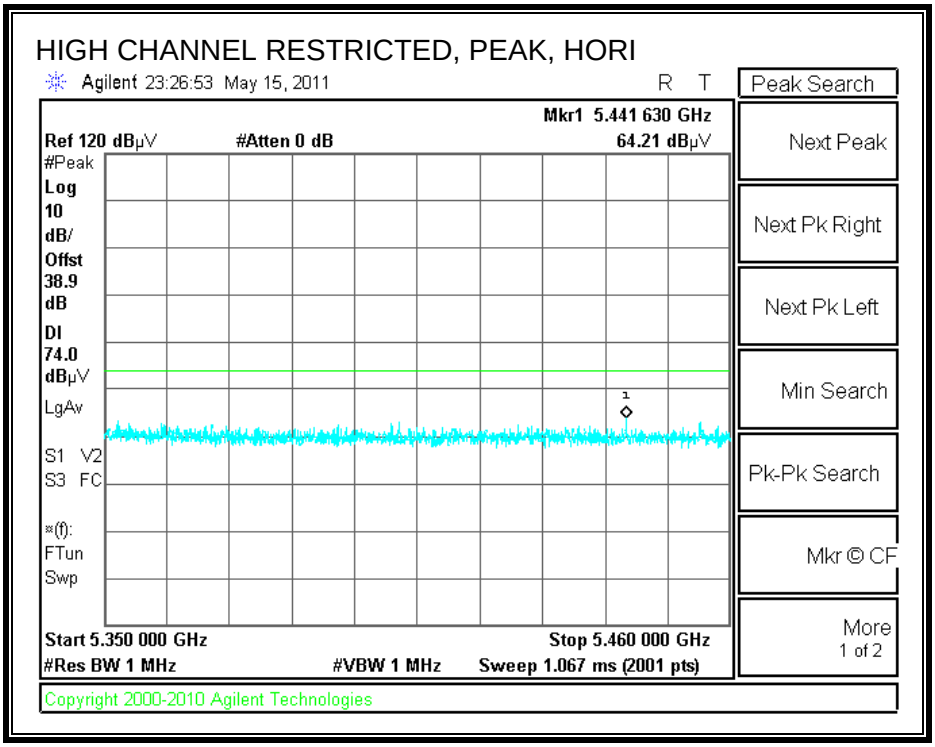
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (5200 MHz)															
15.600	3.0	41.9	29.4	38.7	11.4	-32.3	0.0	0.0	59.7	47.2	74	54	-14.3	-6.8	V
15.600	3.0	40.2	28.7	38.7	11.4	-32.3	0.0	0.0	58.0	46.5	74	54	-16.0	-7.5	H

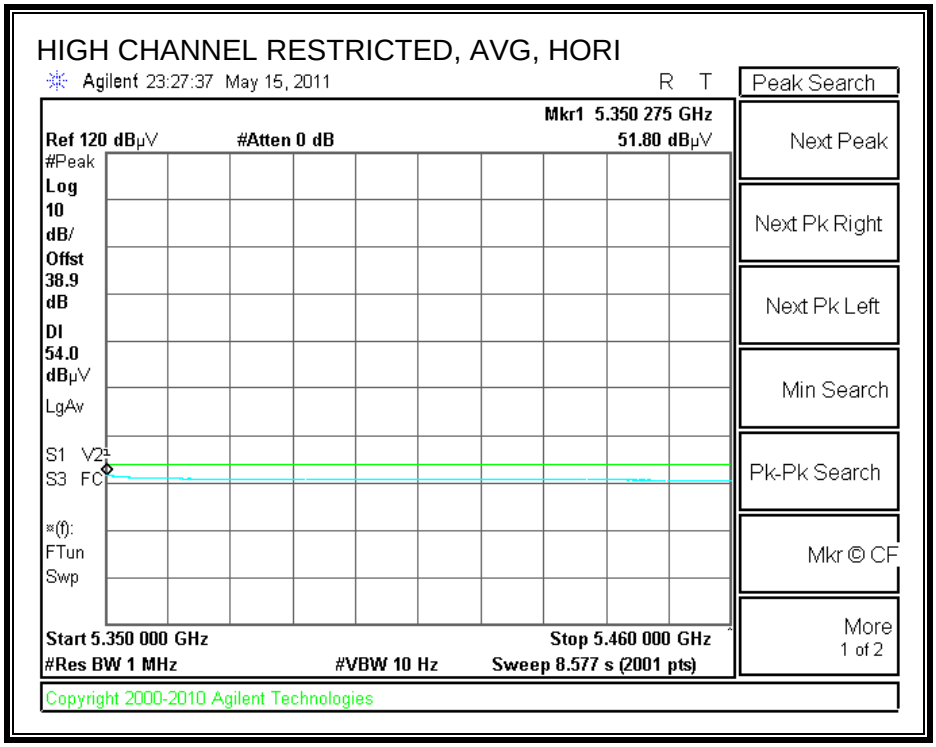
Rev. 07.22.09

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		

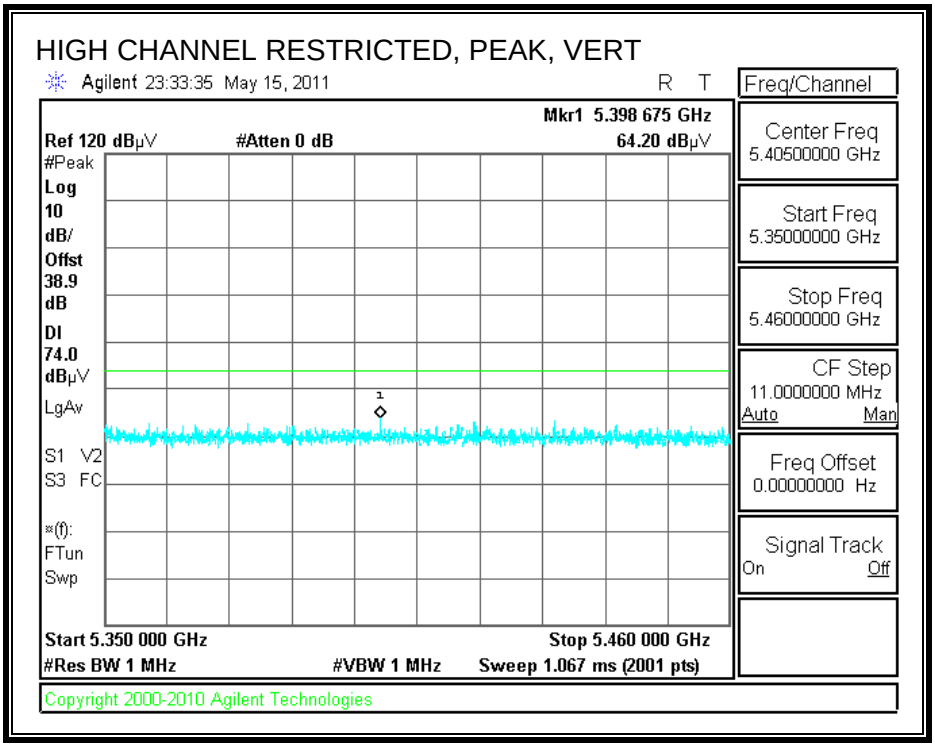
7.1.2. 5.3 GHz BAND

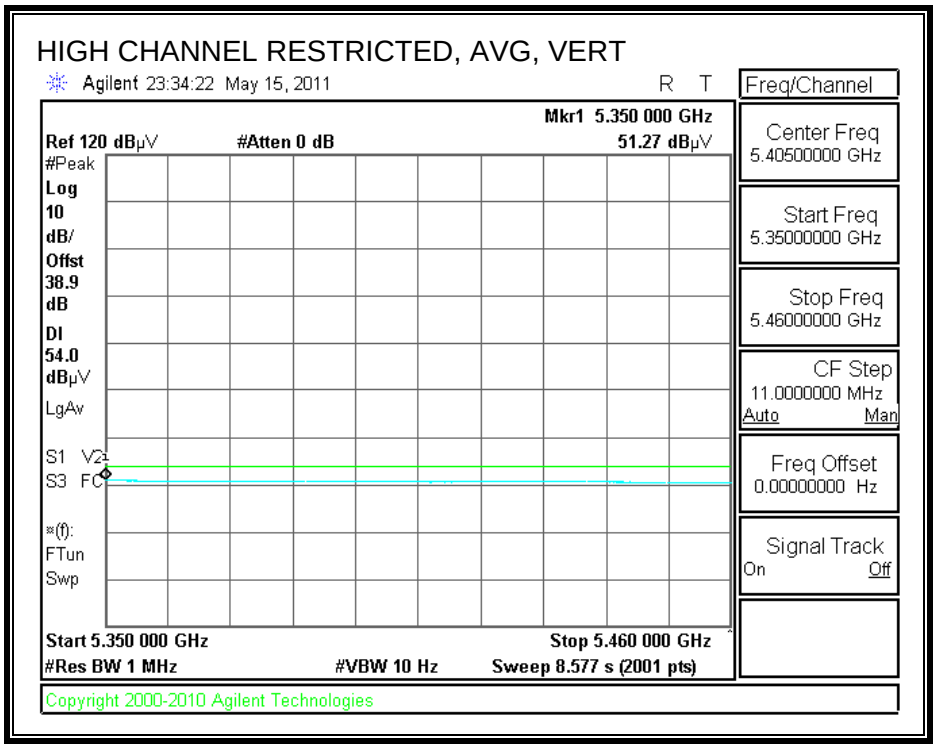
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



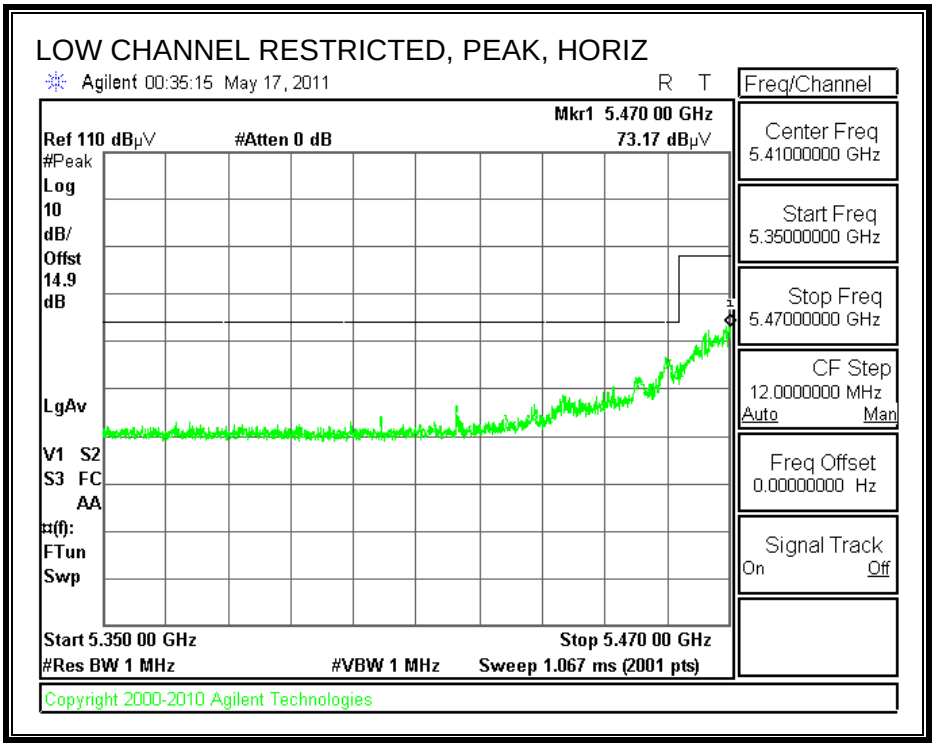


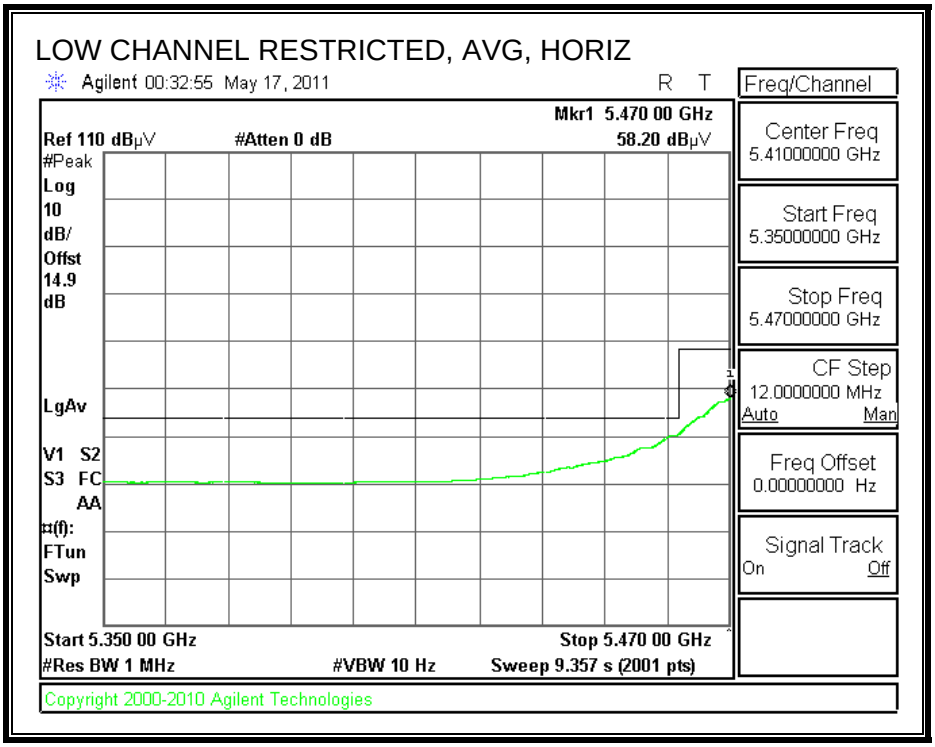
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



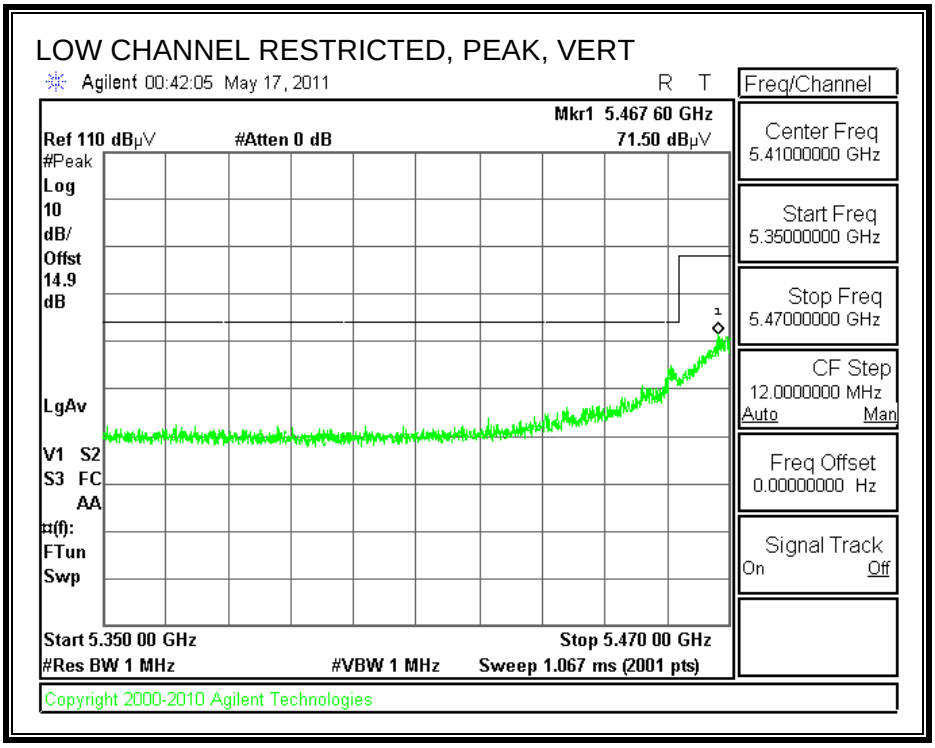


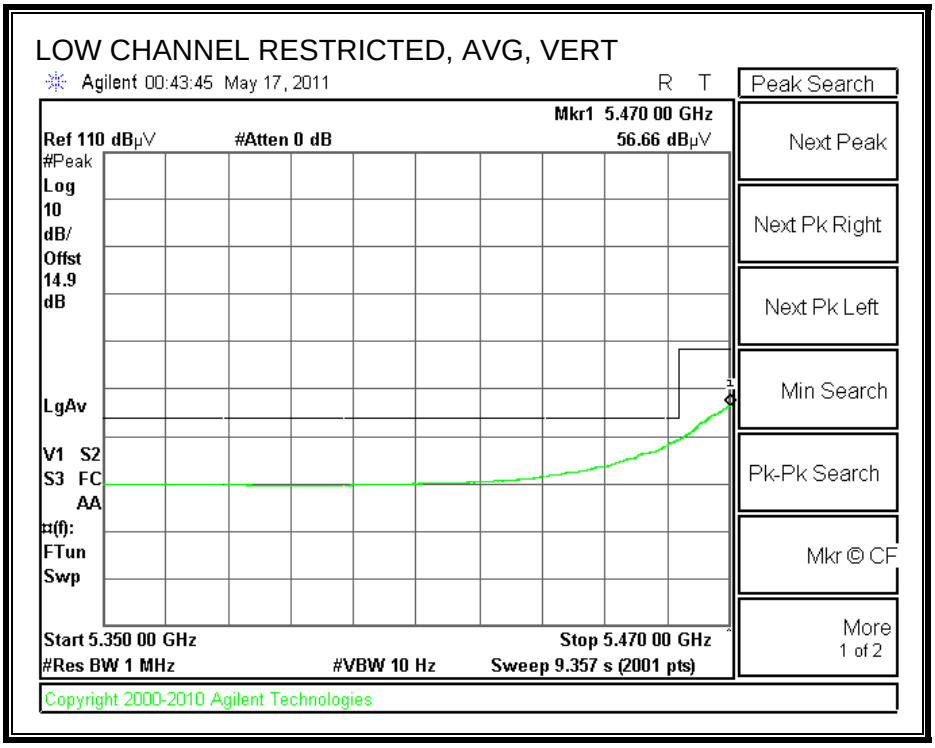
7.1.3. 5.6 GHz BAND



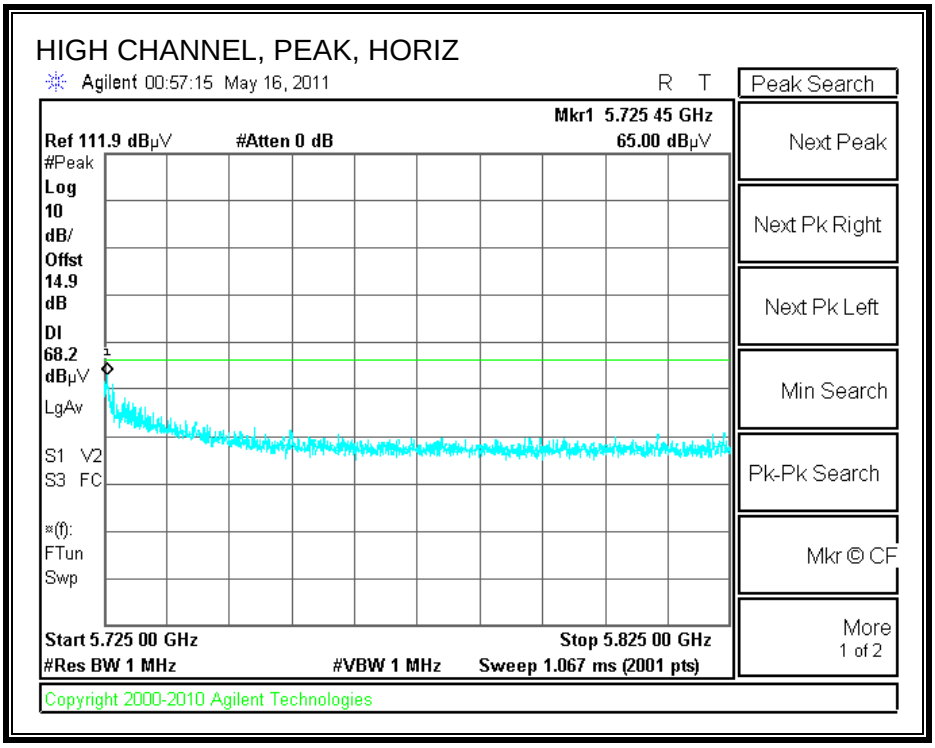


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

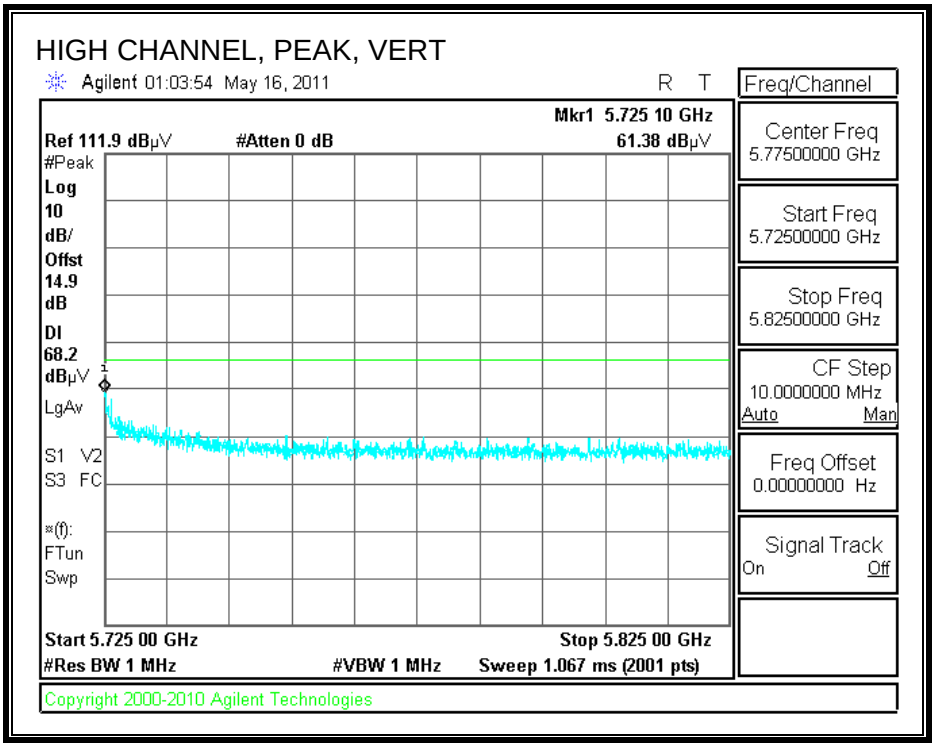




AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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Test Equipment:

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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)
Low Channel (5500 MHz)															
11.000	3.0	51.4	38.5	37.7	9.2	-33.8	0.0	0.0	64.6	51.7	74	54	-9.4	-2.3	V
11.000	3.0	49.1	37.4	37.7	9.2	-33.8	0.0	0.0	62.2	50.6	74	54	-11.8	-3.4	H

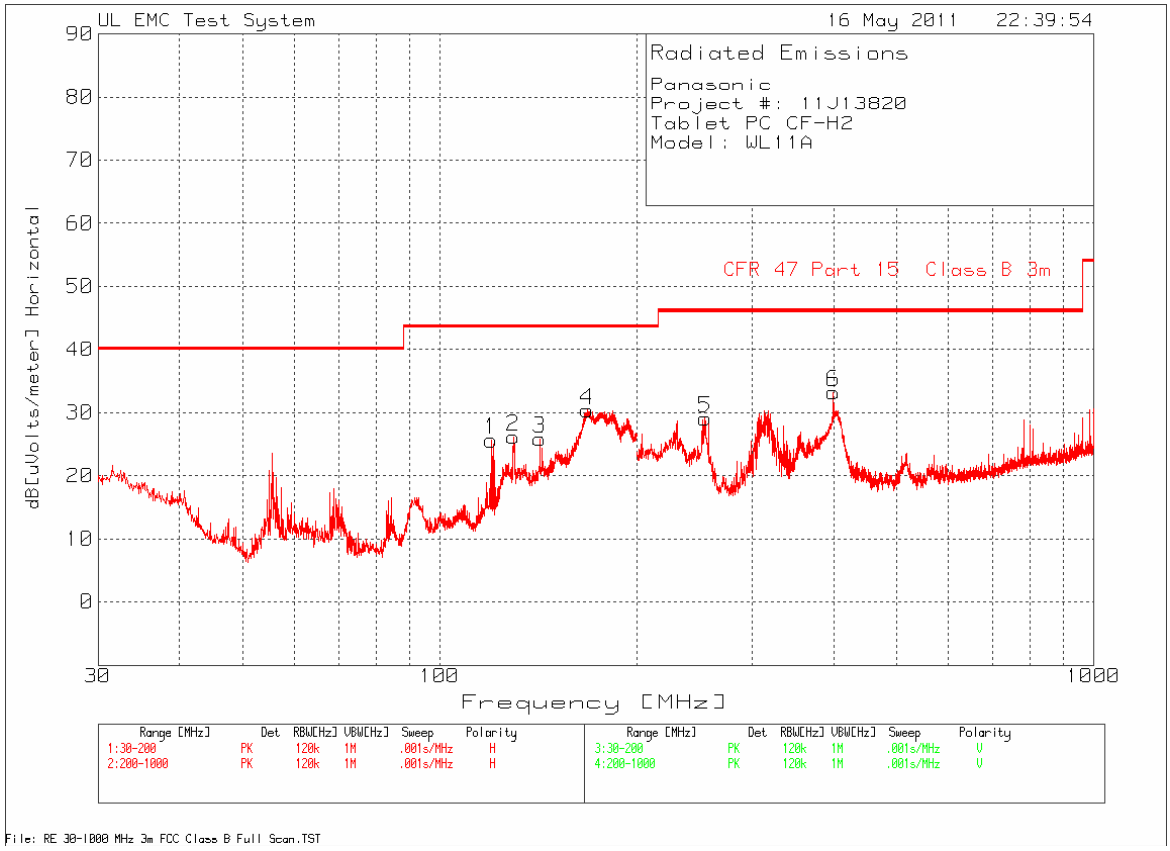
Rev. 07.22.09

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. TRANSMITTER BELOW 1 GHz (worst-case modes)

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

HORIZONTAL PLOT



HORIZONTAL DATA

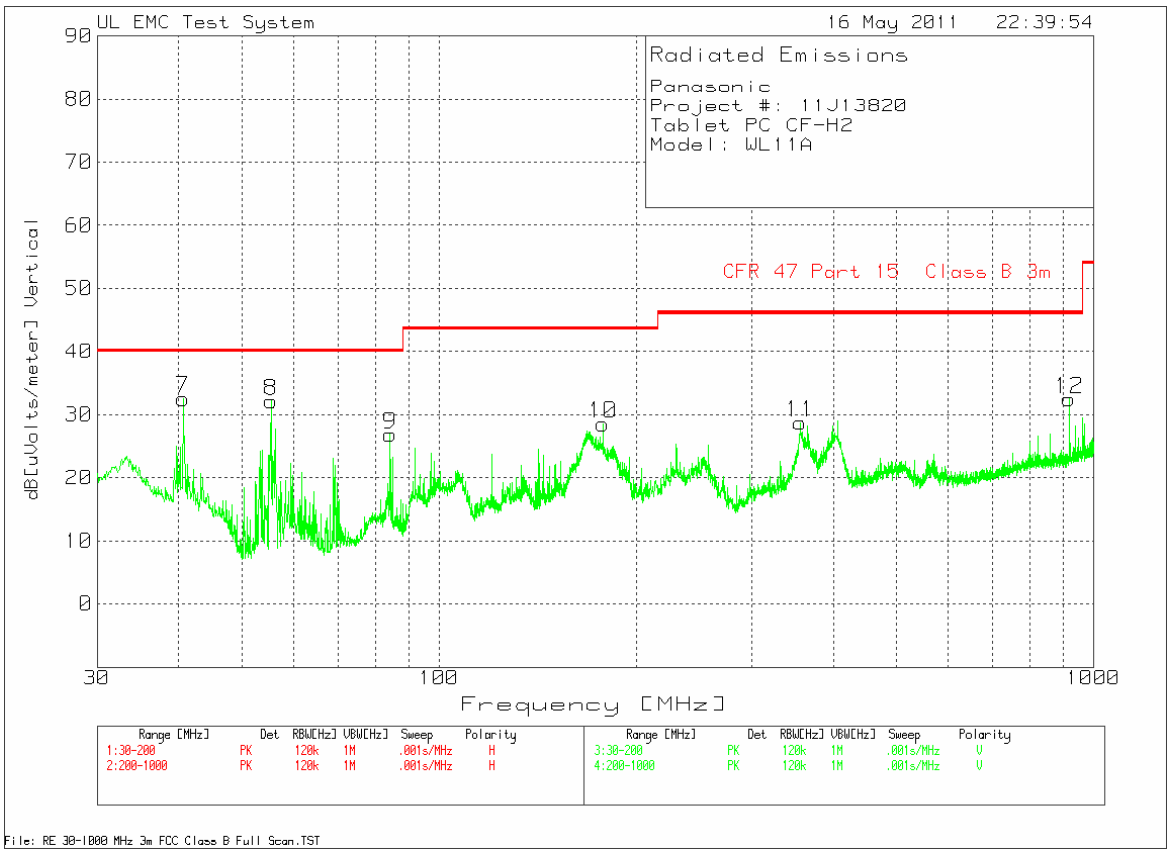
Panasonic
Project #: 11J13820
EUT with AC Adapter
Tx, 5 GHz Band

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level dB[uVolts/meter]	Limit:1	Height: [meter]	Margin [dB]
Horizontal 30 - 1000MHz								
1	40.025	36.99 PK	.9	-15.3	22.59	40	100 Horz	-17.41
2	57.0165	43.41 PK	1.1	-21.5	23.01	40	400 Horz	-16.99
3	129.91	41.21 PK	1.6	-15.6	27.21	43.5	200 Horz	-16.29
4	157.1814	46.5 PK	1.7	-17.8	30.4	43.5	200 Horz	-13.1
5	318.8541	44.37 PK	2.5	-15	31.87	46	100 Horz-	-14.13

Note: No other emissions were detected above noise floor

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

VERTICAL PLOT



VERTICAL DATA

Panasonic
Project #: 11J13820
EUT with AC Adapter
Tx, 5 GHz Band

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Transducer Factor [dB]	Gain/Loss Factor [dB]	Level dB[uVolts/meter]	Limit:1	Height: [meter]	Margin [dB]
Vertical 30 - 1000MHz								
6	39.6852	36.56 PK	.9	-15.1	22.36	40	100 Vert	-17.64
7	53.8731	47.06 PK	1.1	-21.5	26.66	40	100 Vert	-13.34
8	57.6112	48.4 PK	1.1	-21.5	28.0	40	100 Vert	-12.00
9	158.3708	48.57 PK	1.7	-18.0	32.27	43.5	100 Vert	-11.23
10	365.7562	39.77 PK	2.7	-14.4	28.07	46	100 Vert	-17.93

Note: No other emissions were detected above noise floor