



FCC CFR47 PART 15 SUBPART C

**CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

802.11a/b/g/n + BT Half Minicard with 2.4GHz Whip antenna

MODEL NUMBER: WL12A

FCC ID: ACJ9TGWL12A

REPORT NUMBER: 32JE0100-HO-A-R1

ISSUE DATE: May 30, 2012

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

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NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/abou/ut/mark1/index.jsp#nvlap>

Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/24/12	Initial Issue	T.Hatakeda
1	05/30/12	Correction P.8 BE ⇒Band Edge *This report is a revised version of 32JE0100-HO-A, which is replaced with this report.	T.Hatakeda

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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 + BT Half Minicard with 2.4GHz Whip antenna

MODEL: WL12A

SERIAL NUMBER: 2CTSA0097

DATE TESTED: MAY 15 AND 16, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc based on interpretations and/or observations of test results. 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 Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by any government agency.

Approved & Released For UL Japan, Inc. By:

Tested By:



Takahiro Hatakeda
Leader of WiSE Japan
UL Verification Services
UL Japan, Inc.



Hironobu Ohnishi
Engineer of WiSE Japan
UL Verification Services
UL Japan, Inc.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0

The full scope of accreditation can be viewed at

<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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:

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Conducted emission (±dB) 150kHz-30MHz
No.1	3.1dB
No.2	3.3dB
No.3	3.7dB
No.4	3.2dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(±dB)				(1m*)(±dB)		(0.5m*)(±dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (±dB)			Antenna terminal conducted emission (±dB)		Channel power (±dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

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 6235 which is a PCIe half mini card form factor Bluetooth/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 1x2 MISO for 802.11b/g/n modes. Bluetooth only operation mode is a 1x1. When Bluetooth is operational then 802.11b/g/n modes operate as SISO (1x1). 802.11a/n modes still operate as MIMO (2x2) with Bluetooth operational.

The radio module is manufactured by Intel.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding 2.4GHz external antenna.

5.3. MAXIMUM OUTPUT POWER

Same power values were used from original reports.

5.4. DESCRIPTION OF ADDING ANTENNA

Whip antenna with 5dBi in 2.4GHz is added.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was DRTU, version. 1.5.3-0335.

Driver software is V15.0.0.61.

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

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

Worst-case Modes to test

2.4GHz			5.8GHz		
Low Band Edge	High Band Edge	Harmonics	Low Band Edge	High Band Edge	Harmonics
11n 40M	11n 40M	11b	No need to test	No need to test	11a
Chain A	Chain A	Chain A			Chain A
Channel 3	Channel 9	Channel 11			Channel 157 (5785MHz)
Pwr AV=10.2dBm	Pwr AV=9.9dBm	Pwr AV=16.8dBm			Pwr AV=15.4dBm
Margin=-0.8dB	Margin=-1.4dB	AV Margin=-14.7dB			AV Margin=-14.8dB
-	-	Freq.=4924MHz			Freq.=11570MHz

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Panasonic	Toughbook (CF-31)	2CTSA0097	DoC
Laptop Deck	Panasonic	CF-VEB272	9DKSA 02245	DoC
AC/DC	Panasonic	CF-AA5713A M1	5713AM112223038A	DoC

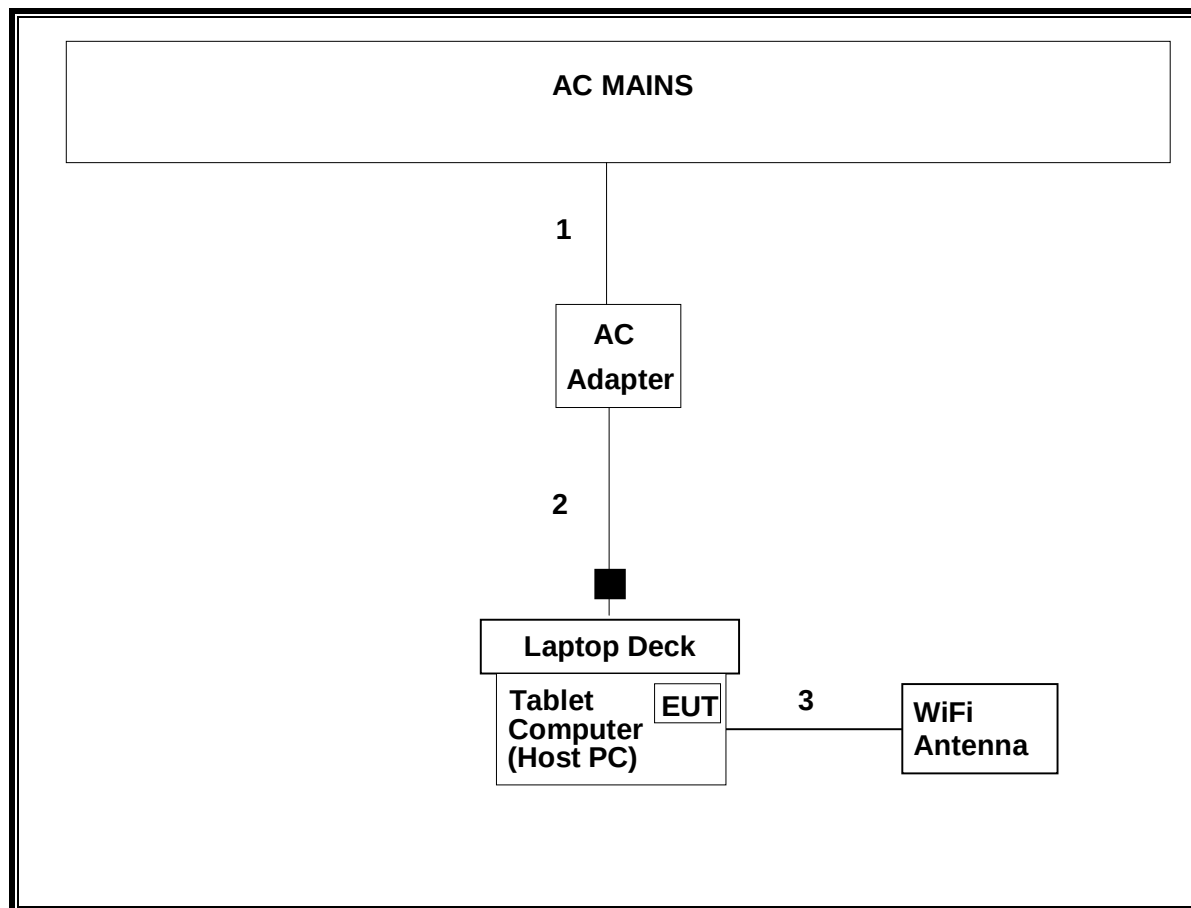
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Un-Shielded	190 cm	N/A
2	DC	1	DC	Un-Shielded	200 cm	N/A
3	Antenna	1	Antenna	Shielded	100 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:

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2011/11/07 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2011/11/07 * 12
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2011/06/23 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2011/11/23 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MHA-04	Horn Antenna 26.5-40GHz	EMCO	3160-10	1140	RE	2011/10/22 * 12
MCC-55	Microwave Cable	Suhner	SUCOFLEX101	2874(1m) / 2877(5m)	RE	2012/03/19 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MHF-16	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	RE	2011/09/08 * 12
MHF-18	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7002	RE	2011/09/08 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2011/12/08 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2012/02/06 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2012/02/16 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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.

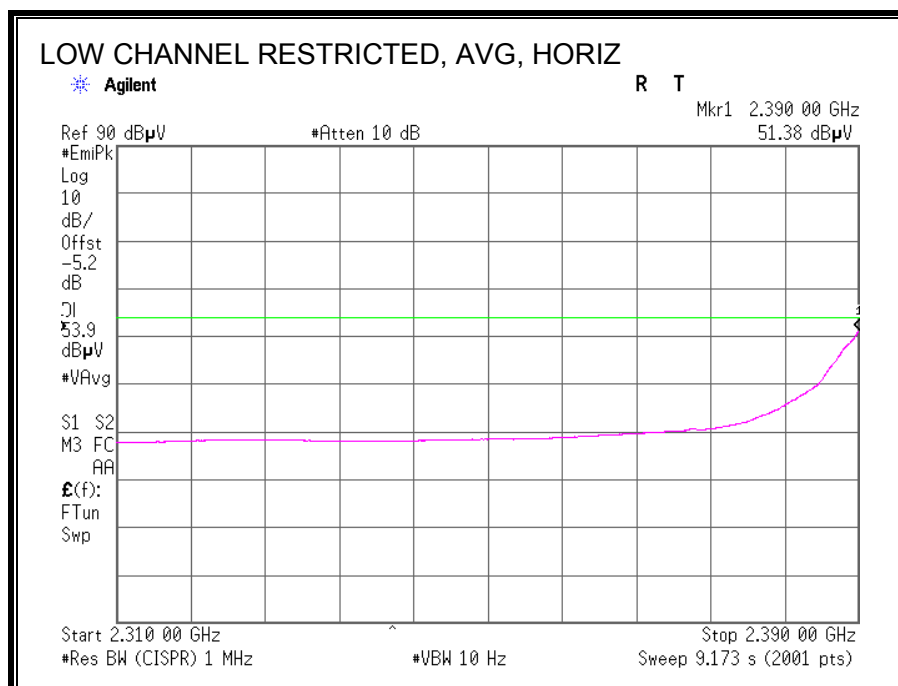
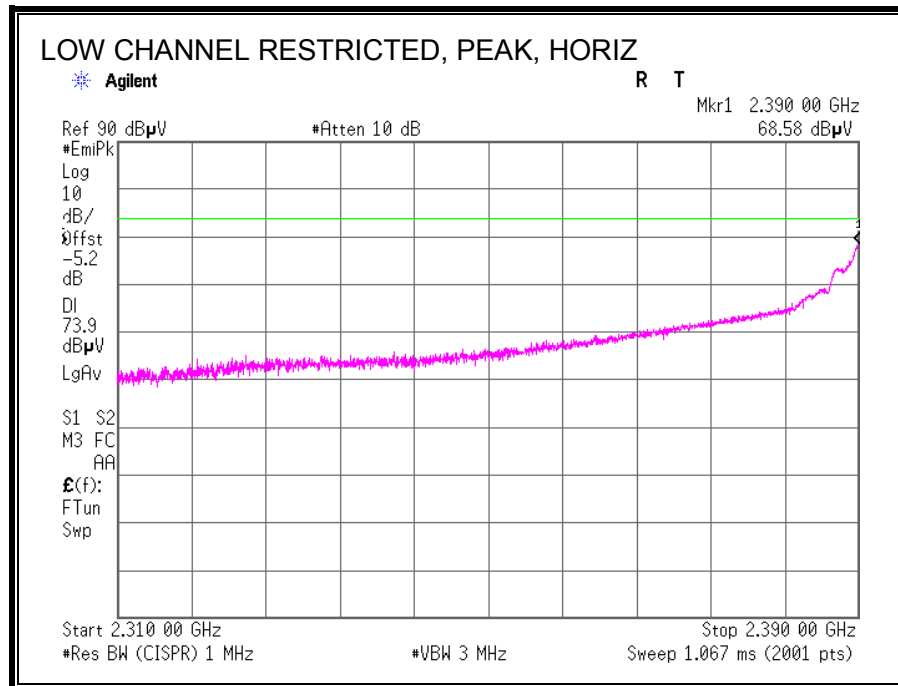
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the middle channel in the 5.8 band.

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.

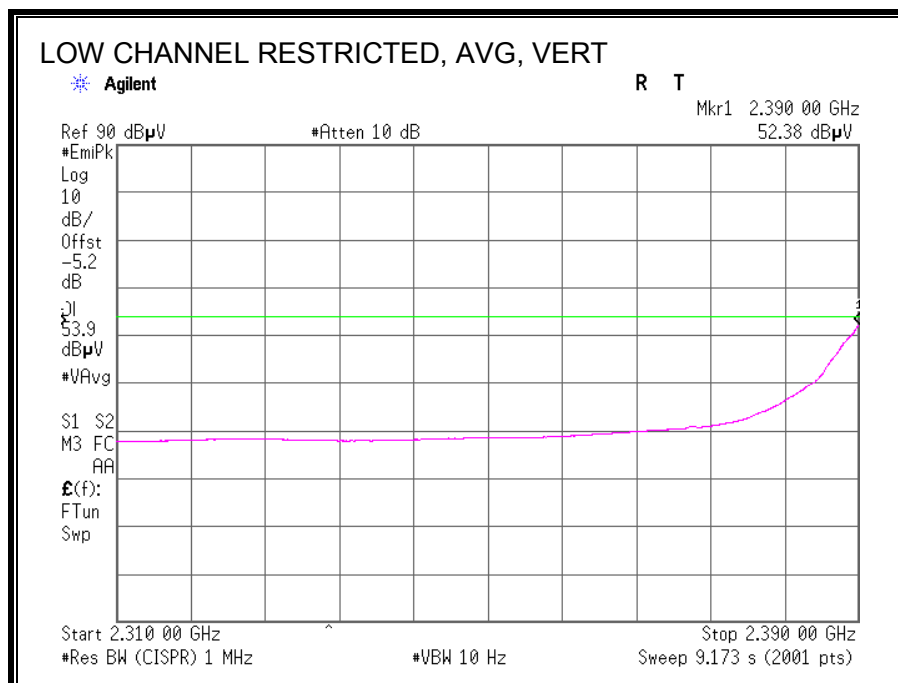
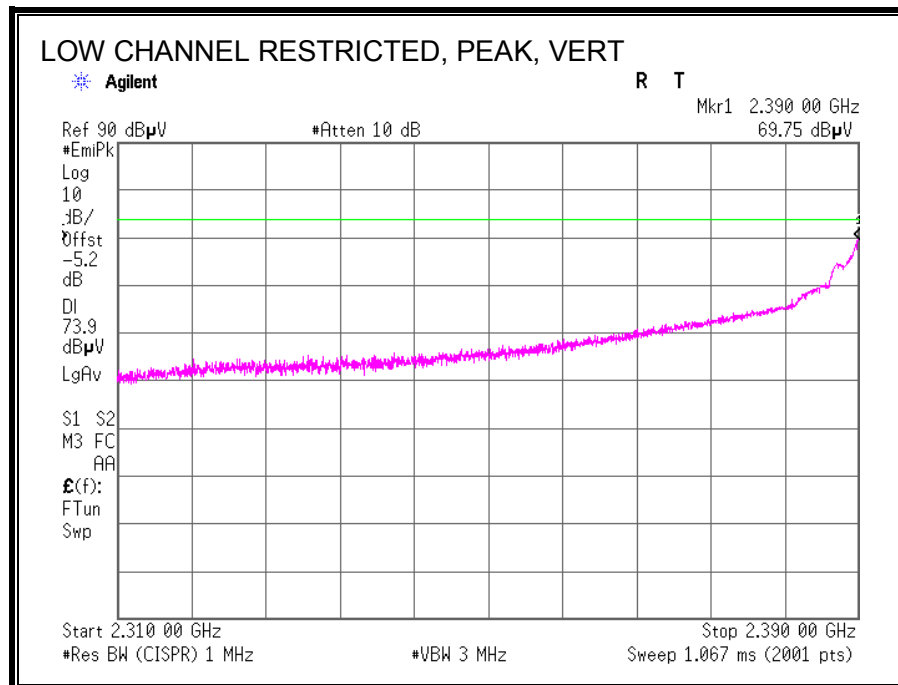
7.2. TRANSMITTER ABOVE 1 GHz (worst-case modes)

7.2.1. 2.4 GHz BAND (11n HT20)

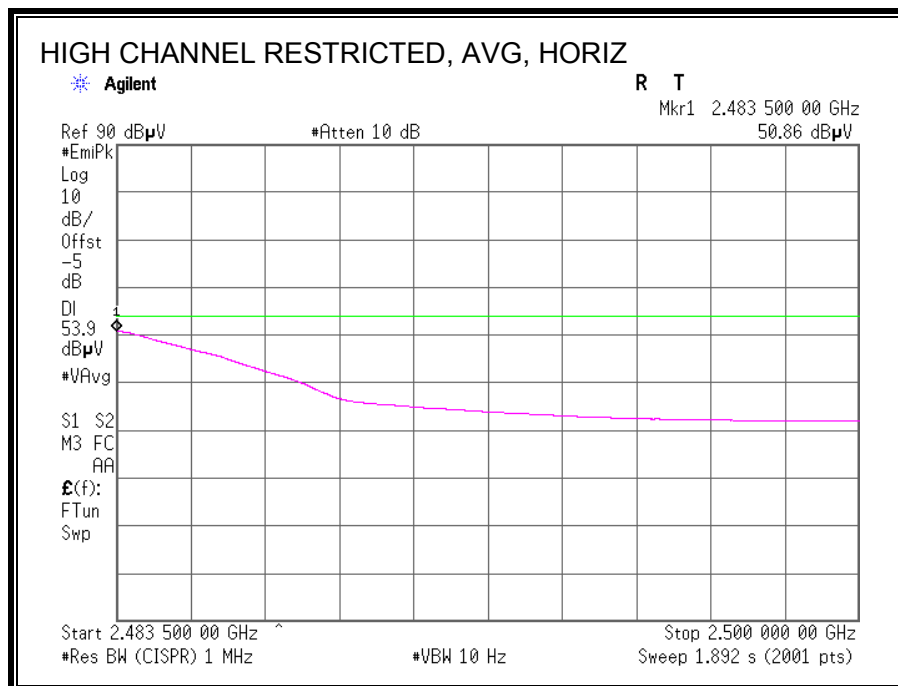
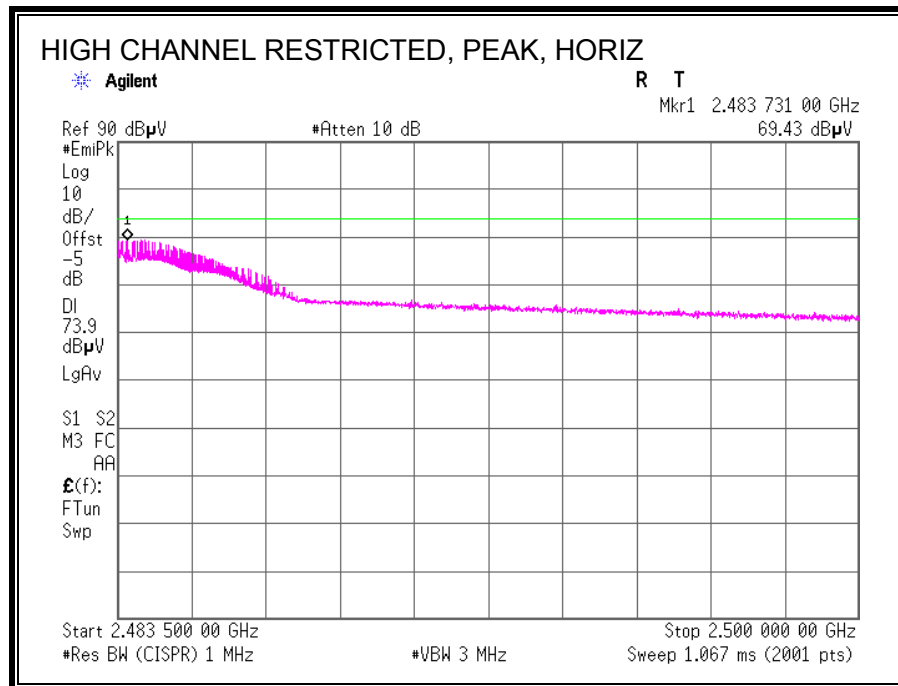
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



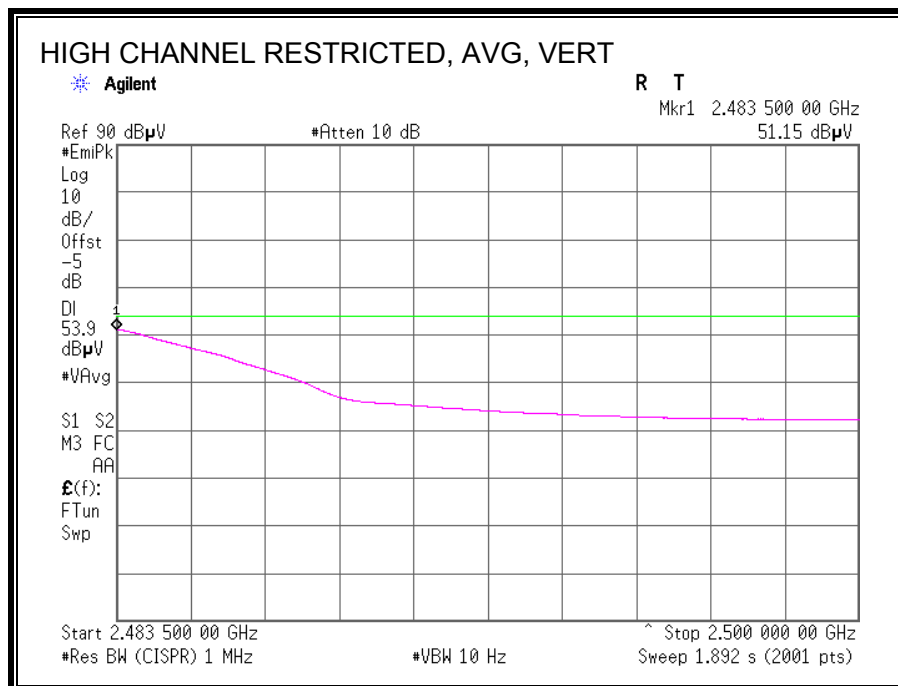
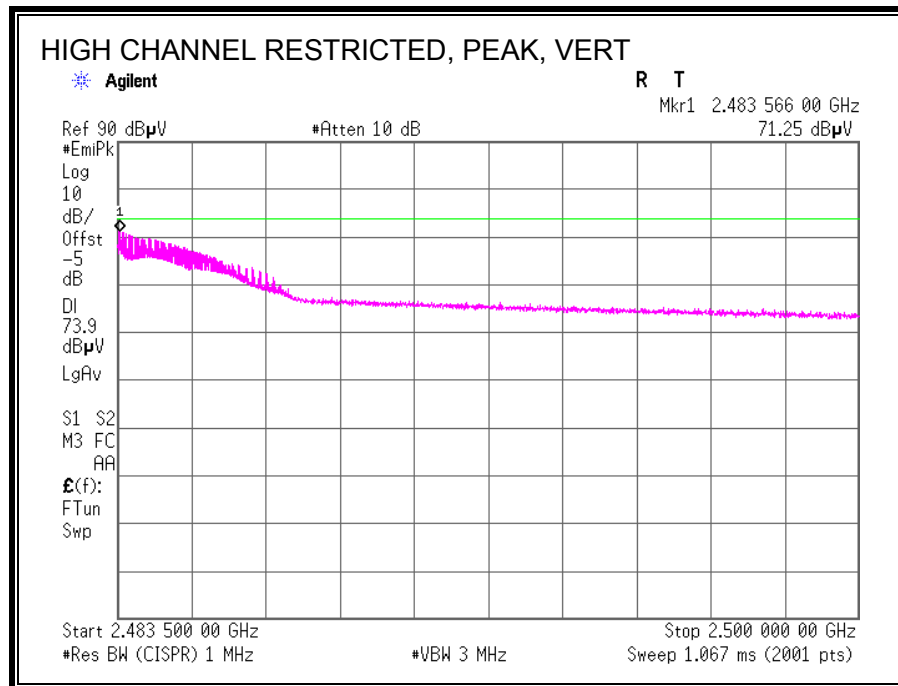
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

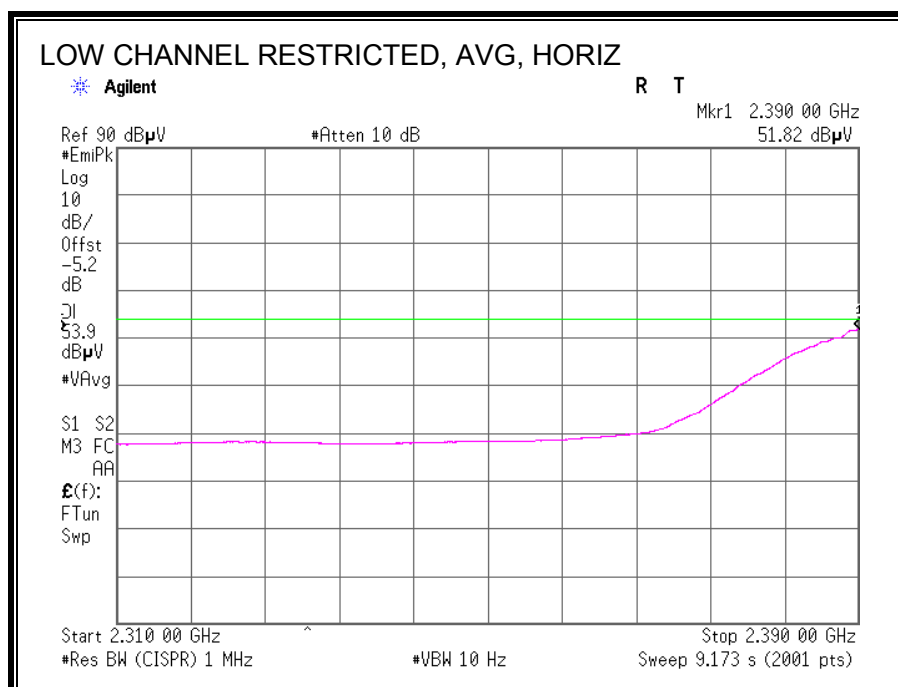
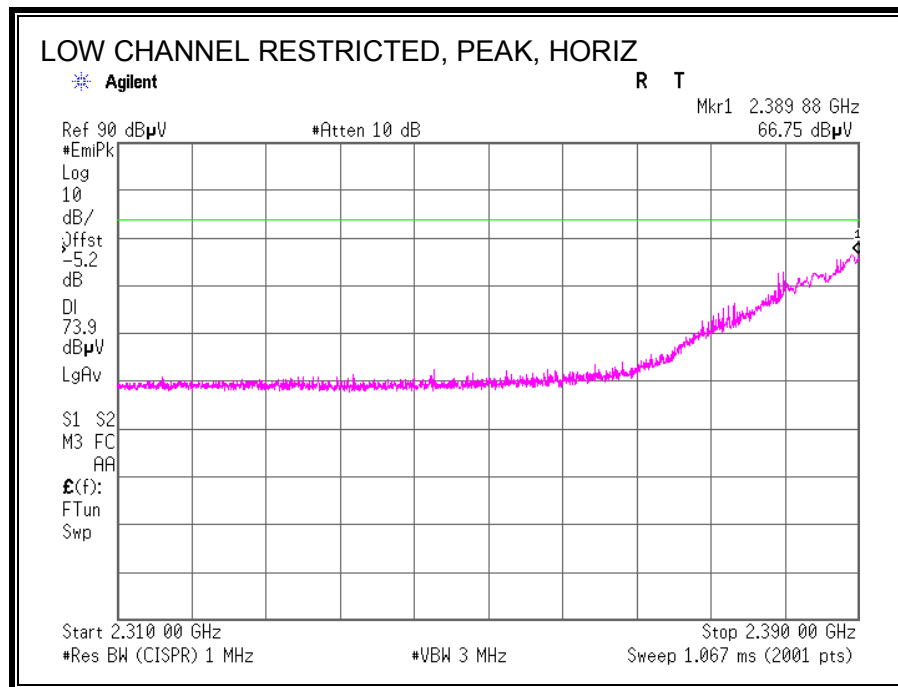


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

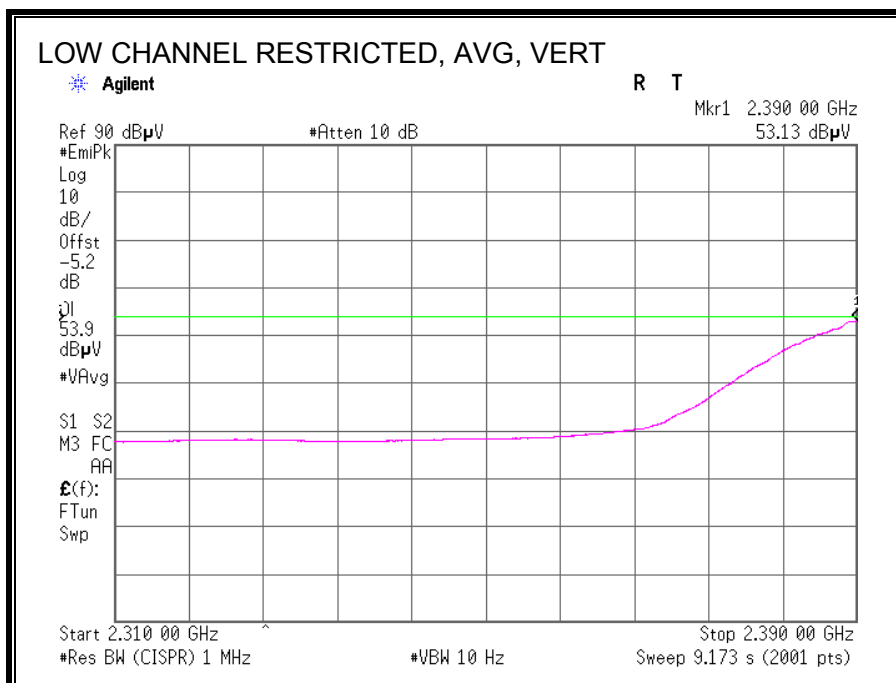
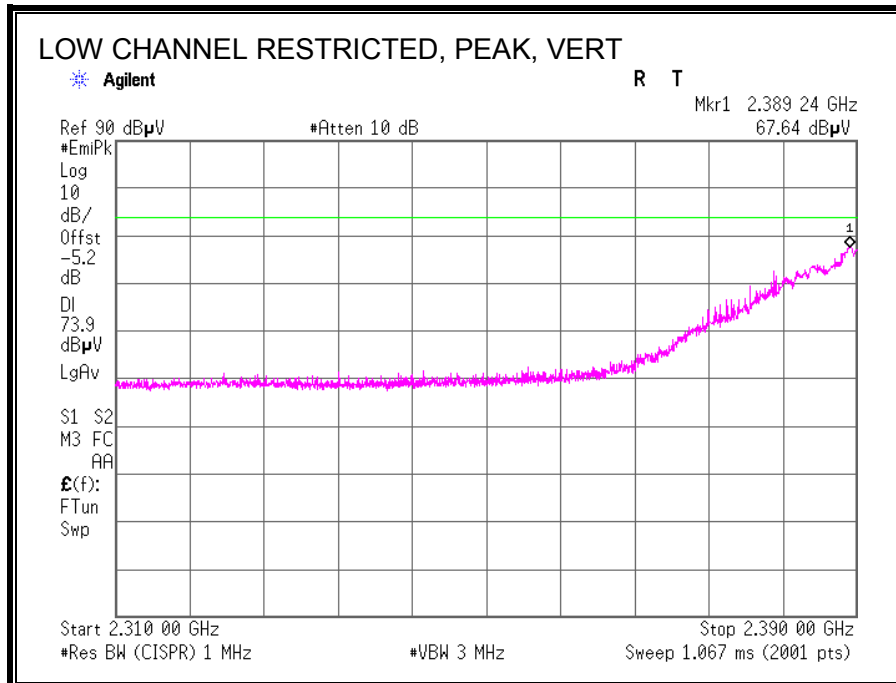


7.2.2 2.4 GHz BAND (11n HT40)

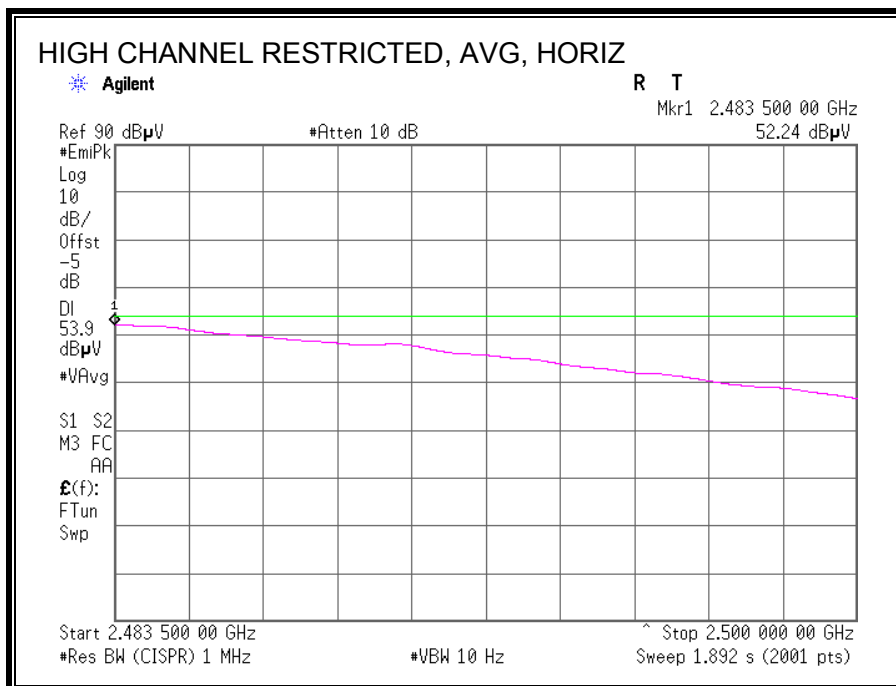
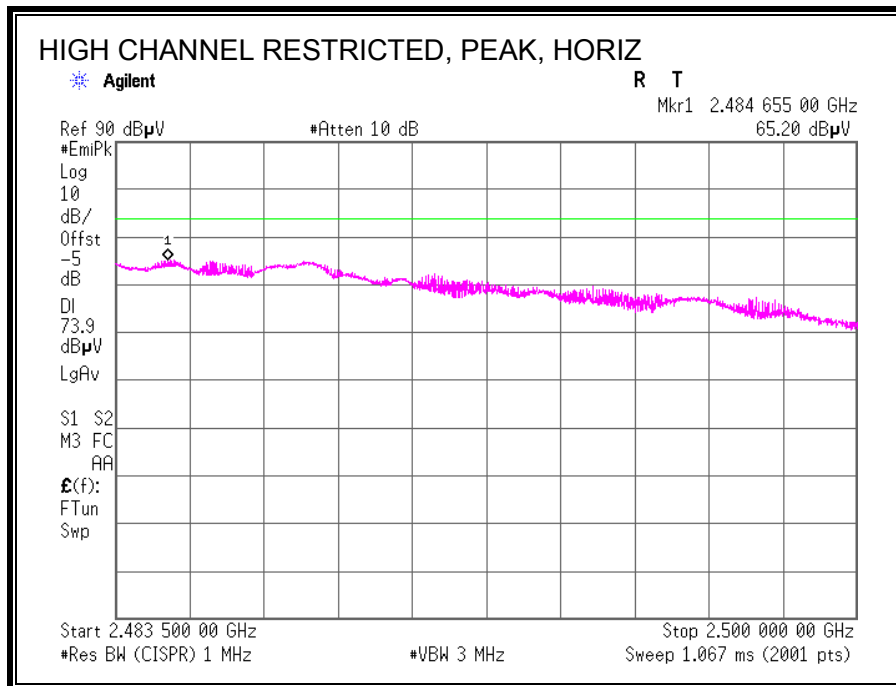
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



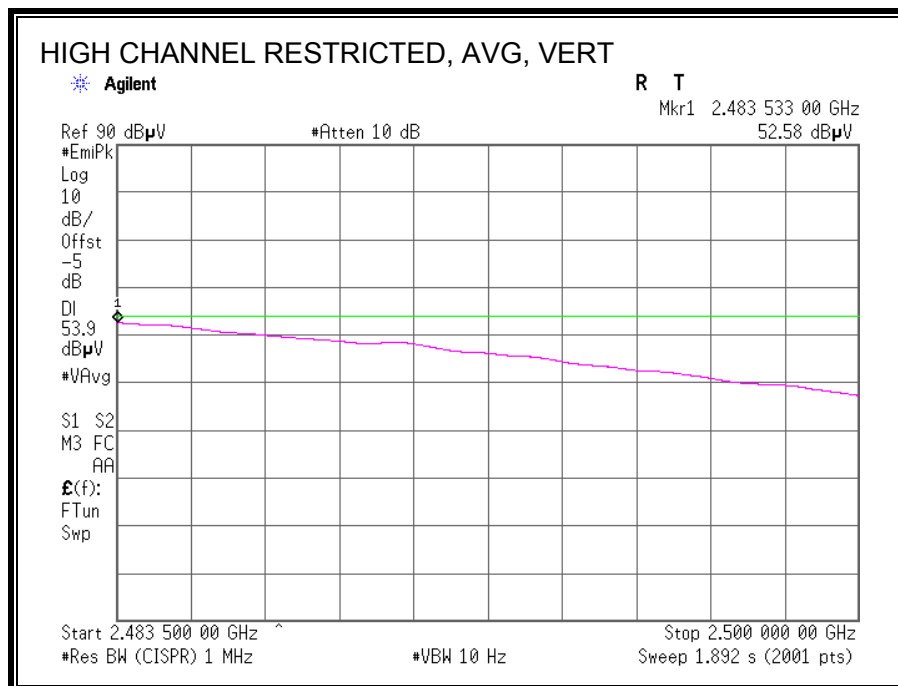
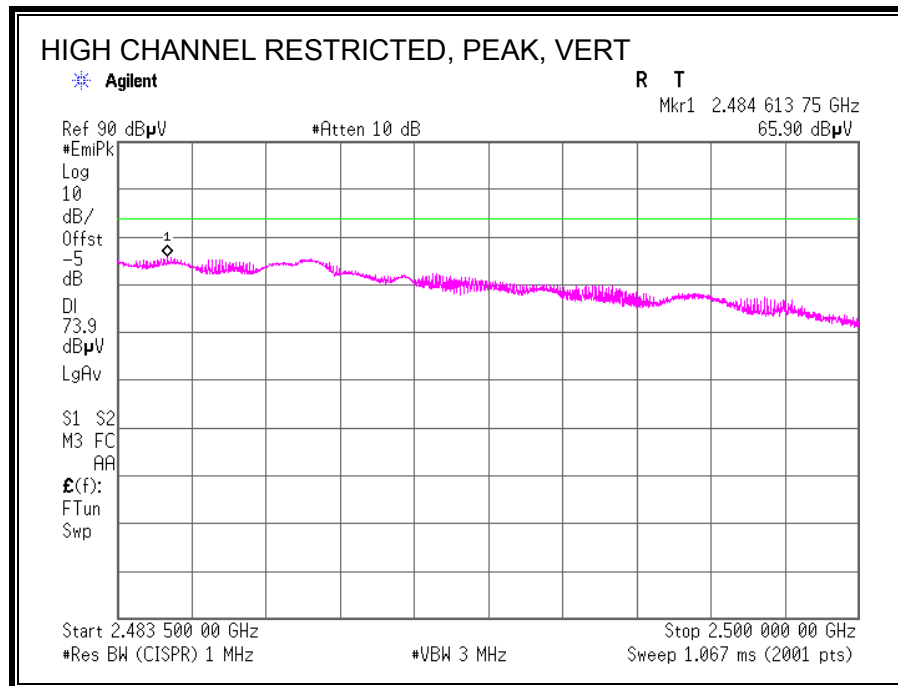
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32JE0100-HO
Date 05/16/2012
Temperature/ Humidity 22 deg. C / 48% RH
Engineer Satofumi Matsuyama
(1-26.5GHz)
Mode 11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4824.000	PK	44.9	31.3	4.9	34.0	47.1	73.9	26.8	
Hori	7236.000	PK	42.9	35.9	6.1	34.2	50.7	73.9	23.2	No signal.
Hori	9648.000	PK	44.1	38.8	6.9	34.7	55.1	73.9	18.8	No signal.
Hori	24120.000	PK	46.6	40.5	-1.7	31.8	53.6	73.9	20.3	No signal.
Hori	4824.000	AV	34.0	31.3	4.9	34.0	36.2	53.9	17.7	
Hori	7236.000	AV	30.5	35.9	6.1	34.2	38.3	53.9	15.6	No signal.
Hori	9648.000	AV	31.1	38.8	6.9	34.7	42.1	53.9	11.8	No signal.
Hori	24120.000	AV	35.8	40.5	-1.7	31.8	42.8	53.9	11.1	No signal.
Vert	4824.000	PK	44.6	31.3	4.9	34.0	46.8	73.9	27.1	
Vert	7236.000	PK	43.4	35.9	6.1	34.2	51.2	73.9	22.7	No signal.
Vert	9648.000	PK	44.3	38.8	6.9	34.7	55.3	73.9	18.6	No signal.
Vert	24120.000	PK	47.6	40.5	-1.7	31.8	54.6	73.9	19.3	No signal.
Vert	4824.000	AV	34.1	31.3	4.9	34.0	36.3	53.9	17.6	
Vert	7236.000	AV	30.5	35.9	6.1	34.2	38.3	53.9	15.6	No signal.
Vert	9648.000	AV	31.1	38.8	6.9	34.7	42.1	53.9	11.8	No signal.
Vert	24120.000	AV	35.8	40.5	-1.7	31.8	42.8	53.9	11.1	No signal.

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32JE0100-HO
Date 05/16/2012
Temperature/ Humidity 22 deg. C / 48% RH
Engineer Satofumi Matsuyama
(1-26.5GHz)
Mode 11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	44.4	31.4	4.9	34.0	46.7	73.9	27.2	
Hori	7311.000	PK	42.7	36.0	6.2	34.2	50.7	73.9	23.2	No signal.
Hori	9748.000	PK	43.0	38.9	7.0	34.7	54.2	73.9	19.7	No signal.
Hori	24370.000	PK	46.2	40.5	-1.7	32.2	52.8	73.9	21.1	No signal.
Hori	4874.000	AV	34.4	31.4	4.9	34.0	36.7	53.9	17.2	
Hori	7311.000	AV	31.1	36.0	6.2	34.2	39.1	53.9	14.8	No signal.
Hori	9748.000	AV	31.6	38.9	7.0	34.7	42.8	53.9	11.1	No signal.
Hori	24370.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	No signal.
Vert	4874.000	PK	44.6	31.4	4.9	34.0	46.9	73.9	27.0	
Vert	7311.000	PK	42.8	36.0	6.2	34.2	50.8	73.9	23.1	No signal.
Vert	9748.000	PK	43.2	38.9	7.0	34.7	54.4	73.9	19.5	No signal.
Vert	24370.000	PK	46.1	40.5	-1.7	32.2	52.7	73.9	21.2	No signal.
Vert	4874.000	AV	34.3	31.4	4.9	34.0	36.6	53.9	17.3	
Vert	7311.000	AV	31.1	36.0	6.2	34.2	39.1	53.9	14.8	No signal.
Vert	9748.000	AV	31.6	38.9	7.0	34.7	42.8	53.9	11.1	No signal.
Vert	24370.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	No signal.

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32JE0100-HO
Date 05/16/2012
Temperature/ Humidity 22 deg. C / 48% RH
Engineer Satofumi Matsuyama
(1-26.5GHz)
Mode 11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4924.000	PK	46.4	31.5	5.0	34.0	48.9	73.9	25.0	
Hori	7386.000	PK	42.7	36.1	6.3	34.3	50.8	73.9	23.1	No signal.
Hori	9848.000	PK	43.5	39.1	7.1	34.7	55.0	73.9	18.9	No signal.
Hori	24620.000	PK	47.1	40.6	-1.6	32.5	53.6	73.9	20.3	No signal.
Hori	4924.000	AV	36.7	31.5	5.0	34.0	39.2	53.9	14.7	
Hori	7386.000	AV	31.3	36.1	6.3	34.3	39.4	53.9	14.5	No signal.
Hori	9848.000	AV	31.9	39.1	7.1	34.7	43.4	53.9	10.5	No signal.
Hori	24620.000	AV	36.2	40.6	-1.6	32.5	42.7	53.9	11.2	No signal.
Vert	4924.000	PK	45.2	31.5	5.0	34.0	47.7	73.9	26.2	
Vert	7386.000	PK	42.6	36.1	6.3	34.3	50.7	73.9	23.2	No signal.
Vert	9848.000	PK	43.1	39.1	7.1	34.7	54.6	73.9	19.3	No signal.
Vert	24620.000	PK	48.1	40.6	-1.6	32.5	54.6	73.9	19.3	No signal.
Vert	4924.000	AV	35.9	31.5	5.0	34.0	38.4	53.9	15.5	
Vert	7386.000	AV	31.3	36.1	6.3	34.3	39.4	53.9	14.5	No signal.
Vert	9848.000	AV	31.9	39.1	7.1	34.7	43.4	53.9	10.5	No signal.
Vert	24620.000	AV	36.2	40.6	-1.6	32.5	42.7	53.9	11.2	No signal.

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32JE0100-HO
Date 05/16/2012
Temperature/ Humidity 22 deg. C / 48% RH
Engineer Satofumi Matsuyama
(1-10GHz)
Mode Rx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2437.000	PK	44.0	27.5	2.2	34.8	38.9	73.9	35.0	No signal.
Hori	2437.000	AV	32.7	27.5	2.2	34.8	27.6	53.9	26.3	No signal.
Vert	2437.000	PK	43.2	27.5	2.2	34.8	38.1	73.9	35.8	No signal.
Vert	2437.000	AV	32.7	27.5	2.2	34.8	27.6	53.9	26.3	No signal.

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

7.2.3 5.8 GHz BAND

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32JE0100-HO
Date 05/16/2012
Temperature/ Humidity 22 deg. C / 48% RH
Engineer Satofumi Matsuyama
(1-40GHz)
Mode 11a Tx 5785MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	11570.000	PK	46.8	39.8	-1.8	33.8	51.0	73.9	22.9	No signal.
Hori	17355.000	PK	43.8	43.2	-0.8	32.6	53.6	73.9	20.3	
Hori	28925.000	PK	35.6	43.6	-0.4	24.8	54.0	73.9	19.9	
Hori	11570.000	AV	34.4	39.8	-1.8	33.8	38.6	53.9	15.3	No signal.
Hori	17355.000	AV	32.5	43.2	-0.8	32.6	42.3	53.9	11.6	
Hori	28925.000	AV	24.7	43.6	-0.4	24.8	43.1	53.9	10.8	
Vert	11570.000	PK	46.6	39.8	-1.8	33.8	50.8	73.9	23.1	No signal.
Vert	17355.000	PK	43.4	43.2	-0.8	32.6	53.2	73.9	20.7	
Vert	28925.000	PK	35.1	43.6	-0.4	24.8	53.5	73.9	20.4	
Vert	11570.000	AV	34.9	39.8	-1.8	33.8	39.1	53.9	14.8	No signal.
Vert	17355.000	AV	32.5	43.2	-0.8	32.6	42.3	53.9	11.6	
Vert	28925.000	AV	24.7	43.6	-0.4	24.8	43.1	53.9	10.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

7.3. WORST-CASE BELOW 1 GHz

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

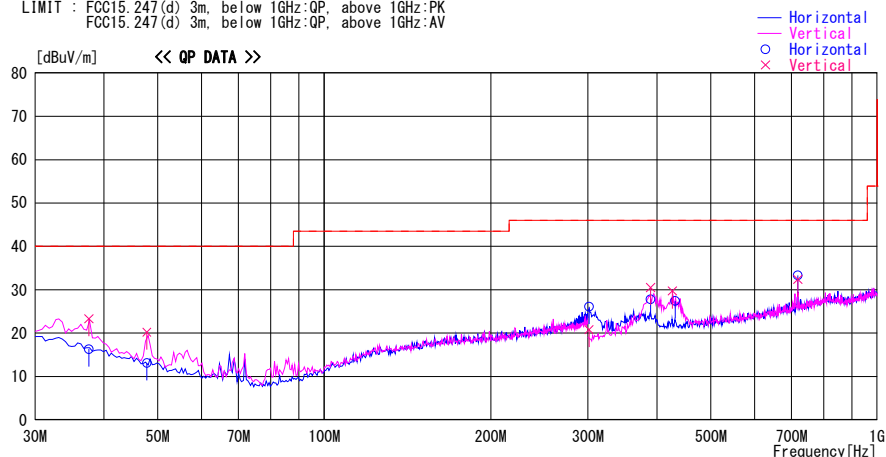
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/05/16

Report No. : 32JE0100-HO
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 48% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11b 1Mbps 2462MHz, Chain A, Gain Control = 23.5dB, Worst-axis(Hor:Y Ver:Y)

LIMIT : FCC15.247(d) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.247(d) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Loss& Gain [dB]						
37.544	29.9	QP	15.2	-21.8	23.3	243	100	Vert.	40.0	16.7
37.557	22.9	QP	15.2	-21.8	16.3	0	300	Hori.	40.0	23.7
47.792	22.9	QP	11.8	-21.6	13.1	0	300	Hori.	40.0	26.9
47.795	30.0	QP	11.8	-21.6	20.2	225	100	Vert.	40.0	19.8
301.136	30.5	QP	14.4	-18.8	26.1	346	100	Hori.	46.0	19.9
301.148	25.2	QP	14.4	-18.8	20.8	0	182	Vert.	46.0	25.2
389.192	29.6	QP	17.1	-18.9	27.8	2	190	Hori.	46.0	18.2
389.204	32.3	QP	17.1	-18.9	30.5	334	117	Vert.	46.0	15.5
426.362	31.0	QP	17.6	-18.9	29.7	332	100	Vert.	46.0	16.3
431.142	28.6	QP	17.7	-18.9	27.4	36	100	Hori.	46.0	18.6
718.592	30.0	QP	21.0	-17.7	33.3	310	194	Hori.	46.0	12.7
718.595	29.1	QP	21.0	-17.7	32.4	339	100	Vert.	46.0	13.6

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz:-HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

7.4. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

RESULTS

6 WORST EMISSIONS

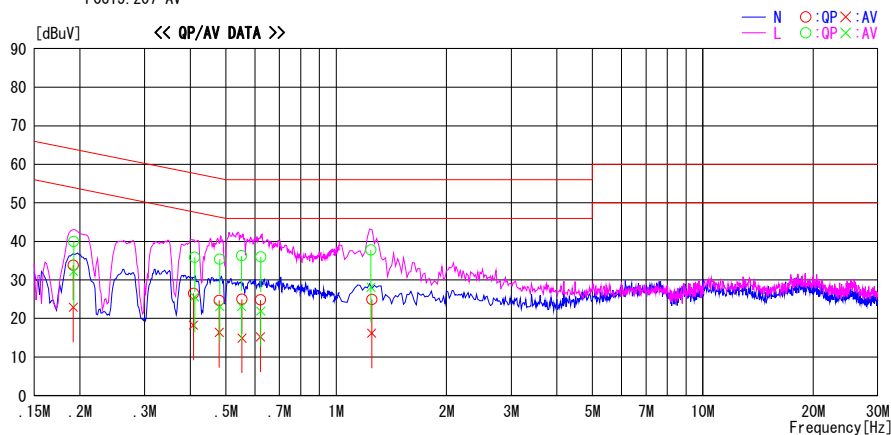
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/05/16

Report No. : 32JE0100-HO
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 48% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11b 1Mbps 2462MHz, Chain A, Gain Control = 23.5dB

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19172	20.6	9.7	13.2	33.8	22.9	64.0	54.0	30.2	31.1	N
0.40805	13.3	5.1	13.2	26.5	18.3	57.7	47.7	31.2	29.4	N
0.47977	11.5	3.2	13.2	24.7	16.4	56.3	46.3	31.6	29.9	N
0.55348	11.8	1.7	13.2	25.0	14.9	56.0	46.0	31.0	31.1	N
0.62197	11.5	1.9	13.3	24.8	15.2	56.0	46.0	31.2	30.8	N
1.24947	11.6	2.9	13.3	24.9	16.2	56.0	46.0	31.1	29.8	N
0.19224	26.8	19.0	13.2	40.0	32.2	63.9	53.9	23.9	21.7	L
0.41121	22.7	12.4	13.2	35.9	25.6	57.6	47.6	21.7	22.0	L
0.48104	22.2	9.9	13.2	35.4	23.1	56.3	46.3	20.9	23.2	L
0.55174	23.1	9.9	13.2	36.3	23.1	56.0	46.0	19.7	22.9	L
0.62209	22.7	8.6	13.3	36.0	21.9	56.0	46.0	20.0	24.1	L
1.24399	24.5	14.8	13.3	37.8	28.1	56.0	46.0	18.2	17.9	L

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C, F(PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.