



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8
(Permissive Change Class II Application)**

CERTIFICATION TEST REPORT

FOR

WIRELESS LAN Module

MODEL NUMBER: DWM-W082

**FCC ID: EW4DWMW082
IC: 4250A-DWMW082**

REPORT NUMBER: 32IE0254-HO-01

ISSUE DATE: June 6, 2012

Prepared for
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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/abo/ut/mark1/index.jsp#nvlap>

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/06/12	Initial Issue	M.Nishiyama

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Mitsumi Electric Co., Ltd.
1601, Sakai, Atsugi-shi, Kanagawa-ken 243, Japan

EUT DESCRIPTION: WIRELESS LAN Module

MODEL: DWM-W082

SERIAL NUMBER: [Radiated emission test]
Antenna (PIFA) [DCA-P17_CS2]: No. EJF10006869 6
Antenna (Dipole) [361.00194.005 CS]: No. EJF10006863 4
[Antenna Terminal Conducted test]
No. EJF100068535

DATE TESTED: May 7 to 10, 2012

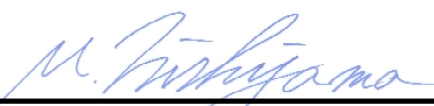
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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:


Masanori Nishiyama
Leader of WiSE Japan
UL Verification Services
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Engineer of WiSE Japan
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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, 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 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:

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

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

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 a Mitsumi Wireless LAN module (802.11b/g).

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding a new host and a new antenna.

5.3. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412-2472	802.11b	7.95	6.24
2412-2462	802.11g	14.08	25.59

Antenna Brand	Antenna type	Antenna Model No.	Max. Peak Antenna Gain (dBi)
Foxconn	Dipole	361.00194.005 CS	1.15
Foxconn	Dipole	361.00194.005 CS2	-5.10
Mitsumi	PIFA	DCA-P17_CS2	-5.39
Mitsumi	PIFA	DCA-P17_VA	-5.66

The radio utilizes two different types of antennas, with a maximum gain of 1.15dBi for Antenna (Dipole) [361.00194.005 CS] and -5.39dBi for Antenna (PIFA) [DCA-P17_CS2].
The test was performed with 2 antennas of maximum gain.

5.4. SOFTWARE AND FIRMWARE

Host of EUT Hardware version is 4.0.

Test Utility for RF:
HOSTIO-ART ver. 1.8

5.5. WORST-CASE CONFIGURATIONS

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11b mode were made at 2 Mb/s.
All final tests in the 802.11g mode were made at 24 Mb/s.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

The EUT was investigated in three orthogonal orientations X,Y, and Z. Orientation Z was found to be worst-case orientation.

The same output power as the original model was used.
Therefore only Spurious Emission (Radiated) test was performed in this report.
For other tests, please see the test report number 32FE0108-HO-01–B issued by UL Japan, Inc.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Lenovo	1952E69	L3KY127	DoC
AC Adapter	Lenovo	92P1156	1129P1156Z1ZDXN0991HM	N/A
UIC-MIDI Intercede	Kyoto Microcomputer Co.	Partner CTR	I0200184-UBA	N/A
EUT AC Adapter	Mitsumi	WAP-002 (USA)	-	N/A
EUT AC Adapter	Tabuchi	WAP-002 (USA)	-	N/A
Headset	-	-	-	N/A

I/O CABLES (ANTENNA PORT TEST CONFIGURATION)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Unshielded	0.9m	
2	DC	1	DC	Unshielded	1.7m	
3	USB	1	USB	Shielded	1.5m	
4	DC	1	DC	Unshielded	1.9m	

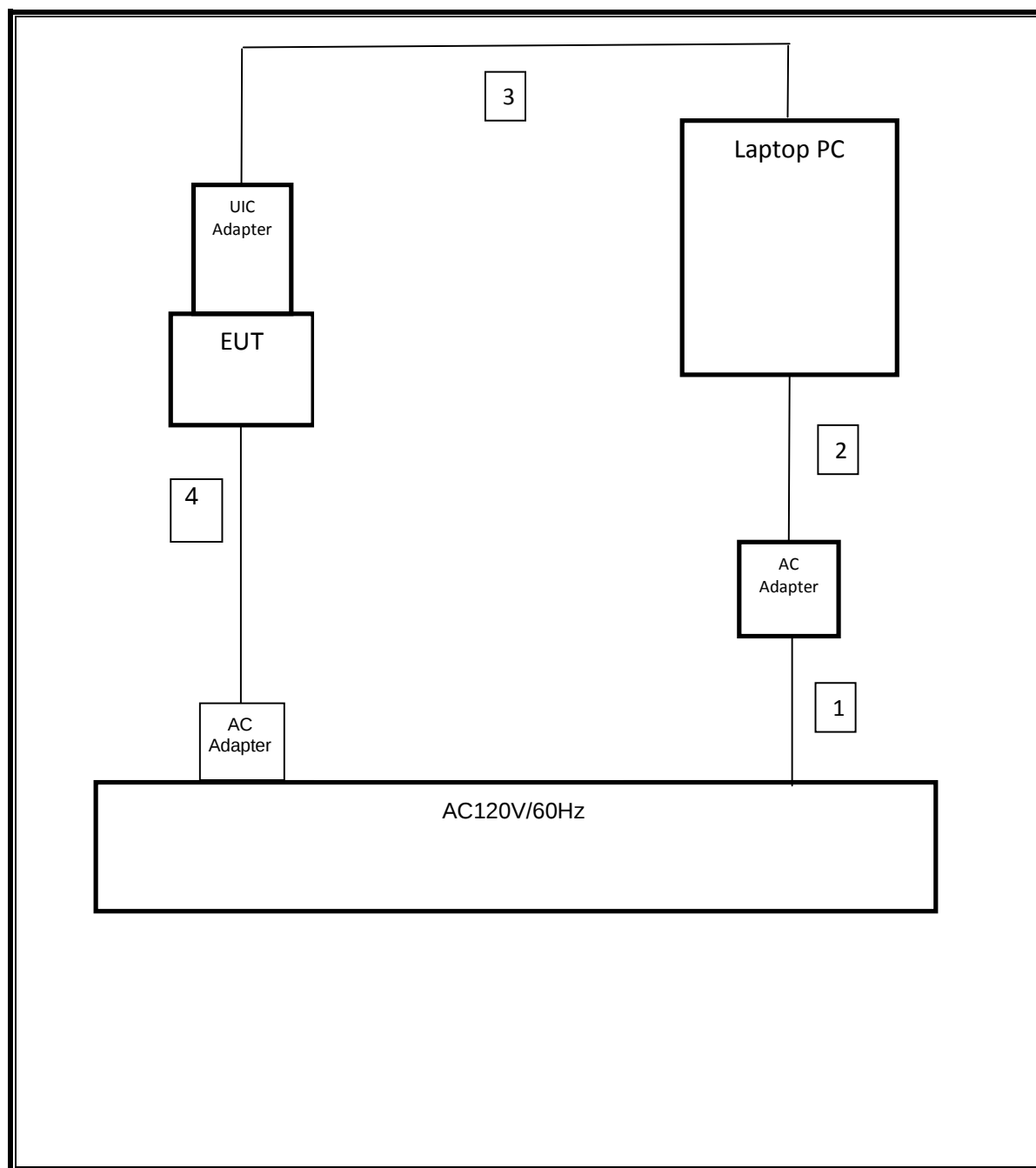
I/O CABLES (RADIATED AND LINE CONDUCTED TEST CONFIGURATION)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC	Unshielded	1.9m	
2	Head set	1	AUDIO	Unshielded	0.9m	

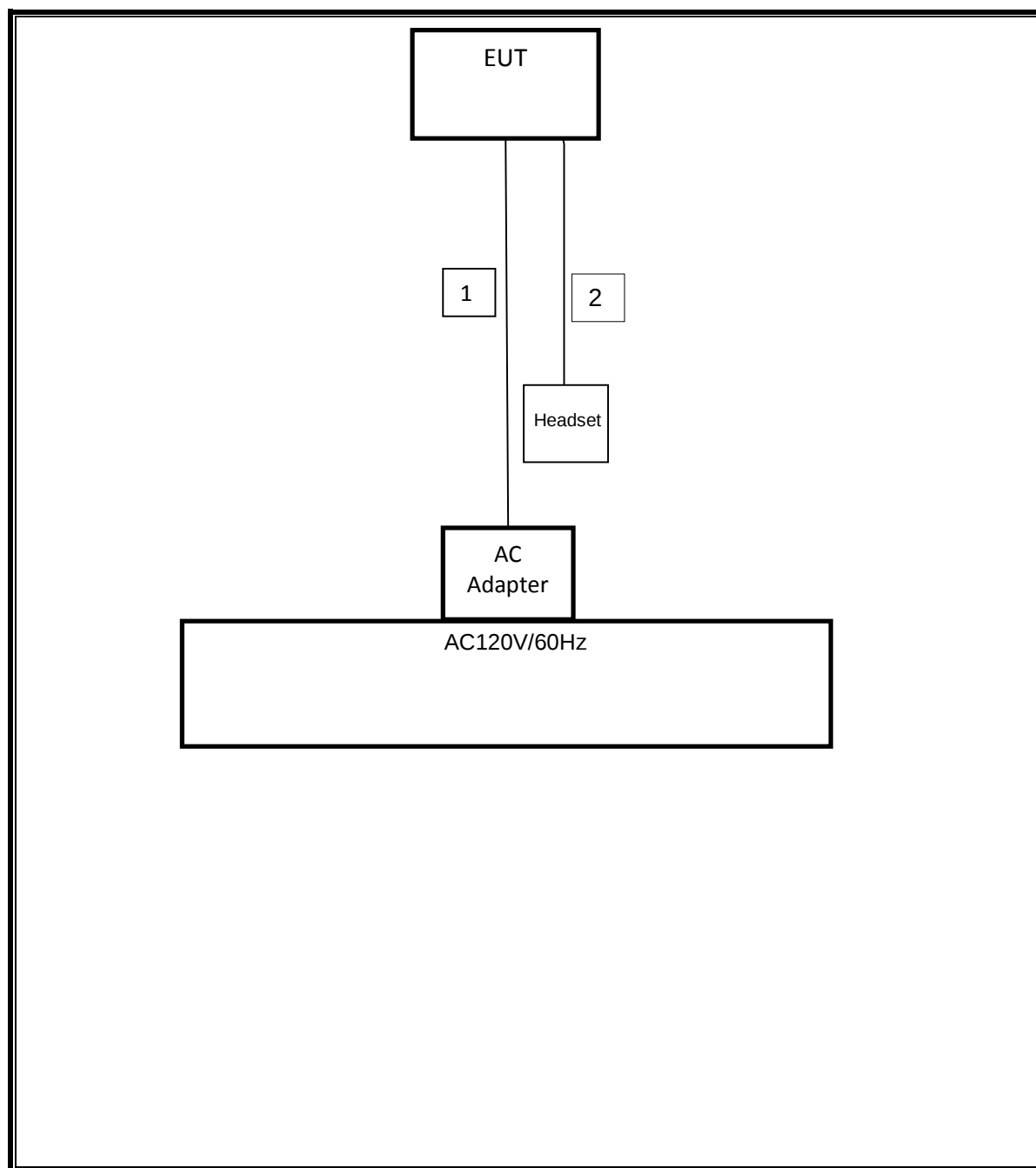
TEST SETUP

The EUT is connected to a Jig card and host laptop computer via a USB cable during the tests. Test software exercised the radio card. The Jig card is removed after the setup.

SETUP DIAGRAM FOR ANTENNA PORT TESTS



SETUP DIAGRAM FOR RADIATED EMISSIONS TESTS



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)
MPSE-12	Power sensor	Anritsu	MA2411B	011598	Power Measurement	2011/09/12 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	Power Measurement	2011/09/12 * 12
MCC-36	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2011/09/30 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/24 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE/CE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2011/06/30 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2011/05/16 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2012/02/03 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2011/05/23 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE	2011/11/23 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE/CE	2012/04/03 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/suciform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2011/07/15 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12

The expiration date of the calibration is the end of the expired month.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item:

RE: Radiated emission, CE: Conducted emission, AT: Antenna Terminal Conducted test

6. ANTENNA PORT TEST RESULTS

6.1 802.11b MODE IN THE 2.4GHz BAND

6.1.1 OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using a wide bandwidth Peak Power Meter.

The cable assembly insertion loss of 10.71 dB (including 10.00 dB pad and 0.71 dB cable for 2412MHz/2442MHz) or 10.72 dB (including 10.00 dB pad and 0.72 dB cable for 2472MHz) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.19	30	21.81
Middle	2442	7.85	30	22.15
High	2472	1.99	30	28.01

6.1.2 AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a Power meter.

RESULTS

The cable assembly insertion loss of 10.71 dB (including 10.00 dB pad and 0.71 dB cable for 2412MHz/2442MHz) or 10.72 dB (including 10.00 dB pad and 0.72 dB cable for 2472MHz) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	5.63
Middle	2442	5.50
High	2472	-0.27

6.2 802.11g MODE IN THE 2.4GHz BAND

6.2.1 OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using a wide bandwidth Peak Power Meter.

The cable assembly insertion loss of 10.71 dB or 10.72 dB (including 10.00 dB pad and 0.71 dB cable for 2412MHz/2437MHz or 0.72 dB cable for 2462MHz) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Power Meter (dBm)	Limit (dBm)	Margin (dB)
Low	2412	14	30	16.00
Middle	2437	13.93	30	16.07
High	2462	14.03	30	15.97

6.2.2 AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.71 dB or 10.72 dB (including 10.00 dB pad and 0.71 dB cable for 2412MHz/2437MHz or 0.72 dB cable for 2462MHz) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	5.42
Middle	2437	5.15
High	2462	4.96

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 ($\mu\text{V/m}$) at 3 m	Field Strength Limit (dB $\mu\text{V/m}$) 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.

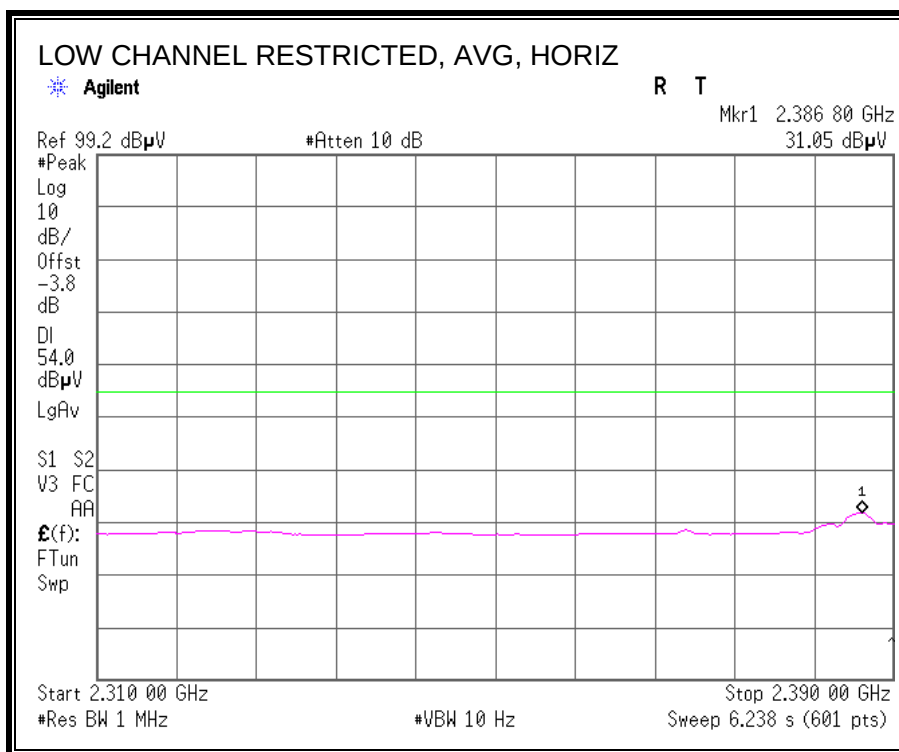
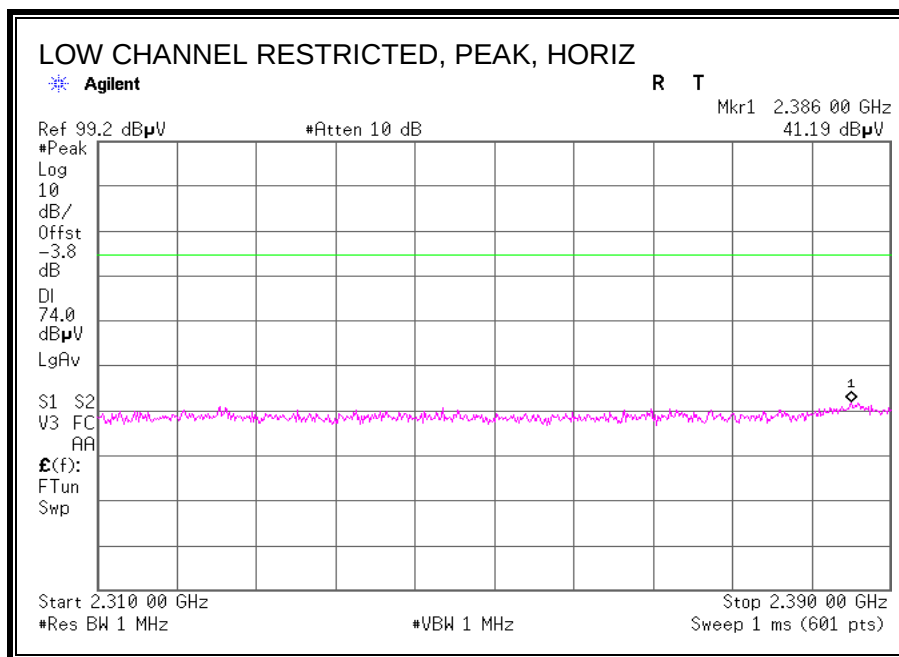
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

7.2 TRANSMITTER ABOVE 1 GHz

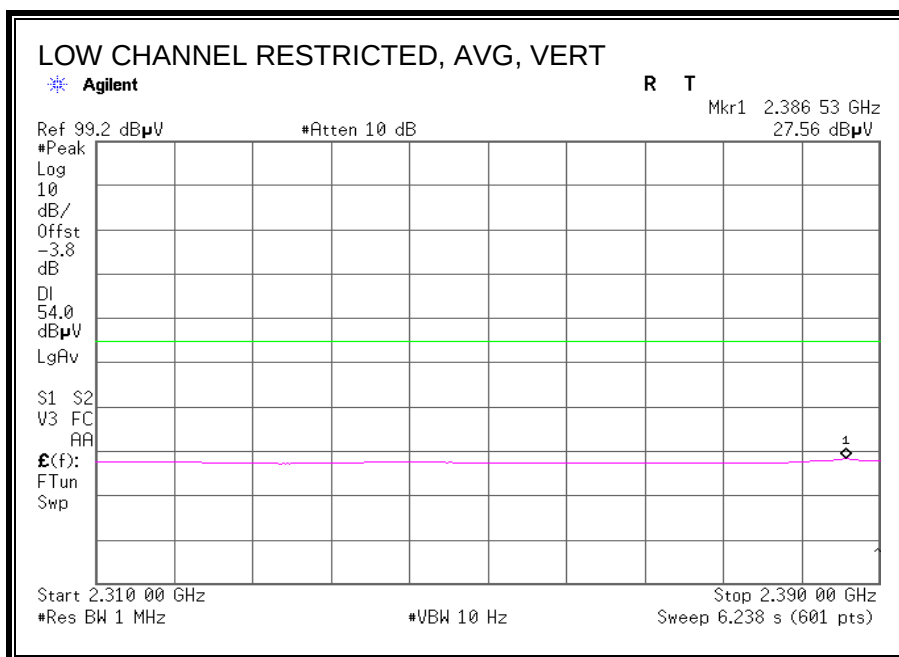
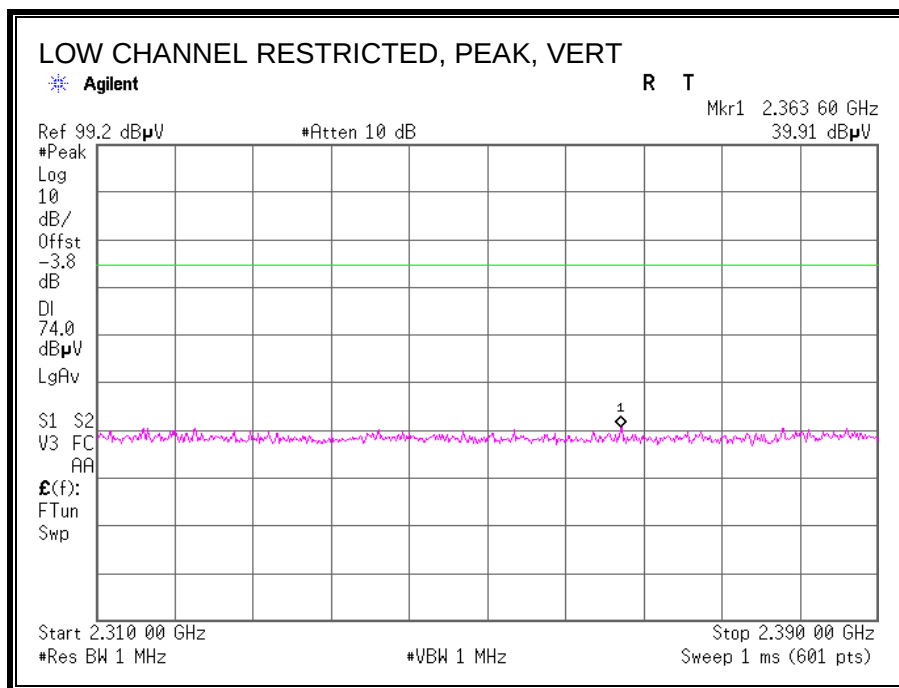
7.2.1 TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

Antenna: Antenna (PIFA) [DCA-P17_CS2]

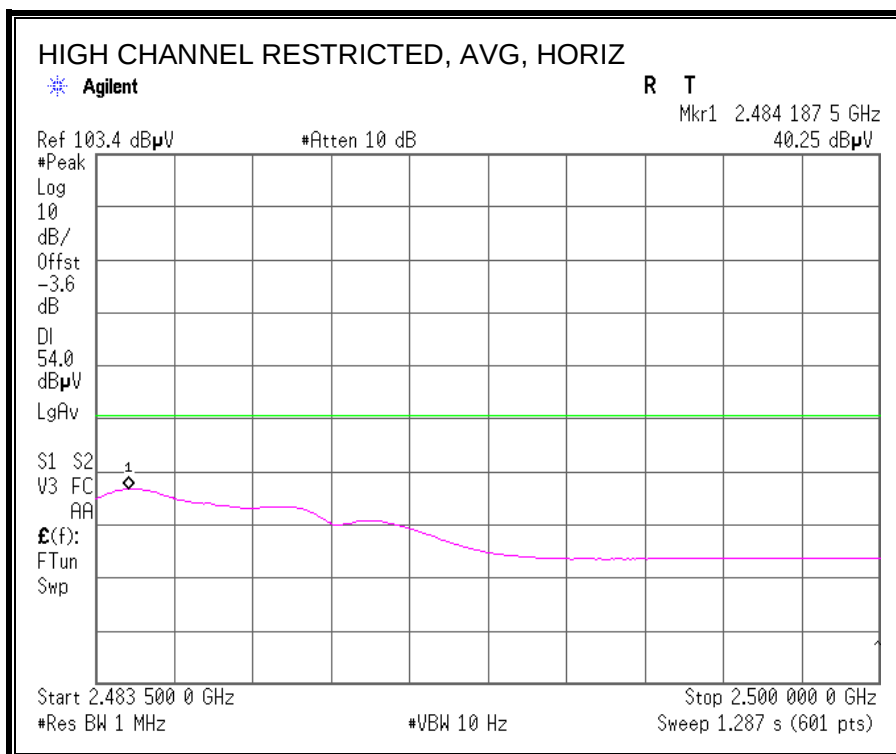
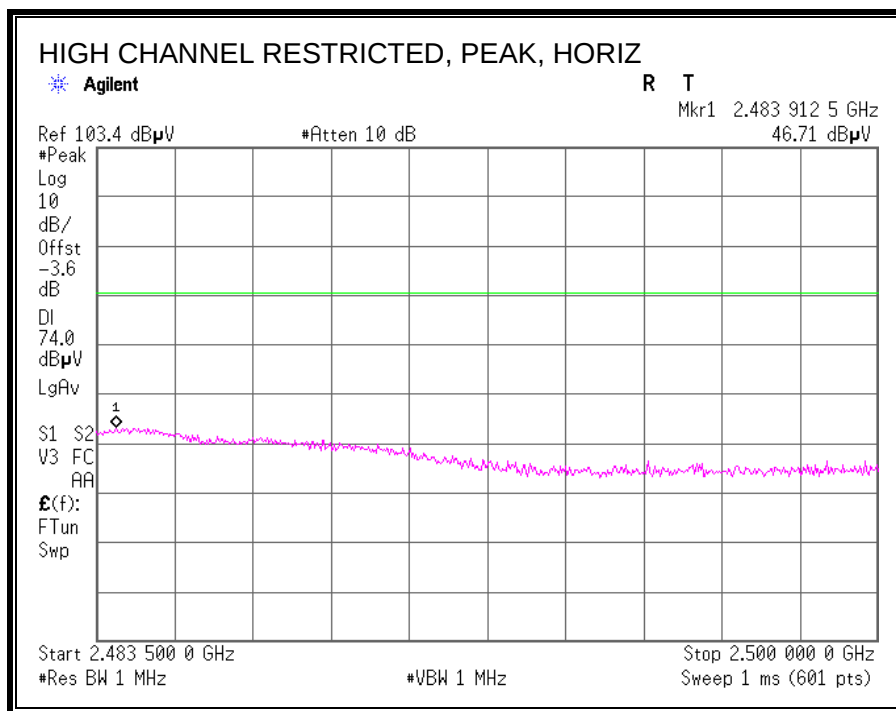
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



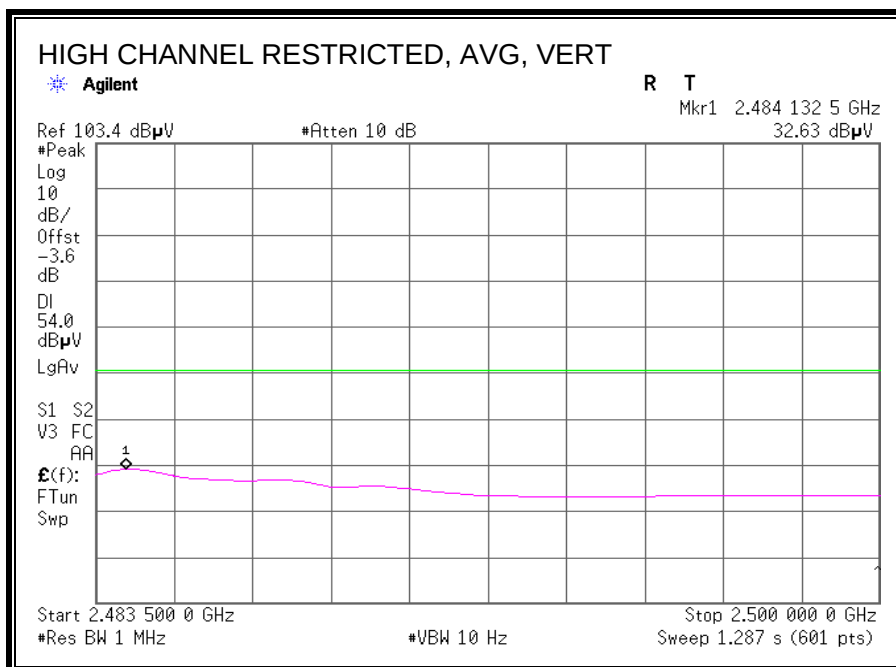
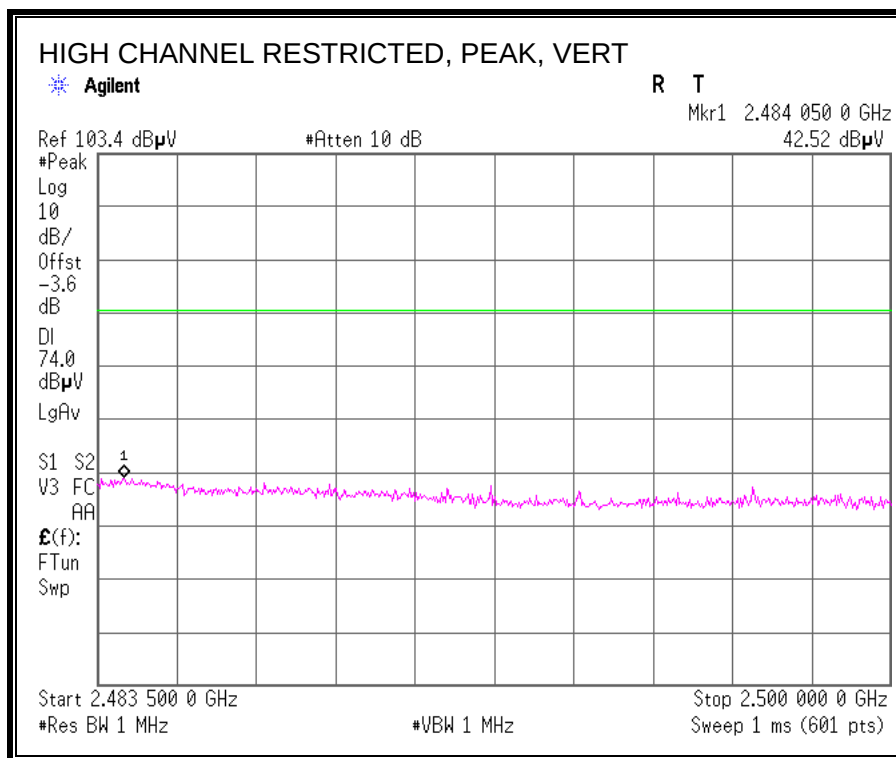
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

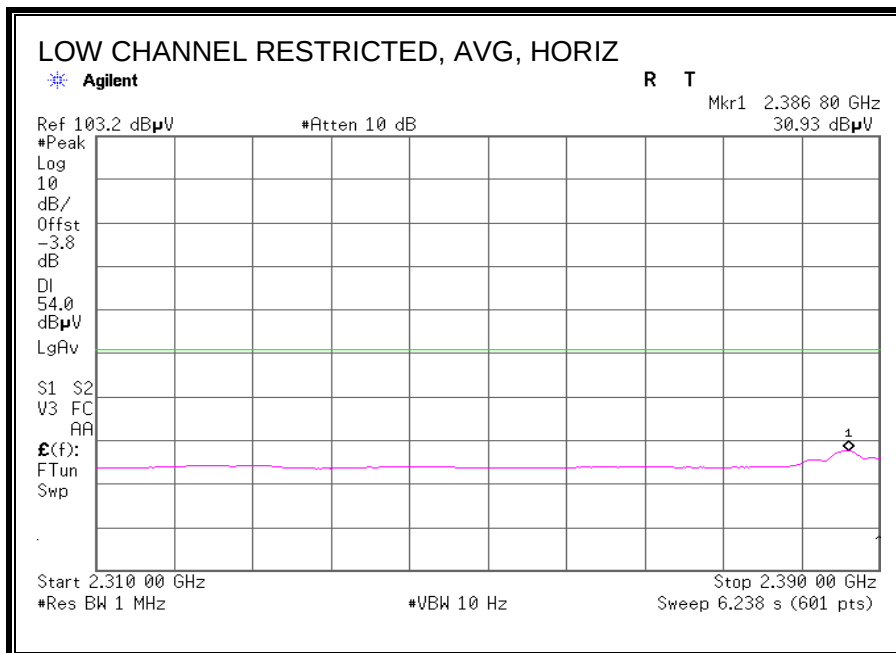
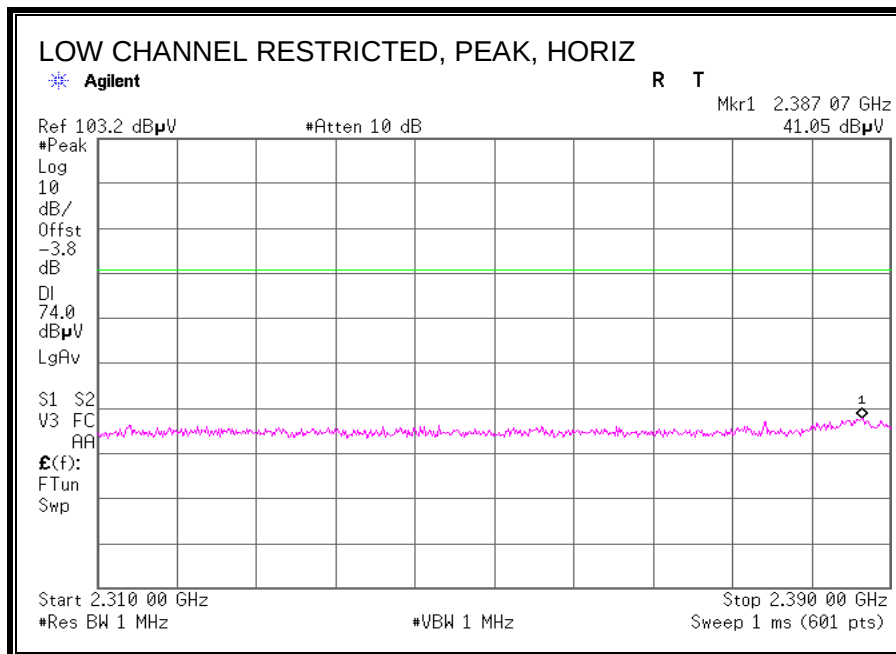


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

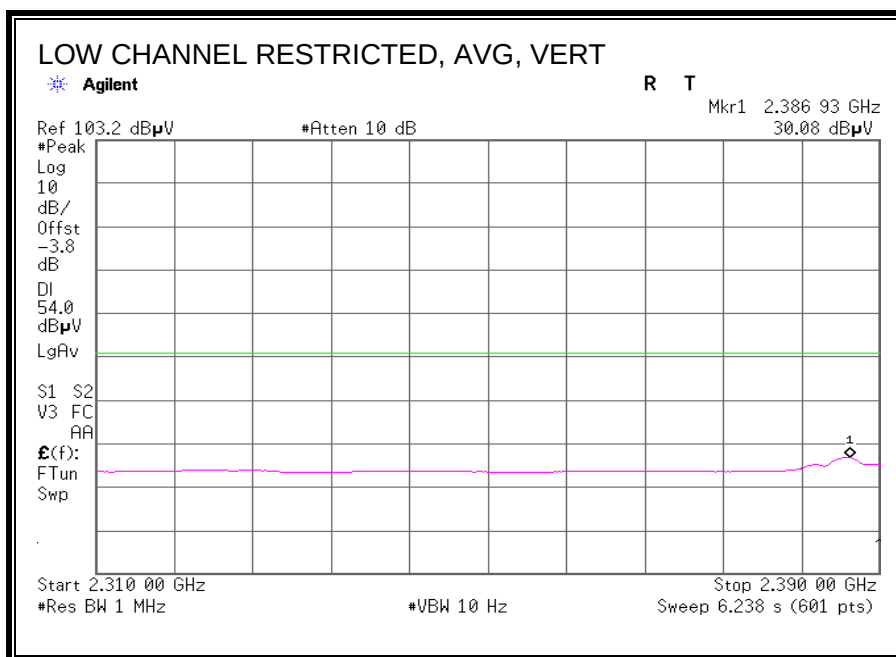
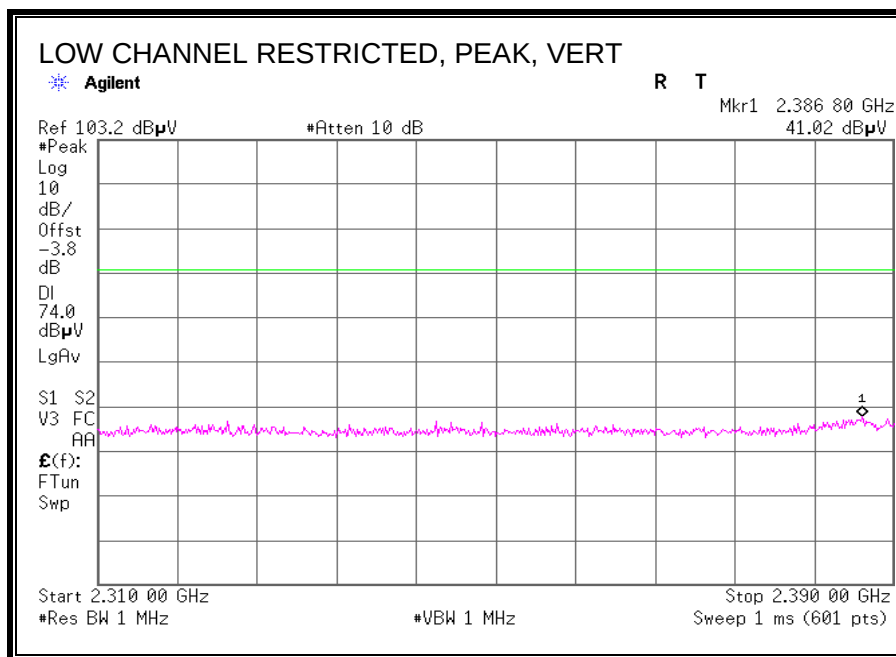


Antenna: Antenna (Dipole) [361.00194.005 CS]

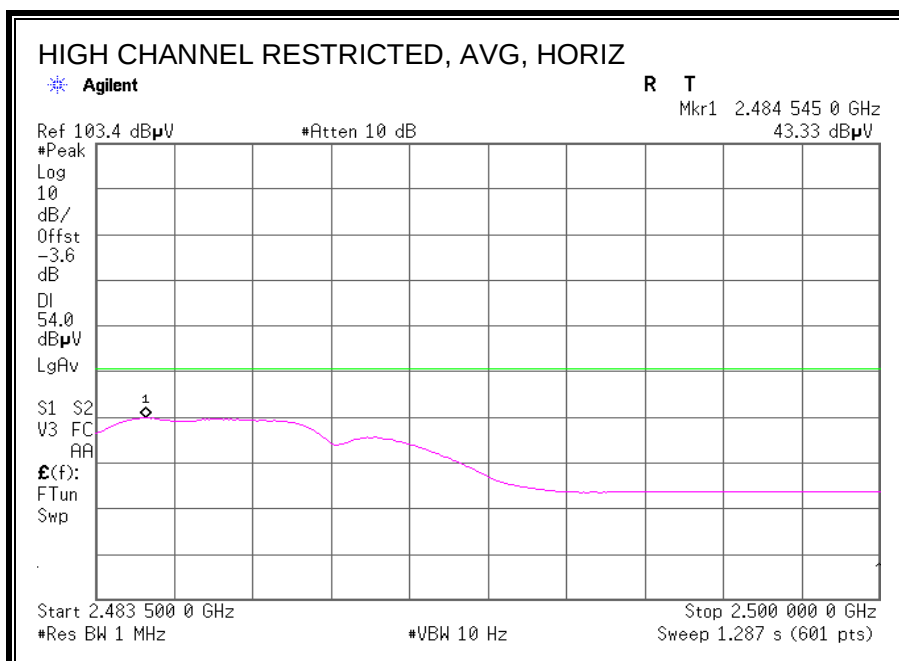
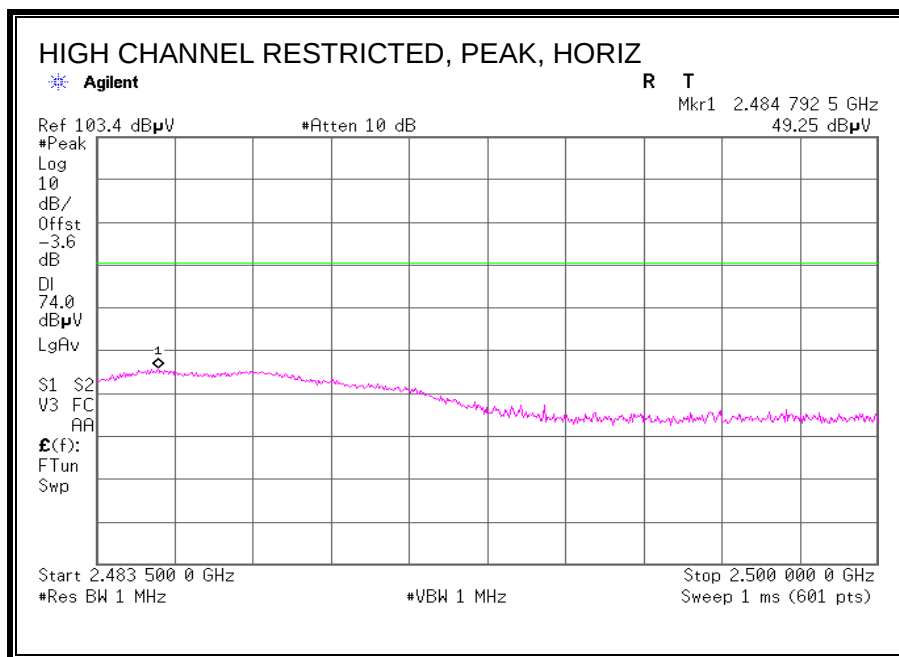
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



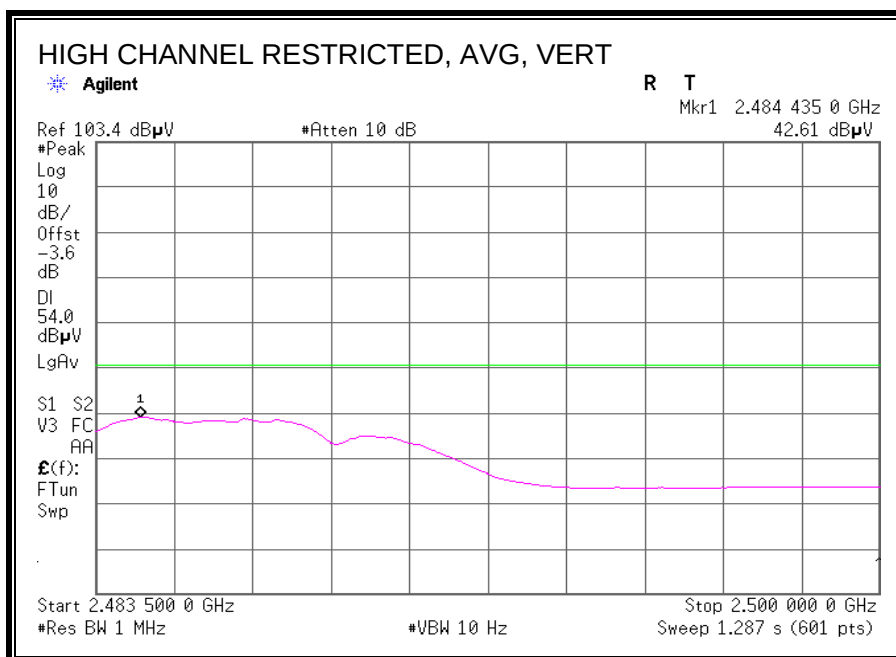
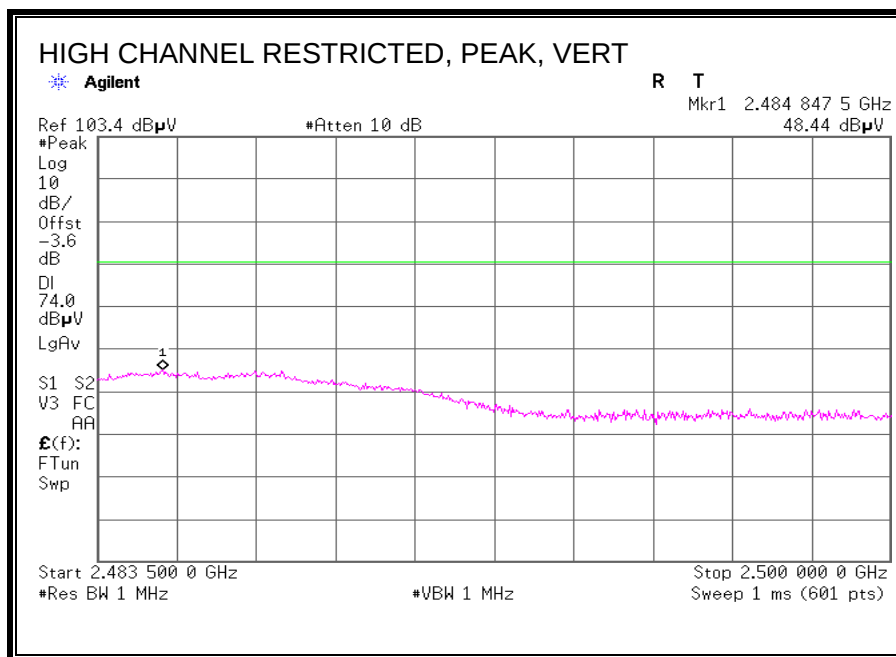
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

Antenna: Antenna (PIFA) [DCA-P17_CS2]

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/07/2012
Temperature/ Humidity 22 deg.C / 60% RH
Engineer Keisuke Kawamura
(1-10GHz)
Mode 11b Tx

Lch 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	2390.000	PK	44.2	26.4	2.2	32.4	40.4	73.9	33.5	
Hori	2400.000	PK	58.3	26.4	2.2	32.4	54.5	-	-	See 20dBc Data Sheet
Hori	2390.000	AV	32.2	26.4	2.2	32.4	28.4	53.9	25.5	
Hori	2400.000	AV	53.7	26.4	2.2	32.4	49.9	-	-	See 20dBc Data Sheet
Vert	2390.000	PK	42.8	26.4	2.2	32.4	39.0	73.9	35.0	
Vert	2400.000	PK	51.0	26.4	2.2	32.4	47.2	-	-	See 20dBc Data Sheet
Vert	2390.000	AV	30.3	26.4	2.2	32.4	26.5	53.9	27.5	
Vert	2400.000	AV	45.4	26.4	2.2	32.4	41.6	-	-	See 20dBc Data Sheet

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 20log(3.0m/1.0m)= 9.5dB

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	95.9	26.4	2.2	32.4	92.1	-	-	Carrier
Hori	2400.000	PK	54.9	26.4	2.2	32.4	51.1	72.1	21.0	
Vert	2412.000	PK	87.9	26.4	2.2	32.4	84.1	-	-	Carrier
Vert	2400.000	PK	46.9	26.4	2.2	32.4	43.1	64.1	21.0	

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

Mch 2442MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1742.755	PK	49.4	25.7	1.9	33.1	43.9	73.9	30.0	
Hori	4884.000	PK	41.2	30.5	3.8	31.4	44.1	73.9	29.8	
Hori	1742.755	AV	44.9	25.7	1.9	33.1	39.4	53.9	14.5	
Hori	4884.000	AV	29.6	30.5	3.8	31.4	32.5	53.9	21.4	
Vert	1742.755	PK	48.1	25.7	1.9	33.1	42.6	73.9	31.4	
Vert	4884.000	PK	40.8	30.5	3.8	31.4	43.7	73.9	30.2	
Vert	1742.755	AV	43.1	25.7	1.9	33.1	37.6	53.9	16.3	
Vert	4884.000	AV	29.8	30.5	3.8	31.4	32.7	53.9	21.2	

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 20log(3.0m/1.0m)= 9.5dB

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Hch 2472MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	48.9	26.5	2.2	32.3	45.3	73.9	28.6	
Hori	2483.500	AV	40.9	26.5	2.2	32.3	37.3	53.9	16.6	
Vert	2483.500	PK	46.7	26.5	2.2	32.3	43.1	73.9	30.8	
Vert	2483.500	AV	37.5	26.5	2.2	32.3	33.9	53.9	20.0	

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 20log(3.0m/1.0m)= 9.5dB

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Antenna: Antenna (Dipole) [361.00194.005 CS]

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/07/2012
Temperature/ Humidity 22 deg.C / 60% RH
Engineer Keisuke Kawamura
(1-10GHz)
Mode 11b Tx

Lch 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	2390.000	PK	44.9	26.4	2.2	32.4	41.1	73.9	32.8	
Hori	2400.000	PK	58.3	26.4	2.2	32.4	54.5	-	-	See 20dBc Data sheet
Hori	2390.000	AV	32.4	26.4	2.2	32.4	28.6	53.9	25.3	
Hori	2400.000	AV	53.7	26.4	2.2	32.4	49.9	-	-	See 20dBc Data sheet
Vert	2390.000	PK	44.2	26.4	2.2	32.4	40.4	73.9	33.5	
Vert	2400.000	PK	57.8	26.4	2.2	32.4	54.0	-	-	See 20dBc Data sheet
Vert	2390.000	AV	31.8	26.4	2.2	32.4	28.0	53.9	25.9	
Vert	2400.000	AV	52.9	26.4	2.2	32.4	49.1	-	-	See 20dBc Data sheet

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 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	95.2	26.4	2.2	32.4	91.4	-	-	Carrier
Hori	2400.000	PK	55.0	26.4	2.2	32.4	51.2	71.4	20.2	
Vert	2412.000	PK	94.1	26.4	2.2	32.4	90.3	-	-	Carrier
Vert	2400.000	PK	54.1	26.4	2.2	32.4	50.3	70.3	20.0	

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

Mch 2442MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1742.750	PK	48.9	25.7	1.9	33.1	43.4	73.9	30.5	
Hori	1742.750	AV	42.5	25.7	1.9	33.1	37.0	53.9	16.9	
Vert	1742.750	PK	48.5	25.7	1.9	33.1	43.0	73.9	30.9	
Vert	1742.750	AV	42.6	25.7	1.9	33.1	37.1	53.9	16.9	

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 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Hch 2472MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	49.8	26.5	2.2	32.3	46.2	73.9	27.7	
Hori	3296.013	PK	46.1	28.2	2.6	32.0	44.9	73.9	29.0	
Hori	2483.500	AV	42.2	26.5	2.2	32.3	38.6	53.9	15.3	
Hori	3296.013	AV	40.4	28.2	2.6	32.0	39.2	53.9	14.7	
Vert	2483.500	PK	49.4	26.5	2.2	32.3	45.8	73.9	28.1	
Vert	3296.013	PK	44.8	28.2	2.6	32.0	43.6	73.9	30.3	
Vert	2483.500	AV	41.8	26.5	2.2	32.3	38.2	53.9	15.7	
Vert	3296.013	AV	37.2	28.2	2.6	32.0	36.0	53.9	17.9	

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

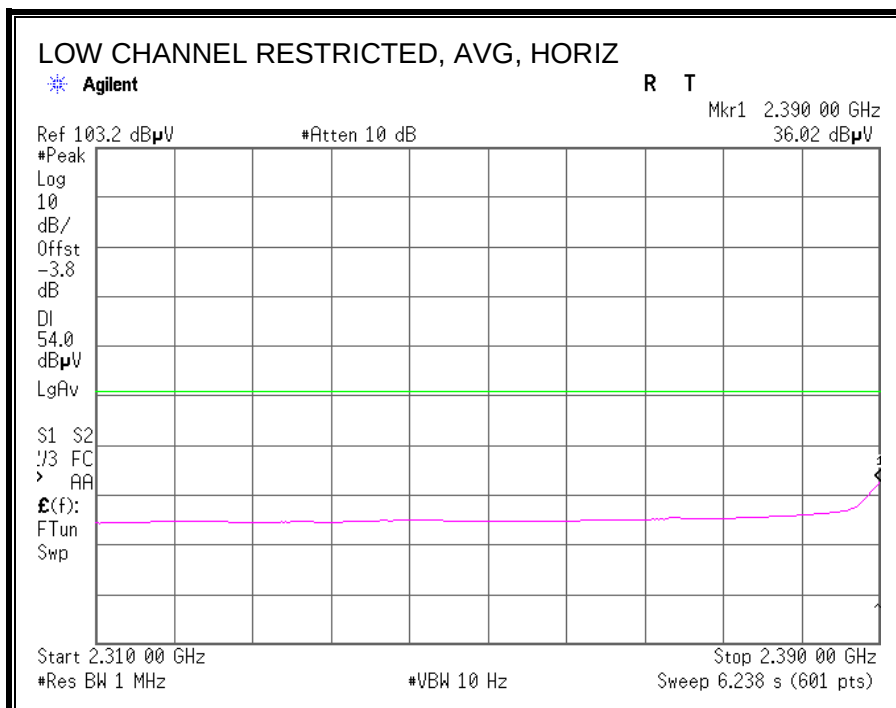
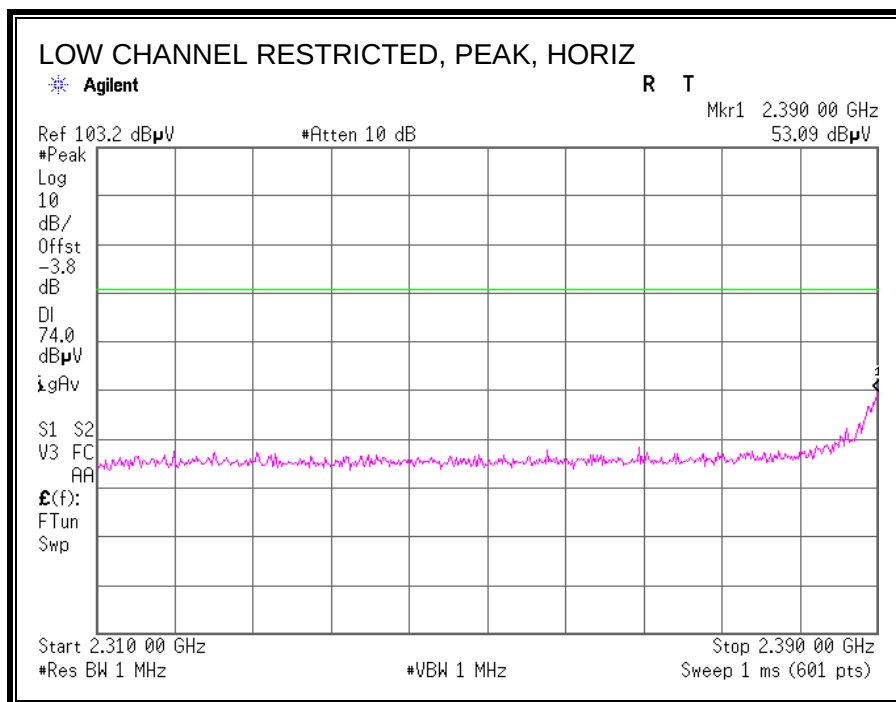
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

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

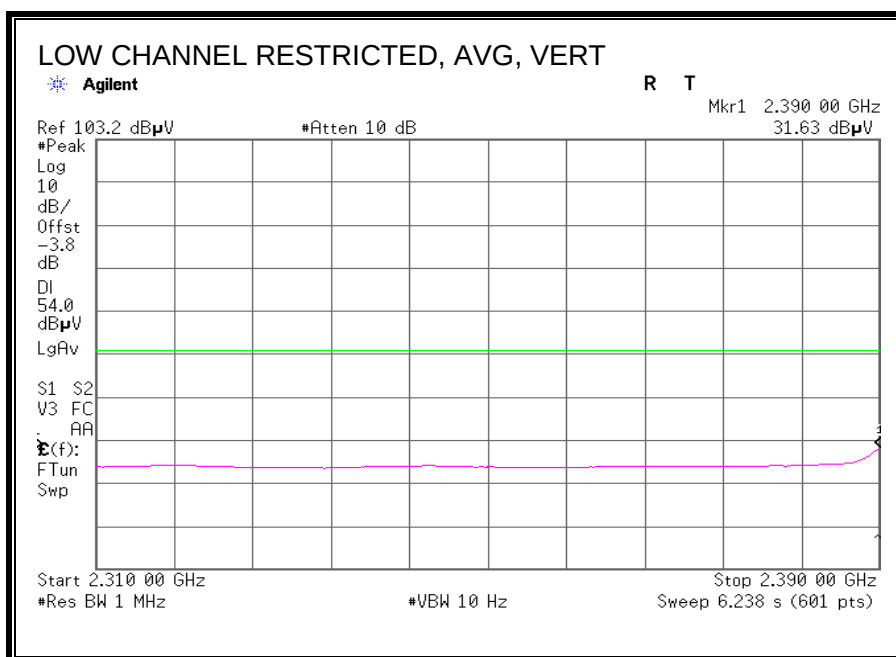
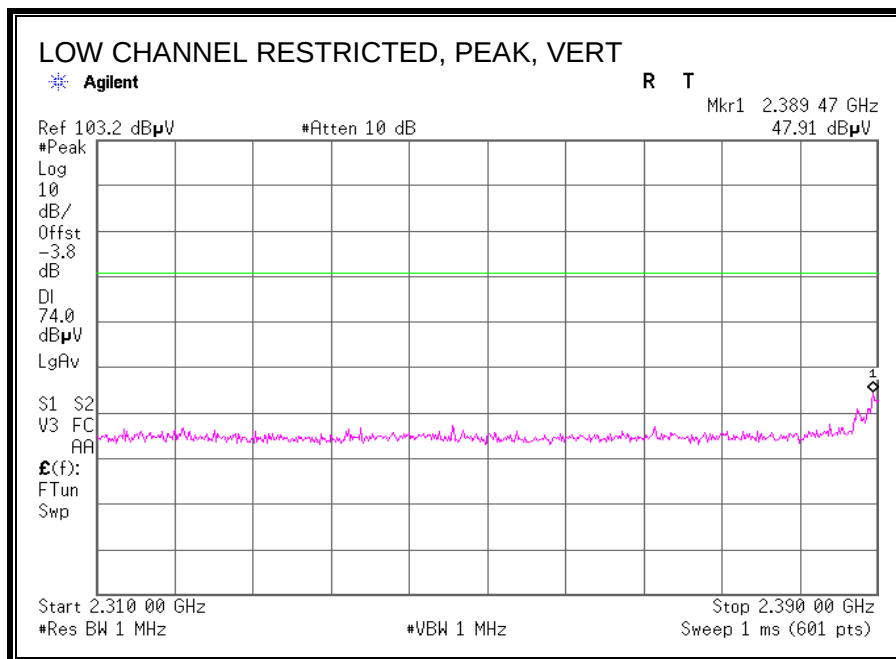
7.2.2 TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

Antenna: Antenna (PIFA) [DCA-P17_CS2]

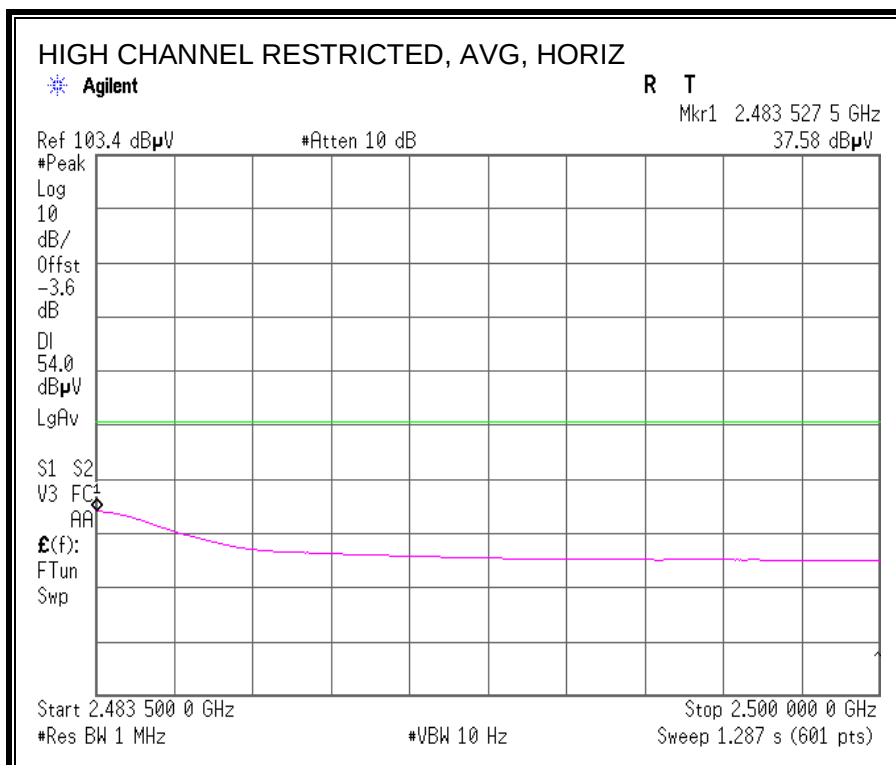
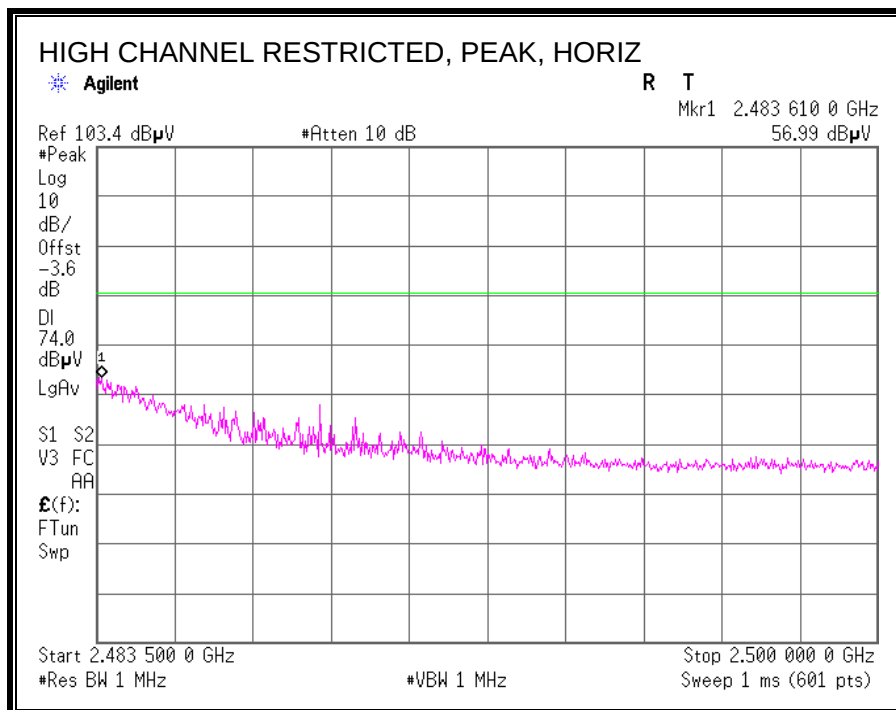
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



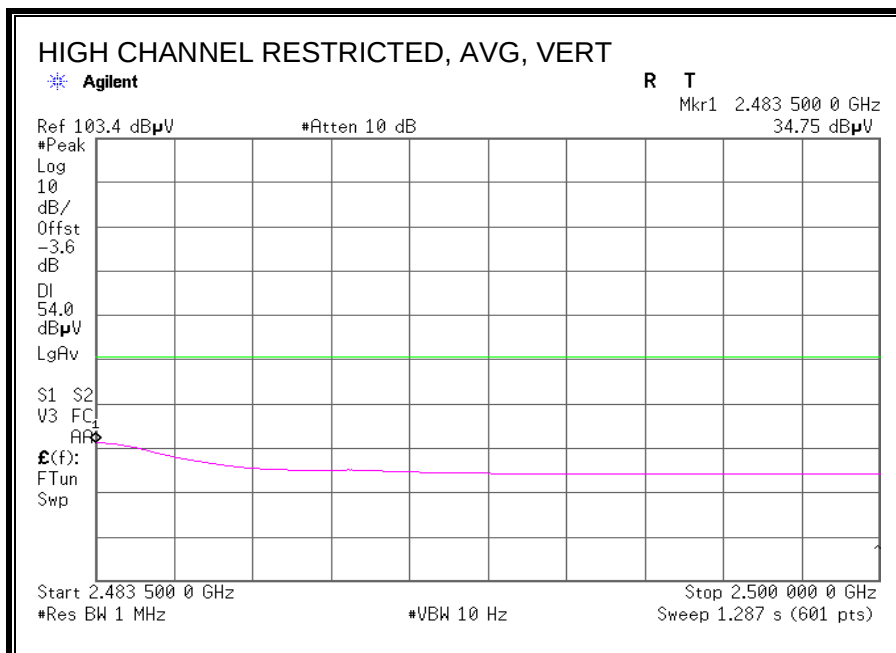
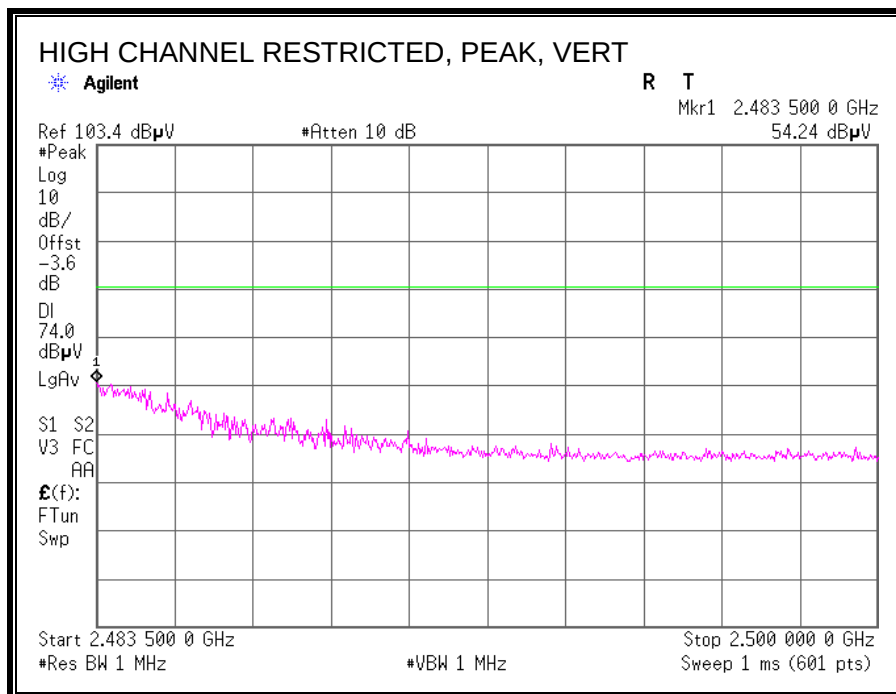
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

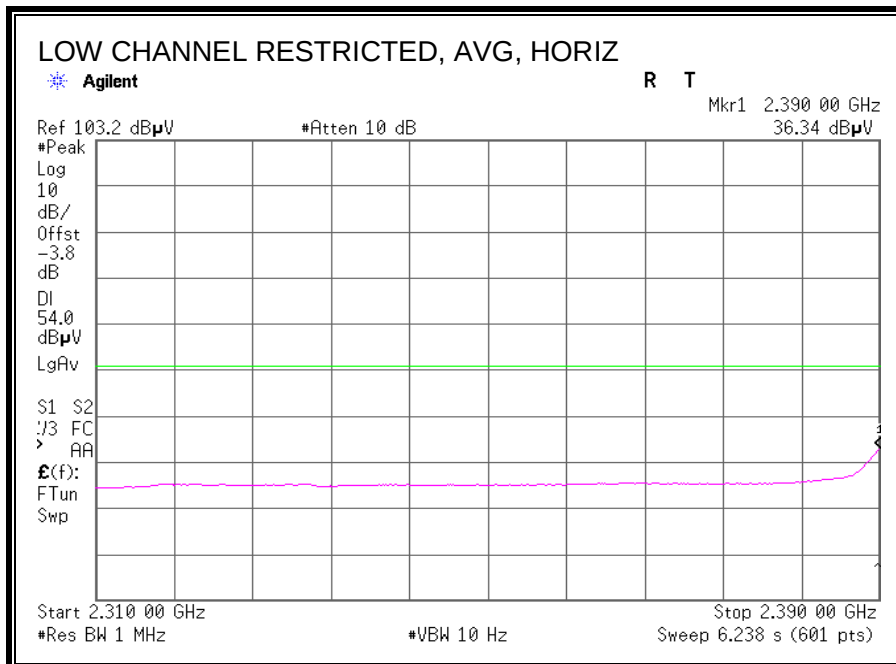
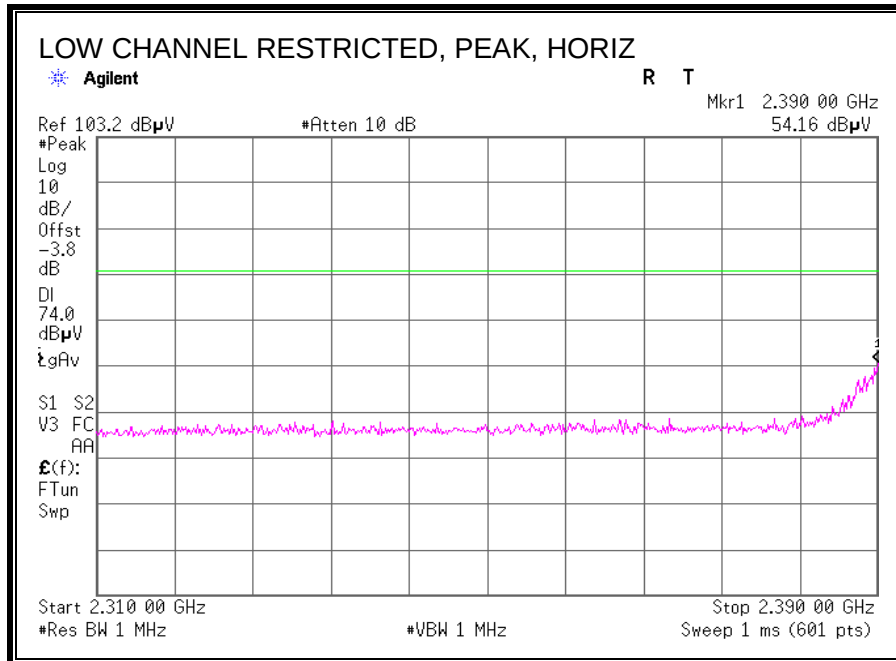


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

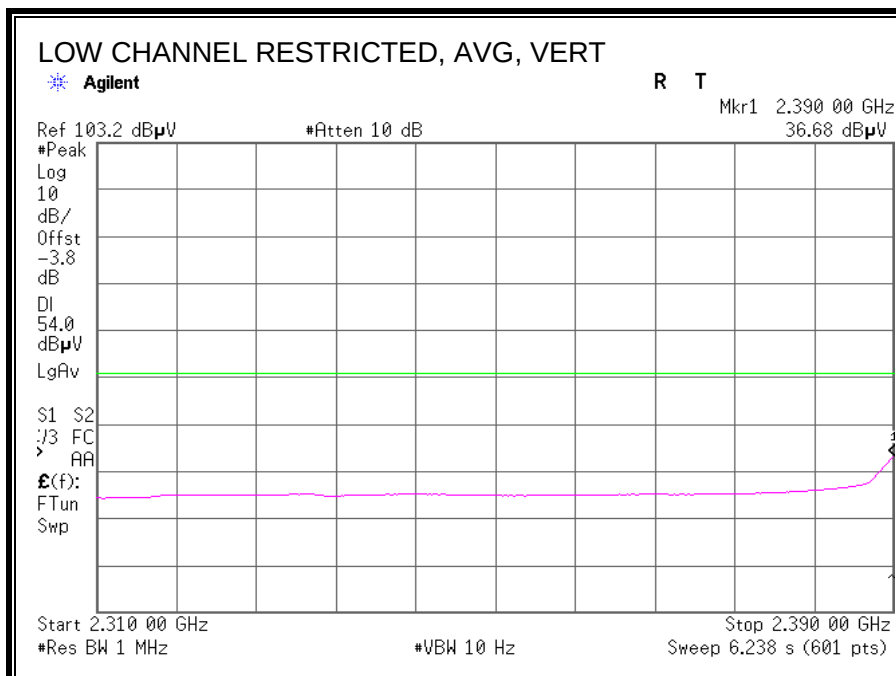
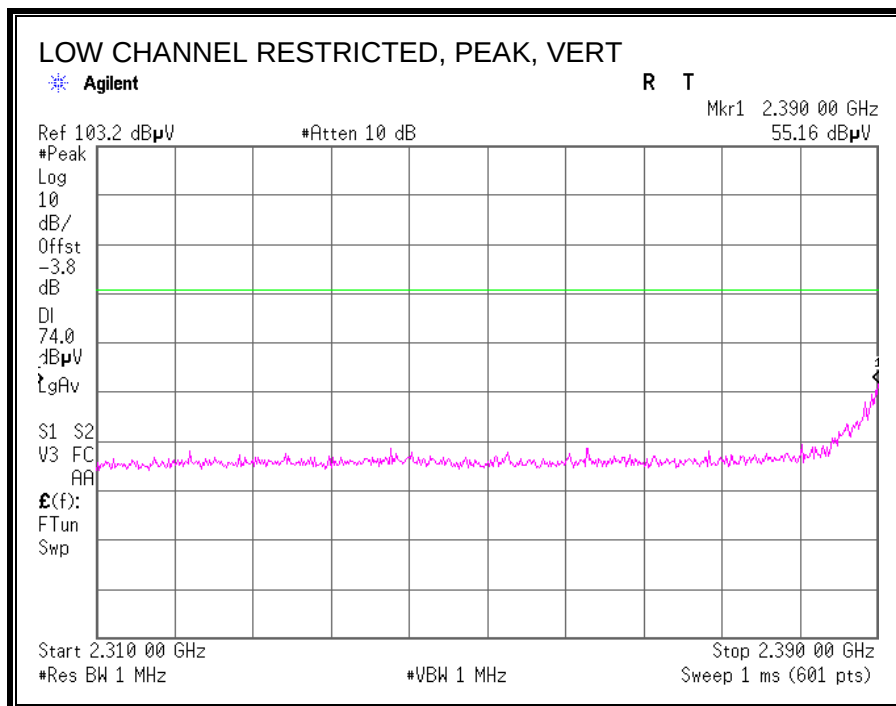


Antenna: Antenna (Dipole) [361.00194.005 CS]

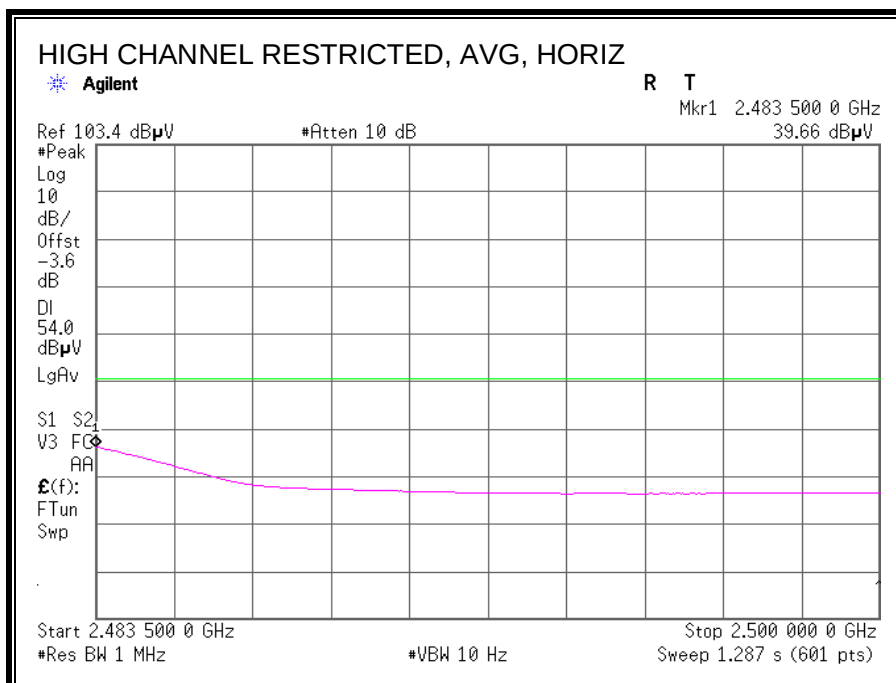
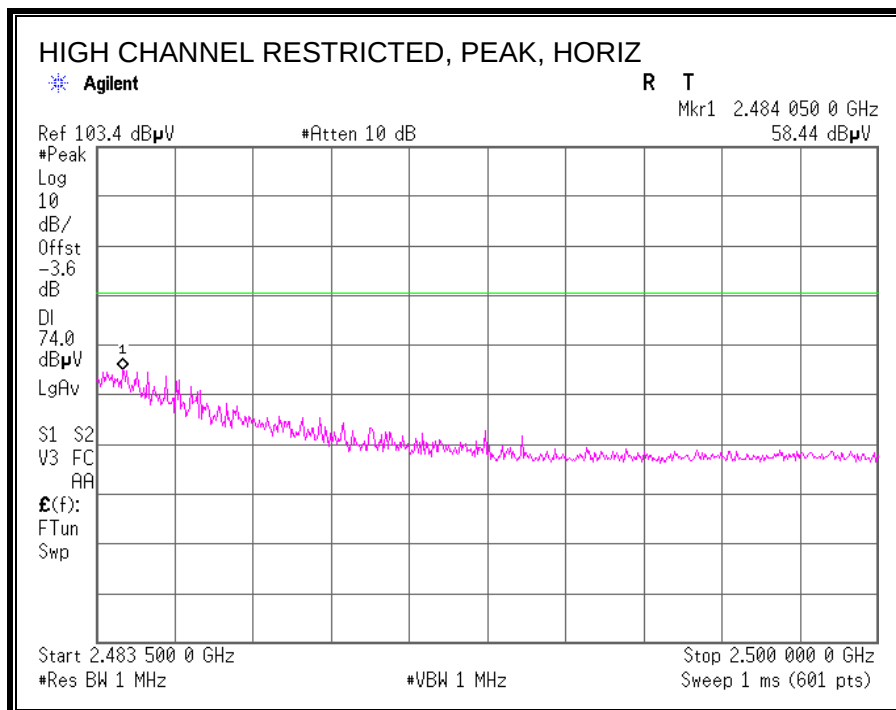
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



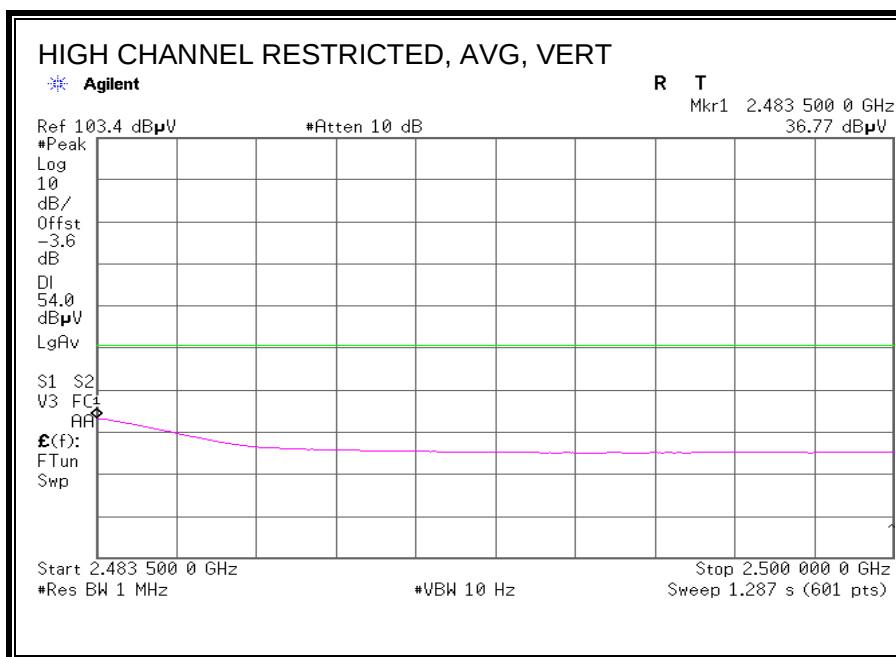
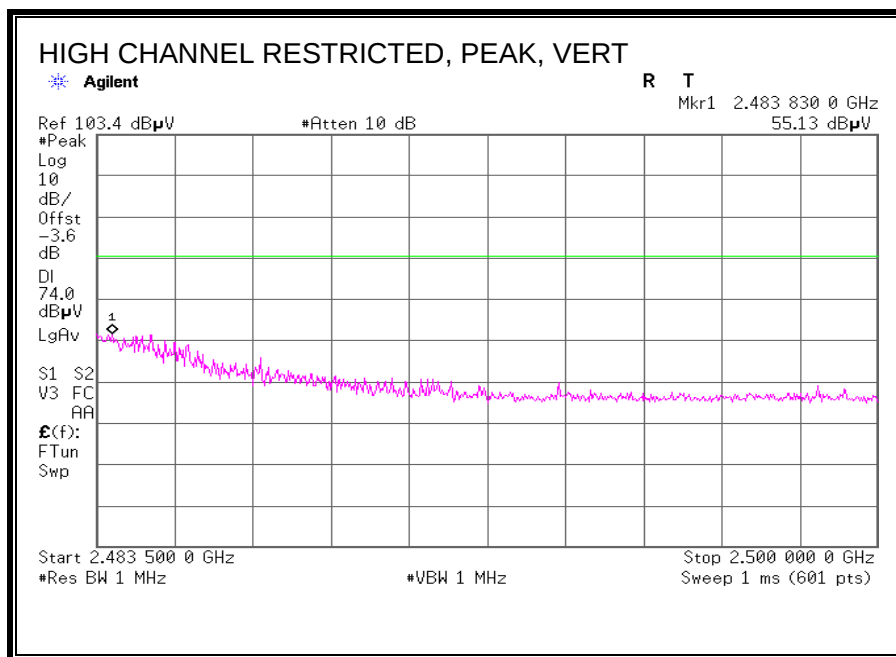
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

Antenna: Antenna (PIFA) [DCA-P17_CS2]

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/07/2012
Temperature/ Humidity 22 deg.C / 60% RH
Engineer Keisuke Kawamura
Mode 11g Tx

Lch 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	2390.000	PK	56.8	26.4	2.2	32.4	53.0	73.9	21.0	
Hori	2400.000	PK	78.4	26.4	2.2	32.4	74.6	-	-	See 20dBc Data Sheet
Hori	2390.000	AV	40.0	26.4	2.2	32.4	36.2	53.9	17.8	
Hori	2400.000	AV	58.5	26.4	2.2	32.4	54.7	-	-	See 20dBc Data Sheet
Vert	2390.000	PK	52.0	26.4	2.2	32.4	48.2	73.9	25.8	
Vert	2400.000	PK	73.5	26.4	2.2	32.4	69.7	-	-	See 20dBc Data Sheet
Vert	2390.000	AV	35.2	26.4	2.2	32.4	31.4	53.9	22.5	
Vert	2400.000	AV	53.7	26.4	2.2	32.4	49.9	-	-	See 20dBc Data Sheet

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 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	93.4	26.4	2.2	32.4	89.6	-	-	Carrier
Hori	2400.000	PK	63.0	26.4	2.2	32.4	59.2	69.6	10.4	
Vert	2412.000	PK	88.1	26.4	2.2	32.4	84.3	-	-	Carrier
Vert	2400.000	PK	58.2	26.4	2.2	32.4	54.4	64.3	9.9	

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

Mch 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	1742.787	PK	44.2	25.7	1.9	33.1	39.1	73.9	34.8	
Hori	1742.787	AV	36.7	25.7	1.9	33.1	30.5	53.9	23.4	
Vert	1742.787	PK	44.8	25.7	1.9	33.1	39.1	73.9	34.8	
Vert	1742.787	AV	33.6	25.7	1.9	33.1	28.1	53.9	25.8	

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 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Hch 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	2483.500	PK	57.4	26.5	2.2	32.3	53.8	73.9	20.1	
Hori	2483.500	AV	38.2	26.5	2.2	32.3	34.6	53.9	19.4	
Vert	2483.500	PK	57.2	26.5	2.2	32.3	53.6	73.9	20.3	
Vert	2483.500	AV	38.6	26.5	2.2	32.3	35.0	53.9	18.9	

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 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Antenna: Antenna (Dipole) [361.00194.005 CS]

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/07/2012
Temperature/ Humidity 22 deg.C / 60% RH
Engineer Keisuke Kawamura
Mode 11g Tx

Lch 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	1742.780	PK	45.9	25.7	1.9	33.1	40.4	73.9	33.5	See 20dBc Data Sheet
Hori	2390.000	PK	57.7	26.4	2.2	32.4	53.9	73.9	20.0	
Hori	2400.000	PK	78.4	26.4	2.2	32.4	74.6	-	-	
Hori	3216.018	PK	43.8	28.1	2.6	32.0	42.5	73.9	31.4	
Hori	1742.780	AV	39.3	25.7	1.9	33.1	33.8	53.9	20.1	See 20dBc Data Sheet
Hori	2390.000	AV	40.5	26.4	2.2	32.4	36.7	53.9	17.3	
Hori	2400.000	AV	58.6	26.4	2.2	32.4	54.8	-	-	
Hori	3216.018	AV	39.4	28.1	2.6	32.0	38.1	53.9	15.8	
Vert	1742.780	PK	49.5	25.7	1.9	33.1	44.0	73.9	29.9	See 20dBc Data Sheet
Vert	2390.000	PK	57.7	26.4	2.2	32.4	53.9	73.9	20.0	
Vert	2400.000	PK	78.2	26.4	2.2	32.4	74.4	-	-	
Vert	3216.018	PK	45.7	28.1	2.6	32.0	44.4	73.9	29.5	
Vert	1742.780	AV	44.6	25.7	1.9	33.1	39.1	53.9	14.8	See 20dBc Data Sheet
Vert	2390.000	AV	40.6	26.4	2.2	32.4	36.8	53.9	17.1	
Vert	2400.000	AV	58.6	26.4	2.2	32.4	54.8	-	-	
Vert	3216.018	AV	39.0	28.1	2.6	32.0	37.7	53.9	16.2	

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 $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	93.0	26.4	2.2	32.4	89.2	-	-	Carrier
Hori	2400.000	PK	63.1	26.4	2.2	32.4	59.3	69.2	9.9	
Vert	2412.000	PK	93.7	26.4	2.2	32.4	89.9	-	-	Carrier
Vert	2400.000	PK	62.9	26.4	2.2	32.4	59.1	69.9	10.8	

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

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/07/2012
Temperature/ Humidity 22 deg.C / 60% RH
Engineer Keisuke Kawamura
Mode 11g Tx

Mch 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	3249.347	PK	50.2	28.2	2.6	32.0	49.0	73.9	24.9	
Hori	3249.347	AV	46.9	28.2	2.6	32.0	45.7	53.9	8.2	
Vert	3249.347	PK	46.2	28.2	2.6	32.0	45.0	73.9	28.9	
Vert	3249.347	AV	40.7	28.2	2.6	32.0	39.5	53.9	14.4	

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 $20\log(3.0m/1.0m)=9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

Hch 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	2483.500	PK	61.4	26.5	2.2	32.3	57.8	73.9	16.1	
Hori	3282.680	PK	51.7	28.2	2.6	32.0	50.5	73.9	23.4	
Hori	2483.500	AV	43.5	26.5	2.2	32.3	39.9	53.9	14.0	
Hori	3282.680	AV	49.1	28.2	2.6	32.0	47.9	53.9	6.0	
Vert	2483.500	PK	57.9	26.5	2.2	32.3	54.3	73.9	19.6	
Vert	3282.680	PK	46.8	28.2	2.6	32.0	45.6	73.9	28.4	
Vert	2483.500	AV	40.7	26.5	2.2	32.3	37.1	53.9	16.8	
Vert	3282.680	AV	42.1	28.2	2.6	32.0	40.9	53.9	13.0	

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 $20\log(3.0m/1.0m)=9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

7.3 RECEIVER ABOVE 1 GHz

7.3.1 RX ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/08/2012
Temperature/ Humidity 23 deg.C / 56% RH
Engineer Keisuke Kawamura
 (1-10GHz)
Mode Rx 2437MHz

DCA

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1742.787	PK	44.6	25.7	1.9	33.1	39.1	73.9	34.8	
Hori	1742.787	AV	36.0	25.7	1.9	33.1	30.5	53.9	23.4	1M/10
Vert	1742.787	PK	44.6	25.7	1.9	33.1	39.1	73.9	34.8	
Vert	1742.787	AV	33.6	25.7	1.9	33.1	28.1	53.9	25.8	1M/10

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 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

SOK

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1742.780	PK	47.7	25.7	1.9	33.1	42.2	73.9	31.7	
Hori	1742.780	AV	41.7	25.7	1.9	33.1	36.2	53.9	17.7	1M/10
Vert	1742.780	PK	50.0	25.7	1.9	33.1	44.5	73.9	29.4	
Vert	1742.780	AV	44.7	25.7	1.9	33.1	39.2	53.9	14.7	1M/10

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

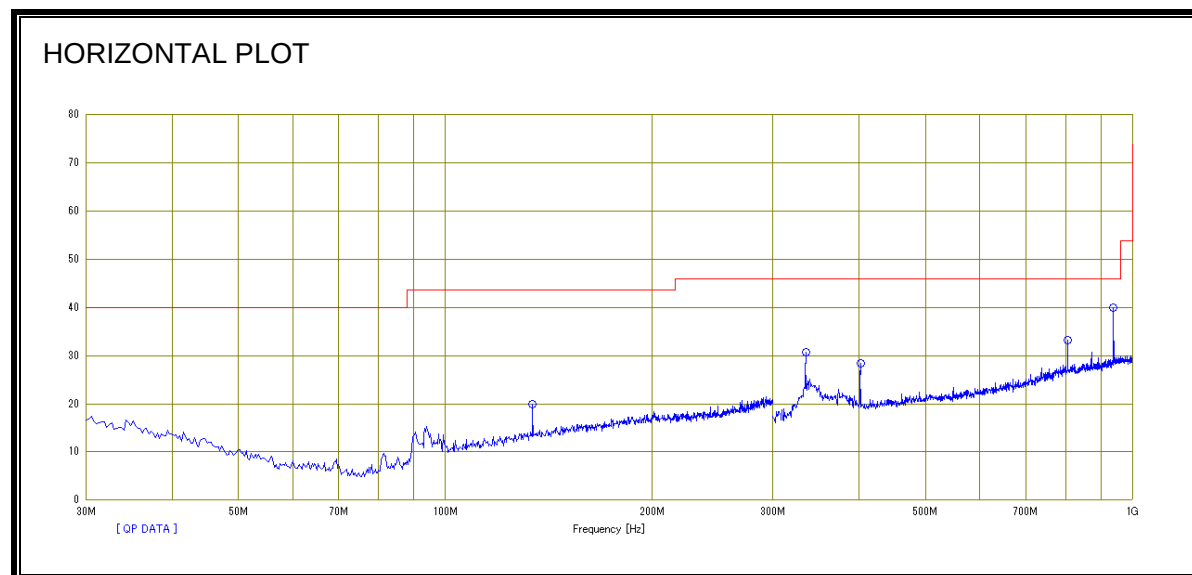
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

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

7.4 WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

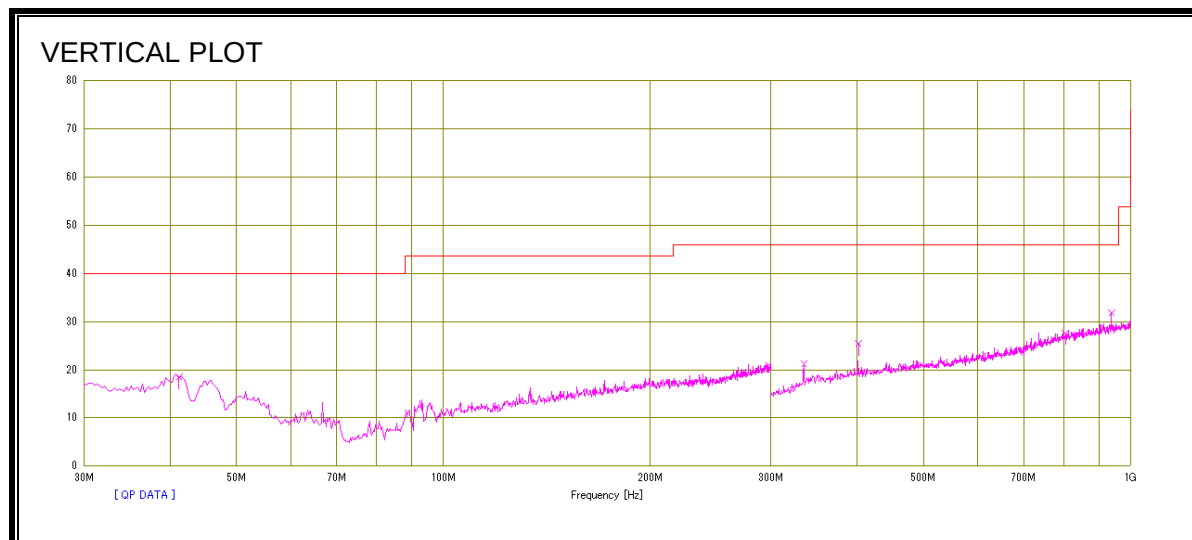
SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)

Antenna: Antenna (PIFA) [DCA-P17_CS2]



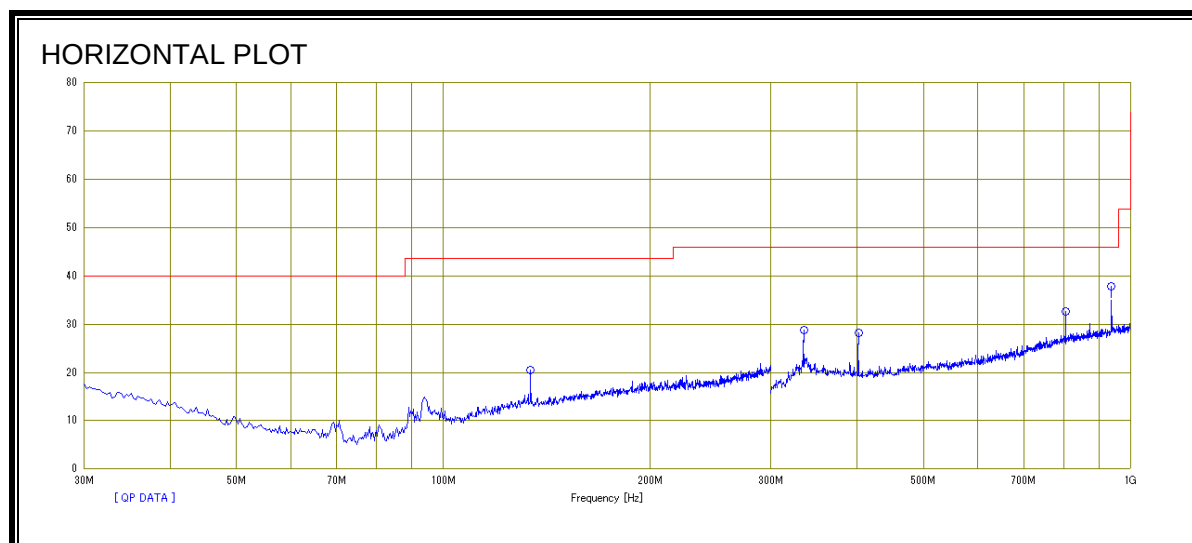
SPURIOUS EMISSIONS 30 TO 1000 MHz (VERTICAL)

Antenna: Antenna (PIFA) [DCA-P17_CS2]



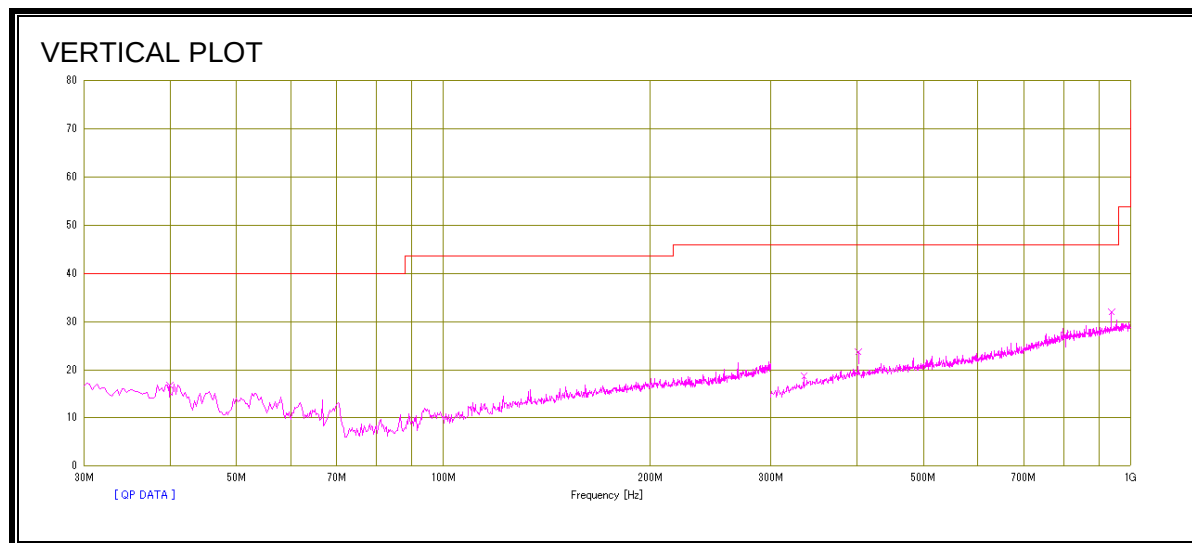
SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)

Antenna: Antenna (PIFA) [DCA-P17_CS2]



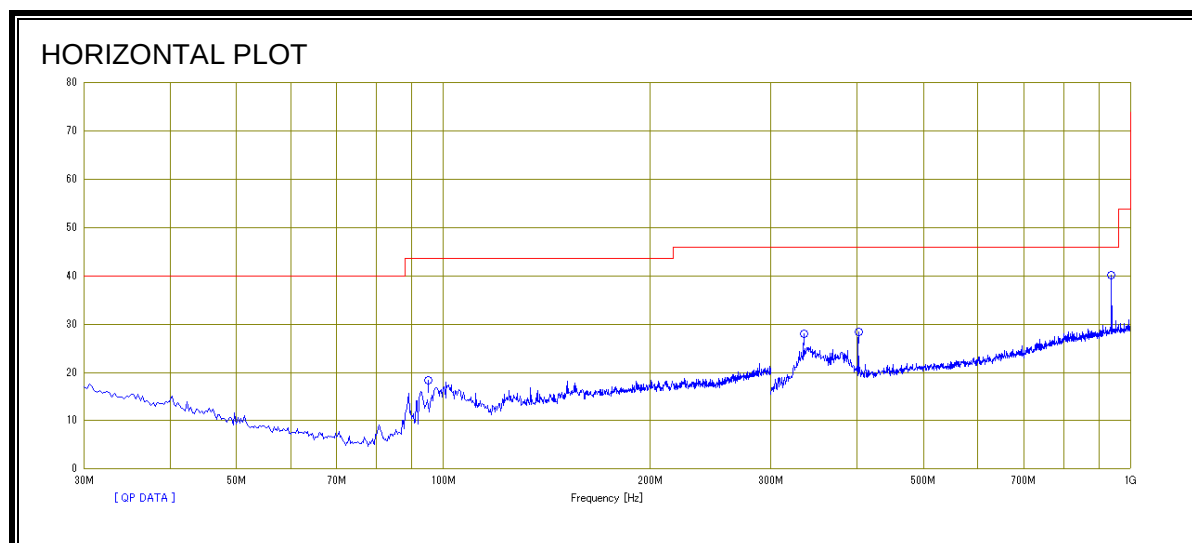
SPURIOUS EMISSIONS 30 TO 1000 MHz (VERTICAL)

Antenna: Antenna (PIFA) [DCA-P17_CS2]



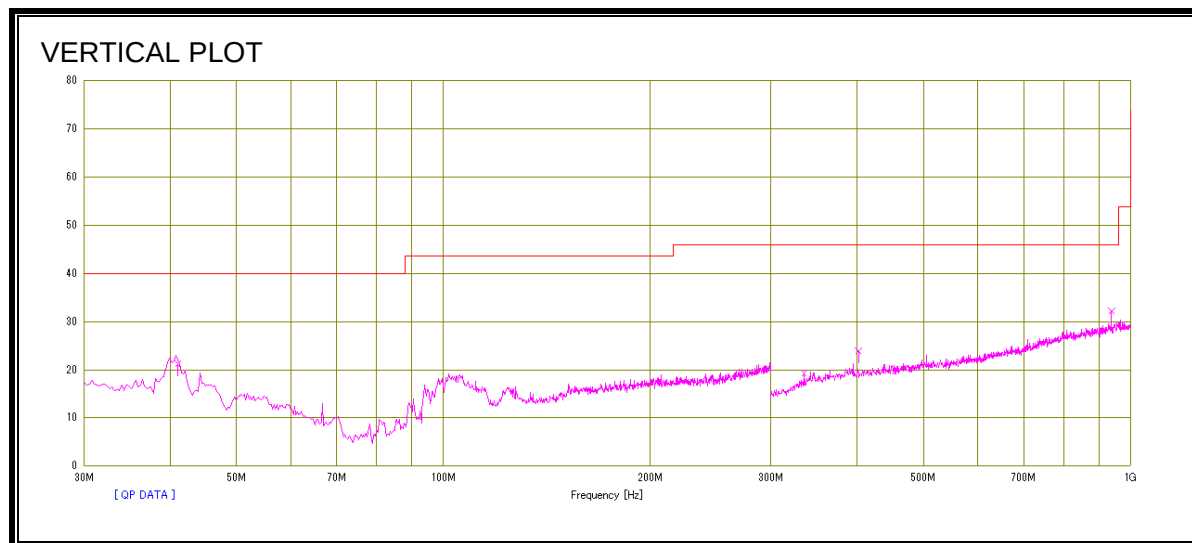
SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)

Antenna: Antenna (Dipole) [361.00194.005 CS]



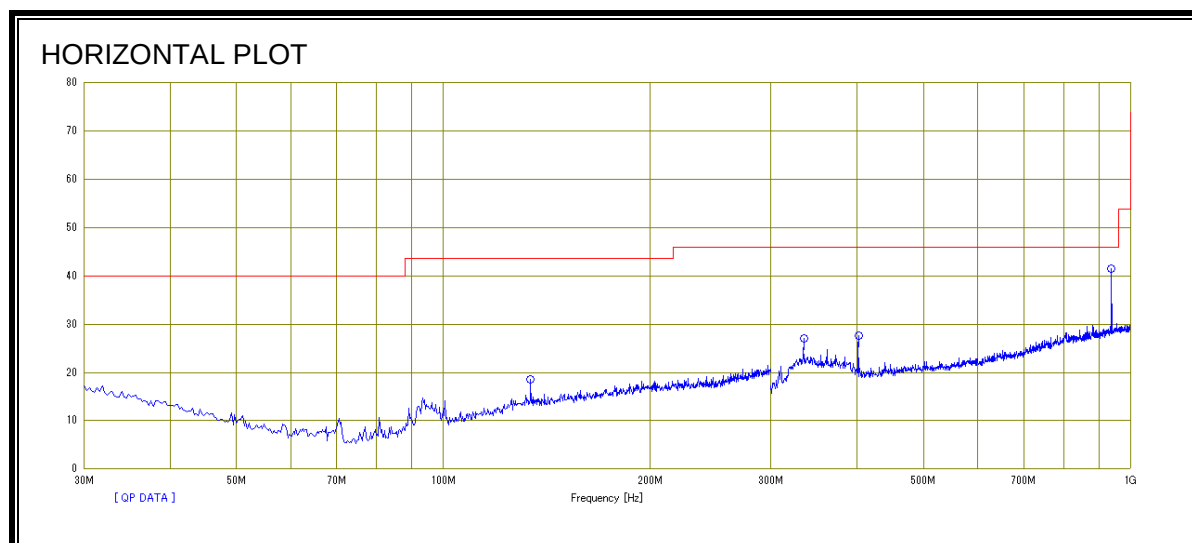
SPURIOUS EMISSIONS 30 TO 1000 MHz (VERTICAL)

Antenna: Antenna (Dipole) [361.00194.005 CS]



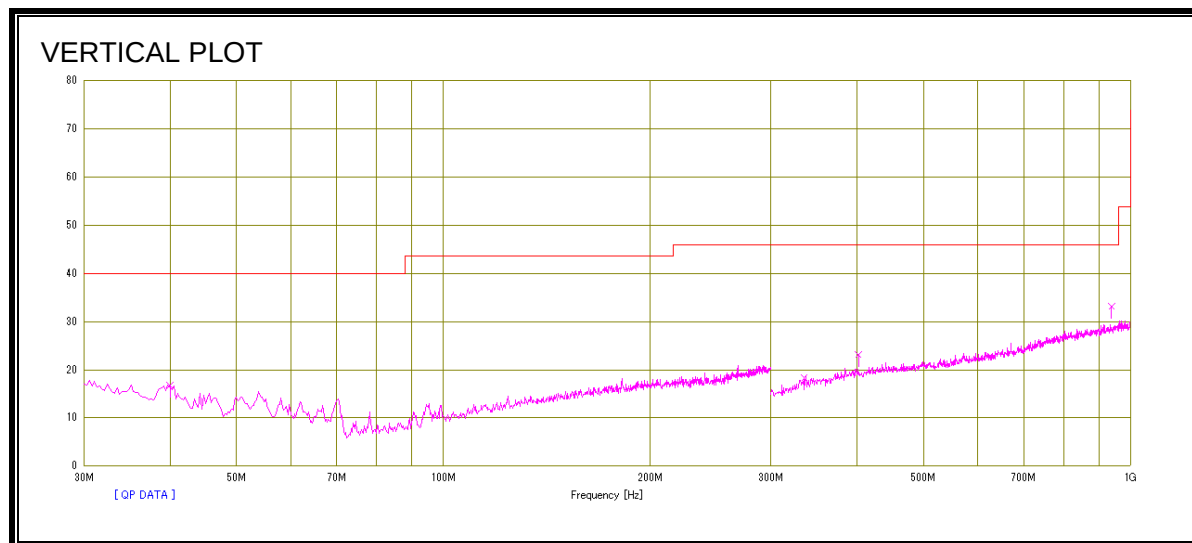
SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)

Antenna: Antenna (Dipole) [361.00194.005 CS]



SPURIOUS EMISSIONS 30 TO 1000 MHz (VERTICAL)

Antenna: Antenna (Dipole) [361.00194.005 CS]



HORIZONTAL AND VERTICAL DATA

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/09/2012
Temperature/ Humidity 23 deg.C/ 53% RH
Engineer Takayuki Shimada
Mode Tx 11g 2437MHz

Antenna: Antenna (PIFA) [DCA-P17_CS2] (With Mitsumi AC Adaptor)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	134.058	QP	29.7	14.0	8.5	32.3	19.9	43.5	23.6	
Hori	335.146	QP	37.0	15.6	10.2	32.1	30.7	46.0	15.3	
Hori	402.175	QP	32.1	17.7	10.7	32.1	28.4	46.0	17.6	
Hori	804.348	QP	29.5	22.0	13.0	31.4	33.1	46.0	12.9	
Hori	938.407	QP	34.3	22.8	13.7	30.8	40.0	46.0	6.0	
Vert	41.220	QP	29.0	14.4	7.3	32.2	18.5	40.0	21.5	
Vert	335.146	QP	27.5	15.6	10.2	32.1	21.2	46.0	24.8	
Vert	402.175	QP	29.1	17.7	10.7	32.1	25.4	46.0	20.6	
Vert	804.348	QP	24.0	22.0	13.0	31.4	27.6	46.0	18.4	
Vert	938.407	QP	26.1	22.8	13.7	30.8	31.8	46.0	14.2	

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).

Antenna: Antenna (PIFA) [DCA-P17_CS2] (With Tabuchi AC Adaptor)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	134.058	QP	30.3	14.0	8.5	32.3	20.5	43.5	23.0	
Hori	335.145	QP	35.0	15.6	10.2	32.1	28.7	46.0	17.3	
Hori	402.175	QP	31.9	17.7	10.7	32.1	28.2	46.0	17.8	
Hori	804.348	QP	29.1	22.0	13.0	31.4	32.7	46.0	13.3	
Hori	938.406	QP	32.2	22.8	13.7	30.8	37.9	46.0	8.1	
Vert	39.981	QP	26.7	14.9	7.3	32.2	16.7	40.0	23.3	
Vert	335.145	QP	25.0	15.6	10.2	32.1	18.7	46.0	27.3	
Vert	402.175	QP	27.3	17.7	10.7	32.1	23.6	46.0	22.4	
Vert	804.348	QP	23.5	22.0	13.0	31.4	27.1	46.0	18.9	
Vert	938.406	QP	26.3	22.8	13.7	30.8	32.0	46.0	14.0	

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).

HORIZONTAL AND VERTICAL DATA

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32IE0254-HO-01
Date 05/09/2012
Temperature/ Humidity 23 deg.C/ 53% RH
Engineer Takayuki Shimada
Mode Tx 11g 2437MHz

Antenna: Antenna (Dipole) [361.00194.005 CS] (With Mitsumi AC Adaptor)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	94.982	QP	33.3	9.2	8.1	32.3	18.3	43.5	25.2	
Hori	335.145	QP	34.3	15.6	10.2	32.1	28.0	46.0	18.0	
Hori	402.175	QP	32.1	17.7	10.7	32.1	28.4	46.0	17.6	
Hori	938.406	QP	34.5	22.8	13.7	30.8	40.2	46.0	5.8	
Vert	41.081	QP	31.5	14.5	7.3	32.2	21.1	40.0	18.9	
Vert	335.145	QP	25.5	15.6	10.2	32.1	19.2	46.0	26.8	
Vert	402.175	QP	27.5	17.7	10.7	32.1	23.8	46.0	22.2	
Vert	938.406	QP	26.4	22.8	13.7	30.8	32.1	46.0	13.9	

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).

Antenna: Antenna (Dipole) [361.00194.005 CS] (With Tabuchi AC Adaptor)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	134.058	QP	28.4	14.0	8.5	32.3	18.6	43.5	24.9	
Hori	335.145	QP	33.4	15.6	10.2	32.1	27.1	46.0	18.9	
Hori	402.175	QP	31.4	17.7	10.7	32.1	27.7	46.0	18.3	
Hori	938.406	QP	35.7	22.8	13.7	30.8	41.4	46.0	4.6	
Vert	40.033	QP	26.7	14.9	7.3	32.2	16.7	40.0	23.3	
Vert	335.145	QP	24.6	15.6	10.2	32.1	18.3	46.0	27.7	
Vert	402.175	QP	26.8	17.7	10.7	32.1	23.1	46.0	22.9	
Vert	938.406	QP	27.4	22.8	13.7	30.8	33.1	46.0	12.9	

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).

8 AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.4

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

Antenna: Antenna (PIFA) [DCA-P17 CS2] (With Mitsumi AC Adaptor)

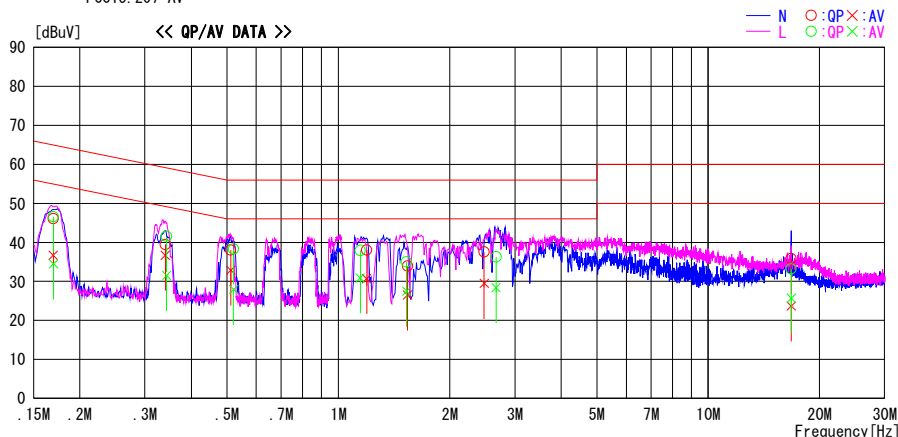
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/05/10

Report No. : 32IE0254-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 59% RH
Engineer : Takayuki Shimada

Mode / Remarks : Mitsumi Adaptor, DCA(PIFA), Tx 11g 24Mbps 2437MHz

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]	
0.16965	32.8	23.4	13.3	46.1	36.7	65.0	55.0	18.9	18.3	N
0.34057	26.1	23.3	13.4	39.5	36.7	59.2	49.2	19.7	12.5	N
0.51183	24.6	19.5	13.4	38.0	32.9	56.0	46.0	18.0	13.1	N
1.19233	24.6	17.3	13.4	38.0	30.7	56.0	46.0	18.0	15.3	N
1.53706	20.3	12.9	13.6	33.9	26.5	56.0	46.0	22.1	19.5	N
2.48009	24.0	15.9	13.6	37.6	29.5	56.0	46.0	18.4	16.5	N
16.75737	19.4	7.3	16.4	35.8	23.7	60.0	50.0	24.2	26.3	N
0.16973	33.3	21.2	13.3	46.6	34.5	65.0	55.0	18.4	20.5	L
0.34323	28.2	18.1	13.4	41.6	31.5	59.1	49.1	17.5	17.6	L
0.52093	24.9	14.6	13.4	38.3	28.0	56.0	46.0	17.7	18.0	L
1.14693	24.5	17.5	13.4	37.9	30.9	56.0	46.0	18.1	15.1	L
1.52913	21.4	13.9	13.6	35.0	27.5	56.0	46.0	21.0	18.5	L
2.66902	22.7	14.8	13.6	36.3	28.4	56.0	46.0	19.7	17.6	L
16.75737	16.8	9.3	16.4	33.2	25.7	60.0	50.0	26.8	24.3	L

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

RESULTS

Antenna: Antenna (PIFA) [DCA-P17 CS2] (With Tabuchi AC Adaptor)

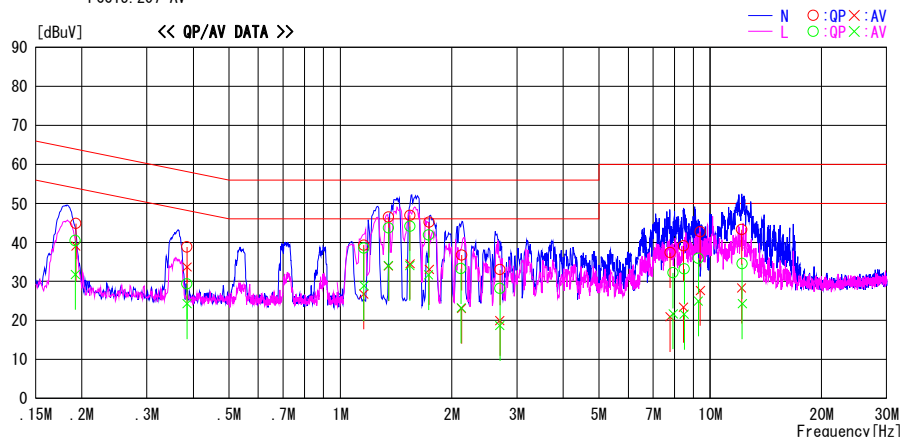
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2012/05/10

Report No. : 32IE0254-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 59% RH
Engineer : Takayuki Shimada

Mode / Remarks : Tabuchi Adaptor, DCA(PIFA), Tx 11g 24Mbps 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19277	31.5	25.8	13.3	44.8	39.1	63.9	53.9	19.1	14.8	N
0.38518	25.4	20.3	13.4	38.8	33.7	58.2	48.2	19.4	14.5	N
1.15717	25.9	13.4	13.4	39.3	26.8	56.0	46.0	16.7	19.2	N
1.35015	33.0	20.5	13.5	46.5	34.0	56.0	46.0	9.5	12.0	N
1.54317	33.3	20.9	13.6	46.9	34.5	56.0	46.0	9.1	11.5	N
1.73723	31.6	19.5	13.6	45.2	33.1	56.0	46.0	10.8	12.9	N
2.12596	23.1	9.5	13.6	36.7	23.1	56.0	46.0	19.3	22.9	N
2.69888	19.4	6.4	13.6	33.0	20.0	56.0	46.0	23.0	26.0	N
7.78631	22.7	6.3	14.7	37.4	21.0	60.0	50.0	22.6	29.0	N
8.46086	24.4	8.7	14.7	39.1	23.4	60.0	50.0	20.9	26.6	N
9.39953	27.9	12.9	14.8	42.7	27.7	60.0	50.0	17.3	22.3	N
12.15581	27.8	12.8	15.5	43.3	28.3	60.0	50.0	16.7	21.7	N
0.19202	27.2	18.5	13.3	40.5	31.8	63.9	53.9	23.4	22.1	L
0.38504	16.0	10.9	13.4	29.4	24.3	58.2	48.2	28.8	23.9	L
1.15817	25.2	15.5	13.4	38.6	28.9	56.0	46.0	17.4	17.1	L
1.35024	30.2	20.6	13.5	43.7	34.1	56.0	46.0	12.3	11.9	L
1.54012	30.5	20.5	13.6	44.1	34.1	56.0	46.0	11.9	11.9	L
1.73213	28.3	18.1	13.6	41.9	31.7	56.0	46.0	14.1	14.3	L
2.12010	19.7	9.6	13.6	33.3	23.2	56.0	46.0	22.7	22.8	L
2.69881	14.6	5.1	13.6	28.2	18.7	56.0	46.0	27.8	27.3	L
7.93524	17.5	7.0	14.7	32.2	21.7	60.0	50.0	27.8	28.3	L
8.49923	18.5	6.9	14.7	33.2	21.6	60.0	50.0	26.8	28.4	L
9.28858	21.1	10.2	14.8	35.9	25.0	60.0	50.0	24.1	25.0	L
12.19581	19.1	8.8	15.5	34.6	24.3	60.0	50.0	25.4	25.7	L

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

RESULTS

Antenna: Antenna (Dipole) [361.00194.005 CS] (With Mitsumi AC Adaptor)

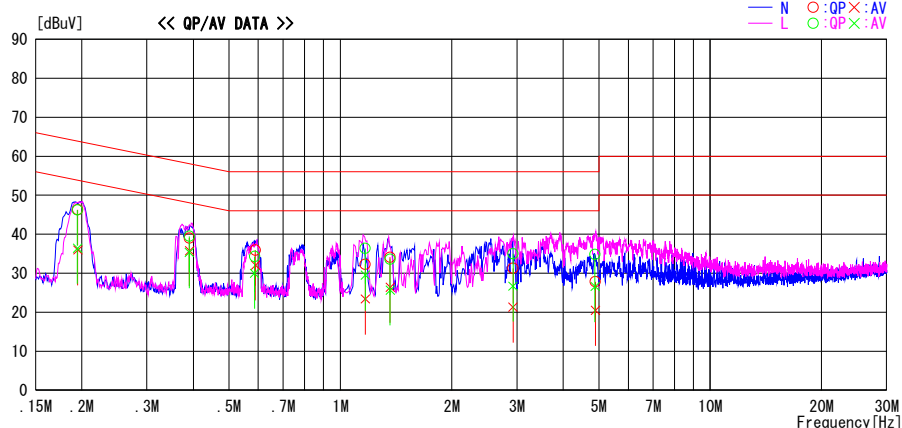
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/05/10

Report No. : 32IE0254-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 59% RH
Engineer : Takayuki Shimada

Mode / Remarks : Mitsumi Adaptor, SOK (Dipole), Tx 11g 24Mbps 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19500	33.0	22.7	13.3	46.3	36.0	63.8	53.8	17.5	17.8	N
0.39077	25.6	22.4	13.4	39.0	35.8	58.0	48.0	19.0	12.2	N
0.58935	22.5	18.7	13.4	35.9	32.1	56.0	46.0	20.1	13.9	N
1.16853	18.9	10.0	13.4	32.3	23.4	56.0	46.0	23.7	22.6	N
1.36381	20.6	12.9	13.5	34.1	26.4	56.0	46.0	21.9	19.6	N
2.92997	17.6	7.6	13.7	31.3	21.3	56.0	46.0	24.7	24.7	N
4.88915	13.6	6.3	14.2	27.8	20.5	56.0	46.0	28.2	25.5	N
0.19471	32.9	23.1	13.3	46.2	36.4	63.8	53.8	17.6	17.4	L
0.39038	26.1	21.9	13.4	39.5	35.3	58.1	48.1	18.6	12.8	L
0.58642	20.9	16.6	13.4	34.3	30.0	56.0	46.0	21.7	16.0	L
1.16843	23.0	16.1	13.4	36.4	29.5	56.0	46.0	19.6	16.5	L
1.36367	20.1	12.2	13.5	33.6	25.7	56.0	46.0	22.4	20.3	L
2.93004	21.3	13.0	13.7	35.0	26.7	56.0	46.0	21.0	19.3	L
4.88315	20.6	12.4	14.2	34.8	26.6	56.0	46.0	21.2	19.4	L

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

RESULTS

Antenna: Antenna (Dipole) [361.00194.005 CS] (With Tabuchi AC Adaptor)

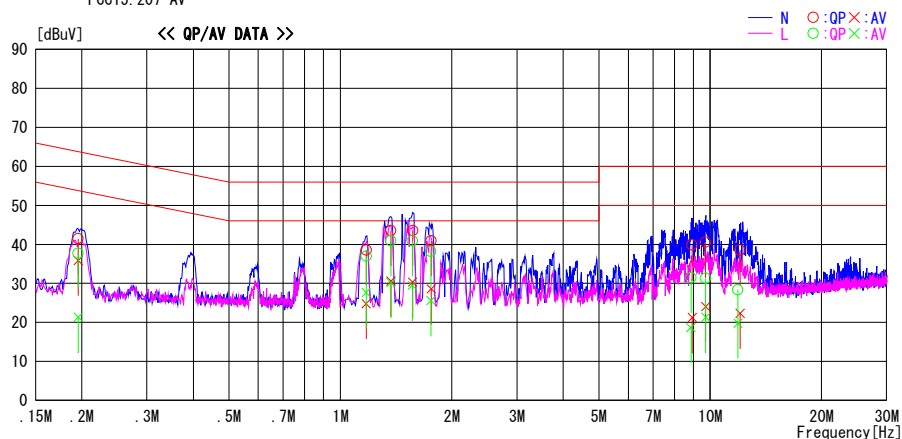
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/05/10

Report No. : 32IE0254-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 59% RH
Engineer : Takayuki Shimada

Mode / Remarks : Tabuchi Adaptor, SOK (Dipole), Tx 11g 24Mbps 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19553	28.2	22.6	13.3	41.5	35.9	63.8	53.8	22.3	17.9	N
1.17454	25.2	11.4	13.4	38.6	24.8	56.0	46.0	17.4	21.2	N
1.37001	30.1	17.1	13.5	43.6	30.6	56.0	46.0	12.4	15.4	N
1.56755	30.0	16.7	13.6	43.6	30.3	56.0	46.0	12.4	15.7	N
1.76188	27.3	15.0	13.6	40.9	28.6	56.0	46.0	15.1	17.4	N
8.93717	25.0	6.4	14.8	39.8	21.2	60.0	50.0	20.2	28.8	N
9.71351	25.7	9.2	14.9	40.6	24.1	60.0	50.0	19.4	25.9	N
12.03524	23.2	6.9	15.4	38.6	22.3	60.0	50.0	21.4	27.7	N
0.19552	24.4	8.0	13.3	37.7	21.3	63.8	53.8	26.1	32.5	L
1.17457	23.6	14.3	13.4	37.0	27.7	56.0	46.0	19.0	18.3	L
1.36934	27.4	16.7	13.5	40.9	30.2	56.0	46.0	15.1	15.8	L
1.56505	27.3	15.9	13.6	40.9	29.5	56.0	46.0	15.1	16.5	L
1.75698	24.6	12.0	13.6	38.2	25.6	56.0	46.0	17.8	20.4	L
8.86797	16.7	3.9	14.8	31.5	18.7	60.0	50.0	28.5	31.3	L
9.72037	16.4	6.4	14.9	31.3	21.3	60.0	50.0	28.7	28.7	L
11.88025	13.0	4.4	15.4	28.4	19.8	60.0	50.0	31.6	30.2	L

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

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	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

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

Notes: 1. Frequency, f , is in MHz.
2. A power density of 10 W/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:

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

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:

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

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

For multiple 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

(MPE distance equals 20 cm)

Antenna: Antenna (PIFA) [DCA-P17 CS2]

Band	Mode	Separation Distance (m)	Output AV Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	0.20	5.63	1.15	0.009	0.0009

Antenna: Antenna (Dipole) [361.00194.005 CS]

Band	Mode	Separation Distance (m)	Output AV Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	0.20	5.63	-5.39	0.002	0.0002