



RADIO TEST REPORT

Test Report No. : 32BE0096-HO-01-A-R2

Applicant : Sony Computer Entertainment Inc.
Type of Equipment : Development Kit
Model No. : PDEL-1001
FCC ID : AK8PDE1001A
Test regulation : FCC Part 15 Subpart C: 2011
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 32BE0096-HO-01-A-R1. 32BE0096-HO-01-A-R1 is replaced with this report.

Date of test: September 14 to October 13, 2011

Representative test engineer:



Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:



Mitsuru Fujimura
Leader of WiSE Japan,
UL Verification Service



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/about/mark1/index.jsp#nvlap>

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CONTENTS	PAGE
SECTION 1: Customer information.....	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Conducted Emission.....	11
SECTION 6: Radiated Spurious Emission	12
SECTION 7: Antenna Terminal Conducted Tests.....	13
APPENDIX 1: Data of EMI test.....	14
Conducted Emission	14
6dB Bandwidth	21
Conducted output power(root mean square averaging)	24
Radiated Spurious Emission	26
Conducted Spurious Emission	40
Conducted Emission Band Edge compliance	59
Power Density	60
99%Occupied Bandwidth	63
APPENDIX 2: Test instruments	65
APPENDIX 3: Photographs of test setup	66
Conducted Emission	66
Radiated Spurious Emission	67
Worst Case Position (Horizontal: Z-axis/ Vertical:Z-axis).....	68

SECTION 1: Customer information

Company Name	Sony Computer Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-3-6748-6333
Facsimile Number	+81-3-6748-6383
Contact Person	Akiko Tsukada

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	Development Kit
Model No	PDEL-1001
Serial No	Refer to Section 4, Clause 4.2
Country of Manufacture	Japan
Receipt Date of Sample	September 13, 2011
Condition of EUT	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	No modification by the test lab.

2.2 Product Description

Model No: PDEL-1001 (referred to as the EUT in this report) is the Development Kit.

Product Specification

Maximum clock frequency	500MHz
Operating Temperature	5-35 deg. C
Power Supply	DC5V (AC Adaptor)
Size	182 x 18.6 x 86.5 mm
Weight	280 g

Radio Specification: WLAN 11b/g/n-20

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	11b: DSSS/CCK, 11g/n-20: OFDM
Bandwidth	11b: 26MHz, 11g/n-20: 20MHz
Channel spacing	5MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC3.1/1.8V
Antenna Type	PIFA
Antenna Gain	1.1dBi max

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Radio Specification: Bluetooth (Ver. 2.1+EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	1MHz & 1MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC3.1/1.8V
Antenna Type	PIFA
Antenna Gain	-3.5dBi max

*Please refer to Test Report No. 31BE0096-HO-01-B-R2 for Bluetooth part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2011, final revised on July 8, 2011 and effective August 8, 2011

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

*The EUT complies with FCC Part 15 Subpart B: 2011, final revised on July 8, 2011 and effective August 8, 2011.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	QP 14.1dB, 0.66018MHz, N AV 9.6dB, 1.00484MHz, N	Complied	-
6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	See data.	Complied	Conducted
Conducted output power(root mean square averaging)	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3		2.6dB 2390.000MHz, PK, Hori.	Complied

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

This EUT provides stable voltage(DC3.1/1.8V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted
Receiver Spurious Emission	IC: RSS-Gen 4.10	IC: RSS-Gen 6	8.2dB 4001.423MHz, AV, Vert.	Complied	Radiated

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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	3.5dB	5.1dB	5.2dB	4.8dB	5.1dB	4.4dB	4.3dB
No.2	4.0dB	5.1dB	5.2dB	4.8dB	5.0dB	4.3dB	4.2dB
No.3	4.2dB	4.7dB	5.2dB	4.8dB	5.0dB	4.5dB	4.2dB
No.4	4.0dB	5.0dB	5.1dB	4.8dB	5.0dB	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

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test (3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11b (11b)	2Mbps, PN9
IEEE 802.11g (11g)	24Mbps, PN9
IEEE 802.11n 20MHz BW (11n-20)	MCS 4, PN9
*Transmitting duty was almost 100% on all tests. *The worst condition was determined based on the preliminary test result of Conducted output power (root mean square averaging) (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: 10 Software: WLAN/BT LAB TEST, Ver. 1.00 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*Details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission Spurious Emission	11b Tx	2412MHz
	11g Tx	2437MHz
	11n-20 Tx	2462MHz
	Rx	2437MHz
6dB Bandwidth Conducted output power (root mean square averaging) Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412MHz 2437MHz 2462MHz

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4.2 Configuration and peripherals

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

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SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247".

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

30dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC 15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		30dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz)		3m (below 10GHz), 1m*2) (above 10GHz)

*1) The test was performed with VBW 10Hz since the EUT had no intervals during which the transmitter was off (see Appendix).

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Conducted output power(root mean square averaging)	-	-	-	Auto	Average	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	18MHz	30kHz	100kHz	600sec	Peak	Max Hold	Spectrum Analyzer *1) *2)
Conducted Spurious Emission *3)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				

*1) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

*2) The test was not performed at RBW:3kHz however the measurement is to be performed with RBW:3kHz in the regulation, Because the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:30kHz.

*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

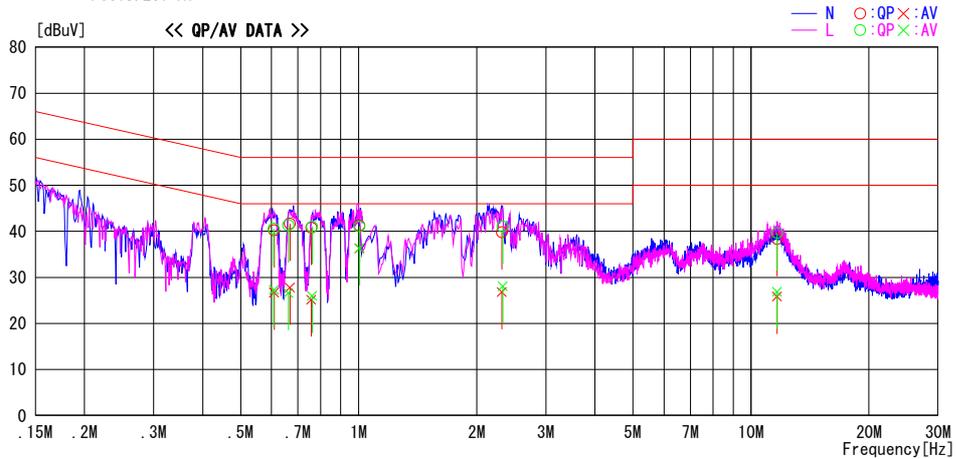
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2011/10/11

Report No. : 32BE0096-HO-01
 Temp./Humi. : 22deg. C / 65% RH
 Engineer : Takumi Shimada

Mode / Remarks : WLAN Tx 11b 2437MHz 2Mbps

LIMIT : FCC15.207 QP
 FCC15.207 AV

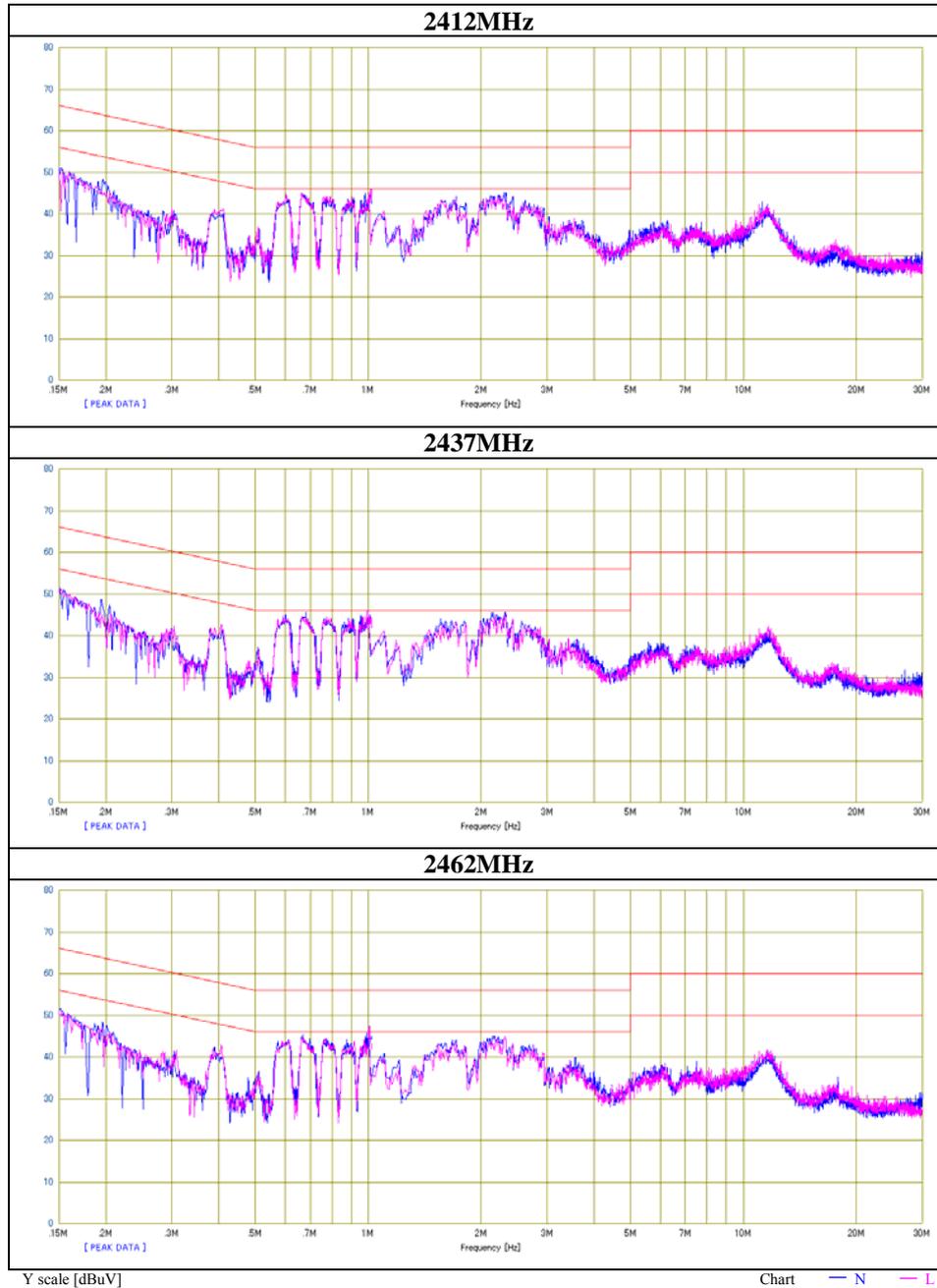


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.60838	26.9	13.4	13.3	40.2	26.7	56.0	46.0	15.8	19.3	N	
0.66773	28.3	14.5	13.3	41.6	27.8	56.0	46.0	14.4	18.2	N	
0.75687	27.4	11.9	13.3	40.7	25.2	56.0	46.0	15.3	20.8	N	
1.00434	27.8	22.9	13.4	41.2	36.3	56.0	46.0	14.8	9.7	N	
2.31879	26.4	13.4	13.4	39.8	26.8	56.0	46.0	16.2	19.2	N	
11.65145	24.1	11.6	14.2	38.3	25.8	60.0	50.0	21.7	24.2	N	
0.60774	27.3	14.0	13.3	40.6	27.3	56.0	46.0	15.4	18.7	L	
0.66204	28.0	13.3	13.3	41.3	26.6	56.0	46.0	14.7	19.4	L	
0.76054	27.7	12.7	13.3	41.0	26.0	56.0	46.0	15.0	20.0	L	
1.00424	27.7	22.9	13.4	41.1	36.3	56.0	46.0	14.9	9.7	L	
2.32828	27.7	14.7	13.4	41.1	28.1	56.0	46.0	14.9	17.9	L	
11.65152	25.4	12.7	14.2	39.6	26.9	60.0	50.0	20.4	23.1	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32BE0096-HO-01
Date	10/11/2011
Temperature/ Humidity	22 deg.C / 65%
Engineer	Takumi Shimada
Mode	11b Tx



Conducted Emission

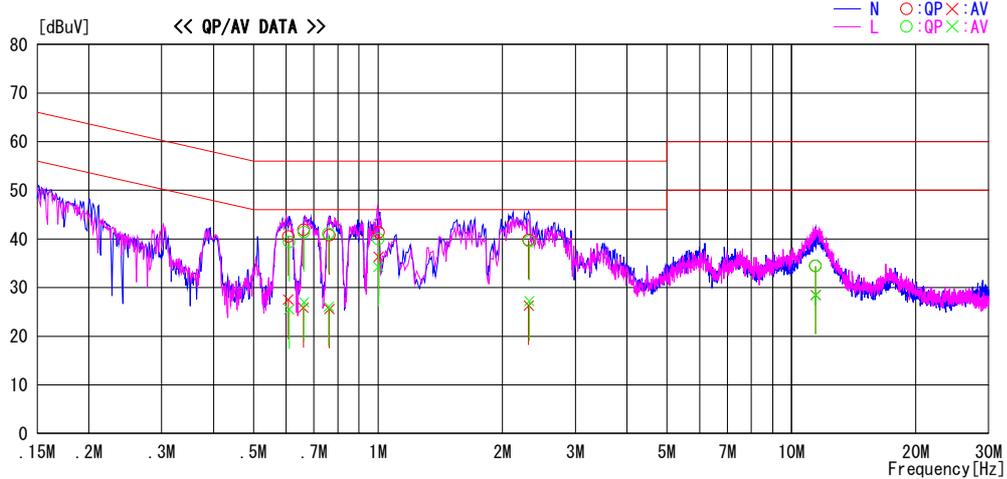
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2011/10/11

Report No. : 32BE0096-HO-01
 Temp./Humi. : 22deg. C / 65% RH
 Engineer : Takumi Shimada

Mode / Remarks : WLAN Tx 11g 2437MHz 24Mbps

LIMIT : FCC15.207 QP
 FCC15.207 AV

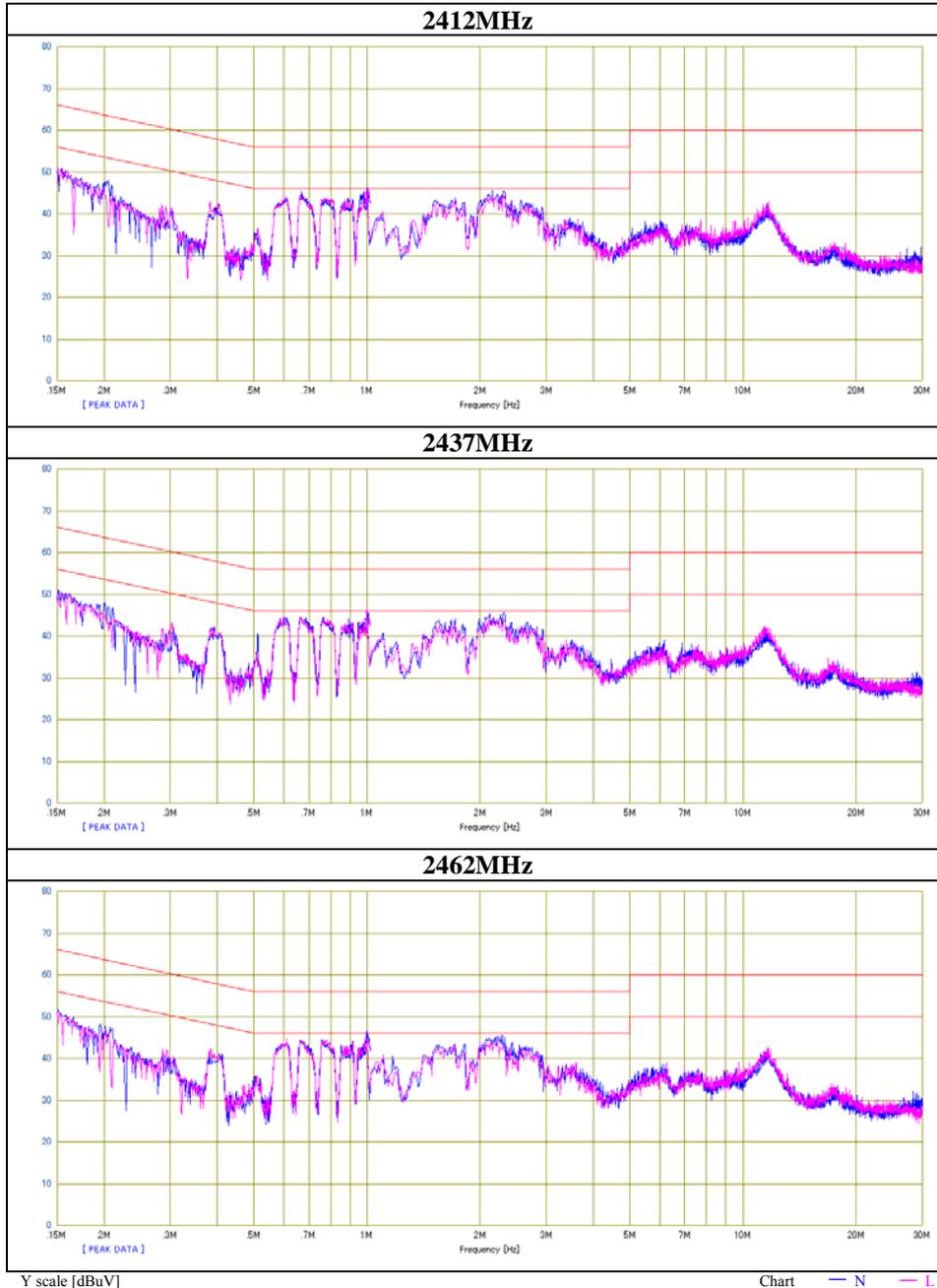


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.60734	27.2	14.2	13.3	40.5	27.5	56.0	46.0	15.5	18.5	N	
0.66018	28.6	12.5	13.3	41.9	25.8	56.0	46.0	14.1	20.2	N	
0.76322	27.4	12.3	13.3	40.7	25.6	56.0	46.0	15.3	20.4	N	
1.00434	27.9	22.9	13.4	41.3	36.3	56.0	46.0	14.7	9.7	N	
2.31409	26.4	12.9	13.4	39.8	26.3	56.0	46.0	16.2	19.7	N	
11.44238	20.2	14.3	14.2	34.4	28.5	60.0	50.0	25.6	21.5	N	
0.60969	26.1	12.2	13.3	39.4	25.5	56.0	46.0	16.6	20.5	L	
0.66267	28.1	13.7	13.3	41.4	27.0	56.0	46.0	14.6	19.0	L	
0.76003	27.8	12.8	13.3	41.1	26.1	56.0	46.0	14.9	19.9	L	
1.00187	26.5	20.8	13.4	39.9	34.2	56.0	46.0	16.1	11.8	L	
2.32389	26.1	13.8	13.4	39.5	27.2	56.0	46.0	16.5	18.8	L	
11.43970	20.2	14.3	14.2	34.4	28.5	60.0	50.0	25.6	21.5	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32BE0096-HO-01
Date	10/11/2011
Temperature/ Humidity	22 deg.C / 65%
Engineer	Takumi Shimada
Mode	11g Tx



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

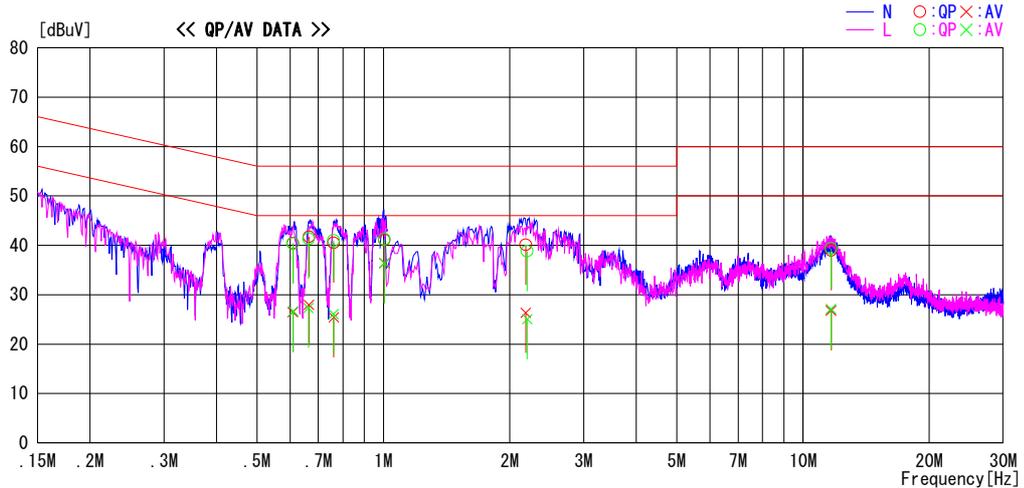
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2011/10/11

Report No. : 32BE0096-HO-01

Temp./Humi. : 22deg. C / 65% RH
Engineer : Takumi Shimada

Mode / Remarks : WLAN Tx 11n 2437MHz MCS4

LIMIT : FCC15.207 QP
FCC15.207 AV

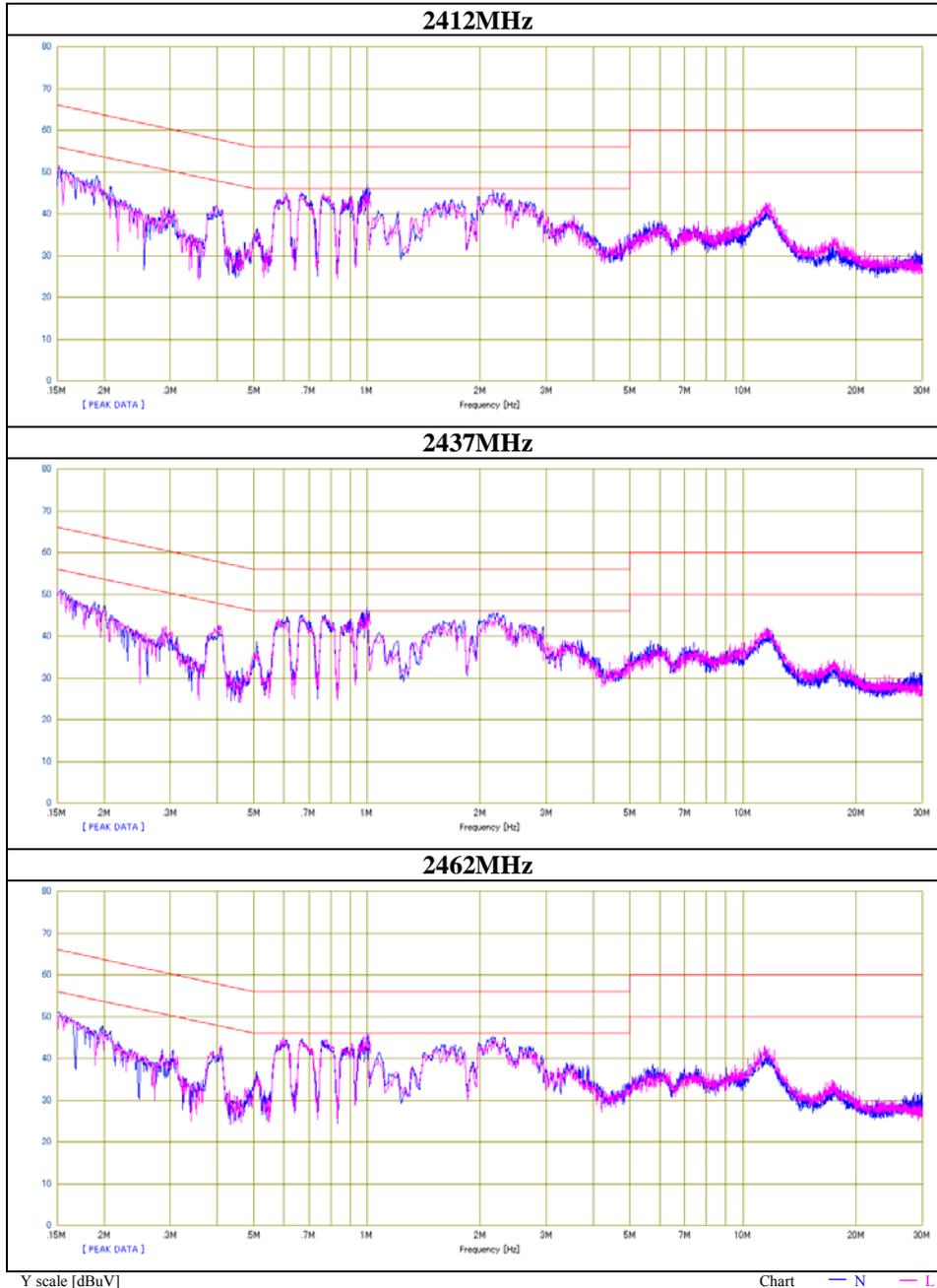


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.60886	27.1	13.2	13.3	40.4	26.5	56.0	46.0	15.6	19.5	N	
0.66492	28.4	14.6	13.3	41.7	27.9	56.0	46.0	14.3	18.1	N	
0.76120	27.2	12.1	13.3	40.5	25.4	56.0	46.0	15.5	20.6	N	
1.00484	27.7	23.0	13.4	41.1	36.4	56.0	46.0	14.9	9.6	N	
2.18465	26.7	12.9	13.4	40.1	26.3	56.0	46.0	15.9	19.7	N	
11.65380	24.8	12.6	14.2	39.0	26.8	60.0	50.0	21.0	23.2	N	
0.60894	27.0	13.3	13.3	40.3	26.6	56.0	46.0	15.7	19.4	L	
0.66340	28.0	14.0	13.3	41.3	27.3	56.0	46.0	14.7	18.7	L	
0.76077	27.7	12.8	13.3	41.0	26.1	56.0	46.0	15.0	19.9	L	
1.00490	27.8	22.9	13.4	41.2	36.3	56.0	46.0	14.8	9.7	L	
2.19964	25.4	11.6	13.4	38.8	25.0	56.0	46.0	17.2	21.0	L	
11.65552	25.2	12.9	14.2	39.4	27.1	60.0	50.0	20.6	22.9	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32BE0096-HO-01
Date	10/11/2011
Temperature/ Humidity	22 deg.C / 65%
Engineer	Takumi Shimada
Mode	11n Tx



Conducted Emission
 Reference data

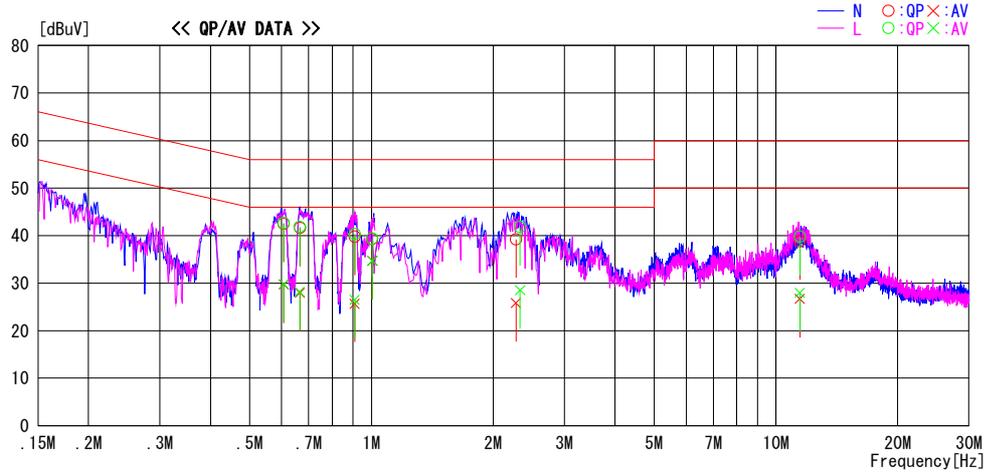
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2011/10/11

Report No. : 32BE0096-HO-01
 Temp./Humi. : 22deg. C / 65% RH
 Engineer : Takumi Shimada

Mode / Remarks : WLAN Rx 2437MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.60727	29.2	16.4	13.3	42.5	29.7	56.0	46.0	13.5	16.3	N	
0.66615	28.3	14.7	13.3	41.6	28.0	56.0	46.0	14.4	18.0	N	
0.90977	26.5	12.4	13.3	39.8	25.7	56.0	46.0	16.2	20.3	N	
1.00500	25.9	21.3	13.4	39.3	34.7	56.0	46.0	16.7	11.3	N	
2.27640	25.8	12.4	13.4	39.2	25.8	56.0	46.0	16.8	20.2	N	
11.45484	24.6	12.5	14.2	38.8	26.7	60.0	50.0	21.2	23.3	N	
0.60730	29.3	16.5	13.3	42.6	29.8	56.0	46.0	13.4	16.2	L	
0.66498	28.5	14.9	13.3	41.8	28.2	56.0	46.0	14.2	17.8	L	
0.90969	27.0	13.2	13.3	40.3	26.5	56.0	46.0	15.7	19.5	L	
1.00512	26.0	21.3	13.4	39.4	34.7	56.0	46.0	16.6	11.3	L	
2.32927	28.4	15.1	13.4	41.8	28.5	56.0	46.0	14.2	17.5	L	
11.45356	25.6	13.8	14.2	39.8	28.0	60.0	50.0	20.2	22.0	L	

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

6dB Bandwidth

Test place Head Office EMC Lab. No.4 Measurement Room
Report No. 32BE0096-HO-01
Date 10/04/2011
Temperature/ Humidity 23 deg.C / 48% RH
Engineer Hisayoshi Sato
Mode 11b/11g/11n Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	9.908	>500
2437	9.910	>500
2462	9.908	>500

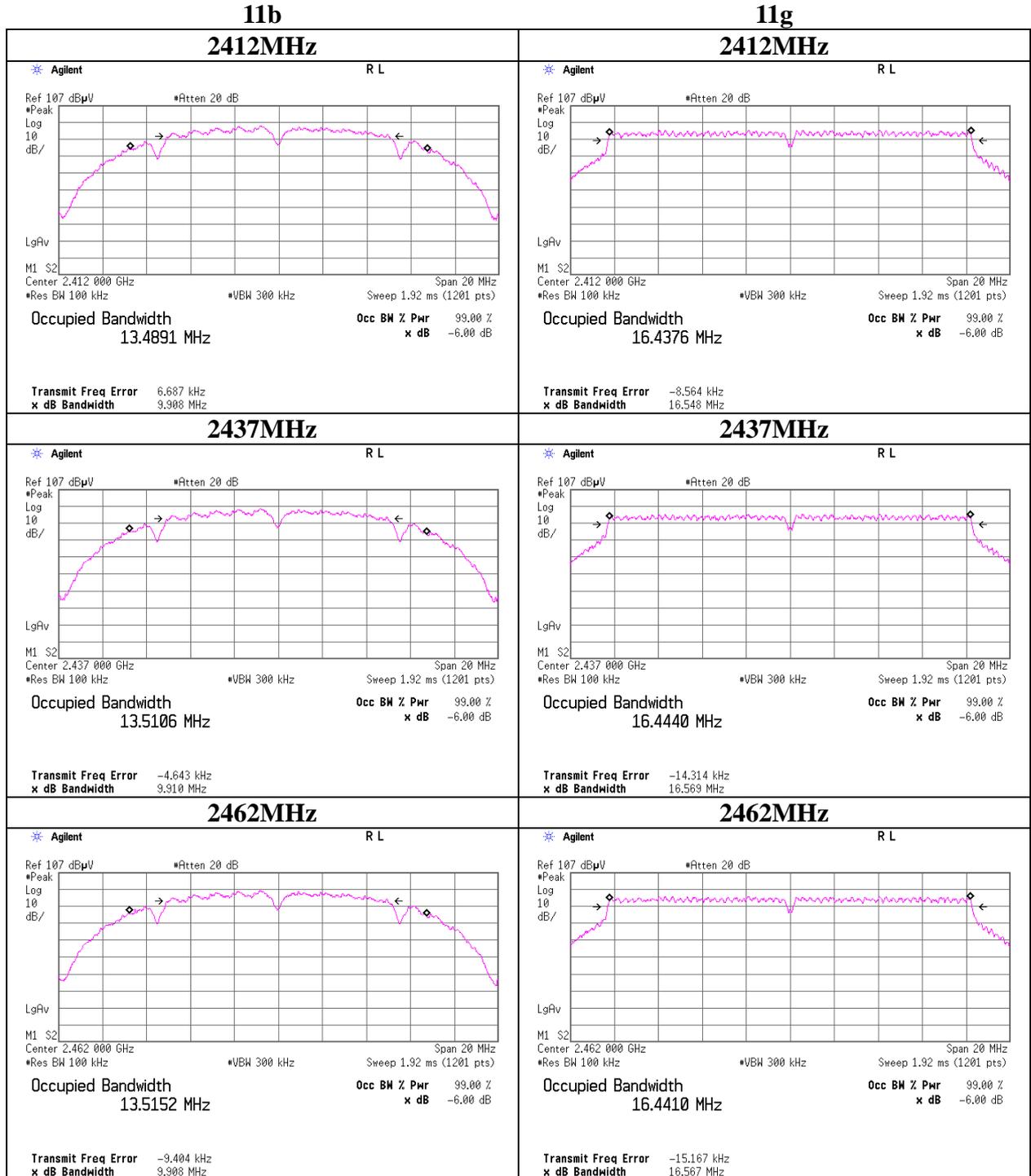
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	16.548	>500
2437	16.569	>500
2462	16.567	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	17.810	>500
2437	17.811	>500
2462	17.819	>500

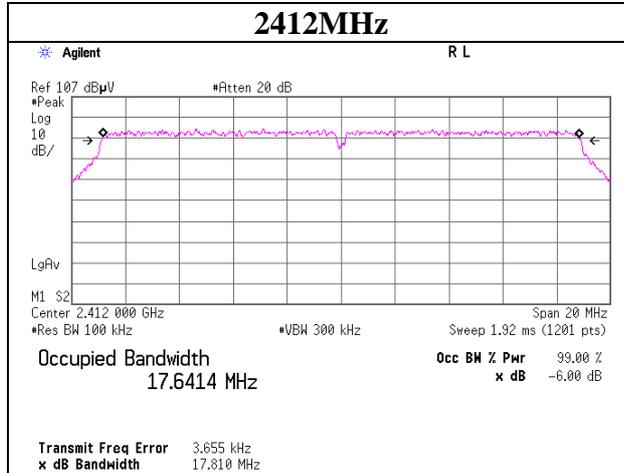
6dB Bandwidth



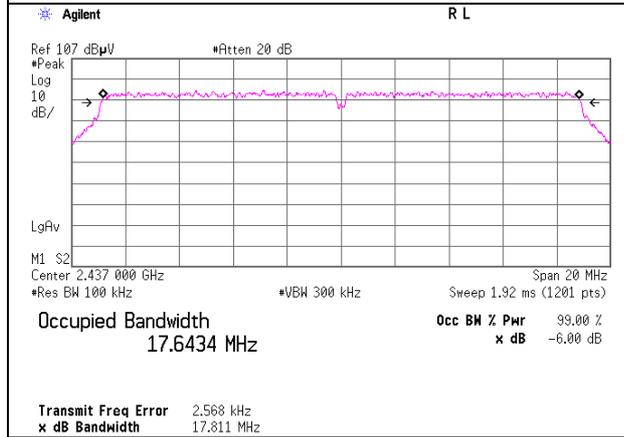
6dB Bandwidth

11n-20

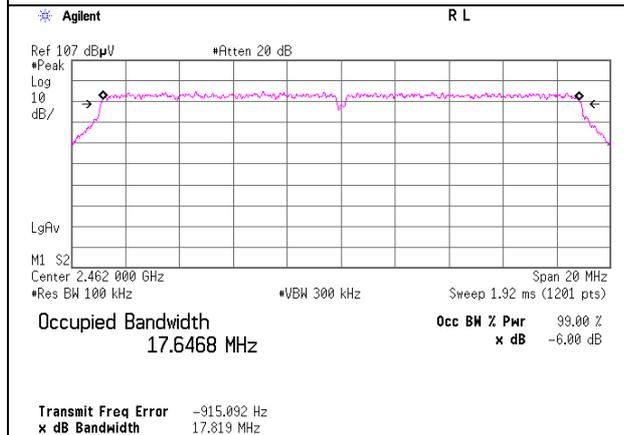
2412MHz



2437MHz



2462MHz



Conducted output power(root mean square averaging)

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32BE0096-HO-01
Date 10/13/2011
Temperature/ Humidity 23 deg.C / 56% RH
Engineer Takayuki Shimada
Mode 11b/11g/11n Tx

11b

Freq. [MHz]	Reading (AV) [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-1.64	1.34	9.96	9.66	9.25	30.00	1000	20.34
2437	-1.53	1.34	9.96	9.77	9.48	30.00	1000	20.23
2462	-0.97	1.34	9.96	10.33	10.79	30.00	1000	19.67

11g

Freq. [MHz]	Reading (AV) [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-1.92	1.34	9.96	9.38	8.67	30.00	1000	20.62
2437	-1.54	1.34	9.96	9.76	9.46	30.00	1000	20.24
2462	-1.11	1.34	9.96	10.19	10.45	30.00	1000	19.81

11n

Freq. [MHz]	Reading (AV) [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-1.72	1.34	9.96	9.58	9.08	30.00	1000	20.42
2437	-1.57	1.34	9.96	9.73	9.40	30.00	1000	20.27
2462	-1.24	1.34	9.96	10.06	10.14	30.00	1000	19.94

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Conducted output power(root mean square averaging)

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32BE0096-HO-01
Date 10/13/2011
Temperature/ Humidity 23 deg.C / 56% RH
Engineer Takayuki Shimada
Mode 11b/11g/11n Tx

11b

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-1.63	
2	-1.53	*
5.5	-1.55	
11	-1.55	

11g

Rate	Reading	Remark
[Mbps]	[dBm]	
6	-1.62	
9	-1.64	
12	-1.61	
18	-1.58	
24	-1.54	*
36	-1.71	
48	-1.62	
54	-1.77	

11n

Rate	Reading	Remark
[MCS]	[dBm]	
0	-1.66	
1	-1.64	
2	-1.64	
3	-1.61	
4	-1.57	*
5	-1.61	
6	-1.64	
7	-1.65	

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/04/2011 10/05/2011 10/07/2011
Temperature/ Humidity : 21 deg.C / 55% RH 21 deg.C / 55% RH 25 deg.C / 51% RH
Engineer : Hisayoshi Sato Tomotaka Sasagawa Takumi Shimada
Mode : (1-10GHz) (10-26.5GHz) (30-1000MHz)
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	65.050	QP	45.0	7.2	7.5	32.2	27.5	40.0	12.5	
Hori	170.953	QP	34.9	15.4	8.7	32.1	26.9	43.5	16.6	
Hori	250.011	QP	37.7	17.2	9.3	32.1	32.1	46.0	13.9	
Hori	448.613	QP	32.6	18.5	10.7	32.1	29.7	46.0	16.3	
Hori	500.024	QP	34.6	19.2	11.0	32.1	32.7	46.0	13.3	
Hori	750.039	QP	32.4	22.8	12.4	32.0	35.6	46.0	10.4	
Hori	2390.000	PK	53.2	28.1	2.2	32.2	51.3	73.9	22.6	
Hori	2399.500	PK	73.6	28.1	2.2	32.2	71.7	-	-	- See 30dBc Data Sheet
Hori	2400.000	PK	74.8	28.1	2.2	32.2	72.9	-	-	- See 30dBc Data Sheet
Hori	4824.000	PK	42.9	31.2	4.8	31.4	47.5	73.9	26.4	
Hori	7236.000	PK	42.6	35.6	5.6	32.4	51.4	73.9	22.5	
Hori	9648.000	PK	43.5	38.3	6.7	33.2	55.3	73.9	18.6	
Hori	24120.000	PK	46.8	38.7	-0.8	31.6	53.1	73.9	20.8	
Hori	2390.000	AV	33.3	28.1	2.2	32.2	31.4	53.9	22.5	
Hori	2399.500	AV	48.6	28.1	2.2	32.2	46.7	-	-	- See 30dBc Data Sheet
Hori	2400.000	AV	45.1	28.1	2.2	32.2	43.2	-	-	- See 30dBc Data Sheet
Hori	4824.000	AV	30.9	31.2	4.8	31.4	35.5	53.9	18.4	
Hori	7236.000	AV	30.1	35.6	5.6	32.4	38.9	53.9	15.0	
Hori	9648.000	AV	29.6	38.3	6.7	33.2	41.4	53.9	12.5	
Hori	24120.000	AV	33.9	38.7	-0.8	31.6	40.2	53.9	13.7	
Vert	60.200	QP	47.9	7.9	7.4	32.2	31.0	40.0	9.0	
Vert	170.962	QP	37.4	15.4	8.7	32.1	29.4	43.5	14.1	
Vert	250.011	QP	38.5	17.2	9.3	32.1	32.9	46.0	13.1	
Vert	448.613	QP	35.5	18.5	10.7	32.1	32.6	46.0	13.4	
Vert	500.013	QP	35.3	19.2	11.0	32.1	33.4	46.0	12.6	
Vert	750.018	QP	27.7	22.8	12.4	32.0	30.9	46.0	15.1	
Vert	2390.000	PK	48.8	28.1	2.2	32.2	46.9	73.9	27.0	
Vert	2399.500	PK	68.1	28.1	2.2	32.2	66.2	-	-	- See 30dBc Data Sheet
Vert	2400.000	PK	69.4	28.1	2.2	32.2	67.5	-	-	- See 30dBc Data Sheet
Vert	4824.000	PK	44.1	31.2	4.8	31.4	48.7	73.9	25.2	
Vert	7236.000	PK	42.3	35.6	5.6	32.4	51.1	73.9	22.8	
Vert	9648.000	PK	43.3	38.3	6.7	33.2	55.1	73.9	18.8	
Vert	24120.000	PK	47.0	38.7	-0.8	31.6	53.3	73.9	20.6	
Vert	2390.000	AV	30.7	28.1	2.2	32.2	28.8	53.9	25.1	
Vert	2399.500	AV	42.7	28.1	2.2	32.2	40.8	-	-	- See 30dBc Data Sheet
Vert	2400.000	AV	39.6	28.1	2.2	32.2	37.7	-	-	- See 30dBc Data Sheet
Vert	4824.000	AV	34.9	31.2	4.8	31.4	39.5	53.9	14.4	
Vert	7236.000	AV	30.4	35.6	5.6	32.4	39.2	53.9	14.7	
Vert	9648.000	AV	30.2	38.3	6.7	33.2	42.0	53.9	11.9	
Vert	24120.000	AV	34.1	38.7	-0.8	31.6	40.4	53.9	13.5	

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

Radiated Spurious Emission
30dBc Data Sheet

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/04/2011
Temperature/ Humidity : 21 deg.C / 55% RH
Engineer : Hisayoshi Sato
(1-10GHz)
Mode : 11b Tx 2412MHz

30dBc 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	100.9	28.2	2.2	32.2	99.1	-	-	Carrier
Hori	2399.500	PK	54.0	28.1	2.2	32.2	52.1	69.1	17.0	
Hori	2400.000	PK	54.9	28.1	2.2	32.2	53.0	69.1	16.1	
Vert	2412.000	PK	96.1	28.2	2.2	32.2	94.3	-	-	Carrier
Vert	2399.500	PK	47.8	28.1	2.2	32.2	45.9	64.3	18.4	
Vert	2400.000	PK	49.2	28.1	2.2	32.2	47.3	64.3	17.0	

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

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/05/2011 10/07/2011
Temperature/ Humidity : 21 deg.C / 55% RH 25 deg.C / 51% RH
Engineer : Tomotaka Sasagawa Takumi Shimada
(1-26.5GHz) (30-1000MHz)
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	65.053	QP	45.1	7.2	7.5	32.2	27.6	40.0	12.4	
Hori	170.955	QP	35.0	15.4	8.7	32.1	27.0	43.5	16.5	
Hori	250.011	QP	37.3	17.2	9.3	32.1	31.7	46.0	14.3	
Hori	448.612	QP	32.2	18.5	10.7	32.1	29.3	46.0	16.7	
Hori	500.016	QP	34.8	19.2	11.0	32.1	32.9	46.0	13.1	
Hori	750.021	QP	32.2	22.8	12.4	32.0	35.4	46.0	10.6	
Hori	3501.655	PK	47.2	28.9	2.7	31.8	47.0	73.9	26.9	
Hori	4001.981	PK	48.4	30.1	2.9	31.6	49.8	73.9	24.1	
Hori	4874.000	PK	42.3	31.4	4.8	31.4	47.1	73.9	26.8	
Hori	7311.000	PK	44.5	35.7	5.6	32.5	53.3	73.9	20.6	
Hori	9748.000	PK	44.6	38.4	6.8	33.2	56.6	73.9	17.3	
Hori	24370.000	PK	46.7	38.6	-0.8	31.6	52.9	73.9	21.0	
Hori	3501.655	AV	41.3	28.9	2.7	31.8	41.1	53.9	12.8	
Hori	4001.981	AV	44.1	30.1	2.9	31.6	45.5	53.9	8.4	
Hori	4874.000	AV	31.2	31.4	4.8	31.4	36.0	53.9	17.9	
Hori	7311.000	AV	31.2	35.7	5.6	32.5	40.0	53.9	13.9	
Hori	9748.000	AV	30.9	38.4	6.8	33.2	42.9	53.9	11.0	
Hori	24370.000	AV	34.2	38.6	-0.8	31.6	40.4	53.9	13.5	
Vert	60.213	QP	48.5	7.9	7.4	32.2	31.6	40.0	8.4	
Vert	170.963	QP	37.7	15.4	8.7	32.1	29.7	43.5	13.8	
Vert	250.012	QP	38.1	17.2	9.3	32.1	32.5	46.0	13.5	
Vert	448.613	QP	35.5	18.5	10.7	32.1	32.6	46.0	13.4	
Vert	500.012	QP	35.7	19.2	11.0	32.1	33.8	46.0	12.2	
Vert	750.018	QP	27.9	22.8	12.4	32.0	31.1	46.0	14.9	
Vert	3501.655	PK	47.0	28.9	2.7	31.8	46.8	73.9	27.1	
Vert	4001.981	PK	49.0	30.1	2.9	31.6	50.4	73.9	23.5	
Vert	4874.000	PK	42.6	31.4	4.8	31.4	47.4	73.9	26.5	
Vert	7311.000	PK	43.9	35.7	5.6	32.5	52.7	73.9	21.2	
Vert	9748.000	PK	44.0	38.4	6.8	33.2	56.0	73.9	17.9	
Vert	24370.000	PK	46.9	38.6	-0.8	31.6	53.1	73.9	20.8	
Vert	3501.655	AV	37.8	28.9	2.7	31.8	37.6	53.9	16.3	
Vert	4001.981	AV	44.0	30.1	2.9	31.6	45.4	53.9	8.5	
Vert	4874.000	AV	31.2	31.4	4.8	31.4	36.0	53.9	17.9	
Vert	7311.000	AV	30.9	35.7	5.6	32.5	39.7	53.9	14.2	
Vert	9748.000	AV	31.0	38.4	6.8	33.2	43.0	53.9	10.9	
Vert	24370.000	AV	34.0	38.6	-0.8	31.6	40.2	53.9	13.7	

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

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/04/2011 10/05/2011 10/07/2011
Temperature/ Humidity : 21 deg.C / 55% RH 21 deg.C / 55% RH 25 deg.C / 51% RH
Engineer : Hisayoshi Sato Tomotaka Sasagawa Takumi Shimada
Mode : (1-10GHz) (10-26.5GHz) (30-1000MHz)
 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	65.047	QP	44.8	7.2	7.5	32.2	27.3	40.0	12.7	
Hori	170.951	QP	34.8	15.4	8.7	32.1	26.8	43.5	16.7	
Hori	250.012	QP	37.5	17.2	9.3	32.1	31.9	46.0	14.1	
Hori	448.614	QP	32.1	18.5	10.7	32.1	29.2	46.0	16.8	
Hori	500.021	QP	34.5	19.2	11.0	32.1	32.6	46.0	13.4	
Hori	750.018	QP	31.7	22.8	12.4	32.0	34.9	46.0	11.1	
Hori	2483.500	PK	52.1	28.5	2.2	32.2	50.6	73.9	23.3	
Hori	2493.170	PK	45.7	28.5	2.2	32.2	44.2	73.9	29.7	
Hori	4924.000	PK	41.2	31.5	4.8	31.4	46.1	73.9	27.8	
Hori	7386.000	PK	42.4	35.8	5.6	32.5	51.3	73.9	22.6	
Hori	9848.000	PK	42.7	38.5	6.9	33.3	54.8	73.9	19.1	
Hori	24620.000	PK	47.1	38.6	-0.8	31.6	53.3	73.9	20.6	
Hori	2483.500	AV	33.8	28.5	2.2	32.2	32.3	53.9	21.6	
Hori	2493.170	AV	32.8	28.5	2.2	32.2	31.3	53.9	22.6	
Hori	4924.000	AV	29.1	31.5	4.8	31.4	34.0	53.9	19.9	
Hori	7386.000	AV	30.8	35.8	5.6	32.5	39.7	53.9	14.2	
Hori	9848.000	AV	29.5	38.5	6.9	33.3	41.6	53.9	12.3	
Hori	24620.000	AV	33.8	38.6	-0.8	31.6	40.0	53.9	13.9	
Vert	60.211	QP	48.7	7.9	7.4	32.2	31.8	40.0	8.2	
Vert	170.959	QP	37.3	15.4	8.7	32.1	29.3	43.5	14.2	
Vert	250.011	QP	38.2	17.2	9.3	32.1	32.6	46.0	13.4	
Vert	448.620	QP	34.7	18.5	10.7	32.1	31.8	46.0	14.2	
Vert	500.019	QP	35.6	19.2	11.0	32.1	33.7	46.0	12.3	
Vert	750.014	QP	27.8	22.8	12.4	32.0	31.0	46.0	15.0	
Vert	2483.500	PK	50.1	28.5	2.2	32.2	48.6	73.9	25.3	
Vert	2493.170	PK	49.0	28.5	2.2	32.2	47.5	73.9	26.4	
Vert	4924.000	PK	43.0	31.5	4.8	31.4	47.9	73.9	26.0	
Vert	7386.000	PK	42.6	35.8	5.6	32.5	51.5	73.9	22.4	
Vert	9848.000	PK	43.0	38.5	6.9	33.3	55.1	73.9	18.8	
Vert	24620.000	PK	46.7	38.6	-0.8	31.6	52.9	73.9	21.0	
Vert	2483.500	AV	33.3	28.5	2.2	32.2	31.8	53.9	22.1	
Vert	2493.170	AV	32.8	28.5	2.2	32.2	31.3	53.9	22.6	
Vert	4924.000	AV	33.3	31.5	4.8	31.4	38.2	53.9	15.7	
Vert	7386.000	AV	30.6	35.8	5.6	32.5	39.5	53.9	14.4	
Vert	9848.000	AV	29.5	38.5	6.9	33.3	41.6	53.9	12.3	
Vert	24620.000	AV	34.2	38.6	-0.8	31.6	40.4	53.9	13.5	

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

Radiated Spurious Emission
30dBc Data Sheet

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. : 32BE0096-HO-01
 Date : 10/04/2011
 Temperature/ Humidity : 21 deg.C / 55% RH
 Engineer : Hisayoshi Sato
 (1-10GHz)
 Mode : 11g Tx 2412MHz

30dBc 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	98.2	28.2	2.2	32.2	96.4	-	-	Carrier
Hori	2399.500	PK	61.1	28.1	2.2	32.2	59.2	66.4	7.2	
Hori	2400.000	PK	59.4	28.1	2.2	32.2	57.5	66.4	8.9	
Vert	2412.000	PK	92.9	28.2	2.2	32.2	91.1	-	-	Carrier
Vert	2399.500	PK	56.1	28.1	2.2	32.2	54.2	61.1	6.9	
Vert	2400.000	PK	54.8	28.1	2.2	32.2	52.9	61.1	8.2	

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

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/04/2011 10/05/2011 10/07/2011
Temperature/ Humidity : 21 deg.C / 55% RH 21 deg.C / 55% RH 25 deg.C / 51% RH
Engineer : Hisayoshi Sato Tomotaka Sasagawa Takumi Shimada
Mode : (1-10GHz) (10-26.5GHz) (30-1000MHz)
 11g 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	65.051	QP	44.0	7.2	7.5	32.2	26.5	40.0	13.5	
Hori	170.953	QP	34.1	15.4	8.7	32.1	26.1	43.5	17.4	
Hori	250.012	QP	36.5	17.2	9.3	32.1	30.9	46.0	15.1	
Hori	448.620	QP	32.3	18.5	10.7	32.1	29.4	46.0	16.6	
Hori	500.018	QP	34.9	19.2	11.0	32.1	33.0	46.0	13.0	
Hori	750.011	QP	31.5	22.8	12.4	32.0	34.7	46.0	11.3	
Hori	2483.500	PK	65.9	28.5	2.2	32.2	64.4	73.9	9.5	
Hori	2483.580	PK	65.9	28.5	2.2	32.2	64.4	73.9	9.5	
Hori	4924.000	PK	40.9	31.5	4.8	31.4	45.8	73.9	28.1	
Hori	7386.000	PK	43.8	35.8	5.6	32.5	52.7	73.9	21.2	
Hori	9848.000	PK	43.5	38.5	6.9	33.3	55.6	73.9	18.3	
Hori	24620.000	PK	46.9	38.6	-0.8	31.6	53.1	73.9	20.8	
Hori	2483.500	AV	43.8	28.5	2.2	32.2	42.3	53.9	11.6	
Hori	2483.580	AV	43.4	28.5	2.2	32.2	41.9	53.9	12.0	
Hori	4924.000	AV	28.6	31.5	4.8	31.4	33.5	53.9	20.4	
Hori	7386.000	AV	30.4	35.8	5.6	32.5	39.3	53.9	14.6	
Hori	9848.000	AV	30.0	38.5	6.9	33.3	42.1	53.9	11.8	
Hori	24620.000	AV	34.0	38.6	-0.8	31.6	40.2	53.9	13.7	
Vert	60.206	QP	48.5	7.9	7.4	32.2	31.6	40.0	8.4	
Vert	170.962	QP	37.3	15.4	8.7	32.1	29.3	43.5	14.2	
Vert	250.012	QP	38.8	17.2	9.3	32.1	33.2	46.0	12.8	
Vert	448.617	QP	35.8	18.5	10.7	32.1	32.9	46.0	13.1	
Vert	500.020	QP	35.0	19.2	11.0	32.1	33.1	46.0	12.9	
Vert	750.011	QP	29.1	22.8	12.4	32.0	32.3	46.0	13.7	
Vert	2483.500	PK	60.5	28.5	2.2	32.2	59.0	73.9	14.9	
Vert	2483.580	PK	60.3	28.5	2.2	32.2	58.8	73.9	15.1	
Vert	4924.000	PK	43.1	31.5	4.8	31.4	48.0	73.9	25.9	
Vert	7386.000	PK	44.4	35.8	5.6	32.5	53.3	73.9	20.6	
Vert	9848.000	PK	44.1	38.5	6.9	33.3	56.2	73.9	17.7	
Vert	24620.000	PK	47.1	38.6	-0.8	31.6	53.3	73.9	20.6	
Vert	2483.500	AV	38.9	28.5	2.2	32.2	37.4	53.9	16.5	
Vert	2483.580	AV	38.7	28.5	2.2	32.2	37.2	53.9	16.7	
Vert	4924.000	AV	32.4	31.5	4.8	31.4	37.3	53.9	16.6	
Vert	7386.000	AV	31.0	35.8	5.6	32.5	39.9	53.9	14.0	
Vert	9848.000	AV	29.9	38.5	6.9	33.3	42.0	53.9	11.9	
Vert	24620.000	AV	33.8	38.6	-0.8	31.6	40.0	53.9	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).

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

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32BE0096-HO-01
Date : 10/04/2011 10/05/2011 10/07/2011
Temperature/ Humidity : 21 deg.C / 55% RH 21 deg.C / 55% RH 25 deg.C / 51% RH
Engineer : Hisayoshi Sato Tomotaka Sasagawa Takumi Shimada
Mode : (1-10GHz) (10-26.5GHz) (30-1000MHz)
 1In 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	65.056	QP	44.1	7.2	7.5	32.2	26.6	40.0	13.4	
Hori	170.959	QP	34.8	15.4	8.7	32.1	26.8	43.5	16.7	
Hori	250.012	QP	36.7	17.2	9.3	32.1	31.1	46.0	14.9	
Hori	448.620	QP	32.2	18.5	10.7	32.1	29.3	46.0	16.7	
Hori	500.021	QP	34.1	19.2	11.0	32.1	32.2	46.0	13.8	
Hori	750.012	QP	31.3	22.8	12.4	32.0	34.5	46.0	11.5	
Hori	2390.000	PK	73.2	28.1	2.2	32.2	71.3	73.9	2.6	
Hori	2399.500	PK	77.1	28.1	2.2	32.2	75.2	-	-	See 30dBc Data Sheet
Hori	2400.000	PK	78.4	28.1	2.2	32.2	76.5	-	-	See 30dBc Data Sheet
Hori	4824.000	PK	41.6	31.2	4.8	31.4	46.2	73.9	27.7	
Hori	7236.000	PK	42.8	35.6	5.6	32.4	51.6	73.9	22.3	
Hori	9648.000	PK	42.8	38.3	6.7	33.2	54.6	73.9	19.3	
Hori	24120.000	PK	47.0	38.7	-0.8	31.6	53.3	73.9	20.6	
Hori	2390.000	AV	46.3	28.1	2.2	32.2	44.4	53.9	9.5	
Hori	2399.500	AV	56.2	28.1	2.2	32.2	54.3	-	-	See 30dBc Data Sheet
Hori	2400.000	AV	56.6	28.1	2.2	32.2	54.7	-	-	See 30dBc Data Sheet
Hori	4824.000	AV	29.4	31.2	4.8	31.4	34.0	53.9	19.9	
Hori	7236.000	AV	30.2	35.6	5.6	32.4	39.0	53.9	14.9	
Hori	9648.000	AV	29.6	38.3	6.7	33.2	41.4	53.9	12.5	
Hori	24120.000	AV	34.1	38.7	-0.8	31.6	40.4	53.9	13.5	
Vert	60.203	QP	48.2	7.9	7.4	32.2	31.3	40.0	8.7	
Vert	170.961	QP	37.5	15.4	8.7	32.1	29.5	43.5	14.0	
Vert	250.013	QP	38.2	17.2	9.3	32.1	32.6	46.0	13.4	
Vert	448.619	QP	35.3	18.5	10.7	32.1	32.4	46.0	13.6	
Vert	500.019	QP	34.9	19.2	11.0	32.1	33.0	46.0	13.0	
Vert	750.013	QP	28.8	22.8	12.4	32.0	32.0	46.0	14.0	
Vert	2390.000	PK	62.4	28.1	2.2	32.2	60.5	73.9	13.4	
Vert	2399.500	PK	67.8	28.1	2.2	32.2	65.9	-	-	See 30dBc Data Sheet
Vert	2400.000	PK	69.8	28.1	2.2	32.2	67.9	-	-	See 30dBc Data Sheet
Vert	4824.000	PK	42.8	31.2	4.8	31.4	47.4	73.9	26.5	
Vert	7236.000	PK	42.8	35.6	5.6	32.4	51.6	73.9	22.3	
Vert	9648.000	PK	43.0	38.3	6.7	33.2	54.8	73.9	19.1	
Vert	24120.000	PK	47.1	38.7	-0.8	31.6	53.4	73.9	20.5	
Vert	2390.000	AV	36.7	28.1	2.2	32.2	34.8	53.9	19.1	
Vert	2399.500	AV	45.8	28.1	2.2	32.2	43.9	-	-	See 30dBc Data Sheet
Vert	2400.000	AV	46.2	28.1	2.2	32.2	44.3	-	-	See 30dBc Data Sheet
Vert	4824.000	AV	33.1	31.2	4.8	31.4	37.7	53.9	16.2	
Vert	7236.000	AV	30.7	35.6	5.6	32.4	39.5	53.9	14.4	
Vert	9648.000	AV	29.8	38.3	6.7	33.2	41.6	53.9	12.3	
Vert	24120.000	AV	33.9	38.7	-0.8	31.6	40.2	53.9	13.7	

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

Radiated Spurious Emission
30dBc Data Sheet

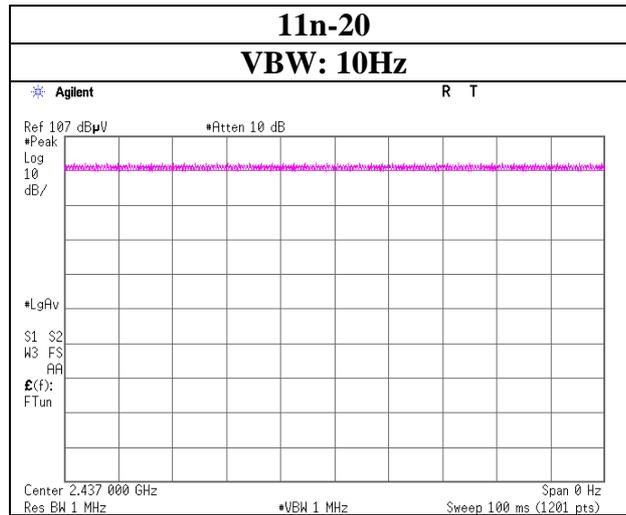
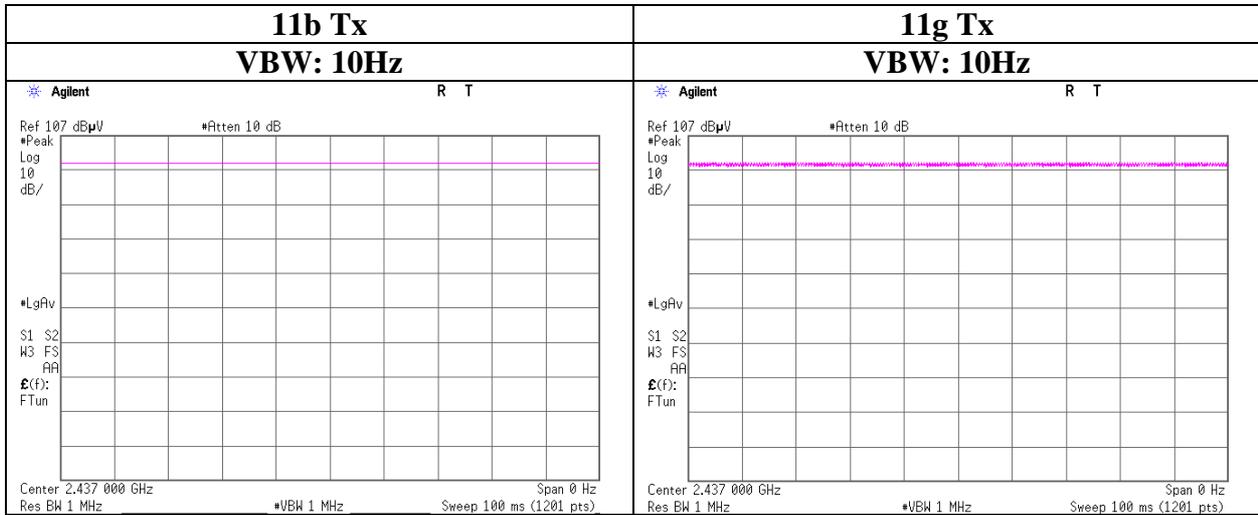
Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. : 32BE0096-HO-01
 Date : 10/04/2011
 Temperature/ Humidity : 21 deg.C / 55% RH
 Engineer : Hisayoshi Sato
 (1-10GHz)
 Mode : 1In Tx 2412MHz

30dBc 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	97.3	28.2	2.2	32.2	95.5	-	-	Carrier
Hori	2399.500	PK	63.5	28.1	2.2	32.2	61.6	65.5	3.9	
Hori	2400.000	PK	62.0	28.1	2.2	32.2	60.1	65.5	5.4	
Vert	2412.000	PK	92.0	28.2	2.2	32.2	90.2	-	-	Carrier
Vert	2399.500	PK	53.7	28.1	2.2	32.2	51.8	60.2	8.4	
Vert	2400.000	PK	51.3	28.1	2.2	32.2	49.4	60.2	10.8	

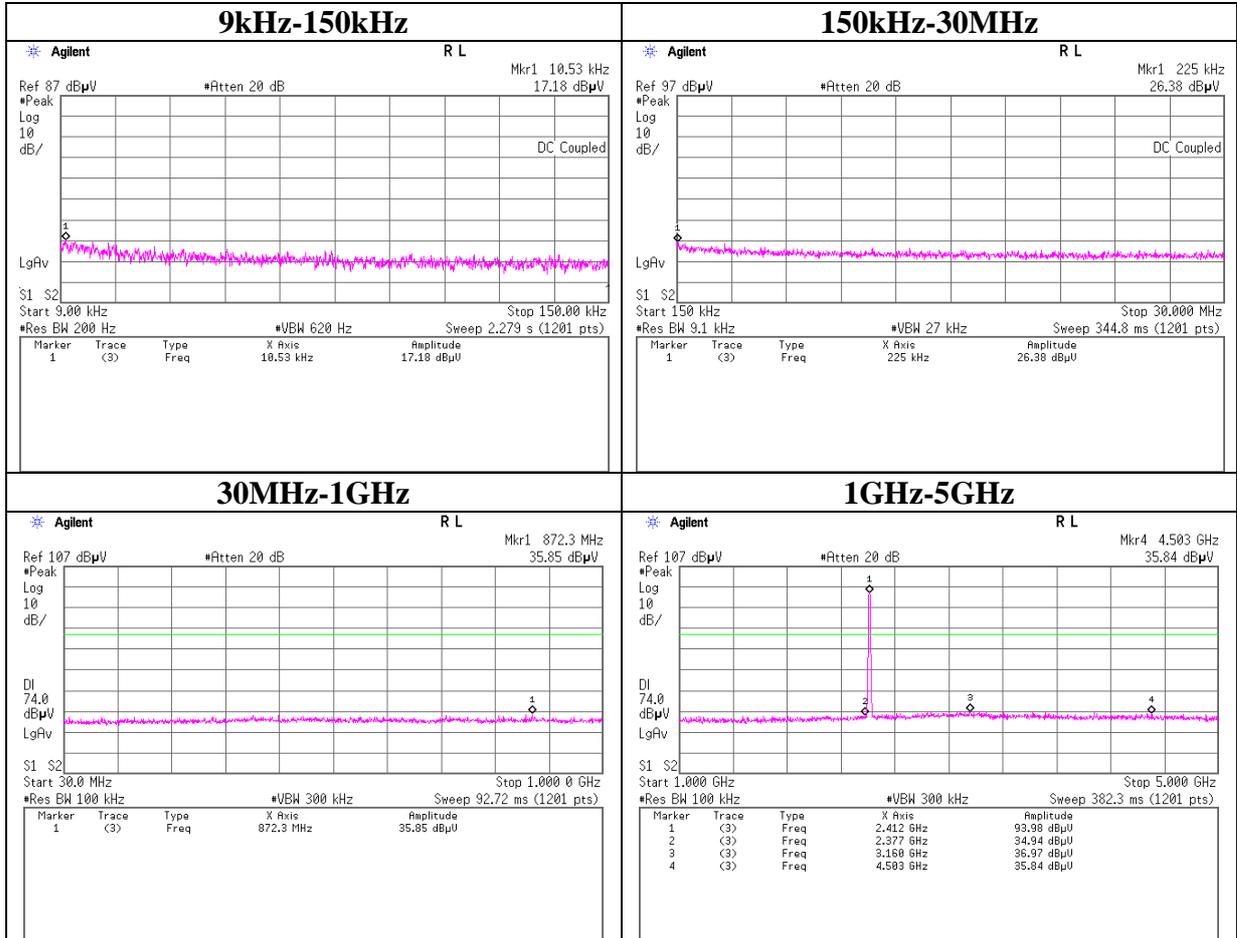
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

VBW (AV) Calculation



Conducted Spurious Emission

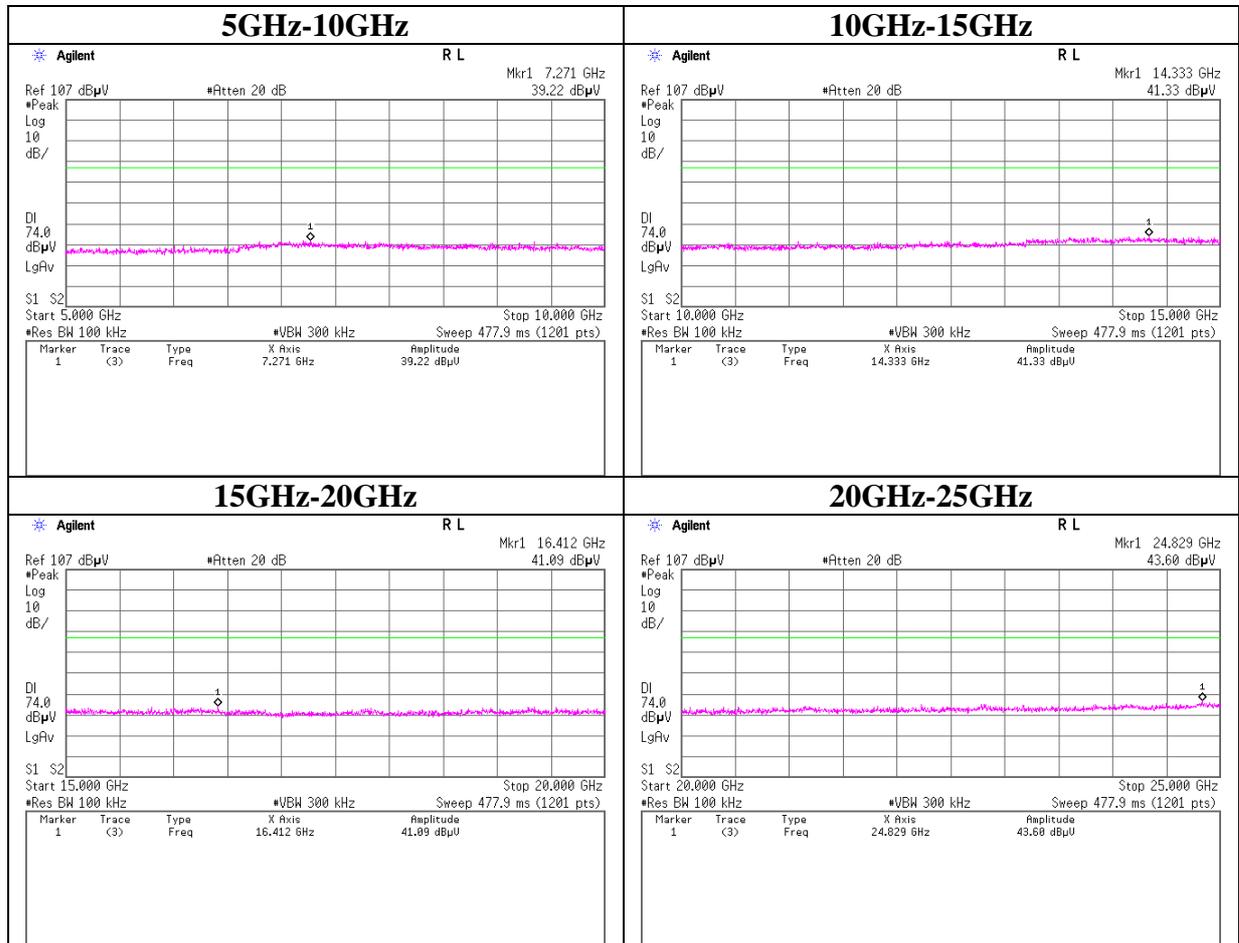
11b Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

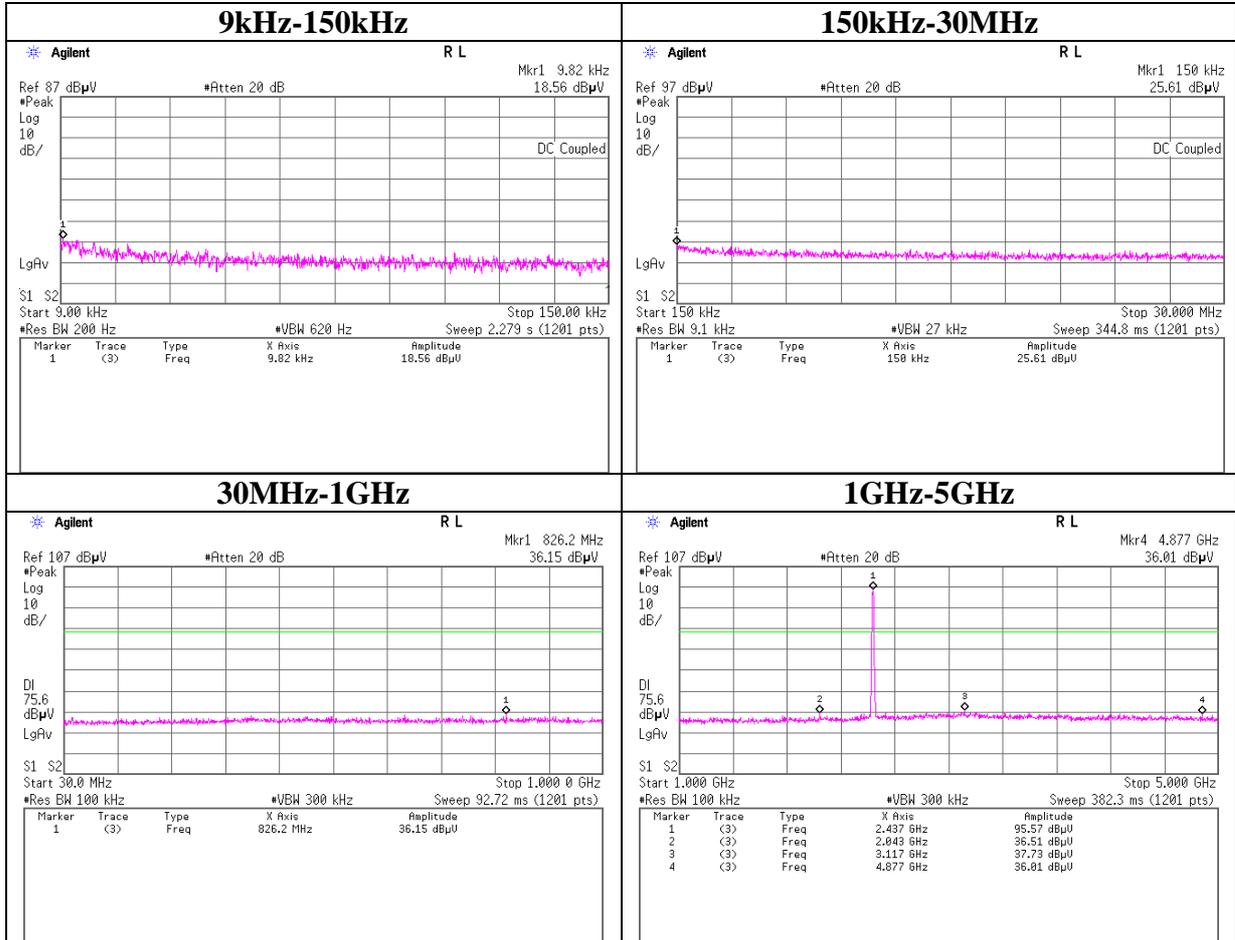
11b Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

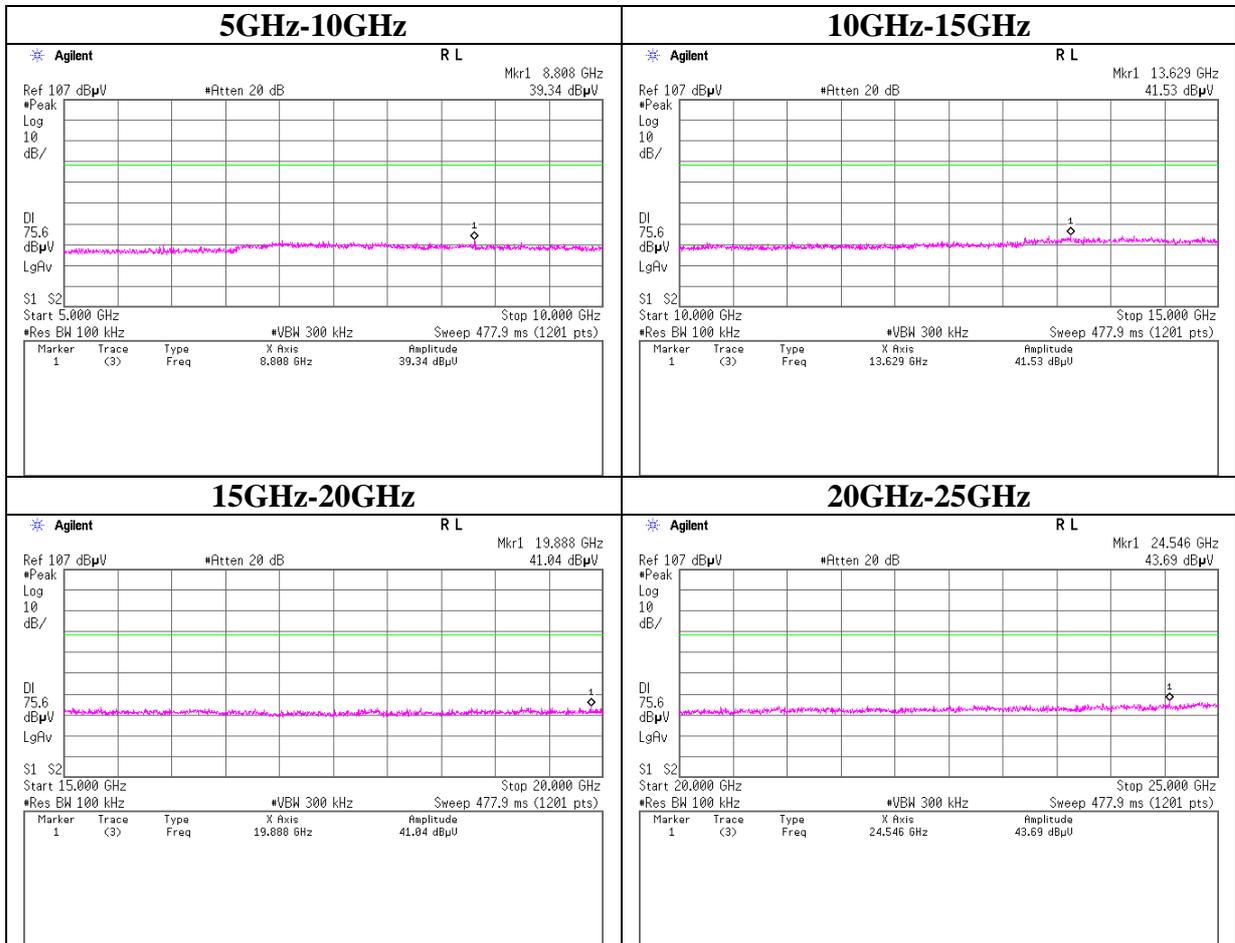
11b Tx 2437MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

11b Tx 2437MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

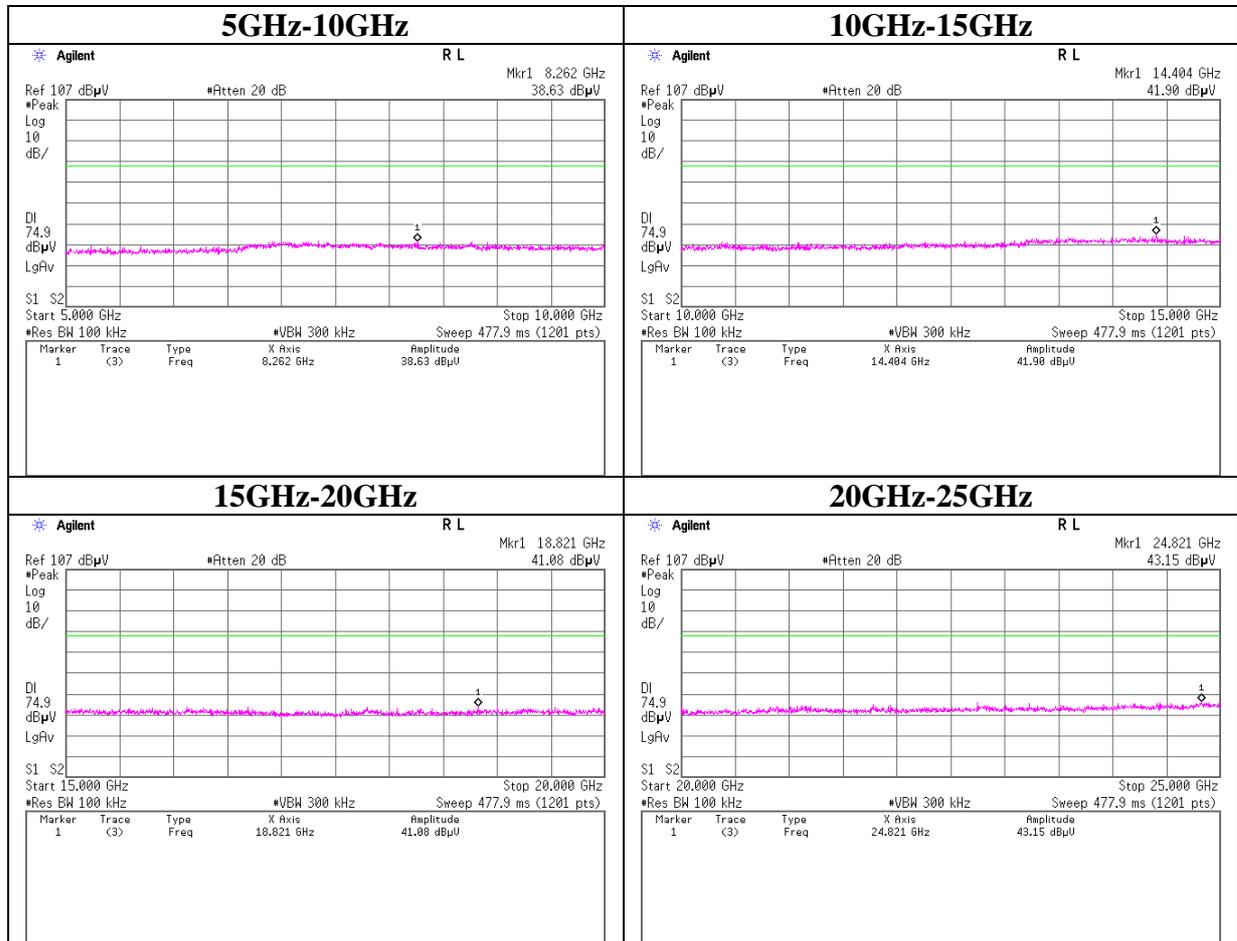
11b Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

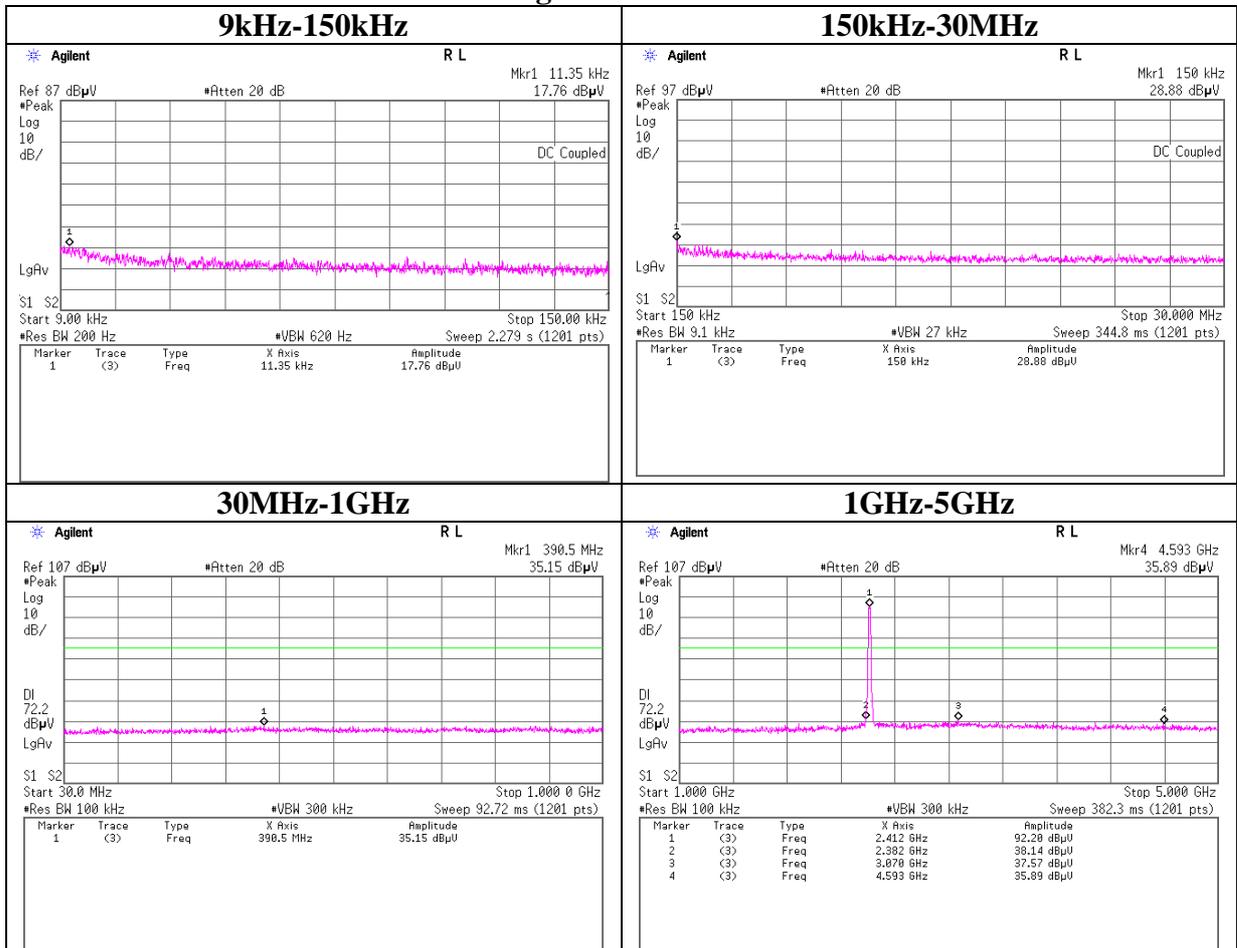
11b Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

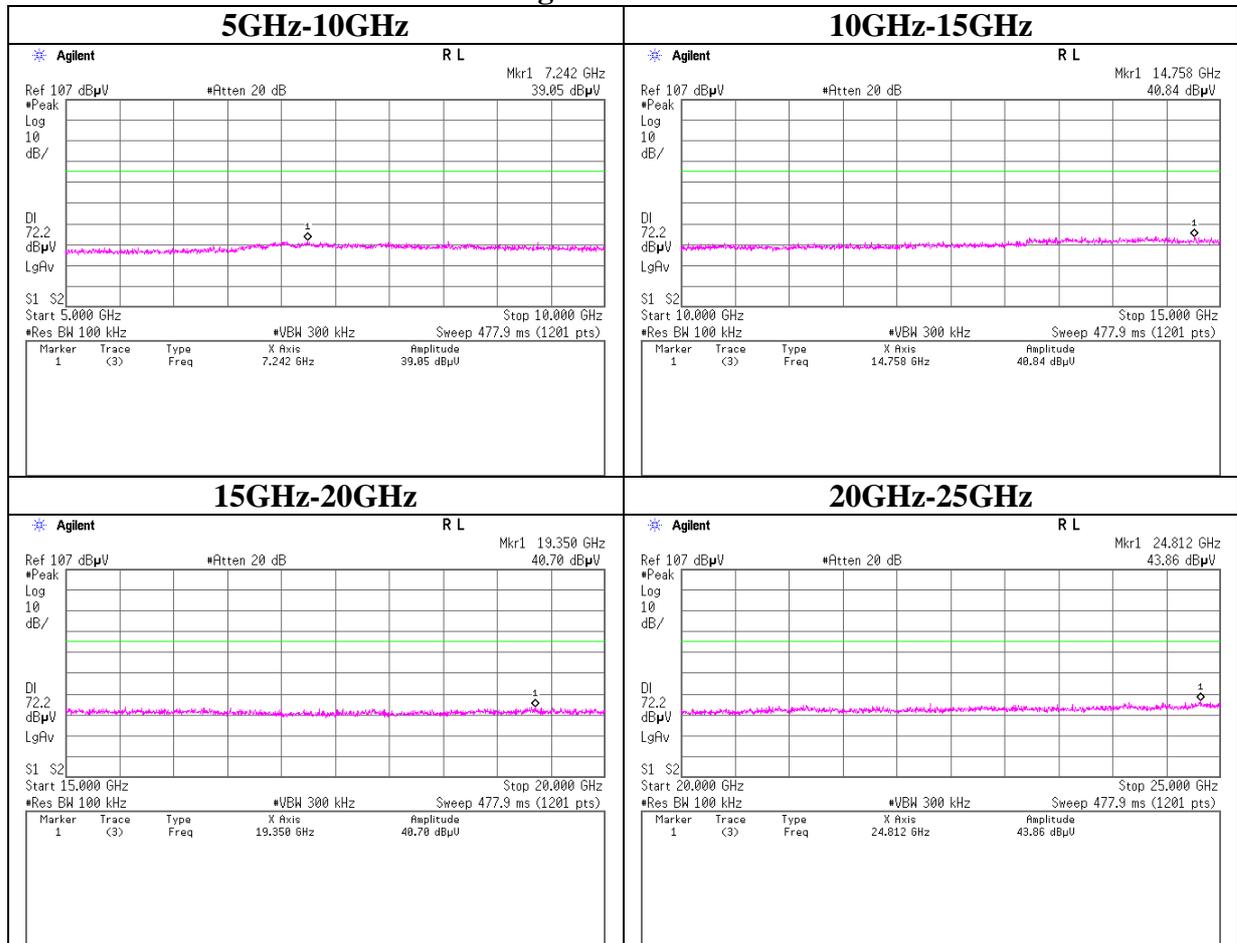
11g Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

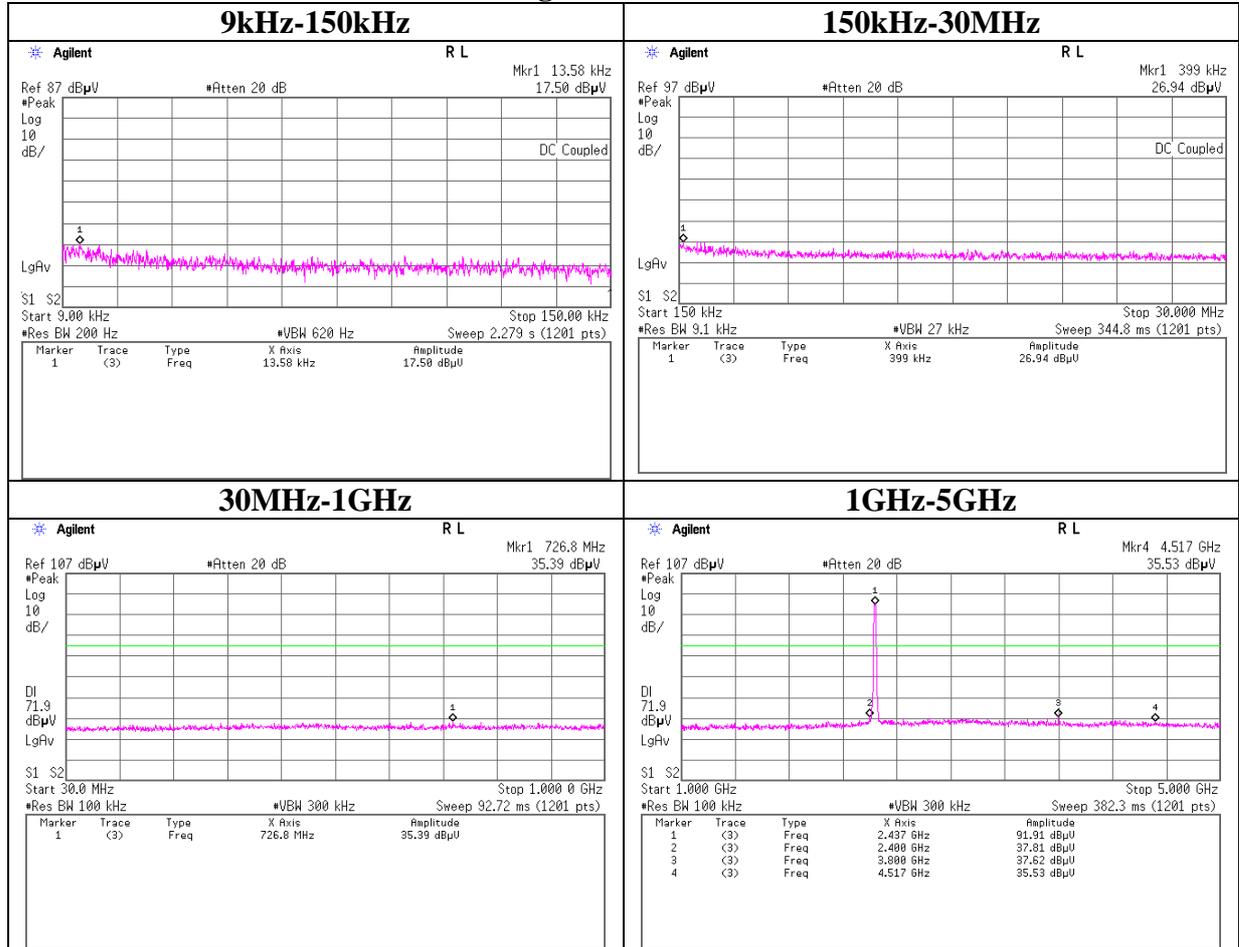
11g Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

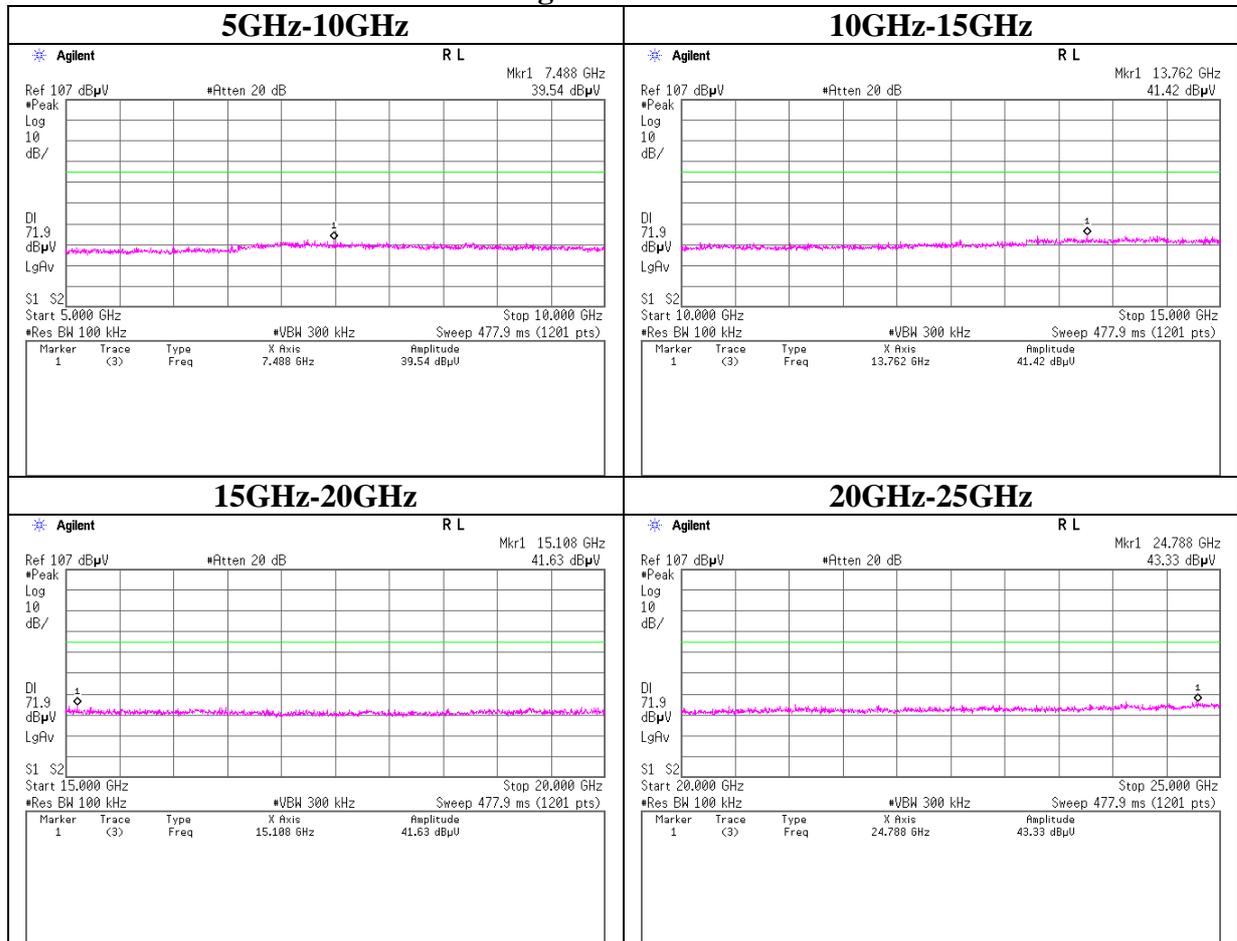
11g Tx 2437MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

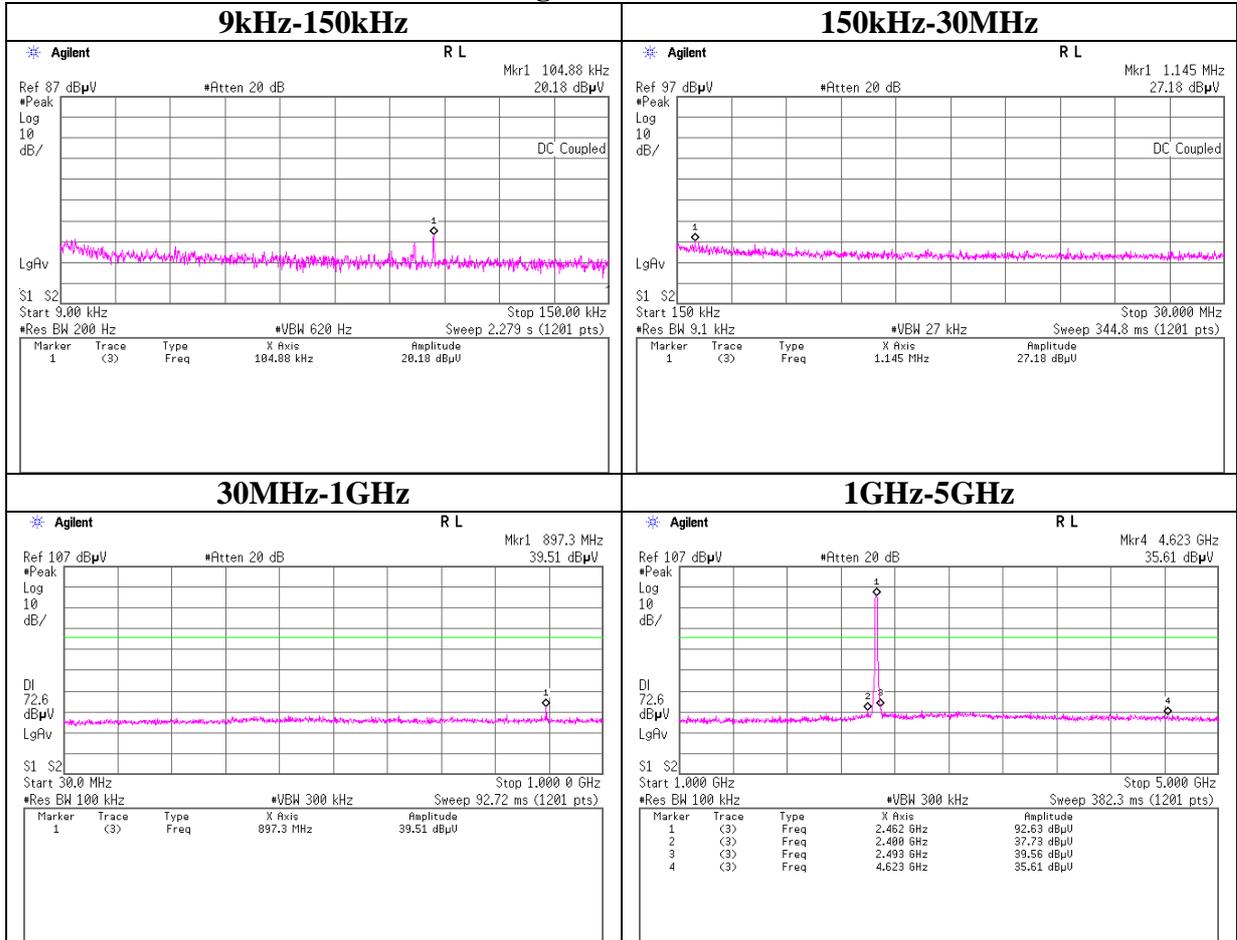
11g Tx 2437MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

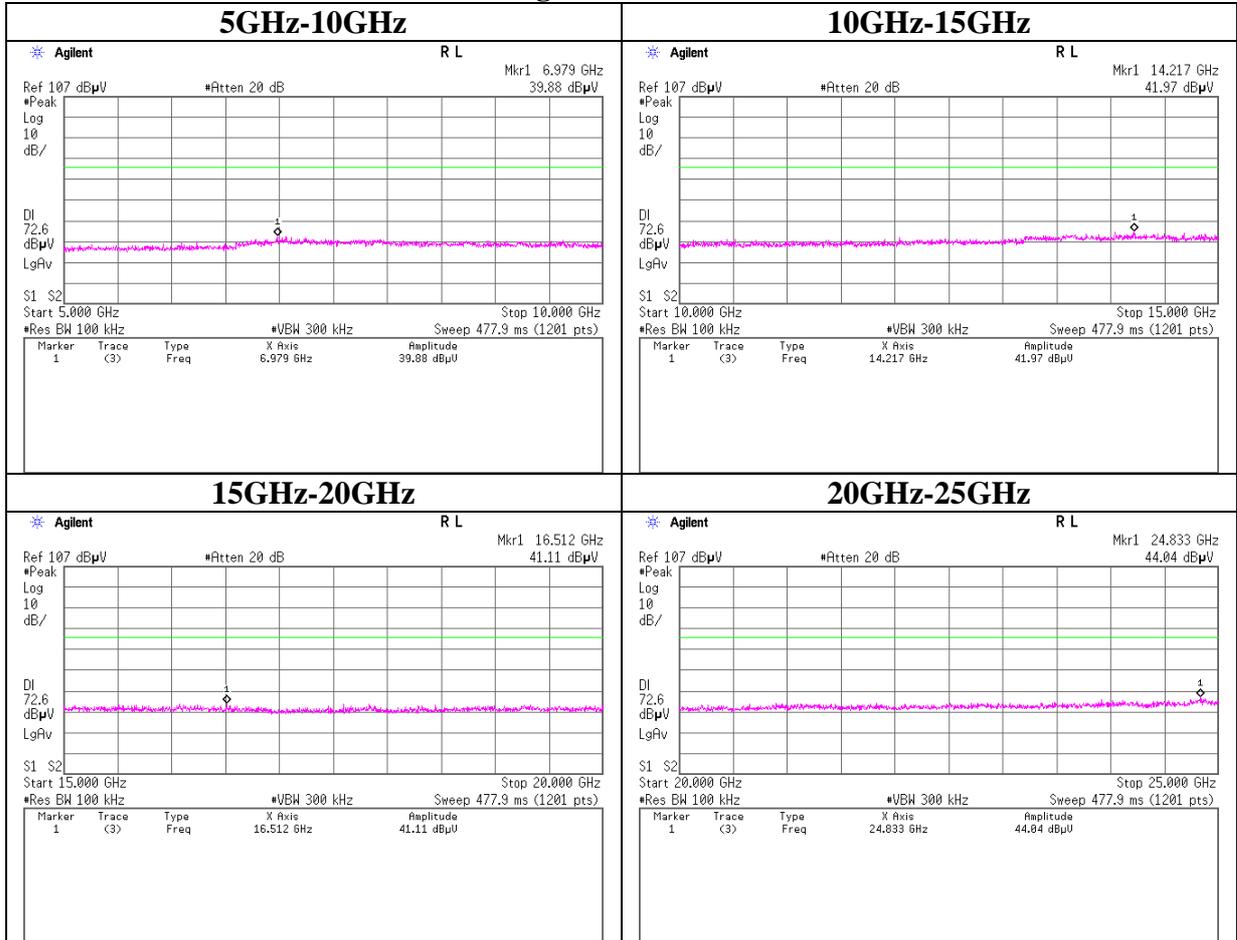
11g Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

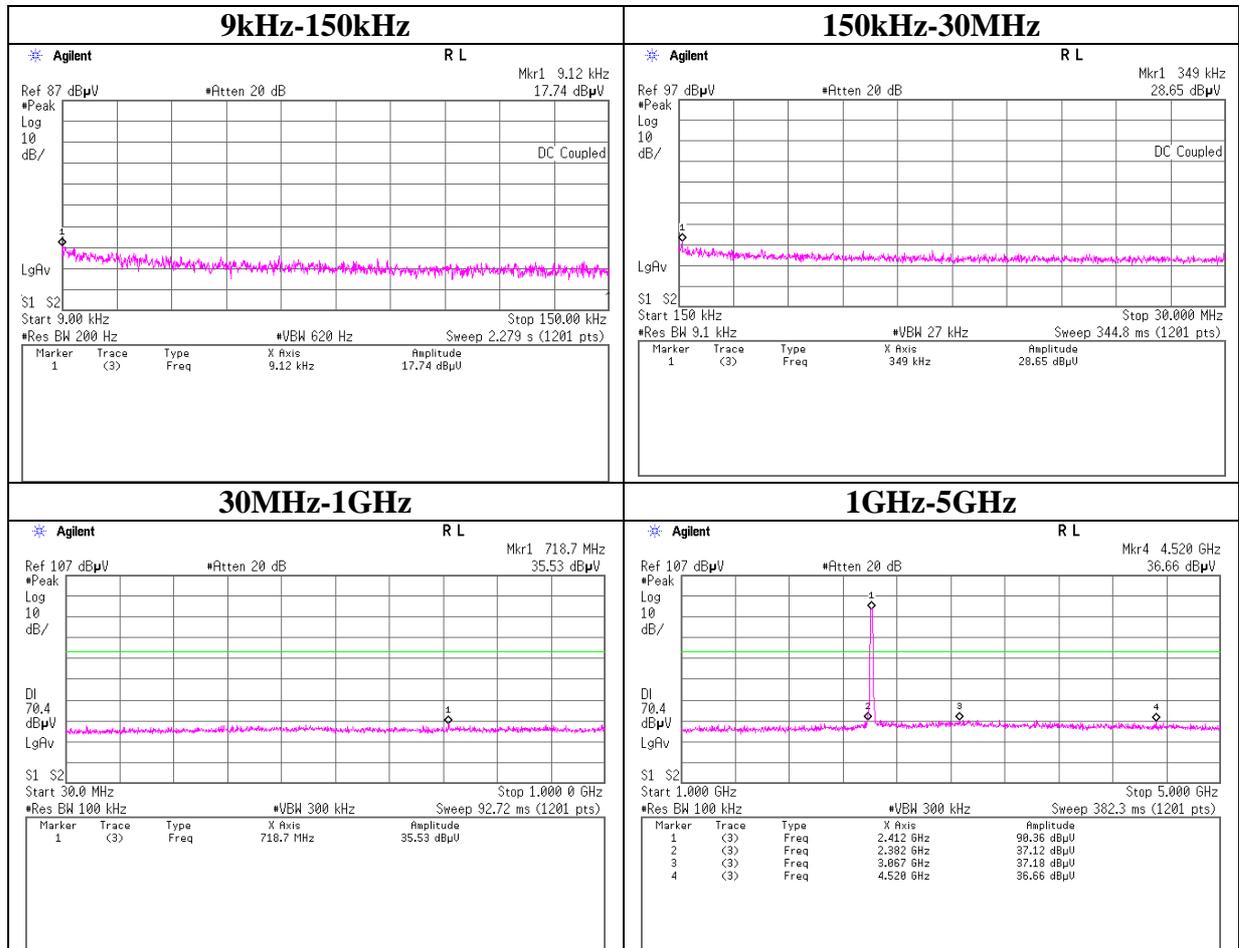
11g Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

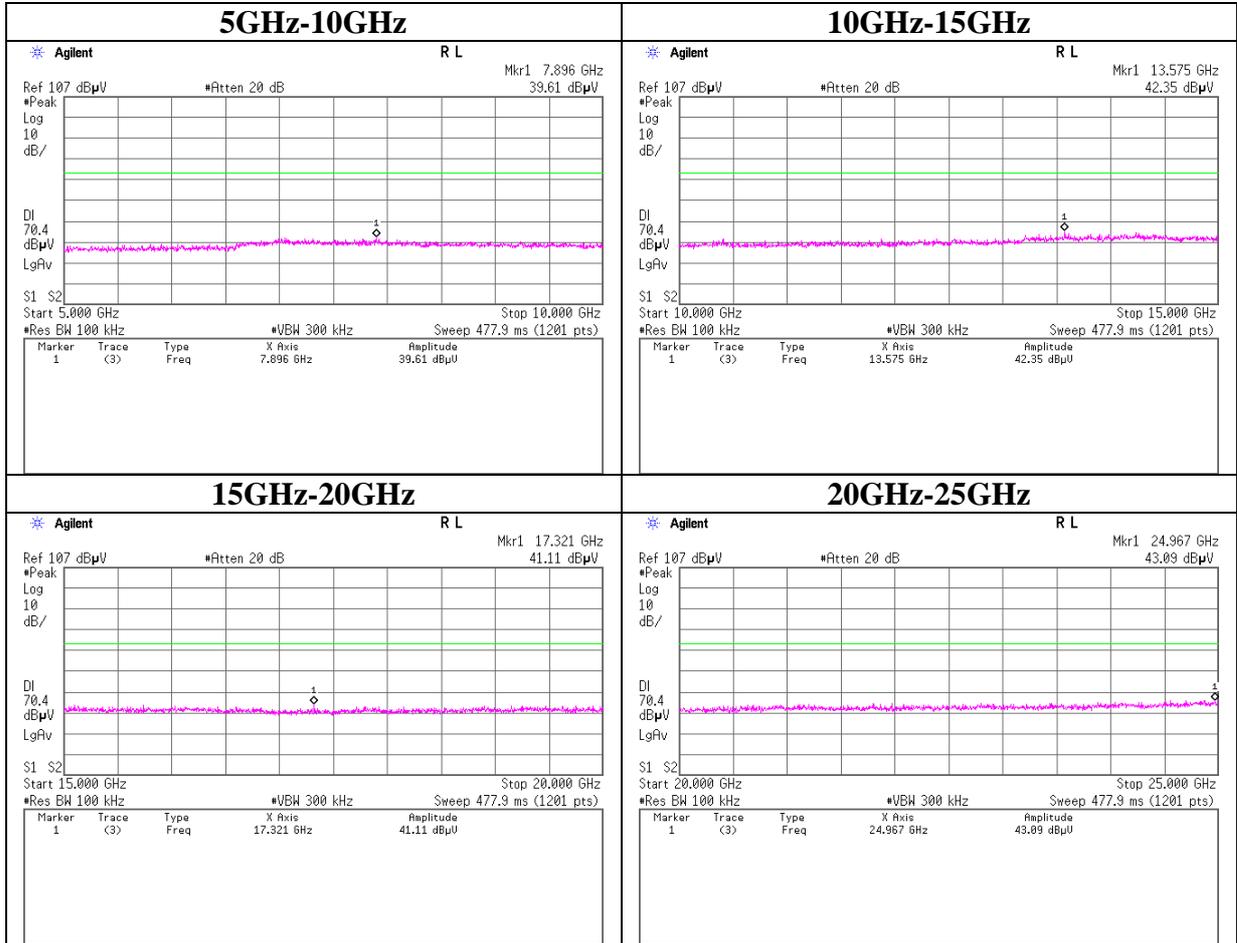
11n Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

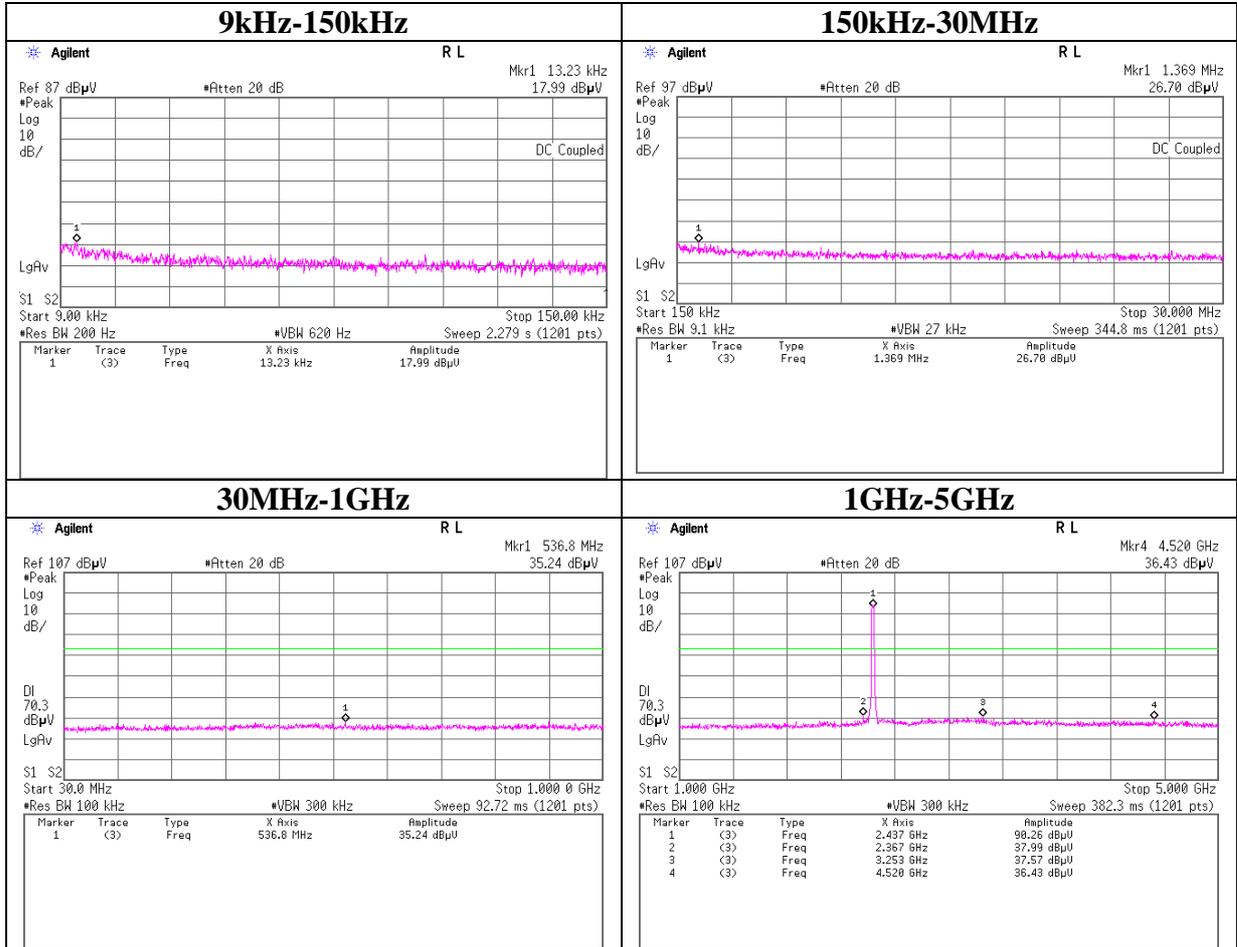
11n Tx 2412MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

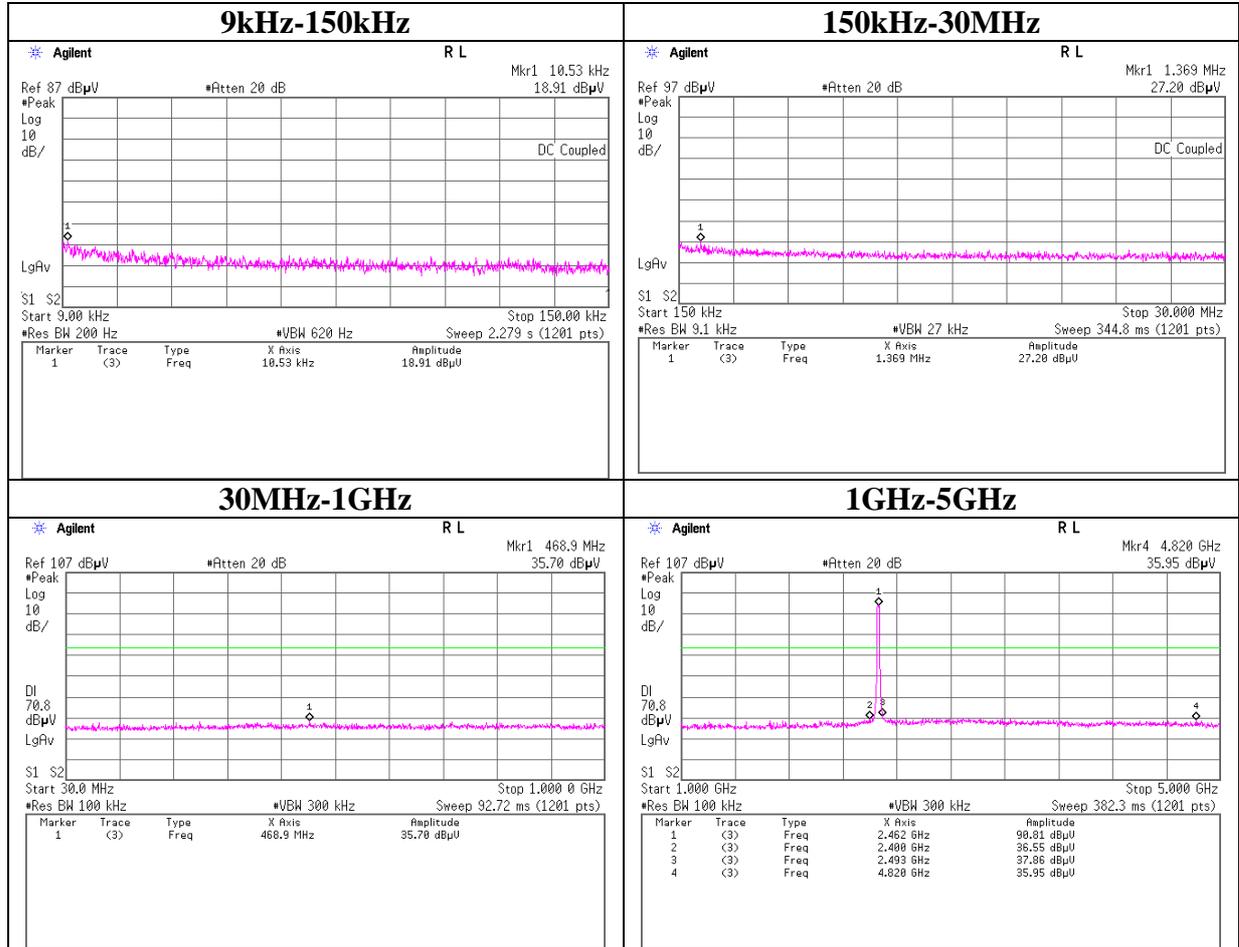
11n Tx 2437MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

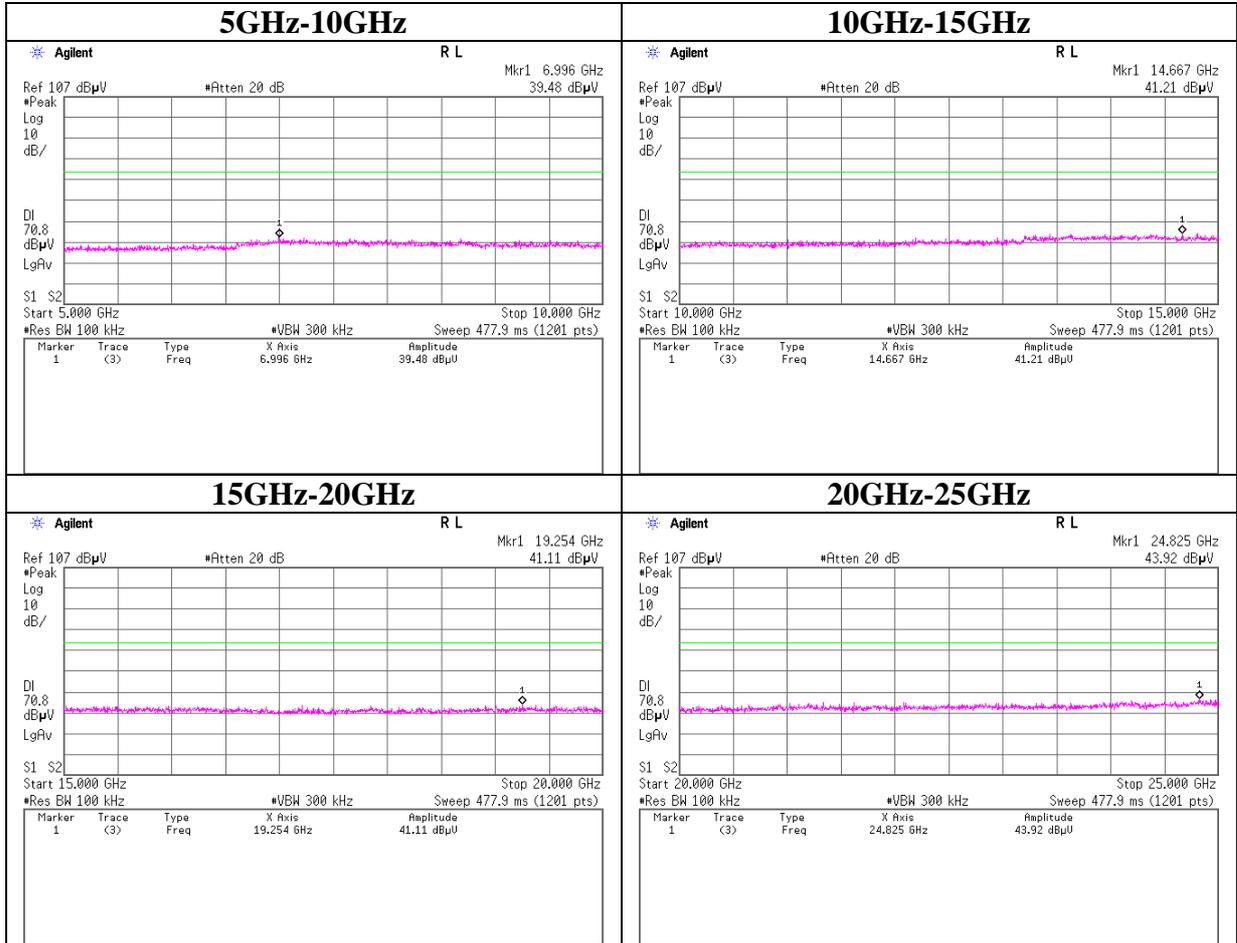
11n Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Conducted Spurious Emission

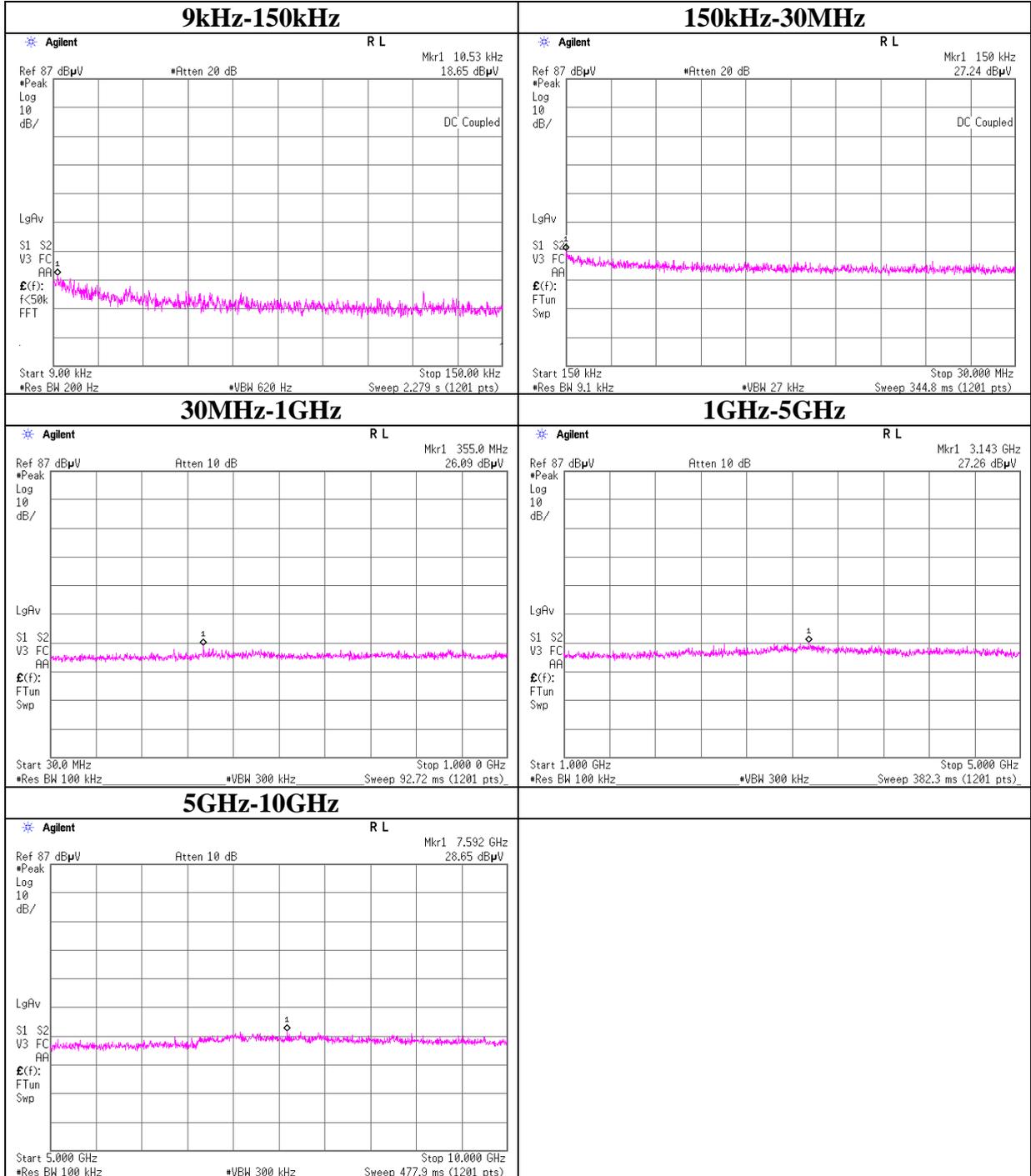
11n Tx 2462MHz



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

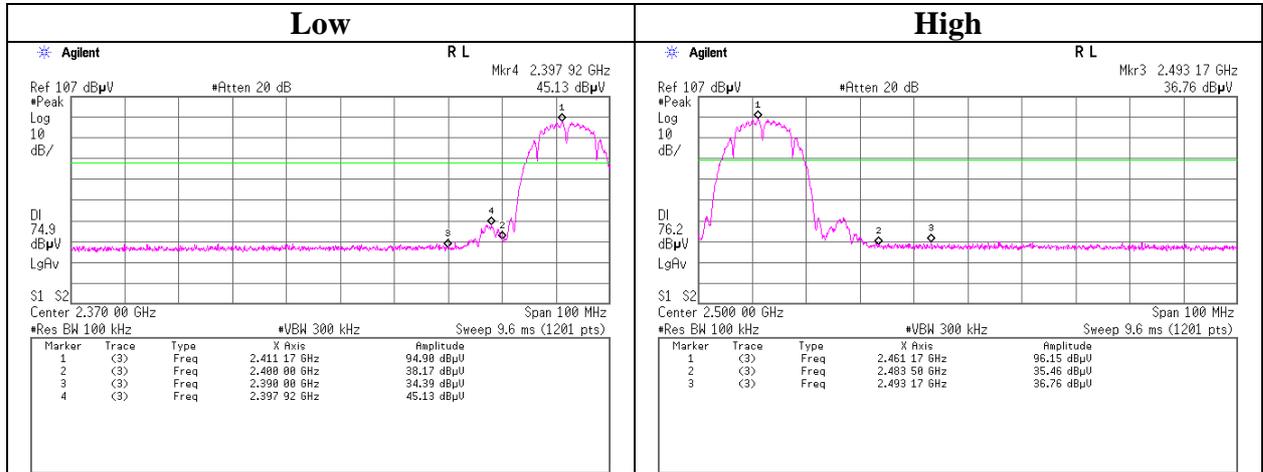
Conducted Spurious Emission
 Reference data

Rx 2437MHz

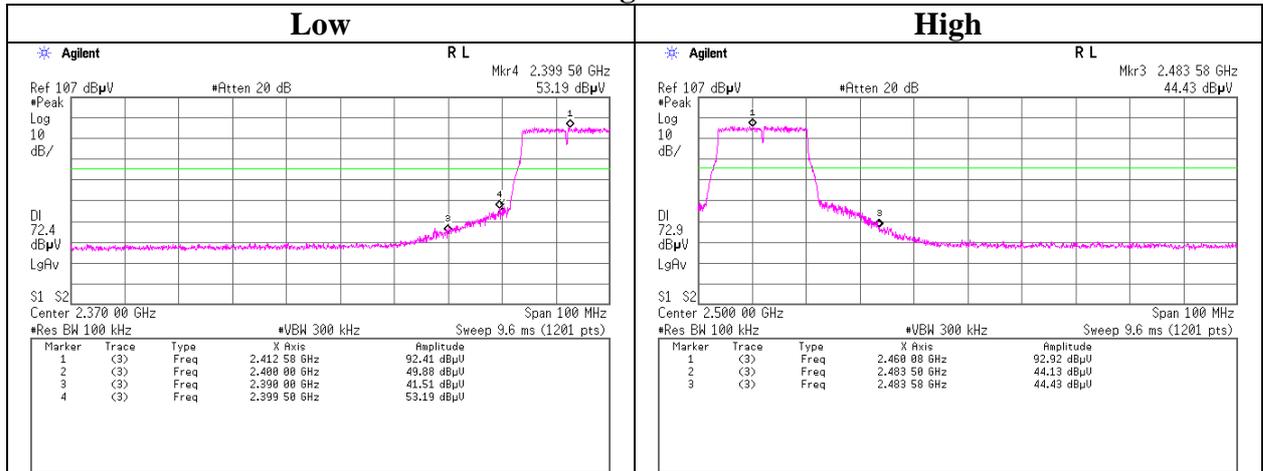


Conducted Emission Band Edge compliance

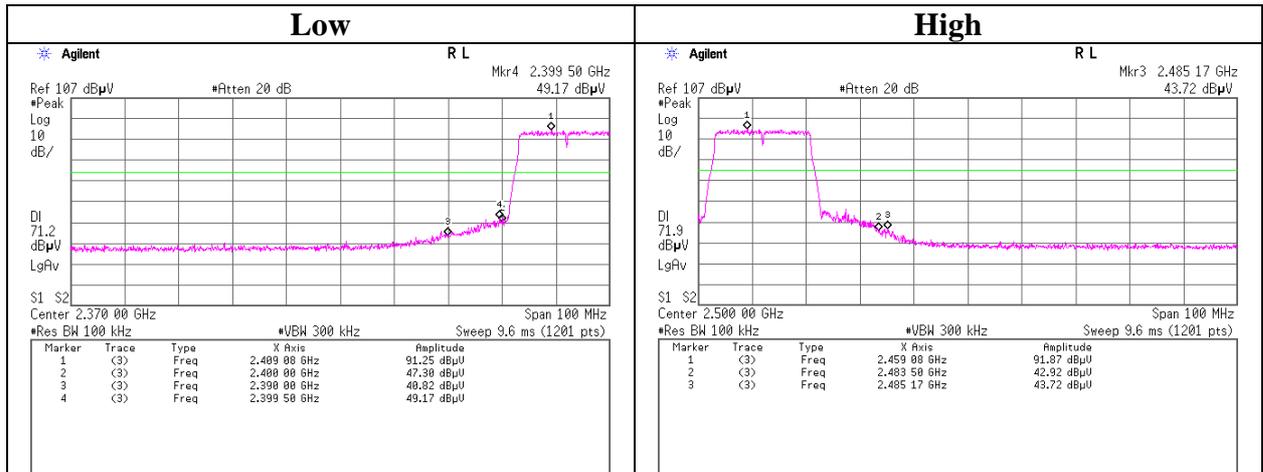
11b Tx



11g Tx



11n Tx



*Green display line was drawn at -20dBc from the carrier level, but spurious emission has enough margin to -30dBc.

Power Density

Test place Head Office EMC Lab. No.4 Measurement Room
Report No. 32BE0096-HO-01
Date 10/04/2011
Temperature/ Humidity 23 deg.C / 48%
Engineer Hisayoshi Sato
Mode 11b/11g/11n Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-17.33	1.34	9.96	-6.03	8.00	14.03
2437.00	-16.02	1.34	9.96	-4.72	8.00	12.72
2462.00	-15.94	1.34	9.96	-4.64	8.00	12.64

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-18.14	1.34	9.96	-6.84	8.00	14.84
2437.00	-17.78	1.34	9.96	-6.48	8.00	14.48
2462.00	-18.12	1.34	9.96	-6.82	8.00	14.82

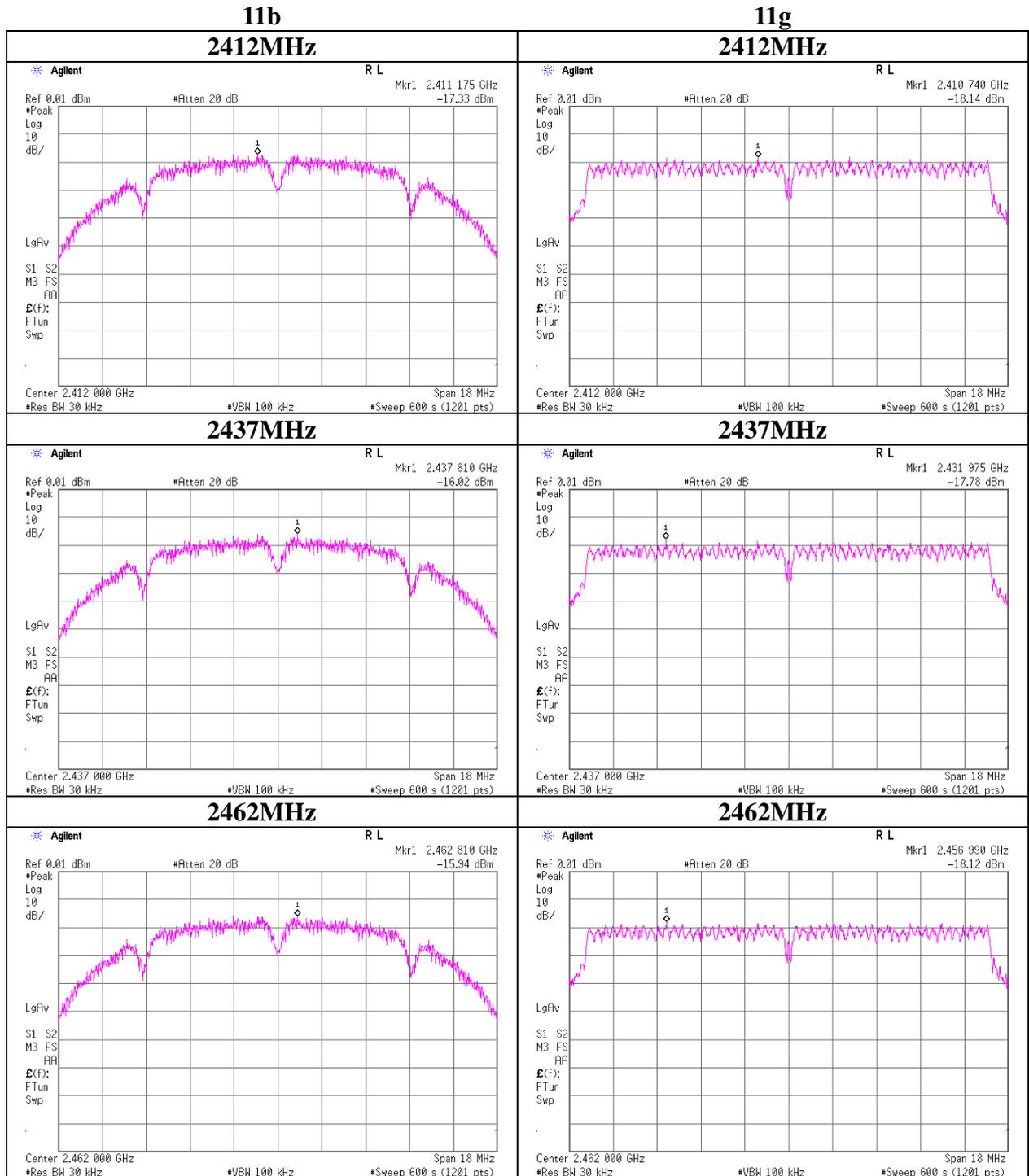
11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-18.26	1.34	9.96	-6.96	8.00	14.96
2437.00	-18.14	1.34	9.96	-6.84	8.00	14.84
2462.00	-17.73	1.34	9.96	-6.43	8.00	14.43

Sample Calculation:

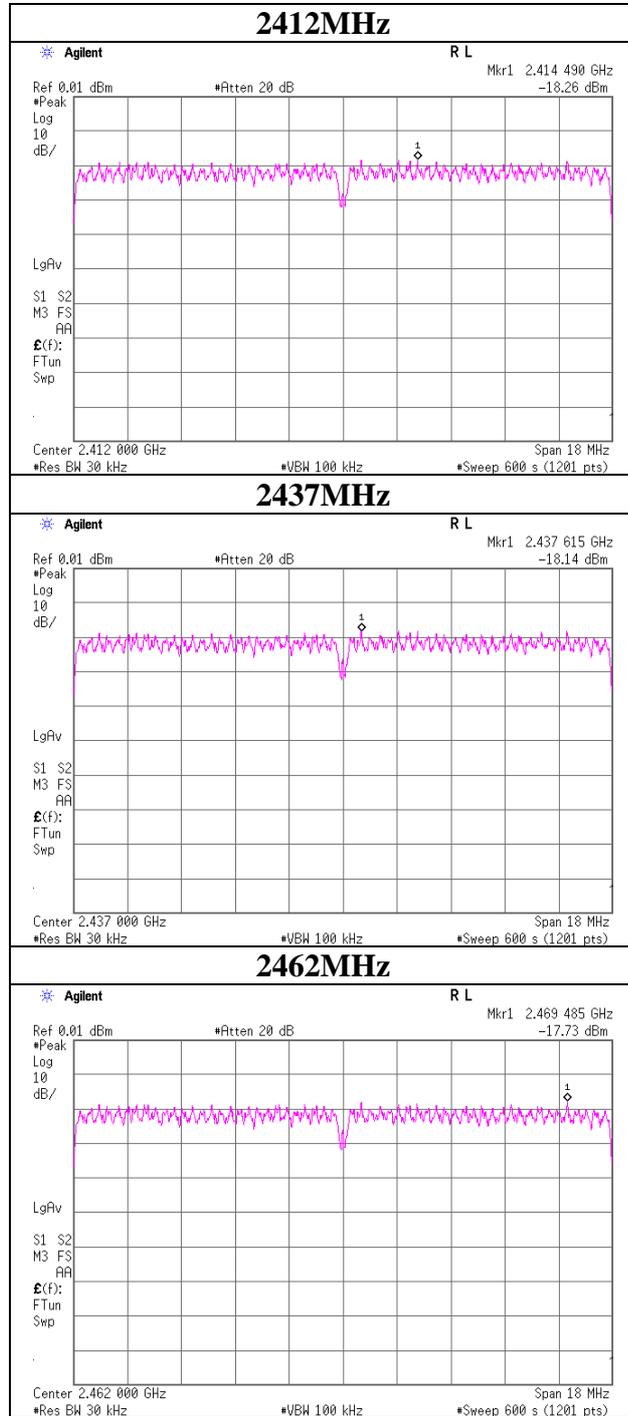
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Power Density

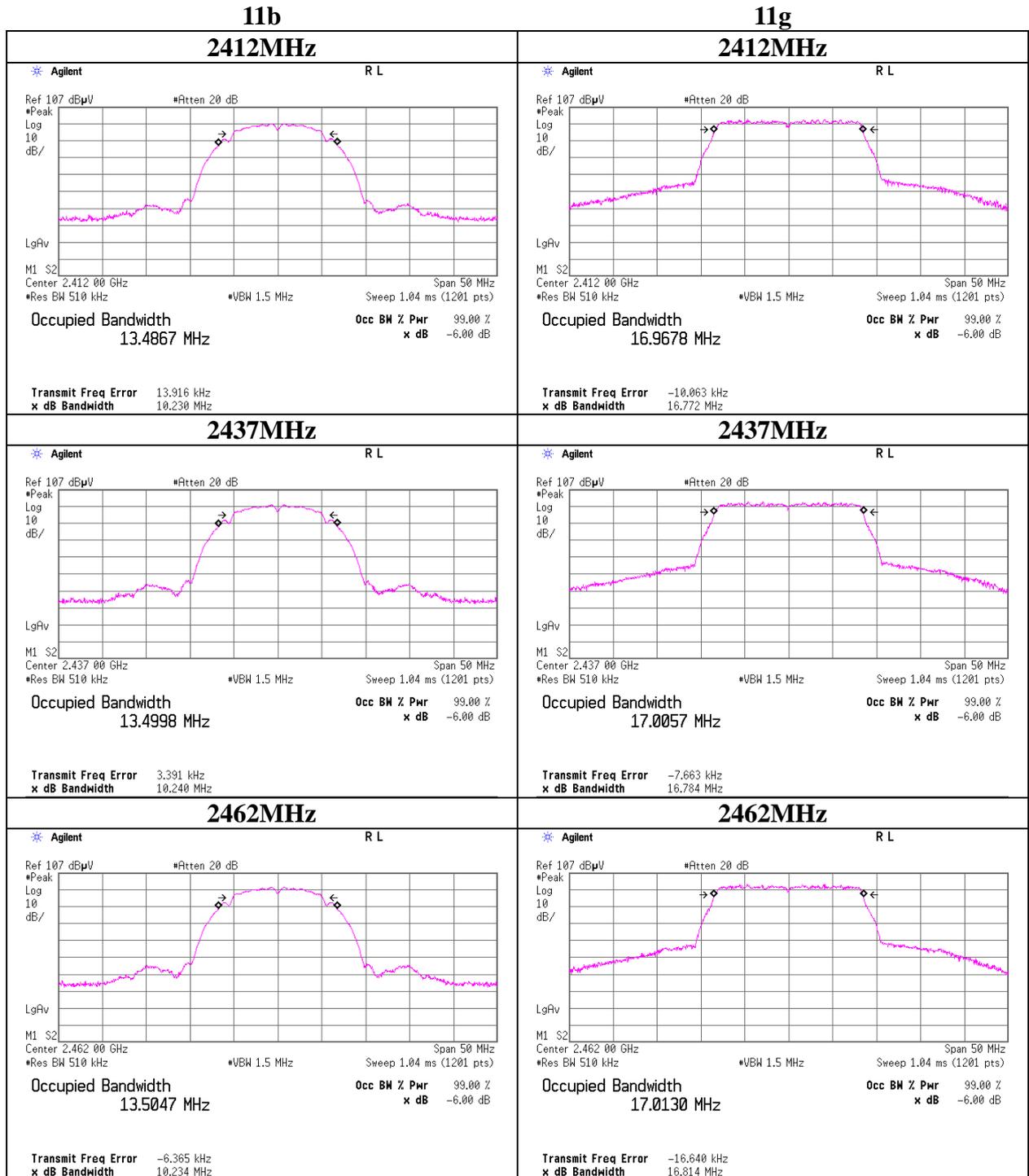


Power Density

11n-20

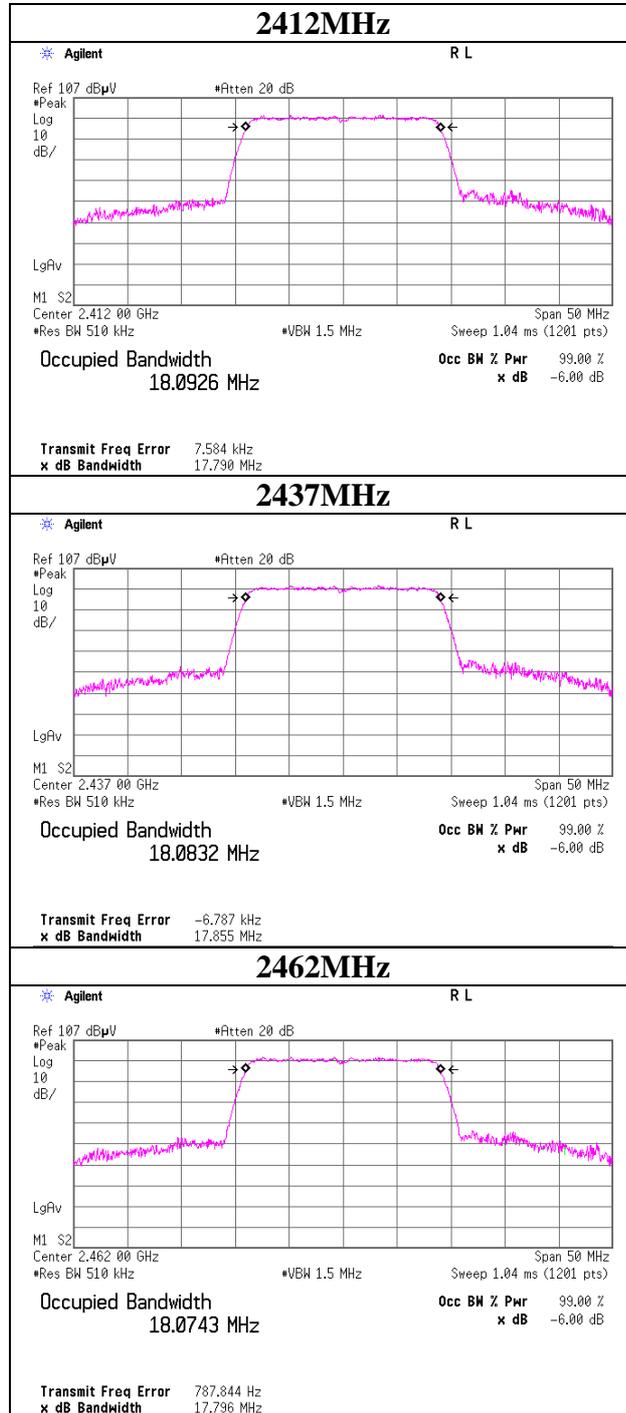


99% Occupied Bandwidth



99% Occupied Bandwidth

11n-20



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185820	AT/RE	2011/06/30 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2011/08/09 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2011/08/09 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2011/06/23 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2011/02/23 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2010/11/01 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2010/11/01 * 12
MCC-115	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	290211/4	AT	2011/08/24 * 12
MOS-23	Thermo-Hygrometer	Custom	CTH-201	0004	AT	2010/12/13 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2011/03/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2011/02/23 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2011/08/11 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2011/03/10 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2011/04/08 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2010/10/27 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/08/17 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/08/17 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2011/03/25 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2011/01/14 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2011/03/04 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2010/11/18 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2011/02/20 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2011/02/22 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2011/01/05 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121 (Switcher)	-/04178	CE	2011/07/04 * 12

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

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

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

**Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test**